Parts Manual

Service Manual

S4 V-8

Turbo 93-96

10.00	**Body Structure**
11.00	**Glazing, Door Weatherstrips, Window Lift**
12.00	**Exterior Hardware & Trim**
13.00	**Seat & Seat Belts**
14.00	**Pedal Box & Fascia**
15.00	**Interior Trim**
16.00	**Sound Insulation**
17.00	**Electrical**
18.00	**Heater/Air Conditioning**
19.00	**Labels & Literature**
30.00	**Chassis**
31.00	**Suspension**
32.00	**Steering**
33.00	**Brakes**
34.00	**Wheels & Tires**
40.00	**Engine**
41.00	**Belts & Pulleys**
42.00	**Induction System**
43.00	**Emission Equipment**
44.00	**Fuel System**
45.00	**Exhaust System**
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47.00	**Transmission**
60.00	**Tools**
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FOREWORD

This publication has been designed for use by Lotus Dealers, and may be updated periodically by the issuing of update packages to the dealer network. Lotus policy is one of continuous product improvement and the right is reserved to alter specifications at any time without prior notice.

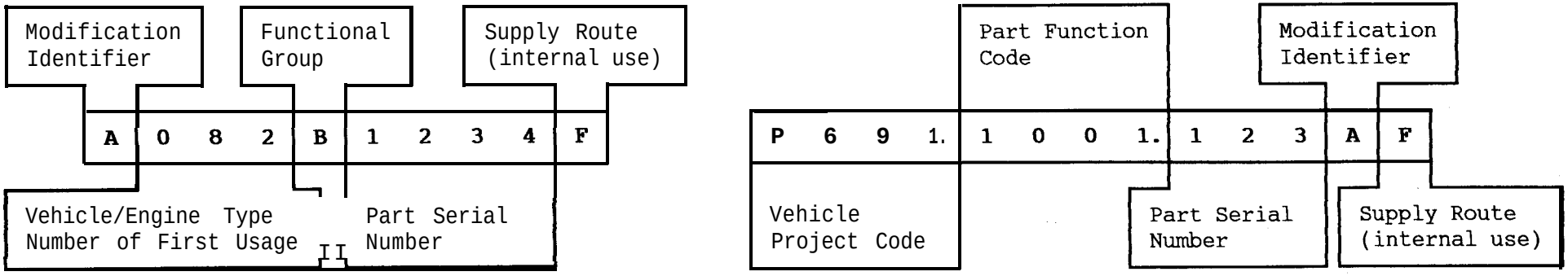
Whilst every care has been taken to ensure correctness of information, it is impossible to guarantee complete freedom from omissions and errors, or to accept liability arising from such omissions and errors, but nothing herein contained shall affect your statutory rights.

USE OF THE PARTS LIST

This parts list covers the Lotus Esprit range, 1993 model year onwards (except '93 M.Y. USA - see supplement to '88 to '92 M.Y. Parts List). The model history for this period is detailed later in the introductory section. The manual is arranged in function groups, as defined by the Contents page, and may sometimes use several versions of the same function group to accommodate model variations - take care to establish the full vehicle specification in order to properly identify the applicable parts list section.

PART NUMBERS

Part numbers used in this publication may be in one of two formats, and are coded as follows:



Modification Identifier: This letter identifies a version or modification of the part. Part numbers with different prefix letters may or may not be interchangeable - refer to the remarks column.

Vehicle/Engine Type Number: The type number indicates either the model or engine type on which the part was first used:

026,036,045,500....Elan	075.. ..Elite Sl	082.. ..Esprit Turbo	085.. ..Esprit S3
050.. ..Elan +2	076.... Eclat Sl	083.. ..Elite S2	089.. ..Excel
046,054,065,074....Europa	079.. ..Esprit Sl/S2/S2.2	084.... Eclat S2	100.. ..Elan 1990

907 = 2.0 litre N.A. 910 = 2.2 litre turbo 911 = 2.2 litre Chrysler 912 = 2.2 litre N.A. 920 = 2.0 litre turbo

Vehicle Project Code: The project code is used for internal auditing purposes.

Functional Group: **A** single letter indicating the functional area of.the part's first use;

A = Chassis	E = Engine	J = Brakes	P = Heater & A.C.	U = Hard Trim
B = Body	F = Transmission	K = Cooling	Q = clutch	V = Soft Trim
C = Front Suspension	G = Wheels & Tyres	L = Fuel System	R = Final Drive	W = Standard Fixings
D = Rear Suspension	H = Steering	M = Electrics	S = Exhaust	

Function code: A four digit code indicating the functional area of the part's first use. See Contents page.

Part Serial Number: A four or three digit number with different sequences for each functional group/code.

Supply Route: The suffix letter is used for procurement purposes by factory personnel.

VEHICLE IDENTIFICATION NUMBER

The Vehicle Identification Number (VIN) is recorded on a bar code label fixed to the bulkhead inside the front luggage compartment. The number is stamped onto the chassis frame on the vertical surface of a flange between the inboard pivots of the right hand front suspension lower wishbone, viewable via the right hand front wheelarch. The VIN must be quoted with all parts enquiries. There are two variations of the VIN, one being for Domestic and Export markets other than for the USA, which complies with European Economic Community (EEC) directives, and one for USA which complies with requirements laid down by the National Highway Traffic Safety Association (NHTSA).
The seventeen characters of the VIN are coded as shown on the two pages overleaf:

NOTES

1. Different serial number sequences are used for the S4 and Sport 300 models:
   s4: 0001 to 0010, then 1011 onwards
   Sport 300: 8001 onwards

2. For change point identification in this parts list, only VIN characters 10 (model year) and 14 to 17 (serial number) will be listed. e.g.:
   R 1242 ('94 model year S4, serial 1242)
   R 8030 ('94 model year Sport 300, serial 8030)

Domestic/Export Type VIN

Manufacturer Identifier Code

Engine Type

910=2.2 Turbo
920=2.0 Turbo

Plant

H=Hethel

Engine Emission Spec.

1=ECE l-5.04
2=49 States (USA)
3=California
4=88/76/EEC
5=Not used
6=50 States (USA) & Japan

S	C	C							**				**	**	**	**
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

** listed for change point identification

Vehicle Type

082=Esprit Turbo

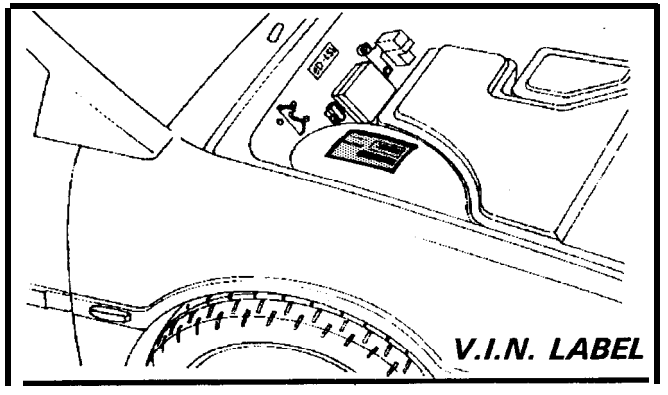
Model Year

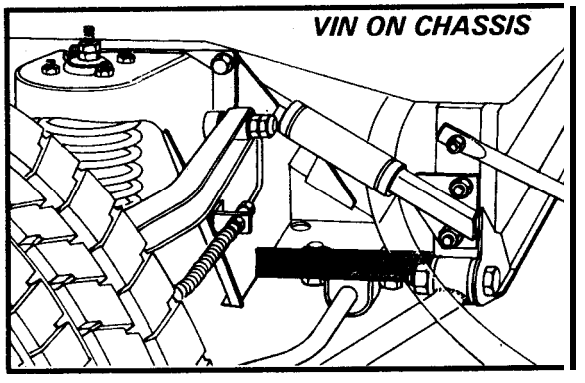
P=1993
R=1994
S=1995

Chassis/ Body Type

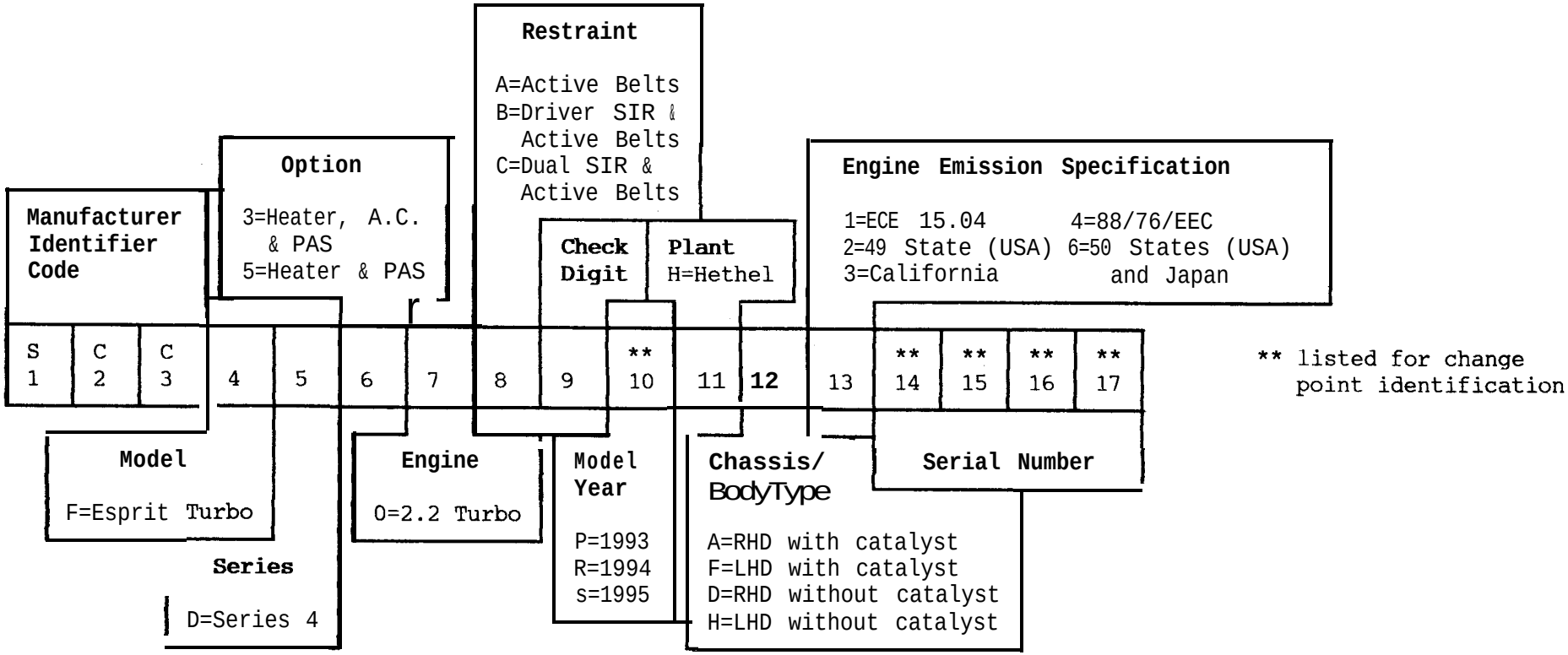
A=RHD with catalyst
F=LHD with catalyst
D=RHD without catalyst
H=LHD without catalyst

Serial Number



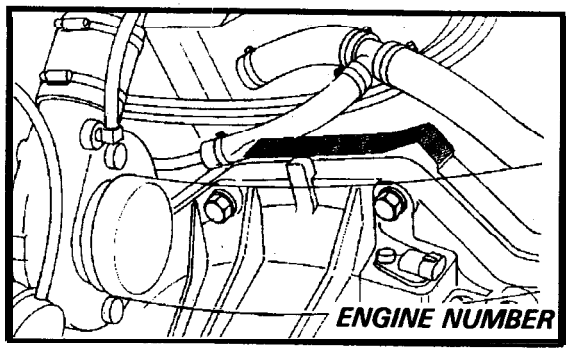


USA Type VIN

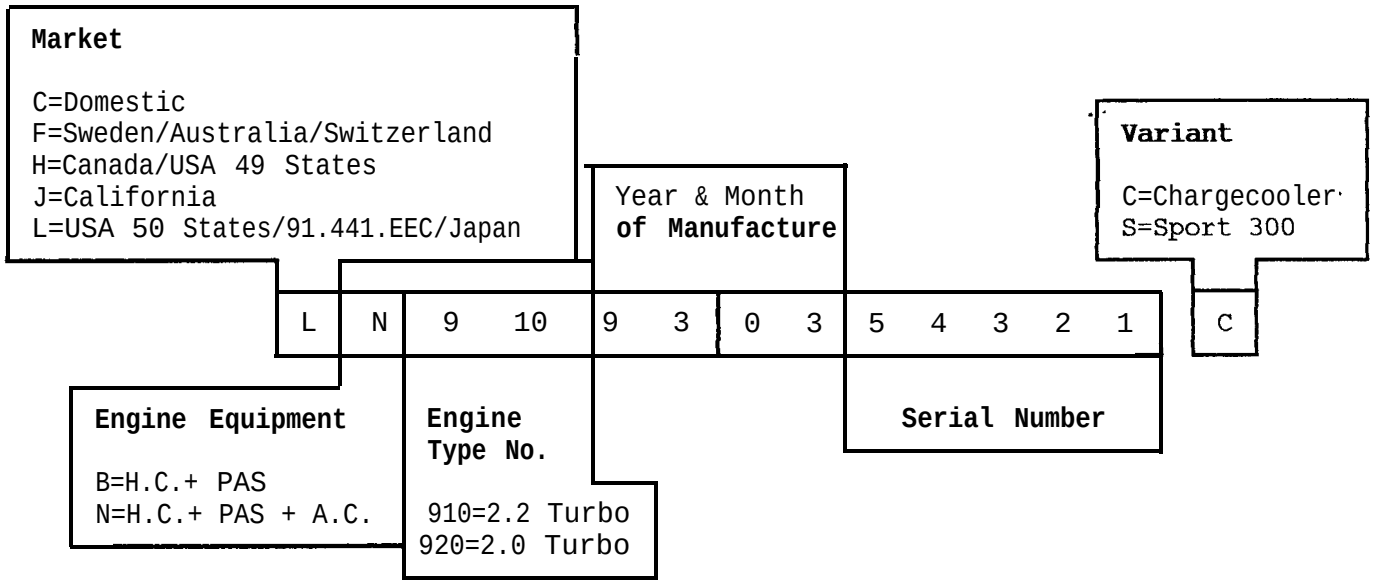


ENGINE NUMBER

Reterence to the engine number may sometimes be needed to identify related components. The engine number is stamped on a horizontal surface at the right and rear of the cylinder block.



Engine Number Coding



ESPRIT MODEL HISTORY - '93 M.Y. ONWARDS (Excluding '93 M.Y. USA - see '88 to '92 M.Y. parts list)

'93 **Model Year Introduction: March '93**

Esprit S4 (U.K. & Export, not USA); VIN: P 0001 to 0010, 1011 onwards

As '92 M.Y. Chargecooler specification with following changes:

Restyled front bumper and spoiler, bonnet, sills, rear aerofoil, transom spoiler, rear valance.

- Power steering.
- Front suspension geometry altered with provision for camber adjustment.
- Rear suspension camber changed, with provision for adjustment
- 17 inch Lotus styled S-spoke alloy wheels, with 215/40 ZR17 (front) and 245/45 ZR17 (rear) Goodyear Eagle GS-A tyres.

New door window lift mechanism, incorporating 'one touch' and obstruction sensing.
New door lock mechanism and CDL, with single key operation of vehicle locks.

- Megamoss vehicle alarm includes 'deadlocking' and engine crank immobilisation.
- Restyled interior including; fascia, crash pad and glovebox lid, seat upholstery, instrument layout and carbon fibre look-alike masks, centre console and tunnel trim, door panels, steering wheel.
- Elan type front side/turn lamps, new front fog lamps and interior lamp, electric vacuum pump, tailgate mounted radio aerial.
- Revised 'High Torque' RH shift transmission.
- New wheel changing scissor jack.

Sport 300: June '93

- U.K. & Export (not USA) VIN: P 8001

As Esprit S4 specification with following changes:

- Lightweight body, bonded-in roof, scuttle brace, enlarged wheel housings with wheelarch extensions, '92 style front bumper/spoiler, fog lamp recesses now brake cooling ducts, '92 style rear bumper, valance and sills. New rear aerofoil.
- Reinforced chassis, bolt-in engine bay brace, roll cage mountings.
- 300 bhp engine with T3/T4 turbocharger, increased boost pressure, recalibrated ECM, larger inlet valves and ports, raised fuel pressure, combined chargecooler radiator/condenser on non a.c. cars.
- Lotus limited slip differential, uprated clutch cover and flywheel
- Revised front and rear suspension springs and dampers.
- Larger front and rear brakes, with AP Racing 4-piston calipers and ventilated discs at all four wheels. Separate parking brake calipers.
- 3-piece O.Z. wheels with 245/45 ZRl.6 (front) and P315/35 ZR17 (rear) Goodyear Eagle GS-C tyres.
- Alcantara interior trim, Senotex instrument masks, larger tachometer and electronic speedometer, mouided bucket seats, anti-slip pedal pads, individually numbered header rail plague.

'94 Model Year Introduction: July '93

- Esprit S4 (U.K. & Export_ **inc. USA);** VIN: R 1090
- Sport 300 (U.K. & Export, not USA); VIN: R 8012

U.K. and Export S4 and Sport 300 unchanged. USA S4 introduced with following changes from U.K./Export spec.:

- Different window lift motors with no 'one touch' or obstruction sensing.

Dual S.I.R. for USA and LHD Export: September '93

- Esprit S4 (USA & LHD Export); VIN: R 1163

Introduced as legal requirement for USA cars, and as option in some LHD markets. S.I.R. equipment as driver only S.I.R. with following changes:

- Passenger side inflator module mounted in place of glovebox.
- Passenger side knee bolster.
- New DERM and dual pole arming sensor.

Revised Wiring Harness: December '93

- Esprit S4 LHD; VIN: R 1242
- Esprit S4 RHD; VIN: R 1250
- Sport 300; VIN: R 8030

As previous with following changes:

- Wiring harnesses rationalised.
- Electrical components resited inc. engine bay components to RHR wheelarch,.
- Addition of sensing switches to front bonnet and tailgate for alarm and illumination.
- Addition of front luggage compartment lamp, and 'lights on' buzzer (non-USA).
- New type inertia switch RHF engine bay, and Elan type electric aerial for some markets, LHR quarter.
- New engine coolant header tank, with incorporation of chargecooling system.

Brembo Brakes on S4 Models: June '94

- Esprit S4 Non-USA; VIN: R 1443 (+ R 1377) July '94
- Esprit S4 USA; VIN: S 1391 June '94

Applicable only to S4 models. Introduction on USA cars coincides with intro. of otherwise unchanged '95 M.Y. USA S4.
Changes include the following:

- Front brakes; four piston calipers and larger discs. Rear brakes; new calipers and larger ventilated discs.
- Rear circuit pressure limiting/proportioning valve deleted.
- Revised front hubs and rear hub carriers.
- 16" spare wheel supplied to clear new brakes.

'95 Model Year Introduction
Introduction of 'CFC Free' R134a Air Conditioning System : March 1995

- Esprit S4 VIN: S 2031 (RHD) S 2017 (LHD)
- Esprit S4S (non-USA) VIN: S 4035 (RHD) S 4006 (LHD)
- Esprit S4S (USA) VIN: S 3012
- Sport 300 VIN: S 8059

Changes include the following:

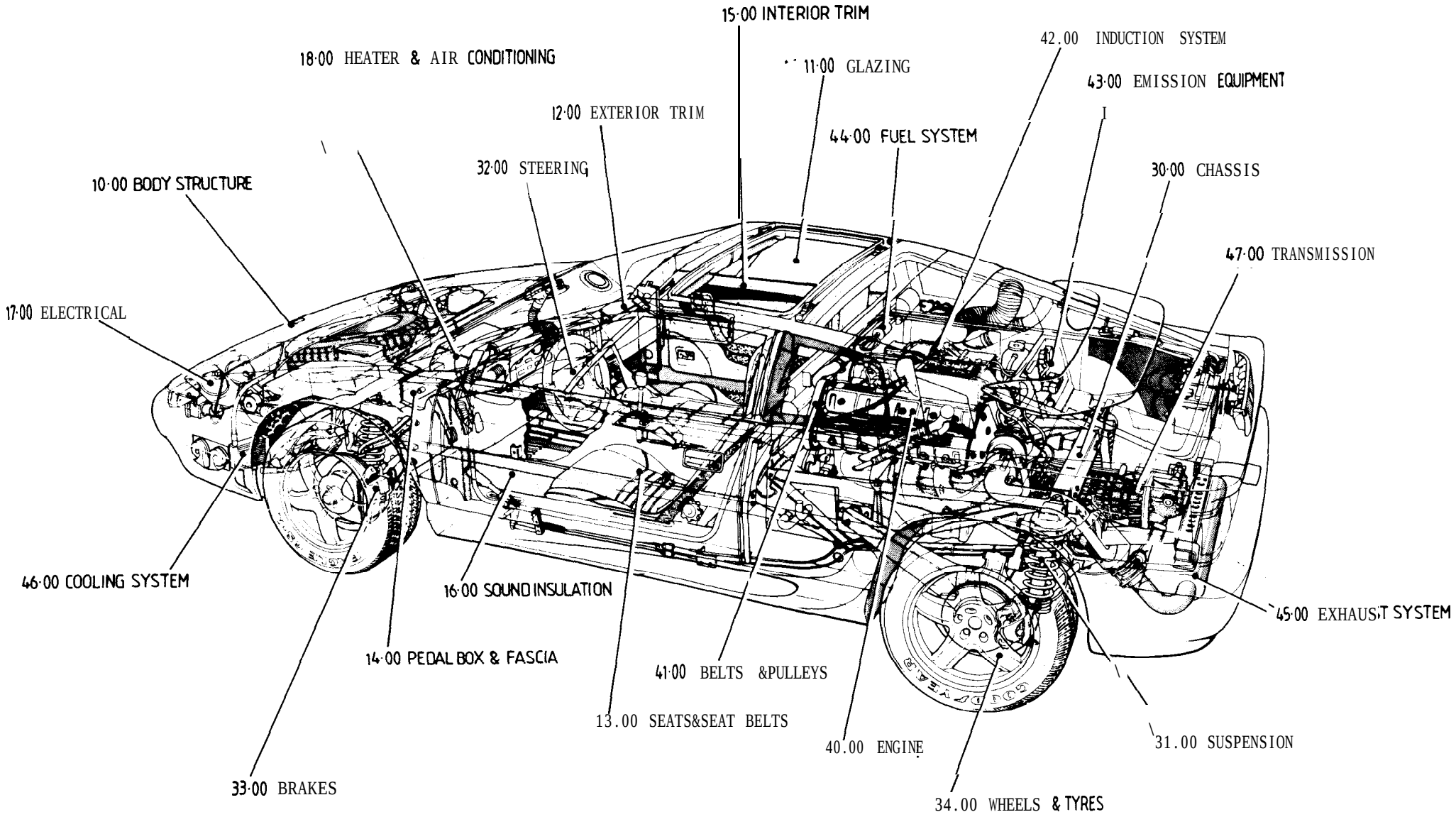
- Compressor; changed to accommodate different oil requirement, high pressure relief valve incorporated on rear cover, service Shraeder valves replaced by snap connectors in the suction and dischage hoses.
- Condenser; pair of square shaped parallel flow condensers mounted side by side and mounted in parallel. The condensers are sandwiched, as previously, between the engine radiator and a new, separate chargecooler radiator.
- Receiver-Drier; new type due change of molecular sieve material
- Hoses and Pipework; modified due increased permeability of the new gas.

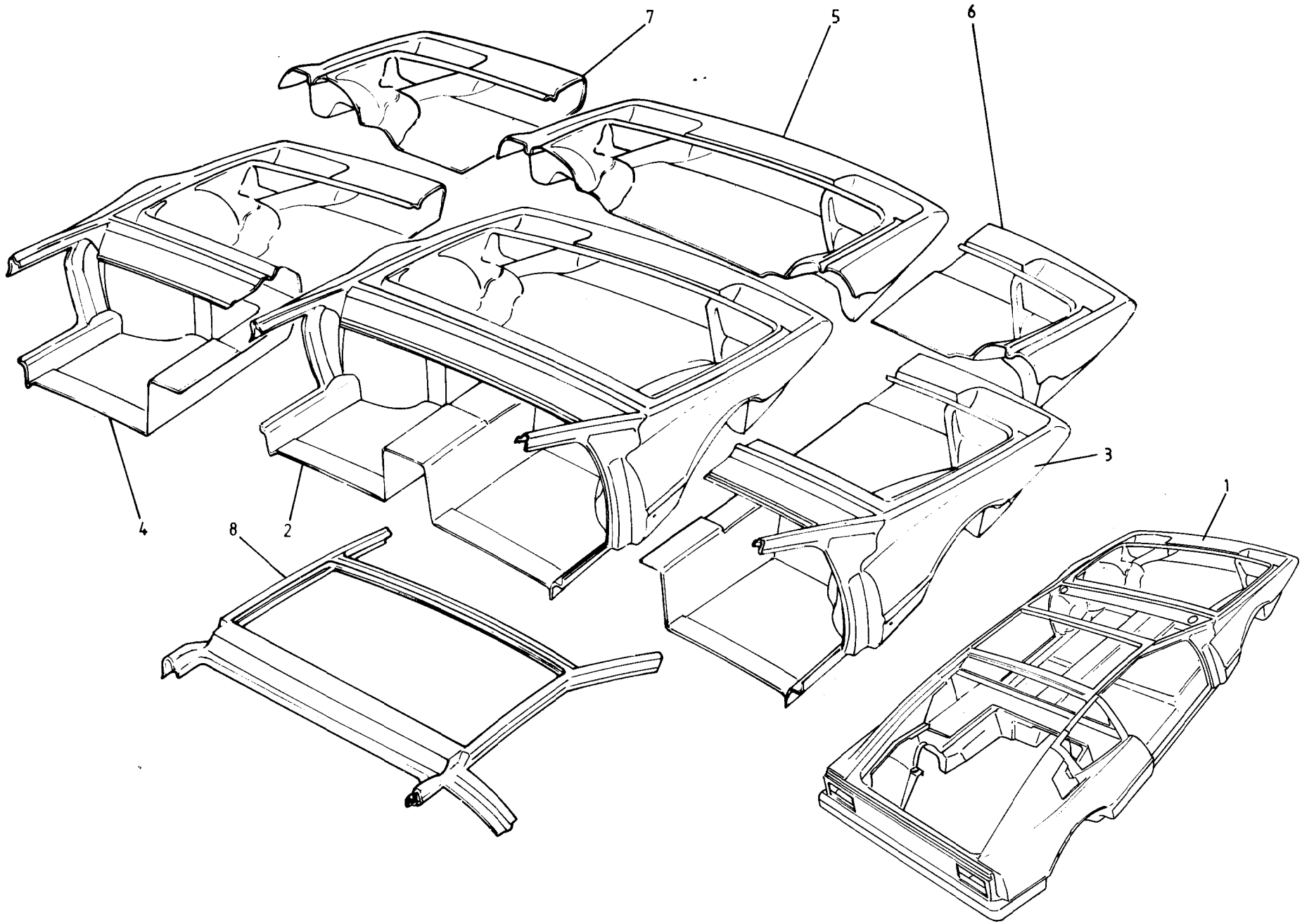
'95 M.Y. S4S & **non-USA '95 M.Y.** S4: **January '95**

- S4(non-USA); VIN: S 2000(+ 1496)
- S4S(USA) VIN: S 3000
- S4S(non-USA) VIN: S 4000

As previous with following principal changes:

- Caerbont instruments with 100 mm speedo and tacho, analogue clock. Oil temp. gauge and ice detection deleted. Footwell lamps added.
- Revised trim stitching. Walnut veneer replaces 'carbon fibre' instrument panel and door finishers. Sport 300 style seats on non-USA S4S.
- S4S: 285 bhp engine with revised turbo, inlet valves and ECM. Uprated clutch cover.
- Non-USA S4S: Enlarged body wheelhousings, wheelarch spats, Sport 300 rear aerofoil.
- Non-USA S4S: Wider O.Z. Futura 3-piece-wheels with Michelin 235/40 ZR17 front and 285/35 ZR18 rear tyres. Revised springs and dampers.
- USA S4S: O.Z. Futura 3-piece wheels in unchanged size with unchanged Goodyear tyres.
- Non-USA S4S: Uprated chassis with reinforced backbone and revised rear spring platforms.


15·00 INTERIOR TRIM
18·00 HEATER & AIR CONDITIONING
11·00 GLAZING
42.00 INDUCTION SYSTEM
43·00 EMISSION EQUIPMENT
12·00 EXTERIOR TRIM
44·00 FUEL SYSTEM
32·00 STEERING
30·00 CHASSIS
10·00 BODY STRUCTURE
47·00 TRANSMISSION
17·00 ELECTRICAL
46·00 COOLING SYSTEM
16·00 SOUND INSULATION
45·00 EXHAUST SYSTEM
14·00 PEDAL BOX & FASCIA
41·00 BELTS &PULLEYS
13.00 SEATS&SEAT BELTS
40.00 ENGINE
31.00 SUSPENSION
33·00 BRAKES
34.00 WHEELS & TYRES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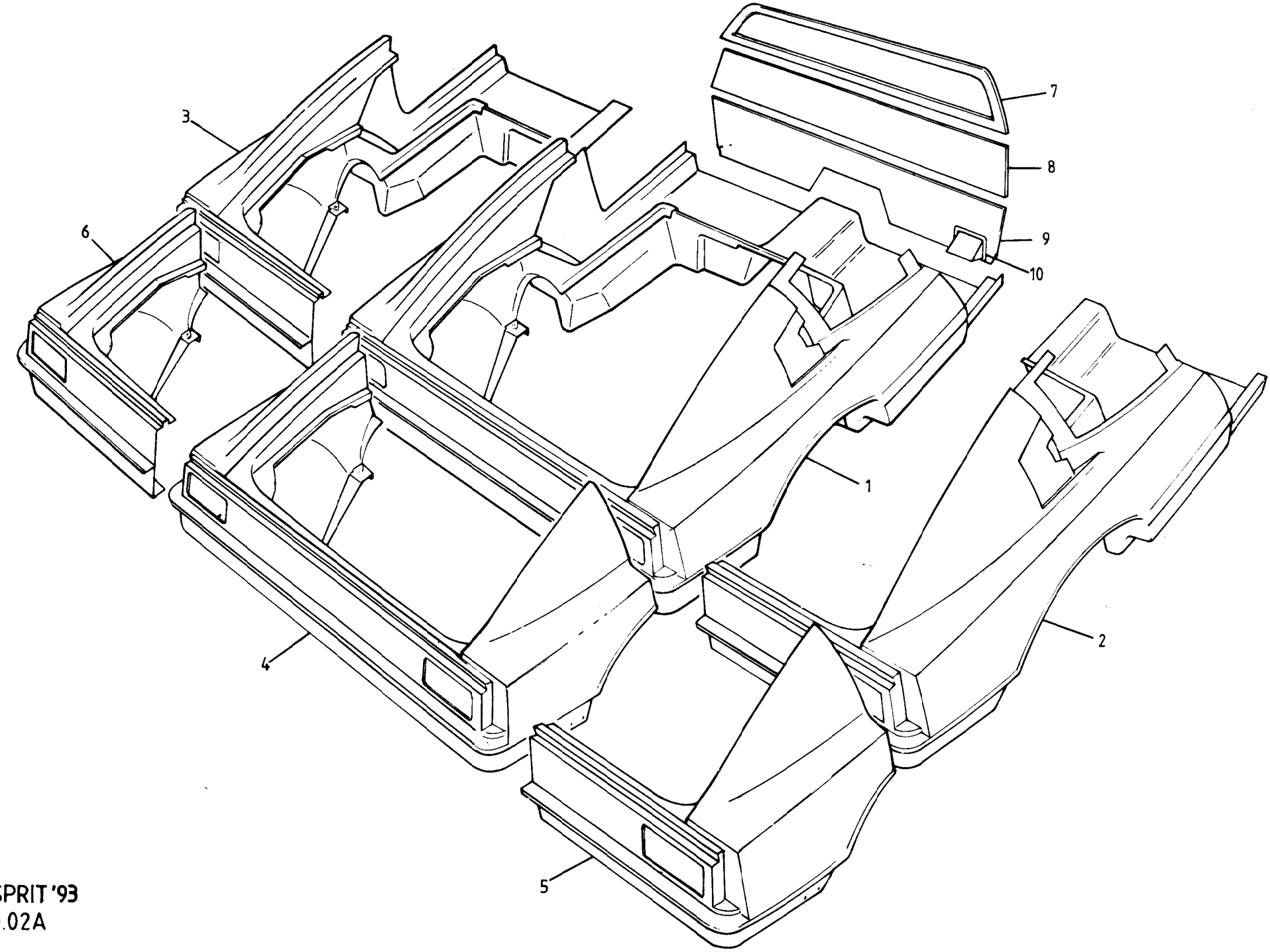
FUNCTION CODE	CONTENTS: Bodyshell & Front Body Repair Sections		QUANTITY				
10.01A	PART DESCRIPTION	PART NUMBER	S4	NON USA S4C	SA S4S	ESPORT 100	REMARKS
1	Bodyshell, RHD, glass roof	A082B5228S*	1				* Prior VIN No.:
	" " " "	C082B5228S#	1				# From VIN No. :
	" " " "	B082B5228S		1			S 2034 (S4)
	" " " "	P691.1001.029AS				1	S 3095 (USA S4S)
	" " composite roof	A082B5229S*	1				
	" " " "	C082B5229S#	1				
	" " " "	B082B5229S		1			
	" " " "	P691.1001.030AS				1	
	" " bonded roof	P691.1001.020AJ				1	
	Bodyshell, LHD, glass roof, except dual SIR	A082B5230S*	1				
	" " " " " " "	E082B5230S#	1				
	" " " " " " "	B082B5230S		1			
	" " " " , with dual SIR	C082B5230S*	1				
	" " " " " " "	F082B5231S#	1				
	" " " " " " "	D082B5230S		1			
	" " " " " " "	A082B5302S*			1		
	" " " " " " "	B082B5302S#			1		
	" " " "	P691.1001.031AS				1	
	" " composite roof, except dual SIR	A082B5231S*	1				
	" " " " " " "	E082B5231S#	1				
	" " " " " " "	B082B5231S		1			
	" " " " , with dual SIR	C082B5231S*	1				
	" " " " " " "	F082B5231S#	1				
	" " " " " " "	D082B5231S		1			
	" " " " " " "	A08285303S*			1		
	" " " " " " "	B082B5303S#			1		
	" " " "	P691.1001.032AS				1	
	" " bonded roof	P691.1001.003AJ				1	

FUNCTION CODE	CONTENTS: Bodyshell & Front Body Repair Sections		QUANTITY				
10.01A	PART DESCRIPTION	PART NUMBER	34	USA S4S	NON USA S34s	PORT 300	REMARKS
2	Body Section, full nose, full width, RHD	A082B5215S*	1				* Prior VIN No.:
	" " " " " " "	B082B5215S#	1				# From VIN No. •
	" " " " " " "	C082B5215S			1		S 2034 (S4)
	" " " " " " "	P691.1001.033AS				1	s 3095 (USA S4S)
	" " " " " " LHD	A082B5216S*	1				Except dual SIR
	" " " " " " "	B082B5216S#	1				" " "
	" " " " " " "	C082B5216S*	1	1			Dual SIR
	" " " " " " "	D082B5216S#	1	1			" "
	" " " " " " "	E082B5216S			1		Except dual SIR
	" " " " " " "	F082B5216S			1		Dual SIR
	" " " " " " "	P691.1001.034AS				1	
3	Body Section, full nose, RH half, RHD	A082B5220S*	1				
	" " " " " " "	B082B5220S#	1				
	" " " " " " "	C082B5220S			1		
	" " " " " " "	P691.1001.036AS				1	
	" " " " " " LHD	A082B5218S*	1				Except dual SIR
	" " " " " " "	B082B5218S#	1				" " "
	" " " " " " "	C082B5218S*	1	1			Dual SIR
	" " " " " " "	D082B5218S#	1	1			" "
	" " " " " " "	E082B5218S			1		Except dual SIR
	" " " " " " "	F082B5218S			1		Dual SIR
	" " " " " " "	P691.1001.038AS				1	
4	Body Section, full nose, LH half, RHD	A082B5217S*	1				
	" " " " " " "	B082B5217S#	1				
	" " " " " " "	C082B5217S			1		
	" " " " " " "	P691.1001.035AS				1	
	" " " " " " LHD	A082B5219S*	1	1			Except dual SIR
	" " " " " " "	B082B5219S#	1	1			" " "
	" " " " " " "	E082B5219S			1		
	" " " " " " "	P691.1001.037AS				1	

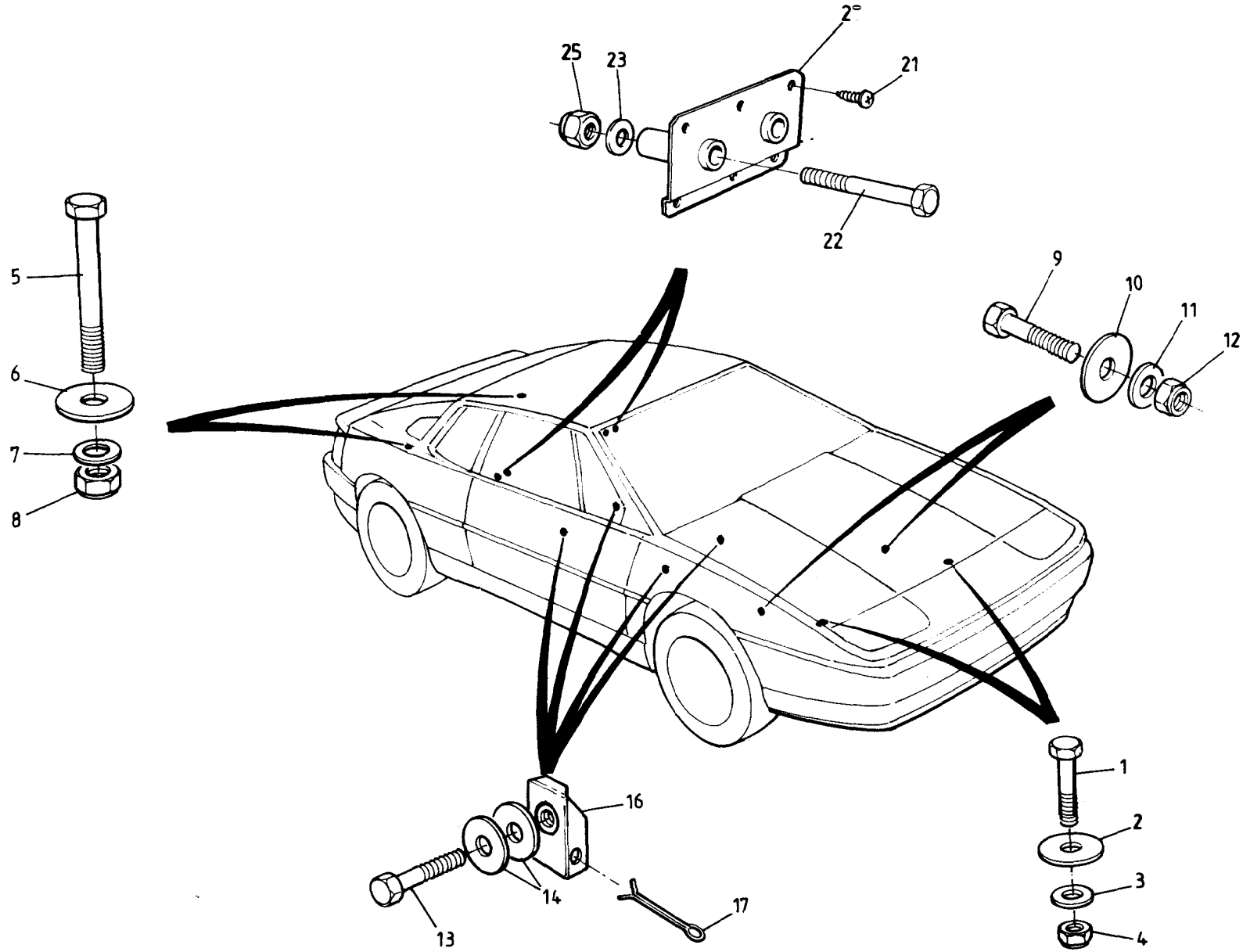
Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Bodyshell & Front Body Repair Sections		QUANTITY				
10.01A	PART DESCRIPTION	PART NUMBER	34	USA S4S	NON USA S4S	SPORT 300	REMARKS
5	Body Section, mid nose, full width	C082B4828S*	1	1			* Prior VIN No.:
	" " " " " "	B082B4828S#	1	1			# From VIN No. :
	" " " " " "	P691.1001.039AS				1	S 2034 (S4)
6	" " " " RH half	C082B4830S	1				S 3095 (USA S4S)
	" " " " " "	P691.1001.040AS				1	
7	" " " " LH half	C082B4831S	1				
	" " " " " "	P691.1001.041AS				1	
8	Body Section, roof, removeable glass	A082B4851S	1	1	1		
	" " " " "	P691.1001.044AS				1	
	" " " removeable composite	B082B4851S	1	1	1		
	" " " " "	P691.1001.043AS				1	
	" " " bonded roof	P691.1001.042AS				1	



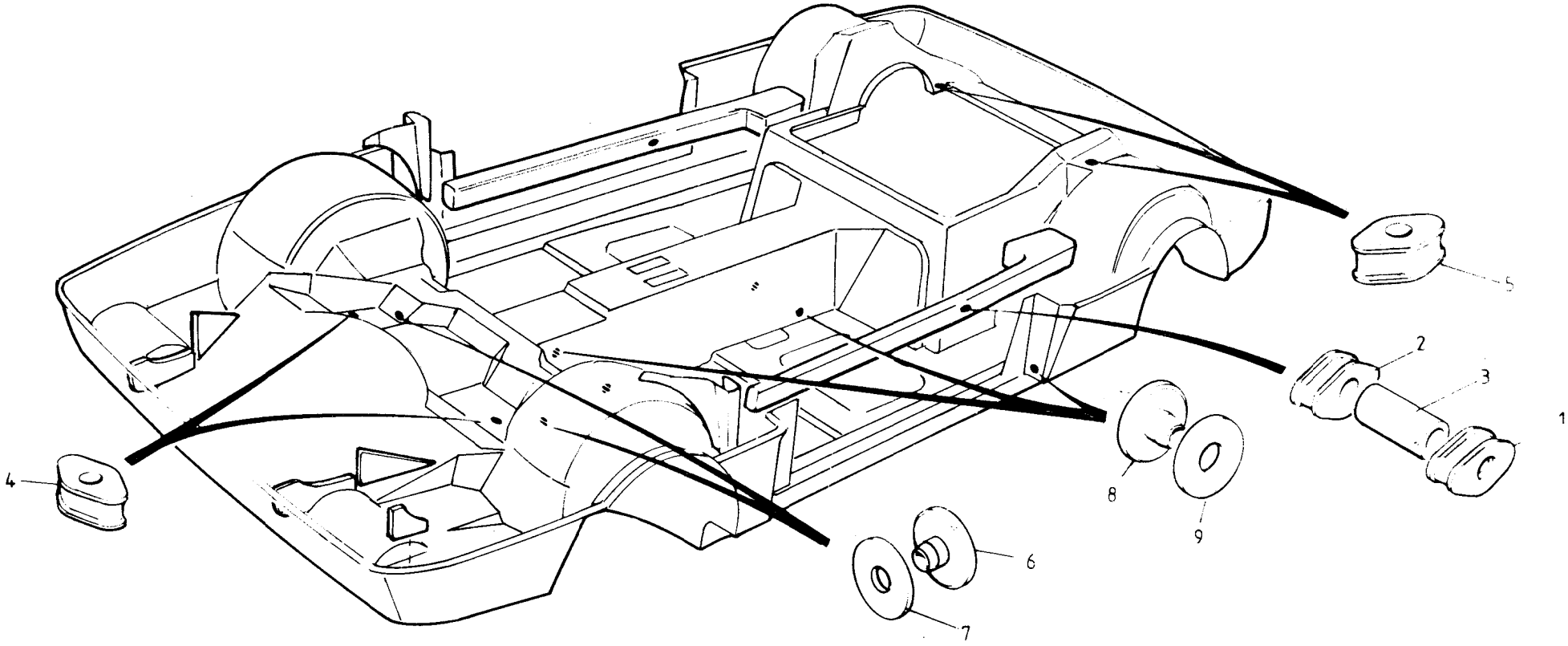
ESPRIT '93
10.02A

FUNCTION CODE	CONTENTS : Rear Body Repair Sections		QUANTITY		
10.02A	PART DESCRIPTION	PART NUMBER	S4 S4S	SPORT 300	REMARKS
1	Body Section, Full Rear, Full Width	ZA082B5232S	1		
	" " " " " "	(C082B5232S	1		tISA S4S*
	" " " " " "	]P691.1001.0458		1	
2	" " " " RH Half	ZA082B5234S	1		
	" " " " " "	(C082B5234S	1		tISA S4S*
	" " " " " "	]P691.1001.046S		1	
3	" " " " LH Half	ZA082B5233S	1		
	" " " " " "	(C082B5233S	1		tISA **S4S***
	" " " " " "	]P691.1001.047S		1	
4	Body Section, Short Rear, Full Width	ZA082B5235S	1		
	" " " " " "	(C082B5235S	1		tISA S4S*
	" " " " " "	]P691.1001.048S		1	
5	" " " " RH Half	ZA082B5236S	1		
	" " " " " "	(C082B5236S	1		tISA S4S*
	" " " " " "	]P691.1001.05OS		1	
6	" " " " LH Half	ZA082B5237S	1		
	" " " " " "	(C082B5237S	1		tISA S4S*
	" " " " " "	]P691.1001.049S		1	
					* Fettled to accept the optional
					;Sport 300 type aerofoil
7	Bulkhead, Rear Upper	]B082B4679F	1		)
a	" Rear Centre	]E079B4675F	1		:)Timber
9	" Rear Lower	(C082B4876F	1		)
10	Speaker Enclosure, Rear Bulkhead, RH	ZA082B4574K	1		
	" " " " LH	ZA082B4573K	1		
	Pop Rivet, Speaker Enclosure Fixing	ZA082W6323F	a		



ESPRIT '93
10.03A

FUNCTION CODE	CONTENTS: Body to Chassis Fixings		QUANTITY		
10.03A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Bolt, M8 x 40, body to front X-member	A075W2039Z	2		
2	Washer, flat, body to front X-member fixing	AO75W4022F	2		
3	Washer, M8, " " " " "	A075W4020Z	2		
4	Nut, Nyloc, M8, " " " " "	A075W3010Z	2		
5	Bolt, M10 x 120, body to rear X-member	A075W2064F	2		
6	Washer, flat, M10 x 30, body to rear X-member	A075W4027Z	2		
7	Washer, flat, M10 x 20, " " " "	A075W4024Z	2		
a	Nut, Nyloc, M10, " " " "	A075W3011Z	2		
9	Bolt, Ml0 x 45, footwell to chassis	A075W2053Z	2		
10	Washer, flat, M10 x 30, footwell to chassis fix	A075W4027Z	2		
11	Washer, flat, Ml0 x 20, " " " "	A075W4024Z	2		
12	Nut, Nyloc, M10, " " " "	A075W3011Z	2		
13	Bolt, M8 x 30, tunnel side to chassis	A075W2037Z	4		
14	Washer, flat, tunnel side to chassis fixing	A075W4022Z	4		
16	Nut Plate, tunnel side to chassis fixing	AO82A4297F	4		
17	Split Pin, nut plate to chassis	A082W6502F	4		
20	Mounting Plate, rear bulkhead body/chassis	A082A4351F	2		
21	Screw, No.10 x 3/4", plate to bulkhead	A075W5041Z	12		
22	Bolt, M8 x 65, rear bulkhead body/chassis	A075W2044Z	4		
23	Washer, flat, " " " "	A075W4020Z	a		
25	Nut, Nyloc, M8, rear body mounting	A075W3010Z	4		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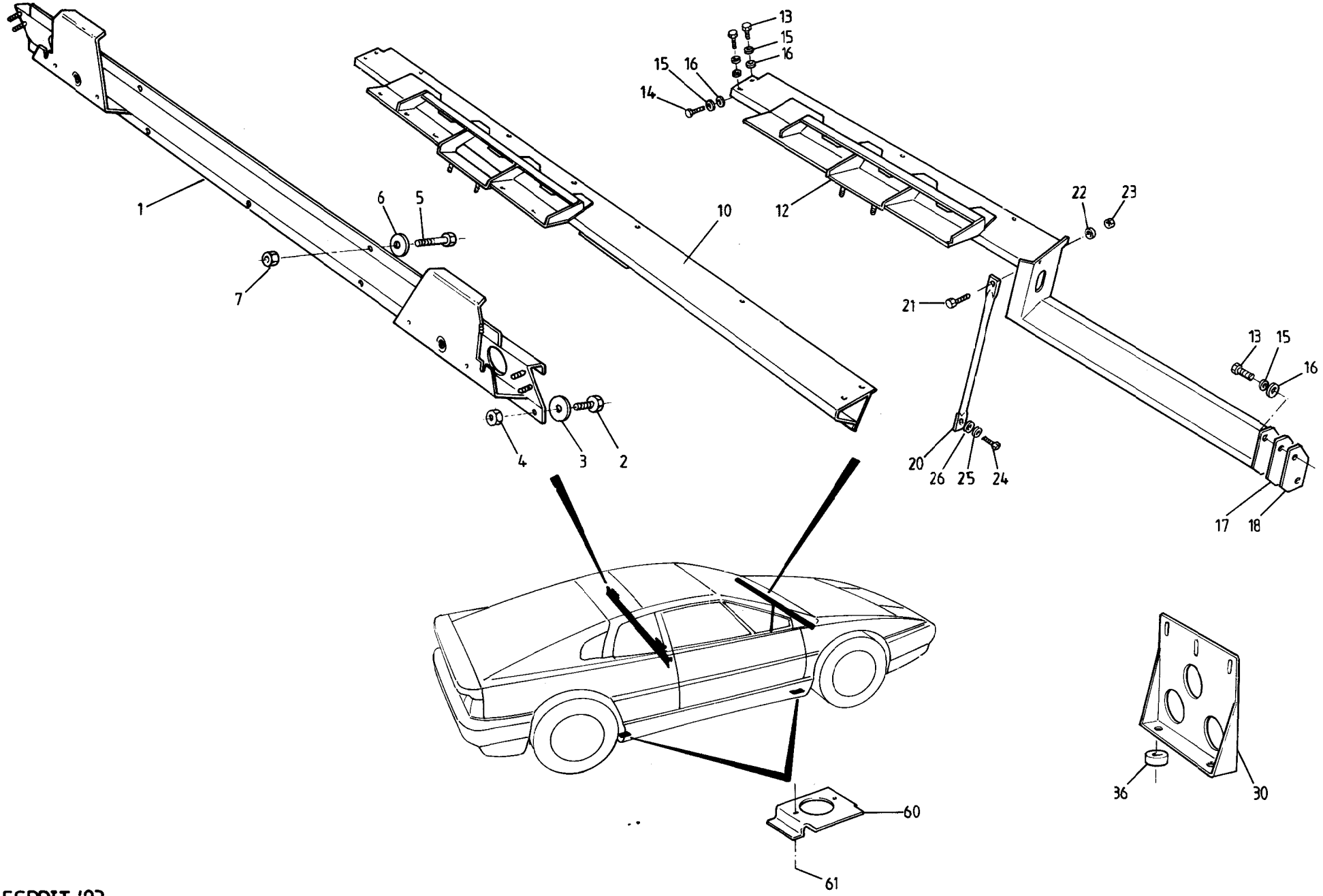
FUNCTION CODE

CONTENTS: Body Attachment 'Bobbins'

QUANTITY 1

10.04B	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Bobbin, threaded, 7/16" UNF, seat belt anchor	A075B2170Z	2		
2	Bobbin, plain, M12.5, " " "	C075B2169Z	2		
3	Spacer, sill bobbins	A082B4863F	2		
4	Bobbin, plain, M8.5, front body/chassis fixing	C075B2166Z	2		
5	Bobbin, plain, M10.5, rear body/chassis fixing	C075B2165Z	2		
6	Bobbin, male, 12mm, footwell/chassis	AX75B2267Z	2		
7	Bobbin, female, 12mm, " "	AX75B2254Z	2		
8	Bobbin, male, 12mm, tunnel side & striker post	AX75B2267Z	6		
9	Bobbin, female, 12mm, " " " "	AX75B2254Z	6		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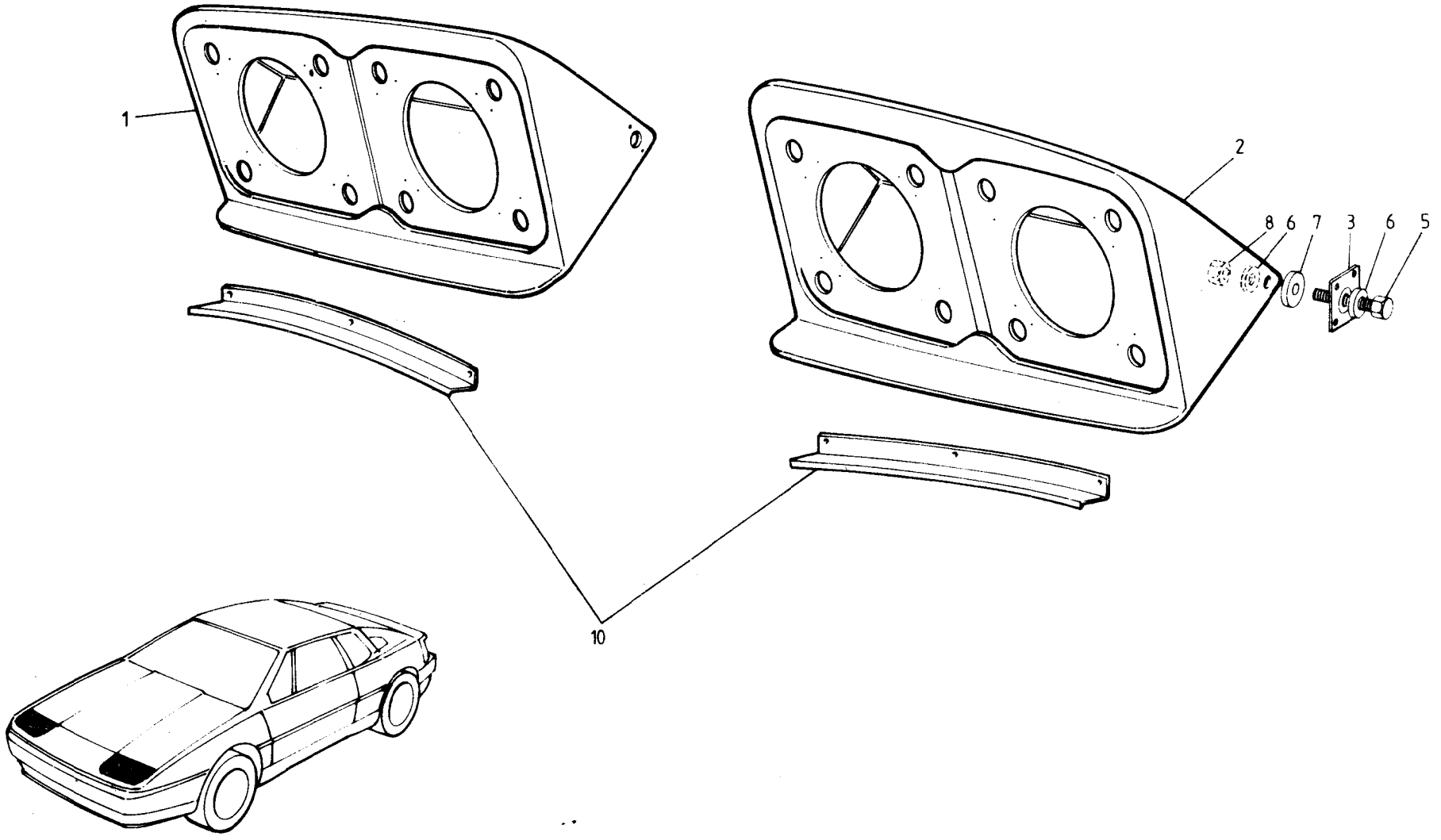
FUNCTION CODE	CONTENTS: Body Crossbeams, Jacking Plates		QUANTITY		
10.05A	PART DESCRIPTION	PART NUMBER	EXCEPT D. SIR	DUAL S.I.R	REMARKS
1	Crossbeam, rear bulkhead, seatbelt mounting	J079U4309F	1	1	
2	Bolt, thinhead, beam end to door aperture	A079U4317F	4	4	
3	Washer, large o/d, " " " "	A075W4021Z	4	4	
4	Nut, M8, crossbeam fixing	A075W3021Z	2	2	
5	Setscrew, M6 x 25, beam to bulkhead	A075W1031Z	12	12	
6	Washer, M6 large o/d " " "	A075W4017Z	12	12	
7	Nut, Nyloc, M6, " " "	A075W3009Z	7	7	
	Crossbeam, scuttle, RHD	A082U7476F	1		s4) Non-S.I.R.
	" " "	P691.1005.004AX	1		Sport 300)
10	" " LHD	A082U7475F	1		S4 non-S.I.R. or driver only S.I.R.
	" " "	P691.1005.003AX	1		Sport 300 non-S.I.R.
12	" " "	A082U7657F		1	
13	Setscrew, MS x 25, beam to hinge post	A075W1039Z	4	4	
14	Setscrew, MB x 20, " " " "	A075W1038Z	2	2	
15	Washer, spring, M8, " " " "	A075W4036Z	6	6	
16	Washer, flat, M8 x 16, " " "	A075W4020Z	6	6	
17	Shim, scuttle beam to door hinge post, 1.5 mm	A082U7657F		A/R	
la	" " " " " " " 2.5 mm	A082U7655F		A/R	
20	Strut, scuttle crossbeam support	A082A4246F	1	1	)
21	Setscrew, M6 x 20, strut to crossbeam	A075W1030Z	1	1	)
22	Washer, flat, M6 x 12, " " "	A075W4013Z	1	1	)
23	Nut, Nyloc, M6, " " "	A075W3009Z	1	1	) Except Sport 300 without a.c.
24	Setscrew, M6 x 30, strut to chassis	A075W1032Z	1'	1	)
25	Washer, spring, strut to chassis	A075W4035Z	1	1	)
26	Washer, Flat, strut to chassis	AO75W4013Z	1	1	)
30	Brace, scuttle beam to chassis tunnel	P691.1005.OO1AF	1		>
	Edging Strip, rubber, scuttle brace lower hole:	A085U6080V	470mm		>
	Foam Seal, scuttle brace to body	P691.1101.001AK	1		>
	Setscrew, M6 x 20, brace to scuttle beam	A075W1030Z	3		>
	Flat Washer, " " " "	A075W4013Z	3		> Sport 300 without a.c.
	Nyloc Nut, M6, " " " "	A075W3009Z	3		>
36	Spacer, brace to chassis	P691.1005.002AF	2		>
	Bolt, Ml0 x 40, brace to chassis	A075W2052Z	2		>
	Flat Washer, " " "	A075W4024Z	2		>
60	Jacking Plate	A082U7571F	4	4	
61	Pop Rivet, jacking plate fix	A075W6069Z	a	a	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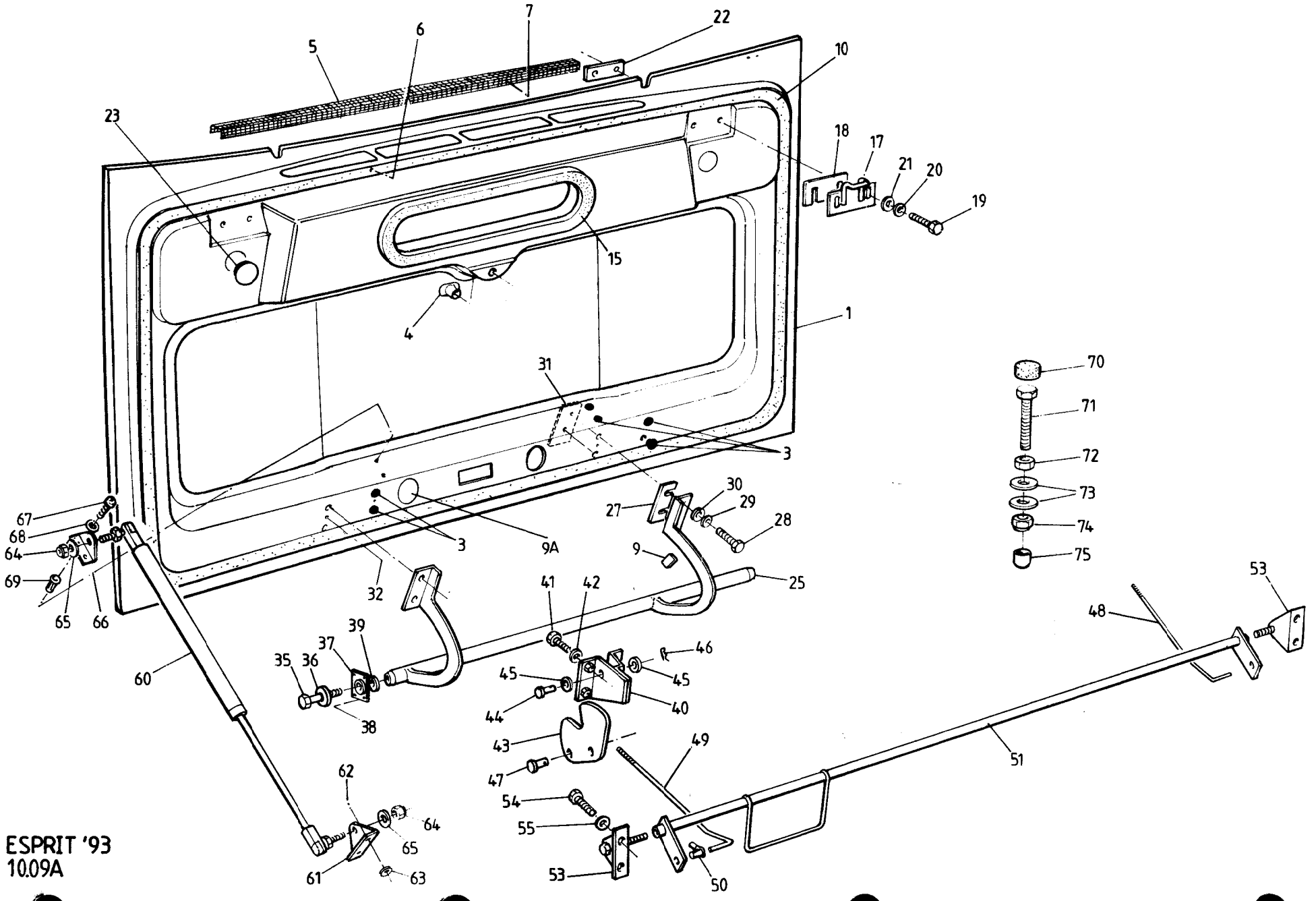
FUNCTION CODE	CONTENTS: Headlamp Pods & Pivots		QUANTITY		
10.07A	**PARTDESCRIPTION**	PART NUMBER	ALL		**REMARKS**
1	Headlamp Pod, RH (6" dia. headlamps)	C082B4852K	1		) Europe
2	" " LH " " "	C082B4853K	1		)
	Headlamp Pod, RH (5 3/4" dia. headlamps)	C082B4854K	1		> USA, CDN, AUL, J
	" " LH " " " "	C082B4855K	1		>
	Headlamp Pod, RH	B082B4980K	1		} France
	" " LH	B082B4979K	1		}
3	Ball Joint, pod pivot	A082U5897F	4		
	Pop Rivet, ball joint to pod	A075W6092Z	16		
5	Setscrew, M6 x 30, pod outer pivot	A075W1032Z	2		
6	Washer, flat, M6 x 18, " "	A075W4018Z	4		
7	Washer, flat, M6 x 25, " "	A075W4065Z	2		
a	Nut, Nyloc, M6, " "	A075W3009Z	2		
10	Watershield, headlamp motor	B079U4459K	2		
	Pop Rivet, watershield to body	A075W6071Z	6		
	Cover, drain hole, pod well	A082B6141K	2		



ESPRIT '93
10.09A

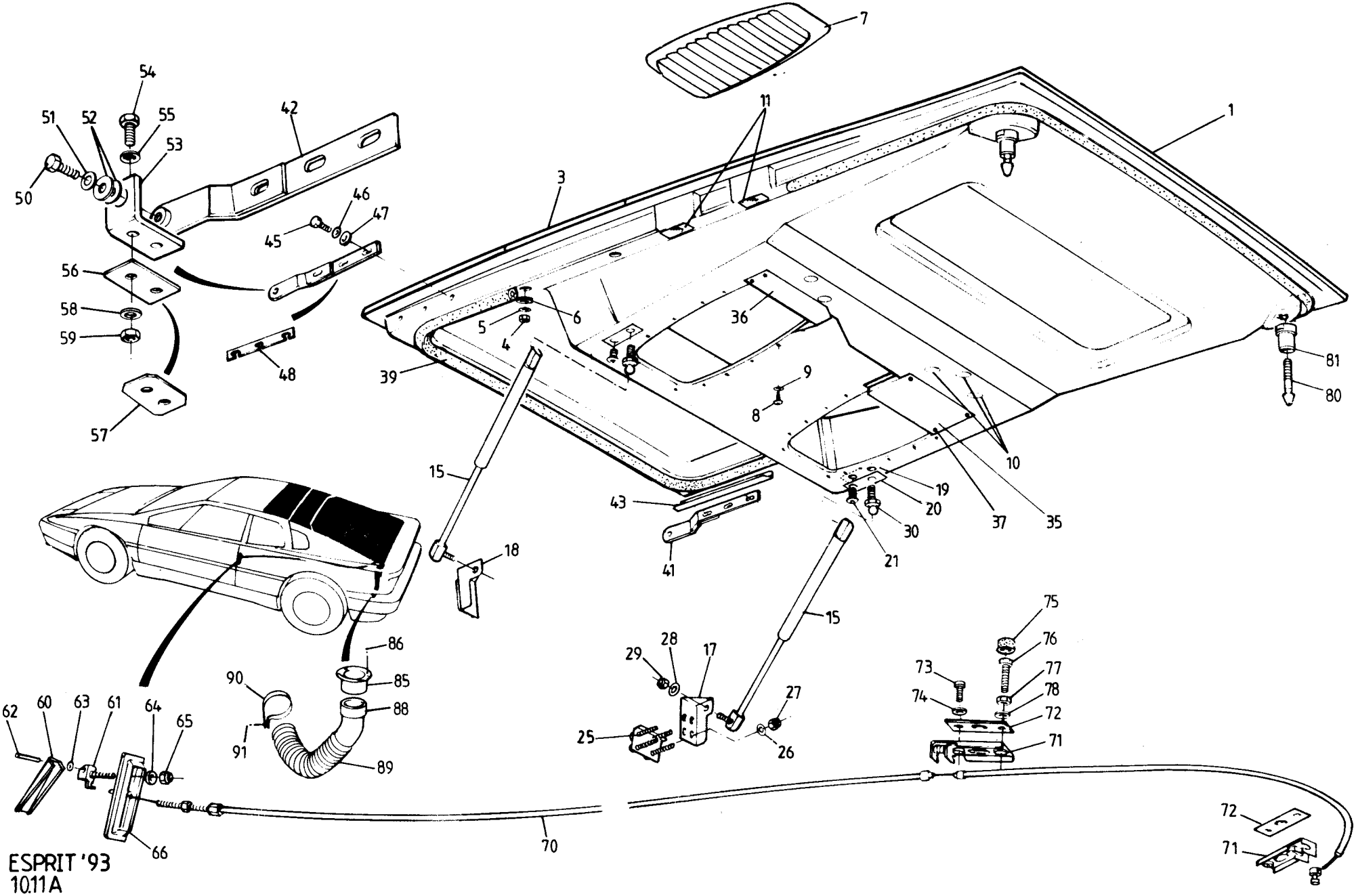
FUNCTION CODE

CONTENTS: Front Bonnet & Release Mechanism

10.09A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Bonnet Panel (Hand Lay)	A082B6233K	1	)	Alternatives
	" " (VARI)	A082B5155K	1	)	
3	Grommet, blanking	A089U6056F	6		
4	Funnel, bonnet plenum drain	A082P6056F	1		
5	Grille, interior air intake	A082B5257K	1		
6	Pop Rivet, grille to bonnet	A075W6092Z	3		
7	Washer, pop rivet	A075W4001Z	3		
9	Edge Clip, bonnet lamp wiring to hinge	A075W6047Z	3		
9a	Grommet, bonnet lamp wiring unused hole blank	A079U6033F	1		
10	Weatherseal, bonnet	A082U7058F	1		
	Primer, bonnet seal	B082U6199V	A/R		
	Double Sided Tape, weatherseal to bonnet	A082U6198V	1.2m		
15	Seal, bonnet to heater plenum, 20mm thick	A082U7304F	) 1	)	Selective
	" " " " " 25mm thick	A082U7305F	)	)	
17	Striker, bonnet catch	A079U4266F	2		
18	Shim, striker to bonnet, 1.2mm	A076U0618Z	A/R		
	" " " " 2.5mm	A082U7415F	A/R		
19	Setscrew, M8 x 25, striker fix	A075W1039Z	4		
20	Washer, spring, M8, " "	A075W4036Z	4		
21	Washer, flat, M8, " "	A075W4021Z	4		
22	Tapping Plate, bonnet catch striker	A079U1448F	2		
23	Grommet, tapping plate access	A079U6033F	2		
25	Hinge Bar, Bonnet	D085U5828F	1		RHD
	" " "	D085U5827F	1		LHD
27	Shim Plate, hinge to bonnet	A076U0600Z	A/R		
28	Setscrew, M8 x 30, hinge to bonnet fix	A075W1040Z	4		
29	Washer, spring, " " " "	A075W4035Z	4		
30	Washer, flat, M8 x 25, " " "	A075W4021Z	4		
31	Tapping Plate, bonnet hinge	A089B2455F	2		
	Pop Rivet, tapping plate fix	A075W6090Z	2		
35	Bolt, M6 x 35, hinge pivot	A075W2029Z	2		
36	Washer, spring, hinge pivot bolt	A075W4035Z	2.		
37	Ball Joint, bonnet pivot	A082U5897F	2		
38	Pop Rivet, ball joint to body	A075W6092Z	8		
39	Spacer Washer, flat, M6 x 12, hinge pivot	A075W4013Z	2		

FUNCTION CODE	CONTENTS: Front Bonnet & Release Mechanism		QUANTITY		
10.09A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
40	Bracket, bonnet latch	A082U5825F	2		
41	Screw, 10 UNF X 3/4", bracket fix	A075W5061Z	6		
42	Washer, flat, " "	A075W4000Z	6		
43	Latch Disc, bonnet lock	A082U7149F	2		
44	Clevis Pin, latch disc to bracket	A075W6033Z	2		
45	Washer, flat, disc to bracket	A075W4020Z	4		
46	'R' Pin, latch disc clevis	A075W6175Z	2		
47	Clevis Pin, latch rod to disc	B079U4219F	2		
48	Rod, bonnet lock, RH	B082U5826F	1		
49	" " " LH	A082U7117F	1		
50	Bush & Clip, rod to cross-shaft	A075U6033Z	2		
	Cross-Shaft, bonnet release, RHD	A082U7681F	1		RHD
51	" " " " LHD	A082U7680F	1		LHD except Dual S.I.R.
	" " " " LHD	A082U7670F	1	)	
	Rod, Bonnet Lock, RH	C082U5826F	1	)	Dual S.I.R.
	Bush & clip, catch rod to cross-shaft, RH	A082U6267F	1	)	
	Bracket, cross-shaft pivot, RH	A082U7663F	1	)	
53	Bracket, cross-shaft pivot	A079U4220K	2		
54	Setscrew, M6 x 12, bracket to body	A075W1027Z	4		
55	Washer, flat, " " "	A075W4013Z	4		
60	Gas Strut, bonnet support	B082U6158F	1		
61	Anchor Bracket, gas strut to plenum	A082U7143F	2		
62	Pop Rivet, anchor bracket to plenum	A075W6087Z	4		
63	Washer, pop rivet, " " "	A075W4009Z	4		
64	Nut, Nyloc, M8, gas strut pivot	A075W3010Z	2		RHD
	" " " thin head, gas strut pivot	A907E6284F	2		LHD
65	Washer, flat, M8 x 20, gas strut pivot	A079U4019F	2		
66	Anchor Bracket, gas strut to bonnet	A082U7143F	1		
67	Setscrew, M5 x 20, bracket to bonnet	A075W5084Z	2		
68	Washer, spring, M5, " " "	A075W4045Z	2		
69	Jacknut, M5, " " "	A076W3043F	2		

FDNCTICM CODE	CONTENTS: Front Bonnet & Release Mechanism		QUANTITY		
10.09A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
70	Buffer, bonnet front corner support	X046B6113Z	2		
71	Setscrew, M8 x 35, bonnet support buffer	A075W1041Z	2		
72	Locknut, M8, " " "	A075W3026Z	4		
73	Washer, flat, M8 x 16, " "	A075W4020Z	2		
74	Nut, Nyloc, M8, " " "	A075W3010Z	2		
75	Cap, harness protection	A082B6166F	2		



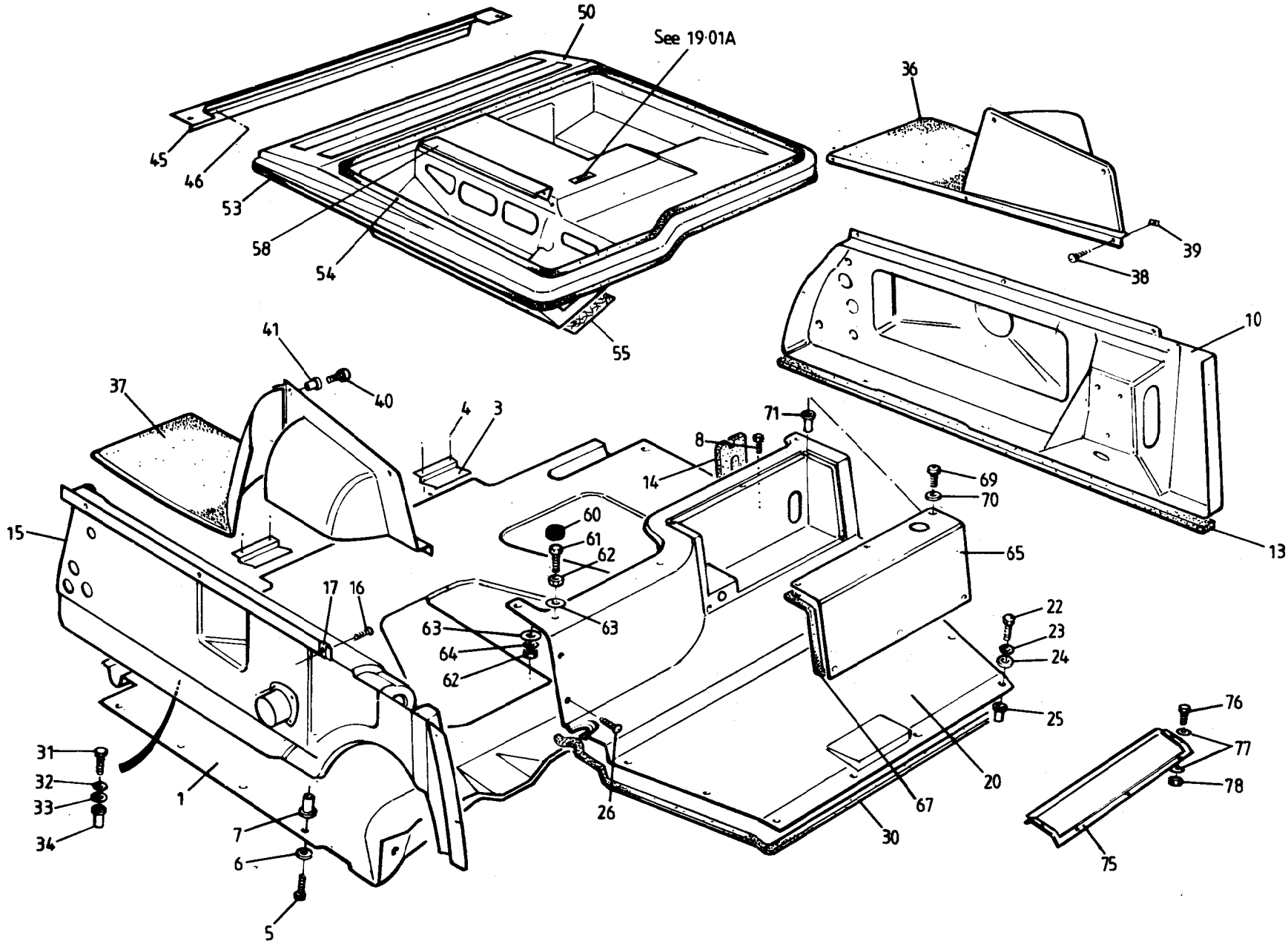
ESPRIT '93
10.11A

FUNCTION CODE	CONTENTS : Tailgate & Release Mechanism		QUANTITY		
10.11A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Tailgate Assembly (With provision for aerofoil)	A082B5057J	1		s4
	" " (No provision for aerofoil)	P691.1011.001AJ	1	1	S4S,Sport 300 (body mounted aerofoil)
3	Canopy, tailgate	B082B5024J	1		
	Nut, **M5, Nyloc,** canopy to tailgate	A075W3008Z	8		
	Spacer washer, neoprene, canopy to tailgate	A082W4115F	20		
	'Washer, flat, canopy fixing	A075W4000Z	8		
7	Grille, tailgate vent	A082B5012F	2		
8	Screw, M4 x 16, grille to tailgate	A082W5141F	22		
9	Washer, flat, grille fixing	A1OOW4120F	28		
10	Grommet, rear screw fixings	A082U6235F	6		
11	Tape, 40mm wide, aerofoil fixing hole blanking	A082U6072V	A/R		
15	Gas Strut, tailgate support	A082U6169F	2		S4 (With aerofoil on tailgate)
	" " " "	P691.1011.6O1AF	2	1	S4S,Sport 300 (Body mounted aerofoil)
17	Anchor bracket, strut to bulkhead, RH	B082U7358F	1		
18	" " " " " LH	B082U7359F	1		
19	Tapping plate, gas strut to tailgate	A082U7441F	2		
20	Spreader plate, gas strut bracket	A082U7524F	2		
21	Screw,M6 x 16, tap./spreader plate	A082W7105F	2		
25	Studplate, anchor bracket to body	B082U7125F	2		
26	Washer, flat, M6 x 15, studplate to anchor brkt.	A075W4015Z	8		
27	Nut, nyloc, M6, studplate to anchor bracket	A075W3009Z	8		
28	Washer, M8 x 16, gas strut to anchor bracket	A075W4020Z	2		
29	Nut, Nyloc, M8, gas strut to bulkhead bracket	A907E6284F	2		
30	Screw, Btn . Hd., M5 x 40, strut to tailgate	A1OOW7102F	2		
35	Drip shield, RH tailgate grille vent (large)	B082U5037F	1		
36	" " LH " " " (small)	B082B5043F	1		
37	Pop rivet, drip shield fixing	A075W6090Z	5		
	Foam strip, tailgate seal packing	A082U6067F	5.5m		
39	Weatherstrip seal, tailgate	A082U7059F	1		
	Tape, double sided, tailgate seal fixing	A082U6198V	1.2m		
41	Hinge blade, tailgate, RH	C082U5952F	1		
42	" " " LH	C082U5951F	1		
43	Tapping plate, RH	BC82U7020K	1		
	" " LH	B082U7021K	1		
45	Screw, M6, stainless, hinge fixing	A1OOW7096F	6		

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS : Tailgate & Release Mechanism		QUANTITY		
10.11A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
46	Washer, Spring M6, hinge fixing	A075W4035Z	6		
47	Washer, stainless, hinge fixing	A082W4133F	6		
	Permabond A115, hinge fixings	A036B6370V	A/R		
48	Shim plate, 1.0mm, hinge blade to tailgate	A082U7399F	A/R		
	" " 2.0mm " " " "	A082U7398F	A/R		
50	Pivot bolt, tailgate hinge	A075W1077Z	2		
51	Washer, shakeproof, pivot bolt	A075W4049Z	2		
52	Washer, flat, pivot bolt	A075W4024Z	4		
53	Pivot bracket, tailgate hinge	C082U5950F	2		
54	Setscrew, M8 x 25, hinge bracket to body	A075W1039Z	4		
55	Washer, M8 x 16, hinge bracket to body	A075W4020Z	4		
56	Gasket, hinge bracket to body	A082U5955F	2		
57	Spreader plate, fixings to body	A082U7416F	2		
58	Washer, nut to harness eyelet	A075W4020Z	2		
59	Half nut, nyloc, M8, hinge bracket fixing	A907E6284F	4		
60	Lever, tailgate release	B082U4916F	1		
61	Hinge bracket, release lever	A082U4915F	1		
62	Spiro1 pin, release lever pivot	A082W6235F	1		
63	Washer, flat, lever pivot	AO75W4011Z	1		
64	Washer, large O/D, lever bracket fixing	A075W4015Z	1		
65	Nut, nyloc, M6, lever pivot	AO75W3009Z	1		
66	Recess Moulding, release lever	A082U7085F	1		
	Screw, No.6 x l/2", Moulding to bulkhead	A075W5012Z	1		
	Washer, flat, M5 x 10, " " "	A075W4011Z	4		
70	Cable, tailgate release	C082U5995F	1		
71	Slider Assembly, tailgate latch	AO82U6087F	2		
72	Guide Plate, tailgate striker	B082U7234F	2		
73	Setscrew, M8 x 20, guide plate/slider fixing	A075W5095Z	2		)Front fixings
74	Washer, s/proof, M8 " " " "	A075W4048Z	2		)
75	Buffer, tailgate abutment	A046B6113Z	2		
76	Setscrew, M8 x 35, latch fix/abutment fix	A075W1041Z	) 2		>As required]
	" M8 x 45 " " " "	A075W1043Z	) 2		>]Rear fixings
77	Locknut, M8 " " " "	A075W3026Z	2		]
78	Washer, s/proof, M8 " " " "	A075W4048Z	2		]

FUNCTION CODE	CONTENTS : Tailgate & Release Mechanism		QUANTITY		
10.11A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
80	Striker Pin	B082U5900L	2		
81	Guide sleeve, tailgate striker pin	B082U7544F	2		Fitted to tailgate
	Nut, striker pin	A082U6092F	2		
85	Adaptor, tailgate channel drain	A082U5821K	2		
86	Pop Rivet, drain adaptor fixing	A075W6070Z	6		
	'Washer, " " "	A075W4001Z	6		
88	Elbow, tailgate channel drain	A082B6079F	2		
89	Hose, tailgate channel drain	A082U5015K	2		
90	Clip, drain hose	A075W6236F	2		
91	Pop Rivet, clip to body	A075W6087Z	2		



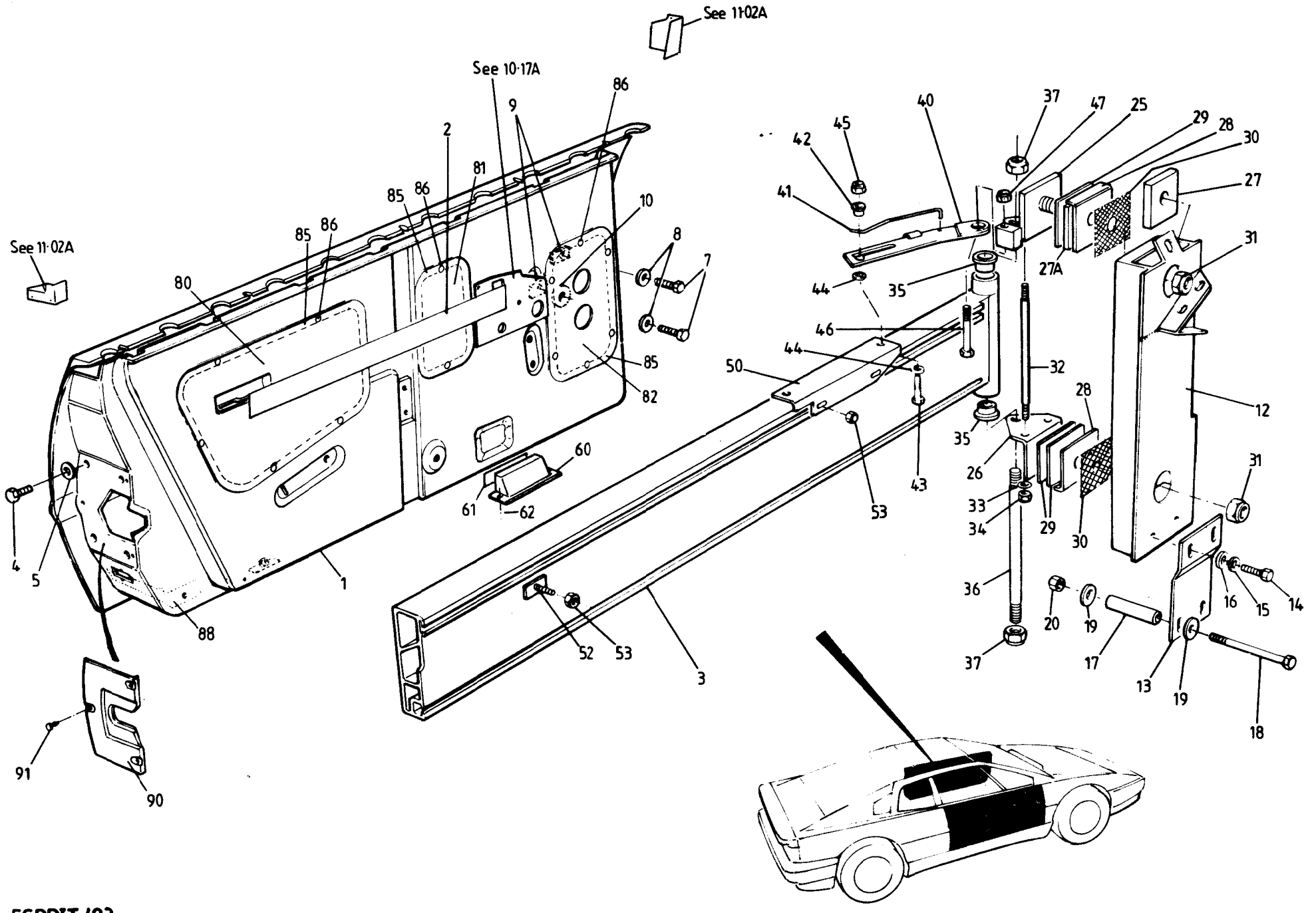
ESPRIT '93
10·13A

FUNCTION CODE

CONTENTS : Engine Compartment, Undertray

10.13A	PART DESCRIPTION	PART NUMBER	QUANTITY S4	QUANTITY SPORT 300	REMARKS
1	Undertray, engine bay	A082B5008K	1	1	* **VIN R 1242 (S4 LHD)**
3	Retainer, undertray front	A082U7508F	2	2	**R 1250 (S4 RHD)**
4	Pop Rivet, retainer to body	B075W6089Z	8	8	**R 8030** (Sport **300)**
5	Setscrew, M6 x 20, undertray to body	A075W1030Z	14	14	# **VIN R 1332 (S4)**
6	Washer, flat, " " "	A075W4013Z	14	14	**R 8035 (Sport 300)**
7	Rivnut, M6, " " "	B082W3092F	14	14	
8	Setscrew, M6 x 16, " " "	A075W1028Z	1	1	) 3rd hole from front, RH side
	Rivnut, M6, " " "	A075W3031Z	1	1	)
10	Engine Bay Sidewall, RH	B082B4782K	1	1	Prior VIN *
	" " " RH	A082B4989K	1	1	From VIN * to VIN #
	" " " RH with evap. can pipe hol	B082B4989K	1	1	From VIN #
13	Seal, engine bay sidewall, RH	A082B4805K	1	1	Made from A036B6221V
14	Foam Seal, RH sidewall/electrical box	A082B4885F	1	1	Prior VIN *
15	Engine Bay Sidewall, LH	C082B4783K	1	1	
16	Screw, No.6 x 3/4", " " "	A075W5028Z	8	8	
17	Spire Clip, sidewalls to body	A082W6255F	8	8	
20	Rear Wall/Floor, engine bay	A082B4784K	1		) For heatshields see 45.05A
	" " " " "	P691.1013.003AF		1	)
22	Setscrew, csk M6, rear wall to sidewalls	A075W7033F	2	2	
23	Washer, spring, M6, " " " "	A075W4035Z	14	14	
24	Washer, M6 x 12, " " " "	A075W4013Z	14	14	
25	Jacknut, M6, " " " "	A075W3031Z	14.	14	
26	Screw, No.8 x ½", rear wall/floor to sidewalls	A075W5034Z	4	4	
30	Seal, rear wall/floor to body	A082U6067F	2.2m	2.2m	
31	Setscrew, M6 x 18, sidewalls/floor to body	A075W1029Z	14	14	
32	Washer, spring, M6, " " " "	A075W4035Z	14	14	
33	Washer, M6 x 12, " " " "	A075W4013Z	14	14	
34	Rivnut, M6, sidewalls to body	B082W3092F	14	14	
	Screw, No.8 x 3/4", " " " "	A075W5037Z	7	7	
36	Trim Panel, rear quarter, RH	A082B4786K	1	1	) Inc. carpet. For carpet see 15.24A
37	" " " " LH	B082B4785K	1	1	)
38	Screw, No.6 x 3/4", quarter panel fixing	A075W5028Z	8	8	
39	Spire Clip, " " "	A082W6255F	8	8	
	Screw, M4, quarter panel top fixing	A082W5141F	4	4	

FUNCTION CODE	CONTENTS: Engine Compartment, Undertray		QUANTITY		
10.13A	**PART DESCRIPTION**	PART NUMBER	s4	SPORT 300	**REMARKS**
	Rawlnut, M4, quarter panel top fixing	A082W6350F	4	4	> Alternatives
	Weldnut, M4, " " " "	B082W6350F	4	4	>
45	Support Channel, engine cover front	B082U7362F	1	1	
46	Pop Rivet, support channel to bulkhead	A075W6090Z	7	7	
50	Engine Cover	B082B4778K	1		Prior VIN *. R/B C082B4778K
	" "	C082B4778K	1		From VIN *. (plastic header tank)
	" "	P691.1013.008AJ		1	
53	Seal, engine cover to sidewalls	A082V5882K	1	1	Made from A089U6055V
54	Seal, engine cover to tailgate	A082U7450K	1	1	
55	Heatshield, engine cover from turbocharger	B082B5036F	1		• VIN R 1242 (S4 LHD)
	" " " " "	P691.1013.009AK		1	R 1250 (S4 RHD)
	Pop Rivet, heatshield to cover	A075W6090Z	4	2	R 8030 (Sport 300)
	Washer, pop rivet	A075W4001Z	4	2	(Revised Harness)
	Insert/spacer, shield to engine cover	B082U7425F		1	
	Screw, M4 x 10, heatshield fixing	A075W5079F		2	
	Washer, flat, " "	A075W4062F		2	
58	Dripshield, engine cover LH side	B082BS053F	1		
	Pop Rivet, dripshield to engine cover	A075W6090Z	6		
60	Buffer, rubber, engine cover location	X046B6113Z	2	2	
61	Bolt, M8 x 25, buffer fix	A075W1039Z	2	2	
62	Locknut, M8, " "	A075W3026Z	4	4	
63	Washer, s/proof, " "	A075W4048Z	2	2	
64	Washer, flat, M8 x 17, buffer fix	A075W4020Z	4	4	
65	Cover, relay box	B082U5935K	1		
	" " "	P691.1013.00lAF		1	
67	Foam Strip, cover sealing	A036B6213V	1.5m		
	" " " "	A082U6067F		1.4m	
69	Screw, M5 x 20, cover fix	A075W5084F	6	4	
70	Washer, flat, " "	A075W4011Z		4	
71	Rawlnut, M5, " "	A075W6074F	6	4	
75	Infill Panel, boot floor, transmission access	A082B4883K	1	1	
76	Setscrew, M6 x 25, infill panel fixing	A075W1031Z	5'	5	
77	Washer, flat, M6 x 15, infill panel fixing	A075W4015Z	10	10	
78	Nut, Nyloc, M6, infill panel fixing	A075W3009Z	5	5	

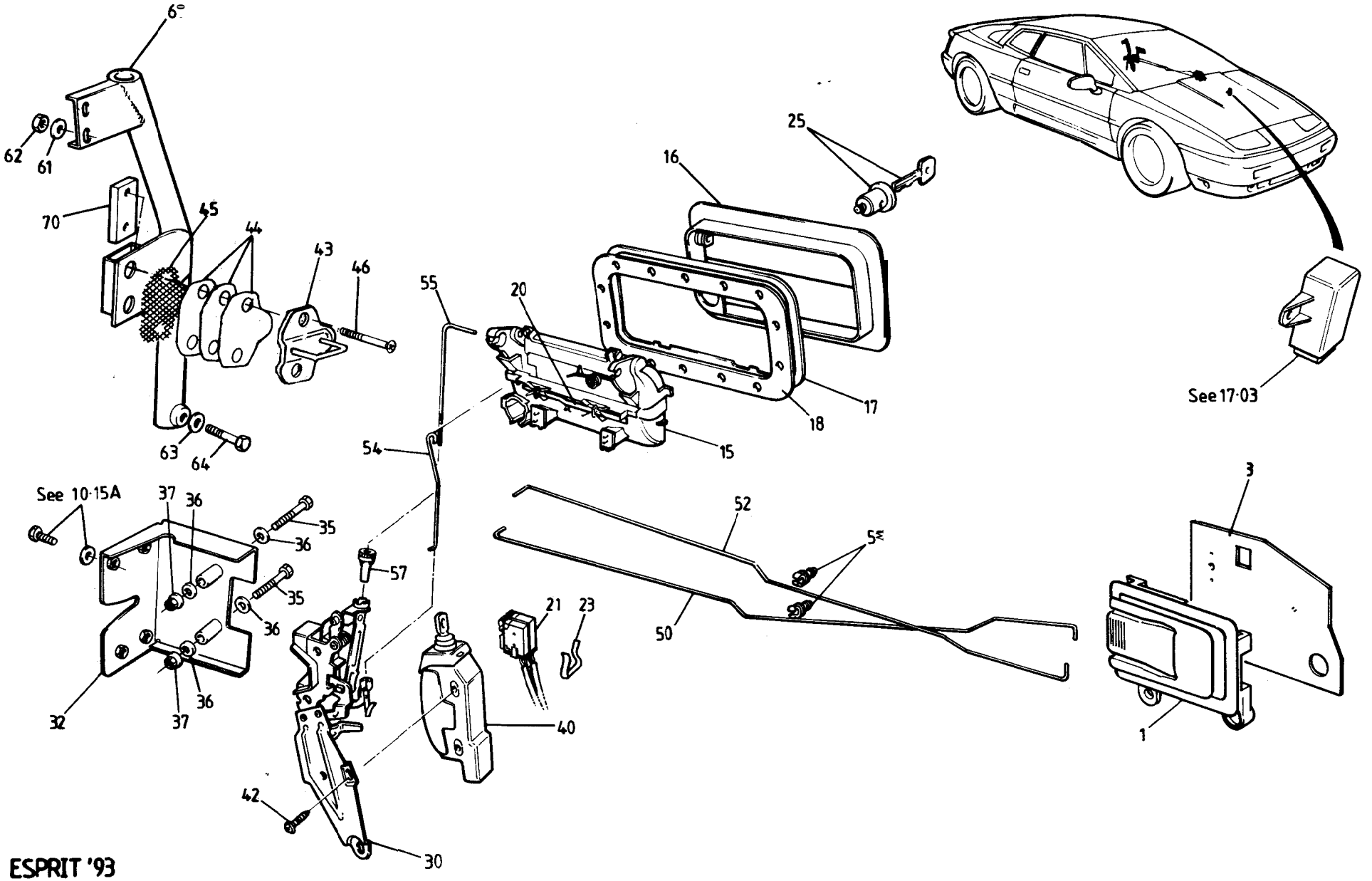


ESPRIT '93
10.15A

FUNCTION CODE	CONTENTS : Door Shell, Beam, Hinges, Hinge Post		QUANTITY		
10.15A	**PART DESCRIPTION**	**PART NUMBER.-**	ALL		**REMARKS**
1	Door Shell, LH	A082B6195K	1		USA & CDN) USA & Canada
	" " "	A082B6201K	1		Except USA & CDN) door mirrors
	Door Shell, RH	A082B6194K	1		USA & CDN) are mounted
	" " "	A082B6200K	1		Except USA & CDN) further back
2	Foam Strip, door panel anti-rattle	A082U6065V	160mm		
3	Door Beam, LH	A082U6229J	1		USA & CDN > USA & Canada
	" " "	A082U6227J	1		Except USA & CDN > door beams
	Door Beam, RH	A082U6230J	1		USA & CDN > have extra
	" " "	A082U6228J	1		Except USA & CDN > stiffening
4	Setscrew, M8 x 20, door rear to beam	A075W1038Z	6		
5	Washer, large o/d, " " " "	A075W4021Z	6		
	Washer, spacing, " " " "	A075W4003Z	A/R		If fitted
7	Setscrew, M6 x 16, door front to beam	A075W1028Z	4		
8	Washer, large o/d, " " " "	A075W4017Z	4		
9	Fixing Plate, M6, " " " "	A079U4329K	4		
10	Washer, spacing, shutline adjust	A075W4022Z	A/R		If fitted
12	Hinge Post, door, LH	C082U7251F	1		R/B E082U7251F
	" " " "	D082U7251F	1		R/B E082U7251F
	" " " "	E082U7251F	1		From VIN *
	Hinge Post, door, RH	C082U7250F	1		Except Dual S.I.R. R/B E082U7250F
	" " " "	D082U7250F	1		Dual S.I.R. R/B E082U7250F
	" " " "	E082U7250F	1		From VIN *
13	Reinforcing Bracket, hinge post to sill	A082B4485K	2		
14	Setscrew, M8 x 16, bracket to post	A075W1036Z	4		
15	Washer, spring, " " "	A075W4036Z	4		
16	Washer, flat, " " "	A075W4021Z	4		
17	Spacer Tube, bracket to sill	A082B4484F	4		
18	Bolt, M8 x 75, " " "	A075W2046Z	4		
19	Washer, large o/d, " " "	A075W4021Z	8		
20	Nut, Nyloc, M8, bracket to sill	A075W3010Z	4		* VIN No. S 2034 (S4)
25	Hinge Bracket, upper, LH	B082U7433F	1		S 4000 (S4S)
	" " " RH	B082U7432F	1		s 3095 (USA S4S)
26	Hinge Bracket, lower	A082U7102F	2		
27	Clamp Plate, door hinge	E079U4340F	4		
27A	Spacer, 5mm, hinge to body	A082U7144F	4		
28	Shim, angled edge, hinge to body	C079U4090F	4		

FUNCTION CODE	CONTENTS : Door Shell, Beam, Hinges, Hinge Post		QUANTITY		
10.15A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
29	Shim, 2.5mm, hinge to body	C079U4091F	A/R		Slotted
	" 1. 2mm, " " "	C079U4092F	A/R		
30	Shim, aluminium, " " "	A082U7199F	4		
31	Nut, Nyloc, ½" UNF, hinge to body	A079W3056F	4		
32	Tie Rod, upper to lower hinge brackets	A079U4326F	2		
	Sleeve, plastic, tie rod	**A082M6492V**	A/R		
33	Washer, tie rod to hinge	A075W4020Z	4		
34	Nut, Nyloc, M8, tie rod to hinge	A079W3056Z	4		
35	Pivot Bush, door beam	C079U4189F	4		
36	Pivot Pin, " "	B079U4558F	2		
37	Nut, Nyloc, M12, pivot pin	**A07513012Z**	4		
40	Check Strap, LH	A089U1517F	1		
	" " RH	A089U1516F	1		
41	Spring, door check, LH	A089U1515F	1		
	" " " RH	A089U1514F	1		
42	Guide, check strap	A089U1518F	2		
43	Setscrew, M6 x 30, guide to bracket	A075W2028Z	2		
44	Washer, flat, " " "	A075W4015Z	4		
45	Nut, Nyloc, M6, guide to bracket	A075W3009Z	2		
46	Bolt, M8 x 45, strap to hinge	A075W2040Z	2		
47	Nut, Nyloc, M8, " " "	A075W3010Z	2		
50	Bracket, check strap guide to beam, LH	B082U5965F	1		
	" " " " " " RH	B082U5966F	1		
52	Studplate, M6, bracket to door beam	B082U5806F	6		
53	Nut, Nyloc, M6, bracket to beam	A075W3009Z	6		
55	Setscrew, M6 x 16, door shell to latch bracket	A075W1082Z	8		Thin head
56	Washer, flat " " " " "	B082W4018F	8		
57	Washer, spring " " " " "	A075W4035Z	8		
60	Housing, air outlet flap valve	A082P4352K	2		
61	Flap, air outlet valve	A082P4351K	2		
62	Scrivet, air outlet valve flap fixing	A100W6479F	4		
	Tape, double sided, flap to housing	A082U6198V	150mm		
	Blanking plug, access panel tooling hole	A100U0156F	1		

FUNCTION CODE	CONTENTS : Door Shell, Beam, Hinges, Hinge Post		QUANTITY		
10.15A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
	Access Panel, door shell rear, RH	A082U7498K	1		
80	" " " " " LH	A082U7499K	1		
81	" " " " centre	A082U7505K	2		
82	" " " " front	A082U7555K	2		Except USA
	" " " " front	A082U7640K	2		USA
85	Foam strip, access panel sealing	A082U6067F	4.7m		
86	Fastex scrivet, 5mm, access panel fixing	A1OOW6479F	32		
	Plate, door switch/lamp mounting, RH	B082M4912F	1		
88	Plate, door switch/lamp mounting, LH	B082M4913F	1		
90	Finisher, rear door edge, RH	A082U7488K	1		
	" " " " LH	A082U7489K	1		
91	Fastex Scrivet	A1OOW6479F	6		

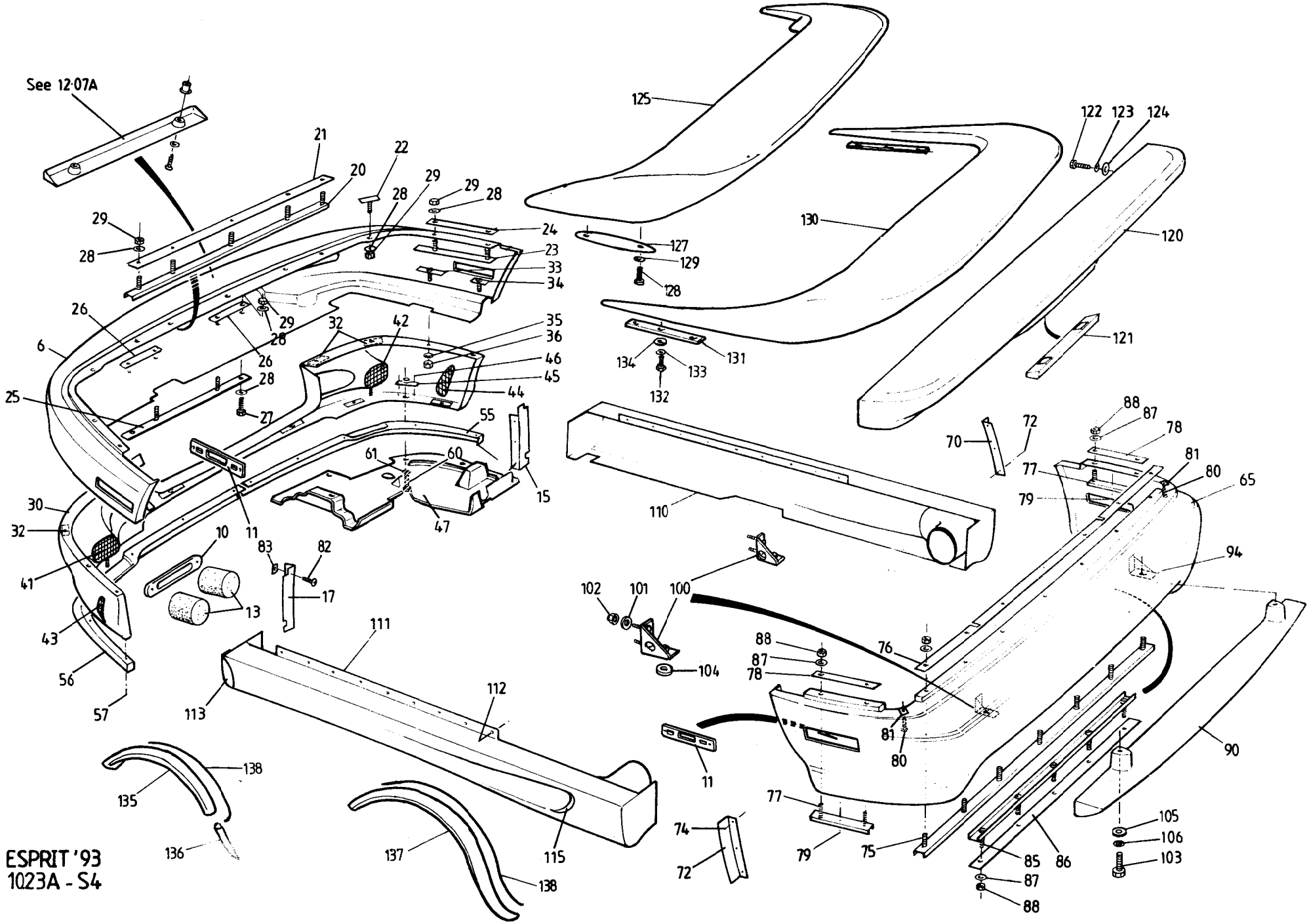


ESPRIT '93
10.17A

FUNCTION CODE	CONTENTS : Door Handles, Lock Mechanism, Striker Posts		QUANTITY		
10.17A	PART DESCRIPTION	PART NUNBER	ALL		REMARKS
1	Door Handle, interior release, LH	A082U6247F	1		
	" " " " RH	A082U6246F	1		
3	Plate, interior handle mounting, LH	A082U7493F	1		Without tie rod
	" " " " RH	A082U7492F	1		
	" " " " LH	B082U7493F	1		used with tie rod to frame
	" " " " RH	B082U7492F	1		
	Pop Rivet, plate to door shell	A075W6091F	6		
	Rawlnut, M4, inner door release fixing	A082W6350F	2		Alternatives
	Weldnut, M4, " " " "	BO82W6350F	2		
10	Tie Rod, door panel to frame	A082U7622F	2		
11	Grommet, Flexiform, tie rod	A082U6307F	150mm		
12	Washer, flat, tie rod fixing	A075W4015Z	4		
13	Washer, shakeproof, tie rod fixing	AO75W4046Z	2		
14	Nut, nyloc, M6, tie rod fixing	A075W3009Z	2		
15	Mounting Recess, exterior door handle, LH	A082U6239F	1		
	" " " " " RH	A082U6238F	1		In primer
16	Lifting Flap, exterior door handle	A082U16240F	2		
17	Gasket, exterior handle to door	A082U6241F	2		
18	Plate, exterior handle reinforcement	B082U6233F	2		Bonded to door shell
20	Slider, exterior handle retention	A082U6259F	2		
21	Micro Switch Assembly, driver's door ext. lock	A082M4916J	1		
	" " " passenger's " " "	A082M4917J	1		
23	Clip, micro switch retaining	A082M6525F	2		
25	Lock Barrel & Keys, driver's door	A082U6300S	1		
	" " " " passenger's door	A082U6301S	1		
	Lock Set, LHD	B082H6059F	1		Inc. barrels and keys for steering lock, driver's & passenger's doors, & glovebox latch
	" " RHD	B082H6060F	1		
30	Latch Mechanism, LH door	A082U6243F	1		
	" " RH door	A082U6242F	1		
32	Bracket, door latch to beam, LH	A082U6231F	1		
	" " " " " RH	A082U6232F	1		
35	Bolt, M8 x SO, latch bracket to beam	A075W2041F	4		
36	Washer, flat " " " "	A079W4019F	8		
37	Nut, M8 Kaylock, " " " "	A1OOC6022F	4		

1995 / on

FUNCTION CODE	CONTENTS : Door Handles, Lock Mechanism, Striker Posts		QUANTITY		
10.17A	**PART** DESCRIPTION	PART NUMBER	ALL		**REMARKS**
40	CDL Motor, drivers side	A082U6245F	1		
	I II passengers side	A082U6244F	1		
42	Screw, CDL motor to latch	A082W5197F	4		
43	Striker Plate, door latch	A082U6262F	2		
44	Spacer, door latch striker	A082U6263F	6		
45	Friction Plate, striker to body	A082U7477F	2		
46	Screw, csk, M8 x 40, striker plate fixing	A082W7107F	4		
	Rod, interior lock to latch, RH	B082U7460F	1		
50	" " " " " LH	B082U7461F	1		
	Rod, interior release to latch, RH	A082U7462F	1		
52	" " " " " LH	A082137463F	1		
	Rod, exterior lock to latch, RH	C082U7464F	1		
54	" " " " " LH	C082U7465F	1		
55	Rod, exterior release to latch	A082U7466F	2		
56	Clip, exterior release rod to handle	A082U6267F	2		
57	Adjuster Nut, exterior release rod	A082U6269F	2		
58	Guide Clip, interior lock/release rods	A075J6027Z	4		
	Striker Post, RH	G079U4382F	1		
60	" " LH	G079U4381F	1		
61	Washer, striker post top	A075W4021Z	4		
62	Nut, Nyloc, M8, striker post top	A075W3010Z	4		
63	Washer, flat, M12, striker post bottom	A075W4071F	2		
64	Setscrew, Ml2 x 30, " "	AO79W1058F	2		
70	Tapping Plate, door striker	A082U7472F	2		


See 12·07A
ESPRIT '93
1023A - S4

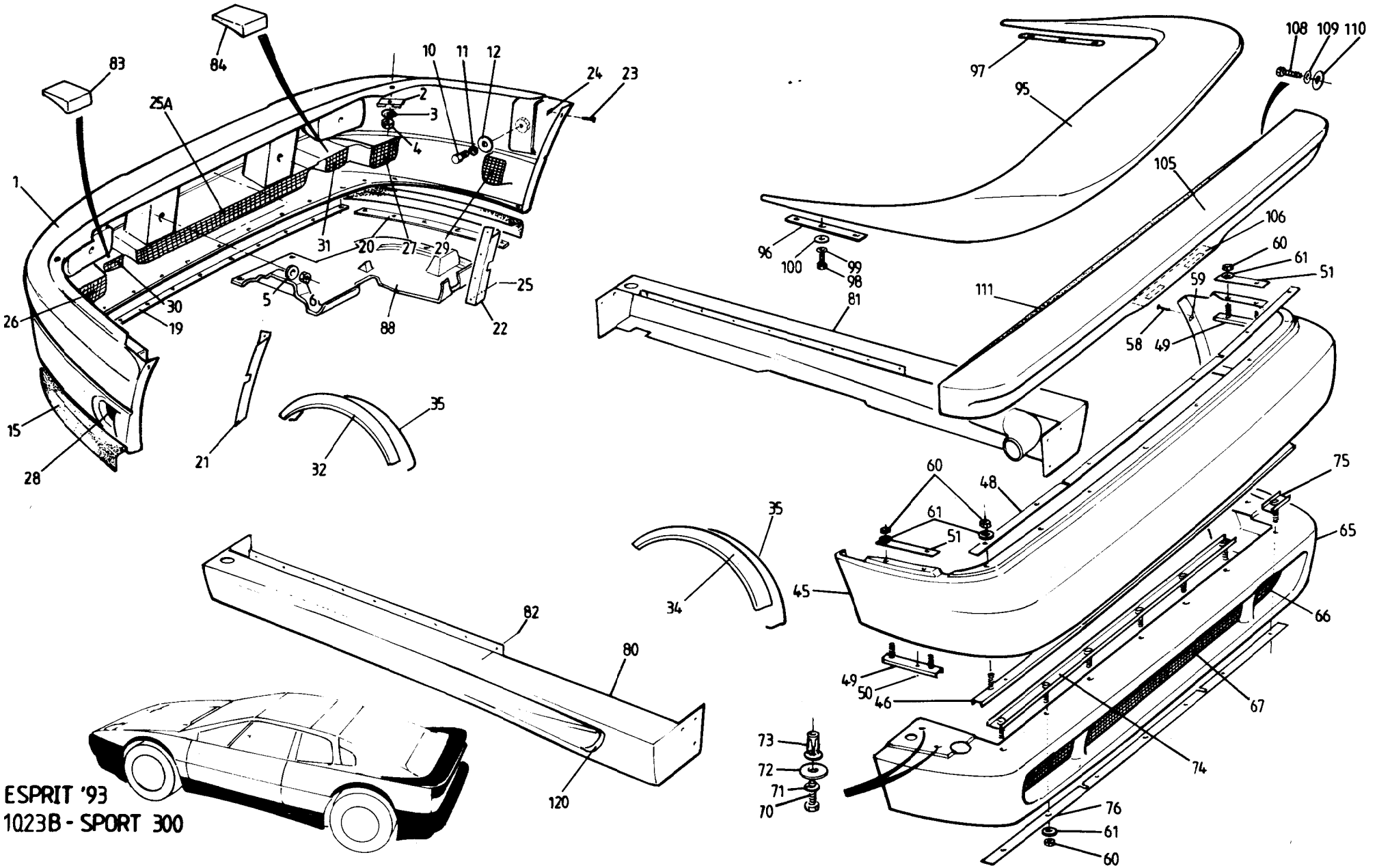
FUNCTION CODE	CONTENTS : S4,S4S: Bumpers, Sills, Valances, Spoilers		QUANTITY		
10.23A	**PART DESCRIPTION**	**PART NUMBER**	non-USA	USA	**REMARKS**
6	Bumper, front, GFRP	A082B5086K	1		/B RRIM bumper A082B5116K
	" " RRIM	A082B5116K	1		
	" " "	A082B5173K		1	ide marker lamp apertures
10	Panel, indicator mounting	A082B5168K		2	
11	Panel, side marker lamp mounting	A082B8180K		4	bonded to bumper
	Foam, front bumper	A082B5171K		1	
13	Foam, indicator support	A082B5169F		4	
15	Plinth, front bumper to wheelarch, RH	B082B4960K	1		se with GFRP bumper) Except non-USA
	" " " " " "	A082B5202K	1	1	' " RRIM ") S4S
	" " " " " "	A082B5288K	1		' " " " non-USA S4S only
17	" " " " " LH	B082B4959K	1		' " GFRP ") Except non-USA
	" " " " " "	A082B5201K	1	1	' " RRIM ") S4S
	" " " " " "	A082B5278K	1		' " " " non-USA S4S only
19	Pop Rivet, waterproof, plinth to body	A075W6068Z	6	6	
20	Studplate, bumper front to body	A082B4809F	1	1	stud
21	Washer Plate, " " " "	A082B4810F	i	1	
22	Studplate, M6 x 25, 'spoiler to bumper	A082B5002F	6	6	stud
23	Studplate, bumper sides to body	A082B4813F	2	2	stud
24	Washer Plate, " " " "	A082B4814F	2	2	
25	Studplate, bumper rear to body	A082B4820F	1	1	stud
26	Washer Plate, " " " "	B082B4818F	2	2	
27	Setscrew " " " "	A075W1031F	2	2	
2%	Washer, flat, bumper to body	A075W4015Z	15	15	
29	Nut, Nyloc, M6, " " "	A075W3009Z	15	15	
30	Spoiler, front, GFRP	A082B5088K	1		
	" " RRIM	A082B5157K	1	1	
32	Plate, fixing reinforcement, spoiler front	A082U7459F	4	4	
33	Studplate, spoiler to bumper	A082B5002F	6	6	
34	" " " "	A082B7321F	2	2	
35	Washer, Flat, " " "	A075W4015Z	8	8	
36	Nut, Nyloc, M6," " "	A075W3009Z	8	8	
	Grille, radiator duct	B082U7584F	1	1	
41	" oil cooler duct, LH front	A082U7585F	1	1	
42	" " " " RH "	A082U7586F	1	1	
43	" " " " LH side	A082U7587F	1	1	
44	" " " " RH "	A082U7588F	1	1	
45	Tapping Plate, spoiler lower edge/undershield	B082B4811F	8	8	

FUNCTION CODE	CONTENTS : S4,S4S: Bumpers, Sills, Valances, Spoilers		QUANTITY		
10.23A	PART DESCRIPTION	PART NUMBER	Non-USA	USA	REMARKS
46	Pop Rivet, tapping plate to spoiler	A075W6090Z	16	16	
47	Undershield, RH Section	A082B5092K	1	1	
	" LH "	A082B5091K	1	1	
	Foam Pad, undershield to oil cooler duct	A054B6110V	A/R	A/R	
55	Spoiler Lip, RH, front spoiler	A082B5084K	1	1	
56	" " LH , " "	A082B5083K	1	1	
57	Scrivet, 8mm, spoiler lip to spoiler	A1OOB6057F	10	10	
60	Setscrew, M6 x 20, front u/shield to spoiler	A075W3009Z	8	8	
61	Washer, flat, " " " "	A075W4015Z	8	8	
65	Bumper, rear, GFRP	A082B6238K	1		S4, R/B RRIM bumper A082B5118K
	" " RRIM	A082B5118K	1		
	" " GRFP	A082B5279K	1		Non USA S4S
	" " RRIM	A082B5174K		1	Side marker lamp apertures
	Foam, rear bumper	A082B5172K		1	
70	Plinth, rear bumper to wheelarch, RH	A082B4774K	1		Use with GFRP bumper) Except non USA
	" " " " " "	B082B5206K	1	1	" " RRIM ") S4S
	" " " " " "	A082B5282K	1		" " " " S4S only
72	" " " " " LH	A082B4775K	1		" " GFRP ") Except non USA
	" " " " " "	B082B5205K	1	1	" " RRIM ") S4S
	" " " " " "	A082B5283K	1		" " " " S4S only
74	Pop Rivet, plinth to body	A075W6068Z	10	10	
75	Studplate, rear bumper top to body	A082B4815F	1	1	7 stud
76	Washer Plate," " " " "	B082B4816F	1	1	
77	Studplate, rear bumper top sides	A082B4817F	2	2	2stud
78	Washer Plate," " " "	B082B4818F	2	2	
79	Pop Rivet, studplate fixing	A075W6090Z	2	2	
80	Screw, c/s, " " " "	A076W5087Z	2	2	
81	Captive Nut, rear bumper top corner	A1OOW6372F	2	2	
82	Screw, bumper ends to plinth	A075W5074F	8	8	
83	Spire Nut," " " "	A075W6172F	8	8	
85	Stud Plate, rear valance bottom to body	A082B5102F	1	1	5stud
86	Washer Plate, " " " " "	A082B5103F	1	1	
87	Flat Washer, M6x12," "	A075W4013Z	16	16	
88	Nut, M6, rear bumper fixing	A075W3020Z	16	16	

1995 / 02

FUNCTION CODE	CONTENTS : S4,S4S: Bumpers, Sills, Valances, Spoilers		QUANTITY		
10.23A	PART DESCRIPTION	PART NUMBER	Jon-USA	USA	REMARKS
90	Aerofoil, rear valance, RH exhaust outlet	A082B6241K	1		2.2 engine. Use with GFRP bumper
	" " " " " "	B082B6241K	1		" " " " RRIM "
	" " " " " "	A082B5175K		1	" " " " RRIM "
	" " " LH " "	A082B6244K	1		2.0 engine. Use with GFRP bumper
	" " " " " "	B082B6244K	1		" " " " RRIM "
94	Spreader Plate, aerofoil to bumper	A082U7459F	2		)
95	Setscrew, M6 x 25, " " "	A075W1031Z	2		) Use with GFRP bumper.
96	Washer, M6, internal spring, aerofoil fixing	A075W4046Z	2		) Fixed from inside bumper
97	Washer, flat, M6 x 12, " "	A075W4013Z	2		) down into aerofoil
100	Bracket, rear valance aerofoil to body	A082U7634F	2	2	>
101	Penny Washer, " " " "	A075W4017Z	4	4	>
102	Nut, M6, aerofoil bracket to body	A075W3020Z	4	4	> Use with RRIM bumper.
103	Setscrew, M6 x 25, valance aerofoil to bracket	A075W1031Z	2	2	> Aerofoil fixes up to bracket
104	Spacer, aluminium, " " " "	A907E0696Z	2	2	>
105	Washer, flat, " " " "	A075W4013Z	2	2	>
106	Washer, M6, internal spring, aerofoil fixing	A075W4046Z	2	2	>
110	Sill, LH, inc duct	A082B5163S	1	1	Except non USA S4S
	" " " "	B082B5163S	1		S4S
111	" RH, " "	A082B5164S	1	1	Except non USA S4S
	" " " "	B082B5164S	1		S4S
112	Pop Rivet, sill to body	A075W6089Z	30	30	
113	Sill Guard, LH	A082B5165K	1	1	) Fitted to front of sill with
	" " RH	A082B5166K	1	1	) Betaseal
115	Film Tape, sill duct anti-chip, LH	A082B5061K	1	1	
	" " " " " " RH	A082B5062K	1	1	
120	Spoiler, rear body	A082B6230K	1	1	Also order infill panel
121	Infill Panel, rear spoiler, licence plate lamps	B082B6232K	1		Rectangular licence plate; 'E'lamps
	" " " " " " "	C082B4935K	1	1	Square licence plate; 'D.O.T.'lamps
122	Setscrew, M6 x 20, spoiler to body	A075W1036Z	5	5	
123	Washer, spring, M6, " " "	A075W4046Z	5	5	
124	Washer, flat, M6 x 25," " "	A075W4017Z	5	5	
125	Aerofoil, tailgate mounted	A082B5093K	1		
	" " "	A082B5191K		1	Provision for centre high)
					mounted stop lamp (CHMSL))
127	Gasket,	A082U7545K	2	2	>) S4
128	Screw, caphead, M6 x 20,	A082W7041F	4	4	>Tailgate mounted aerofoil)
129	Washer, flat,	A075W4013Z	4	4	>)

FUNCTION CODE	CONTENTS : S4,S4S: Bumpers, Sills, Valances, Spoilers		QUANTITY		
10.23A	PART DESCRIPTION	PART NUMBER	Non-USA	USA	REMARKS
130	Aerofoil, rear body mounted	P691.1023.OO1AK	1		
	Aerofoil, " " "	A082B5262J		1	With provision for CHMSL
131	Spreader Plate, aerofoil to body	P691.1023.002AF	2	2	) >
	Gasket, " " "	P691.1023.003AK	2	2	) Rear body >
132	Setscrew, M6 x 20 " " "	A075W1030Z	6	6	) mounted aerofoil > S4S
133	Washer, shakeproof " " "	A075W4046Z	6	6	) >
134	Washer, flat " " "	A075W4013Z	1	1	) >
	Film Tape, body joint line, outboard of door striker	A082B5107K	2	2	
	" " " " " inboard of door striker, LH	A082B5108K	1	1	
	" " " " " inboard of door striker, RH	A082B5109K	1	1	
135	Spat front wheelarch extension, LH	A082B5265J	1		
	" " " " RH	A082B5266J	1		
136	" " lower wheelarch extension LH	A082B5273J	1		
	" " " " " RH	A082B5274J	1		
137	" rear wheelarch extension LH	A082B5269J	1		Non USA S4S
	" " " " RH	A082B5270J	1		
138	Edging strip, wheelarch extensions/body	P530.1023.036AV	A/R		
	Adhesive, edging strip to wheelarch extension	A075U6045V	A/R		
	Tape, anti stone chip, rear wheelarch LH	A082U7711K	1		
	" " " " " " RH	A082U7710K	1		



ESPRIT '93
1023B - SPORT 300

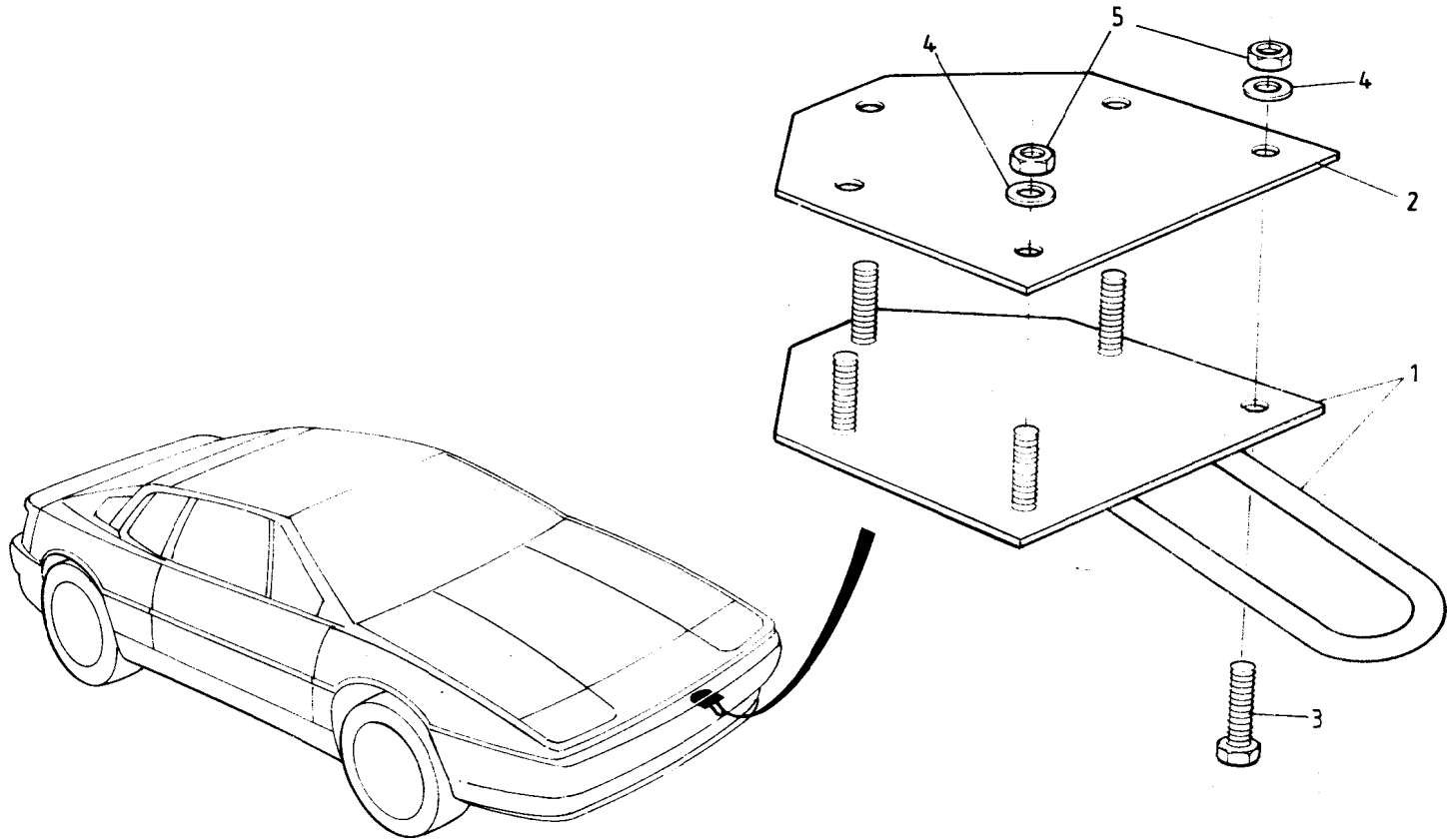
FUNCTION CODE

CONTENTS: Sport 300: Bumpers, Sills, Valances, Spoilers

10.23B	PART DESCRIPTION	PART NUMBER	QUANTITY SPORT 300	REMARKS
1	Bumper, front	P691.1023.009AK	1	
2	Washer plate, Bumper top edge to body	A082B4812F	2	
3	Washer, flat " " " " "	A075W4015F	2	
4	Nut, Nylock M6 " " " " "	A075W3009F	2	
	Spacer, 1.8mm plastic sheet, bumper front	P691.1023.034AK	A/R	
5	Washer, flat, " " "	A075W4021Z	2	
6	Nut, M8 Nyloc, " " "	A075W3010Z	2	
	Spacer, 2.4mm plastic sheet, bumper side	P691.1023.037AK	A/R	
	" 1.8mm " " " "	P691.1023.036AK	A/R	
10	Setscrew, M8 x **25,** " " "	A075W1039Z	2	
11	Washer, spring, " " "	A075W4036Z	2	
12	Penny Washer, " " "	A075W4021Z	2	
15	Spoiler Lip, front	P691.1023.O10AF	1	
	Setscrew, M5 x 20, lip to spoiler	A075W1025F	31	
	Washer, flat, " " "	A075W4011Z	31	
	Nut, M5 Nyloc, " " "	A075W3008Z	31	
19	Spreader Plate, spoiler lip centre	P691.1023.021AF	1	
20	" " " " side	P691.1023.022AF	2	
21	Closing Panel, front bumper to wheelarch, LH	P691.1023.015AK	1	
22	" " " " " " RH	P691.1023.016AK	1	
23	Screw, no.8 x **3/4"**, panel to bumper end	A075W5074Z	6	
24	Spire Nut, no.8, " " " "	A075W6016Z	6	
25	Pop Rivet, panel to wheelarch	A075W6071Z	14	
25A	Grille, radiator air intake	A082B4812F	1	
26	Grille, oil cooler duct intake, LH	AO82U7301F	1	
27	" " " " " RH	A082U7302F	1	
28	" " " " outlet, LH	A082U7317F	1	
29	" " " " " RH	A082U7318F	1	
30	Grille, brake cooling duct, LH	P691.1203.001AK	1	
31	" " " " RH	P691.1203.002AK	1	
32	Spat, front wheelarch extension, LH	P691.1023.023AK	1	
	" " " " RH	P691.1023.024AK	1	
34	Spat, rear wheelarch extension, LH	P691.1023.025AK	1	
	" " " " RH	P691.1023.026AK	1	
35	Edging strip, wheelarch extension/body	P530.1023.036AV	4.5m	

FUNCTION CODE	CONTENTS: Sport 300: Bumpers, Sills, Valances, Spoilers		QUANTITY		
10.23B	PART DESCRIPTION	PART NUMBER	SPORT 300		REMARKS
38	Screw, s/t, No.8 x 3/4", bumper end fixing	A075W5074Z	4		
39	Spire Nut, bumper end to wheelarch	A075W6172F	4		
41	Nut, M5 Nyloc, " " " "	A075W3008Z	12		
42	Washer, flat, """" "	A075W4011Z	12		
45	Bumper, rear	P691.1023.038AK	1		
46	Studplate, rear bumper top to body	A082B4815F	1		
	Pop Rivet, studplate to rear bumper	A075W6090Z	3		
48	Washer Plate, rear bumper top to body	A082B4816F	1		
49	Studplate, rear bumper to body side	A082B4817F	2		
50	Pop Rivet, studplate to rear bumper	A075W6090Z	2		
51	Washer Plate, rear bumper to body side	B082B4818F	2		
	Plinth, rear bumper end mounting, LH	A082B4775K	1		
	" " " " " RH	A082B4774K	1		
	Pop Rivet, plinth to body	A075W6068Z	4		
60	Nut, M6, valance and bumper to body	A075W3020Z	18		
61	Washer, flat, M6 x 12, washer plate	A075W4013Z	18		
65	Valance, rear, RH exhaust tailpipe	A082B4976K	1		
66	Grille, rear valance, RH end piece (tailpipe)	A082U7383F	1		
67	" " " main section	A082U7382F	1		
	Pop Rivet, grille to valance	A075W6094Z	12		
	Washer, pop rivet	A075W4001Z	12		
70	Setscrew, M8 x 25, valance & bumper to body	A075W1039Z	4		
71	Washer, spring, M8, " " " " "	A075W4036Z	4		
72	Washer, flat, M8, " " " " "	A075W4021Z	4		
73	Pulsert, M8, " " " " "	A075W6155F	4		
74	Studplate, long, " " " " "	B082B4825F	1		
75	Studplate,short, " " " " "	A082B4868F	1		
76	Washer Plate, " " " " "	A082B4816F	1		
80	Sill, LH	P691.1023.033AJ	1		) inc. brake cooling ducts
81	" RH	P691.1023.032AJ	1		)
82	Pop Rivet, sill to body	A075W6089Z	30		
83	Deflector Panel, brake cooling, LH	P691.1023.019AK	1		
84	" " " " RH	P691.1023.020AK	1		

FUNCTION CODE	CONTENTS : **Sport** 300: Bumpers, Sills, Valances, Spoilers		QUANTITY 1		
10.23B	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
	Screw, no.8 x 3/4", deflector panel fixing	A075W5074Z	8		
	Washer, flat, M4, " " "	A1OOW4120F	8		
	Spire Nut, no.8, " " "	A075W6016Z	8		
88	Undershield, RH section	A082B5092K	1		
	" LH "	A082B5091K	1		
	'Screw, M5 x 16, undershield fixing	A082W5184F	10		
	Washer, flat, " "	A082W4109F	10		
	Jacknut, M5, " "	A076W3043F	10		
95	Aerofoil, rear	P691.1023.001AK	1		Rear 'wing'
96	Spreader Plate, aerofoil to body	P691.1023.002AF	2		
97	Gasket, " " "	P691.1023.003AK	2		
98	Setscrew, M6 x 20, " " "	A075W1030Z	6		
99	Washer, shakeproof, """	A075W4046Z	6		
100	Washer, flat, " " "	A075W4013Z	6		
105	Spoiler, rear body	A082B6230K	1		Also order infill panel
106	Infill Panel, rear spoiler, licence plate lamps	A082B6232K	1		Rectangular licence plate; 'E' lamps
	" " " " " " "	B082B4935K	1		Square licence plate; 'D.O.T.' lamps
108	Setscrew, M6 x 30, spoiler to body	A075W1032Z	5		
109	Washer, shakeproof, " " "	A075W4046Z	5		
110	Washer, flat, M6 x 15, " " "	A075W4017Z	5		
111	Foam, rear spoiler	A082B4746V	1		
	Film Tape, body joint line, outboard of door striker	A082B5107K	2		
	" " " " " inboard of door striker, LH	A082B5108K	1		
	" " " " " inboard of door striker, RH	A082B5109K	1		
120	Film Tape, sill duct anti-chip, LH	A082B5061K	1		
	" " " " " " RH	A082B5062K	1		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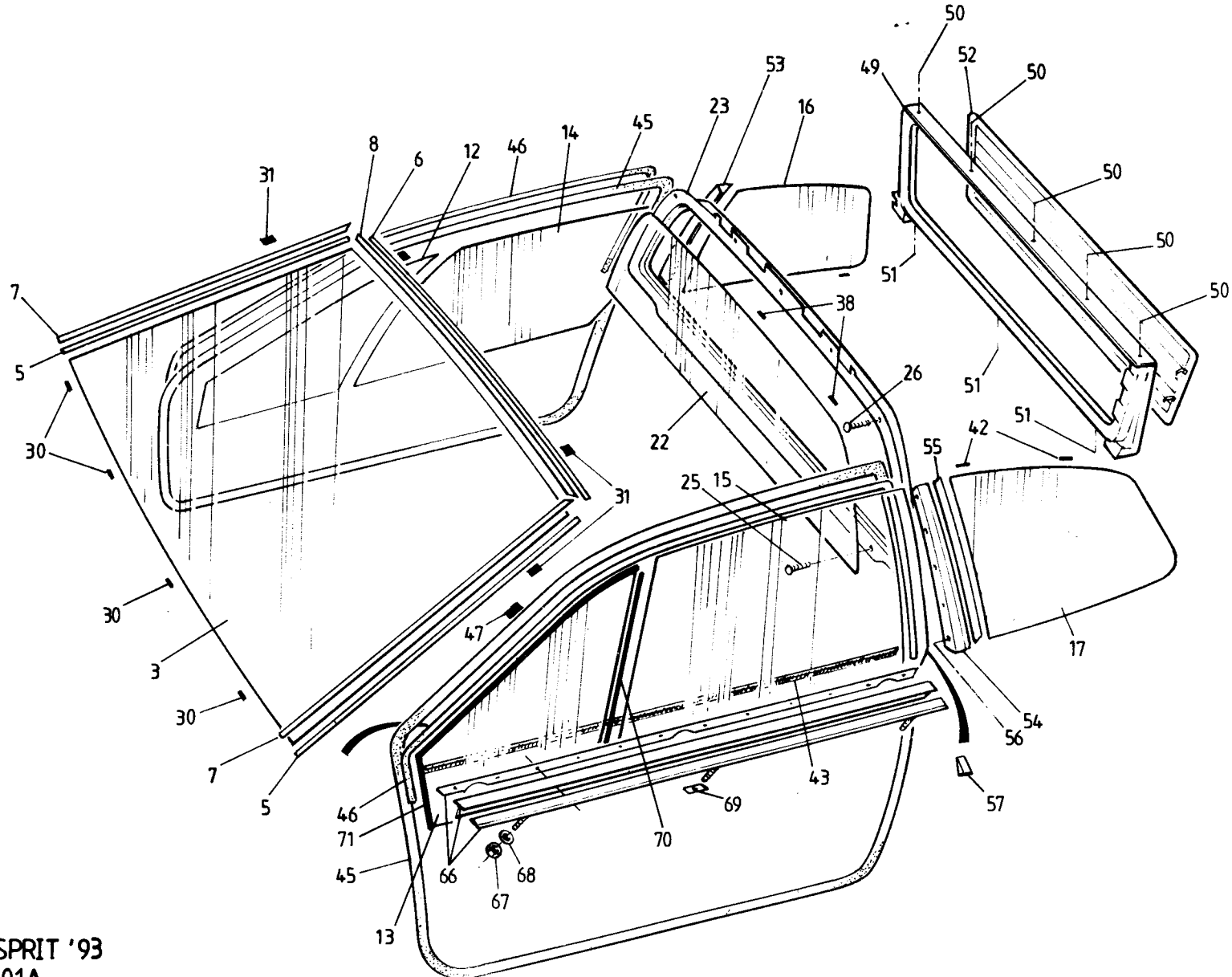
FUNCTION CODE	CONTENTS: Towing Eye & Fixings		QUANTITY		
10.31A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
1	Tow Hook	B082B4957F	1		
	" "	P691.1031.001AF		1	
2	Reinforcement Plate, towing hook	C082B4714F	1	1	
3	Setscrew, M6 x 20, tow hook fixing	A075W1030Z	1	1	
4	Washer, M6 x 12, " " "	A075W4013Z	5	5	
5	Nut, Nyloc, M6. " " "	A075W3009Z	5	5	



ESPRIT '93
11.01A

FUNCTION CODE

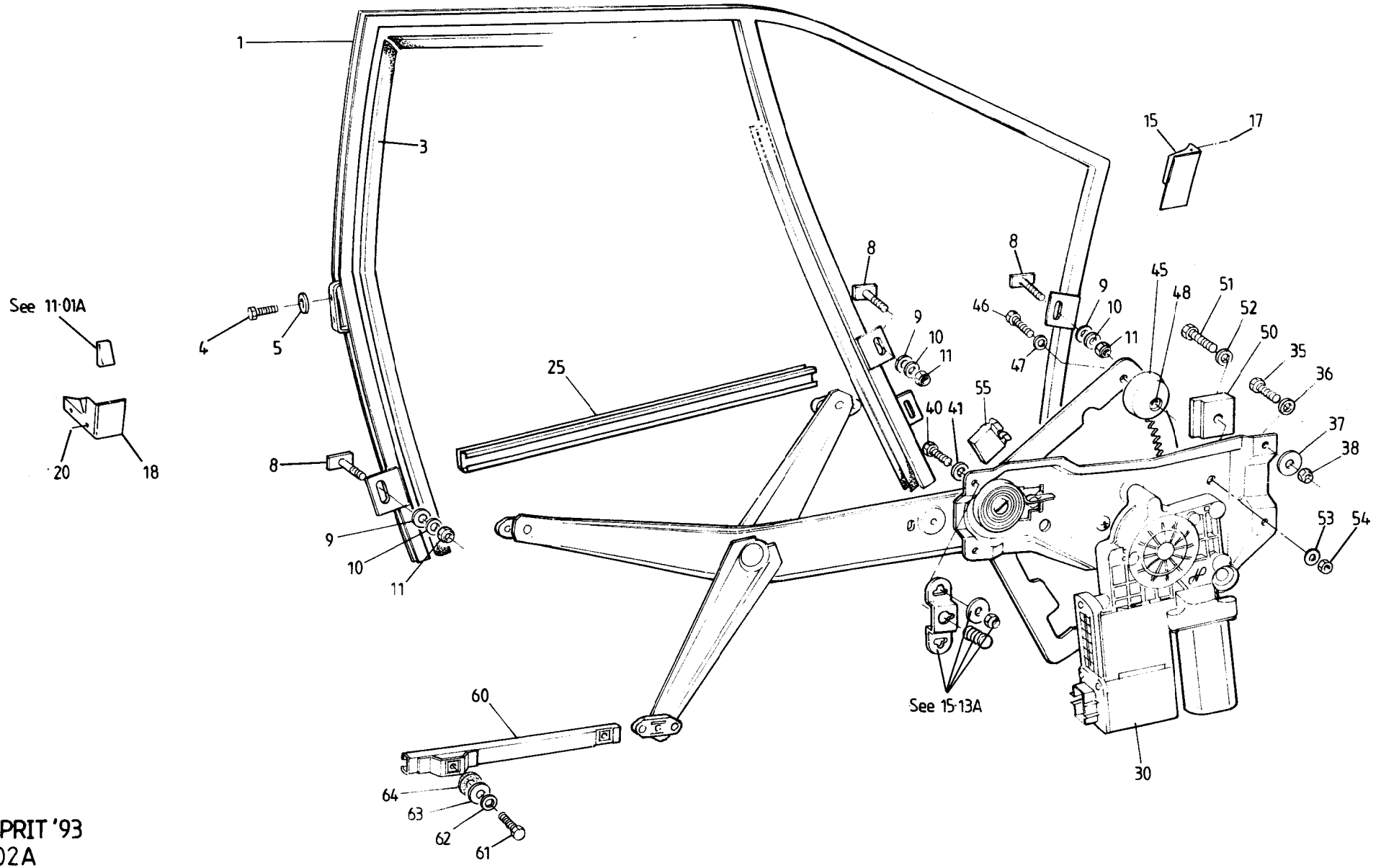
CONTENTS: Glass, Finishers, Door Weatherstrips

11.01A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
	"Betaseal" Screen Fitting Kit	A075B6158J	A/R		Used for windscreen, rear bulkhead glass, tailgate glass, rear ¼ light windows & door drop glass channel
	comprises:				
	Betaseal 71904 in 300cc cartridge		1		
	Glass primer applicator bottle		1		
	Glass primer applicator head and felt pad		1		
	Glass primer, black, 84132-11		1		
	Wipe Cleaner No.4		1		
	Piano Wire 0.6mm x 120cm		1		
	Special Cleaning Paper		1		
	Spacing Blocks 10 x 14 x 20mm		4		
3	Windscreen, tinted	B082U5791F	1		
	" clear	B082U5790F	1		Australia
5	Carrier, windscreen finisher, Sides	A082U7184F	2		
6	" " " Top	A082U7183F	1		
7	Finisher " RH/LH	A082U7178F	2		
a	" " Top	A082U7177F	1		
12	Glass, front ¼ light, tinted, RH	A082U5794F	1		
13	" " " " " LH	A082U5781F	1		
14	Drop Glass, door, tinted, RH	B082U5782F	1		
15	" " " " LH	B082U5795F	1		
16	Glass, rear ¼ light, tinted, RH	A082U5800F	1		
17	" " " " " LH	A082U5801F	1		
22	Glass, rear bulkhead, 7mm thick	B079U4032F	1		
23	Trim Surround, bulkhead glass	A082B4762K	1		
25	Screw, No.6 x ½", surround to bulkhead	A075W5014Z	9		
26	Screw, No,6 x 3/4", " " "	A075W5028Z	5		
30	Spacer, 4mm, windscreen	A075U0588Z	6		
31	" 6mm, "	A082U7065F	4		
34	Spacer, 4mm, tailgate glass	A075U0588Z	a		
38	" 4mm, bulkhead glass	A075U0588Z	6		
42	" 4mm, rear ¼ light windows	A075U0588Z	a		
43	Sealing Strip, door drop glass inner	A089V6166V	2.1m		
45	Weatherstrip, primary door seal	B079U4197F	2		
46	Secondary Seal, door window frame	C082U5779F	2		

FUNCTION CODE

CONTENTS: Glass, Finishers, Door Weatherstrips

11.01A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
47	Spacer, front j light frame	A075U0588Z	4		
49	Trim Surround, tailgate glass	B082U7449K	1		
50	Plastic Rivet, trim surround top edge fix	A082W6505F	5		
51	Pop Rivet, trim surround bottom edge fix	A075W6090Z	3		
52	Tailgate Glass, heated	A082U7436F	1		
53	Finisher, rear j light window, RH	A082U5742K	1		
54	" " " " " LH	A082U5741K	1		
55	Spacer, rear j light window finisher, 1.5mm	A082U7207K			
	" " " " " " 2.5m	A082U7209K	)A/R		
	" " " " " " 3.0mm	A082U7209K	)		
56	Pop Rivet, waterproof, finisher to 'B' post	A075W6071Z	10		
57	Fillet, door seal path	A082U6195F	4		
66	Seal & Carrier Assy, door waist exterior, RH	B082U7076J	1		
	" " " " " " " LH	B082U7077J	1		
67	Nut, Nyloc, M3, waist seal carrier to door	A079W3060F	10		
68	Washer, flat, " " " " "	A075W4001Z	10		
69	Spacer, " " " " "	A082U7353F	10		
70	Extrusion, door j light glass	A082U7536V	0.8m		Fitted to centre leg of frame
71	Foam Strip, " " " "	A036B6221V	0.8m		Fitted to j light front edge
72	Insert, door j light glass front channel	A082U7551K	1		LH inner/RH outer
	" " " " " " "	A082U7552K	1		LH outer/RH inner
75	Support Bracket, door ¼ light glass	A082U7546F	2,		
76	Buffer, door j light glass support bracket	A075U6050F	2		
77	Screw, No.6 x ½", buffer bracket fixing	A075W5012Z	2		
78	Spire Nut, No.6, " " "	A075W6014Z	2		
79	Setscrew, M5 x 16, frame rear upper brkt. fix	A082W1088F	2		
80	Washer, flat, " " " " "	A082W4098F	2		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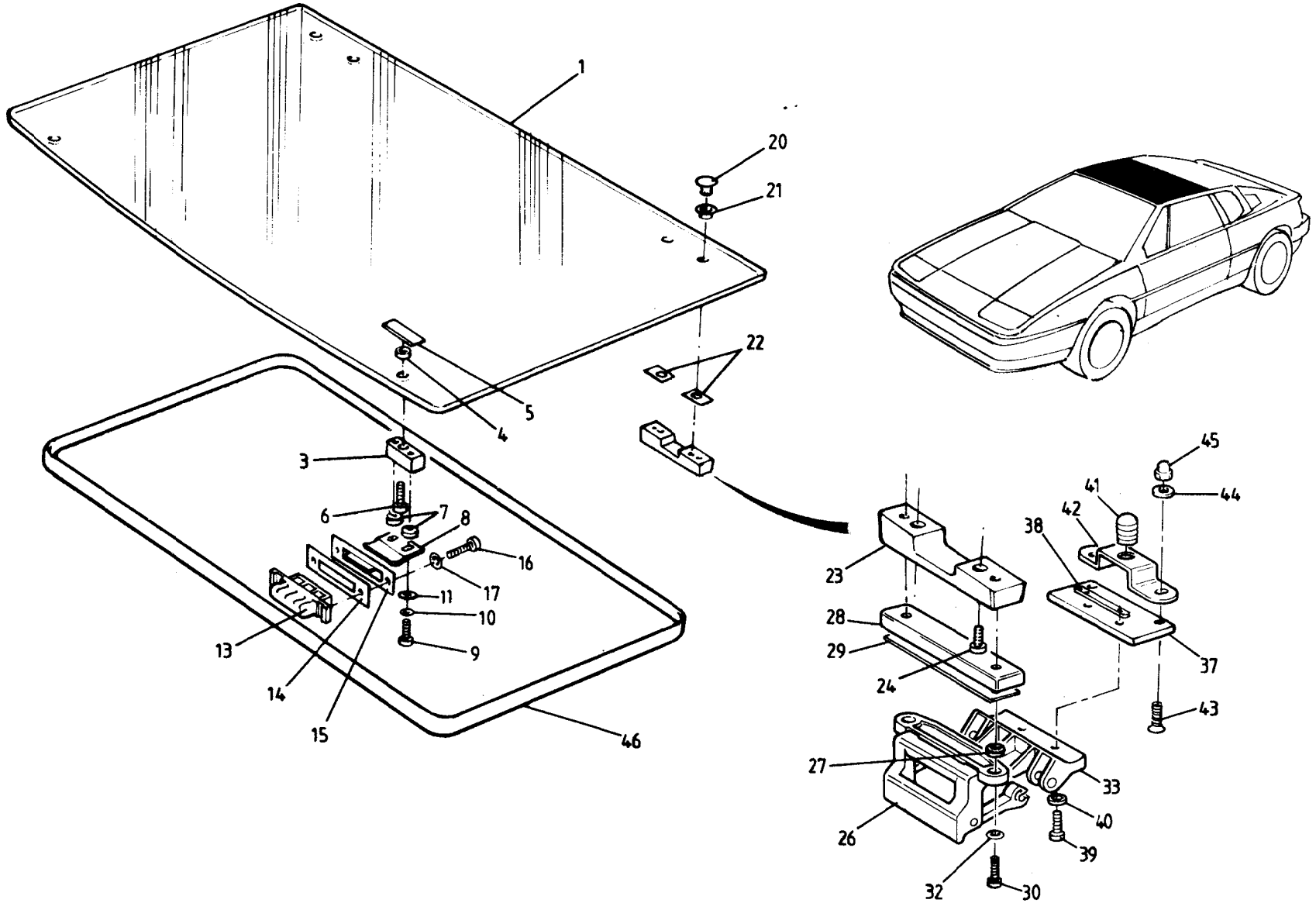
FUNCTION CODE	CONTENTS: Door Window Frames, Window Lift Mechanism		QUANTITY		
11.02A	PART DESCRIPTION	PART NUMBER	EXCEP'T USA	USA ONLY	REMARKS
1	Door Window Frame, LH	G082U5783F	1	1	
	" " " RH	G082U5784F	1	1	
3	Sealing Channel, drop glass/window frame	C082U5822J	2	2	
4	Setscrew, M5 x 16, frame to top rear of door	A075W1088F	4	4	
5	Washer, flat, " " " " " "	A082W4098F	4	4	
8	Studplate, frame to doorbeam, M6 x 40	B082U5947F	10	10	
9	Washer, flat, M6 x 15, frame to door beam	A075W4015Z	6	6	
10	Washer, shake proof " " " "	A075W4046Z	6	6	
11	Nut, Nyloc, M6, " " " "	A075W3009Z	6	6	
15	Finisher, door shell/frame front, LH	A082U7013K	1	1	
	" " " " " RH	A082U7014K	1	1	
17	Pop Rivet, finisher to door shell	A075W6071Z	6	6	
18	Finisher, door shell/frame rear, LH	A082U7489K	1	1	
	" " " " " RH	A082U7488K	1	1	
20	Rokut Rivet, finisher to door shell	A100W6479F	4	4	
21	Washer, 1/8 x 3/8", finisher rivet	A082W4132F	4	4	
25	Carrier Channel, drop glass	A082U6237F	2	2	
	Shim, window lifting channel	A082U7626F	2	2	
	Tape, adhesive, lift channel shim	A100B6142F	1m	1m	
30	Window Lift Motor & Regulator Assembly, LH	A082U6255F	3		
	" " " " " "	A082M4957F		1	No obstruction sensing
	" " " " " RH	A082U6254F	1		
	" " " " " "	A082M4956F		1	No obstruction sensing
35	Setscrew, M5 x 20, window lift motor front fix	A075W1025F	4	4	
36	Washer, flat, 15mm o/d, " " " " "	A075W4014Z	4	4	
37	Washer, flat, 25mm o/d, " " " " "	A075W4004Z	4	4	
38	Nut, M5 Nyloc, " " " " "	A075W3008Z	4	4	
40	Setscrew, M6 x 20, window lift motor rear fix	A075W1030Z	4	4	
41	Washer, shakeproof, M6, " " " " "	A075W4046Z	4	4	
45	Upstop, window regulator, eccentric adjuster	A082U7531F	2		)
46	Setscrew, M6 x 16, upstop fixing	A075W1028Z	2		) If fitted
47	Washer, spring, " "	A075W4035Z	2		)
48	Nut, M6, " "	A075W3020Z	2		)

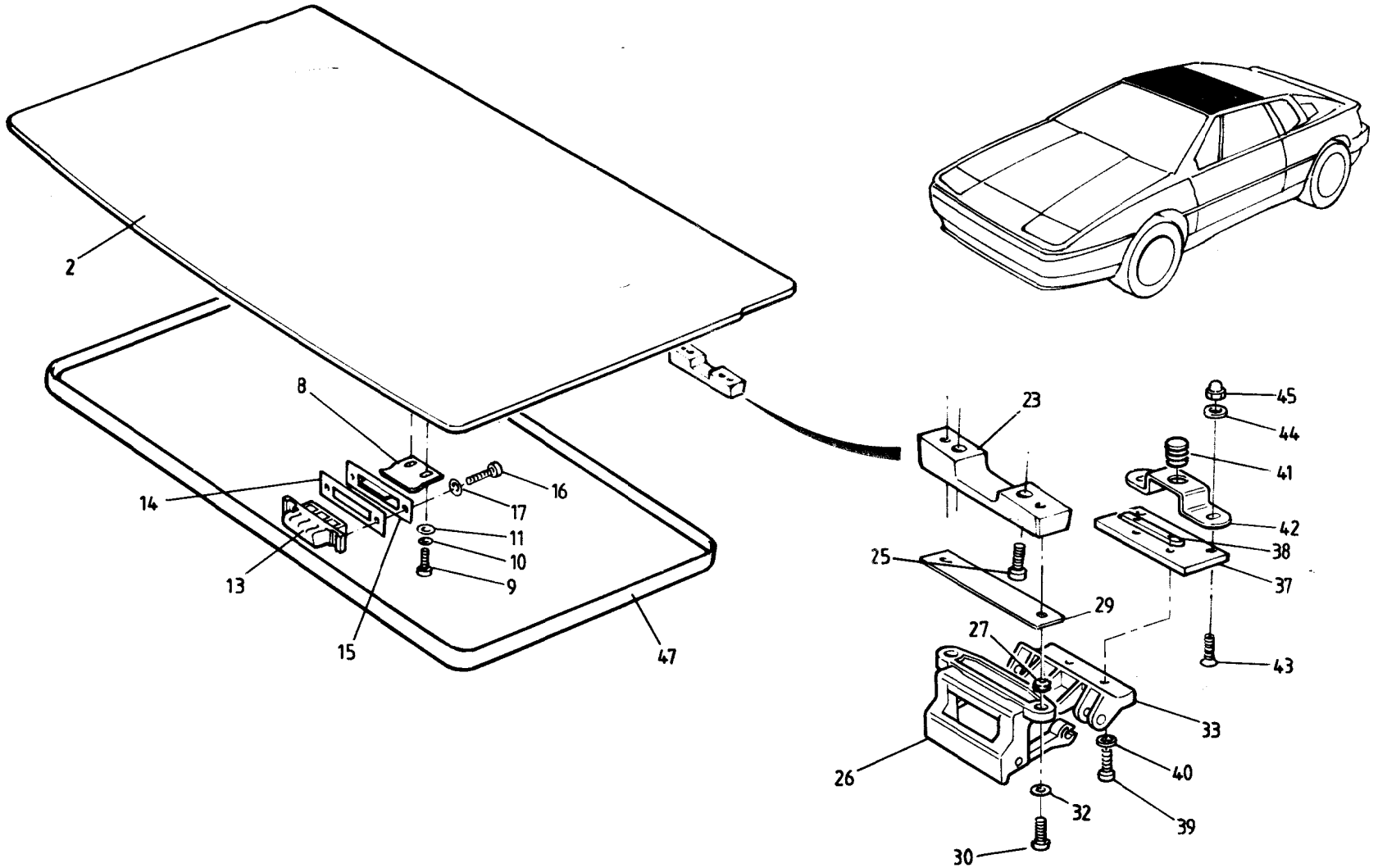
FUNCTION CODE	CONTENTS: Door Window Frames. Window Lift Mechanism		QUANTITY		
11.02A	PART DESCRIPTION	PART NUMBER.	EXCEF USA	USA ONLY	REMARKS
50	Reaction Restraint, regulator upstop	A082U7532F	2		)
51	Setscrew, M8 x 25, reaction restraint fixing	A075W1039Z	2		)
52	Washer, spring, " " "	A075W4036Z	2		) If fitted
53	Washer, flat, " " "	A075W4020Z	4		)
54	Nut, M8, " " "	A075W3021Z	2		)
55	Downstop, window regulator	B082U7494F	2		Square type for early regulator
	" " "	A082M4994F	2		Round, black type for later regulator
	" " " quadrant	A082U7641F		2	Early type regulator assemblies
	" " " "	A082M4990K		2	Later " " "
	Pop Rivet, downstop fixing	A075W6090F		2	
	Upstop, window regulator, eccentric adjuster	A082U7531F		2	) If fitted
	Setscrew, M6 x 16, upstop fixing	A075W1028Z		2	)
60	Channel, window regulator reaction	AO82U6256F	2	2	
61	Setscrew, M6 x 12, reaction channel to door	A075W1027Z	4	4	
62	Washer, spring, " " " "	A075W4035Z	4	4	
63	Washer, flat, " " " "	B082W4018F	4	4	



ESPRIT '93
11.05A - GLASS ROOF

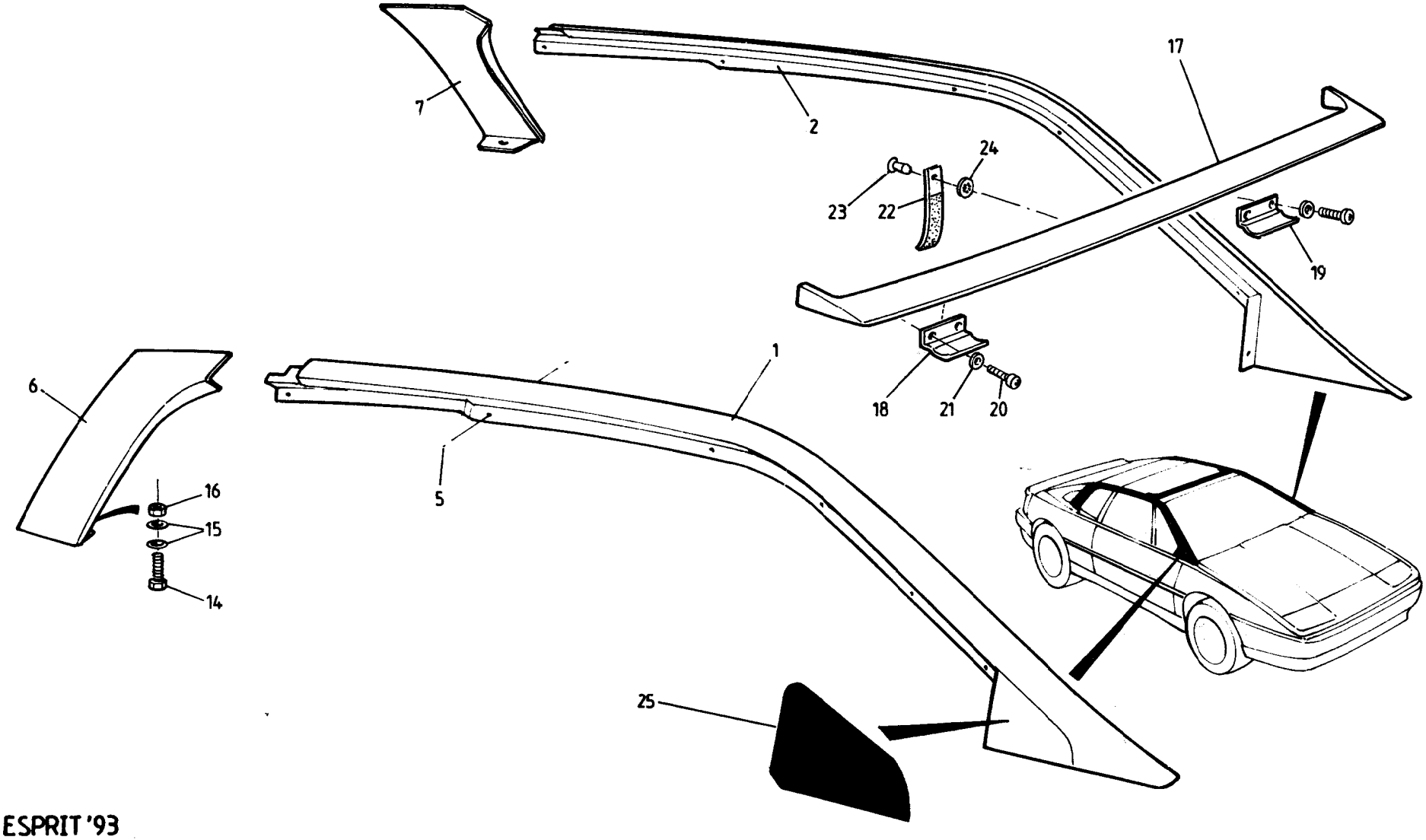
FUNCTION CODE	CONTENTS : Glass Roof		QUANTITY		
11.05A	**PART DESCRIPTION**	**PART NUMBER**	GLASS ROOF		**REMARKS**
1	Glass Roof	A082U5799F	1		R/B B082U5799F
	" "	B082U5799F	1		with obscuration band
3	Plinth, tongue to glass roof	A082U4978F	2		
4	Sealing Ring, plinth to glass roof	A082U6103F	2		
5	Tapping Plate, tongue to glass roof	A082U6100F	2		
6	Screw, M5 x 10, tapping plate to plinth	A082W5097F	2		
7	Rubber Washer, tongue to glass roof	A082W4115F	8		
8	Tongue, roof front	A082U6101F	2		
9	Screw, 10 UNF x ½", tongue to glass roof	A075W5059Z	4		
10	Washer, shakeproof, tongue to roof	A075W4045F	4		
11	Washer, flat, tongue to roof	A075140002	4		
13	Slot Recess, LH	A082U6097F	1		
	" " RH	A082U6098F	1		
14	Gasket, slot recess to body	A082U6099F	2		
15	Bracket, tongue anti-rattle	A082U5771F	2		R/B B082U5771F
	" " " "	B082U5771F	2		
16	Screw, M5 x 25, slot recess to body (Stainless)	A082W5185F	4		
17	Washer, flat, M5 x 12, " " " "	A082W4129F	4		
20	Cap Nut, plinth to glass roof	A082U6134F	4		
21	Sealing Washer, cap nut	A082U6136F	4		
	Neoprene Tube, fixings/roof isolation	AO82U6211V	24mm		
23	Plinth, handle to roof	A082U7091F	2		
24	Screw, 10 UNC x ½", plinth to glass roof	B082W5120F	4		
26	Handle Assembly 'Autoroof'	B082U6160F	2		
	Spiro1 Pin, 5/32 x 7/8", handle pivots	A082W6351F	8		
27	Grommet, handle assembly to plinth	A082U6197F	4		
28	Spacer, " " " "	B082U7138F	2		
29	Shim, lmm, " " " "	A082U7322F	A/R		
	Shim, 3mm, " " " "	A082U7323F	A/R		
30	Screw, M5 x 30, handle assembly to plinth	A082W5142F	4		
32	Washer, flat, " " " "	A082W4109F	4		

FUNCTION CODE	CONTENTS : Glass Roof		QUANTITY		
11.05A	PART DESCRIPTION	PART NUMBER	GLASS ROOF		REMARKS
33	Latch Bracket, handle assembly	B082U6161F	2		
	Spacer, latch bracket to tapping plate	A082U7092K	2		If fitted
37	Tapping Plate, latch bracket to body, LH	A082U7313F	1		
	" " " " " " RH	A082U7312F	1		
38	Tapping Bar, " " " "	A082U6200F	2		
39	Screw, 10 UNF x ½", latch bracket/tapping plate	A075W5059F	4		
40	Rubber Buffer, adjustable, roof abutment	A082U6163F	2		
41	Bracket, rubber buffer	A082U7098F	2		
42	Screw, MS x 25, bracket & tapping plate to body	A076W5087Z	4		
43	Washer, flat, buffer bracket fixing	AO82W4107Z	4		
44	Dome Nut, M5, "" "	A082U3094F	4		
45	Weatherstrip, glass roof to body	A082U6123F	3m		
	Bag, roof storage	A082V7289J	1		



ESPRIT '93
11.05B - COMP. ROOF

FUNCTION CODE	CONTENTS : Composite Roof		QUANTITY		
11.05B	PART DESCRIPTION	PART NUMBER.	COMP. ROOF		REMARKS
2	Composite Roof	B082B4670K	1		inc. headlining
	" " fixed composite	P691.1201.001AK	1		Sport 300
8	Tongue, roof front	A082U6101F	2		
9	Screw, 10 UNF x 3/4", tongue to comp. roof	A075W5058Z	4		
10	Washer, shakeproof, tongue to roof	A075W4045F	4		
11	Washer, flat, " " "	A075W4000Z	4		
13	Slot Recess, LH	A082U6097F	1		
	" " RH	A082U6098F	1		
14	Gasket, slot recess to body	A082U6099F	2		
15	Bracket, tongue anti-rattle	A082U5771F	2		R/B B082U5771F
	" " " "	B082U5771F	2		
16	Screw, M5 x 25, slot recess to body (Stainless)	A082W5185F	4		
17	Washer, flat, M5 x 12, " " " "	A082W4129F	4		
23	Plinth, handle to roof	A082U7091F	2		
25	Screw, M4 x 12, plinth to composite roof	A075W5085Z	4		
26	Handle Assembly 'Autoroof'	B082U6160F	2		
	Spiro1 Pin, 5/32 x 7/8", handle pivots	A082W6351F	8		
27	Grommet, handle assembly to plinth	A082U6197F	4		
29	Shim, 1mm, " " " "	A082U7322F	A/R		
	Shim, 3mm, " " " "	A082U7323F	A/R		
30	Screw, M5 x 16, " " " "	A082W5117F	4		
32	Washer, flat, " " " "	A082W4109F	4		
33	Latch Bracket, handle assembly	B082U6161F	2		
	Spacer, latch bracket to tapping plate	A082U7092K	2		If fitted
37	Tapping Plate, latch bracket to body, LH	A082U7313F	1		
	" " " " " " RH	A082U7312F	1		
38	Tapping Bar, " " " "	A082U6200F	2		
39	Screw, 10 UNF x ½", latch bracket/tapping plate	A075W5059F	4		
40	Rubber Buffer, adjustable, roof abutment	A082U6163F	2		
41	Bracket, rubber buffer	A082U7098F	2		
42	Screw, M5 x 25, bracket & tapping plate to body	A076W5087Z	4		
43	Washer, flat, buffer bracket fixing	A082W4107Z	4		
44	Dome Nut, M5, " " "	A082U3094F	4		
46	Weatherstrip, composite roof to body	A089U6055F	3m		
	Bag, roof storage	A082V7289J	1		

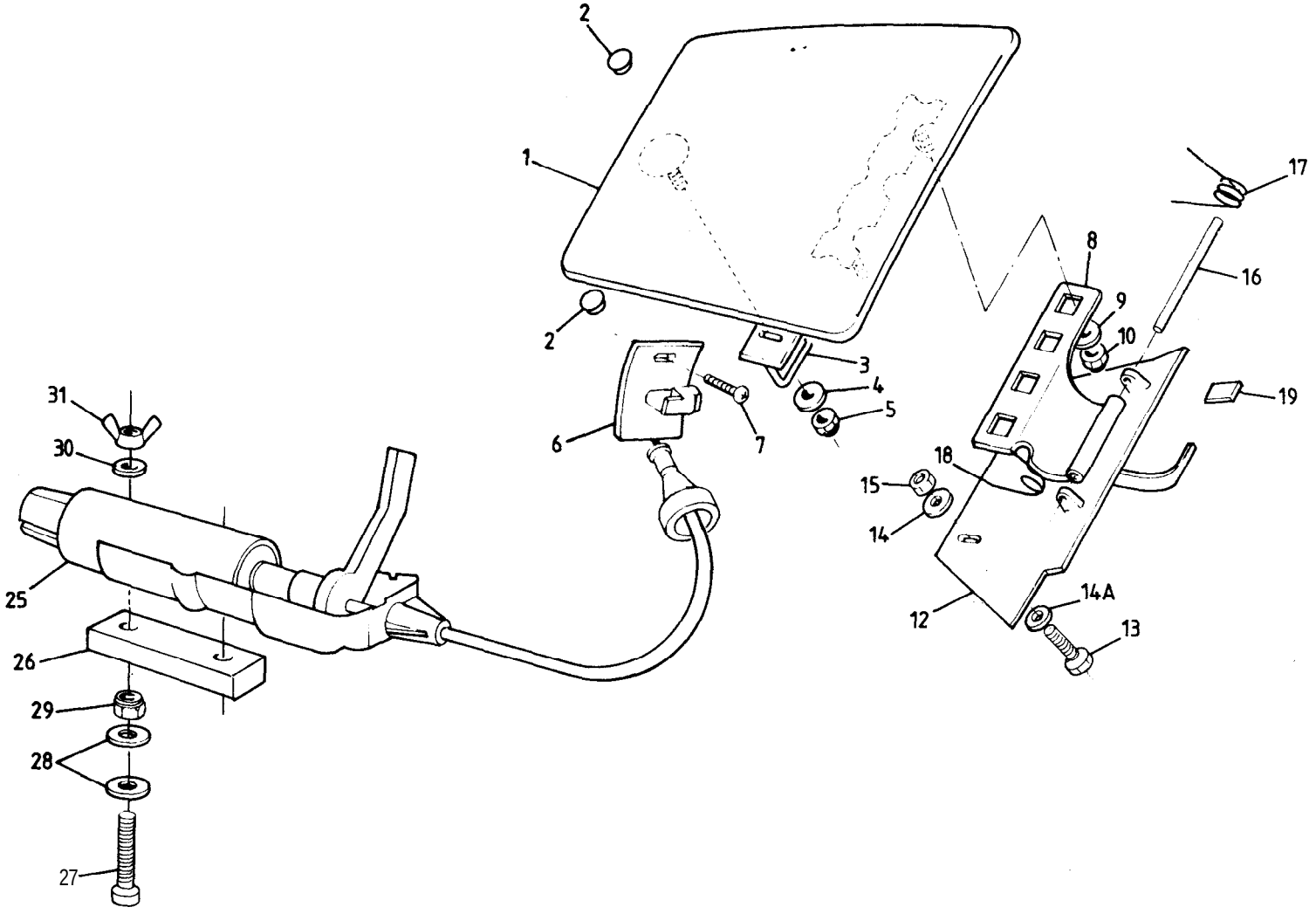


ESPRIT '93
12.01A

FUNCTION CODE

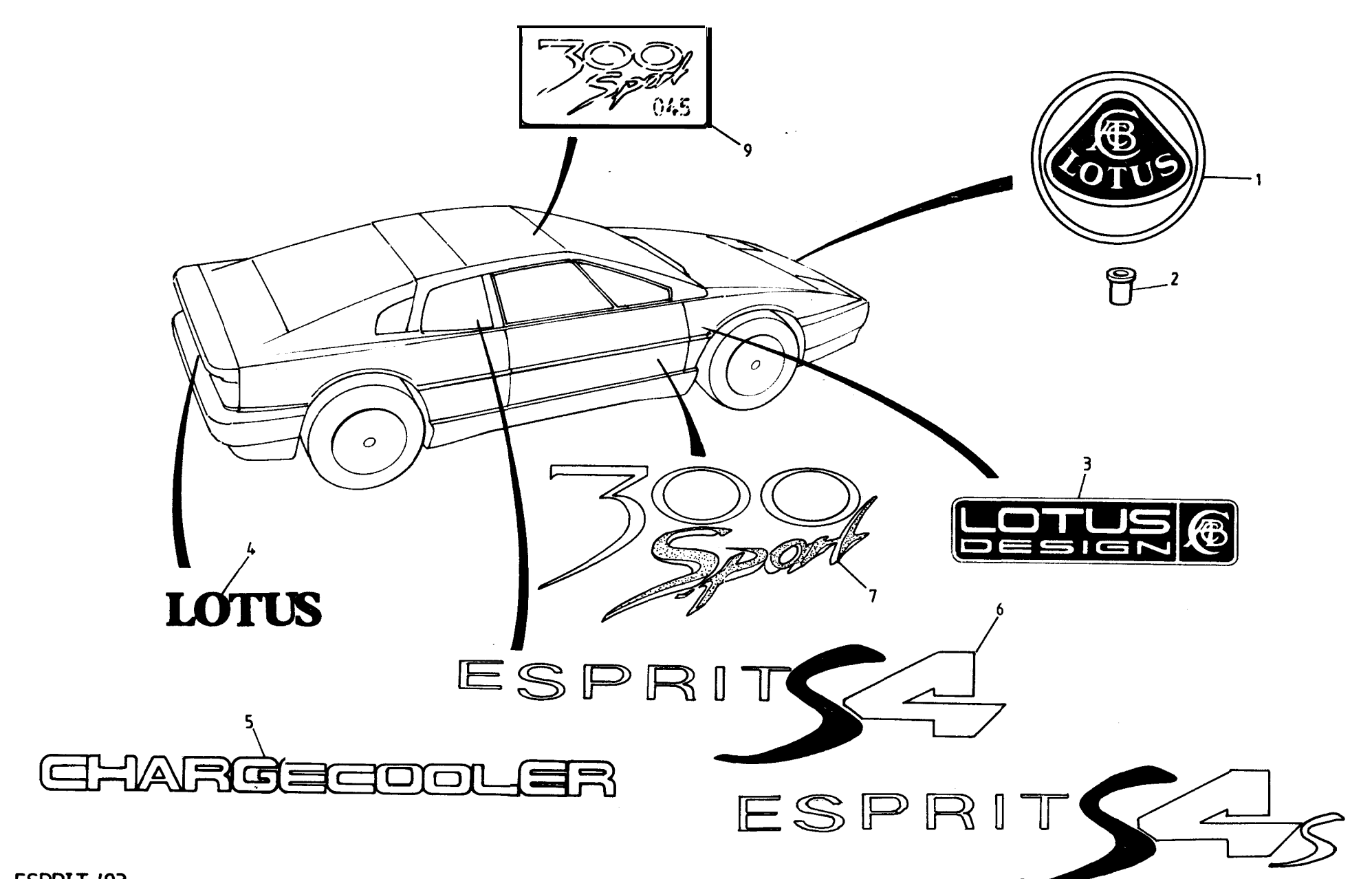
CONTENTS: Capping Rails, Air Scoops, Wind Deflector

12.01A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Capping Rail, RH	A082B6220K	1		
2	" " LH	A082B6221K	1		
	Film, Black, capping rail bottom corner, RH	A082B5064K	1		) Where fitted on USA cars
	" " " " " " LH	A082B5065K	1		)
	Screw, No.6 x 1¼", capping rail to body	B082W5023F	12		
5	Air Scoop, engine bay air intake , LH	A082B6222K	1		> Behind rear l/4 window
6	" " " " " " RH	A082B6223K	1		>
	Finisher, moulded, engine bay air intake, RH	A082B5098K	1		} within rear l/4 window air intake
	" " " " " " LH	A082B5097K	1		} scoop
14	Bolt, M5 x 40, scoop lower fix	A079W2033F	2		
15	Washer, flat, " " "	AO75W4000Z	4		Finished in primer
16	Nut, Nyloc, M5, " " "	A075W3008Z	2		
17	Wind Deflector, sunroof aperture	A082B4869K	1		
18	Retainer Tongue, RH, wind deflector	B082U4986F	1		
19	" " LH, " "	B082U4985F	1		
20	Screw, 10 UNF, tongue to deflector	A075W5059Z	4		
21	Washer, tongue to deflector	A075W4000Z	4		
22	Strap, deflector retaining	A082U7299J	1		
23	Rivet, strap to deflector	A079W6195F	1		
24	Spring Clip, strap rivet	A075W6173F	1		



ESPRIT '93
12.02A

FUNCTION CODE	CONTENTS : Fuel Filler Flaps & Release Mechanism		QUANTITY		
12.02A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Fuel Filler Flap, RH	B082B4672K	1		
	" " LH	B082B4673K	1		
2	Buffer, fuel filler flap shut stop	A075U6050F	4		
3	Striker, fuel filler flap	A082U5814F	2		
4	Washer, flat, striker to flap	A075W4000Z	2		
5	'Nut, Nyloc, M5, striker to flap	A075W3008Z	2		
6	Latch Assembly, fuel filler flap release	A082U6122F	2		
7	Screw, No.6 x l/2", latch to body	A089W5138F	2		
8	Hinge, fuel filler flap, RH (flap mounted)	B082B4694F	1		
	" " " " LH " "	B082B4695F	1		
9	Washer, flat, hinge to flap	A075W4000Z	4		
10	Nut, Nyloc, M5, hinge to flap	A075W3008Z	4		
12	Hinge, fuel filler flap, RH (body mounted)	B082B4692F	1		
	" " " " LH " "	B082B4691F	1		
13	Setscrew, M6 x 20, hinge to body	A075W1030Z	4		
14	Washer, spacer, M6 x 20, hinge to body	A075W4016Z	4		
14A	Washer, flat, M6 x 12, hinge to body	A075W4013Z	4		
15	Nut, Nyloc, M6, hinge to body	A075W3069Z	4		
16	Spiro1 Pin, flap hinge	B082B6111F	2		
17	Spring, fuel flap hinge, upper	A082U6144F	1		
18	" " " " lower	A082U6133F	1		
19	Buffer, flap open stop	A082U7052K	2		
25	Solenoid, fuel filler flap release	A082M6395F	2		
26	Spacer, solenoid to body	A082L4163F	2		
27	Screw, M6 x 30, solenoid fixing	A075W5091Z	4		
28	Washer, Flat, M6 x 15, " "	A075W4015Z	a		
29	Nut, Nyloc, M6, " "	A075W3009Z	4		
30	Washer, shakeproof, " "	A075W4046Z	4		
31	Wing Nut, M6, " "	A075W3033Z	4		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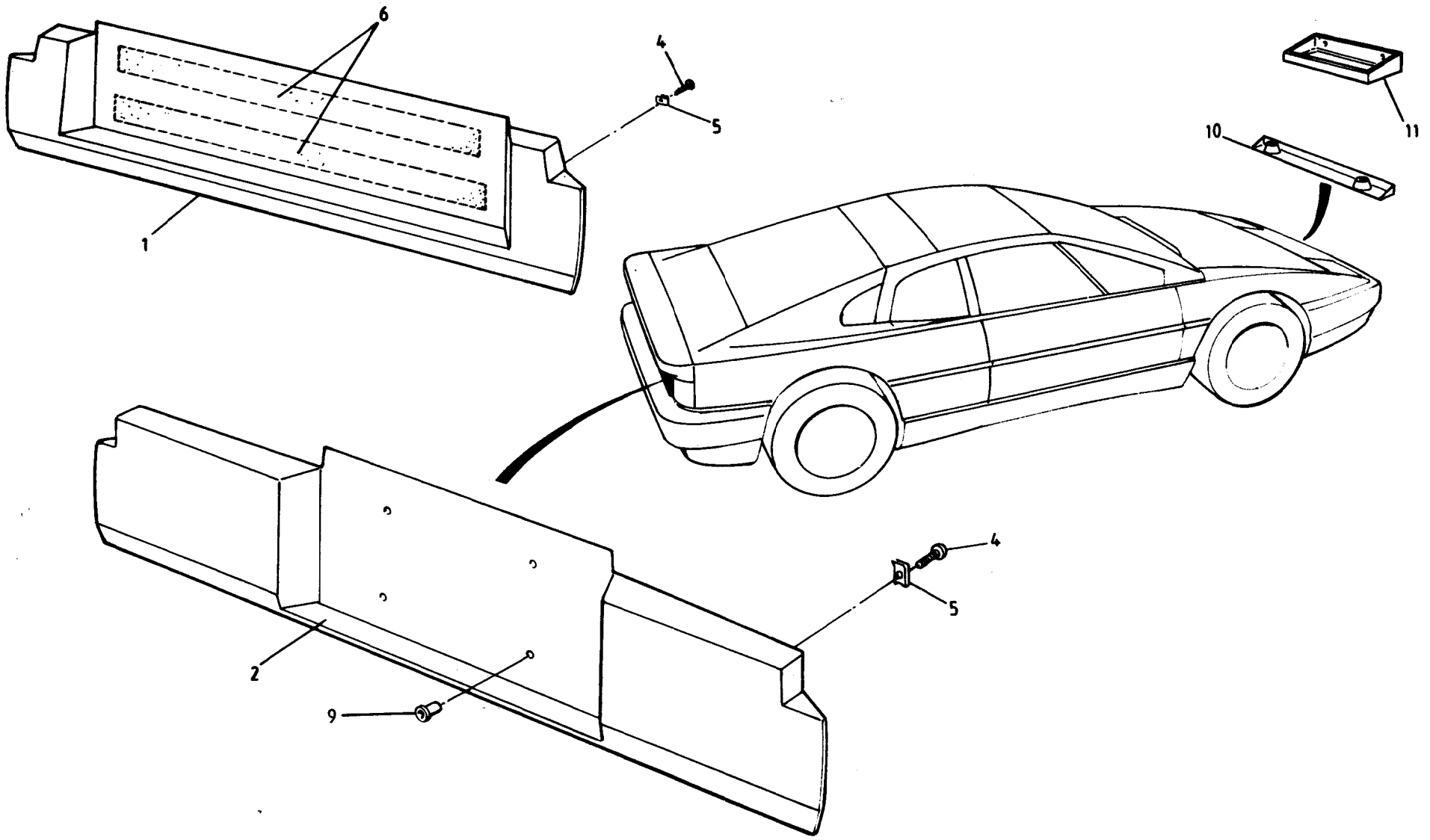
CHARGECOOLER
ESPRIT S4S

FUNCTION CODE	CONTENTS : Decals & Badges		QUANTITY		
12.05A	**PART DESCRIPTION**	**PART NUMBER**	S4/ S4S	SPORT 300	**REMARKS**
1	Badge, enamel, 'Lotus' roundel, green/yellow	A089U1816F	2	2	On nose rear licence plinth
2	Rawlnut, M5, enamel badge fixing	A075W6074F	2	4	
3	Badge, 'Lotus Design', green/gold	A082U7124F	2		
	" " " black/gold	A082U5991F	2		
4	Badge, 'LOTUS', rear spoiler	B1OOU0201F	1		
5	Badge, 'CHARGECOOLER', licence plate plinth	A082U7437F	1		Not USA
6	Decal, 'Esprit S4', rear ¼ window	A082B5114F	2		
	" " S4S " II "	A082B5253F	2		
7	Decal, 'Sport 300', large	P691.1205.001AF		2	Fitted on doors
	" " " small	P691.1205.002AF		1	Fitted on rear bumper
9	Plague, 'Sport 300', header rail	P691.1205.005AF		1	Specify Limited Edition number
	Double Sided Tape, plague to plinth	A075U6070V		5omm	
	Plinth, header rail plague	P691.1205.006AF		1	
	Nut, M4 Nyloc, plinth to header trim	A075W3049F		2	
	Flat Washer, " " " "	A082W4099F		2	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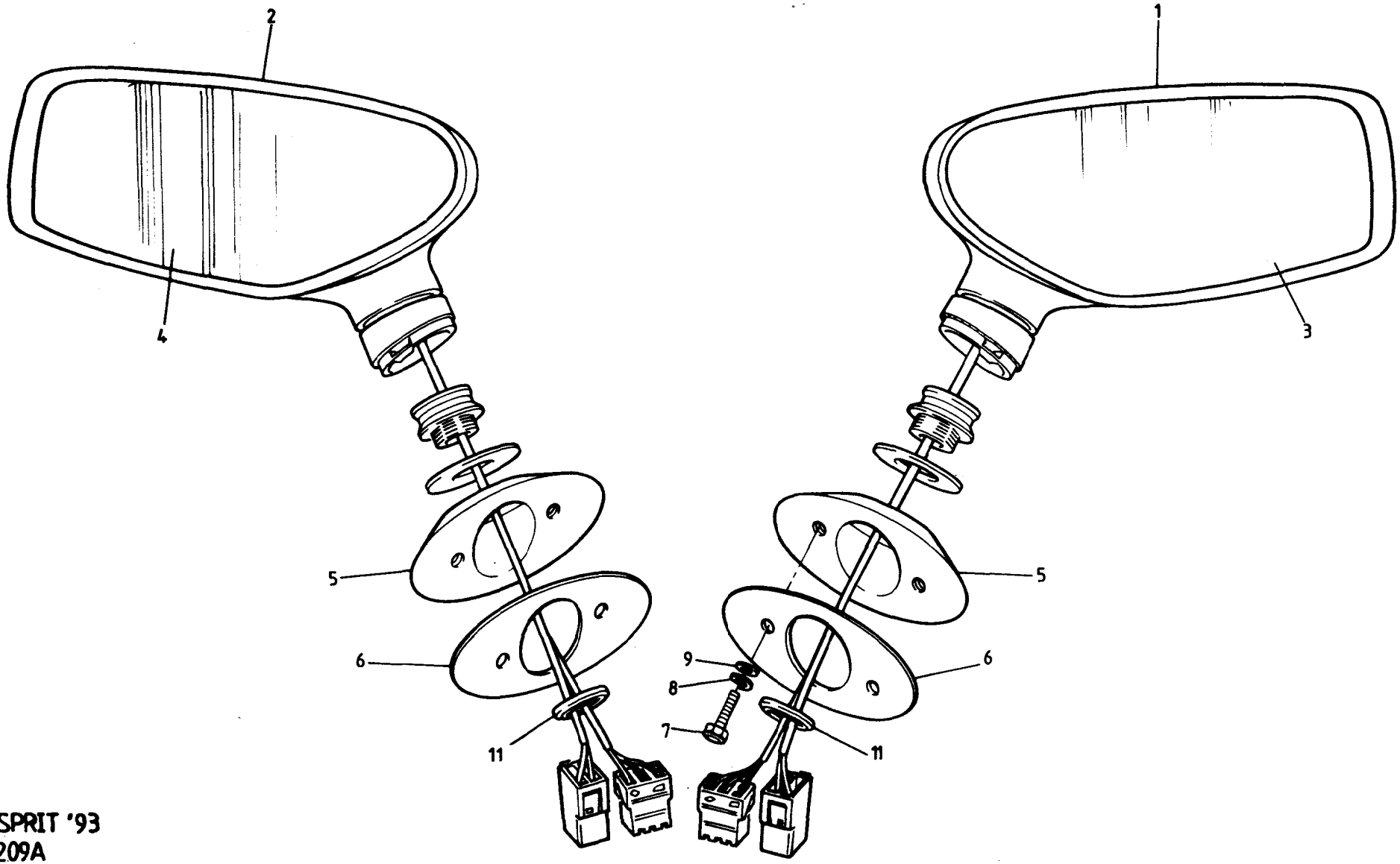
FUNCTION CODE

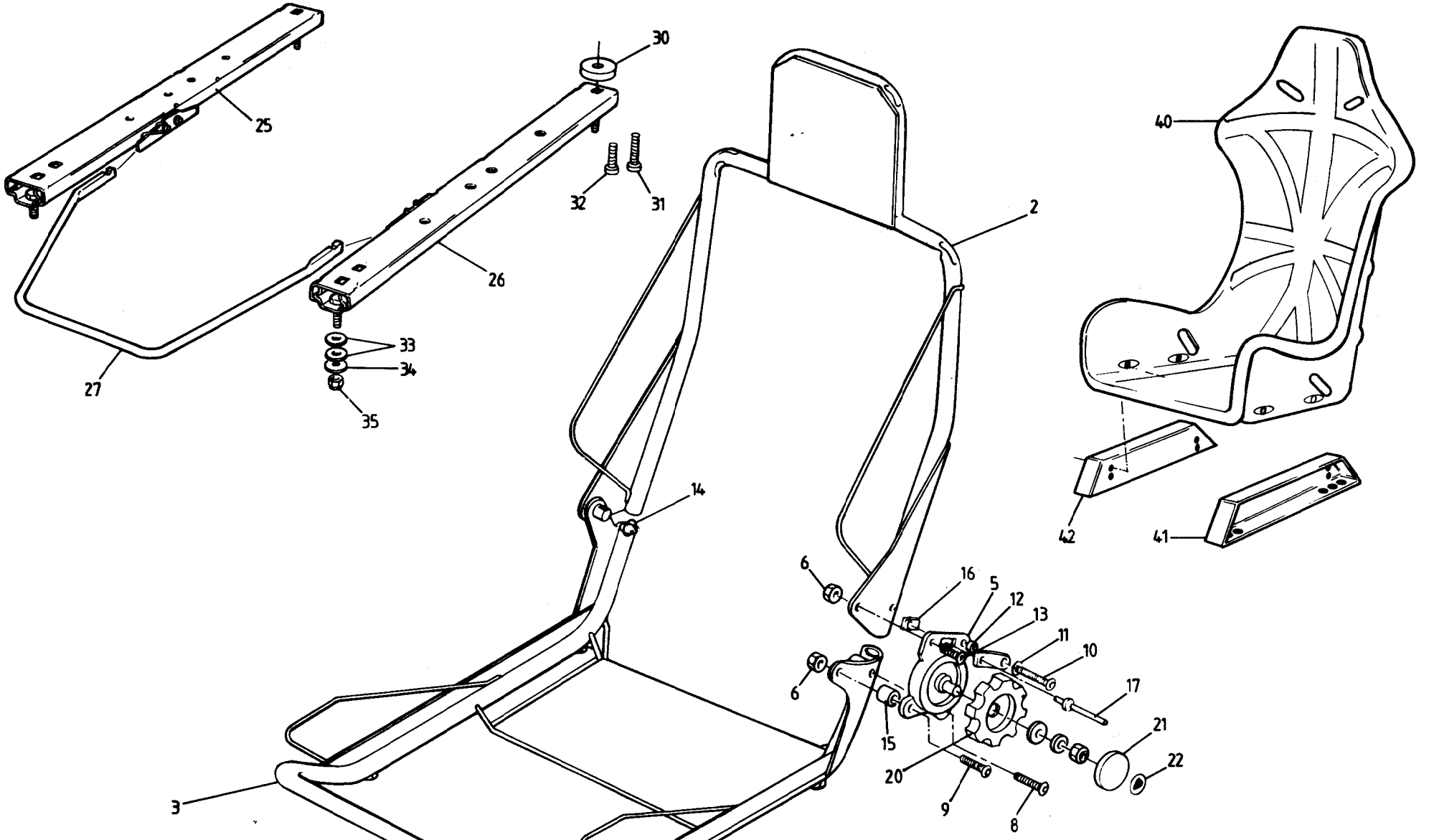
CONTENTS : Licence Plate Plinths

12.07A	PART DESCRIPTION	PART NUMBER	QUANTITY s4	QUANTITY SPORT 300	REMARKS
1	Plinth, rear licence plate	A082U6272J	1		Non-USA No badge)
2	" " " "	A082B5183J	1		USA No badge)Prior '95 M.Y.
	" " " "	B082B5183J	1		USA With badge)
	" " " "	P691.1207.001AJ	1	1	With badge, S4/S4S '95 M.Y. onward
4	Screw, no.6 x 1¼", plinth to body	A075W5013Z	4	4	
5	Spire Nut, no.6, " " "	A075W6024Z	4	4	
6	Tape, double sided " " "	B075U6070V	0.5m	0.5m	
9	Rivnut, M6, licence plate & plinth to body	A082W6318F	4		USA
10	Plinth, front licence plate	A082B5080K	1		Non-USA
11	" " " "	A082B5188J	I		USA
	Screw, M5 x 20, plinth to bumper	A075W5084F	2		
	Washer, flat, " " "	A075W4015Z	2		
	Jacknut, M5, " " "	A076W3043F	2		
	Jacknut, M6, front licence plate fixing	A075W3031F	2		USA



ESPRIT '93
1209A

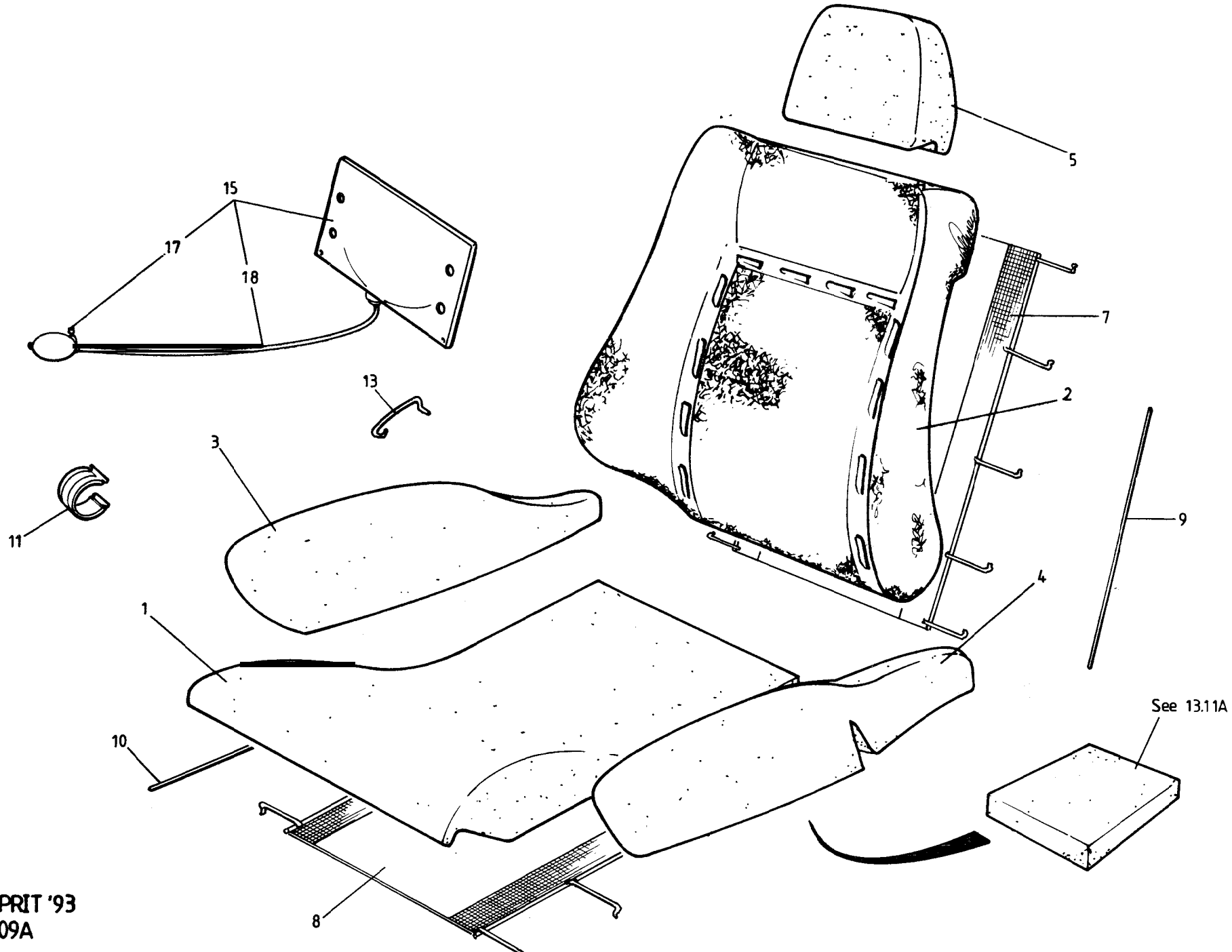
FUNCTION CODE	CONTENTS : Door Mirrors		QUANTITY		
12.09A	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
	Body Door Mirror, RH	A082M6400F	1	1	
	" " " LH	A082M6399F	1	1	
1	Door Mirror Assembly, RH, convex glass	A082M6402J	1	1	
	" " " " " etched glass	A082M6403J		1	USA
	" " " " flat glass	A082M6404J	1		Australia
2	" " " LH, convex glass	A082M6401J	1	1	
	" " " " flat glass	A082M6405J	1	1	USA & Australia
3	Glass/Pad Assembly, RH, convex glass	A082M6414J	1	1	
	" " " " " etched	A082M6413J		1	USA
	" " " " flat glass	A082M6398J	1		Australia
4	" " " LH, convex glass	A082M6415J	1	1	
	" " " " flat	A082M6397J	1	1	
5	Mounting Plinth, mirror to do&	A082U7113J	2	2	
6	Gasket, plinth to door	A082U7123F	2	2	
7	Setscrew, M6 x 25, mirror to door	A075W1031F	4	4	
8	Washer, Spring, M6 " " "	A075W4035Z	4	4	
9	Washer, Flat, M6 x 20 " " "	A075W4016Z	4	4	
10	Nut, special, mirror to plinth	A082U7115F	2	2	



ESPRIT '93
1303A

FUNCTION CODE	CONTENTS: Seat Frames, Runners, Recline Mechanism		QUANTITY		
13.03A	PARTDESCRIPTION	PARTNUMBER	s4	Sport 300	REMARKS
	Seat Frame, backrest, RH	A082V6182F	1		Quantities are per car
2	" " " LH	A082V6181F	1		
	Seat Frame, cushion, RH	A082V6180F	1		
3	" " " LH	A082V6179F	1		
4	Spring, anti-rattle	A083V6091V	2		
	Seat Reclining Mechanism, RH	A083V6065F	1		
5	" " " LH	A083V6066F	1		
6	Nut, Nyloc, M8	A075W3010Z	8		
8	Screw, button head, M8 x 55, recline mech. fix	B082W7051F	2		
9	" " " M8 x 30, " " "	A082W7050F	2		
10	" " " M8 x 50, latch pivot	A082W7060F	2		
11	Washer, flat, M8 x 16, " "	A075W4020Z	2		
12	Insert, nylon, latch pivot	A082W4100F	2		
13	Screw, button head, M8 x 25, recline mech. fix	A082W7062F	2		
14	Clip, idler pivot	A082V6153F	2		
15	Spacer	A082V5921F	4		
16	Locking Plate, tilt pawl	A082V5923F	2		
17	Pop Rivet, locking plate fix	A075W6087Z	2		
18	Washer, drive plate clamp	A089U6066F	2		
19	Washer, recline mechanism shaft	A089U6065F	2		
20	Handwheel, seat recline	A083V6067F	2		
21	Trim, handwheel centre	A083V6068F	2		
22	Lotus Badge, handwheel centre	A089U1813F	2		
25	Seat Runner, RH	C089V6144F	2	2	
26	" " LH	C089V6145F	2	2	
27	Lift Bar, slide release	C082V6183F	2		
	" " " "	P691.1301.004BF		2	
30	Spacer, 12 mm, runner to seat frame	A082U5100F	8	8	If fitted
31	Setscrew, M8 x 30, runner to seat frame	A075W9007F	8	8	Used with 12 mm spacers
32	" M8 x 16, " " " "	A075W9006F	8	8	Used without spacers
33	Washer, Ml0 x 30, runner to floor	A082W4108F	8	8	
34	Washer, M8 x 25, floor underside	A075W4021Z	8	8	
35	Nut, Nyloc, M8, runner to floor	A075W3010Z	8	8	

FUNCTION CODE	CONTENTS: Seat Frames, Runners, Recline Mechanism		QUANTITY		
13.03A	PART DESCRIPTION	PART NUMBER	S4	SSPORT 300	REMARKS
40	Seat Moulding, untrimmed	P691.1302.003AK		2	
41	Plinth, seat mounting, LH	P691.1301.005AF		1	
42	" " " RH	P691.1301.006AF		1	
43	Nut, Nyloc, M8, plinth to seat runner	A075W3010Z		8	
44	'D' Washer, " " " "	P691.1301.008AF		8	
					Quantities are per car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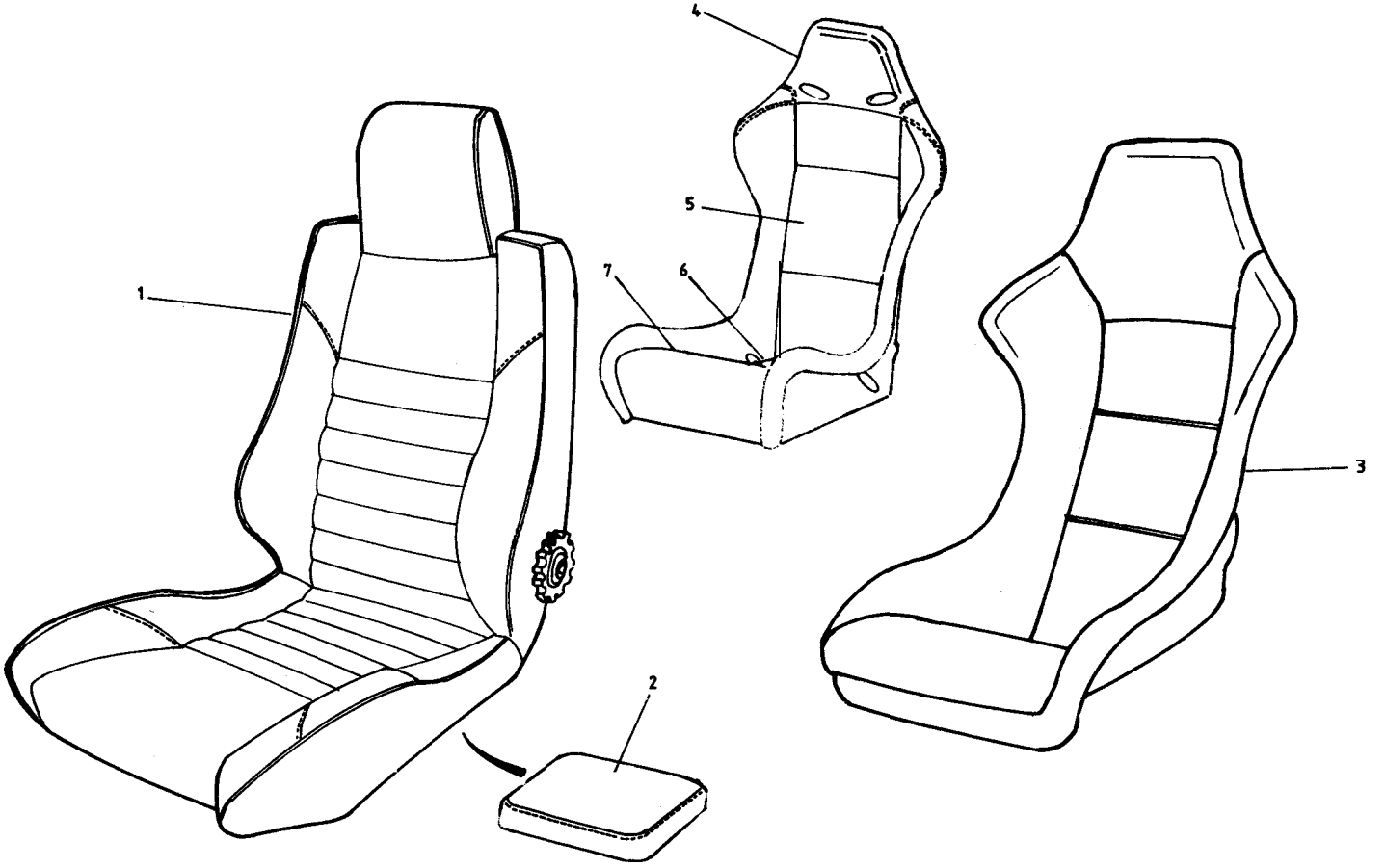
FUNCTION CODE	CONTENTS : Seat Foams & Suspension, Lumbar Support		QUANTITY		
13.09A	PART DESCRIPTION	PART NUMBER	s4	SPORT 300	REMARKS
1	Cushion Foam	A082V8098K	2		Quantities are per car
2	Backrest	A082V8028F	2		
3	Armrest Foam, RH	AO82V8100K	2		
4	" " LH	A082V8099K	2		
5	Headrest Foam	A082V8033K	2		
	'Foam, headrest support	A082V8212K	2		
7	Suspension Unit, backrest	A082V6186F	2		
8	Suspension Unit, cushion	A082V6185F	2		
9	Flexolator, backrest, 520 mm	A082V4782F	4		
10	" cushion, 490 mm	A082V4783F	4		
11	Tube Clip, trim to frame	B079W6120F	110		
	Hogring, flexolator to suspension unit	A075W6076F	80		
13	Hook, 55mm, suspension unit to frame	A082M6299F	8		
15	Lumbar Support Unit, inflatable	A089V6141F	2		
	" " " "	P691.1302.040AJ	2		
17	Pump & Valve, lumbar support unit	A089V6142F	2		
18	Tubing, pump to lumbar support unit	A089V4331F	2		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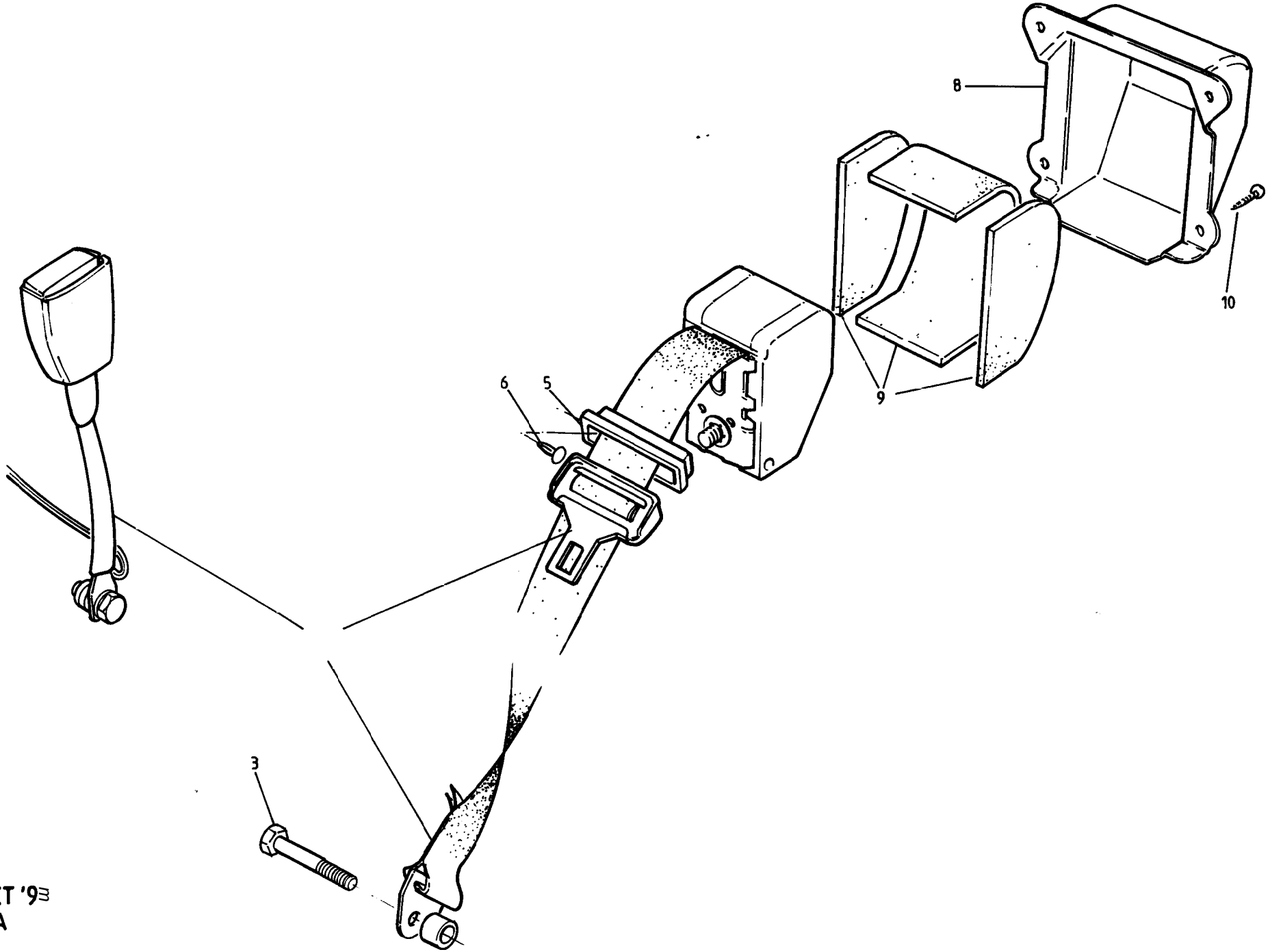
FUNCTION CODE	CONTENTS : Trimmed Seats & Covers		QUANTITY		
13.11A	PART DESCRIPTION	PART NUNBER	S4/ S4S	SPORT 300	REMARKS
	Trimmed Seat Assembly, LH	A082V8671J*	1		)
	" " " RH	A082V8672J*	1		)
	Trim Cover, complete seat, graphite (raven)	A082V8572J*	)		)
	" " " " grey	A082V8573J*	)		)
	" " " " light grey	A082V8574J*	)		) S4 Prior to '95 M.Y.
	" " " " blue	A082V8575J*	) 2		)
	" " " " red	A082V8576J*	)		)
	" " " " magnolia	A082V8577J*	)		)
	" " " " gold	A082V8578J*	)		)
	" " " " sand	A082V8579J*	)		)
2	Bolster Cushion	A082V8688J	2		)
1	Trimmed Seat Assembly, LH	B082V8671J*	1		>
	" " " RH	B082V8672J*	1		> Standard seats, '95 M.Y.onwards
	Trim Cover,complete seat	B082V8572J*	2		>
2	Bolster Cushion	A082V8688J	2		>
3	Trimmed Seat Assembly, (Leather/alcantara)	P691.1302.040BJ*	2		) S4S Sports seat without harness
	Seat Cover Assembly, (Leather/alcantara)	P691.1302.041BJ*	2		) slots, '95 M.Y. onwards
4	Trimmed Seat Assembly	P691.1302.040AJ*		2	>
	Seat Cover Assembly	P691.1302.041AJ*		2	>
5	Backrest Cushion Assembly, trimmed	P691.1302.021AJ*		2	> Sport seat with harness slots
6	Seat Cushion, trimmed, rear	P691.1302.029AJ*		2	>
7	" " " front	P691.1302.028AJ*		2	>

*** Specify or supply sample of trim colour, & state colour of piping. State Vehicle Identification Number (V.I.N.)**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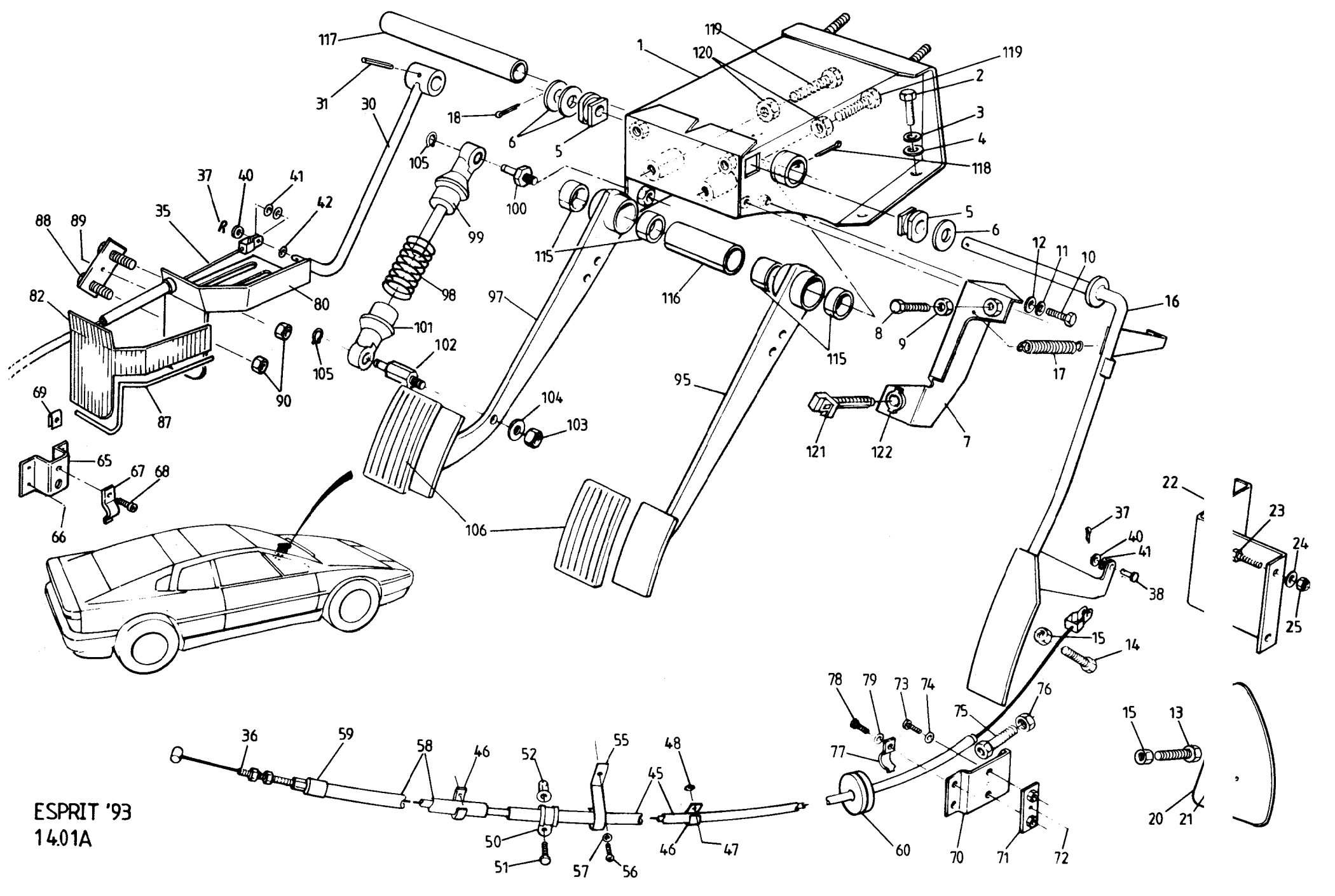
FUNCTION CODE	CONTENTS : Seat Belts & Reel Covers		QUANTITY		
13.27A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Seat Belt Assembly	B085V7166F	2		
	" " "	A082V7972F	2		Australia only
3	Bolt, 7/16" UNF x 3.¼", belt to sill & chassis	B079W2018F	4		
5	Finisher, seat belt bulkhead slot	B075V0612K	2		
6	Button, slot finisher fixing	A075W6041Z	4		
8	Trim Cover, seat belt reel	A082U4740K	2		
9	Foam, trim cover sound insulation	A083V6104V	0.25m		
10	Screw, No.6 x ½", cover fixing	A075W5015Z	8		
	Screw, No.8 x 3/4", belt to mounting beam	A075W5074Z	4		Australia only


ESPRIT '93
14.01A

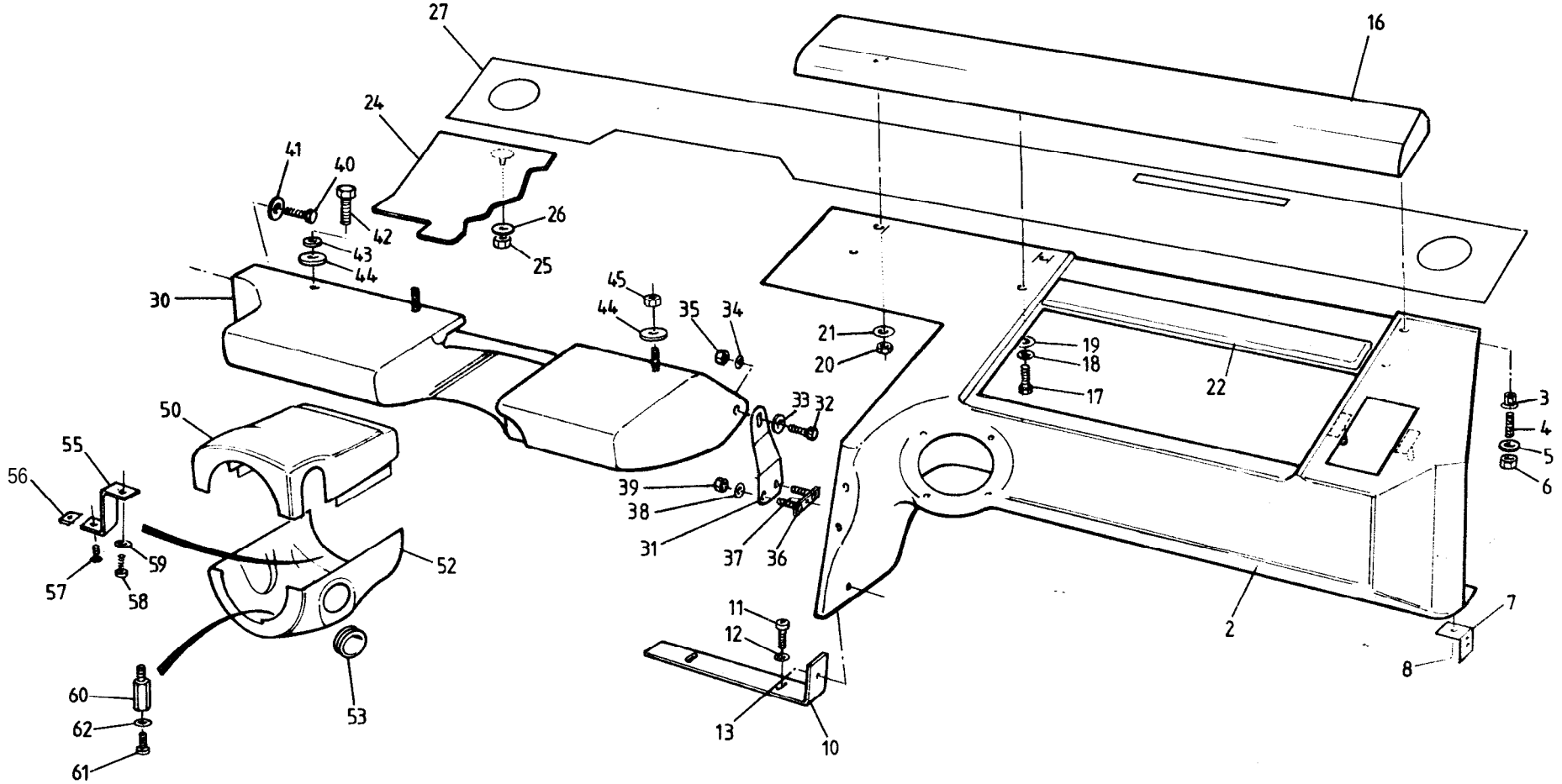
FUNCTION CODE	CONTENTS : Pedal Box & Pedals, Throttle Cable		QUANTITY		
14.01A	PART DESCRIPTION	PARTNUMBER	RHD	LHD	REMARKS
1	Pedal Box	B082J4315F	1	1	
2	Setscrew, M8 x 20, pedal box to chassis	A075W1038Z	4	4	) As fitted
	" M8 x 25, " " " "	A075W1039Z	4	4	)
3	Washer, spring, M8, " " " "	A075W4048Z	4	4	
4	" flat, M8 x 16, " " "	A075W4020Z	4	4	
5	Bush, throttle pedal pivot	A075J6005Z	2	2	
6	Washer, flat, throttle pedal pivot	A075W4005Z	3	3	
7	Bracket, throttle pedal upstop/stop switch mntg	A08254348F	1	1	
8	Bolt, M8, upstop to pedal box	A075W1040Z	1	1	
9	Locknut, M8, upstop to pedal box	A075W3026Z	1	1	
10	Setscrew, M6 x 18, upstop to pedal box	A075W1029Z	2	2	
11	Washer, spring, M6, upstop fixing	A075W4035Z	2	2	
12	" flat, M6 x 12, upstop fixing	A075W4013Z	2	2	
13	Bolt, M8 x 45, throttle pedal downstop	A075W1043F	1		
14	" M8 x 50, " " "	A079W1044F		1	
15	Nut, plain, M8, downstop locking	A075W3072F	1	1	
16	Throttle Pedal	B082J4303F	1		
	" "	A082J4304F		1	
17	Spring, throttle pedal return	A075J6029Z	1	1	
18	Split Pin, l/8" x l", throttle pedal retention	A075W6176F		1	
20	Pad, throttle pedal downstop	A082V7807K	1		
21	Screw, no.8 x 3/8", pad to bulkhead	A075W5032Z	1		
22	Abutment Bracket, throttle downstop	A082J4317F		1	
23	Setscrew, M6 x 16, bracket fix	A075W1028Z		4	
24	Washer, M6 x 25, " "	A075W4017Z		4	
25	Nut, Nyloc, M6, " "	A075W3009Z		4	
30	Lever Arm, throttle pedal	B082J4190F	1		
31	Spiro1 Pin, 5 x 30, lever arm to pedal shaft	A082W6235F	1		
35	Throttle Cable	A082J4309F	1		Length: 2248/2526mm blue colour code
36	" "	C082J4161F		1	" 2110/2526mm white " "
37	'R' Pin, cable securing	A075W6175F	1	1	
38	Clevis Pin, 3/16" x 5/16", cable securing	A075W6030Z		1	
40	Washer, cable clevis to lever	A075W4000Z	3	3	
41	Wavy Washer, " " "	A075W4087Z	1	1	

FUNCTION CODE	CONTENTS : Pedal Box & Pedals, Throttle Cable		QUANTITY		
14.01A	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
42	Washer, Nylon, anti-rattle	A089W4104F	1	1	
45	Conduit, throttle cable	A079L4008V	1.6m	1.6m	
46	'P' Clip, conduit to bulkhead/air deflector	A075W6228F	2	2	
47	Pop Rivet, 'P' clip fixing	A075W6068Z	2	2	
48	Washer, " "	A075W4000Z	2	2	
50	'P' Clip, conduit to engine bay sidewall	A075Q6013Z	1	1	
51	Setscrew, 10 UNF x 3/4", 'P' clip to sidewall	A075W1003Z	1	1	
52	Jacknut, 'P' clip to sidewall	A076W3043F	1	1	
55	Spring Clip, throttle cable to bulkhead	A082U7206F	1	1	
56	Screw, No.10 x ½", clip fixing	A075W5040Z	1	1	
57	Washer, flat, clip fixing	A075W4000Z	1	1	
58	Insulation, throttle cable	A082J6111K	1	1	
59	End Cap, throttle cable insulation	A082L6112F	2	2	
60	Grommet, throttle cable/bulkhead	A036B6182Z	1	1	
65	Clamp Bracket, throttle outer cable to tunnel	B082J4165F	1	1	
66	Pop Rivet, clamp bracket to tunnel	A075W6071F	4	4	
67	Clamp, throttle outer cable to tunnel bracket	A082P4244F	1	1	
68	Screw, No.6 x ½", clamp to bracket	A075W5014F	1	1	
69	Spire Nut, No.6, " " "	A075W6014Z	1	1	
70	Abutment Bracket, throttle cable front	A082J4230F	1	1	
71	Tapping Plate, abutment bracket to tunnel	A082J4231F	1	1	
72	Pop Rivet, waterproof, tapping plate fixing	A075W6071Z	1	1	
73	Screw, M5 x 16, abutment bracket fixing	A082W5107F	2	2	
74	Washer, s/proof, " " "	A075W4045Z	2	2	
75	Adjuster, throttle cable front abutment	A082J4229F	1	1	
76	Lock Nut, 5/16" UNF, cable adjuster	A075W6071Z	1	1	
77	Clamp, throttle cable outer to abut. brkt.	A082P4244F	1	1	
78	Screw, M5 x 10, clamp to abutment bracket	A082W5097F		1	
79	Washer, s/proof " " " "	A075W4045Z		1	
80	Footrest	A082U7160F	1		
	Spacer, footrest to tunnel	P691.1401.005AK	1		Sport 300. Use if no s/proofing fitted
82	Rubber Mat, footrest	A082J6117K	1		
	Foot Pad, footrest	P691.1401.010AK	1		)
	Screw, M4 x 16, pad to rest	SCF04016F	2		) Sport 300
	Washer, flat, pad to rest	WP040011F	2		)
	Nut, Nyloc, M4, pad to rest	A075W3049F	2		)

FUNCTION CODE

CONTENTS: Pedal Box & Pedals, Throttle Cable

14.01A	PART DESCIRIPTION	PART NUMBER	QUANTITY RHD	QUANTITY LHD	REMARKS
87	Rubber Edging, footrest	A085U6080V	3ooml	300m	
88	Studplate, footrest to tunnel	A082U7435F	1	1	
89	Pop Rivet, tapping plate to tunnel	A075W6091F	1	1	
90	Nut, Nyloc, M8, " " "	A075W3010Z	2	2	
95	Brake Pedal	B082J4313F	1	1	
	" "	P691.1401.004AK		1	Sport 300
97	Clutch Pedal	B082J4316F	1	1	
	" "	P691.1401.008AK		1	Sport 300
98	Spring, clutch pedal assistor	B082J6144F	1	1	)
99	Seat, upper, assistor spring	A082J6142F	1	1	inc. guide pin)
100	Pivot Pin, upper seat to pedal box	A082J4305F	1	1	)
101	Seat, lower, assistor spring	A082J6143F	1	1	) If fitted
102	Pivot Pin, lower seat to pedal	A082J4306F	1	1	)
103	Nut, M8, pivot pin to pedal	A082W3116F	1	1	)
104	Washer, flat, pivot pin fixing	A1OOW4134F	1	1	)
105	Circlip, spring seats to pivot pins	A082W6496F	2	2	)
106	Pad, rubber, brake & clutch pedals	A079J6001F	2	2	
	" drilled alloy, brake pedal	P691.1401.009AK	1	1	>
	" " " clutch pedal	P691.1401.008AK	1	1	>
	Screw, M4 x 16, pad to pedal	SCF04016F	4	4	> Sport 300
	Washer, flat, pad to pedal	WP040011F	4	4	>
	Nut, Nyloc, M4, pad to pedal	A075W3049F	4	4	>
115	Pivot Bush, brake & clutch pedals	A079J6025F	4	4	
116	Spacer, brake/clutch pedals	A079J4005F	1	1	
117	Shaft, brake & clutch pedal pivot	B079J4003F	1	1	
118	Split Pin, l/8" x ½", pedal shaft retaining	A075W6008Z	1	1	
119	Setscrew, M8 x 25, brake/clutch pedal upstop	A075W1081Z	2	2	
120	Locking Nut, M8, " " " "	A075W3026Z	2	2	
121	Switch, stop lamps	A089M6019F	1	1	
122	Bush, stop switch to pedal box	A089M6020F	1	1	



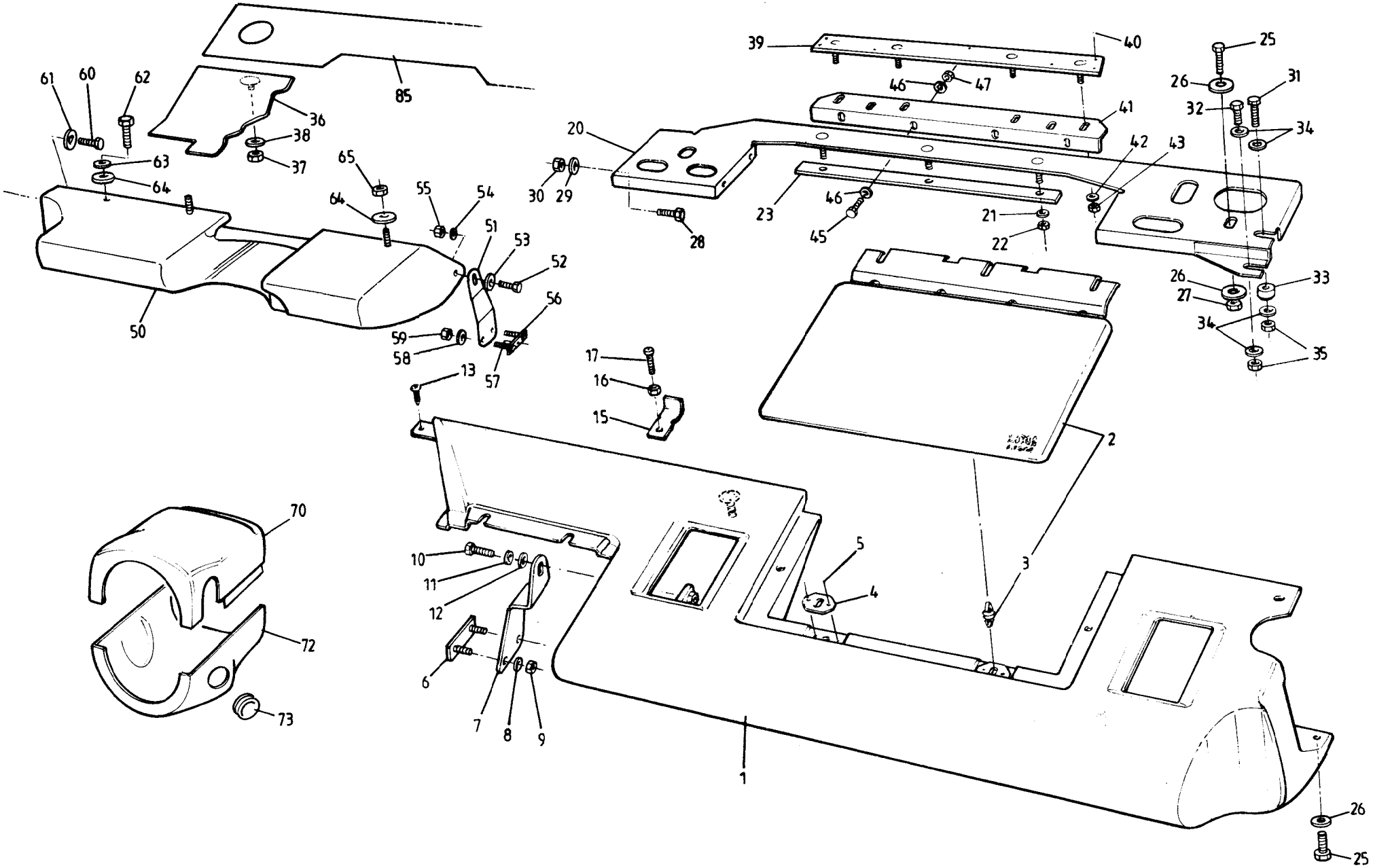
ESPRIT '93
14·05A EXCEPT DUAL SIR

FUNCTION CODE

CONTENTS: **Except Dual S.I.R.:** Fascia Panels, Steering Column Shroud

14.05A	PART DESCRIPTION	PART NUMBER	QUANTITY NON SIR	QUANTITY DRIVER S.I.R	REMARKS
					* **Specify or supply sample of trim & Vehicle Identification** Number
	Fascia, trimmed, passenger side, RHD	A082V8613J*	1		
2	" " " " LHD	A082V8475J*	1	1	
3	Jacknut, M6, fascia fixing	A075W3034Z	1	1	
4	Stud, M6 x 30, fascia to scuttle beam	A082U6082F	1	1	
5	Washer, flat, " " " "	A089U1854F	4	4	
6	Nut, M6 Nyloc, " " " "	A075W3009Z	4	4	
7	Bracket, fascia to door hinge post	B079V4147K	2	2	
8	Pop Rivet, fascia bracket fixing	A075W6090Z	6	6	
10	Bracket, pass. side fascia to tunnel top	A082U6236F	1	1	
11	Screw, M4 x 10, bracket to tunnel top	A075W5079F	2	2	
12	Washer, M4 x 20, " " " "	A1OOW4121F	2	2	
13	Pop Rivet, bracket to fascia	A075W6090Z	2	2	
	Crash Pad, trimmed, RHD	A082V8615J*	1		
16	" " " LHD	A082V7979J*	1	1	
17	Setscrew, M6 x 18, crash pad to fascia	A075W1029Z	3	3	
18	Washer, spring, " " " "	A075W4035Z	3	3	
19	Washer, M6 x 25, " " " "	A075W4017Z	3	3	
20	Nut, Nyloc, M6, crash pad to fascia	A075W3009Z	3	3	
21	Washer, flat, M6 x 12, "" "	A075W4013Z	3	3	
22	Infill Panel, trimmed, crash pad/glovebox	B082V7977J*	1	1	
	" " " binn. to 'A' post, RHD	A082V8614J*	1		
24	" " " " " " " LHD	A082V8684J*	1	1	
25	Nut, M6, Nyloc, infill panel to scuttle beam	A075W3009Z	1	1	
26	Washer, flat, M6 x 12, " " " "	A075W4013Z	1	1	
27	Trim Cover, screen landing	A082V7585K	1	1	
	'Knee Bolster', driver's, trimmed, RHD	A082V8616J*	1		
30	Knee Bolster, " " LHD	B082V7980J*	1	1	
31	Support Bracket, driver's knee bolster inboard	B082V7808F	1	1	
32	Setscrew, M6 x 20, bracket to knee bolster	A075W9015F	1	1	
33	Washer, flat, M6 x 12, " " " "	A075W4013Z	1	1	
34	" " M6 x 20, " " " "	A075W4016Z	1	1	
35	Nut, Nyloc, M6, " " " "	AO75W3009Z	1	1	

FUNCTION CODE	CONTENTS: **Except Dual S.I.R.:** Fascia Panels, Steering Column Shrouds		QUANTITY		
14.05A	**PART DESCRIPTION**	**PART NUMBER**	NON SIR	DRIVE1 S.I.R	**REMARKS**
					* **Specify or supply sample of trim & Vehicle Identification Number**
36	Studplate, knee bolster to tunnel	A082V7809F	1	1	
37	Pop Rivet, studplate to tunnel	A075W6091Z	1	1	
38	Washer, flat, M6 x 12, knee bolster to tunnel	A075W4013Z	2	2	
39	Nut, Nyloc, M6, " " " "	AO75W3009Z	2	2	
40	Bolt, M6 x 30, knee bolster to door hinge post	A075W1032F	1	1	
41	Washer, flat, M6 x 20, " " " " "	A075W4016Z	1	1	
42	Setscrew, M6 x 16, bolster to scuttle beam	A075W1028Z	1	1	
43	Washer, shakeproof, " " " "	A075W5011Z	1	1	
44	Washer, flat, M6 x 15," " " "	A075W4015Z	3	3	
45	Nut, Nyloc, M6, " " " "	A075W3009Z	2	2	
	Column Shroud, upper, trimmed	A082V8685J*	1		
50	" " " "	A082V79813*		1	
	" " lower, "	A082V8686J*	1		
52	" " " "	A082V7982J*		1	
53	Grommet, column lock to shroud	A1OOV6061F	1	1	
54	Screw, No.6 x ½", upper shroud to lower shroud	A075W5012Z	2	2	
55	Bracket, lower column shroud support, front	A082V7975F	1	1	
	" " " " " rear	A082V7698F	1	1	
56	Spire Nut, No.6, shroud to brackets	A079W6024F	1	2	
57	Screw, No,6 x ½", " " "	A075W5012F	1	2	
58	Screw, M4 x 10, brackets to column	A075W5079F	1	2	
59	Washer, s/proof, M4, " " "	A075W4086F	1	2	
60	Extension Stud, column shroud rear	A1OOU0279F	1		
61	Screw, M4 x 12, lower shroud rear	A1OOW5143F	1		
62	Washer, lower shroud rear	AO75W4063Z	1		

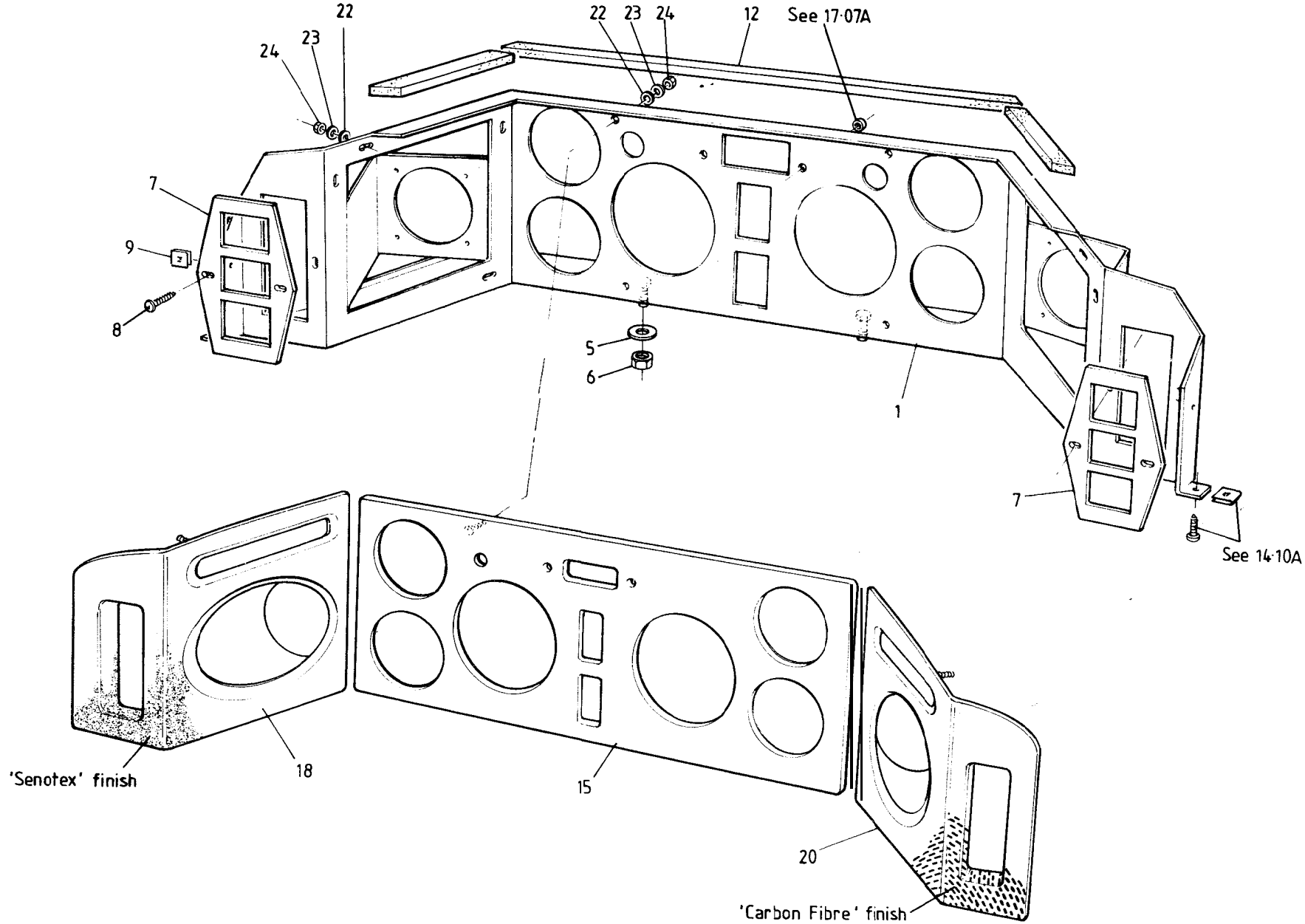


ESPRIT '93
14.05 B - DUAL S.I.R.

FUNCTION CODE	CONTENTS : **Dual S.I.R.:** Fascia Panel, Steering Cloumn shrouds		QUANTITY		
14.05B	**PART DESCRIPTION**	**PARTNUMBER**	DUAL S.I.R.		**REMARKS**
					* **Specify or supply sample of trim & Vehicle Identification Number**
1	Knee Bolster, passenger side, LHD, trimmed	A082V8681J*	1		
2	Lid, trimmed, passenger inflator module	A082V8682J*	1		
3	Clip, 'snap off', lid to knee bolster	A082U6304F	2		Inc. with trimmed lid
4	Plate, clip retaining	A082U7649K	2		
5	Pop Rivet, retaining plate to bolster	A075W6091Z	1		
6	Studplate, knee bolster bracket to tunnel	A082V7809F	1		
7	Bracket, passenger knee bolster " "	A082U7674F	1		
a	Washer, flat, M6 x 12, " " "	A075W4013Z	2		
9	Nyloc Nut, M6, knee bolster bracket to tunnel	A075W3009Z	2		
10	Setscrew, bolster to tunnel	A075W1030Z	1		
11	Washer,s/p, " " "	A075W4035Z	1		
12	Washer, M6 x 15, bolster to tunnel	A075W4015Z	1		
I.3	Screw, fascia to scuttie	A075W5012Z	1		
15	Support Tab, body scuttle	A082U7682F	1		
16	Nut, Nyloc, M6, Tab fixing & bolster height adjust	A075W3009Z	1		
17	Screw, M6 x 30, Tab fixing & bolster height adjust	A075W5091Z	1		
20	Panel, passenger inflator module mounting	A082U7645F	1		
21	Washer, M6 x 15, " " lid to panel	A075W4015Z	3		
22	Nut, Nyloc, M6, " " " " "	A075W3009Z	3		
23	Washer Plate, inflator module panel	A082U7656F	1		
25	Setscrew, M6 x 30, knee bolster outboard fix	A075W1032Z	2		
26	Washer, flat, M6 x 20, " " "	A075W4016Z	3		
27	Nut, M6, Nyloc, " " "	A075W3009Z	1		
28	Setscrew, M5 x 20, panel to scuttle beam	A075W1025F	2		
29	Washer, Flat, " " " "	A075W4011Z	2		
30	Nut, Nyloc, M5, " " " "	A075W3008Z	2		
31	Setscrew, M6 x 30, panel to 'A' post	A075W1032Z	1		
32	Setscrew, M6 x 16, """"	A075W1028Z	1		

FUNCTION CODE	CONTENTS : **Dual S.I.R.:** Fascia Panel, Steering column Shrouds		QUANTITY		
14.05B	**PART DESCRIPTION**	**PART NUMBER**	DUAL S.I.R		**REMARKS**
					• **Specify or supply sample of trim & Vehicle Identification Number**
33	Spacer, panel to 'A' post	A082U7662F	1		
34	Washer, flat, M6 x 15, panel to 'A' post	A075W4015Z	2		
35	Nut, Nyloc, M6, " " " "	A075W3009Z	2		
36	Infill Panel, trimmed, binn. to 'A' post, LHD	A082V8684J*	1		
37	Nut, M6, Nyloc, infill panel to scuttle beam	A075W3009Z	1		
38	Washer, flat, M6 x 12, infill panel/scuttle	A075W4013Z	1		
39	Stud Plate, fixing angle to body scuttle	A082U7677F	1		
40	Pop Rivet, stud plate fixing	A075W6068Z	7		
41	Fixing Angle, inflator module panel to body	A082U7652F	1		
42	Washer, M6 x 12, fix. angle to scut. stud plate	A075W4013Z	4		
43	Nut, Nyloc, M6, " " " " " "	A075W3009Z	4		
45	Setscrew, M5 x 12, module panel front edge fix	AO75W1021Z	4		
46	Washer, flat, M5 x 10, " " " " "	A075W4011Z	8		
47	Nut, Nyloc, M5, " " " " "	A075W3008Z	4		
50	Knee Bolster, drivers side, trimmed, LHD	B082V7980J*	1		
51	Support Bracket, driver's knee bolster inboard	B082V7808F	1		
52	Setscrew, M6 x 20, bracket to knee bolster	A075W9015F	1		
53	Washer, flat, M6 x 12, " " " "	A075W4013Z	1		
54	" " M6 x 20, " " " "	A075W4016Z	1		
55	Nut, Nyloc, M6, " " " "	A075W3009Z	1		
56	Studplate, knee bolster to tunnel	AO82V7809F	1		
57	Pop Rivet, studplate to tunnel	A075W6091Z	1		
58	Washer, flat, M6 x 12, knee bolster to tunnel	A075W4013Z	2		
59	Nut, Nyloc, M6, " " " "	A075W3009Z	2		
60	Bolt, M6 x 30, knee bolster to door hinge post	A075W1032F	1		
61	Washer, flat, M6 x 20, " " " " "	A075W4016Z	1		
62	Setscrew, M6 x 16, bolster to scuttle beam	A075W1028Z	1		
63	Washer, s/p " " " "	A075W5011Z	1		
64	Washer, flat, M6 x 15," " " "	A075W4015Z	3		
65	Nut, Nyloc, M6, " " " "	A075W3009Z	2		
70	Column Shroud, upper, trimmed	A082V7981J*	1		

FUNCTION CODE	CONTENTS: **Dual S.I.R.:** Fascia Panel, Steering Column Shrouds		QUANTITY		
14.05B	**PART DESCRIPTION**	**PART NUMBER**	DUAL S.I.R		**REMARKS**
					• **Specify or supply sample of trim & Vehicle Identification Number**
72	Column Shroud, lower, trimmed	A082V7982J*	1		
73	Grommet, column lock to shroud	A100V6061F	1		
74	Screw, No.6 x ½", upper shroud to lower shroud	A075W5012Z	2		
75	Bracket, lower column shroud support, front	A082V7975F	1		
76	" " " " " rear	A082V7698F	1		
77	Spire Nut, No.6, shroud to bracket	A079W6024F	2		
78	Screw, No,6 x ½", " " "	A075W5012F	2		
79	Screw, No.4 x 1", bracket to column	A075W5079F	2		
80	Washer, s/proof, M4, " " "	A075W4086F	2		
85	Trim Cover, screen landing	A082V7585K	1		



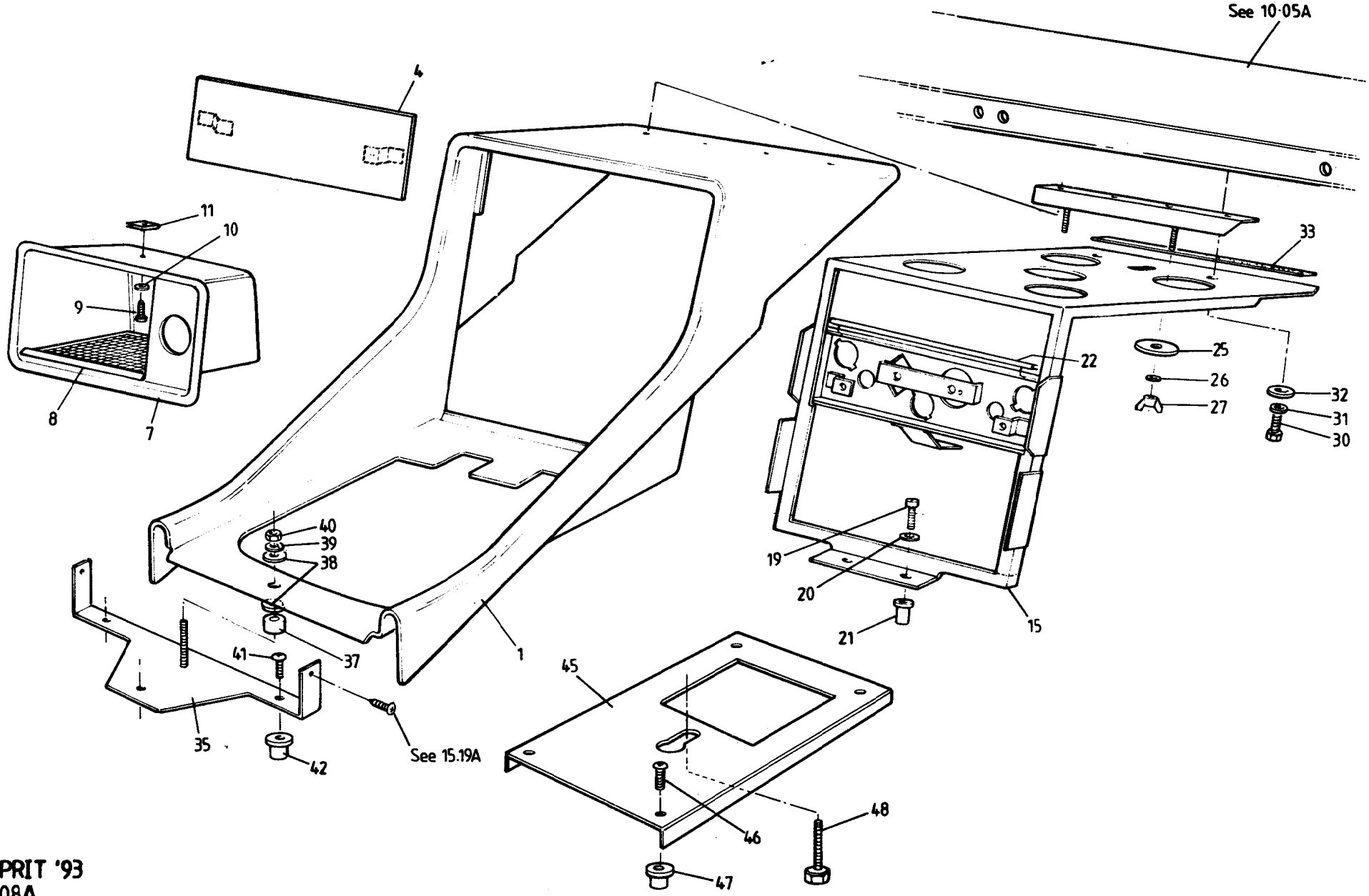
ESPRIT '93
14.07A

FUNCTION CODE	CONTENTS: Binnacle Instrument Panel & Masks		QUANTITY		
14.07A	PART DESCRIPTION	PART NUMBER	S4/ S4S	PORT 300	REMARKS
1	Instrument Panel	A082U7613F	1		on-S.I.R. (no boost gauge)>Prior to
	" "	G082U7307F	1		.I.R. (with boost gauge) >'95 N.Y.
	" "	P691.1407.007BK	1		35 H.Y. onwards
	" "	P691.1407.007BK		1	
5	Washer, flat, M6 x 20, " " "	AO75W4016Z	2	2	
6	Nut, Nyloc, M6, instrument panel to scuttle	AO75W3009Z	2	2	
7	Plate, switch mounting	BO82U5918F	2	2	
8	Screw, No.6 x l/2", plate fixing	A075W5012F	4	4	
9	Spire Nut. No.6, plate fixing	AO75W6014Z	4	4	
12	Foam, self adhesive, panel to binnacle cover	A082U6065V	A/R	A/R	
15	Mask, 'carbon fibre', centre instrument panel	A082U7562F	1		on-S.I.R. (no boost gauge)>Prior to
	" " " " " "	D082U7327F	1		.I.R. (with boost gauge) >'95 M,Y,
	" Burr Walnut, " " "	A082U7706F*	1		35 M.Y. onwards
18	" 'carbon fibre', side instrument panel, LH	B082U7561F	1		Prior to '95 H.Y.
	" Burr Walnut, " " " "	A082U7705F*	1		95 M.Y. onwards
20	" 'carbon fibre'. " " " RH	B082U756OF	1		Prior to '95 H.Y.
	" Burr Walnut, " " " "	A082U7704F*	1		95 M.Y. onwards
	" " " , matching set, centre/LH/RH	A082U7739S#	1		" " "
15	" Senotex, centre instrument panel	P691.1407.002BK		1	
18	" Senotex, side instrument panel LH	P691.1407.003AK		1	
20	" Senotex. " " : RH	P691.1407.004AK		1	
	Recess Moulding, face level vent surround	A082U7564K	2	2	Included in side instrument masks
22	Washer, flat, mask fixing	A075W4000Z	10	10	
23	Washer. S/P " "	A075W4086F	10	10	
24	Nut, M4, mask to instrument panel	AO75W3019F	10	10	

*Panels purchased inividually may not match. see also matched set "#"

Esprit range: '93 M.Y. onwards
d8

1995 / 96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See 15.19A
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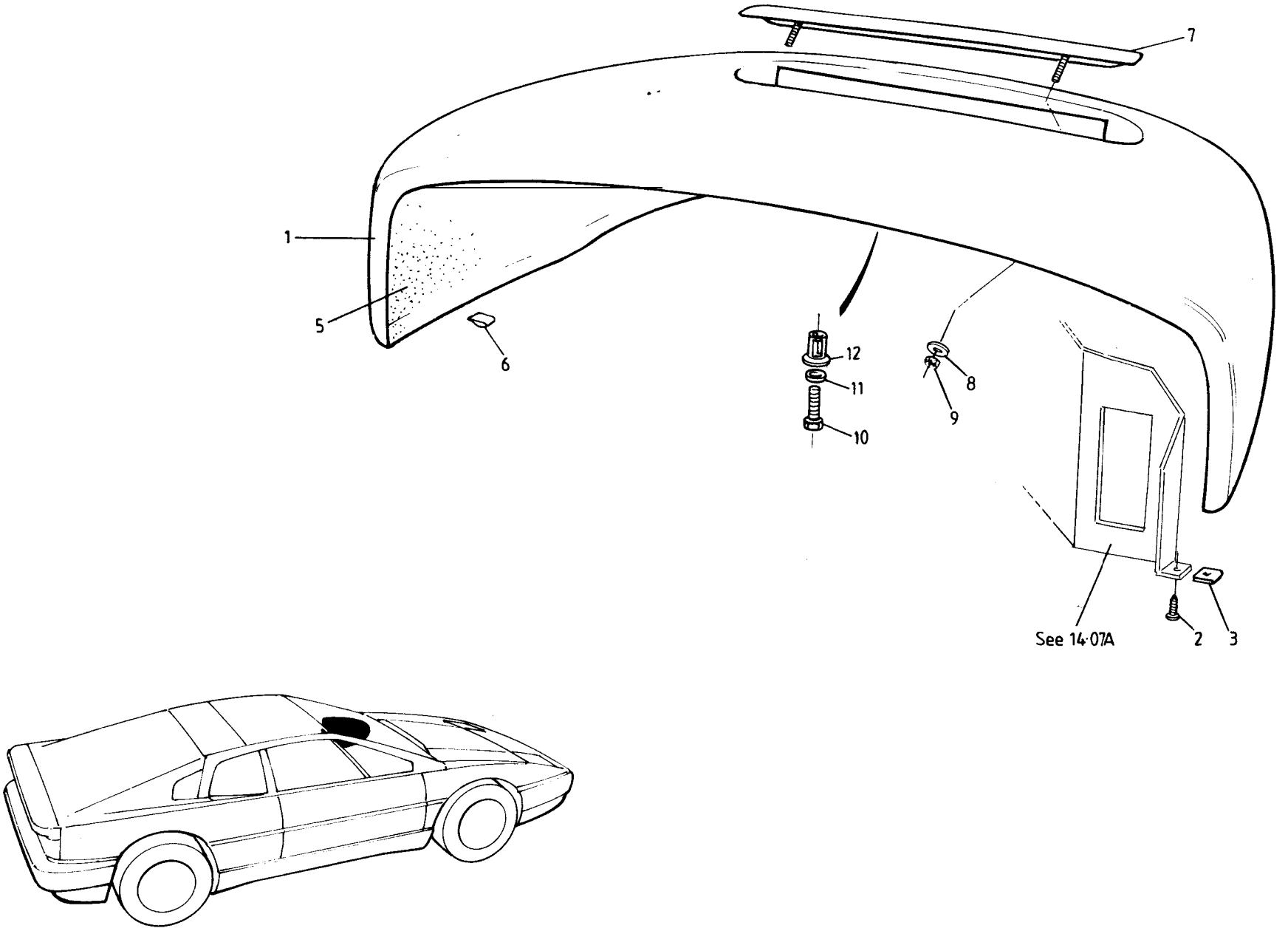
FUNCTION CODE	CONTENTS: Centre Console, Climate Controls Mounting Bracket		QUANTITY		
14.08A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
1	Centre Console, trimmed, LHD	A082V8617J*	1	1	Except Dual S.I.R.
	" " " "	A082V8671J*	1		Dual S.I.R.
	" " " RHD	A082V8618J*	1	1	
4	Blanking Panel, trimmed, radio aperture	A082V7616J*	1	1	
7	Oddment Pocket, centre console	A082V8596K	1		
	" " " "	P691.1408.003AK		1	
8	Mat, oddment pocket	A082V8234K	1	1	
9	Screw, Pozi, M4 x 12, oddment pocket fixing	A1OOW5143F	1	1	
10	Washer, Flat " " "	A075W4063Z	1	1	
11	Spire Nut, M4, " " "	A1OOW6449F	1	1	
15	Mounting Bracket, radio & climate controls	B082U7346F	1	1	
17	Setscrew, M6 x 12, bracket to scuttle beam	A075W1027Z	2	2	
18	Washer, M6, bracket to scuttle beam	A075W4046Z	2	2	
19	Screw, M4 x 10, radio bracket to tunnel	A075W5079F	2	2	
20	Washer, flat, " " " "	A075W4000Z	2	2	
21	Wellnut, M4, " " " "	B082W4046Z	2	2	
22	Edging Strip, bracket edges	A085V6080V	A/R	A/R	
25	Washer, flat, console top to radio mntg. brkt.	A075W4009Z	2	2	
26	Washer, s/proof, " " " " " "	A075W4086Z	2	2	
27	Wing Nut, M4, " " " " " "	A082W3081F	2	2	
30	Setscrew, radio mounting bracket to scuttle beam	A075W1028Z	2	2	
31	Washer, spring, " " " " "	A075W4033Z	2	2	
32	Washer, flat, M6 x 15, " " " "	A075W4015Z	2	2	
33	Seal, neoprene, bracket anti-squeak	B075U6054V	A/R	A/R	
35	Studplate, centre console rear fixing	C082F4117F	1		
37	Spacer, " " " "	A1OOL6007F	1		
38	Washer, flat, M6 x 15, console rear fixing	A075W4015Z	1		
39	Washer, spring, M6, " " "	A075W4035Z	1		
40	Nut, Nyloc, M6, " " "	A075W3009Z	1		
41	Screw, studplate to centre tunnel	A075W5079F	2		
42	Rawlnut, " " " "	A082W6350F	3		

* **Specify or supply sample of colour & Vehicle Identification Number**

FUNCTION CODE	CONTENTS: Centre Console,, Climate Controls Mounting Bracket		QUANTITY		
14.08A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
45	Keyhole Plate, tunnel top, console rear fixing	P691.1519.001AF		1	
46	Screw, M4 x 10, keyhole plate to tunnel	A075W5079F		4	] Alternatives
	Screw, csk pozi, M4 x 12, plate to tunnel	A082W5121F		4	]
47	Rawlnut, M4, plate to tunnel	A082W6350F		4	} Alternatives
	Wellnut, M4, " " "	A082W6350F		4	}
48	Setscrew, M6 x 40, console to keyhole plate	A075W1034Z		1	
	Bracket, fuel filler flap switch	P691.1408.002AK		1	
	Screw, No.6 x 3/8", switch plate fixing	A075W5011Z		4	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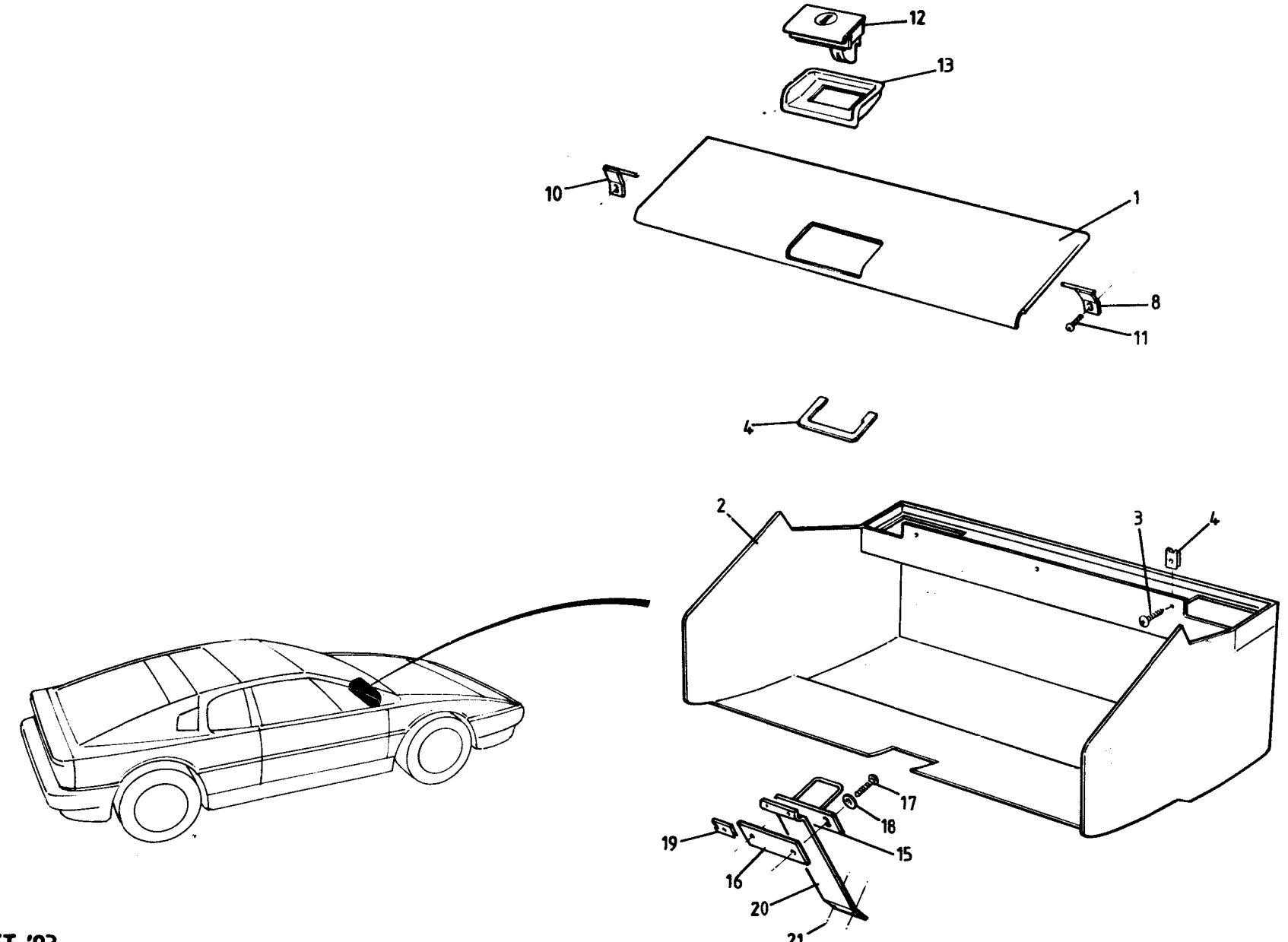
FUNCTION CODE	CONTENTS : Trimmed instrument Binnacle		QUANTITY		
14.10A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Instrument Binnacle Cover, trimmed	AO82V7984J*	1		
	" " " "	B082V7984J*	1		(With twin needle stitching)
2	Screw, binnacle rear corner fixing	A082W5022F	2		
3	Spire Nut " " " "	A075W6014Z	2		
5	Foam, binnacle anti-rattle	A079V6OlOV	A/E		
6	Edge Clip, binnacle cover	A079W6188F	7		
7	Deflector, binnacle demist vent	A082U7089K	1		
8	Washer, flat, M6 x 12, deflector to binnacle	A075W4O13Z	2		
9	Nut, Nyloc, M6, deflector fixing	A075W3009Z	2		
10	Bolt, M6 x 75, binnacle front to scuttle	A075W2036F	1		
11	Washer, s/proof, " " " "	A075W4046Z	1		
12	Jacknut, M6, " " " "	A075W3034Z	1		

Specify or supply sample of colour & Vehicle Identification Number

1995 / 02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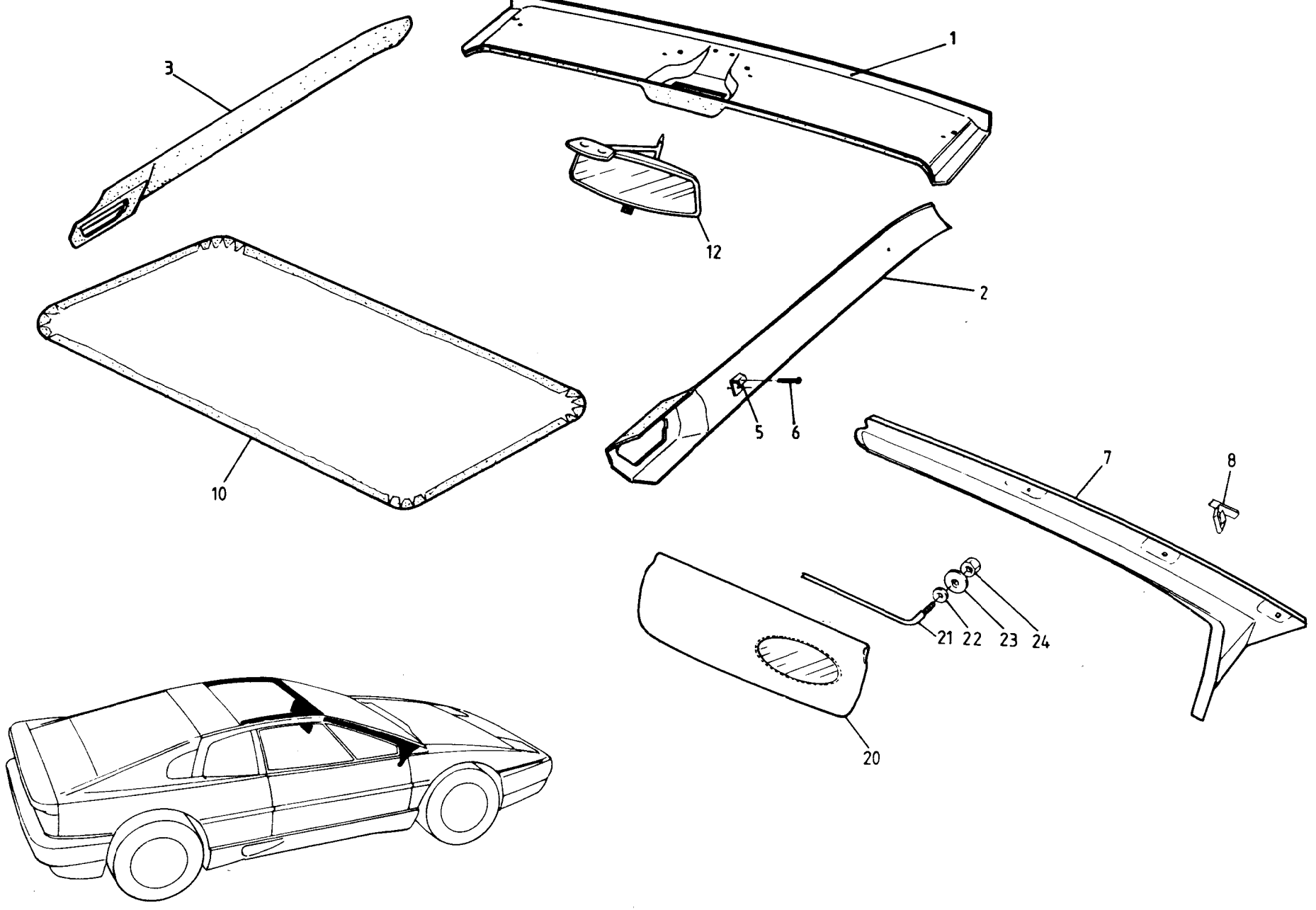
FUNCTION CODE	CONTENTS: Glovebox		QUANTITY		
14.12A	**PART DESCRIPTION**	**PART NUMER**	ALL		**REMARKS**
1	Glovebox Lid, Trimmed	A082V8642J*	1		
2	Glovebox Inner	A082V7835J	1		
3	Screw, No.6 x l/2", inner to scuttle beam	A075W5015Z	3		
4	Spirenut, No.6, " " " "	A075W6014Z	3		
8	Hinge, glovebox lid, RH	C079U4436F	1		
10	" " " LH	C079U4435F	1		
11	Screw, No.6 x l/2", Hinge to fascia	C079U4374F	1		
12	Latch Assembly, glovebox, with keys	B1OOV6004F	1		For complete lock set, see 10.17A
13	Surround, moulded, glovebox latch	A082U7538K	1		
14	Retaining Clip, glovebox latch	A1OOV6005F	1		
15	Striker Bracket, glovebox	A082U7539F	1		
16	Clamping Plate, glovebox striker	A082U7540F	1		
17	Screw, No.8 x l/2", striker to bracket	A075W5034Z	2		
18	Washer, striker to bracket	A075W4000Z	2		
19	Spirenut, striker to bracket	A075W6016Z	2		
20	Bracket, striker to fascia	C079U4374F	1		
21	Pop Rivet, bracket to fascia	A075W6088Z	4		

Note: No glove box on Dual S.I.R cars

* **Specify or supply sample of colour & Vehicle Identification Number**

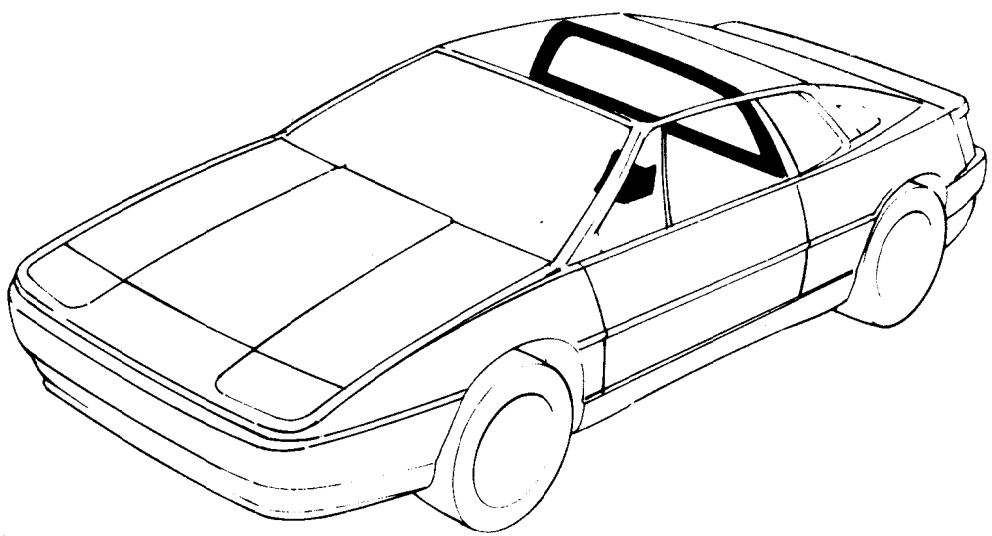
Esprit range: '93 M.Y. onwards

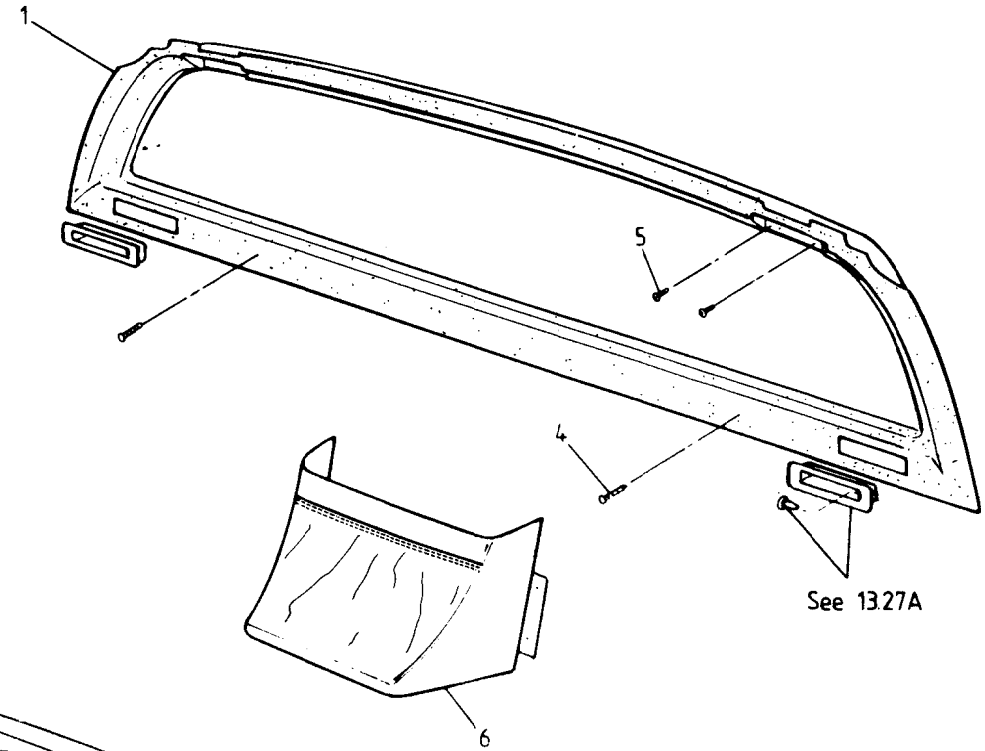


ESPRIT '93
15·01A

FUNCTION CODE	CONTENTS: Roof Trim, Interior Mirror, Sun Visors		QUANTITY		
15.01A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Header Rail, trimmed	082V8619J*	1		
2	Cant Rail, trimmed, RH	082V8605J*	1		
3	" " " LH	082V8604J*	1		
5	Bracket, cant rail fixing	C079U4749K	4		
6	Screw, No.6 x l/2", cant rail fixing	A075W5108F	4		
7	'A' Post Panel, trimmed, RH	082V7730J*	1		Except Dual S.I.R.
	" " " " RH	082V8678J*	1		Dual S.I.R.
	" " " " LH	082V7729J*	1		
a	Clip, 'A' post trim fixing	A075W60622	6		
10	Headlining Panel, trimmed	082V7696J*	1		'Composite' Roof
12	Mirror, interior, rear view	A079U6044F	1		
	Buffer, interior mirror to screen	P691.1505.001AF	1		Sport 300
	Screw, mirror fixing	A079W5052F	2		
	Washer, flat, M5 x 10, mirror fixing	A075W4011Z	2		
	Nut, Nyloc, mirror fixing	A079W3001F	2		
20	Sun Visor, driver, RHD, (no mirror)	082V7380J*	1		
	" " " LHD " "	082V7381J*	1		
	" " passenger, RHD, (with mirror)	079V4801J*	1		
	" " " LHD " "	079V4802J*	1		
21	Swivel Bracket, sun visor	A079V4361F	2		
22	Washer, M6 x 15, swivel bracket	A075W4015Z	4		
23	" M6 x 17, " "	A075W4017Z	4		
24	Nut, Nyloc, M6, " "	A075W3009Z	4		

* prefix trim part numbers with:
A - leather
Y - Alacantra suede
Z - headlining material
Also **specify or supply sample of colour & Vehicle Identification Number (VIN)**

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See 13.27A
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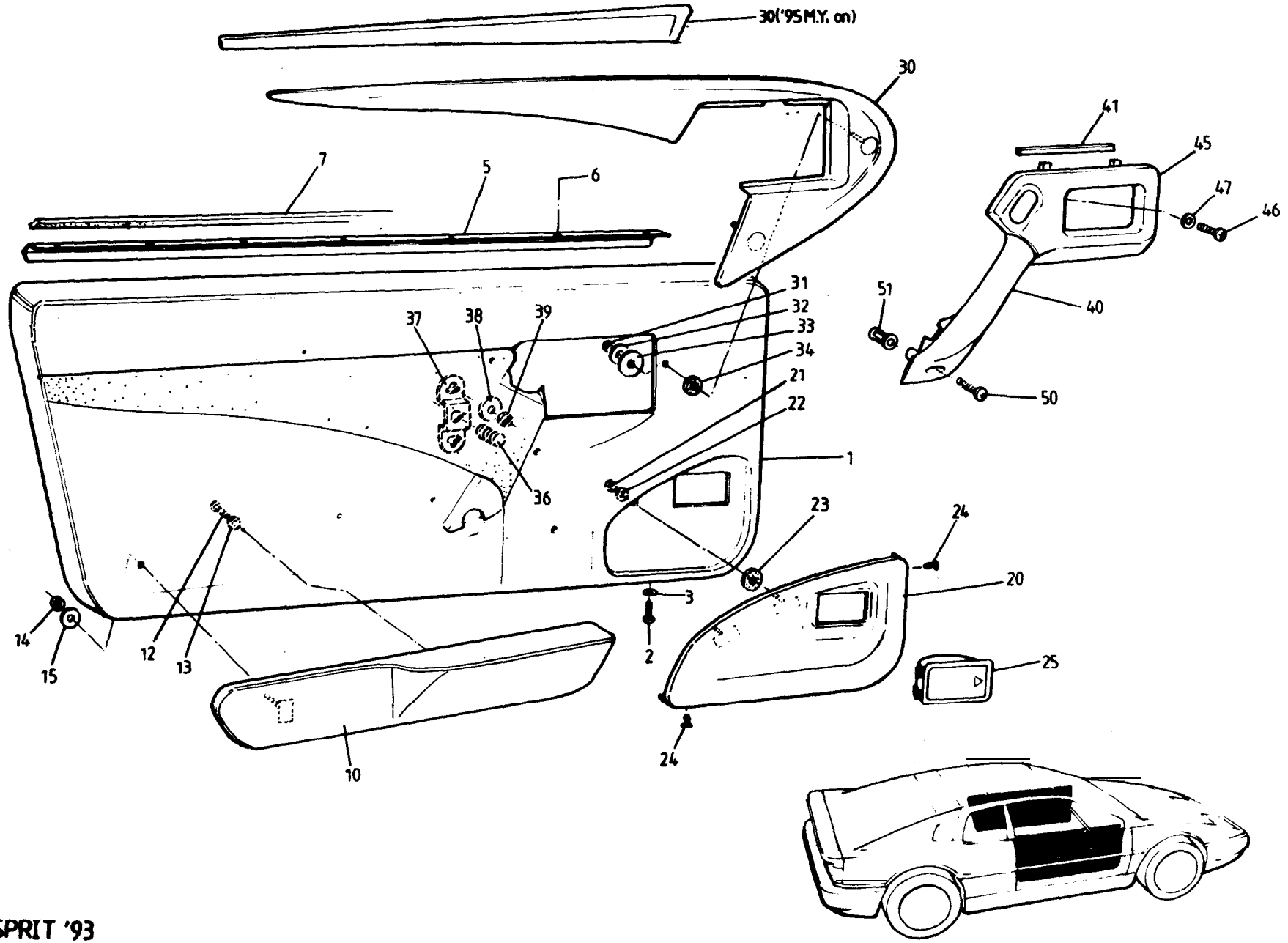
FUNCTION CODE	CONTENTS : Rear Bulkhead Trim, Bulkhead Pocket		QUANTITY		
15.11A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Rear Bulkhead window surround, trimmed	082V8606J*	1		
	Spacer, nylon, trim panel to bulkhead carpet	A082U6162F	2		Sport 300. Use if no soundproofing
4	Screw, bulkhead panel fixing	A082W5022F	2		
5	Screw, " " " , handle recess	A075W5028Z	4		
6	Pocket, rear bulkhead	082V8289J*	1		
	" " " trimmed	B082V8289J*	1		irom '95 M.Y.
	Screw, No.6 x l", pocket to rear bulkhead	A082W5022F	4		

' prefix trim part numbers with:
A- leather
Y- Alacantara suede
Z - headlining material
Also, specify or supply sample of colour & Vehicle Identification Number (VIN)

Esprit range: '93 M.Y. onwards



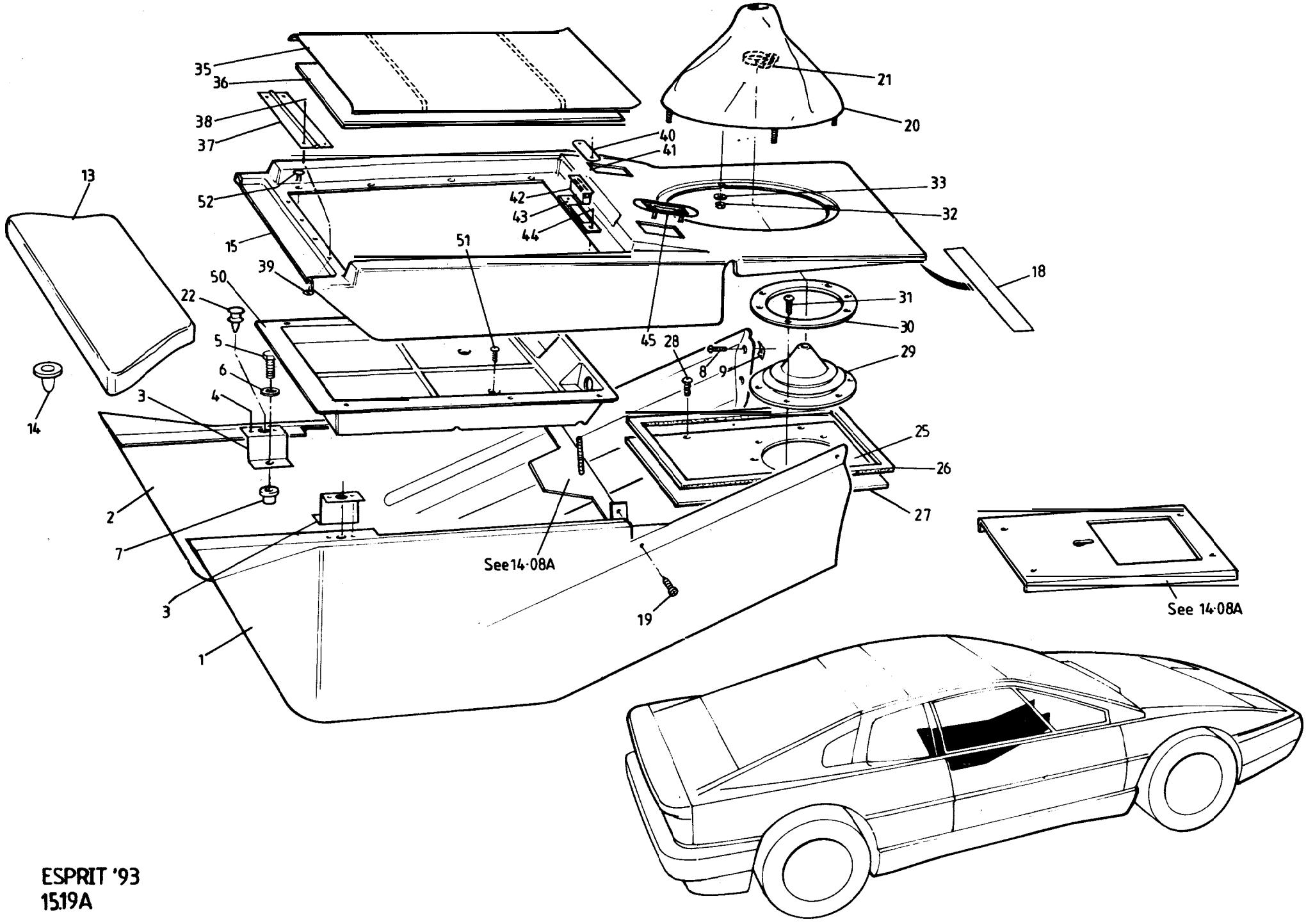
ESPRIT '93
15.13A

FUNCTION CODE	CONTENTS : Door Trim		QUANTITY		
15.13A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
1	Door Trim Panel, trimmed, LH, raven	A082V8299J*	>		
	" " " " " grey	A082V8301J*	>		
	" " " " " light grey	A082V8303J*	>		
	" " " " " blue	A082V8305J*	>l		Prior to '95 M.Y.
	" " " " " red	A082V8307J*	>		
	" " " " " magnolia	A082J8309J*	>		
	" " " " " gold	A082V8311J*	>		
	" " " " " sand	A082V8313J*	>		
	" " " " " (State colour)	A082V8729J*	1		95 M.Y. onwards
	" " " " " grey Alcantara	P691.1513.001AJ*		1	
	Trim Cover, door panel, LH, grey Alcantara	P691.1513.009AK*		1	
	Door Trim Panel, trimmed, RH, raven	A082V8300J*	)		
	" " " " " grey	A082V8302J*	)		
	" " " " " light grey	A082V8304J*	)		›
	" " " " " blue	A082V8306J*	) 1		› Prior to '95 M.Y.
	" " " " " red	A082V8308J*	)		
	" " " " " magnolia	A082J8310J*	)		
	" " " " " gold	A082V8312J*	)		›
	" " " " " sand	A082V8314J*	)		
	" " " " " (State colour)	A082V8730J *	1		'95 M.Y. onwards
	" " " " " grey Alcantara	P691.1513.002AJ*		1	
	Trim Cover, door panel, RH, grey Alcantara	P691.1513.008AK*		1	
2	Screw, M5 x 16, door trim panel fixing	A082W5184F	4	4	
3	Washer, flat, door trim panel fixing	A082W4107F	4	4	
5	Carrier, door trim panel seal	A082V8297F	2	2	
6	Pop Rivet, seal carrier fixing	A075W6088Z	14	14	
7	Foam Seal, trim panel to door inner	A082U6067F	2m	2m	
10	Armrest, trimmed, LH	A082V8325J*	1		
	" " "	P691.1513.007AK*		1	
	Armrest, trimmed, RH	A082V8324J*	1		
	" " "	P691.1513.006AK*		1	
12	Screw, No.6 x ½", armrest to door trim panel	A075W5014Z	6	6	* **Specify or supply sample of colour & Vehicle Identification Number**
13	Washer, flat, " " " " "	A082W4099F	6	6	
14	Nut, M5 Nyloc, " " " " "	A075W3008Z	2	2	
15	Washer, flat, " " " " "	A082W4098F	2	2	

FUNCTION CODE

CONTENTS : Door Trim

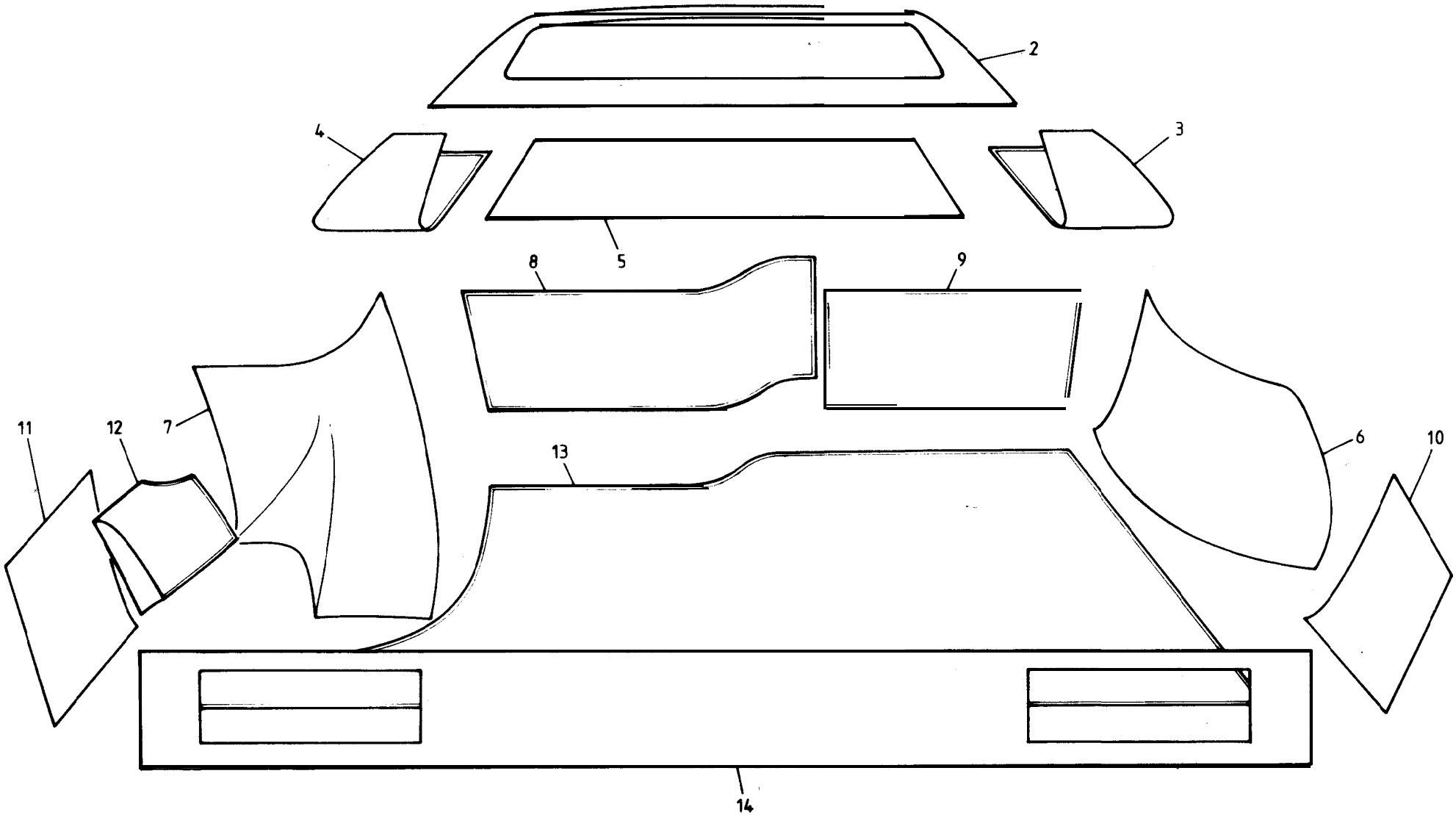
15.13A	PART DESCRIPTION	PART NUMBER	QUANTITY S4/S4S	QUANTITY SPORT 300	REMARKS
20	Kickplate, door trim panel, RH	A082V8464K	1	1	
	" " " " "	B082V8464K	1		'95 M.Y. onwards
	" " " " LH	A082V8463K	1	1	
	" " " " "	B082V8463K	1		'95 M.Y. onwards
21	Nut, M5 Nyloc, kickplate fixing	A075W3008Z	4	4	
22	Washer, flat, " "	A082W4098F	4	4	
23	Washer, rubber, " "	A082W6515F	4	4	
24	Push Fastener, " "	A082W6515F			
25	Ashtray Assembly	A082V6200F	2	2	
30	'Carbon Fibre' Door Trim Finisher, RH	A082U7620F	1		
	'Burr Walnut' " " " "	A082U7708F	1		'95 M.Y. onwards
	'Carbon Fibre' " " " LH	A082U7619F	1		
	'Burr Walnut' " " " "	A082U7707F	1		'95 M.Y> onwards
31	Nut, M5 Nyloc, finisher fixing	A1OOW3113F	10		
32	Washer, flat, " "	A075W4009Z	10		
33	Washer, rubber, large: top fixings to door panel inboard + outboard of door panel all fixings	A036L6019Z	16		
34	Washer, rubber, small: front fixings to door panel inboard	A082W4115F	8		
	Centre Upper Trim Panel, cloth trimmed, RH	P691.1513.012AK		1	
	" " " " " " LH	P691.1513.013AK		1	
36	Buffer, adjustable, door trim panel spacer	A082U6163F	2	2	
37	Bracket, door panel buffer mounting	B082U7098F	2	2	
38	Washer, flat, M6 x 15, buffer bracket fix	A075W4015Z	4	4	
39	Nut, Nyloc, M6, " " "	A075W3009Z	4	4	
	Handle, door interior grab, RH	A082U6248F	1	1	
40	" " " " LH	A082U6249F	1	1	
41	Foam Seal, handle to trim panel	A082U6065V	A/R	A/R	
	Cover, interior release handle, RH, RHD	A082U6252F	1	1	
	" " " " LH, "	A082U6251F	1	1	
	" " " " RH, LHD	A082U6250F	1	1	
45	" " " " LH, "	A082U6253F	1	1	
46	Screw, M6 x 16, door pull top fixing	A076W5090F	2	2	
47	Washer, spring, M6, " " "	A075W5090F	2	2	
50	Screw, M6 x 25, door pull lower fixing	A075W5089Z	2	2	
51	Jacknut, M6, " " " "	A075W3031Z	2	2	



ESPRIT '93
15.19A

FUNCTION CODE	CONTENTS : Tunnel Trim, Gear Lever Gaiters		QUANTITY		
15.19A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
1	Tunnel Side, trimmed, RH, RHD/LHD	082V8288J*	1	1	Except Dual S.I.R.
	" " " RH LHD	082V8680J*	1		Dual S.I.R.
2	" " " LH, RHD/LHD	082V8679J*	1	1	
3	Bracket, tunnel side trim to body	A082V8021F	2	2	
4	Pop Rivet, bracket to trim panel	A075W6090Z	4	4	
5	Setscrew, M5 x 12, tunnel side to body	A082W5188F	2	2	
6	Washer, M6 x 15, " " " "	A075W4015Z	2	2	
7	Rawlnut, M5, " " " "	A075W6074F	2	2	
a	Screw, No.8 x 3/4", tunnel side to fascia	A075W5074Z	2	2	
9	Spire Nut, No.8, tunnel side to fascia	A075W6011Z	2	2	
13	Infill, tunnel top armrest, trimmed	082V8689J*		1	
14	Snapsack, infill to tunnel top	A082W6247F		4	
15	Tunnel Top Armrest, trimmed	082V8611J*	1		
	" " " "	082V8683J*		1	
la	Velcro, armrest to centre tunnel	A082V6088V	100mm	100mm	
19	Screw, No.6 x ½, tunnel sides to tunnel	A075W5012F	3		
20	Gaiter, gear lever, 'trimmed	082V7586J*	1	1	
21	Snapper Clip, gaiter top retention	A075W6205Z	1	1	
22	Clip, armrest fixing	A079W6162F	2	2	
25	Plate, gear lever aperture	C082U4737F	1	1	
26	Foam Strip, aperture plate to gear lever assy.	A036B6213V	1m	1m	* Prefix trim part numbers with:
27	Gasket, aperture plate to body	A082U4738K	1	2	A- leather
28	Screw, No.6 x 3/8", aperture plate to body	A075W5011Z	6	4	Y- Alacantara suede
29	Gaiter, Neoprene, gear lever, lower	B082F4114F	1	1	
30	Clamp Ring, gear lever lower gaiter	A085U4826K	1	1	**Specify or supply sample of colour**
31	Screw, No.6 x 3/8", gaiter clamp ring fixing	A075W5011Z	4	4	**& Vehicle Identification Number**
32	Nut, Nyloc, M5, trim gaiter fixing	A075W3008Z	4	4	
33	Washer, flat, M5, " " "	AO75W4001Z	4	4	
35	Lid, trimmed, tunnel top compartment	B082V7923J*	1		
36	Inner Lid, " " "	A082V7910K	1		
37	Hinge, tunnel top lid	A089V6137F	1		
38	Rivet, hinge fixing	A075W6090Z	a		
39	Washer, hinge fixing	A075W4001Z	a		
40	Counter Plate, magnetic catch	A082V7890F	1		
41	Screw, No.4 x ½", counter plate fixing	A075W5003F	2		

FUNCTION CODE	CONTENTS: Tunnel Trim, Gear Lever Gaiters		QUANTITY		
15.19A	PART DESCRIPTION	PART NUMBER	s4	SPORT 300	REMARKS
42	Magnetic Catch, tunnel top compartment lid	**A082V1824F**	1		
43	Plate, magnetic catch fixing	A082V7822F	1		
44	Pop Rivet, catch fixing plate	A075W6090Z	2		
45	Plate, window operating switch mounting	A082U6298F	2	2	
50	Tray, tunnel top compartment	A082V7914K	1		
51	Screw, tray to tunnel top	A075W5012Z	2		
	Mounting Plate, window override switch	P691.1408.001AK		1	
	Stud, M4 x 14, Swifthread, mounting plate	A082W6518F		2	
	Nut, M4, window override switch plate	A075W3019F		2	
	Rubber Sheet, self adhesive, switch plate	A036B6221V		A/R	
52	Split pin tunnel tray fixing	A076W6154F	8	8	

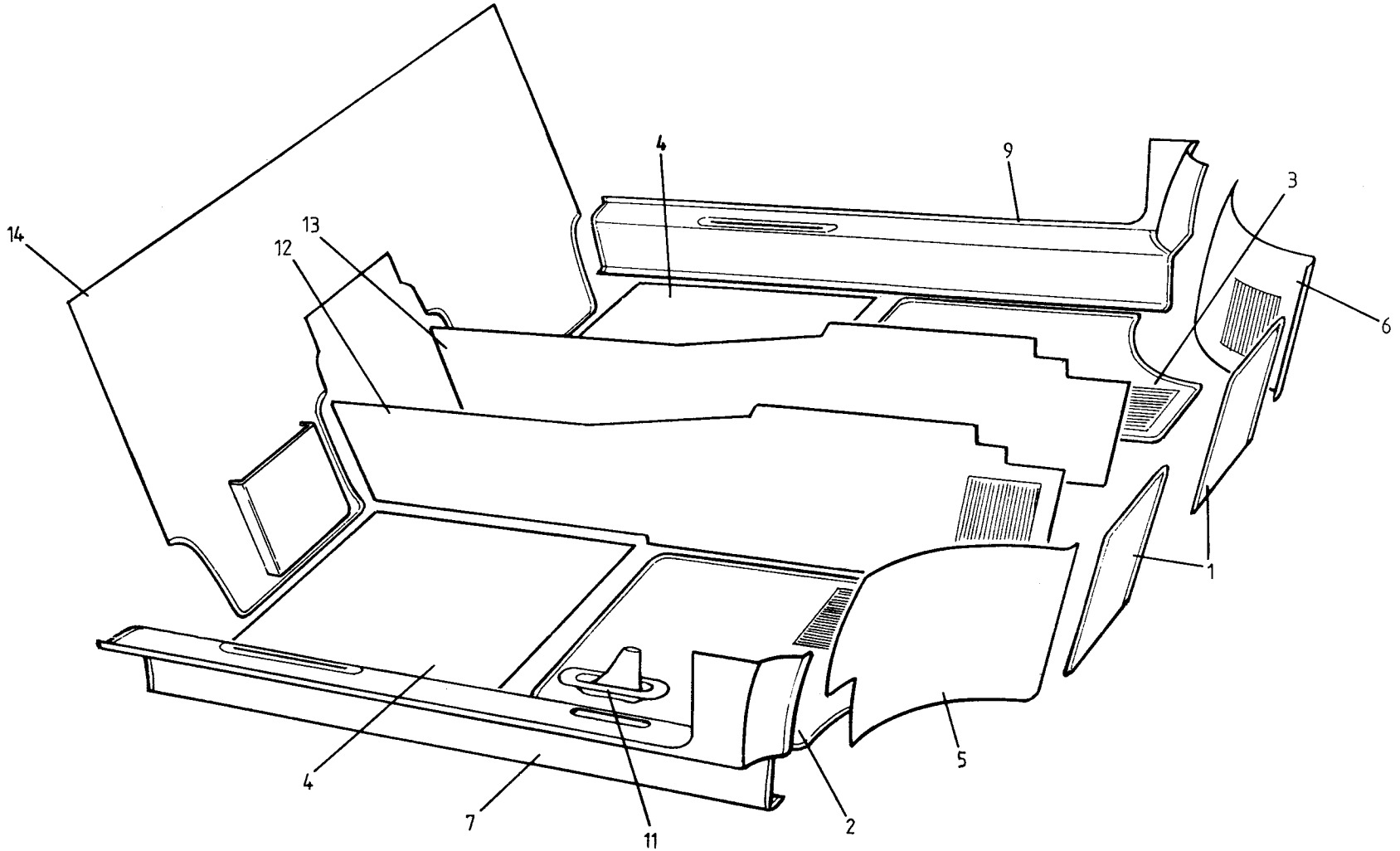


ESPRIT '93
15.24A

FUNCTION CODE	CONTENTS : Luggage Compartment Carpet		QUANTITY	
15.2411	PART DESCRIPTION	PART NUNBER	ALL	REMARKS
2	Carpet, rear bulkhead	A082V5892K	1	
3	" trimmed, Rear Quarter Panel, RH	B082V7582J*	1	) Inside rear guater window
4	" " " " " LH	B082V7583J*	1	) (Matches vehicle interior)
6	" Wheelarch, RH	A082V7606K	1	
7	" " LH	A082V7605K	1	
a	" Engine Bay Rear Wall, trimmed	A082V7617J	1	
9	" Removeable Cover, trimmed	A082V7618J	1	
10	" Body Side, RH	A082V7604K	1	
11	" " " LH	A082V7603K	1	
12	" Expansion Bottle cover, trimmed	A082V7623J	1	
	" Vacuum Pump cover, trimmed	A082V8593J	1	If fitted (RH wheelarch)
13	" & Heatproofing, luggage compartment floor	A082V8612J	1	
14	" Rear Transom Panel, trimmed	A082V7620J	1	
	" Front Luggage Compartment	P691.1524.001	1	Sport 300

*** Specify or supply sample of trim colour, State Vehicle Identification Number** (V.I.N.)

All carpet is grey fleck



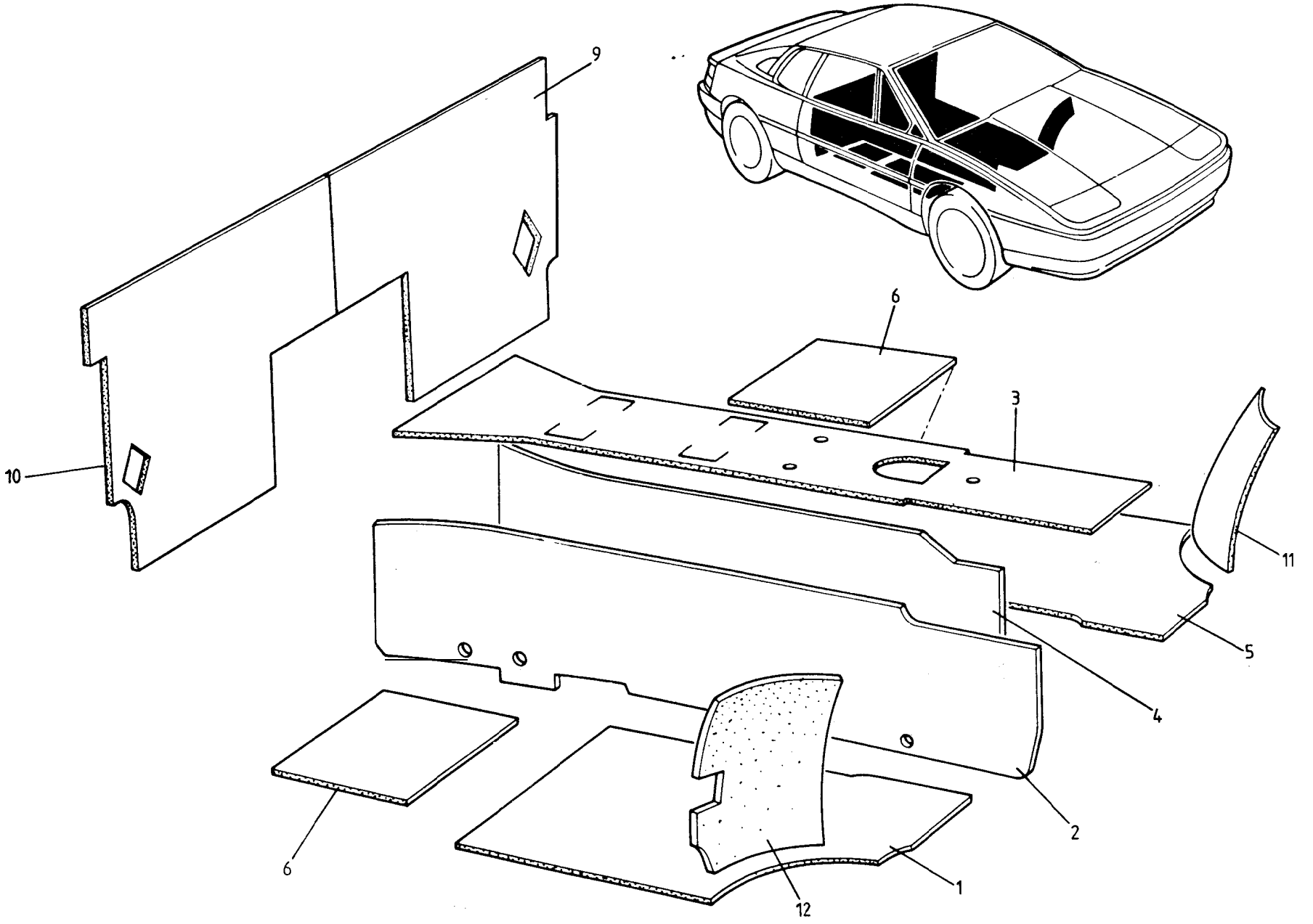
ESPRIT '93
1530A

FUNCTION CODE

CONTENTS: Passenger Compartment Carpet, Handbrake Gaiter

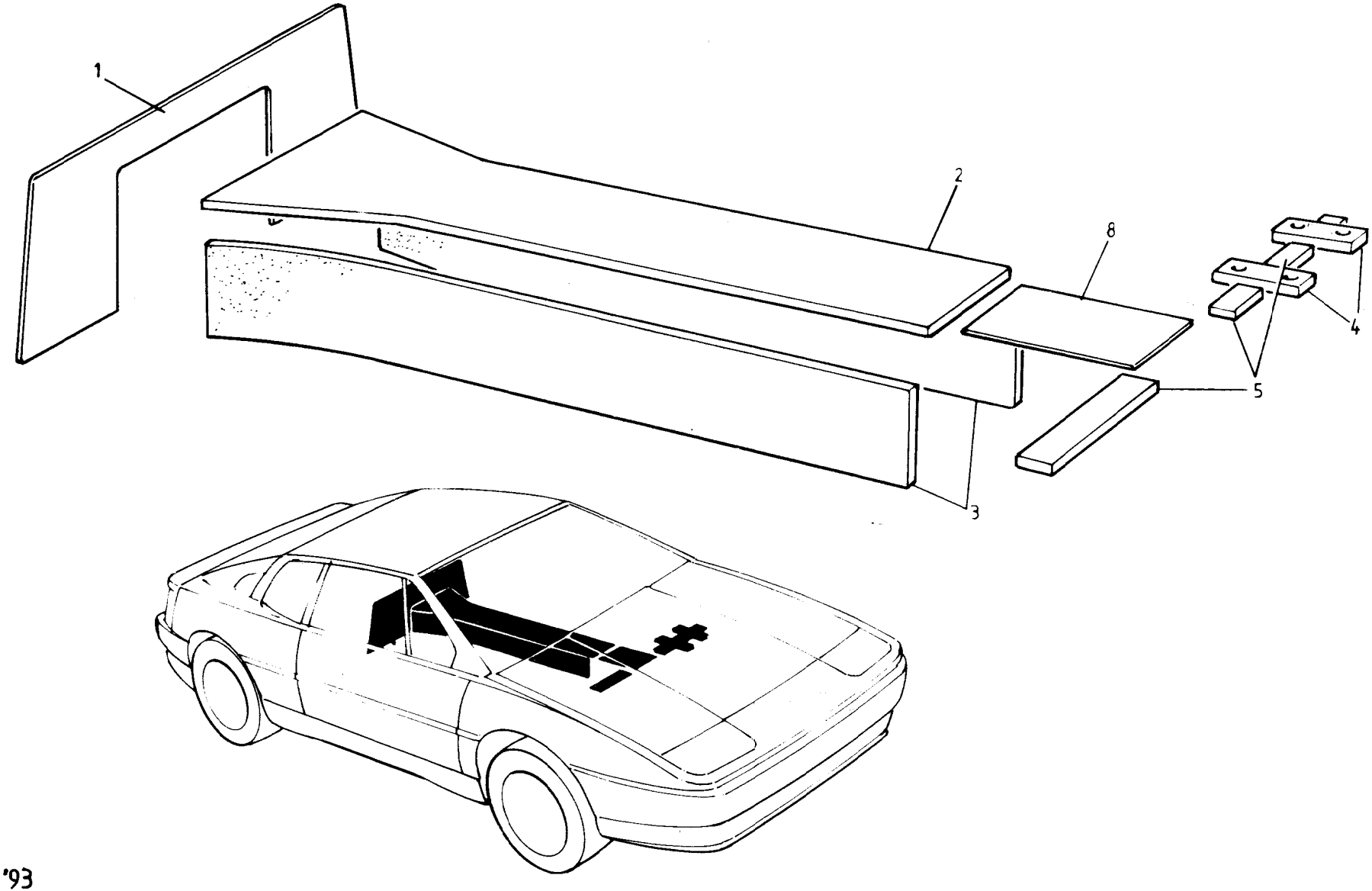
15.30A	PART DESCRIPTION	PART NUMBER	QUANTITY RHD	QUANTITY LHD	REMARKS
1	Carpet, footwell front	A082V7749J*	2	2	
2	Carpet, front floor, with mat, RH	A082V8620J*	1	1	
3	" " " " " LH	A082V8621J*	1	1	
4	Carpet, underseat	A082V7742J*	2	2	
5	Carpet, front wheelarch, with mat, RH	A082V7744J*	1	1	
6	" " " " " LH	A082V7743J*	1	1	
7	Sill Panel, carpeted, RH (inc. handbrake gaiter	AO82V7766J*	1		>
	" " " "	A082V7770J*		1	> s4
9	" " " LH	A082V7772J*	1		>
	" " " " (inc. handbrake gaiter	A082V7765J*		1	>
	Sill Panel, carpeted, RH " " "	P691.1507.006AJ*	1		1
	" " " "	P691.1507.008AJ*		1	1 Sport 300
	" " " LH	P691.1507.005AJ*	1		
	" " " " (inc. handbrake gaiter	P691.1507.007AJ*			3
	Screw, No.6 x 3/4", sill panel fixing	A075W5028Z	)13	)13	) as fitted
	Pop Rivet, sill panel fixing	A075W6065Z	)	)	)
11	Handbrake Gaiter	AO82V7261J*	1	1	
12	Carpet, tunnel side, with mat, RH	A082V7733J*	1		
	" " " RH	A082V7732J*		1	
	" " " LH	A082V7731J*	1		
	" " " with mat, LH	A082V7734J*		1	
	Carpet, rear bulkhead, no pocket	A082V7722K	1.	1	
	" " " , with trimmed pocket	A082V8690J*	1		1 pocket, drivers side
14	" " " " " pockets	A082V8691J*		1	2 pockets

* **Specify or supply sample of trim & Vehicle Identifivation Number**



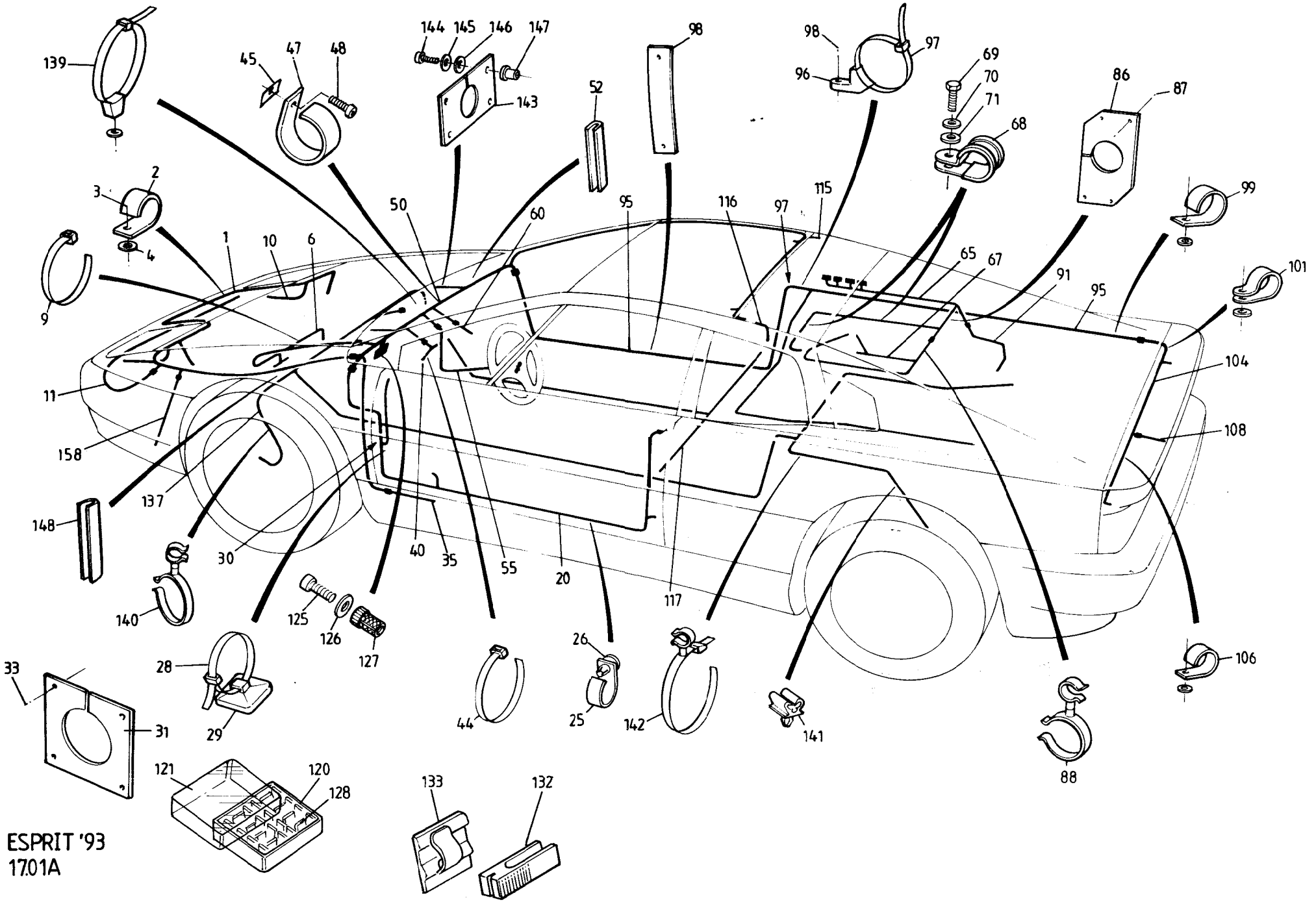
ESPRIT '93
1601A

FUNCTION CODE	CONTENTS: S4: Passenger Compartment Sound Insulation		QUANTITY		
16.01A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Foam, front floor, RH	A082V8082K	1		
2	Foam, tunnel side, RH	A082V8088K	1		
	Foam, tunnel side infill	A082V8214K	2		
3	Foam, tunnel top	A082V8086K	1		
4	Foam, tunnel side, LH	A082V8087K	1		
	" " " , extension, LH	A082V8089K	1		
5	Foam, front floor, LH	A082V8081K	1		
6	Foam, underseat	A082V5816K	2		
9	Foam, rear bulkhead, LH	A082V8083K	1		
10	" " " RH	A082V8084K	1		
11	Felt, front wheelarch, LH	B079V4095F	1		
12	" " " RH	B079V4096F	1		
					Note: **Not** fitted on Sport 300



ESPRIT '93
16.02 A

FUNCTION CODE	CONTENTS: Body Underside Sound Insulation		QUANTITY		
16.02A	**PART DESCRIPTION**	**PARTNUMBER**	ALL		**REMARKS**
1	Sound Barrier Mat, rear bulkhead	A082V8091K	1		
	Screw, No.6 x 1/2", mat fixing	A075W5020F	14		
	Cup Washer, mat fixing screws	A075W6025F	14		
2	Foam, tunnel top underside	A082V8092K	1		
3	Foam, tunnel side inderside	A082V8093K	2		
4	Foam, pedal box seal	A085V5726K	2		
5	Foam, chassis front crossmember	A085V5727K	1		
8	Pad, anti-squeak	A082V7273K	1		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ESPRIT '93
17.01A

FUNCTION CODE	CONTENTS : Harnesses, Leads & Fuses		QUANTITY		
17.01A	**PART DESCRIPTION**	**PART NUMBER**	PRIOR VIN *	FROM VIN *	**REMARKS**
					• **VIN R1242 (S4 LHD)** **R 1250 (S4 RHD)** **R 8030 (Sport 300)**
1	Harness, front, RHD	A082M4876F	1		(Revised Harness)
	" " LHD	D082M4663F	1		
	" " RHD/LHD	B082M4950F		1	
2	'P' Clip, front harness fixing	A075W6228F	15	10	
	" " " " " , LH front corner	A075W6229F		2	
3	Pop Rivet, 'P' clip fixing	A075W6068Z	15	15	
4	Washer, pop rivet	A075W4062F	15	15	
	Tie Wrap, bonnet lamp harness to hinge	A075W6038F	3		
6	Harness, radiator fans	A082M4668F	1		
	Adaptor Harness, S-blade fan motors	A082M4959F	3		Jsed with S-blade fan motor assys.
	Harness, radiator fans, RHD	A082M4969F		1	
	" " " LHD	A082M4968F		1	
9	Tie Wrap, rad. fan harness	A075W6038Z	9	3	
	" " " " " to cowling	A082W6519F	5	6	
10	Harness, inboard headlamps	A082M4241F	2	2	
11	Harness, front bumper	A082M4864F	1		E' mark lamps
	" " "	A082M4952F	1		JSA 'DOT' marked lamps & side markers
	" " "	A082M4949F		1	
	Harness, side marker lamps	A082M4948F	4	4	:f applicable
	Harness, front side/turn lamps	A082M4987K	2	2	Sport 300
	'P' Clip, bumper harness fixing	A075W6228F	3	3	
	Pop Rivet, 'P' clip fixing	A075W6068Z	3	3	
	Washer, pop rivet	A075W4062F	3	3	
20	Harness, driver's door	A082M4914F	1		
	" " "	B082M4914F		1	
	Harness, passenger's door	A082M4915F	1	1	
	Harness, door conversion	A082M4938F		2	ISA only
	Tie Strap, door harness	A079W6224F		8	
25	'P' Clip, 9.5 mm open, door harness to door	A075W6228F	12	12	
26	Fastex Scrivet, 5 mm, 'P' clip fixing	A1OOW6479F	12	12	
	Neoprene Washer, scrivet sealing	A082W4115F	14	14	
28	Tie Wrap, releasable, mirror connector to door	A100W6399F	2	2	

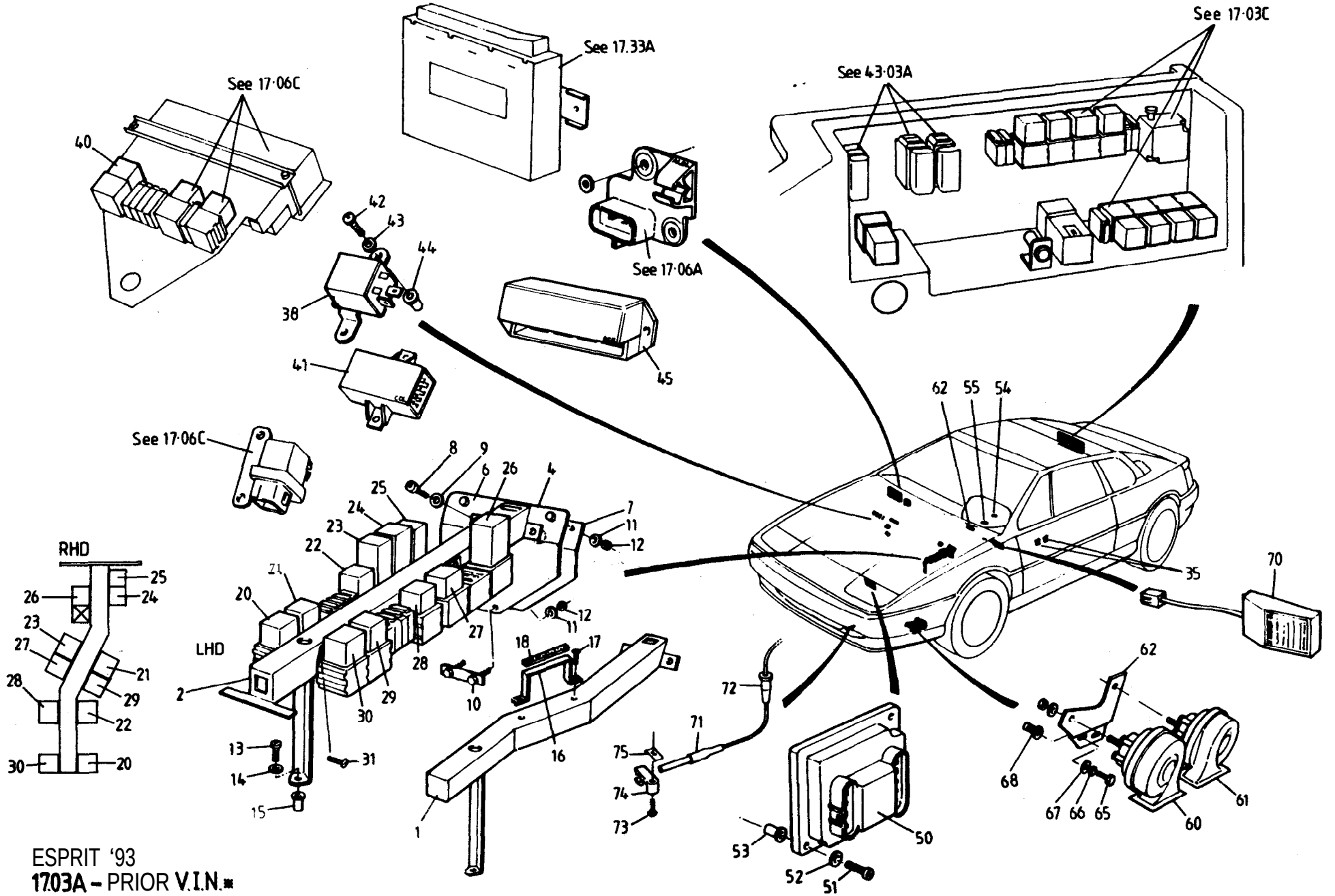
FUNCTION CODE	CONTENTS : Harnesses, Leads & Fuses		QUANTITY		
17.01A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					* VIN R 1242 (S4 LHD) R 1250 (S4 RHD) R 8030 (Sport 300)
29	Self Adhesive Clip, tie wrap fixing	A082M6556F	2	2	(Revised Harness)
30	Grommet, mirror cables	A075U6043Z	2	2	
31	Plate, door harness grommet, 'A' post	A082M4720F	2	2	
	" " " " driver's door	A082M4721F	1	1	
	" " " " passenger's door	A082M4722F	1	1	
33	Pop Rivet, grommet plate fixing	A075W6068Z	16	16	
35	Harness, parking brake switch	A082M4874F	1		
40	Harness, instrument binnacle	A082M4955K	1		s4
	" " "	H082M4664F		1	
	" " "	P691.1701.002AK	1		> Sport 300
	" " "	P691.1701.002CK		1	>
44	Tie Wrap, binnacle harness	A075W6038Z	4	4	
	Foam, harness anti-rattle	B036B6197V	A/R	A/R	
	'P' Clip, binnacle harness securing	A075W6228F	3	3	
	Pop Rivet, 'P' clip fixing	A075W6067Z	3	3	
47	'P' Clip, fascia harness to bulkhead	A079W6200F	2	2	
48	Screw, " " " "	A075W5050F	2	2	
49	Spire Nut, No.6 " " "	A075W6013Z	2	2	
	Harness, fascia, RHD	J082M4666F	1		
	" " "	A082M4992K		1	
50	" " LHD	J082M4665F	1		
	" " "	B082M4991K		1	
	Rubber Edging, fascia harness protection	A085U6080V	100mm	100mm	
	Tie Wrap Clamp, fascia harness fixing	A082W6293F	9	7	
	Tie Wrap, " " "	A082W6286F	9	7	
55	Harness, steering column, non-S.I.R.	A082M4918F	1		
	" " " " "	B082M4918F		1	
	" " " S.I.R.	B082M4833F	1		
	" " " "	C082M4833F		1	
	Harness, rheostat, panel illumination	A082M4855F	1		
60	Harness, centre console	C082M4667F	1		
65	Harness, engine management	B082M4792F	1		

FUNCTION CODE	CONTENTS : Harnesses, Leads & Fuses		QUANTITY		
17.01A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					***VIN R1242 (S4 LHD) R 1250 (S4 RHD) R 8030 (Sport 300)**
	Harness, engine management	A082M4960F		1	(Revised Harness)
67	Harness, oil temp. & pressure senders	B082M4946F		1	
	Harness, boost gauge sender	A082M4970F		1	
68	'P' Clip, engine.management harness fixing	A075Q6013Z	1		
69	Setscrew, M6 x 20, 'P' clip fixing	A075W1030F	1	1	
70	Washer, shakeproof, " " "	A075W4045Z	1	1	
71	Washer, flat, M6 x 12, " "	A075W4013Z	1	1	
	'P' Clip, engine management harness fixing	A075Q6016Z	3	3	
	" " " " " "	AO75W6230F	1		
	'P' Clip, open, eng. man. harness to tank board	A075W6229F	1	4	LH side
	" " " " " " " " "	A075W6228F		2	RH side
	'P' Clip, eng. man. harness to bell housing top	A082M6591F		1	
	'P' Clip, " " " " airbox	A075W6229F		3	
	Tie Wrap, " " " " coolant pipes	A075W6038F		2	
	'P' Clip, Oxygen sensor lead to chargecooler	A075Q6013Z		1	
	Edge Clip, reverse lamp harness to chassis X-mem	A079W6185F		1	
	'P' Clip, fuel tank sender harness	A075W6227F		1	
	Grommet, LH speaker box	A075W6043F		1	
	'P' Clip. washer harness breakout	A075W6228F		1	
	Harness, fuel rail injectors	A082M4793F	1		
	'P' Clip, injector harness fixing	A910E6490F	1	1	
86	Grommet Plate, injector harness	A082M4778F	1		
a7	Pop Rivet, grommet plate fixing	A075W6068Z	4		
88	Swivel Clip, injector harness to water pipe	A089W6287F	4		
	" " " " " " "	A089W6296F	4		
	'P' Clip, open metal, inj. harness to manifold	A082M4618F	1	1	Inlet manifold rear bolt
90	Cable Clip, Oxygen sensor harness to engine bay	A089W6272F		2	
91	Harness, relay box	B082M4791F	1		S4
	" " "	P691.17O1.001AK	1		)
	Grommet, relay box harness	A082M6575F	2		) Sport 300
	Harness, coolant header tank extension	P691.1701.003AK	1		)
95	Harness, rear	J082M4661F	1		S4

FUNCTION CODE	CONTENTS: Harnesses, Leads & Fuses		QUANTITY		
17.01A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					* VIN R 1242 (S4 LHD) R 1250 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
	Harness, rear	P691.1701.004AF	1		port 300
	" "	B082M4945F		1	
96	Cradle Tie Wrap, harness to tankboard	A085W6276F	1	1	
97	Tie Wrap, " " "	A100W6399F	1	1	
98	Pop Rivet, cradle to tankboard	A082W6266F	1	1	
97	Convolute Tubing, harness over fuel tank	A082V7779V	A/R	A/R	
98	Plastic Strip, rear harness to sill	A082M4790K	4	34	
99	'P' Clip, open, rear harness fixing	A075W6229F	3	3	
	" " " " " /overflow fixing	A075W6230F	8	8	
101	" " rear harness fixing	A075W6000Z	2	2	
	Foam, harness anti-rattle	B036B6197V	A/R	A/R	
	Edge Protector, rear harness	AX75L6020V	oomm	oomm	
104	Harness, rear lighting	C082M4662F	1		
	" " "	D082M4662F		1	
106	'P' Clip, rear lighting harness	A075W6230F	5		
	" " " " "	A075W6229F		5	
108	Harness, licence plate illumination	A082M4671F	1		
	Harness, HRS & HMSL in tailgate	A082M4954F	1	1	**S4** with HMSL
	Harness, HMSL in aerofoil	A082M4953F	1	1	
	Harness, Central High Mounted Stop Lamp (CHMSL)	P691.1701.007AK	1	1	S4S USA Body mounted aerofoil '95 MY
	Harness, Central High Mounted Stop Lamp (CHMSL)	P691.1701.007AK	1	1	>
	Cover, HMSL connector	A100M6158F	1	1	> Sport 300
	Terminal, HMSL connector	A100M6115F	1	1	>
	'P' Clip, HMSL harness fixing	A075W6000Z	3	3	
115	Cable, HRS -ve	C082M4675F	1	1	HRS to RH tailgate hinge. No HMSL
116	" " +ve	A082M4676F	1	1	H tailgate hinge to HRS
117	Harness, rear speakers	B082M4734F	1		
	Harness, radio alarm link	A082M4989K		1	
	Tie Wrap, aerial cables to tailgate release cable	A075W6038Z	2	2	
120	Fusebox	A089M6334F	1	1	
121	Lid, fusebox	A082M6194F	1	1	
125	Screw, M5 x 20, fusebox to bulkhead	A075W5084F	2	2	
126	Washer, M5 x 10, " " "	A075W4011Z	2	2	

FUNCTION CODE	CONTENTS : Harnesses, Leads & Fuses		QUANTITY		
17.01A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					* VIN R 1242 (S4 LHD) R 1250 (S4 RHD) R 8030 **(Sport** 300)
127	Lock Insert, M5, fusebox to bulkhead	A075W6221F	2	2	(Revised Harness)
128	Fuse, 'Littel', 2A, grey/black	A082M6316F	A/R	A/R	
	" " 3A, violet	A082M6243F	A/R	A/R	
	" " 4A, pink	A082M6244F	A/R	A/R	
	" " 5A, orange	A082M6245F	A/R	A/R	
	" " 7.5A, brown	A082M6246F	A/R	A/R	
	" " 10A, red	A082M6247F	A/R	A/R	
	" " 15A, light blue	A082M6248F	A/R	A/R	
	" " 20A, Yellow	A082M6249F	A/R	A/R	
	" " 25A, clear	A082M6250F	A/R	A/R	
	" " 30A, light green	A082M6251F	A/R	A/R	
132	Extractor, fuse	A089M6342F	1	1	
133	Clip, fuse extractor,	A075W6043Z	1	1	
	Diode, 1A, black	B075M6141Z	A/R	A/R	
	Harness, wheel speed sensor, RHD	A082M4837F	1		
	" " " " "	B082M4837F		1	) For support bracket to vertical
137	" " " " LHD	A082M4836F	1		) link, see 31.01A
	" " " " "	B082M4836F		1	
139	Swivel Clip/Tie Wrap, rear sensor harness to chassis rail	A082W6324F	2	2	
140	Swivel Clip, " " "	A082W6325F	2	2	
141	Clip, sensor harness to rear radius arm	A082W6457F	8	8	
142	Swivel Clip, sensor harness to brake hose	A082W6458F	8	8	
143	Grommet plate, ABS harness/front bulkhead	A082M4878F	1		
144	Screw, M5 x 20mm, " "	A075W5084F	4		
145	Washer, s/proof, " "	A075W4045Z	4		
146	Washer, flat, M5, " "	A075W4011Z	4		
147	Rawlnut, M5, grommet plate	A075W6074F	4		
148	Rubber Edging, harness protection	AX75W602OV	220mm	220mm	Front spring mount
	" " " "	AX75W602OV	300mm	300mm	Front crossmember
	" " " "	AX75W602OV	80mm	80mm	Rear body mount plate

FUNCTION CODE	CONTENTS : Harnesses, Leads and Fuses		QUANTITY		
17. 01A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					* VIN R1242 (S4 LHD) R 1250 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
	Harness, S.I.R. (yellow)	E082M4797F	1	1	)river's S.I.R. only >
	" Dual S.I.R. (yellow)	A082M4951F		1	)river & pass. S.I.R. >
	'P' Clip, S.I.R. harness to scuttle beam	A075W6228F	16	16	>
	Rubber Edging, harness protection	A085U6080V	0.3m	0.3m	)ERM brackets, scuttle > with
					)eam, 'A' post > S.I.R.
	Convolute Clip, front SIR sensor lead	A082M6572F	6	6	>
	Connector Positive Assurance (CPA), passenger inflator module	A082M6585F	1	1	>)ual S.I.R. >
	Jump Harness, ice detection	A082M4869F	1		'ascia display to module >
158	Harness, electric horns	A082M6558F	1		
	" " "	B082M6558F		1	34
	Harness, air horns	A082M4988K		1	Sport 300
	Harness, daytime running lamps	A082M4877F	1		) Canada, Sweden, Norway, New Zealand
	" " " "	A082M4947F		1	
	Harness, immobiliser bridging link	A082M4971F		1	



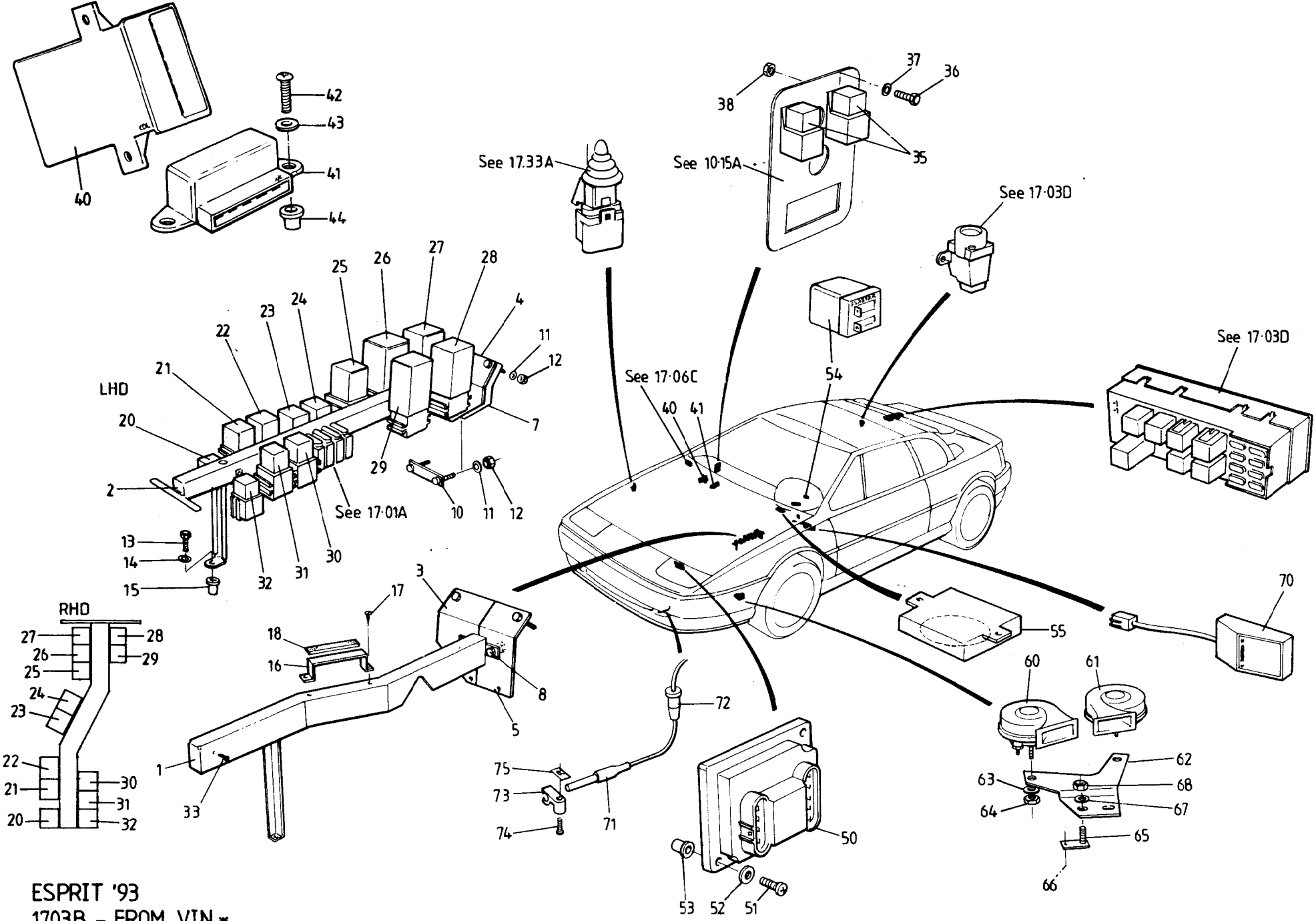
ESPRIT '93
17.03A – PRIOR **V.I.N.**

FUNCTION CODE	CONTENTS: Prior VIN *: Relays, Modules & Horns		QUANTITY		
17.03A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
					• VIN R 1142 (S4 LHD) R 1150 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
1	Relay Mounting Arm	B082M4879F	1		
2	" " "	B082M4739F		'1	
	Cover Plate, outer, relay arm to bulkhead	A082M4742F	1		
4	" " " " " " "	A082M4741F		1	
	" " inner, " " " "	A082M4744F	1		
6	" " " " " " "	A082M4743F		1	
7	Seal, " " " "	A082M4703F	1	1	
a	Setscrew, M5 x 16, relay mounting arm fixing	A082W5117F	2	2	
9	Washer, spring, M5, w " " "	A082W4097F	2	2	
10	Studplate, " " " "	A082M4714F	1	1	
11	Washer, flat, M4, " " " "	A082W4099F	4	4	
12	Nut, Nyloc, M4, " " " "	A075W3049F	4	4	
13	Screw, 10 UNF x 1" " " " to floor	A076W5062F	1	1	
14	Washer, spring, " " " " "	A075W4030Z	1	1	
15	Rawlnut, M5, " " " " "	A075W6074F	5	5	
16	Bracket, relay/pump cover support	A082M4894F	1		
17	Screw, No.6 x ½", bracket fix	A075W5012F	2		
la	Foam Strip, support bracket	A036B6213V	A/R,		
20	" changeover, front fog lamps	C079M6141F	1	1	
21	" " start drop out	C079M6141F	1	1	
22	" " horns	C079M6141F	1	1	
23	Module, headlamp pod delay	C082M6352F	1	1	
24	" tell-tale control	B082M6379F	1	1	
25	" low fuel tell tale lamp delay	D089M6330F	1	1	
26	Delay Unit, windscreen wipers	A082M6457F	1	1	
27	Relay, 30A, single contact, HRS & heated mirrors	A089M6058F	1	1	
28	" 30A, double " radiator fans	A089M6057F	1	1	
29	Relay, single contact, main beam	A089M6058F	1	1	Except USA. Lights inboard lamps only
	" double " " "	B082M6182F		1	USA. Lights 4 lamps
30	" changeover, dipped beam	C079M6141F	1	1	
31	Screw, No.6 x ½", relay base fixing	A075W5012F	11	11	

FUNCTION CODE | CONTENTS: **Prior VIN** *: Relays, Modules & Horns

17.03A	PART DESCRIPTION	PART NUMBER	QUANTITY RHD	QUANTITY LHD	REMARKS
					• **VIN R 1142 (S4 LHD)** **R 1150 (S4 RRD)** **R 8030 (Sport 300)** (Revised Harness)
	Module, window voltage regulator	B082M6531F	1	1	Except USA. Behind centre console
	Module, window voltage bridging link	A082M6595F	1	1	)
35	Relay, window lift	A100M6104F		4	fitted on door access panels)
	Screw, M5 x 10, window lift relay fixing	A082W5097F		4	) USA
	Washer, flat, " " " "	A075W4001F		4	)
	Nut, M5, Nyloc, " " " "	A075W3008F		4	)
38	Power Relay, ignition, 33RA	A082M6236F	1	1	
40	Relay, radio feed isolator	C079M6141F	1	1	
41	Control Unit, central door locking	A082M6529F	1	1	
42	Screw, M5 x 20, relay/control unit fixing	A075W5084F	6	6	
43	Washer, flat, M5 x 10, " " "	A075W4011Z	6	6	
44	Rawlnut, M5, " " "	A075W6074F	6	6	
45	Amplifier, air conditioning, inc. thermistor	A082M4766K	1	1	Front of passenger.footwell
	Cover, passenger side relays	A082M4724K	1		
	" " " "	A082M4723K		1	
	Seal, relay cover to bulkhead	A082U6067V	0.6m	0.6m	
	Screw, M5 x 20, cover fixing	A075W5084F	5	5	
	Washer, flat, M5 x 10, cover fixing	A075W4011Z	5	5	
	Rawlnut, M5, " "	A075W6074F	5	5	
50	Module, headlamp pod lift	A082M6363F	1	1	
51	Screw, M5 x 20, module fixing	A075W5084F	2	2	
52	Washer, flat, M5 x 10, module fixing	A075W4011Z	2	2	
53	Rawlnut, M5, module fixing	A075W6074F	2	2	
54	Flasher Unit, turn indicators (in binnacle)	A083M6303F	1	1	
55	Rheostat Module, panel lights control	A082M4847F	1	1	On scuttle beam
60	Horn, electric, high note (inc. nut & washer)	A100M6030F	1	1	)
61	" " low " " " " "	A100M6031F	1	1	) s4
62	Bracket, electric horns to oil cooler bracket	A082M4934F	1.	1	)

FUNCTION CODE	CONTENTS: **Prior VIN *:** Relays, Modules & Horns		QUANTITY		
17.03A	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
					*** VIN R 1142 (S4 LHD)** **R 1150 (S4 RHD)** **R 8030 (Sport 300)** (Revised Harness)
65	Setscrew, M5 x 20, mounting plate fixing	A075W1025F	2	2	)
66	Washer, spring, " " "	A075W4045F	2	2	) S4
67	Washer, flat, " " "	A075W4011Z	2	2	)
68	Jacknut, MS, " " "	A076W3043F	2	2	)
	Air Horn Compressor/Pipe Kit	A082M6481F	1	1	}
	Trumpet & Bracket Kit, air horns	A089M6345F	1	1	}
	Bracket, Air Horns	A082M4931F	1	1	}
	Pop Rivet, bracket to oil cooler duct	A075W6030F	4	4	}
	Compressor, Fiamm air horns	A089M6346F	1	1	}
	Nut, Nyloc, M8, compressor to body	A075W3010Z	1	1	} Sport 300
	Washer, M8 x 25, " " "	A075W4021Z	2	2	}
	Bracket, air horn trumpet mounting	A089M0550H	1	1	}
	Setscrew, M8 x 30, bracket to body	A075W1040Z	1	1	}
	Washer, M8 x 25, " " "	A075W4021Z	1	1	}
	Washer, M8 x 20, " " "	A075W4019Z	2	2	}
	Nut, Nyloc, M8, " " "	AO75W301OZ	1	1	}
	Logic Module, buzzer	B082M4866F		1	>
	Bracket, logic module	A082M4872F		1	> S.I.R.
	Screw, No.6 x ½", logic module bracket fixing	A082M5012F		2	>
	Spire Nut, No.6, " " " "	A075W6013Z		2	>
70	Module, ice warning	B089M6505F	1	1	On scuttle beam
71	Probe, " "	A089M6507F	1	1	
72	Grommet, ice detection probe	A082B6469F	1	1	
73	Clip, probe securing	A082W6352F	1	1	
74	Screw, probe clip fixing	A100W5168F	1	1	
75	Spire Nut, """	A075W6013Z	1	1	

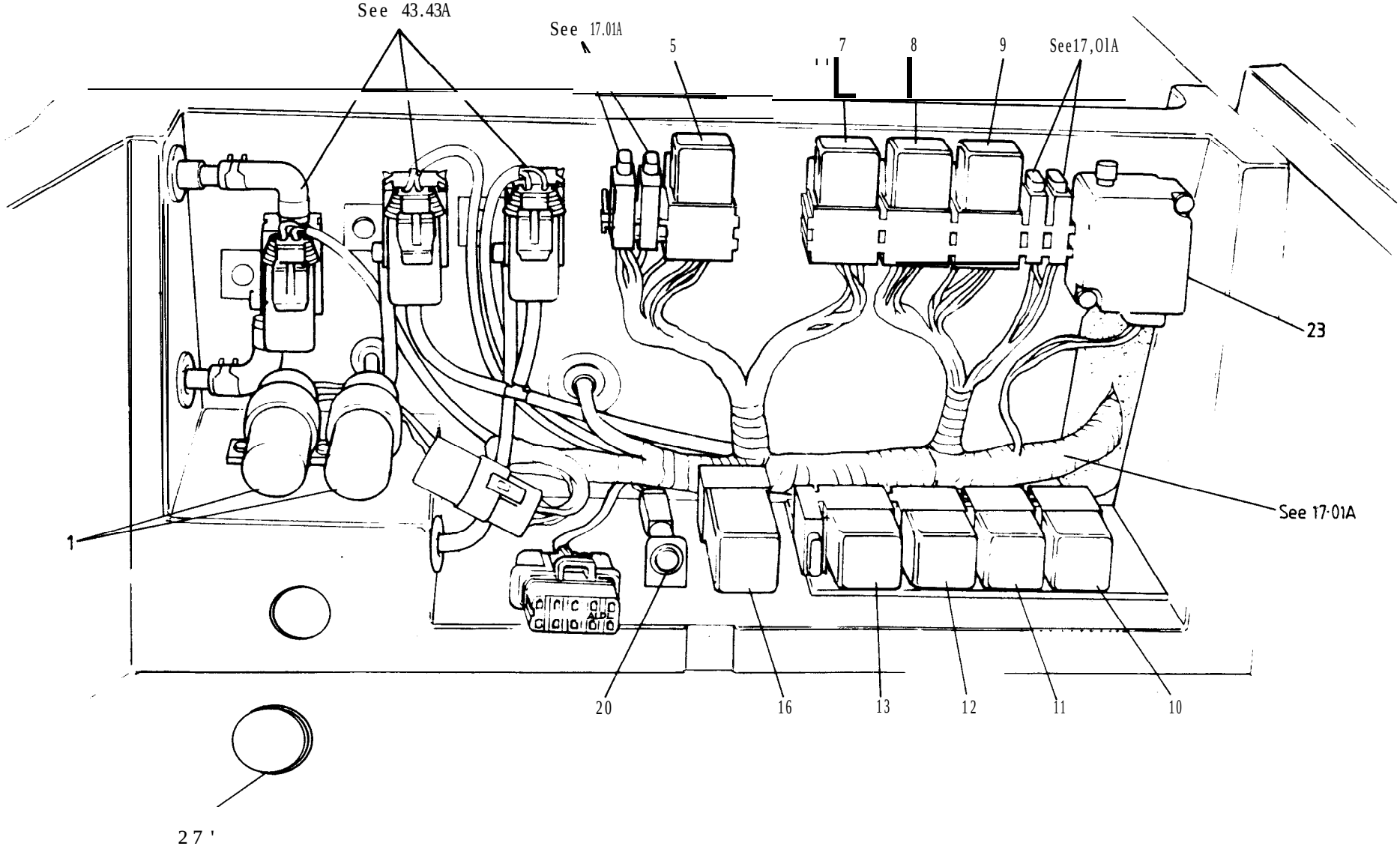


ESPRIT '93
17.03B - FROM VIN *

FUNCTION CODE	CONTENTS: **From VIN *:** Relays, Modules & Horns		QUANTITY		
17.03B	**PART DESCRIPTION**	**PARTNUHBER.**	RHD	LHD	**REMARKS**
					• **VIN R 1142 (S4 LHD)** **R 1150 (S4 RHD)** **R 8030 (Sport 300)** (Revised Harness)
1	Relay Mounting Arm	C082M4879F	1		
2	" " "	C082M4739F		1	
3	Cover Plate, outer, relay arm to bulkhead	A082M4742F	1		
4	" " " "	A082M4741F		1	
5	" " inner, " " " "	A082M4744F	1		
	" " " " " " "	A082M4743F		1	
7	Seal, relay mounting arm to bulkhead	A082M4703F	1	1	
8	Setscrew, M5 x 16, relay mounting arm fixing	A082W5117F	2	2	
	Washer, spring, M5, " " "	A082W4097F	2	2	
10	Studplate, " " "	A082M4714F	1	1	
11	Washer, flat, M4, " " "	A082W4099F	5	5	
12	Nut, Nyloc, M4, " " "	A075W3049F	5	5	
13	Screw, 10 UNF x l", " " to floor	A076W5062F	1	1	
14	Washer, spring, " " " "	A075W4030Z	1	1	
15	Rawlnut, M5, " " "	A075W6074F	1	1	
16	Bracket, cover support	A082M4894F	1		
17	Screw, bracket to arm	A075W5012F	2		
18	Foam Strip, support bracket	A036B6213V	A/R		
20	Power Relay, single contact, 70A	A082M6589F	1	1	Ignition supplies
21	Relay, changeover, dipped beam	C079M6141F	1	1	
22	" single contact, main beam	A089M6058F	1	1	Except USA. Lights inboard lamps only
	" double "	B082M6182F		1	USA. Lights 4 lamps
23	" changeover, start drop out	C079M6141F	1	1	
24	" " radio 'key-in'	C079M6141F	1	1	
25	Rheostat Module, instrument panel lights contro	B082M4847F	1	1	
26	Delay Module, low fuel tell-tale	D089M6330F	1	1	
27	" " windscreen wiper	A082M6457F	1	1	
28	Module, window voltage	C082M6531F	1	1	Except USA, Canada & Australia
	" " " bridging link	A082M6595F	1	1	USA, Canada & Australia
29	Delay Module, headlamp pods	C082M6352F	1	1	

FUNCTION CODE	CONTENTS : From VIN • : Relays, Modules & Horns		QUANTITY		
17.03B	PANT DESCRIPTION	PART NUMBER.	RHD	LHD	REMARKS
					* VIN R 1142 (S4 LHD) R 1150 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
30	Relay, changeover, front fog lamps	C079M6141F	1	1	
31	" horns	C079M6141F	1	1	
32	Power Relay, single contact, 70A, radiator fans	A082M6589F	1	1	
33	Screw, No.6 x ½", relay base fixing	A075W5012F	11	11	
35	Relay, window lift	A100M6104F		4	On door access panel >
36	Screw, M5 x 10, window lift relay fixing	A082W5097F		4	> USA
37	Washer, flat, " "	A075W4001F		4	>
38	Nut, M5, Nyloc, " "	A075W3008F		4	
40	Control Unit, central door locking	A082M6529F	1	1	) In passenger footwell
41	Amplifier, air conditioning (inc. thermistor)	A082M4766K	1	1	)
42	Screw, M5 x 20, amplifier/control unit fixing	A075W5084F	4	4	
43	Washer, flat, M5 x 10," " " "	A075W4011Z	4	4	
44	Rawlnut, M5,	A075W6074F	4	4	
50	Module, headlamp pod lift	A082M6363F	1	1	
51	Screw, M5 x 20, module fixing	A075W5084F	2	2	
52	Washer, flat, M5 x 10, module fixing	A075W4011Z	2	2	
53	Rawlnut, M5, module fixing	A075W6074F	2	2	
54	Flasher Unit, turn indicators (in binnacle)	A083M6303F	1	1	
	Module, lights on buzzer	A082M6586F	1	1	non-USA. R/B A082M6608F
55	" " " "	A082M6608F	1	1	
		B082M4866F	1	1	>
	Bracket, module to scuttle beam	A082M4872F		1	> USA
	Screw, No.6 x ½", logic module bracket fixing	A082M5012F		2	>
	Spire Nut, No.6, "	A075W6013Z		2	>
	Connector, 6-way, lights on warning buzzer	A082M6606F	1	1	} Use with A082M6608F
	Terminal, connector	A082M6607F	3	3	}
60	Horn, electric, high note (inc. nut & washer)	A100M6030F	1	1	
61	" low "	A100M6031F	1	1	) s4
62	Bracket, electric horns to oil cooler bracket	A082M4934F	1	1	)

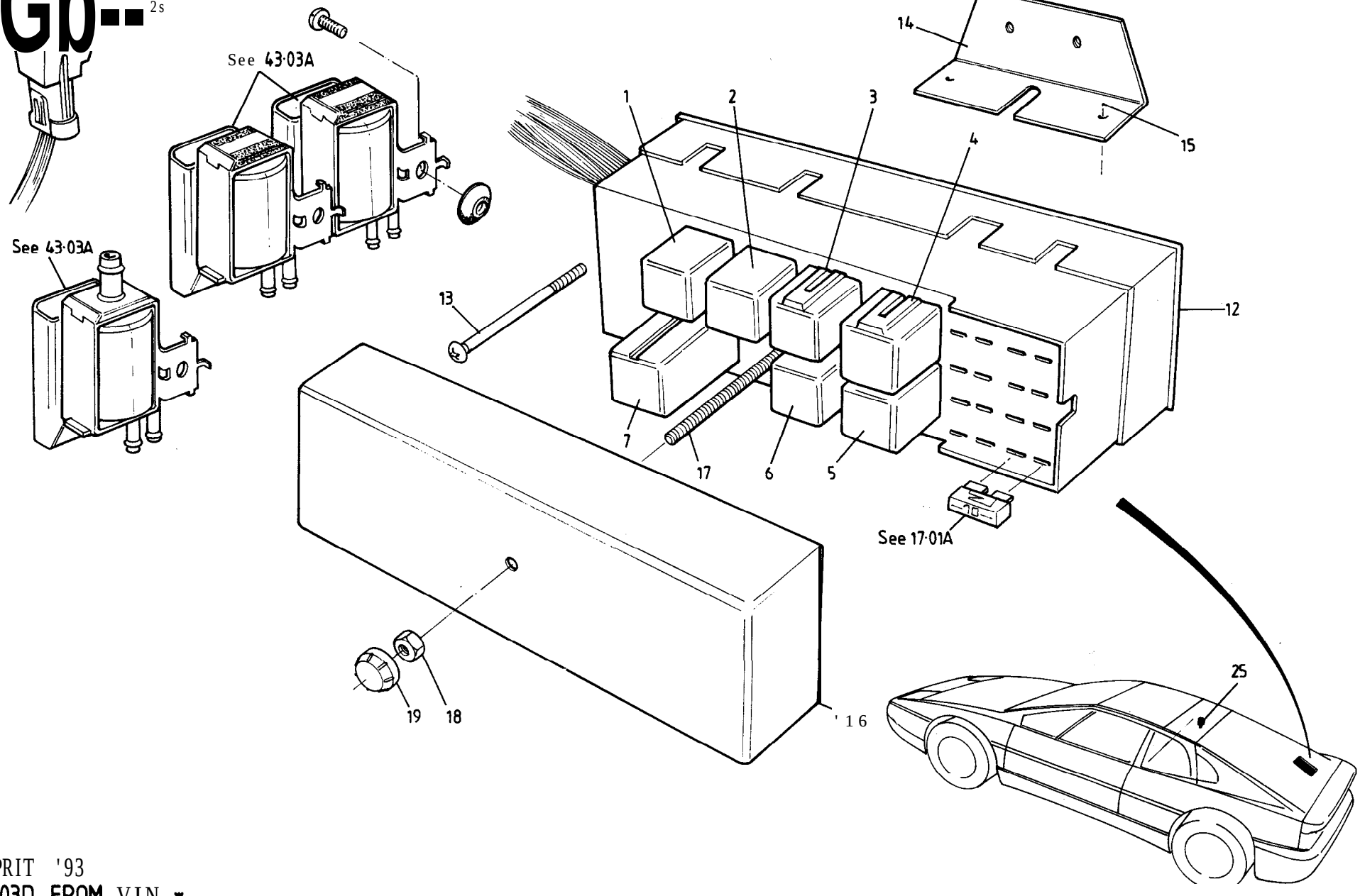
FUNCTION CODE	CONTENTS : **From VIN** *: Relays, Modules & Horns		QUANTITY		
17.03B	**PART DESCRIPTION**	**PARTNUMBER**	RHD	LHD	**REMARKS**
					*** VIN R 1142 (S4 LHD)** **R 1150 (S4 RHD)** **R 8030 (Sport 300)** (Revised Harness)
65	Stud plate, bracket to oil cooler duct	A082U7335F	1	1	)
66	Pop Rivet, stud plate securing	A075W6090Z	1	1	) S4
67	Washer, flat, M6 x 15, bracket to stud plate	A075W4015Z	1	1	)
68	Nut, Nyloc, M6, bracket to stud plate	A075W3009Z	1	1	
	Air Horn Compressor/Pipe Kit	A082M6481F	1	1	3)
	Trumpet & Bracket Kit, air horns	A089M6345F	1	1	}
	Bracket, Air Horns	A082M4931F	1	1	}
	Pop Rivet, bracket to oil cooler duct	A075W6030F	**4**	**4**	}
	Compressor, Fiamm air horns	A089M6346F	1	1	}
	Nut, Nyloc, M8, compressor to body	A075W3010Z	1	1	} Sport 300
	Washer, M8 x 25, " "	A075W4021Z	**2**	2	}
	Bracket, air horn trumpet mounting	A089M0550H	1	1	}
	Setscrew, M8 x 30, bracket to body	A075W1040Z	1	1	}
	Washer, M8 x **25,** " " "	A075W4021Z	1	1	}
	Washer, M8 x 20, " " "	A075W4019Z	**2**	**2**	}
	Nut, Nyloc, M8,	A075W3010Z	1	1	}
	Washer, air horns	A075W4001Z	**2**	2	}
70	Module, ice warning	B089M6505F	1	1	
71	Probe, " "	A089M6507F	1	1	
72	Grommet, ice detection probe	A082B6469F	1	1	
73	Clip, probe securing	A082W6352F	1	1	
74	Screw, probe clip fixing	A100W5168F	1	1	
75	Spire Nut, " " "	A075W6013Z	1	1	



ESPRIT '93

17.03c - PRIOR VIN *

FUNCTION CODE	CONTENTS: **Prior VIN ***: Engine Bay Relay Box & Inertia Switch		QUANTITY		
17.03C	**PART DESCRIPTION**	**PARTNUHBER**	PRIOR VIN *		**REMARKS**
					*** VIN R 1142 (S4 LHD)** **R 1150 (S4 RHD)** **R 8030 (Sport 300)** (Revised Harness)
1	Module, low coolant, dual assembly	A082M4825K	1		
	'P' Clip, module fixing	A075W6230F	2		
	Screw, M5, 'P' clip fixing	A079W5047F	2		
	Rawlnut, M5, " " "	A075W6074F	2		
5	Relay, changeover, radiator fans control	C079M6141F	1		
7	" " RPM, oil pressure tell tale	C079M6141F	1		
8	" " fuel pump	C079M6141F	1		
9	" " engine overheat tell tale	C079M6141F	1		
10	" " solenoid valve changeover	C079M6141F	1		
11	" " a.c. control	C079M6141F	1		
12	" " a.c. request	C079M6141F	1		
13	" " starter motor solenoid	C079M6141F	1		
	Screw, No.6 x ½", relay fixing	A075W5012F	4		
	Spire Nut, No.6, " "	A075W6013Z	4		
16	Resistor Module, secondary injectors	A082M6442F	1		
20	Lamp, 'Check Engine' repeater	A082M6419F	1		
	Bracket, repeater lamp mounting	A082M4779F	1		
23	Inertia Switch, fuel pump cut out	B079M6133F	1		
	Bolt, M5 x 50, inertia switch fixing	A079W2026F	2		
	Washer, flat, " " "	A075W4011Z	2		
	Nut, M5 Nyloc, " " "	A082W3008Z	2		
27	Grommet, blanking	A082U6073F	1		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See 43·03A
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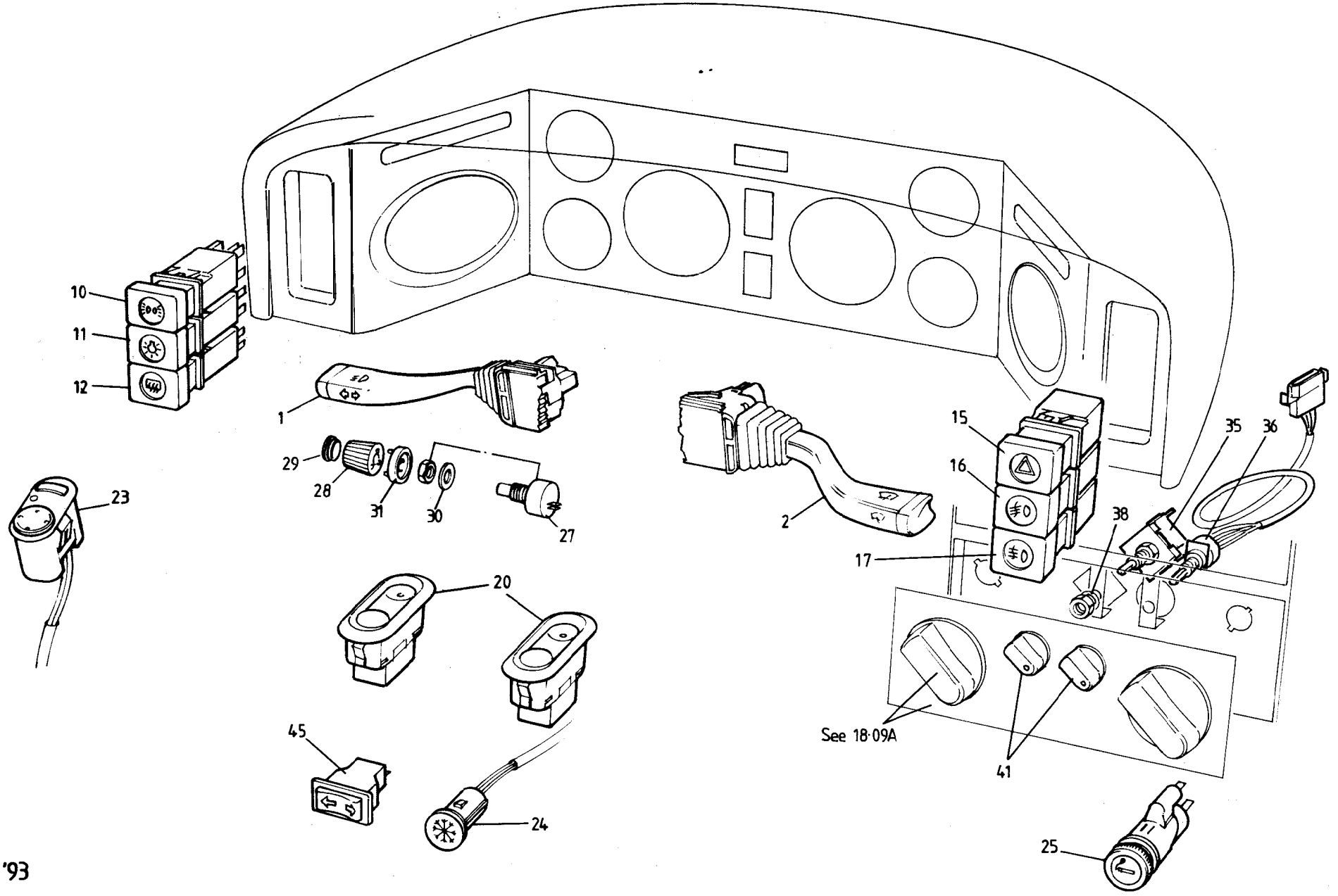
FUNCTION CODE	CONTENTS: From VIN *: Engine Control Relays & Inertia Switch		QUANTITY		
17.03D	PART DESCRIPTION	PART NUMBER	FROM VIN *		REMARKS
					• VIN R 1142 (S4 LHD) R 1150 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
1	Relay, changeover, oil tell tale inhibit	C079M6141F	1		
2	" " throttle jack/EBPV	C079M6141F	1		
3	" double contact, fuel pump & injectors	A082M6182F	1		
4	" " " ignition supplies (rear)	A082M6182F	1		
5	" changeover, starter solenoid	C079M6141F	1		
6	" " a.c. compressor	C079M6141F	1		
7	Resistor Module, secondary injectors	B082M6442F	1		
12	Housing, relays	A082M6610F	1		
13	Screw, housing to bracket	A100W5145F	2		
14	Bracket, housing to wheelarch	A082M4973F	1		
15	Pop Rivet, " " "	A075W6090Z	2		
16	Cover, rear wheelarch relay station	A082B5239K	1		
17	Stud, relay cover fixing	B082B4984F	1		
la	Nut, M6, relay cover fixing	A075W3020F	1		
19	Knurled Knob, relay cover fixing	A082W6468F	1		
25	Inertia Switch, fuel pump cut-off	A082M6588F	1		R/B A082M6598F
	" " " " " "	A082M6598F	1		
	Washer, inertia switch to fuel filter bracket	A082W4099F	2		
	Nut, Nyloc, M4, " " " " "	A082W3049F	2		

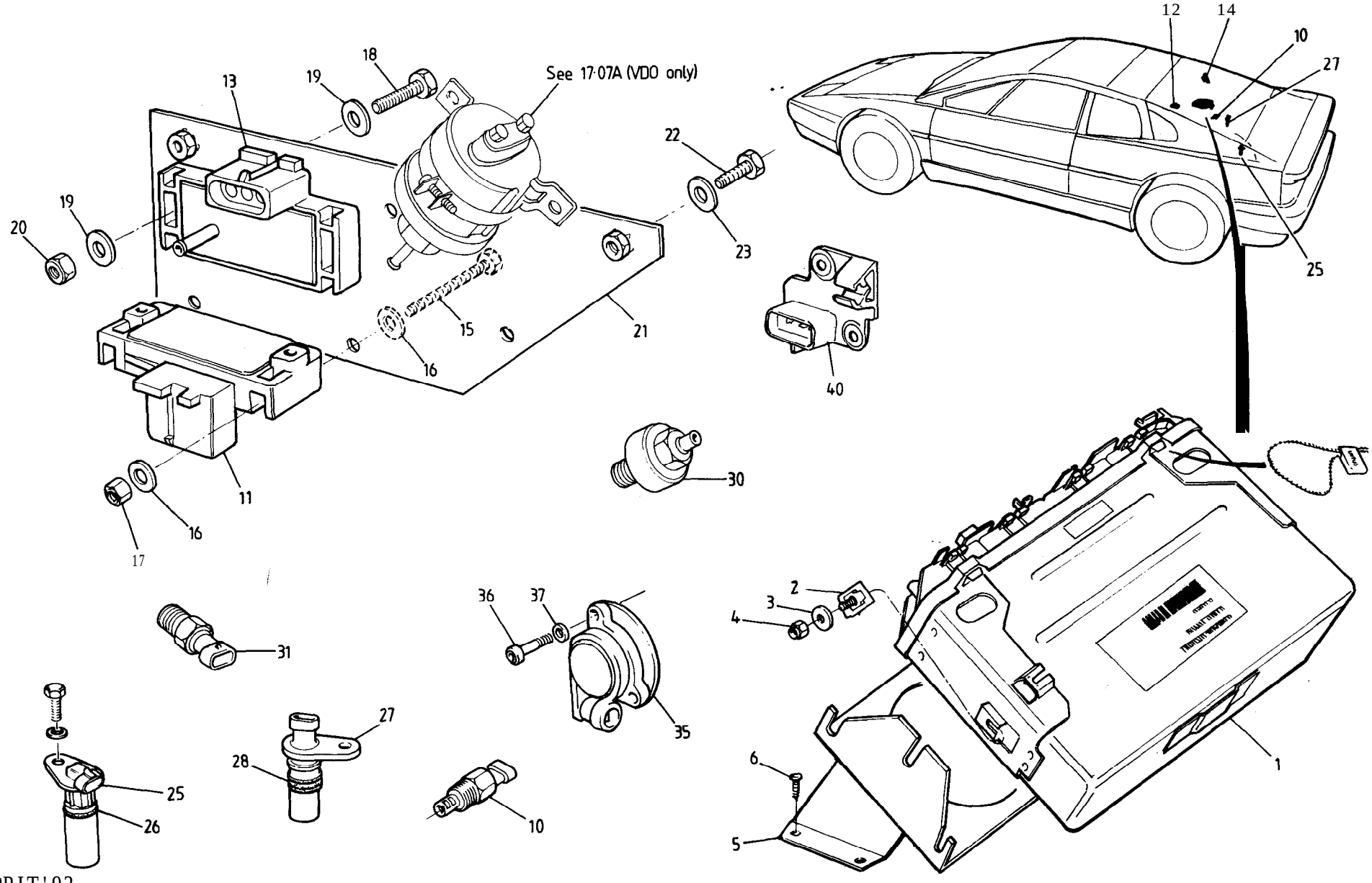


ESPRIT '93
17.05A

FUNCTION CODE

CONTENTS : Driver Operated Switches & Cigar Lighter

17.05A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Column Switch, LH, turn/dip/flash	A100M6048F	1		Non SIR
	" " " " " "	A082M6455F	1		SIR
2	" " RH, windscreen wipe/wash	A100M6049F	1		Non SIR
	" " " " " "	B082M6454F	1		SIR
10	'Push' Switch, parking lamps	A082M6343F	1		
11	'Push' Switch, main lighting	A082M6344F	1		Headlamp symbol (Europe)
	" " " "	A082M6345F	1		Bulb symbol (USA)
12	'Push' Switch, heated rear screen	A089M6347F	1		
15	'Push' Switch, hazard warning lamps	A08286346F	1		
16	'Push' Switch, front fog lamps	A082M6349F	1		Not Sport 300
17	'Push' Switch, rear fog lamps	A082M6348F	1		> as fitted.
	Blank, 'push' switch	A089M6065F	1		>
20	Switch, window lift	A100M6007F	2		
23	Switch, mirror control	A082M6521F	1		
24	Switch, window obstruction sensing override	A082M6530F	1		Not USA
25	Cigar Lighter Assembly	A079M6122F	1		
27	Rheostat, instruments/control illumination	A082M4861F	1		includes next 3 items
28	Knob, rheostat control switch	A082M6375H	1		
29	Cap, rheostat knob	A082M6476H	1		
30	Washer, insulating, rheostat	A082M6490F	1		
31	Cover, rheostat nut	A082M6474H	1		
35	Switch, interior fan speed control	A082M6223F	1		
36	Switch, refrigeration temperature	A082M6221F	1		
	Cover, refrigeration control switch	A082M4239F	1		
38	Spacer Washer, fan switch	A075W4071F	1		
41	Knob, fan speed/fridge switch	A082P4350F	2		
	Spring Clip, knob fixing	A082W6493F	2		
45	Switch, fuel filler flap release	A082M6502F	1		

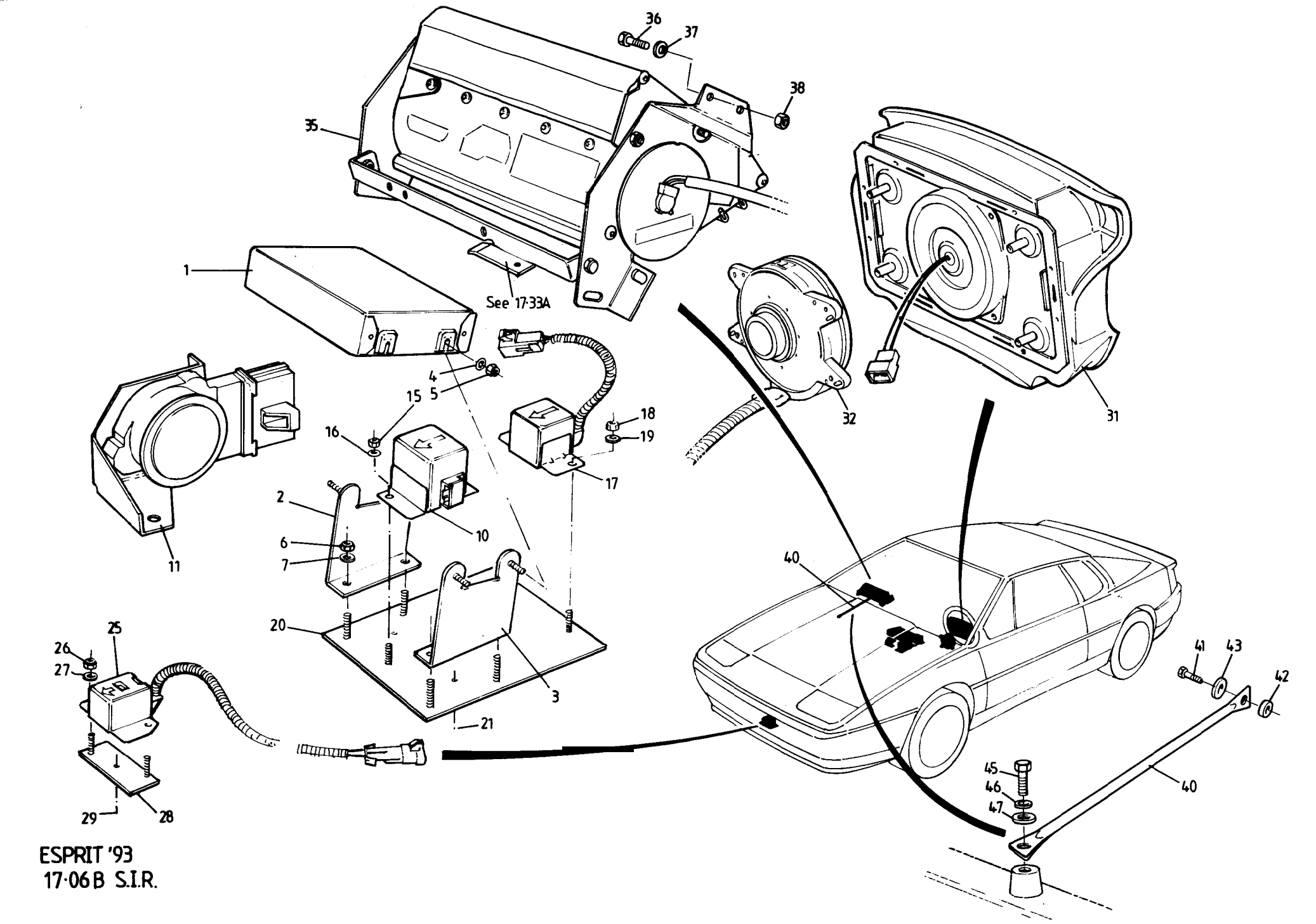

See 17·07A (VDO only)

FUNCTION CODE	CONTENTS : Engine Management ECM & Sensors		QUANTITY		
17.06A	PART DESCRIPTION	PART NUMBER	PRIOR VIN *	FROM VIN *	REMARKS
					*** VIN R 1142 (S4 LHD) R 1150 (S4 RHD) R 8030 (Sport 300)** (Revised Harness)
1	Electronic Control Module, (ECM) engine man.	A910E7038F	1		FROM ID = 1479 R/B B910E7038F)
	" " " " " "	B910E7038F	1		FROM ID = 6519 R/B C910E7038F) S4
	" " " " " "	C910E7038F		1	FROM ID = 5879)
	" " " " " "	P691.4205.001BF	1	1	FROM ID = 300 Sport 300
	" " " " " "	A910E7044F		1	FROM ID = 5269 S4/S4S USA '95 M.Y.
2	Studplate, ECM to mounting bracket	A910E6963F	2	2	
3	Washer, M5 x 10, ECM to mounting bracket	A075W4011Z	2	2	
4	Nut, M5, ECM to mounting bracket	A910E6962F	2	2	
5	Bracket, ECM mounting	B082L4164F	1	1	
6	Screw, No.10 x l/2", bracket to tankboard	A075W5040Z	4	4	
10	Sensor, Mass Air Temperature (MAT)	A910E6927F	1	1	lounted in chargecooler
11	" Manifold Air (Absolute) Pressure (MAP)	A910E6934F	1		On plate above RHR wheelarch
12	" " " " " "	A910E6934F		1	On Body above RHR wheelarch
13	" Barometric (BARO)	A910E6935F	1		On plate above RHR wheelarch
14	" "	A910E6935F		1	Mounted on RH tank board
15	Setscrew, M5 x 45, MAP sensor to plate	A089W5076F	2		
16	Washer, M4, " " " "	A082W4099Z	2		
17	Nut, Nyloc, M4, " " " "	A075W3949Z	2		
	Screw, s/t, BAR0 sensor to tankboard	A075W5025Z		2	
	Screw, MAP sensor to body	A075W5013Z		2	
	Spire Nut, " " "	A075W6013Z		2	
	Cap, protection	A089M6336F		2	
18	Setscrew, M5 x 30, BAR0 sensor to plate	A079W1084F	2		
19	Washer, M5 x 10, " " " "	A075W4011Z	2		
20	Nut, Nyloc, M5, " " " "	A075W3008Z	2		
21	Plate, sensor mounting	C082U7152F	1		
22	Setscrew, M5 x 20, mounting plate to body	A075W5084F	2		
23	Washer, flat, M5, " " " "	A075W4011Z	2		
25	Sensor, flywheel	A910E6938F	1	1	Mounted in clutch housing. Use Permabond A130 (A912E7033V) on fixing.

FUNCTION CODE

CONTENTS: Engine Management ECM & Sensors

17.06A	PART DESCRIPTION	PART NUMBER	QUANTITY PRIOR VIN *	QUANTITY FROM VIN *	REMARKS
					* VIN R 1142 (S4 LHD) R 1150 (S4 RHD) R 8030 (Sport 300) (Revised Harness)
26	'0' Ring, flywheel sensor seating	A910E6978F	1	1	Brown
27	Sensor, vehicle speed (VSS)	A910E6939F	1	1	Mounted in RHR hub carrier
28	'0' Ring, VSS seating	A910E6968F	1	1	Blue
30	Sensor, knock	C910E6937F	1	1	Mounted in cylinder block
31	Sensor, coolant temperature	A910E6928F	1	1	Mounted in inlet manifold
35	Sensor, throttle position	A910E6961K	1	1	
36	Screw, M3 x 16, sensor to throttle body	A082W5110F	2	2	UsePermabond A130 (A912E7033V)
37	Washer, flat, " " " "	A075W4001Z	2	2	
'40	Park Socket, ALDL connector	A100M6070F	1	1	
	Screw, socket to alarm mounting bracket	A075W5012F	1	1	
	Spire Nut, socket to alarm mounting bracket	A075W6014Z	1	1	



ESPRIT '93
17·06B S.I.R.

FUNCTION CODE

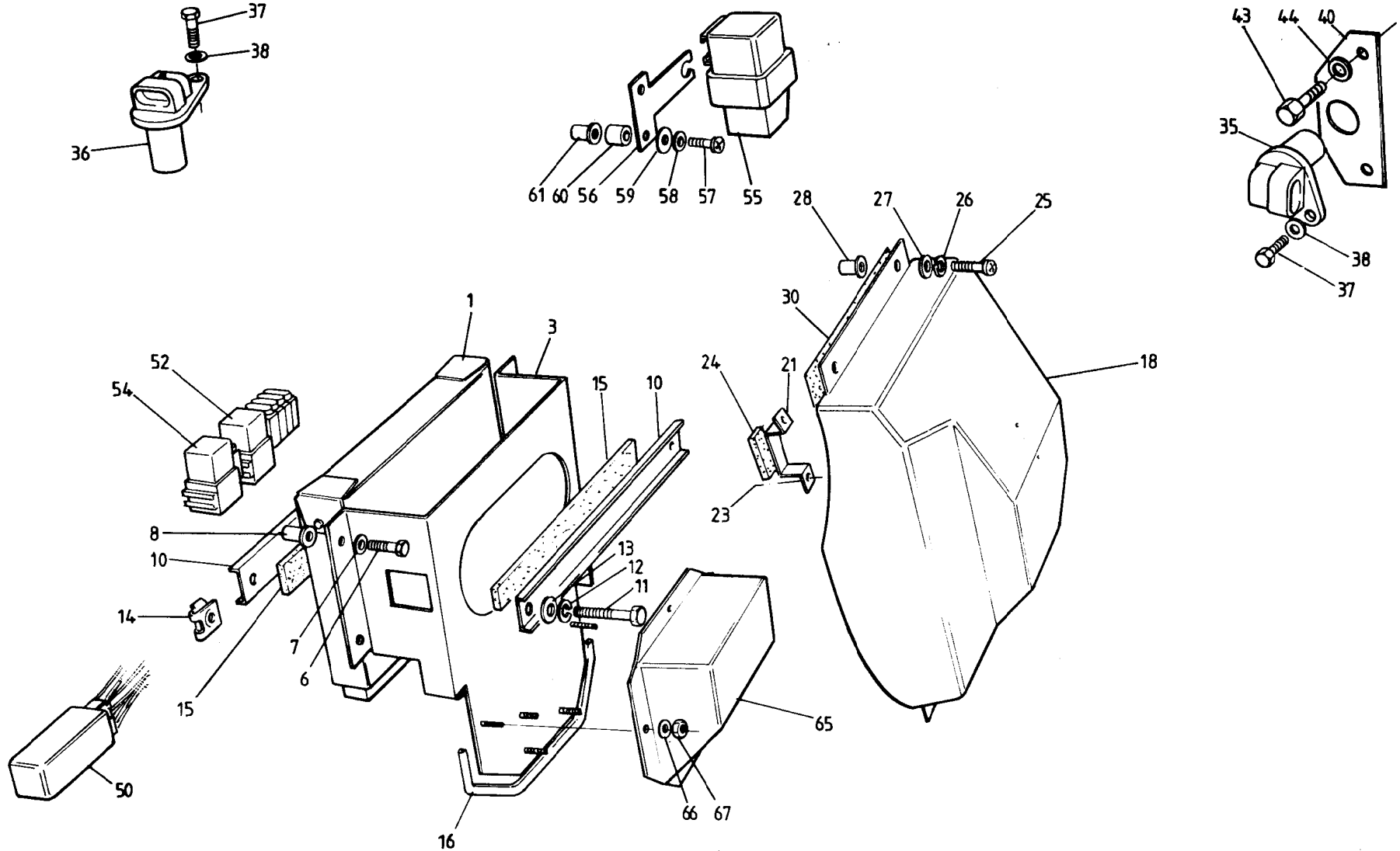
CONTENTS: **S.I.R.:** Inflator Modules, D.E.R.M. & Sensors

17.06B

	PART DESCRIPTION	PART NUMBER	QUANTITY DRIVER S.I.R.	QUANTITY DUAL S.I.R	REMARKS
1	Module, Diagnostic & Energy 'Reserve (DERM)	A082M6446F*	1		) Supplied only on exchange basis
	" " " " " "	A082M6576F*		1	)
2	Bracket, DERM mounting, RH	A082M4841F	1		
	" " " "	A082M4966F		1	
3	" " " LH	A082M4840F	1		* These parts to be fitted only by Lotus Dealers who must complete & return SIR registration card supplied with part.
	" " " "	A082M4965F		1	
4	Washer, flat, DERM to mounting bracket	A082W4099F	4	4	
5	Nut, Nyloc, M4, " " " " "	A075W3049F	4	4	
6	Nut, Nyloc, M6, DERM bracket to body	A075W3009F	4	4	
7	Washer, flat, M6 " " " "	A075W4013Z	4	4	
10	Arming Sensor	A082M6445F*	1		
11	" " dual pole, inc. 'mtg. brkt.	A082M4964J*		1	
15	Nut, Nyloc, M4, arming sensor to body	A075W3049F	2		
16	Washer, flat, " " " "	A082W4099F	2		
	Nut, Nyloc, M6, dual pole arming sensor fix	A075W3009Z		2	
	Washer, flat, M6 x 12, sensor fixing	A075W4013Z		2	
17	Sensor, passenger compartment discriminating	A082M6444F*	1		
18	Nut, Nyloc, M6, pass. comp. sensor to body	A075W3009F	2	2	
19	Washer, flat, M6 " " " " "	A075W4013Z	2	2	
20	Stud Plate, sensor mounting	A082M4961F	1	1	
21	Pop Rivet, stud plate to tunnel	A075W6071Z	3	3	
25	Sensor, forward discriminating	A082M6443F*	1	1	
26	Nut, Nyloc, M6, forward sensor to body	A075W3009Z	2	2	
27	Washer, flat, M6, " " " "	A075W4013Z	2	2	
28	Stud Plate, forward sensor mounting	A082M4849F	1	1	
29	Pop Rivet, stud plate to body	A075W6071Z	1	1	
	Resistor Module	A082M6550S	1		
31	Inflator Module (airbag), driver's side	A082H4034F*	1	1	
32	Rotary Connector (S.I.R. coil)	A082M6456F	1	1	
	Screw, M3 x 16, rotary connector to column	A082W5110F	4	4	
35	Inflator Module (airbag), passenger's side	A082M4980S*		1	Including-end plates
36	Setscrew, M5 x 20, module top fixing	A075W1025F		4	

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: S.I.R.: Inflator Modules, D.E.R.M. & Sensors		QUANTITY		
17.06B	PART DESCRIPTION	PART NUMBER	DRIVER S.I.R.	DUAL S.I.R.	REMARKS
37	Flat Washer, module top fixing	A075W4011Z		4	
38	Nyloc Nut, M5, " " "	A075W3008Z		4	
40	Strut, passenger module to chassis	A082A4364F		1	
41	Setscrew, M6 x 20, strut to module endplate	A075W1030Z		1	
42	Spacer Washer, " " " "	A075W4014Z		1	
43	Flat Washer, " " " "	A075W4015Z		1	
44	Nyloc Nut, M6, " " " "	A075W3009Z		1	
45	Setscrew, M6 x 30, strut to chassis	A075W1032Z		1	
46	Spring Washer, " " "	A075W4035Z		1	
47	Flat Washer, " " "	A075W4013Z		1	



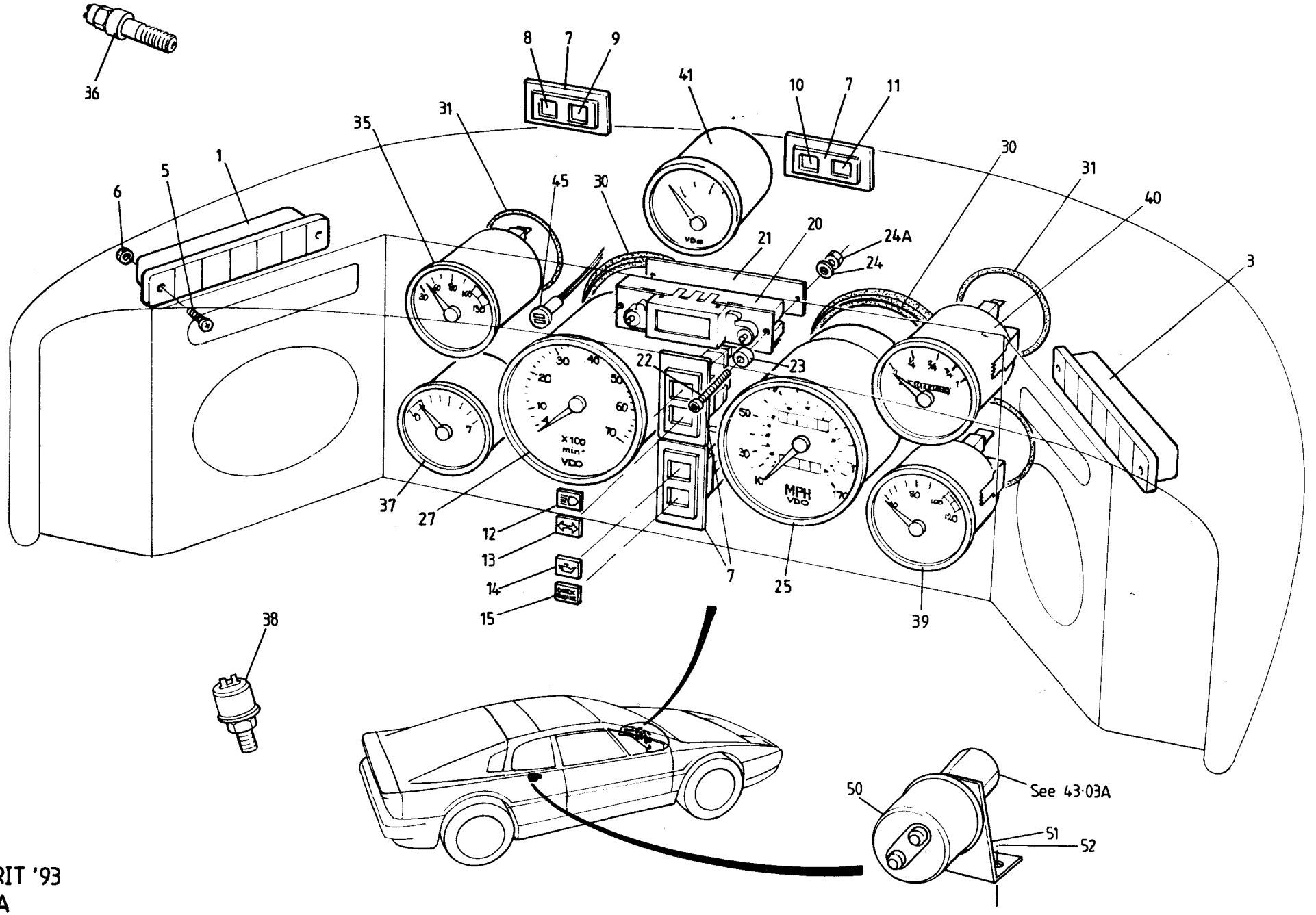
ESPRIT '93
17·06C A.B.S.

FUNCTION/CODE

CONTENTS: ABS: ECM & Sensors

17.06C	PART DESCRIPTION	PART NUMBER	QUANTITY PRIOR VIN *	QUANTITY FROM VIN *	REMARKS
					* **VIN R 1142 (S4 LHD)** **R** 1150 (S4 RHD) R 8030 **(Sport** 300) (Revised Harness)
1	Electronic Control Module (ECM), ABS	A082M6482F	1	1	
	Mounting Bracket, ECM to bulkhead	A082M4804F	1		
3	" " " " " RHD	A082M4982F		1	
	" " " " " LHD	A082M4983F		1	
5	Rubber Strip, self adhesive, controller bracket	A036B6221V		0.2m	
6	Screw, M5 x 20, ECM bracket to bulkhead	A075W5084F	4	4	
7	Washer, M5 x 10, " " " "	A075W4011Z	4	4	
8	Rawlnut, M5, " " " "	A075W6074F	4	4	
10	Clamping Channel, ECM to mounting bracket	A082M4806F	2	2	
11	Bolt, M6 x 45, ECM clamping channel	A075W2031Z	2	2	
12	Washer, Spring " " "	A075W4035Z	2	2	
13	Washer, M6 x 15, " " "	A075W4015Z	2	2	
14	Captive Nut, M6, " " "	A082W6465F	2	2	
15	Foam Strip, ECM clamping	A036B6221V	A/R	A/R	
16	Rubber Edging	A085U6080V	A/R	A/R	
	Permabond C2 Adhesive, edging strip	A075U6045V	A/R	A/R	
18	Cover, ECM, RHD	A082M4901K	1		
	" " RHD	B082M4986K		1	
	" " LHD	A082M4887K	1	1	
21	Support Bracket, ECM cover, RHD	A082M4898F	1	1	
	" " " " LHD	A082M4889F	1	1	
23	Pop Rivet, support bracket to ECM cover	A075W6087Z	2	2	
24	Foam Strip, bracket buffer	A036B6221V	A/R	A/R	
25	Screw, M5 x 20, ECM cover to bulkhead	A075W5084Z	2	2	
26	Washer, M5, s/proof, "" "	A075W4045Z	2	2	
27	Washer, M5 x 10, " " "	A075W4011Z	2	2	
28	Rawlnut, M5, " " "	A075W6074F	2	2	
30	Foam Strip, self adhesive, cover to bulkhead	A036B6221V	A/R.	A/R	
	Sensor, wheel speed, front RH	C082M6484F	1	1	
35	" " " " LH	C082M6485F	1	1	

FUNCTION CODE	CONTENTS: ABS: ECM & Sensors		QUANTITY		
17.06C	**PART DESCRIPTION**	**PARTNUMBER**	PRIOR VIN *	FROM VIN *	**REMARKS**
					*** VIN R 1142 (S4 LHD)** **R 1150 (S4 RHD)** **R 8030 (Sport 300)** (Revised Harness)
	Pole Wheel, 48T, ABS Sensor, front wheels	A082J4192F	2	2	
36	Sensor, wheel speed, rear	C082M6483F	2	2	
	Pole Wheel, ABS Sensor, rear wheels	A082D6034H	2	2	
37	Setscrew, M6 x 12, sensor fixing	A075W1028F	4	4	
38	Washer, flat, M6, " "	A075W4013F	4	4	
40	Shim, 0.75mm, front sensor adjusting	A082C4200F	)	)	
	" 0.95mm, " " "	A082C4201F	) A/R	) A/R	
	" 1.25mm, " " "	A082C4202F	)	)	
43	Setscrew, M6 x 10, shim fixing	A075W1026F	2	2	
44	Washer, flat, M6, " "	A075W4013F	2	2	
50	Lamp Driver Module, ABS tell tale	A082M4875F	1		) Taped to harness near wiper motor
	" " " " " "	B082M4875F		1	)
52	Relay, ABS front solenoid enable	A100M6069F	'1		
	" " " " "	C079M6141F		1	
54	" " rear " "	A100M6069F	1		
	" " " " "	C079M6141F		1	
55	Relay, pump motor enable	A082M6493S	1	1	
56	Mounting Bracket, pump motor enable relay	A082J4282F	1	1	
57	Screw, M5 x 20, pump relay bracket fixing	A075W5084F	2	2	
58	Washer, M5 flat, " " " "	A075W4011Z	2	2	
59	Washer, M6 flat, " " " "	A075W4014Z	2	2	
60	Spacer, bracket to bulkhead	A907E0696Z	2	2	
61	Rawlnut, M5, pump relay bracket fixing	A075W6074F	2	2	
	Nut, M6, wheel speed sensor harness earth stud	A075W3020Z		1	
	Washer, shakeproof, " " " "	A075W4046Z		2	
65	Cover, wheel speed sensor harness connectors	A082M4979F		1	
66	Washer, flat, speed sensor harness cover fix	A082W4099F		5	
67	Nut, Nyloc, M4, speed sensor harness cover fix	A075W3049F		5	



ESPRIT '93
17.07A

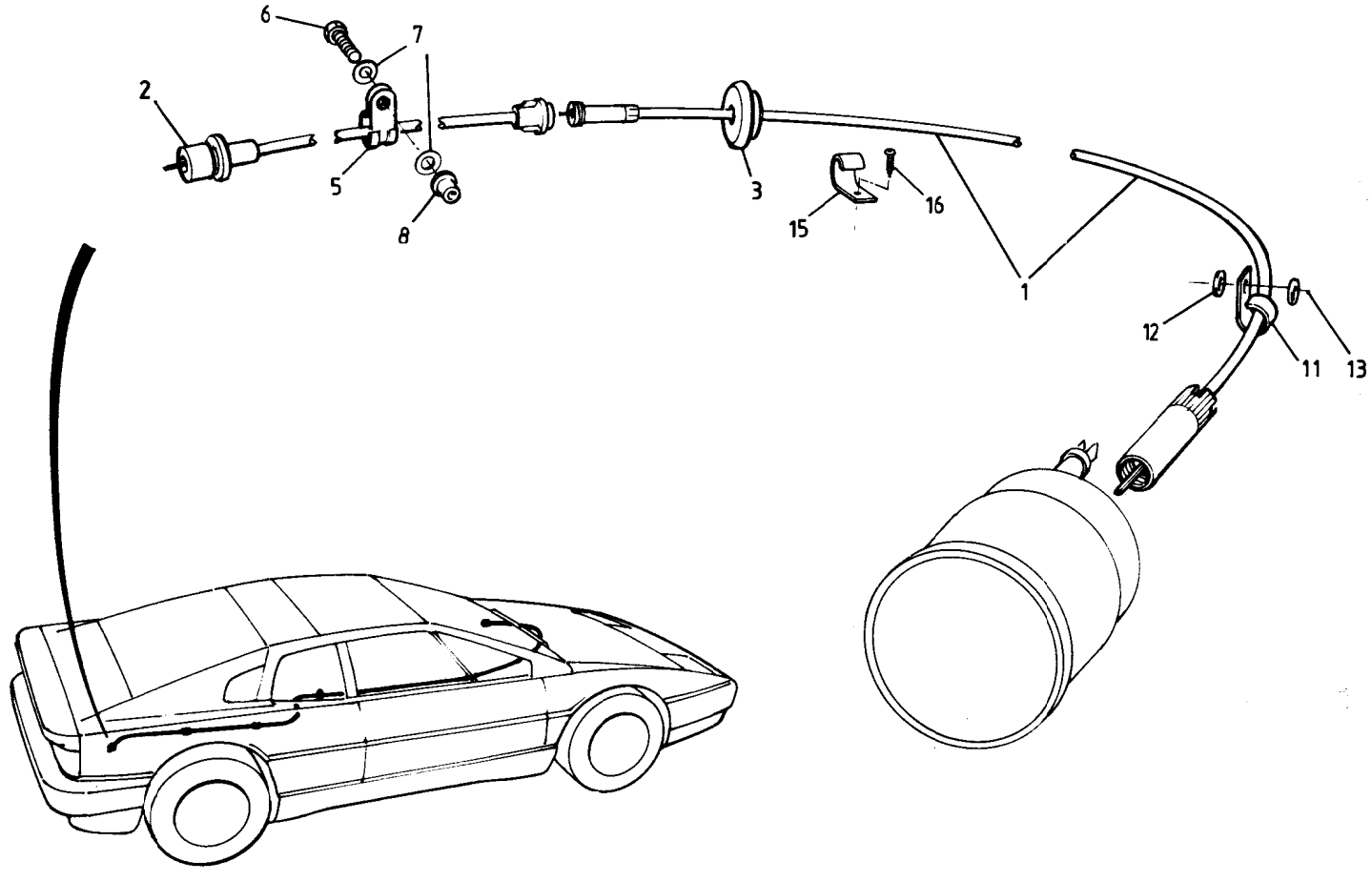
FUNCTION CODE	CONTENTS : Instruments, Senders, Tell Tales, Clock		QUANTITY		
17.07A	**PART DESCRIPTION**	**PART NUMBER**	*	#	**REMARKS**
					***S4 Prior '95M.Y. and Sport 300** **#S4/S4S '95 M.Y. onwards**
1	Tell Tale Lamp Assembly, LH	B082N4023F	1		Prior to VIN♦, Replaced by: A082N6019/20F & A082N4029F
	Housing, tell tale lamp	A082N6019F	2	2	
	Lens, tell tale lamp	A082N6020F	2	2	
	Graphic Strip, LH tell tale lamp	A082N4029F	1	1	
3	Tell Tale Lamp Assembly, RH	A082N4021F	1		Non-USA; Brakes graphic (P)(!)
	" " " " "	A082N4026F	1		USA; Brakes graphic 'BRAKES/PARK'
	Graphic Strip, RH tell 'tale lamp	A082N4028F	1	1	Replaces A082N4021/26F
5	Screw, No.12 x l/2", tell tale lamp fixing	A079W5047F	4	4	
6	Nut, Nyloc, 10 UNF, " " " "	A075W3000Z	4	4	
7	Tell Tale Lamp, dual	A082M6278F	2	2	
8	Lens, tell tale lamp, main beam	A082M6356F	1	1	
9	" " " " turn indicator	A082M6355F	1	1	S.I.R. (horizontal tell tale lamps)
10	" " " " low oil pressure	A082M6279F	1	1	
11	" " " " check engine	A082M4750F	1	1	
12	" " " " main beam	A082M6544F	1	1	>
13	" " " " turn indicator	**A082M6545F**	1	1	> except S.I.R. (vertical tell tale
14	" " " " low oil pressure	A082M6543F	1	1	> lamps)
15	" " " " check engine	A082M6542F	1	1	>
	Bulb, 24V 1.2W, main beam tell tale	A082M6547F	1	1	
20	Time Clock, Digital LCD, orange illumination	A082M6416F	1		Not fitted Sport 300
	" " Analogue	B082N4037F		1	
	Adjuster Tool, clock	A082T4008K	1		
21	Backplate, 'clock mounting	A082U5936F	1		
22	Setscrew, M3 x 30, clock fixing	A082W5119F	2		Used with Digital Clock
23	Spacer, clock fixing	A082W6308F	2		
24	Washer, flat, M3 x 7, clock fixing	A075W4084F	2		
24A	Nut, Nyloc, M3, clock fixing	A079W3060F	2		
					♦ VIN R 1142 (S4 LED) **R 1150 (S4 RHD)** **R 8030 (Sport 300)** **(Revised Harness)**

FUNCTION CODE	CONTENTS : Instruments, Senders, Tell Tales, Clock		QUANTITY		
17.07A	PART DESCRIPTION	PART NUMBER	*	#	REMARKS
					* S4 **Prior '95 M.Y. and Sport 300**
					# S4/S4S '95 M.Y. **onwards**
25	Speedometer, MPH	A082N6063F	1		> Not Sport 300
	" km/h	A082N6064F	1		>
	" MPH	B082N4030F		1	
	" km/h	B082N4031F		1	
	" MPH	P691.1707.605AF	1	1	) Sport 300
	" km/h	P691.1707.606AF	1	1	)
	Clamp speedo retaining	A089U1611F	1		
27	Tachometer, 0 - 7500 rpm	A082N6059F	1		
	" , Θ - 8000 rpm	A082N4032F		1	
	" Θ - 8000 rpm	P691.1707.604AF	1	1	>
	Bezel, speedo & tacho	A082U6234F	1	1	> Sport 300
	Amplifier, tachometer signal,(Fixed to Tacho)	P691.1703.001AF	1	1	>
30	Vibration Insulation Sleeve, speedo/tacho	A089N6014F	2	2	Except Sport 300
31	" " '0' ring, minor instruments	A082M6434F	5	5	
35	Gauge, oil temperature	A082N6067F	1	1	
36	Sender Unit, oil temperature gauge	A082N6068F	1	1	Use Permabond A131 (A912E7034F)
37	Gauge, oil pressure, 0 - 7 bar	A082N6061F	1		
	" " " " "	A082N4035F		1	
38	Sender/Switch, oil pressure gauge/low oil pressure tell tale, 0 - 10 bar	A082N6062F	1		
	Sender, oil pressure gauge	A082N4038F		1	
	Switch, low oil pressure tell-tale lamp	A082N4039F		1	
39	Gauge, coolant temperature	A089N6009F	1		
	" " "	A082N4034F		1	
	Sender, " " gauge	A912E6739F	1		
	" " " "	A082N4040F		1	
40	Gauge, fuel 'unleaded' (Early type)	A082N6055F	1		
	" "	A082N4033F		1	
	Sender Unit, fuel gauge, LH Tank	B082L6155F	1		
	Sender Unit, fuel gauge, LH Tank mounted	A082N4041F		1	

♦ **VIN R 1142 (S4 LHD)**
R 1150 (S4 RHD)
R 8030 (Sport 300)
(Revised Harness)

FUNCTION CODE	CONTENTS : Instruments, Senders, Tell Tales, Clock		QUANTITY		
17.07A	PART DESCRIPTION	PART NUMBER	*	#	REMARKS
					* S4 Prior '95 M.Y. and Sport 300 # S4/S4S '95 M.Y. onwards
41	Gauge, boost pressure, 0 - 1.2 bar	B082N6060F	1		
	Sender, boost gauge	A100M6164F	1		
50	" " "	A082M6365F	1		
51	Bracket, boost gauge transducer mounting	A100E0012F	1		
52	Screw, s/t, No.12 x ½, " " brkt.	A079W5047F	2		Sport 300 & SIR only
	Setscrew, M6 x 12, transducer to mtg. plate	A075W1027Z	2		
	Washer, spring, M6, " " " "	A075W4035Z	2		
	Nut, M6, " " " "	A075W3020Z	2		
	Gauge, boost pressure, 0 - 1.0 bar	A082N4036F		1	
	Sender, boost gauge	A082N4042F		1	
51	Bracket, boost gauge transducer mounting	A082M6611F		2	
52	Screw, s/t, No.10 x ½, brkt to tank board	A075W5040Z		1	
	" No.6 x ½, transducer clamping	A075W5012F		1	
	Spire Nut No.4 " "	A100W6364F		1	
	Bulb, ancillary gauges	A050M6168F	4	4	
	Bulb, speedo/tacho/boost gauges	A089M6062F	3	3	
45	Ice Warning Indicator, LED	A089M6077F	1	1	

*** VIN R 1142 (S4 LHD)**
R 1150 (S4 RHD)
R 8030 (Sport 300)
(Revised Harness)



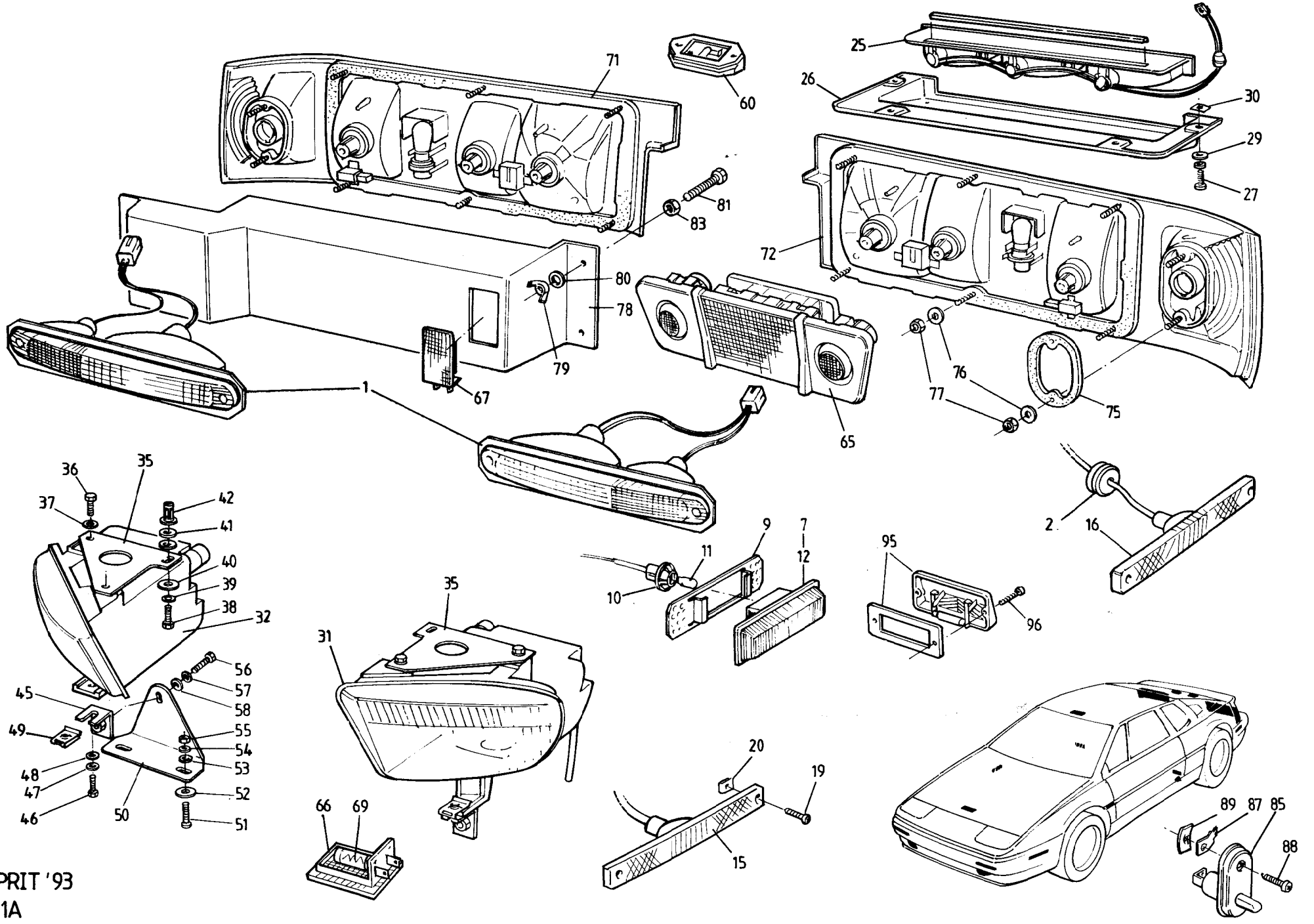
ESPRIT '93
17.09A

FUNCTIONAL CODE

CONTENTS: **S4:** Speedo Cable

17.09A	PART DESCRIPTION	PART NUMBER	QUANTITY s4		REMARKS
1	Cable, speedometer, a-piece, front section	A082N6065F	1		
2	" " " " rear "	A082N6066F	1		
3	Grommet, speedo cable through bulkhead	A075P6096F	1		
	Edging Strip, chassis, cable protection	AX75L6020V	3oom		
5	'P' Clip. speedo cable to chassis	A075Q6013Z	2		
6	Setscrew, M6 x 20, 'P' clip fixing	A075W1030Z	2		
7	Washer, flat, M6 x 12, " "	A075W4013Z	4		
a	Rawlnut, M6 x 15, 'P' clip fixing	A075W6140Z	2		
11	'P' clip, speedo cable to fascia	AO75W6228Z	1		
12	Pop Rivet, clip fixing	A075W6090Z	1		
13	Washer, pop rivet	A075W4001Z	2		
15	'P' clip, speedo cable to tunnel top	A075W6227F	1		
16	Screw, No.6 x 3/4", clip fixing	A075W5025Z	1		

Note: Sport 300 uses electronic speedometer



ESPRIT '93
17.11A

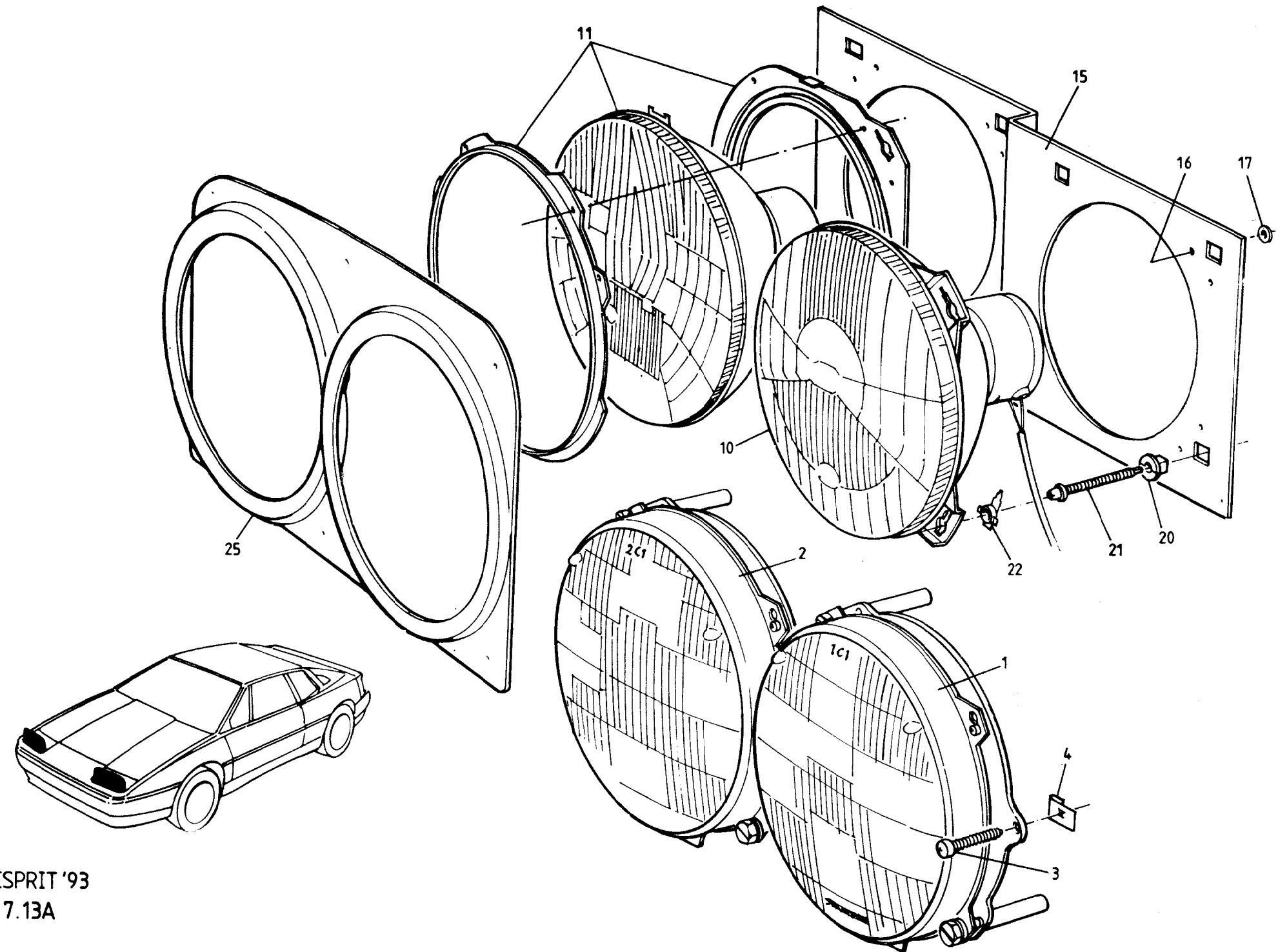
FUNCTION CODE	CONTENTS : Lamps (except headlamps), Door Switches		QUANTITY		
17.11A	PART DESCRIPTION	PART NUMBER	NON U.S.A	USA	REMARKS
1	lamp, front side/turn	C100M0013F	2	2	S4
	" " " " LH	A089M6073F	1		) Sport 300
	" " " " RH	A089M6074F	1		
	Screw, M4 x 20, lamp to bumper	A100W5156F	4		
	Lens, front side/turn lamp	A100M6154S	2	2	
	'Screw, M4 x 25, lens fixing	A100W5155F	4	4	
7	Lamp, side repeater	A082M4930J	2		Prior VIN *
	" " "	B082M4930J	2		From VIN *
9	Mounting Plate, side repeater lamp	A082U7591F	2		
10	Bulb Holder, " " "	A082M6537F	2		
11	Bulb, side repeater lamp	A082M6342F	2		12V 5W 9.5mm wedge base
12	Lens, " " "	A082M6535F	2		
15	Lamp, side marker, LH, amber	A082M6579F		1	
16	" " " " red	A082M6581F		1	
	" " " RH amber	A082M6578F		1	
	" " " " red	A082M6580F		1	
19	Screw, M4 x 20, lamp to bumper	A100W5173F		8	* **VIN R 1142 (S4 LHD)**
20	Spire Nut, M4, " " "	A100W6449F		8	**R 1150 (S4 RHD)**
21	Grommet, rear side marker lamp harness	A075U6043F		2	**R 8030 (Sport 300)**
25	High Mounted Stop Lamp (HMSL)	A100M6029F		1	(Revised Harness)
26	Cover, HMSL	A082B5193K		1	
27	Screw, M4 x 12, HMSL & cover to aerofoil	A100W5143F		4	
29	Flat Washer, " " " " "	A100W4120F		4	
30	Spire Nut, M4, " " " " "	A100W6449F		4	
31	Foglamp, clear, LH	A082M4926J	1	1	
32	" " RH	A082M4927J	1	1	
	" yellow, LH	A082M4928J	1		) France
	" " RH	A082M4929J	1		)
35	Mounting Plate, foglamp top	A082M4922F	2	2	
36	Screw, M6 x 16, mtg. plate to foglamp	A075W1028Z	4	4	
37	Washer, spring, " " " "	A075W4035Z	4	4	
38	Screw, M6 x 25, mtg. plate to bumper	A075W1031Z	2	2	
39	Washer, spring, " " " "	A075W4035Z	2	2	
40	Washer, flat, foglamp mtg. plate to bumper	A075W4016Z	2	2	

FUNCTION CODE

CONTENTS : Lamps (except headlamps), Door Switches

17.11A	PART DESCRIPTION	PART NUMBER	QUANTITY NON USA	QUANTITY USA	REMARKS
41	Spacer Washer, 1.5mm, fog lamp mtg plate to body	A075W4015Z	4	4	
	" " 3.0mm " " " " " "	A075W4014Z	2	2	
42	Jacknut, M6, " " " " "	A075W3031Z	2	2	
45	Mounting Bracket, foglamp lower, small	B082M4923F	2	2	
46	Screw, M6 x 16, small brkt to lamp & large brkt	A075W1028Z	4	4	
47	Washer, spring, " " " " " " "	A075W4035Z	4	4	
48	Washer, flat, " " " " " " "	A075W4013Z	4	4	* VIN R 1142 (S4 LHD)
50	Mounting Bracket, foglamp lower, large	A082M4924F	2	2	R 1150 (S4 RHD)
51	Button Screw, M6 x 20, large brkt to valance	A100W7096F	4	4	R 8030 (Sport 300)
52	Washer, flat, 15mm, screw to valance	A075W4015Z	4	4	(Revised Harness)
53	Washer, flat, 12mm, large brkt to valance	A075W4013Z	4	4	
54	Washer, spring, " " " "	A075W4035Z	4	4	
55	Nut, M6, " " " "	A075W3020Z	4	4	
	Grommet, foglamp adjust access hole	A082U6073F	2	2	
60	Lamp, rear licence plate	A082M6144F	2		E' marked
	" " " "	A075M6025Z		2	D.0.T. marked (USA markets)
	Gasket, licence plate lamp to body	A075M0256Z		2	
65	Lamp, interior, courtesy & reading	A082M6519F	1	1	
66	" luggage compartment illumination, front	A089M6032F	1	1	'rom VIN *
67	" " " " rear	A089M6032F	2	2	
69	Bulb, 12V 5W festoon, luggage comp. lamps	A083M6292F	2/3	2/3	
71	Lamp, Rear, RH	A082M6334F	1		, with rear foglamps
72	" " LH	A082M6333F	1		
	" " RH	A082M6336F		1	} no rear foglamps
	" " LH	A082M6335F		1	}
75	Gasket, rear turn lamp to body	A082M4692F	1	1	
76	Washer, flat, M10 x 24, lamp to body	A075W4023F	16	16	
77	Nut, lamp to body	B082M4707F	16	16	
78	Cover, rear lamp, internal	A082M4686K	2	2	
79	Wing Nut, lamp cover fixing	A075W3033Z	4	4	
80	Washer, Flat, M6 x 15, cover fixing	A082W4015F	2	2	
81	Setscrew, M6 x 40, " "	A075W1034Z	4	4	
	Washer, spring, M6, " "	A075W3034Z	a	8	
83	Nut, plain, M6, cover fixing	A075W3020Z	4	4	
85	Door Switch, courtesy lamp/seat belt buzzer	A082M6461F	2	3	Mounted in door

FUNCTION CODE	CONTENTS : Lamps, (except headlamps), Door Switches		QUANTITY		
17.11A	**PART DESCRIPTION**	**PART NUMBER**	NON USA	USA	**REMARKS**
86	Spacer, door switch to trim panel	¿A082U7678K	2	2	if required
87	Terminal, blade, door switch	¿A082M6491F	2	3	
88	Screw, No.6 x l/2" switch fixing	¿A089W5138F	2	3	
89	Spire Clip, No.6, " "	¿A075W6013Z	2	3	
	Boot, door switch	¿A082M6462F	2	3	
	Watershield, door switch, RH	¿A082U7354K	1	1	
	" " " LH	¿A082U7355K	1	1	
95	Lamp, door edge warning, red	¿A082M6155F	2	2	
96	Screw, lamp to door	¿A075W5012F	4	4	
	Bulb, 12V 5W festoon, door edge warning lamp	¿A083M6292F	2	2	
97	Lamp, footwell	¿A089M6032F	2	2	
98	Bulb, 12V 5W festoon, footwell lamp	¿A083M6292F	2	2	
	Bracket, footwell lamp mounting	¿A082B5251K	2	2	
	Screw, M4 x 20, ""	¿A075W5081F	2	2	
	Washer, flat " "	¿A075W4063Z	2	2	
	Spire Nut, M4, " "	¿A100W6449F	2	2	
	Reflector, drivers side footwell lamp	¿A082M4995K	1	1	
	Pop Pivet, reflector fixing	¿A082W6512F	1	1	
	Washer, pop rivet	¿4075140802	1	1	



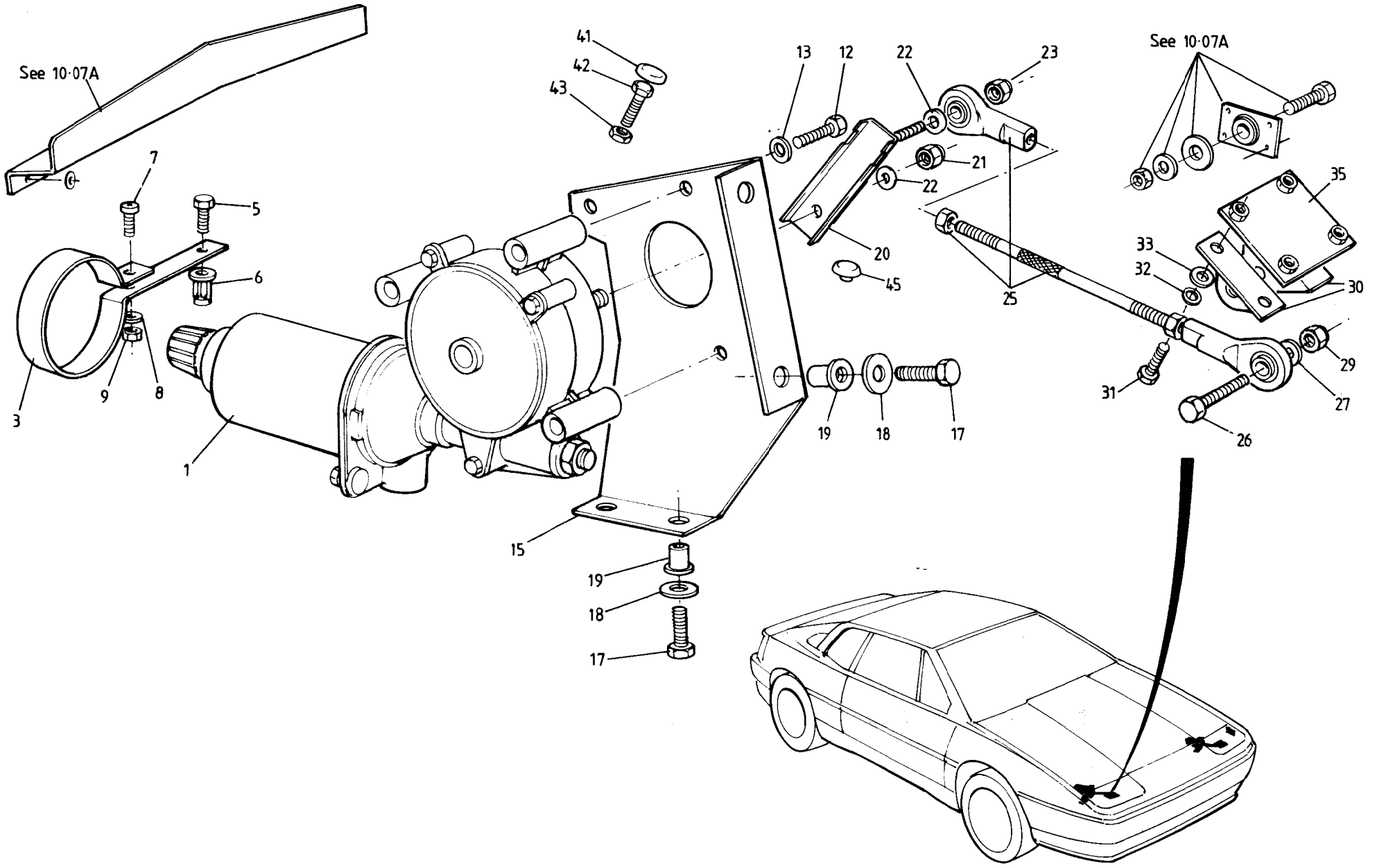
ESPRIT '93
17.13A

FUNCTION CODE

CONTENTS: Headlamps, Carriers & Masks

17.13A	PARTDESCRIPTION	PART NUMBER	QUANTITY RHD	QUANTITY LHD	REMARKS
1	Headlamp Assembly, 5 3/4", beam only, inboard	A079M6055F		2	) Lucas)
	Sealed Beam Unit,	A079M6038F		2	))
	Headlamp Assembly,	A100M6099F	2	2	Stanley.RHD Japan)
2	Headlamp Assembly, 5 3/4", beam/dip, outboard	A079M6056F		2	> Lucas)
	Sealed Beam Unit,	A079M6039F		2	>) D.O.T. marked lamps
	Headlamp Assembly,	A100M6098F	2	2	Stanley.RHD Japan) USA, CDN, AUL, J.
3	Screw, headlamp to pod	A075W5043Z	16	16	)
4	Sprire Nut, headlamp to pod	A075W6016Z	16	16	)
	Screw, No.8 x 3/4", headlamp to pod	AO75W5074Z		12	} USA)
	Sprire Nut, No.8, headlamp to pod	A082W6525Z		12	})
	Mask, headlamp surround, RH	A082B4858K	1	1	)
	LH	A082B4859K	1	1	)
	Screw, finisher to pod	A089W5138F	6	6	)
10	Headlamp Assembly, 6", beam only, inboard	A082M6174F	2	2	>
	5 3/4" " "	A082M6464F		2	France (yellow) >
11	Headlamp Assembly, 6", beam/dip, outboard, RH	A082M4810J	1		} >
		A082M4808J		1	} Unit/carriage >
	LH	A082M4809J	1		} plate/bezel >
		A082M4807J		1	} >
	Bulb, Halogen H1, beam only	A082M6288F	2	2	>
	H4, beam/dip	A075M6126Z	2	2	>
	yellow	A079M6113F	2	2	If fitted > 'E' marked lamps
	Carriage Plate, outboard headlamp adjust, RH	A082M4696F	1	1	> U.K., Europe.
	LH	A082M4697F	1	1	>
15	Plate, headlamp mounting to pod, RH	A082M4688F	1	1	>
	LH	A082M4687F	1	1	>
		A082M4851F		2	France >
16	Pop Rivet, mounting plate to pod	A075W6069F	32	32	>
17	Washer, pop rivet	A075W4062F	32	32	>
20	Insert Bush, headlamp adjuster screw to plate	A082M6207F	12	12	>
21	Adjuster Screw, headlamp aiming	A082M6206F	12	12	>
22	Capsule, ¼ turn, headlamp mounting	A085M6217F	12	12	>
25	Mask, headlamp surround, RH	A082B4856K	1	1	>
	LH	A082B4857K	1	1	>

Esprit range: '93 M.Y. onwards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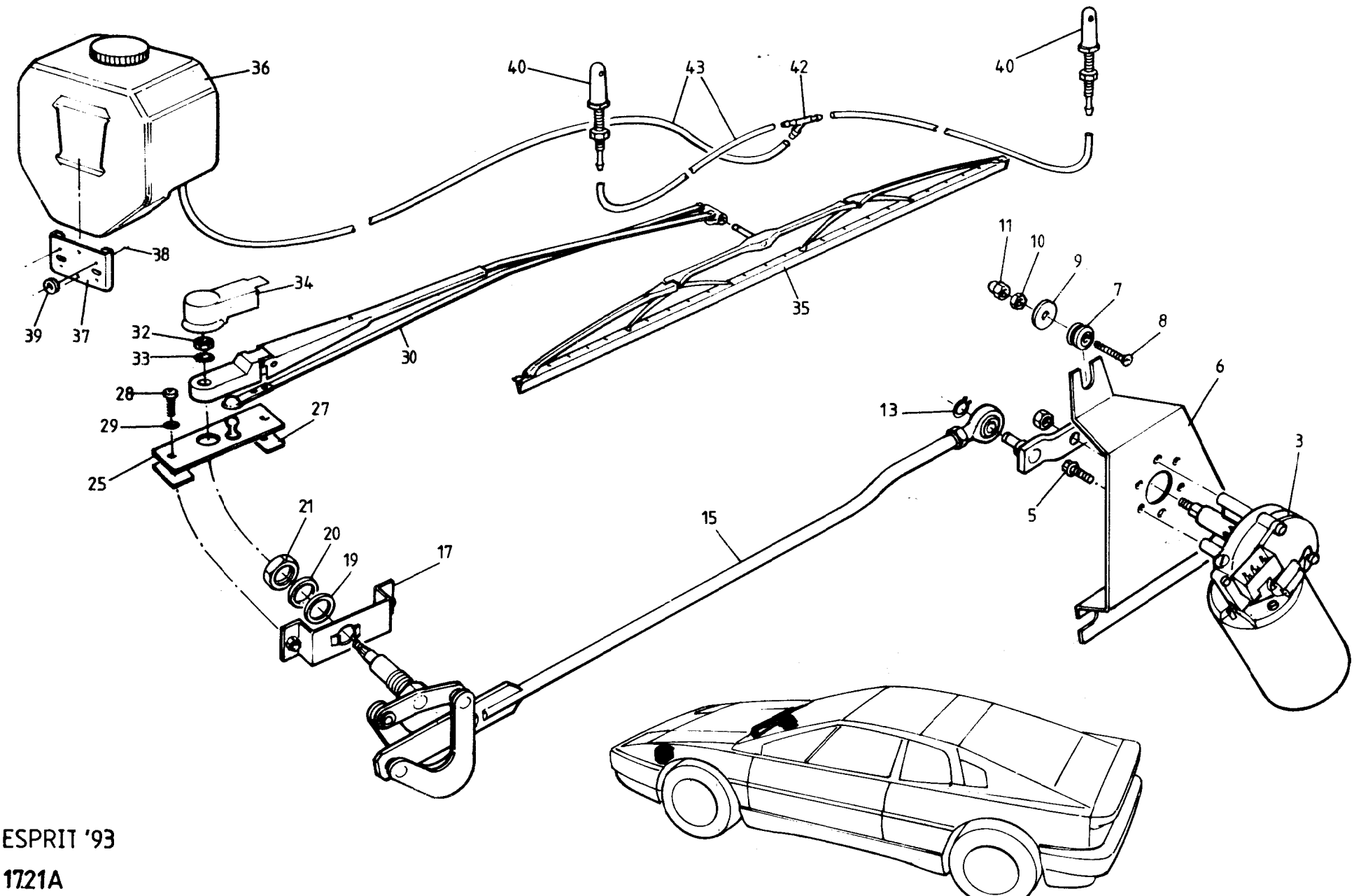
FUNCTION CODE	CONTENTS: Headlamp Pod Motors & Lift Mechanism		QUANTITY		
17.15A	**PART DESCRIPTION**	PART NUMBER	ALL		**REMARKS**
1	Motor, headlamp pod lift, RH	A100B6064F	1		
	LH	A100B6063F	1		
3	Steady Bracket, motor to body, RH	A082U5898F	1		
	LH	A082U5899F	1		
5	Setscrew, M5 x 20,	A075W1025Z	2		
6	Jacknut, M5, steady bracket to body	A076W3042F	2		
7	Screw, M5 x 10,	A082W5097F	2		
8	Washer, flat,	A075W4011Z	2		
9	Nut, M5 Nyloc, steady bracket clamping	A075W3008Z	2		
12	Setscrew, M6 x 16, motor to mounting bracket	A075W1028Z	4		
	Caphead Screw, M6,	A075W7017F	2		
13	Washer, shakeproof,	A075W4046Z	4		
15	Bracket, headlamp motor mounting, RH	A082U7228F	1		
	LH	A082U7229F	1		
17	Setscrew, M6 x 20, bracket to body	A075W1030Z	8		
18	Washer, flat,	A075W4013Z	8		
19	Rawlnut, M6 x 15,	A075W6140F	8		
20	Rotary Link, headlamp motor	A082U7231F	2		
21	Nut, M6 Nyloc, rotary link to motor	A907E6285F	2		
22	Washer, flat, rod ends	A075W4013Z	10		
23	Nut, M6 Nyloc,	A075W3009Z	2		
25	Link Assembly, pod actuation	C082U5852F	2		
26	Setscrew, M6 x 25, rod end to pod bracket	A075W1031F	2		
27	Washer, flat, s/s,	A082W4133F	4		
29	Nut, M6 Nyloc,	A907E6285F	2		
30	Bracket, link to pod	A079U4454K	4		
31	Setscrew, M6 x 18, bracket to pod	A075W1029Z	8		
32	Washer, shakeproof,	A075W4046Z	8		
33	Washer, flat,	A075W4015Z	8		
35	Tapping Plate,	A079U4517F	2		
41	Buffer, adjustable stop	A082W6341F	2		
42	Nut, M5,	A082W3084Z	2		
43	Setscrew, M5,	A082U7290F	2		
45	Buffer, fixed stop	A082U6201F	2		



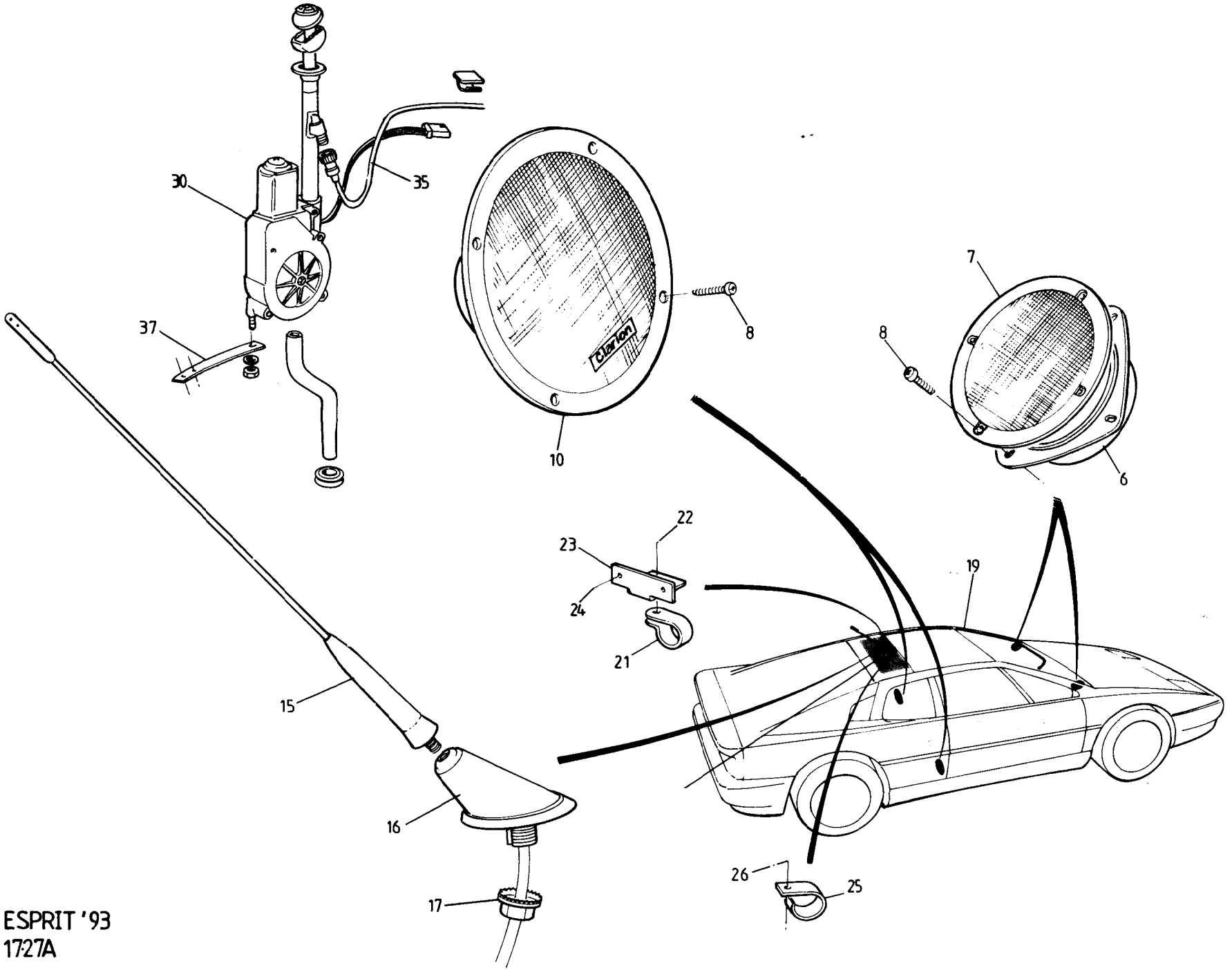
ESPRIT '93

1721A

FUNCTION CODE	CONTENTS: Windscreen Wiper Mechanism & Washers		QUANTITY		
17.21A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
	Wiper Mechanism Assembly	C082M4628F	1		) inc. * items
		C082M4643F		1	)
*3	Wiper Motor Assembly	A082M4708S	1		
		A082M4709S		1	
*5	Bolt, wiper motor to bracket	A082M6382H	3	3	
*6	Bracket, wiper motor mounting	A082M4629F	1	1	
7	Rubber Bush, mounting bracket to body	A082M6338F	3	3	
8	Screw, M5 x 30, " " "	A082W5118F	3	3	
9	Washer, flat, " " "	A082W4098F	3	3	
10	Locknut, M5, " "	A082W3088F	3	3	
11	Nut, dome, M5, " " II	A082W3086F	3	3	
*13	Circlip, linkage assembly to motor crank	A082M6383H	1	1	
*15	Wiper Linkage Assembly	A082M4719S	1		
		A082M4718S		1	
*17	Fixing Plate, wiper spindle	C082M4632H	1		
		C082H4633H		1	
*19	Washer, rubber, M20, wiper spindle fixing	A082M6388H	1	1	
*20	Washer, flat,	A082M6387H	1	1	
*21	Nut, M20, wiper spindle fixing	A082M6386H	1	1	
25	Mounting Plate, wiper ball joint	C082M4746F	1		
		C082M4747F		1	
27	Spacer, mounting plate to body	A082M4748F	1	1	
28	Screw, M5 x 16, " " "	A082W5184F	2 '	2	)
29	Washer,. spring, " " "	A082W4130F	2	2	) Stainless
	Washer, flat, " " "	A082W4129F	2	2	)
30	Wiper Arm Assembly	A082M6339F	1		
		A082M6340F		1	
"32	Nut, M6, wiper arm to spindle	A082M6384H	1	1	
"33	Washer, " "	A082M6385H	1	1	
34	Head Cover, wiper arm	A082M6380F	1	1	
35	Wiper Blade	A079M6015F	1	1	
36	Washer Pump & Reservoir Assembly	C079M6010F	1'	1	
37	Mounting Bracket, washer reservoir	A075M6069Z	1	1	
38	Pop Rivet, bracket to body	AO75W6087Z	3	3	
39	Washer,	A075W4000Z	3	3	

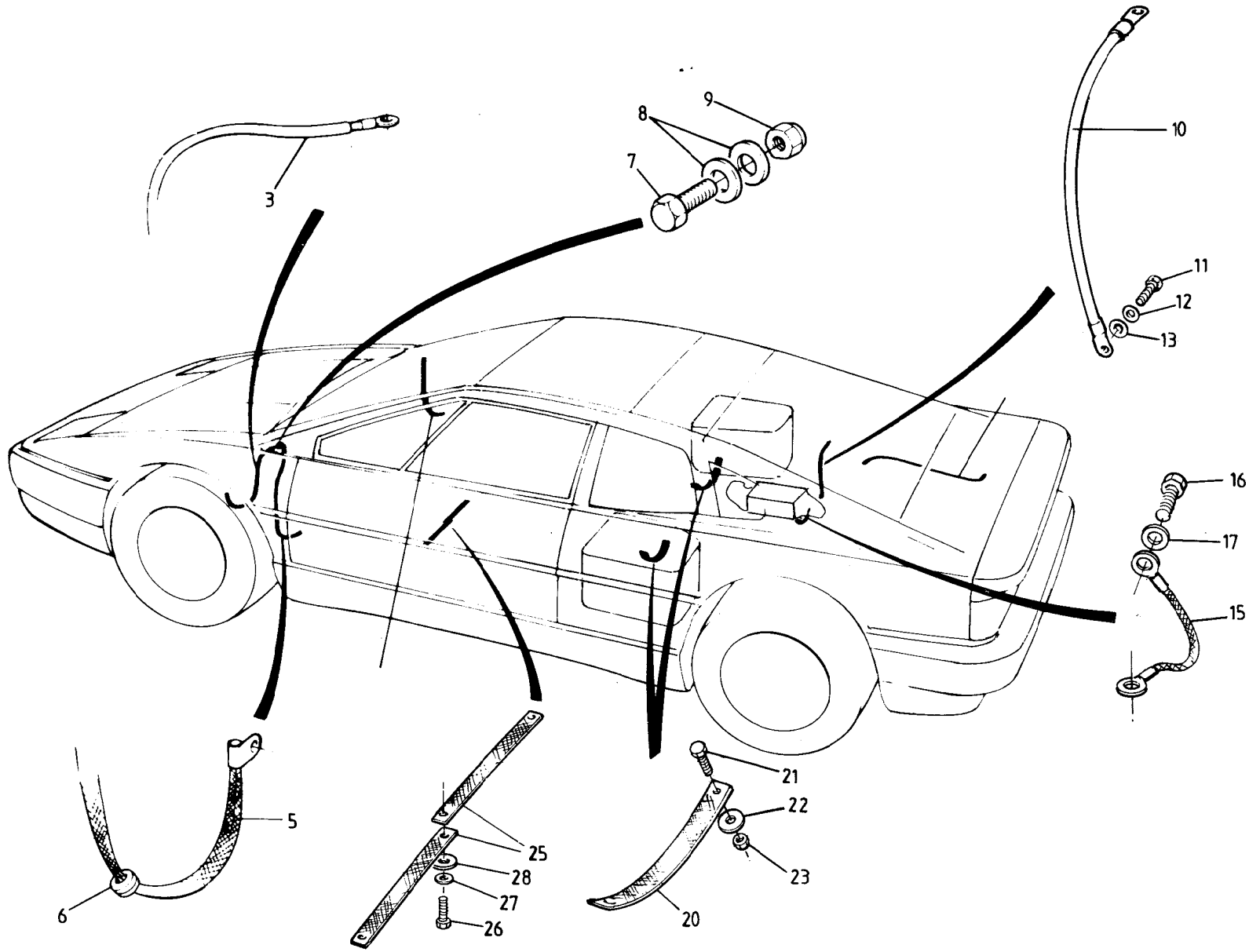
Esprit range: '93 M.Y. onwards.

FUNCTION CODE	CONTENTS: Windscreen Wiper Mechanism and Washers		QUANTITY		
17.21A	PART DESCRIPTION	PARTNUNBER	RHD	LHD	REMARKS
40	Jet, windscreen washer	A082M6369F'	2	2	
42	'T'-piece, washer tubing	A075M6118F'	1	1	
43	Tubing, windscreen washer, 4mm	A050M6164V'	2.6m	2.6m	



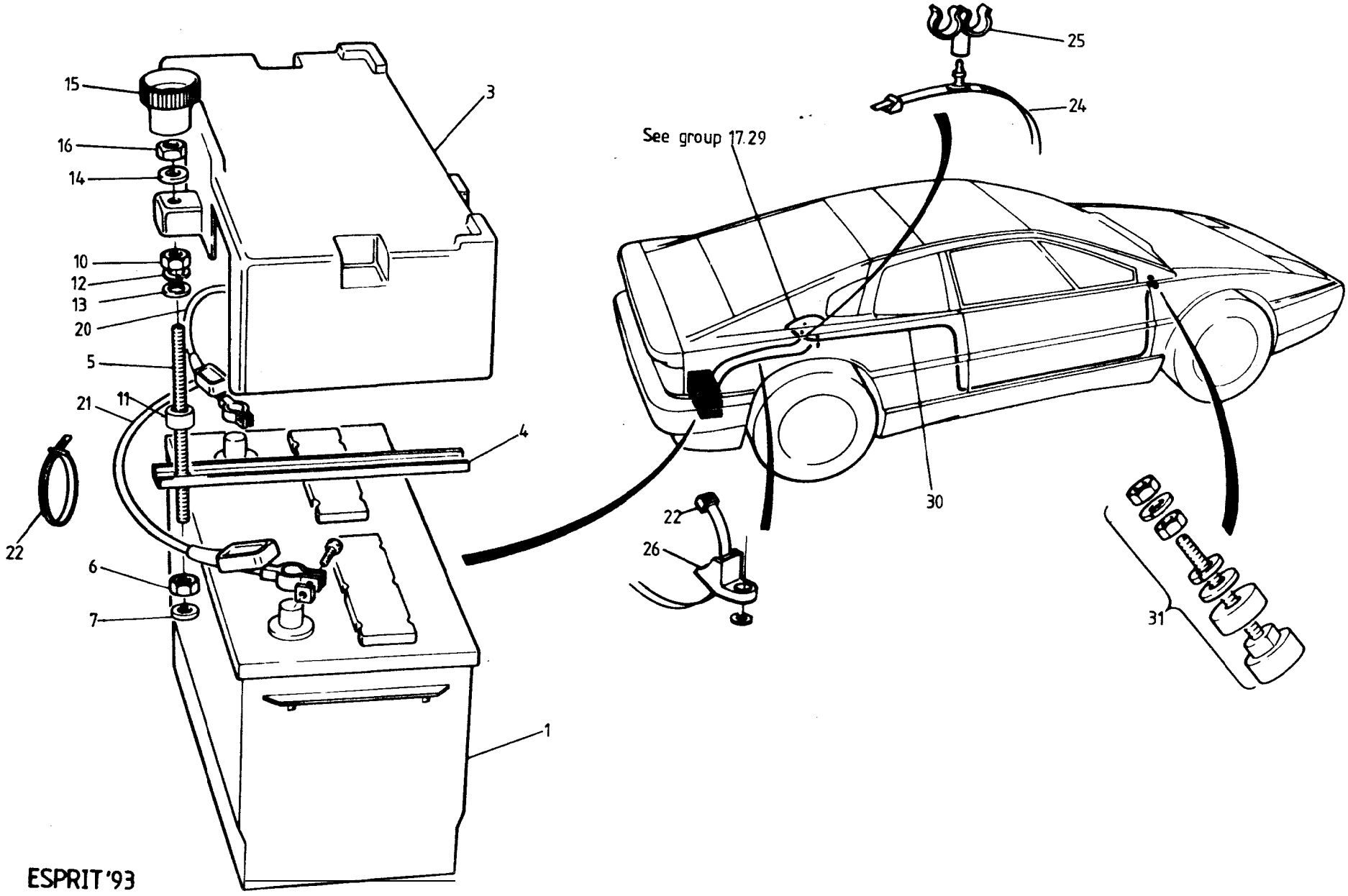
ESPRIT '93
1727A

FUNCTION CODE	CONTENTS : Audio Equipment, Speakers, Aerial		QUANTITY		
17.27A	PART DESCRIPTION	PART NUMBER	NON USA	USA	REMARKS
	Radio/Cassette Player, Clarion CRX 111R	AO82M6509F	1	1	R/B A082M6592F)
	" " " " CRX 121R	A082M6592F	1	1	) Option for non-USA
	CD Player, Clarion CDC 9250	A082M6561F	1		)
	" " " CDC 9300	A089M6347F		1	
	Harness, CD player	A089M0568K		1	
6	Speaker, front, Clarion SE 4260	A082M6392F	2		Nom.15W, max.30W, peak 45W, 4Ω 400Hz
7	Grille, front speaker	B089M6080F	2		
	Speaker Kit, Clarion SE1601/SE4260	A082M6463F	1		Front & rear
	" " front, JVC CSX426	A082M6593F		1	
	" " rear, JVC CSX626	A082M6594F		1	
a	Screw, speaker fixing	A075W5037F	16		
10	Speaker, rear, Clarion SE 1601	A082M6391F	2		Nom.20W, peak 60W, 4Ω @ 400Hz
15	Aerial, radio, tailgate mounted	A082M6533F	1		
16	Base, radio aerial	A082M6534F	1		
17	Nut, M14, aerial fixing	A082M6555F	1		
	Washer, shakeproof, aerial fixing	A079W4051F	1		
19	Extension Lead, aerial	**A082M4933K**	1		Prior VIN *
	" " "	B082M4933K	1		From VIN *
21	Clip, aerial lead to body	A075W6021Z	1		* **VIN R 1142 (S4 LHD)**
22	Pop Rivet, clip to bracket	A075W6067F	1		**R 1150 (S4 RHD)**
23	Bracket, aerial lead clip to body	A082M4932F	1		**R 8030 (Sport 300)**
24	Pop Rivet, bracket to body	A075W6069F	2		(Revised Harness)
25	'P' Clip, aerial lead to tailgate	A075W6228F	2		
26	Pop Rivet, 'P' clip fixing	A075W6091F	2		
30	Aerial, electric retracting	A082M4699F		1	Prior VIN *
	" " "	A100M6127F		1	)
	Bracket, electric aerial support	B082U7692F		1	)
	Rivet, bracket to body	A082W6572F		2	)
35	Cable, electric aerial extension	A100M6128F		1	) From VIN *
	Foil, aerial ground plane	A065M6008V		0.2m	)
	Setscrew, M5 x 10, bracket to aerial	A100W1105F		1	)
	Washer, shakeproof, " " "	A075W4045Z		1	)
37	Earthing Strap, aerial		1	1	



ESPRIT '93
17.29A

FUNCTION CODE	CONTENTS: Earth Braids & Suppression Devices		QUANTITY		
17.29A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
3	Earth Braid, scuttle beam to chassis	B089M0410F	1		
4	" " door to scuttle beam, RH	B082M4171F	1		
5	" " " " " " LH	B082M4172F	1		
6	Grommet, braid through body	A082F6236F	2		
7	Bolt, M8 x 30, scuttle beam earth	AO75W2037Z	1		
8	Washer, flat, " " "	A075W4020Z	1		
9	Nut, M8 Nyloc, " " "	A075W3010Z	1		
10	Earth Braid, engine to chassis	A082M4782F	1		
11	Setscrew, M8 x 25, cable to engine	A075W1039Z	1		
12	Washer, spring, " " "	A075W4036Z	1		
13	Washer, flat, " " "	A075W4020Z	1		
15	Earth Braid, chargecooler to rear bracket	A085M4207F	1		
16	Setscrew, M6 x 10, earth braid fixing	A075W1026Z	1		
17	Washer, shakeproof, " " "	A075W4046Z	1		
	Foil, aluminium, radio suppression	A065M6008V	A/R		
20	Earth Braid, fuel tank to chassis	A079M4094F	2		
21	Setscrew, braid fixing	A075W1038Z	2		
22	Washer, flat, " "	A075W1021Z	4		
23	Nut, " "	A075W4031Z	2		
25	Earth Braid, seats to chassis	AO82M4908F	2		
26	Setscrew, braid to chassis	A075W1029Z	1		
27	Washer, spring, M6, braid fixing	A075W4035Z	1		
28	Washer, flat, M6 x 20, " "	A07514017Z	1		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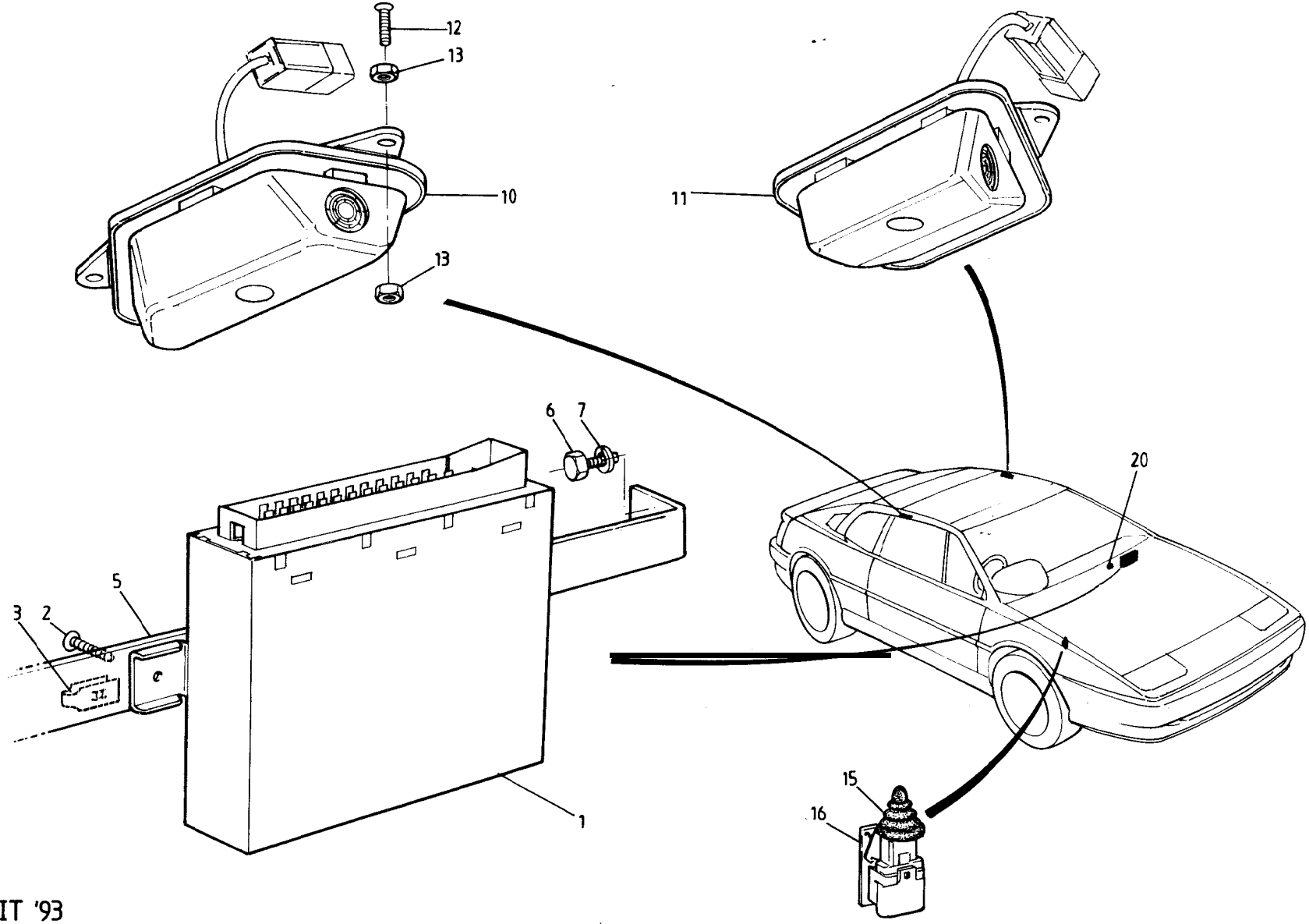
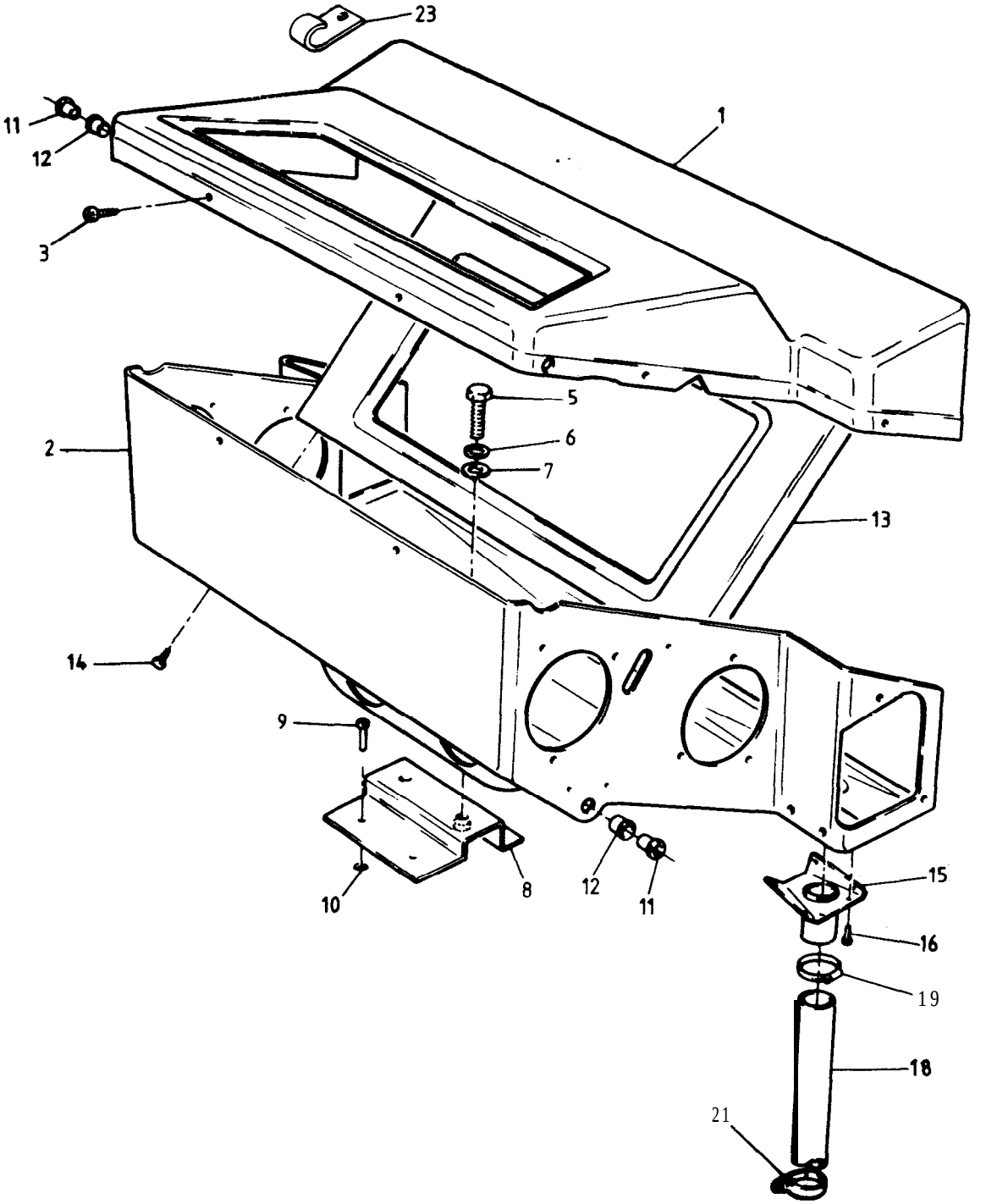
FUNCTION CODE	CONTENTS: Battery & Battery Cables		QUANTITY		
17.31A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Battery, Tungstone Type 088	B082M6284F	1		
3	Battery Cover/Tool Case Tray	B082M4725K	1		
4	Clamp Channel, battery retaining	A085U5115F	1		
5	Stud, M6 x 150, " "	B085M4166F	1		
	Stud, M6 x 185, " "	B085M4167F	1		
6	Nut, M6, battery stud to body	A075W3020Z	2		
7	Washer, flat, " " " "	A075W4013Z	2		
10	Nut, M6, clamp channel retaining	A075W3020Z	2		
11	Spacer, clamp channel to nut	A907E0696Z	2		
12	Washer, spring, clamp channel retaining	A075W4035Z	2		
13	Washer, flat, " " "	A075W4015Z	2		
14	Washer, flat, battery cover retaining	A075W4013Z	2		
15	Knob, finger grip, " " "	A082M6468F	2		
16	Nut, M6, battery cover retention knob	A075W3020Z	2		
20	Cable, battery +ve	C082M4673F	1		
21	" " -ve, battery to engine	C082M4674F	1		
22	Tie Wrap, battery cables	A075W6038Z	8		
24	Tie Wrap/Swivel Clip, cables to chassis	A082W6324F	1		
25	Swivel Clip, double, " " "	A082W6330F	1		
26	Cable Fixing, battery cables to chassis	A085W6276F	8		
	Sheath, battery terminals	A085M8172Z	2		
30	Main Feed Cable, starter motor to binding post	A082M4238F	1.		
31	Binding Post, +ve, scuttle beam	A089M6033F	1		



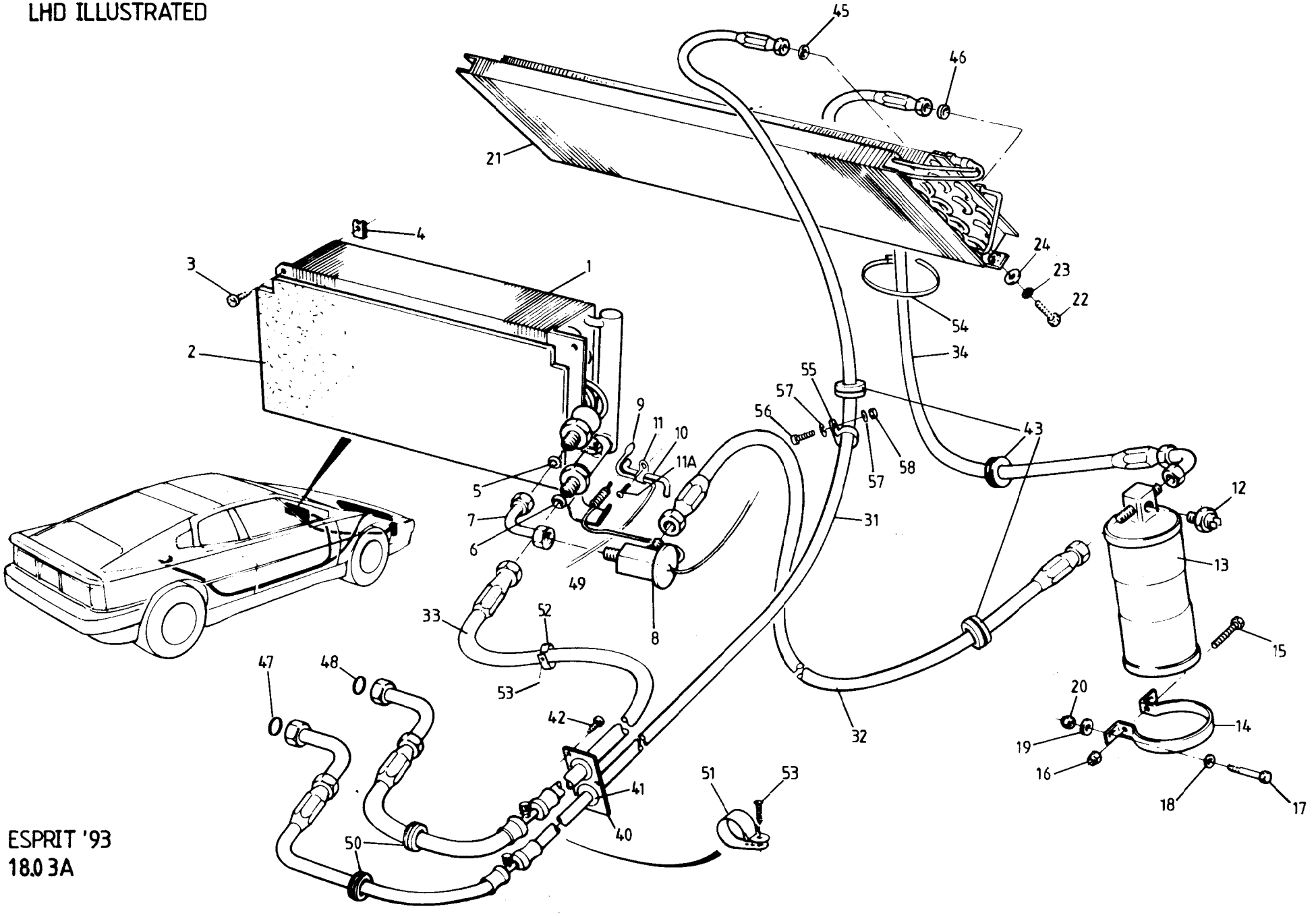
ESPRIT '93
1733A

FUNCTION CODE	CONTENTS : Alarm System Controller & Sensors		QUANTITY		
17.33A	**PART DESCRIPTION**	PART NUMBER	ALL		**REMARKS**
1	Controller, vehicle alarm system	A082M6526F	1		
2	Screw, controller to mounting bracket	A075W5012F	2		
3	Spire Nut, controller fixing	A075W6014Z	2		
5	Mounting Bracket, alarm controller	A082U7683F	1		
6	Setscrew, M5 x 12, bracket fixing	AO75W1021Z	2		
7	Washer, spring, " "	A082W4097F	2		
10	Sensor, ultra sonic, driver's side	A082M6527F	1		
11	" " " passenger's side	A082M6528F	1		
12	Screw, sensor to trimmed capping rail	A089W5104F	4		Cut down rear fixing screws to clear tailgate hinge fixings
13	Nut, " " " " "	A075W3019F	8		
15	Switch, engine lid & bonnet alarm sensing	A082M6587F	2		(bonnet switch on revised harness cars only)
16	Bracket, alarm switch mounting	A082U7687F	2		
	Pop Rivet, bracket to body	A075W6090Z	4		
20	Parking Socket, alarm ALDL connector	A082M6546F	1		
	Screw, socket to controller mounting bracket	A075W5012F	2		
	Spire Nut, " " " " "	A075W6014Z	2		

LHD ILLUSTRATED



FUNCTION CODE	CONTENTS: Heater/Air Conditioning Assembly, Casings		QUANTITY		
18.01A	PART DESCRIPTION	PARTNUMBER	RHD	LHD	REMARKS
	Heater Assembly	A082P4290F	1		) Inc. heater matrix, vacuum valves,
	" "	A082P4291F		1	) control cables, rotary controls
	Heater/Air Conditioning Assembly	B082P4288S	1		} Inc. heater matrix, a.c. evap.
	" " " "	B082P4289S		1	} vac. valves, cables & controls
1	Case, upper, heater only	A079P4154K	1		
	" " " "	A079P4155K		1	
	" " heater/a.c.	A079P4136K	1		
	" " " "	B079P4108K		1	
2	Case, lower, heater only	A079P4156K	1		
	" " " "	A079P4157K		1	
	" " heater/a.c.	B079P4137K	1		
	" " " "	B079P4109K		1	
3	Screw, upper to lower case	A075W5032Z	9	9	
5	Setscrew, M6 x 12, case to mounting plate	A075W1027Z	2	2	
6	Washer, spring, " " " "	A075W4046Z	2	2	
7	Washer, flat, " " " "	A075W4013Z	2	2	
8	Mounting Plate, case to body	A079P4096Z	1	1	
9	Pop Rivet, mounting plate to case	A075W6071Z	2	2	
10	Washer, pop rivet	A075W4046Z	2	2	
11	Bush, screen/footwell & mode flap pivot, inner	A089P0268F	4	4	
12	" " " " " " " outer	A075P6064F	4	4	
13	Closing Panel, mode flap	A079P4112K	1.	1	
14	Screw, closing panel to case	A075W5032Z	4	4	
15	Drain Adaptor	A079P4106Z	1	1	)
16	Pop Rivet, drain adaptor	A075W6090Z	4	4	)
18	Drain Tube, 5/8" PVC	AO75U6083V	4oOmm	4oomm	)
19	Hose Clip, 16-25mm	A079K6018F	1	1	) With a.c.
21	'P' Clip, drain tube	A075W6001F	1	1	)
22	Pop Rivet, 'P' clip to body	A075W6090Z	1	1	)
23	'P' Clip, open, fridge pipe to heater case	A075W6229F	1		)
	Screw, no. 8 x ½", 'P' clip fixing	A075W5034Z	1		)

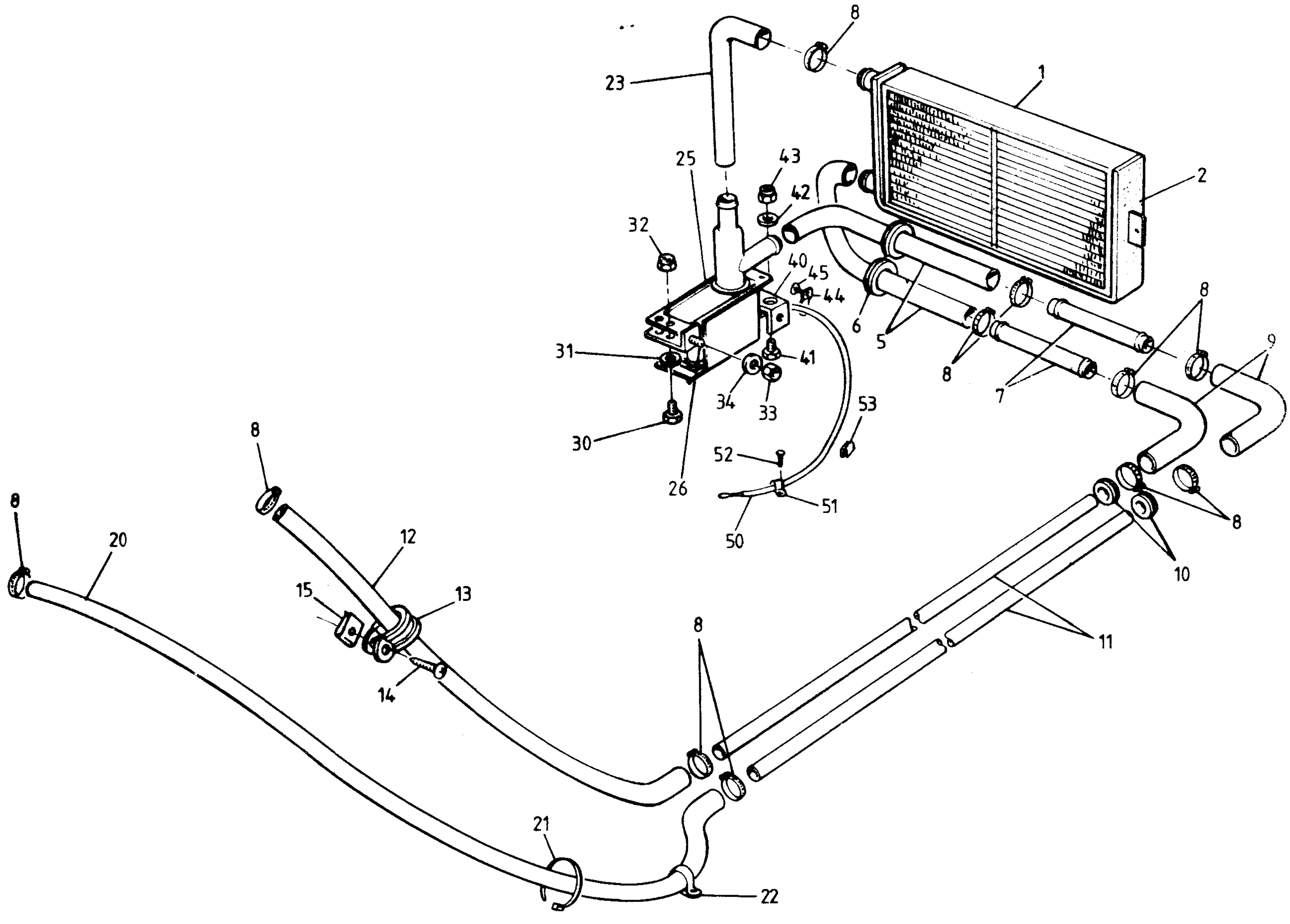


ESPRIT '93
18.03A

FUNCTION CODE	CONTENTS : Condenser, Evaporator, Rec. Drier, Hoses		QUANTITY		
18.03A	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
1	Evaporator	A079P4139F	1		
		A079P4080F		1	
2	Foam, open mesh	A075P0206F	1	1	
3	Screw, evaporator to case	A075W5014Z	2	2	
4	Spire Nut, " " "	A075W6014Z	2	2	
5	Flare Gasket, 10.4 mm, elbow to evaporator	A082P4241F	1	1	
6	" " 15.7 mm, exp. valve to elbow	A082P4242F	1	1	
7	Elbow Adaptor, expansion valve to evaporator	A079P6017F	1	1	
8	Expansion Valve	A079P6012F	1	1	
	Non-Drip Tape	A075P6086F	A/R	A/R	
9	Thermistor (rod mounted)	A082M6408F	1	1	
10	Rod, thermistor mounting	A082P4292F	1	1	
11	Clip, mounting rod to heater lower casing	A075W6051Z	1	1	
11A	Screw, no.8 x 3/8", mounting rod to casing	A075W5032Z	1	1	
12	Switch, low/high pressure cut out	A082P6053F	1	1	
13	Receiver Drier	A082P4294J	1	1	
14	Clamp Bracket, receiver drier	A089P0278F	1	1	
15	Setscrew, M6 x 20, clamping	A075W1030Z	1	1	
16	Nut, M6 Nyloc, clamping screw	A075W3009Z	1	1	
17	Setscrew, M6 x 35, clamp brkt to body stiffener	A075W2029Z	2	2	
18	Washer, flat, " " " " "	A075W4015Z	4	4	
19	Washer, flat, large o/d, " " " "	A075W4017Z	2	2	
20	Nut, M6 Nyloc, " " " "	A075W3009Z	2	2	
21	Condenser/Chargecooler Radiator	A082K4226F	1	1	
	Edge Clip, condenser to engine radiator	A075W6055Z	4	4	
31	Hose, compressor to condenser	A082P4254F	1		
	" " " "	B082P4247F		1	
32	Hose, receiver drier to expansion valve	A079P4135F	1		
	" " " " " "	A079P4077F		1	
33	Hose, evaporator to compressor	A082P4255F	1		
	" " " "	A082P4299F		1	
34	Hose, condenser to receiver drier	A082P4170F	1'	1	
40	Grommet Plate, hoses thro' bulkhead	B079P4084F	1	1	
41	Grommet, " " "	A046K6001Z	2	2	

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Condenser, Evaporator, Rec.Drier, Hoses		QUANTITY		
18.03A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
42	Screw, grommet plate fixing	A075W5050F	4	4	
43	Grommet, a.c. hoses/front body	A075P6021F	5	5	
45	'0' Ring, condenser inlet	A082P6048F	1	1	>
46	" " condenser outlet	A075P6083F	1	1	>
47	" " compressor outlet	A089P6005F	1	1	> If fitted
48	" " condenser inlet	A089P6006F	1	1	>
49	" " expansion valve outlet	A082P6047F	1	1	>
50	Grommet, hose/body	A082P6045F	2	2	
51	'P' Clip, large, 'fridge hose fixing	A079W6200F	3	3	
52	" " small, " " "	A075H6018Z	3	3	
53	Screw, 'P' clip fixing	A075W5043Z	6	6	
54	Tie Strap, 'fridge hose fixing	A075W6038Z	3	3	
55	'P' Clip, " " "	A075H6018Z	1	1	
56	Screw, M5 x 20, 'P' clip fixing	A075W5084F	1	1	
57	Washer, flat, " " "	A075W4009Z	1	1	
58	Nut, Nyloc, M5, " " "	A075W3008Z	1	1	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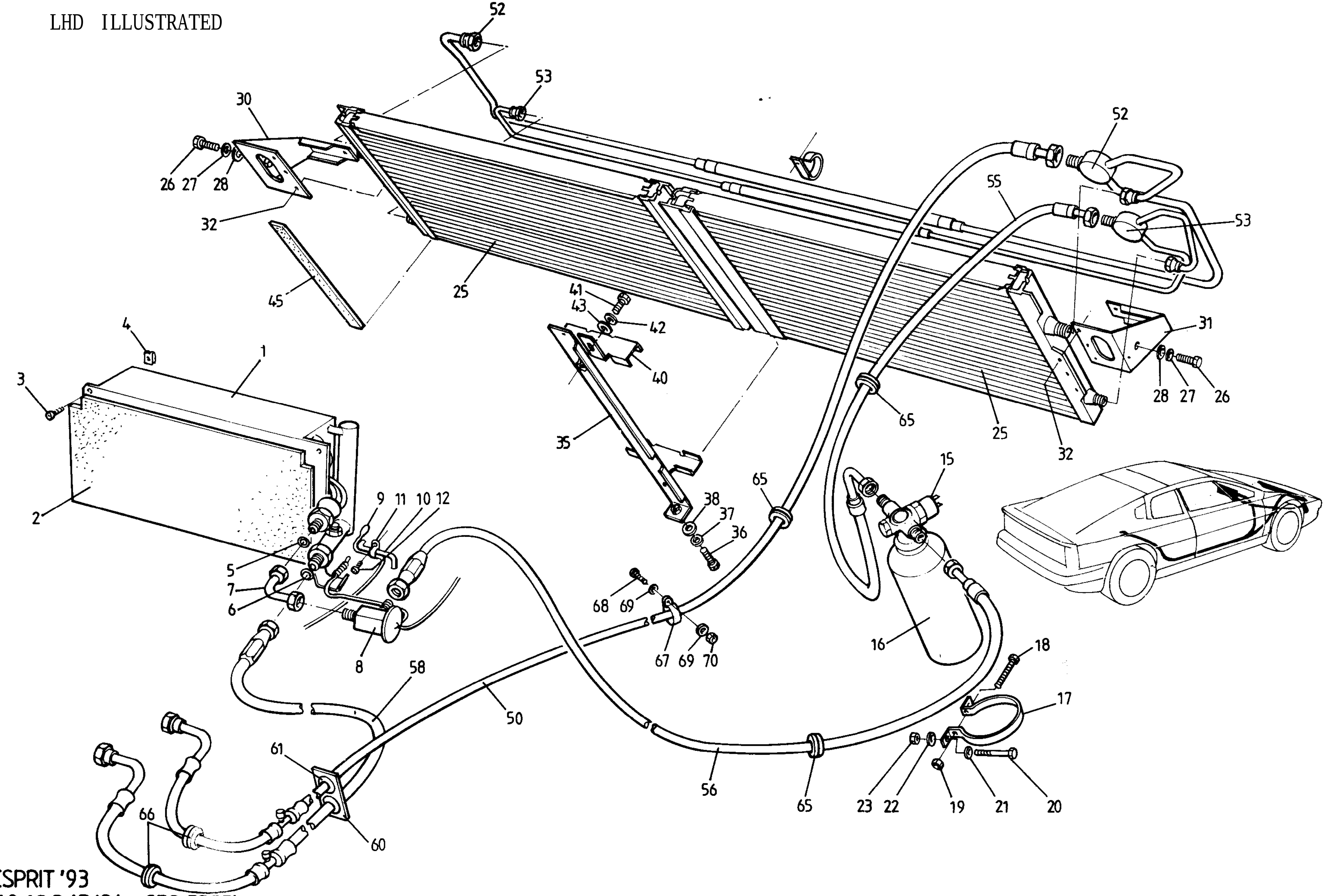
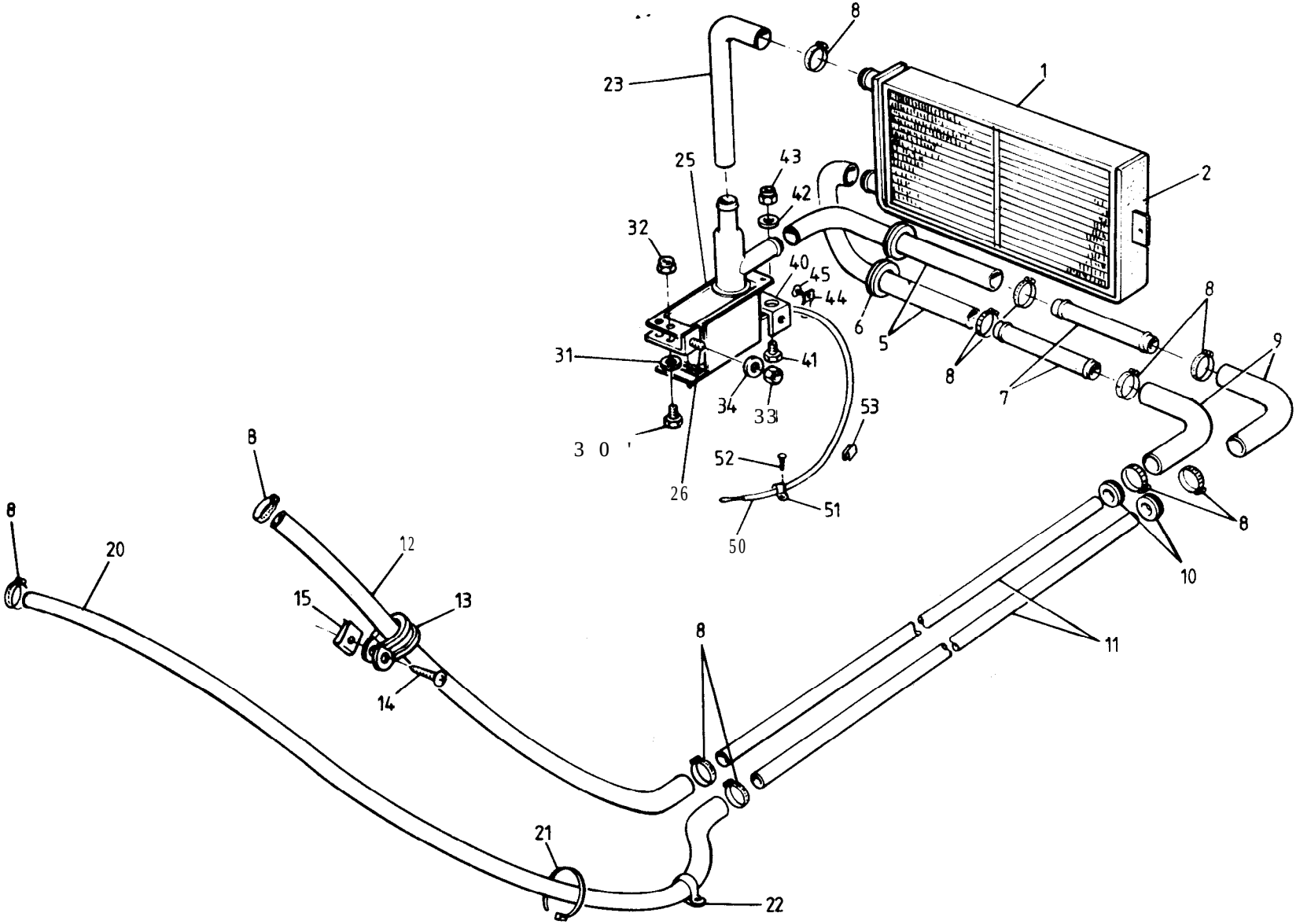
FUNCTION CODE	CONTENTS : Condenser, Evaporator, Rec. Drier, Hoses **(R 134a)**		QUANTITY		
18.03B	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
					This page for R 134a (CFC Free) type system. For Freon 12 refrigerant type see 18.03A
1	Evaporator	A079P4139F	1		
	"	A079P4080F		1	
2	Foam, open mesh	A075P0206F	1	1	
3	Screw, evaporator to case	A075W5014V	2	2	
4	Spire Nut, " " "	A075W6014Z	2	2	
5	Flare Gasket, 10.4 mm, elbow to evaporator	A082P4241F	1	1	
6	" " 15.7 mm, exp. valve to elbow	AO82P4242F	1	1	
7	Elbow Adaptor, expansion valve to evaporator	A079P6017F	1	1	
8	Expansion Valve	A079P6012F	1	1	
	Non-Drip Tape	A075P6086F	A/R	A/R	
9	Thermistor (rod mounted)	A082M6408F	1	1	
10	Rod, thermistor mounting	A082P4292F	1	1	
11	Clip, mounting rod to heater lower casing	A075W6051Z	1	1	
12	Screw, no.8 x 3/8", mounting rod to casing	A075W5032Z	1	1	
15	Switch, low/high pressure cut out	B082P6053F	1	1	
16	Receiver Drier	A082P6065F	1	1	
17	Clamp Bracket, receiver drier	A089P0278F	1	1	
18	Setscrew, M6 x 20, clamping	A075W1030Z	1	1	
19	Nut, M6 Nyloc, clamping screw	A075W3009Z	1	1	
20	Setscrew, M6 x 35, clamp brkt to body stiffener	A075W2029Z	2	2	
21	Washer, flat, " " " " "	A075W4015Z	4	4	
22	Washer, flat, large o/d, " " " "	A075W4017Z	2	2	
23	Nut, M6 Nyloc, " " " "	A075W3009Z	2	2	
25	Condenser	A082P6066F	2	2	
26	Screw M8 x 20, condenser to radiator duct	A075W1028Z	2		
27	Washer, M8, s/p, " " " "	A075W4035Z	2	2	
28	Washer, M8 x 25, " " " "	A075W4015Z	2	2	
30	Bracket, condenser mounting LH	A082U7723F	1	1	
31	" " " RH	A082U7722F	1	1	
32	Pop rivet, " to mounting bracket	A075W6090Z	6	6	
35	Bracket, " mounting centre stay	A082U7727F	1	1	

LHD ILLUSTRATED



ESPRIT '93
18·03 B (R134a CFC FREE)

FUNCTION / CODE	CONTENTS : Condenser, Evaporator, Rec. Drier, Hoses (R 134a)		QUANTITY		
18.03B	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
					'This page for R 134a (CFC Free) type **system. For Freon** 12 refrigerant type see 18.03A
36	Setscrew, M6 x 16, centre bracket lower fix	A075W1028Z	1	1	
37	Washer, spring, M6, " " " "	A075W4035Z	1	1	
38	Washer, M6 x 12, " " " "	A075W4013Z	1	1	
40	Bracket, condenser centre clamping	A082U7724F	I	1	
41	Setscrew, M6 x 16, clamping bracket fix	A075W1028Z	1	1	
42	Washer, spring, M6, " " "	A075W4035Z	1	1	
43	Washer, M6 x 12, " " "	A075W4013Z	1	1	
45	Protective strip 300mm	A082U7730K	1	I	
50	Hose, compressor to condenser	A082P4374F	1		
	" " " "	A082P4369F		1	
52	Pipework, condenser, high pressure	A082P4376F	1	1	
53	" " low "	A082P4377F	1	1	
55	Hose, condenser to receiver drier	A082P4373F	1	1	
56	" receiver drier to expansion valve	A082P4371F	1		
	" " " " " "	A082P4370F		1	
58	" evaporator to compressor	A082P4375F	1		
	" " " "	A082P4372F		1	
59	Tie strap, a.c. hoses	A075W6038Z	1	1	
60	Grommet Plate, hoses thro' bulkhead	A079P4084F	1	1	
61	Grommet, " " "	X046K6001Z	2	2	
	Screw, grommet plate fixing	A075W5050F	4	4	
65	Grommet, a.c. hoses/front body	AO75P6021Z	5	5	
66	Grommet, hose/body	A082P6045F	2	2	
67	'P' Clip, fridge hose fixing	A07586018Z	1	1	
68	Screw, M5 x 20, 'P' clip fixing	A075W5084F	1	1	
69	Washer, flat, "" "	A075W4009Z	1	1	
	" " " " "	A075W4000Z	3	3	
70	Nut, Nyloc, M5, " " "	A075W3008Z	1	1	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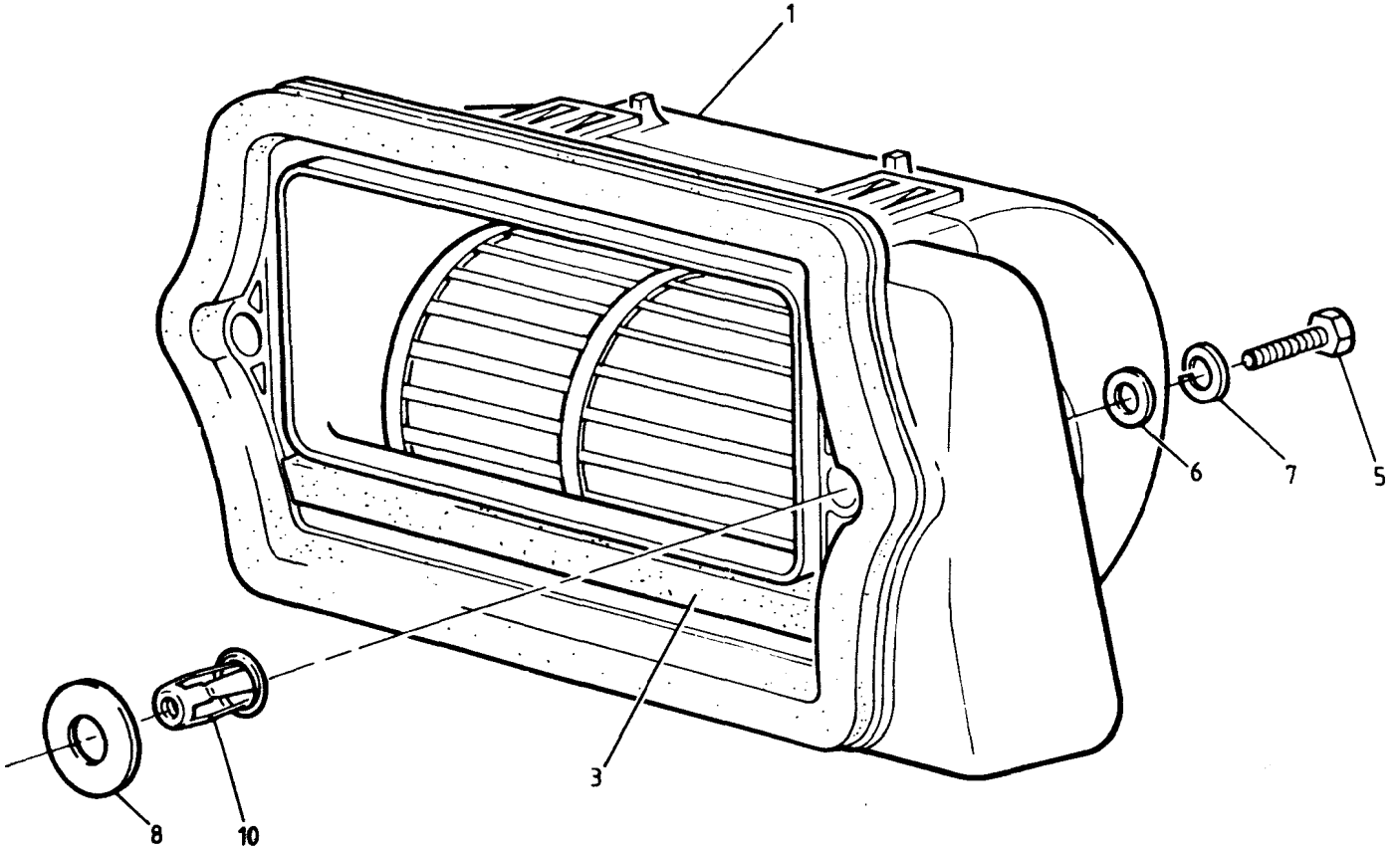
FUNCTION CODE	CONTENTS: Heater Matrix, Water Valve & Plumbing		QUANTITY		
18.05A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Heater Matrix	A075P6055F	1		
2	Foam, heater matrix to case	A075P0194K	2		
5	Hose, heater, to valve & from matrix	A079P4056F	2		
6	Grommet, hoses thro' body	A075P6021Z	2		
7	Connector Pipe, heater hoses	B075KO111Z	2		
8	Hose Clip, 16-25 mm, heater hoses	A079K6018F	14		
9	Elbow Hose, chassis pipe front	A075P0189F	2		
10	Grommet, pipe thro' chassis	A079K6004F	4		
11	Pipe, heater feed & return thro' chassis	A082P4200F	2		
12	Hose, heater return, chassis pipe to water pump	A079K4028F	1		
13	'P' Clip, heater hose securing	A910E6743F	1		
14	Screw, no. 10 x 3/4", 'P' clip fixing	A075W5041Z	1		
15	Captive Nut, " " "	A082W6322F	1		
20	Hose, heater feed, cyl. head to chassis pipe	B079P4057F	1		
21	Tie Wrap, heater hose to chassis	A075W6038Z	2		
22	'P' Clip, hose securing	A910E6490F	2		
23	Hose, water valve to matrix	B079P4142F	1		
25	Water Valve, thermostatically compensated	A075P6060F	1		
26	Bracket, water valve mounting	A082P4297F	1		
30	Setscrew, M5 x 12, valve to bracket	A075W1021Z	2		
31	Washer, flat, " " " LHD	A075W4011Z	2		
32	Nut, M5 Nyloc, " " "	A075W3008Z	2		
33	Nut, M5, mounting bracket to pedal box	A082W3084F	1		
34	Washer,. flat, " " " " "	A075W4011Z	2		
40	Abutment Bracket, control cable to valve	A082P4298F	1		
41	Setscrew, M5 x 12, bracket to valve, LHD	A075W1021Z	2		)
42	Washer, flat, " " " "	A075W4011Z	2		)RHD cars share valve mounting brkt.
43	Nut, M5 Nyloc, " " " "	A075W3008Z	2		)fixings.
44	Clamp, control cable to abut. bracket	A082P4244F	1		
45	Screw, no.8 x 3/8", cable clamp	A075W5032Z	1		
50	Tubing, 3 mm, capillary line protection	AOSOM6165V	250m		
51	Clip, capillary line to case	A075W6051Z	2		
52	Screw, clip fixing	A075W5032Z	2		
53	Clip, water valve sensor	A075W6118F	1		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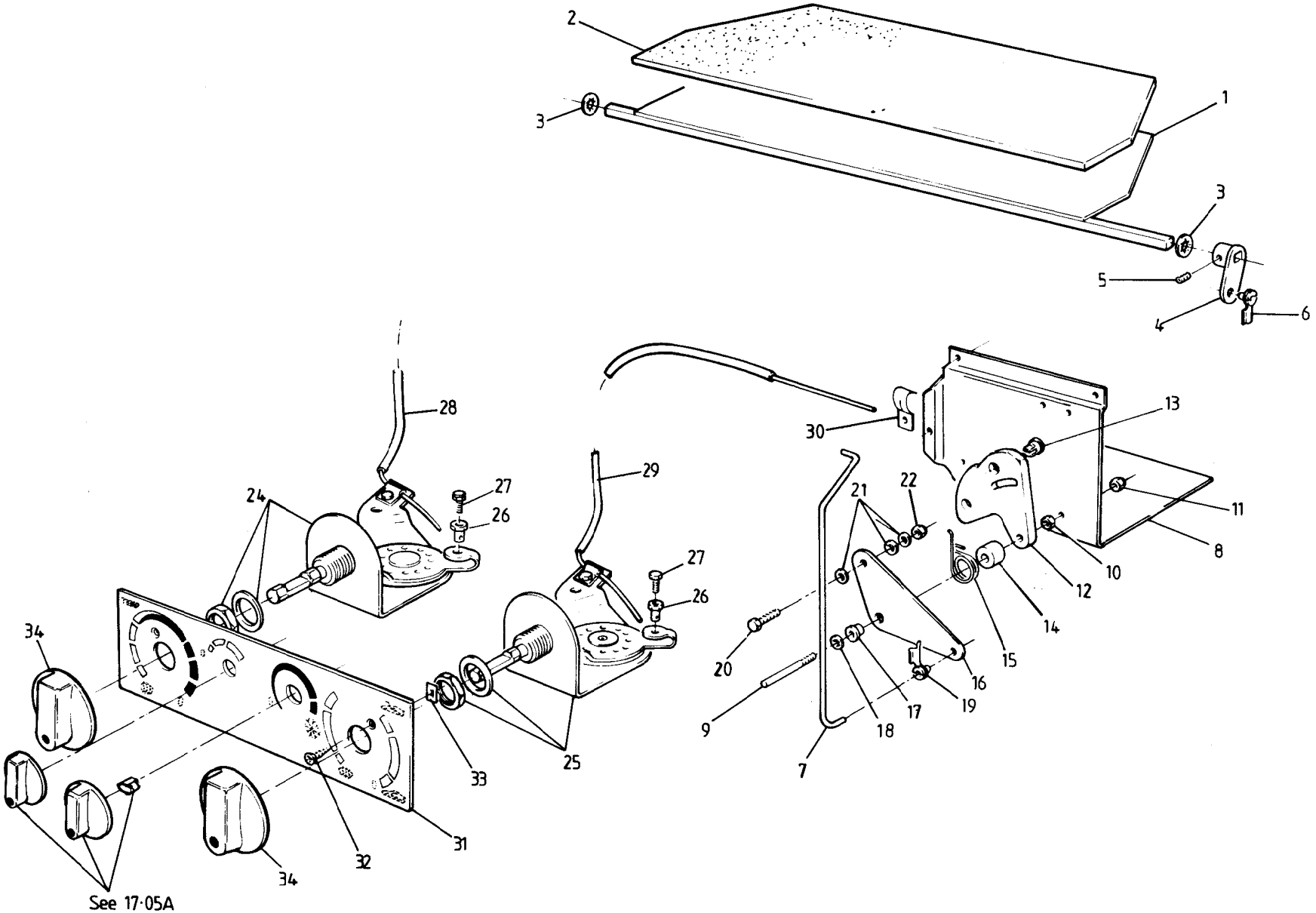
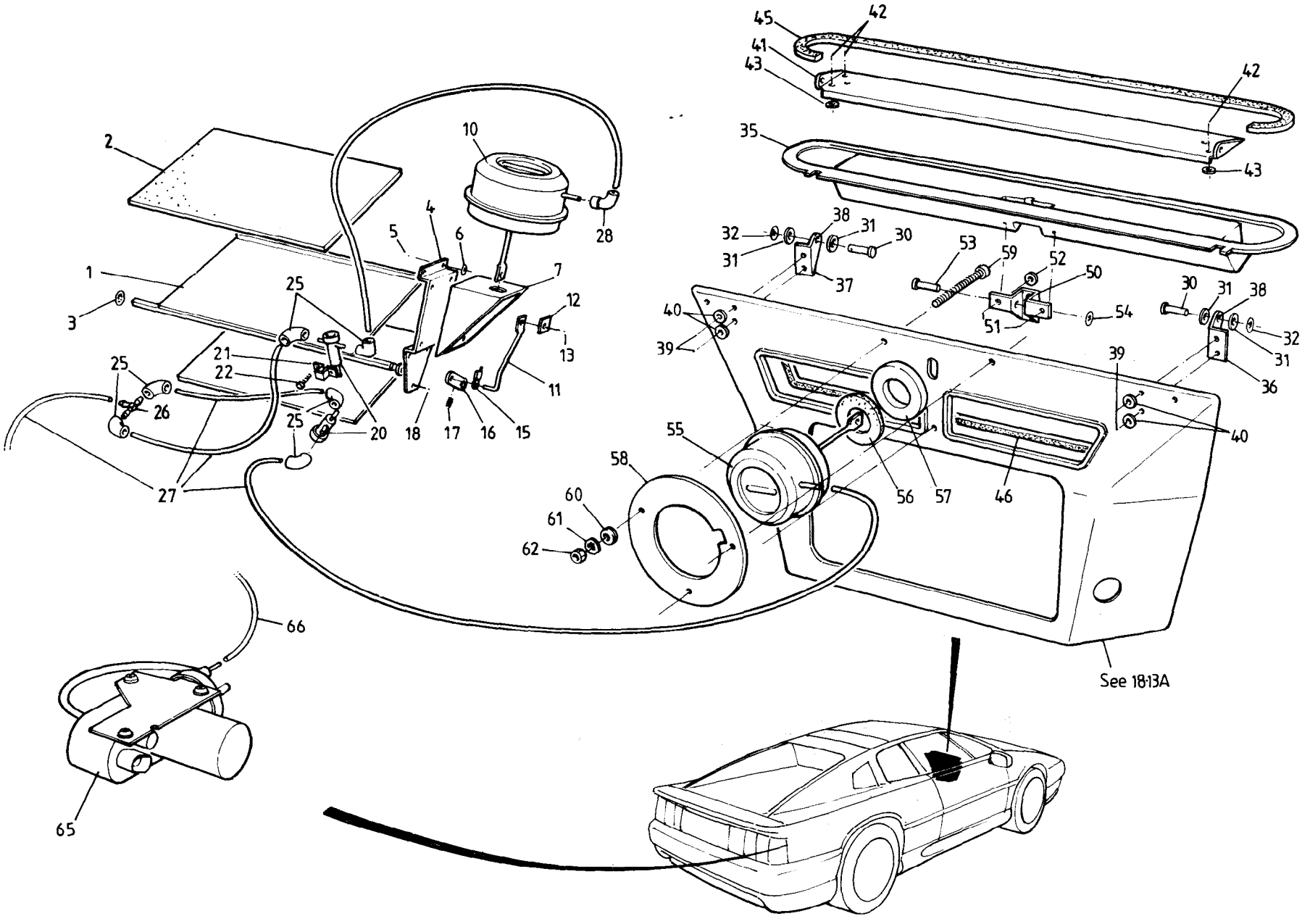
FUNCTION CODE	CONTENTS: Interior Blower Motor		QUANTITY	
18.07A	**PART DESCRIPTION**	**PART NUMBER**	ALL	**REMARKS**
1	Interior Blower Motor Assembly	COB2M6358F	1	
3	Foam Seal, blower motor to bulkhead	A082U6065V	160mm	
5	Setscrew, M6 x 30, " " "	A075W1032Z	2	
6	Washer, flat, " " "	A075W4015Z	2	
7	Washer, spring, " " "	A075W4035Z	2	
a	Washer, M10 flat, jacknut reinforcing	A075W4025Z	2	
10	Jacknut, M6, motor to bulkhead	A075W3034Z	2	



ESPRIT '93
18.09A

FUNCTION CODE	CONTENTS: Rotary Controls, Graphic Panel, Screen Flap Mechanism		QUANTITY		
18.09A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
1	Flap, screen/footwell	B079P4017F	1		
	" "	A079P4175F		1	
2	Foam, screen/footwell flap	B036B6197V	*	*	* 300 x 100 mm
3	Clip, screen flap pivot shaft ends	A075W6173F	2	2	
4	Lever, screen flap operating	A079P4101F	1	1	
5	Grubscrew, lever to screen flap shaft	A075W7023Z	1	1	
6	Clip, operating rod to screen flap	A075U6033F	1	1	
7	Rod, screen/footwell flap operating	B079P4017F	1		
	" " " " "	A082P4246F		1	
a	Control Plate	A082P4300F	1	1	
9	Stud, 10 UNF, cam/lever pivot	A075P0225F	1	1	
10	Nut, 10 UNF plain, pivot stud to plate	A075W3013Z	1	1	
11	" " " Nyloc, " " " "	A075W3000Z	1	1	
12	Cam, vacuum valve operating	B082P4281F	1	1	
13	Trunnion, cable to cam	B075W6121F	1	1	
14	Spacer, lever to cam	A075P0229F	1	1	
15	Spring, cam return	B075P0229F	1		
	" "	A079P4103F		1	
16	Bellcrank Lever, screen/footwell flap	A082P4184K	1	1	
17	Bush, lever pivot	A075P0162K	1	1	
la	Clip, " "	A075W6173F	1	1	
19	Clip, bellcrank lever to screen flap rod	A075U6033F	1	1	
20	Setscrew, 10 UNF x 5/8", cam operating	AO75W1001Z	1	1	
21	Washer, cam setscrew	A075W4011Z	3	3	
22	Nut, 10 UNF Nyloc, cam setscrew	A075W3000Z	1	1	
23	Rotary Control, temperature	B082P4196J	1	1	
25	Rotary Control, air distribution	B082P4196J	1	1	
	Washer, rotary cobtrol to graphic panel	A075W4007Z	2	2	
26	Nipple/Trunnion, rotary control	A074K6001Z	2	2	
27	Screw, cable to nipple/trunnion	B074K6002Z	2	2	
28	Control Cable, temperature (green)	B082P4295F	1	1	

FUNCTION CODE	CONTENTS : Rotary Controls, Graphic Panel, Screen Flap Mech..		QUANTITY		
18.09A	PART DESCRIPTION	PARTNUUBER	RHD	LHD	REMARKS
29	Control Cable, air distribution, (black)	B082P4287F	1	1	
30	Clamp, cable to control plate	A082P4244F	1	1	
	Graphic Control Panel, heater only	D082P4303F	1	1	
31	Graphic Control Panel, with a.c.	D082P4302F	1	1	
32	Screw, no.6, graphic panel fixing	A075W5029Z	2	2	
33	Spire Nut, " " "	A075W6014Z	2	2	
34	Knob, rotary controls, heat & distribution	A082P4349F	2	2	



ESPRIT '93
18.11A

FUNCTION/ CODE

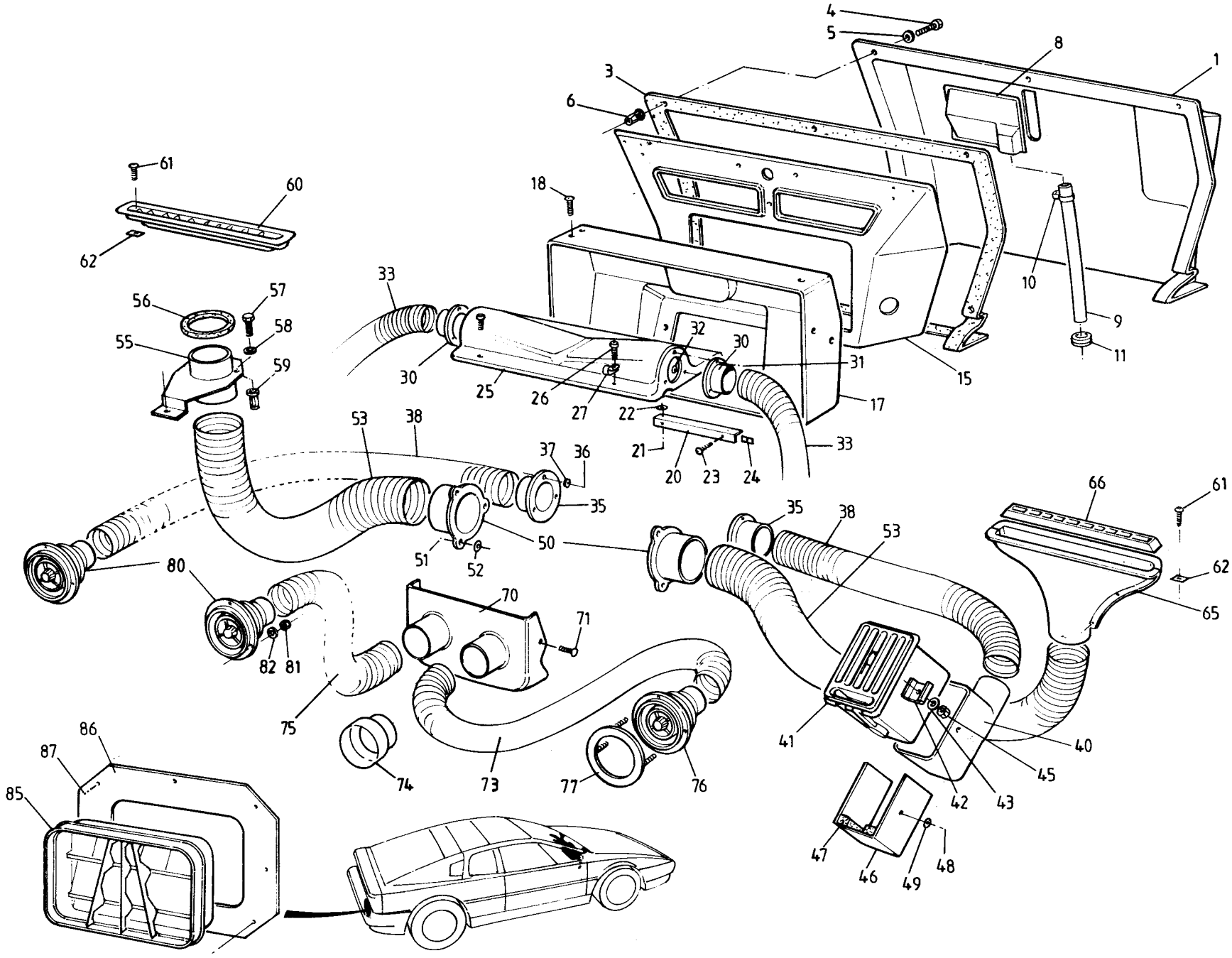
CONTENTS : Vacuum Pipes. Valves, Flaps, **Actauators**, Pump

18.11A

	PART DESCRIPTION	**PART NUMBER**	**QUANTITY** ALL	**REMARKS**
1	Mode Flap, LHD	C079P4014F	1	
	" " RHD	C079P4176F	1	
2	Foam, mode flap	A079P4161K	2	
3	Clip, flap shaft ends	A075W6173F	2	
4	Mounting Plate, actuator bracket	B079P4093F	1	
5	Pop Rivet, plate to case	A075W6090Z	5	
6	Washer, pop rivet	A075W4001Z	5	
7	Bracket, vacuum actuator mounting	B075P0170F	1	
	Pop Rivet, bracket to plate	A075W6071Z	4	
10	Vacuum Actuator, mode flap	B075P6059F	1	
11	Rod, actuator to mode flap	A075P0234F	1	
12	Locking Tab, actuator to rod	AO79P4149K	1	
13	Pop Rivet, locking tab to actuation lever	AO75W6090Z	1	
15	Clip, rod to mode flap lever	A07506033F	1	
16	Lever, mode flap operating	A079P4100F	1	
17	Grub Screw, lever to flap rod	A075W7023Z	1	
18	Pop Rivet, mounting plate lower fixing	A075W6090Z	4	
20	Vacuum Switch, mode/fresh air flaps	A075P6062F	2	
21	Bracket, vacuum switch securing	A075P0172F	2	
22	Screw, No.6 x ¼", bracket to plate	A075W5010Z	4	
25	Elbow Connector	A075P6079F	5	
26	'T'- Piece, vacuum pipes	B075P6081F	1	
27	Vacuum Pipe	A075P6068V	6m	
28	Elbow Connector, unequal bore	A075P6069F	1	
30	Clevis Pin, intake/recirc. flap pivot	A075W6027Z	2	
31	Washer, clevis pin	A075W4001Z	4	
32	Spire Clip, clevis retention	A075W6022Z	2	
35	Flap, fresh air intake/recirculation	A082P4273J	1	
36	Bracket, fresh/recirc. flap support, RH	B082P4276F	1	
37	" " " " " LH	B082P4277F	1	
38	Bush, air flap support bracket	A082P6058F	2	
39	Pop Rivet, bracket to bulkhead	A075W6071Z	4	
40	Washer, bracket to bulkhead	A075W4001Z	4	

FUNCTION CODE	CONTENTS: Vacuum Pipes, Valves, Flaps, Actuators, Pump		QUANTITY		
18.11A	**PART DESCRIPTION**	**PARTNUHBER**	ALL		**REMARKS**
41	Pivot Bracket, fresh air/recirc. flap	A082P4275F	1		
42	Pop Rivet, bracket to flap assembly	A075W6071Z	**6**		
43	Washer, pop rivet	A075W4001Z	**6**		
45	Foam Seal, fresh air/recirc. flap to plenum	B082P4265F	1		
46	" " " " " body	C082P4270F	1		
50	Pivot Bracket, servo to flap	B082P4278F	1		
51	Pop Rivet, waterproof, bracket to flap	A075W6071F	**4**		
52	Washer, pop rivet	A075W4001Z	**4**		
53	Clevis Pin, pivot bracket to servo rod	A075W6027Z	1		
54	Retaining Pin, " " " " "	A082W6348F	1		
55	Vacuum Actuator, fresh air/recirc. flap	B075P6059F	1		
56	Pad, actuator insulation	A082P4341F	1		
57	Spacer, actuator mounting	A082P4279F	1		
58	Clamping Ring, vacuum actuator	C082P4280F	1		
60	Grommet, clamping ring	A082P6057F	**3**		
59	Screw, M3 x 35, clamping ring fixing	A082W5122F	**3**		
61	Washer, flat, M3, " " "	A075W4001F	**6**		
62	Nut, M3 Nyloc, " " "	A079W3060F	**3**		
65	Vacuum Pump, electric	A082M6518F	1		Supplies heater flaps & engine man.
66	Vacuum Pipe, l/8", pump to heater supply pipe	A075P6068V	A/R		
	Connector Sleeve, unequal bore	A075P6080F	**2**		) Prior VIN *
	Clip, self adhesive, vacuum pipe	A075W6043Z	1		Near fuel filler cable) with vac.
	Isolator, upper, vacuum pump (foam)	A082V8594K	1		) pump mounted
	" lower " " "	**A082V8595K**	1		) on wheelarch
	Isolator, upper, vacuum pump (foam)	**B082V8594K**	1		> from VIN * with vacuum pump mounted
	" lower " " "	**B082V8595K**	1		> in engine bay rear box

*** VIN R 1142 (S4 LHD)**
R 1150 (S4 RHD)
R 8030 (Sport 300)
(Revised Harness)



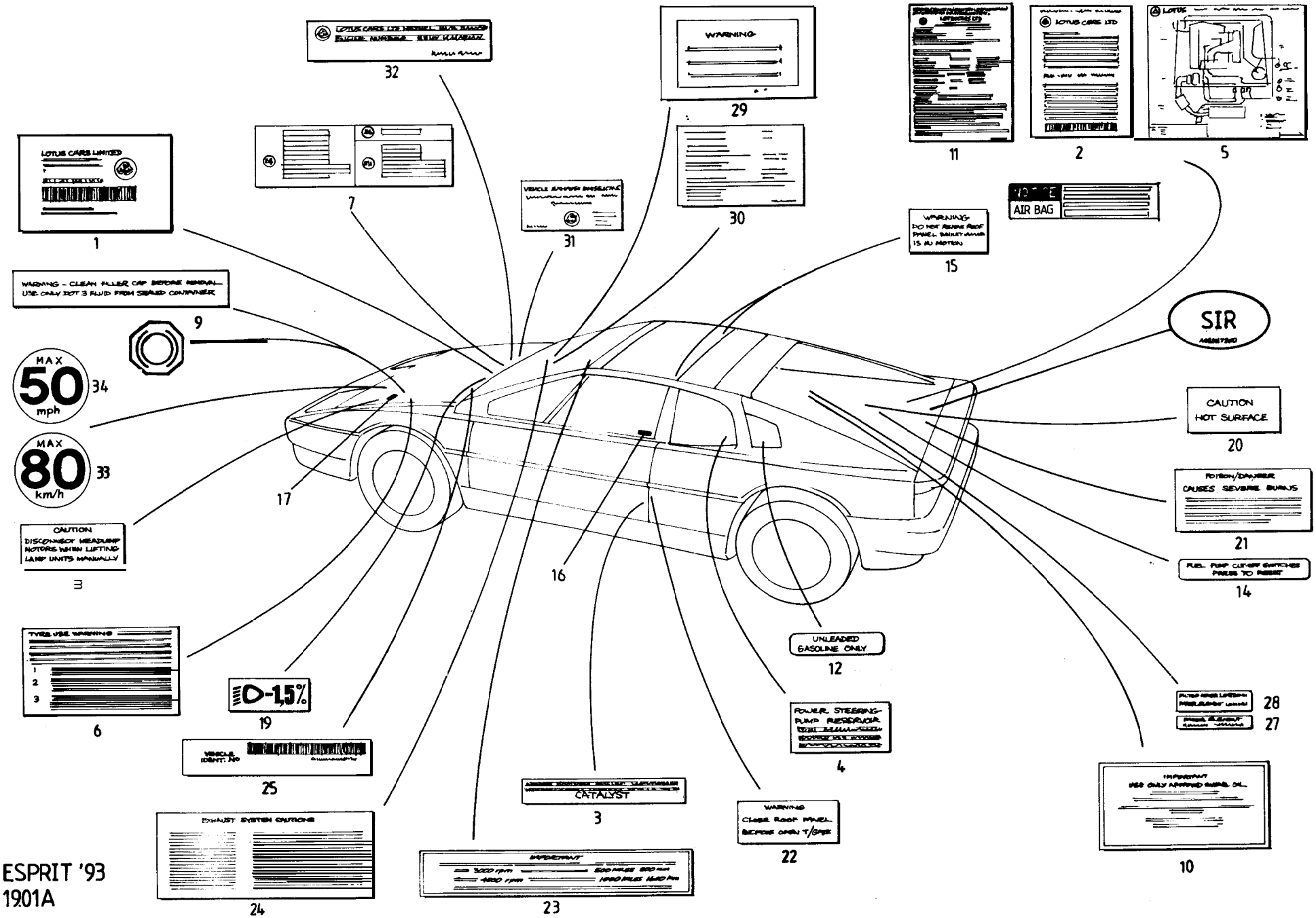
ESPRIT '93
18.13A

FUNCTION CODE	CONTENTS: Intake Plenum, Ducting, Outlets & Vents		QUANTITY		
18.13A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
1	Plenum Cover	B082B4804K	1	1	GRP) inc. item 8
	" "	C082B4804K	1	1	ABS)
3	Seal, plenum cover to bulkhead	A082U6067F	1.8m	1.8~	
4	Screw, M5 x 16, plenum to bulkhead	A082W5107F	7	7	
5	Washer, flat, " " "	A075W4011Z	7	7	
6	Rawlnut, M5, " " "	A075W6074F	7	7	
8	Adaptor, plenum cover to drain hose	A082P4283J	1	1	
9	Tubing, plenum drain	A075U6083V	220m	220m	
10	Snapper Clip, drain tube to plenum cover	A082W6315F	1	1	
11	Grommet, drain tube thro' body	A075P6096Z	1	1	
15	Blanking Panel, bulkhead aperture	A082P4272K	1		
	" " " "	A082P4271K		1	
17	Mounting Panel, interior blower motor	C082P4259K	1	1	
18	Screw, no.8 x ½", mounting panel to casing	A075W5031Z	4	4	
20	Angle Bracket, blower mounting panel to body	A082P4346F	1	1	
21	Pop Rivet, angle bracket to mounting panel	A075W6090Z	2	2	
22	Washer, pop rivet, " " " "	A075W4001Z	2	2	
23	Screw, no.6 x ½", angle bracket to body	A075W5020F	2	2	
24	Spire Nut, no.6, " " " "	A075W6014Z	2	2	
25	Adaptor Cover, footwell outlet	A079P4117K	1	1	
26	Screw, no.8 x 3/4", adaptor cover to casing	A075W5032Z	4	4	
27	'P' Clip, speaker cable	A075W6223F	2	2	
30	Adaptor, footwell duct to casing outlet	A075P0150F	2	2	
31	Pop Rivet, footwell duct adaptor fixing	A075W6090Z	6	6	
32	Washer, pop rivet, " " "	A075W4001Z	6	6	
33	Ducting, 1½", footwell vents	A075P6066V	1m	1m	
35	Adaptor, outer face level vent ducting	AO79P4120K	2	2	
36	Pop Rivet, adaptor to casing	A075W6090Z	6	6	
37	Washer, pop rivet, adaptor to casing	A075W4001Z	6	6	
38	Ducting, 2",, pass. side outer face level vent	A079P4005V	0.8m	0.8m	
40	Adaptor, rectangular face level vent	B082P4366F	1	1	Except Dual SIR
	" " " " "	B082P4366F		2	Dual SIR
41	Face Level Vent, rectangular, passenger side	A082P4356K	1	1	Except Dual SIR
	" " " " " "	A082P4356K		2	Dual SIR
42	Clip, rectangular vent fixing	A082U7559K	2	2/4	

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Intake Plenum, Ducting, Outlets & Vents		QUANTITY		
18.13A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
43	Washer, flat, vent to fascia	A075W4001F	2	2/4	
	Washer, s/proof, vent to fascia	A075W4086F	2	2/4	
45	Nut, M4, vent to fascia	A075W3019F	2	2/4	
46	Strap, vent smoothing	A082P4375K	1	l/2	
47	Foam Seal , smoothing strap	A082U6065V	A/R	A/R	
48	Pop Rivet, strap to vent	A075W6091F	2	2/4	
49	Washer, pop rivet	A075W4001F	2	2/4	
50	Adaptor, screen vent ducting to casing	A079P4119K	2	2	
51	Pop Rivet, screen vent adaptor to casing	A075W6090Z	6	6	
52	Washer, pop rivet, " " " "	A075W4001Z	6	6	
53	Ducting, 2¼", screen vents	A079P6007V	lm	lm	
55	Adaptor, ducting to binnacle screen duct	C082P4338F	1	1	
56	Gasket, demist adaptor	A082P4339F	1	1	
57	Setscrew, M6 x 16, thin, demist adaptor/body	A075W1082Z	1	1	
58	Washer, flat, demist adaptor to body	A075W4013Z	1	1	
59	Nut, Nyloc, M6, " " " "	A075W3009Z	1	1	
60	Outlet Vent, binnacle screen vent	A082P6049F	1	1	
61	Screw, no.6 x ½", outlet vent to duct	A075W5015Z	4	4	
62	Spire Nut, No.6, " " " "	A075W6014Z	4	4	
65	Duct, passenger screen vent	A079P4026K	1	1	
66	Outlet Vent, passenger side demist	B079P4039F	1	1	
70	Adaptor, centre face level vent ducting to case	A085P4213K	1	1	
71	Screw, no.8 x ½", adaptor to casing	A075W5034Z	4	4	
72	Outlet Adaptor, small, face level vent	AO82P4345K	1	1	
73	Ducting, flexible, 1.5" , " "	A075P6066V	0.8m	0.8m	Except Dual SIR
	" " 2.0" " " "	A079P4005V		0.5m	)Dual SIR
74	Reducer, round, inboard pass. vent to ducting	A082P4367F		1	)
75	Ducting, 1½", inboard binnacle vent	A075P6066V	lm	lm	
76	Face Level Vent, round, passenger inboard	A085P6037F	1	1	)
77	Retaining Ring, passenger inboard vent	A085P4217F	1	1	) Except Dual SIR
	Nut, M3 Nyloc, centre face level vent to fascia	A079W3060F	3	3	)
	Washer, flat, " " " " " "	A075W4000Z	3	3	)
80	Face Level Vent, round, binnacle	A085P6037F	2	2	
81	Nut, M3 Nyloc, centre face level vent to fascia	A079W3060F	6	6	
82	Washer, flat, " " " " " "	A075W4000Z	6	6	

FUNCTION CODE	CONTENTS : Intake Plenum,Ducting, Outlets & Vents		QUANTITY		
18.13A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
85	Ventilator, rear luggage compartment	A082P4354F	1	1	(Behind bumper)
86	Plinth, ventilator mounting	A082P4355F	3	1	
87	Pop Rivet, mounting plinth to body	A076W6099F	8	8	



ESPRIT '93
1901A

FUNCTION CODE	CONTENTS: Labels		QUANTITY		
19.01A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Label, VIN & weights	**A082U6276K***	1		
2	" emission control information	A082U7533F	1		93 M.Y.
	" " " "	C082U7533F	1		94 M.Y.
	" " " "	D082U7533F	1		95 M.Y.
	" " " "	CO82U7576F	1		weden
3	" catalyst	D082U7303F	1		93 M.Y.
	" "	E082U7303F	1		94 M.Y.
	" "	F082U7303F	1		95 M.Y.
4	" power steering fluid	A100U0395F	1		
5	" vacuum hose routing	B082U7185F	1		
6	" spare wheel use	A082U7636F	1		
	" tyre loading	A082U7639F	1		ith Bendix brakes
	" " '	B082U7639F	1		" Brembo "
	" " "	C082U7614F	1		ustralia only
7	" 'E' mark	C082U7576F	1		
	" " "	P691.19O1.001AF	1		Sport 300
	" super unleaded fuel	P691.1901.002AF	2		
	" brake fluid warning (Non mineral type)	A082U7623F	1		n relay cover near fluid reservoir
9	" DOT 4 brake fluid	B075U1081F	1		f fitted
10	" Castro1 RS oil recommendation	A910E2622F	1		n engine bay relay box lid
11	" emission control	C082U7241F	1		weden
12	" unleaded fuel (English)	A075U1008F	2		
	" " " (French)	A082U7413F	2		
	" " " (Swedish)	A085U5095F	2		
	" " " (German)	A085U5096F	2		
	" " " (Dutch)	A085U5098F	2		
	" " " (Spanish)	A085U5097F	2		
	" " " (Italian)	A082U7386F	2		
13	" headlamp motor caution	A082U4698F	2		
14	" fuel cut-off switch	A082U7225F	1		
15	" roof warning (on bulkhead glass)	A082U5063F	2		
16	" alarm warning (window)	A082M4993F	2		

Note: Form LSL 317 must be completed when ordering VIN or engine number labels.

Esprit range: '93 M.Y. onwards

FUNCTIC CODE	CONTENTS: Labels		QUANTITY		
19.01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
17	Label, ABS warning (on ABS mtg.bracket)	A082J4292F	1		
19	" headlamp leveling	B082U7039F	1		
20	" hot surface caution (on engine cover)	A082U7455F	1		
21	" battery caution	A075M6143F	1		
22	" tailgate release handle	A082U4976F	1		
23	" running in (on windscreen)	A075B0958Z	1		
24	" exhaust system cautions	C075U1139F	1		
25	" VIN (windscreen)	B079U4666K*	1		
	Plate, VIN Label mounting	C082U7393F	1		
	Pop Rivet, mounting plate to body	A075W6071Z	2		
	Transpaseal, label to plate	A082U7427K	1		
27	Label air box element	A089U1763F	1		
28	" " " cover	B082U7224F	1		
29	" CFC warning	A082U6274K	1		
30	" fuel economy information (in glove box)	A082U7637K	1		
	" " " " " " "	A082U7638K	1		port 300
	" " " " " " "	B082U7638K	1		port 300 and S4S
31	" ECE 83 emission	A100U0511F	1		
32	" engine number	A082U7394J*	1		
33	" spare wheel warning, 80 kmh	A100U0892F	1		
34	" " " " 50 mph	A100U0406F	1		
35	" Air Bag Warning	A082U7700F	1		IR, Centre console lid
36	" SIR	A082U7350	1		IR, Battery cover

Note: Form LSL 317 must be completed when ordering VIN or engine number labels.

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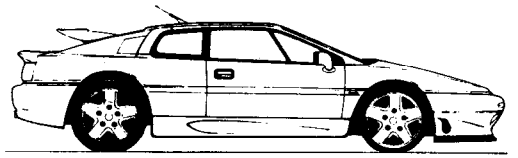
ESPRIT SA



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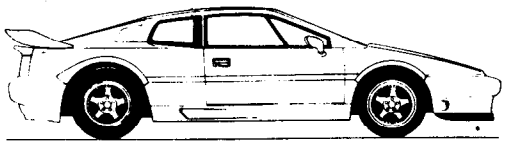
300 Sport



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ESPRIT
r a n g e
1993 Model Year Onwards

SERVICE NOTES

LOTUS CARS LTD

Hethel, Norwich, Norfolk, England, NR14 8EZ.
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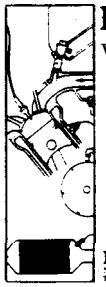
SERVICE NOTES
Section EMH

To be read in conjunction with Service Notes manual 9SE2T03277 Esprit & Esprit Turbo SE M.Y. onwards



Electronic M.P.F.I. with chargecder

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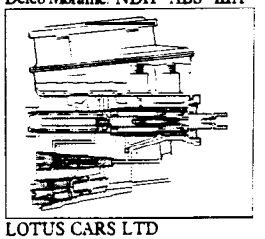
SERVICE NOTES
Section JF Esprit '91 M.Y.

Braking System with Delco Moraine/ NDH ABS IIIA



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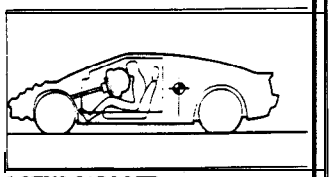
SERVICE NOTES
Section WA Esprit

Supplementary Inflatable Restraint (S.I.R.)



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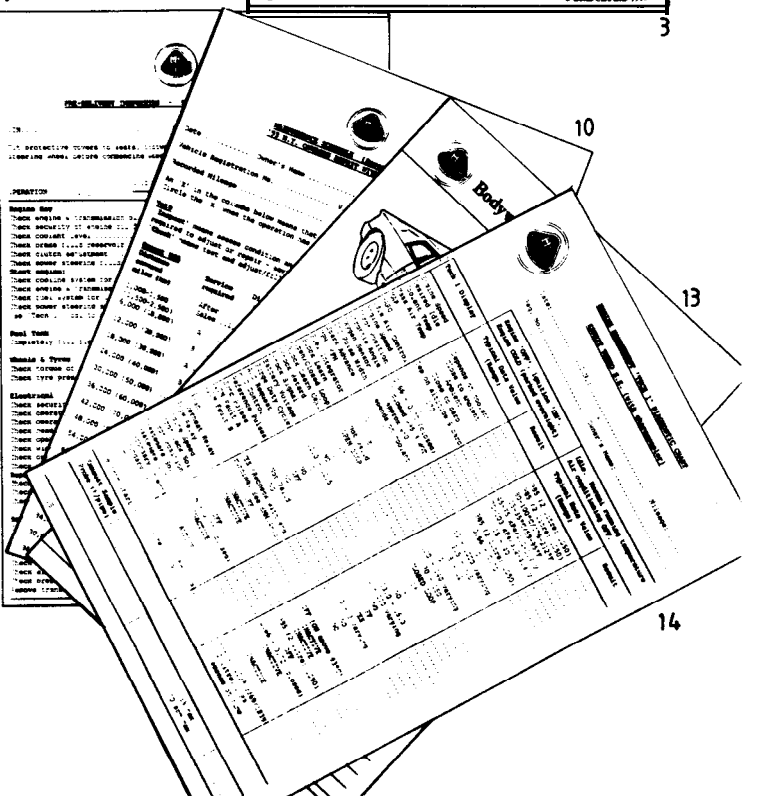

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14

ESPRIT '93
19·03A

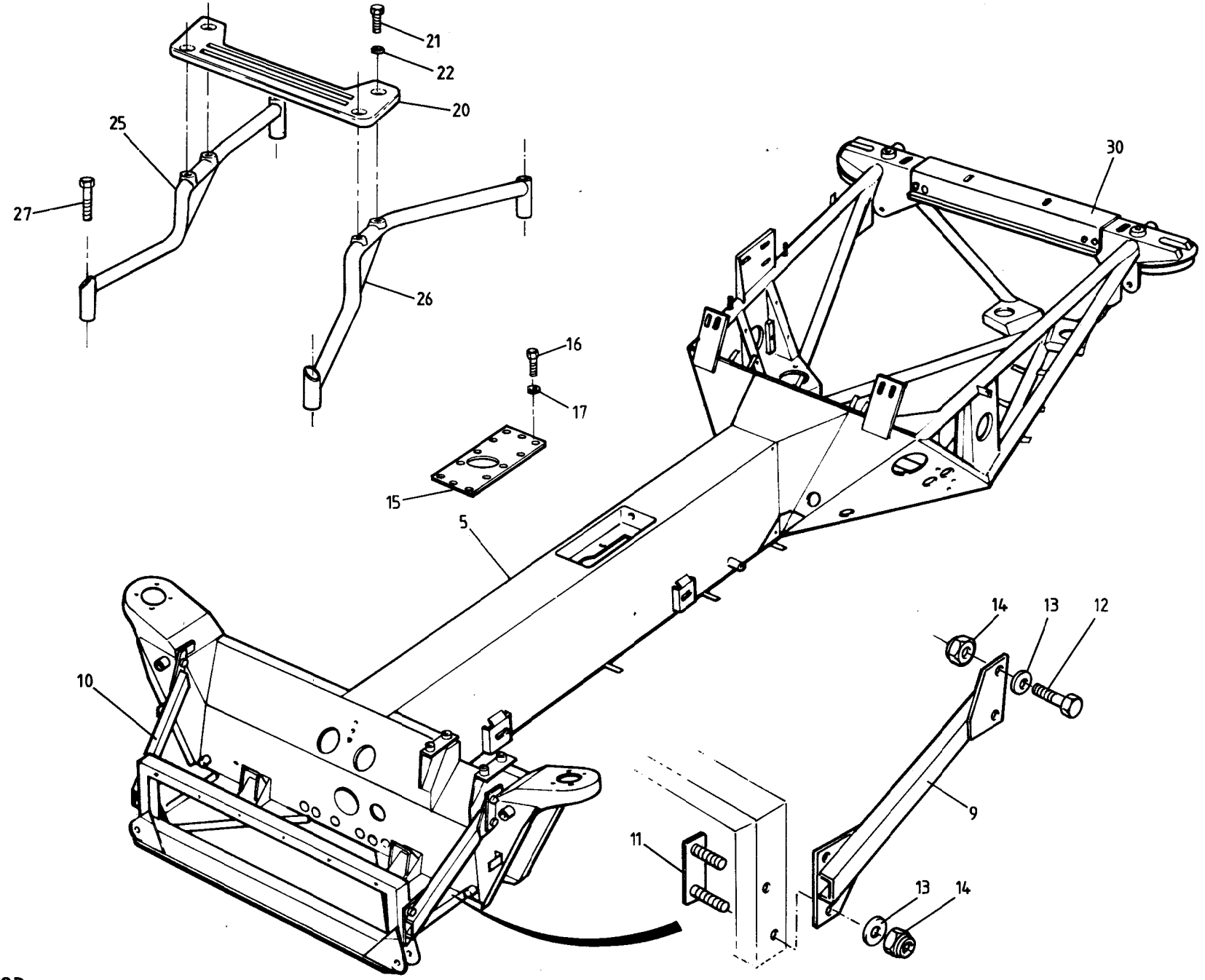
FUNCTION CODE

CONTENTS : Owner's Handbooks & Service Notes Manuals

19.03A	PART DESCRIPTION	PART NUMBER,	QUANTITY NON USA	QUANTITY USA	REMARKS
1	Owner's Handbook	V082T0324J	1		Prior VIN *
	" "	Z082T0324J	1		From VIN * to VIN R 1442
	" "	AA82T0324J	1		From VIN R 1443 (Brembo brakes) - Prior '95 M.Y.
	" "	AB82T0324J	1		'95 M.Y.
	" "	S082T0324J		1	'93 M.Y. 'Phase 1'; VIN P 0186, P 0190 to 0244
	" "	W082T0324J#		1	'93 M.Y. 'Phase 2'; VIN P 0245 to 0306
	" "	X082T0324J#		1	'94 M.Y. S4.) Driver only S.I.R.) Prior VIN R 1242
	" "	Y082T0324J#		1	'94 M.Y. S4.) Dual S.I.R.)
	" "	Z082T0324J		1	From VIN R 1242 prior '95 M.Y.
	" "	AB82T0324J		1	'95 M.Y.
2	Sport 300 Supplement, Owner's Handbook	LSL 328	1		
3	Service Notes Manual	K082T0327J	1	1	
4	Delco Injection Engine Management Manual (EMH)	D082T0327J	1	1	
5	Braking System with ABS (Section JF)	G082T0327J	1	1	
7	Supplementary Inflatable Restraint (Section WA)	E082T0327J	1	1	Driver only SIR R/B J082T0327J
	" " " (Sec. WA & WC)	J082T0327J	1	1	Driver only & dual SIR
9	Pre-Delivery Inspection Sheet	LSL 273D	1	1	
10	Maintenance Schedule (Except California)	LSL 286	1	1	
	" " (California Only)	LSL 325B		1	'93 & '94 M.Y.
	" " " "	LSL 325C		1	'95 M.Y.
13	Bodywork Defects Sheet	LSL 292	1	1	
14	'Tech 1' Data Sheet	LSL 301B	1	1	
	VIN/Engine Number label request form	LSL 317	1	1	# R/B Z082T0324J plus supplement Z082T0324Z/1

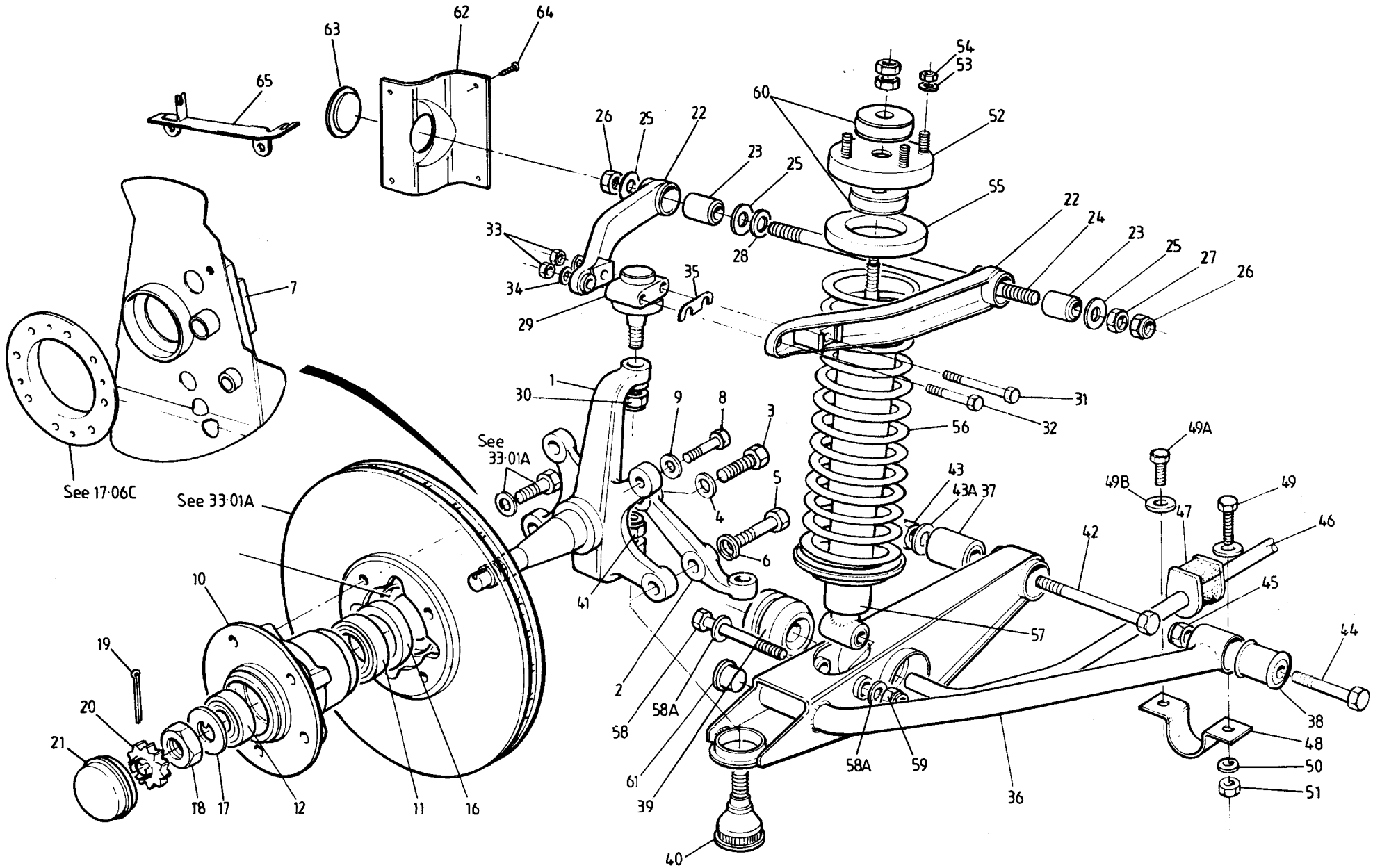
*** VIN R 1242 (S4 LHD)**
R 1250 (S4 RHD)
R 8030 (Sport 300)
(Revised Harness)

Esprit range: '93 M.Y. onwards



ESPRIT '93
30·01A

FUNCTION CODE	CONTENTS : Chassis, Engine Bay Stiffener		QUANTITY				
30.01A	PART DESCRIPTION	PART NUHBER	s4	USA S4S	JON USA S4S	SPORTI 300	REMARKS
	Chassis, RHD	B082A4332F	1				R/B C082A4332F
	" " (with boss for pass. SIR strut)	C082A4332F	1				Prior VIN * R/B D082A4332F
	" " (with holes for park cable)	D082A4332F	1				From VIN * to VIN #
	" "	A082A4368J	1				From VIN #
	" "	A082A4368J			1		
	" "	P691.3001.802AF				1	
5	" LHD	B082A4331F	1				Not Dual SIR R/B C082A4331F
	" " (with boss for pass. SIR strut)	C082A4331F	1				Dual SIR. Prior VIN * R/B D082A4331F
	" " (with holes for park cable)	D082A4331F	1				From VIN * to VIN #
	" "	A082A4369J	1				From VIN #
	" "	A082A4369J			1		
	" "	P691.3001.801AF				1	
9	Bracing Strut, chassis front frame, LH	A082A4315F	1	1	1	1	
10	" " " " " RH	A082A4316F	1	1	1	1	
11	Studplate, strut to front frame	A082A4311F	2	2	2	2	
12	Setscrew, M10 x 25, strut to crossmember	A075W1048Z	4	4	4	4	
13	Flat Washer, M10 x 24, bracing strut fixing	A075W4023F	8	8	8	8	
14	Nyioc Nut. M10, " " "	A075W3011Z	8	8	8	8	
15	Reinforcing Plate, gearchange recess	P525.4705.017AF	1	1	1	1	)
16	Bolt, M8 x 16. plate to chassis	A075W1026Z	1:2	1	12	12	) **S4** and USA S4S from VIN #
17	Flat Washer, " " "	A075W4020Z	1:2	1.	12	12	)
	Cage Nut, M6, gearchange to chassis	A082W6506F	4	4	4	4	
20	Crossbeam, engine bay stiffener	P691.3011.013AR				1	
21	Bolt, Ml2 x 45, crossbeam to bracing tubes	A075W1061F				4	* **VINR1443 (Non USA)**
22	Spring Washer, " " " "	WS120011F				4	**+R 1337**
25	Bracing Tube. crossbeam to chassis, RH	P691.3011.802CF				1	**s 1391 (USA)**
26	" " " " " LH	P691.3011.801CF				1	**(Brenibo Brakes)**
27	Setscrew. Ml2 x 35, bracing tubes to chassis	A075W1059Z				4	
30	Rear Crossmember	A082A4244F	1	1	1	1	# **VIN S 2031 (S4)**
	Bolt, M10 x 75, crossmember to chassis	A075W2059Z	4	4	4	4	**s 3044 (USA)**
	Washer, M10 x 15, " " "	A075W4024Z	8	8	8	8	
	Nut, Nyloc, M10, " " "	A075W3011Z	4	4	4	4	



ESPRIT '93
31.01A

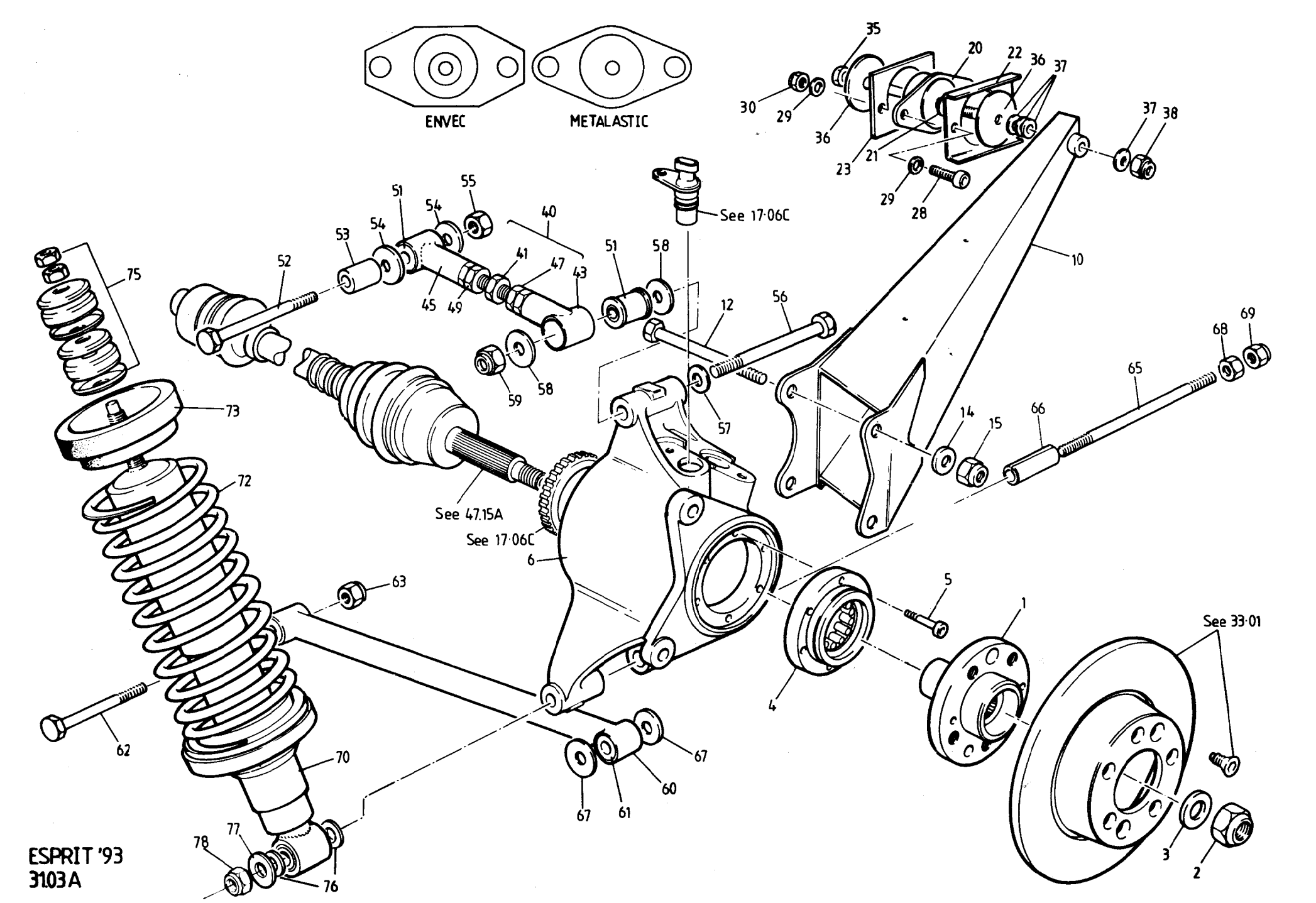
FUNCTION CODE

CONTENTS : Front Suspension & Hubs

31.01A	PART DESCRIPTION	PART NUMBER.	QUANTITY S4/S4S	QUANTITY SPORT 300	REMARKS
1	Vertical Link, RH	A082C4134F	1	1	Green colour code
	" " LH	A082C4135F	1	1	Red colour code
2	Steering Arm, RH	A082C4212F	1	1	
	" " LH	A082C4211F	1	1	* VIN R 1443 **(Non-USA) + R 1377**
3	Setscrew, Ml2 x 35, steering arm to link	A075W1059Z	2	2	**s 1391 (USA)**
4	Washer, spring, " " " "	A075W4069F	2	2	(Brembo Brakes)
5	Bolt, Ml2 x 45, " " " "	A075W1061Z	2	2	
6	Washer, spring, M12, """"	A075W4069F	2	2	
7	Shield, Brake Disc, RH	A082C4190F	1		
	" " " "	P525.3301.806AF		1	
	" " " LH	A082C4189F	1		
	" " " "	P525.3301.805AF		1	
8	Setscrew, disc shield to vertical link	A075W1039F	2	2	
9	Washer, flat, " " " "	A075W4021F	2	2	
10	Hub, front (58mm wheel spigot)	A082C4233F	2		Prior VIN *
	" "	A082C4239K	2		From VIN *
	" "	A082C4233F		2	
11	Bearing, inboard, front hub	A089C8004F	2	2	
12	" outboard, " "	A089C8005F	2	2	
16	Grease Seal, front hub	A089C8003F	2	2	Alternative to A089D8003F
17	Washer, claw, bearing retaining	A089C8006F	2	2	
I8	Nut, castellated, " "	A089C8007F	2	2	
19	Split Pin, hub nut retaining	A075W6222F	2	2	
20	Locking Cap, hub nut	A089C8009F	2	2	
21	Grease Cap, front hub	A089C8008F	2	2	
22	Arm, upper wishbone, front	A082C4216F	2	2	
	" " " rear	A082C4217F	2	2	
	Washer Plate, camber adjust, 10.5mm	A100C0109F	)	)	
	" " " " 11.5mm	A100C0125F	) 4	) 4	
	" " " " 12.5mm	A100COllOF	)	)	
	" " " " 14.0mm	A100CO111F	)	)	
23	Pivot Bush, upper wishbone	X036C6004F	4	4	
24	Stud, ½" UNF x 282, upper wishbone pivot	A082C4223F	2	2	
25	Buffer Washer, pivot bush	A075C0149D	8	8	

FUNCTION CODE	CONTENTS : Front Suspension & Hubs		QUANTITY		
31.01A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
26	Nut, ½" UNF Nyloc, wishbone pivot stud	A075W3005F	4	4	
27	Locknut, ½" UNF, wishbone pivot stud	A075W3017F	2	2	
28	Shim Washer, castor adjust, 1.5mm	A082C4091F	A/R	A/R	
	" " " " 3.0mm	A082C4092F	A/R	A/R	
	" " " " 6.0mm	A082C4093F	A/R	A/R	
29	Ball Joint, upper	A036C6007F	2	2	
30	Nut, Torqloc, 7/16" UNF, ball joint to link	A075W3004F	2	2	
31	Bolt, M8 x 122, ball joint to wishbone, inboard	A075W2050Z	2	2	
32	" M8 x 85, " " " " outboard	A082W2121F	2	2	
33	Nut, M8 Nyloc, " " " "	A075W3010F	4	4	
34	Washer, flat, " " " "	A079W4019F	4	4	
35	Shimplate, castor adjust, 1.5mm	B082C4090F	8	8	) Slotted plate replaces plate
	" " " 3.0mm	B082C4089F	4	4	) with holes
36	Lower Wishbone, LH	B082C4221F	1		
	" " "	P691.3101.007AF		1	
	" " RH	B082C4220F	1		
	" " "	P691.3101.006AF		1	
37	Pivot Bush, lower, wishbone, rear	A075C6000F	2	2	
38	" " " " front	A082D4084F	2	2	
39	Bush, anti-roll bar to lower wishbone	A082C6040F	2	2	
	Circlip, internal, a/r bush to lower link	A082C6039F	4	4	
40	Ball Joint, lower	A089C6089F	1	1	
41	Nut, Ml4 Nyloc, lower ball joint to vert. link	A075W3069Z	2	2	
42	Pivot Bolt, ½" UNF x 5 3/4"	A082A6048F	2	2	Lower link rear to chassis
43	Nut, ½" UNF Nyloc, lower link pivot bolt	A075W3005F	2	2	
43A	Washer, flat, " " " "	A075W4007Z	2	2	
44	Pivot Bolt, ½" UNF x 2 3/4"	A075W2097F	2	2	Lower link front to chassis
45	Nut, ½" UNF Nyloc, lower link pivot bolt	A075W3005F	2	2	
46	Anti-Roll Bar, front	D082C4222F	1	1	
47	Split Bush, anti-roll bar to chassis	A082C4232F	2	2	
48	Clamp, " " " " "	A082C4047F	2	2	
	Spacer, 6mm, rad. brace to a/r bar clamp	A082C4093F	2	2	

FUNCTION CODE	CONTENTS : Front Suspension & Hubs		QUANTITY		
31.01A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
49	Setscrew, Ml2 x 50, ARB/rad. brace to chassis	A100W2116F	2	2	
49A	Setscrew, Ml2 x 35, ARB to chassis (rear)	A079W1059F	2	2	
49B	Washer, flat, " " "	AO75W4028Z	4	4	
50	Spacer, " " "	A082C4093F	2	2	
51	Nut, Ml2 Nyloc, " " "	A075W3012Z	4	4	
52	Abutment Plate, spring/damper top	B082C4075F	2	2	
53	Washer, abutment plate to chassis	A075W4020F	8	8	
54	Nut, M8, " " " "	A075W3010F	8	3	
55	Insulator, front spring top	A082C4069F	2	2	
56	Road Spring, conical, Yel/blue/green colour code	A082C4238F	2		Prior '95 M.Y.)
	" " " Blue/blue/white " "	A082C4242F	2		'95 M.Y. prior # VIN) S4
	" " " Red/blue/white " "	A082C4241F	2		From # VIN)
	" " " Red/blue/white " "	A082C4241F	2		S4S
	" " " White colour code	P525.3101.101AF		2	
57	Damper, front, Yellow/red colour code	A082C4237F	2		Prior VIN #) S4
	" " Part No. stamped on casing	A082C4240F	2		From VIN #)
	" " " " " " "	A082C4240F	2		S4S
	" " Blue colour code	P691.3101.001BF		2	
58	Bolt, ½" UNF x 3½", damper to lower wishbone	A079W2088F	2	2	
58A	Washer, Flat, " " " "	A075W4007Z	2	2	
59	Nut, ½" UNF Nyloc, " " " "	A075W3005F	2	2	
60	Bush Kit, damper top stem	A082C6036F	2	2	
61	Blanking Plug, plastic	A089U6089F	2	2	
62	Cover, wishbone stud access	A079U4352K	2	2	
63	Grommet, " "	A082B6057F	2	2	
64	Screw, No.6 x 3/8", cover fixing	A075W5011Z	8	8	
65	Bracket, ABS cable support/brake hose abutm. RH	B082J4240F	1		Prior VIN *
	" " " " to vertical link "	A082J4378F	1		From VIN *
	" " " " " " " "	P691.3101.006AF		1	
	" " " " /brake hose abutm. LH	B082J4239F	1		Prior VIN *
	" " " " to vertical link "	A082J4379F	1		From VIN *
	" " " " " " " "	P691.3101.005AF		1	
					* VIN R 1443 (Non USA) + R 1377 s 1391 (USA) **(Brembo Brakes)**
					# VIN S 2031 (S4) s 3044 (USA) Esprit range: '93 M.Y. onwards


ENVEC
METALASTIC
See 17·06C
See 47.15A
See 17·06C
See 33·01
ESPRIT '93
31.03A

FUNCTION CODE	CONTENTS : Rear Suspension & Hubs		QUANTITY		
31.03A	PART DESCRIPTION	PART NUMBER	S4/ S4S	PORT 300	REMARKS
1	Rear Hub	B082D6019F	2	2	
2	Nut, hub/driveshaft retaining	A082D6026F	2	2	
3	Washer, flat, " "	A082D6025F	2	2	
4	Double Ball Bearing, rear hub	A082D6020F	2	2	
5	Bolt, cap head, bearing to hub carrier	A082D4106F	12	12	
6	Hub Carrier, RH	B082D4142K	1		rior VIN * R/B C082D4142K
	" " "	C082D4142K	1		rom VIN * (with hole for park cable)
	" " "	P625.3103.002AK		1	
	" " LH	B082D4141K	1		rior VIN * R/B C082D4141K
	" " "	C082D4141K	1		rom VIN * (with hole for park cable)
	" " "	P625.3103.001AK		1	
10	Radius Arm, RH	B082D4110J	1	1	rior VIN * R/B C082D4110J
	" " "	C082D4110J	1	1	rom VIN * (with lugs for park cable)
	" " LH	B082D4111J	1	1	rior VIN * R/B C082D4111J
	" " "	C082D4111J	1	1	rom VIN * (with lugs for park cable)
12	Bolt, M10 x 130, radius arm to hub carrier	A075W2065F	4		
	" M10, caphead, 'radius arm to hub carrier/ caliper block	SC101501F		4	
14	Washer, M10 x 20, " " " " "	A075W4024Z	4		
15	Nut, M10 Nyloc, " " " " "	A075W3011Z	4		
20	Mounting Rubber, radius arm to chassis	A046D6000F	2		rior '95 M.Y.
	" " " " " "	P525.3103.600AF	2		range colour code, '95 M.Y. onwards
	" " " " " "	P691.3103.005AF		2	ed colour code. Envec or Metalastic R/B P525.3103.600AF
	" " " " " "	P525.3103.600AF		2	range colour code
21	Spacer Washer, rad. arm mtg./outboard snub wash.	P691.3103.006AF		2	se only with Envec mountings
22	Reinforcing Plate, " " " "	C079D4013F	2	2	
23	Spacer Plate, toe-in adjust, 0.9mm	C079D4051F	A/R	A/R	
	" " " " " 1.5mm	A079D4051K	A/R	A/R	
	" " " " " 6.0mm	B079D4051K	A/R	A/R	
26	Setscrew, M8 x 30, mounting rubber to chassis	A075W4040Z	)	)	
	" M8 x 35, " " " "	A075W1041Z	)4	)4	as required
	" M8 x 45, " " " "	A075W2040Z	)	)	
29	Washer, spring, " " " "	A075W4023F	4	4	• **VIN R 1443 (Non-USA) + R 1377 s 1391 (USA)** (Brembo Brakes)
30	Nut, M8 Nyloc, " " " "	A075W3010Z	4	4	

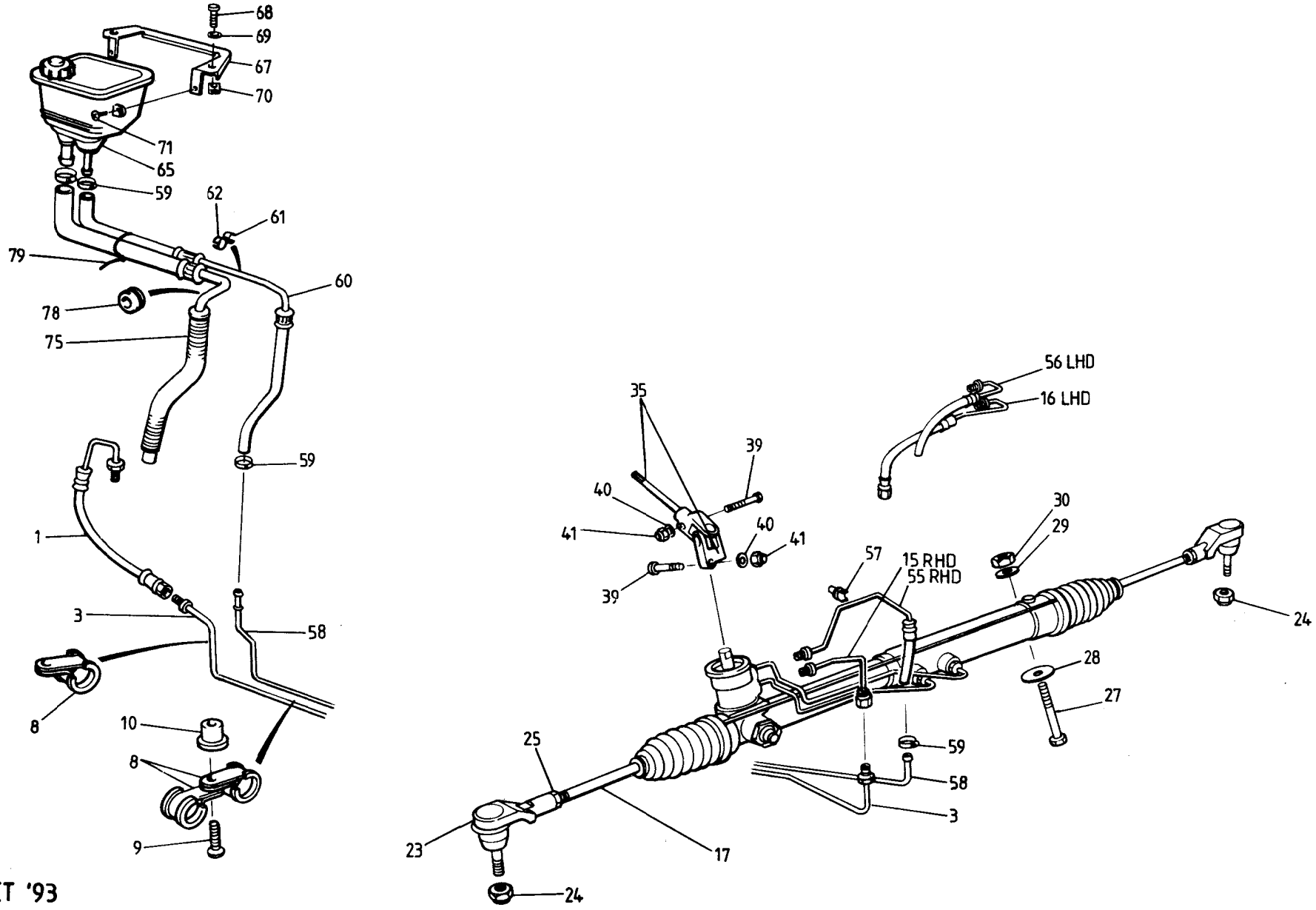
Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Rear Suspension & Hubs		QUANTITY		
31.03A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
35	Bolt, 7/16" UNF x 4½", radius arm to mounting	A075W2087F	2	2	
36	Snubber Washer, 7/16" x 1½", rad. arm mounting	A075W4006Z	4	4	
37	Washer, toe-in adjust	A075W4005Z	10	10	
38	Nut, 7/16" Torqloc, radius arm mounting bolt	A075W3004Z	2	2	
	Top Link (less bushes) fixed length	B082D4118F	2		R/B A082D4166J
40	" " Assy. (less bushes), adjustable length	A082D4166J	2	2	Inc. * items
41	Adjuster Trunnion, upper link	A082D6038F*	2	2	
43	End Piece, upper link, RH thread	A082D4164F*	2	2	
45	" " " " LH "	A082D4165F*	2	2	
47	Locknut, Ml6 x 1.5, RH thread, upper link	A082W3122F*	2	2	
49	" Ml6 x 1.5, LH " " "	A082W3123F*	2	2	
	Top Link Assy. (less bushes), adjustable length	P625.3103.801AJ		2	R/B S4 Assembly A082D4166J
	Adjuster Trunnion, upper link	P625.3103.005AL		2	)
	End Piece, upper link, RH thread	P625.3103.004AF		2	)
	" " " " LH "	P625.3103.003AF		2	) Part of P625.3103.801AJ
	Locknut, Ml6 x 2, RH thread upper link	P625.3103.602AF		2	)
	" M16 x 2, LH " " "	P625.3103.603AF		2	)
51	Bush, top link	A082D4084F	4	4	
52	Bolt, ½" UNF x 4½", top link to chassis	A079W2023F	2	2	
53	Spacer, top link to chassis	A082D4099F	2	2	
54	Snubber Washer, top link inboard bush	A079W4083F	4	4	
55	Nut, ½" UNF Nyloc, top link to chassis	A075W3005Z	2	2	
56	Bolt, ½" UNF x 5½", top link to hub carrier	A079W2091F	2	2	
57	Washer, hardened, " " " " "	A074D6003Z	2	2	
58	Snubber Washer, " " " " "	A079W4083F	4	4	
59	Nut, ½" UNF Nyloc, " " " " "	A075W3005Z	2	2	
60	Lower Link (less bushes)	B082D4083F	2	2	
61	Bush, lower link	A082D4084F	4	4	
62	Bolt, ½" UNF x 2½", lower link to chassis	A075W2097F	2	2	
63	Nut, ½" UNF Nyloc, " " " "	A075W3005Z	2	2	
65	Stud, lower link to hub carrier	B079D4024F	2	2	
66	Split Spacer, hub carrier front lug	B082D4079F	2	2	
67	Snubber Washer, lower link to hub carrier	A079W4083F	4	4	
68	Locknut, ½" UNF, lower link outboard stud	A075W3017Z	2	2	

1995 4.0

FUNCTION CODE	CONTMTS: Rear Suspension & Hubs		QUANTITY		
31.03A	PART DESCRIPTION	PART NUMBER	S4/ S4S	PORT 300	REMARKS
69	Nut, ½" UNF Nyloc, lower link outboard stud	A075W3005Z	2	2	
70	Damper, rear, Green/white colour code	A082D4158F	2		rior VIN #) S4 + USA S4S
	" " Part No. stamped on casing	A082D4168F	2		rom VIN #)
	" " " " " " "	A082D4168F	2		on USA S4S
	" " Orange colour code	P691.3103.001BF		2	
72	Road Spring, rear, Blue/blue/yel colour code	A082D4154F	2		rior VIN # > S4 + USA S4S 42 N/mm
	" " " Green/blue/green colour code	A082D4169F	2		rom VIN # > 45 N/mm
	" " " " " " " "	A082D4169F	2		on USA S4S
	" " " Orange colour code	P625.3103.085AF		2	49 N/mm
73	Insulator, road spring to chassis	A079D4028F	2		rior VIN #) S4 + USA S4S
	" " rear spring seat	P625.3103.009AF	2		rom VIN #)
	" "	P625.3103.009AF	2	2	on USA S4S
75	Bush Kit, damper top stem (M10)	A082C6036F	2	2	
76	Spacer Washer, damper lower fixing	A075W4028Z	4	4	
77	Washer, flat, " " "	A075W4008Z	2	2	
78	Nut, ½" UNF Nyloc, damper to hub carrier	A075W3005Z	2	2	
	Grommet, RH wheelarch	A082U6073F	1	1	

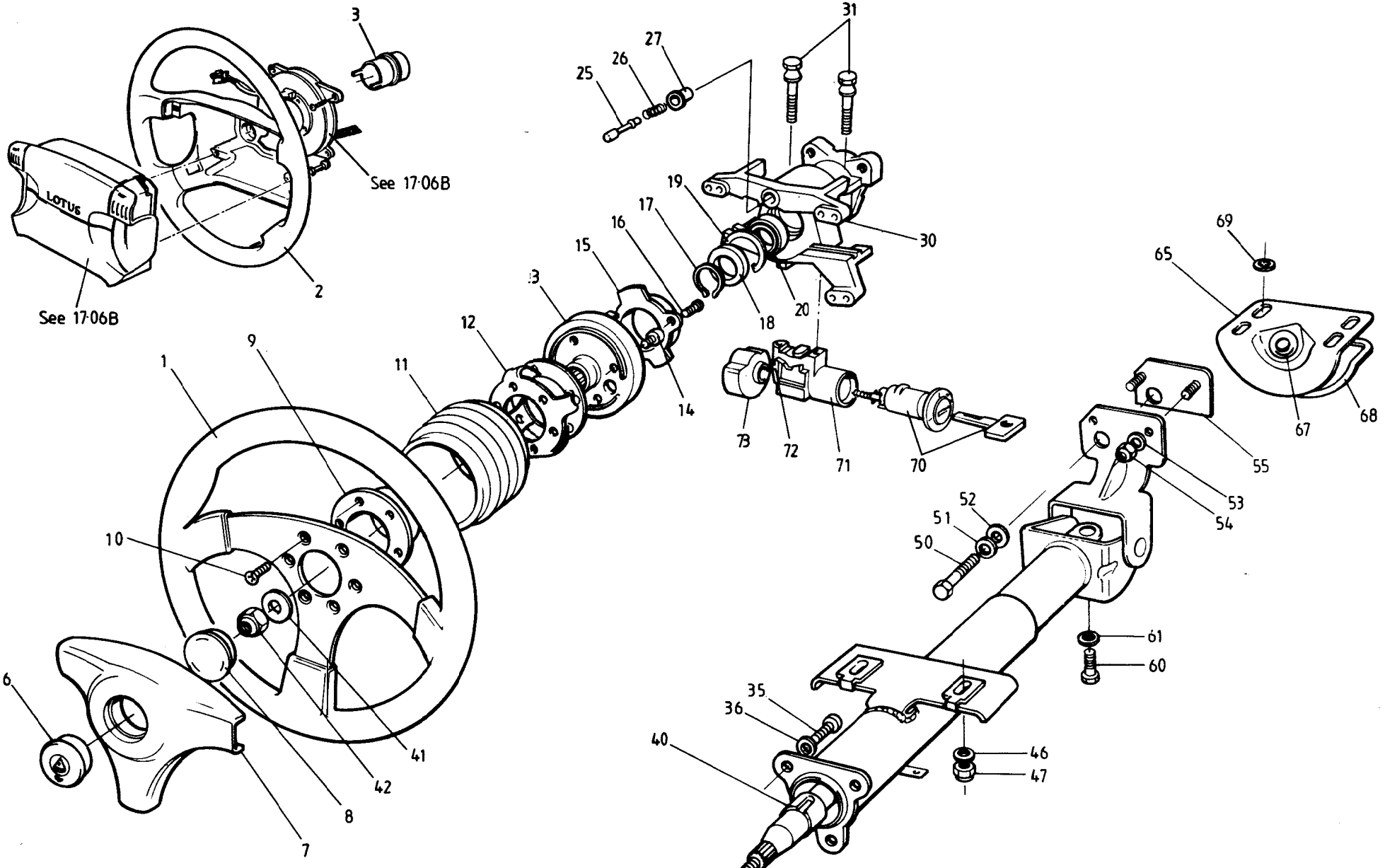
VIN S 2031 (S4)
S 3044 (USA)



ESPRIT '93
32.03A

FUNCTION CODE	CONTENTS: Power Steering Rack, Lower Coiumn		QUANTITY		
32.03A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
1	Pipe, high pressure, pump to chassis pipe	A082H4055F	1	1	
3	Pipe, high pressure, chassis underside	A082H4056F	1	1	
8	'P' Clip, chassis pipe to chassis	A075Q6013Z	17	17	
9	Screw, M5 x 20, 'P' clip fixing	A075W5084F	10	10	
10	Rawlnut, M5, " " "	A075W6074F	10	10	
15	Pipe, high pressure, chassis pipe to rack assy.	A082H4061F	1		
16	Pipe, high pressure, chassis pipe to rack assy.	A082H4059F		1	
17	Power Assisted Rack & Pinion Assembly	A082H6044F	1		) > s4
	" " " " " "	A082H6043F		1	) inc. track rod ends >
	" " " " " "	P691.3203.002AK	1		) }
	" " " " " "	P691.3203.001AK		1	) } Sport 300
	Rackstop	P691.3203.003AF	2	2	}
	Clamp, PAS rack gaiters, large	P691.3203.601AF	2	2	
	" " " " small1	P691.3203.602AF	2	2	
	Gaiter, track rod to rack housing	P691.3203.603AF	2	2	
	Overhaul Kit, PAS rack & pinion assembly	P691.3203.604AJ	1	1	
23	Track Rod End	A082H6063S	2	2	
24	Nut, M12, track rod end to steering arm	A082H4036F	2	2	
25	Locknut, track rod end to track rod	A082H6064S	2	2	
26	Collar, rack assembly mounting to chassis	A082H4052F	4	4	
27	Bolt, Ml2 x 85, rack assembly to chassis	A082W2119F	2	2	
28	Washer, Ml2 flat, " " " "	A075W4071F	4	4	
30	Nut, Ml2 Nyloc, " " " "	A075W3012Z	2	2	
35	Intermediate Column & Universal Joint Assy.	B082H4048F	1		
	" " " " " "	B082H4049F		1	
39	Pinch Bolt, M8 x 40, universal joint	A075W2039D	2	2	
40	Washer, flat, u/j pinch bolt	A075W4020Z	2	2	
41	Nut, M8 Nyloc, u/j pinch bolt	A907E6284F	2	2	
55	Pipe, low pressure, rack assy to chassis pipe	B082H4062F	1		
56	" " " " " " " "	A082H4060F		1	
57	Clip, low pressure pipe to chassis front box	A910E6592F	1		
58	Pipe, reservoir hoses above LH tank	A082H4057F	1	1	

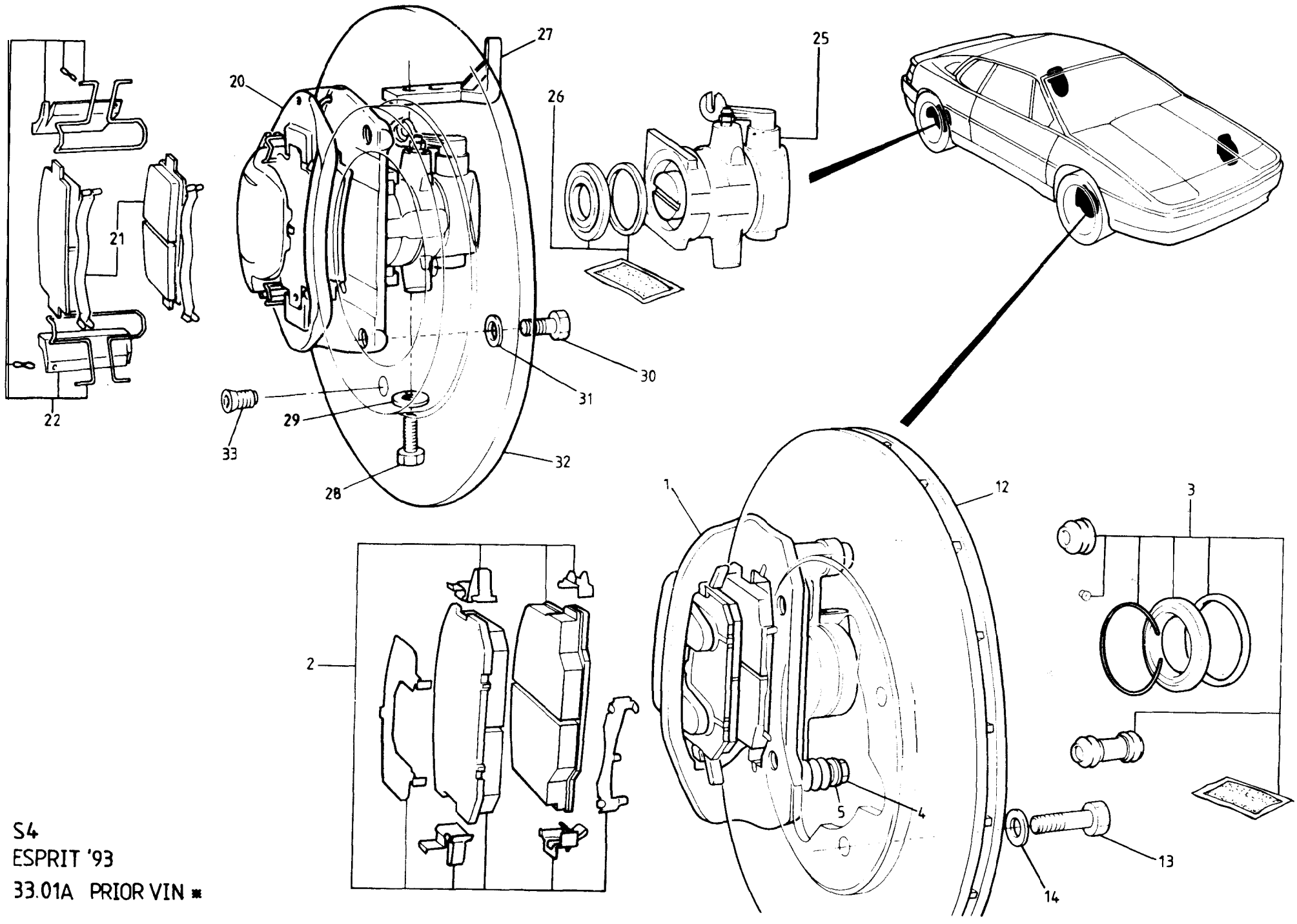
FUNCTION CODE	CONTENTS : Power Steering Rack, Lower Column		QUANTITY		
32.03A	**PART DESCRIPTION**	**PARTNUMBER**	RHD	LHD	**REMARKS**
59	Hose Clip, 12 - 20 mm, PAS hose fixing	A079M6132F	3	3	
60	Pipe, low pressure, chassis pipe to reservoir	A082H4058F	1	1	
61	Swivel Clip, reservoir feed to return hose	A082W6331F	1	1	) Above LH fuel tank
62	" " " " " " "	A082W6338F	1	1	)
65	Reservoir, PAS fluid	A082H6045F	1	1	
	Fluid, power steering	C100E6088V	lit.	lit.	
67	Bracket, PAS Reservoir mounting	A082H4063F	1	1	
68	Screw, M6 x 40, bracket fixing	A082W7104F	2	2	
69	Washer, M6 x 12, bracket fixing	B100W4127F	2	2	
70	Cage Nut, M6, bracket fixing	A100W6362F	2	2	
71	Screw, No.6 x l/2", reservoir to bracket	A075W5014Z	2	2	
75	Hose, low pressure, reservoir to pump	B082H4054F	1	1	34
	" " " " " "	P691.3203.801AK	1	1	
	'P' Clip, open, low pressure hose to tankboard	A075W6230F	1	1	Sport 300
	Pop Rivet, 'P' clip to tankboard	A075W6068Z	1	1	
78	Grommet, PAS hose thro' sidewall	A082H6061F	1	1	
	Grommet, PAS pipe thro' fuel tank well	X036B6167Z	1	1	
79	Tie wrap, low pressure PAS pipe reservior to pump	A075W6038Z	1	1	



ESPRIT '93
3205A

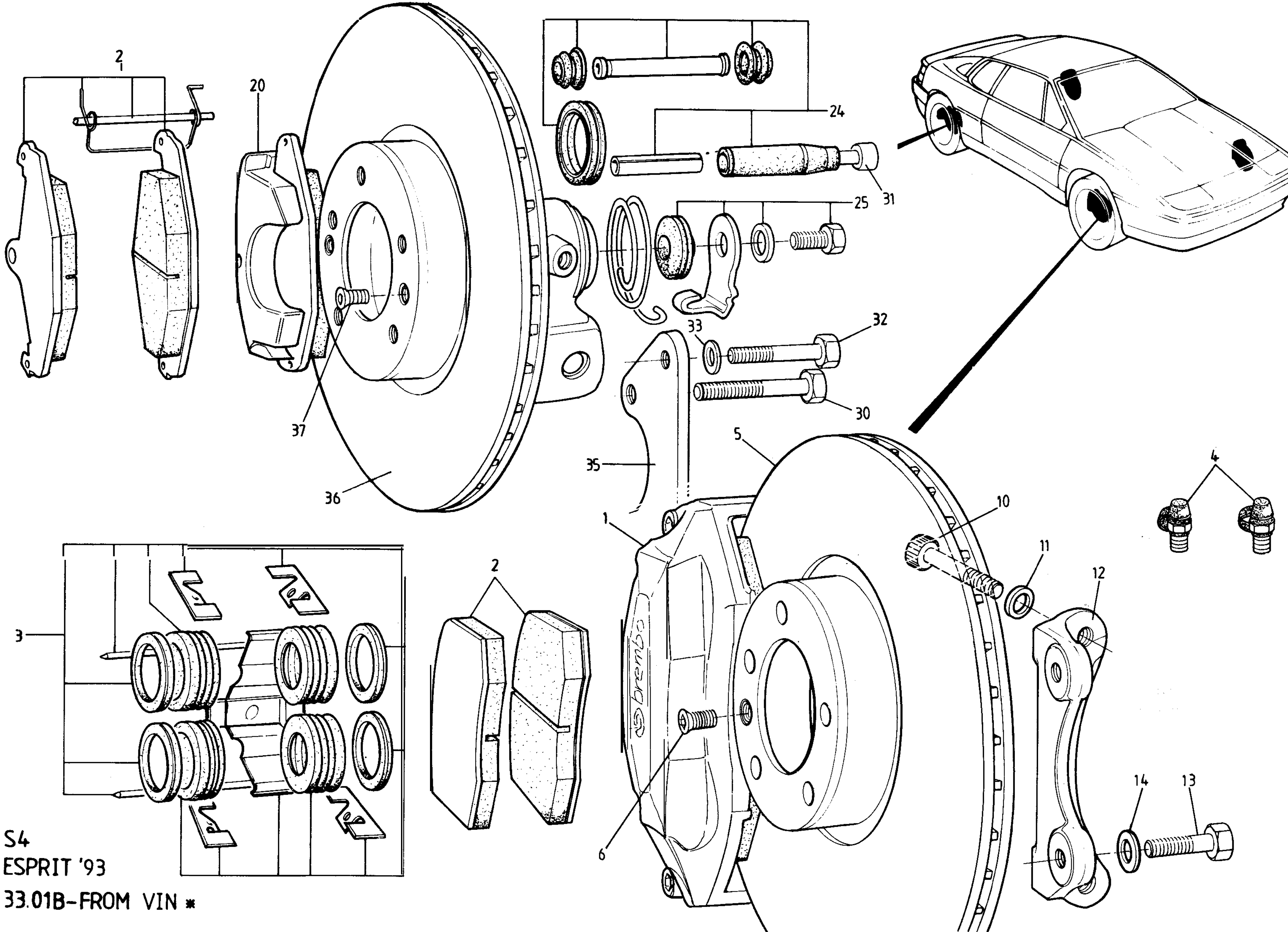
FUNCTION CODE	CONTENTS: Upper Steering Column & Wheel, Steering Lock/Ign. Switch		QUANTITY		
32.05A	PART DESCRIPTION	PART NUMBER	NON S.I.R	S.I.R	REMARKS
1	Steering Wheel Assembly	A082H6047F	1		s4) inc. items marked *
	" " "	P691.3205.001AF	1		Sport 300)
2	Steering Wheel	B082H4033F		1	For S.I.R. inflator module see 17.06B
	Steering Wheel, black leather trimmed	A082H6048H#	1		s4 > inc. crash pad & button
	" " Alcantara trimmed	P691.3205.002AH*	1		Sport 300 >
3	Self Cancelling Bush	B082M4848F	1	1	
6	Horn Button (with logo)	A082H6050H*	1		
7	Crash Pad, steering wheel centre	A082H6049H*	1		
8	Horn Push	A082H6051H*	1		
9	Boss, wheel spider to column	A082H6055H*	1		Alloy
10	Screw, steering wheel to spider	A079H6012H*	6		
11	Rubber Cover, steering wheel spider	A082H6053H*	1		
12	Spider, steering wheel to boss	A082H6054H*	1		Steel
13	Horn Ring	A082H6056H*	1		
14	Screw, horn ring to spider	A082H6058H*	4		
15	Ring, horn push location	A082H6052H*	1		
16	Screw, horn ring to boss	A082H6057H*	2		
17	Circlip, cushion retaining	A082H6036F	1	1	
18	Cushion, rubber	AO82H6035F	1	1	
19	Circlip, bearing retention	A082W6380F	1	1	
20	Bearing, steering column upper support	A082H6037F	1	1	
25	Horn Pin	A100H6013F	1	1	
26	Spring, horn pin	A100H6050F	1	1	
27	Horn Push	C100H0029F	1	1	
30	Carrier, steering column bearing	C082H4035F	3	1	
31	Shearbolt, lock housing to bearing carrier	C082H4045F	2	2	
35	Setscrew, M6 x 18, bearing carrier to column	A075W1029Z	3	3	
36	Washer, spring, " " " "	A075W4035Z	3	3	
40	Steering Column Assembly, upper	A082H6034F	1	1	) Alternatives
	" " " "	A100H6049F	1	1	)
41	Washer, flat, steering wheel to column	A075W4008Z	1	1	
42	Nut, M12 Nyloc, " " " "	A082H4036F	1	1	
46	Washer, flat, column to scuttle beam	A075W4021Z	2	2	
47	Nut, M8 Nyloc, " " " "	A075W3010Z	2	2	

FUNCTION CODE	CONTETS: Upper Steering Column & Wheel, Steering Lock/Ign. Switch		QUANTITY		
32.05A	**PART DESCRIPTION**	PART NUHBER	NON S.I.R	S.I.R.	**REMARKS**
50	Setscrew, M8 x 20, column to pedal box	A075W1038Z	1	1	
51	Washer, spring " " " "	A075W4048Z	1	1	
52	Flat Washer, " " " "	A075W4021Z	1	1	
53	Flat Washer, M5, spacer to column bracket	A075W4011Z	2		>
54	Nut, M5 Nyloc, " " " "	A075W3008Z	2		> RHD
55	Spacer, column to pedal box	A082H4066F	1		>
60	Bolt, M10 x 32, steering column lower joint	CO82H4044F	1	1	
61	Washer, spring, " " " "	A079W4070F	l	1	
65	Infill panel, steering column/bulkhead	A082B5048K	1		RHD
	" " " " "	A082B5047K	1	1	LHD
67	Seal, steering column/bulkhead	A082H6046F	1	1	
68	Foam seal, infill panel to bulkhead	A100B0431V	A/R	A/R	
69	Starlock fastener, """"	A082W6507F	4	4	
70	Barrel & Keys, steering column lock	A082H6039H	1	1	For full lock set see 10.17A
71	Housing, steering column lock	A082H6038H	1	1	
72	Grub Screw, ignition switch fixing	A082H6041H	1	1	
73	Ignition Switch	A082H6460H	1	1	



S4
ESPRIT '93
33.01A PRIOR VIN *

FUNCTION CODE	CONTENTS: S4 **Prior VIN** • : Brake Calipers & Discs (TMC/Bendix)		QUANTITY		
33.01A	**PART DESCRIPTION**	**PART NUHBER**	**s4**		**REMARKS**
1	Brake Caliper Assembly, front, RH	A089J8056F	1		) Less brake pads
	" " " " LH	AOB9J8057F	1		)
2	Brake Pad Set, front (inc. anti-rattle springs)	A082J6109F	1		Ferodo 3432F
3	Caliper Repair Kit, front	AOS9J8025F	1		inc. piston seal, piston boots, locking clips & grease.
4	Bolt, caliper swing release	A089J8068F	2		
5	Bush, lower, caliper sliding	A089J8069F	2		
6	Bleed Nipple, front caliper	A089J8026F	2		
7	Dust Cap, bleed nipple	A089J8013F	2		
	Bolt, caliper mounting	AO89J0358F	4		
	Washer, spring, caliper mounting	A075W4069F	4		
	" flat, " "	A075W4028Z	4		
12	Brake Disc, front, ventilated	AOS9J8014F	2		
13	Bolt, brake disc to hub	A089C8013F	a		
14	Washer, " " " "	A089C8014F	a		
20	Brake Caliper Assembly, rear, RH	A082J6107F	1		) inc. brake pads A082J61 10F
	" " " " LH	A082J6108F	1		)
21	Brake Pad Set, rear (inc. anti-rattle springs)	AOS2J6110F	1		Ferodo 3432F
22	Accessory Kit, rear calipers	AOS2J6078F	1		inc. anti-rattle springs, locking clips, retaining plates, springs & bleed caps
25	Cylinder Assembly, RH	A082J6106S	1		> inc. locking pin & spring
	" " LH	AO82J6105S	1		>
26	Seal Kit, rear caliper	AO82J6079F	2		inc. piston seal, piston boot, locking clips & grease
27	Abutment Bracket, parking brake cable, RH	A082J4176F	1		
	" " " " " LH	A082J4175F	1		
28	Setscrew, MS x 20, abutment bracket to caliper	A075W1038Z	4		
29	Washer, spring, " " " "	A075W4036Z	4		* **VIN R 1443 (Non-USA) + R 1377 s 1391 (USA)** (Brembo Brakes)
30	Bolt, Ml2 x 30, caliper mounting	A089R0142F	4		
31	Washer, shakeproof, " "	A089J8018F	4		
32	Brake Disc, rear	A082D4108F	2		
33	Screw, brake disc retaining	A082C6037F	4		



S4
ESPRIT '93
33.01B-FROM VIN *

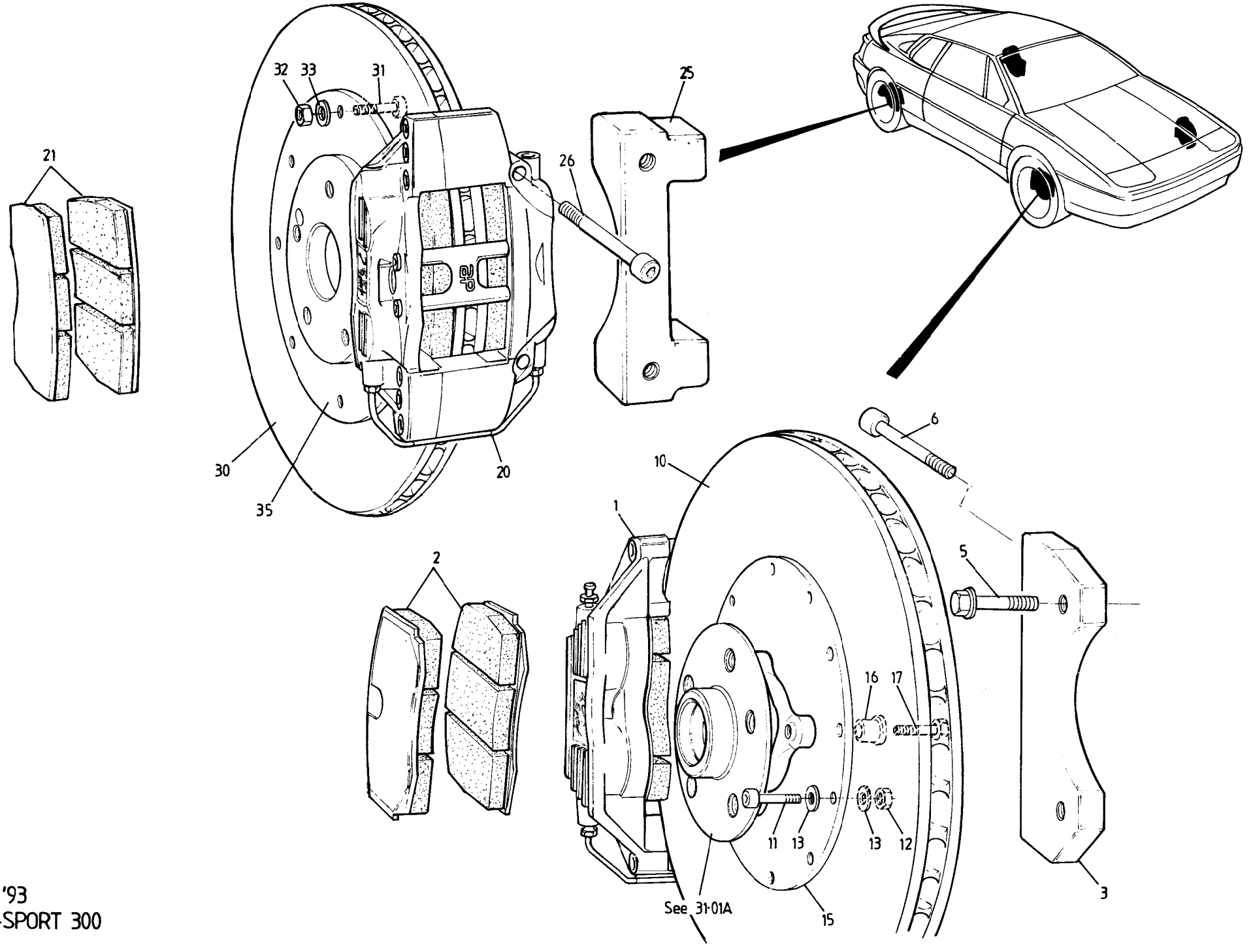
FUNCTION CODE

CONTENTS: **S4 From VIN ***: Brake Calipers & Discs (Brembo)

33.01B	PART DESCRIPTION	PART NUNBER	QUANTITY s4		REMARKS
1	Brake Caliper Assembly, front, RH	A082J4382F	1		) inc. brake pads
	" " " " LH	A082J4383F	1		)
2	Brake Pad Set	A082J6156S	1		
3	Caliper Seal Kit, front	A082J6163S	1		inc. support plates, piston seals, boots, support pins & retaining clip
4	Bleed Nipple Kit, front & rear calipers	A082J6161S	2		inc. 2 nipples & 2 dust caps
5	Brake Disc, front, ventillated	A082J4380F	2		
6	Screw, M10, brake disc retention	A082J4381F	2		
10	Capscrew, Ml2 x 65, caliper to adaptor brkt.	A100W7083F	4		
11	Washer, caliper to adaptor bracket	A082J4386F	4		
12	Adaptor Bracket, caliper mounting	A082J4376K	2		
13	Setscrew, Ml2 x 35, bracket to hub carrier	A075W1059Z	4		
14	Washer, spring, " " " "	A075W4069F	4		
20	Brake Caliper Assembly, rear, RH	A082J6150F	1		) inc. brake pads
	" " " " LH	A082J6151F	1		)
21	Brake Pad Set, (inc. anti-rattle springs & pins	A082J6157S	1		
24	Sliding Pin Bush Kit, rear calipers	A082J6162S	2		inc. sleeves, boots & piston seals
	Rear Caliper Park Lever Kit, LH	A082J6159S	1		) inc. lever screw, washer & dust
25	" " " " " RH	A082J6160S	1		) boot
30	Setscrew, M10 x 80, caliper to mounting bracket	A082W1113F	2		
31	Capscrew, M8 x 60, " " " "	A082W1114F	2		
32	Setscrew, adaptor plate to hub carrier	A089R0142F	4		
33	Washer,. " " " " "	A075W4028Z	4		
	Adaptor Plate, caliper to hub carrier, LH	A082J4375F	1		
35	" " " " " " RH	A08254364F	1		
36	Brake Disc, rear, ventilated	A082D4160F	2		
37	Screw, brake disc retention	A082C6037F	2		

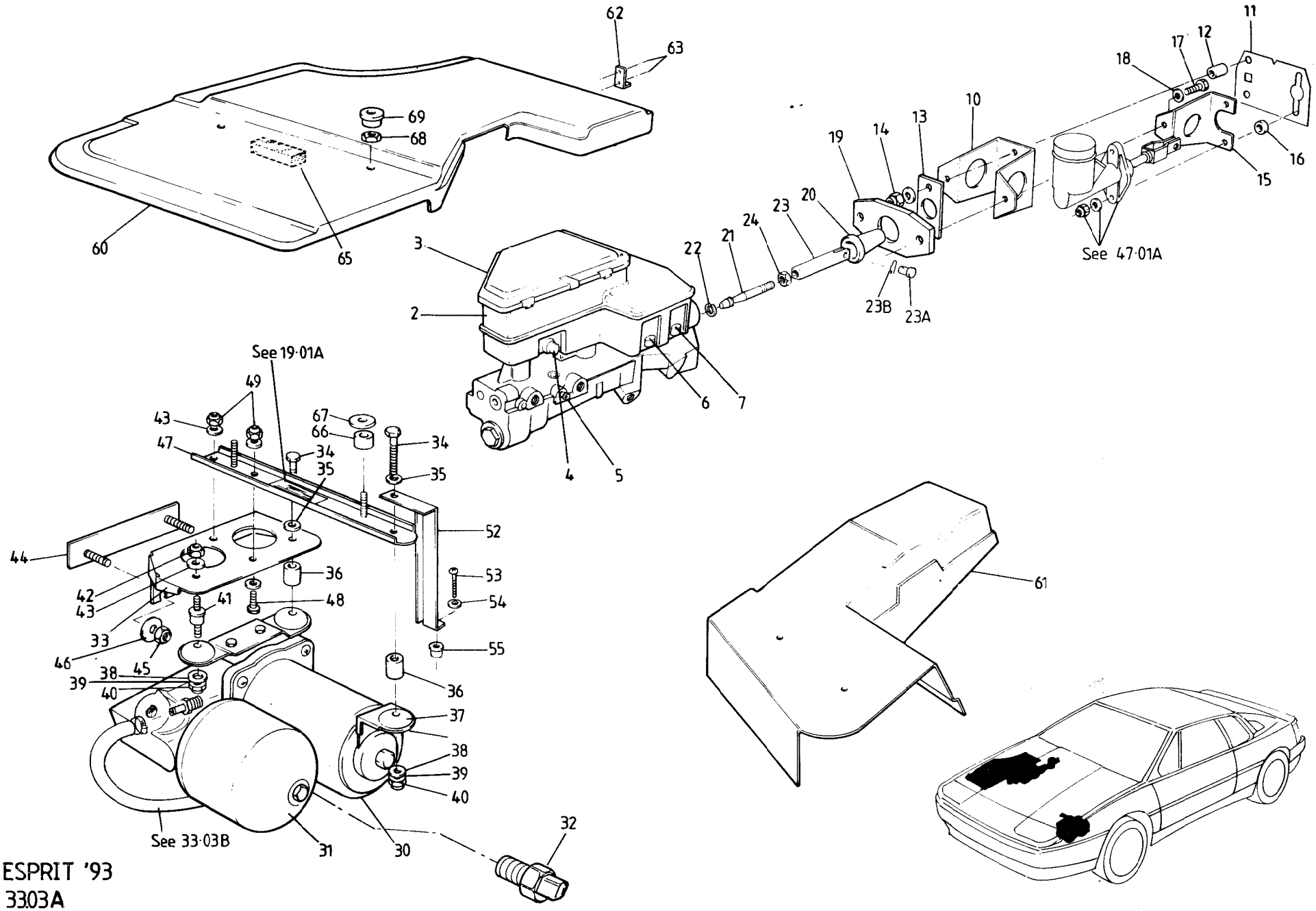
• VIN R 1443 (Non-USA) + R 1377
S 1391 (USA)
(Brembo Brakes)

Esprit range: '93 M.Y. onwards
S4 From VIN * 33.01B



ESPRIT '93
33·01C–SPORT 300

FUNCTION CODE	CONTENTS: Sport 300: Brake Calipers & Discs		QUANTITY		
33.01C	PART DESCRIPTION	PART NUMBER	SPORT 300		REMARKS
	Brake Caliper Assembly, front, LH	P691.3301.003AF	1		
1	" " " " RH	P691.3301.004AF	1		
2	Brake Pad Set, front	P625.3301.612AS	2		1 caliper only
3	Caliper Mounting Block, front	P625.3301.003AF	2		
5	Bolt, Ml2 x 40, caliper mtg. block to upright	P624.3301.614BF	4		
6	Bolt, M10 x 90, caliper to mounting block	SC100901F	4		
	Brake Disc, front, LH	P625.3301.605AF	1		
10	" " " RH	P625.3301.606AF	1		
11	Bolt, ¼" UNF, front disc to mounting bell	P525.3301.644AF	24		
12	Nut, " " " " " " "	P525.3301.643AF	24		
13	Washer, " " " " "	P525.3301.645AF	48		
15	Mounting Bell, front brake disc	P625.3301.001AF	2		
16	Bobbin, front brake disc drive	P525.3301.018AF	8		
17	Bolt, front disc bobbin to hub	P525.3301.032AF	8		
	Brake Caliper Assembly, rear, LH	P691.3301.007AF	1		
20	" " " " RH	P691.3301.006AF	1		
21	Brake Pad Set, rear	P625.3301.613AS	2		1 caliper only
25	Caliper Mounting Block, rear	P625.3301.004BK	2		
26	Bolt, rear caliper to mounting block	P625.3301.007BF	4		
	Brake Disc, rear, LH	P625.3301.607AF	1		
30	" " " RH	P625.3301.608AF	1		
31	Bolt, ¼" UNF rear disc to mounting bell	P525.3301.644AF	16		
32	Nut, " " " " " " "	P525.3301.643AF	16		
33	Washer, " " " " "	P525.3301.645AF	16		
35	Mounting Bell, rear brake disc	P625.3301.002AF	2		
					For Sport 300 parking brake caliper see 33.05A

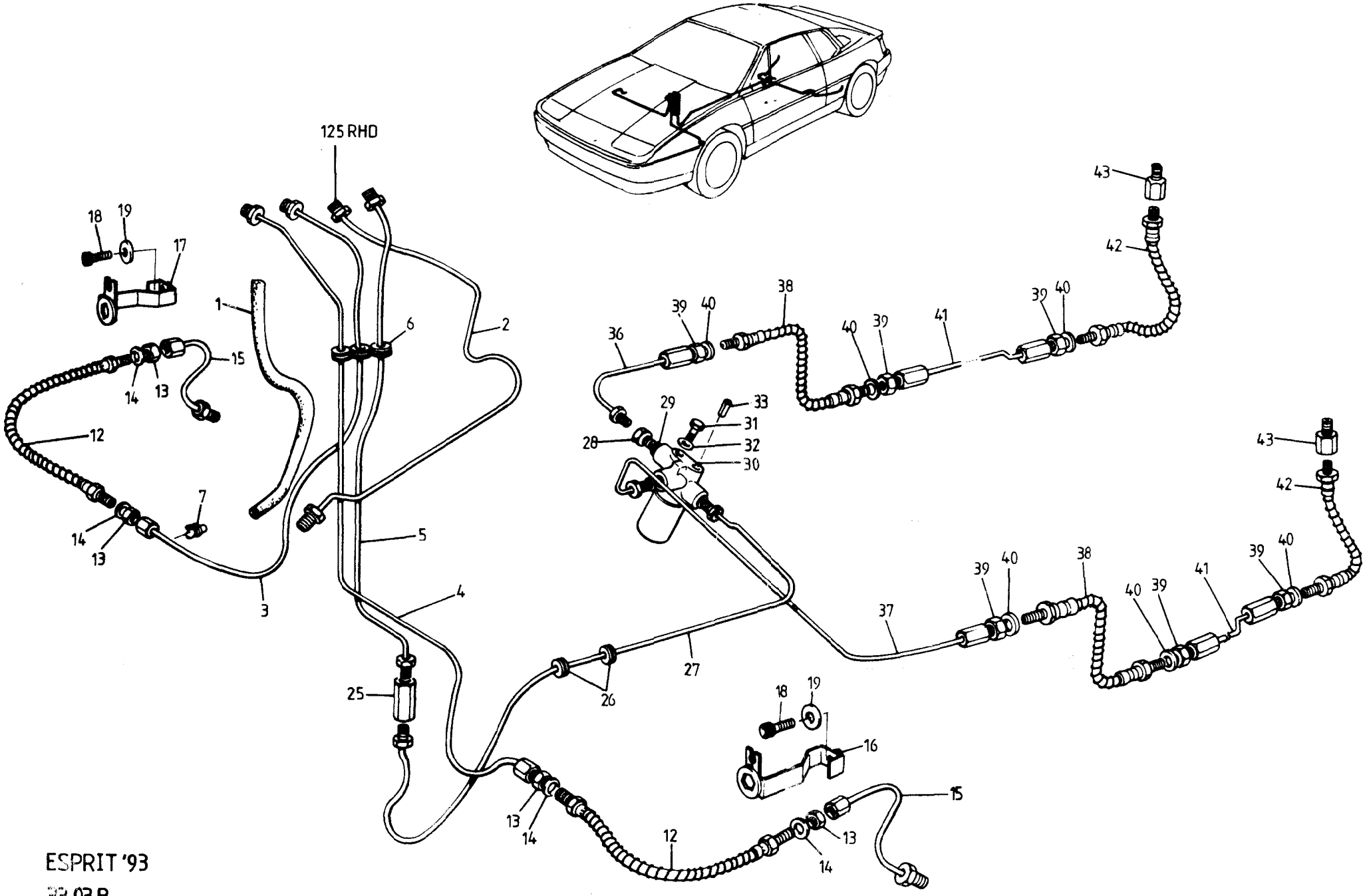


ESPRIT '93
33.03A

FUNCTION CODE	CONTENTS: Booster/Master Cylinder, Pump, Accumulator		QUANTITY		
33.03A	PART DESCRIPTION	PART NUMBER	RHD	LHD	REMARKS
1	Booster/Master Cylinder Assembly (Modulator)	A082J6115F	1	1	
2	Reservoir Assembly, brake fluid	A082J6133S	1	1	
3	Cover & Diaphragm, brake fluid reservoir	A082J6132S	1	1	
4	Sensor, brake fluid level	A082J6130S	1	1	
	Pressure Relief Valve	A082J6136S	1	1	Located inside reservoir
5	Bleed Nipple, master cylinder	A082J6131S	2	2	
6	Solenoid Valve, front	A082J6134S	2	2	
7	" " rear	A082J6135S	1	1	
10	Bracket, master cylinder mounting	B082J4252F	1	1	
11	Gasket, bracket to body	A082J4255F	1	1	
12	Spacer, bracket to pedal box	A079J4004F	2	2	
13	Reinforcing Plate, bracket	A082J4142K	1	1	
14	Nut, M8, Nyloc, bracket to pedal box	A075W3010Z	2	2	
15	Steady Bracket, master cylinder mounting	B082J4250F	1	1	
16	Spacer, steady bracket to pedal box	B082J4260F	2	2	
17	Setscrew, 3/8,, UNC x 1¼, master cylinder fix	A082W1103F	2	2	
18	Washer, flat, " " "	A075W4064F	2	2	
19	Seal Carrier, master cylinder mounting	A082J4246F	1	1	
20	Dust Cover, master cylinder pushrod	A082J6119F	1	1	
21	Pushrod, master cylinder input	A082J4248F	1	1	
22	Retaining Clip, pushrod to master cylinder	AO82J6117F	1	1	
23	Extension, master cylinder pushrod	A082J4247F	1	1	
23A	Clevis, extension to pedal	A082J4197F	1	1	
23B	'R' Pin, pedal clevis	A082W6208F	1	1	
24	Locknut, extension to pushrod	A075W3024Z	1	1	
30	Pump & Accumulator Assembly	A082J6114F	1	1	
31	Accumulator, nitrogen charged	A082J6138S	1	1	
32	Pressure Switch, pump housing	A082J6137S	1	1	Black moulding. R/B B082J6137S
	" " "	B082J6137S	1	1	Grey moulding
33	Bracket, pump mounting	A082J4262F	1		
	" " "	A082J4263F		1	
34	Screw, M5 x 40, pump to mounting bracket	A079W2033F	2'	2	
35	Washer, flat, " " "	A075W4011Z	2	2	
36	Spacer, " " "	A082J4261F	2	2	
37	Cup Washer, " " "	A082J6122F	3	3	

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Booster/Master Cylinder, Pump, Accumulator		QUANTITY		
33.03A	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
38	Rubber Washer, pump to mounting bracket	AO82J6123F	3	3	
39	Washer, flat, " " " "	AO82J6121F	3	3	
40	Nut, Nyloc, **M5**, " " " "	AO75W3008Z	3	3	
41	Stud, shouldered," " " "	AO82J612OF	1	1	M5 x M5 x 45
42	Nut, Nyloc, M6, stud to bracket	AO75W3009Z	1	1	
43	Washer, flat, " " "	AO75W4015Z	1	1	
44	Stud Plate, bracket to body	AO82J4295F	1	1	
45	Nut, Nyloc, M6, " " "	AO75W3009Z	2	2	
46	Washer, flat, " " "	AO75W4017Z	2	2	
47	Channel Bracket, pump support	BO82J4232F	1	1	
48	Setscrew, M6 x 12, channel to bracket	AO75W1027Z	2	2	
49	Nut, Nyloc, M6, " " "	AO75W3009Z	2	2	
52	Support Leg, bracket support	CO82J4242F	1		
	" " " "	CO82J4243F		1	
53	Screw, M5 x 20, support leg to floor	AO75W5084F	1	1	
54	Washer, flat, " " " "	AO75W4011Z	1	1	
55	Rawlnut, M5, " " " "	AO75W6074F	1	1	
60	Cover, ABS pump & relay mounting bracket	AO82M4896K	1		
	" " " " " " "	AO82M4883K		1	
62	Locating Strip, cover	AO82M4751F	1	1	
63	Pop Rivet, locating strip to cover	AO75W6087Z	2	2	
65	Foam Strip, cover anti-rattle	AO36B6213V	A/R	A/R	
66	Spacer, cover to support bracket	A9O7EO696Z	2'	2	
67	Washer,M5 x 16, cover to support bracket	AO82W4115F	2	2	
68	Nut, cover securing	AO75W302OZ	2	2	
69	Knob, knurled, cover securing	AO82W6468F	2	2	



ESPRIT '93

38.03 B

FUNCTION CODE

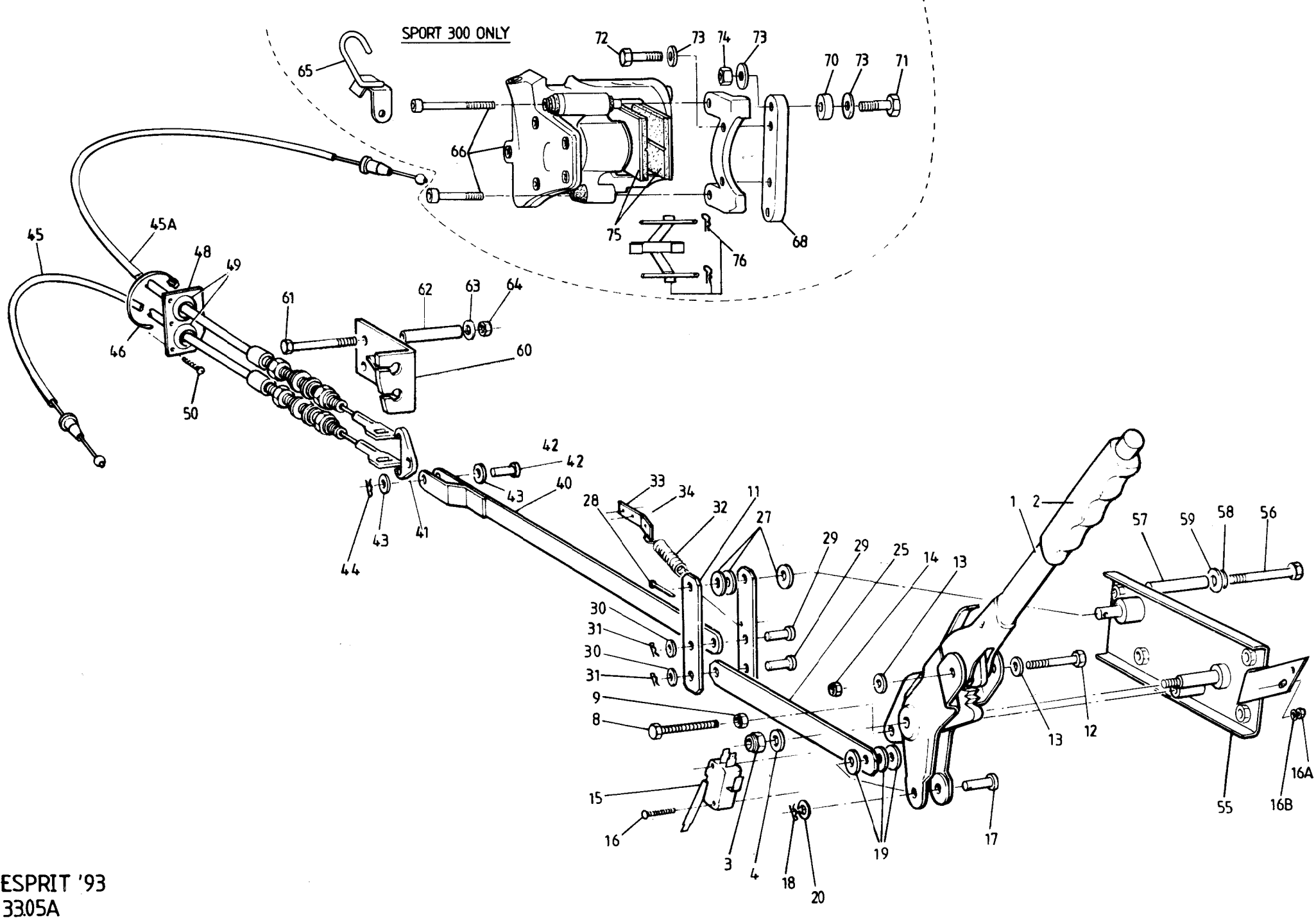
CONTENTS: Hydraulic System, Pipes & Hoses

33.03B	PART DESCRIPTION	PART NUMBER	QUANTITY RHD	QUANTITY LHD	REMARKS
1	Hose, brake fluid reservoir to pump	A082J4274F	1		
	" " " " " "	A082J4275F		1	
2	Pipe, pump to master cylinder	A082J4272F	1		
	" " " " "	A082J4273F		1	• **VIN R 1443 (Non-USA) + R1377 s 1391 (USA)**
3	Pipe, master cylinder to RHF hose	A082J4334F	1		(Brembo Brakes)
	" " " " " "	A082J4336F		1	
4	" " " " LHF "	A082J4335F	1		
	" " " " " "	A082J4337F		1	
5	Pipe, master cylinder to straight conn. (rear)	A082J4338F	1		
	" " " " " " "	A082J4339F		1	
6	**Grommet,** brake pipes thro' body	X036560262	3	3	
	Clip, plastic, brake pipes to front chassis	A075J6027Z	7	3	
12	Brake Hose, front	B089J6012F	2	2	**s4**
	" " "	P625.3301.615BF	2	2	**)**
	Protection Coil, front brake hose	P625.3301.616AF	2	2	**)**
	Banjo Bolt, hose to caliper	A100J6037F	2	2	**)** Sport 300
	Washer, banjo bolt	A100J6038F	4	4	**)**
	Bulkhead Connector,.hose to bundy pipe	A089J6013F	2	2	**)**
13	Locknut, front brake hose	A075J6017Z	4	4	
14	Washer, s/proof, " "	A075W4049Z	4	4	
15	Brake Pipe, hose to front caliper	A089J0338F	2	2	
16	Bracket, hose/pipe/harness to caliper, LH	A082J4237F	1	1	
17	" " " " " " RH	A082J4238F	1	1	
18	Screw, socket head M6 x 20, bracket to caliper	A082W7041F	2	2	
19	Washer, flat, bracket to caliper	A075W4016Z	2	2	
25	Straight Connector, rear feed pipe	A079J6020F	1	1	
26	Grommet, rear feed pipe thro' chassis	X036J6004Z	2	2	
27	Pipe, front to rear	A082J4250F	1		)straight connector to limiting valve
	" " " "	A082J4249F		1	) or 3-way connector
	Clip, double, brake pipes to chassis front box	A100J6044F	1	1	
28	Adaptor, brake pipe to limiting valve	A100J0114F	3	3	
29	Washer, copper, adaptor to limiting valve	A100J6081F	3	3	
30	Pressure Limiting Valve	A100J6078F	1	1	>
31	Setscrew, M8 x 12, valve to chassis	A075W1035Z	1	1	> **S4** Prior VIN *
32	Washer, flat, " " "	A075W4020Z	1	1	>
33	Roll Pin, " " "	A075W6097Z	1	1	>

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS : Hydraulic System, Pipes & Hoses		QUANTITY		
33.03B	**PART DESCRIPTION**	**PART NUMBER**	RHD	LHD	**REMARKS**
	3-Way Connector, rear brake circuit	B075J6019F	1	1	}
	Bolt, M8 x 35, connector to chassis	A075W2038D	1	1	} **S4** from VIN * & all Sport 300
	Washer, flat, " " "	A075W4020Z	2	2	}
	Nut, Nyloc, M8, " " "	A075W3010Z	1	1	}
36	Brake Pipe, limit valve to RH rad. arm hose	A082J4179P	1	1	S4 prior VIN *
	" **3-way conn** . " " " " "	P691.3301.008AF	1	1	S4 from VIN * & all Sport 300
37	" " " " " LH " " "	A082J4178P	1	1	
38	Brake Hose, chassis to radius arm	B089J6012F	2	2	
39	Locknut, brake hose	A07556017Z	6	6	
40	Washer, shakeproof, brake hose	A075W4049Z	6	6	
41	Brake Pipe, rear radius arm	A082J4182P	2	2	
42	Brake Hose, radius arm to caliper	A082J6100F	2	2	R/B A082J4389F used without> S4 adaptor> prior
43	Adaptor, brake hose to caliper	A082J4174F	2	2	Used with A082J6100F > VIN *
	Brake Hose, radius arm to caliper	A082J4389F	2	2	Used without adaptor >
	" " " " " "	A082J4390F	2	2	S4 from VIN *
	" " " " " "	A082J4389F	2	2	Sport 300

• **VIN R 1443 (Non-USA) + R 1377 s 1391 (USA)**
(Brembo Brakes)



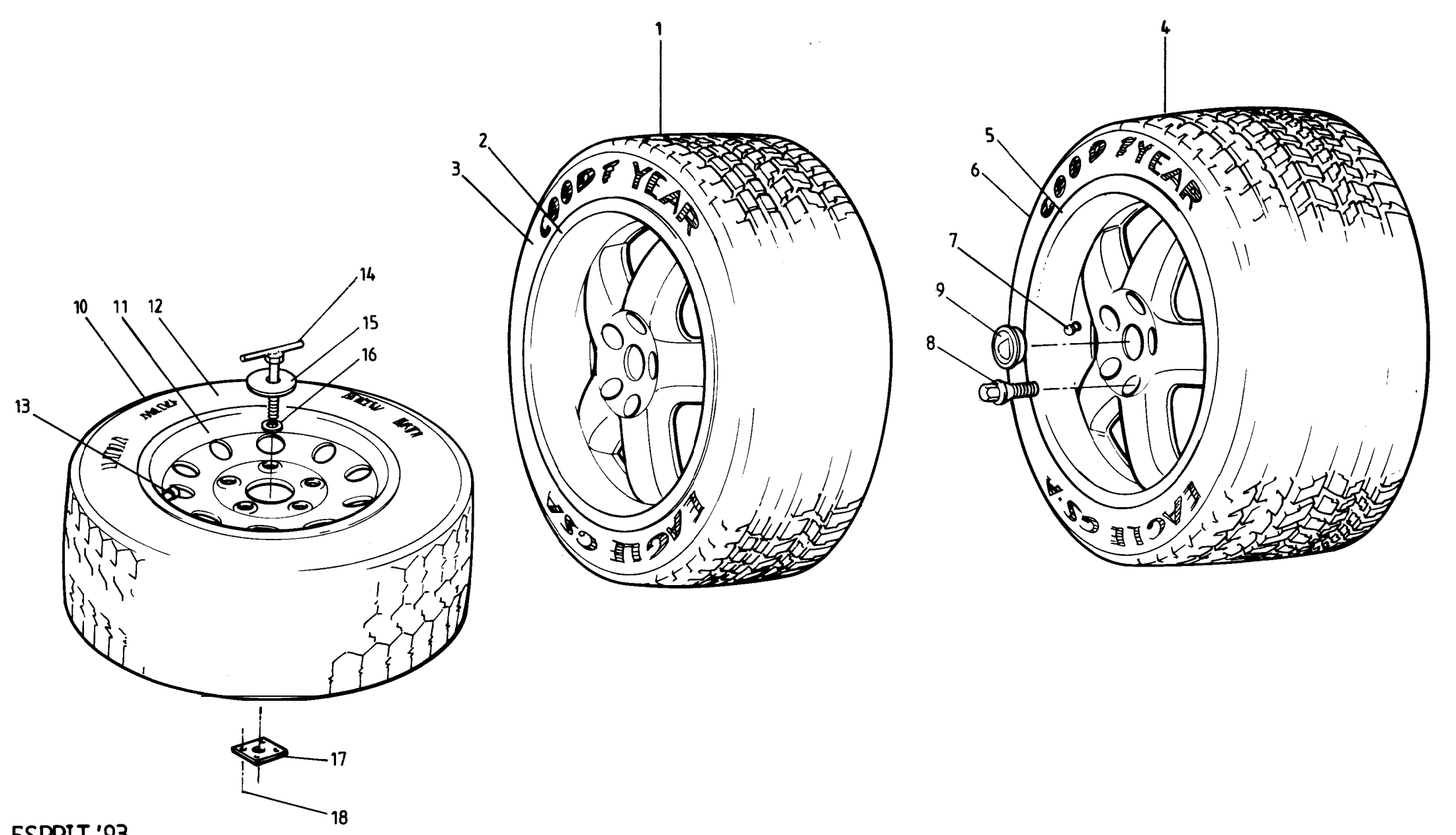
ESPRIT '93
33.05A

FUNCTION CODE	CONTENTS: Parking Brake Mechanism		QUANTITY		
33.05A	**PART DESCRIPTION**	PART NUMBER	S4	SPORT 300	**REMARKS**
1	Parking Brake Lever Assembly	AOB2J4157F	1		)'Fold Down' type
	" " " "	P691.3305.801AJ		1	)
	Ratchet, parking brake lever	B100J0017H		1	
	Setscrew, ratchet location	A075W1030Z		1	
2	Grip, parking brake lever	A079J6050F	1	1	
3	Nut, MB Nyloc, lever pivot	A075W3010F	1	1	
4	Washer, flat, " "	A075W4019F	1	1	
a	Setscrew, M6 x 30, ratchet fix	A075W1032Z	1	1	Also operates park brake switch
9	Nut, M6, " "	A075W3020Z	1	1	
12	Setscrew, M6 x 30, fold-down pivot	A075W1032Z	1	1	
13	Washer, flat, " " "	A075W4013Z	2	2	
14	Nut, M6 Nyloc, " " "	A075W3009Z	1	1	
15	Microswitch, park brake tell tale	C075M6084F	1	1	
16	Screw, M3 x 20, switch to bracket	A082W5163F	2	2	
16A	Nut, M3 Nyloc, " " "	A079W3060F	2	2	
16B	Washer, flat, " " "	A075W4000Z	2	2	
17	Clevis Pin, hand lever to link	A079W6026F	1	1	
18	Spring Clip, clevis retaining	A079W6175F	1	1	
19	Washer, clevis pin	A075W4016Z	3	3	
20	Washer, clevis spring clip	A075W4015Z	1	1	
25	Link, hand lever to multiplier	A082J4122K	1	1	
26	Multiplier Lever	B082J4121K	2	2	
27	Washer, multiplier lever pivot	A075W4024Z	3	3	
28	Split Pin, " " "	A075W6009Z	1	1	
29	Clevis Pin, multiplier lever to links	A075W6031Z	2	2	
30	Washer, multiplier clevis	A075W4015Z	2	2	
31	'R' Pin, clevis retaining	A075W6175Z	2	2	
32	Spring, lever return	AOB2J6075F	1	1	
33	Anchor Bracket, return spring	A082J4159F	1	1	
34	Pop Rivet, anchor bracket to body	A075W6090Z	2	2	
40	Actuator Rod, multiplier to compensator	A082J4120F	1	1	
41	Compensator, parking brake cables	A082J4294F	1	1	
42	Clevis Pin, actuator rod to compensator	A075W6033Z	1	1	
43	Washer, clevis pin	A075W4020Z	2	2	
44	Spring Clip, clevis retaining	A075W6175F	1	1	

FUNCTION CODE 33.05A

CONTENTS : **Parking Brake Mechanism**

	PART DESCRIPTION	PART NUMBER	QUANTITY S4/S4S	QUANTITY sport 300	REMARKS
45	Cable, parking brake, short, driver's side	AO82J4296F	1		2425mm, Bendix brakes (Prior VIN ●)
	" " " " " "	AO82J4373F	1		1802mm, Brembro brakes (From VIN ●)
	" " " " "	P691.3305.001 BF		1	
45A	" " " long, passenger's side	AO82J4295F	1		2883mm, Bendix brakes (Prior VIN *)
	" " " " " "	AO82J4372F	1		273Omm, Brembro brakes (From VIN ●)
	" " " " " "	P691.3305.002BF		1	
46	Cable Tie, parking brake cables	AO82W6286F	3	3	
	" " " " "	AO75W6038F		2	VIN • Esprit S4 non USA R 1443
48	Grommet Plate, Parking brake cable	AO79U4483F	2	2	(+ R 1377)
49	Grommet, parking brake cables	AO79U6033F	4	4	Esprit S4 USA. s 1391
50	Screw, grommet plate fixing	AO75W5015Z	8	8	
55	Mounting Plate, parking brake lever	DO82B4478J	1	1	RHD
	" " " " "	DO82B4479J	1	1	LHD
56	Bolt, M8 x 75, plate fixing	AO75W2046Z	4	4	
57	Spacer Tube, " "	AO8284484F	4	4	
58	Washer, spring, " "	AO75W4036Z	4	4	
59	Washer, large O/D, plate fixing	AO75W4021 Z	4	4	
60	Abutment, parking brake cable front	EO79J4022F	1		RHD
	" " " " "	EO79J4021 F		1	LHD
61	Bolt, M8 x 75, abutment fixing	AO75W2046Z	2	2	
62	Spacer Tube, " "	AO8284484F	2	2	
63	'Penny' Washer, " "	AO75W4021 Z	2	2	
64	Nut, M8 Nyloc, " "	AO75W301 OZ	2	2	
65	Guide Hoop, park brake cable LH	P691.3305.003BF		1	Fixes to top of hub carrier
66	Caliper, parking brake LH	P625.3301.609AF		1	
	" " " RH	P625.3301.61OAF		1	
68	Bracket, parking brake caliper mounting	P625.3301.005A		2	
70	Spacer, caliper bracket to hub carrier	P625.3301.006AF		4	
71	Setscrew, Ml2 x 45, caliper bracket to hub carrier	AO75W1061 F		4	
72	Setscrew, Ml2 x 35, caliper to mounting bracket	AO75W1059Z		4	
73	Washer, flat, caliper and bracket fixings	AO75W4071 F		12	
74	Nut, M12, caliper and bracket fixings	NH12OOOlF		8	
75	Pad Set, parking brake	AO82J6158S		1	Comprises 4 brake pads
	Pad, parking brake	P691.3301.607AH		4	
76	Parking Pad Retaining Pads and Springs Kit	P691.3301.608		2	
	Sliding Pin Bush and Boot Kit	P691.3301.609	2		
	Dust Boot, park caliper piston	P691.3301.610		2	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ESPRIT '93

FUNCTION CODE

CONTENTS: Wheels, Tyres, Spare Wheel Retention

34.01A

	PART DESCRIPTION	PART NUMBER	S4	NON USA S4S	ISA S4S	SPORT 300	REMARKS
1	Wheel & Tyre Assembly, front	A082G4094F	2				
	" " " " "	A082G4104J		2			
	" " " " "	A082G4106F			2		
	" " " " " RH	P691.3401.802AF				1	) Goodyear Eagle GS-C
	" " " " " LH	P691.3401.801AF				1	)
	" " " " " RH	P691.3401.802BF				1	> Goodyear Eagle ZR
	" " " " " LH	P691.3401.801BF				1	>
2	Road Wheel, front, 7J x 17	A082G6083F	2				Single piece
	" " " 8½J x 17	A082G6091F		2			3-piece O.Z. inc. centre cap
	" " " 7J x 17	A082G6094H			2		" " " " " "
	Road Wheel, front, 8½J x 16	P691.3401.601AM				2	" " " " " "
3	Tyre, front, 215/40 ZR17	A082G4092H	2		2		Goodyear Eagle GS-A
	" " 235/40 ZR17	A082G6089F		2			Michelin SX MXX3
	" " , 245/45 ZR16, RH	P691.3401.604AH				1	) Goodyear Eagle GS-C
	" " " " " LH	P691.3401.603AH				1	)
	" " " " "	P691.3401.612AH				2	Goodyear Eagle ZR
4	Wheel & Tyre Assembly, rear	A082G4095F	2				
	" " " " "	A082G4105J		2			
	" " " " "	A082G4017F			2		
	" " " " " RH	P691.3401.804AF				1	) Goodyear Eagle GS-C
	" " " " " LH	P691.3401.803AF				1	)
	" " " " " RH	P691.3401.804BF				1	> Goodyear Eagle ZR
	" " " " " LH	P691.3401.803BF				1	>
5	Road Wheel, rear, 8½J x 17	A082G6084F	2				Single piece
	" " " 10J x 18	A082G6092F		2			3-piece O.Z. inc. centre cap
	" " " 8½J x 17	A082G6095H			2		" " " " " "
	" " " 10½J x 17	P691.3401.602AM				2	" " " " " "
6	Tyre, rear, 245/45 ZR17	A082G4093H	2		2	2	Goodyear Eagle GS-A
	" " 285/35 ZR18	A082G6090F		2			Michelin SX MXX3
	" " P315/35 ZR17, RH	P691.3401.606AH				1	) Goodyear Eagle GS-C
	" " " " " LH	P691.3401.605AH				1	)
	" " " " "	P691.3401.613AH				2	Goodyear Eagle ZR
7	Valve, tyre	A082G6027H	4				
	" "	P691.3401.611AS		4	4	4	

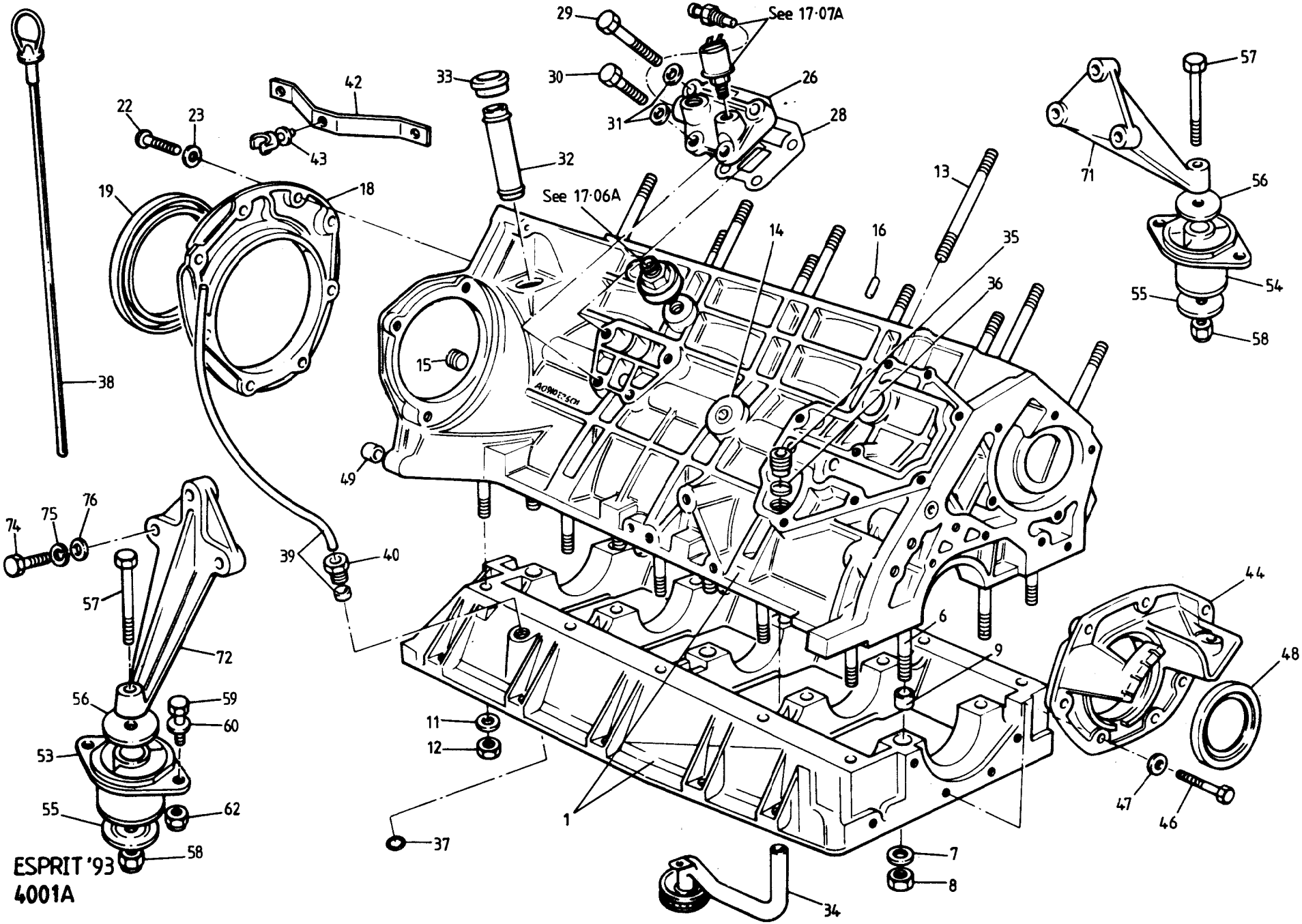
1995 / 02

Esprit range: '93 M.Y. onwards

FUNCTION CODE

CONTENTS: Wheels, Tyres, Spare Wheel Retention

34.01A	PART DESCRIPTION	PART NUMBER	S4	NON USA S4S	USA S4S	SPORT D 300	REMARKS
a	Wheel Bolt, road wheel retaining, 25mm	A082G6038F	20	20			
	" " " " " , 30mm	P691.3401.610AS		20	20	20	
9	Wheel Centre, embellisher (Lotus Badge)	A082G6071F	4				
	Centre cap, road wheel	A082G6099S		4	4		
	Locking tool, wheel centre cap (x 8 screws)	A082G6100S		1	1		
	Wheel centre embellisher	P691.3401.608AS				4	
	Clip, wheel embellisher retaining	P691.3401.609AS				4	
10	Spare Wheel & Tyre Assembly	B082G4065F	1				)
11	Road Wheel, spare, 5.5J x 14	B082G6040F	1				)
12	Tyre, spare, 175/70 R14	B082G6019H	1				) Prior VIN *
13	Valve, spare tyre	A082G6027H	1				)
	Clamp Bolt, spare wheel retention	D082U4763K	1				)
	Spare Wheel & Tyre Assembly	A082G6087F	1	1	1		>
	Road Wheel, spare, 4J x 16 H2	A082G6085H	1	1	1		> From VIN *
	Tyre, spare, Michelin Tex T125/80 R16	A082G6086H	1	1	1		>
	Valve, spare tyre	A082G6088H	1	1	1		>
14	'T'- Bolt, spare wheel retention	E082U4763F	1	1	1		• **VIN R 1443 (Non-USA)**
15	Clamp Plate, spare wheel retention	A075U0492Z	1	1	1		**+ R 1377**
16	'0' Ring, clamp plate to bolt	A912E6398F	1	1	1		**s 1391 (USA)**
17	Tapping Plate, clamp bolt	A079U4341K	1	1	1		(Brembo Brakes)
18	Pop Rivet, tapping plate to body	A075W6068Z	4	4	4		
	'Finilec', tyre sealant canister	P691.3401.607AF				1	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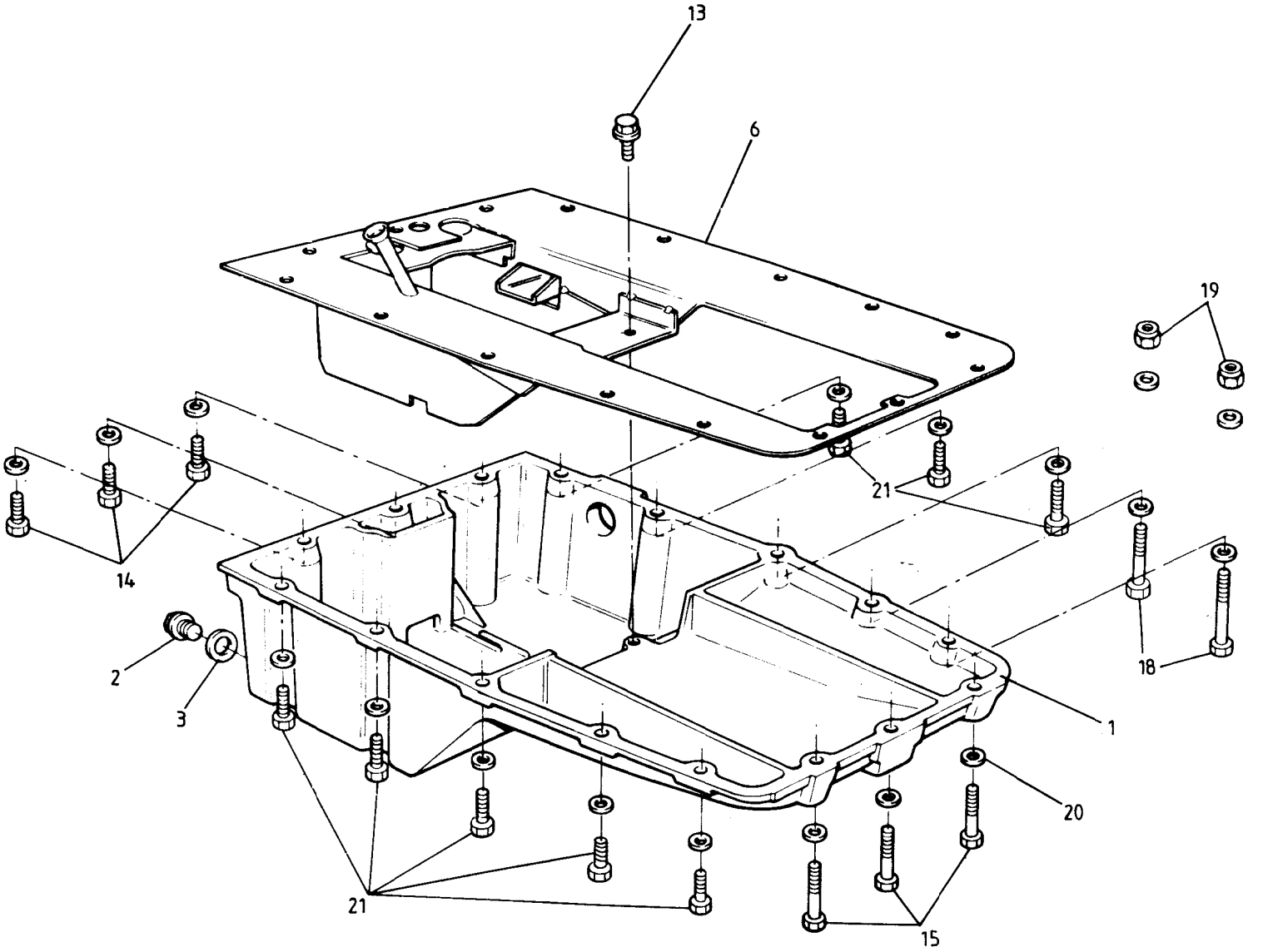
ESPRIT '93
4001A

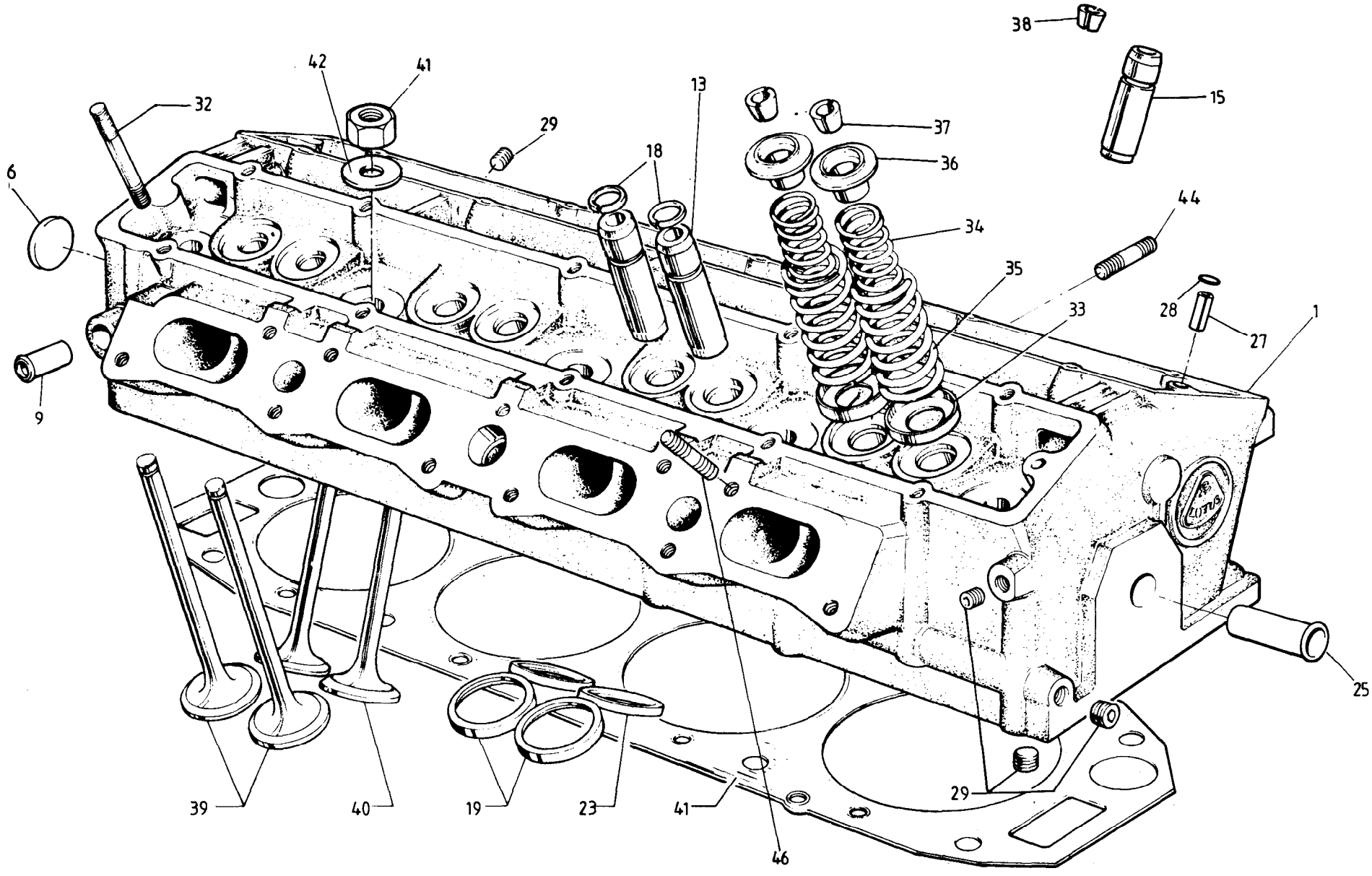
FUNCTION CODE	CONTENTS: Block/Main Bearing Housing, Engine Mountings		QUANTITY		
40.01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Cylinder Block & Main Bearing Housing, 2.2 1	A910E2604J	1		)Inc. items up to 12
	" " " " " " 2.0 1	A912E2617J	1		)
	Permabond A905, Surface Conditioner	A91236759V	A/B		>MBH to block
	Loctite 509	A920E6007V	A/E		>
6	Stud, H12, main bearing housing to block	A907E0225Z	10		
7	Washer, flat, H12, " " " "	B910E2383F	10		
8	Nut, H12, " " " "	A910E6903Z	10		
9	Ring Dowel, " " " "	A911E0320F	10		
10	Stud, M8, MBH outer to block	A90730226Z	10		
11	Washer, flat, " " "	AO75W4020Z	10		
12	Nut, M8, " " "	A075W3021Z	10		
13	Stud, M12, cylinder head to block	B907E0224Z	10		
14	Plug, ½" - 14 NPTF, oil gallery centre	A912W7111Z	1		
15	Plug, ¼" - 18 NPTF, oil gallery rear end	A912E7037Z	1		
	Permabond A131 , oil gallery plugs	A912E7034V	A/R		
16	Spiro1 Pin, oil feed to head	A907E6007Z	1		
18	Housing, crankshaft rear oil seal	C907E0599Y	1		
19	Oil Seal, crankshaft rear	A912E2334F	1		
	Permabond A905, rear oil seal housing sealing	A912E6759V	A/B		
	Permabond A136, " " " " "	A912E6421V	A/H		
22	Button Head Screw, rear seal housing fixing	AO75W7016Z	8		
23	Washer, thin, " " " "	A075W4013Z	8.		
26	Cover, Oil Gallery (2 x M10; 1 x ¼" NPSF)	A910E2540K	1		
28	Gasket,oil gallery cover	A907E0438Z	1		
	Wellseal, oil gallery cover to block	A907E6119Z	A/B		
29	Bolt, M8 x 35, oil gallery cover to block	A075W1041Z	2		
30	Setscrew, M8 x 20, " " " "	AO75W1038Z	2		
31	Washer, flat, " " " "	A075W4020Z	4		
32	Spout, crankcase breather	B907E0626Z	1		
	Permabond A131, crankcase breather spout	A912E7034V	A/R		
33	Bush, breather spout to block	A907E0659Z	1		
34	Pipe, oil pick up	A907E0624Z	1'		
35	Union Nut, oil pick up pipe to block	A907E0605Z	1		
36	Olive, Nylon, " " " " "	A907E0606Z	1		

FUNCTION CODE	CONTENTS : Block/Main Bearing Housing, Engine Mountings		QUANTITY		
40.01A	**PART DESCRIPTION**	**PARTNUMBER**	ALL		**REMARKS**
37	'0' Ring, dipstick tube	A912E6398F	1		
38	Dipstick	A910E1792F	1		
39	Tube, dipstick (c/w olive)	A910E9038J	1		
40	Tube Nut, dipstick tube to block	A911E6378F	1		
	Permabond A131, dipstick tube nut to MBH	A912E7034V	A/R		
42	Bracket, dipstick tube to plenum	A910E1902F	1		
43	Clip, dipstick tube bracket	A910E6592F	1		
44	Front Cover (crankshaft front oil seal housing)	A907E1230F	1		
	Permabond A905, surface conditioner	A912E6759V	A/R		
	Permabond A136, sealant	A912E6421V	A/R		
46	Setscrew, M6 x 25, front cover	A075W1031Z	7		
47	Washer, flat, " "	A075W4013Z	7		
48	Oil Seal, crankshaft front	B907E6010F	1		
49	Dowel, engine to clutch housing	B907E6181F	2		
53	Mounting Rubber, engine, RH, blue	B085E6008F	1		
54	" " " LH, pink	B085E6009F	1		
55	Buffer Washer, engine mounting underside	A085E6010F	2		
56	" " " " topside	A085E6011F	2		
57	Bolt, Ml2 x 100, engine mounting leg to rubber	A079W2072F	2		
58	Nut, Ml2 Nyloc, " " " " "	A075W3012Z	2		
59	Setscrew, M8 x 20, mounting rubber to chassis	A075W1038Z	4		
60	Washer, flat, " " " "	A075W4020Z	6		
	Washer, spring, " " " "	A075W4036Z	2		
62	Nut, M8, Nyloc, " " " "	A075W3010Z	2		
71	Mounting Leg, engine, LH	A082E4079K	1		
72	" " " RH	B082E4078K	1		
74	Setscrew, M8 x 35 caphead, leg to engine	A082W7053F	6		
	Permabond A130, threadlock	A912E7033V	A/R		
75	Washer, spring, " " "	A075W4036Z	6		
76	Washer, flat, " " "	A075W4020Z	6		
	Edge Finisher, engine mounting leg	C082U4775F	40mm		



ESPRIT '93
40.03A

FUNCTION CODE	CONTENTS: Oil Sump		QUANTITY		
40.03A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Oil Sump (ribbed underside) & Baffle Assembly	A910E9282S	1		7.4 litres capacity.
	Permabond A905, surface conditioner, sump to MB	A912E6159V	A/R		
	Permabond A136, sealant, sump to MBH	A912E6421V	A/R		
2	Drain Plug, socket head	A911E6343F	1		
3	'0' Ring, sump drain plug	A912E6694F	1		
6	Baffle, sump	C910E9216J	1		
13	Screw, baffle to sump	A912E6399F	2		
14	Bolt, M8 x 25, sump to MBH	A075W1039Z	3		
15	" M8 x 45, " " "	A075W2040Z	3		
16	" M8 x 55, " " "	A075W2042F	2		
19	Nut, M8 Nyloc, " " "	A075W3010Z	2		
20	Washer, flat, " " "	A075W4020Z	18		
21	Bolt, M8 x 30, " " "	A075W1040Z	8		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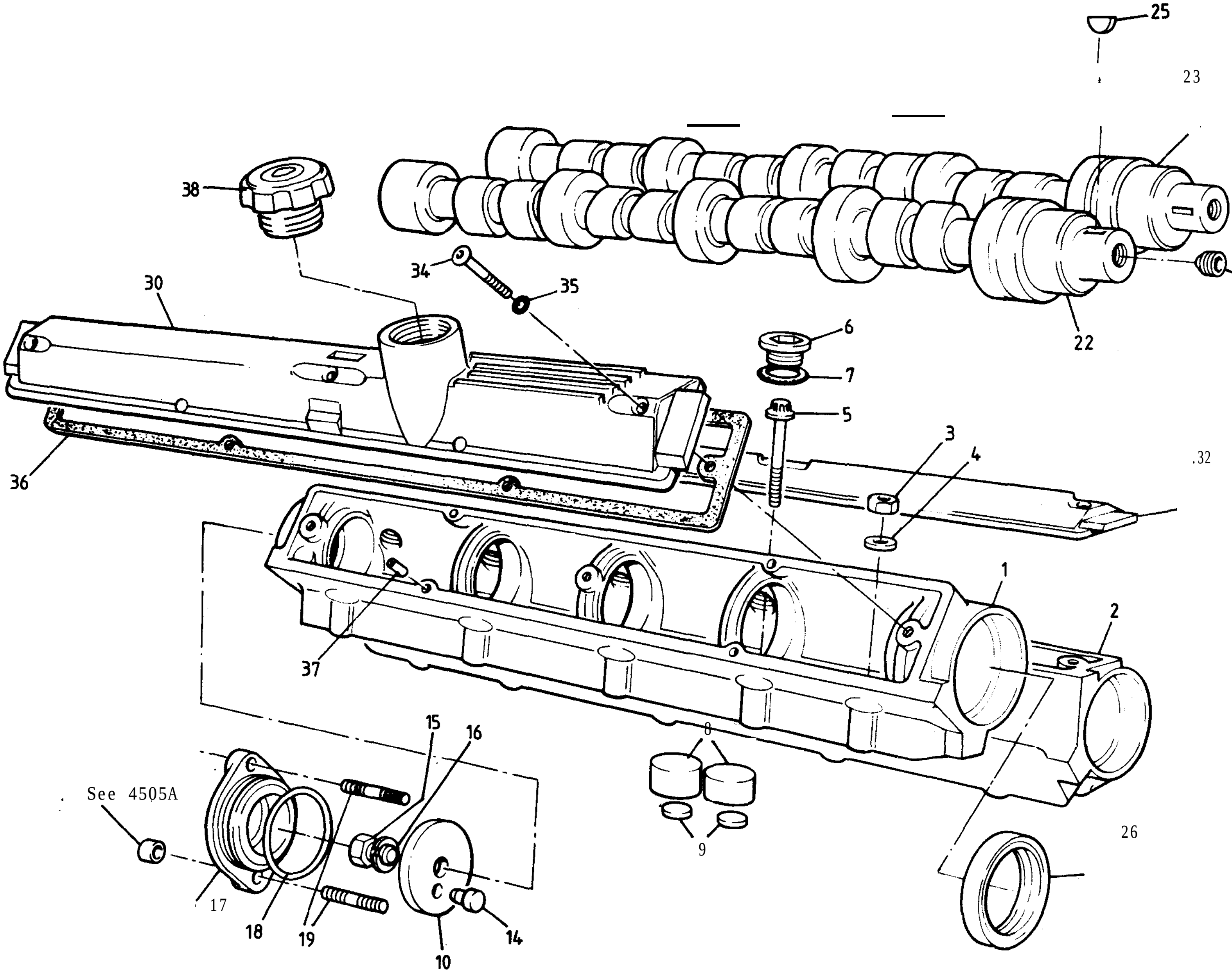
ESPRIT '93

FUNCTION CODE	CONTENTS : Cylinder Head & Gasket, Valves, Guides & Spr ngs		QUANTITY		
40.05A	PART DESCRIPTION	PART NUMBER	S4	TS4S/ SPORT 300	REMARKS
1	Cylinder Head Assembly	A910E9057J*	1		* Inc. items up to **25**
	" " "	P691.4005.8OOBJ*		1	
6	Core Plug, small	A907E6038Z	7	7	
9	Pipe, heater take-off	A907E0486Z	1	1	
	Permabond A134, pipe to cylinder head	A100B6155V	A/R	A/R	
13	Guide, inlet valve, o/d standard	F907E0315Y	)	)	
	" " " o/d + 0.001"	G907E0315Y	) 8	) 8	
	" " " o/d + 0.002"	H907E0315Y	)	)	
	" " " o/d + 0.005"	I907E0315Y	)	)	
15	Guide, exhaust valve, o/d standard	A910E0315F	>	>	
	" " " o/d + 0.001"	B910E0315F	> a	> a	
	" " " o/d + 0.002"	C910E0315F	>	>	
	" " " o/d + 0.005"	D910E0315F	>	>	
18	Circlip, valve guide	A907E6037Z	16	16	
19	Seat Insert, inlet valve, o/d standard	C912E2010F	)	)	
	" " " " o/d + 0.001"	C912E2011F	) 8	) 8	
	" " " " o/d + 0.002"	C912E2012F	)	)	
	" " " " o/d + 0.005"	C912E2013F	)	)	
23	Seat Insert, exhaust valve, o/d standard	A912E2608F	>	>	
	" " " " o/d + 0.001"	A912E2609F	>8	>8	
	" " " " o/d + 0.002"	A912E2610F	>	>	
	" " " " o/d + 0.005"	A912E2611F	>	>	
25	Adaptor, water outlet	A907E0486Z	1	1	
27	Roll Pin, cyl. head to cam hsg. oil feed	A075W6097Z	2	2	
28	'0' Ring, " " " " " " "	A907E6202Z	2	2	
29	Blanking Plug, l/8" BSP, oilways & ex. ports	A907E6023Z	7	7	
	Permabond A134, oilway plug sealing	A100B6155V	A/R	A/R	
	Permabond A025, sample " "	A912E6800V	A/R	A/R	
32	Stud, MS, cam housing to head	A911E0227Z	4	4	
33	Seat, valve spring	A907E0316Z	16	16	
34	Valve Spring, inner	A910E2431F	16	16	
35	" " outer	A910E2432F	16	16	
36	Retainer, valve spring	A910E2430F	16	16	
37	Collet, inlet valve	A907E6040Z	16	16	

FUNCTIONI CODE	CONTENTS : Cylinder Head & Gasket, Valves, Guide & Springs		QUANTITY		
40.05A	PART DESCRIPTION	PART NUMBER	s4	S4S/ SPORT 300	REMARKS
38	Collet, exhaust valve	A910E6377F	16	16	
39	Valve, inlet	A912EO019F	a		
	" "	P691.4005.001BF		8	
40	Valve, exhaust	B910E1383F	8	8	
41	Gasket, cylinder head, reinf. fibre composite	B912E7029Z	1	1	Grey/brown 'Goetze'
42	Washer, M12, cylinder head to block	B910E2383F	10	10	
43	Nut, M12, " " " "	A910E6903Z	10	10	
44	Stud, M8 x 45, exhaust manifold to head	A910E2550F	'12	12	
	Permabond A025, exhaust manifold studs	A912E6800V	A/R	A/R	
46	Stud, M8, inlet manifold to head	A912E2022F	5	5	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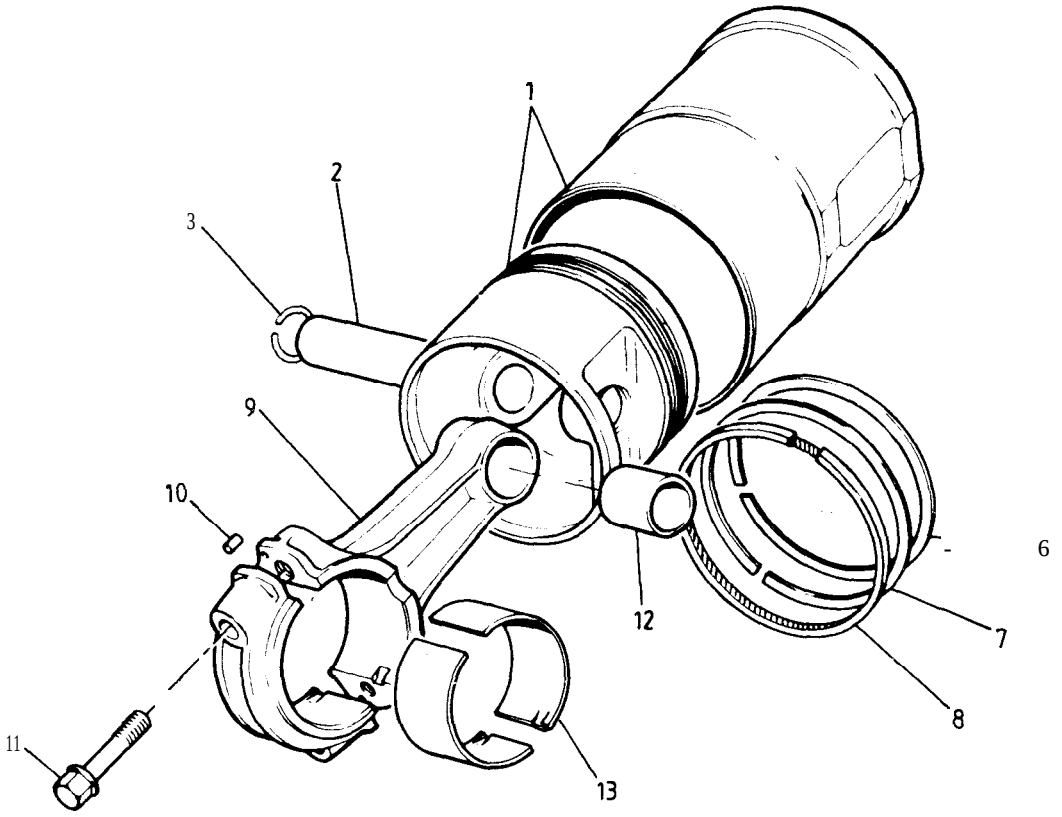
FUNCTION CODE

CONTENTS: Cam Housings, Camshafts, Tappets

40.07A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Camshaft Housing, inlet	A912E2034K	1		2.2 litre. May use A920E0016K
	" " "	A920E0016K*	1		2.0 litre
2	" " exhaust	A912E2033K	1		2.2 litre. May use A920E0015K
	" " "	A920E0015K*	1		2.0 litre
3	Nut, M8, cam housing to head	A075W3021Z	4		* Machined for head
4	Washer, flat, " " "	A075W4020Z	4		stud clearance
5	Torx Bolt, " " "	B911E1311F	16		Requires El0 socket
6	Plug, M20, Torx bolt access	A911E6343F	10		
7	'0' Ring, access plug	A912E6694F	10		
8	Tappet	B920E0017Z	16		
9	Shim, tappet		16		Selective - see 40.07A page 2
10	Thrust Washer, 0.173 - 0.175", cam endfloat	A907E0619Z	)		
	" " 0.175 - 0.177", " "	A907E0620Z	) 2		
	" " 0.177 - 0.179", " "	A907E0621Z	)		
	" " 0.179 - O-181", " "	A907E0622Z	)		
14	Dowel, thrust washer to camshaft	A907E0476Z	2		
15	Setscrew, M10, " " "	A075W1046Z	2		
16	Washer, spring, " " "	A075W4037Z	2		
17	Rear Cover, camshaft housing	A907E0090Z	2		
18	'0' Ring, rear cover	A907E6027Z	2		
19	Stud, rear cover/heatshield	A912E2043F	4		For turbo heatshield see 45.05A
22	Camshaft, inlet (type '107')	A912E0107F	1		Ident. on front shank: 7777....
23	Camshaft, exhaust (type '107')	A912E0107F	1		" " " " "
25	Woodruff Key, camshaft pulley	A907E6025Z	2		
26	Oil Seal, camshaft front	B907E6042F	2		
27	Blanking Plug, camshaft front	A907E6069F	2		
30	Cam Cover, inlet, front filler	A910E2481K	1		S4. Red finish
	" " " " "	P691.4007.002AF	1		Sport 300. Slate grey metallic finish
32	Cam Cover, exhaust	A912E2278K	1		S4. Red finish
	" " "	P691.4007.001AF	1		Sport 300. Slate grey metallic finish
34	Screw, cam cover fixing	B912E2037F	6		
35	'0' Ring, cam cover fixing screws	A912E6695F	6		
36	Gasket, cam cover to housing	A912E2040F	2		
37	Spiro1 Pin, gasket location	A079W6245F	8		
38	Oil Filler Cap, ratchet type	A912E6965F	1		

TAPPET SHIM CHART

Shim Thickness (in.)	Part Number	Shim Thickness (in)	Part Number	Shim Thickness (in)	Part Number	Shim Thickness (in)	Part Number
0.060"	A026E6160Z	0.083"	A026E6183Z	0.106"	A026E6206Z	0.129"	A026E6229Z
0.061"	A026E6161Z	0.084"	A026E6184Z	0.107"	A026E6207Z	0.130"	A026E6230Z
0.062"	A026E6162Z	0.085"	A026E6185Z	0.108"	A026E6208Z	0.131"	A026E6231Z
0.063"	A026E6163Z	0.086"	A026E6186Z	0.109"	A026E6209Z	0.132"	A026E6232Z
0.064"	A026E6164Z	0.087"	A026E6187Z	0.110"	A026E6210Z	0.133"	A026E6233Z
0.065"	A026E6165Z	0.088"	A026E6188Z	0.111"	A026E6211Z	0.134"	A026E6234Z
0.066"	A026E6166Z	0.089"	A026E6189Z	0.112"	A026E6212Z	0.135"	A026E6235Z
0.067"	A026E6167Z	0.090"	A026E6190Z	0.113"	A026E6213Z	0.136"	A026E6236Z
0.068"	A026E6168Z	0.091"	A026E6191Z	0.114"	A026E6214Z	0.137"	A026E6237Z
0.069"	A026E6169Z	0.092"	A026E6192Z	0.115"	A026E6215Z	0.138"	A026E6238Z
0.070"	A026E6170Z	0.093"	A026E6193Z	0.116"	A026E6216Z	0.139"	A026E6239Z
0.071"	A026E6171Z	0.094"	A026E6194Z	0.117"	A026E6217Z	0.140"	A026E6240Z
0.072"	A026E6172Z	0.095"	A026E6195Z	0.118"	A026E6218Z	0.141"	A026E6241Z
0.073"	A026E6173Z	0.096"	A026E6196Z	0.119"	A026E6219Z	0.142"	A026E6242Z
0.074"	A026E6174Z	0.097"	A026E6197Z	0.120"	A026E6220Z	0.143"	A026E6243Z
0.075"	A026E6175Z	0.098"	A026E6198Z	0.121"	A026E6221Z	0.144"	A026E6244Z
0.076"	A026E6176Z	0.099"	A026E6199Z	0.122"	A026E6222Z	0.145"	A026E6245Z
0.077"	A026E6177Z	0.100"	A026E6200Z	0.123"	A026E6223Z	0.146"	A026E6246Z
0.078"	A026E6178Z	0.101"	A026E6201Z	0.124"	A026E6224Z	0.147"	A026E6247Z
0.079"	A026E6179Z	0.102"	A026E6202Z	0.125"	A026E6225Z	0.148"	A026E6248Z
0.080"	A026E6180Z	0.103"	A026E6203Z	0.126"	A026E6226Z	0.149"	A026E6249Z
0.081"	A026E6181Z	0.104"	A026E6204Z	0.127"	A026E6227Z	0.150"	A026E6250Z
0.082"	A026E6182Z	0.105"	A026E6205Z	0.128"	A026E6228Z		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FUNCTION CODE: 40.09A

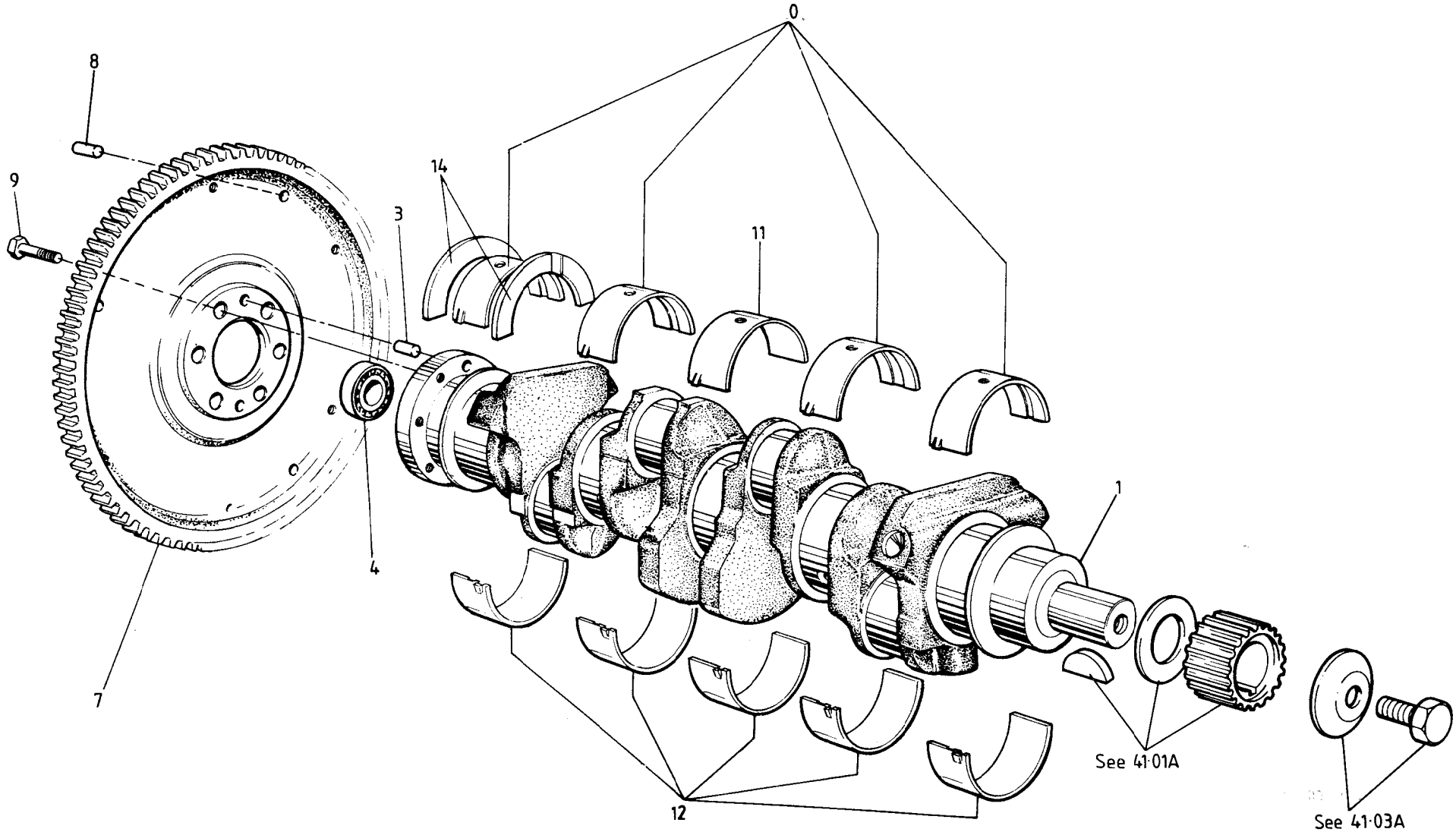
CONTENTS: Pistons & Liners, Connecting Rods

FUNCTION CODE 40.09A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Piston & Liner Assembly	A910E9269F*	4		2.2 litre) Inc. items up to 8
	" " " "	A920E0019F*	4		2.0)
	Permabond A905 Surface Conditioner	A912E6759V	A/R		> Cylinder liners to block
	Loctite 572 Sealant/Adhesive	A912E7030V	A/R		>
2	Gudgeon Pin, profiled	A910E2555H	4		
3	Circlip, gudgeon pin retention	A910E6781F	a		
6	Compression Ring, top, chrome plated	A910E2193F	4		Top & bottom internal edges bevelled
7	" " second	A910E2194F	4		Plain
8	Oil Control Ring	A910E2195F	4		
9	Connecting Rod	B910E0714F#	4		Inc. items up to 12
10	Dowel, cap to rod	A907E0339Z	8		
11	Bolt, cap to rod	A907E0344Z	8		
12	Bush, connecting rod small end	A907E0357Z	4		
13	Bearing Shell, conn. rod 'big end' standard	A907E0342Z	)		
	" " " " " " - 0.010"	A907E05402	) 8		
	" " " " " " - 0.020"	A907E0541Z	)		

* Unless ordering a complete set, quote piston weight grade marking stamped on crown (e.g. +2).

Unless ordering a complete set, quote weight grade letter painted on front of rod.

Esprit range: '93 M.Y. onwards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FUNCTION CODE

CONTENTS : Crankshaft, Flywheel

40.11A	PART DESCRIPTION	PART NUMBER	QUANTITY s4	QUANTITY S4S/ P.300	REMARKS
1	Crankshaft & Dowels	A910E2378J	1	1	.2 litre.
	" " "	A920E0018J	1		.O litre.
3	Dowel, crankshaft to flywheel	A907E6015F	2		
	" " " "	P691.4011.002AK		2	
4	Spigot Bearing, ball	A912E6862F	1	1	
	Permabond Al34	AlOOB6155V	A/R	A/R	
7	Flywheel (integral ring gear)	A910E2417F	1		xcept USA. R/B B910E2417F (material
	" " " "	B910E2417F	1		SA spec)
	" " " "	P691.4011.001AF		1	/B P691.4011.001BF (material spec.)
	" " " "	P691.4011.001BF		1	
8	Dowel, clutch cover to flywheel	A082F4118F	3		
	" " " " "	P691.4011.002AF		3	
9	Bolt, flywheel to crankshaft	A907E6020Z	6	6	
	Permabond A134, flywheel bolts	AlOOB6155V	A/R	A/R	
10	Shell, main bearing, std i/d, std o/d	A907E0336Z	4	4	Groove & hole) Upper, except centre
11	" " " " " " "	A911E1315F	1	1	Plain with hole) Upper, centre
12	" " " " " " "	A907E1170F	5	5	Plain) Lower
	Shell, main bearing, - 0.010" i/d, std o/d	A907E0538Z	4	4	Groove & hole) Upper, except centre
	" " " " " " "	A911E1317F	1	1	Plain with hole) Upper, centre
	" " " " " " "	A907E1172F	5	5	Plain) Lower
	Shell, main bearing, - 0.020,' i/d, std o/d	A907E0539Z	4	4	Groove & hole) Upper, except centre
	" " " " " " "	A911E1318F	1	1	Plain with hole) Upper, centre
	" " " " " " "	A907E1173F	5	5	Plain) Lower
	Shell, main bearing, std i/d, + 0.015" o/d	A907E0675Z	4	4	Groove & hole) Upper, except centre
	" " " " " " "	A911E1316F	1	1	Plain with hole) Upper, centre
	" " " " " " "	A907E1171F	5	5	Plain) Lower
	Shell, main bearing, - 0.010" i/d, + 0.015" o/d	B907E0675Z	4	4	Groove & hole) Upper, except centre
	" " " " " " "	B911E1316F	1	1	Plain with hole) Upper, centre
	" " " " " " "	B907E1171F	5	5	Plain) Lower

FUNCTION CODE	CONTENTS : Crankshaft, Flywheel		QUANTITY		
40.11A	PART DESCRIPTION	PART NUMBER	S4	S4S/ SP.300	REMARKS
	Shell, main bearing, - 0.020" i/d, + 0.015" o/d	C907E0675Z	4	4	(Groove & hole) Upper, except centre
	" " " " " " "	C911E1316F	1	1	(Plain with hole) Upper, centre
	" " " " " " "	C907E1171F	5	5	(Plain) Lower
14	Thrust Washer, crankshaft, standard	A907E1000Z	)	)	
	" " " + 0.0025"	A907E1001Z	)	)	
	" " " + 0.0050~	A907E1002Z	)'2	) 2	
	" " " + 0.0075"	A907E1003Z	)	)	
	" " " + 0.0100"	A907E1004Z	)	)	

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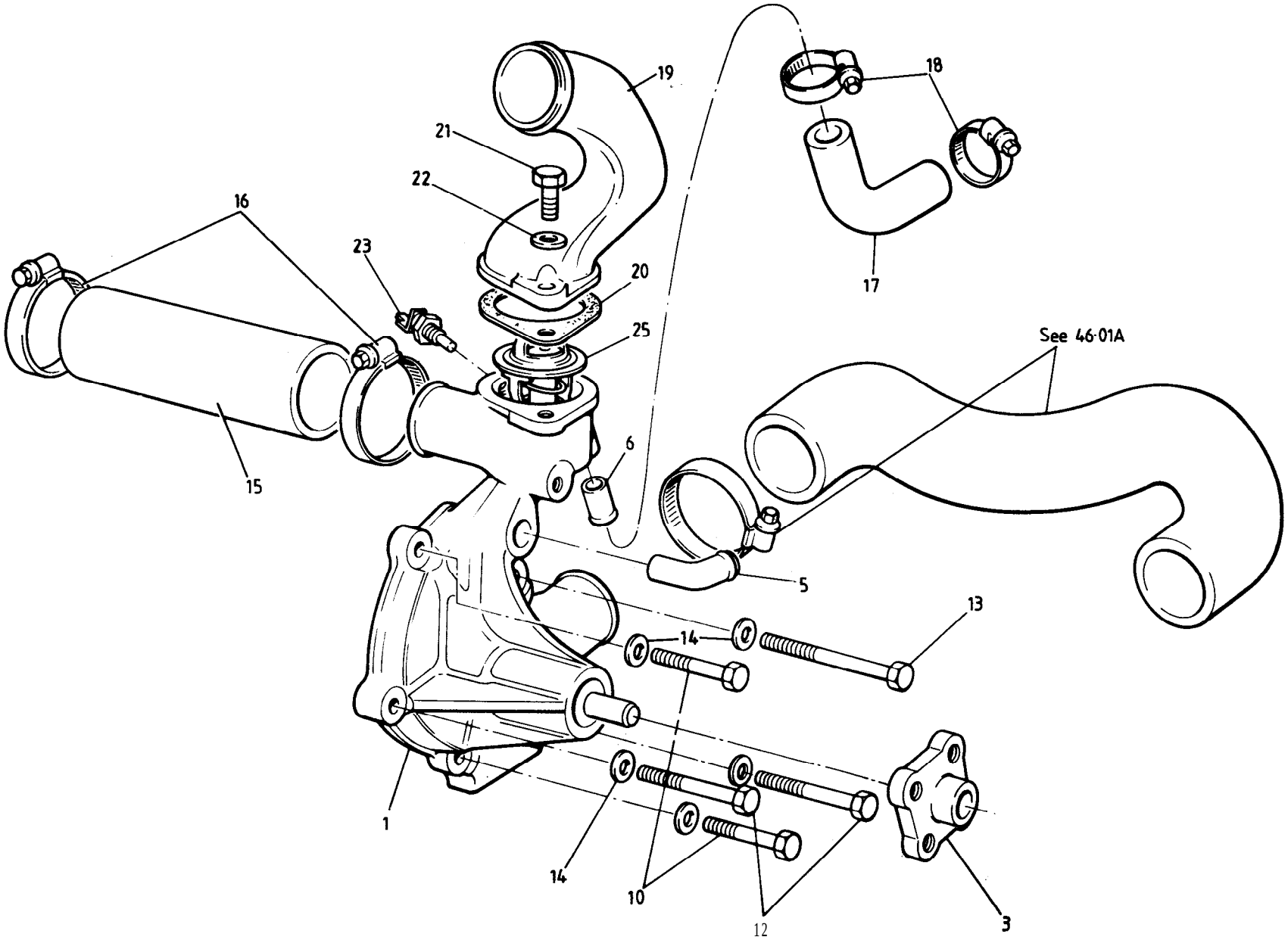
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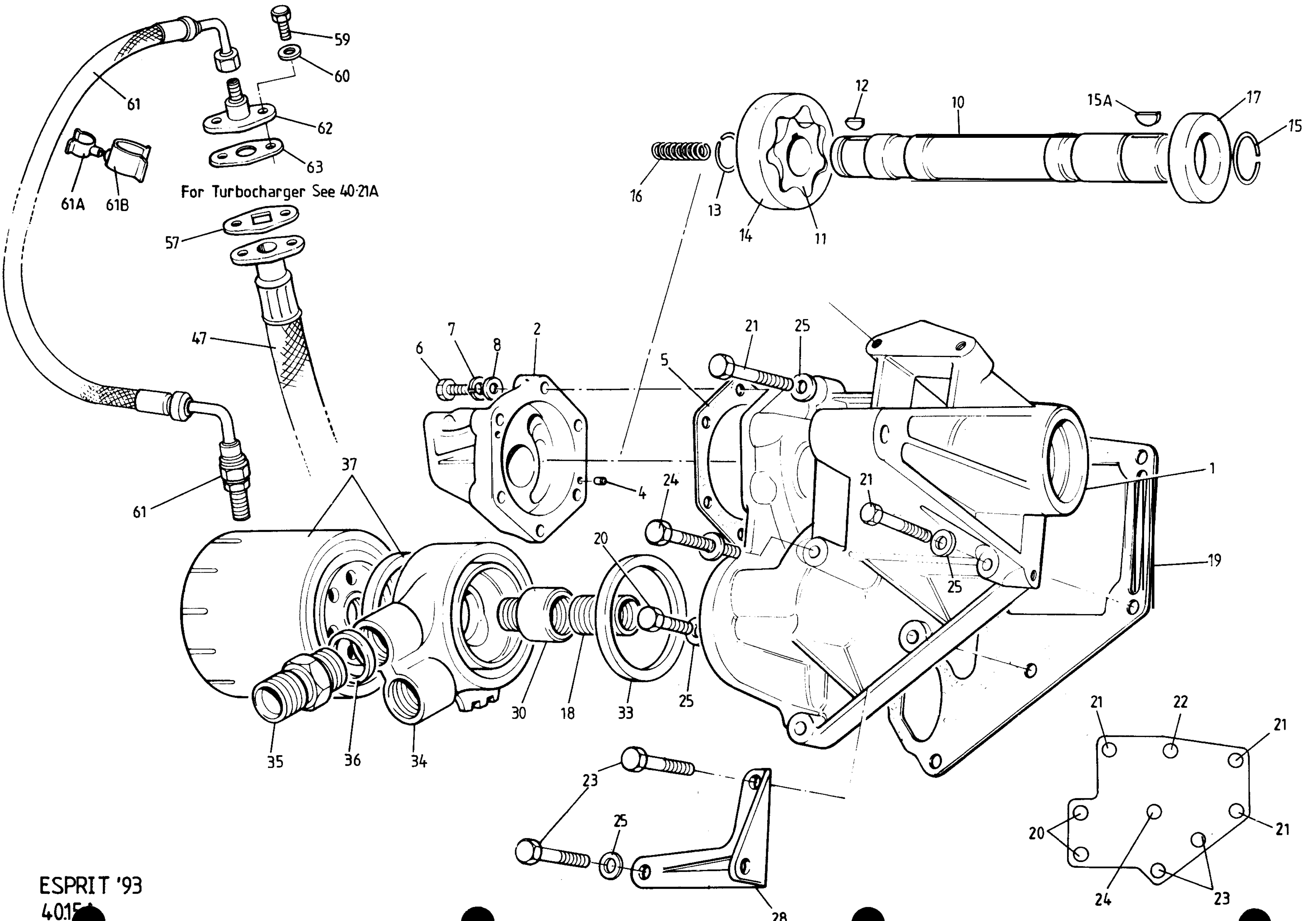
FUNCTION CODE	CONTENTS: Water Pump		QUANTITY		
40.13A	PART DECRPTION	PART NUMBER	ALL		REMARKS
1	Water Pump Assembly (inc. hub & stub pipes)	A912E9277J	1		
	Permabond A905 Surface Conditioner, pump/block	A912E6759V	A/B		
	Loctite 509, water pump to block	A920E6007V	A/B		
3	Hub, water pump pulley	A910E7018F	1		
5	Elbow Pipe, heater return	A911E1431F	1		
6	Stub Pipe, inlet from head front	A910E1909F	1		
	Permabond A131, pipes to pump	A912E7034V	A/B		
10	Bolt, M6 x 30, pump to block	A075W2028Z	2		
12	" M6 x 40, " " "	A075W2030Z	2		
13	" M6 x 55, " " "	A075W2034Z	1		
14	Washer, flat, M6 x 12, water pump fixings	A075W4013Z	5		
15	Hose, inlet manifold to pump	A912E2017F	1		
16	Hose Clip, 32/50	A079K6019F	2		
17	Elbow Hose, cyl. head front to thermo. hsg.	A912E1837F	1		
18	Hose Clip, elbow hose	A079K6018F	2		
19	Thermostat Cover Outlet Elbow	B912E1829K	1		
20	Gasket, thermostat cover	A026E6102Z	1		
21	Setscrew, M8 x 25, thermostat cover fixing	A075W1039Z	2		
22	Washer, flat, " " "	A075W4020Z	2		
23	Thermal Transmitter, temperature gauge	A91236739F	1		For gauge see 17.07A
	Permabond A131, transmitter to pump	A912E7034V	A/B		
25	Thermostat, 82°C	A907E6046Z	1		



ESPRIT '93
40.15

FUNCTION CODE

CONTENTS : Auxiliary Housinci, Oil Pump. Turbo Oil Pipes

40.15A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
	Auxiliary Housing & Oil Pump Assembly	A910E2595H	1		Inc. items up to 18.
1	Auxiliary Housing	A910E2591H	1		
2	Oil Pump Housing Assembly	E907E0803W	1		Inc. oil pressure relief valve
4	Dowel, pump body to aux. housing	A907E0530F	2		
5	Gasket, " " " " "	A907E0474Z	1		
6	Bolt, M6 x 30, " " " "	A075W2028Z	6		
7	Washer, spring, " " "	A075W4035Z	6		
8	Washer, flat, " " "	A075W4013Z	6		
	Auxiliary Shaft & Rotor Assembly	B907E0785F	1		Inc. key & circlip
10	Auxiliary Shaft	E907E0291H	1		
11	Rotor, oil pump	A907E0472F	1		
12	Woodruff Key, oil pump rotor	A907E6001Z	1		
13	Circlip, rotor to shaft	A907E6101F	1		
14	Annulus, oil pump	A907E0473Y	1		
15	Circlip, pulley abutment	A907E6067Z	1		
15A	Woodruff Key, auxiliary shaft pulley	A907E6025Z	1		
16	Spring, oil pump/chargecooler pump	B907E0135Z	1		
17	Oil Seal, auxiliary shaft front	A910E7025H	1		
18	Adaptor Union, oil filter	A907E0249Z	1		
	Permabond Al34	AlOOB6155V	A/R		
19	Gasket, auxiliary housing to block	D907E0442Z	1		
	Wellseal, aux. housing to cylinder block	A907E6119Z	A/R.		
20	Setscrew, M8 x 25, " " " "	A075W1039Z	2		
21	Bolt, M8 x 60, " " " "	A075W2043Z	3		
22	Bolt, M8 x 40, " " " "	A075W2039Z	1		
23	Bolt, M8 x 45, " " " "	A075W2040Z	2		
24	Bolt, M8 x 90, aux. housing to block	A075W2048F	1		
25	Washer, flat, aux. housing fixings	A075W4020Z	9		
28	Bracket, a.c. compressor rear	C912E1379F	1		
30	Extension Union, oil filter	B907E0571F	1		
33	Sealing Ring, oil cooler adaptor to housing	A907E6167F	1		
34	Adaptor (sandwich plate), oil cooler	A907E1248K	1		
35	Union, oil cooler hoses to adaptor	A907E6300F	2		
	Permabond A134, union to adaptor	A100B6155V	A/R		
36	Washer, union to adaptor	B907E6301F	2		

FUNCTION CODE	CONTENTS: Auxiliary Housing. Oil Pump. Turbo Oil Pipes		QUANTITY		
40.15A	**PART DESCRIPTION**	**PARTNUMBER**	ALL		**REMARKS**
37	Oil Filter, inc. sealing ring	C907E6000W	1		May use 'A' or 'B' for service
47	Pipe, oil drain, turbocharger to sump	D910E0990J	1		
	'0' Ring, drain pipe to sump	A910E6491F	1		
	Setscrew, M6 x 16, " " "	A075W1028Z	2		
	Washer, flat, " " "	A075W4013Z	2		
57	Gasket, drain pipe to turbo	A910E6375H	1		
59	Setscrew, M8 x 20, drain/feed to turbo	A075W1038Z	4		
60	Washer, flat, " " " "	A075W4020Z	'4		
61	Hose, turbocharger oil feed	B910E2216F	1		
	Permabond A131, oil feed hose to gallery cover	A912E7034V	A/R		
61A	Swivel Clip, water hose to oil feed hose	A082W6331F	1		Large
61B	" " oil feed hose to water hose	A082W6338F	1		Small. R/B A089W6296F
	" " " " " " " "	A089W6296F	1		
62	Adaptor Flange, oil feed hose to turbo	A910E1545F	1		
63	Gasket, flange to turbo	A910E6374F	1		

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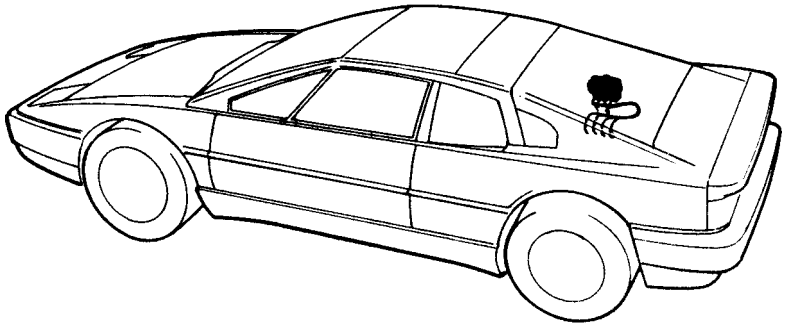
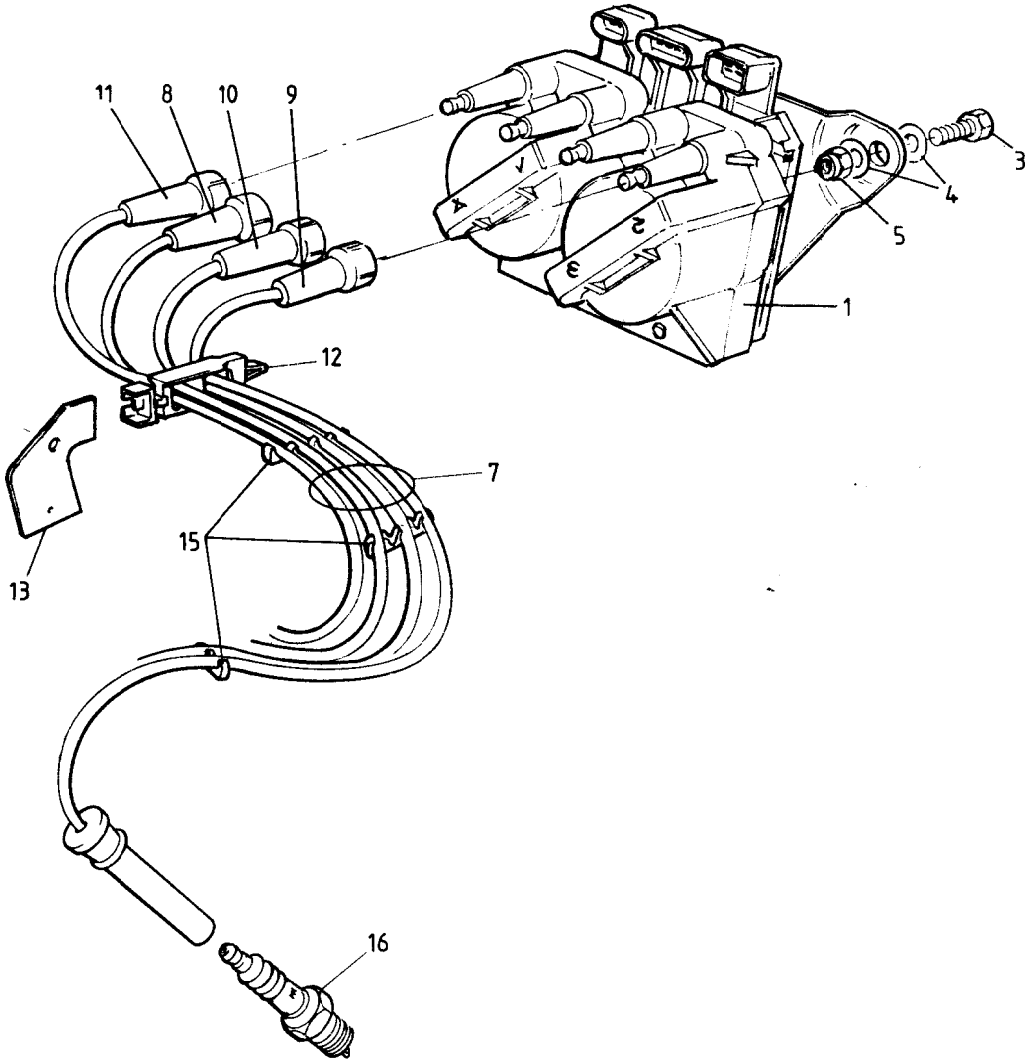
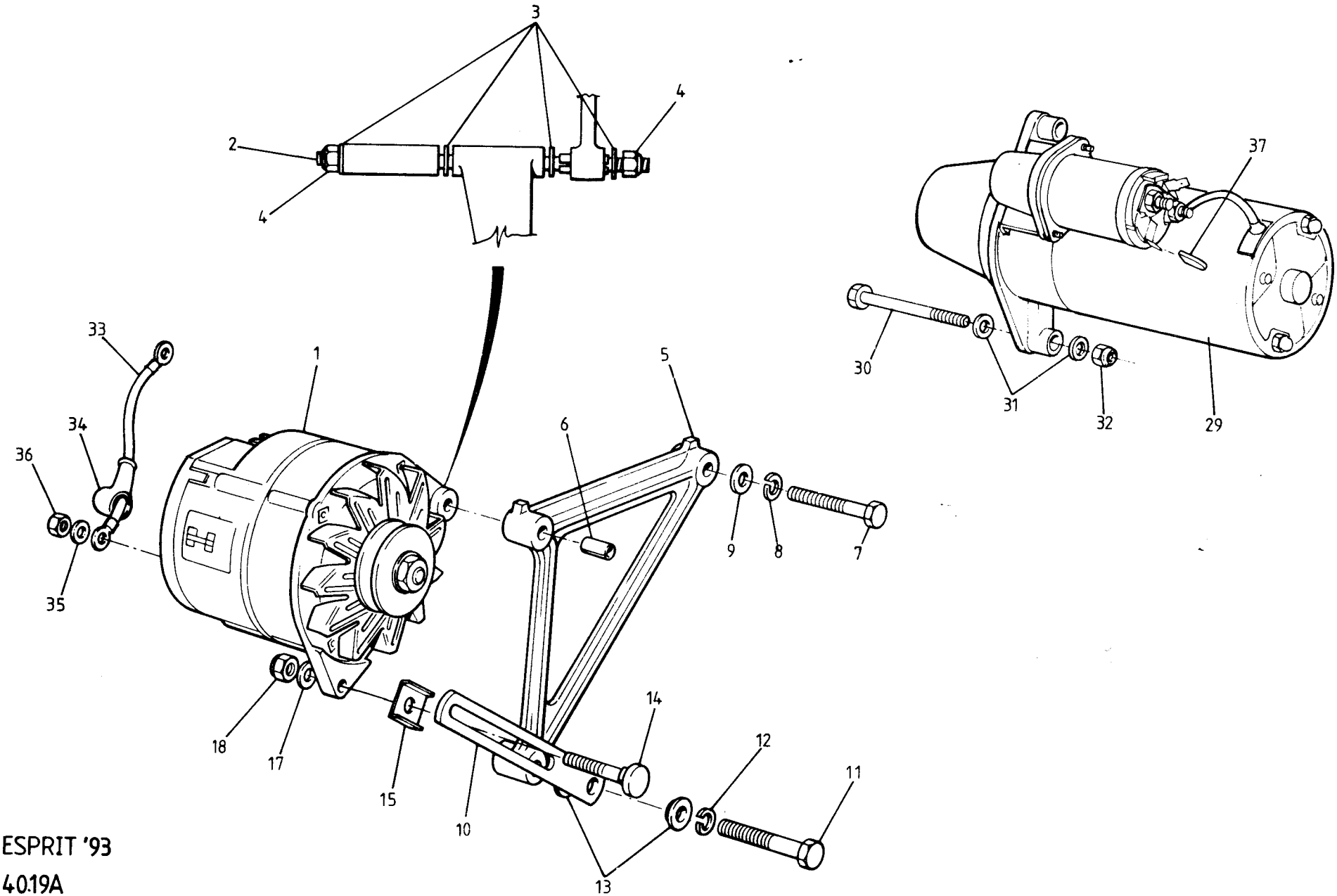




ESPRIT '93
4017A

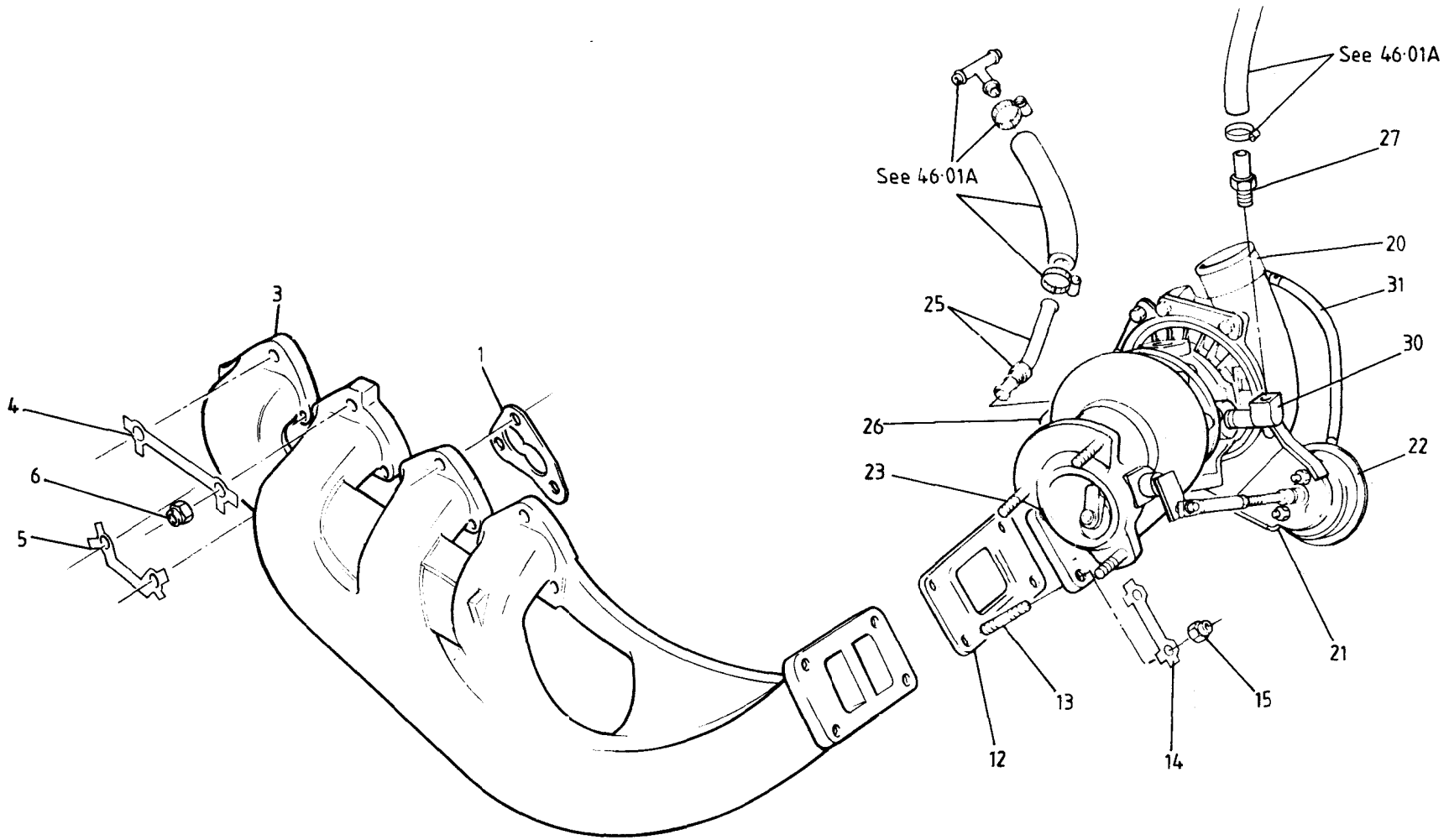
FUNCTION CODE	CONTENTS: D.I. Module/Ignition Coils, H.T. Leads, Spark Plugs		QUANTITY		
40.17A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Direct Ignition Module/H.T. Coils	A910E6940F	1		
3	Setscrew, M% x 20, ignition module to chassis	A075W1038Z	3		
4	Washer, flat, " " " "	A075W4020Z	6		
5	Nut, Nyloc, M%, " " " "	A075W3010Z	3		
7	Ignition Lead Set, H.T.	B910E6953F	1		
8	Ignition Lead, No.1	B910E2454H	1		
9	" " No.2	B910E2455H	1		
10	" " No.3	B910E2456H	1		
11	" " No.4	B910E2457H	1		
12	Clamp, H.T. leads	A910E6954F	1		
13	Plate, plug lead clip	A910E2513F	1		
15	Clip, H.T. harness, 4-cable	A910E7012F	5		Subdivide as required
16	Sparking Plug, NGK BPR6EKN	A910E7009F	4		



ESPRIT '93

40.19A

FUNCTION CODE	CONTENTS: Alternator, Starter Motor		QUANTITY		
40.19A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Alternator & Pulley Assembly, 90A	A910E6604F	1		
	Fan Kit, alternator	A910E6818S	1		
2	Stud, alternator to aux. housing	B910E1797F	1		
3	Washer, flat, alternator stud	A075W4020Z	4		
4	Nut, Nyloc, M8, " "	A075W3010Z	2		
5	Steady Bracket, alternator mounting	E910E1847K	1		
6	Split Bush, steady bracket/alt. pivot stud	B910E1796F	1		
7	Bolt, MS x 40, steady bracket to water pump	A075W2039D	1		
a	Washer, spring, " " " " "	A075W4036Z	1		
9	Washer, flat, " " " " "	A075W4020Z	1		
10	Strap, Nylon, alternator adjusting	B912E2220F	1		
11	Bolt, M10 x 45, strap/bracket/engine	A075W2053Z	1		
12	Washer, spring, strap anchor	A075W4037Z	1		
	Washer, flat, " "	A075W4020Z	1		
13	Bush, stepped " "	A912E2222F	2		
14	Clamp Bolt, alternator to strap	A910E2226F	1		
15	Clamp Plate, " " "	A912E2221F	1		
17	Washer, flat, " " "	A075W4020Z	1		
18	Nut, Nyloc, MS, " " "	A075W3010Z	1		
29	Starter Motor	A912E6884F	1		
	Washer, flat, starter terminal	A082W4118F	1		Fitted between eyelet & spring washer
	Insulation Sleeve, unused terminal	A910E6194F	1		
30	Bolt, M10 x 75, starter fixing	A075W2059Z	2		
31	Washer,flat " "	A075W4024Z	4		
32	Nut, Nyloc, M10, " "	A075W3011Z	2		
33	Cable, alternator to starter solenoid	B089M0414F	1		
34	Rubber Boot, alternator & starter terminals	A075W6174F	2		
35	Washer, flat, cable to alternator	A075W4020Z	1		
	Washer, s/proof, "" "	A082W4114F	1		
36	Nut, MB, cable to alternator	A075W3021Z	1		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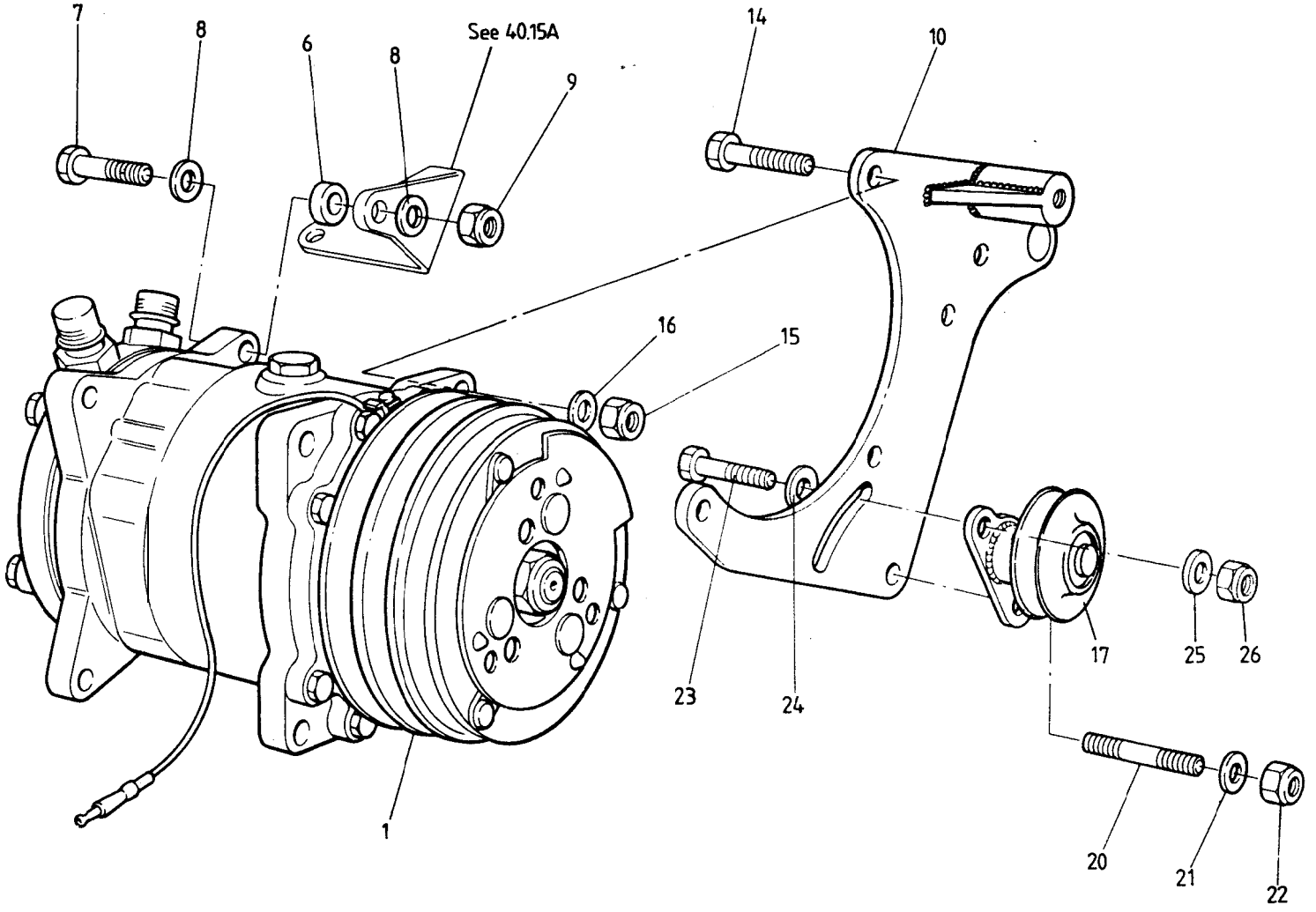
FUNCTION CODE	CONTENTS : Exhaust Manifold, Turbocharger		QUANTITY		
40.21A	PART DESCRIPTION	PART NUMBER	S4/ S4S	SPORT 300	REMARKS
1	Gasket, exhaust manifold to head	A910E2235F	4	4	
2	Exhaust Manifold	A910E2588K	1	1	
4	Locking Plate, manifold to head, upper	A910E2419F	2	2	
5	" " " " " lower	A910E2420F	4	4	
6	Nut, M8, Aerotite " " "	A075W3022Z	12	12	
12	Gasket, turbo to manifold	A910E2565F	1	1	
13	Stud, M10, turbo to manifold	A912E2020F	4	4	
14	Lockplate, " " "	A910E1563F	2	2	
15	Nut, M10, Kaylock, turbo to manifold	A089W3082F	4	4	
20	Turbocharger Assembly	A910E6959F	1		2.2 litre) S4
	" "	A920E6002F	1		2.0 litre)
	" "	A910E7043F	1		S4S
	" "	P691.4021.6OOCF		1	
21	Bracket, wastegate actuator capsule mounting	A910E2355H	1		
	" " " " "	P691.4021.001AF		1	
22	Capsule, wastegate actuation	A910E6915F	1	1	
23	Stud, turbo outlet	A910E7016F	3	3	
25	Stub Pipe & nut, turbo coolant feed	A910E2382F	1		
	" " " " "	A910E2544F		1	Same as outlet pipe
26	Elbow Adaptor, " " "	A910E2369F	1	1	
	Permabond, A134, elbow fixing	AlOOB6155V	A/R	A/R	
27	Pipe & Nut, turbo coolant outlet pipe	A910E2544F	1	1	
30	Elbow Adaptor, " " " "	A910E2369F	1	1	
	Permabond A134, elbow fixing	A100B6155V	A/R	A/R	
31	Hose, pressure sensing (inc. clips)	A910E9280Z	1	1	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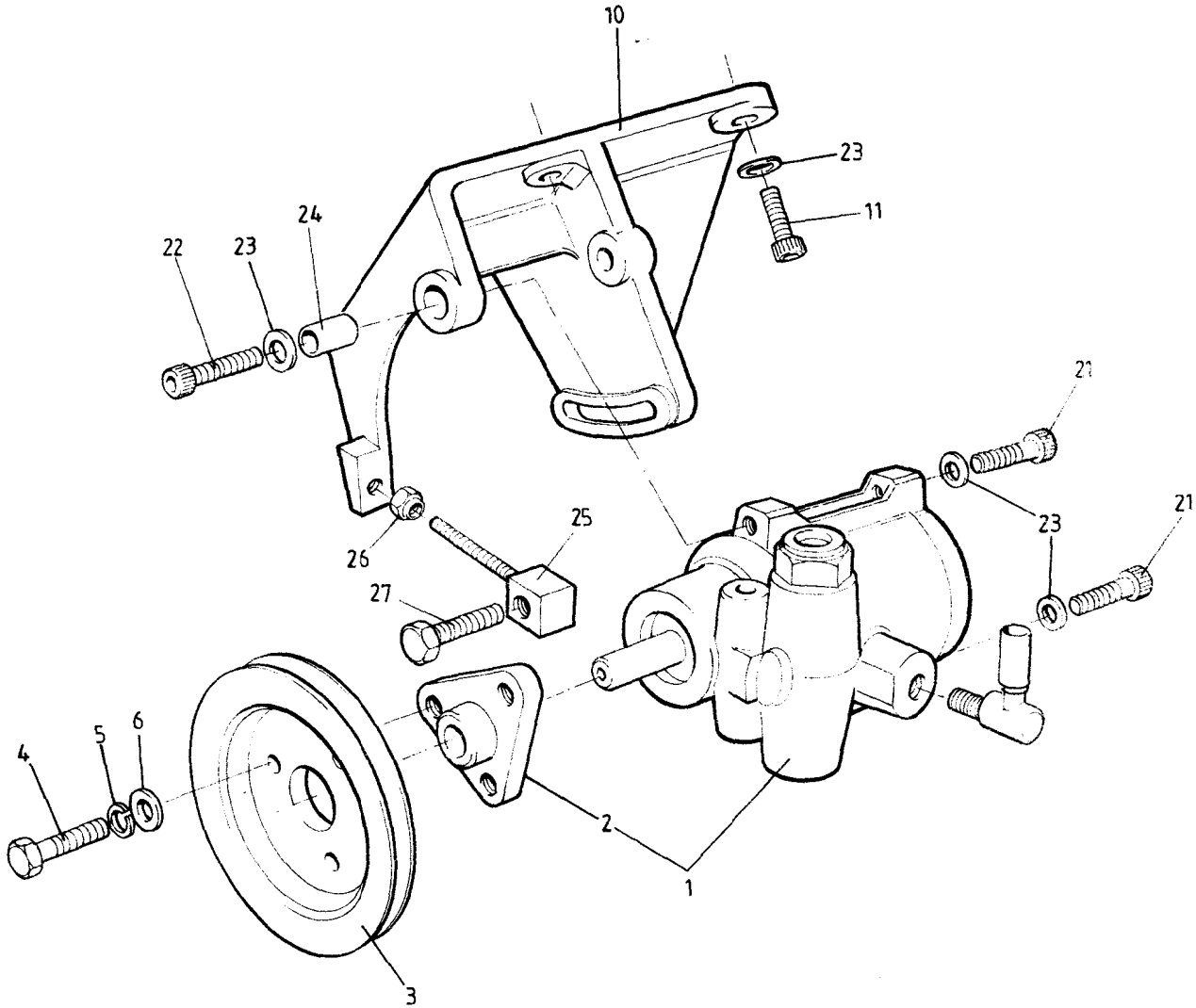
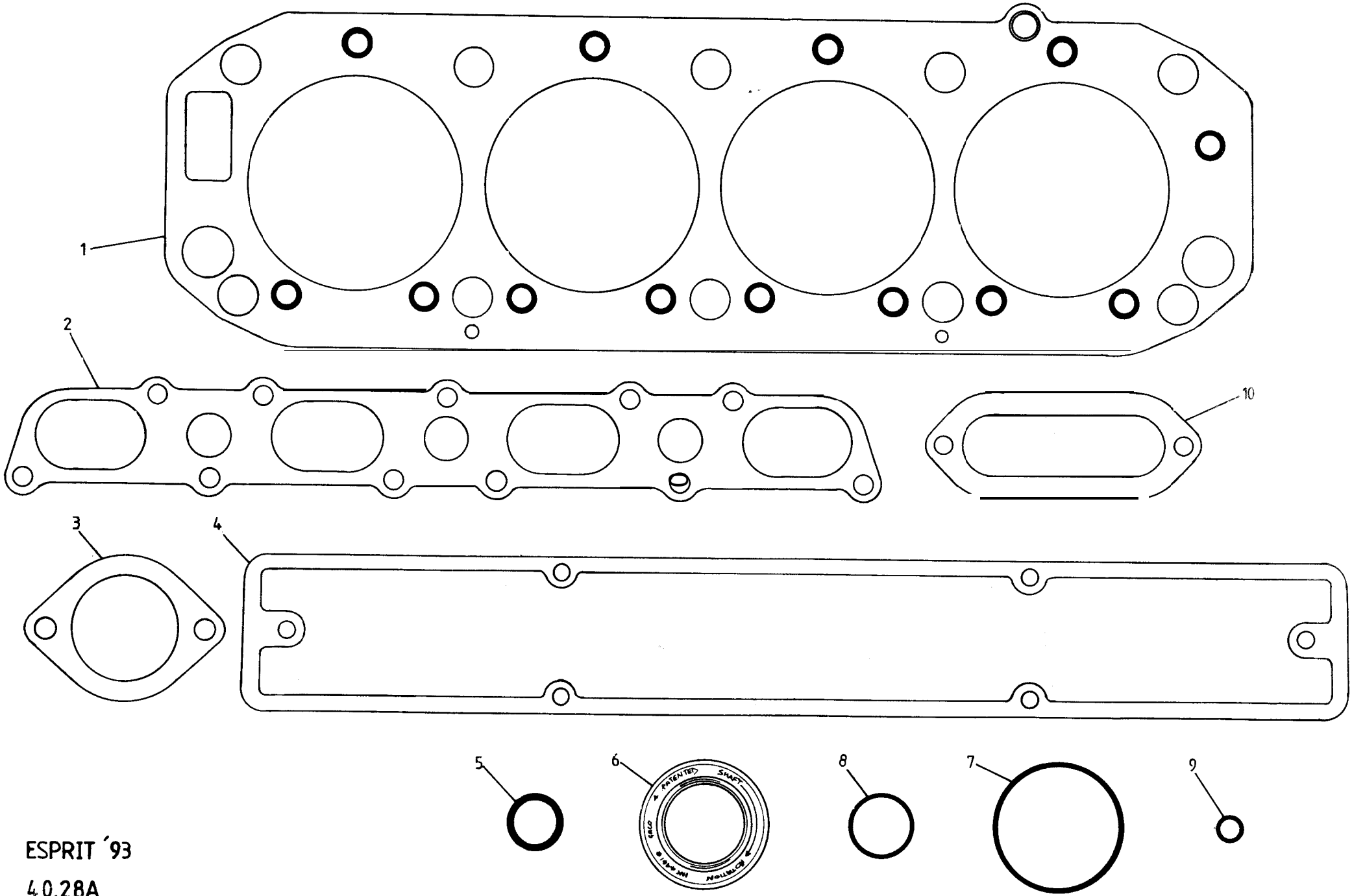
FUNCTION CODE	CONTENTS: A.C. Compressor, Mounting Bracket, Jockey Wheel		QUANTITY		
40.23A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Compressor, air conditioning	A079P6010F	1		
6	Spacer, 6.4mm, compressor to rear bracket	A907E1139F	1		
7	Bolt, M10 x 40, " " " "	A075W2052Z	1		
8	Washer, flat, " " " "	A075W4024Z	2		
9	Nut, M10, " " " "	A075W3011Z	1		
10	Bracket, compressor front to block	A912E2276F	1		
	Bolt, M10 x 45, compressor bracket to block	A075W2053Z	2		
14	Bolt, compressor to front bracket	A075W2051Z	3		
15	Nut, M10, " " " "	A075W3011Z	3		
16	Washer, flat, compressor to front bracket	A075W4024Z	3		
17	Idler Pulley & Adjuster Bracket Assembly	A910E9049J	1		
20	Stud, idler pulley bracket pivot	A907E1197F	1		
	Permabond A130, stud securing	A912E7033V	A/E		
21	Washer, flat, pulley bracket fixing	A075W4020Z	1		
22	Nut, M8, Nyloc, " " "	A075W3010Z	1		
23	Bolt, M8, idler pulley adjust slot	A075W2037Z	1		
24	Washer, thick, " " "	A079W4019F	1		
25	Washer, flat, " " "	A075W4020Z	1		
26	Nut, M8, Nyloc, " " "	A075W3010Z	1		

Esprit range: '93 M.Y. onwards



ESPRIT '93
4025A

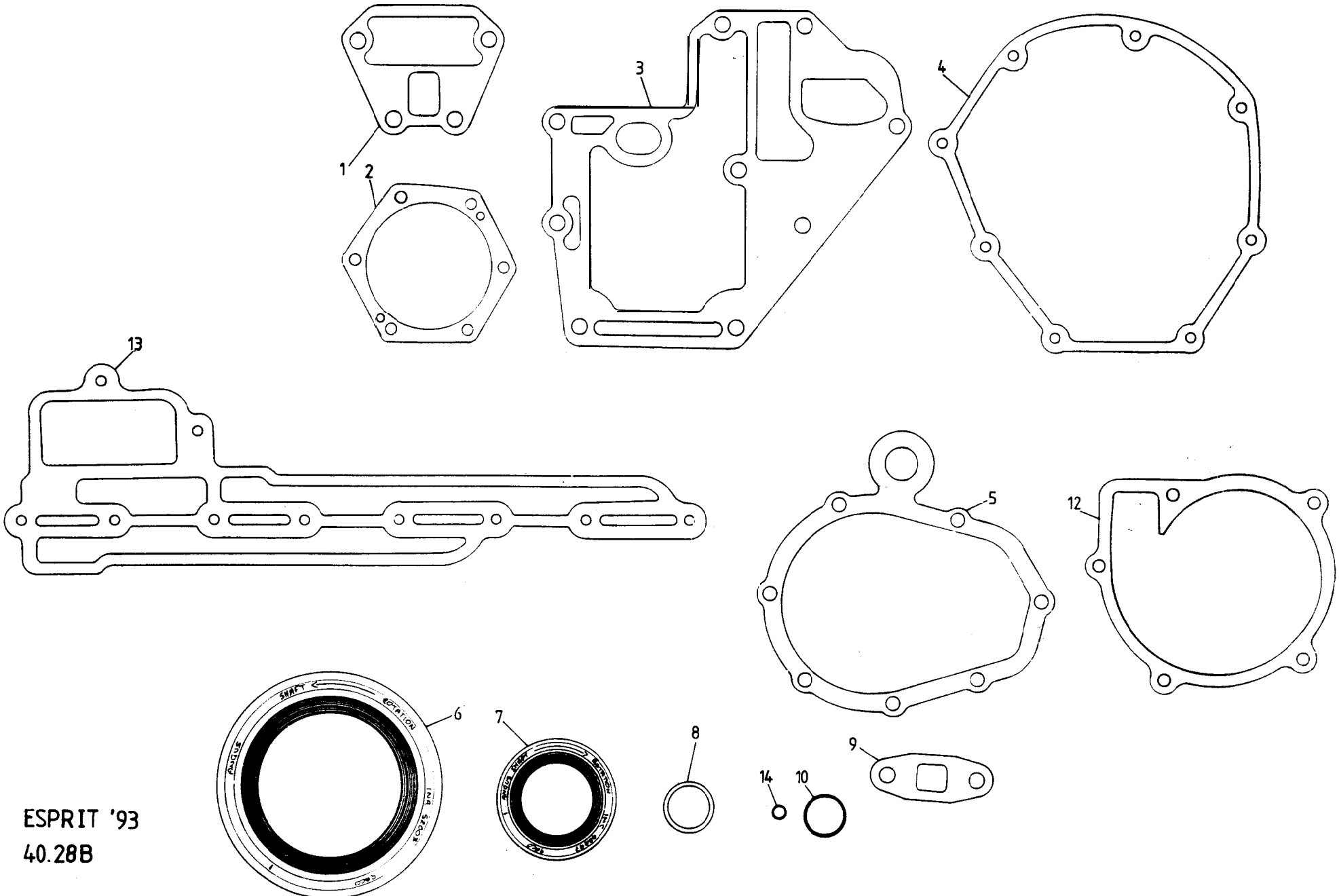
FUNCTION CODE	CONTENTS: Power Steering Pump, Pulley, Mounting Bracket		QUANTITY		
40.25A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Pump Assembly (inc. hub), power steering	A910E7022F	1		
2	Hub, power steering pump pulley	A912E7013F	1		
3	Pulley, power steering pump (pressed steel)	A912E6589F	1		R/B B912E6589F
	" " " " (cast alloy)	B912E6589F	1		
4	Setscrew, M8 x 12, pulley to pump	A075W1035Z	3		Use only with A912E6589F
	" M8 x 16, " " "	A075W1036Z	3		Use only with B912E6589F
5	Washer, spring, " " "	A075W4036Z	3		
6	Washer, flat, M8, " " "	A075W4020Z	3		
10	Bracket, PAS pump mounting	B910E2468K	1		
11	Setscrew, socket head, M8 x 25, pump brkt/block	A075W7024F	4		
21	" " " " " pump to bracket	A075W7024F	2		Rear
22	" " " M8 x 30, pump to bracket	A089W7052F	1		Front
23	Washer, flat, M8, pump/bracket fixing	A075W4020Z	7		
24	Split Bush, pump front fixing lug	A910E2560F	1		
25	Adjuster Stud, belt tension	B910E2470F	1		
26	Locking Nut, adjuster stud	A075W3021Z	1		
27	Pivot Bolt, belt tension adjuster stud	B910E2469F	1		
	Permabond A130, pump & bracket fixings	A912E7033V	A/R		



ESPRIT '93

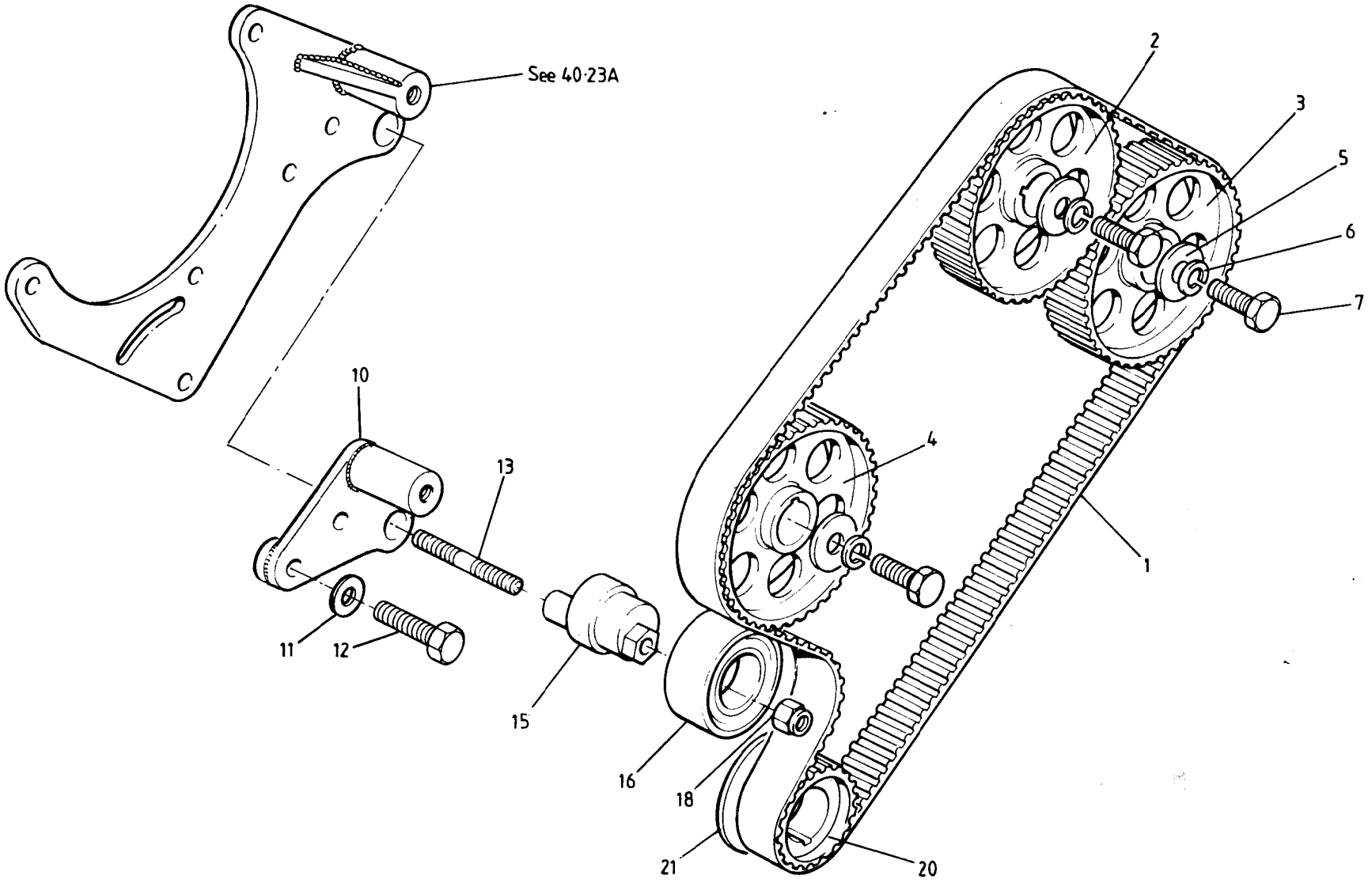
40.28A

FUNCTION CODE	CONTENTS Engine Upper Gasket Set		QUANTITY		
40.2811	**PART DESCRIPTION**	**PARTNUMBER**	ALL		**REMARKS**
	Engine Upper Gasket Set comprising:	B910E9246W	1		
1	Cylinder Head Gasket	B912E7029Z	1		
2	Inlet Manifold Gasket	A912E2009F	1		
3	Thermostat Housing Gasket	A026E6102Z	1		
4	Camshaft Cover Gasket	A912E2040F	2		
5	Camshaft Cover Screw '0' Ring	A912E6695F	6		
6	Camshaft Front Oil Seal	B907E6042Z	2		
7	Camshaft Rear Cover '0' Ring	A907E6027Z	2		
8	Camshaft Housing Access Plug '0' Ring	A912E6694F	10		
9	Cam Housing Oil Feed '0' Ring	A907E6202Z	2		
10	Diffuser/Plenum Gasket	A910E1474F	1		
					Exhaust Manifold Gaskets (A910E2235F 4 off) can be ordered separately if required.



ESPRIT '93
40.28B

FUNCTION CODE	CONTENTS: Engine Lower Gasket Set		QUANTITY		
40.28B	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
	Engine Lower Gasket Set comprising:	A910E0808W	1		
1	Oil Gallery Cover Gasket	A907E0438Z	1		
2	Oil Pump Gasket	A907E0474Z	1		
3	Auxiliary Housing Gasket	C907E0442Z	1		
4	Rear Seal Housing Gasket	A907E0671Z	1		
5	Front Cover Gasket	A907E0245Z	1		
6	Crankshaft Rear Oil Seal	A912E2334F	1		
7	Crankshaft Front Oil Seal	B907E6010Z	1		
8	Oil Pick Up Pipe Olive	A907E0606Z	1		
9	Gasket, oil drain pipe to turbo	A910E6375F	1		
10	'0' Ring, turbo drain pipe to sump	A910E6491F	1		
13	Scavenge Manifold Gasket	A910E1468F	1		) Not used in this application
14	'0' Ring, oil tank hose to pump	A910E6526F	1		) (dry sump engines)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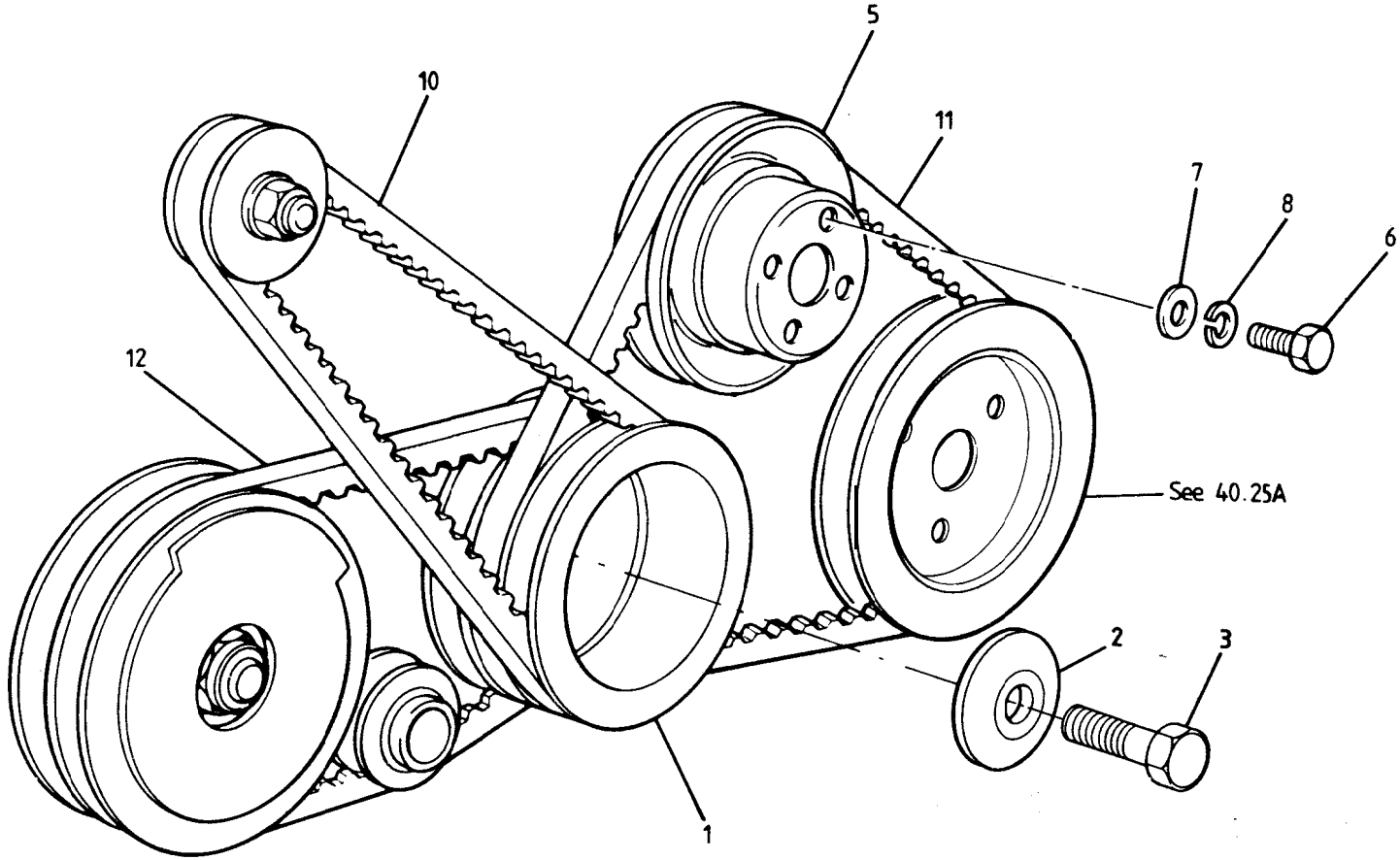
FUNCTION CODE	CONTENTS: Cam Belt, Toothed Pulleys, Tensioner		QUANTITY		
41.01A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Toothed Belt, camshaft timing	A912E6697F	1		R/B B912E6697F
	" " " "	B912E6697F	1		'95 M.Y. California
2	Toothed Pulley, inlet camshaft	C910E2186F	1		Red dots 110° M.O.P.) 2.2 litre
3	" " exhaust "	B910E2169F	1		Blue dots 100° M.O.P.) 910
	Toothed Pulley, inlet camshaft	C910E2186F	1		Red dots 110° M.O.P. > 2.0 litre
	" " exhaust "	A912E2019F	1		Green dots 104° M.O.P.> 920
4	Toothed Pulley, auxiliary shaft	A912E2019F	1		
5	Washer, pulley retention	A907E6026Z	3		
6	Washer, spring, pulley retention	A075W4037Z	3		
7	Bolt, Ml0 x 35, " "	A075W2015Z	3		
	Permabond A131, bolt securing	A912E7034V	A/R		
10	Bracket, belt tensioner to block	C912E2275F	1		)
11	Washer, flat, " " "	AO75W4024Z	2		) Heater only cars. For a.c. see
12	Bolt, M10 x 45, bracket to block	A075W2053Z	2		) 40.23A
13	Stud, M10, tensioner fixing	B907E0504K	1		
	Permabond A134, stud securing	A100B6155V	A/R		
15	Eccentric Hub, belt tensioner	A912E2176F	1		
16	Pulley/Bearing " "	A907E6249F	1		
	Sleeve, tensioner pulley diameter increaser	A920E0020F	1		>
	Circlip, sleeve to pulley/bearing	A920E6006F	1.		> 2.0 litre 920 only
	Belt Adjuster Assembly (hub, bearing, sleeve & circlip)	A920E0026J	1		>
18	Nut, M10, Nyloc, tensioner fixing	A075W3011Z	1		
	Washer, flat, tensioner fixing	A075W4024Z	1		
20	Toothed Pulley, crankshaft, cam belt drive	A912E2018F	1		
21	Flange, toothed pulley rear	A907E0096Z	1		
	Woodruff Key, toothed pulley to crank	A907E6016Z	1		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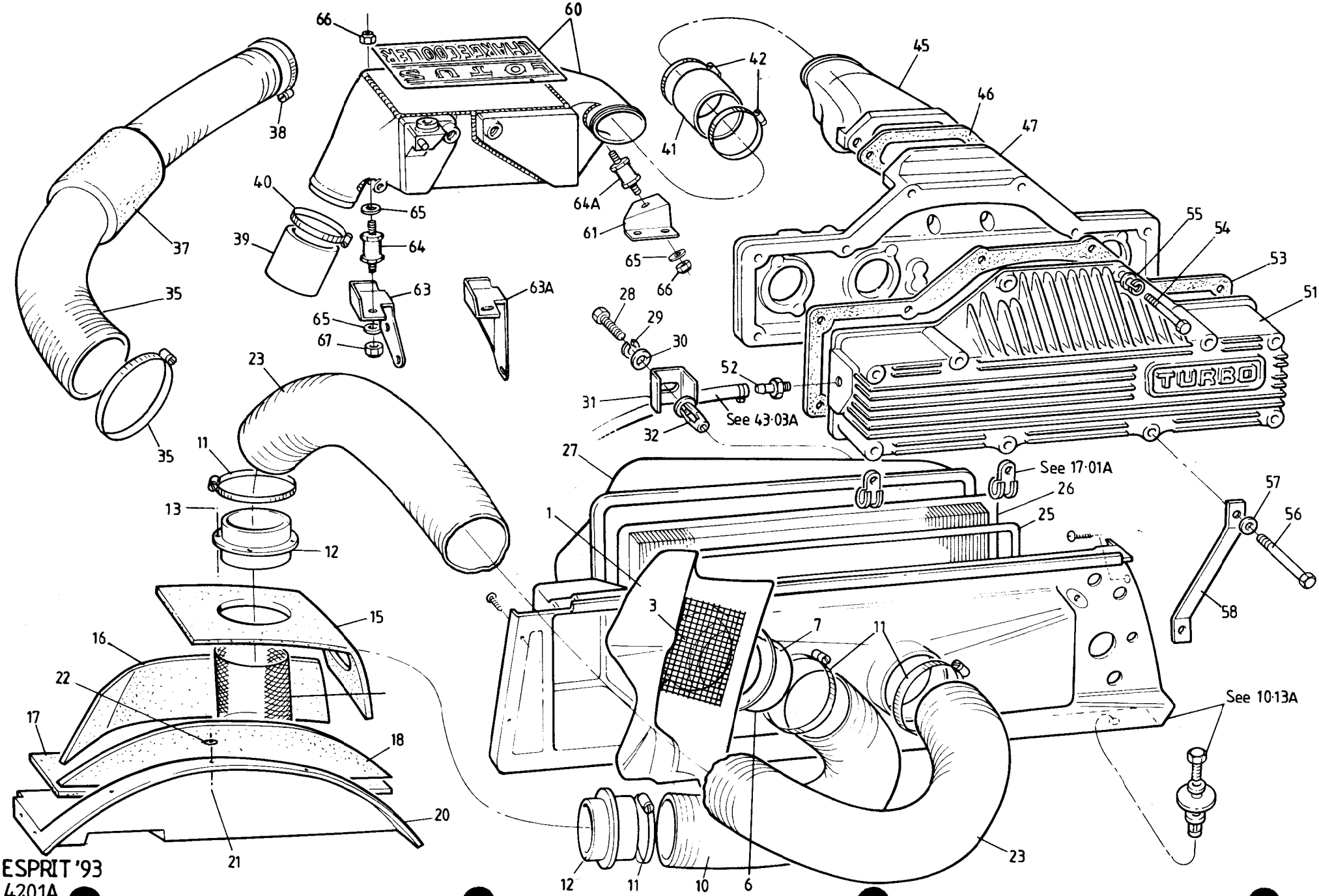
FUNCTION CODE	CONTENTS: Auxiliary Drive Belts & Pulleys		QUANTITY		
41.03A	**PART DESCRIPTION**	**PARTNUMBER**	ALL		**REMARKS**
1	'V' Pulley, crankshaft, triple groove	A907E1193F	1		
2	Washer, conical, pulley retention	B907E1106F	1		
3	Setscrew, ½" UNF x 1½", pulley retention	A075W1020Z	1		
5	'V' Pulley, water pump	A910E7019F	1		
6	Setscrew, M8 x 12, pulley to hub	A075W1035Z	4		
7	Washer, flat, pulley to hub	A075W4020Z	4		
8	Washer, spring, " " "	A075W4036Z	4		
10	'V' Belt, alternator drive	A907E6332F	1		
11	" " water pump/PAS pump drive	A910E6638F	1		
12	" " a.c. compressor drive	A910E6656F	1		If fitted



ESPRIT '93
4201A

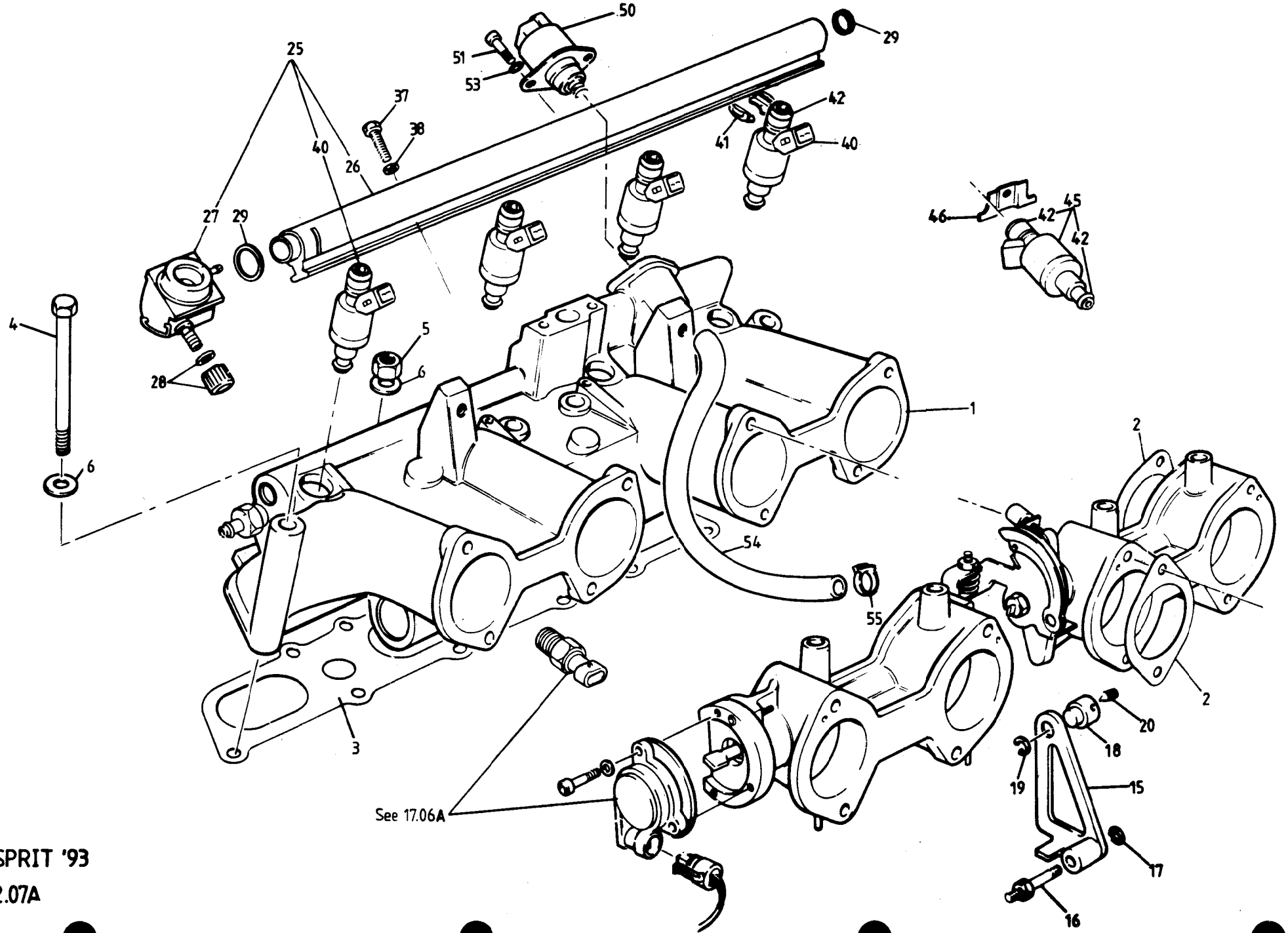
FUNCTION CODE	CONTENTS : Airbox, Chargecooler, Intake Plenum		QUANTITY		
42.01A	PART DESCRIPTION	PARTNUMBER	S4/ S4S	SPORT 300	REMARKS
1	Intake Duct, RH, engine air intake	A082B4770K	1	1	
	Pop Rivet, engine air intake duct to body	A075W6092Z	4	4	
3	Grille, " " " "	A082U5945F	1	1	
	Pop Rivet, waterproof, grille fixing	A075W6094Z	4	4	
	Washer, pop rivet, " "	A075W4001Z	4	4	
6	Adaptor, RH intake duct to trunking	A082B4824K	1	1	
	Screw, adaptor to intake duct	A075W5031Z	3	3	
10	Trunking, intake duct to silencer	A082B4929K	1	1	360 mm
11	Hose Clip, 80-100 mm, hose fixing	A907E6347F	4	4	
12	Hose Connector, induction silencer	A082B4926J	2	2	
	Pop Rivet, connector to body	A089W6297Z	8	8	
15	Liner, induction silencer, upper	A082V7762K	1	1	
16	" " " inboard	A082V7761K	1	1	
17	" " " lower	A082V7760K	1	1	
18	" " " outboard	A082V7759K	1	1	
19	Grille, induction silencer filter	A082U7213F	1	1	
20	Cover, induction silencer, wheelarch	A082B4925K	1	1	
	Pop Rivet, silencer cover to wheelarch	A089W6297F	9	9	
	Washer, pop rivet, " " "	A075W4000Z	9	9	
23	Trunking, induction silencer to sidewall	A082B4928K	1	1	
25	Seal, air filter element	C907E0588F	1	1	
26	Air Filter Element	A907E6182Z	1	1	
27	Cover, air filter	B082E4154K	1	1	
28	Setscrew, M6 x 30, cover to sidewall	A075W1032Z	2	2	
29	Washer, spring, M6, " " "	A075W4035Z	2	2	
30	Washer, flat, M6x25, " " "	A075W4017Z	2	2	
31	Clamp Bracket, " " "	A082E4158F	2	2	
32	Rivnut, M6, " " "	A082W3092F	2	2	
35	Hose Clip, induction hose to airbox	A907E6347F	1	1	
36	Induction Hose, airbox to turbo	F907E1089F	1		
	" " " " "	P691.4201.007BF		1	
37	Foam Sleeve, hose protection	A082E4129K	1	1	
38	Hose Clip, hose to turbo	A075L6044F	1	1	
39	Hose, turbo to chargecooler	A910E2542F	1		
	" " " "	P691.4201.008AF		1	
40	Hose Clip, chargecooler inlet hose	A082L6198F	2	2	

FUNCTION **CODE**

CONTENTS : Airbox, Chargecooler, Intake Plenum

42.01A	PART DESCRIPTION	PART NUMBER	QUANTITY S4/S4S	QUANTITY PORT 300	REMARKS
41	Hose, chargecooler to plenum nozzle	A910E2543F	1		ed
	" " " " "	P691.4201.009AF		1	rey
42	Hose Clip, chargecooler outlet hose	A910E7004F	2	2	
45	Plenum Nozzle	A910E2434K	1		ed) Houses secondary injectors
	" "	P691.42O1.001AF		1	rey)
46	Gasket, diffuser nozzle to backplate	A910E1474F	1	1	
47	Plenum Backplate	A910E9257J	1		ed) Part of throttle bodies
	" "	P691.4201.003AF		1	rey) assembly. See 42.07A
50	Gasket, plenum backplate to cover	A910E1475F	1	1	
51	Cover, intake plenum	B910E2198F	1		ed
	" " "	P691.4201.002AF		1	rey
52	Connector, straight, boost gauge take-off	A910E6771F	1	1	
53	Bolt, M8 x 55, cover/backplate/nozzle	A075W4036Z	2	2	
54	Washer, spring, M8, " "	AO75W4036Z	2	2	*** VIN R 1242 (S4 LHD)**
55	Washer, flat, M8x16, " "	AO75W402OZ	2	2	**R 1250 (S4 RHD)**
56	Bolt, M8 x 80, cover to backplate	A075W2045F	8	8	**R 8030 (Sport 300)**
57	Washer, flat, M8x16, cover to backplate	A075W4020Z	8	8	(Revised Harness)
58	Stay, plenum to engine mounting	A910E2444F	1	1	
60	Chargecooler, air/water (red 'Lotus Chargecooler'	B910E9270J	1		4. **3mm** air bleed spigot)inc.
	" " " "	C910E9270J	1		S4. 6mm " " " *)nameplate
	" " (Red 'Lotus Sport';	A910E9284J	1		4S. 6mm " " ")& MAT
	" " " (grey 'Sport 300')	P691.4201.800AJ		1	3mm " " ")Sensor
	" " " " "	P691.4201.800BJ		1	6mm " " " *)
	Spigot, 3mm, chargecooler air bleed	A910E2629F	1	1	rior VIN *
	" 6mm, " " "	A912E2623F	1	1	rom VIN * (torque to 8-10 Nm)
	Permabond A131, spigot to chargecooler	A912E7034V	A/R	A/R	
	Nameplate,, 'Lotus Chargecooler' (cast)	A910E2553F	1		ed > Prior VIN *
	" 'Lotus Sport 300' "	P691.42O1.010AF		1	rey >
	" 'Lotus Chargecooler' (printed)	B91OE2553F	1		4 Red }
	" 'Lotus Sport' "	A910E2623F	1		4S Red } From VIN *
	" 'Lotus Sport 300' "	P691.4201.010BF		1	port 300 Grey }

FUNCTION CODE	CONTENTS: Airbox, Chargecooler, Intake Plenum		QUANTITY		
42.01A	**PART DESCRIPTION**	**PART NUMBER**	**S4/ S4S**	SPORT **300**	**REMARKS**
61	Mounting Bracket, chargecooler front	A910E2451K	1	1	
63	" " " rear	A910E2452F	1		Fitted against engine. R/B B910E2452F (fitted against heatshield reflector) plus 2 spacers A907E0696Z. **See illustration 45.05A**
63A	" " " "	B91032452F	1	1	Replaces A910E2452F
64	Rubber Mounting, chargecooler rear	A910E7000F	1	1	
64A	" " " front	A910E2564K	1	1	
65	Washer, flat, **M8x16,** chargecooler fixing	A075W4020Z	3	3	
	Spacer Washer, chargecooler to rear mtg. brkt.	A079W4019F		2	
66	Nut, Nyloc M8, " " " " "	A075W3010Z	2	2	
67	Nut, M8 'Aerotite', " " " " "	A075W3022Z	1	1	



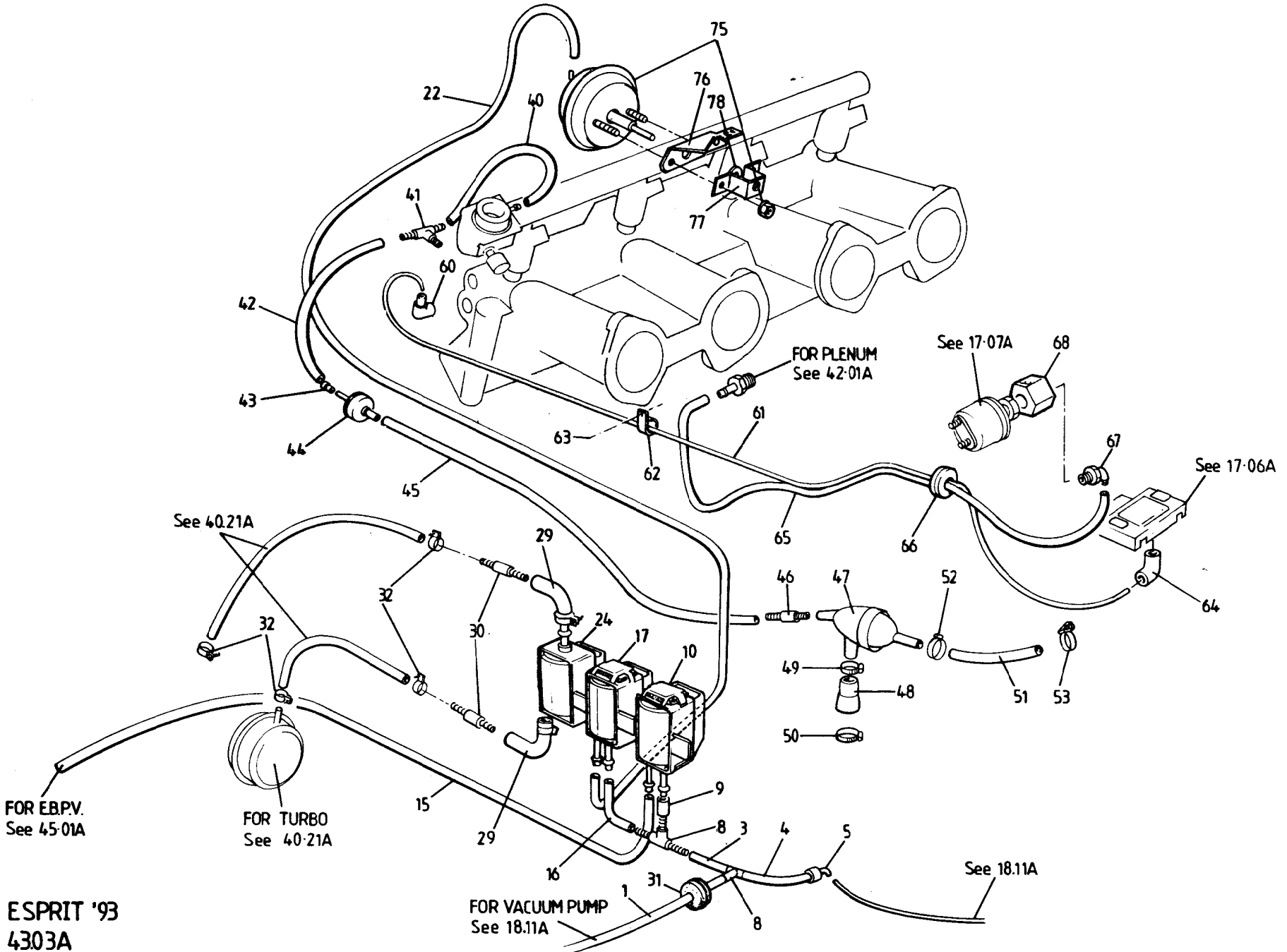
ESPRIT '93

42.07A

FUNCTION CODE	CONTENTS: Inlet Manifold, Fuel Rail, IAC Valve		QUANTITY		
42.07A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
	Inlet Manifold/Throttle Bodies/Plenum Backplate	A910E9260S	1		) Assembly must be mass flowed at the) factory if disassembled
1	Inlet Manifold	A910E9247J	1		inc. 'D' plugs
2	Gasket, manifold/throttle bodies/backplate	A910E1887F	8		
	Bolt, M6 x 65, " " " "	A082W7039F	8		
	Washer, " " " "	A075W4013Z	16		
	Nut, M6 Nyloc, " " " "	A075W3009Z	8		
3	Gasket, inlet manifold to cylinder head	A912E2009F	1		
4	Bolt, M8 x 100, " " " "	A075W2049Z	4		
5	Nut, M8, " " " "	A075W3021Z	5		
6	Washer, flat, " " " "	A075W4020Z	9		
15	Cam Lever, throttle jacking	A910E9205F	1		
16	Pivot Spindle, cam lever	A910E2162F	1		
	Permabond A131, pivot spindle securing	A912E7034V	A/R		
17	Retaining Ring, cam lever to pivot	A910E6798F	1		
18	Trunnion, operating rod to cam lever	A910E2163F	1		
19	Retaining Ring, trunnion to cam lever	A910E6791F	1		
20	Grub Screw, M5 x 8, rod to trunnion	A082W7034F	1		
25	Fuel Rail Assembly	A910E6946F	1		Inc. P.R.V. & injectors
26	Fuel Rail	A910E6945S	1		
27	Fuel Pressure Regulating Valve (P.R.V.)	A910E6950S	1		
	Fixing Kit, P.R.V. to fuel rail	A910E6971F	1		Inc. 2 retaining plates & 3 screws/washers
28	Test Connection Kit, P.R.V.	A100L6020S	1		Inc. connections & seal
29	'0' Ring Kit, fuel rail	A910E6969F	1		Inc. inlet seal, outlet seal, rail to PRV seal, PRV connector seal
40	Fuel Injector, primary (port)	A910E6941S	4		Inc. clip & '0' rings. Black upper band. Blue lower band
41	Clip Pack, primary injectors to fuel rail	A910E6947S	1		Inc. 5 clips
42	'0' Ring Pack, fuel injectors	A910E6979F	6		Inc. 2 '0' rings
45	Fuel Injector, secondary (plenum)	C910E7007F	2		Inc. '0' rings. Green upper & lower bands

Esprit range: '93 M.Y. onwards

FUNCTION CODE	CONTENTS: Inlet Manifold, Fuel Rail, IAC Valve		QUANTITY		
42.07A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
46	Retaining Plate, secondary injectors	A910E2518F	1		
	Screw, M4 x 12, retaining plate fixing	A082W7056Z	1		
	Permabond A130, " " "	A912E7033V	A/R		
	Washer, M4 flat, " " "	A082W4099F	2		
	Cable Tie, spacer, injector plate to nozzle	A082W6374F	2		
50	Idle Air Control (I.A.C.) Valve	A910E6942F	1		
51	Screw, M4 x 12, IAC valve fixing	A082W7056F	2		
53	Washer, M4 flat, " " "	A082W4099F	2		
54	Hose, plenum to IAC valve	A910E2428F	1		
55	Hose Clip, IAC hose	A079M6132F	2		



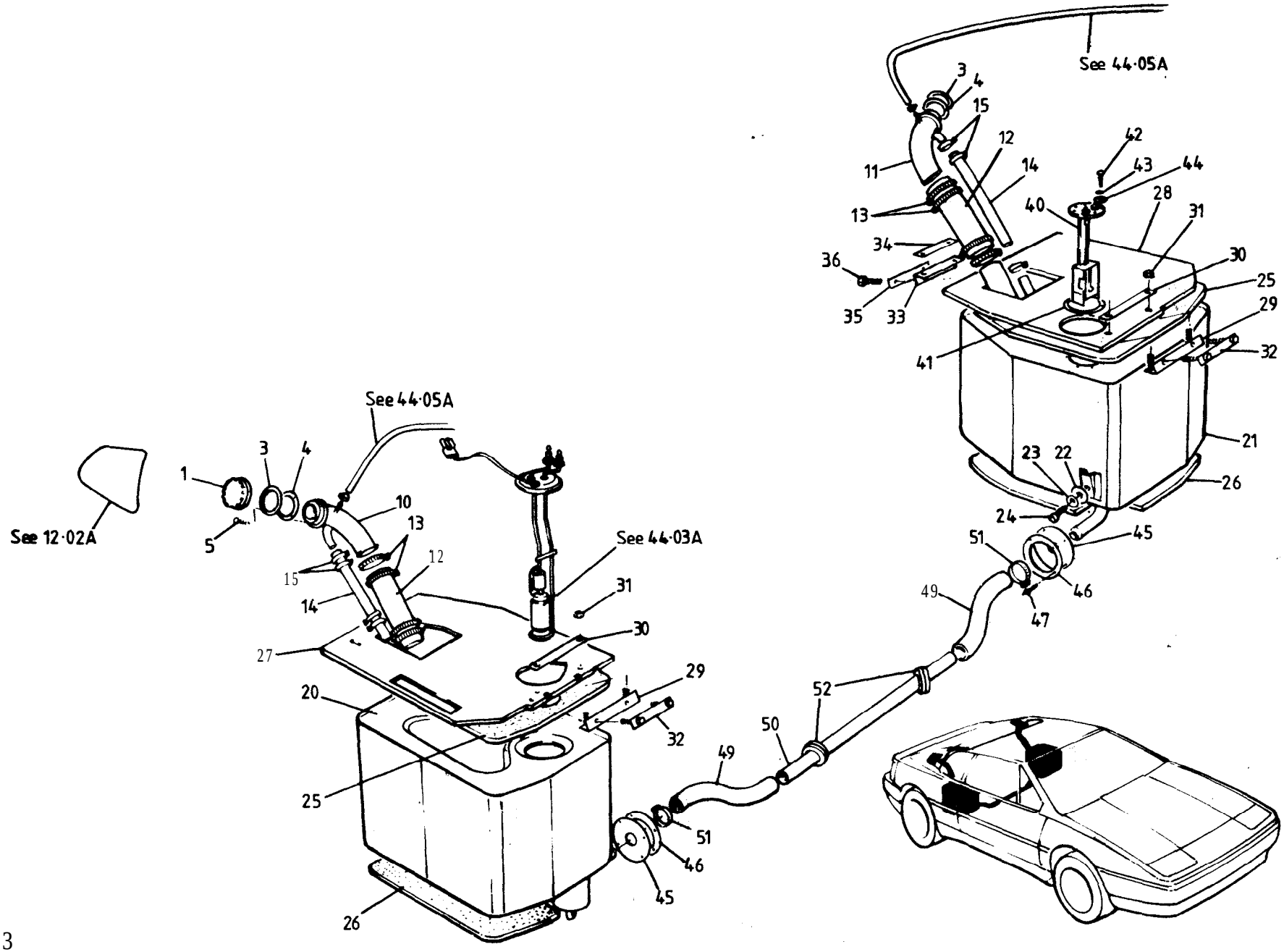
ESPRIT '93
4303A

FUNCTION CODE 43.03A

CONTENTS : Vacuum Hoses & Valves, Crankcase Breather Valve

	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Vacuum Hose, pump to 'T'-piece	C082J4162K	1		50mm of A910E6786V (black)
3	Vacuum Hose, pump 'T'-piece 'T'-piece	B910E2466K	1		Omm of A910E6786V (black)
4	Vacuum Hose, 'T'-piece to heater take-off	A910E2466K	1		195mm of A910E6786V (black)
5	Reducing Elbow, heater system take-off	A075P6069F	1		
8	'T'-piece, vacuum hose connection	A082J6089F	2		
9	Vacuum Hose, 'T'-piece to EBPV vac. solenoid	A910E2465K	1		95mm of A910E6786V (black)
10	Vacuum Solenoid Valve, E.B.P.V.	A082M6421F	1		E.B.P.V.= Exhaust Back Pressure Valve
15	Vacuum Hose, solenoid valve to EBPV	A910E2415K	1		m of A910E6786V (black)
16	Vacuum Hose, 'T'-piece to throttle jack sol.	A910E2464K	1		125mm of A910E6786V (black)
17	Vacuum Solenoid Valve, T.J.S.	A082M6421F	1		T.J.S.= Throttle Jacking Solenoid
22	Vacuum Hose TJS to jacking capsule	A910E2467K	1		65mm of A910E6783V (black/red)
	Grommet, vacuum hose thro' relay box	X036B6150Z	2		Prior VIN *
24	Wastegate Solenoid Valve	A082M6420F	1		
	Spacer, wastegate valve fixing	P691.1703.001AF	1		Sport 300
	Screw, M5 x 40 " " "	A100W5154F	1		
29	Elbow Connector, wastegate solenoid valve	B912E6805F	2		
30	Reducing Connector, 4/6mm	A912E6806F	2		
31	Grommet, hose thro' wall to vacuum pump	X036B6010Z	1		'rom VIN *
32	Clip, ½", vacuum hose securing	A075U6082F	4		
40	Vacuum Hose, fuel PRV to 'T'-piece	A910E2460K	1		170mm of A910E6786V (black)
41	'T'-Piece, vacuum rail take-off	A910E6964F	1		
	Permabond A131, 'T'-piece securing	A912E7034V	A/R		
42	Vacuum Hose, 'T'-piece to non-return valve	A912E2583K	1		50mm of A910E6786V (black)
43	Restrictor, pulsation damping	A912E6452F	1		
44	Non-Return Valve, crankcase breather hose	A910E6863F	1		
45	Vacuum Hose, non-return valve to CBV	A910E2461K	1		55mm of A910E6786V (black)
46	Reducing Connector, 4/6mm, crankcase breather	A912E6806F	1		
47	Crankcase Breather Valve (CBV)	A912E6802F	1		Green
48	Hose, CBV to block	B912E2236F	1		
49	Hose Clip, hose to CBV	A079K6018Z	1		* **VIN R 1142 (S4 LHD)**
50	Hose Clip, Hose to block	B907E6085Z	1		**R 1150 (S4 RHD)**
51	Hose, CBV to airbox	A910E2418F	1		**R 8030 (Sport 300)**
52	Hose Clip, hose to CBV	AO79K6018Z	1		(Revised Harness)
53	Snapper Clip, hose to airbox	A075W6211F	1		

FUNCTION CODE	CONTENTS: Vacuum Hoses & Valves, Crankcase Breather Valve		QUANTITY		
43.03A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
60	Adaptor, vacuum take-off, MAP sensor	A075P6069F	1		
61	Vacuum Tubing, MAP sensor	A910B2463K	1		345mm of A075P6068V (black)
62	'P' Clip, MAP sensor tubing	A075W6227F	1		
63	Pop Rivet, 'P' clip fixing	A085W6259F	1		
64	Elbow Connector, tubing to MAP sensor	A075P6069F	1		
65	Vacuum Hose, plenum to boost gauge transducer	A910E2459K	1		700mm of A910E6784V (black/white)
66	Grommet, vacuum pipe thro' sidewall	X036B6150Z	1		
67	Elbow Connector, vac. hose to transducer block	A910E6772F	1		
	Transducer, boost gauge	A082M6365F	1		Prior '95 M.Y.
68	Mounting Block, boost gauge transducer	A082N4025F	1		
	Mounting Bracket, boost gauge transducer	A100E0012F	1	)	Mounted on plate
	Setscrew, M5 x 10, block to plate	A082W5097F	2	) Prior VIN *	above right hand
	Washer, spring, M5, " " "	A075W40491Z	2	)	rear wheelarch
	Adaptor hose to transducer, l/8" NPT	A910E6771F	1		
	Transducer boost gauge, with pipe union and adapt	A082N4042F	1	>	
	Mounting bracket, boost gauge transducer	A082M6611F	1	>	
	Screw, No.10 x ½" black	A075W5040F	1	>	'95 M.Y. onwards
	" No.8 x 3/4" black	A075W5074Z	1	>	
	Spire clip M4	A100W6364F	1	>	
	Hose, boost transducer to plenum	A910E6784V	785mm		
75	Vacuum Actuator, throttle jacking	A910E6793K	1		
76	Mounting Bracket, vacuum actuator	C910E2157K	1		
77	Stop Bracket, " "	A910E2165F	1		
78	Stop Washer, vacuum actuator rod	A075W4001Z	1		* VIN R 1242 (S4 LHD)
	Permabond A130, vac. actuator mtg. brkt. fixings	A912E7033V	A/R		R 1250 (S4 RHD)
					R 8030 (Sport 300)
					(Revised Harness)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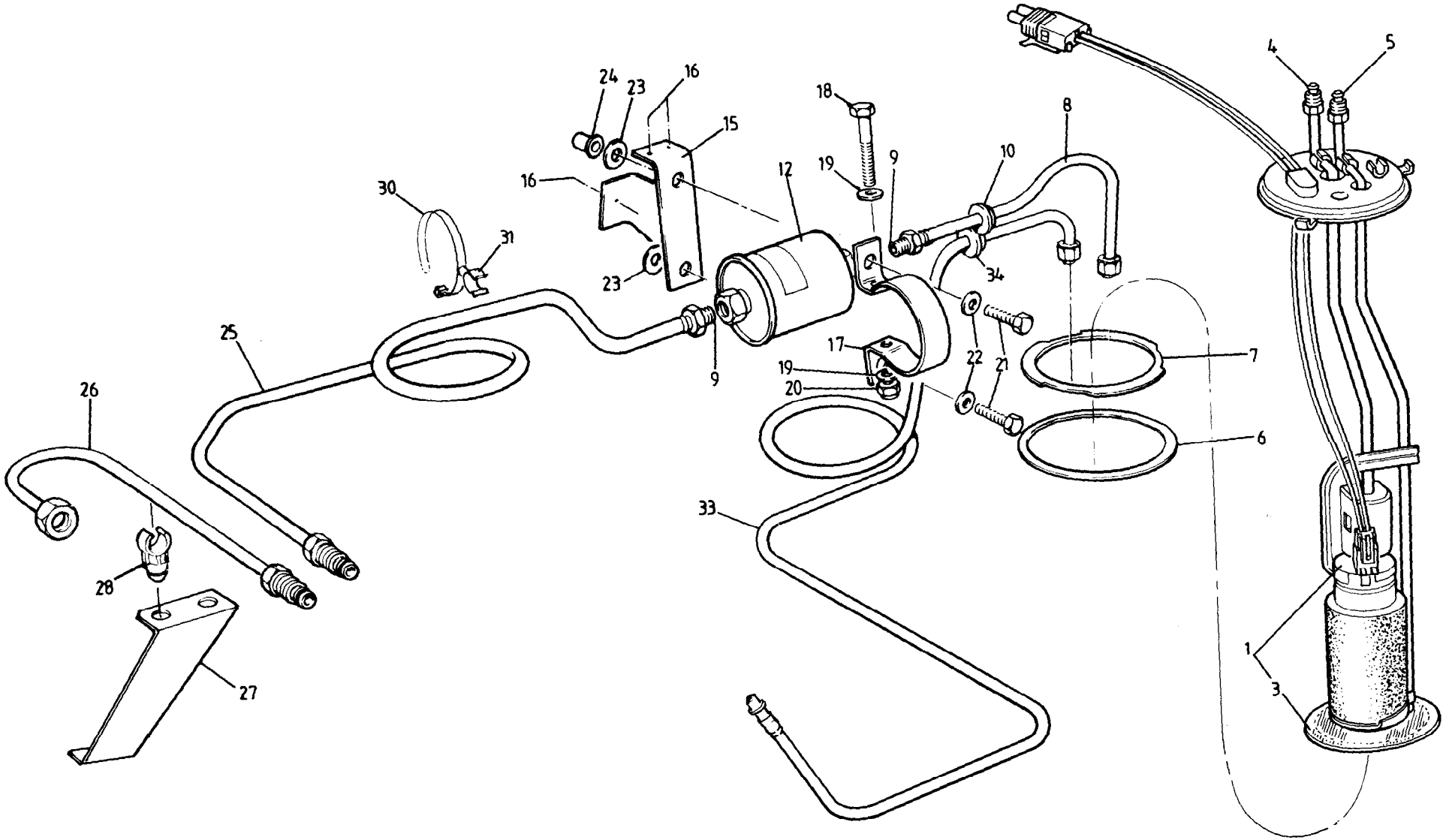
FUNCTION CODE	CONTENTS: Fuel Tanks, Filler Necks, Gauge Sender Unit		QUANTITY		
44. 01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Fuel Filler Cap (torque limiting ratchet)	A082L6168F	2		
3	Clamp Ring, filler neck	B079L4034F	2		
4	Gasket, clamp ring to body	A079L4035F	2		
5	Screw, clamp ring fixing	A075W5014Z	8		
6	Washer, nylon, clamp ring fixing	A082W4146F	8		
10	Fuel Filler Neck, RH	A082L4176F	1		
11	" " " LH	A082L4177F	1		
12	Hose, filler neck to tank	A082L4175F	2		
13	Hose Clip, fuel filler hose	A082L6198F	8		
14	Hose, filler venting	B082L4154F	2		
15	Hose Clip, filler vent hose	A075M6145F	8		
20	Fuel Tank, RH	C082L4168F	1		
21	" " LH	C082L4167F	1		
	Edging, fuel tank anti-rattle	AX75L602OV	A/R		
22	Washer, flat, fuel tank to body	A075W4020Z	2		
23	Washer, spring, " " " "	A075W4036Z	2		
24	Setscrew, M8 x 16, fuel tank to body	A075W1036Z	2		
25	Foam, fuel tank clamping	A082L4173F	2		
26	Foam, fuel tank seating	B082L4119K	2		
27	Board, fuel tank top, RH	A082U7154F	1		Prior VIN *
	" " " " RH	B082U7154F	1		From VIN *
28	" " " " LH	A082U7153F	1		s4
	" " " " LH	P691.4401.001AK	1		Sport 300
29	Bracket; tank board to bulkhead	A082U4675K	2		
30	Washer Plate, bulkhead bracket to board	A082U4678K	2		• **VIN R 1242 (S4 LHD)**
31	Nut, Nyloc, bulkhead bracket fixing	A075W3010Z	8		**R 1250 (S4 RHD)**
32	Studplate, bracket to bulkhead	A082U4677K	2		**R 8030 (Sport 300)**
33	Bracket, tank board to wheelarch	A082U4676K	2		(Revised Harness)
34	Washer Plate, wheelarch bracket to board	A082U4679K	2		
35	" " " " " wheelarch	A082U4680K	2		
36	Setscrew, M8 x 20, wheelarch bracket fixing	A075W1038Z	8		
40	Sender Unit, fuel gauge, LH tank	B082L6155F	1		

FUNCTION CODE	CONTENTS : Fuel Tanks, Filler Necks, Gause Sender Unit		QUANTITY		
44.01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
41	Gasket, fuel gauge sender unit	A082L6161F	1		
42	Setscrew, M5 x 20, sender fixing	A075W1025F	5		
43	Copper Washer, M5, " "	A082W4106F	5		Anneal or replace on each disassembly
44	Washer, flat, M5 x 10, " "	A075W4011Z	5		
45	Grommet, crossover pipe thro' tank well	A082L4064Z	2		
46	Ring, grommet fixing	A082L4065K	2		
47	Pop Rivet, grommet ring fixing	A075W6092Z	8		
49	Hose, tank to crossover pipe	B082L4062F	2		
50	Crossover Pipe, fuel tank interconnection	B082L4061F	1		
51	Hose Clip, crossover pipe hose	A075M6145F	4		
52	Grommet, crossover pipe thro' chassis	X046K6001Z	2		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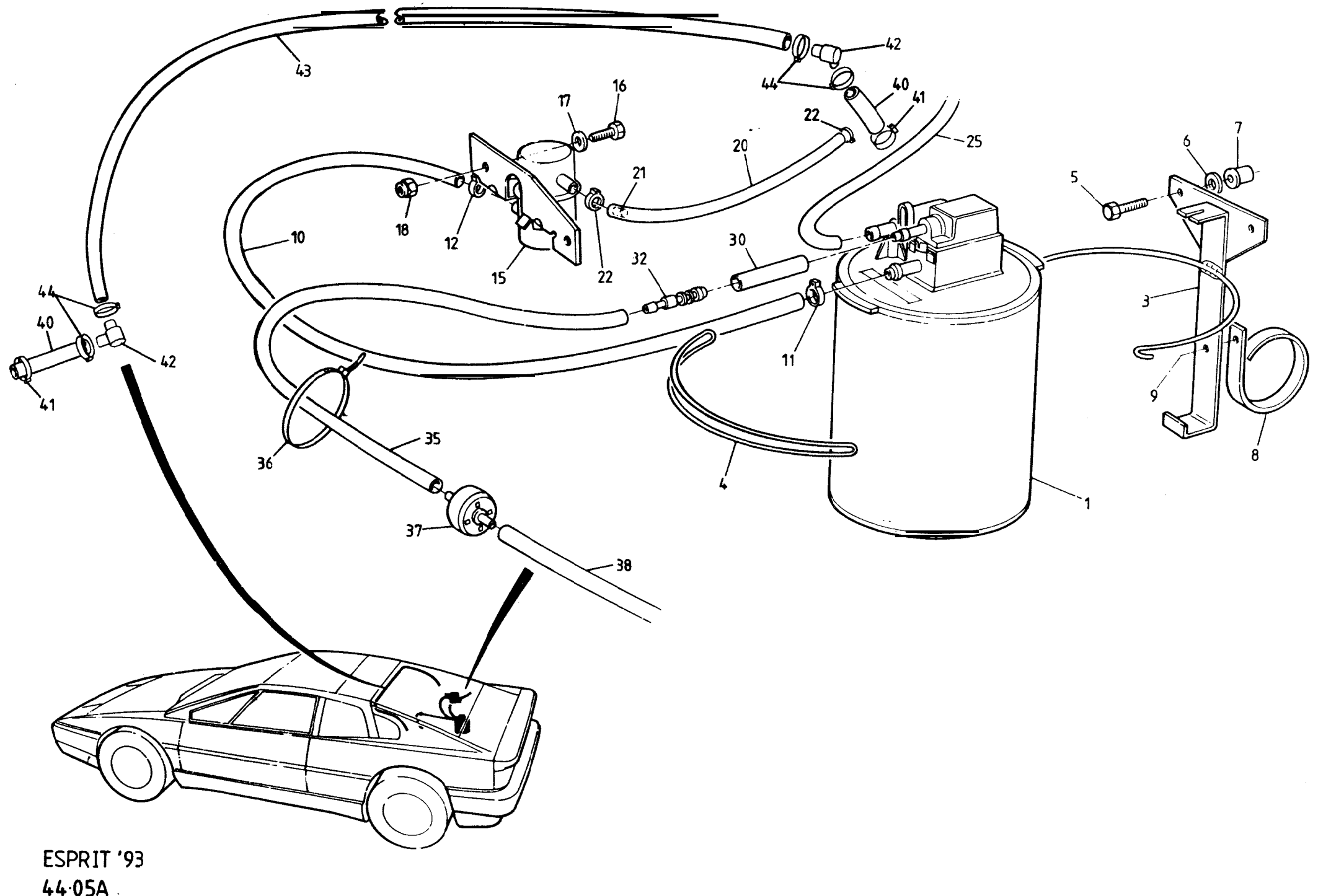
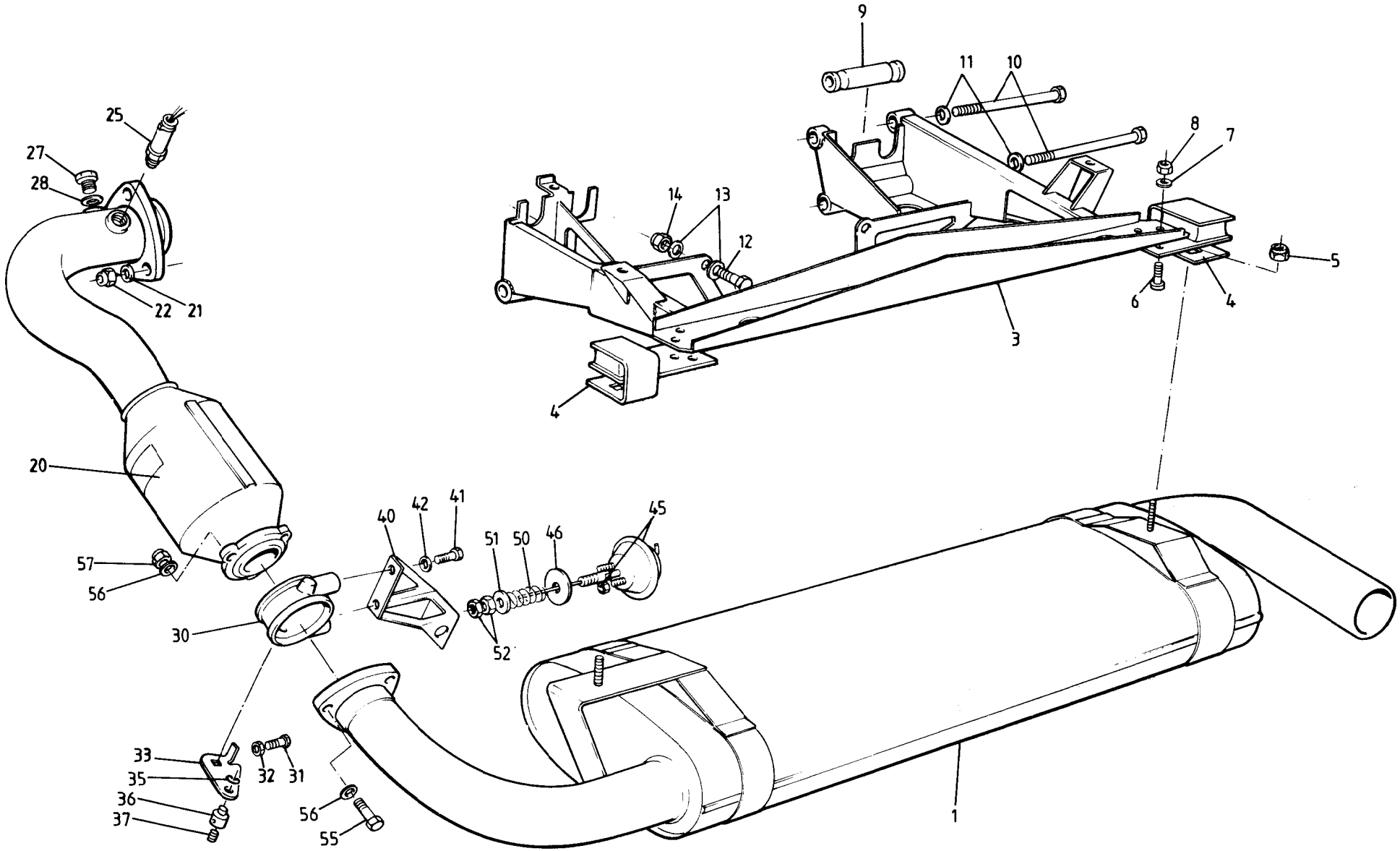
FUNCTIONS CODE	CONTENTS: Fuel Pump, Filter, Fuel Pipes		QUANTITY		
44.03A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Fuel Pump & Strainer Assembly	B910E6931F	1		S4.) Inc. pump, strainer,
	" " " " red paint on top	P691.4403.602AJ	1		> Sport 300) pulsator, '0' rings.
	Fuel Pump (red top)	P691.4403.603AF	1		>
3	Strainer, fuel pump intake	A910E6998F	1		
4	'0' Ring, large, pump output	A082L6199F	1		Brown
5	'0' Ring, Small, pump return	A082L6200F	1		Green
6	Gasket, pump to RH fuel tank	A082L6164F	1		
7	Cam Ring, pump retaining	A082L6163F	1		
8	Pipe, pump to filter	A082L4184F	1		Inc. '0' ring A082L6169F
9	'0' Ring, fuel pipe connections	A082L6169F	5		
10	Grommet, feedpipe thro' sidewall	A082L6181F	1		
12	Fuel Filter	A910E6929F	1		
15	Mounting Bracket, fuel filter to bulkhead	A082U7156F	1		Prior VIN *
	" " " " & inertia switch	A082U7689F	1		From VIN *
16	Pop Rivet, mounting bracket fixing	A075W6067Z	3		
17	Clamp Bracket, fuel filter mounting	C082L4067F	1		
18	Setscrew, M5 x 45, filter clamping	A082W2106F	1		
19	Washer, flat, M5 x 10, clamping screw	A075W4011Z	2		*** VIN R 1242 (S4 LHD)**
20	Nut, Nyloc, M5, clamping screw	A075W3008Z	1		**R 1250 (S4 RHD)**
21	Setscrew, M6 x 20, clamp brkt. to mtg. bracket	A075W1030Z	2		**R 8030 (Sport 300)**
22	Washer, flat, M6 x 15, " " " "	A075W4015Z	2		(Revised Harness)
23	Penny Washer, M6 x 25, " " " "	A075W4017Z	2		
24	Rawlnut, M6 x 15, " " " "	A075W6140F	2		
25	Pipe, filter to plenum nozzle	A082L4187F	1		Inc. '0' ring A082L6169F
26	Pipe, plenum nozzle to fuel rail	A082L4188F	1		
27	Bracket, fuel pipe support	A082L4189F	1		
28	Pipe Clip, support bracket	A082W6349F	2		
30	Swivel Clip, female, fuel/water pipes	A082W6337F	2		
31	" " male " " "	A082W6324F	2		
33	Pipe, fuel return, fuel rail to RH tank	A082L4186F	1		
34	Grommet, return pipe thro' sidewall	A082L6181F	1		



ESPRIT '93
44·05A

FUNCTION CODE	CONTENTS: Evaporative Loss System		QUANTITY		
44.05A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Charcoal Canister	A910E6944F	1		* **VIN R - 1242 (S4 LHD)**
3	Bracket, charcoal canister mounting	A082L4178F	1		**R- 1250 (S4 RHD)**
4	Tie Wrap, canister to mounting bracket	B075W6045Z	1		**R - 8030 (Sport 300)**
5	Setscrew, M6 x 16, bracket to body	A075W1028Z	2		(Revised Harness)
6	Spring Washer, " " "	A075W4035Z	2		
7	Rawlnut, M6 x 15, " " "	A075W6140F	2		
8	'P' Clip, ½", bracket to chassis	A075W6236F	1		
9	Pop Rivet, 'P' clip fixing	A075W6087Z	1		
10	Vapour Hose, roll-over valve to canister	A082L6179K	1		**860 mm** of A082L6050V
11	Snapper Clip, 10 mm, hose to canister	A075W6205Z	1		
12	Hose Clip, 16 mm, hose to roll over valve	A036S6160Z	1		
I5	Roll Over Valve	A075L6036F	1		
	Sleeve, 6 mm bore, roll over valve connections	A082L6195K	2		
16	Screw, M5 x 20, roll over valve fixing	A075W5084F	2		
17	Flat Washer, M5x10, " " "	A075W4011Z	4		
18	Nyloc Nut, M5, " " " "	A075W3008Z	2		
20	Vapour Hose, filler neck to roll-over valve	A082L6180K	1		**400 mm** of A082L6050V
21	Restrictor, roll-over valve hose	A082L4116F	1		
22	Hose Clip, 16 mm, hose to valve & neck	AO36S616OZ	2		
25	Air Hose, canister air feed	A082L6176K	1		Prior VIN * 250 mm of A082L6050V
	" " " " "	B082L6176K	1		From VIN * 400 mm of A082L6050V
	Snapper Clip, 10 mm, air hose to canister	A075W6205Z	1		
30	Purge Hose, canister to reducing connector	A082L6173K	1		40 mm of A036L0085V
32	Reducing Connector, 6 - 4 mm, purge hose	A912E6806F	1		
35	Purge Hose, connector to non-return valve	A082L6184K	1		**660 mm** of A082J6095V
36	Tie Wrap, purge hose to loom	A075W6038Z	4		
37	Non-Return Valve, canister purge line	A910E6863F	1		
38	Purge Hose, non-return valve to inlet manifold	A082L6171K	1		100 mm of A910E6786V (black)
40	Hose, breather, filler neck to elbow	A082L6170F	0.2;2		2 x 110 mm
41	Hose Clip, breather hose to filler neck	A079M6132F	2		
42	Elbow, fuel tank breather hose	A082L6196F	2		
43	Hose, tank breather, elbow to elbow	A082L6170F	2.4mn		
44	Snapper Clip, 10 mm, tank breather hoses	A075W6205F	4		



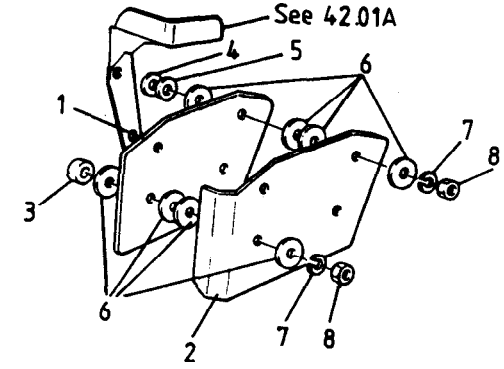
ESPRIT '93
45.01A

FUNCTION CODE

CONTENTS: Exhaust System & Mountings, EBPV

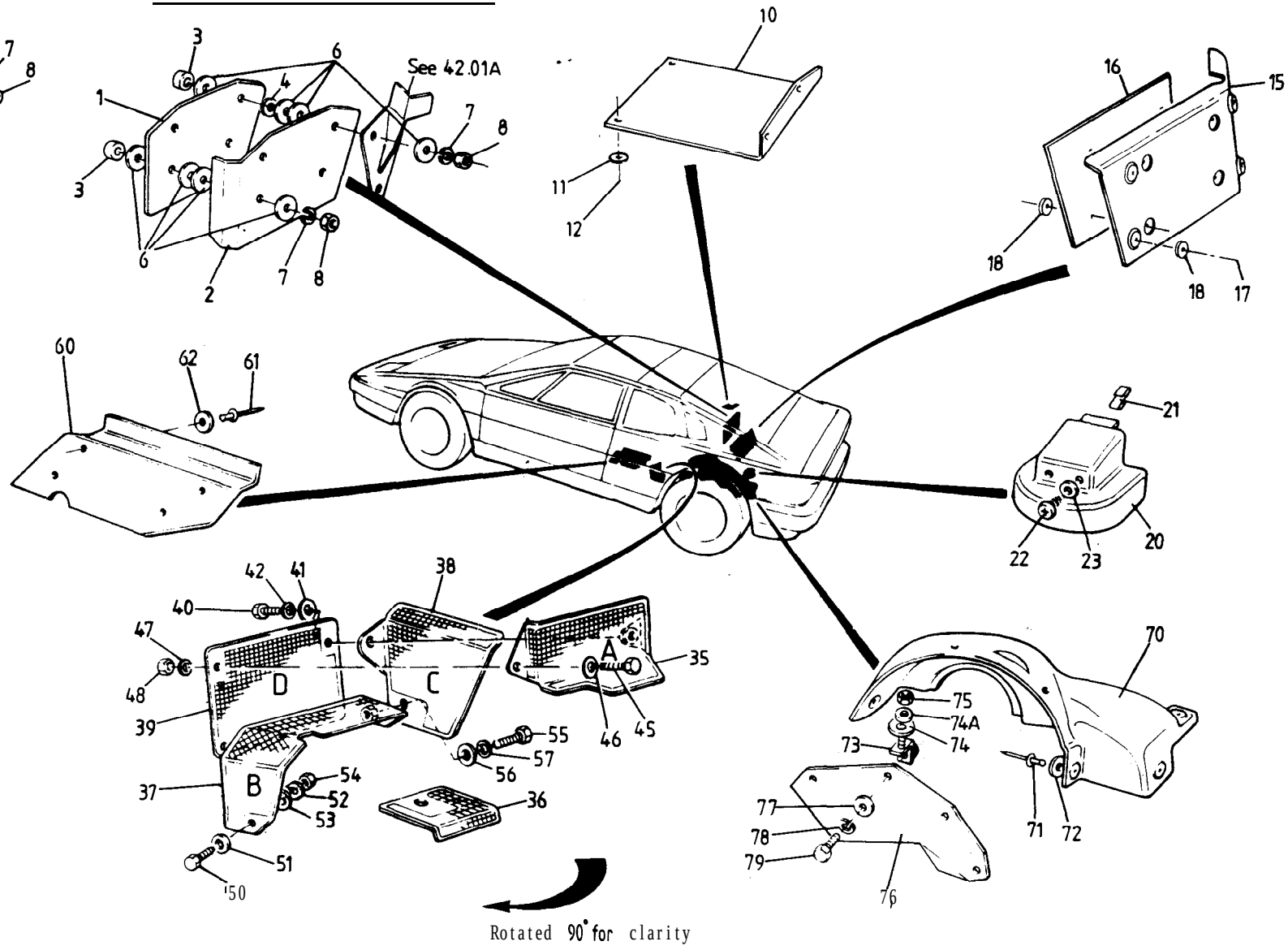
45.01A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Muffler, exhaust, RH tailpipe exit	A082S6054F	1		2.2 litre engine
	" " LH " "	A082S6055F	1		2.0 litre engine
3	Cradle, muffler support	F082F0768F	1		
4	Mounting Rubber, muffler to cradle	A082S6018F	2		
5	Nut, M10, muffler to mounting rubber	AOS2S6051F	2		
6	Setscrew, MB x 25, mounting rubber to cradle	A075W1039Z	6		
7	Washer, flat, MS x 16, " " " "	A075W4020Z	6		
a	Nut, Nyloc, MB, " " " "	A075W3010Z	6		
9	Spacer/Retainer, gear change cable clamp	A082F4143F	1		
10	Bolt, MS x 115, cradle to gearbox	A079W2047F	2		
11	Washer, flat, MB x 16, cradle to gearbox	A075W4020Z	4		
12	Bolt, MB x 35, cradle to gearbox cover	A075W2038Z	2		
13	Washer, flat, MB x 16, cradle to gearbox cover	A075W4020Z	4		
14	Nut, MS, Nyloc, cradle to gearbox cover	A075W3010Z	4		
20	Catalytic Converter	C082S6045F	1		
21	Washer, flat, Ml0 x 20, pipe to turbo	A075W4024Z	3		
22	Nut, M10, pipe to turbo	A082S6051F	3		
25	Oxygen Sensor, feedback control	B918E0322F	1		
	Sealing Washer, Oxygen sensor	A910E7001F	1		
	Grommet, sensor harness thro' sidewall	A075U6043Z	1		
27	Setscrew, Ml0 x 15, sample port blanking	AOB2S6005F	1		
28	Copper Washer, M10 x 16, " " "	A079W4061D	2		
30	Exhaust Back Pressure Valve (EBPV) Assembly	A082S4167J	1		
31	Setscrew, M5 x 20, EBPV lever stop	A082S6026F	1		
32	Nut, M5, " " "	A082S6026F	1		
33	Lever, EBPV actuation	A082S4164F	1		
35	Retaining Clip, trunnion to EBPV lever	A910E6791F	1		
36	Trunnion Clamp, rod to lever	A082S4146F	1		
37	Screw, M5 x 8 socket, rod to trunnion clamp	A082W7034F	1		
40	Bracket, EBPV actuator mounting	A082S4165F	1		
41	Setscrew, MS x 16, bracket to EBPV	A085W1027Z	2		
42	Washer, flat, M6 x 12, bracket to EBPV	A075W4013Z	2		
45	Actuator Assembly, EBPV	A082S4148J	1		Inc. next 4 items
46	Gasket, actuator mounting	A082S4159F	1		
50	Spring, EBPV actuator	A082S6019F	1		

FUNCTION CODE	CONTENTS: Exhaust System & Mountings, EBPV		QUANTITY 1		
45.01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
51	Washer, Flat, EBPV spring abutment	A082S6024F	1		
52	Locknut, M12, " " "	A082S6025F	2		
55	Bolt, M8 x 75, muffler/EBPV/converter	A075W2046Z	3		
56	Washer, flat, M8 x 16, muffler/EBPV/converter	A075W4020Z	6		
57	Nut, M8, copper coated, " " "	A075W3035Z	3		



Using Chargecooler Bracket **A910E2452F**

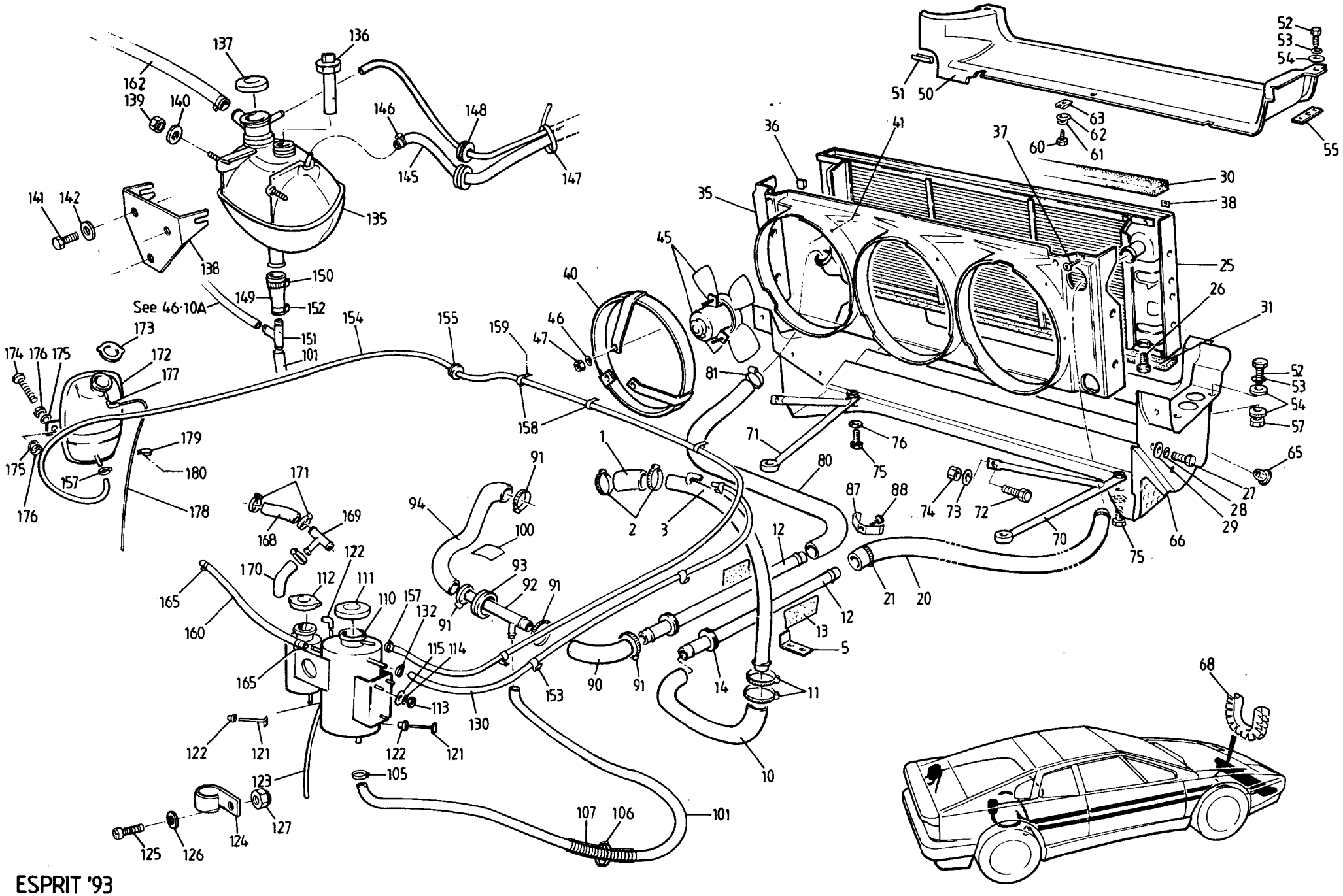
Using Chargecooler Bracket **B910E2452F**



Rotated 90° for clarity

FUNCTION CODE	CONTNTS: Heat Shields		QUANTITY		
45.05A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Heatshield, cam housings	B910E2172F	1		Ref * May be R/B C910E2172F + 2 off spacer washers A075W4014Z
	" " "	C910E2172F	1		Ref # Sport 300
2	Reflector, heatshield	B910E2173F	1		
3	Spacer, heatshield to cam housing	A907E0696Z	2		Ref * * With chargecooler rear
	" " " " "	A907E0696Z	4		Ref # mounting bracket
4	Flat Washer, M6x15x3, shield to cam housing	A075W4014Z	2		A910E2452F
5	" " M6x15x1.5 " " " "	A075W4015Z	2		Ref * # With chargecooler rear
6	" " M6x25, " " " "	A075W4017Z	16		Ref * mounting bracket
	" " " " " " "	A075W4017Z	14		Ref # B910E2452F
7	Spring Washer, " " " "	A075W4035Z	4		See **also** 42.01A
8	Nut, M6, " " " "	A075W3020Z	4		
10	Heatshield, engine cover	B082B5036F	1		
11	Pop Rivet, heatshield to engine cover	A075W6090Z	4		
12	Washer, pop rivet	A075W4001Z	4		
15	Heatshield, engine bay rear wall	B082B4822F	1		
16	Reflector, heatshield	A082S4157F	1		
17	Pop Rivet, heatshield fixing	A076W6099F	9		4-shield/body, S-shield/shield
18	Washer, pop rivet	A075W4009Z	18		8-shield/body, 10-shield/shield
20	Heatshield, LH rear damper	B082U4764F	1		
21	Clip, damper shield to chassis	A082W6370F	1		
22	Screw, " " " "	A075W5038Z	2		
23	Washer, " " " "	A075W4011Z	2		
35	Heatshield, primary, engine mounting	A082E4146F	1		ref. A
36	Heatshield, engine mounting cover	A082E4147F	1		
37	Heatshield, engine mounting	A082E4148F	1		ref. B
38	Heatshield, PAS pump	A082E4162F	1		ref. C
39	Heatshield, radius arm mounting	A082E4150F	1		ref. D
40	Setscrew, M6 x 20, D thro' C to A	A075W1030Z	1		
41	Flat Washer, " " " " "	A075W4015Z	1		
42	Spring Washer, " " " " "	A075W4035Z	1		
45	Setscrew, M6 x 25, D to A	A075W1031Z	1		
46	Flat Washer, " " "	A075W4015Z	1		
47	Spring Washer, " " "	A075W4035Z	1		
48	Nut, M6, " " "	A075W3020Z	1		

FUNCTION CODE	CONTENTS: Heat Shields		QUANTITY		
45.05A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
50	Setscrew, M6 x 16, B to chassis	A075W1028Z	1		
51	Spring Washer, M6, " " "	A075W4035Z	1		
52	Flat Washer, M6x12," " "	A075W4013Z	1		
53	Flat Washer, M6x15, B to chassis	A075W4015Z	1		
54	Nut, M6 Nyloc, " " "	A075W3020Z	1		
55	Setscrew, M6 x 20, C to B	A075W1030Z	1		
56	Flat Washer, M6x12," " "	A075W4013Z	1		
57	Spring Washer, " " "	A075W4035Z	1		
60	Heatshield, LH fuel tank bay	A082B4561F	1		
61	Pop Rivet, tank heatshield to body	A076W6099F	4		
62	Flat Washer, pop rivet	A075W4011Z	4		
70	Heatshield, LHR wheelarch	A082B4821F	1		
71	Pop Rivet, heatshield to body	A076W6099F	5		
72	Flat Washer, pop rivet	A075W4000Z	5		
73	Bracket, heatshield to wheelarch	B082S4156F	3		
74	Flat Washer, M6x15, bracket to heatshield	A075W4015Z	3		
74A	Spring Washer, " " "	A075W4046Z	3		
75	Half Nut, M6, " " "	A075W3085Z	3		
76	Reflector, wheelarch heatshield	B082S4163F	1		
77	Flat Washer, M6x25, reflector to bracket	A075W4017Z	4		
78	Spring Washer, M6, " " "	A075W4035Z	4		
79	Setscrew, M6 x 12, " " "	A075W1027Z	4		
	Heatshield, exhaust to tyre	P691.4505.001AE	1		Fitted in LHR w/arch)
	Heatshield Extension, parking brake cable	P625.4505.006AK	1		)
	Setscrew, M6 x 16, cable & ex. shield to brkt.	A075W1028Z	2		)
	Washer, flat, cable & ex. shield to brkt.	A075W4017Z	2		)
	Spring Washer, " " " " " "	A075W4035Z	2		) Sport 300
	Setscrew, M6 x 16, cable & body shield to body	A075W1028Z	1		)
	Flat Washer, M6 x 13, "" " " " "	A075W4015Z	1		)
	Washer, shakeproof, " " " " " "	A075W4046Z	1		)
	Nut, M6, cable & body shield to body	A082W3085F	1		)



ESPRIT '93
46.01A

FUNCTION CODE	CONTENTS: Radiator & Duct. Rad. Fans, Header Tank. Pipework		QUANTITY		
46.01A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
1	Hose, thermostat housing to pipe	B912E1839F	1	1	
2	Hose Clip, thermostat hsg. hose	A910E6389F	2	2	
3	Water Pipe, engine outlet	A082K4223F	1	1	6.5 mm vent take off Prior VIN *
	" " " "	B082K4223F	1	1	8.0mm " " " From VIN *
5	Bracket, water pipe fixing	A082K4187F	1	1	
6	Washer, flat, bracket to chassis stud	A075W4024Z	1	1	
7	Nut, Nyloc, M10, " " " "	A075W3011Z	1	1	
10	Hose, outlet pipe to chassis pipe	A082K4207K	1	1	
11	Hose Clip, 25-40mm	A075M6145F	6	6	
12	Pipe, water feed/return, thro' chassis	A082K4239F	2	2	
13	Pad, anti-vibration, water pipes to chassis	A082A4286K	2	2	
14	Grommet, pipes thro' chassis	A075K6022F	2	2	
	Grommet, chassis pipes thro' chassis, front	A079K6004F	3		Cut to fit
	Edging Strip, " " " " "	A085U6080V		180mm	
20	Hose, chassis pipe to radiator inlet (top)	A082K4242F	1	1	
21	Hose Clip, hose to chassis pipe/radiator	A079K6019F	2	2	
25	Radiator, engine cooling	A082K4237F	1	1	
26	Drain/Air Bleed Plug	B075K6011F	2	2	
27	Setscrew, M6 x 18, radiator to duct	A075W1029Z	4	4	
28	Spring Washer, " " "	A075W4035Z	4	4	* **VIN R.1242 (S4 LHD)**
29	Penny Washer, M6x25, " " "	A075W4017Z	4	4	**R 1250 (S4 RHD)**
30	Foam, radiator top to body	A079K4001F	1.	1	**R 8030 (Sport 300)**
31	" " bottom to duct	A089K0131F	1	1	(Revised Harhess)
35	Cowling; radiator fans	E082K4102K	1	1	
36	Edge Clip, cowling to radiator	A079W6187F	12	12	
37	Screw, no.6 x ½", cowling to radiator	A075W5014Z	4	4	
38	Spire Nut, no.6, " " "	A075W6013Z	4	4	
40	Fan Shroud & Motor Mounting	A079K4174F	3	3	
41	Pop Rivet, shroud to cowling	A075W6066Z	I8	18	
	Washer, pop rivet	A075W4001Z	18	I8	
45	Fan Motor & Fan (S-blade) Assy., rad. cooling	A082K6066F	3	3	Service replacement with adaptor harness A082M4959F for 4-blade fan/motor units A082K6026/7
	Adaptor Harness, S-blade fan motor	A082M4959F	3	3	Prior VIN *

Esprit range: '93 M.Y. onwards

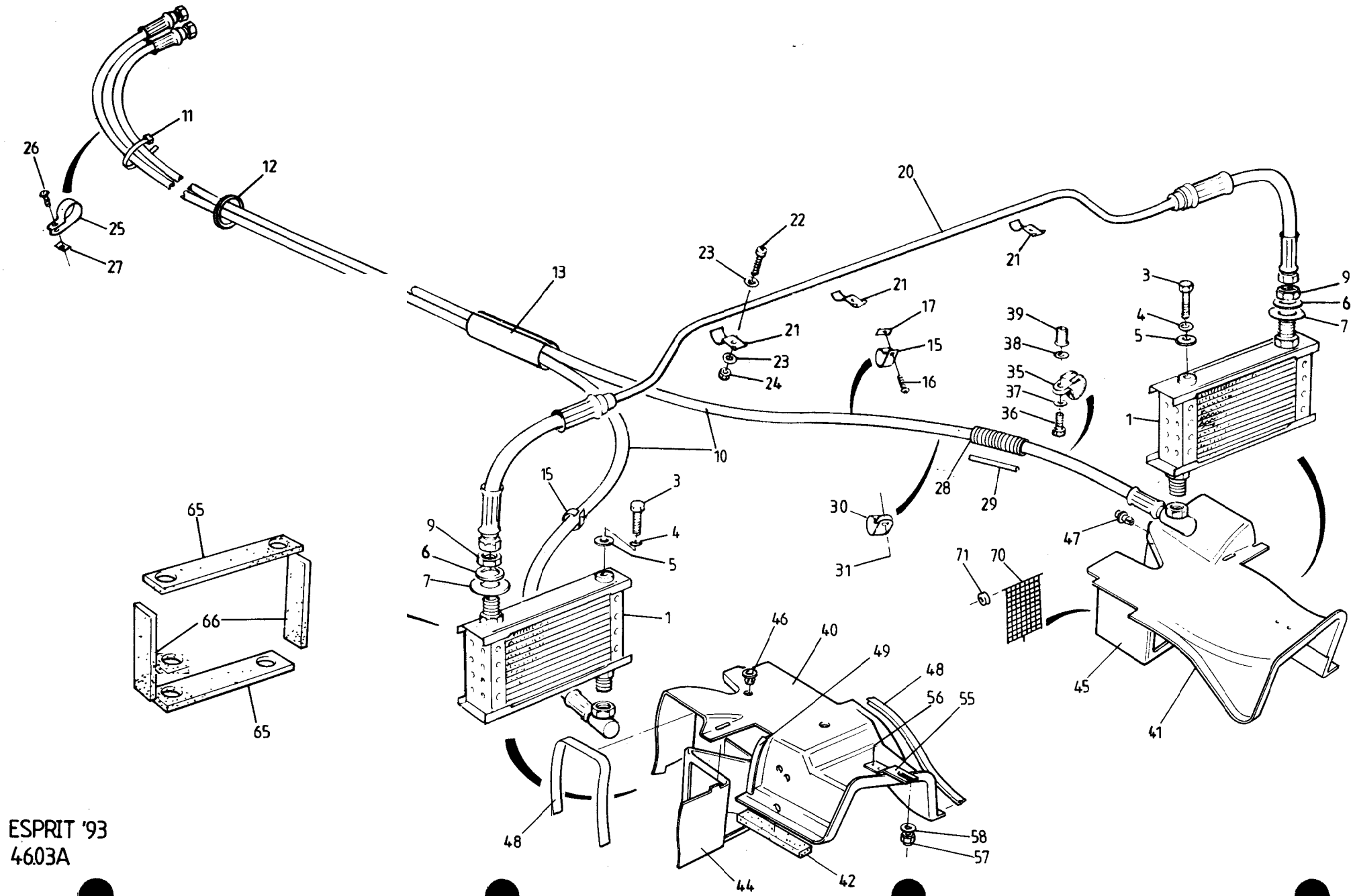
FUNCTION CODE	CONTENTS: Radiator & Duct, Rad. Fans, Header Tank, Pipework		QUANTITY		
46.01A	PART DESCRIPTION	PART NUMBER	s4	SPORT 300	REMARKS
46	Flat Washer, M6x12, motor mounting	A075W4013Z	9	9	
47	Nut, M6 Nyloc, " "	A075W3009Z	9	9	
50	Radiator Air Intake Duct, spoiler to rad. duct	A082B5078K	1		
51	Edging Strip, air duct, coolant hose protect	A085U6080V	55mm		
52	Setscrew, M8 x 25, duct to body	A075W1039Z	4		
53	Washer, Flat, M8x16, " " "	A075W4020Z	8		
54	Washer, spring, " " "	A075W4035Z	8		
55	Tapping Plate, duct to underbody	B082B4811F	'2		
	Pop Rivet, tapping plate fixing	A075W6071Z	4		
57	Nut, Nyloc, M8, duct to body	A075W3010Z	4		
60	Screw, M5 x 16, air duct fixing	A082W5107F	5		
61	Washer, spring, " " "	A082W4097F	5		
62	Washer, flat, " " "	A075W4009Z	5		
63	'C' Clip, M5, " " "	A100W6372F	3		
65	Jacknut, M5, " " "	A076W3043F	2		
66	Radiator Duct	A082B5076K	1		
	" "	B082B4906K		1	
	Grommet, radiator duct	X026B0371Z	2	2	
68	Grommet, flexiform, coolant hose/rad. duct	A082U6275V	150mm	150mm	
7 0	Support Stay, duct to chassis, RH	A082K4232F	1	1	
71	" " " " " LH	A082K4231F	1	1	
72	Setscrew, M8 x 20, stay to chassis	A075W1038Z	2	2	
73	Flat Washer, M8x16, " " "	A075W4020Z	2	2	
74	Nut, M8 Nyloc, " " "	A075W3010Z	2	2	
75	Setscrew, M8 x 25, stay to duct	A075W1081Z	2	2	
76	Washer, flat, " " "	A075W4023Z	2	2	
80	Hose, radiator outlet (bottom hose)	A082K4108F	1	1	
81	Hose Clip, 32-50mm, outlet hose	A079K6019F	2	2	
	Sheathing, chassis strut, hose protection	A082A4230F	1	1	
	Snapper Clip, sheathing to chassis	A082W6275F	2	2	
	'P' Clip, radiator hoses to front frame	A075W6236F	4	4	
	Screw, 'P' clip to chassis	A075W5034F	4	4	
	Spire Nut, 'P' clip fixing	A075W6011Z	4	4	
87	Bracket, water pipe to chassis	A082K4192K	1	1	
88	Screw, bracket to chassis	A075W5016Z	1	1	

FUNCTION CODE	CONTENTS: Radiator & Duct, Rad. Fans, Header Tank, Pipework		QUANTITY		
46.01A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
	Hose Clip, pipe to bracket	A075M6145F	2	2	
90	Elbow Hose, return pipe to junction pipe	B082K4127K	1	1	
91	Hose Clip, hose securing	A075K6014F	4	4	
92	Junction Pipe, header take-off	B082K4191F	1	1	
93	Grommet, junction pipe thro' chassis	A082U6109F	1	1	
94	Hose, water pump inlet	A082K4190F	1		
	Pipe, water pump inlet	P691.46O1.001AF		1	
	Hose, junction pipe to inlet pipe	P691.4601.004AK		1	
	Hose, inlet pipe to water pump	P691.4601.003AK		1	
100	Pad, anti-chafe, inlet hose to chassis	A082U5008F	1	1	
101	Hose, header tank feed	A082P6055F	1		
	Hose, junction pipe to connector pipe	P691.4601.007AK		1	
	Connector Pipe, header tank hose	B075KO111Z		1	
	Elbow Hose, connector pipe to header tank	P691.4601.009AK		1	
105	Hose Clip, 16-25mm, header hose	A079K6018F	2	4	
106	Tie Wrap, header hose securing	A075W6045Z	1	1	
107	Sleeve, hose protective	A082F4148K	1	1	
110	Twin Header Tank, engine and chargecooler	B082K6051F	1	1	)
111	Blanking Cap, engine header tank	A082K6053H	1	1	)
112	Pressure Cap, 7 psi, chargecooler tank	A082K6052H	1	1	)
113	Nut, M6, header tank fixing	A075W3020Z	3	3	)
114	Spring Washer, M6, " "	A075W4035Z	3	3	)
115	Flat Washer, M6x12, tank fixing	A075W4013Z	3	3	)
	Bracket; header tank mounting	P691.4601.002AF		1	)
	Setscrew, M6 x 16 thinhead, bracket to wall	A075W1082Z		3	) Prior VIN *
	Penny Washer, screw head to relay box	A075W4017Z		3	)
	Nut, M6 Nyloc, bracket to relay box	A075W3009Z		3	)
	Washer, flat, nut to bracket	A075W4015Z		3	)
121	Probe, coolant level tell-tale	A082M6282F	1	2	) * VIN R 1242 (S4 LHD)
122	Grommet, " " " "	A082M6283F	1	2	) R 1250 (S4 RHD)
123	Elbow, chargecooler tank overflow	XO36JO135Z	1	1	) R 8030 (Sport 300)
123	Tube, " " "	A082L6050V	600m	600n	) (Revised Harness)
124	'P' Clip, overflow tube securing	A075W6228F	5	5	)

NOV 93

FUNCTION CODE	CONTENTS: Radiator & Duct, Rad. Fans. Header Tank. Pipework		QUANTITY		
46.01A	**PARTDESCRIPTION**	PART NUMBER			**REMARKS**
125	Screw, M3 x 12, 'P' clip to airbox cover	A089W5077F			)
126	Flat Washer, " " " " "	A075W4001Z			)
127	Nut, M3 Nyloc, " " " " "	A079W3060F			) Prior VIN *
130	Hose, air bleed, outlet pipe to header tank	EO75KO113Z			)
	" " " " " " " " "	P691.4601.008AF			)
132		A075U6082F			)
135		A082K6067F			>
136		A082K6068F			>
137	kPa, ssure Cap, 110 " "	A082K6042F			>
138		A082K4248F			>
139		A075W3009Z			>
140	" " " "	A075W4017Z			> From VIN *
141		A075W1082Z			>
142		AO75W4017Z			`
145		A082K4246F			8/12 mm >
146	8/16mm, lip,	A082L6042F			>
147		A075W6038Z			>
148	thro'met, bleed hose	A089M6066F			> * VIN R 1242 (S4 LHD)
149	'T'-ucing Hose, header tank to	A082K4245F			23/15 mm > R 1250 (S4 RHD)
150	20/32mm, ip,	B907E6085Z			> R 8030 (Sport 300)
151	'T' _	B910E7006F			> (Revised Harness)
152	Oetiker Clip, 25.5mm, hoses to 'T'- piece	B082K6060F			>
153	'P'- airbox leed hose to	A075W6257F			Not used on S4 from VIN *
154		A082K4221F			
155	thro'met, overflow hose	X050J0135Z			
	" " " " "	A089M6066F			From VIN *
157		A075U6082Z			
158	'P' Clip, overflow pipe securing	A075W6228F			
159	Pop Rivet, 'P' clip fixing	A075W6071F			
162	Hose, turbocharger to header tank	A910E2379K			325mm of A082K6035V) Prior VIN *
	" " " " "	P691.4601.005AK			)
	" " " " "	A082K4244F			10/16 mm From VIN *
		P691.4601.006AV			

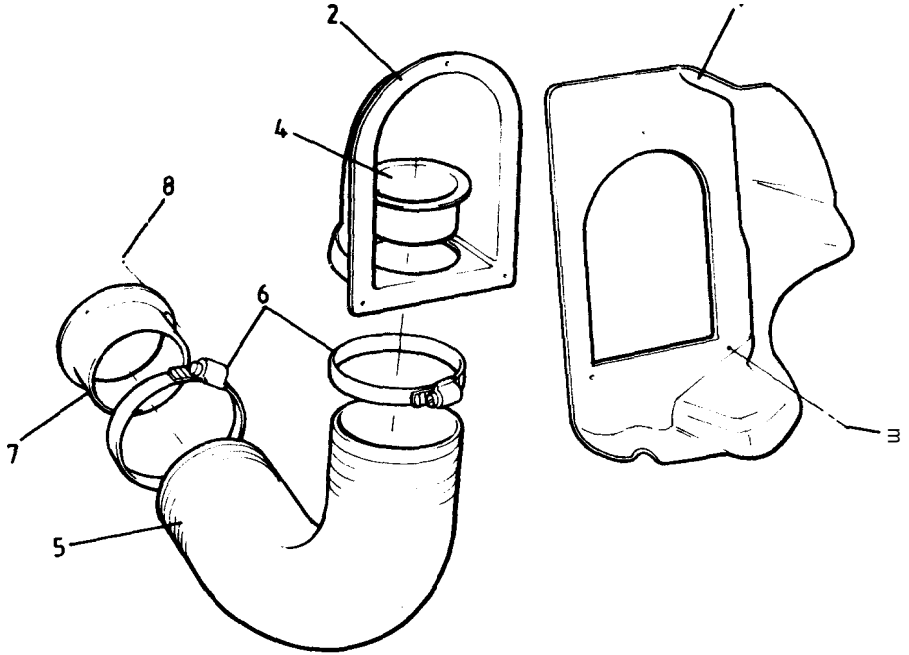
FUNCTION CODE	CONTENTS: Radiator & Duct, Rad. Fans, Header Tank, Pipework		QUANTITY		
46.01A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
	Hose Clip, turbo coolant outlet hose	A910E2389F	2	2	Prior VIN *
	" " " " " " to turbo	A082L6042F	1	1	) From VIN *
	" " " " " " to tank	A079M6132F	1	1	)
168	Hose, cylinder head to 'T'- piece	A910E2381K	1	1	
169	'T'- Piece, cyl. head/heater/turbocharger	A910E2377F	1	1	
170	Hose, 'T'- piece to turbo inlet	A910E2380K	1	1	
171	Hose Clip, 16 - 25mm	A079K6018F	4	4	
172	Expansion Tank	A082K6040F	1	1	
173	Blanking Cap, expansion tank	A082K6041F	1	1	
174	Setscrew, M6 x 25, expansion tank to body	A075W1031Z	2	2	• **VIN R 1242 (S4 LHD)**
175	Flat Washer, M6 x 18, " " "	A075W4018F	4	4	**R 1250 (S4 RHD)**
176	Nut, M6, " " " "	A075W3020Z	4	4	**R 8030 (Sport 300)**
177	Elbow, overflow pipe to expansion tank	XO36JO135Z	1	1	(Revised Harness)
178	Overflow Pipe, expansion tank	A036L0085V	1m	1m	
179	'P' Clip, overflow pipe fixing	A075W6000Z	1	1	
180	Pop Rivet, 'P' clip fixing	A075W6066Z	1	1	

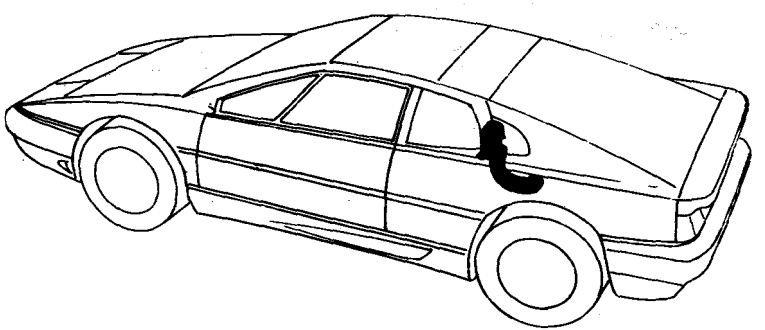


ESPRIT '93
46.03A

FUNCTION CODE	CONTENTS: Oil Coolers, Ducts & Hoses		QUANTITY		
46.03A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Oil Cooler	B082K4225F	2		
3	Setscrew, **M8 x 35**, oil cooler to body	A075W1041Z	2		
4	Flat Washer, M8 x 25," " " "	A075W4036Z	2		
5	Rubber Washer, " " " "	A036L6019Z	4		
6	Spacer Washer, " " " "	A082K4233F	2		
7	Spreader Washer, " " " "	A082K6055F	2		
9	Thin Nut, 5/8" BSP " " " "	A082K6054F	2		
10	Hose Assembly, oil cooler/engine	A910E2519F	2		
11	Tie Wrap, oil cooler hoses	A075W6038Z	3		
12	Rubber Edging, oil cooler hoses thro' chassis	AX75L6020Z	A/R		
13	Foam Tube, hose protection, chassis front	A082E6022V	85mm		
15	'P' Clip, oil cooler hose securing	A075W6236F	4		
16	Screw, 'P' clip fixing	A075W5034Z	4		
17	Spire Nut, " "	A075W6011Z	4		
20	Oil Pipe Assembly, oil cooler cross-over	A910E2520F	1		
21	Clip, cross-over pipe to body	A082W6342F	3		
22	Screw, M4 x 20, " " "	A075W5081F	3		
23	Flat Washer, M4, " " "	A082W4099F	6		
24	Nut, M4, Nyloc, " " "	A075W3049F	3		
25	'P' Clip, oil cooler pipes securing	A075H6018Z	4		
26	Screw, s/t No.8 x ½, clip fixing	A075W5036Z	4		
27	Spire Nut, No.8, " "	A075W6011Z	4		
28	Protective Tube, convolute split, oil hose	A082V7779V	300mm		
29	Edging Strip, hose/chassis protection	AX75L6020V	200mm		
30	'P' Clip, oil cooler pipes securing	A075W6018Z	2		
31	Pop Rivet, 'P' clip fixing	A075W6092Z	2		
35	'P' Clip, metal, oil coler pipes securing	A910E6743F	4		
36	Setscrew, M6 x 20, clip fix	A075W1030Z	2		
37	Washer, spring, M6, " "	A075W4035Z	2		
38	Washer, flat, M8, " "	A075W4020Z	2		
39	Pulsert, M6, " "	A079W6156F	2		
40	Duct, oil cooler, RH	B082B5070K	1		
41	" " " LH	B082B5069K	1		

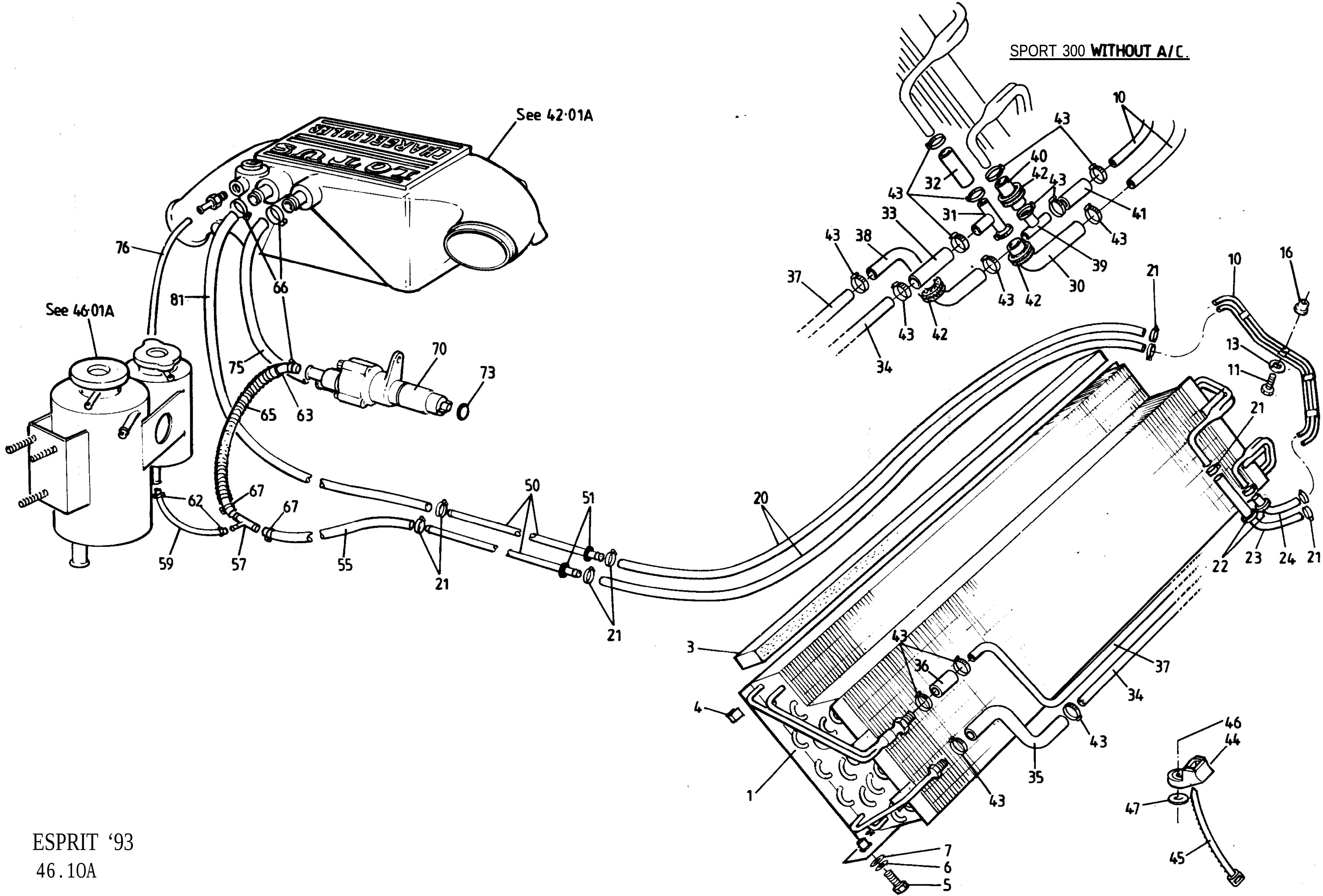
FUNCTION CODE	CONTENTS: Oil Coolers, Ducts & Hoses		QUANTITY		
46.03A	**PARTDESCRIPTION**	**PART** NUMBER	ALL		**REMARKS**
42	Foam Seal, oil cooler duct to spoiler	A082U7601K	2		s4
	" " " " " " "	P691.4603.001AK	2		Sport 300
44	Air Splitter, oil cooler duct, RH	A082B5074K	1		
45	" " " " " LH	A082B5073K	1		
46	Clip, splitter to duct	A082W6356F	6		
47	Fastex Scrivet, splitter to duct	A100W6479F	2		
48	Lip Seal, duct sealing	A100B6039V	1.5m		2 x 420mm; 2 x 320mm
49	Edging Strip, oil cooler-duct	B075U6054V	260m		2 x 130mm
	Foam Strip, oil cooler duct to body	A082U6067V	340m		2 x 170mm
	Foam Strip, self adhesive, splitter to body	A082U6067V	180m		2 x 90mm
55	Bracket, oil cooler duct to front valance	A082B5094F	2		
56	Pop Rivet, bracket to duct	A075W6069Z	4		
57	Nut, M6, Nyloc, duct bracket to valance	A075W3009Z	2		
58	Washer, flat, " " " "	A075W4015Z	2		
	Spacer, " " " "	AlOOL6007F	2		
65	Foam Seal, oil cooler top/bottom	A082U7339F	4		
66	" " " " sides	A082U7340F	4		
70	Grille, oil cooler rear protection	A082U7334F	2		
71	Grommet, grille to duct	A082B6158F	6		





ESPRIT '93
46.05A

FUNCTION CODE	CONTENTS: Engine Bay Cooling Ducts & Trunking		QUANTITY		
46.05A	PART DECRIPTION	PART NUHBER	ALL		REMARKS
1	Intake Duct, engine bay ventilation, LH	B082B4771K	1		Behind LH rear quarter window
	Pop Rivet, intake duct to body	A075W6092Z	4		
2	Adaptor, intake duct to spigot	A082B6215K	1		
3	Pop Rivet, adaptor to duct	A075W6094Z	6		
	Washer, pop rivet	A075W4013Z	6		
4	Spigot, trunking adaptor	A100B0925K	1		glued to intake duct
5	Trunking, 63 x 470mm, LH duct to engine bay	B082E6217F	1		
6	Hose Clip, 50 - 70mm, ventilation trunking	A100E6082F	2		
7	Adaptor, straight, trunking to sidewall rear	A100B0925K	1		
8	Rivet, adaptor to sidewall	A075W6095F	3		

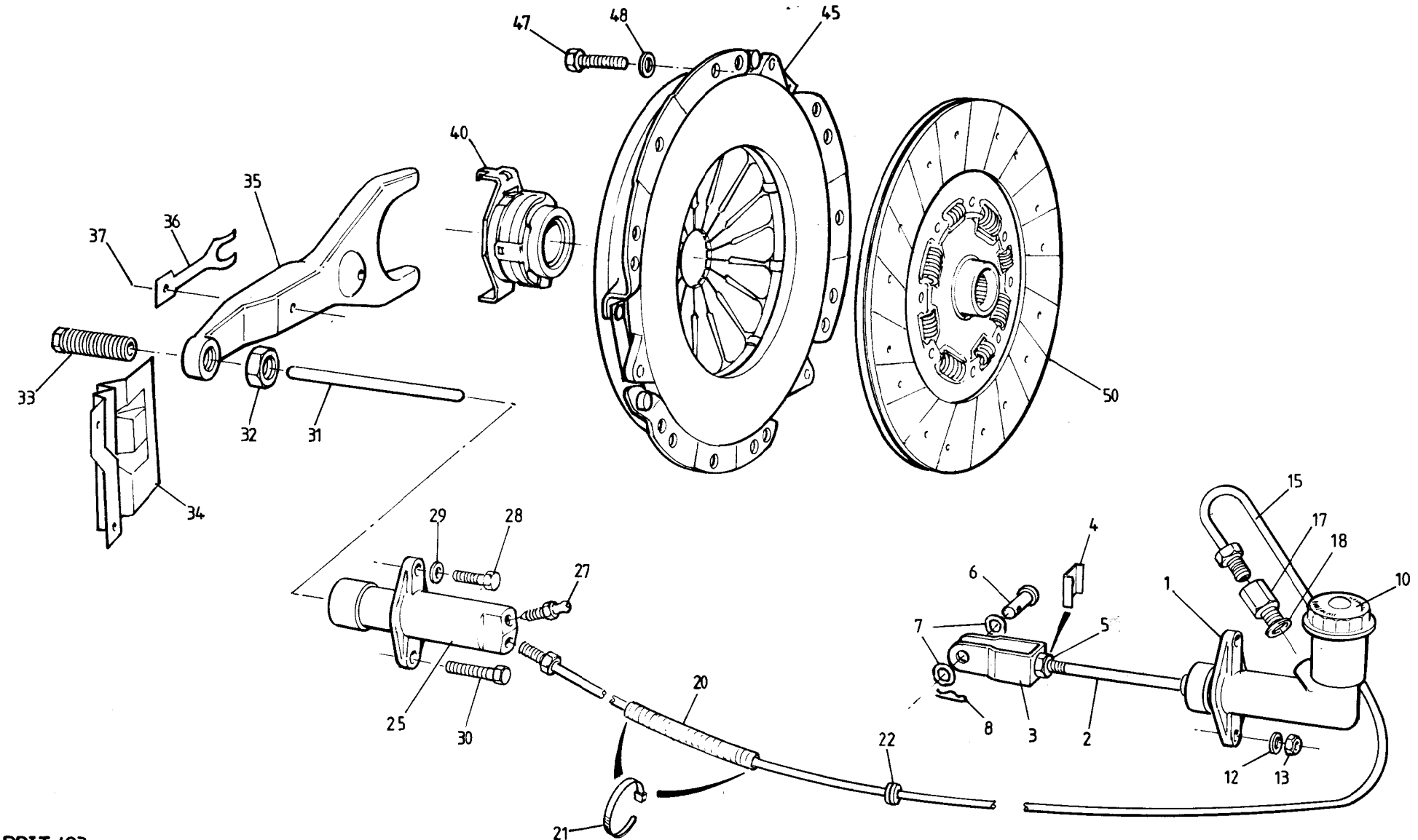


ESPRIT '93
46.10A

FUNCTION CODE	CONTENTS: Chargecooler, Pump, Radiator, Pipes		QUANTITY		
46.10A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
1	Chargecooler Radiator/A.C. Condenser Assembly	A082K4226F	1	1	Sport 300 with air conditioning
	Double Radiator Assembly, chargecooler water	P625.4610.001AF		1	Without air conditioning
3	Foam, radiator to body	A079K4001F	1	1	
4	Edge Clip, chargecooler radiator to duct	A079W6174F	4	4	
5	Setscrew, " " " "	A075W1036Z	2	2	
6	Washer, spring," " " "	A075W4048Z	2	2	
7	Washer, flat, " " " "	A075W4021Z	2	2	
10	Pipe Assembly, inlet/outlet hoses, wheelarch	AOB2K4227F	1	1	
11	Setscrew, M5 x 20, pipe assembly to rad. duct	AO75W5084F	1	1	
13	Washer, M5, spring, " " " " "	A075W4097Z	1	1	
16	Jacknut, M5, " " " " "	AO75W3043F	1	1	
20	Hose, chassis pipe to wheelarch pipe assembly	AOB2K4230K	2	2	
21	Hose Clip, 16-25mm, hose securing	AO79K6018F	10	10	
22	Grommet, hoses thro' body	A075P6021F	2	2	)
23	Hose, chargecooler radiator inlet	AO82K4229F	1	1	) Sport 300 with air conditioning
24	" " " outlet	A082K4228F	1	1	)
30	Elbow Hose, feed pipe to 'T'-piece	P691.4610.005AK		1	] }
31	'T'-Piece, chargecooler radiator feed	P691.4610.6O1AF		1	] }
32	Connector Hose, 'T'-piece to front rad. upper	P691.4610.002BK		1	] Feed }
33	" " " to lower transfer pipe	P625.4610.003BK		1	] }
34	Transfer Pipe, lower, 'T' to rear rad. lower	P691.4610.004AF		1	] }
35	Hose, swan neck, trans. pipe to rear rad. lower	P625.4610.005AK		1	] }
36	Connector Hose, rear rad. upper to trans. pipe	P625.4610.003BK		1	> }
37	Transfer Pipe, upper, rear rad. upper to 'T'	P691.4610.003AF		1	> } Sport 300 without
38	Hose, swan neck, upper trans. pipe to 'T'-piece	P691.4610.625AK		1	> Return } air conditioning
39	'T'-Piece, chargecooler radiator return	P691.4610.6O1AF		1	> }
40	Connector Hose, front rad. lower to 'T'-piece	P625.4610.003BK		1	> }
41	" " return 'T' to return pipe	P691.4610.002BK		1	> }
42	Grommet, hose thro' radiator duct	A075P6021Z		3	}
43	Hose Clip, chargecooler hoses	A079K6018F		12	}
44	Cradle, transfer pipes to duct	A082W6276F		4	}
45	Tie Wrap, pipes to cradle	A100W6399F		4	}
46	Pop Rivet, cradle to duct	A082W6243F		4	}
47	Washer, pop rivet	A075W4000Z		4	}

FUNCTION CODE	CONTENTS: Chargecooler, Pump, Radiator, Pipes		QUANTITY		
46.10A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
50	Pipe, coolant feed/return thro' chassis	A082P4200F	2	2	
51	Grommet, water pipe thro' chassis	A079K6004F	4	4	
	Tie Wrap, pipes to chassis	A075W6038Z	1	1	
55	Hose, chassis pipe to 'T'- piece/connector	A082P6059F	1	1	
	Tie Wrap, hose to chassis	A075W6038F	1	1	
57	'T'- Piece, chargecooler pump hose	A910E7006F	1	1	Prior VIN *
	Connector Pipe, " "	B075KO111Z	1	1	From VIN *
59	Hose, 'T'- piece to chargecooler header tank	A910E2547F	1		)
	" " " " " "	P691.4610.006AF		1	) Prior VIN *
62	Hose Clip, 'Oetiker', hose to 'T'- piece	A082K6060F	2	2	)
63	Hose, 'T'- piece/connector to pump inlet	A910E2528F	1		
	" " " " " "	P691.4610.007AK		1	
65	Protective Tubing, inlet hose	A082F4131K	1	1	
66	Hose Clip, 16-25mm, hose securing	A079K6018F	4	4	
67	Hose Clip, 'Oetiker', hoses to 'T'- piece/conn.	B082K6059F	2	2	
70	Chargecooler Pump, water circulation	B910E9252F	1	1	
	Impellor, chargecooler pump	B910E6992H	1	1	
	Gasket, chargecooler pump end cover	A910E7010F	1	1	
73	'0' Ring, pump spigot	A907E6251F	1	1	
75	Hose, pump to chargecooler	A910E2515F	1	1	
76	Hose, chargecooler air bleed to header tank	A910E2548K	1	1	Prior VIN *
	Hose, chargecooler air bleed to 'T'- piece	A082K4249F	1	1	)
	Oetiker Clip, 8/16mm, bleed hose to chargecoole	A082L6042F	2	2	) From VIN *
	Tie Wrap, bleed hose to heater hose	A075W6038Z	2	2	)
al	Hose, chargecooler to chassis pipe	A910E2527F	1	1	

*** VIN R 1242 (S4 LHD)**
R 1250 (S4 RHD)
R 8030 (Sport 300)

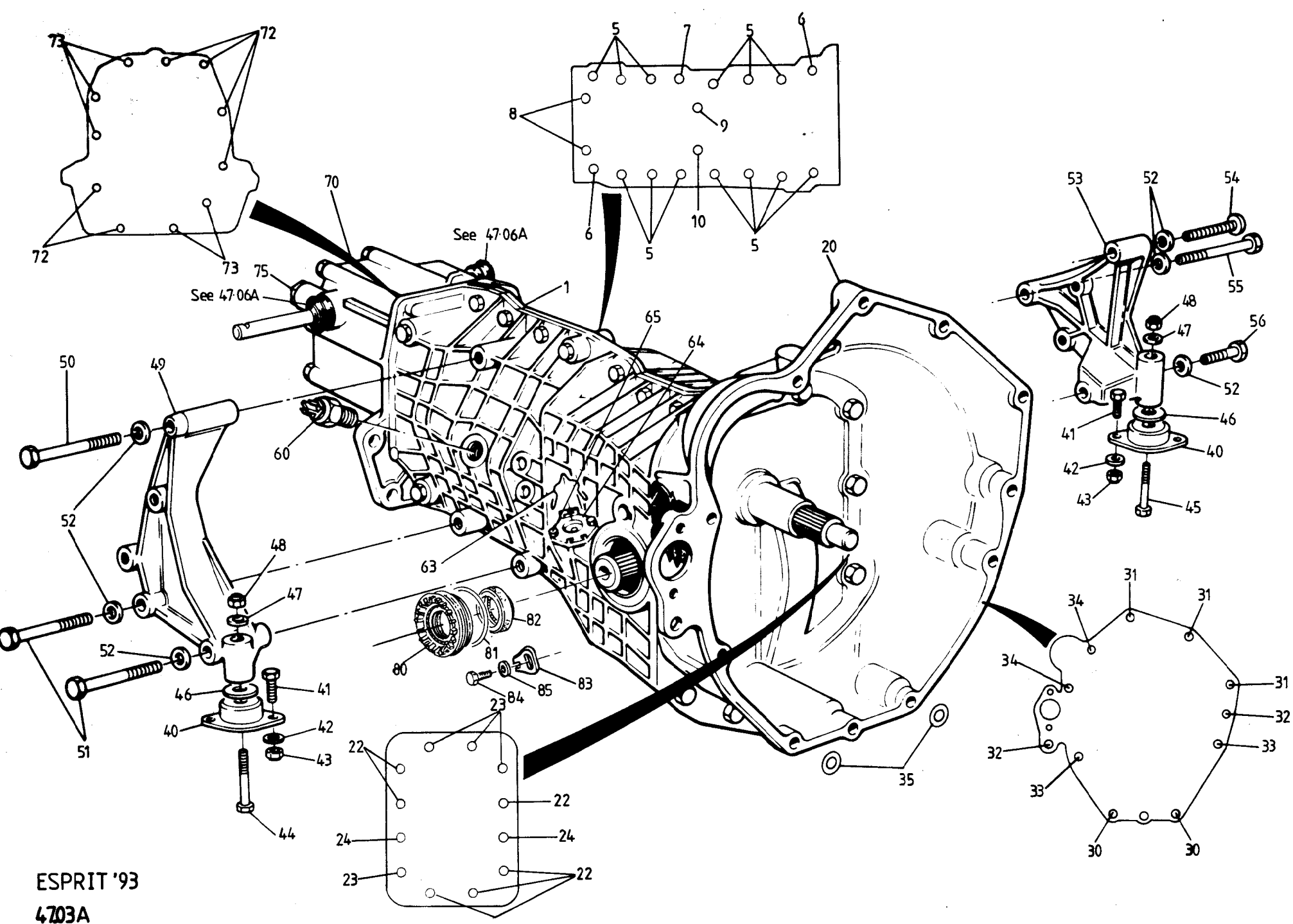


ESPRIT '93
47.01A

FUNCTION CODE	CONTENTS : Clutch & Release Mechanism		QUANTITY		
47.01A	PART DESCRIPTION	PART NUMBER	s4	~~S4S/~~ SPORT 300	REMARKS
1	Master Cylinder, clutch	A082J6147J	1	1	
2	Pushrod, clutch master cylinder	A082J6140F	1	1	
3	Clevis, master cylinder pushrod	A082J6148F	1	1	
4	Clip, pushrod nut retention	A082Q4027F	1	1	
5	Lock Nut, clevis to pushrod	A082J6149F	1	1	
6	Clevis Pin, clutch pedal to clevis	A082J4197F	1	1	
7	Pressure Washer, clutch pedal to clevis	A082W4103F	2	2	
a	'R' Pin, " " " "	A075W6175F	2	2	
10	Filler Cap, clutch master cylinder	A079J6038F	1	1	
	Service Kit, " " "	A036J6091Z	1	1	
12	Flat Washer, MS x 16, master cylinder fixing	A075W4020Z	2	2	
13	Nut, Nyloc, M8, master cylinder upper fix	A075W3010Z	1	1	
	Setscrew, M8 x 45, master cyl. lower fixing	A075W1043Z	1	1	
15	Pipe, flexible, master to slave cylinder	A082J4089F	1	1	1LHD
	" " " " " "	AO82J4088F	1	1	1RHD
	Clip, 8mm, clutch pipe to chassis	A075W6237F	2	2	
17	Adaptor, clutch pipe to master cylinder	A082J6145F	1	1	
18	Washer, adaptor to master cylinder	A082J6146F	1	1	
	Tie Wrap, clutch pipe to gearchange cables	A075W6038F	1	1	
20	Protective Sleeve, clutch pipe	A082F6517K	1	1	
21	Tie Wrap, sleeve to chassis	A075W6038F	4	4	
22	Grommet, pipe thro' chassis	A082L6159Z	2	2	
25	Slave Cylinder, clutch	A082Q6031F	1	1	
	Service Kit, slave cylinder	A082Q6024F	1	1	
27	Bleed Nipple, " "	A082Q6025F	1	1	
28	Setscrew, MS x 25, slave cylinder/bell housing	AO75W1039Z	1	1	
29	Spring Washer, MB, " " " "	A075W4036Z	2	2	
30	Setscrew, MB x 45, " " lower fixing	A075W1043Z	1	1	
31	Push Rod, slave cylinder to release fork	BOS2Q4023F	1	1	
32	Nut, M4, clutch adjuster	A079W3048F	1	1	
33	Threaded Abutment, release fork to push rod	A082F4111F	1	1	
34	Gaiter, clutch release fork	B082F6355F	1	1	
35	Fork, clutch release (inc. leaf spring)	A082Q4026J	1	1	
36	Leaf Spring, release fork retaining	A082F6231F	1	1	
37	Rivet, leaf spring to fork	A082W6302F	1	1	

1995 /02

FUNCTION CODE	CONTENTS : Clutch & Release Mechanism		QUANTITY		
			S4	~~S4S/~~ SPORT 300	
47.01A	**PART DESCRIPTION**	**PART NUMBER**			**REMARKS**
40	Release Bearing Assembly	A082Q6034F	1		
	" " & Carrier Assembly	P691.4701.800AJ		1	
	Ball Bearing, clutch release	P525.4701.606AF		1	)
	Spacer, bearing to carrier	P525.4701.002AF		1	) Part of release bearing assembly
	Profile Adaptor, release bearing	P525.4701.001CF		1	)
45	Pressure Plate Assembly	A082Q6032F	1		Identification 235 CP 7000
	" " "	P525.4701.607AF		1	
47	Setscrew, clutch cover to flywheel	A075W1021Z	6	6	
48	Spring Washer, M6, " " "	A075W4032Z	6	6	
50	Friction Plate, clutch driven	A082Q6033F	1	1	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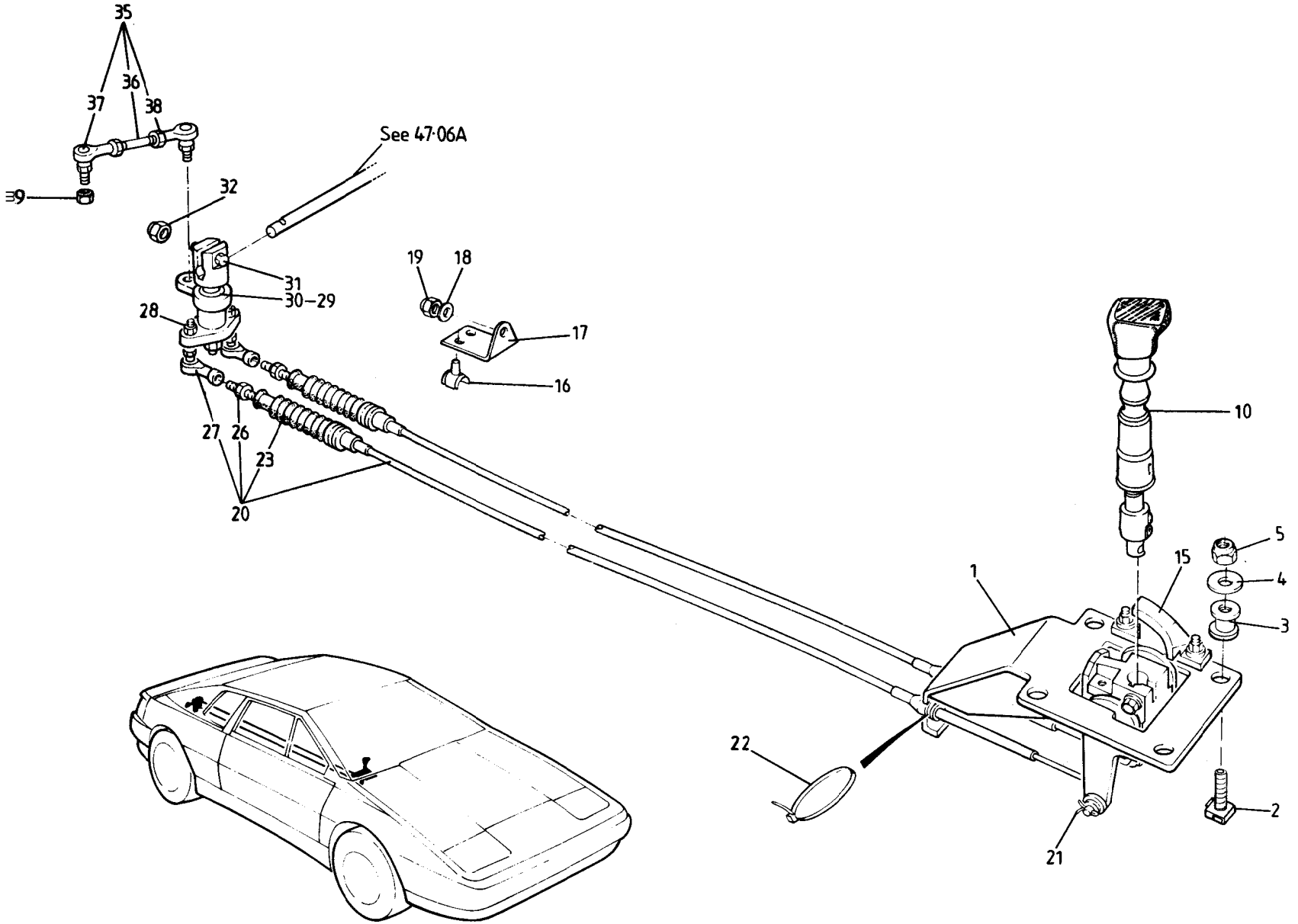
ESPRIT '93
47.03A

FUNCTION CODE	CONTENTS: Transmission Assembly & Mountings		QUANTITY		
47.03A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Transmission Assembly, inc. clutch housing	A082F6522F	1		s4) Type UN1 026 'high
	" " " " "	P691.4703.010AK*	1		Sport 300) torque' RH shift
	Main Case (pair), gearbox	A082F6533S	1		
	Air Vent, breather	A082F6398F	1		* inc. Lotus Limited Slip
5	Bolt, 35mm, main case joint	A082F6389F	13		Differential
6	" 45mm, " " "	A082F6383F	2		
7	" 50mm, " " "	A082F6390F	1		
	Washer, main case bolts (35/45/50mm bolts)	A082F6383F	32		
	Nut, " " " " " " "	A082F6385F	16		
8	Bolt, 110mm, main case joint	A082F6386F	2		
	Washer, main case 110mm bolts	A082F6387F	2		
9	Bolt, 110mm, main case joint	A082F6386F	1		
	Washer, main case 110mm bolt	A082F6387F	2		
	Nut, " " " "	A082F6388F	1		
10	Bolt, 115mm, main case joint	A082F6534S	1		
	Washer, main case 115mm bolt	A082F6535S	2		
	Nut , " " " "	A082F6536S	1		
20	Clutch Housing	A082F4146S	1		
	Gasket, gearbox to clutch housing	A082F6404F	1		
22	Bolt, 40mm, clutch housing to gearbox	A082F6539S	6		
23	" 50mm, " " " "	A082F6540S	4		
24	Dowel Bolt, " " " "	A082F6543S	2		
	Washer, " " " "	A082F6541S	12		
	Nut, dowel bolt, " " "	A082F6544S	2		
30	Bolt, M10 x 40, clutch housing to sump	A075W2052Z	2		
31	Bolt, M10 x 45, clutch housing to engine	A075W2053Z	3		
32	" M10 x 50, " " " "	A075W2054Z	2		
33	" M10 x 60, " " " "	A079W2055F	2		
34	" M10 x 75, " " " "	A079W2059Z	2		
35	Shim, laminated, clutch housing to sump	A082F6358F	2		
	Pointer, engine timing	A082F0753F	1		
	Cover, moulded, engine timing aperture	A082F4129K	1		

47.03A	PARTDESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
	Cover, engine speed sensor hole	A082F4130K	1		
	Setscrew, M6 x 12, cover to housing	A075W1027Z	1		
	Flat Washer, M6x15, " " "	A075W4015Z	1		
40	Mounting Rubber, gearbox	B085E6012F	2		
41	Setscrew, M8 x 20, gearbox mounting to chassis	A075W1038Z	4		
42	Flat Washer, M8x16, " " " "	A075W4020Z	8		
43	Nut, M8 Nyloc, " " " "	A075W3010Z	4		
44	Bolt, 7/16" UNF x 4", mounting to bracket, RH	A082F4112F	1		
45	" 7/16" UNF x 4½", " " " LH	A082F4113F	1		
46	Flat Washer, large o/d, mounting to bracket	A075W4006Z	2		
47	Flat Washer, gearbox mounting bolt	A075W4005Z	2		
48	Nut, 7/16" UNF Nyloc, gearbox mounting bolt	A075W3004Z	2		
49	Mounting Bracket, gearbox, RH	A082F0766K	1		
50	Bolt, Ml0 x 80, bracket to gearbox	A075W2061Z	1		
51	" M10 x 75, " " "	A075W2059Z	2		
52	Flat Washer, M10x20, " " "	A075W4024Z	6		
53	Mounting Bracket, gearbox, LH	A082F0767K	1		
54	Screw, Ml0 x 45 button head, bracket to g/box	A082W7057F	1		
55	Bolt, Ml0 x 65, bracket to gearbox	A075W2056Z	1		
56	" M10 x 30, " " "	A075W1049Z	1		
60	Reverse Lamp Switch	A082F6232F	1		
	Speedo Driven Gear	A082F6434F	1	)	
	'0' Ring, speedo driven gear	A082F6435F	1	)	S4
63	Retaining Clip, speedo cable to gearbox	A082F6236F	1	)	
	Blanking Plug, speedo drive aperture	P691.4703.009AK	1		Sport 300 (electronic speedo)
64	Locking Plate, speedo drive/blanking plate	A082F6400F	1		
65	Bolt, locking plate fixing	A082F6402F	2		
	Washer, locking plate bolt	A082F6378F	2		
	Rear Cover & Cross Shaft Assembly, RH shift	A082F6553S	1		
70	Rear Cover, RH shift	A082F6537S	1		
	Gasket, rear cover to main case	A082F6403F	1		
72	Bolt, 130mm, rear cover to main case	A082F6376F	6		
73	" 35mm, " " " " "	A082F6389F	5		
	Washer, rear cover bolts	A082F6378F	11		
	Dowel, rear cover to main case	A082F6381F	2		

FUNCTION CODE	CONTENTS: Transmission Assembly & Mountings		QUANTITY		
47.03A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
	Bush, cross-shaft, LH	B082F6374F	1		
	" " " RH	A082F6373F	1		
	Oil Seal, cross-shaft, RH	A082F6538S	1		
75	Blanking Plug, rear cover	A082F6375F	1		
80	Ring Nut, bearing adjusting	A082F6391F	1		
81	'0' Ring, ring nut	A082F6393F	1		
82	Lip Seal, output shaft	A082F6392F	2		
83	Locking Plate, ring nut	A082F6396F	1		
84	Screw, locking plate fixing	A082F6394F	1		
85	Washer, " " "	A082F6378F	1		
	Plug, oil drain & fill/level	A082F6397F	2		
	Magnet, oil debris	A082F6399F	1		
	Oil, Castro1 TAF-X 75W/90	A082F6552S	31t		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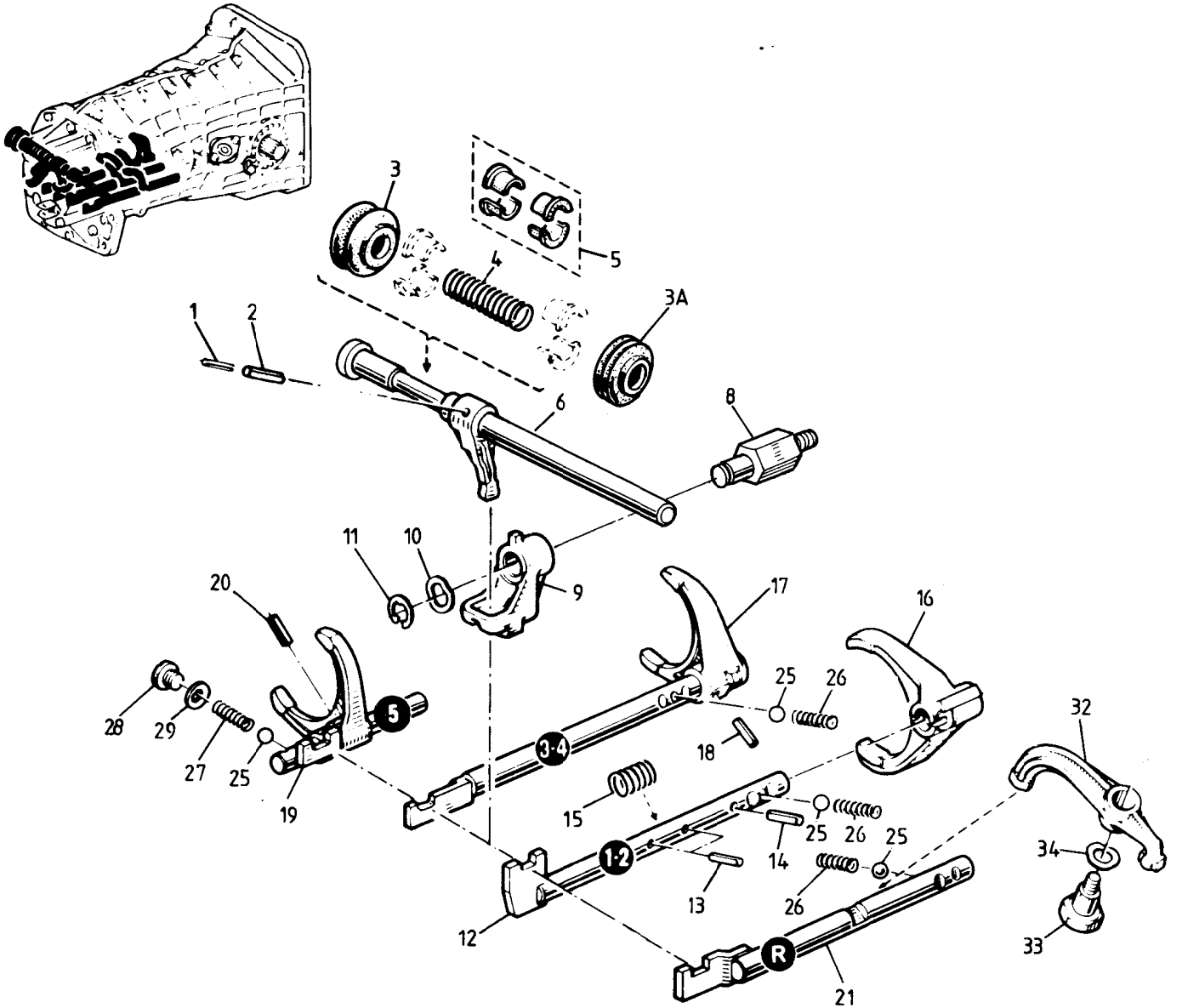
FUNCTION CODE	CONTENTS: Gearchanoe Mechanism - external		QUANTITY	1	
47.05A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Master Unit Assembly, gearchange	A082F6532S	1		Stamped 'C' (short shift)
2	Captive Stud, master unit to chassis	A082W6506F	4		
3	Grommet, master unit to chassis	X036B6150Z	4		
4	Flat Washer, M6 x 15, master unit to chassis	A075W4015Z	4		
5	Nut, M6 Nyloc, master unit to chassis	A907E6285F	4		
10	Gear Lever Assembly (inc. gear knob)	A082F6520F	1		
15	Reverse Baulk Block	A082F6363F	1		
16	Clip, gear cable support	A910E6592F	2		
17	Bracket, cable support clips to clutch hsg.	B082F4145F	1		
18	Washer, flat, " " " "	A075W4020Z	1		
19	Nut, M8 Nyloc, bracket to clutch housing	A075W3010Z	1		
20	Control Cable, gearchange	A082F6551S	2		
	Tie Wrap, gearchange cables to chassis	A089W6260F	1		
	Clip, cable to cable	A100W6418F	3		
21	Split Pin, gearchange cables to lever	A082F6371F	2		
22	Tie Wrap, " " " master unit	A082F6367F	1		
23	Gaiter, gearchange cable	A082F6369F	2		
	Tie Wrap, gaiter to gearchange cable	A082F6370F	4		
26	Locknut, M6, cable to rod end assembly	A082F6372F	2		
27	Rod End, cable to translator	A082F6368F	4		
28	Nut, M6 Nyloc, rod end to translator	A075W3009Z	2		
29	Translator Assembly (inc. tie rod assembly)	B082F6530F	1		Top Arm Length 23mm (short shift)
30	Ball Bearing, translator pivot	A082F6366F	2		
31	Bolt, translator clamp	B082F4144F	1		
32	Nut, M10 Nyloc, translator clamp	A075W3011Z	1		
35	Tie Rod Assembly	A082F6196H	1		inc. items 31, 32 & 33
36	Tie Rod	A082F6503F	1		
37	Rod End, tie rod	A082F6368F	2		
38	Locknut, M6 tie rod	A082F6372F	2		
39	Nut, M6 Nyloc, tie rod ends	A075W3009Z	2		

Esprit range: '93 M.Y. onwards



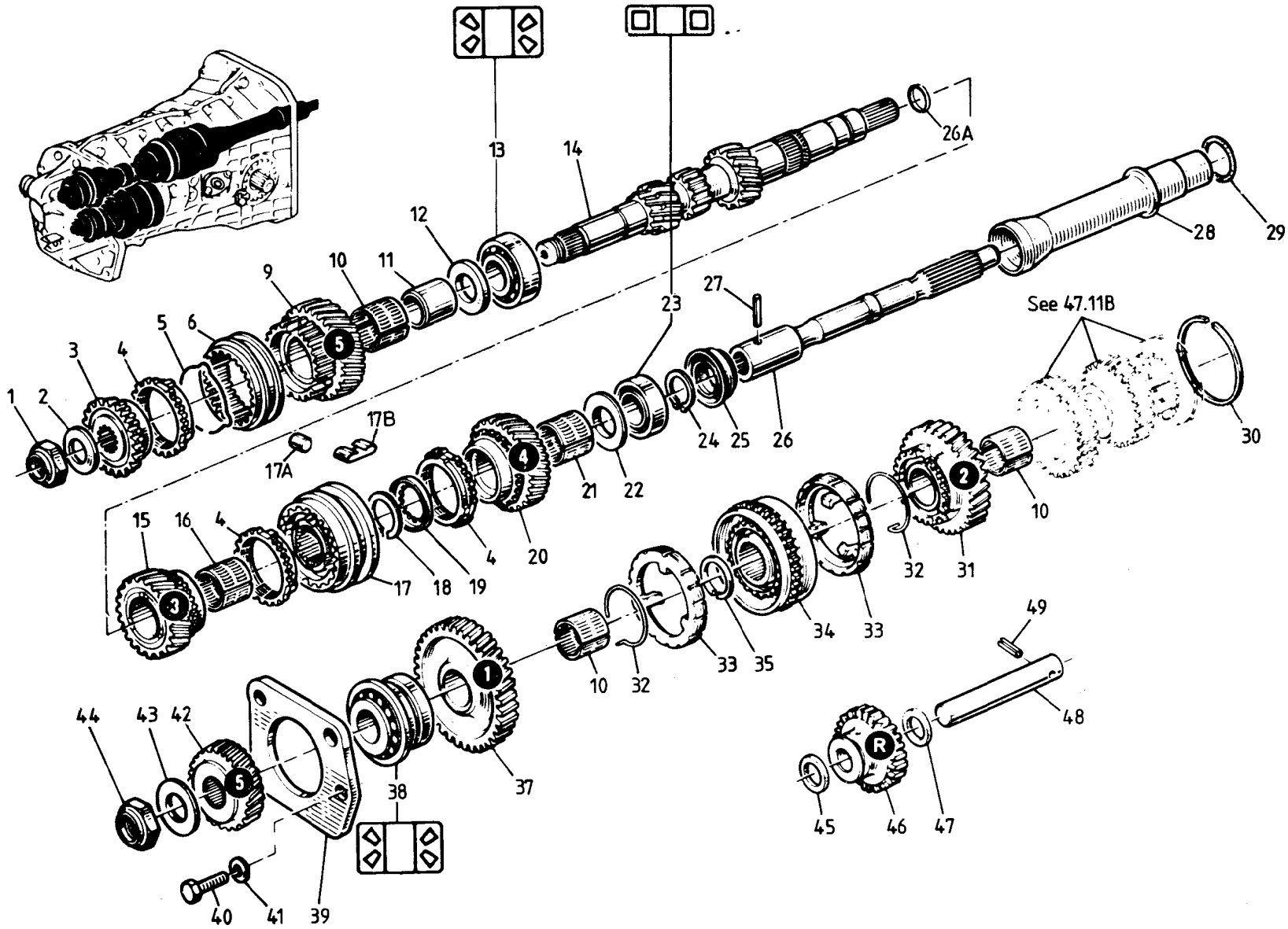
ESPRIT '93
47.06A

FUNCTION CODE

CONTENTS: Gear Selection Mechanism - internal

47.06A	PART DESCRIPTION	PART NUMBER	QUANTITY ALL		REMARKS
1	Roll Pin, 4mm, selector finger to cross shaft	A082F6420F	1		
2	" " 7mm, " " " " "	A082F6419F	1		
3	Bellows Seal, cross shaft, LH	A082F6423F	1		
3A	" " " " RH	A082F6548S	1		
4	Spring, cross shaft positioning	A082F6424F	1		
5	Collet Set, cross shaft spring	A082F6425F	1		
6	Cross Shaft, RH shift	A082F6547S	1		
8	Pivot Shaft, interlock guide	A082F6431F	1		
9	Interlock guide, selector shafts	A082F6430F	1		
10	Wavy Washer, interlock guide pivot	A082F6432F	1		
11	Circlip, interlock guide to pivot shaft	A082F6433F	1		
12	Selector Shaft, lst/2nd gears	B082F6408F	1		
13	Roll Pin, 6mm, 2nd synchro assist spring	A082F6418F	2		
14	Roll Pin, 6mm, 2nd selector fork	A082F6418F	1		
15	Spring, 2nd synchro assist	B082F6409F	1		
16	Selector Fork, lst/2nd	B082F6412F	1		
17	Selector Shaft & Fork Assembly, 3rd/4th	A082F6413F	1		
18	Roll Pin, 6mm, 3rd/4th fork to shaft	A082F6418F	1		
19	Selector Shaft & Fork Assembly, 5th	A082F6414F	1		
20	Roll Pin, 5th fork to shaft	A082F6417F	1		
21	Selector Shaft, reverse	B082F6405F	1		
25	Ball, detent, selector shafts	A082F6407F	4		
26	Spring, detent, lst/2nd, 3rd/4th, reverse	A082F6406F	3		
27	" " 5th	A082F6554S	1		
28	Plug, 5th detent spring retaining	A082F6416F	1		
29	Washer, detent plug	A082F6415F	1		
32	Lever, reverse shaft to gear	A082F6427F	1		
33	Pivot Bolt, reverse lever	A082F6429F	1		
34	Wavy Washer, reverse lever pivot	A082F6428F	1		

Esprit range: '93 M.Y. onwards.

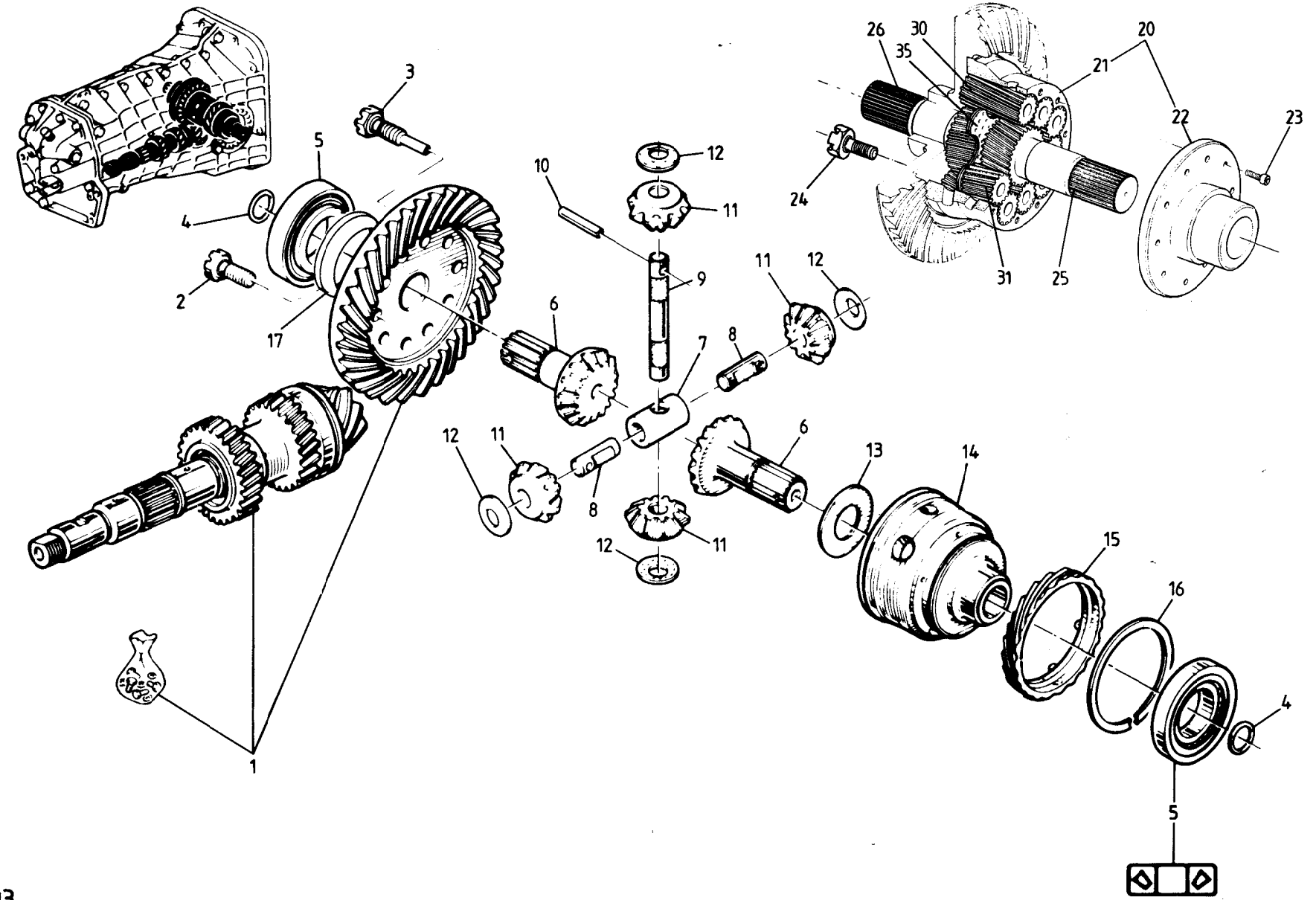


ESPRIT '93

47.07A

FUNCTION CODE	CONTENTS: Gears, Shafts & Bearinss		QUANTITY		
47.07A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Nut, 5th synchro hub to primary shaft	A082F6462F	1		
2	Washer, " " " " "	A082F6461F	1		
3	Synchroniser Hub, 5th	A082F6460F	1		
4	Synchro Ring, 3rd, 4th & 5th	A082F6440F	3		
5	Spring Clip, 5th synchro sleeve	A082F6458F	1		
6	Sliding Gear Sleeve, 5th synchroniser	B082F6458F	1		
9	Drive Gear, 5th, primary shaft	A082F6457F	1		39 teeth
10	Needle Race (pair), lst, 2nd & 5th gear	A082F6456F	3		
11	Sleeve, 5th drive gear bearing	A082F6455F	1		
12	Thrust Washer, 5th drive gear	A082F6454F	1		
13	Bearing, double taper, primary shaft rear	A082F6546S	1		
14	Primary Shaft	A082F6545S	1		
15	Drive Gear, 3rd, primary shaft	A082F6439F	1		21 teeth
16	Needle Race (pair), 3rd gear	A082F6438F	1		
17	Synchromesh Assembly, 3rd/4th	A082F6441F	1		
17A	Roller, 3rd/4th synchroniser sleeve	A082F6443F	3		
17B	Spring, 3rd/4th synchroniser roller	A082F6442F	3		
18	Circlip, 3rd/4th synchro hub retaining	B082F6444F	1		
19	Splined Cup Washer, circlip retaining	A082F6445F	1		
20	Drive Gear, 4th, primary shaft	A082F6447F	1		27 teeth
21	Needle Race (pair), 4th gear	A082F6446F	1		
22	Thrust Washer, 4th drive gear	A082F6448F	1		
23	Roller Bearing, primary shaft front	A082F6449F	1		
24	Circlip; roller bearing retention	B082F6450F	1		
25	Lip Seal, primary shaft front	A082F6451F	1		
26	Clutch Shaft	B082F6452F	1		
26A	'0' Ring, clutch shaft to primary shaft	A082F6549S	1		
27	Spring Pin, " " " " "	A082F6453F	1		
28	Guide Tube, clutch release bearing	A082F6482F	1		
29	'0' Ring, guide tube sealing	A082F6483F	1		
30	Split Ring, sec. shaft front bearing location	A082F6463F	1		
31	Driven Gear, 2nd, secondary shaft	A082F6464F	1		35 teeth
32	Spring Ring, lst/2nd synchroniser	A082F6465F	2		
33	Synchro Ring, lst/2nd	A082F6466F	2		
34	Synchroniser Assembly, lst/2nd	A082F6467F	1		

FUNCTION CODE	CONTENTS: Gears. Shafts & Bearinas		QUANTITY		
47.07A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
35	Circlip, lst/2nd synchroniser retaining	A082F646SF	1		
37	Driven Gear, lst, secondary shaft	A082F6469F	1		37 teeth
38	Bearing, dual taper roller, sec. shaft rear	A082F6470F	1		
39	Retaining Plate, sec. shaft rear bearing	B082F6471F	1		
40	Bolt, retaining plate fixing	A082F6472F	3		
41	Washer, retaining plate fixing bolt	A082F6473F	3		
42	Driven Gear, 5th, secondary shaft	A082F6474F	1		32 teeth
43	Washer, sec. shaft nut to 5th gear	A082F6475F	1		
44	Nut, secondary shaft	A082F6476F	1		
45	Friction Washer, 3mm, reverse gear rear	A082F7479F	1		
46	Gear, reverse idler	A082F6480F	1		25 teeth
47	Friction Washer, 5mm, reverse gear front	A082F6481F	1		
48	Shaft, reverse idler gear	A082F6478F	1		
49	Spring Pin, reverse shaft retaining	A082F6477F	1		



ESPRIT '93

47.11A

FUNCTION CODE	CONTENTS: Crownwheel & Pinion, Differential		QUANTITY		
47.11A	PART DESCRIPTION	PART NUMBER	S4	SPORT 300	REMARKS
1	Crownwheel & Pinion (inc. bolts)	A082F6484F	1	1	(matched set)
2	Bolt, crownwheel to differential carrier	A082F6492F	a		> Use ONCE only
3	Spigot Bolt, crownwheel & spindle locating	A082F6495F	2		>
4	'0' Ring, sun gear shaft seal	A082F6494F	2	2	
5	Bearing, taper roller, differential carrier	A082F6493F	2	2	
6	Sun Gear/Output Shaft	A082F6487F	2		
7	Hub, planet gear half shafts	A082F6498F	1		
a	Half Shaft, planet gear	A082F6499F	2		
9	Shaft, planet gear	A082F6490F	1		
10	Roll Pin, planet gear shaft retaining	A082F6491F	1		
11	Planet Gear, differential	A082F6489F	4		
12	Thrust Washer, planet gear	A082F6488F	4		
13	Thrust Washer, sun gear	A082F6486F	1		
14	Differential Carrier	A082F6485F	1		
15	Speedo Drive Gear	A082F6496F	1		26 teeth
16	Split Ring, speedo drive retaining	A082F6497F	1		
17	Shim Washer, 1.2, backlash adjust	A082F6524F	)	)	)
	" " 1.3, " "	A082F6525F	)	)	)
	" " 1.4, " "	A082F6526F	) 1	) 1	) Selective
	" " 1.5, " "	A082F6527F	)	)	)
	" " 1.6, " "	A082F6528F	)	)	)
	" " 1.7, " "	A082F6529F	)	)	)
20	Limited Slip Differential Assembly	P691.4703.800EF		1	
21	Body, Lotus differential	P691.4703.001DH		1	
22	Cover, Lotus differential	P691.4703.002CH		1	
23	Screw, caphead, M6 x 16, cover to body	SC06016H		10	
24	Bolt, crownwheel to differential carrier	A082F6492F		10	Use ONCE only
25	Sun Gear, output Shaft, RH	P691.4703.003EH		1	Small
26	" " " " , LH	P691.4703.004EH		1	Large
30	Planet Gear, differential, long	P691.4703.005DH		5	
31	" " " short	P691.4703.006DH		5	
35	Thrust Washer, sun gears, INA plain bearing	P691.4703.008BH		2	

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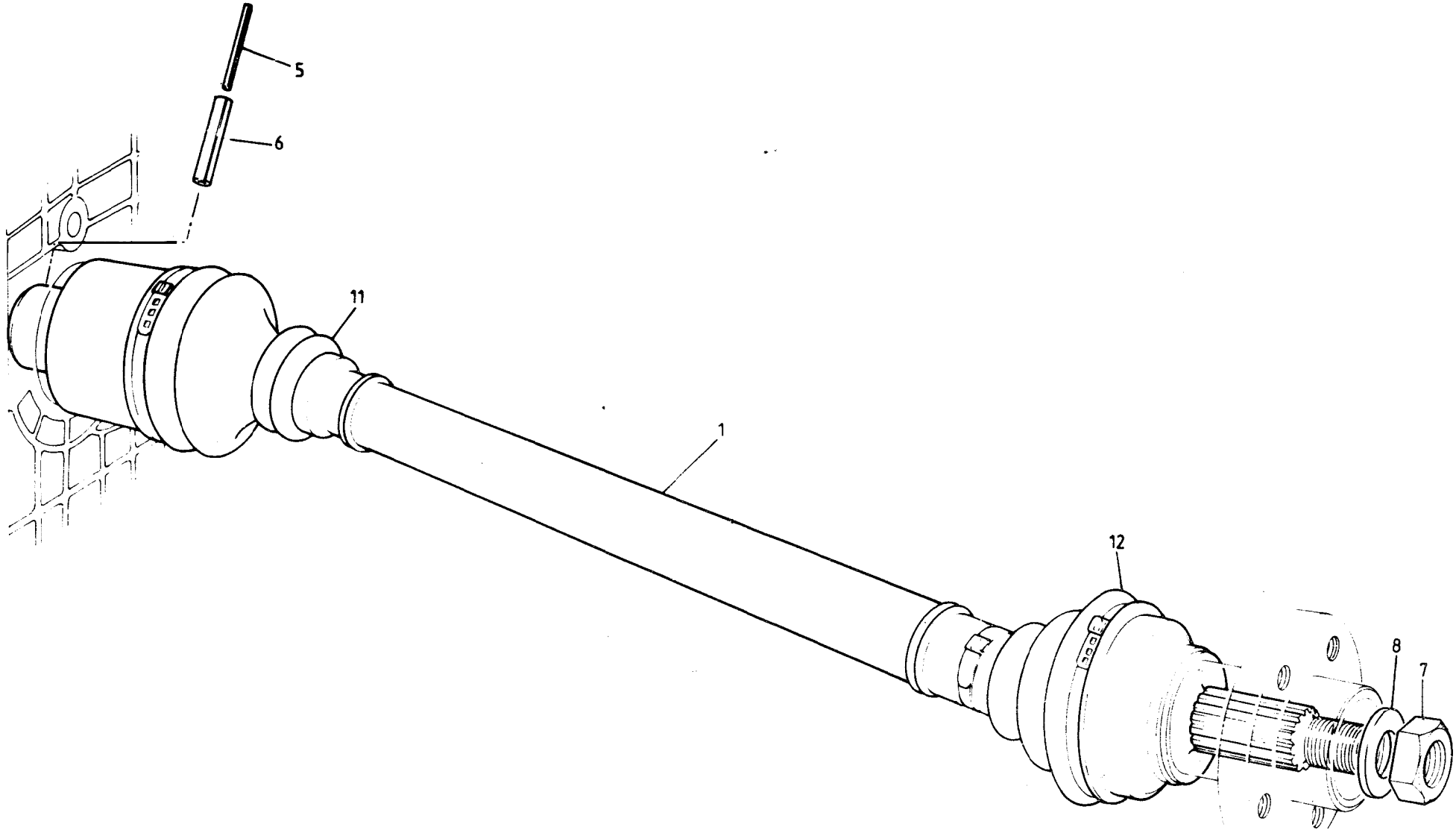
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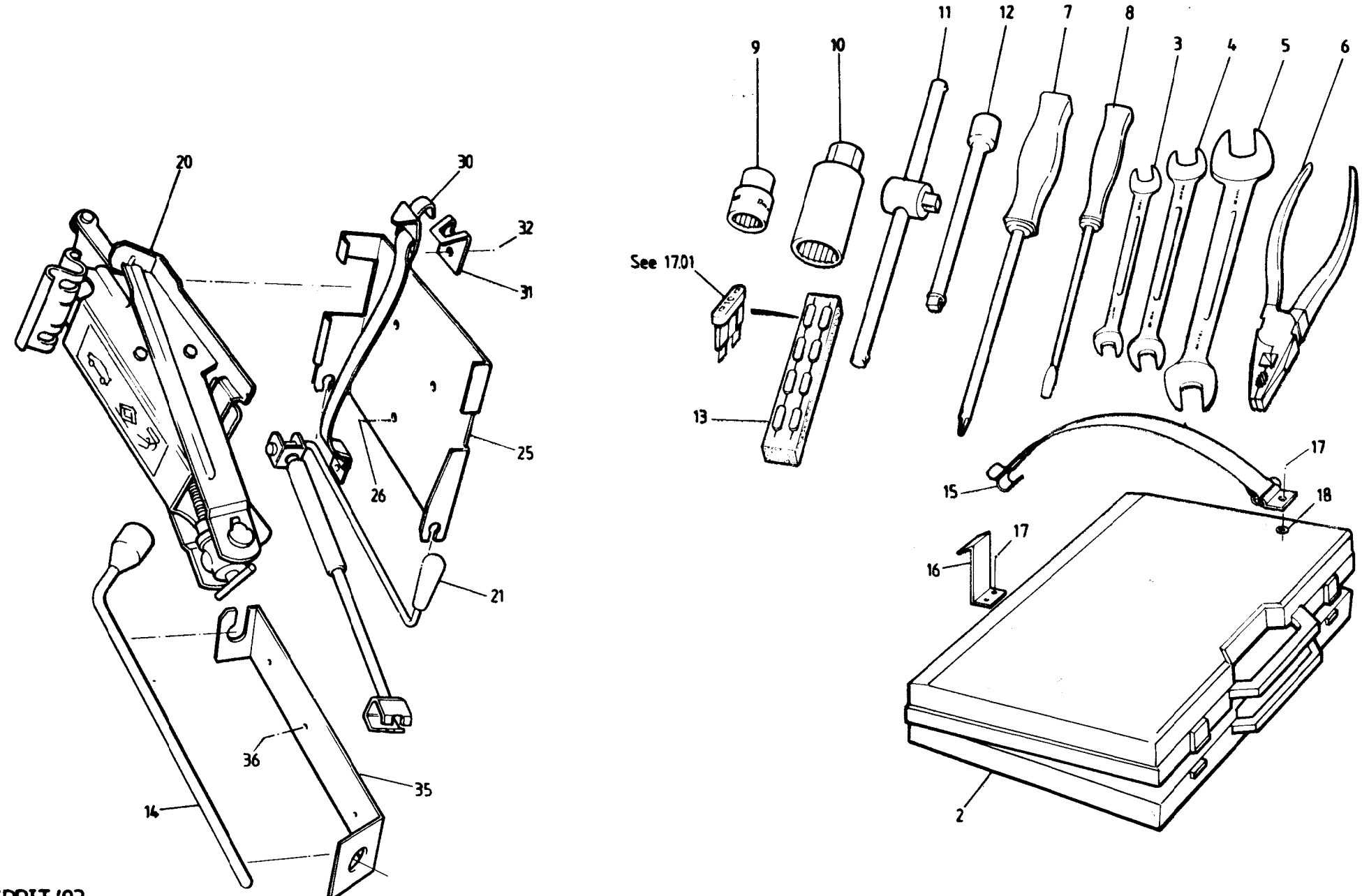
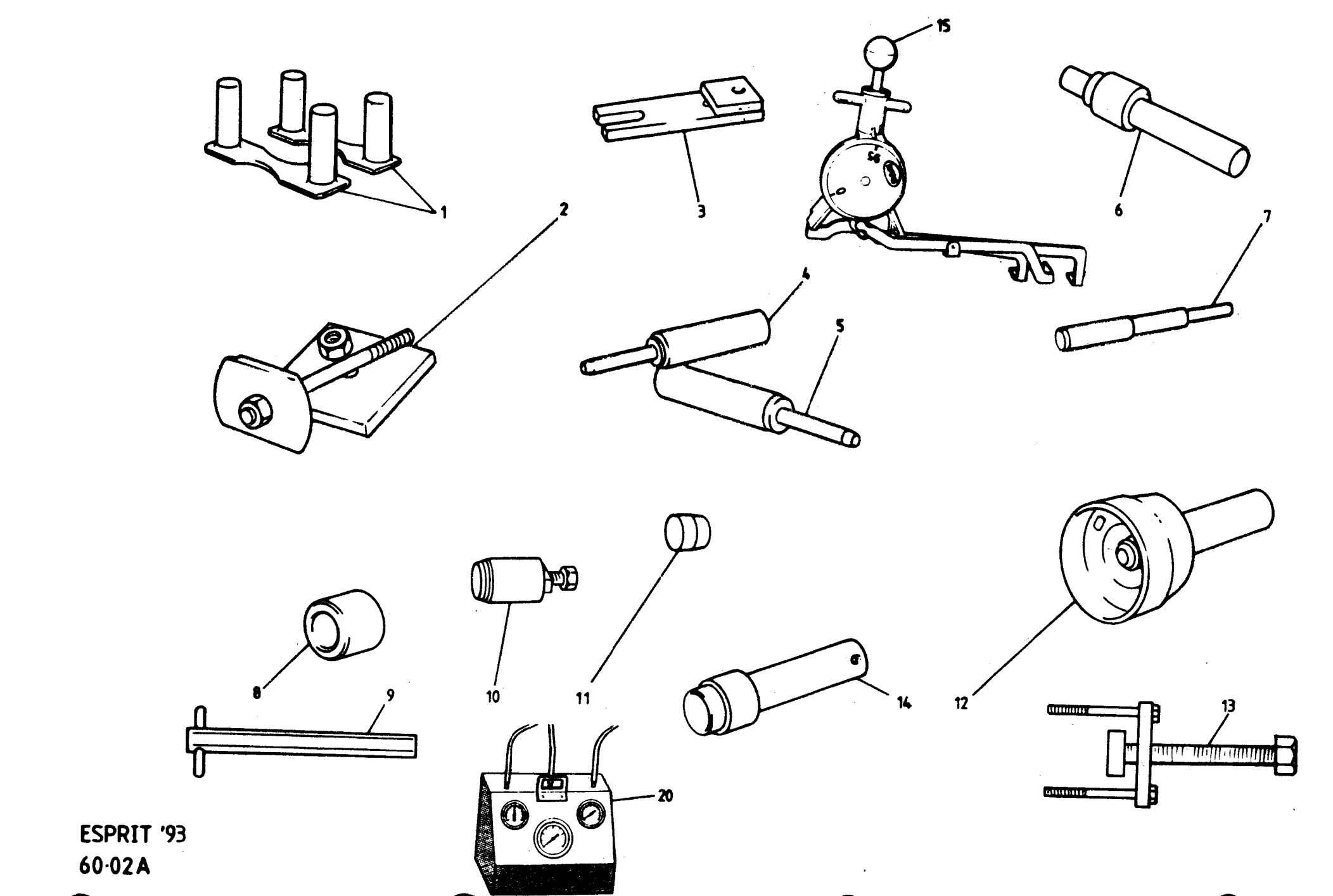
FUNCTION CODE	CONTENTS: Driveshafts		QUANTITY		
47.15A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	Driveshaft Assembly (rolled splines)	A082D6037F	2		Use only with counterbored rear hub
5	Pin, 3.5mm o/d, driveshaft retaining	A082D6023F	2		B082D6019F
6	" 6.0mm o/d, " "	A082D6024F	2		
7	Nut, driveshaft to hub	A082D6026F	2		
a	Flat Washer, driveshaft to hub	A082D6025F	2		
11	Boot Kit, driveshaft inboard joint	A082D6028F	2		) Contains boot, locking clips & grease
12	" " " outboard "	A082D6029F	2		)
	Toothed Ring, vehicle speed sensor	A082D6034H	2		Included in driveshaft assembly



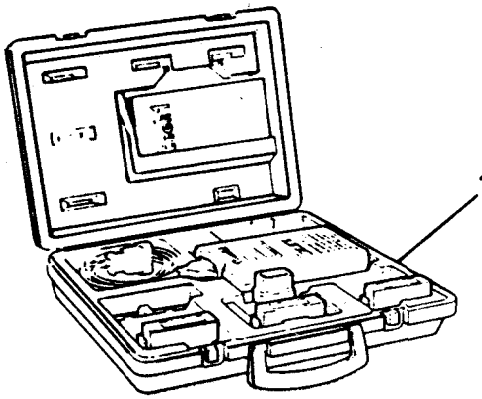
ESPRIT '93
6Q01A

FUNCTION CODE	CONTENTS: Toolkit, Jack & Handle. Wheelbrace & Stowage		QUANTITY		
60.01A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
	Toolkit Assembly	A082T4007F	1		
2	Plastic Case, toolkit	A082T6003H	1		
3	Spanner, open end, 8mm/10mm	A082T6004H	1		
4	" " " 10mm/13mm	A082T6005H	1		
5	" " " 13mm/17mm	A082T6006H	1		
6	Pliers	A082T6008H	1		
7	Screwdriver, Posidrive no.2	A082T6007H	1		
8	" Blade	A082T6012H	1		
9	Socket, 19mm	A082T6015H	1		)
10	" spark plug	A082T6011H	1		) 3/8" drive
11	Sliding 'T' Bar	A082T6009H	1		)
12	5" Extension	A082T6010H	1		)
13	Foam, self adhesive, spare fuse retention	A054B6110V	100mm		
14	Wheelbrace, 19mm	A082T6016F	1		
15	Strap, toolkit retention	A089U1412F	1		
16	Hook, strap	B082U4715K	1		
17	Pop Rivet, strap to battery cover	A085W6259Z	3		
18	Washer, pop rivet	A075W4000Z	3		
20	Scissor Jack & Handle	A082T6019F	1		
21	Handle, jack	A082T6020H	1		
25	Base Plate, jack stowage	A082U7573F	1		
26	Pop Rivet, stowage plate to plenum	A082W6243F	3		
	Washer, pop rivet	A075W4000Z	3		
30	Strap, jack stowage	A082U7575F	1		
	Pop Rivet, stowage strap to plenum	A082W6243F	1		
	Washer, pop rivet	A075W4000Z	1		
31	Anchor, stowage strap	A082U7599F	1		
32	Pop Rivet, anchor to plenum	A075W6089Z	1		
	Washer, pop rivet	A075W4000Z	1		
35	Bracket, wheelbrace securing	A082U7595F	1		
36	Pop Rivet, bracket to plenum	A082W6243F	3		
	Washer, pop rivet	A075W4000Z	3		
	Cover, puncture repair canister	P691.6020.003AJ	1		Sport 300



ESPRIT '93
60·02A

FUNCTION CODE	CONTENTS: Engine Special Tools		QUANTITY		
60.02A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
	Engine Special Toolkit Assembly	T000L0002A	1		Comprises * items
1	Cylinder Liner Clamps *	T000T0002A	1pr		
3	" " Extractor *	T000T0012A	1		
3	" " Nip Gauge	T000G0003A	1		
4	Drift, Inlet Valve Seat *	T000T0093A	1		
5	" Exhaust " " *	T000T0094A	3		
6	Inserter, Spigot Bearing (ball bearing) *	T000T0652A	1		
7	Drift, Valve Guide *	T000T0004A	1		
8	Inserter, Camshaft Oil Seal *	T000T0010A	1		
9	Spanner, Oil Pick Up Pipe Union *	T000T0083A	1		
10	Extractor, Camshaft Oil Seal *	T000T0011A	1		
11	Sleeve, " " " *	T000T0072A	1		
12	Pilot, Rear Oil Seal, Crankshaft *	T000T0084A	1		
13	Puller, Crankshaft Pulley *	T000T0170A	1		
14	Pilot, Front Cover *	T000T0009B	1		
	Oil Filter Wrench *	T000T0912F	1		
	Spare Strap, oil filter wrench *	T000T0913F	1		
15	Burroughs Gauge, toothed belt *	T000G0025J	1		
	Torx Socket, cam housing bolts *	T000T0443A	1		
	Pressure Test Gauge Kit *	T000T0500K	1		
	Exhaust Sample Probe	T000T0501F	1		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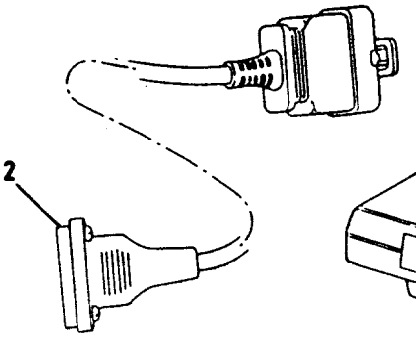
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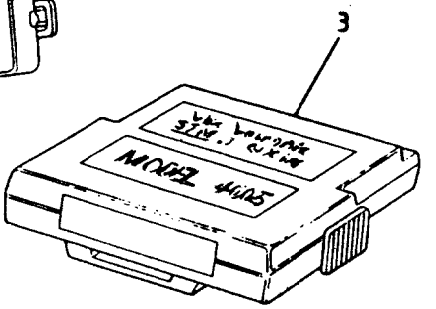
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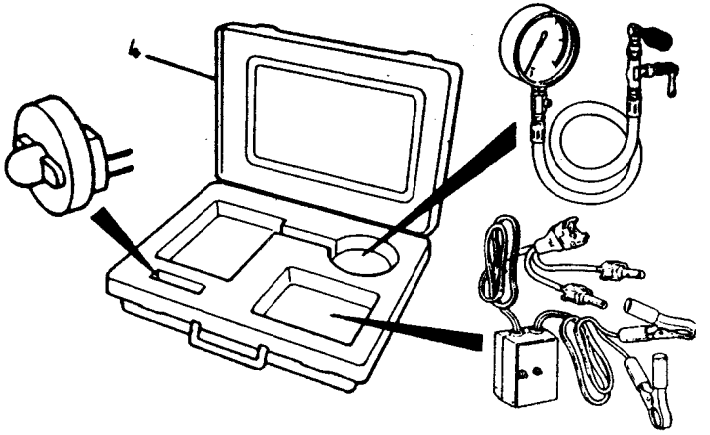
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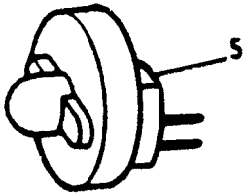
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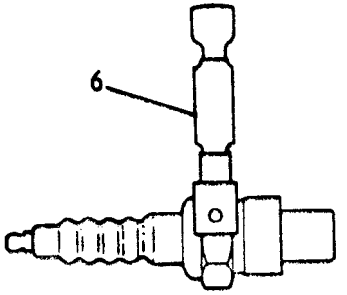
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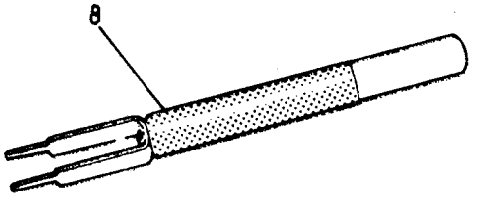
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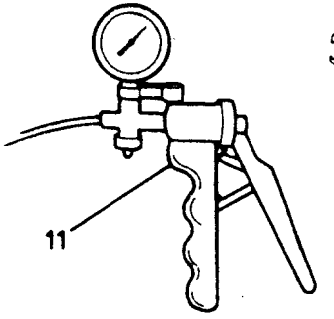
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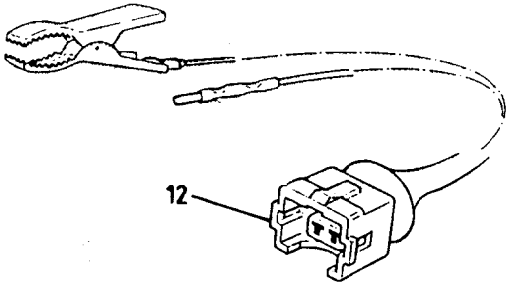
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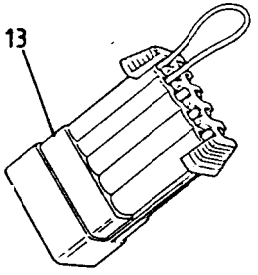
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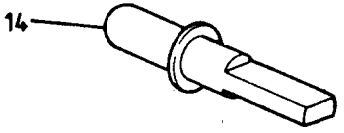
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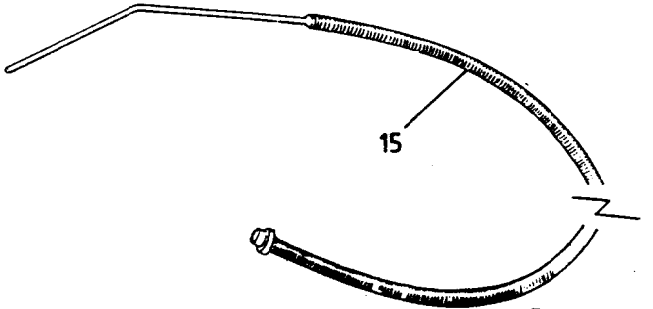
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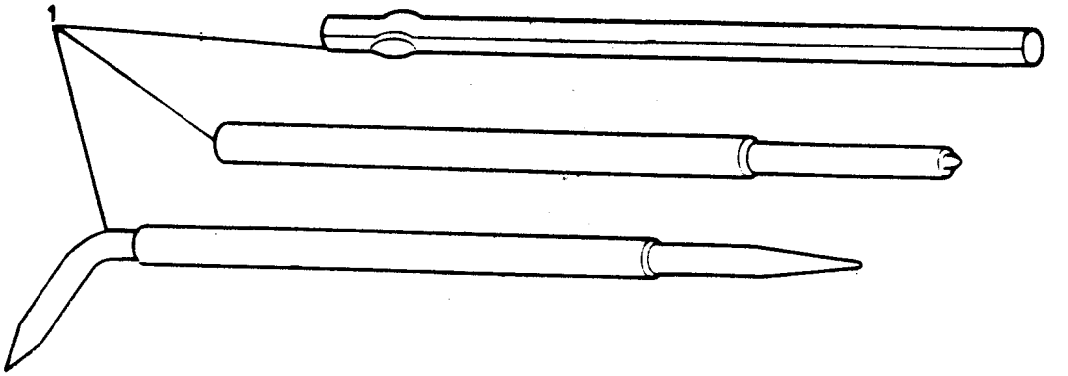
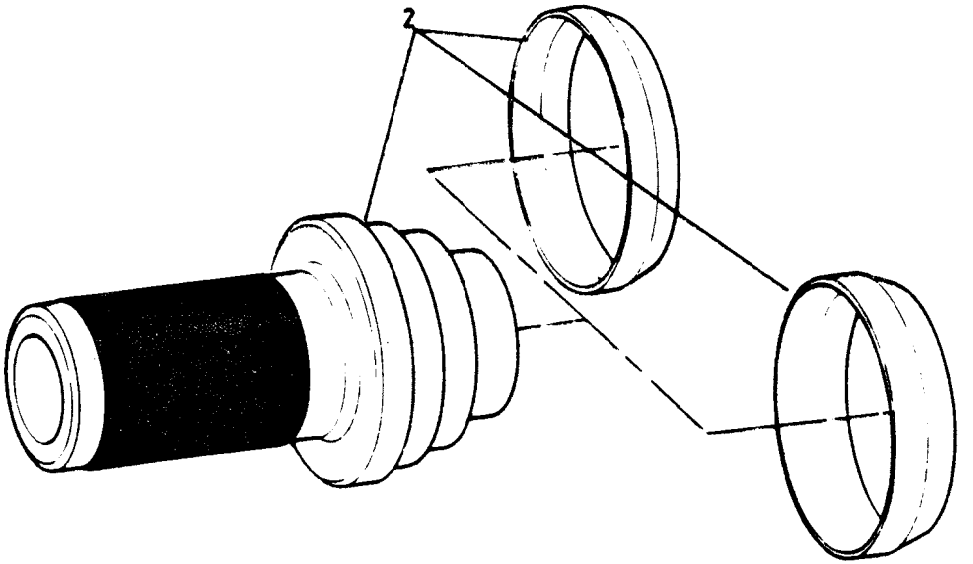
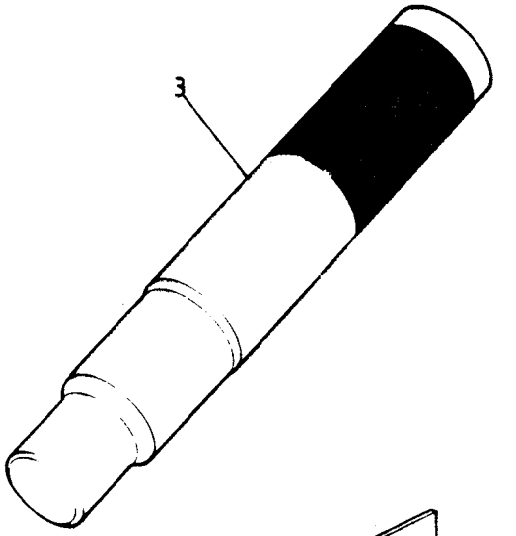
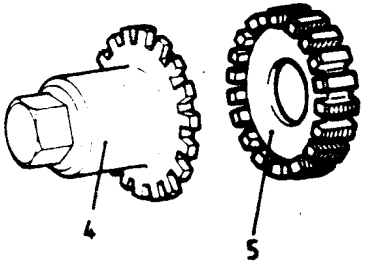
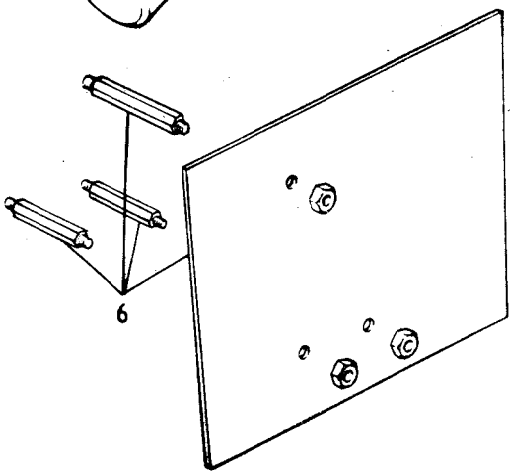
FUNCTION CODE	CONTENTS: Delco Injection Special Tools		QUANTITY		
60.03A	**PARTDESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
1	'Tech 1' Diagnostic Scanner Kit	T000T0896F	1		Inc. next 2 items
2	Connector Lead, 'Tech 1' to ALDL	T000T0897/2	1		
3	Calibration Cartridge, 'Tech 1'	T000T0898/3	1		Identification: LOTUS 89-90 ECM 'PLUS' Inc. Esprit Delco inj. non-c/cooler Esprit " " Chargecooler Elan Delco Injection N.A. Elan " " non-cat Turbo Elan " " cat. Turbo Esprit 'driver only' S.I.R. Elan S.I.R.
4	Fuel Pressure & Injector Diagnostic Kit	T000T0899F	1		Inc. next two lines
	Seal, pressure test gauge to regulator valve	A082L6202F	1		
5	Injector Test Lamp	T000T0900F	1		
6	Spark Tester	T000T0901F	1		
7	Connector, Test Adaptor Kit	T000T0902F	1		
a	Metri-Pack Terminal Remover	T000T0903F	1		
9	Weather-Pack " "	T000T0904F	1		
11	Vacuum Pump	T000T0907F	1		
12	Injector Test Lamp Connector	T000T0908J	1		
13	ALDL Bridging Connector	T000T0909F	1		
14	Blanking Plug, fuel pressure regulator valve	T000T0910F	1		
15	Exhaust Sample Probe	T000T0501F	1		







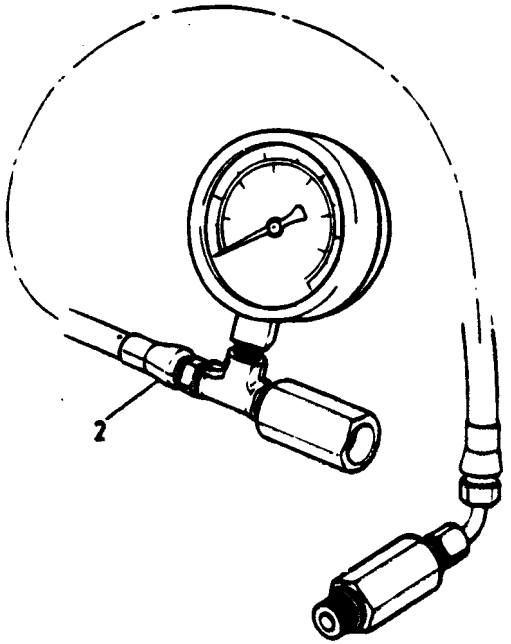




ESPRIT '93

60.04 A

FUNCTION CODE	CONTENTS: Renault Transmission Tools & Adhesives		QUANTITY		
60.04A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
1	Driveshaft Roll Pin Punch Set	T000T0678F	1		
2	Output Shaft Oil Seal Replacer	T000T0681F	1		
3	Clutch Mandrel	T000T0654F	1		
4	Bearing Adjuster Wrench	T000T0679F	1		) Differential bearing adjustment
5	Adaptor, bearing adjuster wrench	T000T0680F	1		)
6	Support Plate, transmission assembly	T000T0682F	1		
	Loctite 518, jointing compound	A082F6514V	A/R		
	Loctite Chisel (removes cured 518)	A082F6517V	A/R		
	Loctite 270, adhesive	A082F6515V	A/R		
	Loctite 648, threadlock	A082F6516V	A/R		
	CAF 4/60 THIXO (100g tube), sealant	A082F6500F	A/R		
	Grease, No.20 (1g sachet)	A082F6501F	A/R		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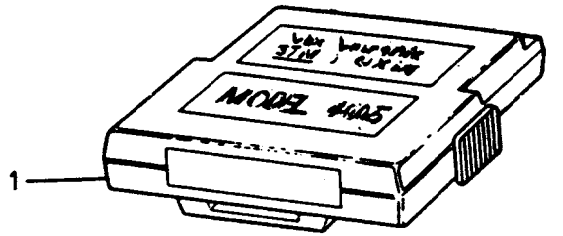
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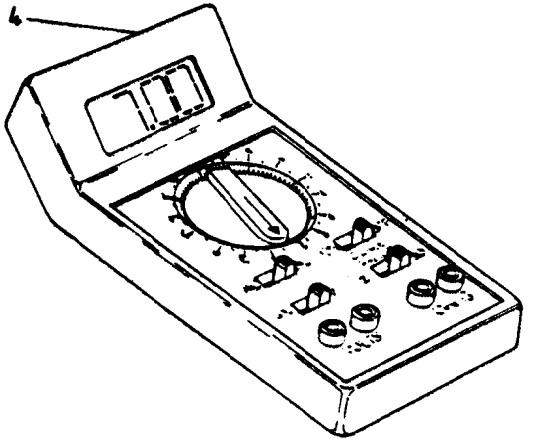
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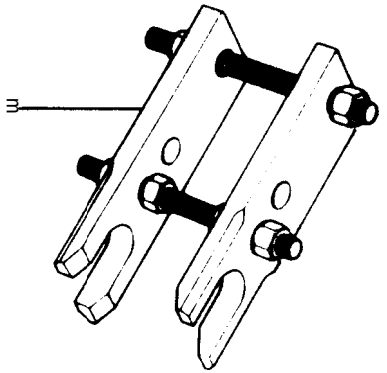
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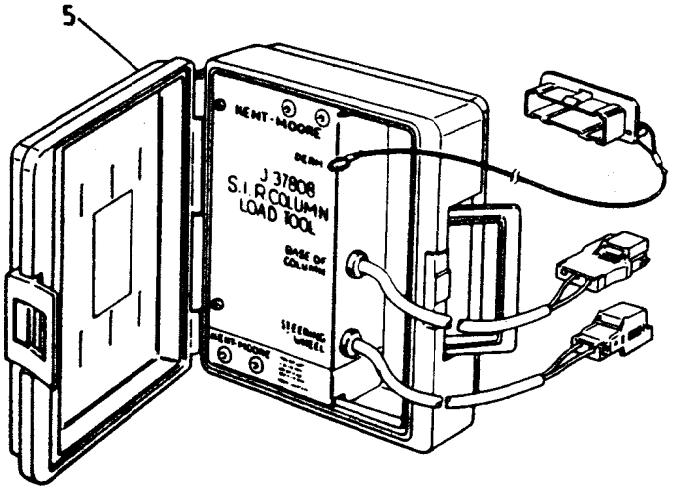

5
J 37808
S.I.R COLUMN
LOAD TOOL

FUNCTION CODE	CONTENTS: ABS, S.I.R. & Body Special Tools		QUANTITY		
60.05A	**PART DECRIPTION**	**PART NUMBER**	IF APPLIC		**REMARKS**
1	'Tech 1' Diagnostic Cartridge, ABS brakes	T000T1115/1	1		Identification: LOTUS 1991 BRAKE
	" " " " Alarm System	A082M6557F	1		English Language
	" " " " Dual S.I.R.	T000T1237F	1		
	" " " " " "	A082M6562S	1		German "
	" " " " " "	A082M6563S	1		Italian "
	" " " " " "	A082M6564S	1		French "
	" " " " " "	A082M6565S	1		Norwegian "
	" " " " " "	A082M6566S	1		Dutch "
	" " " " " "	**A082M6567S**	1		Spanish "
	" " " " " "	**A082M6568S**	1		Swedish "
	" " " " " "	**A082M6569S**	1		Danish "
	" " " " " "	A082M6570S	1		Portuguese "
	(For 'Tech 1' kit, S.I.R. cartridge & connector lead etc., see 60.03A)				
2	Pressure Gauge, ABS hydraulics	T000T1112	1		
3	Rear Caliper Spreader Toll	T000T0556	1		Used for cylinder replacement
	Retraction Tool, park brake caliper piston	T000T1242F	1		'Brembo' equipped cars only
4	Digital Volt Ohm Meter	TOOOT1034	1		High impedance multimeter used in S.I.R. diagnosis
5	Column Load Tool	TOOOT1035	1		Used to simulate resistance of inflator module & column components in S.I.R. diagnosis
	Screen Removal Cutting Wire Tool	A075B6169F	1		
	Suspension Bush Press Tool	T000T0541F	1		Used to replace bushes in suspesion links
	Socket Spanner, ABS Pressure Switch	T000T1238F			39mm long reach

FUNCTION CODE	CONTENTS: Selants & Adhesives		QUANTITY		
80.05A	**PART DESCRIPTION**	**PART NUMBER**	ALL		**REMARKS**
	Permabond Al36 (ready gasket - red)	A912E6421V	A/R		Cam housing to head, crank front & rear seal housing
	Permabond Al34 (pipe sealant - green)	A100B6155V	A/R		Spigot bearing to crank, flywheel bolts, oil filter adaptor, oil cooler adaptor unions, oil cooler hoses to unions, water feed to turbo, cam belt adjuster stud to block, oil temp. & pressure senders, engine mounting bolts to block, cam pulley retaining bolts, PAS pump to mounting bracket & bracket to block
	Permabond A025 (high temperature sealant)	A912E6800V	A/R		Exhaust Manifold Studs, sample port grub screws
	Wellseal (jointing compound - brown)	A907E6119Z	A/R		Aux. housing gasket, oil gallery cover gasket
	Loctite 509 (adhesive/sealant - blue tint)	A920E6007V	A/R		Main bearing panel to block, water pump to block
	Permabond A905 (surface conditioner - aerosol)	A912E6759V	A/R		All joint surfaces
	Loctite 572 (pipe sealant - white)	A912E7030V	A/R		Cylinder liners to block
	Silastic RTV 732 (adhesive/sealant - clear)	A075U6044V	A/R		Alternator bracket to aux. housing
	Sikaflex 221 (adhesive - black)	A089B6174V	A/R		General purpose ABS adhesive
	For Renault Transmission Adhesives see 60.04A				

FUNCTION CODE	CONTENTS: Touch-in Paint		QUANTITY		
80.20A	**PART DESCRIPTION**	PART NUMBER	ALL		**REMARKS**
LOTUS PAINT CODE					
A02	Black	B036B6424S	1		
A03	Silver Diamond	A075B6249F	1		
A04	Gold	A075B6250F	1		
A05	Viper Green	A075B6271F	1		
A06	Bermuda Blue	A075B6251F	1		
A07	Roman Bronze	A075B6255F	1		
A08	Lotus Bronze	A075B6256F	1		
Al3	Tabac	A083B6252F	1		
Al4	Altair Green	A083B6253F	1		
A15	Helleblau	A083B6254F	1		
Al6	Essex Blue	A082B6060F	1		
Al7	Essex Blue	A082B6062F	1		
Al9	Copper Fire Metallic	A082B6063F	1		
A21	Monaco White	B082B6237S	1		
A22	Lotus Yellow (2)	A075B6267F	1		
A23	Calypso Red	B075B6264S	1		
A25	New Gold	A076B6157F	1		
A26	Copper	A082B6063F	1		
A30	Jupiter Red	A076B6158F	1		
A31	Copper	A076B6159F	1		
A32	Mediterranean Blue	C082B6126J*	1		
A33	Ice Blue	A082B6143F	1		* Touch-in Kit, containing paint & lacquer sticks
A34	Essex Blue	A076B6161F	1		
A35	Silver	A076B6162F	1		
A36	New Gold	A076B6163F	1		
A38	Chrysler Steel Grey	A089B6164F	1		
A42	British Racing Green (metallic)	C082B6089J*	1		
A44	Glacier Blue	C082B6090J*	1		
A45	Silver Frost	C082B6091J*	1		
A51	Midnight Blue	A082B6125F	1		
A52	Mediterranean Blue	A082B6126F	1		

FUNCTION CODE	CONTENTS: Touch-in Paint		QUANTITY		
80.20A	PART DESCRIPTION	PART NUMBER	ALL		REMARKS
LOTUS PAINT CODE					
A53	Cirrus Grey	A082B6127F	1		
A54	New Jupiter Red	A082B6128F	1		
A55	Cherry Red	A082B6129F	1		
A56	Nimbus Grey	A082B6130F	3		
A57	Shadow Grey	A082B6131F	1		
A58	Champagne Gold	A082B6132F	1		
A59	Steel Blue	C082B6133J*	1		
A60	Seal Grey	A082B6144F	1		
A61	Atlantic Green	A082B6134F	1		
A62	Claret	C082B6145J*	1		
A63	British Racing Green (non-metallic)	B082B6146S	1		
A64	Camel Yellow/Norfolk Mustard	A082B6192F	1		
A65	British Racing Green (non-metallic)	B082B6171S	1		
A61	Vulcan Grey	C082B6172J*	1		
A68	Pacific Blue	C082B6173J*	1		
B16	Empire Green				
B17	Mica Yellow				* Touch-in Kit, containing paint & laguer sticks
B18	Medina Green				
B19	Palacio Purple				
B20	Dark Blue Metallic				

CONTENTS

ESPRIT RANGE '93 M.Y. ONWARDS

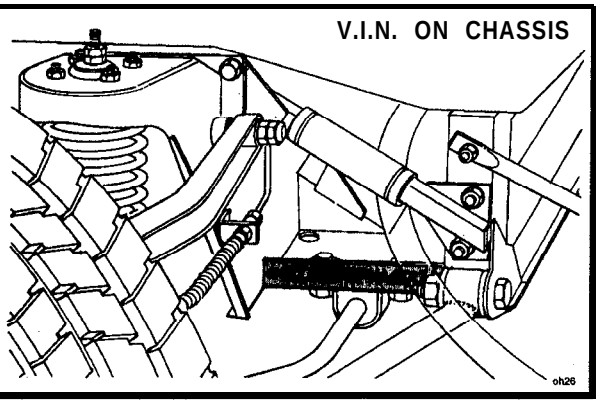
Until the remaining sections are issued, e.g. chassis, body, fuel system, heater/ac; refer to manual B082T0327J.

VEHICLE IDENTIFICATION NUMBER & ENGINE NUMBER

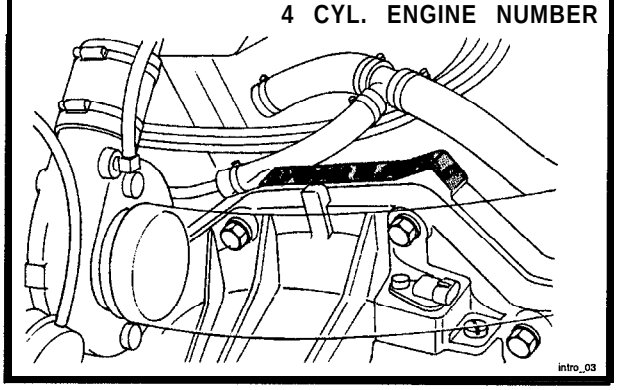
The Vehicle Identification Number (VIN) is stamped onto the chassis frame on the vertical surface of a flange between the inboard pivots of the right hand front suspension lower wishbone, viewable via the right hand front wheelarch. The engine number on 4 cylinder cars is stamped onto a horizontal surface at the right hand rear of the cylinder block, and on V8 models on a vertical flange at the left hand rear of the cylinder block. Both VIN and engine numbers are duplicated on bar code labels fixed to the front bulkhead in the front luggage compartment, and on some vehicles the VIN is repeated for convenience on a label viewable through the windscreen.

Both numbers should always be quoted with any vehicle enquiries, as Factory records are filed against VIN, and specification change points are identified by VIN or engine number. The vehicle licence number may not accurately reflect vehicle age, and may be changed during the car's life, and are an unreliable method of identification.

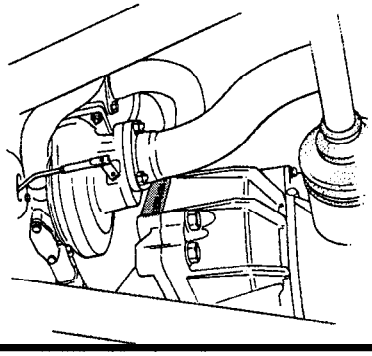
V.I.N. ON CHASSIS

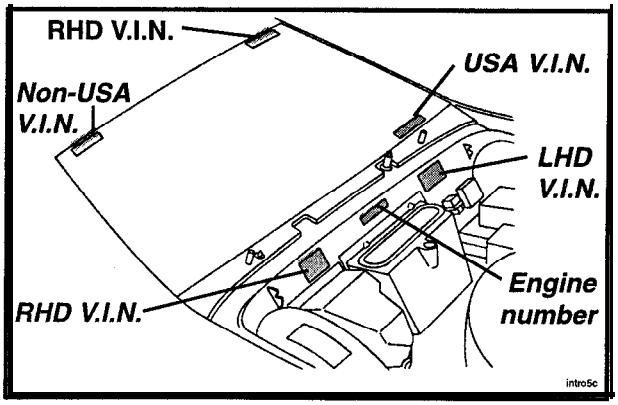


4 CYL. ENGINE NUMBER



V8 ENGINE NUMBER (viewed from beneath)





There are three variations of the VIN; prior to '98 M.Y. there is one for domestic and non-USA export markets, which complies with European Economic Community (EEC) directives; and one for the USA which complies with requirements laid down by the National Highway Traffic Safety Association (NHTSA). From '98 M.Y. a common coding is used. The seventeen characters of the VIN are coded as follows:

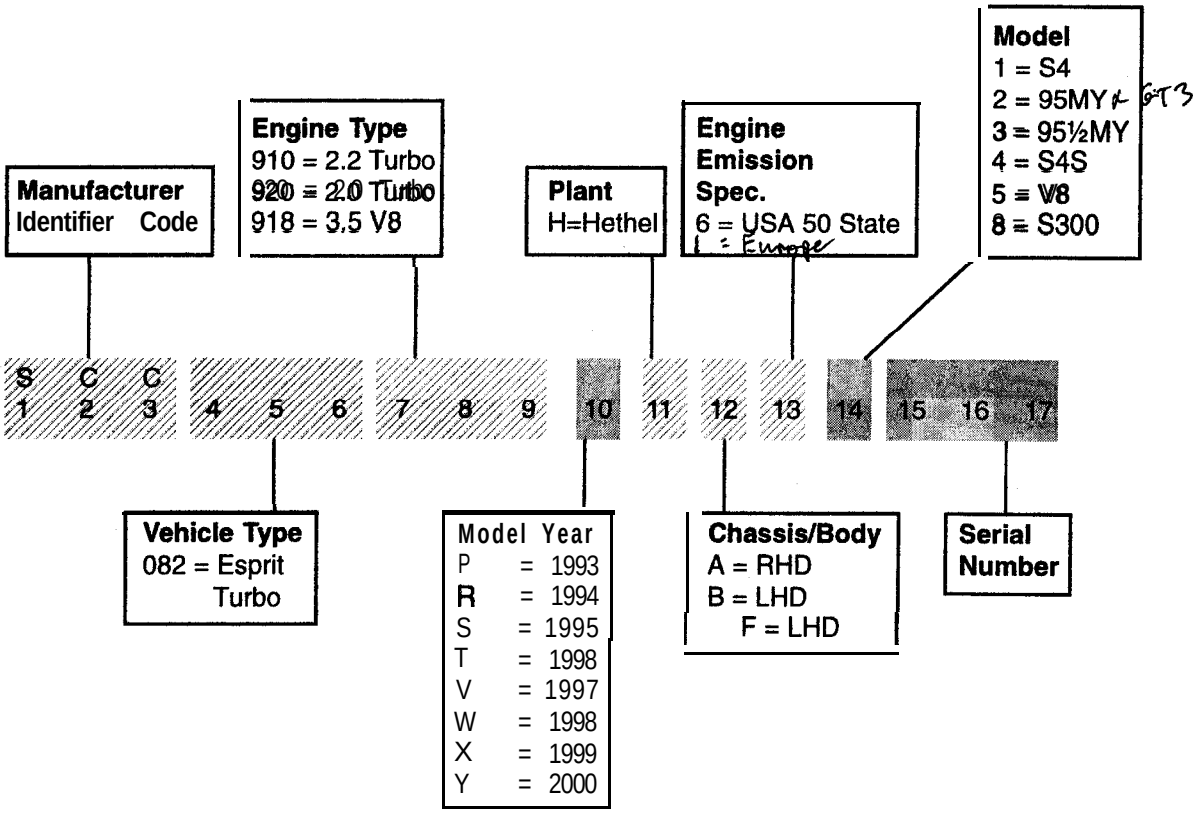
NOTES

1. Prior to '98 M.Y., different serial number sequences are used for the the following variants:

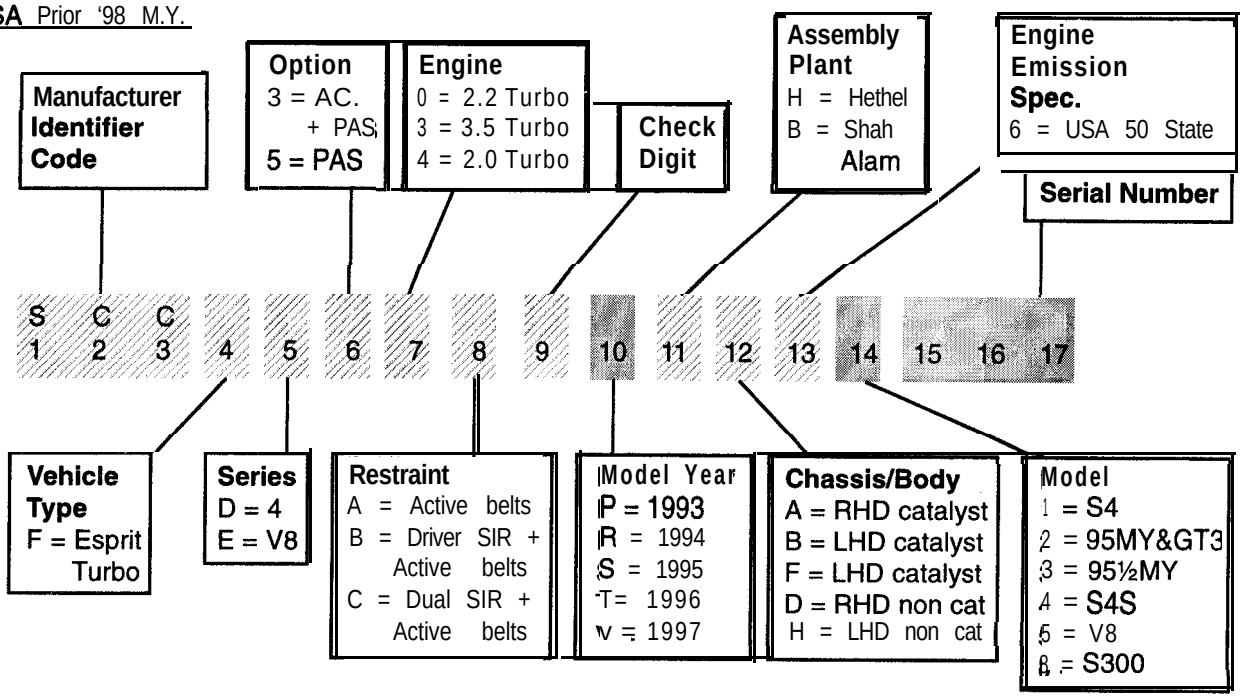
S4 prior to '95 M.Y.:	0001 to 0010, then 1011 onwards
S4 '95 M.Y.: + GT3	2000 onwards
S4S USA:	3000 onwards
S4S non-USA:	4000 onwards
sport 300:	8001 onwards
Esprit V8:	5009 onwards

2. For change point identification in this manual, only VIN characters 10 (model year) and 14 to 17, (serial number) will be listed. e.g.:
   R 1242 ('94 model year S4, serial 1242)
   R 8030 ('94 model year Sport 300, serial 8030)

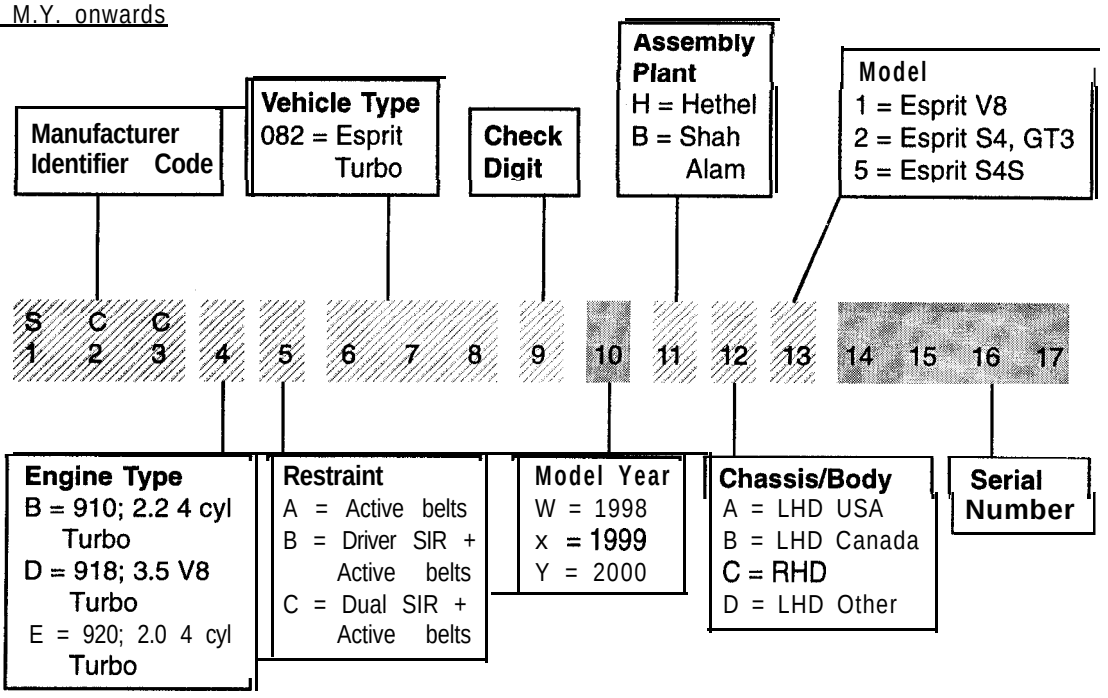
Non-USA Prior '98 M.Y.



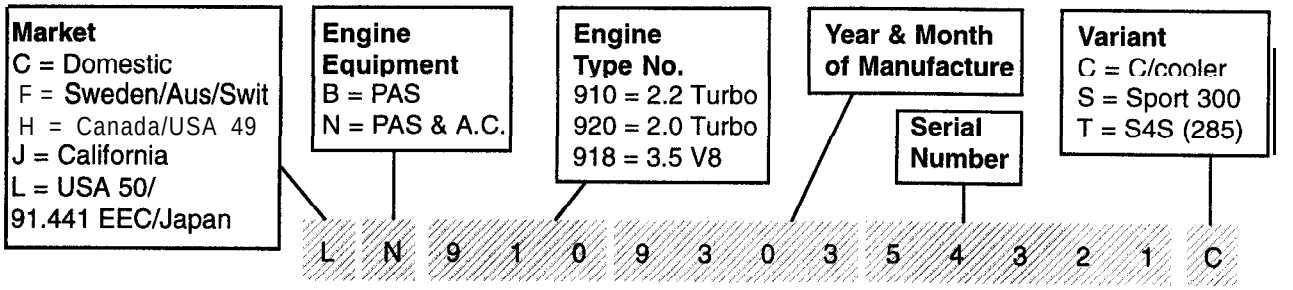
USA Prior '98 M.Y.



'98 M.Y. onwards



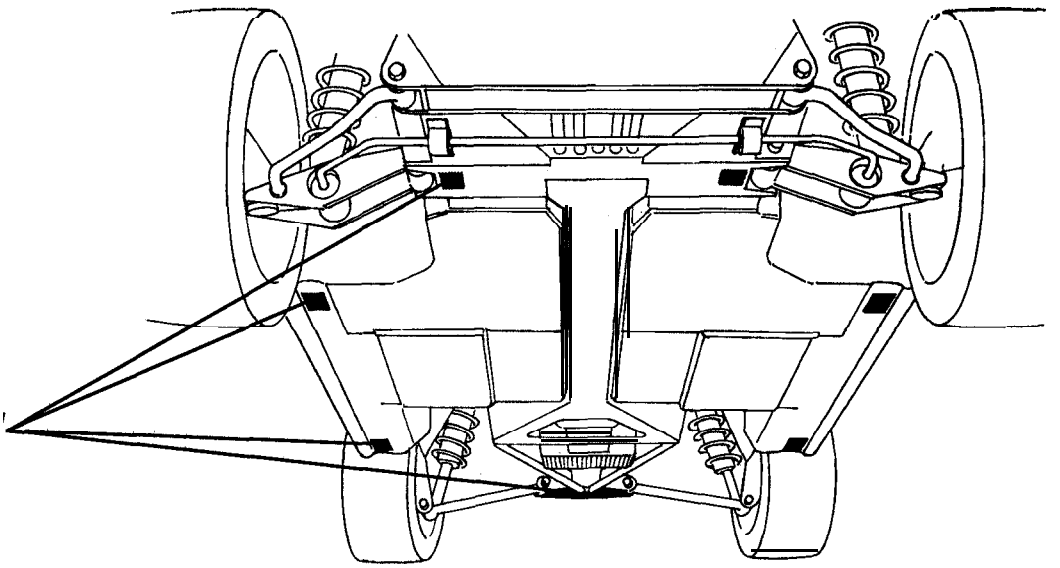
Engine Number Coding



JACKING POINTS

1. Four body jacking points are provided on the car; one just ahead of each rear wheelarch, and one just behind each front wheelarch. Each of these jacking points is provided with a vertical locating tongue designed to engage with a trough in the vehicle wheel changing jack. Do not jack under any other part of the body, or attached panels.

2. Jacking beneath the chassis may be carried out;
   Front - beneath either side of the chassis main front crossmember, adjacent to the lower wishbone rear pivot points.
   Rear - beneath the lower link inboard pivot points.



ESPRIT MODEL HISTORY - '93 M.Y. ONWARDS (Excluding '93 M.Y. USA)

'93 Model Year Introduction: March '93

Esprit S4 (U.K. & Export, not USA); VIN: P 0001 to 0010, 1011 onwards

As '92 M.Y. Chargecooler specification with following changes:

Restyled front bumper and spoiler, bonnet, sills, rear aerofoil, transom spoiler, rear valance.

Power steering.

Front suspension geometry altered with provision for camber adjustment.

Rear suspension camber changed, with provision for adjustment.

17 inch Lotus styled 5-spoke alloy wheels, with 215/40 ZR17 (front) and 245/45 ZR17 (rear) Goodyear Eagle GS-A tyres.

New door window lift mechanism, incorporating 'one touch' and obstruction sensing.

- New door lock mechanism and CDL, with single key operation of vehicle locks.

Megamoss vehicle alarm includes 'deadlocking' and engine crank immobilisation.

Restyled interior including; fascia, crash pad and glovebox lid, seat upholstery, instrument layout and carbon fibre look-alike masks, centre console and tunnel trim, door panels, steering wheel.

- Elan type front side/turn lamps, new front fog lamps and interior lamp, electric vacuum pump, tailgate mounted radio aerial.

Revised 'High Torque' RH shift transmission.

- New wheel changing scissor jack.

Sport 300: June '93

U.K. & Export (not USA) VIN: P 8001

As Esprit S4 specification with following changes:

Lightweight body, bonded-in roof, scuttle brace, enlarged wheel housings with wheelarch extensions, '92 style front bumper/spoiler, fog lamp recesses now brake cooling ducts, '92 style rear bumper, valance and sills. New rear aerofoil.

Reinforced chassis, bolt-in engine bay brace, roll cage mountings.

300 bhp engine with T3/T4 turbocharger, increased boost pressure, recalibrated ECM, larger inlet valves and ports, raised fuel pressure, combined chargecooler rad./condenser on non a.c. cars. Lotus limited slip differential, uprated clutch cover and flywheel.

- Revised front and rear suspension springs and dampers.

Larger front and rear brakes, with AP Racing 4-piston calipers and ventilated discs at all four wheels. Separate parking brake calipers.

3-piece O.Z. wheels with 245/45 ZR16 (front) and P315/35 ZR17 (rear) Goodyear Eagle GSC tyres.

Alcantara interior trim, Senotex instrument masks, larger tachometer and electronic speedometer moulded bucket seats, anti-slip pedal pads, individually numbered header rail plaque.

'94 Model Year Introduction: July '93

Esprit S4 (U.K. & Export **inc. USA);** VIN: R 1090

Sport 300 (U.K. & Export, not USA); VIN: R 8012

U.K. and Export S4 and Sport 300 unchanged. USA S4 introduced with following changes from U.K./Export spec.:

Different window lift motors with no 'one touch' or obstruction sensing.

Dual S.I.R. for USA and LHD Export: September '93

Esprit S4 (USA & LHD Export); VIN: R 1163

Introduced as legal requirement for USA cars, and as option in some LHD markets.

S.I.R. equipment as driver only S.I.R. with following changes:

Passenger side inflator module mounted in place of glovebox.

Passenger side knee bolster.

New DERM and dual pole arming sensor.

Revised Wiring Harness: December '93

Esprit S4 LHD; VIN: R 1242

Esprit S4 RHD; VIN: R 1250

sport 300; VIN: R 8030

As previous with following changes:

Wiring harnesses rationalised.

- Electrical components resited inc. engine bay components to RHR wheelarch.

Addition of sensing switches to front bonnet and tailgate for alarm and illumination.

Addition of front luggage compartment lamp, and 'lights on' buzzer (non-USA).

New type inertia switch RHF engine bay, and Elan type electric aerial for some markets, LHR quarter.

New engine coolant header tank, with incorporation of chargecooling system.

Brembo Brakes: June '94

Esprit S4 Non-USA; VIN: R 1443 (+ R 1377) July '94

Esprit S4 USA; VIN: S 1391 June '94

(Not applicable to Sport 300)

Introduction on USA cars coincides with intro. of otherwise unchanged '95 M.Y. USA S4.

Changes include the following:

Front brakes; four piston calipers and larger discs. Rear brakes; new calipers and larger ventilated discs.

Rear circuit pressure limiting/proportioning valve deleted.

Revised front hubs and rear hub carriers.

16" spare wheel supplied to clear new brakes.

'95 M.Y. S4 & S4S: January '95

S4 (non-USA); VIN: S 2000 (+ 1496)
S4S (USA); VIN: S 3000
S4S (non-USA) VIN: S 4000

As previous with following principal changes:

- Caerbont instruments with 100 mm speedo & tacho, analogue clock. Oil temp. gauge and ice detection deleted. Footwell lamps added.
- Revised trim stitching. Walnut veneer replaces 'carbon fibre' instrument panel and door finishers. Sport 300 style seats on non-USA S4S.
- S4S: 265 bhp engine with revised turbo, inlet valves & ECM. Uprated clutch cover.
- Non-USA S4S: Enlarged body wheelhousings, wheelarch spats, Sport 300 rear aerofoil.
- Non-USA S4S: Wider 0.2. Futura 3-piece wheels with Michelin 235/40 ZR17 front & 285/35 ZR1 6 rear tyres. Revised springs & dampers.
- USA S4S: O.Z. Futura 3-piece wheels in unchanged size with unchanged Goodyear tyres.
- Non-USA S4S: Uprated chassis with reinforced backbone & revised rear spring platforms.

Introduction of 'CFC Free' R134a Air Conditioning System: March 1995

S4; VIN: S 2031 (RHD) S 2017 (LHD)
S4S (non-USA); VIN: S 4035 (RHD) S 4006 (LHD)
S4S (USA); VIN: S 3012
sport 300; VIN: S 6059

Changes include the following:

- New compressor with high pressure relief valve incorporated on rear cover; service Shraeder valves replaced by snap connectors in the suction and disharge hoses.
- Square shaped parallel flow condensers (2 off) mounted side by side and plumbed in parallel.
- New separate chargecooler radiator.
- Receiver-drier with changed molecular sieve material.
- New hoses and pipework for increased permeability gas.

Commonised Undertray: May '95

s4; VIN: S 2034
USA S4S; VIN: S 3095

Body lower moulding commonised with non-USA S4S (enlarged wheelhousings)

'96 M.Y. S4 & non USA S4S: September '95

S4; VIN: T2044
non-USA S4S; VIN: T 4126 (+ 4096)
sport 300; VIN: T 6064

Specification unchanged. Note that no '96 M.Y. USA cars were built.

Esprit V6: May '96

Esprit V6; VIN: T 5009

As S4S with following principal changes:

New Lotus type 916 3.5 litre twin turbo V6 engine. No chargecooling. Lotus/Vertronix engine management.
Kelsey-Hayes ABS-415 antilock brake system.

- Chassis modifications to accommodate engine and exhaust system.
- Cooling system includes recirculation pump and diverter valve.

Larger capacity 'pull-type' clutch. Type UN1 027 transmission with higher 5th ratio and reverse gear brake.
New one piece road wheels and restyled front spoiler.
New variable displacement a.c. compressor.

Esprit GT3: October '96

Esprit GT3; VIN: T 2100 (not USA)

Based on S4 model with following changes:

2 litre (type 920) 250 bhp engine.

No back pressure valve or throttle jack.
No tailgate mounted aerofoil. Swiss type rear transom spoiler lip.
Single fuel filler on LH side.
GT3 decals along door bottoms.
Sport 300 type seats with backs painted body colour.
- Cloth/vinyl interior trim. Senotex instrument masks. Body colour composite gear lever shroud. Aluminium gear lever knob.

Optional panel lamps rheostat; alarm; door edge, bonnet and footwell lamps; lights on buzzer; one touch windows.

'97 M.Y. Esprit V8 & GT3: May '98

USA va; VIN: V 5075 (May '96)
Non USA V8; VIN: V 5215 (Oct. '96)
GT3; VIN: V 2111 (Oct. '96)
Specification unchanged.

Introduction of V8 Twin Plate Clutch: February '97

Esprit V8; VIN: V 5260
Many cars also retro-fitted.

New lightweight flywheel, low inertia twin plate clutch assembly, cast iron clutch housing, pedal downstop, re-calibrated ECM.

'98 M.Y. Esprit V8 & GT3: October '97

Esprit V8; VIN: W 5408 plus 5374, 5382, 5385
GT3; VIN: W 2200 plus 2192
As previous with following principal changes:

Restyled interior with compact instrument binnacle, new centre console and tunnel top.
- Four instrument set, new tell tale clusters, Elise style push switches. Deletion of boost and oil temperature gauges and time clock.

Cobra 6422 security system with remote operation.
Revised interior climate control system, with rotary selector switches and electro-pneumatic flap operation. Stepper motor water valve. New face level vents. Separate re-circulation switch.
New windscreen wiper arm, washer bottle and pump.
Restyled rear aerofoil mounted on tailgate. Locking gas strut for tailgate.
New low effort clutch release system with new hydraulic cylinders and rigid pipe. Revised clutch fork and stiffer alloy clutch housing.
Revised twin cable gearchange mechanism dispenses with translator. Modified transmission selector cross shaft.
Lower third gear and final drive ratio on some GT3.
New Kelsey-Hayes EBC 430 anti-lock brakes electro-hydraulic control unit.

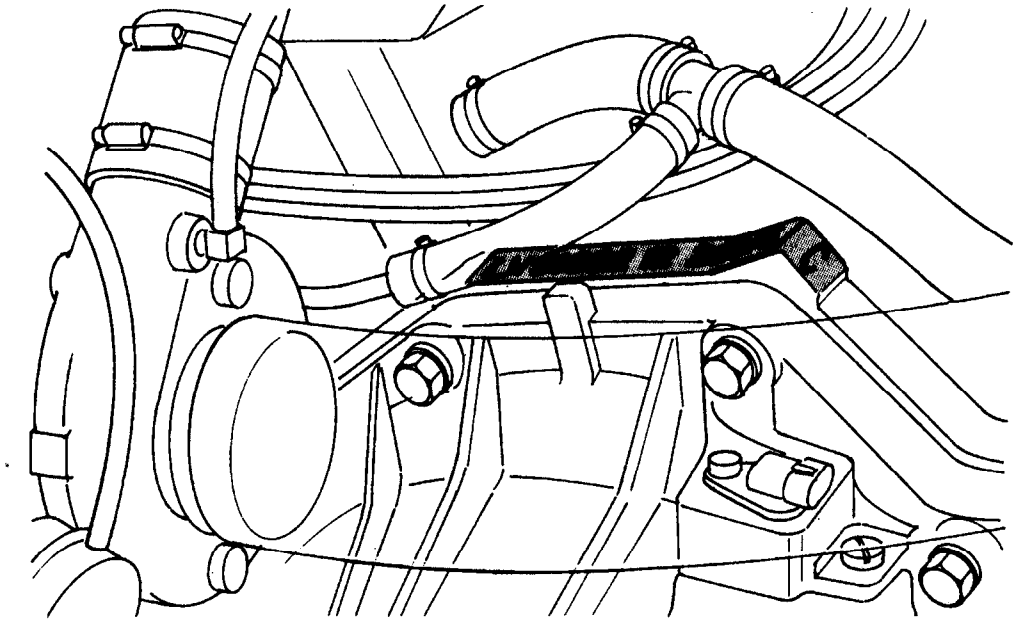
LOTUS ESPRIT S4

(Specification may differ in detail for some markets)

TECHNICAL DATA – Engine

SECTION TDI – 4 CYLINDER ESPRIT RANGE '93 M.Y. ON

Before commencing work on any Lotus engine, first check the engine number and prefix letters to establish the engine specification. This number is stamped on the right hand rear of the cylinder block, above the starter motor, and is duplicated on a bar code label fixed to the bulkhead in the front luggage compartment. The five digit serial number element of the engine number is duplicated on the rear face of the cylinder head.



Example

Market	Engine type no.			Serial no.	
L	N	910	93	10	54321	C
	Engine equipment		Year & month of manufacture		Variant

Market

C = Domestic
F = Sweden/Australia/Switzerland
H = Canada/ USA 49 States
J = California
L = USA 50 States/91.441.EEC/Japan

Engine Equipment

B = PAS
N = PAS + Air Con.

Engine Type Number

910 = 2.2 Litre Turbocharged
920 = 2.0 Litre Turbocharged

Variant

C = Chargecooler
s = sport 300
T = S4S (285)

Turbocharger 910 920

TB03

ENGINE, GENERAL

Type designation - Turbocharged 2.2 litre		910
- Turbocharged 2.0 litre		920
No. of cylinders		4
Capacity - 910		2173 cm³ (132.6 in³)
- 920		1973 cm³ (120.4 in³)
Stroke - 910		76.20 mm (3.000 in)
- 920		69.20 mm (2.724 in)
Bore		95.27 mm (3.751 in)
Compression ratio		8.0:1
Compression pressure		9.5 bar (140 lb/in²) minimum
Maximum boost pressure	- 910 s4	0.84 bar (12 lb/in²)
	- 910 S4S & sport 300	1 .00 bar (14.5 lb/in²)
	- 920	0.97 bar (14 lb/in²)
Firing Order		1,3,4,2
Maximum engine speed		7,450 rpm
Belt tension - toothed timing belt		95 units COLD using Burroughs Gauge TOOOG0025J (see section EB.6)
- alternator 'V' belt		12 mm (0.5 in)*
- a/c compressor 'V' belt		9 mm (0.35in)*
- PAS/water pump 'V' belt		9 mm (0.35in)*
		* total movement using moderate finger pressure on longest belt run
Fuel system		G.M. electronic multi-point injection,
Fuel requirement - S4 & S4S		Super Unleaded (98 RON) or Premium Unleaded (95 RON).
		91 RON Unleaded may be used for short periods but performance & efficiency will be reduced for that period
- Sport 300		Super Unleaded (98 RON).
		The use of Premium Unleaded (95 RON) fuel will result in reduced performance & refinement.
		Fuels with a lower octane rating than 95 RON must not be used
Idle CO level (hot)		0.3 - 1.2% before catalyst
HC level (as Hexane)		300 ppm max. before catalyst
Max power - 910 S4 (DIN 70020)		197 kW (264 bhp) @ 6,500 rpm
- 910 S4S (ISO)		212 kW (285 bhp) @ 6,400 rpm
- 910 Sport 300 (DIN 70020)		225 kW (302 bhp) @ 6,500 rpm
- 920 (DIN 70020)		186 kW (250 bhp) @ 6,250 rpm
Max torque - 910 S4 (DIN 70020)		354 Nm (261 lbf.ft) @ 3,900 rpm
- 910 S4S (ISO)		375Nm (277 lbf.ft) @ 4,160 rpm
- 910 Sport 300 (DIN 700201		377 Nm (278 lbf.ft) @ 4,500 rpm
- 920 (DIN 70020)		307 Nm (226 lbf.ft) @ 3,750 rpm

CYLINDER HEAD

Material	Aluminium alloy
Gasket	Reinforced fibre composite
Combustion chamber depth (nos. 1 & 4)	12.32 - 12.70 mm (0.485 - 0.500 in)

CAMSHAFTS & VALVE TIMING (All cams are symmetrical opening/closing)

Cam type designation - inlet & exhaust	'107'
Identification	'7' on shank between pulley & housing

Open duration		252 ° (at crankshaft)
Maximum lift		9.60 mm (0.378")
Inlet maximum opening point (M.O.P.)		110° ATDC
Inlet cam pulley timing dot		Red
Exhaust maximum opening point (M.O.P.)	- 910	100° BTDC
	- 920	104° BTDC
Exhaust cam pulley timing dot	- 910	Blue
	- 920	Green

VALVES

Angle of valve seats and faces		45°
Head diameter - inlet	- s4	35.47 - 35.65 mm (1.396 - 1.404 in)
	- S4S & Sport 300	36.37 - 36.63 mm (1.432 - 1.442 in)
- exhaust		30.70 - 30.90 mm (1.209 - 1.217 in)
Stem diameter - inlet		7.125 - 7.137 mm (0.2805 - 0.2810 in)
- exhaust		7.955 - 7.970 mm (0.3132 - 0.3138 in)
Stem clearance in guide - inlet		0.015 - 0.053 mm (0.0006 - 0.0021 in)
- exhaust		0.030 - 0.070 mm (0.0012 - 0.0027 in)
Valve clearance (cold) - inlet		0.13 - 0.18 mm (0.005 - 0.007 in)
- exhaust		0.25 - 0.31 mm (0.010 - 0.012 in)

VALVE. SEAT INSERTS

Bore in head: standard - inlet		37.235 - 37.260 mm (1.466 - 1.467 in)
- exhaust		34.290 - 34.315 mm (1.350 - 1.351 in)
+ 0.025 mm (0.001 in)	- inlet	37.260 - 37.285 mm (1.467 - 1.468 in)
	- exhaust	34.315 - 34.340 mm (1.351 - 1.352 in)
+ 0.050 mm (0.002 in)	- inlet	37.285 - 37.315 mm (1.468 - 1.469 in)
	- exhaust	34.340 - 34.365 mm (1.352 - 1.353 in)
+ 0.127 mm (0.005 in)	- inlet	37.365 - 37.390 mm (1.471 - 1.472 in)
	- exhaust	34.415 - 34.440 mm (1.355 - 1.356 in)
Outside diameter of seat:		
standard	- inlet	37.325 - 37.350 mm (1.4695 - 1.4705in)
	- exhaust	34.380 - 34.405 mm (1.3535 - 1.3545in)
+ 0.025 mm (0.001 in)	- inlet	37.350 - 37.375 mm (1.4705 - 1.4715in)
	- exhaust	34.405 - 34.430 mm (1.3545 - 1.3555in)
+ 0.050 mm (0.002 in)	- inlet	37.375 - 37.400 mm (1.4715 - 1.4725in)
	- exhaust	34.430 - 34.455 mm (1.3555 - 1.3565in)
+ 0.127 mm (0.005 in)	- inlet	37.450 - 37.475 mm (1.4745 - 1.4755in)
	- exhaust	34.505 - 34.530 mm (1.3585 - 1.3595in)

VALVE SPRINGS

Type		Dual helical
Free length	- inner	42.2 mm (1.66 in)
	- outer	44.8 mm (1.76 in)
Rate	- inner	12.99 N/mm (74.2 lb/in)
	- outer	37.56 N/mm (214 lb/in)

VALVE GUIDES

Length - inlet & exhaust		53.34 mm (2.100 in)
Internal diameter (to ream after fitting)	- inlet	7.153 - 7.178 mm (0.2816 - 0.2826 in)
	- exhaust	8.000 - 8.025 mm (0.3150 - 0.3159 in)
Bore in head (inlet & exhaust) - standard		11.915 - 11.925 mm(0.4690 - 0.4695 in)
- t 0.025 mm (0.001 in)		11.940 - 11.950 mm(0.4700 - 0.4705 in)

	+ 0.050 mm (0.002 in)	11.965 - 11.975 mm(0.4710 - 0.4715 in)
	+ 0.127 mm (0.005 in)	12.040 - 12.050 mm(0.4740 - 0.4745 in)
Outside diameter of guide	- standard	11.940 - 11.950 mm(0.4700 - 0.4705 in)
	+ 0.025 mm (0.001 in)	11.965 - 11.975 mm(0.4710 - 0.4715 in)
	+ 0.050 mm (0.002 in)	11.990 - 12.000 mm(0.4720 - 0.4725 in)
	+ 0.127 mm (0.005 in)	12.065 - 12.080 mm10.4750 - 0.4755 in)

CAMSHAFTS

End float	- dimension	0.03 - 0.20 mm (0.001 - 0.008 in)
	- controlled by	Selective thrust washers
Running clearance	- except front	0.050 - 0.090 mm (0.0020 - 0.0035 in)
	- front only	0.075 - 0.115 mm (0.0030 - 0.0040 in)

CAM FOLLOWERS

Bore in camshaft housings	34.925 - 34.940 mm (1.3750 - 1.3756in)
Outside diameter	34.904 - 34.912 mm (1.3742 - 1.3745in)

AUXILIARY SHAFT

Running clearance	0.025 - 0.065 mm (0.0009 - 0.0025 in)
End float	0.013 - 0.038 mm (0.0005 - 0.0015 in)

CRANKSHAFT

Balance (inc. flywheel & clutch)		Within 15 gr.cm. (0.2 oz.in)
Diameter - main bearings	- 910 - mains 1 to 4	63.487 - 63.513 mm (2.4995 - 2.5005in)
	- main no. 5	63.500 - 63.513 mm (2.5000 - 2.5005in)
	- 920 - mains 1 to 5	63.500 - 63.513 mm (2.5000 - 2.5005in)
	- crankpin	50.736 - 50.762 mm (1.9975 - 1.9985in)
End float	- dimension	0.08 - 0.20 mm (0.003 - 0.008 in)
	- service limit	0.30 mm (0.012 in)
	- controlled by	Selective thrust washers on rear main bearing
Main bearings	- number	5
	- type	Steel backed, leaded bronze lined
	- static clearance	0.013 - 0.056 mm (0.0005 - 0.0022 in) (measured using 'Plastigage')
	- max. regrind undersize	0.508 mm (0.020 in)
Main bearing configuration	- upper, except centre	Groove with hole
	- centre upper	Plain with hole
	- lower	Plain

FLYWHEEL

Minimum thickness	12.0 mm
Max. axial run-out over clutch face	0.05mm (0.002 in)
Depth of step	0·5 - 0·6 mm.

CONNECTING ROD

Type	'I' section
Material	Steel forging
Distance between centres	139.70 mm (5.500 in) ± 0.25 mm (0.001 in)
Bearings (big end) - type	Steel backed, leaded bronze
- static clearance (Plastigage)	0.025 - 0.081 mm (0.0010 - 0.0032 in)

- end float on c/pin	0.10 0.25 mm (0.004 - 0.010 in)
Small end bearing - type	Steel backed bronze bush
- internal diameter	25.405 - 25.410 mm (1.0002 - 1.0004in)
Permissible weight variation in 1 set	2 grams

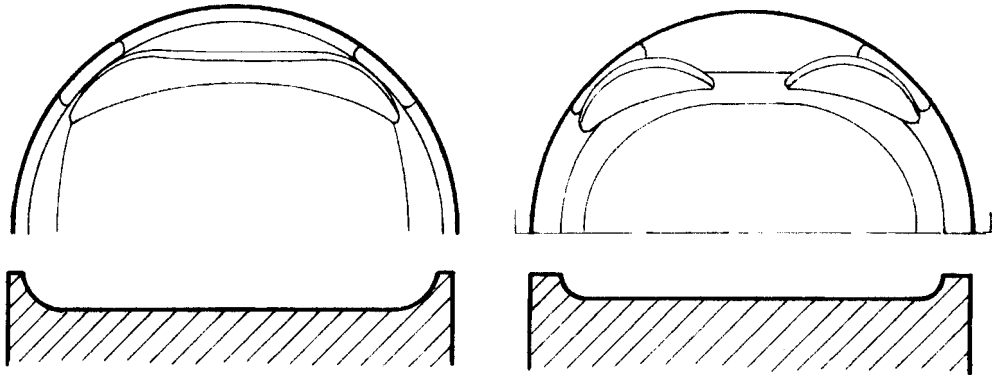
GUDGEON PIN

Type	Fully floating
Location	Circlips
Diameter	25.40 mm (1 .OOO in)
Length	62 mm (2.44 in)
Class of fit	Finger push fit @ 20°C (68°F)

Note - Gudgeon pin has 0.02 mm deep profiled groove each side of connecting rod small end eye.

PISTON & LINER

Piston identification:



'910' 2.2 litre turbo chargecooler '920' 2.0 litre turbo chargecooler

Piston - type		Solid skirt
- material		Forged aluminium alloy
- crown treatment - 910		Chromium plated
- 920		Nickel plated
- rings		2 compression, 1 oil control
- diameter (@ 90° to pin axis, 10 mm (0.4 in) up from skirt lower edge)		
- grade 'A'		95.205 - 95.219mm (3.7482 - 3.7488 in)
- grade 'B'		95.217 - 95.231 mm (3.7487 - 3.7493 in)
- permissible weight variation in one set		3 grams
- gudgeon pin offset	- 910	Zero
	- 920	0.80 mm (0.031 in) towards thrust face
Piston ring gap - top & second		0.26 - 0.59 mm (0.010 - 0.023 in)
- oil control		0.16 - 0.54 mm (0.006 - 0.021 in)
Piston ring to groove clearance - top & second		0.040 - 0.072 mm (0.0016 - 0.0028 in)
- oil control		0.020 - 0.052 mm (0.0008 - 0.0020 in)
Cylinder liner - type		Wet, slip fit
- material		Nikosil coated, forged aluminium alloy
- internal diameter (across thrust axis, 70 mm from top)		
- grade 'A'		95.255 - 95.269 mm (3.7502 - 3.7507in)
- grade 'B'		95.267 - 95.281 mm (3.7507 - 3.7512in)
Liner height above block ('nip')		minus 0.025 to + 0.050 mm (minus 0.001 to + 0.002 in)

Variation between adjacent liners	0.03mm (0.001 in) maximum
Piston clearance in cylinder liner	0.05 - 0.08mm (0.002 - 0.003 in)

LUBRICATION SYSTEM

Minimum oil pressure (hot):	
- idle speed	0.35 bar (5 lb/in²)
- 3,500 rpm	2.4 bar (35 lb/in²)
- 6,500 rpm	3.1 bar (45 lb/in²)
Filter	Full flow disposable canister type with anti-flow back valve
Oil pump - type	Trochoidal rotor/annulus on rear end of auxiliary shaft
- drive	Camshaft toothed belt
- rotor end float	0.06 - 0.09 mm (0.0025 - 0.0035 in)
- annulus/housing clearance	0.18 - 0.30 mm (0.007 - 0.012 in)

IGNITION SYSTEM

Type	'Direct Ignition' with 2 double ended coils & integral ignition module. ECM controlled.
Firing order	1,3,4,2 (no. 1 toward front)
Sparking plugs	NGK BPR6EKN
Spark plug gap	0.9 - 1 .O mm' (0.035 - 0.039 in) * requires use of round pin gauge
Ignition timing	6° - 10° @ hot idle (ECM control)

COOLING SYSTEM

Type	Water.
Pump	Centrifugal, driven by 'V' belt from crankshaft front.
Impellor vanes to housing clearance	0.25 - 0.40 mm (0.010 - 0.016 in)
Radiator	Front mounted. 3 electric cooling fans.
Pressure cap	110 kPa (1.1 bar, 15 lb/in²)
Thermostat	82°C
Anti-freeze/corrosion inhibitor	50% ethylene glycol

TORQUE LOADING FIGURES - ENGINE

Cylinder head (tighten cold, oiled threads):	i)	20 Nm
	ii)	+ 75 degrees
	iii)	+ 40 degrees
	iv)	Wait 5 minutes
	v)	+ 20 degrees

	N.m	lbf.ft
Sparking plug	33 - 38	24 - 28
Camshaft covers	9	7
Camshaft housing	19-22	14 - 16
Cam housing plugs	41	30
Camshaft sprockets	34	25
Main bearing housing (oiled threads) - M12	88	65
- M8	19-22	14 - 16
Crankshaft pulley	79 - 81	58 - 60
Connecting rod (big end) caps (oiled thread)	114 - 117	84 - 86

	N.m	lbf.ft
Flywheel to crankshaft	75	55
Clutch assembly	23 - 26	17 - 19
Sump to main bearing housing	22 - 24	16 - 18
Auxiliary housing to block	18-20	13-15
Auxiliary shaft sprocket	34	25
Oil pick-up pipe union	75	55
Belt tensioner retaining nut	34 - 41	25 - 30
All other M6 nuts or bolts	9 - 11	7 - 8
Stud - cylinder head to block, M 12 (oiled threads)	37 - 41	27 - 30
- main bearing housing, MB	16	12
- main bearing housing, Ml 2	54	40
- camshaft housing to cylinder head, M8	16	12
- all other non-specified M8 studs	16	12
- sump to main bearing housing	7	5
Exhaust manifold to cylinder head	19-22	14 - 16
Turbocharger mounting bolts	40 - 42	29 - 31
Inlet manifold to cylinder head	19-22	14 - 16
Engine mounting legs to rubbers	55 - 60	40 - 45
Engine mounting legs to engine	18-20	14 - 15
Mounting rubbers to chassis	34	25
Earth strap to cylinder block	26	19
Dipstick tube nut	22	16
Sump drain plug	34	25

FUEL CONSUMPTION - United Kinsdom DoE

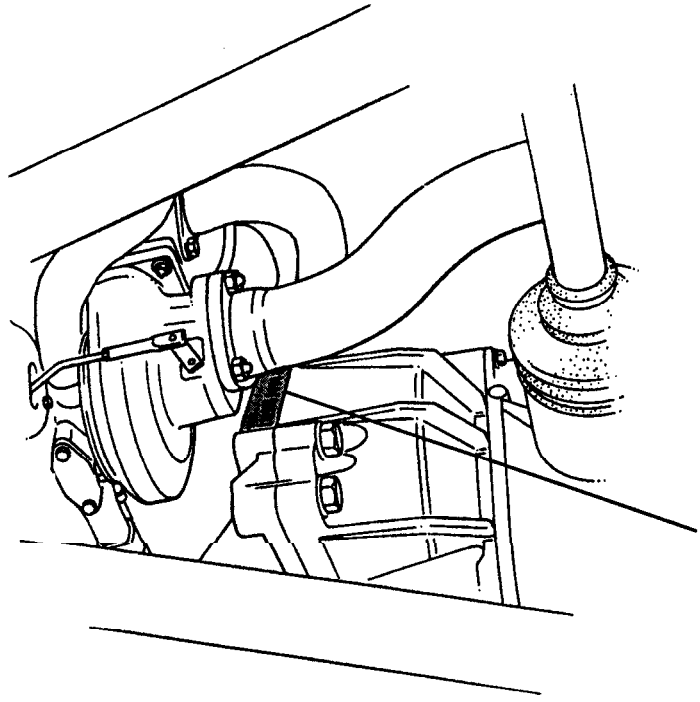
Urban cycle	- 910	17.9 Imp.mpg (1 5.8 l/1 00 km)
	- 920	19.0 Imp.mpg (14.9 l/100 km)
Constant 56 mph (90 km/h)	- 910	36.2 Imp.mpg (7.8 l/100 km)
	- 920	38.5 Imp.mpg (7.3 l/100 km)
Constant 75 mph (120 km/h)	- 910	29.7 Imp.mpg (9.5 l/100 km)
	- 920	30.3 Imp.mpg (9.3 l/100 km)

TECHNICAL DATA – Engine

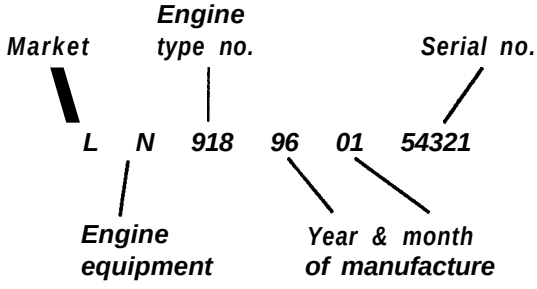
SECTION TDK – Esprit V8

Before commencing work on any Lotus engine, first check the engine number and prefix letters to establish the engine specification. This number is stamped on a vertical flange at the left hand rear of the cylinder block alongside the clutch housing jointface, and is most easily viewed from beneath. The number is duplicated on a bar code label fixed to the bulkhead in the front luggage compartment.

Enaine number location (vie wed from beneath)



Example



Market
L = Worldwide

Engine Equipment
B = PAS
N = PAS + Air Con.

Engine Type Number
918 = 3.5 Litre V8 twin turbo.

ENGINE, GENERAL

Type designation	918
No. of cylinders & configuration	V8
Capacity	3506 cm³ (213.9 in³)
Bore	83.0 mm (3.27 in)
Stroke	81 .O mm (3.19 in)
Bore/stroke ratio	1.025: 1
Valve & camshaft configuration	4 valves per cylinder, DOHC per bank
Camshaft drive • primary stage	inverted tooth chain. 2:1 reduction
• secondary stage	Separate synthetic toothed belt for each cylinder bank
Aspiration	Twin turbocharged. One turbo per cylinder bank. Non-chargecooled.
Compression ratio	8.0:1
Compression pressure (minimum)	10.7 ± 1.0 bar (155 ± 15 lb/in²)
Maximum boost pressure	0.75 bar (11 lb/in²)
Firing Order	1,5,3,7,4,8,2,6
Recommended maximum engine speed	6,500 rpm
Fuel shut off engine speed	7,000 rpm V8 ; 7,400 rpm V8 GT
Belt tension • toothed timing belts	~~Automatic via spring tensioners~~
• auxiliary multi-vee belt	Automatic via spring tensioner
Fuel system	EFI Technology, fully sequential electronic injection
Fuel requirement	Premium unleaded, 95 RON minimum. 91 RON unleaded may be used for short periods but performance & efficiency will be reduced for that period
ignition system	4 x double ended H.T. coils; electronically switched; 'wasted spark' distribution
idle CO level (hot)	0.3 • 1.2% before catalyst
HC level (as Hexane)	300 ppm max. before catalyst
idle speed (hot)	700 rpm
Max power (89/491/EEC)	260 kW (350 bhp) @ 6,500 rpm
Max torque	400 Nm (295 lbf.ft) @ 4,000 rpm

CYLINDER EAD

Material	Aiuminium alloy
Gasket	Laminated steel
Compressed gasket thickness	1.25 mm (0.049 in)
Combustion chamber volume	37 cm³ (2.26 in³)
Flatness tolerance	0.1 mm (0.004 in)

CAMSHAFTS & VALVE TIMING

Camshaft material	Chili cast iron
identification • LH inlet	Blue
• LH exhaust	White
• RH inlet	Tan
• RH exhaust	Green
Camshaft journal size	27.939 • 27.960 mm (1.0956 • 1 .1008in)
Camshaft bearing diameter in head	28.00 • 28.02 mm (1.102 • 1.103 in)
Camshaft bearing cap id • inlet	0,1,2,3,4 from front
• exhaust	5,6,7,8,9 from front
Camshaft endfloat	0.04 • 0.14 mm (0.002 • 0.008 in)
Distance between camshaft thrust faces	25.00 • 25.05 mm (0.984 • 0.986 in)
Cam major axis • inlet	45.90 • 46.00 mm (1.807 • 1.811 in)
exhaust	45.05 • 45.15 mm (1.774 • 1.778 in)

Cam lift	- inlet		9.00 mm
	- exhaust		8.15 mm
Cam duration	- inlet		245"
	- exhaust		230"
Valve timing	- inlet	- MOP	116" ATDC)
		- opens	6.5" BTDC) symmetrical opening/
		- closes	58.5" ABDC) closing
	- exhaust	- MOP	104" BTDC >
		- opens	39" BBDC > symmetrical opening/
		- closes	II" ATDC > closing

CAM FOLLOWERS

Type	Direct acting inverted bucket, with hydraulic control of valve clearance
Outside diameter	31.959 - 31.967mm (1.2582 - 1.2585 in)
Tappet bore diameter	32.000 - 32.016mm (1.2598 - 1.2605 in)

VALVES

Valve material	- inlet	Chrome silicon steel. Chrome plated stem
	- exhaust	Nimonlc 80. Chrome plated stem
Head diameter	- inlet	33.5 mm (1.32 in)
	- exhaust	30.0 mm (1.18 in)
Stem diameter		5.935 - 5.950 mm (0.2337 - 0.2343 in)
Seat face angle		45"

VALVE GUIDES

Material	- inlet	Sintered steel (Brico 4100)
	- exhaust	Sintered steel (Brico 4200)
Bore size (to be reamed after fitting)		6.000 - 6.012 mm (0.2362 - 0.2367 in)
Standout above valve spring seating face on head		8.8 - 9.0 mm (0.34 - 0.36 in)
Length	- inlet	43.0 mm (1.69 in)
	- exhaust	38.0 mm (1.50 in)
Outside diameter	- std.	11.028 - 11.039 mm (0.4342 - 0.4346 in)
	- 0.20 oversize	11.228 - 11.239 mm (0.4420 - 0.4425 in)
	- 0.40 oversize	11.428 - 11.439 mm (0.4499 - 0.4504 in)
Bore in head	- std.	10.971 - 10.989 mm (0.4319 - 0.4326 in)
	- 0.20 oversize	11.171 - 11.189 mm (0.4398 - 0.4405 in)
	- 0.40 oversize	11.371 - 11 .389 mm (0.4477 - 0.4484 in)

VALVE SPRINGS

Type	Single helical
Free length	40.3 mm (1.59 in)
Load at fitted length (32.2 mm)	252 - 278 N

VALVE SEAT INSERTS

Material	- inlet		Sintered steel (Brico 1200)
	- exhaust		Sintered steel (Brico 3200)
Outside diameter	- inlet	- std	34.100 - 34.120 mm (1.3425 - 1.3433 in)
		- 0.20 oversize	34.300 - 34.320 mm (1.3504 - 1.3512 in)
		- 0.40 oversize	34.500 - 34.520 mm (1.3583 - 1.3591 in)
	- exhaust	- std	31.100 - 31.120 mm (1.2244 - 1.2252 in)
		- 0.20 oversize	31.300 - 31.320 mm (1.2323 - 1.2331 in)
		- 0.40 oversize	31.500 - 31.520 mm (1.2402 - 1.2409 in)
Bore in head	- inlet	- std	34.000 - 34.025 mm (1.3386 - 1.3396 in)
		- 0.20 oversize	34.200 - 34.225 mm (1.3465 - 1.3474 in)
		- 0.40 oversize	34.400 - 34.425 mm (1.3543 - 1.3553 in)

exhaust	std	31 .OOO - 31.025 mm (1.2205 - 1.2215 in)
	0.20 oversize	31.200 - 31.225 mm (1.2283 - 1.2293 in)
	0.40 oversize	31.400 - 31.425 mm (1.2362 - 1.2372 in)

PISTONS & LINERS

Piston - type		Cast aluminium alloy
- bowl volume		13.4 cm³
- rings		2 compression, 1 oil control
- gudgeon pin offset		0.7 mm towards thrust face
- piston/liner clearance		0.010 - 0.039 mm (0.0004 - 0.0015 in)
- compression height		33.3 mm (1.31 in)
- top land thickness		5.0 mm (0.20 in)
- grade point		43 mm down from top edge across thrust axis
- diameter at grade point		82.977 - 82.990mm (3.2677 - 3.2682 in)
- gudgeon pin bore		20.995 - 21 .000mm (0.8266 - 0.8268 in)
- top groove width		1.530 - 1.550 mm (0.0602 - 0.0610 in)
- second groove width		1.770 - 1.790 mm (0.0697 - 0.0705 in)
- oil control groove width		2.500 - 2.520 mm (0.0984 - 0.0992 in)
Piston ring- top compression	- gap*	0.19 - 0.39 mm (0.007 - 0.015 in)
	- thickness	1.470 - 1.490 mm (0.0579 - 0.0587 in)
- second compression	- gap*	0.39 - 0.59 mm (0.015 - 0.023 in)
	- thickness	1.720 - 1.740 mm (0.0677 - 0.0685 in)
- oil control scraper	- gap*	0.10 - 0.60 mm (0.004 - 0.024 in)
	- thickness	2.5 mm (0.1 in) nominal
		* fitted squarely in liner, 5 mm down from top edge
Gudgeon pin - diameter		20.995 - 21 .000mm (0.8266 - 0.8268 in)
- pin/piston clearance		0.002 - 0.012 mm (0.0001 - 0.0005 in)
- retention		Round wire circlips
Cylinder liner - type		'Wet' push fit
- material		Cast iron
- diameter		83.000 - 83.013mm (3.2677 - 3.2682 in)
- overboring		Not permissible
- stand-in below block face		0.08 - 0.10 mm (0.003 - 0.004 in)

CONNECTING RODS

Type		Forged steel 'I' section. Straight split, 2 bolt big end cap
Distance between centres		141 mm (5.55 in)
Big end bearing - type		Steel backed copper/lead/tin shell bearings
- fitted shell internal diameter		47.788 - 47.820 mm (1.8814 - 1.8827in)
- static clearance		0.016 - 0.064 mm (0.0006 - 0.0025 in)
- endfloat on crankpin (pair)		0.140 - 0.284 mm (0.005 - 0.0112 in)
Small end bearing - type		Copper/lead/tin
- internal diameter (ream after fitting)		21.007 - 21.023mm (0.8270 - 0.8277 in)
- small end/pin clearance		0.007 - 0.028 mm (0.0003 - 0.0011 in)

CRANKSHAFT

Type		4 throw, single plane, 5 bearing
Material		Forged steel
Main bearings - type		Steel backed tin/aluminium shell bearings. 6-bolt cast iron bearing caps.
- block bore diameter		70.000 - 70.019 mm (2.7559 - 2.7567 in)
- journal diameter		64.955 - 64.968mm (2.5573 - 2.5578 in)
- fitted shell internal diameter		64.982 - 65.013mm (2.5583 - 2.5596 in)
- static clearance		0.014 - 0.058 mm (0.0006 - 0.0023 in)

Crankpin diameter	47.756 - 47.772mm (1.8802 - 1.8808 in)
Endfloat - dimension	0.10 - 0.30 mm (0.004 - 0.012 in)
- controlled by	Selective thrust washers either side of no.4 main bearing

FLYWHEEL

Type	Steel, with integral starter ring gear
Fixing	Eight bolt, Indexed
Axial run out (at friction surface)	0.10 mm (0.004 in)
Maximum metal removal	0.5 mm (0.020 in)

OIL PUMP

Type	9/10 lobe trochoid
Drive	Concentric with crankshaft nose
Minimum oil pressure (hot) - idle	1.4 bar
- 3,500 rpm	2.4 bar
- 6,500 rpm	3.1 bar
Housing diameter	94.10 - 94.15 mm (3.705 - 3.707 in)
Annulus outer diameter	93.84 - 93.88 mm (3.695 - 3.696 in)
Housing/annulus clearance	0.22 - 0.31 mm (0.009 - 0.012 in)
Annulus thickness	13.81 - 13.96 mm (0.544 - 0.550 in)
Rotor thickness	13.93 - 13.98 mm (0.548 - 0.550 in)

COOLING SYSTEM

Type	Water
Pump	Centrifugal, driven by multi-rib 'V' belt from crankshaft
Radiator	Front mounted, 3 row, 3 electric fans
Pressure cap	110 kPa (1.1 bar, 15 lb/in²)
Thermostat	82°C
Anti-freeze/corrosion inhibitor	50% mono-ethylene glycol

IGNITION SYSTEM

Type	'Direct Ignition' with 4 double ended H.T. coils & integral ignition module. ECM controlled
Firing order	1,5,3,7,4,8,2,6
Sparking plugs	NGK BKR6EKC
Spark plug gap (using round pin gauge)	0.9 - 1 .O mm (0.035 - 0.039 in)
Ignition timing	ECM controlled

FIXING TORQUES

Cylinder head (tighten cold, oiled threads)	i) 40 Nm (30 lbf.ft)
	ii) + 90"
	iii) + 90"

	Nm	lbf.ft
Spark plugs	20-22	15 - 16
Intake plenum	20	15
Camshaft bearing caps	8	6
Camshaft pulley bolts	100	74
Water pump	20	15
Water pump pulley	8	6
Turbocharger to manifold	40	30
Exhaust manifold to head	20	15
Sump to block	20	15
Crankshaft pulley	230	170

		Nm	lbf.ft
Oil pressure relief valve		45	33
Front cover	- M8	20	15
	- M6	6	6
Flywheel to crankshaft		110	61
Crankshaft rear seal housing		6	6
Connecting rod bolts	• step 1	20	15
	• step 2	+ 90°	
Main bearing caps	• central 2 rows	55	41
	• outer vertical rows	55	41
	• outer horizontal rows	42	31

TECHNICAL DATA VEHICLE
SECTION TDJ - ESPRIT '93 M.Y. ON

DIMENSIONS

Overall length	- S4; USA S4S; GT3		4369 mm (172.0 in)
	- non-USA S4S; V8		4414 mm (173.8 inj
	- sport 300		4391 mm (172.9 in)
Overall width	- excluding mirrors	- S4; USA S4S; GT3	1867 mm (73.5 in)
		- non-USA S4S; V8	1883 mm (74.1 in)
		- sport 300	1900 mm (74.8 in)
	- including mirrors		1981 mm (78.0 in)
Overall height	- S4; S4S; V8; GT3		1150 mm (45.3 in) > at kerb
	- sport 300		1164 mm (45.8 in) > weight
Wheelbase			2420 mm (95.3 in)
Front track	- S4; USA S4S; GT3		1529 mm (60.2 in)
	- non-USA S4S; V8		1520 mm (59.8 in)
	- sport 300		1533 mm (60.4 in)
Rear track	- S4; USA S4S; GT3		1544 mm (60.8 in)
	- non-USA S4S; V8		1520 mm (59.8 in)
	- sport 300		1594 mm (62.8 in)
Ground clearance (driver only)	- S4; S4S; V8; GT3		105 mm (4.1 in) } approx. below
		- Sport 300	97 mm (3.8 in) } radiator duct
Turning circle (between kerbs)			10.6 m (34 ft 9 in)
Approach angle			7"
Departure angle	- S4; S4S; V8; GT3		19"
	- sport 300		17"
Kerb weight	- total	- s4; S4S	1339 kg (2952 lb) >
		- GT3	1229 kg (2710 lb) > inc. full fuel
		- sport 300	1306 kg (2880 lb) > tank
		- V8	1380 kg (3043 lb) >
	- front	- s4; S4S	595 kg (1312 lb)
		- GT3	
		- sport 300	559 kg (1233 lb)
		- V8	590 kg (1301 lb)
	- rear	- s4; S4S	744 kg (1641 lb)
		- GT3	
		- sport 300	747 kg (1647 lb)
		- V8	790 kg (1742 lb)
Gross weight	- total	- S4; S4S; Sport 300; GT3	1566 kg (3453 lb) >
		- V8	1607 kg (3543 lb) >
Max. permissible axle weight	- front- S4; S4S; GT3; S300		680 kg (1499 lb) > inc. occupants
		- V8	675 kg (1488 lb) > & luggage
	- rear - S4, S4S, GT3; S300		896 kg (1976 lb) >
		- V8	942 kg (2077 lb) >
Trailer towing			Not permissible

CAPACITIES

Engine (inc. filter)	- 4 cyl.	- dry	7.4 litre (13.0 imp pt; 7.8 US qt)
		- refill	6.3 litre (11 .1 imp pt; 6.7 US qt)
	- V8	- dry	7.5 litre (13.2 imp pt; 7.9 US qt)
		- refill	6.5 litre (11.4 imp pt; 6.7 US qt)
Difference between high and low dipstick marks		- 4 cyl.	0.85 litre (1.5 imp pt; 0.9 US qt)
		- V8	1 .O litre (1.8 imp pt; 1 .0 US qt)
Transmission			3.0 litre (5.3 imp pt; 3.2 US qt)
Engine cooling system			
	- 4 cyl. - with separate chargecooler system		18 litre (32 imp pt; 19 US qt)
		- with integral chargecooler system	24 litre (42 imp pt; 25 US qt)
	- V8		15 litre (26 imp pt; 16 US qt)
Chargecooler system (when separate)			6.0 litre (10.6 imp pt; 6.3 US qt)
Fuel tanks (combined)			73 litre (16.0 imp gall; 19.3 US gall)

Brake & clutch fluid	3.5 litre (6.2 imp pt; 3.7 US qt)
Power steering fluid	2.0 litre (3.5 imp pt; 2.1 US qt)
Refrigerant R134a (4 & 8 cyl.)	1 kg (2.2 lb)

For recommended lubricants and anti-freeze, see section OD (4 cyl.), or OF (V8).

SUSPENSION

Front

Type		Upper & lower wishbones with co-axial coil spring and telescopic damper. Anti-roll bar
Mid-laden ride height (driver & passenger + half tank of fuel) for geometry check:		
- front	- S4; S4S; Sport 300; V8	170 mm below front crossmember
	- GT3	180 mm below front crossmember
- rear	- S4; USA S4S	170 mm below chassis rear hoop
	- Sport 300; non-USA S4S; V8	164 mm below chassis rear hoop
	- GT3	174 mm below chassis rear hoop
Camber	- S4; USA S4S	- 0.7"; + 0.2°, - 0.1" (- 0°42'; + 12', - 6')
	- Sport 300; non-USA S4S	- 0.9"; ± 0.1" (- 0°54'; ± 6') within 0.2" (0°12') side to side
	- GT3	- 0.9"; ± 0.2" (- 0°54'; ± 12') within 0.2" (0°12') side to side
	- V8	- 0.25"; ± 0.25" (- 0°15'; ± 15') within 0.2" (0°12') side to side
Castor		+ 3.2"; ± 0.2" (+ 3°12'; ± 12') within 0.2" (0°12') side to side
Alignment	- S4; S4S; Sport 300; GT3	1.0 mm toe **out** overall; ± 0.5 mm (0.14" toe **out** overall; ± 0.07") {0°8' toe **out** overall; ± 4'}
	- V8	1.5 mm toe **out** overall; ± 0.5 mm (0.2" toe out overall; ± 0.07") {0°12' toe out overall; ± 4'}
Steering axis inclination	- S4; USA S4S	9.6" (9°35') nominal
	- Sport 300; non-USA S4S; V8; GT3	9.8" (9°47') nominal
Front hub endfloat		0.05 mm (0.002 in) maximum

Rear

Type		Upper & lower transverse link with box section trailing radius arm. Co-axial coil spring and telescopic damper.
Mid-laden ride height (driver & passenger + half tank of fuel) for geometry check:		
- front	- S4; S4S; Sport 300; V8	170 mm below front crossmember
	- GT3	180 mm below front crossmember
- rear	- S4; USA S4S	170 mm below chassis rear hoop
	- Sport 300; non-USA S4S; V8	164 mm below chassis rear hoop
	- GT3	174 mm below chassis rear hoop
Camber	- S4; USA S4S	- 0.9"; ± 0.2" (- 0°54'; ± 12')
	- Sport 300; non-USA S4S	- 1.0"; ± 0.1" (- 1°0'; ± 6') within 0.1" (0°6') side to side
	- GT3	- 1.0"; ± 0.2" (- 1°0'; ± 12') within 0.2" (0°12') side to side
	- V8	- 1.5"; ± 0.25" (- 1°30'; ± 15') within 0.2" (0°12') side to side
Alignment	- S4; USA S4S	1.5 mm toe in **each side; ± 0.5** mm (0.2" toe in **each side; ± 0.07")** {0°12' toe in **each side; ± 4'}**

- Sport 300; non-USA S4S; V8; GT3	1.0 mm toe in **each side; - 0, + 0.3** mm (0.13" toe in **each side; - 0, + 0.04")** {0°8' toe in **each side; - 0, + 2')** within 0.2 mm (0.1°){0°4'} side to side

STEERING

Turning circle (between kerbs)	10.6 m (34 ft 9 in)
Type	Power assisted rack & pinion with energy absorbing collapsible column
Turns, lock to lock	3.05
Uncollapsed length of upper column - inner	612 ± 0.8 mm: u/j centreline to top end
- outer	105.4 ± 1 mm: exposed lower section (see section HD)
Rack & pinion ratio	46.6 mm per turn
System ratio	15.7 : 1

CLUTCH

Type - 4 cyl.	Single dry plate, diaphragm spring, pressed steel cover.
- V8	Single dry plate, diaphragm 'pull off' spring, alloy cover
Release mechanism	Ball race release bearing. Hydraulic release mechanism with self adjusting slave cylinder
Master cylinder bore diameter - 4 cyl.	17.8 mm (0.700 in)
- V8	15.9 mm (0.625 in)
Slave cylinder bore diameter	22.23 mm (0.875 in)
Friction plate diameter - 4 cyl.	228 mm (9.00 in)
- V8	280 mm (11.02 in)
No. of friction plate damper springs - 4 cyl.	8
- V8	5 concentric pairs
Clutch cover clamp load - S4	7000 N
- sport 300, S4S	8300 N
- V8	12,100 N / 9,100 N (see section QE)

TRANSMISSION

Type	Manual 5 speed transaxle incorporating clutch housing, gearbox, crownwheel and pinion and differential
Gearbox	2 shaft all indirect 5 speed manual. Synchromesh on all forward gears. V8 - reverse gear synchromesh
Final drive gears	Spiral bevel
Differential - S4, S4S, V8	4 pinion bevel gear differential
- sport 300	Lotus compact torque biasing differential using helical spur gear trains

Gear	Internal Ratio		Final Drive Ratio	mph/1000 rpm		km/h/1000 rpm	
	4 cyl.	V8		4 cyl.	V8	4 cyl.	V8
First	3.36 : 1	3.36 : 1	3.89 : 1	5.7	5.7	9.2	9.2
Second	2.06 : 1	2.06 : 1	3.89 : 1	9.4	9.4	15.1	15.1
Third	1.38 : 1	1.38 : 1	3.89 : 1	14	14	22.5	22.5
Fourth	1.04 : 1	1.04 : 1	3.89 : 1	18.6	18.6	29.9	29.9
Fifth	0.82 : 1	0.76 : 1	3.89 : 1	23.1	25.5	37.2	41
Reverse	3.54 : 1	3.54 : 1	3.89 : 1	5.4	5.4	8.8	8.8

Speedo drive gear		26 teeth) S4 prior '95 M.Y.
Speedo driven gear		21 teeth)
COOLING SYSTEM		
Engine cooling system		Closed water circuit. Centrifugal pump driven via **'V'** belt (4 cyl.) or multi-rib belt **(V8),** from crankshaft. Dual valve thermostat. Front mounted radiator with 3 electric fans under ECM control
Chargecooler system (4 cyl.)		Closed water circuit. Air/water heat ex changer (chargecooler) mounted in intake tract linked to front mounted radiator
Integration of chargecooler system into engine cooling system		From VIN **R** 1242 (LHD S4) **R** 1250 (RHD S4) **R** 8030 (Sport 300)
Pressure cap - engine		110 **kPa** (1.1 bar; 15 **lb/in²)**
	- chargecooler (prior to integration)	Prior above VIN; fitted on expansion tank. After above VIN; fitted on header tank 48 **kPa** (0.48 bar; 7 **lb/in²)**
Thermostat nominal opening temperature		82°C
Cooling system anti-freeze/corrosion inhibitor		
	- **type**	Ethylene glycol blend
	- concentration	50%
BRAKES		
Change point	- non-USA S4	* VIN **R** 1443 (+ 1377); July '94
	- USA S4	* VIN S 1391; June '94
Type	- S4 prior VIN *	Ventilated front discs, solid rear discs. Single piston sliding calipers at each wheel
	- S4 from VIN *; **S4S;** V8; GT3	Ventilated front & rear discs. 4-piston fixed front calipers. Single piston sliding rear calipers
	- sport 300	Curved vane ventilated front **&** rear discs. **4-piston** fixed calipers at each wheel
Disc diameter - front	- S4 prior VIN *	258 mm
	- S4 from VIN *; **S4S;** V8; GT3	296 mm
	- sport 300	327 mm
- rear	- S4 prior VIN *	275 mm
	- S4 from VIN *; **S4S;** V8; GT3	300 mm
	- sport 300	280 mm
Brake disc thickness		
- front - S4 prior VIN .	- nominal	20 mm (0.79 in)
	- minimum	19 mm (0.75 in)
- S4 from VIN *; **S4S,** V8; GT3 -	nominal	28 mm (1.10 in)
	- minimum	25 mm (0.98 in)
- sport 300	- nominal	28 mm (1 **.10** in)
	- minimum	26.9 mm (1.06 in)
- rear - S4 prior VIN .	- nominal	12 mm (0.47 in)
	- minimum	11 mm (0.43 in)
- S4 from VIN *; **S4S;** V8; GT3 -	nominal	22 mm (0.87 in)
	- minimum	20.4 mm (0.80 in)
- sport 300	- nominal	28 mm (1.10 in)
	- minimum	26.9 mm (1.06 in)
Maximum thickness variation		0.015 mm (0.0006 in)

Maximum disc runout			
- front	- S4 prior VIN *		0.05 mm (0.002 in)
	- S4 from VIN *; S4S; V8; GT3		0.15 mm (0.006 in)
	- sport 300		0.10 mm (0.004 in)
- rear	- S4 prior VIN *		0.10 mm (0.004 in)
	- S4 from VIN *; S4S; V8; GT3		**0.20** mm (0.008 in)
	- sport 300		0.15 mm (0.006 in)
			0.15 mm (0.006 in)
Brake pad thickness			
- new	- front	- S4 prior VIN *	10.5 mm (0.41 in)
		- S4 from VIN *; S4S; V8; GT3	9.0 mm (0.35 in)
		- sport 300	15.0 mm (0.59 in)
	- rear	- S4 prior VIN .	9.5 mm (0.37 in)
		- S4 from VIN *; S4S; V8; GT3	9.5 mm (0.37 in)
		- sport 300	11 .0 mm (0.43 in)
- minimum	- front & rear		**2.5** mm (0.10 in)
Operation - 4 cyl.			Delco ABS IIIA anti-lock brake system: Powermaster front brake tandem master cylinder; electrically operated hydraulic pump providing front power assistance and rear brake operation.
- V8			Kelsey Hayes ABS-415 anti-lock system. Tandem master cylinder and vacuum servo. Hydraulic circuit split front/rear.
ABS control logic - 4 cyl.			Independent front, select low rear, 3 channel system.
- V8			4 channel.
Parking brake			Cable operation of rear calipers.

WHEELS & TYRES

S4; USA S4S; GT3

Wheels - type			One piece light alloy, 5 bolt fixing
- size	- front		7J x 17 ET23.3
	- rear		8.5J x 17 ET30
- inset	- front		**+ 23.3** mm
	- rear		+ 30 mm
Tyres - type			Goodyear Eagle GS-A
- size	- front		215/40 ZR17
	- rear		**245145** ZR17
- temporary spare	- prior VIN *		175/70 SR14
	- from VIN *		T125/80 R16
	*** VIN - non-USA**		**R 1443 (+ 1377); July '94**
	- USA S4		**S 1391; June '94**
Tyre pressures (cold)			
- normal use	- front		2.0 bar (29 lb/in²)
	- rear		2.1 bar (30.5 lb/in²)
- sustained speeds over 240 km/h (149 mph)			
	- front		2.5 bar (36.5 lb/in²)
	- rear		2.5 bar (36.5 lb/in²)
- temporary spare (50 mph max.)	- prior VIN *		2.0 bar (30 lb/in²)
	- from VIN *		4.2 bar (60 lb/in²)
Wheel bolt torque			10 daNm (74 lbf.ft)

Non-USA S4S; V8

Wheels - type	- 4 cyl.		3-piece light alloy, 5 bolt fixing
	- V8		One piece light alloy, 5 bolt fixing
- size	- front		8.5J x 17 ET19
	- rear		10J x 18 ET17

	• inset • front	+ 19 mm
	• rear	+ 17 mm
Tyres	• type	Michelin Pilot SX MXX3
	• size • front	235/40 ZR17
	• rear	285/35ZR1 a
	• spare (if fitted)	175170 SR14
Tyre pressures (cold)		
	• normal use • front	2.0 bar (29 lb/in²)
	• rear	2.0 bar (29 lb/in²)
	• sustained speeds over 240 km/h (149 mph)	
	• front	2.5 bar (36.5 lb/in²)
	• rear	2.5 bar (36.5 lb/in²)
	• temporary spare (50 mph max.)	4.2 bar (60 lb/in²)
Wheel bolt torque		10 daNm (74 lbf.ft)

sport 300

Wheels	• type	3-piece light alloy, 5 bolt fixing
	• size -front	8.5J x 16 ET20
	• rear	10.5J x 17 ET6
	• inset • front	+ 20 mm
	• rear	+ 6 mm
Tyres	• type	Goodyear Eagle GS-C or Goodyear Eagle ZR
	• size • front	245/45 ZR16
	• rear	P315/35 ZR17
Tyre pressures (cold)	• front	2.0 bar (29 lb/in²)
	• rear	2.0 bar (29 lb/in²)
Wheel bolt torque		10 daNm (74 lbf.ft)

ELECTRICAL EQUIPMENT

Voltage/polarity		12V/negative earth
Alternator		90 Amp
Starter motor	• type	Lucas M80R
	• drive	Pre-engaged
Battery	• type	Tungstone Heavy Duty type E088
	• cranking power	570 amps SAE
	• reserve capacity	100 mins
	• dimensions	Length 154mm, Width 175mm, Height 206mm
	• terminals	Standard tapered round
	• rec. bench charge	5.5 amps

Light Bulbs

		Wattage	Type
Headlamps (Dom/Exp)	• outer (dip)	60/65	H4 P43t
	• inner (main)	55	H1 P14.5s
Headlamps (USA)	• outer (main & dip)	37½/60	4002 Sealed beam
	• inner (main)	50	4001 Sealed beam
Side/parking lamps, front		5	W2x4.6d
Turn indicators, front/rear		21	SCC BA15s
Side repeater lamps (not USA)		5	W2x4.6d
Side marker lamps (USA)		5	W2x4.6d
Stop/tail lamps		5/21	SBC BAY1 5d
High mounted stop lamp (USA)		11	891
Rear fog lamps (not USA)		21	SCC BA15s
Reversing lamps		21	SCC BA15s
Front fogs		55	H3 Pk22s

	Wattage	Type
Licence plate lamps	5	SU 8.5-8
Luggage compartment lamps	5	SU 0.5-8
Door edge warning	5	SU 8.5-8
Interior lamp	10	SU 8.5-8
Reading lamps	5	W2x4.6d
Cigar lighter	1.2	W2x4.6d
Climate controls	3	10 mm capless
Tell-tale lamps	3	W2.1x9.5d
Speedo/tacho/boost gauge	3	BA9s (A089M6062F)
Oil/temp/fuel/volt gauge	3	10 mm capless
Fascia switches	1.2	W2x4.6d

TORQUE SETTINGS

	N.m	lbf.ft
Front Susoension		
Upper wishbone to chassis*	70	50
Upper ball joint to wishbone	35 - 39	26 - 29
Upper ball joint to vertical link	55	40
Steering arm to vertical link	90	65
Lower wishbone to chassis*	70	50
Lower ball joint to vertical link	65	45
Anti-roll bar to chassis	90	65
Damper to lower wishbone*	70	50
Damper top stem to spring plate**	see below	
Spring top plate to chassis	20	15
Wheel bolts	100	74
Rear Susoension		
Radius arm to rubber mounting*	55 - 65	40 - 45
Radius arm to hub carrier - s4	41 - 47	30 - 35
Radius arm to hub carrier - sport 300	70 §	52 §
Radius arm mounting to chassis	35	25
Damper top stem**	see below	
Top link to chassis*	70	50
Top link to hub carrier*	70	50
Top link camber adjuster locknut - s4	60	44
Top link camber adjuster locknut - sport 300	70	50
Lower link to chassis*	70	50
Lower link to hub carrier*	70	50
Hub bearing to carrier	31 - 34	23 - 25
Hub to outboard driveshaft	260 - 270	190-200
Wheel bolts	100	74

* Tighten only with the car at normal ride height.

** Nut is 'nipped' to shoulder on stem, holding top of stem with spanner, then locknut tightened. Spring must be in compressed condition during this operation.

§ Use Permabond Al 38.

Steering

PAS rack assembly to chassis	70	52
Ml 6 pipe to rack assembly	23	16
Ml 8 pipe to rack assembly	33	24
Upper column to pedal box	24	17.5
Upper column to scuttle beam	15	11
Steering column lock bolts	'break off' type	
Steering wheel to column	34	25

		N.m	lbf.ft
Upper u/j pinch bolt		40	30
Lower u/j pinch bolts		18 - 20	14-15
Tie rod locknuts		80 - a2	58-60
Tie rod end to steering arm		46 - 48	33 - 35
Brakes			
Master Cylinder/Booster Assy to Mounting Bracket (4 cyl.)		33	24
Master Cyl./Booster Mtg. Bracket to Pedal Box (4 cyl.)		18 - 20	14-15
Pedal Box to Chassis		18 - 20	14-15
Front brake caliper mounting	- S4; S4S; V8; GT3	90	65
Front brake caliper to mtg. bracket	- sport 300	77 #	57 #
Front caliper bracket to upright	- sport 300	108 §	80 §
Front brake disc to hub	- S4; S4S; V8; GT3	52 - 55	38 - 40
Front brake disc to mounting bell	- sport 300	16	12
Front disc mounting bell to hub	- sport 300	47 #	35 #
Front brake disc shield to upright	- S4; S4S; V8; GT3	16-20	12 -15
Rear brake caliper mounting	- S4; S4S; V8; GT3	73 - 75	53 - 55
Rear brake caliper to mtg. bracket	- sport 300	77 #	57 #
Rear cal. mtg. brkt. to hub carrier	- sport 300	70 §	52 §
Handbrake cable bracket to caliper	- S4; S4S; V8; GT3	18 - 20	13 - 15
Parking brake cal. to cal. brkt.	- sport 300	47 #	35 #
Park cal: brkt. to mounting brkt.	- sport 300	75 §	55 §
Park cal. mtg. brkt. to hub carrier	- sport 300	75 §	55 §
Rear brake disc to hub	- S4; S4S; V8; GT3	18 - 20	13-15
Rear brake disc to mounting bell	- sport 300	16	12
Rear disc mounting bell to hub	- sport 300	18 - 20	13-15
Brake pipe/hose male/female unions		13-14	9 - 10
# Use Permabond All5			
§ Use Permabond Al36			
Chassis			
Rear crossmember		41 - 47	30 - 35
Exhaust			
Exhaust mountings to cradle (4 cyl.)		18 - 20	14 -15
Silencer to mountings (4 cyl.)		25 - 27	18 -20
Transmission			
Gearbox mounting bracket to gearbox		29 - 31	20 - 23
Gearbox mounting bracket to rubber mounting		52 - 54	38 - 40
Rubber mountings to chassis		18 - 20	14 - 15
Gearchange lever assembly to chassis		4.75	3.5
Translator clamp bolt		18 - 20	14 - 15
Cable abutment clamp bolt		7 - a	5 - 6
Miscellaneous			
Seat runner to body		21 -23	15-17
Seat runner to seat		32	24
Door hinge to body		101 - 103	74 - 76
Door striker to body		21	15
Oil cooler to hose		32 - 34	23 - 25
Seat belt fixings		32 - 34	23 - 25
Door hinge pin (M12)		68 - 75	50 - 55
Handbrake lever mounting plate to body		24	18

FUEL CONSUMPTION

Models tested to directive 80/1 268/EEC:

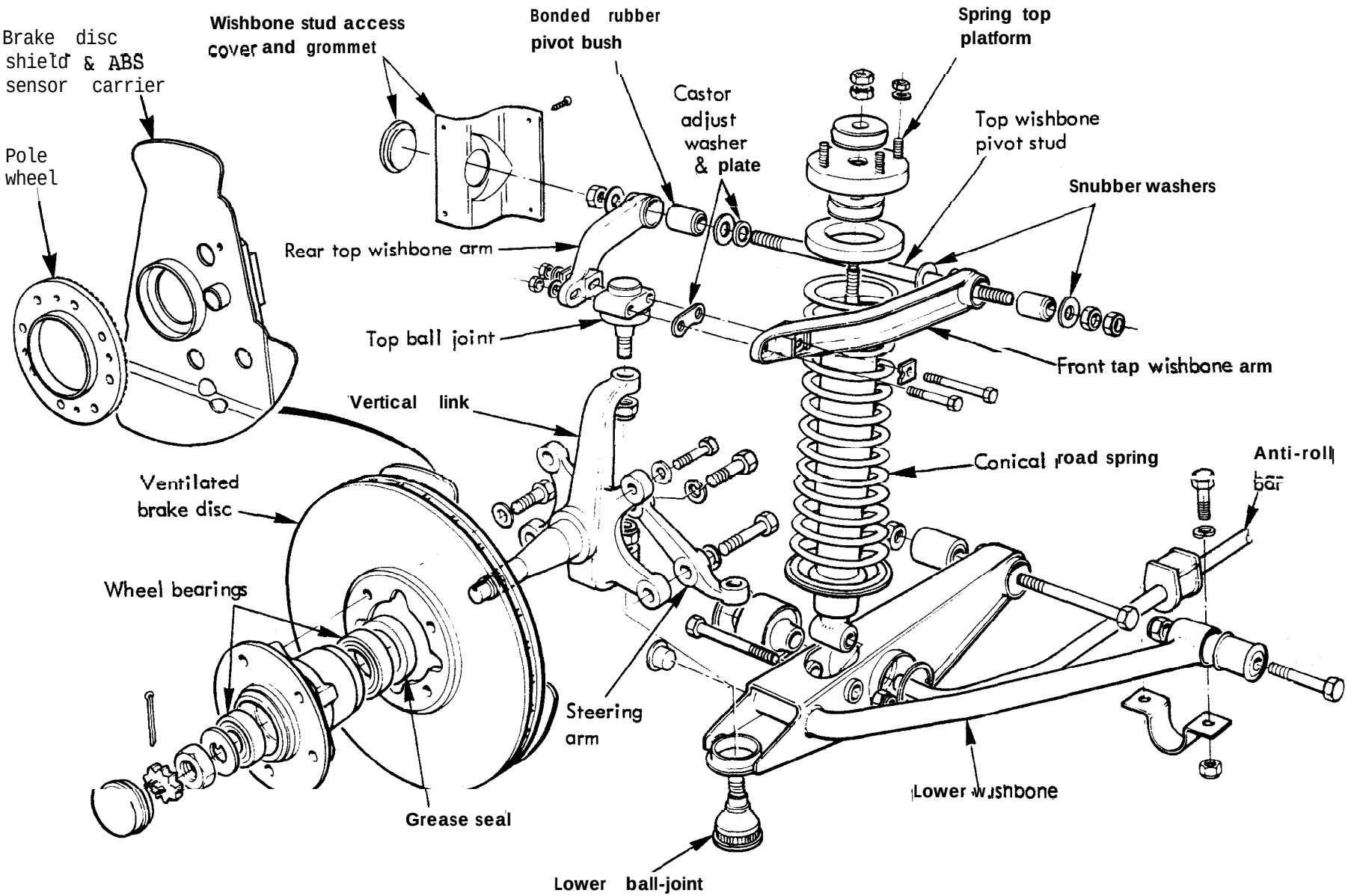
	Metric l/100 km			Imperial mpg		
	Urban	*90 km/h*	*120 km/h*	*Urban*	*56 mph*	*75mph*
s4	15.8	7.8	9.5	17.9	36.2	29.7
S4S	15.0	8.2	10.3	18.8	34.4	27.4
sport 300	15.0	8.2	10.3	18.8	34.4	27.4

Models tested to directive 93/116/EC:

	Metric l/100 km			Imperial mpg			
	Urban	*Extra-urban*	*Combined*	*Urban*	*(cold)*	*Extra-urban*	*Combined*
GT3	19.0	8.6	12.5	14.9	32.8		22.6
V8	20.0	9.3	13.3	14.1	30.4		21.2

FRONT SUSPENSION
SECTION CF - ESPRIT TURBO

Ewm! SUSPENSION GENERAL LAYOUT



CF.1 - GENERAL DESCRIPTION

The front suspension is fully independent, using upper and lower wishbones, concentric spring/damper assemblies and an anti-roll bar. The top wishbone comprises two similar pressed steel arms, sandwiching at their outboard ends the steering swivel top ball joint. Shims fitted between the wishbone arms and chassis, and between the arms and ball joint, permit adjustment of castor angle, and selective offset washer plates at the wishbone outer ends allow for camber adjustment. The lower wishbone consists of a main channel section track control arm to which the spring/damper unit connects, and an integral tubular brace running forward to a second bonded rubber pivot bush. The anti-roll bar locates in two chassis mounted rubber bushes, and engages into flexible spherical rubber bushes housed in the lower wishbones.

The concentric coil spring/telescopic damper units use a fabricated top abutment for the spring and damper, which is bolted to the chassis tower. Springs on the S4 are conical in shape in order to resist bowing, with the greater diameter lowermost, whilst the higher rate Sport 300 springs are parallel. Sport 300 models also use high specification 'N65' type dampers which require larger apertures in the lower wishbones in order to clear the greater diameter of the damper bodies.

A stub axle, integral with the vertical link (hub carrier), carries each front hub on two taper roller bearings which are adjustable for end float. The offset fixing holes for the top and bottom ball joints result in the vertical links being handed, and are identified by green paint for the RH unit, and red for the LH.

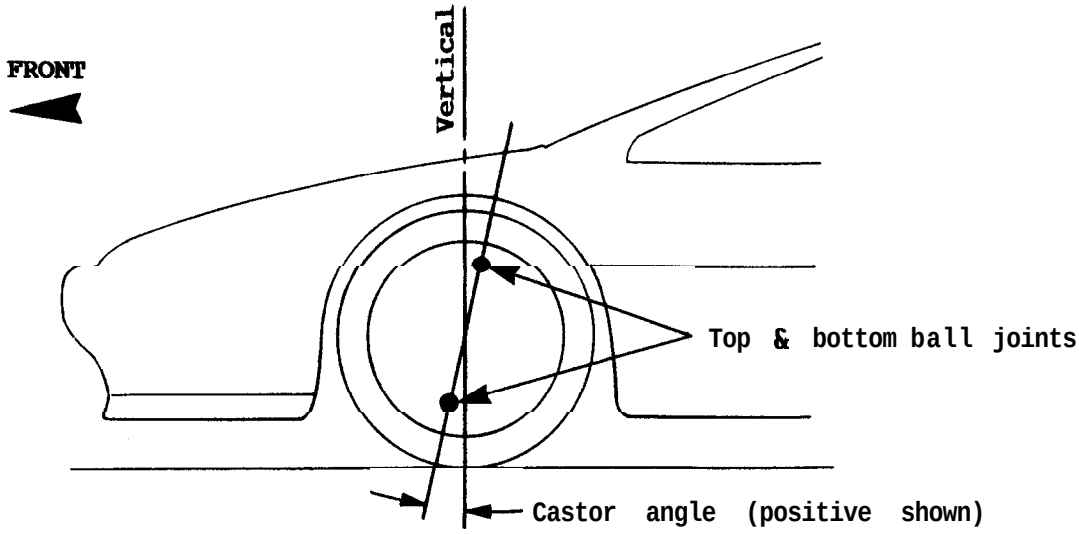
CF.2 - GEOMETRY & ADJUSTMENTS

Under normal service conditions, the only periodic scheduled check necessary is of front wheel alignment. A full geometry check is required only after front suspension repair, or if excessive tyre wear is evident, or if steering difficulties are encountered. Before any measurements or adjustments are made it is essential first to set the vehicle to its 'mid-laden' ride height, approximating to driver and passenger and a half tank of fuel:

Mid laden ride height	- front	170 mm below chassis front crossmember
	- rear - S4	170 mm below chassis rear hoop
	- Sport 300	164 mm below chassis rear hoop
Camber - S4		- 0.7°; + 0.2°, - 0.1° (- 0°42'; + 12', - 6')
- Sport 300		- 0.9°; ± 0.1° (- 0°54'; ± 6') within 0.2° (12') side to side
Castor		+ 3.2°; ± 0.2° (+ 3°12'; ± 12') within 0.2° (12') side to side
Alignment		1.0 mm toe out overall; ± 0.5 mm (0.3° toe out overall; ± 0.15°) (0°20' toe out overall; ± 10')
Steering axis inclination	- S4	9.6° (9°35') nominal
	- Sport 300	9.8° (9°47') nominal

Castor Adjustment

Castor is the angle from vertical of the steering axis of the wheel when viewed from the side. Its primary purpose is to provide a natural straight running tendency of the steered wheels with forward vehicle motion. Castor angles have a complex interaction with other steering geometries and can lead to



various stability and handling shortcomings if unbalanced or outside specification.

Provision is made for castor adjustment by the following means:

At each side, shim washers to a total thickness of 9 mm are distributed between the front and rear halves of the top wishbone and the chassis. Shim plates of total thickness 12 mm are distributed between the front and rear of the top ball joint and top wishbone halves.

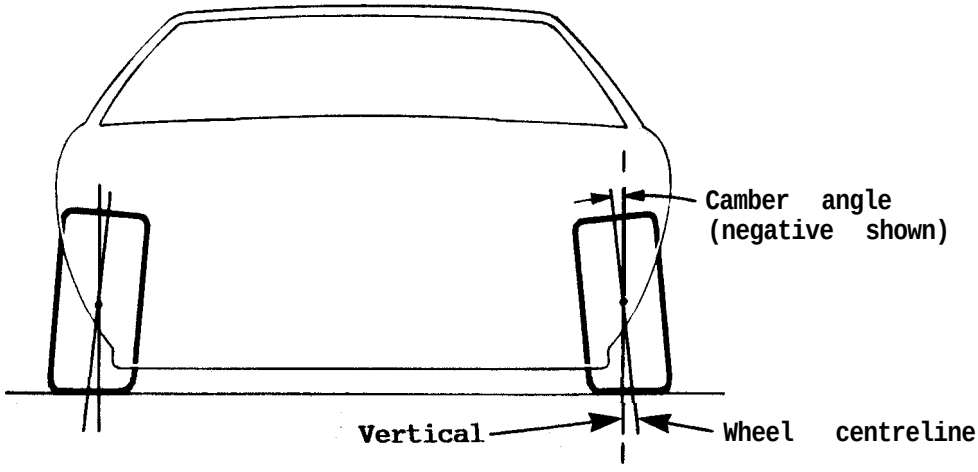
Shims are available as follows:

Shim Washer (pivot stud)	1.5 mm	A082C4091F	As a guide, transference of a 1.5 mm shim will alter the castor by approximately 0.4° (0°24')
" " " "	3.0 mm	A082C4092F	
" " " "	6.0 mm	A082C4093F	
Shim Plate (ball joint)	1.5 mm	A082C4090F	
" " " "	3.0 mm	A082C4089F	

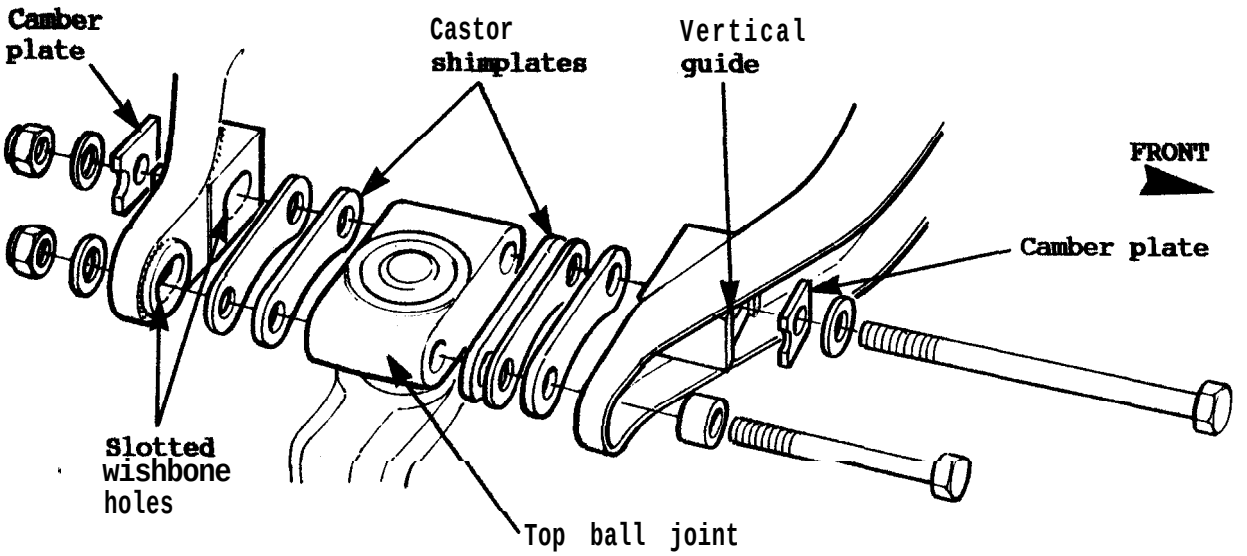
Castor adjustments may be made at either the inboard or outboard ends of the top wishbone, but the total number of shims must remain intact and there must be a minimum of 5 mm clearance between the top wishbone and the chassis. On reassembly of the top wishbones to the chassis, ensure that the large diameter snubber washers are fitted on both sides of each wishbone bush.

Camber Adjustment

Camber is the angle from vertical of the wheel when viewed from the front, and is said to be negative when the wheel leans inwards at the top (positive when



leaning outwards). The primary purpose of camber is to achieve the maximum efficiency of the tyre under cornering loads and body roll, with the specification closely allied to a particular wheel/tyre combination. The camber angle changes with suspension travel, becoming more negative with bounce, and should be measured only at the specified ride height. Incorrect camber can result in handling deficiencies and uneven tyre wear.

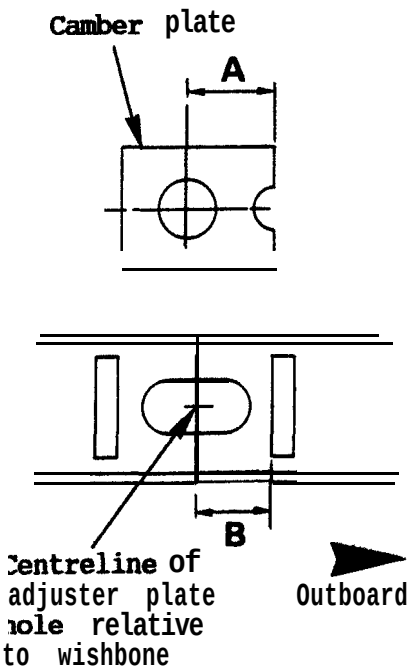


Camber adjustment is effected by the selection and orientation of offset washer plates located between vertical guides on the top wishbone arms at the ball joint inboard fixing hole. Four variations of plate provide seven camber settings, with a 1 mm change in hole position altering camber by approx. 0.4° (0°24').

To make an adjustment, first establish the variation of plate fitted before selecting an alternative plate, and/or orientation, from the table below.

Dimension 'A'	Part no. of plate	Plate orientation	Dimension 'B'
		Outboard ▶	
14.0 mm	A100C0111		7.0 mm
12.5 mm	A100C0110		8.5 mm
11.5 mm	A100C0125		9.5 mm
10.5 mm	A100C0109		10.5 mm
11.5 mm	A100C0125		11.5 mm
12.5 mm	A100C0110		12.5 mm
14.0 mm	A100C0111		14.0 mm

negative camber increases

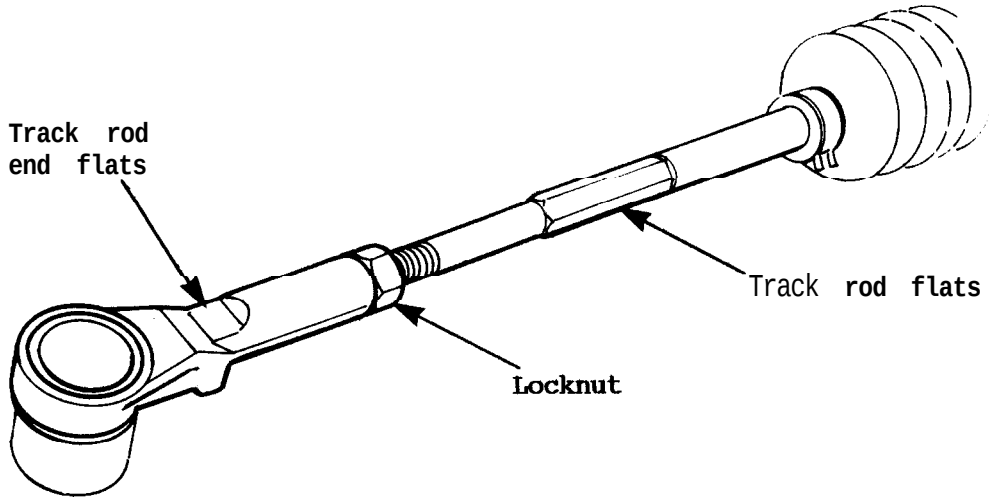


Slacken the top ball joint outer fixing, and remove the inboard fixing bolt. Fit the replacement adjuster plates into the guides on the top wishbone arms (making sure that the front and rear positions are mirror image of each other), and fit and tighten the fixings:
Socket head bolts; 35 - 39 Nm (26 - 29 lbf.ft) > Alternatives
Hex. head bolts; 22 - 25 Nm (16 - 18 lbf.ft) >

Alignment

Wheel alignment refers to the parallelism of the wheels when viewed from above and is crucial to vehicle stability, handling and tyre wear. It is measured either by the angle a wheel makes with the vehicle centre line, or the difference in dimension between the wheel rim to wheel rim measurement at the front and rear of the wheel at hub centre height. The wheels are said to 'toe-in', when the wheel paths converge ahead of the vehicle, and 'toe-out' when they diverge. Wheel alignment is designed to vary with both steering angle and suspension travel and should be measured only 'straight ahead' at the specified ride height.

Front wheel alignment is adjusted by screwing the track rods into or out of the track rod outer end ball joints. In order to preserve steering wheel 'straight ahead' alignment, each track rod should be adjusted by a similar amount.



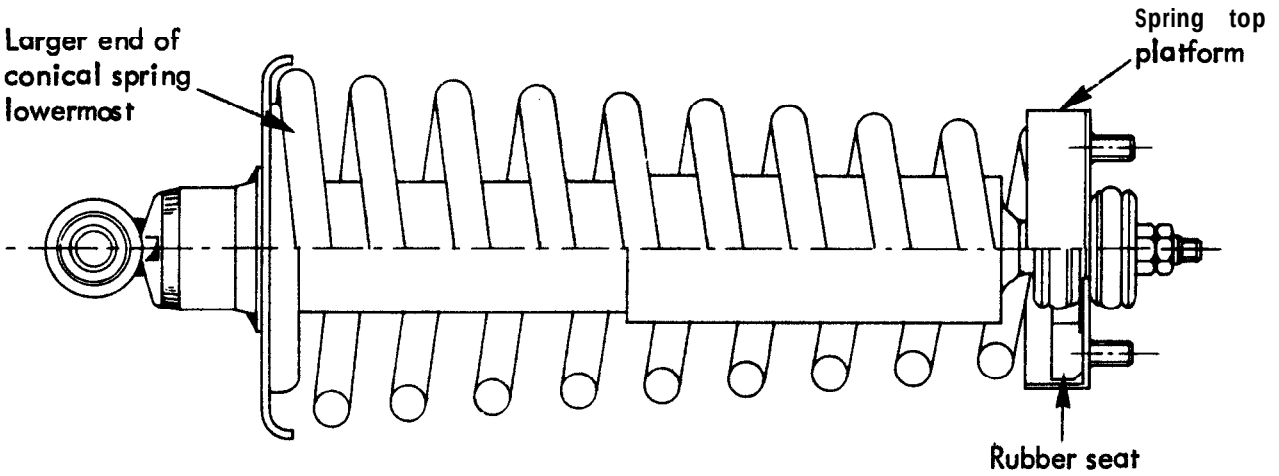
Hold the track rod using the flats provided, and slacken the track rod end locknut. Repeat for the opposite side.
Turn each track rod a similar amount. As a guide, turning both track rods by one 'flat' (one sixth of a turn) will alter overall toe-in by approx. 1.8 mm (0.50) (0°30').
When adjustment is correct, hold each track rod end and tighten the locknuts to 80 - 82 Nm (58 - 60 lbf.ft).

When slackening or tightening the the track rod end locknuts, it is important that the torque reaction is resisted using the track rod end flats, and that the ball joint itself is not allowed to be stressed.

CF.3 - SUSPENSION DISASSEMBLY/ASSEMBLY

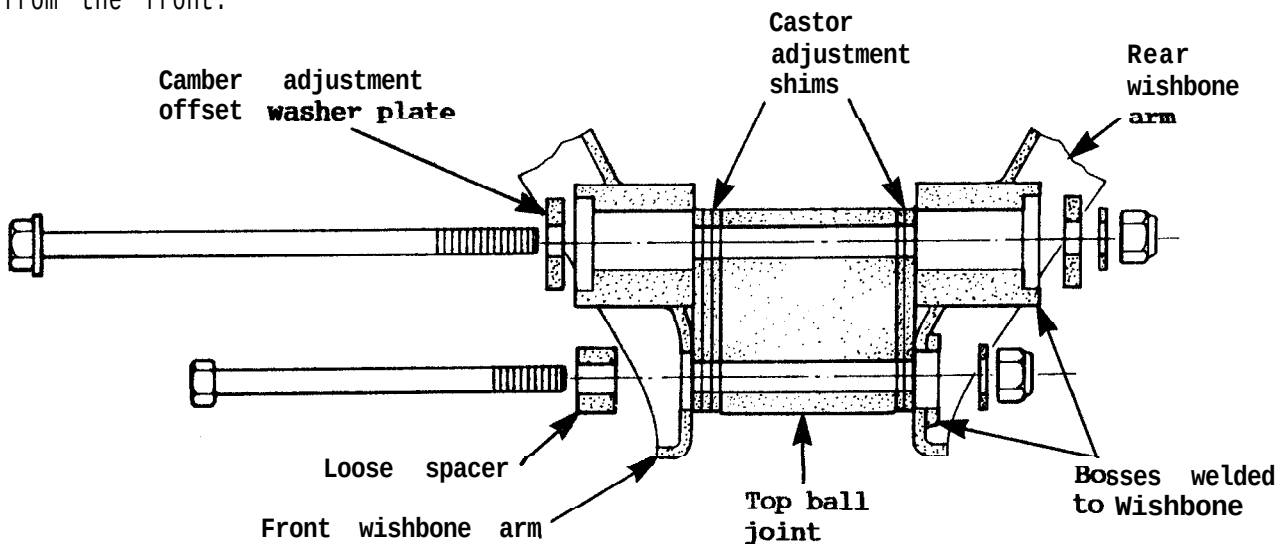
The road spring lower platform is integral with the damper body, and the top platform is bolted to the chassis. The spring/damper assembly may be removed

from the car by disconnecting the damper lower fixing, and removing the four nuts securing the top abutment to the chassis. Do not remove the damper top stem nuts unless spring compressor clamps are fitted, or the unit is mounted in a suitable press.



On reassembly, note that the S4 spring is conical in shape and that the larger end is fitted lowermost. Ensure that the spring rubber seat is fitted inside the abutment platform.

The front and rear halves of the top wishbone differ at the ball joint outboard fixing point: the rear arm has a welded (slotted) boss for the fixing bolt, whereas the front arm has a plain slot and uses a loose spacer under the bolt head. Note that the two fixing bolts for the top ball joint are inserted from the front.



A special tapered tool T000T0541 is available to aid insertion of the lower wishbone front unsleeved pivot bush. (P.90 (A082C6042V))

When fitting the anti-roll bar, use ~~rubber grease~~ to lubricate the chassis mounted bushes, and PBC (copper) grease where each end spigots into the lower link bush.

Use PBC grease on the shanks of the wishbone pivot bolts and studs, and tighten these bolts, and the damper to lower link bolt, only with the car at

normal ride height to avoid preloading the bushes.

Ensure that a plastic blanking plug A089U6089F is fitted into the open rear end of the lower wishbone front tube.

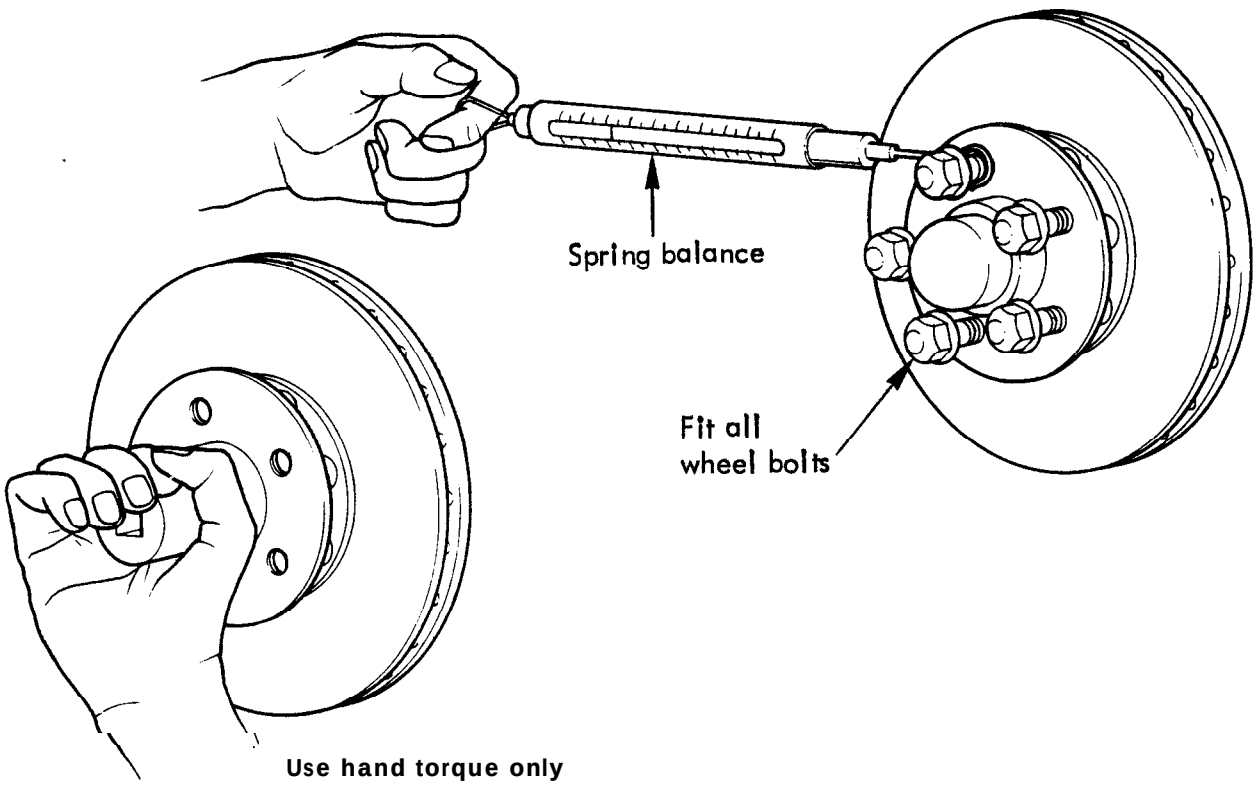
CF.4 - FRONT WHEEL BEARINGS

The front hub is supported on a pair of taper roller bearings which may be adjusted to achieve the correct end float.

To Adjust

1. Remove the road wheel and check that the brake is not binding. If necessary, push the pads back to clear the disc.

2. Remove the hub dust cap, hub nut split pin and locking ring. Torque the hub nut to 29 Nm (22 lbf.ft) whilst rotating the hub to centralise the bearings. Loosen the nut and re-tighten using only hand grip on the 30 mm socket.



3. Fit the wheel bolts into the hub and using a suitable spring balance as shown, measure the force needed to rotate the hub. Adjust nut tightness as necessary to achieve the following preload:

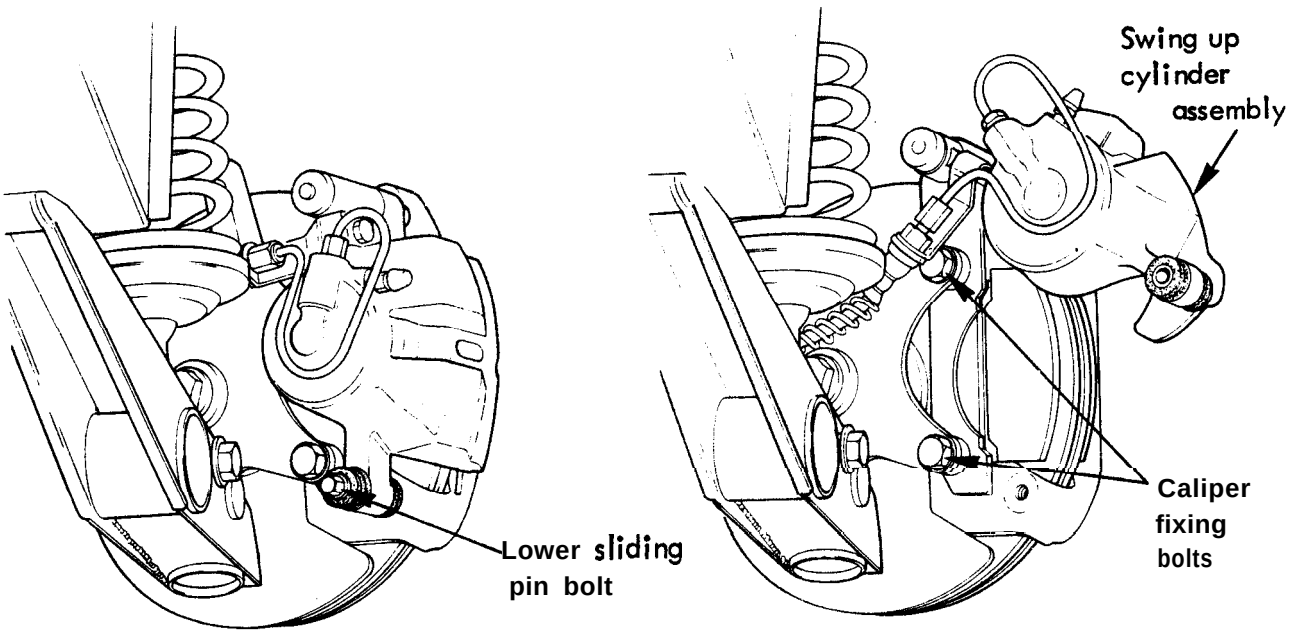
With new oil seal	350 - 875g (0.8 - 1.9 lb)
With used oil seal	50 - 500g (0.1 - 1.1 lb)

4. Using a dial gauge, measure the hub end float. Maximum = 0.05 mm (0.002 in) Install the lock ring and split pin, if necessary tightening the hub nut further by the smallest amount required. Refit dust cap and road wheel.

5. Apply brakes to restore pad position.

To Replace

1. The brake caliper must first be removed. Unclip the ABS sensor lead from the brake hose.
   s4 - In order to extract the caliper uppermost fixing bolt, it is necessary first to remove the bolt from the lower sliding pin, and swing up the cylinder (turn steering as necessary to prevent strain on brake hose). This allows the cylinder assembly to slide on its top pin and provide clearance for removal of the caliper top fixing bolt.

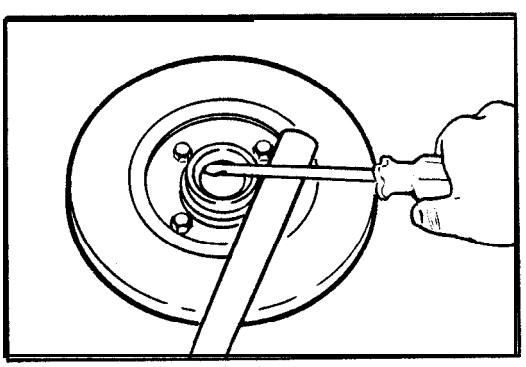


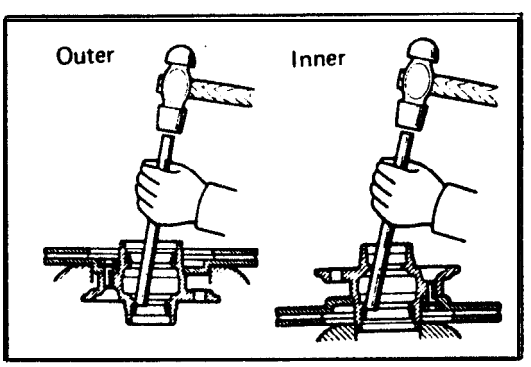
   Remove both caliper bolts and secure the caliper assembly aside without straining the flexible hose.
   Sport 300 - Remove the two bolts securing the caliper to the adaptor bracket and secure the caliper assembly aside without straining the flexible hose.

2. Prise off the hub dust cap. Remove the split pin and lock ring, hub nut and claw washer, and pull off the hub complete with brake disc.

3. Prise out the inner hub grease seal and remove the rollers/inner race assembly of the inboard bearing.

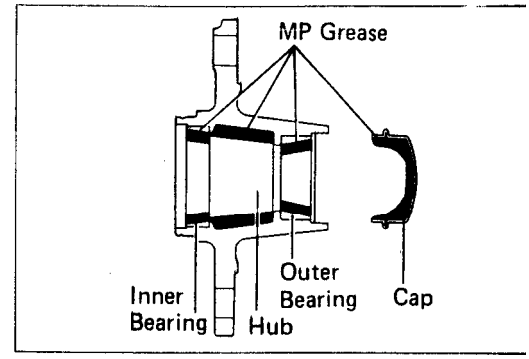
4. The outer races of inboard and outboard bearings may be removed from the hub using a drift, as shown, at diametrically opposite points.





5. Use a press to fit new outer races into the hub. (correct way round!)

6. Pack the new bearings with a Lithium base wheel bearing grease and work well into the roller cage. Coat the inside of the hub, outer races and cap with grease.



7. Insert the inboard bearing centre and retain by pressing in the inner grease seal.

8. Refit the hub onto the stub axle and retain with claw washer and nut.

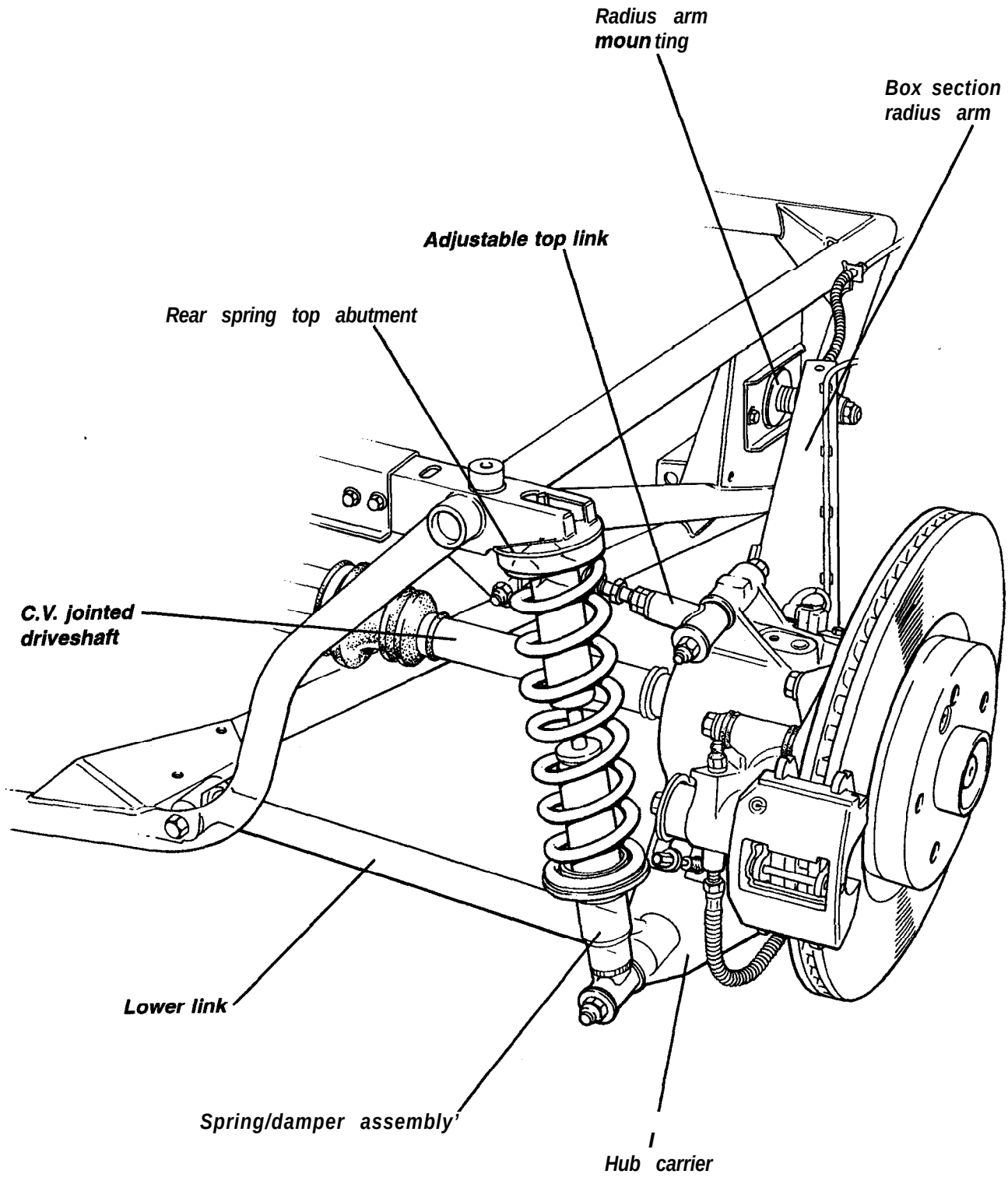
9. Adjust the bearings as detailed above.

10. Refit brake caliper and torque bolts:
S4 - Caliper to vertical link 88 Nm (65 lbf.ft)
Cylinder sliding pin bolt 16 - 24 Nm (12 - 17 lbf.ft).
Sport 300 - Caliper to mounting bracket 77 Nm (57 lbf.ft).

11. Re-clip the ABS wheel speed sensor harness, and apply the brakes to restore brake pad position.

REAR SUSPENSION
SECTION DF - ESPRIT TURBO

Rear Suspension General Layout



DF.1 • GENERAL DESCRIPTION

The fully independent rear suspension uses, on each side, a tapered box section trailing radius arm, in conjunction with single tubular top and bottom transverse links and a concentric coil springldamper unit. A cast alloy hub carrier houses a 'bolt on', double row, ball type hub bearing to support the steel hub and outboard driveshaft, and provides mounting points for the disc brake caliper and wheel speed sensor. The spring/damper unit is overhung from the bottom rear of the hub carrier, sharing the lower link pivot stud. The fabricated steel radius arm is bolted rigidly to the hub carrier via four lugs in order to resist the driveshaft and brake torque loads, control the steer alignment, and transmit the thrust loads into the chassis and via a bonded rubber pivot bush, at the side of the engine bay. Wheel alignment is adjusted by shimming at this pivot bush, with camber adjustment facilitated by an adjustable length top link. Replaceable bonded rubber pivot bushes are used in both top and bottom links.

DF.2 • GEOMETRY & ADJUSTMENTS

Provision is made for the adjustment of wheel alignment and camber. Under normal service conditions, no periodic scheduled check of the geometry is necessary, with a full geometry check required only after suspension repair, or if excessive tyre wear is evident, or handling deficiencies encountered. Before any measurements or adjustments are made, it is essential first to set the vehicle to its 'mid-laden' ride height, approximating to driver and passenger and a half tank of fuel:

Mid-laden ride height (driver & passenger + half tank of fuel) for geometry check:

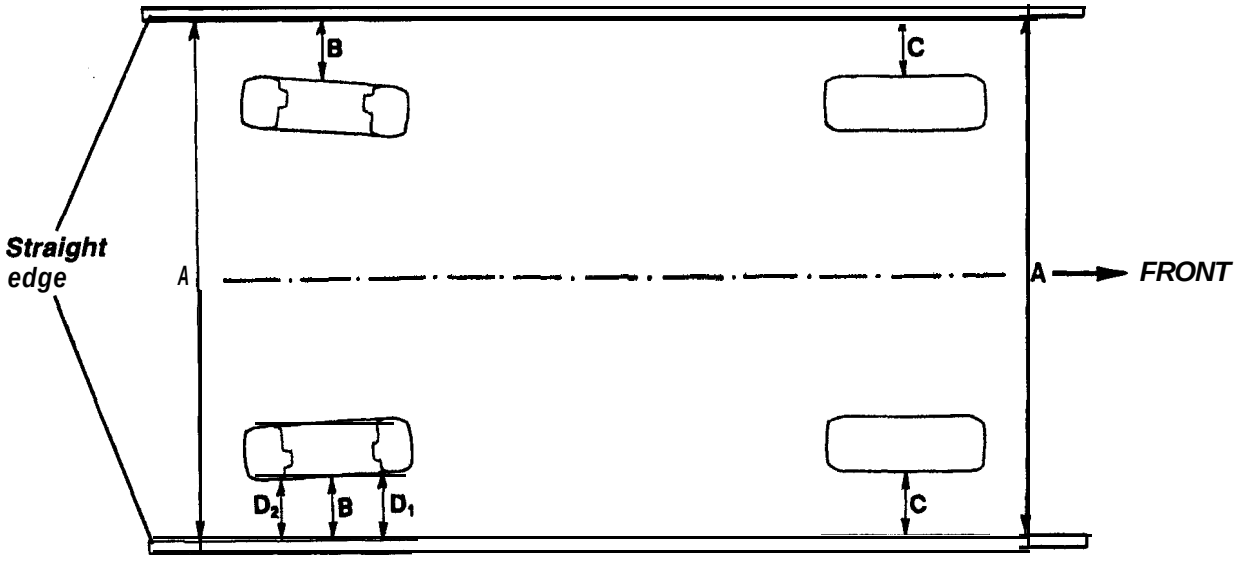
	• front	• S4, **S4S, Sport** 300, **V8**	170 mm below front crossmember
		• GT3	180 mm below front crossmember
	• rear	• S4, USA **S4S**	170 mm below chassis rear hoop
		• Sport 300. non-USA **S4S,** V8	164 mm below chassis rear hoop
		• GT3	174 mm below chassis rear hoop
Camber	• S4, USA **S4S**		• 0.9"; ± 0.2" **(- 0°54'; ± 12')**
	• Sport 300, non-USA **S4S,** GT3		• 1.0"; ± 0.1" **(- 1°0'; ± 6')** within **0.1° (0°6')** side to side
	• **V8**		• 1.5"; ± 0.25" **(- 1°30'; ± 15')** within **0.2° (0°12')** side to side
Alignment	• S4, USA **S4S**		1.5 mm toe in **each side; ± 0.5** mm (0.2" toe in **each side; ± 0.07")** **{0°12'** toe in **each side; ± 4')**
	• Sport 300, non-USA **S4S, V8,** GT3		1.0 mm toe in **each side; • 0, + 0.3** mm (0.13" toe in **each side; - 0, + 0.04")** **{0°8'** toe in **each side; • 0, + 2')** within 0.2 mm **(0.1°){0°4'}** side to side

Alianment

Wheel alignment refers to the parallelism of the wheels when viewed from above and is crucial to vehicle stability, handling and tyre wear. It is measured either by the angle a wheel makes with the vehicle centre line, or the difference in dimension between the wheel rim to wheel rim measurement at the front and rear of the wheel at hub centre height. The wheels are said to 'toe-in' when the wheel paths converge ahead of the vehicle, and 'toe-out' when they diverge. Rear wheel alignment should be measured only using equipment which measures **individual** rear wheel alignment reletive to the car centreline. Wheel alignment is designed to vary with suspension travel ('bump steer') and the base setting should be measured only at the specified mid laden ride height.

It is possible to accurately measure individual wheel alignment using a pair of long straight bars or round section elastic in conjunction with 4 axle stands or similar. Any bars used must be longer than the length of the car, and be suitably stiff and straight.

Set up the bars or elastic on each side of the car at wheel centre height as shown an the diagram, so that A = A, B = B and C = C.

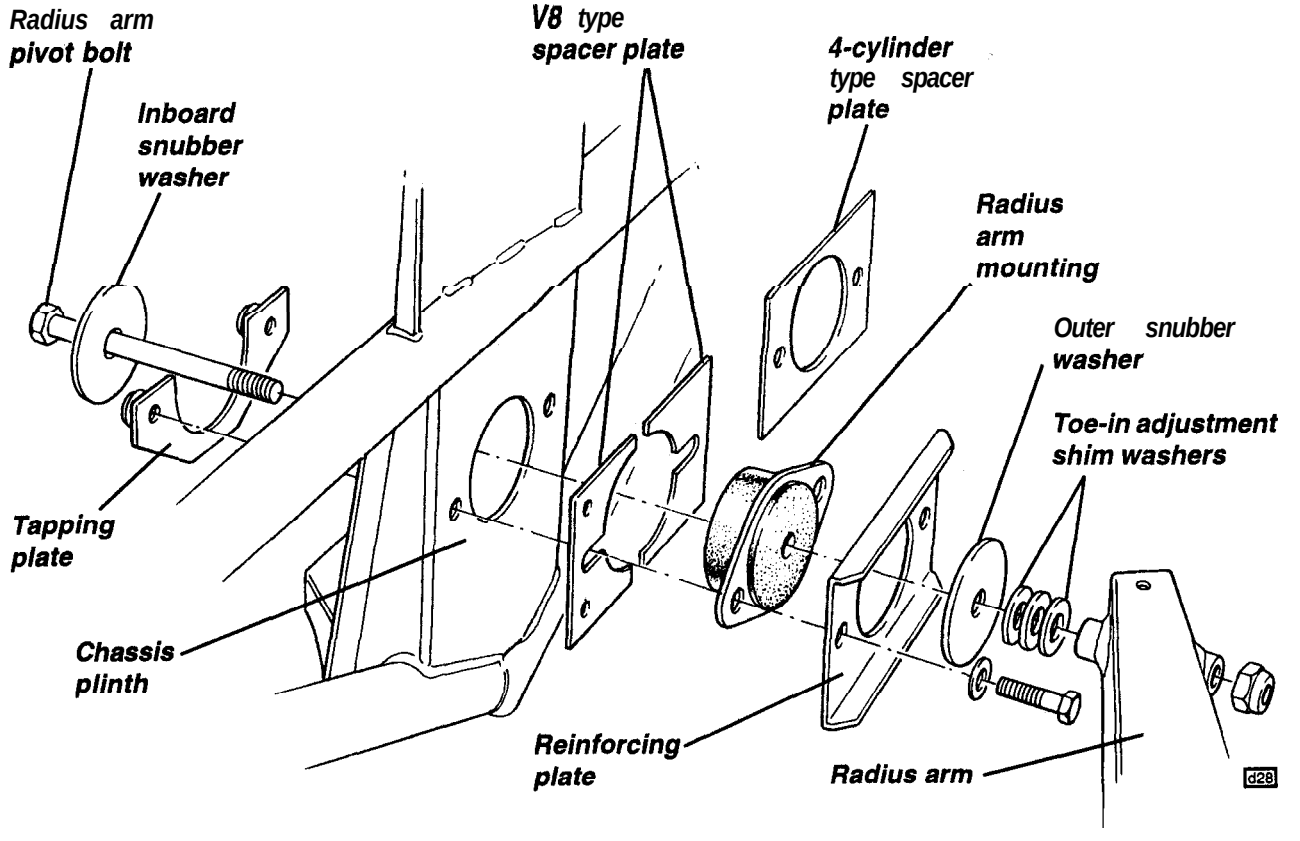


Measure the distance from the bar to the rim of the wheel concerned at the front and rear of the centre fine of the wheel (D_1, D_2). If the front dimension, D_1, Is greater than the rear dimension, D_2, the wheel has TOE-IN. If the rear dimension is greater than the front dimension, the wheel has TOE-OUT. The difference between the two measurements is the amount the wheel has toe-in or toe-out.

Adjustment of toe-in is provided for at the radlus arm to chassis rubber mounting;

i) Up to three 1 mm shim washers may be fitted on the plvot bolt between the radius arm and the mounting outer snubber washer,

ii) Spacer plates may be fitted between the radius arm mounting and the chassis.



Access to the pivot bolt is restricted on some models by the engine mounting and/or heat shields, such that the mounting rubber spacer plate may be the most convenient means of adjustment. On the V8 model, the proximity of the turbochargers to the mounting, and the associated heat shielding, prompted the introduction of split spacer plates, in conjunction with a tapping plate to which are fitted captive nuts for the two radius arm mounting fixings. This arrangement allows the two bolts to be loosened and the two halves of the spacer plate slid out and replaced by another pair of appropriate thickness. These later parts may be fiied to any earlier Esprit to ease toe-in adjustment.

One piece spacer plated are available in three thicknesses:	**0.9mm**	**C079D4051F**
	1.5mm	A07904051 F
	6.0mm	**B079D4051F**
Split spacer plates are available in thicknesses:	**0.9mm**	**A082D4170F**
	1.6mm	**A082D4171F**
	2.5mm	**A082D4172F**

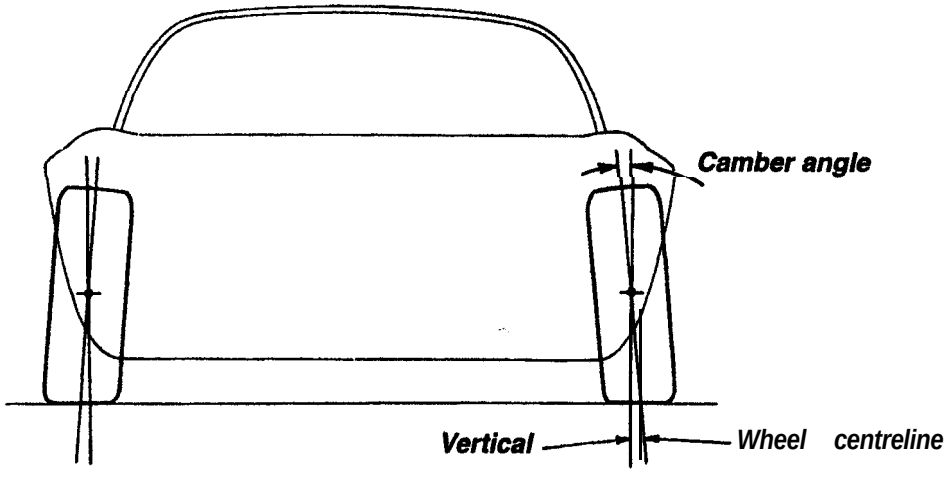
As a rough guide, the addition of lmm shim thickness at the radius arm mounting will reduce toe-in by approximately **0.35mm** (0.04"; **0°3').**

On reassembly, note the following:

i) A large diameter snubber washer must always be fitted directly against each side of the rubber mounting.
ii) The channel section reinforcing plate must be fitted against the outer face of the mounting.
iii) After adjustments have been made, ensure that the thread of all fixing bolts protrudes fully through the nylon self locking section of the nut. If necessary using a longer fixing.
iv) Torque tighten the radius arm pivot bolt only with the car at normal ride height: 55 • 60 Nm. Tighten the mounting fixings to 32 • 34 Nm.

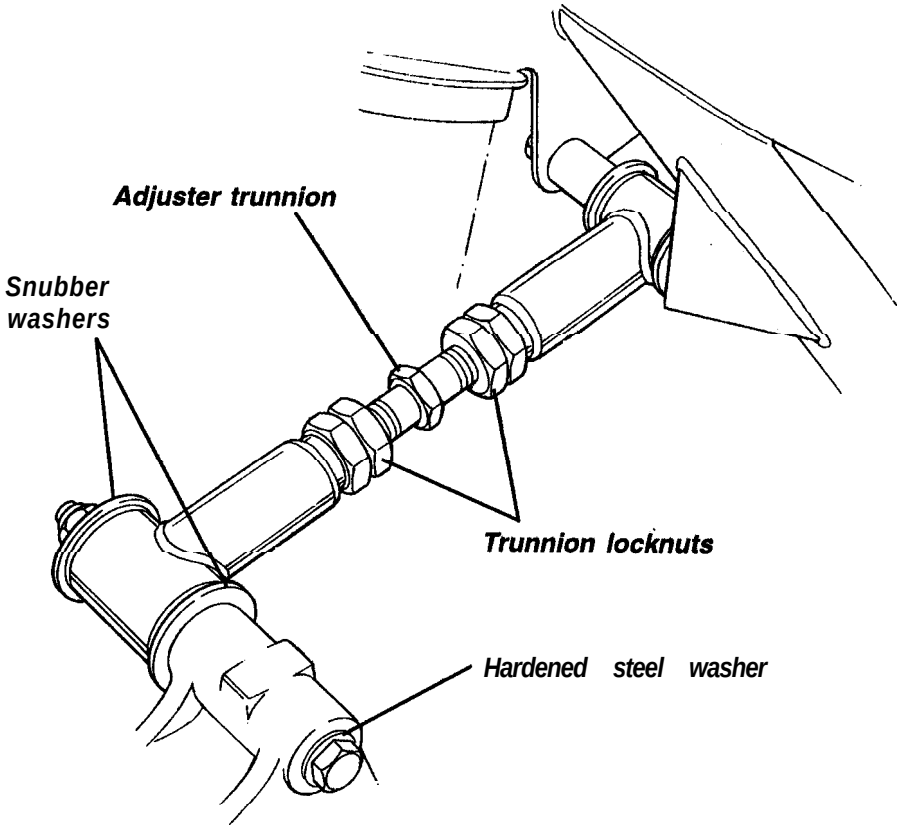
Camber

Camber is the angle from vertical of the wheel when viewed from the rear, and is said to be negative when the wheel leans inwards at the top (positive when leaning outwards).



c29

The primary purpose of camber is to achieve the maximum efficiency of the tyre under cornering loads and body roll, with the specification closely allied to a particular **wheel/tyre** combination. The camber angle changes with suspension **travel,** becoming more negative on bump, and should be measured only at the specified ride height. Incorrect camber can result in handling deficiencies and excessive tyre wear.



d29

Adjustment of camber is provided for by an adjustable length top link. A trunnion fitted into the centre of the tubular top link, has a RH thread on one end, and a LH thread on the other, such that turning the trunnion has the effect of lengthening or shortening the link. Locknuts are provided to fix the assembly when the correct setting has been achieved. As a rough guide, a 1° change in camber requires approximately 1½ turns of the trunnion. After adjustment, use two spanners to maintaln alignment of the top link end bushes whilst tightening the trunnion locknuts to 60 Nm.

Note that with the exception of the RH and LH threads, the top link is symmetrical, and may be fitted either way round.

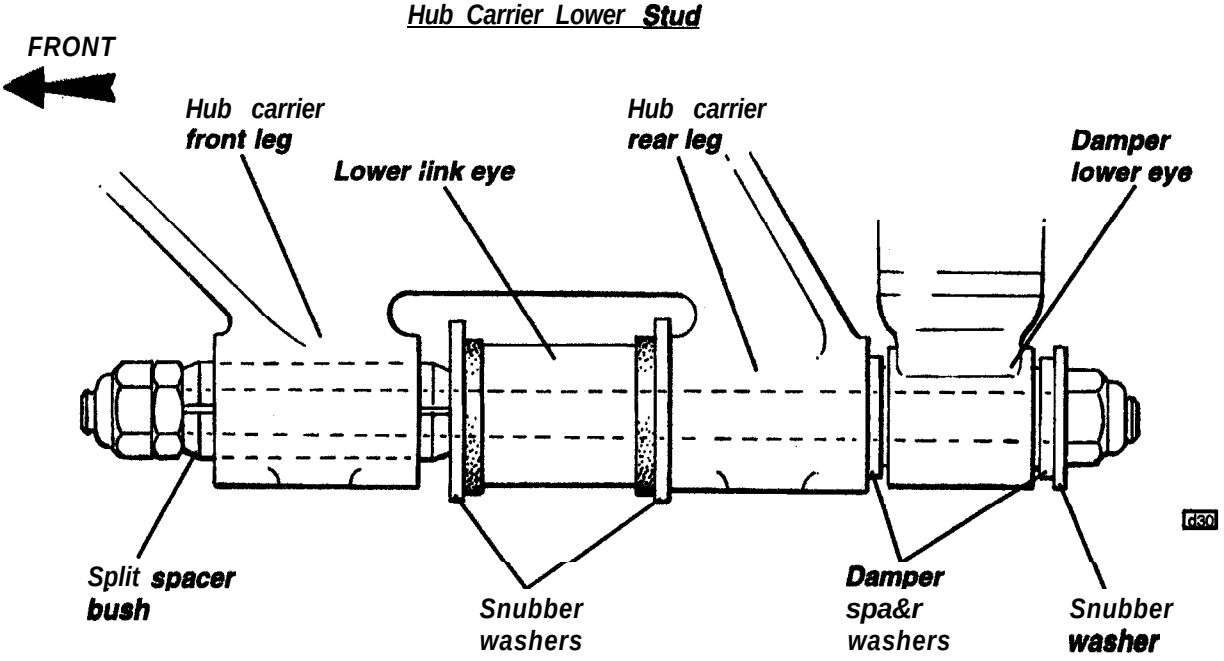
DF.3 - SUSPENSION DISASSEMBLY/ASSEMBLY

CAUTION: The spring top abutment is an integral part of the chassis, such that spring compressors are required before the damper top stem nuts may be released and the spring/damper assembly withdrawn.

The rubber pivot bushes of the upper and lower links are bonded to a steel inner sleeve, but have no outer sleeve, and require the use of a tapered guide tool TOOOT0541 in conjunction with a suitable ***short term*** assembly lubricant, such as P-80 Rubber Lubricant Emulsion, manufactured by IPC and available under Lotus part number A082C6042V.

The upper and lower link pivot bolts, and the radius arm pivot bolt should be left completely loose, or loosened fully before torque tightening only with the vehicle at the specified ride height (see above).

A special hardened steel washer is fitted between the head of the top link pivot bolt and the hub carrier. Withdrawing the hub from the bearing will normally result in damage being caused to the bearing, but this operation should not be required unless the bearing is to be replaced - see DF.4.



- Snubber washers are fitted each side of the inboard and outboard pivot bushes in the top link, and each side of the outboard pivot bush in the lower link. The chassis forms a snubber function at the inboard end of the lower link.
- A split spacer bush is fitted in the rear lower lug of the hub carrier in order to avoid stressing the two lower lugs without the requirement for shimming.
- Ensure that a small diameter spacer washer is fitted at each side of the damper lower eye to allow articulation of the damper on its bush.
- The shanks of all bolts passing through the alloy hub carrier should be coated with a **PBC** type grease or similar anti-seize compound.

DF.4 • REAR HUB BEARINGS

A sealed, double row ball bearing, is pressed onto the spigot of the wheel hub, and is clamped to it by the outboard driveshaft. A flange on the outer race of the bearing is bolted to the hub carrier by six **caphead** fixings. **Removing** the hub from the bearing should not be required unless the bearing is to be replaced, and the withdrawal process will normally result in damage being caused to the beating. The outboard drlveshaft is splined into the hub, and may easily be withdrawn after removal of the **driveshaft/hub** nut.

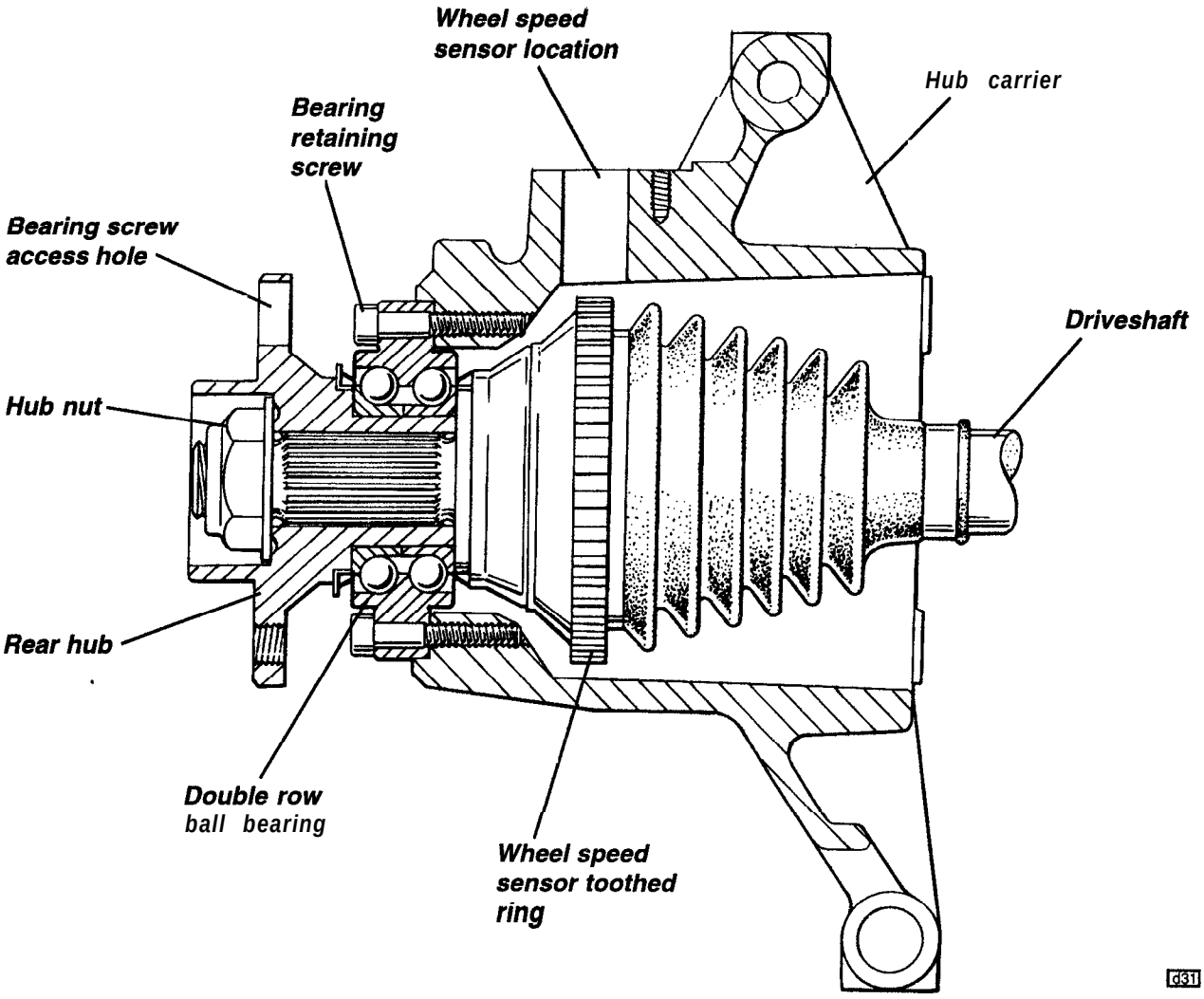
To replace the bearing

1. Remove the rear wheel, and slacken the hub nut before disabling the brakes. Note that both rear hub nuts have a RH thread.

2. Remove the outboard brake pad from the caliper before removing the two countersunk, 'Torx' headed brake disc retaining screws, and withdraw the disc from the hub.

3. Using the access holes provided in the hub flange, remove the six **caphead** screws securing the outer race of the hub bearing to the hub carrier. Remove the hub nut and washer, and withdraw the hub and bearing assembly from the hub carrier and driveshaft. Avoid applying any **'streching'** load to the driveshaft.

4. Using a suitable split collar and hydraulic press, separate the hub from the bearing assembly. Note that the outboard half of the bearing inner race will remain on the hub, and must be withdrawn separately.



5. Press a new bearing (either way round) onto the hub spigot, applying load only to the inner race.

6. Fit the hub onto the driveshaft splines and locate the bearing against the hub carrier counterbore. Fit the six caphead screws via the access holes in the hub flange, and tighten to 31 ▪ 34 Nm.

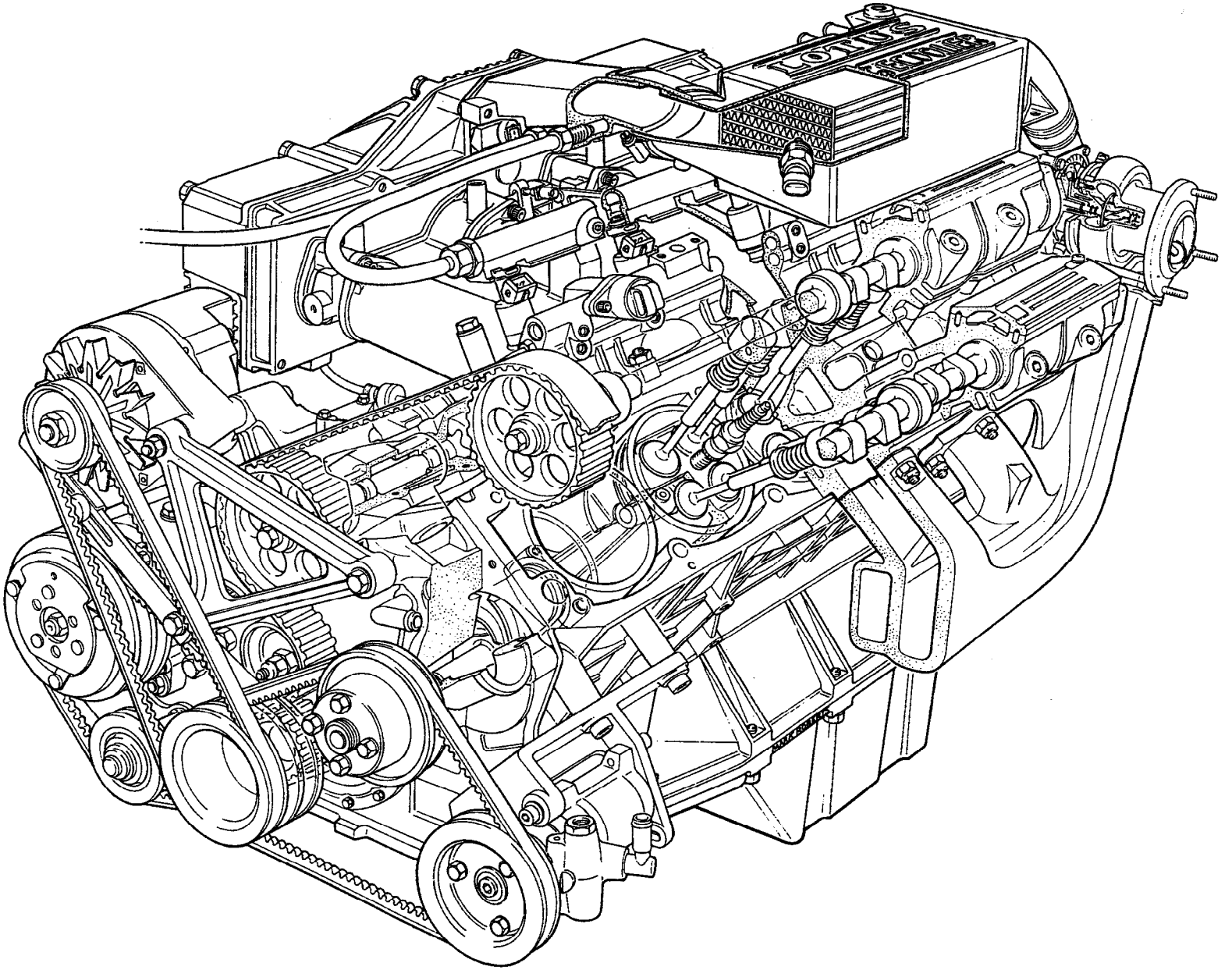
7. Fit the hub nut washer and a new hub nut, and nip tighten.

8. Refit the brake disc and retain with the two countersunk screws. Fit the brake pads, restore brake pad position, and apply the brakes to allow the hub nut to be tightened to 260 ▪ 270 Nm. Refit the roadwheel.

Engine

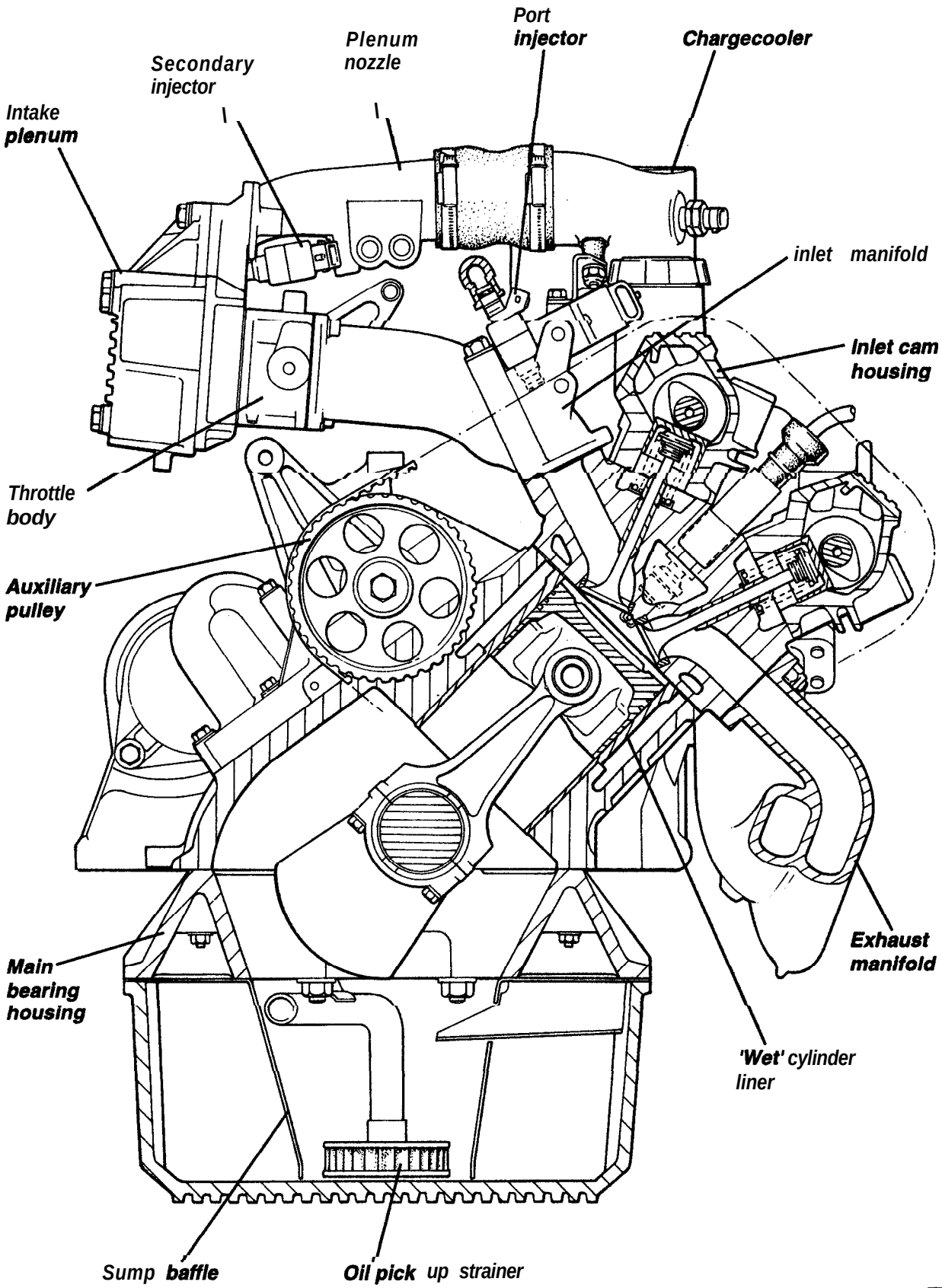
SECTION EF - ESPRIT 4-Cylinder ’93 M.Y. Onwards.

Lotus TvDe 910 Charaecooled 4-Cylinder Enaine



e179

Cross section - Lotus **910/920**



e217

EF.1 • GENERAL DESCRIPTION

The die-cast, all alloy, four cylinder engine is inclined at 45" and is fitted with twin overhead camshafts operating four valves per cylinder in 'pent roof' combustion chambers. The cylinder block uses 'wet' cylinder liners forged from aluminium alloy, with a 'Nikosil' coating applied to the bores. The liners are a push fit into the open deck block and are fitted with forged aluminium alloy, solid skirt pistons, with nickel or chrome plated crowns, and two compression and one oil control ring located above the fully floating gudgeon pin, itself retained by wire circlips. The cylinder block extends to the horizontal centre line of the crankshaft, with the lower halves of the main bearings being contained within a one piece main bearing panel bolted to the bottom of the block. Below this is bolted a die cast aluminium alloy sump.

The cast iron, dynamically balanced crankshaft runs in five steel backed leaded bronze lined main bearings, with end float controlled by thrust washers located in the cylinder block on either side of the rearmost main bearing. A steel flywheel, bolted to the crankshaft rear flange, has an integral starter ring gear machined on its periphery. The I-section forged steel connecting rods have steel backed bronze lined big end bearings, with the bearing caps located by dowels and retained by bolts.

The cylinder head containes two inlet and two exhaust valves per cylinder, at an included angle of 38°, and are actuated directly by the camshafts via inverted bucket tappets and selective 'biscuit' shims. The exhaust valves are sodium filled to assist cooling, and operate in bronze guides, whereas the solid inlet valves use cast iron valve guides. Each valve is closed by dual helical valve springs, and seals against a replaceable sintered steel seat insert in the combustion chamber. A separate camshaft housing for inlet and exhaust camshafts is fitted on the cylinder head with the five journals on each camshaft running directly in the housing, with end float controlled by a selective thrust washer at the rear end.

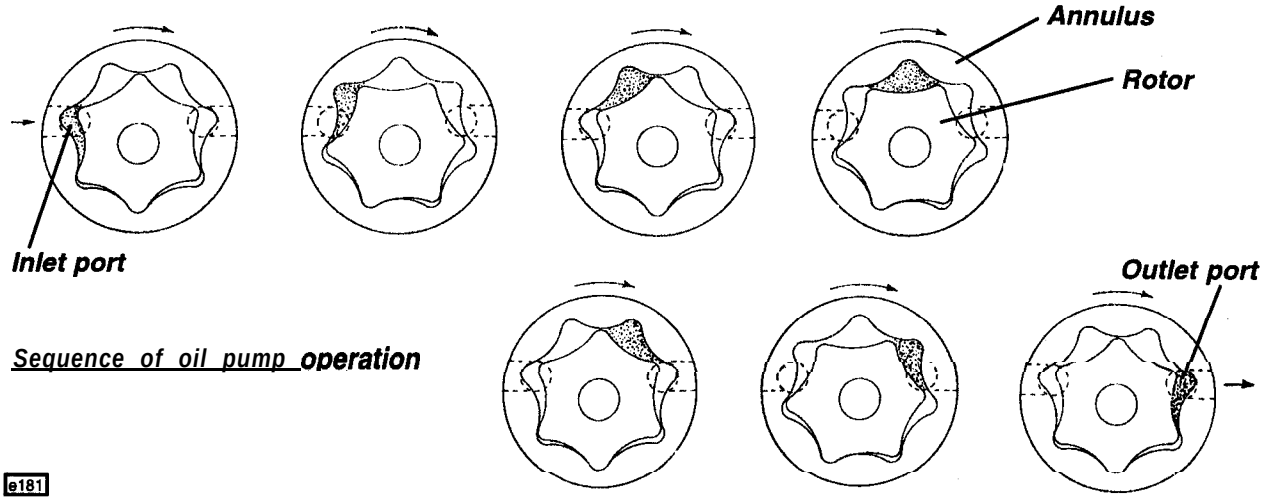
An auxiliary shaft is mounted on the right hand side of the crankcase in a separate auxiliary housing onto the rear of which is fitted a trochoid type oil pump, and a flexible impeller type chargecooler water pump. Both camshafts and the auxiliary shaft are driven from the front end of the crankshaft by a single toothed rubber belt, provided with a manually adjusted eccentric belt tensioner.

EF.2 • LUBRICATION SYSTEM

General

The wet sump lubrication system uses a trochoid type oil pump mounted on the rear of the auxiliary housing on the right hand side of the cylinder block. The pump is driven by the auxiliary shaft which is itself driven via toothed pulley from the camshaft drive belt.

Oil is stored in a cast aluminium sump fitted with sheet steel baffles, and is drawn through a gauze screen, up a pick-up pipe into the auxiliary housing, and into the inlet side of the oil pump. The pump uses a 6-lobe rotor keyed to the auxiliary shaft, and turning within a 7-lobe annulus housed eccentrically in the pump body. The space between the rotor tips and annulus expands and contracts as the components rotate, causing a depression at the pump inlet port, and pressurising the oil at the pump outlet, where a spring plunger type pressure relief valve incorporated into the body of the pump, bleeds off excessive pressure back to the inlet side of the pump.



Sequence of oil pump operation

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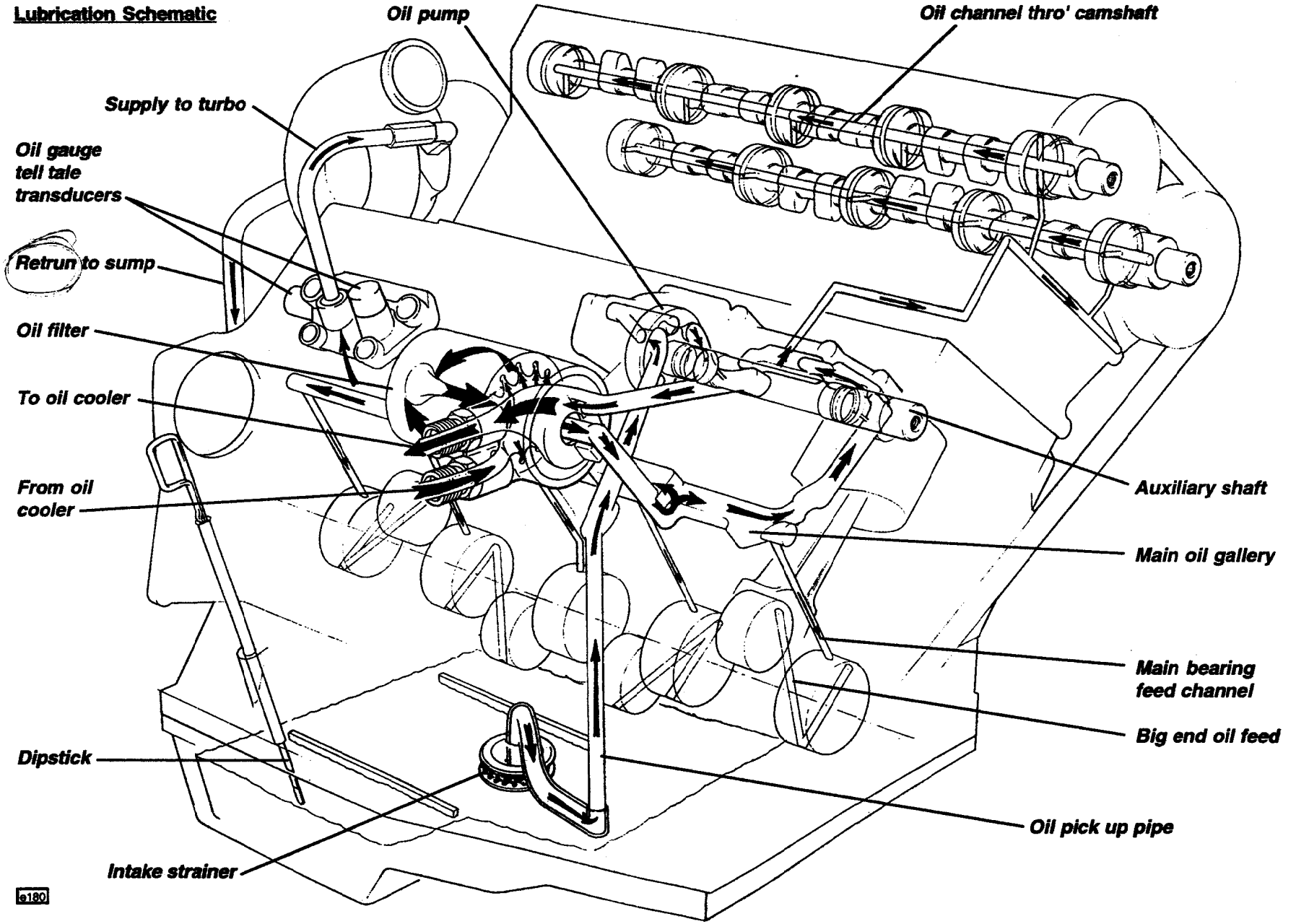
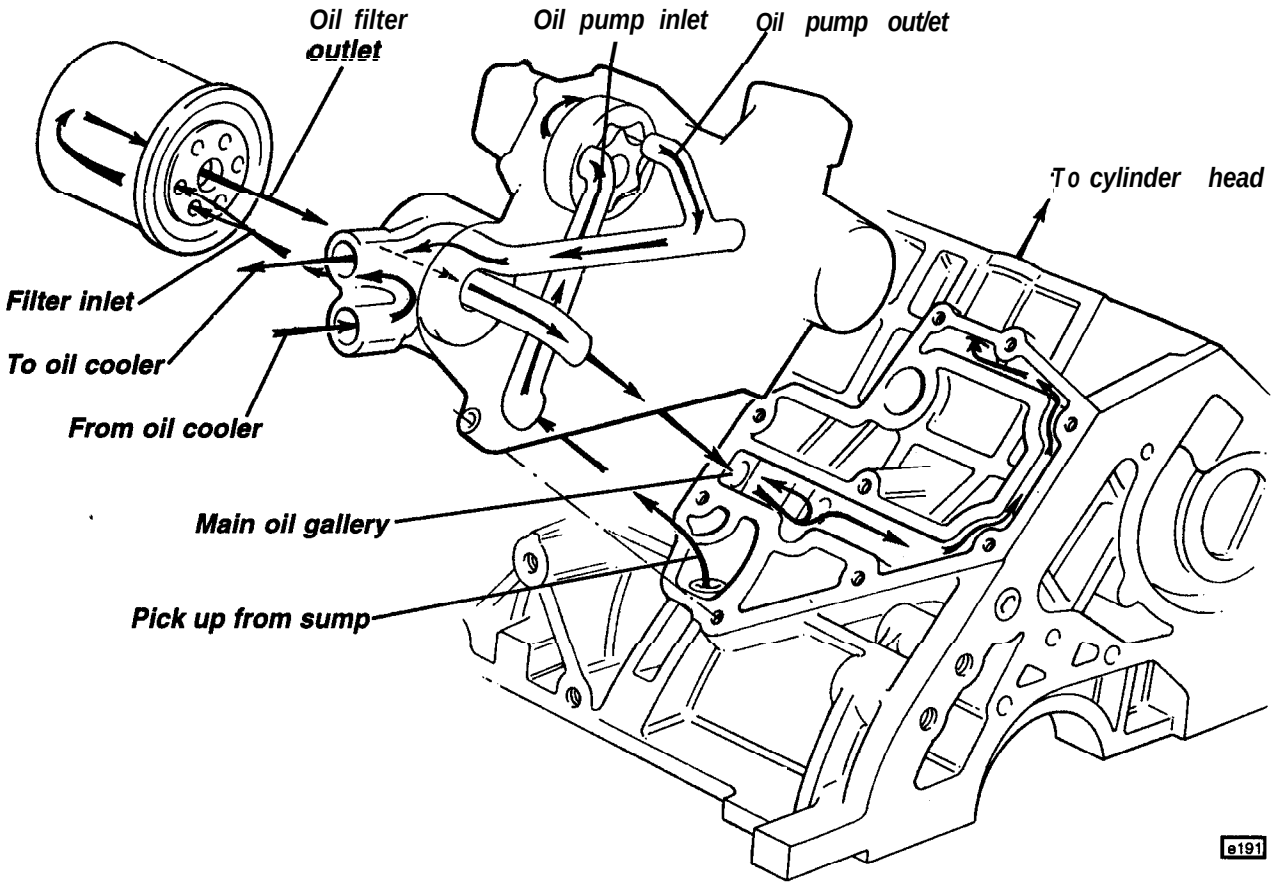
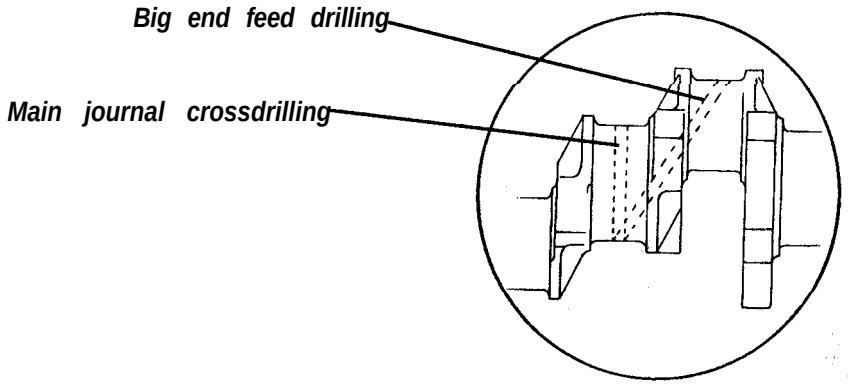
Lubrication Schematic

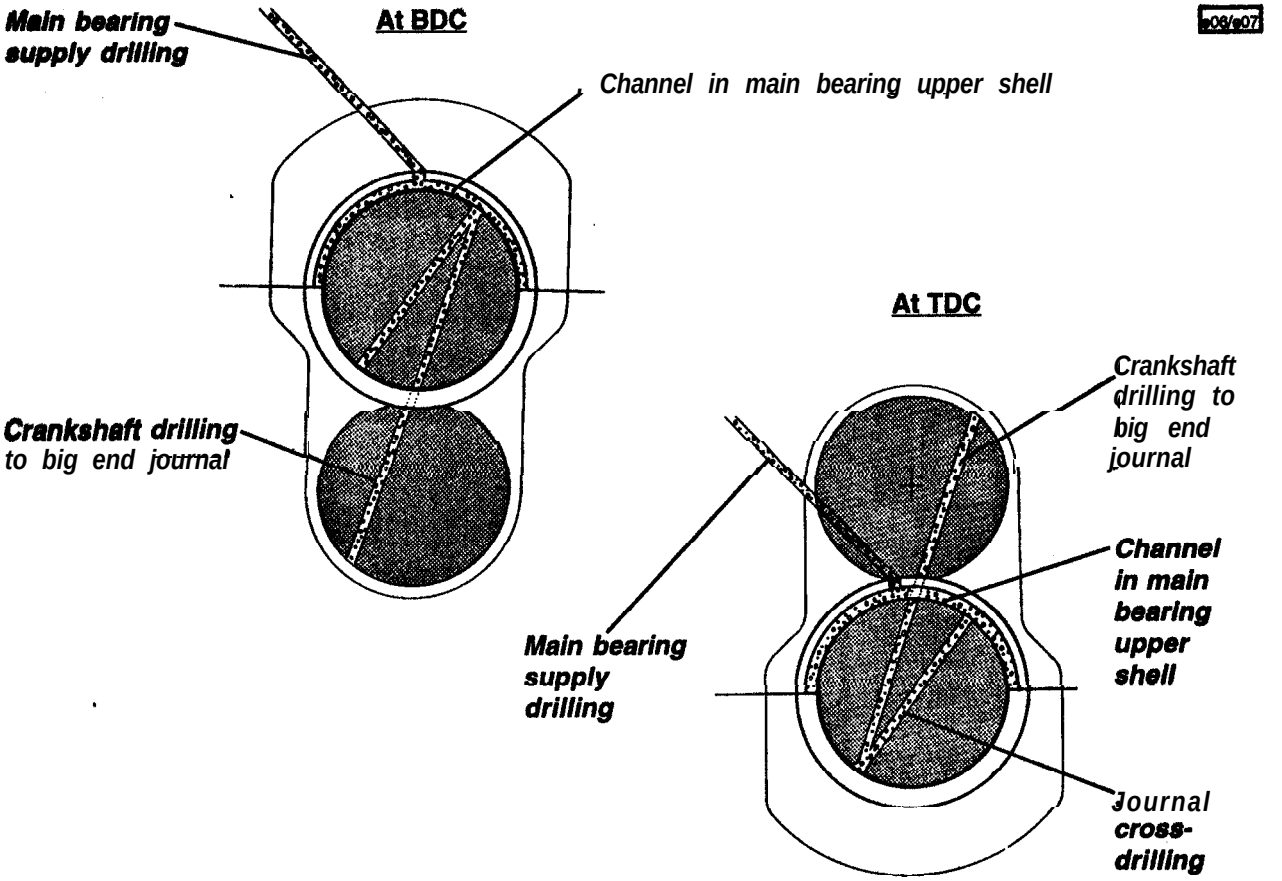


Pressurised oil then flows through a duct in the auxiliary housing to the oil cooler adaptor which diverts ail the oil flow down flexible hoses to a pair of oil coolers mounted one each side of the main radiator duct beneath the nose of the car. Oil returning from the cooler flows via the oil cooler adaptor to the full flow canister type oil filter mounted on the rear of the auxiliary housing. The oil filter, being horizontally mounted incorporates an anti-fiowback valve to prevent oil draining from the filter when the engine is stopped.



From the central outlet of the filter, oil flows into the oil gallery which runs along the right hand side of the cylinder block. Five driiiings connect this gallery with the top of each crankshaft main bearing. Crank journals 1,2,4 and 5 are provided with driiiings through to their adjacent crankpins for big end lubrication, and are also drilled diametrically across the journal. These journals are fitted with main bearing shells having a hole, to admit the oil supply from the block drilling, and a groove which acts as an oil supply channel to one end of the journal cross-drilling, in order to maintain a continuous oil supply to the big end bearing. The journal cross-drilling allows the lower main bearing shells to be plain (rather than grooved) for greater load capacity. The centre main bearing, since it does not feed a big end bearing, has an upper shell which has a hole but no groove.





The connecting rods have a small scallop on each side at the top of the big end eye to provide an oil spray to the underside of the piston to aid piston crown cooling and lubrication of the little end and cylinder wails.

At the rear of the oil gallery, a separate cover provides take offs for the oil pressure gauge transducer, and the turbocharger oil feed hose. An armoured flexible hose supplies oil to the turbocharger bearing housing, from the opposite side of which the oil drains via a larger bore armoured hose back into the left hand side of the sump.

The front end of the oil gallery is extended by a passageway contained by the auxiliary housing, upwards and rearwards, with a drilling supplying oil to the auxiliary shaft front bearing. The auxiliary shaft rear bearing is supplied via a drilling from the oil pump outlet. From the front end of the oil gallery, oil is fed via driiiings from the block into the cylinder head where it emerges at each camshaft front bearing. Each camshaft is bored throughout its length to distribute oil to each of its journals, after which the now unpressurised oil, lubricates the cam followers and valve stems on its way, via passageways in the head and block, back to the sump.

Precautions

i) Use only those lubricants listed in section 'O' for the ambient temperature range pertaining.

ii) When rebuilding an engine, use copious amounts of recommended lubricant to ensure adequate lubrication on initial start up.

iii) After rebuild, the engine should be cranked with the ignition disabled until oil pressure is registered on the gauge.

iv) if the engine is not to be used for some time after building, the use of a graphogen grease assembly compound (e.g. 'Cyiesso' - part no A907E6178V) is recommended for the main and big end bearings.

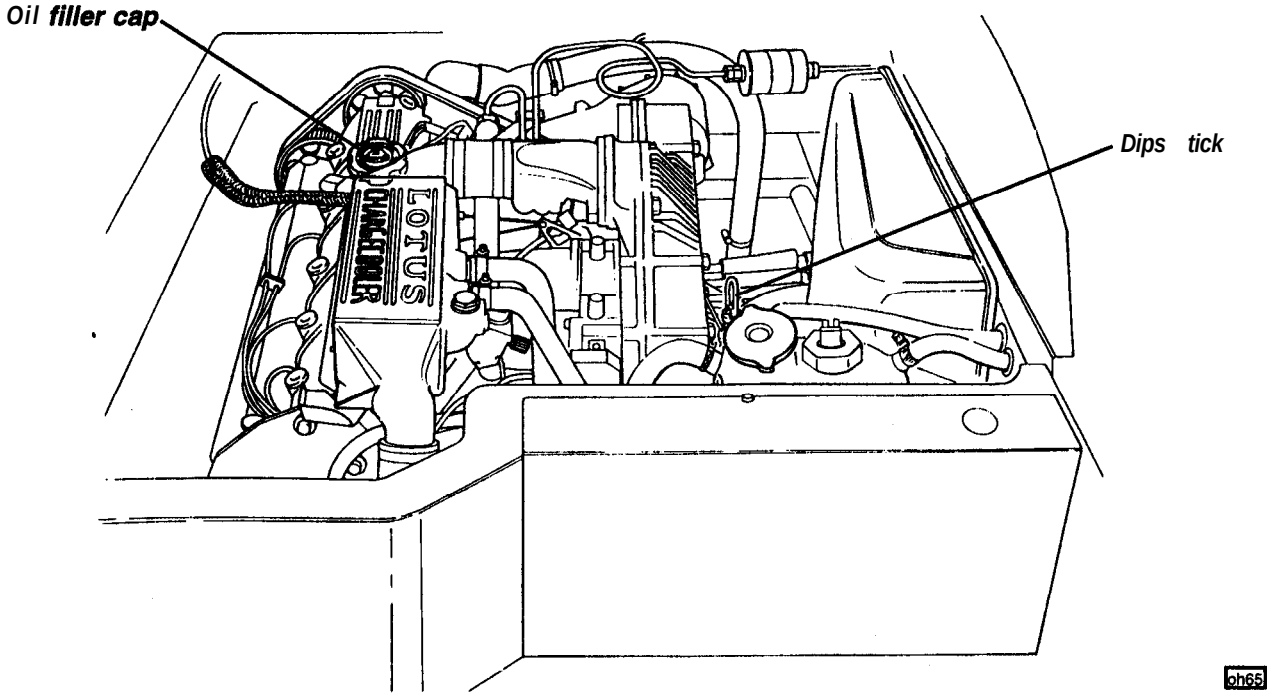
v) Since the oil pump is not of the submerged type, the integrity of the suction pick up side is crucial to oil pump performance, particularly during start up. The nylon olive sealing the pick up pipe into the block should be replaced each time it is disturbed, together with the pick up pipe if heavily 'necked'.

in the event of engine failure involving the possibility of debris entering the lubrication system, it is essential that the following precautions are taken before re-assembly:

a) Clean and inspect all engine oilways in block, crankshaft, cylinder head etc.
b) Clean and inspect oil pump, pick up pipe and strainer and auxiliary housing.
c) Thoroughly flush out oil cooler hoses.
d) In view of the difficulty of ensuring no debris is retained in the oil cooler, this item should always be replaced in such circumstances.

Oil Level Checking

Ensure that the car is parked on a level surface and that a few minutes have elapsed since stopping the engine to allow oil to drain back into the sump. If the engine is stopped before reaching normal running temperature, the oil will not drain back to the sump so readily, and the dipstick will display an artificially low reading.



Dipstick: The dipstick is located at the right hand rear of the engine, adjacent to the intake plenum chamber. Withdraw the dipstick, and wipe with a paper towel. Replace the dipstick, pressing firmly to make sure it is fully seated, and withdraw again to inspect the oil level. The correct level is to the upper mark on the dipstick.
Topping Up: If topping up is necessary, remove the oil filler cap at the front of the inlet cam cover, and add a suitable quantity of a recommended engine oil (see 'Recommended Lubricants'). Take care not to spill any oil onto the drive belts at the front of the engine, or onto any electrical components; use a funnel if necessary. The difference between high and low dipstick marks is equivalent to 0.85 litre (1.5 imp.pt; 0.9 US qt). Allow several minutes for the oil to drain through to the sump before rechecking the oil level. Do NOT overfill, or the oil will become aerated and its lubricating properties degraded. Refit the filler cap and turn clockwise until the ratchet mechanism is heard to 'click' indicating that the cap is fully tightened.

Oil Changing Procedure

Used Engine Oil

WARNING:

- Prolonged and repeated contact may cause serious skin disorders, including dermatitis and cancer. Avoid contact with skin as far as possible and wash thoroughly after any contact.
- Keep out of reach of children.

PROTECT THE ENVIRONMENT It is illegal to pollute drains, water courses and soil. Use authorised waste collection facilities, including civic amenity sites and garages providing facilities for disposal of used oil and used oil filters. If in doubt, contact your local authority for advice on disposal.

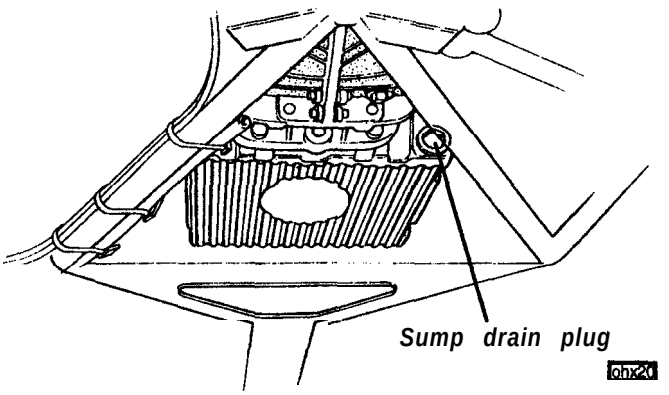
'Severe Service' Conditions

Certain operating conditions can cause rapid degradation of the oil quality, either by the accumulation of dirt particles, or by the absorption of water from condensation. If either of the 'severe service' conditions described below apply, It is recommended that the oil and filter be changed twice as frequently as is listed in the Maintenance Schedule.

- Driving in dusty areas (e.g. on unmetalled roads). Change the oil and filter as soon as possible after driving in a dust storm.
- Stop/start city driving with frequent short trips where the engine rarely warms up thoroughly (especially in cold weather); and/or frequent or prolonged idling.

The sump plug is located on the right hand rear face of the sump and should be removed to drain the sump immediately after a run when the oil is warm and the impurities are held in suspension. Allow to drain thoroughly, clean the drain plug, replace the sealing washer if necessary, and refit securely.

Renew the oil filter (see below). Fill with a recommended lubricant to the top mark on the dipstick. Run the engine briefly and recheck the level.



Sump drain plug

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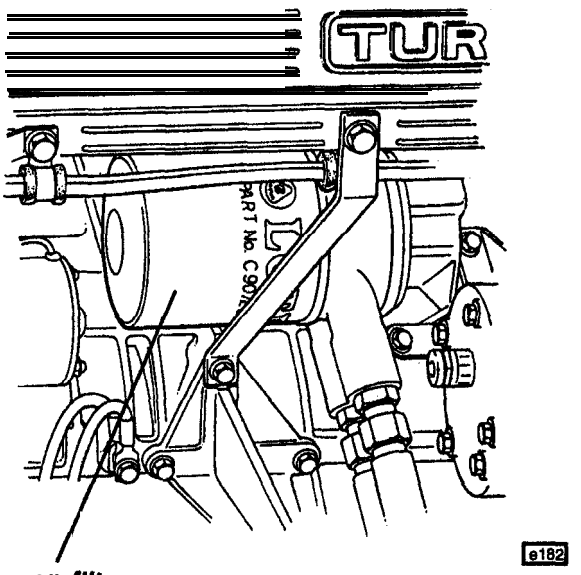
Oil filter

The oil filter should be renewed at intervals specified in the Maintenance Schedule - see Section 'OF'.

To remove the canister type filter, turn in a counter-clockwise direction, using an oil filter wrench if necessary. Discard the filter after removal. Before fitting a new filter, clean the mating faces on both the new filter and the oil cooler adaptor and smear both faces with clean oil. Add a small amount of clean engine oil into the filter and screw on by hand just sufficiently to make a seal, usually 2/3 to 3/4 of a turn after the faces have made contact. Ensure that the oil cooler adaptor is not disturbed during this operation.

Start the engine and check for oil leaks, tightening the filter further if necessary. Stop the engine and recheck the oil level.



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Oil filter

EF.3 - ENGINE REMOVAL/REPLACEMENT

WARNING: Pressure is maintained in the fuel lines after the engine is switched off in order to reduce the possibility of vapour pocket formation, and to speed engine restart. Before disconnecting a fuel line, carry out the following fuel pressure relief procedure:

i) If the engine is operative; disconnect the fuel pump electrical plug, start the engine, and run until starved. Crank for a further 10 seconds to reduce any remaining fuel pressure.

ii) If the engine is inoperative; connect fuel pressure gauge TOOOT0889 to the Shraeder type valve fitted on the pressure regulator valve. Ensure that the gauge bleed tap is closed, and use a cloth to shield from any fuel spray as the connection is made. After connection, position the bleed line in a suitable receptacle and open the bleed tap to relieve the system of fuel pressure.

iii) The fuel line may now be opened using an absorbent cloth for protection from any residual fuel pressure, and to absorb the small amount of fuel draining from the line. Dispose of the cloth safely.

The engine is removed complete with the transmission assembly from above:

1. Remove the tailgate panel for maximum access.

2. Depressurise the fuel system (see above), disconnect the battery, and drain cooling system.

3. From the engine bay relay box/rear wall; label and disconnect the vacuum hoses to the solenoid valves, and unplug the harness connectors. On cars with an electric vacuum pump, disconnect the vacuum pipe. Release the header tank hoses and level sensor wires. Remove the luggage compartment floor with coolant header tank.

4. Remove air cleaner cover from RH engine bay wall, and the ignition coil pack from the chassis bracket.

5. Disconnect the following:
   - Fuel feed and return pipes;
     Throttle cable;
   - Coolant hoses to water pump, and heater feed and return hoses; Remove the water pipe from the RH front of the engine bay.
   - Vacuum pipes for engine management, heater system, boost gauge;
   - Engine harness.

6. Label and disconnect the pipes and harness to the evaporative loss canister, and remove the canister.

7. Remove the oil filter and sandwich plate complete with oil cooler hoses.

6. Drain the power steering oil, and disconnect the feed and return hoses from the PAS pump.

9. Release the a.c. compressor without disturbing the hoses, and secure clear of the engine.

10. Disconnect the gearchange cables from the transmission and engine, and release the reverse light switch wires.

11. Remove the exhaust system and support cradle.

12. Remove the clutch slave cylinder from the clutch housing, and secure aside.

13. Remove the chassis rear crossmember.

14. Using punch set TOOOT0678, drive out the two concentric roll pins securing each drive shaft inboard joint to the transmission output shaft and discard the pins.

15. Taking note of the positions of the bolt head washer and bushing snubber washers, remove the stud securing the hub carrier to the top link. Loosen the hub carrier lower stud, and pull the hub outwards sufficiently to draw the drive shaft off the output shaft splines. Repeat for the opposite side.

16. Fit slings around the engine/transmission assembly, and support the weight using suitable lifting equipment. Remove the two engine mounting legs from the rubber mountings and from the engine, and release the transmission mounting legs from their rubber mounts. Lift the power unit clear of the car.

17. If necessary, remove the transmission from the engine.

To Refii

Replacement is a reversal of the removal procedure, but the following points should be observed:

1. Note that the LH engine mounting rubber has a higher temperature resistance than the RH mounting, the two being colour coded pink and blue respectively. Ensure correct fitment.

2. Torque tighten engine/transmission mountings to chassis to 34 Nm (25 lbf.ft) and engine mounting legs to rubber mountings to 55 - 60 Nm (40 - 45 lbf.ft). Ensure engine earth strap is connected.

3. Refit driveshafts using tool TOOOT0678 to fit new roll pins to connect the shafts to the transmission.

4. Torque tighten chassis rear crossmember to 41 - 47 Nm (30 - 35 lbf.ft).

5. Refill cooling system.

6. If necessary, refill engine, transmission and power steering systems with recommended lubricants (see Section OF).

7. Check gear linkage adjustment (see Section FG)

8. Check security of all fuel pipe connections.

9. Run engine and check for oil, water, fuel, vacuum and exhaust leaks, rectifying where necessary.

10. Road test car and check operation of all ancillaries, brakes, instruments etc.

EC.4. COMPRESSION CHECK

1. Warm the engine to its normal operating temperature. Switch 'off' engine and remove all sparking plugs. Note: before removing spark plugs ensure that wells are free from any foreign matter. Set throttles to fully open position.

2. Using proprietary compression testing equipment, place the gauge in a convenient position to be observed and insert the conical-ended rubber tube in the No. 1 sparking plug orifice. The normal compression pressure with an engine that has been 'run-in' correctly is given in TECHNICAL DATA.
At altitudes above sea-level, proportionally lower pressures will be obtained. Compression is checked with the starter motor turning the engine at approximately 200 r.p.m. Battery and starter motor must of course be in good condition.

3. Test the remaining cylinders in a similar manner.

4. Replace sparking plugs and re-connect the sparking plug leads.

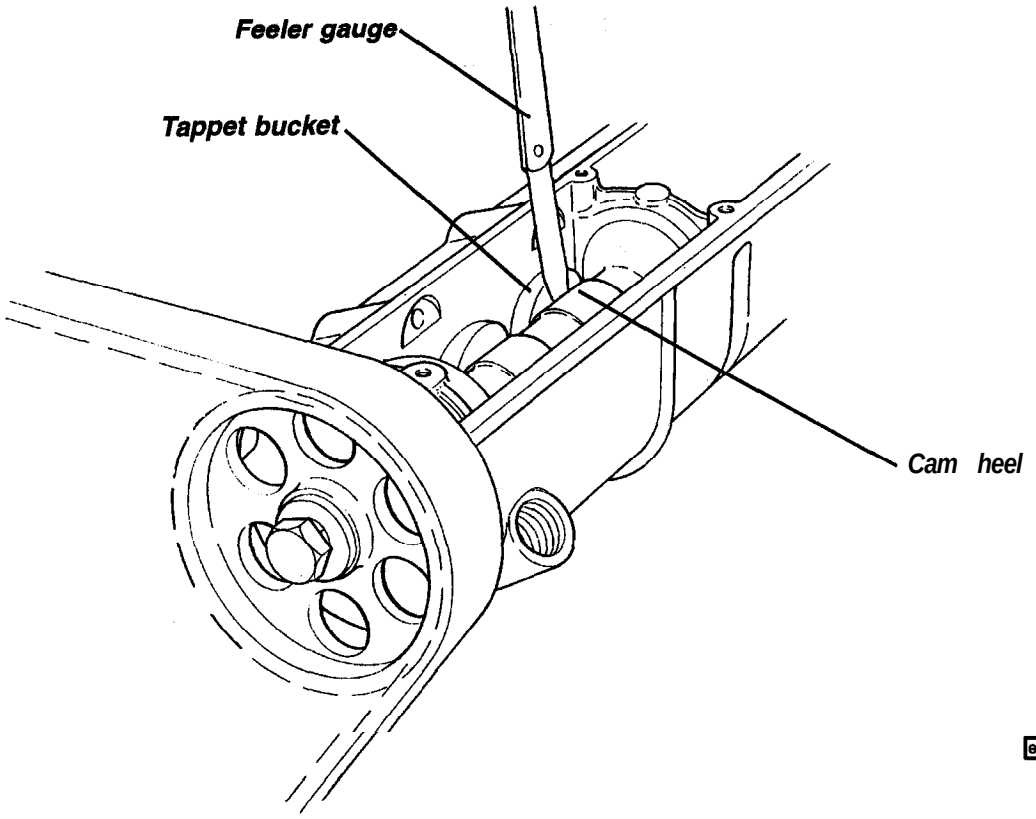
EF.5 - VALVE CLEARANCES, CAMSHAFTS AND CAM HOUSINGS

Valve clearances should be checked only when the engine is COLD. The clearances are controlled by 'biscuit' shims between the top of the valve stems and the underside of the bucket tappets such that changing a shim necessitates the removal of the cam housings complete with camshafts and tappets.

1. Remove the chargecooler for access to the inlet cam cover, and release the throttle cable abutment. Release the three socket head screws securing each cam cover, and remove.

2. Turn the engine until the heel of the cam is against the cam follower concerned, and using a feeler gauge, determine the clearance between cam and follower.

3. Repeat for all 16 valves keeping careful note, and numbering valves from 1 to 8 from front to back for both inlet and exhaust.
Specification - inlet 0.13 - 0.18 mm (0.005 - 0.007 in)
- exhaust 0.25 - 0.31 mm (0.010 - 0.012 in)
For each valve, record the correction needed to bring the clearance to mid specification.



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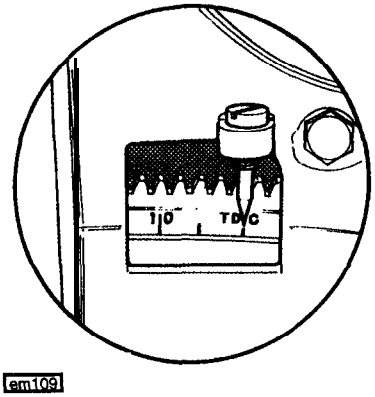
4. Turn the engine to No.1 (firing) TDC using the timing marks and pointer on the flywheel rim and clutch housing, with the cam pulley timing marks facing towards each other. The position of the auxiliary pulley is not relevent.

Flywheel timing marks



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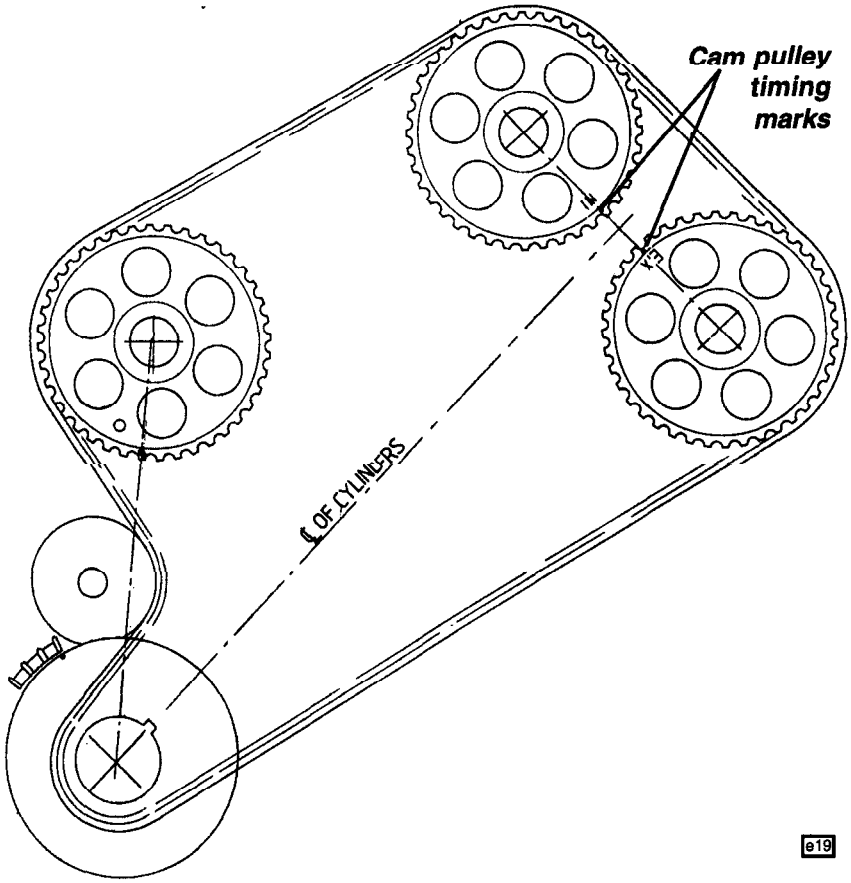

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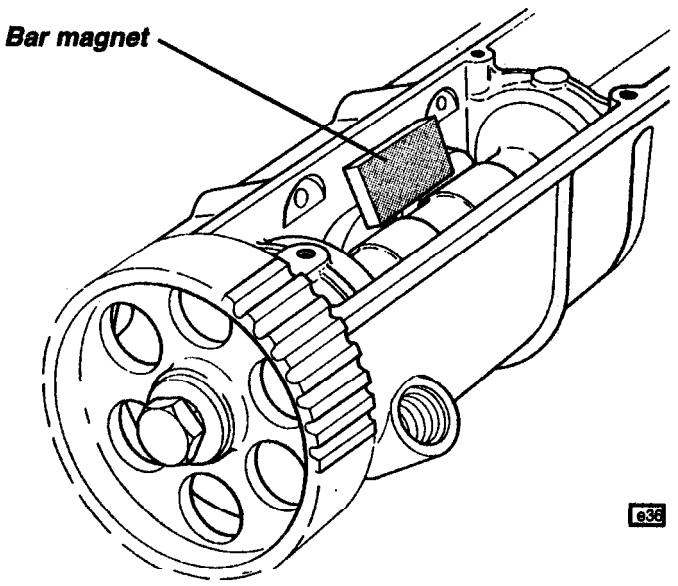
Timina mark colour

Inlet: *Red (110° MOP)*
Exhaust:
- *910* *Blue (100° MOP)*
- *920* Green (104" *MOP)*

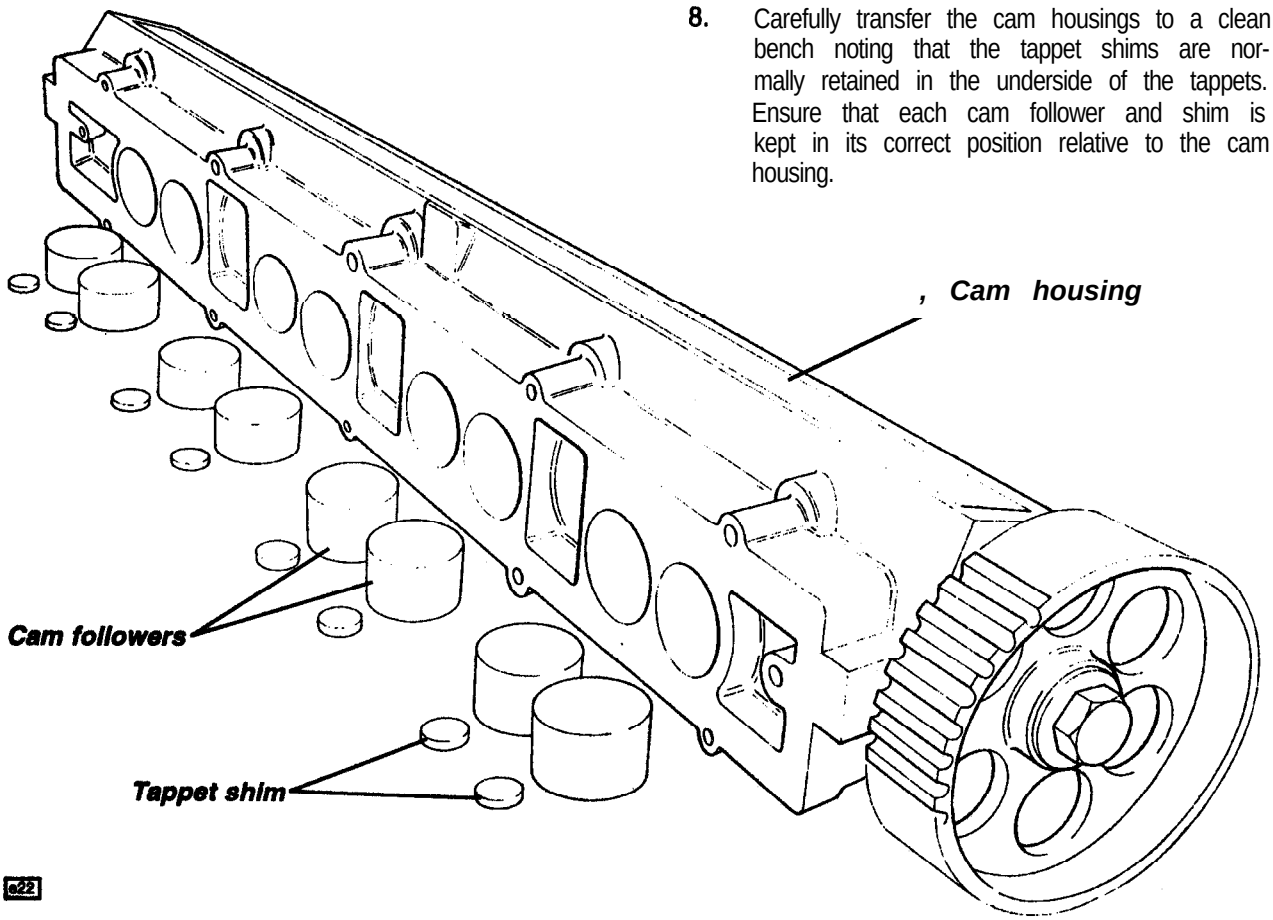
5. Release timing belt eccentric belt tensioner lock nut, slacken belt tension and slide belt off both camshaft pulleys.

6. Remove the heatshields and chargecooler support bracket from the rear of the cam housings taking careful note of the spacer washer assembly sequence.

7. Using an MI2 hexagonal key, remove the 5 access plugs on each cam housing to gain access to the 8 Torx bolts and 2 nuts and washers securing each cam housing to the head. Gradually release the 10 fixings on each housing working diagonally inwards from the outside, using an EI0 'Torx' socket (Lotus part no. TOOOT0443) on the bolts. Take precautions as necessary to prevent fixings being dropped down the inside front of the cam housing.
Before lifting off the cam housings, insert small bar magnets across pairs of cam followers as shown, or take other precautions as necessary to ensure that the followers are retained in the housings. Note: Magnets should be used only for removal of the housings, not for replacement, otherwise the location of the shims could be disturbed.

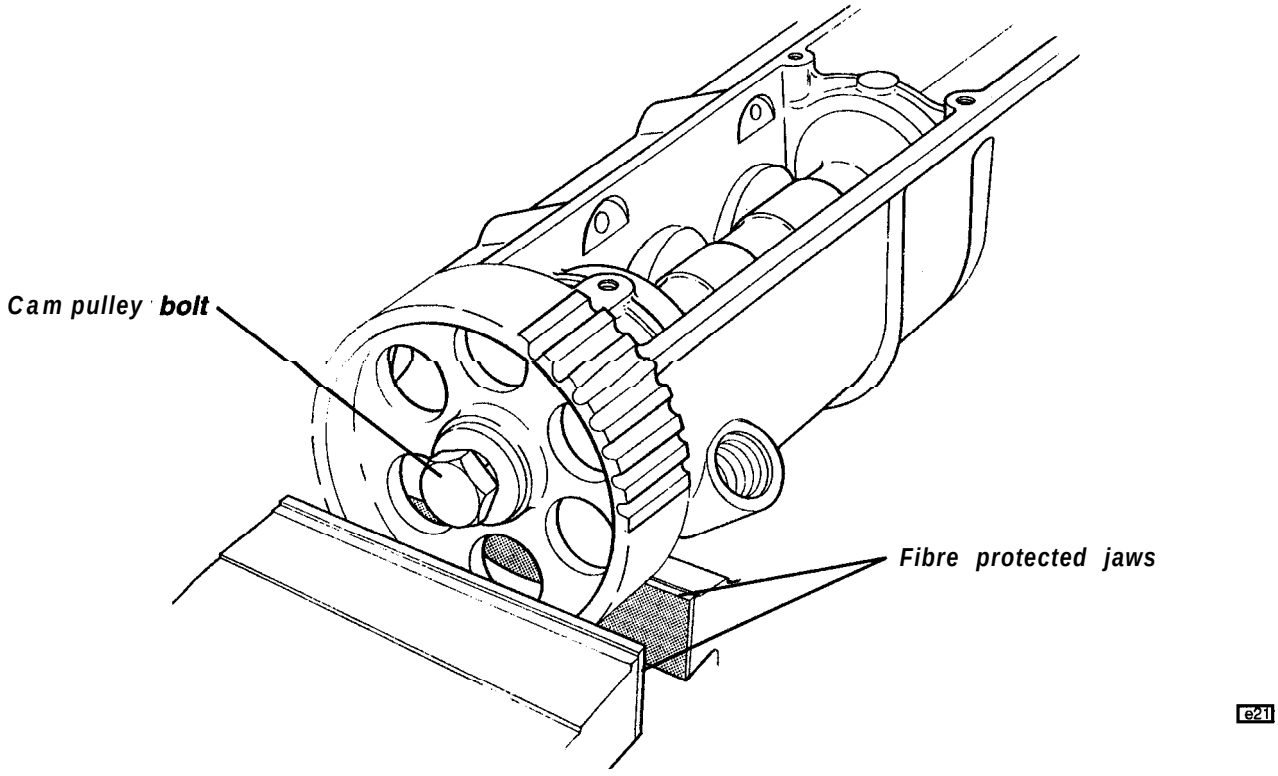


8. Carefully transfer the cam housings to a clean bench noting that the tappet shims are normally retained in the underside of the tappets. Ensure that each cam follower and shim is kept in its correct position relative to the cam housing.



9. Measure the thickness of each shim and by reference to the measurements recorded in step 3, note the new shim thickness required (a thicker shim reduces valve clearance). If correcting valve clearances only, proceed to step 17.

10. To remove a camshaft: Clamp the camshaft pulley in a vice having fibre protected jaws and provide support for the cam housing. Remove the cam housing rear cover with 'O' ring, and release and remove the thrust washer retaining bolt, spring washer and thrust washer. Remove the camshaft pulley bolt and washers and withdraw the camshaft and housing from the pulley.



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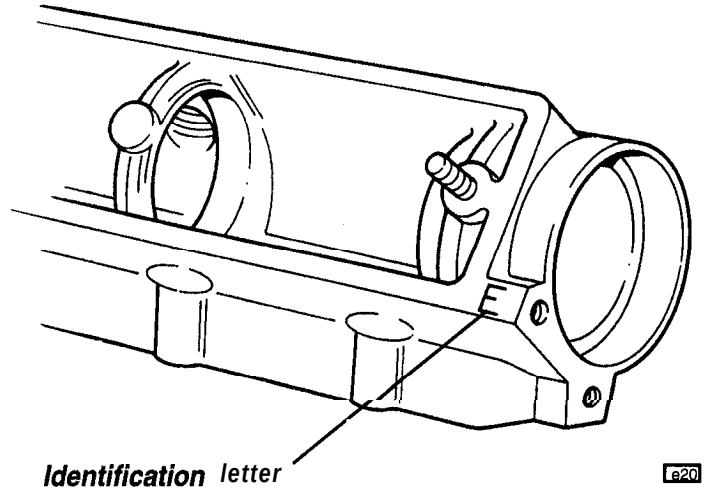
11. From the rear of the housing, push out the camshaft and front oil seal.

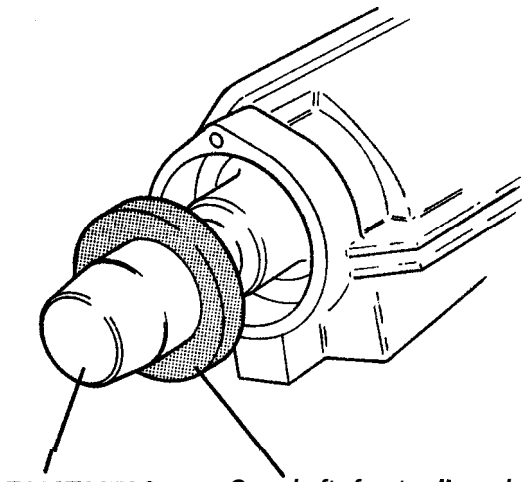
12. To refit camshaft: First check that the correct cam housing is selected. The position of the oil drain holes differs on inlet and exhaust housing, and each is identified by a letter 'I' (inlet) or 'E' (exhaust) stamped on the front of the housing adjacent to the cam cover face.
Note that the cam housings for 920 type 2 litre engines must have clearance pockets in the underside to accommodate the standard length cylinder head studs. Cam housings made prior to the introduction of the 920 engine were not so machined.

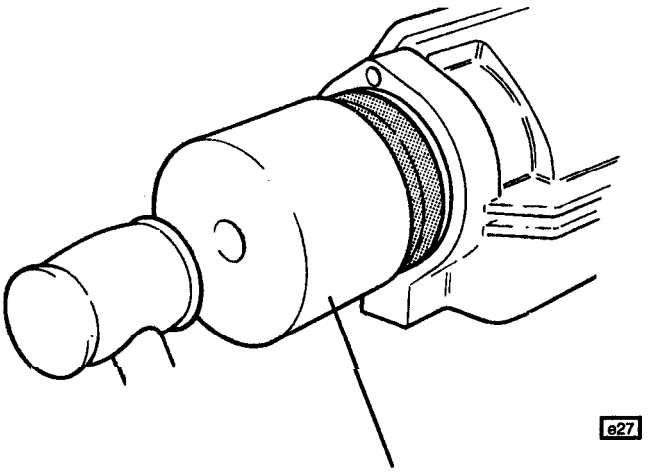


e20

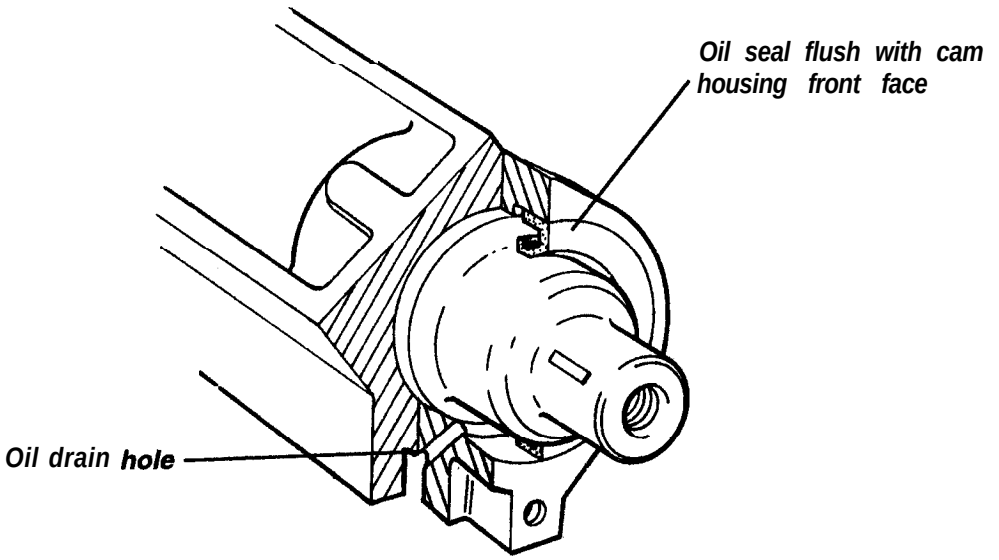
13. Smear a little graphite grease on the bearing surfaces of the cam housing, or coat with clean engine oil, and insert camshaft into housing from front.

14. Fit camshaft front oil seal using tool T000T0072A to locate seal and protect lip, and tool TOOOTOOlOA to press into housing.



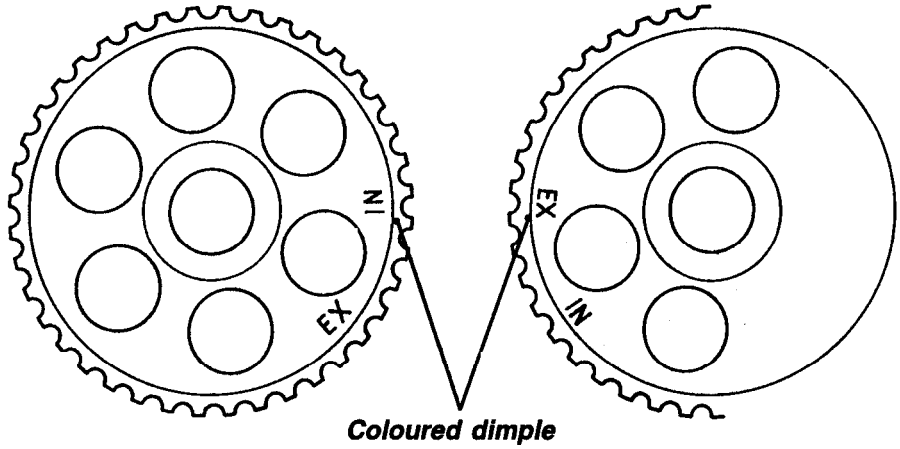


CAUTION The seal is fitted flush with the front face of the housing - if pressed in fully to the shoulder inside the housing, the oil drain hole would be blocked.



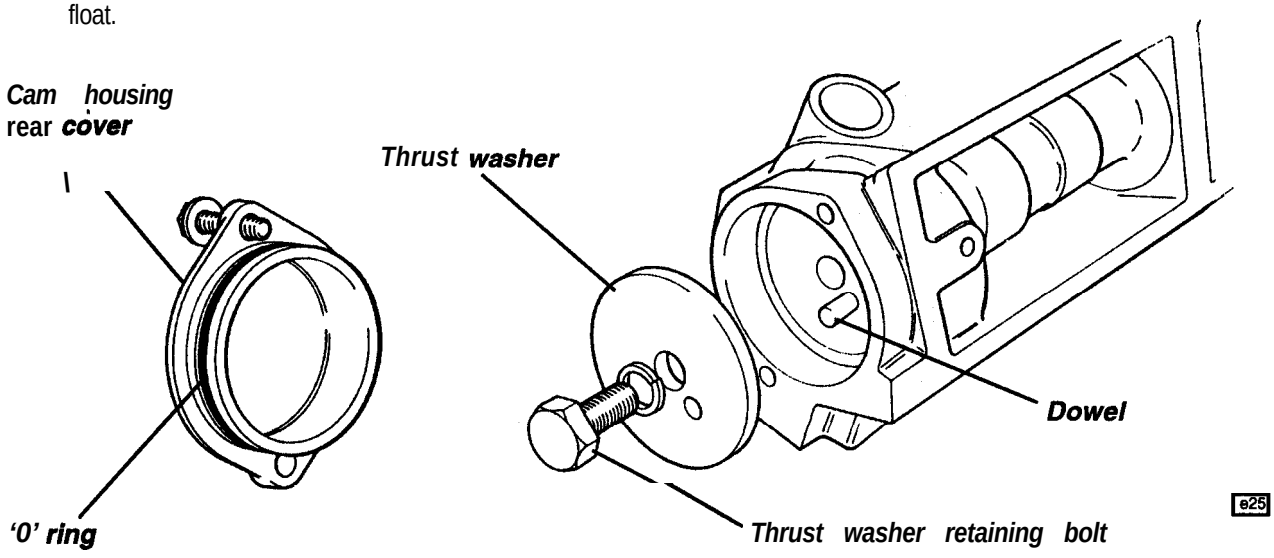
15. Check that the oilway blanking grub screw is fitted into the front end of the camshaft and that the woodruff key is inserted before fitting the camshaft pulley.
Check section TDI for correct specification of inlet and exhaust pulleys (dimple colour).

CAUTION Ensure each pulley is fitted onto the camshaft the correct *way* round. A coloured timing dimple is provided on the rim of each side of the pulley. On one side the dimple is adjacent to the letters 'IN' cast on the pulley, and on the other side the dimple is adjacent to the letters 'EX'. On the inlet camshaft, the pulley should be fitted with the dimple adjacent to 'IN' facing forward. On the exhaust camshaft the dimple adjacent to 'EX' should face forward. See diagram.
Fit the thick flat washer, spring washer and retaining bolt and torque tighten the pulley bolt to 35 Nm (25 lbf.ft.) with the pulley clamped in the fibre protected jaws of a vice.



e26

16. At the rear end of the housing, fit the selective thrust washer over the camshaft dowel, and retain with the spring washer and Ml0 setscrew. Torque tighten to 35 Nm (25 lbf.ft). Fit a new '0' ring on the cam housing rear cover, fit cover to housing and tighten fixings. Use a dial gauge to measure camshaft end float.



e25

Specification: 0.03 - 0.20 mm (0.001 - 0.006 in)
If end float is outside spec. replace selective thrust washer with one of appropriate thickness. Washers are available as follows:

4.40 - 4.45 m m (0.173 - 0.175 in) A907E0619Z
4.45 - 4.50 m m (0.175 - 0.177 in) A907E0620Z
4.50 - 4.55 m m (0.177 - 0.179 in) A907E0621Z
4.55 - 4.60 m m (0.179 - 0.181 in) A907E0622Z

17. To refit cam housings: Use a small quantity of graphogen grease to retain each tappet shim to its valve stem. Apply graphogen grease to each cam follower and insert into its bore. NOTE - use only ONE shim to each valve.

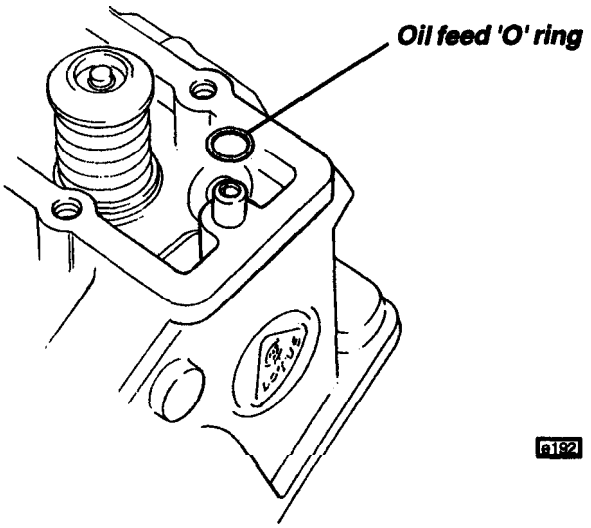
16. Before fitting the cam housings it is ESSENTIAL to turn the crankshaft BACK approximately 90° from its TDC position to bring all pistons to mid-stroke, and so avoid valve/piston damage during assembly.

19. Clean cam housing joint face on housing and cylinder head using a blunt scraper, taking care not to scratch the mating faces. Degrease using methylated spirit or similar. Lay a thin continuous bead of

Permabond Al36 **(A912E6421V)** in the centre of the sealing surface on the cam housing following the outer surface around the stud holes.

NOTE If any work has been carried out, or components replaced which may affect valve clearances a trial assembly should be carried out using a set of equal thickness (thin) shims to establish a base line measurement from which the correct shimming may be established. In this case do not use Permabond on the cam housing joint face, but assemble dry and after calculating the required shim thicknesses add 0.0005 in. to allow for the sealant **thickness** on final assembly.

20. Fit a new **'O'** ring over the oil feed roll pin at the front of the head, and carefully slide the cam housing over the studs onto the head.
Fit the washer and nut onto each stud and fit the 6 'Torx' bolts. Progressively tighten the cam housing fixings diagonally outwards from the centre up to the specified torque loading of **19** • 22 Nm (14 • 16 **lbf.ft.).**



21. Recheck valve clearances and repeat procedure if necessary to correct.

22. Coat camshaft and followers with clean engine oil before fitting cam cover. Locate new dry gasket on cam housing location dowels, fit cam cover with three socket head screws fitted with new '0' rings, and tighten to 4 • 6 Nm (3 • 4 **lbf.ft.).** Refit the chargecooler.

23. Re-align the timing marks on the camshaft pulleys and turn the crankshaft to No.1 (firing) TDC. The position of the auxiliary pulley is not relevent. With the shafts so aligned, refit the toothed belt over the pulleys and re-check timing mark positions.

24. Tension timing belt using a Burroughs Gauge **T000G0025J** (see Section EF.6).

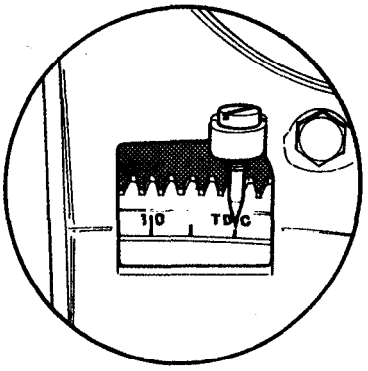
EF.6 - CAMSHAFT DRIVING BELT & TENSIONER

A single High Torque Drive (H.T.D.) glassfibre reinforced synthetic rubber toothed belt is used to transmit drive from **a** toothed pulley on the front of the crankshaft to larger diameter half speed pulleys on the front of each camshaft, and on the auxiliary shaft. A smooth pulley wheel mounted on a ball bearing with an eccentric hub, acts against the back of the belt to provide sufficient wrap around the crank pulley and enable adjustment of belt tension to be made.

It is most important that the condition of the cam belt is carefully inspected, and its tension checked as specified in the Service Schedule, and that the belt is renewed every 36,000 miles (60,000 km). Always use the specified Burroughs Gauge (see below) to measure belt tension, as an over tightened belt will whine and may **fail** prematurely, whereas a slack belt is liable to 'jump' a cam pulley (especially at cold start up) and result in damage to the valve gear

WARNING: Be aware of the danger caused by unprotected pulleys when the engine is running. Keep fingers and loose clothing well clear and take precautions against dropping tools. nuts/bolts etc. into the belt/pulley system.

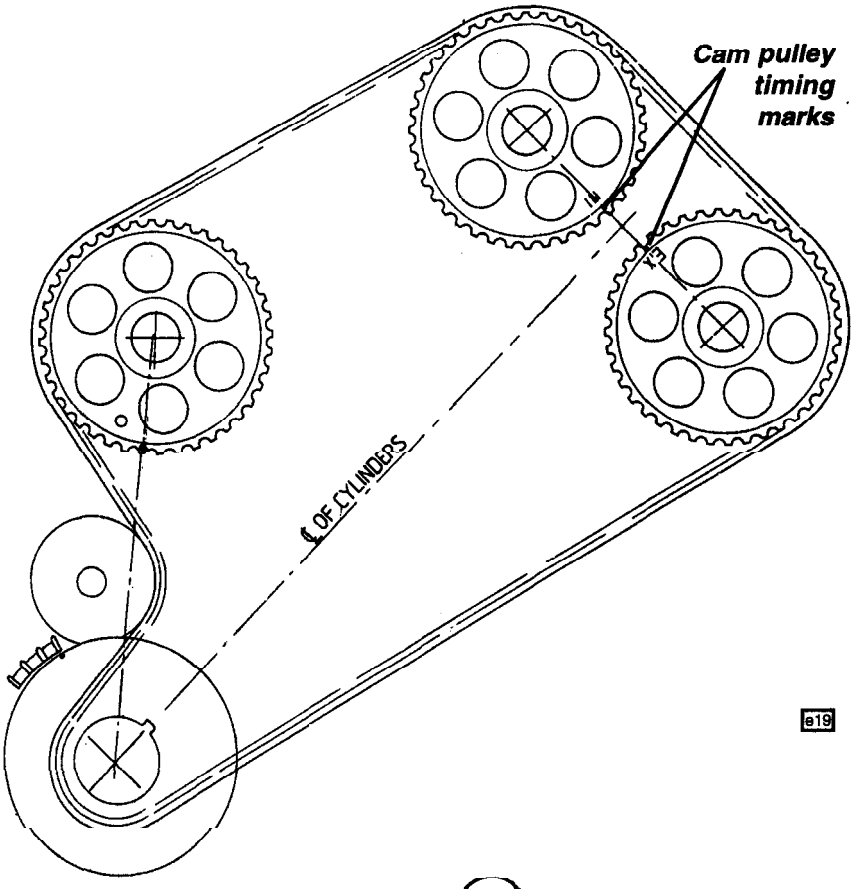
*Flywheel **timing** marks*



em109

*Timina mark **colour***

***Inlet:** Red (110° MOP)*
Exhaust:
- ***910** Blue (100° MOP)*
- ***920** Green (104" MOP)*



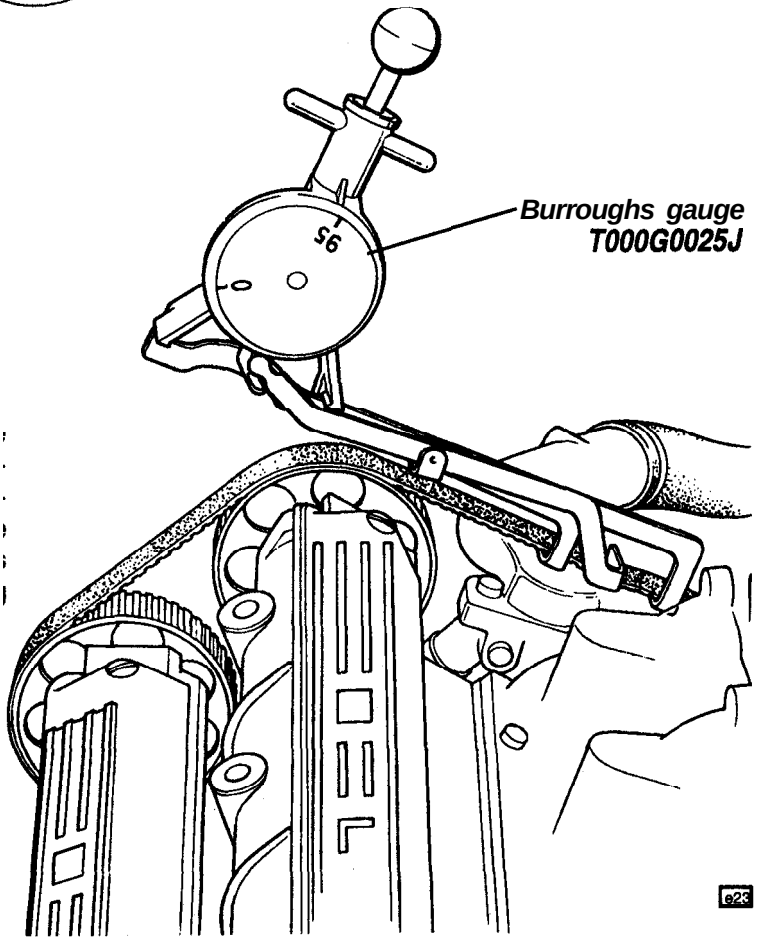
e19

Cam Belt Adiustment

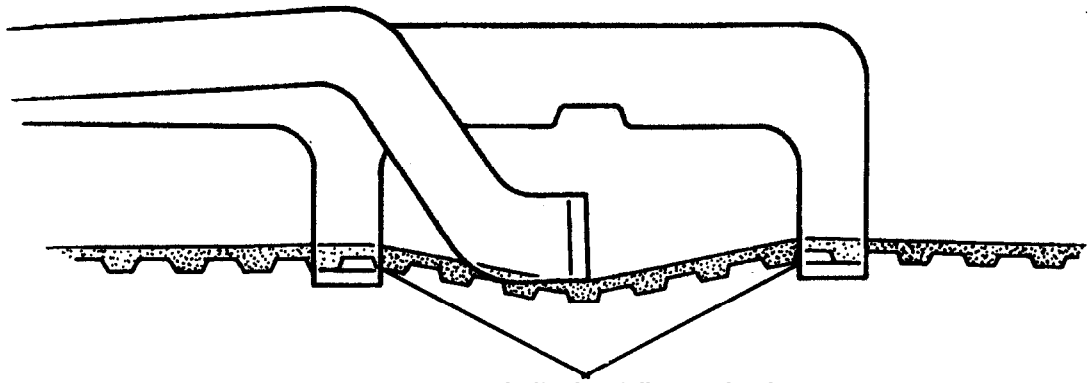
Do NOT attempt to adjust belt tension on a hot engine. Carry out the following procedure only at an engine (ambient) temperature of between 15 - 25°C.

If the camshaft drive has just been reassembled, rotate the engine in the normal direction of rotation (clockwise viewed from in front) several times before setting at TDC. Use the timing marks and pointer on the flywheel rim and clutch housing aperture viewable after removing the protective rubber grommet in the top of the clutch housing.

1. Fit cantilevered Burroughs Gauge T000G0025J between auxiliary and inlet camshaft pulleys as shown in the diagram, with the central arm resting on the flat side of the belt, and the two hooks on the toothed side, with the belt sitting fully on the hooks.



e23



e24

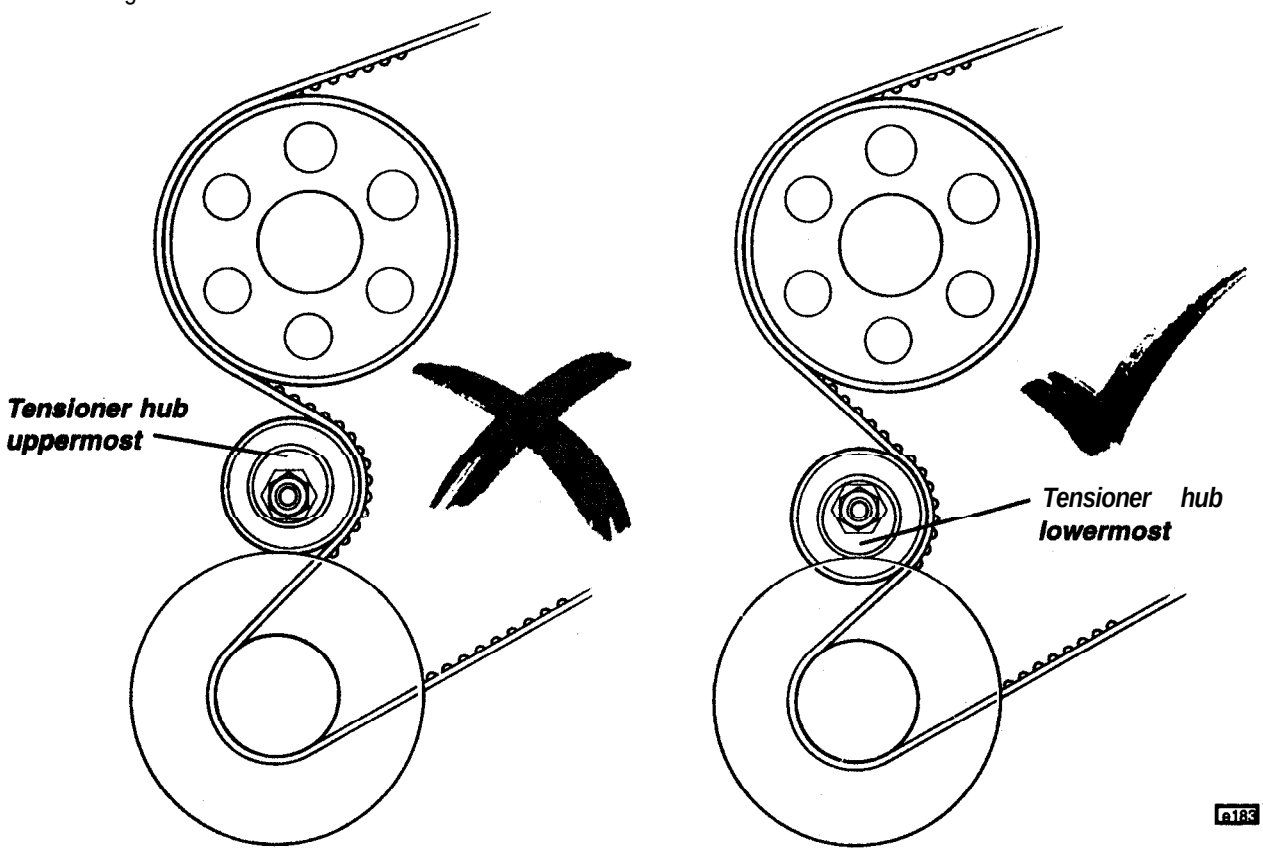
Ensure be/f sits fully on hooks

Care must be taken to ensure that no part of the gauge rests on the engine bay surround or thermostat housing etc., and that the hooks are not trapped between belt and pulleys.

2. Press and release the plunger knob several times to obtain a settled reading. Rotate the engine **360°** and measure again. Repeat the procedure to obtain a third reading and average the results.

Correct belt tension = 95 units on the **gauge**.

3. Before adjusting belt tension, first check the orientation of the belt tensioner: The eccentric should point downwards as shown so that any tendency for the eccentric to **turn** in operation will cause the clamp nut to tighten.



e183

To adjust, slacken the clamp nut and use a 19 mm spanner to turn the eccentric as required. Torque tighten clamp nut to 34 - 41 Nm (25 - 30 **lbf.ft.)** and re-check belt tension.

Cam Belt Removal/Replacement

It is important to realise that with the cam belt removed, Inadvertent turning of the camshafts or crankshaft may result in contact between the valves and pistons with consequent damage. The belt is removed with the engine in the 'timing position' and if it is then desired to turn the camshafts, the crankshaft should first be turned through 90° to bring the pistons to mid-stroke.

1. Drain cooling system and disconnect the radiator and heater return hoses from the water pump. Release the hose from the thermostat housing outlet elbow.

2. Turn the engine to the 'timing position' with the crankshaft at no 1 (firing) TDC and the timing dots on the camshaft pulleys facing towards each other. Use the timing marks and pointer on the flywheel rim and clutch housing aperture, viewable after removing the protective rubber grommet in the top of the clutch housing.

3. Slacken and remove all auxiliary drive 'V' belts.

4. Remove crankshaft pulley bolt and conical washer and withdraw triple 'V' pulley from crankshaft.

5. Remove triangular brace between alternator, water pump and belt tensioner bracket, taking careful note of the positioning of all spacers and washers etc.

6. Re-check timing position before slackening the cam belt tensioner clamp nut and rotating the tensioner eccentric away from the belt. Slide the belt off the pulleys.

7. Before replacing the cam belt, check the condition of all toothed pulleys and the belt tensioner. Check that the camshafts and crankshaft are in the timing position as in (1) and slide the belt onto the pulleys. Rotate the tensioner eccentric counterclockwise to take up belt slack and temporarily tighten the clamp nut. Recheck cam timing.

6. Re-fit triple 'V' pulley to crankshaft with conical washer and retaining bolt. Torque tighten to 79 - 61 Nm (56 - 60 lbf.ft.).

9. Adjust cam belt tension (see above).

10. Re-fit triangular alternator brace taking care to fit spacers and washers as noted in (5).

11. Re-fit and tension all auxiliary drive 'V' belts in the order - a/c compressor, water pump/PAS pump, alternator.

12. Refit heater and coolant hoses to water pump and refill cooling system (see section KC).

13. Run engine for several minutes and re-check cam belt tension.

Cam Belt Tensioner Removal/Replacement

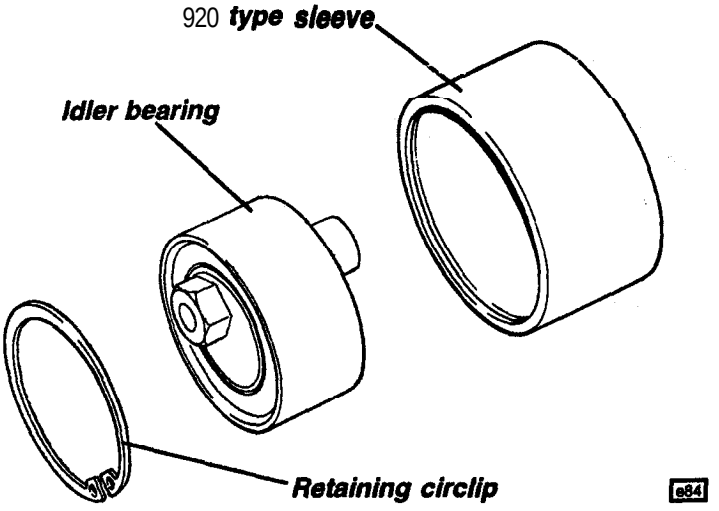
1. Turn the engine to the timing position and tape the cam belt to both camshaft pulleys and auxiliary shaft pulley as an aid to to re-assembly.

2. Slacken and remove all auxiliary 'V' Belts, remove crankshaft pulley bolt and conical washer and withdraw triple 'V' pulley from crankshaft.

3. Remove tensioner clamp nut and withdraw eccentric and pulley/bearing assembly off the mounting stud. Press out the eccentric from the pulley/bearing hub.

4. To replace: Press the pulley/bearing onto the eccentric adjuster, fit onto the mounting stud and retain with a new nyloc nut.

Note: In order to utilise the a common timing belt on both 2.2 and 2.0 litre engines, the tensioner pulley on the 920 (2 litre) engine has a sleeve added to increase its diameter from 63 to 70 mm. The sleeve is a press fit on the bearing and is retained by a shoulder and circlip.



5. Check that the cam belt is fitted correctly around the pulleys with all shafts in the timing position, and rotate tensioner eccentric counterclockwise to take up belt slack, and temporarily tighten clamp nut. Re-check cam timing.

6. Re-fit triple 'V' pulley to crankshaft with conical washer and retaining bolt. Torque tighten to 79 - 81 Nm (58 - 60 lbf.ft).

7. Adjust cam belt tensioner (see previous).

8. Refit and tension all auxiliary drive 'V' belts in the order - a/c compressor, water pump/PAS pump, alternator.

0. Run engine for several minutes and recheck cam belt tension.

EF. - C INDER HEAD

Note that the cylinder head assembly is common to S4/S4S/Sport 300 & GT3 models with the exception of the inlet valve seat and throat, which for the S4S and Sport 300 models is increased in diameter from 31 to 32 mm.

Although it is possible to remove the cylinder head with the engine 'in situ' by releasing the engine mountings and raising the engine to provide sufficient clearance, in view of the difficulties that may be encountered in removing the exhaust manifold and those arising from the restricted access, it is generally recommended first to remove the engine/transmission unit complete.

To Remove

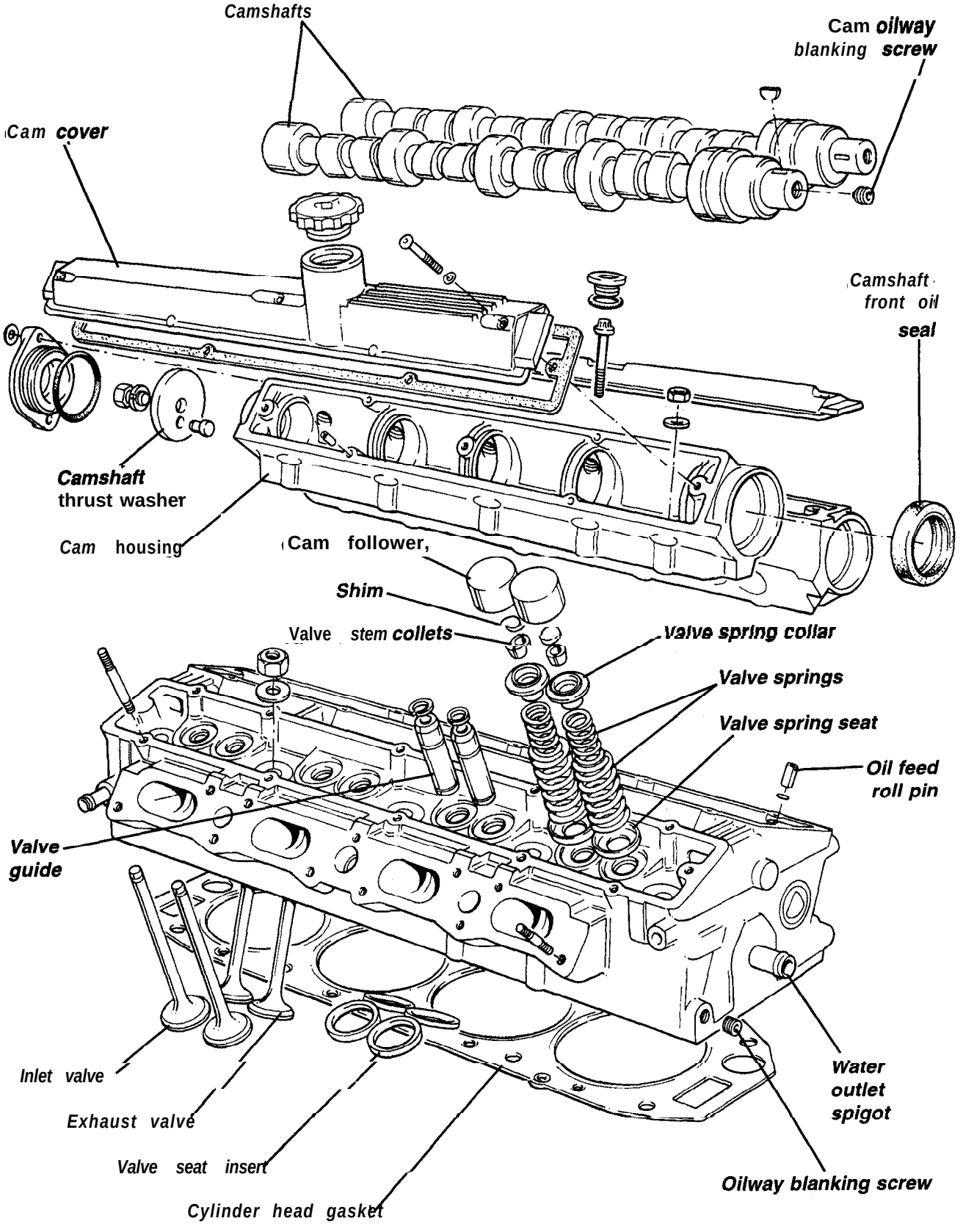
1. Remove complete engine/transmission assembly (See EF.3).

2. Disconnect turbocharger oil feed and drain pipes, water feed and return pipes, compressor outlet to chargecooler. Remove the exhaust manifold from the head complete with turbocharger assembly.

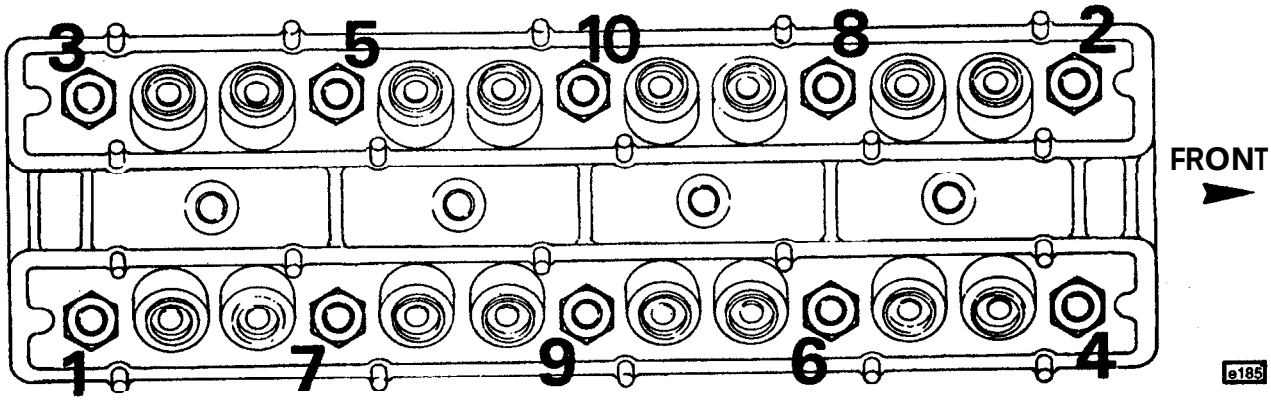
3. Disconnect the chargecooler water hoses, release the outlet connector hose, and remove the chargecooler from its mounting brackets.

4. Remove the intake plenum stay; disconnect the inlet manifold water hose; release the vacuum rail hoses and harness connectors as necessary; release the 5 nuts and 4 bolts securing the inlet manifold to the cylinder head, and remove the manifold complete with throttle bodies and intake plenum.
CAUTION: The throttle bodies are assembled to the plenum backplate before being calibrated at the factory using mass flow techniques. The throttle bodies should not be separated from the backplate.

Cylinder Head Assembly



Releasing Sequence

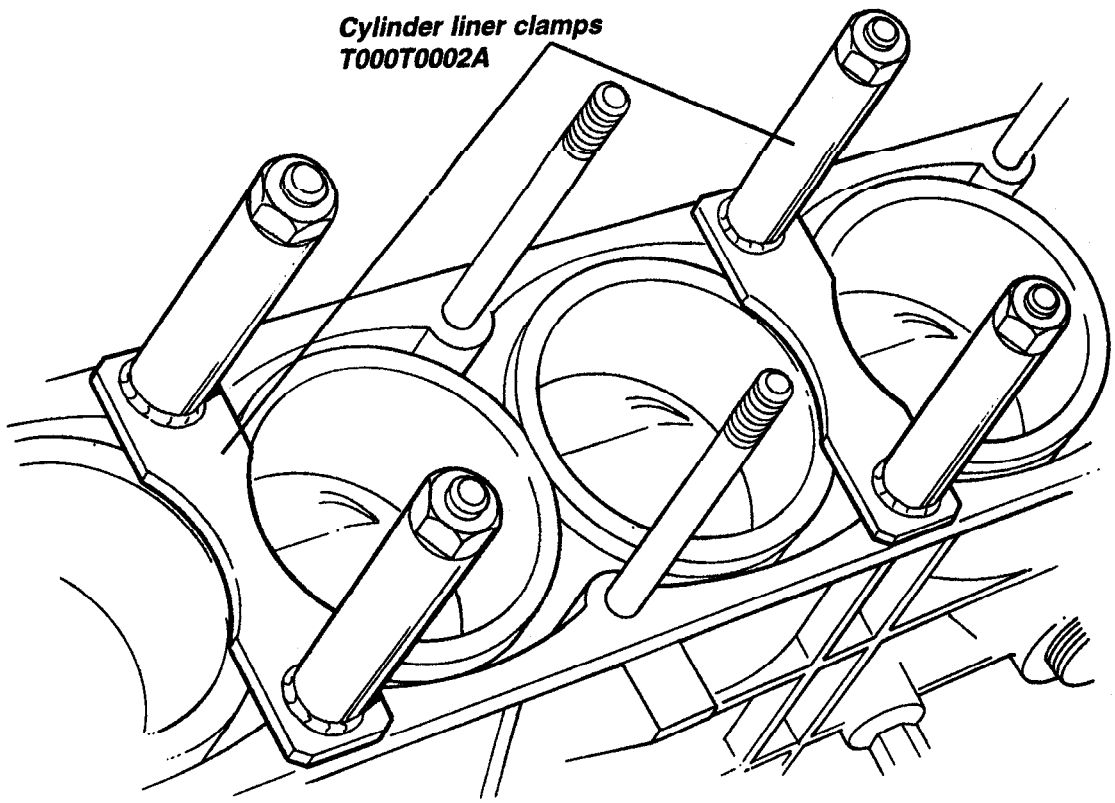


5. Remove both cam covers and measure valve clearances noting any which require adjustment (see EF.5). Remove both cam housing assemblies (see EF.5).

7. Release spark plug leads.

8. Release the cylinder head nuts evenly and progressively, working diagonally inwards from the outside as shown in the diagram. Remove the ten nuts with their washers. Lift off the cylinder head and take care to cover any working surface with protective material to prevent damage to the cylinder head mating face.

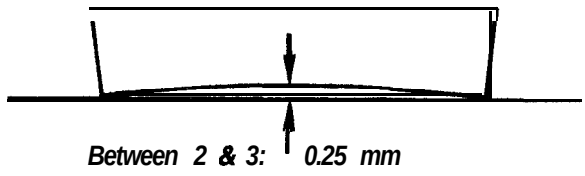
9. Do NOT turn the crankshaft without first fitting cylinder lining clamps **T000T0002A** as shown, otherwise the wet cylinder liners could be pushed from their seats.



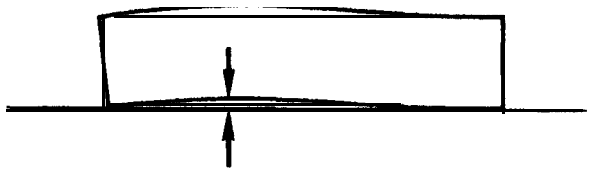
To Replace

1. Remove the cylinder liner clamps. Thoroughly clean the cylinder black mating face, cylinder liner top surfaces, and cylinder head mating face. Using a straight edge or surface plate, check the cylinder head mating face for distortion. A certain amount of 'bowing' Is permissible, up to the limits shown in the diagram.

Permissible longitudinal distortion

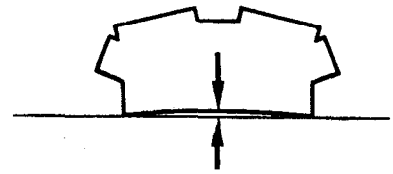


Between 2 & 3: 0.25 mm



Between 1 & 2 or 3 & 4: 0.12 mm

Permissible transverse distortion



Central: 0.06 mm

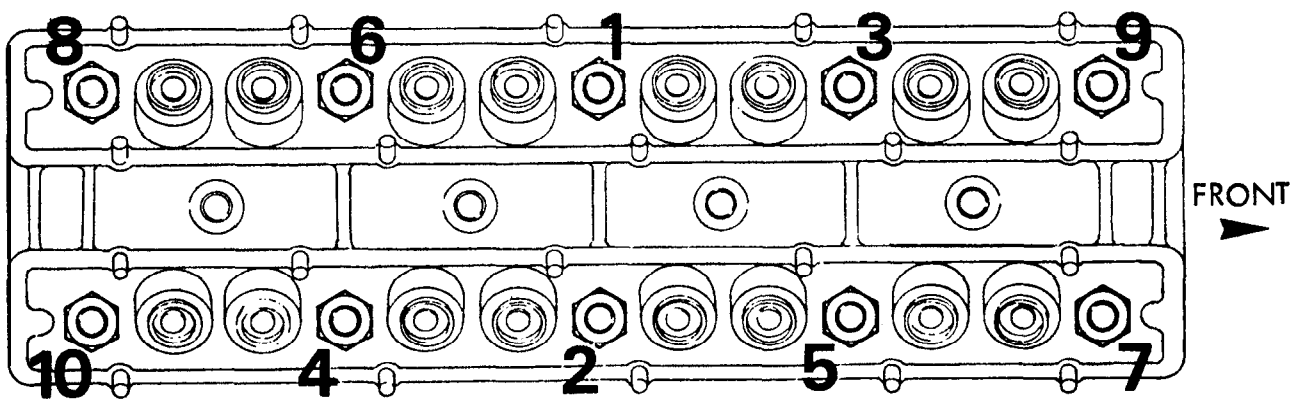
e30

Distortion greater than this may be corrected by machining the face up to a ***maximum*** of 0.015 in. If the head face is machined, the two cam housing joint faces on the cylinder head should also be machined the minimal amount necessary to achieve flatness.

2. Check cylinder liner 'nip' (standout above block face). See EF.18.

3. Fit a new drycomposite cylinder head gasket into position on the block, and fit cylinder head assembly to block, retaining with the ten washers and nuts.
Tighten nuts progressively in a diagonal sequence working outwards from the centre, in five stages:
i) 20 Nm;
ii) + 75 angular degrees;
iii) + 40 angular degrees;
iv) Wait 5 minutes;
v) + 20 angular degrees.

Tiahtenina Sequence



e186

5. Replace both cam housings, correcting valve clearance if necessary (see EF.5).

6. Refit ancillaries in reverse order to dissassembly.

7. Refii engine/transmission unit, refill cooling system and check engine oil level. Start engine and run up to normal operating tempertaure, checking for oil/water leaks. Thoroughly check fuel system for leaks, security of joints and routing of fuel pipes.

EF.8 VALVES, GUIDES AND SEATS

Two inlet and two exhaust valves are used for each cylinder, with the inlet valves operating in cast iron valve guides, and the sodium filled exhaust valves in bronze guides. The valve guides are replaceable, as are the sintered steel valve seat inserts.

Each valve is fitted with dual helical valve springs wound in opposite directions, and acting against a steel seat on the head, and a retaining collar secured to the valve by a pair of tapered collets locating in a single groove in the valve stem.

Valves

1. Remove cylinder head (EF.7) and cam housings (EF.5).

2. Use a suitable valve spring compressor to depress each valve spring retainer and remove the split collets. Release the compressor and remove all valves, springs, spring seats and retainers, labelling each parts set with its location.

3. Check the condition of each valve around its seating face and along the stem and replace if necessary. Remove all carbon deposits taking care not to mark the stem or seating face.

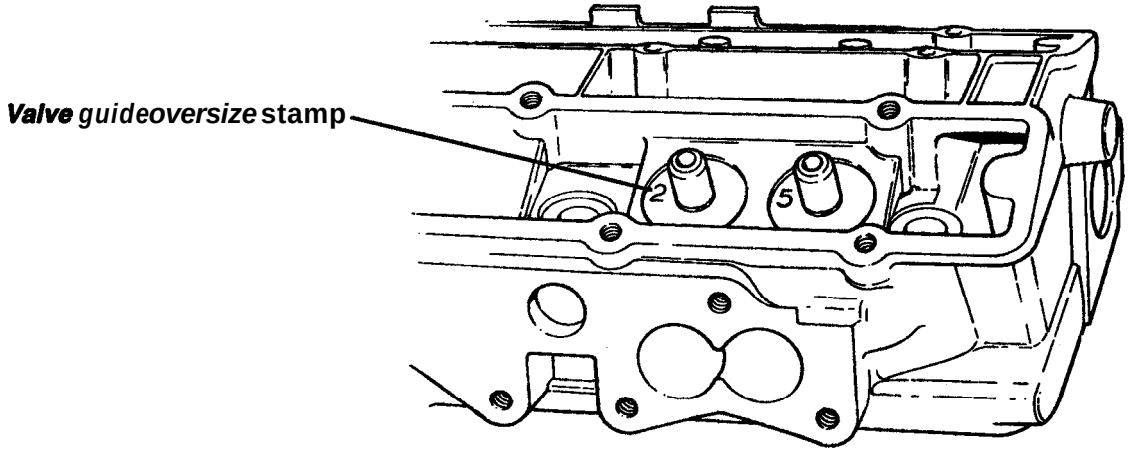
4. Inspect and replace if necessary the valve guides or seat inserts (see below). If necessary, recut the valve seat using a **45°** tool, followed by suitable blending cutters. Lap each valve to its seat first using coarse and then fine grinding paste, taking care to avoid contaminating the valve stem/guide area. Continue until the seating area on both valve and seat insert is an unbroken uniform matt grey ring. Thoroughly clean away all traces of grinding paste from the port.

5. Lubricate the valve stem with clean engine oil and insert into its guide. Fit the valve spring lower seat, inner and outer valve springs, and retaining collar and use a valve spring compressor to depress the collar sufficiently to enable the split collets to be inserted. Release compressor and check that the collets are correctly seated.

6. Refit the cam housings and check/correct the valve clearances. Refit the cylinder head.

Valve Guides

Before replacing a valve guide, check whether an oversize outside diameter guide was fitted on production by looking for a figure **'1',** '2' or **'5'** stamped in the spring seat area adjacent to the guide. The figures refer the oversize required, **i.e.** 0.001 in, 0.002 in, or 0.005 in.



e16

To remove: Remove ail valves and heat the whole cylinder head to 100 - 150°C (210 - 300°F). Use special tool T000T0004A to knock the guides out of the head from the combustion chamber side.

To rep/ace: Heat the whole cylinder head to 100 - 150°C (210 - 300°F). Fit a new circiip on the new guide and press into the head bore from the top side until the circiip seats completely in its recess. Take care not to apply further load to the guide after this point is reached.

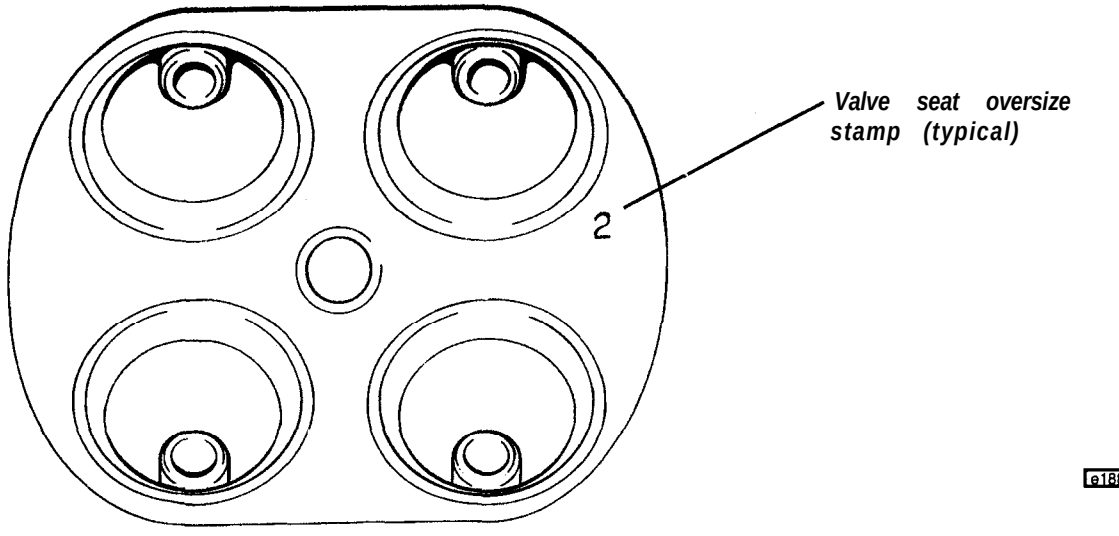
New guides must be reamed after fitment to the following sizes:

inlet: 7.153 - 7.178 mm (0.2818 - 0.2826 in)
Exhaust: 8.000 - 8.025 mm (0.3150 - 0.3159 in)

After fitting a new valve guide, the valve seat should be re-cut (see later) to ensure concentricity with the guide.

Valve Seat inserts

Before replacing a valve seat insert, check whether an oversize outside diameter insert was fitted on production by looking for a figure '1', '2' or '5' stamped in the combustion chamber adjacent to the seat. The figures refer to the oversize required, i.e. 0.001 in, 0.002 in, or 0.005 in.



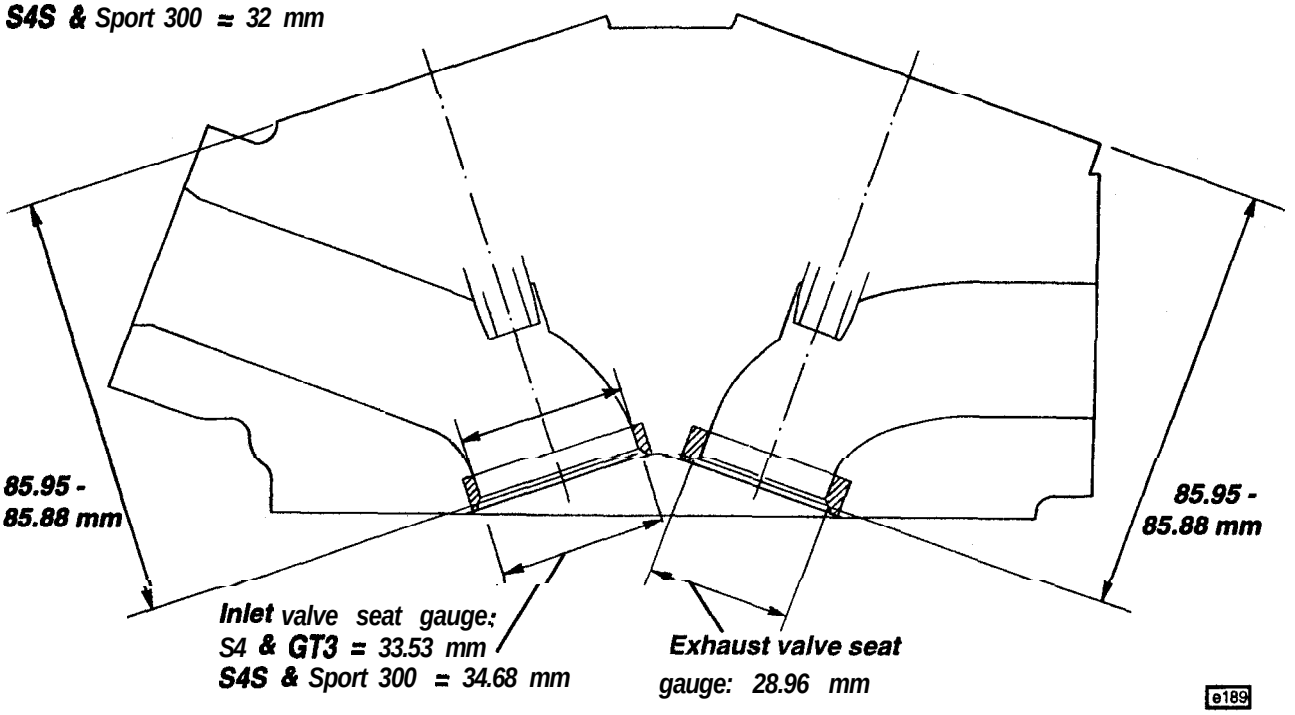
To remove: The insert must be milled through without damaging the recess in the head. The seat should then collapse allowing it to be withdrawn, but may need to be tapped from its recess using a suitable drift inserted through the port.

To rep/ace: Ensure that the recess in the head is scrupulously clean, otherwise the new insert will not seat fully in the recess. Heat the whole cylinder head to a temperature NOT EXCEEDING 200°C and freeze the insert with dry ice to a temperature NO LOWER THAN minus 80°C. With the aid of a suitable tool, press the insert into place, ensuring that the seat is fitted the correct way round. Note that on inlet valve seats the throat profile identifies the correct orientation, and on both inlet and exhaust seats, the outside top edge has a slight chamfer to clear the machined corner in the head recess. Standard inlet valve seats are profiled on the inner surface, whereas those for Sport 300/S4S are bored to 32 mm inside diameter (from 31 mm) and are machined with a 60° included angle valve seat, to be cut to 45° after fitting in the head.

Allow the head to cool naturally in the air. The seat must be cut or ground concentric with the guide at an angle of 45°, until the seat width is 1.5 mm (exhaust) or 2.0 mm (inlet), before lapping in the valve using grinding paste (see above). Optimum valve seat depths relative to the cam housing joint face are shown in the diagram.

Note that factory built heads with the S4S/Sport 300 inlet valve seats are identified by 'S300' stamped at the RH rear of the head, above the heater take off.

Inlet fhroaf diameter:
S4 & GT3 = 31 mm
S4S & Sport 300 = 32 mm



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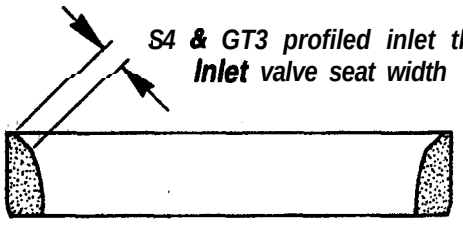

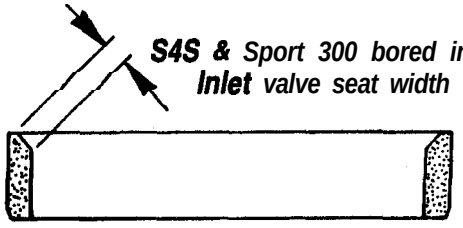

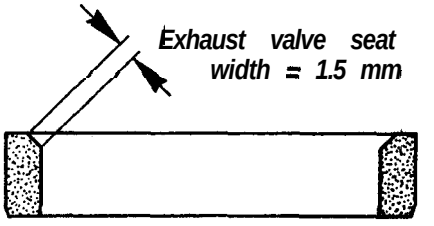

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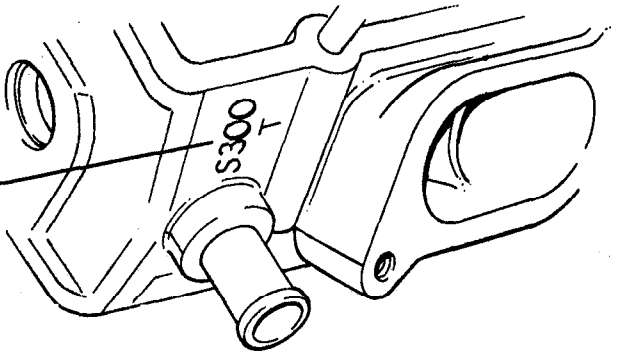
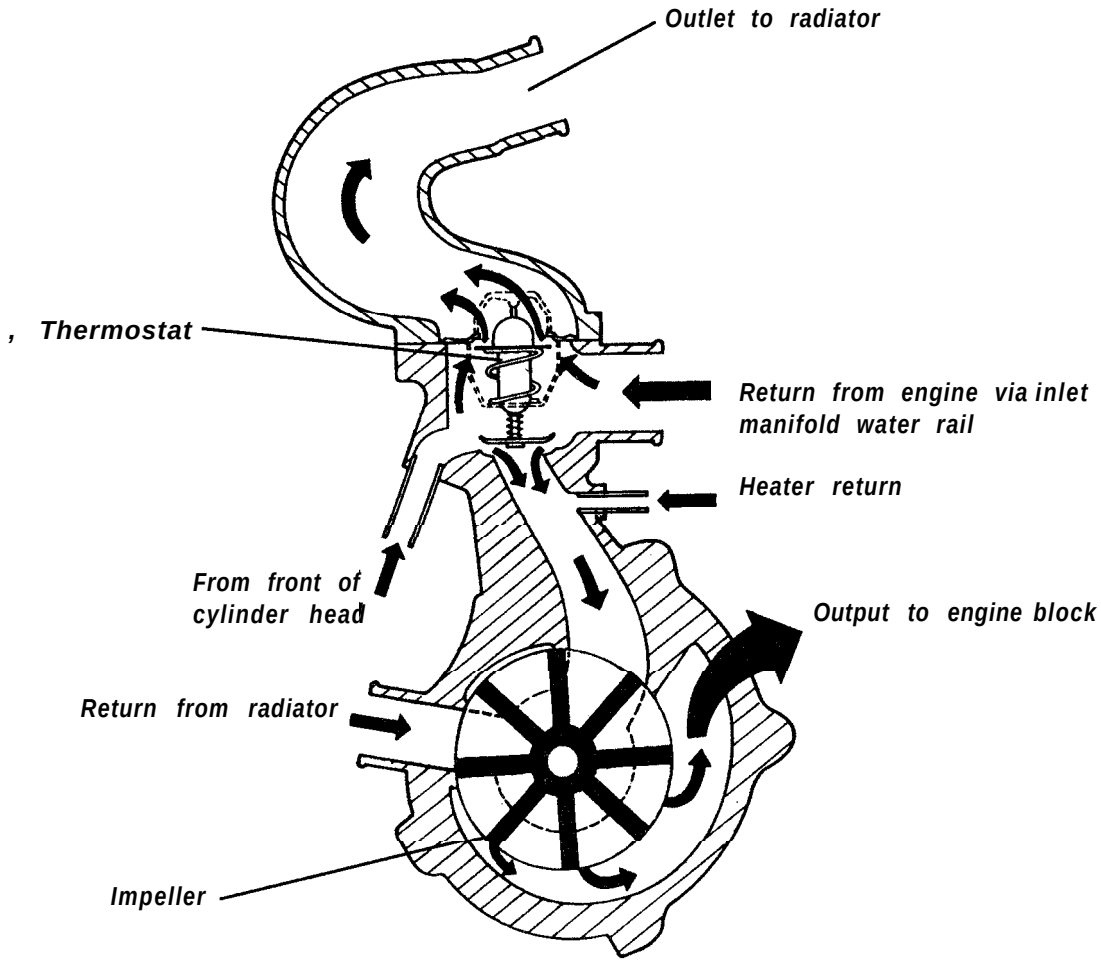
Cylinder head identification



e194

EF.9 - WATER PUMP

A centrifugal water pump is mounted on the front of the block and is driven by 'V' belt from the crankshaft. Coolant is pumped by the impellor into the front of the cylinder block, and thence around the engine before emerging via the inlet manifold water rail, and smaller take off on the front of the cylinder head, and flowing into the thermostat housing formed integrally with, and on top of, the water pump. When the thermostat is closed, all coolant is directed downwards (by-pass) back into the pump to commence another cycle. As the thermostat opens, an increasing proportion of coolant is directed upwards through the thermostat into the radiator circuit, whilst the by-pass port is closed off by a face valve mounted on an extension of the thermostat spindle. Running the engine without a thermostat fitted will result in overheating due to the lack of by-pass circuit closure.



The thermal transmitter for the water temperature gauge is fitted into the thermostat housing, and the water pump body is provided with a heater return connection.

The water pump is a non-serviceable assembly, and if found to be noisy, develop discernible play in the bearing, or leak water, should be replaced a complete unit.

To Remove:

1. Drain the cooling system.

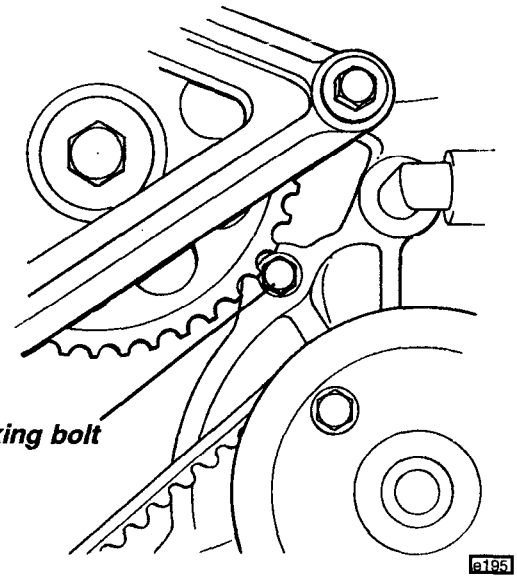
2. Disconnect the following hoses from the pump:
   - inlet manifold water rail;
   - return from radiator to pump body;
   - outlet from thermostat cover:

- outlet from front of cylinder head;
- heater return.

3. 'Remove the water pump **'V'** belt.

4. Remove the triangular alternator mounting brace.

5. One of the water pump fixing screws is positioned close to the auxiliary shaft pulley, and dependent on tolerance stack up, it may be necessary on some engines to withdraw the pulley in order to allow the screw to be removed: Turn the engine to the timing position (See EF.5) and tape the toothed belt to each camshaft pulley before slackening the belt tensioner and releasing the auxiliary shaft pulley retaining bolt. Withdraw the pulley.



Obscured fixing bolt

6. Remove all 5 water pump fixings, disconnect thermal transmitter wire and withdraw pump. Check the water pump bearing for wear: No play should be discernible at the pulley hub or impeller.

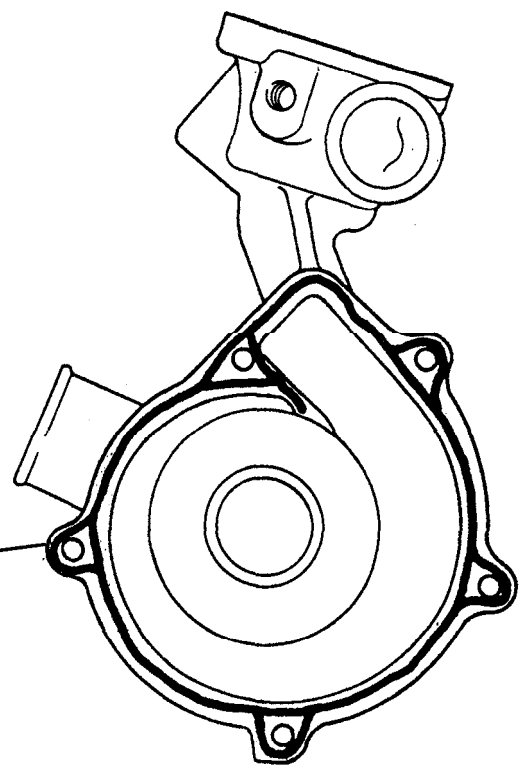
To Replace:

Note that no gasket is used between water pump and cylinder block. Permabond Al 36 sealant is used in the following manner:

i) Clean the joint faces on both water pump and cylinder block.

ii) Spray both joint faces with Permabond A905 Surface Conditioner **(A912E6759)**.

iii) Apply a 3 - 4 mm wide bead of Permabond Al36 **(A912E6421)** to the water pump joint face as shown in the diagram.



Bead of Permabond Al36

iv) Take care when fitting the water pump not to break the bead of Permabond. Fit the water pump fixing bolts and washers, and torque tighten to 8 - 11 Nm (6 - 8 lbf.ft.).

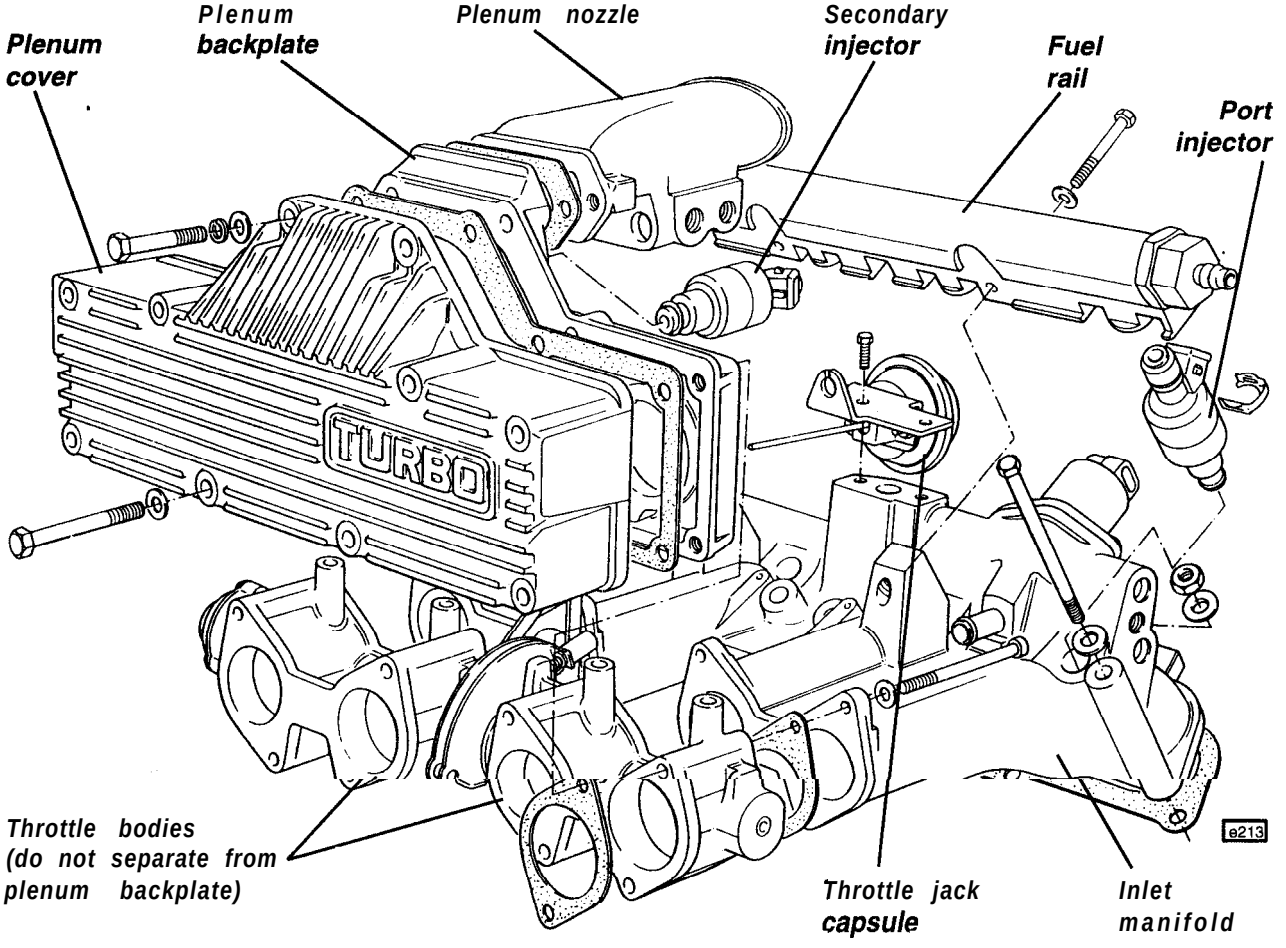
v) Refit ancillaries in the reverse order to disassembly, ensuring that in cases where the auxiliary shaft pulley was removed, the valve timing and toothed belt tension are correctly set (See EF.6). Tighten the auxiliary shaft pulley bolt to 34 Nm.

vi) Refill with coolant, run engine to normal operating temperature and check for coolant leaks. Recheck valve timing.

EF.10 - INLET MANIFOLD/THROTTLE BODIES/PLENUM

WARNING: Pressure is maintained in the fuel lines after the engine is switched off in order to reduce the possibility of vapour pocket formation, and to speed engine restart. Before disconnecting a fuel line, carry out the fuel pressure relief procedure detailed in sub-section EF.3:

CAUTION: The throttle bodies are assembled to the plenum backplate before being calibrated at the factory using mass flow techniques. The throttle bodies should not be separated from the backplate.



For access to the auxiliary housing or when removing the cylinder head, the complete assembly of inlet manifold, throttle bodies, plenum backplate, cover and nozzle, may be removed from the engine in the following manner:

1. Depressurise the fuel system (see EF.3), and disconnect the fuel feed pipe from the plenum nozzle, and the fuel return pipe from the pressure regulator valve.

2. Drain the coolant from the engine and chargecooler systems, and remove the chargecooler.

3. Disconnect the oil pressure senders and sender harness plug. Disconnect the 6 fuel injectors, idle air control valve, throttle position switch, coolant temperature sensor (underside of manifold).

4. Release the vacuum hoses from the rear end of the vacuum rail and plenum. Release the purge pipe from the front end of the vacuum rail, and the 'P' clips from the plenum cover.

5. Disconnect the throttle cable.

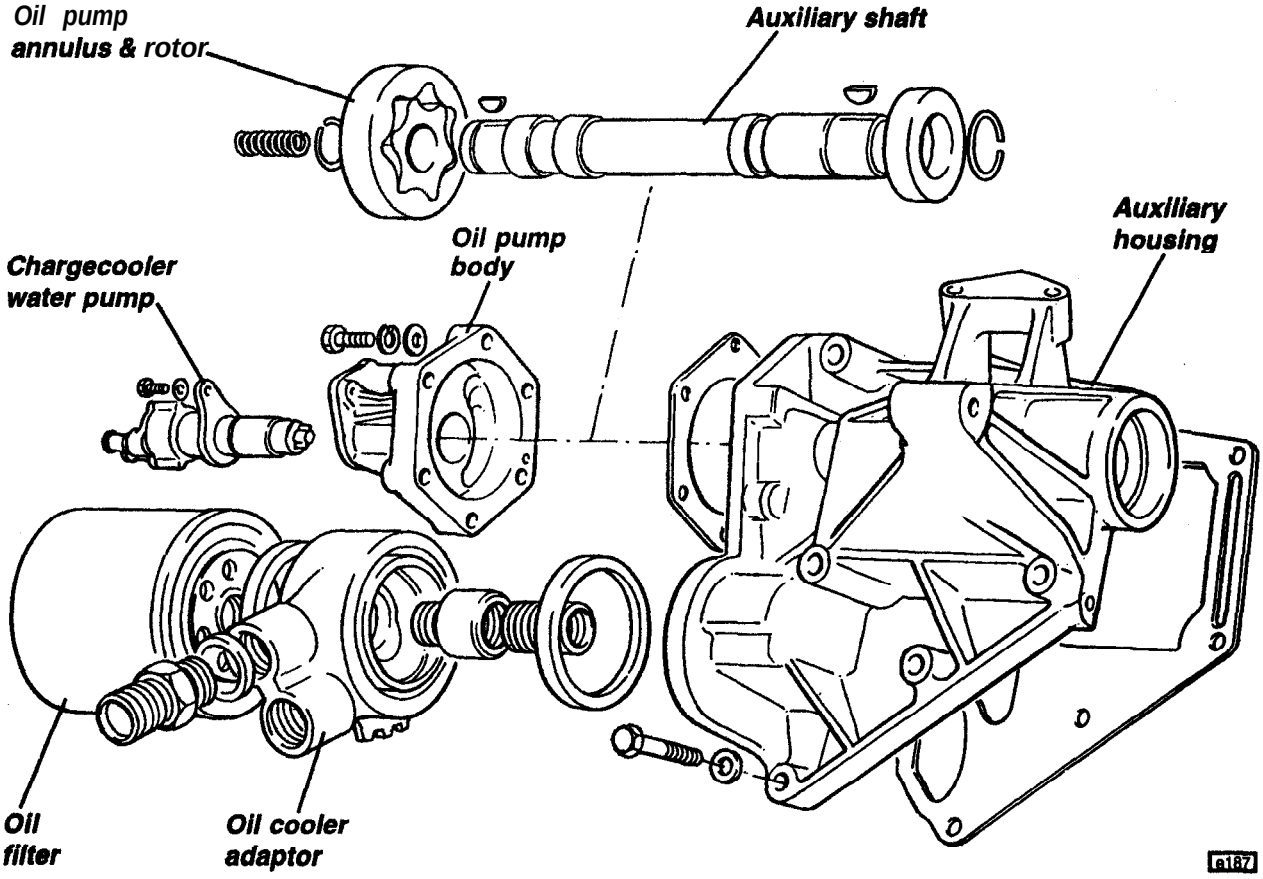
6. Disconnect the hose between the manifold water rail and the thermostat housing.

7. Release the plenum stay, and the 5 nuts and 4 bolts securing the manifold assembly, and withdraw from the engine.

Refit the manifold assembly in reverse order to removal, using a new dry gasket between manifold and head, and tightening the inlet manifold fixings to 19 - 22 Nm (14 - 16 lbf.ft).

EF 11 - AUXILIARY HOUSING & OIL PUMP

The auxiliary housing is mounted on the right hand side of the cylinder block and contains the auxiliary shaft which is used to transfer drive from the camshaft toothed belt to the oil pump and chargecooler water pump mounted horizontally on the rear of the housing. The housing contains passageways to direct oil drawn from the sump into the oil pump, and from there, via an oil cooler take-off sandwich plate, to the oil filter mounted on the rear of the housing. Oil flowing out of the filter feeds the main oil gallery, along the side of the block, which extends at the front end to lubricate the auxiliary shaft front journal and then supplies a drilling up to the cylinder head. The housing also provides a mounting plinth for the 'V' belt driven alternator.



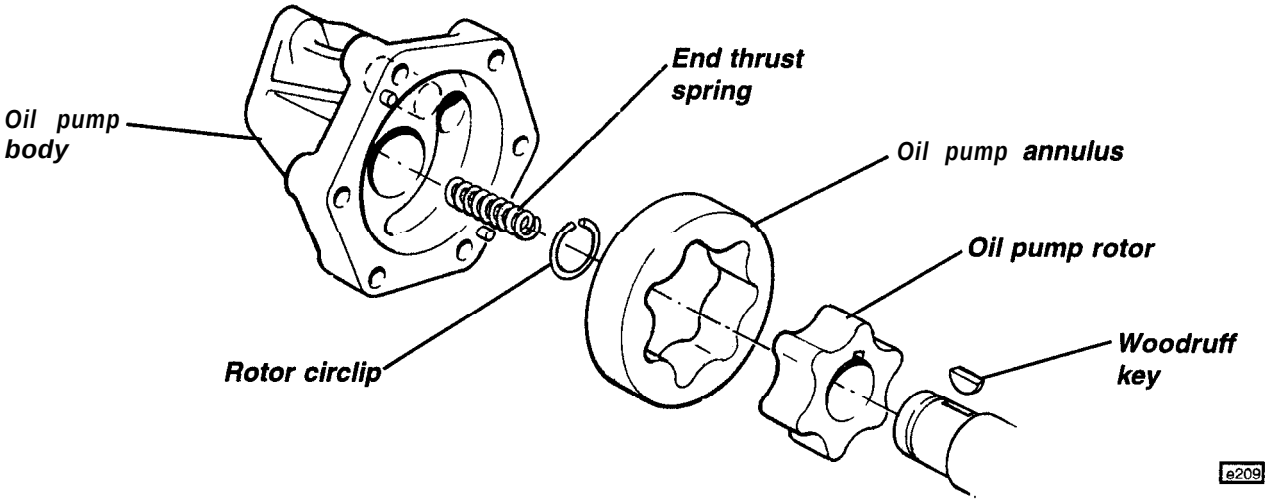
The water pump for the chargecooler system is also driven from the rear end of the auxiliary shaft, and is spigotted into the oil pump housing, with an offset dog drive connection to the shaft. The pump spigot is sealed by an '0' ring, and is retained by a single M6 screw. For chargecooler pump overhaul detaiis, see sub-section KE.6.

Oil Pumo

For access to the oil pump, the intake manifold assembly should first be removed (see sub-section EF.10). The oil pump may then be removed without disturbing the cam timing:

- Remove the single retaining screw and withdraw the chargecooler water pump, leaving the hoses attached. Do not misplace the oil pump end thrust spring.

Release the six screws retaining the oil pump body, and withdraw the pump body and annulus. Mark the orientation of the annulus to ensure its correct re-fitment.



If necessary, remove the wire circlip retaining the oil pump rotor, and, noting the orientation, withdraw the rotor from the shaft Take care not to misplace the woodruff key.

Check the working faces of the oil pump body, rotor and annulus for signs of wear, scoring or scuffing and replace if in any doubt. Check the free operation of the pressure relief valve, and replace the oil pump body if in doubt.

Before re-assembling, ensure the absolute cleanliness of all components. Fit the rotor onto the shaft in the correct orientation, with its woodruff key and circlip.

Fit the annulus the correct way round into the oil pump housing, and copiously lubricate with engine oil. In order to maintain the correct pump rotor endfloat, it is essential to use a NEW gasket which is fitted DRY. Secure the pump body to the auxiliary housing, torque tightening the six fixings to 10 - 11 Nm.

Smear the chargecooler pump spigot '0' ring with engine oil. Ensure that the oil pump end thrust spring is fitted into the end of the auxiliary shaft before inserting the pump into the housing and engaging the offset dog drive mechanism. If necessary, align the drive dog by turning the pump shaft only in the direction of the arrow on the end cover. Retain with the single fixing screw.

Auxiliary Housing

The most usual reason for auxiliary housing removal is to allow access to the oil pick up pipe union, necessary if the oil pick up pipe is to be removed.

1. Disconnect the battery.

2. Remove the inlet manifold assembly (sub-section EF.10).

3. Remove the single retaining screw and withdraw the chargecooler water pump, leaving the hoses attached. Do not misplace the oil pump end thrust spring.

4. Disconnect the alternator leads, remove the adjuster bolt and mounting pivot bolt, and remove the alternator.

5. Remove the oil filter and oil cooler sandwich plate using paper towel to absorb escaping lubricant.

6 Turn the engine to the timing position, with No 1 cylinder (firing) at TDC using the **flywheel** timing marks and clutch housing pointer, with the cam pulley timing marks facing towards each other (see **EF.5).** Release the timing belt eccentric tensioner lock nut, slacken belt tension, and slide the belt off the auxiliary pulley.

7. Remove the **a.c.** compressor mounting bracket from the auxiliary housing, and release the remaining fixings securing the housing to the block. Remove the auxiliary housing assembly.

6. Release the six screws retaining the oil pump body, and withdraw the pump body and **annulus.** Mark the orientation of the **annulus** to ensure its correct re-fitment.

9. Noting which way round the toothed pulley is fitted, release pulley fixing bolt and withdraw the pulley from the front of the shaft. Remove the woodruff key and pulley abutment circlip.

10. Push the auxiliary shaft out of the housing from the front end, and if necessary, remove the circlip securing the oil pump rotor and, noting its orientation, withdraw the rotor from the shaft.

11. Use a suitable drift to remove the auxiliary housing front oil seal.

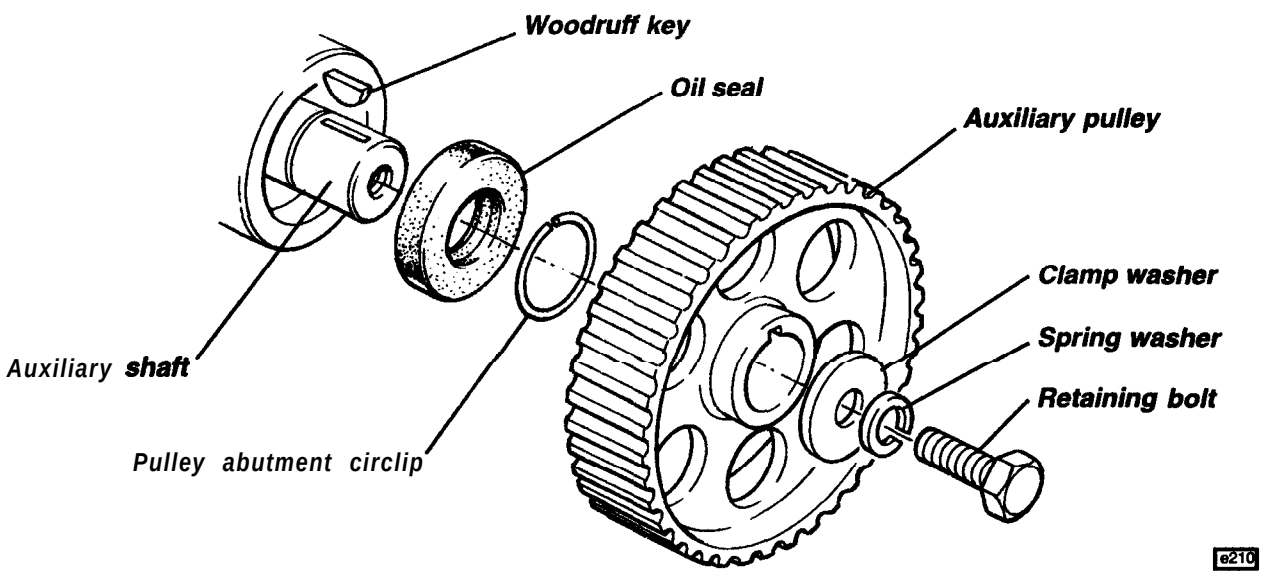
To Replace:

1. Fit a new oil seal to the front end of the housing, and lubricate the seal lip with grease.

2. Fit the oil pump inner rotor in its original orientation, to the rear end of the auxiliary shaft using a new woodruff key and circlip.

3. Insert the shaft into the housing from rear end, taking care not to damage the front oil seal, and refit the oil pump (see above).

4. Fit a new pulley abutment circlip and woodruff key onto front end of shaft, and refit auxiliary shaft pulley (same way round). Fit pulley retaining bolt with washers and torque tighten to 35 Nm.



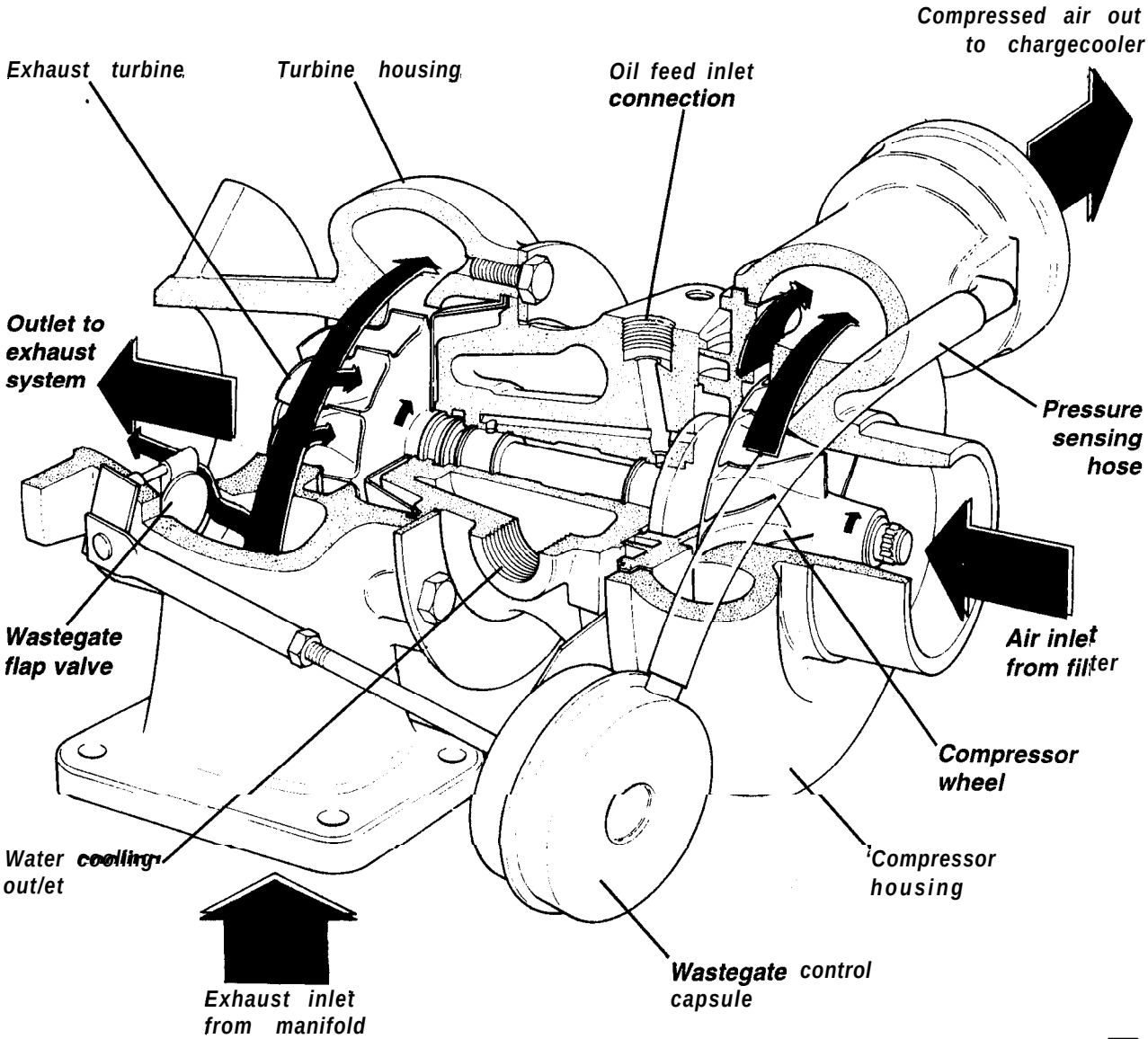
5. Refit the auxiliary housing to the block using a new gasket and suitable jointing compound (e.g. Wellseal). Take care to use the correct length bolt in each fixing position, and fit the a/c compressor rear mounting bracket if applicable. **Torque** tighten all auxiliary housing fixings to 16 - 20 Nm.

6. Smear the chargecooler pump spigot '0' ring with engine oil. Ensure that the oil pump end thrust spring is fitted into the end of the auxiliary shaft before inserting the pump into the housing and engaging the offset dog drive mechanism. if necessary, align the drive dog by turning the pump shaft only in the direction of the arrow on the end cover. Retain with the single fixing screw.

7. Refit the cam drive belt (see sub-section **EF.6),** and inlet manifold assembly (sub-section EF.lO).

EF.12 • EXHAUST MANIFOLD. TURBOCHARGER & WASTEGATE

The cast iron exhaust manifold converges the gas streams from four branches into two, joining cylinders 1 with 4, and 2 with 3. These two gas streams are kept separated up to the turbine housing of the Garrett Airesearch type TB03 turbocharger which incorporates a water cooled bearing housing and integral wastegate. The exhaust gases spin the turbine wheel at speeds up to 100,000 rpm, before exiting the turbocharger and flowing through the catalytic converter and exhaust silencer. The turbine wheel is fixed to a short shaft supported by fully floating bearings in a water cooled housing, with the other end of the shaft carrying the compressor wheel. The compressor draws filtered air from the airbox and centrifuges the air out of the compressor housing into the air/water chargecooler, where the hot, compressed air is cooled by a circulated water supply before entering the intake plenum chamber.



The extent to which the intake air is compressed is dependent primarily on throttle opening and engine speed, but is mechanically limited by the action of an exhaust wastegate, which is designed to open at a specified boost level and bleed exhaust gas away from the turbine through a by-pass channel. The wastegate consists of a coil spring/pneumatically operated flap valve fitted between the turbine housing inlet and outlet which, when opened, diverts a proportion of the exhaust gas away from the turbine to limit the boost pressure built up in the inlet. The flap valve is linked to an pneumatic capsule which contains a spring to hold the valve shut, and a diaphragm pressure chamber connected by a hose to the boost pressure at the compressor outlet. As boost pressure builds up, the force in the pressure chamber, opposing the spring pressure, rises until the flap valve is opened.

In order to allow for controlled boost pressure in excess of this mechanical setting, a solenoid valve is fitted into the boost pressure sensing hose and under the control of the engine management ECM, is able to bleed off a proportion of the hose pressure in order to delay the opening of the wastegate and allow a higher boost pressure to be developed. As an engine safeguard, in case of a boost control system failure, the ECM will shut off the fuel pump and ignition if boost pressure in excess of 1.03 bar is detected for more than three seconds. For full details see section EMH.2 • T.

The turbocharger bearings are supplied with an oil feed from the oil gallery cover at the right hand rear of the block, and an oil drain hose is provided to return oil to the left hand side of the sump. In order to help protect the turbocharger bearings from the effects of heat soak after the engine has been stopped, a water feed and return system is provided, and connected between the heater take-off at the rear of the block and the header tank. Water circulation around the bearings continues after engine switch off, by thermo-syphon action, and reduces the possibility of carbonisation of the oil in the turbocharger.

The turbocharger unit is, with the exception of the wastegate capsule, a non-serviceable item which must be renewed if faulty. A certain amount of free play in the shaft bearings is a design feature, and should cause no conuem unless the amount of play allows the turbine or compressor wheels to contact any part of their housings. The shaft should turn freely and smoothly and the turbine and compressor blades should be free form signs of mechanical damage. Note that great care must be taken when working on the engine to prevent any foreign bodies from entering the turbocharger or the wheels will be severly damaged.

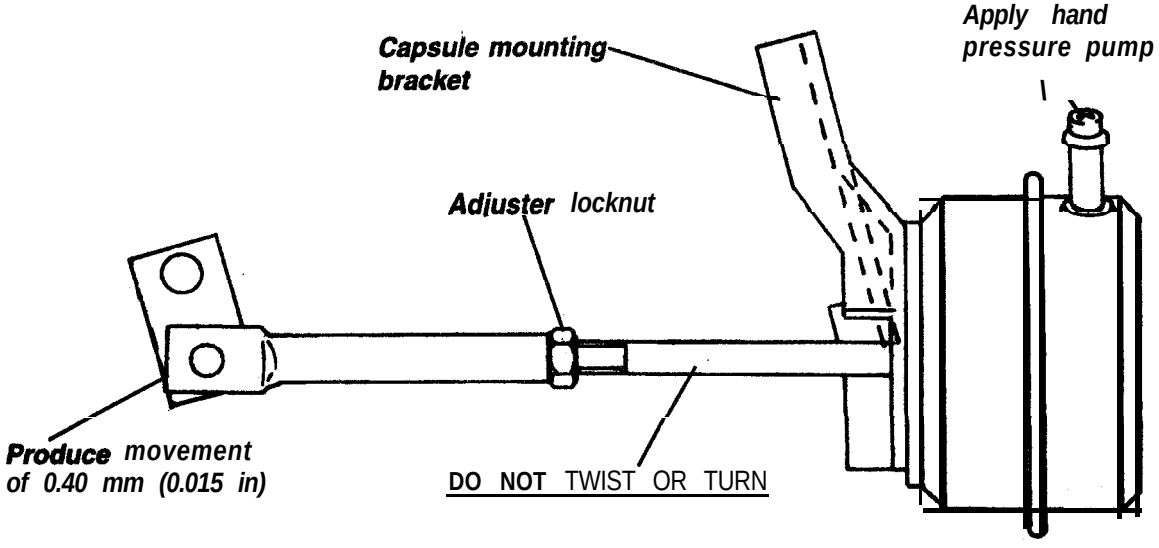
Wasteaate Capsule Replacement

To remove the capsule, pull off the pressure sensing hose, remove the circlip from the flap valve operating arm to release the actuator rod, and release the two capsule fixing nuts.

After fitting the new capsule, it is necessary to set the actuator rod length to achieve the specified maximum boost pressure of 0.65 bar (9.5 lb/sq.in). For this purpose a hand pressure pump (e.g. seat lumbar support bulb) and 0 • 0.7 bar (0 - 10 lb/sq.in) pressure gauge are required:

Apply pressure to the capsule, and observe the pressure required to produce an actuator rod movement of 0.40 mm (0.015 in).

Specification = 0.58 ± 0.02 bar (8.6 ± 0.25 lb/sq.in)



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If the pressure is below specification, the actuator rod should be shortened, and if above specification, lengthened.

CAUTION: Do not turn, twist or force the threaded actuator rod emerging from the capsule and affixed to the diaphragm. Hold this rod stationary whilst slackening the locknut and screwing the extension piece on or off the actuator rod as required.

When the correct specification has been achieved, fit the rod onto the flap valve arm with the circlip, and connect the pressure sensing hose.

Note:

i) The practice of 'revving' the engine before switching off should be discouraged since the turbo will continue to spin, due to its inertia, after the engine has stopped and the pressurised oil supply has ceased.

ii) After a fast run, the engine should be allowed to idle for a few minutes before switching off in order to maintain oil circulation whist the turbo cools down and prevent oil carbonisation from heat soak.

EF.13. - OIL SUMP

The sump may be removed with the engine 'in situ'.

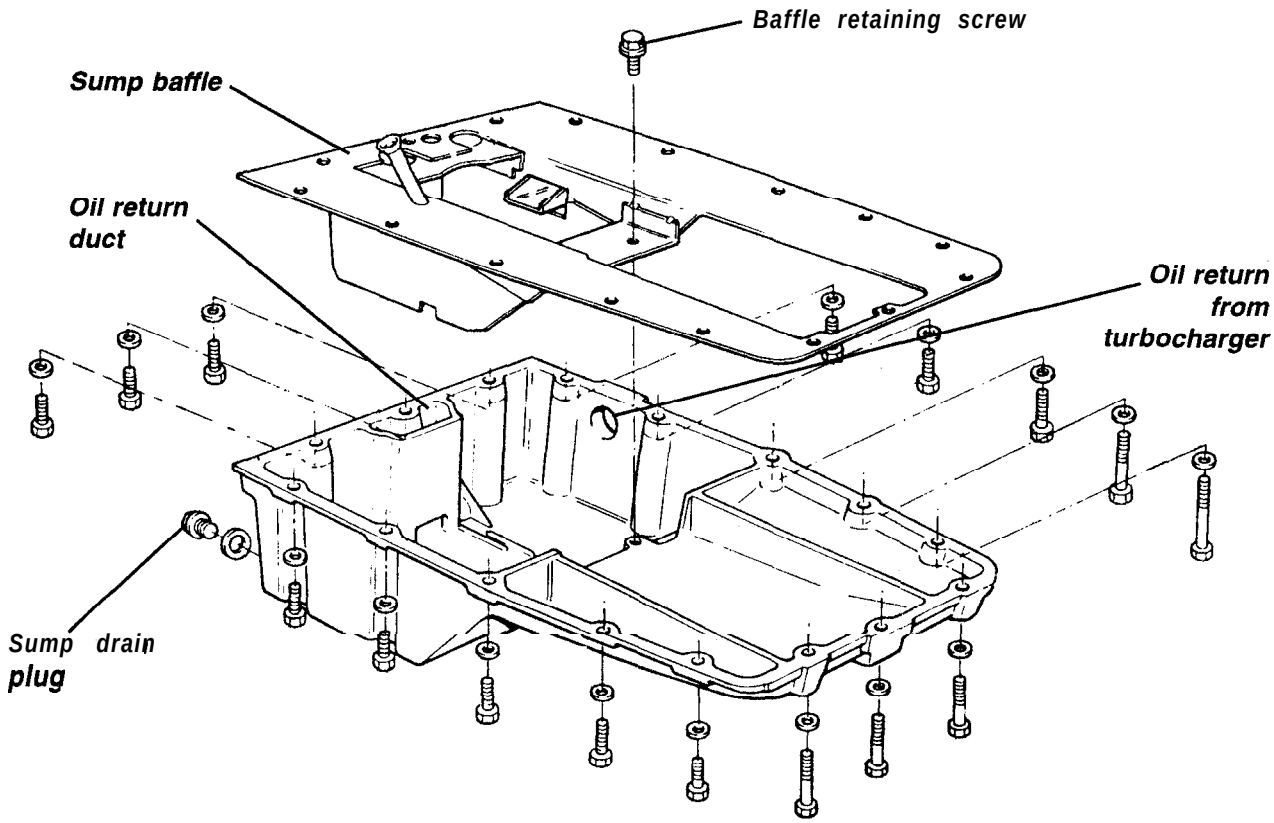
To Remove:

1. Drain the oil and remove the dipstick.

2. Release the turbocharger oil drain pipe from the left hand side of the sump.

3. Release all sump fixings including the two through the clutch housing, noting any shims fitted at this point. Remove the sump.

4. Release the two screws securing the sump baffle and remove baffle to thoroughly clean out sump.

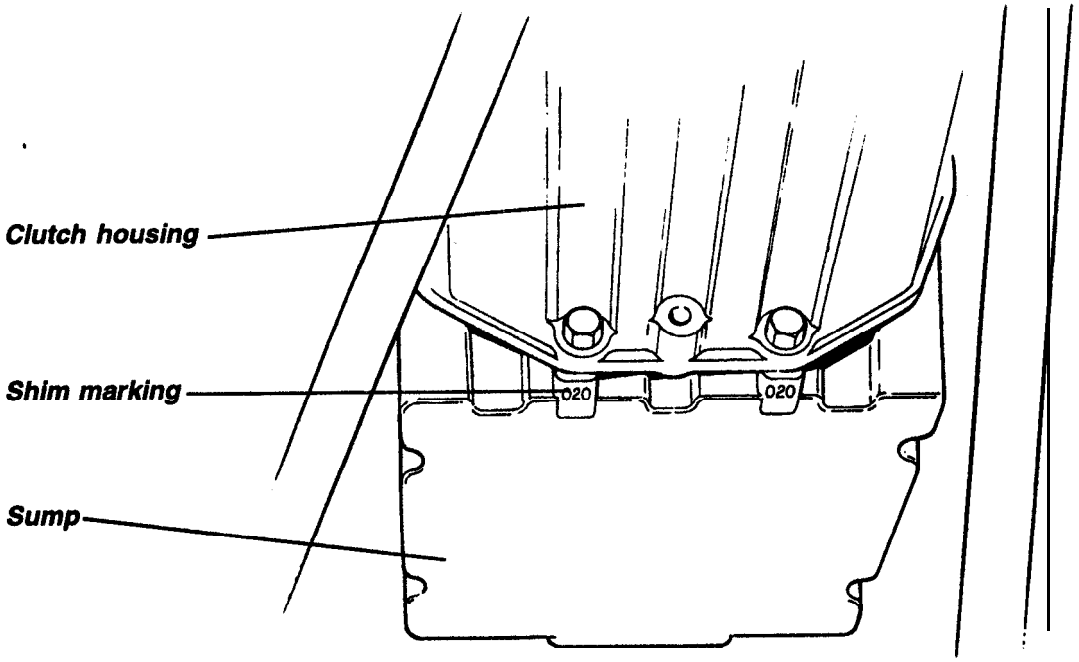


To Replace:

1. No sump gasket is used on 912 and 910 engines, but Permabond Al36 **(A912E6421V)** is used in the following manner:
   Apply a 1 .O ▪ 1 **.5mm** bead of Permabond to both the sump and main bearing housing joint face with the bead passing to the inside of the fixing holes, and fit the sump baffle with its two retaining screws.
   Note: The sump baffle retaining screws are of the self tapping 'Taptite' type and will form their own thread in the plain holes of a new sump. If re-fitting a sump, degrease the tapped holes and apply a thread locking compound to the baffle screws.

2. Before offering up the sump assembly, check that the '0' ring is fitted over the dipstick tube inside the main bearing housing. Fit sump assembly and retain with fixings to the main bearing housing.

3. Push the sump rear-wards before tightening the fixings to 22 ▪ 24 Nm. If the transmission is fitted, measure the gap between the sump and the clutch housing lower fixings; a number may be stamped on each of the sump bosses at this point, representing the shim thickness (in 0.010" steps) to be used between sump and clutch housing.



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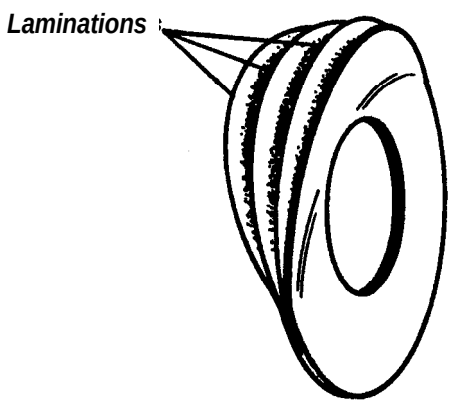
Laminated brass shim washers **A082F6358F** are available which may be adjusted to the required thickness. Tighten the clutch housing to sump fixings to 41 Nm.



G204

4. Refit the turbocharger drain pipe to the sump using a new 'O' ring.

5. Refill the engine with oil.

EF.14 - CONNECTING ROD 'BIG END' BEARINGS

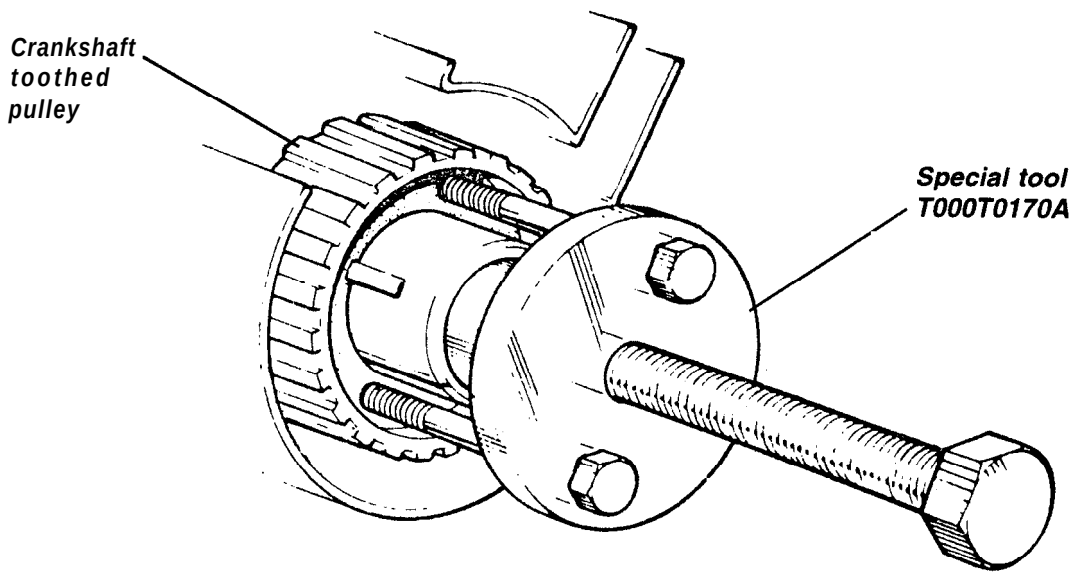
The connecting rods are fitted with steel backed leaded bronze lined big end bearings which may be replaced with the engine 'in situ'.

1. Remove the sump (see sub-section EF.13).
2. Check each connecting rod and cap for paired markings, and if necessary mark with a figure 1,2,3 or 4 to identify each cap with its rod and cylinder.
3. Remove both bolts from no.1 connecting rod and tap the cap to release from the dowels. Remove the remaining connecting rod caps. Remove the bearing shells from the rods and caps.
4. Examine the condition of the crankpins for excessive wear or scoring and if necessary, remove the crankshaft for regrinding.
5. Measure crankpin diameter to establish whether the crankshaft has been reground (-0.010 in. or -0.020 in.) before selecting replacement shells. See Technical Data.
6. Fit new shells into each connecting rod and cap and lubricate with clean engine oil before fitting the correct cap to each rod.
7. Progressively tighten each pair of big end bolts to 114 - 117 Nm (84 - 86 lbf.ft.)
8. Refit sump (see sub-section EF.13).

EF.15 - CRANKSHAFT FRONT OIL SEAL

The crankshaft front oil seal is located in the front cover, which may be removed with the engine 'in situ'.

1. Remove all 'V' belts. release crankshaft 'V' pulley bolt and conical washer and withdraw triple 'V' pulley,
2. Turn engine to timing position, with no. 1 cylinder (firing) at TDC using the timing marks and pointer on the flywheel rim and clutch housing with the cam pulley timing marks facing towards each other (see EF.5).
3. Release timing belt eccentric tensioner lock nut, slacken belt tension, and slide belt off crankshaft toothed pulley,



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4. Using special tool **T000T0170A,** and fitting the two bolts into the pulley finger tight only, pull the toothed pulley off the crankshaft nose.

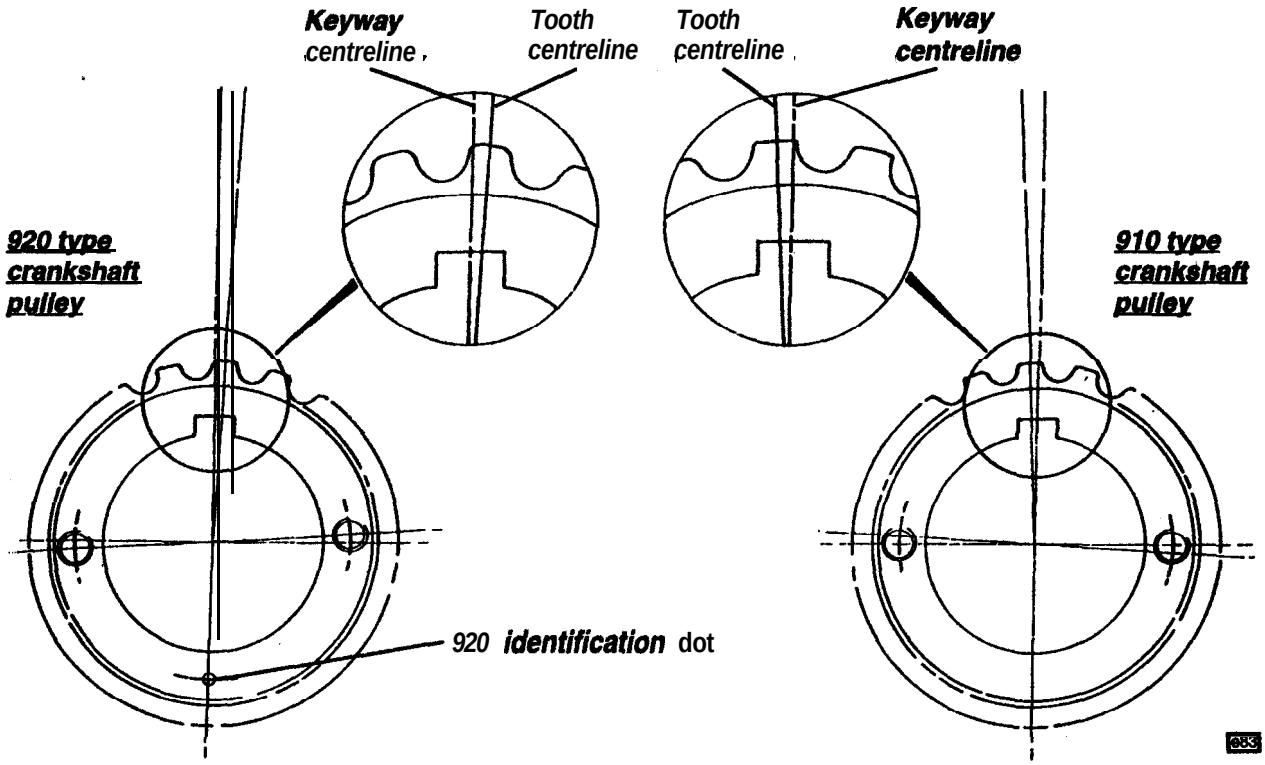
5. Release the seven fixings securing the front cover to the front of the block, and withdraw cover. Press out oil seal.

To Replace:

1. Apply 'Wellseal' to the outer diameter of a new oil seal, and insert into the front cover until flush with the rear face.

2. Apply jointing compound to both mating faces, use a new gasket, and carefully fii the cover and oil seal over the crankshaft nose and into position. If access permits, use special tool TOOOT0675 to protect the lip seal during fitment. Torque tighten fixings to 10 ▪ 11 Nm (7 ▪ 6 **lbf.ft).**

3. **Refit** remaining parts in reverse order to disassembly, referring to sub-section EF.6 to refit and tension timing belt. Torque tighten **'V'** pulley bolt to 79 ▪ 61 Nm (56 ▪ 60 **lbf.ft).**
Note that the 920 type front pulley is different to the 910 type in respect to the orientation of the teeth to the **keyway.** The 920 type is identified by a dot mark on the hub of the pulley. A few engines may be fitted with a pulley having two **keyways,** one for 920 and one for 910 applications. Refer to the diagram for the correct assembly condition.



EF.16 - FLYWHEEL & CRANKSHAFT REAR OIL SEAL

Flywheel

A steel flywheel is used on all versions, with an integral starter ring gear machined on the periphery.

To Remove:

1. Remove the transmission assembly (see section F).

2. Remove the clutch cover and centre plate from the flywheel (see section **Q).**

3. Release the six bolts securing the flywheel to the crankshaft and withdraw the flywheel from the locating dowels.

4. Examine the clutch wearing face of the flywheel for signs of excessive wear or scoring and reface or replace flywheel if necessary.

To Replace:

1. Fit the flywheel onto the crankshaft flange, locating the two dowels. Apply Permabone Al34 thread locking compound (A100B6155V) to the threads in the flywheel and fit the six retaining bolts WITHOUT washers. Torque tighten to 75 Nm (55 ibf.ft)

2. Check axial run out at the clutch face on the flywheel using a dial gauge. See Technical Data.

3. Replace clutch centre plate and cover (see section Q).

4. Replace transmission assembly (see Section F).

Crankshaft Rear Oil Seal

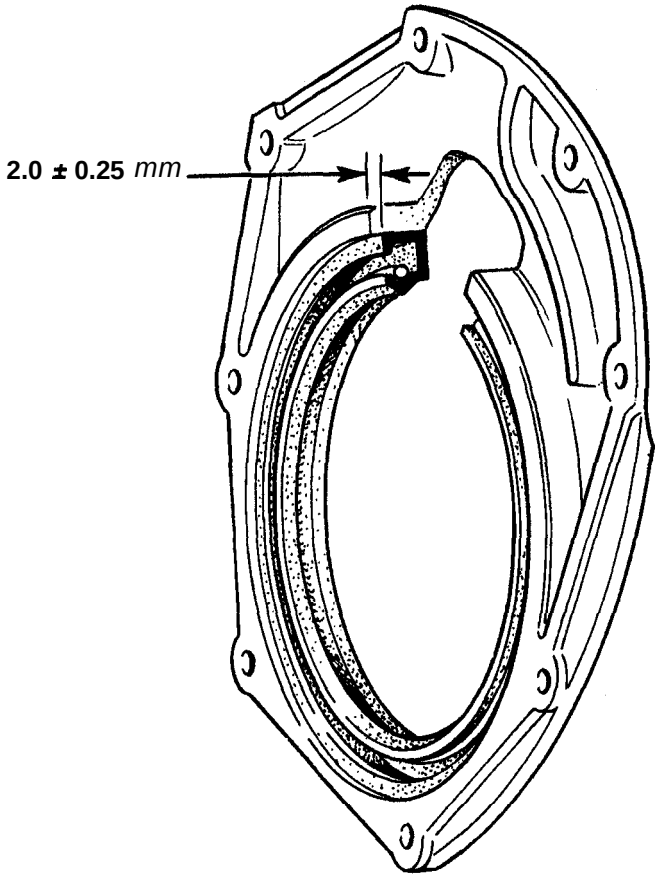
The cover of the oil separation chamber on the rear of the cylinder block houses a lip seal running on the outer diameter of the crankshaft rear flange.

To Remove:

1. Remove flywheel (see above).

2. Release the 8 button head screws and remove the rear housing. Press out the oil seal.

3. Fit a new oil seal into the housing to the dimension shown in the diagram. Ensure the seal is fitted squarely.



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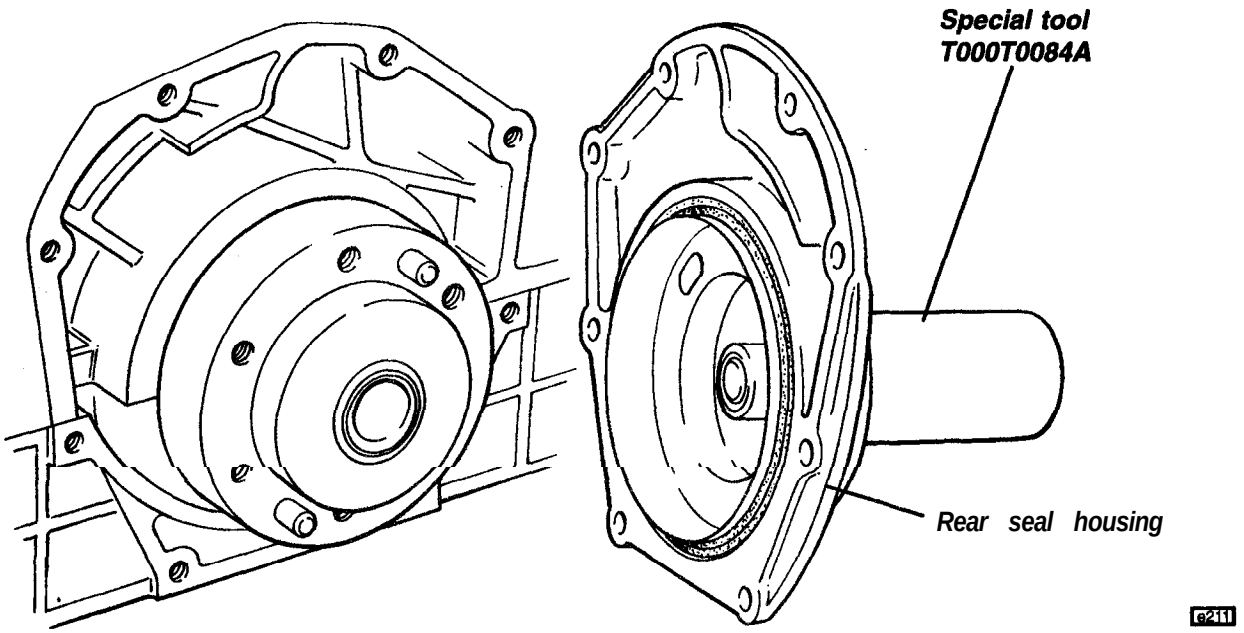
4. Lightly lubricate the lip of the seal, apply Permabond Al36 **(A912E6421V)** to the mating face of the housing, and refit using special tool **T000T0084A** to protect the seal and position the housing.



5. Fit the eight special 'button' head screws with their thin flat washers and torque tighten to 10 • 11 Nm (7 • 6 **lbf.ft)**

6. Refit flywheel, clutch and transmission assembly.

EF.17 • CRANKSHAFT & MAIN BEARINGS

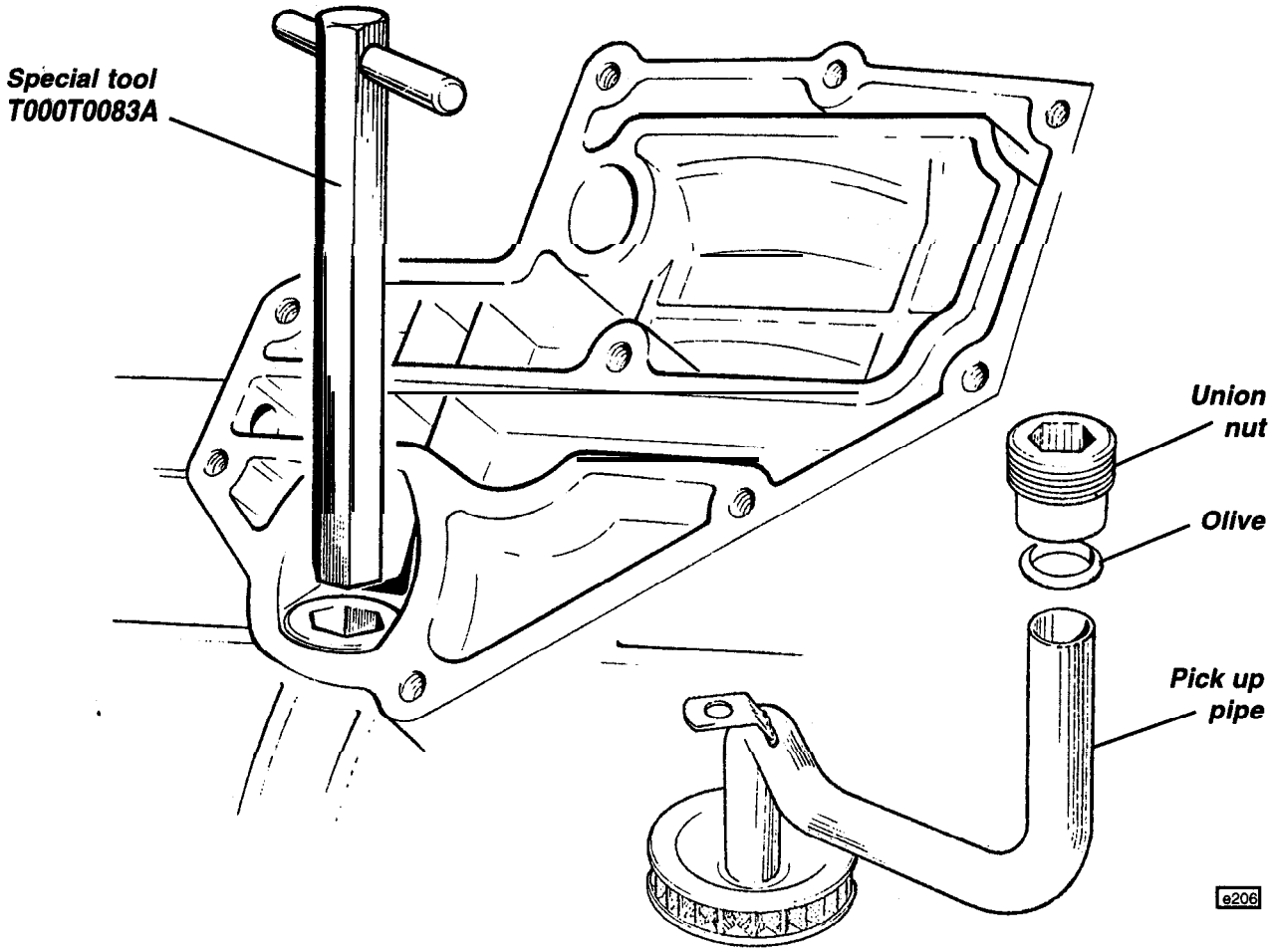
The cast iron crankshaft runs in five steel backed leaded bronze lined main bearings, with end float controlled by thrust washers located in the cylinder block on either side of the **rearmost** main bearing. The main bearing 'caps' are integral with a one piece main bearing housing bolted to the underside of the cylinder block.

To Remove:

1. Remove the engine/transmission assembly from the car (see sub-section **EF.3),** separate the transmission from the engine (see Section F) and mount the engine on a suitable stand.

2. Remove the crankshaft front oil seal housing (see sub-section **EF.15),** flywheel and rear oil seal housing (see sub-section **EF.16),** and sump (see sub-section **EF.13).**

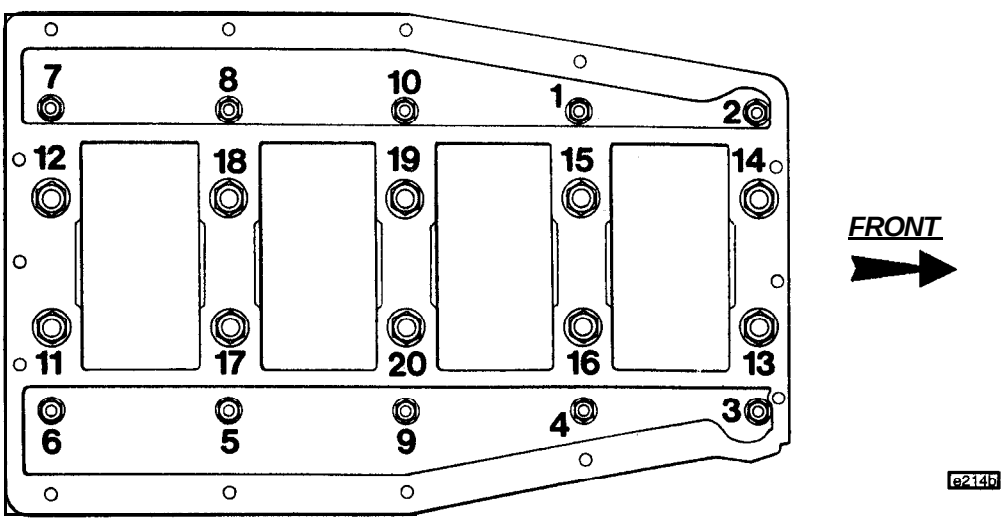
3. Remove the auxiliary housing (see sub-section **EF.11),** and with the aid of special tool **T000T0083A** (19 mm a/f) remove the union nut securing the oil pick up pipe in the block.



4. Ensure each connecting rod bearing cap is identified with its rod and cylinder, before releasing each pair of connecting rod bolts and tapping the cap free. Push each piston up its bore to clear the connecting rods from the crankshaft.

5. Working in a diagonal sequence as shown in the diagram, progressively release first the ten M8 nuts and washers securing the outer part of the main bearing housing to the block, followed by the ten Ml2 nuts and washers securing the main bearing journals. Withdraw the oil pick up pipe from the block.

Main Bearing Housing Releasing Sequence

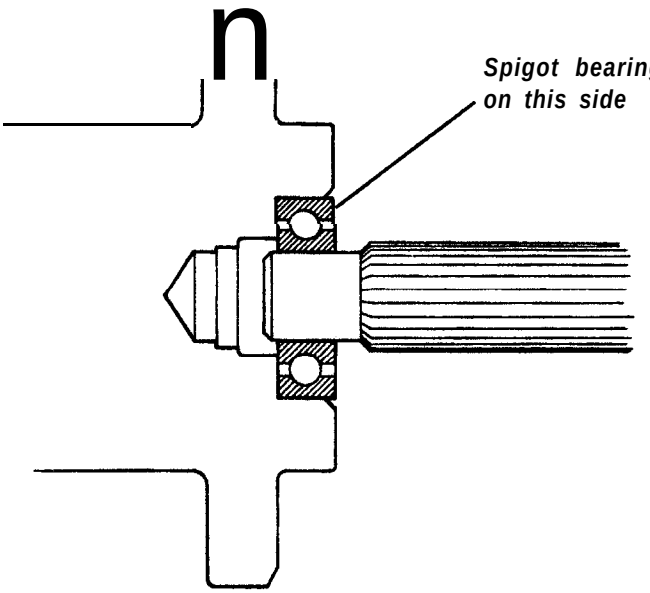


6. Lift off the main bearing housing, tapping if necessary with a rubber mallet to ease withdrawal. Remove the spray shield (if fitted) from the rear of the block, and discard. There is no requirement to refit this component.

7. Lift out the crankshaft. Remove the main bearing shells from both the block and m.b.h. Remove the thrust washers from each side of no.5 main bearing in the block.

To Replace:

1. Pull out the ball type spigot bearing from the rear end of the crank using a suitable puller or slide hammer. The bearing has a single rubber seal, and should be packed with Esso Unirex N3 or equivalent before fitting. Apply Loctite 646 adhesive to the outside of the bearing before fitting, seal side outermost, using a suitable dolly (e.g. special tool TOOOT0652) to apply force only to the outer race, until fully bottomed in its bore.



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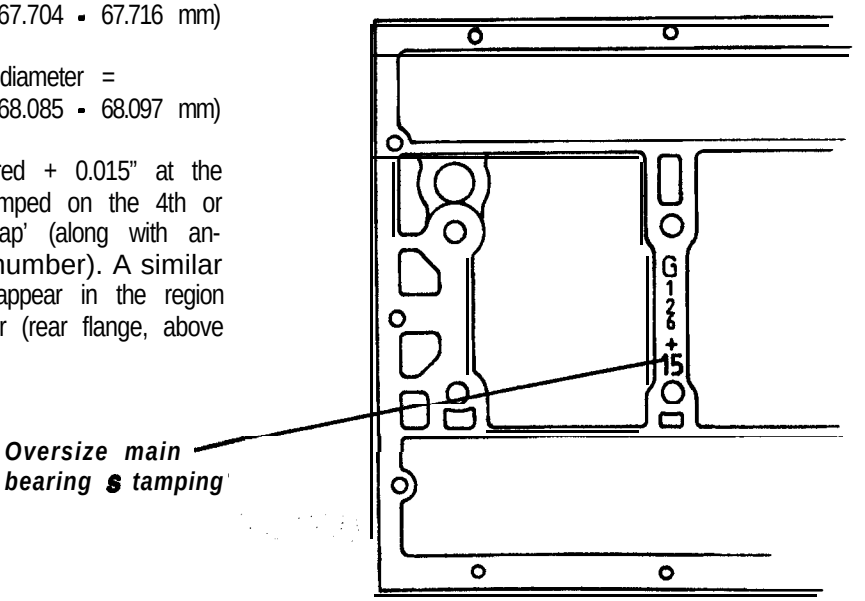
2. Before selecting replacement main bearing shells, it is MOST IMPORTANT to check whether the block assembly has been bored to accept + 0.015" oversize outside diameter main bearing shells:
Fit the m.b.h. to the block without shells fitted and measure the main bearing bore diameter:

Standard bore diameter =
2.6655 - 2.6660 in (67.704 - 67.716 mm)

+ 0.015" O/D bore diameter =
2.6805 - 2.6810 in (68.085 - 68.097 mm)

Block assemblies bored + 0.015" at the factory have '15' stamped on the 4th or 5th main bearing 'cap' (along with another 4 or 5 digit number). A similar stamping may also appear in the region of the engine number (rear flange, above starter motor).



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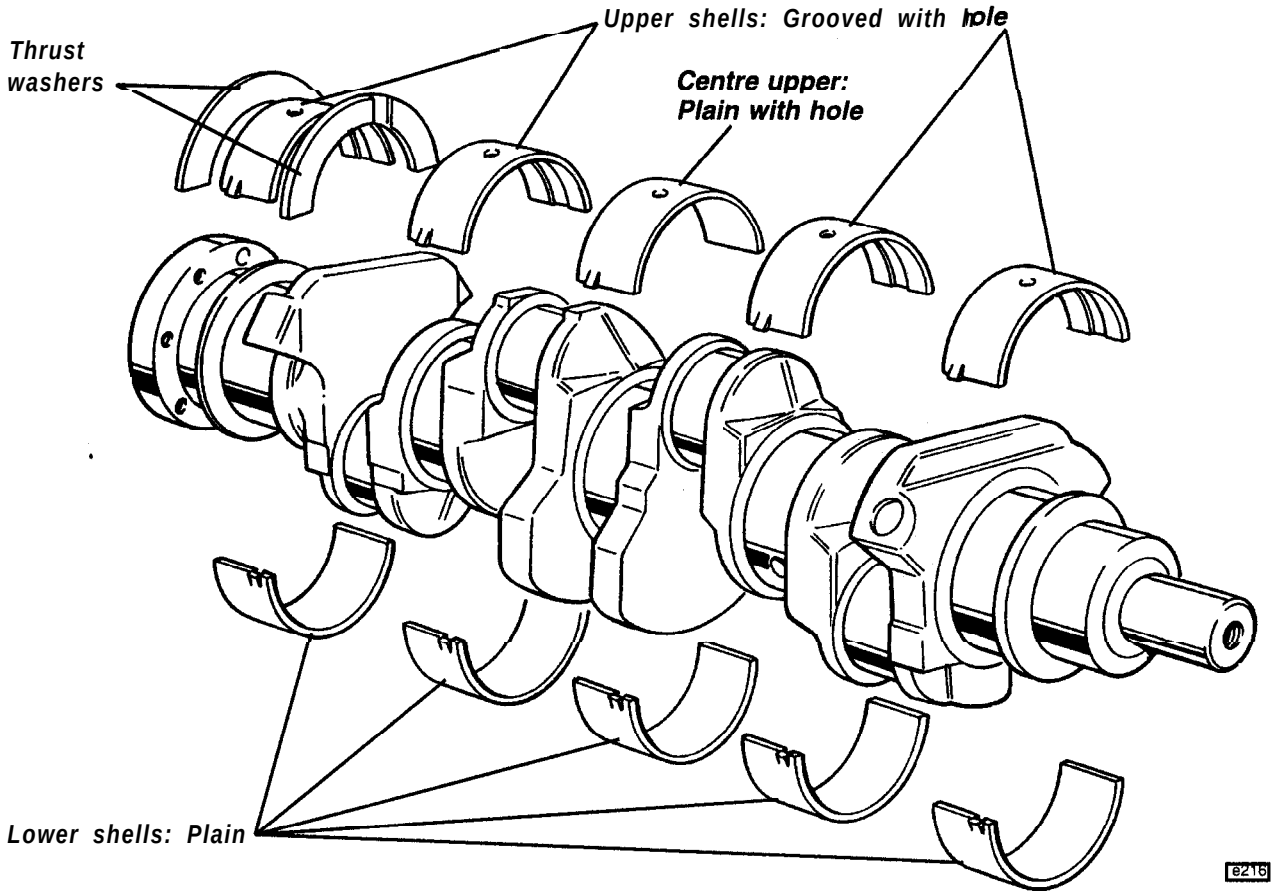
Also check crankshaft main journal diameter to check whether the crank has been reground. Main bearing shells are available in standard, - 0.010", and - 0.020" internal diameters, in both standard and + 0.015" oversize outside diameters.

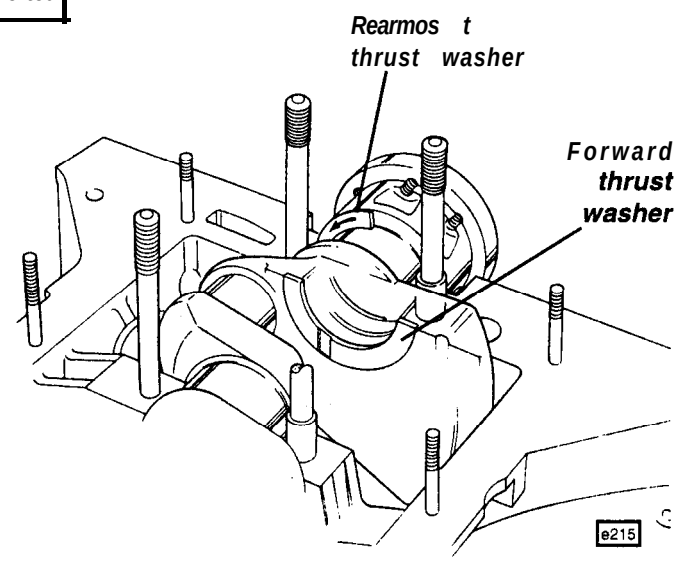
3. Note that three different types of shell are fitted in each engine.
   - all lower shells are plain.
   - upper shells except centre are grooved with hole.
   - upper centre shell is plain with hole.



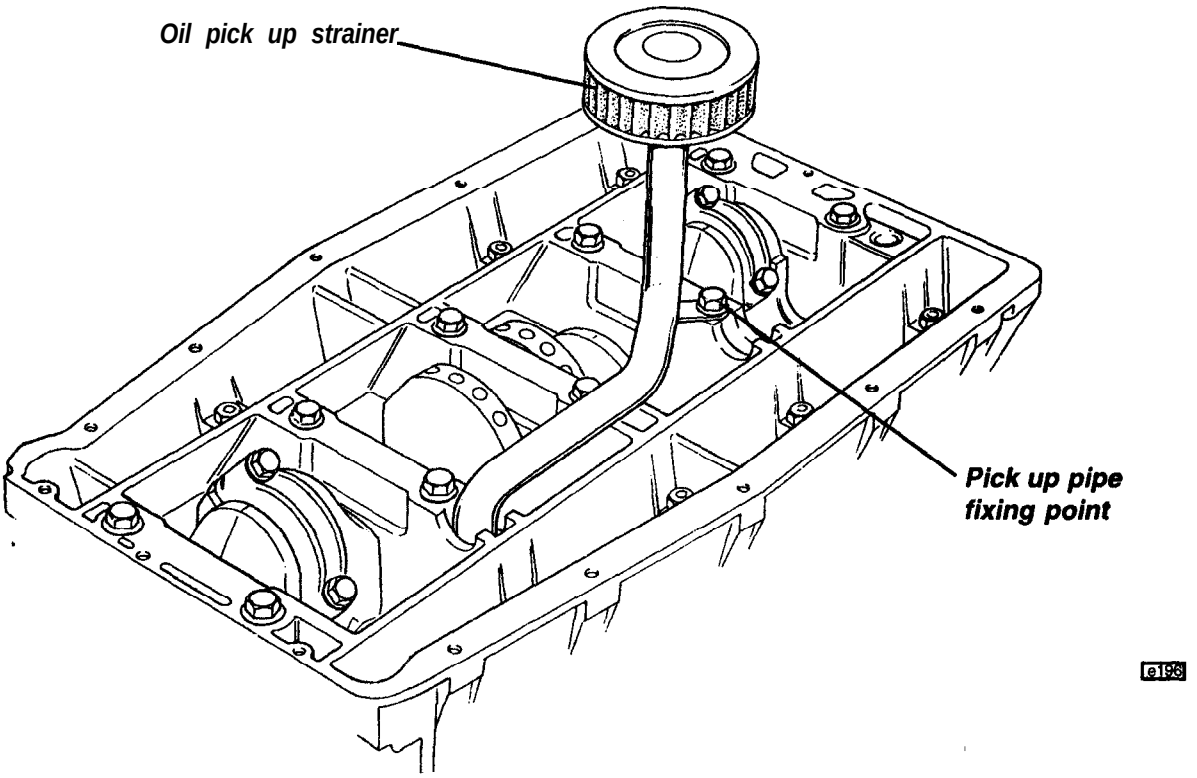
Note: Remember that when fitting main bearing shells, the block will normally be inverted

Fit the new shells into the block and main bearing housing in the correct configuration, and apply a small amount of graphogen grease to each bearing.

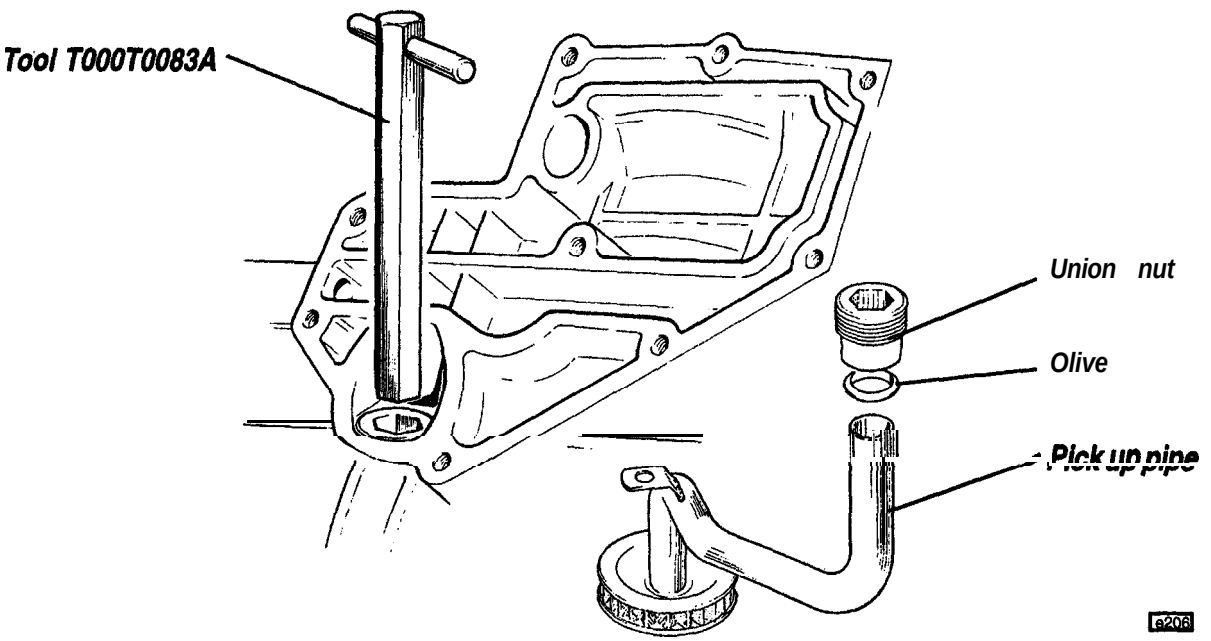
4. Fit the crankshaft into the block and turn to distribute the graphogen grease. Slide new selective thrust washers into position on no. 5 main bearing, with the grooved 'copper' side toward the crank. Measure the crankshaft end float (refer to Technical Data) and change thrust washers if necessary to bring within specification.



5. Check that all main bearing housing to block location dowels are fitted. Apply Loctite 509 sealant (A920E6007V) or Wellseal jointing compound (A907E6119Z) to the joint face on both main bearing housing and block, and fit the m.b.h. into position. If necessary, use a pair of nuts to pull up the joint over the dowels, but do not tap the housing as the bearing shells may be displaced.

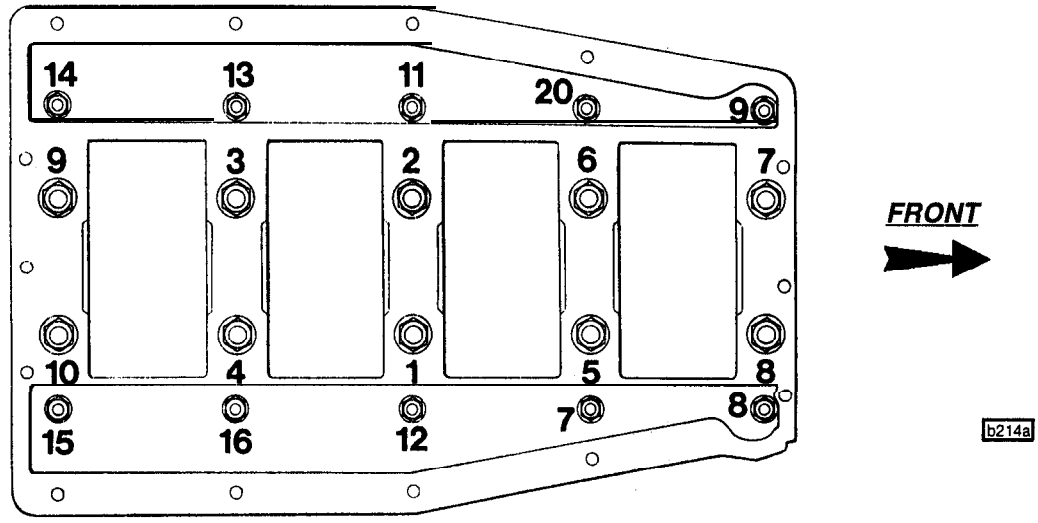


6. Fit the oil pick up pipe/strainer assembly into position with the pipe bracket located by no 4 main bearing bolt. Coat a new plastic compression olive with engine oil, and from the auxiliary housing end, push over the end of the pick up pipe. Fit the (oiled) union nut, and with the aid of special tool T000T0083A, torque tighten the nut to 75 Nm (55 lbf.ft).



7. Fit all main bearing housing retaining washers and nuts and progressively tighten the M8 nuts along the outer sides in a diagonal sequence outwards from the centre to 19 - 22 Nm (14 - 16 lbf.ft)
Progressively tighten the (oiled) MI2 nuts adjacent to the main bearings, in pairs, outwards from the centre, to 88 Nm (65 lbf.ft).

Main Bearing Housing Tighi tenina Sequence



8. Fit new 'big end' bearing shells into the connecting rods and caps (see EF.14.) and refit to the crankshaft after liberally coating with engine oil.
Torque tighten connecting rod bolts to 114 - 117 Nm (84 - 86 lbf.ft).

9. Refit sump (EF.13) crankshaft front oil seal (EF.15) flywheel and crankshaft rear oil seal (EF.16)

10. Replace engine/transmission assembly (EF.3)

EF.18 - PISTONS. CONNECTING RODS & CYLINDER LINERS

The forged aluminium alloy pistons have nickel or chrome plated crowns and are fitted with two compression rings and one oil control ring, all above the fully floating gudgeon pin. The 'wet' cylinder liners are forged from aluminium alloy with a 'Nikosil' coating applied to the bores, and are a push fit into the block. The 'I' section forged steel connecting rods have steel backed bronze lined big end bearings, with the bearing caps located by dowels and retained by bolts.

Pistons & Connecting Rods:

1. Remove engine/transmission assembly (see sub-section EF.3).

2. Remove cylinder head (sub-section EF.7).

3. Remove sump (sub-section EF.13).

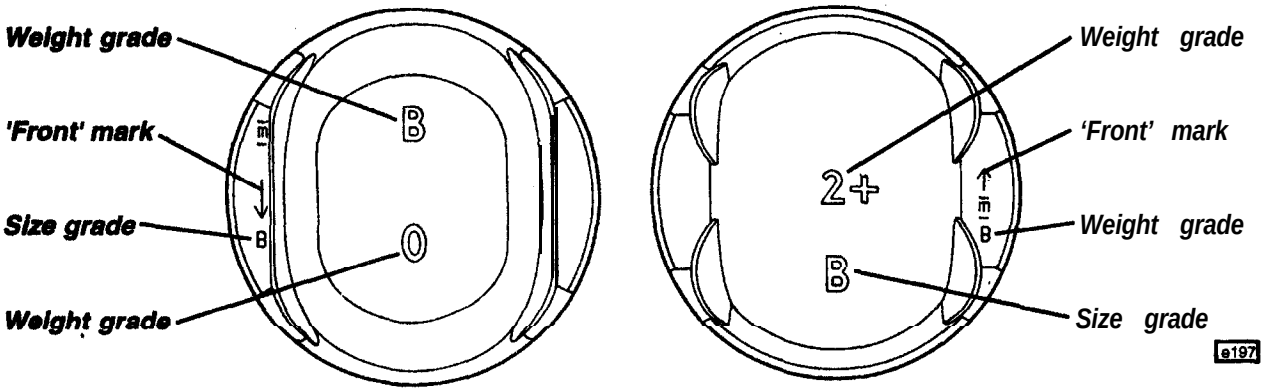
4. Ensure each connecting rod bearing cap is identified with its rod and cylinder before releasing each pair of connecting rod bolts and tapping the cap free.

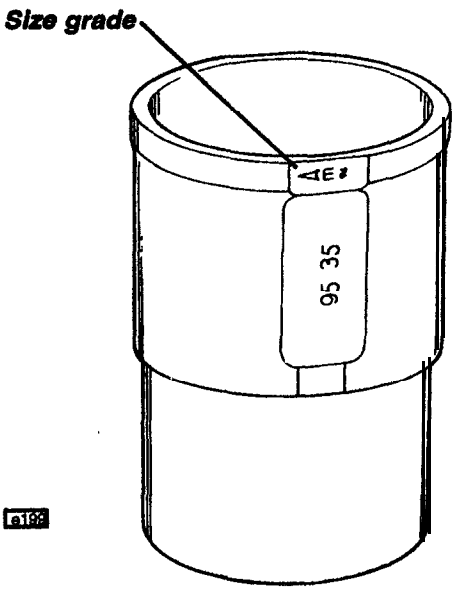
5. Remove the ring of carbon from around the top of the liner bores and push each connecting rod and piston up and out of its cylinder. Mark each piston with its cylinder number.

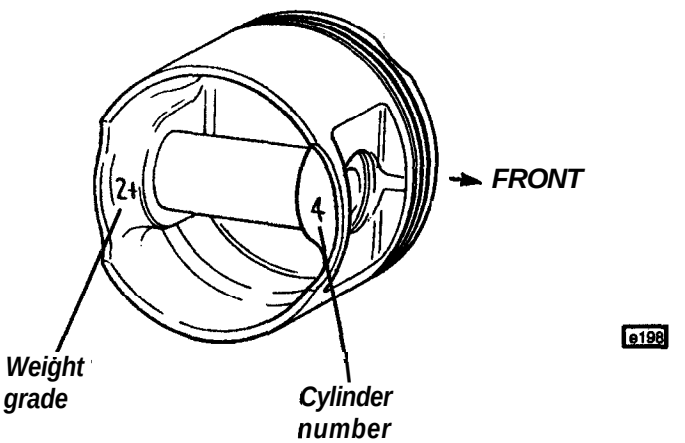
6. Remove the gudgeon pin circlips and push the pin from the piston to release the connecting rod.

7. To replace a piston:
New pistons are supplied complete with matched cylinder liner, piston rings, gudgeon pin and circlips. The pistons are weight graded in **3g** increments and are marked on the crown with a stamping **3+, 2+, 1+,** 0, **1-,** 2-, or **3-.** The pistons and liners are also graded by diameter as either 'A' or 'B', with the letter stamped on the piston crown, and marked on an outside 'flat' of the liner. Each engine should use four pistons of the same weight grade, but 'A' and **'B'** grade diameters may be mixed provided 'A' grade pistons are fitted in 'A' grade liners and 'B' with **'B'.** Thus if replacing a single piston/liner assembly, it is necessary to check the weight grade of the remaining pistons, and quote this with the parts order. Complete engine sets (4) will be supplied automatically as a weight graded set.

2.2 litre piston ***2.0 litre piston***

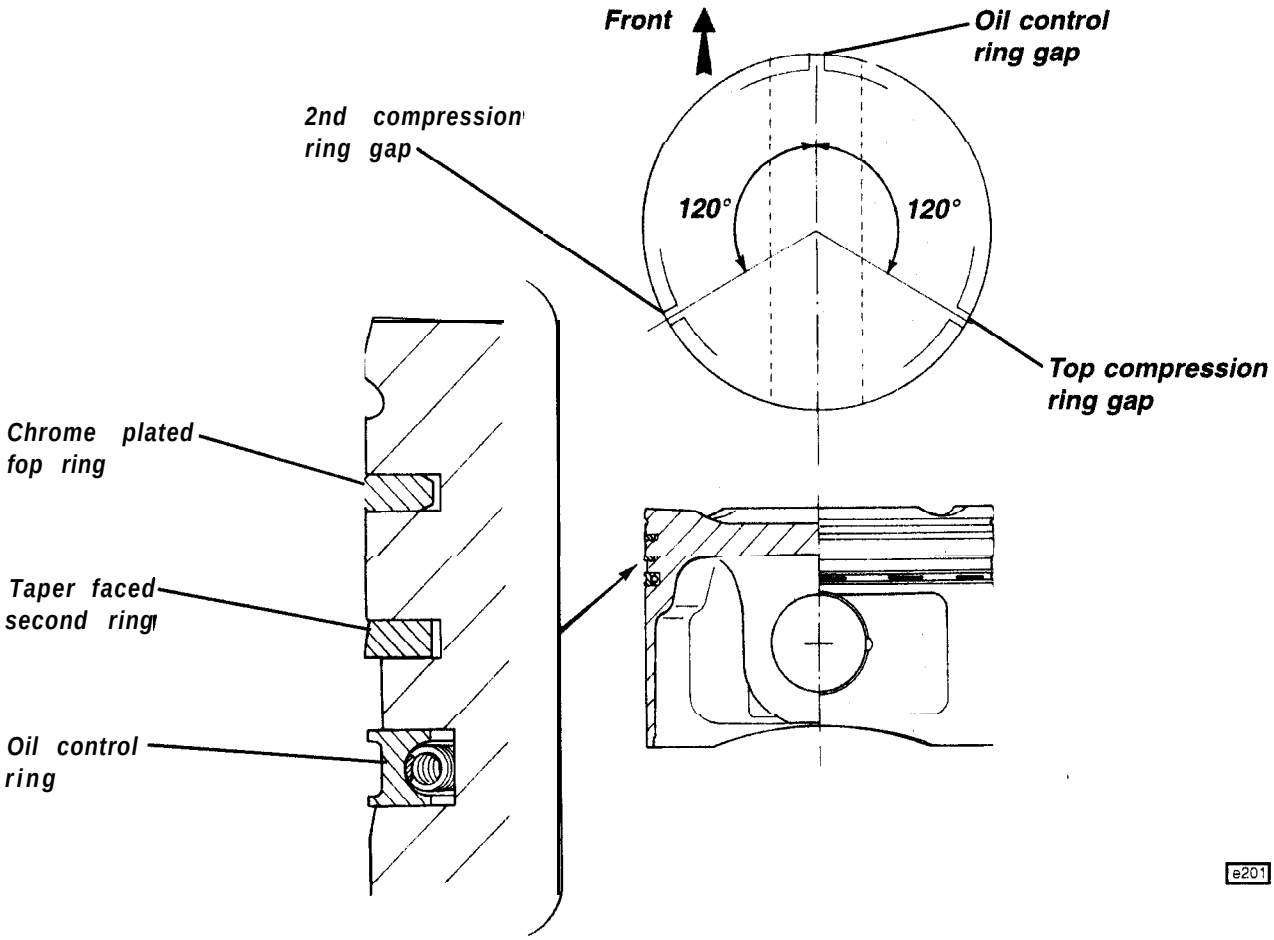






The arrow stamped on the piston crown should point towards the front of the engine. Note that the gudgeon pin on 920 engines is offset 0.8 mm towards the thrust side to reduce piston rocking.
Piston rings are available individually, and comprise a chrome plated top compression ring which may be fitted either way up, a plain second compression ring with a tapered face and the word 'TOP' marked on the upper side, and an oil control ring backed with a spring.
Use a piston ring expander tool to fit the piston rings onto the piston:

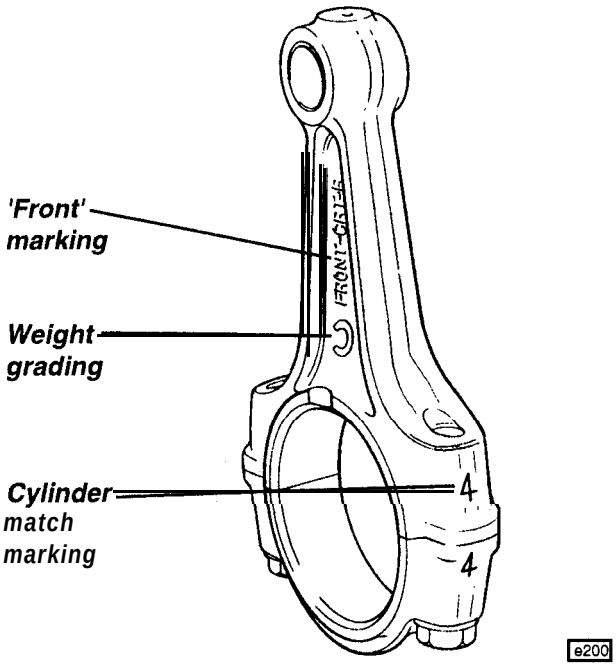
- Fit the oil control ring expander spring into the bottom groove, with the gap positioned at the rear of the piston.
- Fit the oil control ring over the expander spring, with the gap at the front of the piston.



- Fit the second compression ring into the middle groove with the 'TOP' mark uppermost, and position the gap 120° from the oil ring gap.
- Fit the top compression ring, either way up if new, or as previously fitted if being reused, with the gap 120° apart from the other two ring gaps.

8. Connecting rods: The connecting rods are weight graded in 2g increments, with each engine fitted with a matched set of four. The grade is identified by a letter code painted and/or etched below the forged 'FRONT' on the rod. If replacing a single connecting rod the weight grade on the remaining rods should be quoted with the parts order. Complete engine sets (4) will be supplied automatically as a matched set.

The steel backed bronze little end bush may be renewed using suitable press tools, but must be reamed to size after fitting (see Technical Data).



9. Fit the connecting rod into the piston with the arrow on the piston crown pointing towards the 'FRONT side of the rod. Insert the gudgeon pin and retain with new circlips, ensuring these are securely seated in their grooves.

10. Lubricate the liner bore with clean engine oil and using a lubricated piston ring compressor, press the piston and rod assembly into the liner with the arrow on the piston crown pointing forwards. Take precautions as necessary to prevent the big end eye damaging the cylinder bore.

11. Fit new bearing shells into the connecting rod big end and cap (see sub-section **EF.14),** lubricate with clean engine oil and fit to the crankpin. torque tightening connecting rod bolts to 114 ▪ 117 Nm (84 ▪ 88 **lbf.ft).**

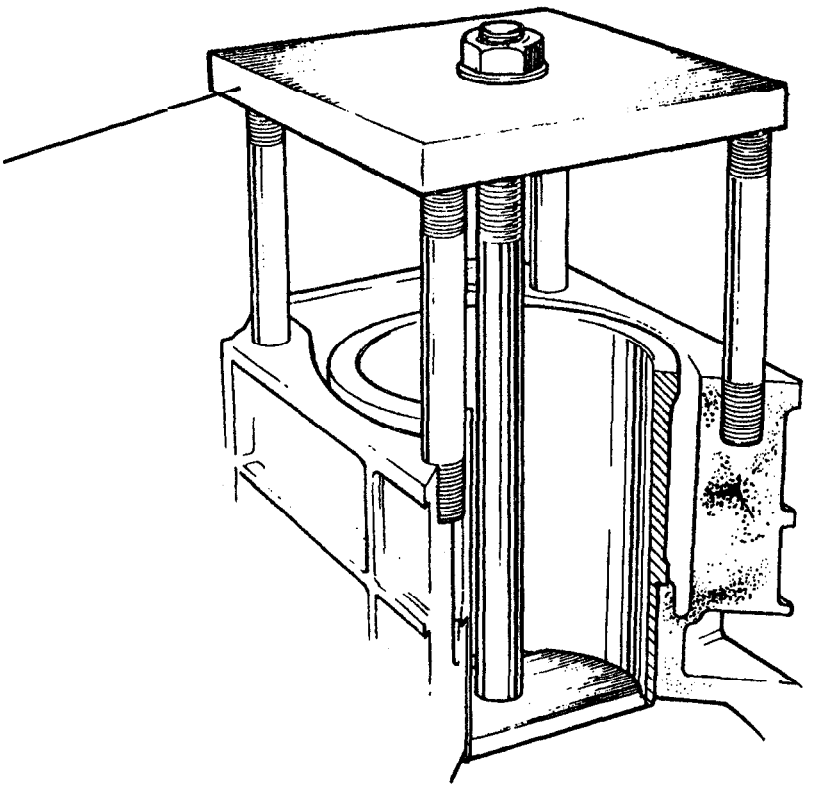
12. Replace sump, cylinder head and engine/transmission assembly.

Cylinder Liners

In order to ensure complete sealing of the water jacket from the crankcase, Locitite 572 is used to seal the seating flange and lower portion of the cylinder liner. The adhesive properties of this product also help to retain the sealing of the liners when the cylinder head is removed. Although the liners themselves are a light push fit into **the** block, the adhesive requires that a puller tool is used to withdraw the liners.

1. Remove piston/connecting rod assemblies (see above).

2. Using special tool TOOOT0012, withdraw the liners from the block.



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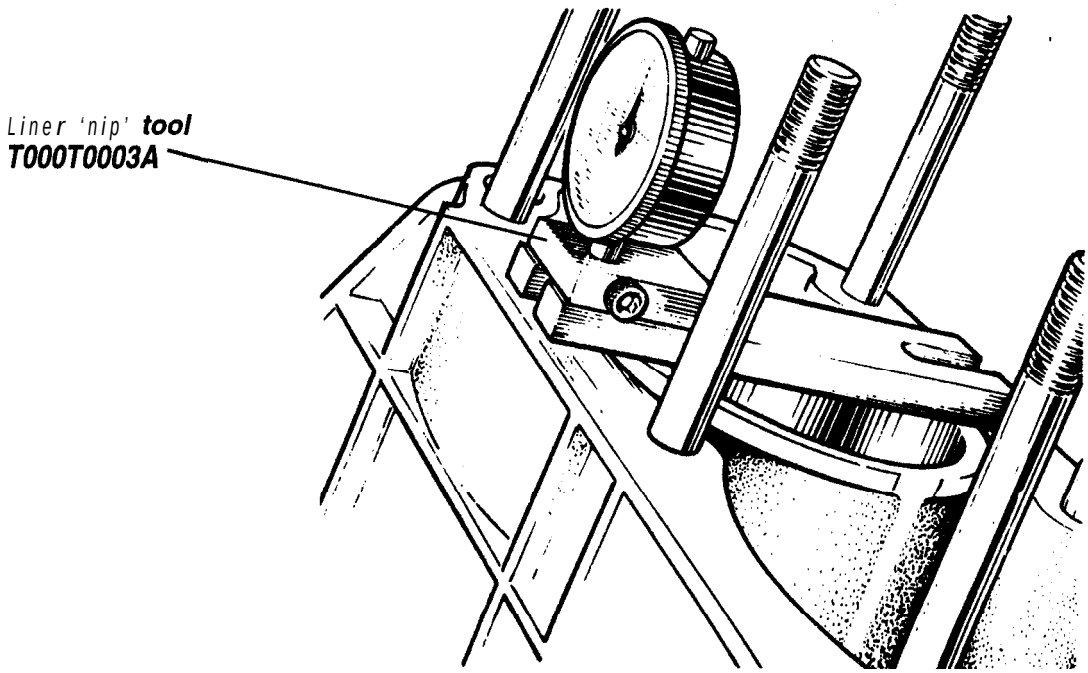
3. Before fitting a liner, clean all traces of adhesive/sealant from the seating flange and spigot area in the block, and similarly clean all sealant from the liner.
Fit the liner clean and dry with it's 'flats' to the front and rear. Check liner 'nip' (standout of liner above block face) and variation in height between adjacent liners using special tool **T000T0003A.**
Specification: ▪ **0.03** mm to + 0.05 mm (- 0.001 to + 0.002 in)
max. variation between adjacent liners; 0.03 mm (0.001 in)
If necessary, swop and/or rotate liners to optimise standout variation.



4. Withdraw each liner and apply a small bead of Loctite 572 around the seating face of the liner. Apply a thin smear of Loctite around the outside of the liner spigot and around the top edge of the liner spigot bore in the block.

5. Slide the liners into the block, and fit and torque tighten the cylinder head within 4 hours to ensure that the liners are seated correctly before the adhesive cures.

6. Continue engine re-assembly,

EF.19 - SPECIAL TOOLS

T000T0002A Cylinder Liner Clamps; to retain cylinder liners when head removed

T000G0003A Cylinder Liner Nip Gauge; to check liner standout

T000T0004A Valve Guide Drift: to assemble/remove guides

T000T0660A Inlet Valve Seat Drift; to insert valve seat

T000T0094A Exhaust Valve Seat Drift; to insert valve seat

T000T0675A Front Cover Pilot; to protect front crank seal

T000T001OA Camshaft Oil Seal Inserter; for fitting oil seal

T000T0011A Camshaft Oil Seal Extractor; for extracting oil seal

T000T0012A Cylinder Liner Extractor; for extracting liners

T000T0072A Camshaft Oil Seal Sleeve; to protect oil seal

T000T0083A Oil Pick-Up Pipe Union Spanner; for socket nut

T000T0084A Rear Oil Seal Housing Pilot; to locate housing on re-assembly

T000T0170A Crankshaft Sprocket Puller; for removal of toothed sprocket

T000T0652A Spigot Bearing Inserter; for inserting ball bearing type spigot bearing

T000T0654A Clutch Alignment Mandrel; for use with ball type spigot bearing

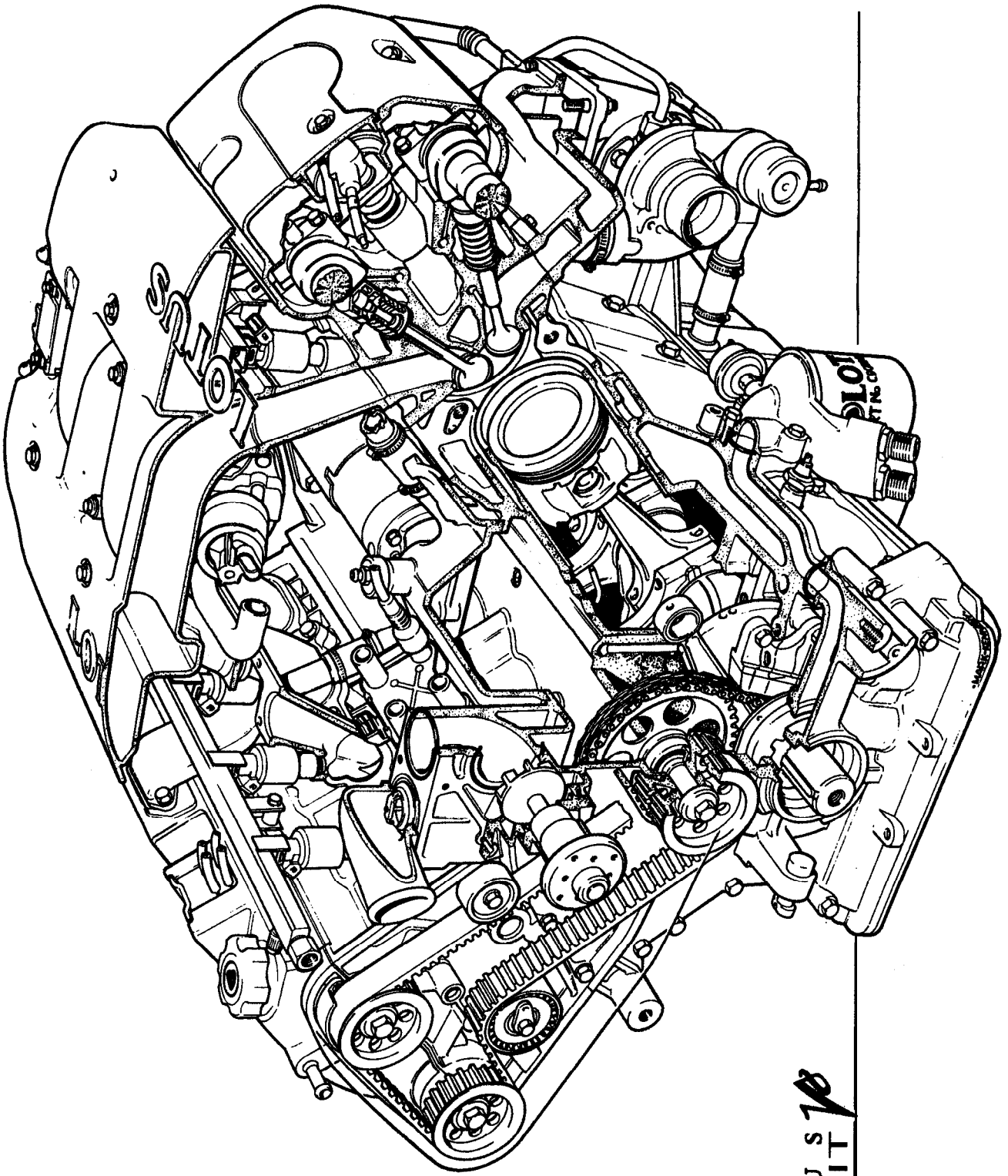
T000G0025J Borroughs Gauge; for checking timing belt tension

TOOOT0443 'Torx' socket; for cam housing bolts

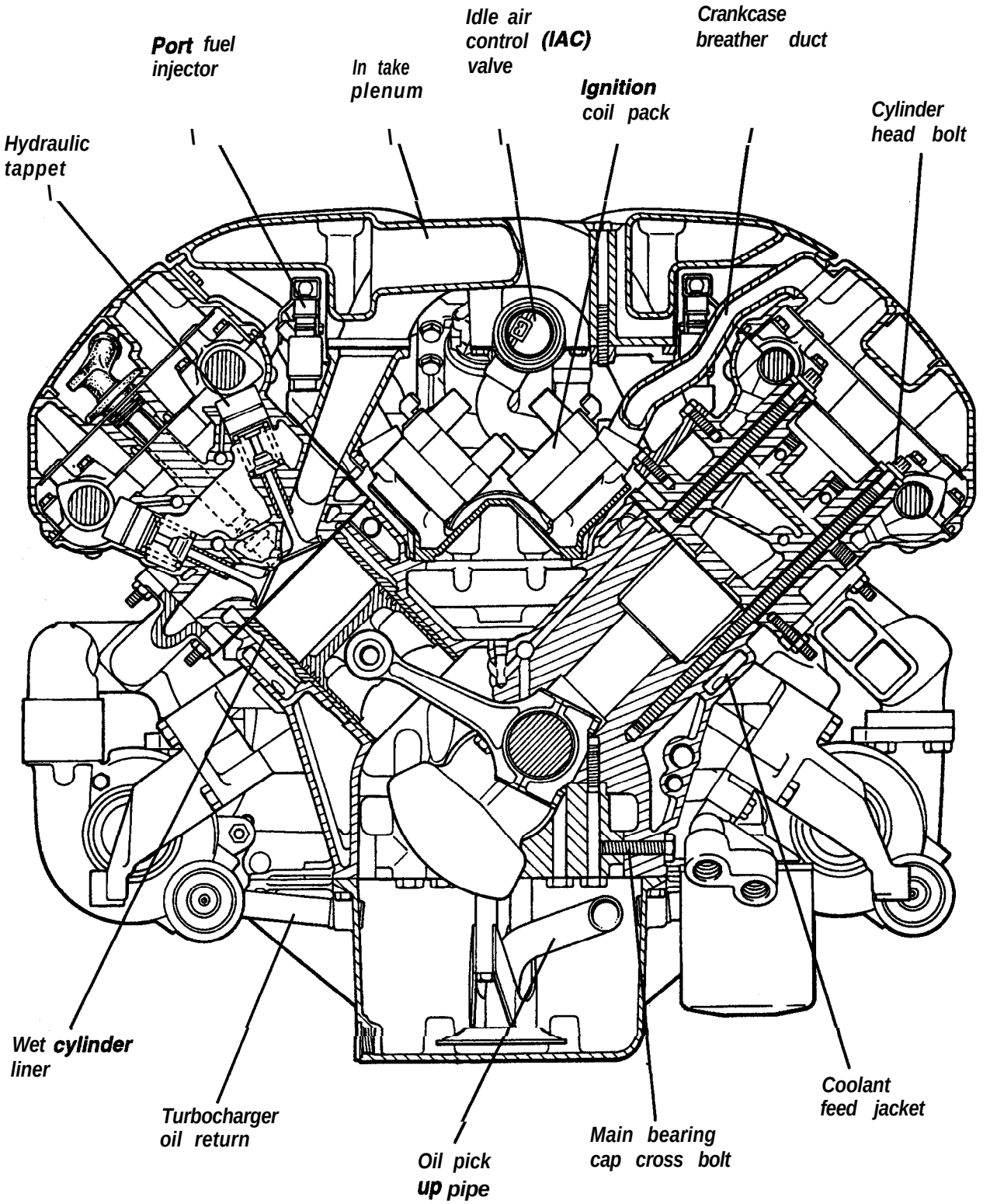
EF.20 - SEALANTS & ADHESIVES

Product	Part Number	Application
Permabond Al36 Ready Gasket	A912E6421V	• cam housing to head • sump to main bearing housing • crankshaft front and rear seal housings
Permabond Al 34 Sealant	Al 00B6155V	• spigot bearing to crank • flywheel bolts • water feed to turbo • cam belt adjuster stud to block • oil temp/pressure transducers • engine mounting bolts to block • cam pulley retaining bolts
Permabond A905 Surface Conditioner	A912E6759V	• all joint surfaces
Permabond A025 High Temp. Sealant	A91 2E6800V	• sample port grub screws • exhaust manifold studs
Loctiie 509 Adhesive/Sealant	A920E6007V	• main bearing panel to block
Loctite 572 Adhesive/Sealant	A91 2E7030V	• cylinder liners to block
Wellseal Gasket Cement	A907E6119Z	• oil gallery cover gasket • aux. housing gasket

Engine – V8
SECTION EF - ESPRIT


S7L
LOTUS ESPRIT

Cross Section - **Lotus 918**



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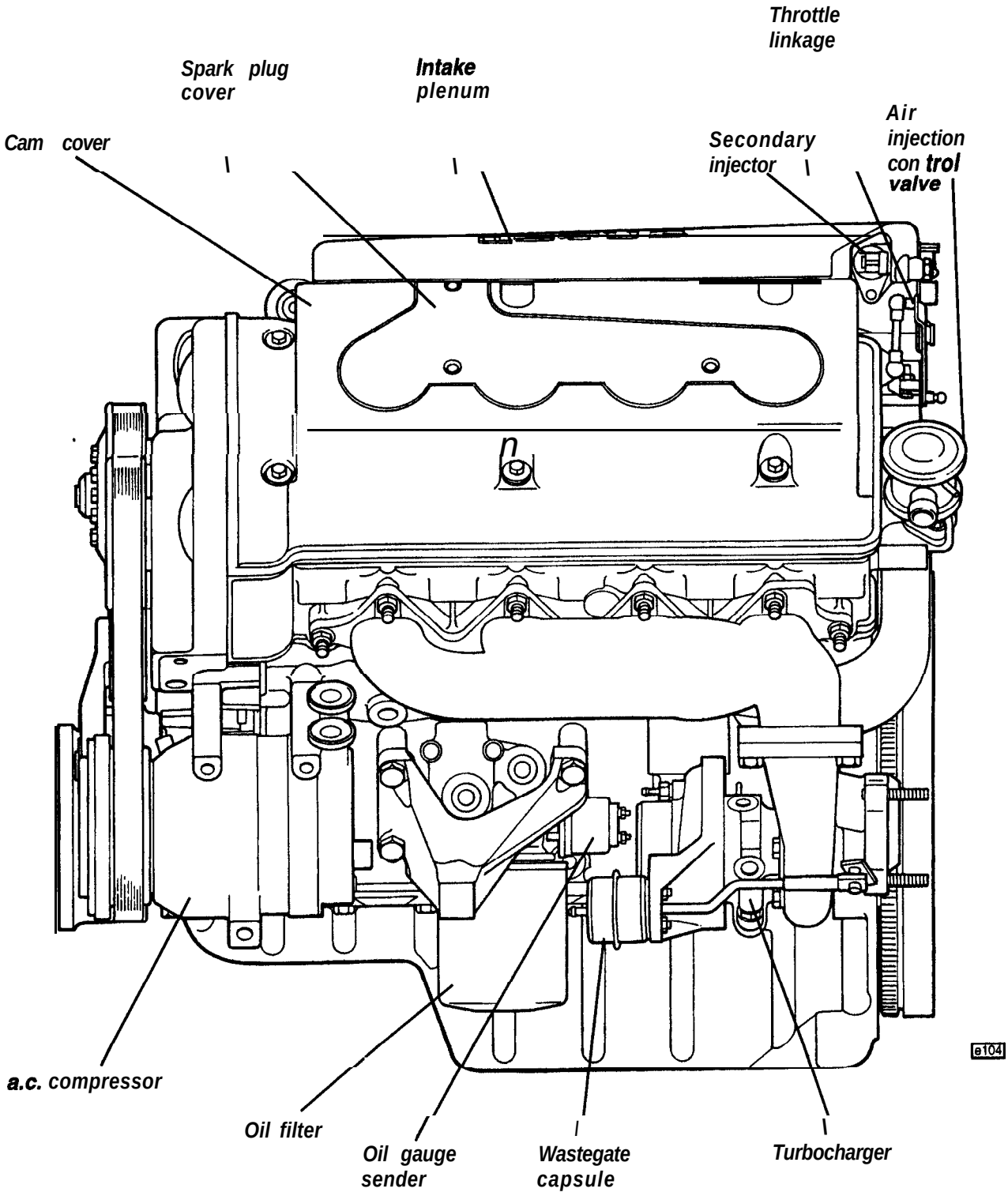
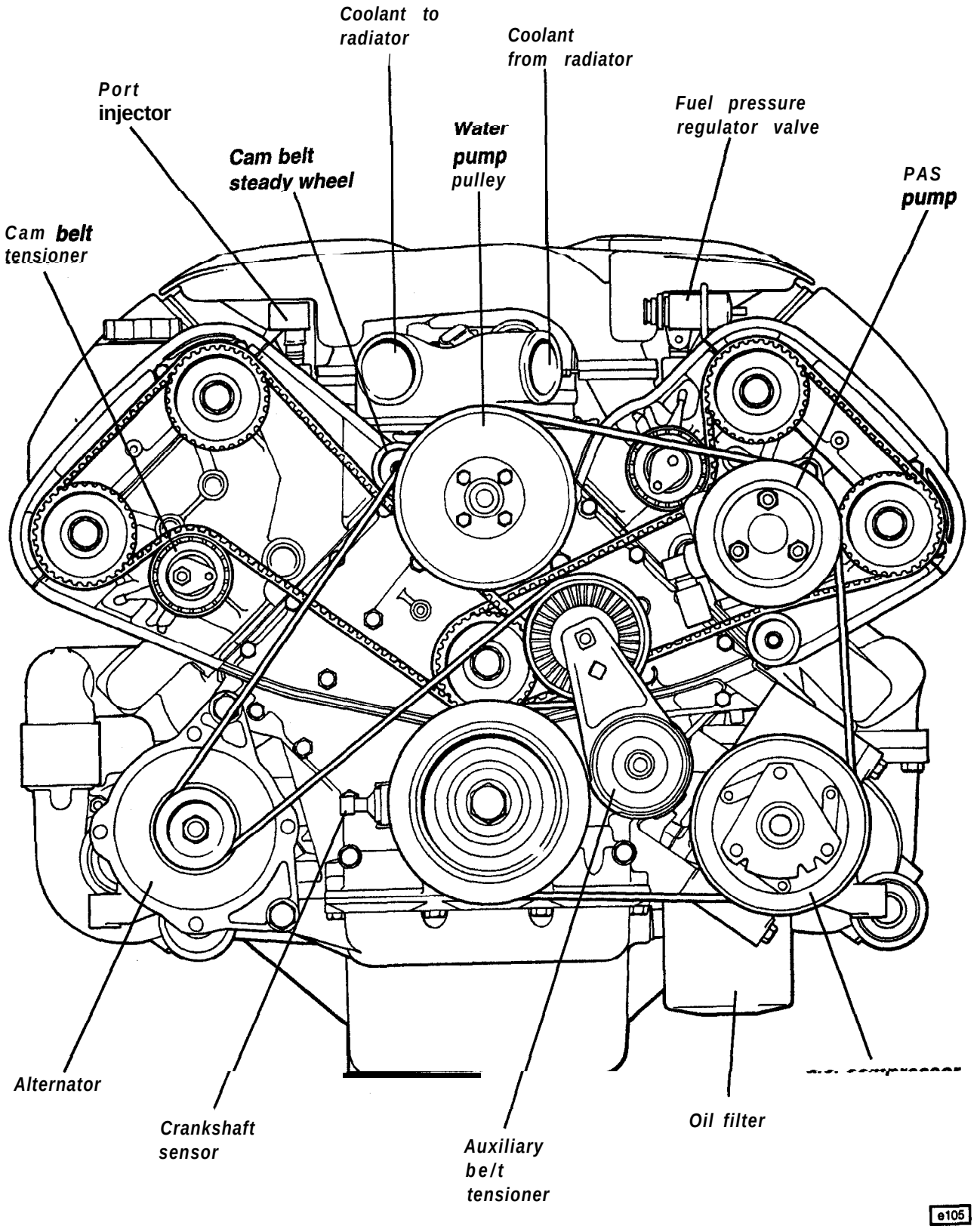
General View - LH side



General View - front



ED.1- GENERAL DESCRIPTION

The Lotus type 918 3.5 litre V8 engine was introduced on the Esprit model range in the spring of 1996, and incorporates the following features:

Cylinder Block

The aluminium alloy (LM25TF) cylinder block comprises two 'open deck' type cylinder banks angled at 90° to each other and mounted on a common crankcase. The RH bank is staggered ahead of the LH bank and contains cylinders 1,2,3,4 with cylinders 5,6,7,8 designated as the LH bank,.counting from the front in both cases. Cast iron, push fit 'wet', cylinder liners are spigotted into the block, seated on a flange near the bottom of the swept volume, and clamped down by the cylinder head. The crankcase extends some way below the crankshaft centreline, and is further stiffened by cross bolted spheroidal graphite cast iron main bearing caps and a cast alloy sump.

Cylinder Head

Each of the two aluminium alloy (LM25TF) cylinder heads contain four valves for each cylinder in 'pent roof' combustion chambers, with the inlet and exhaust valves angled at 42° to each other, and at 21.5° and 20.5" respectively to the cylinder axis. A twin electrode 14mm spark plug is centrally placed in each chamber and accessed via a deep tunnel in the head casting. Each cylinder head is retained by 10 long Ml1 setscrews threaded deep into the base of the block. The top face of each head coincides with the centreline of the two overhead camshafts whose five bearings run directly in the head with individual bearing caps.

Crankshaft and Reciprocating Components

The forged steel, four throw, single plane crankshaft uses five main bearings with each bearing cap secured by four vertical bolts, and two cross bolts through the sides of the crankcase skirt. End float is controlled by thrust washers either side of no.4 main bearing. A torsional vibration damper is incorporated with the auxiliary drive pulley and mounted on the front end of the crankshaft, and a steel flywheel fixed by eight bolts to the rear. Each crankpin is shared by a connecting rod big end from each cylinder bank. The forged steel 'I' section connecting rods use straight split big end caps, retained by two bolts, fully floating little ends and gudgeon pins retained in the pistons by wire circlips. The cast alloy pistons have bowl shaped crowns and use a barrel faced compression ring, a 'Napier' type scaper second ring, and an oil control ring pack consisting of two scraper rails and a separater. Bore and stroke dimensions of 83 x 81mm provide a swept volume of 3506cc.

Camshaft Drive and Valveaear

Drive to the twin overhead camshafts of each cylinder head is provided by a two stage driveline at the front of the engine. A short primary stage comprises a Morse inverted tooth chain drive from the crankshaft to an intermediate shaft contained within the engine front cover. This stage accommodates the 2:1 reduction and enables a common size of toothed pulley to be used throughout the secondary stage, also benefitting power unit width. The secondary stage uses a pair of pulleys on the intermediate shaft to drive separate synthetic toothed belts for each cylinder bank, each belt controlled by a temperature compensating 'dynamic' tensioner on the non-drive side, with a steady wheel on the drive side to inhibit oscillation.

Each of the four camshafts is supported in five bearings and operates eight inlet or exhaust valves via maintenance free, inverted bucket, hydraulic tappets. The 33.5mm inlet and 30.0mm exhaust valves have solid stems, operate in replaceable guides and seats, and are closed by single coil springs. Valve stem seals are used to control the flow of lubricant to the valve guides.

Turbocharging and Engine Manaoement Systems

Twin non-handed Garratt T25 type turbochargers with integral wastegates are used, one for each cylinder bank, to provide up to 0.75 bar (10.9 psi) boost pressure. Each turbocharger is mounted alongside the outside rear of each cylinder bank, on a cast iron (Niresist S5S) manifold, and supplies charge air to the opposite cylinder bank. Charge air from each compressor is discharged via a cast alloy duct, to a throttle body at the rear of the engine. The throttle body contains two butterfly valves, one for each cylinder bank, operated by the throttle cable via a rising rate linkage for optimum control at small openings, and quick response at wider openings. Air then flows into an intake plenum comprising a common chamber, two plenum chambers, and eight inlet tracts. The small common chamber sited immediately above the throttle body, allows air supplied from the two turbochargers to mix and balance pressures before separating into two plenum chambers, one

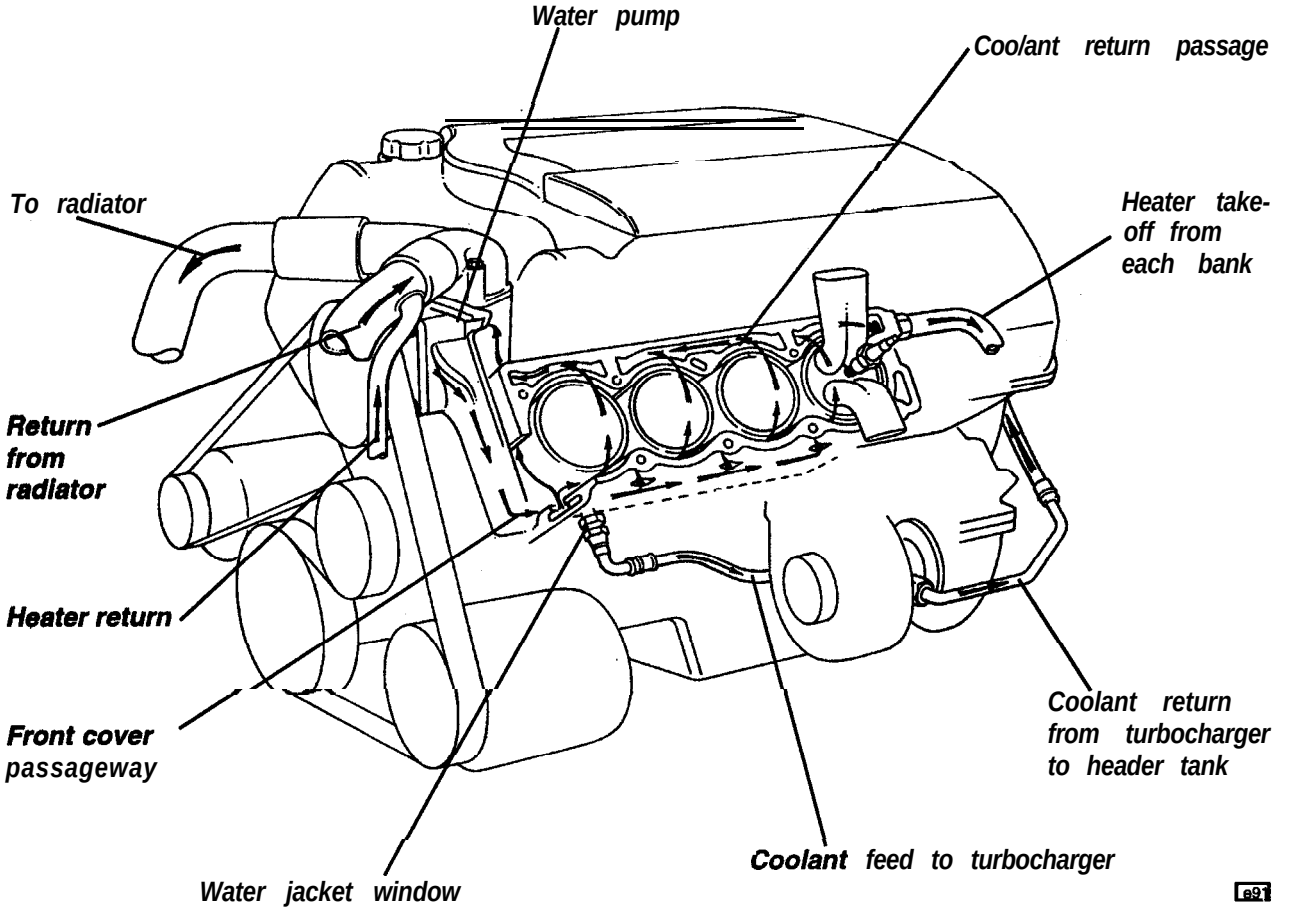
mounted over each cylinder head's cam cover. From each plenum chamber, four inlet tracts lead to a short injector housing (intake manifold) on the opposite cylinder head.

Each branch of the two injector housings is fitted with a dual spray injector to serve its bifurcated inlet port, and is operated sequentially by the engine management ECU. A further two, 'secondary' injectors, are fitted into the rear of the plenum chamber and operate at constant frequency only under conditions of greatest demand. Two twin coil ignition units are mounted within the 'V' and are controlled by the engine management ECU which receives engine speed and position signals from the crankshaft front pulley and rear end of the RH inlet camshaft.

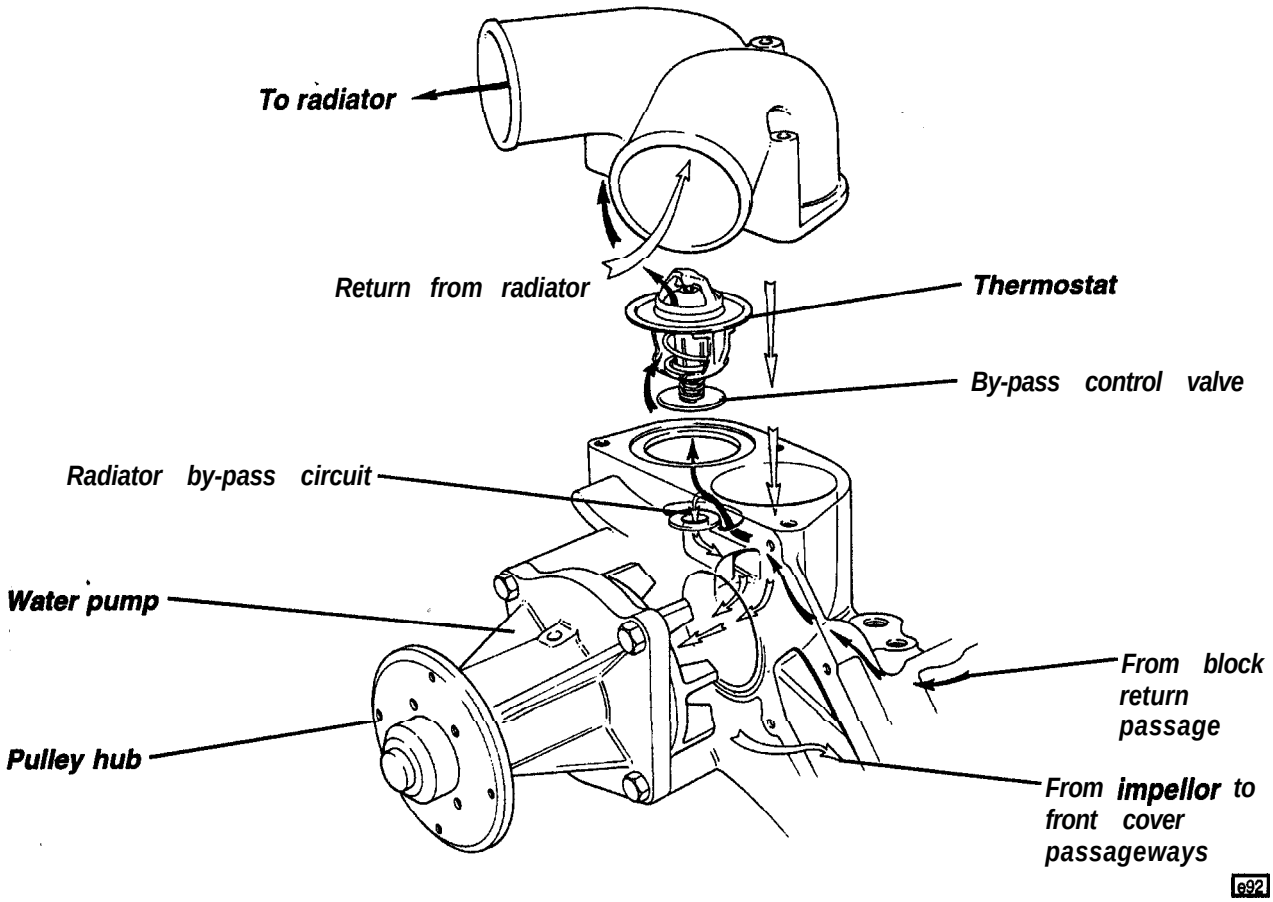
In order to reduce nitrous oxide emissions, exhaust gas recirculation (EGR) is used, whereby exhaust gases collected from the LH exhaust manifold are piped to an EGR control valve mounted at the rear of the intake plenum. Air injection is used for a short period following a cold start in order to help complete combustion of the exhaust gas and to speed the warm up time of the catalytic converters. An electric air pump is used to supply air into drillings in the head emerging just downstream of the exhaust valve guides. The stepper motor for idle speed control is mounted on the underside of the intake plenum, and controls the amount of air allowed to by-pass the throttle butterflies. Other engine management sensors are located as follows: Manifold air pressure (MAP) sensor - top rear of intake plenum; intake air temperture (IAT) sensor - compressor RH duct; knock sensor - crankcase breather cover in 'V'. For further details of the engine management system, see Service Notes Section EMM.

Coolina System

A centrifugal water pump is mounted on the front of the block, driven by multirib 'V' belt from the crankshaft. Water is pumped via passageways in the front cover, into the outside of each cylinder bank and via a window in each cylinder's water jacket, is circulated around each cylinder liner. Coolant then flows up into the head and around the combustion chamber before returning to a passage on the inside of the block and back to the pump. Take offs for the heater are provided at the rear of each cylinder bank coolant return passage, with a heater return connection in the coolant return pipe at the LH front of the engine bay.



A by-pass type thermostat then controls the proportion of coolant which flows through external pipework to the radiator, or back to the pump impellor for recirculation. Cooling take offs for the turbochargers are provided at the front of the outer water gallery at each side of the block, and return from the turbochargers to the header tank.



Lubrication

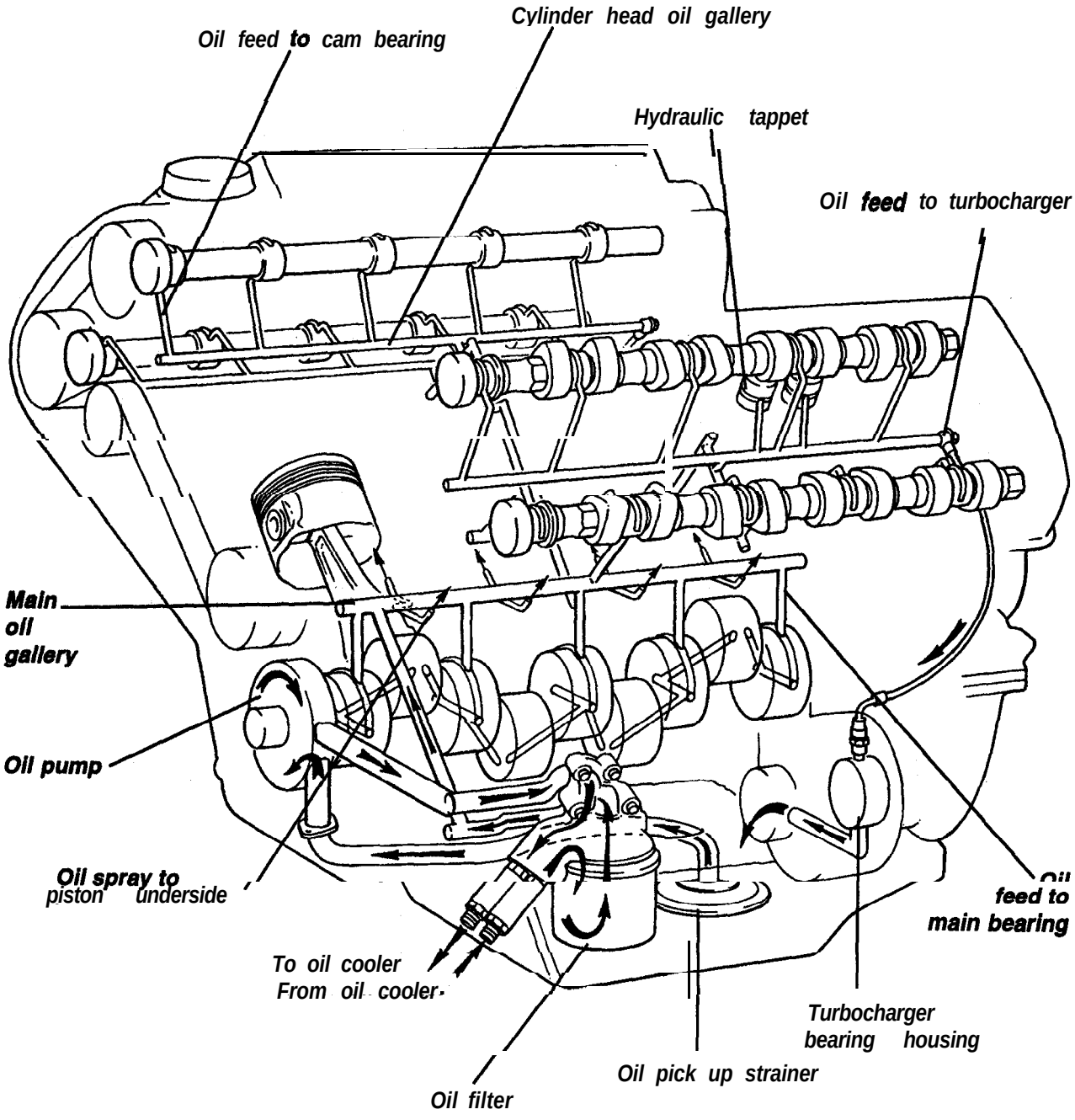
The trochoidal oil pump, uses a 9 lobe rotor, splined to the nose of the crankshaft, and an eccentrically constrained 10 lobe annulus housed within the front cover. The pump draws oil stored in the baffled 'wet' sump through a gauze strainer and suction pipe into the inlet side of the pump, and outputs the pressurised oil into a drilling along the LH side of the crankcase. An oil pressure relief valve is contained within the front cover, and controls a passageway linking the pump outlet and inlet ports. Excessive oil pressure is thus allowed to bleed off from the high to low pressure side.

Pressurised oil then flows via a passageway along the LH side of the crankcase to the filter head which also provides take offs for the oil cooler and temperature/pressure gauge transducer. An upper port on the filter head connects with the crankcase passageway and directs oil via external pipework to the oil cooler radiator. The return pipe from the cooler connects to a lower port on the filter head which directs the flow into the outside of the canister type vertically mounted filter.

Filtered oil flows from the centre of the filter, through the filter head and into a second, lower, passageway along the LH side of the crankcase. A cross drilling at the front of the block joins with the main gallery running along the centre of the 'V' which supplies, via vertical drillings, each of the five main bearings. The upper main bearing shells are grooved in order always to supply one end of a cross drilling in each crankshaft main journal, from which further drillings through the crankshaft provide an oil supply to each crankpin for lubrication of the big end bearings.

Feeding off the main oil gallery, four pairs of spray nozzles direct a jet of oil onto the underside of each piston crown in order to aid piston cooling.

Lubrication Schematic



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Drillings at the inside centre of each cylinder bank provide an oil supply up to the deck face of each bank, where a connection is made with the adjacent cylinder head bolt hole. In the cylinder head, a transverse drilling is used to connect this bolt hole with two longitudinal oilways from which further drillings supply the camshaft bearings and hydraulic tappets. Oil return passageways are provided at the front and back of the cylinder head and block, through which oil is able to drain back into the sump.

Oil supply take offs for the two turbochargers are provided at each rear end of the cylinder head oil galleries, with braided hoses used to link with the tops of the turbocharger bearing housings. Oil draining from each turbocharger is directed via an elbow pipe and connector hose to the sump.

Lubrication Svstem Precautions

Use only those lubricants listed in 'Section OF' for the appropriate ambient temperature range.

During engine rebuild, use copious amounts of the recommend lubricant or an appropriate assembly compound to ensure adequate lubrication on initial start up.

- After rebuild, the engine should be cranked with the ignition disabled until oil pressure is registered on the gauge.

In the event of engine failure involving the possibility of debris entering the lubrication system, it is essential that the following precautions are taken before re-assembly:

Thoroughly clean and inspect all engine oilways in block, crankshaft, cylinder head and other components.

- Thoroughly clean and inspect the oil pump, pick up pipe and strainer, pressure relief valve and cooler thermostat.
- Thoroughly flush out oil cooler hoses.
- In view of the difficulty of ensuring no debris is retained in the oil cooler, this item should always be replaced in such circumstances.

Auxiliarv Drives

The water pump, alternator, a.c. compressor and power steering pump are all driven by a single multirib 'V' belt from the front end of the crankshaft, with a temperature compensating automatic tensioner mounted on the front of the block.

ED.2 - ENGINE MAINTENANCE OPERATIONS

Engine Lubrication

Used Enaine Oil

WARNING:

- Prolonged and repeated contact may cause serious skin disorders, including dermatitis and cancer.

Avoid contact with skin as far as possible and wash thoroughly after any contact.

Keep out of reach of children.

PROTECT THE ENVIRONMENT: It is illegal to pollute drains, water courses and soil. Use authorised waste collection facilities, including civic amenity sites and garages providing facilities for disposal of used oil and used oil filters. If in doubt, contact your local authority for advice on disposal.

'Se re Service' Conditions

Certain operating conditions can cause rapid degradation of the oil quality, either by the accumulation of dirt particles, or by the absorption of water from condensation. If either of the 'severe service' conditions described below apply, it is recommended that the oil and filter be changed twice as frequently as is listed in the Maintenance Schedule.

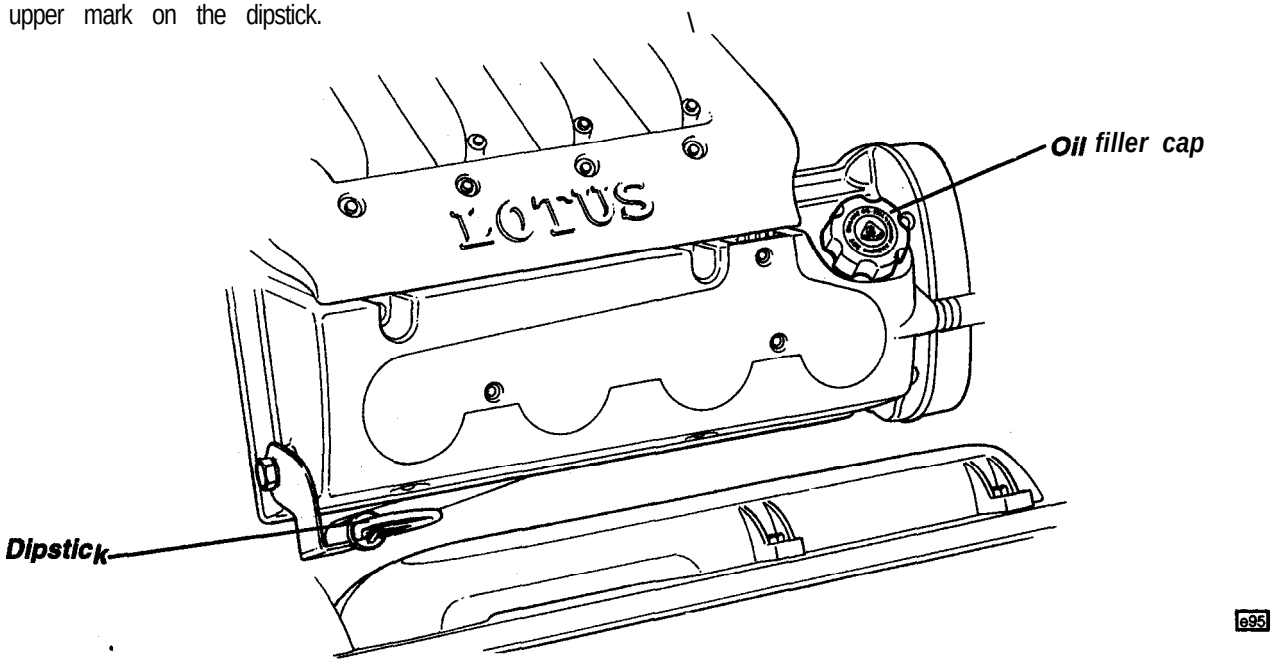
Driving in dusty areas (e.g. on unmetalled roads). Change the oil and filter as soon as possible after driving in a dust storm.

Stop/start city driving with frequent short trips where the engine rarely warms up thoroughly (especially in cold weather); and/or frequent or prolonged idling.

Oil Level Check and Top Up

Ensure that the car is parked on a level surface and that at least one minute has elapsed since stopping the engine to allow oil to drain into the sump before withdrawing the dipstick, located at the RH rear of the engine. Be aware that if the engine was stopped when the oil was not fully warm, the draining process will take

much longer, before which time an artificially low dipstick reading will be obtained. Wipe the dipstick with a paper towel, replace, pressing firmly, and withdraw again to inspect the oil level. The correct level is to the upper mark on the dipstick.

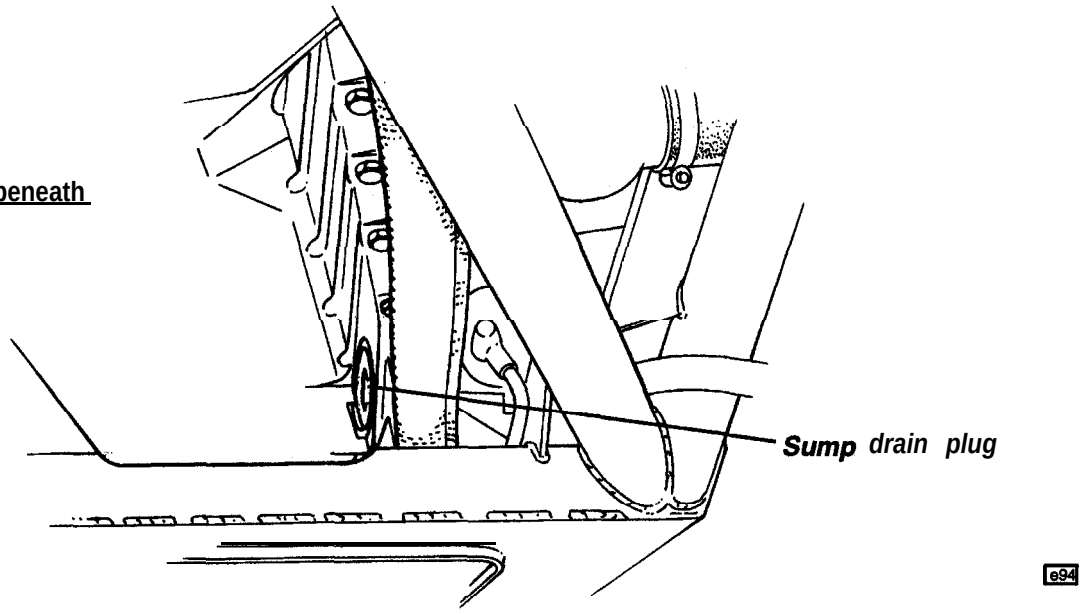


The oil capacity difference between high and low dipstick marks is 1 .O litre (1.8 imp.pt; 1 .0 U.S. qt). Top up if necessary via the filler on the RH cam cover using a recommended lubricant, but do NOT overfill. Refit the filler cap and tighten until the torque limiting ratchet mechanism operates.

Oil Change Procedure

The oil should be renewed, and a new oil filter fitted at intervals specified in the maintenance schedule • see 'Section OF'.

Viewed from beneath

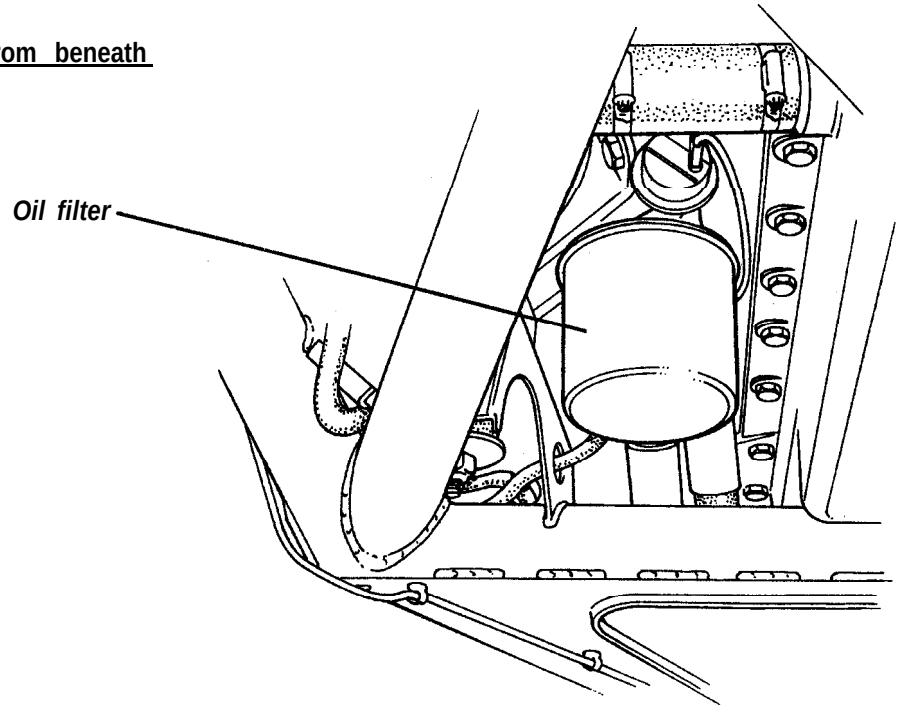


The socket head sump plug is located at the right hand front of the sump, and should be removed to drain the sump immediately after a run when the oil is warm and the impurities are held in suspension. Allow to drain thoroughly, clean the drain plug, replace the sealing 'O' ring if necessary, and tighten to 34 Nm (25 lbf.ft). Renew the oil filter (see below), and fill with a recommended lubricant to the top mark on the dipstick. Re-check the oil level when the engine is fully warm. Dispose of the used oil as detailed above.

Oil' Filter

The oil filter should be renewed at intervals specified in the maintenance schedule - see 'Section OF'. The disposable canister type oil filter is vertically mounted at the LH side of the block and is accessible from beneath the vehicle. Always use a genuine Lotus branded filter element to ensure the correct filtration and pressure drop characteristics are maintained. To remove the filter, turn counterclockwise, using a filter or strap wrench if necessary, and dispose of as detailed above.

Viewed from beneath



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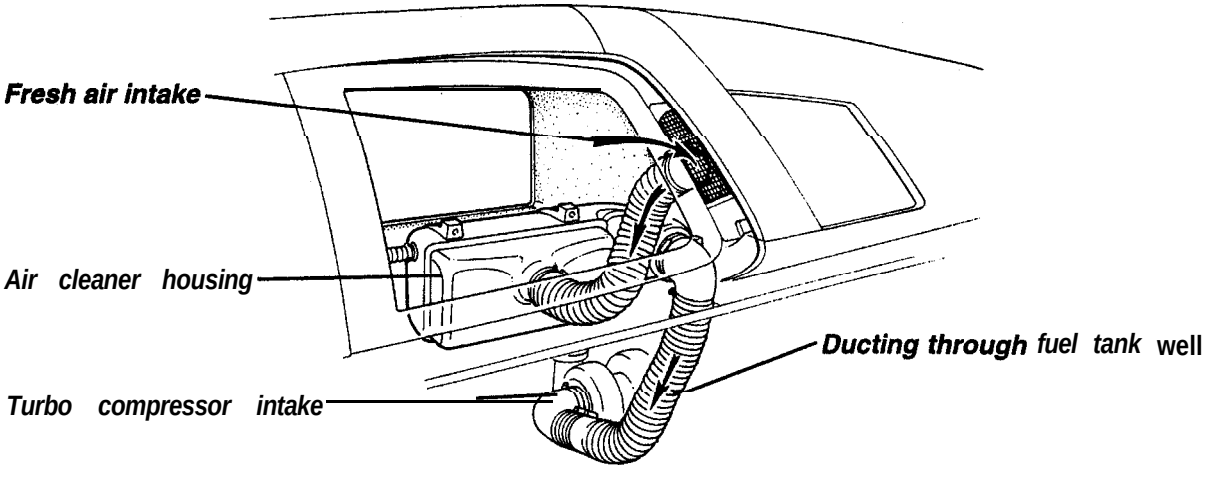
Before fitting a new filter, clean the mating faces on both the new filter and the engine, and smear both faces with clean oil. Fill the new filter with oil before screwing onto its spigot and tightening by hand just sufficiently to ensure a firm seal; typically 2/3 to 3/4 of a turn after the faces have made contact. Start the engine and check for oil leaks. Recheck the security of the filter, further tightening by hand if necessary. Check the oil level when the engine is fully warm.

Air Cleaner Replacement

Intake air for the engine is admitted via scoops behind the rear quarter windows. From these intakes, air is ducted to an air cleaner housing located in each engine bay sidewall, where the air is drawn through a disposable folded paper element. From the engine side of the filter element, the air is ducted back through the sidewall and down to the turbocharger compressor intake.



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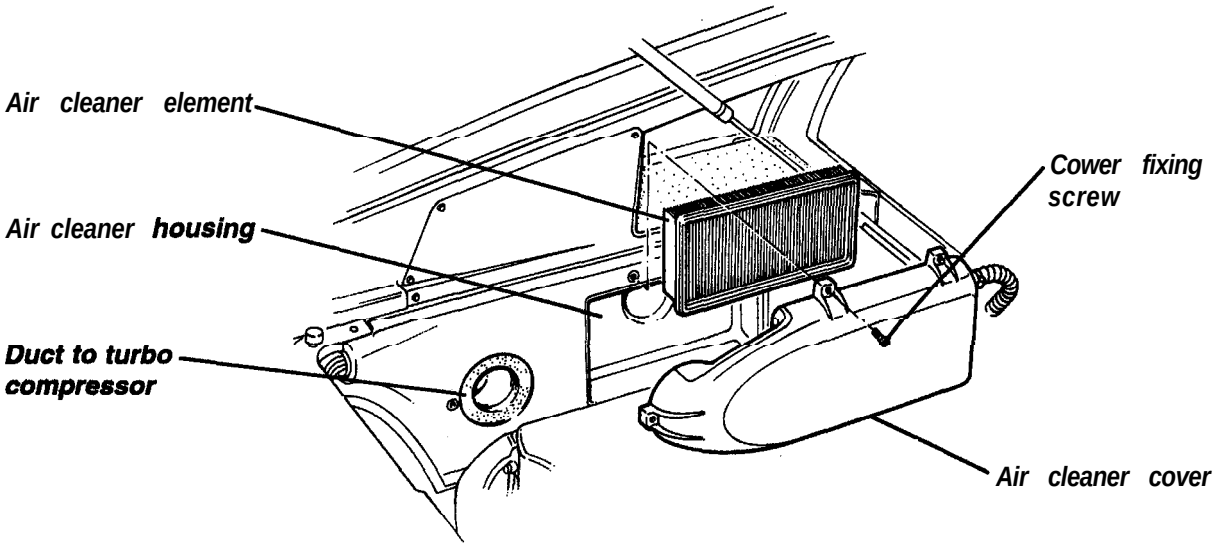
When the vehicle is operated in a **reletively** dust free environment, the paper elements should be renewed at intervals specified in the maintenance schedule, but where a dusty or smog laden atmosphere prevails, more frequent replacement will be required, dependent on the level of pollution.



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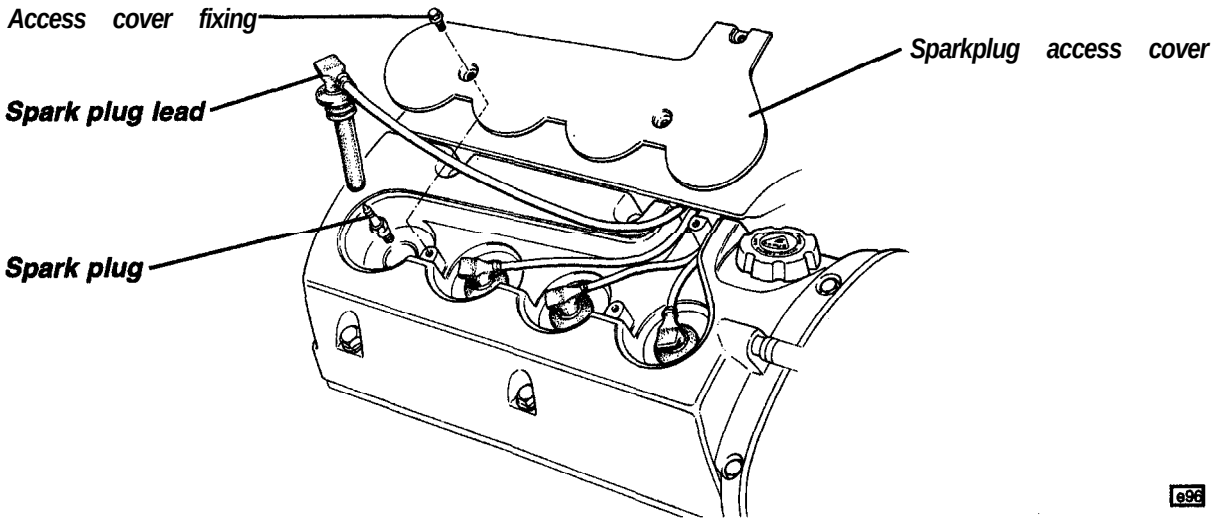
To'replace a cleaner element, release the five fixing screws securing the cover to the engine bay sidewall, and pull open, leaving the breather hose attached. Withdraw and dispose of the paper element. Clean any dirt from the inlet housing, but take care to prevent debris entering the 'clean' duct to the compressor. Locate the seal of the new element into the groove in the air cleaner cover, and refit the cover to the sidewall with the five screws.

Spark Plug Replacement

The spark plugs should be renewed at intervals specified in the maintenance schedule - see 'Section OF'.

- Remove the three screws securing each spark plug access cover to the cam cover.
- Pull off the HT lead from each spark plug.



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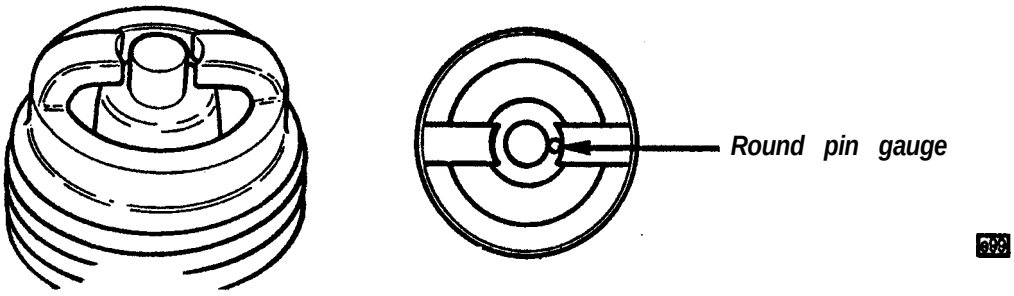
- Before removing the spark plugs, use an airline or vacuum cleaner to remove any loose **dirt** from the plug wells.
- Unscrew each spark plug and take precautions to ensure that no debris is allowed to fall through the open plug hole.
- Check the electrode gap (0.9 - 1 .Omm (0.035 - **0.039in**)) of the new spark plugs using a round pin gauge before fitting and tightening to 20 - 22 Nm (15 - 16 lbf.ft).



Refit the numbered plug leads, labelled 1,2,3,4 for each cylinder bank, counting from the front in both cases. Note that the leads require a firm press before 'clicking' onto the spark plug terminals. When refitting the cover, take care to avoid trapping a lead between the cover and a plinth.

Compression Check

A proprietary compression gauge may be used to provide an indication of general bore/piston ring sealing, and valve seating:

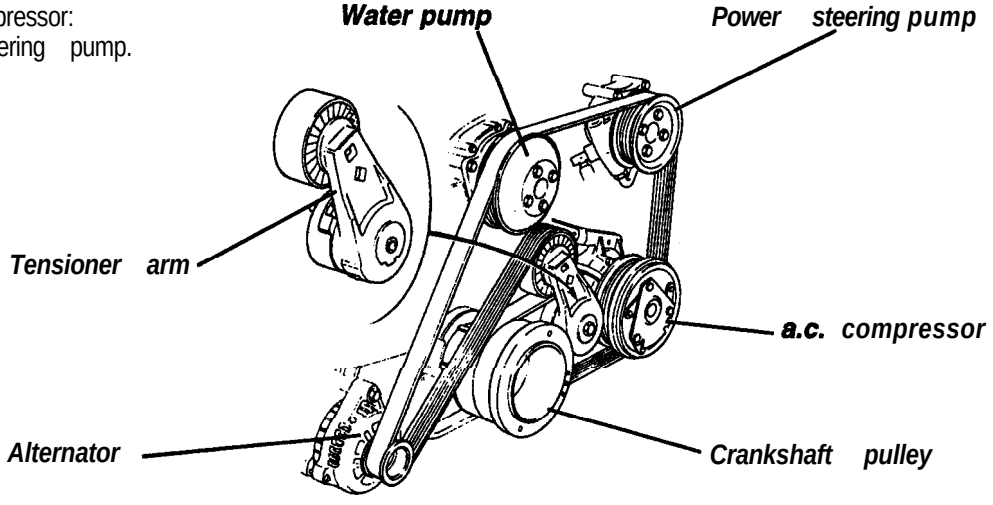
- Remove all spark plugs, and disable the ignition and fuel pump circuits.
- Apply the gauge to no.1 plug hole.
- Hold the throttle fully open and record the gauge reading after 10 seconds.
- If the reading is below specification, squirt a small amount of engine oil into the cylinder and repeat the test. A significant increase in compression pressure would indicate a piston ring/bore problem. No change in the reading would suggest a valve sealing problem.
- Repeat the test for the remaining cylinders.

Specification = 10.7 ± 1 .O bar (155 ± 15 lb/in²)

EIAUXILIARY DRIVE BELT & TENSIONER

A single multi-rib type belt is used to transmit drive from the crankshaft nose to the following auxiliaries:

- water pump:
- alternator:
- a.c. compressor:
- power steering pump.



A spring loaded temperature compensated automatic tensioner is mounted on the front cover, and operates between the crankshaft and alternator pulleys. The belt requires no periodic maintenance other than a visual check of its condition. If the belt exhibits any evidence of physical damage, cracking, fraying, perishing, abrasion or contamination, it should be replaced. In the case of oil contamination, each of the pulleys must be

thoroughly degreased before the new belt is fitted.

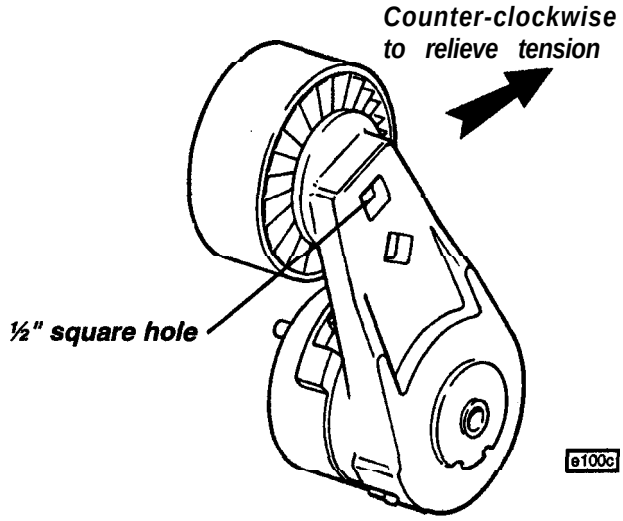
To replace the belt:

1. Use a ½ in. square drive wrench in the hole provided in the tensioner arm, and turn counterclockwise to relieve the belt tension.

2. Remove the belt from the pulleys.

3. Before fitting the new belt, check each of the pulleys for damage, excessive wear or runout, contamination or corrosion, and clean or replace as required.

4. Hook the smooth side of the new belt over the tensioner pulley, and engage the ribbed side around the crankshaft, a.c. compressor, PAS pump and water pump pulleys. Relieve the tension (as in step 1) before fitting around the alternator pulley.



To replace the tensioner assembly, first remove the belt before releasing the single retaining bolt to remove the tensioner. When refitting, take care to engage the two dowels on the back of the tensioner hub into the corresponding holes in the mounting plinth, before fitting the retaining bolt and tightening to 42 Nm (31 lbf.ft).

ED.4 - INTAKE PLENUM, THROTTLE BODY & FUEL INJECTORS

The intake plenum casting is mounted on top of the engine, and incorporates a plenum chamber for each cylinder bank fed from a common chamber at the rear, and the eight inlet tracts from plenum to injector housings. Removal of the intake plenum is necessary for access to the fuel injectors, ignition coils, knock sensor, IAC valve, EGR valve or starter motor.

WARNING: - Safety Precautions

Removal of the intake plenum requires the disconnection of the fuel feed to the secondary injectors. Pressure is maintained in the fuel lines after the engine is switched off in order to reduce the possibility of vapour pocket formation, and to speed engine restart. Before disconnecting a fuel line, carry out the fuel pressure relief procedure detailed below.

Fuel Pressure Relief Procedure

This procedure should be used prior to disconnecting any part of the fuel line except the unpressurised return line from the pressure regulating valve to the fuel tank.

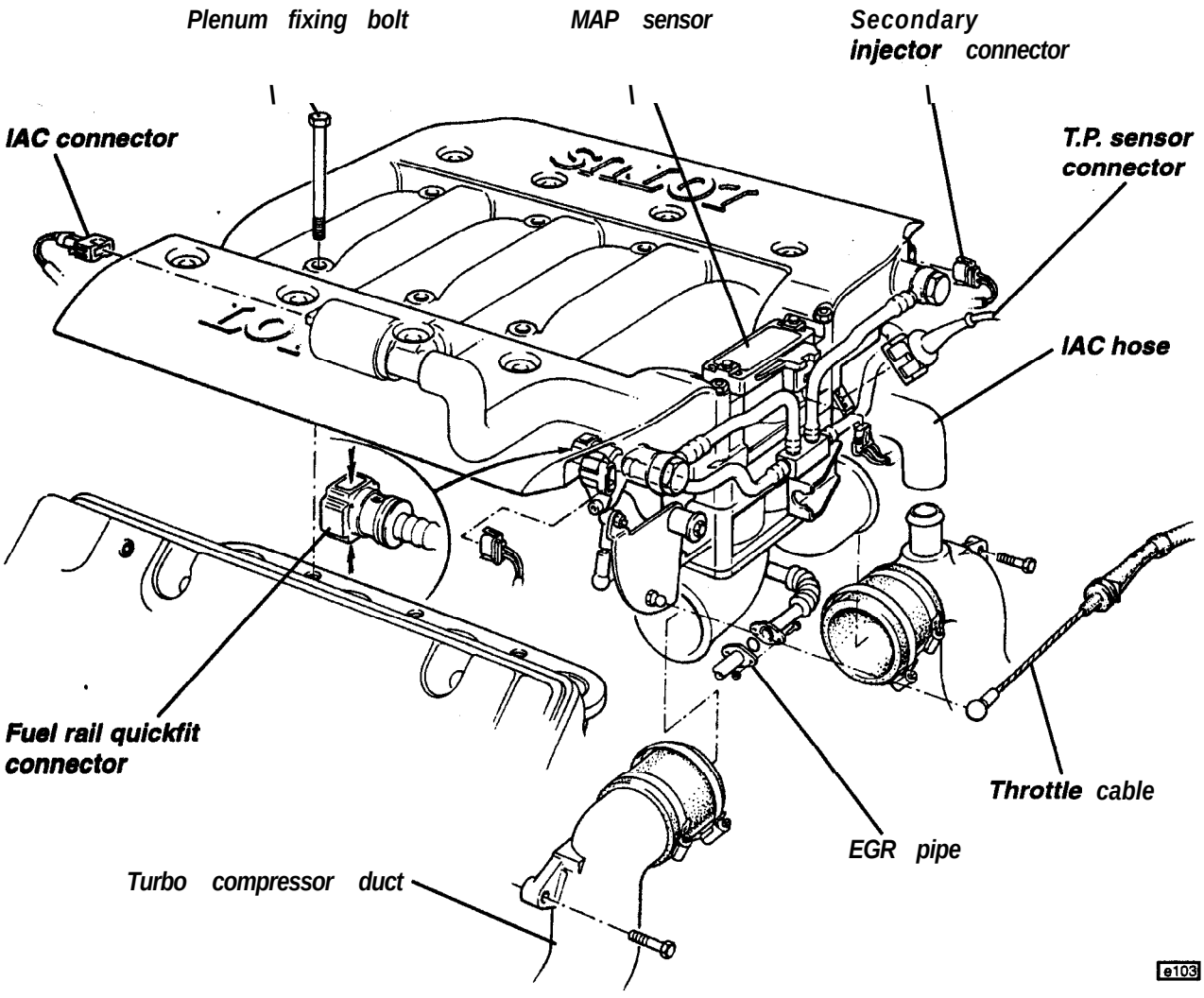
i) If the engine is operative, disconnect the fuel pump feed, start the engine, and run until starved. Crank for a further 10 seconds to reduce any remaining fuel pressure.

ii) Alternatively, or if the engine is inoperative, connect fuel pressure gauge TOOOT1366 to the Shraeder type valve fitted at the front end of the RH fuel rail. Ensure that the gauge bleed tap is closed, and use a cloth to shield from any fuel spray as the connection is made. After connection, position the bleed line in a suitable receptacle and open the bleed tap to relieve the system of fuel pressure.

iii) The fuel line may now be opened using an absorbent cloth for protection from any residual fuel pressure, and to absorb the small amount of fuel draining from the line. Dispose of the cloth safely.

To Remove Intake Plenum:

1. Carry out the fuel pressure relief procedure detailed above, before releasing the quickfit connectors of the secondary injector pipe assembly from the rear end of the fuel rails; press the two red buttons on each connector to release the retaining clip, and withdraw from the rail, using a paper towel to absorb any fuel draining from the pipes.



2. Remove the air intake hose clips on the throttle body intake elbows, release the IAC valve hose from the RH compressor outlet duct, and remove the single screw fixing each duct to the cylinder head. Remove the hoses connecting the ducts to the throttle body intake elbows.

3. Release the harness connectors to the MAP (Manifold Absolute Pressure) sensor at the top rear of the plenum, the throttle position sensor at the right hand side of the throttle body, and to the two secondary injectors.

4. Disconnect the EGR (Exhaust Gas Recirculation) pipe at its joint near the throttle body intake elbows.

5. Release the throttle cable from the quadrant lever and the abutment on the throttle body.

6. From the front end of the plenum, disconnect the vacuum supply hose to the brake servo, and the small bore vacuum hose to the climate and AIR systems. Release the vacuum hose between plenum and the fuel pressure regulator valve.

7. Release the primary breather hose from the rear end of the RH cam cover.

8. Disconnect the translucent purge hose between EGR manifold and the non-return valve at the front of the engine bay, and the red boost sensing hose from the RH side of the throttle body.

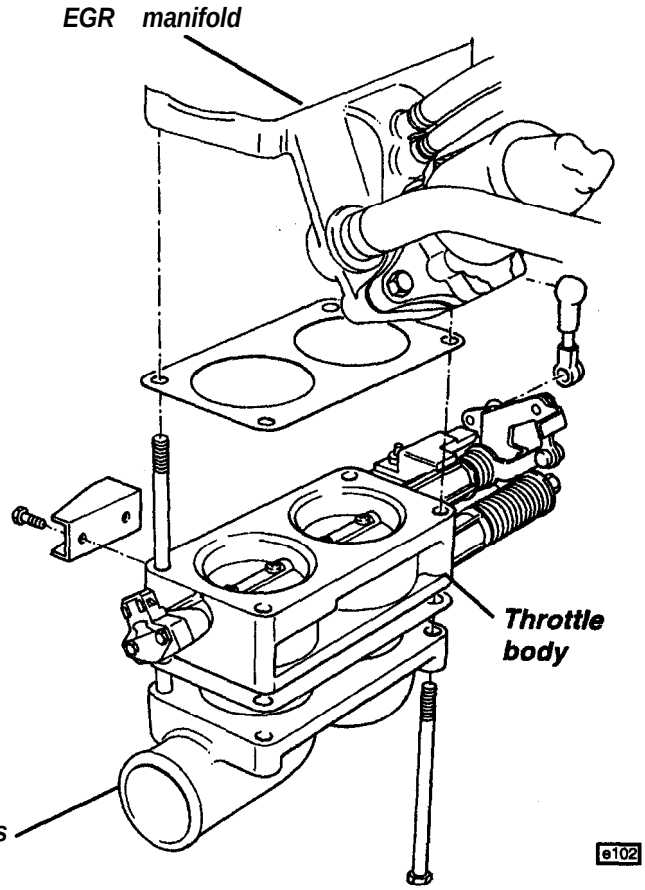
9. Remove the 14 x M8 bolts securing the plenum, and lift the plenum sufficiently to enable disconnection

of the following parts:

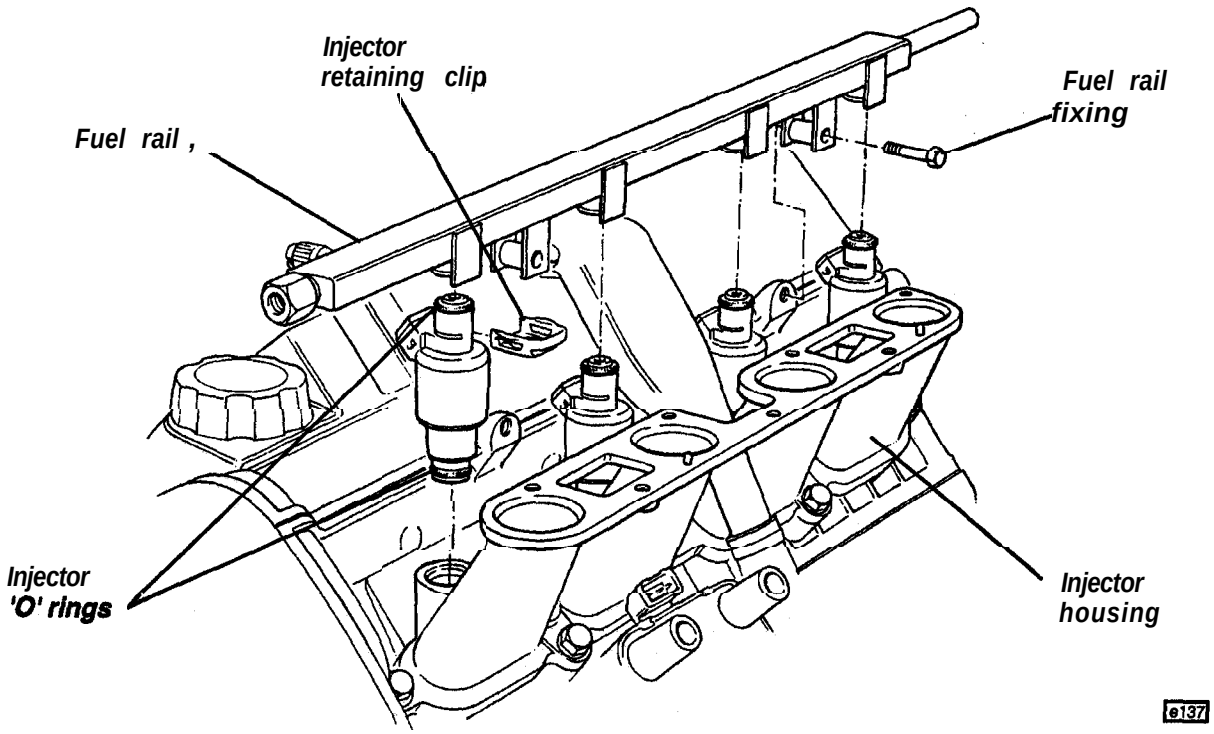
- IAC valve connector plug.
- EGR valve connector plug.
- EGR temperature sensor.

10. Withdraw the plenum. Take suitable precautions to prevent debris entering the inlet tracts.

11. The intake elbows, throttle body and EGR manifold are sandwiched to the underside of the plenum, and secured with two long studs tapped into the intake elbow, with nuts on the top surface of the plenum, and two bolts fitted from beneath and threaded into the plenum. To disassemble, first disconnect the throttle linkage between bellcrank lever and relay disc.
If necessary, release the EGR valve from the manifold (2 fixing screws) and the IAC valve from its saddle on the underside of the plenum (2 screw retaining strap).



12. To remove a fuel injector, release the two bolts securing the fuel rail, unplug the injector harness connectors and carefully withdraw the rail complete with the four injectors. Remove an injector from the rail by prising off the retaining clip, and withdrawing the injector from the rail.



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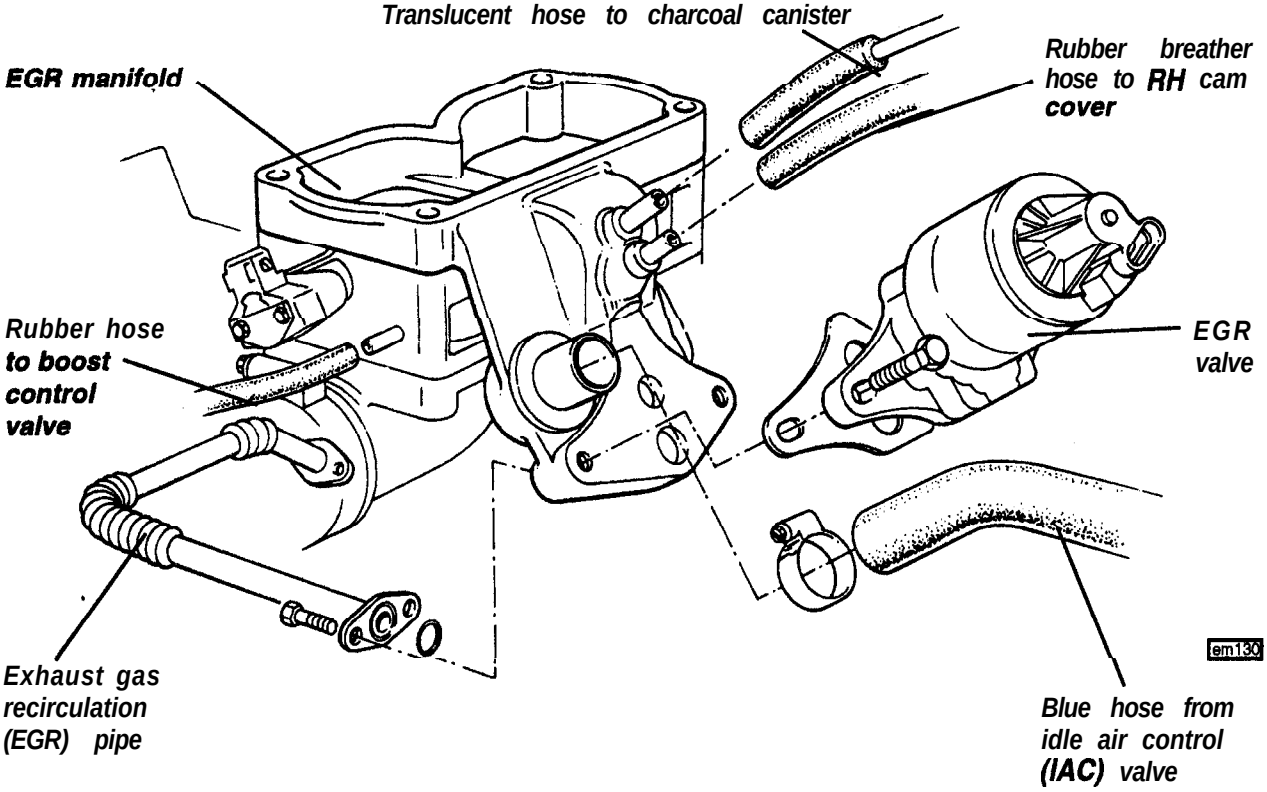
Re-assemble in the reverse order to disassembly, with the following notes:

- Ensure that all the hoses are fitted and secured to the EGR manifold before fitting the plenum assembly to the engine.



- Fit new 'O' rings to the top and bottom of any removed injectors, and lubricate with clean engine oil before installing into the fuel rail and fitting the retaining clips.
- Carefully seat the four injectors into their housings, and fit the two screws securing the fuel rail to the cylinder head. Before tightening the screws, take care to position the rail so that the injectors are correctly aligned, and perpendicular to the rail.
  If one or both of the injector housings (inlet manifolds) has been disturbed, it is necessary to align both injector housings with the plenum joint face before tightening the fixing bolts to the cylinder head:
  i) Slacken all the injector housing fixing bolts on both cylinder heads.
  ii) Using new gaskets (dry) if necessary, fit the plenum onto the housings and tighten the plenum fixing bolts to 20 Nm (15 lbf.ft).
  iii) Nip up the end two fixings securing each injector housing to the cylinder head.
  iv) Remove the plenum and fully tighten all the injector housing fixings to 20 Nm (15 lbf.ft).
- If necessary use new gaskets on the injector housings, and assemble dry. Tighten the plenum fixing bolts to 20 Nm (15 lbf.ft).
- Before pushing on the two quickfit connectors of the secondary injector fuel pipe assembly, first lightly lubricate the spigot of each fuel rail with engine oil.
- For details of the TP sensor, EGR valve, EGR temperature sensor, and IAC valve, refer to service notes Section EMM.

ED.5 • CAM DRIVE BELTS & CAM TIMING

This sub-section includes the following operations: Cam Timing Verification; Cam Belt Tensioning; Valve Timing Resetting Procedure; Cam Belt Replacement.

Genera/: A two stage drive is used for the twin overhead camshafts of each cylinder bank. The first stage comprises an inverted tooth 'Morse' chain from the crankshaft to an intermediate shaft housed within the front

cover. The second stage uses separate, synthetic, straight toothed, HTD (High Torque Drive) profile belts for each cylinder bank, driven from two pulleys on the intermediate shaft, each belt using a smooth pulley/bearing mounted on an eccentric hub to bear against the back of the belt and facilitate belt tension adjustment. In order to achieve the optimum accuracy of valve timing, all the toothed pulleys are clamped to their shafts without the positional constraint of indexing keys. A crankshaft positioning tool and four camshaft setting pins can be used to set each of the shafts in **a** 'timing' position, corresponding to **10°** BTDC no.2 cylinder firing. Great care must be taken if the cam drive system is disturbed, in order to avoid valve to piston contact.

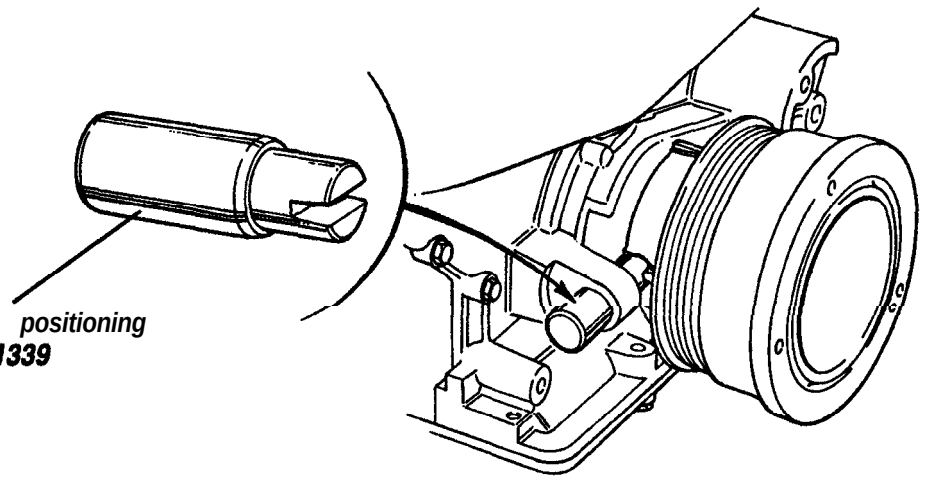
CAUTION: The engine should be turned only in the normal direction of rotation; i.e. clockwise as viewed from the front. Turning the engine backwards causes cam drive loading to be applied to the belt tensioners, and may result in loss of valve timing due to a cam belt jumping teeth.

Cam Timing Verification

Special tools **required:** Crankshaft Positioning Tool TOOOT1339
Camshaft Tolerance Pin TOOOT1345 (4 off)

It is important to realise that the positions of the toothed pulleys themselves are not relevent to cam timing, as there is no indexing of any of the pulleys to their shafts. If the cam timing needs to be checked, it is necessary to establish the positions of the camshafts themselves, using camshaft position 'tolerance' pins, **T000T1345,** and a crankshaft positioning tool TOOOT1339. Removal of the cam covers is not necessary.

a). Release the single fixing screw, and remove the crankshaft sensor from its plinth on the front cover. Turn the engine to align the marked vane on the crankshaft front pulley (1 marked, 3 unmarked) with the sehsor plinth. Fit the crankshaft positioning tool TOOOT1339 into the plinth and engage onto the marked pulley vane. This fixes the crankshaft at **10°** BTDC no.2 cylinder (note that there is no visual indication whether this is exhaust/intake or firing TDC).



Crankshaft positioning tool T000T1339

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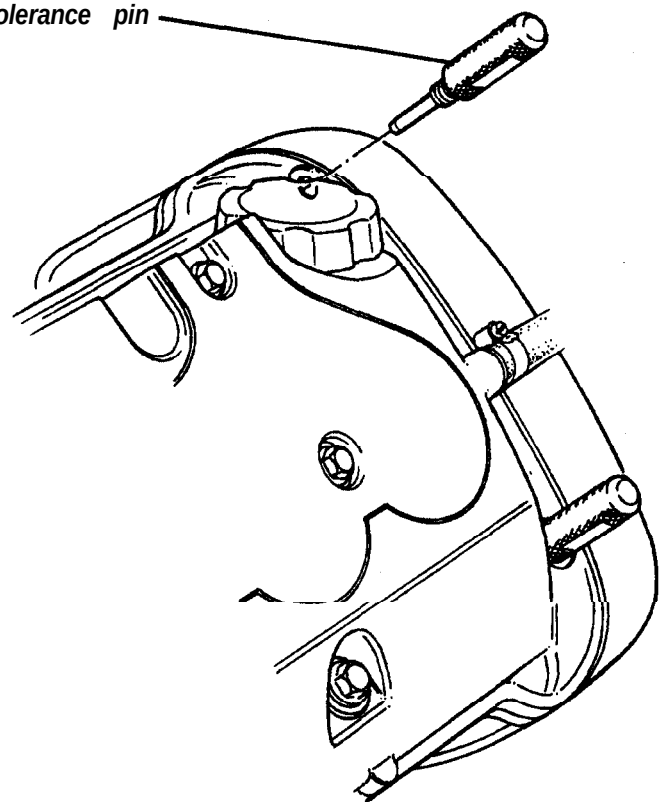
b). Remove the pair of frontmost fixings from both camshaft covers, and insert a camshaft position tolerance pin TOOOT1345 into each of the four fixing holes. Note that the 'tolerance' pins should not be confused with the 'setting' pins, which are similar but of larger diameter:

Tolerance Pin	TOOOT1345	4.2 mm diameter
Setting Pin	TOOOT1337	4.7 mm diameter

When no.2 cylinder is at **10°** BTDC on the **firing stroke,** the tolerance pins should engage fully with a positioning hole in each camshaft. It may be necessary to remove the crankshaft positioning tool and turn the crankshaft **360°** to move from the exhaust/intake TDC to the firing TDC, and refit the positioning **tool.**

c). Having established the correct (firing) TDC, if the tolerance pin cannot be fully inserted into each of the holes, the cam timing is outside specification. A small variation in cam timing can occur without consequent damage, but an error of one belt tooth or more may result in valve to piston contact and associated



damage. If the engine is operative, measure the cylinder compressions to check for valve sealing, and if satisfactory, reset the cam timing as detailed in the later procedure.

Cam Belt Tensioning

Each of the two cam belts uses a smooth pulley wheel bearing against the back of the belt via an eccentric hub, in order to facilitate adjustment of belt tension. An electronic frequency meter ('Clavis' gauge) is used to accurately measure belt tension. Note that the same belt tension reading is used for each of the two belts, but that the mirror imaging of the inlet and exhaust camshaft layout between LH and RH heads results in the tension being set at different camshaft positions for each cylinder bank - LH bank at **90°** ATDC No.2 (TDC No.6 **&** 7); RH bank at 135" ATDC No.2 (45" BTDC No.1 **&** 4).

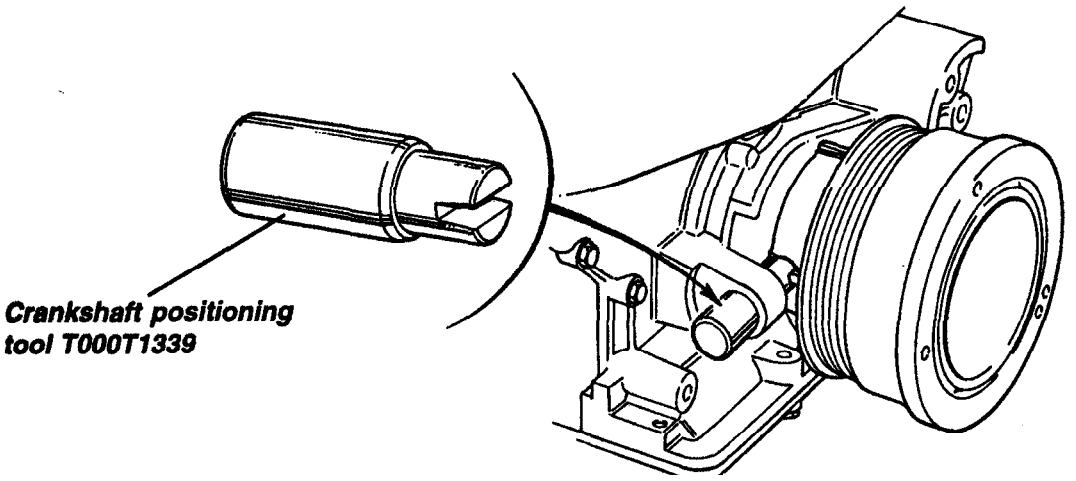
Special tools required:	Clavis Gauge	TOOOTI396
	Tensioning Tool	**T000T1360**
	Timing Disc	**T000T1391**

1. Remove the auxiliary drive belt and tensioner (sub-section **ED.3),** and water pump pulley.

2. Remove the four bolts securing the three section cam belt cover, and remove the cover.

3. Release the single retaining screw, and remove the crankshaft sensor from the plinth in the front cover. Turn the crankshaft clockwise until the crankshaft positioning tool TOOOT1339 can be inserted through the sensor plinth to engage the marked vane on the crankshaft pulley (Note: one marked vane, three unmarked). This positions the the crankshaft at **10°** BTDC no.2 cylinder.

4. Make up a timing pointer (e.g. fixed by the sump fixing bolt), with the point adjacent to the crankshaft front pulley. Secure the timing disc to the front pulley using a few dabs of putty or double sided tape, with the disc positioned to align the **'10°** BTDC No.2 cylinder' mark with the pointer. Note that one side of the timing disc is designed to be used with a mirror.



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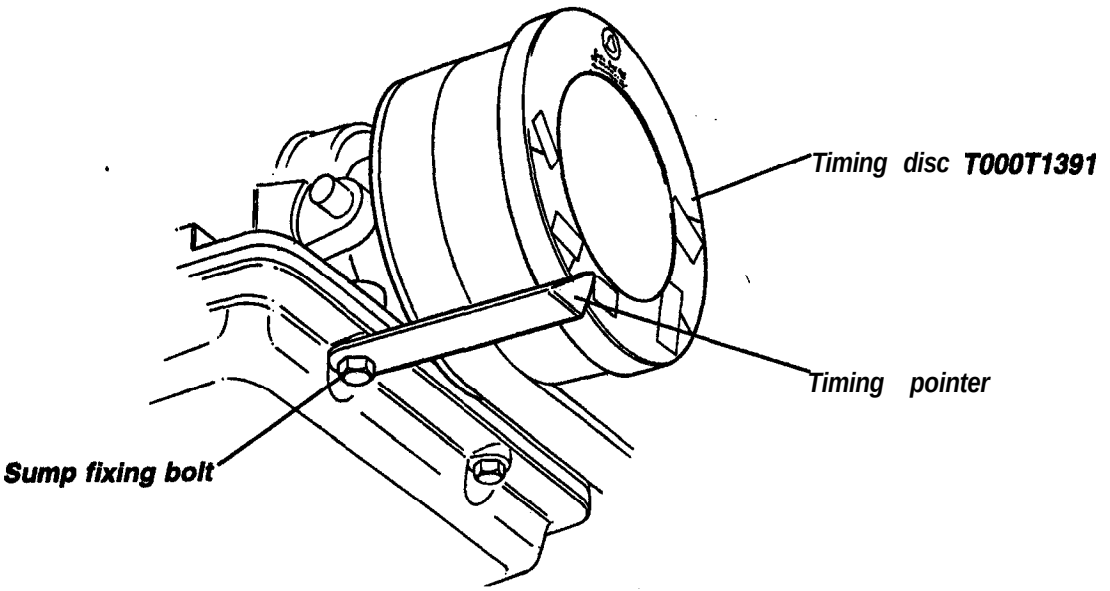

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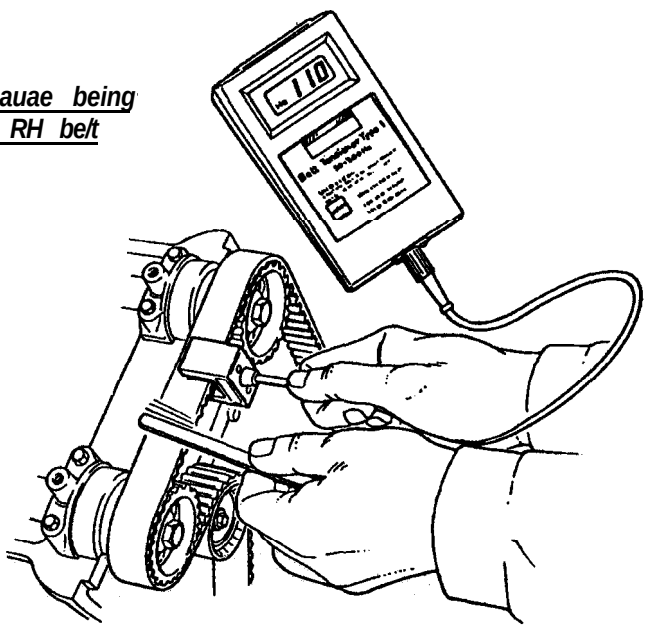
5. Remove the crankshaft positioning tool, and turn the crankshaft clockwise to align the '90° ATDC No.2 cylinder' mark with the timing pointer.

6. Measure the LH cam belt tension using the Clavis gauge between the two camshaft pulleys (NOT on any other belt run).
Specification = 95 • 120 Hz

Clavis aauae being used on RH be/t



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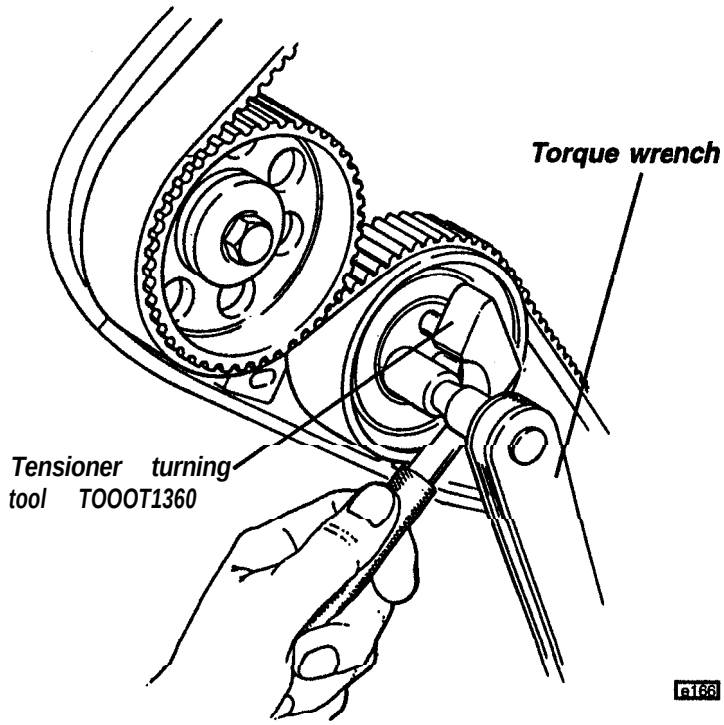
7. If necessary, slacken the tensioner clamp bolt, and use special tool **T000T1360** to turn the eccentric hub as required to adjust belt tension. Torque the clamp bolt to 20 Nm and recheck belt frequency.

8. Turn the crankshaft clockwise to align the '135" ATDC No.2 cylinder' mark with the timing pointer.

9. Measure the RH cam belt tension using the Clavis gauge between the two camshaft pulleys (NOT on any other belt run).
Specification = 95 - 120 Hz

10. If necessary, slacken the tensioner clamp bolt, and turn the eccentric hub as required to adjust belt tension, and torque the clamp bolt to 20 Nm. Recheck belt frequency.

11. Remove the timing pointer and disc and refit the cam belt covers.



Valve Timing Resetting Procedure

Special tools required:	Crankshaft Positioning Tool	**T000T1** 339
	Camshaft Setting Pin	TOOOT1337 (4 off)
	Camshaft Tolerance Pin	TOOOT1345 (4 off)
	Camshaft Clamping Cap	TOOOT1336 (4 off)
	Clavis Gauge	TOOOT1398
	Tensioning Tool	**T000T1360**
	Timing Disc	**T000T1391**
If the intermediate shaft pulley bolt is to be checked or tightened:		
	Flywheel Locking Tool (transmission fitted)	TOOOT1358 or;
	Flywheel Locking Tool (transmission removed)	TOOOT1249

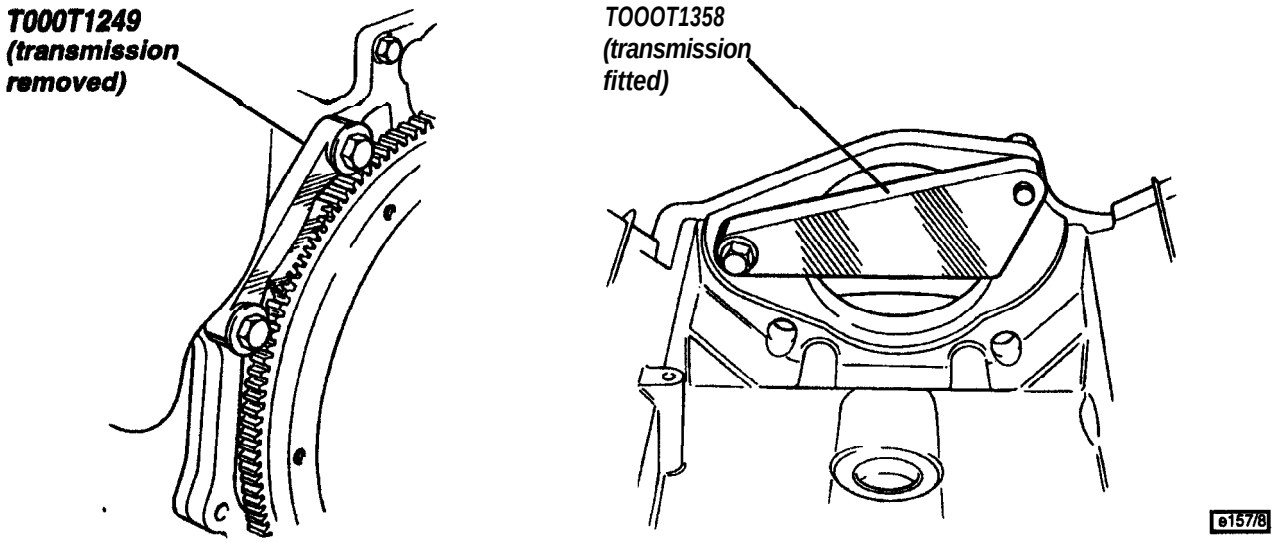
Crankshaft 'Safe' Position: Whenever the cam timing is disturbed it is most important to guard against damage from valve to piston contact. In order to park the crankshaft in a 'safe' position:

a) Remove the crankshaft sensor from its plinth, and fit the crankshaft positioning tool. Turn the engine to its timing position, with the marked vane on the crankshaft front pulley (1 marked, 3 unmarked) aligned with the positioning tool, and the holes in the camshaft front bearing caps aligned with the camshaft drillings. This is **10°** BTDC no.2. No.2 cylinder may be approaching TDC on the inlet/exhaust stroke, or the firing stroke. Check the alignment of the camshaft drillings with the holes in the camshaft front bearing caps, and if necessary, turn the crankshaft **360°** in order to align the holes, as will occur on the firing stroke. Locate the positioning tool onto the crank pulley vane.

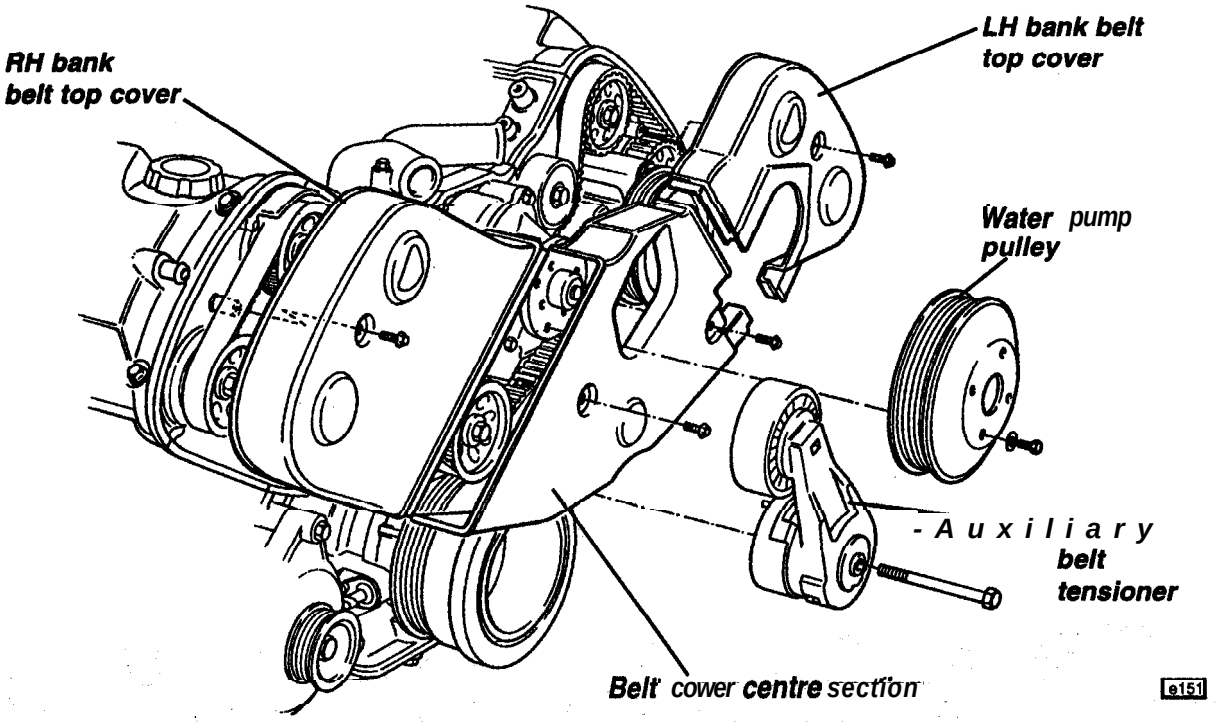
b) Make up a timing pointer and secure by a sump fixing bolt, with the point adjacent to the crankshaft front pulley. Secure the timing disc to the front pulley using a few dabs of putty or double sided tape, with the disc positioned to align the **'10°** BTDC No.2 cylinder' mark with the pointer. Note that one side of the timing disc is designed to be used with a mirror.

c) Withdraw the positioning tool and turn the crankshaft just short of **two** complete revolutions, to align the "45" BTDC No.2 'Safe' Position" mark on the timing disc with the pointer. In this position, no piston is near the top of its stroke.

Intermediate Shaft Pulley Bolt: If the intermediate shaft pulleys have been replaced, or if the intermediate shaft pulley bolt needs to be checked or tightened, the flywheel needs to be locked in order to resist the torque. Two tools are available for this purpose; With the engine 'in situ', or if the transmission is fitted, locking tool TOOOT1358 is available to fit via the starter motor aperture (first remove intake plenum **{ED.4}** and starter motor). If the transmission is removed, tool TOOOT1249 may be used:



i) Park the crankshaft in the 'safe' position (see above) before fitting either of the flywheel locking tools.
ii) Remove the auxiliary drive belt and tensioner (sub-section **ED.3),** and water pump pulley.
iii) Remove the four bolts securing the three section cam belt cover, and remove the cover.
iv) Check that the correct intermediate shaft pulley bolt **(A918W5225F)** is fitted, identifiable by its flanged (integral washer) head, together with a separate clamping washer. Tighten the pulley bolt to 125 Nm (92 **lbf.ft).** Note that the positioning of the pulleys is not important.



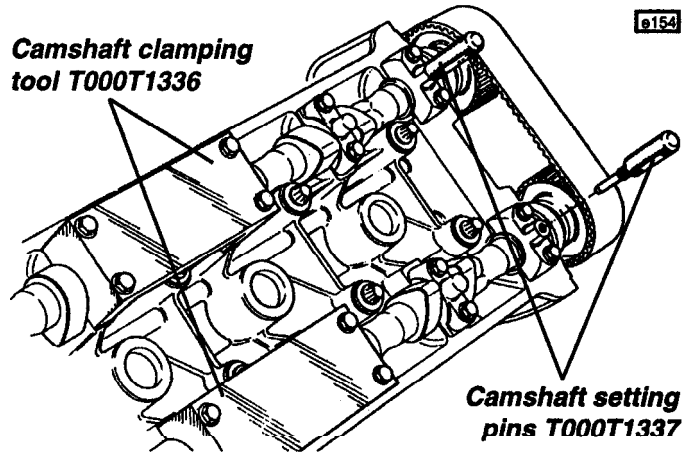
Setting the ***Valve Timing:*** To set the valve timing, the cam pulley retaining bolts must be slackened. **This** operation requires the removal of the intake plenum and cam covers in order to allow the camshafts to be restrained whilst torque is applied to the pulley bolt - DO NOT allow the checking/positioning pin to resist the applied torque, or the pin and/or associated parts will be damaged.

1. If not already removed, remove the top part of each cam belt cover.

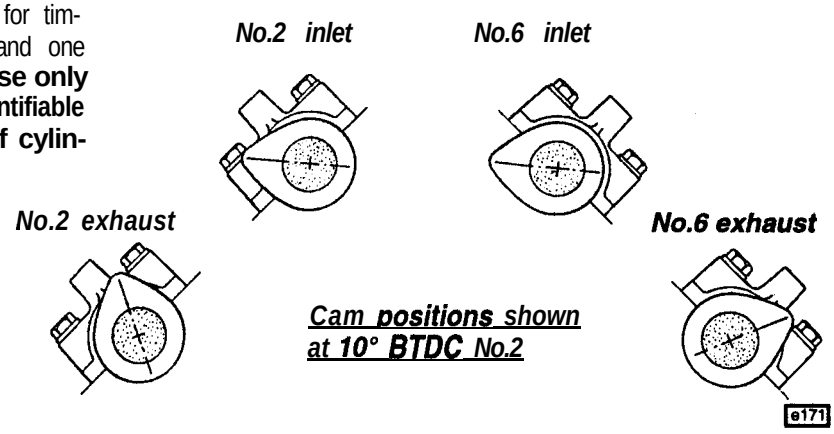
2. Remove the intake plenum (see sub-section ED.4) and cam covers. Set the engine in the 'safe' position (see above).

3. Use a 23 mm open ended spanner on the hexagonal shank of each camshaft in turn, in order to hold the camshaft whilst the cam pulley retaining bolt is removed.

4. Rotate each of the camshafts in turn to enable a camshaft position setting pin TOOOT1337 to be inserted through the front bearing cap and into the camshaft drilling. (Note that the setting pins are of larger diameter than the tolerance pins.) Remove camshaft bearing caps 3 & 4 from each camshaft, noting the match mark letter or number on each cap, and fit a clamping tool TOOOT1336 to each camshaft, tightening the bolts to 6 Nm (6 **lbf.ft).** Check that the setting pins can still be freely inserted.



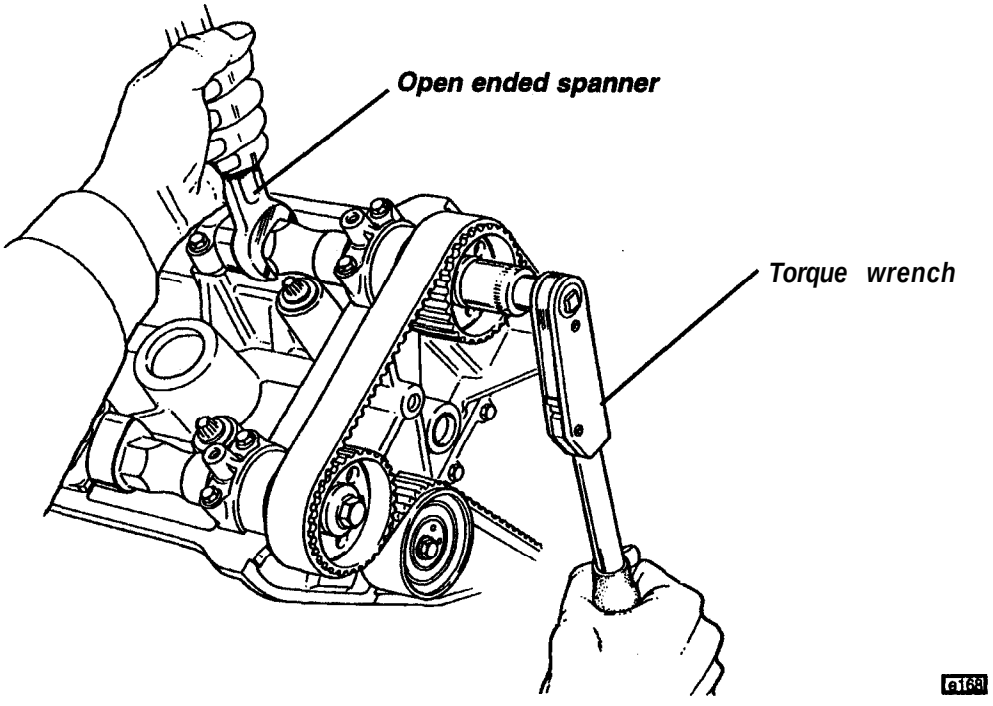
Note
Some very early engines may have camshafts with two drilled holes; one for timing at **10°** BTDC no.1 cylinder, and one for **10°** BTDC no.2 cylinder. **Use only the no.2 cylinder drillings, identifiable by the cam lobe positions of cylinders 2 and 6 as shown.**



5. Clean the threads of the cam pulley bolts before applying Loctite 572 **(A912E7030V),** and re-installing, nip tightening each cam pulley bolt to only 7 Nm (5 **lbf.ft)** at this stage.

6. With the camshafts still locked, turn the crankshaft clockwise, dragging the cam pulleys just until the crankshaft positioning tool TO0011339 can be inserted through the sensor plinth to engage fully with the marked vane on the crankshaft pulley (timing disc will read **10°** BTDC No.2 cylinder). If the crankshaft is inadvertently turned too far, do NOT reverse direction, but continue clockwise for a complete revolution.

7. **Remove the setting pins** before holding each camshaft in turn using a 23 mm open ended spanner on the flats of the shaft, and torque tightening the cam pulley bolt to 100 Nm (74 **lbf.ft).**



8. Remove the camshaft locking caps and crank positioning tool. Refit the standard cam caps and torque tighten to 8 Nm (6 lbf.ft). Carefully rotate the engine through two complete revolutions, checking for any tendency to lock up, indicating a possible valve timing error and valve to piston contact.

9. Check, and if necessary adjust the cam belt tension (see earlier).

10. Refit the crankshaft positioning tool and check that a camshaft tolerance pin TOOOT1345 fits into each camshaft drilling, noting that this pin is of smaller diameter than the setting pins to allow for an acceptable tolerance stack up. If the pin fits in all the shafts, the timing is correct.

11. Refit remaining components as necessary.

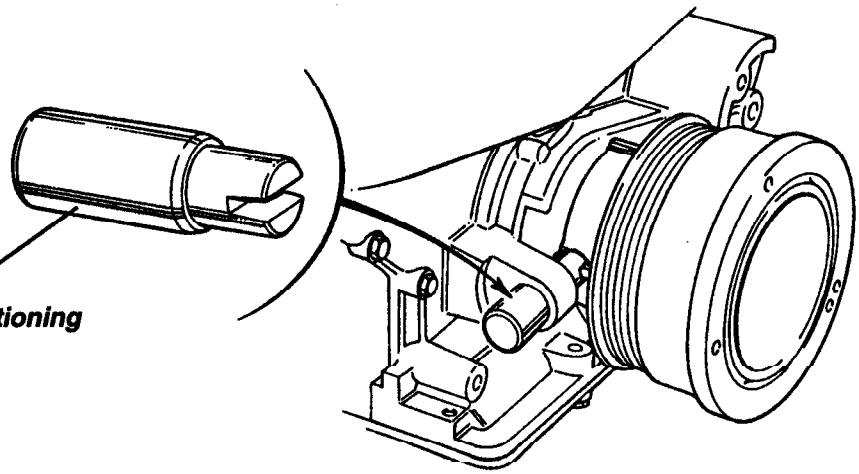
Cam Belt Replacement

Special tools required:	Crankshaft Positioning Tool	T000T1339
	Camshaft Tolerance Pin	TOOOT1345 (4 off)
	Clavis Gauge	T000T1398
	Tensioning Tool	T000T1360
	Timing Disc	T000T1391

1. Remove the auxiliary drive belt, auxiliary belt tensioner and water pump pulley. Release the four screws securing the three sections of the cam belt cover, and remove the cover.

2. To avoid draining the power steering fluid, remove the three bolts securing the power steering pump mounting bracket to the head, release the hose routing clips as necessary, and support the pump clear of the engine.

3. Release the single fixing screw, and remove the crankshaft sensor from its plinth on the front cover. Turn the engine to align the marked vane on the crankshaft front pulley (1 marked, 3 unmarked) with the sensor plinth. Fit the crankshaft positioning tool T000T1339 into the plinth and engage onto the marked pulley vane. This fixes the crankshaft at 10° BTDC no.2 cylinder (note that there is no visual indication whether this is exhaust/intake or firing TDC).



Crankshaft positioning tool T000T1339

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4. Remove the pair of frontmost fixings from both camshaft covers, and insert camshaft position tolerance pins TOOOT1345 into each of the four fixing holes. Note that the 'tolerance' pin should not be confused with the 'setting' pins, which are similar but of larger diameter:

Tolerance Pin	TOOOT1345	4.2 mm diameter
Setting Pin	TOOOT1337	4.7 mm diameter

When no.2 cylinder is at **10°** BTDC on the **firing stroke,** the tolerance pin should engage fully with a positioning hole in each camshaft. It may be necessary to remove the crankshaft positioning tool and turn the crankshaft **360°** to move from the exhaust/intake TDC to the firing TDC, and refit the positioning **tool.**

5. Release the tensioner clamp bolts, and slide both cam belts off the intermediate and camshaft pulleys. Note that if the same cam belt is to be refitted, the direction of rotation should be marked on the belt before removal to enable this orientation to be maintained. Ensure that both cam belts are 106 tooth, and the tensioner pulleys 73 mm diameter (early cars **107T** and 60 mm diameter).

6. Slide the new belt onto the LH pulleys ensuring that the drive side run, and the span between the two cam pulleys, are both tight with no 'extra' belt tooth. Use tool TOOOT1360 to rotate the tensioner hub and take up the belt slack before tightening the clamp bolt. Repeat the operation for the RH belt.

7. Remove the camshaft tolerance pins.

6. Refer to 'Cam Belt Tensioning' above to set the tension on both belts.

9. Turn the crankshaft over **1½** times clockwise, and refit the crankshaft positioning tool onto the marked pulley vane. Check that the tolerance pins may still be fitted into each of the four camshafts. If not, then the 'Valve Timing Resetting Procedure' must be followed to bring the valve timing into tolerance.

10. Refit cam belt covers, auxiliary belt and other removed components.

ED.6 • CAMSHAFTS

The chill cast iron camshafts have different profiles for inlet and exhaust, and differ in the length of the front shank for RH and LH cylinder banks. New camshafts have phosphated cam lobes to assist initial running and prevent scuffing of the highly loaded cam/tappet surfaces. Each shaft runs in five plain bearings bored directly in the cylinder head, with removeable, two bolt bearing caps. End float is controlled via flanges on the camshaft either side of the front bearing journal. A hexagon is provided ahead of the foremost cam lobe to aid camshaft manipulation.

Special tools required:		
	Crankshaft Positioning Tool	TOOOT1339
	Camshaft Setting Pin	TOOOT1337 (4 off)
	Camshaft Tolerance Pin	TOOOT1345 (4 off)
	Camshaft Clamping Cap	TOOOT1336 (4 off)
	Clavis Gauge	TOOOT1398
	Tensioning Tool	**T000T1360**
	Timing Disc	TOOOT1391

Camshaft Removal

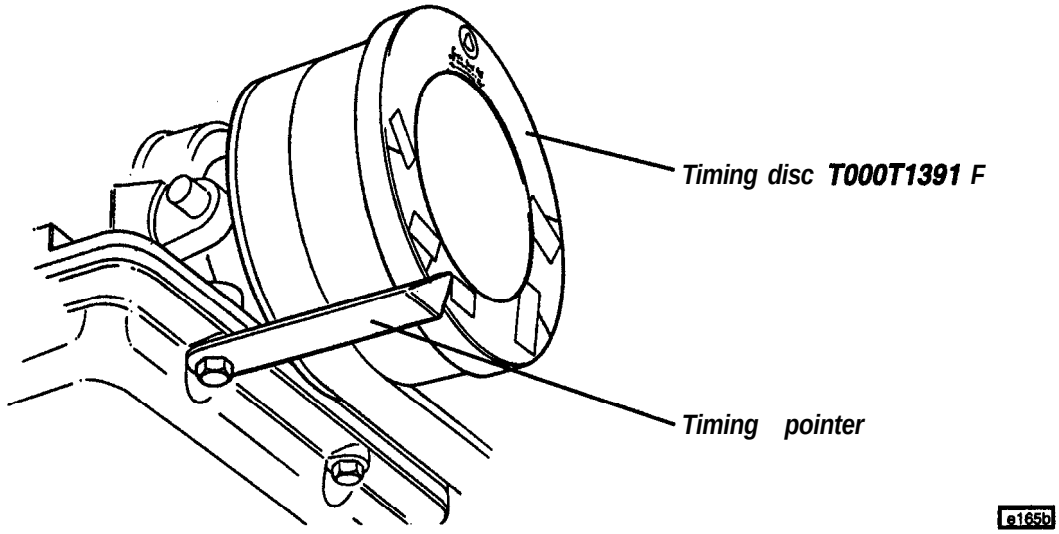
1. Remove the intake plenum (see Sub-Section ED.4).

2. On each cylinder bank: Remove the spark plug cover, and disconnect the plug leads. Disconnect the breather hose from the front of the cam cover, and the hose between the breather spout and crankcase cover plate in the **'V'.** From the rear end of the RH cover, disconnect the breather hose, and release the dipstick tube.

3. Remove the 6 x M6 fixings securing each cam cover, and lift off the covers.

4. Remove the single bolt securing each top section of the cam belt cover, and withdraw the two top covers.

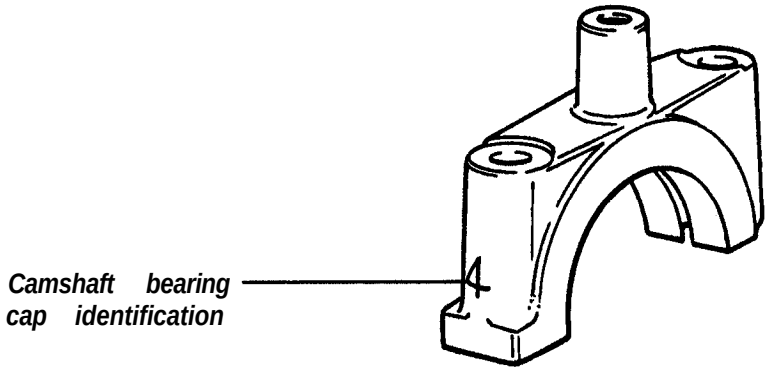
5. Crankshaft 'Safe' Position: Whenever the cam belt is disturbed it is most important to guard against damage from valve to piston contact. In order to park the crankshaft in a 'safe' position:
a) ' Remove the crankshaft sensor from its plinth, and fit the crankshaft positioning tool. Turn the engine to its timing position, with the marked vane on the crankshaft front pulley (1 marked, 3 unmarked) aligned with the positioning tool, and the holes in the camshaft front bearing caps aligned with the camshaft drillings. This is **10°** BTDC no.2. No.2 cylinder may be approaching TDC on the inlet/exhaust stroke, or the firing stroke. Check the alignment of the camshaft drillings with the holes in the camshaft front bearing caps, and if necessary, turn the crankshaft **360°** in order to align the holes, as will occur on the firing stroke. Locate the positioning tool onto the crank pulley vane.
b) Make up a timing pointer and secure by the sump fixing bolt, with the point adjacent to the crankshaft front pulley. Secure the timing disc to the front pulley using a few dabs of putty or double sided tape, with the disc positioned to align the **'10°** BTDC No.2 cylinder' mark with the pointer. Note that one side of the timing disc is designed to be used with a mirror.



c) Withdraw the positioning tool and turn the crankshaft just short of two complete revolutions, to align the **'45°** BTDC No.2 'Safe' Position' mark on the timing disc with the pointer. In this position, no piston is near the top of its stroke.

6. Slacken the clamping bolt on the LH or RH (as appropriate) belt tensioner, and slide the cam belt off the camshaft pulleys.

7. Each camshaft is retained by five bearing caps. Slacken the cap bolts evenly and progressively with regard to the varying load on the shaft due to the different cam lobe positions. Note that on the LH head, the cam caps and corresponding bearing plinths on the head are marked **0,1,2,3,4** on the outboard side of the inlet cam bearings (counting from the front), and **5,6,7,8,9** on the outboard side of the exhaust cam bearings (counting from the front). On the RH head, the inlet cam caps are marked **A,B,C,D,E** and the exhaust **F,G,H,J,K.** The bearings are line bored and the bearing caps must not be interchanged.



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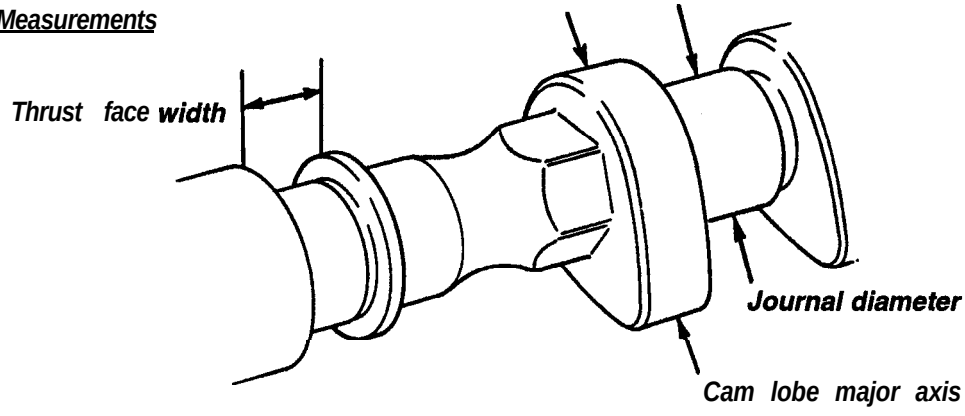
8. Lift out each camshaft and label with its location.

9. If the cam pulley is to be removed, secure the pulley in a soft jaw vice before releasing the cam pulley bolt and clamping washer, and withdrawing the camshaft. Withdraw the camshaft front oil seal from the nose of the camshaft and discard.

10. Carefully examine the camshaft journals, cam lobes and end thrust faces for signs of undue wear or scoring. Measure each camshaft journal:
New size tolerance: 27.939 - **27.960mm** (1.0956 - 1 **.1008in)**
Measure the major axis of each cam:
New size tolerance: inlet: **46.00mm** (1.811 in). Exhaust: **45.15mm (1.778in)**
Measure the distance between thrust faces: New size tolerance: 25.000 - **25.052mm** (0.9843 - **0.9863in)**
Replace any camshaft showing signs of scoring or undue wear on any bearing journals or cam lobes.

Camshaft Measurements



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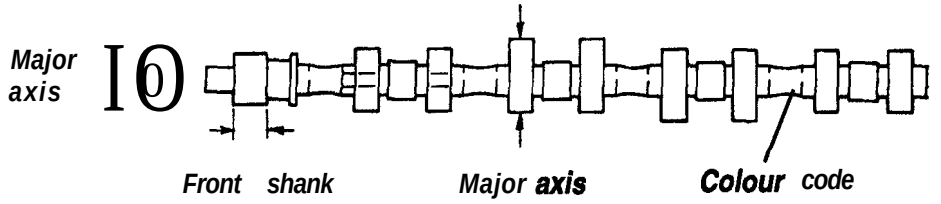
11. Carefully examine the bearing surface for the camshaft in both the the cylinder head and cam cap, and check for undue wear or scoring. Refit the cam caps and torque tighten to 8 Nm (6 **lbf.ft).** Measure the diameter of each cam bearing across the thrust axis.
New size tolerance: 28.000 - 28.021 mm (1 **.1024 - 1.1032in)**
Replace the cylinder head if the cam bearings are **unservicable.**

Camshaft Refitment

1. First check the camshaft identification:
   - LH camshafts have a long, **26mm,** front shank; RH have a short, 21mm shank.

- The rear end of the RH inlet camshaft has either an integral cam angle sector, or is tapped with a female M8 thread for a separate cam angle sector.
- Inlet cam major axis; **46.00mm** Exhaust cam major axis; **45.15mm**
- Colour code paint mark: LH exhaust; White.
  LH inlet; Blue.
  RH inlet; Tan.
  RH exhaust; Green.



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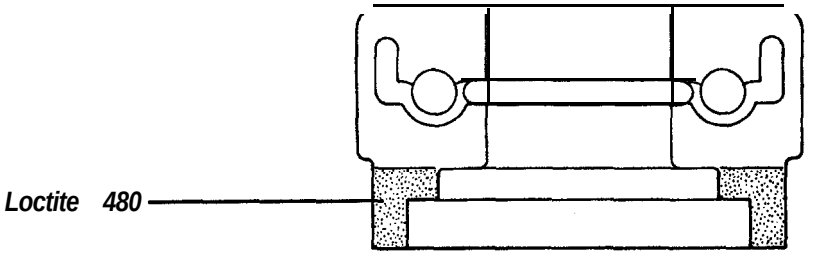
2. Liberally apply engine oil to each camshaft journal and lobe, and lay the inlet camshaft into position in the head, with the front journal location hole pointing away from the head.

3. Sparingly apply Loctite 480 to the joint face of only the oil seal extension **part** of the front cam bearing caps (see diagram).



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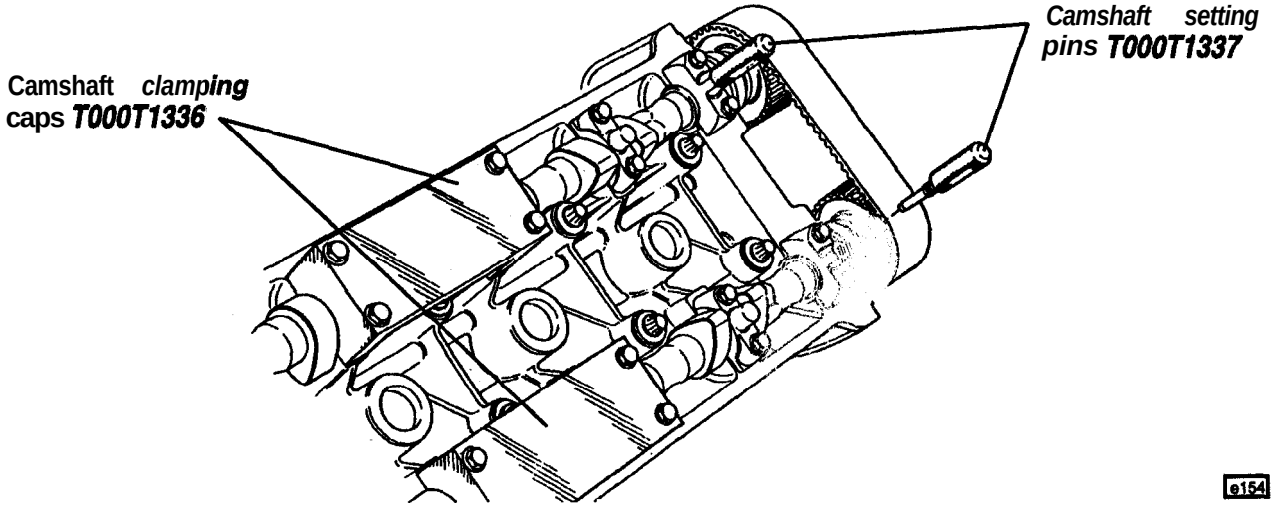
4. Prepare the cam bearing caps for fitment noting that on the LH head, the cam caps and corresponding bearing plinths on the head are marked **0,1,2,3,4** on the outboard side of the inlet cam bearings (counting from the front), and **5,6,7,8,9** on the outboard side of the exhaust cam bearings (counting from the front). On the RH head, the inlet cam caps are marked A,B,C,D,E and the exhaust **F,G,H,J,K.** The bearings are line bored and the bearing caps must not be interchanged. Fit caps 1, 2 & 5, to each camshaft, with a clamping cap TOOOT1336 fitted in place of caps 3 & 4. Fit a camshaft setting pin TOOOT1337 into each front cap to locate in the camshaft drilling and set the position of the shaft.



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5. Fit the cam bearing cap bolts and washers, and tighten evenly and progressively with regard to the varying load on the shaft due to the different cam lobe positions. Finally tighten to 8 Nm (6 lbf.ft).
Note that fully filled and extended tappets may provide 1 - 2 mm extra lift as the camshaft is installed, but oil bleeding past the ball valves will allow the tappet to bottom out after a few minutes.

6. Use a dial gauge on the shaft end, or a feeler gauge between the front bearing and thrust collar to measure the shaft endfloat:
New endfloat tolerance: 0.040 - 0.144mm (0.0016 - 0.0057in)

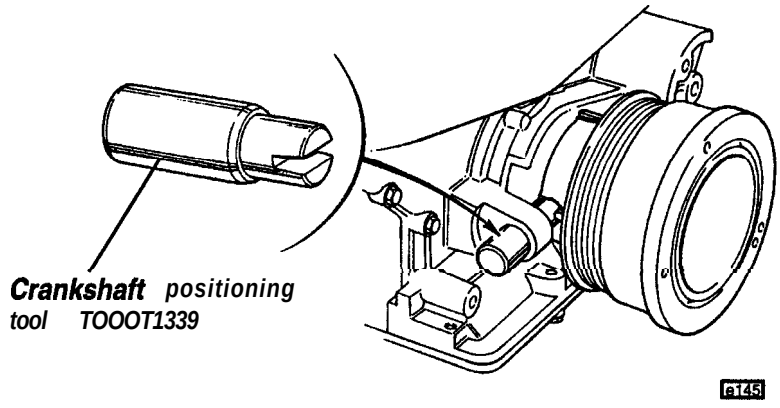
7. Lubricate the lip of each new camshaft oil seal, and apply Loctite 480 to the outer surface. Press fully into its counterbore, spring side rearmost.

8. Fit the pulleys to the camshafts with the rim on the RH shafts offset forwards, and on the LH pair offset rearwards. Clean the threads of the cam pulley bolts and apply Loctite 572 (A912E7030V). Install the bolts with their clamping washers but leave loose at this stage.

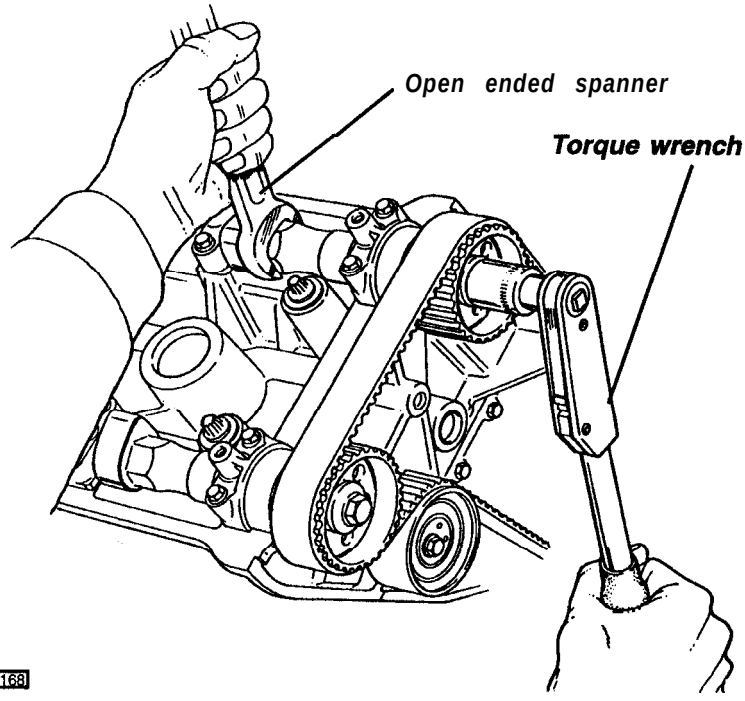
9. Slide each cam belt onto the pulleys, and use special tool TOOOT1360 to turn the eccentric hub of the tensioner to take up the belt slack before tightening the tensioner clamp bolt to 20 Nm (15 lbf.ft).

10. Nip tighten each cam pulley bolt to only 7 Nm (5 lbf.ft).

11. With the camshafts still locked, turn the crankshaft clockwise, dragging the cam pulleys just until the crankshaft positioning tool TOOOT1339 can be inserted through the sensor plinth to engage fully with the marked vane on the crankshaft pulley (timing disc will read 10° BTDC No.2 cylinder). If the crankshaft is inadvertently turned too far, do NOT reverse direction, but continue clockwise for another revolution.



12. **Remove the setting pins** before using a 23 mm open ended spanner on the flats of each shaft in turn to hold the camshaft whilst torque tightening the cam pulley bolt to 100 Nm (74 lbf.ft).

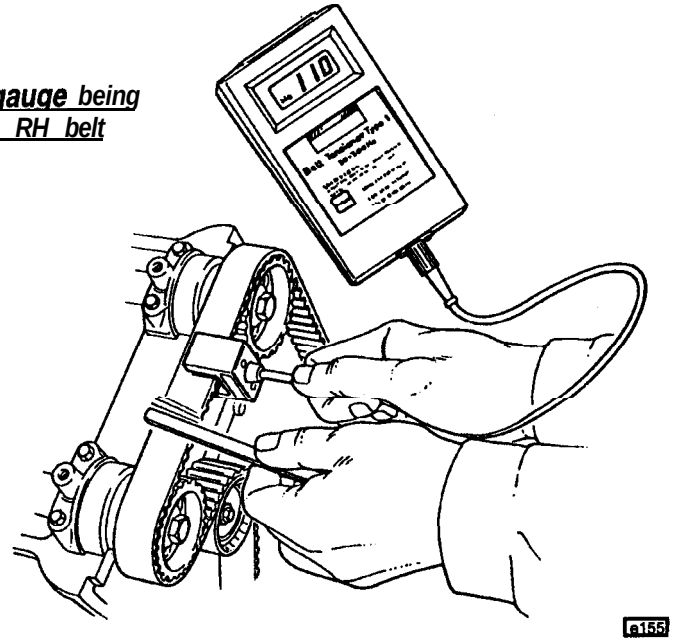


13. Remove the locking caps and crank positioning tool. Refit the standard cam caps and torque tighten to 6 Nm (6 lbf.ft). Carefully rotate the engine through two complete revolutions, checking for any tendency to lock up, indicating a possible valve timing error and valve to piston contact.

14. Turn the crankshaft clockwise to align the '90° ATDC No.2 cylinder' mark with the timing pointer.

15. Measure the LH cam belt tension using the Clavis gauge between the two camshaft pulleys (NOT on any other belt run).
Specification = 95 - 120 Hz
If necessary, slacken the tensioner clamp bolt, and use special tool TOOOT1360 to turn the eccentric hub as required to adjust belt tension. Torque the clamp bolt to 20 Nm and recheck belt frequency.

Clavis gauge being used on RH belt



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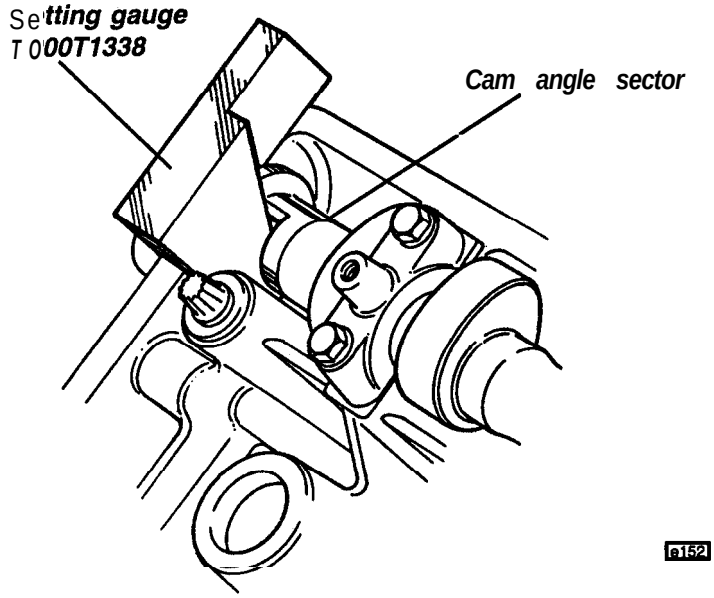
16. Turn the crankshaft clockwise to align' the '135° ATDC No.2 cylinder' mark with the timing pointer and measure the RH cam belt tension using the Clavis gauge between the two camshaft pulleys (NOT on any other belt run).
Specification = 95 - 120 Hz
If necessary, slacken the tensioner clamp bolt, and turn the eccentric hub as required to adjust belt tension, and torque the clamp bolt to 20 Nm. Recheck belt frequency.

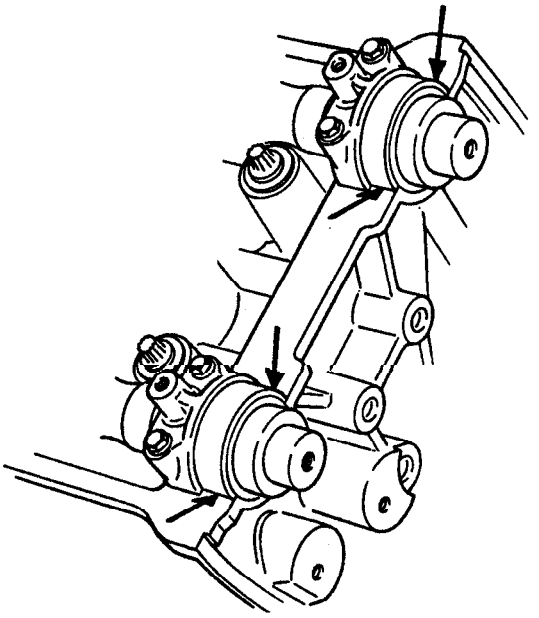
17. Refit the crankshaft positioning tool and check that a camshaft tolerance pin TOOOT1345 fits into each camshaft drilling, noting that this pin is of smaller diameter than the setting pin to allow for an acceptable tolerance stack up. If the pin fits in all the shafts, the timing is correct.

16. If the cam angle sector on the rear end of the RH inlet camshaft is a separate part, refit the camshaft setting pin and use gauge TOOOT1336 to set the position of the sector. Use a spanner on the flats of the camshaft to resist the torque whilst tightening the sector retaining screw. Remove the camshaft setting pin.
If the sector gauge is not available:
- Position the crankshaft at 55" BTDC no.1 (firing) using a degree disc.
- Position the sector inboard with the flat edge at 90° to the cam housing joint face.
- Tighten the sector retaining screw.



e152

19. Check, and if necessary replace, the camshaft cover gaskets before refitting the cam cover. Use a small dab of silicone RTV sealant at each of the sharp corners in the gasket as it seals around the camshaft front caps. Retain with the six screws and washers. Continue reassembly in reverse order to disassembly.



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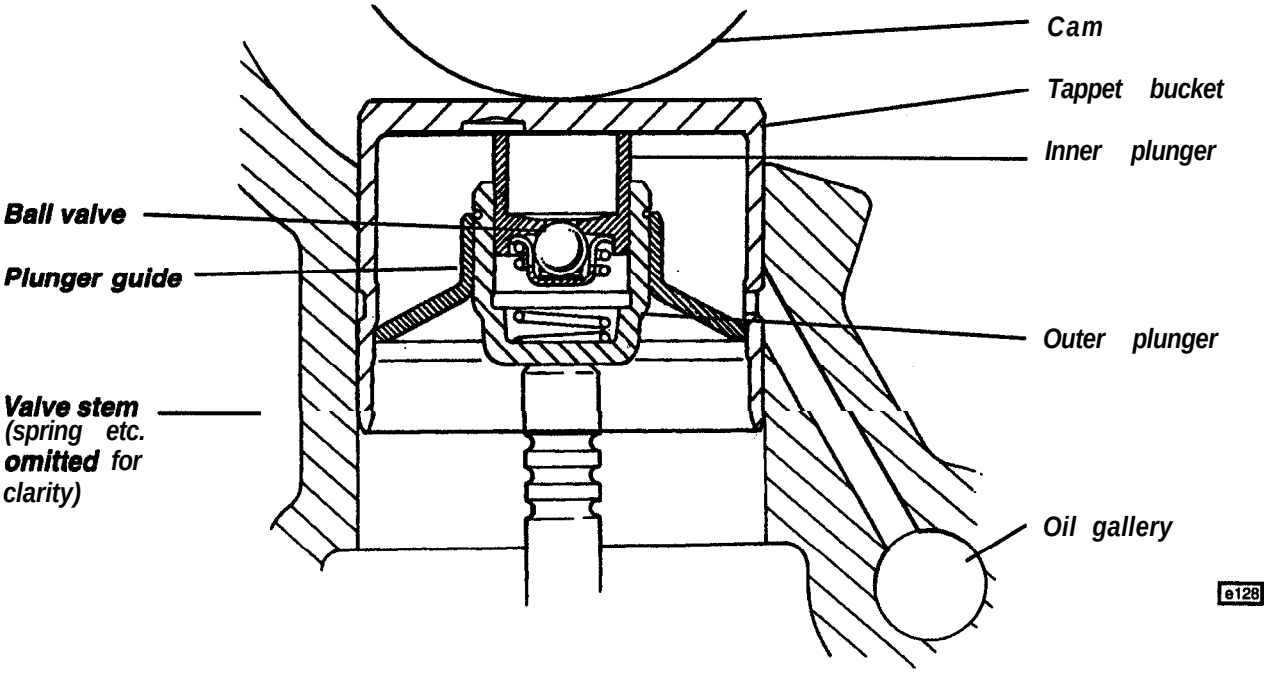
Showing aositions of dabs of silicone RTV sealant

ED. - HYDRAULIC TAPPETS

Hydraulic Tappets - Description of Operation

The hydraulic tappets fitted on the 918 engine use the pressurised engine oil supply to control valve clearance and eliminate the necessity for periodic checking, and adjustment of tappet shimming.



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The tappet consists of three main components; a tappet bucket, a two part (telescopic) plunger, and a ball valve. The plunger assembly slides inside the tappet bucket, with the inner and outer plungers held apart (extended) by a coil spring. In operation, with the engine valve closed, pressurised oil from an oil gallery running alongside the valves, is fed into the inside of the tappet bucket, and into the inner plunger. The oil

flows past the ball valve, and enters the lower chamber where it extends the plunger assembly and takes up any clearance between the valve stem and the heel of the cam. When the cam lobe starts to depress the tappet bucket, and compress the plunger assembly, pressure in the lower chamber rapidly rises above that of the oil supply, so that the ball valve is forced against its seat in the inner plunger. The trapped incompressible fluid in the lower chamber acts to transfer the movement of the tappet bucket to the engine valve stem.

When the engine valve is returned to its seat, the compression force on the plunger assembly is relieved, and pressure in the lower chamber is reduced to that of the oil supply. Oil is again able to flow past the ball valve into the lower chamber to keep the plunger assembly fully extended and the tappet against the heel of the cam.

The coil spring maintains full plunger extension when the engine is stopped and oil pressure is absent. The lower chamber thus remains filled with oil, and the tappet assembly operates satisfactorily for the short period before working oil pressure is attained following engine start up. If any air should become trapped in the lower chamber of the tappet, the compressibility of this air will result in reduced valve lift and mechanical noise, but the system is self bleeding and a short period of running should expel the air.

Note that in order to achieve a uniform wear profile on the top surface of the tappet, the cams are offset in relation to the tappet centreline and impart a gradual rotation of the tappet during normal running.

Tappet Replacement

Access to the tappets is available after the camshafts have been removed (see Sub-Section ED.6). Use a rubber sucker or magnet to withdraw a tappet assembly. The tappet assembly is not servicable, and should be replaced if found to be faulty or worn beyond service limits. New tappets are supplied ready filled with oil and do not require bleeding before fitting.

Inspection

1. Using finger pressure, try to compress the inner plunger of the tappet. No discernable free play or movement should be apparent.

2. Inspect the top surface of the tappet for flatness and smoothness, and replace if visibly marked.

3. Measure the tappet diameter in several positions, and record the smallest dimension.
   New part diameter: 31.959 - 31.967mm (1.2582 - 1.2585in)

4. Remove the valve and spring assembly (see Sub-Section ED.9) and measure the cylinder head tappet bore across the thrust direction.
   New bore diameter: 32.000 - 32.016mm (1.2598 - 1.2605in)

On re-assembly, liberally coat the tappet with clean engine oil or assembly lubricant before refitting into the tappet bore. Refit the camshafts (see Sub-Section ED.6).

ED.8 - CYLINDER HEADS

The aluminium alloy twin overhead camshaft cylinder heads are handed, and are secured by ten long setscrews which are threaded deep into the crankcase. The camshaft bearings are machined directly in the head, but replaceable valve seats and guides are used.

Cylinder Head Removal

The engine must be removed from the vehicle before a cylinder head can be removed, but the camshafts may remain in position. In the following procedure, the exhaust manifold and turbocharger are also left fitted. Note that the dipstick tube cannot be removed with the exhaust manifold fitted, but may remain in position during cylinder head replacement. If necessary, loosen the union nut to allow the tube to be rotated for improved access.

1. Remove the engine (see Sub-Section ED.1 7).

2. Remove the intake plenum (see Sub-Section ED.4).

3. Remove the cam drive belt (see Sub-Section ED.5).

4. Release the injector housing complete with injectors and fuel rail:
   - Release the two screws securing the fuel rail to the cylinder head;
   - Remove the 10 M8 bolts securing the injector housing to the cylinder head;
   - Withdraw the housing and lay aside.

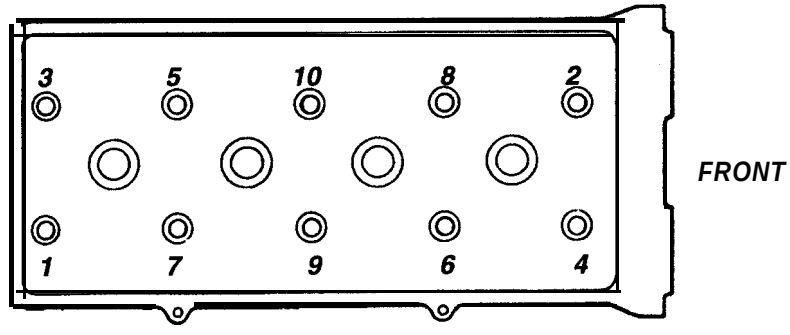
5. Remove the turbo compressor discharge ducts:
   - Remove the bolt securing the duct to the rear face of the cylinder head;
   - Release the duct to throttle body hose;
   - Release the duct to compressor housing hose.

8. Release the turbocharger oil and water hoses:
   - Disconnect the coolant feed from the outside of the cylinder block.
   - Release the coolant return hose from the outlet port (outboard) on the turbocharger.
   - Release the oil drain hose between the turbocharger and sump.

7. Release the vacuum and air supply hoses to the AIR valve on the back of the LH head, and disconnect the pipe between the valve and the RH head.

8. Progressively release the ten cylinder head bolts in a diagonal pattern, starting with the endmost fixings and working towards the centre. See diagrammatic sequence below:

Cylinder Head Bolt Releasing Sequence



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9. Lift the head, complete with exhaust manifold and turbocharger, from the block, and do NOT rest the head face downwards, or damage to the valves and/or joint face may be caused.

10. If necessary;
   - remove the exhaust manifold and turbocharger after releasing the turbo oil feed hose, and the 9 M8 nuts securing the manifold to the head.
   - remove the camshafts (refer to Sub-Section ED.6).
   - remove the hydraulic tappets (refer to Sub-Section ED.9).
   - replace the valves, valve guides and seats (refer to Sub-Section ED.9).

11. Carefully clean the head joint face, taking great care not to scratch or mark the surface, especially the critical combustion sealing area mating against the top of the cylinder liner. If damaged, the cylinder head must be machined or replaced.

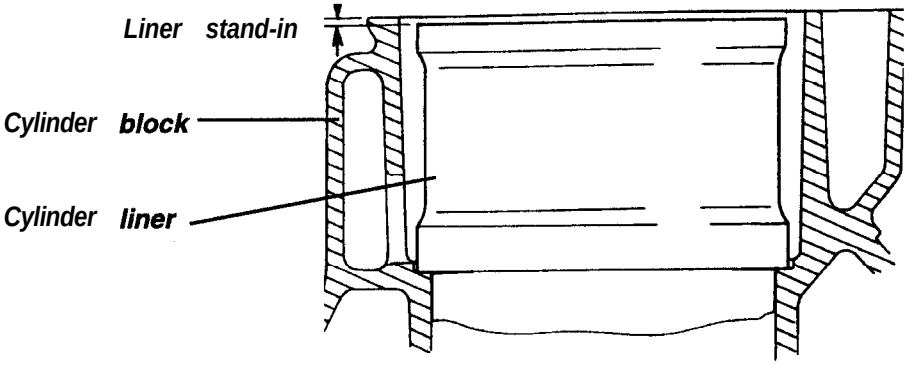
Inspection

- Use a feeler gauge and straight edge or surface plate to check the head to block, and manifold joint faces for flatness. Remove the minimum amount of metal necessary to correct, or replace the head as required.
  Cylinder head joint face flatness tolerance: 0.1 mm (0.004 in)
- Thoroughly inspect for cracks in the combustion chambers or water jacket.
- Check for corrosion in the water jacket and around the water jacket apertures.

Cylinder Head Re-fitment

i) Before re-fitting the cylinder head, check the flatness of the block deck face (excluding the liners):
Specification: 0.1 mm (0.004in) maximum
Note that if the deck face is machined, a similar amount of metal must be removed from the cylinder liner seats in order to maintain liner stand-in within specification.

ii) Check the stand-in of each cylinder liner below the block deck face using a staight edge and feeler gauge, or a depth gauge.



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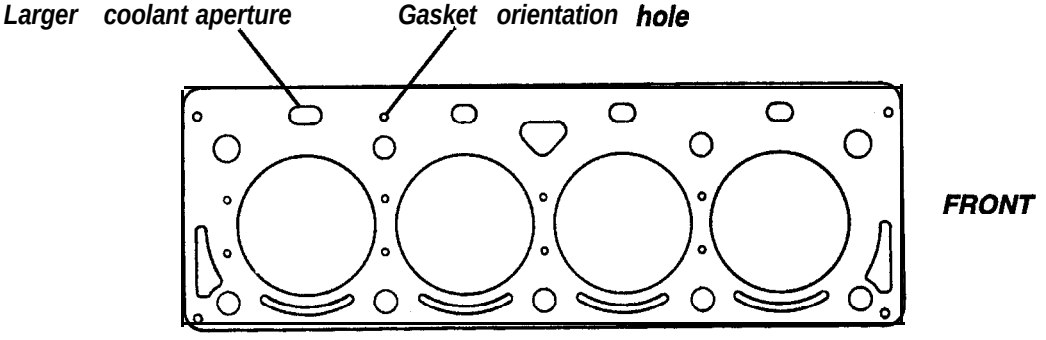
Specification: 0.08 - 0.10 mm (0.003 - 0.004 in)

iii) Ensure all oilways are scrupulously clean and clear of machining debris.

iv) Check that the dipstick tube is in position before fitting the RH head and ex. manifold (see ED.16).

1. Check that the pistons are not at TDC (crankshaft at 45° before no.2 TDC).

2. The laminated steel cylinder head gasket is common to both cylinder banks, and is fitted DRY. Lay the gasket onto the block over the head location dowel at each inboard end of the deck face, and over the small gasket orientation pin towards the rear end of the inboard side of the deck face. Note that the larger inlet side water jacket slot is positioned at the rear end.



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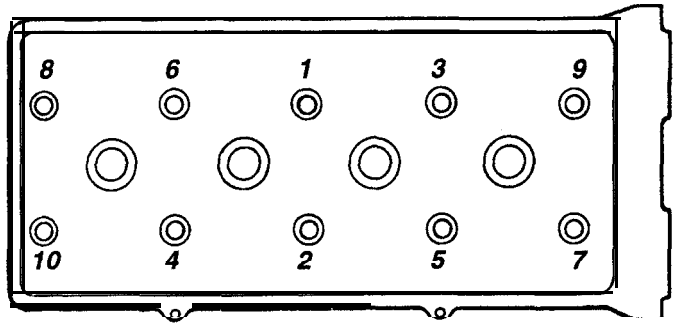
3. Fit the cylinder head onto the block, and locate on the two dowels,

4. Use engine oil to lubricate the end of the thread on the ten cylinder head setscrews, and also the screwhead to washer clamping surface. Insert the ten screws and washers and secure finger tight.
Note that the screws are threaded throughout their length to provide a uniform yield characteristic, and have a rolled thread and captive flat washer. The 12 point heads are ½" A/F.

5. Tighten the fixings using a torque/angle gauge wrench in three stages, in the following order:
   - 1st stage 40 Nm (36 lbf.ft);
   - 2nd stage + 90";
   - 3rd stage + 90".

Cylinder Head Tightening Sequence



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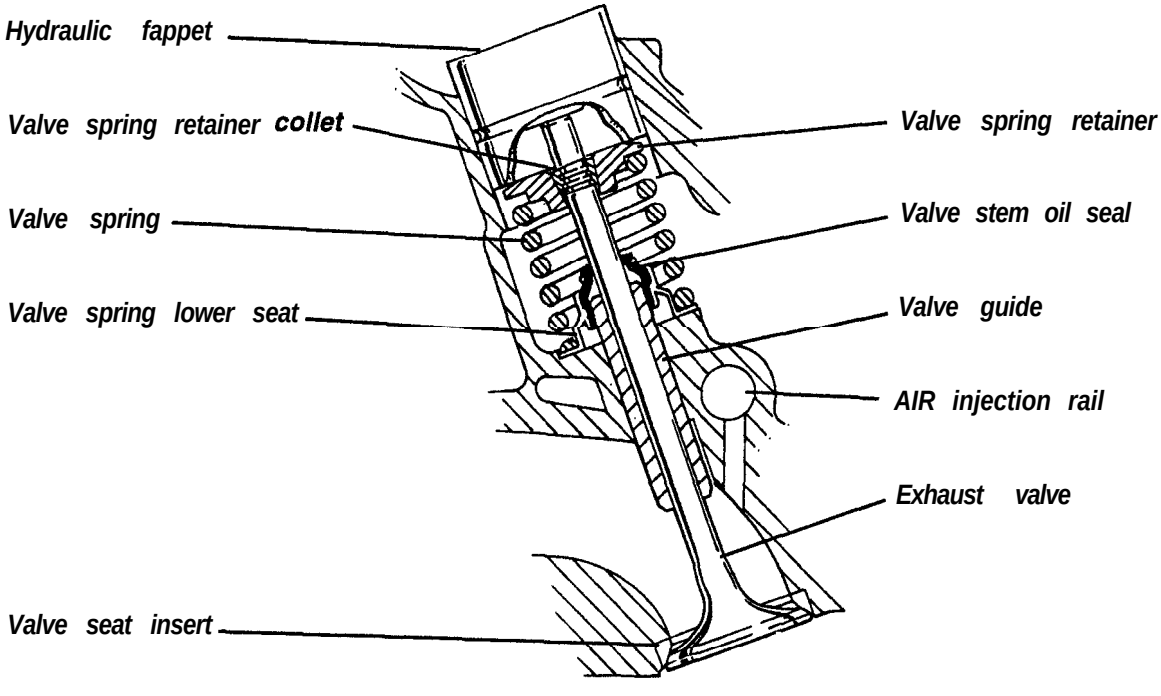
6. Continue re-assembly in the reverse order to disassembly using new gaskets where appropriate.

ED.9 - VALVES. GUIDES & SEATS

Two 33.5mm diameter, chrome silicon steel inlet valves, and two 30.0mm Nimonic 80 exhaust valves are used for each cylinder. The chrome plated valve stems operate in replaceable sintered steel valve guides, with sintered steel seat inserts in the cylinder head. Each valve uses a single helical closing spring which acts against a steel seat on the head, and a retaining collar secured to the valve stem by a three ridge, tapered, split collet. In order to control oil flow to the valve stems, a valve stem oil seal is incorporated into each spring lower seat, which is located by press fit over the top of the valve guide.



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The valves, springs, guides and seats may be removed or replaced once the cylinder head (Sub-Section ED.8) and camshafts (Sub-Section ED.6) have been removed.

1. Withdraw the hydraulic tappets (Sub-Secion ED.7).

2. Use a proprietary valve spring compressor to depress the valve spring top retainer, and withdraw the two halves of the split collet.

3. Release the compressor, and withdraw the spring retaining collar and spring. Withdraw the valve. Take great care to label each part with its location in the cylinder head.

4. Prise the spring lower seat/valve stem oil seal off the top of the guide, and discard.

Valves & Valve Guides

Clean all carbon deposits from the valve heads, taking care not to scratch or damage the seating face or stem. Examine the seating face and valve head periphery for signs of burning or erosion, and the stem for scoring or visible wear. If any such signs are apparent the valve and guide should be replaced as a set.

Measure the valve stem diameter at various points and record the smallest dimension (a).

- Measure the valve guide internal diameter across the thrust axis. 5mm from the top and bottom edges, and record the largest dimension (b).
- Calculate the running clearance (b - a), and compare all figures with the new component limits below. Replace the valve and guide as a set if any visible damage is apparent, or significant wear is measured.

New valve stem diameter:	5.935 - 5.950mm (0.2337 - 0.2343in)
New valve guide bore:	6.000 - 6.012mm (0.2362 - 0.2367in)
New stein clearance in guide:	0.050 - 0.077mm (0.0020 - 0.0030in)

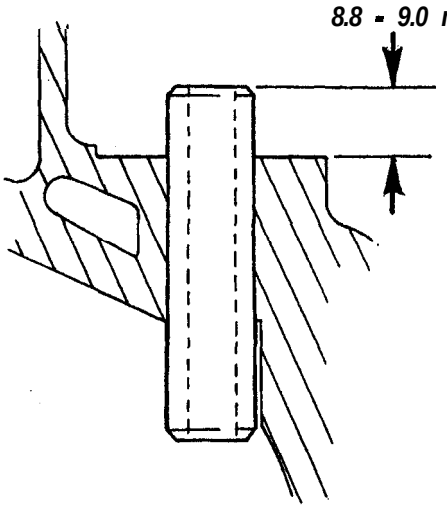
Valve Guide Replacement

The sintered steel inlet valve guides are 43.5 mm long and as such are longer than the 38.5 mm exhaust valve guides, which are sintered from a different specification steel. All the guides are symmetrical end to end, and are retained in the head by interference fit, being installed to a specified dimension without locating shoulder or circlip. Before attempting to remove a guide, the cylinder head should be uniformly heated to 100 to 150°C and the guide then pressed out of the head towards the combustion chamber side.

Valve guides with oversize outside diameters are available to reclaim damaged or oversize guide bores. If an oversize guide is fitted on production, the valve spring seat area around the guide is marked with the applicable oversize; + 0.200mm; + 0.400mm. To verify. always measure the o/d of a guide after removal. See Technical Data section TDK for dimensional data.

Before fitting a guide, uniformly heat the whole cylinder head to 100 to 150°C, lubricate the outside of the guide with engine oil, and using a suitable press tool, press the guide into position from the top, until the length of exposed guide above the valve spring seating face on the head = 8.8 - 9.0mm (0.34 - 0.36in). Allow to cool naturally to room temperature before reaming the guide bore to size: 6.000 - 6.012mm (0.2362 - 0.2367in).

Valve Guide Protrusion



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Valve Springs

Measure the free length of the valve springs using a vernier caliper. Also check the squareness with a surface plate and square gauge. If any spring fails to meet specification, a complete engine set should be fitted. Note that the valve springs are common for the inlet and exhaust.

Standard free length:	42.3mm (1.67in) approx.
Standard max. squareness deviation:	1.5 mm (0.06 in)
Load at 25 mm length (valve fully open):	740 ± 37 N (167 ± 8 lbf)

Valve Seat Inserts

With the valves removed, inspect the contact surface on the valve seats for uniformity and consistency, and for significant valve recession. Normal wear can be rectified by re-cutting or lapping in the valves using traditional techniques, but heavier wear or damage will require replacement of the valve seats and subsequent re-machining.

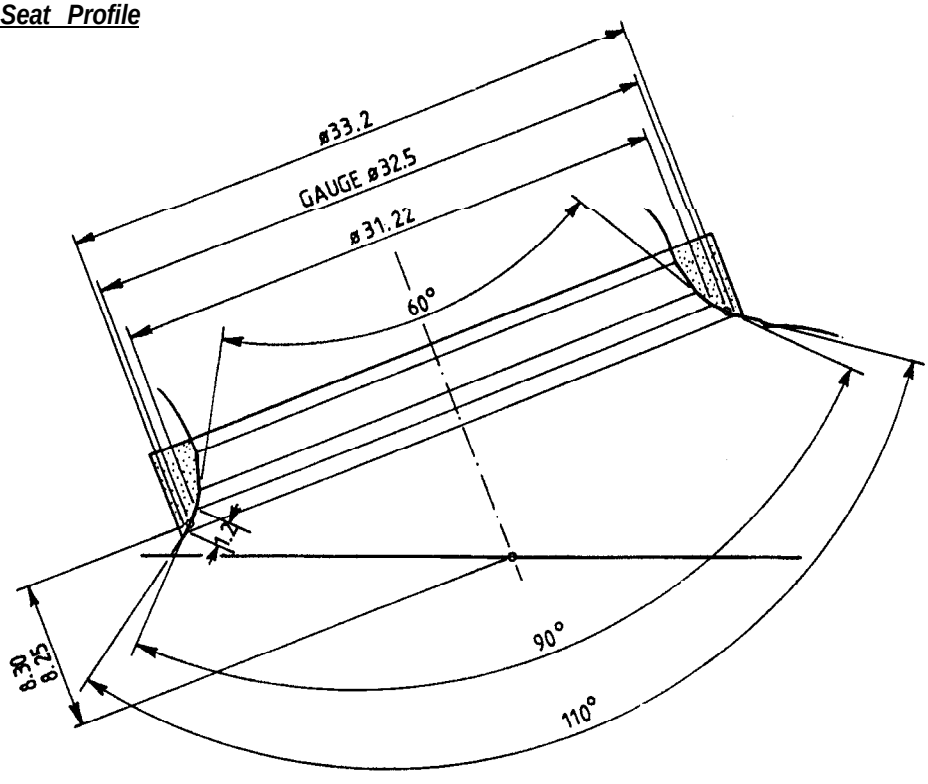
Techniques for removing a valve seat include: Using a expanding valve seat extractor; milling through the seat and drifting out; arc welding puller rods to the seat. Whatever method is used, it is most important not to damage the seat recess in the head.

Before attempting to fit a new insert, the cylinder head should be uniformly warmed in an oven to a temperature NOT EXCEEDING 200°C and the insert cooled using dry ice to a temperature NO LOWER THAN minus 80°C. Using a suitable tool, press the insert into place.

A new insert will require the use of three (110°, 90°, 60") cutters to blend the seat and port profile. If the valve guide is to be replaced, it is essential that the new guide is fitted before any seat cutting operation is performed. Referring to the diagram, note the distance of each gauge diameter axis to the head joint face, and the seat width.

Valve seat inserts with oversize outside diameters are available to reclaim damaged or oversize insert bores: + 0.200mm; + 0.400mm. Always measure the o/d of an insert after removal. See Technical Data section TDK for dimensional data.

/n/et Valve Seat Profile



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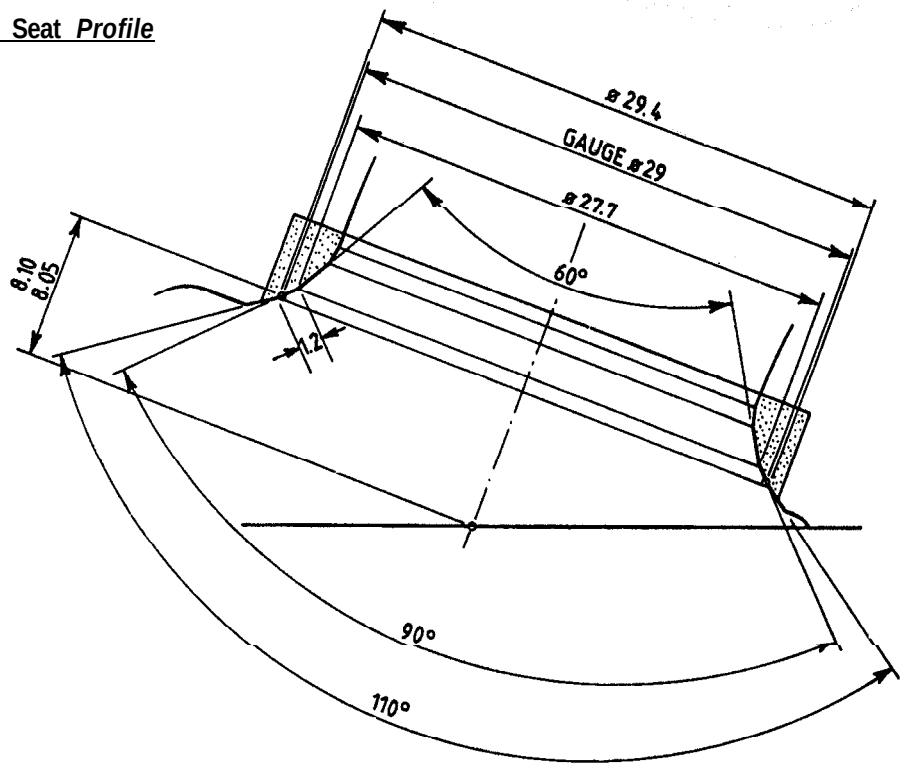
Exhaust Valve Seat *Profile*



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Re-assembly

Before final re-assembly, each valve should be lapped to its seat using first coarse, and then fine grinding paste, taking great care to avoid contamination of the valve stem/guide. Lapping is complete when the seating face on both valve and seat is an unbroken uniform matt grey ring. Thoroughly clean all traces of grinding paste from the port.

- Fit a new spring lower seat/valve stem oil seal over the top of each guide, using a suitable dolly. Lubricate each valve stem with engine oil and insert into its guide.
- Fit a valve spring and top retainer into position, and use a proprietary valve spring compressor to enable the split collet to be fitted to the valve stem. Release the compressor and check for proper seating of the collets in the spring retainer.

Repeat for remaining valves.

Refit the hydraulic tappets (Sub-Section ED.7)

Refit the camshafts (Sub-Section ED.6) and cylinder heads (Sub-Section ED.8).

ED.10 - WATER PUMP

The centrifugal water pump is mounted in the top of the engine front cover, and is driven by multi-rib belt from the crankshaft. The pump assembly is a single service unit, and if found to leak, run noisily, or develop play in the bearing, should be replaced as a complete unit. The pump may be removed without disturbing the engine front cover or the cam belt lower cover.

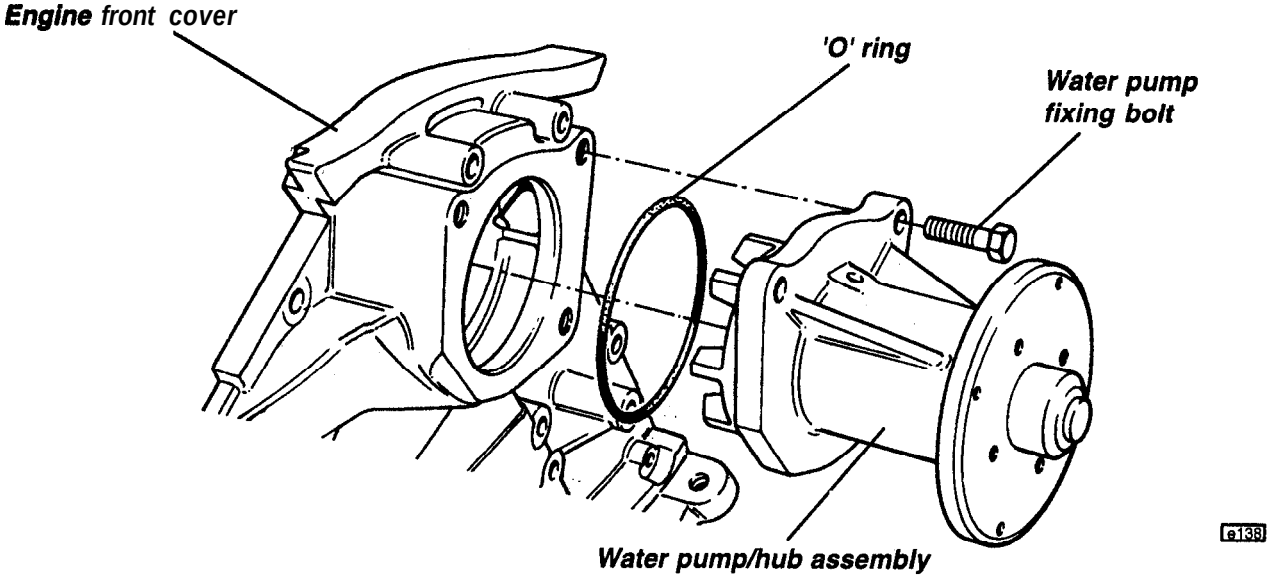
To Remove the Water Pump

1. Remove the radiator drain plug, and drain the cooling system. Refit the drain plug.

2. Use a ½ inch square drive wrench in the hole provided in the auxiliary belt tensioner arm, to relieve tension on the belt and unhook the belt from the water pump pulley.

3. Release the four screws securing the water pump pulley, and remove the pulley.

4. Release the three screws securing the water pump to the front cover, and withdraw the pump.



To Refit Water Pump

1. Replace the '0' ring on the water pump spigot, and lubricate with rubber grease.

2. Fit, the pump into position and retain with the three bolts. Tighten to 20 Nm (15 lbf.ft).

3. Fit the pulley to the water pump hub, and retain with the four screws and washers. Tighten to 8 Nm (6 lbf.ft).

4. Use a ½ inch square drive wrench in the hole provided in the auxiliary belt tensioner arm, and turn counterclockwise to resist the tensioning spring and enable the auxiliary drive belt to be slipped over the water pump pulley. Ensure that the belt is fitted correctly onto each of the pulleys, and remove the wrench to re-apply tension.

5. Refill with coolant.

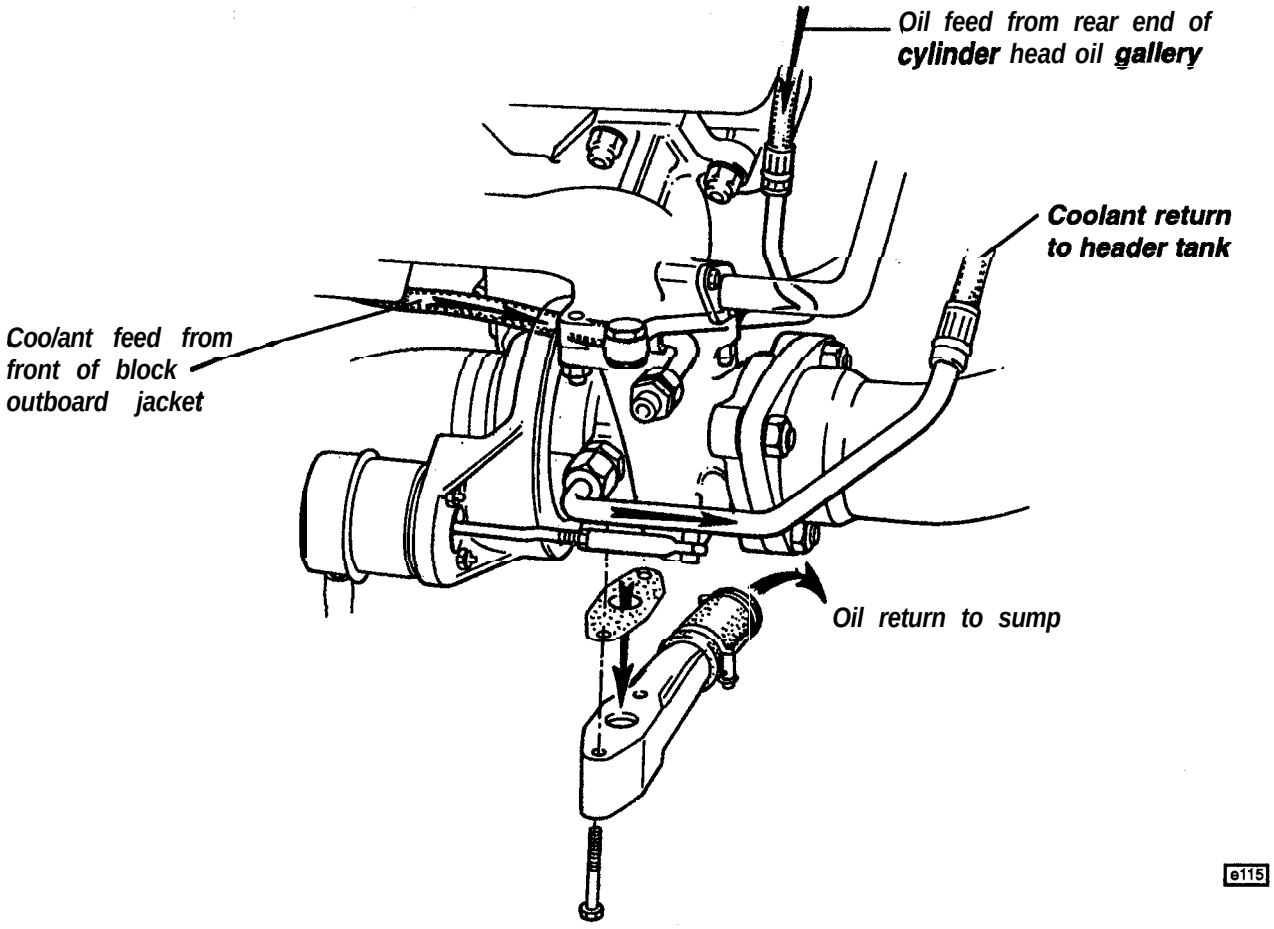
ED.11 - TURBOCHARGERS AND EXHAUST MANIFOLDS

A Garrett T25 turbocharger is used for each cylinder bank, mounted on a short cast iron manifold at each rear side of the engine bay. The turbochargers feature water cooled bearing housings and integral wastegates, operated by a pressure capsule. The pressure line between the turbocharger compressor outlet and the wastegate operating capsule is routed via a frequency valve, in order to permit boost control by the engine management ECU.

The turbochargers are not handed, and as such require different designs of exhaust manifold. Each cast iron manifold maintains separate gas streams for cylinders 1 & 4, and 2 & 3 (RH cylinder bank), and cylinders 5 & 8, and 6 & 7 (LH bank) up to the turbocharger turbine intake, in order to optimise pressure wave effects, Nine stainless steel studs and self locking nuts are used to secure each manifold to the cylinder head, with a 3-laminate steel gasket sealing the joint.

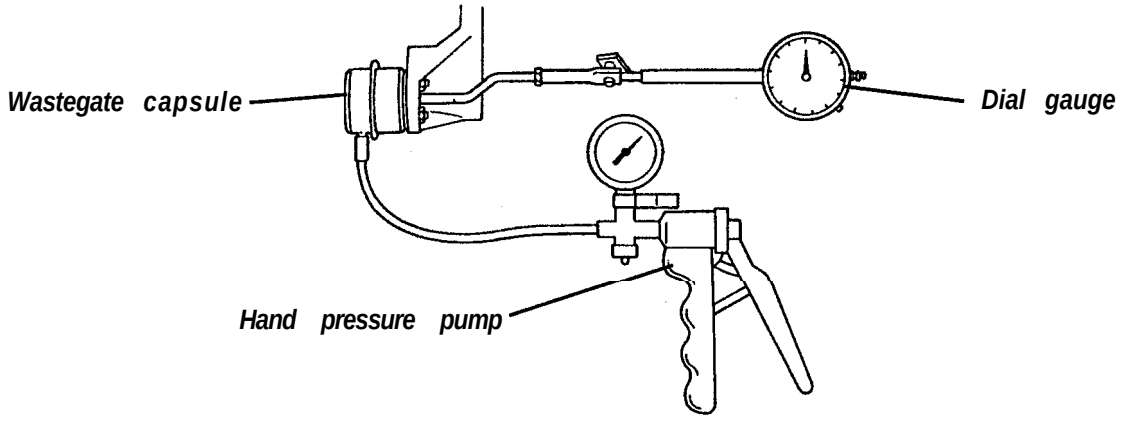
Each turbocharger is provided with an oil feed for its fully floating turbine shaft bearings, from an oilway in the cylinder head via a tapping at the outboard centre of each head. Oil from the turbocharger returns to the sump via a drain pipe directly into the side of the sump. The turbocharger bearing housing is cooled by the engine coolant in order to help control oil temperature and prevent carbonising during heat soak conditions after engine switch off. The coolant supply is tapped off the front end of the cylinder block outboard water jacket, and is returned to the rear end of the inboard jacket. Steel braided hoses are used for coolant and oil feed plumbing, with additional heat protective sleeving on the LH oil feed and LH coolant return hoses.

The wastegate capsule and actuating rod are calibrated by the turbocharger manufacturer to limit the mechanically controlled boost pressure to 0.35 bar (5.0 lb/in²), representing the base setting which can be increased by the ECU controlled frequency valve bleeding pressure from the capsule pressure line. The base



setting can be checked using a using a dial gauge and hand operated pressure pump with 0 - 1 bar (15 lb/in²) pressure gauge:

- Mount the dial gauge against the end of the actuating rod.
  Connect the pressure pump directly to the capsule, and record the pressure required to produce an actuator rod movement of 0.4 mm (0.015 in).
  Specification = 0.34 - 0.36 bar (4.9 - 5.2 lb/in²).
  If necessary, adjust the actuator rod length after removing the 'C' clip and releasing the rod extension from the wastegate lever arm: shorten the rod to increase pressure; lengthen to lower pressure.
  CAUTION: Do not turn, twist or force the threaded actuator rod emerging from the capsule and affixed to the diaphragm. Hold this rod stationary whilst slackening the locknut and screwing the extension piece on or off the actuator rod as required. Refit to the wastegate lever arm and recheck pressure setting.



The wastegate capsule may be removed by disconnecting the pressure hose, uncoupling the actuator extension from the wastegate lever arm, and releasing the nuts securing the capsule to the mounting bracket.

To Remove a Turbocharger/Exhaust Manifold Assembly

In view of the restriced access and harsh fixings environment, it is generally expedient to remove the power unit from the car before attempting to remove the turbochargers or exhaust manifolds.

1. Remove the power unit from the vehicle (See Sub-Section ED.17).

2. Disconnect the inlet ducting to the turbocharger compressor.

3. Release the three fixings securing the exhaust system to the turbocharger.

4. Remove heat shield wrap, and release the clips securing the compressor discharge hose.

5. Release the turbocharger oil and water hoses:
   - Disconnect the coolant feed from the outside of the cylinder block, and the coolant return pipe from the turbocharger.
   - Disconnect the oil feed hose from the rear end of the cylinder head, and the oil drain hose to the sump.
   - Disconnect the wastegate capsule pressure hose.

6. Release the four fixings securing the turbocharger to the exhaust manifold, and remove the turbo, and/or;

7. Release the manifold heat shield (two fixings) and remove the nine exhaust manifold fixing nuts, and withdraw the manifold or turbocharger/manifold assembly.

Inspection of Components

- Check the condition of the exhaust turbine wheel, and compressor impellor. If any damage to the vanes is apparent, the turbocharger should be replaced.
  Note that a significant amount of free play in the bearings is a feature of the turbochargers, and is of no concern unless sufficient to allow the wheels to contact the housing.
  The turbocharger shaft spindle should spin smoothly and freely, without any noise or roughness.
  Use new hose clips to secure the compressor hose to its duct.
  Any sign of oil in the compressor housing may be an indication of turbocharger oil seal failure.
  Check the flatness of the manifold joint face, and machine if necessary, removing the minimum material.
  Thoroughly check the manifold for cracks, evidenced by discoloration.

Refit Turbocharger/Exhaust Manifold Assembly

Reverse the removal procedure with the following notes:

- ** Ensure that the dipstick tube is inserted into the block before the RH exhaust manifold is fitted.** (ED.16)
  Use new gaskets throughout.
  Apply anti-sieze paste to all exhaust fixings.

Toraue Settings:

Turbocharger to manifold (Ml 0 Kaylock):	40 Nm (30 lbf.ft)
Manifold to head (M8 Aerotight):	20 Nm (15 lbf.ft)

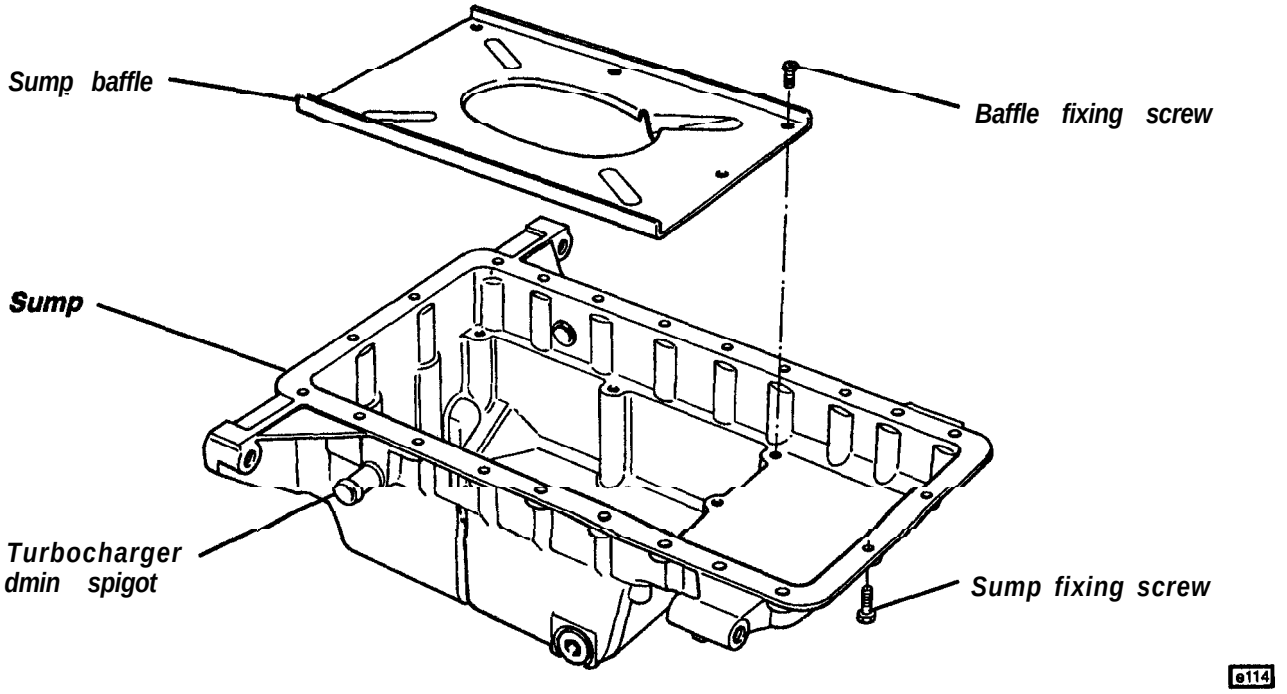
ED.12 - OIL SUMP

The cast aluminium alloy sump is secured to the bottom of the crankcase with 22 fixings. A steel baffle plate is used to control oil surge and maintain an uninterruped oil supply to the pick up pipe when the vehicle is subject to high lateral forces.

To Remove Sump

It is possible to remove the sump with the engine 'in situ', but the engine mountings must be released and the engine raised to provide sufficient clearance to the chassis to enable the sump to be withdrawn without damaging the pick up pipe.

1. To allow the engine to be sufficiently raised, drain the cooling system and disconnect the radiator feed and return pipes from the engine elbows, and the adjacent heater return pipe.



2. Drain the sump, and release the fixing securing the a.c. compressor manifold to the sump.

3. Remove both turbocharger oil drain hoses.

4. Remove the alternator lower fixing bolt.

5. Disconnect the air intake hose from each turbocharger compressor.

6. Remove the bolt securing each of the two engine mounting legs to the rubber mounting, and use a jack or hoist to raise the engine as far as connecting services allow. Take care to monitor all hoses and cables to prevent strain or damage.

7. Remove the lower four bolts securing the clutch housing to the sump, and release the 22 fixings around the sump flange, including the two at the rear of the sump within the clutch housing. Draw the sump vertically downwards to clear the alternator fixing lug, and carefully manoeuvre the sump baffle over the oil pick up pipe. Take care not to damage the a.c. compressor manifold.

6. Thoroughly clean the inside of the sump, removing the baffle if necessary, and clean all sealant from the sump and block joint faces.

To Refit Sump

Reverse the removal procedure with the following notes:

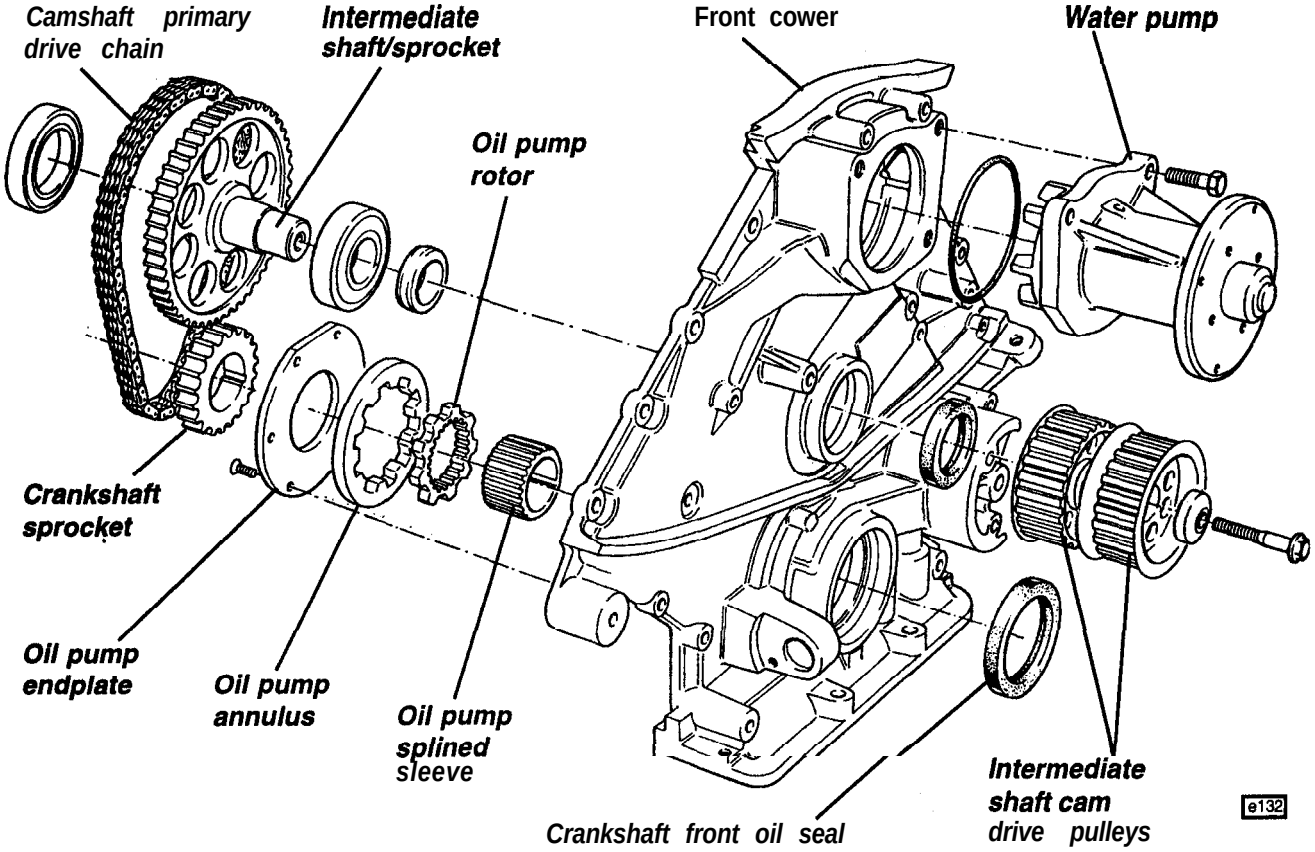
- Use Loctite 646 on the six baffle retaining screws, and torque to 6 Nm (6 **lbf.ft)**
- Use Loctite 646 on the turbocharger oil drain spigots and use a suitable cruciform tool to tighten to 20 Nm (15 lbf.ft).
- Use Loctite 5910 on the sump/block flange, and tighten the M6 fixings to 20 Nm (15 **lbf.ft).**

ED.13 - FRONT COVER & OIL PUMP

The front cover is bolted to the front of the cylinder block, and houses the camshaft primary drive, the oil pump, and the water pump, The camshaft primary drive utilises a half speed intermediate shaft, driven by inverted tooth Morse chain, and supported in two roller bearings; one located in the front face of the block, and

one in the front cover. The intermediate shaft, which is integral with the chain sprocket, projects through the front cover and carries on its 'overhung' front end, the two cam belt drive pulleys.

Note that early cars using ball bearings on the intermediate shaft should have been updated to roller bearings in accodance with Service Bulletin 1997/20.



The trochoid type oil pump uses a 9 lobe rotor driven by, and concentric with the crankshaft, running within a 10 lobe annulus housed within the front cover. An oil pressure relief valve is fitted into the bottom of the cover and controls a passageway between inlet and outlet ports on the pump. The oil pick up pipe is bolted to the bottom of the front cover, and connects the suction side of the oil pump with the oil supply stored in the sump.

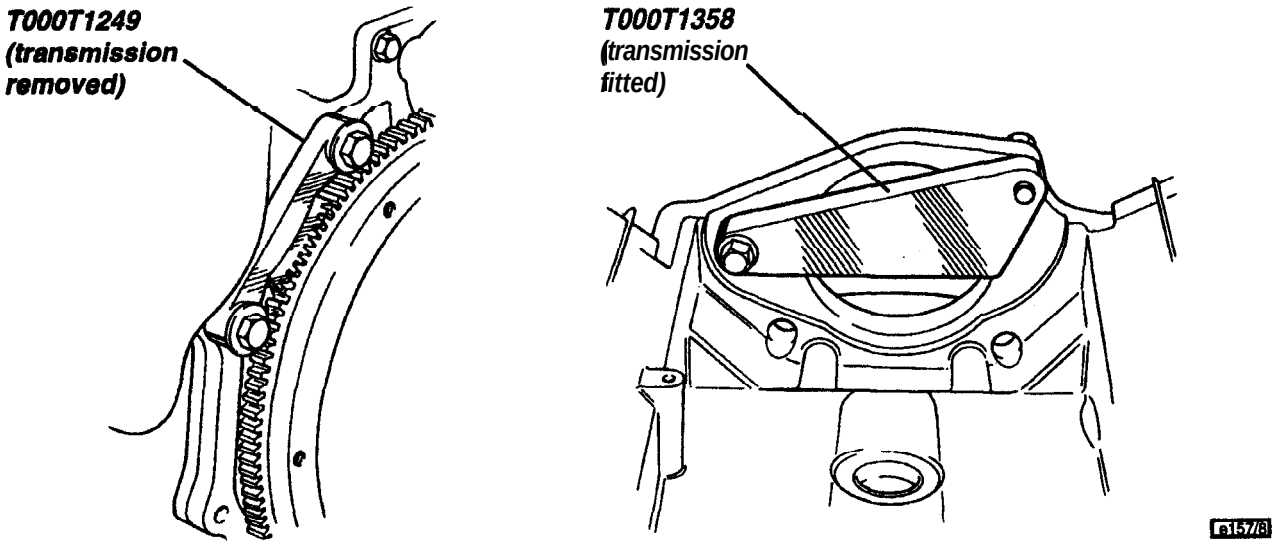
The centrifugal water pump is mounted on the upper front face of the front cover, and is accessible without disturbing the cover (see sub-section ED.lO). Similarly, removal of the cover is not necessary in order to replace the crankshaft front oil seal or intermediate shaft seal. Access to the oil pump or camshaft primary drive does require front cover removal, and is most easily accomplished by first removing the power unit from the car.

To Replace Crankshaft Front Oil Seal

1. Use a ½ in. square drive wrench in the hole provided in the auxiliary belt tensioner arm, and turn counterclockwise to relieve the belt tension, Remove the belt from the pulleys.

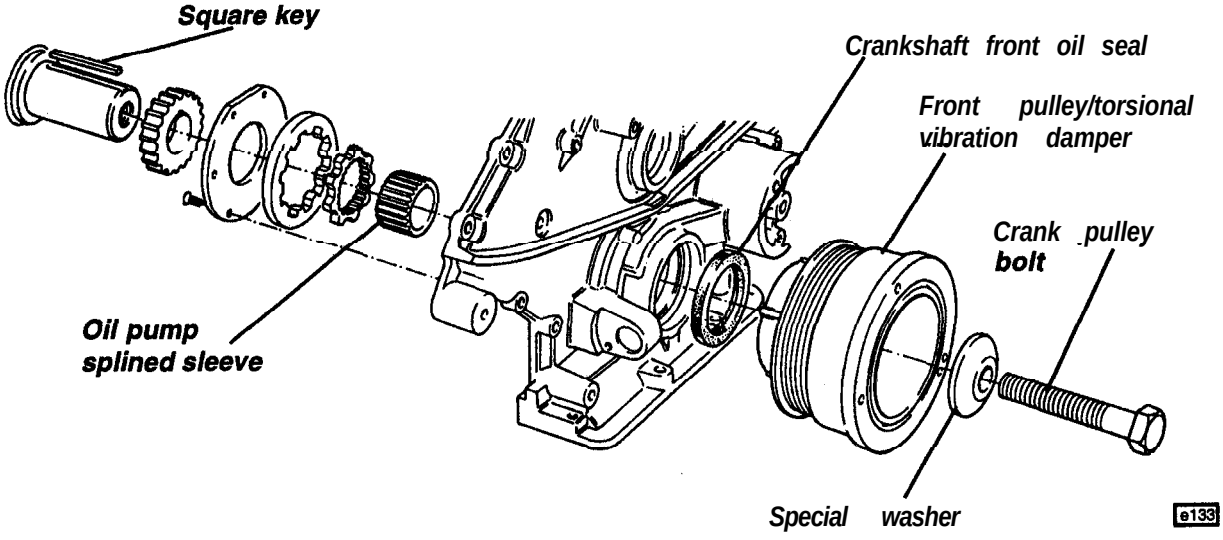
2. To reduce the possibility of damage, unplug and remove the engine speed sensor from its plinth on the front cover.

3. The crankshaft pulley bolt is tightened to 230 Nm such that its removal requires locking of the crankshaft. If the engine is 'in-situ', or the transmission attached, access to the flywheel is limited to that provided after removal of the starter motor. Use locking tool TOOOT1358 in the starter aperture. If the transmission is removed, flywheel locking tool TOOOT1249 may by used. Remove the bolt and washer securing the crankshaft front pulley/harmonic damper, and draw the pulley off the crankshaft nose.



4. Using a suitable oil seal extractor, or by careful prising, remove the crankshaft oil seal from the front cover, and discard. Take care not to damage the oil seal recess in the cover.

5. Apply rubber grease to the outside of a new seal, and press into position in the front cover, spring side rearmost. Take care not to damage or distort the seal, and ensure the seal is fitted squarely and flush with the front face of the cover.



6. Before fitting the front pulley, check that the oil pump splined sleeve and square key are fitted to the crankshaft.

7. Grease the lip of the oil seal before sliding the front pulley onto the crankshaft nose, engaging the **keyway** with the square key. Fit the pulley retaining bolt and special washer, and with the flywheel locking tool **fitted,** tighten the bolt to 230 Nm (170 lbf.ft).

8. Remove the flywheel locking tool and refit and connect the engine speed sensor.

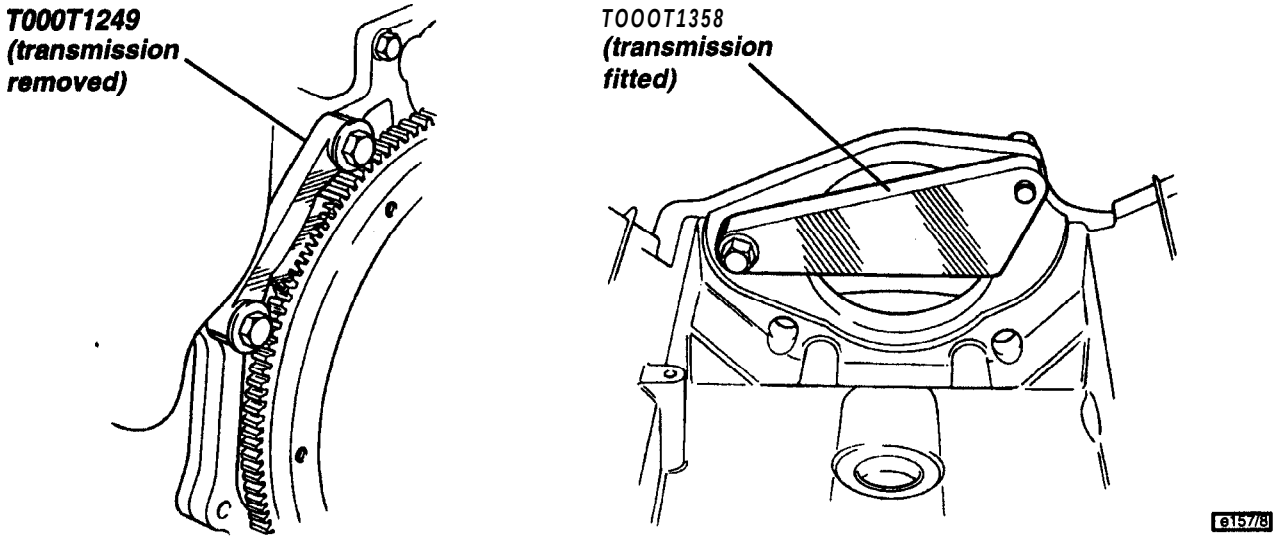
9. Hook the smooth side of the auxiliary belt over the tensioner pulley, and engage the ribbed side around the crankshaft, **a.c.** compressor, PAS pump and water pump pulleys. Relieve the tension (as in step 1) before fitting around the alternator pulley.

To **Replace** Intermediate Shaft Oil Seal

The intermediate shaft oil seal may be replaced with the engine 'in situ', but the cam belt and cam drive pulleys on the intermediate shaft must be removed, necessitating a complete cam timing procedure together with appropriate safety precautions.

1. Follow the procedure in sub-section ED.5 to remove the cam belts. Take care to avoid turning the crankshaft from the 'safe' position whilst the cam belts are removed.

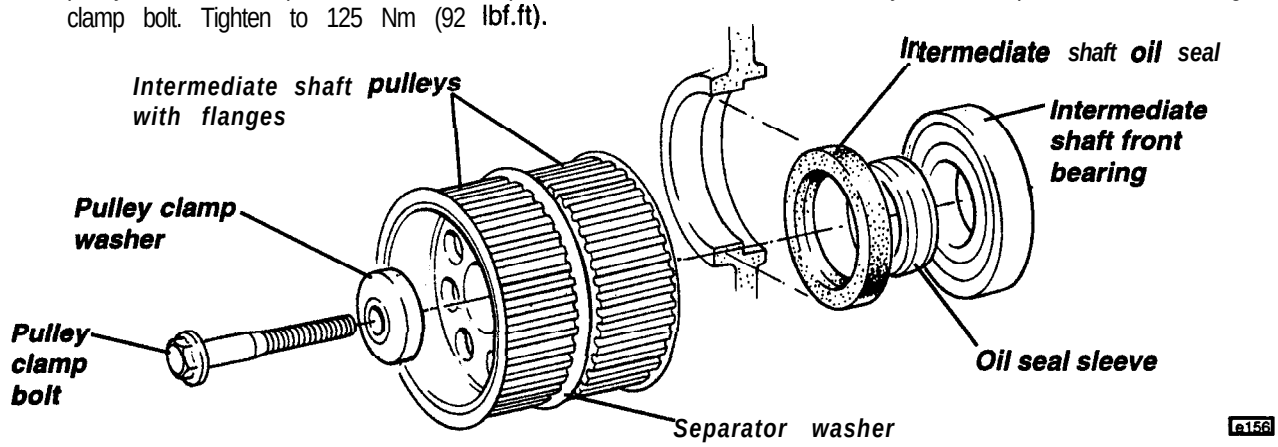
2. Fit a flywheel locking tool;
   - If the transmission is not fitted, use tool TOOOT1249
   - If the transmission is fitted, remove the starter motor, and use tool TOOOT1358



3. Remove the bolt and washer securing the intermediate shaft pulleys. Withdraw and label the two pulleys and separator washer, to permit re-assembly in the same order. Remove the oil seal sleeve from the shaft.

4. Using a suitable oil seal extractor, withdraw the intermediate shaft seal and discard. Apply rubber grease to the outside surface and sealing lip of a new seal, and press into position in the front cover, spring side rearmost. Take care not to damage the lip or distort the seal, and ensure the seal is fitted squarely and flush with the outer surface of the front cover.

5. Slide the oil seal sleeve DRY, onto the intermediate shaft, and avoid contamination of the pulley clamping face with rubber grease from the seal. Before fitting the pulleys, separatorwasher, clamping washer and clamp bolt, carefully degrease all the clamping surfaces using an acetone based cleaner. Slide the two pulleys with the separator washer interposed, onto the shaft, followed by the clamp washer and flanged clamp bolt. Tighten to 125 Nm (92 lbf.ft).



6. Refit the two pulleys and separator washer onto the intermediate shaft. Retain with the clamp washer and flanged clamp bolt. torque tightening to 125 Nm (92 lbf.ft).

7. Remove the flywheel locking tool, and continue with the cam belt replacement procedure detailed in sub-section ED.5.

To Remove the Front Cover

The front cover must be removed for access to the oil pump or camshaft primary drive. It is recommended that the power unit be first removed from the car.

1. Remove the power unit from the car (see Sub-Section ED.15).

2. Remove the auxiliary drive belt and tensioner (see Sub-Section ED.3) and water pump pulley.

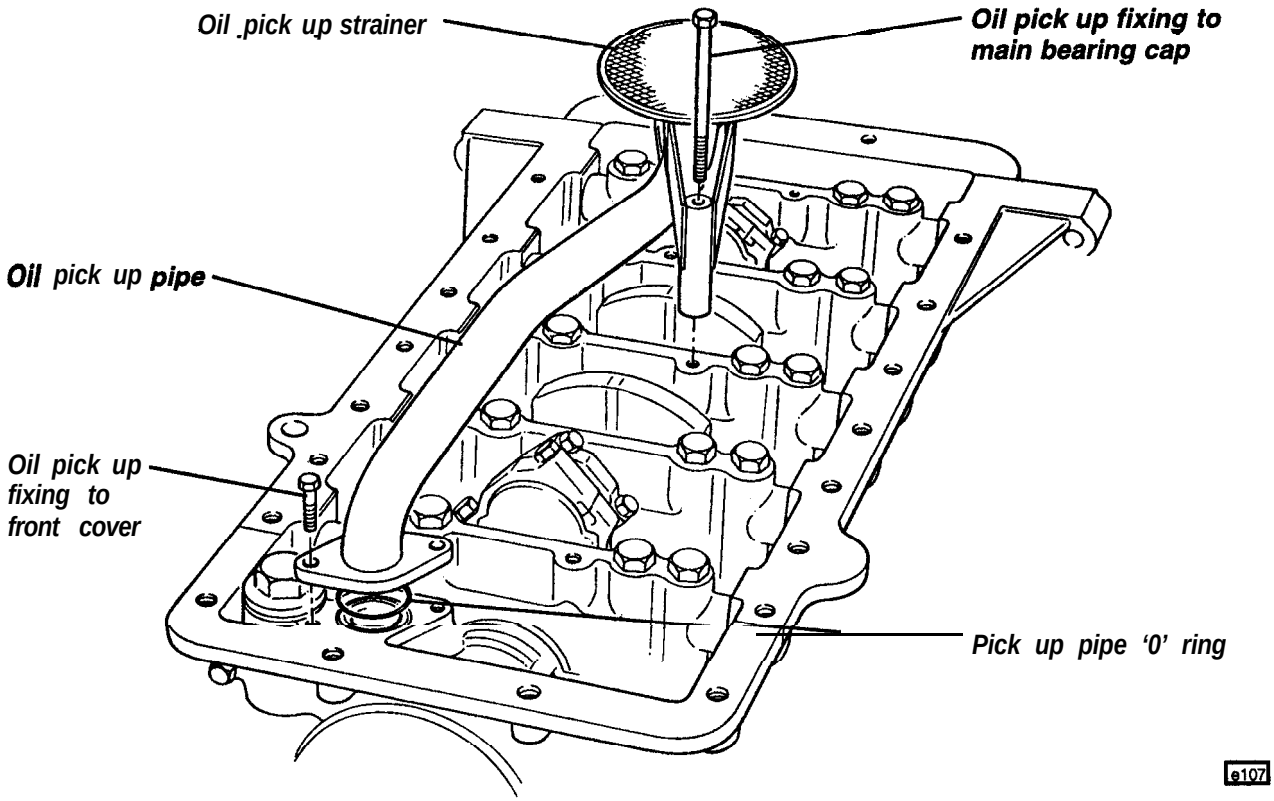
3. Remove the four bolts securing the three sections of the cam belt cover, and withdraw the cover.

4. Before removing or disturbing the camshaft drive belts, it is most important to guard against valve to piston contact, and to adopt procedures helpful to the reinstatement of valve timing. Follow the procedure detailed above (To Replace Intermediate Shaft Oil Seal) to remove the intermediate shaft pulleys.

5. With the flywheel locking tool still fitted, remove the crankshaft pulley bolt and washer, and withdraw the auxiliary pulley/harmonic damper from the crankshaft.

6. If still fitted, remove the alternator and a.c. compressor.

7. Remove the sump (Sub-Section ED.12). Release the two fixings securing the oil pick up pipe to main bearing caps 3 and 4, and the two fixings to the front cover, and remove the pipe and 'O' ring.

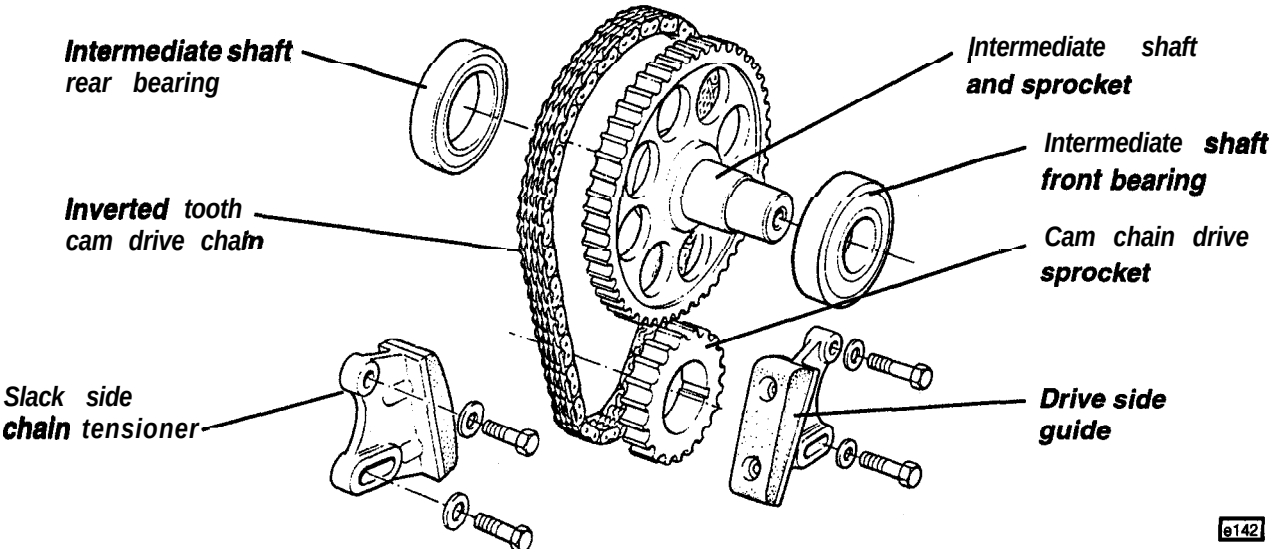


8. Progressively release the 24 fixings securing the front cover (18 around the periphery, 6 along inside of water ducts), and note the different lengths used in each location as the screws are withdrawn.

9. Withdraw the front cover complete with oil and water pumps. Slide the oil pump drive splined sleeve off the crankshaft.

10. Remove the chain tensioner and guide blocks, by releasing the two M8 bolts securing each part.

11. Slide off the intermediate shaft/sprocket complete with chain and crankshaft sprocket. If necessary, withdraw the roller bearing outer races from the block and front cover. Pull the inner races off the intermediate shaft, and if necessary, extract the square key from the crankshaft.



12. To remove the oil pump assembly, release the six screws securing the oil pump end plate, and withdraw the rotor and annulus. Label the orientation of the rotor and annulus to enable refitment in the same manner. Remove the oil pressure relief valve plug, spring and plunger from the bottom face of the front cover.

13. Press out from the front cover, the oil seals for the intermediate shaft and crankshaft.

Inspection

Inspect the pump housing and end plate for damage, surface scoring or visible wear.

- Inspect the pump rotor and annulus for damage, scoring or visible wear.
- Inspect the seating face of the oil pressure relief valve on both the plunger and front cover bore.

Measure the oil pump components as follows:

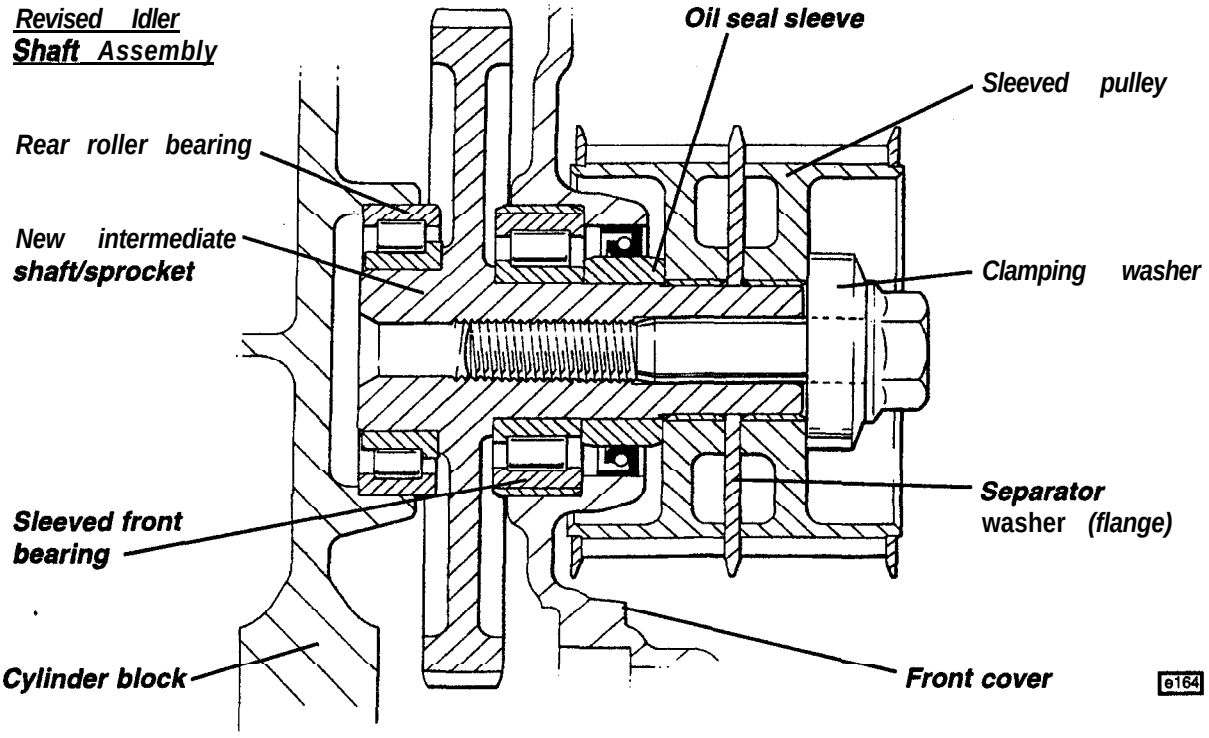
Standard annulus diameter	93.845 - 93.880mm
Standard housing diameter	94.100 - 94.154mm
Standard annulus radial clearance	0.220 - 0.309mm
Standard annulus thickness	13.810 - 13.960mm
Standard housing depth	12.000 - 12.005mm
Standard rotor thickness	13.930 - 13.980mm

Re-assembly

Note that the driven sprocket for the camshaft primary drive, uses two dissimilar roller bearings, the rear bearing mounted in the cylinder block, and the other in the front cover. Note also that a special tool is required to locate the front end of the intermediate shaft in order that the primary chain tension may be correctly set.

1. Assemble the camshaft primary drive:
   - The narrower of the two roller bearings for the intermediate shaft is to be fitted into the block. Separate the inner race from the rollers. Lubricate the bearing rollers with Graphogen grease or similar, and apply Loctite 648 to the outer race. Press the outer race/roller assembly into the block until fully seated against the shoulder. Note that the race will protrude by about 3.5mm.
   - Apply Loctite 648 to the rear spigot of the intermediate shaft, and to the bore of the inner race of the rear roller bearing, and press the race onto the shaft, flanged end first, until it abuts the shoulder.
   - Apply Locite 243 to the outer race of the intermediate shaft front bearing, and press into the front cover until fully seated against the shoulder (Note that on early engines, the front bearing outer race is sleeved, and will protrude from the cover by approx. 3mm). Coat the bearing rollers with Graphogen grease or

similar. Slide the inner race of the front bearing onto the shaft, flanged end first, until it abuts the shoulder. Fit the intermediate shaft into its rear (cylinder block) bearing.



2. In order to check for any bearing 'nip', the front cover should be dry fitted at this stage: Fit the cover over the crankshaft and intermediate shafts, and align the cover by using alignment dolly TOOOT1362 over the crankshaft nose to fully engage in the crankshaft seal bore in the cover. Align the bottom edge of the front cover with the sump joint face on the block. Fit four of the M8 x 30 front cover fixings around the intermediate shaft, and tighten to 20 Nm. Check that the intermediate shaft is free to revolve, with just perceptible endfloat. If the shaft is tight, check the fitment of the bearings.

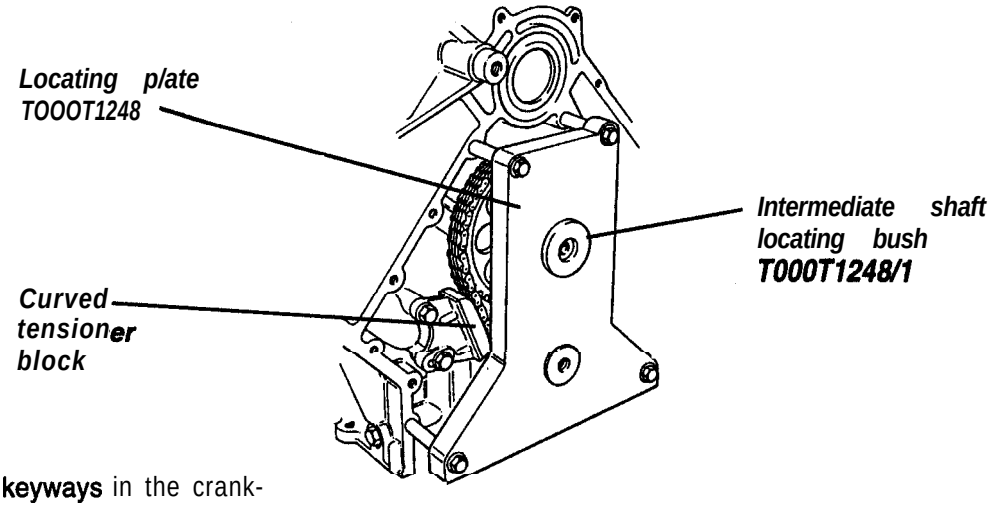
3. Remove the front cover. Apply rubber grease to the sealing lips of a new intermediate shaft oil seal, and press into position in the front cover, spring side rearmost. Take care not to damage the sealing lips or distort the seal, and fit squarely until flush with the cover front face. Do not fit the new crankshaft seal at this stage.

4. Fit the chain around the crankshaft and intermediate shaft sprockets (crank sprocket orientated as previously), and fit the sprocket and chain assembly to the engine by sliding the crankshaft sprocket onto the crank, **without** the key fitted, whilst locating the intermediate shaft rear bearing race into its rollers in the cylinder block.

5. Fit the two chain rubbing blocks loosley into position, noting that the drive side block (LH side as fitted in car) is a flat faced wedge, thick end uppermost, and the slack side block has a curved profile.

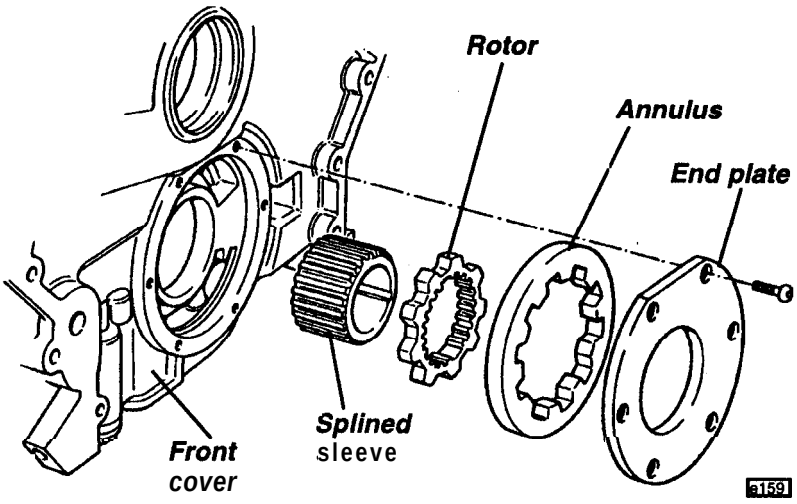
6. Fit locating plate TOOOT1248 over the crankshaft and intermediate shafts, and retain with the four bolts. Check that the locating plate is fitted with the correct bush **(T000T1248/1)** to fit the diameter of the intermediate shaft.

7. Use moderate finger pressure against the curved tensioner block to take up the chain slack, and tighten the two bolts to 20 Nm (15 lbf.ft). Position the drive side guide block to lightly contact the chain, and tighten the two bolts to 20 Nm (15 lbf.ft). Remove the locating plate.



8. Align the **keyways** in the crankshaft and sprocket, and slide the square section key fully into engagement.

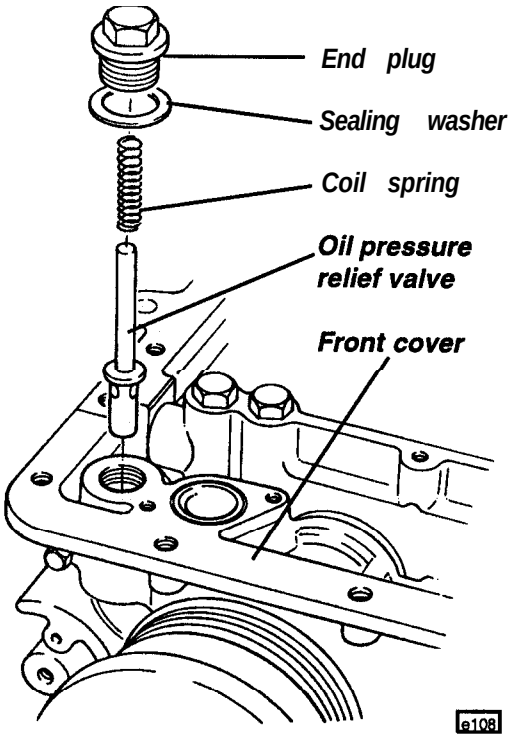
9. Copiously lubricate the oil pump **annulus** and rotor, and fit into the housing in the same orientation as noted on removal. Fit the end plate, and retain with the six screws, using Loctite 243 on the threads and tightening to 5 Nm (45 lbf.in).



10. Lubricate the relief valve plunger, and insert into the front cover bore, followed by the spring, washer and end plug. Tighten to 55 Nm (41 lbf.ft).

10. Lubricate the water pump '0' ring with rubber grease, and fit around the pump aperture on the block. Similarly lubricate and fit the smaller '0' ring into its location groove around the main oil feed gallery on the LH side of the block.

11. Prepare the jointface on front cover and block with Permabond A905 surface conditioner, before applying a bead of Loctite 5910 sealant around the cover joint. Apply Loctite 243 to the outside of the intermediate shaft front bearing.



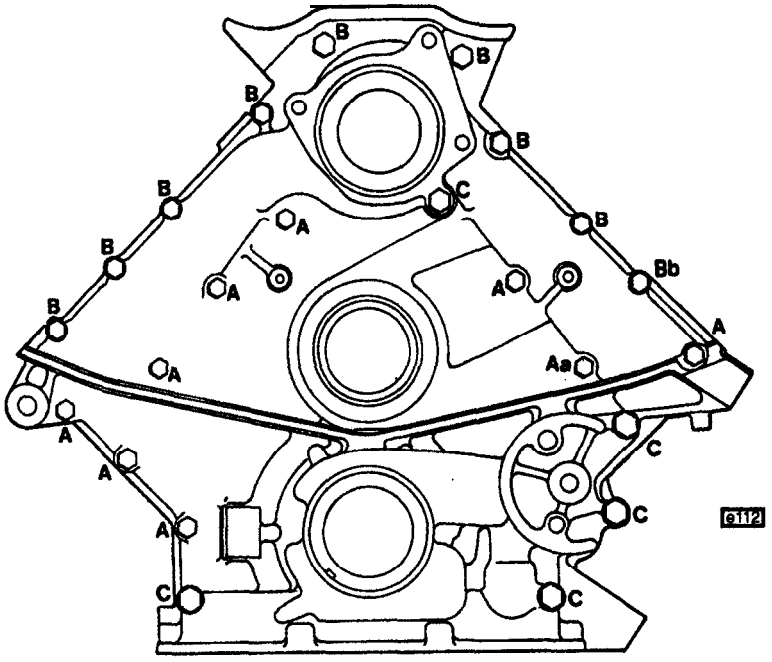
12. Fit the oil pump splined sleeve into the oil pump rotor in the front cover, and fit the cover assembly over the crankshaft and intermediate shafts, aligning the **keyway** in the splined sleeve with the crankshaft key. . Position the cover by fitting the alignment dolly TOOOT1362 over the crankshaft nose to fully engage into the crankshaft seal bore in the cover, and aligning the cover bottom edge with the sump joint face on the block.

13. Fit the front cover fixings as shown in the diagram, and progressively tighten to the specified torque:
    - **M8** bolts; 20 Nm (15 **lbf.ft)**
    - M8 bolts; 8 Nm (6 **lbf.ft)**

    Remove the alignment dolly.

A = M8 x 30
Aa = M8 x 25
B = M6 x 25
Bb = M6 x 20
C = M8 x 65

Note that if an M8 countersunk screw is fitted at any position, this should be fitted and tightened only after torque tightening all the others.



14. Fit the crankshaft front oil seal and pulley/damper (see earlier this sub-section).

15. Refit the oil feed pipe, using rubber grease on the **'O'** ring seal connection to the front cover.

16. Continue re-assembly in the reverse order to disassembly, referring to Sub-Section ED.5 to set the cam timing and refit the cam belts.

ED.14 - FLYWHEEL & CRANKSHAFT REAR OIL SEAL

The steel flywheel is fixed to the rear end of the crankshaft by eight bolts, one of which is displaced from the otherwise regular spacing to allow the flywheel to be fitted in only one orientation. No dowels are used, and no washers are used on the flywheel fixing bolts. The flywheel also serves as carrier for the clutch cover assembly, and a friction face for the clutch centre plate. A ring gear of 153 induction hardened teeth is machined into the periphery of the flywheel and accommodates the pre-engaged starter motor mounted at the rear of the cylinder block **'V'.**

The crankshaft rear oil seal runs on the outside of the crankshaft rear flange, to which the flywheel is bolted, and is mounted in a separate alloy housing bolted to the rear of the cylinder block.

Access to the flywheel is available with the engine 'in situ' if the transmission is removed.

Replacement of Flywheel

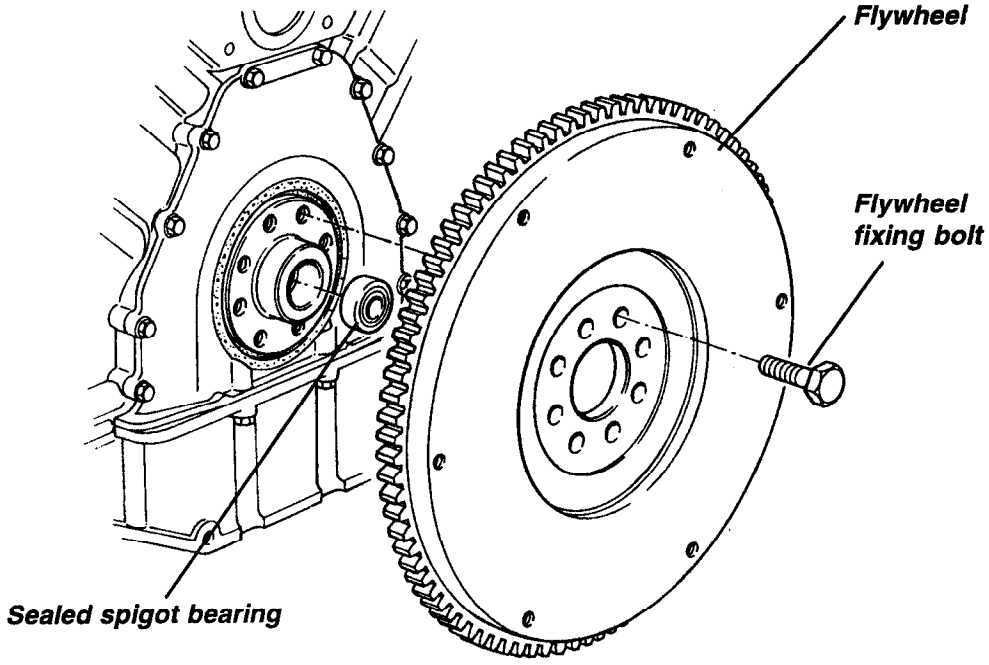
1. Remove the transmission (see Section FG) and clutch assembly (see Section QE).

2. If the **runout** of the clutch friction surface is to be checked, do this before removing the flywheel from the crankshaft.
   Standard axial run out at outer edge of friction surface: 0.10 mm (0.004 in)

3. Match mark the flywheel to the crankshaft to aid re-fitment before removing the eight bolts securing the flywheel, and lifting the flywheel off the crankshaft flange. Beware of the considerable weight of the flywheel, and take appropriate precautions.

4. Inspect the clutch friction surface on the flywheel for scoring or wear ridges. If necessary, the flywheel may be refaced within the following restrictions:
Maximum metal removal; Single plate; 1.0 mm Twin plate; 0.75 mm
Minimum flywheek thickness; Single plate; 20.0 mm Twin plate; 13.0 mm
If the flywheel is to be machined, both the friction face and the mating face for the clutch cover must be machined by a similar amount in order to preserve the clamping load and design geometry. The cover fixing bolts should also be checked for length and shortened if necessary to prevent 'bottoming out'. See section QE for further details of clutch and flywheel.

5. Before refitting the flywheel, check the condition of the spigot bearing in the rear end of the crankshaft, and replace if necessary. Use a slide hammer to remove the old bearing, and knock the outer race of the new bearing into position until flush with the crankshaft rear face. The ball type spigot bearing is sealed, and requires no additional lubrication.



6. Thoroughly clean the two mating faces before mounting the flywheel on the crankshaft rear flange, with the match marks aligned, and securing with two of the eight Ml 2 flywheel fixing bolts (dry). Apply Loctite 243 to the threads of the remaining bolts and tighten to 110 Nm (81 lbf.ft). Remove the first two bolts, apply the Loctite and refit and torque tighten. This procedure prevents contamination of the mating face.

7. Refit the clutch mechanism (Section QE) and transmission (Section FG).

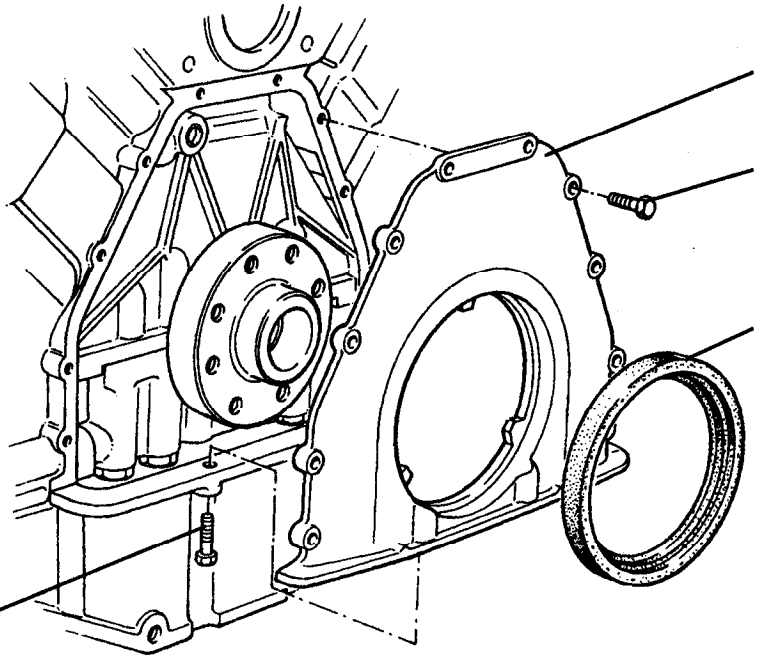
Crankshaft Rear Oil Seal Replacement

1. Remove the flywheel (see above).

2. Remove the ten M6 screws, and and the two rearmost sump fixings, and withdraw the housing and seal. Press the oil seal from the housing.

3. Thoroughly clean the mating faces on housing, block and sump flange of all old sealant.

4. Apply rubber grease to the outside surface and sealing lip of the new oil seal, and press into position in the rear housing, spring side rearmost. Take care not to damage the sealing lip or distort the seal, and ensure the seal is bottomed squarely against the flange in the housing recess.



5. Apply Loctite 5910 to the jointface on the seal housing, and carefully fit the housing over the crankshaft rear flange, taking care not to damage the lip of the seal. Fit the ten M6 fixing screws, and the two rearmost sump fixings, and tighten evenly and progressively to:
   M6 fixings to block: 8 Nm (6 lbf.ft)
   M8 sump fixings: 20 Nm (15 lbf.ft)

6. Refit the flywheel (see above).

ED.15 - PISTONS. CYLINDER LINERS & CONNECTING RODS

The forged steel 'I' section connecting rods use copper/lead/tin little end bushes, and steel backed copper/lead/tin lined big end shell bearings with straight split caps retained by two bolts. The cast alloy pistons have bowl shaped crowns without valve head clearance pockets, and fully floating gudgeon pins offset towards the thrust face by 0.7 mm, retained in the pistons by wire circlips. All eight pistons, and all eight connecting rods are common although the Goetze pistons and cylinder liners are size graded 'A' or 'B'. The piston ring pack comprises a chrome plated, barrel faced, top compression ring, a 'Napier' type scraper second ring, and an oil control ring pack consisting of two chromed scraper rails and a corrugated expander/separator. Note that the use of push fit, wet cylinder liners, dictates that no overboring is provided for. If new piston rings are to be fitted in a used liner, the cast iron liner bore should be lightly honed to remove the glazing and provide a fresh surface into which the rings can bed.

Access to the big end bearings is available with the sump removed. Removal of the cylinder head allows a piston and connecting rod to be withdrawn.

To Remove a Piston, Liner & Connecting Rod Assembly

1. Carry out a compression check (See Sub-Section ED.2) before disabling the engine to assess the condition of pistons, rings and valve sealing.

2. Remove the power unit from the car (See Sub-Section ED.1 7).

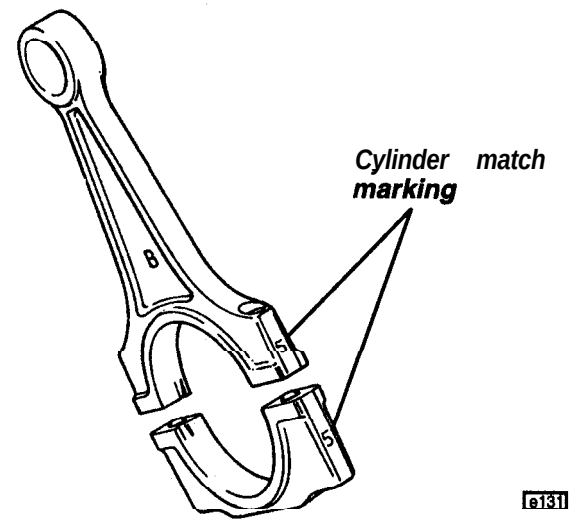
3. Remove the cylinder head (See Sub-Section ED.8).

4. Remove the sump (See Sub-Section ED.12).

5. Carefully scrape the top inside edge of the cylinder liner free of carbon deposit to allow assessment of any wear ridge, and withdrawal of piston. Any wear ridge greater than barely discernible by feel, indicates that piston and liner renewal is required.

NOTE: If parts are to be refitted, take care to keep each set of parts identified with its cylinder, and ensure that no mixing of parts is allowed to occur.

6. At the connecting rod big end, check that the same side of the cap and rod are marked with their cylinder number. Progressively release the two big end bolts, and remove the cap and bearing shells.



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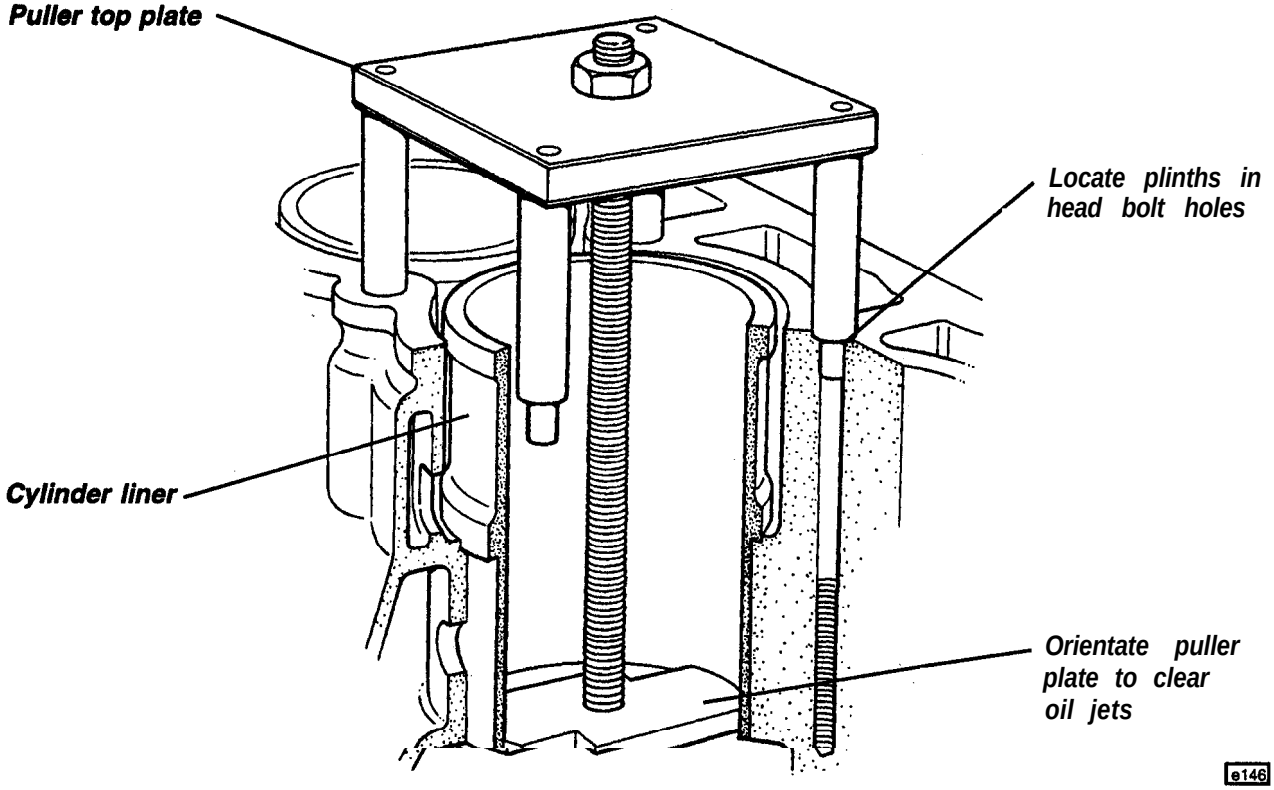
7. Taking care not to damage the cylinder bore with the connecting rod big end, push the connecting rod and piston assembly upwards and out of the cylinder liner. Mark the piston with its cylinder number.

6. Remove the gudgeon pin circlips, and press the pin out of the piston. Use a piston ring expander tool to remove each ring from the piston.

9. If necessary, remove the cylinder liner using special puller tool TOOOT1357. The liners are a push fit into the block, but are sealed using Loctite 572 adhesive/sealant for optimum sealing durability and to reduce the possibility of liner disturbance with the cylinder head removed.



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Inspection of Comoonents

Cylinder liner: Examine the bore surface for scoring or visible wear, and the top and bottom sealing flanges for scratches or erosion. Measure the internal diameter at several points and directions between 10 and 60mm below the top surface.

Standard bore diameter:
- grade A 83.000 - 83.015 mm (3.2677 - 3.2683 in).
- grade B 83.015 - 83.030 mm (3.2683 - 3.2689 in).

Piston: Carefully remove ail carbon deposits from the piston crown and examine for signs of overheating or detonation. inspect the ring lands for cracks or erosion, and the skirt for scoring or cracks. Measure the piston diameter across the thrust axis at the grade point, 42 mm down from the top edge:

Standard piston diameter:	- grade A 82.975 - 82.990 mm (3.2667 - 3.2673 in).
	- grade B 82.990 - 83.005 mm (3.2673 - 3.2679 in).
Gudgeon pin bore diameter:	20.995 - 21 .OOO mm (0.8266 - 0.8268 in).
Top groove width:	1.530 - 1.550 (0.0602 - 0.0610 in).
Second groove width:	1.770 - 1.790 mm (0.0697 - 0.0705 in).
Oil control groove width:	2.500 - 2.520 mm (0.0984 - 0.0992 in).

Piston rings: Check the bearing surface of the rings for scoring or other marking, and measure their thickness. Check the ring gaps with the ring fitted squarely into the liner, 5 mm down from the top edge:

Top ring thickness:	1.470 - 1.490 mm (0.0579 - 0.0587 in).
Second ring thickness:	1.720 - 1.740 mm (0.0677 - 0.0685 in).
Top ring gap:	0.19 - 0.39 mm (0.007 - 0.015 in).
Second ring gap:	0.39 - 0.59 mm (0.015 - 0.023 in).
Oil control ring gap:	0.10 - 0.60 mm (0.004 - 0.024 in).

Gudgeon pin: Check the surface of the gudgeon pin for visible wear or marking, and measure the diameter:

Standard pin diameter: 20.995 - 21 .000 (0.8266 - 0.8268 in).

Connecting rod: Measure the diameter of the small end bush, and also of the big end bearing with the shells fitted and the cap bolts tightened:

Small end bore:	21.007 - 21.023 mm (0.8270 - 0.8277 in).
Big end bore:	47.788 - 47.820 mm (1.881 - 1.883 in).

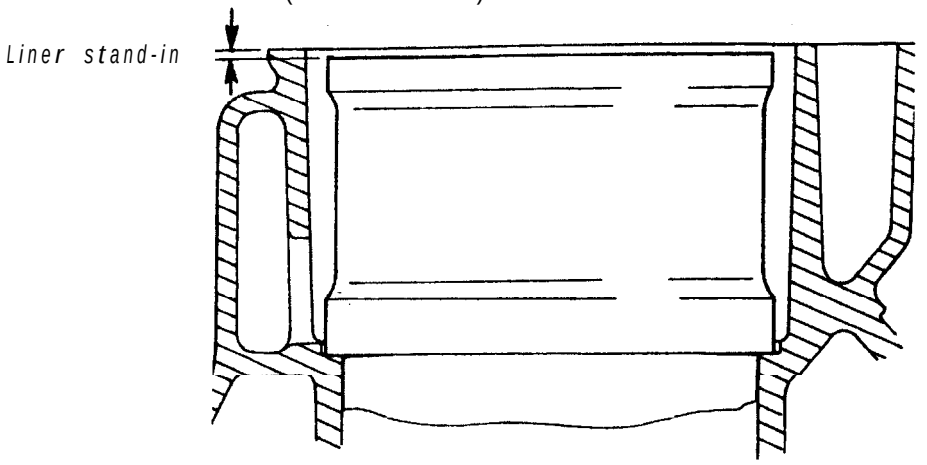
The small end bush may be replaced if necessary using a suitable mandrel and a press, but will require reaming to the specified size after fitment. Ensure the oil hole is correctly aligned at the top of the bush

To Fit a Piston. Liner & Connecting Rod Assembly

Pistons and liners are size graded 'A' and 'B', with the liners marked on their outer surface, and pistons marked on their crowns. Ensure that 'A' pistons are fitted in 'A' liners, and 'B' with 'B'.

1. Fit the cylinder liner using Loctite 572 adhesive/sealant (A912E7030V):
   - Thoroughly clean the liner spigot and seat, and the corresponding seating face in the block.
   - Dry fit the liner, and check the liner 'nip', or stand-in below the block deck face:

   Specification: 0.08 - 0.10 mm (0.003 - 0.004 in).



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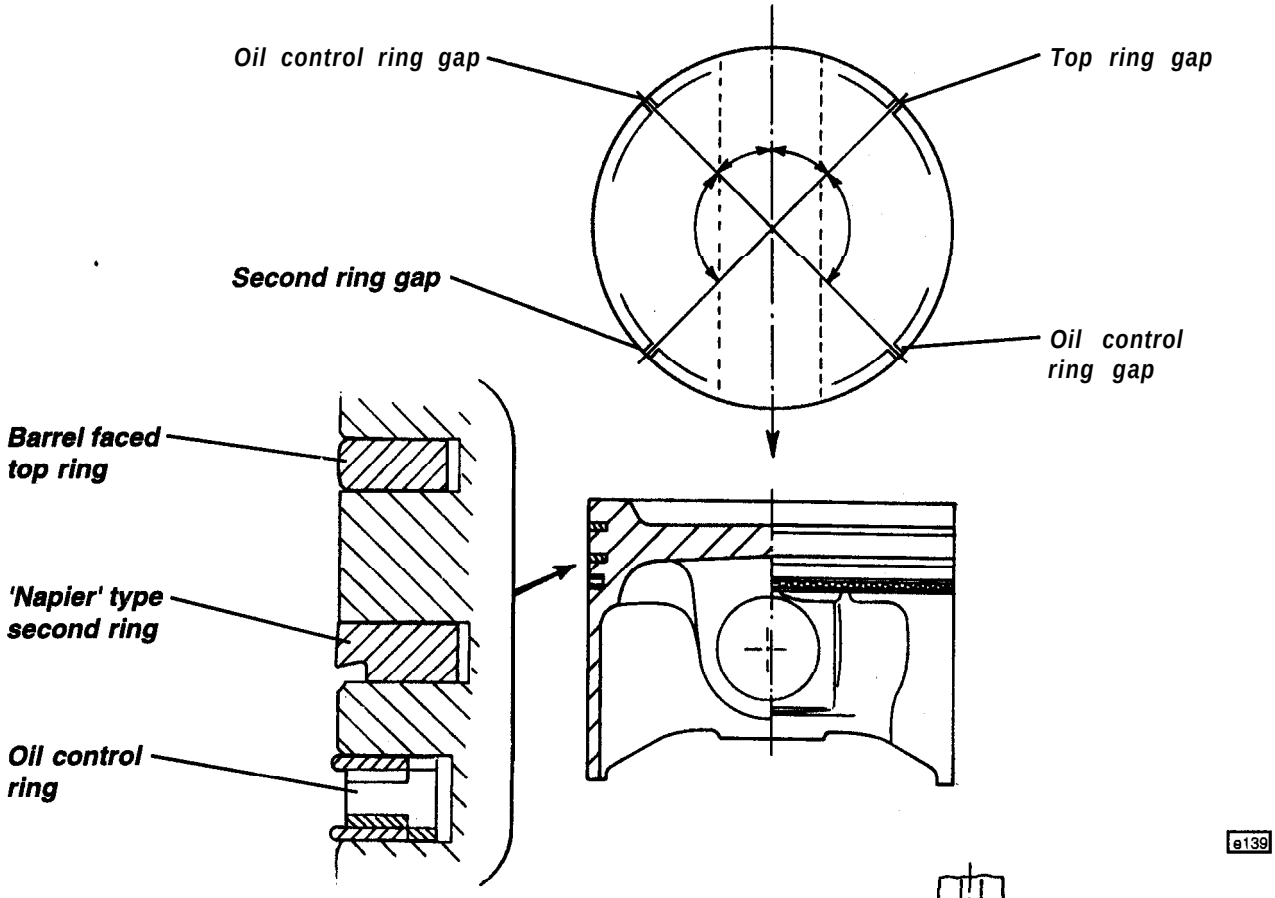
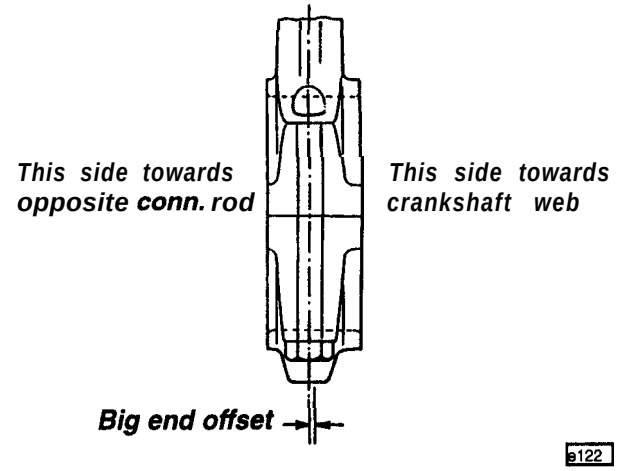
- Apply a small bead of Loctite around the seating face of the liner.
- Apply a thin smear of Loctite around the outside of the liner spigot.
- Apply a thin smear of Loctite around the top edge of the liner spigot bore in the block.
- Slide the liner into the block and fit the cylinder head within 4 hours to ensure that the liners are seated correctly before the adhesive cures.

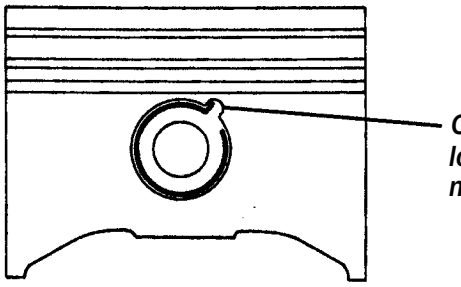
2. Use a piston ring expander tool to fit the piston rings onto the piston:
   - Fit the oil control ring corrugated expander/separator into the bottom groove.
   - Fit the two oil control scraper rings either side of the separator, and arrange the ring gaps diametrically opposite to each other.
   - Fit the second compression ring with the 'TOP' mark uppermost, and position the gap between those of the oil control rings. Note that new rings are phosphor coated to aid the bedding-in process.
   - Fit the top compression ring, either way up if new, or as previously fitted if being reused, with the gap diametrically opposite that of the second ring.



3. Fit the piston to its connecting rod:
   - Note that the rod is asymmetrical side/side due to offset machining of the big end eye: The side with the most metal also has a larger chamfer to clear the crankpin fillet radius and is fitted on the front side (same as is pointed towards by the piston crown arrow) on the RH cylinder bank, and on the rear side on the LH cylinder bank.



- Fit one new circlip into its groove in the piston, with the tang located in the piston notch.
- Position the connecting rod the correct way round, and slide the gudgeon pin through the piston and connecting rod little end eye.
- Fit the second circlip into its groove with tang located in the piston notch.



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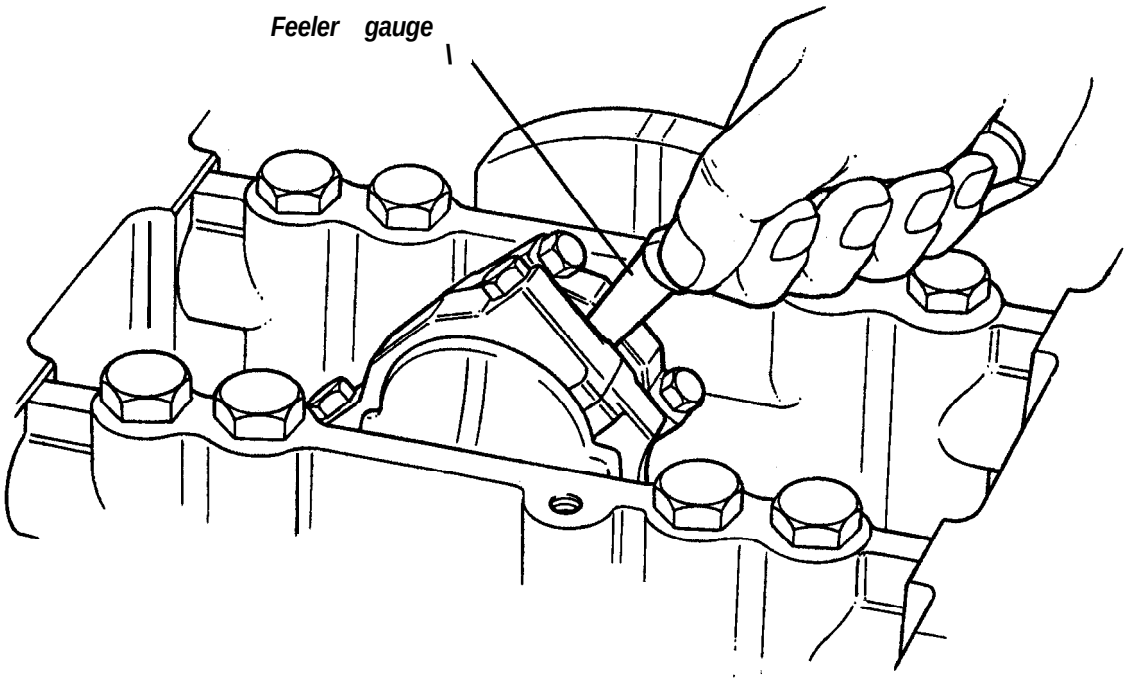
4. Copiously lubricate the piston and rings, and using a piston ring compressor, insert the piston/connecting rod assembly into the liner with the arrow on the piston crown pointing forwards. Take care to protect the cylinder wall from the connecting rod big end.

5. Fit the big end shells into the connecting rod and cap, with the locating tabs engaged in their recesses. Copiously lubricate the **crankpin** and big end shells before locating the big end around the **crankpin** and fitting the connecting rod cap. Check that the correct cap is fitted the correct way round on each rod by referring to the match marking. Lubricate the big end bolt threads and heads before fitting and tightening to 20 Nm (15 lbf.ft).

6. Check the **endfloat** of the pair of big ends on each crankpin:
Side clearance: 0.14 - 0.26 mm (0.0055 - 0.0110 in).
If there is insufficient side clearance, loosen the big end bolts and retighten to finger tight. Rotate the crankshaft several times, torque the bolts to 20 Nm (15 **lbf.ft),** and recheck the **endfloat.**



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7. When big end **endfloat** is correct, tighten the big end bolts a further 90" using an appropriate angle gauge wrench (i.e. total tightening **spec.** = 20 Nm + 90").

6. Refit the sump (Sub-Section **ED.12),** and cylinder head (Sub-Section **ED.8),** and refit the power unit (Sub-Section ED.1 7).

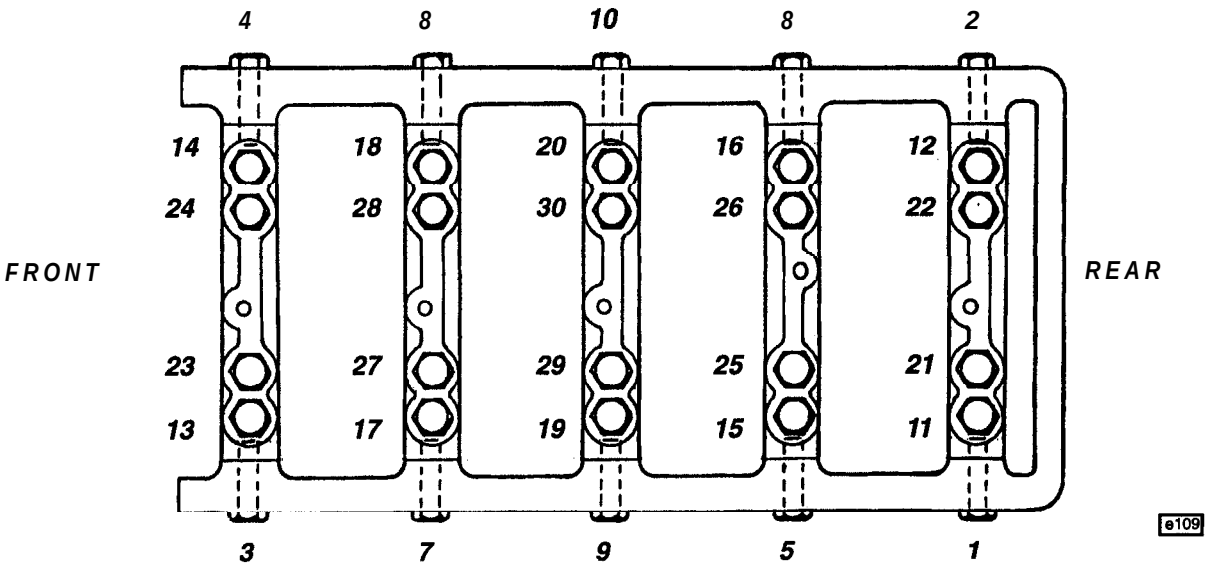
ED 16 ▪ CRANKSHAFT & MAIN BEARINGS

The forged steel, four throw, single plane crankshaft uses five main bearings with each cast iron bearing cap secured by four vertical bolts, and two cross bolts through the sides of the crankcase skirt. Steel backed **tin/aluminium** bearing shells are used with crankshaft **endfloat** controlled by thrust washers either side of no.4 main bearing.

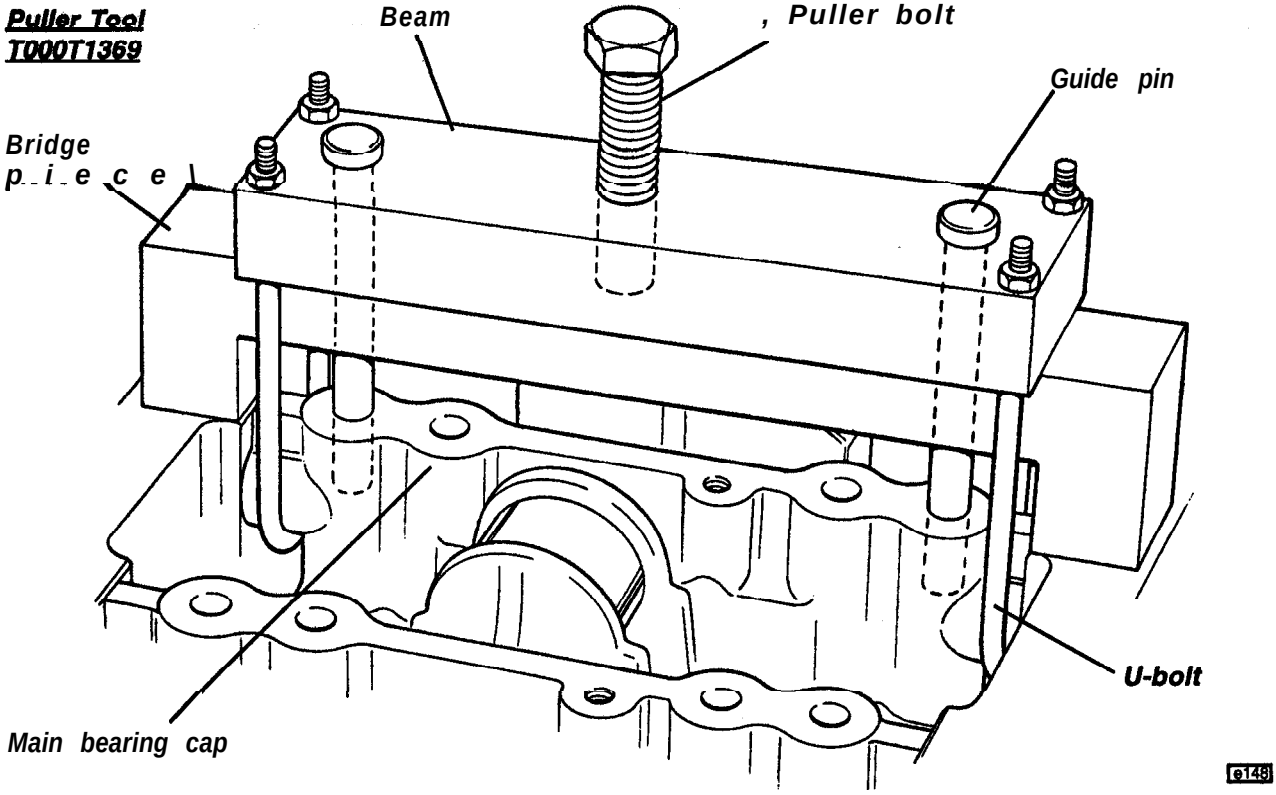
To Remove the Crankshaft

1. Remove the power unit from the car (See Sub-Section ED.17).
2. Remove the cylinder head (See Sub-Section ED.6).
3. Remove the sump (See Sub-Section ED.12).
4. Remove the front cover and camshaft primary drive (See Sub-Section ED.13).
5. Remove the flywheel and crankshaft rear seal housing (See Sub-Section ED.14).
6. Check that each connecting rod and cap is identified with its cylinder (engraved on LH side of rod end and cap) before releasing each pair of big end bolts, and separating the connecting rods from the crankshaft. Take care not to displace the big end bearing shells.
7. Remove the main bearing caps:
   - Check that each main bearing cap is identified with its location; i.e. numbered 1 to 5 counting from the front.
   - Working from each end towards the centre, and in the order shown, remove the horizontally disposed bolts securing each main bearing cap to the cylinder block skirt (nos.1 to 10 in diagram).

Main Bearing Bolt RELEASING Sequence



- Working from each end towards the centre, and in the order shown, progressively loosen, in **20°** increments, the OUTER rows of main bearing cap bolts, until bolt tension is relieved. Remove the bolts (nos. 11 to 20).
- Working from each end towards the centre, and in the order shown, progressively loosen, in **20°** increments, the INNER rows of main bearing cap bolts, until bolt tension is relieved. Remove the bolts (nos. 21 to 30).
- Withdraw each of the main bearing caps, taking care to keep the cap square to avoid damage to the



seating faces in the crankcase. The caps are a tight fit and a special puller tool **T000T1** 369 is available to aid their withdrawal.

- Do not displace the bearing shells from the caps. Note that the crankshaft thrust washers are located either side of no.4 main bearing; label each washer as it is removed from no.4 cap, and slide out and label the two thrust washers from the crankcase.

8. Lift out the crankshaft from the crankcase, and rest on clean surface.

Inspection

Thoroughly degrease and clean the crankshaft, paying special attention to the internal **oilways.** Inspect the crankshaft journals, crankpins, thrust faces and rear flange oil sealing surface for scoring or visible wear. Measure the journals and crankpins:

Standard journal diameter: 64.955 - 64.968 mm (2.5573 - 2.5578 in).
Standard **crankpin** diameter: **47.756** - **47.772** mm (1.8802 - 1.8808 in).

Crankshaft main journal and big end shells are available in undersizes of **0.25mm** and **0.50mm.**

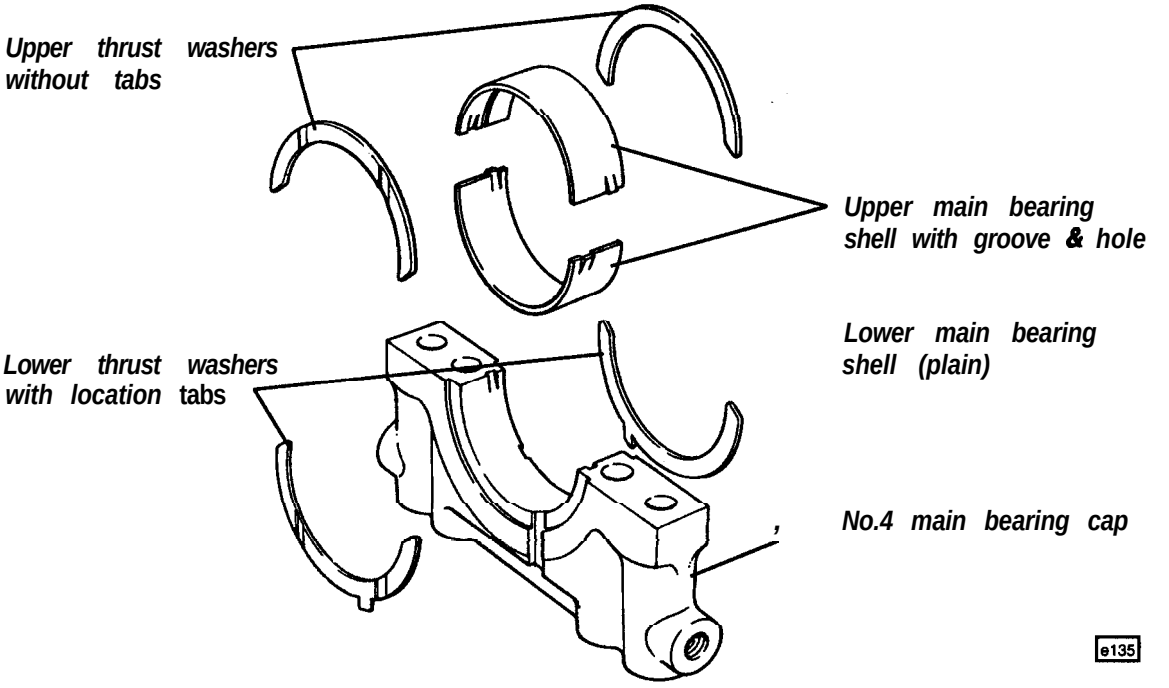
Crankshaft Refitment

1. Fit the upper main bearing shells into the block with the locating tabs engaged in their slots. Note that the upper shells have a hole to align with the **oilway** in the block, and a groove to maintain an oil feed to the adjacent crankpin. Lower shells, fitted into the main bearing caps, are plain, with no hole or groove. All five bearings use identical shells, but if refitting the original shells, care should be taken to refit in their original positions.

2. Copiously lubricate the main bearings with engine oil or assembly compound, and lay the crankshaft into position. Slide the pair of upper thrust washers into position either side of no.4 main bearing, noting that the upper washers have no location tabs, and are fitted with the oil grooves outward, to face the crankshaft. Use a dial gauge or feeler gauge to measure the crankshaft endfloat:
   Crankshaft endfloat: 0.10 - **0.30** mm (0.004 - 0.012 in).

3. Fit the lower (plain) bearing shells into the main bearing caps, with the locating tabs engaged in their

slots. Note that bearing caps 1, 2, 3 & 5 are single dowelled and nominally identical, but all caps are line bored and must not be interchanged; refer to the match marks made prior to removal. No.4 cap is double offset dowelled, and machined to accommodate the thrust washers. Grease and fit the tabbed thrust washers each side of the cap with the locating tabs engaged in their guides.

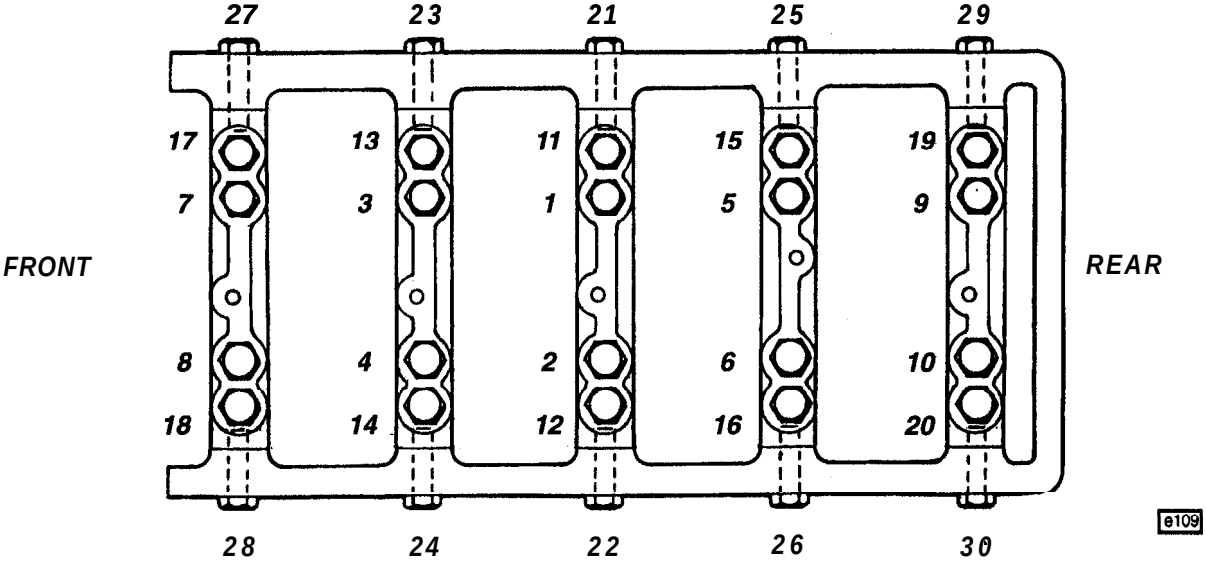


4. Copiously lubricate the crankshaft main journals and shells with engine oil or assembly compound, and fit each cap into position. The caps are a push fit into the block, and must be kept square to avoid binding and damaging the alloy block. Lubricate the heads and threads of the main bearing cap bolts, noting the three different lengths, and finger tighten the six bolts securing each cap, longest bolts centremost.

5. Progressively tighten the three groups of bolts in the following sequence, in each case working from the centre outwards as shown in the diagram.

1st stage: Vertical bolts (1 - 20): **40** Nm
2nd stage: Vertical bolts (1 - 20): **55** Nm
3rd stage: Horizontal bolts (21 - 30): 42 Nm

Main Bearina Bolt TIGHTENING Sequence



6. Check that the crankshaft revolves freely without binding, and recheck the crankshaft endf!oat as in step (2).

7. Copiously lubricate each crankpin and big end bearing before locating the big end around the crankpin and fitting the connecting rod cap. Check that the correct cap is fitted the correct way round on each rod. Lubricate the big end bolt threads and heads before fitting and tightening to 20 Nm (15 lbf.ft).

a. Check the endfloat of the pair of big ends on each crankpin:
Side clearance: 0.14 - 0.28 mm (0.0055 - 0.0110 in).
If there is insufficient side clearance, loosen the big end bolts and retighten to finger tight. Rotate the crankshaft several times, torque the bolts to 20 Nm (15 lbf.ft), and recheck the endfloat.

9. When big end endfloat is correct, tighten the big end bolts a further 90° using an appropriate angle gauge wrench (i.e. total tightening spec. = 20 Nm + 90°).

10. Refit the sump (Sub-Section ED.12), and cylinder head (Sub-Section ED.8), and refit the power unit (Sub-Section ED.1 7).

Dipstick Tube

The dipstick tube is secured in the block using a union nut and olive. in order to prevent damage to the tube during engine overhaul, the tube should be withdrawn from the block after releasing the union nut. Note, however, that ***the tube cannot be inserted with the RH exhaust manifold in place.***

If a new dipstick tube is to be fitted, it is most important to ensure that the correct tube height is attained in order to provide an accurate dipstick reading. Mark the new tube 103mm from the bottom edge. This mark must coincide with the top surface of the dipstick hole in the block. Fit a new olive onto the tube and hold the tube at this position whilst the union nut is tightened.

ED.17 - ENGINE REMOVAL/REPLACEMENT

The engine and transmission assembly are mounted as a unit via four bonded rubber bushes to the chassis. Two engine mounting legs, one bolted to each side of the cylinder block, mate with a conical rubber bush mounted on a horizontal plinth at each side of the engine bay. Similar but smaller bushes are used at the rear of the engine bay, in conjunction with cast alloy legs bolted to the sides of the transmission. The engine and transmission assembly are removed as a unit from above, although the transmission alone may be removed in the same way if necessary.

Fuel Pressure Relief Procedure

The fuel system remains pressurised after engine switch off in order to reduce the possibility of vapour locks, and to speed engine starting. The following procedure should be used to de-pressurise the system prior to disconnecting any part of the fuel line except the unpressurised return line from the pressure regulating valve to the fuel tank.

i) If the engine is operative; disconnect the fuel pump feed, start the engine, and run until starved. Crank for a further 10 seconds to reduce any remaining fuel pressure.

ii) If the engine is inoperative; connect fuel pressure gauge TOOOT1366 to the Shraeder type valve fitted at the front end of the RH fuel rail. Ensure that the gauge bleed tap is closed, and use a cloth to shield from any fuel spray as the connection is made. After connection, position the bleed line in a suitable receptacle and open the bleed tap to relieve the system of fuel pressure.

iii) The fuel line may now be opened using an absorbent cloth for protection from any residual fuel pressure, and to absorb the small amount of fuel draining from the line. Dispose of the cloth safely.

Removal of Engine/Transmission Assembly

Preparatory

1. Remove the engine cover lid, rear luggage compartment floor, and both rear quarter window trim panels. Release the tailgate gas struts to allow the tailgate to be secured in a vertical position for maximum hoist access.

2. Disconnect the battery. Drain the cooling system. If necessary, drain the sump.

3. Refer to sub-section ED.4 and de-pressurise the fuel system.

4. If refrigerant recovery facilities are available, de-pressurise the air conditioning system via the service valves at the front underside of the engine bay.

From beneath the car

5. If the a.c. has been de-pressurised: Disconnect the two a.c. hoses at the joint beneath the passenger side fuel tank.

6. If the **a.c.** is not de-pressurised: The compressor may be released from the engine at a later stage and the refrigerant circuit left intact. Release the auxiliary drive belt from the compressor pulley by using a **½"** square drive wrench in the belt tensioner arm and turning counterclockwise to relieve belt tension.

7. Disconnect the two oil cooler hoses from the filter head.

a. Disconnect the main and tell tale alternator leads.

9. Disconnect the pressure sensing hose from the wastegate capsule on each turbocharger.

10. Disconnect the oxygen sensor harness plugs, and remove the catalytic converters. Remove the silencer.

11. Disconnect the two gearchange cables from the translator, and release from the abutment bracket. Remove the exhaust mounting bracket from the transmission.

12. Using punch set TOOOT0678, drive out from above the two concentric roll pins securing each of the drive shaft inboard joints to the transmission output shaft.

13. Taking note of the positions of the bolt head washer and bushing snubber washers, remove the stud securing the hub carrier to the top link. Loosen the hub carrier lower stud, and pull the hub outwards sufficiently to draw the drive shaft off the output shaft splines.

14. Disconnect the high pressure PAS hose from the chassis **pipe.**

15. Disconnect the inlet **ducting** to each of the turbocharger compressors.

16. Unplug the a.c. compressor clutch lead.

***From** above*

17. Release the breather hoses between the cam covers and the air filter covers, and remove both filter covers.

18. Check that the fuel pressure relief procedure has been carried out (see start of this section) before releasing the fuel feed and return pipes from the fuel rail.

17. Disconnect the radiator feed and return pipes from the engine outlet/inlet elbows, and the adjacent heater return pipe.

18. Disconnect the following vacuum and engine management hoses:
- Brake servo from RH front of plenum, and adjacent small bore hose for climate and AIR systems;
- Translucent hose (charcoal canister purge) from one way valve at front of engine bay;
- Red tubing from 'T-piece at bottom front of engine bay (wastegate capsule supply);
- Red hose from RH side of throttle body (boost sensing);
- Blue vacuum tubing and black air supply hose to AIR valve on back of LH cylinder head.

19. Disconnect the low pressure PAS hose from the power steering pump.

20. Remove the clutch slave cylinder from the bell housing, and secure aside with the hydraulics intact.

21. Disconnect the throttle inner cable from the quadrant and the outer from the abutment on the throttle body.

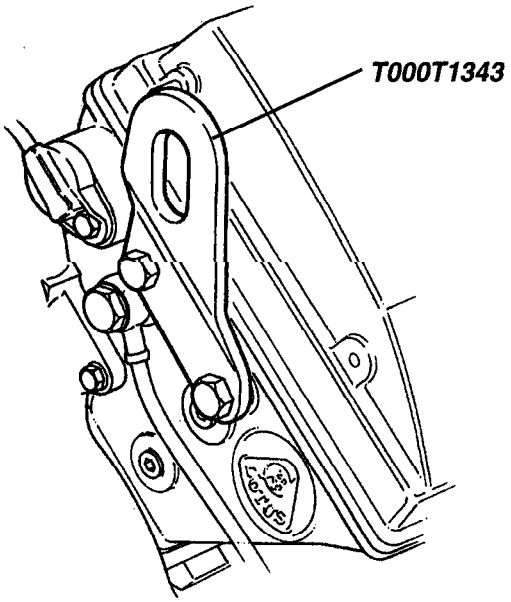
22. Disconnect the starter motor cable and starter solenoid lead from the battery positive terminal, and free the two cables.

23. Disconnect the engine harness:
Disconnect the crankshaft sensor on the front cover, and feed the cable through the engine sidewall.
Disconnect the fuel pressure sensor from the top of the RH tank.
Disconnect the two multi-plug connectors from the vehicle harness above the RH tank.
- Unplug the BARO sensor above the RH tank.
Unplug the ECM above the RH tank.
At the RH rear corner of the engine bay, unplug the coolant recirculation pump, and the rough road sensor.
Free the engine harness from the sidewall and any retaining clips.

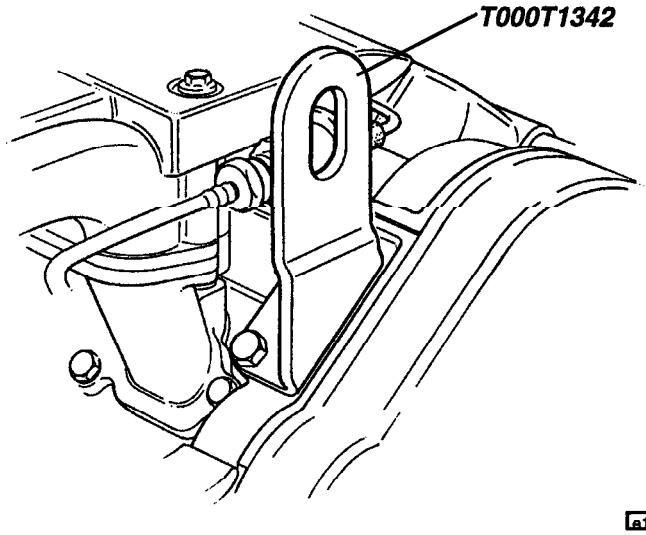
24. Release the four bolts securing the chassis rear crossmember behind the engine, and remove the crossmember.

25. Fit engine lifting brackets TOOOT1342 & TOOOT1343 to the dedicated bosses at the front of the LH cylinder head, and the rear of the RH head. Secure an engine hoist sling to the hooks, and support the engine weight on the hoist.

Enaine Liftina Rear Bracket



Enaine Liffina Front Bracket



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26. Release the two transmission rubber mountings from the chassis. Remove the single bolt securing each of the two engine mounting legs to its rubber mounting.

27. If the a.c. has not been de-pressurised, raise the power unit sufficiently to allow access to the three compressor fixing bolts. Take all appropriate precautions to guard against entrapment of hands when the power unit is suspended by sling. Release the single screw fixing the compressor manifold to the sump, and, paying due regard to the weight of the compressor, remove the three compressor mounting bolts. Lay the compressor aside without straining the alloy manifold.

28. Carefully hoist the power unit clear of the engine bay, constantly monitoring the clearance to the body, and for snagging of cables and pipes.

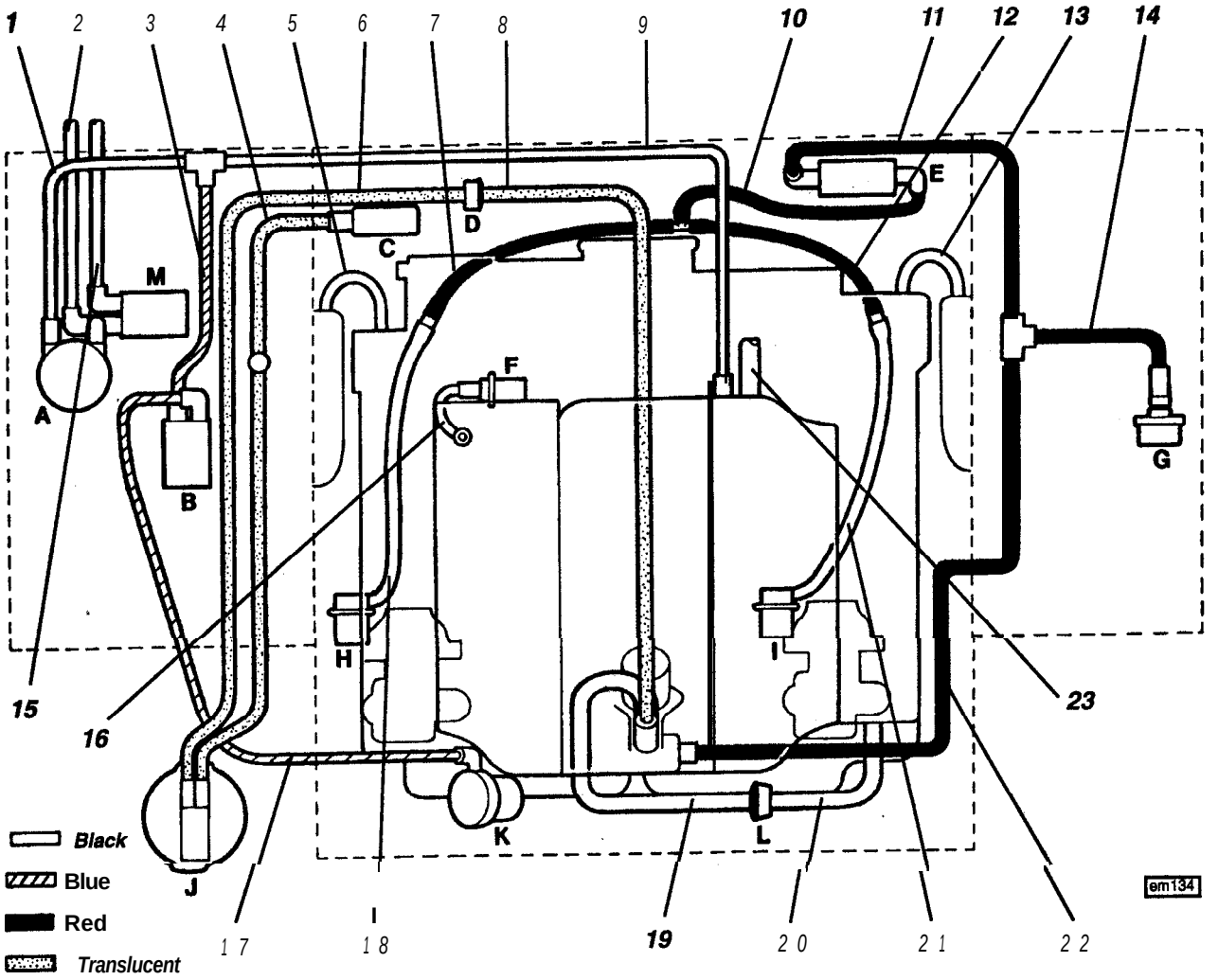
29. Release the engine to transmission bolts, and withdraw the transmission from the engine.

Re- fitment of **Engine/Transmission** Assembly

Refit in the reverse order to removal noting the following:

- If the a.c. was not de-pressurised, take care not to trap or damage the **a.c.** compressor when re-installing the power unit. Fit the compressor to the engine before the engine is fully lowered.
- Use new concentric roll pins when re-fitting the driveshafts.
- Refer to the hose connection diagram in ED.18.

ED.18 - HOSE CONNECTION DIAGRAM



Key to Hose Connection Diagram

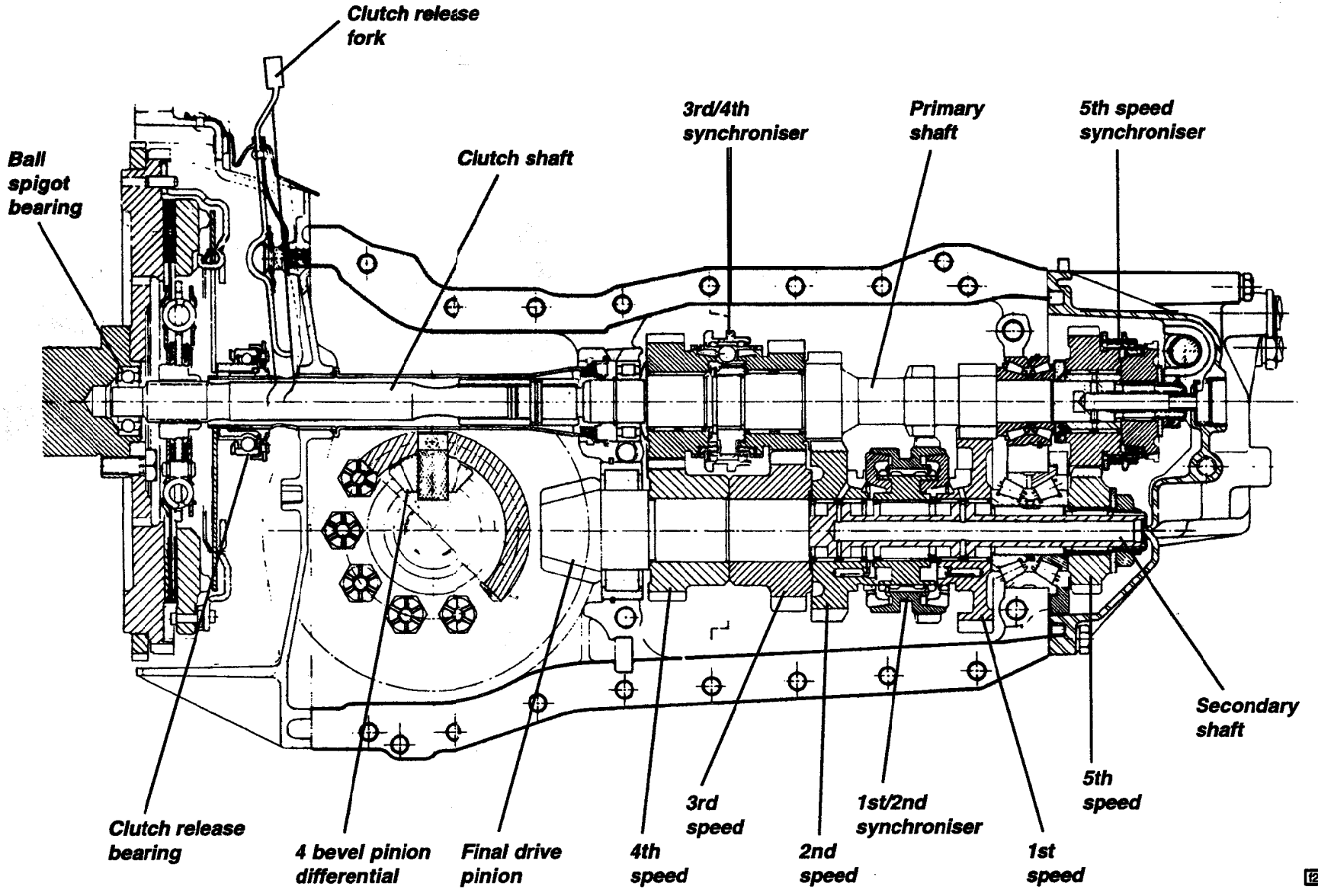
A Vacuum reservoir, climate controls
B Solenoid valve, air injection (AIR)
C Canister close valve & filter
D Non return valve, canister purge
E Wastegate solenoid valve
F Fuel pressure regulating valve
G Boost gauge transducer
H LH wastegate capsule
I RH wastegate capsule
J Charcoal canister
K Air injection (AIR) control valve
L Non return valve, crankcase breather
M Coolant recirc. solenoid valve

1 Climate control feed, T-piece to reservoir
2 Climate control feed, reservoir to heater
3 (Blue) AIR, T-piece to solenoid valve
4 (Trans.) Evap. canister to close valve
5 Breather, cam cover to LH air cleaner
6 (Trans.) Purge, canister to EGR manifold
7 (Red) T-piece to LH wastegate reducer
8 (Trans.) Purge, EGR manifold to NRV
9 Climate and AIR supply
10 (Red) Wastegate solenoid to T-piece
11 (Red) T-piece to wastegate solenoid
12 (Red) T-piece to RH wastegate reducer
13 Breather, cam cover to RH air cleaner
14 (Red) T-piece to boost gauge transducer
15 Solenoid valve to recirc. diverter valve
16 Plenum to fuel pressure regulator valve
17 (Blue) AIR solenoid valve to control valve
18 Reducer to LH wastegate capsule
19 Breather, EGR manifold to non-return valve
20 Breather, non-return valve to cam cover
21 Reducer to RH wastegate capsule
22 (Red) Throttle body to T-piece
23 Brake servo supply

Transmission

SECTION FG - ESPRIT MODEL '93 M.Y. Onwards.

LOTUS ESPRIT 5 SPEED TRANSMISSION - TYPE UN1 026



FG.I • GENERAL DESCRIPTION

The transmission assembly comprises of the clutch housing, five speed gearbox, crownwheel and pinion, and differential. The transmission is built by Renault specifically for the Esprit application, with the 'high torque' version introduced for '93 M.Y. designated 'UN1 026' (previously 'UN1 016') and identifiable by an i/d plate attached to the rear cover, and by the gear selector cross-shaft emerging from the right hand side (previously left) of the rear cover. Note however that VINs P 0001, P 0002, P 0003 and P 0004 were fitted with UN1 016 transmissions updated to 'RH shift'. The 1996 V8 model saw the introduction of the type UN1 027 version of the transmission, with a higher 5th gear ratio, reverse gear brake, and from '98 M.Y. onwards, a modified cross shaft for the revised gear cable linkage without translator mechanism. During '98, the GT3 model adopted a UN1 028 variant which is based on the 027 type but with lower final drive and third gear ratios.

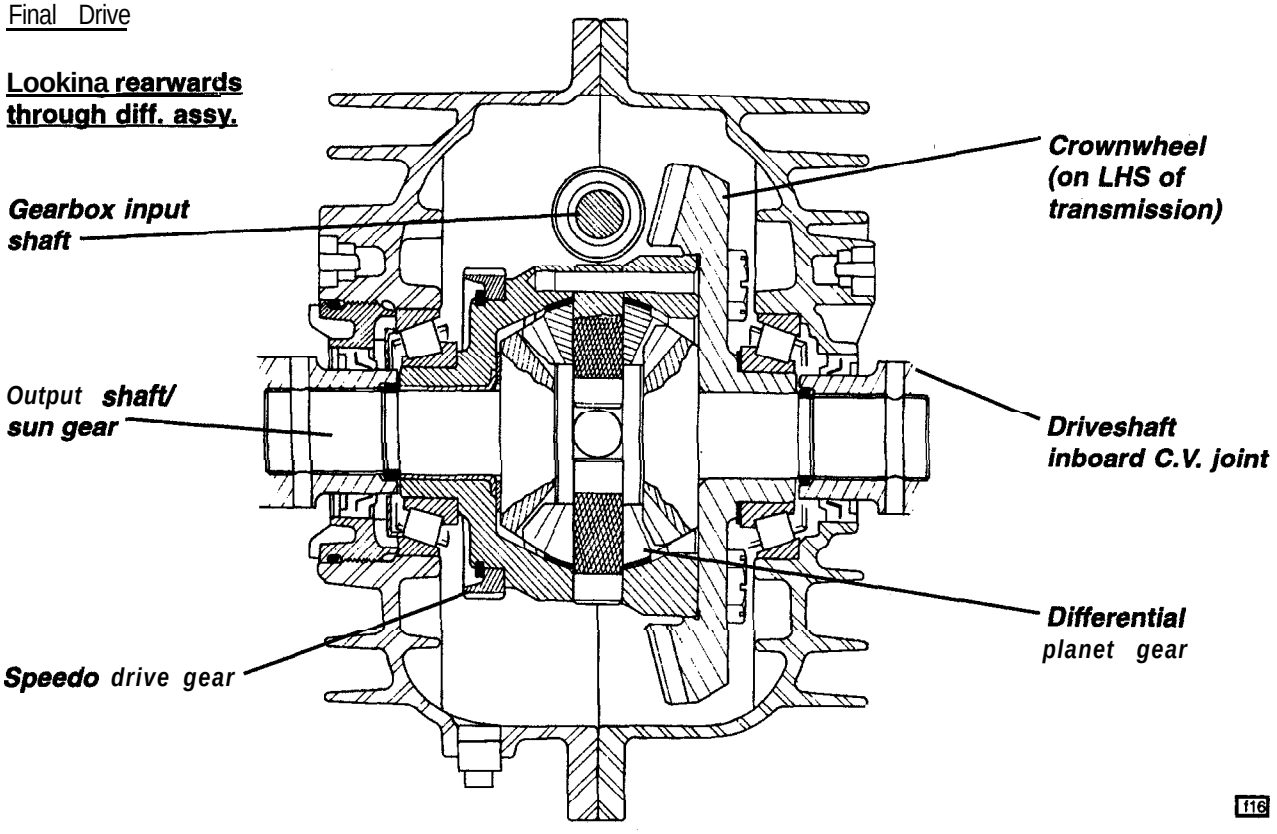
Gearbox

The gearbox is a two shaft all indirect five speed manual, with drive passing in via the upper, primary shaft, and out via the lower secondary shaft, onto the front end of which is formed an integral final drive spiral bevel pinion. Synchromesh is fitted to all forward speeds, with the 1st/2nd synchroniser mounted on the secondary shaft, the 3rd/4th synchroniser on the the primary shaft, and the 5th synchroniser on the 'overhung' rear end of the primary shaft.

Reverse gear is achieved by sliding an idler spur gear into engagement with both a drive gear integral with the primary shaft, and the spur gear teeth machined on the outside of the 1st/2nd synchroniser assembly. Transmission types 027 and 028 use a conical brake mechanism to ensure that the input gear train is stationary before the idler gear is able to slide into engagement. Synchromesh on 3rd/4th and 5th gear is of the conventional Borg-Warner type, whereas that on 1 st/2nd gear is of the inverted cone type for maximum cone surface area.

A clutch shaft, which carries the friction plate on 21 splines is supported at its front end by a ball type spigot bearing in the crankshaft, and is connected at its rear end by a splined sleeve to the gearbox primary shaft. The primary shaft is supported by a roller bearing at the front, and a dual taper roller bearing at the rear • note that prior to the '93 M.Y. 'high torque' version, the primary shaft rear bearing was a double row ball bearing. The secondary shaft uses a roller bearing at the front and a dual taper roller bearing at the rear. Needle roller bearings are used on each of the 'free' pinions.

Final Drive



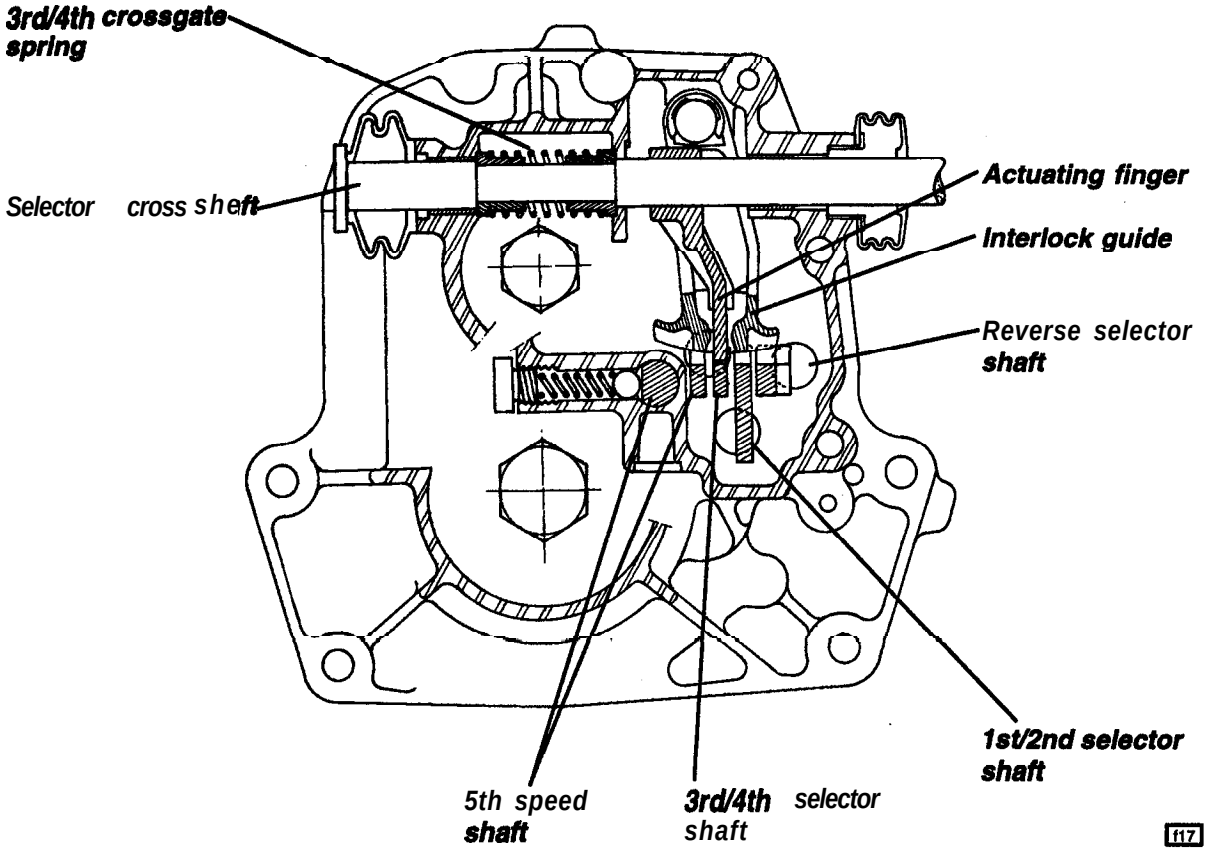
The final drive assembly is incorporated into the front end of the transmission casing between the clutch housing and gearbox, and shares a common oil supply. A spiral bevel gear crownwheel and pinion is used, with a four pinion bevel gear differential. Some Sport 300 models used a Lotus Compact Torque Biasing differential.

Short splined shafts, integral with the differential sun gears, project through each side of the casing where they carry the inboard C.V. joints of the drive shafts. The **crownwheel/differential** carrier assembly is supported by taper roller bearings with shim washers used to control crownwheel and pinion backlash, and a threaded sleeve to set the bearing preload. Final drive pinion depth is controlled by **gearset** matching, and is not adjustable.

On cars using a cable driven speedometer, the **speedo** drive gear is mounted on the differential carrier and mates with a driven pinion located in the right hand side of the casing. Sport 300 models using the Lotus 'Compact Differential', and all cars '95 **M.Y.** onwards, use an electronic **speedo** which receives signals from a sensor mounted on the RH rear hub carrier in conjunction with a toothed ring on the driveshaft. This data is also used by the engine management system.

Gearchange Mechanism

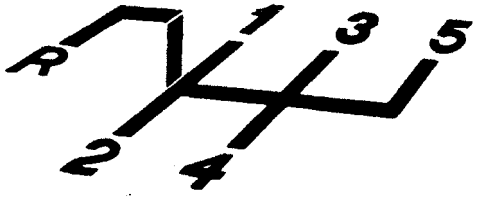
Four selector shafts lie along the right hand side of the gearbox, and are operated by a cross shaft with a single actuating finger. A slotted interlock guide prevents more than one selector shaft being moved from the neutral position, at any one time.



The cross shaft projects through the rear housing and connects with the push/pull gearchange cables, the crossgate cable moving the shaft axially, and the shift cable rotating the shaft.

The second gear selector fork is operated by its selector shaft via a compression spring, which ensures that after **synchronisation** has occurred, and the **synchroniser** detent springs have been overridden, the dog gear sleeve is engaged instantly, even with slow gear lever movement. This feature protects against loss of **synchronisation** through hesitant gear lever operation.

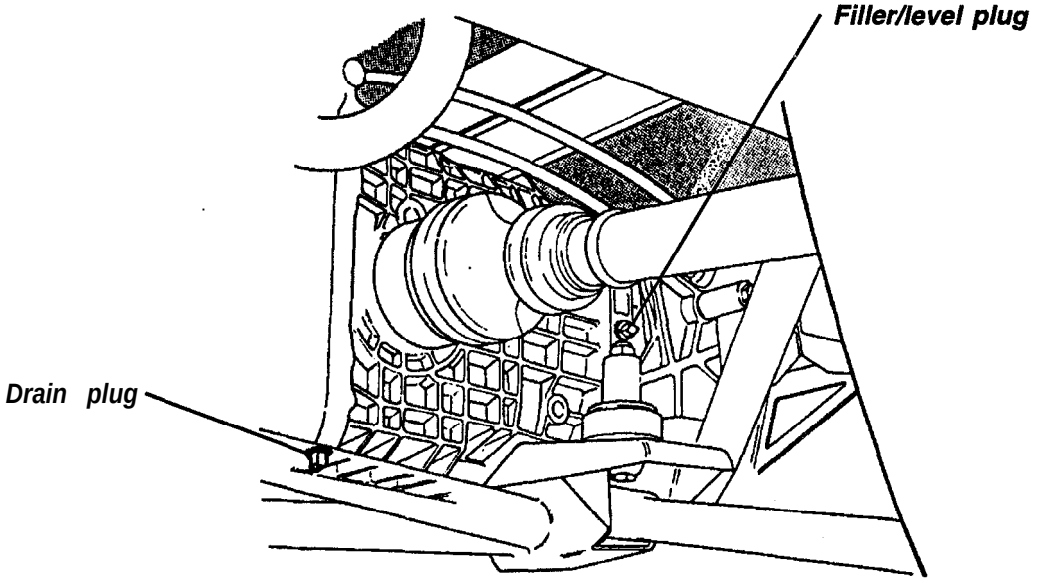
The gearchange lever is spring biased towards the 3rd/4th gear plane, and must be moved against light spring pressure to the left before selecting 1st or 2nd gear, and against similar pressure to the right to select 5th gear. The selection of reverse gear is inhibited by a plate at the base of the gear lever, above which a stop pad must be raised by lifting a collar beneath the gear knob. This allows the lever to be moved fully leftwards and to the rear to engage the gear.



f03

FG.2 • LUBRICATION

The gearbox and final drive share a common oil supply for which square headed drain and filler/level plugs are provided. The drain plug is located in the forward underside of the unit, and the filler/level plug in the left hand side, just forward of the gearbox mounting bracket.



f04

The oil level should be checked or renewed at intervals specified in the maintenance schedule. Drain the transmission when the oil is warm so that it flows more readily, and whilst the impurities are held in suspension. Clean and replace the drain plug when the old oil has drained thoroughly and refill ONLY WITH CASTROL TAF-X 75W/90 (Lotus part no. A082F6552S) up to the level plug hole (approx. 3 litres). Note that this product is a fully synthetic lubricant and is the ONLY oil approved for this application. Clean and replace level plug.

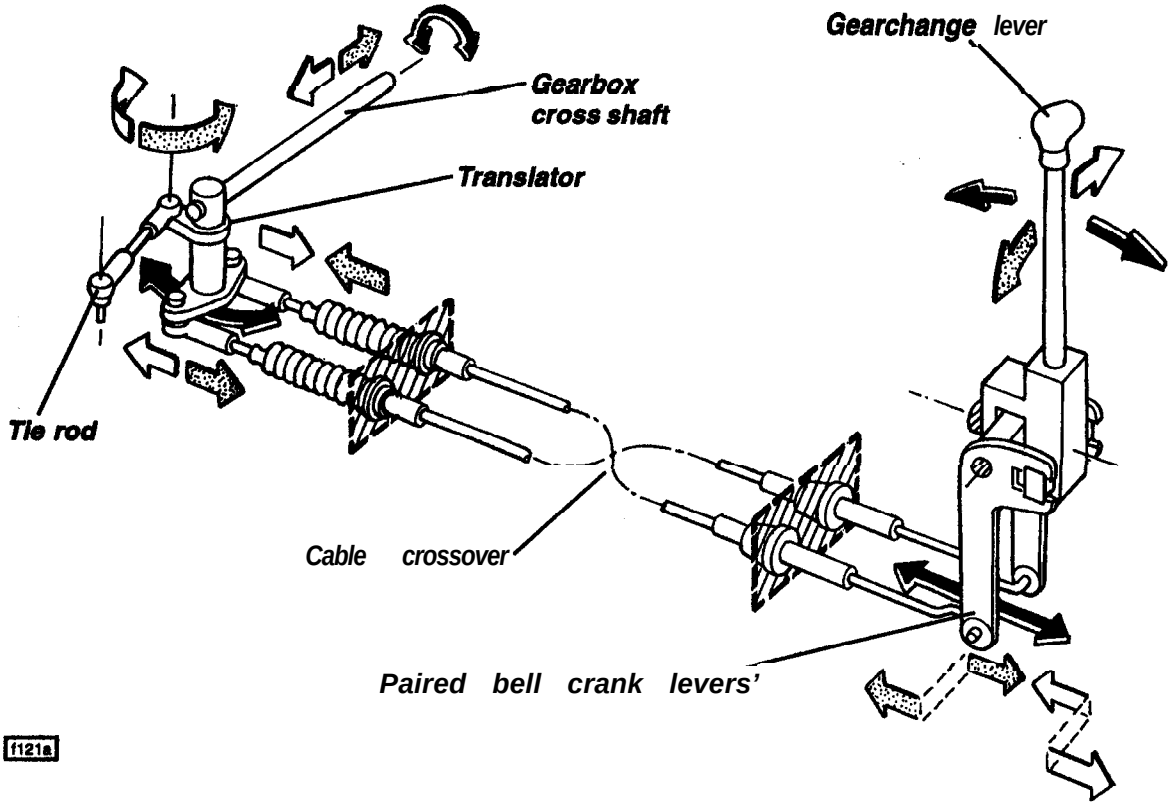
FG.3 • GEARCHANGE MECHANISM ADJUSTMENT

Two types of gearchange cable system have been used, a revised mechanism being introduced for '98 M.Y. V8 models and a corresponding running change during '98 for the GT3.

4-Cylinder cars '93 to mid '98, and V8 '96 & '97 M.Y.

A two cable mechanism is used to connect the gearchange lever to the gearbox cross-shaft. The gearchange lever assembly uses paired bellcrank levers to pull or push both cables equally when the lever is moved in the fore/aft plane, and to pull one cable and push the other when the lever is moved sideways (crossgate). At the gearbox end this cable movement is converted via a 'translator' into rotational or axial movement of the gearbox cross shaft which exits the transmission rear cover on the RH side. Note that on cars prior to '93 M.Y. the cross shaft exits on the left, and requires a more circuitous cable route. Note also that '93 M.Y. saw the introduction of

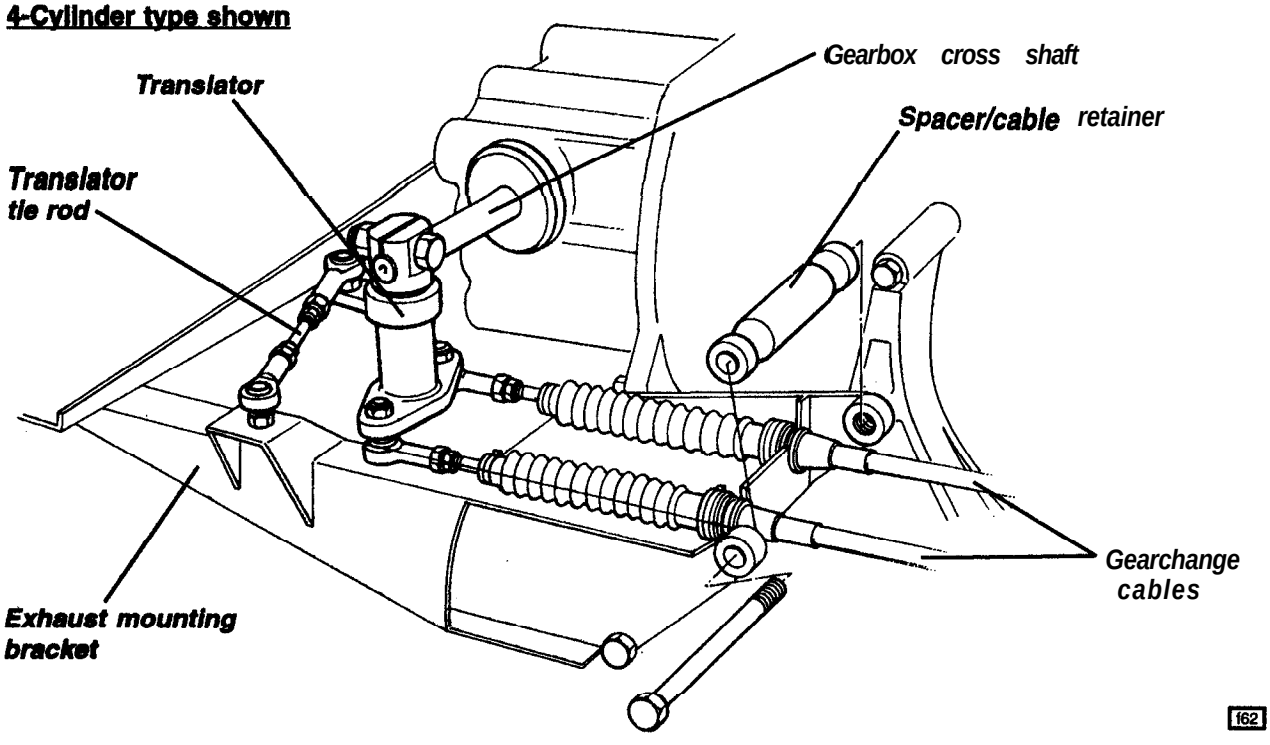
a 'short shift' gearlever mechanism which requires a correspondingly modified translator with a top arm reduced in length from 28 to 23 mm in order to maintain cross shaft movement at the previous level.



f1121a

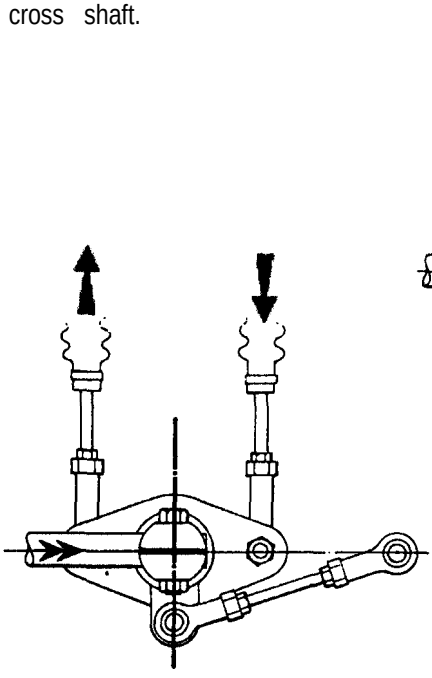
The translator consists of two parts: a swivel 'tree' and a pivot pin. the pivot pin hangs from a clamp which is secured to the gearbox cross shaft. The swivel tree which pivots on this pin via two ball bearing races, has two diametrically opposed arms at its lower end and a single arm disposed at 90" to the others, at its top end.

4-Cylinder type shown

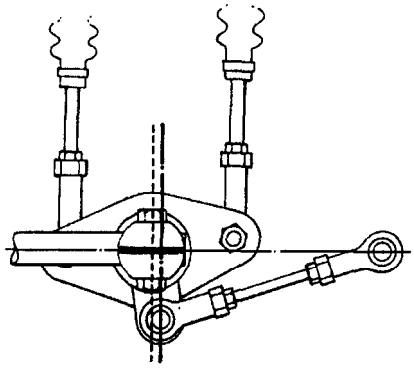


f62

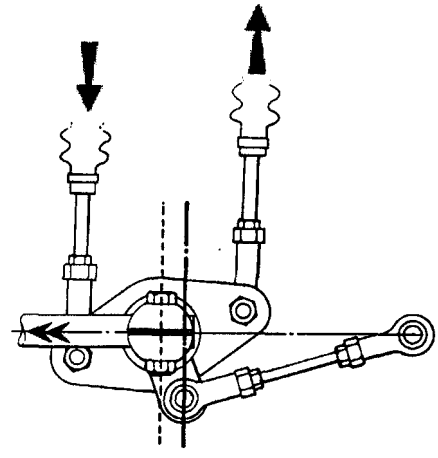
When the two gearchange cables pull or push together, the lower end of the translator is pulled or pushed, and a rotation imparted to the cross shaft. When one cable pulls and the other pushes, the translator is rotated about its vertical axis, but since the top arm of the translator is connected by a tie rod to a fixed bracket, the translator itself must pivot around the outer end of its top arm, thus imparting an axial (lateral) movement to the cross shaft.



***1st/2nd** gear plane*
(cross shaft moved to right)



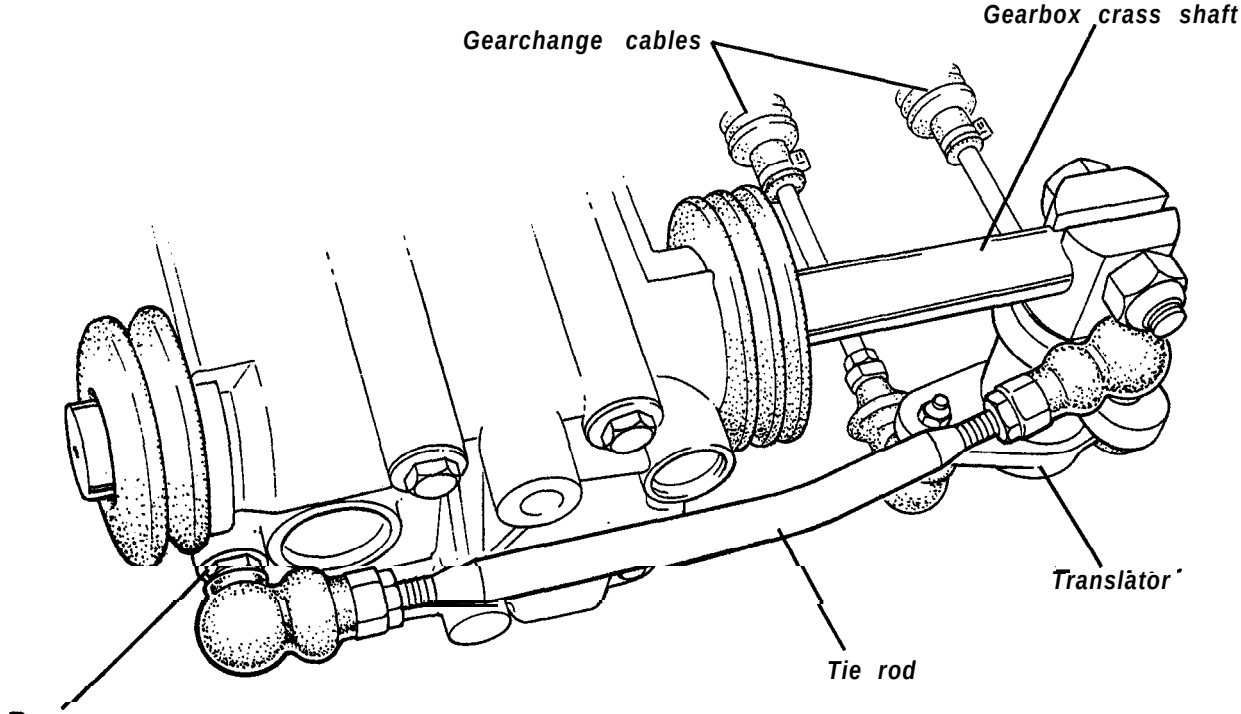
***3rd/4th** gear plane*
(sprung 'default' position)



5th gear plane
*(cross shaft moved to **left**)*

f63

On '96 and '97 M.Y. V6 models, the translator top arm is anchored to the transmission rear cover, but the principle remains the same.



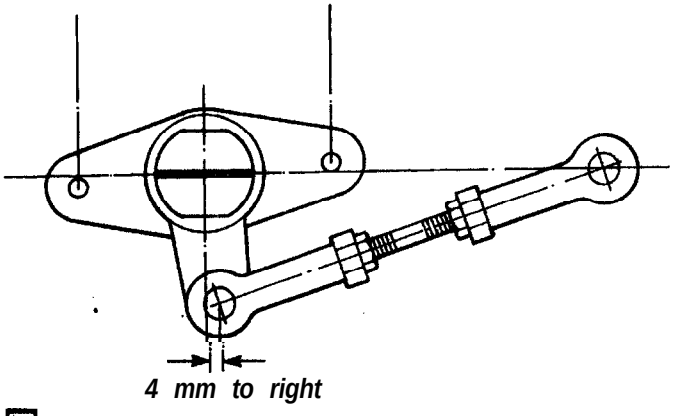
f104a

Gearchange Cable Adjustment Procedure **(4-cyl. '93** to mid '98 **&** '97 **V8)**

1. **With** the transmission in neutral, disconnect the ball joint on the rear end of both cables from the translator in order to allow the gearbox cross shaft to assume its spring loaded **3rd/4th** crossgate position.

2. Adjust the translator tie rod:
   4-cylinder *mode/s:* The tie rod fixing hole in the translator upper arm should be offset 4mm to the right of a fore/aft datum line passing through the centre of the translator clamp.
   V8 *models:* The translator upper arm should be at 90" to the cross shaft axis, with any tolerance to the right of this ideal setting.
   Tiihten the tie rod ball joint locknuts with the joints in alignment with each other.

4-cylinder models



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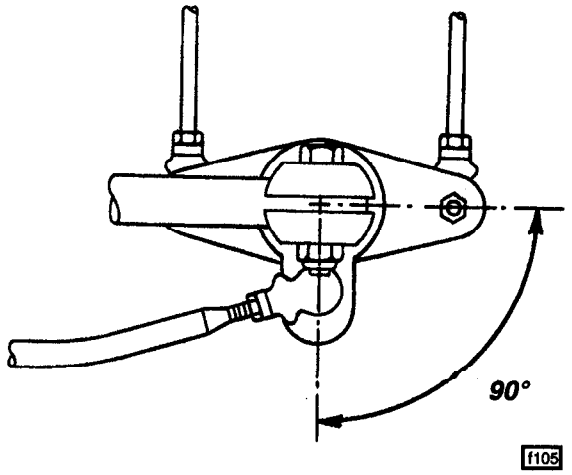
V8 models



f105

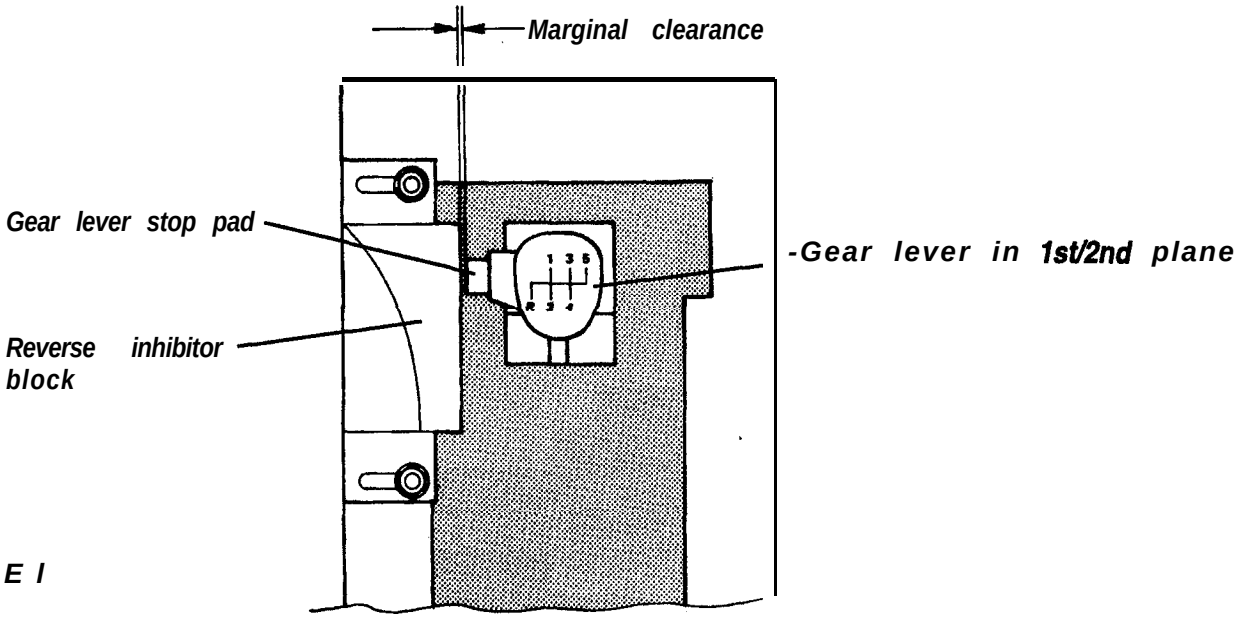
3. The gearchange lever is independently spring loaded to the **3rd/4th** gear plane, and when viewed from behind, will lean slightly to the right on **4-cylinder** cars, and stand vertically on V8 (and late GT3). Viewing the lever from the side, have an assistant hold the lever in a fore/aft vertical position, without disturbing the crossgate position.

4. Adjust the length of the two cables at their rear end ball joints so that they can be connected to the translator without preload. Note that both gearchange cables are identical and that the right hand cable at the gearlever end is fitted to the left hand side at the gearbox end. As a check, move the gear lever across the gate from right to left and observe cable movement at the rear end. The cable that moves forward is fitted to the left hand side at the gearbox. V8 cables are **10mm** longer than **4-**cylinder cables.

Reverse Inhibitor Settina:

The gearchange lever assembly incorporates a reverse inhibitor which requires that a collar beneath the lever knob to be raised before the lever may be moved fully to the left, and then rear-wards, to select reverse gear. Raising of the collar causes a stop pad to be lifted above an inhibitor block allowing the lever to be moved fully leftwards. The reverse inhibitor is correctly set if first and second gears may be obtained without obstruction, but reverse gear cannot be selected without first lifting the gear lever collar.

Before any adjustment to the inhibitor block position is made, first check that the gearchange cables are correctly adjusted (see above). If necessary, remove the centre console and gear lever mechanism access plate (see Sub-Section **FG.4),** and adjust the position of the inhibitor block for marginal clearance between it, and the gear lever pad when the lever is moved in the **1st/2nd** plane.



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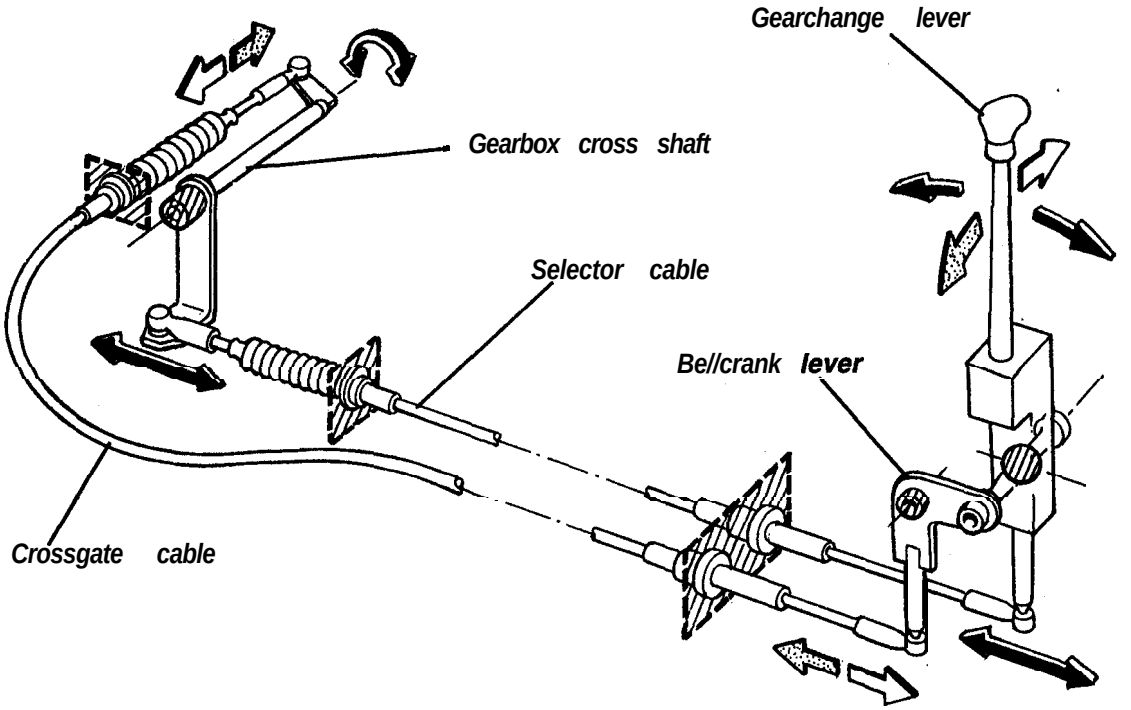
'98 M.Y. V8 and GT3 mid '98 Onwards:

These cars use a revised twin cable gearchange mechanism to enhance gearchange quality and reduce the level of transmitted engine noise. A new gearlever master unit utilises the same gearlever and reverse baulk block as previously, but uses a different mechanism to operate one of the cables (selector) directly, and the other (crossgate) via a bellcrank lever. The transmission rear housing is revised in order to dispense with the translator mechanism and provide for the two cables to connect directly with the cross shaft, the selector cable via a lever on the shaft RH end, and the crossgate cable to a lug on the LH end of the shaft.



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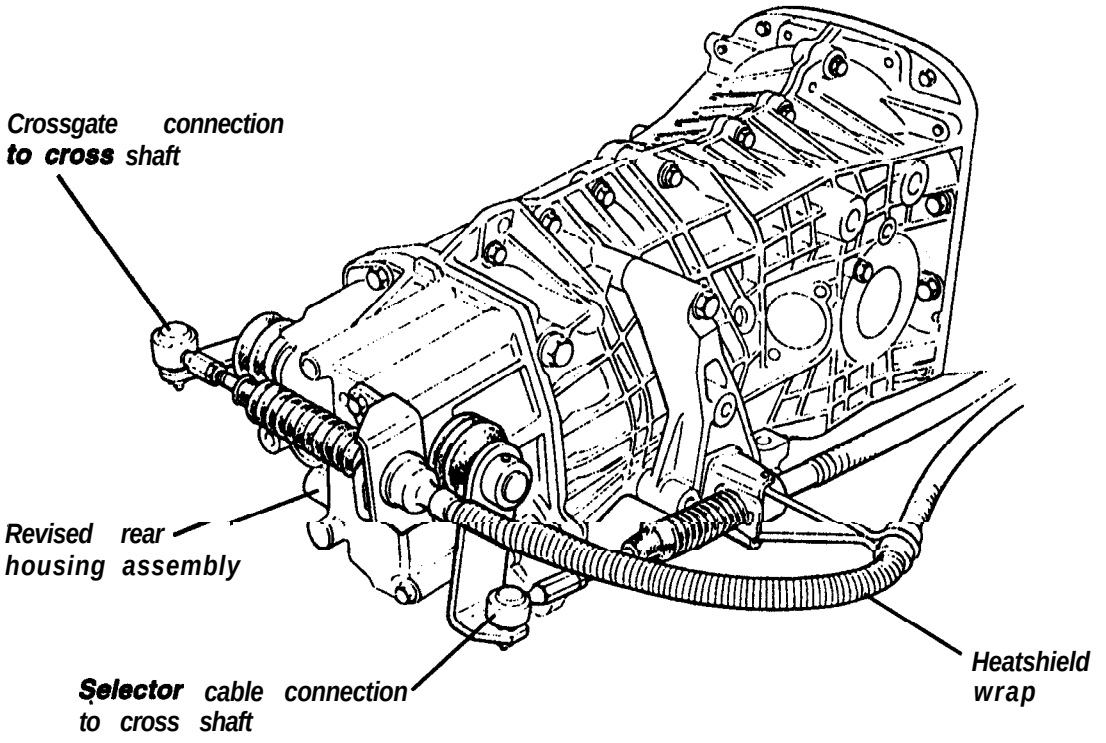
Note that the later components are not practically retrofittable to earlier cars due to the revised transmission components and modified water rails in the chassis backbone to provide necessary clearance to the later type gearchange mechanism.



f119

Gearchange Cable Adiustment Procedure ('98 M.Y. V8 and GT3 mid '98 Onwards)

1. With the transmission in neutral, disconnect the ball joint on the rear end of both cables from the gearbox cross shaft in order to allow the shaft to assume its spring loaded 3rd/4th crossgate position.

2. The gearchange lever is independently spring loaded to the 3rd/4th gear plane, and when viewed from behind will stand vertically. With an assistant holding the lever vertical in the fore/aft plane, adjust the length of the cables to allow their connection to the cross shaft without preload.

3. Adjust the position of the reverse inhibitor block on the gearlever mechanism baseplate in the same way as for the previous type mechanism (see above).

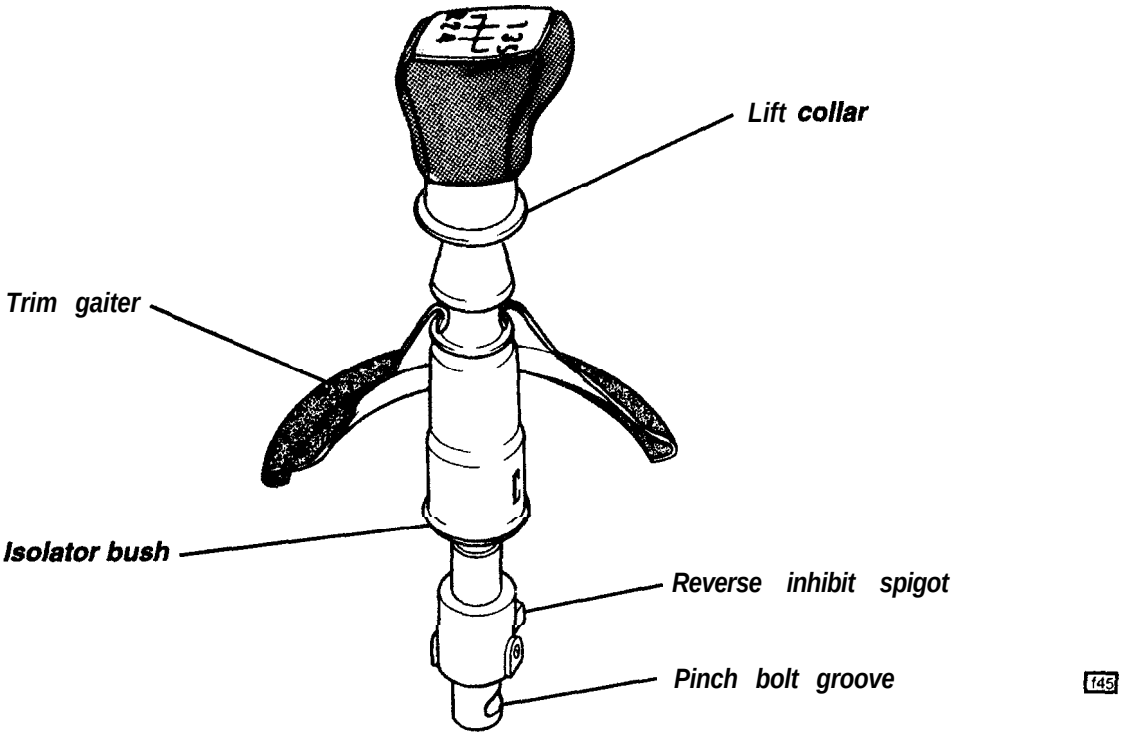
FG.4 - GEAR KNOB/LEVER REPLACEMENT

The gear lever assembly comprises the lever, with isolator rubber bush, knob, and reverse inhibitor lift tube. The knob is a press fit on the lever, with the trim gaiter designed to be withdrawn over it after untying the neck from beneath. If for any reason the knob is separated from the lever, no attempt should be made to refit the knob, as the fitting tolerance will be lost. The lever is retained in the gearchange mechanism assembly by a pinch bolt, with a corresponding groove in the lever defining orientation and increasing security.

To replace the gear lever, access to the pinch bolt must be obtained:

'93 to '97 M.Y. cars

- Remove tunnel top tray & lever trim gaiter:
- Pull the trimmed filler panel (between tunnel top tray and rear bulkhead) out from its 'Snapsac' retainers.
- Remove the two screws securing-the tunnel tray to the body, and release the front end of the gear lever tray from its 'Velcro' retaining strip.
- Raise the panel and disconnect the two window switches.
- Release the clip securing the top of the lever trim gaiter, and slide the gaiter over the lever knob.



- Remove the six screws securing the lower gaiter retaining ring, and lift the gaiter to provide access to the gear lever base unit.
- Remove the pinch bolt clamping the lever into the base unit, and withdraw the gear lever assembly.

'98 M.Y. cars:

- Remove the two screws from the gear lever tray switch panel and withdraw the switch panel cowl.
- Disconnect the switches and remove the two nuts securing the switch panel and gear lever tray to the tunnel top.
- Withdraw the gear lever tray front tongues from beneath the centre switch panel, and lift the tray over the gear lever, untying the neck of the trim gaiter to allow it to pass over the gear knob.
- Release the six screws securing the lower gaiter ring, and lift the plastic gaiter to allow access to the pinch bolt. Remove the pinch bolt and withdraw the lever assembly.

On re-assembly, apply thread locking compound to the thread of the pinch bolt and to the bottom end of the lever before inserting the lever into the base unit. Note that a pinch bolt groove in the bottom end of the lever defines the lever height and orientation. Check adjustment of the reverse inhibitor block before refitting the trim panel in the reverse order to disassembly.

FG.5 • GEARCHANGE LEVER MECHANISM & CONTROL CABLES

The gearchange lever mechanism is secured to a recess in the top side of the chassis 'backbone', with the cables passing within the chassis, through the rear diaphragm panel into the engine bay, and thence to the transmission. Rubber grommets are used in the four mounting holes of the base unit in order to provide a measure of NVH isolation from the chassis.

Introduced for the Sport 300 model, and carried over to the S4S and subsequently to all models, was a reinforcing plate secured around the gear lever mechanism chassis aperture by 12 bolts. This plate serves to stiffen the chassis centre section, and also provides a mounting for the lever lower gaiter, a function previously provided for by a lightweight steel plate screwed to the body aperture.

'93 to '97 *M. Y. Cars:* The lever mechanism uses a gimbal type pivot arrangement and a pair of bellcrank levers

to connect the gearchange lever with the two gearchange control cables, The mechanism provides a pull or push equally to both cables when the lever is moved in the fore/aft plane, and a pull to one cable and push to the other when the lever is moved side to side ('crossgate'). Note that for the introduction of the '93 M.Y. S4, the lengths of the bellcrank levers on the base unit were lengthened in order to reduce gear lever travel ('short **shift'),** and the unit identified by a 'C' stamped on its top surface. This unit may directly replace its predecessor in conjunction with the corresponding translator with a 23 mm top arm (previously 28 mm).

The gearchange control cables abut against the gearchange lever mechanism bracket at their forward end, run through the chassis backbone rear diaphragm, to the right hand side of the engine, and abut against a bracket fixed to the right hand side of the transmission. Note that the two identical cables are crossed over such that the right hand cable at the gearlever end is fitted into the left hand abutment at the gearbox end. As a check, before fitting the rear end of the cables to the translator, move the gear lever across the gate from right to left and observe cable movement at the rear end. The cable that moves forward is fitted to the **left** hand side at the gearbox. Note also that the different rear abutment brackets on the V8 model require slightly longer cables.

'98 ***M. Y.*** Cars: The lever assembly pivots on a ball joint which is bolted to the LH side of the lever mounting and cable abutment bracket. An effective extension of the lever below the ball joint connects to the selector cable which transmits fore/aft movement of the lever. Crossgate movement of the gear lever is converted via a bellcrank lever mounted on the RH side of the carrier bracket, into fore/aft motion to be transmitted by the crossgate cable.

Gearchanae Lever Assemblv Removal

1. Remove the gear lever tray, trim gaiter and lower gaiter (see sub-section FG.4).

2. *'93 to '97 M. Y.*

Remove the centre console:

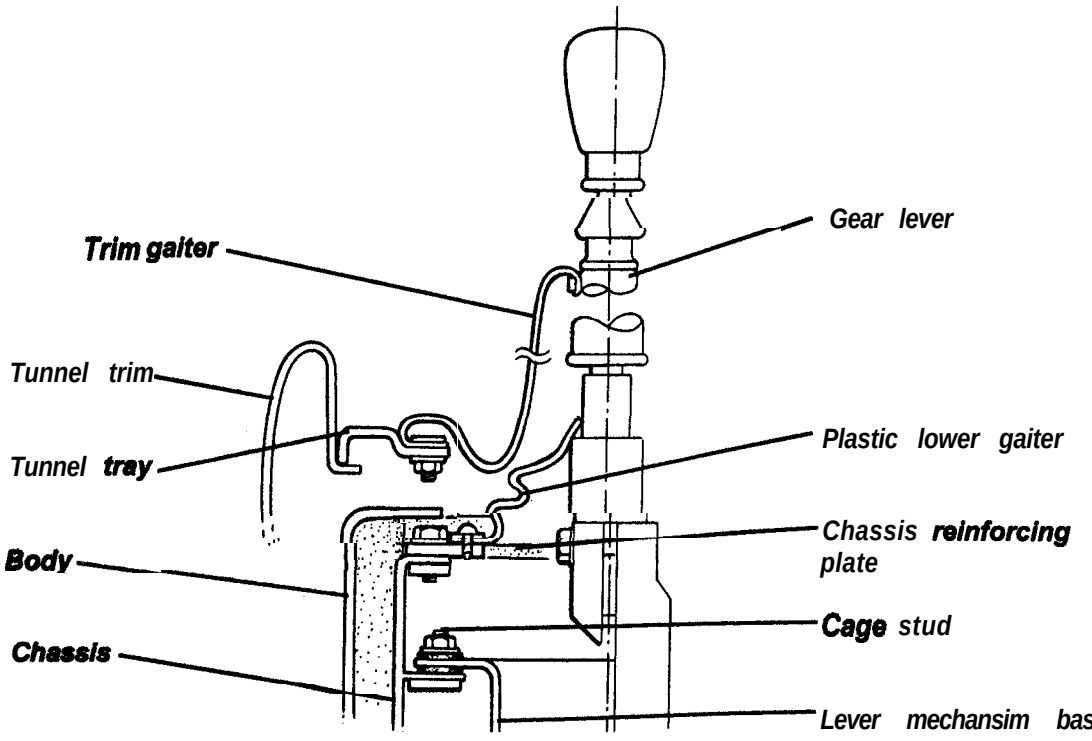
Remove the radio and mounting frame.

Release the single screw inside the top of the cubby box, and withdraw the cubby box, **discon necting** the cigarette lighter.

Remove the single fixing screw securing the rear of the console to the tunnel.

Remove the two **wingnuts** securing the front edge of the console to the fascia.

- Release the two nuts securing the instrument panel to the scuttle beam to allow the panel to be raised sufficiently to release the centre console. **Withdraw** the console.

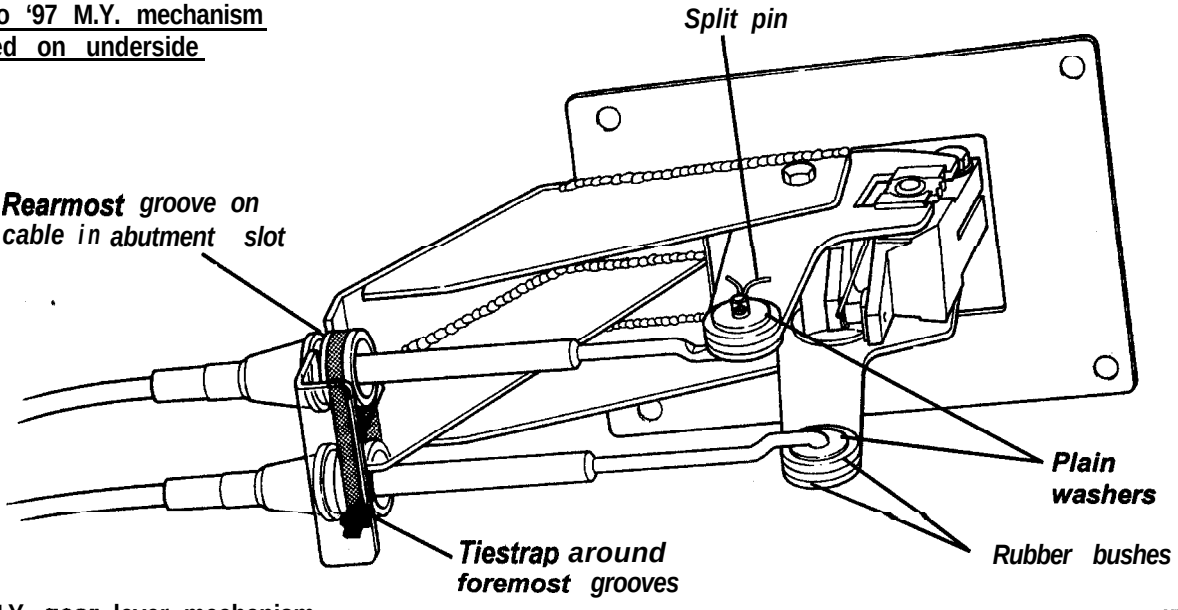


3. Remove the 4 self tapping screws securing the aperture plate to the chassis, or the 12 bolts fixing the chassis reinforcing plate on later models. This may necessitate some fettling or drilling of the body for access. Slide the plate rearwards to permit access to the gearchange lever mechanism.

4. At the gearbox end, release each gearchange cable from the translator or cross shaft, and abutment bracket, and release tie straps etc. securing the cables in the engine bay.

5. Remove the 4 fixings securing the gearchange lever mechanism to the chassis, and withdraw the complete unit sufficiently to enable the control cables to be released: Remove the split pin securing each cable end to the mechanism, or prise the cable socket off the lever ball as applicable, and cut the tie strap securing the two outer cables to the abutment bracket. If the cables are not to be replaced, identify each cable with its fitting position. If necessary, withdraw each cable from the chassis.

'93 to '97 M.Y. mechanism viewed on underside



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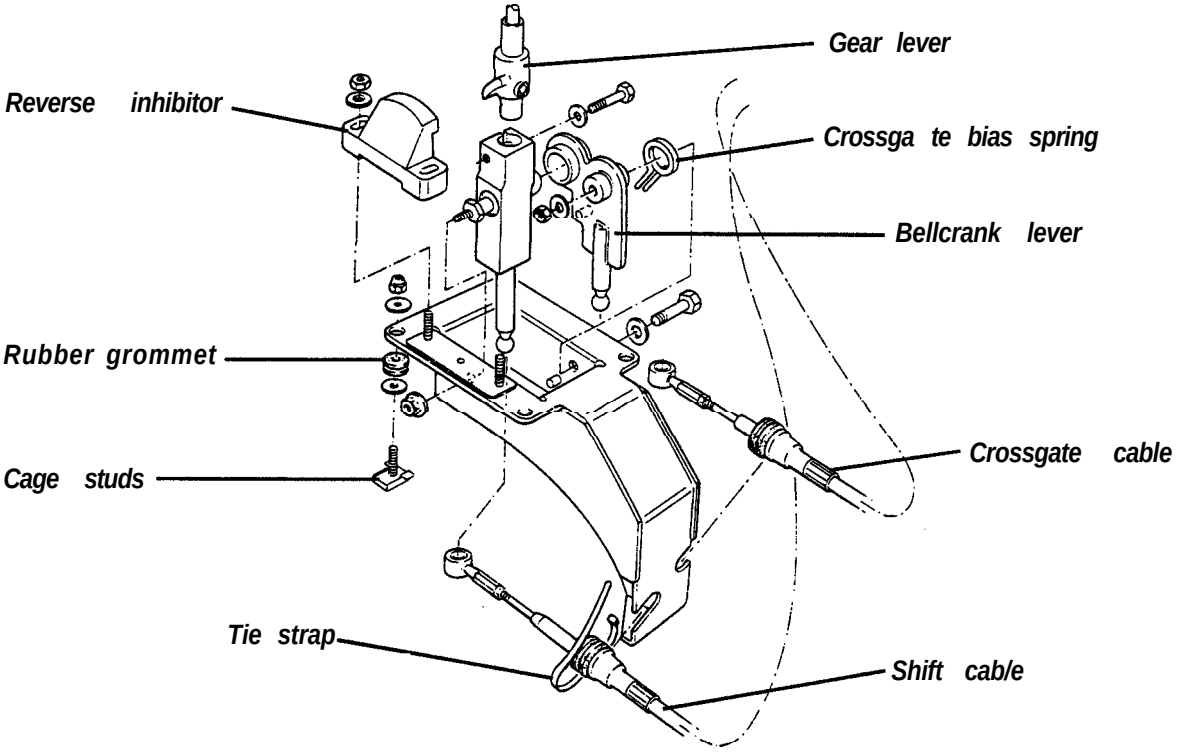
'98 M.Y. gear lever mechanism



f122

To Refit:

1. Feed the two control cables through the chassis rear diaphragm, and pull up into the cabin,

2. On the earlier type mechanism, check that the rubber bush is fitted into each of the two bellcrank lever arms. Fit a plain washer onto each control cable cranked end, and hook into one of the bellcrank lever arms from the inner side. Fit a second flat washer and split pin to retain each cable. On the later type mechanism, snap the ball joints into place.

3. Locate the **rearmost** of the two grooves in each outer cable front end, into the abutment slot on the gearchange mechanism bracket. Use a single tie strap **A082F6367** located in the foremost groove of the two outer cables to secure the two cables together, and retain them in the abutment bracket.

4. Continue reassembly in the reverse order to removal, and adjust the cables as detailed in sub-section FG.3

FG.6 • OUTPUT SHAFT SEAL REPLACEMENT

Tools **Required:** Roll Pin Punch Set TOOOT0678
Output Shaft Seal Replacer TOOOT0681

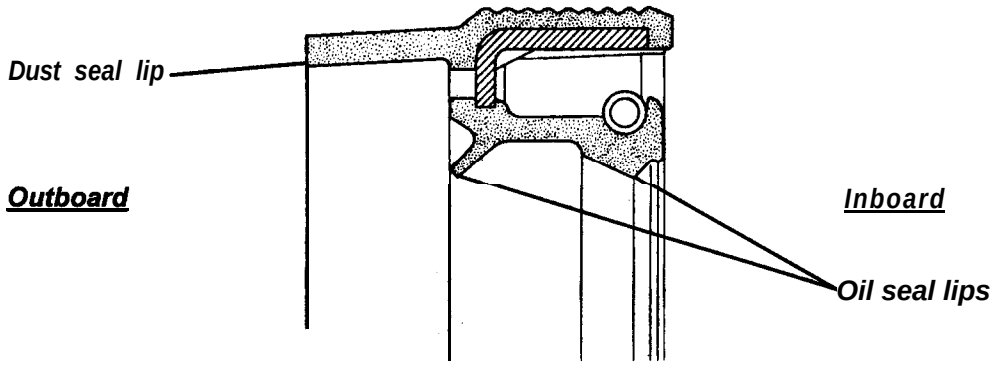
The output shaft oil seals may be replaced without any dismantling of the transmission other than **disconnecting the** drive shafts. However, the special construction of the seals necessitates the use of fitting tool TOOOT0681 in order to prevent damage during fitment. Whenever replacing an oil seal, the **'O'** ring on the output shaft splines should also be replaced.

1. Remove rear luggage compartment floor/engine bay rear wall. for improved access.

2. Using punch set TOOOT0678, drive out from above the two concentric roll pins securing the drive shaft inboard joint to the transmission output shaft, and discard.

3. Taking note of the positions of the bolt head washer and bushing snubber washers, remove the stud securing the hub carrier to the top link. Loosen the hub carrier lower stud. Pull the hub outwards sufficiently to draw the drive shaft off the output shaft splines.

4. Use oil seal extractor tool TOOOT0481 to extract the output shaft seal.
CAUTION: When using the tool on the right hand seal, it is most important to ensure that the puller claws locate under the lip of the seal, and not on the bearing shield fitted immediately behind the seal.

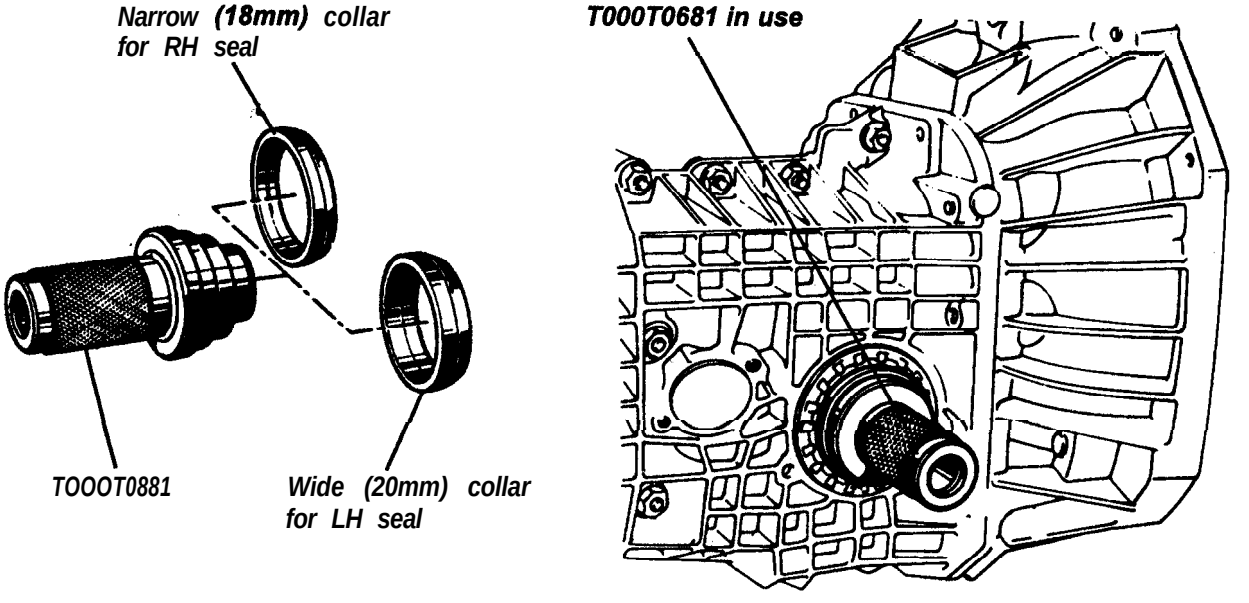


f47

5. With the lip seal removed, hook out the '0' ring fitted at the base of the shaft splines. **Always fit a new 'O' ring** taking care not to damage the ring on the shaft splines.

6. Apply 'Wellseal' to the outside of a new oil seal and position on the transmission. Use inserter tool

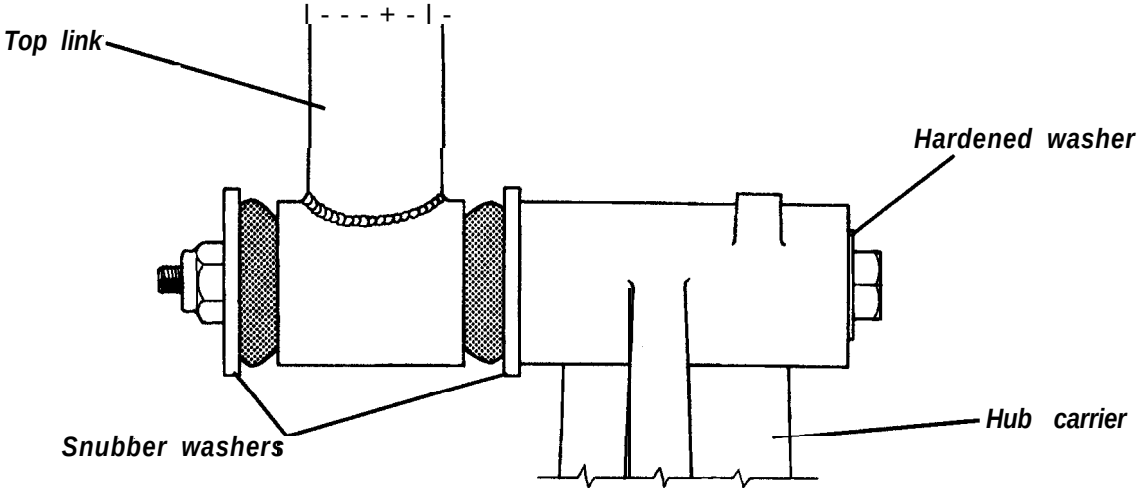
TOOOT0681 with the appropriate collar, to drive the seal fully home. The narrow (18mm) collar is for the right hand seal (fitted in the adjuster nut), and the wide (20mm) collar for the left hand seal (fitted in the housing).



f48

7. Clean the roll pin bore in the C.V. joint spigot and output shaft, and fill with Silastic RTV 732 sealant (A075U6044V). Lubricate the lips of the output shaft seal with transmission oil, and fit the drive shaft onto the splines, with the roll pin holes aligned.

8. Refit the hub carrier top stud (coated with PBC grease) through the hub carrier and top link, correctly positioning the washers. Torque tighten both upper and lower hub carrier studs only with the car at ride height, to 70Nm (50 lbf.ft).



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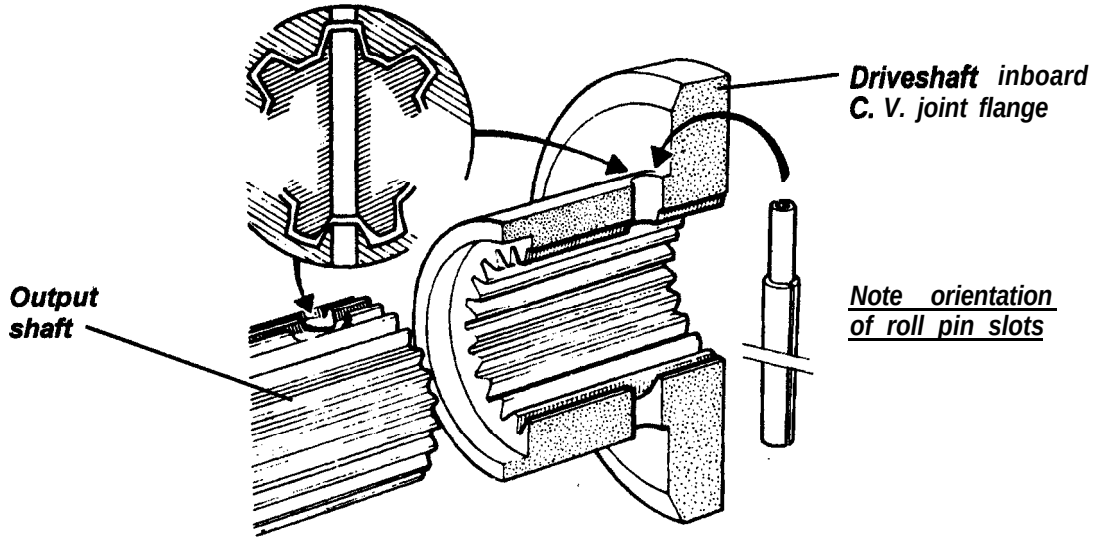
9. Use the tapered tool in set TOOOT0678 to fully align the roll pin holes in the drive shaft and output shaft. Insert the two NEW concentric roll pins from above, with their splits diametrically opposed and at 90° to the shaft axis.
Progressively knock in each of the pins until flush with the surface. Seal each end of the pins with Silastic.



f21

10. Refit luggage compartment floor/engine bay rear wall.

FG.7 -'REAR HOUSING GASKET REPLACEMENT

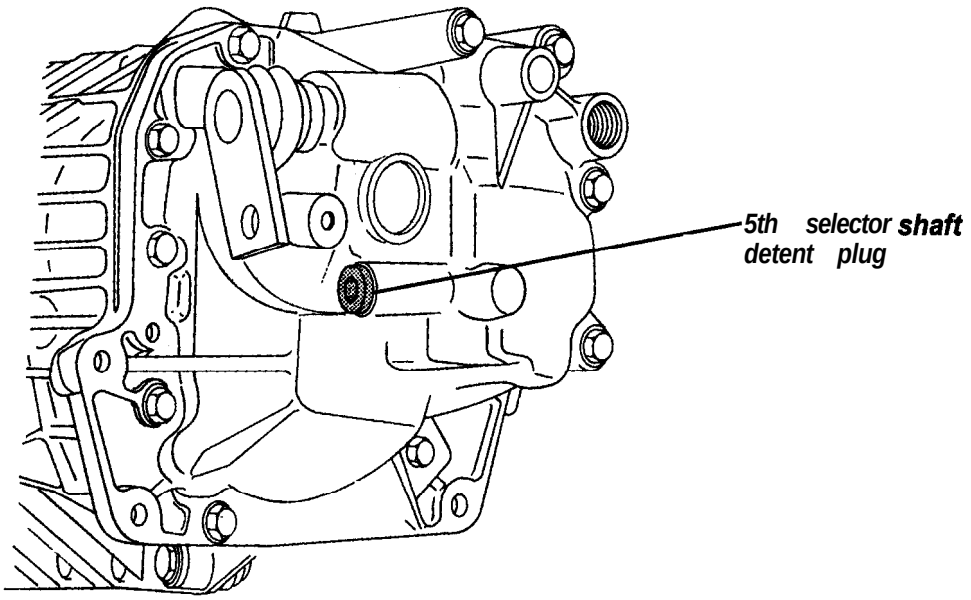
To Remove Rear Housing

1. Remove rear luggage compartment floor, drain the transmission oil and remove the exhaust silencer.

2. Select neutral before removing the translator from the gearbox cross shaft, or, on '98 M.Y. cars, disconnecting the gearchange cables.

3. On 4-cylinder cars, remove the exhaust mounting cradle and gearchange cables from the gearbox, without disturbing the cable or translator tie rod adjustments.

4. Using a 8mm hexagonal drive bit, remove the 5th selector shaft detent plug on the rear case, followed by the spring and ball bearing.



f18

5. Remove the eleven bolts securing the rear housing, noting the positions of the two different bolt lengths.

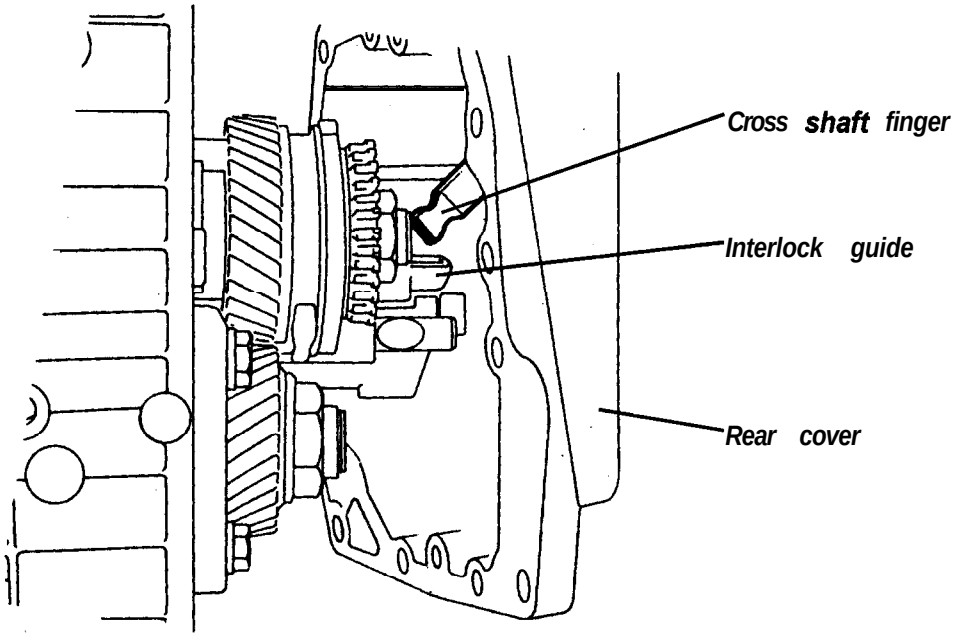
6. Withdraw the rear housing, disengaging the cross shaft finger from the interlock guide.

To Replace Rear Housing

1. Remove and discard the old gasket and thoroughly clean the joint faces on the rear cover and transmission case.

2. Apply 'Wellseal' to both joint faces, and fit a new gasket.

3. Check that all the selector shafts are in the neutral position (all slots in line) and fit the rear cover, engaging the cross shaft finger into the interlock guide. See illustration.



f49

4. Fit the eleven rear cover bolts with their washers, and torque tighten to 25Nm (18 lbf.ft)

5. Refit the 5th selector detent ball and spring and retain with the socket head plug, after applying a thread locking compound to the thread. Torque tighten the plug to 17Nm (13 lbf.ft).

6. Operate the cross shaft and check that all gears can be obtained before refitting the exhaust cradle/translator/gearchange cable assembly.

7. Refit the exhaust silencer and fill the transmission with the specified lubricant up to the level/filler plug hole.

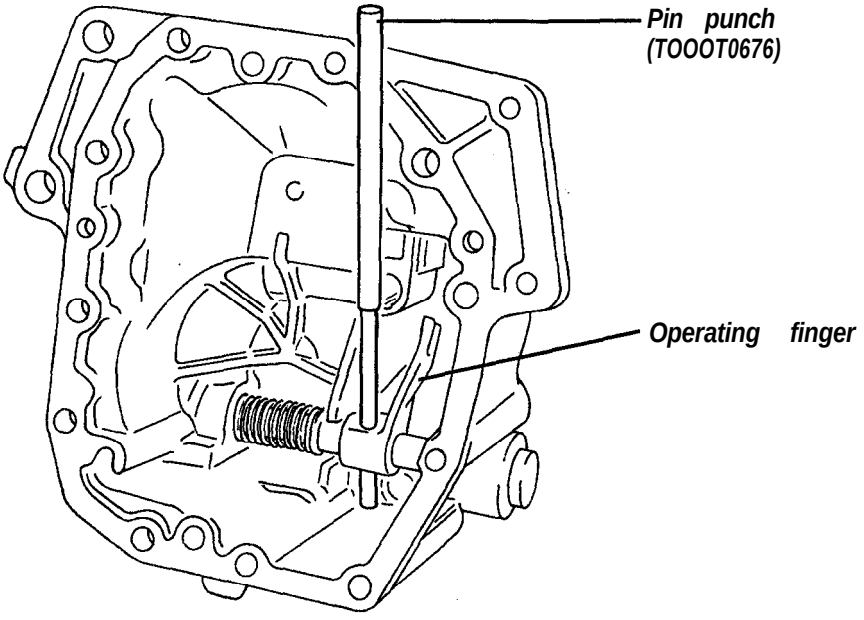
8. Check the translator tie rod and gearchange cable adjustments (FG.3). Refit rear floor.

FG.8 - SELECTOR CROSS SHAFT SEAL REPLACEMENT

Tools Required: Roll Pin Punch Set TOOOT0678

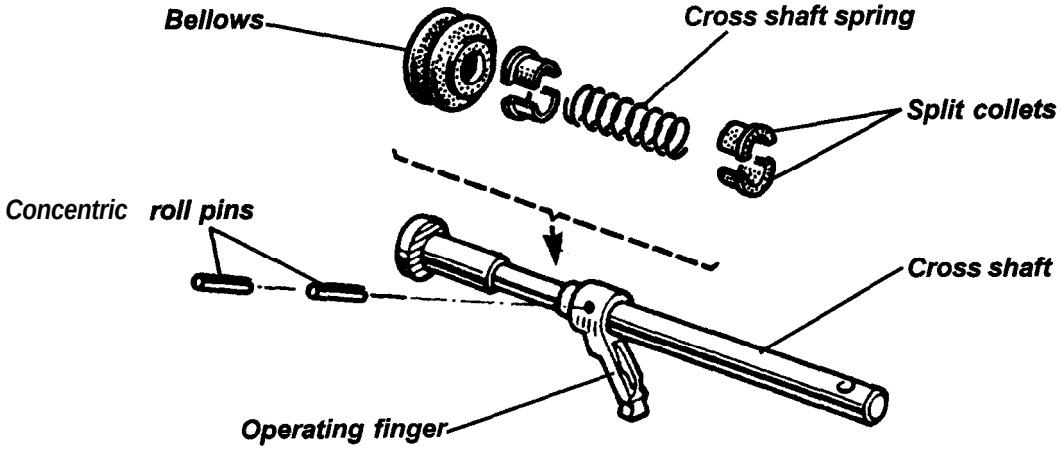
1. Remove the rear housing (FG.7).

2. Using punch set TOOOT0678, remove the two concentric roll pins securing the operating finger to the cross shaft.



f19

3. Compress the cross shaft spring sufficiently to remove first one pair and then the other pair of spring collets. Withdraw the cross shaft and remove the spring and operating finger.



f52

4. Prise out the cross shaft seal and press in a new item. Lubricate the lip of the seal with transmission oil.

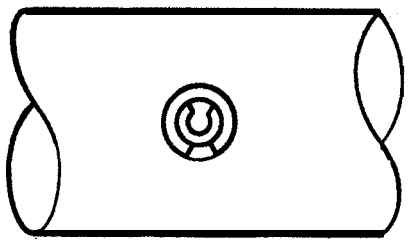
5. Check that the bellows is correctly fitted onto the cross shaft. Position the spring and operating finger (correct way round) into the rear housing and insert the cross shaft into the housing, taking care not to damage the seal, and through the spring and operating finger.

6. Compress the spring sufficiently to enable one pair of split collets to be fitted, and then compress in the opposite direction to fit the second pair.

7. Using punch set TOOOT0678, fit two new concentric roll pins to secure the operating finger to the cross shalt. Ensure that the pins are fitted as shown in the diagram with their splits diametrically opposed and 90° to the cross shaft axis.

8. Refit the rear housing (FG.7).

Orientation of roll pins



f53

FG.9 - SPEEDO DRIVEN GEAR REPLACEMENT (S4 prior to '95 M.Y.)

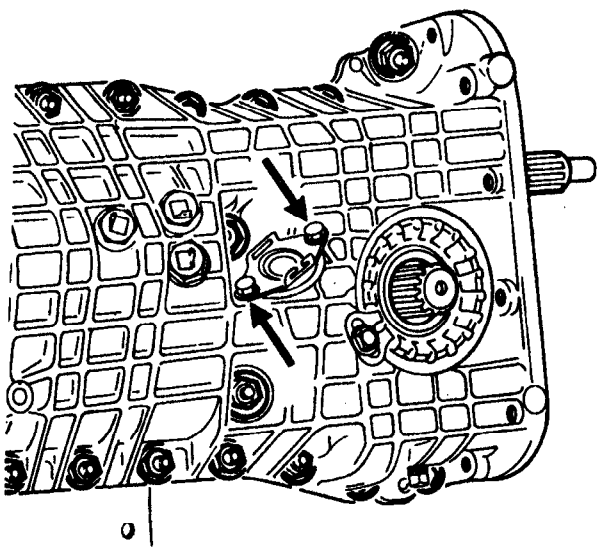
The **speedo** drive gear, fitted on the outside of the differential carrier, meshes with a driven gear mounted in the right hand side of the transmission casing to the rear of the output shaft. The plastic driven gear is fixed to a short steel spindle supported in a plastic bush, which incorporates an oil seal to prevent oil rising up the shaft. The gear, spindle and bush are supplied as a complete assembly which should not be dismantled. An '0' ring seals the bush into the casing.

To Remove:

1. Release the wire clip retaining the **speedo** cable to the gearbox casing, and withdraw the cable.

2. Remove the two screws securing the retaining plate, remove the plate and use pliers to pull out the driven gear/bush assembly.

Speedo drive retaining plate fixings



f54

To Replace:

1. If necessary, renew the '0' ring on the outside of the bush, and lubricate with transmission oil before pressing back into location in the gearbox case.

2. Refit the retaining plate with the open slot outermost, and secure with the two screws.

3. Insert the **speedo** cable and retain with the wire clip.

FG.10 - TRANSMISSION REMOVAL/REPLACEMENT

Transmission Removal

1. Remove the rear luggage compartment floor/engine bay rear wall, disconnecting vacuum hoses and electrical leads as necessary.

2. Remove the chassis rear crossmember.

3. Remove the silencer. Drain the transmission oil.

4. Disconnect the reverse light switch wires, and release the speedo cable (if applicable).

5. Disconnect the gearchange cables, and on 4-cylinder cars, remove the exhaust mounting cradle from the transmission.

6. Using punch set TOOOT0678, drive out the two concentric roll pins securing the drive shaft inboard joint to the transmission output shaft and discard the pins.

7. Taking note of the positions of the bolt head washer and bushing snubber washers, remove the stud securing the hub carrier to the top link. Loosen the hub carrier lower stud, and pull the hub outwards sufficiently to draw the drive shaft off the output shaft splines.

8. On 4-cylinder cars, disconnect the turbocharger oil drain pipe, water feed pipe and air inlet hose. Seal the turbo air intake to prevent dirt entry.

9. On 4-cylinder cars, release the clutch slave cylinder from the clutch housing, and remove the flywheel sensor from the top of the clutch housing. Remove the starter motor.
On V8 models, remove the clutch slave cylinder and mounting bracket. Pull the clutch release fork upwards and rearwards to unhook the keyhole slot in the fork from the pivot ball, and allow the fingers of the fork to be withdrawn from the release bearing collar (release bearing is captive in clutch cover diaphragm spring).

10. Support the transmission and remove the gearbox mounting brackets and rubber mountings. Support the engine and release the clutch housing to engine bolts, noting their different lengths and positions. Note any shim washers fitted between sump and clutch housing.

11. Carefully draw the transmission rearwards to disengage the clutch shaft from the spigot bearing and clutch cover, and lift out the complete transmission assembly.

Transmission Replacement

Refit the transmission by reversing the removal procedure, noting the following:

i) Check that the clutch centre plate is correctly aligned using mandrel T000T0654F (4-cylinder) or TOOOT1402 (V8).

ii) On 4-cylinder cars; ensure that the release bearing and fork are fitted onto the transmission before mating the transmission to the engine.
On V8; the release bearing is captive in the clutch cover spring. On pre '98 cars, the release fork should be hooked loosely onto the pivot ball before mating the transmission to the engine, and the fingers guided into the release bearing groove during the process. On cars '98 M.Y. onwards, the release fork is captive on its pivot, but must be pulled upwards during the mating operation and guided into position.

iii) On 4-cylinder, do not fit the two clutch housing to sump bolts until all the clutch housing to engine bolts have been torque tightened. Measure the gap between the clutch housing and sump at the two fixing points and check that the two spacer washers removed during disassembly are of similar thickness. If necessary, use new laminated shim washers A082F6358F and peel off sufficient layers to achieve the thickness required.

iii) When refitting the hub carrier top stud, coat the stud with PBC grease and ensure that the bolt head washer and snubber washers are correctly positioned. Tighten upper and lower studs only with the car at ride height to 70 Nm (50 lbf.ft).

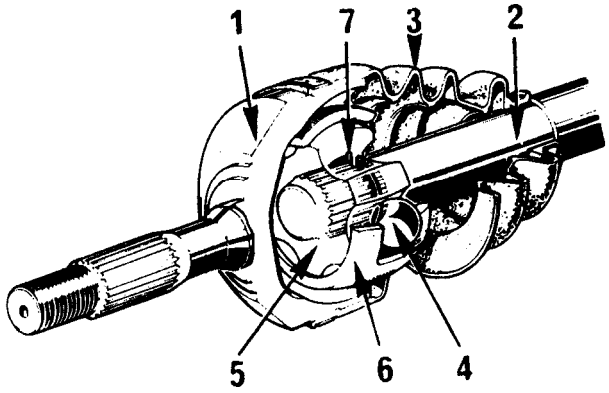
iv) Refit the driveshafts as detailed in sub-section FG.6.

FG.11 - DRIVESHAFT JOINT GAITER REPLACEMENT

Tools Reauired: Roll Pin Punch Set TOOOT0678

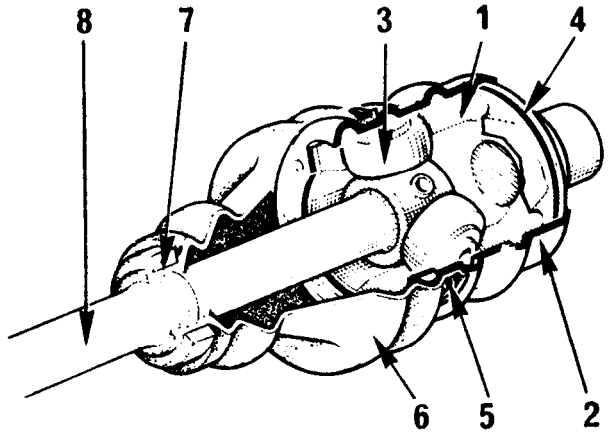
The two driveshaft assemblies are identical and use constant velocity joints on each end. The inboard joints accommodate the plunging (axial) movement necessary with suspension travel, and are of the 'tripod' three roller type whereas the outboard joints are non plunging 6 ball 'Lobro' type with integral outboard (hub) driveshafts.

Outboard Joint
1. Yoke
2. Drive shaft
3. Gaiter
4. Ball
5. Ball hub
6. Ball cage
7. Circlip



F55

Inboard Joint
1. Yoke
2. Cover
3. Spider
4. Seal
5. Retaining clip
6. Gaiter
7. Retaining clip
8. Drive shaft



F58

The only service operations which may be carried out on the driveshaft assemblies, is the fitment of replacement gaiters for the C.V. joints. Note that if both C.V. joint gaiters on the same shaft are to be replaced, it is only necessary to remove one of the joints (inboard is easier) and slide the other gaiter along the shaft using a suitable lubricant.

Driveshaft Removal

1. Remove the rear road wheel and loosen the rear hub nut.

2. Use tool TOOOT0678 to drive out, from above, the two concentric roll pins securing the inboard C.V. joint to the transmission output shaft. Discard the roll pins.

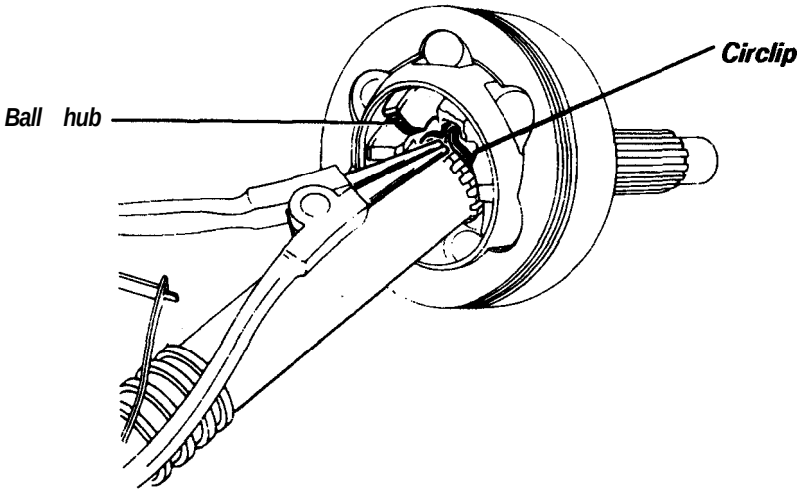
3. Taking note of the positions of the bolt head washer and bushing snubber washers, remove the stud securing the hub carrier to the top link. Loosen the hub carrier lower stud. Pull the hub outwards sufficiently to draw the drive shaft off the output shaft splines.

4. **Remove the wheel speed sensor(s) from the top of the hub carrier to prevent damage, before** removing the hub nut and washer and withdrawing the driveshaft from the hub.

C.V. Joint Gaiter Replacement • Outboard End

1. Place the driveshaft in a soft jawed vice. Remove (cut) the gaiter retaining clips and cut down the whole length of the gaiter. Remove as much grease as possible from the joint.

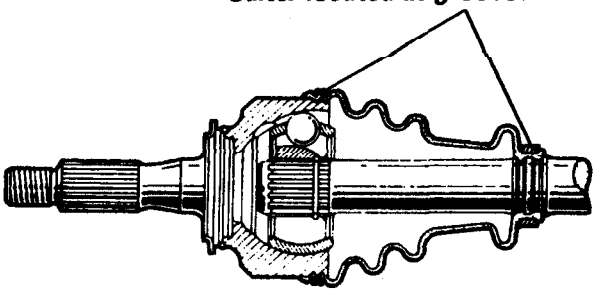
2. **Spread the joint retaining circlip whilst tapping the exposed face of the ball hub to remove the coupling from the shaft.**
Note that the circlip locates in both the shaft groove and the ball hub, but the groove in the hub is **of sufficient depth to allow the circlip to be spread, (i.e. opened up, NOT closed) over the shaft** splines. Take care to apply force only to the hub, and not the ball cage.

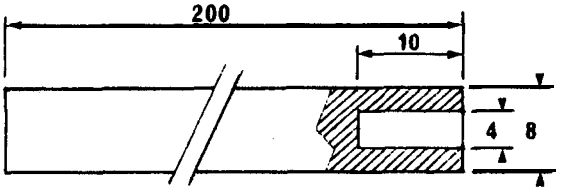


F56

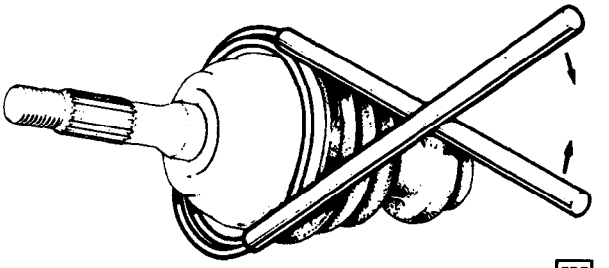
3. Slide a new rubber collar followed by the new gaiter onto the shaft.

4. Slide the coupling complete with the retaining circlip onto the shaft splines until the circlip locates in the shaft groove.





Fitting gaiter clips



F57

5. Spread the sachet of grease (140 g) into the joint and around the the inside of the gaiter. Locate the lip of the gaiter in the grooves on the C.V. joint and fit the new retaining clip using two short lengths of tube as shown. Locate the small end of the gaiter into its location on the shaft and secure with rubber collar.

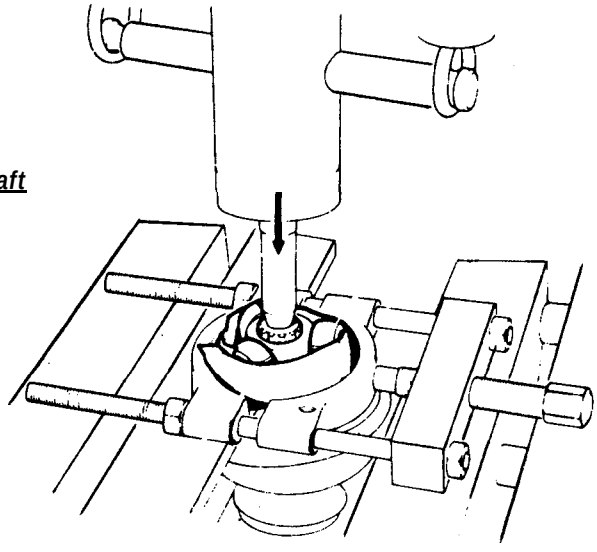
C.V. Joint Gaiter Replacement - Inboard End

1. Place the driveshaft in a soft jawed vice. Protect the oil sealing surface on the inboard end of the inboard C.V. joint with tape.

2. Remove (cut) the gaiter retaining clips and cut down the whole length of the gaiter to remove,

3. Slide the yoke off the shaft, and remove as much grease as possible from the joint.

4. Fit a split collar press tool beneath the spider and press the driveshaft from the spider. Ensure that no load is taken by the rollers; only by the spider hub.



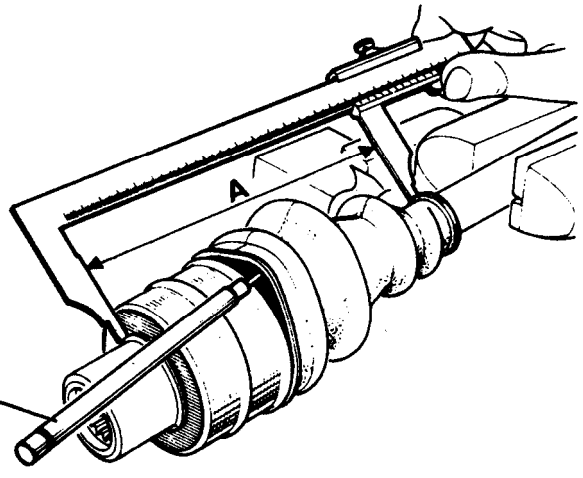
Pressing shaft from yoke

F59

5. Slide a new rubber collar, followed by the new gaiter, onto the driveshaft. Tap the spider assembly onto the shaft and retain by using a centre punch at 3 points 120° apart to peen over the shaft splines.

6. Spread the sachet of grease (150 g) equally between the gaiter and the joint, Slide the yoke onto the spider and locate the small end of the gaiter in the shaft ridges. Retain with the rubber collar.

7. Locate the large end of the gaiter in the ridges on the yoke and insert a smooth round ended rod or screwdriver between the gaiter and yoke toventilate air within the gaiter, Adjust the coupling position on the shaft to achieve a dimension between the gaiter small end and the back of the yoke (as shown in the diagram) of 162 ± 1 mm.



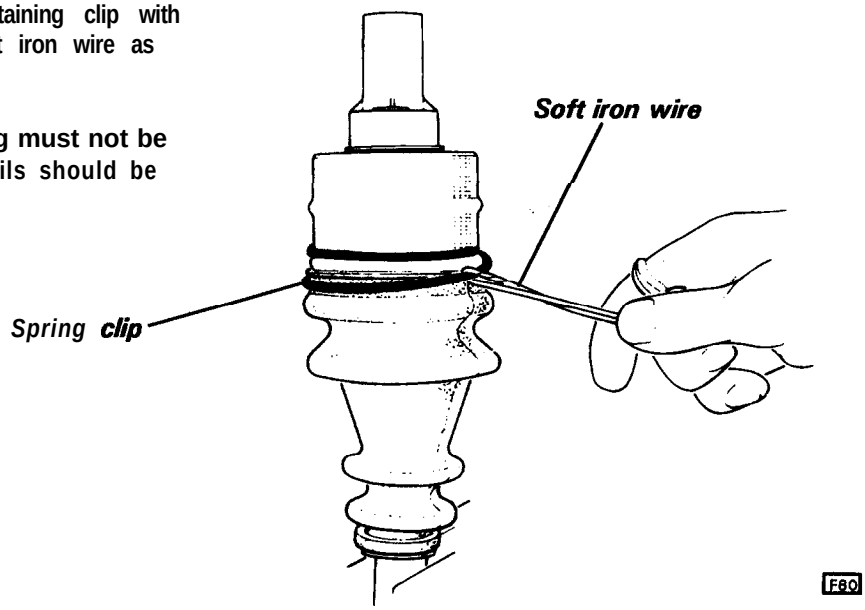
Ventilation rod

Setting dimension
A = 162 ± 1mm

F60

In this position, remove the ventilation rod and fit the gaiter retaining clip with the aid of a piece of soft iron wire as shown.

IMPORTANT: The spring must not be stretched. The spring coils should be touching after fitment.



Driveshaft Refitment

1. Fit the outboard driveshaft (part of outboard C.V. joint) into the rear hub splines, and retain with the hub washer and nut. Do not tighten at this stage. Refit speed sensor (if applicable) to hub carrier.

2. Remove the protective tape from the seal area of the inboard joint, and fit onto the output shaft splines, with the roll pin holes aligned.

3. Refit the hub carrier top stud (coated with 'Copperslip') through the hub carrier and top link, with the washers correctly positioned. Torque tighten both upper and lower hub carrier studs only with the car at ride height to 70 Nm (50 lbf.ft).

4. Torque tighten the hub nut to 260 - 270 Nm (190 - 200 lbf.ft).

5. Use the tapered tool in set TOOOT0678 to fully align the roll pin holes in the drive shaft and output shaft. Insert two NEW concentric roll pins from above with their splits diametrically opposed and at 90° to the shaft axis. Progressively knock in each of the pins until flush with the surface. Seal each end of the pins with Silastic.

FG. 12 - TRANSMISSION DISASSEMBLY

Tools reauired

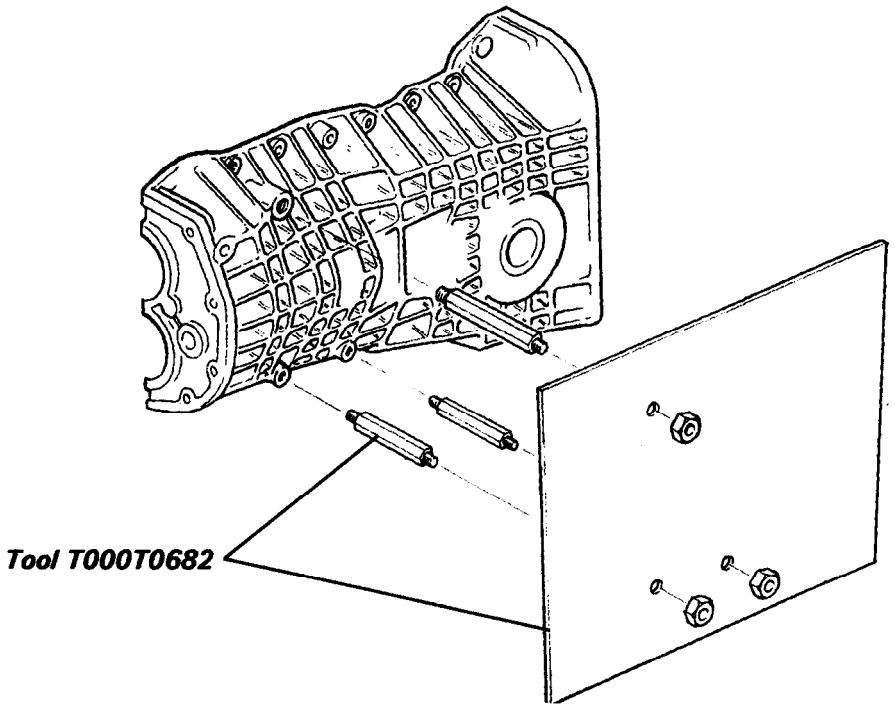
Roll Pin Punch set	TOOOT0678
Castellated Wrench	TOOOT0679
Diff. Nut Spanner	TOOOT0680
Diff. Seal Fitting Tool	TOOOT068 1
Gearbox Support Plate	TOOOT0682

Consumables used durina transmission overhaul or repair.

Grease No. 20 (1gm.)	A082F6501	Sunwheel splines Clutch shaft splines Clutch release fork pivot Release bearing guide tube Release fork pads

CAF 4/60 Thixo (100gm.)	A082F6500	Screwed plugs and switches Locking ball plugs End of roll pins on driveshafts (or Silastic)
Loctite 5 18	A082F65 14	Housing assembly faces
Loctite Chisel	A082F6517	Releases cured '5 18'
Loctite 648	A082F6516	5th speed fixed gear 5th speed dog
Loctite 270	A082F6515	Primary & secondary shaft nuts Reverse assembly bolt Crown wheel bolts
Castrol TAF-X	A082F6552S	Immersion of all gearbox parts

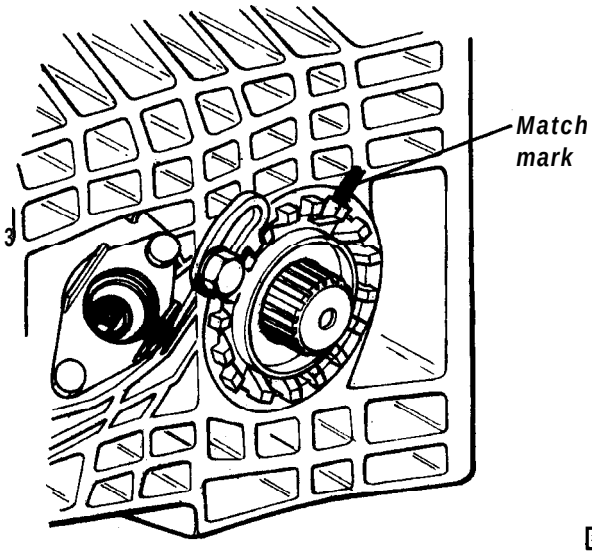
Remove the transmission from the vehicle (see FG. 10), and place on a clean rubber or plastic coated bench. Mount the support plate (T000T0682) to the RH main case.



F26

Separating the Main Case

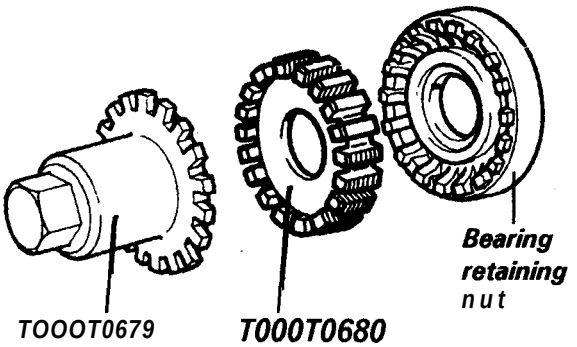
1. On the RH side of the transmission, match mark the differential bearing retaining nut against the casing.
2. Remove the bearing nut locking plate.



F41

3. Loosen the differential bearing nut by a full turn using the castellated wrench and diff. nut spanner. (T000T0679 & T000T0680)

4. Remove the two screws securing the retaining plate and remove the speedo driven gear/bush assembly.

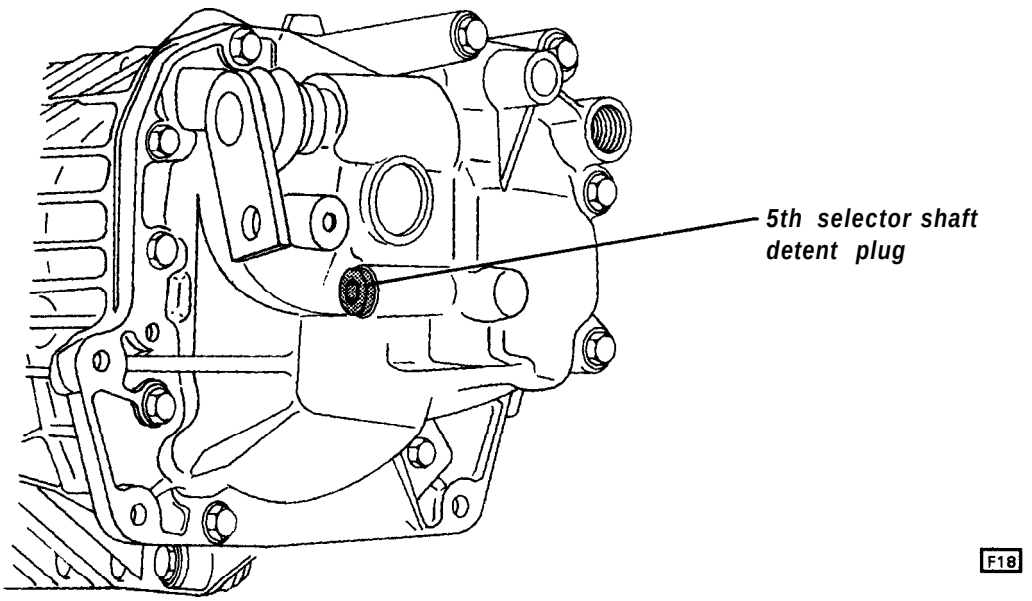


5. Remove the clutch release bearing. F64

6. Remove the release fork by pulling towards the clutch housing aperture to disengage the leaf spring from behind the pivot ball.

7. Remove the clutch housing bolts and withdraw the clutch housing. Discard the gasket and take note of the two location dowels.

8. With the gearbox in neutral, use an 8 mm hexagonal drive bit to remove the 5th selector shaft detent plug on the rear case, followed by the spring and ball bearing.



F18

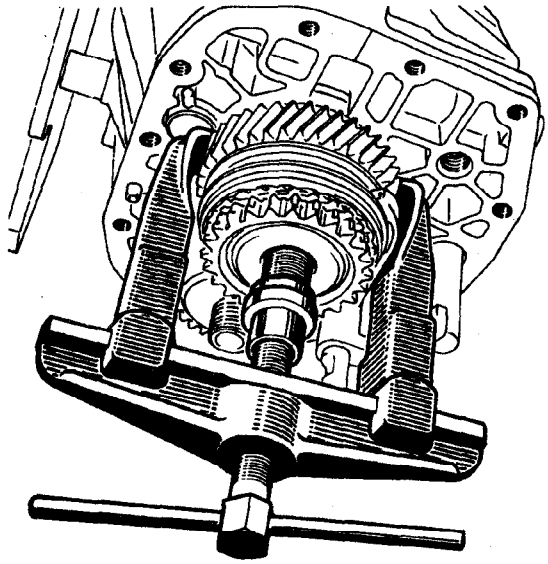
9. Remove the eleven bolts, (note the different lengths) and washers, and pull off the rear housing. Discard the paper gasket.

10. Swing the interlock guide aside, and select reverse (right hand selector shaft), together with any other gear to lock the two shafts. Remove and discard the primary and secondary shaft nuts (both right hand threads). Select neutral.

11. Using a suitable puller and taking care not to damage the gear teeth, withdraw the 5th speed drive gear and synchroniser assembly complete with selector fork and shaft, from the primary shaft, Match mark the synchroniser sliding sleeve against the gear.

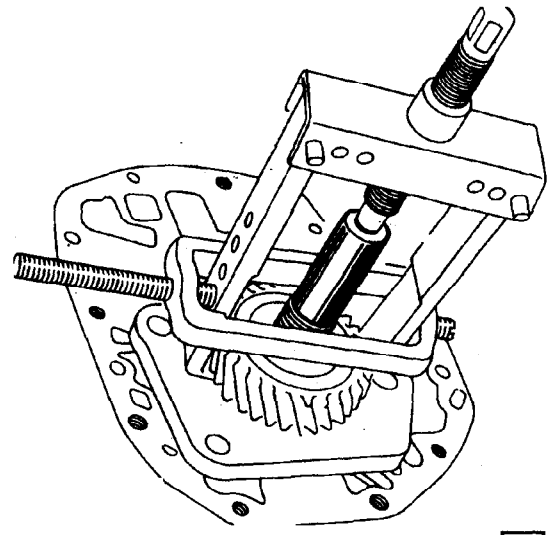
12. Remove the 5th gear needle roller bearing and pull off the needle bearing sleeve and thrust washer,

Removing *5th* ***speed*** *drive* ***gear*** *&* ***syncro.***



F65

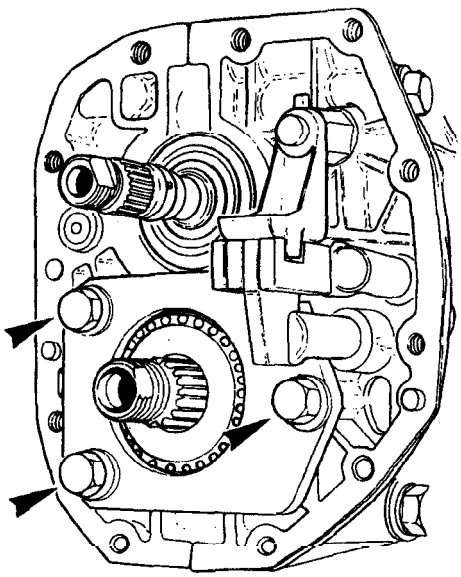
Removing *5th driven* ***gear***



F66

13. Using a suitable puller extract the 5th speed fixed gear from the secondary shaft.

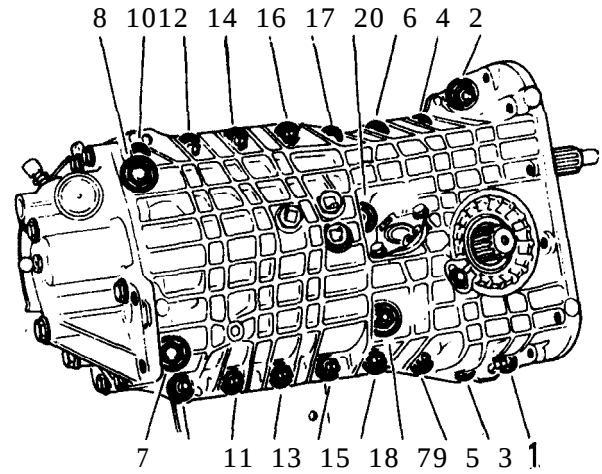
14. Remove the 3 bolts from the plate retaining the secondary shaft double taper roller bearing, and remove the plate.



Bearing retaining ***plate*** *fixings*

F67

Main case ***fixings*** *LOOSENING* ***sequence***



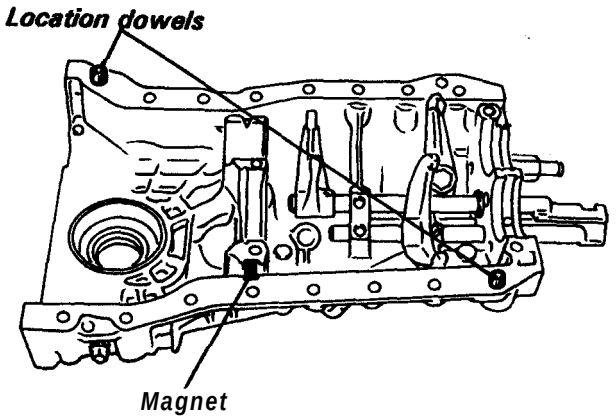
F68

15. Loosen the main case bolts in the sequence shown. Remove the nuts, bolts and washers, noting the different bolt lengths.

16. With the LH case uppermost, separate the two halves of the main case. It may be necessary to use a plastic hammer to tap the mating faces apart as they are coated with Loctite 518. Place the LH casing aside.

17. Remove, in order, from the RH casing:
- the differential
- the secondary shaft
- the primary shaft

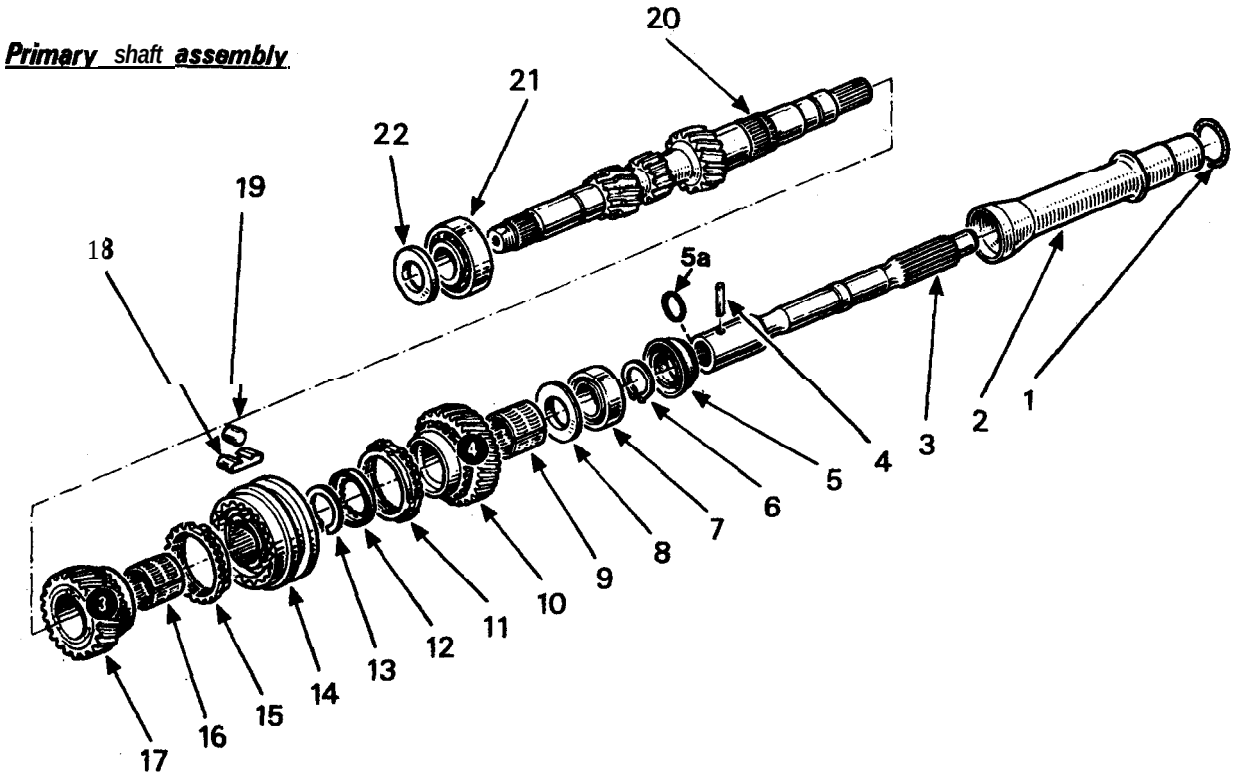
This will leave the selector shafts, the magnet and the two locating dowels in the R.H. main case.



F69

FG.13 - PRIMARY SHAFT - Disassembly.

1. Place the primary shaft complete with the clutch shaft on a clean area of the bench.



F70

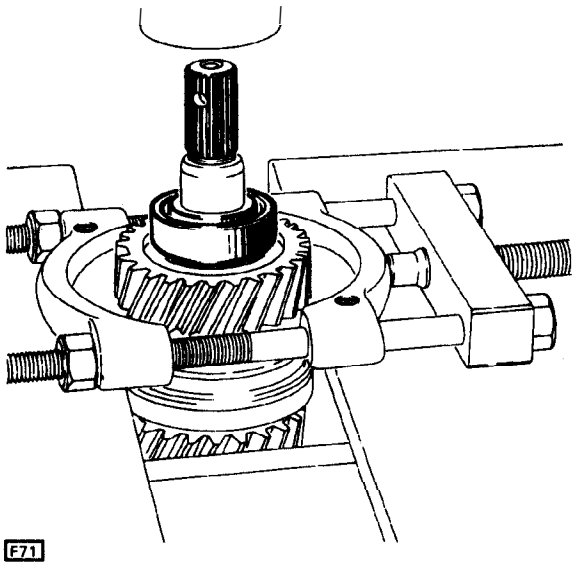
2. Pull off the release bearing guide tube (2), and discard the '0' ring seal (1).

3. Separate the clutch and primary shafts by driving out, and discarding, the connecting roll pin (4).

4. Remove and discard the lip seal (5), '0' ring (5a), and bearing retaining circlip (6).

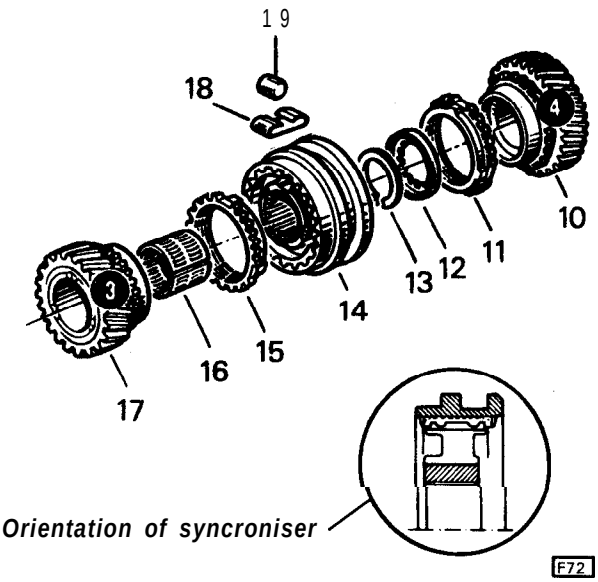
5. On a press, taking the load on the 4th speed gear, extract the gear, needle race halves, thrust washer and roller bearing (7-10).

***Removing** 4th **gear** & **roller** bearing*



F71

***3rd/4th gear** syncroniser & mars*



F72

6. Lift off the 4th speed synchroniser ring (1 1) and splined washer (1 2).

7. Remove the circlip retaining the 3rd/4th speed synchroniser (1 3).

8. Pull off the 3rd speed drive gear and 3rd/4th synchroniser, with 3rd speed sychro ring and needle bearing halves (1 4 • 17).

9. Match mark the 3rd/4th speed sychroniser sleeve to the hub before sliding off and removing the rollers and springs (19 & 18).

10. Free the dual taper roller bearing from the rear end of the shaft using a pin punch and press.

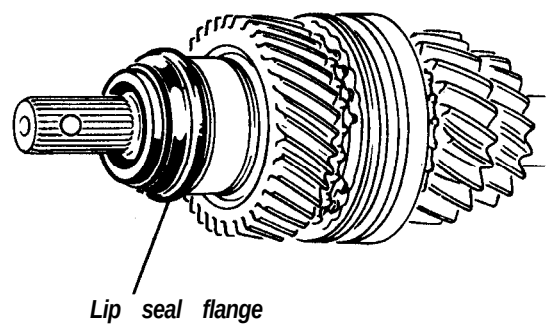
Check all components for excessive or uneven wear, and/or damage. Renew all circlips, roll pins, '0' rings and lip seals. If the contact area on the primary shaft for the lip seal is damaged replace the primary shaft. Check the lip seal contact area on the release bearing guide tube.

Primary Shaft Reassembly.

Reassemble in the reverse order to disassembly, taking care to align thebosses on the synchroniser rings with the slots in the hub,

Ensure the following are the correct way round:

- 3rd/4th speed synchro hub (identification groove to front).
- 3rd/4th synchro sliding gear (selector fork groove to front).
- 4th gear thrust washer (chamfered side toward bearing).
- Lip seal (locating flange to rear)



Lip seal flange

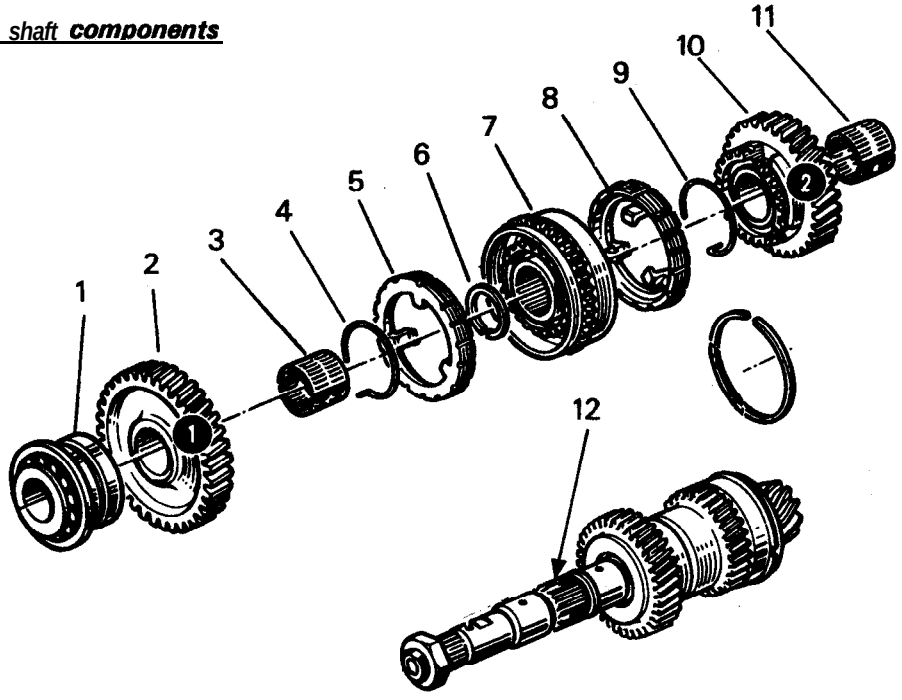
F73

FG. 14 • SECONDARY SHAFT • Disassembly

1. Place the shaft in a soft jawed vice and grip across the 4th speed gear.

2. Remove 1 st speed gear (2) and the double taper roller bearing (1), taking care to keep the bearing as an assembly, and not misplacing the spacer between the cones. Remove the needle roller bearing halves (3), and the 1st speed synchro ring (5).

Secondary** shaft **components

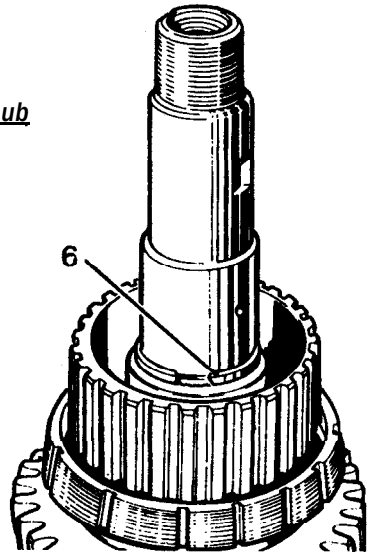


F74

3. Match mark the 1 st/2nd synchro hub and sliding gear

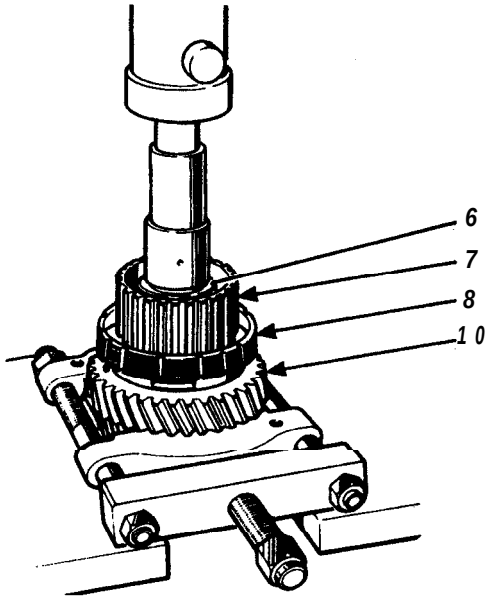
4. Remove and discard the circlip (6) retaining the synchro hub to the shaft.

1st/2nd syncro** hub **circlip



F75

1st/2nd** syncro & 2nd **gear removal



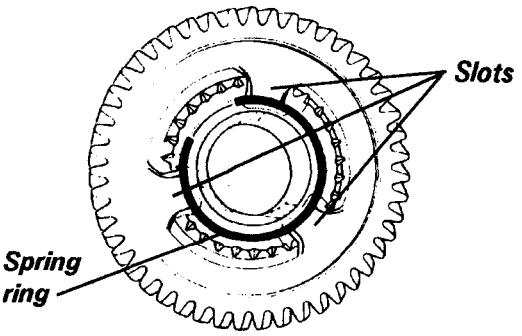
F76

5. Taking the load under the 2nd speed idle gear, extract 2nd gear (IO) and 1 st/2nd synchro assembly (7) using a press. Remove the needle bearing halves (11).

The 3rd and 4th gears and the front bearing are not removeable. If any one is damaged, a new secondary shaft and crown wheel (matched pair) must be fitted.

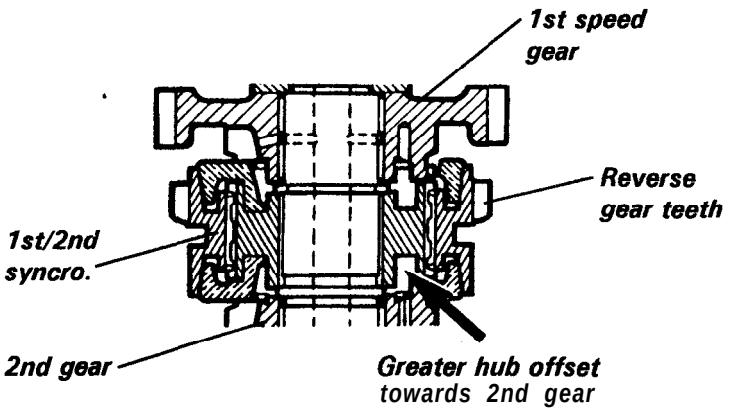
Secondary Shaft Reassemblv.

1. Fit the synchroniser spring to the 2nd speed gear so that it covers the 3 slots
2. Coat the 2nd speed gear needle bearing with transmission oil, and assemble the gear and bearings onto the shaft.
3. Fit the 2nd speed synchro ring onto 2nd gear.

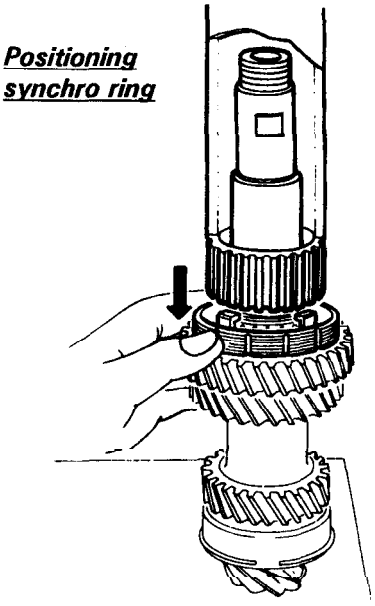


F77

4. Fit the 1 st/2nd synchro hub onto the shaft with the greater hub offset towards 2nd gear as shown, and press into position up to the shoulder on the shaft. **Ensure that the synchro ring is correctly centralised** with the lugs below the level of the locating shoulder, to avoid damaging the spring.

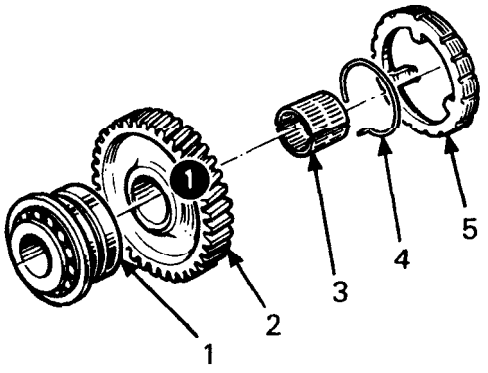


F78



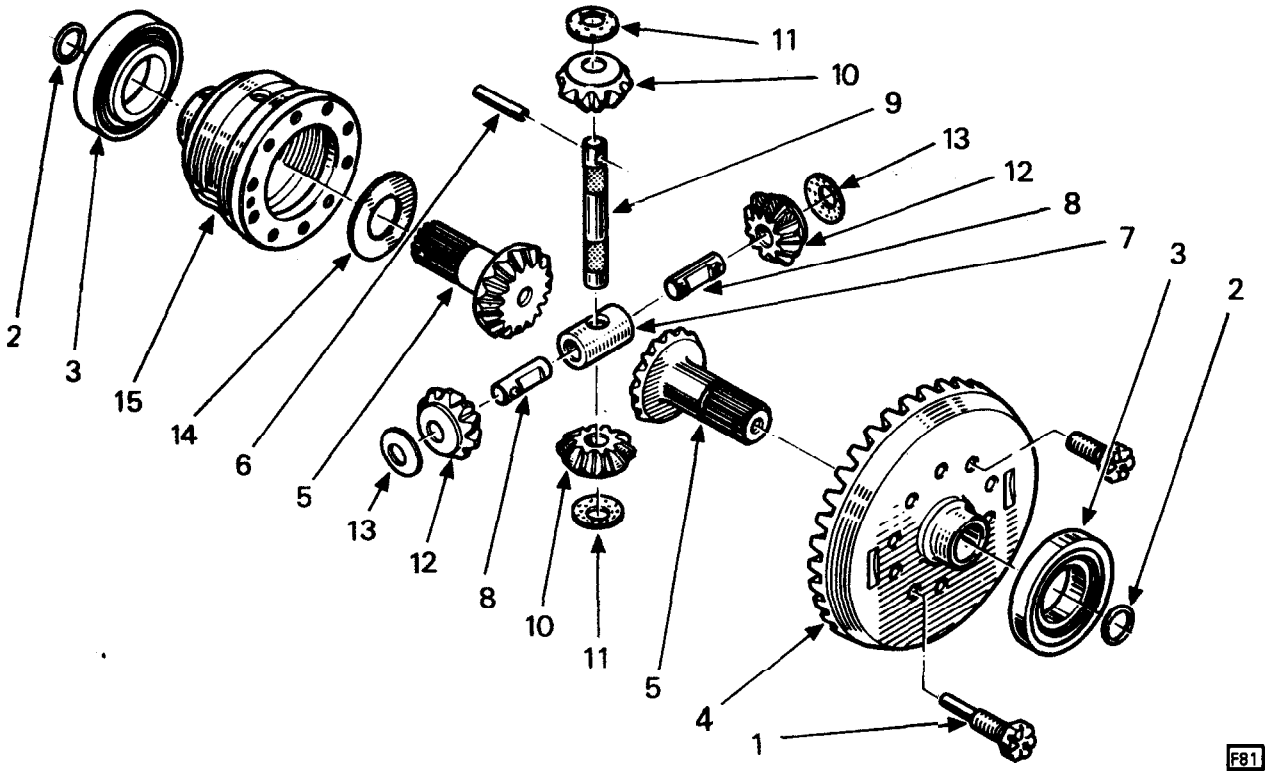
F79

5. Fit a new hub retaining circlip, and the synchroniser sliding gear with the match marks aligned (reverse gear teeth to the rear).
6. Fit the spring ring (4) into 1st speed gear (2), and assemble the synchro ring (5), needle bearing halves (3) (lubricated) and 1st gear (21 onto the shaft, ensuring that the synchro ring is correctly located.
7. Fit the double taper roller bearing ensuring that the spacer is placed between the cones.



F80

FG. 15 - BEVEL GEAR DIFFERENTIAL (S4) - Disassembly.

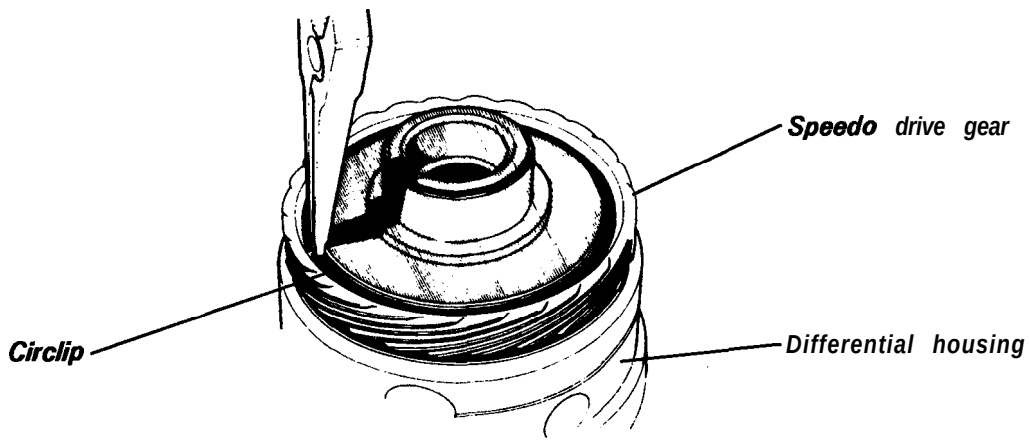


F81

1. Mark the differential bearings LH and RH. Remove and discard all but 2 diametrically opposite crown wheel bolts and use a suitable puller to remove the LH bearing (3) and shim washer (3a). Remove the RH bearing (3).

2. Remove and discard the '0' rings (2) from the sun wheel shafts (5).

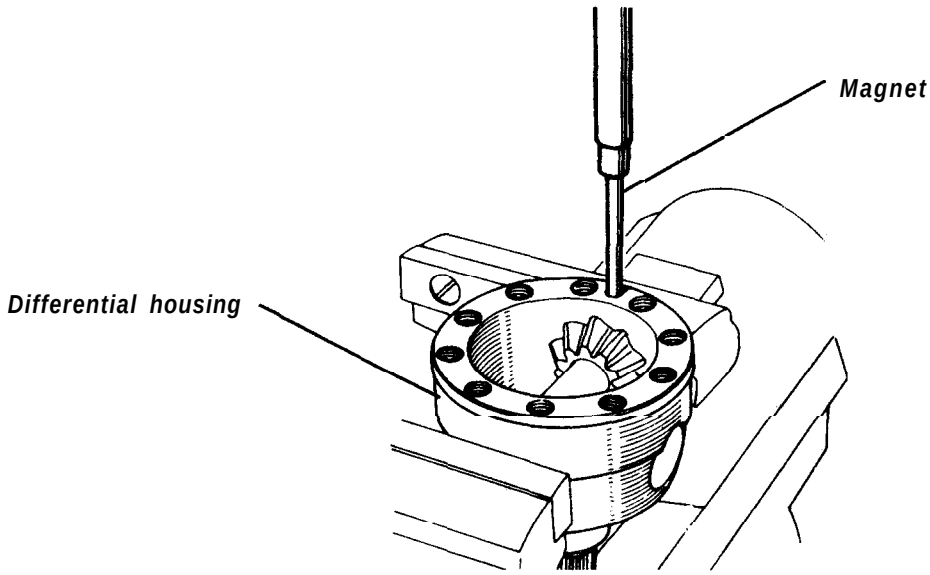
3. Remove the speedometer drive gear circlip and withdraw the worm gear from the differential housing,



F82

4, Remove the remaining 2 bolts and lift off the crown wheel from thedifferential housing

5. Lift out the planet wheel shaft pin (6) with a magnet.



F83

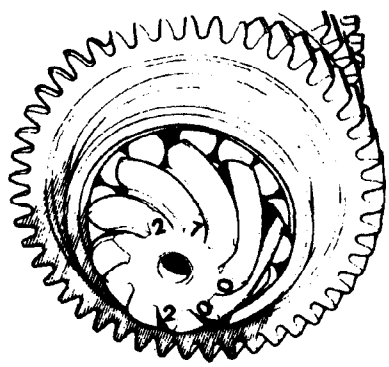
6. Separate the internal components and examine for uneven/excessive wear or damage. Inspect:
   - the gear teeth
   - the bearing surfaces
   - the thrust washers
   - the splines
   - the housing

7. Remove from the two casing halves, the outer races for the differential bearing taper roller bearings using a press or bronze drift.

Crownwheel and Pinion Matching

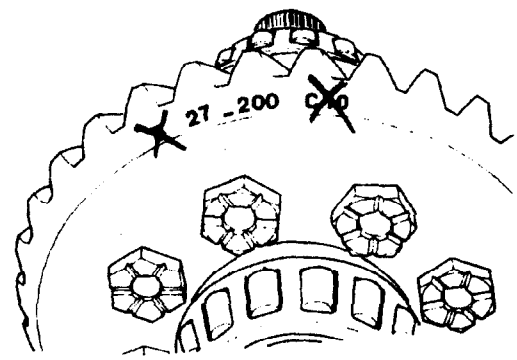
The crown wheel and pinion are matched during manufacture and carry a common reference number, **e.g. 27-200 (27th gear set machined on 200th day of the year).** The gears are replaceable only as a matched set. The pinion depth is not adjustable, but the crownwheel and pinion backlash is adjusted via a shim washer between the crownwheel and its taper roller bearing (see later).

Pinion marking



F84

Crown wheel marking



F85

Differential Re-assemblv.

Immerse all parts in gearbox oil before re-assembly. Take care not to mix up the outer races for the taper roller bearings.

1. Place in the housing in the following order:
   - the steel washer (14)
   - one of the sun wheels (5)
   - two of the planet wheels (12) with their thrust washers (13).

2. Insert the two short planet wheel shafts (6) until they are just flush with the planet wheels but do not project beyond them.

3. Fit the remaining two planet wheels (10) and their thrust washers (11); and insert the longer shaft (9) through one planet wheel, through the connecting sleeve (7), and into the other planet wheel. Retain the shaft with pin (6).

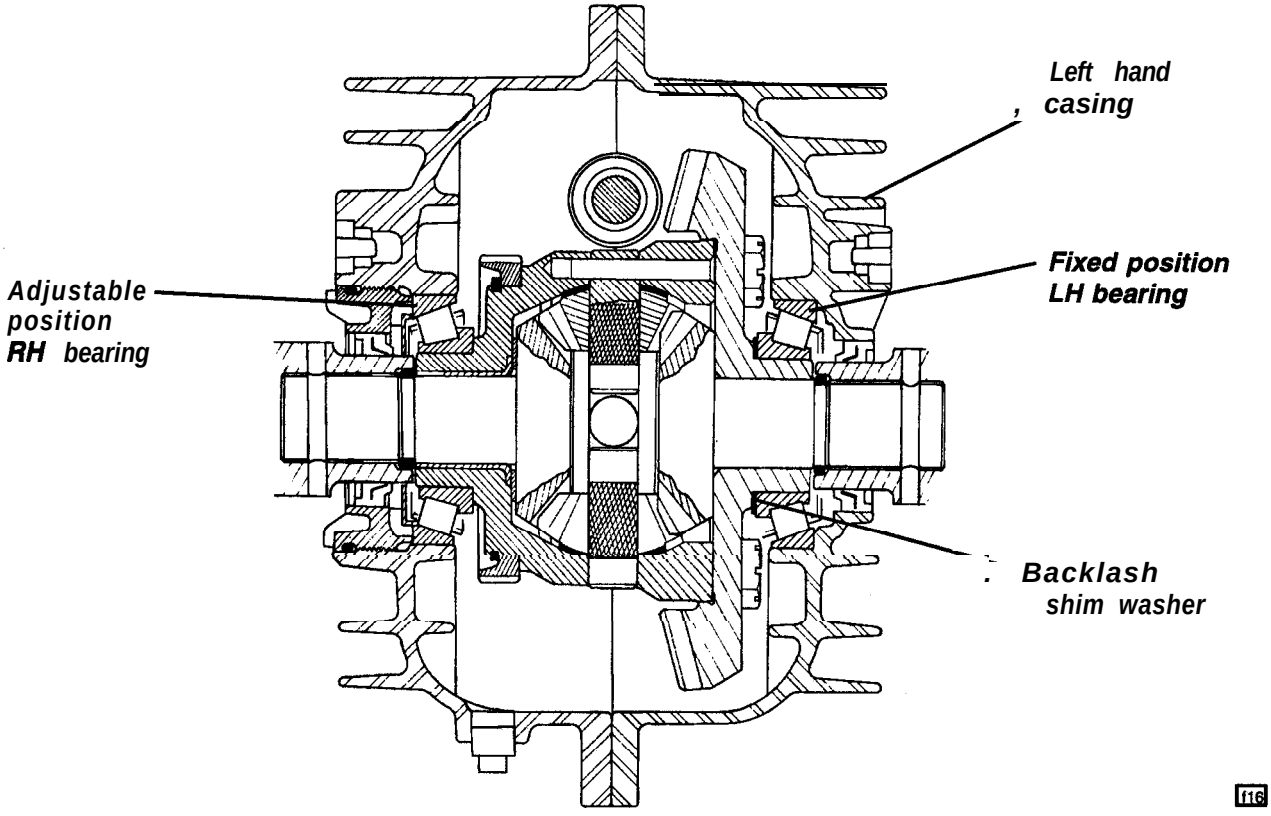
4. Push the 2 shorter shafts (6) fully home into the sleeve, aligning their locating holes with those on the housing.

5. Fit the second sun wheel (5) into the crown wheel, and fasten the crownwheelto the differential housing using new self locking bolts. The two spigot bolts are used to locate the short planet wheel shafts.

6. Torque tighten the crownwheel bolts to 155 - 165 Nm (115 - 135 lbf.ft).

7. Crownwheel and Pinion Backlash:
   The crownwheel is fitted on the left hand side of the pinion, and the distance between it and the taper roller bearing fitted in a fixed position in the left hand casing, determines the backlash between the spiral bevel gears. The procedure for measuring the backlash (0.1 - 0.2 mm) is detailed in sub-section FG.19. New gear sets are supplied with a backlash shim washer as determined by Renault using a setting jig. Discard any old shim washers.

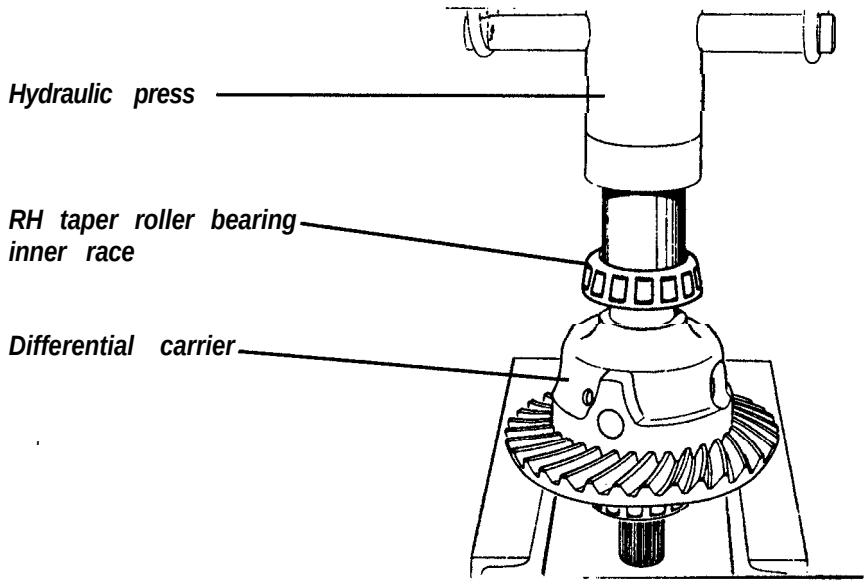
Looking rearwards onto transmission assembly



8. Fit the backlash shim washer onto the crownwheel bearing spigot before pressing the LH taper roller bearing inner race into position.

9. Press the RH taper roller bearing inner race into position on the differential carrier spigot.

Fitting RH bearing onto differential carrier



f88

10. Fit new '0' rings to the sun wheel shafts.

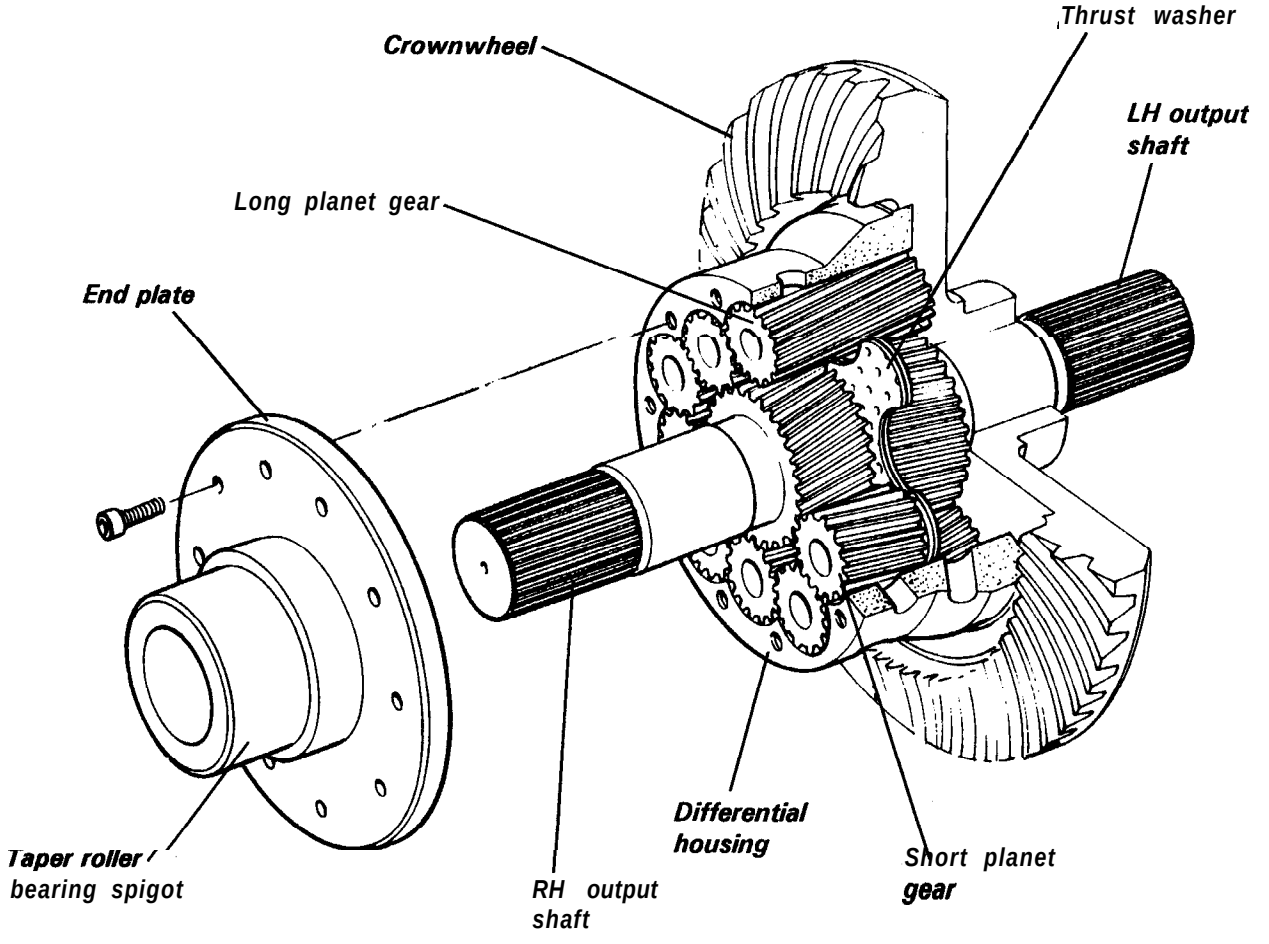
11. If applicable, refit the speedo worm drive gear onto the diff. carrier, and retain with a new circlip.

12. Press the differential LH taper roller bearing outer race into the LH casing until bottomed in its recess. Press the RH outer race into its location to a position slightly back from the inside face of the casing; its final position is determined by the adjustment procedure for the differential bearings (see FG.19).

FG. 16 - LOTUS COMPACT TORQUE BIASING DIFFERENTIAL (Sport 300)

The Lotus Compact Torque Biasing differential uses a helical spur gear train to transmit torque between the two output shafts, in place of the conventional bevel gear differential.

The two output shaft sun gears are of different diameters to enable five pairs of (long and short) intermeshing planet gears to provide a reversing drive path between the two output shafts. The planet gears are not located on spindles, but are contained in hardened pockets in the differential housing. Under balanced conditions, when the housing is turned by the final drive crownwheel (as in the conventional transmission), torque is transmitted to the two output shaft sun gears without the planet gears turning relative to the housing. When cornering, the speed differential between the two output shafts is accommodated by the planet gear train transmitting the relative motion between the shafts. If, however, one wheel should lose traction, the torque transmitted through this gear train causes the planet gears to be forced (by the gear separating forces) against the walls of their pockets, whilst the helical tooth angle also causes the sun and planet gears to be forced either against the sides of the housing or against each other. This frictional force rises quickly with the input torque or the difference in output resistance, and acts to transfer torque from the higher speed output to the lower speed output, thus limiting the degree of 'slip'.



F46

The Lotus Compact differential assembly uses the same crownwheel and taper roller output shaft bearings as the bevel gear differential, and fits in the same space. It may be fitted in place of the 4-bevel gear differential on any electronic speedo '95 M.Y. Esprit S4; cars earlier than the S4 use a cable type mechanical speedometer for which there is no drive gear provision on the Lotus differential. The original final drive crownwheel is transferred to the Lotus diff. casing, and the original output shaft taper roller bearings may be re-used.

To fit Lotus Compact Differential in place of 4-bevel gear differential

Tools Reauired

Bearing Adjuster Wrench	T000T0679F
Adaptor, bearing adjuster wrench	T000T0680F
Slim 21 mm Socket Spanner	
Spring Balance/Force Meter (up to 100 Newtons)	

Tools Preferred

Gearbox Support Plate	T000T0682F
Outer Race 'Drift	P691.4703.901
Inner Race Press Tool	P691.4703.902
Driveshaft Roll Pin Punch Set	T000T0678F

Parts Reauired

Lotus Compact Differential	P691.4703.800EF	
Bolt, crownwheel to differential body	A082F6492F	10 off
'0' Ring, output shaft	A082F6494F	2 off
Gasket, rear cover	A082F6403F	
Gasket, clutch housing	A082F6404F	
Bearing, taper roller, differential carrier (if required)	A082F6493F	
Loctite 5 18 Jointing Compound	A082F6514V	
Loctite 'Chisel' (removes cured 518)	A082F6517V	
Thixo Sealant	A082F6500F	
Lotite Al 31, thread lock	A9 12FE7034V	
Castrol TAF-X 75W/90	A082F6552S	3 litres

Procedure

1. Remove the transmission from the car - refer to sub-section FG.lO.

2. Remove the clutch housing and split the gearbox main case to gain access to the differential - follow sub-section FG. 12 with the following amendments:
   - There is no need to withdraw either of the fifth gears from their shafts, but the bolts securing the secondary shaft bearing retaining plate must be removed.
   - After separating the main case halves, lift out the differential assembly.
   - The primary and secondary shafts must also be removed in order for the differential bearing preload to be correctly set. Raise the secondary shaft slightly, and lift out the primary shaft, working the 5th gear around the selector. Pull out the 5th gear selector fork (note the orientation), and finally lift out the secondary shaft assembly.

3. Remove the 10 bolts securing the crownwheel to the differential, and discard the bolts and differential. **Clean and retain the crownwheel and taper roller bearing assembly. If the bearing is** unserviceable, use a suitable puller to withdraw the bearing inner assembly from the crownwheel spigot, and any shim washers behind the bearing, and press out the outer race from the main casing left hand half.
   If a new crownwheel and/or LH taper roller bearing is to be used, refer to sub-section FG. 15 to select the correct backlash shim washer to be fitted onto the crownwheel spigot prior to the bearing.

4. Fit the crownwheel onto the new differential body (P691.4703.001) using new bolts A082F6492F **with oiled threads and seats. Torque tighten the bolts using a slim 21 mm socket to clear the** bearing rollers:
   Stage 1; 75 Nm
   Stage 2; 170 Nm

5. If the original RH diff. bearing is to be retained, use a suitable puller to withdraw the inner bearing assembly from the diff. housing. If a new bearing (A082F6493F) is to be used, ensure that the outer race in the RH gearbox casing is renewed. **Using tool P691.4703.902, press the inner bearing** assembly onto the Lotus diff. end cover (P691.4703.002).

6. immerse the differential gears and thrust washers in transmission oil (Castrol 'TAF-X') before assembling into the differential body in the following order:

Description	Part Number
Sun Gear (output shaft) - large	P691.4703.004
Planet Gear - long	P691.4703.005
Thrust Washer*	P691.4703.008 x 2
Planet Gear - short	P691.4703.006
Sun Gear (output shaft) - small	P691.4703.003

* Fit the thrust washers back to back with the thrust faces (dimpled) towards the gears.

7. Bolt the cover to the body using 10 bolts (SC.06.016) with Loctite A131 applied to the threads, and torque tighten to 15 Nm. Check for smooth rotation of diff. internals.

8. Fit new 'O' rings (A082F6494F) onto the output shafts.

9. Before final assembly, the differential bearing preload must be checked and adjusted without the primary and secondary shafts fitted. Follow the procedure detailed in sub-section FG. 19 with the following notes:
Main case fixing torques:
M8; 25 Nm (18.5 lbf.ft)
M10; 50 Nm (37.0 lbf.ft)
M12; 98 Nm (72.0 lbf.ft)

10. Reflt the transmission referring to sub-section FG. 10, and fill to the correct level with Castrol TAF-X 75W/90 (A082F6552S).

FG.17 - REVERSE IDLER GEAR

On the UN1 type 027 and 028 transmissions (V8 and later GT3), the reverse idler gear incorporates a conical brake mechanism in order to ensure that the input shaft gear train is stationary before the idler gear is slid into engagement. The system is designed to operate only with the vehicle at a complete standstill, and requires that the gear lever be lightly loaded for a short period in order to allow time for the braking of the gear train to take effect.

Operation is as follows:

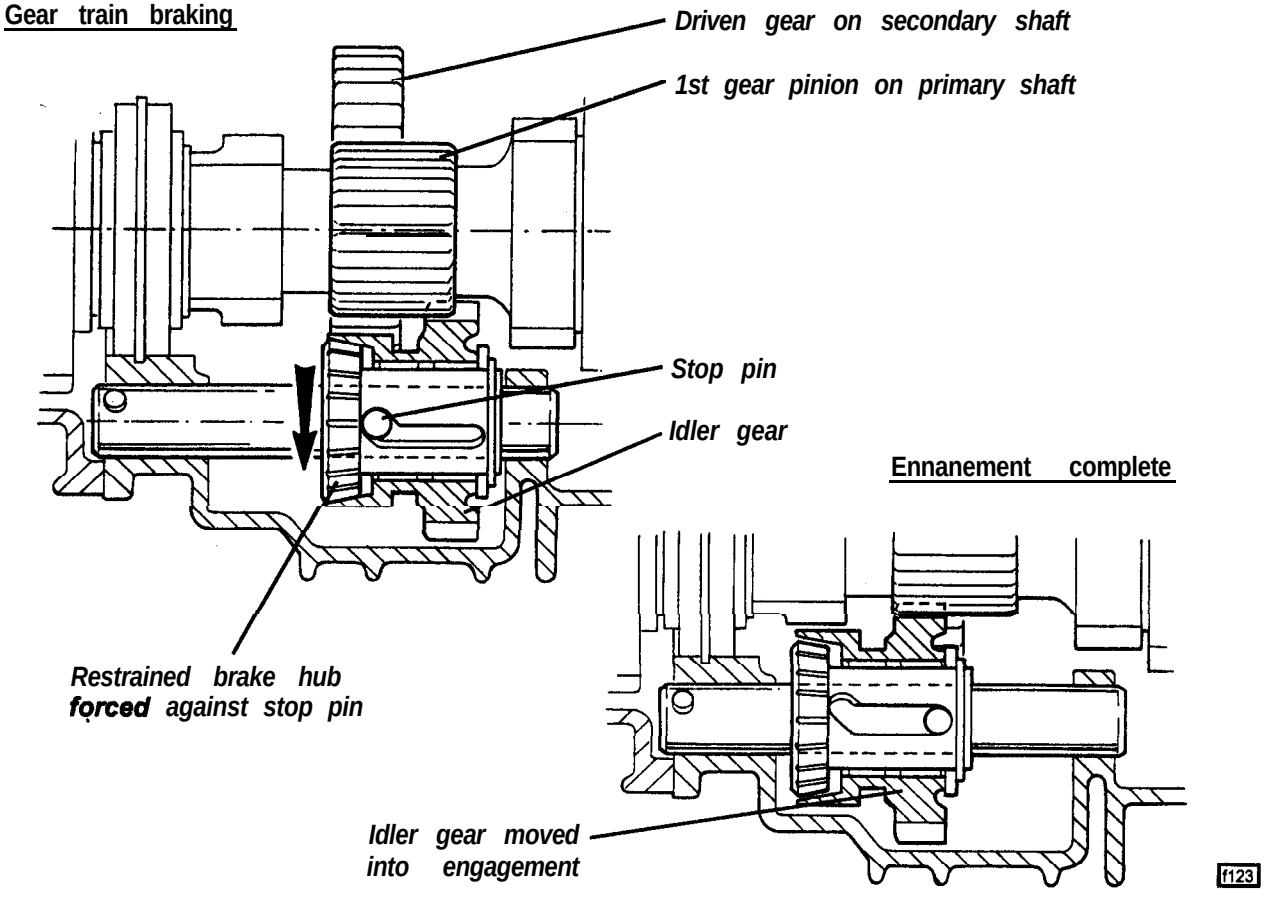
The idler gear shaft is fixed into the case via a roll pin at its rear end.

The cone brake hub is able to slide axially along the shaft, but is prevented from rotating by a stop pin in the shaft, which locates in a slot in the brake hub.

The idler gear is free to rotate on the cone brake hub, and is constantly in mesh with a gear on the input shaft. Reverse gear is obtained when this gear is slid to engage also with a gear machined on the outside of the 1st/2nd synchroniser, which is splined to the output shaft.

When the vehicle is stationary, the output shaft, being directly linked to the wheels, is also stationary. In neutral, with the clutch engaged, the input shaft rotates at engine speed. When the clutch is disengaged, the input shaft and associated geartrain continues to rotate under its own inertia for a period, exacerbated by clutch windage. Before the idler gear can be quietly engaged with the output shaft, the input shaft must be brought to a halt.

As the reverse gear fork slides the idler gear rearwards, the idler gear, rotating with the input shaft, is mated with the cone of the stationary brake hub. The inertia of the gear train tries to rotate the hub and forces the dog leg in the hub slot against the stop pin in the shaft, preventing the hub from sliding rear-wards. Only when the input shaft is brought to a halt and there is no longer any rotational inertia, can the hub be slid rearwards (causing it to turn a small amount 'backwards' as it disengages the slot dogleg from the stop pin) to engage the idler gear with the output shaft gear.

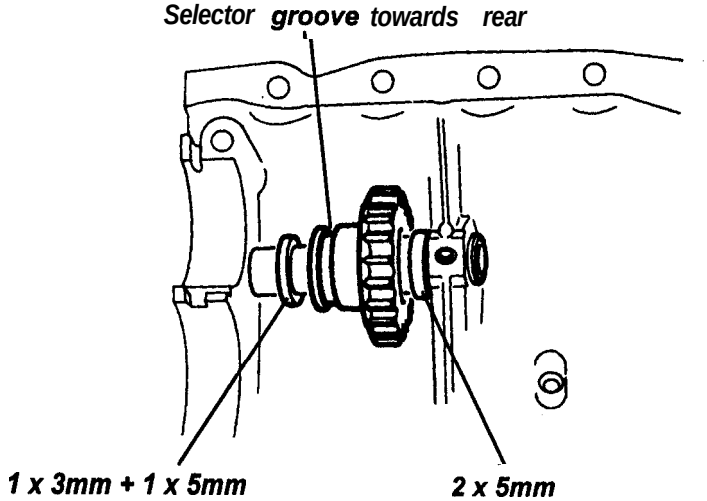


The idler gear is located in the left hand case half. With the casings separated, the shaft may be withdrawn rear-wards to release the reverse idler gear components. Note that the idler gear bushes are not serviced separately.

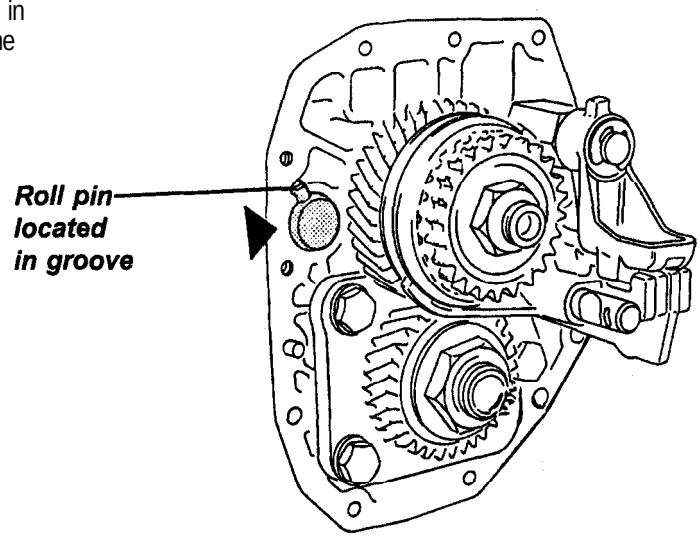
When re-assembling the reverse idler shaft, note the following:

- If necessary, replace the shaft locating roll pin using tool TOOOT0678. The new roll pin must not protrude more than 5mm.

Insert the shaft from the rear, ensuring that, on UN1 -026 types, the idler gear orientation and friction washer fitment are as shown in the illustration.



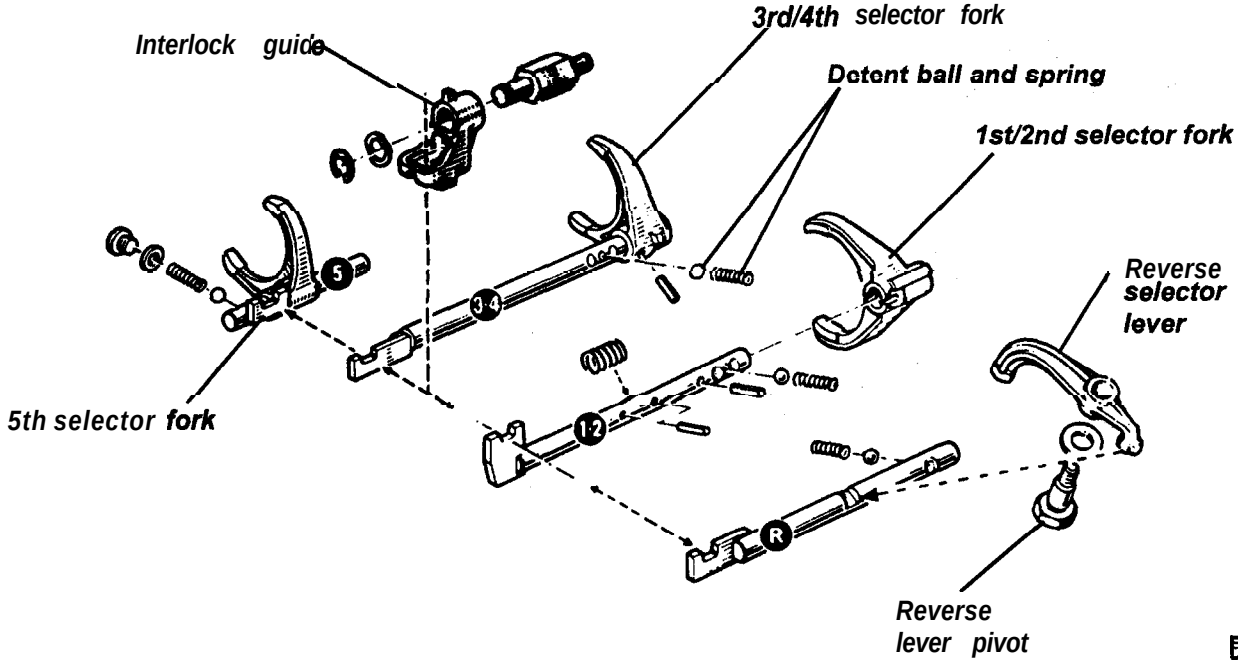
Ensure the roll pin locates in the groove machined in the case.



F91

FG.18 - GEAR SELECTOR FORKS & SHAFTS

1st/2nd, 3rd/4th and reverse selector shafts and forks, are located within the gearbox in the RH casing. 5th selector shaft and fork are located within the rear housing, together with the interlock guide.



F92

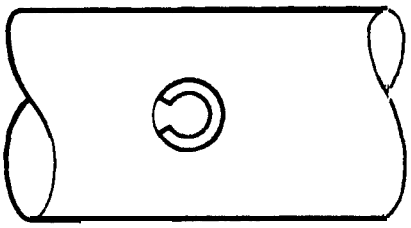
Disassemblv.

1. Unscrew the reverse light switch.
2. Ensure the selector shafts are in the neutral **postion**.
3. Using TOOOT0878 and a 4mm punch, drive out the roll pins from the **1st/2nd** and **3rd/4th** **selector shafts.** Withdraw the shafts.
4. Retrieve the detent balls and springs
5. Unscrew the reverse selector lever pivot bolt and remove the selector and shaft.

6. Using a 5mm punch drive out the 5th selector fork roll pin and slide the fork off the shaft

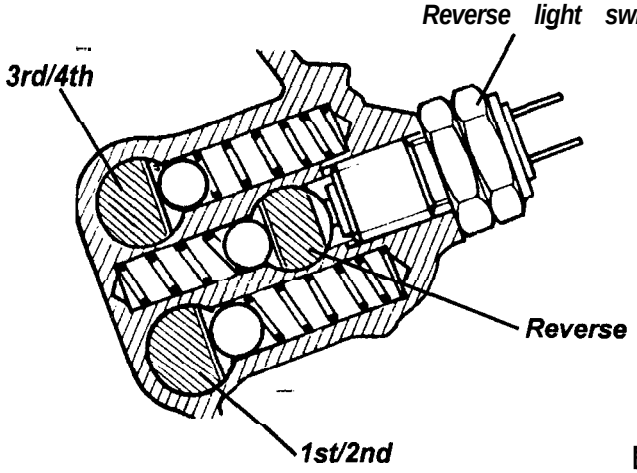
Re-assembly is in the reverse order to disassembly. Note that all roll pins should be oreintated with the slots along the selector shaft.

Orientation of selector fork roll pins



F93

Selector shaft detents



F94

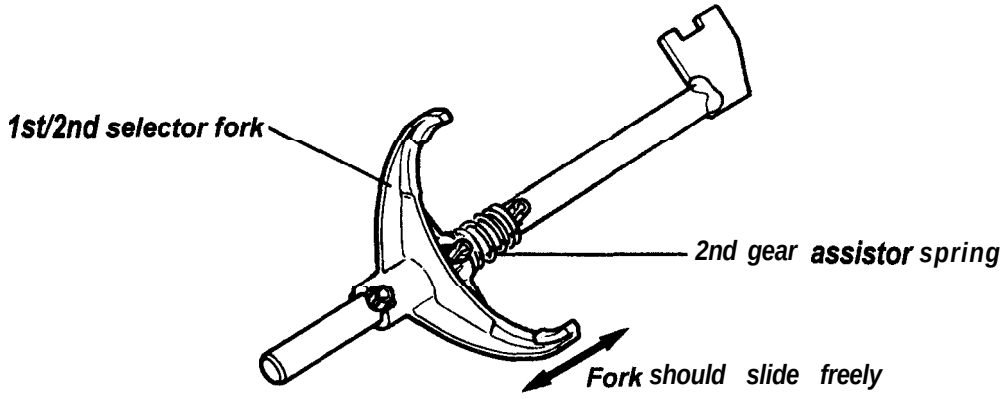
1. Fit the detent ball and spring and insert the reverse shaft.

2. Fit the reverse selector lever, locating the lever end into the slot on the shaft. Coat the threads of a new pivot bolt with Loctite 270 and torque tighten to 25 Nm (18.5 lbf.ft).

3. Fit the 3rd/4th detent ball and spring and selector shaft. Slide on the 3rd/4th fork and secure to the shaft using a new roll pin.

4. Fit the detent ball and spring for the 1st/2nd selector shaft whilst fitting the shaft. Fit the 1st/2nd speed fork and spring.

Important. 2nd speed synchronrsation assistance: When refitting the 1st/2nd selector fork to the shaft it is essential that;
- the selector fork and assistor spring are correctly orientated.
- the roll pins do not project above the spring coils.
- the fork slides freely on the shaft.



F95

5. Coat the threads of the reverse light switch with THIXO (A082F6500) before refitting and tightening to 25 Nm (18.5 lbf.ft).

FG.19 - TRANSMISSION RE-ASSEMBLY

Checking/Adjusting the Differential Preload

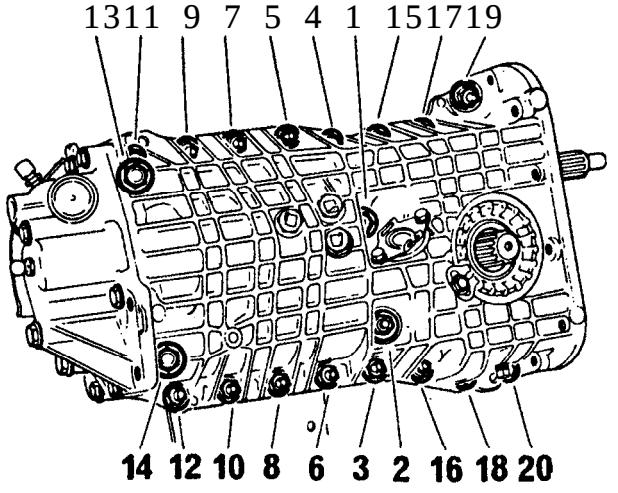
Before the transmission is finally re-assembled for installation in the vehicle the differential bearing preload **must** be checked and, if necessary, adjusted.

Proceed as follows:

Leaving out the primary and secondary shafts, fit the differential to the RH case half. Fit the LH case half and fasten the two halves together, noting that the curve of the washer is towards the bolt/nut. Fit the end cover and tighten all bolts to their correct torque in the order shown.

M8 casing fixings:	25 Nm (18.5 lbf.ft)
M10 casing fixings:	50 Nm (37 lbf.ft)
Ml 2 casing fixings:	98 Nm (72 lbf.ft)
Rear housing fixings:	25 Nm (18.5 lbf.ft)

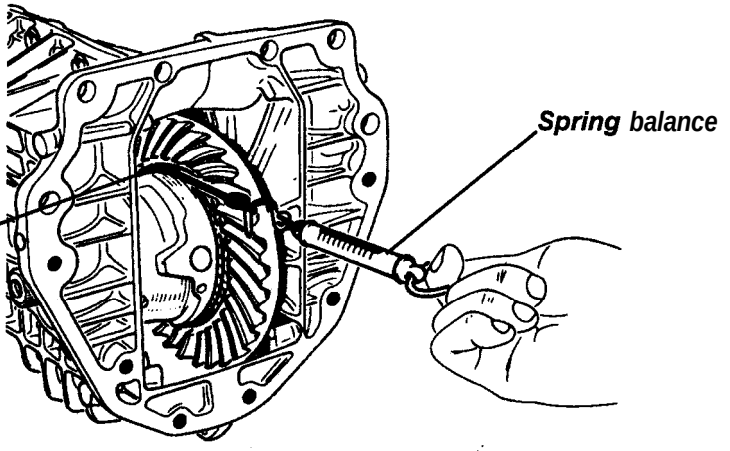
Main case TIGHTENING sequence



F96

1. a) If the original differential bearings and crownwheel and pinion are refitted, tighten the nut (using tool T000T0679/0680) to the reference mark and ensure the differential rotates freely without any bearing free play.

   b) If new bearings and/or crownwheel and pinion are fitted, screw in the nut until the differential is slightly stiff to rotate. Then check the preload as follows:
   - Turn the differential several times to centralise the bearings.
   - Wind a piece of cord around the differential housing.
   - Pull on the cord using a spring balance, and read the balance whilst the differential is turning. The reading should be between 35 and 40 N (8 - 9 lbf).



F97

- Adjust the nut as required and recheck until the reading is correct.

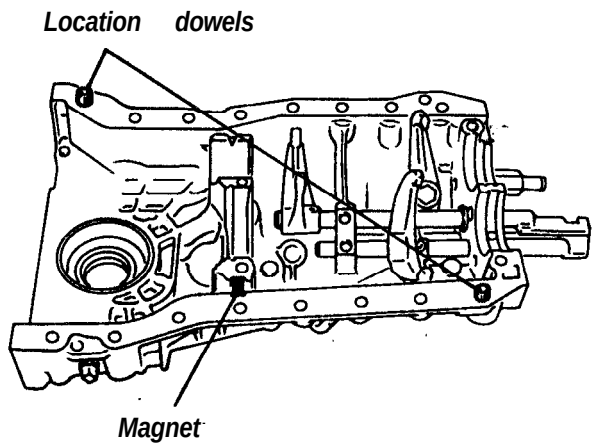
2. In both cases [(a) and (b)] match mark the nut and case.

3. Loosen the nut by one turn, separate the case halves. and remove the differential.

Gearbox Re-assembly.

1. Clean the mating faces of the main case halves with Loctite 'Chisel' (A082F6517) to remove all traces of Loctite '518'.

2. Ensure the following are correctly positioned in the RH casing:
   - the two locating dowels
   - the magnet in its location
   - the 1st/2nd, 3rd/4th, and reverse selector shafts in the neutral position.



f69

3. Fit the primary shaft into position ensuring that the rear bearing location ring and the lip seal metal cap fit into the grooves machined in the case, and that the 3rd/4th selector fork engages the sliding gear groove.

4. Fit the secondary shaft ensuring that the pinion bearing locating ring fits into the machined groove, and that the 1st/2nd selector fork engages in the sliding gear groove.

5. Fit the differential assembly.

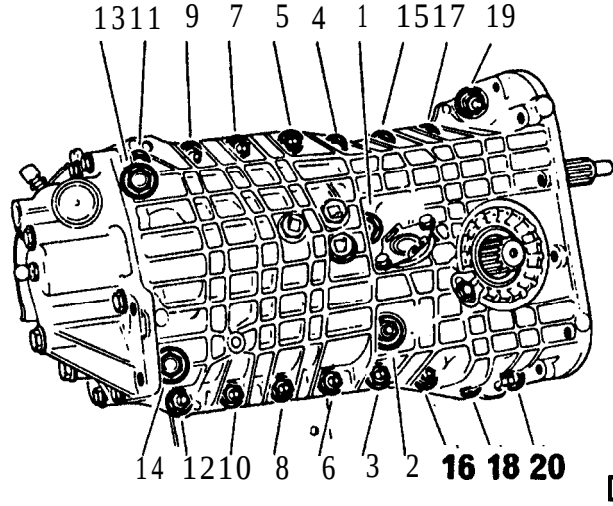
6. On the LH casing, position the reverse idler gear at the front end of its shaft.

7. Coat the mating surfaces of the casings with Loctite'518' (A082F6514) and place the LH casing in position.

8 Fit the LH case half and fasten the two halves together, noting that the curve of the washer is towards the bolt/nut. Fit the end cover and tighten all bolts to their correct torque in the order shown.

M8 casing fixings:	25 Nm (18.5 lbf.ft)
Ml 0 casing fixings:	50 Nm (37 lbf.ft)
Ml 2 casing fixings:	98 Nm (72 lbf.ft)
Rear housing fixings:	25 Nm (18.5 lbf.ft)

Main case TIGHTENING sequence



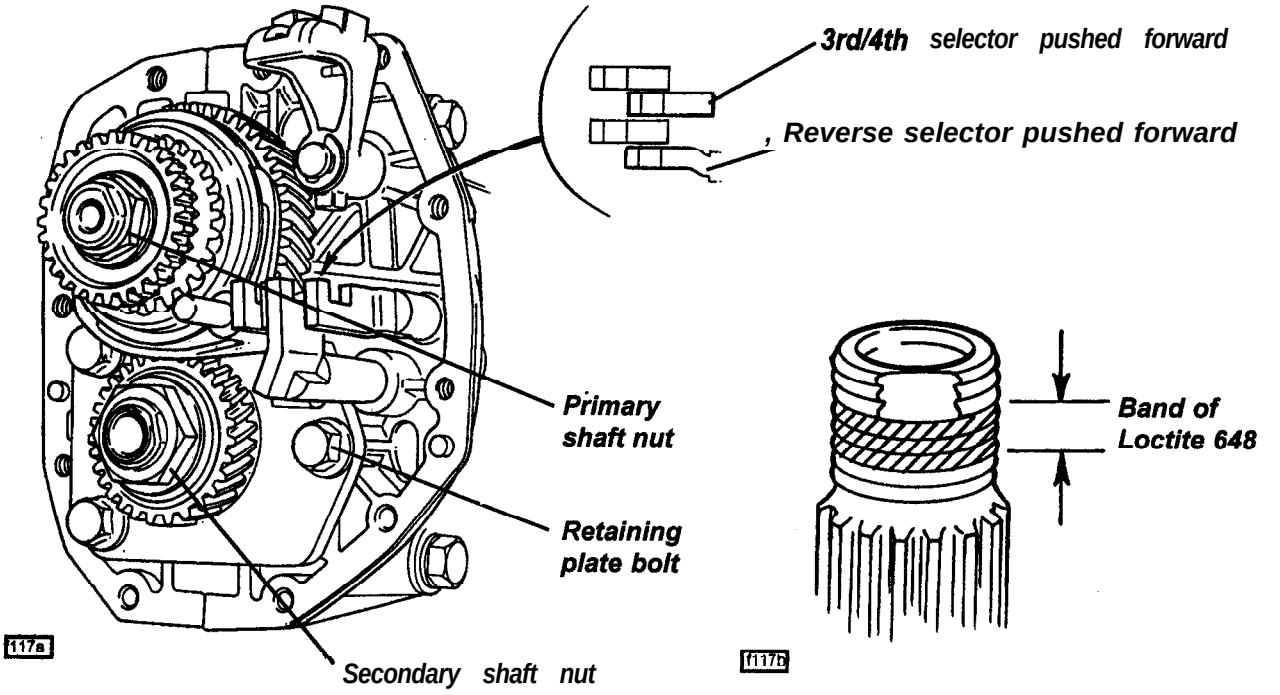
f96

9. Fit the bearing retainer plate and tighten the bolts to 65 Nm (48 lbf.ft).

10. On the secondary shaft apply 3 drops of Loctite '648' (A082F6516) to the splines and fit the fixed gear and belleville washer.

11. Fit the following to the primary shaft: 5th gear thrust washer; needle bearing sleeve; needle bearing halves; 5th speed drive gear complete with synchro sleeve, selector fork and shaft.

12. Apply 3 drops of Loctite 648 (A082F6516) to the splines of the primary shaft. Fit the bosses on the 5th synchroniser ring into the slots in the hub before fitting the 5th speed dog and the spring washer.

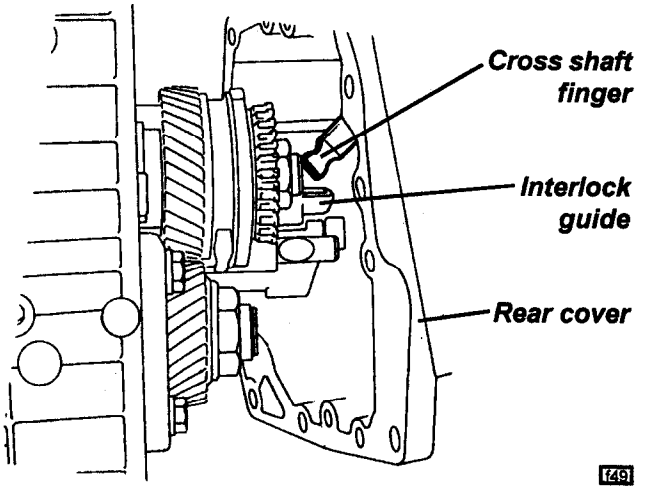


13. Lock the transmission by swinging the interlock guide aside and selecting 4th and reverse gears as shown. Clean the threads on both shafts using a brass brush and degrease with acetone. Apply a continuous bead of Loctite 648 (A082F6516F) around each shaft thread over a width of 2/3 threads just beyond the machined flat. Fit both nuts, and tighten to:
Primary shaft nut; 135 Nm (100 lbf.ft)
Secondary shaft nut; 250 Nm (185 lbf.ft)
Stake both the nuts to their shafts.

14. Return the selectors to the neutral position and check that all gears engage correctly.

15. Fit a new rear housing paper gasket.

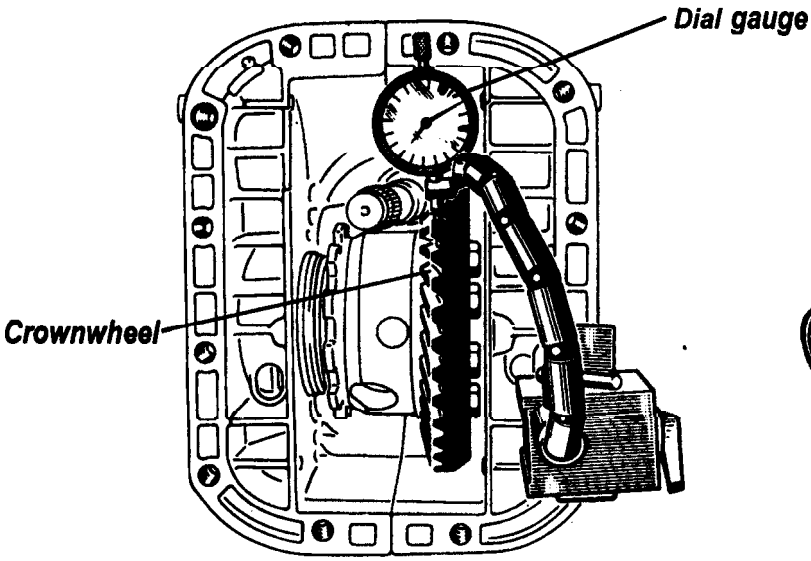
16. With the gears in neutral refit the rear housing ensuring that the cross-shaft selector lever engages in the interlock guide.



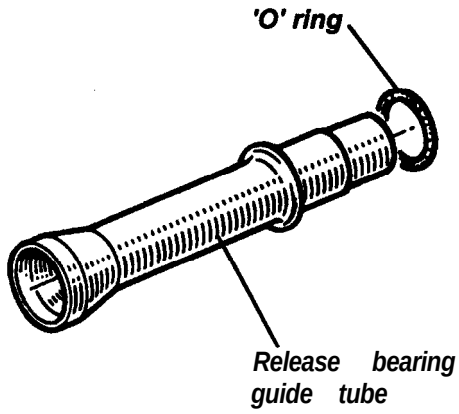
17. Refit the bolts and tighten to the specified torque: 25 Nm (18.5 lbf.ft).

18. Fit the 5th speed detent ball and spring, and retain with the plug after applying THIXO (A082F6500) to the thread.

19. Check the crownwheel backlash at 3 points 120° apart.
Specification: 0.1 - 0.2 mm (0.004 - 0.008 in).
If out of specification, refer to Sub-Section FG.15.



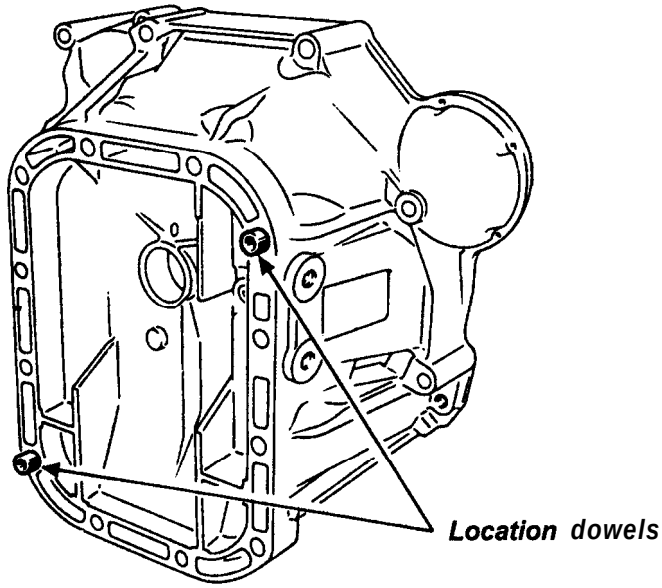
F98



F99

20. Fit a new 'O' ring to the release bearing guide tube, lubricate the lip seal contact surface and refit carefully, ensuring the drain hole in the tube points downwards.

21. Ensure the clutch housing location dowels are in place.



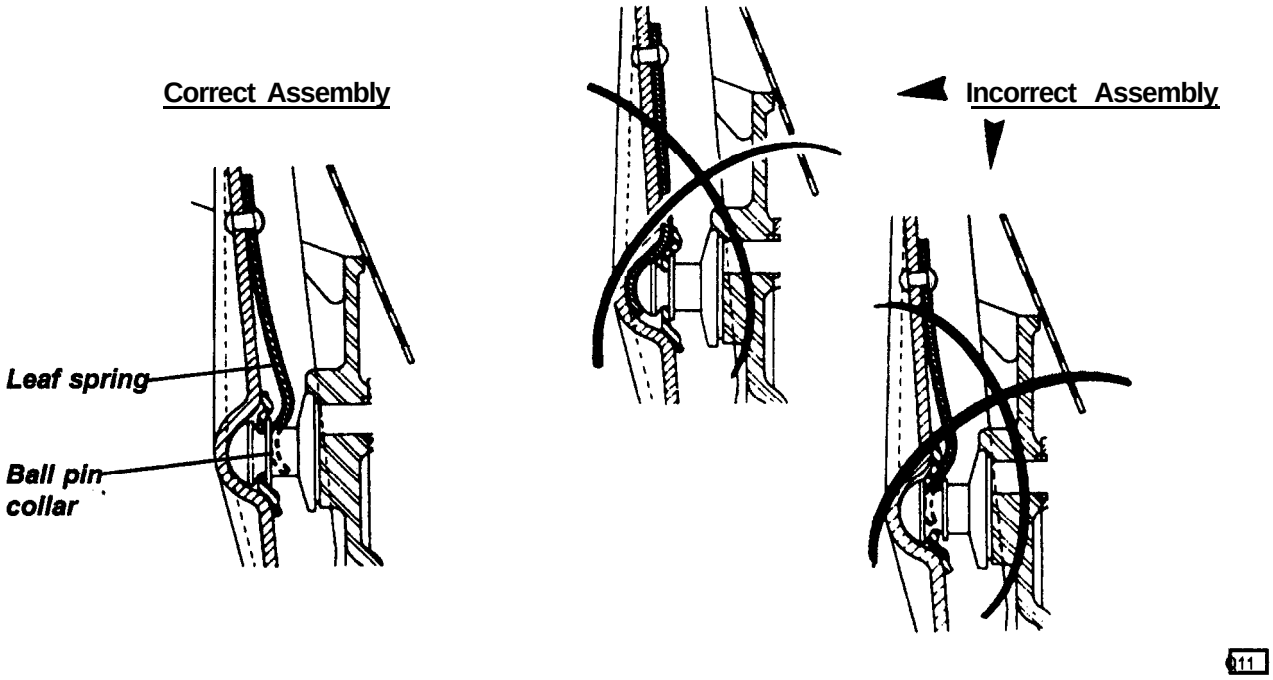
F100

22. Fit a new paper gasket (hold in place with petroleum jelly).

23. Fit the clutch housing and tighten the bolts to 50 Nm (37 lbf.ft).

24. Using T000T0679/0680 retighten the differential nut until the match marks are aligned, and lock the nut with the locking plate.

25. Use molybdenum disulphide lithium base grease (NLGI No.2) to lubricate sparingly the contact points of the clutch release mechanism.



26. On four cylinder cars, fit the release fork onto the pivot ball ensuring that the fingers of the leaf spring are engaged behind the pivot ball collar as shown in the diagram. Slide the release bearing onto the guide tube with the lamer lug uppermost and engage with the release fork.

27. Before removing the gearbox from its support plate check the clutch housing locating dowels are in place.

TIGHTENING TORQUES (Nm)

Nut on primary shaft	135
Nut on secondary shaft	250
8mm housing bolts	25
10mm housing bolts	50
12mm housing bolts	98
Bearing retaining plate bolts	50
Rear housing bolts	25
Screwed plugs	25
Reverse light switch	25
Locking rocker shaft	35
Locking ball plugs	17
Level and drain plugs	25
Clutch housing bolts	50

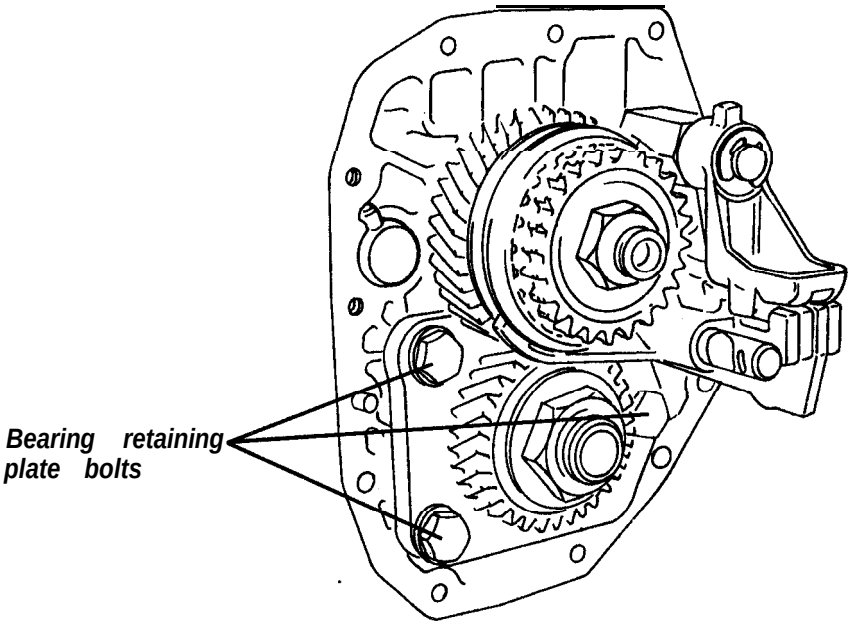
FG.20 • PRIMARY SHAFT INPUT OIL SEAL REPLACEMENT

If the primary shaft input oil seal is to be replaced, the transmission casings must be separated, as a flange on the seal locates in a groove in the casings. However, it is not necessary to completely dismantle the transmission. With the main shafts and selector mechanism left in position in the RH casing, there is sufficient movement available at the front end of the primary shaft to enable the seal to be replaced. Proceed as follows:

1. Remove the transmission from the vehicle (FG.IO).

2. Follow the procedure detailed in FG.12 to remove the clutch housing, and rear housing, but do not slacken the primary and secondary shaft nuts.

3. Remove the 3 bolts from the plate retaining the secondary shaft double taper roller bearing, and let the plate hang loose.



f101

4. Loosen and separate the main cases as detailed in sub-section FG.12.

5. With the LH case uppermost, separate the two halves of the main case. It may be necessary to use a plastic hammer to tap the mating faces apart as they are coated with Loctite 518. Place the LH casing aside.
With the 5th gear selector fork still fitted, it is not possible to remove the primary shaft assembly from the casing, but the following operations may be performed with the shaft 'in situ'.

8. Pull off the release bearing guide tube, and discard the 'O' ring seal.

7. Separate the clutch and primary shafts by driving out, and discarding, the connecting roll pin.

8. Pull the lip seal from its locating groove, and withdraw from the primary shaft. Clean and inspect the sealing surface on the primary shaft, and replace the shaft if necessary.

9. Re-assemble in reverse order to disassembly, referring to section FG.19.

WHEELS & TIRES

SECTION GE - ESPRIT MODEL '93 M.Y. Onwards.

EC.1 - WHEELS

Several wheel/tyre combinations have been fitted on cars since introduction of the '93 M.Y. S4 model: The model was introduced with 17" single piece Lotus styled wheels and Goodyear Eagle GS-A tyres, Sport 300 models used 3-piece O.Z. Futura wheels (16" fronts) and Eagle GS-C tyres. The Introduction of the '96 M.Y. S4S model saw the use of Sport 300 style wheels in 17" and 18" sizes front and rear with Michelin MXX3 tyres, whilst an option on USA S4S models used similarly styled wheels in the rtandard S4 sizes with the standard GS-A tyres. Note that the front wheel housings in the bodyshell were enlarged on both Sport 300 and non-USA S4S models to accommodate the larger wheel/tyre assemblies, and that this feature was carried over to S4 and USA S4S models in May '95.

The spigot diameter for the front wheels and hubs was changed for the S4 introduction, from 60 mm to 58 mm, with that fer the rear wheels remaining at 60 mm.

Wheel Specification

84

Wheel type		Single piece light alloy, Lotus styled, B-spoke, 5 bolt fixing.
Wheel size	= front	7J x 17
	= rear	8½J x 17
Inset	= front	+ 23.3 mm
	= rear	+ 30 mm
Wheel bolt thread length		25 mm
Wheel bolt torque		10 daNm (74 lbf.ft)

Non-USA 848

Wheel type		3-piece light alloy, O.Z. Futura, 5-spoke, 6 bolt fixing.
Wheel size	= front	8½J x 17
	= rear	10J x 18
Inset	= front	+ 19 mm
	= rear	+ 17 mm
Wheel bolt thread length		30 mm or 25 mm (see below)
Wheel bolt torque		10 daNm (74 lbf.ft)

USA 848

Wheel type	= standard	Single piece light alloy, Lotus styled, 5-spoke.
	= optional	3-piece light alloy, O.Z. Futura, 5-spoke.
Wheel size	= front	7J x 17
	= rear	8½J x 17
Inset	= front	t 23.3 mm
	= rear	+ 30 mm
Wheel bolt thread length		26 mm standard wheels; 30 mm optional wheels,
Wheel bolt torque		10 daNm (74 lbf.ft)

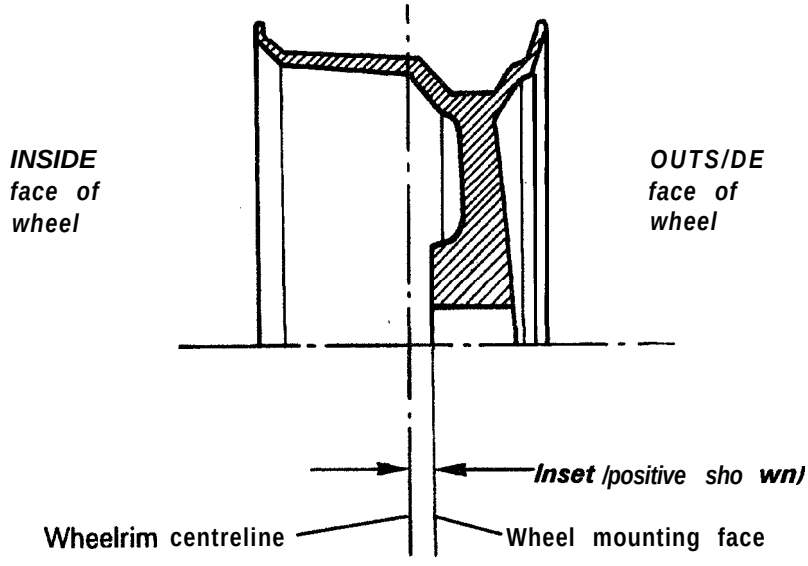
sport 300

Wheel type		3-piece light alloy, O.Z. Futura, 5-spoke, 5 bolt fixing.
Wheel size	- front	8½J x 16
	- rear	10½J x 17
Inset	- front	+ 20 mm
	- rear	+ 6 mm
Wheel bolt thread length		30 mm
Wheel bolt torque		10 daNm (74 lbf.ft)

All cars

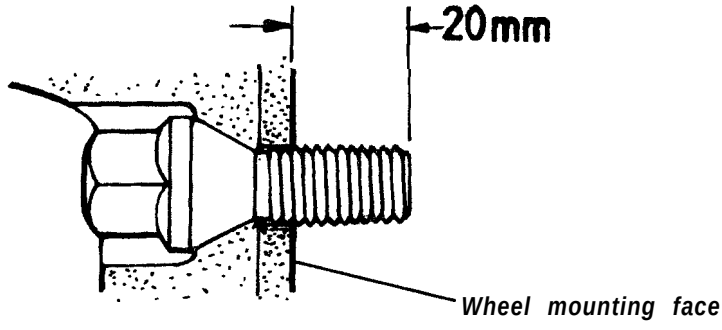
Radial run-out at bead seat	0.3 mm max.
Lateral run-out at rim flange	0.3 mm max.

Note that the inset figure is the offset of the wheelrim centreline reletive to the wheel/hub mounting face. A positive figure indicates that the wheelrim centreline lies inboard of the wheel mounting face, whereas a negative figure means the wheelrim centreline is outboard of the mounting face.



g02

Note that there are two lengths of wheelbolt; 25 mm thread length for the single piece S4 type wheels, and 30 mm for the 3-piece wheels fitted to other models. A running change to the non-USA 3-piece wheel enabled it to use the shorter 25 mm bolt. In all cases, the correct bolt may be identified by fitting a bolt into an unmounted wheel; the correct bolt will protrude 20mm from the wheel mounting face.



g13

Ensure that the correct bolts are fitted.

25 mm bolt: Lotus part number A082G6038F

30 mm bolt: Lotus part number P691.3401.610AS

Commonisation of Body Front Wheelhousings

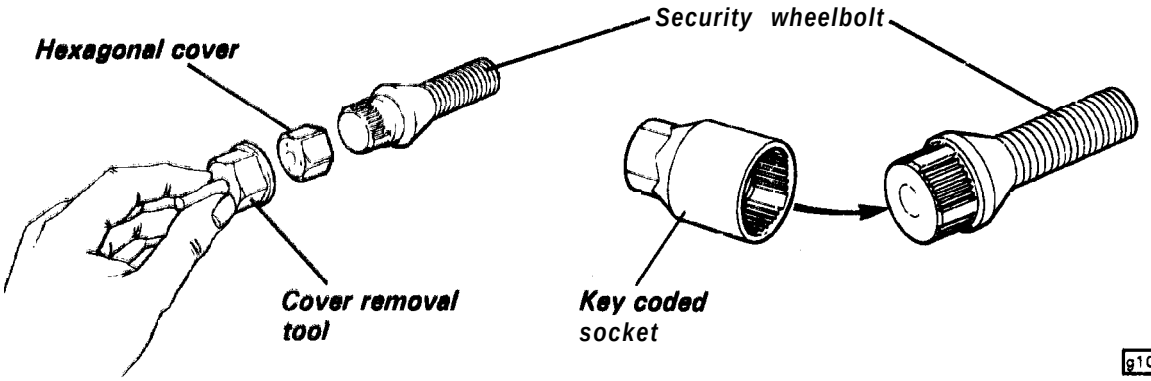
The body lower half moulding (undertray) of the non-USA S4S model, with larger front wheel housings, was commonised onto the S4 and USA S4S models at the following changepoint:

VIN S 2034 (S4, May '94)
s 3095 (USA S4S, May '94)

Security Keyed Wheel Bolts

Later S4 and non-USA S4S models are factory fitted with 'Tri-lock' security keyed wheel bolts. On these cars, one of the bolts securing each wheel is of a special key coded design requiring a matching key coded socket before it may be removed using the standard 19mm wheelbrace. The head of the coded bolt is capped by a hexagonal cover which may be removed using a tool stowed, together with the key coded socket, in the vehicle tool kit.

The key code number should be noted in the owner's handbook, and a record kept with the owner's vehicle documents. Replacement key sockets may be ordered, quoting the key number and providing suitable proof of vehicle ownership, from: Carflow Products (U.K.) Ltd., Chiltern Trading Estate, Grovebury



g14 g10

Road, Leighton Buzzard, Bedfordshire. LU7 8TU.

Security keyed wheel bolt kits under Lotus part number A082G6093F may be fitted to any car using S4 type single piece wheels, or any later type non-USA S4S using 25 mm long wheelbolts (see above), The kit must NQT be fitted to earlier non-USA S4S models, or any other car reauiring 30 mm long wheelbolts.

Note that the security keyed wheel bolts described in Service Bulletin 1994/1 0 were not introduced,

O.Z. Wheel Centre Cap

The O.Z. Future 3-piece wheels have a centre cap to cover the wheel bolts, which is itself retained by two anti-tamper type screws (three other 'screws' are dummies), The special screwdriver is stowed in the mep pocket behind the seat.

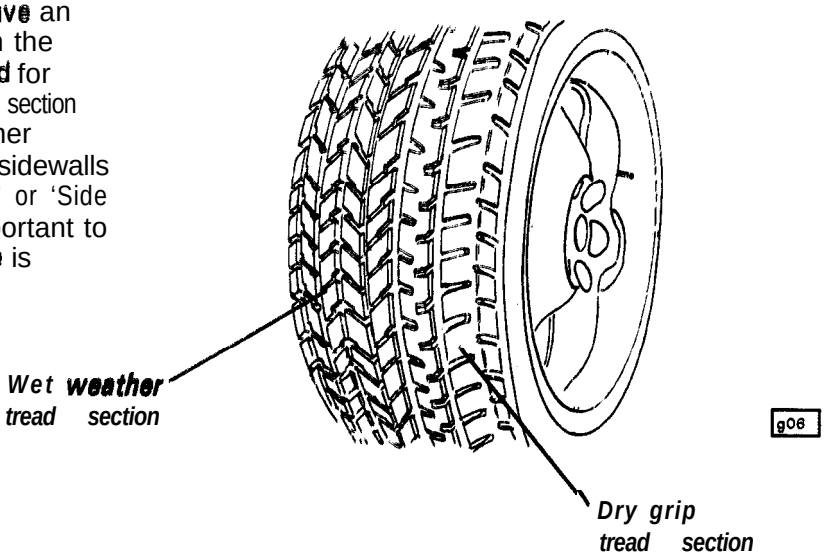
GE.2 - TYRES

Tyre Specification

S4 & USA S4S

Make & type — Goodyear Eagle GS-A

Goodyear 'Eagle GS-A' tyres have an assymetrical tread pattern, with the outer section of tread optimised for dry road grip, and the inboard section designed to enhance wet weather performance. Each of the tyre sidewalls is marked 'Side Pacing inwards' or 'Side Facing Outwards', and it is important to ensure that any replacement tyre is correctly fitted,

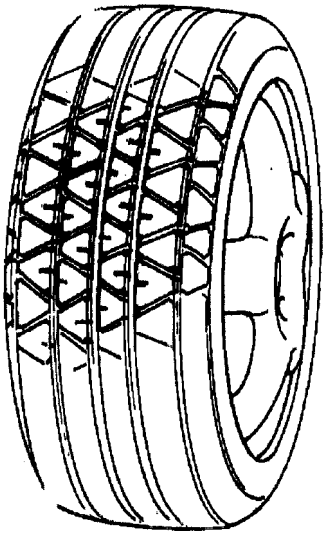


g06

Size - front	215/40 ZR17
- rear	245/45 ZR17
Pressure (cold)	
- normal use - front	2.0 bar (29 lb/in²)
- rear	2.1 bar (30.5 lb/in²)
= sustained speeds over 240 km/h (149 mph)	
- front	2.5 bar (36.5 lb/in²)
- rear	2.5 bar (36.5 lb/in²)

Non USA **S4S**
Make & type — Michelin Pilot SX MXX3

Michelin 'Pilot SX **MXX3'** tyres are neither directional nor handed,

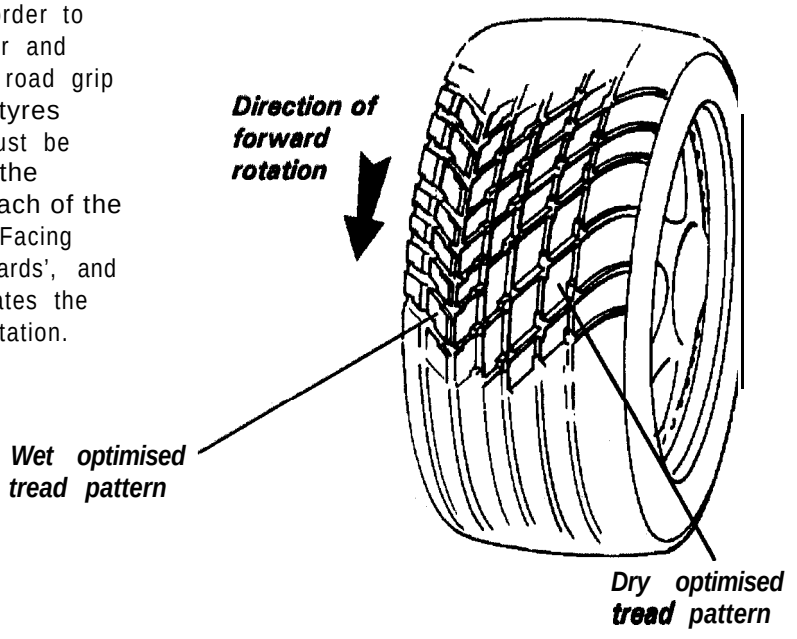


g11

Site - front	**235/40 ZR17**
- rear	**285/35 ZR18**
Pressure '(cold)	
- normal use - front	**2.0** bar **(29 lb/in²)**
- rear	2.0 bar 129 **lb/in²)**
- sustained speeds over 240 km/h (148 mph)	
- front	2.5 bar (36.5 **lb/in²)**
- rear	2.5 bar (36.5 **lb/in²)**

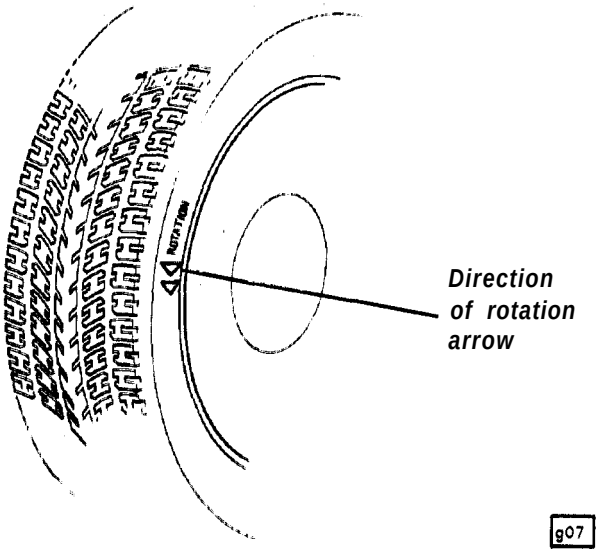
Sport 300
Make & type — Goodyear Eagle GS-C
or Goodyear Eagle **ZR**

Goodyear 'Eagle GS-C' tyres are both asymmetric and directional in order to enhance the dispersion of water and provide optimised wet and dry road grip and wear characteristics. The tyres themselves are handed, and must be fitted to the wheels to provide the correct direction of rotation. Each of the tyre sidewalls is marked 'Side Facing Inwards' or 'Side Facing Outwards', and an arrow on the sidewall indicates the correct direction of forward rotation.



g12

Goodyear 'Eagle ZR' tyres are directional but not handed. Refer to the sidewall direction of rotation arrow.



Size - front	245/45 ZR16
- rear	P315/35 ZR17
Pressure (cold) - front	2.0 bar (29 lb/in²)
- rear	2.0 bar (29 lb/in²)

GE.3 - SPARE WHEEL & TYRE

The spare wheel supplied on S4 and S4S models is for EMERGENCY USE ONLY, and must be replaced with the normal wheel and tyre equipment as soon as possible, Only one spare wheel may be used on the vehicle at any one time. When the spare wheel is in use, differential tyre wear will be experienced, and the handling characteristics of the car will be modified. It is therefore necessary that the following recommendations be observed:

1. Less than moderate speeds and cornering loads should be employed, i.e. no more than half the car's potential relative to the pertaining road conditions subject to a recommended maximum speed of 80 km/h (50 mph) under the most favourable conditions:

2. When other vehicles are being followed, Lotus recommend that observation is made of the U.K. Highway Code or American Safety Council guidelines for vehicle spacing; this advice applies equally to spare wheel usage as to all other motoring situations.

3. Spare wheel tyre pressure; see specifications below:

The spare wheel is carried in the front luggage compartment and is secured with one 'T' bolt to the floor. Care should be taken not to disturb other components when removing or restowing the spare wheel. Always secure the spare wheel with the 'T' bolt to avoid any possible damage to other components, or to the body.

Note that the introduction of Brembo brakes on the S4 model in June '94, necessitated a change in spare wheel type from a 'regular' 14" wheel/tyre assembly, to a 'space saver' type 16" assembly in order to clear the larger diameter brakes.

Spare wheel - type		Steel, one piece, 5 bolt fixing
- size	- prior VIN *	5.5J x 14
	- from VIN *	4J x 16 H2
= Inset	- prior VIN *	+ 2 mm
	- from VIN *	+ 14mm

Spare tyre	- size	- prior VIN *	175/70 SR 14
		- from VIN *	T125/80 R16
Pressure (cold)		- prior VIN *	2.0 bar (30 lb/in²)
		- from VIN *	4.2 bar (60 lb/in²)
Maximum speed			80 km/h (50 mph)

*VIN R 1443 (non-USA, July '94)
S 1391 (USA, June '94)

GE.4 - WHEEL/TYRE ASSEMBLY BALANCING

Before balancing a wheel with a used tyre, ensure that any 'parking' flatspot is eradicated by running the car for several miles to warm the tyre to normal running temperature.

Wheel/tyre assemblies should be balanced at the recommended inflation pressure, off the car, using equipment which measures static and dynamic error. It is essential that the wheel is located using the 58 mm (front) or 60 mm (rear) centre spigot hole, or by back coning. Do not locate using the wheel bolts.

Balance Specification

Acceptable balance error	- inside rim (static)	15 g
	- outside rim (dynamic)	20 g
Maximum balance weight permissible	- inside rim	70 g
	- outside rim	60 g

After balancing 'off car', it is preferable to optimise the balance with the wheel refitted to the car.

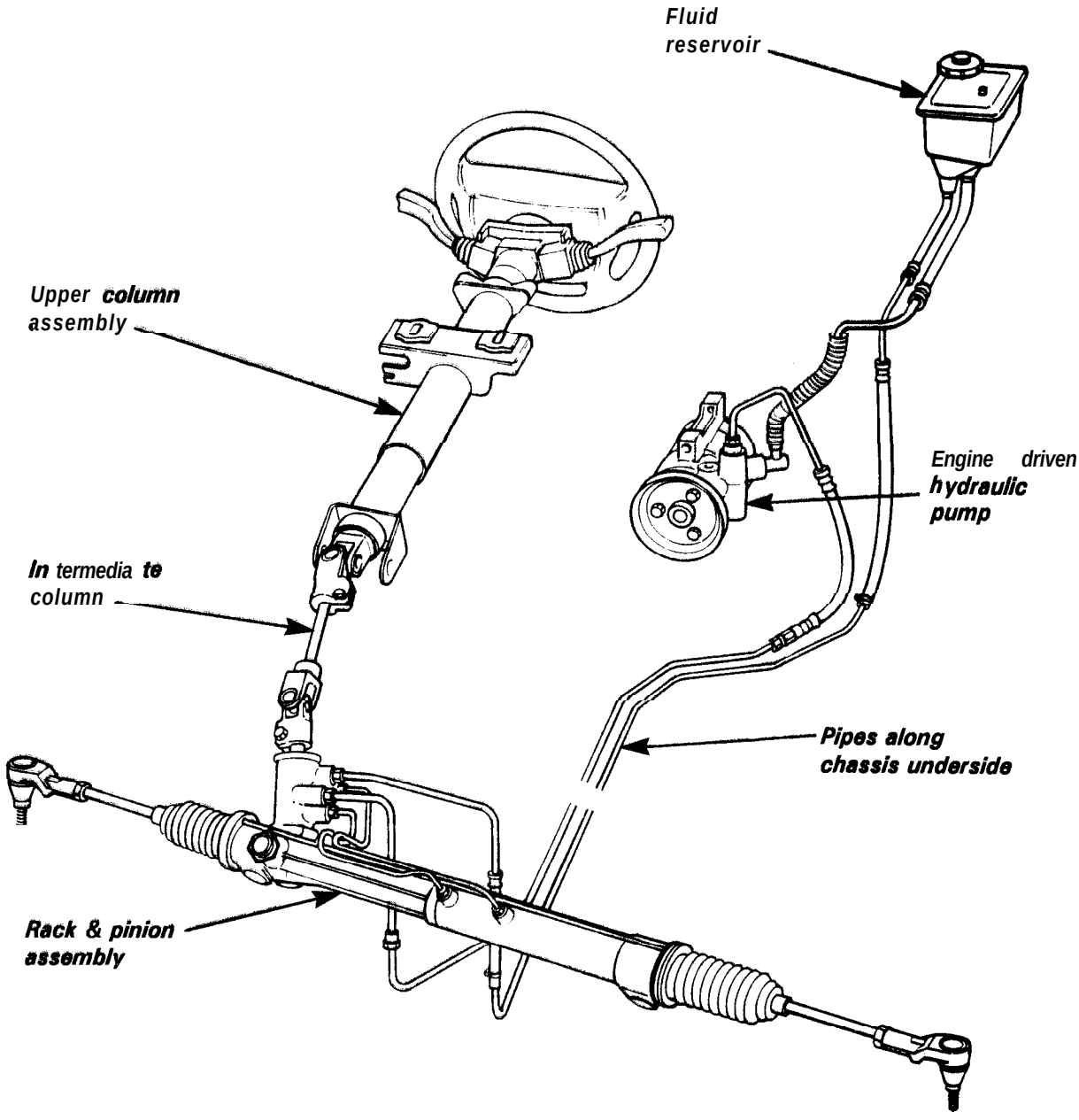
Acceptable balance error	10 g
Permissible 'on car' correction	20 g

If an error of more than 20 g is recorded 'on car' after balancing the assembly 'off car', then either a procedure error is indicated @e-balance 'off car'), or there is a serious imbalance of other rotating components (e.g. brake disc, hub, etc.).

Power Steering
SECTION HD - ESPRIT S4 & Sport 300

HD.1 - GENERAL DESCRIPTION

The power assisted steering system introduced on the Esprit model range in January '93, uses a Saginaw power rack and pinion assembly, an engine driven hydraulic pump, a collapsible upper steering column, and a connecting intermediate column. The rack assembly is bolted rigidly to the chassis ahead of the front crossmember, and connects to steering arms on the front hub carriers, ahead of the front axle line, via ball jointed track rods. The same type of steering column assembly is used on cars with and without a supplementary inflatable restraint (S.I.R.), and bolts to the pedal box at the lower end, and to the scuttle beam at the upper end. On S.I.R. cars, an air bag steering wheel is fitted together with longer, cranked steering column switches. A hydraulic pump mounted at the left hand front of the engine, is driven by 'V' belt (shared with the water pump) from the engine crankshaft nose, and is supplied by a fluid reservoir mounted behind the engine bay left hand trim panel, A pair of metal pipes are routed along the underside of the chassis backbone to transfer the high pressure hydraulic feed from pump to rack assembly, and the low pressure return from rack to reservoir, with connecting hoses at each end.

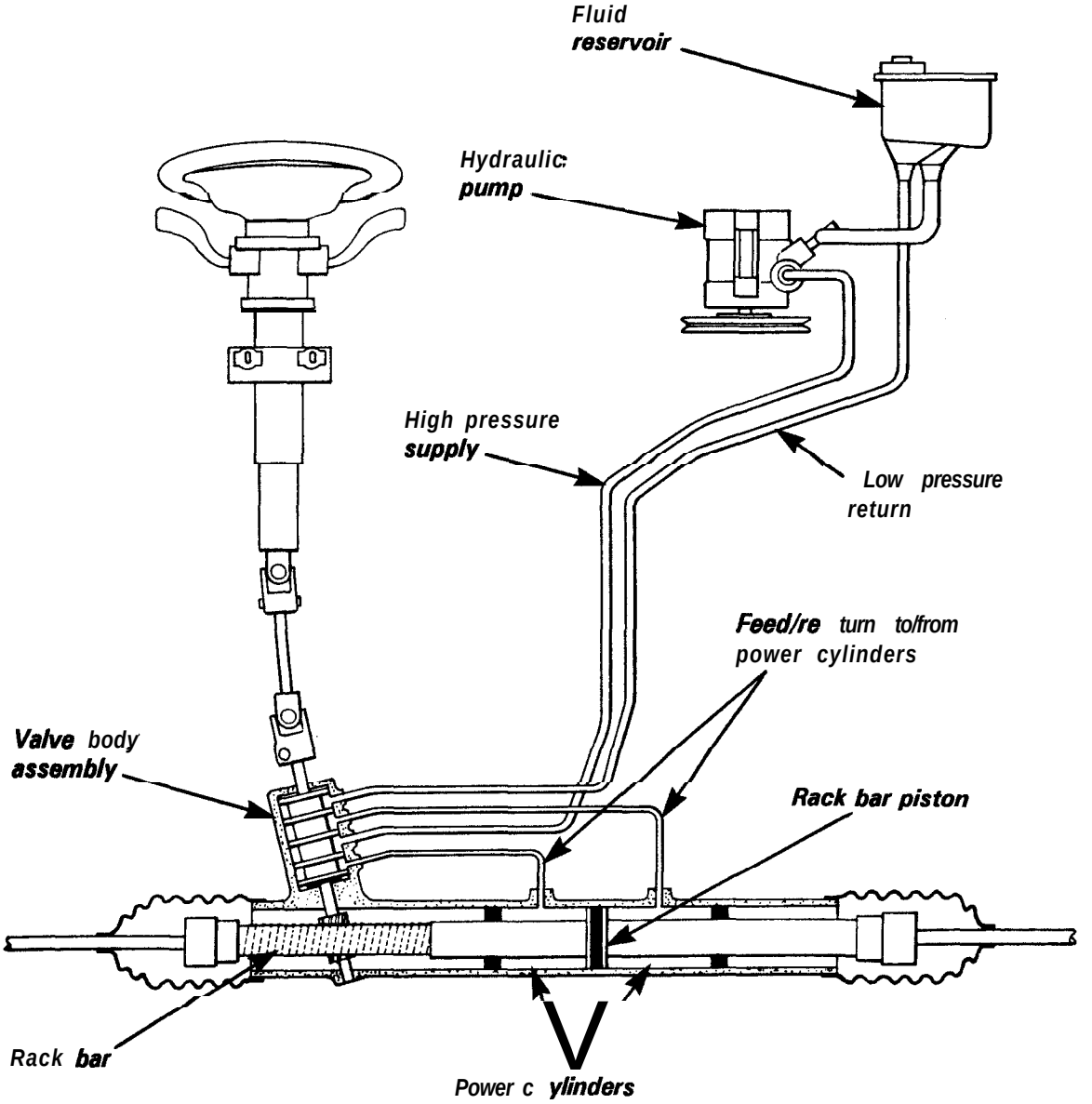


HD.2 - POWER STEERING RACK OPERATION

The steering rack assembly comprises the following major components:

i) a cylindrical steel bar with the rack teeth machined at one end;
ii) an alloy rack housing. which supports the rack bar and incorporates a steel tube to form a divided power cylinder;
iii) a cast iron body secured into one end of the rack housing to support the pinion gear and valve body assembly.

Each end of the rack housing is hydraulically sealed to the cylindrical part of the sliding rack bar, so that a piston fixed to the central part of this bar divides the housing into two hydraulic cylinders, each of which is linked to the valve body by a steel pipe. By using a pressurised oil supply and creating a pressure differential between the two cylinders, a force can be applied to the piston and rack bar to provide steering assistance in one direction or the other.



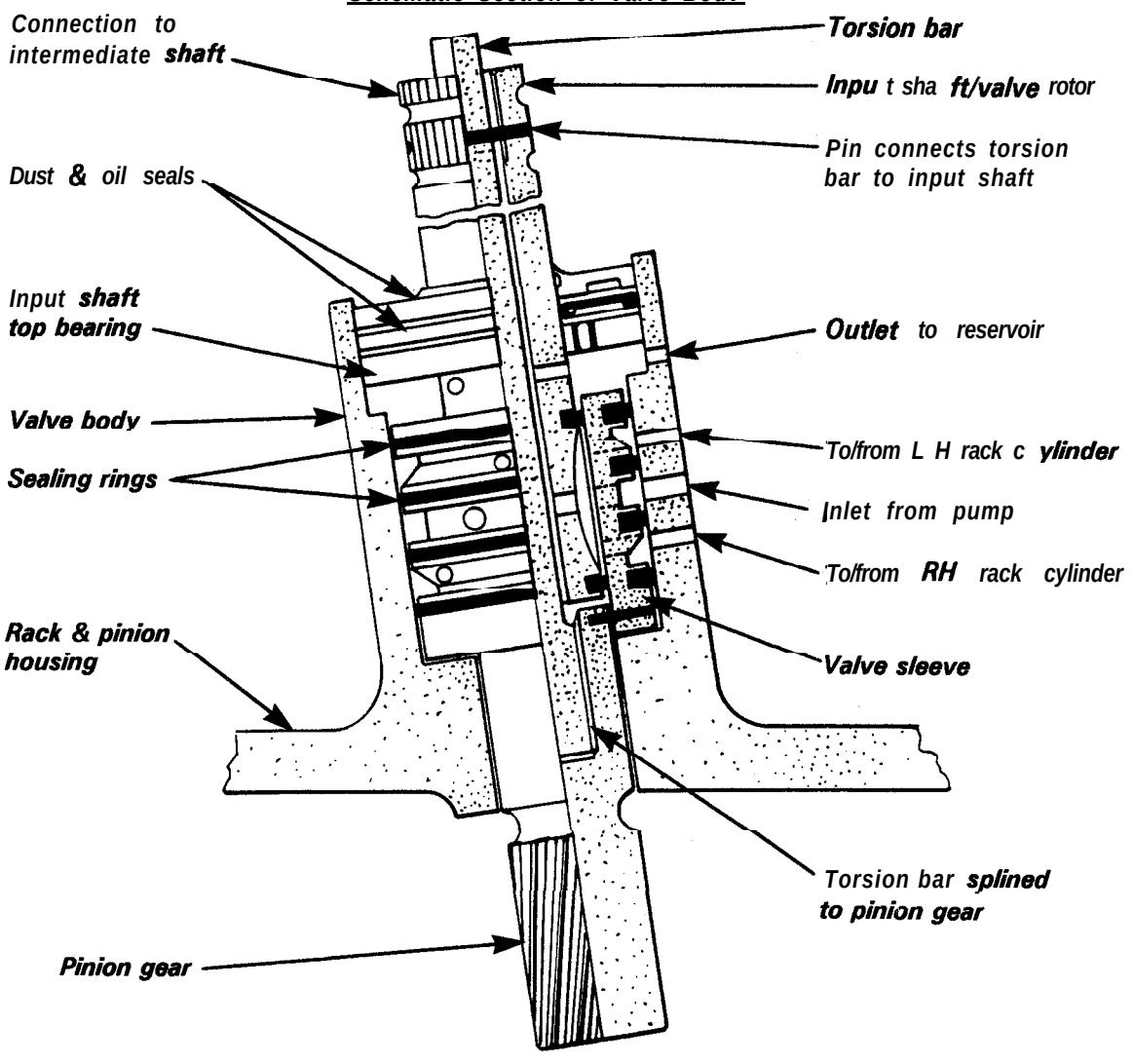
The valve body, which is integral with the pinion gear housing, contains three main elements:

a) an input shaft/valve rotor;
b) a torsion bar;
c) a valve sleeve fixed to the pinion gear.

The top end of the hollow input shaft connects to the steering column. The bottom end of the shaft is machined to form a valve rotor which turns within the valve sleeve. The valve sleeve is fixed to the pinion gear and contains hydraulic ports which are controlled by the position of the rotor reletive to the sleeve.

The rotor and sleeve are connected together by a torsion bar which is contained within the hollow input shaft/rotor. The top end of the torsion bar is connected together with the input shaft to the steering column, and the bottom end is splined into the pinion gear/valve sleeve. The degree of twist of the torsion bar is dependent on the effort applied at the steering wheel, which is itself dependent on speed of steering, road speed, road surface friction and many other factors. With low torque applied (e.g. at high road speed), little twisting of the torsion bar occurs, and little or no steering assistance is provided. When a high steering wheel torque is applied (e.g. parking manoeuvre), the torsion bar is forced to twist in its effort to transmit the force from the column-to the pinion, and the angular displacement between the valve rotor and sleeve causes the hydraulic ports to divert oil flow and provide steering assistance.

Schematic Section of Valve Bodv



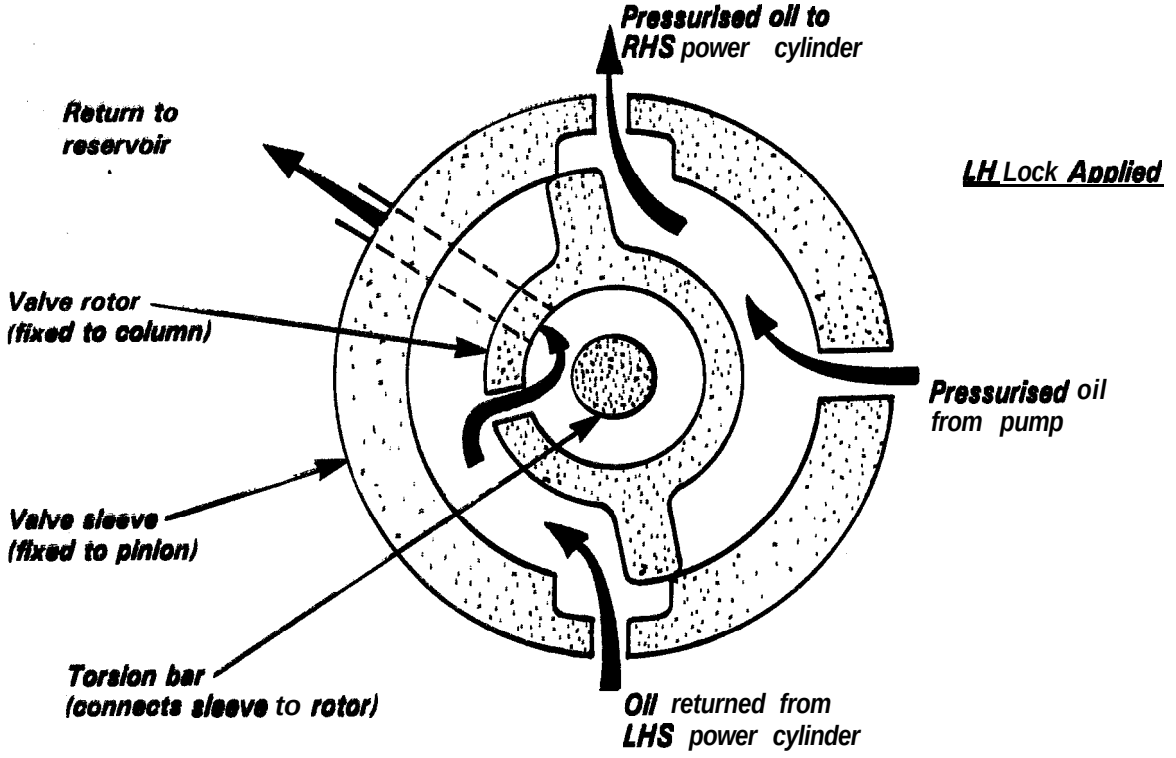
The greater the steering effort, the greater the twist of the torsion bar, **and the greater the angular** displacement between the rotor and valve sleeve.

The valve body is provided with four ports:

- inlet from the engine driven pump;
- outlet to the reservoir;
- connection to the right hand rack cylinder;
- connection to the left hand rack cylinder.

When no torque is applied to the steering wheel, no twist is applied to the torsion bar, and the ports In the valve sleeve allow fluid supplied by the pump to flow through both of the rack cylinders and return to the **reservoir.**

The schematic diagrams below show the principle of valve control, although in practice, four pockets **are** machined in the rotor and the valve system is repeated four times. The valve sleeve is provlded with four **sealing rings** In order to divide the inlet and outlet feeds and connect with ports in the **valve** body, whilst **allowing 360°** rotation of the valve assembly.



When the steering is turned to the left, the input shaft/rotor transmits this motion to the pinion gear/valve sleeve **via** the torslon bar, which twists in proportion to the effort applied at the wheel. Effort Is hlgh typically at slow vehicle speeds, when parking etc. When the bar twists, the angular **posltion** of the rotor relative to the valve sleeve alters, with the result that the ports to the right hand rack **cylinder** become biased towards the pressurised supply, and the ports to the left hand side biased towards the reservoir return, **Hence** a pressure differential is created within the rack housing, with hlgher pressure In the right hand rack cylinder applying a force to the steering rack to assist a left hand turn, A **slmilar** but opposlte condition occurs for a right hand turn.

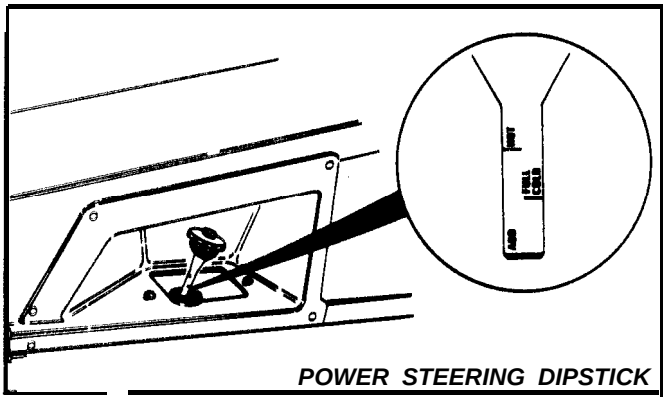
The ultimate degree to which the torsion bar is permitted to twist, is limited by mechanical contact between the Input shaft and the pinion gear, This mechanism prevents the torsion bar being over **stressed,** deflnes the maximum level of assistance, and provides a safety back up in case of torsion bar **failure;** steerlng control would be retained, albeit with a small amount of lost motion.

HD.3 - PAS FLUID CHECK AND REFILL PROCEDURE

Recommended fluid: PAS or Automatic Transmission Fluid, type Dexron or Dexron 2
Capacity: 2.0 litre (3.5 imp.pt; 2.1 US.qt)

Fluid Level Check

The PAS fluid reservoir is located at the left hand side of the engine bay and is accessible without disturbing the engine cover, The level of fluid, which should be checked at every service Interval, will rise as it warms up during normal oparatlon, and tha best time to check the level is with the engine wart-n, immediately rafter a run, Unscrew the reservoir cap, and inspect the oil level indication on the integral dipstick.



POWER STEERING DIPSTICK

With a warm engine, the level should be close to the 'HOT' mark, and if cold, close to the 'FULL COLD' mark on the dipstick, Under normal circumstances, the PAS fluid should not require any topping up, and a drop in level is likely to be an indication of a leak, If topping up is required, use only an approved fluid and do not overfill. Refit the reservoir cap securely,

Hydraulic Fluid Change

The hydraulic fluid should be changed at intervals specified in the maintenance schedule, or any time that eontomlnetlon Is suspected, or if the system is drained in the course of component removal/replacement.

1. Brain the fluid, preferably after a run when the oil is still warm:
   Remove the engine bay undertray;
   From the left hand underside of the engine bay, disconnect both the low and high pressure hoses from the twe chassis pipes;
   - Remove the reservoir cap and allow to drain thoroughly;
   - To dispel oil from the pump, disable the engine (trip the inertia switch or remove the fuel pump fuse) and crank the engine for a few moments;

   to dispel oil from the rack unit, turn the steering to each full lock in turn.

2. When the oil has drained thoroughly, refit both hoses and tighten securely. Refit the engine bay undertray.

3. Fill the reservoir wlth new fluid, and with the engine still disabled, crank the engine whilst continually replenishing the reservoir. When the level of fluid remains constant, the engine may be enabled and started. Slowly turn the steering wheel from lock to lock and continue to top up the reservoir, ensuring that at no time is the level allowed to drop sufficiently for air to enter the system.

4. The system is fully charged when the fluid level remains constant, and no bubbles can be seen, Top up the reservoir to the 'PULL COLD' mark on the dipstick, and check the system for leaks,

HD.4 - STEERING WHEEL & LOCK STOPS (Non-S.I.R. type)

Information In this section applies only to cars WITHOUT an S.I.R. (Supplementary Inflatable Restraint) flttad within the steering wheel centre pad,

WARNING: Any work on vehicles equipped with S.I.R. requires that rigorous safety precautions be taken, which are fully detailed in a separate manual part no. **J082T0327J** (Sections WA & WC).

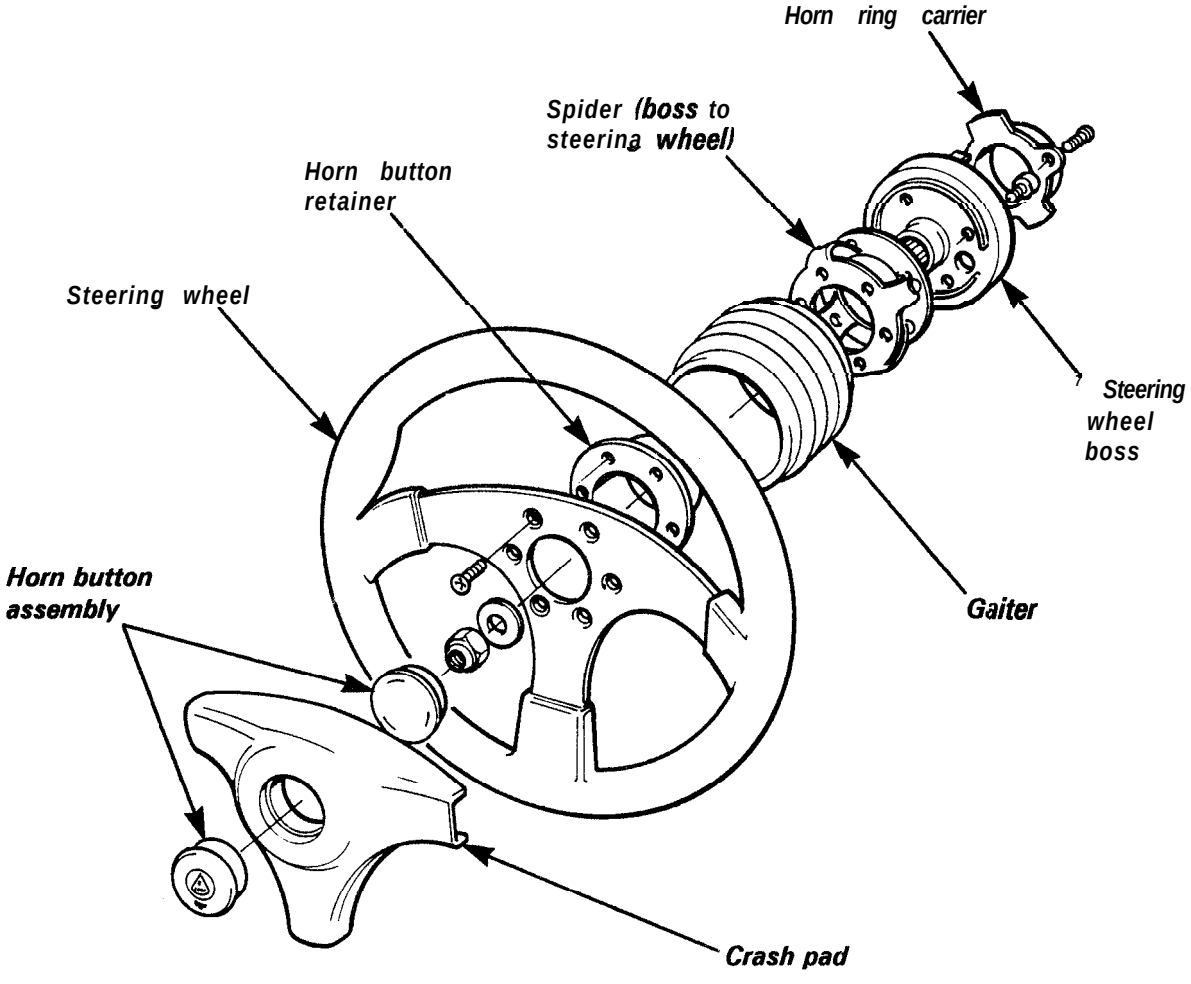
Non-S.I.R. steering wheels are 3-spoke **with the horn button in the centre, whereas S.I.R. type wheels** are 4-spoke with a large centre pad containing the air bag, and horn buttons on two of the spokes. For S.I.R. equipped models, see Section WA.3/WC.3 in separate manual J082T0327J.

Steering Wheel Removal (Non-S.I.R. type)

1. Pull off the centre trim pad and prise out the horn button assembly.

2. Remove the nut and washer retaining the steering wheel and mark the reletive positions of the wheel and inner column to aid refitting.

3. Pull the wheel off the column using minimum force. If necessary, use a suitable puller to apply force between the alloy boss and the column end, having first removed the column shrouds for improved access.
   CAUTION: Do NOT apply excessive axial force to either the inner or outer column without the use of a steering wheel puller, or the mechanism retaining the telescopic length of the collapsible column may be overridden, necessitating column replacement. Pulling against the steering wheel or steel spider may cause distortion of the spider.



Refit the steering wheel in the reverse order to removal, aligning the match marks, and torque tighten the steering wheel nut to 40 Nm (30 lbf.ft). If no match marks are available. refer to 'Steering Wheel Alignment'.

Steering Wheel Alignment

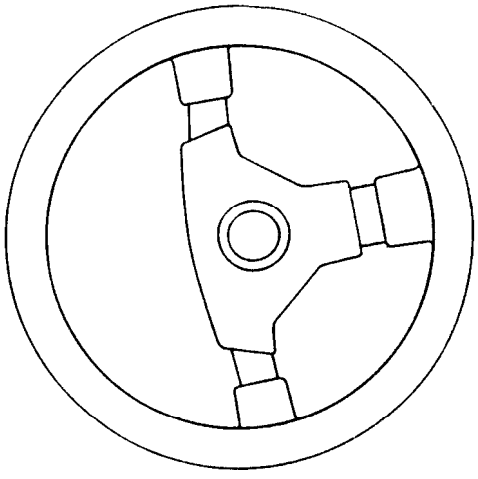
Ideally, the steering wheel should align in the straight running position, with the steering rack centralised and with equal track rod lengths. In practice, some compromise to track rod lengths will have to be made. To arrive at the optimum setting, proceed as detailed below:

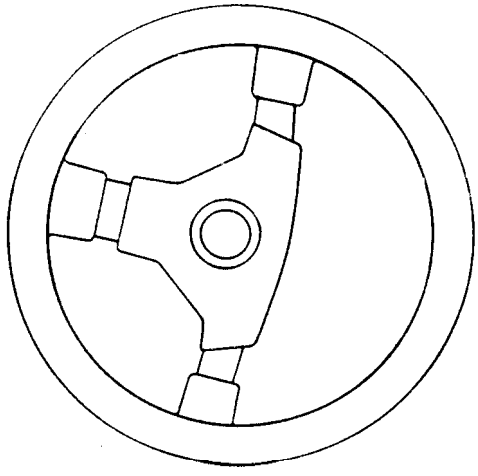
Note that the two universal joints used to connect the upper steering column to the rack pinion shaft via the intermediate shaft, are 'phased' at 65° to each other in order to provide the minimum cyclical force variation as the steering wheel is turned. The straight ahead orientation of the u/js (with the rack centralised) is also selected to provide the optimum steering feel. The design of the column assembly and u/js is such as to allow fitment of the u/js in only the correct configuration.

1. Set the front wheel alignment to specification with equal track rod lengths (see later).

2. Turn the steering to each full lock in turn and check for clearance between the tyres and body or suspension. If there is any evidence of contact, fit a rack stop (P691.3203.003) into that side of the rack as detailed below. Set the steering wheel on the column splines such that its orientation in one full lock position is the nearest possible mirror image of its position at the opposite full lock.

Typical full lock wheel positions





3. Secure the steering wheel before road testing the car and marking the actual 'straight ahead' position of the steering wheel which should deviate from the ideal position by less than 6°. Final alignment is achieved by asymmetric adjustment of the track rods, retaining the overall toe-in setting.

Steering Rack Lock Stops

In certain cases, it may be necessary to fit lock stops to the ends of the rack housing in order to maintain sufficient tyre clearance at full lock, throughout the range of suspension travel.

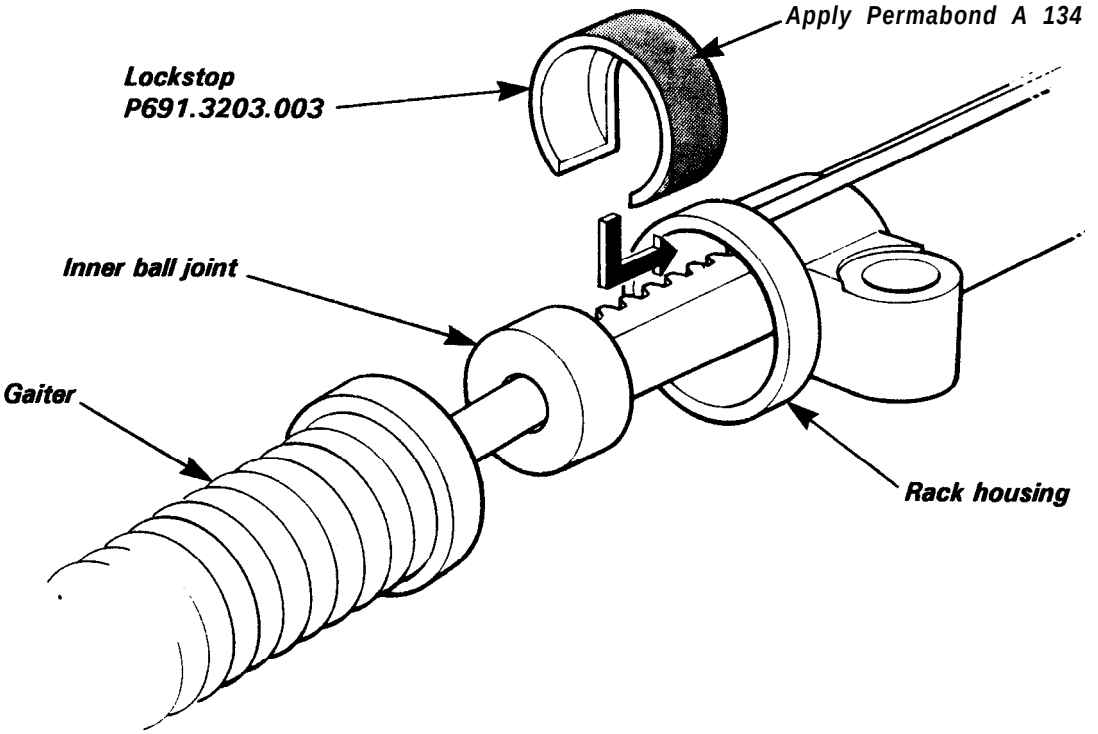
Parts Required:

Rack Stop	P691.3203.003	1/2 off
Permabond A905 Surface Conditioner	A912E6759V	AIR
Permabond A 134 Adhesive	AI 00B6155V	A/R

1. Remove the clamp securing the rack gaiter to the rack housing, and slide the gaiter along the track rod and off the housing and breather tube.

2. Wipe clean the inside end of the rack housing before applying Permabond A905 surface conditioner.

3. Apply Permabond Al 34 adhesive to the outside of the lockstop P691.3203.003 and insert, closed end first, into the end of the housing with the slot pointing downwards. Tap fully into the housing until bottomed out.



4. Refit the gaiter, engaging the breather tube into the gaiter hole, and secure with a new clamp.

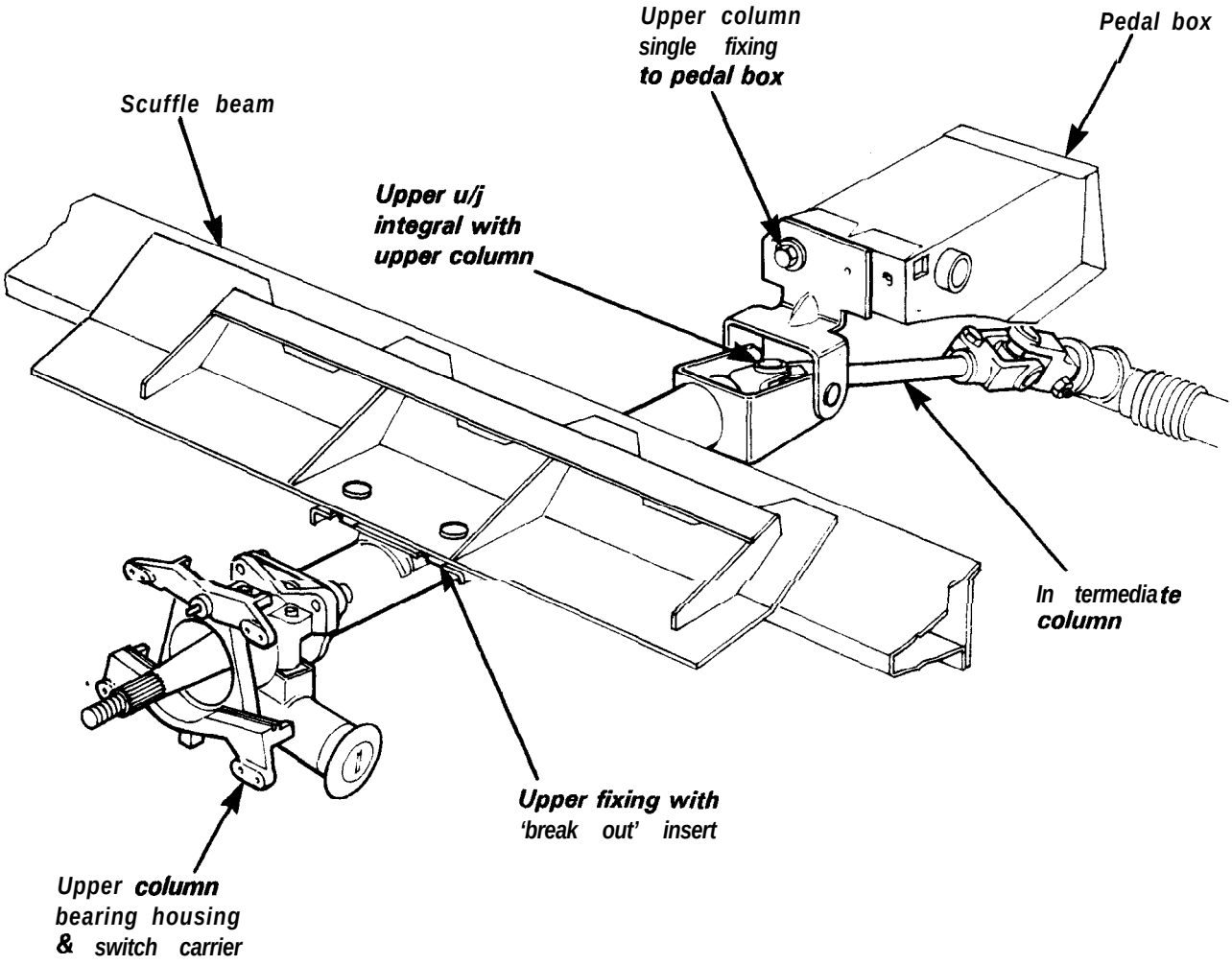
5. Repeat for the opposite side if necessary.

HD.5 • UPPER STEERING COLUMN ASSEMBLY

The upper steering column assembly comprises an inner column which connects the steering wheel to the intermediate shaft, and a tubular steel outer column which supports the inner column and carries the column lever switches for lighting and wiper control, and also the ignition switch/steering lock.

Both inner and outer columns are of fixed length, but are telescopically collapsible when subjected to crash forces. The two parts of the inner column are fixed together by plastic pins designed to shear and allow telescoping to occur beyond a specified axial load. The two part outer column tube uses gripper rings to retain the column length, with the lower part fixed to the pedal box, and the upper section attached to the scuttle beam via 'break out' alloy inserts. These inserts are retained in slots in the upper column mounting bracket by nylon pins which are designed to shear under crash impact and allow the column to break free of the alloy inserts and scuttle beam and telescope downwards. This behaviour minimises steering column intrusion into the cabin in a vehicle frontal collision,

The top end of the outer column tube is secured to an alloy bearing housing which accommodates a ball bearing to support the inner column, and provides mountings for the column lever switches, horn push pick up, and steering lock/ignition switch. On S.I.R. equipped cars, the rotary connector is also secured to this housing.



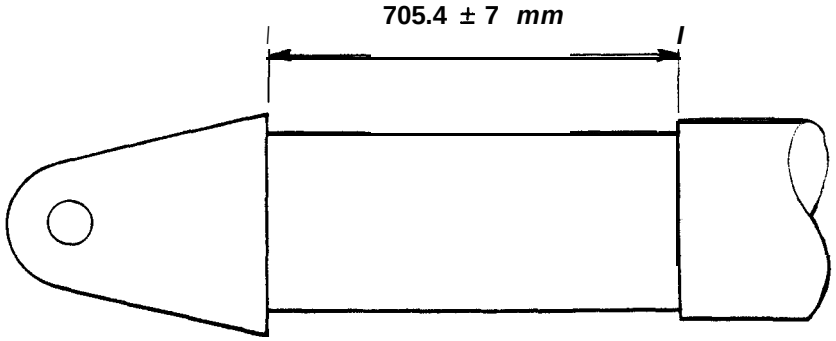
Dimensional Check

If the vehicle is involved in an accident, whether or not involving air bag deployment on cars so equipped, the steering column should be carefully examined to establish if any telescoping has occurred, Perform the following checks, and replace the complete upper column assembly if any of the dimensions are outside specification:

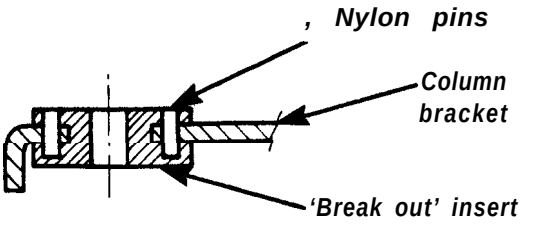
1. Outer column:

Measure the length of the lower part of the outer column as shown in the diagram.

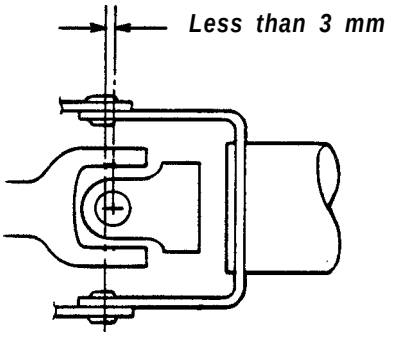
Specification = 105.4 ± 1 mm



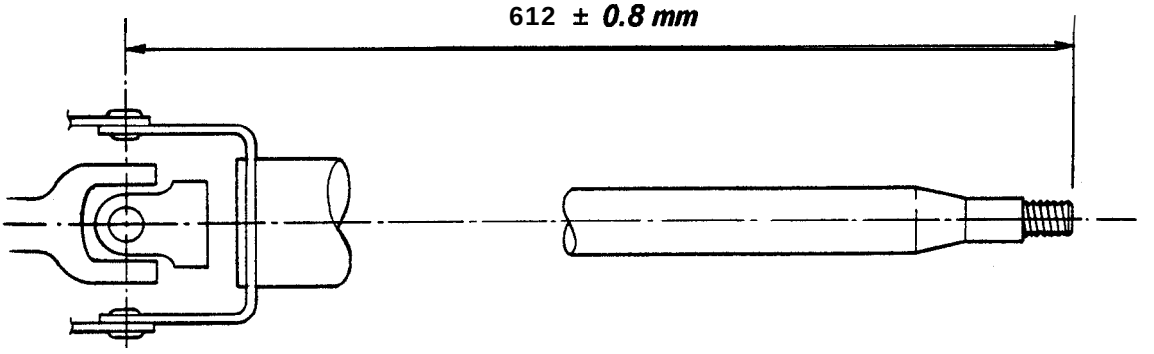
If outside specification, replace the column assembly:
Remove the column shrouds, loosen the column to scuttle beam fixing bolts and check that the two alloy 'break out' inserts are securely attached to the column flange. If the nylon pins securing the inserts are sheared, the column assembly must be replaced.



2. Inner column:
Check that the centreline of the u/j at the lower end of the column is within 3 mm of the pivot point of the outer column lower bracket. If greater than 3 mm, replace the column assembly.



Remove the steering wheel (see Sub-Section HD.4) and measure the overall length of the inner column. Specification = 612 ± 0.8 mm



To Remove Upper Steering Column Assembly:

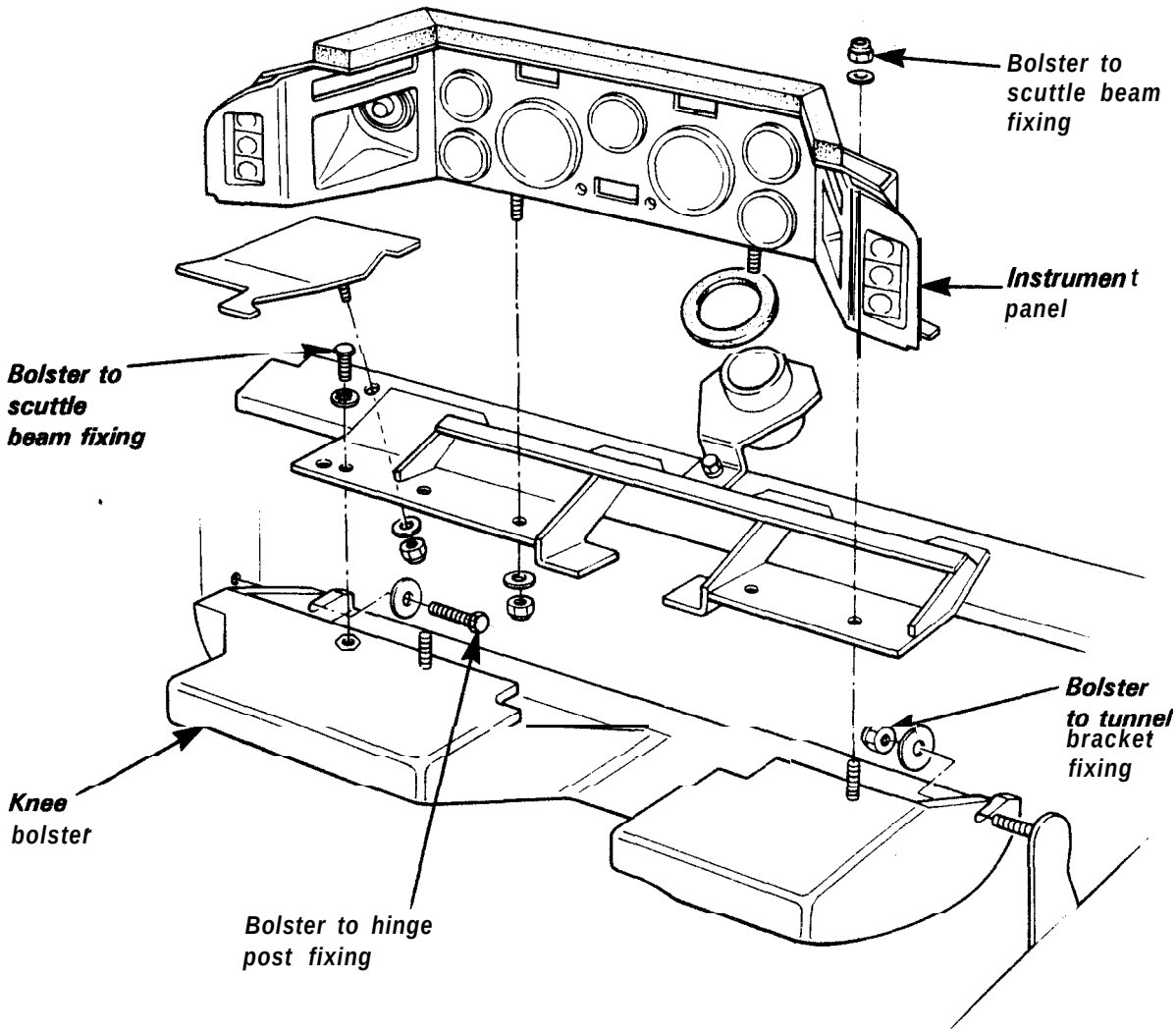
1. Remove the steering wheel. See Sub-Section HD.4.

2. Remove the steering column shrouds:
Unplug the block connector for the instrument illumination rheostat;
Remove the upper shroud after releasing the single screw at each side securing it to the lower shroud;
Remove the lower shroud after removing the two screws fixing it to the column brackets.

3. On S.I.R. cars, remove the rotary connector. See section WA.3 ▪ K / WC.3 ▪ L.

4. Remove the driver's side knee bolster (S.I.R.) or fascia trim panel:
Remove the instrument binnacle trimmed cover after releasing the single screw beneath each rear corner, and the single bolt fixing the front edge of the cover adjacent to the demist vent adaptor.
▪ From beneath the fascia, slacken the screw securing the outboard end of the knee bolster to

the door hinge post (captive nut).
From beneath the inboard end of the bolster, slacken the Nyloc nut and penny washer securing the bolster to the stud on the support bracket.
From behind the instrument panel, release the two nuts and washers, and the single screw securing the bolster to the scuttle beam, and remove the knee bolster/trim panel by lowering the top edge, and drawing from its lower open slots.



5. Unplug the block connectors and release the harnesses for the column switches. Depress the retaining prongs, and slide out the column switches from the column top bearing carrier. Release the small grub screw at the bottom left hand rear of the steering lock body, and pull out the ignition switch.

6. If necessary, remove the steering lock mechanism either by unscrewing the two shear bolts using a hammer and punch, or by drilling out the bolt heads.

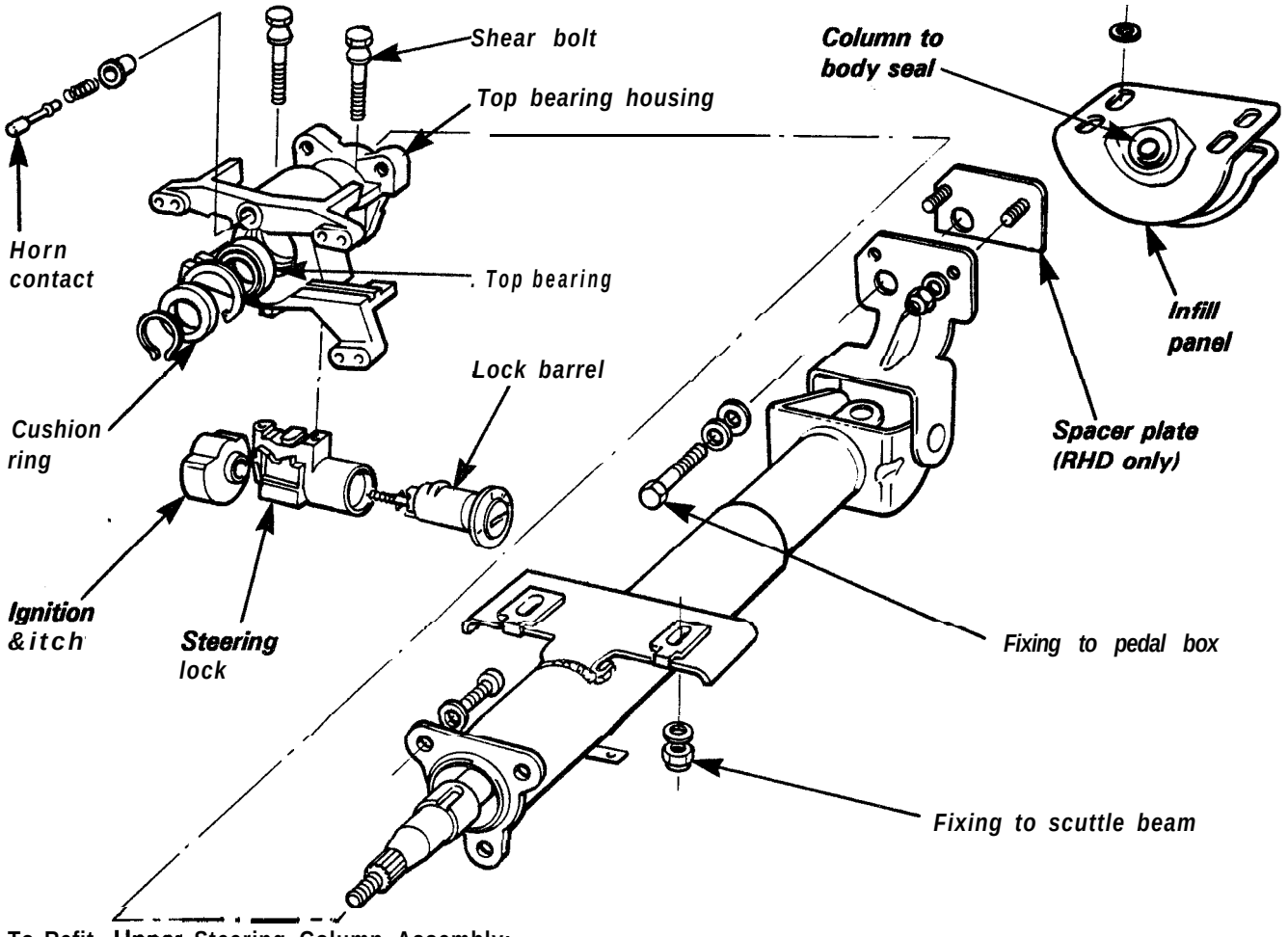
7. Remove the pinch bolt from the u/j at the bottom end of the steering column, and remove the bolt securing the column lower mounting bracket to the pedal box.

a. Remove the two nuts and bolts securing the top end of the column to the scuttle beam, and withdraw the column assembly from the intermediate shaft.

9 To remove the inner column, remove the circlip from the top end of the column, followed by the

cushion ring, and withdraw the inner column from the bottom end of the outer column.

10. If necessary, remove the three bolts securing the top bearing housing to the outer column Remove the circlip, and press out the ball bearing assembly.



To Refit Upper Steering Column Assembly:

1. Fit the ball bearing into the top bearing housing using a press, and fit the retaining circlip. Fit the bearing housing to the top of the column, and retain with the three M6 setscrews and spring washers. Tighten the three screws.

2. Fit the inner column into the outer, and fit the cushion ring over the top end, followed by the retaining circlip.

3. Fit the integral u/j at the bottom of the upper column assembly onto the splines of the intermediate shaft, noting that a master spline permits assembly in only one orientation, with the flat on the shaft aligned with the pinch bolt hole in the u/j. Fit the special Ml0 pinch bolt and spring washer, but do not tighten at this stage.

4. Loosely assemble the column to scuttle beam fixings, and the single M8 bolt with shakeproof and flat washer securing the column assembly lower bracket to the pedal box.

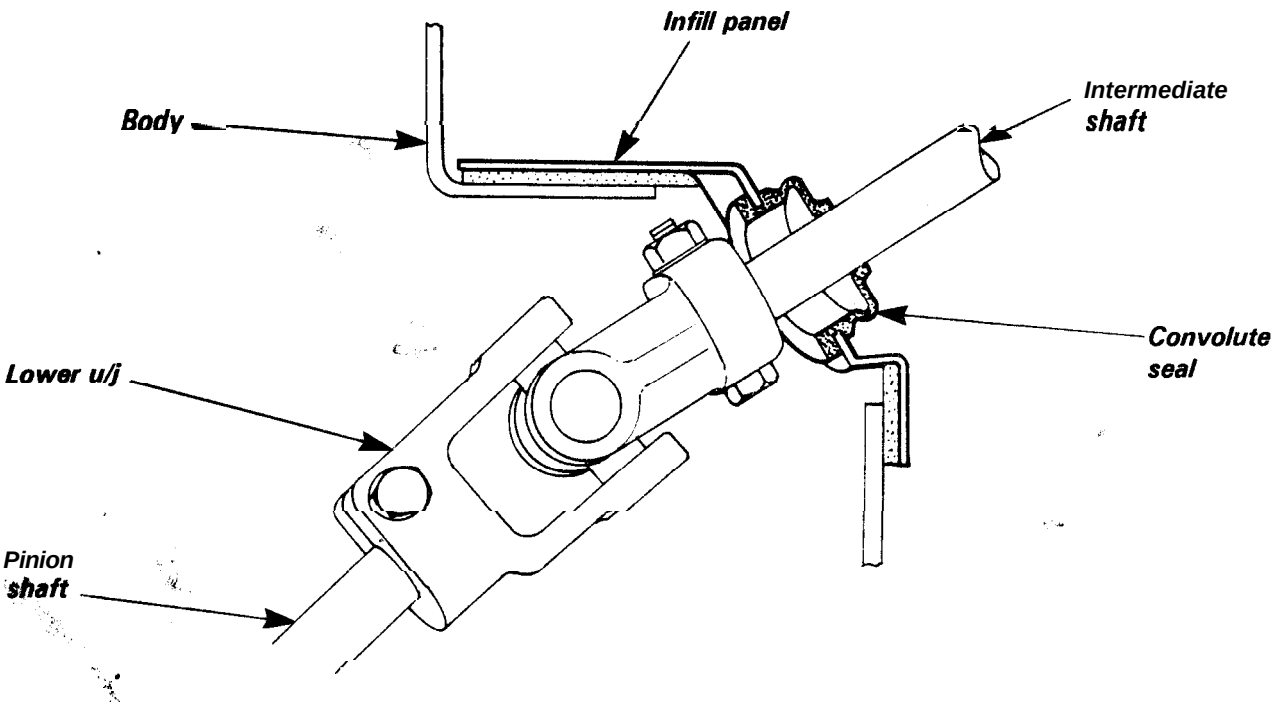
5. Tighten the steering column fixings in the following order:
   column to pedal box; 24 Nm (17.5 lbf.ft).
   column to scuttle beam (2 off); 15 Nm (11 lbf.ft).
   upper column u/j to intermediate shaft; 40 Nm (30 lbf.ft).

6. Fit the steering lock to the top bearing housing using new shear bolts, and tighten until the bolt heads shear.

7. Continue re-assembly in the reverse order to disassembly.

HD.6 • INTERMEDIATE STEERING COLUMN ASSEMBLY

A single intermediate shaft is used to connect the upper column assembly to the steering rack pinion shaft. The upper end of the shaft is splined to accept the universal joint integral with the upper column assembly, and the lower end has two flats in order to mate with the separate lower u/j connecting to the rack pinion shaft. The two u/js are phased at 65° to each other in order to minimise cyclical force variations as the steering wheel is turned, and the design of the shaft permits assembly only in this configuration.



In order to provide a weatherproof seal for the passage of the intermediate shaft through the front bulkhead, a convolute seal is mounted in an infill panel itself secured by spring clips over the pedal box mounting studs.

To Replace Intermediate Shaft

1. Remove the upper steering column assembly (see above), or release sufficiently to disengage the upper u/j from the intermediate shaft.

2. From within the driver's wheelarch, remove the pinch bolt securing the lower u/j to the steering rack pinion shaft and push the u/j off the shaft. If necessary, remove the chassis front frame stiffening strut (bolted on) to improve access.

3. Withdraw the shaft and u/j from the body grommet.

On re-assembly, first assemble the lower u/j to the intermediate shaft, noting that the splined end of the shaft is colour coded red for RHD and white for LHD (u/j orientation). Torque tighten the u/j pinch bolt to 25 Nm (18 lbf.ft). Refit the intermediate shaft assembly in the reverse order to removal, tightening the upper u/j pinch bolt to 40 Nm (30 lbf.ft), and the lower u/j to pinion shaft pinch bolt to 25 Nm (18 lbf.ft).

HD.7 • TRACK ROD ENDS & FRONT WHEEL ALIGNMENT

Each, end of the steering rack is connected to the front hub steering arms via a track rod with a maintenance free spherical joint at its inner end, and a replaceable ball joint ('track rod end') at the outboard end. Front wheel alignment refers to the parallelism of the wheels when viewed from above and is crucial to vehicle stability, handling and tyre wear. It is measured either by the angle a wheel makes with the vehicle centre line, or the difference in dimension between the wheel rim to wheel rim measurement at the front and rear of the wheel at hub centre height. The wheels are said to 'toe-in', when the wheel paths converge ahead of the vehicle, and 'toe-out'. when they diverge. Wheel alignment is designed to vary with both steering angle (Ackerman effect) and suspension travel (bump steer) and should be measured only 'straight ahead' at the specified ride height.

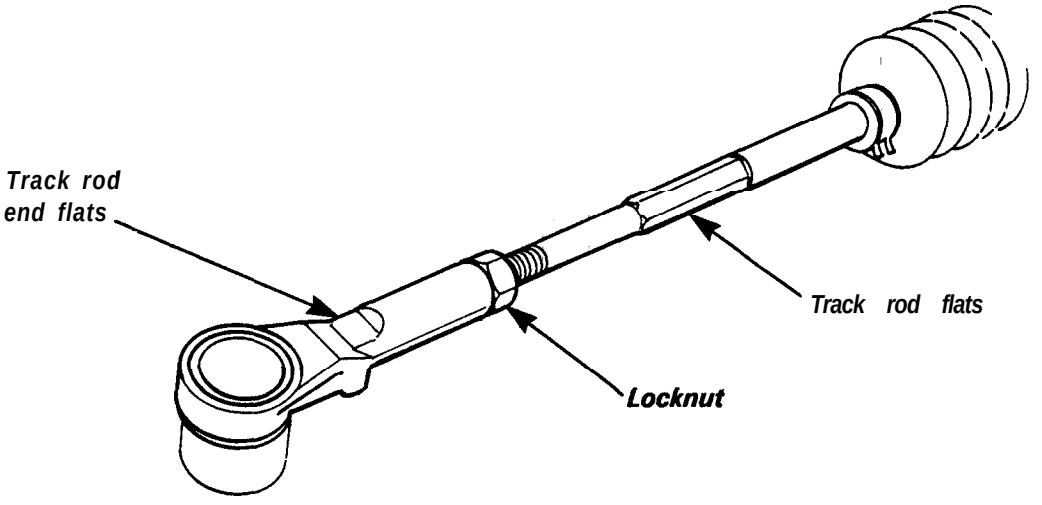
Wheel alignment is adjusted by screwing the track rods into or out of the track rod ends in order to alter the effective length of the track rods. To maintain the required bump steer characteristic, it is important to ensure that the steering rack is centralised in the straight ahead position, i.e. both track rods are the same length, within the limitations of steering wheel alignment (see Sub-Section HD.4).

Specification: At a ride height of 170 mm below chassis front crossmember:
1 .O mm toe out overall; ± 0.5 mm (0.14° toe out overall; ± 0.07° (0°8' toe out overall; ± 4')

Adjustment of Front Wheel Alignment

Hold the track rod using the flats provided, and slacken the track rod end locknut. Repeat for the opposite side.

Turn each track rod a similar amount. Increase the track rod length to increase toe out, and shorten to reduce toe out. As a guide, turning both track rods by one 'flat' (one sixth of a turn) will alter alignment by approx. 1.8 mm (0.24°) (0°14').



When adjustment is correct, hold each track rod end and tighten the locknuts to 80 • 82 Nm (58 • 60 lbf.ft). Re-check alignment.

CAUTION: When slackening or tightening the track rod end locknuts, it is important that the torque reaction is resisted using the track rod end flats, and that the ball joint itself is not allowed to be stressed.

For full steering geometry specification and adjustment of castor and camber, see Section CF.

Track Rod End Replacement

If a ball joint boot is damaged, or if any play in the joint is discernible, the track rod end should be replaced. Before removing a track rod end, first measure the track rod end to track rod setting (e.g. measure the length of exposed track rod thread) in order that the initial setting of the new joint may be

approximately correct.

Remove the nut securing the track rod end to the hub steering arm, and use a suitable ball joint splitter tool to separate the joint.

Hold the track rod end using the flats provided, and slacken the track rod end locknut. Unscrew the track rod end from the track rod.

Thread the new joint onto the track rod and position at the length noted before removal.

Fit the ball pin into the steering arm from the top, and secure with a new Nyloc nut (without washer). Torque tighten to 46 - 48 Nm (33 - 35 lbf.ft).

Check front wheel alignment and tighten track rod end locknuts as above.

HD.8 - STEERING RACK GAITERS

Convoluted gaiters are fitted at each end of the rack assembly in order to seal the rack bar to the housing and protect the rack and pinion teeth, rack housing end bushes, and track rod inner ball joints. An external breather tube links the two gaiters together to accommodate the changes in enclosed space resulting from rack movement. The integrity of the gaiters and their sealing to the rack housing and track rods is vital to the longevity of the steering assembly, as any water or dirt ingress will cause rapid wear and deterioration of the moving parts. The gaiters should be carefully inspected at every service, and replaced if showing any signs of damage, wear, age hardening or perishing. A quick check method is to squeeze each gaiter in turn and listen for any escape of air from a gaiter hole or joint.

To Replace a Gaiter

1. Remove the nut securing the track rod end to the hub carrier steering arm, and use a ball joint separater to disconnect the joint.

2. Mark the position of the track rod end against the track rod, and measure the length of exposed thread before slackening the track rod end locknut, and unscrewing the rod end and locknut from the track rod.

3. Mark the position of the gaiter breather tube against the rack housing before cutting the clip securing the gaiter to the rack housing, and sliding the gaiter off the housing, breather tube, and track rod.

4. Inspect the condition of the rack assembly and track rod inner ball joints, and replace the steering unit if necessary. If the assembly is serviceable, clean off any dirt if necessary before re-lubricating the rock assembly with a lithium base grease.

5. Fit the new gaiter over the track rod, and fit onto the rack housing and breather tube. Check that the breather tube is correctly postitioned before securing the gaiter with the new clip, Fit the outer, small end clip.

6. Refit the track rod end as detailed in sub-section HD.7.

HD.9 - PAS PUMP & TESTING PROCEDURE

The Saginaw, vane type, constant displacement hydraulic pump, is mounted on the left hand front of the cylinder block and is driven by a 'V' belt shared with the water pump. The pump is secured to its mounting bracket by cap head screws, and is provided with a jacking stud to aid belt adjustment,

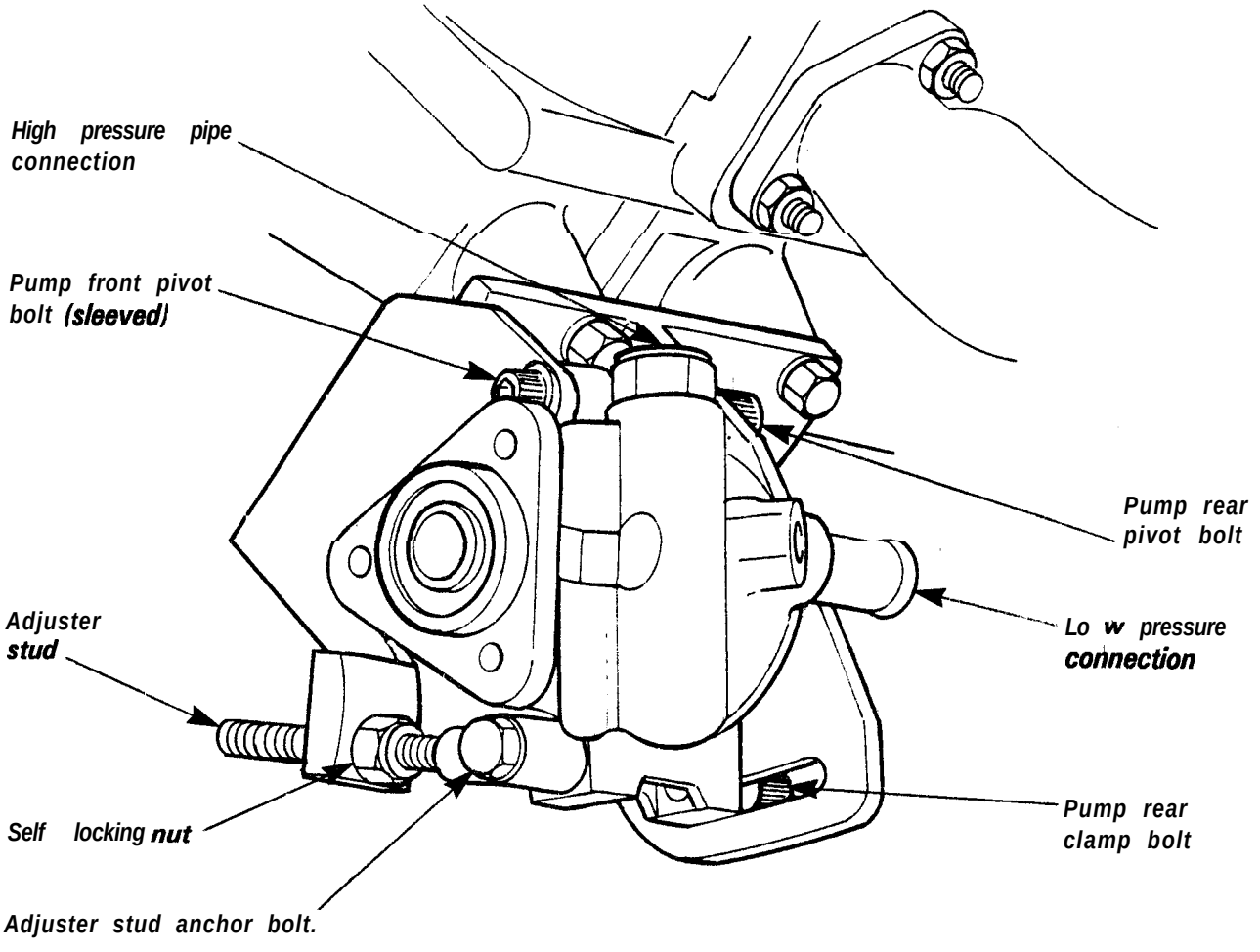
To adjust belt tension:

Slacken the cap head setscrew securing the top rear pivot lug of the pump to the mounting bracket, Note that it is not necessary to release the top front bolt, as a split sleeve at this point accommodates pump pivoting.

- Slacken the capscrew securing the bottom rear of the pump to the adjustment slot in the bracket. Slacken the adjuster stud anchor bolt at the front of the pump, and turn the self locking nut on the

adjuster stud as necessary to achieve the correct belt tension:
Specification = 6 mm one way deflection from the straight line, using moderate finger pressure on the longest belt run.
Tighten all fixings to 20 Nm (15 lbf.ft) and recheck belt tension.

'V' Pulley Removed for Clarity.



Note that the nut on the adjuster stud should not be screwed right to the end of the thread, or the self locking mechanism of the nut may be damaged. No nut is fitted on the opposite side of the locking nut abutment bracket, as the angle of contact will change dependent on pump position.

Pressure Test

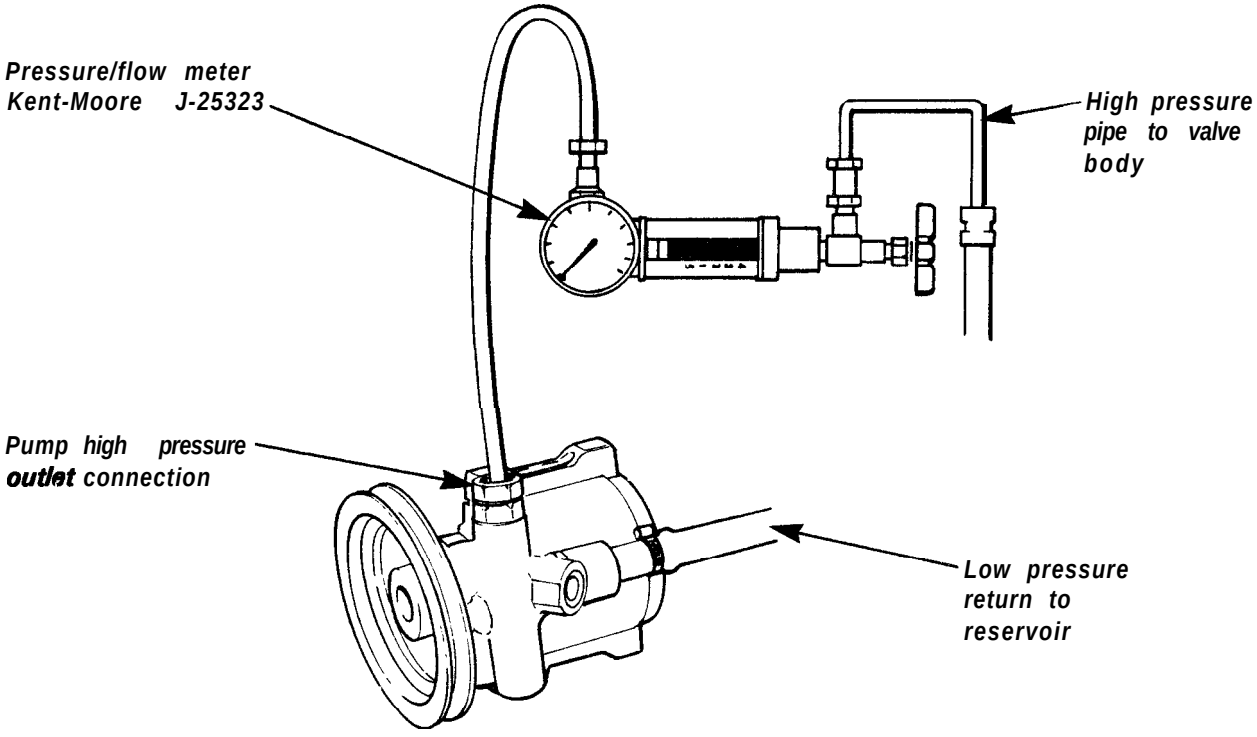
To check both the pump output, and the steering rack assembly seals for leakage, a pressure/flow meter such as Kent-Moore J-25323 is required to measure the line pressure and flow rate in the output hose from the pump:

1. Thoroughly clean the outside of the pump before disconnecting the output pipe connection from the top of the pump, using a shop towel to collect any draining fluid, and fit the test gauge between the pump and the disconnected pipe. Top up the PAS reservoir if necessary.

2. Open the gauge valve fully, start the engine, and check the gauge connections for leaks, If necessary, add fluid to the reservoir to bring the level to 10 mm above the strainer. Slowly close

the gauge valve until a pressure of about 20 kgf/cm² (300 lbf/in²) is registered. Run in this condition until the system reaches a normal running temperature of 50 - 60°C (120 - 1 40°F).

3. Raise engine speed to 1500 rpm. Briefly close the gauge valve fully and record the highest pressure reading. NOTE: Do not shut the valve for longer than 10 seconds or the quickly rising fluid temperature will result in a false pressure reading. Briefly shut the valve twice more, and record the pressure readings.
   Specification: 70 - 77 kgf/cm² (1000 - 1100 lbf/in²)
   If any of the three pressure readings are outside of specification, or if there is a difference of more than 3.5 kgf/cm² (50 lbf/in²) between any two readings, the pump should be replaced.



4. With the gauge valve open and engine speed still at 1500 rpm, hold the steering hard against the left hand lock stop for a moment and record the maximum pressure and flow rate, and then hold hard against the right hand lock stop and record the pressure and flow. NOTE: Do not maintain the high steering wheel torque for longer than 10 seconds, or the quickly rising fluid temperature will result in false readings.
   Specification: **70 kgf/cm² (1000 lbf/in²) minimum**
   3.6 litre/min (0.8 imp.gall/min; 1 .O US gall/min) maximum
   If readings are outside of specification, a leaking valve body seal or rack piston seal is indicated. Repair rack assembly as necessary.

5. To check the pump delivery, with engine speed held at 1300 rpm and the gauge valve open, check the flow rate:
   Specification: 7.5 - 9.5 litre/min (1.7 - 2.1 imp.gal; 2.0 - 2.5 US gal).
   To check that the flow rate drops off at higher engine speed, raise to 3,500 rpm, and measure the flow rate.
   Specification: 5.2 - 7.2 litre/min (1 .1 - 1.6 imp.gal; 1.4 - 1.9 US gal).
   If either reading is out of specification, the pump should be renewed.

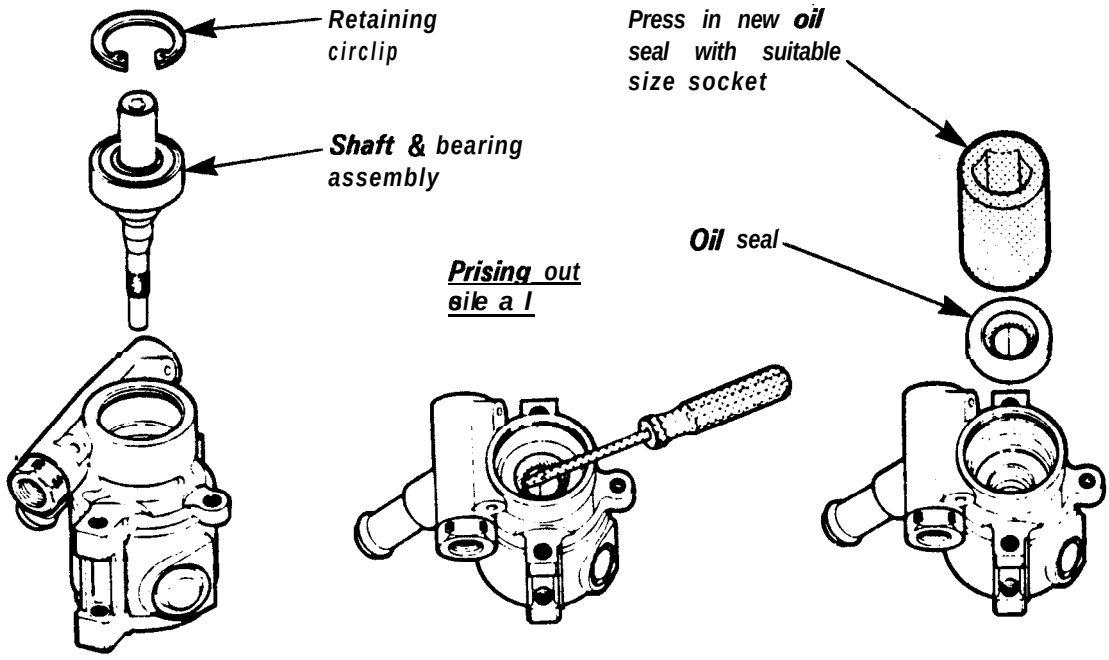
Pump Servicing

The flow control valve contained within the pump housing is calibrated by the manufacturer, and should not be disturbed. The pump may be serviced to replace a driveshaft seal or ball bearing, and it is

recommended that these items are renewed as a pair.

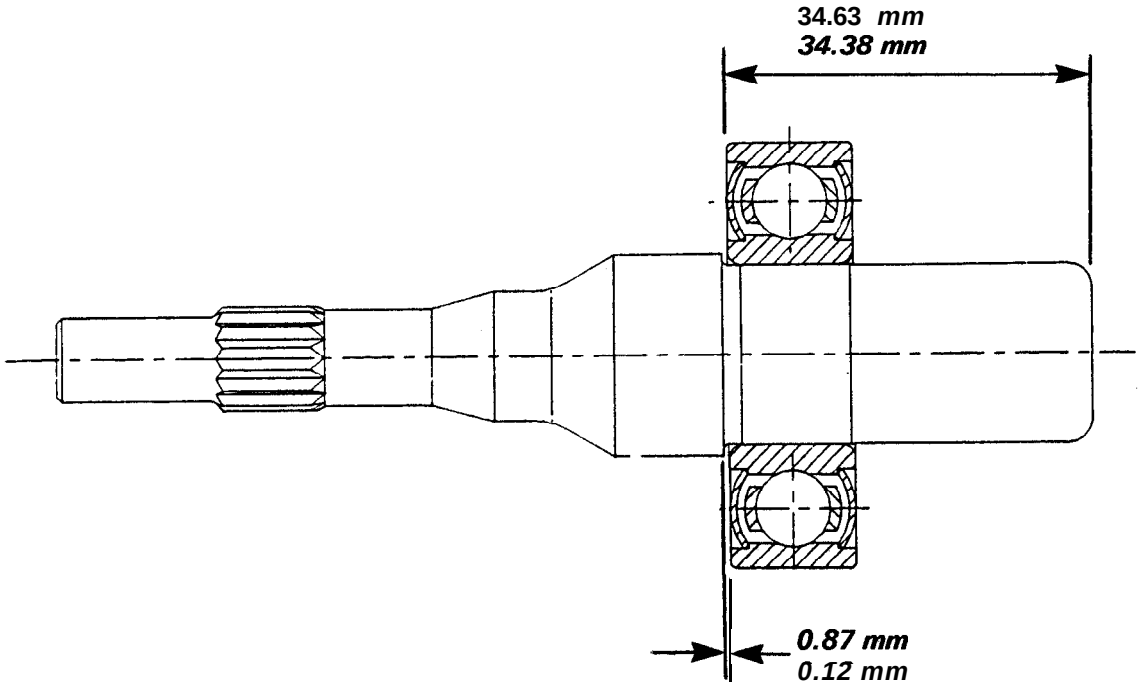
1. Press or draw the pulley hub off the pump shaft.

2. Remove the bearing retaining circlip and use the 3/8" UNC thread in the end of the shaft and a slide hammer to withdraw the shaft and ball bearing assembly from the pump housing.



3. Examine the surface of the shaft where the oil seal runs, and replace the pump assembly if badly marked.

4. Press the ball bearing from the shaft, and fit a new bearing into position pressing only on the inner race.



5. Prise the oil seal from the pump housing, and press a new seal into position until bottomed in the housing.

6. Refit the shaft assembly into the pump, rotating the shaft to engage the shaft serrations with those of the pump rotor. Press only on the ball bearing outer race. Retain by fitting the circlip with the bevelled side outwards.

7. Use the 3/8" UNC thread in the end of the shaft to draw on the pulley hub until flush with the end of the shaft.

HD.10 • RACK & PINION ASSEMBLY REMOVAL/REPLACEMENT

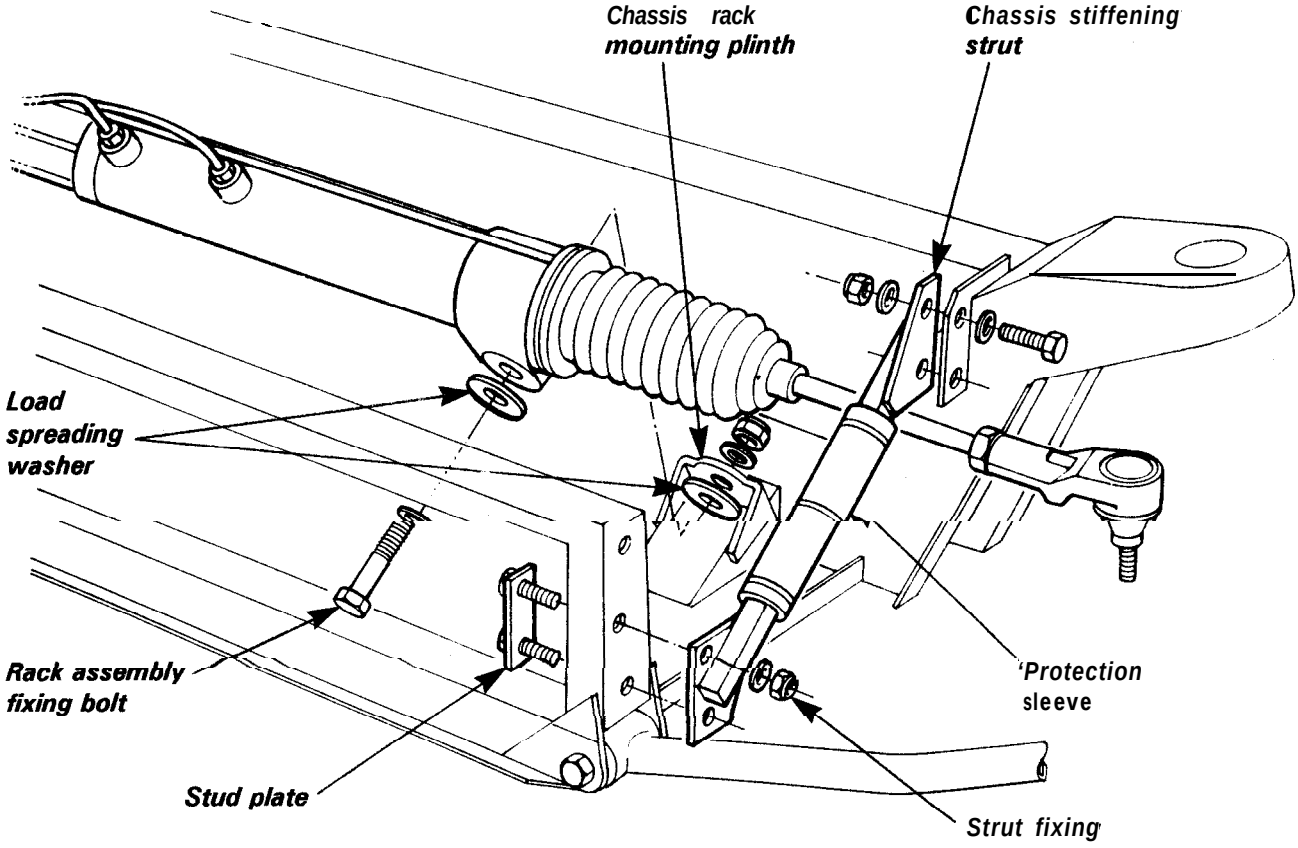
The rack and pinion assembly is bolted rigidly to the chassis ahead of the front crossmember. The chassis front frame is braced to the crossmember at each side by a bolted in strut, the removal of which allows better access to the steering rack assembly. Removal of the steering rack assembly is best achieved using a wheel free lift.

1. Remove both front road wheels, and disconnect the track rod ends from the steering arms

2. Release the two M8 nuts securing each end of the driver's side chassis stiffening strut, and remove the strut.

3. Remove the pinch bolt securing the lower u/j to the rack pinion shaft.

4. Disconnect the high pressure connection between feed hose and chassis pipe, and release the hose clip securing the low pressure return hose to the chassis pipe. Collect the draining fluid and/or cap the pipes and hoses.



5. Remove the Ml0 nut and bolt securing the rack assembly at each side, noting the positioning of washers.

6. Withdraw the pinion shaft from the lower u/j, and manoeuvre the rack assembly out from the driver's side, taking care not to snag on any hoses, pipes or harnesses.

Re-fitment is a reversal of the removal procedure with the following notes:

- Feed the pinion shaft into the lower u/j as the rack assembly is positioned; the design of the joint allows assembly in only one orientation. Fit and tighten the pinch bolt to 18 - 20 Nm (14 -15 lbf .ft).
- A large load spreading washer is fitted against each side of the two rack housing mounting lugs, and a normal flat washer beneath the head of the bolts and beneath the nuts. The bolts are inserted from below. Torque to 70 Nm (52 lbf.ft).
- For refitting the track rod ends, refer to Sub-Section HD.7.
- For refilling the hydraulic svstem, refer to Sub-Section HD.3.

HD.II - RACK & PINION ASSEMBLY OVERHAUL

The only service parts of the rack and pinion assembly, are the two rack gaiters, and an overhaul kit which includes most of the seals and bushes. If any other parts are required, a complete rack and pinion assembly should be fitted.

Special Tools Required

Drift, rack inner seal extractor	TOOOTI 243
Installer, valve sleeve	TOOOTI 244
Installer, pinion seal	TOOOTI 245

After removing the steering unit from the car:

1. Thoroughly clean the steering unit, especially around the two gaiters, pinion shaft and pipe connections. If necessary, remove the feed and return pipes from the valve body and plug the pipes and ports. Release the two metal pipes from the rack housing and drain the housing of oil by traversing the rack from end to end.

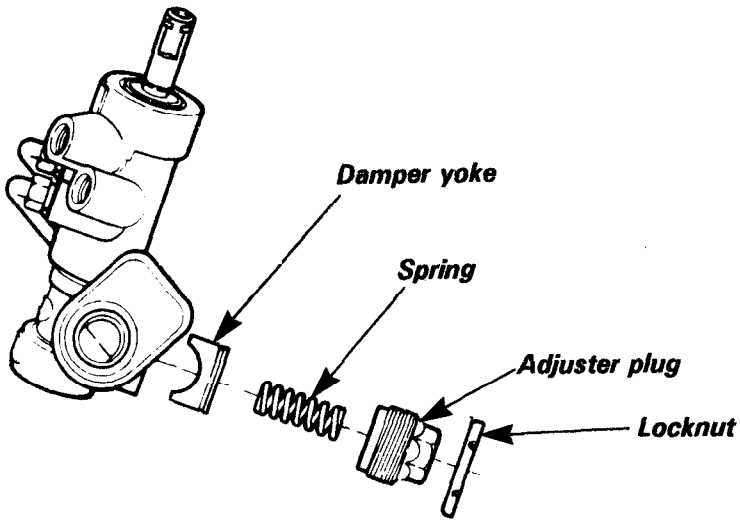
2. Note the position of the gaiter breather tube before cutting off the inboard clips, and sliding the rack gaiters along the track rods.

3. Before further dismantling the rack assembly, establish the rack central position (mid-way between full travel each way) and mark for reference.

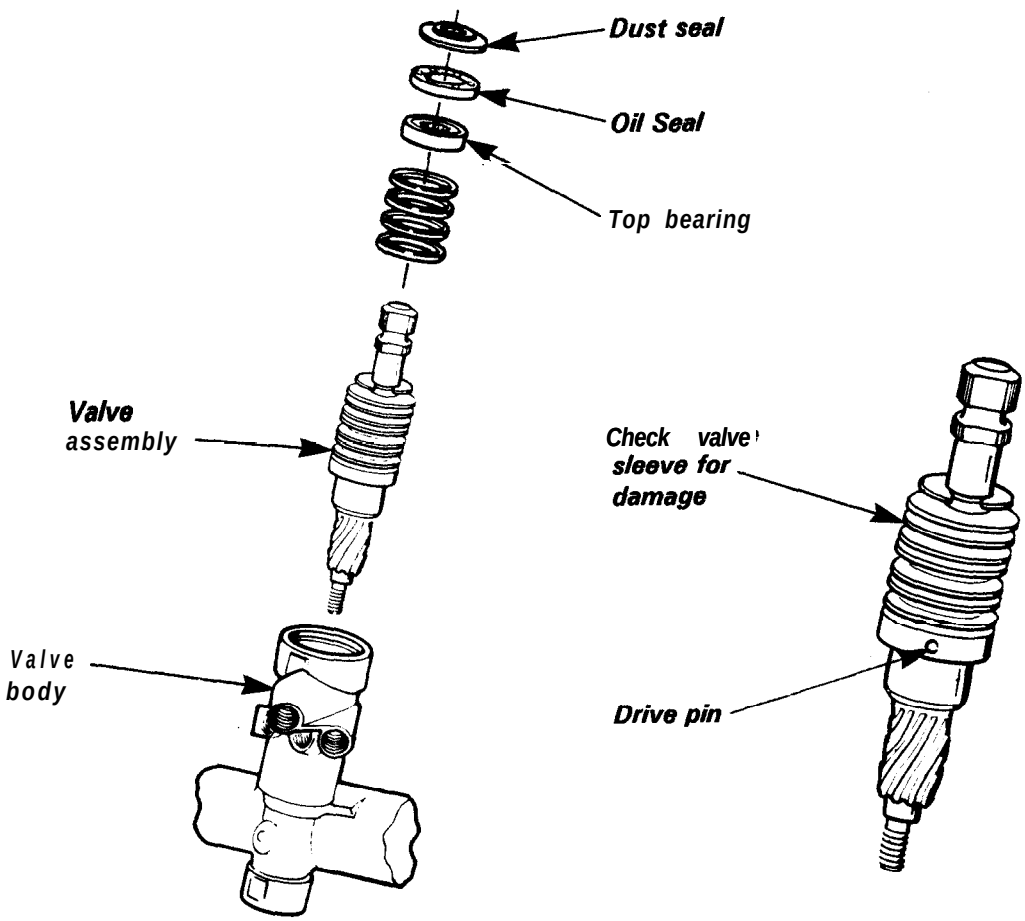
4. Clamp the rack in a soft jaw vice and push back the shock damper washers from the inner ball joints. Using the flats on the inner ball joint, unscrew each ball joint from the end of the rack. Some force will be required to overcome the peening of the ball joint flange. Remove the damper washers.
CAUTION: Do not allow the pinion to resist the rack torque when unscrewing the ball joints, or damage will occur. The rack must be securely clamped.

5. Release the damper yoke locknut, and remove the adjuster plug and spring. Withdraw the damper yoke.

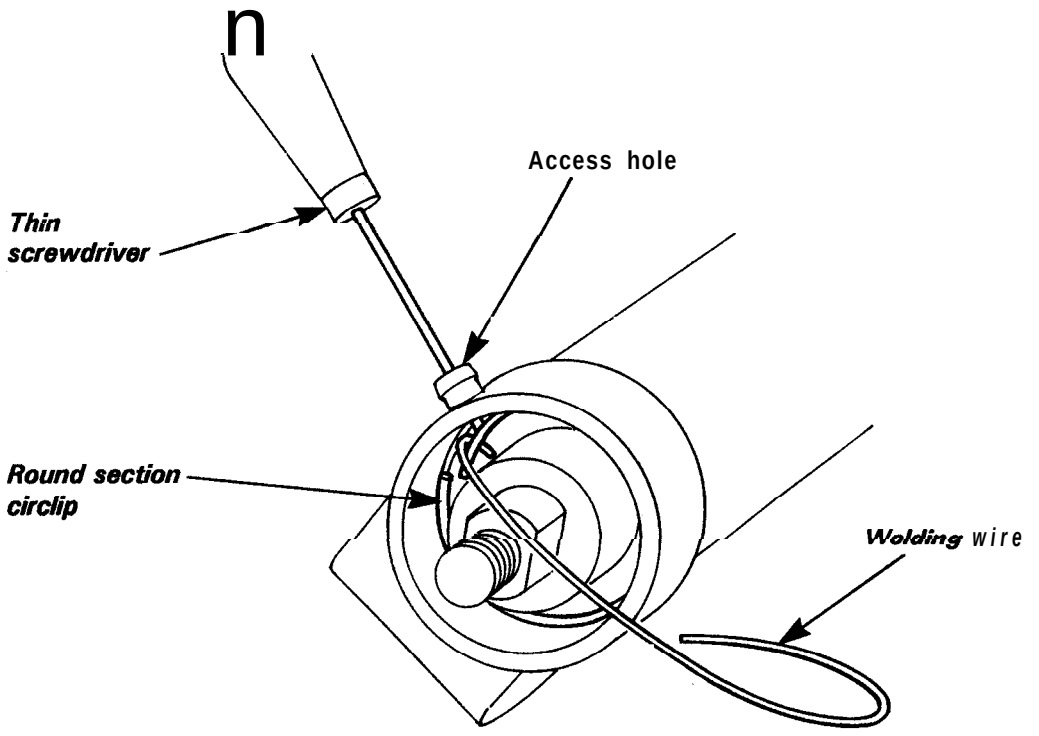
6. Tap off the end cover from the bottom of the valve body. Hold the top end of the pinion shaft and remove the nut from the bottom of the shaft.
CAUTION: The pinion shaft must be held during this operation to prevent damage being caused to the gear teeth.



7. Remove the circlip retaining the pinion shaft dust seal. Press the pinion shaft assembly out of the valve body complete with top seals and bearing. Do NOT use a hammer, or damage to the assembly and/or loosening of the drive pin may result.
After removal, carefully inspect the valve assembly for damage or a loose drive pin; replace the pinion shaft assembly if any defects are found.



8. At the non-pinion end of the rack housing, remove the dust cap and use a thin rod in the access hole to press on the end of the wire circlip retaining the rack housing bulkhead. Press the bulkhead into the housing to relieve pressure on the circlip and hook the circlip out of the housing using a suitably bent welding wire or similar.



9. Press the rack out of the housing towards the non-pinion end, and with it, the bulkhead, wavy washer, and rack bush carrier.

10. To remove the rack housing inner seal, an extended drift tool TOOOT1243 is required. Insert the tool from the pinion end of the housing, and locate behind the seal. Tap out the seal towards the non-pinion end of the housing.

11. Remove the circlip retaining the pinion shaft lower ball bearing, and press or tap out the bearing.

12. Use a drift to tap out the pinion shaft bush and seal towards the top end of the valve body.

Re-assembly

IMPORTANT: Valve assemblies, racks and housings are not interchangeable. The same major components must be reinstalled, or the complete steering unit renewed.

1. Fit the new pinion shaft bush into the valve body housing using a suitable press tool or drift, followed by the new oil seal, with open side uppermost. Lubricate the bush and seal lip with lithium grease (Shell Retinax or equivalent).

2. Press a new pinion shaft lower ball bearing into the housing using a 19 mm socket as a drift, and retain with the circlip.

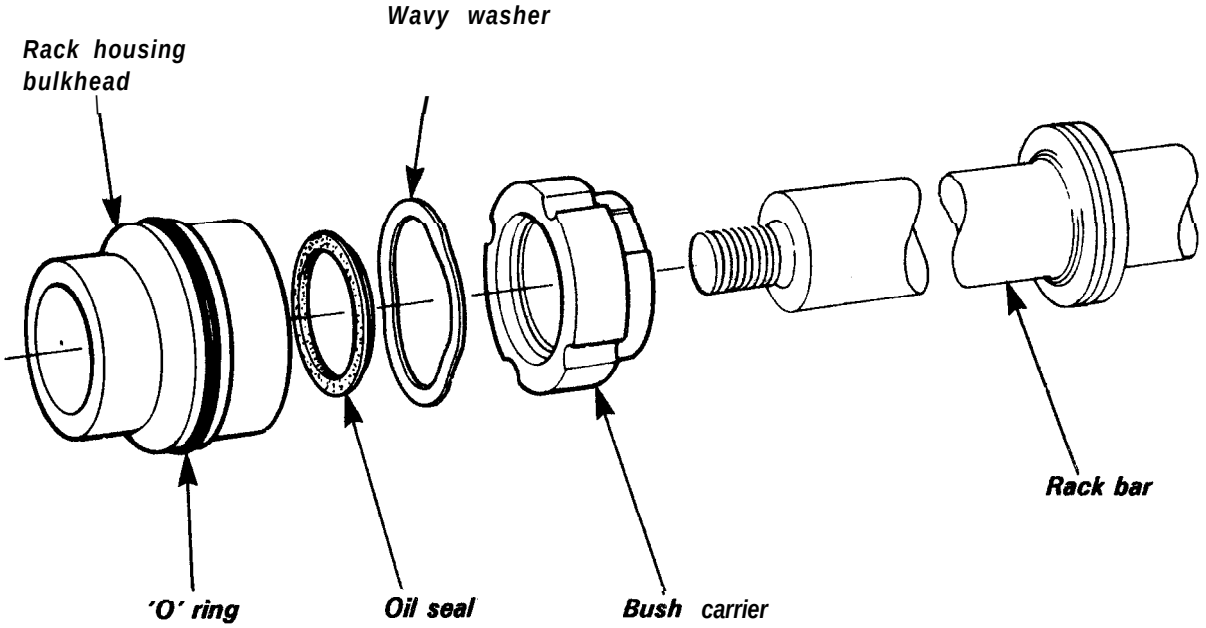
3. Remove the piston ring from the rack piston, and carefully fit the new ring, stretching as little as possible and allowing time for recovery before further reassembly.

4. Lubricate the new rack housing inner seal with power steering fluid. To protect the inner rack seal during fitment, tape over the end of the rack bar, and wrap the rack teeth with thin card. Slide the new seal onto the card, with the seal open side towards the rack piston, and traverse the card and

seal across the rack teeth. Slide the seal off the card onto the rack bar, and abut against the rack piston.

5. Lubricate the rack teeth with lithium grease, such as Shell Retinax or equivalent. Insert the rack bar, rack end first, into the non-pinion end of the rack housing, and press or tap with a soft face mallet on the end of the rack bar to fully seat the seal inside the housing.

6. Lubricate the rack bush with power steering fluid and insert the bush carrier, smaller end first, into the non-pinion end of the rack housing. Follow with the wavy washer.



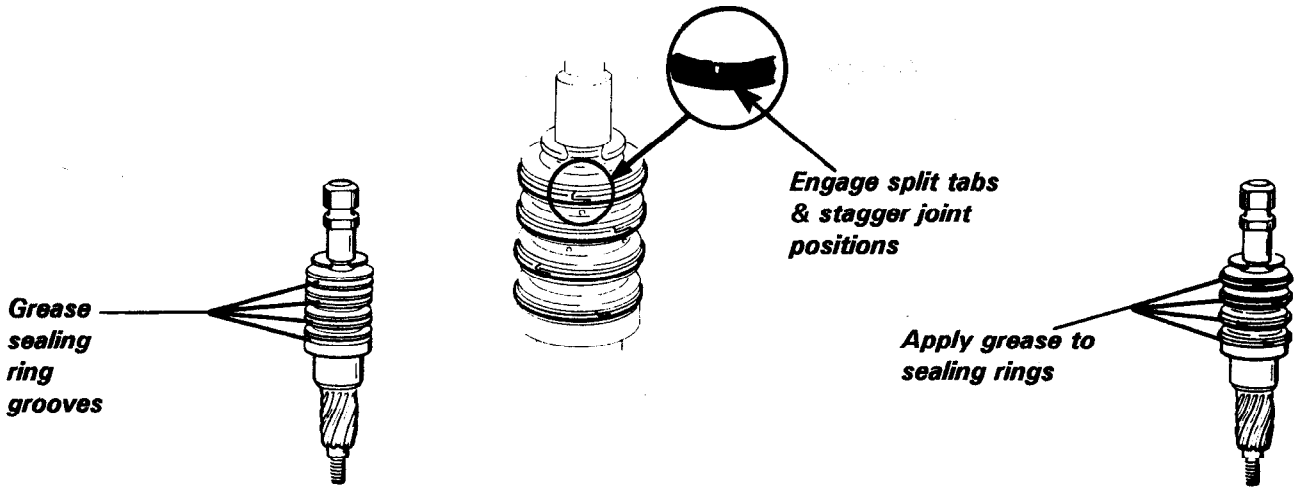
7. Remove the old oil seal and '0' ring from the rack housing bulkhead, and press a new seal, open side innermost, into position. Use tape over the end of the rack bar to protect the seal during fitment. Fit a new '0' ring onto the outside of the bulkhead, coat the seal and '0' ring with power steering fluid, and insert the bulkhead over the rack bar and into the non-pinion end of the rack housing. Press into position until fully seated.

8. Use a new wire circlip to retain the bulkhead, positioning the end of the clip 10 to 15 mm from the clip access hole. Press the bulkhead into the housing when fitting the circlip, to compress the wavy washer. Ensure the clip is fully engaged in the bulkhead groove.

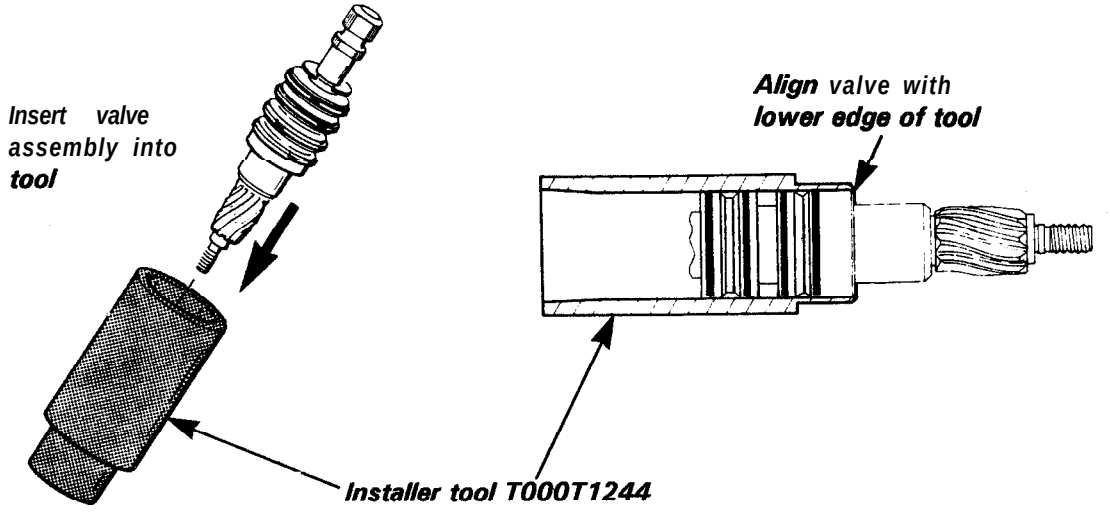
9. Remove the four PTFE sealing rings from the valve sleeve taking care not to mark the sleeve. Note that the factory fitted sealing rings are endless, whereas the service replacement rings are a split type to enable fitment without damage.

IMPORTANT: Before fitting the replacement sealing rings, apply a liberal quantity of grease supplied in the service kit to each ring groove. Carefully fit the four new rings into position, taking care not to damage or stretch the rings. Ensure that the split tabs are engaged and staggered with respect to one another.

IMPORTANT: Apply a liberal quantity of grease supplied in the service kit to the rings to hold the rings in position prior to fitment into the valve body.

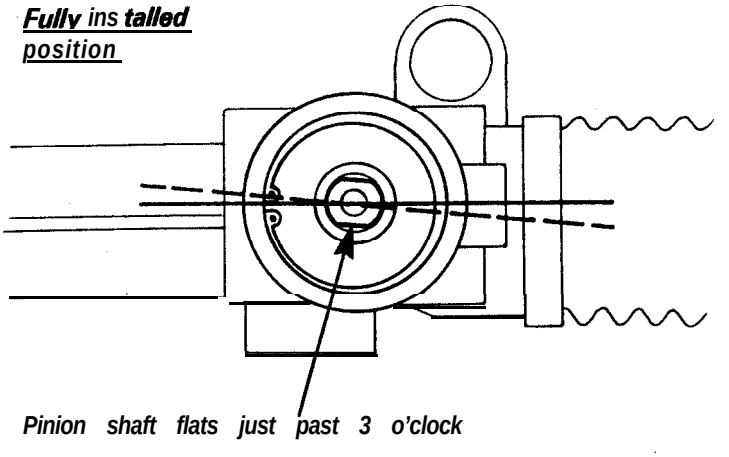


10. Insert the valve assembly into the installer tool T000T1 244, with the edge of the valve sleeve flush with the bottom of the tool. Using the transparency of the tool, check that all the sealing rings are undamaged and correctly seated in the grooves with their split tabs engaged. Allow a recovery time of at least three minutes before continuing installation.



11. Centralise the rack using the reference marks noted before disassembly, and rotate to align the gear teeth with the pinion aperture.

12. Insert the pinion shaft into the housing with the flats on the tip end of the shaft at the 2 o'clock position as the teeth are engaged. Slide the pinion shaft fully into position, guiding the bottom spigot through the ball bearing, and seating the needle bearing and annulus in the top end. When the shaft is fully engaged, the flats should be aligned slightly past the 3 o'clock position with the rack still centralised.



13. Fit the locknut onto the bottom end of the pinion shaft and tighten to 35 Nm (26 lbf.ft). Press the end cover into the housing.

14. Press out the pinion shaft needle bearing from the annulus, and press a new bearing into position. Fit the bearing and annulus onto the top end of the pinion shaft and lubricate the pinion teeth with lithium grease such as Shell Retinax or equivalent.

15. Lubricate the lip of the pinion shaft upper oil seal with power steering fluid, and the dust seal with lithium grease. Press both seals into position in the valve body housing, open sides lowermost, using tool TOOOT1245, and retain with the circlip.

16. Lubricate the damper yoke with lithium grease (Shell Retinax or equivalent), and fit into the rack housing. Fit the spring, adjuster plug and locknut. Finger tighten the adjuster plug at this stage.

17. Move the rack to expose sufficient rack teeth to clamp in a soft jaw vice. Fit a shock damper washer over one end of the rack bar, flat side towards the rack housing. Screw a track rod/inner ball joint assembly onto the rack bar, using a shim washer if re-using a ball joint in order to offset the peening marks by 90°.
Tighten the ball joint to 95 Nm (70 lbf.ft).
CAUTION: Do not allow the tightening torque to be resisted by the pinion, or damage to the gears may occur.

18. Peen the ball joint lip fully into both flats on the rack bar, and press the shock damper washer into position on the ball joint.

19. Repeat operation (17) for the opposite ball joint.

20. With the rack centralised, tighten the adjuster plug to 8 - 15 Nm (6 - 11 lbf.ft), before backing off 40° - 60°. Apply a torque wrench to the pinion shaft, and check the torque required to move the rack at a steady state (NOT the starting torque) ± 90° of the straight ahead position.
Also check that the rack travels from end to end within 4 seconds when a force of 380 N is applied axially to the rack.
If either result falls outide of specification, re-adjust the rack yoke as necessary.

21. Refit the rack gaiters and breather tube, using new inboard retaining clamps.

Cooling System

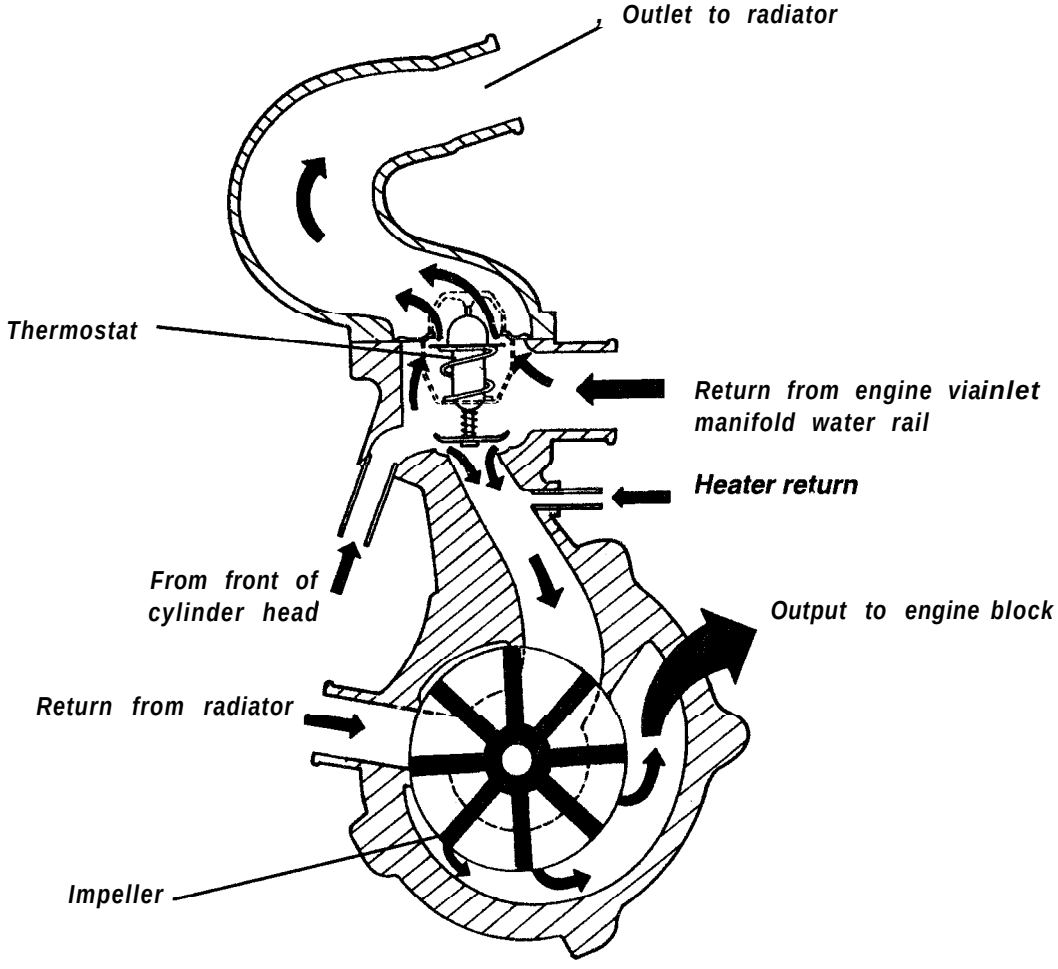
SECTION KE - ESPRIT S4 & Sport 300

KE.I - GENERAL DESCRIPTION

Engine Cooling: 4-Cylinder Models

A centrifugal water pump is mounted on the front face of the cylinder block, and is driven by a single 'V' belt from the nose of the crankshaft. Coolant is pumped by the impellor into the front of the block, around the 'wet' cylinder liners, and into the cylinder head, exiting via passageways between the inlet ports into a collector pipe integral with the inlet manifold. The collector pipe Is connected by hose to the thermostat housing which is integrated into the top of the water pump housing. An additional connection between the cylinder head and thermostat housing is provided via an elbow hose and a spigot pipe in the front face of the head.

When the thermostat is closed, coolant returning to the thermostat housing flows downwards back into the water pump to commence another cycle. When the thermostat Is fully open, the secondary valve of the thermostat closes off the by-pass port, so that all the coolant flow Is directed upwards, through the thermostat and into pipework leading to the front mounted radiator. Coolant returning from the radiator flows back into the water pump impeller housing to commence another cycle.

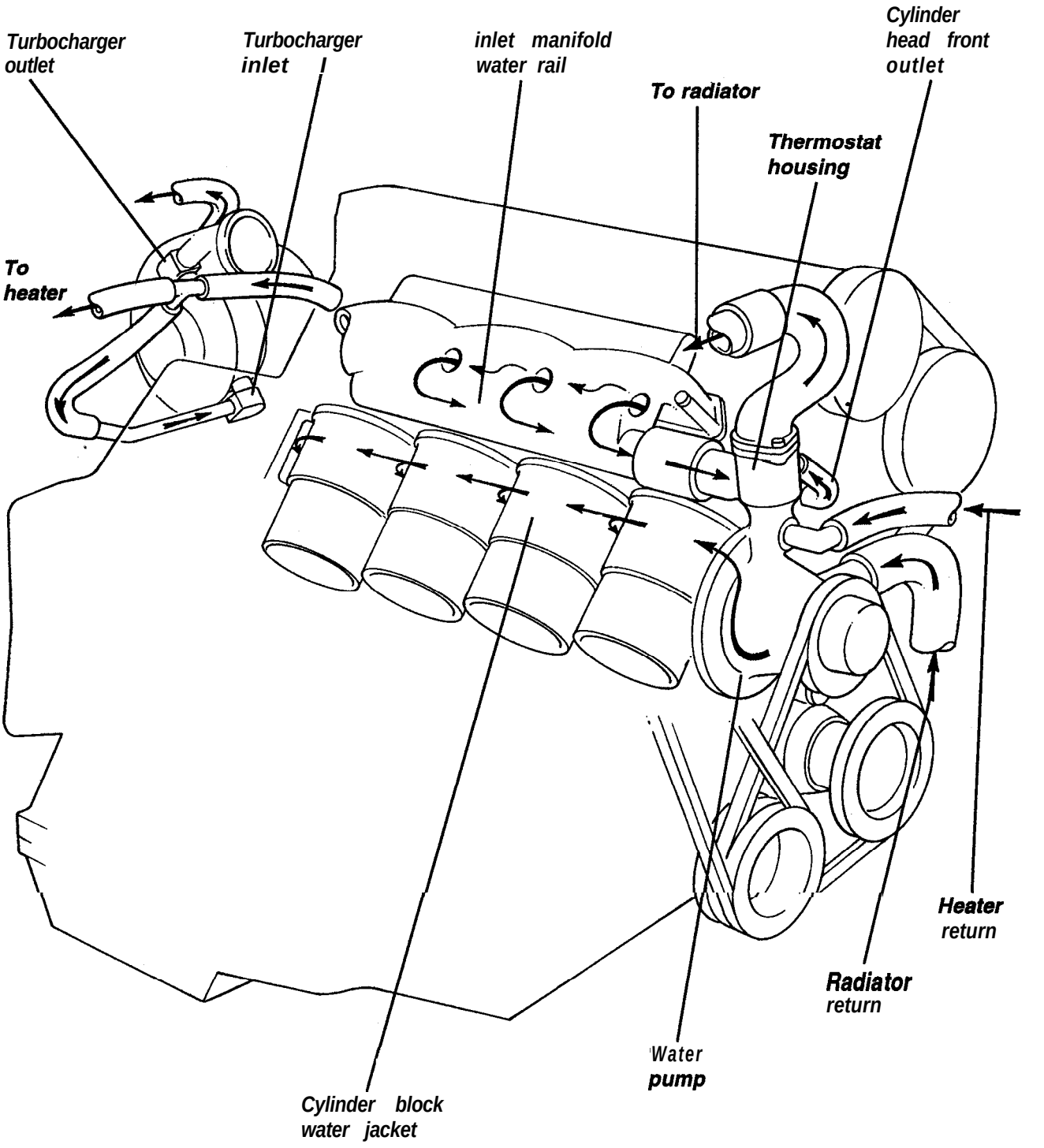


e35

The radiator is located in the nose of the car, and is mounted in a duct fixed to the underside of the front luggage compartment. Three electric cooling fans are fitted in a cowling on the rear side of the radiator, and are controlled by the engine management ECM.

The cooling system uses a header tank to ensure that the system remains competely filled, and an expansion tank to accommodate expansion of the coolant when the engine is warm. The header tank is located at the right hand rear corner of the engine bay, and is connected with the return pipework between the radiator and water pump. The expansion tank is mounted in the left hand rear of the rear luggage compartment, and is connected by hose to the neck of the header tank. Two types of header tank have been used;

*Schematic water flow thro' **4-cylinder** enaine*



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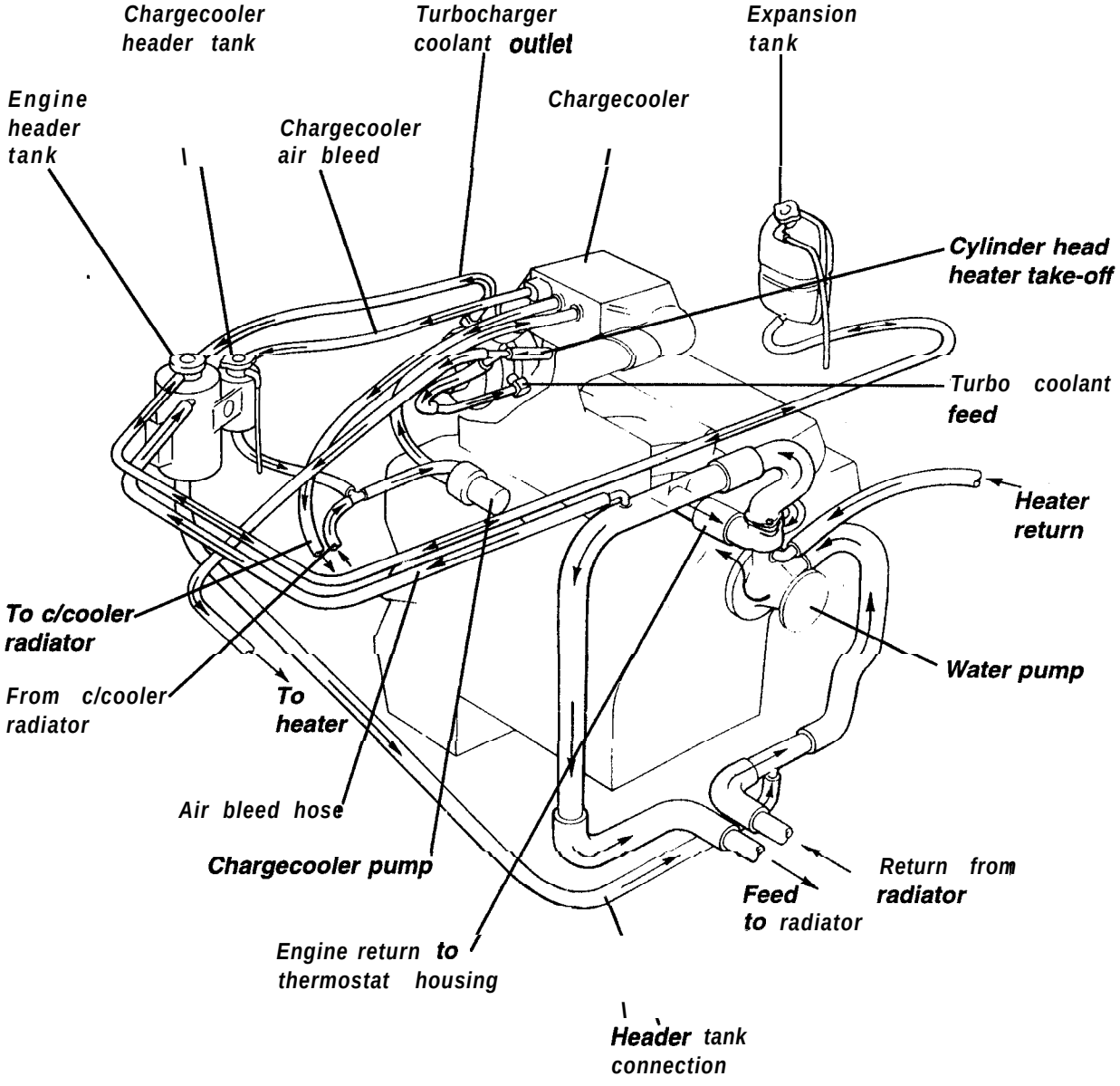
Twin header tank - 4 cylinder

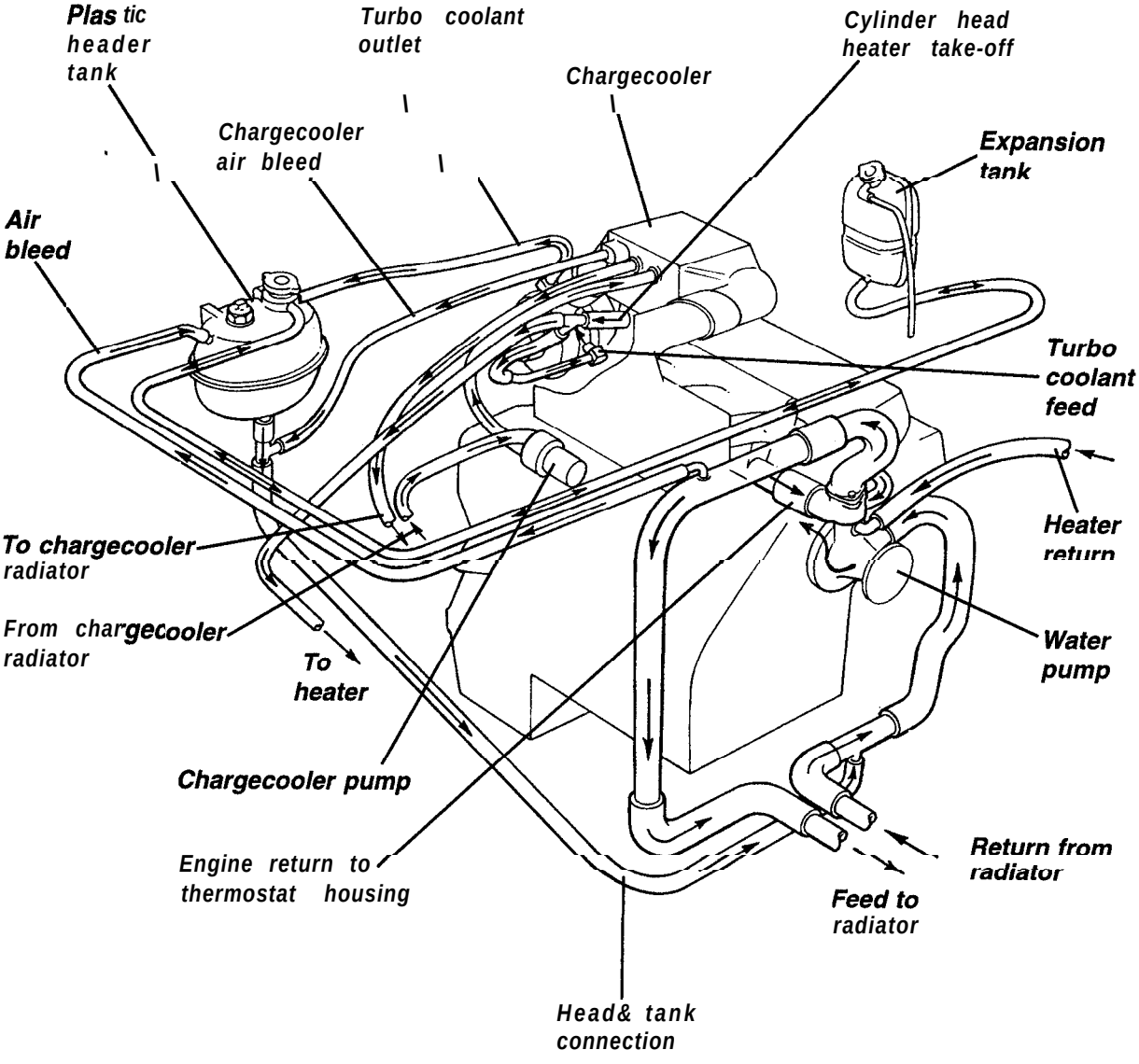
Prior to December '93, a cylindrical steel tank was fitted, with a similar but much smaller tank for the totally separate chargecooling water system attached to It. This type of header tank is fitted with a blanking cap, and the expansion tank with a 110 kPa (15 psi) pressure cap. Low level sensors are fitted to the main header and chargecooler tanks, and operate, via a low coolant module, the coolant tell tale lamp on the fascia.



Single header tank - 4 cylinder.

- Cars built after December '93 are fitted with a single plastic header tank which is shared by the chargecooling system. This tank uses a 110 kPa pressure cap, with a blanking cap fitted to the expansion tank. Expanding coolant opens the pressure cap and transfers to the unpressurised expansion tank, from which it returns via the pressure cap vent valve when the cooling system develops negative pressure on cool down. A low level sensor in the header tank operates the coolant tell tale directly, but also signals the engine management ECM which then activates the Check Engine' tell tale.

The coolant supply for the interior heating system is provided by a take-off at the right hand side rear of the head, with a return connection to the thermostat housing. The feed to the turbocharger bearing housing is tapped via a 'T'-piece from the heater take-off hose, with the return connected to the header tank.



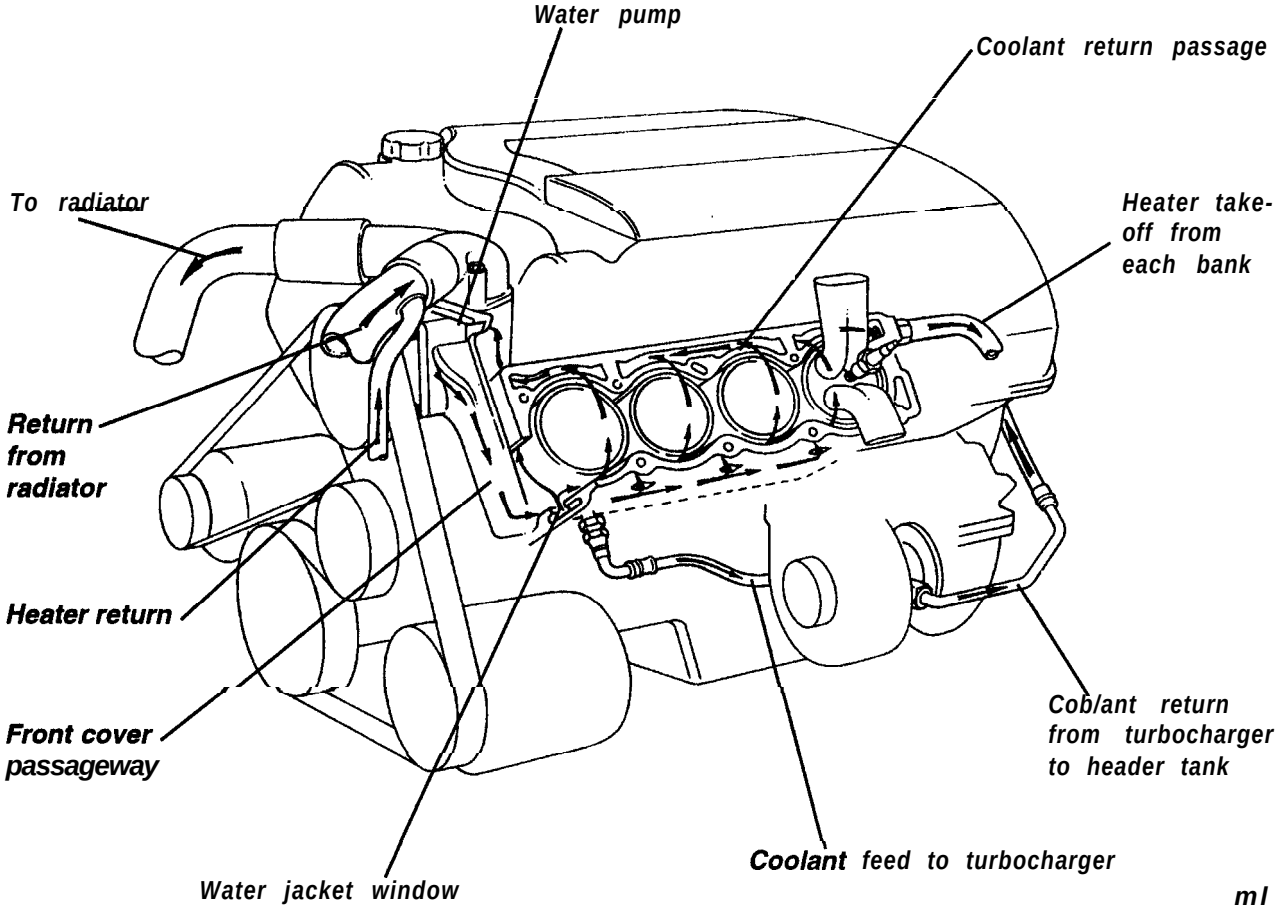
Engine Cooling: V8 Model

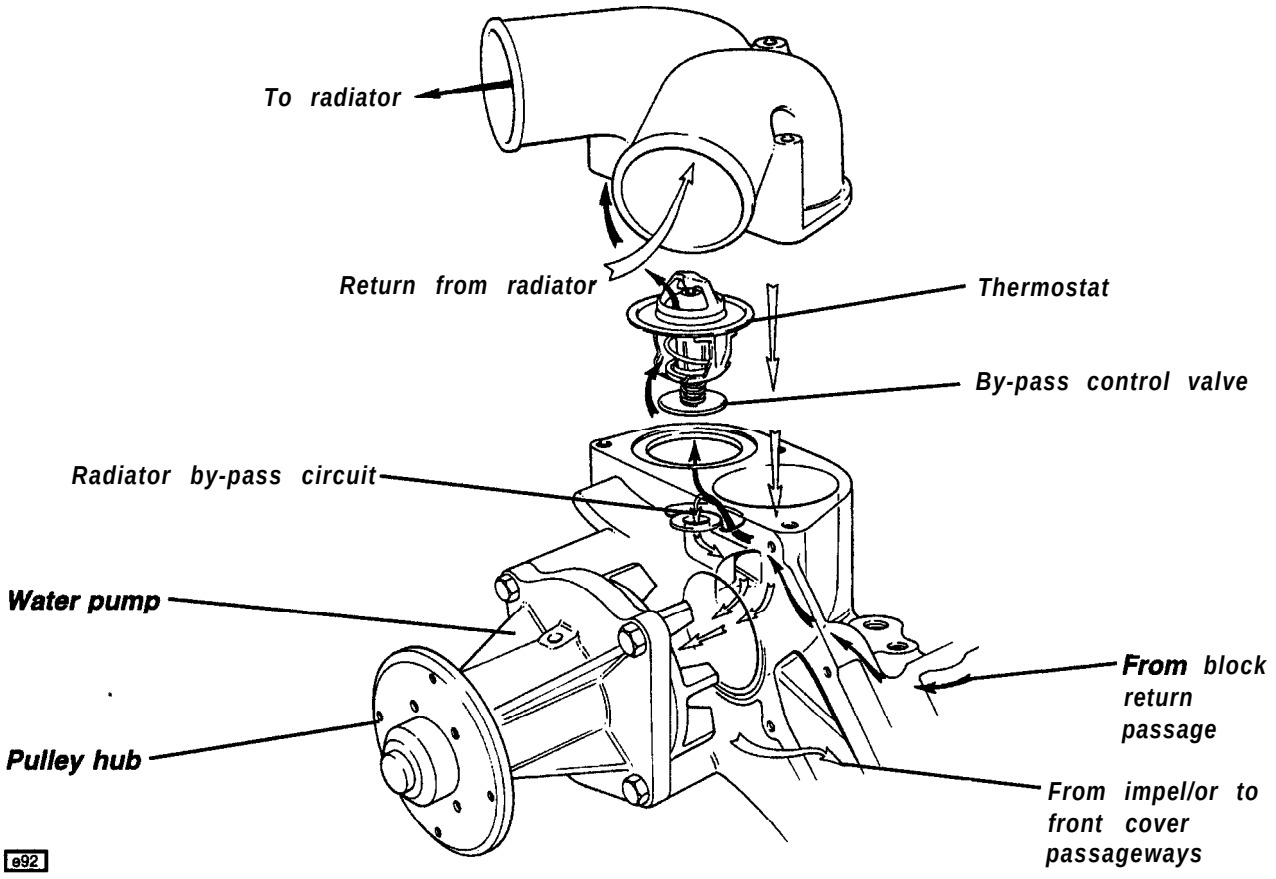
A centrifugal water pump is mounted on the front of the block, driven by multirib 'V' belt from the crankshaft. Water is pumped via passageways in the front cover, into the outside of each cylinder bank and via a window in each cylinder's water jacket, is circulated around each cylinder liner. Coolant then flows up into the head and around the combustion chamber before returning to a passage on the inside of the block and back to a thermostat housing at the front of the block. When the thermostat Is closed, coolant flows through a by-pass port to the water pump to commence another cycle. When fully open, the thermostat secondary valve closes off the by-pass port and directs all coolant upwards through the thermostat and into pipework leading to the front mounted radiator. Coolant returning from the radiator enters the top of the thermostat housing and is directed into the pump

The radiator is located in the nose of the car, and is mounted in a duct fixed to the underside of the front luggage compartment. Three electric cooling fans are fitted in a cowling on the rear side of the radiator, and are controlled by the engine management ECM.

The cooling system uses a header tank to ensure that the system remains competely filled, and an expansion tank to accommodate expansion of the coolant when the engine is warm. The plastic header tank is located at the right hand rear corner of the engine bay, and is fitted with a 110 kPa pressure cap to raise the boiling point of the coolant to over 120°C. The expansion tank is mounted within the right hand rear wheelarch and is fitted with a blanking cap. Expanding coolant opens the pressure cap and transfers to the unpressurised expansion tank, from which it returns via the pressure cap vent valve when the cooling system develops negative pressure on cool down. A low level switch in the header tank operates a coolant tell tale lamp on the fascia.

Engine coolant is used as the heat source for the interior heating system, with a take off provided at the rear of each cylinder bank coolant return passage. These two supplies are joined and feed a water rail at the left hand side of the engine bay, with a heater return connection in the coolant return pipe at the LH front of the engine bay. Cooling take offs for the turbochargers are provided at the front of the outer water gallery at each side of the block, and return from the turbochargers to the header tank.





Engine Coolant Tell Tale

A red coloured tell tale lamp in the fascia is provided to warn the driver of a cooling system related problem:

i) Low coolant /eve/ in *the* header *tank:* On cars with a separate chargecooler header tank, a probe is fitted near the bottom of the both the engine and chargecooler tanks, whereas later 4-cylinder cars, and V8 models use a level sensor mounted into the top of the single tank. Early twin tank 4-cylinder cars use two cylindrical 'low coolant modules' located in the engine bay relay box, replaced on later cars by a single cuboid module. Single header tank 4-cylinder cars operate the tell tale directly, but also signal the ECM which will light the 'Check Engine' tell tale, and restrict engine power. On V8 models, the tell tale is also operated directly, and the ECM signalled, but the 'Check Engine' light will not automatically be activated.

ii) High coolant *temperature:* The ECM will light the coolant tell tale to warn of excessive coolant temperature as detected by the engine coolant temperature sensor (Twin header tank cars utilise a switching relay in the engine bay relay box):
4-cylinder; over 110°C on rise, 105°C on fall
V8; over 118°C on rise, 110°C on fall. Flashes at temperatures over 115°C

Fan Fail Tell Tale (4-cylinder twin header tank cars only)

The three radiator fans are controlled by the engine management ECM. One side of the fan fail tell tale is connected to the switching input at the radiator fan relay, and the other side to the output side of the three fan fuses. The lamp will light only when a voltage imbalance occurs, the most likely cause of which would be a faulty relay or a blown rad. fan fuse.

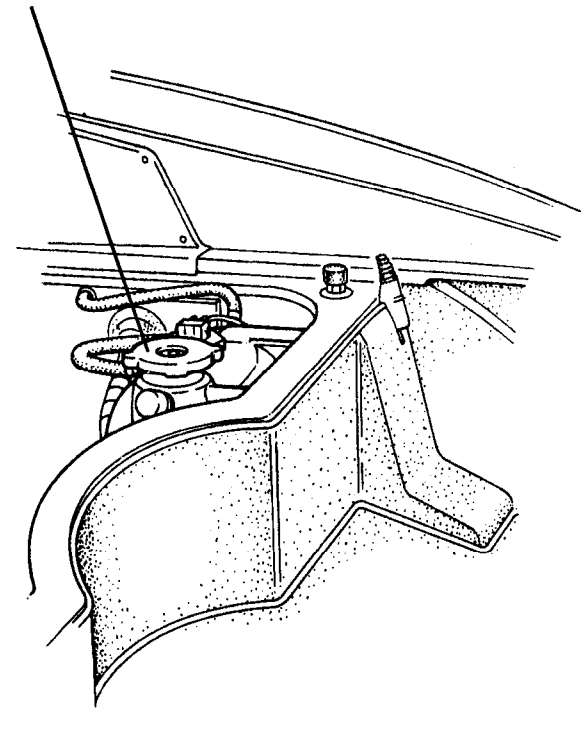
KE.2 ▪ MAINTENANCE

The level of coolant in the translucent expansion tank at the left hand side of the rear luggage compartment (4-cylinder) or within the RH wheelarch (V8), will rise as the engine warms up, and fall as it cools down, and under normal circumstances it should not be necessary to add any coolant to the system between services. If overfilled, the excess coolant will be ejected when the engine is warm. If underfilled, overheating may result.

WARNING: Do NOT remove the cap from the engine cooling header tank or expansion tank when the engine is warm, as serious scalding could result from boiling water and/or steam.

As a precaution, every week when the engine is completely COLD, the level of coolant in the header tank at the right hand rear of the engine bay should be checked. If necessary, top up the tank, being sure to use an approved coolant mixture (see below) in order to maintain full protection from freezing damage and corrosion. In areas where the tap water is extremely hard (exceeding 250 parts per million), distilled, de-ionised or filtered rain water should be used. Refit the cap securely. Coolant in the expansion tank will find its own level and need not be of concern.

V8 header tank



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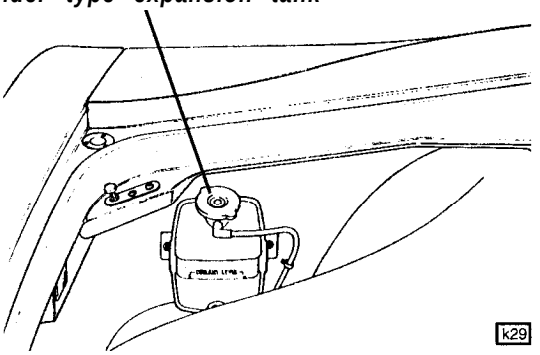
I-cylinder type expansion tank



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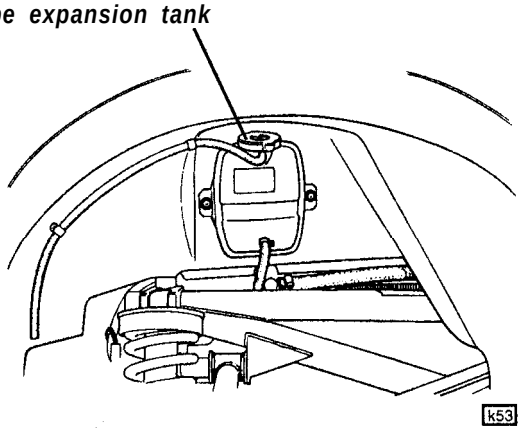
V8 type expansion tank



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NOTE: If the cap is removed from the header tank or from a pressurised type of expansion tank when the engine is warm, the pressure balance of the system will be disturbed and a small coolant loss may occur. The completely cold header tank level should be checked at the first subsequent opportunity.

Anti-Freeze/Corrosion Inhibitor

It is necessarv that the coolant contains an anti-freeze with corrosion inhibitor to protect the engine and heat exchangers from both frost damage, and corrosion of the metallic elements. A good quality mono-ethylene glycol anti-freeze, provides protection against these dangers as well as raising the boiling point of the coolant. The car is factory filled, for all markets, with a 50% concentration of anti-freeze which provides freezing protection down to approximately - 35°C. In warm climates it is recommended that the concentration is not allowed to fall below 25%, in order to maintain full corrosion protection.

The simplest means of checking the antifreeze concentration is to measure the specific gravity (density) of the coolant at a known temperature, using a hydrometer. The following table provides a general guide:

	Density @	
Concentration	**20°C**	**60°C**
25%	1.039	1.020
33%	1.057	1.034
50%	1.080	1.057

The coolant density reflects the effective level of mono-ethylene glycol, and not the level of corrosion inhibitors present, whose effectiveness diminishes over a period of time. The coolant should therefore be renewed every 24 months to ensure optimum corrosion protection.

In areas where the tap water is extremely hard (exceeding 250 parts per million), use of this water will lead to 'furring up' of the system over a period of time. In such areas, distilled, de-ionised or filtered rain water should be used.

Radiator Fin Cleaning

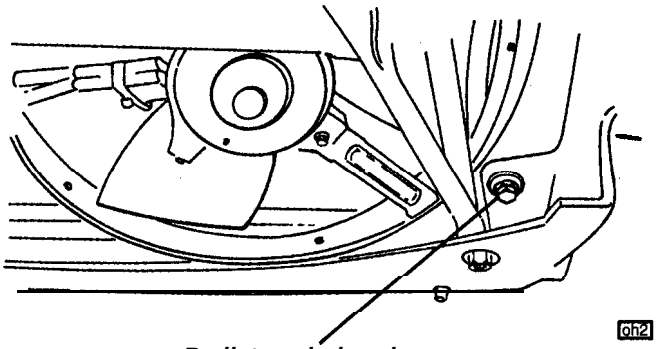
WARNING: The radiator cooling fans may start up without warning during a 20 minute period following engine switch off. To avoid personal injury, do not encroach into this area unless the fans are disabled.

At designated service intervals, the air ducts and matrices of all the cooling radiators should be checked externally for clogging by insects, leaves or other debris, and if necessary, a water jet used from behind to clear the finning. Take care not to damage the fragile tubes or distort the delicate finning by too powerful a water jet. At the same time, the integrity of all cooling system joints and flexible hoses should be checked.

KE.3 • DRAIN/REFILL PROCEDURE

4-cylinder cars with twin header tanks and all V8 models

To drain the engine cooling system, set the heater temperature control to 'hot', release the header tank cap, and remove the radiator drain plug. Also release hose connections in the engine bay as necessary to fully drain the pipework.



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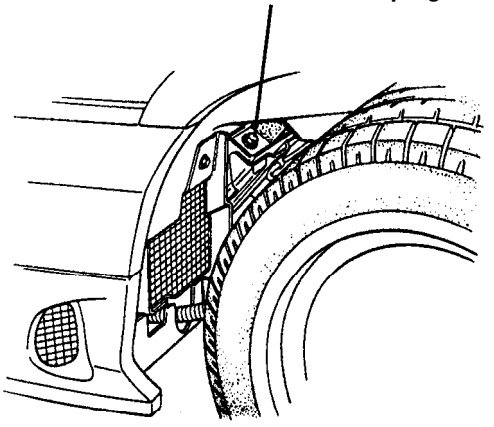
Radiator drain plug

Radiator air bleed plug

To refill the system, refit the hose connections securely, replace the drain plug, and open the radiator bleed plug from inside the left hand front wheelarch. Fill with coolant until a steady stream flows from the bleed. Close the bleed and add coolant until the system is fully filled.

WARNING: Wear protective gloves and take precautions as necessary to prevent scalding from the hot coolant.



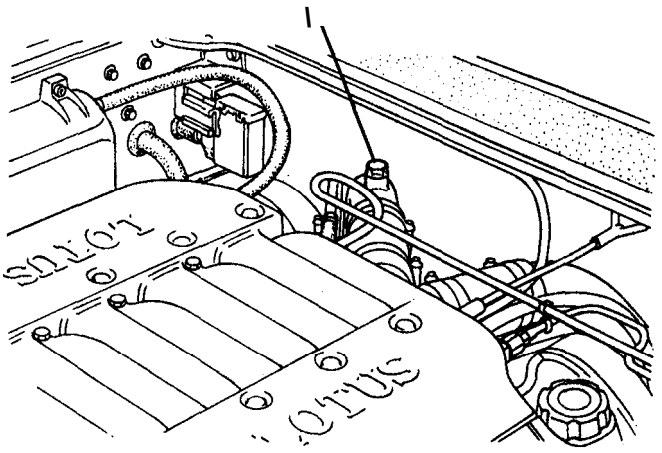
k52

On V8 models, remove the air bleed plug from the coolant return pipe at the front of the engine bay, and replace when all air has escaped. Run the engine up to operating temperature whilst topping up the header tank and refitting the cap when necessary to prevent coolant overflow. After normal running temperature has been reached and the cooling fans have cut in for the second time, loosen the radiator bleed plug again.

WARNING: Wear protective gloves and take precautions as necessary to prevent scalding from the hot coolant.

Close the bleed when all air has escaped, and a steady stream of coolant flows out. Allow the engine to cool fully, completely fill the header tank. and replace the cap securely.

Air bleed plug



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4-cylinder cars with plastic header tank

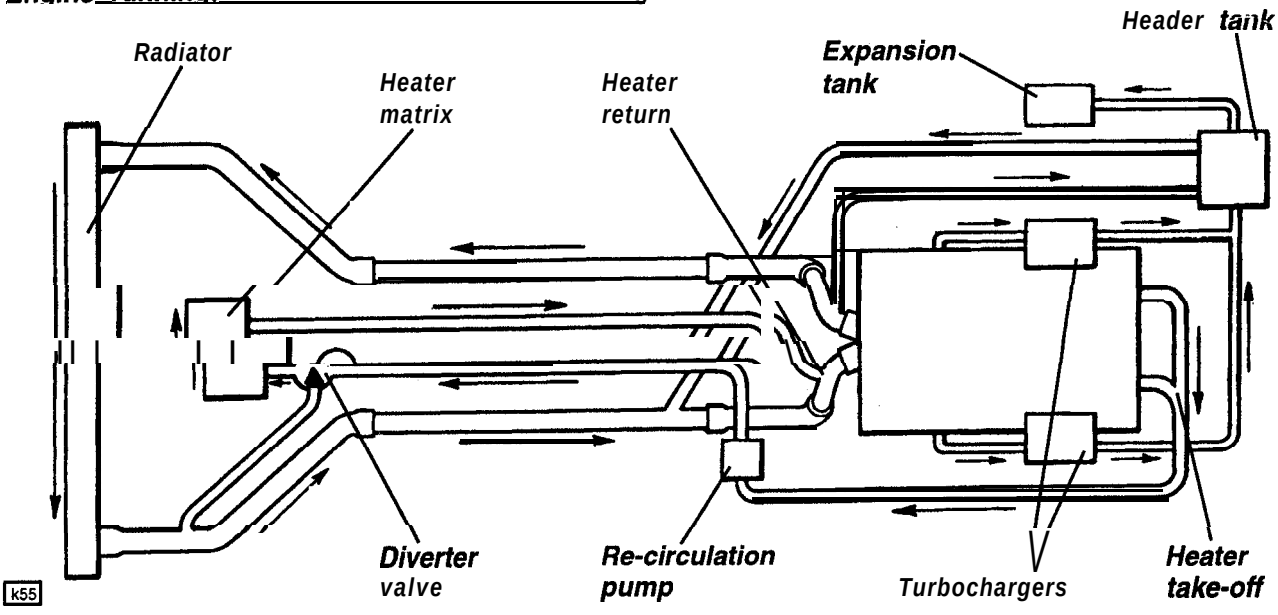
On cars with integrated chargecooler/engine cooling systems, the only inter-connection between the two systems is via the chargecoller air bleed hose to the header tnak, so that the system cannot be filled satisfactorily from empty only from the header tank. Refill after draining as follows:

i) Set the heater tamperature control to full hot.
ii) Clamp off the air bleed hose between the chargecooler and header tank (joined via 'T'-piece beneath the tank).
iii) Remove the plug from the top of the chargecooler, and fill with coolant.
iv) Fill the main cooling system via the header tank.
v) With the chargecooler bleed hose still clamped off, run the engine at idle speed, and keep both the chargecooler and header tank fully topped up.
vi) Replace the chargecooler plug and header tank pressure cap, and remove the clamp from the bleed pipe.
vii) Check that the expansion tank is part filled (add coolant if necessary), and is fitted with the blanking cap.
viii) Road test vehicle.
ix) When fully cold, check that the header tank is full, and the expansion tank contains a small amount of coolant.

KE.4 ▪ COOLANT RE-CIRCULATION PUMP & DIVERTER VALVE ▪ (V8 models only)

In order to control coolant temperature during conditions of 'heat soak' after engine switch off, an electic coolant circulation pump is fitted in the heater feed line, in conjunction with a diverter valve. The engine management ECM switches on the pump and radiator cooling fans, at coolant temperatures over 105°C on rise, 90°C on fall, as sensed by the coolant temperature sensor, during a 20 minute period following engine switch off. When the engine is stopped, the diverter valve shuts off the heater matrix and connects the heater feed line to the main radiator bottom hose. When the pump is running, coolant is pumped in reverse to the normal heater flow, into the back of the cylinder block, through the engine and out of the thermostat housing into the radiator feed pipe, through the engine cooling radiator and back to the diverter valve. The pump is mounted at the left hand front of the engine bay, and the diverter valve on the chassis front outrigger crossmember.

Engine running: thermostat open: heater opera ting



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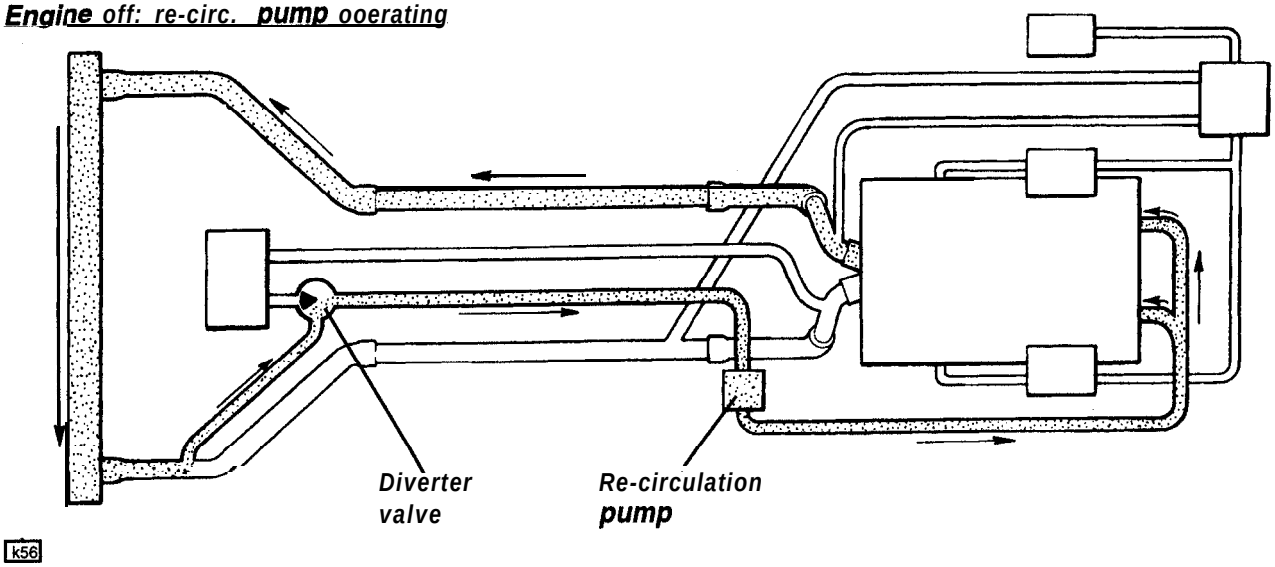
Engine off: re-circ. pump ooerating



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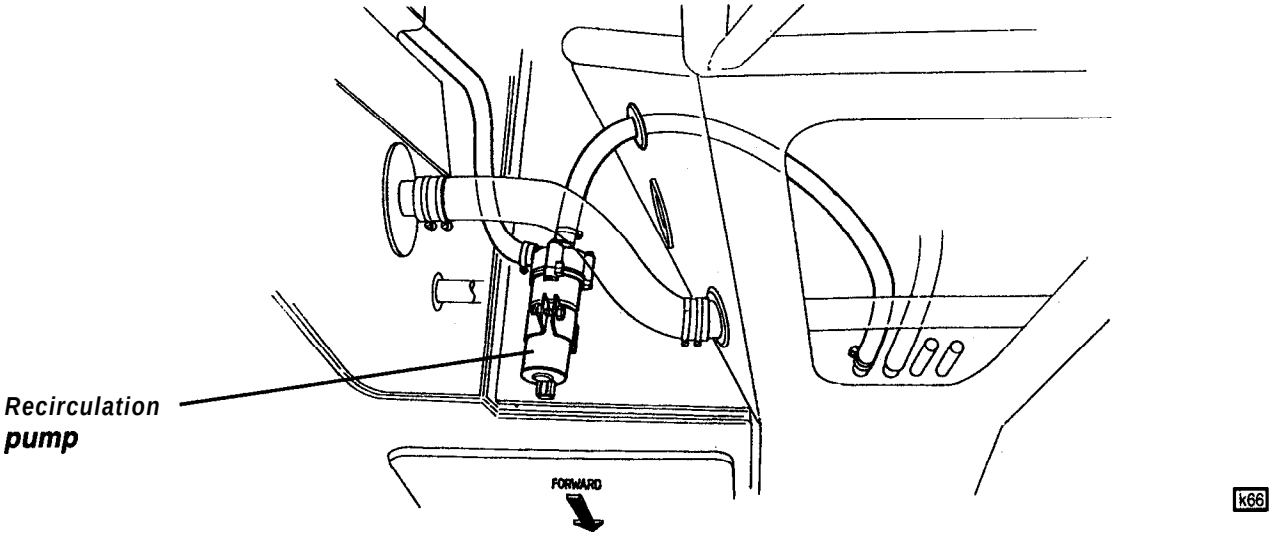

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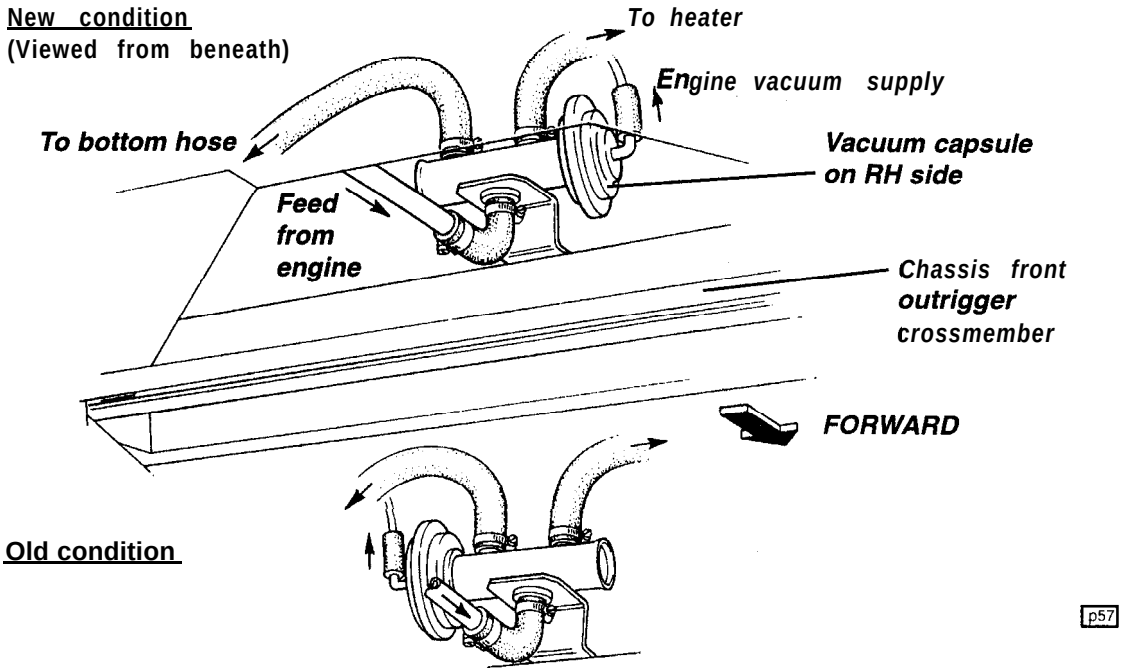
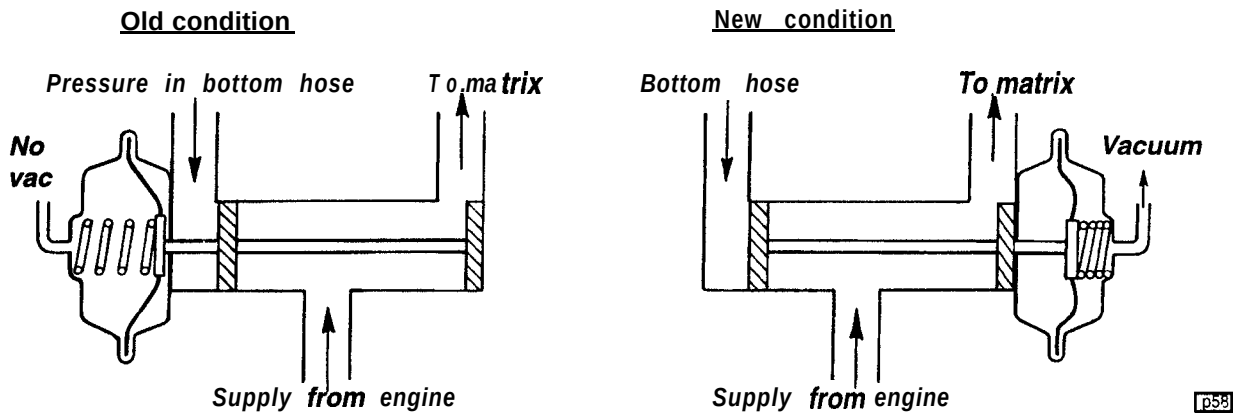
Diverter Valve Piumbina & Control Logic Revision

In September 1996, the plumbing and control logic of the diverter valve was revised. On early Esprit V8 models, built before September '96, it is possible that continued high speed cruising may allow the water pressure in the heater circuit to overcome the spring pressure on the diverter valve, resulting in water flow to the heater matrix bleeding off to the bottom hose, and cold air being supplied to the interior. On later cars, the control logic and plumbing of the diverter valve is changed, so that the valve is held in the heater supply state by engine vacuum rather than by spring pressure, and is unaffected by pressure differential forces on the valve.





if an Esprit V8 prior to approx. VIN T 5178 (September 1996) is found to exhibit the symptoms described above, the following modification may be carried out to effect a cure:

Parts Reauired

Description	*Part Number*	*Qty*
Kit, diverter valve electrical re-work comprising:	**A082M5039S**	1
Cable, orange/white, 0.5 mm² x 4.5m	*A082M5038S*	*1*
Terminal, solenoid valve connector	*A082M6635S*	*1*
Seal, solenoid valve connector	*A082M6636S*	*1*
Terminal, fuel pump relay base	*A082M6637S*	*1*

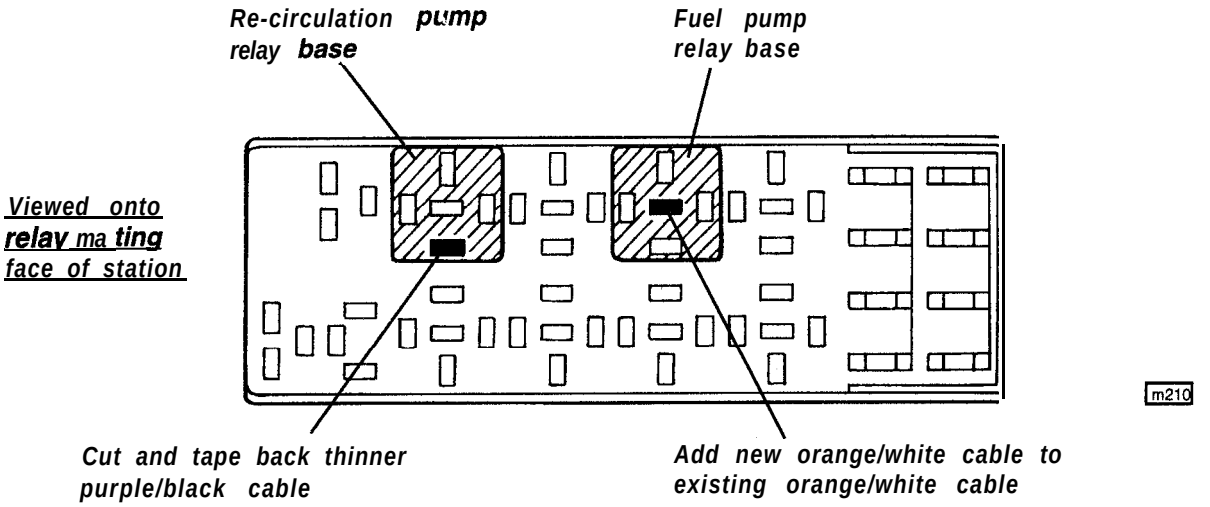
1. Check the orientation of the diverter valve beneath the front of the car. If the vacuum capsule is towards the LH side of the valve, continue with this modification procedure: If the capsule is on the RH side of the valve, the car is already built to the later condition; check the integrity of the vacuum supply system.

2. Disconnect battery.

3. From beneath the front of the car, clamp off the three hoses at the diverter valve to minimise coolant loss. Disconnect the vacuum pipe to the capsule, slacken the centre hose connection, and release the remaining two hoses.

4. Rotate the valve 180" in its mounting bracket grommet, and reconnect the hoses to the opposite ends of the valve. Reconnect the vacuum pipe and tighten all hose connections. Remove the hose clamps. If necessary, top up cooling system.

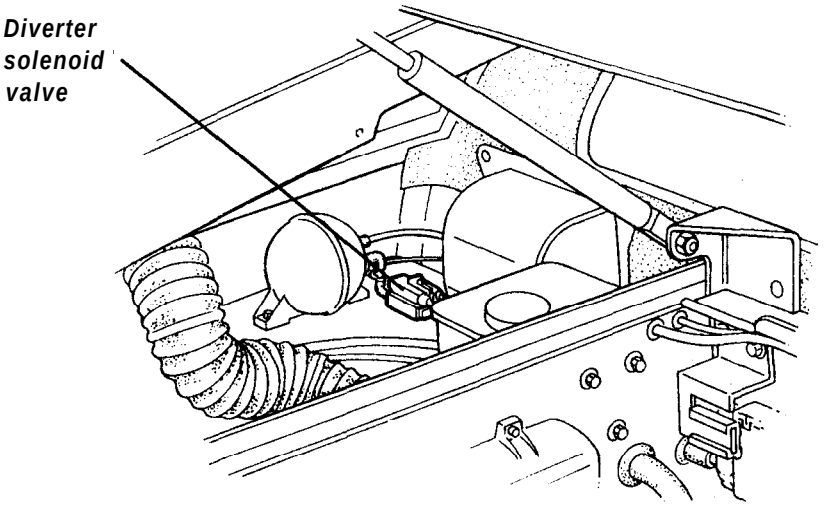
5. Release the relay station from its mounting bracket at the RH rear of the rear luggage compartment. Unclip the baseplate from the station. At the recirculation pump relay base, identify the ***thinner*** of the two purple/pink cables into terminal 1, and cut this cable (the feed to the recirc. solenoid valve) as close to the terminal as possible. Insulate and tape back the free end of the cable.
Note: On some early cars, terminal 1 may be found to house only the thick purple/pink. In this case, the solenoid valve feed is picked up via a purple cable from the recirc. pump connector plug. Cut and tape back this cable.



6. At the primary fuel pump/injectors relay base, remove the centre terminal with its orange/white cable, and cut off the terminal. Join this cable with new orange/white cable A082M5038 and terminate with the larger of the two new terminals, A082M6637. Refit the terminal into the relay base. Refit the relay station baseplate and secure the station to its mounting bracket.

7. Remove the LH rear quarter window trim panel. At the diverter solenoid valve on the LH fuel tank board, release the electrical connector, prise off the blue keeper, and use a jeweller's screwdriver or terminal tool to release the purple/pink cable from the solenoid connector. Insulate the terminal and tape back to the harness.

8. Route and space tape the new orange/white cable around the luggage bay following existing harness routing where possible, to the diverter valve solenoid valve. Slide the terminal seal A082M6636 onto the cable before terminating with the smaller new terminal A082M6635. Fit the terminal back into the solenoid valve connector, and secure with the blue keeper. Plug onto the valve, and refit the quarter window trim.



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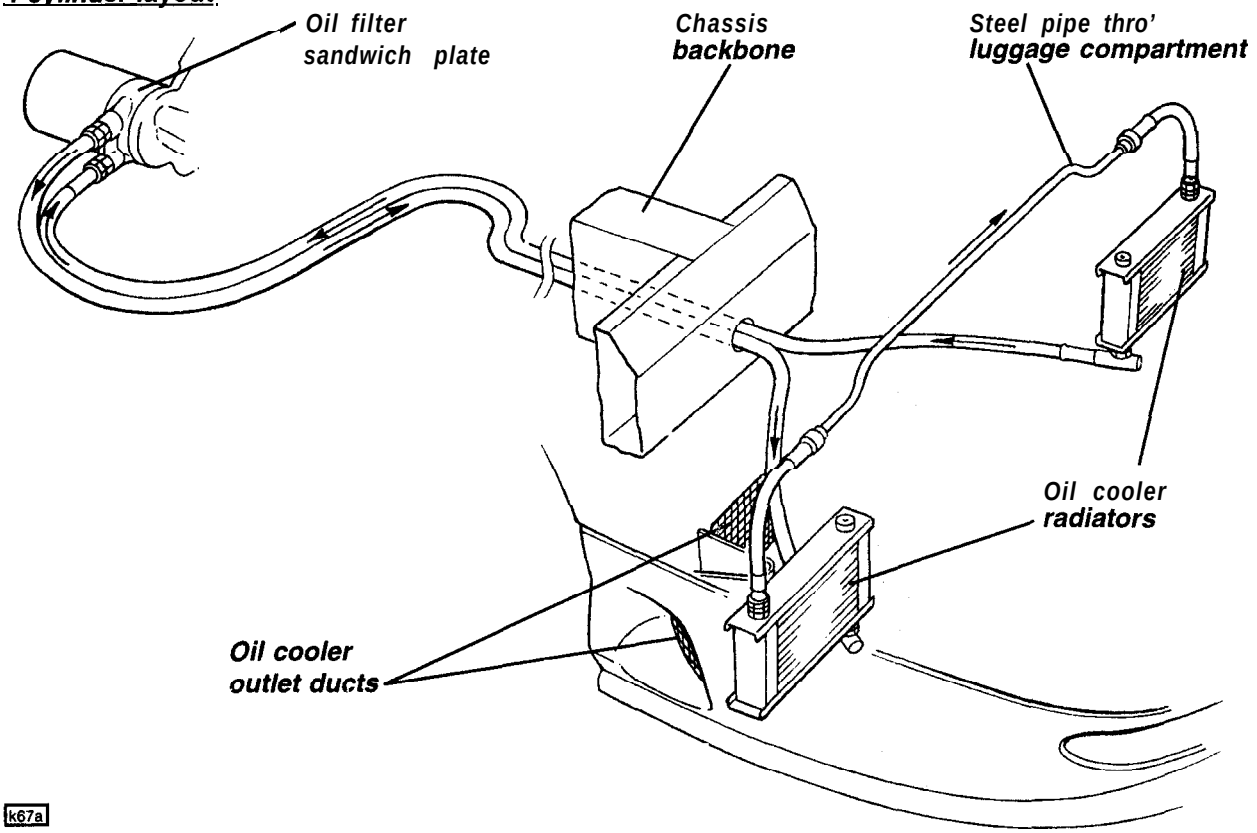
9. Verify correct vacuum switching by disconnecting the vacuum hose at the diverter valve, and checking:
vacuum is supplied when the engine is running;
the line is ventilated when the engine is stopped.

KE.5 - OIL COOLING SYSTEM

Pressurised oil from the oil pump is cooled before flowing through the oil filter and into the engine, by being directed through high pressure rubber hoses to a pair of oil cooler radiators mounted one each side of the main radiator duct. On four cylinder engines, a sandwich plate is used between the oil filter and auxiliary housing, to connect with the oil cooler feed and return hoses.

4-cylinder layout



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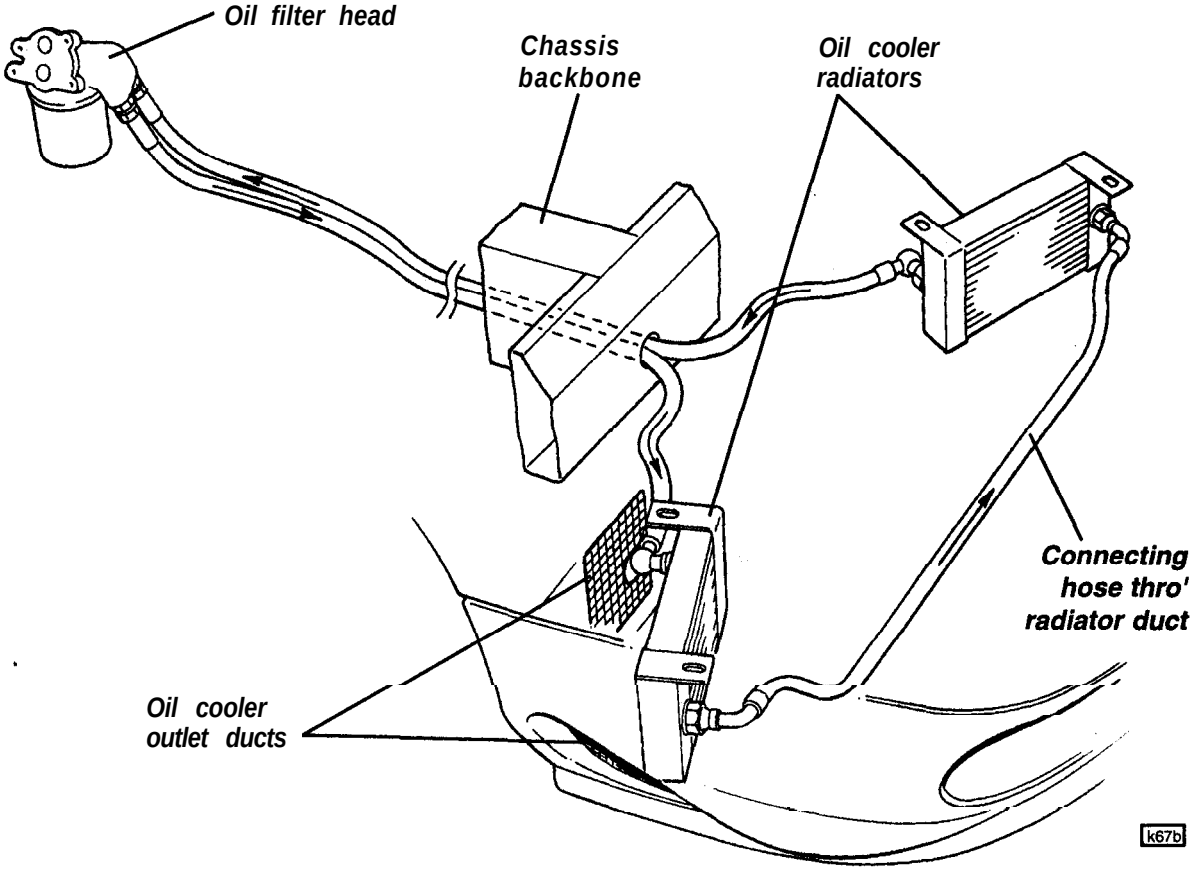
V8 oil cooler layout



On V8 engines the oil filter head incorporates feed and return unions. The hoses are routed through the chassis backbone to the front of the car, then into one of the side mounted radiators (inboard bottom connection on 4-cylinder, outboard rear on V8), across to the second radiator, and then back to the engine. On 4-cylinder cars, the link between the two radiators uses a steel pipe routed through the front luggage compartment, beneath the front edge of the lid aperture, whereas V8 models use a hose running through the main radiator duct ahead of the air conditioning condenser. Each oil cooler radiator is mounted in its own duct, receiving air from an intake in the front spoiler, and exhausting through a divided duct to both an outlet in the wrapped around rear end of the spoiler, and directly into the front wheelarch.

Ensure that the oil cooling hoses are always re-connected to the engine in the original orientation in order to maintain the direction of oil flow. Due to the significant volume of oil held in the oil cooler circuit, it is recommended to purge the cooling system when changing the engine oil.

KE.6 - CHARGE AIR COOLING SYSTEM (4-cylinder models)

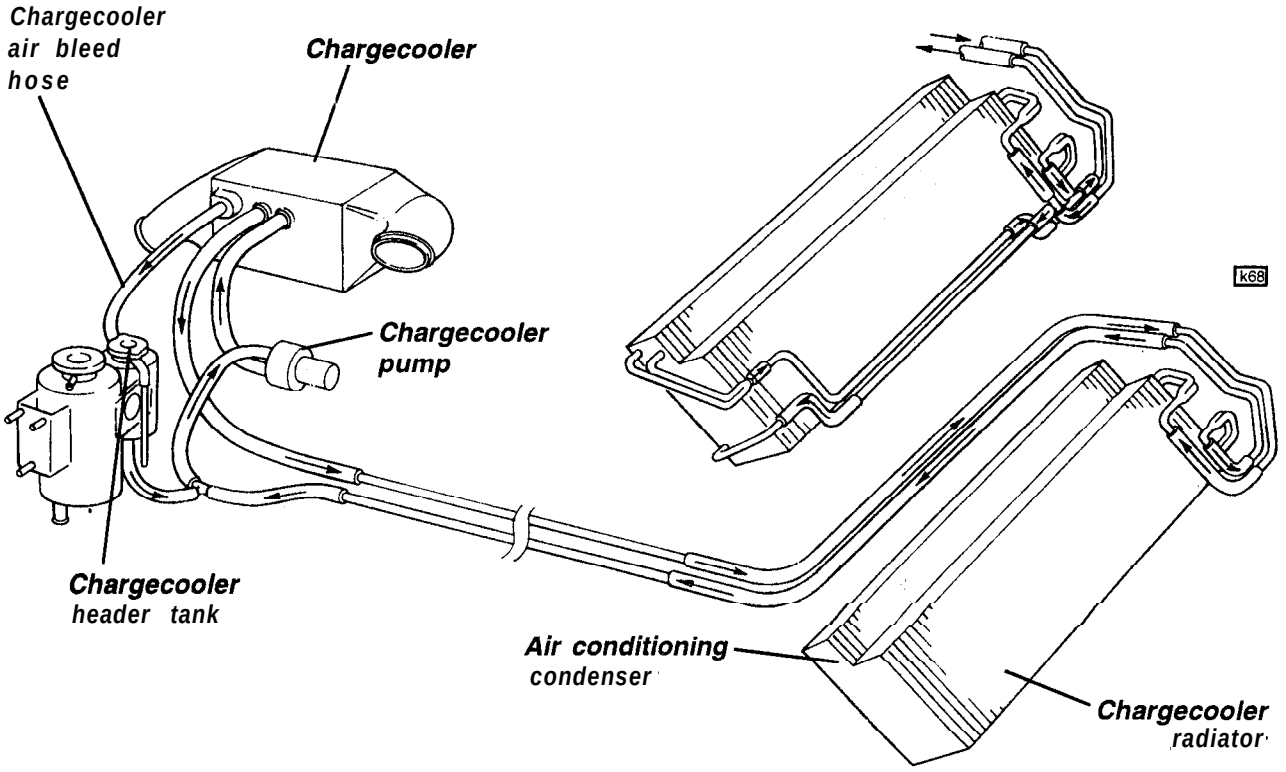
Four cylinder models use an air/water heat exchanger (chargecooler) to reduce the temperature and increase the density of air leaving the turbocharger compressor before it enters the intake plenum chamber. The chargecooler is flexibly mounted to the engine, and uses flexible high temperature hoses to connect the intake and outlet to the compressor and plenum respectively. Air passing through the chargecooler flows past a matrix of tubes through which water is circulated in a closed system by an engine driven pump. Heat is transferred from the intake charge air to the water which is pumped via alloy pipes routed through the chassis backbone, to a chargecooler radiator mounted ahead of both the air conditioning condenser and the engine cooling radiator.

On air conditioned cars prior to March '95 using refrigerant R12, the a.c. condenser and chargecooler radiator are constructed as one unit with integral side frames. Later cars using refrigerant R134a use a pair of 'side by side' condensers, and a separate chargecooler radiator.

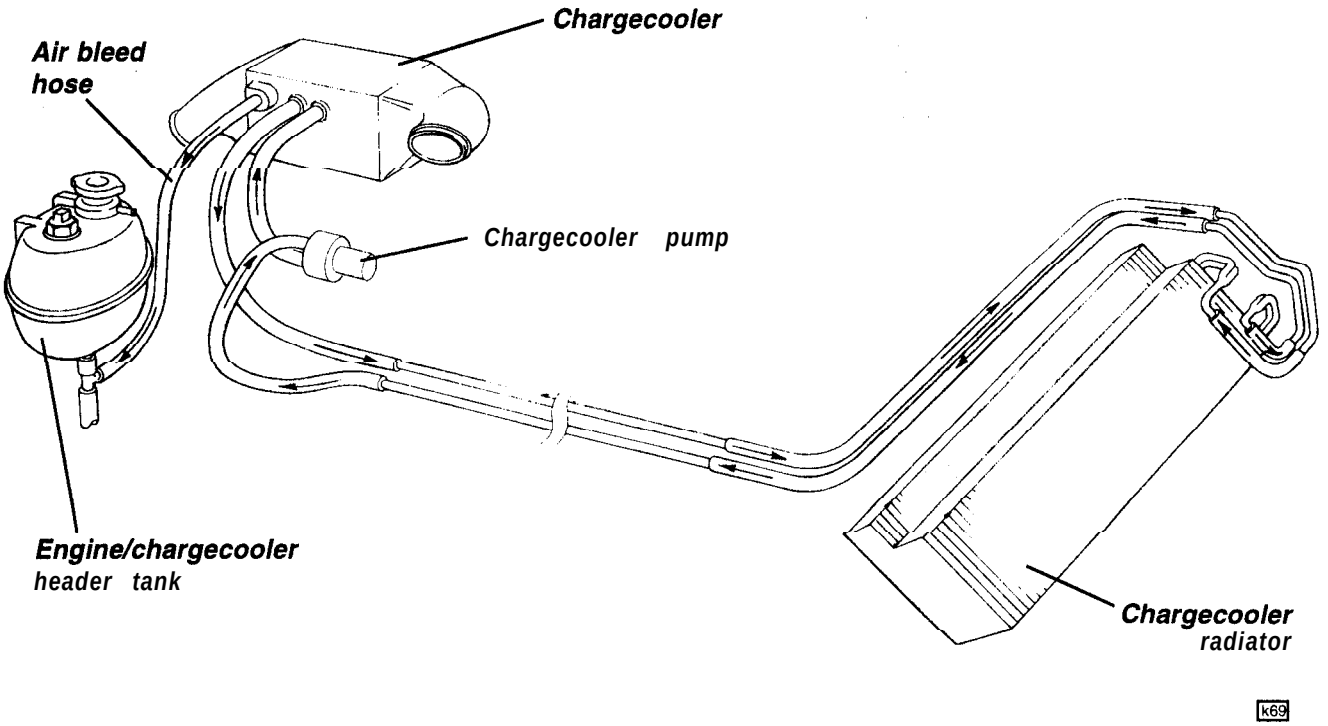
On Sport 300 models without air conditioning, the R12 type of integrated a.c. condenser is adapted to become a second chargecooler radiator in addition to the standard item ahead of it, with the plumbing arranged to provide parallel water flow through the two radiators.

'Twin tan&' independent chargecooler system

Sport 300 with parallel flow double radiator



Single tank infeurated chargecooler system



Prior to December '93, the chargecooler system is entirely separate from the engine cooling system, and is equipped with its own header tank mounted adjacent to the engine header tank at the left hand rear corner of the engine bay. The tank, which should be filled (cold) to a level 25mm below the filler neck, is connected into the chargecooler pump inlet hose, and is fitted with a 48 kPa (7 psi) pressure cap. From December '93, the chargecooler system, whilst continuing to function in a largely independent manner, is linked with the engine cooling system by a connection between the chargecooler air bleed spigot and the engine coolant header tank, thus dispensing with the need for a separate chargecooler tank.

Testina the Chargecooler Pumo

The chargecooler pump is driven off the rear end of the auxiliary shaft in the position occupied on some earlier engine variants by the ignition distributor, and uses an impellor with flexible vanes mounted in an eccentric chamber. The output of the chargecooler pump may be checked as follows:

- Disconnect and plug the outlet hose from the pump.
- Fit a slave hose to the pump outlet spigot, and place the other end of the hose in a graduated jug of at least 2 litres capacity.

Remove the chargecooler header tank cap, or the combined header tank cap as applicable, and prepare at least 2 litres of coolant with which to keep the tank topped up.

Start the engine and run at 3,000 rpm, adding coolant as necessary to keep the header tank filled.

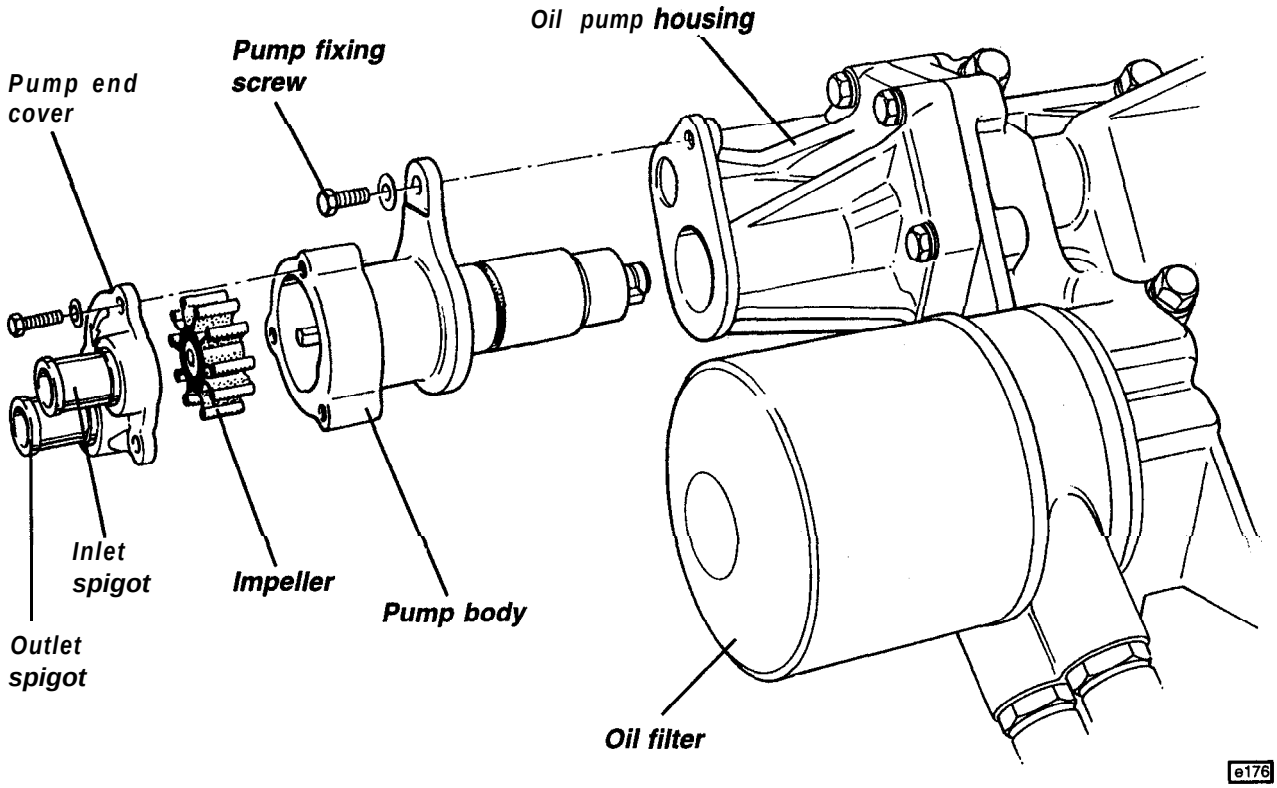
Time the delivery of 1 litre of coolant into the graduated jug. Specification = 9 - 12 seconds.

Servicing the Charaecooler Pump

The rubber impeller of the chargecooler pump may be inspected and/or replaced as follows:

1. Drain the chargecooler system of coolant.

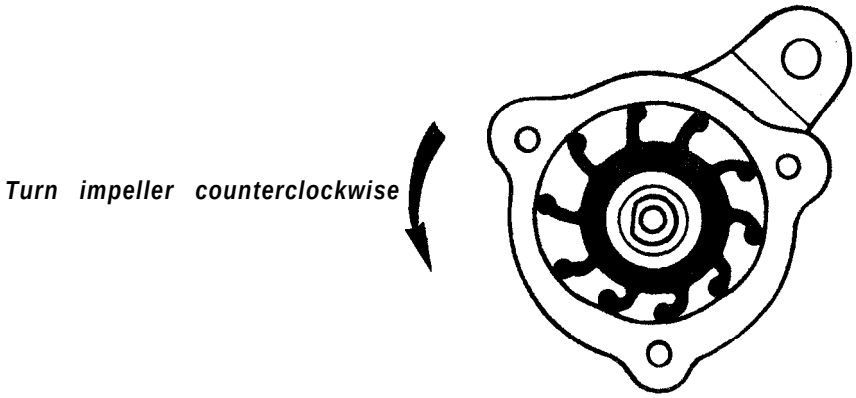
2. Remove the single screw securing the chargecooler pump to the oil pump housing, and withdraw the pump with the hoses attached.



3. Release the three screws and remove the pump end cover.

4. If necessary, use long nose pliers to withdraw the impellor from the spindle taking care not to damage the housing inner surface or end face.

5. Clean the mating faces of the pump body and end cover, removing ail traces of the old gasket, and ensure that the inside of the housing is thoroughly cleaned. Smear some petroleum jelly around the inside of the pump housing and on the shaft.
6. Carefully fit the new impeller B910E6992F (either way round) onto the 'D' of the shaft and introduce into the housing whilst turning in a counterclockwise direction, so that the vanes of the impeller are **trailing** when the pump shaft rotates counterclockwise as viewed onto the impeller. See diagram.



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CAUTION: Once the impeller has been installed, take care not ot reverse the direction of shaft rotation, or damage to the impeller vanes may occur.

7. Apply a thresd locking compound to the three end cover fixing screws, smear some petroleum jelly around the end mating face of the pump body, and using a mnew gasket A91 OE701 OF, fit the end cover, tightening the screws to 2.4 - 2.7 Nm. DO NOT OVERTIGHTEN.

8. Smear the chargecooler pump spigot '0' ring with engine oil. Ensure that the oil pump end thrust spring is fitted into the end of the auxiliary shaft before inserting the pump into the housing and engaging the offset dog drive mechanism. if necessary, align the drive dog by turning the pump shaft only in the direction of the arrow on the end cover. Retain with the single fixing screw.

9. Refill the system with the recommended coolant mix.

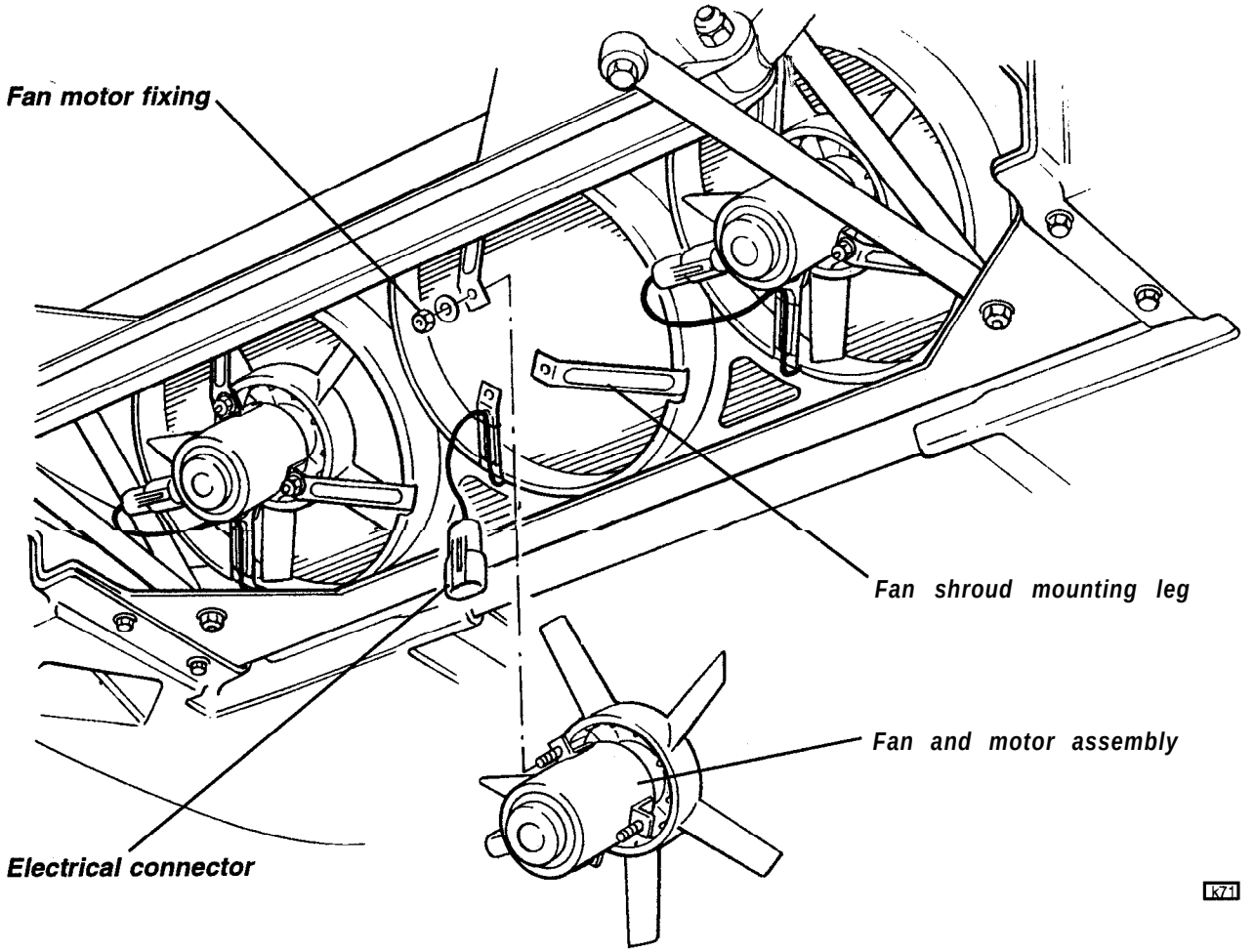
CAUTION: Never run the engine when the chargecooler system is drained. The pump impeller will be damaged if run dry.

KE.7 - RADIATOR COOLING FANS

Three cooling fans are mounted in a cowling on the back of the radiator, and draw air through the radiator stack of chargecooler radiator (4-cylinder), a.c. condenser. and engine radiator. Ail three fans are controlled as a unit by the engine management ECM, which energises the fans at approx. 90°C (4-cylinder) or 100°C (V8) as sensed by the engine coolant temperature sensor. The fans will also run when the a.c. compressor is operating and road speed is low, in order to provide sufficient cooling of the condenser. if any fault codes are set which indicate a type of fault which could result in engine overheating, the fans will be energised as an engine safeguard. The fans will not operate if the battery voltage is detected as being too low.

On V8 models, the fans will also run in conjunction with the coolant re-circulation pump during a 20 minute period following engine switch off, if coolant temperatures over 105°C are sensed.

Each fan motor assembly is mounted via three fixings and may be removed from beneath without disturbing the radiator duct.

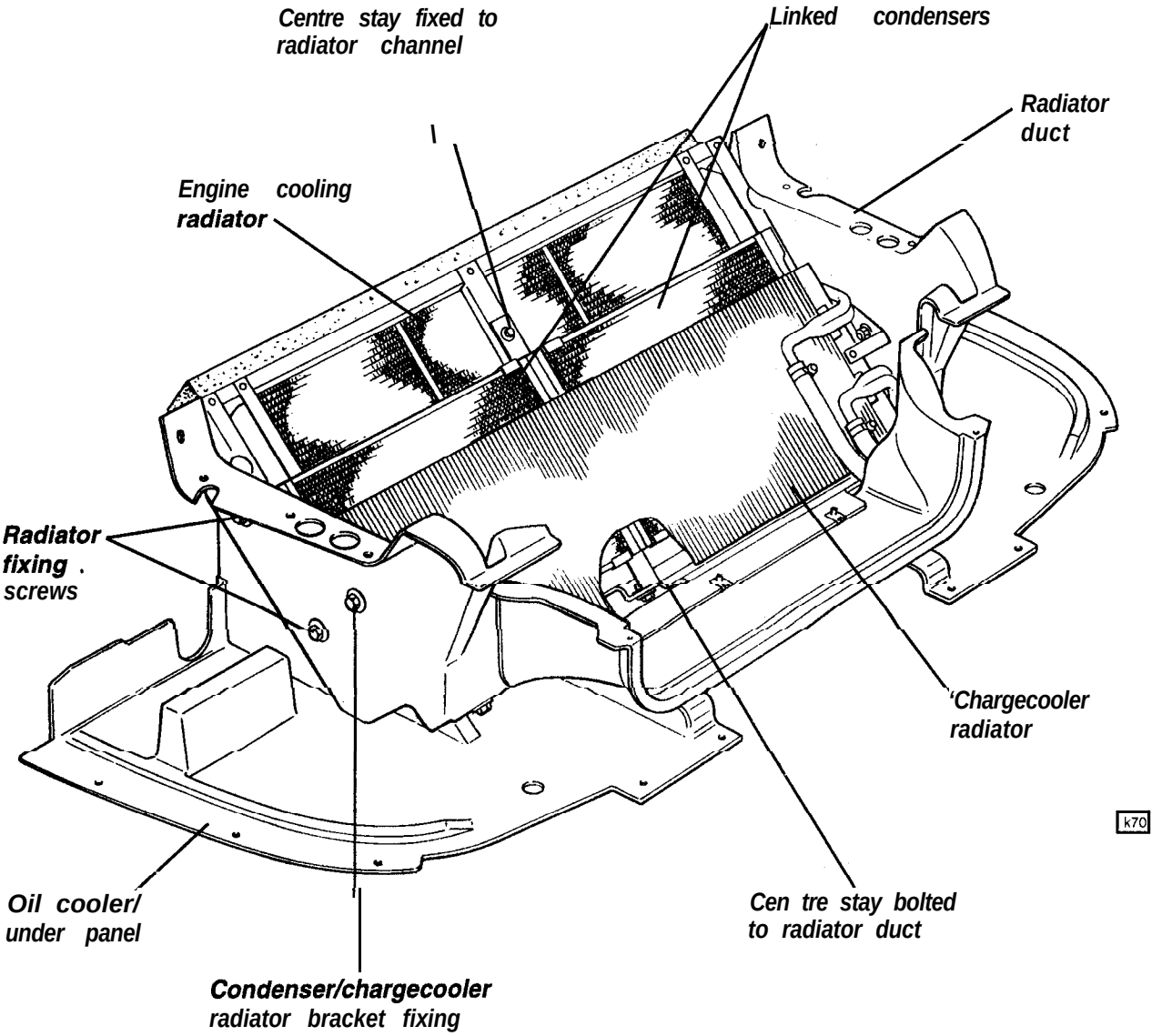


KE.8 • RADIATOR DUCT

A composite duct is used to house the radiator stack, and is bolted to the underside of the front luggage compartment floor. The engine cooling radiator is fixed to each side of the duct via two fixings in the side members of the radiator support frame. Cars using R12 refrigerant and a unitary condenser/chargecooler radiator, retain the assembly via a fixing through the bottom of the radiator duct into a captive nut on a flange at each end of the condenser, and use edge clips to secure the top of the condenser to the engine cooling radiator. Later cars using R134a refrigerant, use two condensers mounted side by side, and a separate chargecooler radiator. A rivetted bracket at each side joins the chargecooler radiator to a condenser, and is fixed with a screw through the side of the radiator duct. A central stay joins the inboard ends of the two condensers, and is bolted at its bottom end to the radiator duct, and at its top end to the centre of the engine cooling radiator.

To remove a radiator or condenser, the complete radiator duct assembly must be dropped from beneath after removing the various under panels. The oil coolers can remain in position. The engine and chargecooler systems must be drained, although the a.c. system should remain intact if possible to avoid the requirement for the use of recovery/recharging equipment. The duct is mounted via three fixings at each side to the luggage compartment floor, with two tubular stays bracing the duct rear end to the chassis front frame.

Radiator Duct: 4-cylinder, R134a refrigerant type



Electrical

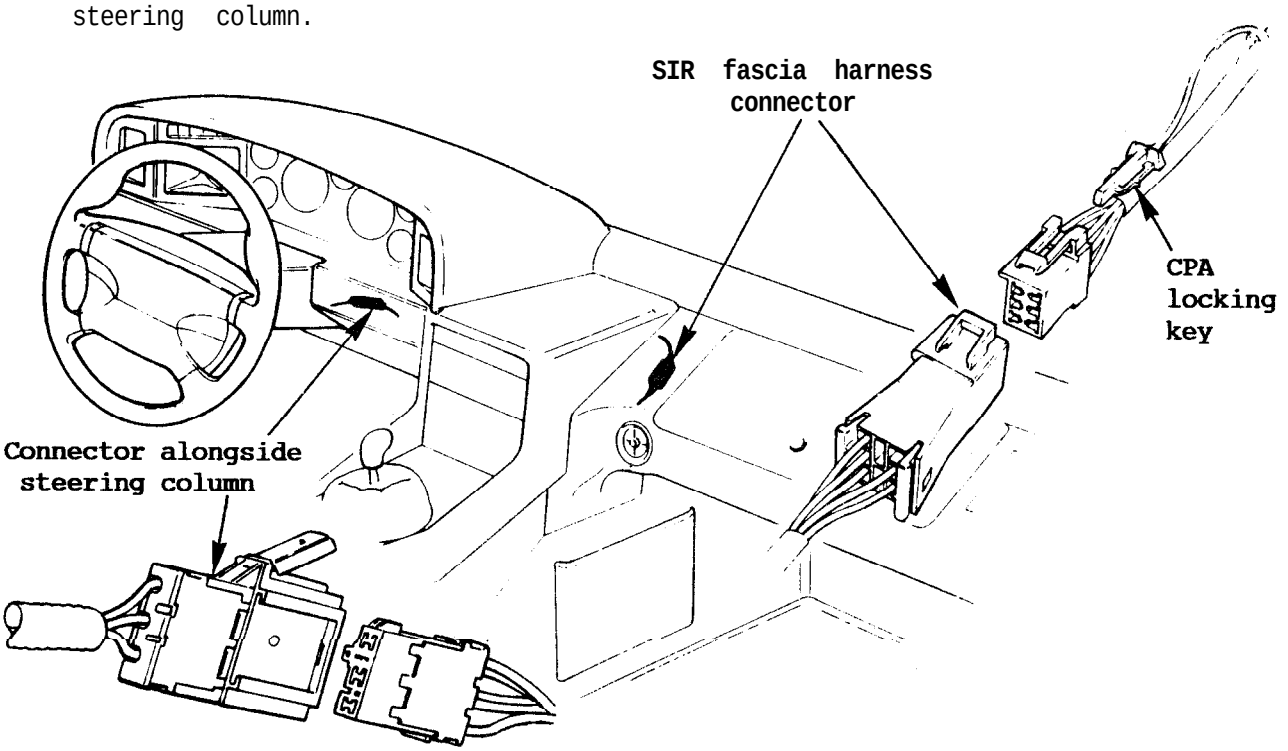
SECTION ML - ESPRIT S4 & Sport 300

ML.1 - SAFETY PRECAUTIONS FOR SUPPLEMENTARY INFLATABLE RESTRAINT (S.I.R.) MODELS

On SIR equipped cars, safety precautions should be taken to guard against accidental deployment of an airbag when working on the electrical system. The Diagnostic Energy Reserve Module (DERM), a key component in the SIR system, can maintain sufficient voltage to cause air bag deployment for up to 10 minutes after the ignition is turned off and the battery is disconnected. Before carrying out ANY electrical maintenance or diagnostic work, the following procedure MUST be adopted in order to disable the SIR system:

Cars With Driver Only S.I.R.

1. Turn off the ignition.
2. From beneath the passenger side fascia, locate the six way SIR fascia harness connector block, pull out the Connector Positive Assurance (CPA) locking key, and unplug the connector.
3. Unplug the orange 3-way connector to the inflator module alongside the steering column.



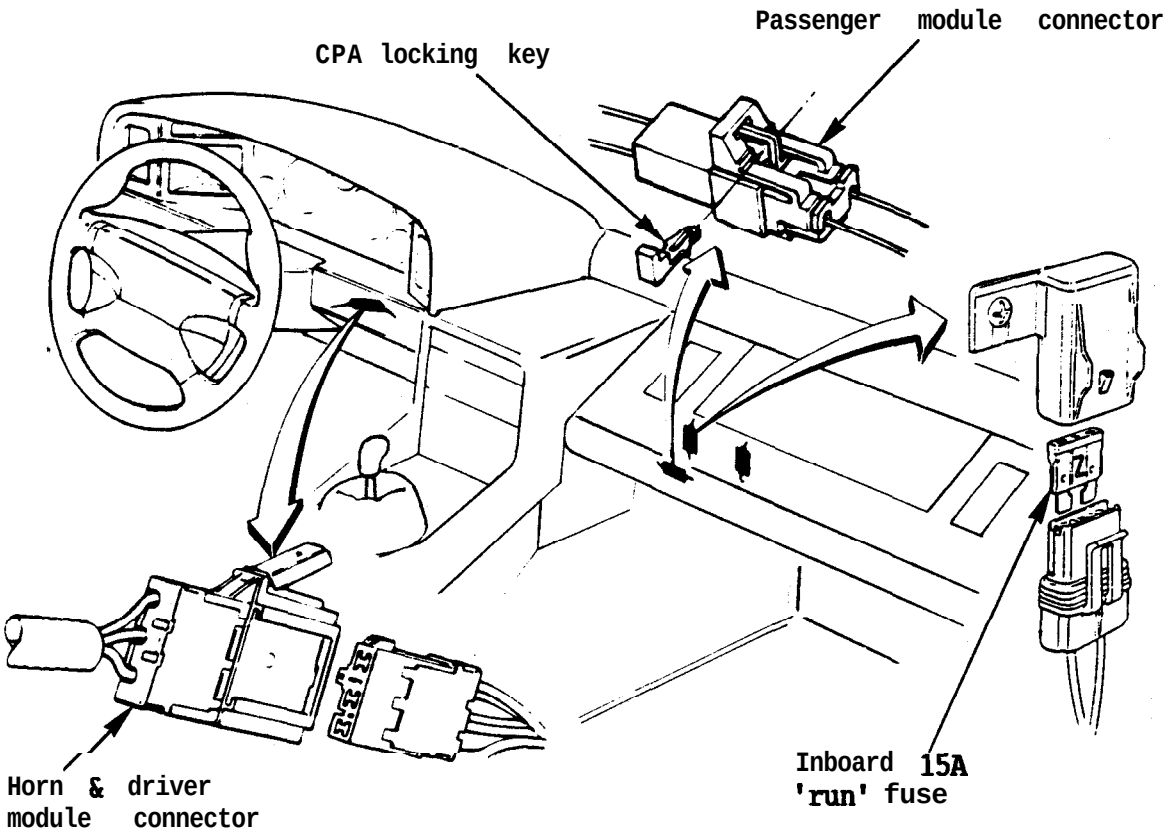
When all service work is completed, ensure the SIR system is reconnected:

1. Reconnect the orange 3-way connector between SIR harness and steering column.
2. Plug in the 6-way SIR fascia harness connector block, and refit the CPA locking key.
3. Conduct 'SIR Diagnostic System Check' as follows:
   - Turn on the ignition and observe the SIR tell tale; it should flash seven to nine times and then go out. When the engine is cranked, the lamp should come on steady, and then flash for another seven to nine times after the engine has started.

WARNING: If the SIR tell tale lamp does not come on with the ignition, and follow the sequence detailed above, or if it lights at any other time, a fault in the SIR system is indicated which should be investigated without delay (see section WA.4 of the SIR Service Notes) as the SIR may not function correctly.

Cars With Driver & Passenger S.I.R. (Dual S.I.R.)

1. Turn off the ignition.
2. From beneath the passenger side fascia, locate the two S.I.R. fuse holders secured to the back of the scuttle beam. Withdraw the INBOARD fuse from its holder, and remove the 15A 'run' fuse (the outboard 'crank' fuse is 5A).
3. Unplug the orange 3-way connector to the driver's inflator module alongside the steering column.
4. Locate the yellow 2-way connector to the passenger's inflator module beneath the passenger side knee bolster, withdraw the locking key, and unplug the connector.



When all service work is completed, ensure the SIR system is reconnected:

1. Reconnect the orange 3-way and yellow 2-way connectors to the driver and passenger inflator modules. Ensure that the locking key is used to secure the 2-way connector.
2. Refit the 15A run fuse and insert into the fuse holder beneath the fascia.
3. Conduct 'SIR Diagnostic System Check' as follows:
   - Turn on the ignition and observe the SIR tell tale; it should flash seven to nine times and then go out. When the engine is cranked, the lamp should come on steady, and then flash for another seven to nine times after the engine has started.

WARNING: If the SIR tell tale lamp does not came on with the ignition, and follow the sequence detailed above, or if it lights at any other time, a fault in the SIR system is indicated which should be investigated without delay (see section UC.4 of the SIR Service Notes) as the SIR may not function correctly.

ML.2 - INTRODUCTION OF REVISED WIRING HARNESS

A revised wiring harness was introduced as a running change on Esprit S4 and Sport 300 models in December '93, and features simplified and rationalised circuitry. Change point:

VIN R 1242 (LHD S4 December '93)
R 1250 (RHD S4 December '93)
R 8030 (Sport 300 December '93)
Engine no. 28394

The principal changes associated with the revised harness are as follows:

1. Wiring Harnesses
   - Centre console harness incorporated into fascia harness.
   - Engine bay relay box components revised and resited to relay station on rear of right hand rear wheelarch.
   - MAP and BARO sensors and the boost gauge transducer relocated over the RH fuel tank.
   - Vacuum pump resited to former engine bay relay box.
   - Fuel rail harness incorporated into engine management harness.
   - Handbrake switch, rheostat, and rear speaker harnesses incorporated into fascia harness.
   - . Licence plate lamps harness incorporated into rear lighting harness.
   - Commonised front harness (was RHD/LHD)
   - Radiator fan harness becomes handed RHD/LHD (was common).

2. Vehicle Alarm
   Sensing switches added to the tailgate and front bonnet.

3. Front Luggage Compartment Lamp
   Lamp added into the front underside of the front bonnet, operated via a new bonnet sensing switch (also alarm function) whenever the bonnet is raised. Note that as the interior lights are also switched on via the bonnet switch, leaving the vehicle with the bonnet raised should be avoided.

4. Lights-on Buzzer (non-USA)
   Lights-on warning buzzer added to non-USA cars, and mounted on the scuttle beam outboard of the steering column. With ignition off, if the driver's door is opened when the lights are on, a continuous buzzer will sound.

5. Tell Tale Lamps
   - Fan fail tell tale and tell tale check module deleted.
   - Catalyst overheat tell tale added, connected only on Japanese market cars.
   - Low oil pressure tell tale (warns only at engine speeds in excess of 1600 rpm) linked to the battery non-charging tell tale in order to provide a lamp test function on initial switch on.

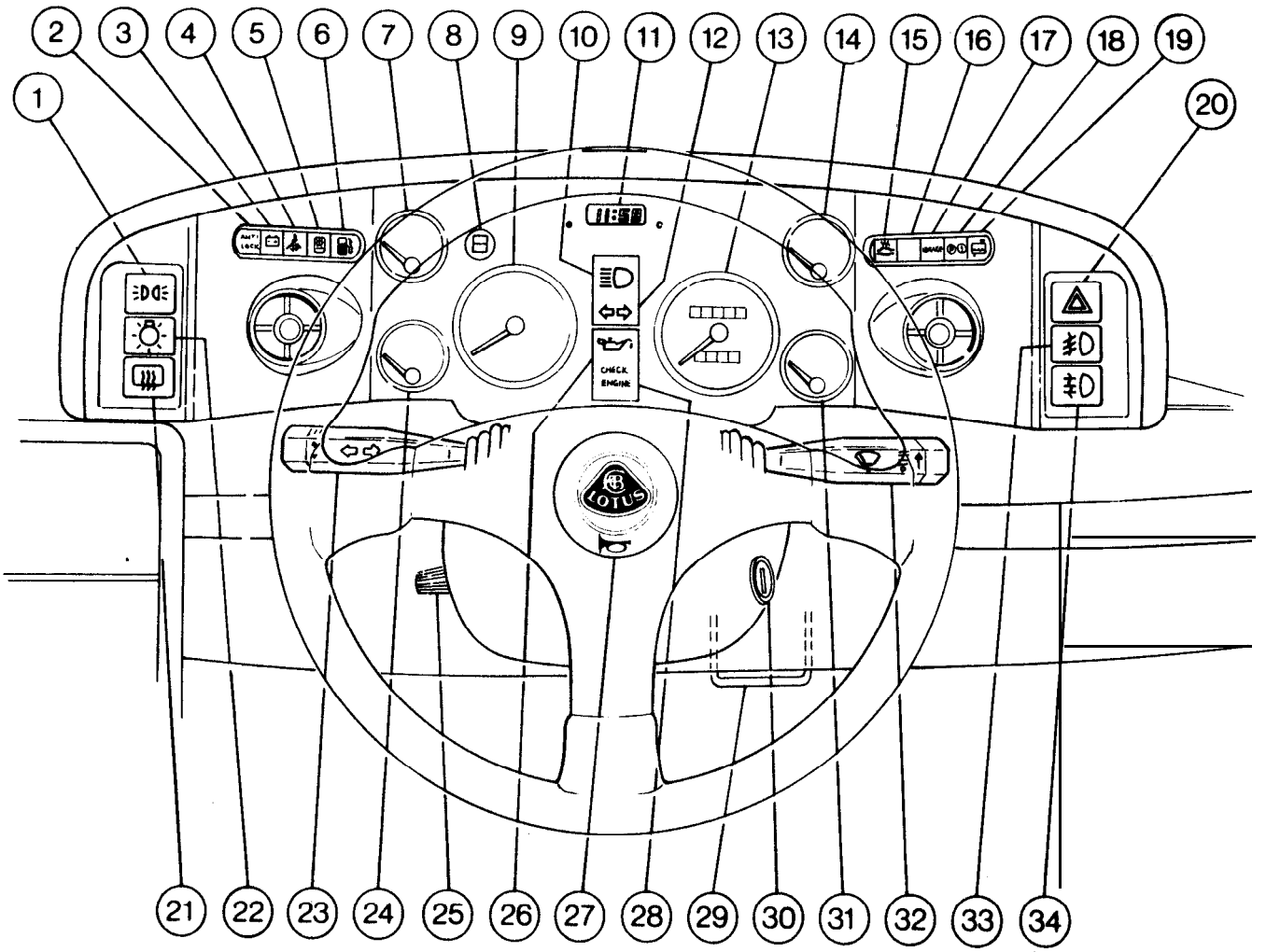
6. Inertia Switch
   New type inertia switch fitted at the right hand front corner of engine bay.

7. Headlamp Switching Logic
   Headlamp main/dip switching changed so that the dip beams **remain lit** when main beam is selected.

8. Radio Aerial
   Electric aerial fitted for some markets, in the left hand rear quarter.

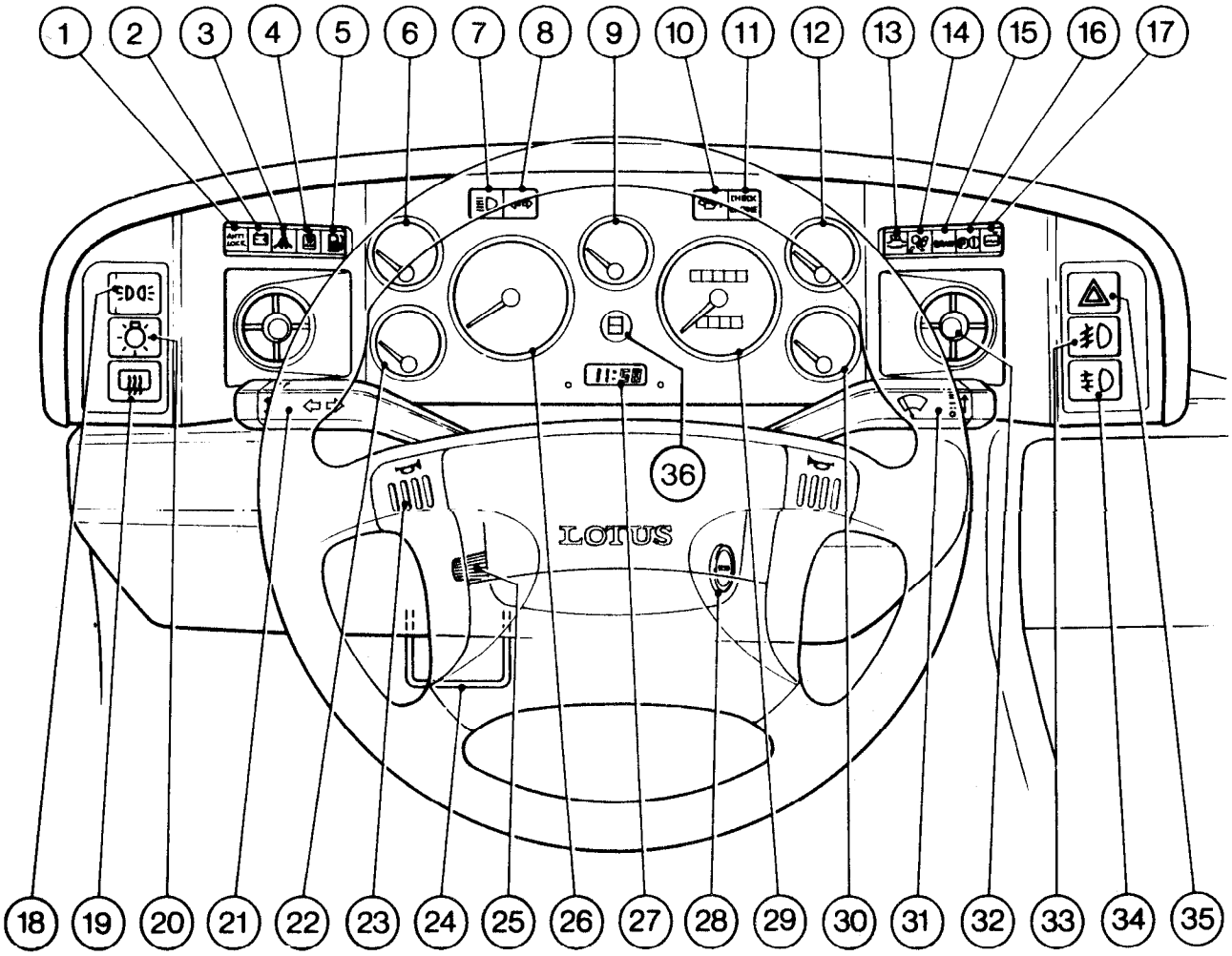
ML.3 - SWITCH & TELL TALE OPERATION

Fascia Layout - Cars without S.I.R.



1 Parking lamps switch
2 Anti-lock brakes tell tale
3 Battery non-charging tell tale
4 Seat belt tell tale
5 Low screenwash level tell tale
6 Low fuel level tell tale
7 Oil temperature gauge
a Ice warning display
9 Tachometer
10 Main beam tell tale
11 Digital time clock
12 Turn indicator tell tale
13 Speedometer
14 Fuel gauge
15 Early cars: Fan fail tell tale
Later cars: Catalyst overheat tell tale (Japan)
16 Not used
17 Brakes/parking brake tell tale (USA type)
la Brakes/parking brake tell tale (EEC type)
19 Engine coolant tell tale
20 Hazard warning lamp switch
21 Heated tailgate/mirror glass switch
22 Headlamp switch
23 Dipswitch/flasher/turn indicators
24 Oil pressure gauge
25 Panel lamps rheostat
26 Low oil pressure tell tale
27 Horn button
28 Check engine tell tale
29 Front bonnet release handle
30 Ignition switch/steering column lock
31 Water temperature gauge
32 Windscreen wiper/washer control
33 Front fog lamps switch
34 Rear fog lamps switch (if fitted)

Fascia Layout - Cars with S.I.R.



1 Anti-lock brakes tell tale
2 Battery non-charging tell tale
3 Seat belt tell tale
4 Low screenwash level tell tale
5 Low fuel level tell tale
6 Oil temperature gauge
7 Main beam tell tale
a Turn indicator tell tale
9 Boost guage
10 Low oil pressure tell tale
11 Check engine tell tale
12 Fuel gauge
13 Early cars: Fan fail tell tale
Later cars: Catlayst overheat tell tale (Japan)
14 Supplementary Inflatable Restraint (S.I.R.) tell tale
15 Brakes/parking brake tell tale (USA type)
16 Brakes/parking brake tell tale (EEC type)
17 Engine coolant tell tale
la Parking lamps switch
19 Heated tailgate/mirror glass switch
20 Headlamps switch
21 Dipswitch/flasher/turn indicators
22 Oil pressure gauge
23 Horn button
24 Front bonnet release handle
25 Panel lamps rheostat
26 Tachometer
27 Digital time clock
28 Ignition switch/steering column lock
29 Speedometer
30 Water temperature gauge
31 Windscreen wiper/washer control
32 Face level vent
33 Front fog lamps switch
34 Rear fog lamps switch (if fitted)
35 Hazard lamps switch
36 Ice warning display

TELL TALE LAMPS

ABS Tell Tale

This amber tall tale should light for the ABS three second initialisation phase when the ignition is turned on. The lamp will also light when cranking the engine. If the lamp lights at any other time:

- a flashing light indicates that the ABS computer has detected an anomaly in the anti-lock system, but is still allowing full ABS operation. Diagnosis and rectification should be carried out without delay. Refer to Service Notes Section JF.

CAUTION: Prolonged vehicle operation with a flashing ABS tell tale may cause damage to the ABS and result in the anti-lock facility being switched out.

- a continuous light indicates that the ABS computer has detected a fault and has switched out the anti-lock system. The base brake system will operate as normal unless the 'Brakes/Parking Brake' tell tale is also lit (see later). The fault should be diagnosed and rectified without delay. Refer to Service Notes Section JF.

Battery Non-Charging Tell Tale

This will glow red when the ignition is switched on and will normally go out when the engine is started.

Although the lamp may glow when the engine is idling, if it lights at engine speeds above idle, a fault in the charging circuit, or a broken alternator belt is indicated.

Seatbelt Tell Tale

Non-USA cars:

This will glow red when the ignition is switched on, and go out when the driver's seatbelt is fastened.

USA market cars:

After engine cranking, this red tell tale will flash for approximately eight seconds. If the driver's seat belt is not fastened, this light will be accompanied by a warning chime. The controlling logic/chime module is located on the driver's side of the scuttle beam.

Low Screenwash Level Tell Tale

A positive is supplied to the tell tale only when the screenwash switch is operated, and a level switch in the screenwash reservoir supplies an earth signal when the level is low.

Low Fuel Level Tell Tale

When the tank level drops to 10 litres (2.2 imp. gal; 2.6 US gal), a normally open switch incorporated in the fuel gauge sender unit, closes and supplies an earth signal, via a delay module (mounted on the front luggage compartment relay bracket), to the tell tale.

Fan Fail Tell Tale (not fitted on 'revised harness' cars)

The three electric cooling fans are energised by the engine management ECM at approximately 92°C coolant temperature (opens at 87°C on fall) as sensed by the coolant temperature sensor (CTS) in the inlet manifold water jacket. The fans are also switched on when the a.c. compressor is operating in order to cool the condenser (on later cars only below 35 mph), and as an engine safety precaution,

whenever the 'check engine' lamp is lit.

One side of the fan fail tell tale is connected to the switching input at the radiator fan relay, and the other side to the output side of the three fan fuses. The lamp will light only when a voltage imbalance occurs, the most likely cause of which would be a faulty relay or blown rad. fan fuse.

Catalyst Overheat Tell Tale (Japan only)

This tell tale is fitted only for the Japanese market, and consists of a temperature sensor in the catalytic convertor linked to a control module mounted beneath the fascia, to the left of the steering column. If an engine fault occurs which results in the temperature of the catalytic converter rising to a level liable to cause damage to the converter, the tell tale will light, indicating that the vehicle should be stopped in an area free of combustible materials (dry grass, leaves etc.) and the converter allowed to cool for several minutes before proceeding with caution. Refer to Section EMH for diagnosis.

As a lamp test function, the lamp will light when the ignition is first switched on.

Supplementary Inflatable Restraint (S.I.R.) Tell Tale (if fitted)

The S.I.R. system has a self-diagnostic facility which lights the red tell tale if a fault is detected.

As a bulb and circuit check, the tell tale should flash for about eight seconds when the ignition is switched on, and then go out. When the engine is cranked, the lamp will come on steady, and then flash for another eight seconds after cranking.

WARNING: If the S.I.R. tell tale lamp does not come on with the ignition, and follow the sequence detailed above (bulb and circuit check), or if it lights at auyothertime, a fault in the S.I.R. system is indicated. Refer to Section WA.4 (Driver only S.I.R.) or WC.4 (Dual S.I.R.).

Brakes/Parking Brake Tell Tale

This tell tale will glow red with the ignition switched on when any of the following conditions apply:

i) parking brake applied; sensed via a micro switch on the parking brake lever mechanism.
ii) brake fluid level low; sensed via a level sensor in the fluid reservoir.
iii) ABS hydraulic pressure low. If the brake pedal has been pressed several times with the ignition off, stored hydraulic pressure for the anti-lock brake system may fall sufficiently to close the pressure switch fitted in the pump/accumulator base. The electric pump should start up when the ignition is switched on, and the lamp should go out within 40 seconds.

Under normal circumstances, with the engine idling, the tell tale should light when the parking brake is applied, and go out when released. If the lamp fails to go out when the parking brake is released, or comes on whilst driving, the brake fluid level or ABS hydraulic pressure may be dangerously low. The rear brakes may not function, with non power assisted non-ABS braking remaining only on the front wheels. Refer to Section JF.

Engine Coolant Tell Tale

This dual-function tell tale warns of:

i) Low coolant level in via a probe or level sensor in the cooling system header tank. On cars with twin header tanks, a level probe is fitted near the bottom of each tank and is linked to a low coolant module in the engine bay

relay box. On later 'revised harness' cars, the combined plastic header tank incorporates a level sensor.

ii) excessive engine coolant temperature (over 110°C on rise, 105°C on fall) via the coolant temperature sensor in the inlet manifold. Operation of the tell tale is controlled by the engine management ECM, and on twin header tank cars, a relay in the engine bay relay box.

Main Beam Tell Tale

This lamp is wired in parallel with the main beam'circuit and glows blue whenever the headlamp main beams are operating.

Turn Tell Tale

When the left hand or right hand turn indicators are operating, this green tell tale flashes in unison. If the tell tale fails to light, or flashes at an unusual rate, the operation of the turn indicator lamps should be checked.

Oil Pressure Tell Tale

This red tell tale is provided to warn of dangerously low engine oil pressure. To prevent unnecessary concern at idle, an engine speed relay is used to enable the circuit only at engine speeds above 1600 rpm. If the oil pressure falls below 1.4 bar (20 psi) at any time above this engine speed, the tell tale will light.

On early cars, the tell tale is linked to the warning lamp check module such that the tell tale will light when the ignition is switched on, and should go out when the engine is cranked. On later 'revised harness' cars, no check module is fitted, and as a lamp test function, the tell tale is linked to the battery non-charging tell tale and should glow when the ignition is switched on. On these cars, if the lamp lights together with the battery tell tale at engine speeds above idle, it is likely that the fault lies in the charging system.

Check Engine Tell Tale

The check engine tell tale is provided to:

i) Inform the driver that the engine management self diagnostic system has detected a fault;

ii) Assist the technician with fault diagnosis.

As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. If, however, the lamp remains lit, or comes on whilst driving, this indicates that the self diagnostic- system has detected a problem, information on which is stored in the system memory. If the fault corrects itself, or is no longer detected, the lamp will go out in most cases after about 10 seconds, but information on the fault will remain stored in the memory for the next 50 engine start ups to indicate to the technician that an intermittent fault has been detected. If no recurrence is recorded during this period, the stored information will be erased from the memory.

Certain types of detected fault will result in the system limiting engine speed to 4,000 rpm in order to protect the engine from damage.

For further information see Section EMH.

Ice Warning

Green and red LED tell tale indicators are provided on the main instrument panel to warn of very low ambient temperatures and the possibility of ice formation. The lamps operate as follows:

Green Only - The green tell tale will light for 3 to 5 seconds when the ignition is first switched on, as a systems check.

CAUTION: The above test function should be observed at the start of every journey in cold weather, and if the lamp does not light, be aware that the system is not functioning, and will give no warning of potentially icy conditions. Note however, that after initial switch on, a period of one to two minutes must elapse before the check system will reset, during which time subsequent switch ons will not initiate a system check.

If the ambient temperature is between +2°C and +5°C, the lamp will remain on after the check period, or in the case of falling temperature, come on whilst driving. This is an initial warning that the outside temperature is approaching that at which ice can form.

Green & Red - **CAUTION** If both green and red tell tale lamps light, the ambient air temperature is between 0°C and +2°C. Since under certain conditions, the ground temperature can be up to 2°C colder than the air temperature, be aware that there is a possibility of ice on the road.

Red Only - **DANGER** Air temperature is at or below 0°C. Icy conditions are likely.

The ice warning feature is provided as an aid to the driver's own judgement of road conditions; the lack of a tell tale should not be regarded as meaning 'all clear'. Icy patches are always a possibility.

Note: It is most important that the detection probe, located beneath the left hand end of the front bumper, is cleaned regularly, as any build up of dirt will adversely affect the sensitivity of the unit.

Fault Diagnosis

If the ice detection system should fail to operate:

i) Check fuse no 21 (instruments & tell tales).
ii) If the red LED lights at temperatures above +2°C, a faulty probe or open circuit to the probe is indicated. Check feed to probe and if OK, replace probe.
iii) The LED lamps operate on 5V only, and must only be tested accordingly.
iv) Check feed and earth connections at module, and if OK, replace module.

INSTRUMENTS

Speedometer

This instrument displays road speed in either MPH or km/h according to market, and incorporates a total distance recorder and a trip recorder. The trip recorder may be zeroed by turning clockwise the small knob protruding through the instrument glass.

On S4 models, the speedo is mechanically driven via cable from the transmission final drive. Sport 300 models use an electric speedo operated via the ECM from the vehicle speed sensor on the RHR hub.

Tachometer

The tachometer indicates engine speed in revolutions per minute. Maximum safe engine speed is 7,400 rpm at which point the ECM cuts off the fuel pump and injectors to safeguard the engine from overspeeding. Sport 300 models use an amplifier fixed to the rear of the tacho to enhance the signal from the ECM. Engine speed input to the ECM derives from the flywheel sensor mounted in the top of the clutch housing.

Oil Pressure Gauge

This gauge is calibrated in bar units and registers oil pressure as detected by the sender unit in the oil gallery cover at the rear of the RH side of the block. Under normal running conditions when the engine is warm, the gauge should register not less than:

0.35 at idle;
2.4 at 3,500 rpm;
3.1 at 6,500 rpm.

Readings will increase when the engine oil is cold, and there is no cause for alarm if very high readings are indicated after start up in cold weather.

See also 'Oil Pressure Tell Tale'.

Fuel Gauge

The fuel gauge is operative with the ignition switched on, and indicates the proportion of fuel remaining in the interconnected twin tanks, which have a combined capacity of 73 litre (16 imp-gall; 19.3 US gall). A low fuel tell tale glows when the tank level drops to approximately 10 litres (2.2 imp.gall; 2.6 US gall). The sender unit is mounted in the top face of the LH tank, and incorporates the low fuel level switch. An open circuit between gauge and sender will result in full scale deflection.

Note that the gauge needle movement is damped to reduce the effects of fuel surge, and consequently a few moments must be allowed after switching on the ignition before a true reading will be obtained.

Oil Temperature Gauge

This instrument indicates engine oil temperature in degrees Centigrade as detected by a sensor in the oil gallery cover at the rear of the RH side of the block. If oil temperature rises into the red sector (above 115°C) a fault is indicated, and the engine should be stopped immediately to prevent serious damage. Check oil level, and for blockages of the two oil cooler ducts in the front spoiler.

Water Temperature Gauge

This instrument registers engine coolant temperature as sensed by a sender unit in the water pump body. Coolant temperature will fluctuate a certain amount as the operating conditions change, and during periods of idling or in heavy traffic, the temperature may rise to over 100°C. Note, however, that the pressurised system (110 kPa {15 psi}) has a coolant boiling point of over 120°C.

If a system malfunction should occur, and the temperature rises to a dangerously high level (over 120°C), the engine coolant tell tale will light.

Boost Gauge (if fitted)

This gauge is marked in bar units, and indicates turbocharger boost pressure. The amount of boost developed by the engine is dependent on engine speed and throttle opening but is limited by a mechanically operated wastegate to prevent excessive boost pressure causing engine damage. Additional electronic controls permit higher boost levels to be developed under certain conditions.

Maximum boost pressure readings will be seen with wide throttle openings at normal running temperature and will be up to 0.84 bar (0.97 bar on 2 litre engines). The system allows a controlled amount of overboost for short periods only, following rapid accelerator pedal movement. The gauge indications will rise with increasing altitude or where the atmospheric pressure is lower than normal, although the actual pressures applied to the engine are unaffected.

Boost pressure is sensed from the rear end of the intake plenum, and is piped to a transducer mounted either above the RH rear wheelarch on early cars, or on 'revised harness' cars, on top of the RH fuel tank board.

Digital Time Clock

The digital LCD time clock is fitted in the centre of the instrument panel, and displays at all times. The display is illuminated for greater clarity when the ignition is turned on, and is dimmed to prevent distraction when the lights are selected.

Two buttons are provided to adjust the time setting; the left hand button for hours, and the right hand button for minutes. Use the push key provided on the key ring to gently depress each button in turn. If the battery is disconnected for any reason, the display will flash on re-connection to indicate that re-setting is required.

FASCIA **SWITCHES**

Sidelamps/Parking Lamps Switch

This push switch operates with or without the ignition on, and switches the front and rear side/parking lamps, side marker lamps (USA models) and instrument panel illumination. The switch motif is backlit green when the ignition is switched on, and lights up when the circuit is activated. Press a second time to switch off.

With the ignition switched off; if the driver's door is opened when the lights are switched on, an audible warning will sound:
Non-USA early cars - no warning.
Non-USA 'revised harness' cars - continuous buzzer:
USA cars - chime for about five seconds.

The non-USA type buzzer unit is fixed to the scuttle beam outboard of the steering column, and the USA type logic/buzzer module inboard of the column.

Headlamp Switch

Pressing this switch, with or without ignition, causes the headlamp pods to rise with the headlamps lit. In addition, the side/parking lamps and side marker lamps (USA) are switched on regardless of the side/park lamp switch position. The switch motif is backlit green when the ignition is switched on, and lights up when the circuit is activated. Press a second time to switch off.

If the headlamp main beams are operating at the time of headlamp switch off, the dropping of the pods will be delayed for a moment.

Note that on non-USA cars, the outer pair of headlamps provide the dip beams, and go out when main beam, provided by the inner pair of headlamps, is selected. If the headlamp main beam single contact relay is replaced by a double contact relay B082M6182F, all four headlamp main beams will light, and ECE lighting regulations will be contravened.

USA specification vehicles use sealed beam headlamp units, with the outer headlamps providing the dip beams, and all four headlamps the main beams.

Heated Rear Screen Switch

This push switch operates only with ignition, and energises the heating elements in the tailgate window, and the two door mirror glasses. The switch motif is backlit amber when the lights are switched on, and lights up when the circuit is operating. Press a second time to switch off. No timer is used on this circuit, and as the heated glass elements place a high demand on the electrical supply, the heating should be used only for as long as is necessary.

Hazard Warning Lamps Switch

This push switch, which is operative at all times, causes all the turn indicators to flash in unison. The switch motif is backlit amber when the lights are switched on, and lights up when the switch is pressed. The hazard flasher unit is combined with the turn indicator flasher, and is located within the

instrument binnacle.

Front Fog Lamps Switch

Two fog lamps are mounted in the front spoiler, and are controlled by a 'push' switch in the right hand side of the binnacle. The lamps are operative only in conjunction with the side/parking lamps or headlamps. The switch motif is backlit green when the lights are switched on, and lights up when the circuit is operating. Press a second time to switch off.

To adjust the foglamps, remove the grommet in the undershield beneath each foglamp, and use a flat blade screwdriver to turn the adjuster and raise or lower the fog lamp beam as desired. Note that a plastic guide tube is provided to aid location of the adjuster screw.

Rear Fog Lamps Switch (if fitted)

Rear fog lamps, on cars so equipped, are incorporated into the rear lamp clusters, and are controlled by a 'push' switch in the right hand side of the binnacle. The lamps are operative only in conjunction with the headlamps. The switch motif is backlit red when the lights are switched on, and lights up when the circuit is operating. Press a second time to switch off.

Cigarette Lighter

A cigarette lighter is fitted alongside the oddments recess at the base of the centre console, and is operative at all times. To use the lighter, press the centre button of the knob to activate the heating circuit. When the element has been sufficiently heated, which takes only a few moments, the button will spring back out. The lighter may then be withdrawn for use. Care should be taken when handling the hot lighter to avoid contact other than with its target.

An illumination ring around the lighter is backlit red when the lights are switched on.

Panel Lights Rheostat

The brightness of the instrument and switch illumination is controlled by a rheostat knob on the left hand side of the steering column shroud. Turn the knob clockwise to increase the brightness, and counterclockwise to decrease illumination. The rheostat module on early cars is fitted on the driver's side of the scuttle beam, and on later 'revised harness' cars, on the relay bracket in the front luggage compartment.

COLUMN SWITCHES &HORN

Headlamp Dipswitch/Flasher/Turn Indicators

The steering column left hand lever switch controls the headlamp dipswitch, headlamp flasher and turn indicators.

Headlamp Dipswitch: The headlamps must be selected via the headlamp push switch before the pods will rise with the headlamps lit. The left hand lever switch is then used to select main or dip beam. Main beam is obtained with the lever furthest forward, away from the steering wheel, and dip beam with the lever moved back towards the wheel. The main beam tell tale lamp in the instrument panel lights when main beam is operating.

Headlamp Flasher: The headlamp flasher is operative at all times. If the lever is pulled towards the steering wheel against spring pressure, the headlamp pods will rise with the main beams lit. The headlamps go out when the lever is released, but the pods remain raised for a few seconds in order to avoid unnecessary oscillations if the lights are repeatedly flashed.

Turn Indicators: The turn indicators operate only with the ignition switched on. Move the lever down to indicate a left hand turn, and up for a right hand Lurn. The switch will be cancelled when the steering wheel is returned to the straight ahead position.

If the switch is pressed up or down only lightly, the switch will return under spring pressure for convenience when signalling a lane change.

Windscreen Wiper/Washers

The steering column right hand lever switch controls the windscreen wiper and washers, and is operative only with the ignition switched on.

Windscreen Wiper: The wiper is controlled by the up/down position of the lever switch, which operates as follows:

- Moved fully down, the wiper is switched off.
- Move up to the first position for intermittent wipe. The wiper will make one sweep about every five seconds.
- Move to the next position to select normal wiper operation.
- Move fully upwards for high speed wipe, for use only in heavy rain.

Windscreen Washers: Pulling the lever towards the steering wheel will operate both the washers and the wiper. When the switch is released, the wiper will continue for a further four sweeps.

The wash/wipe delay module is located on the relay bracket in the front luggage compartment.

Horn

The dual pitch electric horns, which function at all times, are operated on cars without driver's S.I.R. by a central button in the steering wheel boss. On S.I.R. equipped cars, two horn buttons are provided on the the steering wheel spokes.

The horns are located beneath the LH side of the front spoiler, fixed to the oil cooler duct, and are protected by an undershield. The horn relay is fitted on the relay bracket in the front luggage compartment, as is the fuse on early cars. On 'revised harness' cars, the fuse is located on the scuttle beam, beneath the fascia, outboard of the steering column.

Audio Equipment (if fitted)

The audio equipment is operative only with the key inserted into the ignition switch, but at all key positions. Note that with the key inserted, a small battery drain occurs through the radio feed relay even when the set is switched off.

Some audio equipment uses a four digit security code (Computer Anti-Theft System - CATS) as a theft deterrent, such that if the power supply to the set is interrupted, the unit cannot be used again until the 4-digit code is entered. The code may be customer chosen or factory allocated, but in either case, the number should be recorded on the radio ID card and kept safely off board by the customer. If the vehicle battery is disconnected, the code will need to be entered after reconnection. Refer to the audio equipment manufacturer's separate booklet for further details of this system.

Electric Window Control

The different legislative requirements of the USA, have resulted in no 'one touch' or obstruction sensing features being provided on USA or Canadian specification vehicles.

Raising and lowering of the electrically operated door windows is controlled by two switches on the centre tunnel, to the rear of the gearchange lever. To help locate the switches in the dark, a white dot marker in each switch is illuminated whenever the switch is operative.

To lower a window, switch on the ignition, and press the rear (dished) end of the right or left hand switch. To raise a window, press the front (domed) end of the switch. Non-USA market cars feature a 'one touch' facility: Tap the switch to move the window in increments, or press for a moment longer for continuous operation to fully open or close the window. To stop the glass movement at any point, press again either end of the switch.

The windows are operative under any of the following conditions:

Non-USA cars;

- whenever the ignition is switched on;
- during the period between switching off the ignition and a door being opened and closed;
- when either door is open;.
- when using the key to lock the car, if the key is turned and held at the locking position for a moment, both door windows will close automatically.

USA specification cars;

- whenever the ignition is switched on.

Obstruction Sensing: On non-USA cars, a safety feature is incorporated into the window closing mechanism, such that if an obstruction is sensed (increased resistance) during the last third of the travel, the motor stops automatically and reverses window glass movement for a moment. This feature may be manually overridden to cope with frosty conditions and the stiffer window action which may result. An override button is provided in the front of the tunnel top tray, and must be pressed together with the window switch. On Sport 300 models, the override button is located between the two window switches.

WARNING: - On non-USA cars, if the battery becomes discharged or the power supply interrupted (e.g. battery disconnected), the window system must be re-programmed after power re-instatement or neither the obstruction sensing or 'one touch' features will operate.

To re-programme each window: Lower the window fully and keep the switch pressed for 5 to 10 seconds until a 'click' is heard. Then raise the window fully and keep the switch pressed until a 'click' is heard. Repeat the procedure for the opposite window.

ML.4 - CENTRAL DOOR LOCKING

The central door locking (CDL) system operates only on the two doors, and functions as follows:

To unlock either door from outside, turn the key clockwise (RH door) or counterclockwise (LH door) as appropriate. The central door locking will operate automatically to unlock the opposite door. Turn the key in the opposite direction to lock, and note that on non-USA cars, if the key is held at the locking position in the driver's door for a moment, both door windows will close automatically.

From inside the car, locking the driver's door will automatically lock the passenger's door, but locking the passenger's door will **NOT** lock the driver's door. Unlocking either door via the interior flap handles will automatically

unlock the opposite door.

To lock the doors from outside without the use of the key; with one door open, lock both doors using the interior locking flaps, and then shut the door. Note that when shutting the driver's door, the exterior handle must be held raised, or else the doors will unlock automatically to help prevent an inadvertent lock out.

Deadlocking: When the vehicle alarm is set (see later), both doors are 'deadlocked' and cannot be unlocked via the interior locking flaps. This security feature protects against a door being opened after door glass breakage.

Notes

On USA market cars, if the ignition has been switched off and the key left in position, a chime will sound for about five seconds when the driver's door is opened.

In the event of a flat battery, the central door locking will not operate, and each door must be locked or unlocked manually. If the battery becomes flat whilst the vehicle alarm is set (see later) and the doors are deadlocked, the passenger door cannot then be manually unlocked from inside or outside until power is reinstated.

The CDL module incorporates an inertia switch which operates on collision impact to unlock both doors.

The central door locking (CDL) system consists of the following principal components:

- CDL Module; fitted on early cars in the front luggage compartment on the passenger side front bulkhead, and on 'revised harness' cars at the outboard front of the passenger footwell.
- Door Lock Actuators; fitted directly to the door latch mechanism. The driver's side unit is identified by 'BU' and the passenger's unit by 'BW'.
- Exterior Handle Micro Switches; two switches mounted on the back of each exterior door handle sense the key lock/unlock commands. Note that on the passenger's door, the two switches are identical and may be connected either way round. On the driver's door, the 3-wire switch is the outer of the two.

C.D.L. Module Connections:

Orange/Blue	Pin 2	Lock/unlock status signal from door locks.
Green	Pin 3	Ignition +ve.
Orange/Red	Pin 6	Lock/unlock status signal from door locks.
Orange/Green	Pin 7	Output to locking motors
Orange/White	Pin 8	Output to locking motors
Purple	Pin 9	Battery +ve

ML.5 - VEHICLE ALARM SYSTEM

The Lotus vehicle alarm system enhances theft protection of the car, and of the contents in the vehicle interior. When the alarm is triggered the vehicle horns are sounded for 30 seconds, and in some markets the hazard lights flash for a period of 5 minutes, before the alarm switches off and automatically resets. (Note that variations may occur due to the legal requirements of individual countries).

The alarm system monitors the following parameters and may be triggered by:

opening either door;
on 'revised harness' cars: opening the front bonnet or tailgate;
movement detected (by ultrasonics) within the passenger compartment;

energising the ignition or starter circuits using a key or by 'hot wiring';
removing the radio;
tampering with the alarm circuits.

Additional protection provided by the alarm system includes electrical immobilisation of the engine, and electro-mechanical disablement of the door interior locking flaps ('deadlocking'), such that the doors cannot be unlocked from the inside.

WARNING: Do NOT euergise the alarm when the vehicle is occupied as the doors cannot then be unlocked from inside.

To switch on the alarm, close both doors, and turn the key in the driver's side to lock the door, and then turn further in the same direction to the horizontal position before withdrawing the key. A red tell tale lamp on the ultrasonic sensor housing at the passenger side top rear corner of the cabin, will light for 10 seconds, and then blink continuously to indicate that the alarm is armed and the passenger compartment movement sensing (ultrasonics) activated.

To switch off the alarm, turn the key all the way in the opposite direction, as to unlock the doors. Switching off the alarm is not possible in any other way, so the safe keeping of a duplicate key is to be emphasised.

Cabin Movement (Ultrasonic) Sensing

The passenger compartment is monitored by two ultrasonic modules, one mounted in the rear end of each of the trimmed capping rails. An ultrasonic pulse (a high frequency sound wave above the limit of human hearing) is emitted from one of the transducers, and a fraction of a second later, its echo is received by the same transducer and is stored by the ECU in the form of an echo profile of the vehicle interior. The opposite sensor then performs the same task, and by continually alternating in this way, the two sensors and ECU build up a 'map' of the interior space. In order for this profile to be consistent, the windows and roof should be closed. If the echo subsequently differs beyond a tolerance band, as will occur in the case of glass breakage or intrusion, the alarm will be triggered. Because the echo profile is continuously updated, the system is adaptive, and is able to adjust automatically to echo disturbances caused by changes in ambient air temperature, external noise, wind from passing vehicles etc., and avoids many causes of false alarms.

If animals are to be left in the vehicle, or if for any other reason it is desired to cancel the ultrasonics feature: press the small button on the ultrasonic sensor housing at the driver's side top rear corner of the cabin. The tell tale in the opposite corner will flash for 10 seconds. Close the doors and use the key to switch on the alarm in the normal way. The tell tale will light for 10 seconds and then go out, indicating that the alarm is armed without cabin movement detection.

The ultrasonic sensing will be reinstated automatically next time the alarm is armed, unless the cancelling button is pressed beforehand.

Alarm Resetting

When triggered, the alarm will sound the horn for 30 seconds, and for some markets, flash the hazard lamps for five minutes before resetting. The ultrasonic movement sensors will trigger a maximum of three times in any one switch on phase, but the door and ignition sensors will trigger an unlimited number of times.

The alarm may be stopped by switching off using the key (see above).

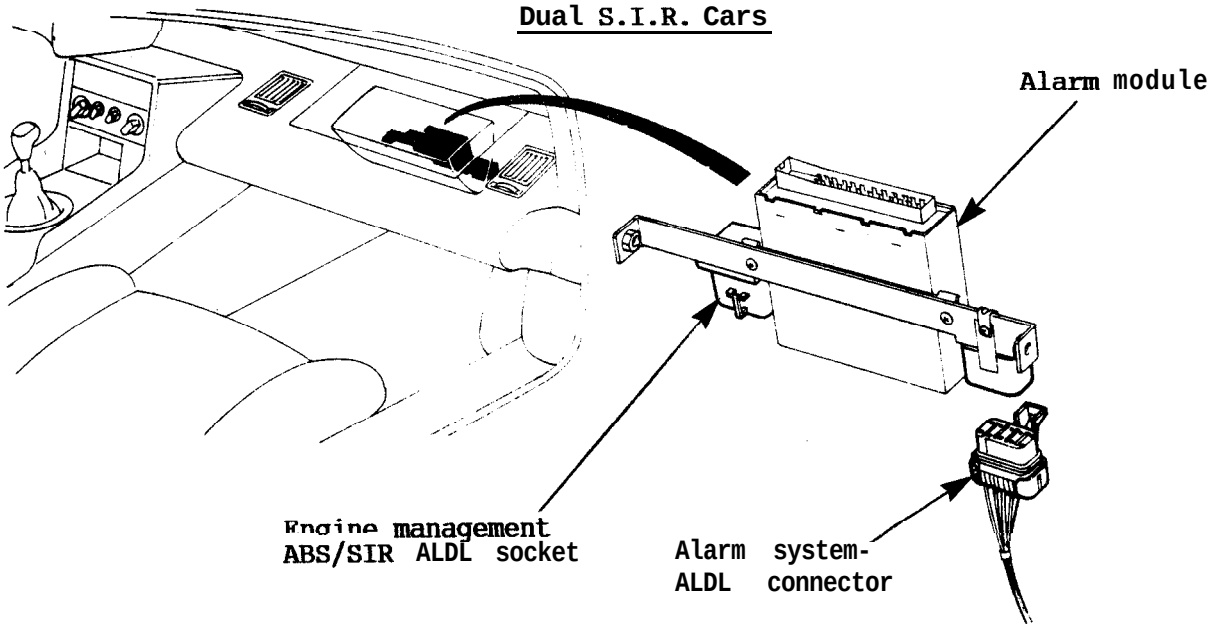
Alarm Verification & Self Diagnosis

Immediately the alarm is switched on, the system performs a test on itself, and lights an LED tell tale on the ultrasonic sensor housing at the passenger side top rear corner of the cabin. If the system is in order, the tell tale will light for approximately ten seconds, and then unless the feature has been overridden, blink continuously to indicate that the ultrasonics are activated.

If the tell tale initially lights only briefly, rather than for 10 seconds, or remains lit continuously, either the bonnet, tailgate or a door is not fully closed, or there is a system fault - see below.

ALDL Connector & 'Tech 1' Diagnosis

An Assembly Line Diagnostic Link (ALDL) connector socket dedicated to the alarm system is provided to enable connection of the Tech 1 scanner tool (TOOOT0896) for fault diagnosis. The ALDL is located behind the outboard side of the glovebox and is fitted with a bridging link required as part of the self diagnostics. On cars with passenger side S.I.R., the ALDL is parked in a socket (which incorporates the bridging link) fixed to the outboard end of the alarm module bracket beneath the passenger side fascia. The alarm ALDL is identified by a label on the harness to distinguish it from the engine management/ASS/SIR system ALDL connector located at the inboard end of the passenger side under-fascia.



To diagnose the alarm system, remove the bridging link (or unplug from parking socket), and plug in the Tech 1 tool. Insert the alarm specific cartridge A082M6557 (English language - for others, see service parts list) into the tool, and proceed as follows to check for trouble codes:

Tech 1 prompt	Response
OPEL/VAUXHALL 90-91 ECU	YES
SELECT MODEL YEAR: 199?	1
SELECT MODEL:	'NO' to scroll through options
OMEGA/CARLTON	YES

Tech 1 prompt	Response
STOP ENGINE, TURN ON IGNITION	YES
AUTOMATIC SYSTEM IDENTIFICATION	'NO' to scroll through options
SELECT ELECTRONIC BODY SYSTEM	YES
ANTI THEFT W.	YES
COMPARE OPEL PART-NO ???????? WITH CHART 3	YES if part number is correct (see chart below). If part number is incorrect, fit correct part.
COMPARE COUNTRY CODE ???????? WITH CHART 3	YES. Even if country is wrong, it cannot be changed until any fault/ history codes have been read and cleared.
Alarm codes activated in the last armed period are listed followed by history codes	YES to scroll through sequence
Main Menu	
F0: Data list	Current actual values of sensors and signals are displayed. See later table.
F1: Not used	
F2: Trouble codes	Stored trouble codes are displayed.
F3: Snapshot	Enables intermittent faults to be identified over a set period. See detailed description in Tech 1 Operating Instructions.
F4: Clear codes	Enables stored codes to be erased.
F5: Actuator test	To test check light, horn, turn signal relay, fuel/crank relay
F6: Not used	
F7: Programming	Permits country code to be set: GB (intermittent horn) Switzerland (continuous horn and flashing turn indicators) Netherlands - not used Germany (intermittent horn and flashing turn indicators) - also used for all remaining countries.

Chart 3

ECU Opel part no. 90358389 - cars built before June '92. R/B 90460636
ECU Opel part no. 90460636
Both these ECUs are applicable to all markets.

Note that the selection of German programming on U.K. vehicles will result in the turn indicators flashing in addition to the intermittent sounding of the horn, and will contravene U.K. legislation.

TECH 1 QUICK CHECK 'PO' DATA LIST

Test Step No.	Displayed Parameter	Notes	Displayed Values	Possible Trouble Codes
01	BATTERY VOLTAGE		**OKAY** >9V	55
02	IGNITION STATUS	- ignition OFF - ignition ON	OFF 0V ON 12V	35
03	DOORS SWITCH	- both doors closed - one or both doors open	OPEN 12V CLOSED 0V	.8,34
04	TRUNK SWITCH (Front bonnet)	Early Cars Not used	OPEN 12v	18,32
		'Revised Harness' Cars - front bonnet closed - front bonnet open	OPEN 12v CLOSED 0V	18,32
04	ENGINE HOOD SW. (Tailgate)	Early Cars Not used	OPEN 12v	33
		'Revised Harness' Cars - tailgate closed - tailgate open	OPEN 12v CLOSED 0V	33
06	RESERVED SWITCH	Not used	ALARM ov	41
07	RADIO STATUS	- radio fitted - no radio or set removed	IN USE NOT IN USE	37
08	RADIO GROUND	- radio ground connected - ground disconnected	GROUND 0V OPEN >2V	37
09	CRANK SIGNAL	With ECU 90358389 - ignition OFF - ignition ON	INACTIVE 0V ACTIVE 12v	35,36
		With ECU 90460636 Not used	INACTIVE 0V	35,36
	CRANKRELAY (Ignition relay output on Lotus)	- ignition OFF - ignition ON - ign OFF alarm triggered	INACTIVE 0V INACTIVE 0V ACTIVE 12v	35.36
	DISARM SIGNAL	First arm alarm with key, then: - disarm alarm - after 1 sec.	ACTIVE 12v (momentarily) INACTIVE 0V	18,39
	ARM SIGNAL	First disarm alarm, then: - arm alarm - after 1 sec.	ACTIVE 12v (momentarily) INACTIVE 0V	18
	TRUNK SIGNAL	Not used	OPEN > 2v	18,32,39

Test Step No.	Displayed Parameter	Notes	Displayed Values	Possible Trouble Codes
14	TURN SIG.RELAY	- alarm disarmed - armed, not triggered - armed, triggered* * not GB spec.	INACTIVE INACTIVE INACTIVE/ ACTIVE (alternating)	
15	TURN SIGNAL LEFT	Not used	INACTIVE OV	26
16	TURN SIG. RIGHT	Not used	INACTIVE OV	27
17	HORN RELAY	- alarm disarmed - armed, not triggered - armed, triggered* * contin. ACTIVE for CH	INACTIVE INACTIVE INACTIVE/ ACTIVE (alternating)	25
18	HORN	- alarm disarmed - armed, not triggered - armed, triggered* *contin. ACTIVE OV for CH	INACTIVE 12V INACTIVE 12V INACTIVE 12V/ ACTIVE OV (alternating)	25
19	FAN	Not used	INACTIVE >2V	
20	DIAG.REQUEST		INACTIVE >2V	
21	U/S SWITCH (Ultrasonic sensor)	Button in driver's side sensor housing (cant rail) - button pressed - button released	 ACTIVE 5V INACTIVE OV	28
22	CHECK LIGHT	Ign OFF. Press & release U/S button & observe LED in pass. sensor housing: - 10 secs. LED flashes - after 10 secs. LED off	 ON 6V/OFF OV alternating OFF ov	29
23	U/S SWITCH	See (21) above		
24	u/s ALARM	Ignition OFF. - press & release U/S button - arm & disarm alarm	 DISABLED ENABLED	28,29
25	THEFT STATUS	- disarmed - 10 sec period after arming - after 10 secs	DISARMED ARMING ARMED	18,32 34,39
26	ALARM SIG.INPUT	Not used	INACTIVE	

Chart 1 - ALDL and Voltage Supply Check

Test Step	Description
ALDL	
1	With ignition OFF; measure resistance between ALDL terminal A and ground. Should be zero.
2	With ignition ON; measure exitation line voltage between ALDL terminal H and ground. Should be greater than 2 volts. If outside specification: - check for open circuit between ALDL terminal H and ECU terminal 5, or short circuit to ground. - replace ECU.
3	With ignition ON; measure supply voltage between ALDL terminal F and ground. Should be greater than 11 volts. If outside specification: - check battery voltage. - check fuse 19. - check for open circuit between ALDL terminal F, fuse 19, and positive post.
4	With ignition ON; measure voltage on bidirectional data line between ALDL terminal G and ground. Should be greater than 6 volts. If outside specification: - check for open circuit between ALDL terminal G and ECU terminal 2. - replace ECU.
Alarm LED	
5	With ignition OFF, close both doors, bonnet 'and tailgate. Arm alarm and observe LED in passenger side U/S housing. Should light for 10 seconds. If not: - check for open circuit between sensor terminal 1 and ECU terminal 23 (sensor ground). - check for open circuit between sensor terminal 3 and ECU terminal 22 (sensor voltage supply, 8 volts). - check for open circuit between sensor terminal 2 and ECU terminal 6 (LED pulse lead).
Tech 1	
6	See Tech 1 operating instructions.
ECU	
7	With ignition OFF, measure resistance between ECU terminals 10 and ground, and 23 and ground. Should be zero. If not: - check for open circuit between terminals 10 and 23 and the negative post.
8	With ignition ON and ECU plug disconnected, measure supply voltage at ECU connector terminal 13. Should be greater than 11.5 volts. If not: - check battery voltage. - check for open circuit between ECU terminal 13, fuse 33 and the positive post. - replace ECU.

Chart 2 - Trouble & Alarm Codes

Trouble Codes	Associated sensor or problem	Possible causes of fault
18	Disarm not connected	- incorrect voltage level, or open circuit between ECU terminal 11 and driver's door lock - ECU defective
25	Horn circuit	- incorrect voltage level or open circuit between ECU terminal and horn relay - open circuit between horn and fuse 14 - fuse 14 defective - horn relay defective - ECU defective
28	Driver's ultrasonic sensor inoperative	- leads from driver's side u/s sensor supply incorrect voltage to ECU, or are open circuit See Tech 1 test step 21
29	Passenger's ultrasonic sensor inoperative	- leads from passenger's side u/s sensor supply incorrect voltage to ECU, or are open circuit. See Tech 1 test step 21
55	ECU	- ECU defective
Alarm Code		
32	Alarm activated via front bonnet switch	- ECU has registered an unauthorised opening of the bonnet: See Tech 1 test step 4. If fault is present: - close bonnet. If voltage at terminal 4 of ECU is less than 11 volts, check for short circuit to ground between bonnet switch and ECU; or defective bonnet switch; or defective luggage compartment lamp. - open bonnet. If voltage at terminal 4 of ECU is greater than 1 volt, check for open circuit between bonnet switch and ECU.
33	Alarm activated via tailgate switch	- ECU has registered an unauthorised opening of the tailgate: See Tech 1 test step 5. If fault is present: - close tailgate. If voltage at terminal 16 of ECU is less than 11 volts, check for short circuit to ground between tailgate switch and ECU; or defective tailgate switch; or defective luggage compartment lamp. - open tailgate. If voltage at terminal 16 of ECU is greater than 1 volt, check for open circuit between tailgate switch and ECU.

34	Alarm activated via door switch	- ECU has registered an unauthorised opening of a door: See Tech 1 test step 3. If fault is present: - close both doors and measure voltage at ECU terminal 3. Should be greater than 11 volts. If not, check for short circuit between door switches and ECU; or faulty interior light circuit; or faulty door switch. - open and close both doors one after another and measure voltage at ECU terminal 3: Door open; less than 1 volt. Doors closed; greater than 11 volts. If readings are outside spec., a door switch may be defective.
35	Alarm activated via ignition	- ECU has registered an unauthorised energising of the ignition: See Tech 1 test step 2. If fault is present: - measure voltage at ECU terminal 17 (do **not** disconnect plug from ECU); if less than 11 volts, check fuse 17, or for open circuit between ECU terminal 18 and ignition switch.
36	Alarm activated via crank signal input	- ECU has registered an unauthorised input at the ignition relay terminal: See Tech 1 test: If fault is present: - with ignition on, ECU terminal 18 should receive 12 volts from ignition switch. not, check RU cable for shcrt to ground. - measure voltage at ECU terminal 21, without u/s sensor button depressed: Should be less than 0.5 volt. If not, check for open circuit in RU cable. Note that if the Tech 1 display, after pressing the u/s button changes continually between INACTIVE/ACTIVE, check for open circuit in cable from ECU terminal 23 to sensor ground.
39	Alarm activated via disarm signal	- ECU has registered an unauthorised signal at the desensitise input. See Tech 1 test step 9. If fault is present: - measure voltage at ECU terminal 11; should be 5 to 12 volts momentarily after arming, then less than 1 volt. If not, check OW cable between ECU terminal 11 and CDL module. - check for short circuit in either CDL motor. - check for faulty CDL module.
40	Alarm activated via two simultaneous triggers	- ECU has registered 2 unauthorised intrusions at its input terminals **at** the **same time.**

Reading Alarm/Trouble Codes Without 'Tech 1' Tool

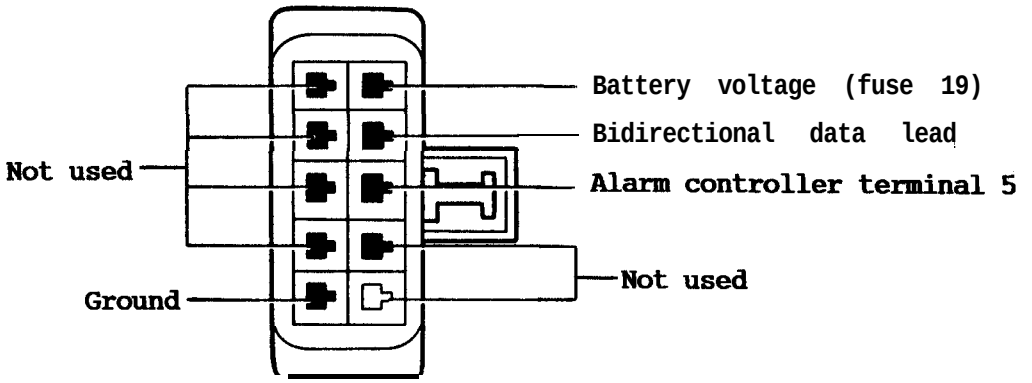
The alarm/trouble codes can be read without the use of a 'Tech 1' tool by bridging two terminals in the ALDL connector:

Remove the existing bridging link, or unplug the ALDL from its parking socket.

Bridge the brown/green cable in ALDL terminal H, to the black cable in terminal A. (i.e. ground pin 5 of the'alarm controller)

The LED in the passenger side ultrasonic sensor will flash the following sequence of numbers; each number is flashed 3 times before moving on to the next:

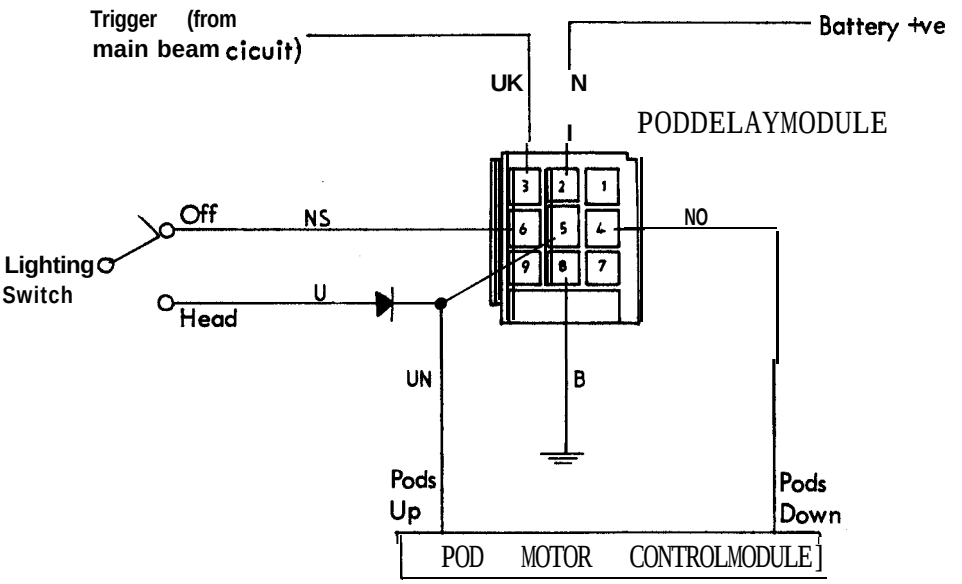
- '12' to indicate that the system is in diagnostic mode;
- any trouble codes (see chart 2 above)
- any alarm history codes (see chart 2 above)



ML.6 - ELECTRONIC MODULE OPERATION

Headlamp Pod Delay Module (Sheet 13)

The module is green in colour, located on the relay bracket in the front luggage compartment, and controls the downfeed to the pod control module. The pod delay module is fitted to keep the pods raised whilst the headlamps are flashed, and prevent the pods oscillating unnecessarily. The pods will remain raised for approximately 4 seconds after the flasher control has been released, or if the headlamps are switched off whilst main beam is selected.



When the headlamps are switched on, a feed to the UN lead is supplied to raise the pods. When the headlamps are switched off, a feed into terminal 6 is supplied which outputs from terminal 4 to the NO downfeed.

If the h/l flash is operated, a (main beam) feed into terminal 3 is supplied, which outputs via terminal 5 to the UN **upfeed.** The **downfeed** output via terminal 4 is overidden. When the feed into terminal 3 is switched off, the module, (via +ve feed into terminal 2) maintains the **upfeed** output at terminal 5 for approx. 4 seconds before switching off, and allowing the down feed output to resume. This logic also applies if the headlamp main beams are operating and are then switched off at the lighting switch.

Pod Lift (Control) Module

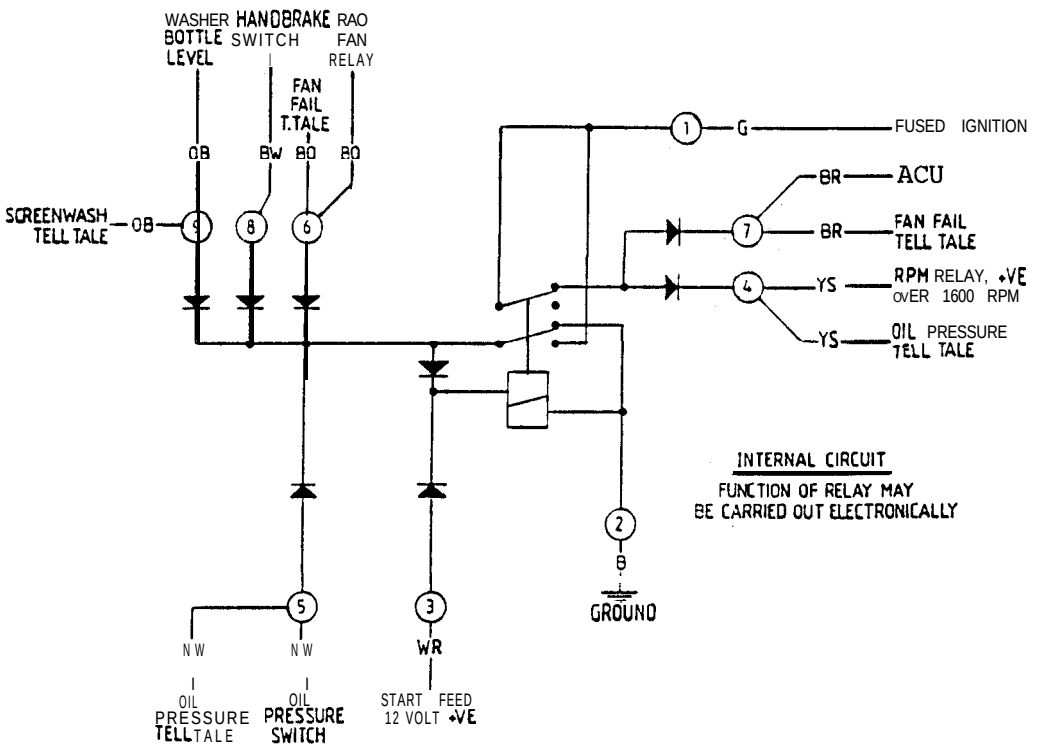
This module is a rectangular unit mounted at the extreme left hand side of the front luggage compartment, and controls the up and down feeds to the two headlamp pod reversing motors.

For the headlamp motors to raise the pods, the UN cable to input terminal A of the lift module must supply a 12 volt feed from either the lighting switch or flasher switch. The lift module then switches a 12 volt output via the KO cables to each lift motor, and an earth to each KB motor cable. The motors operate to raise the pods until the lift module senses a stall condition, and switches off the 12 volt supply.

When the headlamps are switched off, the control module receives a 12 volt feed on the NO cable from the delay module, and operates to output 12 volts positive to each KB motor cable, and supplies an earth on the two KO cables. When the module senses a motor stall condition, the feed is switched off.

Tell Tale Control Module. (not fitted on 'revised harness' cars)

This module is black in colour, and located on the relay mounting bracket in the front luggage compartment. The function of the module is to light various fascia tell tale lamps as a circuit/bulb test when the ignition is switched on (G terminal 1) and extinguish the lamps, unless activated by control function, on engine cranking (WR terminal 3).

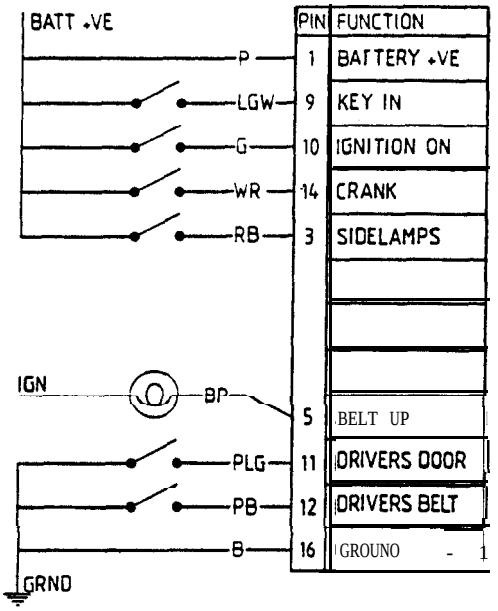


When the ignition is first switched on, terminals 5,6,8 & 9 are provided with an earth path through the module via terminal 2, whereas terminals 4 & 7 are provided with a +ve feed. When an engine crank signal is applied' to terminal 3, the relay switches over and is held in the switched condition after the crank signal is removed by the ignition feed at terminal 1. The earth path for terminals 5,6,8 & 9 is broken, and the feed to terminals 4 & 7 is removed. The relay will reset when the ignition feed to terminal 1 is switched off.

Logic Module (USA models)

The logic module is mounted on the scuttle beam inboard of the steering column. The unit incorporates an audible chime, and is fitted to provide a warning of; key left in ignition, lights on, and driver's seatbelt unbuckled. A courtesy lamp delay is also included.

- 'Key in' reminder: If the driver's door is opened after the ignition has been turned off and the key left in the ignition, the chime will sound at 2 Hz for two seconds.
  'Lights on' reminder: If the driver's door is opened when the sidelights are switched on and the ignition is off, the chime will sound at 2 Hz for two seconds.
  Seat belt reminder: When the ignition key is turned to crank, the seat belt tell tale will flash at 1 Hz for seven seconds. If the driver's seat belt is not fastened, this tell tale will be accompanied by a chime at 1 Hz.
  Courtesy lamp delay: With the interior lamp switched to the courtesy position, and the ignition switched off; when the second door is closed, the lamp will remain lit for ten seconds or until the engine is cranked.



Logic Module Connections:

Pin 1: Permanent battery supply.
Pin 2: Not used.
Pin 3: Input from sidelamps feed. 12V +ve when sidelamps switched on.
Pin 4: Not used.
Pin 5: Input from negative side of seatbelt tell tale. Controls earth switching. Lamp current is 0.33A at 12V.
Pin 6: Not used.

Pin 7: Not used.
Pin 8: Not used.
Pin 9: 'Key in' input. Battery voltage when key is inserted and turned to first position.
Pin 10: Ignition input.
Pin 11: Output to driver's door switch. Switched to ground when door is opened. Maximum volt drop at the unit 0.5V.
Pin 12: Output to seat belt switch. Switched to ground when belt is not buckled.
Pin 13: Not used.
Pin 14: Crank input. Goes high when starter is engaged.
Pin 15: Not used.
Pin 16: Permanent earth connection.

Rheostat Module

The rheostat module (blue) is mounted on early cars on the scuttle beam inboard of the steering column, and on 'revised harness' cars on the relay bracket in the front luggage compartment. The module is linked to the rheostat control on the steering column shroud, and reduces the power handling requirement of the rheostat.

Wiper/Washer Switch & Intermittent Wipe/Wash Module

The windscreen wiper/washer operation is controlled by the steering column RH lever switch, which functions electrically as follows:

OFF:	RLG - ON cables connected (terminals 53 - 53e)
SLOW:	G - RLG cables connected (terminals 53a - 53)
FAST:	G - ULG cables connected (terminals 53a - 53b)
INTERMITTENT:	G - OP cables connected (terminals 53a - J)

The intermittent wipe/wash module is mounted on the relay bracket in the front luggage compartment, and controls the 6 cables as follows:

Orange/Purple	Pin 1 (I)	12 volt supply to module from wiper switch when intermittent wipe is selected.
Orange/Brown	Pin 2 (53E)	12 volt output to wiper motor via 'slow speed' contacts in wiper switch when intermittent wipe is selected. One pulse approx. every 5 seconds.
Black	Pin 4 (31)	Ground.
Brown/Lt.Green	Pin 5 (31B)	12 volt input to module from motor limit switch for continued motor operation after switch off until limit (park) switch grounds.
Lt.Green/Black	Pin 6 (53C)	12 volt input to module from washer switch to initiate 4 wiper sweeps.
Green	Pin 8 (15)	12 volt ignition feed from fuse 20.

A.C. & Radiator Fan Control (see sheet 8)

The air conditioning uses a control system which includes cycling energisation of the compressor clutch to modulate cabin temperature. The driver operated a.c. temperature control in the cabin is linked to a thermistor control unit which compares demand and supply temperatures, and when necessary sends a 12 volt signal via a low pressure cut-out switch (mounted in the receiver-drier) to the compressor control circuit. The normally closed cut-out switch protects the compressor from lubricant starvation as a result of running with too low a pressure in the refrigerant system.

Operation of the a.c. compressor is controlled by the engine management ECM, which under certain conditions will override the a.c. request signal and switch

off the air conditioning. These operating conditions include: engine speeds below idle to help prevent stalling; wide open throttle to make available full engine power; near maximum vehicle speed to increase engine cooling sustem margins.

A.C. Control - Early Cars:
Output from the thermistor control unit energises the rad. fan relay, and also the air con. request relay. Switching of the request relay supplies a 12 volt signal to ECM terminal J3-C17. The ECM uses this signal to raise the idle speed via the idle air control valve, before grounding terminal Jl-A12 to energise the a.c. compressor (via the a.c. control relay).

A.C. Control - 'Revised Harness' Cars:
Output from the thermistor control unit supplies a 12 volt signal to ECM terminal J3-C17. The ECM uses this signal to raise the idle speed via the idle air control valve, before grounding terminal Jl-A12 to energise the a.c. compressor (via the a.c. compressor relay).

Radiator Fan Control - Early Cars:
Output from the thermistor control unit energises the rad. fan relay whenever the compressor is requested. In addition, the rad. fan relay is switched by the ECM (via the rad. fan control relay) under the following conditions:
- at coolant temperatures above 90°C as sensed by the coolant temperature switch in the inlet manifold water jacket.
- as an engine safety precaution, whenever the 'Check Engine' tell tale is lit.

The fans will not be switched on by the ECM if battery voltage is sensed as being too low.

Radiator Fan Control - 'Revised Harness' Cars:
The radiator fan power relay is switched via ECM terminal Jl-A9 under any of the following conditions:
- at coolant temperatures above 90°C as sensed by the coolant temperature switch in the inlet manifold water jacket.
- when the a.c. compressor is operating, and vehicle speed is below 35 mph.
- as an engine safety precaution whenever the 'Check Engine' tell tale is lit.

The fans will not be switched on by the ECM if battery voltage is sensed as being too low.

Central Door Locking

C.D.L. Hodule:
The CDL module is located, on early cars, on the passenger side bulkhead, front luggage compartment, and on 'revised harness' cars, at the outboard front of the passenger footwell. The module controls the operation of the CDL system, and includes an inertia switch to unlock the doors in the event of a sufficiently severe collision impact.

Orange/Blue	Pin 2	Lock/unlock status signal from door locks.
Green	Pin 3	Ignition +ve.
Orange/Red	Pin 6	Lock/unlock status signal from door locks.
Orange/Green	Pin 7	Output to locking motors; 12V to lock
Orange/White	Pin 8	Output to locking motors; 12V to unlock
Purple	Pin 9	Battery +ve
Black	Pin 11	Ground
Orange/Yellow	Pin 12	12V momentarily when locking

ML.7 - RADIO WIRING & SUPPRESSION

Audio Wiring

Wiring for audio equipment is provided in all cars, and terminates in an IS0 16-way connector plug located behind the centre console. The separate yellow/pink cable with a female spade connector, should be connected to the body (earth) of the set in order to trigger the vehicle alarm if the set is removed. A radio auxiliary ('key-in') relay, mounted on the passenger side front bulkhead of early cars, or front luggage compartment relay station on 'revised harness' cars, is used to provide a 'clean' auxiliary feed to the radio. Note that this relay is energised whenever the ignition key is inserted (at all key positions), so that a small battery drain will occur even without the audio system or other auxiliary equipment operating. i.e. do not leave the car with the key inserted.

Four speakers are fitted, the front pair beneath each end of the fascia, and the rear pair at each bottom corner of the rear bulkhead. The speaker wiring terminates in the 16-way IS0 audio connector.

Speaker specifications are as follows:

Front

Type: Clarion SE 4260 dual concentric solid state type tweeter.
Diameter: 100mm.
Feature: Water resistant cone.
Input power: Nominal 15W; Maximum 30W; Peak 45W.
Impedance: 4Ω ± 15% @ 400Hz

Rear

Type: Clarion SE 1601 wide frequency response dual cone.
Diameter: 160mm.
Feature: Water resistant cone.
Input power: Nominal 20W; Peak 60W.
Impedance: 4Ω ± 15% @ 400Hz

Radio Aerial

Three types of aerial have been fitted;

A fixed helical whip transformer aerial mounted on the leading edge of the tailgate; The aerial mast may be unscrewed from the plinth (using the small spanner provided with the vehicle documents) when necessary to prevent damage. The aerial lead and transformer cable are routed along the driver's side capping rail and 'A' post.

A motor driven telescopic aerial mounted ahead of the LH door hinge post. For access, the knee bolster and screen pillar trim panel must be removed.

On some 'revised harness' cars, a motor driven telescopic aerial is mounted in the left hand rear quarter panel, at the left hand side of the rear luggage compartment. The aerial lead is routed over the left hand tank board and along the tunnel top.

In each case, a ground plane is provided by screening foil stuck to the underside of the body or tailgate around the aerial base, and must be earthed to the co-axial cable sheath by the aerial fixings.

Suppression

The ignition system is suppressed by the use of resistive plug leads in conjunction with resistor spark plugs. Reflective screening foil is used to line the cabin rear bulkhead and engine bay surround and lid. A suppression capacitor is attached to the rear cover of the alternator.

ML.8 - BATTERY, BATTERY CABLES AND EARTHING POINTS

Battery

WARNING: POISON/DANGER - CAUSES SEVERE BURNS - KEEP OUT OF REACH OF CHILDREN.
Contains sulphuric acid - avoid contact with skin, eyes or clothing.
Antidote: External - flush with water; Internal - drink large quantities of water' or milk. Call physician immediately; Eyes - flush with water for 15 minutes and get prompt medical attention.
Batteries produce explosive gases. Keep sparks, flames and cigarettes away. Ventilate when charging or using in enclosed space. Always shield eyes when working near batteries,

Specification:

Type;	Tungstone Heavy Duty type 088
Cranking power;	570 Amps SAE
Reserve capacity;	100 mins.
Dimensions;	L 254mm, W 175mm, H 206mm
Terminals;	Standard tapered round post
Recommended bench charge;	5.5 amps

Battery Access

The 'maintenance free' battery is located behind the right hand rear wheelarch in the rear luggage compartment and requires no routine topping up of the electrolyte. However, at intervals specified in, the Maintenance Schedule, the battery terminals should be checked for security and condition, and protected with petroleum jelly.

For access to the battery, remove the tool case, release the two fingernuts, and lift off the battery cover. To remove the battery, disconnect both terminals (see below), remove the two nuts securing the clamping channel, and slide out the battery.

When refitting, take care not to crush the battery case by overtightening the battery clamp. Tighten only sufficiently to adequately secure the battery.

Disconnecting the Battery

If the battery is to be disconnected, the following precautions should be taken:

i) Disconnect the **negative** (earth; black;'-') battery cable first, and re-connect last, to minimise the possibility of an accidental short to earth of the battery positive connection.

ii) Before disconnecting the battery, wait for at least ten seconds after switching off the ignition to allow the engine management system to adjust the setting of some components ready for re-starting.

iii) After battery re-connection, a change in the engine performance characteristics may be noted for a period whilst the computer controlled engine management system Ire-learns' some of its settings. The duration of this period will depend on driving style, but may be shortened by steady cruising in 4th gear at about 40 mph.

iv) Whenever the battery is re-connected, or a 'jump' start attempted, first ensure that the keys are removed from the vehicle, since under certain circumstances the central door locking may operate and lock both doors.

Battery Charging

If the state of charge of the battery is in doubt, the specific gravity (s.g.) of the electrolyte should be checked using a hydrometer. An **s.g.** of 1.22 is typical of a 65% state of charge, considered to be the minimum serviceable condition. If the hydrometer indicates that the battery needs recharging, the

battery should first be removed to a well ventilated area to avoid a build up of fumes in the luggage compartment. Observe the safety precautions listed above when removing the battery. Charge the battery following the charger manufacturer's instructions while observing these basic rules:

If the s.g. is over 1.22, there is no need to charge the battery and charging attempts will only increase the possibility of undesirable overcharge effects.
Check that the electrolyte level is between the upper and lower markers on the battery case, or approximately 5 mm above the separators, and if necessary add distilled water.
Commence charging at normal bench charge rate (5.5 amps) keeping the vent plugs in place, and continue until the voltage reading and s.g. are constant for three successive hourly readings. The s.g. of a fully charged battery is approx. 1.28 at 15°C.
Boost charging (at up to 11 amps) may be used in urgent cases **provided** that the voltage reading does not exceed 15 volts, **and** the battery temperature does not exceed 43°C. If either of these limits is reached, reduce to normal bench charging rate.

Battery Testing

To test the battery, use a voltmeter and battery load tester capable of supplying a load of 200 amps.

i) If the battery has been on charge either externally or via the vehicle alternator, first remove the surface charge by applying a 125 amp load to the battery for 10 seconds. Turn off the load and wait for at least 5 minutes to allow the battery to recover.

ii) Apply a 200 amp load to the battery for a period of 15 seconds, and note the voltage reading at the end of this period just prior to switching off the load.

iii) Estimate the temperature of the area in which the battery was located for the few hours prior to the test, and determine the minimum acceptable voltage for step (ii) from the following table:

Temperature				Minimum voltage at end of discharge test
	°C		°F	
Above	21	Above	70	9.6
	10		50	9.4
	0		30	9.1
	-10		15	8.8
	-18		0	8.5
Below	-18	Below	0	8.0

iv) If the voltage observed in step (ii) is at or above the minimum voltage in the table above, the battery is serviceable. If below the minimum voltage, the battery should be replaced.

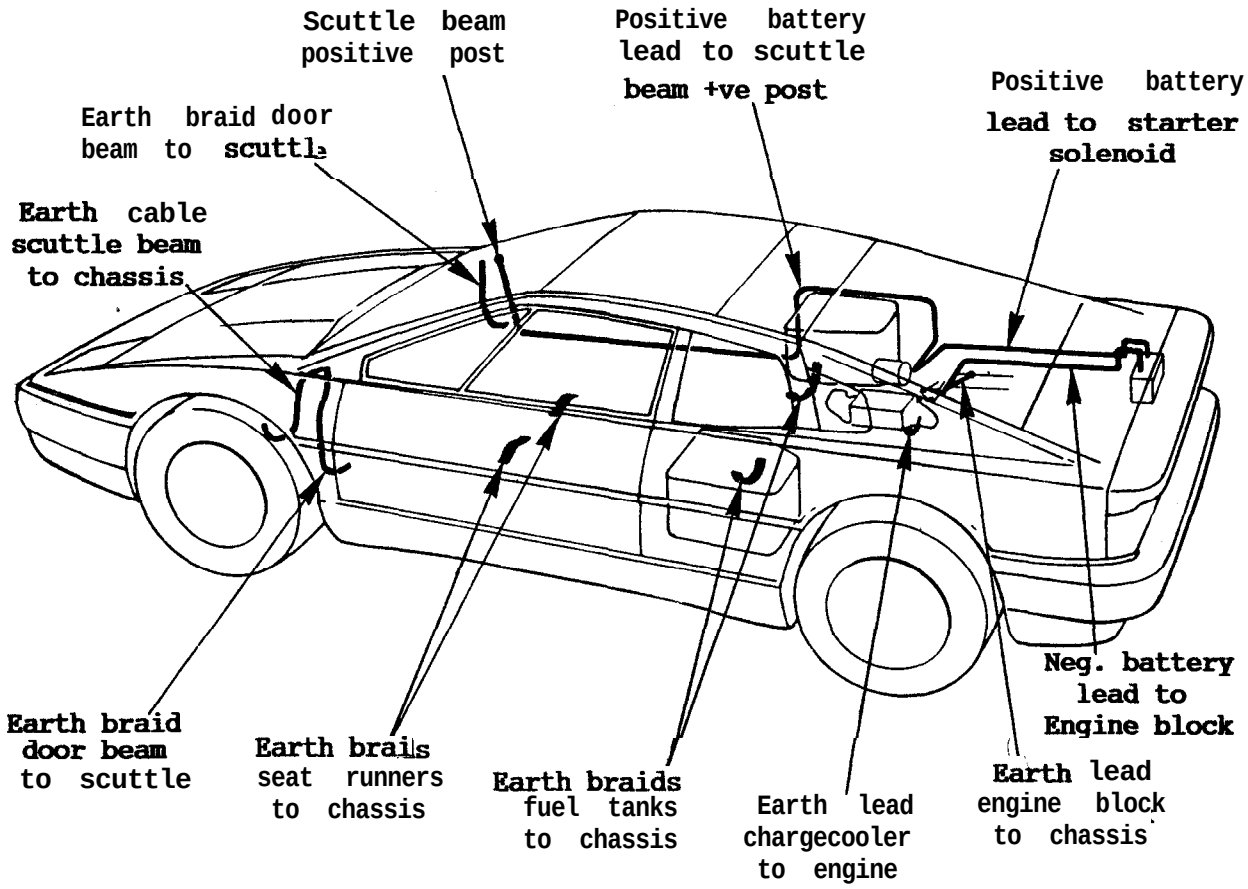
Battery Cables

The positive battery lead runs directly to the starter motor solenoid, from which another lead runs forward, along the right hand sill, to an insulated positive post at the right hand end of the scuttle beam. The negative, earth lead, runs from the battery to the cylinder block earth point, just to the rear of the right hand engine mounting leg. A further lead joins this point to a chassis stud at the right hand side of the engine bay.

Earthing Points

Most of the earths at the rear of the vehicle are either incorporated into the harness, or lead directly to the battery negative post. Earths at the front of the vehicle are incorporated into the harness, or lead to the scuttle beam, which itself is earthed by a heavy duty cable from the left hand end of the beam, through the body, to the rear of the chassis front crossmember.

Earthing braids are fitted between each door beam and the scuttle beam, and between the radio aerial and the scuttle beam. Braids are also used to connect the inboard seat runners to the chassis, to earth the seat frames, and each fuel tank to the chassis to prevent static build up on the tanks.

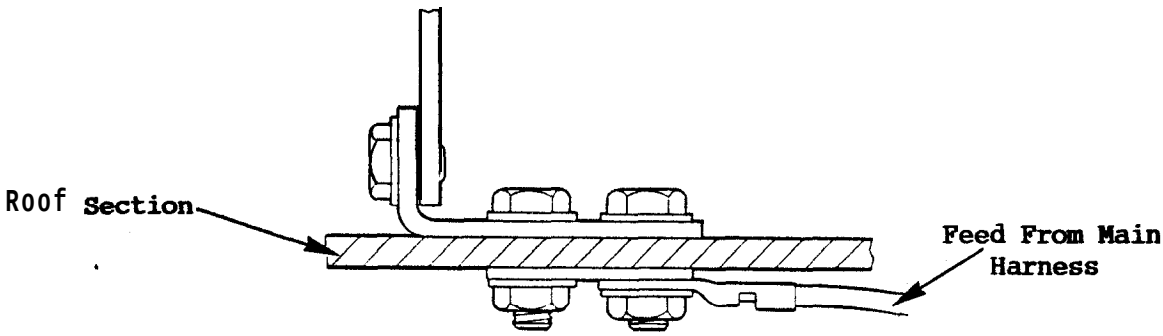


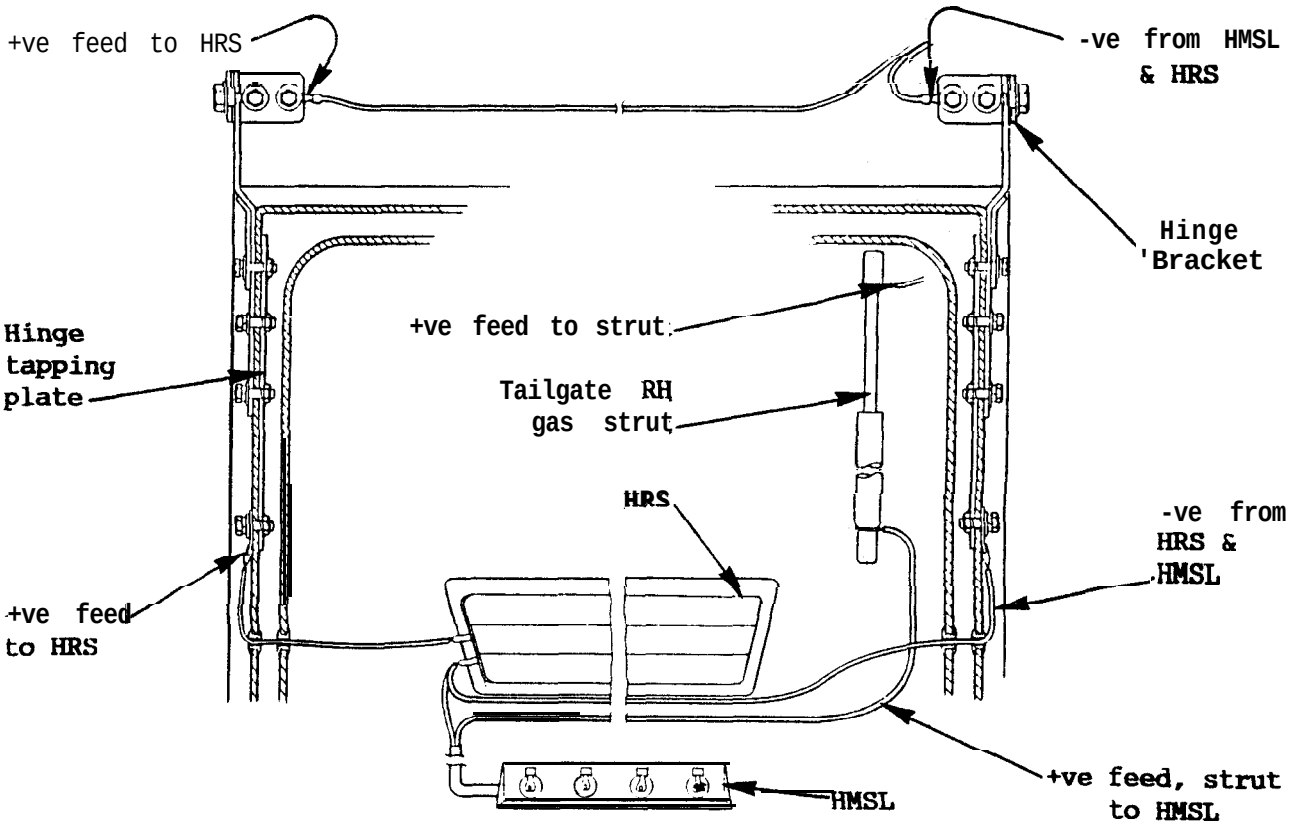
ML.9 - HEATED REAR SCREEN & HIGH MOUNTED STOP LAMP WIRING

The positive feed to the heated rear screen is transmitted to the tailgate via the tailgate left hand hinge: an extension of the fascia harness terminates in an eyelet connecting to the tailgate hinge bracket to body fixings; this feed is picked up by another cable connected to the tailgate hinge tapping plate retaining screw, and joins to the HRS feed terminal. The earth wire from the screen is routed to the right hand hinge tapping plate, which transmits current through the hinge to an earth cable secured by the hinge bracket fixings.

The feed to the high mounted stop lamp is transmitted to the tailgate via the tailgate right hand gas strut, and is earthed via the HRS earth terminal.

Hinge Bracket





ML.10 - COMPONENT LOCATION & FUSE RATINGS

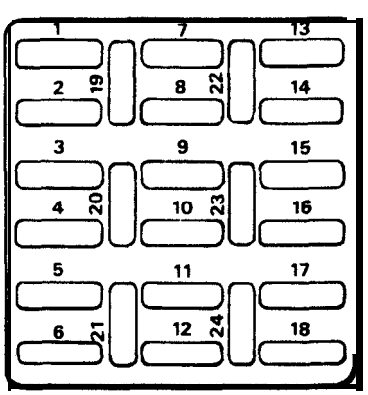
A fusebox ('A') containing 24 'Littel' type fuses is mounted on the driver's side of the front bulkhead in the front luggage compartment with additional fuses, and many of the relays and delay units located on the adjacent relay mounting bracket. The passenger side of the front bulkhead accommodates the ABS controller and relays.

Fusebox 'A' (driver's side front bulkhead)

Slot	Rating	Circuit
Early cars		
1	10A	Central door locking
2	7.5A	Turn indicators
3	5A	Rear fog lamps (if fitted)
4	20A	Fuel filler flaps
5	5A	LH side, tail, licence
6	5A	RH side, tail, licence
7	15A	Cigarette lighter
8	15A	Interior fan
9	7.5A	ACU comp., ACU control
10	10A	Radiator fan no.3
11	10A	Radiator fan no.1
12	10A	Radiator fan no.2
13	2A	Radiator fans control
14	5A	Int. lamp, door lamps, h/l flash, horn relay
15	15A	Hazard, LHD stoplamps
16	-RHD 15A -LHD 5A	Rev. lamps, stoplamps Rev. lamps
17	5A	Window control, mirrors, CDL, read lamps, alarm
18	5A	HRS
19	10A	Audio equipment
20	15A	Wiper motor, screenwash
21	5A	Instruments, tell tales
22		Not used
23	2A	Window volt. controller
24	5A	Low coolant module

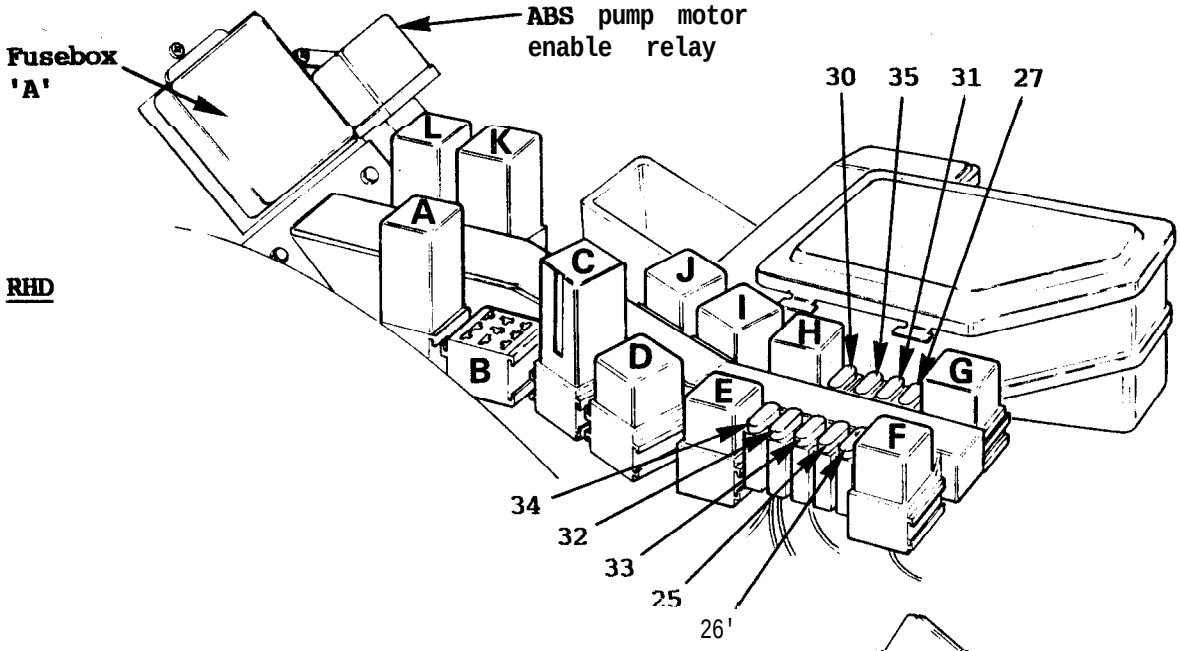
Slot	Rating	Circuit
'Revised Harness' Cars		
1	10A	Central door locking
2	7.5A	Turn indicators
3	5A	Rear fog lamps (if fitted)
4	20A	Fuel filler flaps
5	5A	LH side & tail, logic module, radio illum., cigar lighter illum., clock, front fog control console illum.
6	5A	RH side & tail, rheostat module, inst. illum. lights on buzzer
7	15A	Cigarette lighter
8	15A	Interior fan
9	7.5A	A.C. control
10	15A	Headlamp lift motor
11	15A	Headlamp lift motor
12	20A	Pass. window lift
13	20A	Driver window lift
14	5A	Int. lamps, horn control clock, logic module, h/l flash control
15	15A	Hazard, stop lamps
16	20A	Not used
17	5A	Ignition services, CDL module, interior lamp, alarm controller
18	7.5A	HRS
19	10A	Audio, front ALDL, alarm ALDL
20	15A	Windscreen wash/wipe
21	5A	Instruments, logic box, lamp driver module, rad. fan relay control, lights on buzzer, low fuel delay., daytime lamps control (Sweden & Canada), ice det. module
22	3A	Heated door mirrors
23	2A	Window voltage module
24	7.5A	Elec. aerial (if fitted)

Fusebox 'A' slot numbers

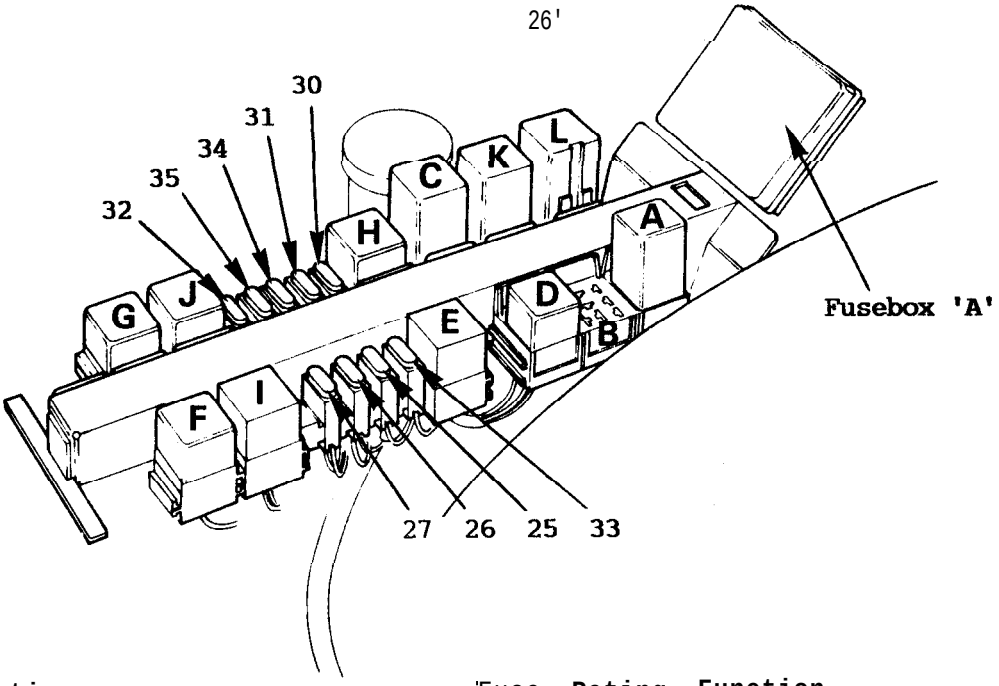


Early Cars: Driver's side front bulkhead

RHD



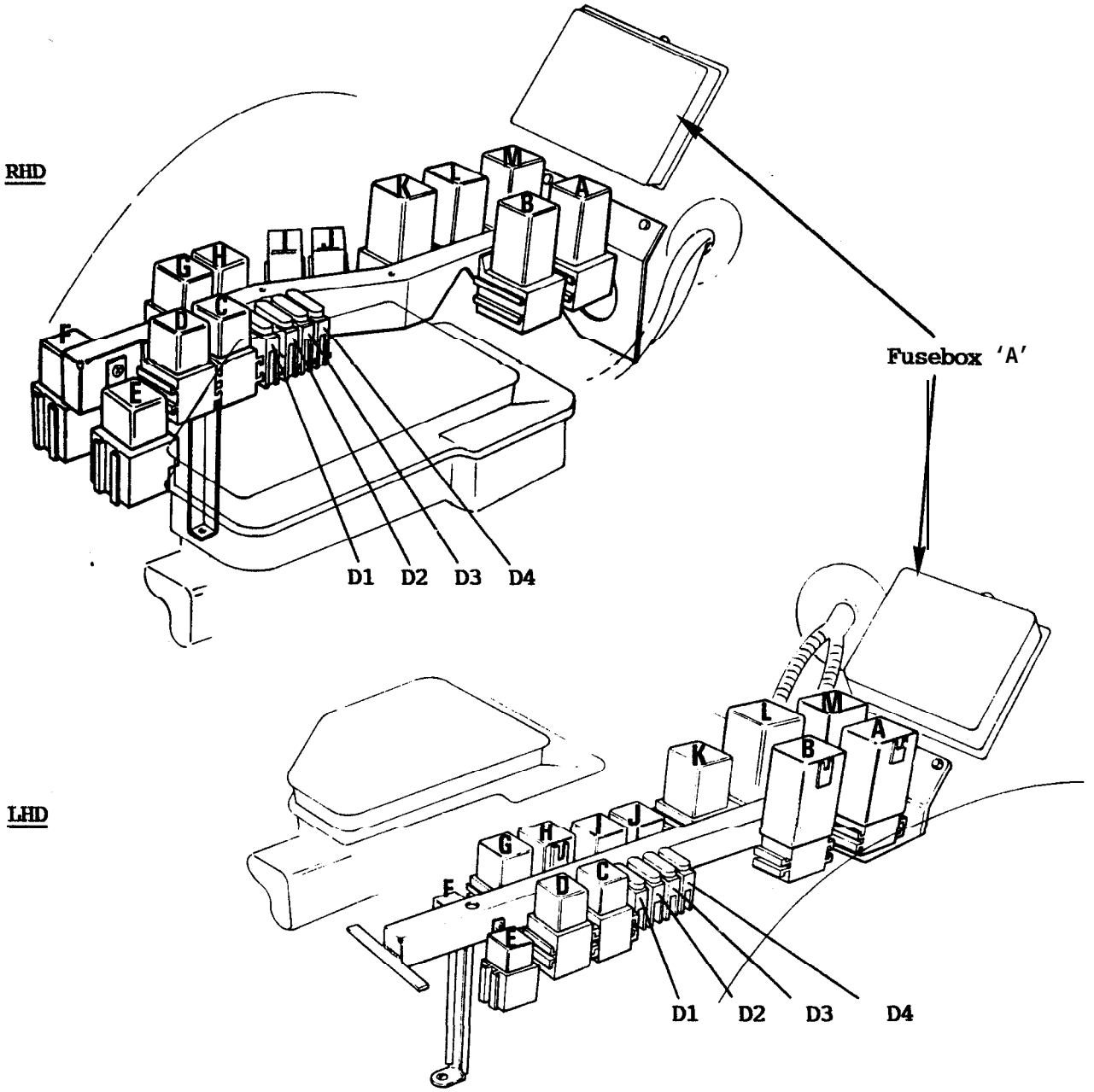
LHD



Relay	Function
A	Wiper delay module
B	Not used
C	Headlamp pod delay module
D	HRS/mirror relay
E	Radiator fan relay
F	Dip beam relay
G	Front fog relay
H	Horn relay
I	Main beam relay
J	Start drop out relay
K	Tell tale control module
L	Low fuel delay module

Fuse	Rating	Function
25	15A	Headlamp lift motor
26	15A	Headlamp lift motor
27	15A	Front fog lamps
28		Not used
29		Not used
30	20A	RH window
31	20A	Horn
32	20A	Powerwash
33	15A	Alarm
34	20A	LH window
35	3A	Heated mirrors

'Revised Harness' Cars: Driver's side front bulkhead

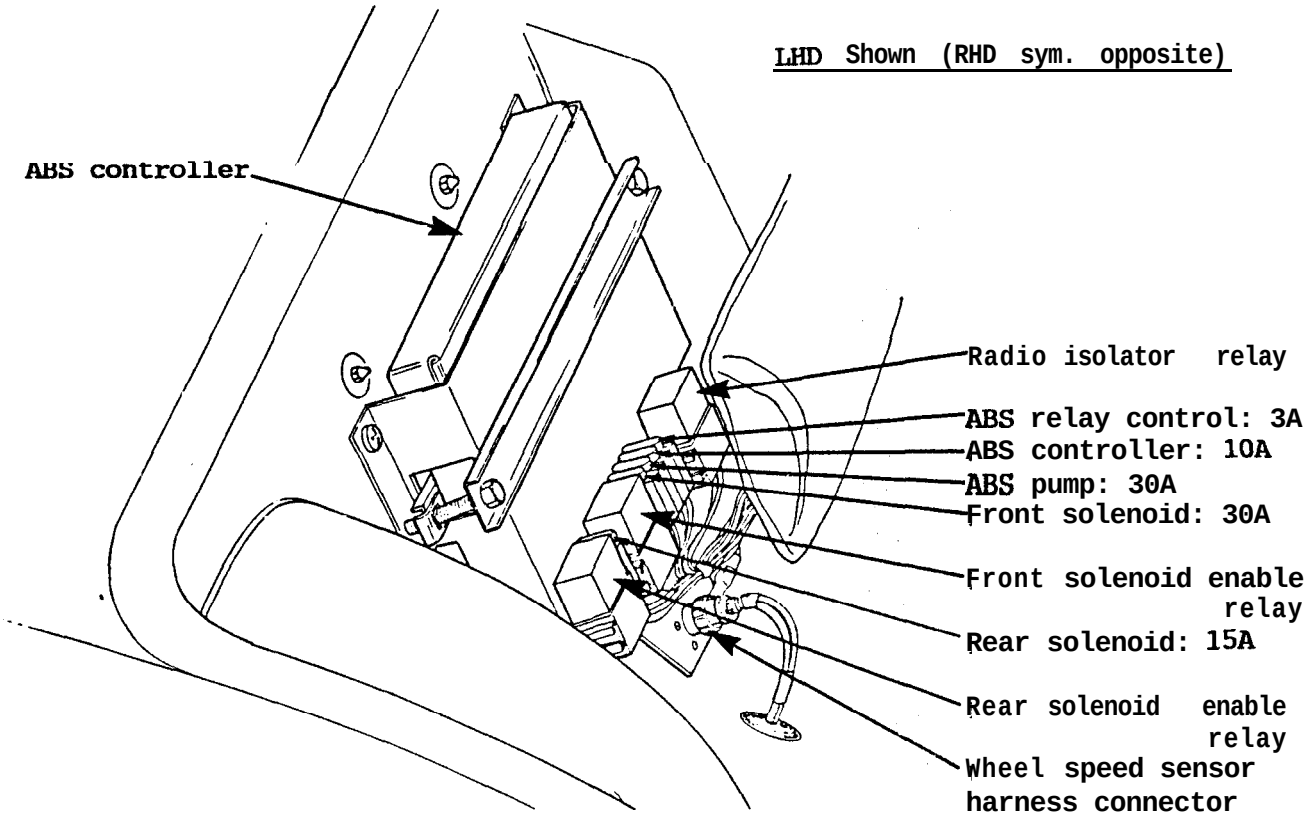


Relay	Function
A	Non-USA: Window voltage module USA: Bridging link
B	Pod delay module
C	Front fog lamp relay
D	Horn relay
E	Radiator fans relay
F	Ignition power relay
G	Dip beam relay
H	Main beam relay
I	Start drop out relay
J	Radio key-in relay

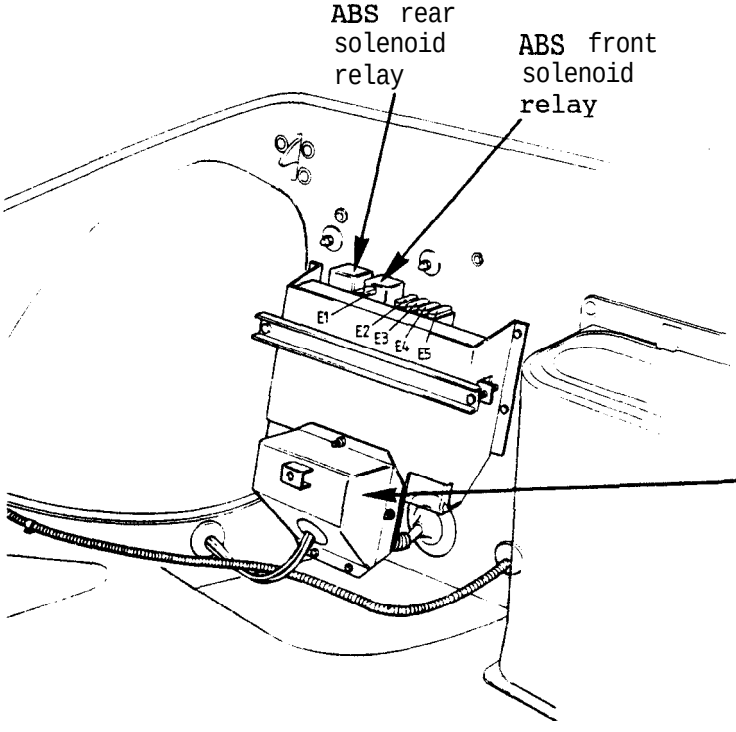
Relay	Function
K	Panel lamps rheostat module
L	Low fuel tell tale delay module
M	Wash/wipe delay module

Fuse	Rating	Function
D1	15A	Front fog lamps
D2	10A	Radiator fan, RH
D3	10A	Radiator fan, centre
D4	10A	Radiator fan, LH

Early Cars: Passenger side bulkhead



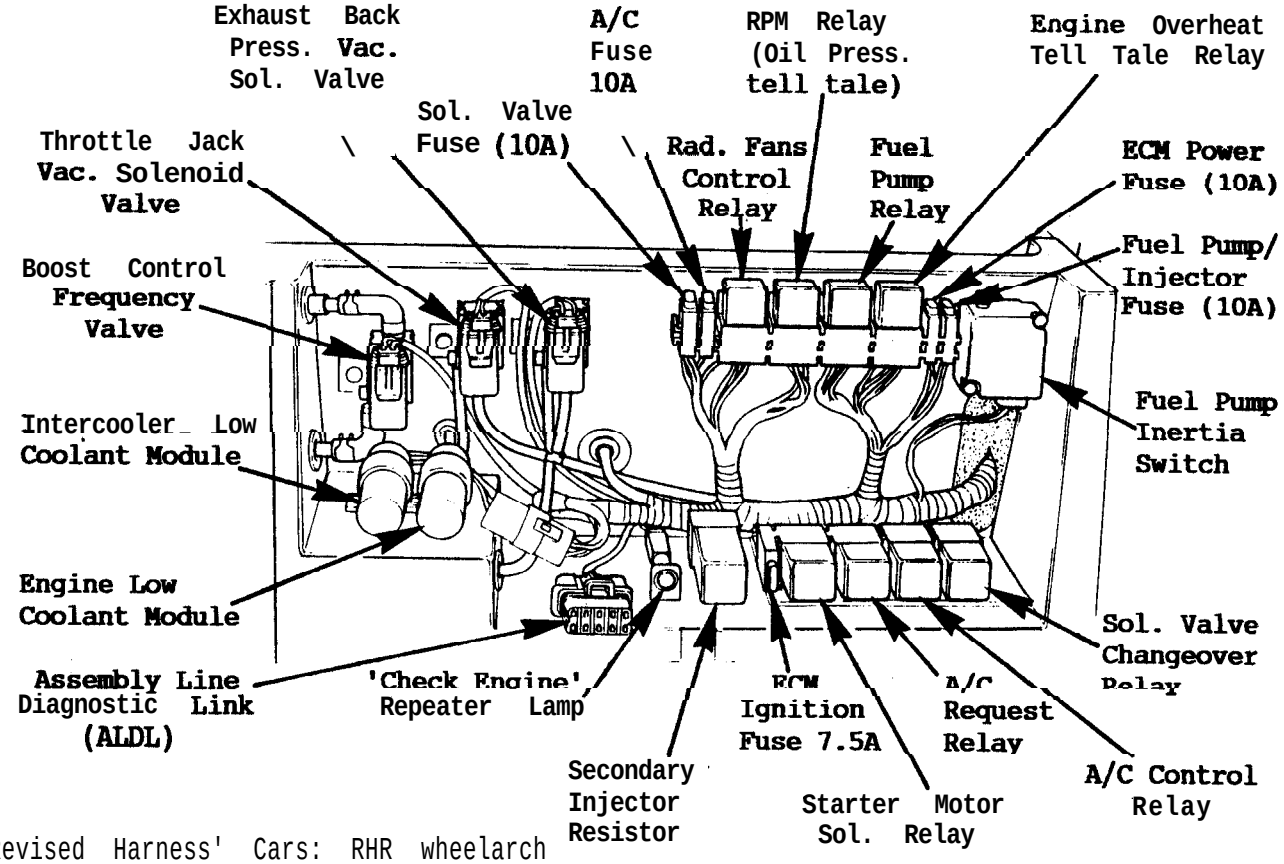
'Revised Harness' Cars: Passenger side front bulkhead



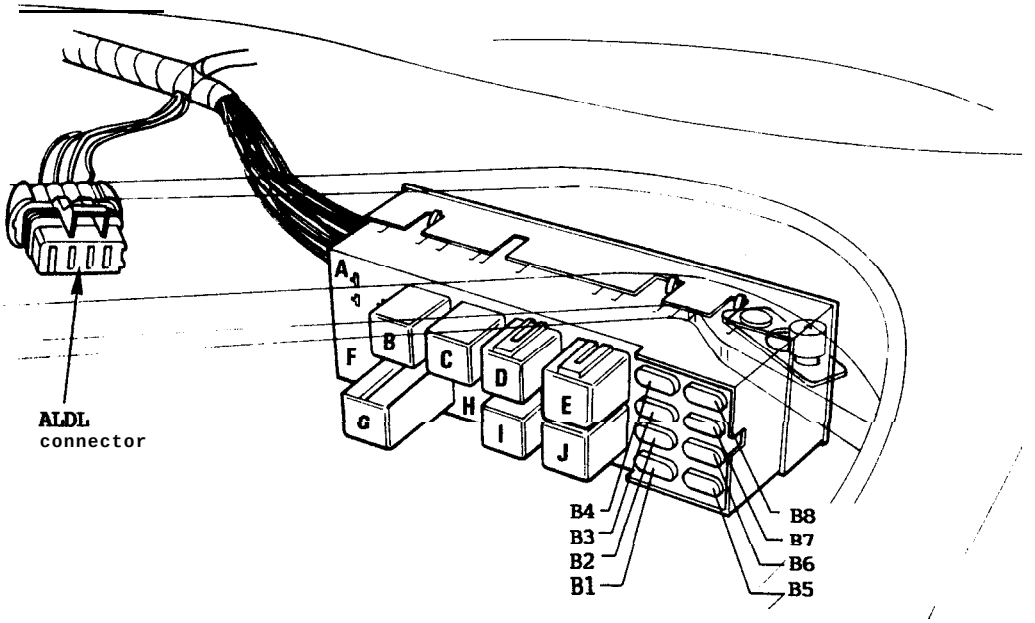
Fuse	Rating	Function
E1	15A	ABS rear solenoid
E2	30A	ABS front solenoid
E3	30A	ABS pump motor
E4	10A	ABS controller
E5	3A	ABS relay control

Relays and fuses associated with engine management are located in the rear luggage compartment - either in a relay box in the rear wall of the engine bay, or on 'revised harness' cars, in a relay station fixed to the rear of the RH rear wheelarch. Further engine management related components are fitted either on a plate above the RH rear wheelarch, or on 'revised harness' cars, on the RH fuel tank top board.

Early Cars: Engine bay relay box



'Revised Harness' Cars: RHR wheelarch

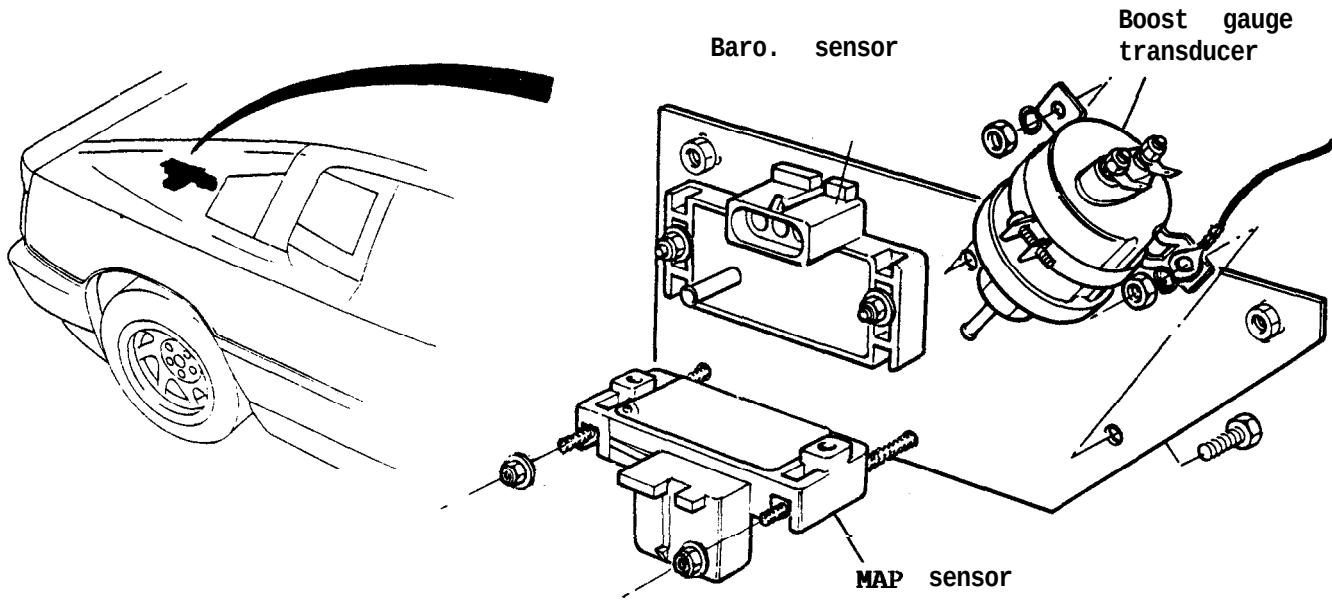


Key to wheelarch relay station:

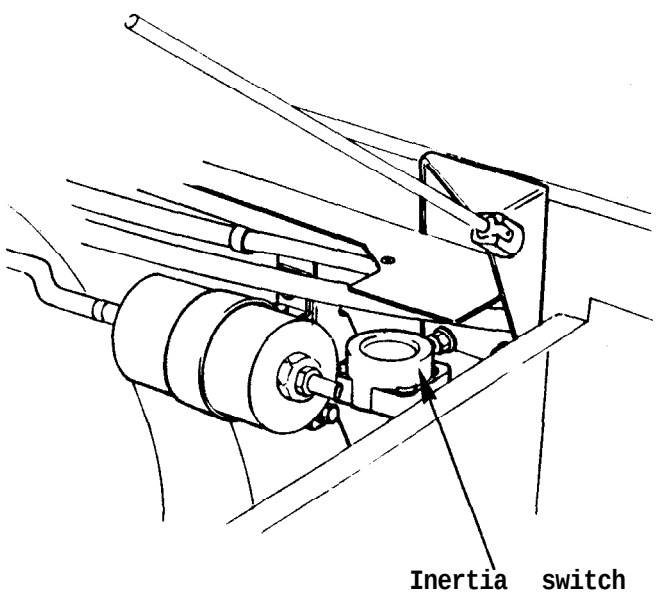
Relay	Function
A	**Not** used
B	**Oil** tell tale rpm inhibit
C	Throttle jack/EBPV changeover
D	Fuel pump & injectors
E	Ignition supply
F	**Not** used
G	Secondary injector resistor
H	**Not** used
I	A.C. compressor
J	Starter solenoid

Fuse	Rating	Function
B1	10A	ECM power, ALDL (rear)
B2	3A	Luggage compartment lamps
B3	15A	Fuel pump and injectors
B4	7.5A	ECM & direct ignition
B5	10A	A.C. compressor
B6	7.5A	Reverse lamps & vac. pump
B7	10A	Canister purge solenoid, O_2 heater, wastegate sol.
B8	5A	Throttle jack solenoid & EBPV solenoid

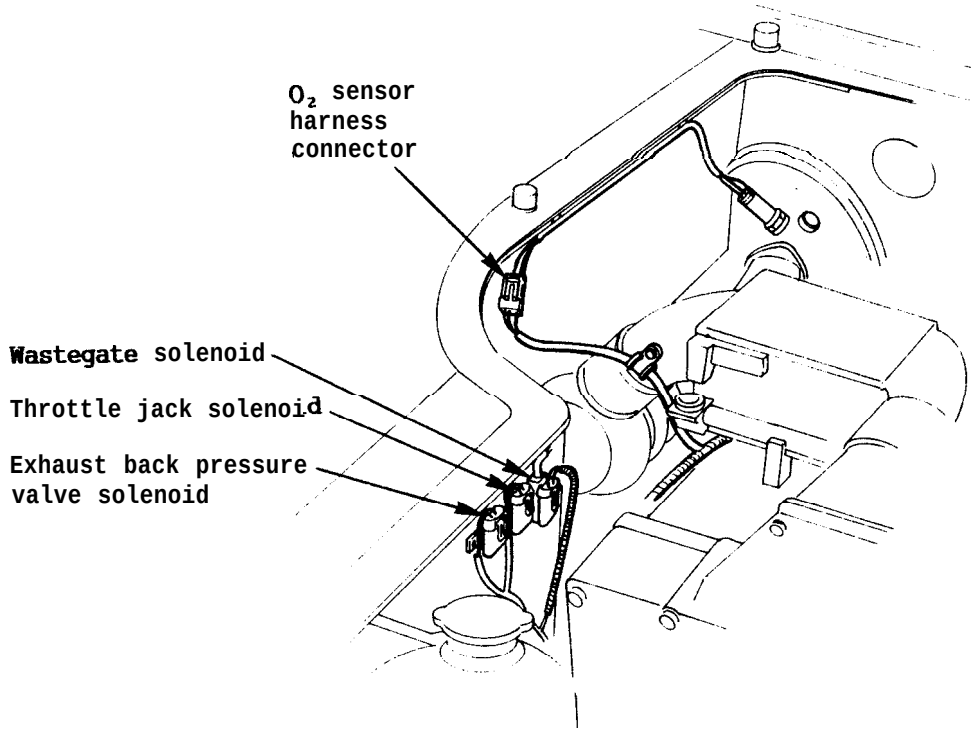
Early Cars: MAP/Baro./Boost transducer mounting plate



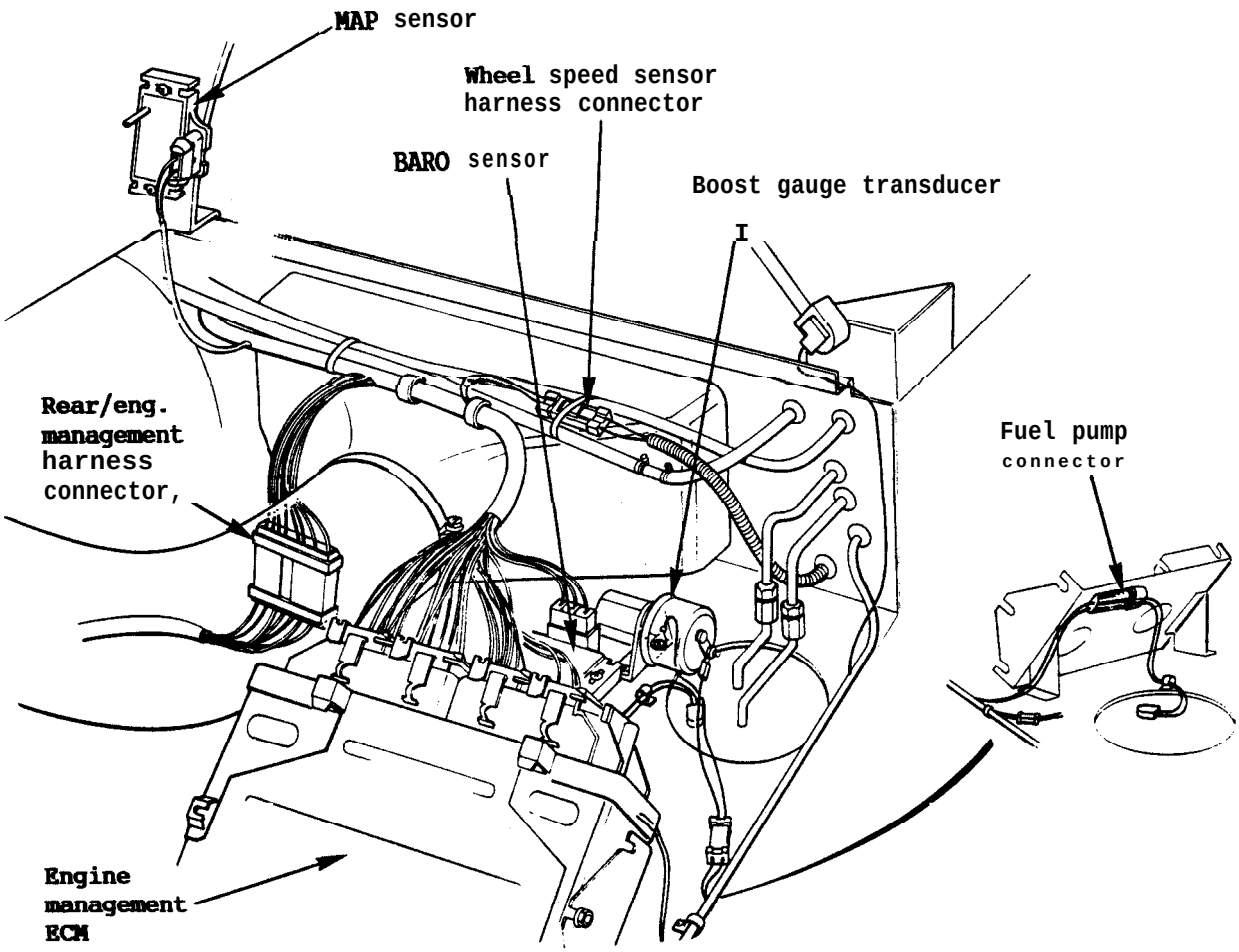
'Revised Harness' Cars: Inertia switch



'Revised Harness' Cars: Solenoid valves



'Revised Harness' Cars: ECM, MAP/Baro/Boost gauge transducers



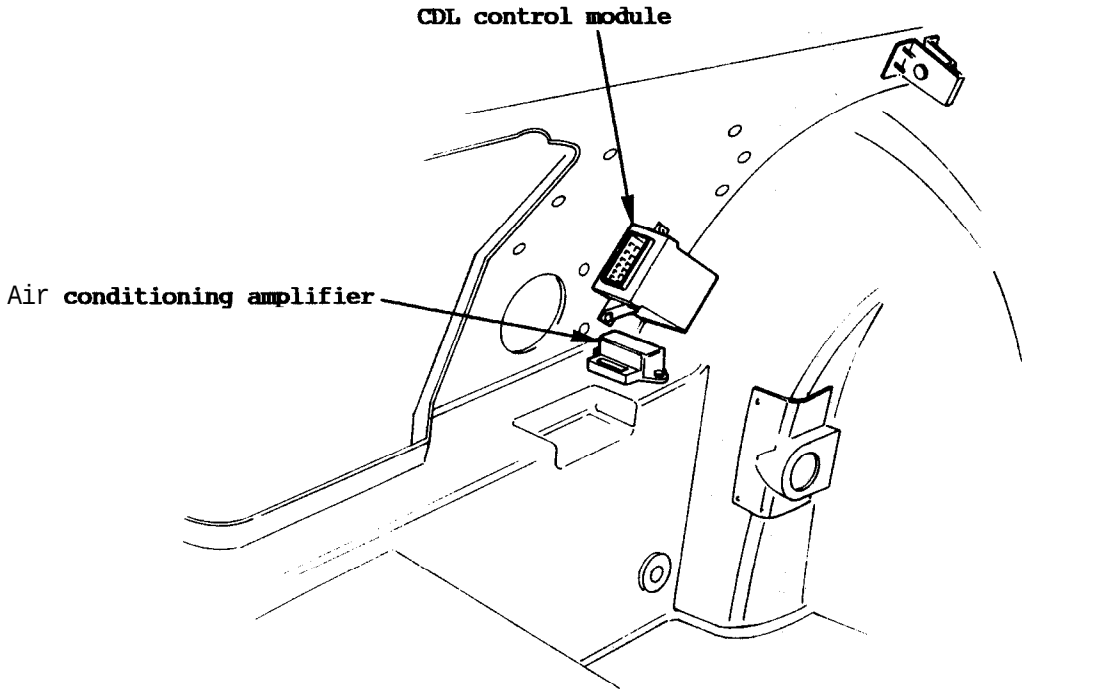
In addition, the following components are fitted as stated:

Early cars:

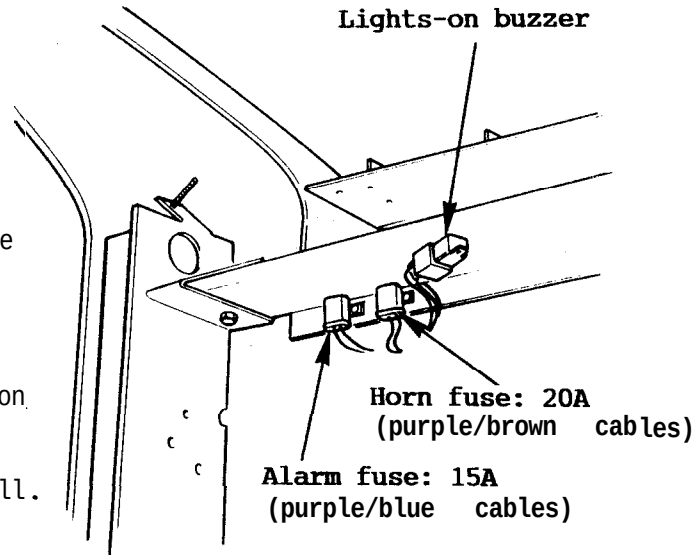
Radio feed relay, ignition power relay, CDL module; on passenger side front bulkhead, beneath ABS components.
USA type logic box/buzzer unit; on scuttle beam inboard of steering column.
Flasher unit; inside instrument binnacle.
Pod control module; extreme LH side of front luggage compartment.
Rheostat (dimmer control) module; on scuttle beam, driver's side.
Ice detection module; on scuttle beam, driver's side
Vacuum pump; in trimmed foam box on rear of RH rear wheelarch.

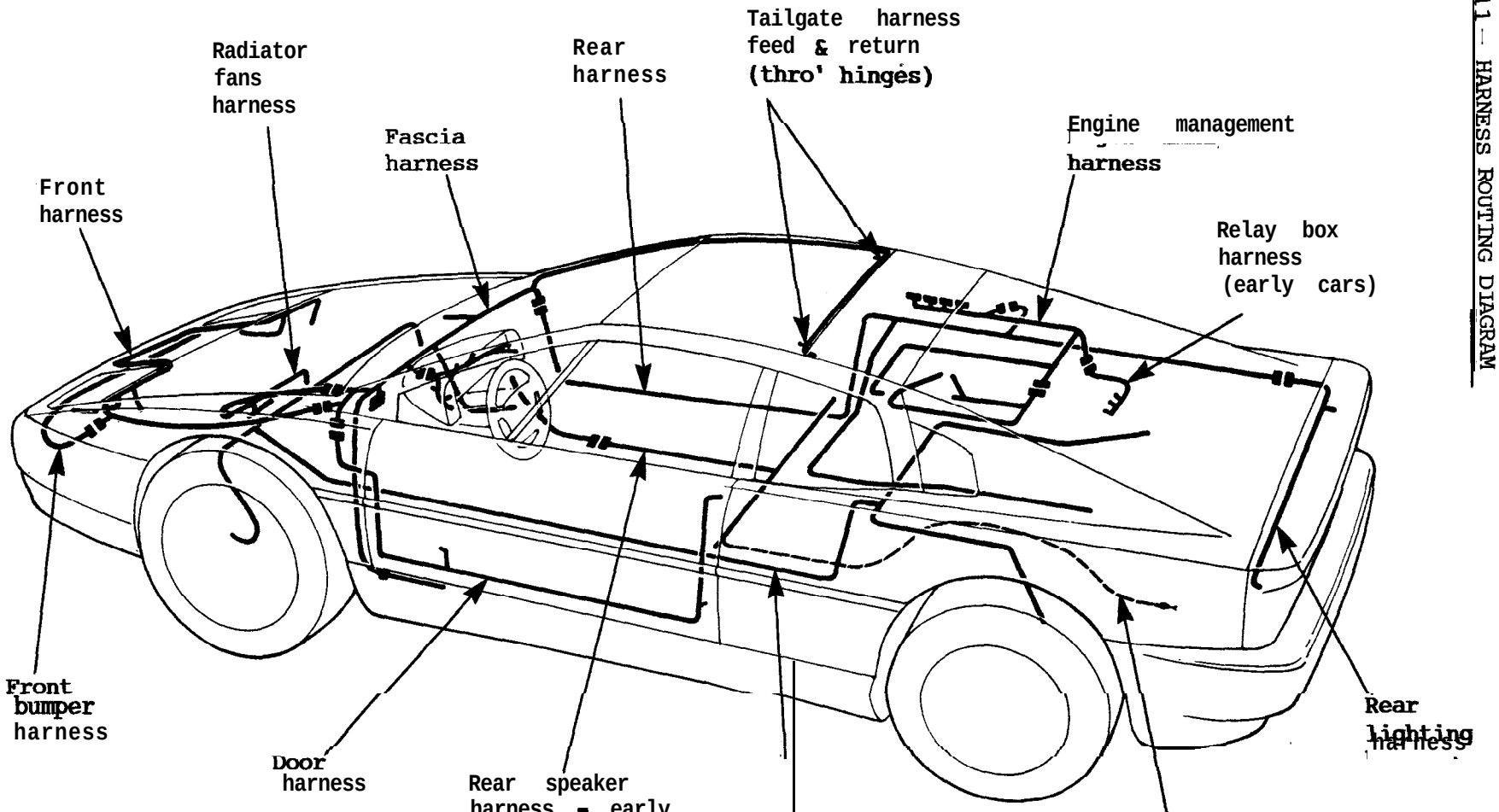
'Revised harness cars':

CDL module and a.c. control (amplifier) module; front of passenger footwell.



- Lights on buzzer unit, horn and alarm fuses; on scuttle beam outboard of steering column.
- USA type logic box/buzzer unit; on scuttle beam inboard of steering column.
- Flasher unit; inside instrument binnacle.
- Pod control module; extreme LH side of front luggage compartment.
- Ice detection module; on scuttle beam, driver's side.
- Vehicle alarm module; on back of glovebox, or on dual S.I.R. cars, on scuttle beam bracket beneath passenger fascia.
- Vacuum pump; in engine bay rear wall.
- ABS pump relay: near fusebox 'A'.




Radiator fans harness
Rear harness
Tailgate harness feed & return (thro' hinges)
Fascia harness
Engine management harness
Front harness
Relay box harness (early cars)
Front bumper harness
Door harness
Rear speaker harness - early cars (integrated with fascia harness on later cars
wheelspeed sensor harness
Electric aerial extension harness (if fitted)
Rear lighting harness

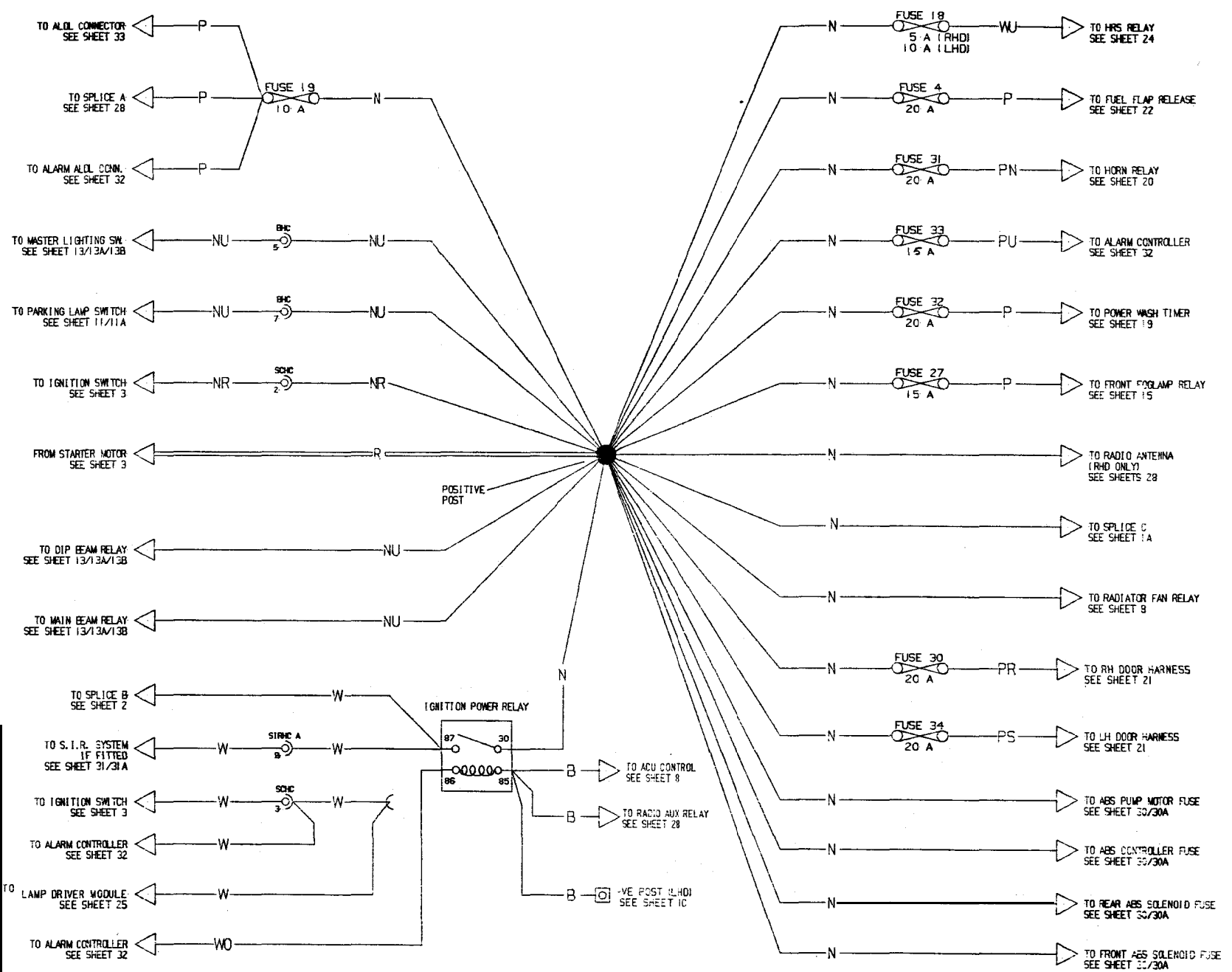
ML.12 - CIRCUIT DIAGRAMS - Early Cars

(for 'revised harness' cars, see ML.13 cream pages)

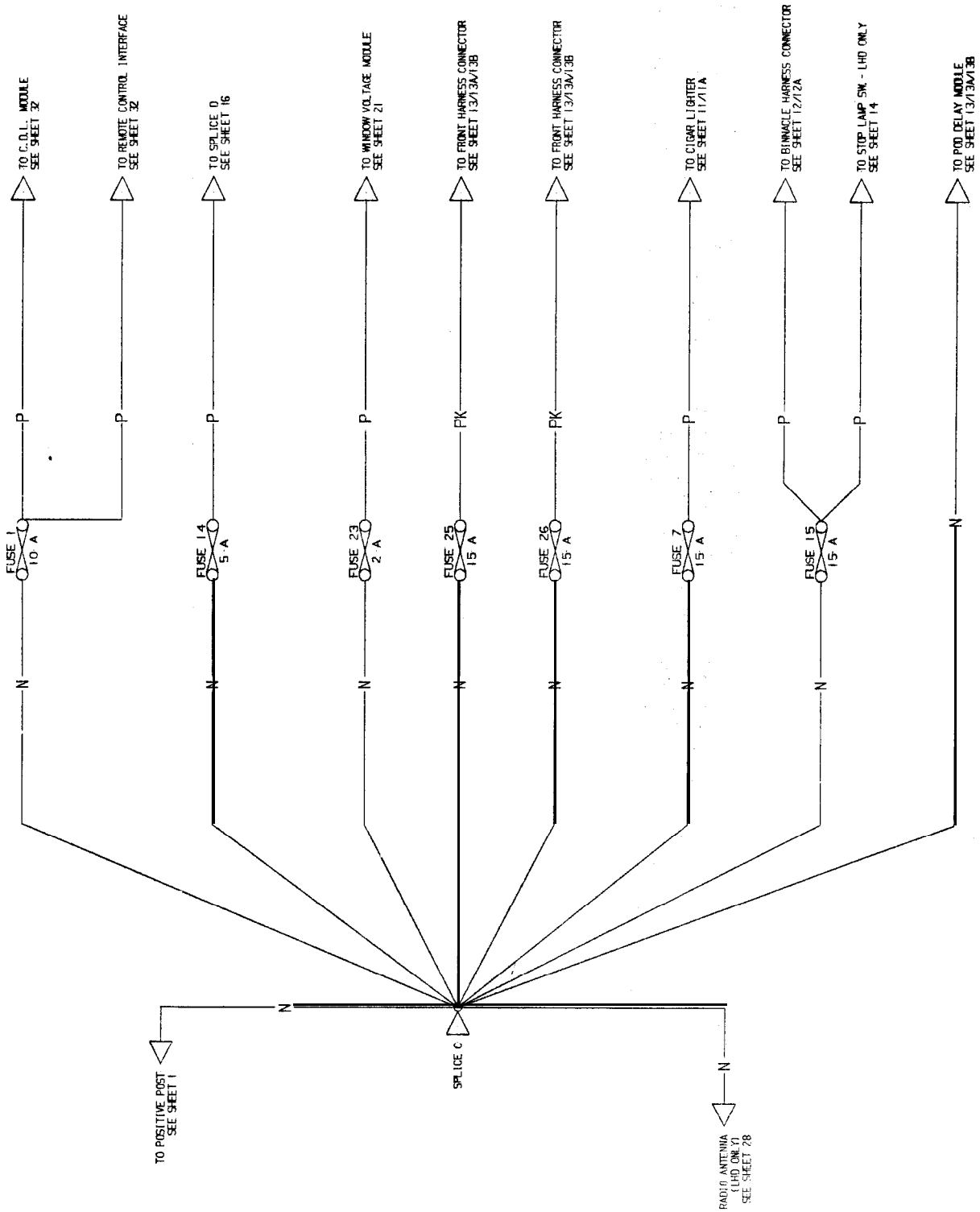
Continued .....

Principle Colour Usage

Brown	Main battery feed	Green	Accessories fused via ignition switch
Blue	Feed from lighting switch when headlamps selected	Green/Red	LH flasher lamps
		Green/White	RH flasher lamps
Blue/Red	Dipswitch to dip beams	White	Ignition control circuit (unfused)
Blue/White	Dipswitch to main beams	White/Red	Engine cranking circuits
Red/Black	LH side & tail lamps feed	Yellow	Auxiliary Circuits
Red/Orange	RH side & tail lamps feed	Black	Earth Connections
Purple	Accessories fused direct from battery	Slate	Window Lift

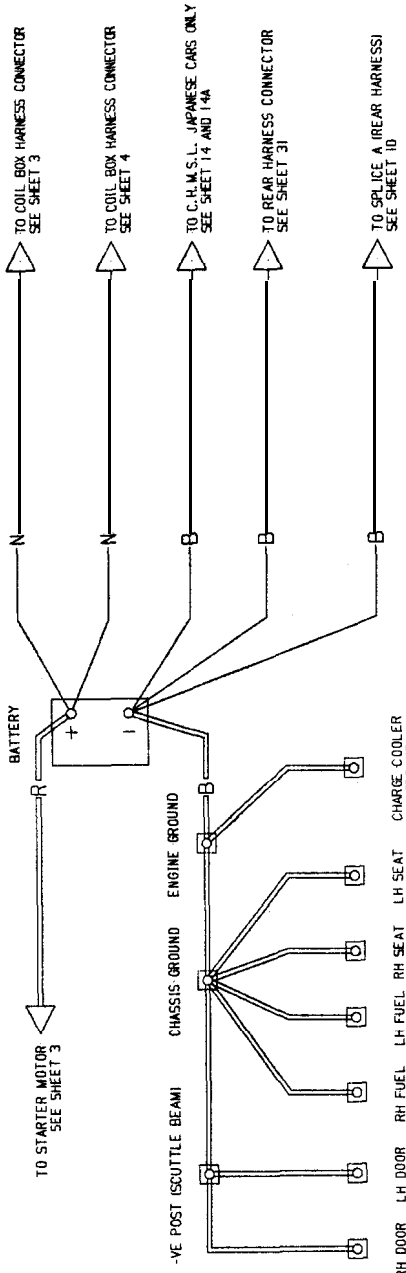

TO ALDL CONNECTOR SEE SHEET 33
TO SPLICE A SEE SHEET 28
TO ALARM ALDL CONN. SEE SHEET 32
FUSE 19 10 A
TO MASTER LIGHTING SW. SEE SHEET 13/13A/13B
TO PARKING LAMP SWITCH SEE SHEET 11/11A
TO IGNITION SWITCH SEE SHEET 3
FROM STARTER MOTOR SEE SHEET 3
BHC
SCHC
POSITIVE POST
TO DIP BEAM RELAY SEE SHEET 13/13A/13B
TO MAIN BEAM RELAY SEE SHEET 13/13A/13B
TO SPLICE B SEE SHEET 2
TO S.I.R. SYSTEM IF FITTED SEE SHEET 31/31A
SIRHC A
TO IGNITION SWITCH SEE SHEET 3
TO ALARM CONTROLLER SEE SHEET 32
TO LAMP DRIVER MODULE SEE SHEET 25
TO ALARM CONTROLLER SEE SHEET 32
IGNITION POWER RELAY
87
30
86
85
TO ACU CONTROL SEE SHEET 8
TO RADIO AUX RELAY SEE SHEET 28
-VE POST (LHD) SEE SHEET 1C
FUSE 18 5 A (RHD) 10 A (LHD)
TO HRS RELAY SEE SHEET 24
FUSE 4 20 A
TO FUEL FLAP RELEASE SEE SHEET 22
FUSE 31 20 A
TO HORN RELAY SEE SHEET 20
FUSE 33 15 A
TO ALARM CONTROLLER SEE SHEET 32
FUSE 32 20 A
TO POWER WASH TIMER SEE SHEET 19
FUSE 27 15 A
TO FRONT FOGLAMP RELAY SEE SHEET 15
TO RADIO ANTENNA (RHD ONLY) SEE SHEETS 28
TO SPLICE C SEE SHEET 1A
TO RADIATOR FAN RELAY SEE SHEET 9
FUSE 30 20 A
TO RH DOOR HARNESS SEE SHEET 21
FUSE 34 20 A
TO LH DOOR HARNESS SEE SHEET 21
TO ABS PUMP MOTOR FUSE SEE SHEET 30/30A
TO ABS CONTROLLER FUSE SEE SHEET 30/30A
TO REAR ABS SOLENOID FUSE SEE SHEET 30/30A
TO FRONT ABS SOLENOID FUSE SEE SHEET 30/30A

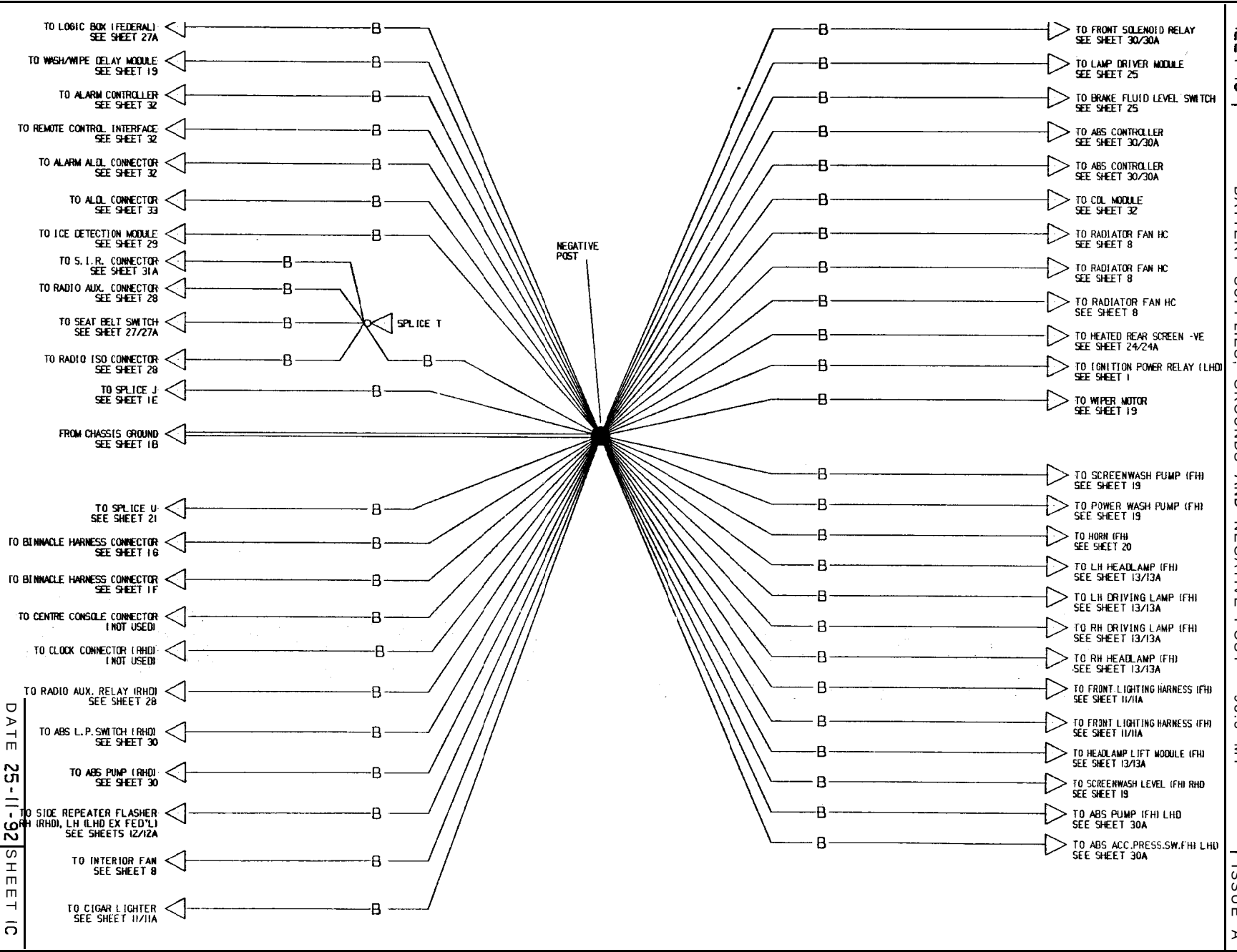
SHEET 1A | BATTERY SUPPLIES - SPLICE C | ISSUE A

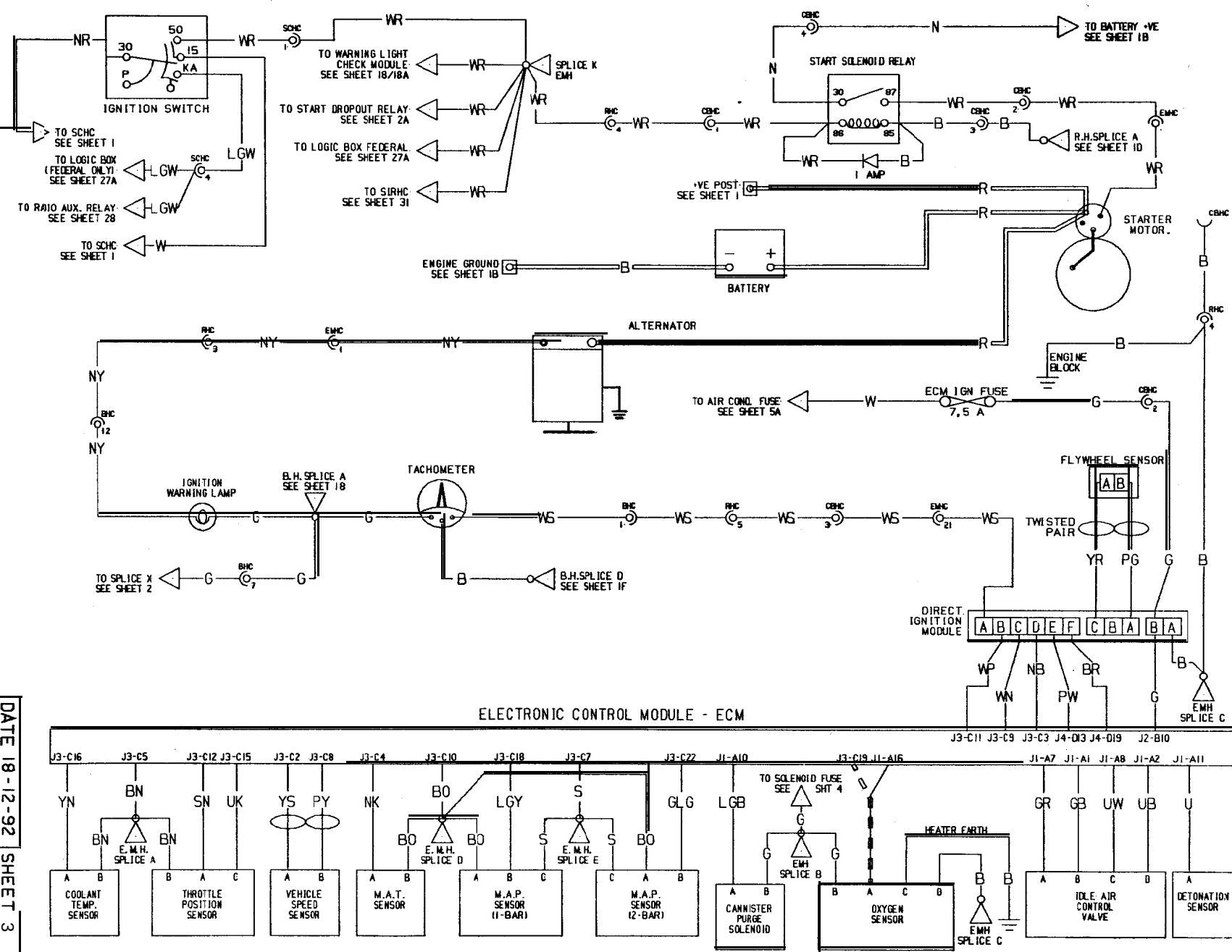


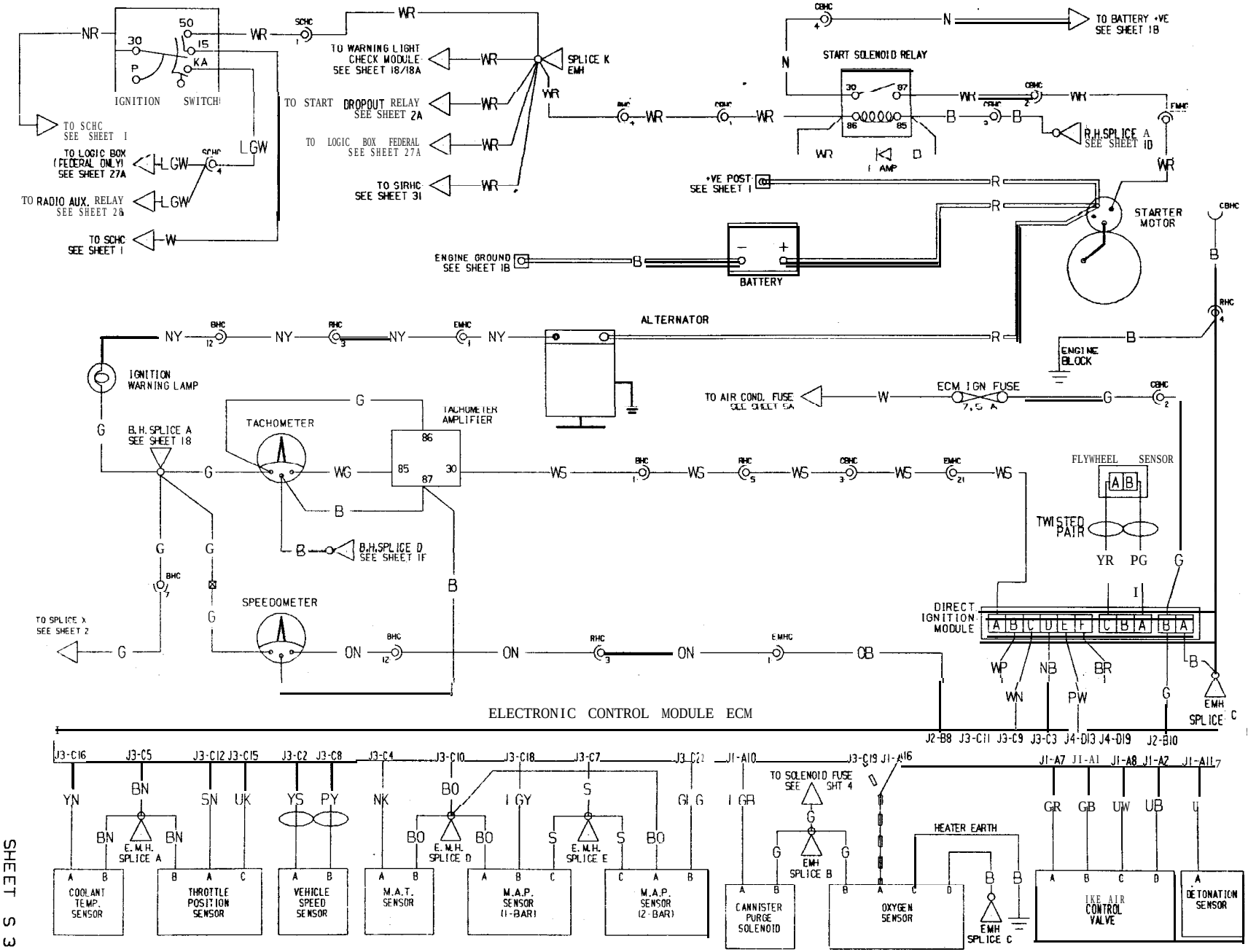
DATE 18-12-92 | SHEET 1A

SHEET 1B	DIRECT BATTERY SUPPLIES POSITIVE & NEGATIVE - 93.5MY	ISSUE A



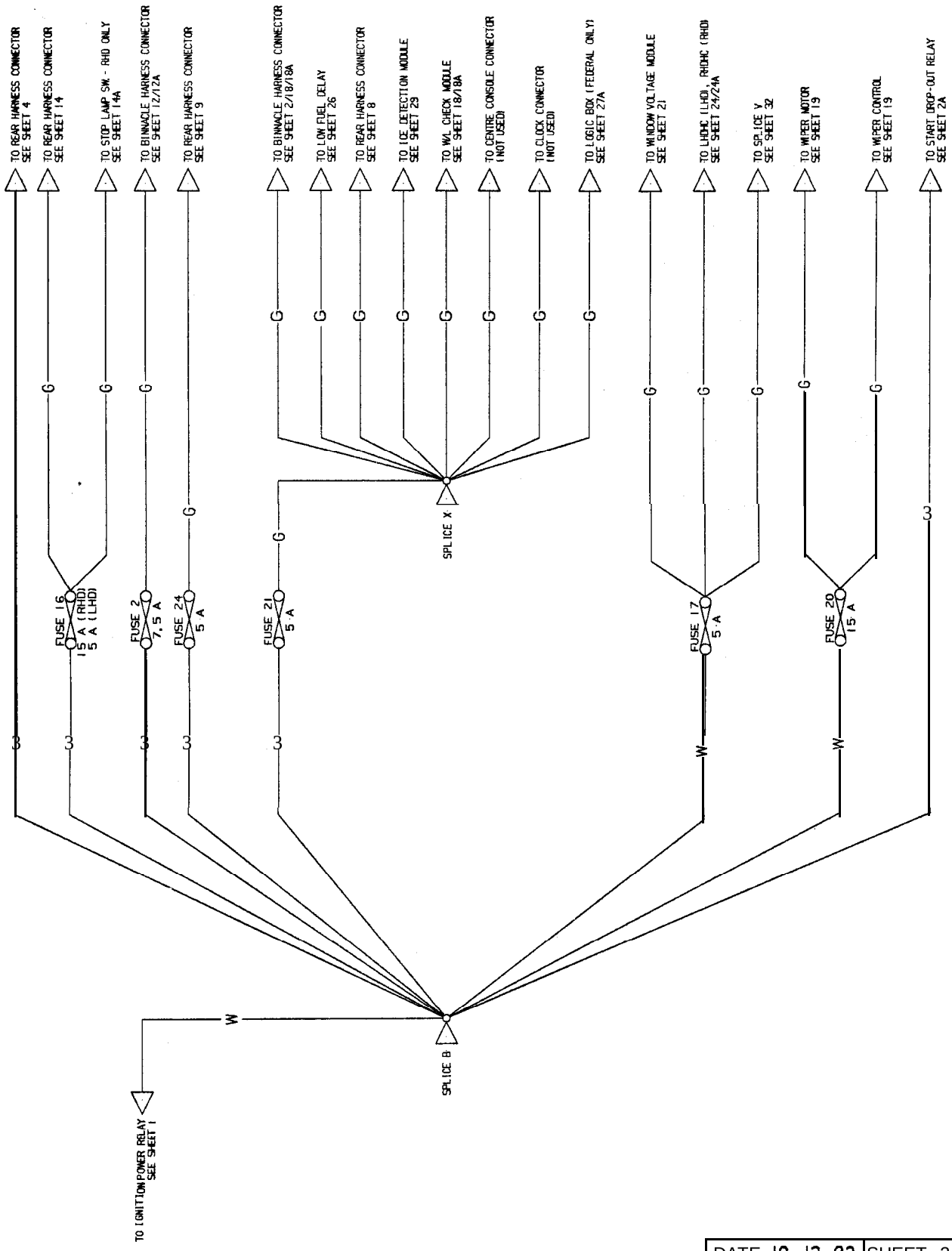

TO LOGIC BOX (FEDERAL) SEE SHEET 27A
TO WASH/WIPE DELAY MODULE SEE SHEET 19
TO ALARM CONTROLLER SEE SHEET 32
TO REMOTE CONTROL INTERFACE SEE SHEET 32
TO ALARM ALDL CONNECTOR SEE SHEET 32
TO ALDL CONNECTOR SEE SHEET 33
TO ICE DETECTION MODULE SEE SHEET 29
TO S.I.R. CONNECTOR SEE SHEET 31A
TO RADIO AUX. CONNECTOR SEE SHEET 28
TO SEAT BELT SWITCH SEE SHEET 27/27A
TO RADIO ISO CONNECTOR SEE SHEET 28
TO SPLICE J SEE SHEET 1E
FROM CHASSIS GROUND SEE SHEET 1B
SPLICE T
NEGATIVE POST
TO SPLICE U SEE SHEET 21
TO BINNACLE HARNESS CONNECTOR SEE SHEET 1G
TO BINNACLE HARNESS CONNECTOR SEE SHEET 1F
TO CENTRE CONSOLE CONNECTOR (NOT USED)
TO CLOCK CONNECTOR (RHD) (NOT USED)
TO RADIO AUX. RELAY (RHD) SEE SHEET 28
TO ABS L.P.SWITCH (RHD) SEE SHEET 30
TO ABS PUMP (RHD) SEE SHEET 30
TO SIDE REPEATER FLASHER RH (RHD), LH (LHD EX FED'L) SEE SHEETS 12/12A
TO INTERIOR FAN SEE SHEET 8
TO CIGAR LIGHTER SEE SHEET 11/11A
TO FRONT SOLENOID RELAY SEE SHEET 30/30A
TO LAMP DRIVER MODULE SEE SHEET 25
TO BRAKE FLUID LEVEL SWITCH SEE SHEET 25
TO ABS CONTROLLER SEE SHEET 30/30A
TO ABS CONTROLLER SEE SHEET 30/30A
TO COL MODULE SEE SHEET 32
TO RADIATOR FAN HC SEE SHEET 8
TO RADIATOR FAN HC SEE SHEET 8
TO RADIATOR FAN HC SEE SHEET 8
TO HEATED REAR SCREEN -VE SEE SHEET 24/24A
TO IGNITION POWER RELAY (LHD) SEE SHEET 1
TO WIPER MOTOR SEE SHEET 19
TO SCREENWASH PUMP (FH) SEE SHEET 19
TO POWER WASH PUMP (FH) SEE SHEET 19
TO HORN (FH) SEE SHEET 20
TO LH HEADLAMP (FH) SEE SHEET 13/13A
TO LH DRIVING LAMP (FH) SEE SHEET 13/13A
TO RH DRIVING LAMP (FH) SEE SHEET 13/13A
TO RH HEADLAMP (FH) SEE SHEET 13/13A
TO FRONT LIGHTING HARNESS (FH) SEE SHEET 11/11A
TO FRONT LIGHTING HARNESS (FH) SEE SHEET 11/11A
TO HEADLAMP LIFT MODULE (FH) SEE SHEET 13/13A
TO SCREENWASH LEVEL (FH) RHD SEE SHEET 19
TO ABS PUMP (FH) LHD SEE SHEET 30A
TO ABS ACC.PRESS.SW.(FH) LHD SEE SHEET 30A


IGNITION SWITCH
TO SCHC SEE SHEET 1
TO LOGIC BOX (FEDERAL ONLY) SEE SHEET 27A
TO RADIO AUX. RELAY SEE SHEET 28
TO SCHC SEE SHEET 1
TO WARNING LIGHT CHECK MODULE SEE SHEET 18/18A
TO START DROPOUT RELAY SEE SHEET 2A
TO LOGIC BOX FEDERAL SEE SHEET 27A
TO SIRHC SEE SHEET 31
SPLICE K EMH
START SOLENOID RELAY
1 AMP
TO BATTERY +VE SEE SHEET 1B
R.H.SPLICE A SEE SHEET 1D
+VE POST SEE SHEET 1
STARTER MOTOR
ENGINE GROUND SEE SHEET 1B
BATTERY
ALTERNATOR
ENGINE BLOCK
TO AIR COND. FUSE SEE SHEET 5A
ECM IGN FUSE 7.5 A
IGNITION WARNING LAMP
B.H. SPLICE A SEE SHEET 1B
TACHOMETER
TO SPLICE X SEE SHEET 2
B.H.SPLICE D SEE SHEET 1F
FLYWHEEL SENSOR
TWISTED PAIR
DIRECT IGNITION MODULE
EMH SPLICE C
ELECTRONIC CONTROL MODULE - ECM
J3-C16 J3-C5 J3-C12 J3-C15 J3-C2 J3-C8 J3-C4 J3-C10 J3-C18 J3-C7 J3-C22 J1-A10 J3-C19 J1-A16 J1-A7 J1-A1 J1-A8 J2-A2 J1-A11
J3-C11 J3-C9 J3-C3 J4-D13 J4-D19 J2-B10
COOLANT TEMP. SENSOR
THROTTLE POSITION SENSOR
VEHICLE SPEED SENSOR
M.A.T. SENSOR
M.A.P. SENSOR (1-BAR)
M.A.P. SENSOR (2-BAR)
CANNISTER PURGE SOLENOID
TO SOLENOID FUSE SEE SHT 4
EMH SPLICE B
OXYGEN SENSOR
HEATER EARTH
IDLE AIR CONTROL VALVE
DETONATION SENSOR

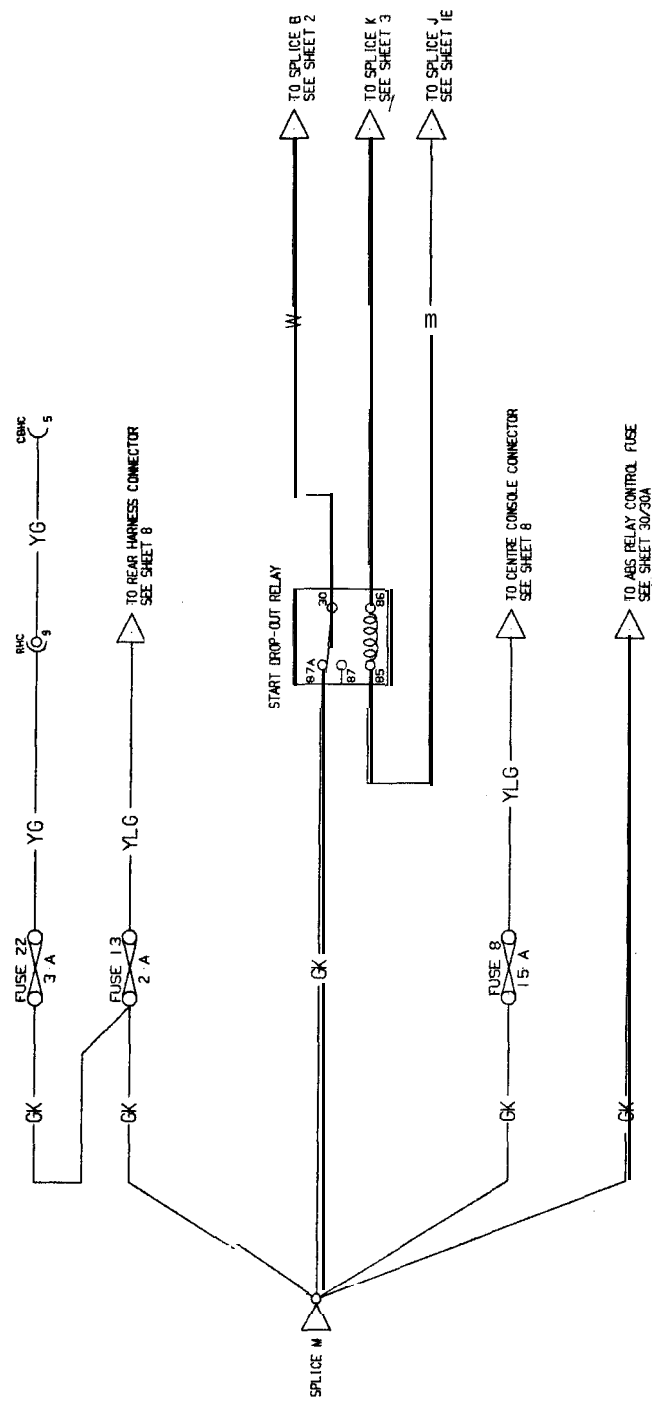


STARTER, ALTERNATOR, IGNITION & ECM - SPORT 300

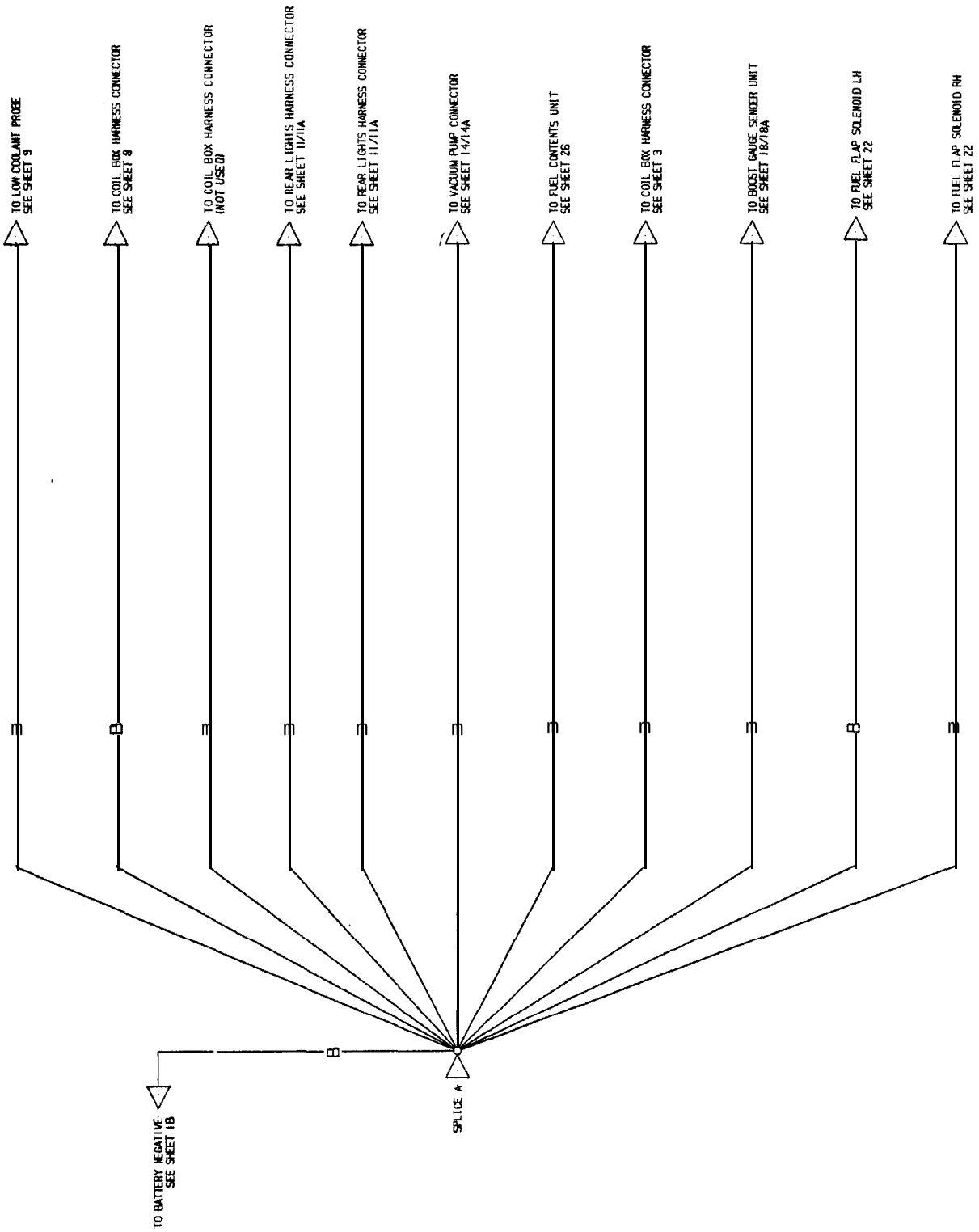
SHEET 2 | IGNITION SUPPLIES.- SPLICES B AND X | ISSUE A



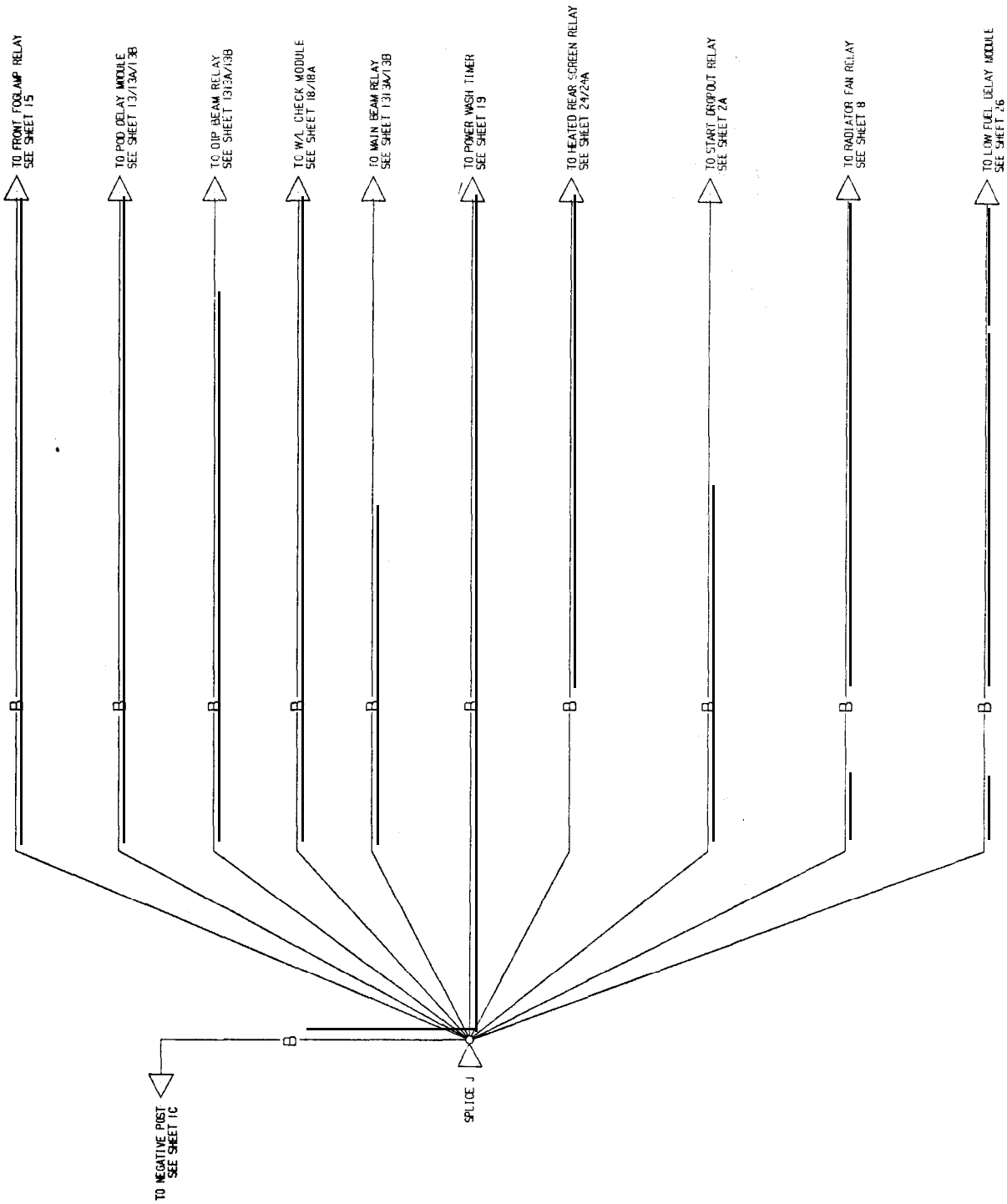
SHEET 2A | IGNITION SUPPLIES • START DROP OUT | ISSUE A



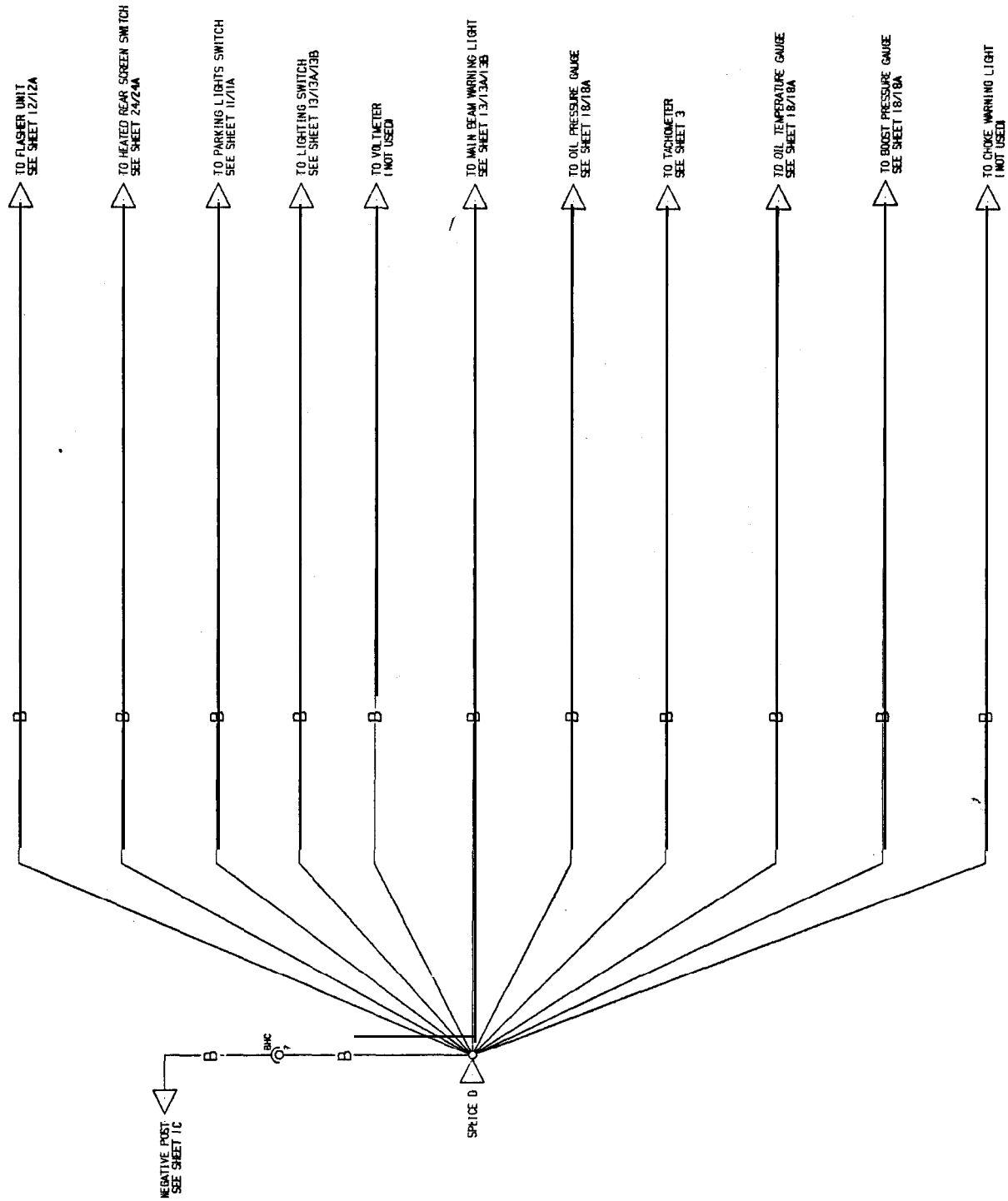
SHEET ID	GROUND SPLICE A - REAR HARNESS - 93.5 MY	ISSUE A



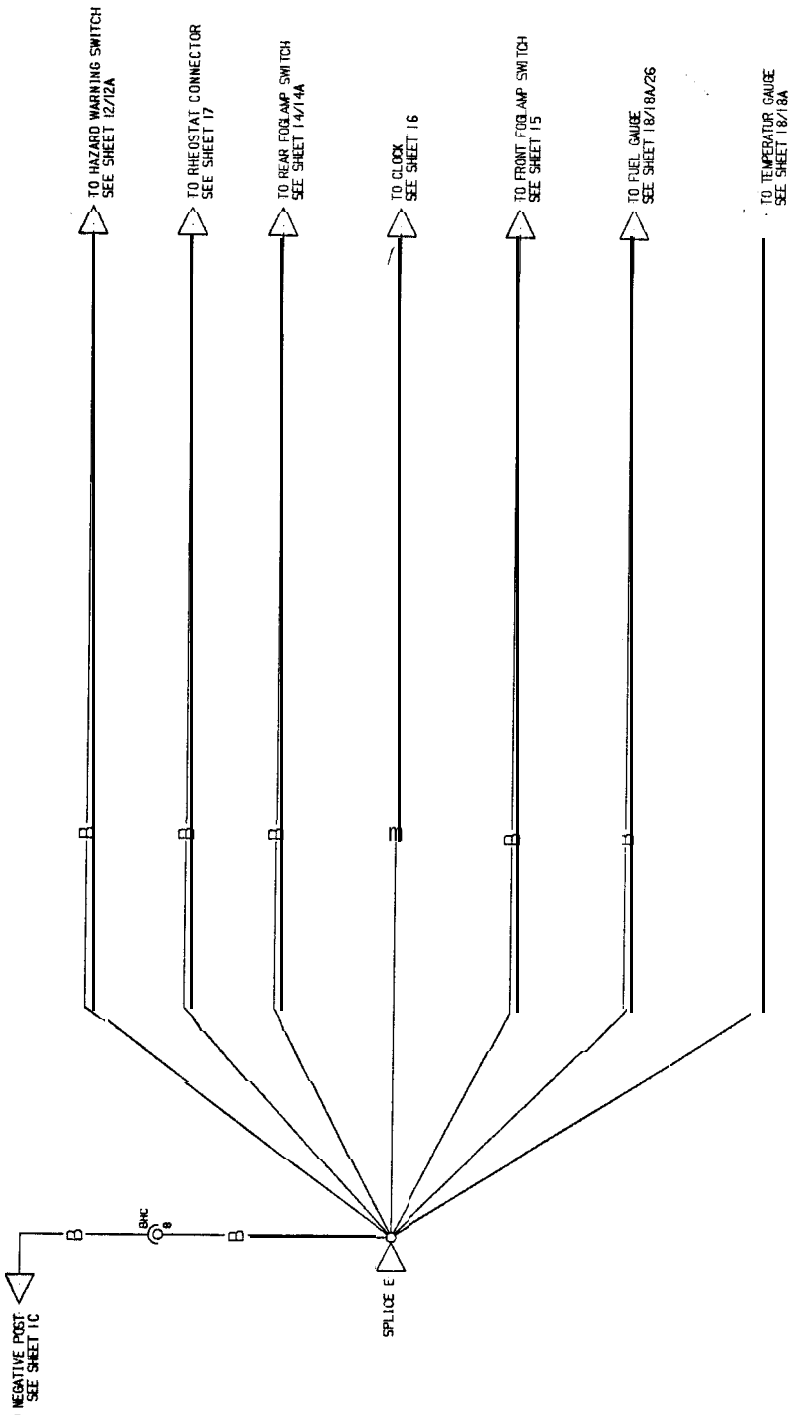
SHEET 1E	GROUND SPLICE J • FACIA HARNESS • 93.5 MY	ISSUE A

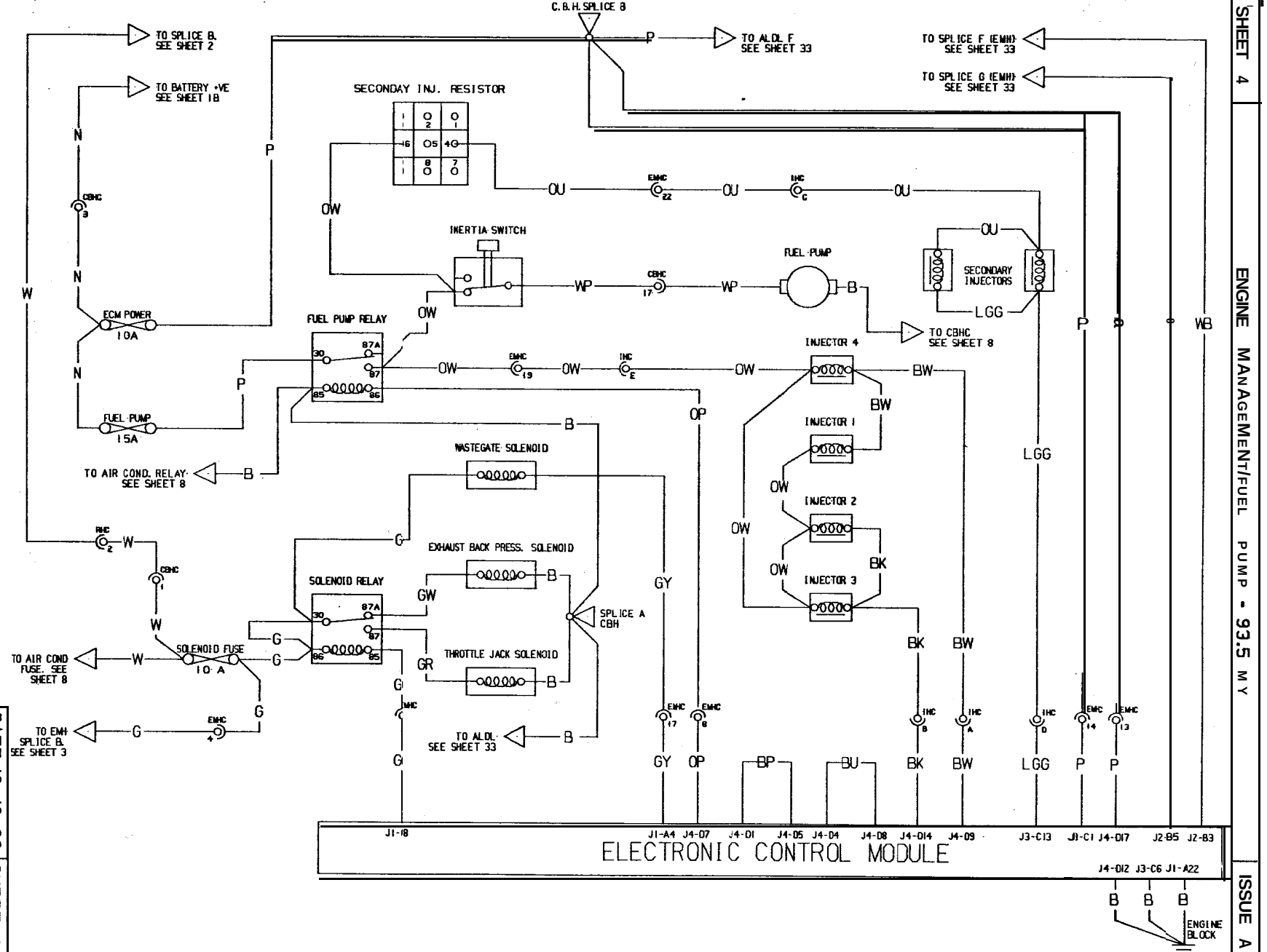


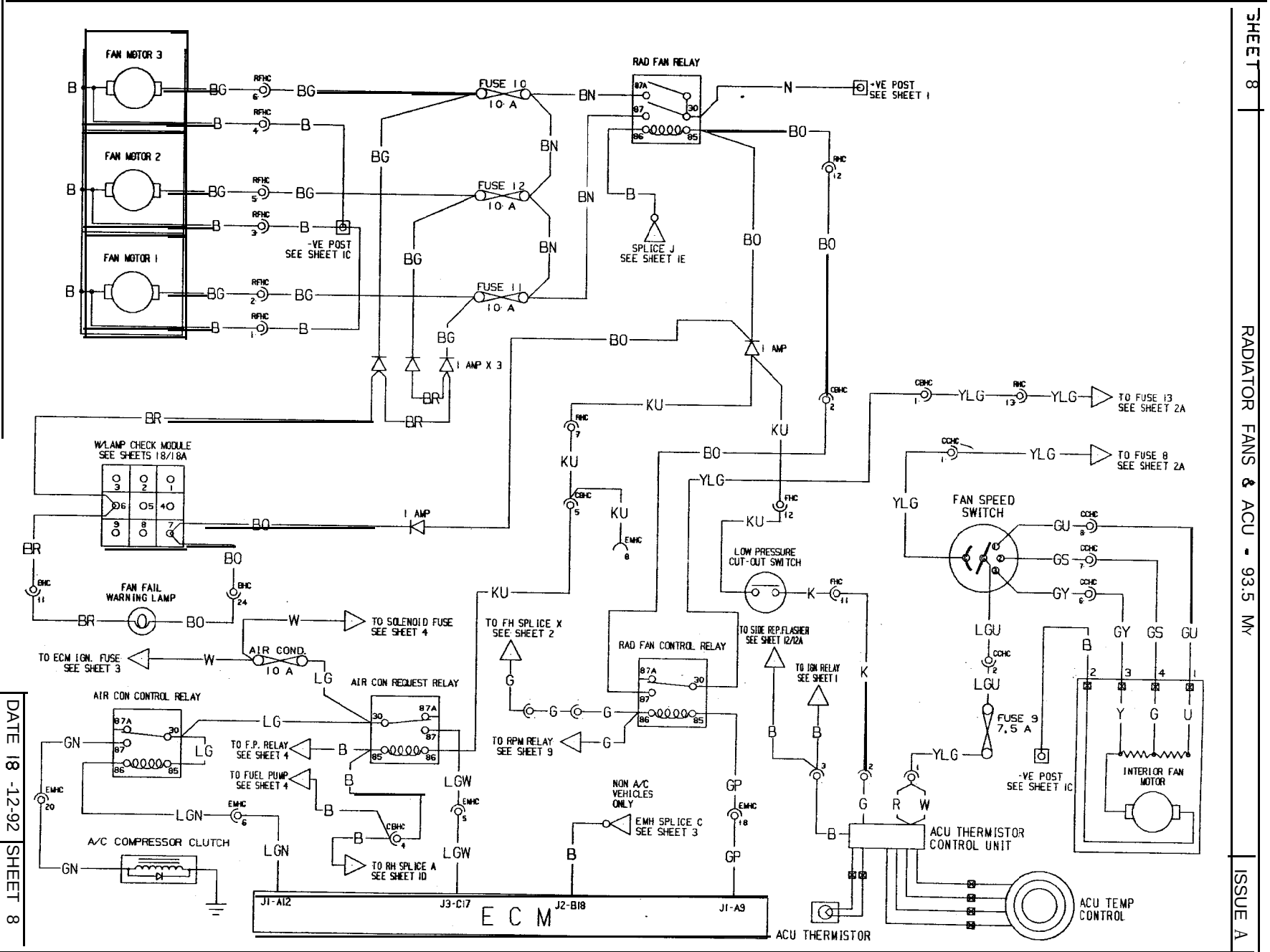
SHEET IF GROUND SPLICE D - BINNACLE HARNESS - 93.5 MY ISSUE A

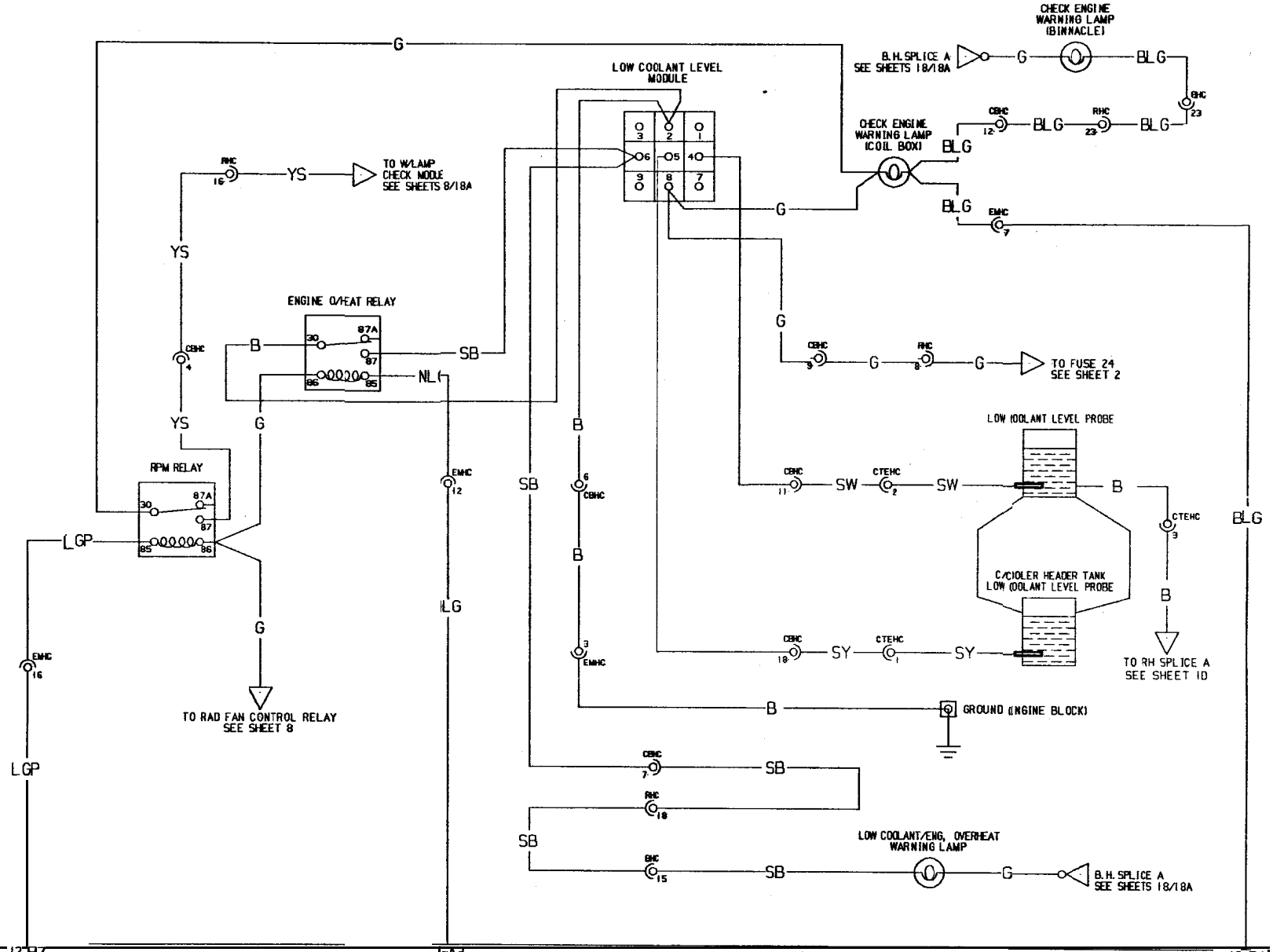


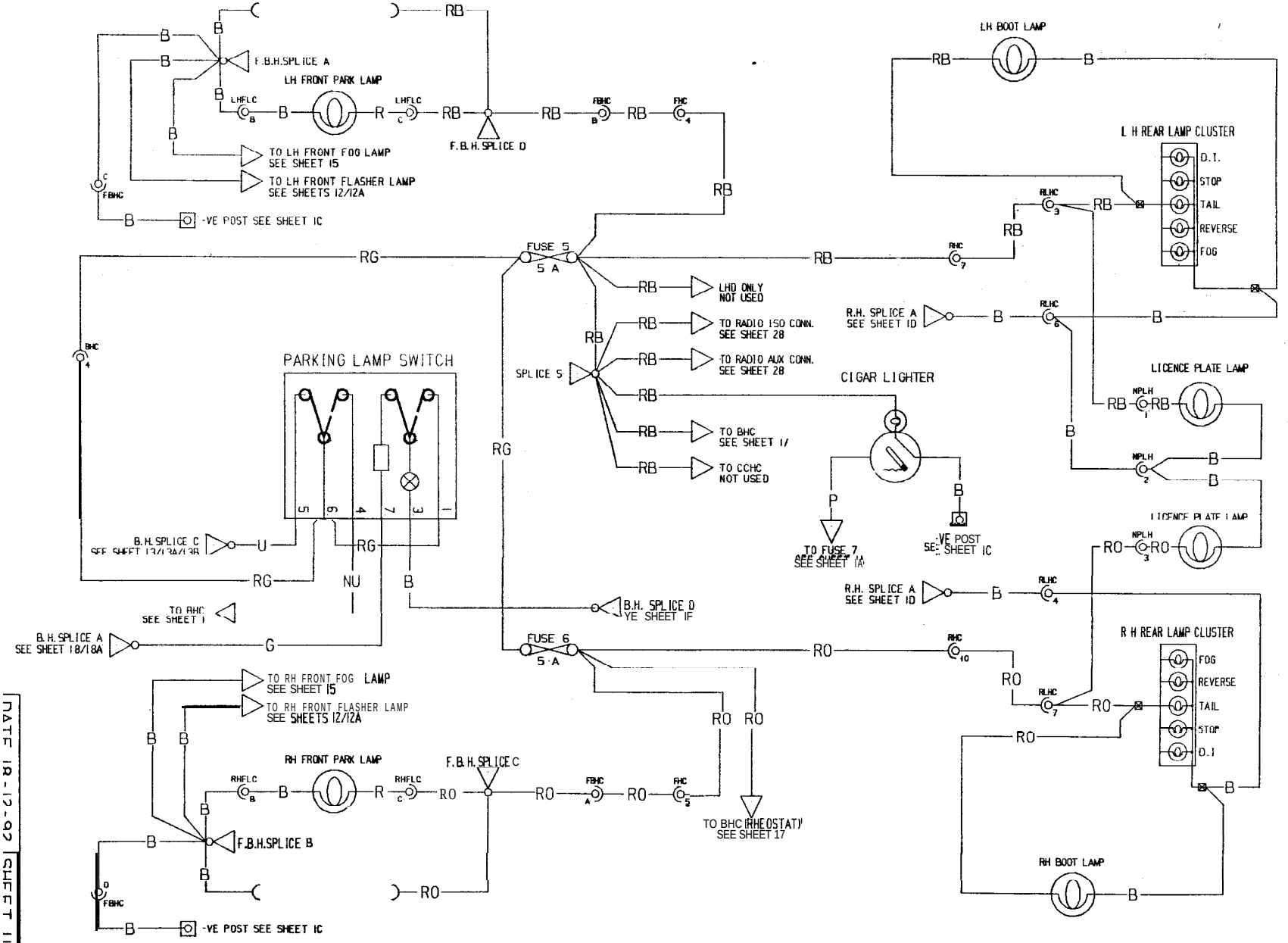
SHEET 16 | GROUND SPLICE E - BINNACLE HARNESS - 93.5 MY | ISSUE A

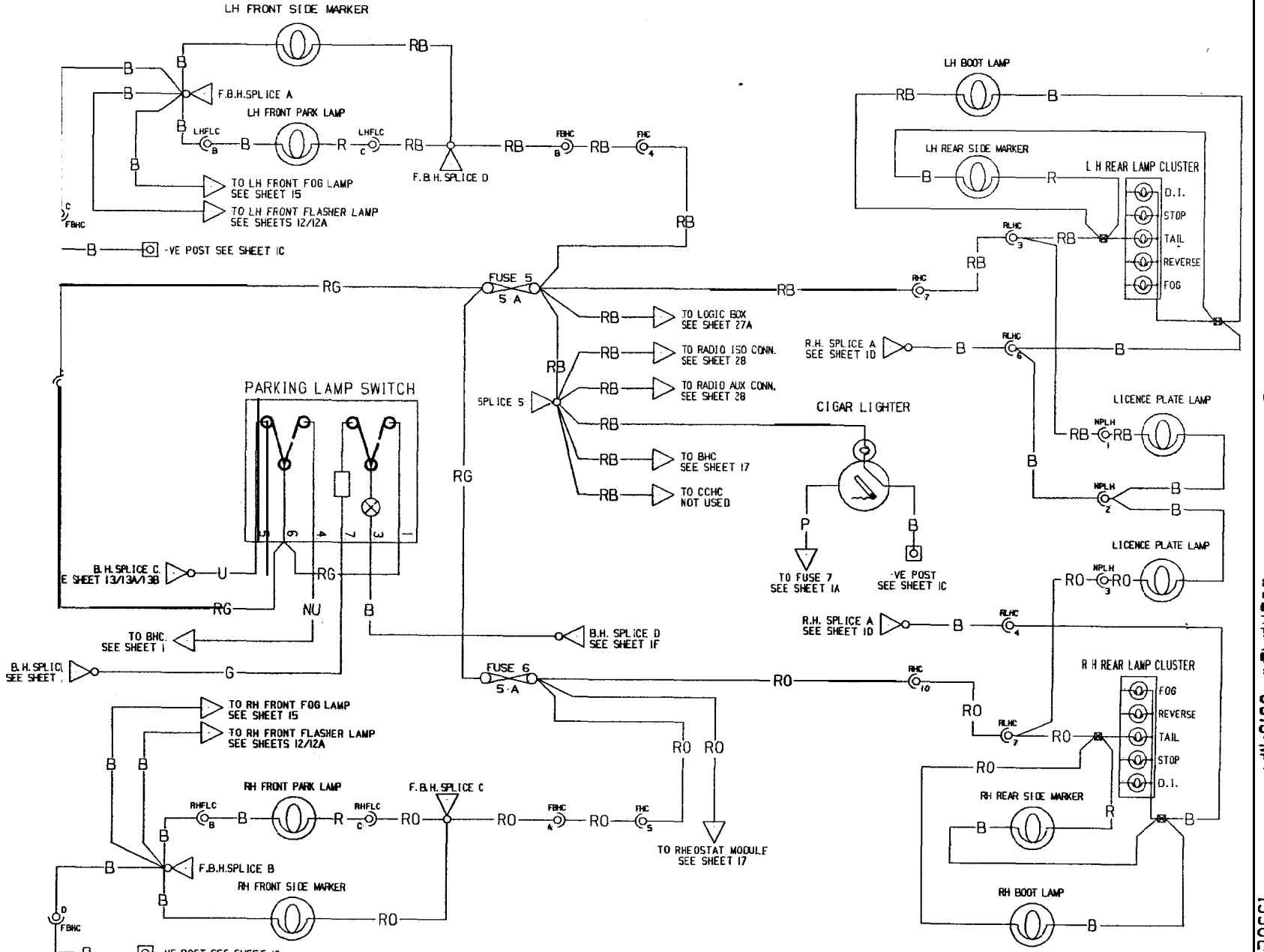


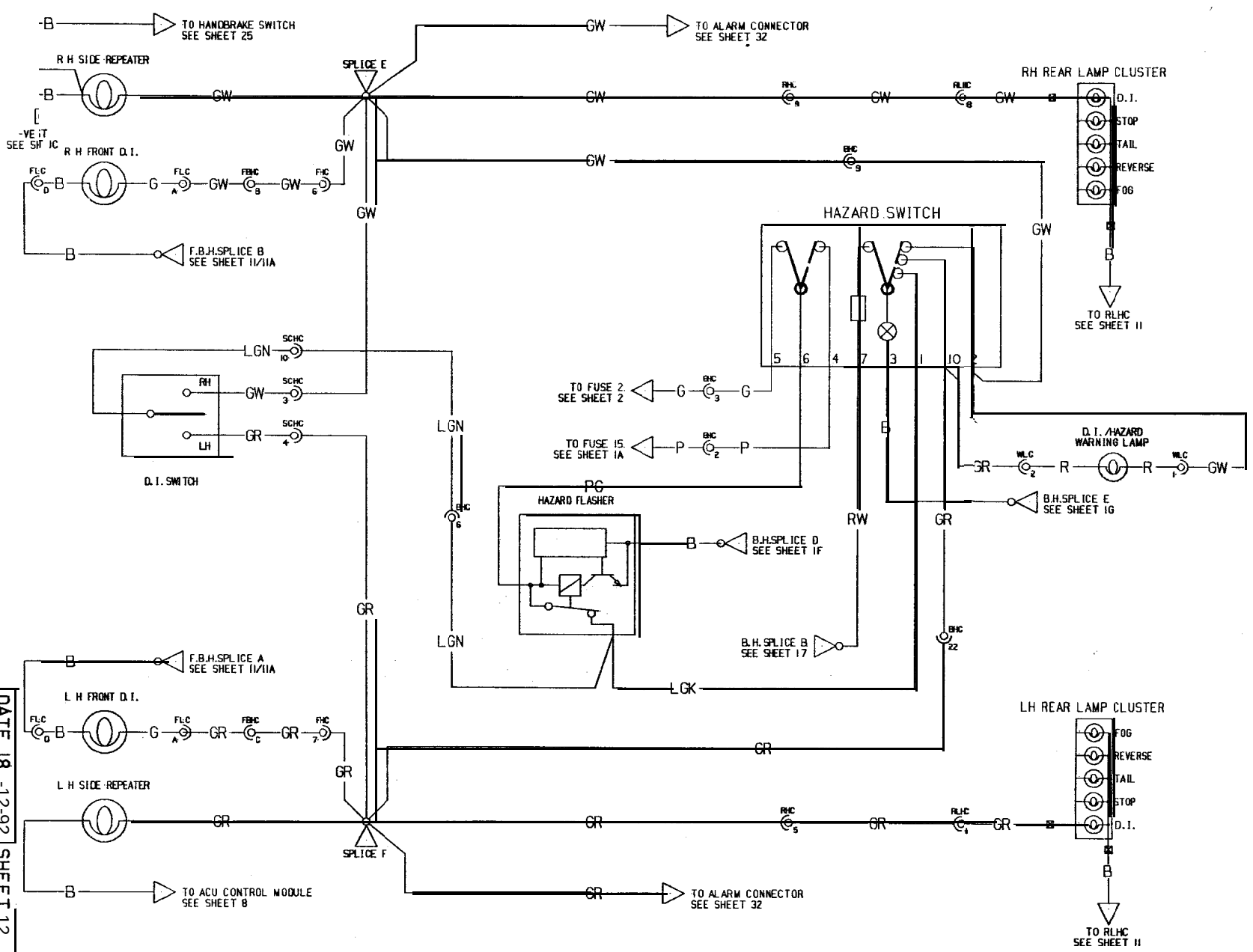

C.B.H. SPLICE B
TO SPLICE B, SEE SHEET 2
TO BATTERY +VE SEE SHEET 18
TO ALDL F SEE SHEET 33
TO SPLICE F (EMH) SEE SHEET 33
TO SPLICE G (EMH) SEE SHEET 33
SECONDAY INJ. RESISTOR
INERTIA SWITCH
FUEL PUMP
SECONDARY INJECTORS
ECM POWER 10A
FUEL PUMP RELAY
FUEL PUMP 15A
TO CBHC SEE SHEET 8
INJECTOR 4
INJECTOR 1
INJECTOR 2
INJECTOR 3
TO AIR COND. RELAY SEE SHEET 8
WASTEGATE SOLENOID
EXHAUST BACK PRESS. SOLENOID
SOLENOID RELAY
SPLICE A CBH
SOLENOID FUSE 10 A
TO AIR COND FUSE, SEE SHEET 8
THROTTLE JACK SOLENOID
TO EMH SPLICE B, SEE SHEET 3
TO ALDL SEE SHEET 33
ELECTRONIC CONTROL MODULE
J1-18
J1-A4 J4-07
J4-01
J4-05
J4-04
J4-08
J4-014
J4-09
J3-C13
J3-C1 J4-017
J2-B5 J2-B3
J4-012 J3-C6 J1-A22
ENGINE BLOCK

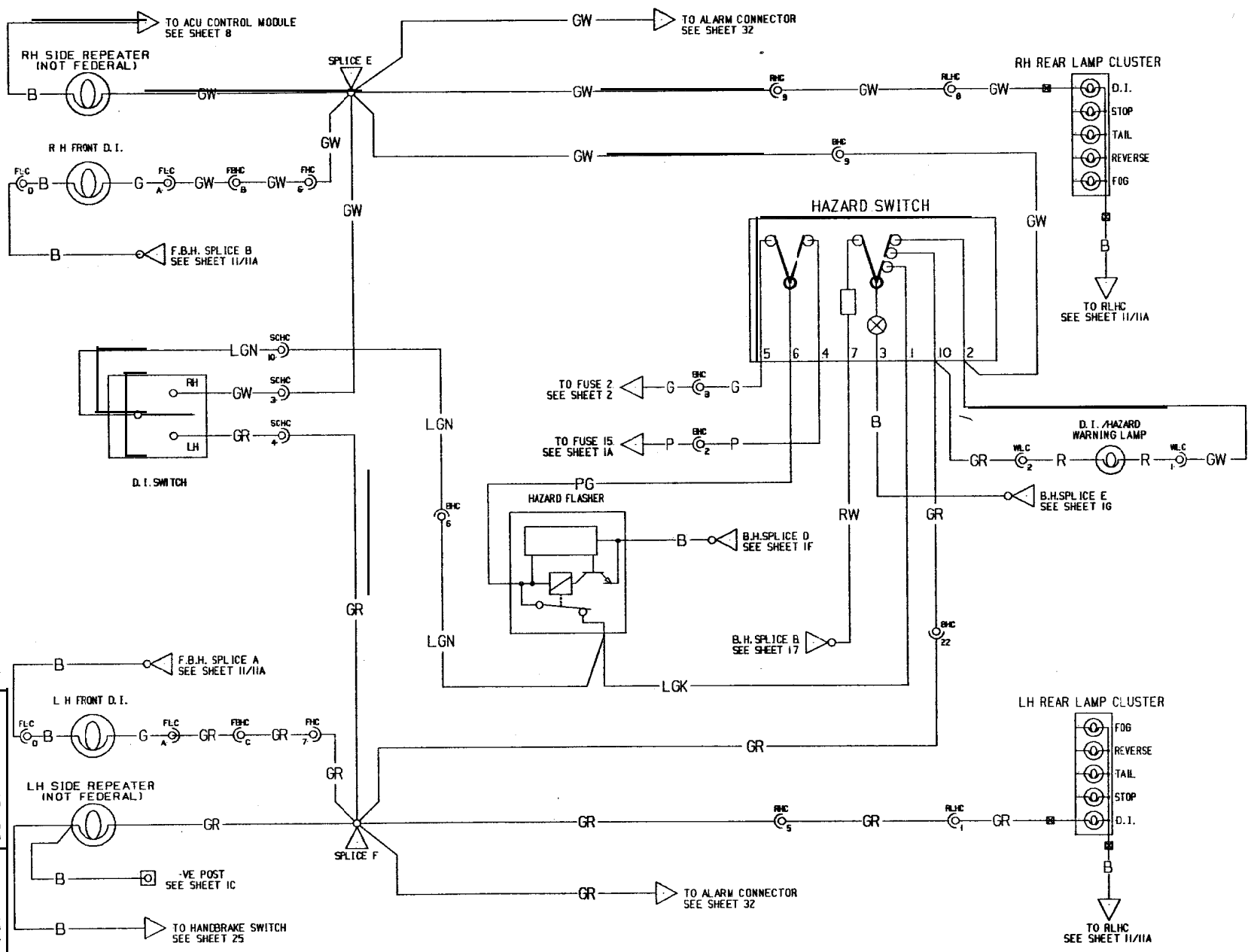

FAN MOTOR 3
FAN MOTOR 2
FAN MOTOR 1
RFHC
-VE POST SEE SHEET IC
FUSE 10 10 A
FUSE 12 10 A
FUSE 11 10 A
RAD FAN RELAY
-VE POST SEE SHEET 1
SPLICE J SEE SHEET IE
1 AMP X 3
1 AMP
W/LAMP CHECK MODULE SEE SHEETS 18/18A
FAN FAIL WARNING LAMP
TO SOLENOID FUSE SEE SHEET 4
AIR COND. 10 A
TO ECM IGN. FUSE SEE SHEET 3
AIR CON CONTROL RELAY
AIR CON REQUEST RELAY
TO F.P. RELAY SEE SHEET 4
TO FUEL PUMP SEE SHEET 4
A/C COMPRESSOR CLUTCH
TO RH SPLICE A SEE SHEET ID
TO FH SPLICE X SEE SHEET 2
RAD FAN CONTROL RELAY
TO RPM RELAY SEE SHEET 9
NON A/C VEHICLES ONLY
EMH SPLICE C SEE SHEET 3
LOW PRESSURE CUT-OUT SWITCH
TO SIDE REP.FLASHER SEE SHEET 12/12A
TO IGN RELAY SEE SHEET 1
ACU THERMISTOR CONTROL UNIT
ACU THERMISTOR
ACU TEMP CONTROL
FAN SPEED SWITCH
TO FUSE 13 SEE SHEET 2A
TO FUSE 8 SEE SHEET 2A
FUSE 9 7.5 A
INTERIOR FAN MOTOR
J1-A12
J3-C17
E C M
J2-B18
J1-A9

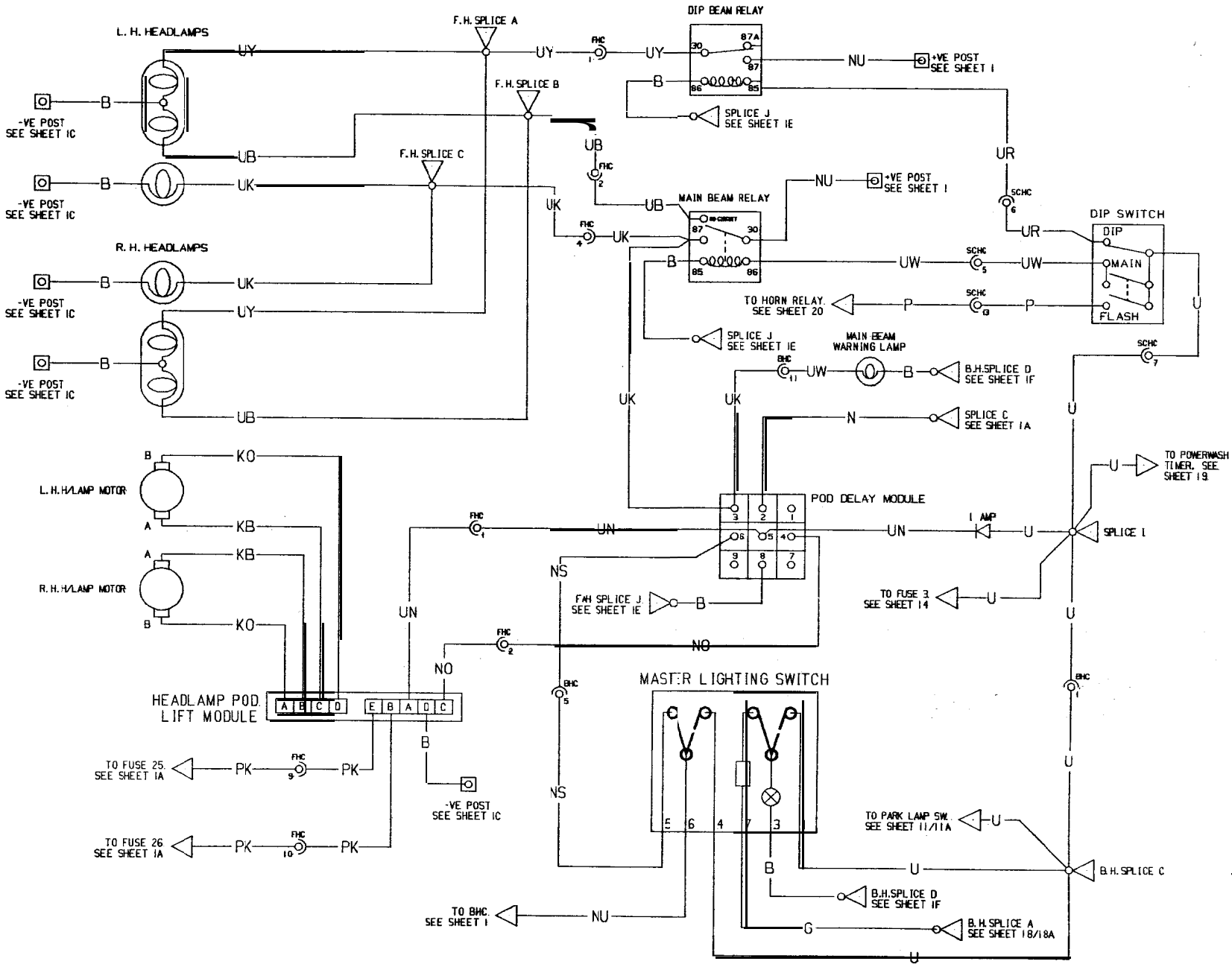

CHECK ENGINE WARNING LAMP (BINNACLE)
B.H. SPLICE A SEE SHEETS 18/18A
LOW COOLANT LEVEL MODULE
CHECK ENGINE WARNING LAMP (COIL BOX)
TO W/LAMP CHECK MODULE SEE SHEETS 8/18A
ENGINE O/HEAT RELAY
TO FUSE 24 SEE SHEET 2
LOW COOLANT LEVEL PROBE
C/COOLER HEADER TANK LOW COOLANT LEVEL PROBE
RPM RELAY
TO RH SPLICE A SEE SHEET 10
GROUND (ENGINE BLOCK)
TO RAD FAN CONTROL RELAY SEE SHEET 8
LOW COOLANT/ENG. OVERHEAT WARNING LAMP
B.H. SPLICE A SEE SHEETS 18/18A
J2-B7
J-A3
J2-B1
E.C.M.


F.B.H.SPLICE A
LH FRONT PARK LAMP
LHFLC
FBHC
FHC
F.B.H. SPLICE D
TO LH FRONT FOG LAMP
SEE SHEET 15
TO LH FRONT FLASHER LAMP
SEE SHEETS 12/12A
-VE POST SEE SHEET 1C
LH BOOT LAMP
L H REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
RLHC
RHC
FUSE 5
5 A
LHD ONLY
NOT USED
TO RADIO ISO CONN.
SEE SHEET 28
TO RADIO AUX CONN.
SEE SHEET 28
SPLICE 5
TO BHC
SEE SHEET 17
TO CCHC
NOT USED
R.H. SPLICE A
SEE SHEET 1D
PARKING LAMP SWITCH
CIGAR LIGHTER
LICENCE PLATE LAMP
NPLH
TO FUSE 7
SEE SHEET 1A
-VE POST
SEE SHEET 1C
BHC
B.H. SPLICE C
SEE SHEET 13/13A/13B
TO BHC
SEE SHEET 1
B.H. SPLICE A
SEE SHEET 18/18A
B.H. SPLICE D
SEE SHEET 1F
FUSE 6
5 A
R H REAR LAMP CLUSTER
TO RH FRONT FOG LAMP
SEE SHEET 15
TO RH FRONT FLASHER LAMP
SEE SHEETS 12/12A
RH FRONT PARK LAMP
RHFLC
F.B.H.SPLICE C
F.B.H.SPLICE B
TO BHC (RHEOSTAT)
SEE SHEET 17
RH BOOT LAMP
-VE POST SEE SHEET 1C

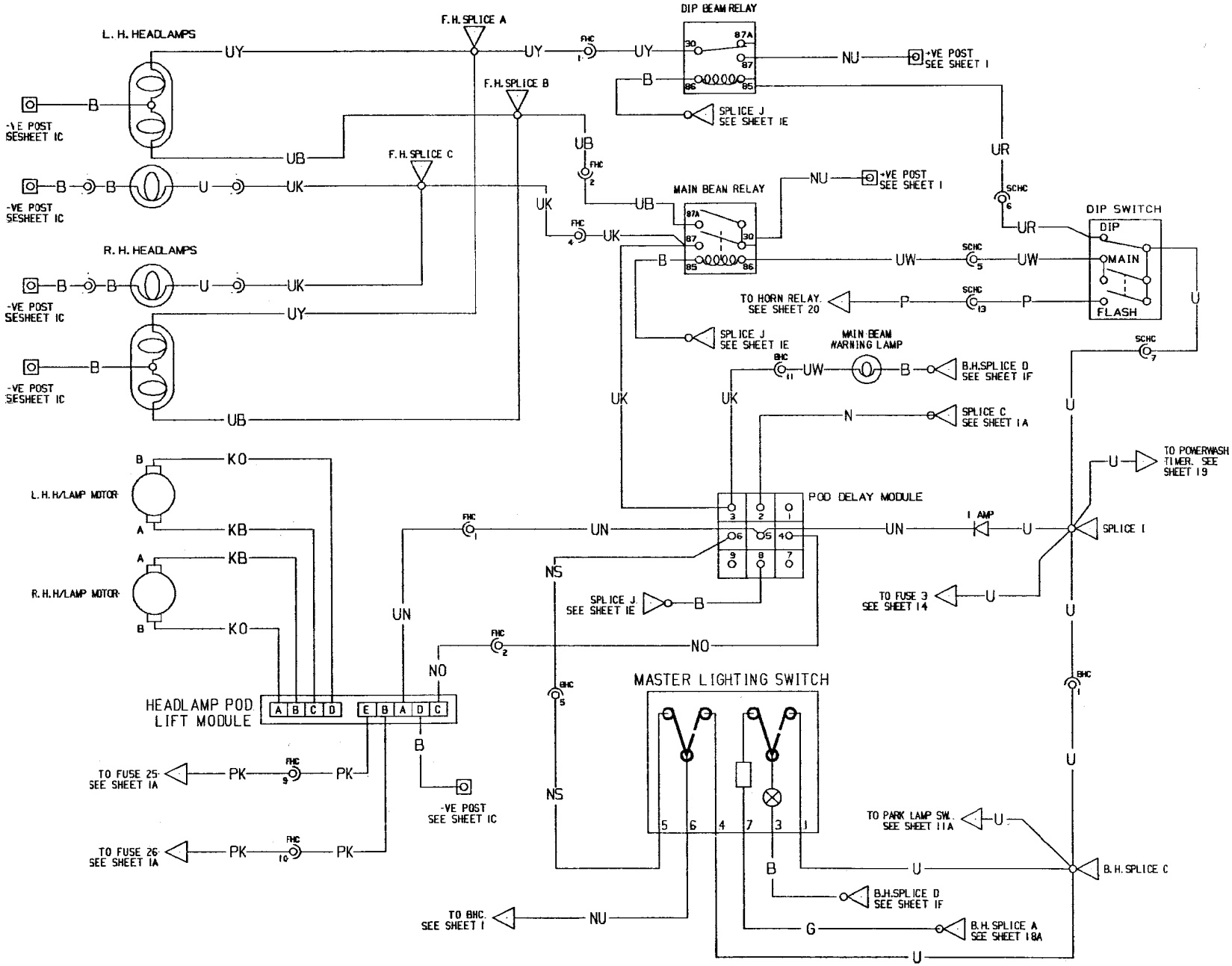

LH FRONT SIDE MARKER
RB
B
F.B.H.SPLICE A
LH FRONT PARK LAMP
LHFLC
R
RB
FBHC
FHC
F.B.H. SPLICE D
TO LH FRONT FOG LAMP
SEE SHEET 15
TO LH FRONT FLASHER LAMP
SEE SHEETS 12/12A
-VE POST SEE SHEET 1C
LH BOOT LAMP
LH REAR SIDE MARKER
L H REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
RLHC
FUSE 5
5 A
RG
TO LOGIC BOX
SEE SHEET 27A
TO RADIO ISO CONN.
SEE SHEET 28
TO RADIO AUX CONN.
SEE SHEET 28
SPLICE 5
TO BHC
SEE SHEET 17
TO CCHC
NOT USED
R.H. SPLICE A
SEE SHEET 1D
PARKING LAMP SWITCH
CIGAR LIGHTER
LICENCE PLATE LAMP
NPLH
P
TO FUSE 7
SEE SHEET 1A
-VE POST
SEE SHEET 1C
B.H. SPLICE C
SEE SHEET 13/13A/13B
U
NU
TO BHC
SEE SHEET 1
B.H. SPLICE D
SEE SHEET 1F
B.H. SPLICE
SEE SHEET
G
FUSE 6
5 A
RO
TO RH FRONT FOG LAMP
SEE SHEET 15
TO RH FRONT FLASHER LAMP
SEE SHEETS 12/12A
RH FRONT PARK LAMP
RHFLC
F.B.H.SPLICE C
TO RHEOSTAT MODULE
SEE SHEET 17
F.B.H.SPLICE B
RH FRONT SIDE MARKER
R H REAR LAMP CLUSTER
RH REAR SIDE MARKER
RH BOOT LAMP

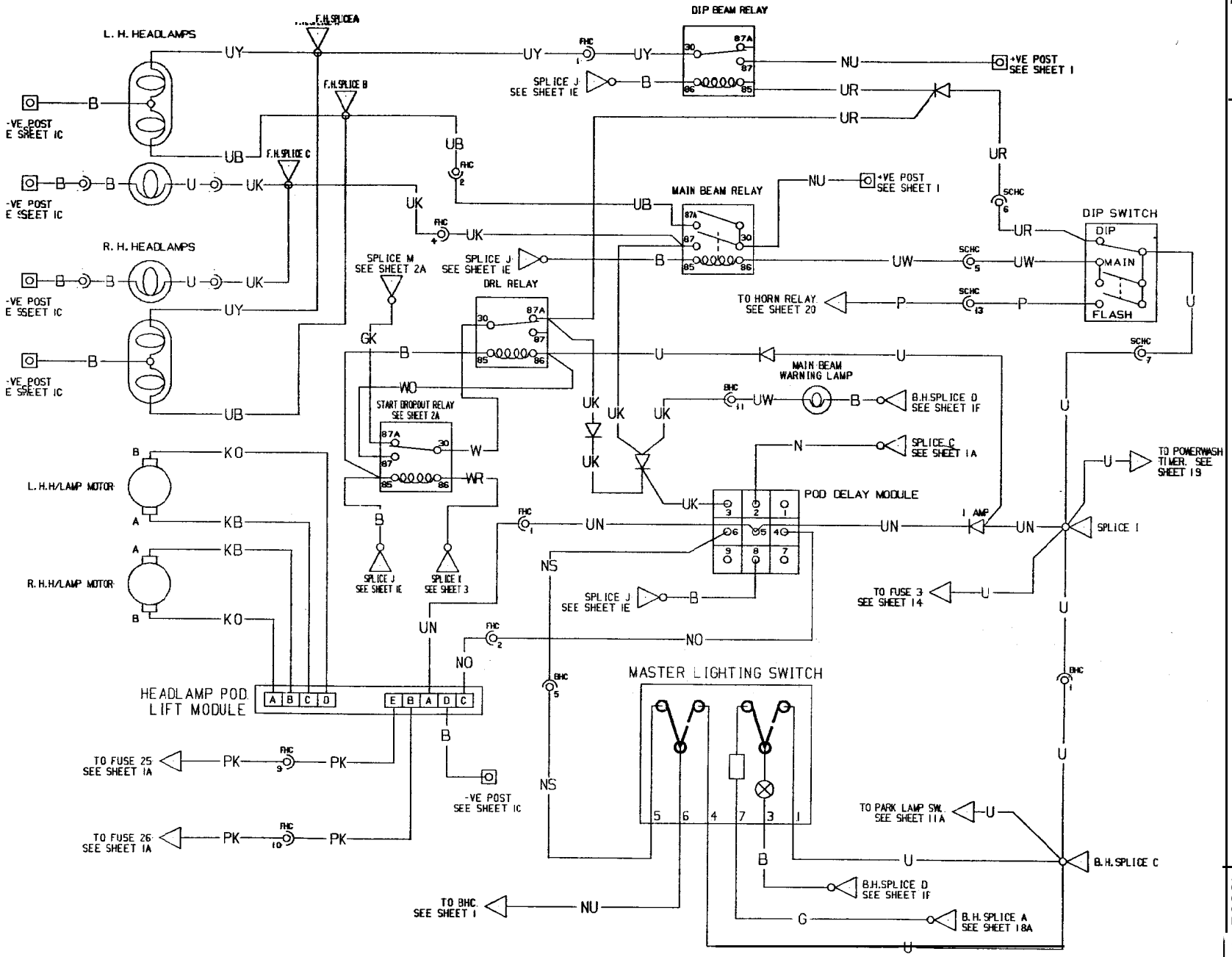

TO HANDBRAKE SWITCH SEE SHEET 25
TO ALARM CONNECTOR SEE SHEET 32
R H SIDE REPEATER
SPLICE E
RH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
R H FRONT D.I.
F.B.H.SPLICE B SEE SHEET 11/11A
HAZARD SWITCH
TO RLHC SEE SHEET 11
TO FUSE 2 SEE SHEET 2
TO FUSE 15 SEE SHEET 1A
D.I. SWITCH
D.I./HAZARD WARNING LAMP
B.H.SPLICE E SEE SHEET 1G
HAZARD FLASHER
B.H.SPLICE D SEE SHEET 1F
B.H. SPLICE B SEE SHEET 17
F.B.H.SPLICE A SEE SHEET 11/11A
L H FRONT D.I.
L H SIDE REPEATER
SPLICE F
LH REAR LAMP CLUSTER
TO ACU CONTROL MODULE SEE SHEET 8
TO ALARM CONNECTOR SEE SHEET 32
TO RLHC SEE SHEET 11

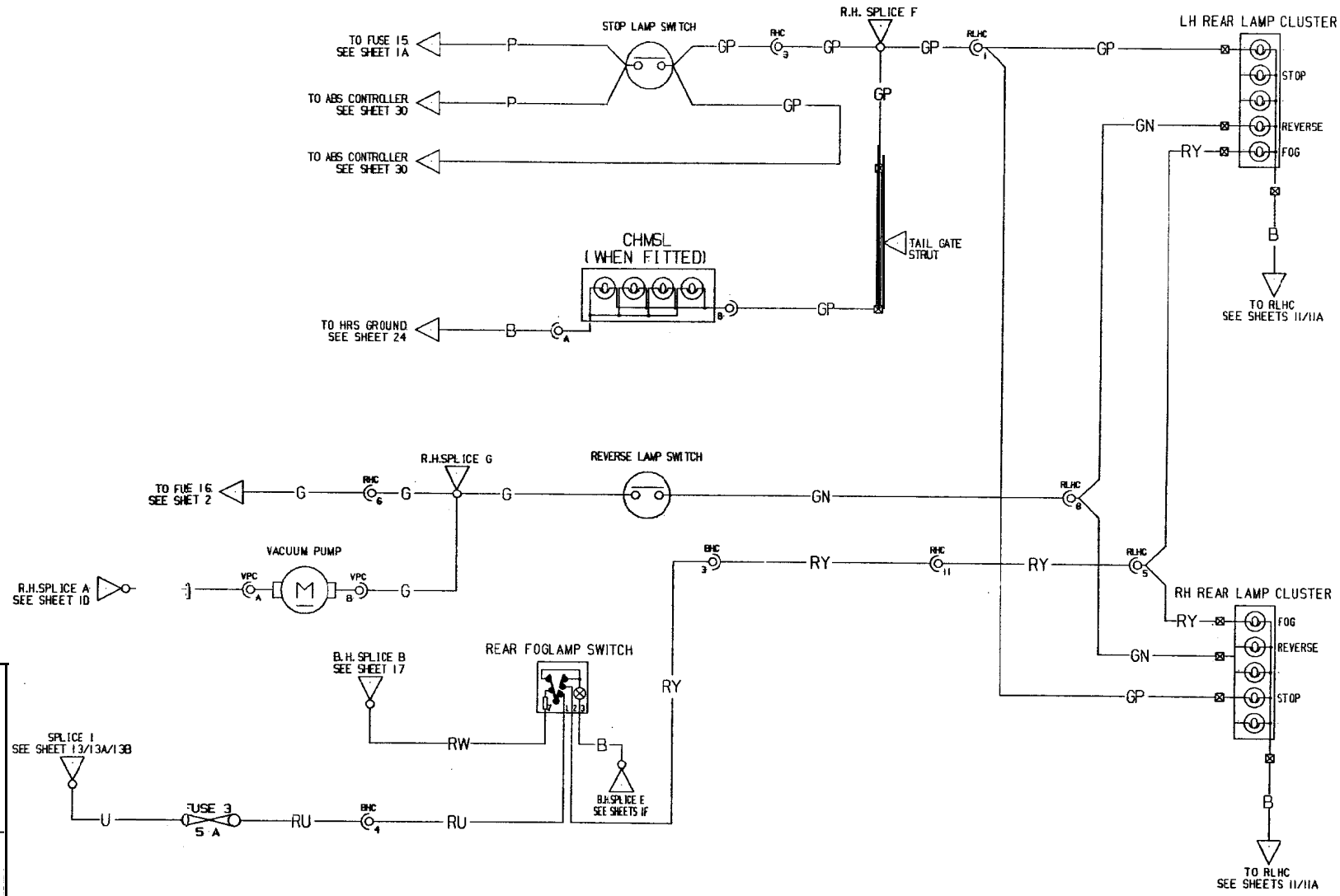

TO ACU CONTROL MODULE SEE SHEET 8
RH SIDE REPEATER (NOT FEDERAL)
SPLICE E
GW
TO ALARM CONNECTOR SEE SHEET 32
RH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
R H FRONT D.I.
F.B.H. SPLICE B SEE SHEET 11/11A
HAZARD SWITCH
TO RLHC SEE SHEET 11/11A
LGN
RH
LH
D.I. SWITCH
TO FUSE 2 SEE SHEET 2
TO FUSE 15 SEE SHEET 1A
D.I. /HAZARD WARNING LAMP
B.H.SPLICE E SEE SHEET 1G
PG
HAZARD FLASHER
B.H.SPLICE D SEE SHEET 1F
RW
GR
LGK
B.H. SPLICE B SEE SHEET 17
F.B.H. SPLICE A SEE SHEET 11/11A
L H FRONT D.I.
LH SIDE REPEATER (NOT FEDERAL)
SPLICE F
LH REAR LAMP CLUSTER
-VE POST SEE SHEET 1C
TO HANDBRAKE SWITCH SEE SHEET 25



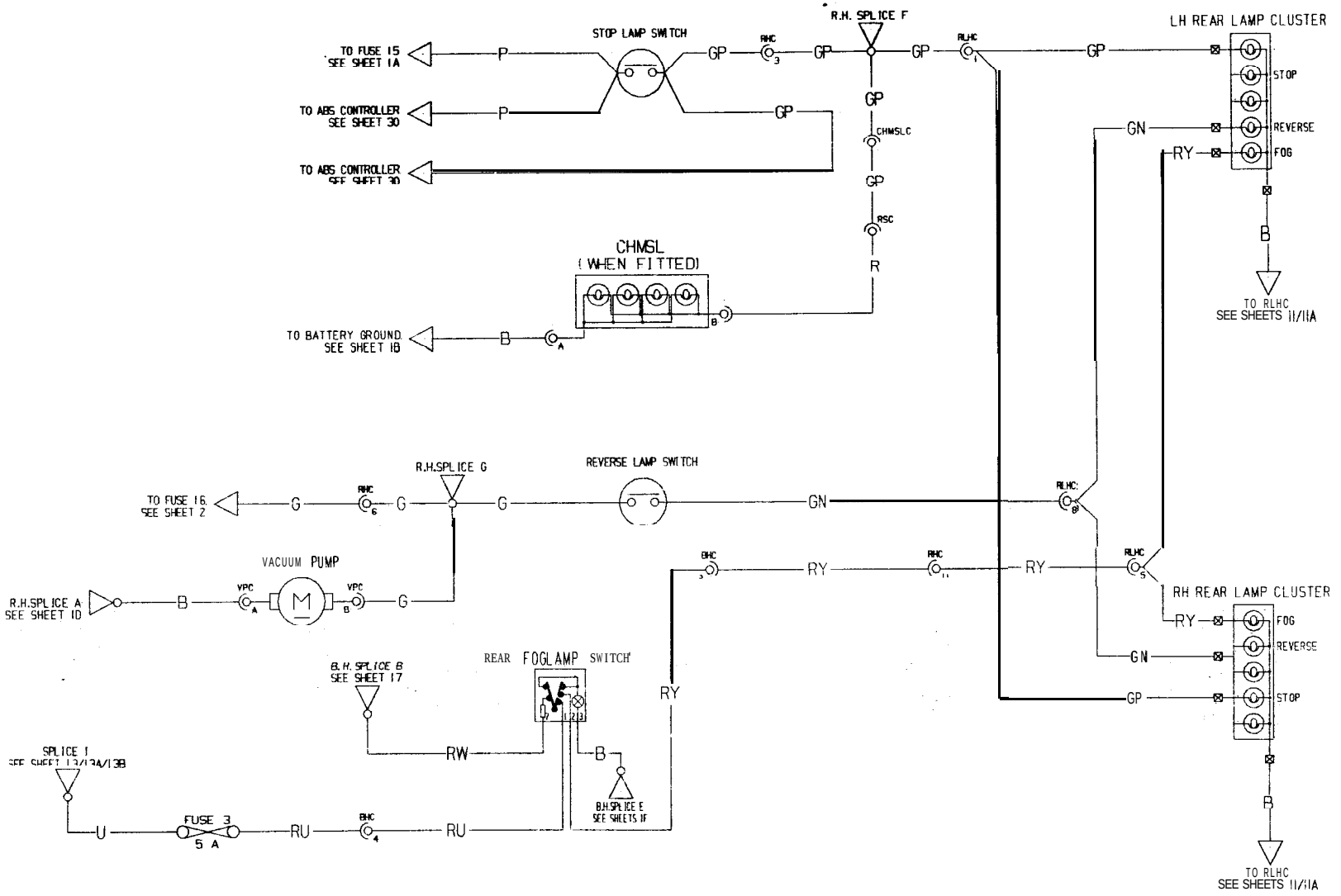
DATE 18-12-92 | SHEET 13

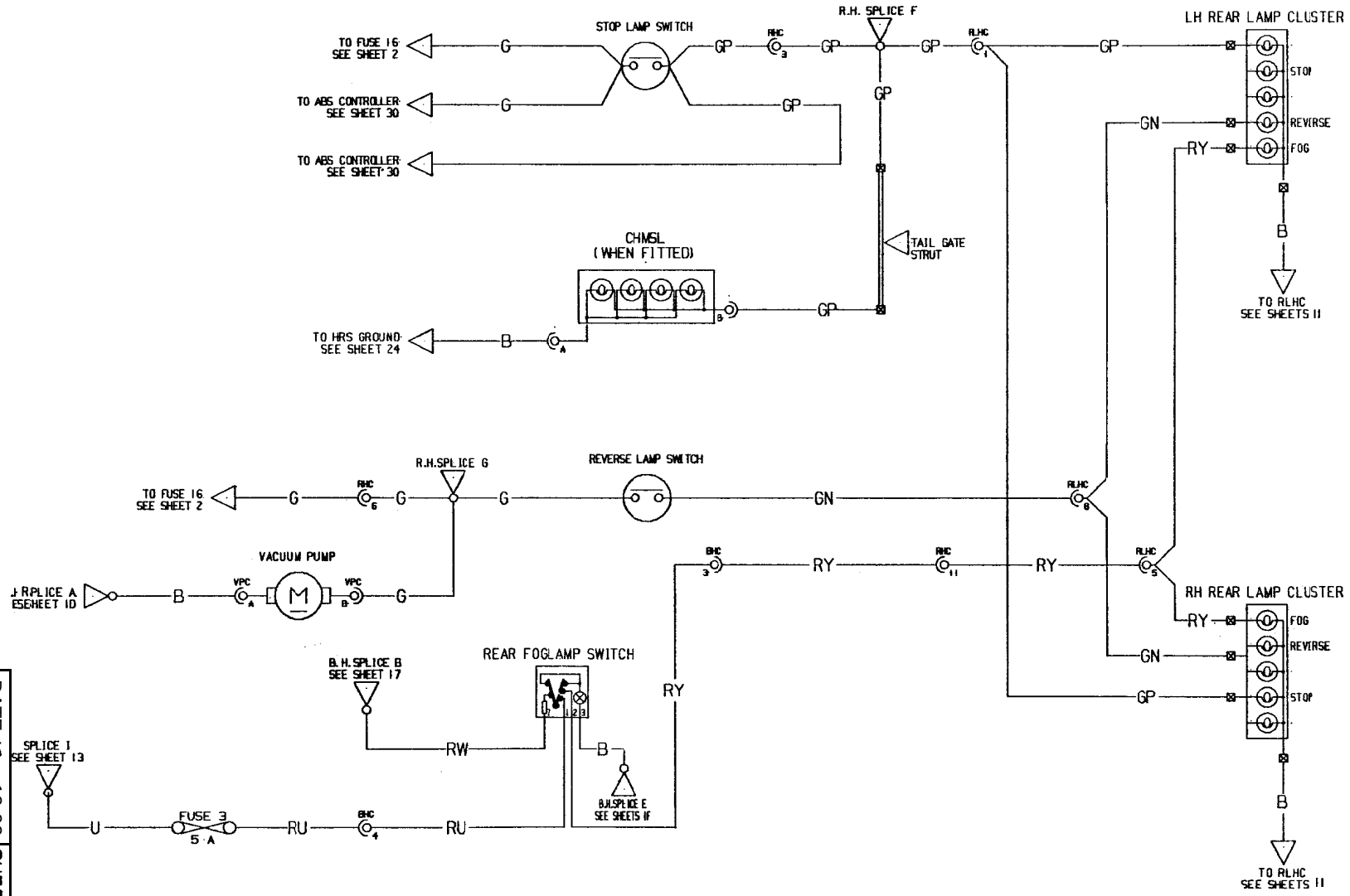

L. H. HEADLAMPS
R. H. HEADLAMPS
-VE POST SEE SHEET IC
F.H. SPLICE A
F.H. SPLICE B
F.H. SPLICE C
DIP BEAM RELAY
MAIN BEAM RELAY
+VE POST SEE SHEET 1
SPLICE J SEE SHEET IE
DIP SWITCH
DIP
MAIN
FLASH
TO HORN RELAY. SEE SHEET 20
MAIN BEAM WARNING LAMP
B.H.SPLICE D SEE SHEET IF
SPLICE C SEE SHEET 1A
TO POWERWASH TIMER. SEE SHEET 19
L.H.H/LAMP MOTOR
R.H.H/LAMP MOTOR
POD DELAY MODULE
1 AMP
SPLICE 1
TO FUSE 3 SEE SHEET 14
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
TO FUSE 25 SEE SHEET 1A
TO FUSE 26 SEE SHEET 1A
TO PARK LAMP SW. SEE SHEET 11A
B.H. SPLICE C
TO BHC SEE SHEET 1
B.H.SPLICE A SEE SHEET 18A


L. H. HEADLAMPS
R. H. HEADLAMPS
F.H.SPLICE A
F.H.SPLICE B
F.H.SPLICE C
-VE POST SEE SHEET IC
DIP BEAM RELAY
MAIN BEAM RELAY
DRL RELAY
START DROPOUT RELAY SEE SHEET 2A
SPLICE M SEE SHEET 2A
SPLICE J SEE SHEET IE
+VE POST SEE SHEET 1
DIP SWITCH
DIP
MAIN
FLASH
TO HORN RELAY SEE SHEET 20
MAIN BEAM WARNING LAMP
B.H.SPLICE D SEE SHEET IF
SPLICE C SEE SHEET 1A
POD DELAY MODULE
TO POWERWASH TIMER. SEE SHEET 19
SPLICE I
TO FUSE 3 SEE SHEET 14
L.H.H/LAMP MOTOR
R.H.H/LAMP MOTOR
SPLICE J SEE SHEET IE
SPLICE I SEE SHEET 3
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
TO FUSE 25 SEE SHEET 1A
TO FUSE 26 SEE SHEET 1A
-VE POST SEE SHEET IC
TO PARK LAMP SW. SEE SHEET 11A
B.H. SPLICE C
B.H.SPLICE D SEE SHEET IF
TO BHC SEE SHEET 1
B.H. SPLICE A SEE SHEET 18A

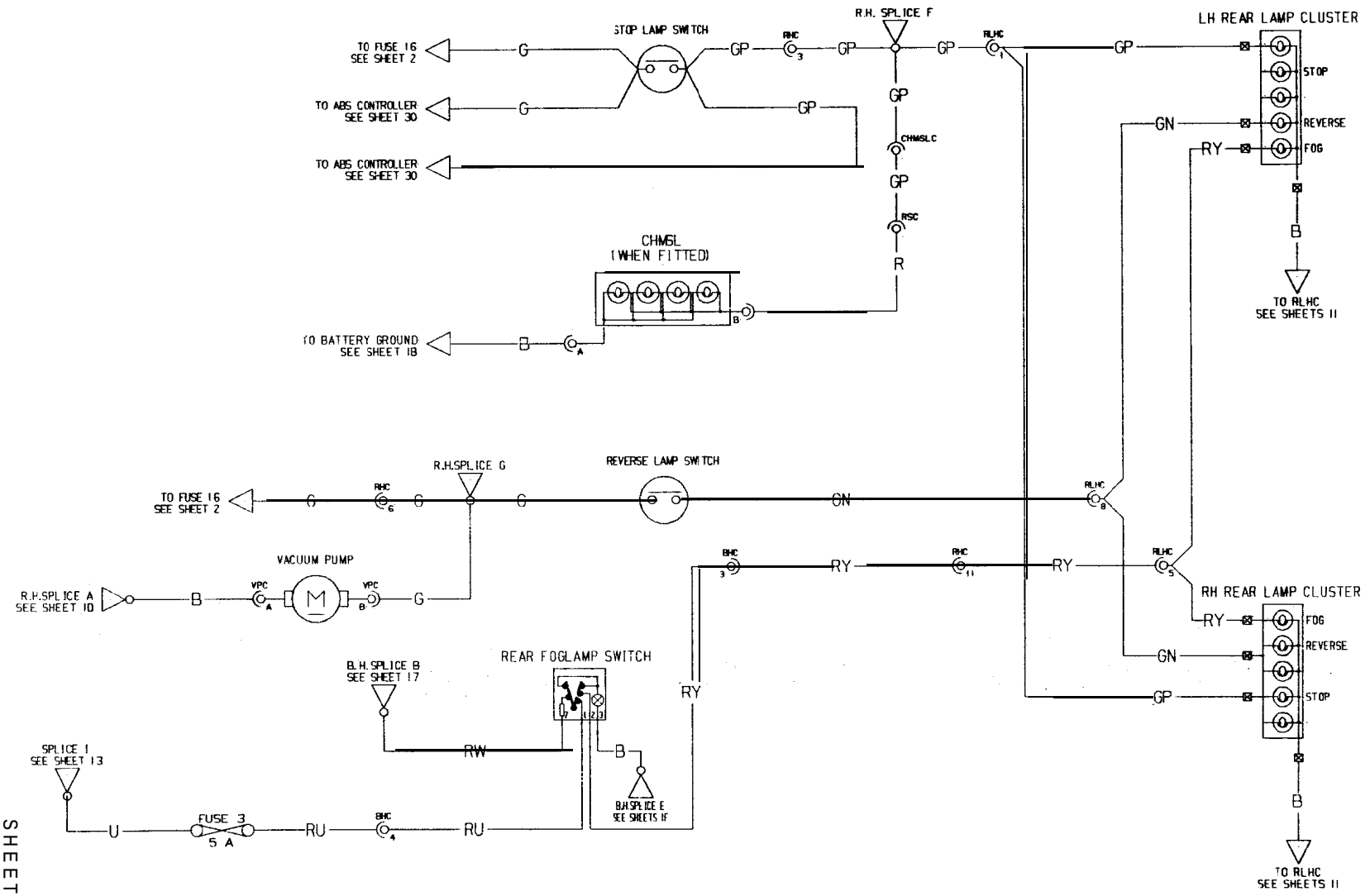

TO FUSE 15
SEE SHEET 1A
TO ABS CONTROLLER
SEE SHEET 30
TO ABS CONTROLLER
SEE SHEET 30
STOP LAMP SWITCH
R.H. SPLICE F
LH REAR LAMP CLUSTER
STOP
REVERSE
FOG
CHMSL
(WHEN FITTED)
TAIL GATE
STRUT
TO HRS GROUND
SEE SHEET 24
TO RLHC
SEE SHEETS 11/11A
TO FUE 16
SEE SHEET 2
R.H.SPLICE G
REVERSE LAMP SWITCH
VACUUM PUMP
R.H.SPLICE A
SEE SHEET 1D
RH REAR LAMP CLUSTER
FOG
REVERSE
STOP
REAR FOGLAMP SWITCH
B.H. SPLICE B
SEE SHEET 17
SPLICE 1
SEE SHEET 13/13A/13B
FUSE 3
5 A
B.H.SPLICE E
SEE SHEETS 1F
TO RLHC
SEE SHEETS 11/11A

STOP.REVERSE & REAR FOG LAMPS, & VAC. PUMP LHD SPORT 300

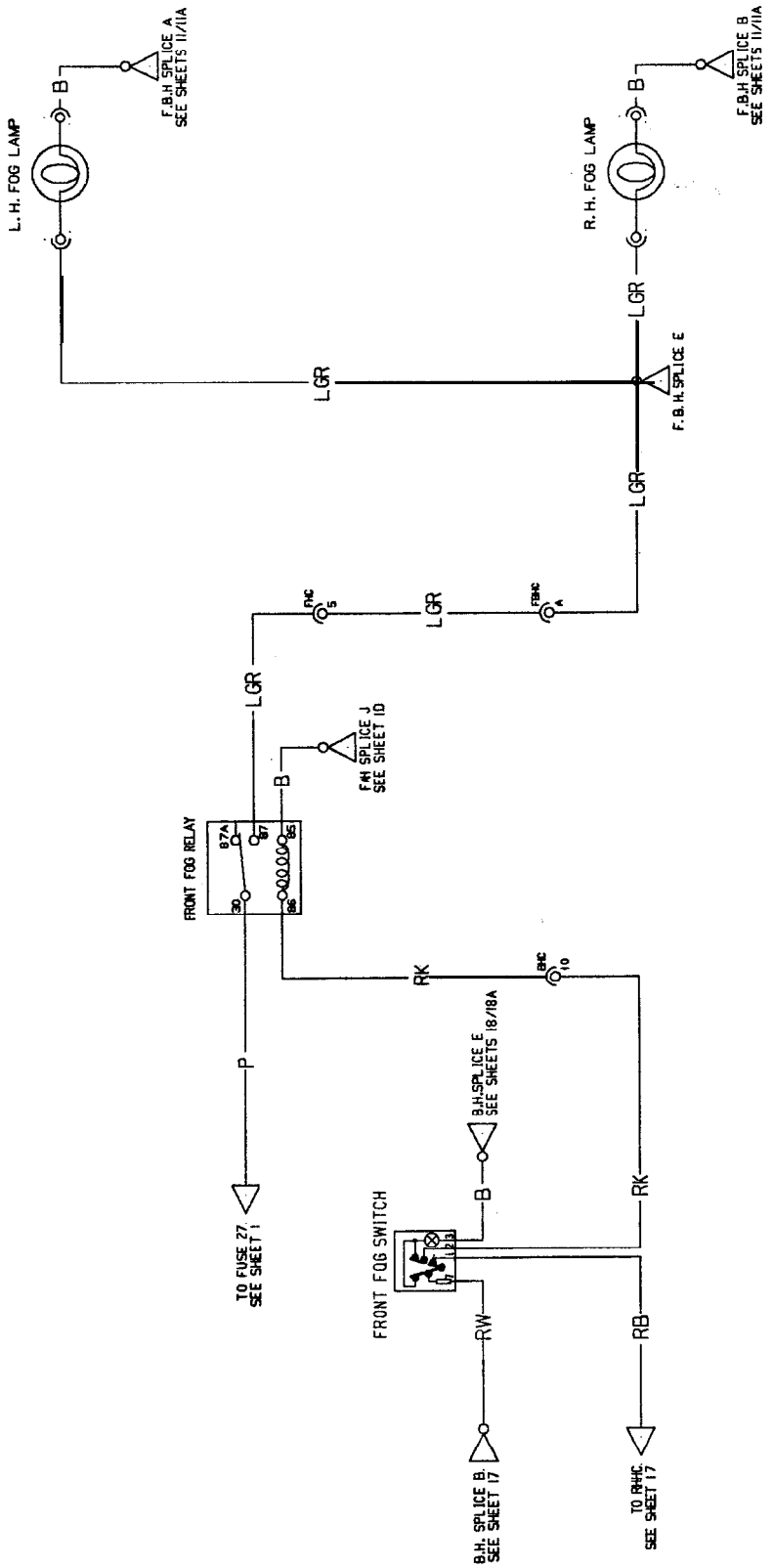


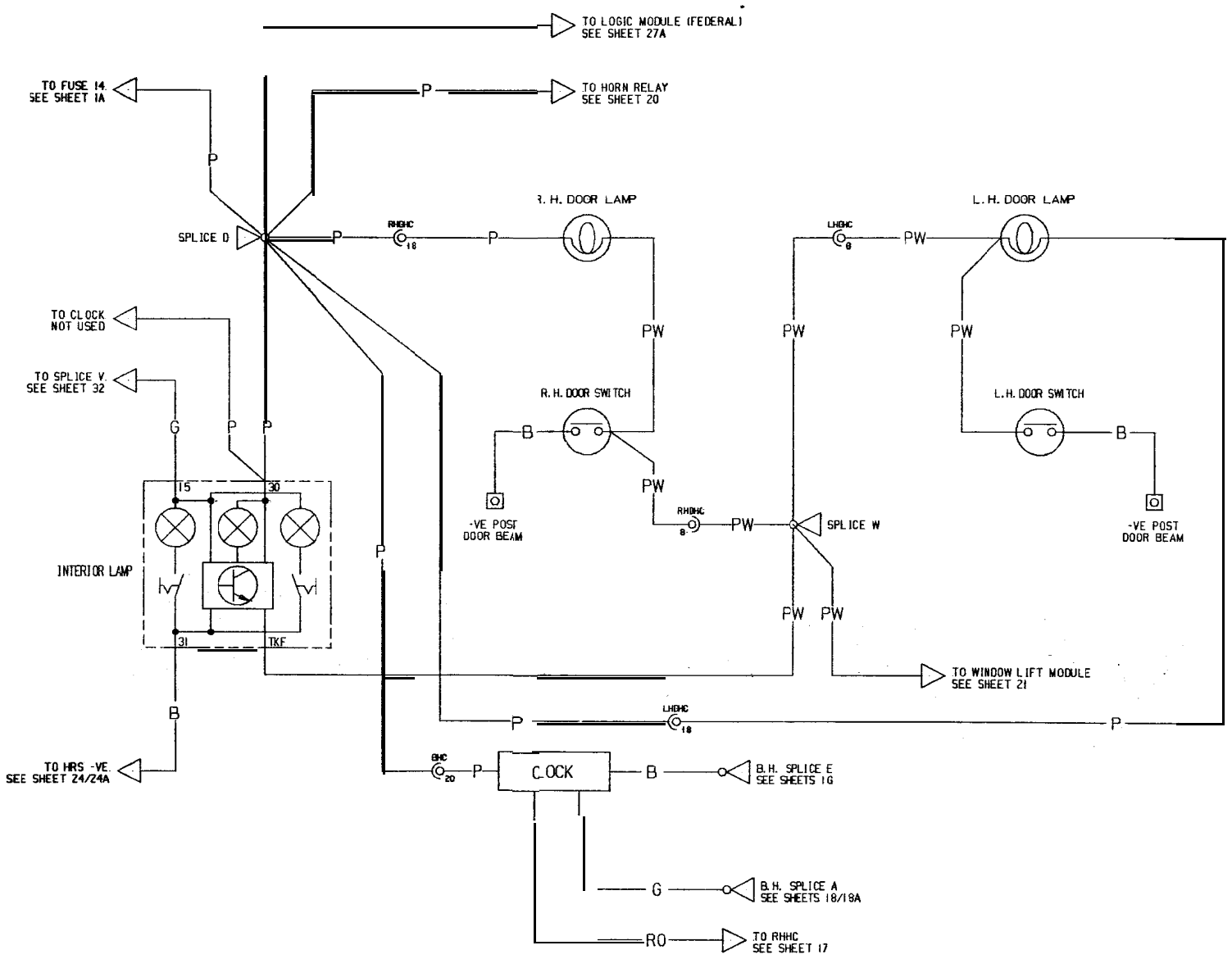

STOP LAMP SWITCH
R.H. SPLICE F
LH REAR LAMP CLUSTER
TO FUSE 16 SEE SHEET 2
TO ABS CONTROLLER SEE SHEET 30
TO ABS CONTROLLER SEE SHEET 30
STOP
REVERSE
FOG
TAIL GATE STRUT
CHMSL (WHEN FITTED)
TO RLHC SEE SHEETS 11
TO HRS GROUND SEE SHEET 24
R.H.SPLICE G
REVERSE LAMP SWITCH
TO FUSE 16 SEE SHEET 2
VACUUM PUMP
J.R.P.SPLICE A SEE SHEET 10
RH REAR LAMP CLUSTER
REAR FOGLAMP SWITCH
B.H. SPLICE B SEE SHEET 17
SPLICE I SEE SHEET 13
FUSE 3 5 A
B.H.SPLICE E SEE SHEETS 16

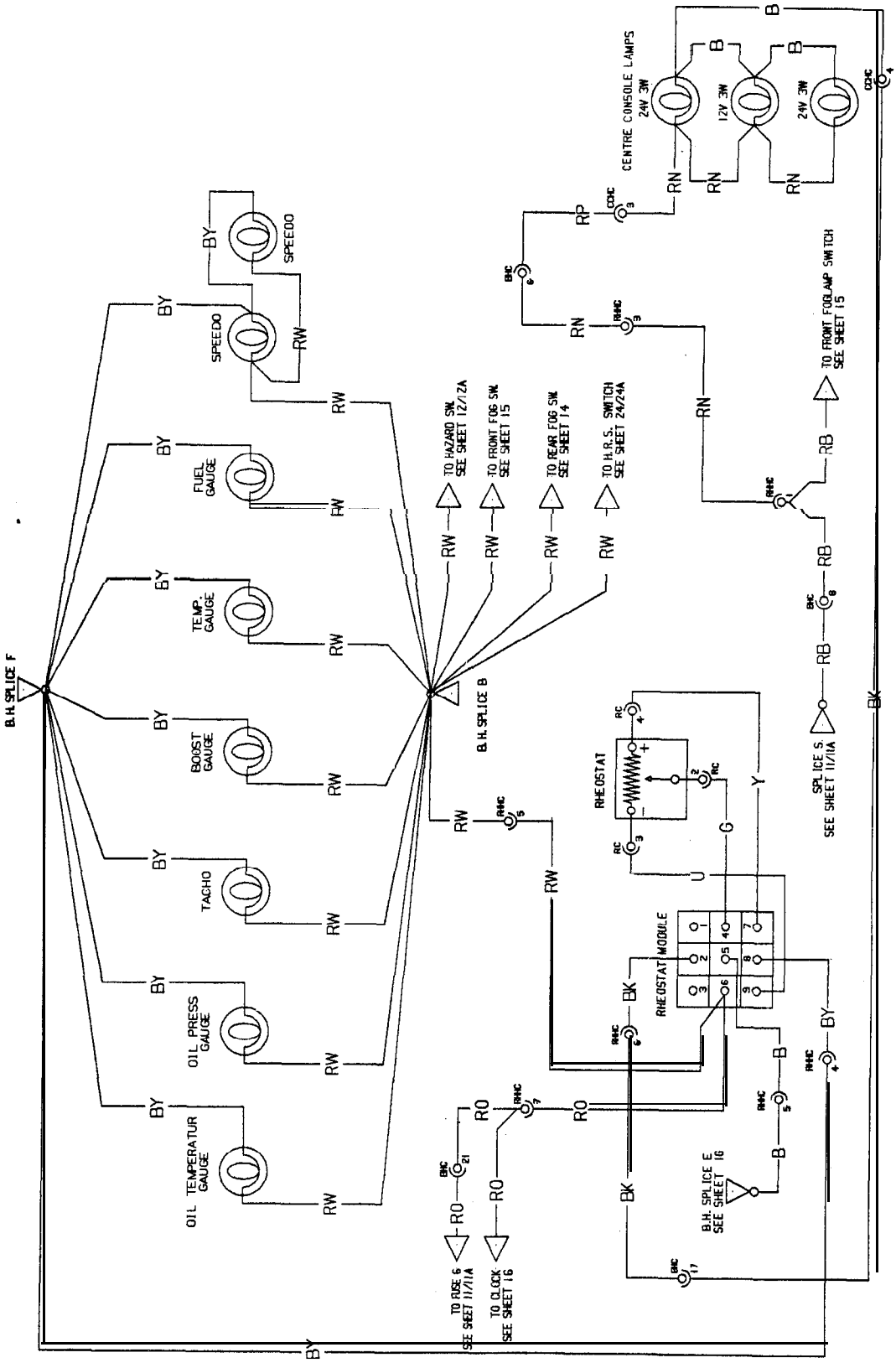
STOP, REVERSE & REAR FUG LAMPS, & VAC. PUMP RHD SPORT 300

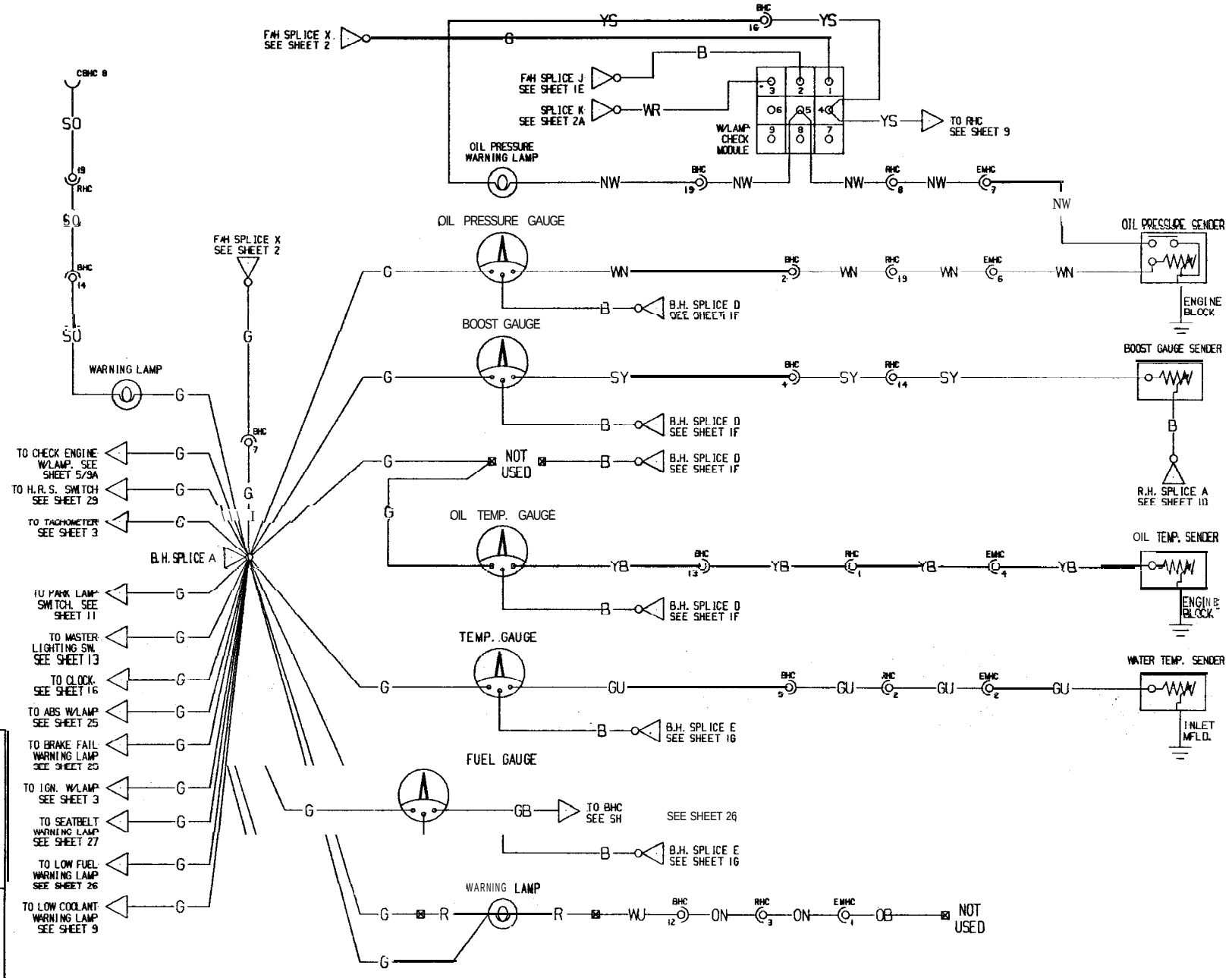


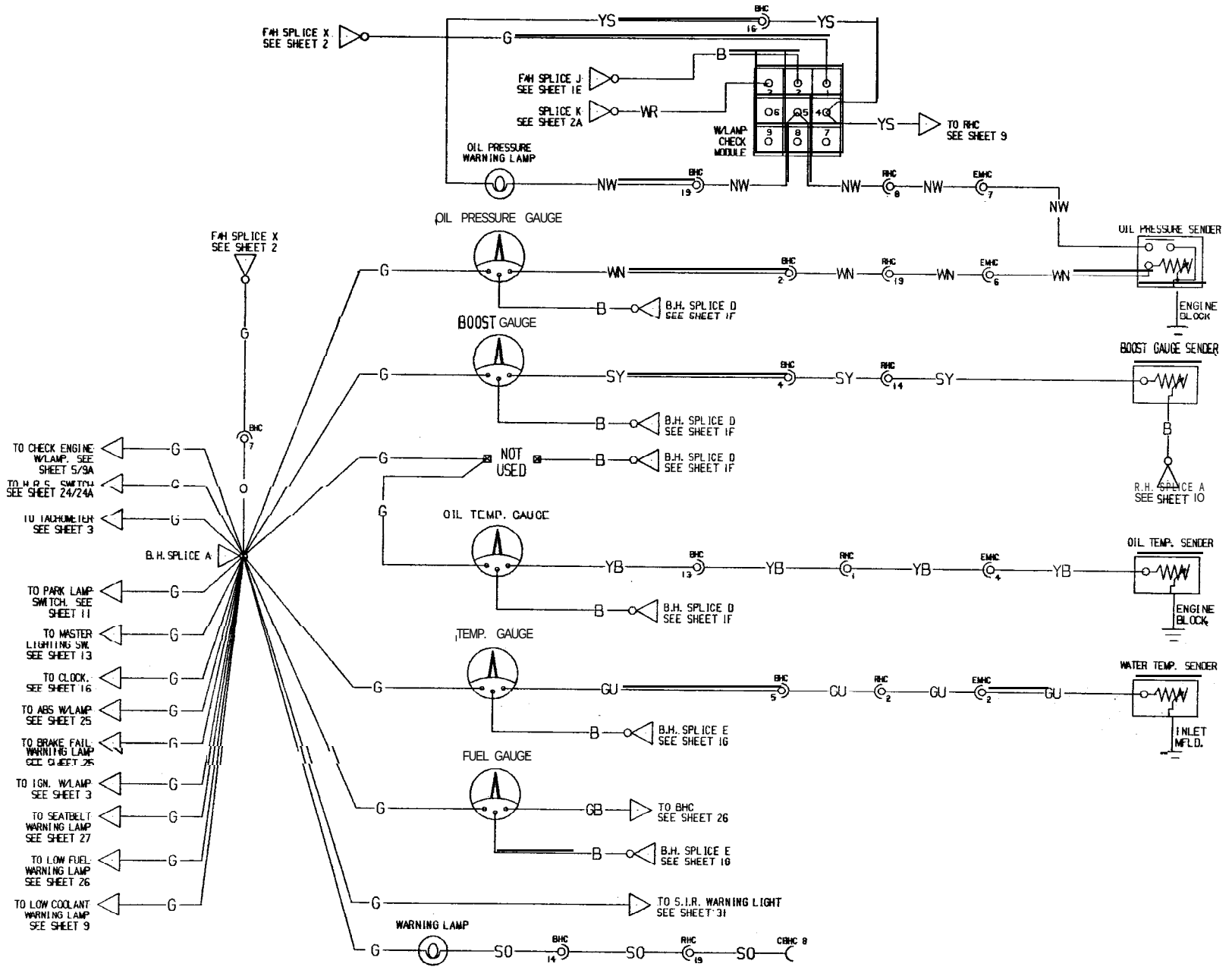
HEET 15 | FRONT FOG LAMPS • 93.5 MY | ISSUE A

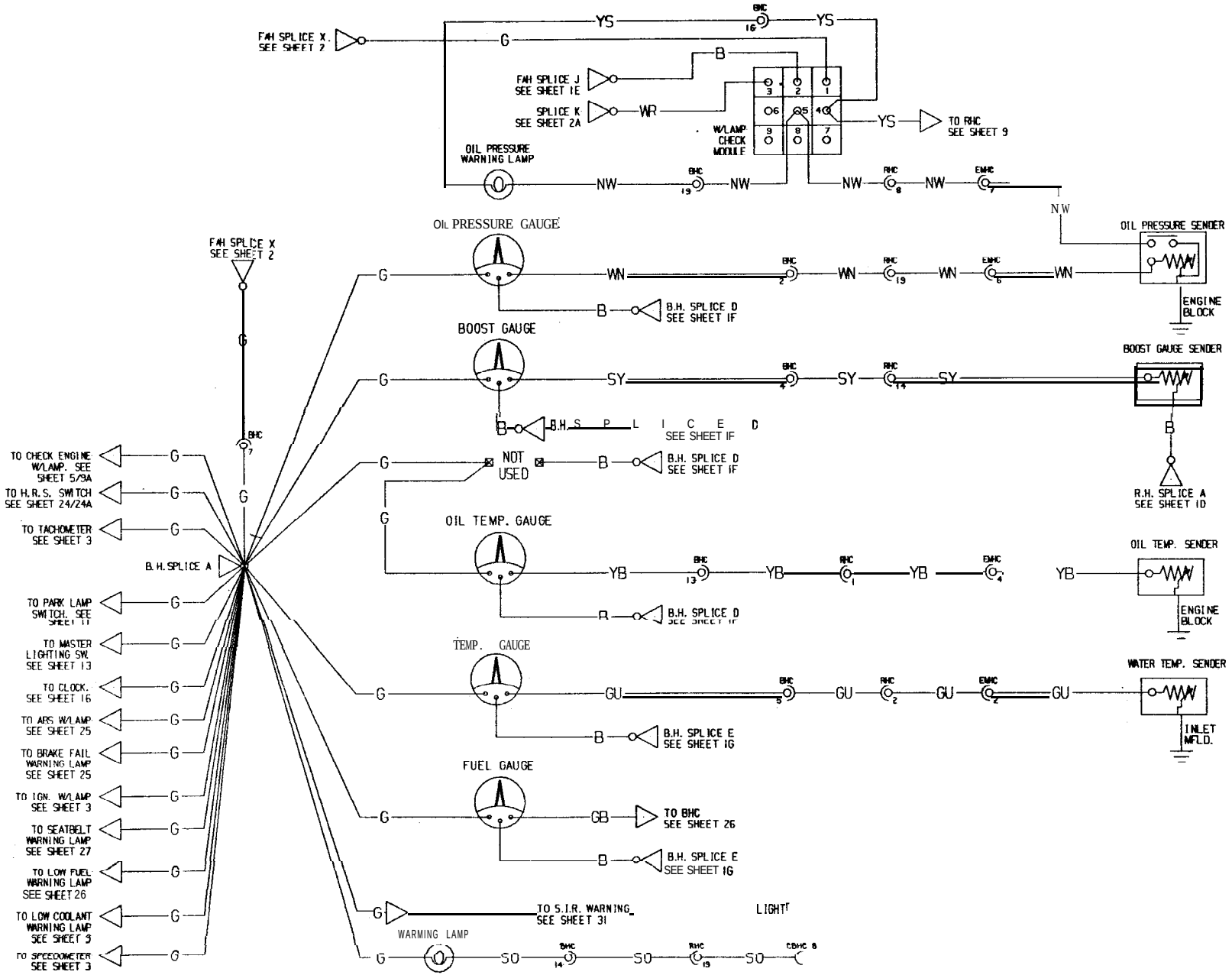


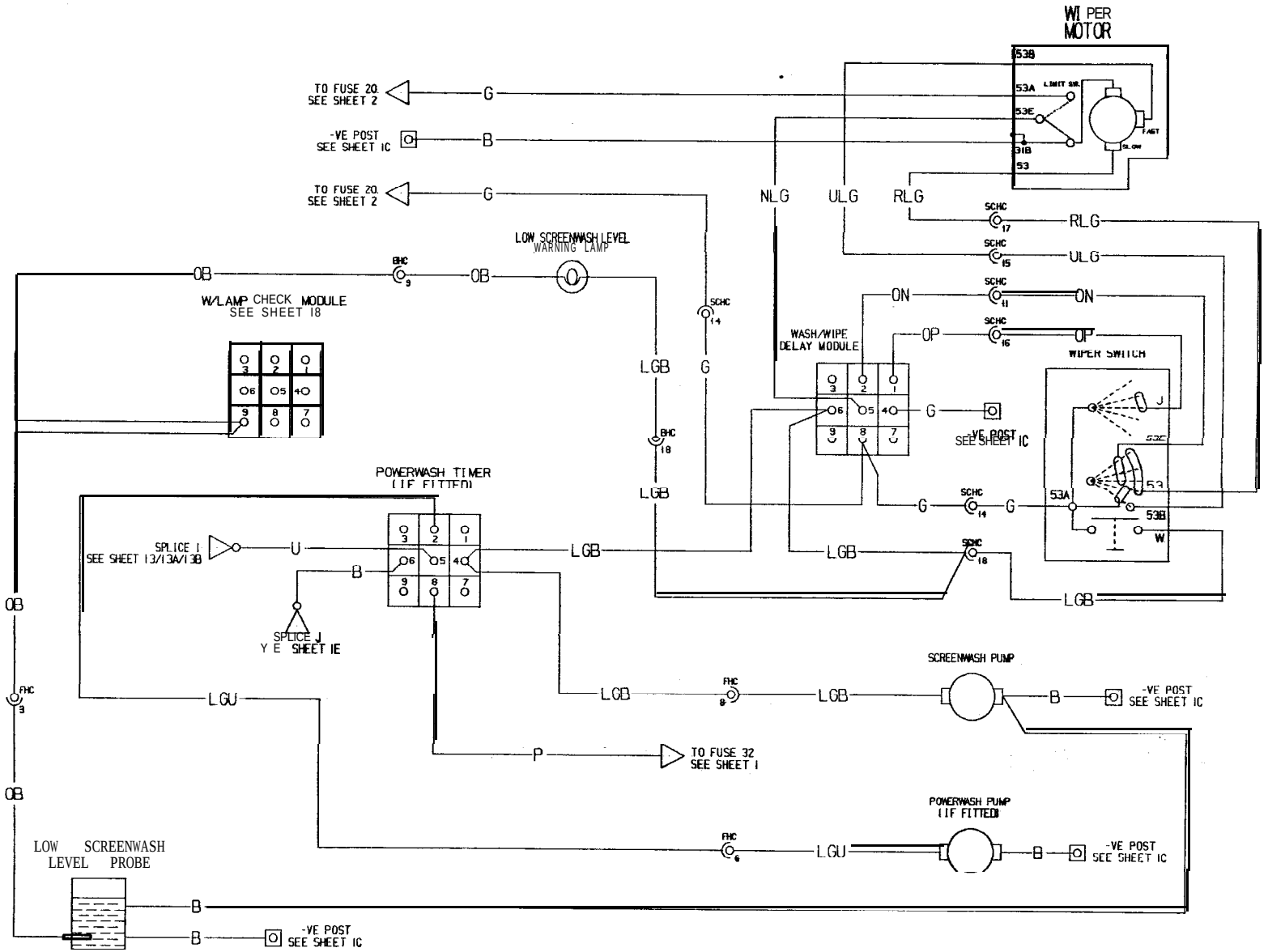

TO LOGIC MODULE (FEDERAL)
SEE SHEET 27A
TO FUSE 14
SEE SHEET 1A
P
TO HORN RELAY
SEE SHEET 20
SPLICE D
RHBHC
18
R. H. DOOR LAMP
LHBHC
8
L. H. DOOR LAMP
PW
TO CLOCK
NOT USED
TO SPLICE V
SEE SHEET 32
G
R. H. DOOR SWITCH
L. H. DOOR SWITCH
B
-VE POST
DOOR BEAM
SPLICE W
15
30
INTERIOR LAMP
31
TKF
TO WINDOW LIFT MODULE
SEE SHEET 21
TO HRS -VE
SEE SHEET 24/24A
BHC
20
CLOCK
B.H. SPLICE E
SEE SHEETS 1G
B.H. SPLICE A
SEE SHEETS 18/18A
RO
TO RHHC
SEE SHEET 17

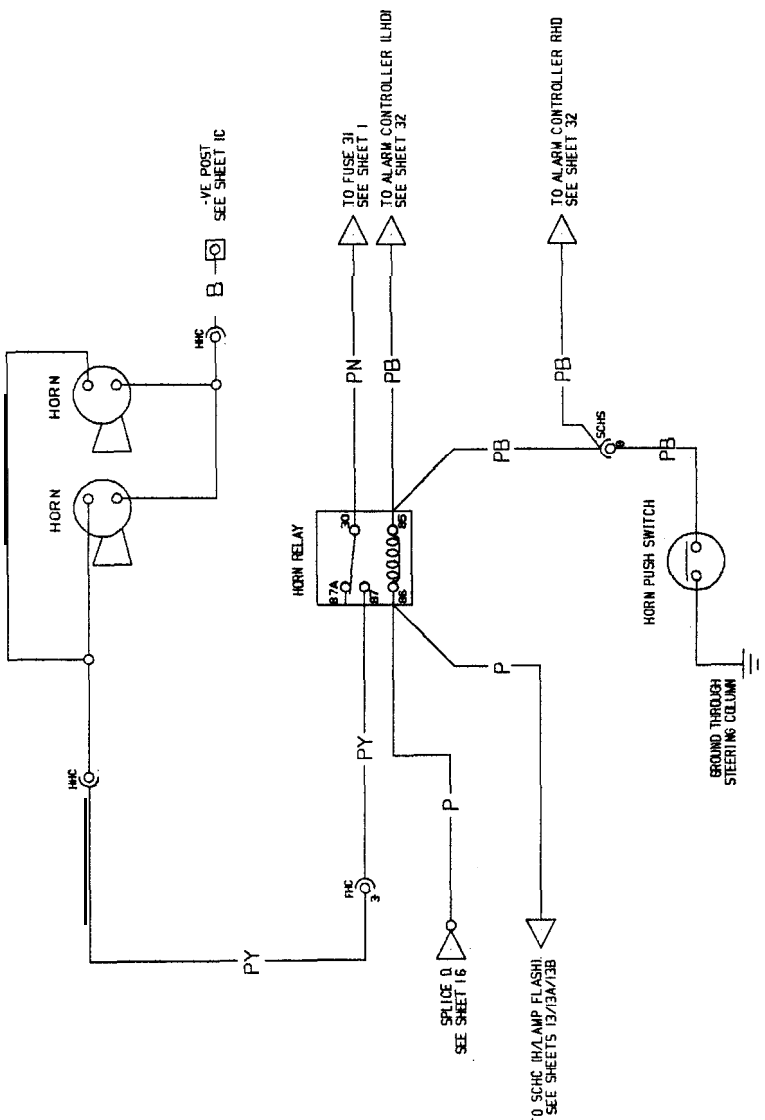

B.H. SPLICE F
B.H. SPLICE B
SPEEDO
FUEL GAUGE
TEMP. GAUGE
BOOST GAUGE
TACHO
OIL PRESS GAUGE
OIL TEMPERATUR GAUGE
CENTRE CONSOLE LAMPS
24W 3W
12W 3W
24W 3W
TO HAZARD SW. SEE SHEET 12/12A
TO FRONT FOG SW. SEE SHEET 15
TO REAR FOG SW. SEE SHEET 14
TO H.R.S. SWITCH SEE SHEET 24/24A
TO FRONT FOGLAMP SWITCH SEE SHEET 15
RHEOSTAT
RHEOSTAT MODULE
SPLICE S. SEE SHEET 11/11A
B.H. SPLICE E SEE SHEET 16
TO RISE & SEE SHEET 11/11A
TO CLOCK SEE SHEET 16


FAH SPLICE X
SEE SHEET 2
YS
BHC 16
YS
G
B
FAH SPLICE J
SEE SHEET 1E
SPLICE K
SEE SHEET 2A
WR
W/LAMP CHECK MODULE
YS
TO RHC
SEE SHEET 9
OIL PRESSURE WARNING LAMP
NW
BHC 19
NW
NW
RHC 8
NW
EMHC 7
NW
CBHC 8
SO
19 RHC
SO
BHC 14
SO
FAH SPLICE X
SEE SHEET 2
OIL PRESSURE GAUGE
OIL PRESSURE SENDER
G
WN
BHC 2
WN
RHC 19
WN
EMHC 6
WN
B
B.H. SPLICE D
SEE SHEET 1F
ENGINE BLOCK
BOOST GAUGE
BOOST GAUGE SENDER
G
SY
BHC 4
SY
RHC 14
SY
B
B.H. SPLICE D
SEE SHEET 1F
B
R.H. SPLICE A
SEE SHEET 10
WARNING LAMP
G
G
NOT USED
B
B.H. SPLICE D
SEE SHEET 1F
BHC 7
G
I
G
OIL TEMP. GAUGE
OIL TEMP. SENDER
YB
BHC 13
YB
RHC 1
YB
EMHC 4
YB
B
B.H. SPLICE D
SEE SHEET 1F
ENGINE BLOCK
TO CHECK ENGINE W/LAMP. SEE SHEET 5/9A
TO H.R.S. SWITCH SEE SHEET 29
TO TACHOMETER SEE SHEET 3
B.H. SPLICE A
TO PARK LAMP SWITCH. SEE SHEET 11
TO MASTER LIGHTING SW. SEE SHEET 13
TO CLOCK. SEE SHEET 16
TO ABS W/LAMP SEE SHEET 25
TO BRAKE FAIL WARNING LAMP SEE SHEET 25
TO IGN. W/LAMP SEE SHEET 3
TO SEATBELT WARNING LAMP SEE SHEET 27
TO LOW FUEL WARNING LAMP SEE SHEET 26
TO LOW COOLANT WARNING LAMP SEE SHEET 9
G
TEMP. GAUGE
WATER TEMP. SENDER
GU
BHC 5
GU
RHC 2
GU
EMHC 2
GU
B
B.H. SPLICE E
SEE SHEET 1G
INLET MFLD.
FUEL GAUGE
GB
TO BHC
SEE SH
SEE SHEET 26
B
B.H. SPLICE E
SEE SHEET 1G
WARNING LAMP
G
R
R
WU
BHC 12
ON
RHC 3
ON
EMHC 1
OB
NOT USED
G

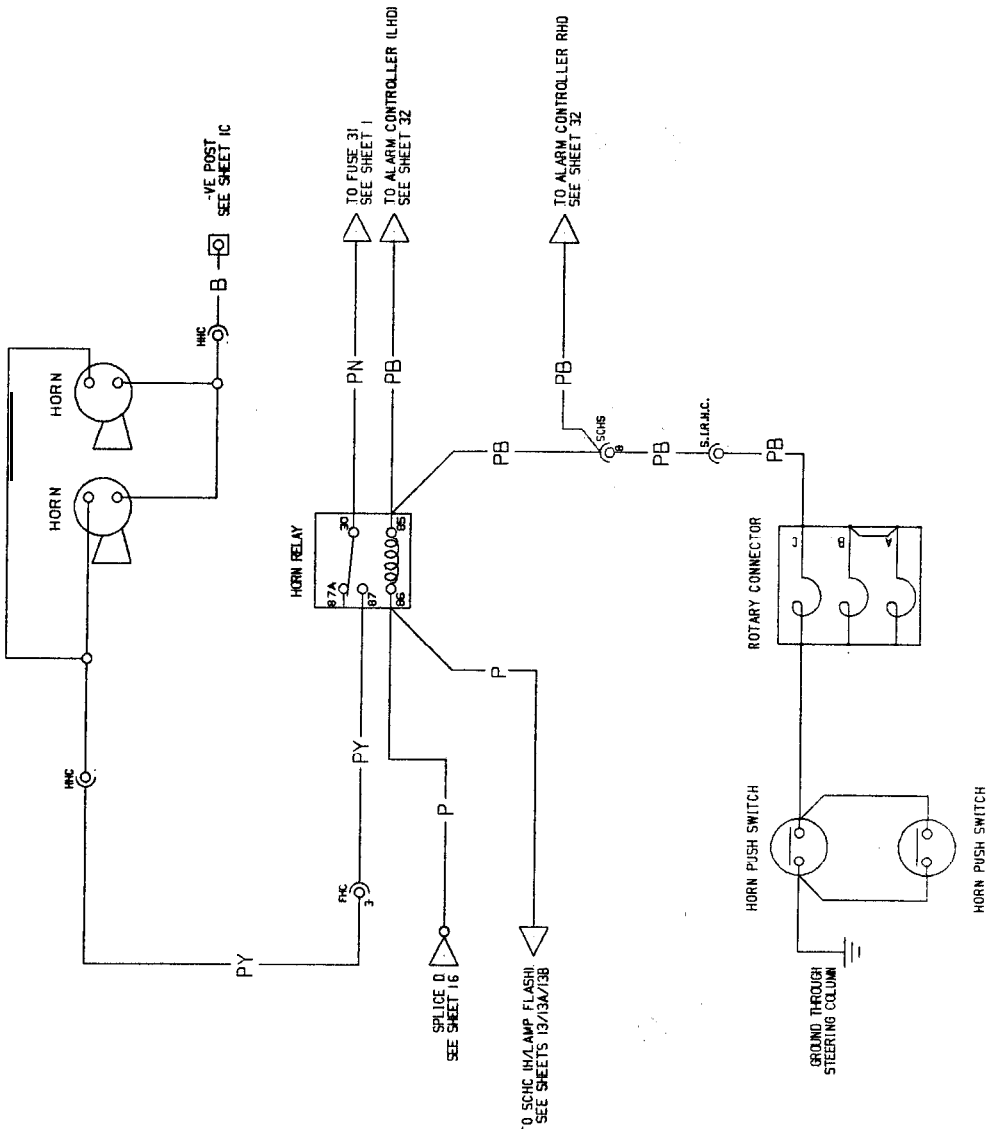

F4H SPLICE X SEE SHEET 2
YS
BHC 16
YS
G
B
F4H SPLICE J SEE SHEET 1E
SPLICE K SEE SHEET 2A
WR
W/LAMP CHECK MODULE
YS
TO RHC SEE SHEET 9
OIL PRESSURE WARNING LAMP
NW
BHC 19
NW
NW
RHC 8
NW
EMHC 7
NW
OIL PRESSURE GAUGE
OIL PRESSURE SENDER
WN
BHC 2
WN
RHC 19
WN
EMHC 6
WN
B
B.H. SPLICE D SEE SHEET 1F
ENGINE BLOCK
BOOST GAUGE
BOOST GAUGE SENDER
SY
BHC 4
SY
RHC 14
SY
B
B.H. SPLICE D SEE SHEET 1F
B
R.H. SPLICE A SEE SHEET 10
NOT USED
B
B.H. SPLICE D SEE SHEET 1F
OIL TEMP. GAUGE
OIL TEMP. SENDER
YB
BHC 13
YB
RHC 1
YB
EMHC 4
YB
B
B.H. SPLICE D SEE SHEET 1F
ENGINE BLOCK
TEMP. GAUGE
WATER TEMP. SENDER
GU
BHC 5
GU
RHC 2
GU
EMHC 2
GU
B
B.H. SPLICE E SEE SHEET 1G
INLET MFLD.
FUEL GAUGE
GB
TO BHC SEE SHEET 26
B
B.H. SPLICE E SEE SHEET 1G
TO S.I.R. WARNING LIGHT SEE SHEET 31
WARNING LAMP
SO
BHC 14
SO
RHC 19
SO
CBHC 8
F4H SPLICE X SEE SHEET 2
G
BHC 7
B.H. SPLICE A
TO CHECK ENGINE W/LAMP. SEE SHEET 5/9A
TO H.E.G. SWITCH SEE SHEET 24/24A
TO TACHOMETER SEE SHEET 3
TO PARK LAMP SWITCH. SEE SHEET 11
TO MASTER LIGHTING SW. SEE SHEET 13
TO CLOCK. SEE SHEET 16
TO ABS W/LAMP SEE SHEET 25
TO BRAKE FAIL. WARNING LAMP SEE SHEET 25
TO IGN. W/LAMP SEE SHEET 3
TO SEATBELT WARNING LAMP SEE SHEET 27
TO LOW FUEL WARNING LAMP SEE SHEET 26
TO LOW COOLANT WARNING LAMP SEE SHEET 9


F/H SPLICE X SEE SHEET 2
YS
G
B
F/H SPLICE J SEE SHEET 1E
SPLICE K SEE SHEET 2A
WR
W/LAMP CHECK MODULE
TO RHC SEE SHEET 9
OIL PRESSURE WARNING LAMP
NW
OIL PRESSURE GAUGE
OIL PRESSURE SENDER
B.H. SPLICE D SEE SHEET 1F
ENGINE BLOCK
BOOST GAUGE
BOOST GAUGE SENDER
SY
B.H. SPLICE D SEE SHEET 1F
R.H. SPLICE A SEE SHEET 1D
NOT USED
OIL TEMP. GAUGE
OIL TEMP. SENDER
YB
TEMP. GAUGE
WATER TEMP. SENDER
GU
INLET MFLD.
FUEL GAUGE
GB
TO BHC SEE SHEET 26
B.H. SPLICE E SEE SHEET 1G
TO S.I.R. WARNING LIGHT SEE SHEET 31
WARMING LAMP
SO
B.H. SPLICE A
TO CHECK ENGINE W/LAMP. SEE SHEET 5/9A
TO H.R.S. SWITCH SEE SHEET 24/24A
TO TACHOMETER SEE SHEET 3
TO PARK LAMP SWITCH. SEE SHEET 11
TO MASTER LIGHTING SW. SEE SHEET 13
TO CLOCK. SEE SHEET 16
TO ABS W/LAMP SEE SHEET 25
TO BRAKE FAIL WARNING LAMP SEE SHEET 25
TO IGN. W/LAMP SEE SHEET 3
TO SEATBELT WARNING LAMP SEE SHEET 27
TO LOW FUEL WARNING LAMP SEE SHEET 26
TO LOW COOLANT WARNING LAMP SEE SHEET 3
TO SPEEDOMETER SEE SHEET 3

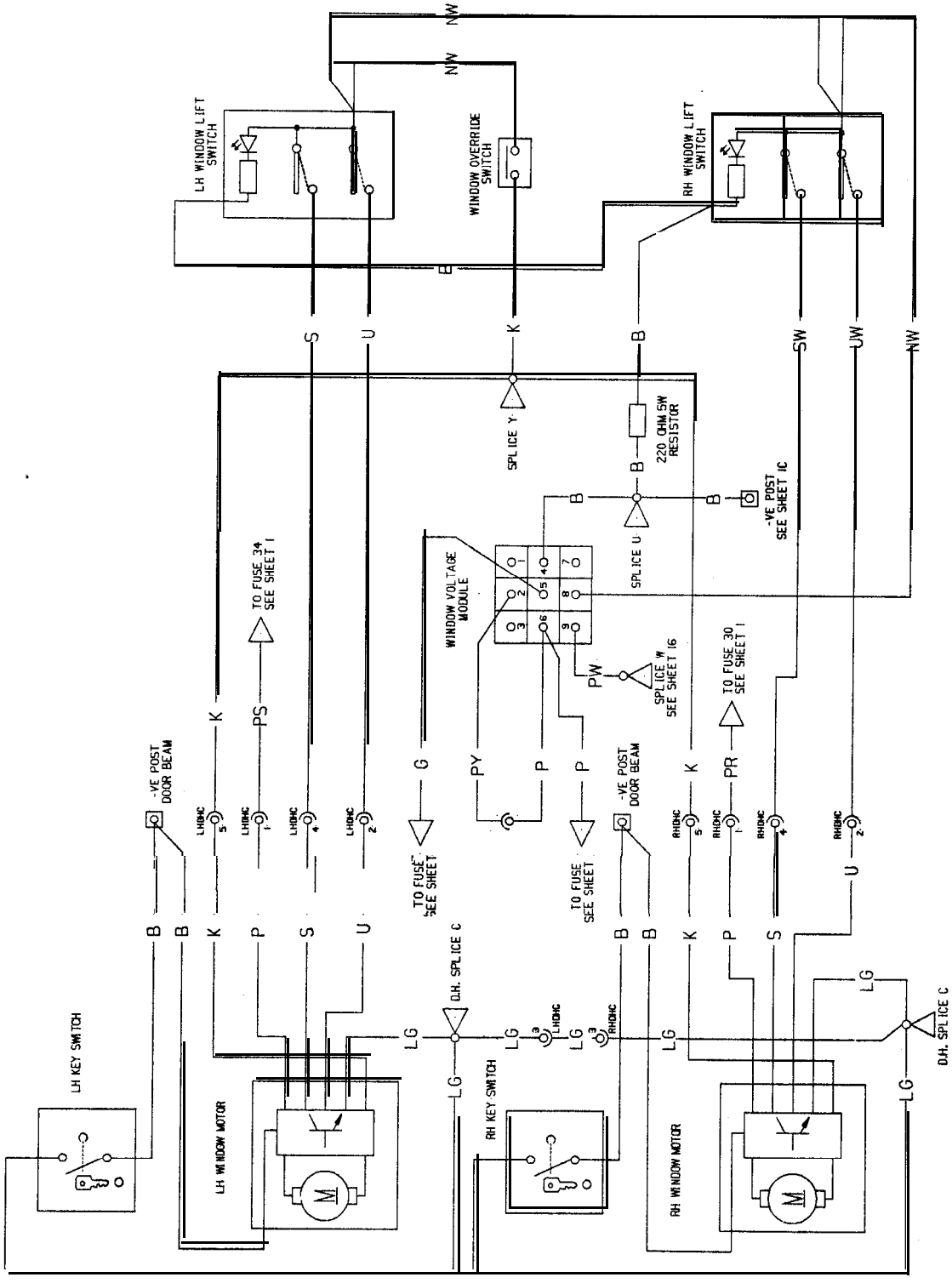

WIPER MOTOR
53B
53A
53E
31B
53
LIMIT SW.
FAST
SLOW
TO FUSE 20. SEE SHEET 2
-VE POST SEE SHEET IC
NLG
ULG
RLG
SCHC
LOW SCREENWASH LEVEL WARNING LAMP
BHC
OB
W/LAMP CHECK MODULE SEE SHEET 18
WASH/WIPE DELAY MODULE
ON
OP
WIPER SWITCH
LGB
G
POWERWASH TIMER (IF FITTED)
SPLICE I SEE SHEET 13/13A/13B
SPLICE J SEE SHEET IE
U
B
P
TO FUSE 32 SEE SHEET I
SCREENWASH PUMP
POWERWASH PUMP (IF FITTED)
LGU
FHC
LOW SCREENWASH LEVEL PROBE
W


HORN
HORN
HMC
HMC
B
-VE POST
SEE SHEET 1C
PY
PY
P
P
PHC
3
SPLICE 0
SEE SHEET 16
TO SCHC (H/LAMP FLASH)
SEE SHEETS 13/13A/13B
HORN RELAY
87A
87
86
85
30
PN
PB
PB
TO FUSE 31
SEE SHEET 1
TO ALARM CONTROLLER (LHD)
SEE SHEET 32
TO ALARM CONTROLLER RHD
SEE SHEET 32
SCHS
PB
PB
HORN PUSH SWITCH
GROUND THROUGH
STEERING COLUMN

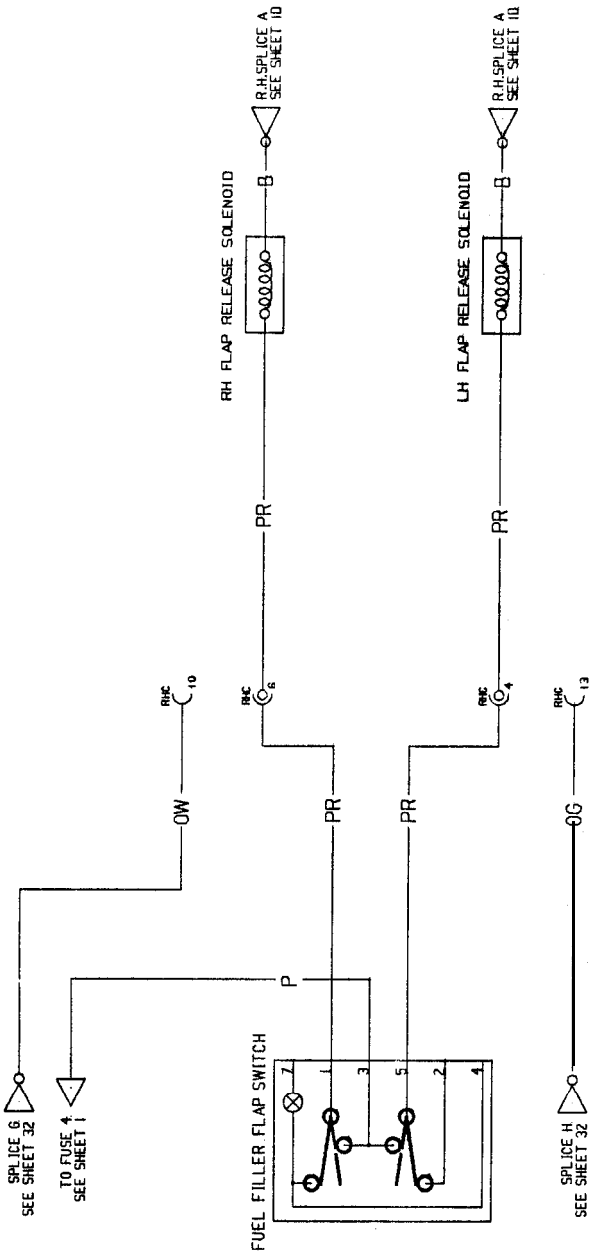
SHEET20A HORN3 • 93.5 MY IF FITTED WITH S.I.R. ISSUE A

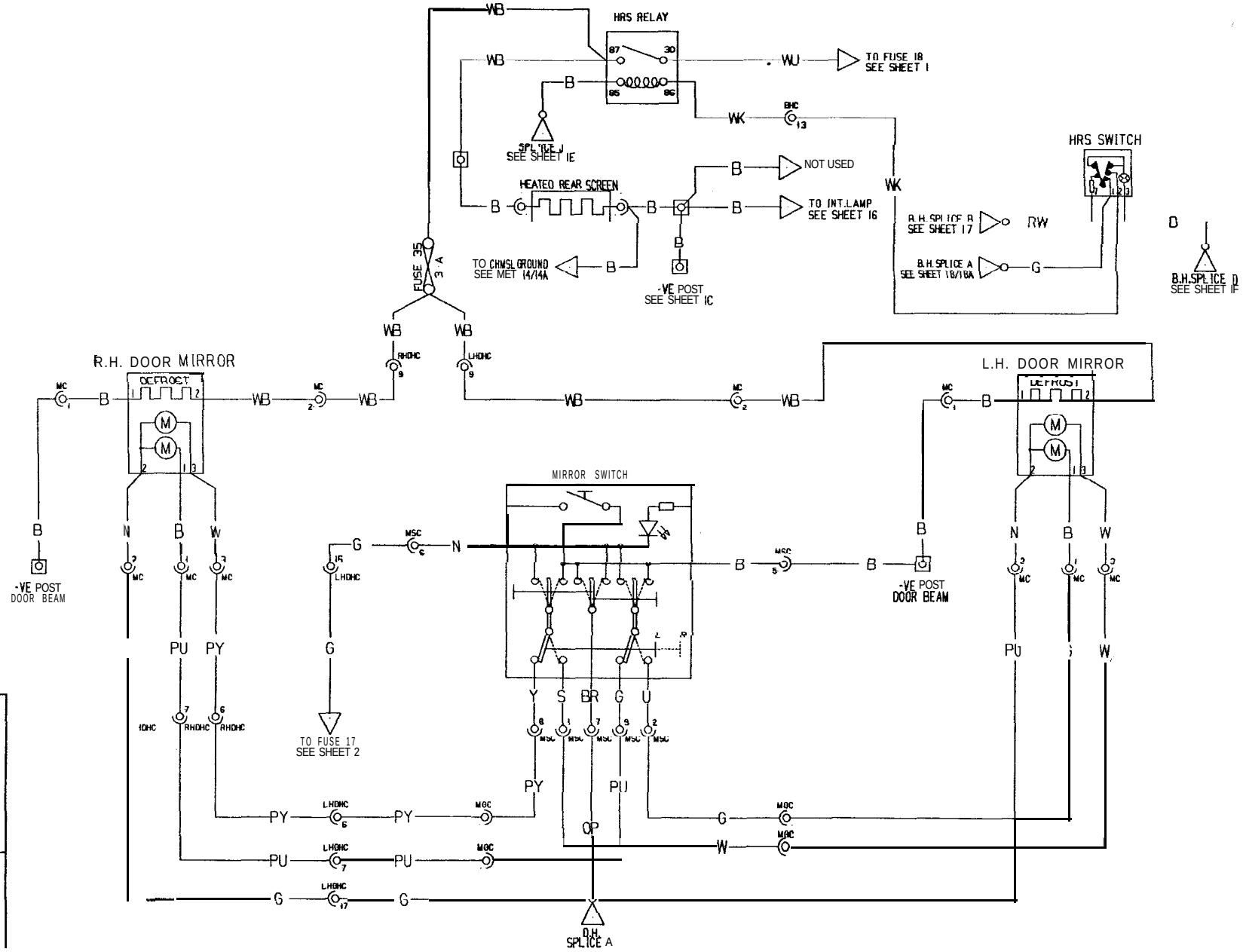


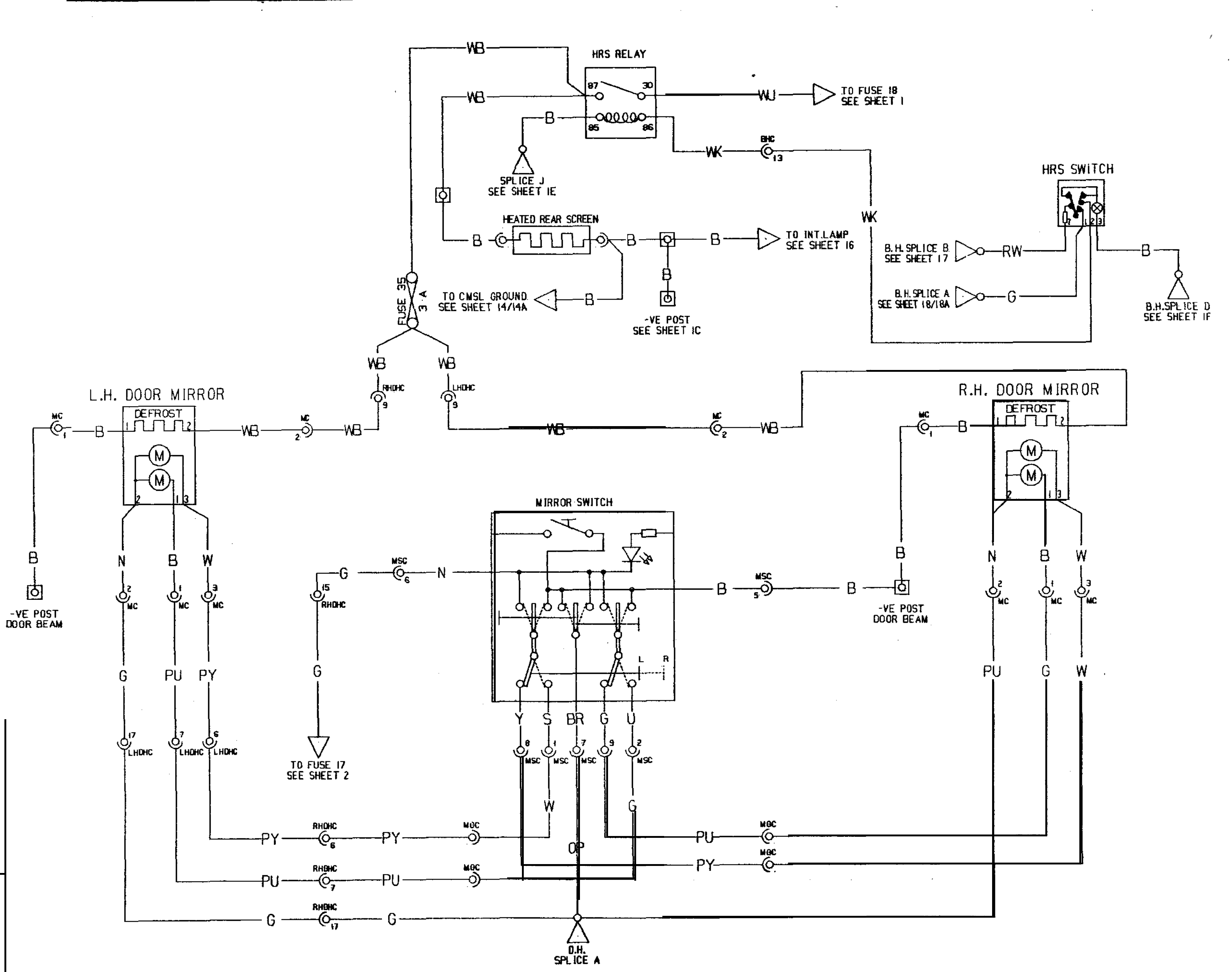
SHEET 2-1 WINDOW LIFT - 93.5 MY ISSUE A

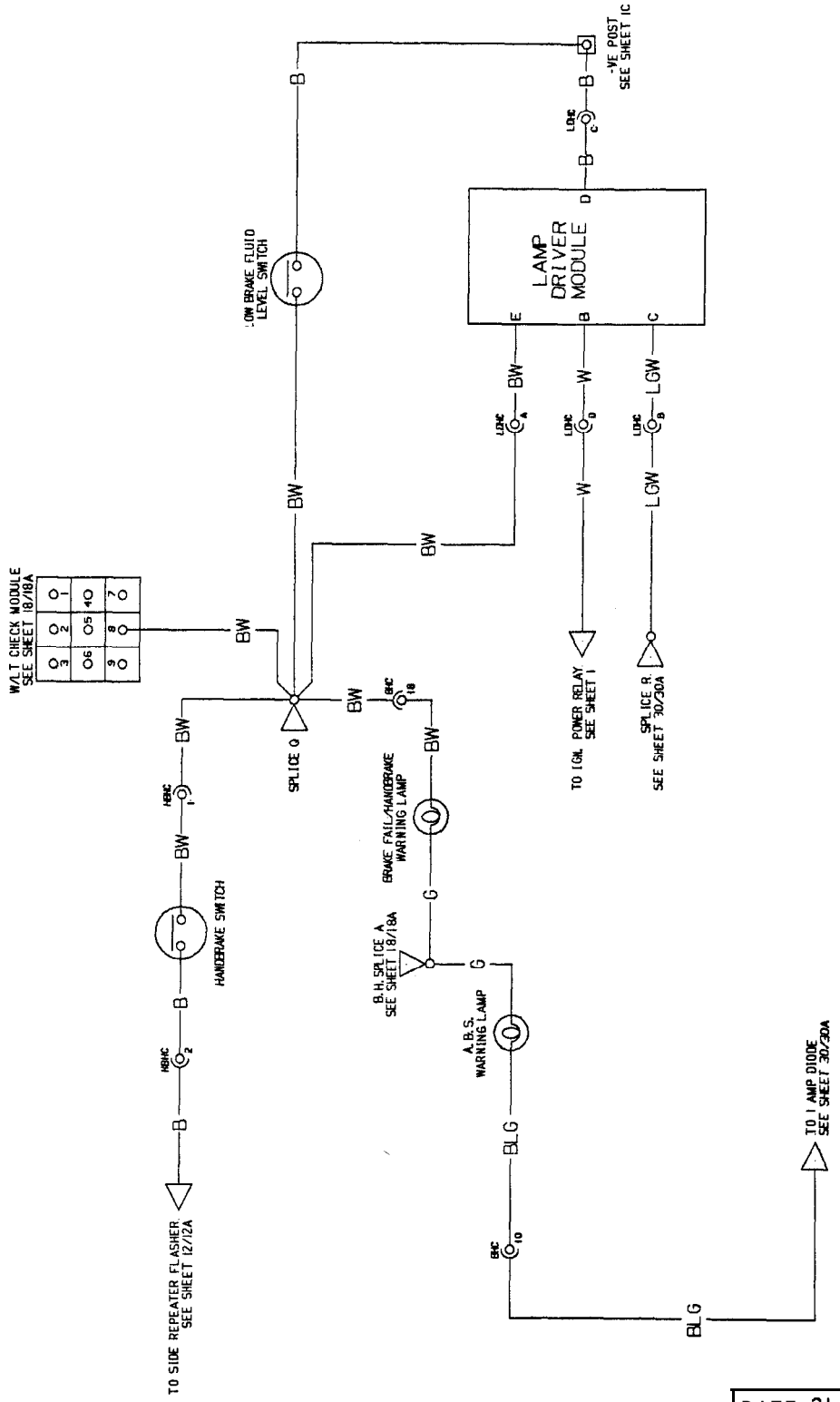


SHEET 22 | FUEL FILLER FLAP RELEASE - 93.5 MY | ISSUE A

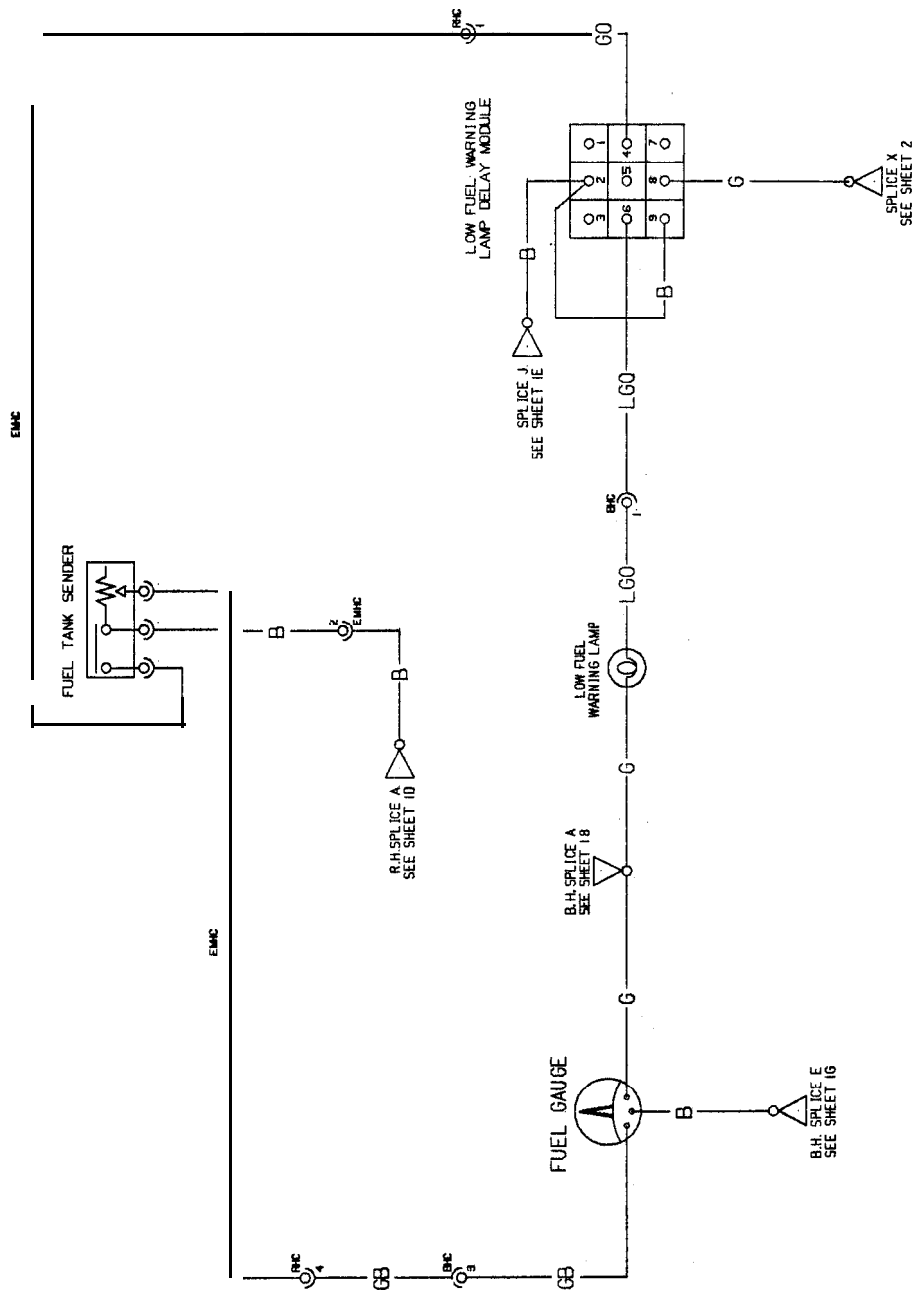



HRS RELAY
TO FUSE 18
SEE SHEET 1
SPLICE J
SEE SHEET 1E
HRS SWITCH
NOT USED
HEATED REAR SCREEN
TO INT.LAMP
SEE SHEET 16
TO CHMSL GROUND
SEE MET 14/14A
-VE POST
SEE SHEET 1C
B.H. SPLICE B
SEE SHEET 17
B.H. SPLICE A
SEE SHEET 18/18A
B.H. SPLICE D
SEE SHEET 1F
FUSE 35
R.H. DOOR MIRROR
L.H. DOOR MIRROR
DEFROST
MIRROR SWITCH
-VE POST
DOOR BEAM
TO FUSE 17
SEE SHEET 2
O.H. SPLICE A

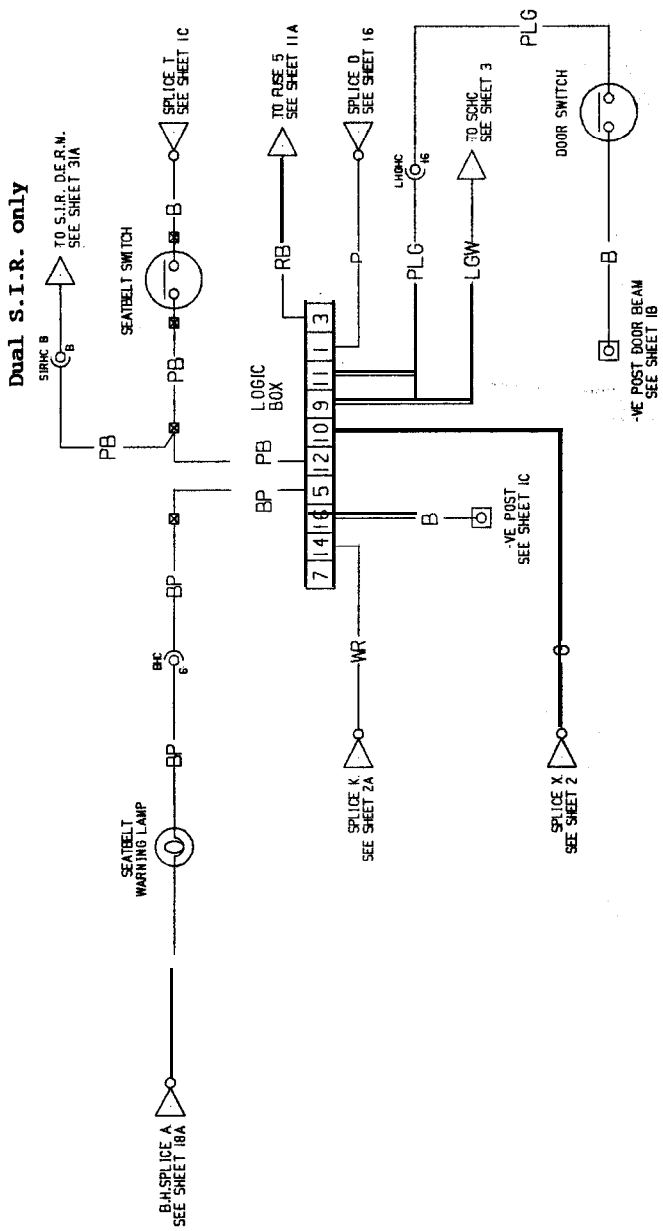

HRS RELAY
87
30
85
86
WB
WU
TO FUSE 18
SEE SHEET 1
B
SPLICE J
SEE SHEET 1E
WK
BHC
13
HRS SWITCH
HEATED REAR SCREEN
TO INT.LAMP
SEE SHEET 16
B.H. SPLICE B
SEE SHEET 17
RW
B.H. SPLICE A
SEE SHEET 18/18A
G
B.H.SPLICE D
SEE SHEET 1F
FUSE 35
3 A
TO CMSL GROUND
SEE SHEET 14/14A
-VE POST
SEE SHEET 1C
RHDHC
LHDHC
L.H. DOOR MIRROR
DEFROST
R.H. DOOR MIRROR
MC
MIRROR SWITCH
MSC
N
PU
PY
W
-VE POST
DOOR BEAM
TO FUSE 17
SEE SHEET 2
Y
S
BR
U
L
R
MGC
OP
D.H.
SPLICE A

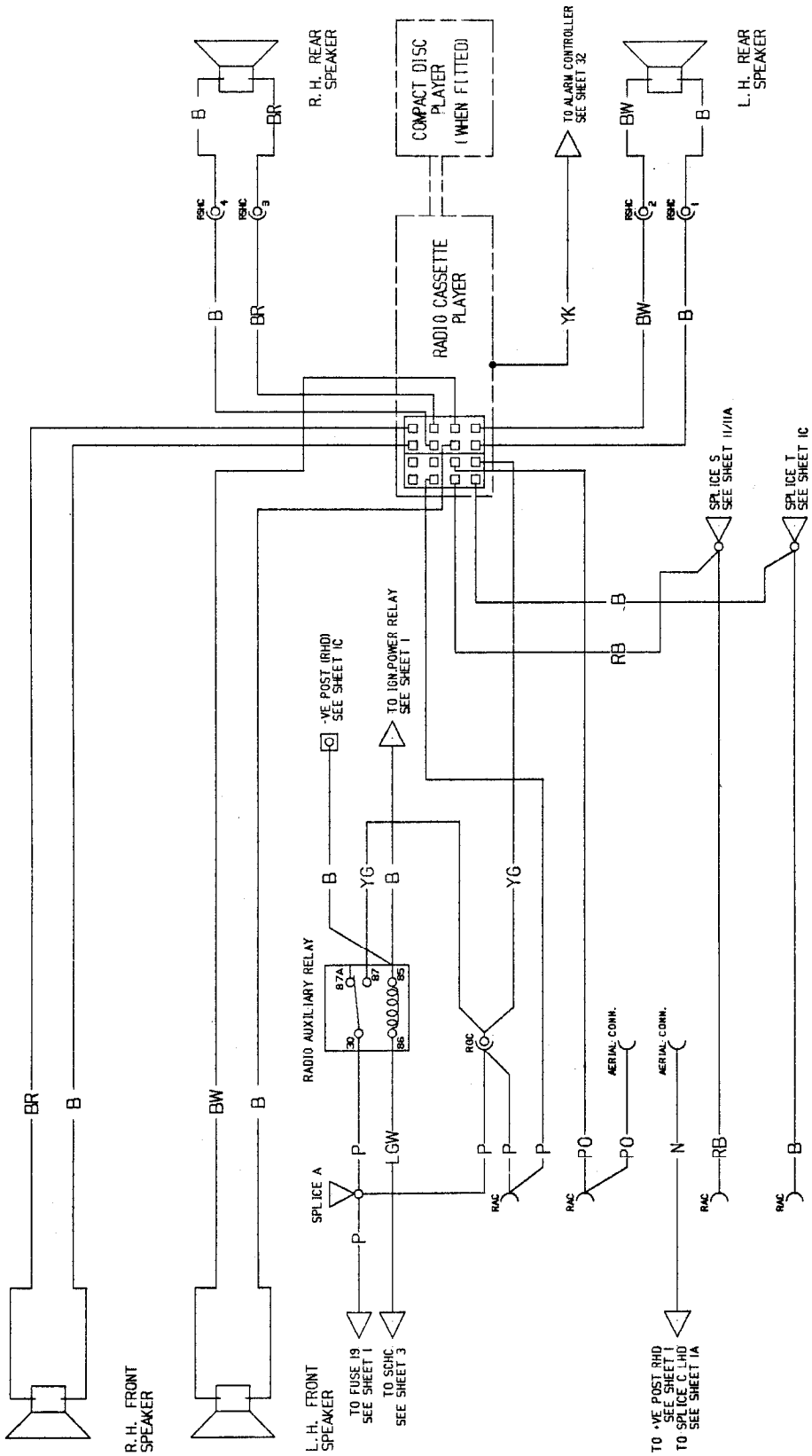

WAIT CHECK MODULE
SEE SHEET 18/18A
LOW BRAKE FLUID
LEVEL SWITCH
-VE POST
SEE SHEET 1C
LAMP
DRIVER
MODULE
SPLICE Q
HANDBRAKE SWITCH
BRAKE FAIL/HANDBRAKE
WARNING LAMP
B.H. SPLICE A
SEE SHEET 18/18A
A.B.S.
WARNING LAMP
TO SIDE REPEATER FLASHER
SEE SHEET 12/12A
TO IGN. POWER RELAY
SEE SHEET 1
SPLICE R
SEE SHEET 30/30A
TO 1 AMP DIODE
SEE SHEET 30/30A
BW
B
W
LGW
G
BLG

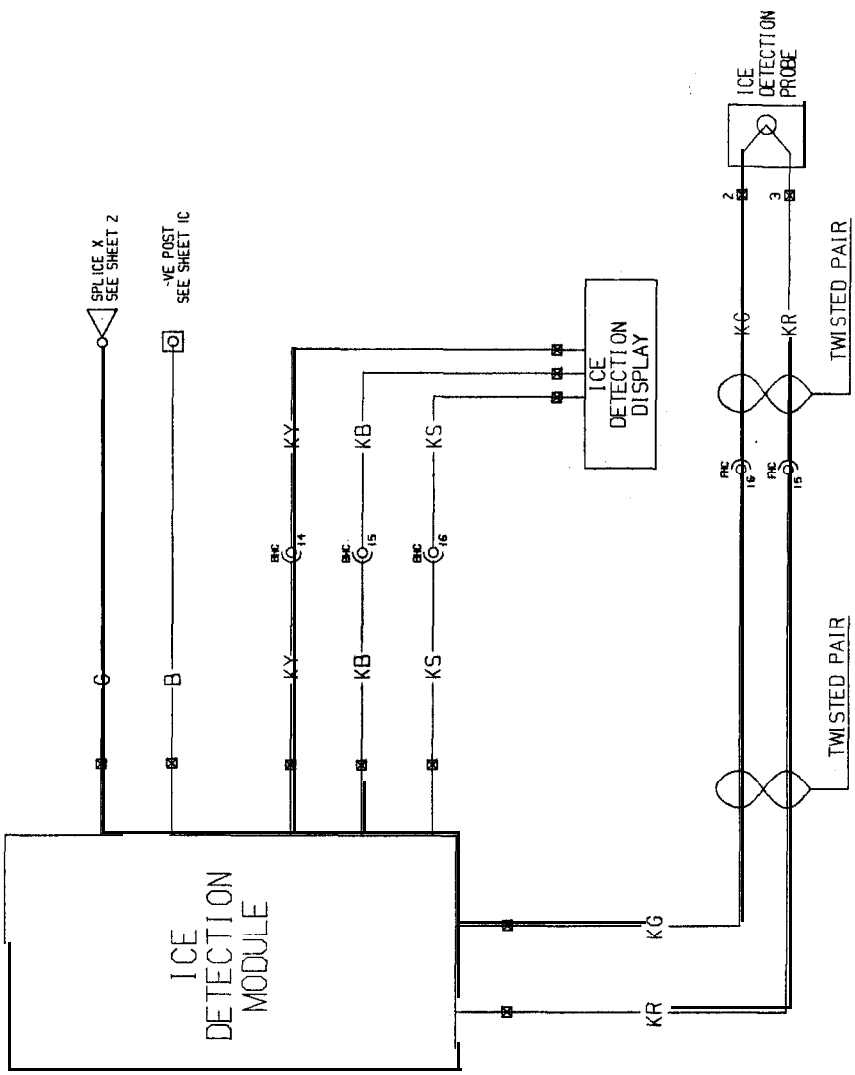
SHEET 26	FUEL LEVEL • 93.5 MY	ISSUE A

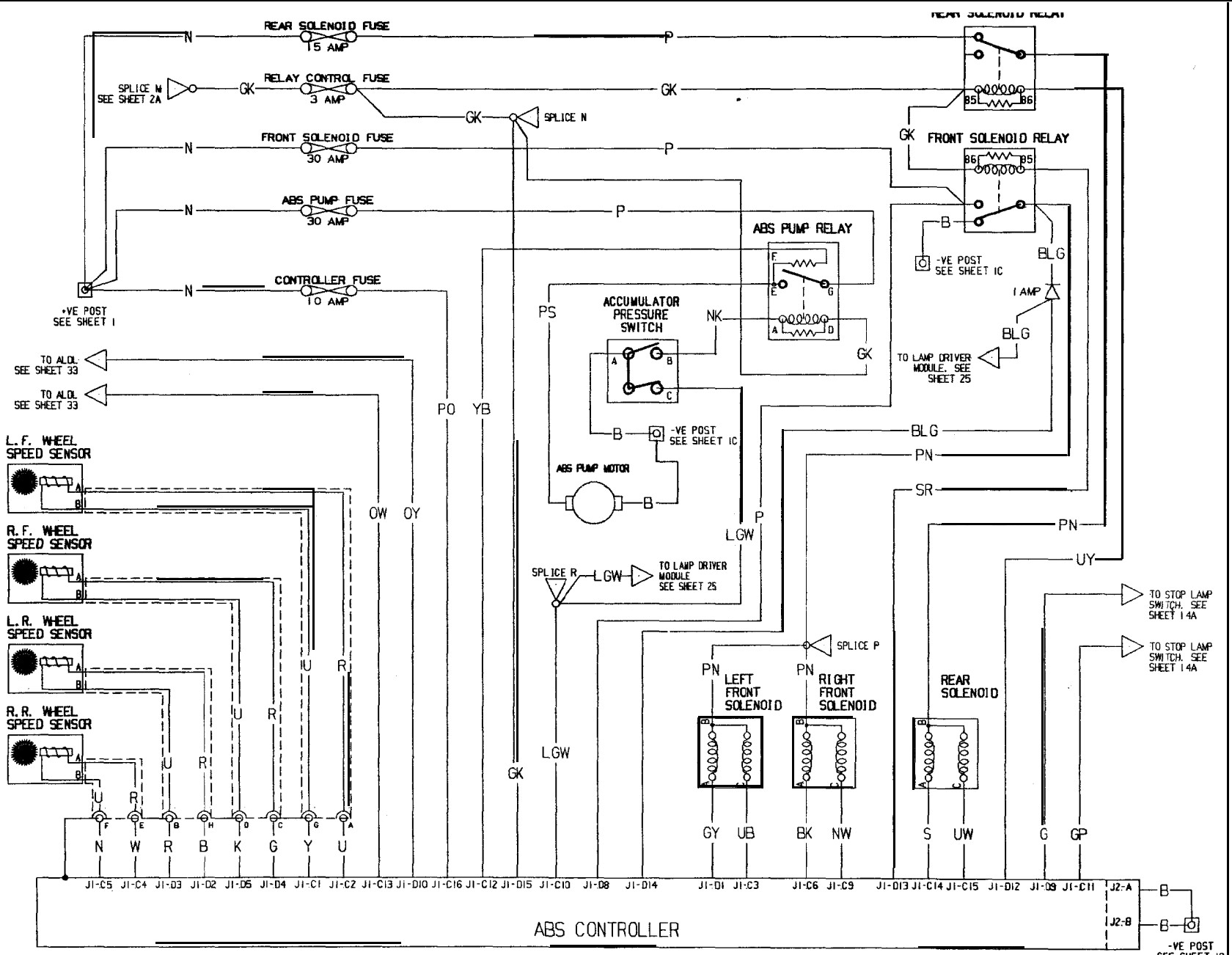


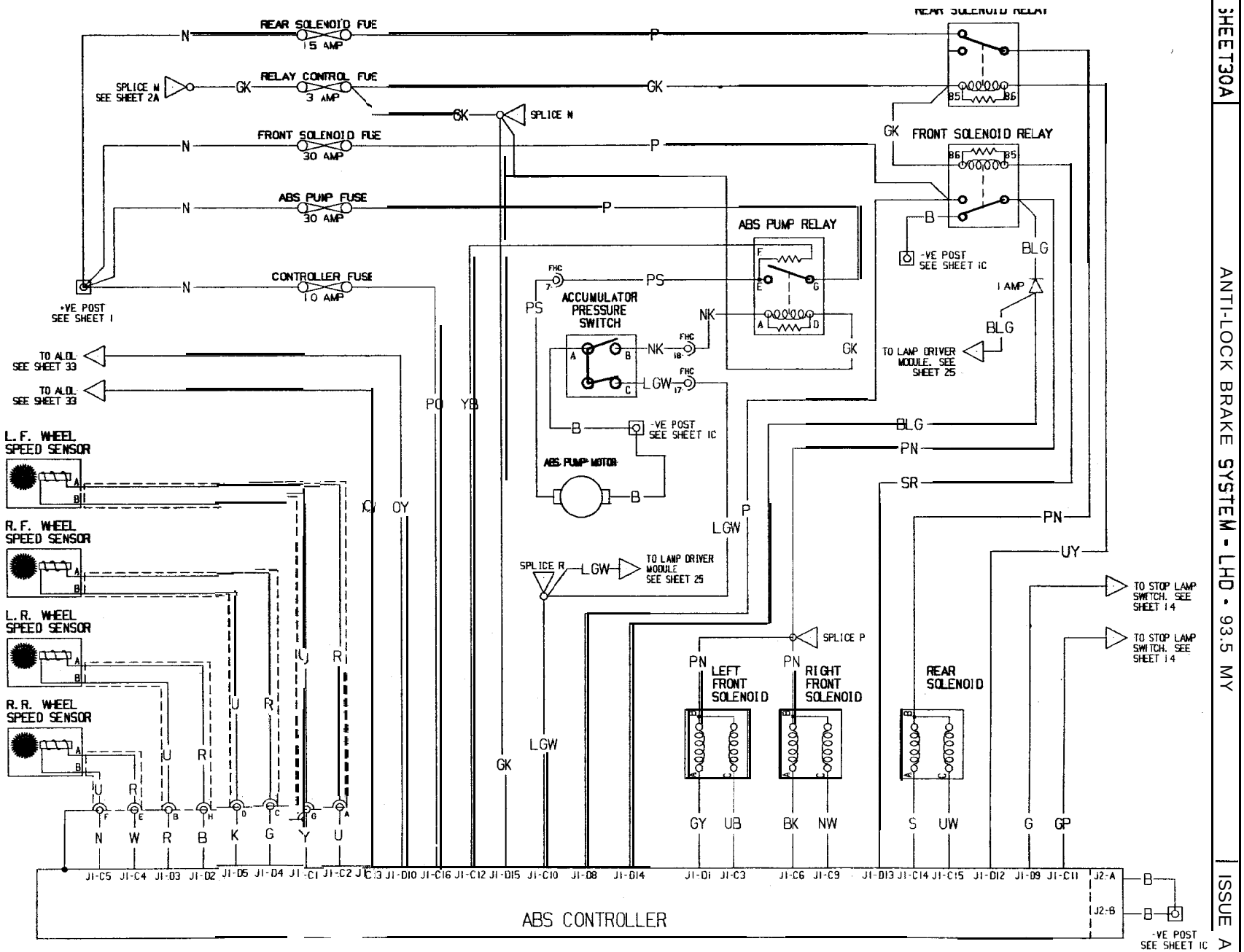

SPLICE T
SEE SHEET 1C
B
SEATBELT SWITCH
BP
BMC
BP
SEATBELT
WARNING LAMP
G
B.H. SPLICE A
SEE SHEET 1B

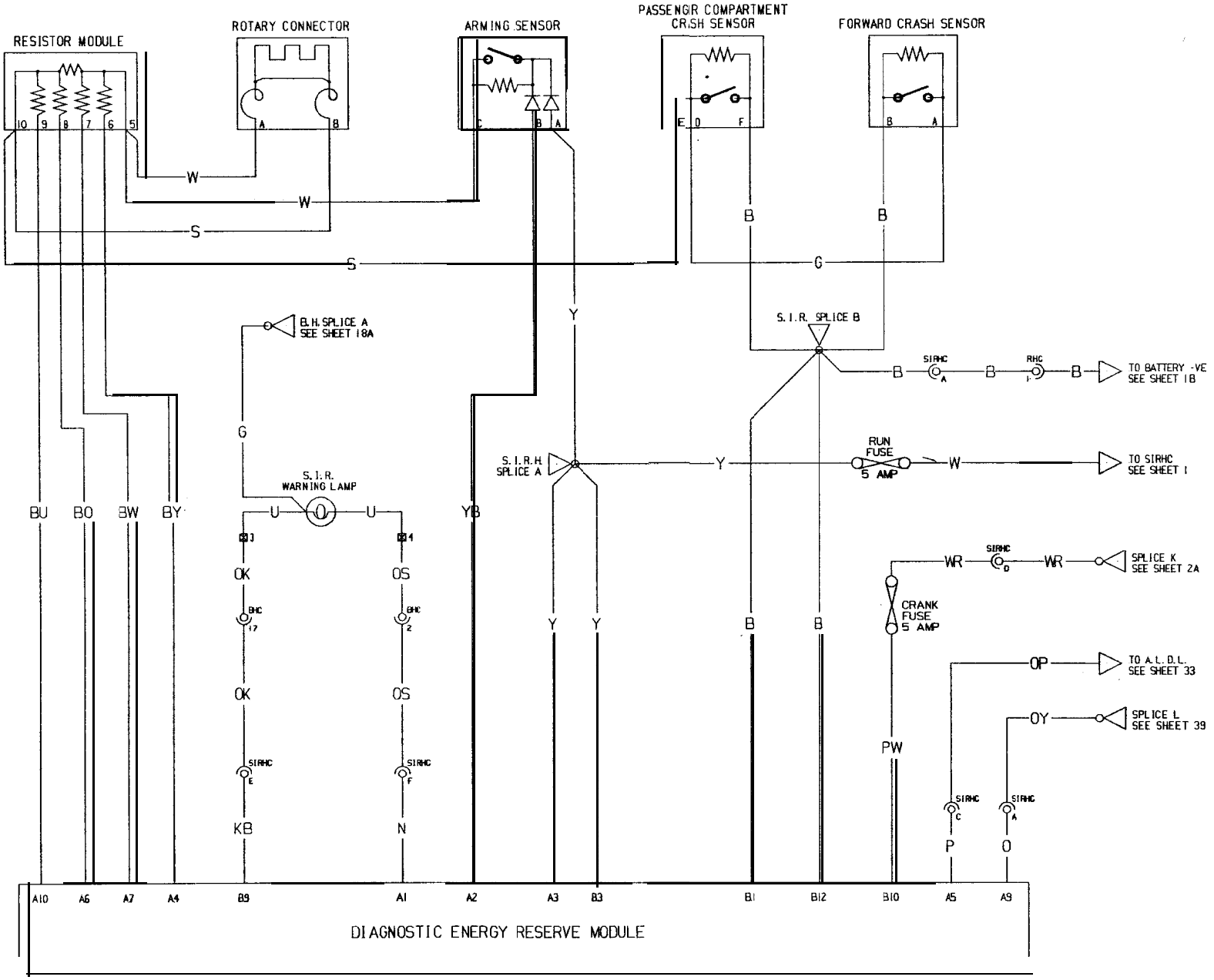

Dual S.I.R. only
TO S.I.R. D.E.R.N.
SEE SHEET 31A
SIRHC B
SEATBELT SWITCH
SPLICE T
SEE SHEET 1C
TO FUSE 5
SEE SHEET 11A
SPLICE D
SEE SHEET 16
LHDHC
TO SCHC
SEE SHEET 3
PLG
DOOR SWITCH
LOGIC BOX
-VE POST DOOR BEAM
SEE SHEET 1B
-VE POST
SEE SHEET 1C
SEATBELT WARNING LAMP
B.H.SPLICE A
SEE SHEET 18A
SPLICE K
SEE SHEET 2A
SPLICE X
SEE SHEET 2

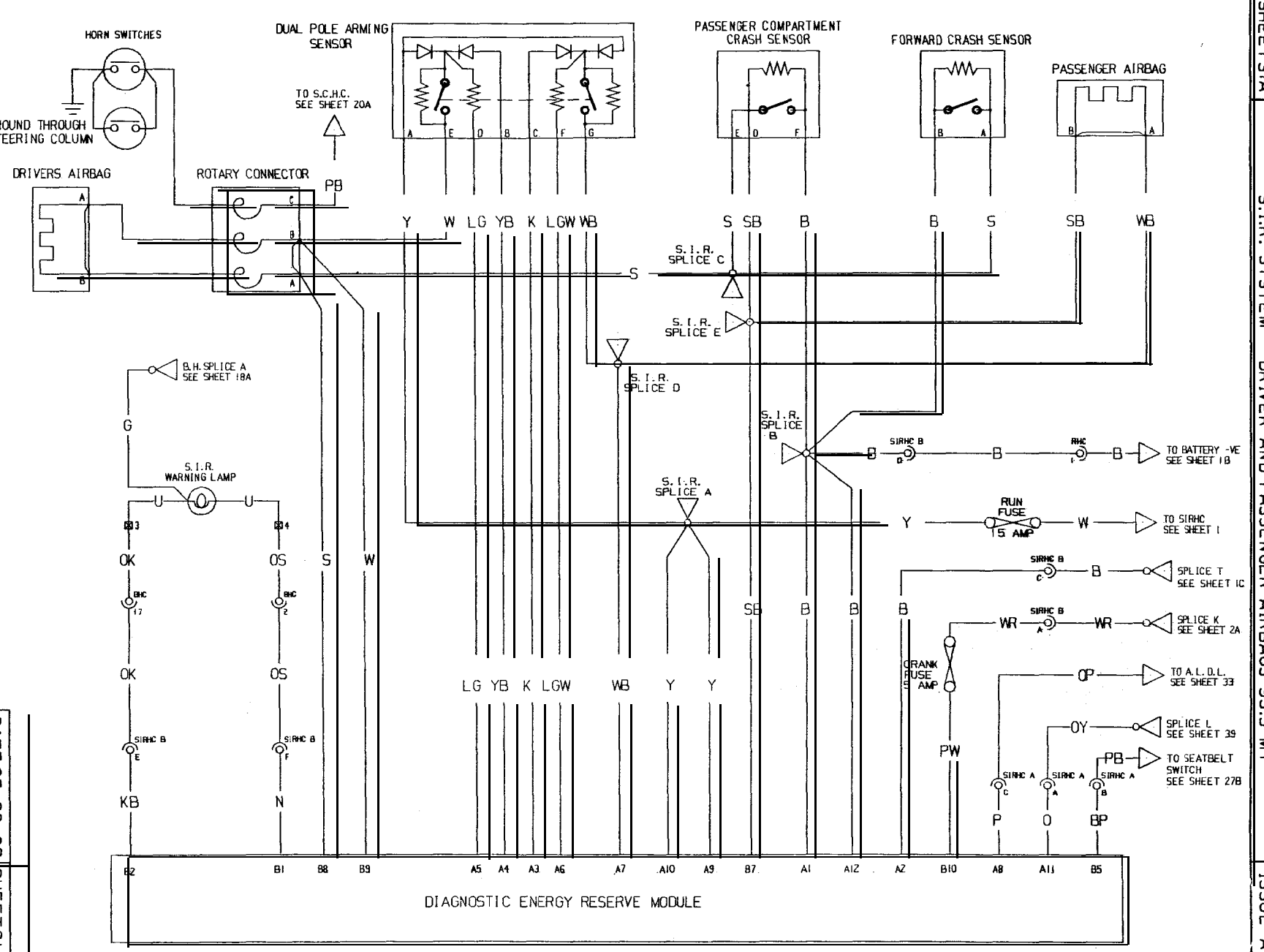

R. H. REAR SPEAKER
COMPACT DISC PLAYER (WHEN FITTED)
TO ALARM CONTROLLER SEE SHEET 32
L. H. REAR SPEAKER
RADIO CASSETTE PLAYER
SPLICE S SEE SHEET 11/11A
SPLICE T SEE SHEET 1C
-VE POST (RHD) SEE SHEET 1C
TO IGN.POWER RELAY SEE SHEET 1
RADIO AUXILIARY RELAY
87A
87
85
30
86
SPLICE A
AERIAL CONN.
AERIAL CONN.
R. H. FRONT SPEAKER
L. H. FRONT SPEAKER
TO FUSE 19 SEE SHEET 1
TO SCHC SEE SHEET 3
TO -VE POST RHD SEE SHEET 1
TO SPLICE C LHD SEE SHEET 1A

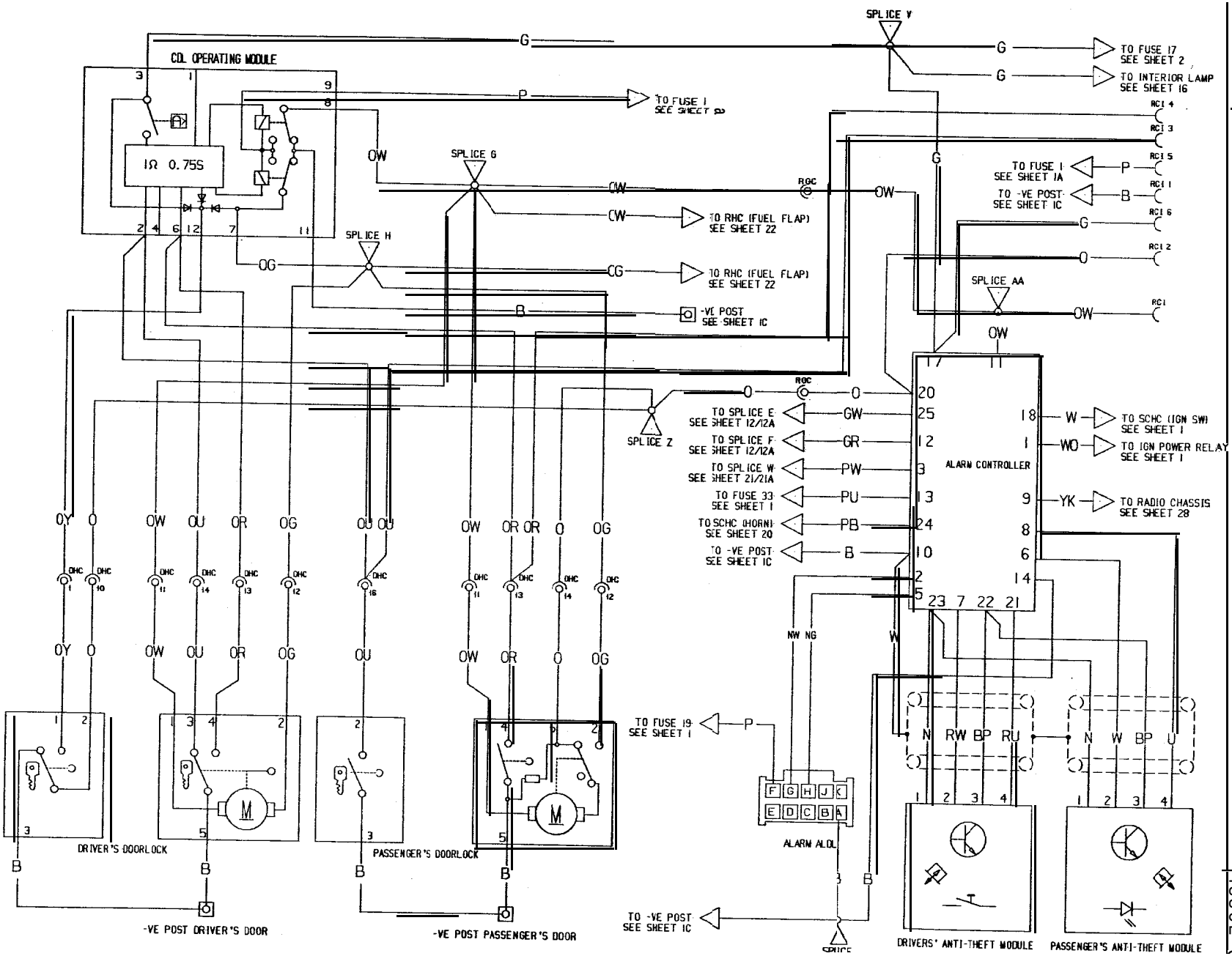

ICE DETECTION MODULE
SPLICE X SEE SHEET 2
-VE POST SEE SHEET 1C
G
B
KY
KB
KS
KG
KR
BNC 14
BNC 15
BNC 16
ICE DETECTION DISPLAY
ICE DETECTION PROBE
2
3
BNC 16
BNC 15
TWISTED PAIR
TWISTED PAIR

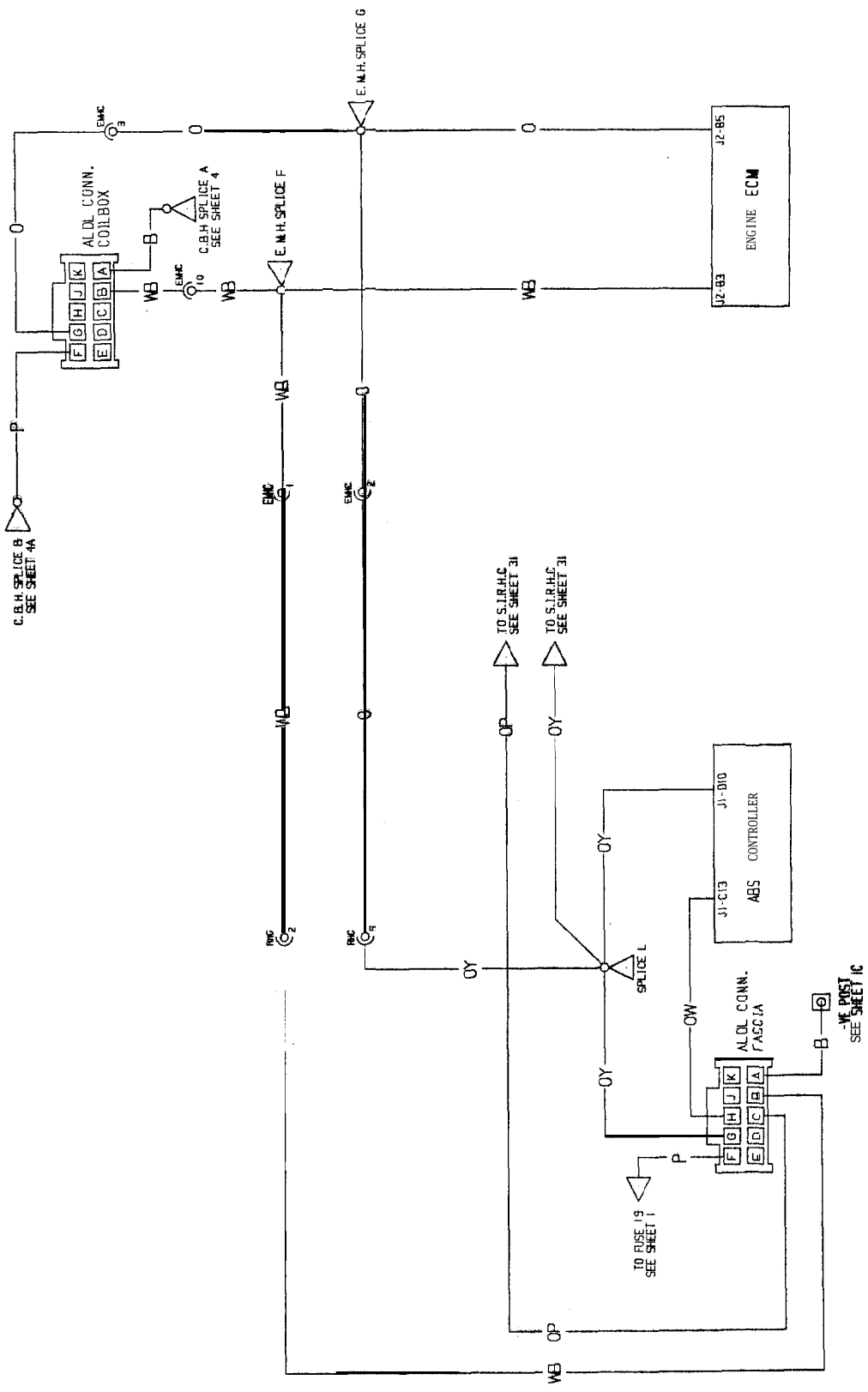

REAR SOLENOID FUSE
15 AMP
RELAY CONTROL FUSE
3 AMP
SPLICE M
SEE SHEET 2A
SPLICE N
FRONT SOLENOID FUSE
30 AMP
ABS PUMP FUSE
30 AMP
CONTROLLER FUSE
10 AMP
+VE POST
SEE SHEET 1
REAR SOLENOID RELAY
FRONT SOLENOID RELAY
ABS PUMP RELAY
-VE POST
SEE SHEET 1C
1 AMP
TO LAMP DRIVER
MODULE. SEE
SHEET 25
ACCUMULATOR
PRESSURE
SWITCH
ABS PUMP MOTOR
TO ALDL
SEE SHEET 33
TO ALDL
SEE SHEET 33
L.F. WHEEL
SPEED SENSOR
R.F. WHEEL
SPEED SENSOR
L.R. WHEEL
SPEED SENSOR
R.R. WHEEL
SPEED SENSOR
SPLICE R
TO LAMP DRIVER
MODULE
SEE SHEET 25
SPLICE P
LEFT
FRONT
SOLENOID
RIGHT
FRONT
SOLENOID
REAR
SOLENOID
TO STOP LAMP
SWITCH. SEE
SHEET 14A
TO STOP LAMP
SWITCH. SEE
SHEET 14A
ABS CONTROLLER
J1-C5 J1-C4 J1-D3 J1-D2 J1-D5 J1-D4 J1-C1 J1-C2 J1-C13 J1-D10 J1-C16 J1-C12 J1-D15 J1-C10 J1-D8 J1-D14
J1-D1 J1-C3 J1-C6 J1-C9 J1-D13 J1-C14 J1-C15 J1-D12 J1-D9 J1-C11
J2:A
J2:B
-VE POST
SEE SHEET 1C
N W R B K G Y U
GY UB BK NW S UW G GP
PO YB OW OY LGW GK PS NK P BLG PN SR UY


REAR SOLENOID FUSE
15 AMP
RELAY CONTROL FUSE
3 AMP
SPLICE M
SEE SHEET 2A
SPLICE N
FRONT SOLENOID FUSE
30 AMP
ABS PUMP FUSE
30 AMP
CONTROLLER FUSE
10 AMP
+VE POST
SEE SHEET 1
REAR SOLENOID RELAY
FRONT SOLENOID RELAY
ABS PUMP RELAY
ACCUMULATOR
PRESSURE
SWITCH
-VE POST
SEE SHEET 1C
1 AMP
TO LAMP DRIVER
MODULE. SEE
SHEET 25
TO ALDL
SEE SHEET 33
TO ALDL
SEE SHEET 33
ABS PUMP MOTOR
L.F. WHEEL
SPEED SENSOR
R.F. WHEEL
SPEED SENSOR
L.R. WHEEL
SPEED SENSOR
R.R. WHEEL
SPEED SENSOR
SPLICE R
TO LAMP DRIVER
MODULE
SEE SHEET 25
SPLICE P
LEFT
FRONT
SOLENOID
RIGHT
FRONT
SOLENOID
REAR
SOLENOID
TO STOP LAMP
SWITCH. SEE
SHEET 14
TO STOP LAMP
SWITCH. SEE
SHEET 14
N W R B K G Y U
GY UB BK NW S UW G GP
J1-C5 J1-C4 J1-D3 J1-D2 J1-D5 J1-D4 J1-C1 J1-C2 J1-C13 J1-D10 J1-C16 J1-C12 J1-D15 J1-C10 J1-D8 J1-D14 J1-D1 J1-C3 J1-C6 J1-C9 J1-D13 J1-C14 J1-C15 J1-D12 J1-D9 J1-C11 J2-A J2-B
ABS CONTROLLER
-VE POST
SEE SHEET 1C

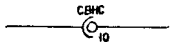

RESISTOR MODULE
ROTARY CONNECTOR
ARMING SENSOR
PASSENGR COMPARTMENT CRASH SENSOR
FORWARD CRASH SENSOR
10 9 8 7 6 5
A B
C B A
E D F
B A
W
W
S
S
B
B
G
Y
S. I. R. SPLICE B
B
SIRHC A
B
RHC 1
B
TO BATTERY -VE SEE SHEET 1B
G
EL.H. SPLICE A SEE SHEET 18A
S. I. R. WARNING LAMP
U
U
S. I. R. H. SPLICE A
Y
RUN FUSE 5 AMP
W
TO SIRHC SEE SHEET 1
BU
BO
BW
BY
YB
OK
OS
BHC 17
BHC 2
OK
OS
SIRHC E
SIRHC F
KB
N
Y
Y
B
B
SIRHC D
WR
WR
SPLICE K SEE SHEET 2A
CRANK FUSE 5 AMP
PW
OP
TO A.L.D.L. SEE SHEET 33
OY
SPLICE L SEE SHEET 39
SIRHC C
SIRHC A
P
O
A10 A6 A7 A4 B9 A1 A2 A3 B3 B1 B12 B10 A5 A9
DIAGNOSTIC ENERGY RESERVE MODULE


HORN SWITCHES
DUAL POLE ARMING SENSOR
TO S.C.H.C. SEE SHEET 20A
PASSENGER COMPARTMENT CRASH SENSOR
FORWARD CRASH SENSOR
PASSENGER AIRBAG
ROUND THROUGH STEERING COLUMN
DRIVERS AIRBAG
ROTARY CONNECTOR
PB
Y W LG YB K LGW WB
S SB B B S SB WB
S.I.R. SPLICE C
S.I.R. SPLICE E
S.I.R. SPLICE D
S.I.R. SPLICE B
S.I.R. SPLICE A
B.H. SPLICE A SEE SHEET 18A
G
S.I.R. WARNING LAMP
SIRHC B
RHC
TO BATTERY -VE SEE SHEET 1B
RUN FUSE 15 AMP
TO SIRHC SEE SHEET 1
SPLICE T SEE SHEET 1C
SPLICE K SEE SHEET 2A
CRANK FUSE 5 AMP
TO A.L.D.L. SEE SHEET 33
SPLICE L SEE SHEET 39
TO SEATBELT SWITCH SEE SHEET 27B
OK
OS
S
W
KB
N
PW
P
O
BP
LG YB K LGW WB Y Y
SB B B B
DIAGNOSTIC ENERGY RESERVE MODULE


CDL OPERATING MODULE
1Ω 0.75S
SPLICE V
SPLICE G
SPLICE H
SPLICE Z
SPLICE AA
TO FUSE 17 SEE SHEET 2
TO INTERIOR LAMP SEE SHEET 16
TO FUSE 1 SEE SHEET 1A
TO -VE POST SEE SHEET 1C
TO RHC (FUEL FLAP) SEE SHEET 22
TO RHC (FUEL FLAP) SEE SHEET 22
-VE POST SEE SHEET 1C
TO SPLICE E SEE SHEET 12/12A
TO SPLICE F SEE SHEET 12/12A
TO SPLICE W SEE SHEET 21/21A
TO FUSE 33 SEE SHEET 1
TO SCHC (HORN) SEE SHEET 20
TO -VE POST SEE SHEET 1C
ALARM CONTROLLER
TO SCHC (IGN SW) SEE SHEET 1
TO IGN POWER RELAY SEE SHEET 1
TO RADIO CHASSIS SEE SHEET 28
TO FUSE 19 SEE SHEET 1
TO -VE POST SEE SHEET 1C
ALARM ALOL
DRIVER'S DOORLOCK
PASSENGER'S DOORLOCK
-VE POST DRIVER'S DOOR
-VE POST PASSENGER'S DOOR
DRIVERS' ANTI-THEFT MODULE
PASSENGER'S ANTI-THEFT MODULE


E.M.H. SPLICE G
ENGINE ECM
J2-85
J2-83
ALDL CONN. COILBOX
C.B.H SPLICE A SEE SHEET 4
E.M.H. SPLICE F
C.B.H. SPLICE B SEE SHEET 4A
TO S.I.R.H.C SEE SHEET 31
TO S.I.R.H.C SEE SHEET 31
ABS CONTROLLER
J1-B10
J1-C13
SPLICE L
ALDL CONN. FASCIA
TO FUSE 19 SEE SHEET 1
-VE POST SEE SHEET 1C

ML.13 - CIRCUIT DIAGRAMS - 'Revised Harness' Cars
(for early cars, see ML.12 white pages)



CONNECTOR (WITH CAVITY NUMBER

CONNECTION CODES :-

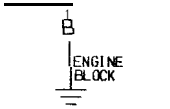
WC BINNACLE HARNESS CONNECTOR
CBHC - COIL BOX HARNESS CONNECTOR
CCHC - CENTRE CONSOLE HARNESS CONNECT'3
DHC - DOOR HARNESS CONNECTOR
EMHC - ENGINE MANAGEMENT HARNESS CONNECTCR
FBHC - FRONT BUMPER HARNESS CONNECTOR
FEOC FED/EUROPEAN OPTION CONNECTOR
FHC FRONT HARNESS CONNECTOR
FLC FRONT LAMP CONNECT&i
HBHC HANDBRAKE HARNESS CONNECTCR
IHC INJECTOR HARNESS CONNECTOR
LOHC - LAW DRIVER HARNESS CONNECTOR
LHDHC LEFT HAND DOOR HARNESS CONNECTOR
LHFLC LEFT HAND FRONT LAW CONNECTCR
MC MIRROR CONNECT03
MSC - MIRROR SWITCH CONNECTOR
NPLH NUMBER PLATE LAMP HARNESS
RAC RADIO AUXILIARY CONNECTOR
RC - RHEOSTAT CONNECTOR
RCI REMOTE CONTROL INTERFACE
RFHC RADIATOR FAN HARNESS CONNECTCR
RHC - REAR HARNESS CONNECTCR
RHDHC RIGHT HAND DOOR HARNESS CONNECTOR
RHFLC RIGHT HAND FRONT LAM' CONNECTOR
RHHC RHEOSTAT HARNESS CONNECTCR
RLHC REAR LAMPS HARNESS CONNECTOR
ROC REMOTE OPTION CONNECTOR
RSHC REAR SPEAKER HARNESS CONNECTOR
SCHC STEERING COLUMN HARNESS CONNECTOR
SIRHC S.I.R. HARNESS CONNECTOR
VPC VACUUM PUMP CONNECTOR
WLC - WARNING LAMP CONNECTOR

TWISTED PAIR

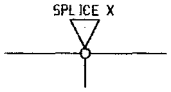
FUSE NUMBER AND RATING

GROUND POINT LOCATION

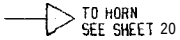
GROUND POINT THROUGH COMPONENT BODY



CABLE GROUND THROUGH LOCAL FIXING



SPLICE



DESTINATION OF CABLE BY SHEET NUMBER TO COMPONENT

DESTINATION OF CABLE BY SHEET NUMBER TO SPLICE

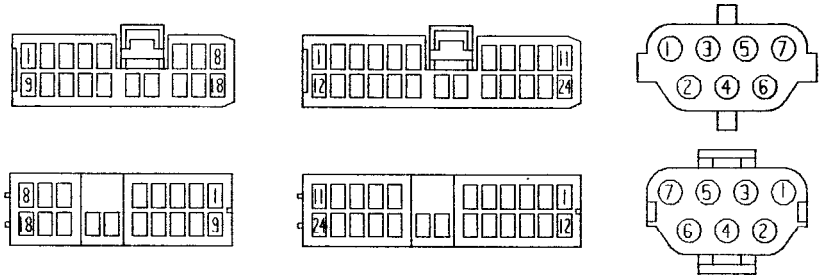
CABLE COLOUR

COLOUR CODES :-

8 - BLACK	P - PURPLE
G - GREEN	R RED
K PINK	S - SLATE
LG- LIGHT GREEN	U BLUE
N - BROWN	w - WHITE
0 - ORANGE	Y YELLOW

BHC (FACI A HARNESS TO BI NNACLE HARNESS)

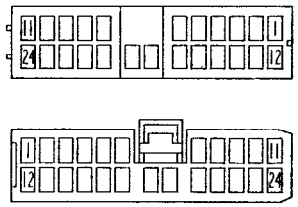
FACIA HARNESS



BINNACLE HARNESS

CBHC (ENGINE MANAGEMENT HARNESS TO COIL BOX HARNESS) ,

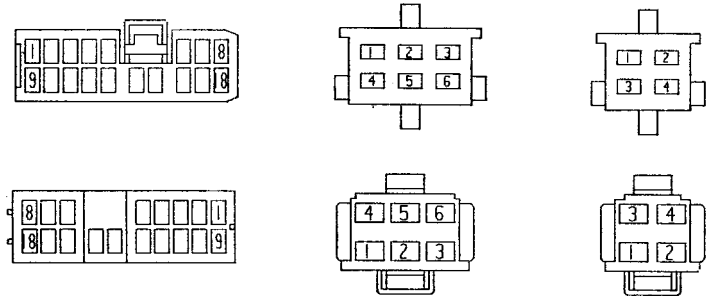
ENGINE MANAGEMENT HARNESS



COIL BOX HARNESS

CBHC (REAR HARNESS TO COIL BOX HARNESS1

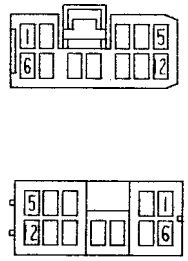
REAR HARNESS



COIL BOX HARNESS

CCHC I FACIA HARNESS TO CENTRE CONSOLE HARNESS)

FACIA HARNESS

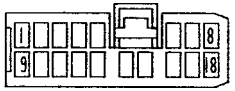


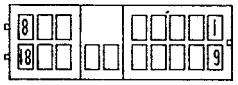
CENTRE CONSOLE HARNESS

NOTE : ALL CONNECTORS ARE SHOWN ON MATING FACE

WC, LHDHC, RHDHC (FACIA HARNESS TO DOOR HARNESS1

FACIA HARNESS

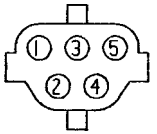


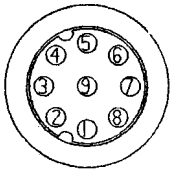


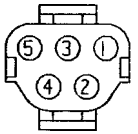
DOOR HARNESS

EMHC (REAR HARNESS TO ENGINE MANAGEMENT HARNESS)

REAR HARNESS



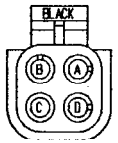


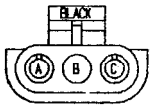


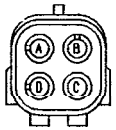
ENGINE MANAGEMENT HARNESS

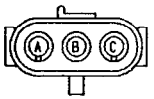
FBHC (FRONT HARNESS TO FRONT BUMPER HARNESS)

FRONT HARNESS





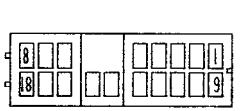


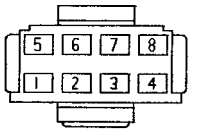


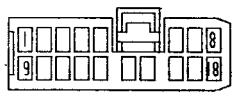
FRONT BUMPER HARNESS

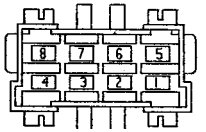
FHC (FACIA HARNESS TO FRONT HARNESS)

FACIA HARNESS







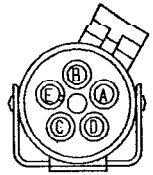


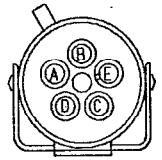
FRONT HARNESS

NOTE : ALL CONNECTORS ARE SHOWN ON MATING FACE

IHC (ENGINE MANAGEMENT HARNESS TO INJECTOR HARNESS1

ENGINE MANAGEMENT HARNESS

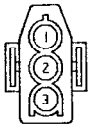


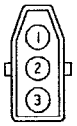


INJECTOR HARNESS

NPLH (REAR LIGHTING HARNESS TO NUMBER PLATE LAM'S HARNESS)

REAR LIGHTING HARNESS

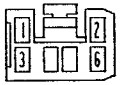


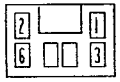


NUMBER PLATE LAM'S HARNESS

RFHC (FACIA HARNESS TO RAOI ATOR FAN HARNESS1

FACIA HARNESS

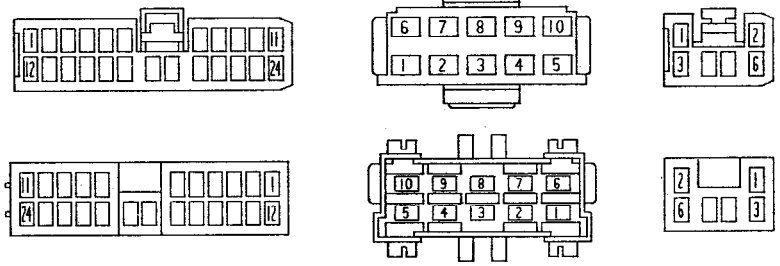




RADIATOR FAN HARNESS

RHC (FACIA HARNESS TO REAR HARNESS)

FACIA HARNESS

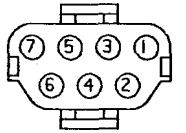


REAR HARNESS

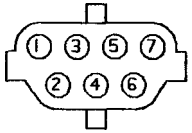
NOTE : ALL CONNECTORS ARE SHOWN ON MATING FACE

RHHC [BINNACLE HARNESS TO RHEOSTAT HARNESS1

BINNACLE HARNESS



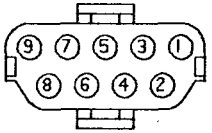
BLUE MOULDINGS

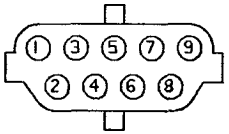


RHEOSTAT HARNESS

RLHC (REAR HARNESS TO REAR LI GHTING HARNESS1

REAR HARNESS

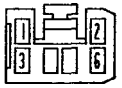


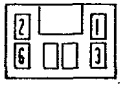


REAR LIGHTING HARNESS

RSHC (FACIA HARNESS TO REAR SPEAKER HARNESS)

FACIA HARNESS





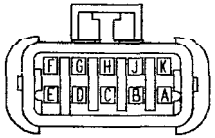
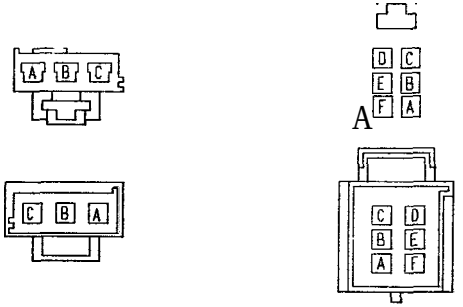
REAR SPEAKER HARNESS

HBHC (FACIA HARNESS TO HANDBRAKE HARNESS)

FACIA HARNESS

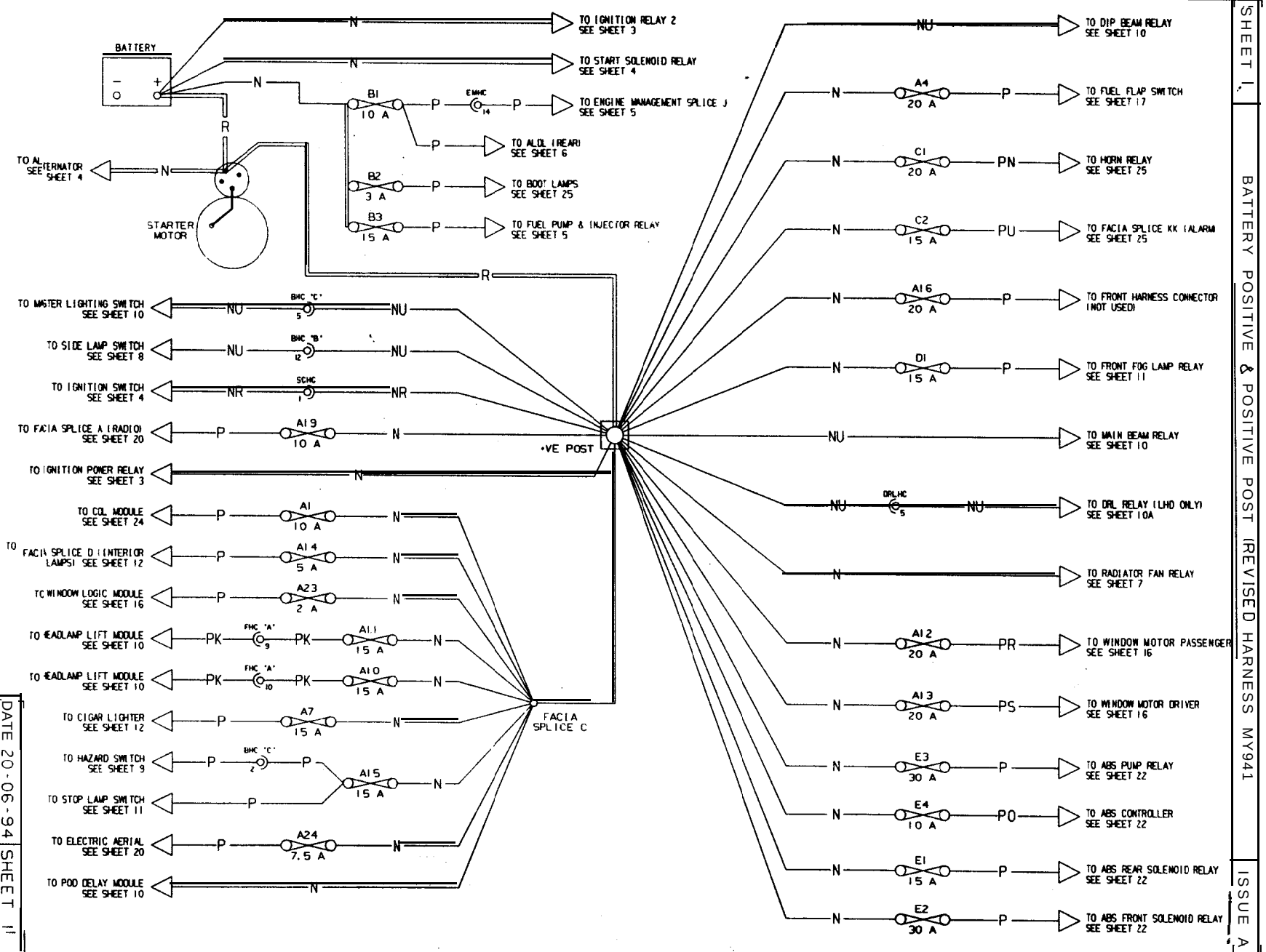
HANDBRAKE HARNESS

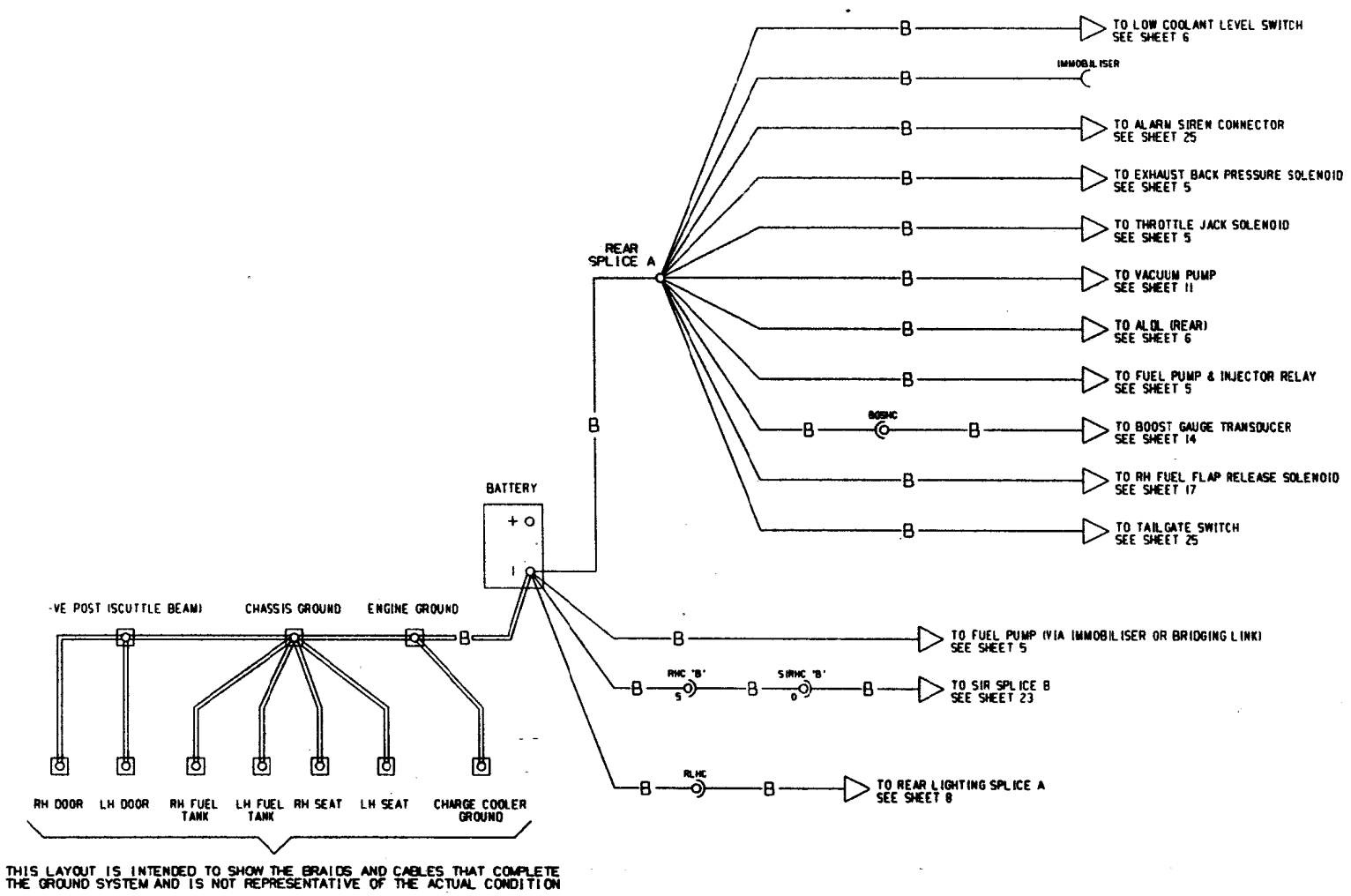
NOTE : ALL CONNECTORS ARE SHOWN ON MATING FACE

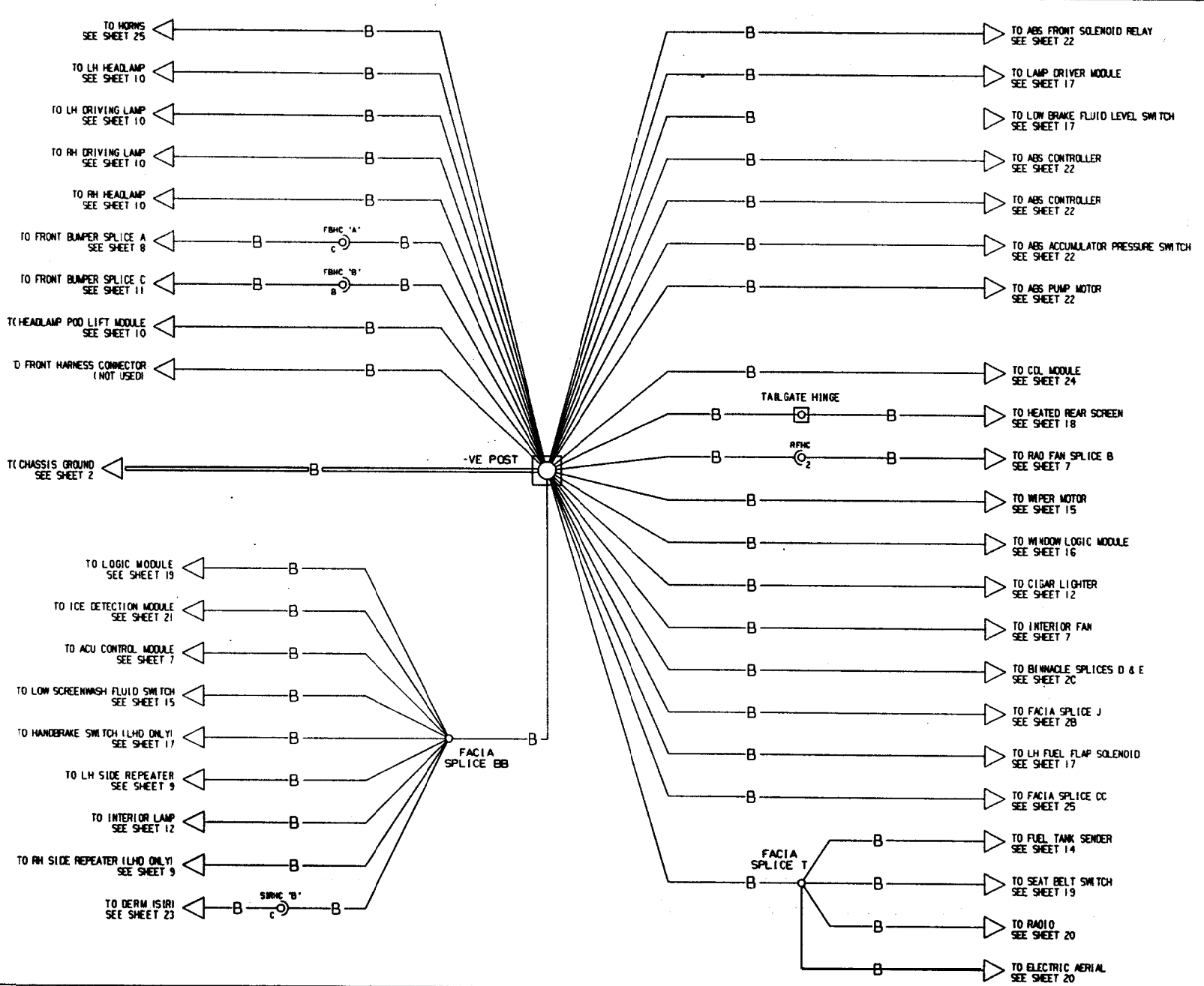
ALDL (FACIA & ENGINE MANAGEMENT HARNESS1	SIRHC (FACIA HARNESS TO SIR HARNESS1
ALDL CONNECTOR 	FACIA HARNESS  SIR HARNESS

NOTE :- ALL CONNECTORS ARE SHOWN ON MATING FACE

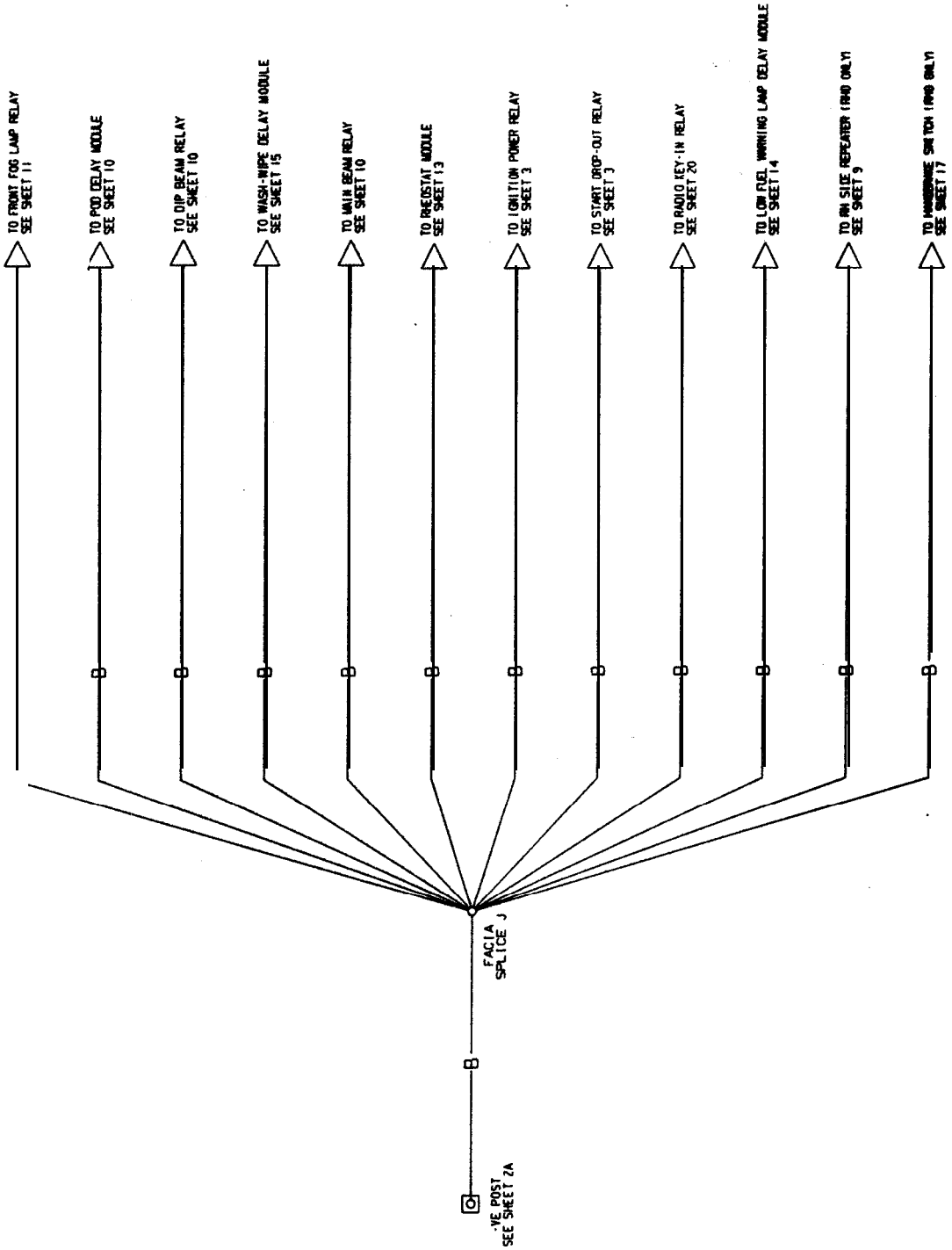
ML.13 - CIRCUIT DIAGRAMS - 'Revised Harness' Cars
(for early cars, see ML.12 white pages)


BATTERY
TO IGNITION RELAY 2 SEE SHEET 3
TO START SOLENOID RELAY SEE SHEET 4
TO ENGINE MANAGEMENT SPLICE J SEE SHEET 5
TO ALDL (REAR) SEE SHEET 6
TO BOOT LAMPS SEE SHEET 25
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
TO ALTERNATOR SEE SHEET 4
STARTER MOTOR
B1 10 A
B2 3 A
B3 15 A
EMHC
TO MASTER LIGHTING SWITCH SEE SHEET 10
TO SIDE LAMP SWITCH SEE SHEET 8
TO IGNITION SWITCH SEE SHEET 4
TO FACIA SPLICE A (RADIO) SEE SHEET 20
TO IGNITION POWER RELAY SEE SHEET 3
TO COL MODULE SEE SHEET 24
TO FACIA SPLICE D (INTERIOR LAMPS) SEE SHEET 12
TO WINDOW LOGIC MODULE SEE SHEET 16
TO HEADLAMP LIFT MODULE SEE SHEET 10
TO HEADLAMP LIFT MODULE SEE SHEET 10
TO CIGAR LIGHTER SEE SHEET 12
TO HAZARD SWITCH SEE SHEET 9
TO STOP LAMP SWITCH SEE SHEET 11
TO ELECTRIC AERIAL SEE SHEET 20
TO POD DELAY MODULE SEE SHEET 10
BHC "C"
BHC "B"
SCHC
FHC "A"
A19 10 A
A1 10 A
A14 5 A
A23 2 A
A11 15 A
A10 15 A
A7 15 A
A15 15 A
A24 7.5 A
+VE POST
FACIA SPLICE C
TO DIP BEAM RELAY SEE SHEET 10
TO FUEL FLAP SWITCH SEE SHEET 17
TO HORN RELAY SEE SHEET 25
TO FACIA SPLICE KK (ALARM) SEE SHEET 25
TO FRONT HARNESS CONNECTOR (NOT USED)
TO FRONT FOG LAMP RELAY SEE SHEET 11
TO MAIN BEAM RELAY SEE SHEET 10
DRLHC
TO DRL RELAY (LHD ONLY) SEE SHEET 10A
TO RADIATOR FAN RELAY SEE SHEET 7
TO WINDOW MOTOR PASSENGER SEE SHEET 16
TO WINDOW MOTOR DRIVER SEE SHEET 16
TO ABS PUMP RELAY SEE SHEET 22
TO ABS CONTROLLER SEE SHEET 22
TO ABS REAR SOLENOID RELAY SEE SHEET 22
TO ABS FRONT SOLENOID RELAY SEE SHEET 22
A4 20 A
C1 20 A
C2 15 A
A16 20 A
D1 15 A
A12 20 A
A13 20 A
E3 30 A
E4 10 A
E1 15 A
E2 30 A

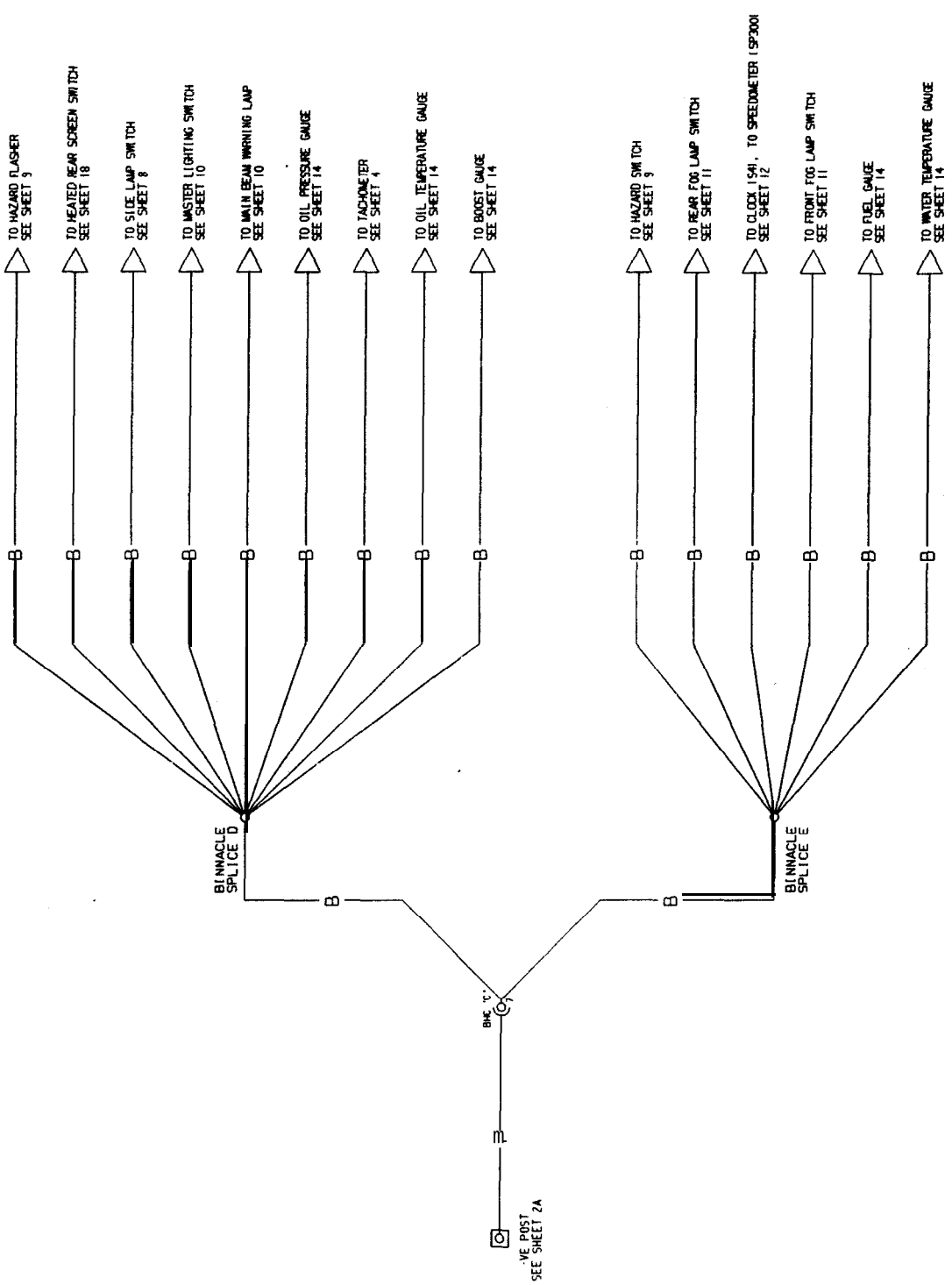

REAR SPLICE A
TO LOW COOLANT LEVEL SWITCH SEE SHEET 6
IMMOBILISER
TO ALARM SIREN CONNECTOR SEE SHEET 25
TO EXHAUST BACK PRESSURE SOLENOID SEE SHEET 5
TO THROTTLE JACK SOLENOID SEE SHEET 5
TO VACUUM PUMP SEE SHEET 11
TO ALOL (REAR) SEE SHEET 6
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
BOOSTHC
TO BOOST GAUGE TRANSDUCER SEE SHEET 14
TO RH FUEL FLAP RELEASE SOLENOID SEE SHEET 17
TO TAILGATE SWITCH SEE SHEET 25
BATTERY
+ O
- O
-VE POST (SCUTTLE BEAM)
CHASSIS GROUND
ENGINE GROUND
TO FUEL PUMP (VIA IMMOBILISER OR BRIDGING LINK) SEE SHEET 5
RHC 'B'
5
SIRHC 'B'
D
TO SIR SPLICE B SEE SHEET 23
RLHC
TO REAR LIGHTING SPLICE A SEE SHEET 8
RH DOOR
LH DOOR
RH FUEL TANK
LH FUEL TANK
RH SEAT
LH SEAT
CHARGE COOLER GROUND
THIS LAYOUT IS INTENDED TO SHOW THE BRAIDS AND CABLES THAT COMPLETE THE GROUND SYSTEM AND IS NOT REPRESENTATIVE OF THE ACTUAL CONDITION

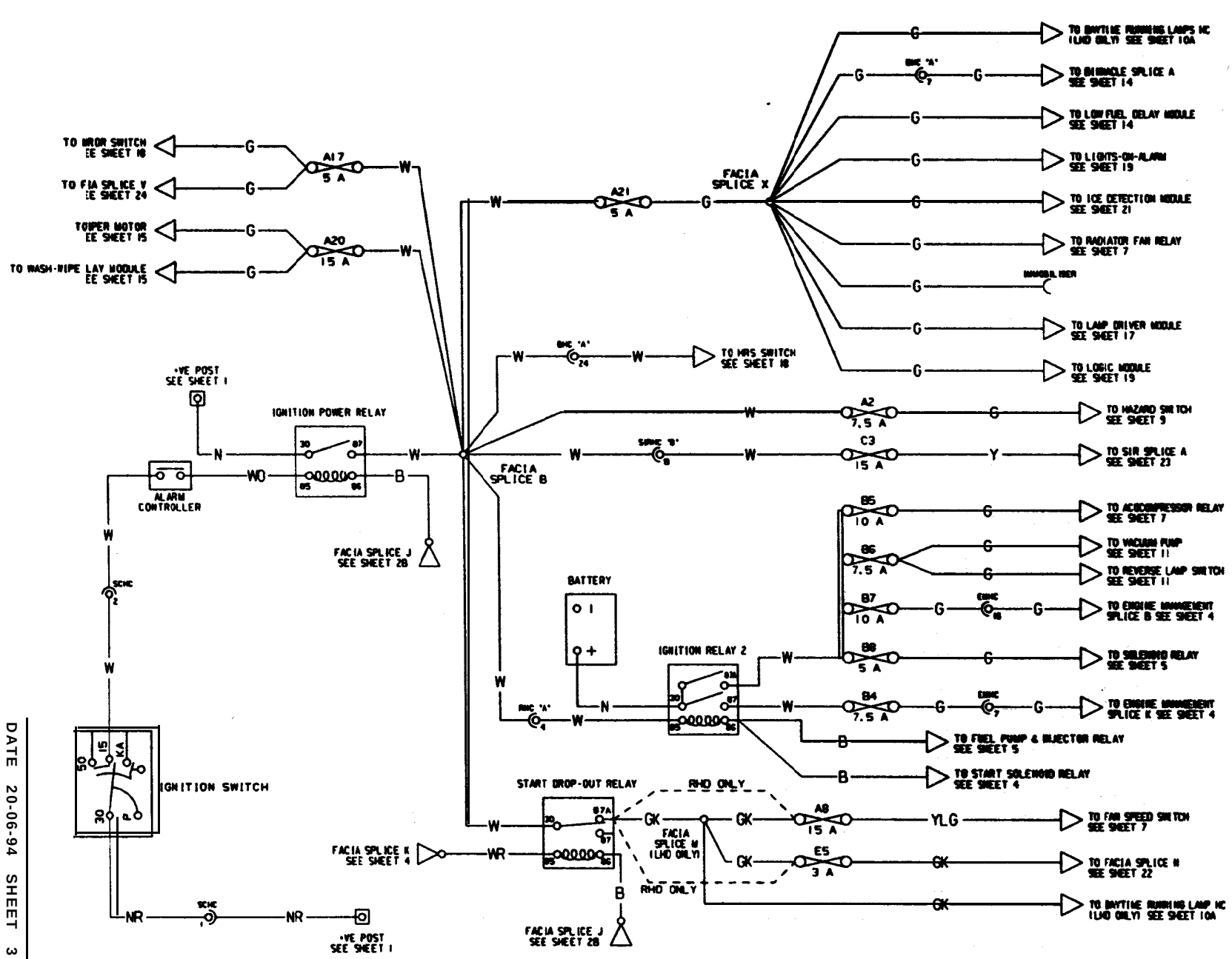

TO HORNS SEE SHEET 25
TO LH HEADLAMP SEE SHEET 10
TO LH DRIVING LAMP SEE SHEET 10
TO RH DRIVING LAMP SEE SHEET 10
TO RH HEADLAMP SEE SHEET 10
TO FRONT BUMPER SPLICE A SEE SHEET 8
FBHC 'A'
TO FRONT BUMPER SPLICE C SEE SHEET 11
FBHC 'B'
TO HEADLAMP POD LIFT MODULE SEE SHEET 10
TO FRONT HARNESS CONNECTOR (NOT USED)
TO CHASSIS GROUND SEE SHEET 2
-VE POST
TO LOGIC MODULE SEE SHEET 19
TO ICE DETECTION MODULE SEE SHEET 21
TO ACU CONTROL MODULE SEE SHEET 7
TO LOW SCREENWASH FLUID SWITCH SEE SHEET 15
TO HANDBRAKE SWITCH (LHD ONLY) SEE SHEET 17
TO LH SIDE REPEATER SEE SHEET 9
TO INTERIOR LAMP SEE SHEET 12
TO RH SIDE REPEATER (LHD ONLY) SEE SHEET 9
TO DERM ISIRI SEE SHEET 23
SIRHC 'B'
FACIA SPLICE BB
TO ABS FRONT SOLENOID RELAY SEE SHEET 22
TO LAMP DRIVER MODULE SEE SHEET 17
TO LOW BRAKE FLUID LEVEL SWITCH SEE SHEET 17
TO ABS CONTROLLER SEE SHEET 22
TO ABS CONTROLLER SEE SHEET 22
TO ABS ACCUMULATOR PRESSURE SWITCH SEE SHEET 22
TO ABS PUMP MOTOR SEE SHEET 22
TO CDL MODULE SEE SHEET 24
TAILGATE HINGE
TO HEATED REAR SCREEN SEE SHEET 18
RFHC
TO RAD FAN SPLICE B SEE SHEET 7
TO WIPER MOTOR SEE SHEET 15
TO WINDOW LOGIC MODULE SEE SHEET 16
TO CIGAR LIGHTER SEE SHEET 12
TO INTERIOR FAN SEE SHEET 7
TO BINNACLE SPLICES D & E SEE SHEET 2C
TO FACIA SPLICE J SEE SHEET 28
TO LH FUEL FLAP SOLENOID SEE SHEET 17
TO FACIA SPLICE CC SEE SHEET 25
FACIA SPLICE T
TO FUEL TANK SENDER SEE SHEET 14
TO SEAT BELT SWITCH SEE SHEET 19
TO RADIO SEE SHEET 20
TO ELECTRIC AERIAL SEE SHEET 20

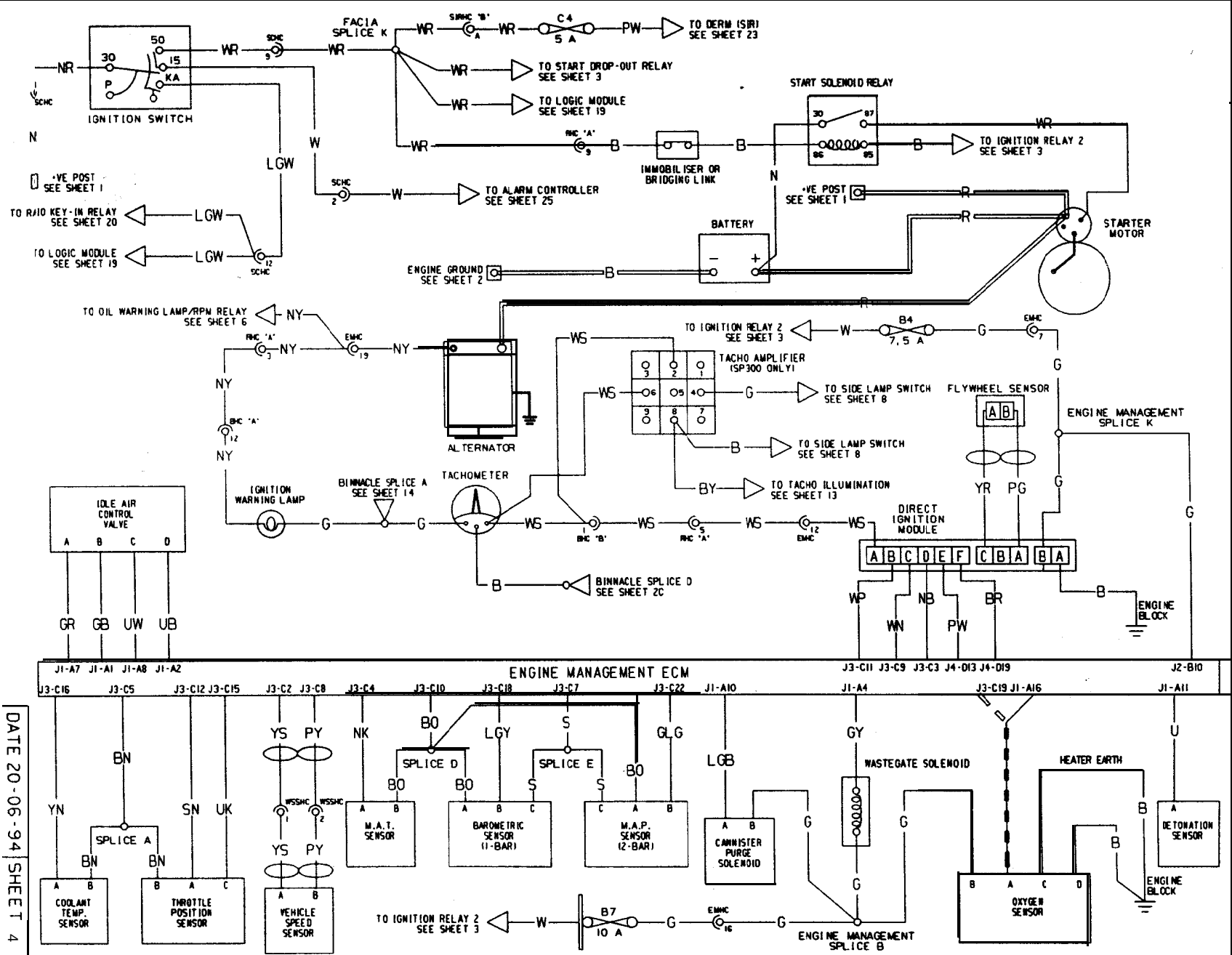
SHEET 2B | FACIA HARNESS GROUND SPLICE J (REVISED HARNESS MY941 | ISSUE A

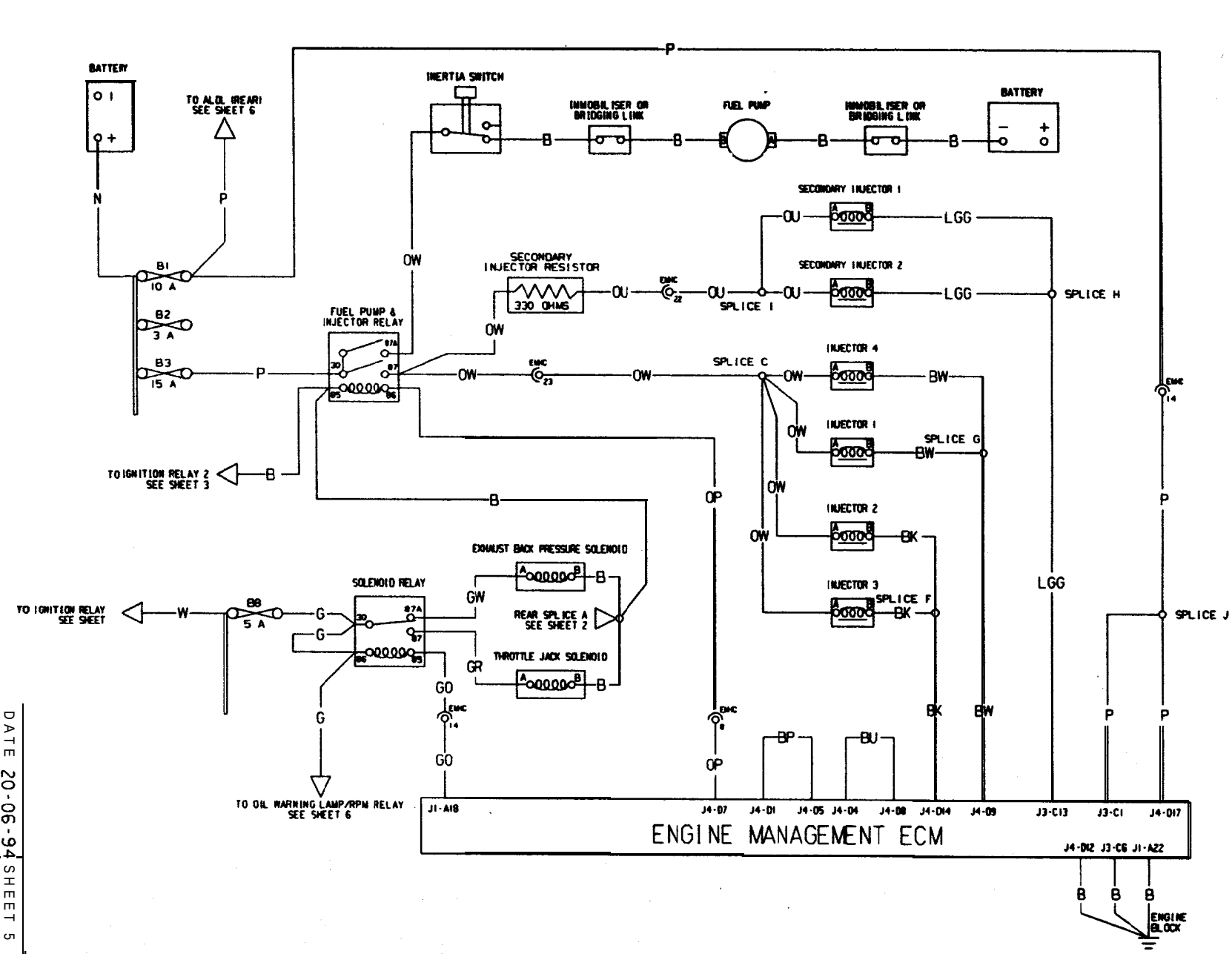


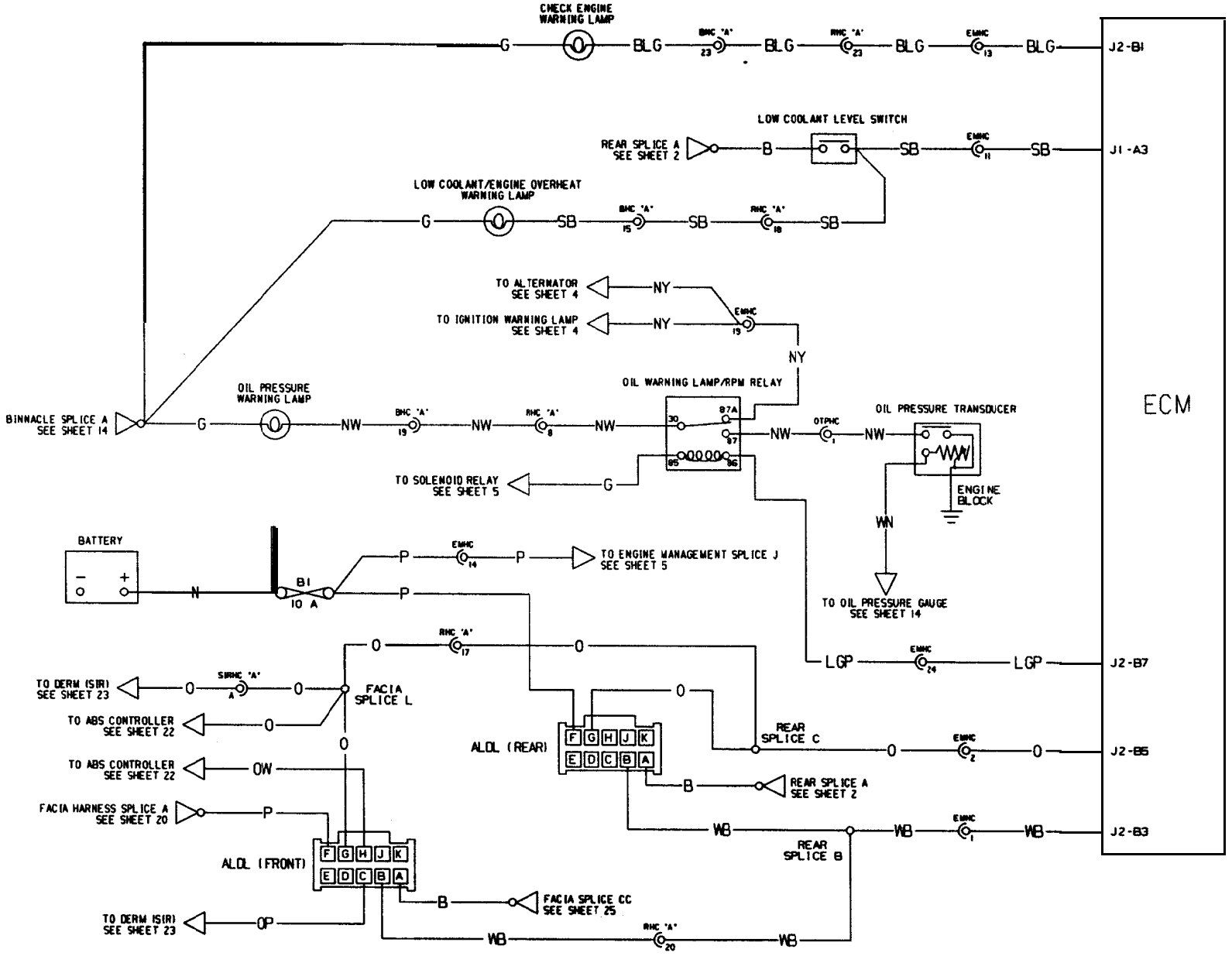
SHEET 2C | BINNACLE HARNESS GROUND SPLICES (REVISED HARNESS MY94) | ISSUE A



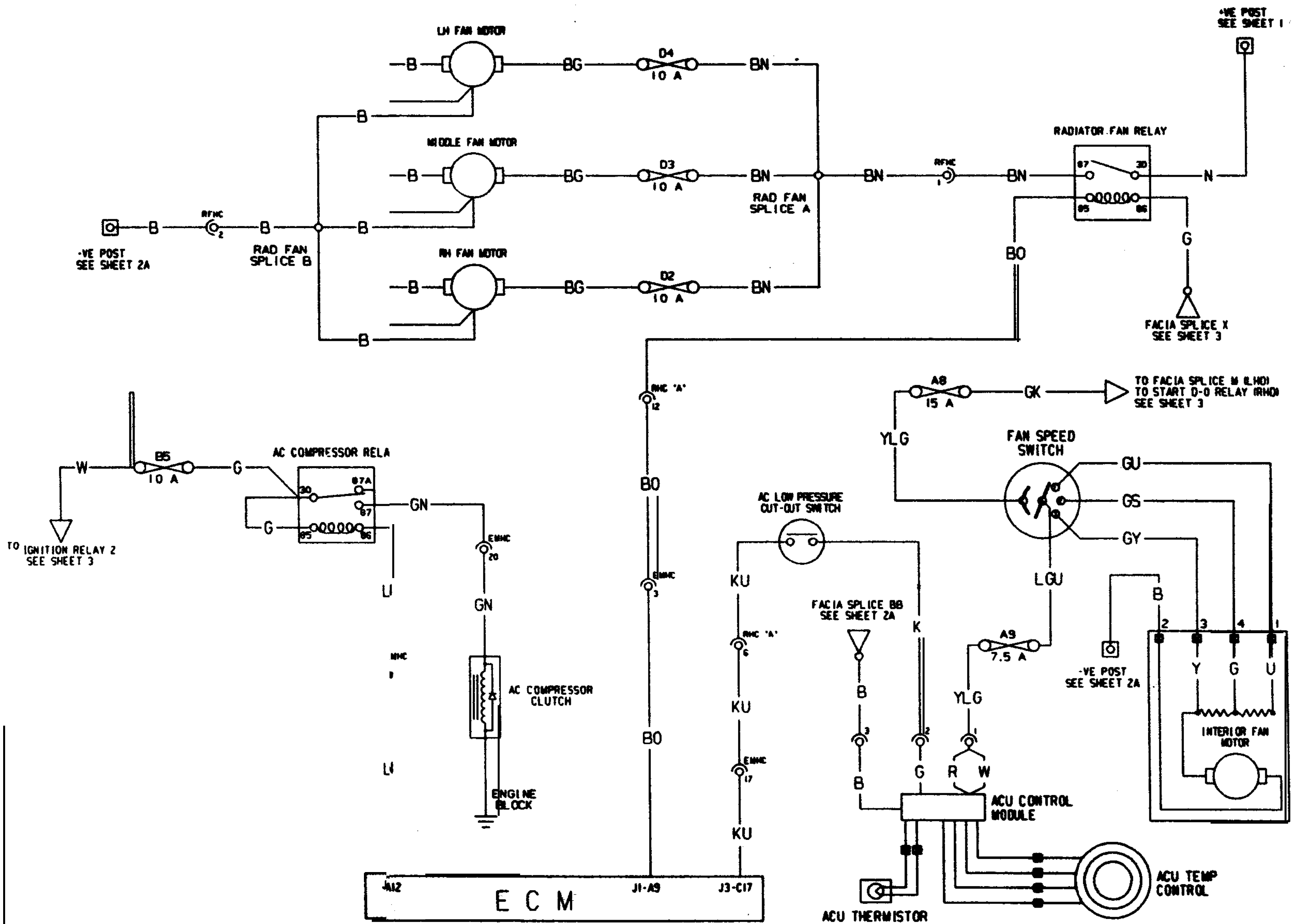

TO MIRROR SWITCH SEE SHEET 18
TO FIA SPLICE V SEE SHEET 24
TOPPER MOTOR SEE SHEET 15
TO WASH-WIPE DELAY MODULE SEE SHEET 15
A17 5 A
A20 15 A
A21 5 A
FACIA SPLICE X
TO DAYTIME RUNNING LAMPS RC (LHD ONLY) SEE SHEET 10A
TO BINNACLE SPLICE A SEE SHEET 14
TO LOW FUEL DELAY MODULE SEE SHEET 14
TO LIGHTS-ON-ALARM SEE SHEET 19
TO ICE DETECTION MODULE SEE SHEET 21
TO RADIATOR FAN RELAY SEE SHEET 7
TO LAMP DRIVER MODULE SEE SHEET 17
TO LOGIC MODULE SEE SHEET 19
TO HRS SWITCH SEE SHEET 18
+VE POST SEE SHEET 1
IGNITION POWER RELAY
ALARM CONTROLLER
FACIA SPLICE B
A2 7.5 A
TO HAZARD SWITCH SEE SHEET 9
C3 15 A
TO SIR SPLICE A SEE SHEET 23
FACIA SPLICE J SEE SHEET 28
B5 10 A
TO ACRCOMPRESSOR RELAY SEE SHEET 7
B6 7.5 A
TO VACUUM PUMP SEE SHEET 11
TO REVERSE LAMP SWITCH SEE SHEET 11
B7 10 A
TO ENGINE MANAGEMENT SPLICE B SEE SHEET 4
BATTERY
IGNITION RELAY 2
B8 5 A
TO SOLENOID RELAY SEE SHEET 5
B4 7.5 A
TO ENGINE MANAGEMENT SPLICE K SEE SHEET 4
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
TO START SOLENOID RELAY SEE SHEET 4
IGNITION SWITCH
START DROP-OUT RELAY
RHD ONLY
A8 15 A
TO FAN SPEED SWITCH SEE SHEET 7
FACIA SPLICE K SEE SHEET 4
FACIA SPLICE M (LHD ONLY)
E5 3 A
TO FACIA SPLICE N SEE SHEET 22
TO DAYTIME RUNNING LAMP RC (LHD ONLY) SEE SHEET 10A
+VE POST SEE SHEET 1
FACIA SPLICE J SEE SHEET 28

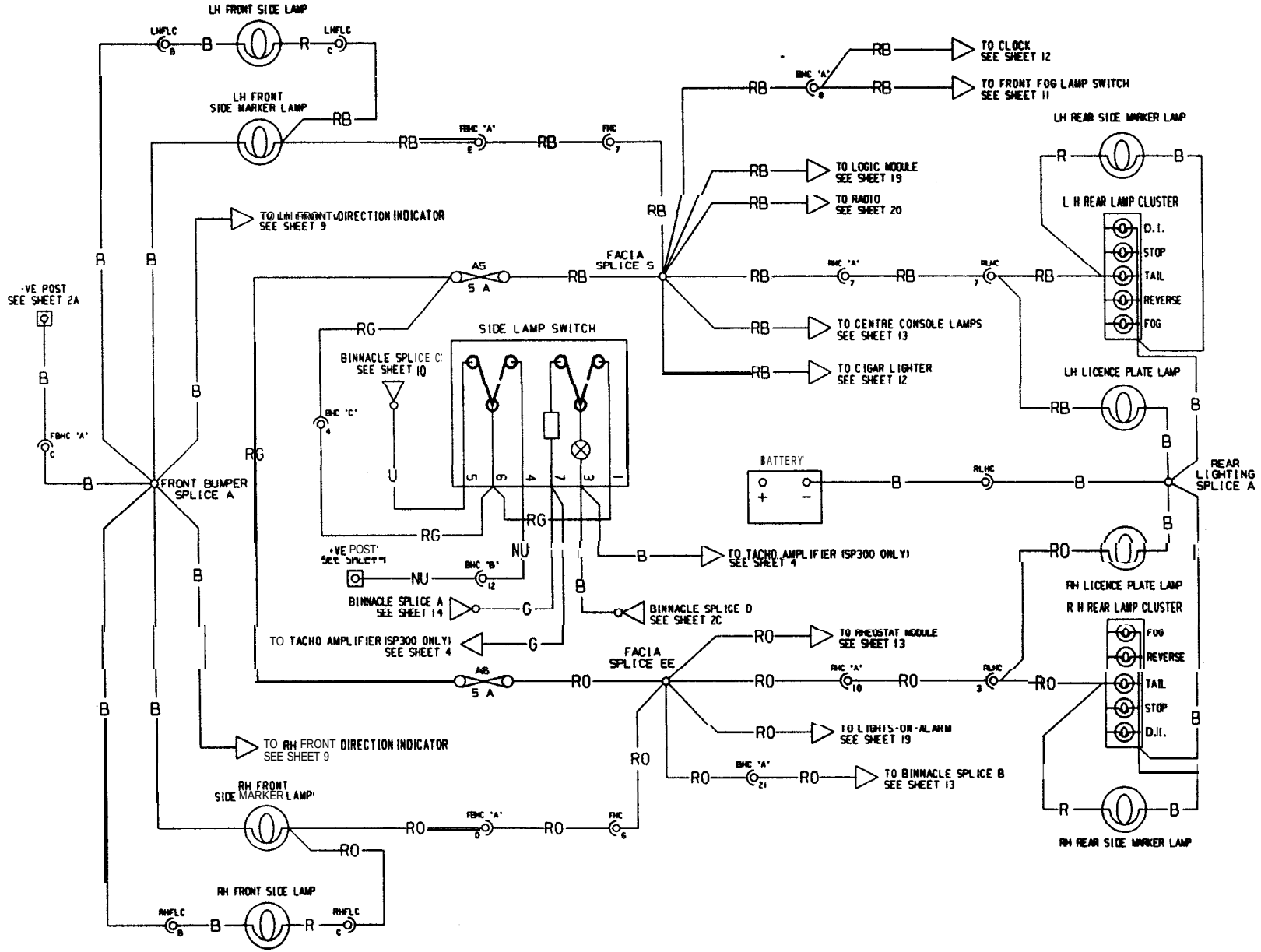

IGNITION SWITCH
50
30
15
P
KA
NR
WR
SCHC
FACIA SPLICE K
TO DERM (SIR) SEE SHEET 23
TO START DROP-OUT RELAY SEE SHEET 3
TO LOGIC MODULE SEE SHEET 19
START SOLENOID RELAY
TO IGNITION RELAY 2 SEE SHEET 3
IMMOBILISER OR BRIDGING LINK
+VE POST SEE SHEET 1
TO ALARM CONTROLLER SEE SHEET 25
TO R/IO KEY-IN RELAY SEE SHEET 20
TO LOGIC MODULE SEE SHEET 19
LGW
W
N
BATTERY
STARTER MOTOR
ENGINE GROUND SEE SHEET 2
TO OIL WARNING LAMP/RPM RELAY SEE SHEET 6
NY
RHC 'A'
EMHC
ALTERNATOR
TACHO AMPLIFIER (SP300 ONLY)
TO IGNITION RELAY 2 SEE SHEET 3
B4
7.5 A
TO SIDE LAMP SWITCH SEE SHEET 8
TO TACHO ILLUMINATION SEE SHEET 13
FLYWHEEL SENSOR
ENGINE MANAGEMENT SPLICE K
IGNITION WARNING LAMP
BINNACLE SPLICE A SEE SHEET 14
TACHOMETER
BINNACLE SPLICE D SEE SHEET 2C
DIRECT IGNITION MODULE
IDLE AIR CONTROL VALVE
GR GB UW UB
WP WN NB PW BR
ENGINE BLOCK
ENGINE MANAGEMENT ECM
J1-A7 J1-A1 J1-A8 J1-A2
J3-C16 J3-C5 J3-C12 J3-C15 J3-C2 J3-C8 J3-C4 J3-C10 J3-C18 J3-C7 J3-C22 J1-A10 J1-A4 J3-C19 J1-A16 J1-A11 J2-B10
SPLICE A
SPLICE D
SPLICE E
COOLANT TEMP. SENSOR
THROTTLE POSITION SENSOR
VEHICLE SPEED SENSOR
M.A.T. SENSOR
BAROMETRIC SENSOR (1-BAR)
M.A.P. SENSOR (2-BAR)
CANNISTER PURGE SOLENOID
WASTEGATE SOLENOID
HEATER EARTH
DETONATION SENSOR
OXYGEN SENSOR
TO IGNITION RELAY 2 SEE SHEET 3
B7
10 A
ENGINE MANAGEMENT SPLICE B

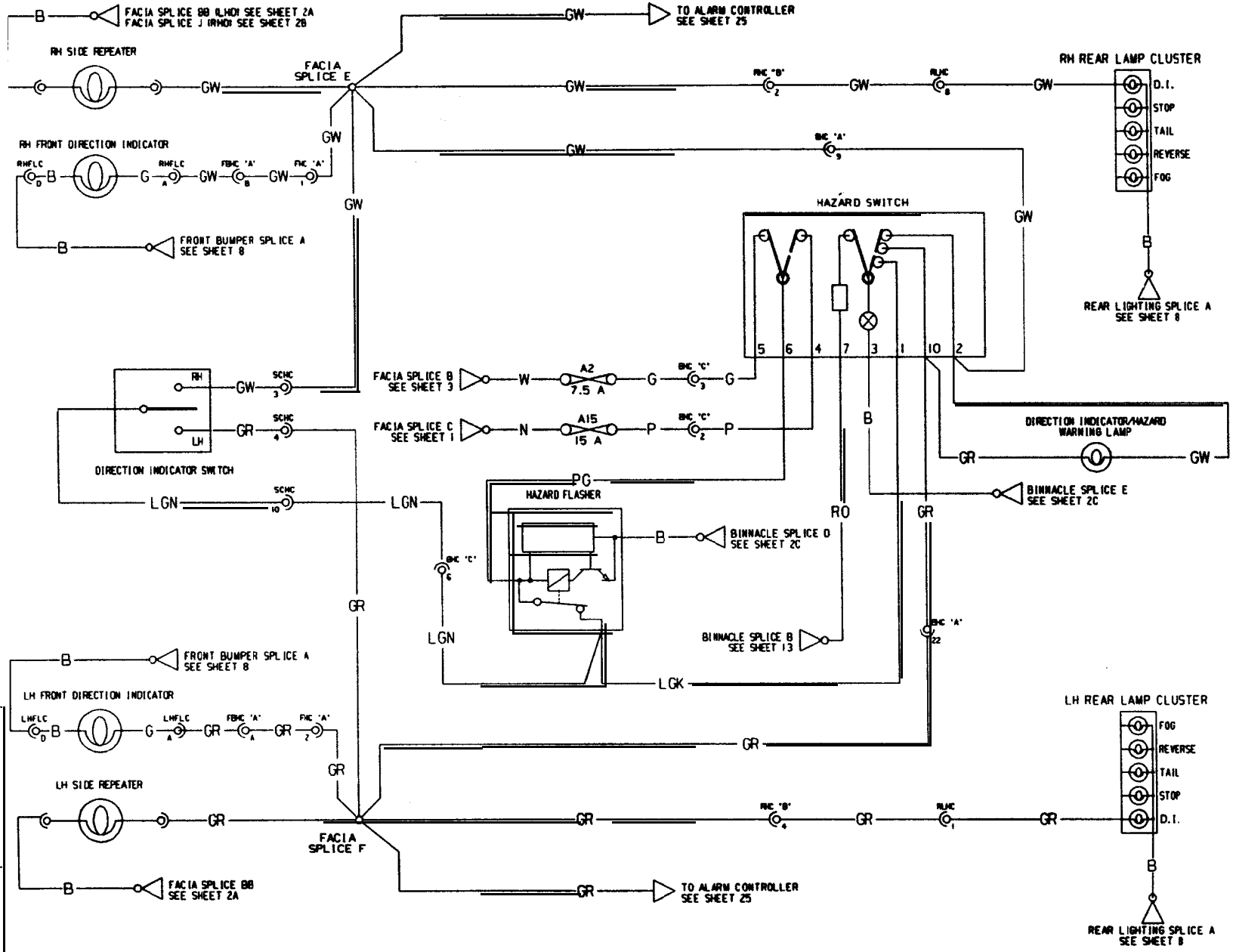

BATTERY
TO ALDL (REAR) SEE SHEET 6
INERTIA SWITCH
IMMOBILISER OR BRIDGING LINK
FUEL PUMP
IMMOBILISER OR BRIDGING LINK
BATTERY
SECONDARY INJECTOR 1
SECONDARY INJECTOR RESISTOR
330 OHMS
SECONDARY INJECTOR 2
SPLICE I
SPLICE H
B1 10 A
B2 3 A
B3 15 A
FUEL PUMP & INJECTOR RELAY
SPLICE C
INJECTOR 4
INJECTOR 1
SPLICE G
INJECTOR 2
INJECTOR 3
SPLICE F
SPLICE J
TO IGNITION RELAY 2 SEE SHEET 3
EXHAUST BACK PRESSURE SOLENOID
SOLENOID RELAY
B8 5 A
TO IGNITION RELAY SEE SHEET
REAR SPLICE A SEE SHEET 2
THROTTLE JACK SOLENOID
TO OIL WARNING LAMP/RPM RELAY SEE SHEET 6
J1-A18
J4-07
J4-01
J4-05
J4-04
J4-08
J4-014
J4-09
J3-C13
J3-C1
J4-017
ENGINE MANAGEMENT ECM
J4-D12 J3-C6 J1-A22
ENGINE BLOCK

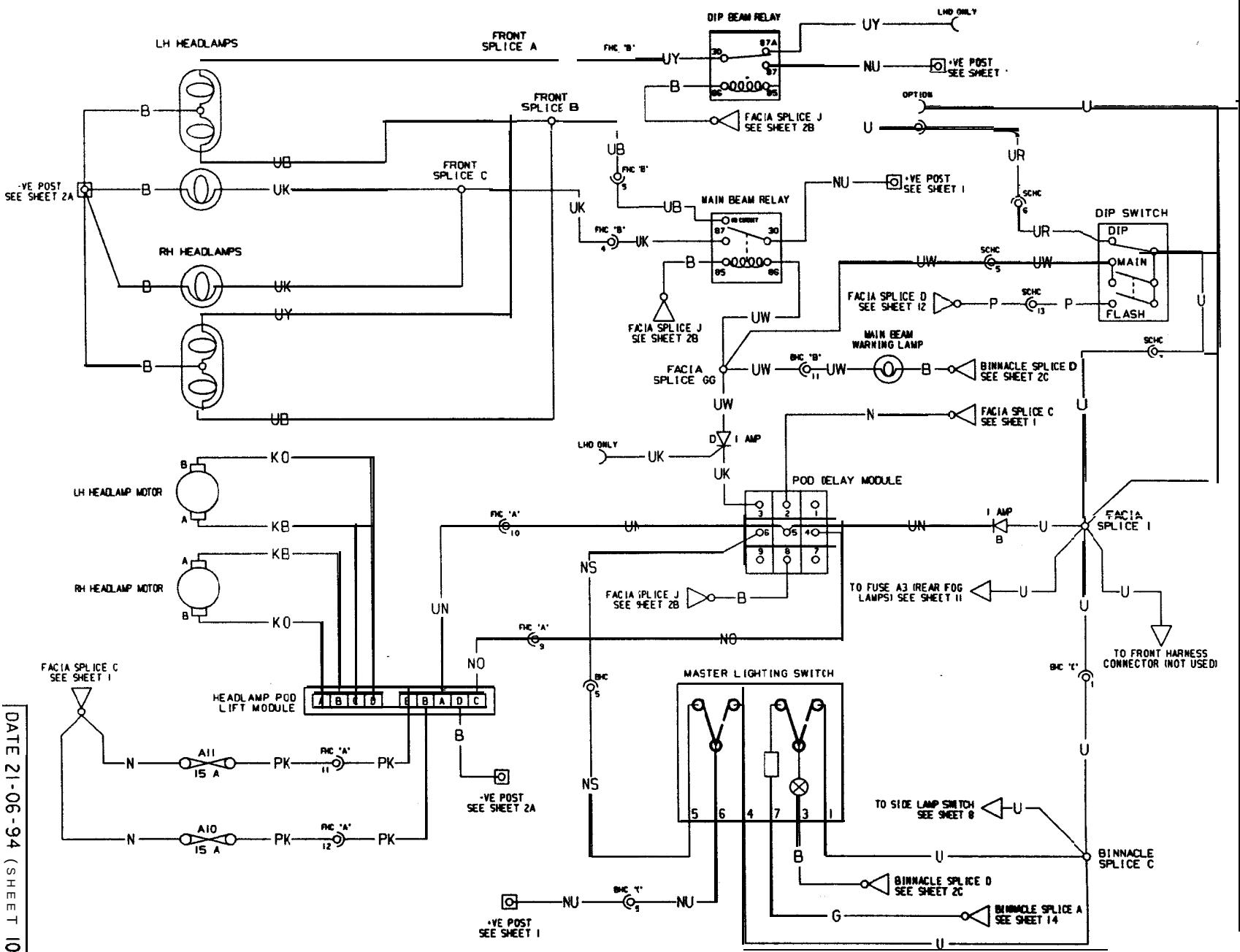

CHECK ENGINE WARNING LAMP
LOW COOLANT LEVEL SWITCH
REAR SPLICE A SEE SHEET 2
LOW COOLANT/ENGINE OVERHEAT WARNING LAMP
TO ALTERNATOR SEE SHEET 4
TO IGNITION WARNING LAMP SEE SHEET 4
OIL PRESSURE WARNING LAMP
BINNACLE SPLICE A SEE SHEET 14
OIL WARNING LAMP/RPM RELAY
OIL PRESSURE TRANSDUCER
ENGINE BLOCK
TO SOLENOID RELAY SEE SHEET 5
BATTERY
TO ENGINE MANAGEMENT SPLICE J SEE SHEET 5
TO OIL PRESSURE GAUGE SEE SHEET 14
TO DERM (SIR) SEE SHEET 23
TO ABS CONTROLLER SEE SHEET 22
FACIA SPLICE L
ALDL (REAR)
REAR SPLICE C
REAR SPLICE A SEE SHEET 2
FACIA HARNESS SPLICE A SEE SHEET 20
ALDL (FRONT)
REAR SPLICE B
FACIA SPLICE CC SEE SHEET 25
ECM
J2-B1
J1-A3
J2-B7
J2-B5
J2-B3

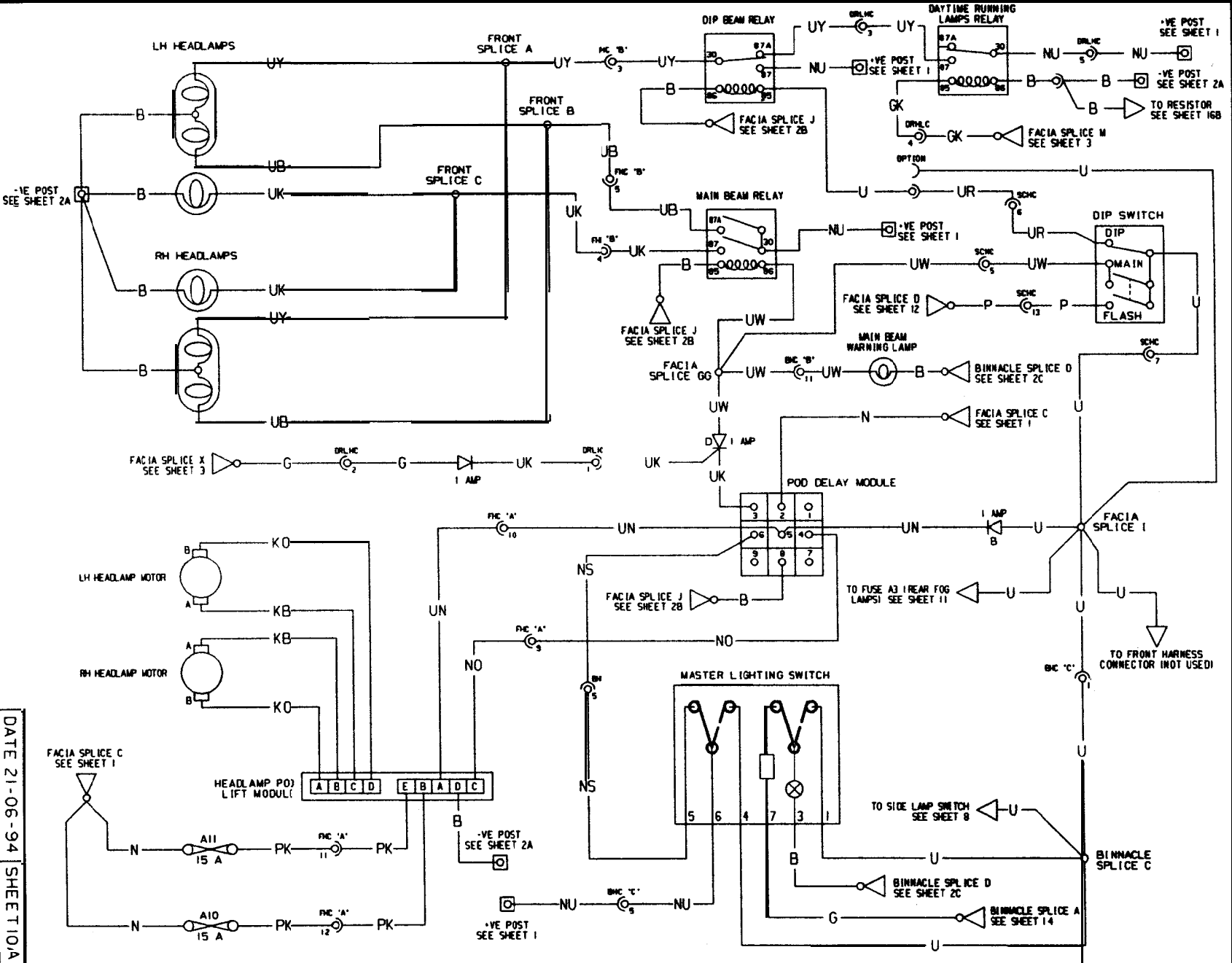
SHEET 7 RADIATOR FANS & AIR CONDITIONING (REVISED HARNESS MY94) ISSUE A

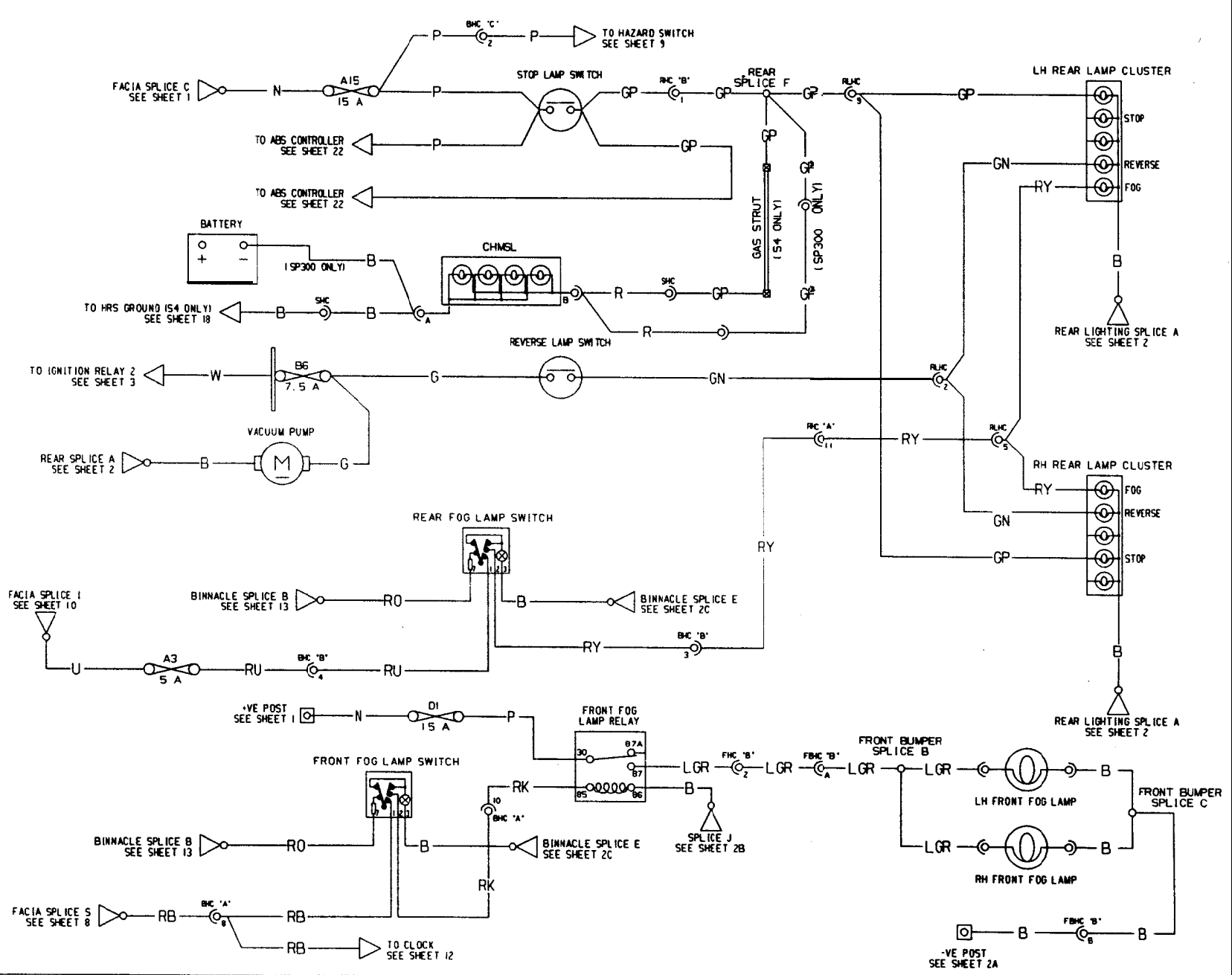

LH FAN MOTOR
MIDDLE FAN MOTOR
RH FAN MOTOR
D4 10 A
D3 10 A
D2 10 A
B
BG
BN
RAD FAN SPLICE A
RAD FAN SPLICE B
-VE POST SEE SHEET 2A
+VE POST SEE SHEET 1
RADIATOR FAN RELAY
87 30 85 86
N
G
BO
FACIA SPLICE X SEE SHEET 3
A8 15 A
GK
TO FACIA SPLICE M (LHD) TO START D-O RELAY (RHD) SEE SHEET 3
YLG
FAN SPEED SWITCH
GU
GS
GY
LGU
A9 7.5 A
AC LOW PRESSURE CUT-OUT SWITCH
KU
K
FACIA SPLICE BB SEE SHEET 2A
B5 10 A
W
AC COMPRESSOR RELA
30 87A 87 85 86
GN
U
TO IGNITION RELAY 2 SEE SHEET 3
AC COMPRESSOR CLUTCH
ENGINE BLOCK
INTERIOR FAN MOTOR
Y G U
1 2 3 4
R W
ACU CONTROL MODULE
ACU TEMP CONTROL
ACU THERMISTOR
ECM
JA12 J1-A9 J3-C17

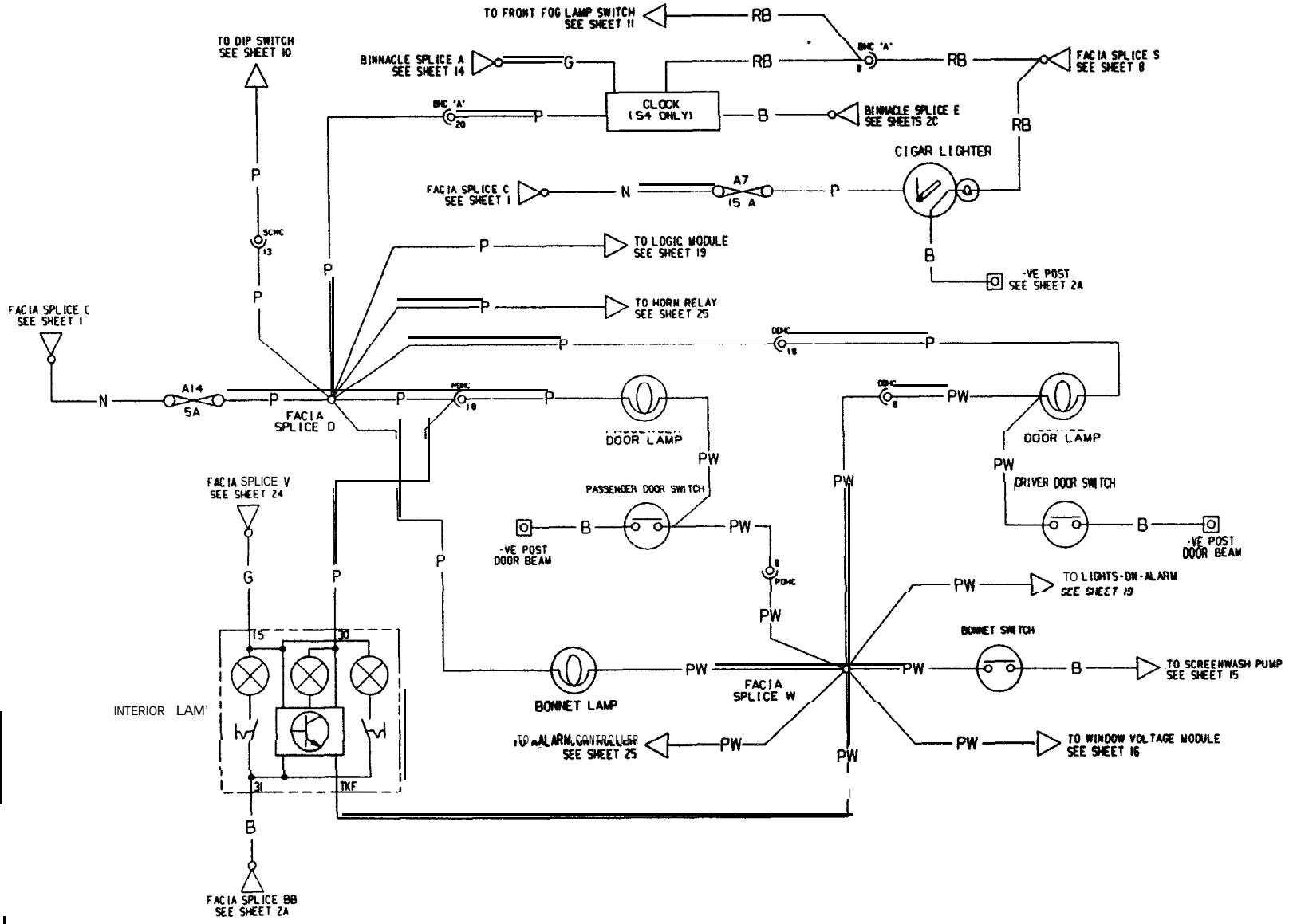

LH FRONT SIDE LAMP
LNFLC
LH FRONT SIDE MARKER LAMP
TO LH FRONT DIRECTION INDICATOR SEE SHEET 9
-VE POST SEE SHEET 2A
FBHC 'A'
FRONT BUMPER SPLICE A
AS 5 A
FACIA SPLICE S
SIDE LAMP SWITCH
BINNACLE SPLICE C SEE SHEET 10
BHC 'C'
+VE POST SEE SHEET 11
BHC 'B'
BINNACLE SPLICE A SEE SHEET 14
TO TACHO AMPLIFIER (SP300 ONLY) SEE SHEET 4
BINNACLE SPLICE D SEE SHEET 2C
TO TACHO AMPLIFIER (SP300 ONLY) SEE SHEET 4
TO RH FRONT DIRECTION INDICATOR SEE SHEET 9
RH FRONT SIDE MARKER LAMP
RH FRONT SIDE LAMP
RHFLC
FHC
TO CLOCK SEE SHEET 12
TO FRONT FOG LAMP SWITCH SEE SHEET 11
TO LOGIC MODULE SEE SHEET 19
TO RADIO SEE SHEET 20
TO CENTRE CONSOLE LAMPS SEE SHEET 13
TO CIGAR LIGHTER SEE SHEET 12
RHC 'A'
RLHC
LH REAR SIDE MARKER LAMP
L H REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
LH LICENCE PLATE LAMP
BATTERY
REAR LIGHTING SPLICE A
RH LICENCE PLATE LAMP
R H REAR LAMP CLUSTER
FOG
REVERSE
TAIL
STOP
D.I.
RH REAR SIDE MARKER LAMP
TO RHEOSTAT MODULE SEE SHEET 13
TO LIGHTS-ON-ALARM SEE SHEET 19
TO BINNACLE SPLICE B SEE SHEET 13
FACIA SPLICE EE

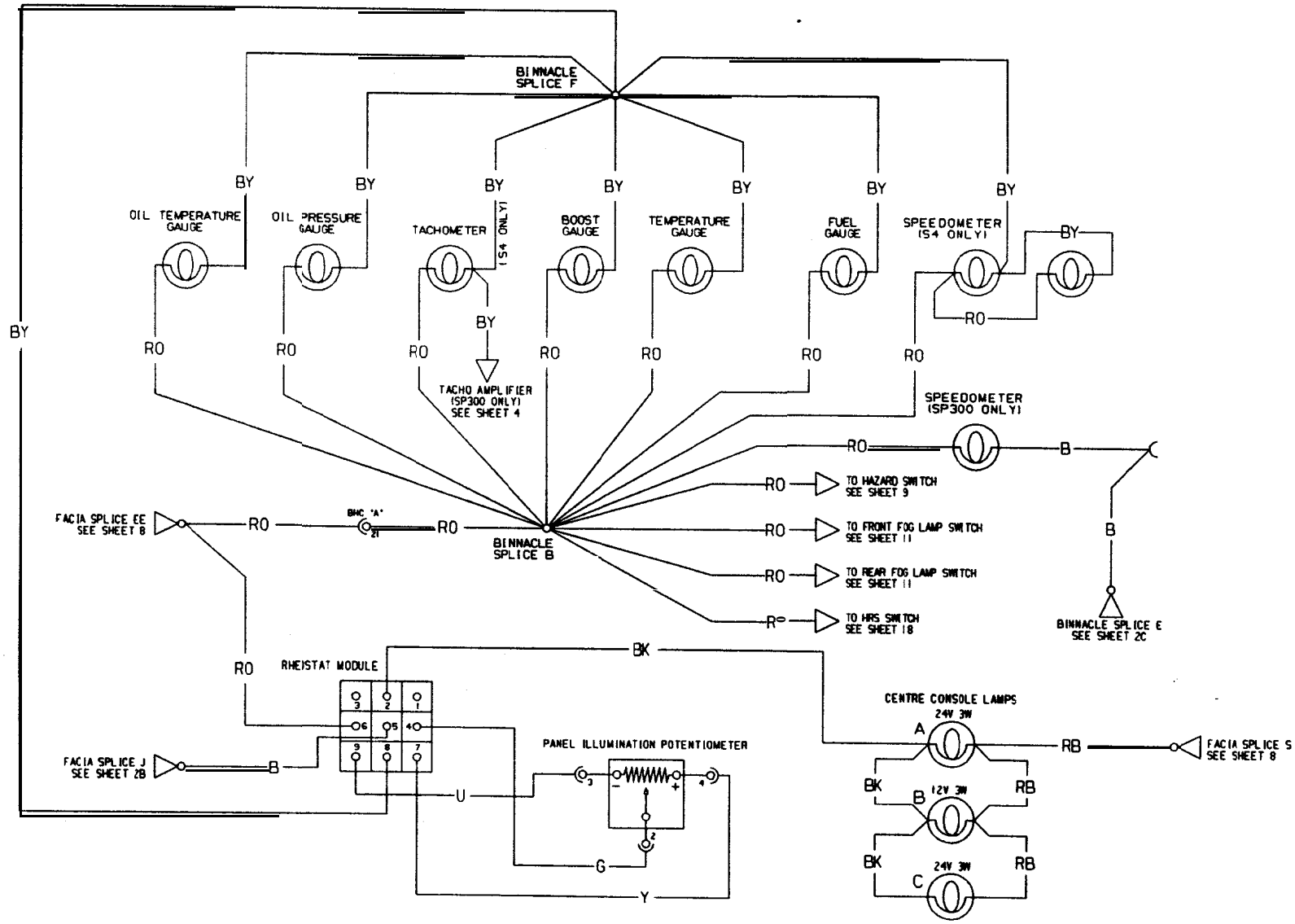

FACIA SPLICE 88 (LHD) SEE SHEET 2A
FACIA SPLICE J (RHD) SEE SHEET 2B
TO ALARM CONTROLLER SEE SHEET 25
RH SIDE REPEATER
FACIA SPLICE E
RH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
RH FRONT DIRECTION INDICATOR
FRONT BUMPER SPLICE A SEE SHEET 8
HAZARD SWITCH
REAR LIGHTING SPLICE A SEE SHEET 8
FACIA SPLICE B SEE SHEET 3
FACIA SPLICE C SEE SHEET 1
A2 7.5 A
A15 15 A
DIRECTION INDICATOR SWITCH
DIRECTION INDICATOR/HAZARD WARNING LAMP
BINNACLE SPLICE E SEE SHEET 2C
HAZARD FLASHER
BINNACLE SPLICE D SEE SHEET 2C
BINNACLE SPLICE B SEE SHEET 13
LH FRONT DIRECTION INDICATOR
LH REAR LAMP CLUSTER
FOG
REVERSE
TAIL
STOP
D.I.
LH SIDE REPEATER
FACIA SPLICE F
FACIA SPLICE 88 SEE SHEET 2A
TO ALARM CONTROLLER SEE SHEET 25
REAR LIGHTING SPLICE A SEE SHEET 8

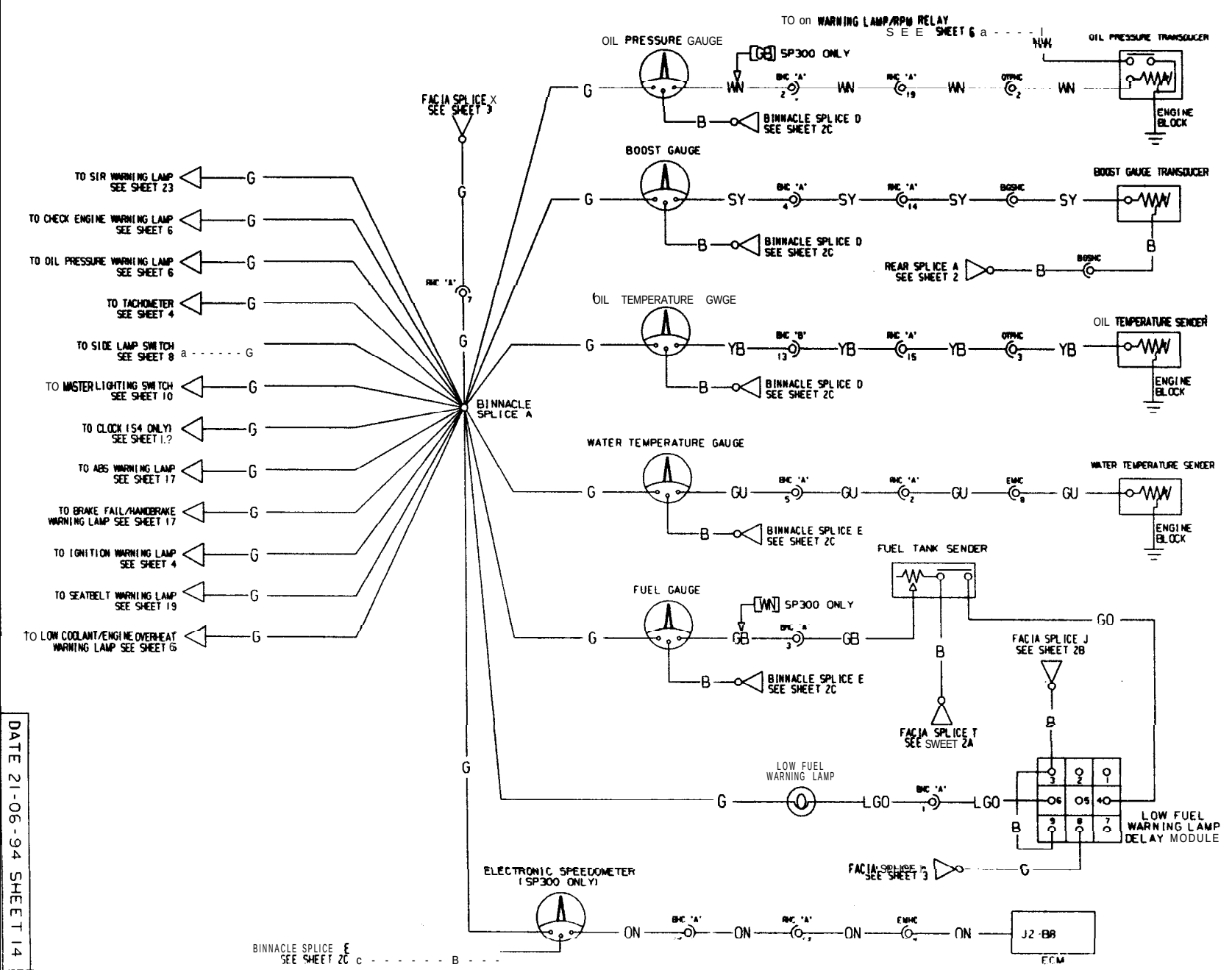

LH HEADLAMPS
FRONT SPLICE A
FRONT SPLICE B
FRONT SPLICE C
-VE POST SEE SHEET 2A
RH HEADLAMPS
DIP BEAM RELAY
LHD ONLY
+VE POST SEE SHEET
FACIA SPLICE J SEE SHEET 2B
OPTION
MAIN BEAM RELAY
+VE POST SEE SHEET 1
DIP SWITCH
DIP
MAIN
FLASH
FACIA SPLICE D SEE SHEET 12
FACIA SPLICE J SEE SHEET 2B
MAIN BEAM WARNING LAMP
FACIA SPLICE GG
BINNACLE SPLICE D SEE SHEET 2C
1 AMP
FACIA SPLICE C SEE SHEET 1
POD DELAY MODULE
FACIA SPLICE I
LH HEADLAMP MOTOR
RH HEADLAMP MOTOR
TO FUSE A3 (REAR FOG LAMPS) SEE SHEET 11
TO FRONT HARNESS CONNECTOR (NOT USED)
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
A11
15 A
A10
15 A
-VE POST SEE SHEET 2A
TO SIDE LAMP SWITCH SEE SHEET 8
BINNACLE SPLICE C
BINNACLE SPLICE D SEE SHEET 2C
BINNACLE SPLICE A SEE SHEET 14
+VE POST SEE SHEET 1

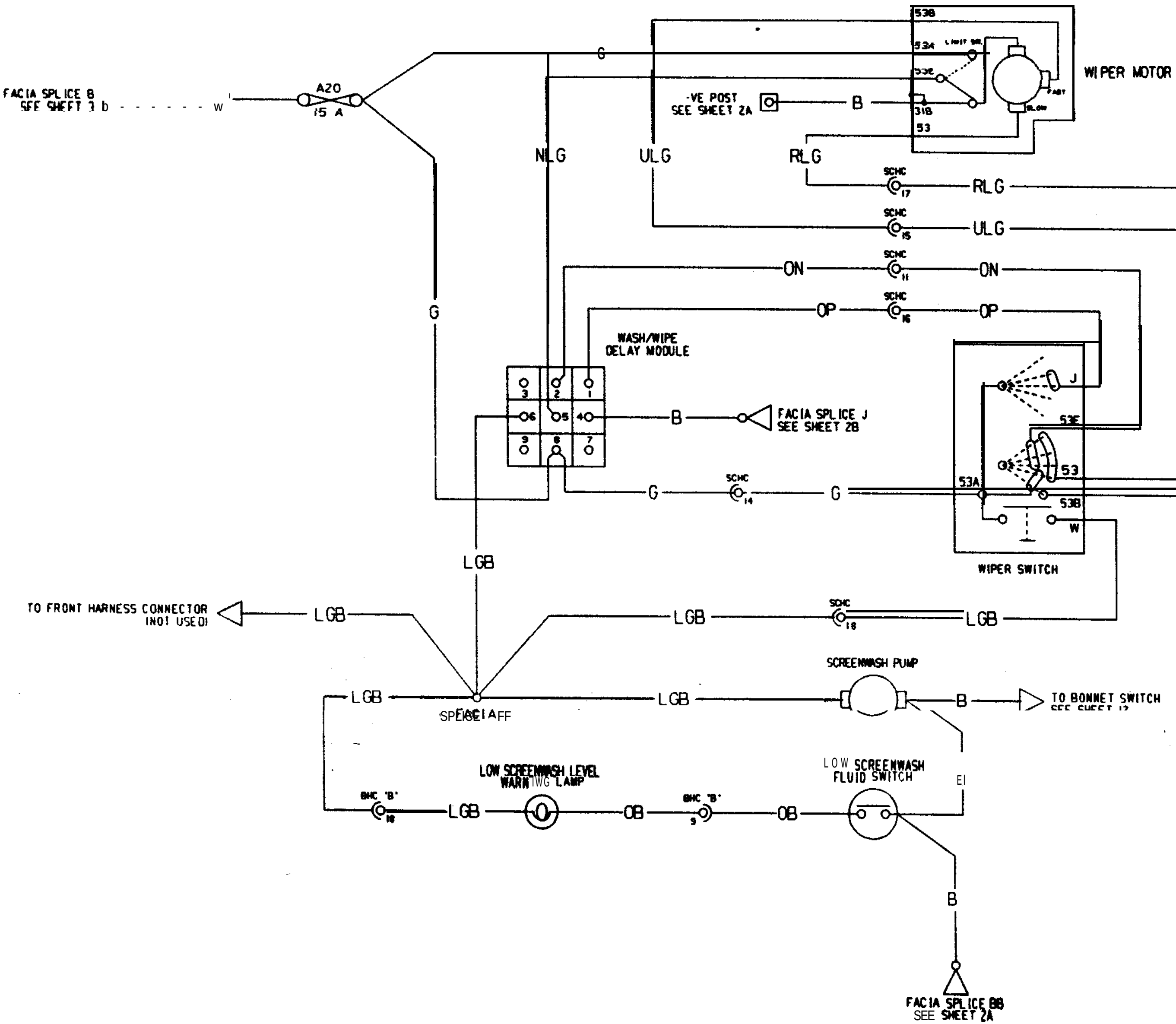

LH HEADLAMPS
RH HEADLAMPS
-VE POST SEE SHEET 2A
FRONT SPLICE A
FRONT SPLICE B
FRONT SPLICE C
DIP BEAM RELAY
DAYTIME RUNNING LAMPS RELAY
MAIN BEAM RELAY
DIP SWITCH
DIP
MAIN
FLASH
+VE POST SEE SHEET 1
-VE POST SEE SHEET 2A
TO RESISTOR SEE SHEET 16B
FACIA SPLICE J SEE SHEET 2B
FACIA SPLICE M SEE SHEET 3
FACIA SPLICE D SEE SHEET 12
FACIA SPLICE GG
MAIN BEAM WARNING LAMP
BINNACLE SPLICE D SEE SHEET 2C
FACIA SPLICE X SEE SHEET 3
1 AMP
POD DELAY MODULE
FACIA SPLICE C SEE SHEET 1
FACIA SPLICE I
TO FUSE A3 (REAR FOG LAMPS) SEE SHEET 11
TO FRONT HARNESS CONNECTOR (NOT USED)
LH HEADLAMP MOTOR
RH HEADLAMP MOTOR
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
TO SIDE LAMP SWITCH SEE SHEET 8
BINNACLE SPLICE C
BINNACLE SPLICE A SEE SHEET 14
A11 15 A
A10 15 A


BHC 'C'
TO HAZARD SWITCH SEE SHEET 9
FACIA SPLICE C SEE SHEET 1
A15 15 A
STOP LAMP SWITCH
REAR SPLICE F
BHC 'B'
RHC
LH REAR LAMP CLUSTER
STOP
REVERSE
FOG
TO ABS CONTROLLER SEE SHEET 22
GAS STRUT (IS4 ONLY)
(SP300 ONLY)
BATTERY
CHMSL
(SP300 ONLY)
TO HRS GROUND (IS4 ONLY) SEE SHEET 18
SHC
REVERSE LAMP SWITCH
REAR LIGHTING SPLICE A SEE SHEET 2
TO IGNITION RELAY 2 SEE SHEET 3
B6 7.5 A
VACUUM PUMP
REAR SPLICE A SEE SHEET 2
RH REAR LAMP CLUSTER
REAR FOG LAMP SWITCH
FACIA SPLICE I SEE SHEET 10
BINNACLE SPLICE B SEE SHEET 13
BINNACLE SPLICE E SEE SHEET 2C
A3 5 A
+VE POST SEE SHEET 1
D1 15 A
FRONT FOG LAMP RELAY
FRONT FOG LAMP SWITCH
FHC 'B'
FBHC 'B'
FRONT BUMPER SPLICE B
FRONT BUMPER SPLICE C
LH FRONT FOG LAMP
RH FRONT FOG LAMP
SPLICE J SEE SHEET 2B
FACIA SPLICE S SEE SHEET 8
TO CLOCK SEE SHEET 12
-VE POST SEE SHEET 2A

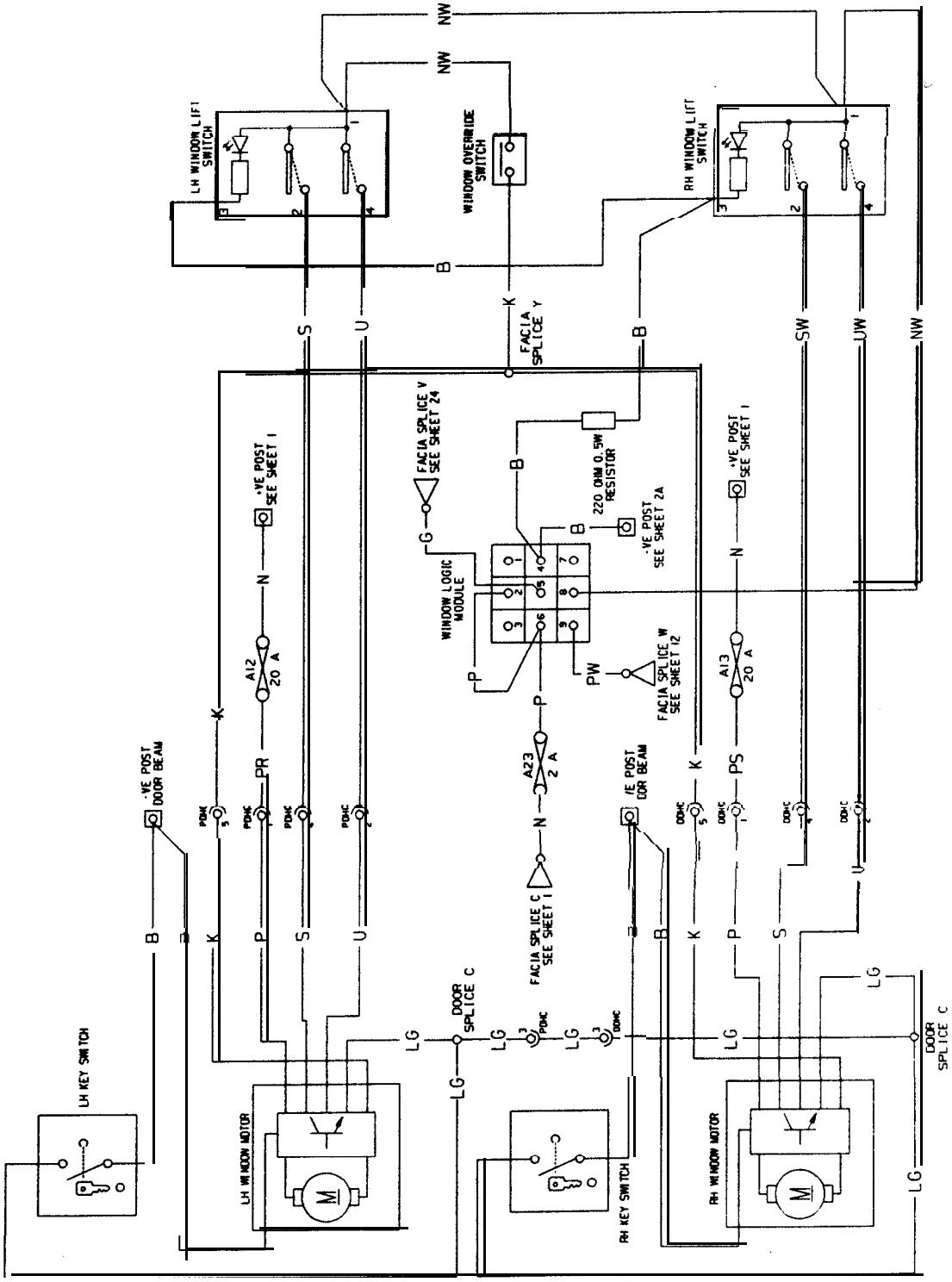

TO FRONT FOG LAMP SWITCH SEE SHEET 11
RB
TO DIP SWITCH SEE SHEET 10
BINNACLE SPLICE A SEE SHEET 14
G
BMC 'A'
RB
RB
FACIA SPLICE S SEE SHEET 8
BMC 'A'
20
P
CLOCK (S4 ONLY)
B
BINNACLE SPLICE E SEE SHEETS 2C
RB
CIGAR LIGHTER
P
FACIA SPLICE C SEE SHEET 1
N
A7
15 A
P
SCMC
13
P
P
TO LOGIC MODULE SEE SHEET 19
B
-VE POST SEE SHEET 2A
P
TO HORN RELAY SEE SHEET 25
FACIA SPLICE C SEE SHEET 1
P
DDMC
18
P
N
A14
5A
P
FACIA SPLICE D
P
PDMC
18
P
DOOR LAMP
PW
DDMC
8
PW
DOOR LAMP
PW
PASSENGER DOOR SWITCH
DRIVER DOOR SWITCH
FACIA SPLICE V SEE SHEET 24
-VE POST DOOR BEAM
B
PW
B
-VE POST DOOR BEAM
G
P
P
8
PDMC
PW
PW
TO LIGHTS-ON-ALARM SEE SHEET 19
BONNET SWITCH
15
30
PW
PW
B
TO SCREENWASH PUMP SEE SHEET 15
BONNET LAMP
FACIA SPLICE W
TO ALARM CONTROLLER SEE SHEET 25
PW
PW
PW
TO WINDOW VOLTAGE MODULE SEE SHEET 16
31
TKF
B
FACIA SPLICE BB SEE SHEET 2A


BINNACLE SPLICE F
BY
OIL TEMPERATURE GAUGE
OIL PRESSURE GAUGE
TACHOMETER (S4 ONLY)
BOOST GAUGE
TEMPERATURE GAUGE
FUEL GAUGE
SPEEDOMETER (S4 ONLY)
RO
TACHO AMPLIFIER (SP300 ONLY) SEE SHEET 4
SPEEDOMETER (SP300 ONLY)
B
TO HAZARD SWITCH SEE SHEET 9
TO FRONT FOG LAMP SWITCH SEE SHEET 11
TO REAR FOG LAMP SWITCH SEE SHEET 11
TO HRS SWITCH SEE SHEET 18
BINNACLE SPLICE E SEE SHEET 2C
FACIA SPLICE EE SEE SHEET 8
BMC "A"
BINNACLE SPLICE B
RHEISTAT MODULE
BK
CENTRE CONSOLE LAMPS
24V 3W
12V 3W
RB
FACIA SPLICE S SEE SHEET 8
FACIA SPLICE J SEE SHEET 2B
PANEL ILLUMINATION POTENTIOMETER
U
G
Y

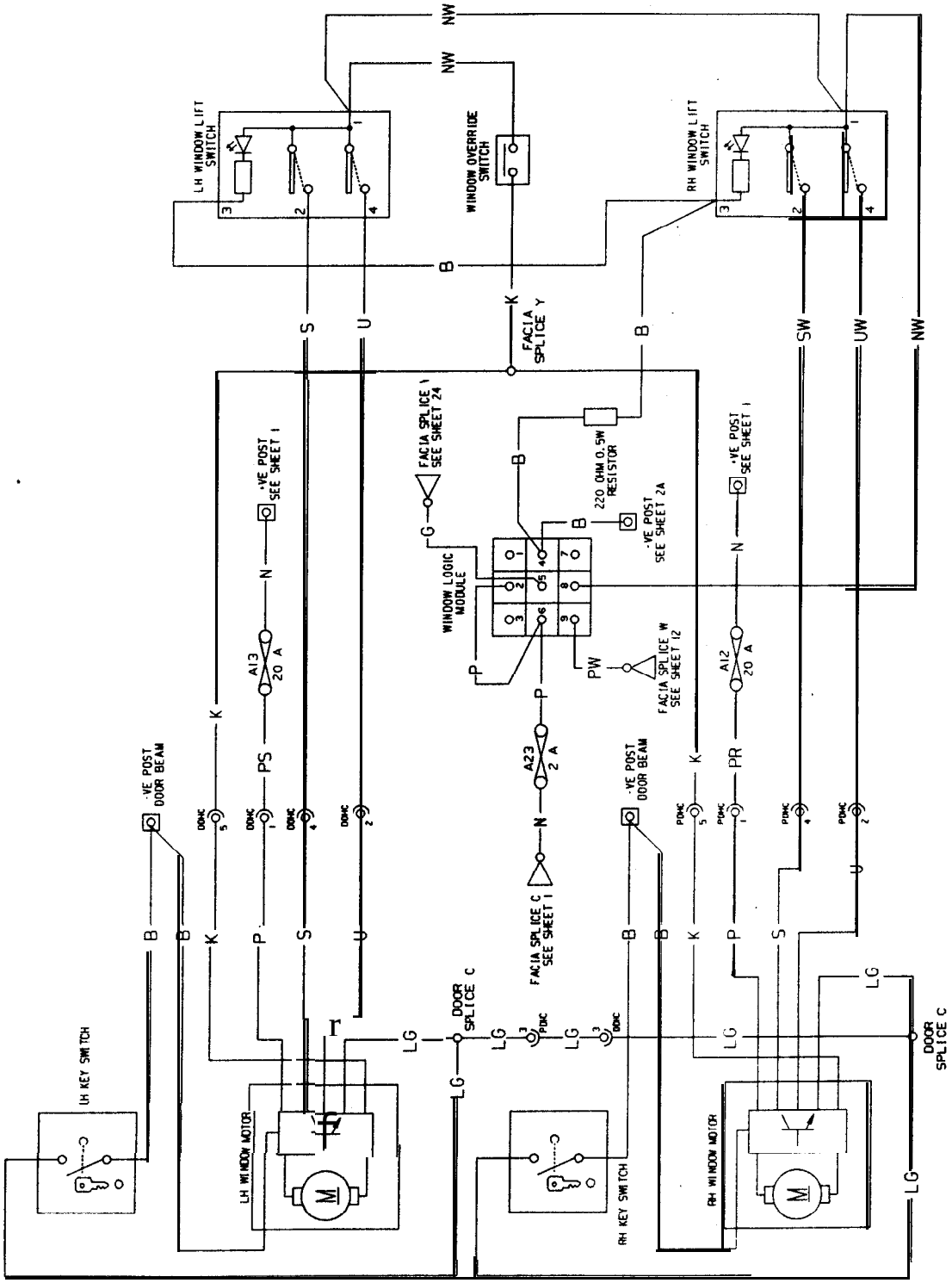

TO on WARNING LAMP/RPM RELAY
SEE SHEET 6 a
OIL PRESSURE GAUGE
SP300 ONLY
OIL PRESSURE TRANSDUCER
ENGINE BLOCK
FACIA SPLICE X
SEE SHEET 3
BINNACLE SPLICE D
SEE SHEET 2C
BOOST GAUGE
BOOST GAUGE TRANSDUCER
REAR SPLICE A
SEE SHEET 2
OIL TEMPERATURE GWGE
OIL TEMPERATURE SENDER
TO SIR WARNING LAMP SEE SHEET 23
TO CHECK ENGINE WARNING LAMP SEE SHEET 6
TO OIL PRESSURE WARNING LAMP SEE SHEET 6
TO TACHOMETER SEE SHEET 4
TO SIDE LAMP SWITCH SEE SHEET 8
TO MASTER LIGHTING SWITCH SEE SHEET 10
TO CLOCK (S4 ONLY) SEE SHEET 12
TO ABS WARNING LAMP SEE SHEET 17
TO BRAKE FAIL/HANDBRAKE WARNING LAMP SEE SHEET 17
TO IGNITION WARNING LAMP SEE SHEET 4
TO SEATBELT WARNING LAMP SEE SHEET 19
TO LOW COOLANT/ENGINE OVERHEAT WARNING LAMP SEE SHEET 6
BINNACLE SPLICE A
WATER TEMPERATURE GAUGE
WATER TEMPERATURE SENDER
FUEL GAUGE
FUEL TANK SENDER
FACIA SPLICE T
SEE SWEET 2A
FACIA SPLICE J
SEE SHEET 2B
LOW FUEL WARNING LAMP
LOW FUEL WARNING LAMP DELAY MODULE
FACIA SPLICE P
SEE SHEET 3
ELECTRONIC SPEEDOMETER (SP300 ONLY)
J2-B8
ECM
BINNACLE SPLICE E
SEE SHEET 2C


WIPER MOTOR
53B
53A
53E
31B
53
LIMIT SW.
FAST
SLOW
-VE POST
SEE SHEET 2A
FACIA SPLICE B
SEE SHEET 3 b
W
A20
15 A
G
NLG
ULG
RLG
B
SCHC 17
SCHC 15
SCHC 11
SCHC 16
SCHC 14
SCHC 18
ON
OP
WASH/WIPE
DELAY MODULE
FACIA SPLICE J
SEE SHEET 2B
WIPER SWITCH
J
53E
53
53A
53B
W
LGB
TO FRONT HARNESS CONNECTOR
(NOT USED)
FACIA SPLICE FF
SCREENWASH PUMP
TO BONNET SWITCH
LOW SCREENWASH LEVEL
WARNING LAMP
LOW SCREENWASH
FLUID SWITCH
BHC 'B' 18
BHC 'B' 9
OB
FACIA SPLICE BB
SEE SHEET 2A

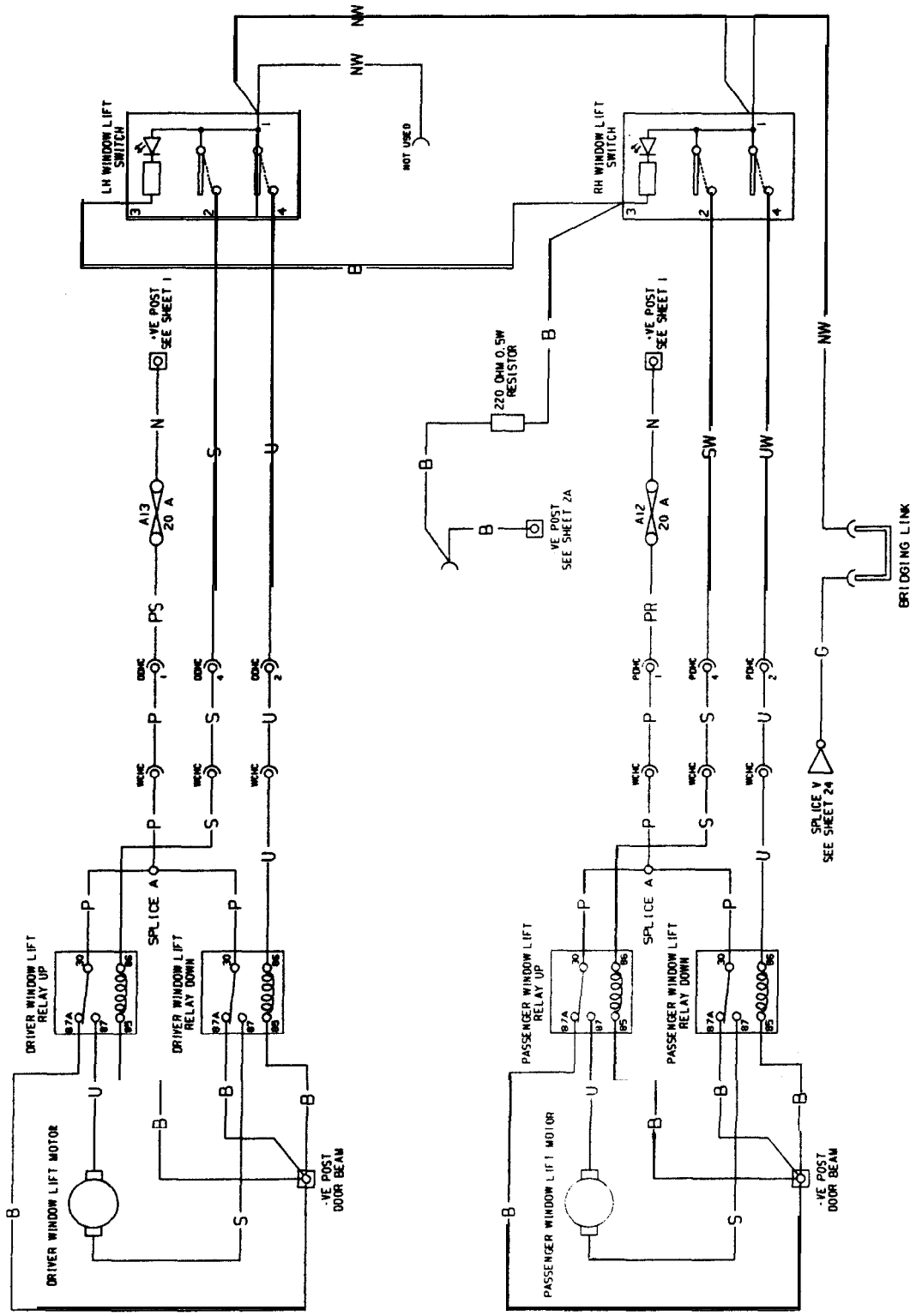
SHEET 16 | WINDOW LIFT (RHD -ONE TOUCH SYSTEM) (REVISED HARNESS MY94) | ISSUE A

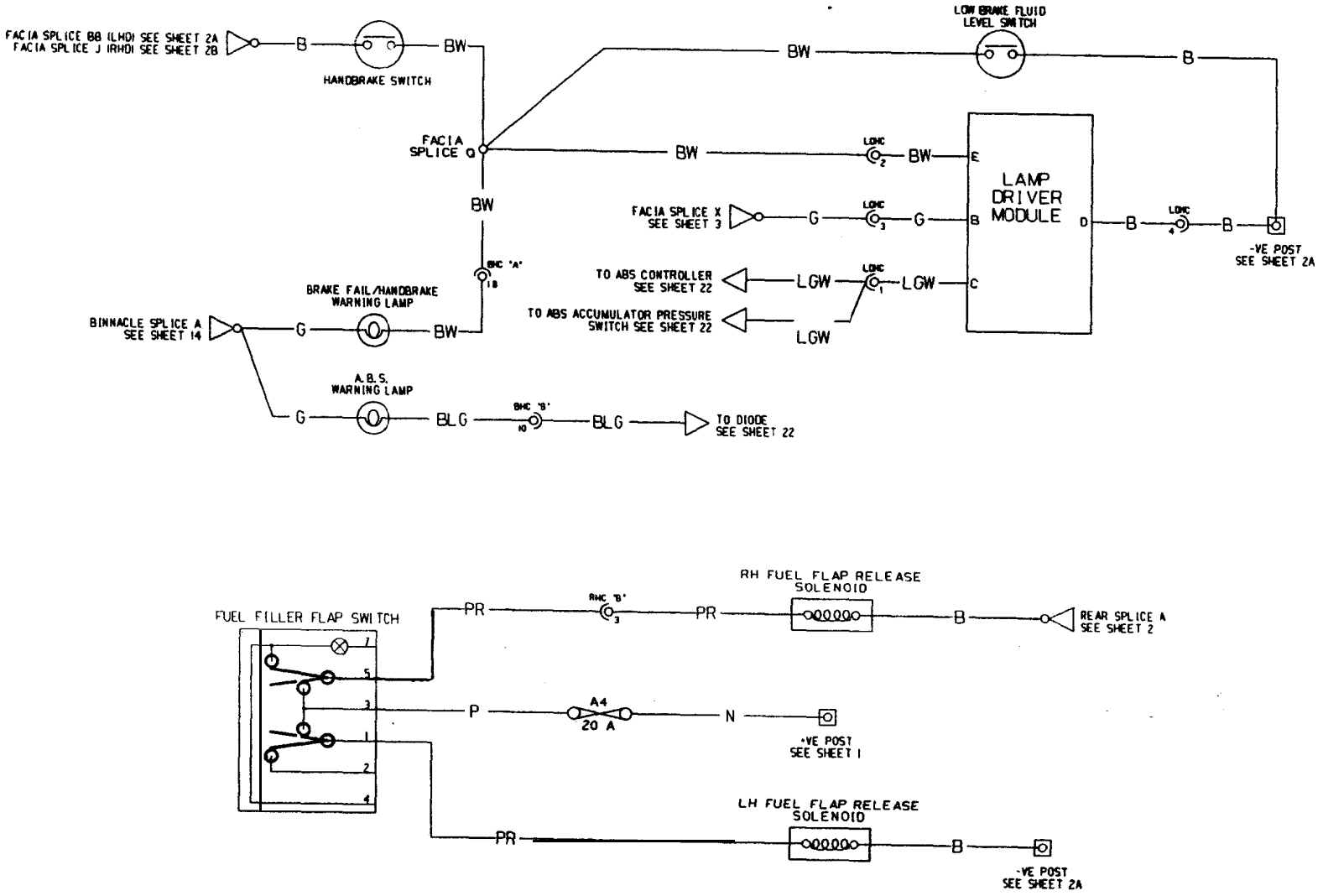


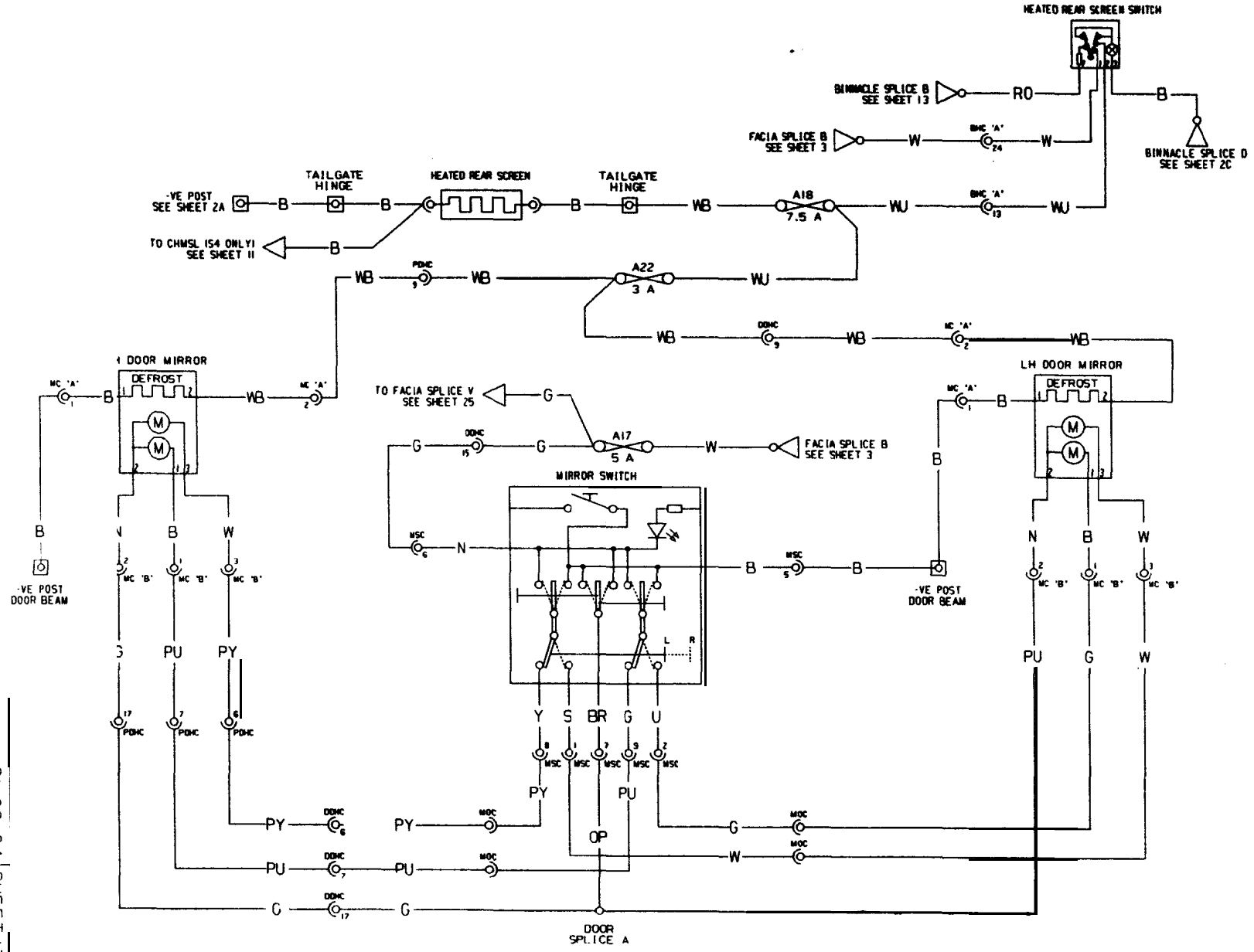
SHEET 16A | WINDOW LIFT (LHD • ONE TOUCH SYSTEM1 (REVISED HARNESS MY941 | ISSUE A

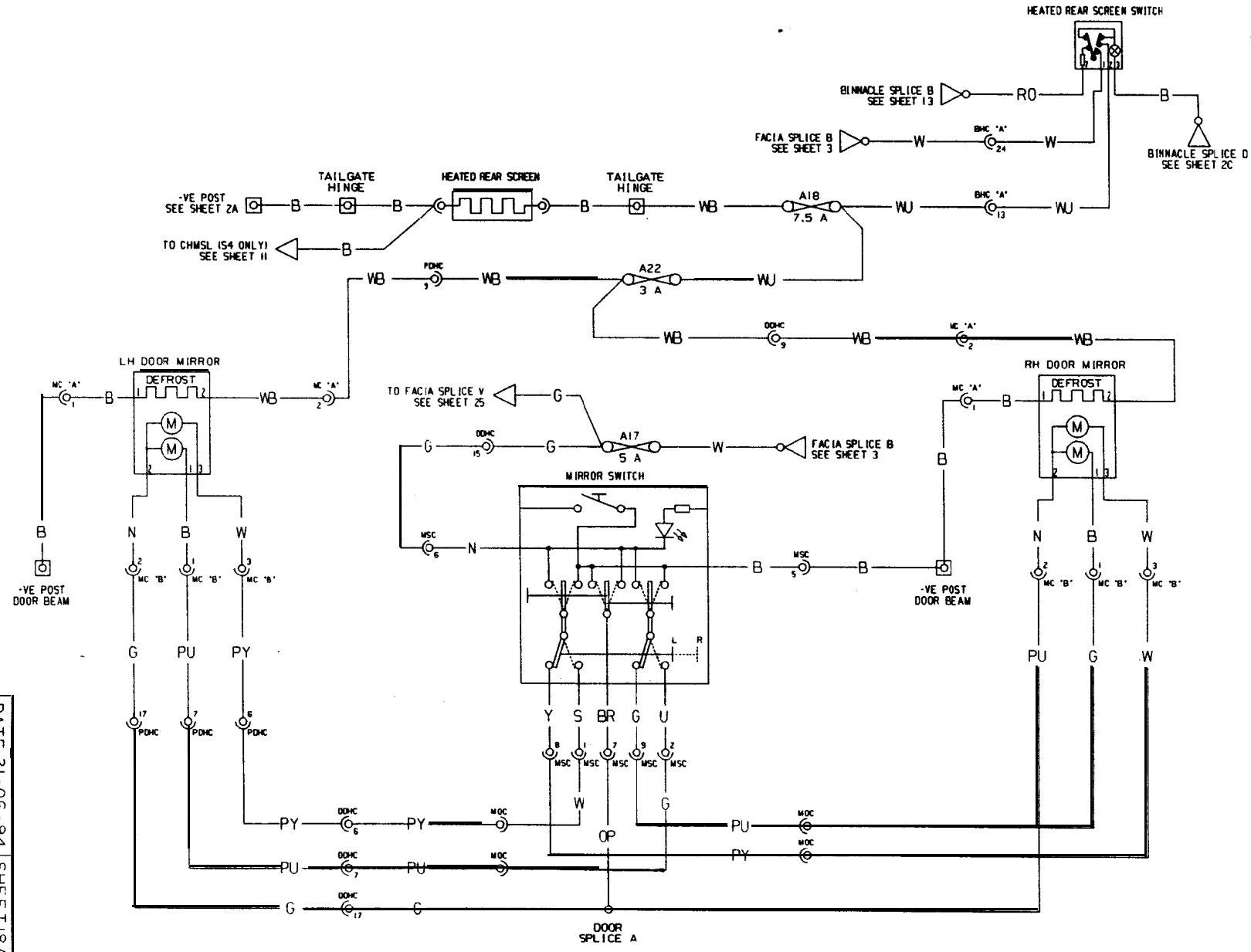


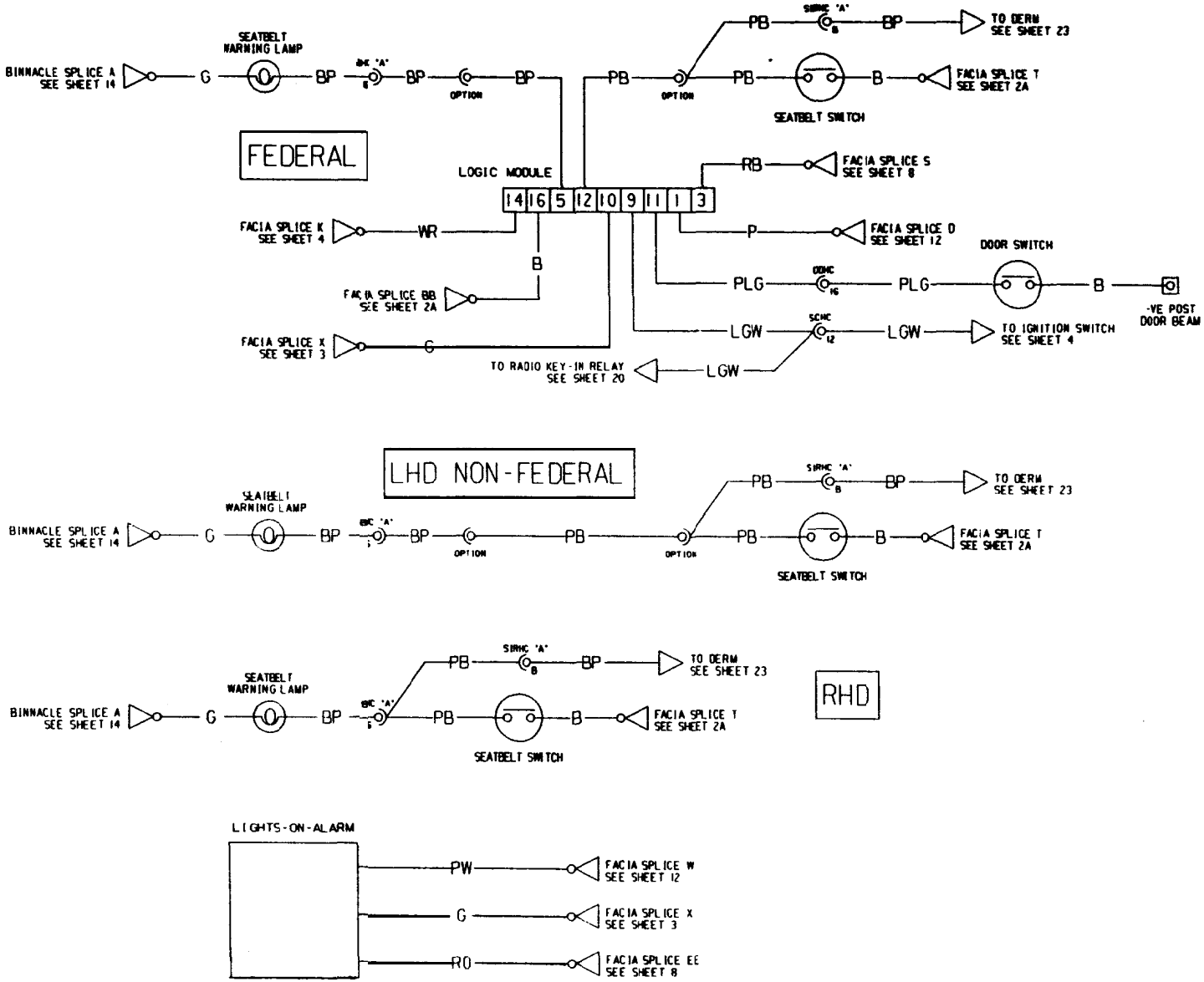
SHEET 16B | WINDOW LIFT (LHD • NON ONE TOUCH SYSTEM) (REVISED HARNESS MY94) | ISSUE A

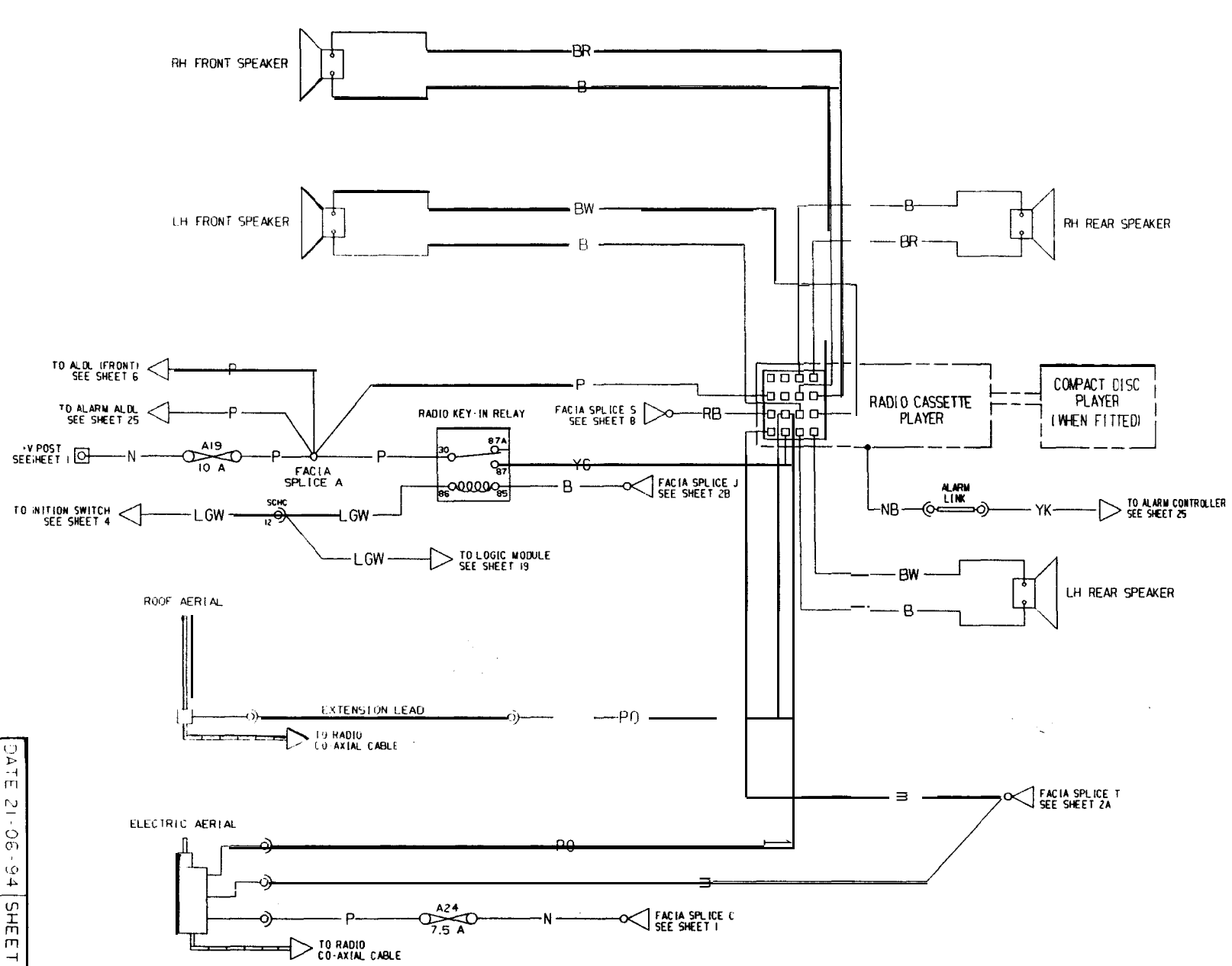



FACIA SPLICE BB (LHD) SEE SHEET 2A
FACIA SPLICE J (RHD) SEE SHEET 2B
B
HANDBRAKE SWITCH
BW
LOW BRAKE FLUID LEVEL SWITCH
FACIA SPLICE Q
LDHC
LAMP DRIVER MODULE
FACIA SPLICE X SEE SHEET 3
G
TO ABS CONTROLLER SEE SHEET 22
LGW
TO ABS ACCUMULATOR PRESSURE SWITCH SEE SHEET 22
-VE POST SEE SHEET 2A
BHC 'A'
BRAKE FAIL/HANDBRAKE WARNING LAMP
BINNACLE SPLICE A SEE SHEET 14
A.B.S. WARNING LAMP
BLG
BHC 'B'
TO DIODE SEE SHEET 22
FUEL FILLER FLAP SWITCH
PR
RH FUEL FLAP RELEASE SOLENOID
REAR SPLICE A SEE SHEET 2
P
A4
20 A
N
+VE POST SEE SHEET 1
LH FUEL FLAP RELEASE SOLENOID

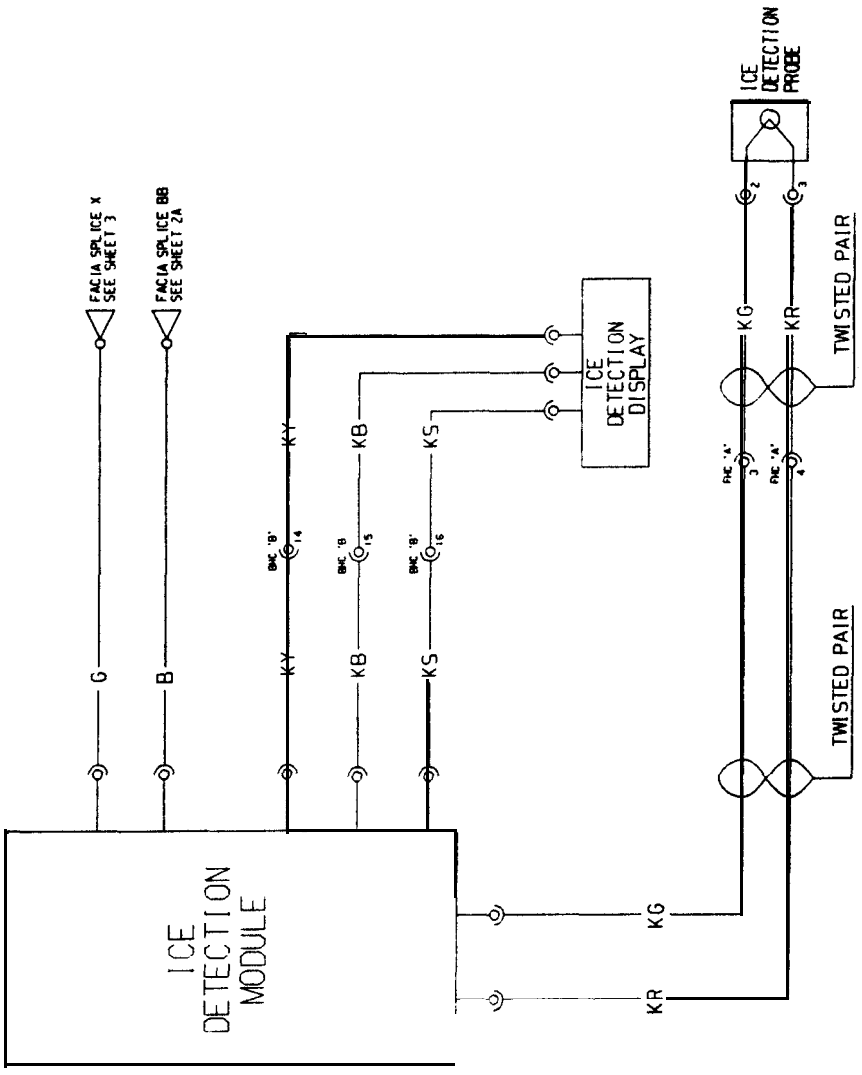

HEATED REAR SCREEN SWITCH
BINNACLE SPLICE B SEE SHEET 13
RO
B
BINNACLE SPLICE D SEE SHEET 2C
FACIA SPLICE B SEE SHEET 3
W
BHC 'A' 24
W
-VE POST SEE SHEET 2A
TAILGATE HINGE
B
HEATED REAR SCREEN
TAILGATE HINGE
WB
A18 7.5 A
WU
BHC 'A' 13
WU
TO CHMSL (S4 ONLY) SEE SHEET 11
B
PDHC 9
WB
A22 3 A
WU
DDHC 9
WB
MC 'A' 2
WB
LH DOOR MIRROR
DEFROST
MC 'A' 1
B
MC 'A' 2
WB
TO FACIA SPLICE V SEE SHEET 25
G
DDHC 15
G
A17 5 A
W
FACIA SPLICE B SEE SHEET 3
MIRROR SWITCH
MSC 6
N
B
MSC 5
B
-VE POST DOOR BEAM
B
-VE POST DOOR BEAM
N
B
W
MC 'B'
PU
G
W
G
PU
PY
PDHC 17
PDHC 7
PDHC 6
Y
S
BR
G
U
MSC 8
MSC 1
MSC 7
MSC 9
MSC 2
PY
PU
OP
PY
DDHC 6
PY
MOC
G
MOC
PU
DDHC 7
PU
MOC
W
MOC
G
DDHC 17
G
DOOR SPLICE A

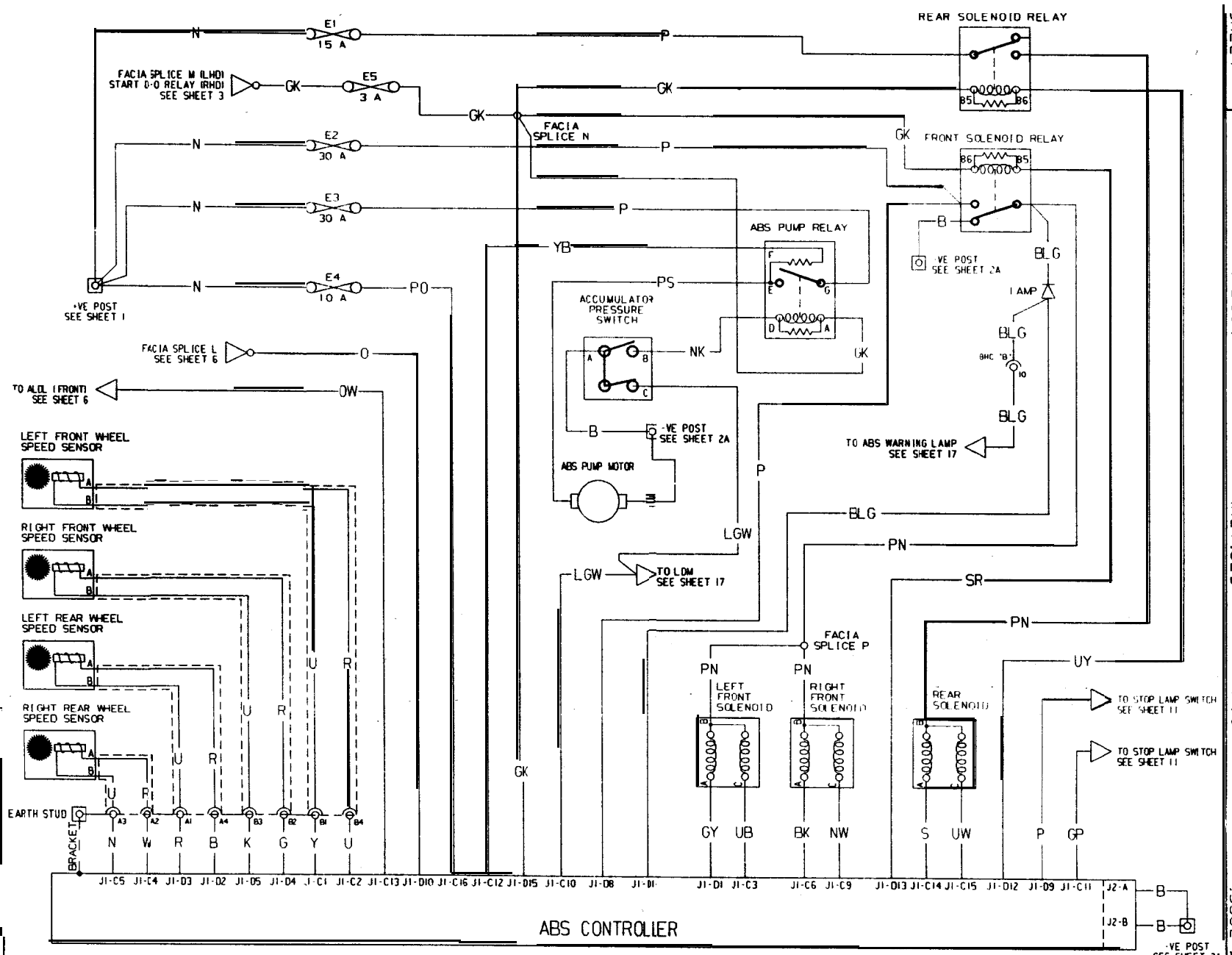

HEATED REAR SCREEN SWITCH
BINNACLE SPLICE B SEE SHEET 13
FACIA SPLICE B SEE SHEET 3
BINNACLE SPLICE D SEE SHEET 2C
-VE POST SEE SHEET 2A
TAILGATE HINGE
HEATED REAR SCREEN
TAILGATE HINGE
A18 7.5 A
TO CHMSL (S4 ONLY) SEE SHEET 11
A22 3 A
A17 5 A
LH DOOR MIRROR
DEFROST
RH DOOR MIRROR
DEFROST
TO FACIA SPLICE V SEE SHEET 25
MIRROR SWITCH
-VE POST DOOR BEAM
-VE POST DOOR BEAM
DOOR SPLICE A


FEDERAL
SEATBELT WARNING LAMP
BINNACLE SPLICE A SEE SHEET 14
G
BP
BHC 'A'
OPTION
PB
SRHC 'A'
TO DERM SEE SHEET 23
SEATBELT SWITCH
FACIA SPLICE T SEE SHEET 2A
LOGIC MODULE
14 16 5 12 10 9 11 1 3
RB
FACIA SPLICE S SEE SHEET 8
FACIA SPLICE K SEE SHEET 4
WR
B
FACIA SPLICE BB SEE SHEET 2A
P
FACIA SPLICE D SEE SHEET 12
DOOR SWITCH
PLG
DDHC
-VE POST DOOR BEAM
FACIA SPLICE X SEE SHEET 3
LGW
SCHC
TO IGNITION SWITCH SEE SHEET 4
TO RADIO KEY-IN RELAY SEE SHEET 20
LHD NON-FEDERAL
RHD
LIGHTS-ON-ALARM
PW
FACIA SPLICE W SEE SHEET 12
FACIA SPLICE X SEE SHEET 3
RO
FACIA SPLICE EE SEE SHEET 8

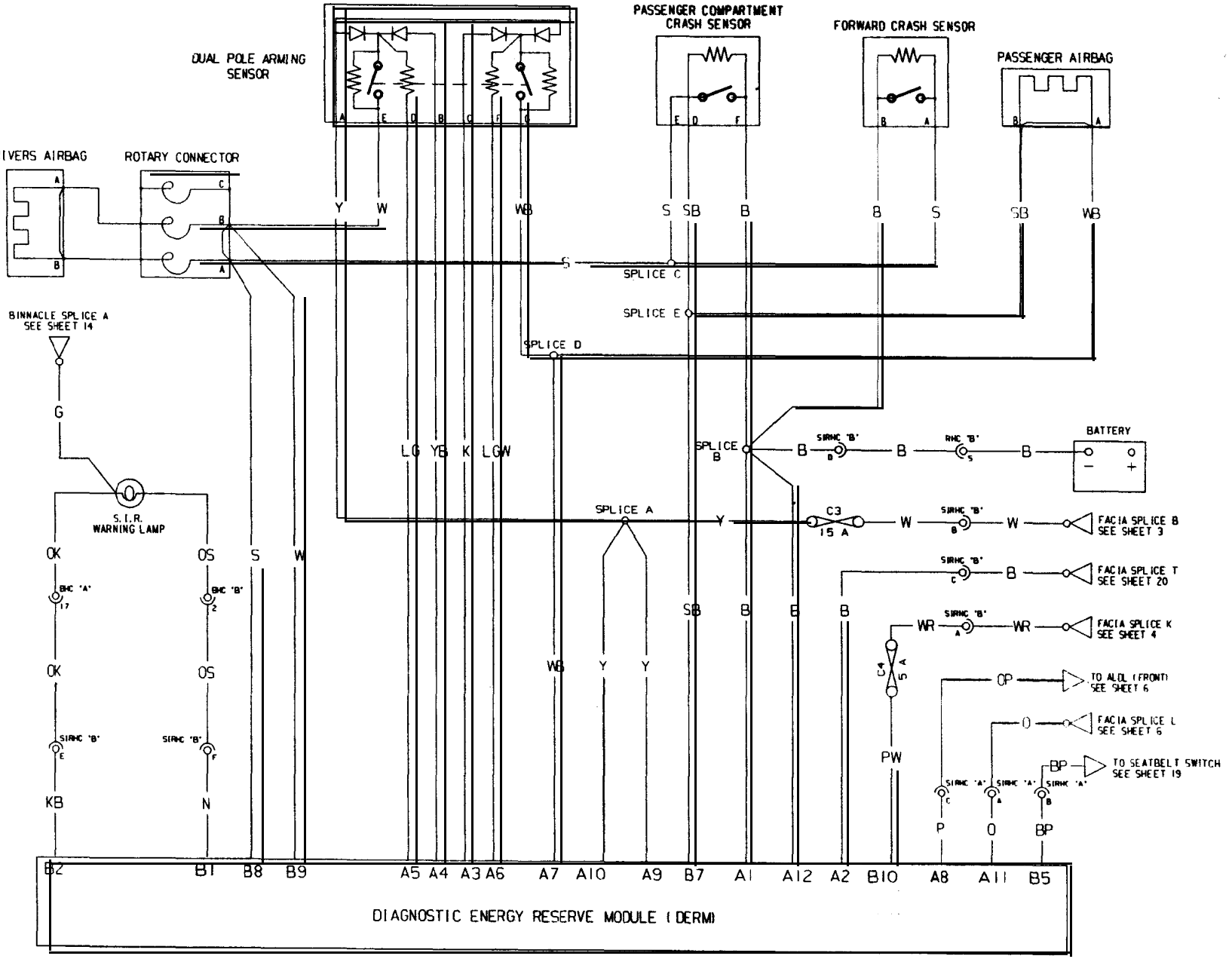

RH FRONT SPEAKER
BR
B
LH FRONT SPEAKER
BW
B
B
BR
RH REAR SPEAKER
TO ALDL (FRONT) SEE SHEET 6
P
TO ALARM ALDL SEE SHEET 25
P
P
RADIO KEY-IN RELAY
FACIA SPLICE S SEE SHEET 8
RB
RADIO CASSETTE PLAYER
COMPACT DISC PLAYER (WHEN FITTED)
+V POST SEE SHEET 1
N
A19
10 A
P
FACIA SPLICE A
P
30
87A
87
YG
86
85
B
FACIA SPLICE J SEE SHEET 2B
TO IGNITION SWITCH SEE SHEET 4
LGW
SCMC
12
LGW
LGW
TO LOGIC MODULE SEE SHEET 19
ALARM LINK
NB
YK
TO ALARM CONTROLLER SEE SHEET 25
BW
B
LH REAR SPEAKER
ROOF AERIAL
EXTENSION LEAD
PO
TO RADIO CO-AXIAL CABLE
FACIA SPLICE T SEE SHEET 2A
ELECTRIC AERIAL
PO
P
A24
7.5 A
N
FACIA SPLICE C SEE SHEET 1
TO RADIO CO-AXIAL CABLE

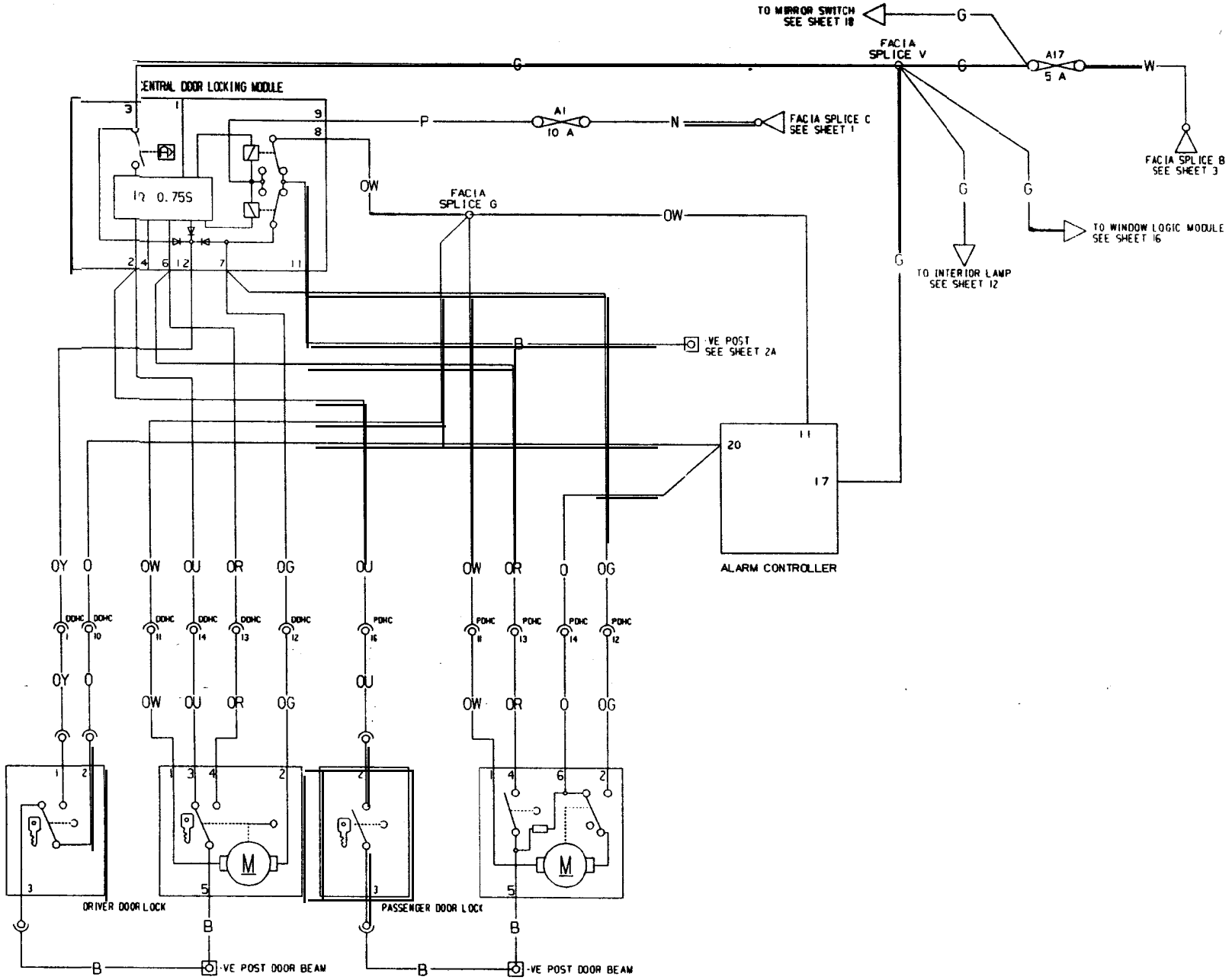
SHEET 21 ICE DETECTION SYSTEM (REVISED HARNESS MY94) ISSUE A

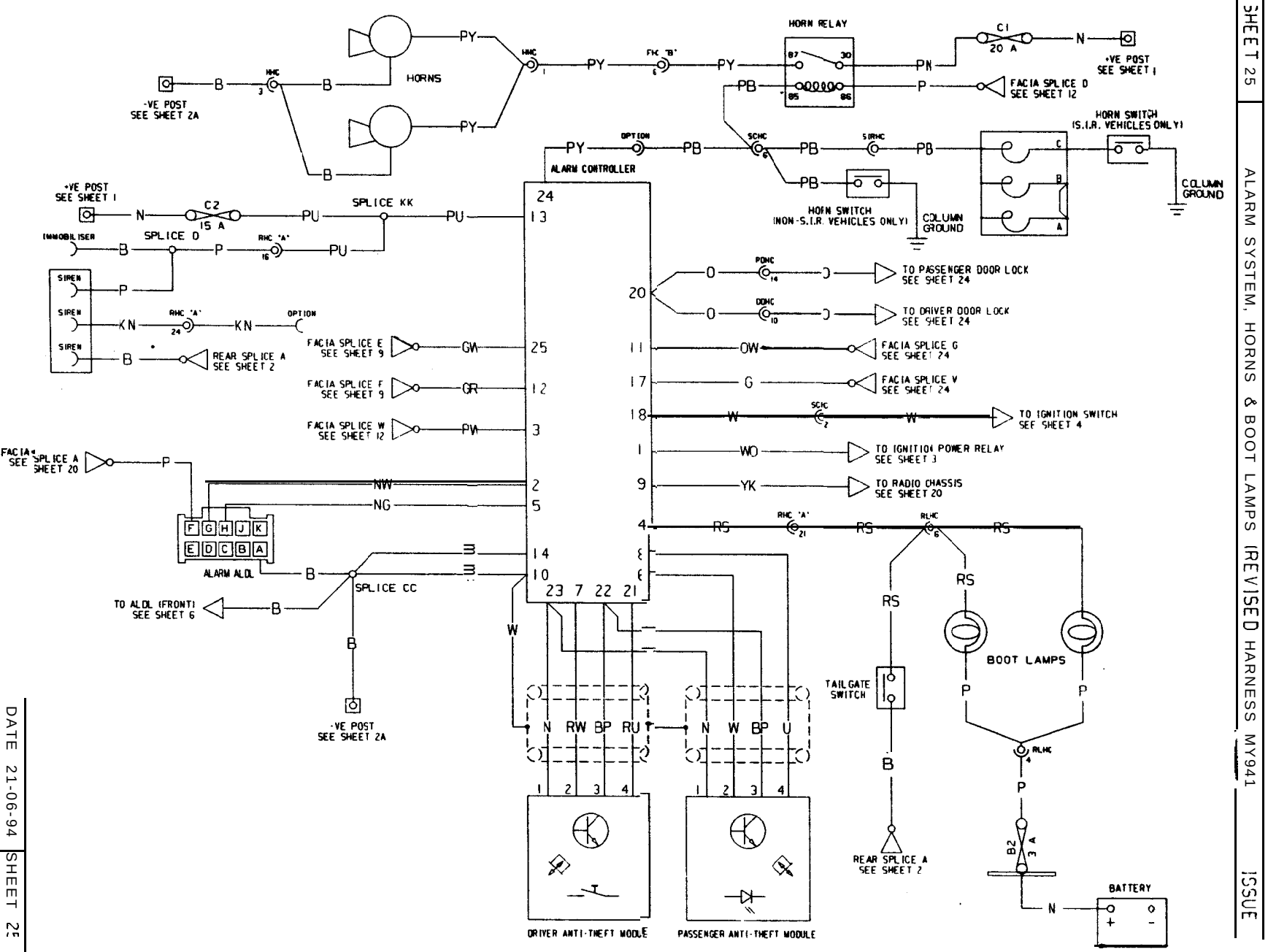




Lotus Service Note


DUAL POLE ARMING SENSOR
PASSENGER COMPARTMENT CRASH SENSOR
FORWARD CRASH SENSOR
PASSENGER AIRBAG
DRIVERS AIRBAG
ROTARY CONNECTOR
BINNACLE SPLICE A SEE SHEET 14
SPLICE C
SPLICE E
SPLICE D
SPLICE B
SPLICE A
BATTERY
S.I.R. WARNING LAMP
FACIA SPLICE B SEE SHEET 3
FACIA SPLICE T SEE SHEET 20
FACIA SPLICE K SEE SHEET 4
TO ALDL (FRONT) SEE SHEET 6
FACIA SPLICE L SEE SHEET 6
TO SEATBELT SWITCH SEE SHEET 19
DIAGNOSTIC ENERGY RESERVE MODULE (DERM)


TO MIRROR SWITCH SEE SHEET 18
FACIA SPLICE V
A17 5 A
FACIA SPLICE B SEE SHEET 3
CENTRAL DOOR LOCKING MODULE
A1 10 A
FACIA SPLICE C SEE SHEET 1
FACIA SPLICE G
TO WINDOW LOGIC MODULE SEE SHEET 16
TO INTERIOR LAMP SEE SHEET 12
-VE POST SEE SHEET 2A
ALARM CONTROLLER
DRIVER DOOR LOCK
PASSENGER DOOR LOCK
-VE POST DOOR BEAM
-VE POST DOOR BEAM


HORNS
-VE POST SEE SHEET 2A
HORN RELAY
+VE POST SEE SHEET 1
FACIA SPLICE D SEE SHEET 12
HORN SWITCH (S.I.R. VEHICLES ONLY)
COLUMN GROUND
HORN SWITCH (NON-S.I.R. VEHICLES ONLY)
ALARM CONTROLLER
SPLICE KK
SPLICE D
IMMOBILISER
SIREN
REAR SPLICE A SEE SHEET 2
TO PASSENGER DOOR LOCK SEE SHEET 24
TO DRIVER DOOR LOCK SEE SHEET 24
FACIA SPLICE E SEE SHEET 9
FACIA SPLICE G SEE SHEET 24
FACIA SPLICE F SEE SHEET 9
FACIA SPLICE V SEE SHEET 24
FACIA SPLICE W SEE SHEET 12
TO IGNITION SWITCH SEE SHEET 4
FACIA SPLICE A SEE SHEET 20
TO IGNITION POWER RELAY SEE SHEET 3
TO RADIO CHASSIS SEE SHEET 20
ALARM ALDL
SPLICE CC
TO ALDL (FRONT) SEE SHEET 6
-VE POST SEE SHEET 2A
TAILGATE SWITCH
BOOT LAMPS
REAR SPLICE A SEE SHEET 2
BATTERY
DRIVER ANTI-THEFT MODULE
PASSENGER ANTI-THEFT MODULE

CBHC
10

CONNECTOR (WI TH CAVITY NUMBER

CONNECTI ON CODES :

BHC BIMNACLE HARNESS CONNECTOR
BGSHC BOOST GAUGE SENDER HARNESS CONNECTOR
DDHC DRIVER DOOR HARNESS CONNECTOR
DRLHC DAYTIME RUNNING LAMPS HARNESS CONNECTOR
EMHC ENGINE MANAGEMENT HARNESS CONNECTOR
FBHC FRONT BUMPER HARNESS CONNECTOR
FHC FRONT HARNESS CONNECTOR
HHC HORNS HARNESS CONNECTOR
LDHC LAMP DRIVER HARNESS CONNECTOR
LHFLC • LEFT HAND FRONT LAMP CONNECTOR
MC MIRROR CONNECTOR
MSC • MIRROR SWITCH CONNECTOR
OTPHC OIL TEMP & PRESSURE HARNESS CONNECTOR
PM: • PASSENGER DOOR HARNESS CONNECTOR
RFHC • RADIATOR FAN HARNESS CONNECTOR
R-c • REAR HARNESS CONNECTOR
RHFLC • RIGHT HAND FRONT LAMP CONNECTOR
RLHC REAR LAWS HARNESS CONNECTOR
SCHC • STEERING COLUMN HARNESS CONNECTOR
SHC SPOILER HARNESS CONNECTOR
SIRHC • S.I.R. HARNESS CONNECTOR
CHC WINDOW CONVERSION HARNESS CONNECTOR
WSSHC • MEL SPEED SENSOR HARNESS CONNECTOR

TWISTED PAIR

A2
7.5A
FUSE NUMBER AND RATING

GROUND POINT LOCATION
·VE POST

GROUND POINT THROUGH COMPONENT BODY

B
ENGINE BLOCK
CABLE GROUND THROUGH LOCAL FIXING

FACIA SPLICE X
SPLICE

TO HORNS SEE MET 25
DESTINATION OF CABLE BY SHEET NUMBER TO COMPONENT

FACIA SPLICE X SEE SHEET 3
DESTINATION OF CABLE BY SHEET NUMBER TO SPLICE

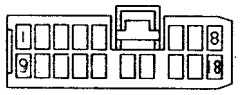
UR
CABLE COLOUR

COLOUR CODES :

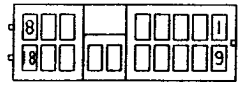
B	BLACK	P	PURPLE
G	GREEN	R	RED
K	PINK	S	SLATE
LG	LIGHT GREEN	U	BLUE
N	BROWN	W	MITE
O	ORANGE	Y	YELLOW

DDHC, PDHC, SCHC

FAC I A HARNESS



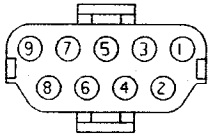
MATING FACE



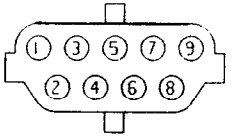
DOOR/STEERI NG COLUMN HARNESS

RLHC

REAR HARNESS



MATING FACE

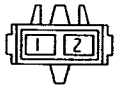


REAR L I GHTI NG HARNESS

RFHC

FAC I A HARNESS

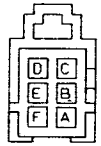
MATING FACE

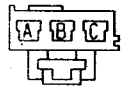


RAD FAN HARNESS

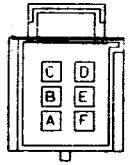
SIRHC

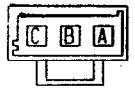
FAC I A HARNESS





B MATING FACE A

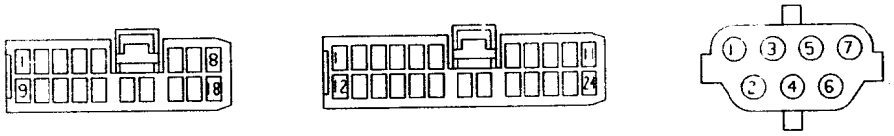


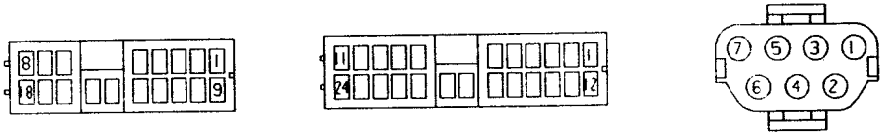


S I R HARNESS

BHC

FACIA HARNESS

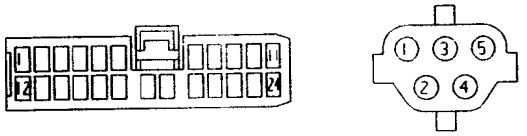


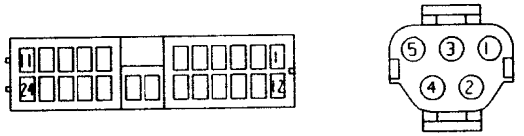


BINNACLE HARNESS

RHC

FACIA HARNESS

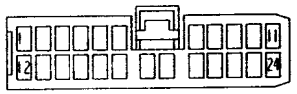




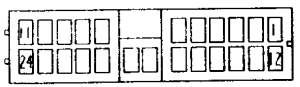
REAR HARNESS

EMHC

FACIA HARNESS



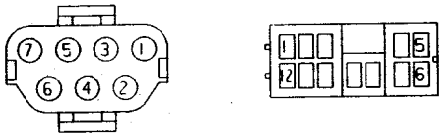
MATING FACE

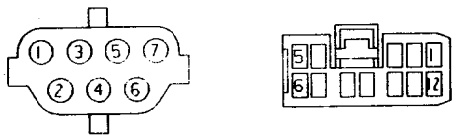


ENGINE MANAGEMENT HARNESS

FHC

FACIA HARNESS

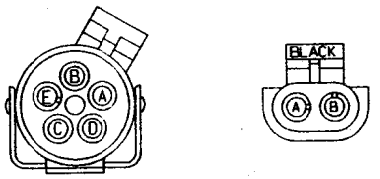


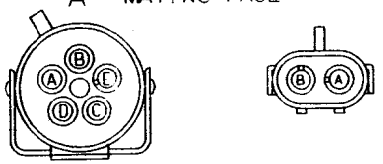


FRONT HARNESS

FBHC

FRONT HARNESS





FRONT BUMPER HARNESS

ML.14 - ESPRIT V8 SUPPLEMENT

This supplement details those areas where the V8 specification differs from that of the 4 cylinder models.

ABS Tell Tale

This amber tall tale should light for about four seconds following ignition switch on, and then go out. If the lamp remains lit, or comes on whilst driving, a fault in the ABS is indicated. The base brake system will continue to operate normally, but without ABS regulation. The car can be driven but should be checked and repaired at the earliest opportunity. Refer to manual 'Section JG' - M082T0327J.

Brakes/Parking Brake Tell Tale

This tell tale will glow red with the ignition switched on when either of the following conditions apply:

i) The parking brake is applied;
ii) The brake fluid level is low;

Under normal circumstances, the tell tale should light when the parking brake is applied, and go out when released. If the lamp fails to go out when the parking brake is released, or comes on whilst driving, stop immediately as the brake fluid level may be dangerously low. A possible hydraulic leak is indicated, together with the potential for air to enter the system. Refer to separate manual 'Section JG' - M082T0327J.

Check Engine Tell Tale

The 'check engine tell tale (also known as the Malfunction Indicator Lamp', or MIL) is provided to:

i) Inform the driver that the engine management self diagnostic system has detected a fault;
ii) Assist the technician with fault diagnosis.

As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. On USA market cars, if the lamp remains lit, flashes, or comes on whilst driving:

Steady /amp; This indicates that the self diagnostic system has detected a problem, information on which is stored in the system memory. The vehicle should be taken for check/repair as soon as is practicable. If the fault corrects itself, or is no longer detected, the lamp will go out after three engine start ups with no fault present. Information on the fault will remain stored in the memory for the next 40 engine warm up cycles, to indicate to the technician that an intermittent fault has been detected. If no recurrence is recorded during this period, the stored information will be erased from the memory.

Flashing Lamp: This indicates that a severe engine misfire has been detected, with the potential for heat damage to the catalytic converters. The fault should be repaired with the utmost urgency.

For further information on the engine management system, refer to separate manual 'Section EMM' - L082T0327J.

Boost Gauge

This gauge is marked in bar units. and indicates turbocharger boost pressure. The amount of boost developed by the engine is dependent on engine speed and throttle opening but is controlled by both mechanical and electronic means to prevent excessive boost pressure causing internal engine damage.

Maximum steady boost pressure readings will be seen with wide throttle openings at normal running temperature and will be up to 0.75 bar, although short durations of higher boost up to 1.0 bar may occur (typically during gearchanges). A built-in engine safeguard operates to shut off the fuel injectors if a control system failure results in dangerously high boost being developed.

Note that the boost gauge indications will rise with increasing altitude or where the atmospheric pressure is lower than normal. However, as the engine management sensors work on absolute values, the actual pressures within the engine are unaffected by variations in atmospheric pressure.

Fuel Filler Flaps

Note that on V8 models prior to VIN T 5105, pressing either end of the fuel filler flap switch (located in the

tunnel top tray) will open both filler flaps. After this changepoint, each flap will be released only when that side of the switch is pressed.

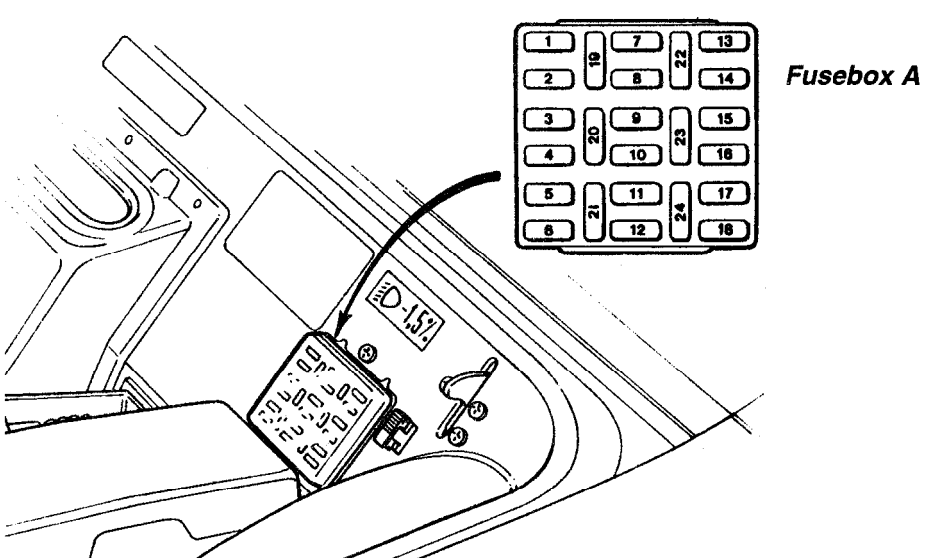
Component Location & Fuse Ratinas

Fuses

The main fusebox is located on the driver's side of the cabin front bulkhead in the front luggage compartment, and is protected by a transparent cover. The fuses are numbered, and coloured according to their amperage rating, and may be pulled out from their slots using the fuse extractor tool stowed in the vehicle tool kit.

Main Fusebox 'A' - front luaaage compartment

Slot	*Rating*	*Circuit*
Al	10A	Central door locking
A2	7.5A	Turn indicators
A3	5A	Rear fog lamps
A4		Not used
A5	5A	LH side &tail lamps, logic module, radio illumination, cigar lighter illumination, clock, front fog lamp control, centre console illumination
A6	5A	RH side & tail lamps, rheostat module
A7	15A	Cigar lighter
A8	15A	Interior fan
A9	7.5A	Air conditioning control
A10	15A	Headlamp lift motor
AII	15A	Headlamp lift motor
AI2	20A	Window lift motor (passenger)
AI3	20A	Window lift motor (driver)
AI4	5A	Interior lamps, horn control, clock, logic module, headlamp flash control
AI5	15A	Hazard & stop lamps
AI6	10A	ABS ignition supply
AI7	5A	Ignition services - CDL module, interior lamp, alarm controller
A18	7.5A	Heated rear screen
A19	10A	Radio, ALDL (front) & alarm ALDL
A20	15A	Windscreen wash/wipe
A21	5A	Instruments, logic box, lamp driver module, radiator fan relay control, lights-on buzzer, low fuel delay module, daytime running lamps control (Sweden & Canada)
A22	3A	Heated door mirrors
A23	2A	Window voltage module
A24	15A	Front fog lamps



Fusebox A

m176a

Relay Station & Fusebox 'D'. front luggage compartment

Additional fuses, and many of the relays and delay units are fitted along a relay mounting bracket ahead of the main fusebox. A protective plastic cover, shields this equipment from luggage being loaded into the front compartment. To remove the cover, unscrew the two fingernuts, and withdraw the cover upwards and forwards to unhook from the rear end of the bracket.

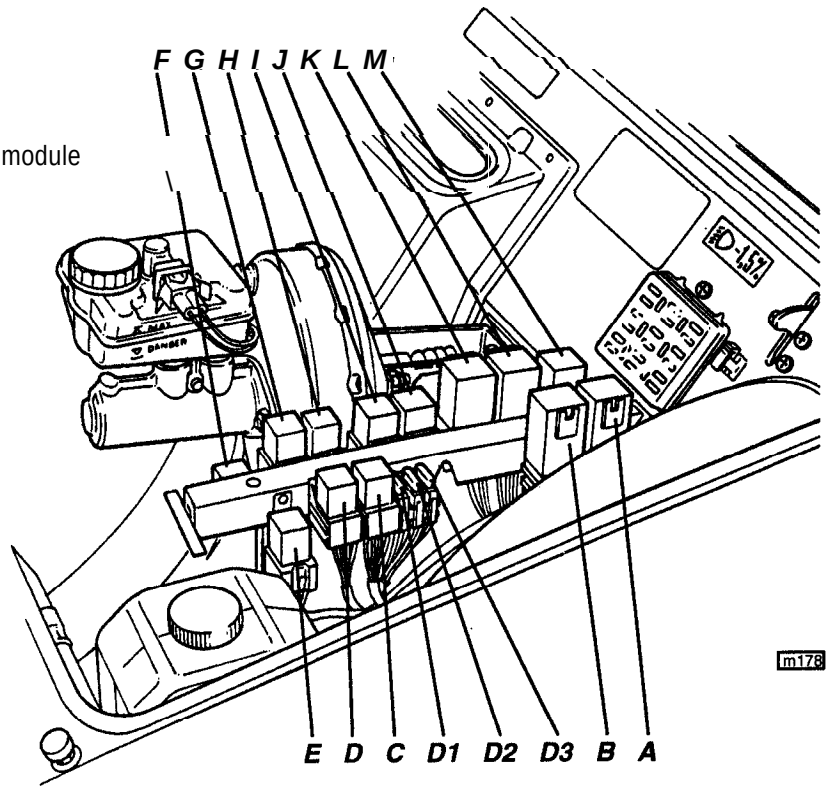
Fuses:

Slot	*Rating*	*Circuit*
D1	15 A	Radiator fan RH
D2	15 A	Radiator fan centre
D 3	15A	Radiator fan LH

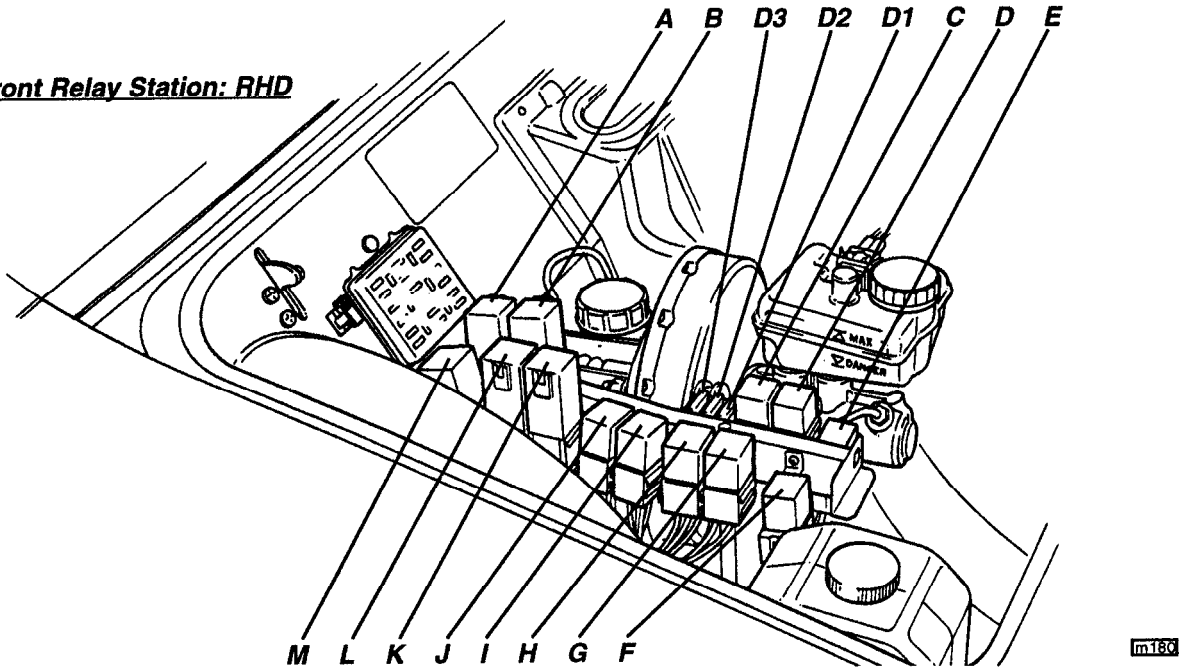
Relays:

Ref.	*Function*
A	Non-USA cars: Window voltage module USA cars: Bridging link
B	Headlamp pod delay module
C	Front fog lamp relay
D	Horn relay
E	Radiator fans relay
F	Ignition power relay
G	Dip beam relay
H	Main beam relay
I	Start drop out relay
J	Radio 'key-in' relay
K	Rheostat module
L	Low fuel delay module
M	Wash/wipe delay module

Front Relay Station: LHD



Front Relay Station: RHD



Relay Station & Fusebox 'B', rear luggage compartment

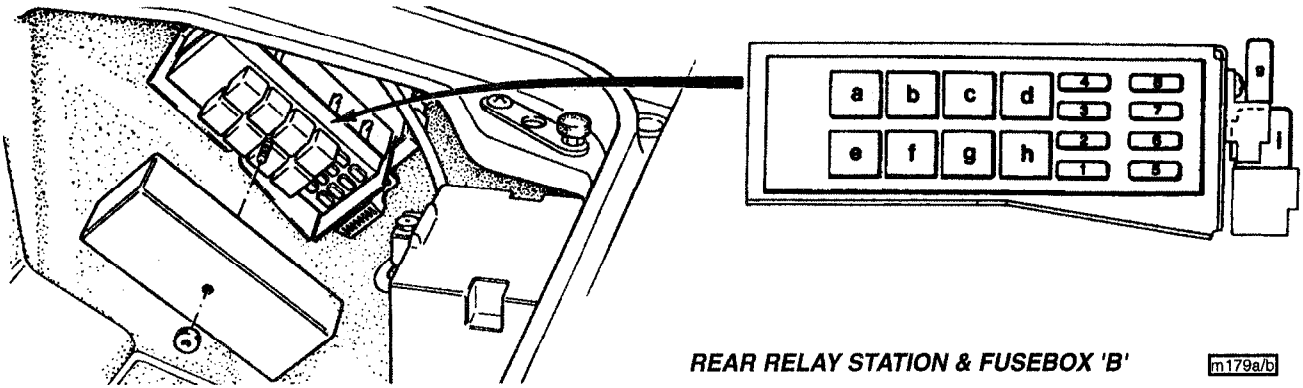
Fuses and relays for the engine management system are located in a relay station mounted at the right hand side of the rear luggage compartment, on the rear face of the wheelarch. To access the station, release the finger nut and pull off the protective plastic cover.

Fuses:

Slot	*Rating*	*Circuit*
B1	25A	Fuel filler flaps
B2	5A	ECM & coolant pump
B3	25A	Primary fuel pump & injectors
B4	15A	Secondary fuel pump
B5	15A	Ignition coils
B 6	10A	Engine ignition supply
8 7	7.5A	ignition controls
B8	10A	A.C. compressor & reverse lamps
B9	30A (Maxi)	Air pump

Relays:

Ref.	*Function*
a	Coolant pump. relay
b	Secondary fuel pump
c	Primary fuel pump & injectors relay
d	Ignition power relay
e	Oxygen sensor heater control relay
f	Fuel filler flaps relay
g	A.C. compressor
h	Starter motor solenoid relay
i	Air pump relay



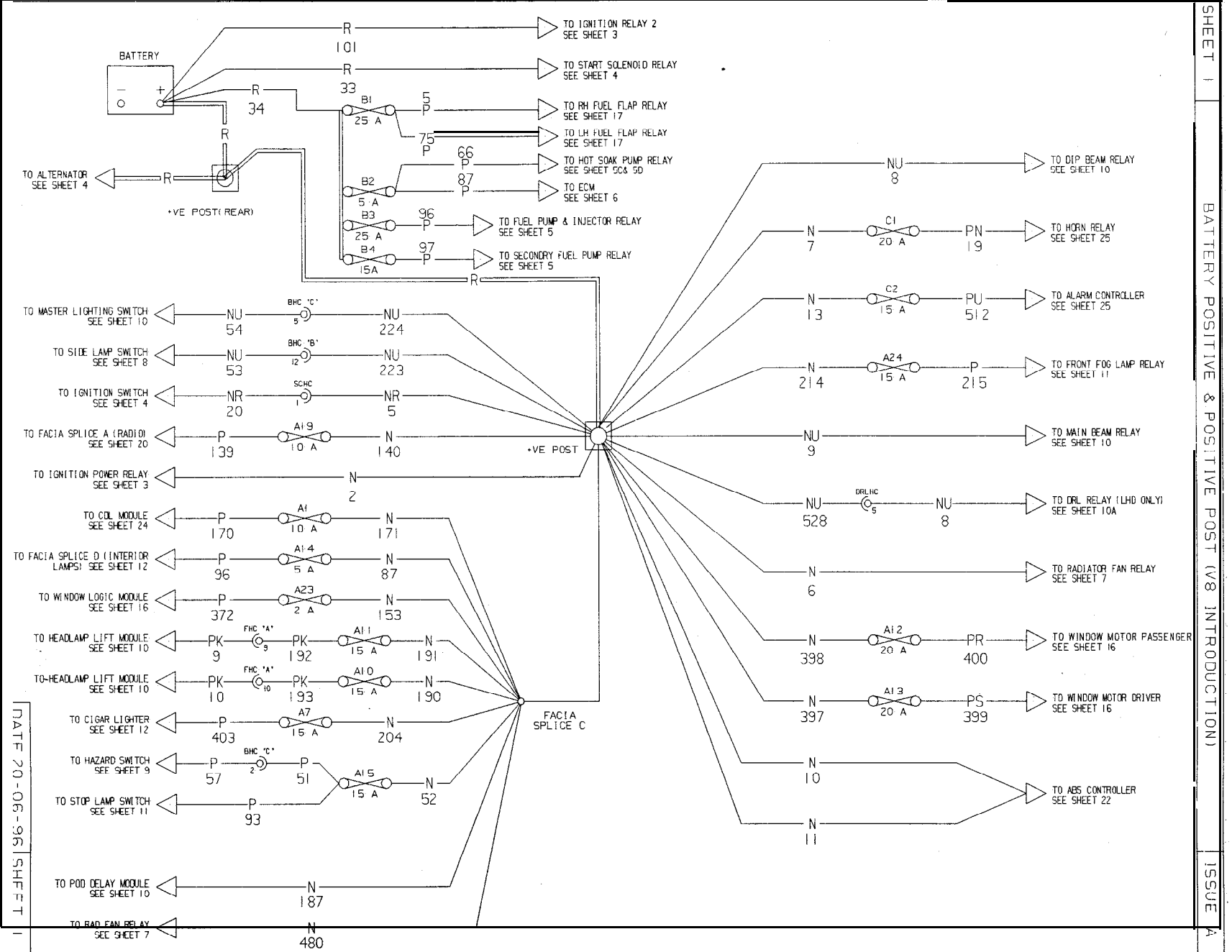
REAR RELAY STATION & FUSEBOX 'B' m179a/b

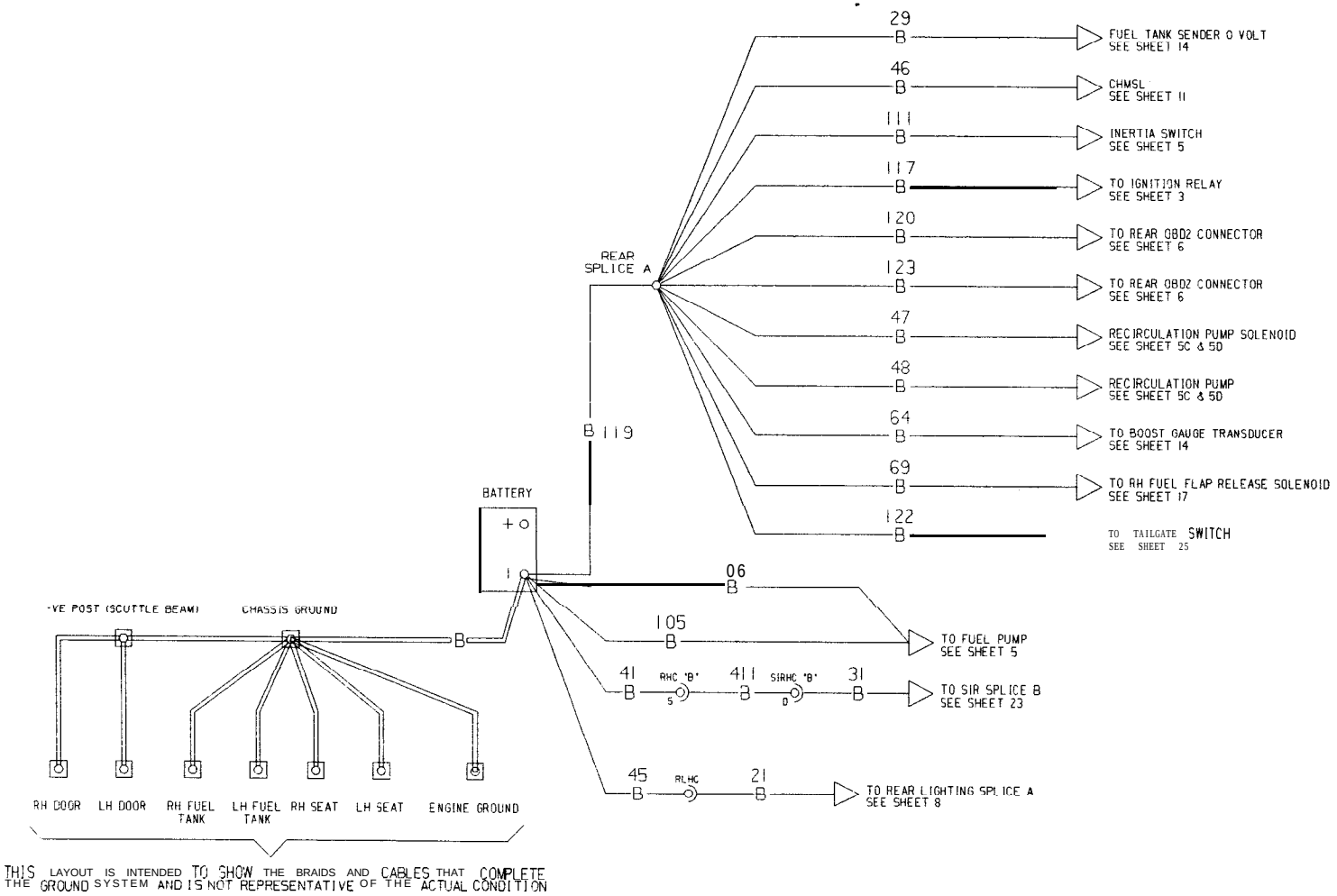
Fuses for the vehicle alarm system (15 amp) and horn (20 amp) are located beneath the driver's side fascia, as on S4 models. For engine management components, refer to Section EMM (L082T0327J).

Fuse colours:

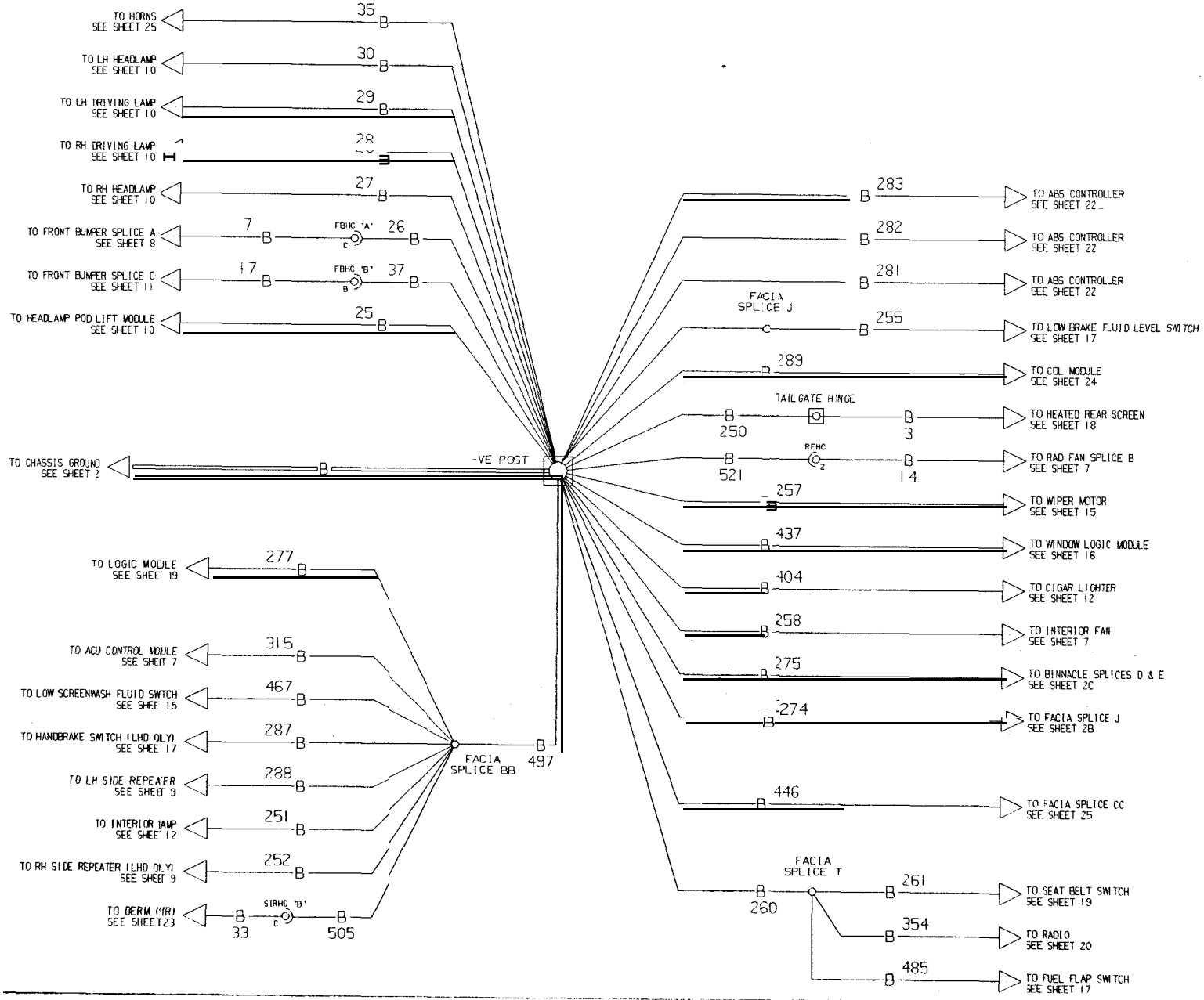
2A - Black;
3A - Violet;
4A - Pink;
5A - Orange;
7.5A - Brown;
10A - Red;
15A - Light Blue;
20A - Yellow;
25A - Clear.

CIRCUIT DIAGRAMS - V8

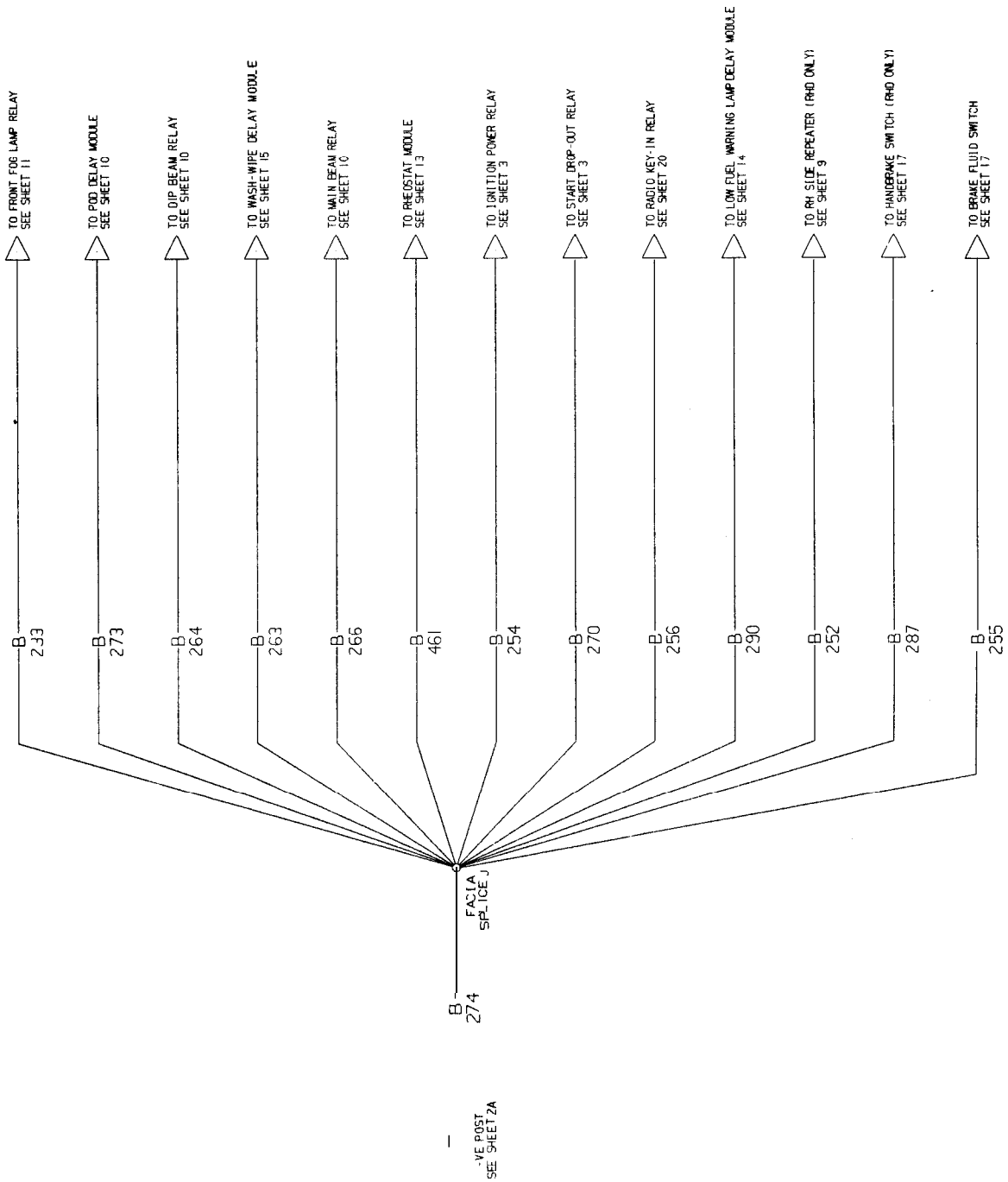

BATTERY
R 101
TO IGNITION RELAY 2 SEE SHEET 3
R 33
TO START SOLENOID RELAY SEE SHEET 4
R 34
B1 25 A
5 P
TO RH FUEL FLAP RELAY SEE SHEET 17
75 P
TO LH FUEL FLAP RELAY SEE SHEET 17
66 P
TO HOT SOAK PUMP RELAY SEE SHEET 5C& 5D
B2 5 A
87 P
TO ECM SEE SHEET 6
B3 25 A
96 P
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
B4 15A
97 P
TO SECONDRY FUEL PUMP RELAY SEE SHEET 5
TO ALTERNATOR SEE SHEET 4
+VE POST(REAR)
R
NU 8
TO DIP BEAM RELAY SEE SHEET 10
N 7
C1 20 A
PN 19
TO HORN RELAY SEE SHEET 25
N 13
C2 15 A
PU 512
TO ALARM CONTROLLER SEE SHEET 25
N 214
A24 15 A
P 215
TO FRONT FOG LAMP RELAY SEE SHEET 11
NU 9
TO MAIN BEAM RELAY SEE SHEET 10
NU 528
DRLHC 5
NU 8
TO DRL RELAY (LHD ONLY) SEE SHEET 10A
N 6
TO RADIATOR FAN RELAY SEE SHEET 7
N 398
A12 20 A
PR 400
TO WINDOW MOTOR PASSENGER SEE SHEET 16
N 397
A13 20 A
PS 399
TO WINDOW MOTOR DRIVER SEE SHEET 16
N 10
N 11
TO ABS CONTROLLER SEE SHEET 22
TO MASTER LIGHTING SWITCH SEE SHEET 10
BHC 'C' 5
NU 54
NU 224
TO SIDE LAMP SWITCH SEE SHEET 8
BHC 'B' 12
NU 53
NU 223
TO IGNITION SWITCH SEE SHEET 4
SCHC 1
NR 20
NR 5
TO FACIA SPLICE A (RADIO) SEE SHEET 20
A19 10 A
P 139
N 140
+VE POST
TO IGNITION POWER RELAY SEE SHEET 3
N 2
TO CDL MODULE SEE SHEET 24
A1 10 A
P 170
N 171
TO FACIA SPLICE D (INTERIOR LAMPS) SEE SHEET 12
A14 5 A
P 96
N 87
TO WINDOW LOGIC MODULE SEE SHEET 16
A23 2 A
P 372
N 153
TO HEADLAMP LIFT MODULE SEE SHEET 10
FHC 'A' 9
PK 9
PK 192
A11 15 A
N 191
TO HEADLAMP LIFT MODULE SEE SHEET 10
FHC 'A' 10
PK 10
PK 193
A10 15 A
N 190
TO CIGAR LIGHTER SEE SHEET 12
A7 15 A
P 403
N 204
TO HAZARD SWITCH SEE SHEET 9
BHC 'C' 2
P 57
P 51
A15 15 A
N 52
TO STOP LAMP SWITCH SEE SHEET 11
P 93
FACIA SPLICE C
TO POD DELAY MODULE SEE SHEET 10
N 187
TO RAD FAN RELAY SEE SHEET 7
N 480



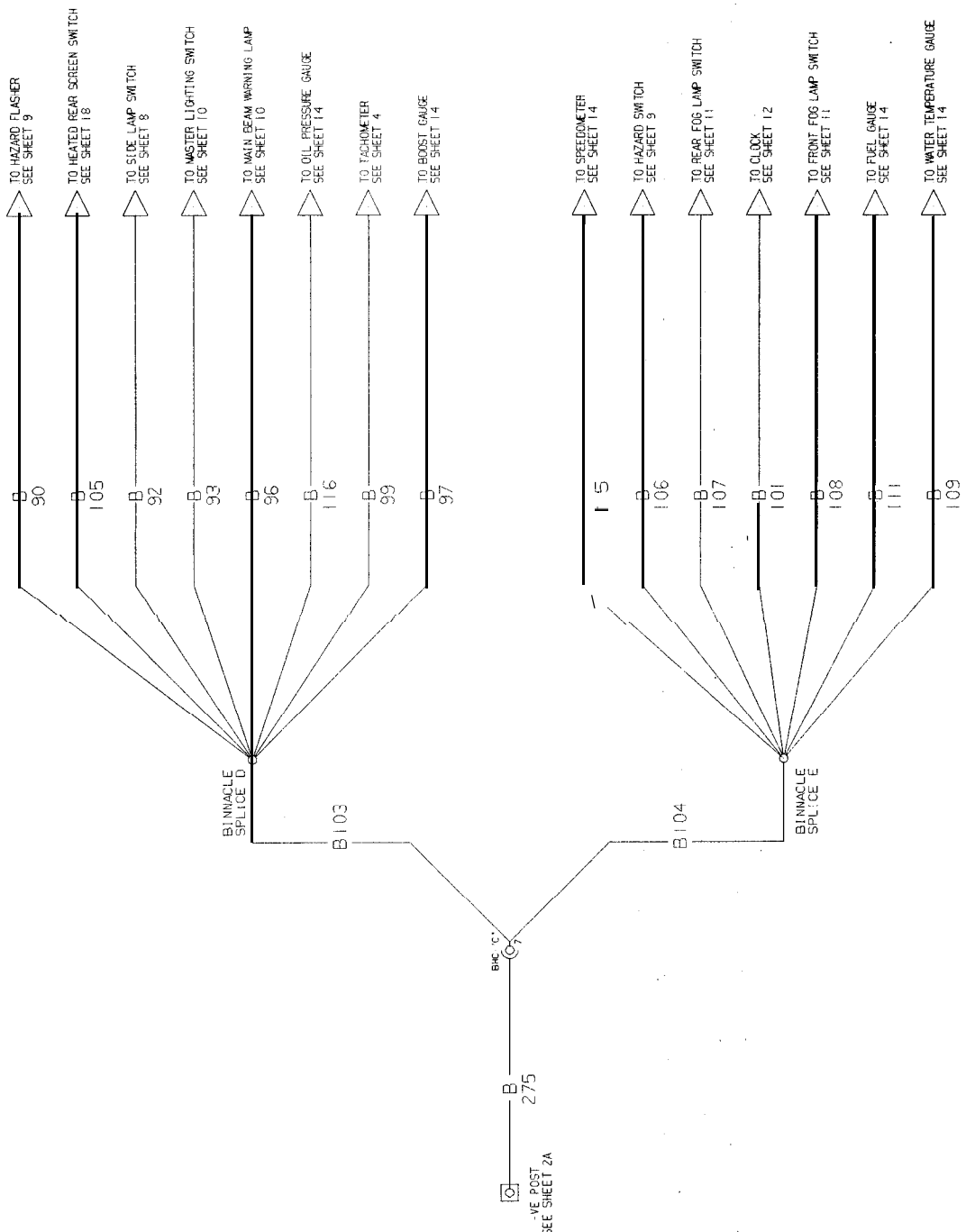
THIS LAYOUT IS INTENDED TO SHOW THE BRAIDS AND CABLES THAT COMPLETE THE GROUND SYSTEM AND IS NOT REPRESENTATIVE OF THE ACTUAL CONDITION

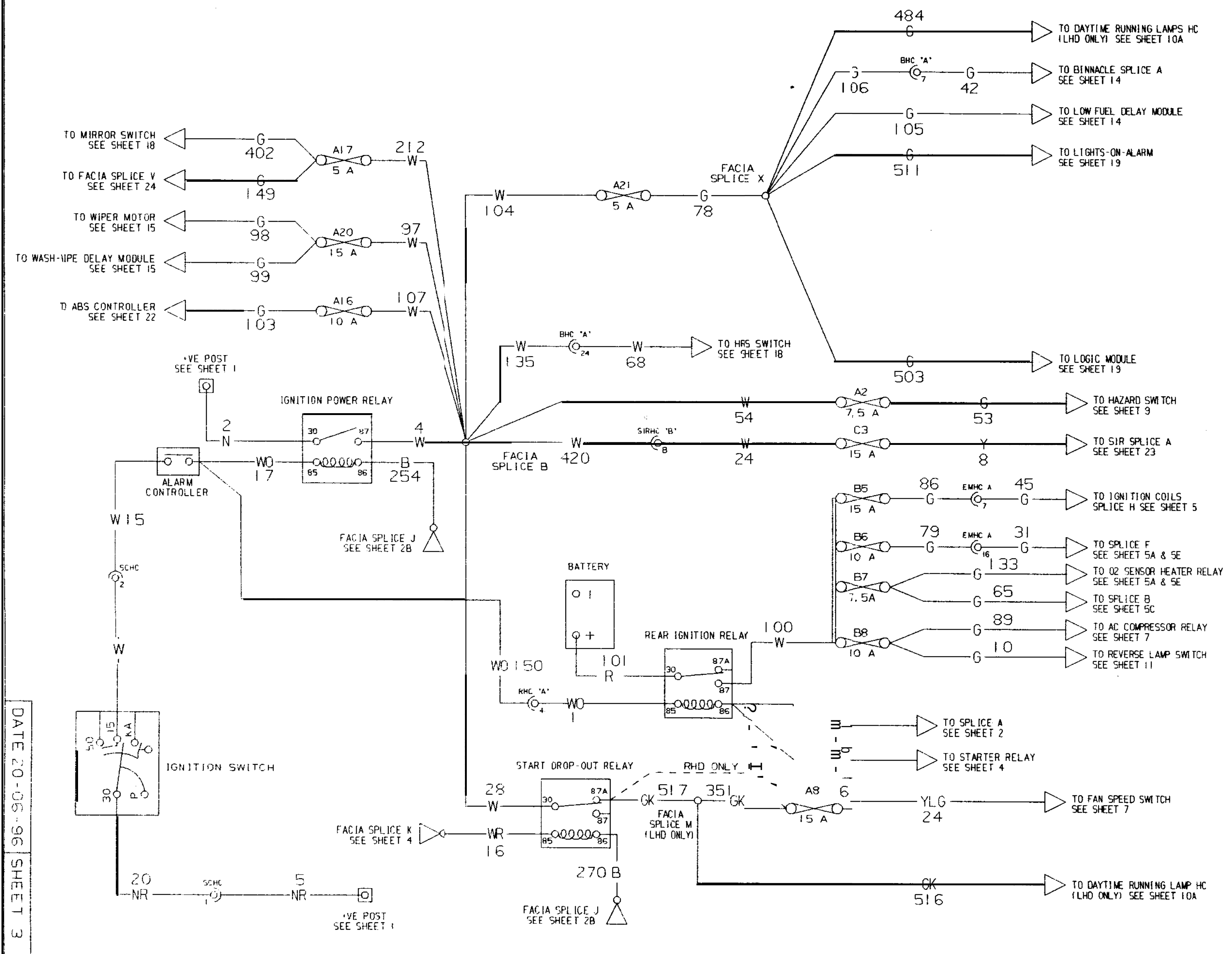

TO HORNS SEE SHEET 25
35 B
TO LH HEADLAMP SEE SHEET 10
30 B
TO LH DRIVING LAMP SEE SHEET 10
29 B
TO RH DRIVING LAMP SEE SHEET 10
28 B
TO RH HEADLAMP SEE SHEET 10
27 B
TO FRONT BUMPER SPLICE A SEE SHEET 8
7 B
FBHC 'A' C
26 B
TO FRONT BUMPER SPLICE C SEE SHEET 11
17 B
FBHC 'B' B
37 B
TO HEADLAMP POD LIFT MODULE SEE SHEET 10
25 B
TO CHASSIS GROUND SEE SHEET 2
B
-VE POST
TO LOGIC MODULE SEE SHEET 19
277 B
TO ACU CONTROL MOULE SEE SHEET 7
315 B
TO LOW SCREENWASH FLUID SWITCH SEE SHEET 15
467 B
TO HANDBRAKE SWITCH (LHD ONLY) SEE SHEET 17
287 B
TO LH SIDE REPEATER SEE SHEET 9
288 B
TO INTERIOR LAMP SEE SHEET 12
251 B
TO RH SIDE REPEATER (LHD ONLY) SEE SHEET 9
252 B
TO DERM (IR) SEE SHEET 23
B 33
SIRHC 'B' C
B 505
FACIA SPLICE BB
B 497
B 283
TO ABS CONTROLLER SEE SHEET 22
B 282
TO ABS CONTROLLER SEE SHEET 22
B 281
TO ABS CONTROLLER SEE SHEET 22
FACIA SPLICE J
C
B 255
TO LOW BRAKE FLUID LEVEL SWITCH SEE SHEET 17
289 B
TO COL MODULE SEE SHEET 24
TAILGATE HINGE
B 250
B 3
TO HEATED REAR SCREEN SEE SHEET 18
RFHC
B 521
C2
B 14
TO RAD FAN SPLICE B SEE SHEET 7
257 B
TO WIPER MOTOR SEE SHEET 15
437 B
TO WINDOW LOGIC MODULE SEE SHEET 16
404 B
TO CIGAR LIGHTER SEE SHEET 12
258 B
TO INTERIOR FAN SEE SHEET 7
275 B
TO BINNACLE SPLICES D & E SEE SHEET 2C
274 B
TO FACIA SPLICE J SEE SHEET 2B
446 B
TO FACIA SPLICE CC SEE SHEET 25
FACIA SPLICE T
B 260
B 261
TO SEAT BELT SWITCH SEE SHEET 19
B 354
TO RADIO SEE SHEET 20
B 485
TO FUEL FLAP SWITCH SEE SHEET 17

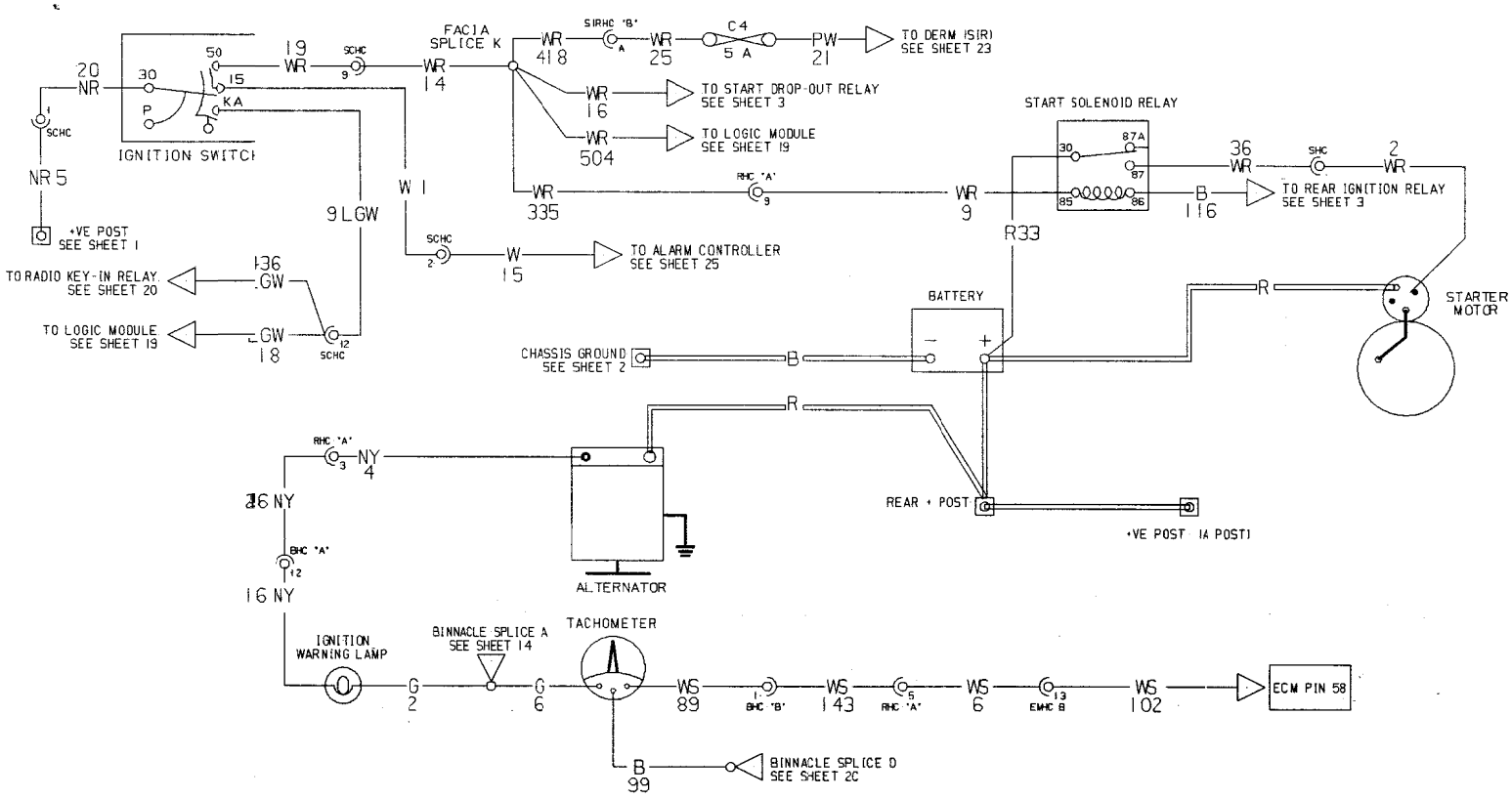
SHEET 2B | FACIA HARNESS GROUND SPLICE J (V8 INTRODUCTION) | ISSUE A

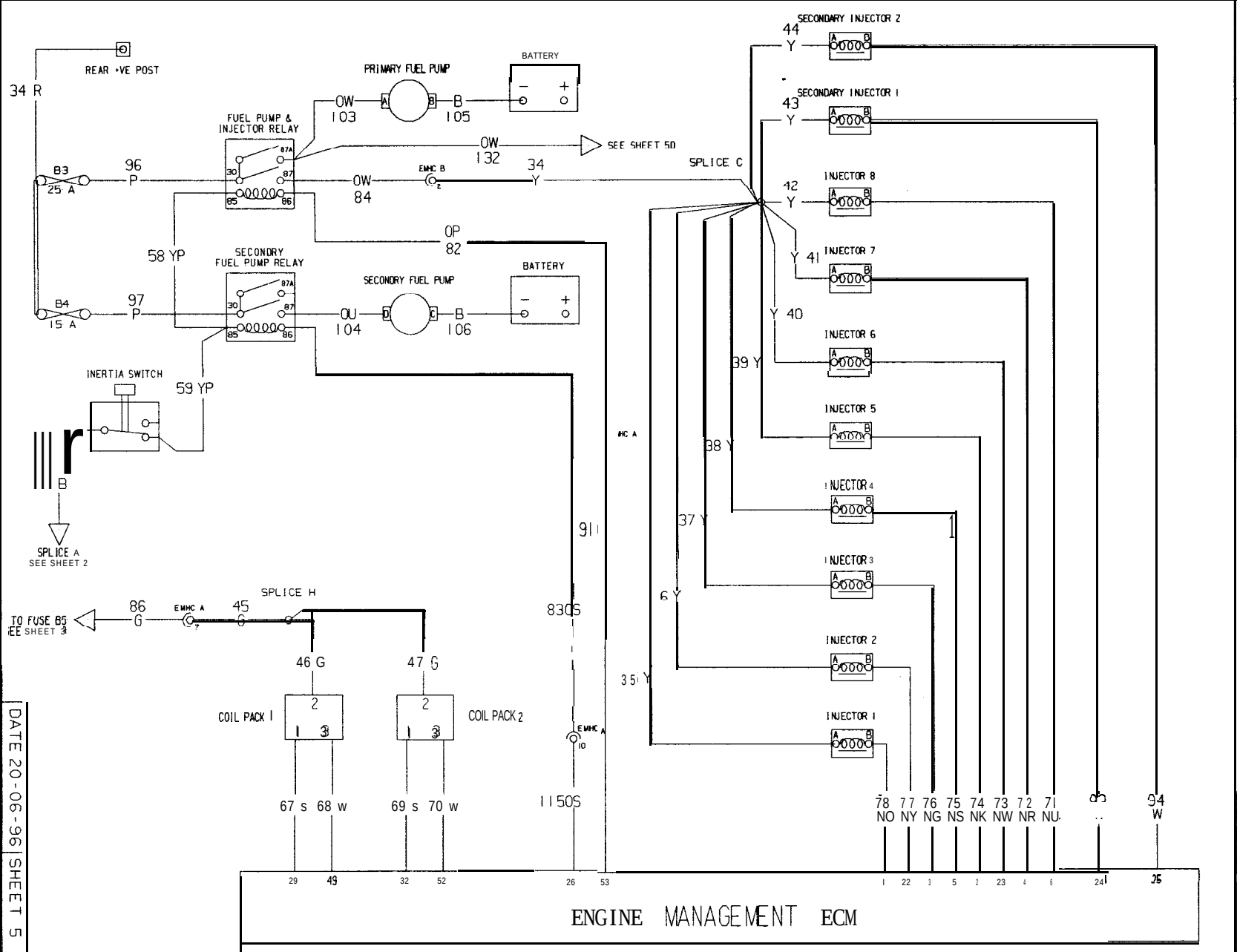


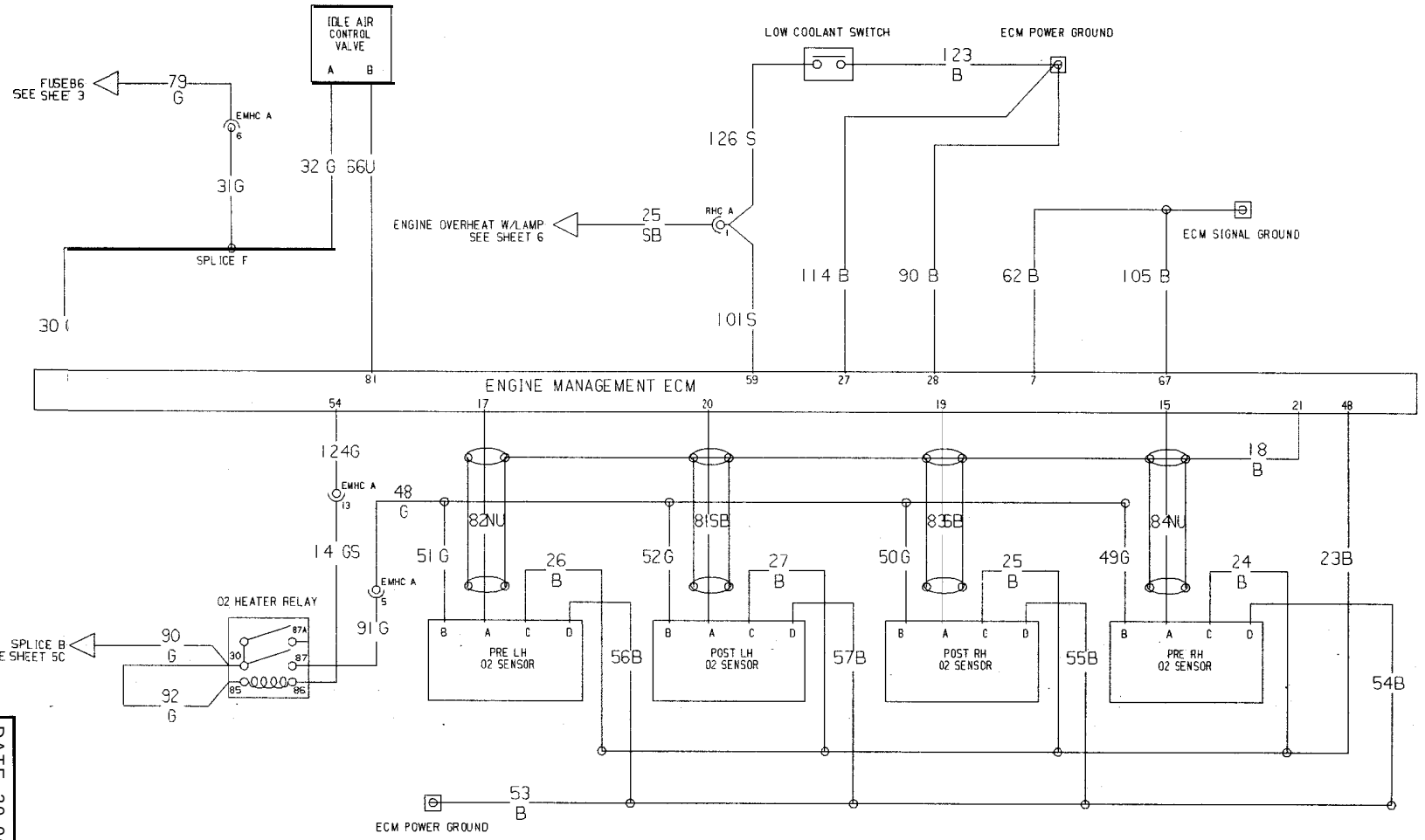
SHEET 2C | BINNACLE HARNESS GROUND SPLICES IV8 (INTRODUCTION) | ISSUE A

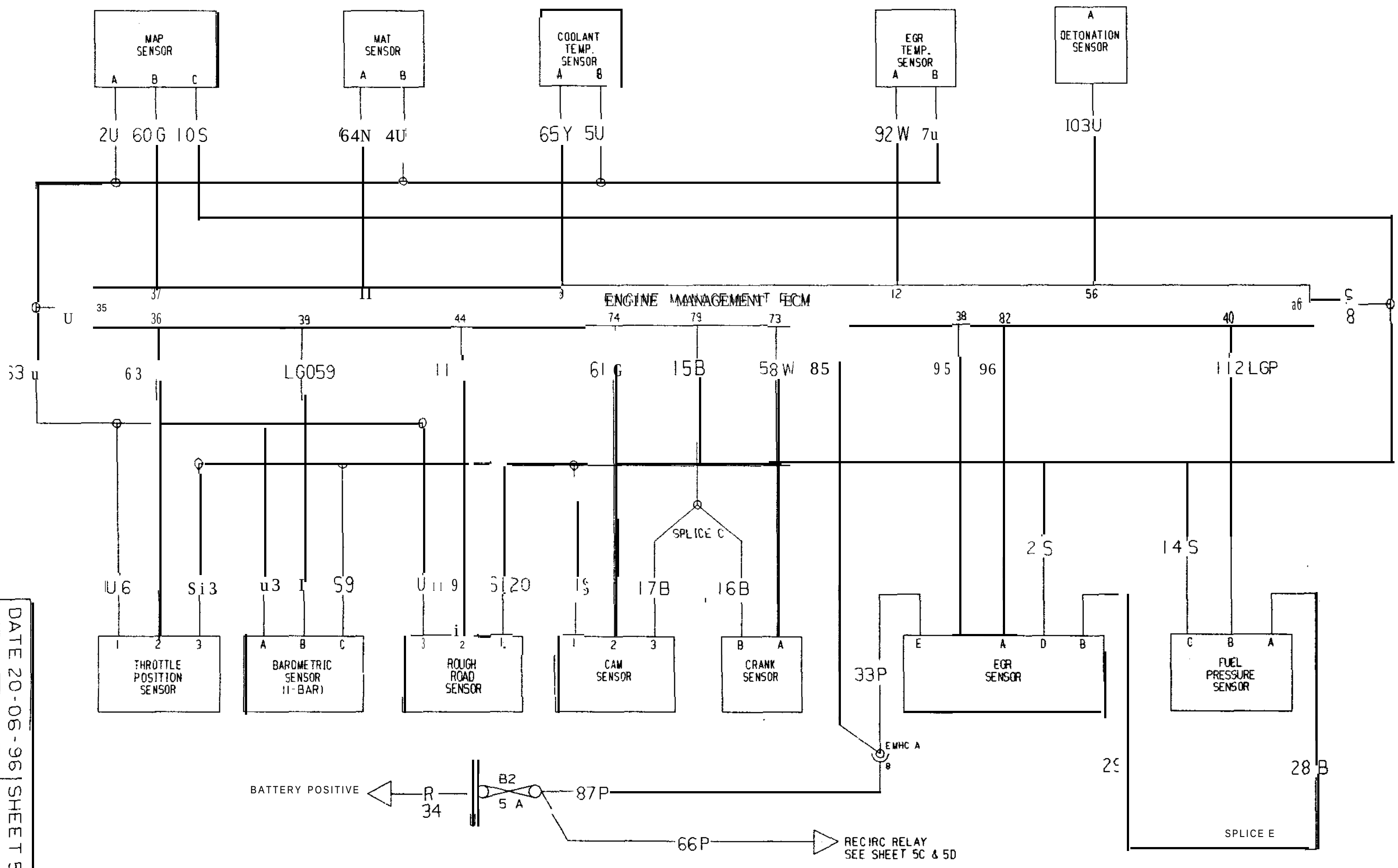


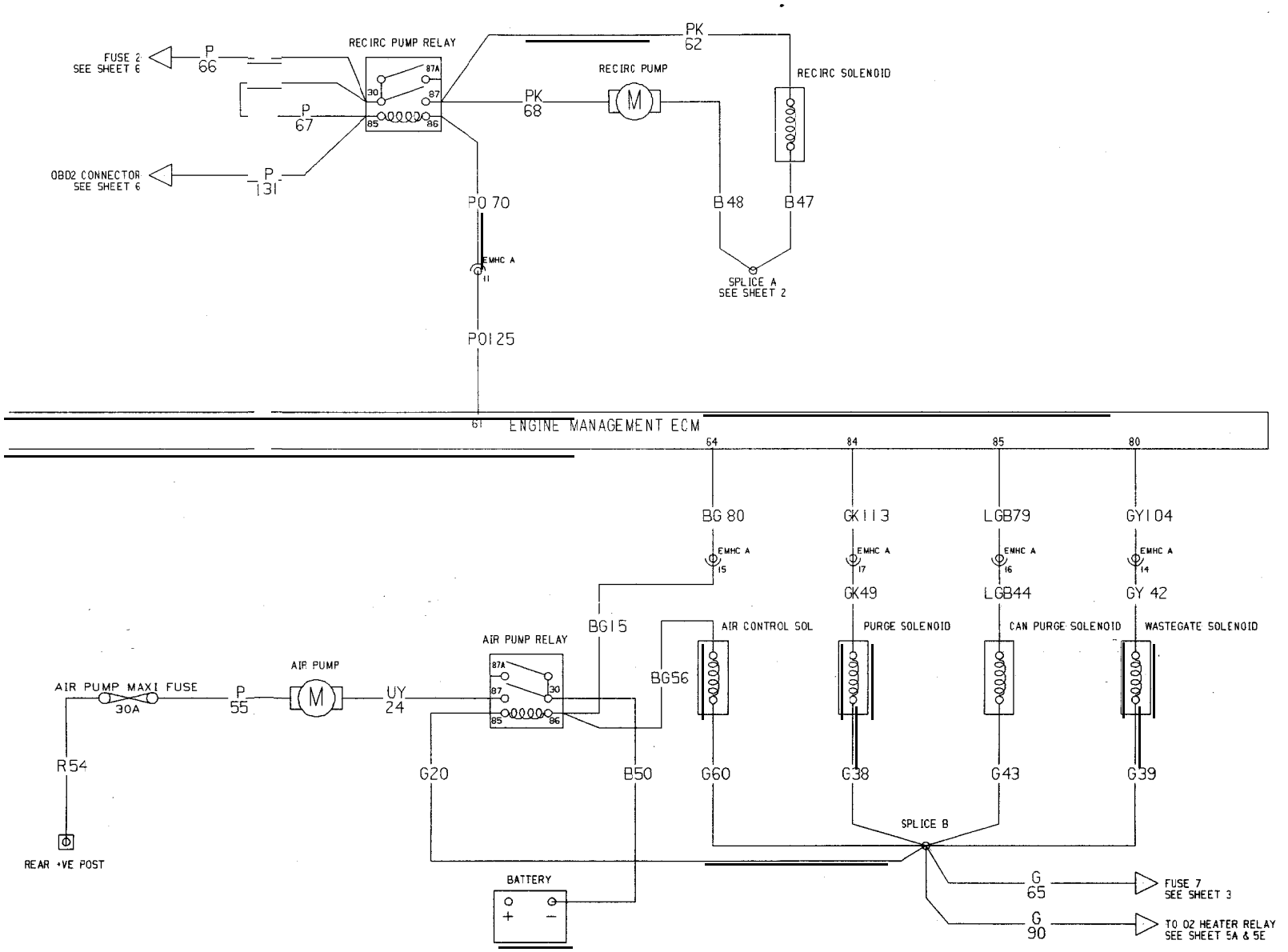

TO MIRROR SWITCH SEE SHEET 18
TO FACIA SPLICE V SEE SHEET 24
TO WIPER MOTOR SEE SHEET 15
TO WASH-WIPE DELAY MODULE SEE SHEET 15
TO ABS CONTROLLER SEE SHEET 22
A17 5 A
A20 15 A
A16 10 A
A21 5 A
FACIA SPLICE X
TO DAYTIME RUNNING LAMPS HC (LHD ONLY) SEE SHEET 10A
TO BINNACLE SPLICE A SEE SHEET 14
TO LOW FUEL DELAY MODULE SEE SHEET 14
TO LIGHTS-ON-ALARM SEE SHEET 19
TO LOGIC MODULE SEE SHEET 19
BHC 'A'
TO HRS SWITCH SEE SHEET 18
+VE POST SEE SHEET 1
IGNITION POWER RELAY
ALARM CONTROLLER
FACIA SPLICE B
FACIA SPLICE J SEE SHEET 28
A2 7.5 A
TO HAZARD SWITCH SEE SHEET 9
SIRHC 'B'
C3 15 A
TO SIR SPLICE A SEE SHEET 23
B5 15 A
EMHC A
TO IGNITION COILS SPLICE H SEE SHEET 5
B6 10 A
TO SPLICE F SEE SHEET 5A & 5E
B7 7.5A
TO O2 SENSOR HEATER RELAY SEE SHEET 5A & 5E
TO SPLICE B SEE SHEET 5C
B8 10 A
TO AC COMPRESSOR RELAY SEE SHEET 7
TO REVERSE LAMP SWITCH SEE SHEET 11
BATTERY
REAR IGNITION RELAY
RHC 'A'
SCHC
IGNITION SWITCH
TO SPLICE A SEE SHEET 2
TO STARTER RELAY SEE SHEET 4
START DROP-OUT RELAY
RHD ONLY
FACIA SPLICE M (LHD ONLY)
A8 15 A
TO FAN SPEED SWITCH SEE SHEET 7
FACIA SPLICE K SEE SHEET 4
FACIA SPLICE J SEE SHEET 28
TO DAYTIME RUNNING LAMP HC (LHD ONLY) SEE SHEET 10A
+VE POST SEE SHEET 1

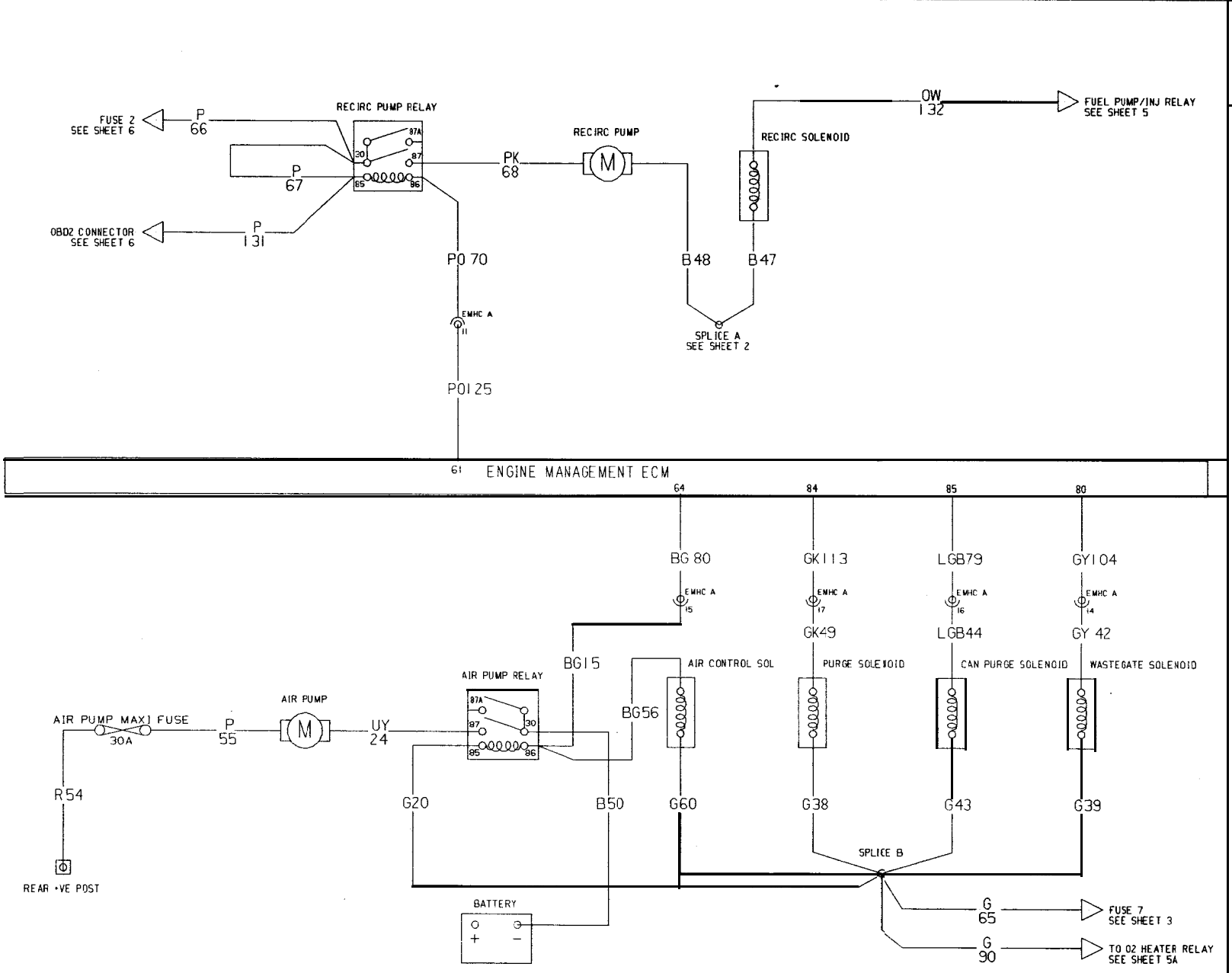

IGNITION SWITCH
20 NR
30
50
15
19 WR
SCHC 9
P
KA
1 SCHC
NR 5
+VE POST SEE SHEET 1
FACIA SPLICE K
WR 14
W 1
9 LGW
SIRHC "B"
WR 418
WR 25
C4 5 A
PW 21
TO DERM (SIR) SEE SHEET 23
WR 16
TO START DROP-OUT RELAY SEE SHEET 3
WR 504
TO LOGIC MODULE SEE SHEET 19
WR 335
RHC "A" 9
WR 9
START SOLENOID RELAY
30
87A
87
85
86
36 WR
SHC
2 WR
B 116
TO REAR IGNITION RELAY SEE SHEET 3
R33
SCHC 2
W 15
TO ALARM CONTROLLER SEE SHEET 25
136 GW
TO RADIO KEY-IN RELAY SEE SHEET 20
GW 18
SCHC 12
TO LOGIC MODULE SEE SHEET 19
BATTERY
CHASSIS GROUND SEE SHEET 2
B
R
STARTER MOTOR
RHC "A" 3
NY 4
16 NY
RHC "A" 12
16 NY
ALTERNATOR
REAR + POST
+VE POST (A POST)
IGNITION WARNING LAMP
G 2
BINNACLE SPLICE A SEE SHEET 14
G 6
TACHOMETER
WS 89
WS 143
WS 6
WS 102
ECM PIN 58
B 99
BINNACLE SPLICE D SEE SHEET 2C

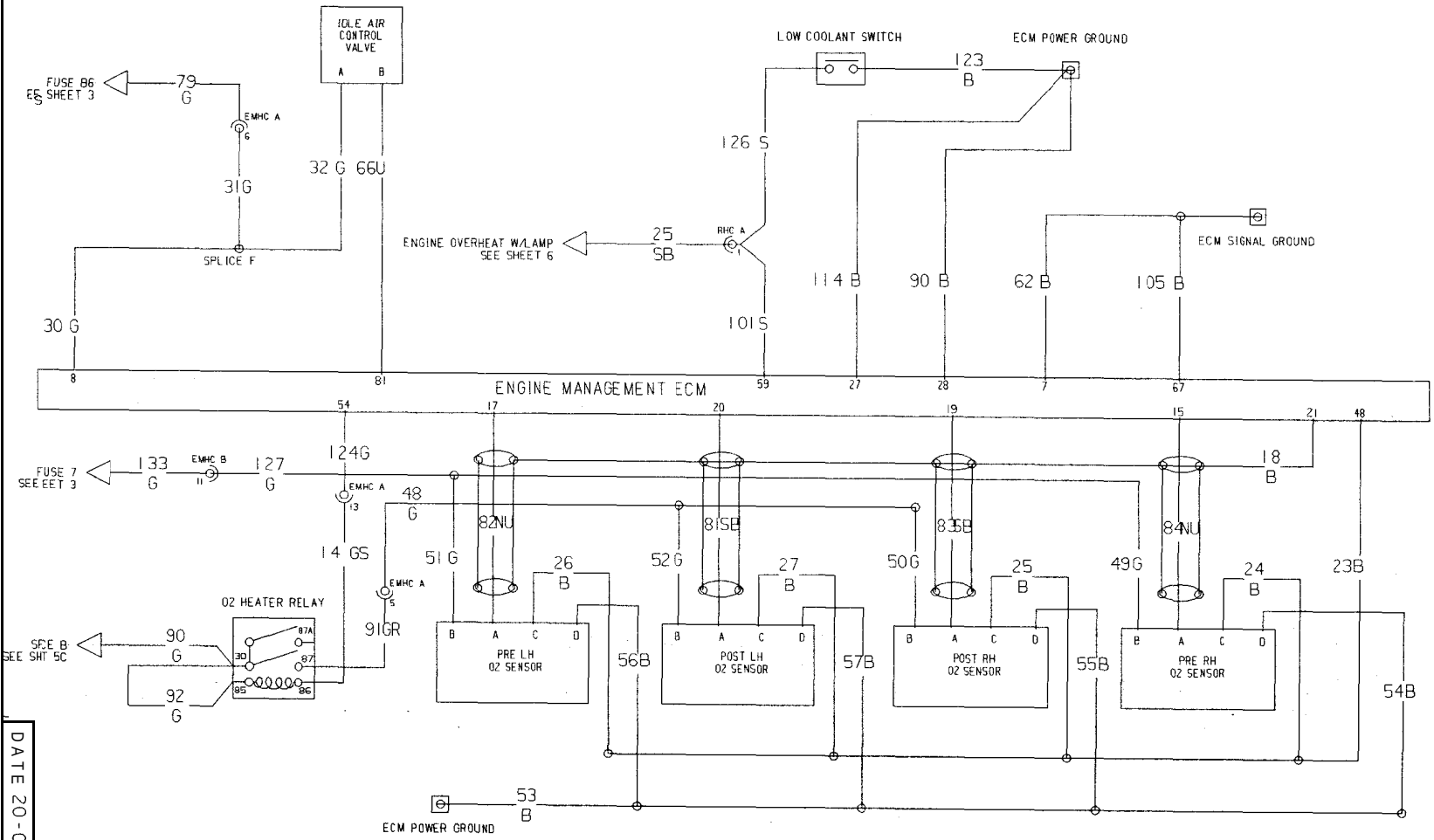

REAR +VE POST
34 R
PRIMARY FUEL PUMP
BATTERY
0W 103
B 105
FUEL PUMP & INJECTOR RELAY
0W 132
SEE SHEET 5D
B3 25 A
96 P
0W 84
EMHC B
34 Y
SPLICE C
SECONDARY INJECTOR 2
44 Y
SECONDARY INJECTOR 1
43 Y
INJECTOR 8
42 Y
INJECTOR 7
41 Y
INJECTOR 6
40 Y
INJECTOR 5
39 Y
INJECTOR 4
38 Y
INJECTOR 3
37 Y
INJECTOR 2
6 Y
INJECTOR 1
35 Y
0P 82
58 YP
SECONDRY FUEL PUMP RELAY
SECONDRY FUEL PUMP
BATTERY
B4 15 A
97 P
0U 104
B 106
INERTIA SWITCH
59 YP
SPLICE A
SEE SHEET 2
SPLICE H
86 G
EMHC A
45 G
TO FUSE B5
SEE SHEET 3
46 G
47 G
COIL PACK 1
COIL PACK 2
911
830S
1150S
67 s 68 w
69 s 70 w
78 NO
77 NY
76 NG
75 NS
74 NK
73 NW
72 NR
71 NU
94 W
29
49
32
52
26
53
ENGINE MANAGEMENT ECM

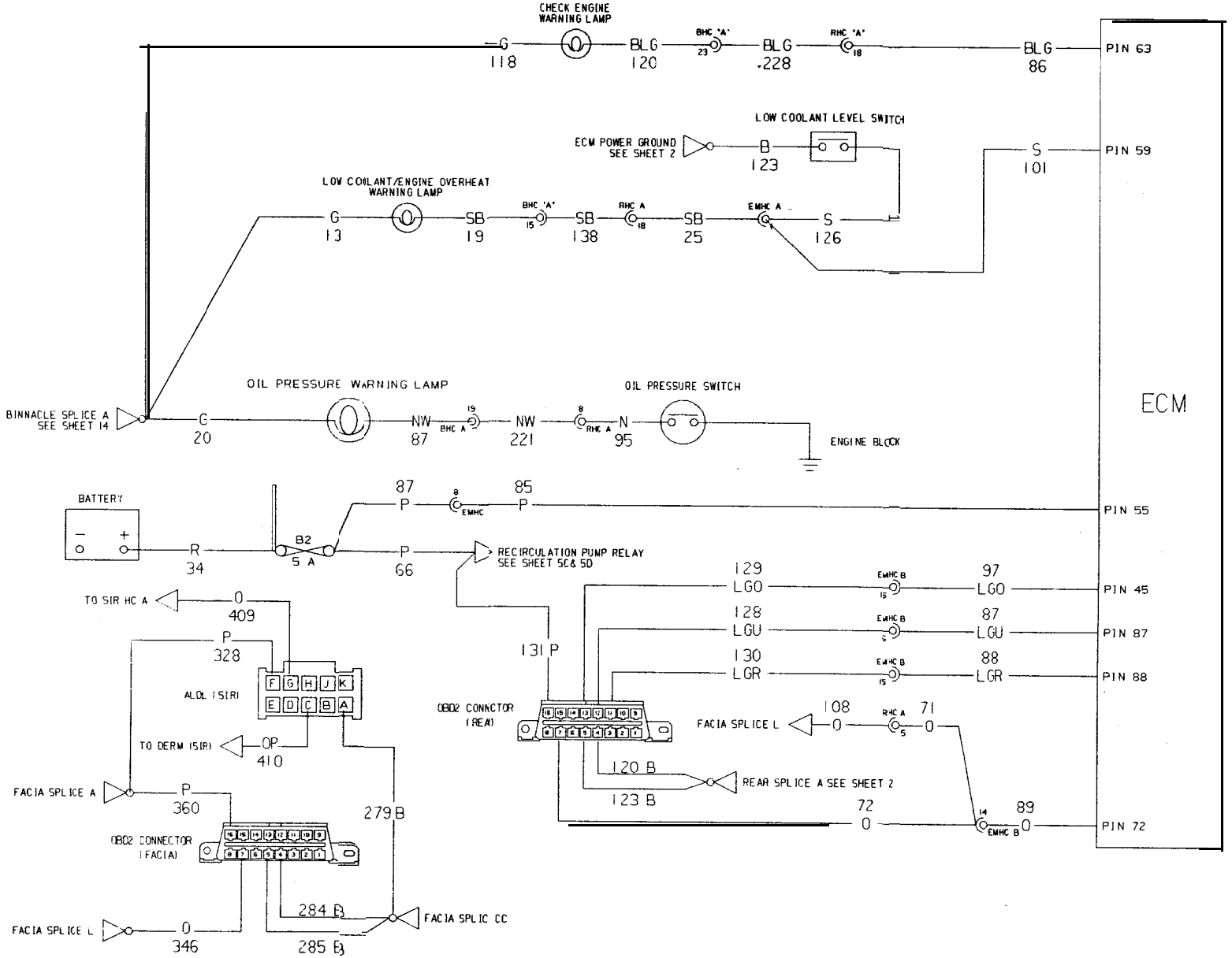

IDLE AIR CONTROL VALVE
A B
FUSE86 SEE SHEE 3
79 G
EMHC A 6
31G
32 G 56U
SPLICE F
30 (
LOW COOLANT SWITCH
ECM POWER GROUND
123 B
126 S
ENGINE OVERHEAT W/LAMP SEE SHEET 6
25 SB
RHC A 1
ECM SIGNAL GROUND
114 B
90 B
62 B
105 B
101S
81
ENGINE MANAGEMENT ECM
59
27
28
7
67
54
17
20
19
15
21
48
124G
EMHC A 13
18 B
48 G
82NU
81SB
83SB
84NU
14 GS
51 G
26 B
52G
27 B
50G
25 B
49G
24 B
23B
EMHC A 5
02 HEATER RELAY
87A
30
87
85
86
SPLICE B SEE SHEET 5C
90 G
91 G
92 G
B A C D
PRE LH 02 SENSOR
56B
POST LH 02 SENSOR
57B
POST RH 02 SENSOR
55B
PRE RH 02 SENSOR
54B
53 B
ECM POWER GROUND

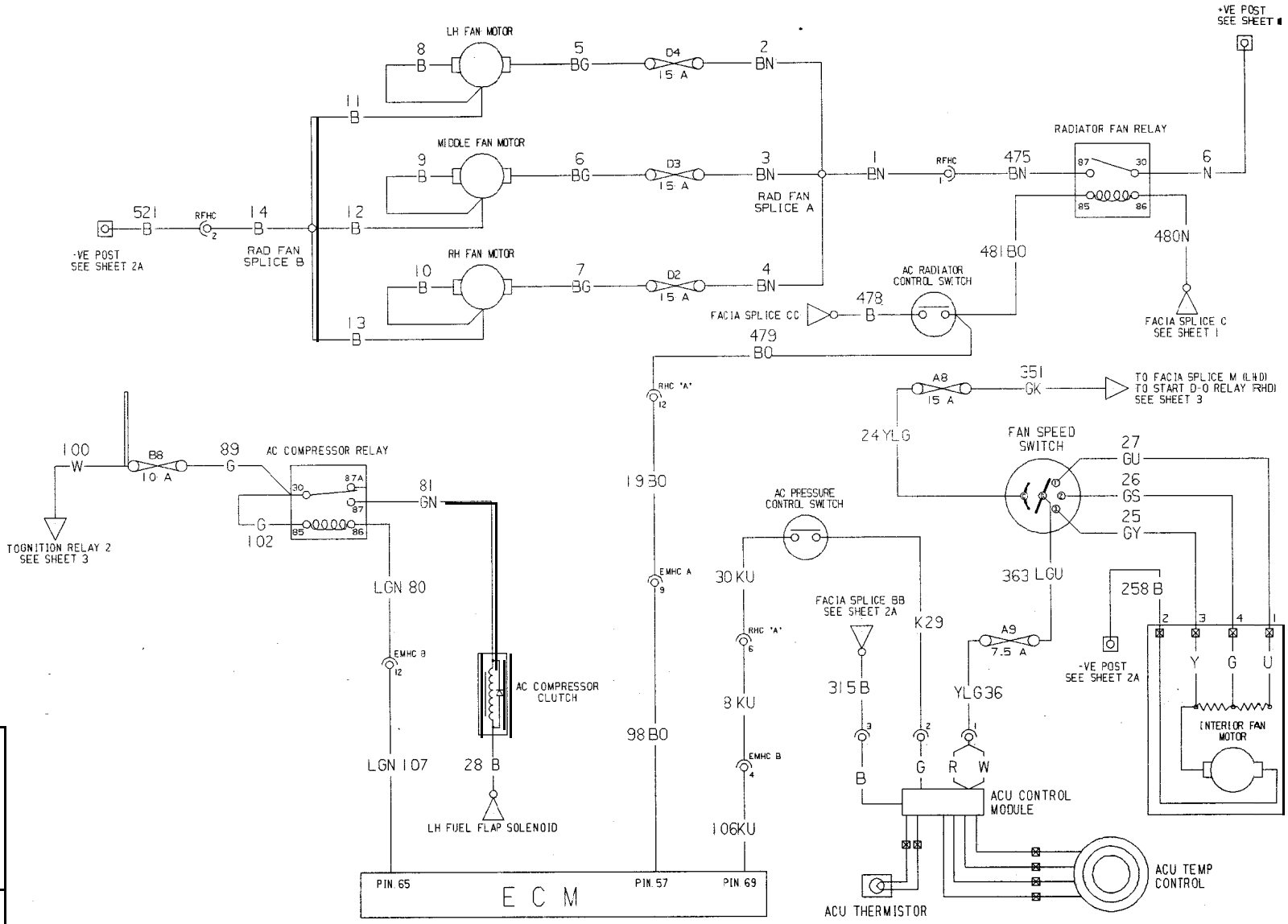

MAP SENSOR
MAT SENSOR
COOLANT TEMP. SENSOR
EGR TEMP. SENSOR
DETONATION SENSOR
2U 60G 10S
64N 4U
65Y 5U
92W 7u
103U
ENGINE MANAGEMENT ECM
63u
63
LG059
61G
15B
58W
85
95
96
112LGP
U6
Si3
u3
S9
S120
17B
16B
SPLICE C
2S
14S
THROTTLE POSITION SENSOR
BAROMETRIC SENSOR (1-BAR)
ROUGH ROAD SENSOR
CAM SENSOR
CRANK SENSOR
33P
EGR SENSOR
FUEL PRESSURE SENSOR
EMHC A
29
28B
BATTERY POSITIVE
R 34
B2
5 A
87P
66P
RECIRC RELAY SEE SHEET 5C & 5D
SPLICE E

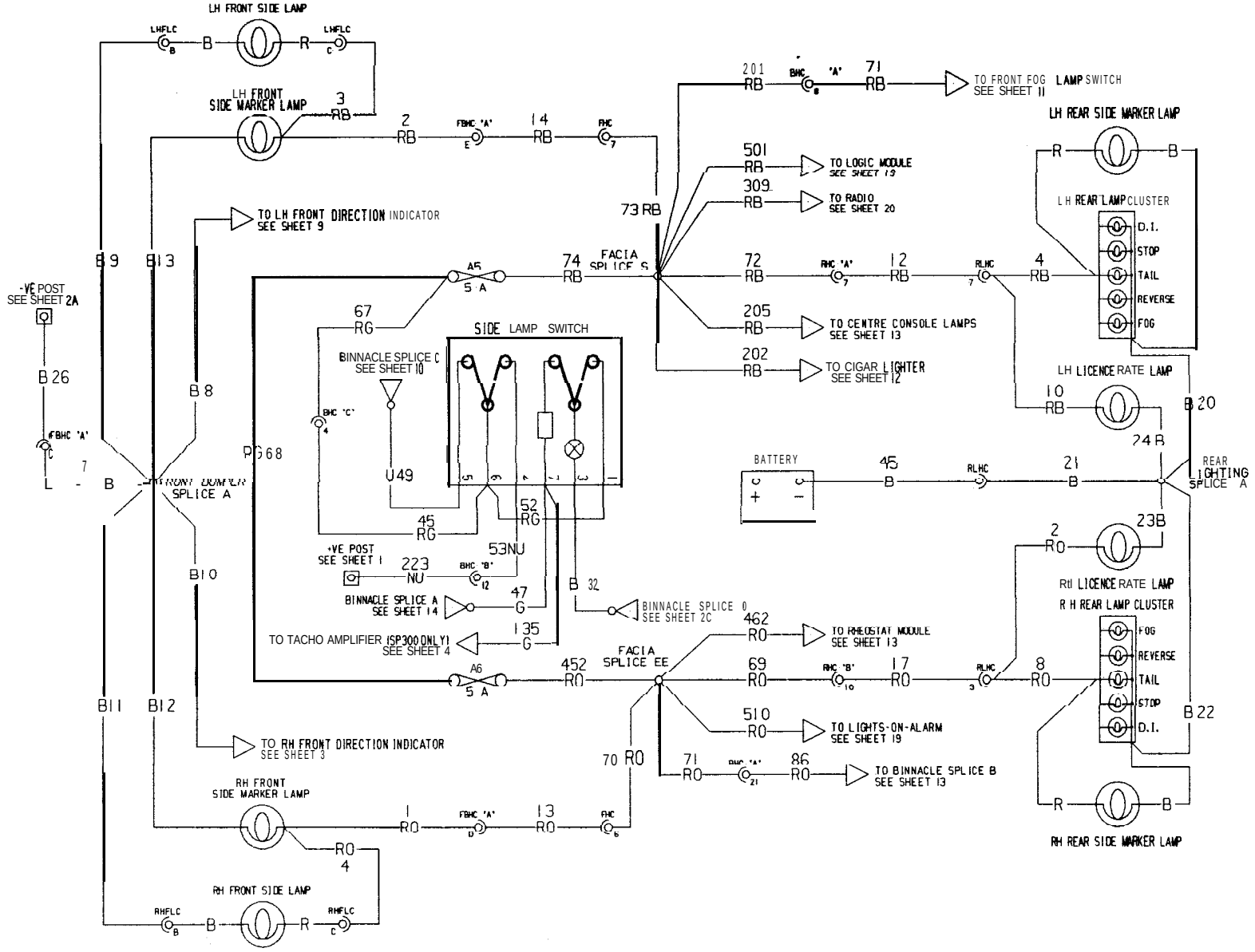

FUSE 2
SEE SHEET 6
P
66
RECIRC PUMP RELAY
87A
30
87
85
86
P
67
PK
62
RECIRC PUMP
M
PK
68
RECIRC SOLENOID
OBD2 CONNECTOR
SEE SHEET 6
P
131
P0 70
B48
B47
EMHC A
11
SPLICE A
SEE SHEET 2
P0125
61
ENGINE MANAGEMENT ECM
64
84
85
80
BG 80
GK113
LGB79
GY104
EMHC A
15
EMHC A
17
EMHC A
16
EMHC A
14
GK49
LGB44
GY 42
BG15
AIR CONTROL SOL
PURGE SOLENOID
CAN PURGE SOLENOID
WASTEGATE SOLENOID
AIR PUMP RELAY
AIR PUMP
AIR PUMP MAXI FUSE
30A
P
55
M
UY
24
BG56
R54
G20
B50
G60
G38
G43
G39
SPLICE B
REAR +VE POST
BATTERY
+
−
G
65
FUSE 7
SEE SHEET 3
G
90
TO O2 HEATER RELAY
SEE SHEET 5A & 5E

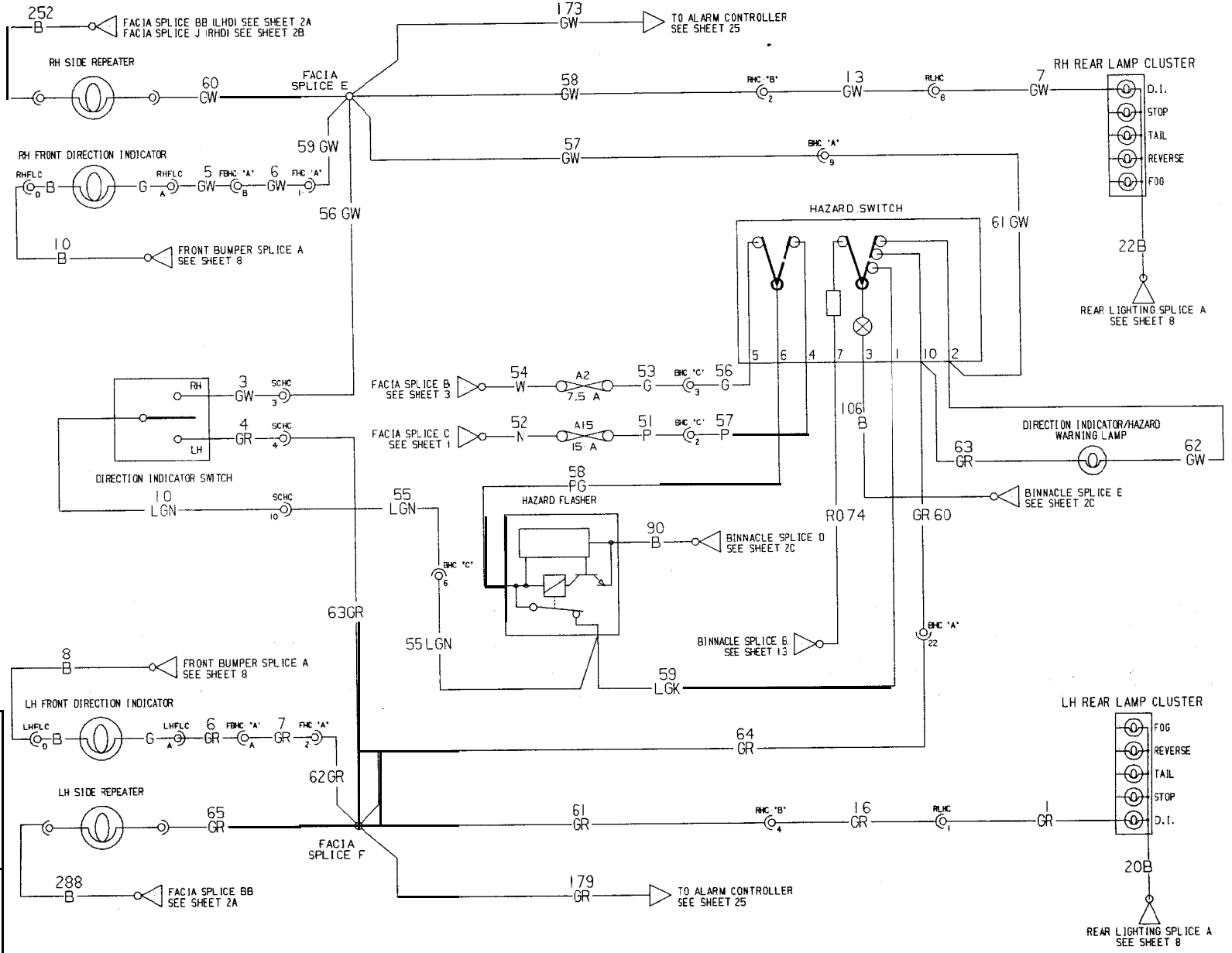

FUSE 2
SEE SHEET 6
P
66
RECIRC PUMP RELAY
87A
30
87
85
86
P
67
OBD2 CONNECTOR
SEE SHEET 6
P
131
PK
68
RECIRC PUMP
M
RECIRC SOLENOID
OW
132
FUEL PUMP/INJ RELAY
SEE SHEET 5
P070
EMHC A
11
P0125
B48
B47
SPLICE A
SEE SHEET 2
61
ENGINE MANAGEMENT ECM
64
84
85
80
BG80
GK113
LGB79
GY104
EMHC A
15
EMHC A
17
EMHC A
16
EMHC A
14
GK49
LGB44
GY 42
BG15
AIR CONTROL SOL
PURGE SOLENOID
CAN PURGE SOLENOID
WASTEGATE SOLENOID
AIR PUMP RELAY
AIR PUMP
AIR PUMP MAXI FUSE
30A
P
55
M
UY
24
BG56
R54
G20
B50
G60
G38
G43
G39
SPLICE B
REAR +VE POST
BATTERY
+
−
G
65
FUSE 7
SEE SHEET 3
G
90
TO O2 HEATER RELAY
SEE SHEET 5A

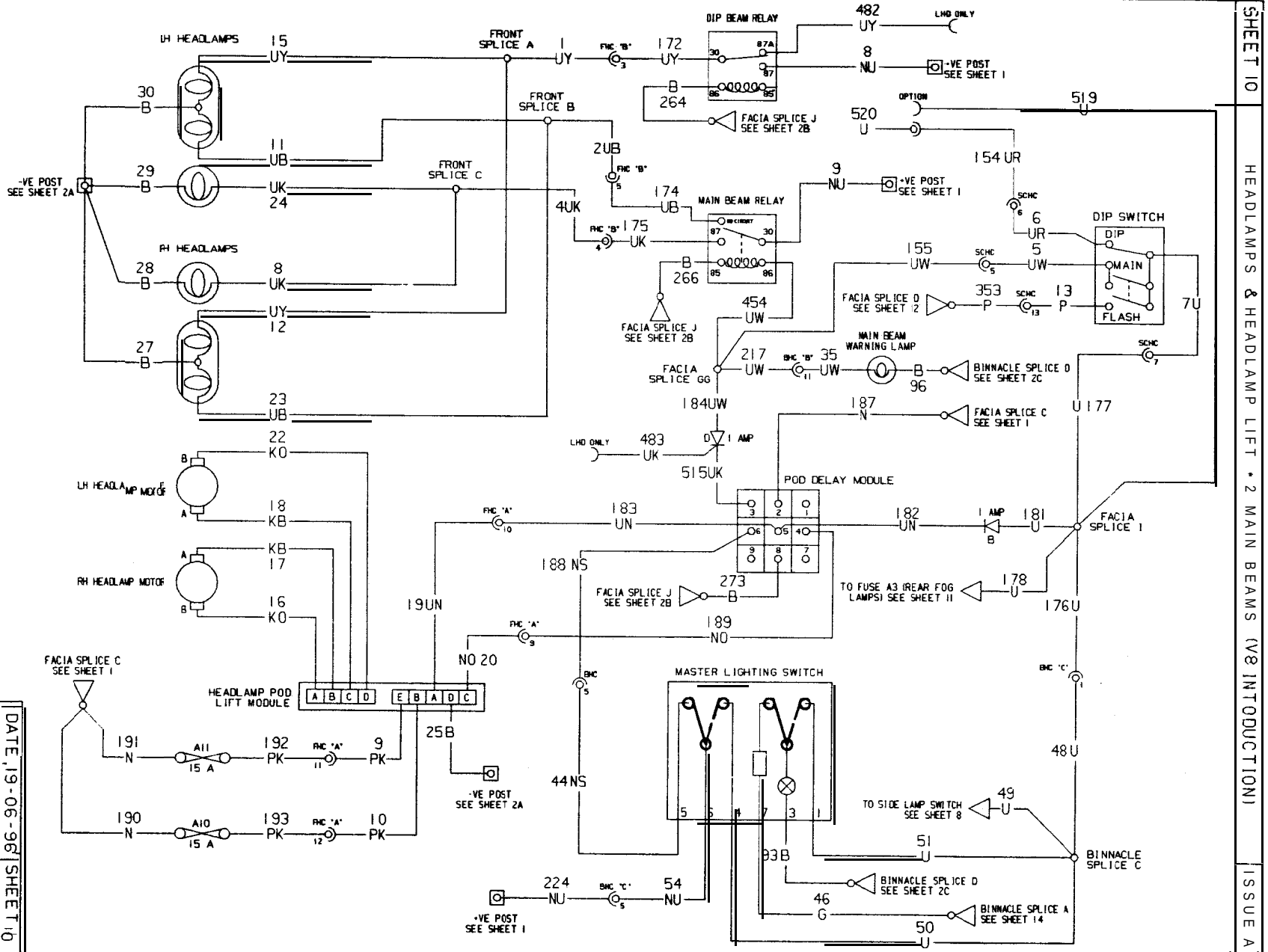

IDLE AIR CONTROL VALVE
A
B
FUSE 86 SEE SHEET 3
79 G
EMHC A 6
31G
32 G
66U
SPLICE F
30 G
LOW COOLANT SWITCH
123 B
ECM POWER GROUND
126 S
ENGINE OVERHEAT W/LAMP SEE SHEET 6
25 SB
RHC A 1
101S
114 B
90 B
62 B
105 B
ECM SIGNAL GROUND
8
81
ENGINE MANAGEMENT ECM
59
27
28
7
67
54
17
20
19
15
21
48
FUSE 7 SEE SHEET 3
133 G
EMHC B 11
127 G
124G
EMHC A 13
18 B
48 G
82NU
81SB
83SB
84NU
14 GS
51G
26 B
52G
27 B
50G
25 B
49G
24 B
23B
EMHC A 5
91GR
02 HEATER RELAY
SEE B SEE SHT 5C
90 G
92 G
87A
30
87
85
86
PRE LH 02 SENSOR
POST LH 02 SENSOR
POST RH 02 SENSOR
PRE RH 02 SENSOR
B
A
C
D
56B
57B
55B
54B
53 B
ECM POWER GROUND

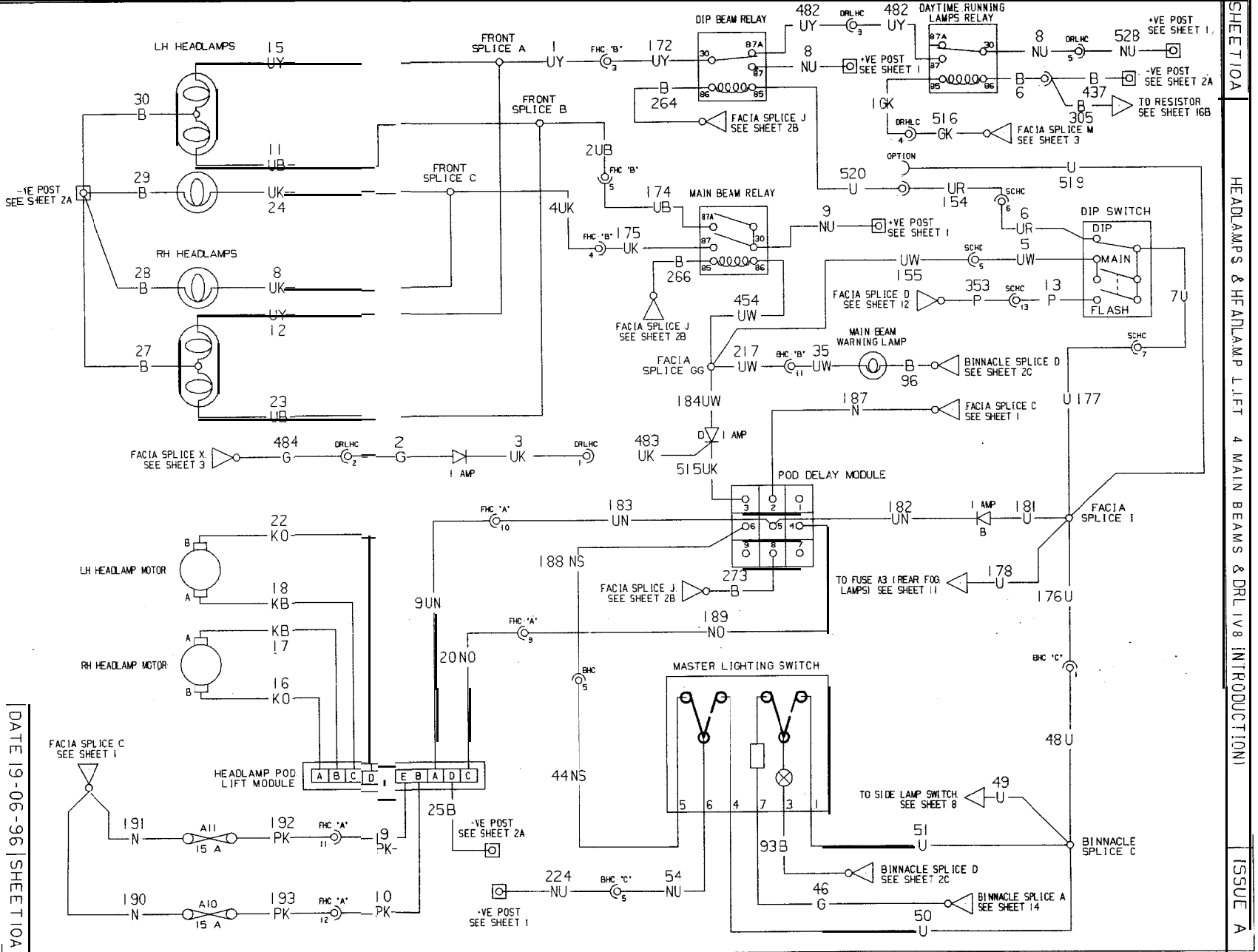

CHECK ENGINE WARNING LAMP
G 118
BLG 120
BHC "A" 23
BLG 228
RHC "A" 18
BLG 86
PIN 63
LOW COOLANT LEVEL SWITCH
ECM POWER GROUND SEE SHEET 2
B 123
S 101
PIN 59
LOW COOLANT/ENGINE OVERHEAT WARNING LAMP
G 13
SB 19
BHC "A" 15
SB 138
RHC A 18
SB 25
EMHC A 1
S 126
OIL PRESSURE WARNING LAMP
OIL PRESSURE SWITCH
BINNACLE SPLICE A SEE SHEET 14
G 20
NW 87
BHC A 19
NW 221
RHC A 8
N 95
ENGINE BLOCK
ECM
BATTERY
R 34
B2 5 A
87 P
EMHC 8
85 P
PIN 55
P 66
RECIRCULATION PUMP RELAY SEE SHEET 5C & 5D
TO SIR HC A
O 409
P 328
ALDL (SIR)
F G H J K
E D C B A
TO DERM (SIR)
OP 410
FACIA SPLICE A
P 360
OBD2 CONNECTOR (FACIA)
279 B
FACIA SPLICE L
O 346
284 B
285 B
FACIA SPLIC CC
131 P
OBD2 CONNCTOR (REAR)
129 LGO
EMHC B 15
97 LGO
PIN 45
128 LGU
EMHC B 5
87 LGU
PIN 87
130 LGR
EMHC B 15
88 LGR
PIN 88
FACIA SPLICE L
108 O
RHC A 5
71 O
120 B
123 B
REAR SPLICE A SEE SHEET 2
72 O
14 EMHC B
89 O
PIN 72

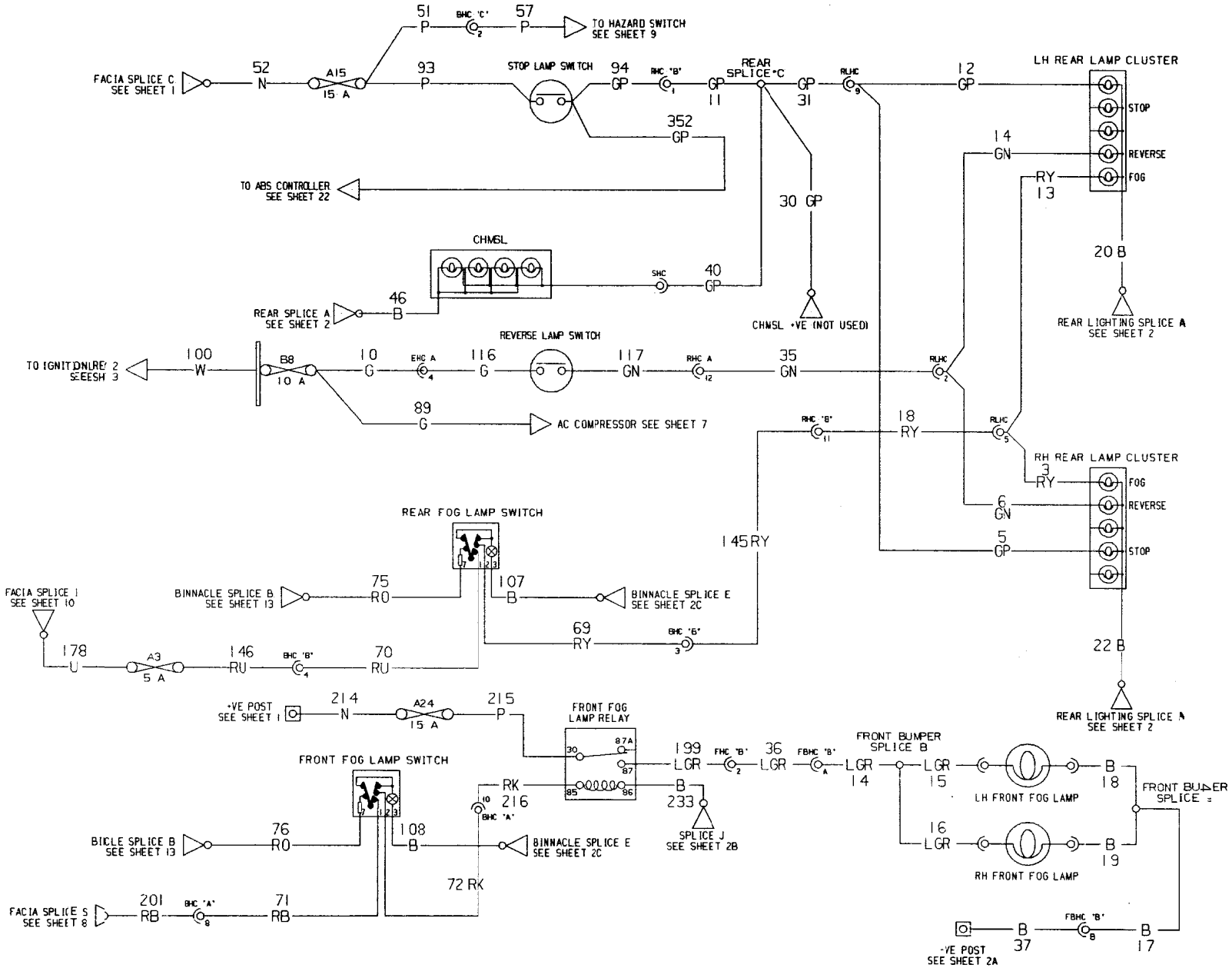

LH FAN MOTOR
MIDDLE FAN MOTOR
RH FAN MOTOR
RAD FAN SPLICE A
RAD FAN SPLICE B
RADIATOR FAN RELAY
+VE POST SEE SHEET 1
-VE POST SEE SHEET 2A
AC RADIATOR CONTROL SWITCH
FACIA SPLICE CC
FACIA SPLICE C SEE SHEET 1
TO FACIA SPLICE M (LHD) TO START D-O RELAY (RHD) SEE SHEET 3
TO IGNITION RELAY 2 SEE SHEET 3
AC COMPRESSOR RELAY
AC COMPRESSOR CLUTCH
LH FUEL FLAP SOLENOID
AC PRESSURE CONTROL SWITCH
FAN SPEED SWITCH
FACIA SPLICE BB SEE SHEET 2A
-VE POST SEE SHEET 2A
INTERIOR FAN MOTOR
ACU CONTROL MODULE
ACU TEMP CONTROL
ACU THERMISTOR
E C M
PIN 65
PIN 57
PIN 69

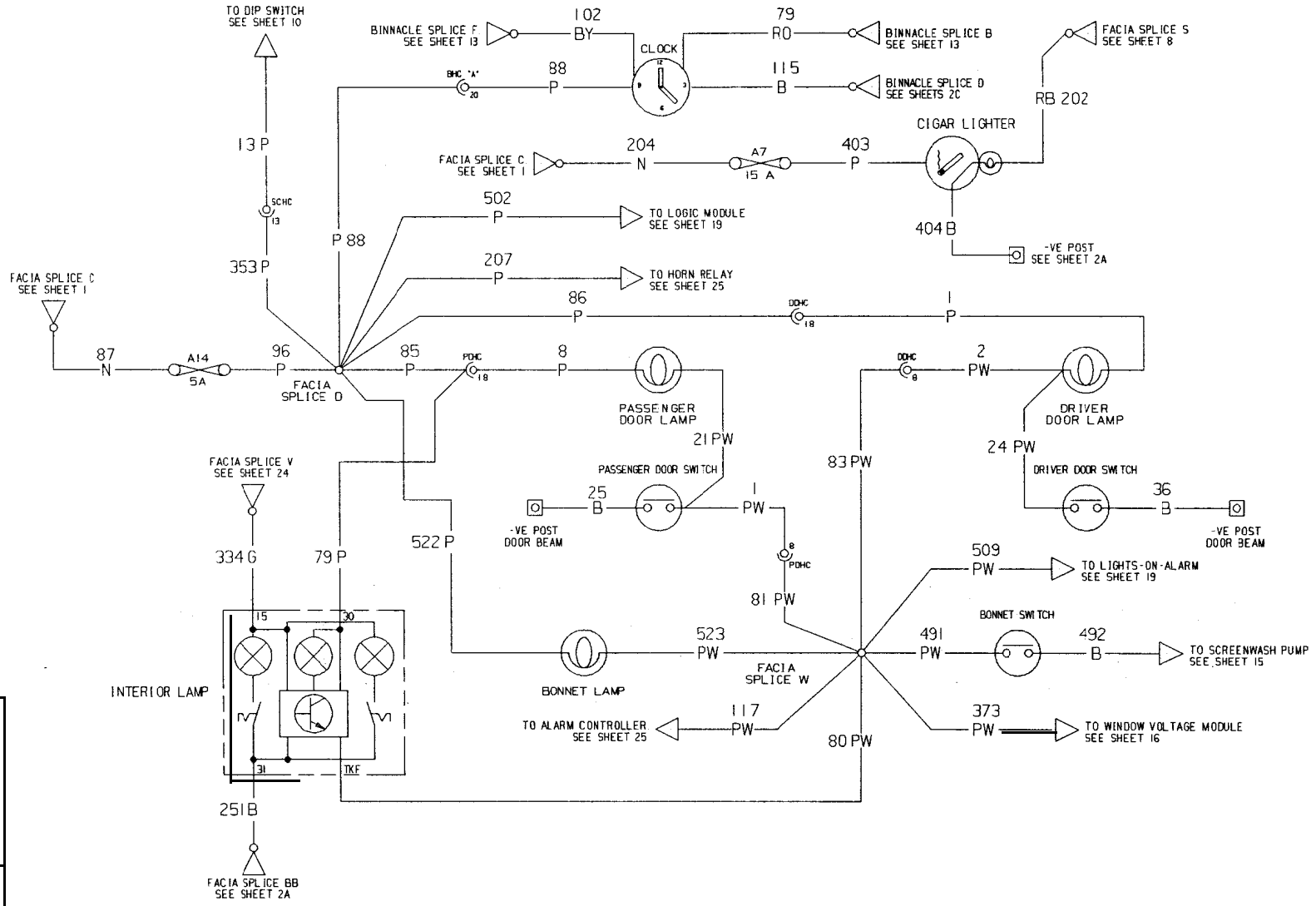

LH FRONT SIDE LAMP
LHFLC
LHFLC
LH FRONT SIDE MARKER LAMP
3 RB
2 RB
FBHC 'A'
14 RB
RHC
TO LH FRONT DIRECTION INDICATOR SEE SHEET 9
-VE POST SEE SHEET 2A
B26
B9
B13
B8
B10
B11
B12
FBHC 'A'
L - B
FRONT BUMPER SPLICE A
P668
A5 5 A
74 RB
FACIA SPLICE S
73 RB
67 RG
SIDE LAMP SWITCH
BINNACLE SPLICE C SEE SHEET 10
BHC 'C'
U49
45 RG
52 RG
+VE POST SEE SHEET 1
223 NU
BHC 'B'
53NU
47 G
B32
BINNACLE SPLICE A SEE SHEET 14
BINNACLE SPLICE D SEE SHEET 2C
TO TACHO AMPLIFIER (SP300 ONLY) SEE SHEET 4
135 G
A6 5 A
452 RO
FACIA SPLICE EE
201 RB
BHC 'A'
71 RB
TO FRONT FOG LAMP SWITCH SEE SHEET 11
501 RB
TO LOGIC MODULE SEE SHEET 19
309 RB
TO RADIO SEE SHEET 20
72 RB
RHC 'A'
12 RB
RLHC
4 RB
205 RB
TO CENTRE CONSOLE LAMPS SEE SHEET 13
202 RB
TO CIGAR LIGHTER SEE SHEET 12
LH REAR SIDE MARKER LAMP
LH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
LH LICENCE RATE LAMP
10 RB
B20
24 B
BATTERY
45
RLHC
21 B
REAR LIGHTING SPLICE A
462 RO
TO RHEOSTAT MODULE SEE SHEET 13
69 RO
RHC 'B'
17 RO
RLHC
8 RO
2 RO
23B
RH LICENCE RATE LAMP
RH REAR LAMP CLUSTER
FOG
REVERSE
TAIL
STOP
D.I.
B22
510 RO
TO LIGHTS-ON-ALARM SEE SHEET 19
70 RO
71 RO
86 RO
TO BINNACLE SPLICE B SEE SHEET 13
RH REAR SIDE MARKER LAMP
TO RH FRONT DIRECTION INDICATOR SEE SHEET 3
RH FRONT SIDE MARKER LAMP
1 RO
13 RO
RO 4
RH FRONT SIDE LAMP
RHFLC
RHFLC

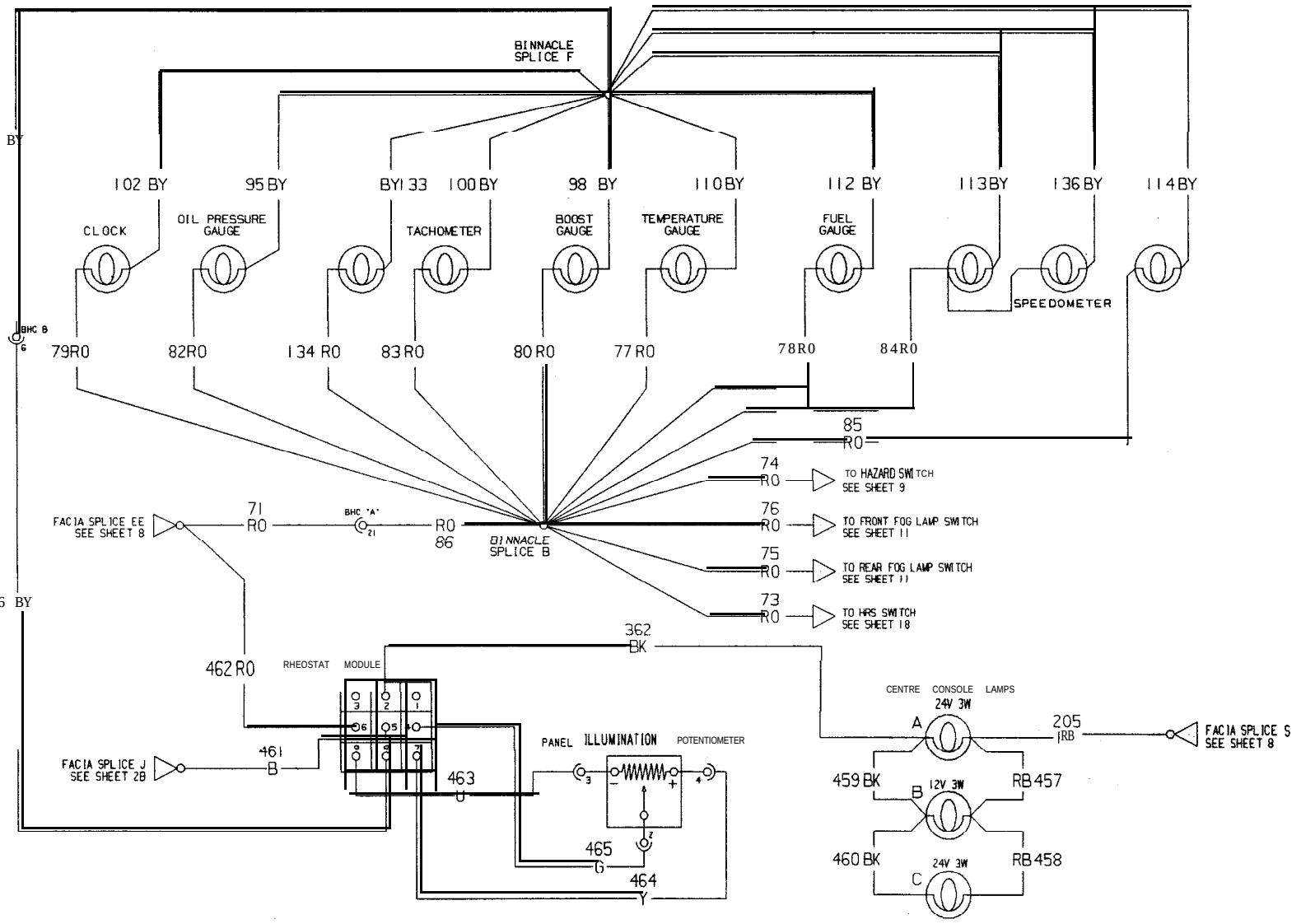

252 B
FACIA SPLICE BB (LHD) SEE SHEET 2A
FACIA SPLICE J (RHD) SEE SHEET 2B
RH SIDE REPEATER
60 GW
FACIA SPLICE E
173 GW
TO ALARM CONTROLLER SEE SHEET 25
58 GW
13 GW
7 GW
RH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
RH FRONT DIRECTION INDICATOR
59 GW
57 GW
56 GW
HAZARD SWITCH
61 GW
22B
REAR LIGHTING SPLICE A SEE SHEET 8
10 B
FRONT BUMPER SPLICE A SEE SHEET 8
3 GW
4 GR
DIRECTION INDICATOR SWITCH
10 LGN
FACIA SPLICE B SEE SHEET 3
54 W
A2 7.5 A
53 G
56 G
FACIA SPLICE C SEE SHEET 1
52 N
A15 15 A
51 P
57 P
106 B
DIRECTION INDICATOR/HAZARD WARNING LAMP
63 GR
62 GW
BINNACLE SPLICE E SEE SHEET 2C
58 PG
HAZARD FLASHER
55 LGN
90 B
BINNACLE SPLICE D SEE SHEET 2C
R074
GR 60
63GR
55 LGN
BINNACLE SPLICE G SEE SHEET 13
59 LGK
8 B
FRONT BUMPER SPLICE A SEE SHEET 8
LH FRONT DIRECTION INDICATOR
64 GR
LH REAR LAMP CLUSTER
FOG
REVERSE
TAIL
STOP
D.I.
62GR
LH SIDE REPEATER
65 GR
61 GR
16 GR
1 GR
FACIA SPLICE F
20B
288 B
FACIA SPLICE BB SEE SHEET 2A
179 GR
TO ALARM CONTROLLER SEE SHEET 25
REAR LIGHTING SPLICE A SEE SHEET 8

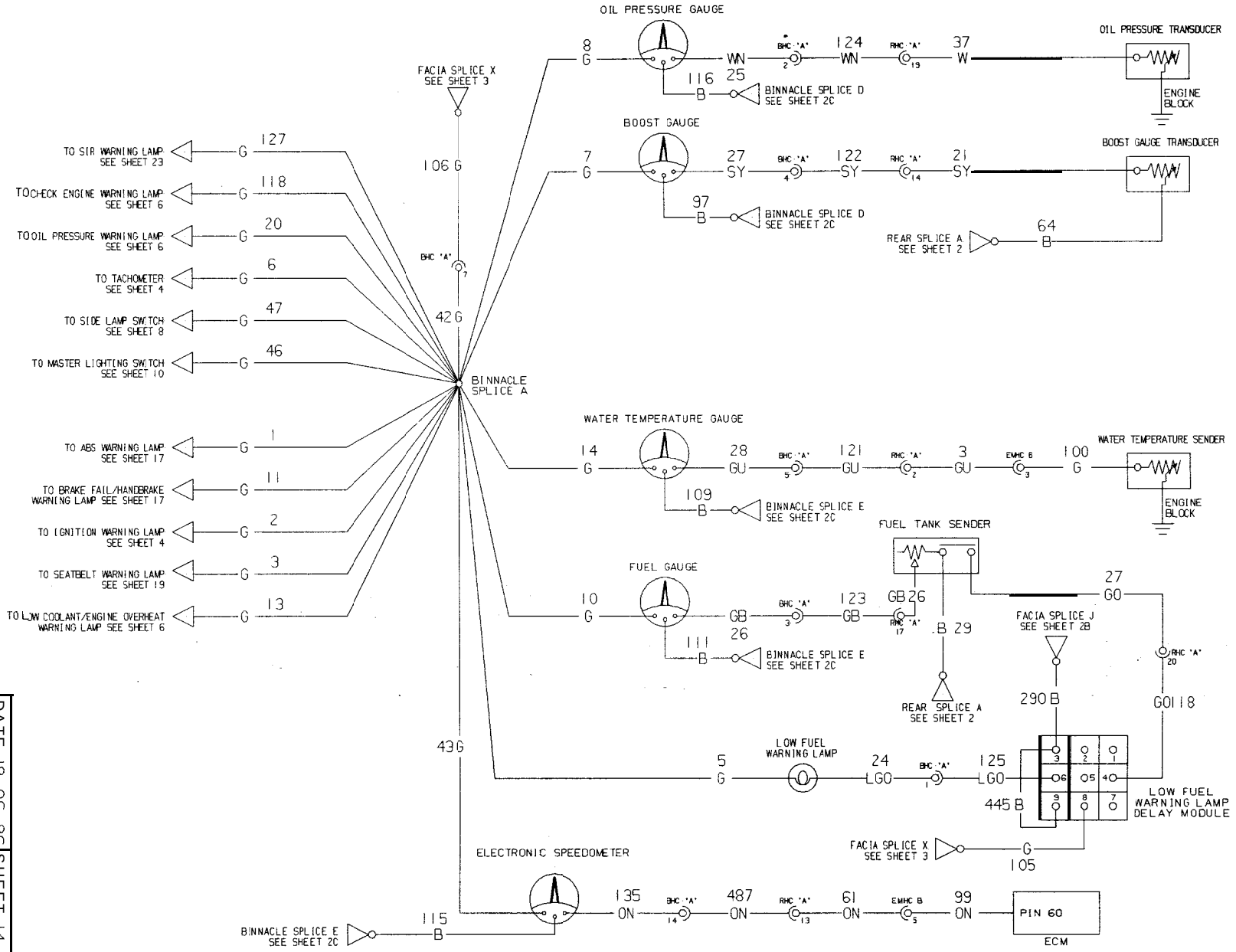

LH HEADLAMPS
RH HEADLAMPS
-VE POST SEE SHEET 2A
FRONT SPLICE A
FRONT SPLICE B
FRONT SPLICE C
DIP BEAM RELAY
MAIN BEAM RELAY
LHD ONLY
-VE POST SEE SHEET 1
FACIA SPLICE J SEE SHEET 2B
OPTION
DIP SWITCH
DIP
MAIN
FLASH
FACIA SPLICE D SEE SHEET 12
MAIN BEAM WARNING LAMP
FACIA SPLICE GG
BINNACLE SPLICE D SEE SHEET 2C
FACIA SPLICE C SEE SHEET 1
1 AMP
POD DELAY MODULE
FACIA SPLICE I
TO FUSE A3 (REAR FOG LAMPS) SEE SHEET 11
LH HEADLAMP MOTOR
RH HEADLAMP MOTOR
HEADLAMP POD LIFT MODULE
A11 15 A
A10 15 A
MASTER LIGHTING SWITCH
TO SIDE LAMP SWITCH SEE SHEET 8
BINNACLE SPLICE C
BINNACLE SPLICE A SEE SHEET 14
+VE POST SEE SHEET 1

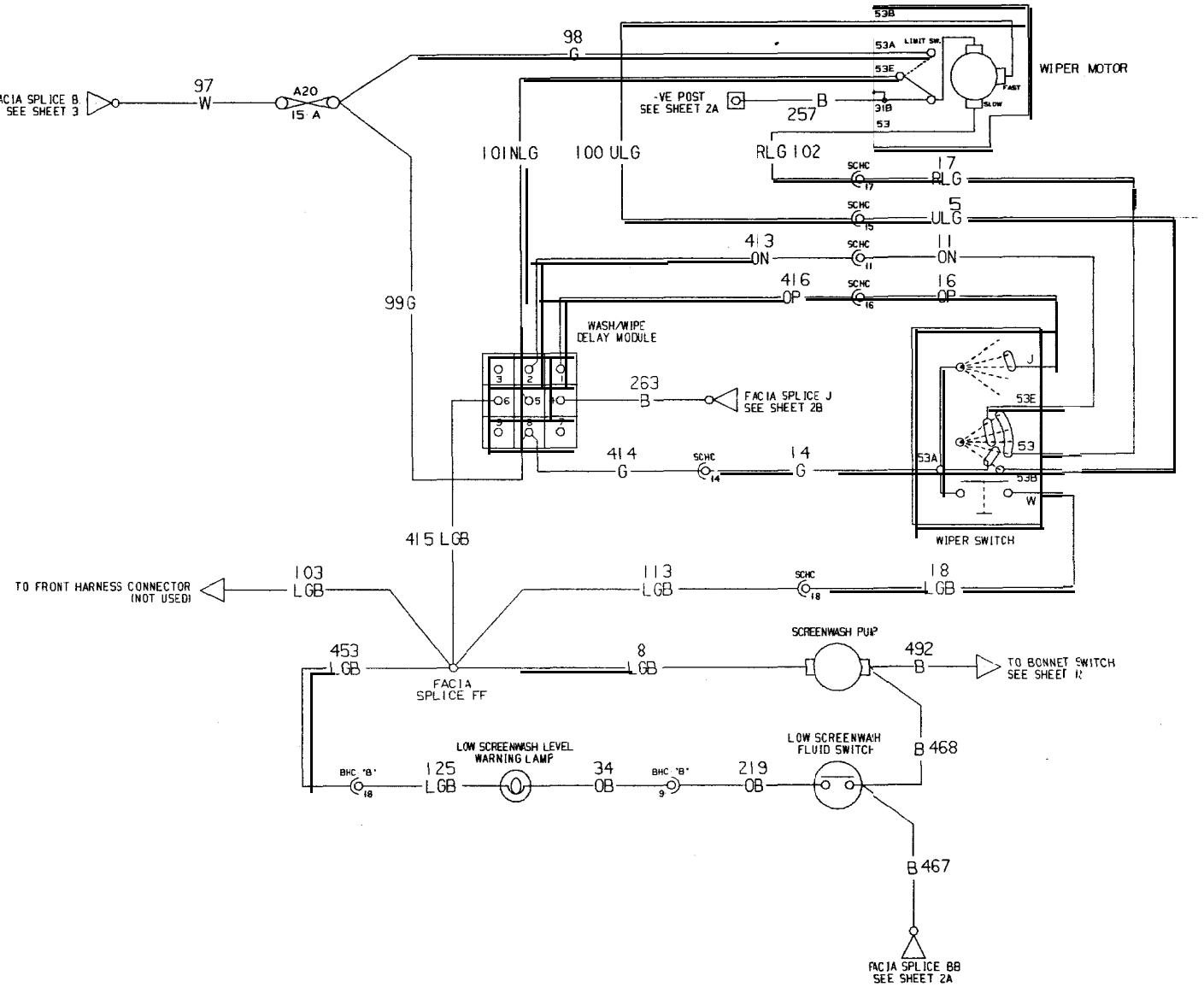

LH HEADLAMPS
RH HEADLAMPS
FRONT SPLICE A
FRONT SPLICE B
FRONT SPLICE C
DIP BEAM RELAY
DAYTIME RUNNING LAMPS RELAY
MAIN BEAM RELAY
DIP SWITCH
DIP
MAIN
FLASH
MAIN BEAM WARNING LAMP
FACIA SPLICE GG
FACIA SPLICE I
FACIA SPLICE J
FACIA SPLICE M
FACIA SPLICE D
FACIA SPLICE C
FACIA SPLICE X
POD DELAY MODULE
LH HEADLAMP MOTOR
RH HEADLAMP MOTOR
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
-VE POST SEE SHEET 2A
+VE POST SEE SHEET 1
TO RESISTOR SEE SHEET 16B
TO FUSE A3 (REAR FOG LAMPS) SEE SHEET 11
TO SIDE LAMP SWITCH SEE SHEET 8
BINNACLE SPLICE C
BINNACLE SPLICE D SEE SHEET 2C
BINNACLE SPLICE A SEE SHEET 14
1 AMP
A11 15 A
A10 15 A

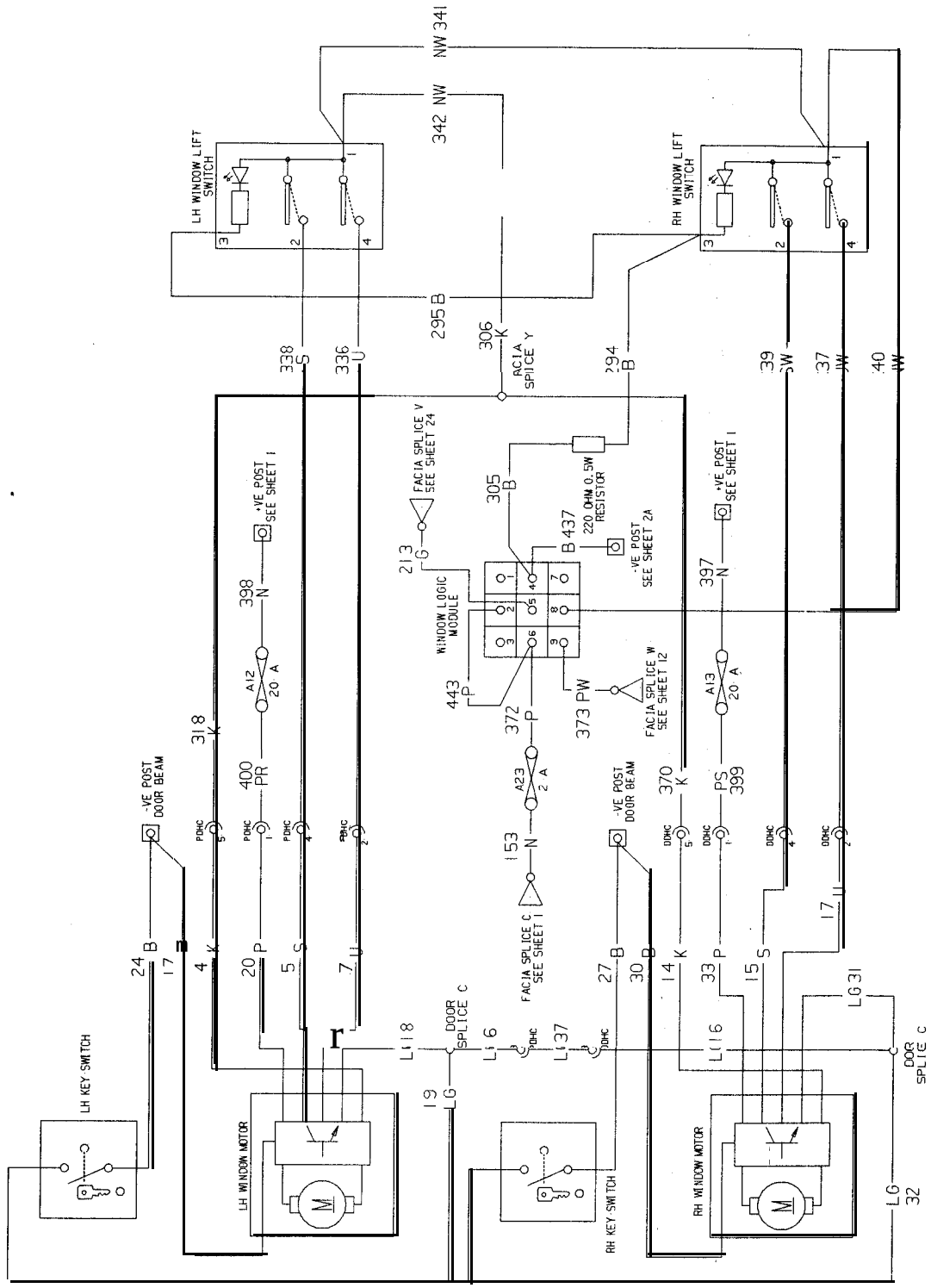

51
BHC 'C'
57
TO HAZARD SWITCH SEE SHEET 9
FACIA SPLICE C SEE SHEET 1
52
N
A15
15 A
93
P
STOP LAMP SWITCH
94
GP
RHC 'B'
REAR SPLICE 'C'
GP
11
GP
31
RLHC
12
GP
LH REAR LAMP CLUSTER
STOP
REVERSE
FOG
352
GP
TO ABS CONTROLLER SEE SHEET 22
14
GN
RY
13
30 GP
CHMSL
SHC
40
GP
20 B
REAR SPLICE A SEE SHEET 2
46
B
CHMSL +VE (NOT USED)
REAR LIGHTING SPLICE A SEE SHEET 2
REVERSE LAMP SWITCH
TO IGNITION RELAY 2 SEE SHEET 3
100
W
B8
10 A
10
G
EHC A
116
G
117
GN
RHC A
35
GN
RLHC
89
G
AC COMPRESSOR SEE SHEET 7
RHC 'B'
18
RY
RLHC
RH REAR LAMP CLUSTER
3
RY
FOG
REVERSE
6
GN
STOP
145 RY
5
GP
REAR FOG LAMP SWITCH
FACIA SPLICE I SEE SHEET 10
BINNACLE SPLICE B SEE SHEET 13
75
RO
107
B
BINNACLE SPLICE E SEE SHEET 2C
69
RY
BHC '6'
178
U
A3
5 A
146
RU
BHC 'B'
70
RU
22 B
REAR LIGHTING SPLICE A SEE SHEET 2
+VE POST SEE SHEET 1
214
N
A24
15 A
215
P
FRONT FOG LAMP RELAY
87A
30
87
85
86
199
LGR
FHC 'B'
36
LGR
FBHC 'B'
LGR
14
FRONT BUMPER SPLICE B
LGR
15
B
18
FRONT BUMPER SPLICE
LH FRONT FOG LAMP
FRONT FOG LAMP SWITCH
RK
B
10
216
BHC 'A'
233
SPLICE J SEE SHEET 2B
16
LGR
B
19
RH FRONT FOG LAMP
BICLE SPLICE B SEE SHEET 13
76
RO
108
B
BINNACLE SPLICE E SEE SHEET 2C
72 RK
FACIA SPLICE S SEE SHEET 8
201
RB
BHC 'A'
8
71
RB
-VE POST SEE SHEET 2A
B
37
FBHC 'B'
8
B
17

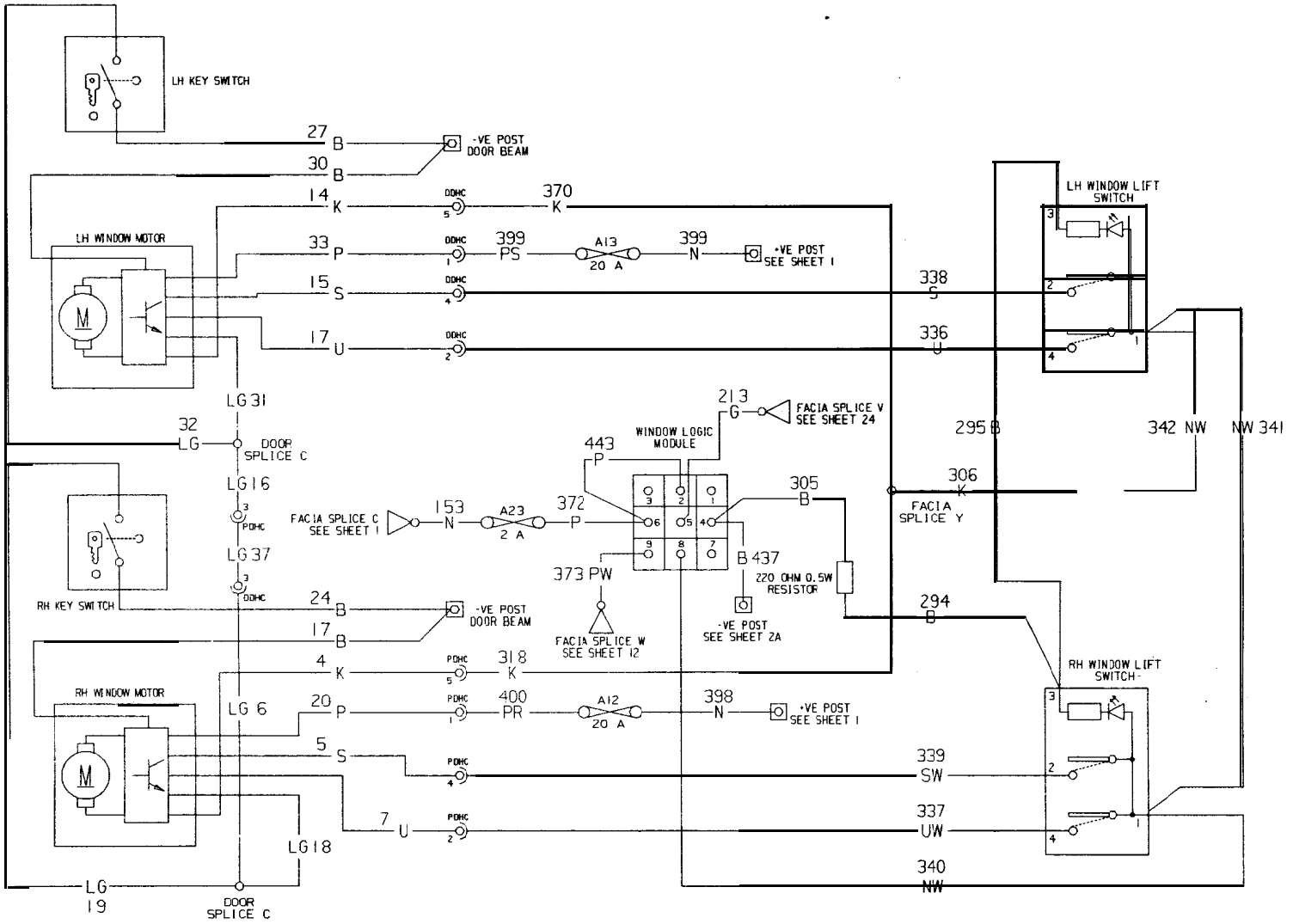

TO DIP SWITCH SEE SHEET 10
BINNACLE SPLICE F SEE SHEET 13
102 BY
79 RO
BINNACLE SPLICE B SEE SHEET 13
CLOCK
BHC "A" 20
88 P
115 B
BINNACLE SPLICE D SEE SHEETS 2C
FACIA SPLICE S SEE SHEET 8
RB 202
CIGAR LIGHTER
FACIA SPLICE C SEE SHEET 1
204 N
A7 15 A
403 P
13 P
SCHC 13
353 P
P 88
502 P
TO LOGIC MODULE SEE SHEET 19
404 B
-VE POST SEE SHEET 2A
207 P
TO HORN RELAY SEE SHEET 25
FACIA SPLICE C SEE SHEET 1
86 P
DDHC 18
1 P
87 N
A14 5A
96 P
FACIA SPLICE D
85 P
PDHC 18
8 P
PASSENGER DOOR LAMP
DDHC 8
2 PW
DRIVER DOOR LAMP
21 PW
24 PW
83 PW
FACIA SPLICE V SEE SHEET 24
PASSENGER DOOR SWITCH
DRIVER DOOR SWITCH
25 B
1 PW
36 B
-VE POST DOOR BEAM
-VE POST DOOR BEAM
522 P
334 G
79 P
8 PDHC
81 PW
509 PW
TO LIGHTS-ON-ALARM SEE SHEET 19
BONNET SWITCH
15
30
INTERIOR LAMP
523 PW
491 PW
492 B
TO SCREENWASH PUMP SEE SHEET 15
BONNET LAMP
FACIA SPLICE W
31
TKF
117 PW
373 PW
TO ALARM CONTROLLER SEE SHEET 25
TO WINDOW VOLTAGE MODULE SEE SHEET 16
80 PW
251 B
FACIA SPLICE BB SEE SHEET 2A

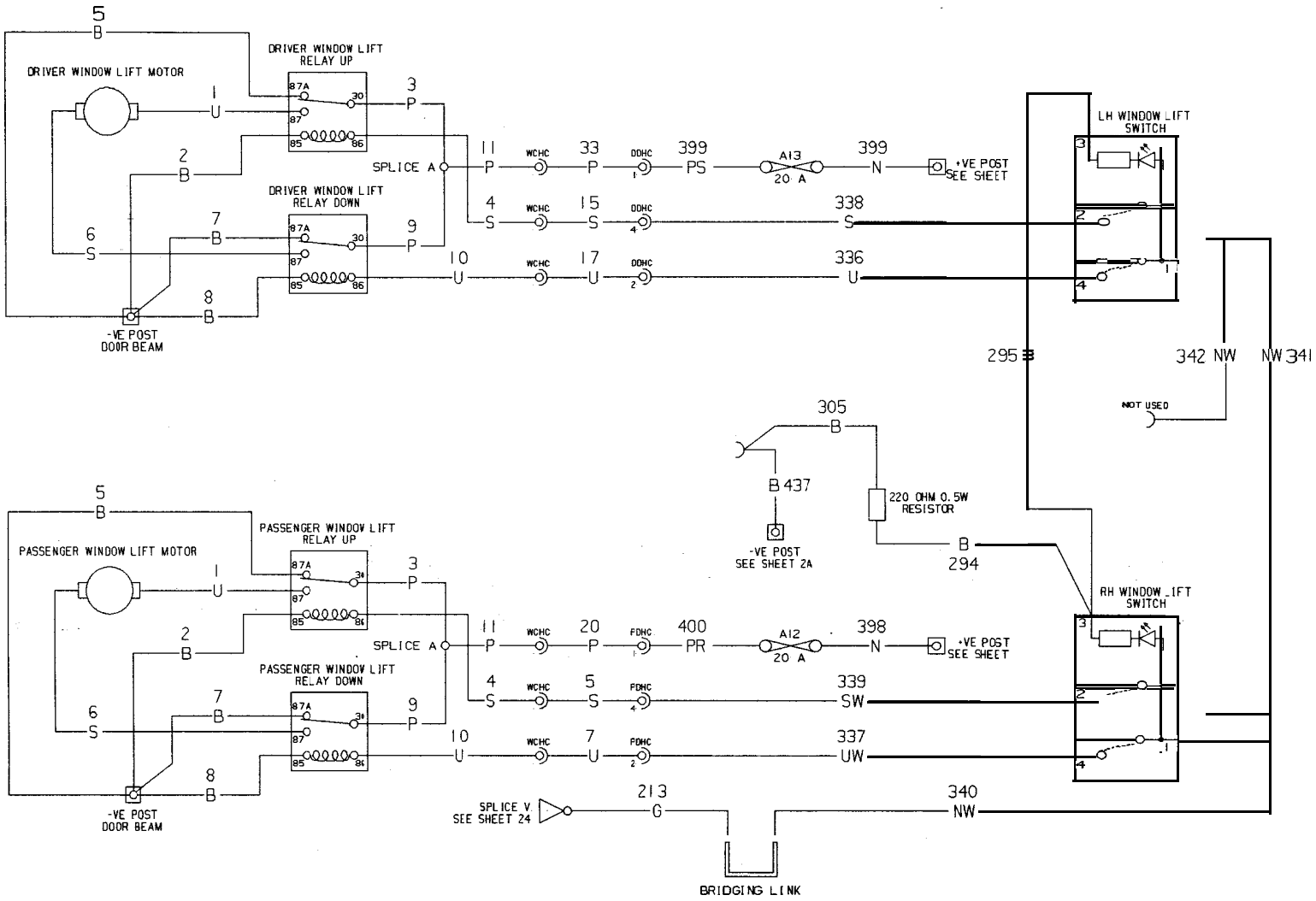

BINNACLE SPLICE F
128 BY
102 BY
95 BY
BY133
100 BY
98 BY
110 BY
112 BY
113 BY
136 BY
114 BY
CLOCK
OIL PRESSURE GAUGE
TACHOMETER
BOOST GAUGE
TEMPERATURE GAUGE
FUEL GAUGE
SPEEDOMETER
BHC B
79R0
82R0
134 R0
83R0
80R0
77R0
78R0
84R0
85 R0
74 R0
TO HAZARD SWITCH SEE SHEET 9
76 R0
TO FRONT FOG LAMP SWITCH SEE SHEET 11
75 R0
TO REAR FOG LAMP SWITCH SEE SHEET 11
73 R0
TO HRS SWITCH SEE SHEET 18
FACIA SPLICE EE SEE SHEET 8
71 R0
BHC "A"
21
R0 86
BINNACLE SPLICE B
466 BY
462 R0
RHEOSTAT MODULE
362 BK
CENTRE CONSOLE LAMPS
24V 3W
A
205 RB
FACIA SPLICE S SEE SHEET 8
459 BK
12V 3W
B
RB 457
460 BK
24V 3W
C
RB 458
FACIA SPLICE J SEE SHEET 2B
461 B
463 U
PANEL ILLUMINATION POTENTIOMETER
465 G
464 Y

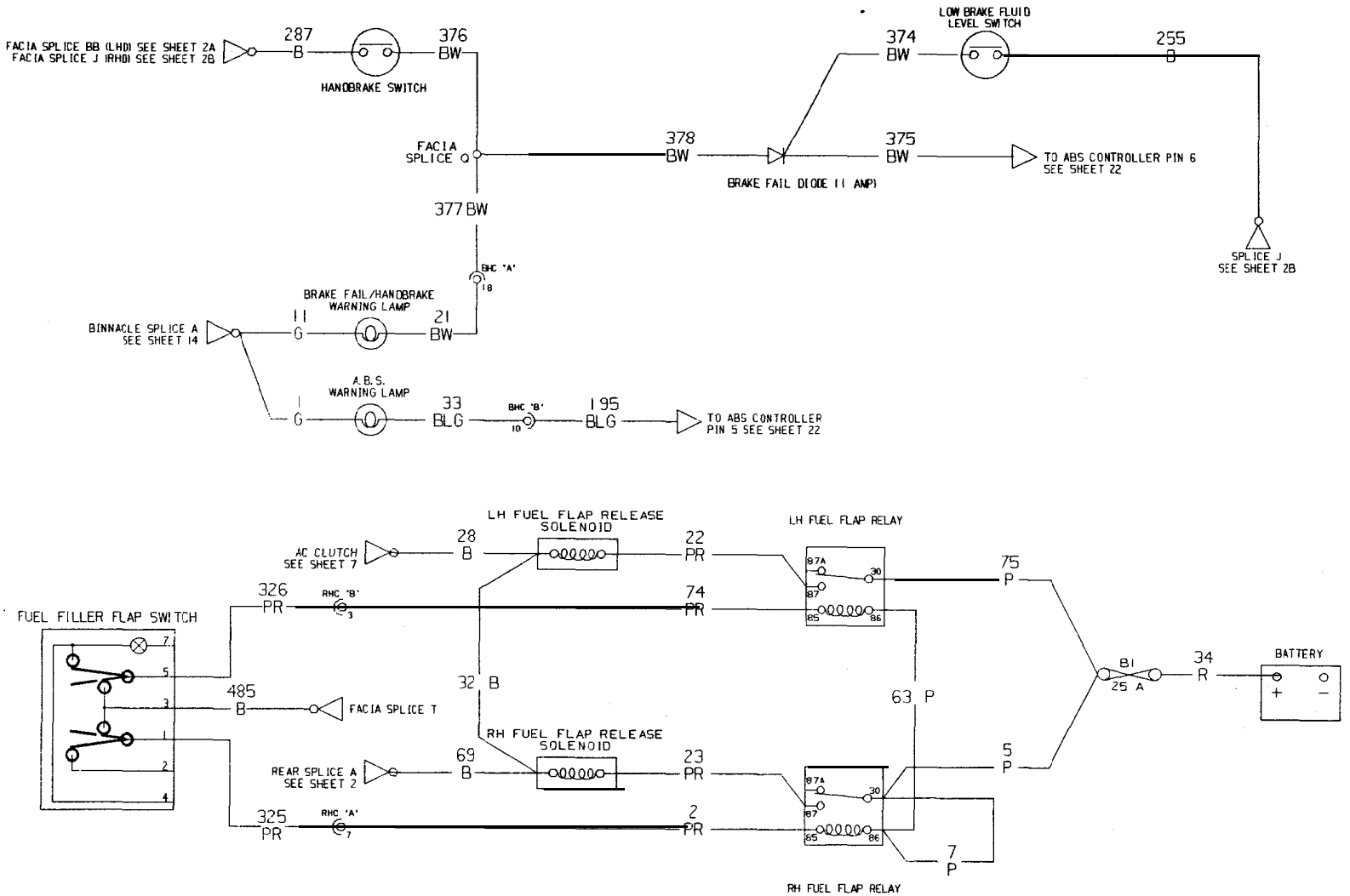

OIL PRESSURE GAUGE
OIL PRESSURE TRANSDUCER
ENGINE BLOCK
BOOST GAUGE
BOOST GAUGE TRANSDUCER
FACIA SPLICE X SEE SHEET 3
BINNACLE SPLICE A
BINNACLE SPLICE D SEE SHEET 2C
REAR SPLICE A SEE SHEET 2
TO SIR WARNING LAMP SEE SHEET 23
TO CHECK ENGINE WARNING LAMP SEE SHEET 6
TO OIL PRESSURE WARNING LAMP SEE SHEET 6
TO TACHOMETER SEE SHEET 4
TO SIDE LAMP SWITCH SEE SHEET 8
TO MASTER LIGHTING SWITCH SEE SHEET 10
TO ABS WARNING LAMP SEE SHEET 17
TO BRAKE FAIL/HANDBRAKE WARNING LAMP SEE SHEET 17
TO IGNITION WARNING LAMP SEE SHEET 4
TO SEATBELT WARNING LAMP SEE SHEET 19
TO LOW COOLANT/ENGINE OVERHEAT WARNING LAMP SEE SHEET 6
WATER TEMPERATURE GAUGE
WATER TEMPERATURE SENDER
BINNACLE SPLICE E SEE SHEET 2C
FUEL GAUGE
FUEL TANK SENDER
FACIA SPLICE J SEE SHEET 2B
LOW FUEL WARNING LAMP
LOW FUEL WARNING LAMP DELAY MODULE
ELECTRONIC SPEEDOMETER
PIN 60
ECM

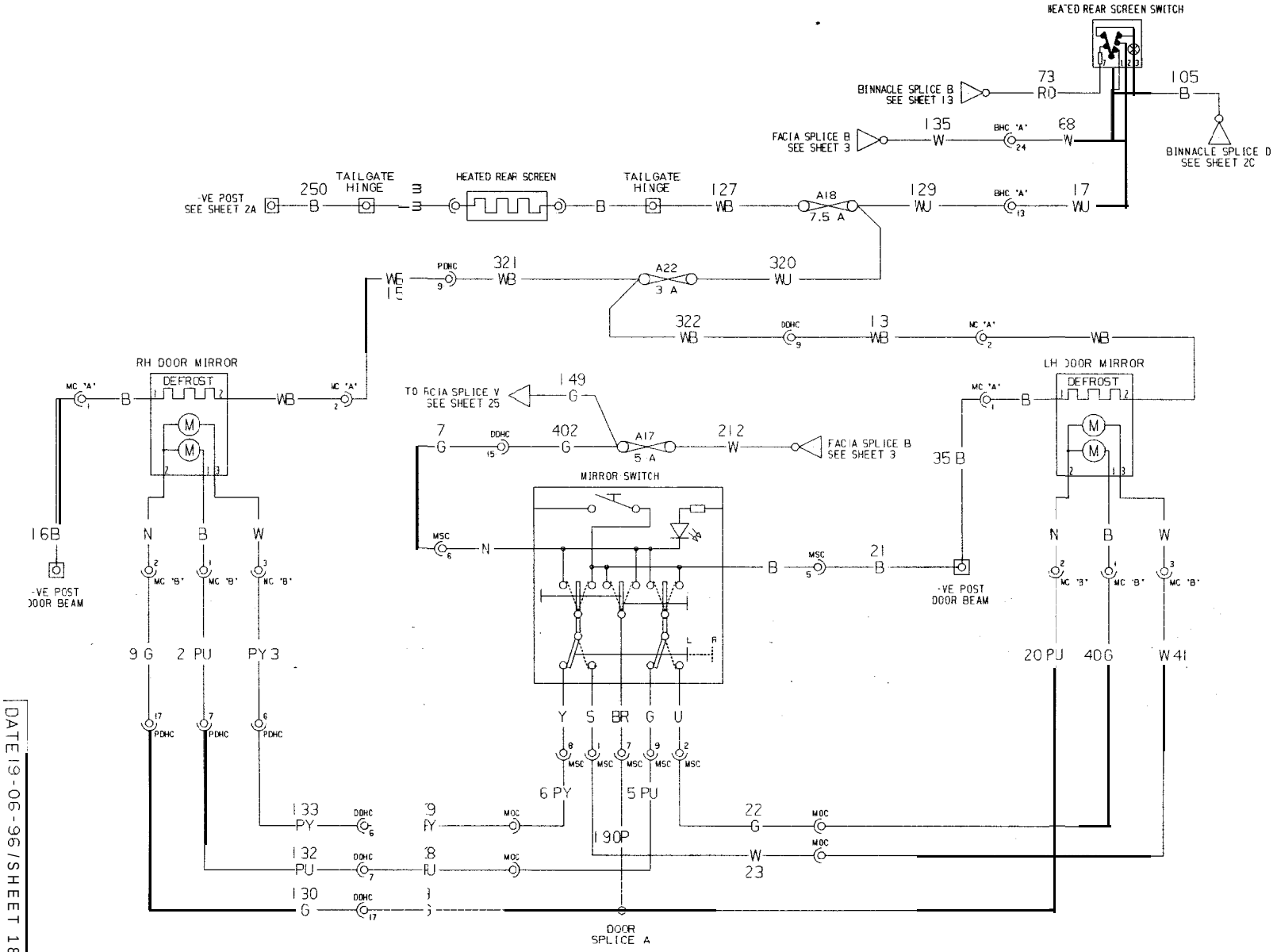

FACIA SPLICE B
SEE SHEET 3
97
W
A20
15 A
98
G
-VE POST
SEE SHEET 2A
257
B
WIPER MOTOR
53B
53A
LIMIT SW.
53E
31B
53
FAST
SLOW
101NLG
100 ULG
RLG 102
SCHC
17
17
RLG
SCHC
15
5
ULG
413
ON
SCHC
11
11
ON
416
OP
SCHC
16
16
OP
99G
WASH/WIPE
DELAY MODULE
263
B
FACIA SPLICE J
SEE SHEET 2B
J
53E
53
53A
53B
W
WIPER SWITCH
414
G
SCHC
14
14
G
415 LGB
TO FRONT HARNESS CONNECTOR
(NOT USED)
103
LGB
113
LGB
SCHC
18
18
LGB
SCREENWASH PUMP
453
LGB
FACIA
SPLICE FF
8
LGB
492
B
TO BONNET SWITCH
SEE SHEET N
LOW SCREENWASH LEVEL
WARNING LAMP
LOW SCREENWASH
FLUID SWITCH
B 468
BHC "B"
18
125
LGB
34
OB
BHC "B"
9
219
OB
B 467
FACIA SPLICE BB
SEE SHEET 2A

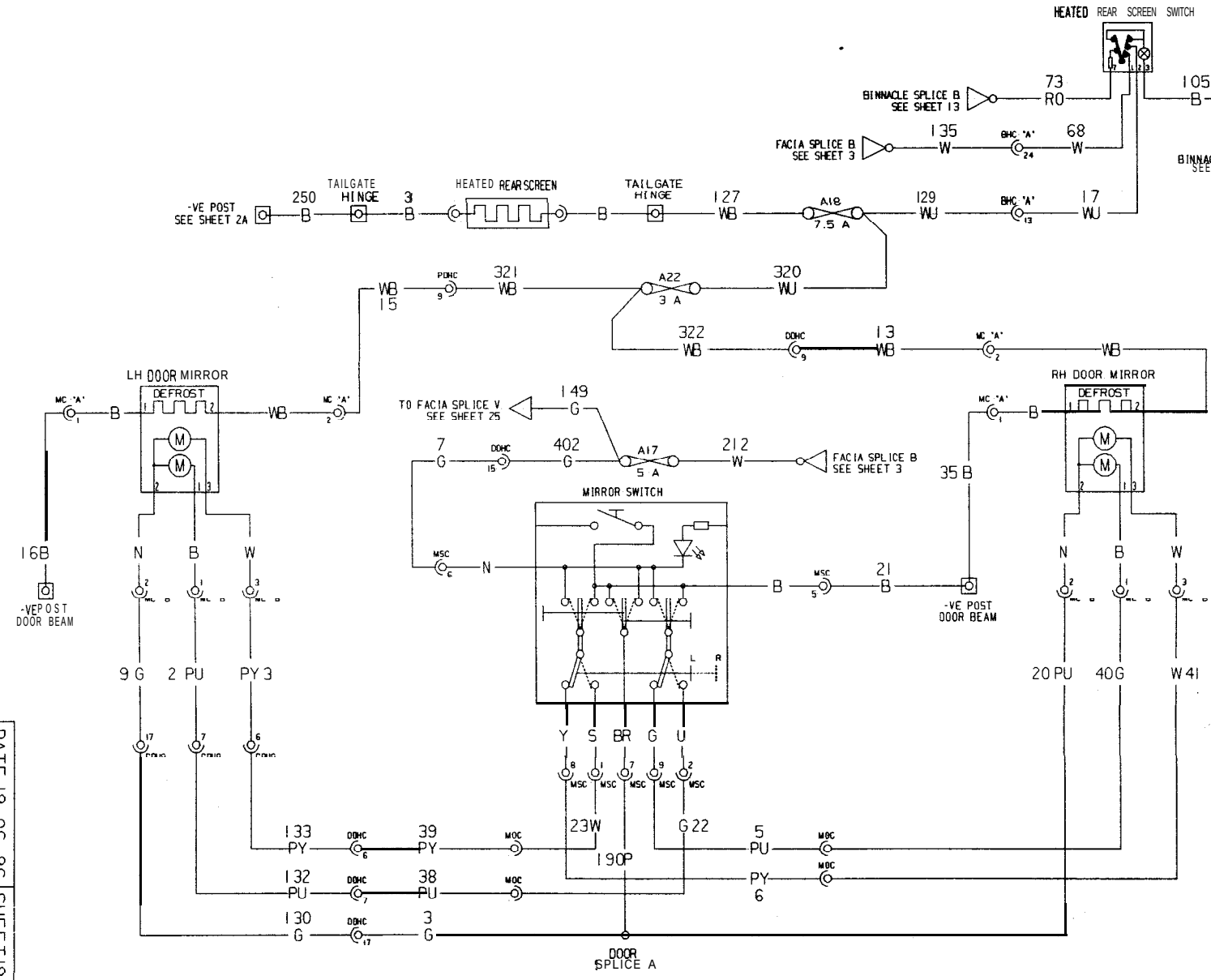

LH WINDOW LIFT SWITCH
RH WINDOW LIFT SWITCH
NW 341
342 NW
295 B
306 K
RCIA SPLICE Y
338 S
336 U
294 B
39 SW
37 JW
40 JW
FACIA SPLICE V SEE SHEET 24
213 G
305 B
B 437
220 OHM 0.5W RESISTOR
-VE POST SEE SHEET 2A
WINDOW LOGIC MODULE
+VE POST SEE SHEET 1
398 N
397 N
A12 20 A
A13 20 A
443 P
372 P
373 PW
FACIA SPLICE W SEE SHEET 12
318 K
400 PR
399 PS
370 K
A23 2 A
153 N
FACIA SPLICE C SEE SHEET 1
-VE POST DOOR BEAM
DOOR SPLICE C
L118
L16
L137
L116
L631
LH KEY SWITCH
LH WINDOW MOTOR
RH KEY SWITCH
RH WINDOW MOTOR
DOOR SPLICE C
DOHC

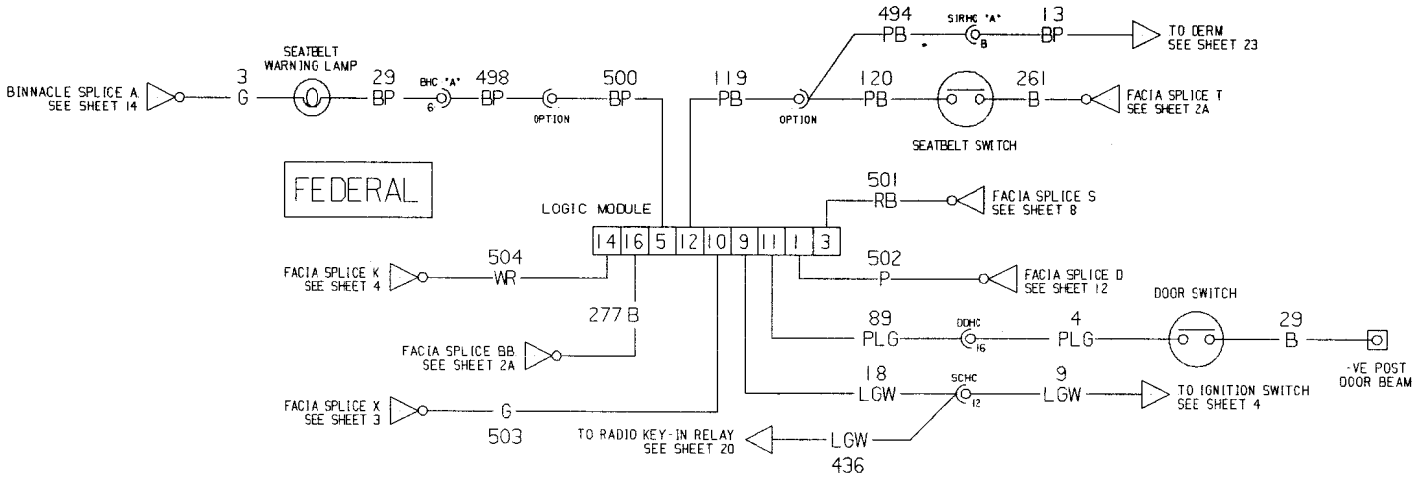

LH KEY SWITCH
27 B
-VE POST DOOR BEAM
30 B
14 K
370 K
LH WINDOW MOTOR
33 P
399 PS
A13 20 A
399 N
+VE POST SEE SHEET 1
15 S
17 U
338 S
336 U
LH WINDOW LIFT SWITCH
LG31
32 LG
DOOR SPLICE C
213 G
FACIA SPLICE V SEE SHEET 24
WINDOW LOGIC MODULE
443 P
295 B
342 NW
NW 341
306 K
FACIA SPLICE Y
LG16
FACIA SPLICE C SEE SHEET 1
153 N
A23 2 A
372 P
305 B
LG37
B 437
220 OHM 0.5W RESISTOR
373 PW
FACIA SPLICE W SEE SHEET 12
-VE POST SEE SHEET 2A
RH KEY SWITCH
24 B
-VE POST DOOR BEAM
17 B
294 B
4 K
318 K
RH WINDOW LIFT SWITCH
RH WINDOW MOTOR
LG 6
20 P
400 PR
A12 20 A
398 N
+VE POST SEE SHEET 1
5 S
339 SW
7 U
337 UW
LG18
340 NW
LG 19
DOOR SPLICE C

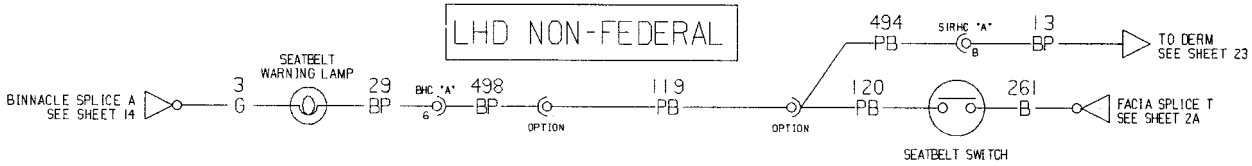

DRIVER WINDOW LIFT MOTOR
DRIVER WINDOW LIFT RELAY UP
DRIVER WINDOW LIFT RELAY DOWN
-VE POST DOOR BEAM
SPLICE A
WCHC
DDHC
A13 20 A
+VE POST SEE SHEET
LH WINDOW LIFT SWITCH
295
342 NW
NW 341
NOT USED
305
B 437
-VE POST SEE SHEET 2A
220 OHM 0.5W RESISTOR
294
PASSENGER WINDOW LIFT MOTOR
PASSENGER WINDOW LIFT RELAY UP
PASSENGER WINDOW LIFT RELAY DOWN
FDHC
A12 20 A
RH WINDOW LIFT SWITCH
SPLICE V SEE SHEET 24
213
340 NW
BRIDGING LINK

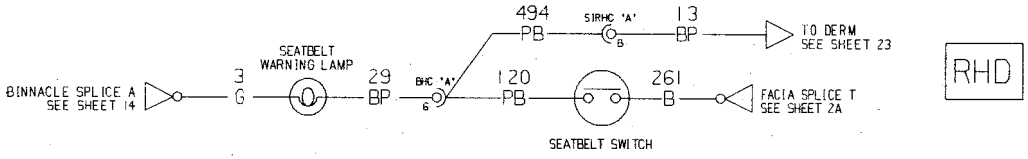

FACIA SPLICE BB (LHD) SEE SHEET 2A
FACIA SPLICE J (RHD) SEE SHEET 2B
287 B
376 BW
HANDBRAKE SWITCH
FACIA SPLICE Q
378 BW
LOW BRAKE FLUID LEVEL SWITCH
374 BW
255 B
375 BW
TO ABS CONTROLLER PIN 6 SEE SHEET 22
BRAKE FAIL DIODE (1 AMP)
SPLICE J SEE SHEET 2B
377 BW
BHC 'A' 18
BRAKE FAIL/HANDBRAKE WARNING LAMP
BINNACLE SPLICE A SEE SHEET 14
11 G
21 BW
A.B.S. WARNING LAMP
1 G
33 BLG
BHC 'B' 10
195 BLG
TO ABS CONTROLLER PIN 5 SEE SHEET 22
LH FUEL FLAP RELEASE SOLENOID
LH FUEL FLAP RELAY
AC CLUTCH SEE SHEET 7
28 B
22 PR
326 PR
RHC 'B' 3
74 PR
75 P
FUEL FILLER FLAP SWITCH
87A
30
87
85
86
B1
25 A
34 R
BATTERY
32 B
63 P
485 B
FACIA SPLICE T
RH FUEL FLAP RELEASE SOLENOID
REAR SPLICE A SEE SHEET 2
69 B
23 PR
5 P
325 PR
RHC 'A' 7
2 PR
7 P
RH FUEL FLAP RELAY

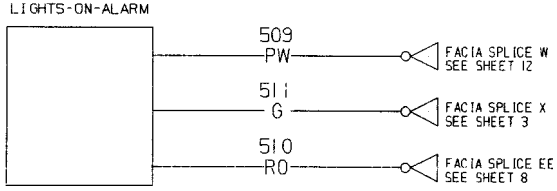

HEATED REAR SCREEN SWITCH
BINNACLE SPLICE B SEE SHEET 13
73 RD
105 B
BINNACLE SPLICE D SEE SHEET 2C
FACIA SPLICE B SEE SHEET 3
135 W
BHC 'A' 24
68 W
-VE POST SEE SHEET 2A
250 B
TAILGATE HINGE
HEATED REAR SCREEN
TAILGATE HINGE
127 WB
A18 7.5 A
129 WU
BHC 'A' 13
17 WU
PDHC 9
321 WB
A22 3 A
320 WU
322 WB
DDHC 9
13 WB
MC 'A' 2
WB
RH DOOR MIRROR
DEFROST
MC 'A' 1
B
MC 'A' 2
WB
TO FACIA SPLICE V SEE SHEET 25
149 G
7 G
DDHC 15
402 G
A17 5 A
212 W
FACIA SPLICE B SEE SHEET 3
MIRROR SWITCH
MSC 6
N
B
MSC 5
21 B
35 B
LH DOOR MIRROR
DEFROST
MC 'A' 1
B
16B
-VE POST DOOR BEAM
N
B
W
MC 'B' 2
MC 'B' 1
MC 'B' 3
-VE POST DOOR BEAM
N
B
W
MC 'B' 2
MC 'B' 1
MC 'B' 3
9 G
2 PU
PY 3
20 PU
40 G
W 41
17 PDHC
7 PDHC
6 PDHC
Y
S
BR
G
U
8 MSC
1 MSC
7 MSC
9 MSC
2 MSC
L
R
6 PY
5 PU
133 PY
DDHC 6
9 PY
MOC
22 G
MOC
190P
132 PU
DDHC 7
8 RU
MOC
W 23
MOC
130 G
DDHC 17
3
DOOR SPLICE A

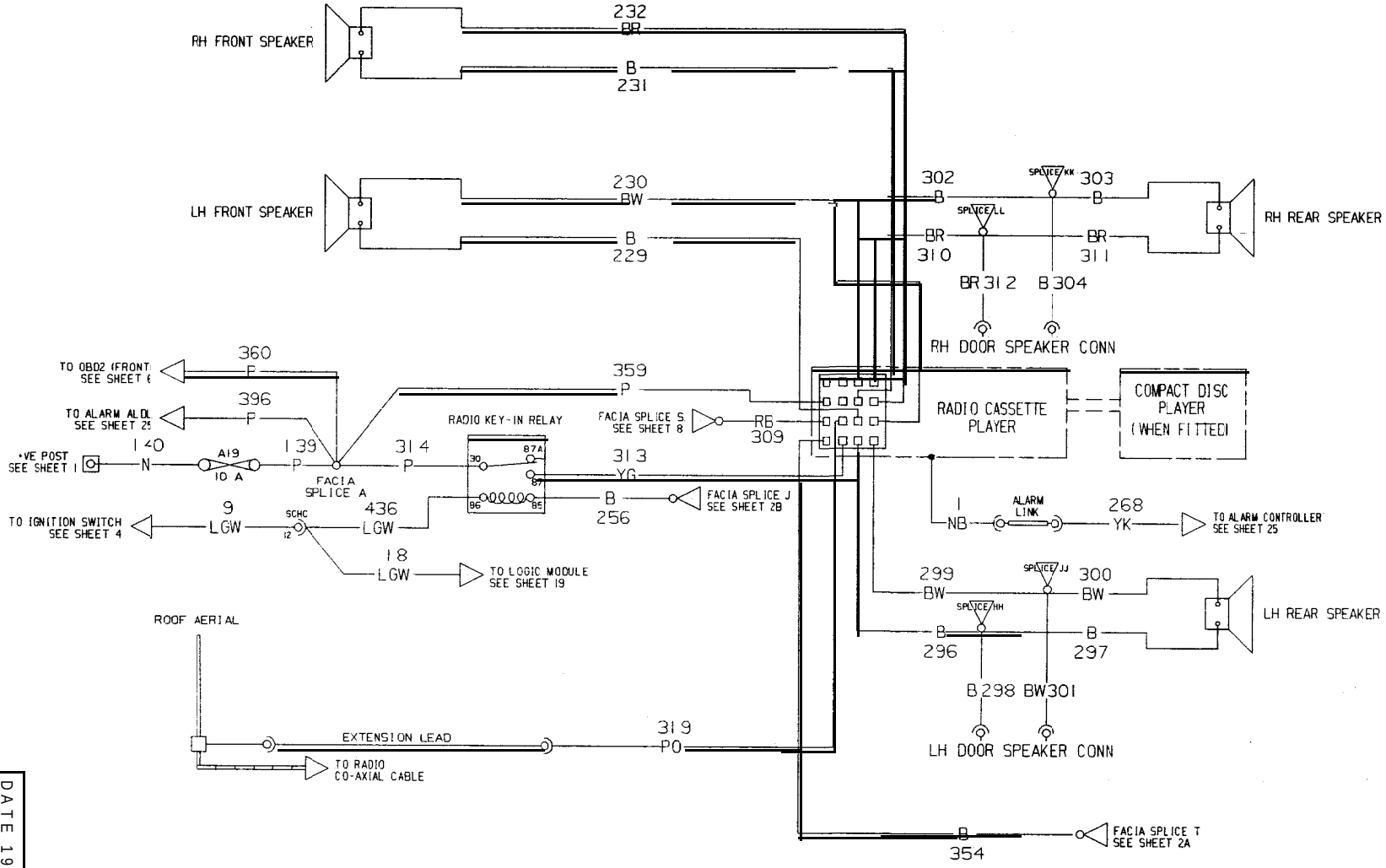

HEATED REAR SCREEN SWITCH
BINNACLE SPLICE B SEE SHEET 13
73 RO
105 B
BINNACLE SPLICE D SEE SHEET 2C
FACIA SPLICE B SEE SHEET 3
135 W
BHC 'A' 24
68 W
-VE POST SEE SHEET 2A
250 B
TAILGATE HINGE
3 B
HEATED REARSCREEN
B
TAILGATE HINGE
127 WB
A18 7.5 A
129 WU
BHC 'A' 13
17 WU
WB 15
PDHC 9
321 WB
A22 3 A
320 WU
322 WB
DDHC 9
13 WB
MC 'A' 2
WB
LH DOOR MIRROR
MC 'A' 1
B
DEFROST
1
2
WB
MC 'A' 2
TO FACIA SPLICE V SEE SHEET 25
149 G
7 G
DDHC 15
402 G
A17 5 A
212 W
FACIA SPLICE B SEE SHEET 3
35 B
RH DOOR MIRROR
MC 'A' 1
B
DEFROST
1
2
MIRROR SWITCH
MSC 6
N
B
MSC 5
21 B
16B
-VE POST DOOR BEAM
N
B
W
-VE POST DOOR BEAM
N
B
W
9 G
2 PU
PY 3
20 PU
40 G
W 41
L
R
Y
S
BR
G
U
MSC 8
MSC 1
MSC 7
MSC 9
MSC 2
133 PY
DDHC 6
39 PY
MOC
23W
190P
G 22
5 PU
MOC
132 PU
DDHC 7
38 PU
MOC
PY 6
MOC
130 G
DDHC 17
3 G
DOOR SPLICE A

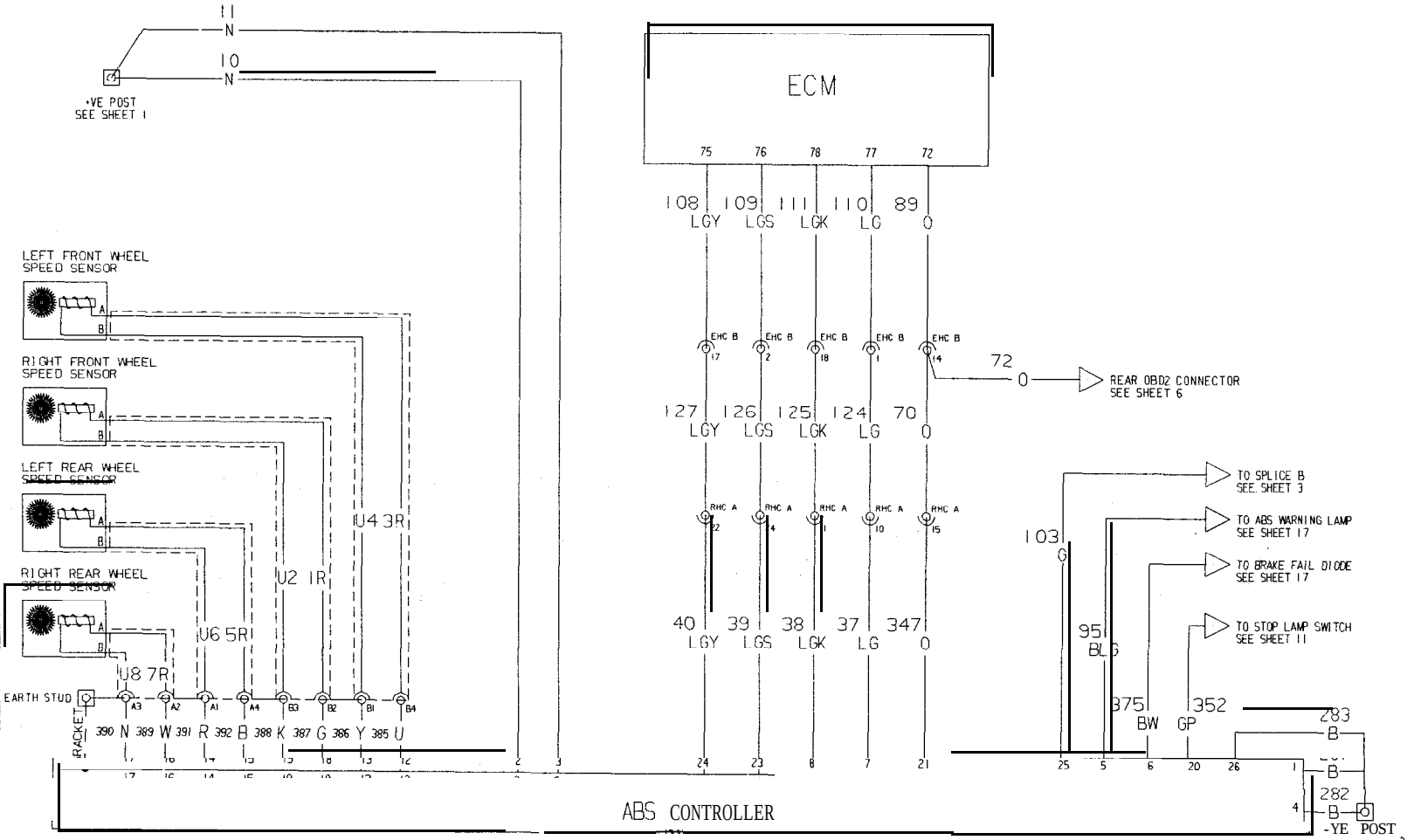

FEDERAL
BINNACLE SPLICE A SEE SHEET 14
3 G
SEATBELT WARNING LAMP
29 BP
BHC "A" 6
498 BP
OPTION
500 BP
119 PB
OPTION
494 PB
SIRHC "A" B
13 BP
TO DERM SEE SHEET 23
120 PB
261 B
FACIA SPLICE T SEE SHEET 2A
SEATBELT SWITCH
LOGIC MODULE
14 16 5 12 10 9 11 1 3
501 RB
FACIA SPLICE S SEE SHEET 8
504 WR
FACIA SPLICE K SEE SHEET 4
502 P
FACIA SPLICE D SEE SHEET 12
DOOR SWITCH
277 B
FACIA SPLICE BB SEE SHEET 2A
89 PLG
DDHC 16
4 PLG
29 B
-VE POST DOOR BEAM
18 LGW
SCHC 12
9 LGW
TO IGNITION SWITCH SEE SHEET 4
FACIA SPLICE X SEE SHEET 3
G 503
TO RADIO KEY-IN RELAY SEE SHEET 20
LGW 436

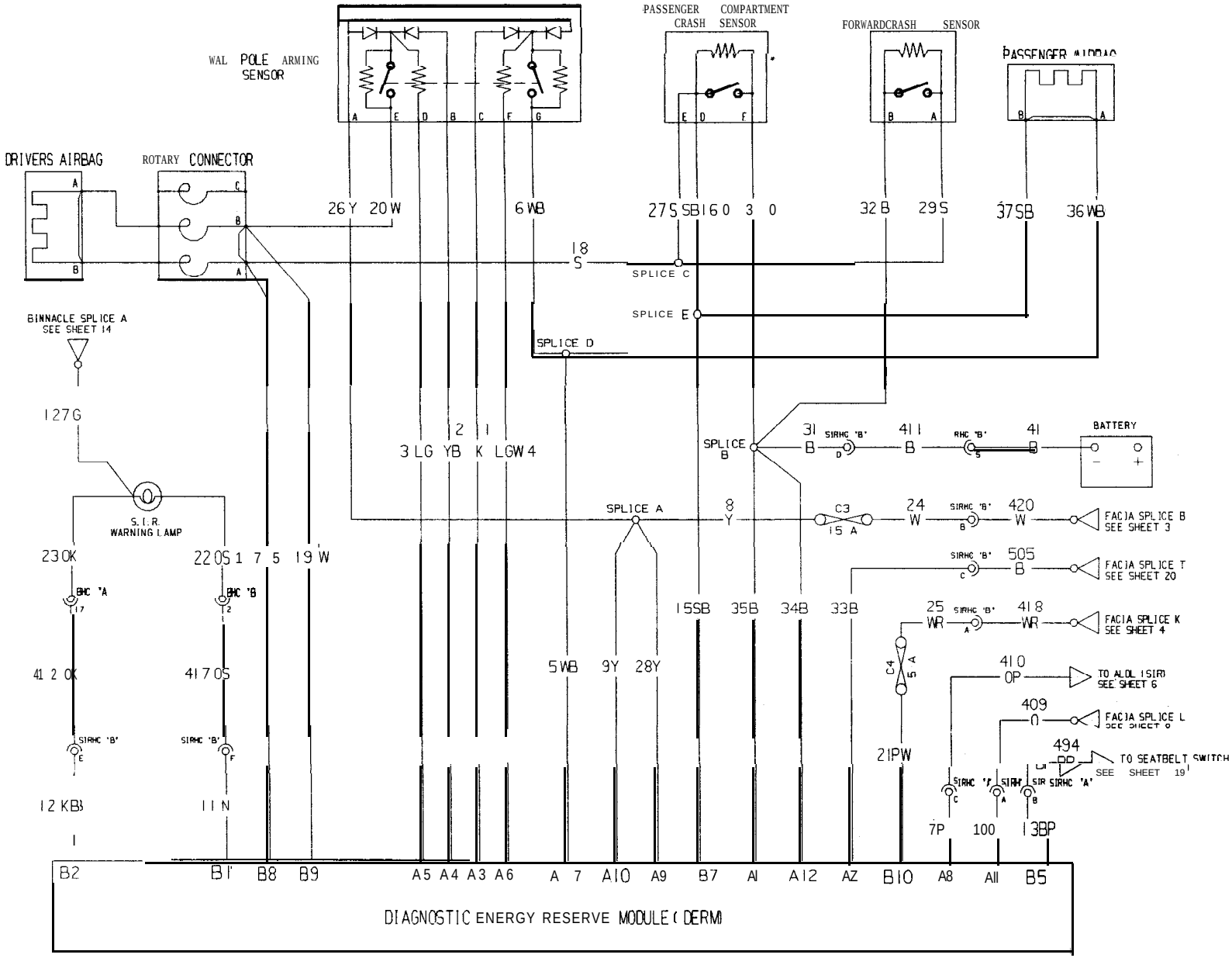

LHD NON-FEDERAL
BINNACLE SPLICE A SEE SHEET 14
3 G
SEATBELT WARNING LAMP
29 BP
BHC "A" 6
498 BP
OPTION
119 PB
OPTION
494 PB
SIRHC "A" B
13 BP
TO DERM SEE SHEET 23
120 PB
261 B
FACIA SPLICE T SEE SHEET 2A
SEATBELT SWITCH

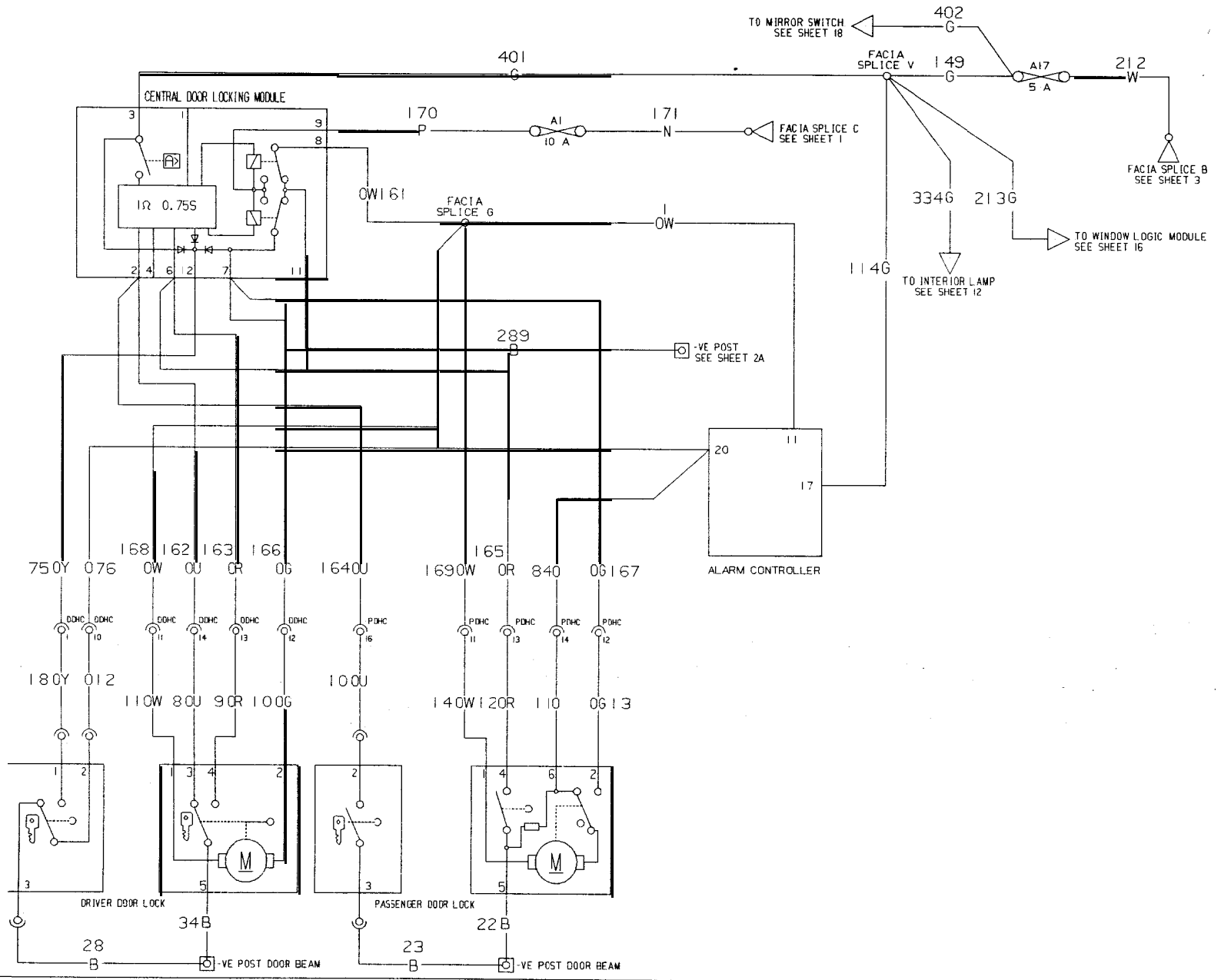

RHD
BINNACLE SPLICE A SEE SHEET 14
3 G
SEATBELT WARNING LAMP
29 BP
BHC "A" 6
494 PB
SIRHC "A" B
13 BP
TO DERM SEE SHEET 23
120 PB
261 B
FACIA SPLICE T SEE SHEET 2A
SEATBELT SWITCH

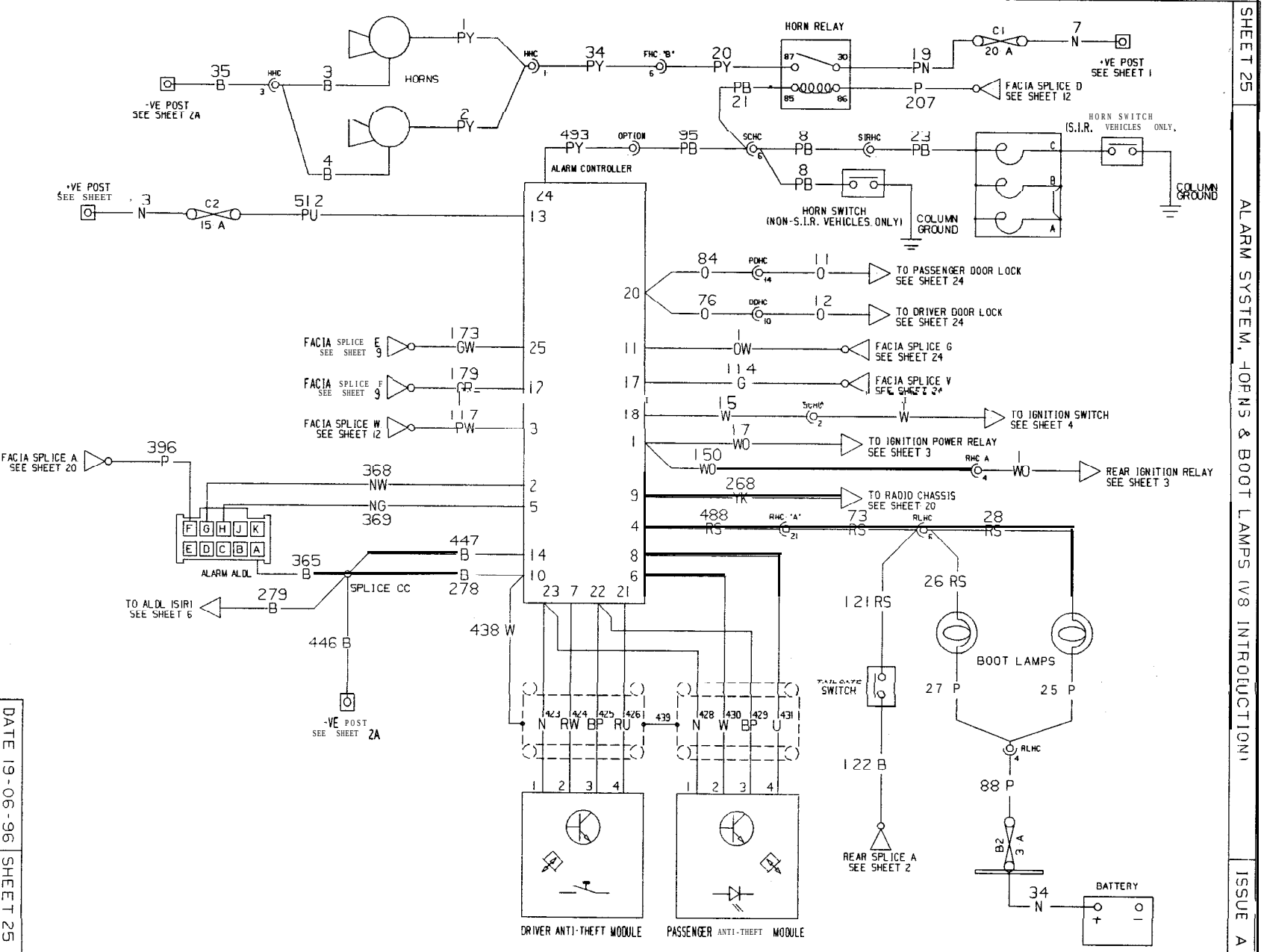

LIGHTS-ON-ALARM
509 PW
FACIA SPLICE W SEE SHEET 12
511 G
FACIA SPLICE X SEE SHEET 3
510 RO
FACIA SPLICE EE SEE SHEET 8


RH FRONT SPEAKER
232
BR
B
231
LH FRONT SPEAKER
230
BW
B
229
302
B
SPLICE KK
303
B
SPLICE LL
BR
310
BR
311
RH REAR SPEAKER
BR 312
B 304
RH DOOR SPEAKER CONN
TO OBD2 (FRONT
SEE SHEET 6
360
P
TO ALARM ALDL
SEE SHEET 25
396
P
359
P
RADIO KEY-IN RELAY
FACIA SPLICE S
SEE SHEET 8
RB
309
RADIO CASSETTE
PLAYER
COMPACT DISC
PLAYER
(WHEN FITTED)
+VE POST
SEE SHEET 1
140
N
A19
10 A
139
P
FACIA
SPLICE A
314
P
30
87A
87
313
YG
86
85
B
256
FACIA SPLICE J
SEE SHEET 2B
TO IGNITION SWITCH
SEE SHEET 4
9
LGW
SCHC
12
436
LGW
18
LGW
TO LOGIC MODULE
SEE SHEET 19
1
NB
ALARM
LINK
268
YK
TO ALARM CONTROLLER
SEE SHEET 25
299
BW
SPLICE JJ
300
BW
SPLICE HH
B
296
B
297
LH REAR SPEAKER
B 298 BW 301
LH DOOR SPEAKER CONN
ROOF AERIAL
EXTENSION LEAD
319
PO
TO RADIO
CO-AXIAL CABLE
B
354
FACIA SPLICE T
SEE SHEET 2A


11
N
10
N
+VE POST
SEE SHEET 1
ECM
75 76 78 77 72
108 109 111 110 89
LGY LGS LGK LG 0
EHC B
72
0
REAR OBD2 CONNECTOR
SEE SHEET 6
127 126 125 124 70
LGY LGS LGK LG 0
RHC A
40 39 38 37 347
LGY LGS LGK LG 0
LEFT FRONT WHEEL
SPEED SENSOR
RIGHT FRONT WHEEL
SPEED SENSOR
LEFT REAR WHEEL
SPEED SENSOR
RIGHT REAR WHEEL
SPEED SENSOR
U43R
U21R
U65R
U87R
EARTH STUD
BRACKET
390 N 389 W 391 R 392 B 388 K 387 G 386 Y 385 U
A3 A2 A1 A4 B3 B2 B1 B4
TO SPLICE B
SEE SHEET 3
TO ABS WARNING LAMP
SEE SHEET 17
TO BRAKE FAIL DIODE
SEE SHEET 17
TO STOP LAMP SWITCH
SEE SHEET 11
103
G
95
BLG
375
BW
352
GP
283
B
282
B
-VE POST
SEE SHEET 2A
ABS CONTROLLER


WAL POLE ARMING SENSOR
PASSENGER CRASH SENSOR
COMPARTMENT SENSOR
FORWARDCRASH SENSOR
PASSENGER AIRBAG
DRIVERS AIRBAG
ROTARY CONNECTOR
26Y 20W
6WB
27S SB160 3 0
32B 29S
37SB 36WB
18 S
SPLICE C
SPLICE E
SPLICE D
BINNACLE SPLICE A SEE SHEET 14
127G
3LG YB K LGW4
SPLICE B
31 B
SIRHC 'B'
411 B
RHC 'B'
41 B
BATTERY
S.I.R. WARNING LAMP
SPLICE A
8 Y
C3 15 A
24 W
SIRHC 'B'
420 W
FACIA SPLICE B SEE SHEET 3
230K
220S 175 19W
BHC 'A'
BHC 'B'
SIRHC 'B' 505 B
FACIA SPLICE T SEE SHEET 20
15SB 35B 34B 33B
25 WR
SIRHC 'B'
418 WR
FACIA SPLICE K SEE SHEET 4
412 0K
417 0S
5WB 9Y 28Y
C4 5 A
410 OP
TO ALDL (SIR) SEE SHEET 6
409 O
FACIA SPLICE L
494 PP
TO SEATBELT SWITCH SEE SHEET 19
SIRHC 'A'
21PW
12KB
11N
7P 100 13BP
B2 B1 B8 B9 A5 A4 A3 A6 A7 A10 A9 B7 A1 A12 A2 B10 A8 A11 B5
DIAGNOSTIC ENERGY RESERVE MODULE (DERM)


TO MIRROR SWITCH SEE SHEET 18
402 G
401 G
FACIA SPLICE V
149 G
A17 5 A
212 W
FACIA SPLICE B SEE SHEET 3
CENTRAL DOOR LOCKING MODULE
170 P
A1 10 A
171 N
FACIA SPLICE C SEE SHEET 1
1Ω 0.75S
0W161
FACIA SPLICE G
1 0W
334G
213G
TO WINDOW LOGIC MODULE SEE SHEET 16
114G
TO INTERIOR LAMP SEE SHEET 12
289 B
-VE POST SEE SHEET 2A
20
11
17
ALARM CONTROLLER
168 162 163 166 165
750Y 076 0W 0U 0R 0G 1640U 1690W 0R 840 0G167
DDHC
PDHC
180Y 012
110W 80U 90R 100G
100U
140W 120R 110 0G13
DRIVER DOOR LOCK
PASSENGER DOOR LOCK
34B
22B
28 B
23 B
-VE POST DOOR BEAM
-VE POST DOOR BEAM


HORNS
HORN RELAY
-VE POST SEE SHEET 2A
+VE POST SEE SHEET 1
FACIA SPLICE D SEE SHEET 12
HORN SWITCH (S.I.R. VEHICLES ONLY)
COLUMN GROUND
ALARM CONTROLLER
HORN SWITCH (NON-S.I.R. VEHICLES ONLY)
+VE POST SEE SHEET
TO PASSENGER DOOR LOCK SEE SHEET 24
TO DRIVER DOOR LOCK SEE SHEET 24
FACIA SPLICE E SEE SHEET 9
FACIA SPLICE F SEE SHEET 9
FACIA SPLICE W SEE SHEET 12
FACIA SPLICE G SEE SHEET 24
FACIA SPLICE V SEE SHEET 24
TO IGNITION SWITCH SEE SHEET 4
TO IGNITION POWER RELAY SEE SHEET 3
REAR IGNITION RELAY SEE SHEET 3
FACIA SPLICE A SEE SHEET 20
TO RADIO CHASSIS SEE SHEET 20
ALARM ALDL
SPLICE CC
TO ALDL (SIR) SEE SHEET 6
-VE POST SEE SHEET 2A
BOOT LAMPS
TAILGATE SWITCH
REAR SPLICE A SEE SHEET 2
BATTERY
DRIVER ANTI-THEFT MODULE
PASSENGER ANTI-THEFT MODULE

CBHC 10

CONNECTOR I WITH CAVITY NUMBER

CONNECTION CODES :-

WC BINNACLE HARNESS CONNECTOR
DDHC DRIVER DOOR HARNESS CONNECTOR
DRLHC DAYTIME RUNNING LAMPS HARNESS CONNECTOR
EWC ENGINE MANAGEMENT HARNESS CONNECTOR
FBHC FRONT BUMPER HARNESS CONNECTCR
FHC FRONT HARNESS CONNECTOR
HHC HORNS HARNESS CONNECTOR
LMC LAMP DRIVER HARNESS CONNECTOR
LHFLC LEFT HAN0 FRONT LAM' CONNECTOR
MC MIRROR CONNECTOR
MSC MIRROR SWITCH CONNECTOR
PMC PASSENGER DOOR HARNESS CONNECTCR
RFHC RADIATOR FAN HARNESS CONNECTCR
RHC REAR HARNESS CONNECTOR
RHFLC RIGHT HAND FRONT LAMP CONNECTOR
RLHC REAR LAM'S HARNESS CONNECT07
SCHC STEERING COLUMN HARNESS CONNECTCR
SHC SPOILER HARNESS CONNECT07
SIRHC S I.R. HARNESS CONNECTOR
WCHC WINDOW CONVERSION HARNESS CONNECTOR
WSSHC MEEL SPEED SENSOR HARNESS CONNECTOR

TWISTED PAIR

A2 7.5A — FUSE NUMBER AND RATING

GROUND POINT LOCATION

-VE POST

GROUND POINT THROUGH COM'ONENT BODY

B — ENGINE BLOCK — CABLE GROUND THROUGH LOCAL FIXING

FACIA SPLICE X — SPLICE

TO HORNS SEE SHEET 25 — DESTINATION OF CABLE BY SHEET NUMBER TO COM'ONENT

FACIA SPLICE X SEE SHEET 3 — DESTINATION OF CABLE BY SHEET NUMBER TO SPLICE

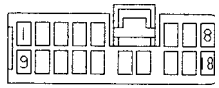
UR — CABLE COLOUR

COLOUR CODES :-

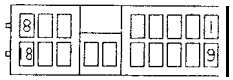
B	BLACK	P	PURPLE
G	GREEN	R	RED
K	PINK	S	SLATE
LG	LIGHT GREEN	u	BLUE
N	BROWN	W	WHITE
0	ORANGE	Y	YELLOW

DDHC. PDHC. SCHC

FAC I A HARNESS



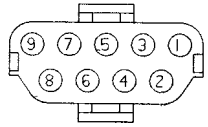
MATING FACE



DOOR/STEER I NG COLUMN HARNESS

RLHC

REAR HARNESS



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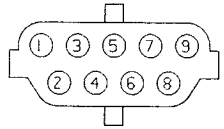
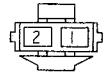


REAR L I GHTI NG HARNESS

RFHC

FAC I A HARNESS



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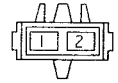
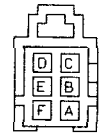
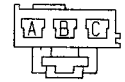


RAD FAN HARNESS

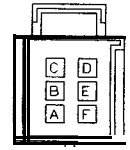
SIRHC

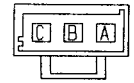
FAC I A HARNESS





B MATING FACE A

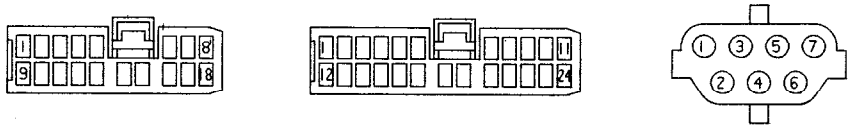




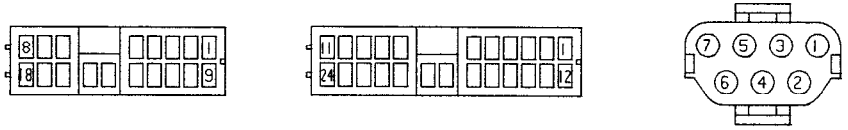
S I R HARNESS

BHC

FACIA HARNESS



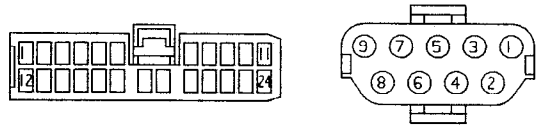
B MATING FACE A MATING FACE C



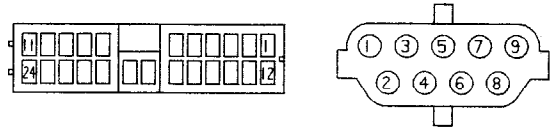
BINNACLE HARNESS

RHC

FACIA HARNESS



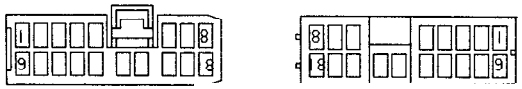
A MATING FACE B



REAR HARNESS

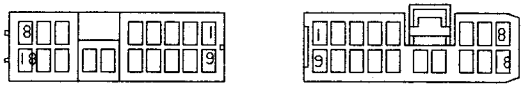
EM-K

REAR HARNESS



BLACK MOULDING

MATING FACE

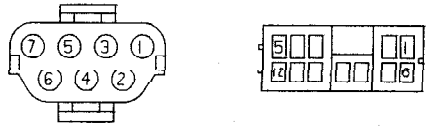


BLACK MOULDING

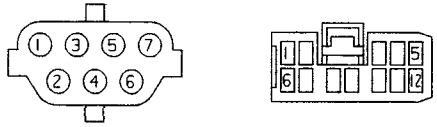
ENGINE MANAGEMENT HARNESS

FHC

FACIA HARNESS



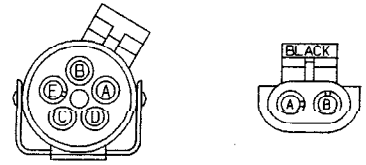
B MATING FACE A



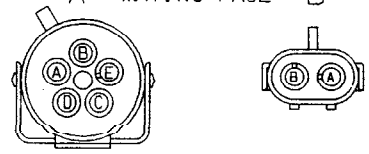
FRONT HARNESS

FBHC

FRONT HARNESS



A MATING FACE B



FRONT BUMPER HARNESS

ML.15 - 1998 MODEL YEAR SUPPLEMENT

VEHICLE SECURITY

In order to provide an exceptional level of theft and vandal protection, the 1998 M.Y. Esprit is factory fitted with a vehicle security alarm incorporating a Cobra 6422 system. Features include:

'Dynamic coding' of the transmitter keys; Each time the transmitters are used, the operating frequency is randomly changed to guard against the possibility of code copying.

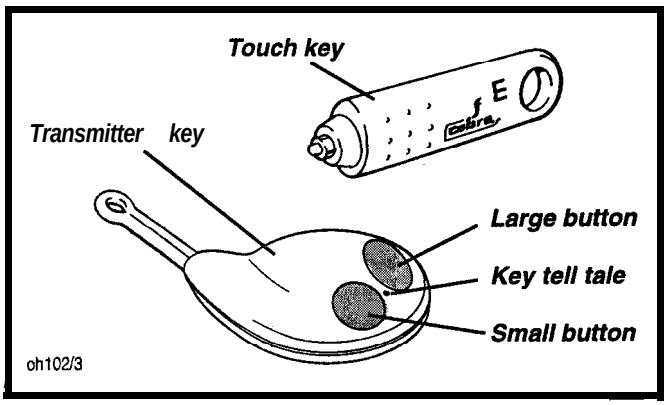
- Self powered siren to maintain protection if the vehicle power supply is interrupted.
- Automatic (passive) engine immobilisation to prevent the engine from being started.

Selectable cabin intrusion sensing using a hyperfrequency radar sensor.

'Deadlocking' of the door latches to disable the interior release handles.

Transmitter Keys

Two transmitter keys are provided with the car, together with two electronic touch keys. The transmitter key is used to arm and disarm the alarm and to remotely lock and unlock the driver's and passenger's doors. The touch key is provided as a safety back up in case of transmitter key failure (e.g. flat battery), and should be kept separate but available..



Arming the Alarm

Remove the ignition key, close the roof panel, tailgate, front bonnet and both doors. Press once, the larger of the two buttons on the transmitter key. This command will be acknowledged by:

- Two flashes of the hazard warning lamps;

Flashing of the alarm tell tale on the centre console.

Check that these indications occur. If not, press the button a second time, as the first press may have switched off the passive immobilisation (see later).

The arming command initiates the following actions:

The locking of both doors;
On non-USA cars, the automatic closing of both door windows;
The immobilisation of the engine via two separate circuits.

Note that if the system is armed when a door, tailgate or front bonnet is not fully closed, the buzzer will sound continuously until the opening is secured. **If still open after 40 seconds, the siren will sound.** After arming the system, a period of at least 40 seconds must elapse before all functions and sensors become fully active. After this time, the alarm will be triggered by any of the following actions:

Opening a door, tailgate or front bonnet;
Movement detected within the cabin;
Energising the ignition circuit ('hot wiring').

When triggered, the electronic siren will sound and the hazard warning lamps will flash for a period of approximately 30 seconds before closing down and resetting, ready for any further triggering input. If the tailgate or front bonnet are left open, the alarm will repeat after a short delay, and continue in this sequence for a total of ten cycles. To silence the siren when the alarm has been triggered, press once the larger of the two buttons on the transmitter key. The siren will reset and the system will remain armed.

Disarming the Alarm

To disarm the alarm prior to entering the vehicle, press once the larger of the two buttons on the transmitter key. This command will be acknowledged by:

One flash of the hazard warning lamps;

- Extinguishing of the alarm tell tale on the centre console. (If the tell tale is flashing intermittently, the alarm has been triggered during the armed period - see 'Trouble Shooting')

In addition, both doors will be unlocked.

Deadlocking

For the highest level of protection, the interior door release handles may be disabled ('deadlocked') by using the 'mechanical door key ***before*** the alarm has been armed with the transmitter key:

1. Close all apertures, and use the mechanical (ignition) key in the driver's door handle to turn the lock **90°** to the horizontal **positon:**
   - counterclockwise on RHD cars;
   - clockwise on LHD cars;

   and withdraw the key.
2. Arm the alarm with the transmitter key (see above).

WARNING: Do not deadlock with persons remaining in the vehicle, as they will be unable to open the doors.

Note that if the alarm is armed when the deadlocking operation is performed, only the driver's door will be deadlocked, and a loss of syncronisation may occur with the central locking function.

To remove the deadlocking, ***first disarm the alarm*** before using the mechanical key to return the driver's door lock to the vertical position. Performing this operation when the alarm is armed will result in the passenger door remaining deadlocked.

Passive Immobilisation

The system will automatically immobilise the engine four minutes after switching **off the ignition, or one** minute after switching off and opening and closing a door. Immobilisation will be indicated by:

- The alarm tell tale flashing.

  And if initiated by the door being opened and closed:

  Two flashes of the hazard warning lamps.

Note that these indications are the same as those for the arming of the alarm, but in this instance it is only engine immobilisation which is activated.

To start **the car** after immobilisation has been activated, it is necessary to switch ***OFF*** **the** ignition and press once the large button on the transmitter key. The alarm tell tale will be extinguished.

Intrusion Sensing

A hyperfrequency radar detector, mounted in the map pocket at the rear of the centre tunnel, is able to detect substantial movement within the cabin and trigger the alarm in the event of unauthorised entry. In order for the radar detection to operate effectively, it is necessary to close the windows and roof panel.

If an animal is to be left in the vehicle when the alarm is armed, it is necessary temporarily to switch off the intrusion sensing by the following procedure:

Arm the system in the usual way by pressing once the large button on the transmitter.

Within 40 seconds, press once the smaller button on the transmitter. This action will be acknowledged by a single buzz of the buzzer.

Note.

Switching off the intrusion sensing will cancel the automatic window closure feature.
Intrusion sensing will automatically be reinstated the next time the alarm is armed.
Do not inhibit operation of the radar detector by placing bags or large objects on the tunnel top close to the map pocket.

Adjustment of microwave sensor: The sensitivity of the microwave unit is **pre-set** at a level which should be suitable for all conditions. To test the performance of the unit:

a) Open the driver's window, and close all other apertures.

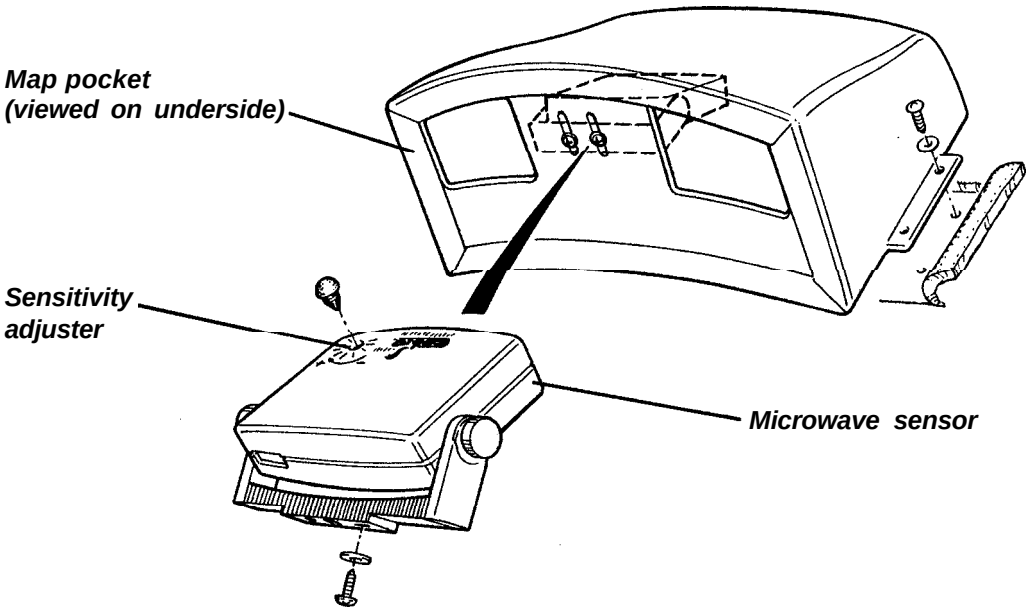
b) **Arm** the alarm by pressing once the transmitter large button, and then immediately press the small button to prevent the window automatically closing.

c) Wait for 20 seconds (sensor is inhibited until 15 seconds of non-activity have elapsed) before moving an arm slowly through the open window towards the gear lever. The buzzer should sound, accompanied after the arming delay of 40 seconds, by the siren.

d) Disarm and then re-arm the system and wait a further 20 seconds before waving an arm just above the

roof and windscreen. The buzzer should not sound.

e) If the sensitivity needs to be adjusted, remove the map pocket from the bulkhead, and the sensor from the pocket. Pull out the grommet, and turn the adjuster screw as appropriate.



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Summary of Alarm Normal Operation

In normal use, whenever leaving the car, close all apertures and press once the transmitter large button to lock the doors and arm the alarm ▪ acknowledged by two hazard lamp flashes, and the alarm tell tale flashing. **Check that two hazard flashes occur** and not one (see below).

On return to the car, whether or not the alarm is armed, again press once the transmitter large button. This will either unlock the doors and disarm the alarm, or, if the alarm was not armed, the passive immobilisation will be switched off. In both cases, this will be acknowledged by **one hazard lamps flash** and the alarm tell tale going out.

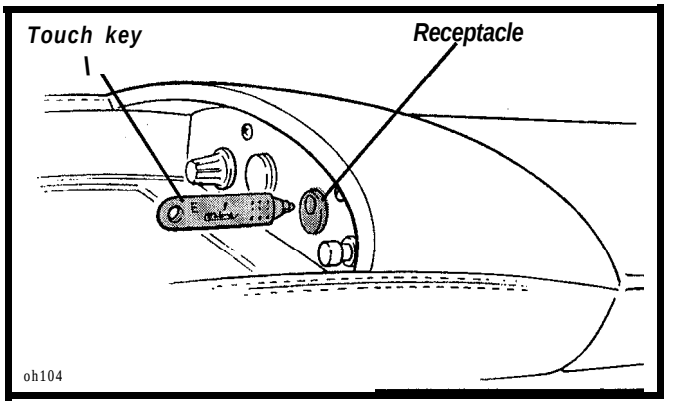
For details of deadlocking and intrusion sensing override, see above, and for diagnostic code interpretation, see below.

Emergency Disarming

In the event of lost or failed transmitter keys, an electronic touch key may be used to mobilise the engine:

Use the mechanical key to unlock the door and enter the vehicle, causing the alarm to be triggered.

With the ignition OFF, insert the touch key into the receptacle on the tunnel top switch panel. This will disarm the alarm and mobilise the engine. Note that if this operation is performed with the ignition ***ON***, the transmitter key codes will be wiped, and must be reprogrammed (see below).



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Passive immobilisation will still function after the appropriate delay (see above), requiring another insertion of the touch key, with ignition OFF, to overcome.

New Transmitter Programming

If a transmitter key is lost or damaged, a new (non-coded) key may be purchased and then programmed to the car's alarm system using the following procedure:

1. With the alarm system disarmed ***and mobilised***, switch on the ignition. Note that if the transmitter key codes have been wiped, the alarm must be disarmed using the touch key (see above).

2. Insert a touch key into the receptacle on the tunnel top switch panel. The alarm tell tale will light steady.
3. Press, simultaneously, both buttons on the new transmitter key for about ten seconds, until the tell tale in the key stops flashing and goes out. When the buttons are released, the key tell tale will light steady.
4. Press either one of the transmitter key buttons; the transmitter key tell tale will blink, and the alarm tell tale on the fascia will go out for one second.
5. Repeat steps 3 and 4 for all other transmitter keys to be used, up to a maximum of four. When all keys have been programmed, switch off the ignition (the alarm tell tale will go out).

Note that this programming procedure erases all existing transmitter codes, so that all keys to be used must be reprogrammed at the same time.

Checking the Alarm System

To ensure that optimum vehicle protection is maintained, the functioning of the alarm system should be checked periodically:

1. Arm the alarm and wait for 40 seconds;
2. Open either door; The siren should sound and the hazard lamps flash for 30 seconds. To turn off the siren before the 30 seconds have elapsed, press the large button on the transmitter key - this will not disarm the alarm.
3. Repeat step (2) testing the opposite door, the tailgate and the front bonnet. (Sit in car with intrusion sensing turned off in order to open the tailgate and bonnet)
4. If the tailgate or front bonnet are left open, the alarm will stop after approximately 30 seconds, and then repeat after a short delay, and continue in this sequence for a total of ten cycles.
5. To test the intrusion sensing, remain in the vehicle and arm the system. Within the 30 second arming perlod, substantial body movement should trigger the alarm and be signalled by the sounding of the buzzer. Disarm the alarm before the 30 seconds elapses, or the siren will be activated.

Alarm Trouble Shooting

Symptom: Vehicle was left for a few minutes without setting the alarm, and now the engine won't start.
Possible cause: Passive immobilisation has taken effect (indicated by the tell tale flashing), as designed - see above.

Symptom: The transmitter key will not arm or disarm system.
Possible cause: Transmitter key battery low. When the key battery becomes low, the transmitter key LED will blink in an irregular manner, or once only instead of remaining lit until the button is released.
To replace transmitter battery:

a). Open the transmitter key body by levering in the zone marked 'OPEN', and withdraw the battery.
b). The keys are powered by a 3v long life lithium battery type CR2032. With normal use, this should last between 3 and 5 years. After opening the new battery packaging, touch only the sides of the battery, and fit the battery into the key case with the positive side (+) upwards as shown.
c). Press the battery case together.

Symptom: Both transmitters fail to operate with good batteries.
Possible cause: Transmitter programming has been inadvertently wiped during use of touch key - programme keys (see above).

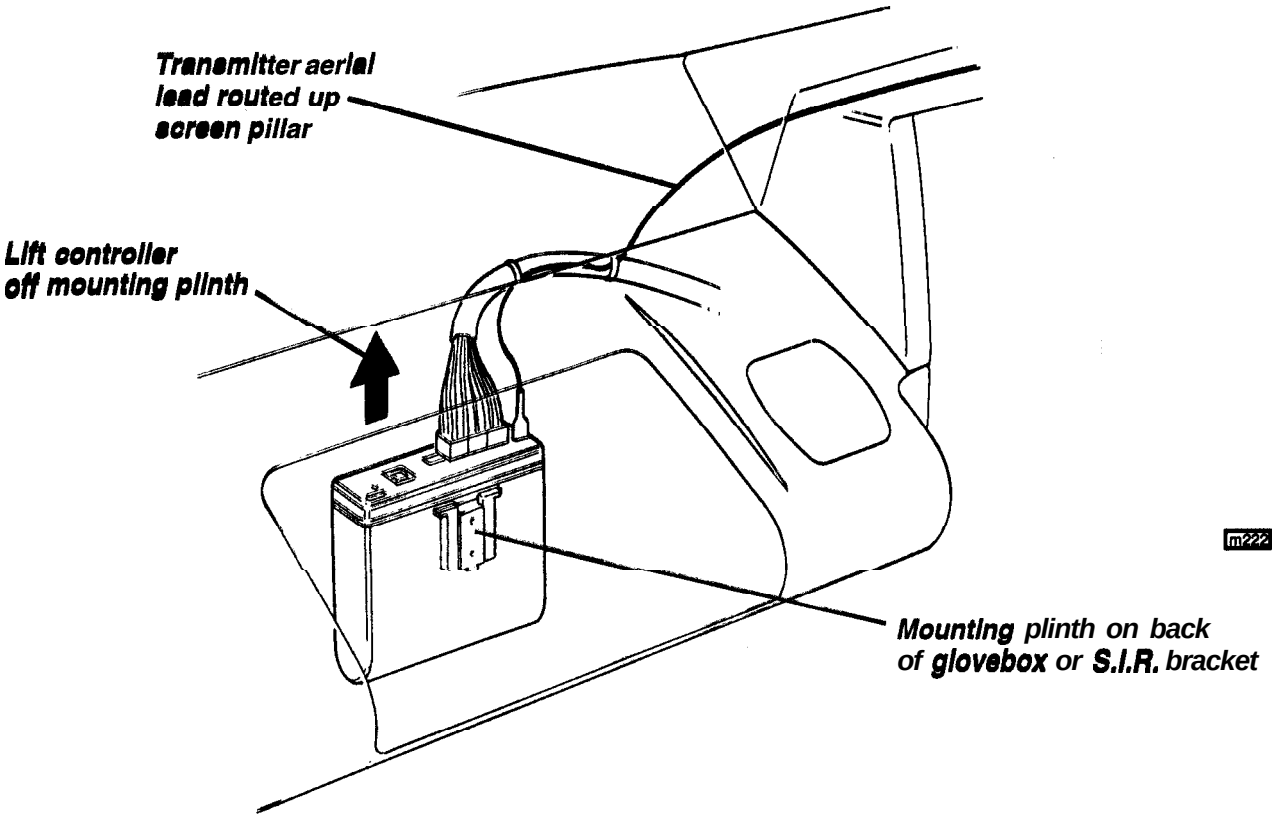
Symptom: The alarm triggers for no apparent reason.
Possible *cause:* When the transmitter key is used to disarm the system, if the alarm had been triggered during the armed period, a 'diagnostic code' will be displayed by the alarm tell tale until the ignition is next switched on.
The flash codes are interpreted as follows:
Sing/e flash followed by 2 second break: Caused by a door, tailgate or front bonnet sensor. A sensing switch may require attention.
Three *flashes followed by 2 second break:* Caused by the intrusion sensor. If there are no loose or moving objects or animals in the vehicle, the sensitivity of the sensor may need adjustment.
Four *flashes followed by a 2 second break:* Caused by the ignition circuit being energised.

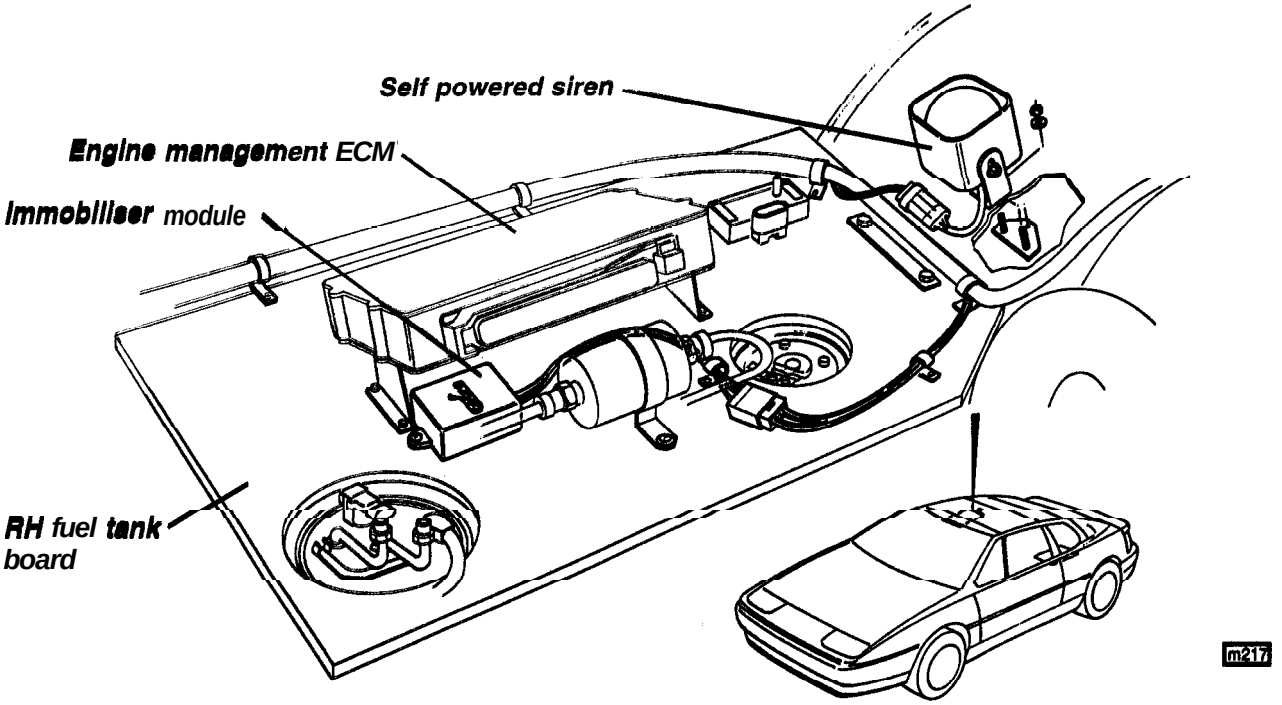
Note that there is no facility for 'Tech 1' scanner diagnosis as applied to Esprit S4 models.

Alarm **System** Componenta

The alarm controller Is mounted on the back of the glovebox, or on cars with a passenger side SIR, on a bracket In the same area, The **aerial** lead for the transmitter signal, is routed up the passenger side windscreen pillar, Note that the **adjuster** on the back of the unit Is not used In this application. The immobiliser module and self powered slren are mounted on the right hand fuel tank board.

Replacement **(uncoded)** transmltter keys may be ordered, and programmed to the vehicle system as detailed above, Replacement (coded) touch keys may be ordered quoting the alarm code.





SWITCH & INSTRUMENT FUNCTION

Door Windows

Raising and lowering of the electrically operated door windows is controlled by two rocker switches in the centre console, ahead of the gearchange lever. To help locate the switches in the dark, they are backlit green whenever the switch is operative.

To lower a window, switch on the ignition, and press the lower (dished) end of the right or left hand switch. To raise a window, press the top end of the switch. Non-USA market cars feature a 'one touch' facility: Tap the switch to move the window in increments, or press for a moment longer for continuous operation to fully open or close the window. To stop the glass movement at any point, press again either end of the switch.

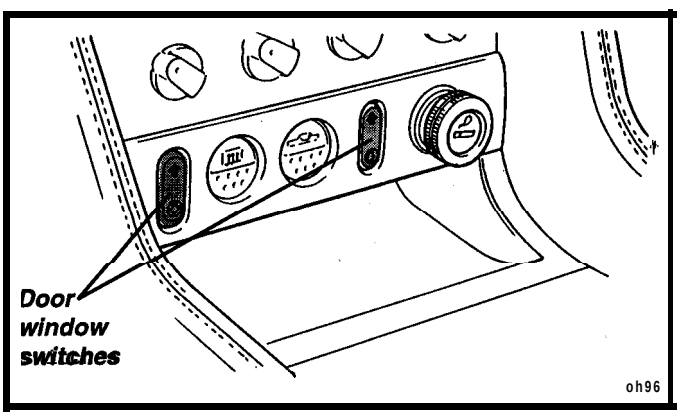
The windows are operative under any of the following conditions:

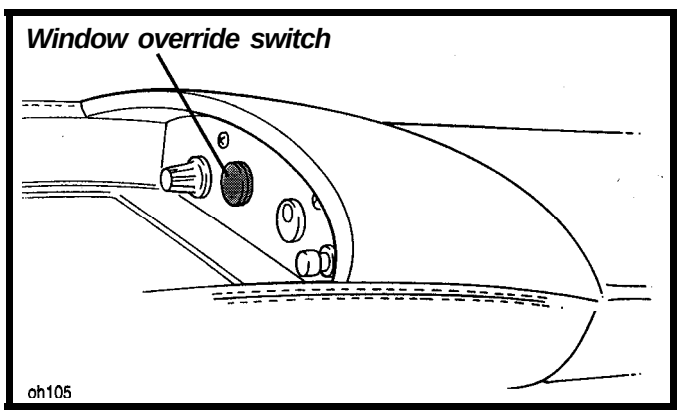
Non-USA cars;

- Whenever the ignition is switched on;
- During the period between switching off the ignition and a door being opened and closed;
- When either door is open;.
- When the transmitter key is used to arm the vehicle alarm, both door windows will automatically close (unless the intrusion sensing has been switched off).
- When using the mechanical key to lock the car, if the key is turned and held at the locking position for a moment, both door windows will close automatically.

USA specification cars;

- Whenever the ignition is switched on.

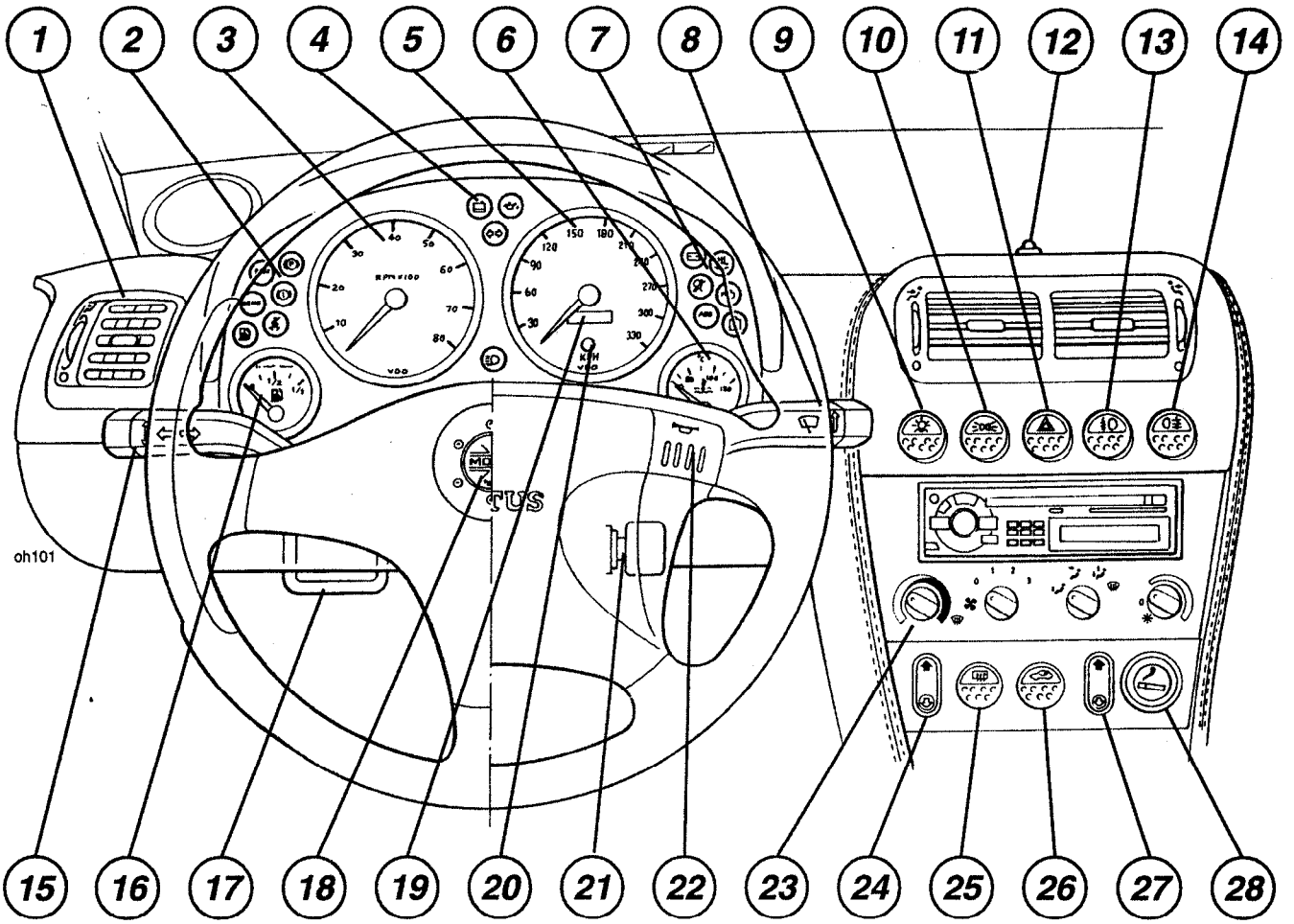




Obstruction Sensing: On non-USA cars, a safety feature is incorporated into the window closing mechanism, such that if an obstruction is sensed (increased resistance) during the last third of the travel, the motor stops automatically and reverses window glass movement for a moment. This feature may be manually overridden to cope with frosty conditions and the stiffer window action which may result. An override button is provided in the tunnel top switch panel, and must be pressed together with the window switch.

If difficulty is experienced in lowering or raising a window in extremely cold conditions, use a windscreen de-icer spray along the door to glass seal. Do NOT use radiator anti-freeze solutions, as these could seriously damage the paintwork.

WARNING: On non-USA cars, if the battery becomes discharged or the power supply interrupted (e.g. battery disconnected), the window system must be re-programmed after power reinstatement or neither the obstruction sensing or 'one touch' features will operate.
To re-programme each window: Lower the window fully and keep the switch pressed for 5 to 10 seconds until a 'click' is heard. Then raise the window fully and keep the switch pressed until a 'click' is heard. Repeat the procedure for the opposite window.



Key to Fascia Layout Diagram

1. Outer face level vent
2. Left hand tell tale cluster
3. Tachometer
4. Centre tell tale cluster
5. Speedometer
6. Water temperature gauge
7. Right hand tell tale cluster
8. Windscreen wiper/washer control
9. Master lighting switch
10. Sidelamps/parking lamps switch
11. Hazard warning lamps switch
12. Security alarm tell tale
13. Front fog lamps switch
14. Rear fog lamps switch
15. Headlamp dipswitch/flasher/turn indicators control
16. Fuel gauge
17. Front bonnet release handle
18. Horn button (non-S.I.R. type)
19. Distance recorder
20. Trip reset button
21. Ignition/starter switch/steering lock
22. Horn button (S.I.R. type)
23. Interior climate controls
24. Left hand door window switch
25. Heated rear screen switch
26. Re-circulation switch
27. Right hand door window switch
28. Cigarette lighter

TELL TALE LAMPS

Parking Brake Tell Tale

This tell tale may display as script or as a symbol dependent on market. The lamp will glow red with the ignition switched on whenever the parking brake is applied. Driving the car with the brake not fully released will cause overheat damage to the rear brakes. Each time the parking brake is released, check that the tell tale is extinguished.

The tell tale micro switch is mounted on the base of the parking brake lever, with access provided via an aperture in the sill trim panel, covered by a flap of carpet.

Brakes Tell Tale

This tell tale may display as script or as a symbol dependent on market, and is linked to a level sensor in the brake master cylinder hydraulic reservoir.

As a lamp test function, this lamp will glow red with the ignition switched on, together with the parking brake tell tale. If the lamp fails to go out when the parking brake is released, or comes on whilst driving, this is an indication that the brake fluid level may be dangerously low.

Low Fuel Level Tell Tale

This lamp is calibrated to light up amber when the level of fuel in the combined tanks falls to approximately 10 litres (2.2 imp. gal; 2.6 US gal). Note that the fuel gauge will be reading zero at this time. The level sensor is combined with the fuel gauge sender in the LH tank.

Seatbelt Tell Tale

Non-USA cars: This will glow red when the ignition is switched on, and go out when the driver's seatbelt is fastened.

USA market cars: When the ignition key is turned to start the engine, this red lamp will flash for approximately eight seconds. If the driver's seat belt is not fastened, this light will be accompanied by a warning chime via the logic module on the scuttle beam inboard of the steering column.

Engine Coolant Tell Tale

This multi-function tell tale warns of:

i) Low coolant level (via a sensor in the coolant header tank);
ii) Excessive engine coolant temperature (via the coolant temperature sensor and ECM);
iii) V8 only - excessive engine oil temperature (via sensor incorporated in sump drain plug - new for '98).

If the lamp glows red at any time with the ignition switched on, a loss of coolant or excessively high coolant or oil temperature is indicated. Note that on V8 models, a high temperature warning is indicated by a flashing tell tale rather than the steady lighting of a low coolant level indication.

Oil Pressure Tell Tale

This red tell tale is provided to warn of dangerously low engine oil pressure. Check that the lamp lights up when the ignition is switched on.

When the engine is started, the lamp should go out. If the lamp lights at any time when the engine is running, it is an indication that the oil pressure has fallen below 1.4 bar (20 lb/in²), which is the minimum pressure necessary to ensure proper lubrication of the engine. Note that on 4-cylinder models, the circuit is only activated at engine speeds over 1600 rpm (via rpm relay in rear relay station).

Turn Tell Tale

When the left hand or right hand turn indicators are operating, this green tell tale flashes in unison. If the tell tale fails to light, or flashes at an unusual rate, check the operation of the turn indicator lamps.

Main Beam Tell Tale

This lamp glows blue whenever the headlamp main beams are operating.

Battery Non-Charging Tell Tale

This will glow red when the ignition is switched on and will normally go out when the engine is started. Although the lamp may glow when the engine is idling, if it lights at engine speeds above idle, a fault in the charging circuit, or a broken alternator belt is indicated. On V8 models, the single serpentine belt also drives

the coolant water pump.

Catalyst Overheat Tell Tale (Japan only)

This tell tale will glow yellow if an engine fault occurs which results in the temperature of the catalytic converter rising to a level liable to cause damage to the converter and/or engine. Stop the vehicle in an area free of combustible materials (dry grass, leaves etc.) and allow the converter to cool for several minutes before proceeding with caution. The fault should be investigated without delay.

Supplementary Inflatable Restraint (SIR.) Tell Tale (if fitted)

The S.I.R. system has a self-diagnostic facility which lights the red tell tale if a fault is detected. As a bulb and circuit check, the tell tale should flash for about eight seconds when the ignition is switched on, and then go out. When the engine is cranked, the lamp will come on steady, and then flash for another eight seconds after the engine has started.

WARNING: If the S.I.R. tell tale lamp does not come on with the ignition, and follow the sequence detailed above (bulb and circuit check), or if it lights at any other time, a fault in the S.I.R. system is indicated. The fault should be investigated immediately as the S.I.R may not function correctly.

Check Engine Tell Tale

The check engine tell tale (also known as the 'Malfunction Indicator Lamp', or MIL) is provided to:

i) Inform the driver that the engine management self diagnostic system has detected a fault;

ii) Assist the technician with fault diagnosis.

4-Cylinder Cars

As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. If, however, the lamp remains lit, or comes on whilst driving, this indicates that the self diagnostic system has detected a problem, information on which is stored in the system memory. If the fault corrects itself, or is no longer detected, the lamp will go out in most cases after about 10 seconds, but information on the fault will remain stored in the memory for the next 50 engine start ups. If no recurrence is recorded during this period, the stored information will be erased from the memory.

Certain types of detected fault will result in the system limiting engine speed to 4,000 rpm in order to help protect the engine from damage.

V8 Models

As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. On USA market cars, if the lamp remains lit, flashes, or comes on whilst driving:

Steady lamp: This indicates that the self diagnostic system has detected a problem, information on which is stored in the system memory. If the fault corrects itself, or is no longer detected, the lamp will go out after three engine start ups with no fault present. Information on the fault will remain stored in the memory for the next 40 engine warm up cycles, but if no recurrence is recorded during this period, the stored information will be erased from the memory.

Flashing Lamp: This indicates that a severe engine misfire has been detected, with the potential for heat damage to the catalytic converters. The fault should be repaired with the utmost urgency.

For diagnostic information on engine management, refer to 'Section EMH' for 4-cylinder models, or 'Section EMM' on V8.

ABS Tell Tale

This yellow tall tale should light for about four seconds following ignition switch on, and then go out. If the lamp remains lit, or comes on whilst driving, a fault in the ABS is indicated. The base brake system will continue to operate normally, but without ABS regulation. The car can be driven but should be checked and repaired at the earliest opportunity.

For diagnostic information, refer to Section JG'.

Low Screenwash Level Tell Tale

If the fluid in the screenwash reservoir needs replenishing, this yellow tell tale will glow when the washer is operated.

INSTRUMENTS

Speedometer

This instrument displays road speed in either MPH with a secondary scale in km/h, or solely in km/h according to market, and is supplied with an electronic signal from a wheel speed sensor. Incorporated into the instrument is a digital (LCD) display for distance travelled, which may be switched between total distance and trip distance. This feature will display with the ignition switched on and is backlit green when the sidelights are lit.

Total Distance: The normal display is calibrated in the same units as the speedometer primary scale, and reads up to 999,999 miles or kilometres, plus an additional digit displaying tenths.

Trip Distance: To display trip distance, press once the small button protruding through the bottom of the instrument glass; the display will change to a 4 digit display plus a tenths digit, with a 't' prefix identifying the trip mode. This display may be zeroed by pressing the button for 2 seconds. Take care when changing mode not to inadvertently zero the trip.

Wheel speed signals from all four wheels are fed into the ABS ECM, which outputs four individual signals to the engine management ECM. The signal from only the RH rear wheel is used to supply the speedometer.

Tachometer

The tachometer indicates engine speed in revolutions per minute. Maximum safe engine speed is 7,400 rpm (Ccylinder) or 6,500 rpm (V8), with the engine management system operating to cut off the fuel supply at 7,450 rpm (Ccylinder) or 7,000 rpm (V8). Maximum power is produced at 6250 ▪ 6500 rpm, and it is not desirable or necessary when seeking full performance to cause the rev limiter to be activated when accelerating through the gears.

The engine speed signal is derived from the crankshaft sensor on the front cover, before processing by the ECM.

Fuel Gauge

The fuel gauge is operative with the ignition switched on, and provides a proportional display of fuel quantity held in the 73 litre (16 imp.gall; 19.3 US gall) tank. When the gauge reading falls to zero, the low fuel tell tale will light to indicate that there is approximately 10 litres (2.2 imp.gall; 2.6 US gall) remaining.

The total fuel tankage is divided between two interconnected tanks, one mounted ahead of each rear wheelarch, with a single filler in the left hand side.

Water Temperature Gauge

This instrument registers engine coolant temperature, which will fluctuate a certain amount as the operating conditions change and the radiator cooling fans switch in and out. During periods of idling or in heavy traffic, the temperature may rise to over 1 00°C, but need not be of concern since the pressurised system raises the coolant boiling point to over 120°C.

If a system malfunction should occur, and the temperature rises to a dangerously high level (over 120°C), the engine coolant tell tale will light. Note that the minimum temperature displayed by the gauge is 40%.

FASCIA SWITCHES

Master Lighting Switch

The switch motif is back lit green with the ignition switched on to help locate the switch. Pressing the switch, which operates with or without ignition, raises the headlamp pods with the headlamps lit, in addition to switching on the sidelamps (or side marker lamps) and panel illumination. The switch motif also lights up to indicate that the circuit is active.

Press the button a second time to switch off the lights and lower the headlamp pods. Note that if the headlamp main beams are operating when the switch is pressed 'off', the dropping of the headlamp pods will be delayed for a moment.

Sidelamps/Parking Lamps Switch

The switch motif is back lit green with the ignition switched on to help locate the switch. Pressing the switch, which operates with or without the ignition, switches on the front and rear side/parking lamps, side marker lamps (USA models) and instrument panel illumination. The switch motif also lights up to indicate that the circuit is active.

The switch is used only when lights are required without the headlamps (see above). Press the button, a second time to switch off.

Lights On Reminder

With the ignition switched off; if the driver's door is opened when the lights are switched on, an audible warning will sound:
Non-USA cars - continuous buzzer (via buzzer unit on scuttle beam outboard of steering column);
USA cars - chime for about five seconds (via logic module on scuttle beam inboard of steering column).

Hazard Warning Lamps Switch

This push switch, which is operative at all times, causes all the turn indicators to flash in unison. The switch motif is backlit red when the lights are switched on, and lights up when the switch is pressed. Press a second time to switch off.

Front Fog Lamps Switch

Two fog lamps are mounted in the front spoiler, and are controlled by a single 'push' switch in the centre console. The switch motif is backlit green when the lights are switched on, and lights up when the circuit is active. The fog lamps are operative only in conjunction with the side/parking lamps or headlamps. Press a second time to switch off.

Rear Fog Lamps Switch (if fitted)

Rear fog lamps, on cars so equipped, are incorporated into the rear lamp clusters, and are controlled by a 'push' switch in the centre console. The switch motif is backlit green when the lights are switched on, and lights up when the circuit is active.

The rear fog lamps are operative only in conjunction with the headlamps, and in some territories may legally be used only in conditions of 'seriously reduced visibility'. Indiscriminate use of rear fog lamps can cause distraction and discomfort to following traffic, and in order to minimise any unintended nuisance, the rear fog circuit is designed (new for '98 M.Y.) to switch off automatically whenever the headlamps are next turned off, regardless of the rear fog switch position. In order to reactivate the rear fog lamps, the switch must first be pressed 'off' before pressing 'on' once again. Note that the switch tell tale lights up only when the fog circuit is active.

The module controlling the 'default off' operation is mounted on the relay bracket in the front luggage compartment.

Heated Rear Screen Switch

This push switch, sited at the bottom of the centre console, operates only with ignition, and energises the heating elements in the tailgate window and the two door mirror glasses. The switch motif is backlit yellow when the lights are switched on, and lights up when the circuit is operating. Press a second time to switch off. The heated glass elements place a high demand on the electrical supply and should be used only for as long as is necessary - no timer is used.

Cigarette Lighter

A cigarette lighter is located at the bottom of the centre console, and is operative only with the ignition. To use the lighter, press the centre button of the knob to activate the heating circuit. When the element has been sufficiently heated, which takes only a few moments, the button will spring back out. The lighter may then be withdrawn for use. Care should be taken when handling the hot lighter to avoid contact other than with its target.

An illumination ring around the lighter is backlit green when the lights are switched on.

Panel Lights Rheostat

The brightness of the instrument and switch illumination is controlled by a rheostat knob on the gear lever tray switch panel. Turn the knob clockwise to increase the brightness, and counterclockwise to decrease illumination.

COLUMN SWITCHES & HORN

Headlamp Dipswitch/Flasher/Turn Indicators

The steering column left hand lever switch controls the headlamp dipswitch, headlamp flasher and turn indicators.

Head/amp ***Dipswitch:*** The headlamps must be selected via the master lighting switch before the pods will rise with the headlamps lit. The left hand lever switch is then used to select main or dip beam. Main beam is

obtained with the lever furthest forward, away from the steering wheel, and dip beam with the lever moved back towards the wheel. The main beam tell tale lamp in the instrument panel lights when main beam is operating.

Note that on non-USA cars, the outer pair of headlamps provide the dip beams, and go out when main beam; provided by the inner pair of headlamps, is selected. USA specification vehicles use sealed beam headlamp units, with the outer headlamps providing the dip beams, and all four headlamps the main beams.

Head/amp ***Flasher:*** The headlamp flasher is operative at all times. If the lever is pulled towards the steering wheel against spring pressure, the headlamp pods will rise with the main beams lit. The headlamps go out when the lever is released, but the pods remain raised for a few seconds in order to avoid unnecessary oscillations if the lights are repeatedly flashed.

Turn *Indicators:* The turn indicators operate only with the ignition switched on. Move the lever down to indicate a left hand turn, and up for a right hand turn. The switch will be cancelled when the steering wheel is returned to the straight ahead position.

If the switch is pressed up or down only lightly, the switch will return under spring pressure for convenience when signalling a lane change.

Windscreen Wiper/Washers

The steering column right hand lever switch controls the windscreen wiper and washers, and is operative only with the ignition switched on. Never use the wiper on a dry screen. Note that the wiper arm and pantograph anchor plate are new for '98 M.Y. in order to improve wiper performance at high vehicle speed, and a new washer bottle and pump assembly provides greater water delivery and increased storage capacity.

Windscreen ***Wiper:*** The wiper is controlled by the up/down position of the lever switch, which operates as follows:

Moved fully down, the wiper is switched off.

Move up to the first position for intermittent wipe. The wiper will make one sweep about every five seconds.

Select the next position for normal wiper operation.

Move fully upwards for high speed wipe, for use only in heavy rain.

Windscreen Washers: Pulling the lever towards the steering wheel will operate both the washers and the wiper. When the switch is released, the wiper will continue for a further four sweeps.

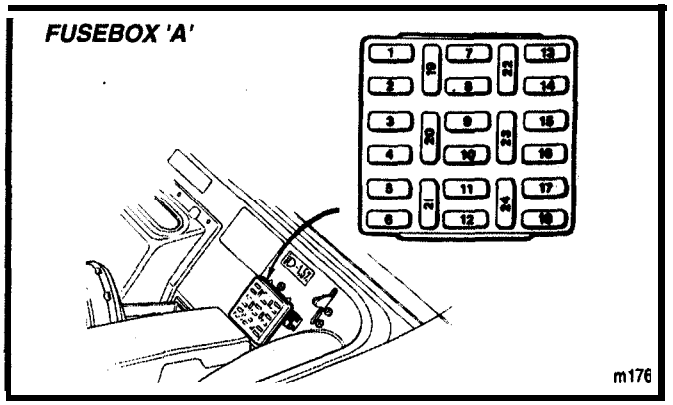
Horn

The two tone horns, which function at all times, are operated on cars without a supplementary inflatable restraint (S.I.R.) by a button in the steering wheel centre boss. On S.I.R. equipped cars, two horn buttons are provided on the steering wheel spokes.

FUSES & RELAYS

Fuses

The main fusebox is located on the driver's side of the cabin front bulkhead in the front luggage compartment, and is protected by a transparent cover. The fuses are numbered, and coloured according to their amperage rating, and may be pulled out from their slots using the fuse extractor tool stowed in the vehicle tool kit.

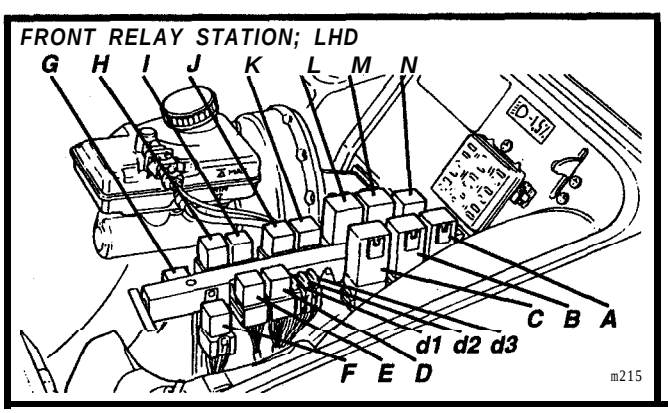


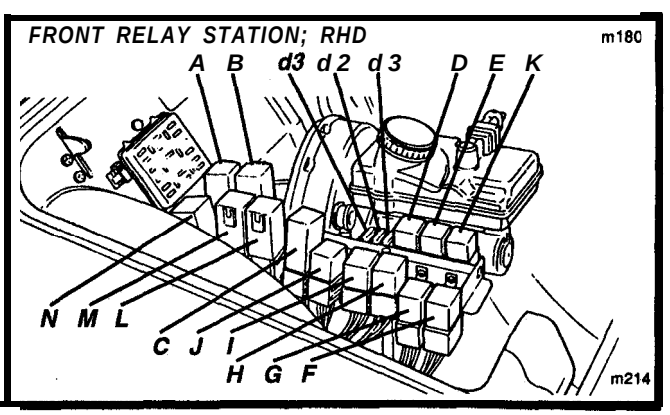
Main Fusebox 'A' - front luggage compartment

Slot	Rating	Circuit
A1	10A	Central door locking
A 2	7.5A	Turn indicators
A3	5A	Rear fog lamps
A 4	5A	Climate controls
A5	5A	LH side & tail lamps, logic module, radio illumination, cigar lighter illumination, front fog lamp control, centre console illumination
A6	5A	RH side & tail lamps, rheostat module
A 7	15A	Cigar lighter
A 0	15A	Interior fan
A 9	7.5A	Air conditioning control
A10	15A	Headlamp lift motor
A l l	15A	Headlamp lift motor
Al2	20A	Window lift motor (passenger)
Al3	20A	Window lift motor (driver)
Al4	5A	Interior lamps, horn control, logic module, headlamp flash control
A15	15A	Hazard & stop lamps
A l6	10A	ABS ignition supply
Al7	5A	Ignition services, mirrors, alarm controller
A18	7.5A	HRS
A19	10A	Radio, front DLC
A20	15A	Windscreen wash/wipe
A21	5 A	Instruments, logic box, lights-on buzzer, low fuel delay module, day lamps control (SWE, CAN)
A22	3A	Heated door mirrors
A23	2A	Window voltage module
A24	15A	Front fog lamps

Relay Station & Fusebox 'D', front luggage compartment

Additional fuses, and many of the relays and delay units are fitted along a relay mounting bracket ahead of the main fusebox. A protective plastic cover, shields this equipment from luggage being loaded into the front compartment. To remove the cover, unscrew the two fingernuts, and withdraw the cover upwards and forwards to unhook from the rear end of the bracket.





Fuses:

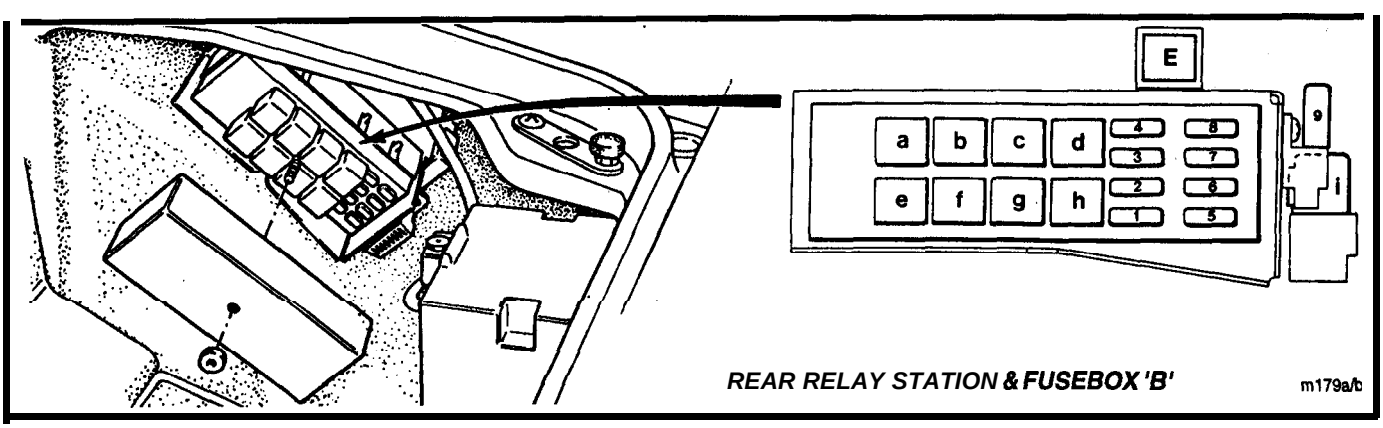
Slot	*Rating*	*Circuit*
D1	15A	Radiator fan RH
D 2	15A	Radiator fan centre
D 3	15A	Radiator fan LH

Relays:

Ref.	*Function*
A	Non-USA cars: Window voltage module. USA cars: Bridging link
B	Headlamp pod delay module
C	Rear fog lamp module
D	Front fog lamp relay
E	Horn relay
F	Radiator fans relay
G	Ignition power relay
H	Dip beam relay
I	Main beam relay
J	Start drop out relay
K	Radio 'key-in' relay
L	Rheostat module
M	Low fuel delay module
N	Wash/wipe delay module

Relay Station & Fusebox 'B', rear luggage compartment

Fuses and relays for the engine management system are located in a relay station mounted at the right hand side of the rear luggage compartment, on the rear face of the wheelarch. To access the station, release the finger nut and pull off the protective plastic cover.



REAR RELAY STATION & FUSEBOX 'B' m179a/b

Fuses - 4 cylinder models:

Slot	*Rating*	*Circuit*
B1	10A	ECM power
B2	25A	Fuel filler flap
B3	15A	Fuel pump & injection
B4	7.5A	ECM & direct ignition
B5	10A	A.C. compressor
B6	7.5A	Reverse lamps & vacuum pump
B7	1 OA	Evap. canister purge solenoid., 02 heater, wastegate solenoid
B8	5A	Throttle jack & EBPV solenoids
B9	30A	Vacuum pump

Fuses - V8 models:

Slot	*Rating*	*Circuit*
B1	25A	Fuel filler flaps
B2	5A	ECM & coolant pump
B3	25A	Primary fuel pump & injectors
B4	15A	Secondary fuel pump
B5	15A	Ignition coils
B6	10A	Engine ignition supply
B7	7.5A	Ignition controls
B8	10A	A.C. compressor & reverse lamps
B9	30A	Air pump

Relays - 4 cylinder models:

Ref.	*Function*
a	Oil tell tale rpm relay
b	Throttle jack/EBPV relay
c	Fuel pump & injector relay
d	Ignition relay
E	Secondary injector resistor
f	Fuel filler flap relay
g	a.c. compressor relay
h	Starter motor solenoid relay
i	Vacuum pump control module

Relays - V8 models:

Ref.	*Function*
a	Coolant pump relay
b	Secondary fuel pump relay
c	Primary fuel pump & injectors relay
d	Ignition power relay
e	Oxygen sensor heater control relay
f	Fuel filler flap. relay
g	A.C. compressor relay
h	Starter motor solenoid relay
i	Air pump relay

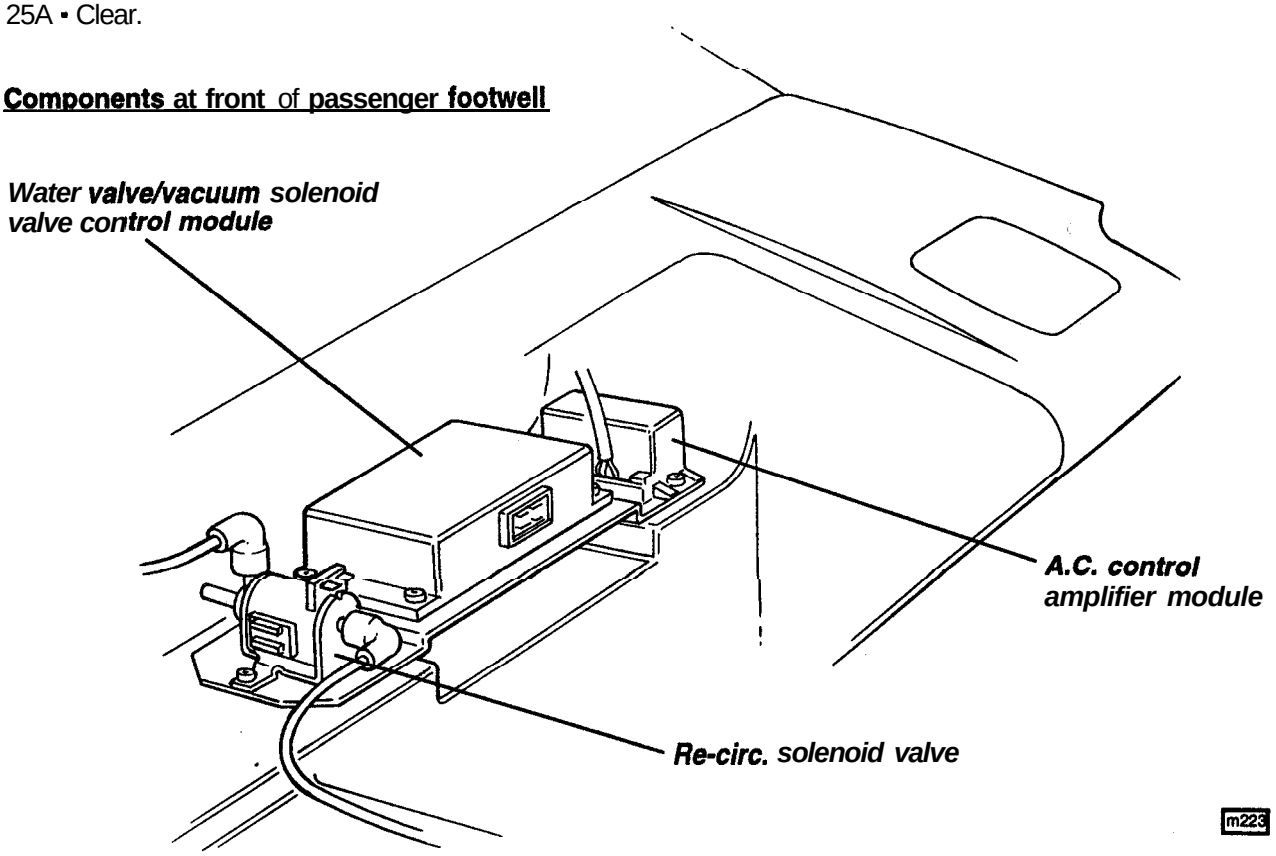
Other Fuses & Relays

- Lights on buzzer unit, horn and alarm fuses; on scuttle beam outboard of steering column.
- USA type logic module/buzzer unit; on scuttle beam inboard of steering column.
- Flasher unit; inside instrument binnacle.
- Headlamp pod control module; on back of LH headlamp pod well in front luggage compartment.
- Security alarm module; on back of glovebox, or in same area on passenger SIR cars.
- A.C. control amplifier module, water valve/vacuum solenoid valve control module and re-circ. solenoid valve; at front of passenger footwell.
- Air distribution flap solenoid valve; on tunnel top behind centre console.

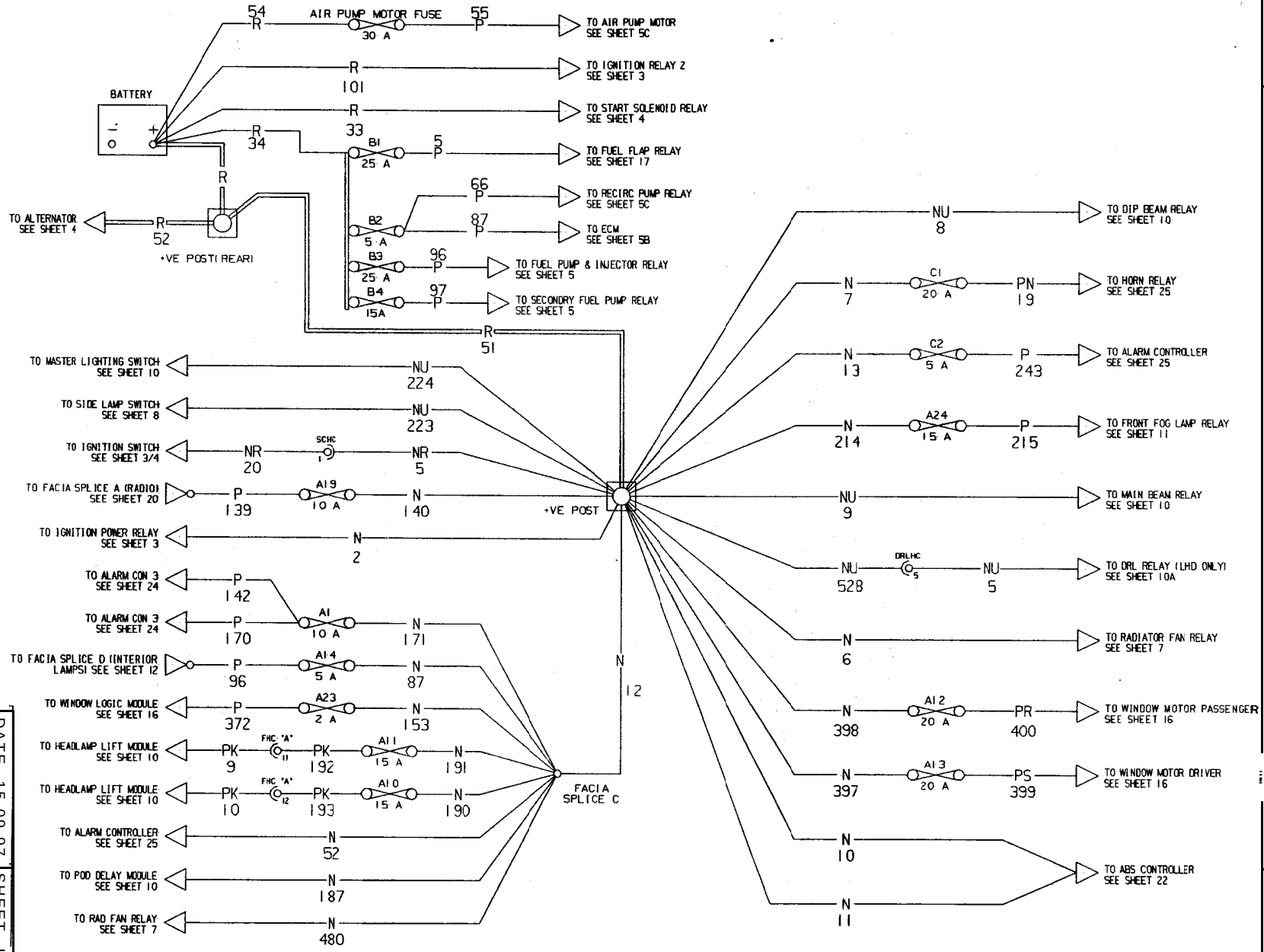
Fuse *colours:*

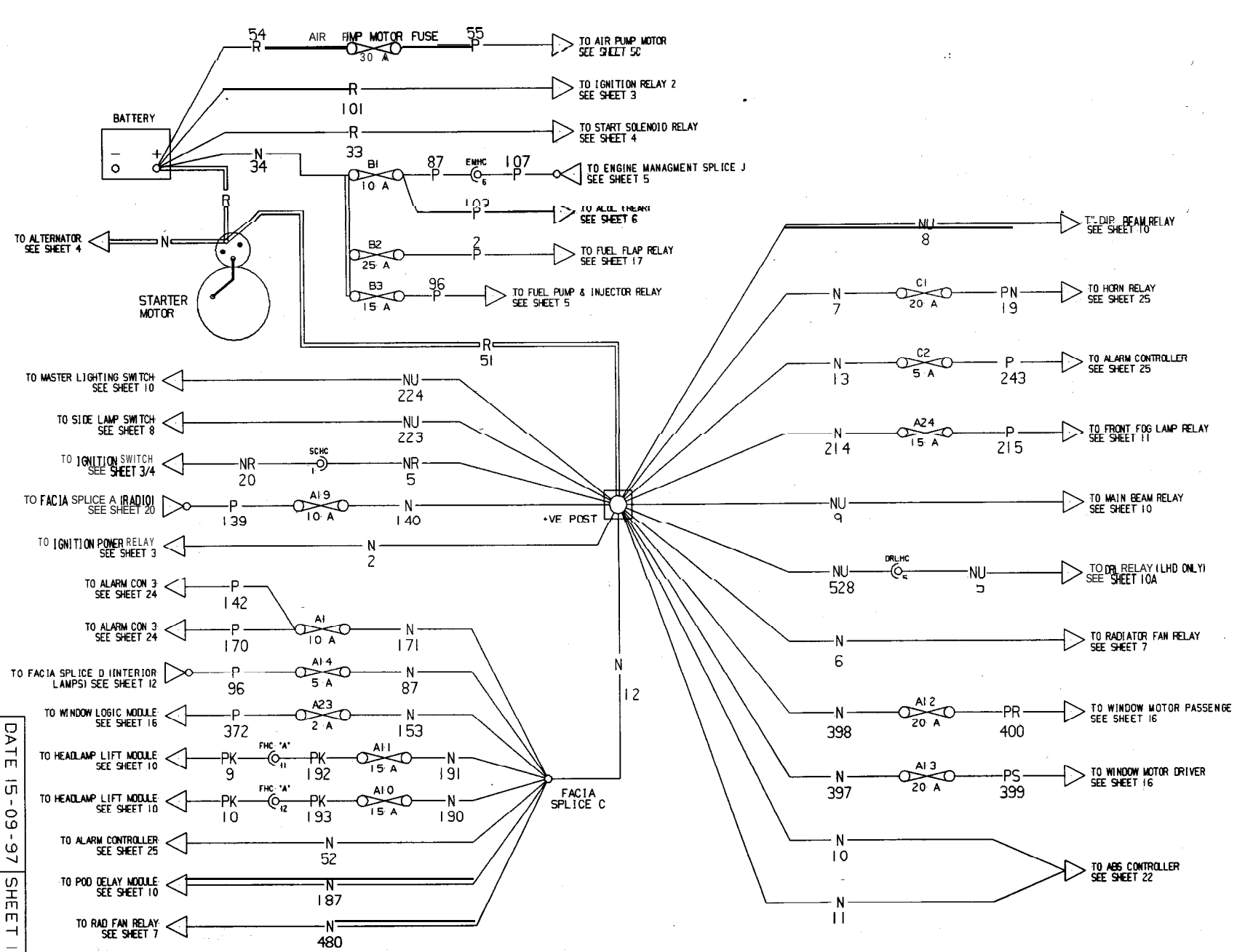
2A - Black;	3A - Violet;
4A - Pink;	**5A** - Orange;
7.5A - Brown;	**10A** - Red;
15A - Light Blue;	20A - Yellow;
25A - Clear.	

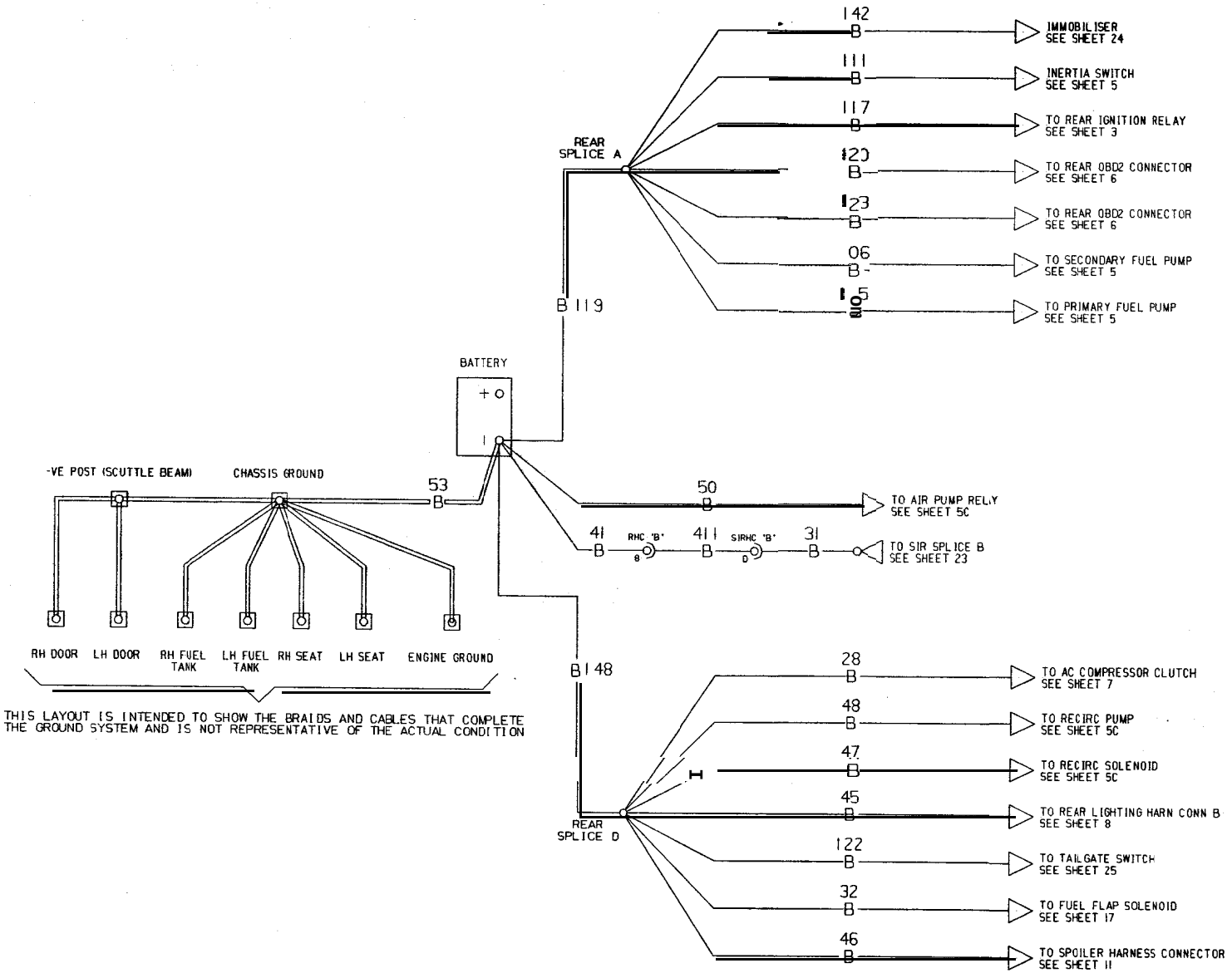
Components at front of passenger footwell

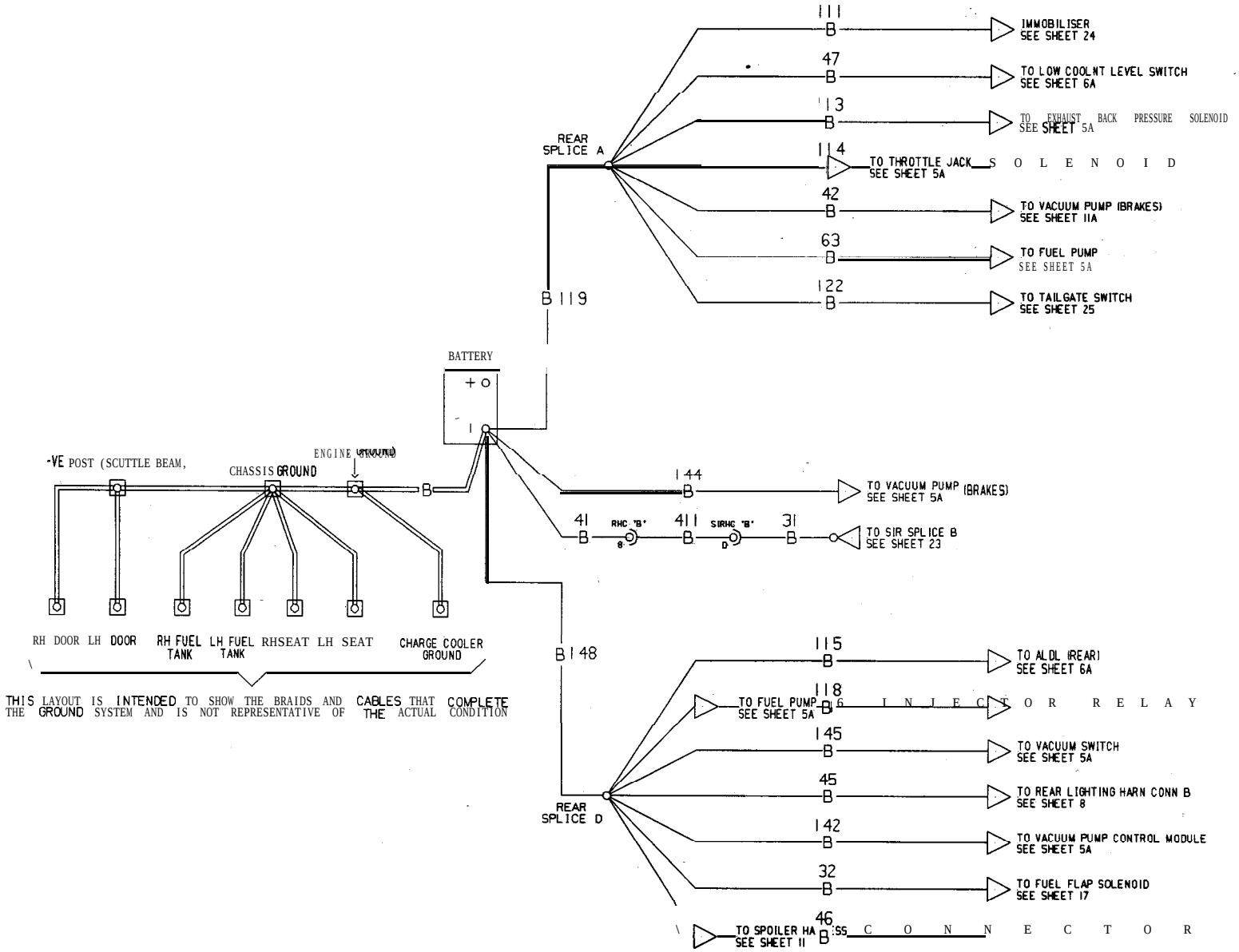


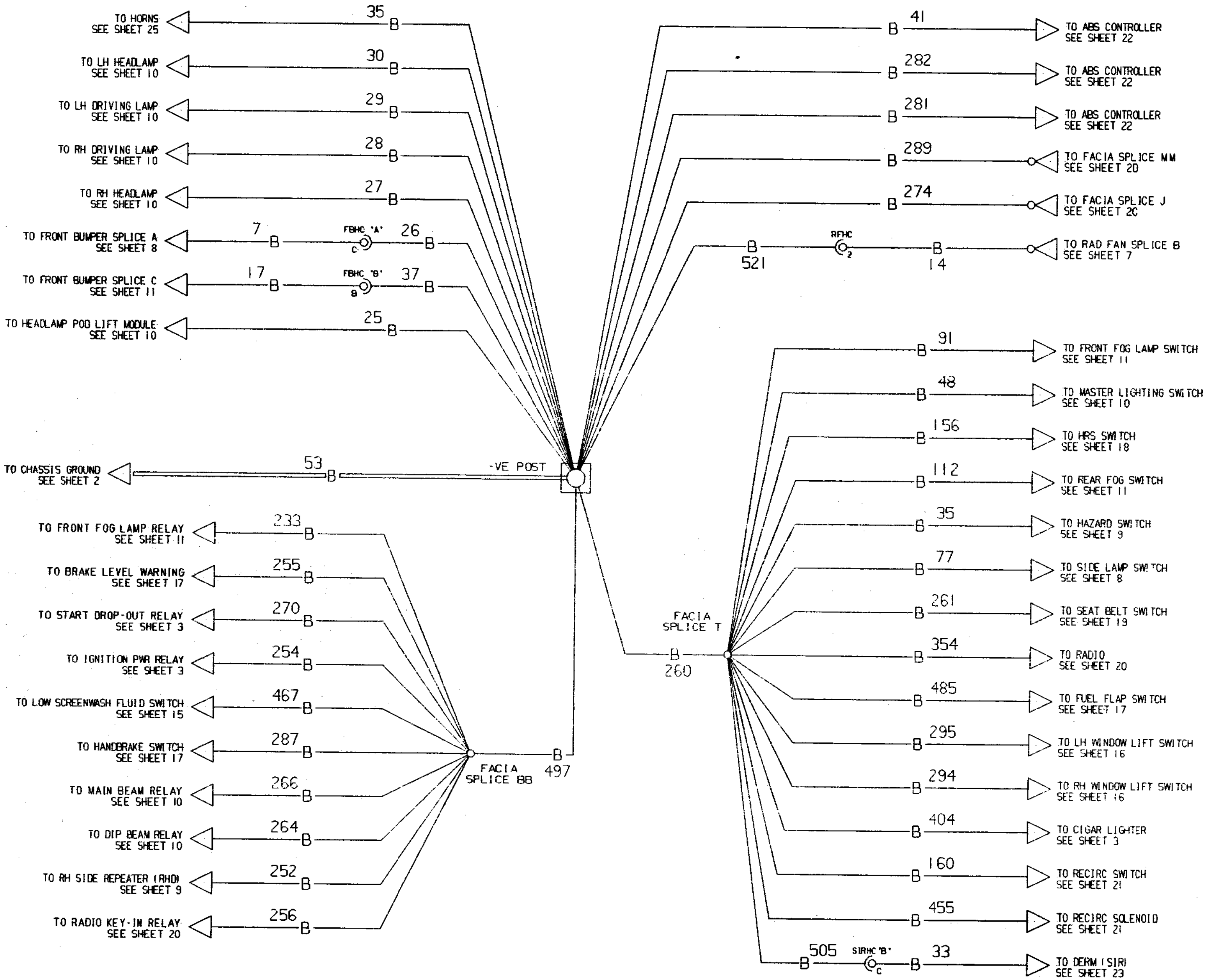
CIRCUIT DIAGRAMS - '98 M.Y.

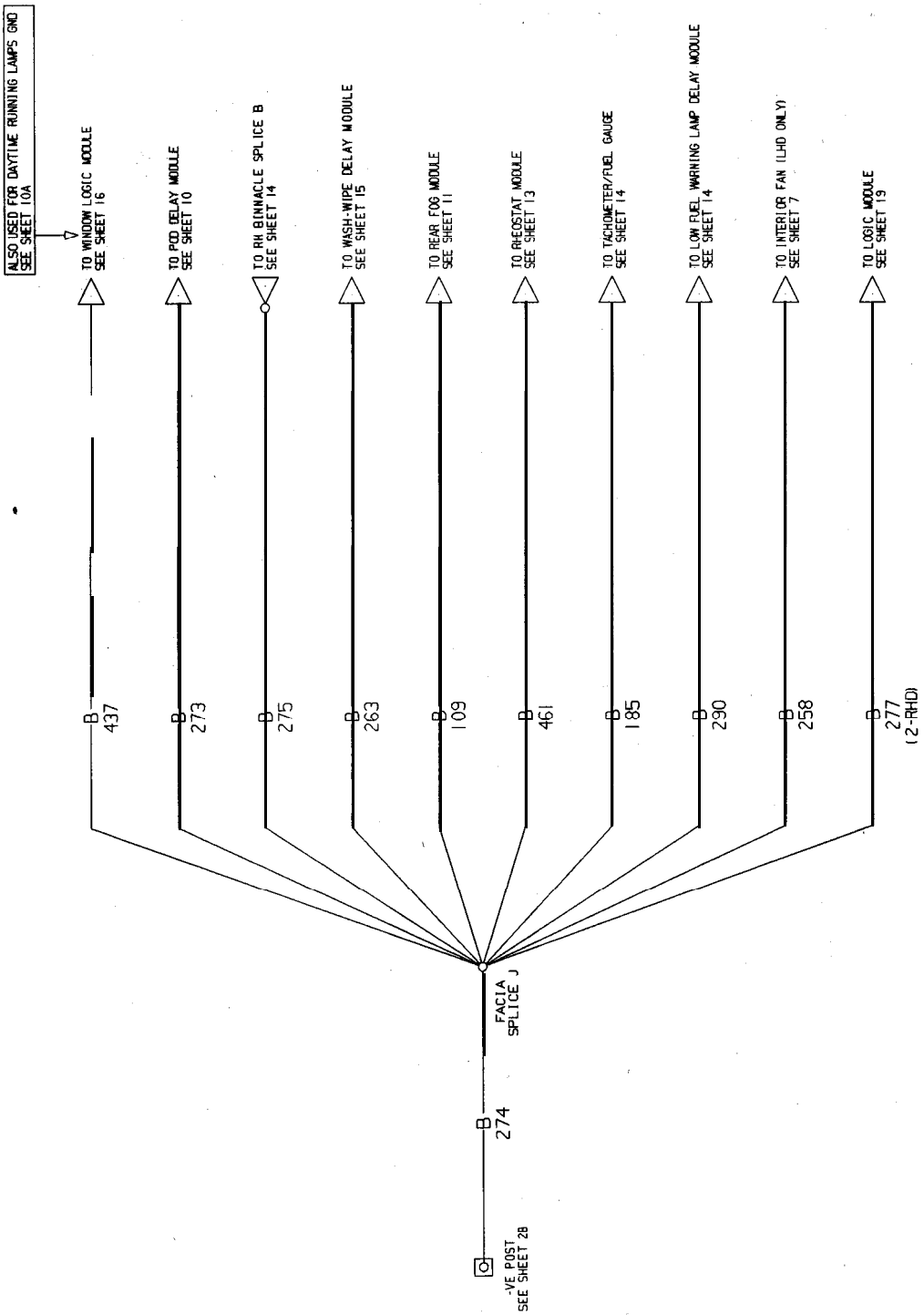

BATTERY
54 R
AIR PUMP MOTOR FUSE
30 A
55 P
TO AIR PUMP MOTOR SEE SHEET 5C
R 101
TO IGNITION RELAY 2 SEE SHEET 3
R
TO START SOLENOID RELAY SEE SHEET 4
R 34
R 33
B1 25 A
5 P
TO FUEL FLAP RELAY SEE SHEET 17
66 P
TO RECIRC PUMP RELAY SEE SHEET 5C
B2 5 A
87 P
TO ECM SEE SHEET 5B
B3 25 A
96 P
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
B4 15A
97 P
TO SECONDRY FUEL PUMP RELAY SEE SHEET 5
TO ALTERNATOR SEE SHEET 4
R 52
+VE POST(REAR)
R 51
TO MASTER LIGHTING SWITCH SEE SHEET 10
NU 224
TO SIDE LAMP SWITCH SEE SHEET 8
NU 223
TO IGNITION SWITCH SEE SHEET 3/4
NR 20
SCHC 1
NR 5
TO FACIA SPLICE A (RADIO) SEE SHEET 20
P 139
A19 10 A
N 140
TO IGNITION POWER RELAY SEE SHEET 3
N 2
+VE POST
TO ALARM CON 3 SEE SHEET 24
P 142
TO ALARM CON 3 SEE SHEET 24
P 170
A1 10 A
N 171
TO FACIA SPLICE D (INTERIOR LAMPS) SEE SHEET 12
P 96
A14 5 A
N 87
TO WINDOW LOGIC MODULE SEE SHEET 16
P 372
A23 2 A
N 153
TO HEADLAMP LIFT MODULE SEE SHEET 10
PK 9
FHC "A" 11
PK 192
A11 15 A
N 191
TO HEADLAMP LIFT MODULE SEE SHEET 10
PK 10
FHC "A" 12
PK 193
A10 15 A
N 190
TO ALARM CONTROLLER SEE SHEET 25
N 52
TO POD DELAY MODULE SEE SHEET 10
N 187
TO RAD FAN RELAY SEE SHEET 7
N 480
N 12
FACIA SPLICE C
NU 8
TO DIP BEAM RELAY SEE SHEET 10
N 7
C1 20 A
PN 19
TO HORN RELAY SEE SHEET 25
N 13
C2 5 A
P 243
TO ALARM CONTROLLER SEE SHEET 25
N 214
A24 15 A
P 215
TO FRONT FOG LAMP RELAY SEE SHEET 11
NU 9
TO MAIN BEAM RELAY SEE SHEET 10
NU 528
DRLHC 5
NU 5
TO DRL RELAY (LHD ONLY) SEE SHEET 10A
N 6
TO RADIATOR FAN RELAY SEE SHEET 7
N 398
A12 20 A
PR 400
TO WINDOW MOTOR PASSENGER SEE SHEET 16
N 397
A13 20 A
PS 399
TO WINDOW MOTOR DRIVER SEE SHEET 16
N 10
N 11
TO ABS CONTROLLER SEE SHEET 22

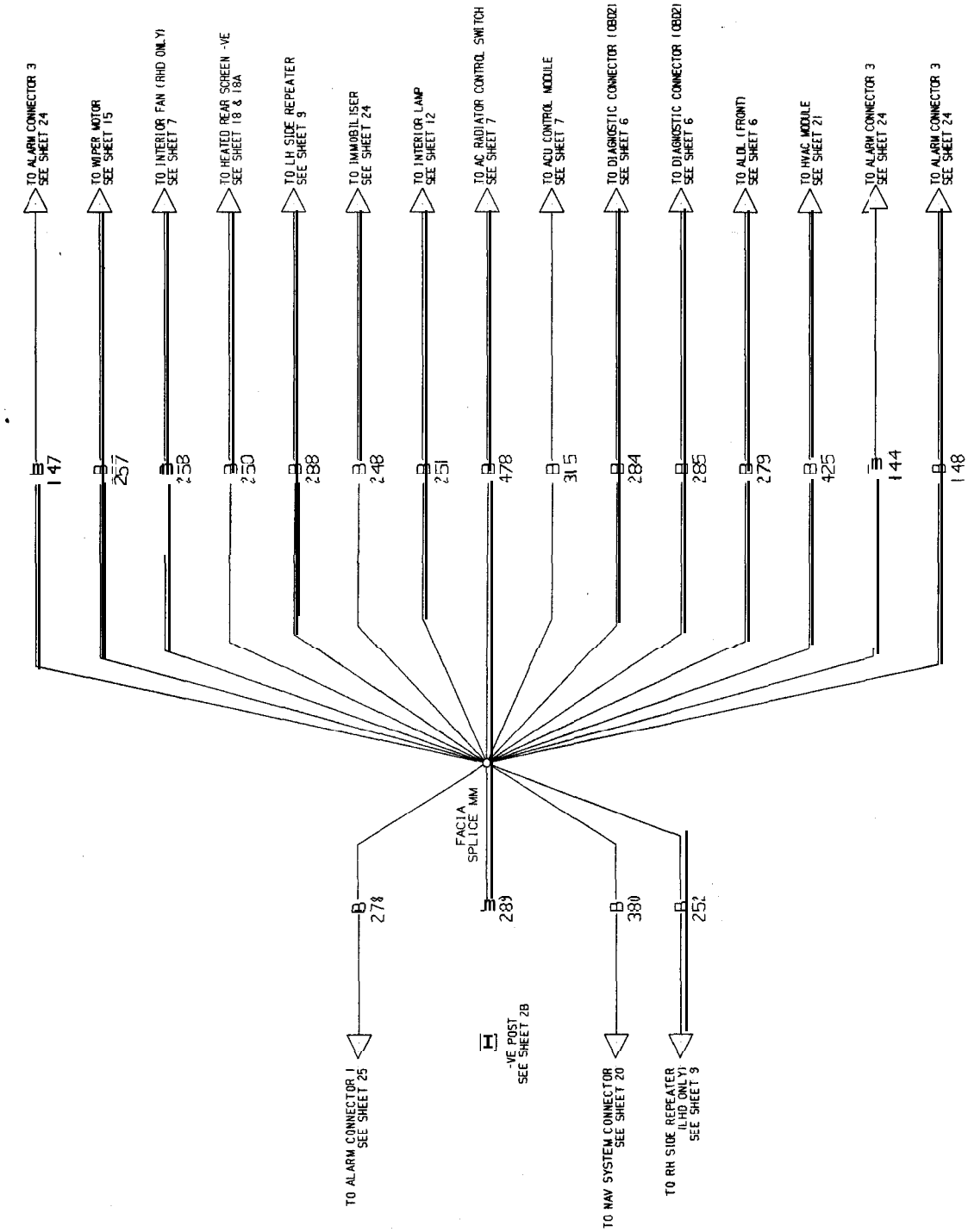

54 R
AIR PUMP MOTOR FUSE
30 A
55 P
TO AIR PUMP MOTOR SEE SHEET 5C
R 101
TO IGNITION RELAY 2 SEE SHEET 3
BATTERY
R 33
TO START SOLENOID RELAY SEE SHEET 4
N 34
B1 10 A
87 P
EMHC 6
107 P
TO ENGINE MANAGMENT SPLICE J SEE SHEET 5
103 P
TO ALOL HEART SEE SHEET 6
TO ALTERNATOR SEE SHEET 4
N
R
B2 25 A
2 P
TO FUEL FLAP RELAY SEE SHEET 17
STARTER MOTOR
B3 15 A
96 P
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5
R 51
TO MASTER LIGHTING SWITCH SEE SHEET 10
NU 224
TO SIDE LAMP SWITCH SEE SHEET 8
NU 223
TO IGNITION SWITCH SEE SHEET 3/4
NR 20
SCHC 1
NR 5
TO FACIA SPLICE A (RADIO) SEE SHEET 20
P 139
A19 10 A
N 140
+VE POST
TO IGNITION POWER RELAY SEE SHEET 3
N 2
TO ALARM CON 3 SEE SHEET 24
P 142
TO ALARM CON 3 SEE SHEET 24
P 170
A1 10 A
N 171
TO FACIA SPLICE D (INTERIOR LAMPS) SEE SHEET 12
P 96
A14 5 A
N 87
N 12
TO WINDOW LOGIC MODULE SEE SHEET 16
P 372
A23 2 A
N 153
TO HEADLAMP LIFT MODULE SEE SHEET 10
PK 9
FHC "A" 11
PK 192
A11 15 A
N 191
TO HEADLAMP LIFT MODULE SEE SHEET 10
PK 10
FHC "A" 12
PK 193
A10 15 A
N 190
FACIA SPLICE C
TO ALARM CONTROLLER SEE SHEET 25
N 52
TO POD DELAY MODULE SEE SHEET 10
N 187
TO RAD FAN RELAY SEE SHEET 7
N 480
NU 8
T" DIP BEAM RELAY SEE SHEET 10
N 7
C1 20 A
PN 19
TO HORN RELAY SEE SHEET 25
N 13
C2 5 A
P 243
TO ALARM CONTROLLER SEE SHEET 25
N 214
A24 15 A
P 215
TO FRONT FOG LAMP RELAY SEE SHEET 11
NU 9
TO MAIN BEAM RELAY SEE SHEET 10
NU 528
DRLHC 5
NU 5
TO DRL RELAY (LHD ONLY) SEE SHEET 10A
N 6
TO RADIATOR FAN RELAY SEE SHEET 7
N 398
A12 20 A
PR 400
TO WINDOW MOTOR PASSENGE SEE SHEET 16
N 397
A13 20 A
PS 399
TO WINDOW MOTOR DRIVER SEE SHEET 16
N 10
N 11
TO ABS CONTROLLER SEE SHEET 22

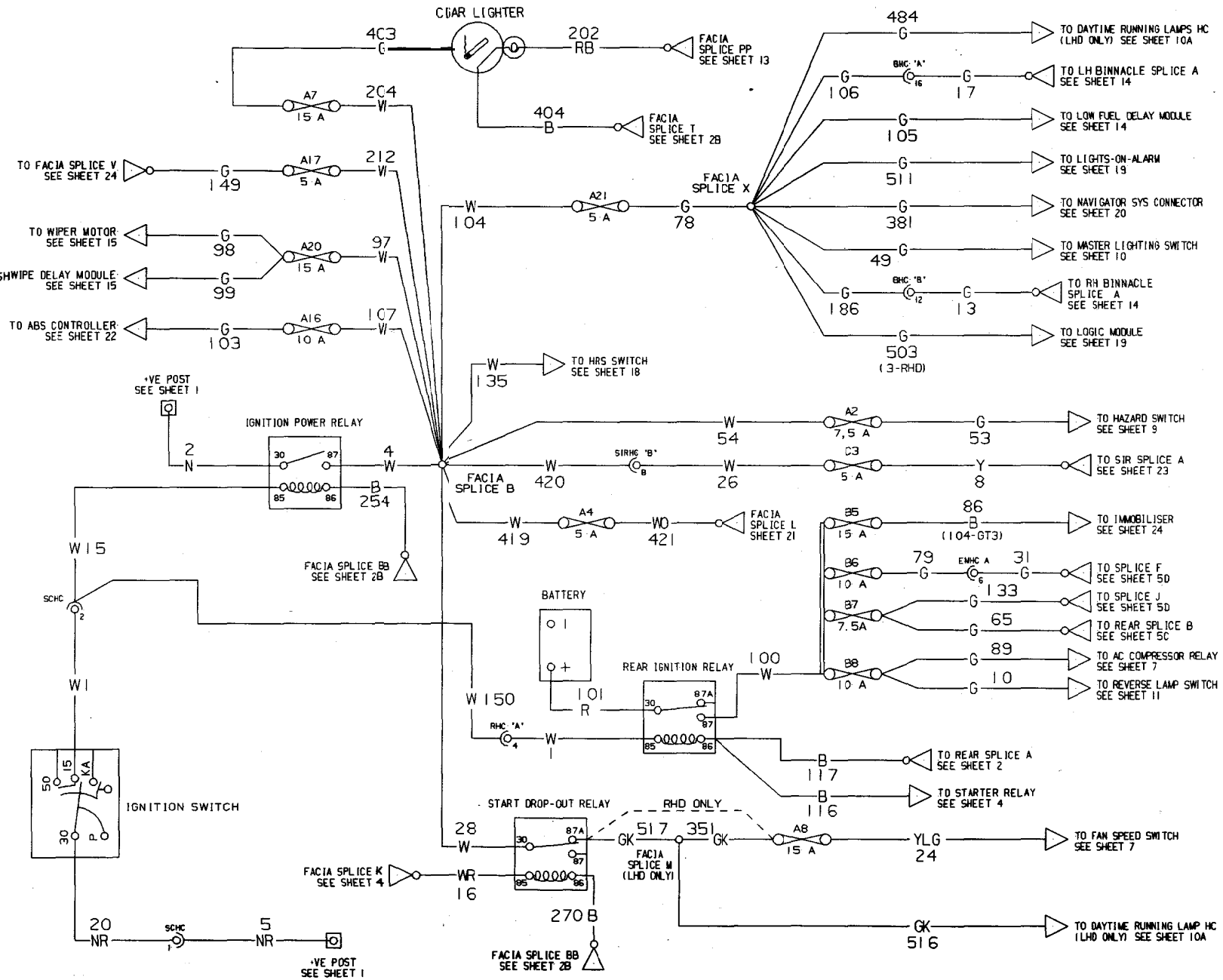

142
IMMOBILISER
SEE SHEET 24
111
INERTIA SWITCH
SEE SHEET 5
117
TO REAR IGNITION RELAY
SEE SHEET 3
120
TO REAR OBD2 CONNECTOR
SEE SHEET 6
123
TO REAR OBD2 CONNECTOR
SEE SHEET 6
06
TO SECONDARY FUEL PUMP
SEE SHEET 5
105
TO PRIMARY FUEL PUMP
SEE SHEET 5
REAR
SPLICE A
B119
BATTERY
+
-
-VE POST (SCUTTLE BEAM)
CHASSIS GROUND
53
50
TO AIR PUMP RELAY
SEE SHEET 5C
41
RHC 'B'
411
SIRHC 'B'
31
TO SIR SPLICE B
SEE SHEET 23
RH DOOR
LH DOOR
RH FUEL TANK
LH FUEL TANK
RH SEAT
LH SEAT
ENGINE GROUND
THIS LAYOUT IS INTENDED TO SHOW THE BRAIDS AND CABLES THAT COMPLETE THE GROUND SYSTEM AND IS NOT REPRESENTATIVE OF THE ACTUAL CONDITION
B148
28
TO AC COMPRESSOR CLUTCH
SEE SHEET 7
48
TO RECIRC PUMP
SEE SHEET 5C
47
TO RECIRC SOLENOID
SEE SHEET 5C
45
TO REAR LIGHTING HARN CONN B
SEE SHEET 8
122
TO TAILGATE SWITCH
SEE SHEET 25
32
TO FUEL FLAP SOLENOID
SEE SHEET 17
46
TO SPOILER HARNESS CONNECTOR
SEE SHEET 11
REAR
SPLICE D

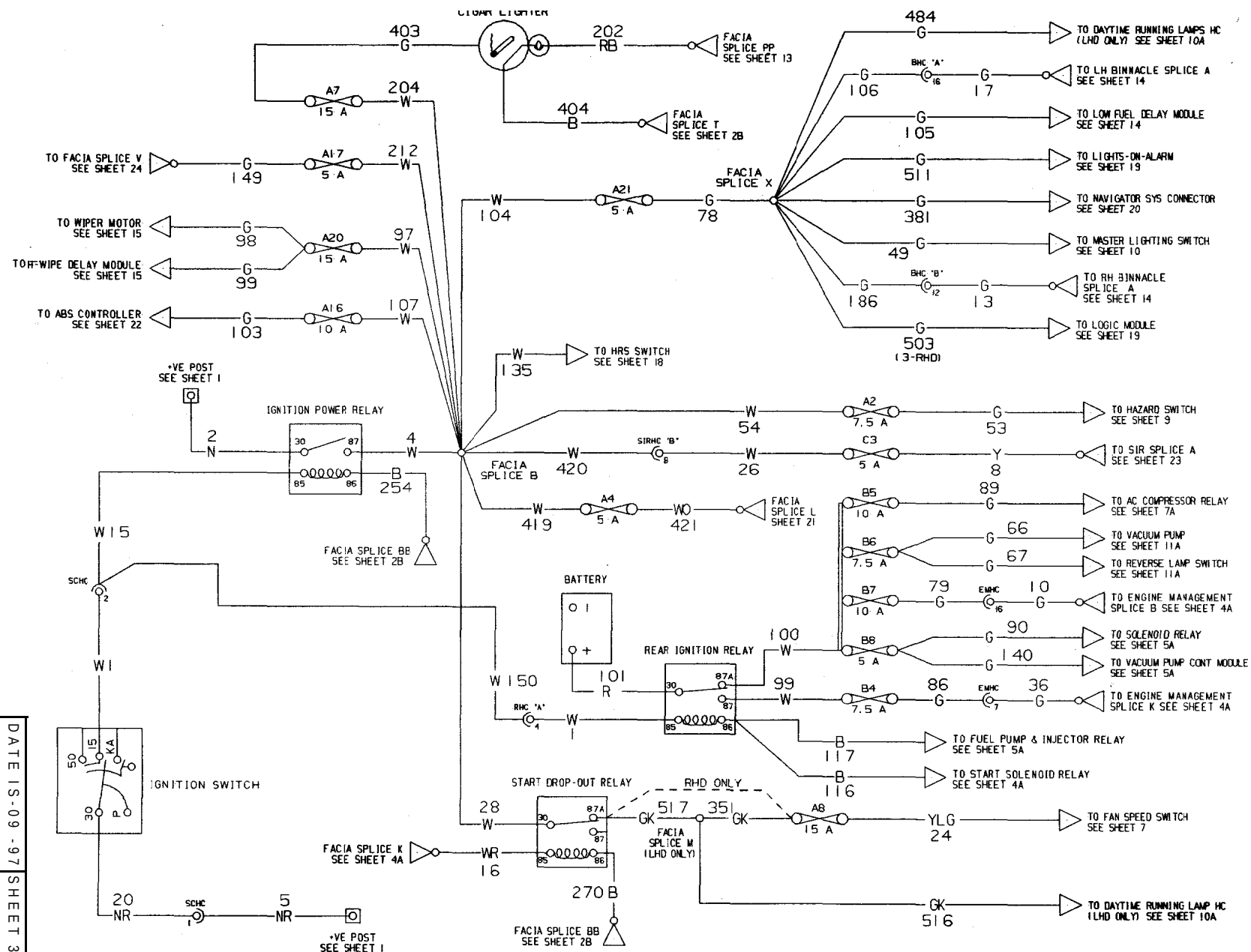

REAR SPLICE A
B119
111 B
IMMOBILISER SEE SHEET 24
47 B
TO LOW COOLNT LEVEL SWITCH SEE SHEET 6A
113 B
TO EXHAUST BACK PRESSURE SOLENOID SEE SHEET 5A
114 B
TO THROTTLE JACK SOLENOID SEE SHEET 5A
42 B
TO VACUUM PUMP (BRAKES) SEE SHEET 11A
63 B
TO FUEL PUMP SEE SHEET 5A
122 B
TO TAILGATE SWITCH SEE SHEET 25
BATTERY
+ o
-
1
-VE POST (SCUTTLE BEAM, CHASSIS GROUND
ENGINE GROUND
B
144 B
TO VACUUM PUMP (BRAKES) SEE SHEET 5A
41 B
RHC "B" 8
411 B
SIRHC "B" D
31 B
TO SIR SPLICE B SEE SHEET 23
RH DOOR
LH DOOR
RH FUEL TANK
LH FUEL TANK
RHSEAT
LH SEAT
CHARGE COOLER GROUND
THIS LAYOUT IS INTENDED TO SHOW THE BRAIDS AND CABLES THAT COMPLETE THE GROUND SYSTEM AND IS NOT REPRESENTATIVE OF THE ACTUAL CONDITION
B148
REAR SPLICE D
115 B
TO ALDL (REAR) SEE SHEET 6A
118 B
16 INJECTOR RELAY
TO FUEL PUMP SEE SHEET 5A
145 B
TO VACUUM SWITCH SEE SHEET 5A
45 B
TO REAR LIGHTING HARN CONN B SEE SHEET 8
142 B
TO VACUUM PUMP CONTROL MODULE SEE SHEET 5A
32 B
TO FUEL FLAP SOLENOID SEE SHEET 17
46 B
55 CONNECTOR
TO SPOILER HA SEE SHEET 11

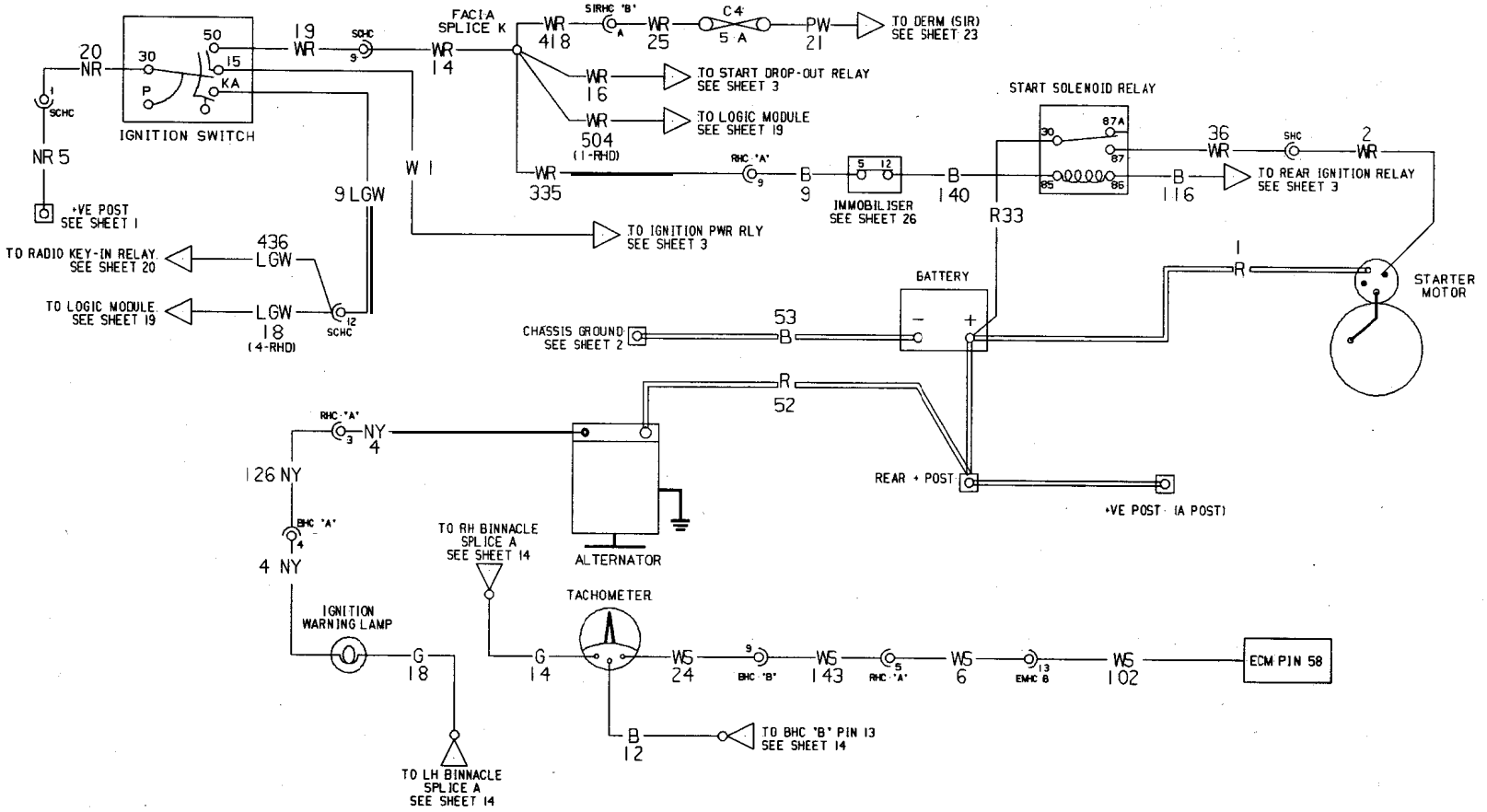

TO HORNS SEE SHEET 25
35 B
TO LH HEADLAMP SEE SHEET 10
30 B
TO LH DRIVING LAMP SEE SHEET 10
29 B
TO RH DRIVING LAMP SEE SHEET 10
28 B
TO RH HEADLAMP SEE SHEET 10
27 B
TO FRONT BUMPER SPLICE A SEE SHEET 8
7 B
FBHC "A" C
26 B
TO FRONT BUMPER SPLICE C SEE SHEET 11
17 B
FBHC "B" B
37 B
TO HEADLAMP POD LIFT MODULE SEE SHEET 10
25 B
TO CHASSIS GROUND SEE SHEET 2
53 B
-VE POST
TO FRONT FOG LAMP RELAY SEE SHEET 11
233 B
TO BRAKE LEVEL WARNING SEE SHEET 17
255 B
TO START DROP-OUT RELAY SEE SHEET 3
270 B
TO IGNITION PWR RELAY SEE SHEET 3
254 B
TO LOW SCREENWASH FLUID SWITCH SEE SHEET 15
467 B
TO HANDBRAKE SWITCH SEE SHEET 17
287 B
TO MAIN BEAM RELAY SEE SHEET 10
266 B
TO DIP BEAM RELAY SEE SHEET 10
264 B
TO RH SIDE REPEATER (RHD) SEE SHEET 9
252 B
TO RADIO KEY-IN RELAY SEE SHEET 20
256 B
FACIA SPLICE BB
B 497
41 B
TO ABS CONTROLLER SEE SHEET 22
282 B
TO ABS CONTROLLER SEE SHEET 22
281 B
TO ABS CONTROLLER SEE SHEET 22
289 B
TO FACIA SPLICE MM SEE SHEET 20
274 B
TO FACIA SPLICE J SEE SHEET 20
B 521
RFHC 2
B 14
TO RAD FAN SPLICE B SEE SHEET 7
FACIA SPLICE T
B 260
91 B
TO FRONT FOG LAMP SWITCH SEE SHEET 11
48 B
TO MASTER LIGHTING SWITCH SEE SHEET 10
156 B
TO HRS SWITCH SEE SHEET 18
112 B
TO REAR FOG SWITCH SEE SHEET 11
35 B
TO HAZARD SWITCH SEE SHEET 9
77 B
TO SIDE LAMP SWITCH SEE SHEET 8
261 B
TO SEAT BELT SWITCH SEE SHEET 19
354 B
TO RADIO SEE SHEET 20
485 B
TO FUEL FLAP SWITCH SEE SHEET 17
295 B
TO LH WINDOW LIFT SWITCH SEE SHEET 16
294 B
TO RH WINDOW LIFT SWITCH SEE SHEET 16
404 B
TO CIGAR LIGHTER SEE SHEET 3
160 B
TO RECIRC SWITCH SEE SHEET 21
455 B
TO RECIRC SOLENOID SEE SHEET 21
505 B
SIRHC "B" C
33 B
TO DERM (SIR) SEE SHEET 23

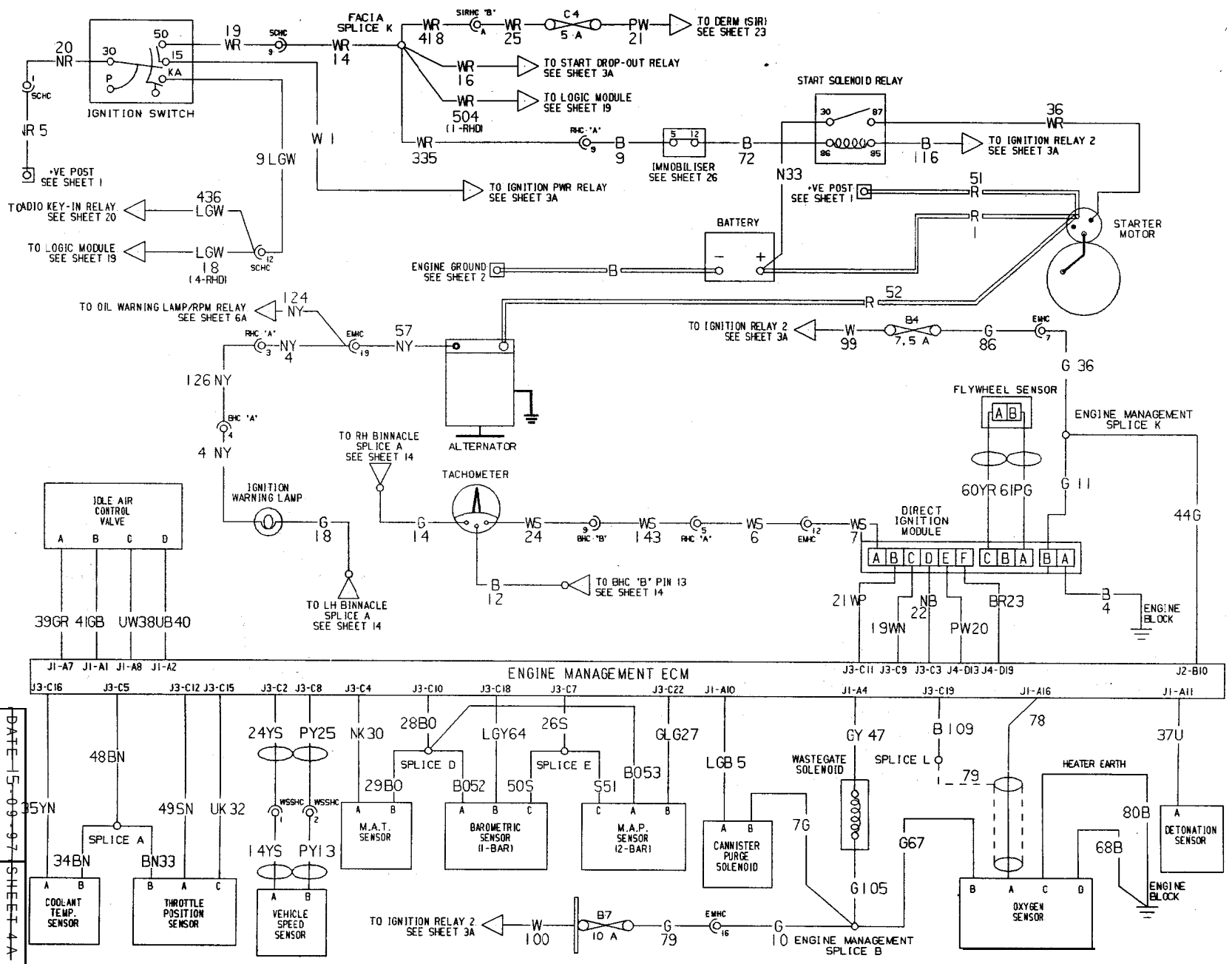

ALSO USED FOR DAYTIME RUNNING LAMPS GND SEE SHEET 10A
TO WINDOW LOGIC MODULE SEE SHEET 16
TO POD DELAY MODULE SEE SHEET 10
TO RH BINNACLE SPLICE B SEE SHEET 14
TO WASH-WIPE DELAY MODULE SEE SHEET 15
TO REAR FOG MODULE SEE SHEET 11
TO RHEOSTAT MODULE SEE SHEET 13
TO TACHOMETER/FUEL GAUGE SEE SHEET 14
TO LOW FUEL WARNING LAMP DELAY MODULE SEE SHEET 14
TO INTERIOR FAN (LHD ONLY) SEE SHEET 7
TO LOGIC MODULE SEE SHEET 19
B 437
B 273
B 275
B 263
B 109
B 461
B 185
B 290
B 258
B 277 (2-RHD)
FACIA SPLICE J
B 274
-VE POST SEE SHEET 2B

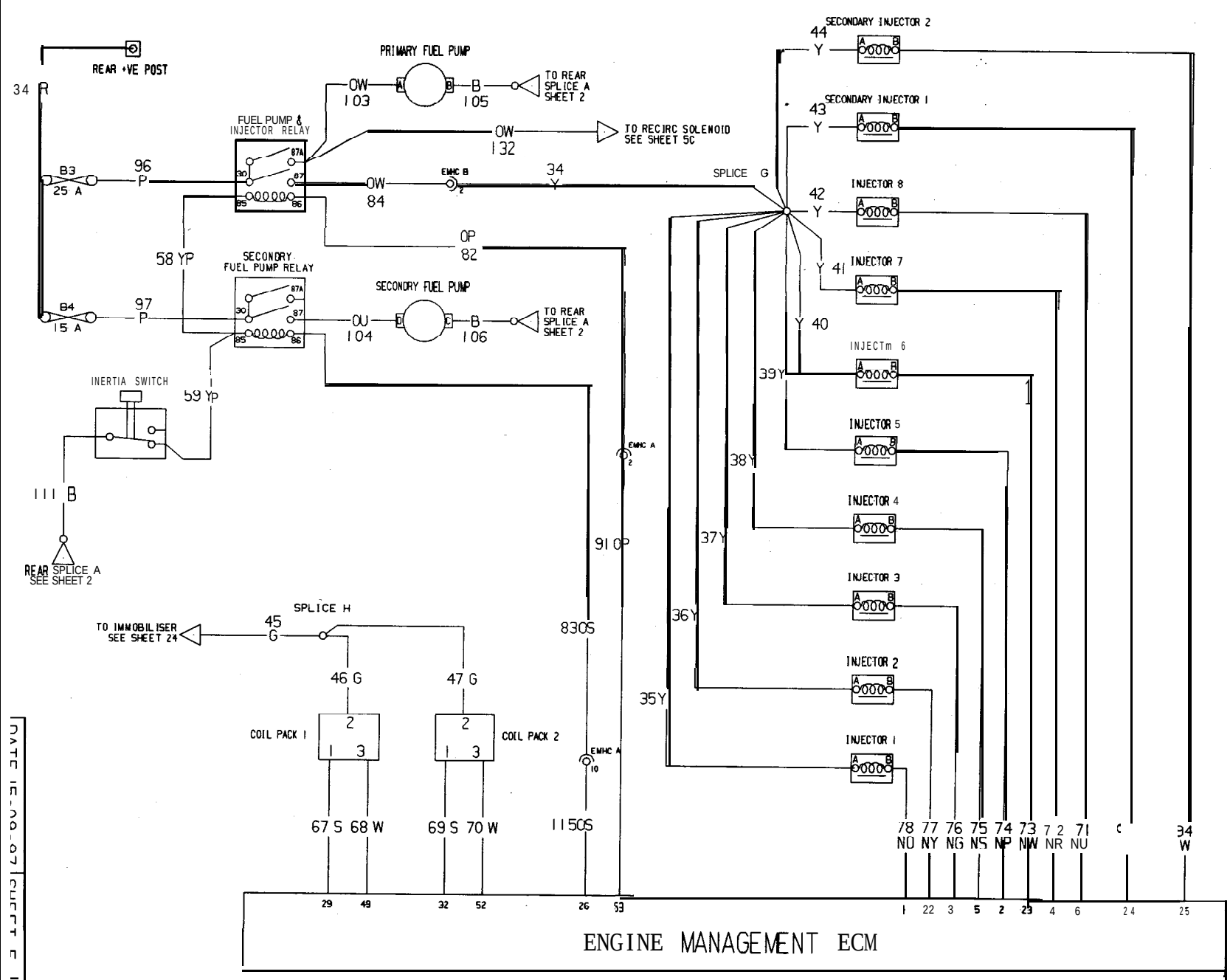

TO ALARM CONNECTOR 3
SEE SHEET 24
147
TO WIPER MOTOR
SEE SHEET 15
257
TO INTERIOR FAN (RHD ONLY)
SEE SHEET 7
258
TO HEATED REAR SCREEN -VE
SEE SHEET 18 & 18A
250
TO LH SIDE REPEATER
SEE SHEET 9
288
TO IMMOBILISER
SEE SHEET 24
248
TO INTERIOR LAMP
SEE SHEET 12
251
TO AC RADIATOR CONTROL SWITCH
SEE SHEET 7
478
TO ACU CONTROL MODULE
SEE SHEET 7
315
TO DIAGNOSTIC CONNECTOR (OBD2)
SEE SHEET 6
284
TO DIAGNOSTIC CONNECTOR (OBD2)
SEE SHEET 6
285
TO ALDL (FRONT)
SEE SHEET 6
279
TO HVAC MODULE
SEE SHEET 21
425
TO ALARM CONNECTOR 3
SEE SHEET 24
144
TO ALARM CONNECTOR 3
SEE SHEET 24
148
FACIA
SPLICE MM
289
278
330
252
TO ALARM CONNECTOR 1
SEE SHEET 25
-VE POST
SEE SHEET 2B
TO NAV SYSTEM CONNECTOR
SEE SHEET 20
TO RH SIDE REPEATER
(LHD ONLY)
SEE SHEET 9

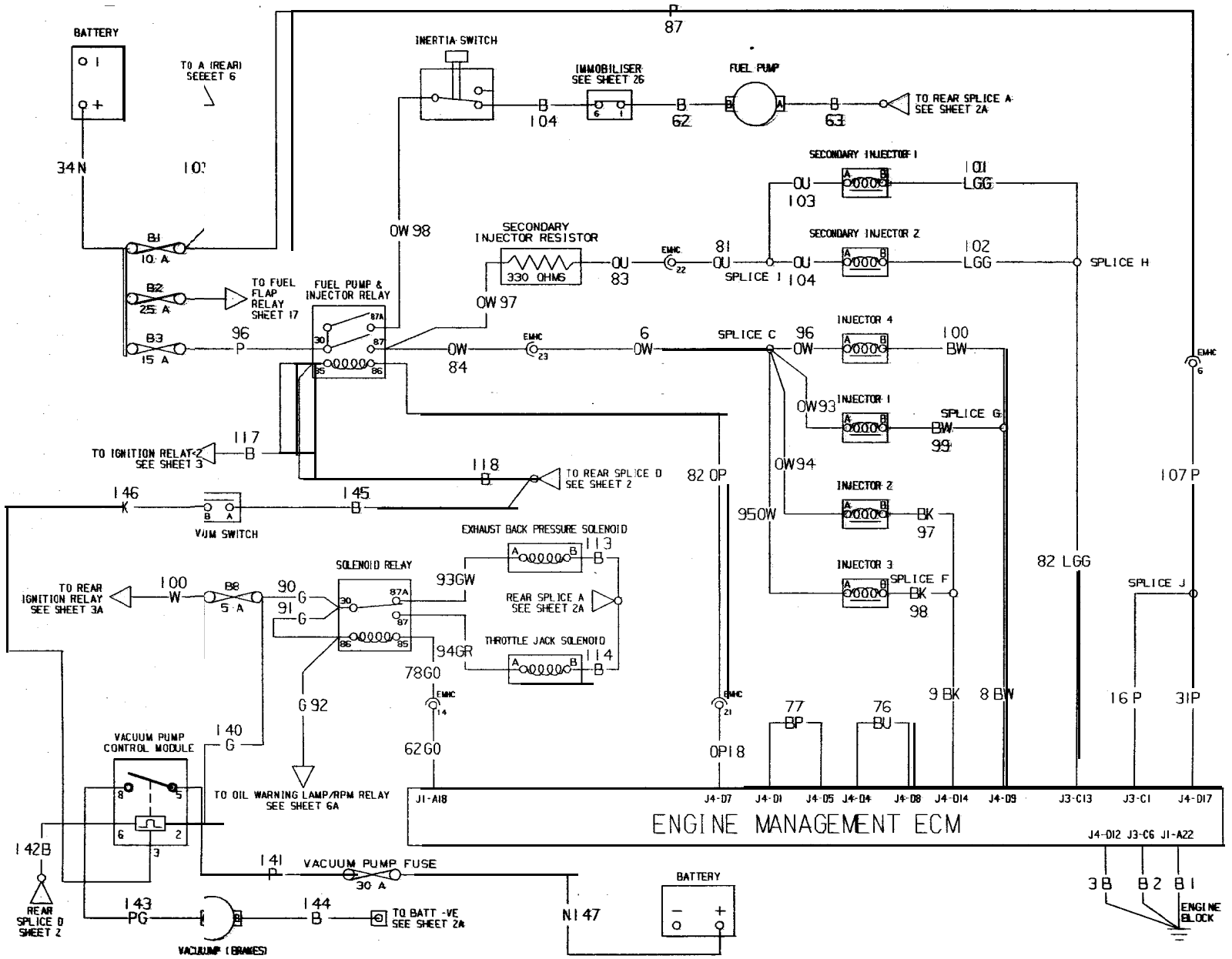

CIGAR LIGHTER
403 G
202 RB
FACIA SPLICE PP SEE SHEET 13
404 B
FACIA SPLICE T SEE SHEET 28
A7 15 A
204 W
A17 5 A
212 W
TO FACIA SPLICE V SEE SHEET 24
G 149
TO WIPER MOTOR SEE SHEET 15
G 98
TO WASHWIPE DELAY MODULE SEE SHEET 15
G 99
A20 15 A
97 W
TO ABS CONTROLLER SEE SHEET 22
G 103
A16 10 A
107 W
+VE POST SEE SHEET 1
IGNITION POWER RELAY
2 N
4 W
B 254
FACIA SPLICE BB SEE SHEET 28
W 15
SCHC
W 1
IGNITION SWITCH
20 NR
5 NR
+VE POST SEE SHEET 1
W 104
A21 5 A
G 78
FACIA SPLICE X
484 G
TO DAYTIME RUNNING LAMPS HC (LHD ONLY) SEE SHEET 10A
RHC 'A' 16
G 106
G 17
TO LH BINNACLE SPLICE A SEE SHEET 14
G 105
TO LOW FUEL DELAY MODULE SEE SHEET 14
G 511
TO LIGHTS-ON-ALARM SEE SHEET 19
G 381
TO NAVIGATOR SYS CONNECTOR SEE SHEET 20
G 49
TO MASTER LIGHTING SWITCH SEE SHEET 10
RHC 'B' 12
G 186
G 13
TO RH BINNACLE SPLICE A SEE SHEET 14
G 503 (3-RHD)
TO LOGIC MODULE SEE SHEET 19
W 135
TO HRS SWITCH SEE SHEET 18
W 54
A2 7.5 A
G 53
TO HAZARD SWITCH SEE SHEET 9
FACIA SPLICE B
W 420
SIRHS 'B' 8
W 26
C3 5 A
Y 8
TO SIR SPLICE A SEE SHEET 23
W 419
A4 5 A
WO 421
FACIA SPLICE L SHEET 21
BATTERY
W 150
101 R
REAR IGNITION RELAY
100 W
85 15 A
86 B (104-GT3)
TO IMMOBILISER SEE SHEET 24
86 10 A
79 G
EMHC A 6
31 G
TO SPLICE F SEE SHEET 5D
87 7.5A
G 133
TO SPLICE J SEE SHEET 5D
G 65
TO REAR SPLICE B SEE SHEET 5C
88 10 A
G 89
TO AC COMPRESSOR RELAY SEE SHEET 7
G 10
TO REVERSE LAMP SWITCH SEE SHEET 11
RHC 'A' 4
W 1
B 117
TO REAR SPLICE A SEE SHEET 2
B 116
TO STARTER RELAY SEE SHEET 4
START DROP-OUT RELAY
RHD ONLY
28 W
GK 517
351 GK
A8 15 A
YLG 24
TO FAN SPEED SWITCH SEE SHEET 7
FACIA SPLICE M (LHD ONLY)
FACIA SPLICE K SEE SHEET 4
WR 16
270 B
FACIA SPLICE BB SEE SHEET 28
GK 516
TO DAYTIME RUNNING LAMP HC (LHD ONLY) SEE SHEET 10A

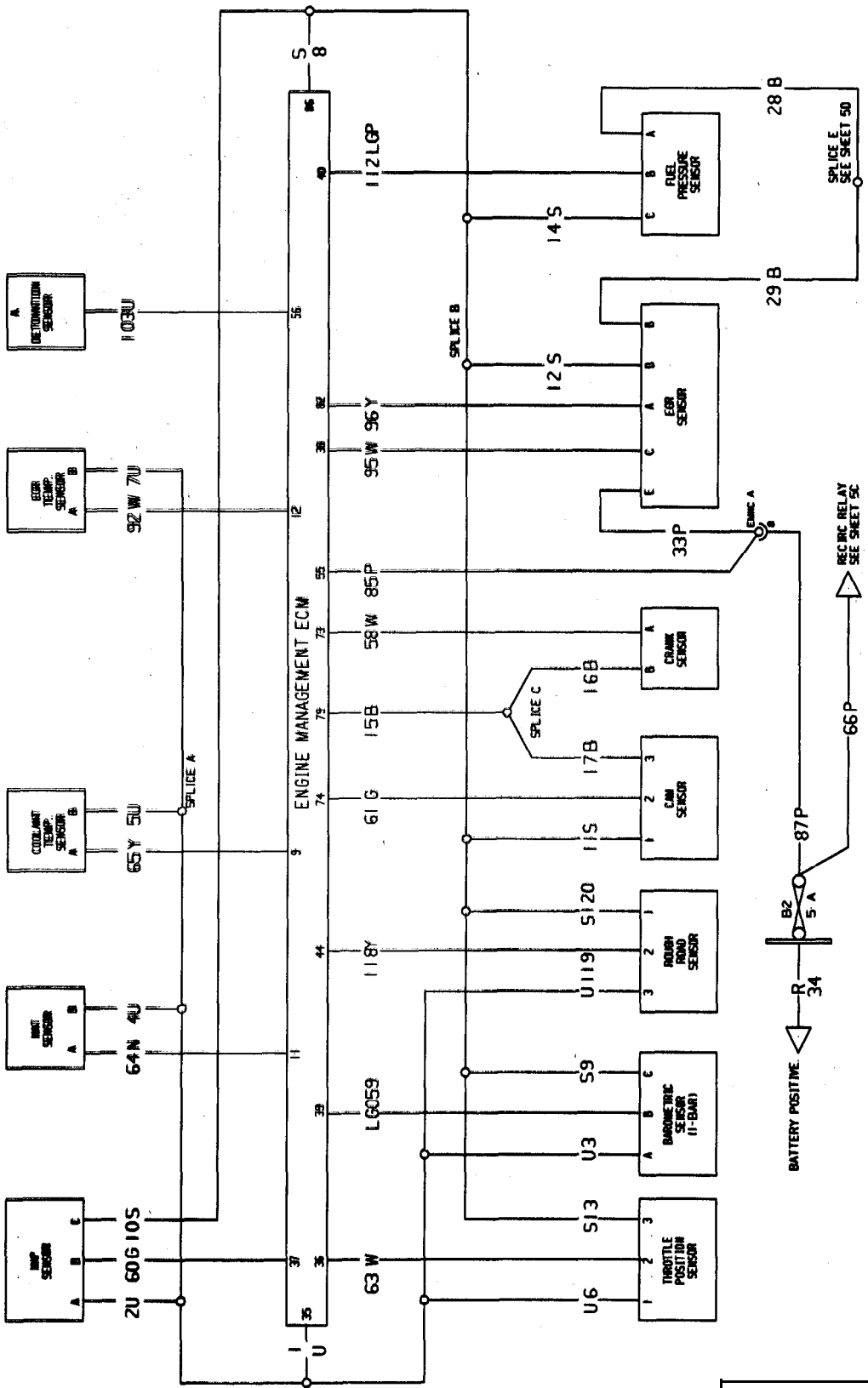

CIGAR LIGHTER
403 G
202 RB
FACIA SPLICE PP SEE SHEET 13
404 B
FACIA SPLICE T SEE SHEET 28
A7 15 A
204 W
TO FACIA SPLICE V SEE SHEET 24
G 149
A17 5 A
212 W
TO WIPER MOTOR SEE SHEET 15
G 98
TO H-WIPE DELAY MODULE SEE SHEET 15
G 99
A20 15 A
97 W
TO ABS CONTROLLER SEE SHEET 22
G 103
A16 10 A
107 W
+VE POST SEE SHEET 1
IGNITION POWER RELAY
2 N
30 87 85 86
4 W
B 254
FACIA SPLICE BB SEE SHEET 28
W 104
A21 5 A
G 78
FACIA SPLICE X
484 G
TO DAYTIME RUNNING LAMPS HC (LHD ONLY) SEE SHEET 10A
BHC 'A' 16
G 106
G 17
TO LH BINNACLE SPLICE A SEE SHEET 14
G 105
TO LOW FUEL DELAY MODULE SEE SHEET 14
G 511
TO LIGHTS-ON-ALARM SEE SHEET 19
G 381
TO NAVIGATOR SYS CONNECTOR SEE SHEET 20
G 49
TO MASTER LIGHTING SWITCH SEE SHEET 10
BHC 'B' 12
G 186
G 13
TO RH BINNACLE SPLICE A SEE SHEET 14
G 503 (3-RHD)
TO LOGIC MODULE SEE SHEET 19
W 135
TO HRS SWITCH SEE SHEET 18
W 54
A2 7.5 A
G 53
TO HAZARD SWITCH SEE SHEET 9
FACIA SPLICE B
W 420
SIRHC 'B' 8
W 26
C3 5 A
Y 8
TO SIR SPLICE A SEE SHEET 23
W 419
A4 5 A
WO 421
FACIA SPLICE L SHEET 21
B5 10 A
89 G
TO AC COMPRESSOR RELAY SEE SHEET 7A
B6 7.5 A
66 G
TO VACUUM PUMP SEE SHEET 11A
67 G
TO REVERSE LAMP SWITCH SEE SHEET 11A
B7 10 A
79 G
EMHC 16
10 G
TO ENGINE MANAGEMENT SPLICE B SEE SHEET 4A
B8 5 A
90 G
TO SOLENOID RELAY SEE SHEET 5A
140 G
TO VACUUM PUMP CONT MODULE SEE SHEET 5A
B4 7.5 A
86 G
EMHC 7
36 G
TO ENGINE MANAGEMENT SPLICE K SEE SHEET 4A
W15
SCHC 2
W1
BATTERY
0 1
0 +
W 150
101 R
REAR IGNITION RELAY
100 W
99 W
RHC 'A' 4
W 1
B 117
TO FUEL PUMP & INJECTOR RELAY SEE SHEET 5A
B 116
TO START SOLENOID RELAY SEE SHEET 4A
50 15 KA 30 R
IGNITION SWITCH
START DROP-OUT RELAY
RHD ONLY
28 W
GK 517
GK 351
A8 15 A
YLG 24
TO FAN SPEED SWITCH SEE SHEET 7
FACIA SPLICE M (LHD ONLY)
FACIA SPLICE K SEE SHEET 4A
WR 16
270 B
FACIA SPLICE BB SEE SHEET 28
GK 516
TO DAYTIME RUNNING LAMP HC (LHD ONLY) SEE SHEET 10A
20 NR
SCHC 1
5 NR
+VE POST SEE SHEET 1

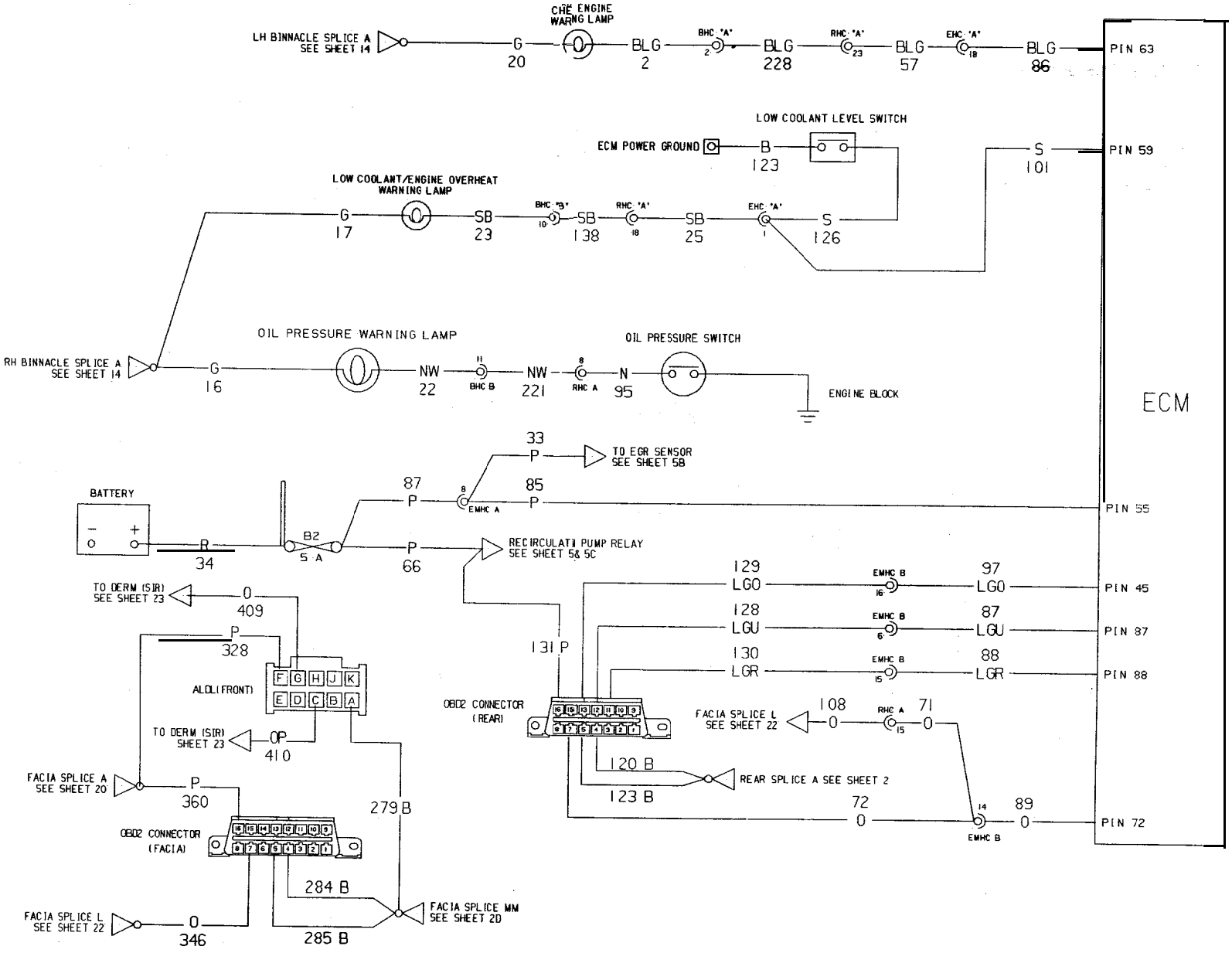

IGNITION SWITCH
50
30
15
KA
P
20 NR
19 WR
SCHC
FACIA SPLICE K
WR 14
WR 418
SIRHC 'B'
WR 25
C4
5 A
PW 21
TO DERM (SIR) SEE SHEET 23
WR 16
TO START DROP-OUT RELAY SEE SHEET 3
WR 504 (1-RHD)
TO LOGIC MODULE SEE SHEET 19
WR 335
RHC 'A'
B 9
5 12
IMMOBILISER SEE SHEET 26
B 140
START SOLENOID RELAY
87A
87
85
86
30
36 WR
SHC
2 WR
B 116
TO REAR IGNITION RELAY SEE SHEET 3
R33
NR 5
+VE POST SEE SHEET 1
W 1
9 LGW
TO IGNITION PWR RLY SEE SHEET 3
436 LGW
TO RADIO KEY-IN RELAY SEE SHEET 20
LGW 18 (4-RHD)
TO LOGIC MODULE SEE SHEET 19
SCHC
BATTERY
CHASSIS GROUND SEE SHEET 2
53 B
I R
STARTER MOTOR
R 52
RHC 'A'
NY 4
126 NY
BHC 'A'
4 NY
TO RH BINNACLE SPLICE A SEE SHEET 14
ALTERNATOR
REAR + POST
+VE POST (A POST)
IGNITION WARNING LAMP
TACHOMETER
G 18
G 14
WS 24
BHC 'B'
WS 143
RHC 'A'
WS 6
EMHC 8
WS 102
ECM PIN 58
B 12
TO BHC 'B' PIN 13 SEE SHEET 14
TO LH BINNACLE SPLICE A SEE SHEET 14

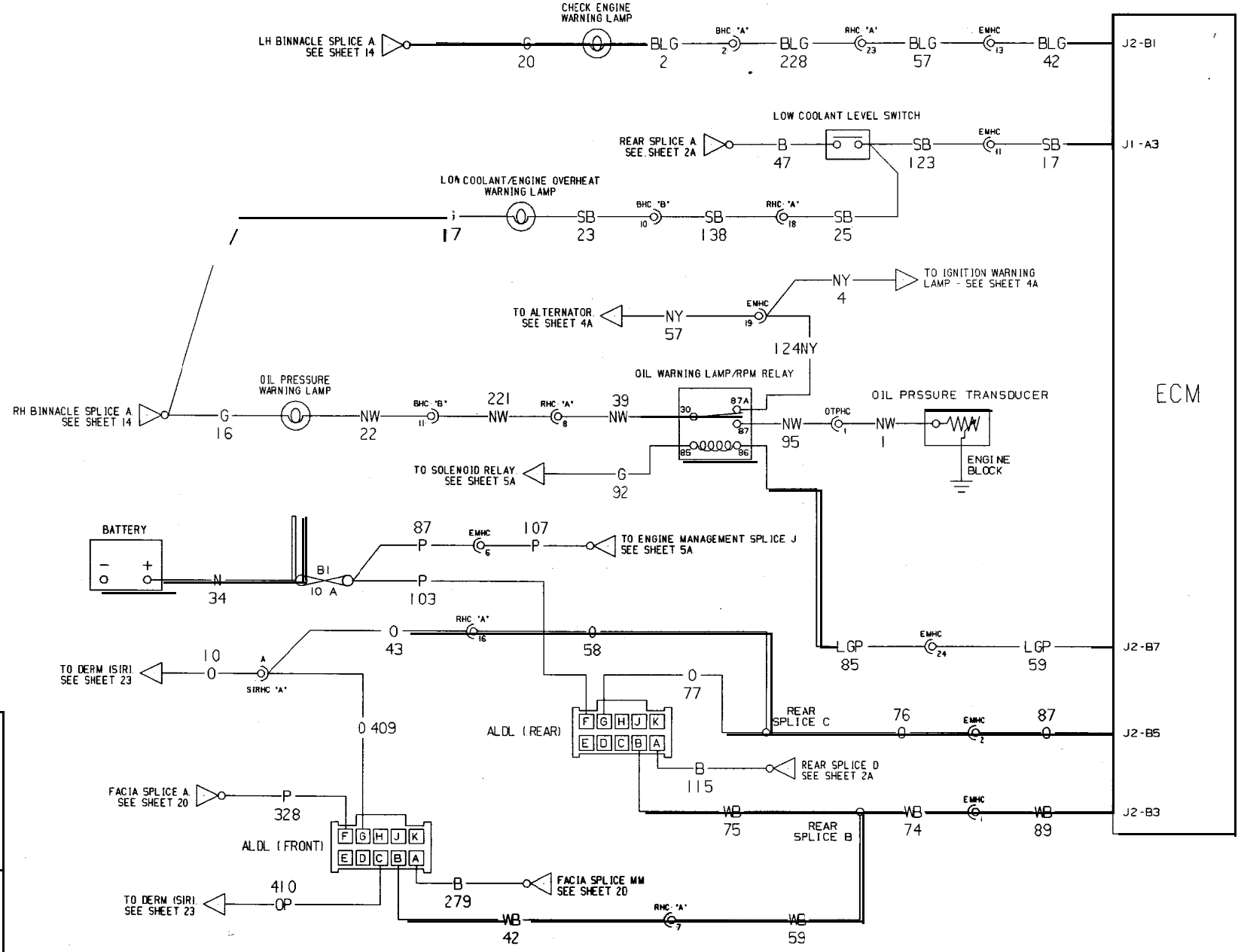

IGNITION SWITCH
FACIA SPLICE K
TO DERM (SIR) SEE SHEET 23
TO START DROP-OUT RELAY SEE SHEET 3A
TO LOGIC MODULE SEE SHEET 19
START SOLENOID RELAY
TO IGNITION RELAY 2 SEE SHEET 3A
IMMOBILISER SEE SHEET 26
+VE POST SEE SHEET 1
TO IGNITION PWR RELAY SEE SHEET 3A
TO RADIO KEY-IN RELAY SEE SHEET 20
TO LOGIC MODULE SEE SHEET 19
BATTERY
STARTER MOTOR
ENGINE GROUND SEE SHEET 2
TO OIL WARNING LAMP/RPM RELAY SEE SHEET 6A
ALTERNATOR
FLYWHEEL SENSOR
ENGINE MANAGEMENT SPLICE K
IDLE AIR CONTROL VALVE
IGNITION WARNING LAMP
TO RH BINNACLE SPLICE A SEE SHEET 14
TACHOMETER
TO BHC 'B' PIN 13 SEE SHEET 14
TO LH BINNACLE SPLICE A SEE SHEET 14
DIRECT IGNITION MODULE
ENGINE BLOCK
ENGINE MANAGEMENT ECM
SPLICE D
SPLICE E
SPLICE A
SPLICE L
WASTEGATE SOLENOID
HEATER EARTH
M.A.T. SENSOR
BAROMETRIC SENSOR (1-BAR)
M.A.P. SENSOR (2-BAR)
CANNISTER PURGE SOLENOID
DETONATION SENSOR
COOLANT TEMP. SENSOR
THROTTLE POSITION SENSOR
VEHICLE SPEED SENSOR
OXYGEN SENSOR
TO IGNITION RELAY 2 SEE SHEET 3A
ENGINE MANAGEMENT SPLICE B

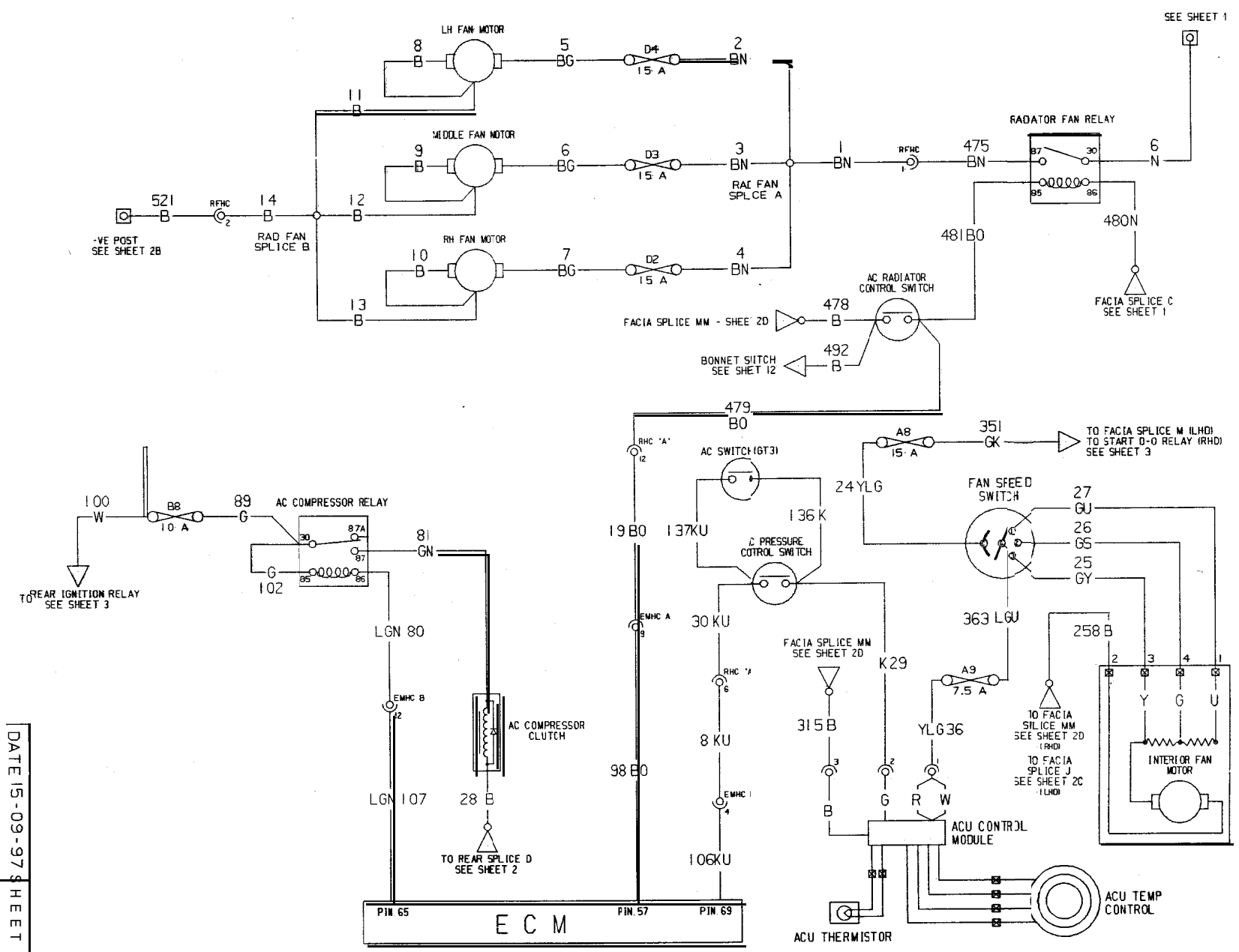

REAR +VE POST
34 R
PRIMARY FUEL PUMP
OW 103
B 105
TO REAR SPLICE A SHEET 2
FUEL PUMP & INJECTOR RELAY
OW 132
TO RECIRC SOLENOID SEE SHEET 5C
B3 25 A
96 P
87A 30 87 85 86
EMHC B 2
34 Y
OW 84
SPLICE G
SECONDARY INJECTOR 2
44 Y
SECONDARY INJECTOR 1
43 Y
INJECTOR 8
42 Y
INJECTOR 7
41 Y
INJECTOR 6
40 Y
INJECTOR 5
39 Y
INJECTOR 4
38 Y
INJECTOR 3
37 Y
INJECTOR 2
36 Y
INJECTOR 1
35 Y
0P 82
58 YP
SECONDRY FUEL PUMP RELAY
SECONDRY FUEL PUMP
B4 15 A
97 P
OU 104
B 106
TO REAR SPLICE A SHEET 2
INERTIA SWITCH
59 YP
EMHC A 2
111 B
REAR SPLICE A SEE SHEET 2
910P
SPLICE H
TO IMMOBILISER SEE SHEET 24
45 G
830S
46 G
47 G
COIL PACK 1
COIL PACK 2
2 1 3
EMHC A 10
67 S 68 W
69 S 70 W
1150S
78 NO 77 NY 76 NG 75 NS 74 NP 73 NW 72 NR 71 NU
34 W
29 49 32 52 26 53
1 22 3 5 2 23 4 6 24 25
ENGINE MANAGEMENT ECM

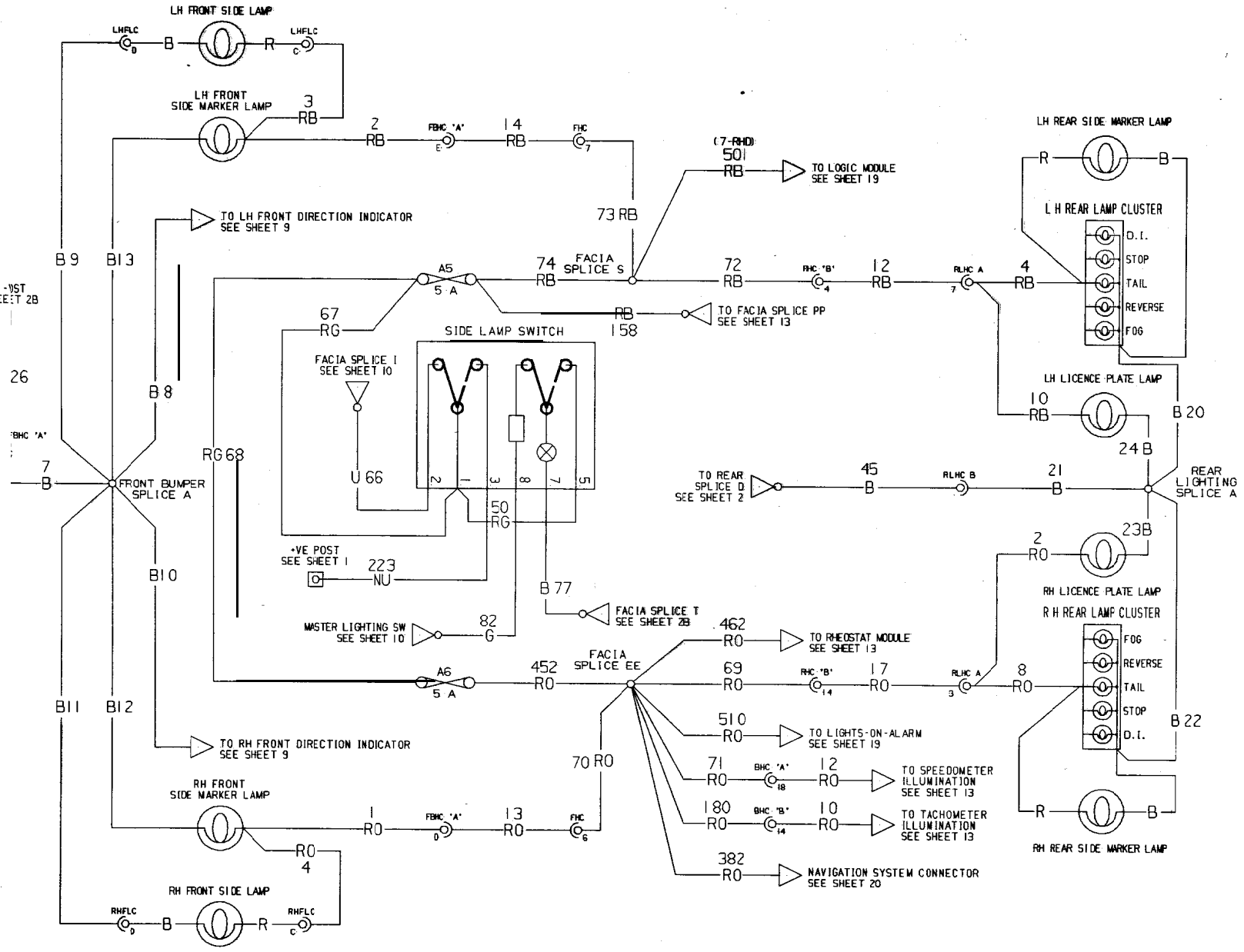

BATTERY
TO A (REAR) SEEEET 6
INERTIA SWITCH
IMMOBILISER SEE SHEET 26
FUEL PUMP
TO REAR SPLICE A SEE SHEET 2A
87
104
62
63
34N
10?
SECONDARY INJECTOR 1
SECONDARY INJECTOR 2
SECONDARY INJECTOR RESISTOR
330 OHMS
SPLICE H
SPLICE I
SPLICE C
SPLICE G
SPLICE F
SPLICE J
B1 10 A
B2 25 A
B3 15 A
TO FUEL FLAP RELAY SHEET 17
FUEL PUMP & INJECTOR RELAY
OW 98
OW 97
OW 84
OW 93
OW 94
950W
82 OP
82 LGG
107 P
INJECTOR 4
INJECTOR 1
INJECTOR 2
INJECTOR 3
TO IGNITION RELAY SEE SHEET 3
TO REAR SPLICE D SEE SHEET 2
VUM SWITCH
EXHAUST BACK PRESSURE SOLENOID
SOLENOID RELAY
TO REAR IGNITION RELAY SEE SHEET 3A
REAR SPLICE A SEE SHEET 2A
THROTTLE JACK SOLENOID
93GW
94GR
78GO
62GO
0P18
9 BK
8 BW
16 P
31P
VACUUM PUMP CONTROL MODULE
TO OIL WARNING LAMP/RPM RELAY SEE SHEET 6A
ENGINE MANAGEMENT ECM
J1-A18
J4-D7
J4-D1
J4-D5
J4-D4
J4-D8
J4-D14
J4-D9
J3-C13
J3-C1
J4-D17
J4-D12 J3-C6 J1-A22
VACUUM PUMP FUSE
30 A
TO BATT -VE SEE SHEET 2A
VACUUM (BRAKES)
REAR SPLICE D SHEET 2
BATTERY
ENGINE BLOCK

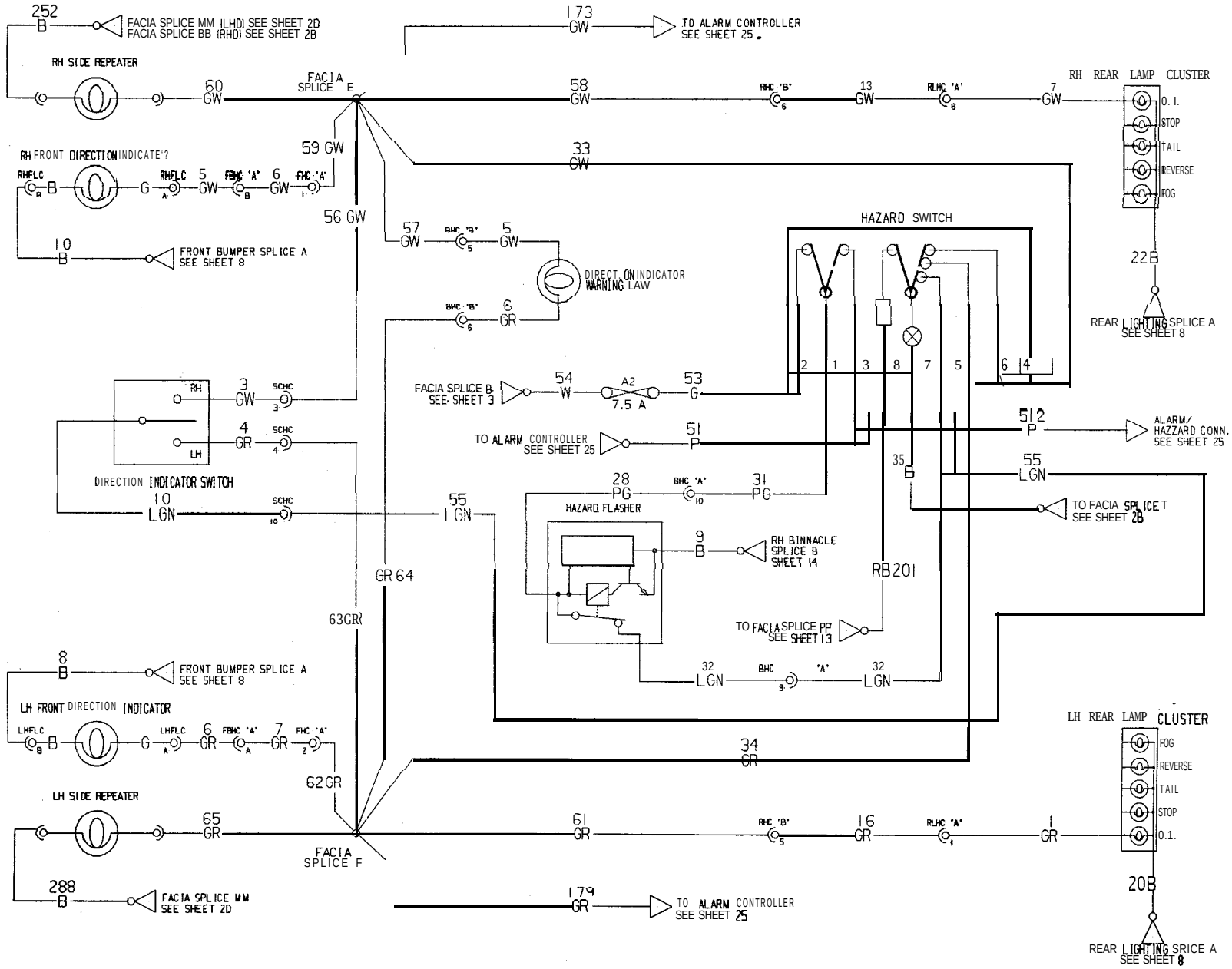

ENGINE MANAGEMENT ECM
KNOCK SENSOR
EGR TEMP. SENSOR
COOLANT TEMP. SENSOR
MAP SENSOR
FUEL PRESSURE SENSOR
EGR SENSOR
CRANK SENSOR
CAM SENSOR
ROUGH ROAD SENSOR
BAROMETRIC SENSOR (1-BAR)
THROTTLE POSITION SENSOR
SPLICE A
SPLICE B
SPLICE C
SPLICE E SEE SHEET 50
RECIRC RELAY SEE SHEET 5C
BATTERY POSITIVE

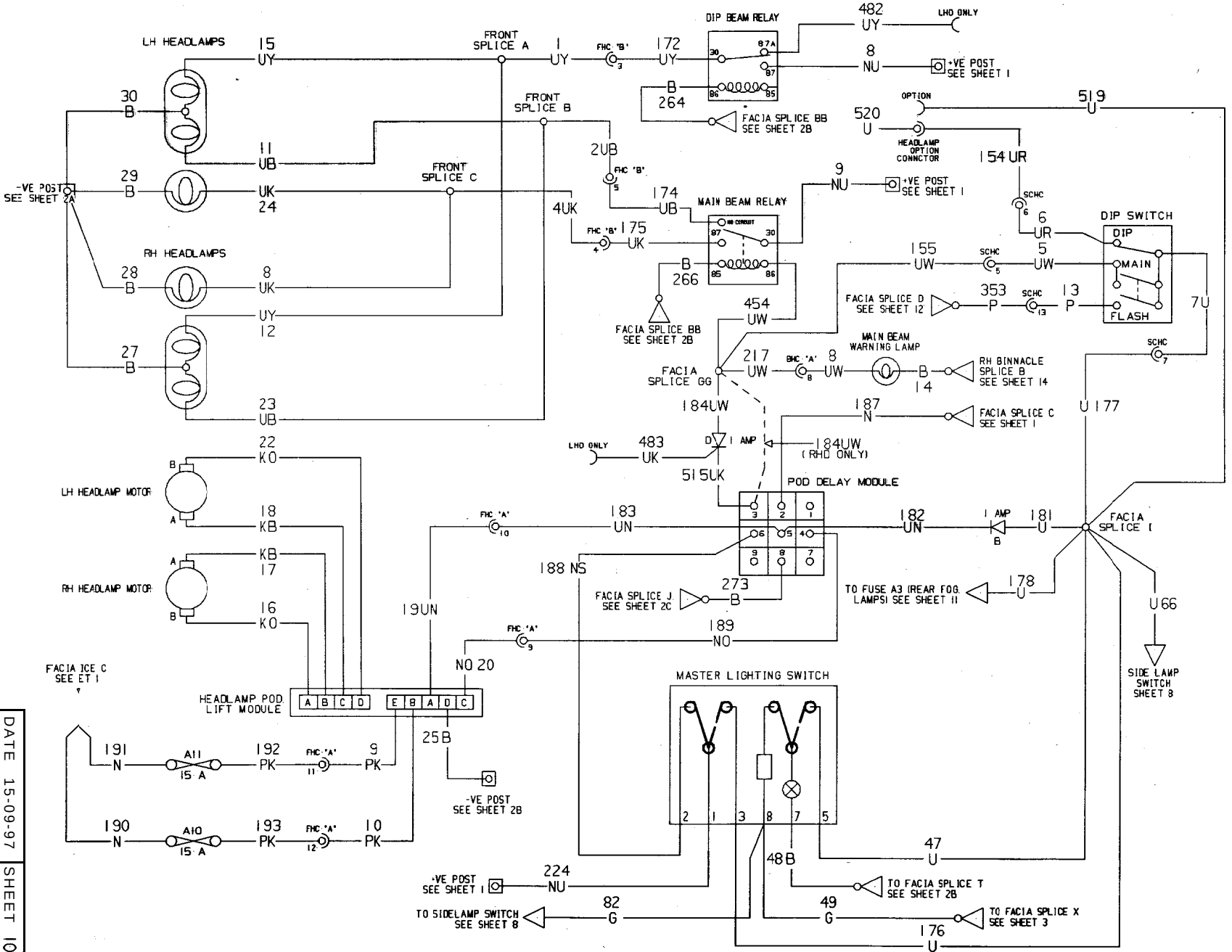

CHECK ENGINE WARNING LAMP
LH BINNACLE SPLICE A SEE SHEET 14
G 20
BLG 2
BHC "A" 2
BLG 228
RHC "A" 23
BLG 57
EHC "A" 18
BLG 86
PIN 63
LOW COOLANT LEVEL SWITCH
ECM POWER GROUND
B 123
S 101
PIN 59
LOW COOLANT/ENGINE OVERHEAT WARNING LAMP
G 17
SB 23
BHC "B" 10
SB 138
RHC "A" 18
SB 25
EHC "A" 1
S 126
OIL PRESSURE WARNING LAMP
OIL PRESSURE SWITCH
RH BINNACLE SPLICE A SEE SHEET 14
G 16
NW 22
BHC B 11
NW 221
RHC A 8
N 95
ENGINE BLOCK
ECM
33 P
TO EGR SENSOR SEE SHEET 5B
BATTERY
87 P
EMHC A 8
85 P
PIN 55
R 34
B2 5 A
P 66
RECIRCULATN PUMP RELAY SEE SHEET 5& 5C
TO DERM (SIR) SEE SHEET 23
O 409
P 328
ALDL(FRONT)
F G H J K
E D C B A
131 P
129 LGO
EMHC B 16
97 LGO
PIN 45
128 LGU
EMHC B 6
87 LGU
PIN 87
130 LGR
EMHC B 15
88 LGR
PIN 88
OBD2 CONNECTOR (REAR)
FACIA SPLICE L SEE SHEET 22
108 O
RHC A 15
71 O
TO DERM (SIR) SHEET 23
OP 410
120 B
REAR SPLICE A SEE SHEET 2
123 B
FACIA SPLICE A SEE SHEET 20
P 360
279 B
72 O
EMHC B 14
89 O
PIN 72
OBD2 CONNECTOR (FACIA)
284 B
FACIA SPLICE MM SEE SHEET 2D
FACIA SPLICE L SEE SHEET 22
O 346
285 B

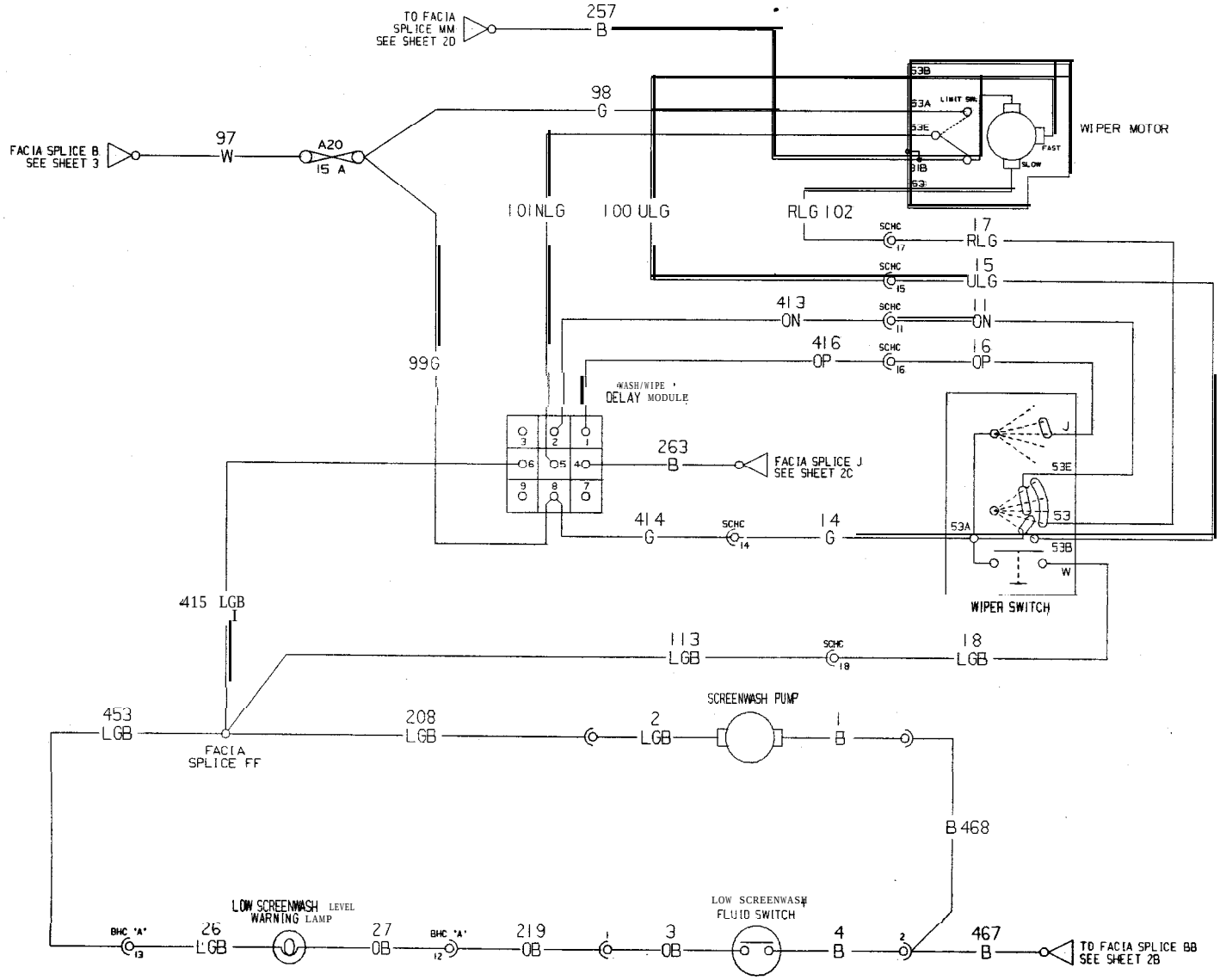

CHECK ENGINE WARNING LAMP
LH BINNACLE SPLICE A SEE SHEET 14
G 20
BLG 2
BHC "A" 2
BLG 228
RHC "A" 23
BLG 57
EMHC 13
BLG 42
J2-B1
LOW COOLANT LEVEL SWITCH
REAR SPLICE A SEE SHEET 2A
B 47
SB 123
EMHC 11
SB 17
J1-A3
LOW COOLANT/ENGINE OVERHEAT WARNING LAMP
17
SB 23
BHC "B" 10
SB 138
RHC "A" 18
SB 25
TO IGNITION WARNING LAMP - SEE SHEET 4A
NY 4
TO ALTERNATOR SEE SHEET 4A
NY 57
EMHC 19
124NY
OIL PRESSURE WARNING LAMP
OIL WARNING LAMP/RPM RELAY
OIL PRSSURE TRANSDUCER
ECM
RH BINNACLE SPLICE A SEE SHEET 14
G 16
NW 22
BHC "B" 11
221 NW
RHC "A" 8
39 NW
30
87A
87
85
86
NW 95
OTPHC 1
NW 1
ENGINE BLOCK
TO SOLENOID RELAY SEE SHEET 5A
G 92
BATTERY
N 34
B1
10 A
87 P
EMHC 6
107 P
TO ENGINE MANAGEMENT SPLICE J SEE SHEET 5A
P 103
RHC "A" 16
0 43
0 58
LGP 85
EMHC 24
LGP 59
J2-B7
TO DERM (SIR) SEE SHEET 23
10 O
A
SIRHC "A"
0 409
0 77
ALDL (REAR)
F G H J K
E D C B A
REAR SPLICE C
76 0
EMHC 2
87 0
J2-B5
B 115
REAR SPLICE D SEE SHEET 2A
FACIA SPLICE A SEE SHEET 20
P 328
ALDL (FRONT)
F G H J K
E D C B A
WB 75
REAR SPLICE B
WB 74
EMHC 1
WB 89
J2-B3
410 OP
TO DERM (SIR) SEE SHEET 23
B 279
FACIA SPLICE MM SEE SHEET 20
WB 42
RHC "A" 7
WB 59

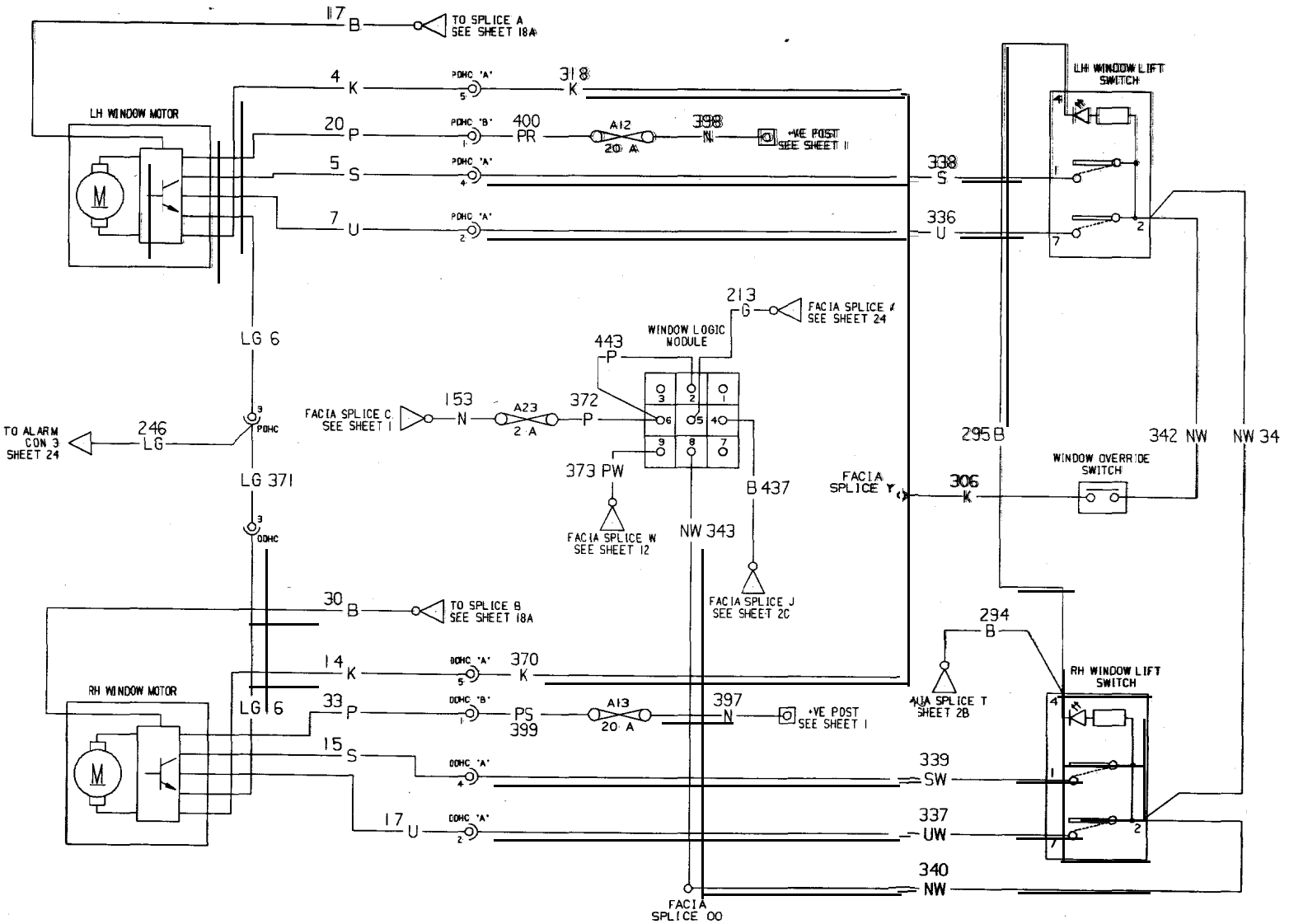

SEE SHEET 1
LH FAN MOTOR
MIDDLE FAN MOTOR
RH FAN MOTOR
RAD FAN SPLICE A
RAD FAN SPLICE B
RADIATOR FAN RELAY
-VE POST SEE SHEET 2B
RFHC
475 BN
481 BO
480 N
FACIA SPLICE C SEE SHEET 1
AC RADIATOR CONTROL SWITCH
FACIA SPLICE MM - SHEET 2D
BONNET SWITCH SEE SHEET 12
479 BO
AC SWITCH (GT3)
AC PRESSURE CONTROL SWITCH
TO FACIA SPLICE M (LHD) TO START D-O RELAY (RHD) SEE SHEET 3
FAN SPEED SWITCH
AC COMPRESSOR RELAY
TO REAR IGNITION RELAY SEE SHEET 3
AC COMPRESSOR CLUTCH
TO REAR SPLICE D SEE SHEET 2
FACIA SPLICE MM SEE SHEET 2D
ACU CONTROL MODULE
ACU THERMISTOR
ACU TEMP CONTROL
INTERIOR FAN MOTOR
TO FACIA SILICE MM SEE SHEET 2D (RHD)
TO FACIA SPLICE J SEE SHEET 2C (LHD)
PIN 65
PIN 57
PIN 69
E C M

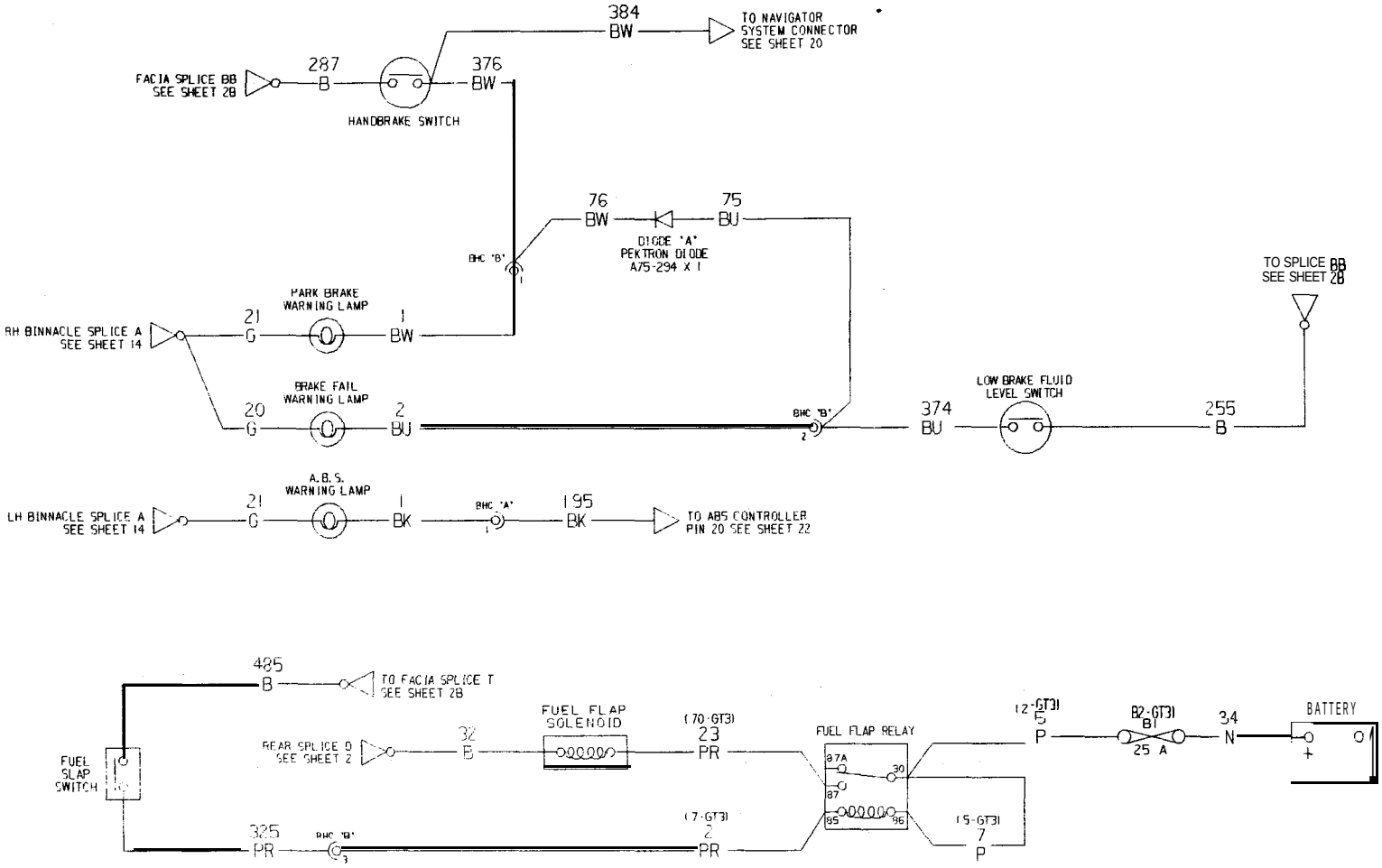

LH FRONT SIDE LAMP
LHFLC
B
R
LHFLC
LH FRONT SIDE MARKER LAMP
3 RB
2 RB
FBHC 'A'
14 RB
FHC
(7-RHD) 501 RB
TO LOGIC MODULE SEE SHEET 19
LH REAR SIDE MARKER LAMP
LH REAR LAMP CLUSTER
D.I.
STOP
TAIL
REVERSE
FOG
TO LH FRONT DIRECTION INDICATOR SEE SHEET 9
73 RB
B9
B13
A5
5 A
74 RB
FACIA SPLICE S
72 RB
RHC 'B'
12 RB
RLHC A
4 RB
TO FACIA SPLICE PP SEE SHEET 13
158 RB
67 RG
SIDE LAMP SWITCH
FACIA SPLICE I SEE SHEET 10
LH LICENCE PLATE LAMP
10 RB
B20
24B
26
B8
U66
50 RG
RG68
TO REAR SPLICE D SEE SHEET 2
45 B
RLHC B
21 B
REAR LIGHTING SPLICE A
FRONT BUMPER SPLICE A
+VE POST SEE SHEET 1
223 NU
B10
B77
FACIA SPLICE T SEE SHEET 28
2 RO
23B
RH LICENCE PLATE LAMP
RH REAR LAMP CLUSTER
MASTER LIGHTING SW SEE SHEET 10
82 G
462 RO
TO RHEOSTAT MODULE SEE SHEET 13
FACIA SPLICE EE
A6
5 A
452 RO
69 RO
17 RO
8 RO
B11
B12
510 RO
TO LIGHTS-ON-ALARM SEE SHEET 19
B22
TO RH FRONT DIRECTION INDICATOR SEE SHEET 9
70 RO
71 RO
12 RO
TO SPEEDOMETER ILLUMINATION SEE SHEET 13
180 RO
10 RO
TO TACHOMETER ILLUMINATION SEE SHEET 13
RH FRONT SIDE MARKER LAMP
1 RO
13 RO
FHC
RO 4
382 RO
NAVIGATION SYSTEM CONNECTOR SEE SHEET 20
RH FRONT SIDE LAMP
RHFLC
RHFLC

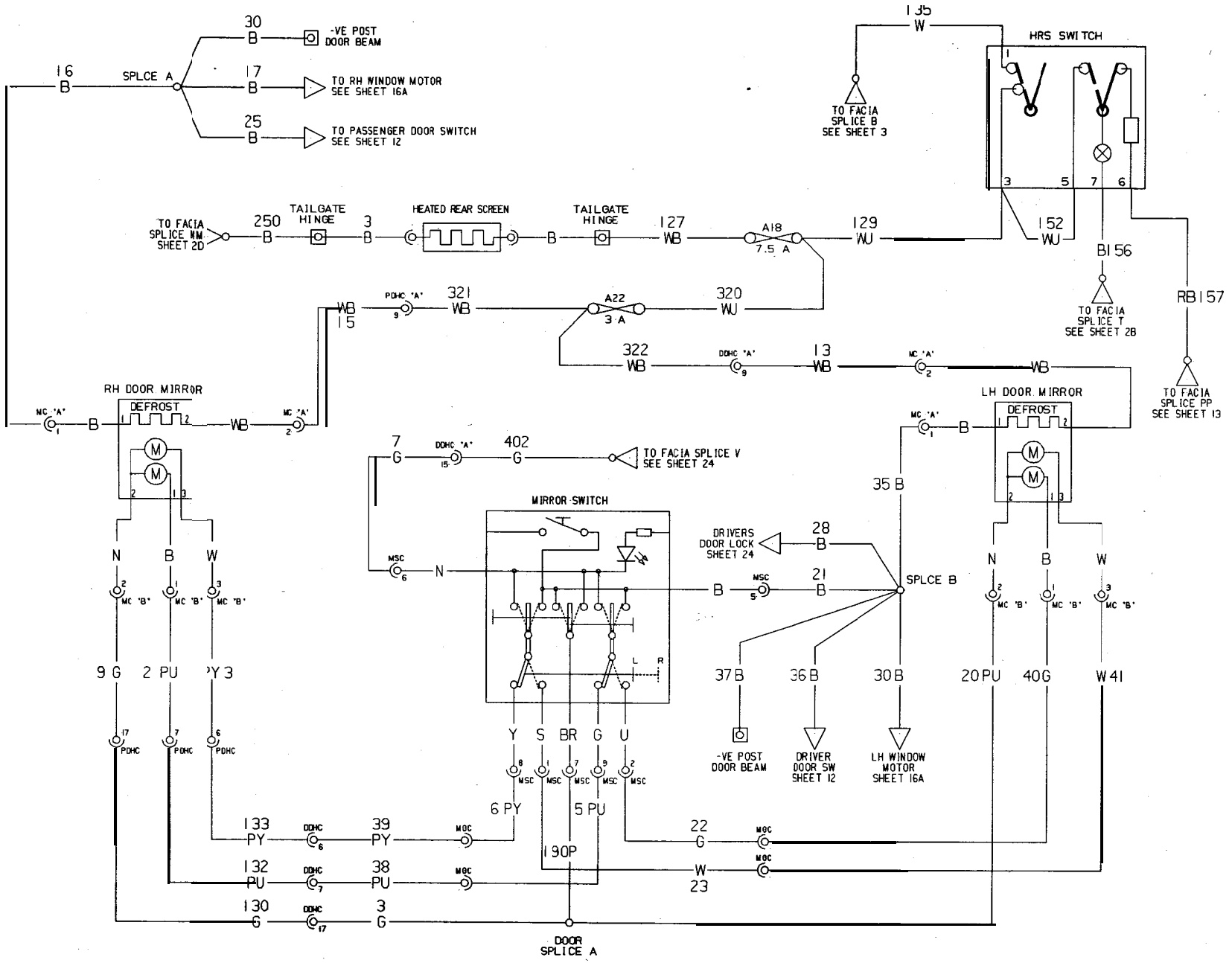

252 B
FACIA SPLICE MM (LHD) SEE SHEET 2D
FACIA SPLICE BB (RHD) SEE SHEET 2B
RH SIDE REPEATER
60 GW
FACIA SPLICE E
173 GW
TO ALARM CONTROLLER SEE SHEET 25
58 GW
RHC 'B' 6
13 GW
RLHC 'A' 8
7 GW
RH REAR LAMP CLUSTER
O. I.
STOP
TAIL
REVERSE
FOG
RH FRONT DIRECTION INDICATE'?
RHFLC B
RHFLC A
5 GW
FBHC 'A' B
6 GW
FHC 'A' 1
59 GW
33 GW
56 GW
10 B
FRONT BUMPER SPLICE A SEE SHEET 8
57 GW
RHC 'B' 5
5 GW
DIRECT. ON INDICATOR WARNING LAW
BHC 'B' 6
6 GR
HAZARD SWITCH
22B
REAR LIGHTING SPLICE A SEE SHEET 8
2 1 3 8 7 5 6 4
FACIA SPLICE B SEE SHEET 3
54 W
A2 7.5 A
53 G
RH
3 GW
SCHC 3
LH
4 GR
SCHC 4
DIRECTION INDICATOR SWITCH
TO ALARM CONTROLLER SEE SHEET 25
51 P
512 P
ALARM/ HAZZARD CONN. SEE SHEET 25
35 B
55 LGN
TO FACIA SPLICE T SEE SHEET 2B
28 PG
BHC 'A' 10
31 PG
HAZARD FLASHER
10 LGN
SCHC 10
55 LGN
9 B
RH BINNACLE SPLICE B SHEET 14
RB201
GR 64
63GR
TO FACIA SPLICE PP SEE SHEET 13
32 LGN
BHC 'A' 9
32 LGN
8 B
FRONT BUMPER SPLICE A SEE SHEET 8
LH FRONT DIRECTION INDICATOR
LHFLC B
LHFLC A
6 GR
FBHC 'A' A
7 GR
FHC 'A' 2
34 GR
LH REAR LAMP CLUSTER
FOG
REVERSE
TAIL
STOP
O.I.
62GR
LH SIDE REPEATER
65 GR
61 GR
RHC 'B' 5
16 GR
RLHC 'A' 1
1 GR
FACIA SPLICE F
20B
REAR LIGHTING SRICE A SEE SHEET 8
288 B
FACIA SPLICE MM SEE SHEET 2D
179 GR
TO ALARM CONTROLLER SEE SHEET 25

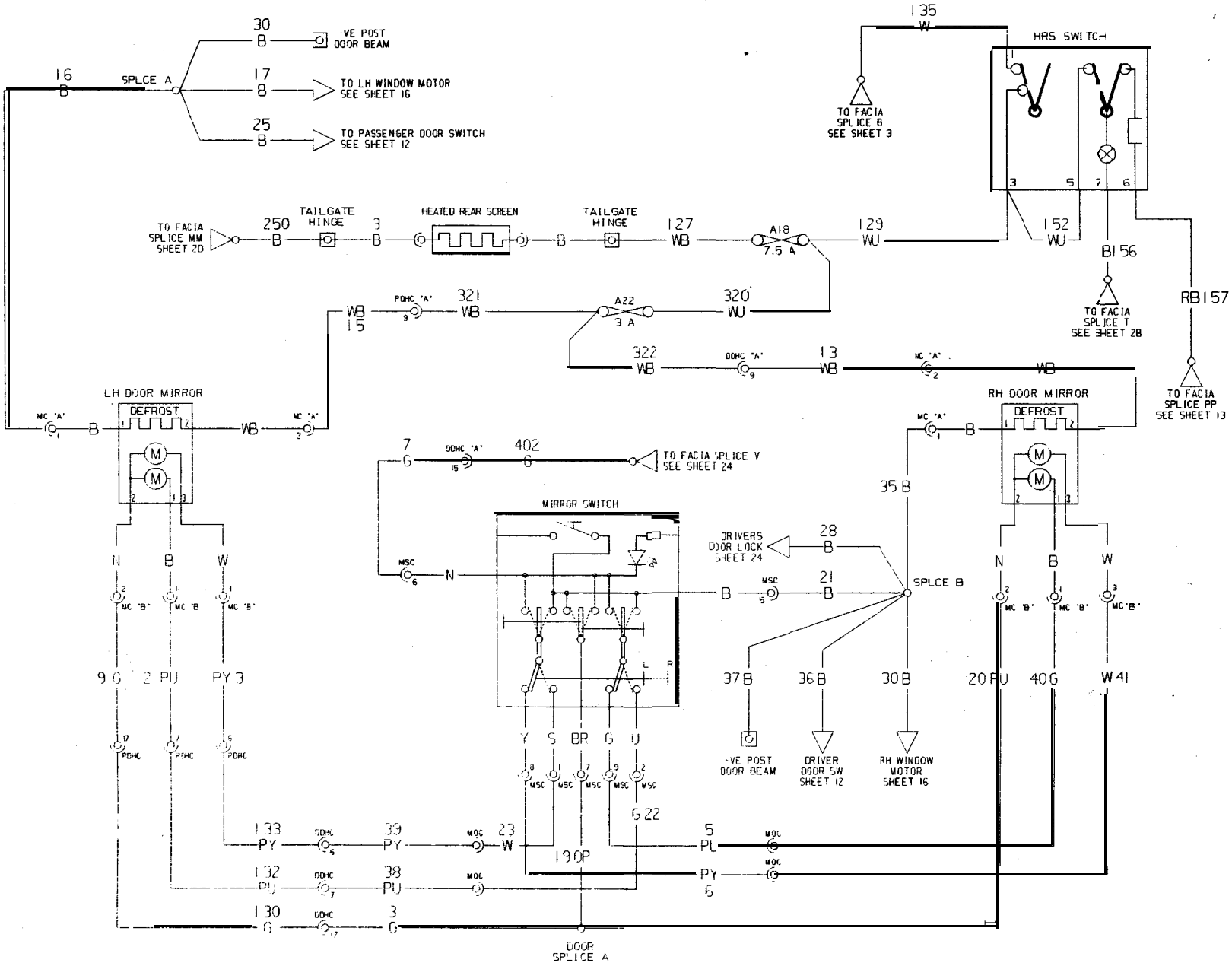

LH HEADLAMPS
RH HEADLAMPS
FRONT SPLICE A
FRONT SPLICE B
FRONT SPLICE C
DIP BEAM RELAY
MAIN BEAM RELAY
DIP SWITCH
DIP
MAIN
FLASH
OPTION
HEADLAMP OPTION CONNCTOR
LHD ONLY
-VE POST SEE SHEET 2A
+VE POST SEE SHEET 1
FACIA SPLICE BB SEE SHEET 2B
FACIA SPLICE D SEE SHEET 12
FACIA SPLICE GG
MAIN BEAM WARNING LAMP
RH BINNACLE SPLICE B SEE SHEET 14
FACIA SPLICE C SEE SHEET 1
FACIA SPLICE I
FACIA SPLICE J SEE SHEET 2C
TO FUSE A3 (REAR FOG LAMPS) SEE SHEET 11
SIDE LAMP SWITCH SHEET 8
LH HEADLAMP MOTOR
RH HEADLAMP MOTOR
POD DELAY MODULE
HEADLAMP POD LIFT MODULE
MASTER LIGHTING SWITCH
TO SIDELAMP SWITCH SEE SHEET 8
TO FACIA SPLICE T SEE SHEET 2B
TO FACIA SPLICE X SEE SHEET 3
-VE POST SEE SHEET 2B
15 UY
1 UY
172 UY
482 UY
8 NU
264 B
519 U
520 U
154 UR
2UB
9 NU
174 UB
4UK
175 UK
6 UR
155 UW
5 UW
266 B
454 UW
353 P
13 P
7U
217 UW
8 UW
14 B
184UW
187 N
U 177
483 UK
184UW (RHD ONLY)
515UK
183 UN
182 UN
181 U
188 NS
273 B
178 U
U66
19UN
189 NO
NO 20
25B
191 N
192 PK
9 PK
190 N
193 PK
10 PK
224 NU
82 G
49 G
48B
47 U
176 U
30 B
29 B
28 B
27 B
11 UB
23 UB
24
12
22 KO
18 KB
17
16 KO

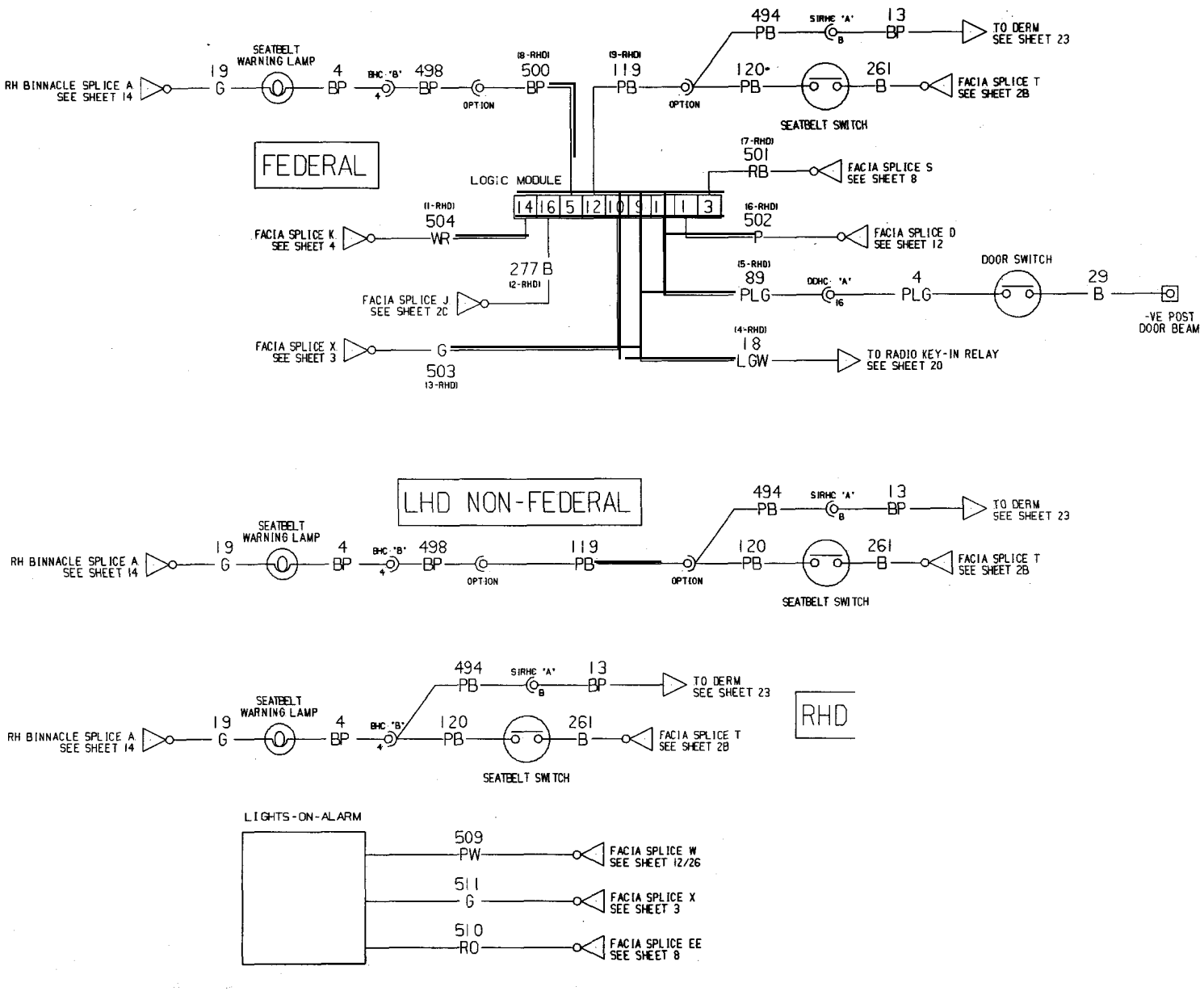

TO FACIA SPLICE MM SEE SHEET 2D
257 B
98 G
FACIA SPLICE B SEE SHEET 3
97 W
A20 15 A
WIPER MOTOR
LIMIT SW.
FAST
SLOW
101 NLG
100 ULG
RLG 102
SCHC 17 RLG
SCHC 15 ULG
413 ON
SCHC 11 ON
416 OP
SCHC 16 OP
99G
WASH/WIPE DELAY MODULE
263 B
FACIA SPLICE J SEE SHEET 2C
414 G
SCHC 14
14 G
WIPER SWITCH
415 LGB
113 LGB
SCHC 18
18 LGB
SCREENWASH PUMP
453 LGB
FACIA SPLICE FF
208 LGB
2 LGB
1 B
B 468
LOW SCREENWASH LEVEL WARNING LAMP
LOW SCREENWASH FLUID SWITCH
BHC 'A'
26 LGB
27 OB
BHC 'A'
219 OB
3 OB
4 B
467 B
TO FACIA SPLICE BB SEE SHEET 2B

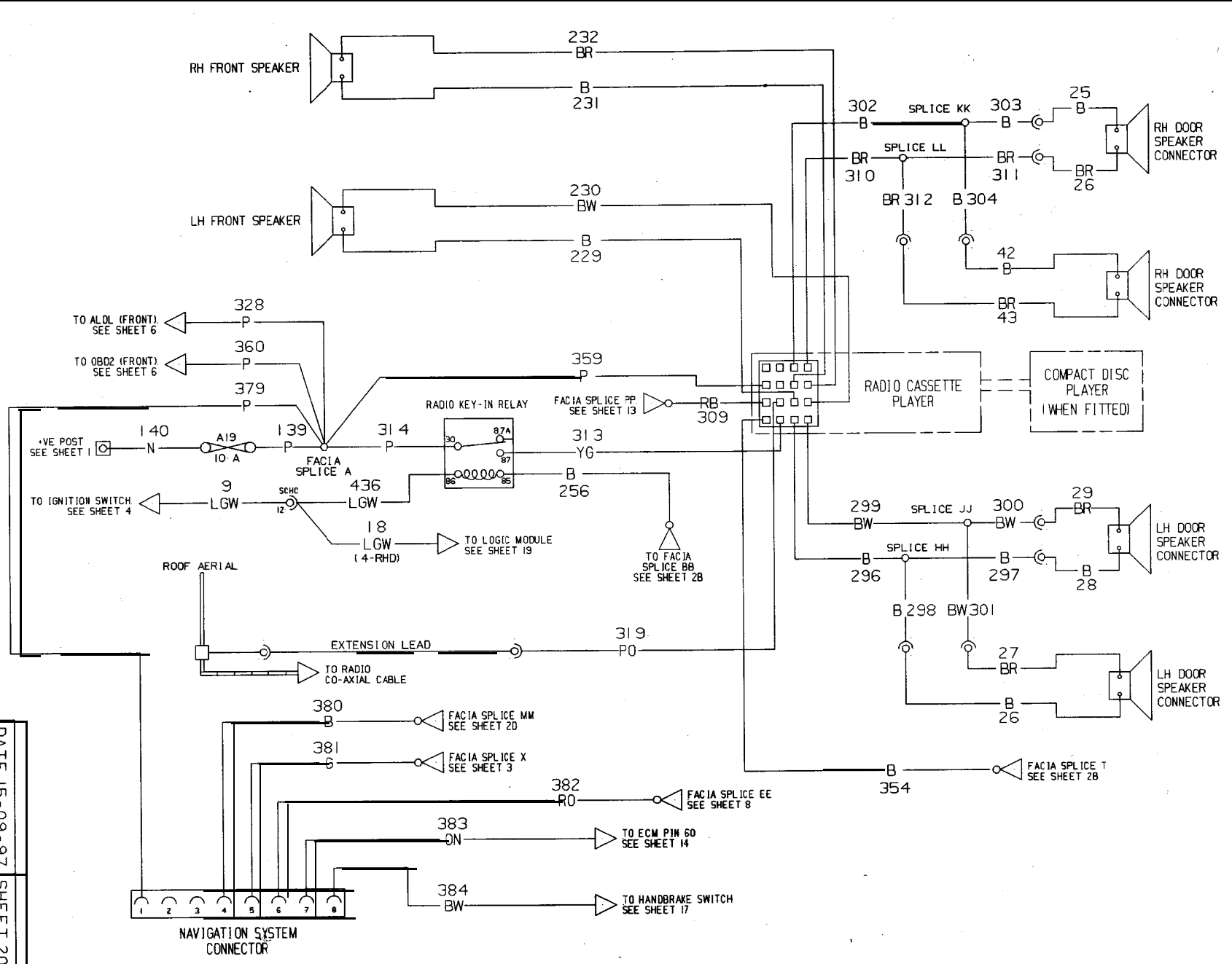

LH WINDOW MOTOR
RH WINDOW MOTOR
LH WINDOW LIFT SWITCH
RH WINDOW LIFT SWITCH
WINDOW OVERRIDE SWITCH
WINDOW LOGIC MODULE
TO SPLICE A SEE SHEET 18A
TO SPLICE B SEE SHEET 18A
TO ALARM CON 3 SHEET 24
FACIA SPLICE C SEE SHEET 1
FACIA SPLICE W SEE SHEET 12
FACIA SPLICE J SEE SHEET 2C
FACIA SPLICE Y
FACIA SPLICE T SEE SHEET 2B
FACIA SPLICE OO
FACIA SPLICE V SEE SHEET 24
+VE POST SEE SHEET 11
+VE POST SEE SHEET 1
PDHC
DDHC
A12 20 A
A13 20 A
A23 2 A
LG 6
LG 371
LG 246
17 B
4 K
20 P
5 S
7 U
318 K
400 PR
398 N
338 S
336 U
213 G
443 P
153 N
372 P
373 PW
B 437
NW 343
295 B
342 NW
NW 34
306 K
30 B
14 K
33 P
15 S
17 U
370 K
PS 399
397 N
339 SW
337 UW
340 NW
294 B

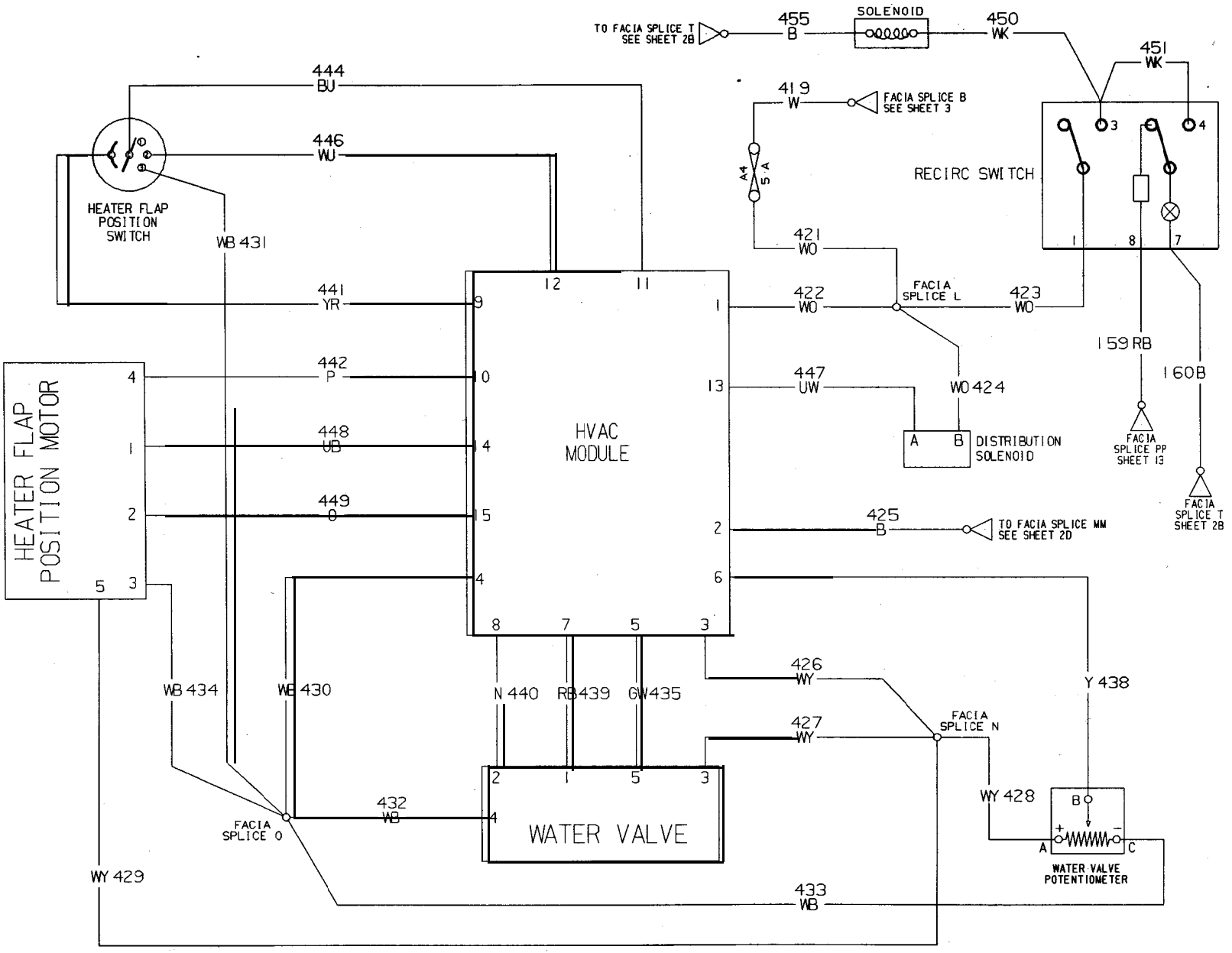

384
BW
TO NAVIGATOR
SYSTEM CONNECTOR
SEE SHEET 20
FACIA SPLICE BB
SEE SHEET 28
287
B
376
BW
HANDBRAKE SWITCH
76
BW
75
BU
DIODE "A"
PEKTRON DIODE
A75-294 X 1
BHC "B"
1
TO SPLICE BB
SEE SHEET 28
PARK BRAKE
WARNING LAMP
RH BINNACLE SPLICE A
SEE SHEET 14
21
G
1
BW
BRAKE FAIL
WARNING LAMP
20
G
2
BU
BHC "B"
2
374
BU
LOW BRAKE FLUID
LEVEL SWITCH
255
B
A.B.S.
WARNING LAMP
LH BINNACLE SPLICE A
SEE SHEET 14
21
G
1
BK
BHC "A"
1
195
BK
TO ABS CONTROLLER
PIN 20 SEE SHEET 22
485
B
TO FACIA SPLICE T
SEE SHEET 28
FUEL FLAP
SOLENOID
FUEL
SLAP
SWITCH
REAR SPLICE D
SEE SHEET 2
32
B
(70-GT3)
23
PR
FUEL FLAP RELAY
87A
30
87
85
86
(12-GT3)
5
P
B2-GT3)
B1
25 A
34
N
BATTERY
+
325
PR
BHC "B"
3
(7-GT3)
2
PR
(15-GT3)
7
P

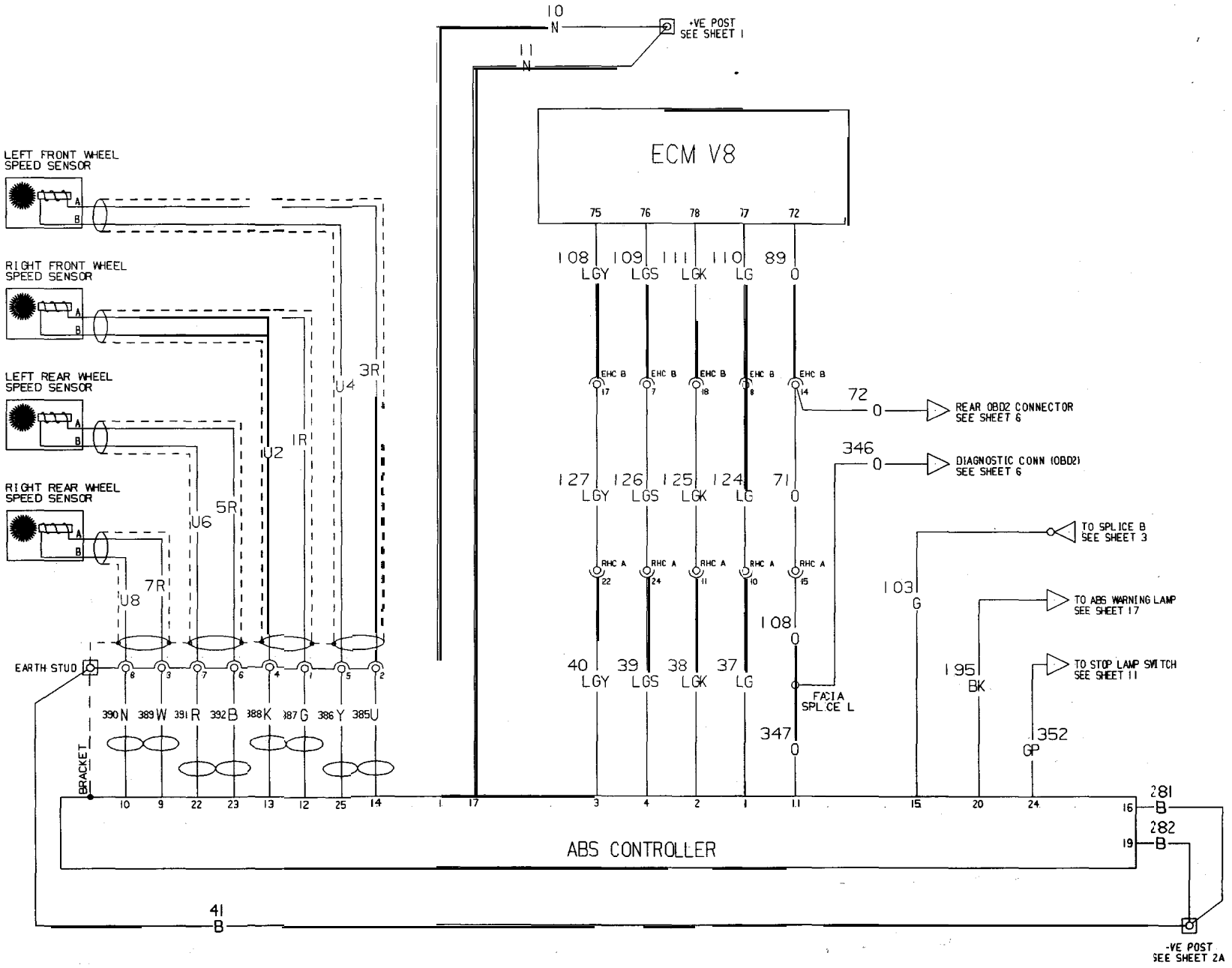

30 B -VE POST DOOR BEAM
16 B SPLCE A
17 B TO RH WINDOW MOTOR SEE SHEET 16A
25 B TO PASSENGER DOOR SWITCH SEE SHEET 12
135 W
TO FACIA SPLICE B SEE SHEET 3
HRS SWITCH
TO FACIA SPLICE MM SHEET 2D
250 B
TAILGATE HINGE
3 B
HEATED REAR SCREEN
B
TAILGATE HINGE
127 WB
A18 7.5 A
129 WU
152 WU
B156
TO FACIA SPLICE T SEE SHEET 2B
RB157
TO FACIA SPLICE PP SEE SHEET 13
WB 15
PDHC "A" 9
321 WB
A22 3 A
320 WU
322 WB
PDHC "A" 9
13 WB
MC "A" 2
WB
RH DOOR MIRROR
DEFROST
MC "A" 1
B
MC "A" 2
WB
LH DOOR MIRROR
DEFROST
MC "A" 1
B
7 G
DDHC "A" 15
402 G
TO FACIA SPLICE V SEE SHEET 24
35 B
MIRROR SWITCH
MSC 6
N
DRIVERS DOOR LOCK SHEET 24
28 B
MSC 5
21 B
B
SPLCE B
N B W
MC "B"
9 G 2 PU Y 3
PDHC
37 B
36 B
30 B
20 PU
40 G
W 41
-VE POST DOOR BEAM
DRIVER DOOR SW SHEET 12
LH WINDOW MOTOR SHEET 16A
Y S BR G U
MSC
6 PY
5 PU
133 PY
DDHC 6
39 PY
MQC
22 G
MQC
190P
132 PU
DDHC 7
38 PU
MQC
W 23
MQC
130 G
DDHC 17
3 G
DOOR SPLICE A

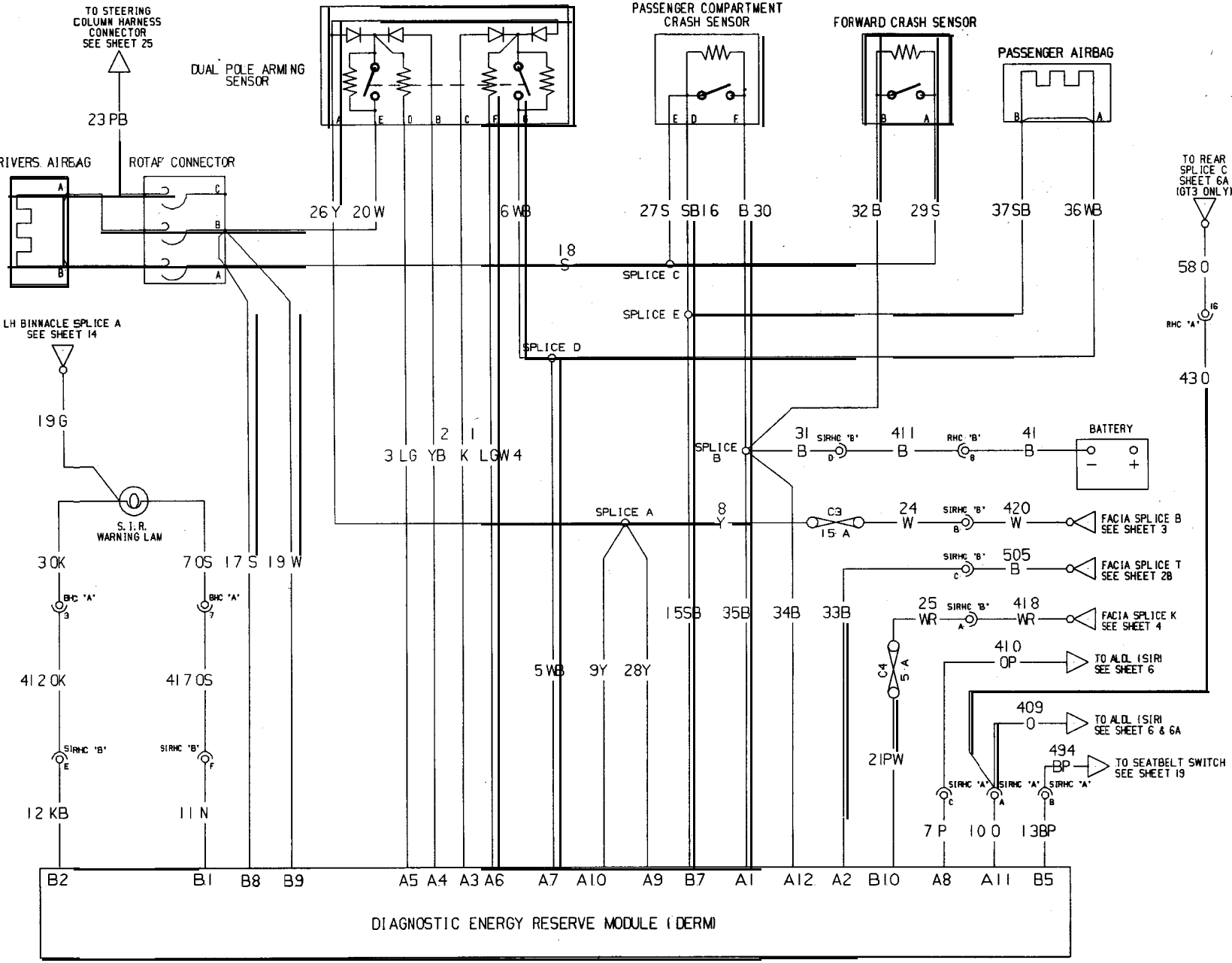

30 B -VE POST DOOR BEAM
16 B SPLICE A
17 B TO LH WINDOW MOTOR SEE SHEET 16
25 B TO PASSENGER DOOR SWITCH SEE SHEET 12
135 W
TO FACIA SPLICE B SEE SHEET 3
HRS SWITCH
TO FACIA SPLICE MM SHEET 20
250 B
TAILGATE HINGE
3 B
HEATED REAR SCREEN
B
TAILGATE HINGE
127 WB
A18 7.5 A
129 WU
152 WU
B156
TO FACIA SPLICE T SEE SHEET 28
RB157
TO FACIA SPLICE PP SEE SHEET 13
WB 15
PDHC "A"
321 WB
A22 3 A
320 WU
322 WB
13 WB
MC "A"
LH DOOR MIRROR
DEFROST
RH DOOR MIRROR
7 G
402 G
TO FACIA SPLICE V SEE SHEET 24
MIRROR SWITCH
35 B
DRIVERS DOOR LOCK SHEET 24
28 B
21 B
SPLICE B
N B W
96 2PU PY3
37B 36B 30B
20PU 40G W41
-VE POST DOOR BEAM
DRIVER DOOR SW SHEET 12
RH WINDOW MOTOR SHEET 16
Y S BR G U
G22
133 PY
39 PY
MQG
23 W
5 PU
190P
132 PU
38 PU
PY 5
130 G
3 G
DOOR SPLICE A

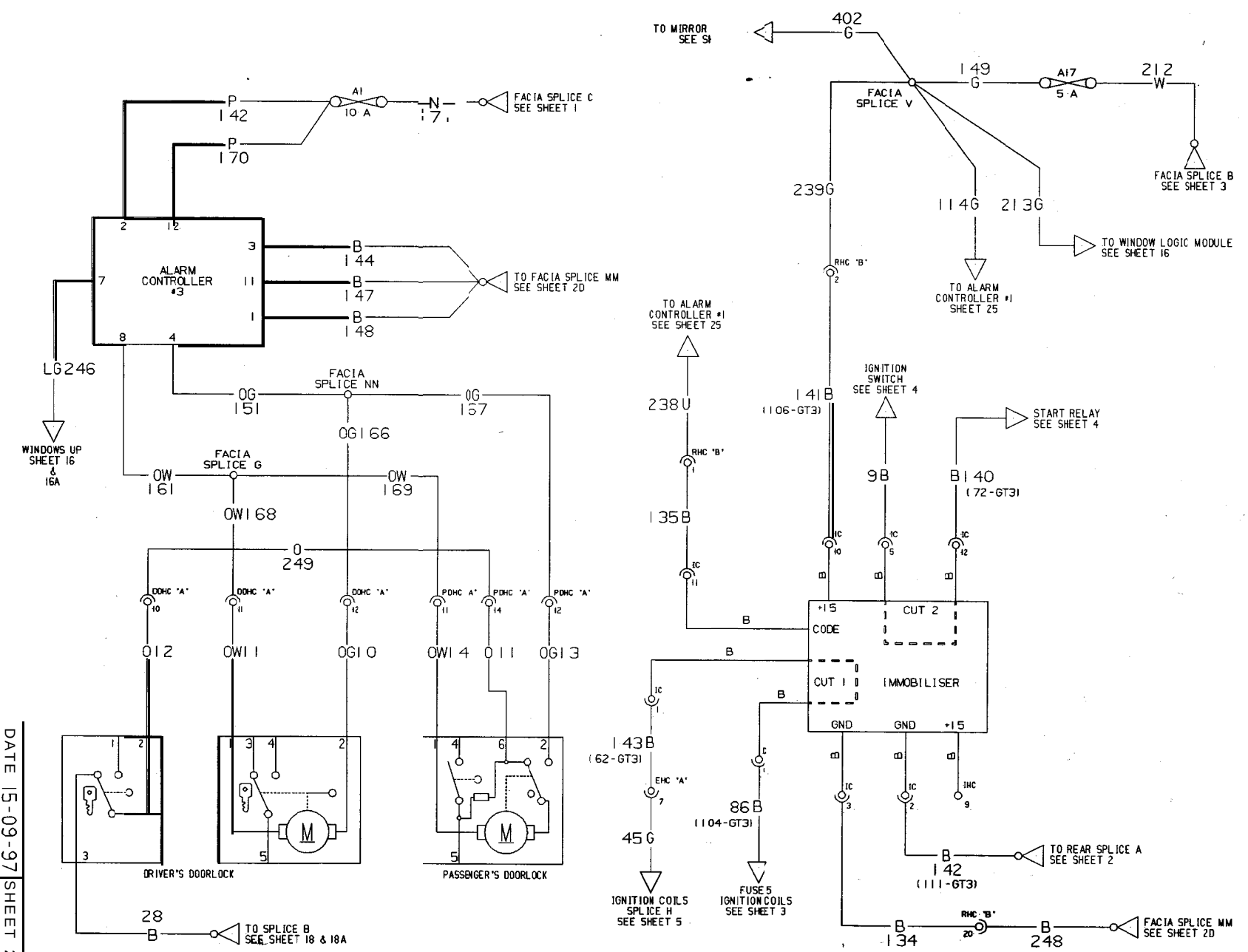

FEDERAL
RH BINNACLE SPLICE A SEE SHEET 14
19 G
SEATBELT WARNING LAMP
4 BP
BHC 'B' 4
498 BP
OPTION
(8-RHD) 500 BP
(9-RHD) 119 PB
OPTION
494 PB
SIRHC 'A' B
13 BP
TO DERM SEE SHEET 23
120 PB
261 B
FACIA SPLICE T SEE SHEET 2B
SEATBELT SWITCH
(7-RHD) 501 RB
FACIA SPLICE S SEE SHEET 8
LOGIC MODULE
14 16 5 12 10 9 1 1 3
(1-RHD) 504 WR
16-RHD 502 P
FACIA SPLICE D SEE SHEET 12
FACIA SPLICE K SEE SHEET 4
277 B (2-RHD)
FACIA SPLICE J SEE SHEET 2C
(5-RHD) 89 PLG
DDHC 'A' 16
4 PLG
DOOR SWITCH
29 B
-VE POST DOOR BEAM
FACIA SPLICE X SEE SHEET 3
G 503 (13-RHD)
(4-RHD) 18 LGW
TO RADIO KEY-IN RELAY SEE SHEET 20
LHD NON-FEDERAL
RH BINNACLE SPLICE A SEE SHEET 14
19 G
SEATBELT WARNING LAMP
4 BP
BHC 'B' 4
498 BP
OPTION
119 PB
OPTION
494 PB
SIRHC 'A' B
13 BP
TO DERM SEE SHEET 23
120 PB
261 B
FACIA SPLICE T SEE SHEET 2B
SEATBELT SWITCH
RH BINNACLE SPLICE A SEE SHEET 14
19 G
SEATBELT WARNING LAMP
4 BP
BHC 'B' 4
120 PB
261 B
FACIA SPLICE T SEE SHEET 2B
SEATBELT SWITCH
494 PB
SIRHC 'A' B
13 BP
TO DERM SEE SHEET 23
RHD
LIGHTS-ON-ALARM
509 PW
FACIA SPLICE W SEE SHEET 12/26
511 G
FACIA SPLICE X SEE SHEET 3
510 RO
FACIA SPLICE EE SEE SHEET 8

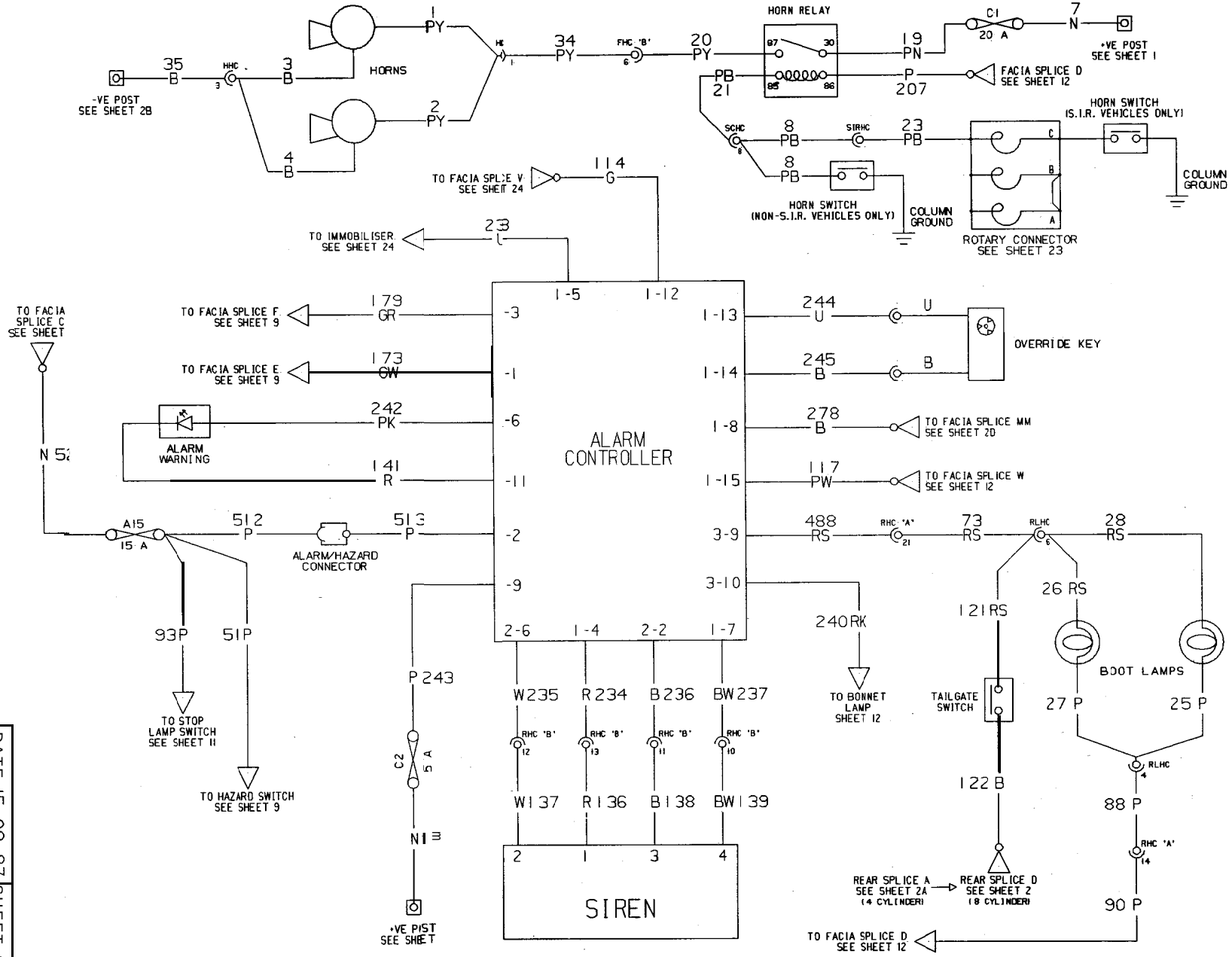

RH FRONT SPEAKER
232 BR
B 231
LH FRONT SPEAKER
230 BW
B 229
TO ALDL (FRONT) SEE SHEET 6
328 P
TO OBD2 (FRONT) SEE SHEET 6
360 P
379 P
+VE POST SEE SHEET 1
140 N
A19 10 A
139 P
FACIA SPLICE A
314 P
RADIO KEY-IN RELAY
30 87A 87 86 85
FACIA SPLICE PP SEE SHEET 13
359 P
RB 309
313 YG
B 256
TO IGNITION SWITCH SEE SHEET 4
9 LGW
SCHC 12
436 LGW
18 LGW (4-RHD)
TO LOGIC MODULE SEE SHEET 19
TO FACIA SPLICE BB SEE SHEET 2B
ROOF AERIAL
EXTENSION LEAD
319 PO
TO RADIO CO-AXIAL CABLE
380 B
FACIA SPLICE MM SEE SHEET 2D
381 G
FACIA SPLICE X SEE SHEET 3
382 RO
FACIA SPLICE EE SEE SHEET 8
383 ON
TO ECM PIN 60 SEE SHEET 14
384 BW
TO HANDBRAKE SWITCH SEE SHEET 17
1 2 3 4 5 6 7 8
NAVIGATION SYSTEM CONNECTOR
RADIO CASSETTE PLAYER
COMPACT DISC PLAYER (WHEN FITTED)
302 B
SPLICE KK
303 B
25 B
RH DOOR SPEAKER CONNECTOR
BR 310
SPLICE LL
BR 311
BR 26
BR 312
B 304
42 B
BR 43
299 BW
SPLICE JJ
300 BW
29 BR
LH DOOR SPEAKER CONNECTOR
B 296
SPLICE HH
B 297
B 28
B 298
BW 301
27 BR
B 26
B 354
FACIA SPLICE T SEE SHEET 2B


TO FACIA SPLICE T SEE SHEET 2B
455 B
SOLENOID
450 WK
451 WK
419 W
FACIA SPLICE B SEE SHEET 3
A4 5A
RECIRC SWITCH
3
4
1
8
7
444 BU
446 WU
HEATER FLAP POSITION SWITCH
WB 431
421 WO
441 YR
12
11
9
422 WO
FACIA SPLICE L
423 WO
159 RB
160B
442 P
10
13
447 UW
WO 424
448 UB
14
HVAC MODULE
A
B
DISTRIBUTION SOLENOID
FACIA SPLICE PP SHEET 13
FACIA SPLICE T SHEET 2B
449 0
15
425 B
TO FACIA SPLICE MM SEE SHEET 2D
HEATER FLAP POSITION MOTOR
4
1
2
5
3
WB 434
WB 430
8
7
5
3
N 440
RB 439
GW 435
426 WY
Y 438
427 WY
FACIA SPLICE N
2
1
5
3
WY 428
B
+
−
A
C
WATER VALVE POTENTIOMETER
432 WB
4
WATER VALVE
FACIA SPLICE O
WY 429
433 WB


10 N
+VE POST SEE SHEET 1
11 N
ECM V8
75 76 78 77 72
108 LGY
109 LGS
111 LGK
110 LG
89 O
EHC B 17
EHC B 7
EHC B 18
EHC B 8
EHC B 14
72 O
REAR OBD2 CONNECTOR SEE SHEET 6
346 O
DIAGNOSTIC CONN (OBD2) SEE SHEET 6
127 LGY
126 LGS
125 LGK
124 LG
71 O
RHC A 22
RHC A 24
RHC A 11
RHC A 10
RHC A 15
TO SPLICE B SEE SHEET 3
103 G
TO ABS WARNING LAMP SEE SHEET 17
108 O
195 BK
TO STOP LAMP SWITCH SEE SHEET 11
40 LGY
39 LGS
38 LGK
37 LG
FASIA SPLICE L
347 O
352 GP
LEFT FRONT WHEEL SPEED SENSOR
RIGHT FRONT WHEEL SPEED SENSOR
LEFT REAR WHEEL SPEED SENSOR
RIGHT REAR WHEEL SPEED SENSOR
3R
U4
1R
U2
5R
U6
7R
U8
EARTH STUD
8 3 7 6 4 1 5 2
390 N
389 W
391 R
392 B
388 K
387 G
386 Y
385 U
BRACKET
10 9 22 23 13 12 25 14
1 17
3 4 2 1 11 15 20 24
281 B 16
282 B 19
ABS CONTROLLER
41 B
-VE POST SEE SHEET 2A


TO STEERING COLUMN HARNESS CONNECTOR SEE SHEET 25
23 PB
DUAL POLE ARMING SENSOR
PASSENGER COMPARTMENT CRASH SENSOR
FORWARD CRASH SENSOR
PASSENGER AIRBAG
DRIVERS AIRBAG
ROTARY CONNECTOR
26 Y 20 W
6 WB
27 S SB 16 B 30
32 B 29 S
37 SB 36 WB
TO REAR SPLICE C SHEET 6A (GT3 ONLY)
18 S
SPLICE C
SPLICE E
SPLICE D
LH BINNACLE SPLICE A SEE SHEET 14
19 G
3 LG YB K LGW 4
SPLICE B
31 B
SIRHC 'B' D
411 B
RHC 'B' B
41 B
BATTERY
SPLICE A
8 Y
C3 15 A
24 W
SIRHC 'B' B
420 W
FACIA SPLICE B SEE SHEET 3
SIRHC 'B' C
505 B
FACIA SPLICE T SEE SHEET 28
25 WR
SIRHC 'B' A
418 WR
FACIA SPLICE K SEE SHEET 4
410 OP
TO ALDL (SIRI SEE SHEET 6
C4 5 A
409 O
TO ALDL (SIRI SEE SHEET 6 & 6A
494 BP
TO SEATBELT SWITCH SEE SHEET 19
SIRHC 'A' C
SIRHC 'A' A
SIRHC 'A' B
SIRHC 'A'
7 P 10 0 13 BP
S.I.R. WARNING LAMP
30 K
70 S 17 S 19 W
BHC 'A' 3
BHC 'A' 7
412 OK
417 OS
SIRHC 'B' E
SIRHC 'B' F
12 KB
11 N
15 SB 35B 34B 33B
5 WB 9Y 28Y
21 PW
580
RHC 'A' 16
430
B2 B1 B8 B9 A5 A4 A3 A6 A7 A10 A9 B7 A1 A12 A2 B10 A8 A11 B5
DIAGNOSTIC ENERGY RESERVE MODULE (DERM)


ALARM CONTROLLER #3
P 142
P 170
A1 10 A
N 171
FACIA SPLICE C SEE SHEET 1
B 144
B 147
B 148
TO FACIA SPLICE MM SEE SHEET 2D
LG246
WINDOWS UP SHEET 16 & 16A
FACIA SPLICE NN
OG 151
OG 167
OG166
FACIA SPLICE G
OW 161
OW 169
OW168
O 249
DDHC "A"
PDHC "A"
012
OW11
OG10
OW14
011
OG13
DRIVER'S DOORLOCK
PASSENGER'S DOORLOCK
28 B
TO SPLICE B SEE SHEET 18 & 18A
TO MIRROR SEE SH
402 G
FACIA SPLICE V
149 G
A17 5 A
212 W
FACIA SPLICE B SEE SHEET 3
239G
114G
213G
TO WINDOW LOGIC MODULE SEE SHEET 16
TO ALARM CONTROLLER #1 SHEET 25
RHC "B"
TO ALARM CONTROLLER #1 SEE SHEET 25
238U
141B (106-GT3)
IGNITION SWITCH SEE SHEET 4
START RELAY SEE SHEET 4
9B
B140 (72-GT3)
135B
+15
CUT 2
CODE
CUT 1
IMMOBILISER
GND
GND
+15
143B (62-GT3)
EHC "A"
45G
IGNITION COILS SPLICE H SEE SHEET 5
86B (104-GT3)
FUSE 5 IGNITION COILS SEE SHEET 3
B 142 (111-GT3)
TO REAR SPLICE A SEE SHEET 2
B 134
B 248
FACIA SPLICE MM SEE SHEET 2D


HORNS
-VE POST SEE SHEET 28
HORN RELAY
HORN SWITCH (NON-S.I.R. VEHICLES ONLY)
HORN SWITCH (S.I.R. VEHICLES ONLY)
COLUMN GROUND
ROTARY CONNECTOR SEE SHEET 23
+VE POST SEE SHEET 1
FACIA SPLICE D SEE SHEET 12
TO FACIA SPLICE V SEE SHEET 24
TO IMMOBILISER SEE SHEET 24
TO FACIA SPLICE C SEE SHEET
TO FACIA SPLICE F SEE SHEET 9
TO FACIA SPLICE E SEE SHEET 9
ALARM WARNING
ALARM CONTROLLER
OVERRIDE KEY
TO FACIA SPLICE MM SEE SHEET 2D
TO FACIA SPLICE W SEE SHEET 12
ALARM/HAZARD CONNECTOR
TO STOP LAMP SWITCH SEE SHEET 11
TO HAZARD SWITCH SEE SHEET 9
TO BONNET LAMP SHEET 12
TAILGATE SWITCH
BOOT LAMPS
SIREN
REAR SPLICE A SEE SHEET 2A (4 CYLINDER)
REAR SPLICE D SEE SHEET 2 (8 CYLINDER)
TO FACIA SPLICE D SEE SHEET 12
+VE PIST SEE SHEET

CBHC — 10

CONNECT@ (WITH CAVITY NUMBER

CONNECTION CODES :-

BHC - BINNACLE HARNESS CONNECTOR
DDHC - DRIVER DOOR HARNESS CONNECTCR
DRLHC - DAYTIME RUNNING LAMPS HARNESS CONNECTOR
EMHC - ENGINE MANAGEMENT HARNESS CONNECTCR
FBHC - FRONT BUMPER HARNESS CONNECTOR
FHC FRONT HARNESS CONNECTOR
HHC - HORNS HARNESS CONNECTOR
LDHC - LAMP DRIVER HARNESS CONNECTOR
LHRC - LEFT HAN0 FRONT LAM' CONNECTOR
MC MIRROR CONNECTOR
MSC MIRROR SWITCH CONNECT'37
PDHC - PASSENGER DOOR HARNESS CONNECTCR
RFHC - RADIATOR FAN HARNESS CONNECTOR
RHC - REAR HARNESS CONNECTOR
RHFLC RIGHT HAND FRONT LAMP CONNECTOR
RLHC REAR LAM'S HARNESS CONNECTOR
SCHC STEERING COLUMN HARNESS CONNECTOR
SHC SPOILER HARNESS CONNECTOR
SIRHC S.I.R. HARNESS CONNECTOR
EHC WINDOW CONVERSION HARNESS CONNECTOR
WSSHC - WHEEL SPEED SENSOR HARNESS CONNECTCR

TWISTED PAIR

A2 — 7.5A — FUSE*NUMBER AND RATING

GROUND POINT LOCATION

-VE POST

GROUND POINT THROUGH COM'ONENT BODY

B — ENGINE BLOCK — CABLE GROUND THROUGH LOCAL FIXING

FACIA SPLICE X — SPLICE

TO HORNS SEE SHEET 25 — DESTINATION OF CABLE BY SHEET NUMBER TO COM'ONENT

FACIA SPLICE X SEE SHEET 3 — DESTINATION OF CABLE BY SHEET NUMBER TO SPLICE

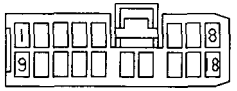
UR — CABLE COLOUR

COLOUR CODES :-

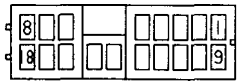
B	BLACK	P	PURPLE
G	GREEN	R	FED
K	PINK	S	SLATE
LG	LIGHT GREEN	u	BLUE
N	BROWN	w	WHITE
0	ORANGE	Y	YELLOW

DDHC, PDHC, SCHC

FAC I A HARNESS



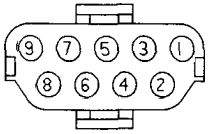
MATING FACE



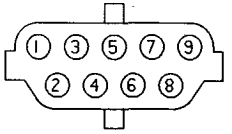
DOOR/STEER1 NG COLUMN HARNESS

RLHC

REAR HARNESS



MATING FACE

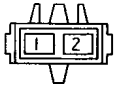


REAR LI GHTI NG HARNESS

RFHC

FAC I A HARNESS

MATING FACE

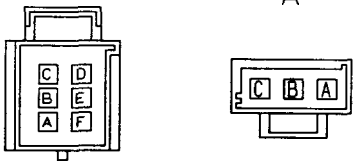


RAD FAN HARNESS

SIRHC

FAC I A HARNESS

B MAT1 NG FACE A



SIR HARNESS

BHC

FACIA HARNESS

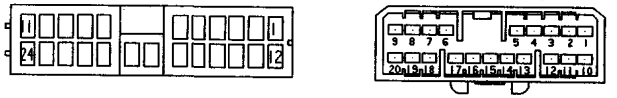
B MATING FACE A

BINNACLE HARNESS

RHC

FACIA HARNESS

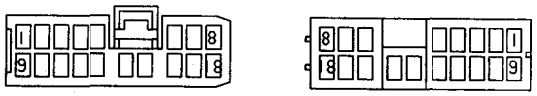
A MATING FACE B



REAR HARNESS

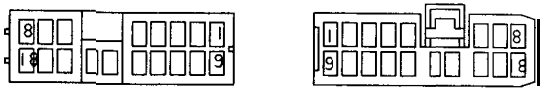
EMHC

REAR HARNESS



BLACK MOULDING

MATING FACE

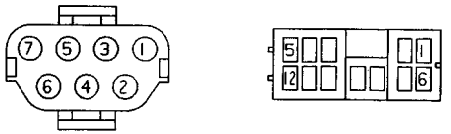


BLACK MOULDING

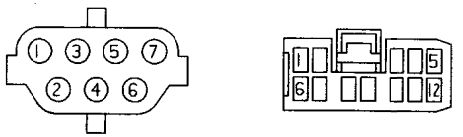
ENGINE MANAGEMENT HARNESS

FHC

FACIA HARNESS



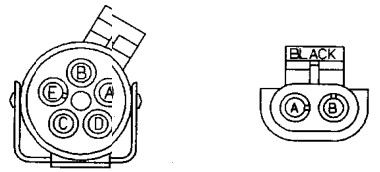
B MATING FACE A



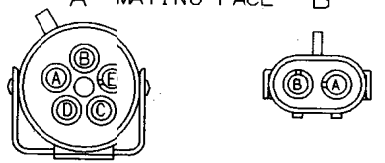
FRONT HARNESS

FBHC

FRONT HARNESS



A MATING FACE B



FRONT BUMPER HARNESS

MAINTENANCE & LUBRICATION

SECTION OF - ESPRIT S4 & Sport 300

RECOMMENDED LUBRICANTS

Engine

In order to ensure the longevity and reliability of the vehicle, it is most important that only the specified lubricants are used. It is an entirely false economy to try to save money by using lower quality oils, which may break down before the next change interval and provide inadequate protection before the end of the term. High oil consumption may also result.

4-Winder (910, 920)

Whenever possible, one of the specific products listed below should be used, at least one of which should be available from most good retail outlets. The listing is alphabetical and is in no order of preference.

Above 0°C	*viscosity*	*Below 0°C*	*viscosity*
Agip F1 Super Motor Oil	15W/50	**Agip** Sint 2000	10W/40
Castrol Formula RS	10W/60	**BP** Visco 2000+	10W/40
Elf Competition	20W/50	**Castrol** Formula RS	10W/60
Elf Competition S	15W/50	**Elf** Sporti	15W/40
Mobil 1	5W/50	**Mobil** 1	5W/50
Valvoline Racing Oil	20W/50	**Texaco** Hovoline XI	10W/40
		Valvoline XLD	15W/40

(V8)

Lotus specifically recommends the use, in all climatic conditions, of **Mobil 1 5W/50 or 5W/30.** Otherwise, one of the products in the following alphabetical list should be used, one of which should be available from most good retail outlets.

Alternative Product to Mobil 1	*Viscosity*
Agip F1 Super Motor Oil	15W/50
Castrol Formula RS	10W/60
Elf Competition	20W/50
Elf Competition S	15W/50

Note that the viscosity rating is made up of two numbers; the first, identified by a 'W' suffix is the winter (or low temperature) viscosity grade, and the second number the summer or high temperature viscosity grade. i.e. a 20W/50 oil performs like an SAE 20 oil at low temperature and an SAE 50 oil at high temperature.

If none of the above named products are available, a good quality oil meeting API SG or API SH (printed on oil container) should be used with the following viscosity grades:

A **maximum** low temperature viscosity grade of **15W;** and a **minimum** high temperature viscosity grade of 40. e.g. 15W/40, 10W/60, 5W/50 etc.

Refill capacity (inc. filter)	- 4 cylinder	6.3 litre (11.1 imp.pt; 6.7 US qt)
	- V8	6.5 litre (11.4 imp.pt; 6.7 US qt)
Difference between high & low dipstick marks	- 4 cyl.	0.85 litre (1.5 imp.pt; 0.9 US qt)
	- V8	1.0 litre (1.8 imp.pt; 1.0 US qt)

Transmission (gearbox & final drive)

Lotus strongly recommends that for optimum protection under the most arduous conditions, combined with good cold shift performance, only **Castrol** TAF-X **75W/90** (Lotus part number **A082F6552S)** is used in the transmission. If the car is operated in continuously very low ambient temperatures, Mobil SHC 75W/90 may be used.

Capacity: 3.0 litre (5.3 imp pt; 3.2 US qt)

Power Steering

Automatic Transmission Fluid/Power Steering Fluid: Type Dexron II.

Front Hubs

Lubricant Type: Lithium complex wheel bearing grease

Consistency: NLGI No.2

Brake System

Non-mineral type hydraulic fluid meeting DOT 4 **ONLY**

Check that the container is marked with a yellow and black symbol:

Capacity:	3 litre
Fluid change interval:	12 months

Clutch Release

Non-mineral type hydraulic fluid meeting DOT 3 or DOT 4

Capacity:	0.5 litre

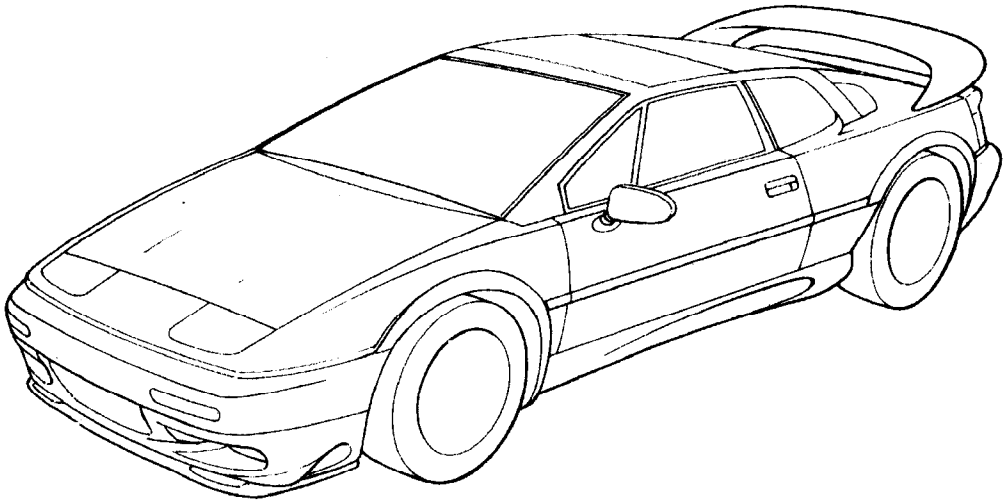
Engine Coolant Additive

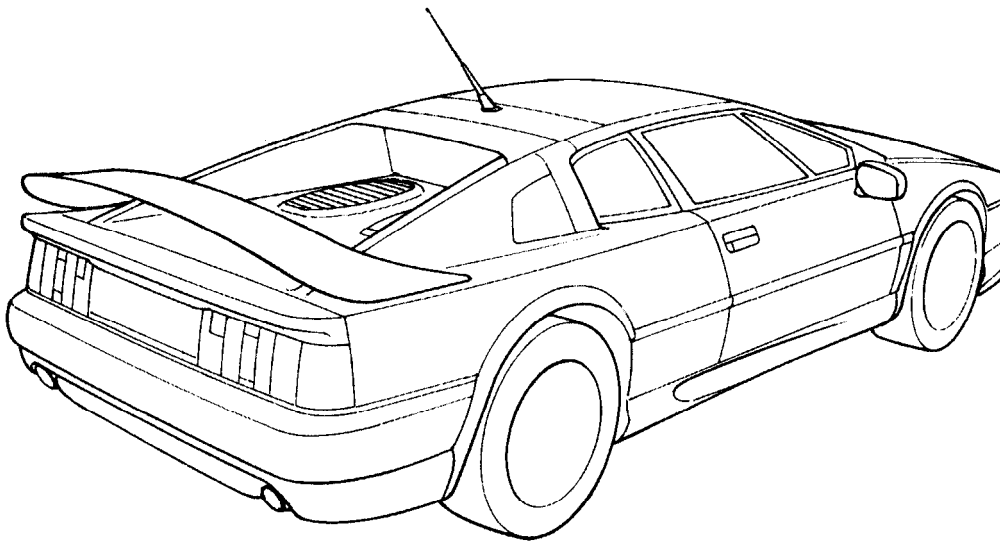
Type:		Mono-ethylene glycol blend
Recommended product:		Castrol Antifreeze or Shellsafe Plus (do not mix)
Concentration	▪ recommended:	**30%**
	▪ requirements:	min: 25%; max; 50%
Additive quantity required @ 30% concentration	▪ 4 cyl.	7.2 litre (12.7 imp.pt; 7.6 US qt)
	▪ V8	4.5 litre (8.0 imp.pt; 4.8 US qt)

LSL 292

BODYPAINTINSPECTION

ESPRIT





CODES

C CHIPS
D DISTORTION
F FLAKING
G GEL GRAZING
H PIN HOLES
K SINKAGE
M MAT CREASES
0 OVERSPRAY
P PRE-RELEASES
R RUN
S SCRATCHES
T THIN PAINT
U DIRT UNDER PAINT
V VOIDS

UNIT No.

COLOUR

OWNER

PRE-DELIVERY INSPECTION - ELAN & 4-CYLINDER ESPRIT

LSL 273D

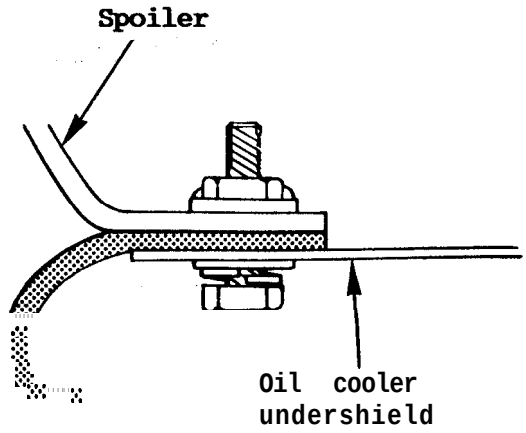
VIN ..... Engine No. .....

Fit protective covers to seats, footwells and steering wheel before commencing work.

OPERATION	X if work required &	Tick if satisfactory submit warranty claim	Technician's initials
Engine Bay			
Check engine & transmission oil levels			
Check security of engine oil filter			
Check coolant level			
Check brake fluid reservoir level			
Check clutch adjustment			
Check power steering fluid level (if fitted)			
Start engine:			
Check cooling system for leaks			
Check engine & transmission for oil leaks			
Check fuel system for leaks			
Check power steering system for leaks (if fitted)			
Use 'Tech 1' tool to check data list & for stored trouble codes			
Fuel Tank			
Completely fill fuel tank & check for leaks			
Wheels & Tyres			
Check torque of wheel bolts			
Check tyre pressures inc. spare			
Electrical			
Check security of battery terminals			
Check operation of all exterior & interior lamps			
Check operation of headlamp pods			
Check headlamp alignment			
Check operation of horns & hazard switch			
Check wiper operation in all modes & park position			
Check operation of windscreen washers & reservoir level			
Check operation of all instruments			
Reprogramme door window switches (Esprit) and check operation			
Check operation of heater/air conditioning & blower fan			
Check operation of door mirror controls & heaters			
Check operation of audio equipment			
Body			
Check operation of doors, door locks & central locking			
Check bonnet and roof stowage lid (Elan) release mechanism			
Check soft top roof erection & stowage (Elan)			
Check interior trim for damage & cleanliness			
Check operation of seat belts			
Check all paintwork for damage			
Check presence of toolkit, jack & literature pack			
Remove transit tie down eyes (Elan - if fitted)			

'93 M.Y. Esprit Front Spoiler Lip

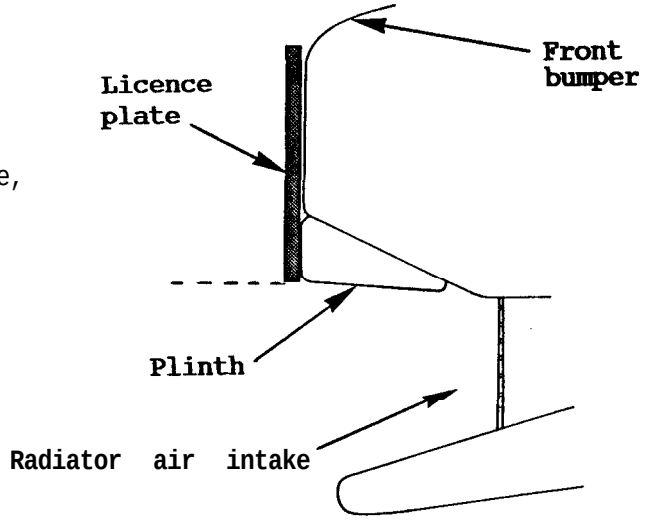
The two part front spoiler lip is supplied in the luggage compartment complete with fixings. The lip is fitted **between** the oil cooler undershields and the spoiler: Remove the 4 fixings from each undershield and insert the spoiler lip. Refit the M6 fixings and secure the remainder of each lip with the 4 Scrivets supplied, using the pre-drilled holes in the spoiler.



i i - **Spoiler lip**

'93 M.Y. Esprit Front Licence Plate

When'fitting the front licence plate, ensure that airflow to the radiator is not disturbed by aligning the bottom edge of the plate with the plinth on the underside of the bumper.



Road Test

Road test the vehicle and carry out further rectification work if necessary.

The pre-delivery inspection is subject to the following conditions:

a) It is the responsibility of the supplying distributor/importer/dealer to ensure that the car is delivered to the customer in the best possible condition.

b) All costs incurred during the inspection are the responsibility of the supplying distributor/importer/dealer.

c) Failure to return a signed copy of this inspection to Lotus Cars Ltd. by the distributor/importer/dealer, may result in warranty claims on the particular car being rejected.

Dealer signature: ..... Date:,.....

Dealer stamp:

PRE-DELIVERY INSPECTION - ESPRIT V8 & ELISE

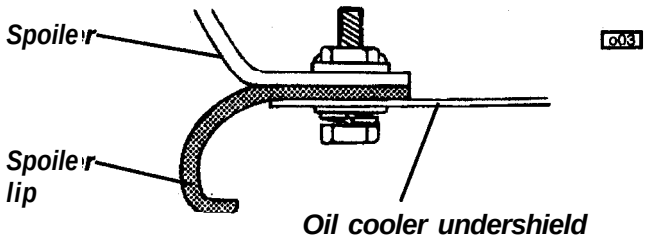
Model: ..... Colour: ..... V.I.N.: S C C.....

OPERATION	Esprit	Elise
Fit protective covers to seats, footwells & steering wheel	X	X
Engine Bay		
Check engine & transmission oil levels	X	X
Check security of engine oil filter	X	X
Check coolant level	X	X
Check power steering fluid levels	X	
Sirt Engine		
Check engine & transmission for oil leaks	X	X
Check cooling system for leaks	X	X
Check power steering system for leaks	X	
Use 'Tech 1' tool to check data list & for stored codes	X	
Fuel Tank		
Completely fill fuel tank and check for leaks	X	X
Wheels & Tyres		
Check cold tyre pressures, inc. spare (if fitted)	X	X
Check torque of wheel bolts	X	X
Electrical		
Check security of battery terminals	X	X
Check operation of all exterior & interior lamps	X	X
Check operation of headlamp pods	X	
Check headlamp alignment	X	X
Check operation of horn(s) & hazard switch	X	X
Check wiper operation at all speeds & park position	X	X
Check washer operation, jet alignment & reservoir level	X	X
Check operation of all instruments & set time clock	X	X
Reprogramme door window switches	X	
Check operation of heater/air conditioning and blower fan	X	X
Check operation of door mirror controls & heaters	X	
Check operation of audio equipment	X	X
Body		
Check brake & clutch fluid levels	X	X
Check operation of doors, door locks & central locking (if fitted)	X	X
Check adjustment & operation of tailgate & fuel filler flap release	X	
Check adjustment of front bonnet & release mechanism	X	
Check soft top roof erection & stowage		X
Check operation of seat belts	X	X
Check interior trim for damage and cleanliness	X	X
Check all paintwork for damage	X	X
Check presence of jack, wheelbrace, toolkit & literature pack (as applicable)	X	X
Road Test & Valet		
Carry out road test report overleaf	X	X
Carry out full vehicle valet	X	X

c:\pm5\sn_pdi

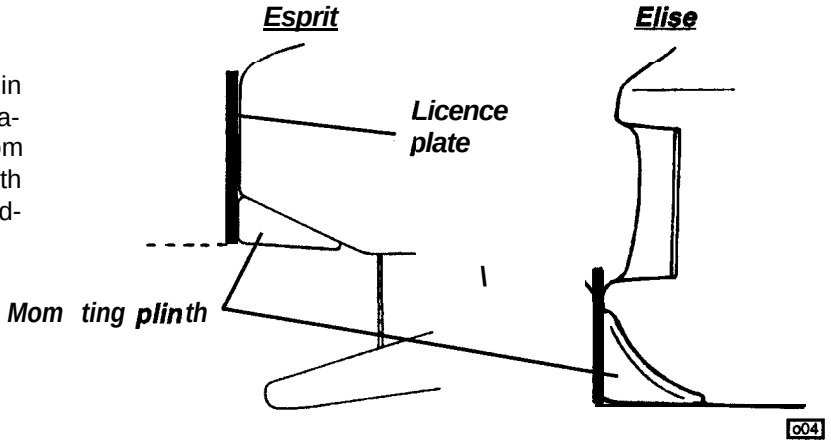
Esprit Front Spoiler Lip

The two part front spoiler lip is supplied in the luggage compartment complete with fixings. The lip is fitted between the oil cooler undershields and the spoiler: Remove the 4 fixings from each undershield and insert the spoiler lip. Refit the M6 fixings and secure the remainder of each lip with the 4 Scrivets supplied, using the pre-drilled holes in the spoiler.



Front Licence Plate

When fitting the front licence plate, in order to ensure that airflow to the radiator is not unduly restricted, the bottom edge of the plate should be aligned with the plinth on both Esprit and Elise models.



Road Test Performance

Engine performance ..... Brake performance .....

Clutch operation ..... Gearbox operation .....

Steering performance ..... Wheel balance .....

Driveline & suspension noise/vibration .....

General comments.. .....

Additional work required .....

.....

Work completed by ..... .

Notes

The PDI is subject to the following conditions:

a) It is the responsibility of the supplying dealer to ensure that the car is delivered to the customer in the best possible condition.

b) All costs incurred during the inspection are the responsibility of the supplying dealer.

c) Failure to return a signed copy of this inspection to Lotus Cars Ltd. by the dealer, may result in warranty claims on the particular car being rejected.

Dealer stamp:

Dealer signature: .....

Date: .....

MAINTENANCE SCHEDULE (Except California)
'93 M.Y. ONWARDS 4-CYLINDER ESPRIT

LSL 286

Date . . . . . Owner's Name . . . . . Vehicle . . . . . .

Vehicle Registration No. . . . . V.I.N. . . . . .

Recorded Mileage . . . . . Service Reqd. . . . . Job No. . . . . .

An 'X' in the columns below means that the service operation is to be performed. Circle the X when the operation has been performed satisfactorily.

Note
'Inspect' means assess condition and test for correct operation. Extra time is required to adjust or repair - advise customer beforehand if necessary.
'Check' means test and adjust/fill or tighten as necessary.

Except USA Distance covered miles (km)	Service required	USA Distance covered miles
	After Sales	
1,000-1,500 . . . . (1,500-2,500)		..1,000-1,500
6,000 (10,000)	A	6,000
12,000 (20,000) . . .	B	12,500
18,000 (30,000) . . .	A	18,500
24,000 (40,000) . . .	B	25,000
30,000 (50,000) . . .	A	31,000
36,000 (60,000) ...	C	37,500
42,000 (70,000)	A	43,500
48,000 (80,000)	B	50,000
54,000 (90,000)	A	56,000
60,000 (100,000) ..	B	62,500
66,000 (110,000) ..	A	68,500
72,000 (120,000) ...	C	75,000
78,000 (130,000) ...	A	81,000
84,000 (140,000) ...	B	87,500
90,000 (150,000) ...	A	93,500
96,000 (160,000)...	B	100,000

X Required Maintenance

Lotus Cars Ltd. requires that these maintenance operations and checks are made within 1,000 miles (1,600 km) of the distances indicated to maintain warranty validation and help ensure proper safety, emissions performance and dependability of the vehicle. The advice of the dealer should be sought for any service problems. All necessary repairs should be completed at once.

X² Recommended Maintenance

Lotus Cars Ltd. recommends that these operations are performed in addition to the required maintenance in order to help ensure optimum efficiency, economy and dependability, but their performance is not a requirement of either the vehicle or emission system warranties.

Recommended Time Period

Lotus Cars Ltd. recommends that in the case of low usage vehicles where a 'mileage interval' service is not required in any 12 month period, a 'time period' service is performed as indicated.

Note
There is no charge for the labour labour content of the After Sales service. Only materials used will be charged for.

Op no.	OPERATION DESCRIPTION	Time Period (months)	SERVICE TYPE A/S	A	B	C
1	**Fit protective covers to seats, footwells, steering wheel, & rear wings.**		X	X	X	X
	Lubrication					
2	Renew engine oil*	12	X	X	X	X
3	Renew engine oil filter*	12	X	X	X	X
4	Inspect engine & transmission for oil leaks		X	X	X	X
5	Check transmission oil level		X	X	X	
6	Renew transmission oil					X
7	Check PAS fluid level		X	X	X	
8	Renew PAS fluid					X
9	Repack front wheel bearings					X
10	Lubricate & adjust locks, hinges & catches		X	X	X	X
	* In 'severe service' conditions (dusty areas, or cold, stop/start driving), change twice as frequently or as required.					
	Engine					
11	Inspect radiator, oil cooler, chargecooler & pipework for damage or leaks. Clean all radiator finning	12			X	X
12	Check coolant level & anti-freeze concentration	12	X	X	X	
13	Renew coolant	24				X
14	Check 'V' belt condition & check tension	12		X	X	X
15	Inspect cam belt condition & valve timing				X	
16	Check cam belt tension				X	
17	Renew cam belt & inspect valve clearances	36				X
18	Renew fuel filter					X
19	Renew air cleaner element* (refer above)				X	X
20	Renew spark plugs** (refer below)				X	X
	With engine running:					
21	Check cooling system hoses & connections	12	X		X	X
22	Inspect fuel tanks, caps & fuel pipe connections	12	X		X	X
23	Inspect exhaust system & check connections				X	X
	Using 'Tech 1' scanner tool:					
24	Inspect for stored codes		X	X	X	X
25	Check TPS adjustment		X[2]	X[2]	X[2]	X[2]
	**For peak engine performance the spark plugs should be replaced every 'B' service. However, plug changes at 30,000 mls will not affect or invalidate emission performance of the engine.					
	Braking System					
26	Check parking brake adjustment		X	X	X	X
27	Inspect operation of brake tell tales		X	X	X	X
28	Inspect brake pad thickness			X	X	X
29	Inspect brake hoses, pipes & hydraulic units	12	X	X	X	X
30	Renew brake fluid	12			X	X
31	Check brake fluid level	12	X	X	X	X

Continued.....

Op no,,	OPERATION DESCRIPTION	Time Period (months)	SERVICE TYPE A/S	A	B	C
	Clutch					
32	Check clutch fluid level & inspect for leaks		X	X	X	X
	Steering & Suspension					
33	Inspect condition of driveshaft gaiters	12		X	X	X
34	Inspect steering ball joints & gaiters			X	X	X
35	Inspect PAS pipes & hoses	12		X	X	X
36	Inspect condition of all suspension bushes				X	X
37	Inspect dampers for leaks & performance			X	X	X
38	Check front hub bearing adjustment			X	X	X
39	Inspect rear wheel bearings for play			X	X	X
40	Check security of front & rear suspension			X	X	X
41	Check condition of steering column u/js				X	X
42	Inspect front wheel toe setting			X	X	X
42a	Check torque of rear hub nuts		X			
	Wheels & Tyres					
43	Inspect tyre condition & set pressures (inc spare) . .	12	X	X	X	X
44	Check wheel nut torque		X	X	X	X
45	Lubricate wheel hub spigots	12		X	X	X
	Electrical					
46	Inspect battery condition	12			X	X
47	Check battery terminals for security & condition	12			X	X
48	Inspect operation of all lights	12		X	X	X
49	Check headlamp alignment		X		X	X
50	Inspect operation of all electrical equipment	12		X	X	X
	Body					
51	Check adjustment of hinges & latches				X	X
52	Inspect operation & condition of seat belts			X	X	X
53	Inspect operation of heater/air conditioning				X	X
54	Cop up screenwash reservoir		X	X	X	X

Road Test Performance

Engine performance ..... Brake performance .....

Clutch operation ..... Gearbox operation .....

Steering performance ..... Wheel balance .....

Driveline and suspension noise/vibration . . . . . .

General comments . . . . . .

Work completed by ..... Dealer stamp:

Date .....

MAINTENANCE SCHEDULE - CALIFORNIA '93/'94 M.Y. 4-CYLINDER ESPRIT

LSL 325A

Date . . . . . Owner's Name . . . . . Vehicle . . . . . .

Vehicle Registration No. . . . . V.I.N. . . . . .

Recorded Mileage . . . . . Service Reqd. . . . . Job No. . . . . .

An 'X' in the columns below means that the service operation is to be performed. Circle the X when the operation has been performed satisfactorily.

Note
'Inspect' means assess condition and test for correct operation. Extra time is required to adjust or repair - advise customer beforehand if necessary.
'Check' means test and adjust/fill or tighten as necessary.

Distance covered miles	Service required
l,OOO-1,500	After Sales
6,000	A
12,500	B
18,500	A
25,000	B
31,000	A
37,500	c
43,500	A
50,000	B + extra operations
56,000	A
62,500	B
68,500	A
75,000	C
81,000	A
87,500	B
93,500	A
100,000	B + extra operations

X Required Maintenance

Lotus Cars Ltd. requires that these maintenance operations and checks are made within 1,000 miles of the distances indicated to maintain warranty validation and help ensure proper safety, emissions performance and dependability of the vehicle. The advice of the dealer should be sought for any service problems. All necessary repairs should be completed at once.

X² Recommended Maintenance

Lotus Cars Ltd. recommends that these operations are performed in addition to the required maintenance in order to help ensure optimum efficiency, economy and dependability, but their performance is not a requirement of either the vehicle or emission system warranties.

Recommended Time Period

Lotus Cars Ltd. recommends that in the case or low usage vehicles where a 'mileage interval' service is not required in any 12 month period, a 'time period' service is performed as indicated.

Notes: There is no charge for the labour content of the After Sales service. Only the materials used will be charged for.

Op no.	OPERATION DESCRIPTION	Time Period (months.)	SERVICE TYPE A/S	A	B	C
1	**Fit protective covers to seats, footwells, steering wheel, & rear wings.**		X	X	X	X
	Lubrication					
2	Renew engine oil*	12	X	X	X	X
3	Renew engine oil filter*	12	X	X	X	X
4	Inspect engine & transmission for oil leaks		X	X	X	X
5	Check transmission oil level		X	X	X	
6	Renew transmission oil					X
7	Repack front wheel bearings					X
8	Lubricate & adjust locks, hinges & catches		X	X	X	X
	* In 'severe service' conditions (dusty areas, or cold, stop/start driving), change twice as frequently or as required.					
	Engine					
9	Inspect radiator, oil cooler, chargecooler & pipework for damage or leaks. Clean all radiator finning ...	12			X	X
10	Check coolant level & anti-freeze concentration	12	X	X	X	
11	Renew coolant	24				X
12	Check 'V' belt condition & check tension	12		X[2]	X[2]	X
13	Inspect cam belt condition & valve timing				X[2]	
14	Check cam belt tension				X[2]	
15	Inspect valve clearances					X
16	Renew cam belt	50,000 miles				
17	Renew fuel filter	50,000 miles				
18	Renew air cleaner element* (refer above)				X[2]	X
19	Renew spark plugs** (refer below)				X[2]	X
	With engine running:					
20	Check cooling system hoses & connections	12	X		X	X
21	Inspect fuel tanks, caps & fuel pipe connections . .	12	X[2]		X[2]	X[2]
22	Inspect exhaust system & check connections				X	X
	Using 'Tech 1' scanner tool:					
23	Inspect for stored codes		X[2]	X[2]	X[2]	X[2]
24	Check TPS adjustment		X[2]	X[2]	X[2]	X[2]
25	Inspect operation of exhaust back pressure valve and throttle jack		X[2]		X[2]	X[2]
	**For peak engine performance the spark plugs should be replaced every 'B' service. However, plug changes at 30,000 mls will not affect or invalidate emission performance of the engine.					
	Braking System					
26	Check parking brake adjustment		X	X	X	X
27	Inspect operation of brake tell tales		X	X	X	X
28	Inspect brake pad thickness			X	X	X
29	Inspect brake hoses, pipes & hydraulic units	12	X	X	X	X
10	Renew brake fluid	12			X	X
11	Check brake fluid level	12	X	X	X	X

Continued.....

Op no.	OPERATION DESCRIPTION	Time Period (months)	SERVICE TYPE A/S	A	B	C
	Clutch					
32	Check clutch fluid level & inspect for leaks		X	X	X	X
	Steering & Suspension					
33	Inspect condition of driveshaft gaiters	12		X	X	X
34	Inspect steering ball joints & gaiters			X	X	X
35	Inspect PAS pipes & hoses	12		X	X	X
36	Inspect condition of all suspension bushes				X	X
37	Inspect dampers for leaks & performance			X	X	X
38	Check front hub bearing adjustment			X	X	X
39	Inspect rear wheel bearings for play			X	X	X
40	Check security of front & rear suspension			X	X	X
41	Check condition of steering column u/js				X	X
42	Inspect front wheel toe setting			X	X	X
	Wheels & Tyres					
43	Cnspect tyre condition & set pressures (inc spare) . .	12	X	X	X	X
44	Check wheel nut torque		X	X	X	X
45	Lubricate wheel hub spigots	12		X	X	X
	Electrical					
46	Cnspect battery condition	12			X	X
47	Check battery terminals for security & condition	12			X	X
48	Cnspect operation of all lights	12		X	X	X
49	Check headlamp alignment		X		X	X
50	Inspect operation of all electrical equipment	12		X	X	X
	Body					
51	Check adjustment of hinges & latches				X	X
52	Inspect operation & condition of seat belts			X	X	X
53	Inspect operation of heater/air conditioning				X	X
54	Top up screenwash reservoir		X	X	X	X

Road Test Performance

Engine performance . . . . . Brake performance . . . . . .

Clutch operation . . . . . Gearbox operation . . . . . .

Steering performance . . . . . Wheel balance . . . . . .

Driveline and suspension noise/vibration . . . . . .

General comments . . . . . .

Work completed by . . . . . Dealer stamp:

Date . . . . . .

MAINTENANCE SCHEDULE - CALIFORNIA '95 M.Y. 4-CYLINDER ESPRIT

LSL 325C

Date . . . . . Owner's Name . . . . . Vehicle . . . . . .

Vehicle Registration No. . . . . V.I.N. . . . . .

Recorded Mileage . . . . . Service Reqd. . . . . Job No. . . . . .

An **'X'** in the columns below means that the service operation is to be performed. Circle the X when the operation has been performed satisfactorily.

Note.
'Inspect' means assess condition and test for correct operation. Extra time is required to adjust or repair - advise customer beforehand if necessary.
'Check' means test and adjust/fill or tighten as necessary.

Distance covered miles	**Service required**
1,000-1,500	After Sales
6,000	A
12,500	B
18,500	A
25,000	B
31,000	A
37,500	C
43,500	A
50,000	B + extra operations
56,000	A
62,500	B
68,500	A
75,000	C
81,000	A
87,500	B
93,500	A
100,000	B + extra operations

X Required Maintenance

Lotus Cars Ltd. requires that these maintenance operations and checks are made within 1,000 miles of the distances indicated to maintain warranty validation and help ensure proper safety, emissions performance and dependability of the vehicle. The advice of the dealer should b sought for any service problems. All necessary repairs should be completed at once.

X² Recommended Maintenance

Lotus Cars Ltd. recommends that these operations are performed in addition to the required maintenance in order to help ensur optimum efficiency, economy and dependability, but their performance is not a requirement of either the vehicle or emission system warranties.

Recommended Time Period

In the case of low usage vehicles, where a 'B' service is not required in any 12 month period, any outstanding time period operations listed, should be performed within 45 days of the due date, and the Time Period Service recorded in the Owners's Handbook.

Notes : There is no charge for the labour content of the After Sales service, Only the materials used will be charged for.

Op no.	OPERATION DESCRIPTION	Time Period (months:)	SERVICE TYPE A/B	A	B	C
1	**Fit protective covers to seats, footwells, steering wheel, & rear wings.**		X	X	X	X
	Lubrication					
2	Renew engine oil*	12	X	X	X	X
3	Renew engine oil filter*	12	X	X	X	X
4	Inspect engine & transmission for oil leaks		X	X	X	X
5	Check transmission oil level		X	X	X	
6	Renew transmission oil					X
7	Check PAS fluid level		X	X	X	
8	Renew PAS fluid					X
9	Repack front wheel bearings					X
10	Lubricate & adjust locks, hinges & catches		X	X	X	X
	* In 'severe service' conditions (dusty areas, or cold, stop/start driving), change twice as frequently or as required.					
	Engine					
11	Inspect radiator, oil cooler, chargecooler & pipework for damage or leaks. Clean all radiator finning ...	12			X	X
12	Check coolant level & anti-freeze concentration	12	X	X	X	
13	Renew coolant	24				X
14	Check 'V' belt condition & check tension	12		X[2]	X[2]	X
15	Inspect cam belt condition & valve timing				X[2]	
16	Check cam belt tension				X[2]	
17	Inspect valve clearances					X
18	Renew cam belt	100,000 miles				
19	Renew fuel filter	100,000 miles				
20	Renew air cleaner element* (refer above)				X[2]	X
21	Renew spark plugs** (refer below)				X[2]	X
	With engine running:					
22	Check cooling system hoses & connections	12	X		X	X
23	Inspect fuel tanks, caps & fuel pipe connections . .	12	X[2]		X[2]	X[2]
14	Inspect exhaust system & check connections				X	X
	Using 'Tech 1' scanner tool:					
15	Inspect for stored codes		X[2]	X[2]	X[2]	X[2]
26	Check TPS adjustment		X[2]	X[2]	X[2]	X[2]
27	Inspect operation of exhaust back pressure valve and throttle jack		X[2]		X[2]	X[2]
	**For peak engine performance the spark plugs should be replaced every 'B' service. However, plug changes at 30,000 mls will not affect or invalidate emission performance of the engine.					
	Braking System					
28	Check parking brake adjustment		X	X	X	X
29	Inspect operation of brake tell tales		X	X	X	X
30	Inspect brake pad thickness			X	X	X
31	Inspect brake hoses, pipes & hydraulic units	12	X	X	X	X
32	Renew brake fluid	12			X	X
33	Check brake fluid level	12	X	X	X	X

Continued.....

Op no.	OPERATION DESCRIPTION	Time Period (months)	SERVICE TYPE A/S	A	B	C
	Clutch					
32	Check clutch fluid level & inspect for leaks		X	X	X	X
	Steering & Suspension					
33	Inspect condition of driveshaft gaiters	12		X	X	X
34	Inspect steering ball joints & gaiters			X	X	X
35	Inspect PAS pipes & hoses	12		X	X	X
36	Inspect condition of all suspension bushes				X	X
37	Inspect dampers for leaks & performance			X	X	X
38	Check front hub bearing adjustment			X	X	X
39	Inspect rear wheel bearings for play			X	X	X
40	Check security of front & rear suspension			X	X	X
41	Check condition of steering column u/js				X	X
42	Inspect front wheel toe setting			X	X	X
	Wheels & Tyres					
43	Inspect tyre condition & set pressures (inc spare) . .	12	X	X	X	X
44	Check wheel nut torque		X	X	X	X
45	Lubricate wheel hub spigots	12		X	X	X
	Electrical					
46	Inspect battery condition	12			X	X
47	Check battery terminals for security & condition	12			X	X
48	Inspect operation of all lights	12		X	X	X
49	Check headlamp alignment		X		X	X
50	Inspect operation of all electrical equipment	12		X	X	X
	Body					
51	Check adjustment of hinges & latches				X	X
52	Cnspect operation & condition of seat belts			X	X	X
53	Cnspect operation of heater/air conditioning				X	X
54	Top up screenwash reservoir		X	X	X	X

Road Test Performance

Engine performance ..... Brake performance .....

Clutch operation ..... Gearbox operation .....

Steering performance ..... Wheel balance .....

Driveline and suspension noise/vibration .....

General comments .....

Work completed by .....

Dealer stamp:

Date:

Recommended Service Times
After Sales = 2.5 hr 'A' Service = 3.4 hr
'B' Service = 5.4 hr 'C' Service = 6.5 hr
12 month time period service = 2.5 hr

MAINTENANCE SCHEDULE - Non-USA ESPRIT V8

LSL 344c

Date: ..... Owner's Name: ..... Vehicle: .....

Vehicle Registration No.: ..... V.I.N.. .....

Recorded Mileage: ..... Months Since Last Service: ..... Job No.: .....

EXPLANATORY NOTES:

Required Maintenance

In order to maintain warranty validation and help ensure proper safety, emissions performance and dependability of the vehicle, Lotus Cars Ltd. requires that the vehicle be serviced in accordance with this schedule. Each service should be performed either within 1,000 miles (1,600 km) of the distances stipulated, or within one month of the anniversary of the previous service, whichever first occurs. Any necessary repairs should be completed without delay.

A cross (X) in the following table indicates an operation to be performed. The corresponding box should be ticked (J) when the operation has been satisfactorily performed, or the X circled if extra work and time is required. The approval of the customer should be obtained before any extra work is undertaken, details of which should be recorded in the space provided at the end of the schedule.

After Gales Service

There is no charge to the vehicle owner for the labour content of the After Sales Service. Only materials used will be charged.

'Inspect' means assess condition and test for correct operation. Extra time is required to adjust or repair - advise customer beforehand if necessary.

'Check' means test and adjust/fill or tighten as necessary. Labour time is included.

Service Intervals		Service Type
1,000 to 1,500 miles (1,500 to 2,500 km)	To be performed within 12 months of vehicle date of sale.	After Sales Service.
6,000 miles (10,000 km)	Or 12 months since last service.	A
12,000 miles (20,000 km)	" " " " " "	A
18,000 miles (30,000 km)	" " " " " "	A
24,000 miles (40,000 km)	" " " " " "	A
30,000 miles (50,000 km)	" " " " " "	A
36,000 miles (60,000 km)	" " " " " "	B
42,000 miles (70,000 km)	" " " " " "	A
48,000 miles (80,000 km)	" " " " " "	A
54,000 miles (90,000 km)	" " " " " "	A
60,000 miles (100,000 km)	" " " " " "	A
66,000 miles (110,000 km)	" " " " " "	A
72,000 miles (120,000 km)	" " " " " "	B + cam belts & fuel filter change
78,000 miles (130,000 km)	" " " " " "	A
84,000 miles (140,000 km)	" " " " " "	A
90,000 miles (150,000 km)	" " " " " "	A
96,000 miles (160,000 km)	" " " " " "	A
102,000 miles (170,000 km)	" " " " " "	A

Op No	OPERATION DESCRIPTION	SERVICE TYPE			
		After Sales	A	B	Other
1	Fit protective covers to seats, footwells, steering wheel & rear body	X	X	X	
	Lubrication				
2	Renew engine oil*	X	X	X	
3	Renew engine oil filter*	X	X	X	
4	Inspect engine & transmission for oil leaks	X	X	X	
5	Check transmission oil level		X		
6	Renew transmission oil			X	
7	Check PAS fluid level	X	X		
8	Renew PAS fluid			X	
9	Repack front wheel bearings			X	
	• In 'severe service' conditions (dusty areas, or cold, stop/start driving), change twice as frequently or as required.				
	Engine				
10	Check for free operation of both turbocharger wastegates		X	X	
11	Inspect auxiliary drive belt condition		X	X	
12	Check cam belt tension		12,000m (20,000km)		
13	Renew cam belts		72,000m (120,000km)/8 years		
14	Renew fuel filter		102,000m (170,000km)/8 years		
15	Renew air cleaner element* (refer above)			X	
16	Renew spark plugs & re-seal covers			X	
17	Carry out 'Tech 1' test	X	X	X	
	Cooling System				
18	Inspect radiator, oil coolers, & pipework for damage or leaks. Clean all radiator finning	X	X	X	
19	Check coolant level	X	X	X	
20	Renew coolant				24mths
	Braking System				
21	Inspect parking brake adjustment	X	X	X	
22	Inspect operation of brake tell tales	X	X	X	
23	Inspect brake pad thickness & disc condition^		X	X	
	^ In conditions where the brakes are subject to heavy use, inspection may be required more frequently				
24	Inspect brake hoses, pipes & hydraulic units		X	X	
25	Check brake/clutch fluid level & inspect for leaks	X	X	X	
26	Renew brake/clutch fluid				12mths
	Steering & Suspension				
27	Inspect security and condition of front & rear suspension		X	X	
28	Inspect dampers for leaks & performance		X	X	
29	Inspect front & rear wheel bearings for play		X	X	
30	Check torque of rear hub nuts (260 - 270 Nm)	X			
31	Inspect condition of driveshaft gaiters		X	X	

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Op No	OPERATION DESCRIPTION	SERVICE TYPE			
		After Sales	A	B	Other
32	Inspect steering ball joints & gaiters		X	X	
33	nspect free play at steering wheel		X	X	
	Wheels & Tyres				
34	nspect tyre condition & set pressures (inc. spare)	X	X	X	
	Electrical				
35	Check battery terminals for security & condition		X	X	
36	Inspect operation of all lights	X	X	X	
37	Inspect operation of all electrical equipment	x	x	x	
	Body				
38	Check adjustment & lubrication of hinges & latches	X	X	X	
39	Inspect operation & condition of seat belts		X	X	
40	Inspect operation of heater/air conditioning		X	X	
41	Top up screenwash reservoir	X	X	X	

Road Test Performance

Engine performance ..... Brake performance .....

Clutch operation ..... Gearbox operation .....

Steering performance ..... Wheel balance .....

Driveline & suspension noise/vibration .....

General comments.. .....

Additional work required .....

.....

.....

.....

Work completed by .....

Recommended Service Times

After Sales Service: ***2.5*** hr
'A' Service: ***3.4*** hr
'B' Service: ***8.4*** hr

Dealer stamp:

Date:

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MAINTENANCE SCHEDULE - USA ESPRIT V8

Date: ..... Owner's Name: ..... Vehicle: .....

Vehicle Registration No.: ..... V.I.N.: .....

Recorded Mileage: ..... Months Since Last Service: ..... Job No.: .....

EXPLANATORY NOTES:

Reauired Maintenance

In order to maintain warranty validation and help ensure proper safety, emissions performance and dependability of the vehicle, Lotus Cars Ltd. requires that the vehicle be serviced in accordance with this schedule. Each service should be performed either within 1,000 miles (1,600 km) of the distances stipulated, or within one month of the anniversary of the previous service, whichever first occurs. Any necessary repairs should be completed without delay.

A cross (X) in the following table indicates an operation to be performed. The corresponding box should be ticked (J) when the operation has been satisfactorily performed, or the X circled if extra work and time is required. The approval of the customer should be obtained before any extra work is undertaken, details of which should be recorded in the space provided at the end of the schedule.

After Sales Service

There is no charge to the vehicle owner for the labour content of the After Sales Service. Only materials used will be charged.

'Inspect' means assess condition and test for correct operation. Extra time is required to adjust or repair - advise customer beforehand if necessary.

'Check' means test and adjust/fill or tighten as necessary. Labour time is included.

Service Intervals		Service Type
1,000 to 1,500 miles (1,500 to 2,500 km)	To be performed within 12 months of vehicle date of sale.	After Sales Service.
6,000 miles (10,000 km)	Or 12 months since last service..	A
12,000 miles (20,000 km)	" " " " " "	A
18,000 miles (30,000 km)	" " " " " "	A
24,000 miles (40,000 km)	" " " " " "	A
30,000 miles (50,000 km)	" " " " " "	A
36,000 miles (60,000 km)	" " " " " "	B
42,000 miles (70,000 km)	" " " " " "	A
48,000 miles (80,000 km)	" " " " " "	A
54,000 miles (90,000 km)	" " " " " "	A
60,000 miles (100,000 km)	" " " " " "	A
66,000 miles (110,000 km)	" " " " " "	A
72,000 miles (120,000 km)	" " " " " "	B
78,000 miles (130,000 km)	" " " " " "	A
84,000 miles (140,000 km)	" " " " " "	A
90,000 miles (150,000 km)	" " " " " "	A
96,000 miles (160,000 km)	" " " " " "	A
102,000 miles (170,000 km)	" " " " " "	A

Op No	OPERATION DESCRIPTION	SERVICE TYPE			
		After Sales	4	B	Other
1	Fit protective covers to seats, footwells, steering wheel & rear body	X	X	X	
	Lubrication				
2	Renew engine oil*	X	X	X	
3	Renew engine oil filter*	X	X	X	
4	Inspect engine &transmission for oil leaks	X	X	X	
5	Check transmission oil level		X		
6	Renew transmission oil			X	
7	Check PAS fluid level	X	X		
8	Renew PAS fluid			X	
9	Repack front wheel bearings			X	
	* In 'severe service' conditions (dusty areas, or cold, stop/start driving), change twice as frequently or as required.				
	Engine				
10	Inspect auxiliary drive belt condition		X	X	
11	Renew cam belts		102,000 miles/8 yrs		
12	Renew fuel filter				102,000 miles
13	Renew air cleaner element* (refer above)			X	
14	Renew spark plugs			X	
	Cooling System				
15	Inspect radiator, oil coolers, & pipework for damage or leaks. Clean all radiator finning	X	X	X	
16	Check coolant level	X	X	X	
17	Renew coolant				24mths
	Braking System				
18	Inspect parking brake adjustment	X	X	X	
19	Inspect operation of brake tell tales	X	X	X	
20	Inspect brake pad thickness & disc condition^		X	X	
	^ In conditions where the brakes are subject to heavy use, inspection may be required more frequently				
21	Inspect brake hoses, pipes & hydraulic units		X	X	
22	Check brake/clutch fluid level & inspect for leaks	X	X	X	
23	Renew brake/clutch fluid				12mths
	Steering & Suspension				
24	Inspect security and condition of front & rear suspension		X	X	
25	Inspect dampers for leaks & performance		X	X	
26	Check torque of rear hub nuts	X			
27	Inspect front & rear wheel bearings for play		X	X	
28	Inspect condition of driveshaft gaiters		X	X	
29	Inspect steering ball joints & gaiters		X	X	
30	Inspect free play at steering wheel		X	X	

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Continued . . . . . .

OP No	OPERATION DESCRIPTION	SERVICE TYPE			
		After Sales	A	6	Other
	Wheels & Tyres				
131	Inspect tyre condition & set pressures (inc. spare)	X	X	X	
	Electrical				
32	Check battery terminals for security & condition		X	X	
33	Inspect operation of all lights	X	X	X	
34	inspect operation of all electrical equipment	X	X	X	
	Body				
35	Check adjustment & lubrication of hinges & latches	X	X	X	
36	Inspect oberation & condition of seat belts		X	X	
37	Inspect operation of heater/air conditioning		X	X	
38	Top UD screenwash reservoir	X	X	X	

Road Test Performance

Engine performance ..... Brake performance .....

Clutch operation ..... Gearbox operation .....

Steering performance ..... Wheel balance .....

Driveline & suspension noise/vibration .....

General comments.. .....

Additional work required .....

.....

.....

.....

Work completed by .....

Recommended Service Times

After Sales Service:	**2.5** hr
'A' Service:	**3.4** hr
'B' Service:	**4.7** hr

Dealer stamp:

Date:

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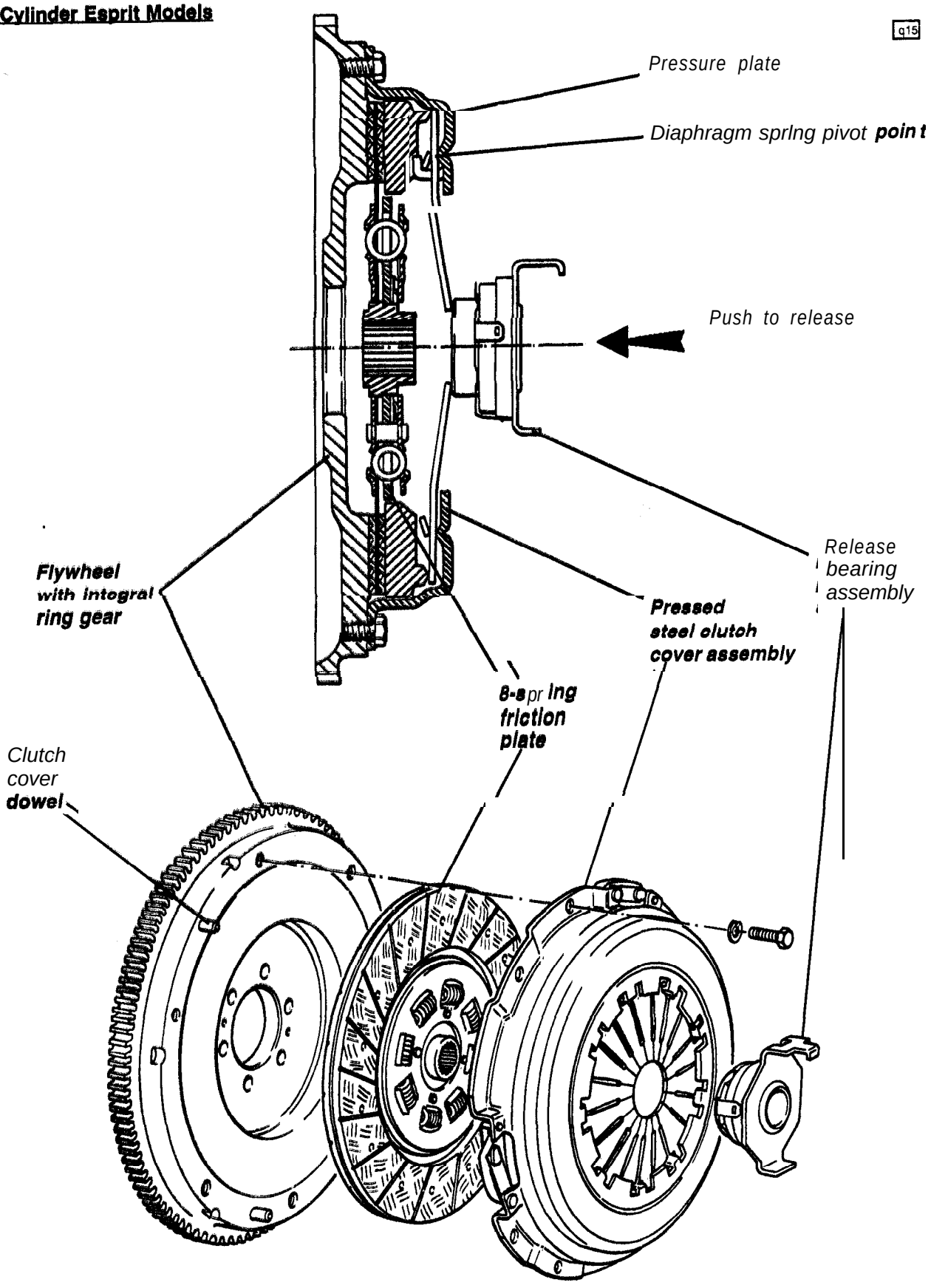
Clutch

SECTION QE - ESPRIT S4 & Sport 300

4 Cylinder Esprit Models

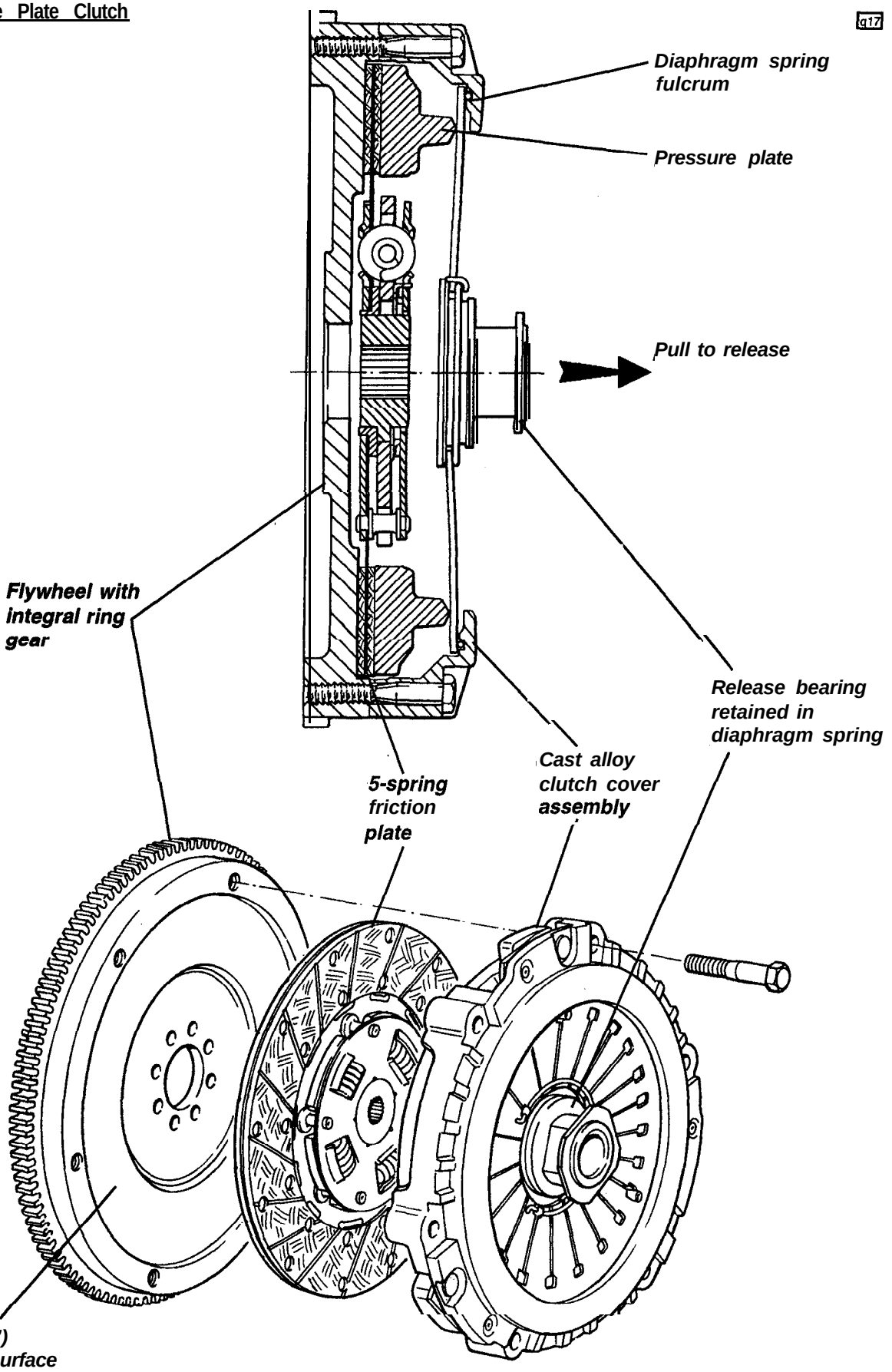
q15



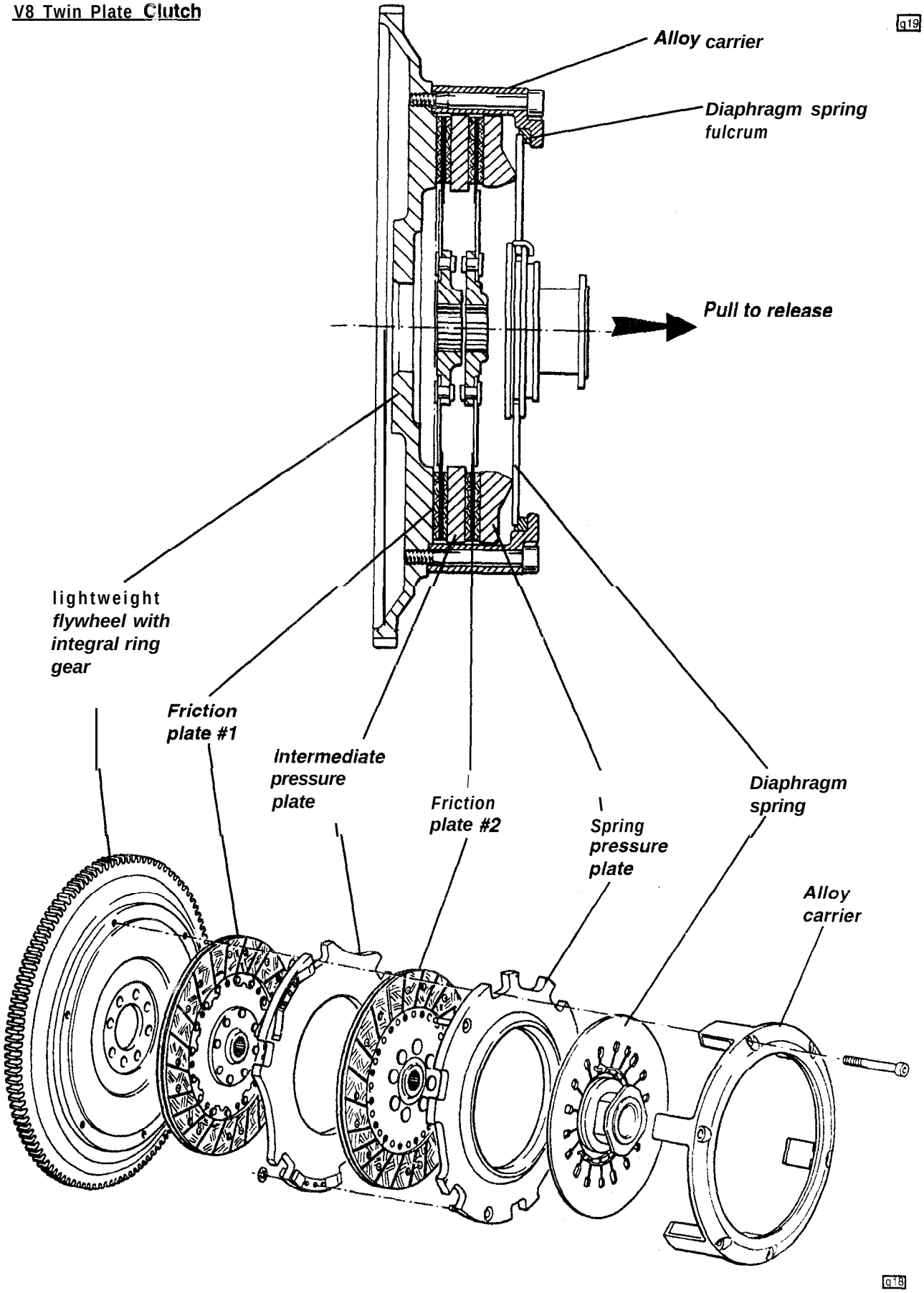
q14

V8 Single Plate Clutch

q17



V8 Twin Plate Clutch



QE.I -GENERAL DESCRIPTION

4-cylinder cars

The clutch consists of a single, dry, 228mm diameter friction plate, clamped between the pressure plate and flywheel by a diaphragm spring. The friction plate incorporates eight coil springs to absorb transmission shock loads, and is free to slide along the splines of a clutch shaft, the rear end of which is splined to the gearbox primary shaft, with the front end supported by a ball bearing race housed in the rear end of the crankshaft. A steel clutch cover assembly incorporates a pressure plate and diaphragm spring, with a sealed ball type release bearing acting against the fingers of the spring. The bearing is mounted on a carrier which slides over a guide tube fixed into the clutch housing, and is pressed towards the flywheel by a cast iron release fork pivotted on a ball fulcrum and emerging from the right hand side of the clutch housing.

8-cylinder cars

V8 engined cars built prior to Feburary 1997 (VIN V 5280) use a dry, single plate, 280mm diameter clutch assembly, and cars after this change point a dry twin plate, 215mm diameter assembly. Single plate systems use a friction plate with five concentric pairs of coil springs in the hub to absorb transmission shock loads, and a clutch cover which incorporates a cast iron pressure plate and steel diaphragm spring mounted in an alloy carrier, bolted to the rear face of the flywheel via six fixings. Twin plate assemblies use two friction plates without torque damping springs, clamped by a diaphragm spring between two floating iron pressure plates and the flywheel. An alloy carrier bolted to the flywheel by six fixings, mounts the diaphragm spring, and drives the pressure plates via steel cappings on the six legs of the carrier.

On both single and twin plate V8 clutch assemblies, a ball type release bearing is retained in the centre of the diaphragm spring by a spring wire circlip, and is **pulled away** from the flywheel by the release fork in order to relieve the clamp load on the friction plate(s) and disengage the drive. This 'pull to disengage' concept allows the diaphragm spring to be designed with a greater mechanical advantage for the release mechanism, and permits a higher clamping load for the same pedal effort. The release bearing slides on a sleeve fitted over a guide tube fitted in the clutch housing, with the bearing hub prevented from rotating by its square profile fitting between the legs of the release fork. The release fork is pivotted on a fulcrum pin anchored to the clutch housing, with assembly accommodated by a keyhole slot in the fork.

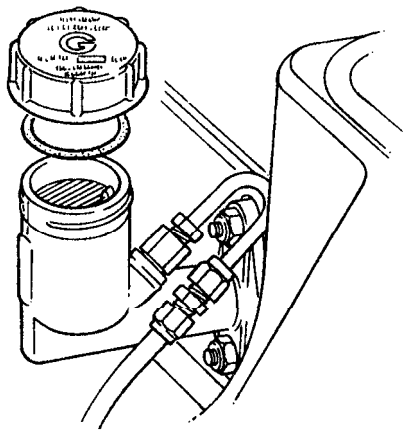
The clutch hydraulic release mechanism comprises a pendant type clutch pedal and pushrod operating a master cylinder, connected to a clutch housing mounted slave cylinder. A spring within the slave cylinder applies a preload to the ball race type release bearing in order to maintain its contact with the clutch cover diaphragm spring fingers. The slave cylinder is self adjusting, with the 'rest' position of the piston dependent on the thickness, or degree of wear, of the friction plate. As wear of the friction plate takes place, and its thickness is reduced, the slave cylinder piston is pushed progressively further back on its return stroke, with fluid being displaced back to the master cylinder reservoir.

QE.2 - MAINTENANCE

The hydraulic clutch release mechanism is self adjusting to compensate for friction plate wear, and once set up correctly requires no regular maintenance other than the checking of the fluid level at each service, and the yearly renewal of the hydraulic fluid in order to combat the effects of water absorption.

Before adding any fluid to the master cylinder, first clean around the reservoir cap and neck to ensure no dirt enters the reservoir when the cap is removed. The reservoir must not be overfilled, since the level of fluid will rise as wear of the friction plate takes place.

Clutch fluid reservoir



q30

Use only a hydraulic fluid meeting DOT 3 or DOT 4 specification, from a container marked with the yellow and black symbol designating a ***non-mineral type*** fluid.

A bleed nipple is provided at the slave cylinder to allow system bleeding by conventional techniques. The fluid capacity is approximately 0.15 litres.

j146

Clutch Pedal Adiustment

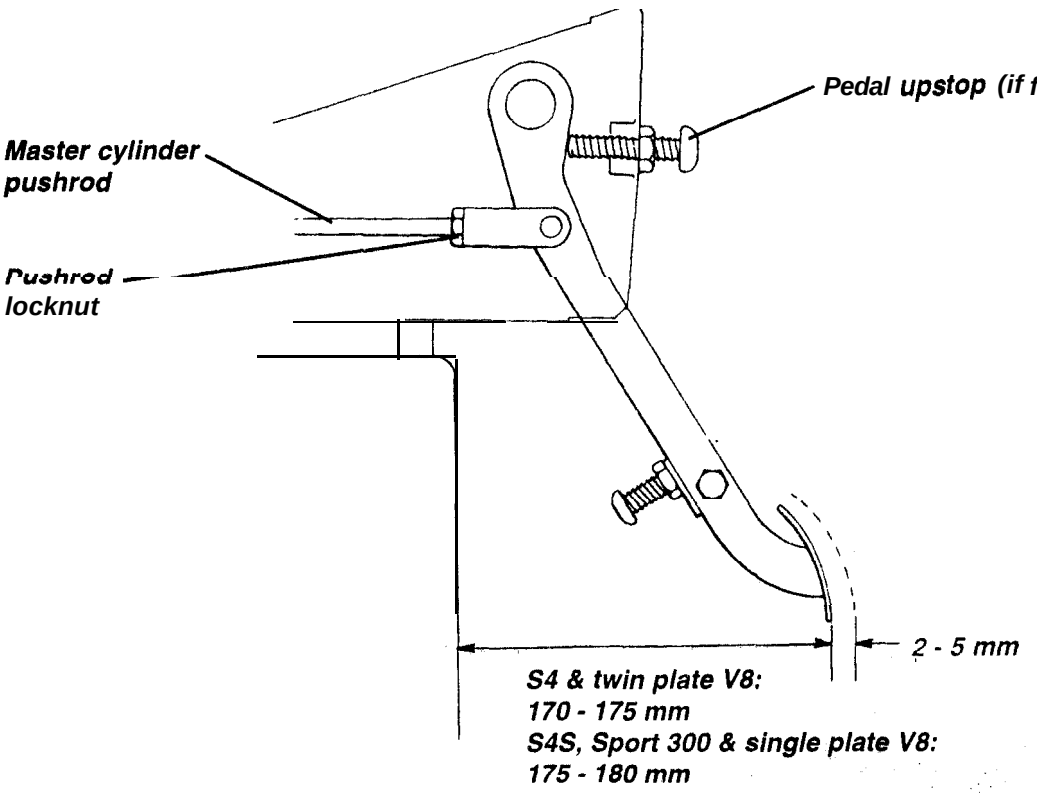
Adjustments available at the clutch pedal include; pushrod length, pedal upstop, and, on twin plate clutches only, a pedal downstop. These adjustments control the pedal height and the maximum fluid displacement from the master cylinder. Insuff icient displacement may not provide sufficient clutch release clearance, and result in drag, whereas too much displacement may result in over-travel of the release mechanism and damage to the clutch cover assembly.

Set the pedal height as follows:

With the pedal upstop backed off, and the clutch pedal released, measure the perpendicular distance from the fully compressed bulkhead carpet to the bottom edge of the metal pedal pad. If necessary adjust the master cylinder pushrod length to achieve the following specification:

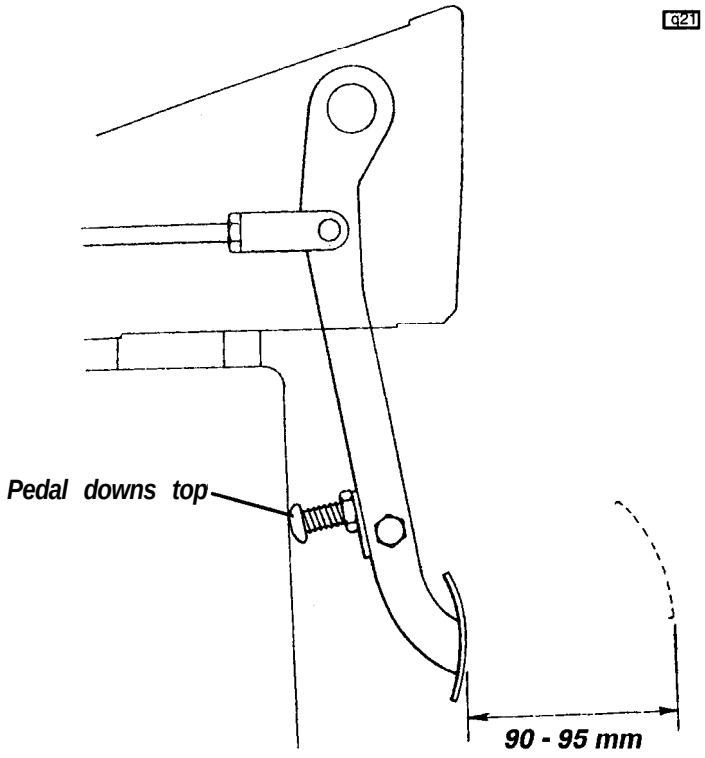
S4 & twin plate V8: 170 - 175 mm
S4S, Sport 300 & single plate V8: 175 - 180 mm

Adjust the pedal upstop to allow a small amount (2 • 5 mm) of upward free play in order to ensure that the master cylinder is 'topping out'. If prevented from so doing, pressure will be trapped in the system and result in clutch slip.



q20

On twin plate V8 models, set the downstop to achieve a pedal stroke of 90 - 95 mm as shown.



With the pedal adjusted as above, the following amount of travel should be available at the slave cylinder pushrod:

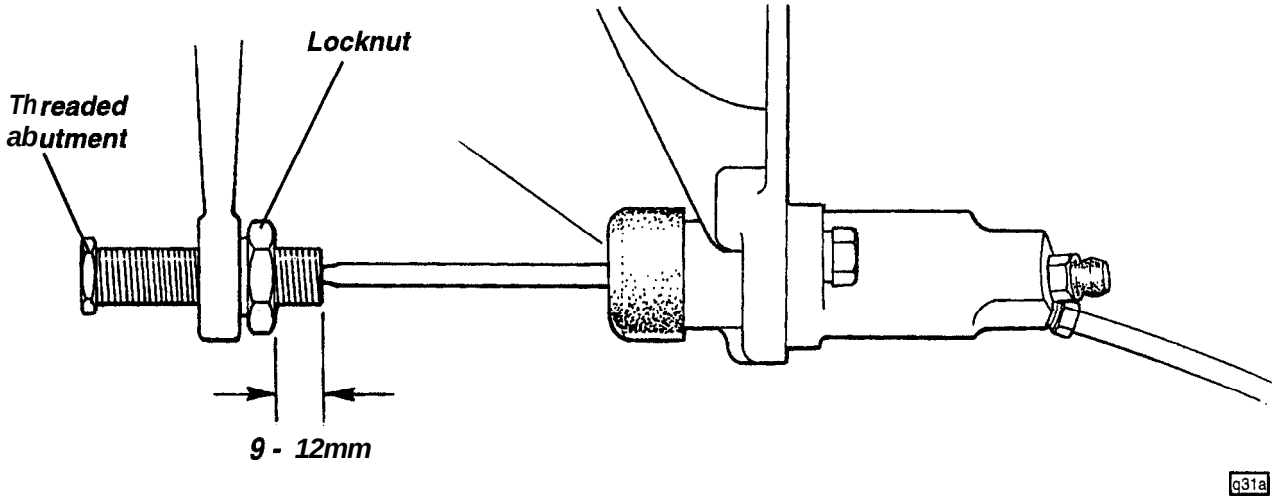
s4:	17.0 - 18.5 mm
S4S, sport 300 & single plate V8:	18.5 - 19.5 mm
Twin plate V8:	9.0 - 10.0 mm

(Note that on V8 models, the slave cylinder pushrod movement cannot be measured without removing the cylinder from the housing)

Release Fork Adjustment (4 cylinder cars)

On four cylinder cars, a threaded abutment in the end of the release fork must be set to a specified dimension in order to accommodate the positional working range of the slave cylinder piston with both a new friction plate, and a fully worn plate. The dimension specified allows the maximum permissible wear of the friction plate to take place before the slave cylinder piston 'tops out' on its return stroke, causing release mechanism preload and consequent clutch slip. This indicates that clutch replacement is necessary. A smaller dimension would allow the friction plate to wear to the point where damage could be caused to the pressure plate and/or flywheel, whereas a larger dimension would not fully utilise the friction plate material thickness.

Specification = 9 - 12 mm



Release Fork Adiustment (V8)

No adjustment is provided for on V8 engined cars, with the optimum setting controlled by design.

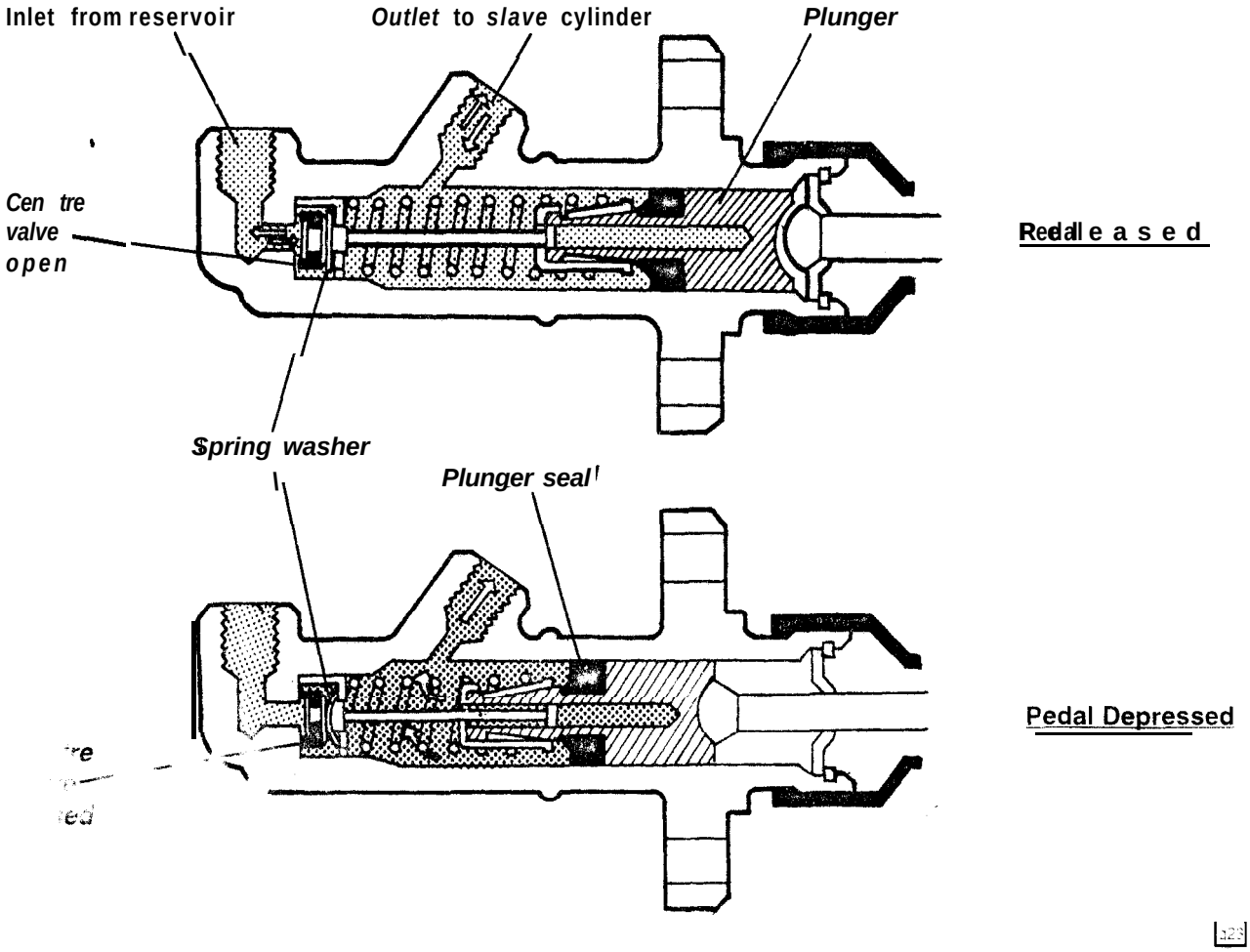
QE.3 • MASTER CYLINDER

The Girling Centre Valve (C.V.) type master cylinder with a bore size of 0.7" (17.8mm) on 4 cylinder cars, or 5/8" (15.9mm) on V8 models is fixed to the pedal box and is accessible from within the front luggage compartment. The integral fluid reservoir should be kept topped up with DOT 3 or 4 non-mineral type hydraulic fluid, but overfilling must be avoided, as the level will rise as the friction plate wears. On four cylinder cars, a flexible translucent plastic pipe is used to connect the master and slave cylinders, and is routed alongside the lower outside edge of the chassis backbone. On eight cylinder cars, a flexible front section joins a metal pipe routed alongside the chassis backbone, with a flexible steel braided hose connecting the rear end of the pipe to the slave cylinder in order to accommodate engine movement.

Operatina Principles

When the clutch pedal is depressed, the push rod contacts the plunger and pushes it up the bore of the cylinder. During the first 0.8 mm of movement, the spring washer fitted under the valve head is allowed to resume its natural 'bowed' shape, and closes the port to the reservoir. As the plunger continues to move up the bore, fluid is forced through the pipe to the slave cylinder.

On the return stroke, the plunger moves back with the return of the fluid, the final movement of the plunger pulling the valve stem and compressing the spring washer. This causes the valve seal to be lifted off its seat, opening the reservoir port and allowing free passage of fluid between system and reservoir.



If the mastercylinder is dismantled and the working surfaces of the cylinder and plunger are in unmarked condition, then the unit may be rebuilt-with a service kit, but if any doubt exists a replacement master cylinder should be fitted.

Master Cylinder Removal

Beware of the detrimental effect of brake fluid on painted body surfaces, and take all appropriate precautions to prevent spillage of fluid during any repair operations on the hydraulic system. Wash off any accidental contamination immediately to minimise damage.

1. Disconnect the outlet pipe from the cylinder, and collect the draining fluid. Cap or plug the port and pipe to prevent the ingress of dirt.

2. Remove the specially coated maintenance free clevis pin connecting the push rod to the pedal,

3. Release the two fixings securing the master cylinder to the pedal box. and withdraw the cylinder from the car.

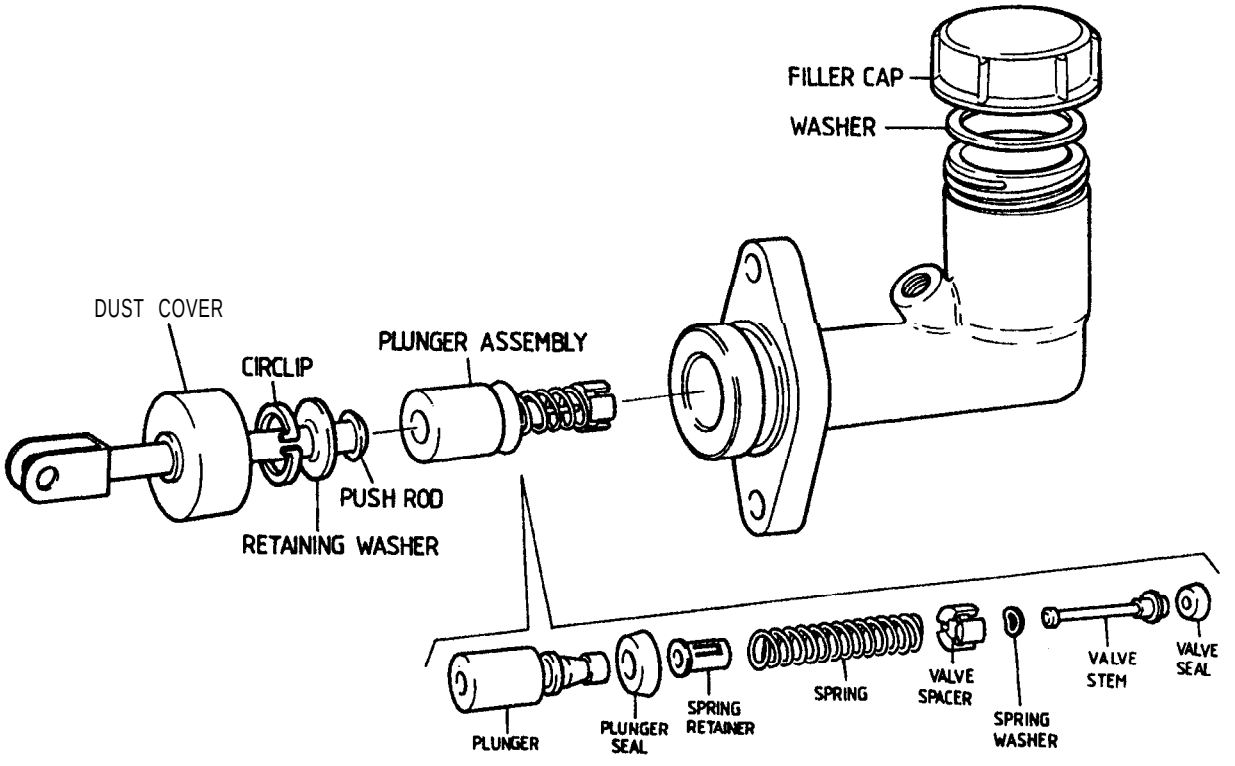
Refit in reverse order to removal. Fill with the specified fluid and bleed the system of air using the nipple provided on the slave cylinder. Check pedal adjustment as detailed above.

To Fit Repair Kit

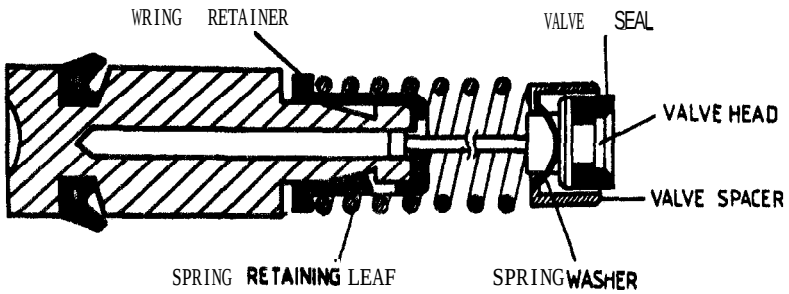
Pull back the rubber dust cover and remove the circlip with a pair of long nosed pliers. The plunger assembly can now be removed by shaking or using compressed air.

Lift the leaf of the spring retainer and remove the spring assembly from the plunger. Compress the spring to free the valve stem from the keyhole of the spring retainer, thus releasing the tension of the spring. Remove the spring, valve spacer and spring washer from the valve stem and the valve seal from the valve head.

To remove the plunger seal select a small screwdriver and round off and highly polish the end of the blade. Note: This is most important for if the surface of the plunger is damaged in any way, a new master cylinder must be fitted.

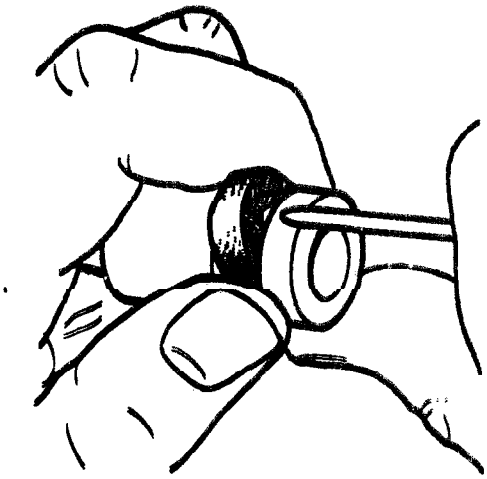


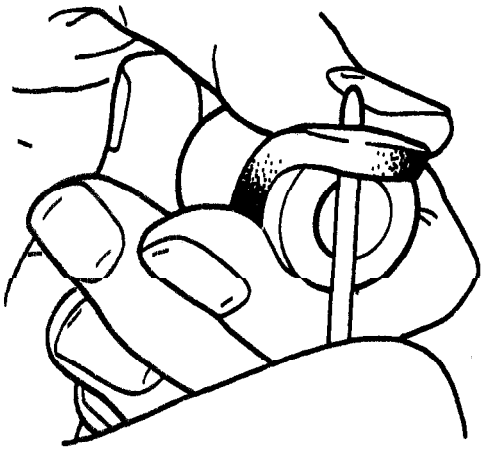
q24



q24

Referring to the diagram, squeeze the seal until the polished blade of the screwdriver can be inserted, fhen lever and press the seal from the plunger,





q25

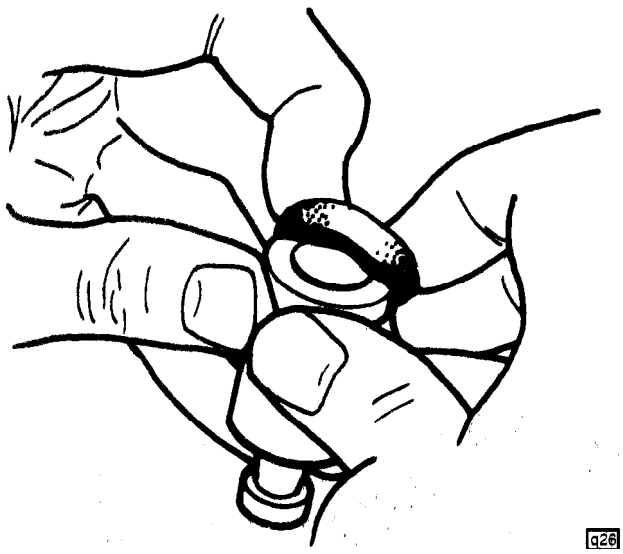
Cleaning & Assembling

Comparison of the parts contained In the approprlate Glrllng Service Kit will indicate which used parts should be discarded. fhoroughiy clean all the retained pans wlth Glrling Cleaning Fluid, or new brake fluid, and place on a clean sheet of paper.

Examine the plunger and cylinder bore for visible score marks, ridges and corrosion. Check the bore is perfectly smooth to the touch, If there la the slightest doubt as to the condition of parts, then a new guaranteed master cylinder should be fitted.

Lubricate the inner dlamefer of the new plunger seal wlfh brake fluid and fit the seal to the plunger,

FIt the valve seal, smallest diameter leading, on the valve stem so that It 'flares' away from the valve stem shoulder as Illustrated,



q26

- Fit the spring washer, valve spacer (legs first), spring and spring retainer onto the valve stem, and compress the spring to enable the end of the stem to locate in the keyhole slot in the retainer.
- Fit the valve stem sub-assembly to the plunger and press home the leaf of the spring retainer.
- Liberally lubricate the plunger seal and the cylinder bore with brake fluid before carefully easing the insertion of the plunger assembly into the cylinder bore, valve end leading.
- Position the push rod and retaining washer and fit the circlip.
- Smear the sealing areas of the rubber dust cover with the rubber grease provided, and fit the cover to the pushrod; use the remainder of the grease to pack the inside of the dust cover before fitting the cover to the cylinder body.

Refit the master cylinder and fill and bleed the hydraulic system.

QE.4 • SLAVE CYLINDER

On four cylinder cars, the slave cylinder is mounted at the right hand side of the clutch housing, facing rearwards, and on eight cylinder cars, the same cylinder is mounted in a separate carrier on top of the clutch housing, and faces forwards. To remove the unit, disconnect the fluid hose, and plug both the hose and cylinder port to reduce spillage and prevent dirt ingress. Release the two cylinder fixings and withdraw the cylinder assembly.

To disassemble the cylinder, pull off the dust boot, remove the spring wire circlip, and withdraw the piston assembly.

Cleaning

The new parts in the Girling Service Kit will indicate which used parts should be discarded. Clean the remaining parts and the cylinder thoroughly with Girling Cleaning Fluid or new non-mineral type brake fluid, and place on a sheet of paper.

Examine the cylinder bore and the piston for signs of corrosion, ridges or score marks. If the working surfaces are in unmarked condition, new seals from the service kit can be fitted, but if there is any doubt as to the condition of the parts, then a new guaranteed cylinder should be fitted.

Assembling

Fit the new seal to the piston with the flat back of the seal against the shoulder. Lubricate the seal and the cylinder bore with brake, fluid and reassemble the cylinder. Before fitting the dust cover, smear the sealing areas with Girling rubber grease. Apply more rubber grease to the inside of the dust cover to help protect internal parts.

Refit the cylinder to the clutch housing with the pushrod in position, connect the fluid hose and bleed the system of air.

QE.5 • CLUTCH ASSEMBLY

The transmission assembly must be removed to allow access to the clutch cover, friction plate and release bearing. See section FG.10.

Note • V8 enained cars:

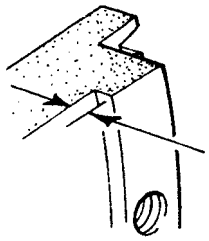
a). A rough guide to friction plate wear may be obtained after removal of the slave cylinder, by measuring the protrusion of the pushrod beyond the slave cylinder housing joint face. When new, the pushrod will be approximately flush with the jointface, increasing to approximately 14 mm protrusion with a fully worn friction plate.

b). The release bearing is retained in the centre of the clutch cover diaphragm spring, and before the transmission can be removed, the release fork must be disengaged from the release bearing: Remove the slave cylinder and the slave cylinder carrier from the clutch housing. Pull the fork upwards and rearwards to unhook the keyhole slot in the fork from the pivot ball, and allow the fingers of the fork to be withdrawn from the release bearing collar. It is not necessary to completely remove the fork from the clutch housing. If the friction plate is well worn, extracting the fork may require significant effort, which can be eased, if the same plate is to be refitted, by suitable fettling of the clutch housing aperture.

c). The first 50 (approx.) Esprit V8 power units were fitted with 5.5mm step flywheels and corresponding

clutch cover assemblies. Subsequent cars have 3.5mm step flywheels and matching cover assemblies. Only the later type components are available, and it is essential to ensure that compatible parts are fitted.

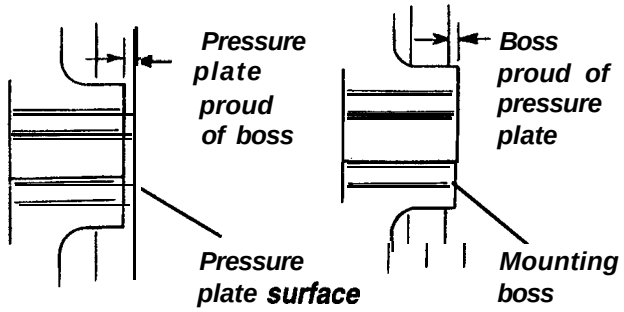
Flywheel Step



Early cars = 5.5mm
Later cars = 3.5mm

Clutch Cover Detail

5.5mm flywheel type *3.5mm flywheel type*



q12a/13a

d). On twin plate clutch cars, the clutch 'pack' should not be dismantled unless required in order to examine for surface contamination. Assessment of wear should be carried out before the clutch is removed from the flywheel (see below).

After removal of the transmission, the six fixings securing the clutch cover to the flywheel may be progressively released and the clutch assembly removed. It is especially important on twin plate V8 cars that the releasing sequence be carried out evenly and progressively to ensure that the settings of the spring clips securing the clutch pack assembly are not disturbed.

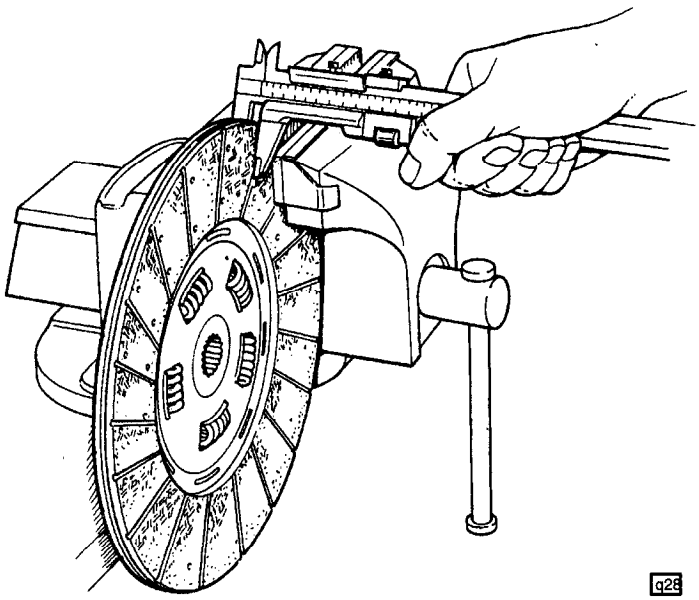
Insoection

Single plate clutches

Inspect the condition of the friction plate linings for wear, oil contamination or any other damage. Check for signs of excessive wear on the splines, and check that none of the cush drive springs in the drive plate hub are broken. Inspect the condition of the wearing surfaces on the flywheel and pressure plate, and renew the component if there is evidence of excessive wear, scoring, or other damage.

Clamp a section of the friction plate in a soft jawed vice to compress the axial damping springs, and measure the friction plate thickness:

Specification: - new *7.7 ± 0.3* mm.
- service limit 5.9 mm



q28

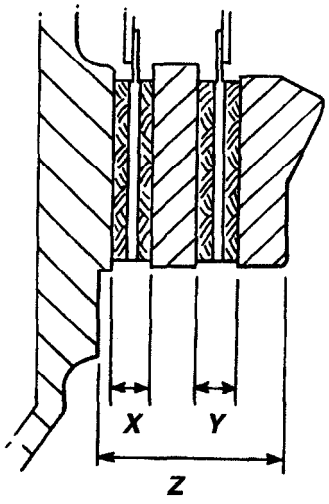
Twin plate clutch

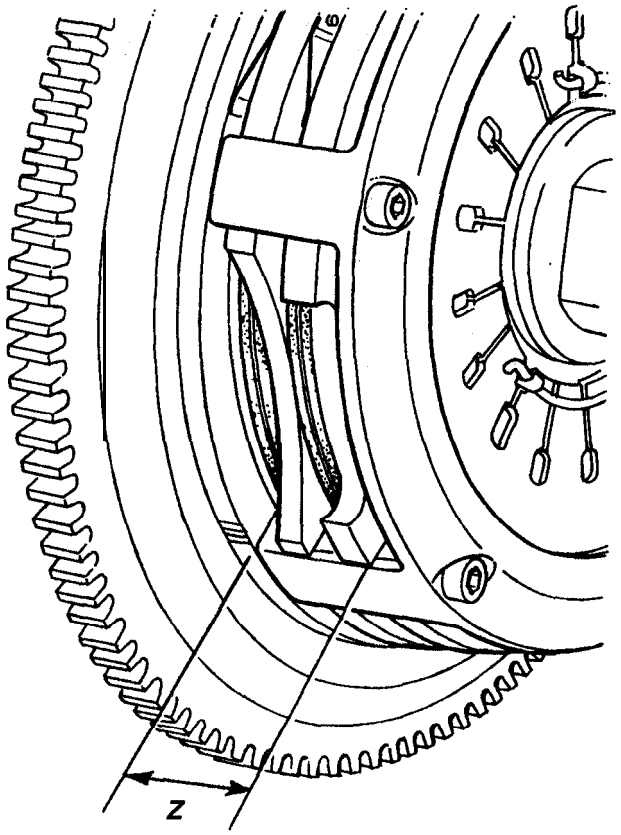
Note that the twin plate assembly is replaceable only as a complete pre-assembled unit of friction plates, pressure plates, diaphragm spring and carrier. Wear of the assembly should be measured with the clutch fitted to the flywheel, by measuring the distance between the carrier mounting face on the flywheel and the front (friction face) of the spring pressure plate as shown in the diagram.

Specification: ('Z' in illustration) - new *35.5* mm
- service limit TBA

Also measure the wear of the two separate friction elements, by using vernier calipers between the flywheel and the intermediate pressure plate, and between the intermediate and spring pressure plate.

Specification: - new *X = 7.0* mm Y = *7.0* mm
- service limit X = TBA Y = TBA





q33

When removing the clutch pack from the flywheel it is essential that the six fixing screws are released evenly and progressively to avoid any tilting of the pressure plates and the disturbance of the fitted position of the spring steel clips retaining the pressure plates together. Handle the removed clutch pack with great care to prevent any disturbance of these clips.

The clutch pack should not be disassembled unless contamination or overheating is suspected. If dismantled for this or any other reason, it is essential that the three spring steel clips retaining the intermediate pressure plate to the pins on the spring pressure plate, are renewed together with the pins and their nuts. A service pack is available containing three pins, with pre-applied thread locking compound, three nuts, and three spring clips. The position of the clips should be set as specified in the assembly procedure:

Flywheel

If the flywheel shows signs of overheating through excessive clutch slip, characterised by large areas of 'blueing' of the friction surfaces, distortion is likely to have occurred, together with weakening of the diaphragm spring. Replace the clutch cover assembly, or twin plate clutch pack, and check the runout of the flywheel face. On early V8 cars, check the depth of the friction face step for clutch cover compatibility (see above).

Single plate systems:	At 312 mm diameter;	± *0.25* mm
Twin plate system:	At 228 mm diameter,	*0.3* mm TIR

To Replace Flywheel

1. Match mark the flywheel to the crankshaft to aid re-fitment before removing the six bolts (4-cylinder) or eight bolts (V8) securing the flywheel, and lifting the flywheel off the crankshaft flange. Beware of the considerable weight of the flywheel, and take appropriate precautions.

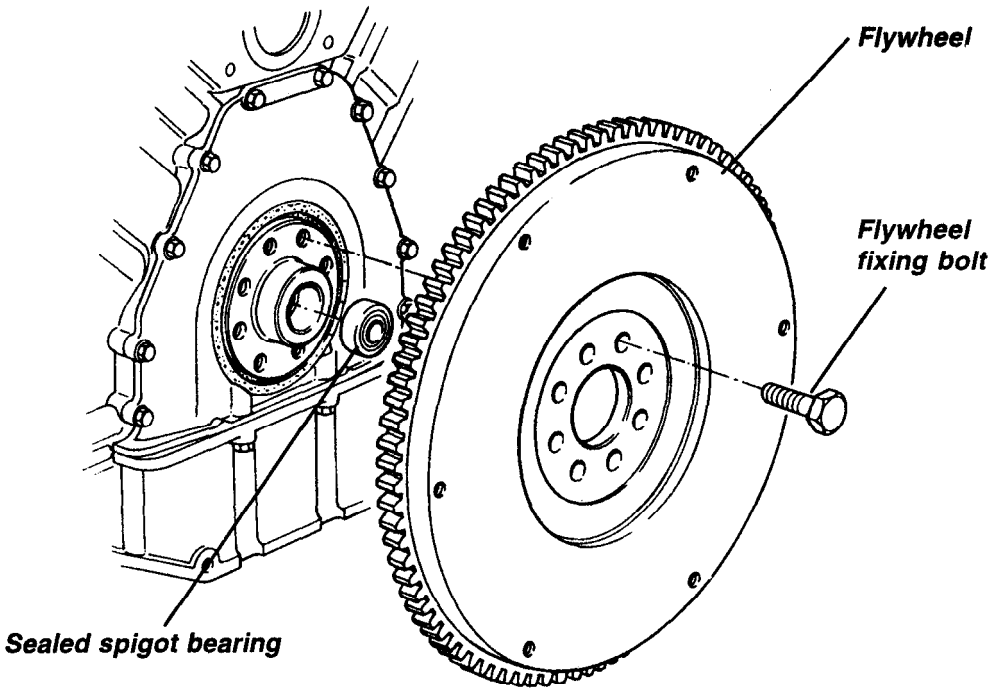
2. If necessary, the flywheel may be refaced within the following restrictions:

4-cylinder:	Minimum flywheel thickness:	12.0 mm
V8 single plate clutch:	Maximum metal removal:	1.0 mm
	Minimum flywheel thickness:	20.0 mm

V8 twin plate clutch:	Maximum metal removal:	0.75mm
	Minimum flywheel thickness:	13.0 mm

If the V8 flywheel is to be machined, both the friction face and the mating face for the clutch cover must be machined by a similar amount in order to preserve the clamping load and design geometry. The cover fixing bolts should also be checked for length and shortened if necessary to prevent 'bottoming out'.

3. Before refitting the flywheel, check the condition of the spigot bearing in the rear end of the crankshaft, and replace if necessary (see sub-section QE.7).



4. Thoroughly clean the two mating faces before mounting the flywheel on the crankshaft rear flange:
4-cylinder; Fit the flywheel onto the crankshaft flange, locating the two dowels. Apply thread locking compound to the threads to the six retaining bolts, and fit WITHOUT washers. Torque tighten to 75 Nm (55 lbf.ft).
V8; Fit the flywheel to the crankshaft with the match marks aligned, and secure with two of the eight Ml 2 flywheel fixing bolts (dry). Use of flywheel locking tool TO0011249 will prevent the engine being turned backwards as the bolts are tightened. Apply Loctite 243 to the threads of the remaining bolts and tighten to 110 Nm (81 lbf.ft). Remove the first two bolts, apply the Loctite and refit and torque tighten. This procedure prevents contamination of the flywheel to crankshaft mating face.

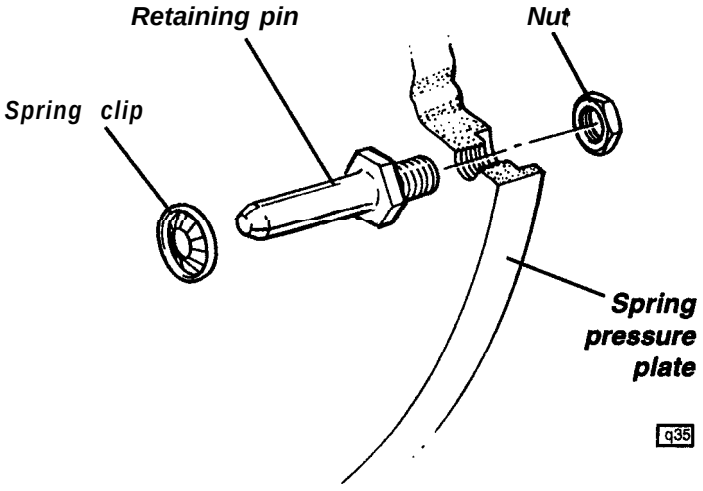
Re-assembly

Before re-assembling the clutch assembly, inspect the spigot bearing in the rear end of the crankshaft, and replace if necessary (see sub-section QE.7). Apply a small quantity of molybdenum disulphide lithium base (NLGI No.2) grease to the clutch shaft splines. On V8 models (single and twin plate), fit the release bearing into the diaphragm spring before assembling to the flywheel.

Single plate systems: Fit the friction plate to the flywheel the correct way round (flat side towards flywheel), and locate with centralising mandrel T000T0654A, whilst the clutch cover is fitted and the six fixing screws progressively tightened to the specified torque:

4 cylinder;	23 - 25 Nm (17 - 19 lbf.ft)
V8;	42 Nm (31 lbf.ft)

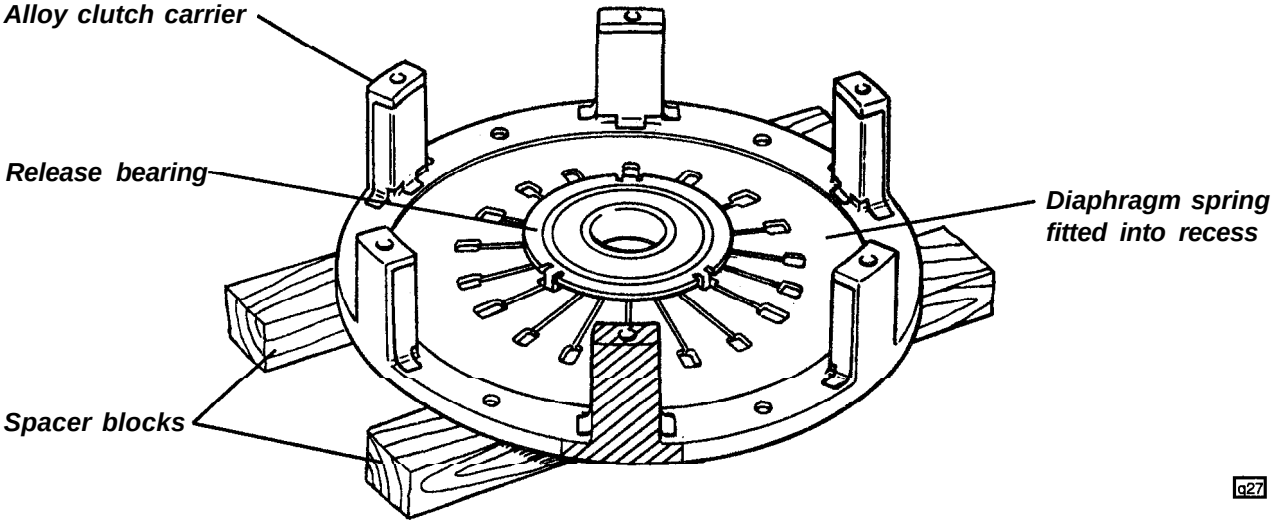
Twin date systems: If the clutch pack has been dismantled for any reason, it is essential that the spring steel clips retaining the intermediate pressure plate to the spring pressure plate, together with their pins and nuts, are renewed. Service packs are available containing three pins, with thread locking compound applied, three nuts, and three spring clips.



Use the following assembly procedure to set the clip position:

Fit the release bearing into the diaphragm spring (hub on concave side), and retain with the spring wire clip.

- Using two spacer blocks to provide clearance for the release bearing hub, lay the alloy carrier onto the bench with the diaphragm spring/release bearing assembly located in its recess in the carrier.

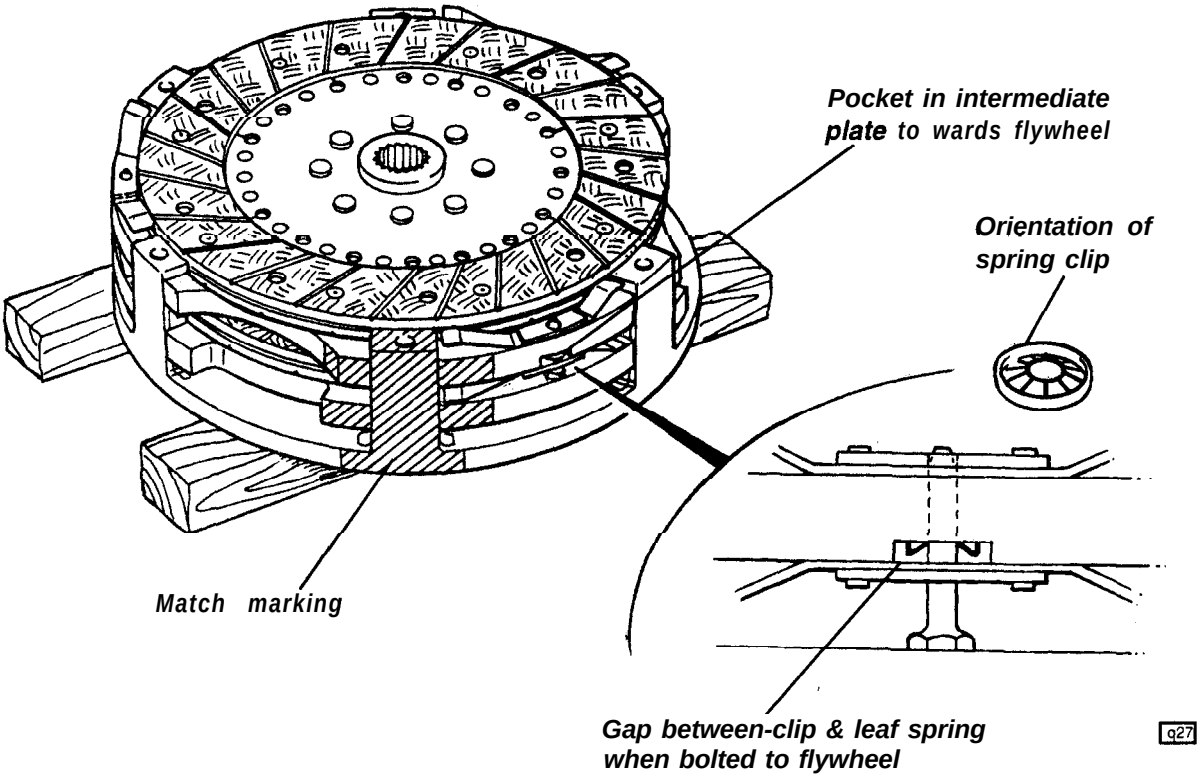


Lay the spring pressure plate, friction face upwards onto the diaphragm with the match marks aligned.

Place friction plate # 2 the correct way round ('release bearing side' downwards) onto the spring pressure plate and centralise.

Before fitting the intermediate pressure plate, fit three new spring clips into the pockets in the plate with the 'entry' side of the clips towards the leaf springs (see illustration).

Lay the intermediate pressure plate over the three spring plate pins with the match marks aligned, and lightly squeeze the assembly together to press the pins through the spring clips, taking care to maintain the plates square to each other.



Lay friction plate # 1 onto the intermediate pressure plate the correct way round ('flywheel side' uppermost), and support the complete assembly on alignment tool TOOOT1402 or a spare clutch shaft B082F6452F. Note that centralising mandrel T000T0654A, without splines, is unsuitable due to the requirement to align the splines of the two friction plates.

- Fit the clutch pack to the flywheel, with the spigot of the spare clutch shaft located in the crankshaft spigot bearing, and fit the six bolts through the carrier into the flywheel. It is essential that the six fixing screws are tightened evenly and progressively to avoid tilting the clutch pack and to correctly set the position of the spring clips. When the all the bolts are tight, each of the clips should abut the pressure plate side of the pocket, with a gap between the clip and the leaf spring. Finally torque tighten to 30 Nm (22 lbf.ft).
- On four cylinder cars, fit the release bearing and fork onto the transmission (see sub-section QE.6) before re-fitting the transmission to the engine (see sub-section FG.IO).
- On eight cylinder cars, the release bearing is pre-fitted to the clutch cover, and the release fork should be hooked loosely onto the pivot ball before re-fitting the transmission to the engine (see also sub-section QE.6).

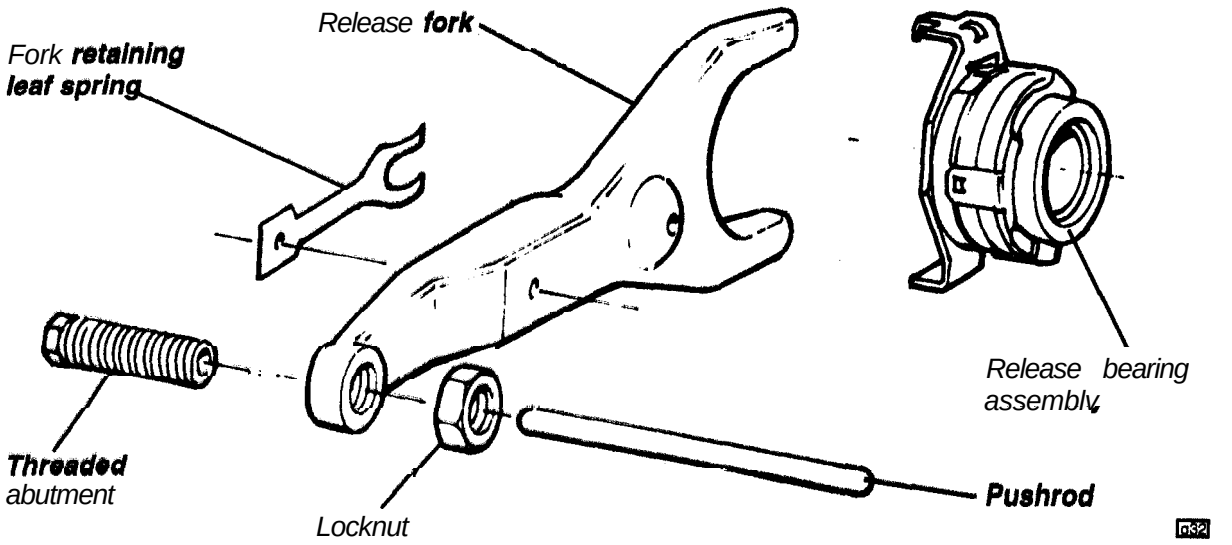
QE.6 - RELEASE BEARING & FORK

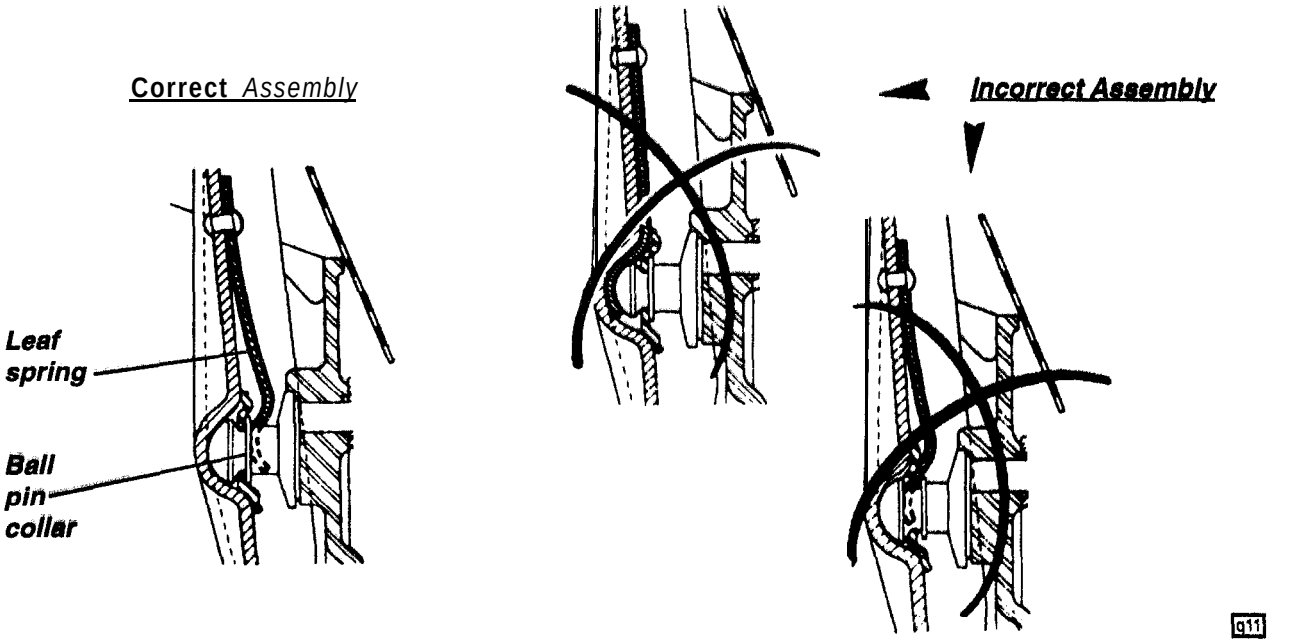
Four Cylinder Cars

The release bearing and fork are mounted within the clutch housing, and are accessible after removal of the transmission (see sub-section FG.IO).

Slide the release bearing off the guide tube. No clips are used to attach the fork to the bearing, but a lug on the bearing carrier hooks behind the fork leg to retain the bearing on assembly. The ball bearing assembly is clipped to a carrier comprising a plastic inner sleeve to slide along the guide tube, and a steel end plate against which the release fork operates. The bearing is serviced only as a complete assembly, Remove the release fork by pulling towards the clutch housing aperture to free the fork from the pivot ball to which it is retained by a leaf spring rivetted to the fork.

When re-assembling, use molybdenum disulphide lithium base grease (NLGI no.2) to lubricate sparingly the fulcrum and leg contact surfaces of the release fork.





- Fit the release fork onto the pivot ball ensuring that the fingers of the leaf spring are engaged behind the pivot ball collar as shown in the diagram.
  Slide the release bearing onto the guide tube with the larger lug uppermost and engage with the release fork.

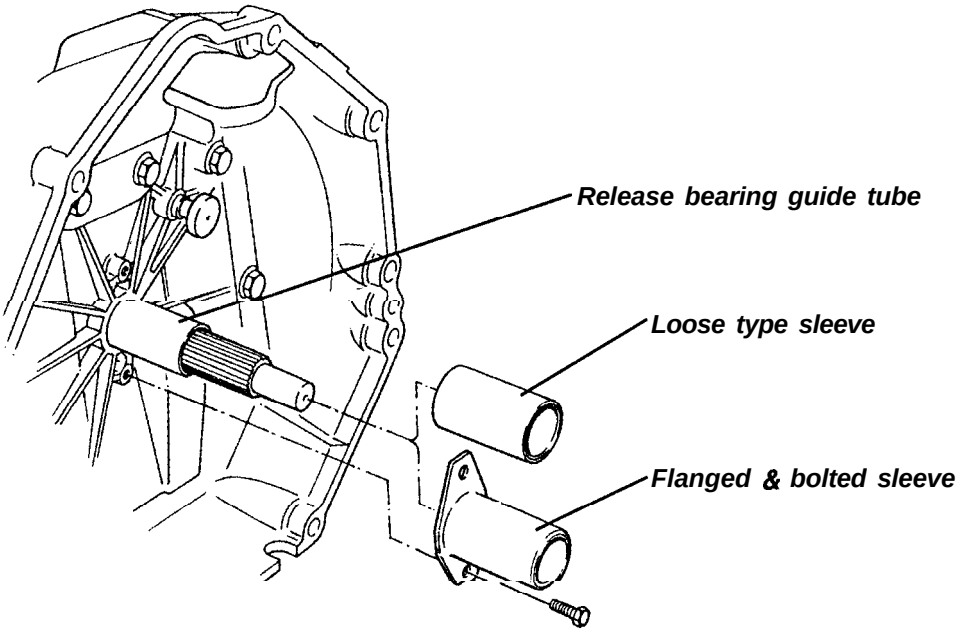
Eiaht Cylinder Cars

These cars use a 'pull' type clutch release, with the release bearing retained in the centre of the diaphragm spring by a wire circlip. Before the transmission can be removed from the engine, the release fork must be disengaged from the release bearing:

Remove the slave cylinder and the slave cylinder carrier from the clutch housing. Pull the fork upwards and rear-wards to unhook the keyhole slot in the fork from the pivot ball, and allow the fingers of the fork to be withdrawn from the release bearing collar. It is not necessary to completely remove the fork from the clutch housing. If the friction plate is well worn, extracting the fork may require significant effort, which can be eased, if the same plate is to be refitted, by suitable fettling of the clutch housing aperture.

- Remove the transmission assembly (see sub-section FG.10).
- To remove the release bearing, the clutch cover must first be removed from the flywheel (see sub-section

QE.5). Release the wire circlip and remove the release bearing from the centre of the diaphragm spring. Release *bearing guide tube* sleeve: Note that for the V8 model, a steel sleeve is fitted over the release bearing guide tube to increase its diameter to that of the bearing. For single plate clutches, the sleeve is 62 mm long and is a loose fit over the guide tube. Some early twin plate clutch assemblies use a similar, but shorter sleeve, 59 mm long, the shorter length required to allow complete clutch disengagement. Later twin plate cars, and those with a cast iron clutch housing, use a flanged sleeve bolted to the clutch housing by two M6 x 12 fixings, tightened to 9 Nm with Loctite 243 threadlock. In all cases, ensure that the sleeve is in place (especially the loose variants) before mating the engine and transmission.



q04

On re-assembly, **sparingly** apply synthetic MoS_2 grease to the following surfaces:

- Rear (spherical) surface of release fork pivot stud;
- Release bearing guide tube;
- Clutch shaft splines and spigot;
- Outside of guide tube sleeve.
- Fulcrum and legs of release fork.

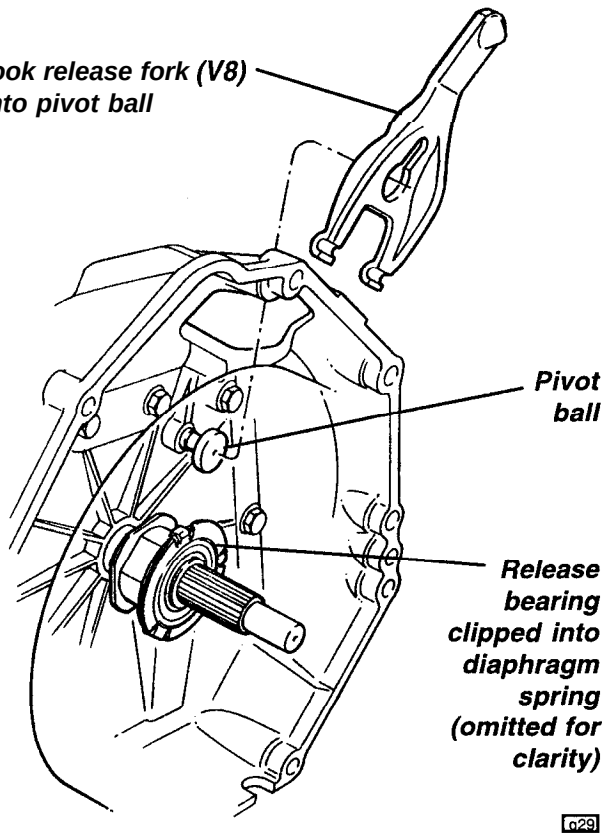
Note that excessive grease application may affect clutch release, and contaminate the friction surfaces.

Before refitting the transmission, fit the release fork loosely into position, with the keyhole slot over the pivot ball.

Refit the transmission assembly (see sub-section FG.IO) locating the fingers of the release fork around the square hub of the release bearing.

Hook the keyhole slot in the fork onto the pivot ball, pressing the fork downwards and rearwards to locate the pivot ball into the fork socket and retaining clip.

Refit the slave cylinder housing, cylinder and pushrod (see above).

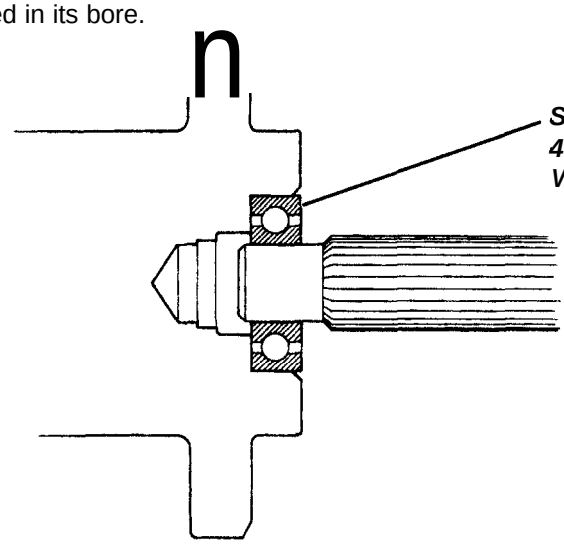


q29

QE.7 - SPIGOT BEARING

The front end of the clutch shaft is supported by a ball bearing assembly pressed into the rear end of the crankshaft. Access to the bearing is available after removing the transmission (see sub-section FG.10) and clutch assembly (see sub-section QE.5).

Use a suitable puller tool or slide hammer to extract the bearing. New bearings have a single rubber seal, and should be packed with Esso Unirex N3 or equivalent before fitting. Apply Loctite 648 adhesive to the outside of the bearing before fitting, seal side rearmost, using a suitable dolly to apply force only to the outer race, until fully bottomed in its bore.



e44

QE.8 - RETROFITTING OF TWIN PLATE CLUTCH ON V8

The twin plate clutch and corresponding flywheel has the benefit over the single plate system, of reducing inertia loads applied to the transmission input gear train during gear shifting. This results in enhanced gear change quality and synchromesh performance, as well as reducing pedal effort. A kit of parts is available to convert a V8 single plate clutch system to a twin plate assembly, with assembly details all available within this section and the following notes:

a). The twin plate type flywheel is required due to the different diameter of the clutch surface, different cover fixings, and lighter weight. Flywheel fixing bolts should be used only once.

b). A shorter, flanged, release bearing guide tube sleeve allows for complete clutch disengagement.

c). The clutch pedal downstop is required in order to prevent overtravel of the release mechanism.

d). The engine management ECM must be returned to Lotus for recalibration in order to maintain idle quality and prevent false diagnosis of engine misfire due to the reduced flywheel/clutch inertia.

e). In order to align the splines of the two friction plates during assembly of the clutch pack to the flywheel. it is necessary to use alignment tool TOOOT1402 or a spare input shaft BO82F6452F.

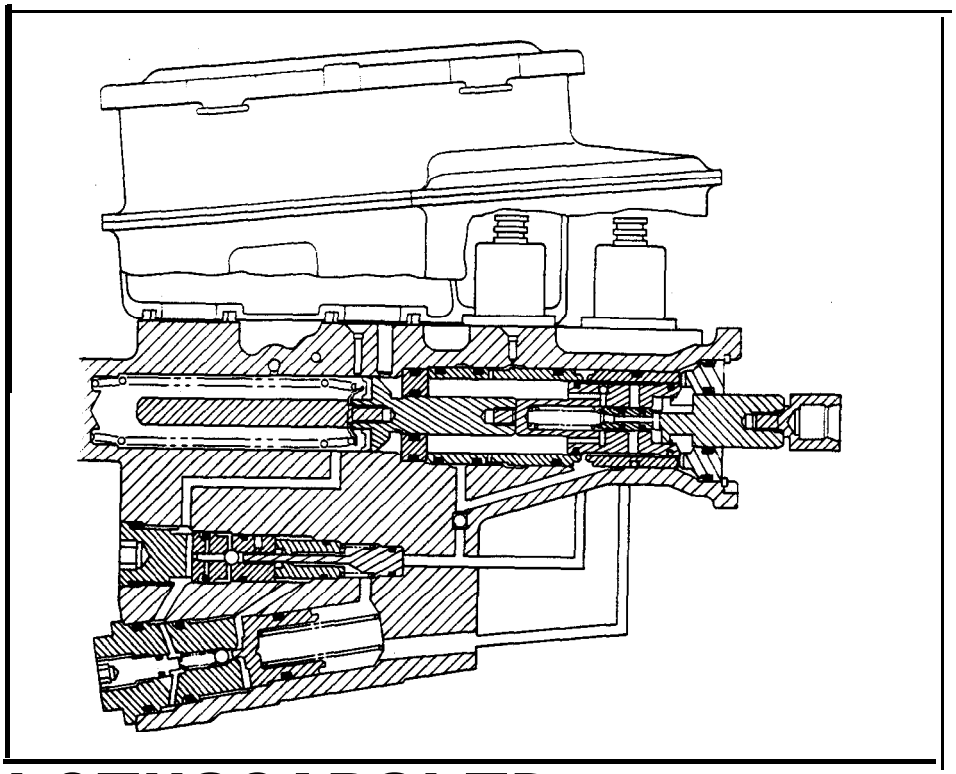
Description	*Pan' Number*	*QtY*
Twin Plate Clutch Retrofit Kit	A082Q0720S	1
Comprising:		
- Flywheel, twin plate clutch	A91 8E0325F	1
- Bolt, Ml2 x 1.25 x 28, flywheel to crank	A91 8E0043F	8
- Twin Plate Clutch Assembly	A082Q0718F	1
- Screw, caphead, M8 x 60	A082W1114	6
- Sleeve, flanged, release bearing guide tube	A082Q4049F	1
- Setscrew, M6 x 20, guide tube sleeve	A075W1027Z	2
- Block, clutch pedal downstop	A082Q4052F	1
- Setscrew, M8 x 20, block to pedal	A075W1038	1
- Setscrew, button head, Ml 0 x 45, pedal downstop	A082W7075	1
- Locknut, M10, pedal downstop	A075W3024	1
- Engine ECM Recalibration	(return to Lotus)	1

SERVICE NOTES

Section JF

Esprit '91'-'95 M.Y.

Braking System with Delco Moraine ABS IIIA



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Publication Part Number G082T0327J

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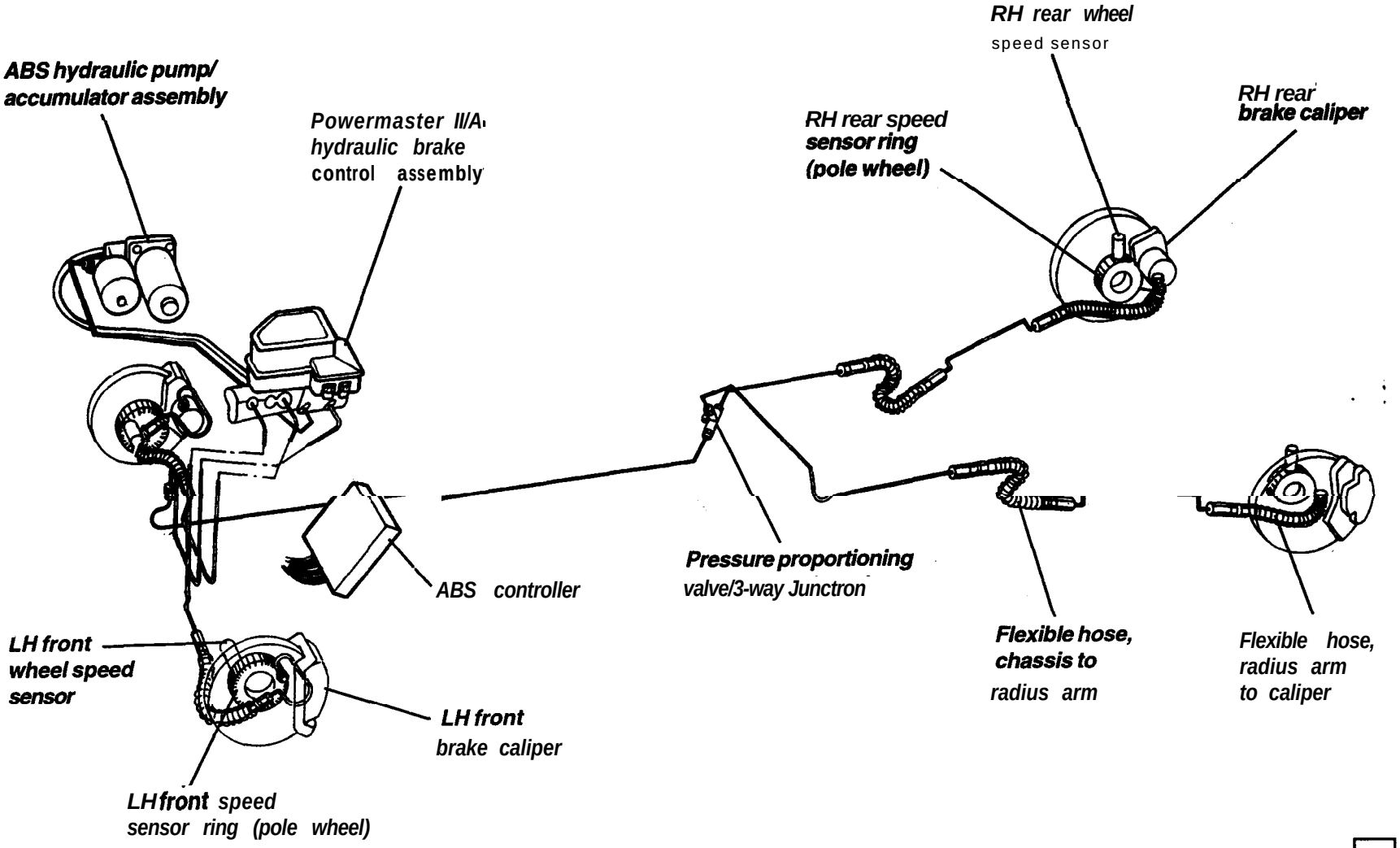
BRAKING SYSTEM [with ABS)

SECTION JF- -- ESPRIT & ESPRIT TURBO

Brake System Layout



J68

JF.1 - GENERAL DESCRIPTION

Three variations of wheel brake have been used, all of which share a common anti-lock operating system. Prior to June '94, Esprit models used TMC front calipers and Bendix rear calipers, with ventilated front and solid rear discs. From June/July '94, Brembo calipers were used with new ventilated discs front and rear. Sport 300 models use AP Racing calipers with curved vane ventilated discs front and rear. The cable operated parking brake actuates the Esprit rear caliper pistons, or the Sport 300 dedicated handbrake calipers.

SUMMARY CHART	Esprit		Sport 300
	Prior VIN *	**From VIN ***	
3rake Manufacturer	TMC/Bendix	Brembo	A.P. Racing
Front Calipers	Single piston sliding. Behind axle.	4-piston fixed. Behind axle.	4-piston fixed. Behind axle.
Rear Calipers	Single piston sliding. Behind axle.	Single piston sliding. Behind axle.	4-piston fixed. Ahead of axle.
Parking Brake	Cable operation of rear caliper	Cable operation of rear caliper	Cable operated separate (behind axle) caliper
Front Discs	Ventilated 258 x 20	Ventilated 296 x 28	Curved vane 327 x 28
Rear Discs	Solid 275 x 12	Ventilated 300 x 22	Curved vane 280 x 28

* VIN: **Non-USA;** R 1443 (+ 1377) - July '94.1 USA; S 1391 - **June '94**

In all cases, the braking system is designed to enhance brake system performance during high speed driving, with good fade and pad wear characteristics. However, as is usual with high performance brake pad materials, the brakes do require a relatively long bedding-in period, and have a higher friction level when heated to normal working temperature, than when cold. Consequently, the brake pedal effort may feel higher during the running-in period (up to 1,000 miles) and when the brakes are cold.

The parking brake lever is mounted on the body sill and uses a balancing linkage to actuate individual cables to each rear wheel brake. Adjustment of the caliper mechanism to compensate for pad wear is automatic.

A Delco Moraine/NDH Antilock Brake System (ABS-IIIA) is used to reduce the tendency of any wheel to lose traction (lock) while braking. This feature is especially advantageous when braking on slippery road surfaces and in bad driving conditions, by aiding vehicle stability, maintaining the steering ability of the car, and in many cases reducing the stopping distance. Under normal circumstances, the hydraulic power brake system of the vehicle operates, governed by the force applied to the brake pedal. The antilock system functions only when a combination of a brake pedal switch, four wheel speed sensors and a microprocessor, determine that one or more of the wheels is losing traction during braking. The ABS-IIIA then controls the brake pressure independently to both front wheels, and to the rear wheels as a pair, to reduce the tendency of the wheel(s) to lock up.

The Powermaster IIIA hydraulic brake control assembly, incorporates a master cylinder operated by the brake pedal in the conventional manner, with power assistance provided by a pressurised supply of hydraulic fluid from a separately mounted electric pump and accumulator. Each front brake is equipped

with a separate hydraulic circuit fed from a common master cylinder chamber. The rear brake circuit is not operated by the master cylinder directly, but uses the separate pressurised hydraulic supply also used for the power assistance and ABS system. The pressure in the rear circuit is regulated by a spool valve within the master cylinder before feeding a single hydraulic line which then splits to feed each rear brake caliper. On cars with Bendix rear calipers, a pressure proportioning valve is used at the rear circuit split point in order to prevent over adjustment of the rear pads if subjected to extreme pressure.

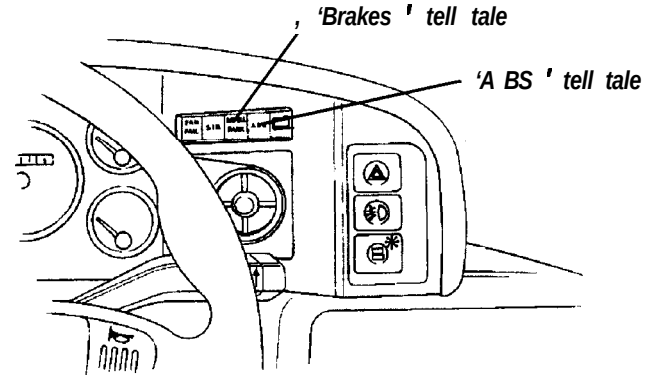
An ABS controller (microprocessor) uses a wheel speed sensor mounted at each of the four wheel hubs to continuously monitor wheel speeds when braking. If the deceleration of any wheel is too great, or its speed reletive to the other three is too low, the contoller will cycle a solenoid valve in that wheel brake's hydraulic circuit to reduce pressure and prevent wheel lock. The 'three channel, independent front, select low rear' system uses one solenoid valve in each of the two front circuits, and a single solenoid for the combined rear circuit, with the rear solenoid reacting to the behaviour of the rear wheel with least grip.

The ABS controller also monitors the system for faults, and lights a fascia mounted tell tale lamp if a fault is detected (see later).

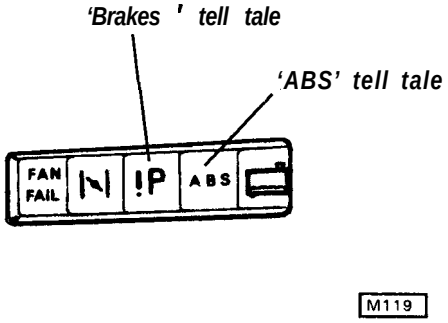
JF.2 - TELL TALE LAMPS

Two tell tale lamps are provided on the fascia to warn of problems in the brake system.

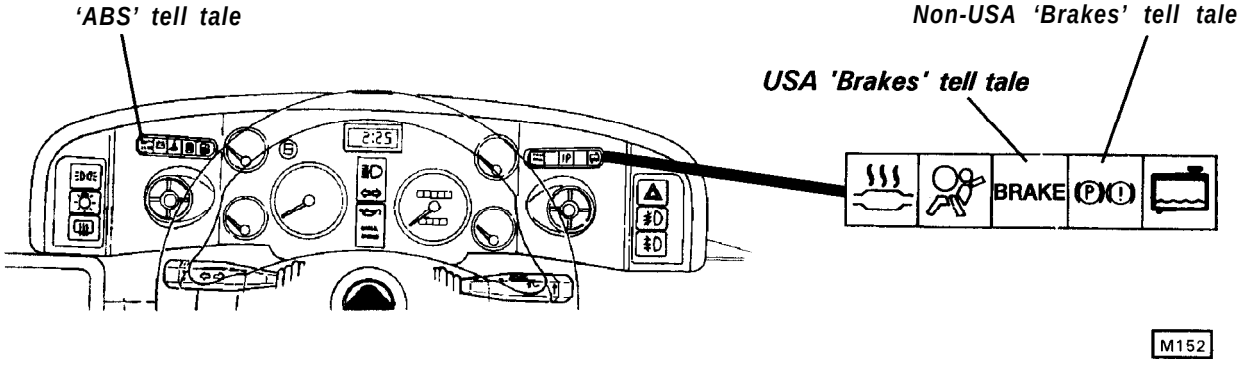
Pre '93 M.Y. USA cars



Pre '93 M.Y. non-USA graphics



'94 M.Y. onwards



Brakes Tell Tale

This tell tale will glow red with the ignition switched on, under any of the following conditions:

i) When the parking brake is applied;
ii) If the brake fluid level is low;
iii) If accumulator pressure is below 12,400 kPa (1,800 psi). If the brake pedal has been pressed several times with the ignition off, stored hydraulic pressure may fall sufficiently to activate the tell

tale. The electric pump will start up when the ignition is switched on to restore pressure, and the lamp should go out within 40 seconds.

As a bulb check function, this lamp should light when the ignition is first turned on, and go out when the engine is cranked. Under normal circumstances, with the engine idling, the tell tale should light when the parking brake is applied, and go out when released. If the lamp fails to go out when the parking brake is released, or comes on whilst driving, stop immediately as the brake fluid level or accumulator pressure may be dangerously low. Only non power assisted non-ABS braking on the front wheels may remain.

ABS Tell Tale

This amber tell tale should light for the ABS system's three second initialisation phase when the ignition is turned on. The lamp will also light in crank mode. If the lamp lights at any other time:

- a flashing light indicates that the ABS controller has detected a fault, but is still allowing full ABS operation.
  NOTE: Prolonged vehicle operation with a flashing ABS tell tale may further damage the ABS system and may cause complete ABS system failure

a continuous light indicates that the ABS controller has detected a fault and disabled part (front) or all (front and rear) of the anti-lock brake system. It will not disable the non-ABS power brake system.

JF.3 - ABS BRAKE CHARACTERISTICS

When the ignition is switched on, the ABS controller turns on the amber ABS tell tale for three seconds and cycles the solenoid valves. The clicking noise heard during this period is the solenoid operation and is quite NORMAL. If accumulator pressure is low, which normally will be the case only if the brake pedal has been operated several times since the last ignition cycle, the pump may be heard to start up and run for up to 60 seconds.

Normal braking occurs when the road conditions allow for the retardation required (controlled by pedal effort) to be achieved without danger of wheel lock. In these conditions, the Powermaster IIIA booster/master cylinder assembly uses modulated fluid pressure from the pump/accumulator to operate the rear brakes and provide power assistance to the front brakes master cylinder. If the ABS controller detects, from the wheel speed sensors, that one or more of the wheels is tending to lock, it will cause the solenoid valves to control the pressures in the relevant brake circuits. This will result in the brake pressures being modulated in cycles of apply and release (increase and decrease of pressure) until either the vehicle comes to rest, or the tendency of the wheels to lock ceases. The latter may be due to an improvement in road conditions or a reduction in pedal pressure. Whilst this cycling is taking place, the driver will notice a pulsating effect at the brake pedal as the pressure is modulated, and may also hear the solenoid valves clicking on and off. These signals indicate to the driver that maximum retardation is being approached, and that driving style should be modified to suit the conditions.

If the brakes are held moderately applied and then the ignition is switched on, these pulsations may be felt through the brake pedal as the initialisation process takes place and the solenoid valves are cycled for a few seconds. This is NORMAL and is an indication that the ABS is functioning correctly.

To minimise stopping distance using the ABS facility, the driver should steadily and firmly apply the brake pedal and allow the system to modulate hydraulic pressure. The driver should not attempt to 'pump' the brakes manually. During ABS operation, the wheels may appear to lock momentarily as the wheel speed changes rapidly, and some tyre noise (intermittent screeching) may be heard. This noise is NORMAL and will vary with road and tyre conditions. However, a wheel that completely locks and stays locked for more than one or two seconds is not normal, and indicates that the vehicle should be serviced as soon as possible. ABS IIIA cannot operate properly if the base brake system is faulty. Dragging brakes, faulty wheel bearings or other faults may not allow proper ABS operation.

Pedal Travel

When the vehicle is stopped and the ABS system is pressurised, continuous heavy pedal pressure will result in the pedal falling very slowly to near the floor. This is NORMAL. Excessive pedal travel does

exist however, if braking action does not begin until after the first 35 mm (1.4 in) of pedal movement while the system is pressurised.

With the ABS system de-pressurised (ignition off, pedal firmly applied 40 times), light pedal pressure should not result in pedal movement of more than.
55 mm (2.2 in).

Tn o w

If, in an emergency, the car is being towed, the ignition should be switched on to energise the pump and provide front brake power assistance and rear wheel braking. Without ignition, only unassisted front wheel braking will be available.

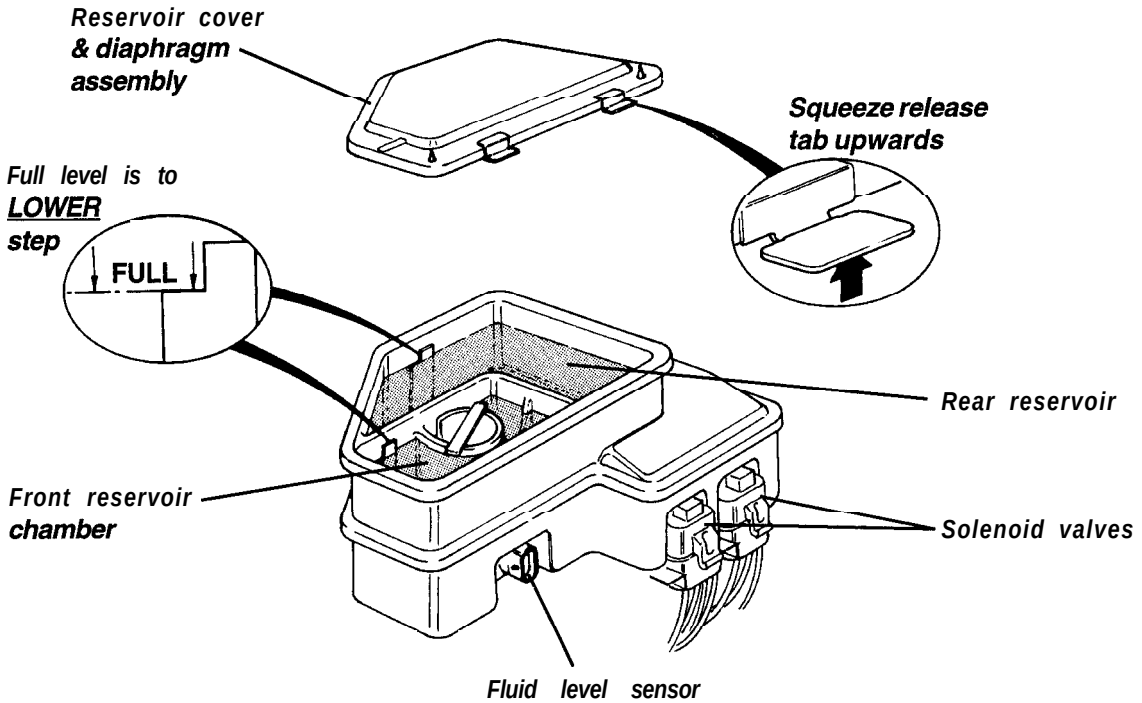
JF.4 · BRAKE FLUID LEVEL CHECK

The brake fluid reservoir is fitted on the booster/master cylinder unit in the front luggage compartment. To check the fluid level proceed as follows:

1. Park the vehicle on a level surface.

2. **IMPORTANT: De-pressurise the accumulator.** Always de-pressurise the accumulator before performing any service operations. When the system is pressurised, most of the fluid is stored in the accumulator, and the reservoir level is correspondingly low. Topping up the reservoir in this condition will result in overfilling. Although the fluid reservoir is not under pressure, if the brake pedal is operated when the reservoir cover is removed and the system is pressurised, returning brake fluid may spray from the reservoir.
   To de-pressurise the accumulator:
   Turn off the ignition.
   FIRMLY apply and release the brake pedal up to 40 times. A noticeable change in brake pedal feel (to a hard pedal with extended initial travel) will occur when the accumulator is completely discharged.

3. Clean the reservoir cover and top of the reservoir before squeezing the release tabs and lifting off the cover and diaphragm assembly.



J41

4. Check the fluid level in both front and rear chambers of the reservoir. The full level is to the lower step mark moulded on the inside wall of the reservoir.
NOTE: On initial assembly of the boester/master cylinder, the insertion of components is eased using a lubricant which is subsequently washed out of the seals by the brake fluid. This may cause the fluid to appeat as a grey emulsion, especially in the rearmost section. This is quite normal and should cause no concern. The formation of brake fluid droplets on the underside of the reservoir lid diaphragm should not be confused as being condensation.

5. If either chamber level is low:
Examine the system carefully for signs of leakage, and repair as necessary.
Use only non-mineral type DOT 4 brake fluid from a sealed container marked with a yellow and black symbol. Do not use DOT 5 silicone symbol fluid, or any fluid which has been exposed to the atmosphere for more than a brief period, or any fluid suspected of being wet, dirty or contaminated.
- Fill or top up until the levels in both chambers are aligned with the full marks.
Refit the reservoir cover and diaphragm assembly.

6. If a reservoir chamber is found to be overfilled:
- Correct the fluid level.
Install the cover and diaphragm assembly.
- Turn on the ignition and allow the system to pressurise.
Depressurise the accumulator (see above), remove the reservoir cover and re-check fluid levels.
- , If a reservoir chamber is again found to be overfilled, refer to 'Hydraulic Diagnosis'.

JF.5 - FRONT BRAKE PAD REPLACEMENT

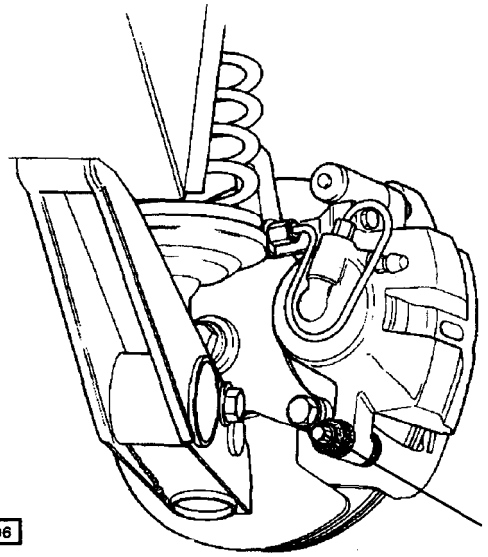
Pad thickness may be checked without disturbing the caliper.

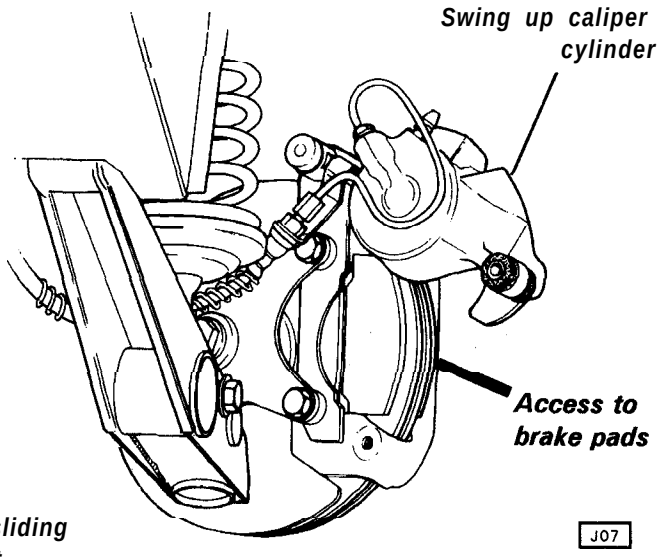
Standard pad thickness;	- TMC Calipers (prior June/July '94);	10.5 mm
	- Brembo Calipers (June/July '94 on);	9.0 mm
	- A.P. Racing (Sport 300);	15.0 mm
Minimum pad thickness;		2.5 mm

NOTE: If the pads are to be renewed, fluid may need to be removed from the master cylinder reservoir when the caliper pistons are retracted. Before the fluid level can be established, the accumulator must be de-pressurised to return fluid from the accumulator to the reservoir. This must be done before the pads are removed; turn off the ignition and FIRMLY apply and release the brake pedal up to 40 times until the pedal feel goes hard.

Front Pad Replacement - TMC Front Calipers (Prior June/July '94)

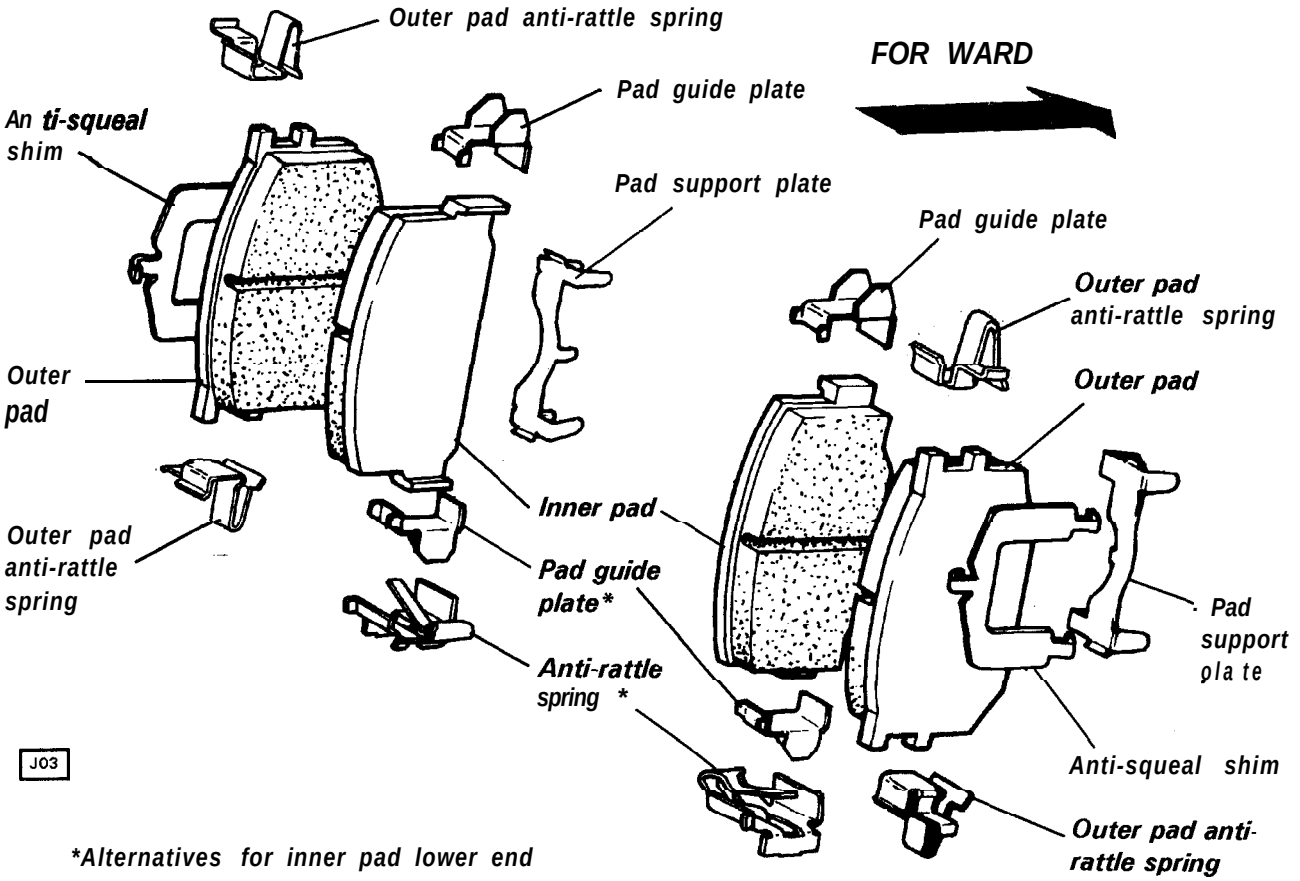
1. **Remove the bolt from the caliper lower sliding pin, and raise the caliper assembly,** turning the steering as necessary to avoid straining the flexible hose, to provide access to the pads.





2. Slide out both brake pads. Referring to the illustration remove each anti-rattle spring/guide plate/ support plate ONE AT A TIME, and replace with the new item supplied with the new pad set.

NOTE: Pay special attention to the correct assembly of anti-rattle'springs and pad guide plates to the caliper. Most of these are handed. Refer to the illustration below.



*Alternatives for inner pad lower end

3. Before fitting new pads the pistons must be pushed back into the caliper. Take care not to damage the surface of the brake discs, or the piston rubber boots.

4. Fit the anti-squeal shim to the outer pad and insert into the caliper, ensuring that the anti-rattle spring tongues are tucked into the brake pad backplate slots. Insert the inner pad into the caliper.

5. Lower the caliper cylinder, and secure with the lower sliding pin bolt, torque tightening to 16 - 24 Nm (12 - 17 lbf.ft.)

6. Before driving the car, press the brake pedal several times to bring the pads to their correct running position. Before switching on the ignition, check the brake fluid level in the reservoir, and top up if necessary.

7. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

F ont Pad Replacement - Brembo Front Calipers (June/July '94 onwards)

1. Remove the front road wheels. At each front caliper:

2. Using a hammer and suitable small diameter drift, knock out the lower pad retaining pin towards the inside. Remove the pad spring clip, and knock out the upper retaining pin.

3. Withdraw the pads and measure the lining thickness. Renew the axle set of pads if any lining thickness is below 2.5 mm.

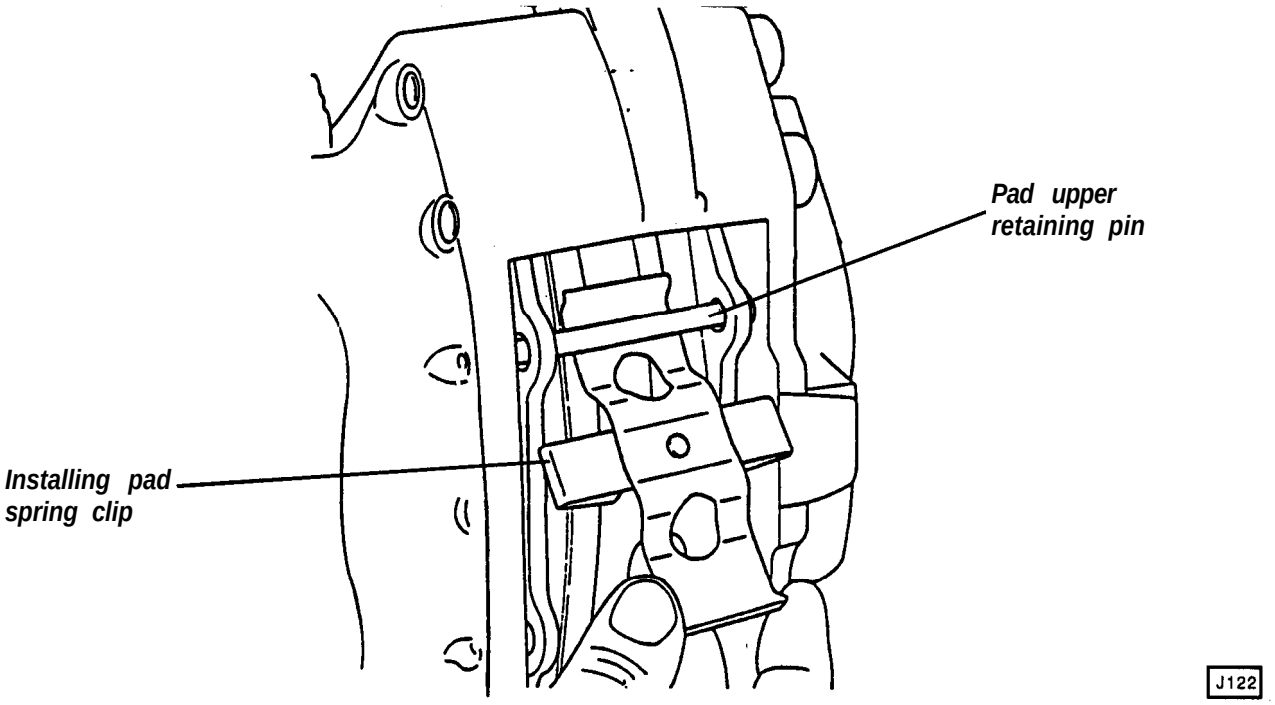
4. Before refitting the pads, inspect the piston boots for splits, cracks or other damage, and for any signs of fluid leakage or wetness. If any of these symptoms are evident, a new caliper should be fitted.

5. If refitting the existing brake pads, refit each pad in the same position as originally fitted.

6. Before fitting new pads the pistons must be pushed back into the caliper. Take care not to damage the surface of the brake discs, or the piston rubber boots.

7. Instal the brake pads into the caliper, and fit the top retaining pin from the inboard side until the small end of the pin is engaged in the outboard caliper half.

8. Hook one end of the pad spring clip under the upper retaining pin, and press down the other end whilst the lower pin is inserted. Use a pin punch to ensure that both pad retaining pins are fully installed such that the pin retaining rings are locked into the caliper bores. Check that the spring clip is centred in the caliper aperture and is preloading both brake pad backplates.



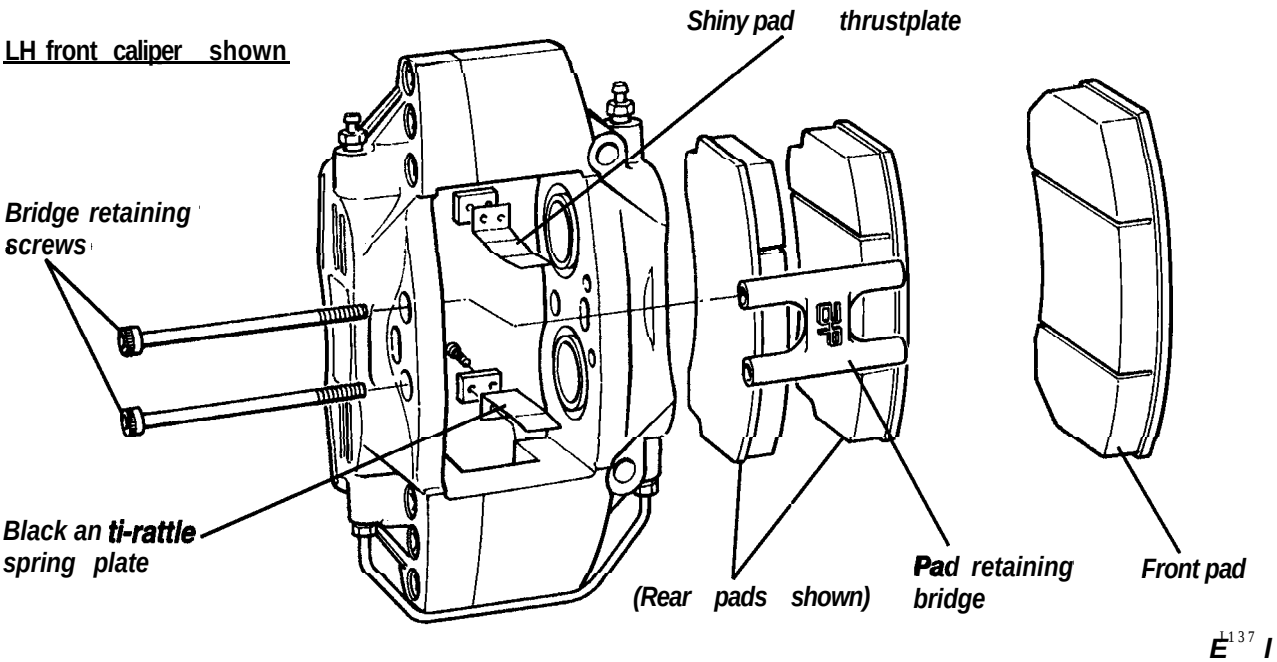
9. Refit the road wheels and press the brake pedal several times to set the brake pad position. Before switching on the ignition. check the brake fluid level in the reservoir, and top up if necessary.

10. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

Front Pad Replacement · A.P. Racing Front Calipers (Sport 300)

1. Remove the front road wheels. At each front caliper:

2. Release the two socket head screws and remove the pad retaining bridge.



3. Withdraw the brake pads, noting their fitted positions, and measure the lining thickness. Renew the axle set of pads if any lining thickness is below 2.5 mm.

4. Before fitting new pads the pistons must.be pushed back into'the caliper. Take care not to damage the surface of the brake discs or pistons.

5. Before fitting the pads, examine the pad thrust plates (shiny) fixed at the top end of the pad recess in the caliper, and the anti-rattle spring plates (black) at the bottom end of the recess. Also examine for any signs of fluid leakage or corrosion from or around the pistons, pipe connections and joints.

6. If refitting the original pads, fit in their original positions. Otherwise fit the new pads and retain with the bridge piece. Fit and securely tighten the bridge retaining screws.

7. Refit the road wheels and press the brake pedal several times to set the brake pad position. Before switching on the ignition, check the brake fluid level in the reservoir, and top up if necessary.

Maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

J.6 REAR BRAKE PAD REPLACEMENT

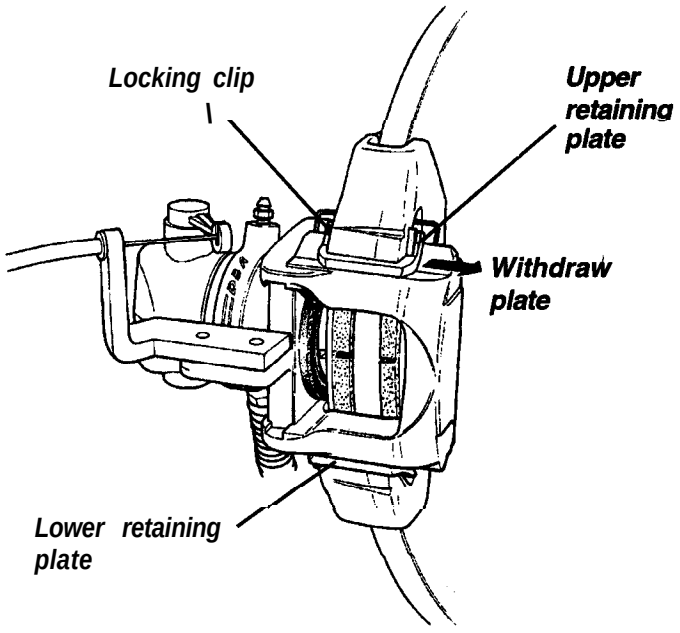
Pad thickness may be checked without disturbing the caliper.

Standard pad thickness;	· Bendix Calipers (prior June/July '94);	9.5 mm
	· Brembo Calipers (June/July '94 on);	9.5 mm
	· A.P. Racing (Sport 300);	11.0 mm
Minimum pad thickness;		**2.5** mm

NOTE: If the pads are to be renewed, fluid may need to be removed from the master cylinder reservoir when the caliper pistons are retracted. Before the fluid level can be established, the accumulator must be de-pressurised to return fluid from the accumulator to the reservoir. This must be done before the pads are removed; turn off the ignition and FIRMLY apply and release the brake pedal up to 40 times until the pedal feel goes hard.

Rear Pad Replacement - Bendix Rear Calipers (prior June/July '94)

1. At each rear caliper: Pull out the locking clips from both caliper retaining plates. Using a pin drift, drive out one retaining plate, and then remove the other plate.

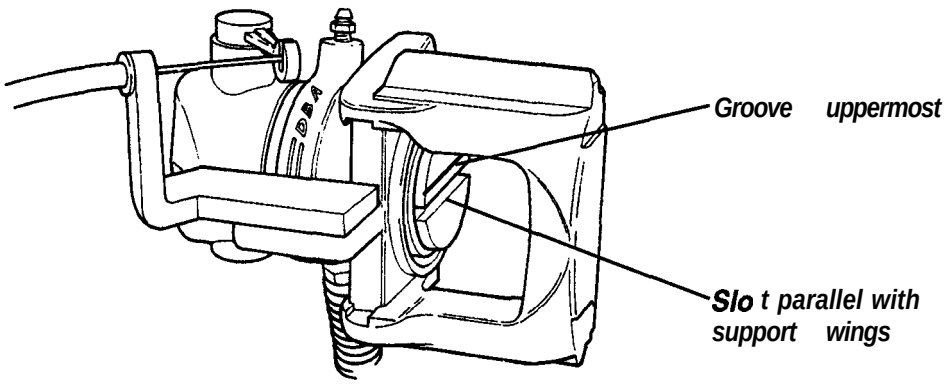


J02

2. Withdraw the caliper from the caliper mounting plate and brake pads, and support clear without stressing the flexible hose. Remove the brake pads and anti-rattle springs.

3. Before fitting new pads, it is necessary to retract the caliper piston in its bore. To retract the piston, use a l/4" drive ratchet in the slot of the piston to screw the piston clockwise down its handbrake adjuster mechanism. Take care that the fluid reservoir does not overflow during this operation. When fully retracted, screw out again until the slot is parallel with the two support wings, and the groove is toward the bleed nipple (upper) side of the cylinder as shown.

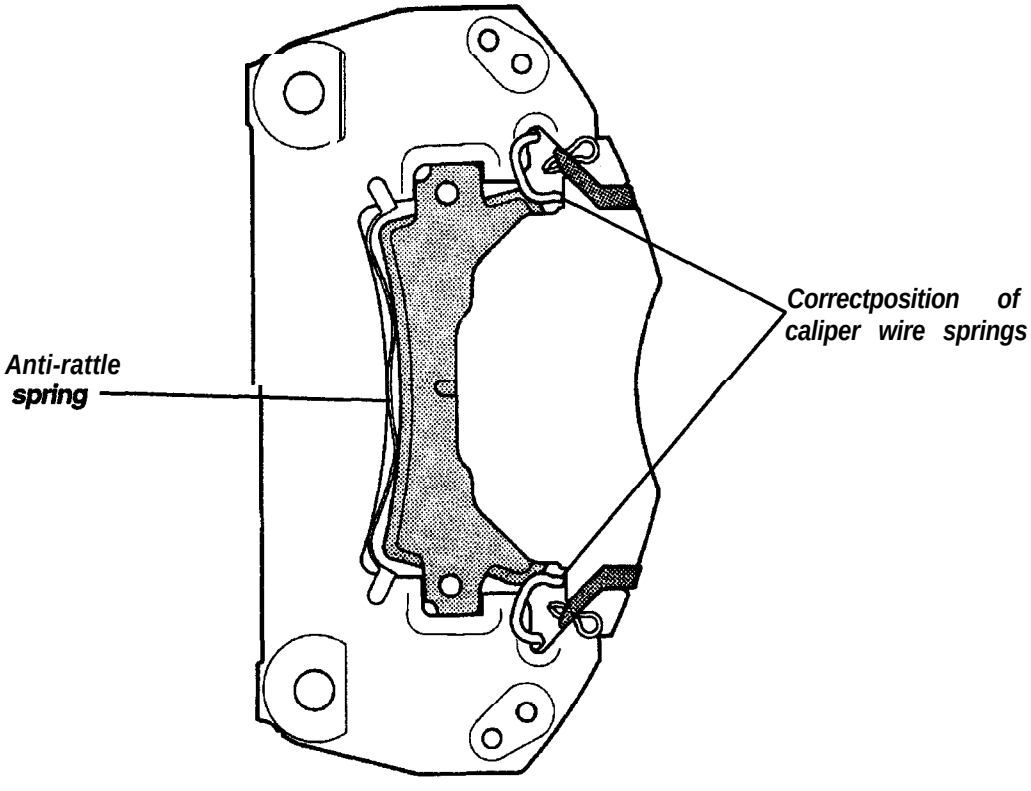
Riaht Hand Rear Caliper Shown



J04

4. Fit the brake pads, with their anti-rattle springs into the caliper bracket.

5. Refit the caliper over the pads ensuring that the caliper wire springs are located correctly, and slide in both retaining plates. Fit the locking clips.



J09

6, Press the brake pedal several times to set the brake pad position and to take up the parking brake adjustment. Before switching on the ignition, check the brake fluid level in the reservoir, and top up if necessary.

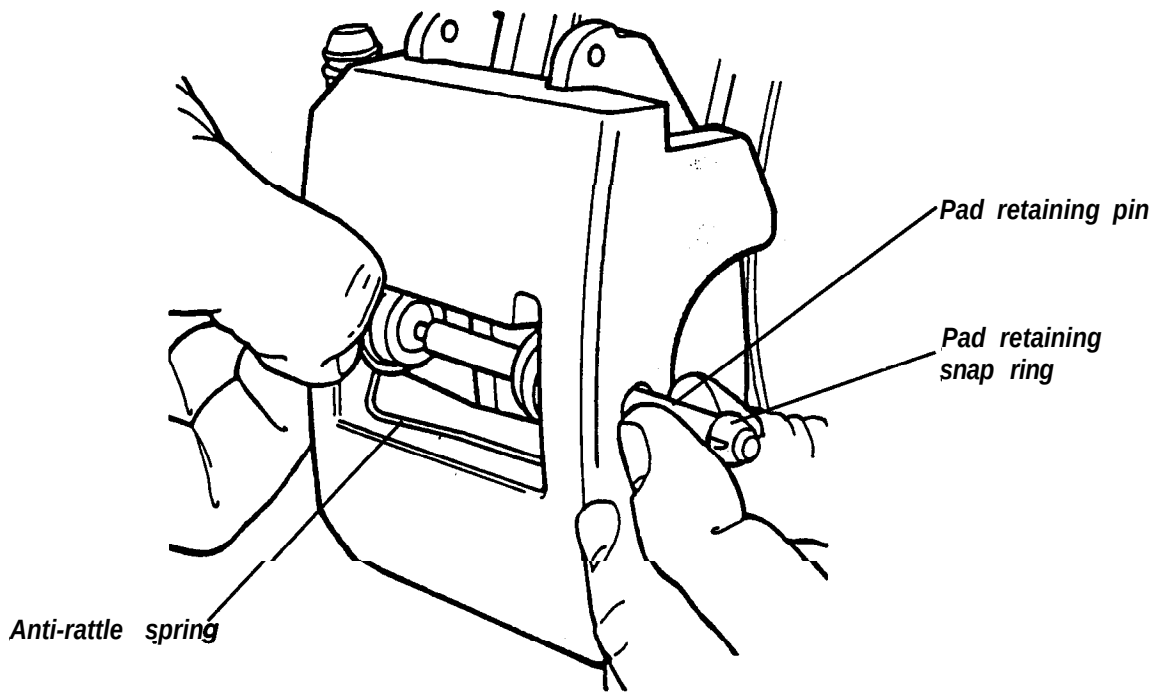
7. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

Rear Brake Pad Replacement - Brembo Rear Calipers (June/July '94 onwards)
Tools Required: Piston Retraction Tool TOOOT1242

1. Remove the rear road wheels.

2. At each rear corner: using a suitable pin punch, knock the pad retaining pin out of the caliper towards the outside.
WARNING: Take precautions as necessary to restrain the anti-rattle spring from flying off as the pin is withdrawn.

3. Remove the anti-rattle spring, and withdraw both brake pads from the caliper. Measure the thickness of the lining material, and renew the axle set of pads if any are below 2.5 mm.



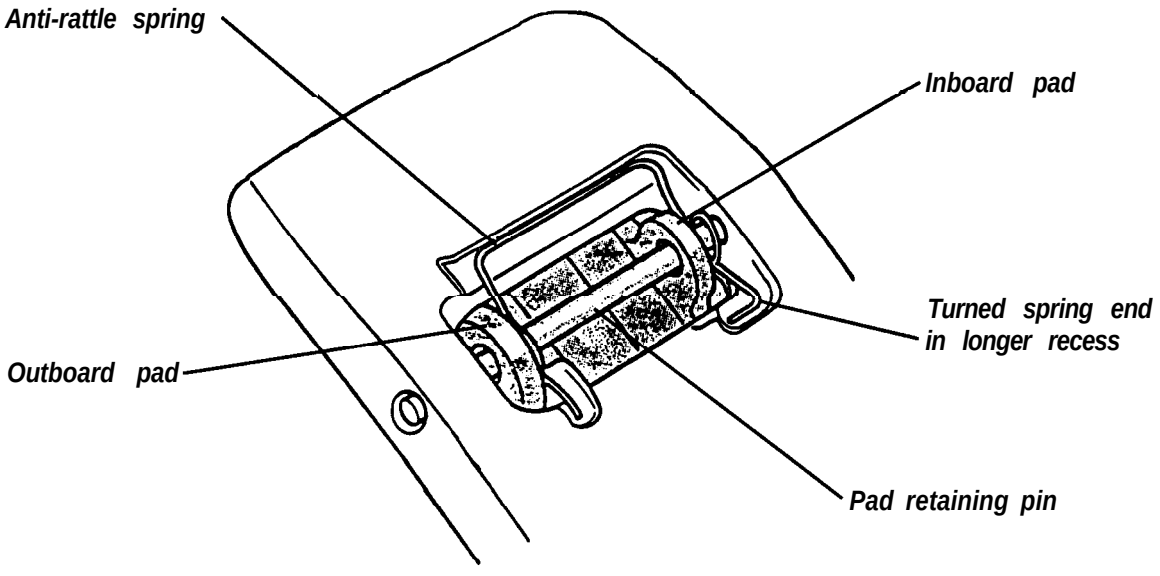
4. Before refitting the pads, inspect the piston boot for splits, cracks or other damage, and for any signs of fluid leakage or wetness. If any such signs are apparent, the complete caliper should be replaced as Brembo do not recommend that this caliper be dismantled.

5. If refitting the existing brake pads, refit each pad in the same position as originally fitted.

6. Before fitting new rear pads, the caliper piston must be screwed back into the caliper down the parking brake actuation mechanism. This operation requires the use of special tool TOOOT1242 and the removal of the brake disc:
Remove the single socket head screw retaining the brake disc, and remove the disc.
Fit special tool TOOOT1242 into the holes in the caliper piston, and screw the piston back down

the parking brake mechanism screwthread until fully bottomed.
Refit the brake disc, and tighten the countersunk retaining screw to 12 Nm.

7. Slide the brake pads into the caliper. Position the pad anti-rattle spring in the caliper aperture, with the spring ends located in the recesses provided. Ensure that the spring is fitted the correct way up, with the turned spring end in the longer recess. Press the spring eyes into alignment whilst the pad retaining pin is inserted through the caliper from the outside. Ensure that the pin passes through both eyes of the anti-rattle spring, and both brake pads, and that the pin is fully installed with the snap ring seated in the outboard side of the caliper.



8. Refit the roadwheels and press the brake pedal several times to set the brake pad position. Before switching on the ignition, check the fluid level in the reservoir and top up if necessary.

9. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

Rear Brake Pad Reoiacement • A.P. Racing Rear Calipers (Sport 300)

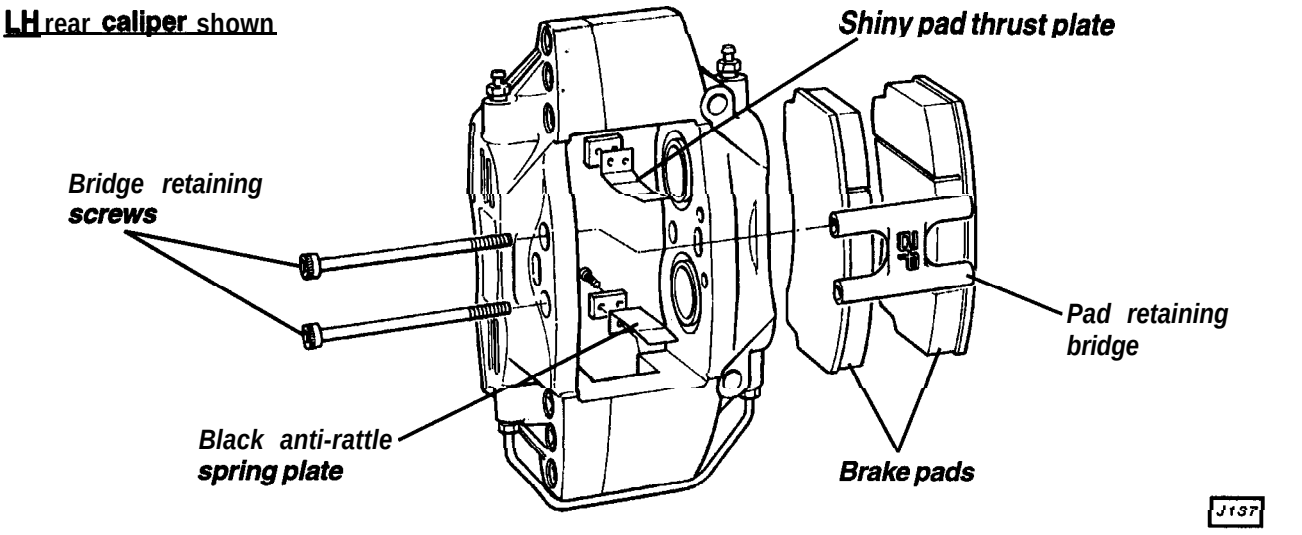
1. Remove the rear road wheels. At each rear caliper:

2. Release the two socket head screws and remove the pad retaining bridge.

3. Withdraw the brake pads, noting their fitted positions, and measure the lining thickness. Renew the axle set of pads if any lining thickness is below 2.5 mm. if refitting the used pads, instai in their original positions.

4. Before fitting the pads, examine the pad thrust plates (shiny) fixed at the bottom end of the pad recess in the caliper, and the anti-rattle spring plates (black) at the top end of the recess. Also examine for any signs of fluid leakage or corrosion from or around the pistons, pipe connections and joints.

5. if new pads are to be fitted, the pistons must be pushed back into the caliper. Take care not to damage the surface of the brake discs or pistons.



6. Insert the pads into the caliper, and retain with the bridge piece. Fit and securely tighten the bridge retaining screws.

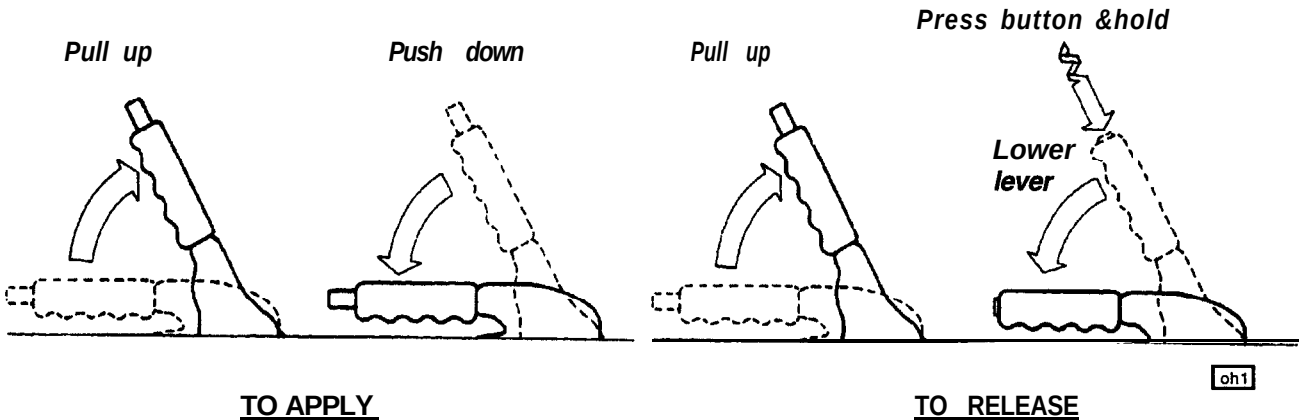
7. Refit the road wheels and press the brake pedal several times to set the brake pad position. Before switching on the ignition, check the brake fluid level in the reservoir, and top up if necessary.

6. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

JF.7 • PARKING BRAKE ADJUSTMENT

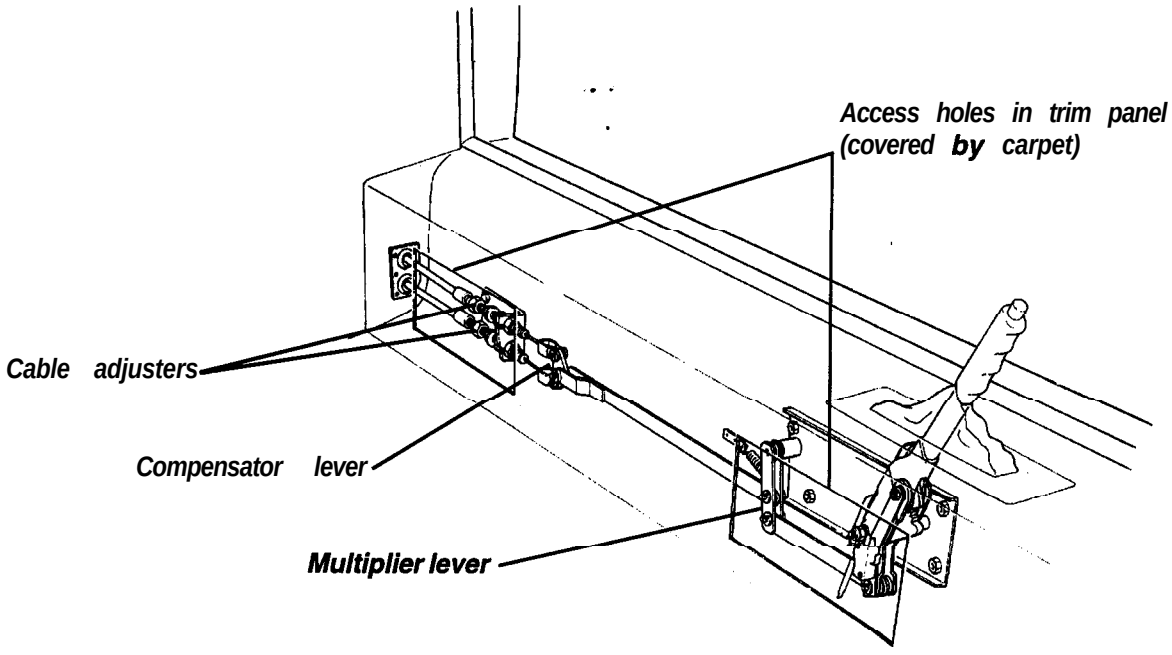
It is feature of the mechanically operated parking brake mechanism, that a large amount of parking brake lever travel is required in order for the brake to work efficiently and for the automatic adjustment to function. For this reason, a 'fold down' type parking brake lever is used to ease driver entry/exit.

The brake is applied by pulling the lever upwards in the usual manner. After application, the lever may be pushed down again (WITHOUT pressing the release button in the end of the handgrip) whilst the fascia tell tale lamp warns of parking brake application. To release the brake, pull the lever up, press the release button and HOLDING THE BUTTON PRESSED IN, lower the lever fully.



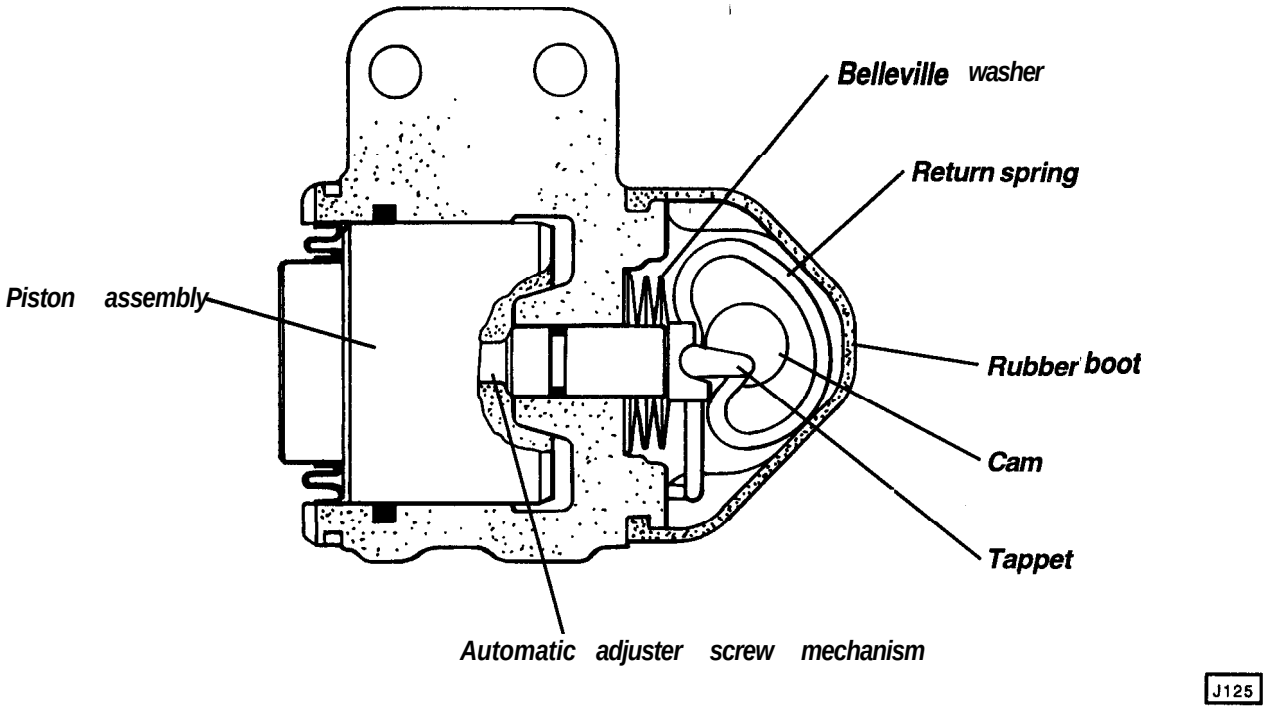
TO APPLY **TO RELEASE**

The parking brake lever is connected via a short link to a multiplier lever to increase leverage and reduce operator effort. The multiplier lever connects to an actuating link which uses a compensator lever to balance the force applied to each parking brake cable.



Parkina Brake Mechanism - Bendix

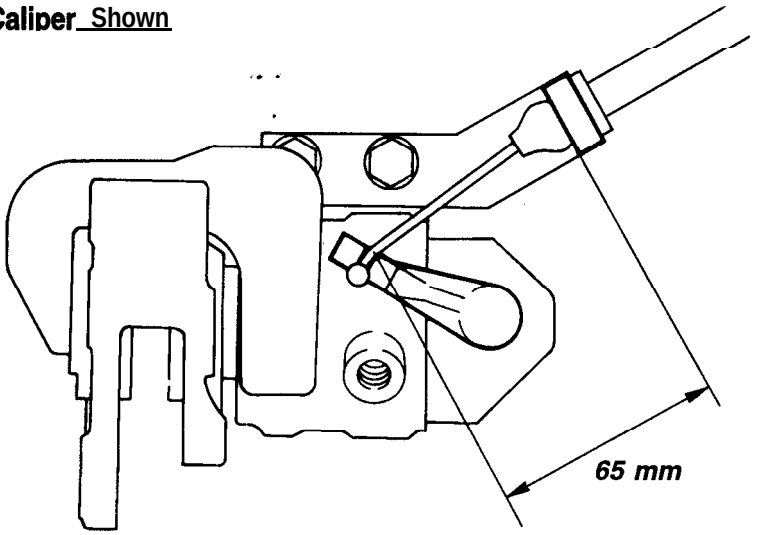
At each caliper, the parking brake cable is attached to a lever which rotates a shaft across the back of the caliper cylinder. A cam on this shaft uses a pawl to transmit rotation of the shaft into an axial movement of a pin which operates the caliper piston to apply the brake pads.



A screw thread mechanism links the pin to the piston, and automatically compensates for brake pad wear by rotation of the nut within the piston when the footbrake is applied. For the auto adjustment system to function correctly, it is essential that each caliper parking brake lever is allowed to return fully when the brake is released, and is not prevented from doing so by maladjustment of the parking brake cable.

To check that this condition is achieved, with the parking brake 'off', measure the distance between the cable abutment and caliper lever as shown.

Riaht Hand Rear **Caliper** Shown

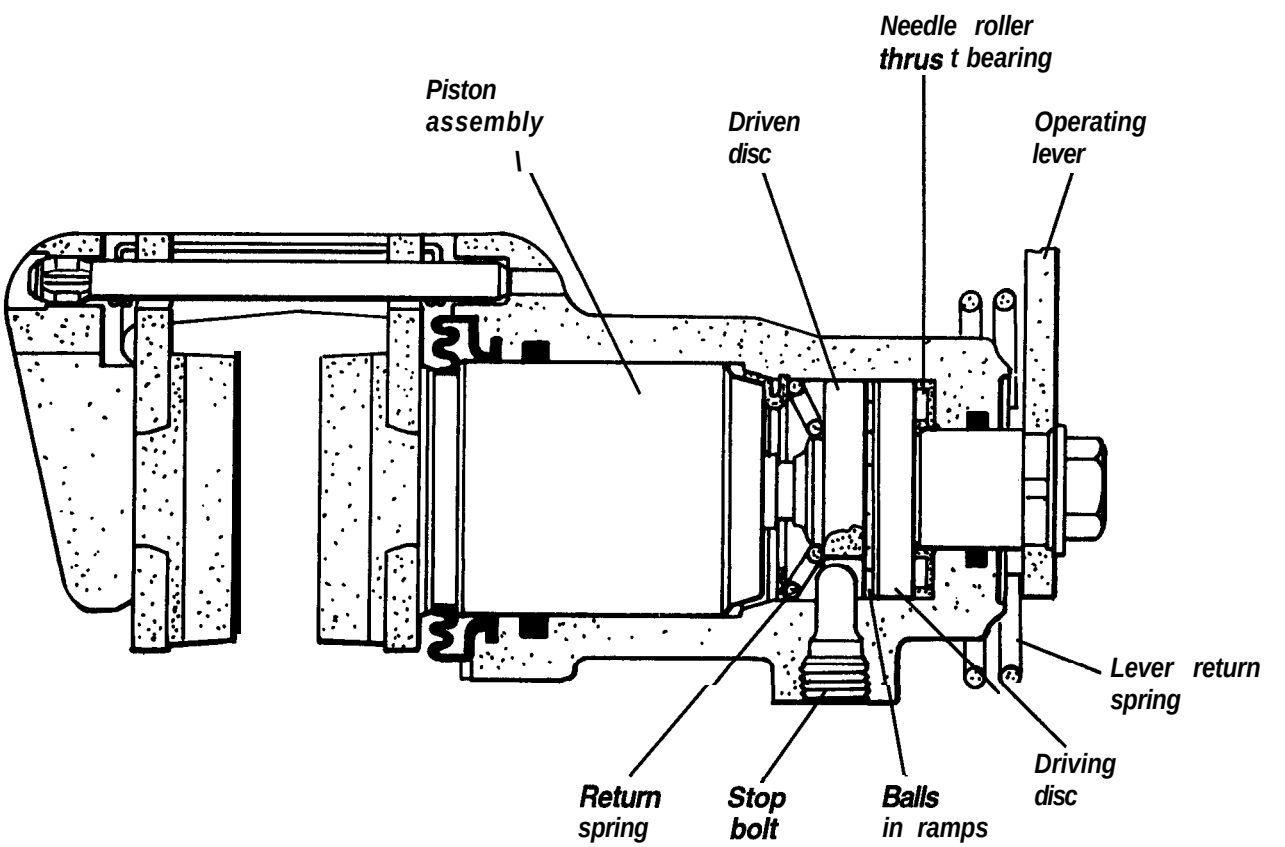


J10

After verifying this dimension, any slack in the cables may be adjusted out at their forward abutment inside the driver's sill trim panel. For access, slide the driver's seat fully forward and lift the rear end of the sill carpet to expose the trim panel aperture. After adjustment, recheck the caliper lever 'off' dimension as above.

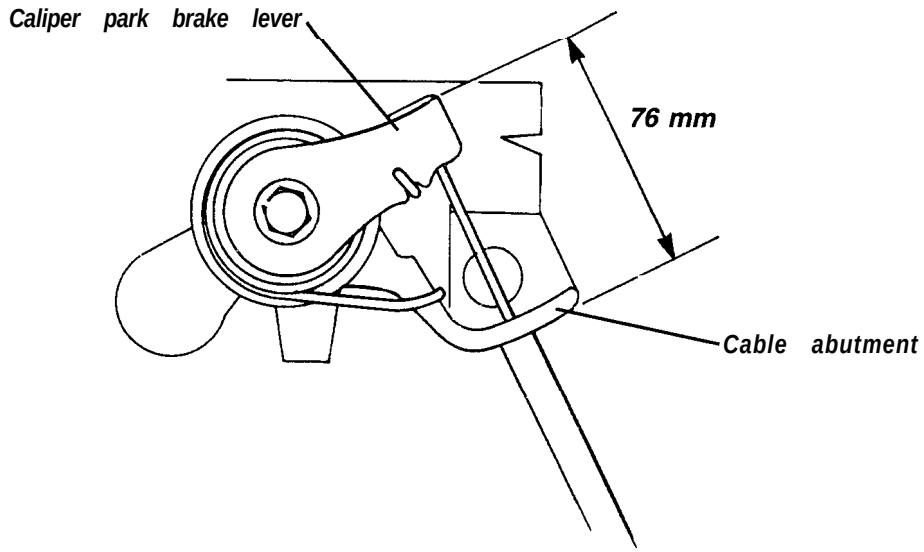
Parking Brake Mechanism • Brembo S4

The Brembo caliper uses two discs separated by hardened steel balls in ramps machined in the discs, to convert the rotation of the drive disc (to which the parking brake lever is attached) into axial movement of the driven disc, whose rotation is restrained by a stop bolt. The axial movement of the driven disc is transmitted to the caliper piston by a screwthread mechanism which compensates for pad wear by rotation of the nut within the piston when the footbrake is applied.



J126

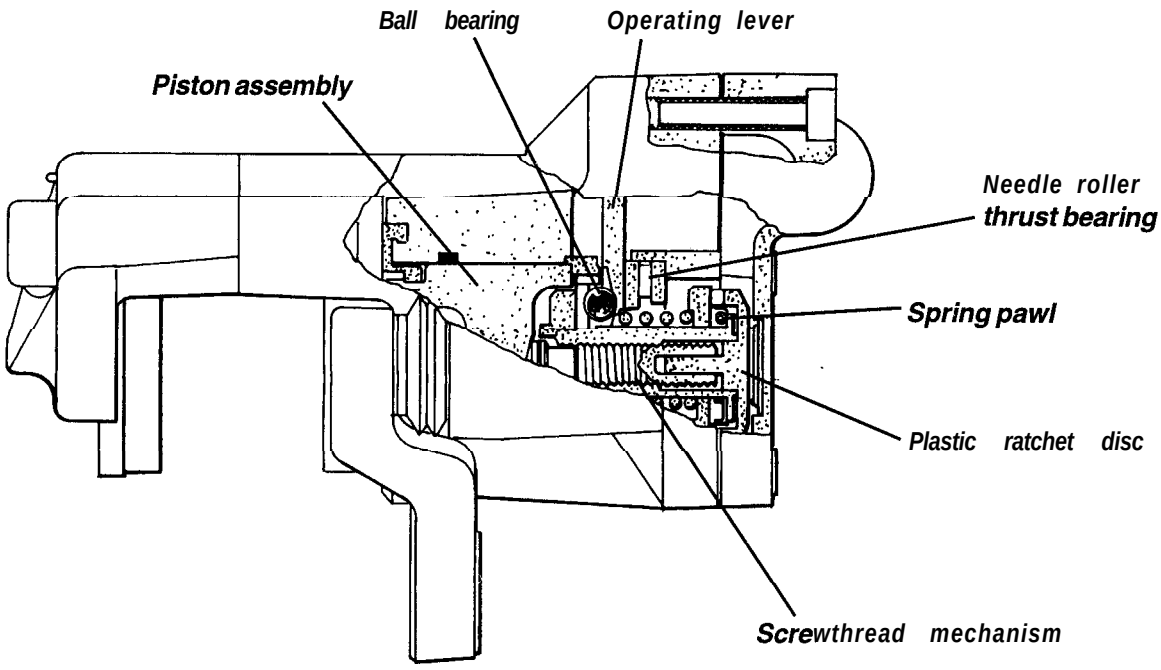
For the auto adjustment system to function correctly, it is essential that each caliper parking brake lever is allowed to return fully when the brake is released, and is not prevented from doing so by maladjustment of the parking brake cable. To check that the caliper levers are fully returned; with the parking brake 'off', measure the distance between the cable abutment and caliper lever as shown.



After verifying this dimension, any slack in the cables may be adjusted out at their forward abutment inside the driver's sill trim panel. For access to the cable adjusters, slide the driver's seat fully forward and lift the rear end of the sill carpet to expose the trim panel aperture. After adjustment, re-check the caliper lever 'off' dimension.

Parkina Brake Mechanism - A.P. Racing: Sport 300

On Sport 300 models, a dedicated parking brake caliper is mounted on the rear of each rear hub carrier. The single piston sliding calipers are operated by cable and incorporate a self adjustment mechanism to compensate for pad wear.



The lever to which the cable attaches is contained within the caliper body, protected by a bolt on cover, and uses a system of balls and ramps to convert the rotation of the lever into axial movement of the piston via an adjuster screwthread mechanism. The screwthread is linked to a plastic ratchet disc via a tongue and groove. A spring pawl rotates with the lever, and if the piston movement on application becomes excessive, the pawl rides over a ratchet tooth on the disc, which it subsequently causes to rotate when the brake is released and the mechanism is unloaded, when the lever and pawl return to their start positions. This rotation of the disc is transferred to the screwthread which extends the piston and takes up the free play which would otherwise develop.

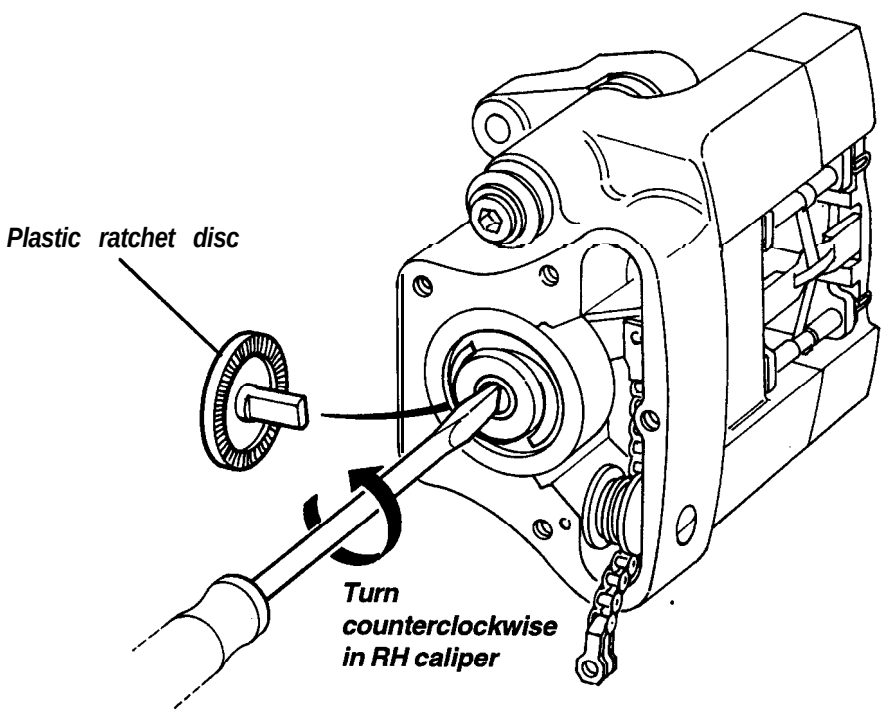
A short length of chain is used in conjunction with a pulley wheel to connect the operating cable to the caliper lever, and provides for an optimum cable run. The chain linkage is contained behind the caliper cover.

When adjusting the parking brake cables, care must be taken to take out only the slack, and not to preload the caliper mechanisms, whose levers are concealed by covers. For access to the cable adjusters, slide the driver's seat fully forward and lift the rear end of the sill carpet to expose the trim panel aperture.

To replace the parking brake pads:

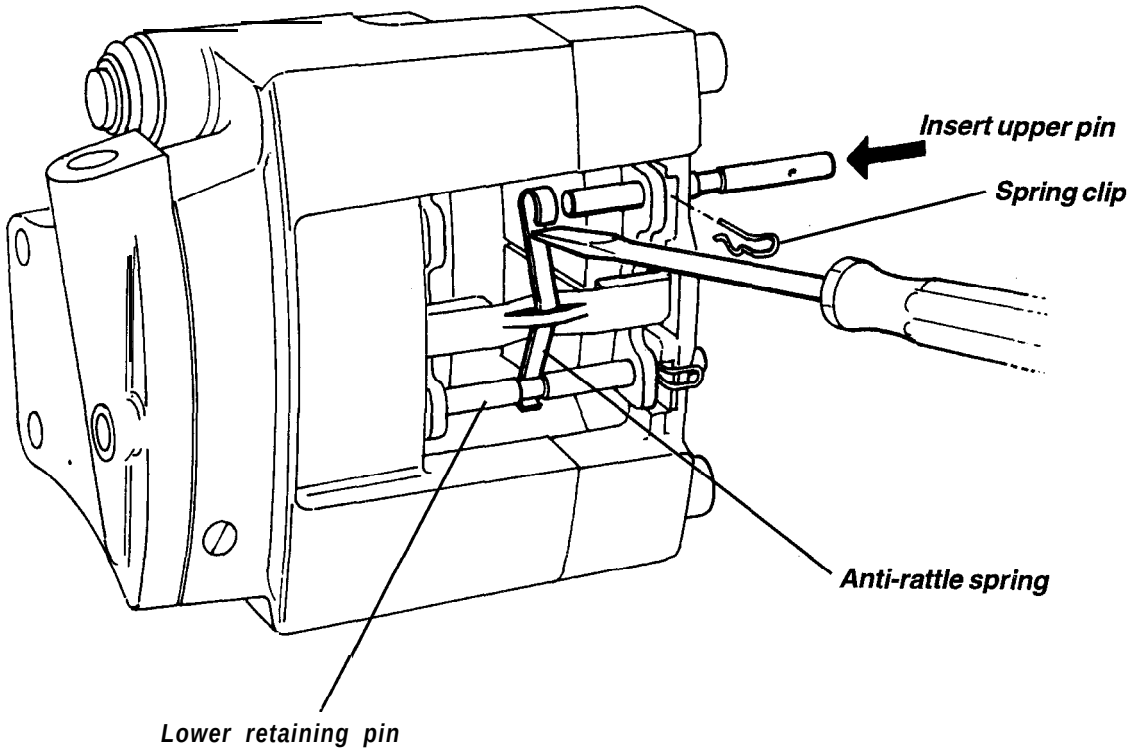
1. Pull out the spring clips and tap out the two pad retaining pins whilst pressing down the appropriate leg of the anti-rattle spring. Withdraw the anti-rattle spring and pads from the caliper.

2. Before fitting new pads, the piston must be retracted into the caliper;
   - In order to allow the caliper cover to be removed, it is necessary to either slacken or disconnect the parking brake cables from the cabin end. For access, slide the driver's seat fully forward and lift the carpet at the rear end of the sill trim panel.
   - Release the 5 capscrews, and pull away the caliper mechanism cover with the cable still attached.
     Pull out the white plastic ratchet disc and use a flat blade screwdriver to screw the screwthread mechanism into the piston and allow the piston to be retracted.
   - Turn the screwthread: · clockwise in the LH caliper;
     · counterclockwise in the RH caliper.
   - Refit the ratchet disc and caliper cover with gasket and ratchet disc spring.



J127

3. Fit the new pads into the caliper and retain with one of the two pins. Fit the anti-rattle spring into position with one leg engaged beneath the central, waisted part of the pin. Insert the second pin whilst holding down the other leg of the anti-rattle spring. Secure the two retaining pins with the spring clips.



4. Re-connect the front end of the cables and adjust carefully to take out any slack without preloading the caliper mechanism. Operate the brake several times to allow the caliper self adjusting mechanism to set the brake pad postion.

JF.8 - BRAKE BLEEDING PROCEDURE

If a Powermaster IIIA booster/master cylinder assembly, or a pump/accumulator assembly has been replaced, or if air has entered (or is suspected in) the brakelines, the entire brake system including all hydraulic units must be bled at each wheel. If only a hydraulic part of the booster/master cylinder or pump/ accumulator has been replaced, and air has not entered the brake lines. it may only be necessary to bleed at the booster/master cylinder bleed nipples.

Manual Bleeding

1. Ensure ignition is switched off.

2. De-pressurise the accumulator by FIRMLY applying and releasing the brake pedal up to 40 times. A noticeable change in brake pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

3. Clean the reservoir cover and top of the reservoir before squeezing the release tabs and lifting off the cover and diaphragm assembly.

4. Fill or top up both front and rear compartments using only DOT 4 brake fluid from a sealed container until levels reach the full marks.
IMPORTANT · Use only DOT 4 brake fluid. Do not use DOT 5 silicone fluid, or any fluid which has been exposed to the atmosphere for more than a brief period, or any fluid suspected of being wet, dirty or contaminated.
Refit the reservoir cover and diaphragm assembly.

5. If a replacement booster/master cylinder assembly has been fitted, or if there is difficulty when trying to bleed the front master cylinder sections,ensure all air is removed from the master cylinder body by opening the brake pipe tube nuts on the master cylinder (front two only) approximately two turns, or until fluid begins to bleed. Torque tighten the pipe nuts:
- Front pipe (LHF brake) M13: 24 · 26 Nm (18 · 19 lbf.ft)
- Second pipe (RHF brake) M12: 22 · 24 Nm (16 · 18 lbf.ft)

6. Bleed right front wheel brake:
- Attach bleeder hose to caliper nipple and submerge opposite end in clean brake fluid.
- Open bleed nipple.
- Slowly depress brake pedal.
- Close bleed nipple.
- Release brake pedal.
Check fluid level and top up as necessary.

7. Repeat step 6 until the brake pedal feels firm at half travel and no air bubbles are observed in the bleeder hose.

8. Repeat steps 6 and 7 on the left hand front brake.

9. Turn the ignition on and allow the pump to run and pressurise the accumulator. **NOTE:** Turn off the ignition if the pump runs for longer than 60 seconds, and refer to 'Pump Runs Continuously' (see later).

10. Bleed right hand rear caliper:
Attach bleeder hose to caliper nipple and submerge opposite end in clean brake fluid.
Open bleed nipple.
With ignition on, **lightly** depress the brake pedal until fluid begins to flow from the hose. The harder the pedal is pressed, the more fluid will flow. Do not fully depress the pedal. Note that the pump will run during this process. Allow fluid to flow for about 15 seconds.
Close bleed nipple, then release brake pedal.
- Repeat as necessary until no air bubbles are seen at the bleeder hose.

11. Check fluid level in the reservoir rear chamber. To avoid de-pressurising the accumulator at this interim stage, top up the reservoir rear chamber to a level 25 mm below the full mark.
IMPORTANT: Final fluid level must be checked after de-pressurising unit at step 14.

12. Repeat steps 10 and 11 for the left hand rear caliper.

13. Bleed master cylinder isolation valves:
Attach a bleeder hose to the bleed nipple on the inboard side of the master cylinder, and sub merge opposite end in clean brake fluid.
With ignition on, apply light force to the brake pedal and slowly open the bleeder valve to allow brake fluid to flow until no air is seen in the fluid.
Close the bleed nipple when fluid begins to flow without air bubbles.
Repeat procedure on the outboard side nipple.
(or use the 'Tech 1' bleeding sequence)

14. Bleed accumulator:
Turn off ignition, de-pressurise the accumulator by FIRMLY applying and releasing the brake

pedal up to 40 times. A noticeable change in brake pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

Wait two minutes for air to clear from-the brake fluid in the reservoir.

- Remove the reservoir cover and check the level in both front and rear sections of the reservoir. If necessary, top up to the correct level - see start of this section. Refit reservoir cover.
- Turn on the ignition and allow the pump motor to run.

NOTE: Turn off the ignition if the pump motor runs for more than 60 seconds. Refer to 'Pump Motor Runs Continuously' in this section.

15. Bleed booster section of the booster/master cylinder assembly:

Depress the brake pedal with moderate pressure and turn on the ignition without starting the engine for 3 seconds.

Repeat this off/on procedure 10 times to cycle the solenoids.

(part of 'Tech 1' bleed sequence)

16. Assess brake pedal 'feel':

Apply brake pedal and note pedal feel and travel.

If pedal feels firm and smooth without excessive travel, system is properly bled.

If pedal feels soft or spongey or travel is excessive, refer to 'Excessive Pedal Travel' in this section.

If a 'bump' is noted upon initial pedal application, or application does not feel smooth and uniform, refer to 'Non-Uniform Pedal Feel' in this section.

17. Road test vehicle and note pedal travel and feel. If any symptoms described above in step 16 appear, refer to the appropriate section below.

Excessive Pedal Travel

Excessive brake pedal travel exists if, when driving the vehicle, braking action does not start until after the first 35 mm (1.4 in) of pedal travel. If after carrying out the brake bleeding procedure above, excessive travel is evident, proceed as follows:

1. Re-bleed front brakes (rear brake circuit may be omitted) as described above in steps 6, 7 & 8 of 'Manual Bleeding', and check brake fluid levels.

2. Re-assess pedal feel as in step 16 of 'Manual Bleeding' above. If excessive travel is still evident, first check fluid level, then check for leakage throughout the brake system.

Non-Uniform Pedal Feel

Bleed the system using the 'Tech 1' bleeding procedure.

Pump Runs Continuously

IMPORTANT: This procedure is to be used if the pump runs for more than 60 seconds.

1. With the ignition off, de-pressurise the accumulator by FIRMLY applying and releasing the brake pedal up to 40 times. A noticeable change in brake pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

   NOTE: In the following steps, use a suitable container and/or shop towels to catch the brake fluid and prevent it from contacting any painted surfaces.

2. Loosen but do not remove the two tube nuts from the master cylinder front chamber (for the left and right hand front brakes).

3. Press the pedal to its fullest extent. Fluid should run slowly from around the tube nuts.

4. With the pedal depressed, tighten both the tube nuts.

5. Quickly release the pedal and re-apply using a jabbing (sharp and rapid) motion with full force.

6. Turn on the ignition and allow the motor to pressurise the accumulator.

7. Assess brake pedal feel, and road test-as in steps 16 & 17 of 'Manual Bleeding'.
IMPORTANT: If the pump still runs continuously, refer to 'Hydraulic Diagnosis'

JF.9 - FRONT CALIPER OVERHAUL

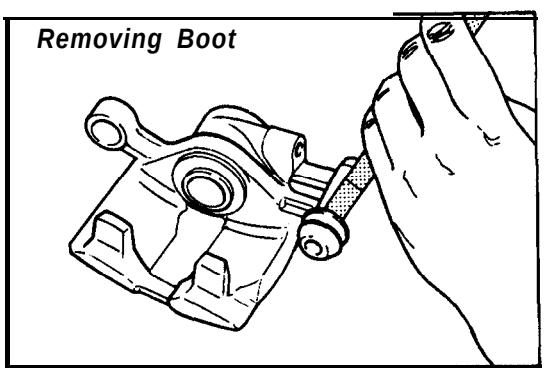
The dust boots and hydraulic seals of the TMC calipers may be replaced, but if there is any visible marking or wear on the pistons or cylinder bores, the complete caliper assembly should be replaced. The sliding pins of the TMC caliper may also be overhauled. The AP Racing calipers fitted to the Sport 300 however, are to be overhauled only by AP Racing at Wheeler Road, Seven Stars Industrial Estate, Coventry, CV3 4LB. No attempt should be made to dismantle or repair the Brembo calipers.

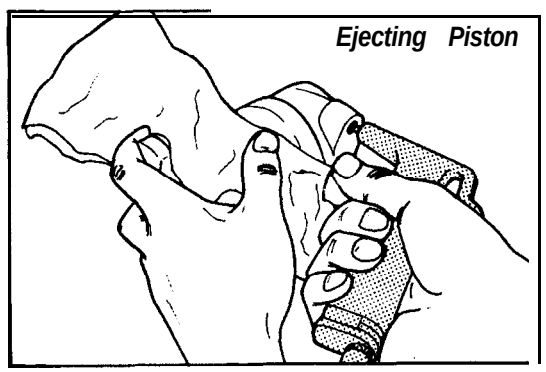
Front Calioer Overhaul - TMC (Prior June/July '94)

1. Disconnect the brake hose from the caliper brake pipe and bracket. Remove the caliper swing release bolt, raise the caliper and draw off from the top slide pin.

2. Remove the lower sliding bush and its rubber boots.

3. Remove the top pin boot from the caliper using a small chisel as shown.





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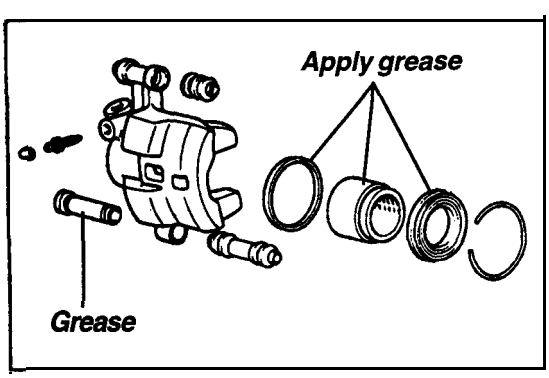
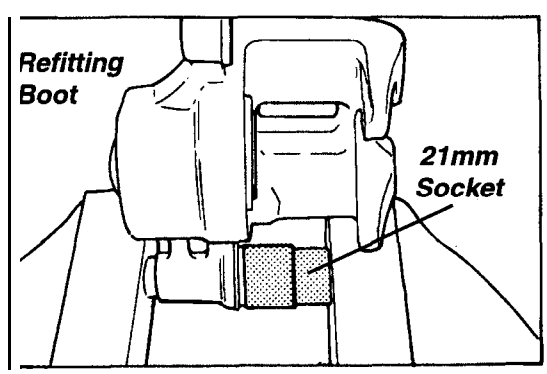
4. Remove the spring ring and boot from the piston bore and use compressed air to eject the piston from the cylinder.
WARNING: Keep fingers well clear during this operation, and use rags to guard against brake fluid spray.

5. Remove piston seal from cylinder.

6. On re-assembly, apply rubber grease to parts as indicated.

7. Instal piston seal into cylinder bore, and insert piston. Fit cylinder dust boot, and retain with spring ring.





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a. Fit the top slide pin boot by using a 21 mm socket as shown.

9. Fit the sliding bush with its two boots.

10. Instal the caliper onto the top slide pin, swing down, and refit the lower sliding pin bolt. Torque tighten to 16 · 14 Nm (12 · 17 Ibf.ft).

11. Reconnect the brake hose, and bleed the brakes.

JF.10 · REAR CALIPER OVERHAUL

The Bendix rear calipers may be overhauled and new seals and dust boots fitted. If the parking brake mechanism within the piston needs attention, the complete cylinder assembly should be replaced. For the Brembo footbrake and Sport 300 parking caliper, only the sliding pins may be overhauled, with any signs of hydraulic leakage from the footbrake caliper being rectified by the fitting of a new caliper. The Sport 300 rear footbrake uses AP Racing calipers which should be overhauled only by AP Racing at Wheeler Road, Seven Stars Industrial Estate, Coventry, CV3 4LB.

Rear Caliper Overhaul · Bendix (Prior June/July '94)

1. Disconnect the handbrake cable and brake hose from the caliper.

2. Remove the locking clips, slide out the caliper retaining plates (see JD.3), and remove caliper to bench.

3. Clean the caliper thoroughly. Remove piston boot. Using a l/4" drive ratchet, unscrew the piston from the handbrake adjustment mechanism.

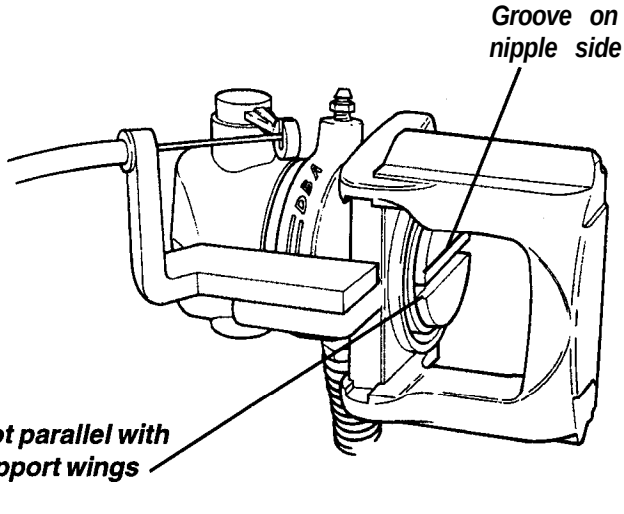
4. Using a rag to protect against brake fluid spray, and keeping fingers well clear, use compressed air to eject the piston from the cylinder. Remove seal from groove in cylinder.

5. Clean the groove, cylinder bore and piston with methylated spirit and dry with compressed air. Inspect the groove, bore and piston surface for any signs of scratching or pitting. If any such signs are apparent, a replacement cylinder assembly should be fitted.

6. Fit a new seal into the cylinder groove. Lubricate the piston and bore with brake fluid and press the piston into the cylinder.

7. Smear the exposed part of the piston with the special Lockheed grease supplied in the seal kit, and fit a new dust boot.

a. Screw the piston fully in along the handbrake adjuster mechanism, and then position with the piston slot parallel with the two support wings and the groove toward the bleed nipple side. (See pad replacement procedure JF.6).

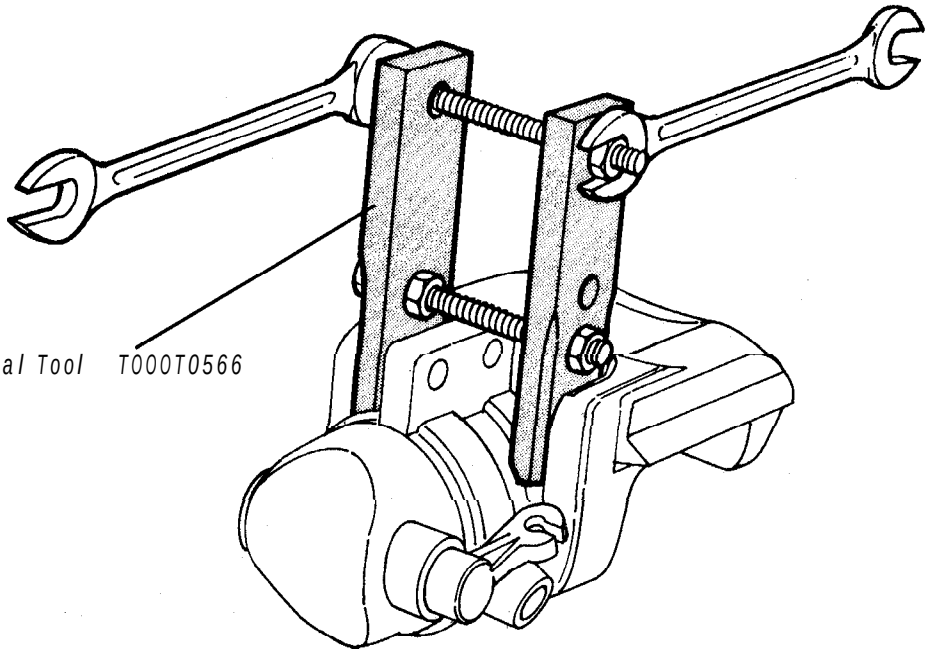


Bendix Cylinder Removal

If it is necessary to replace a cylinder assembly, special spreader tool TOOOT0556 must be used to avoid damaging the special protective coating-on the cylinder and wings of the carrier bracket:

4 Position the tool as shown and adjust the inner nuts on the lower stud to set the ends of the tool snugly against the wings of the carrier bracket.

b) Gradually tighten the two nuts on the upper stud until the cylinder is no longer gripped by the carrier bracket. It may be necessary to re-position the tool to enable the cylinder to move easily.



Special Tool T000T0566

c) Using a 3 mm allen key or similar, depress the spring loaded pawl and slide the cylinder out of the carrier.

Bendix Cylinder Replacement

d) With the tool holding the wings of the carrier apart, slide the new cylinder into the carrier bracket whilst depressing the locking pawl.
NOTE: Check that the cylinder is fitted the correct way up.

e) Ensure that the pawl locks into the carrier bracket locating hole and remove the spreader tool.

Rear Caliper Slidina Pins - Brembo (June/July '94 onwards)

The sliding bushes and sleeves of the Brembo rear calipers may be replaced without disturbing the hydraulic connection:

a) Disconnect the parking brake cable from the caliper.

b) Remove the cap head bolt securing the bottom guide bush to the caliper adaptor plate.

c) Remove the hex. head bolt securing the top guide bush to the caliper adaptor plate, and withdraw the caliper from the car with the brake hose still connected.

d) Slide out the lower steel guide sleeve and withdraw the bush/boot from the caliper. Pull the boots off the top steel guide bush and slide out the bush from the caliper.

e) Clean the guide bores in the caliper body with brake cleaner. Lubricate the new bushes and boots with silicone grease provided in the repair kit, and reassemble into the caliper in reverse order to

disassembly.

f) Refit the caliper to the adaptor plate, torque. tightening the two fixings to:
Upper M10 bolt; 45 - 50 Nm (33 - 37 lbf.ft)
Lower M8 caphead; 26 - 30 Nm (19 - 22 lbf.ft)

g) Reconnect the parking brake cable and operate the brakes several times before driving the car

Parkina Caliper Slidina Pins - Sport 300 (Brembo)

a) Remove the socket head guide bolt from the lower end of the caliper, and the caphead bolt securing the top guide bush to the caliper plate.

b) Withdraw the caliper from the brake disc, and slide out the lower guide bolt, and the upper guide bush. Remove from the lower caliper bore, the Teflon and rubber bushes. From the caliper top guide pin bore, remove the two rubber boots.

c) Clean the caliper bores and all other parts to be reused, and re-assemble in reverse order to dissassembly using silicone grease on the sliding components.

JF.11 - BRAKE DISCS

The condition of the brake disc friction surface is a major factor in brake performance and feel, with a good surface quality and minimal run-out and thickness variation being required. After an extended lay up, some surface rust may develop on the discs which will cause a degradation in braking quality until the surfaces are cleaned up by normal brake action. Excessive run-out or thickness variation as a result of overheating or extended wear, may cause brake judder and/or extended pedal travel due to pad 'knock off'. It may be possible to rectify excessive surface rusting/pitting or warping by resurfacing both sides of the disc using specialist equipment, but on no account should the minimum thickness be transgressed. NOTE: Ensure the front wheel bearings are correctly adjusted before measuring front disc run-out.

Brake disc thickness

		TMC/Bendix	*Brembo*	*A. P. Racing*
Front	- nominal	**20** mm (0.79 in)	**28** mm (1.10 in)	**28** mm (1.10 in)
	- minimum	19 mm (0.75 in)	**25** mm (0.98 in)	26.9 mm (1.06 in)
Rear	- nominal	12 mm (0.47 in)	**22** mm (0.87 in)	28 mm (1.10 in)
	- minimum	11 mm (0.43 in)	20.4 mm (0.80 inj	26.9 mm (1.06 in)

Maximum disc runout

Front	0.15 mm (0.006 in)	0.10 mm (0.004 in)	0.10 mm (0.004 in)
Rear	**0.20** mm (0.008 in)	0.15 mm (0.006 in)	0.15 mm (0.006 in)

Maximum Thickness Variation

Front and rear	0.015 mm (0.0006 in)	0.015 mm (0.0006 in)	0.015 mm (0.0006 in)

Front Disc Replacement

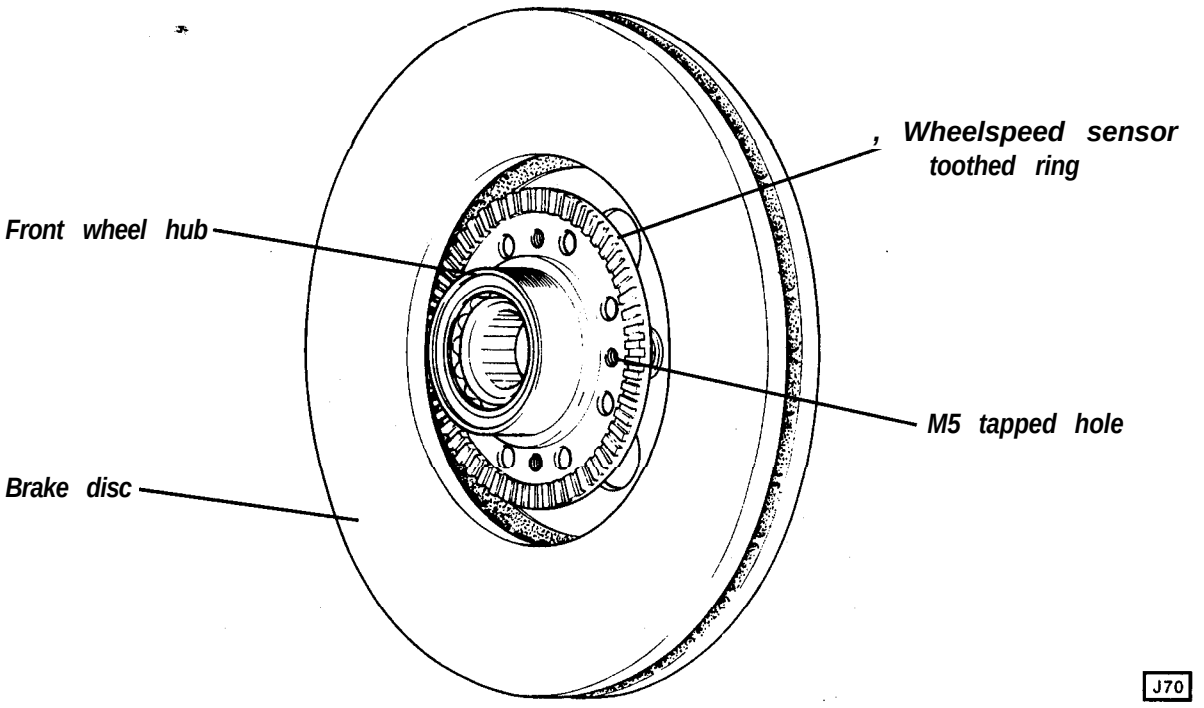
Before fitting a new brake disc, ensure that any corrosion protective coating is removed from the braking surface of the disc with a suitable solvent. Otherwise contamination of the brake pads may occur resulting-in initial poor brake performance.

TMC brakes

On cars with TMC front brakes, the brake discs are fixed to the inboard sides of the front hubs, which must be removed from the car to before the discs may be replaced.
To remove a front disc:

- Remove the hub/disc assembly as detailed in sub-section CD.5 ('91 & '92 M.Y.) or CF.4 ('93 M.Y. onwards).

To obtain access to the disc/hub bolts, the speed sensor toothed ring must first be withdrawn from the hub. Use four M5 screws through the tapped holes in the sensor ring either to push the ring from the hub, or to attach a suitable puller, taking care not to twist or distort the ring.



Remove the four MI0 bolts, and withdraw the disc from the hub.

When re-assembling, ensure scrupulous cleanliness of the disc to hub jointface. Torque tighten the four disc retaining bolts to 52 · 55 Nm (38 · 40 lbf.ft) before pressing the sensor ring onto the hub up to the shoulder. Adjust the hub bearings as detailed in sub-section CD.5 ('91 & '92 M.Y.) or CF.4 ('93 M.Y. onwards).

Brembo brakes

The Brembo front brake discs are fitted on the outboard side of the front hubs, and are retained for convenience when the front wheels are removed, by a single socket head recessed screw. To, remove a brake disc, release the front caliper fixing bolts and withdraw the caliper from the disc. Remove the retaining screw, and withdraw the brake disc.

When re-fitting, ensure scrupulous cleanliness of the disc to hub jointface before mounting the disc and retaining with the recessed screw. Refit the brake caliper.

A.P. Racing brakes

Sport 300 models use alloy mounting bells to connect the brake discs to the inboard side of the front hubs. A ring of 12 socket head bolts secures each front disc to the mounting bell.

To remove a front disc:

Remove the hub/disc assembly as detailed in sub-section CD.5 ('91 & '92 M.Y.) or CF.4 ('93 M.Y. onwards).

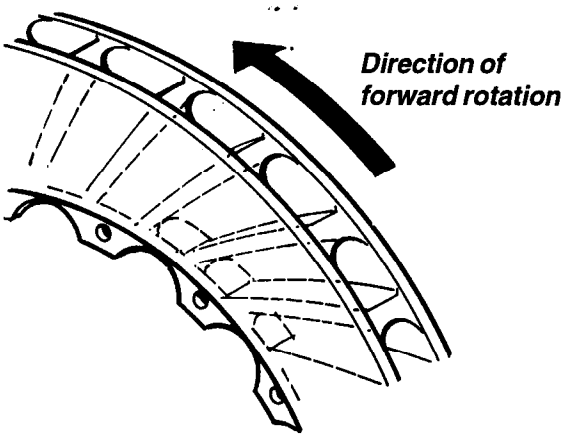
Remove the 12 socket head bolts securing the disc to the mounting bell, and withdraw the disc.

If the mounting bell is to be removed from the hub, the speed sensor toothed ring must first be withdrawn before access to the four fixing bolts is available. Use four M5 screws through the tapped holes in the sensor ring either to push the ring from the hub, or to attach a suitable puller, taking care not to twist or distort the ring. Note that a steal bobbin is pressed into each of the four fixing holes in the mounting bell.

Re-fitting a front disc:

Note that the brake discs are handed due to the curved cooling vanes. Air is drawn into the inside

of the disc and centrifuged from the outside edge. The curvature of the vanes trails the direction of forward rotation (see diagram).



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Before fitting the alloy mounting bells to the hubs, check that a steel load spreading bobbin is pressed into each of the mounting holes. Apply Permabond Al 15 to the threads of the four mounting bell retaining bolts before tightening to 47 Nm (35 Ibf.ft).

Press the wheel speed sensor ring onto the hub up to the shoulder.

Ensure scrupulous cleanliness of the disc to mounting bell jointface before fitting the 12 retaining bolts and tightening to 16 Nm (12 Ibf.ft).

Adjust the hub bearings as detailed in sub-section CD.5 ('91 & '92 M.Y.) or CF.4 ('93 M.Y. onwards).

Rear Disc Replacement

Bendix & Brembo brakes

The rear discs are mounted between the outboard side of the rear hubs and the roadwheels, and are retained for convenience when the roadwheels are removed, by a pair of countersunk 'Torx' headed screws. On Bendix brake cars, the caliper must be released before the brake disc may be withdrawn, 'but on Brembo cars removal of the rear brake pads allows sufficient clearance for the disc to be removed.

When refitting, ensure scrupulous cleanliness of the disc to hub jointface before mounting the discs and retaining with the two countersunk screws.

A.P. Racing brakes

Sport 300 models use alloy mounting bells to connect the rear brake discs to the hubs, with a ring of eight socket head bolts securing each disc to the mounting bell. The bells are retained to the hub for convenience when the roadwheels are removed, by a pair of countersunk 'Torx' headed screws. To remove a brake disc, the caliper must first be released to allow the disc and mounting bell assembly to be withdrawn from the hub.

When refitting, note that the brake discs are handed due to the curved cooling vanes. Air is drawn into the inside of the disc and centrifuged from the outside edge. The curvature of the vanes trails the direction of forward rotation (see diagram above). Tighten the disc to mounting bell bolts to 16 Nm (12 Ibf.ft).

JF.12 · RETRO-FITMENT OF BREMBO BRAKES TO ESPRIT S4

Brembo brake calipers and discs were introduced on Esprit S4 models at the following change point:

Non-USA cars: running change during '94 M.Y. at VIN R 1443 (+ 1377). August '94
USA cars: at intro. of '95 M.Y. at VIN S 1391. June '94.

The Brembo brake system, compared with the earlier TMC/Bendix system, provides increased braking efficiency and tolerance to heat build up caused by frequent hard use, as may occur during track sessions or exceptionally severe road driving. The effective radius of the wheel brakes is increased at

both front and rear, and the capacity for heat dissipation is considerably enhanced by thicker ventilated front discs, and a change from solid to ventilated rear discs. Fitment of the Brembo brake system to earlier Esprit S4 models is permissible only-as a complete car set using kit 'LOTSKESOOI' as detailed below.

The Brembo brakes differ from the earlier type TMC/Bendix brakes in the following respects:

	TMC/Bendix	Brembo
Front Calipers	Single piston sliding calipers	Four piston fixed calipers
Front Discs	Ventilated 258 x 20	Ventilated 296 x 28
Rear Calipers	Single piston sliding calipers	Single piston sliding calipers
Rear Discs	Solid 275 x 12	Ventilated 300 x 22

- The anti-lock system is unchanged.
  The parking brake (as previously) uses cable operation of the rear caliper pistons, and adjusts automatically to compensate for pad wear.
- A new 16" spare wheel is required in order to clear the greater diameter of the brake system components.
- The wheels fitted to pre-S4 cars will not accommodate Brembo brakes.
- At the front, the new brake discs are mounted on the outboard side of the new hubs (previously mounted on inboard side of the hubs). Adaptor brackets are used to mount the new calipers to the existing hub carriers.
  At the rear, adaptor plates are used to mount the new calipers to the hub carriers. New hub carriers use a reprofiled lower stiffening web in order to accommodate the hole required to route the parking brake cable, without loss of strength.
  The rear brake circuit limiting/proportioning valve (fitted to prevent over adjustment of the parking brake mechanism) is deleted and replaced by a 3-way connector.

Parts Reauired

Description	Part Number	Qty	
Brembo Brake Kit	LOTSKESOOI	1	
comprising:			
Brake Caliper Assembly, front, LH	A082J4383F	1	) inc. pads
" " " " RH	A082J4382F	1	)
Capscrew, M12x65, caliper to adaptor bracket	Al OOW7083F	4	
Flat Washer, " " "	A082J4386F	4	
Adaptor Bracket, front caliper to hub carrier	A082J4376K	2	
Setscrew, Ml2x35, adaptor brkt. " "	A075W1059Z	4	
Spring Washer, M12, " " " "	A075W4069F	4	
Brake Disc, front	A082J4380F	2	
Screw, M10, brake disc retention	A082J4381 F	2	
Brake Caliper Assembly, rear, LH	A082J6151 F	1	) inc. pads
" " " " RH	A082J615OF	1	)
Setscrew, M10x80, caliper to mounting bracket	A082W1113F	2	
Capscrew, M8x60, " " " "	A082W1114F	2	
Adaptor Plate, caliper to hub carrier, LH	A082 J4375F	1	
" " " " " " RH	A082J4374F	1	
Brake Disc, rear	A082D416OF	2	
Brake Pipe, front hose to caliper	A082J4387F	2	
3-Way Connector, rear brake circuit	BO75J6019F	1	
Bolt, M8x35, 3-way to chassis	A075W2038D	1	
Flat Washer, " " "	A075W4020Z	2	
Nyloc Nut, M8, " " "	A075W301 OZ	1	

Continued . . . . . .

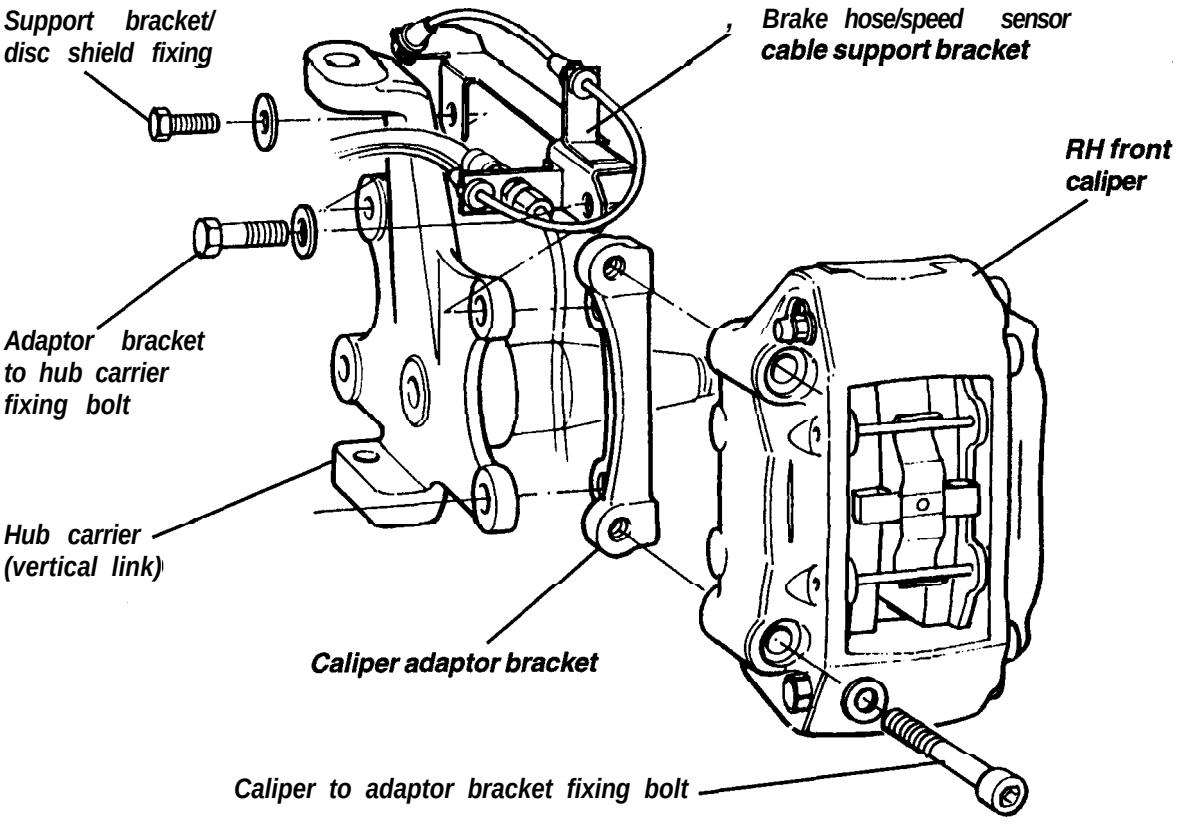
Parts Reauired (Continued)

Description	Part Number	Qty
Brake Pipe, RHR rad. arm hose to 3-ways	P691.3301.008AF	1
Brake Hose, radius arm to caliper	A082J4390F	2
Cable, parking brake, short, driver's side	AO82J4373F	1
" " " long, passenger's side	A082J4372F	1
Grommet, park cable thro' chassis	A082L6181 F	2
Plate, grommet retention in body	A082J4392F	1
Screw, no.6 x 3/4", grommet plate to body	A075W5037Z	2
Spring Clip, park cable to radius arm	A089W6272F	4
Tie Wrap, park cable to radius arm	A082W6286F	1
Front Hub	A082C4239K	2
Bearing, front hub outer	A089C8005F	2
" " " inner	A089C8004F	2
Grease Seal, front hub	A089C8003F	2
Bracket, ABS cable support to hub carrier, LH	A082J4379F	1
" " " " " " " RH	A082J4378F	1
Hub Carrier, rear, LH	C082D4141 K	1
" " " RH	C082D4142K	1
Spare Wheel & Tyre Assembly	A082G6087F	1
'T'- Bolt, spare wheel retention	E082U4763F	1

Fittina Procedure

1. At each'front corner; clamp off the front brake hose, remove the front caliper, disc, hub, brake hose bracket and sensor cable support bracket. Use four M5 setscrews to press the speed sensor ring off the front hub taking care to apply pressure evenly to avoid distortion.

2. Fit the speed sensor ring onto the new front hub with the teeth facing inboard. Fit the new taper roller bearings and grease seal into the hub, and adjust the bearing preload as detailed in Service Notes sub-section CDS.



j132

3. Fit the front caliper adaptor bracket (unhanded and symmetrical) to the outboard side of the hub carrier bosses, with the caliper flange turned inboard. At the same, time fit the new combined brake hose/speed sensor cable support bracket.
Torque tighten the caliper bracket to hub carrier fixing bolts (Ml2 x 35) to 65 Nm.

4. Fit the new brake disc and retain to the hub with the recessed screw, tightening to 12 Nm.

5. Fit the new caliper to the adaptor bracket with the bleed nipple uppermost. Tighten the Ml2 x 65 mounting bolts to 65 Nm. Secure the brake hose into the new support bracket, and fit the new brake pipe between hose and caliper. Tighten the pipe into the caliper using a split ring spanner and torque to 17 - 20 Nm.

6. Fit the speed sensor cable into the new support bracket lugs.

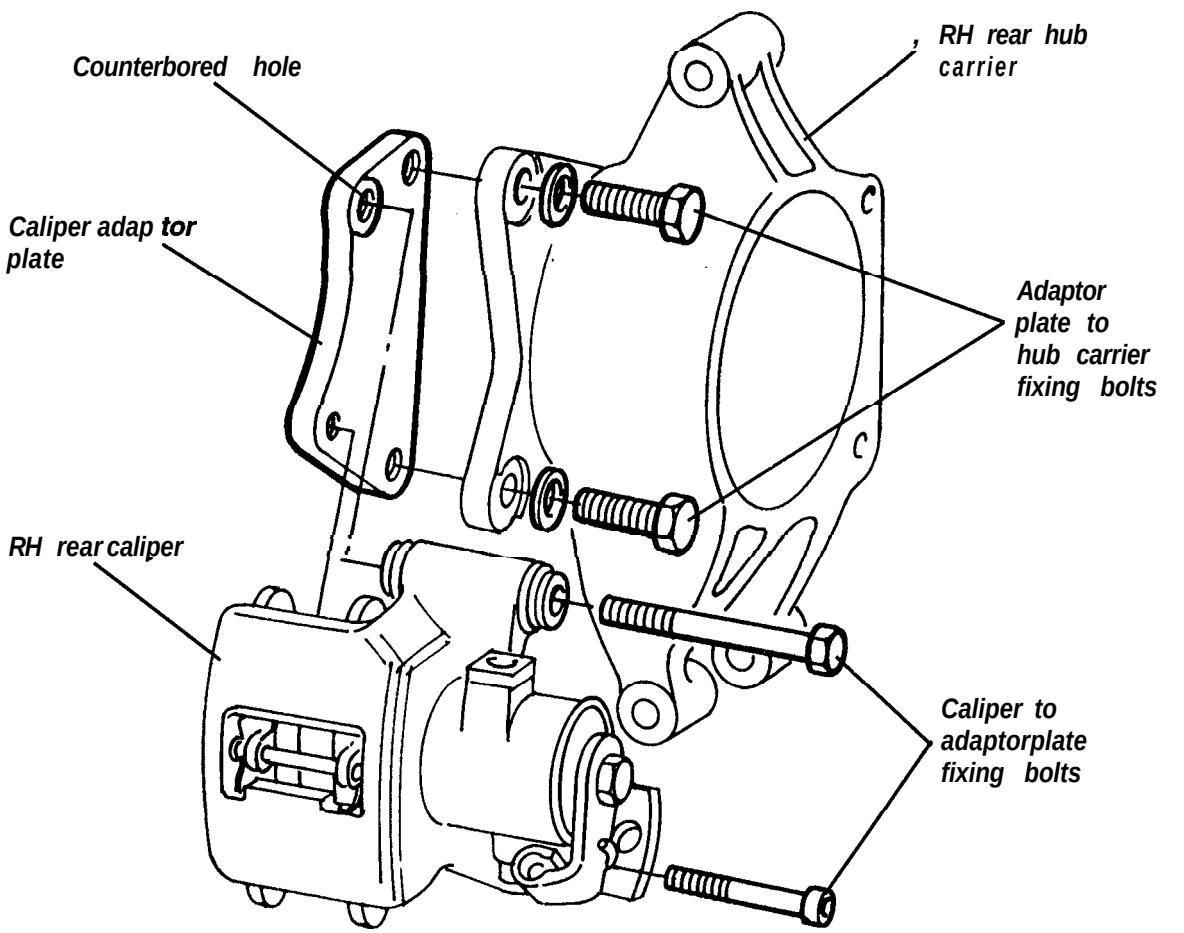
7. Repeat operations 1 to 6 for the opposite front corner.

8. At each rear corner; remove the rear disc. hub/wheel bearing assembly (retain), hub carrier and caliper brake hose.

9. Fit the existing hub/wheel bearing assembly to the new hub carrier, and reassemble the suspension as detailed in Service Notes section DC.

10. Fit the new rear brake disc and retain to the hub with the recessed screw, tightening to 12 Nm.

11. Fit the caliper adaptor plate to the hub carrier with the counterbored hole at the inboard top. Torque tighten the fixing bolts to 65 Nm.



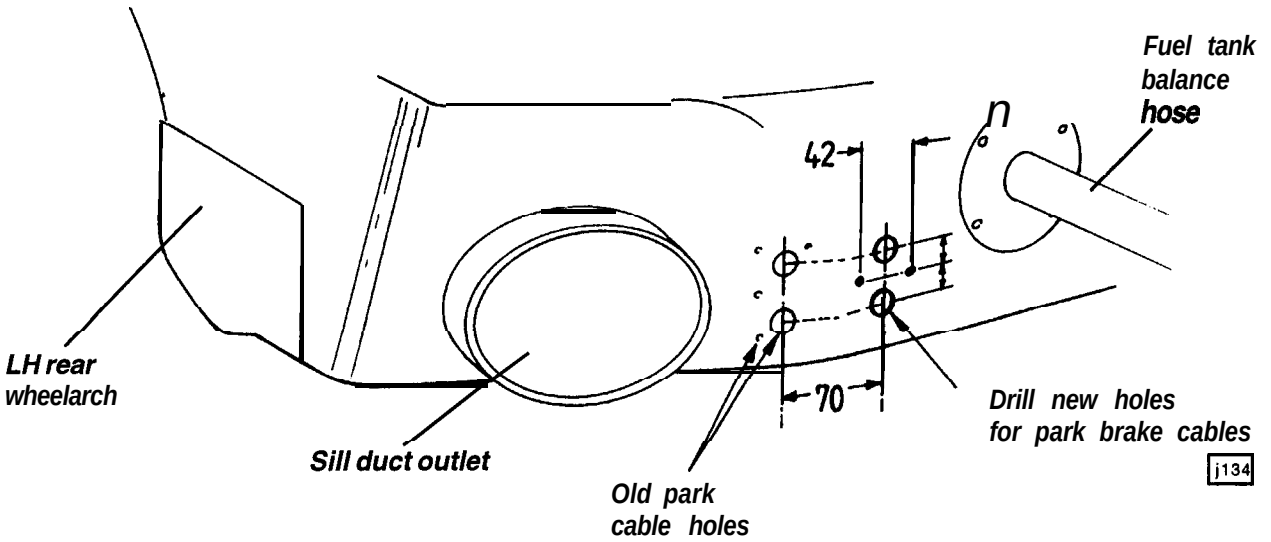
12. Fit the new caliper to the mounting plate with the parking brake lever lowermost. Torque tighten as follows:
Ml0 x 80 bolts: 45 · 50 Nm
M8 x 60 bolts: 26 · 30 Nm
Transfer the bleed nipple to the top port.

13. Fit the new brake hose into the caliper lower port and torque to 9 · 13 Nm. Connect the hose to the radius arm bracket and pipe.

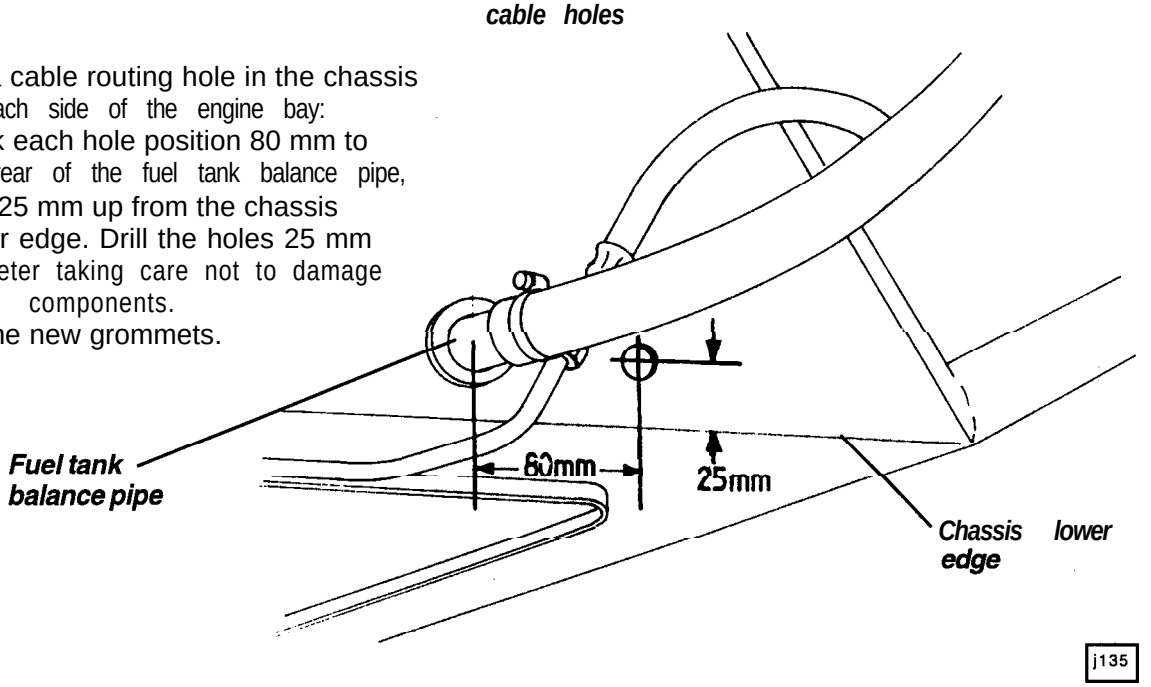
14. Repeat operations 8 to 13 for the opposite rear corner. Check rear wheel alignment, and adjust if necessary.

15. Remove the engine bay undertray, peel back the rear end of the sill carpet and remove the parking brake cables.

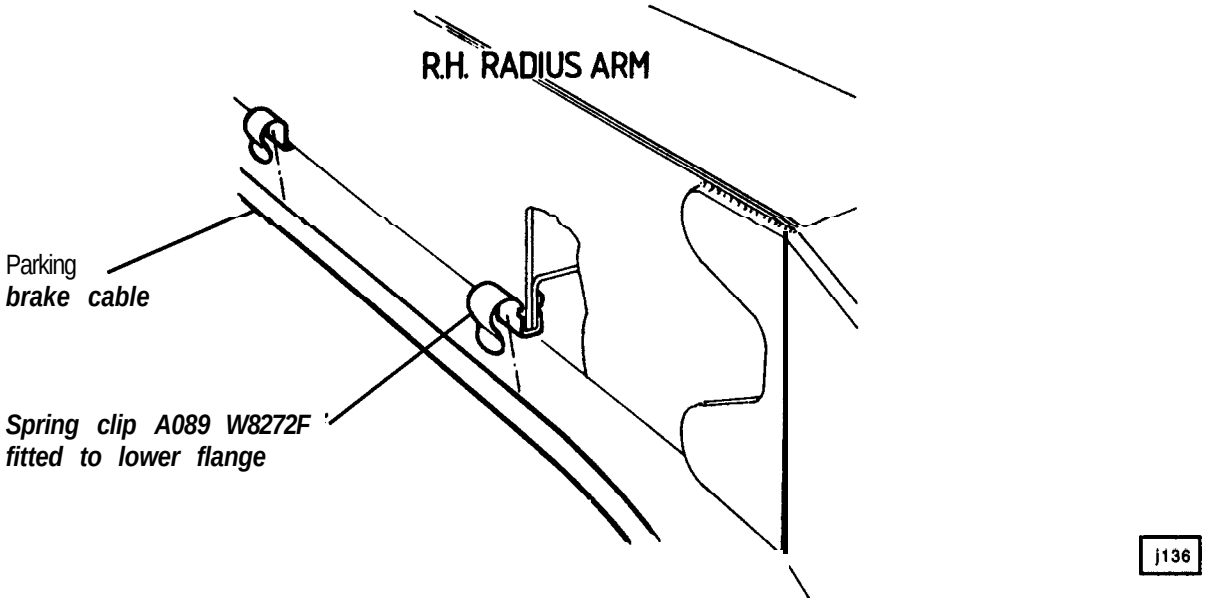
16. Reposition the holes in the fuel tank well for the park cables:
Mark the new hole positions 70 mm forwards of the existing holes, at the same height, and drill/ fettle to 25 mm diameter, taking care not to damage other components. Transfer the existing grommets to the new grommet plate, drill two 3.5 mm fixing holes in the body, and secure the plate with the two self tapping screws.



17. Drill a cable routing hole in the chassis at each side of the engine bay:
Mark each hole position 80 mm to the rear of the fuel tank balance pipe, and 25 mm up from the chassis lower edge. Drill the holes 25 mm diameter taking care not to damage other components.
Fit the new grommets.



18. Fit the new parking brake cables with the longest cable to the passenger side, routed through the lower hole in the fuel tank well, and the two new chassis grommets. Feed each cable through the hole in the hub carrier web before connecting to the caliper lever.
Secure each cable to the inboard lower flange of the radius arm using the new spring clips, and position to maintain cable clearance in the hub carrier. Use the tie wrap to secure the passenger side cable to the fuel tank balance pipe.



19. Adjust the cables as necessary, ensuring that the caliper levers are allowed to return fully.

20. At the outside of the right hand front corner of the engine bay, disconnect and remove the rear brake circuit pressure proportioning valve and cap the input pipe. Remove the pipe from the valve to the RH rear radius arm hose, and replace with the new brake pipe. Temporarily fit the three pipes into the new 3-way connector, and mark the fixing hole position on the chassis. Remove the connector and cap the pipes before drilling an M8 clearance hole for the connector fixing bolt.
Secure the 3-way connector using the M8x35 fixing bolt and washers, and fit and tighten the three brake pipes.

21 Bleed the brake system as detailed in Service Notes sub-section JF.8.

22. Substitute the new 16" spare wheel/tyre assembly and secure with the new 'T'- bolt.

Maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed-in' fully before being used to their full potential.

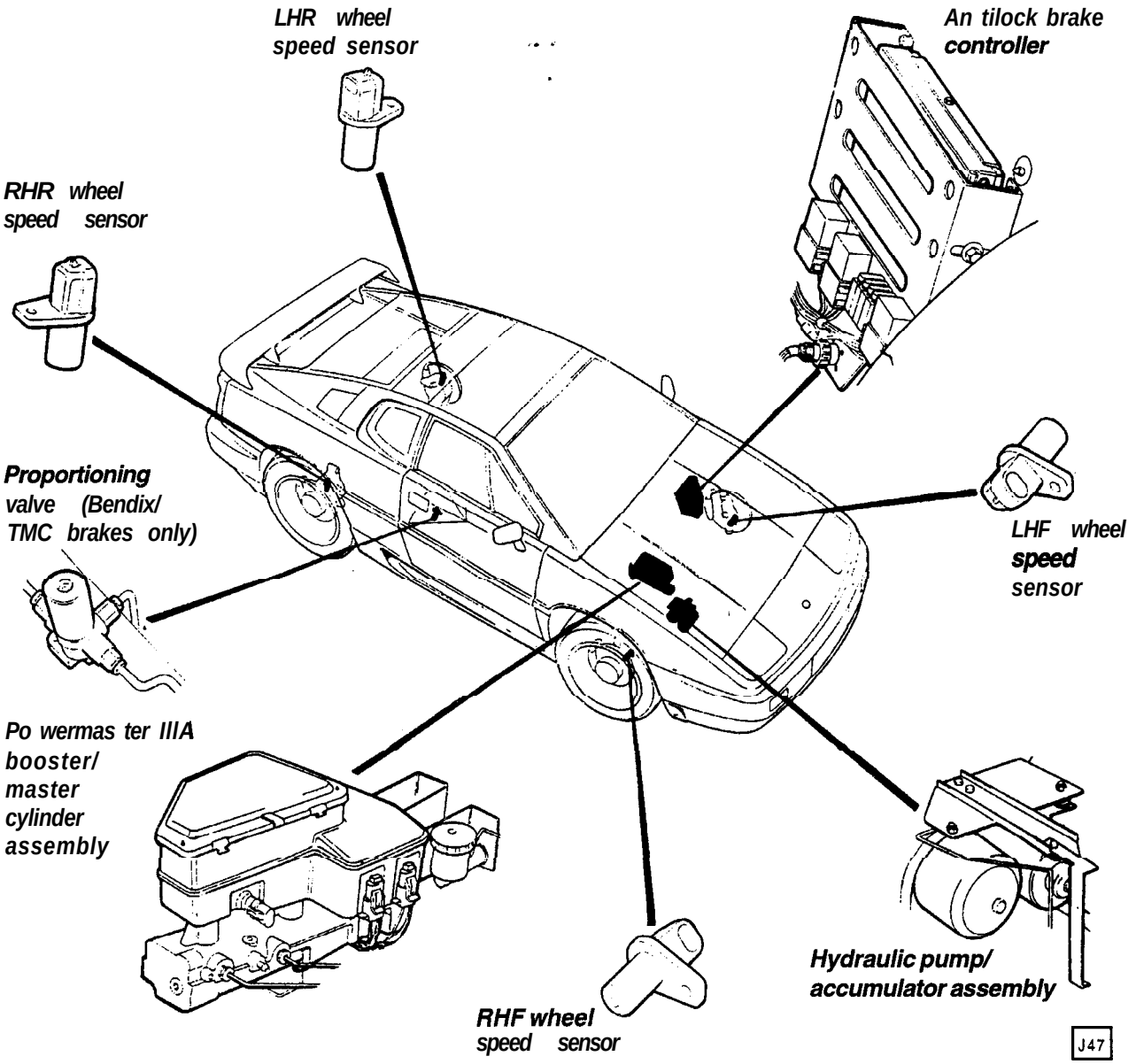
JF.13 - ABS SYSTEM THEORY OF OPERATION

The Delco Moraine Antilock Brake System (DM ABS-IIIA) consists of the following major components:

Powermaster IIIA Booster/Master Cylinder: Fitted on the front bulkhead in place of the conventional master cylinder and servo. Incorporates the front brakes master cylinder, power boost chamber, boost/ rear brakes spool valve, fluid reservoir, solenoid valves (3 off), displacement chambers (2 off), and isolator valves (2 off).

Hydraulic Pump/Accumulator Assembly: Fitted in the front luggage compartment. Provides hydraulic pressure for; front brake power assist, rear brake operation, ABS operation.

Antilock Brake Controller: Microprocessor fitted in the front luggage compartment. Processes signals received from the four wheel speed sensors and modulates brake line pressure via three solenoid valves in the Powermaster IIIA. Also monitors the system for faults, provides diagnostic information, and operates the ABS tell tale lamp.



Wheel Speed Sensors: One variable reluctance sensor fitted at each wheel hub. Sends wheel speed signals to the ABS controller.

Solenoid Valves: Incorporated in the Powermaster IIIA. One for each front brake circuit, and one for the combined rear circuit. Modulate brake line pressure as commanded by the ABS controller.

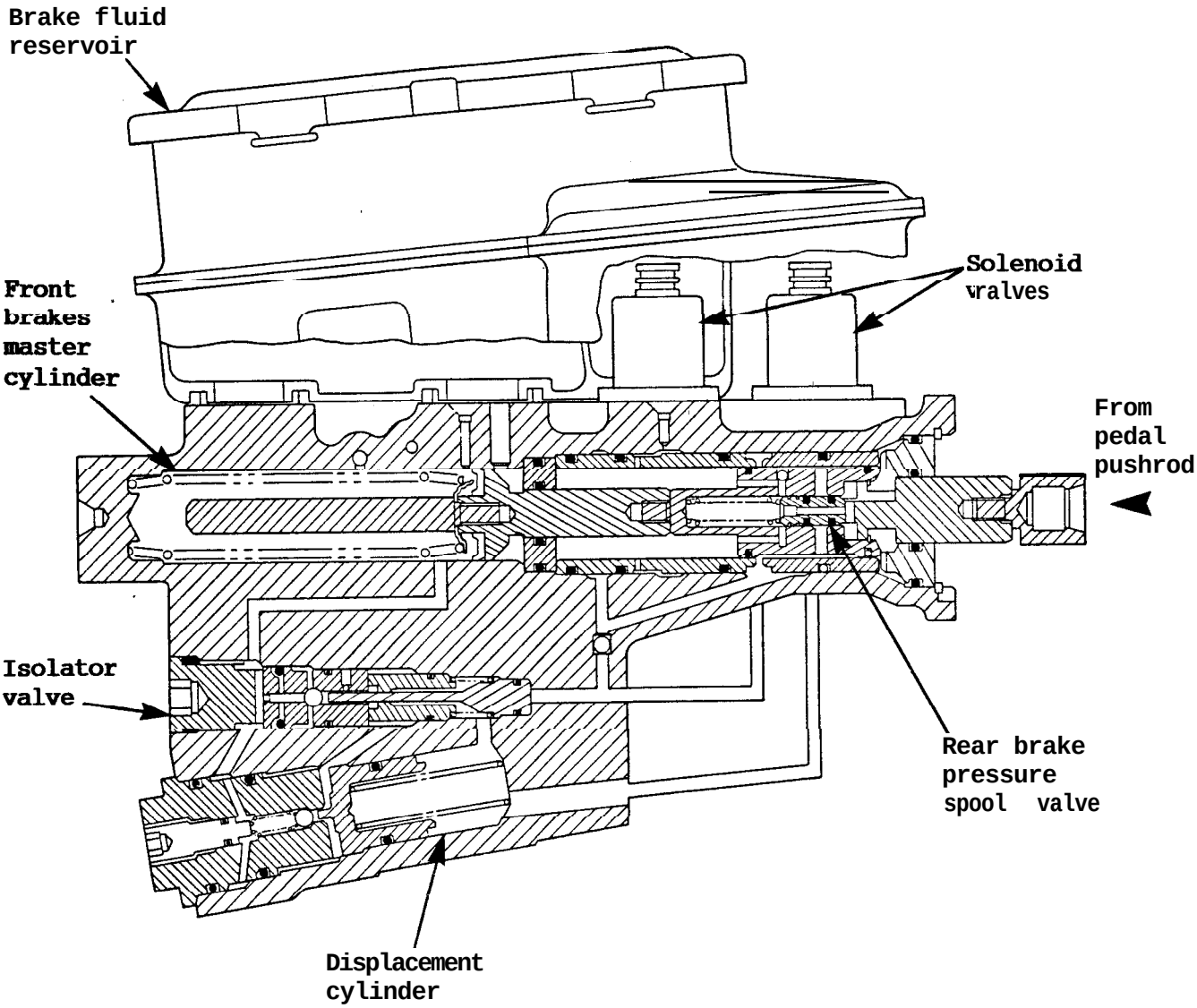
Displacement Cylinders: One for each front brake circuit, contained within the Powermaster IIIA, and not serviceable. Provide for reduction and reinstatement of line pressure during ABS operation without loss of pedal height.

Isolation Valves: One for each front brake circuit, contained within the Powermaster IIIA and not serviceable. Fitted between the master cylinder/front brake circuit and the displacement cylinder to limit the amount of pressure pulsation feedback to the brake pedal, and also to maintain manual unassisted front brake function in the event of boost pressure failure.

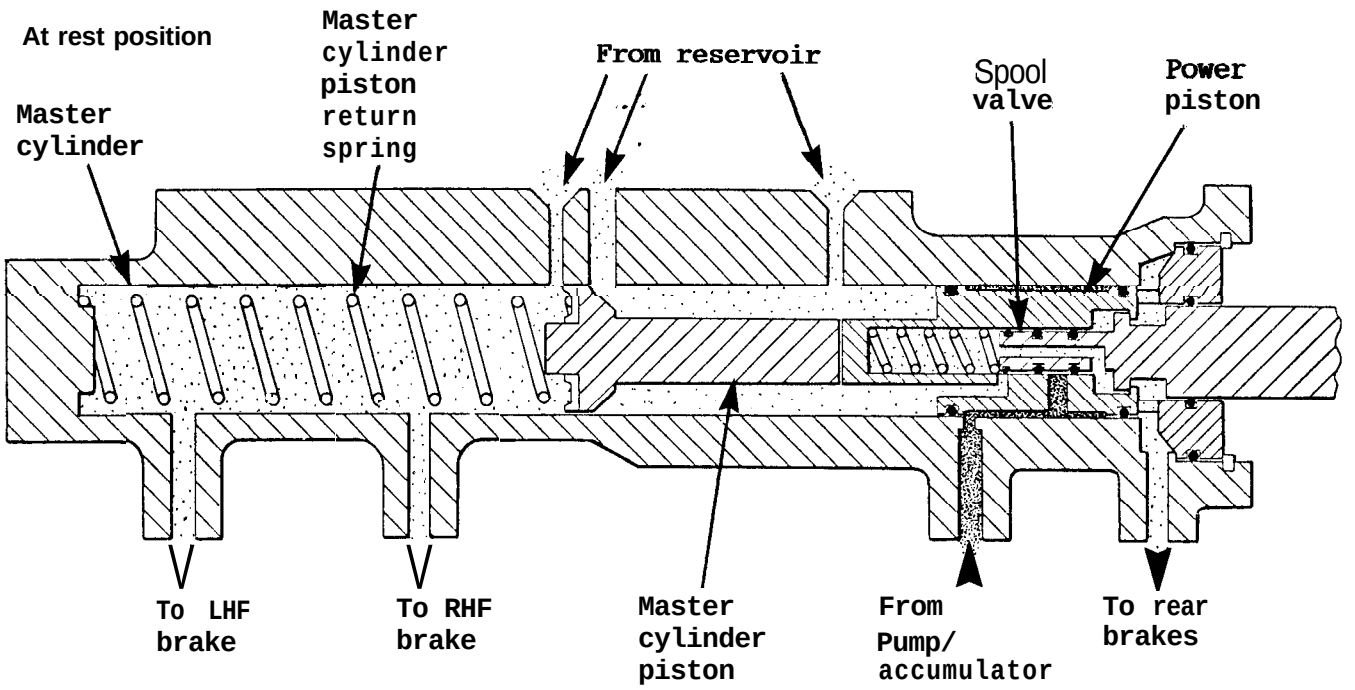
Proportioning Valve: Fitted only on cars with Bendix rear brakes. Single valve in rear brake circuit to control rear brake line pressure when ABS is not operating, and prevent over adjustment of rear caliper parking brake mechanism.

Powermaster IIIA Booster/Master Cylinder Assembly

The Powermaster IIIA booster/master cylinder assembly is mounted in the front luggage compartment, and is bolted through the bulkhead to the pedal box. The assembly provides brake line pressure to both front and rear circuits for normal (non ABS) braking, and modulated line pressure in ABS mode. The assembly contains a cylinder which houses a rear brake pressure spool valve, and a front brake circuit master cylinder, both of which are operated by the brake pedal pushrod. The main housing also contains the two displacement cylinders and isolator valves, and is topped by a fluid reservoir which also shrouds the three solenoid valves.

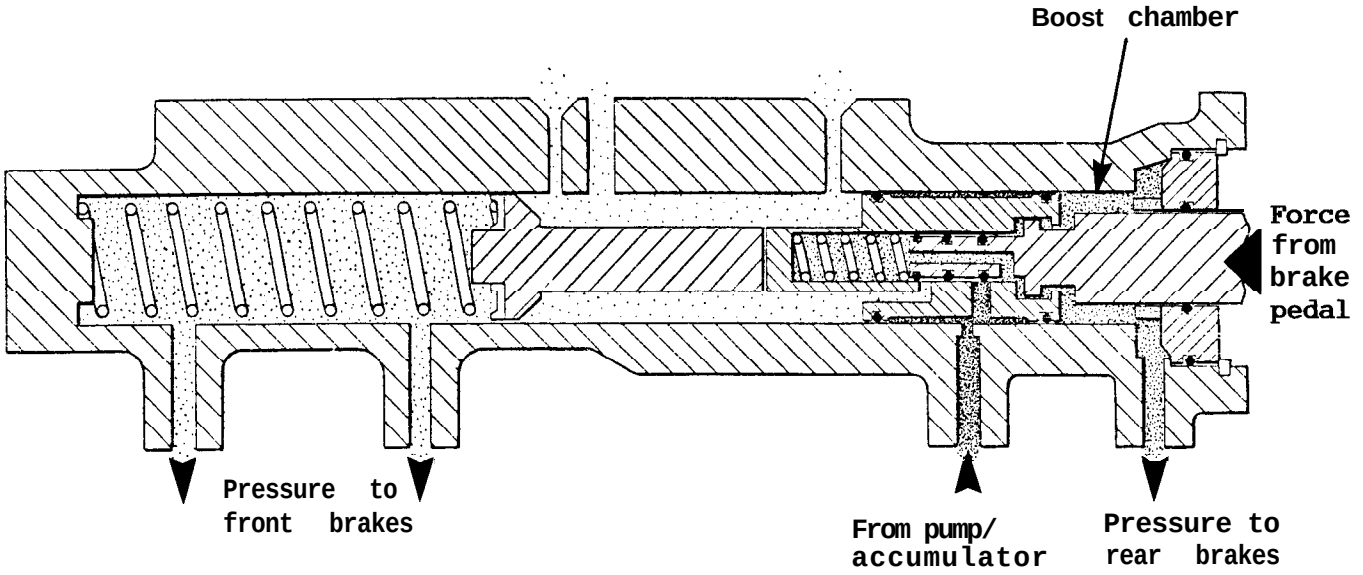


The rear brakes use a hydraulic circuit which is independent to that of the front brakes, and which also supplies the power assistance to the front brakes, and the ABS control circuit. Fluid at a pressure of approx. 17,000 kPa (2,500 lbf/in²) supplied by an accumulator pump (see below) is fed into the rear part of the Powermaster IIIA cylinder, to a spool control valve.



With no pressure applied to the brake pedal, the master cylinder return spring and spool valve return spring push the master cylinder piston, power piston and spool valve fully rear-wards, and open all chambers, except accumulator input, to atmospheric (reservoir) pressure.

Brakes applied



As the brake pedal is pressed, the spool valve moves to:
admit pressurised fluid into the boost chamber.
close the connection between reservoir and boost chamber;

Pressure in the boost chamber has three effects:
i) it applies the rear brakes;
ii) it acts on the spool valve to resist push rod movement and provide 'feedback' or 'feel';
iii) it pushes against the power piston to provide power assistance to the front brake master cylinder.

If the fluid pressure from the pump/accumulator is absent, the rear brakes will not apply, but direct contact between the spool valve, power piston and master cylinder piston, results in application of the front brakes without power assistance.

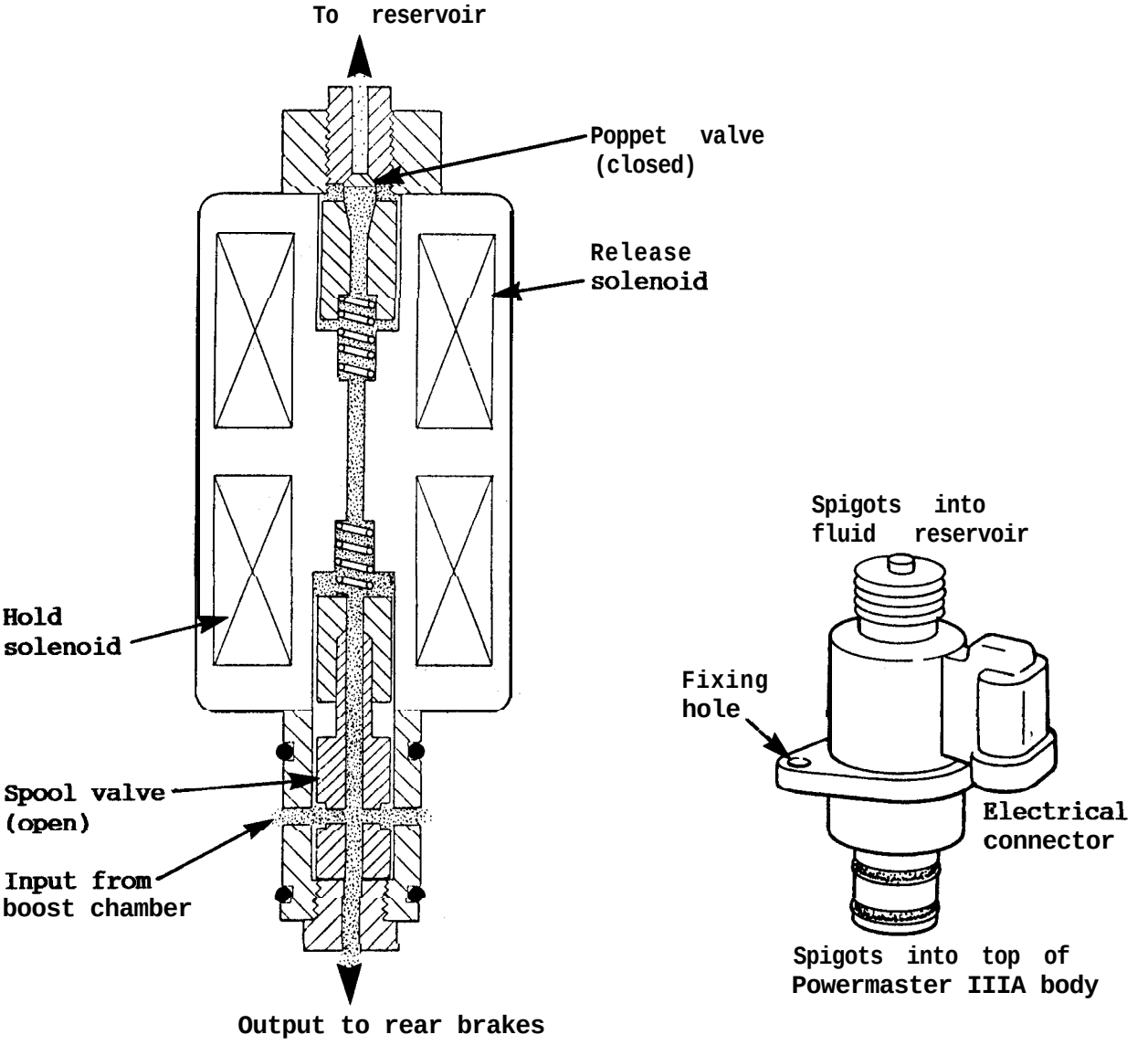
Rear Solenoid Valve

The rear solenoid valve is one of three located at the top rear of the Powermaster IIIA, shrouded by the fluid reservoir. The purpose of the solenoid valve is to modulate rear brake line pressure when wheel lock is detected by the ABS controller. The solenoid valve consists of two elements;

- a 'hold' solenoid controlling a normally open spool valve;
- a 'release' solenoid controlling a normally closed poppet valve.

Pressure apply mode

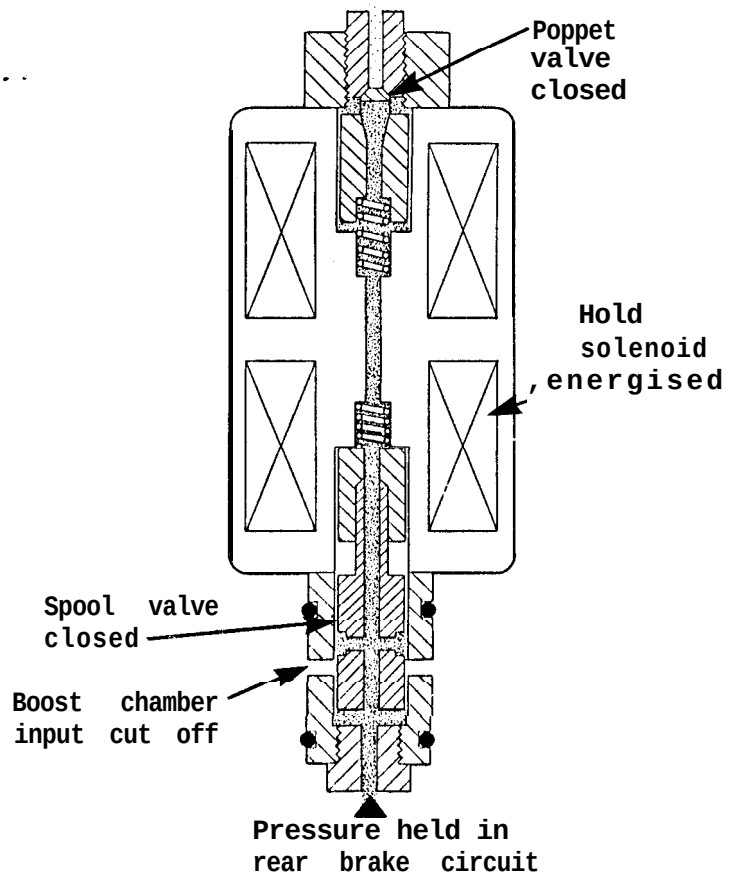
Under normal (non ABS) conditions, both solenoids are de-energised, so that the spool valve is open, and the poppet valve closed. Pressurised fluid from the boost chamber of the booster/master cylinder, flows through the spool valve and into the rear brake circuit.



Pressure hold mode

If either rear wheel begins to lock during braking, the ABS controller. grounds pin 1 C14, which energises the 'hold' solenoid and closes the spool valve.
The poppet valve remains closed.

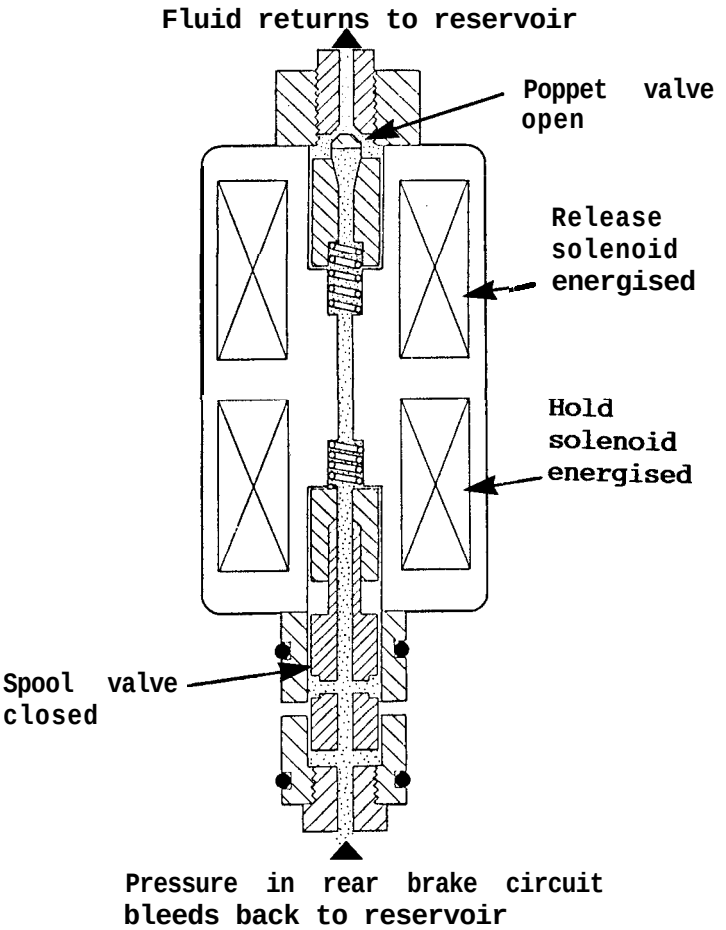
The rear brake circuit is isolated from the boost chamber, retaining the existing pressure but allowing no further increase.



Pressure release mode

If wheel lock is still occurring, the controller leaves pin 1 Cl4 grounded, but also toggles pin 1C15 to ground. This causes the poppet valve to open and release rear brake circuit pressure back to the reservoir.

When wheel speed has been regained, and the controller determines that a pressure increase is needed, both solenoid grounds are removed, the poppet valve closes, the spool valve opens, and the rear circuit is again connected with the boost chamber pressure.

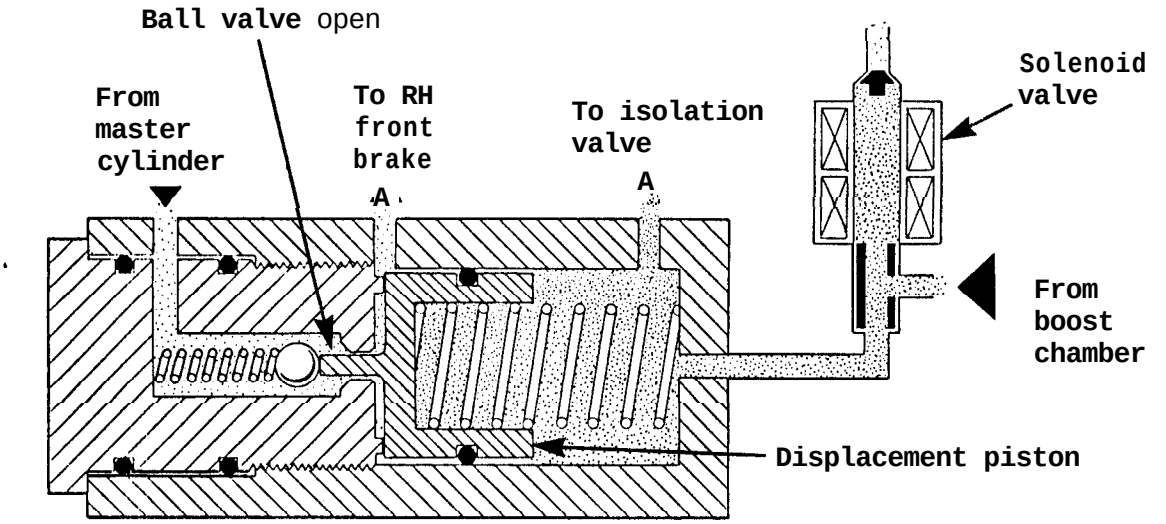


Displacement Cylinders

Two displacement cylinders are contained within the booster/master cylinder assembly, one for each front brake circuit. Each displacement cylinder is linked with a solenoid valve similar to that used on the rear circuit. The purpose of the displacement cylinder is to allow a pressure reduction and reinstatement during the course of ABS modulation, without losing brake pedal height. The following description of the RH circuit applies equally to the LH circuit.

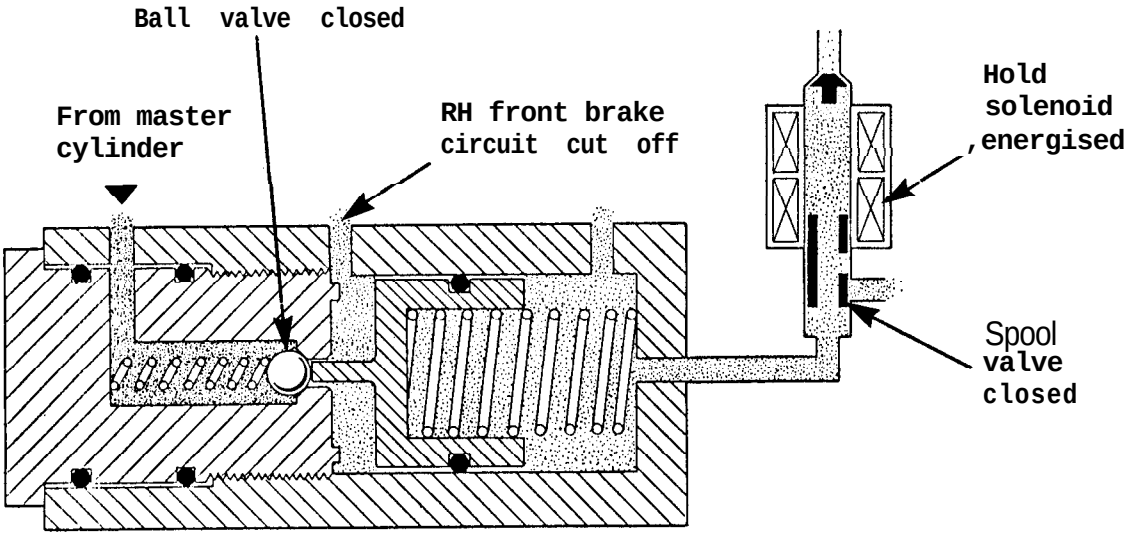
Rest & pressure apply mode

Under normal (non ABS) braking, both coils in the solenoid valve are de-energised, the spool valve is open, and pressurised fluid from the boost chamber flows through the spool valve to the underside of the displacement piston The piston is forced both by hydraulic and spring pressure against the end of the cylinder, and opens the spring loaded ball valve. Fluid from the front brake master cylinder is able to pass the ball valve and, flow to another RH front brake circuit ball valve controlled by the isolation valve (see later).



Pressure hold mode

If the ABS controller detects that the RH front wheel is beginning to lock, it grounds pin C6 to energise the RH front hold solenoid (D1 for LH solenoid).

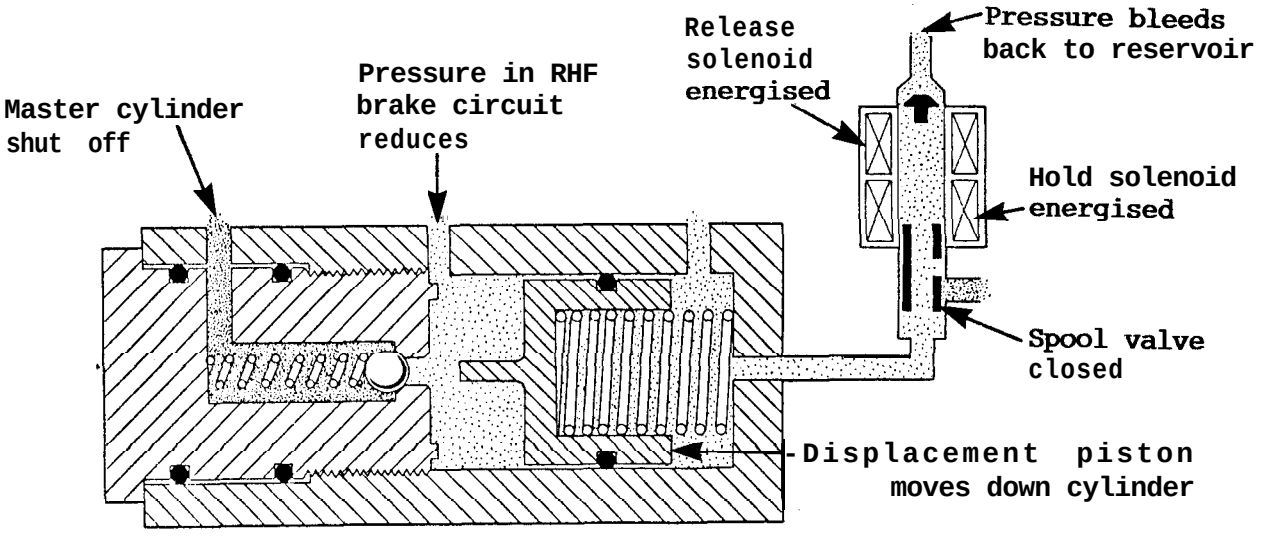


This causes the spool valve to shut off boost pressure from the underside of the displacement piston. If the master cylinder pressure continues to rise, the displacement piston is forced to move against its spring until the ball valve closes and shuts off-the master cylinder output line. Pressure in the front brake circuit then remains constant regardless of increasing pedal pressure.

Pressure release mode

If the ABS controller determines that pressure needs to be reduced to prevent wheel lock, it leaves pin C6 grounded (or D1 for left hand), and momentarily grounds pin C9 (C3 for LH).

This energises the release solenoid, and opens the poppet valve to allow the pressure at the underside of the piston to bleed off to the reservoir. As this pressure falls below brake line pressure, the piston is forced down the cylinder by fluid returning from the caliper, effecting a reduction in line pressure.



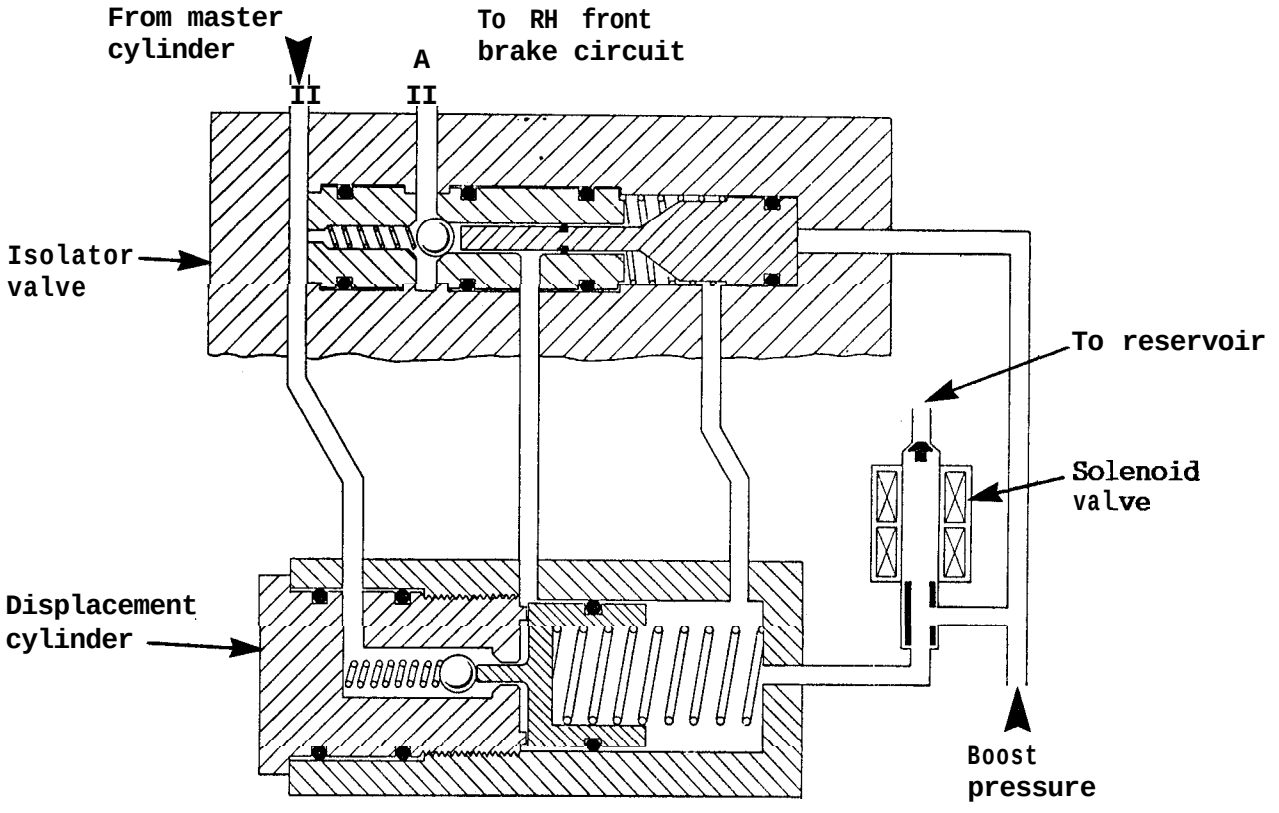
When pressure needs to be restored, the controller removes the earth from the two solenoids, allowing boost pressure to be readmitted to the underside of the displacement piston. The piston then moves back up the cylinder to pressurise the brake line, and return the displaced fluid back into the brake circuit. When fully returned, the piston opens the ball valve to connect the master cylinder with the brake line.

If the pedal is released when the displacement piston is down the cylinder, master cylinder pressure falls below brake line pressure, and fluid flows through the ball valve to return to the master cylinder. The displacement piston returns under spring pressure.

Isolation Valves

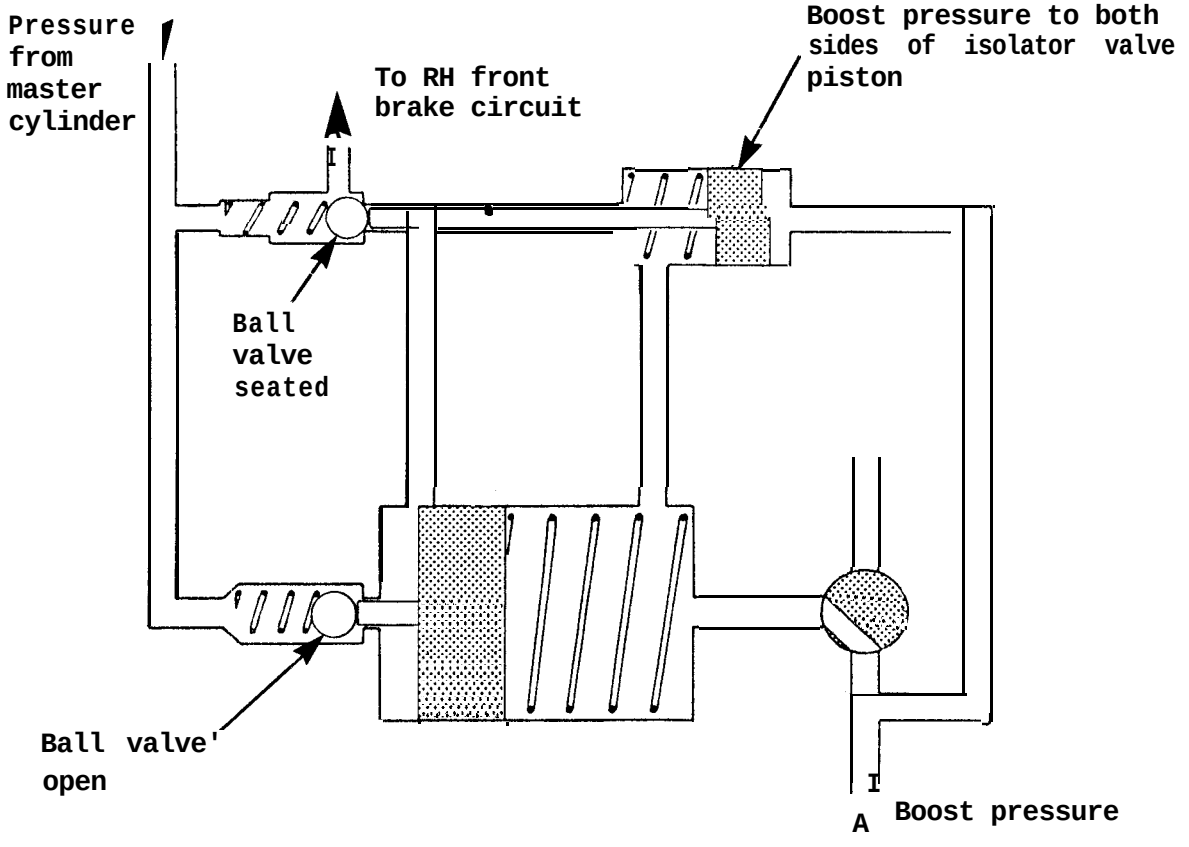
Each of the front brake circuits is equipped with an isloation valve to limit the magnitude of the pressure pulsations felt at the brake pedal when the anti-lock is operating, and to ensure that unassisted non-ABS operation may continue after failure of the hydraulic boost pressure. If the fluid pressure from the pump/accumulator is absent; when the brakes are applied, each front brake circuit displacement piston will be pushed back the small amount necessary for the ball valve to close, thus cutting off the front brakes.

The two valves (one for each front circuit) are housed within the booster/master cylinder assembly, are not servicable, and are connected between the master cylinder/front circuit and the displacement cylinders.



Normal mode

During normal non-ABS braking, boost pressure is applied to both sides of the isolation piston. The spring pushes the piston to the right, allowing the ball valve to be seated, so that fluid is free to pass from the master cylinder to the front brake circuit.



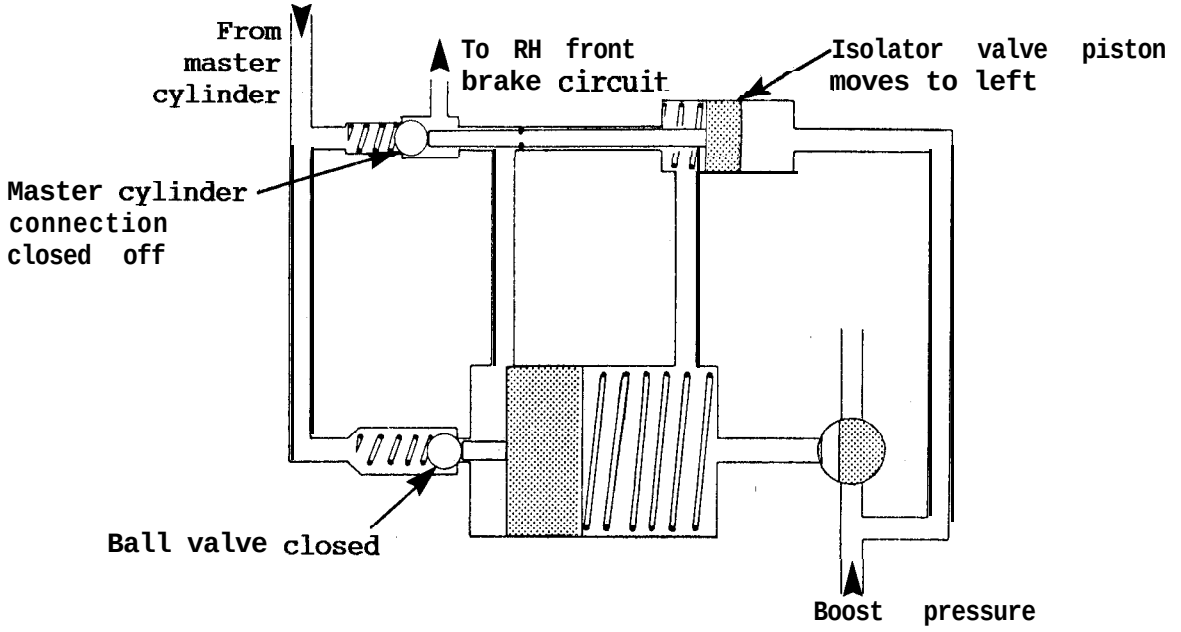
Hold mode

As soon as the controller determines that front wheel lock is occurring, and the solenoid spool valve has been activated to shut off boost pressure from the displacement cylinder, any further increase of pedal pressure results in the displacement piston ball valve closing as previously described, and due to the simultaneous increase in boost pressure, the isolation piston moving to operate its ball valve, thus:

shutting off the direct connection between master cylinder and RH front brake circuit;

opening the connection between displacement chamber and RH front brake circuit.

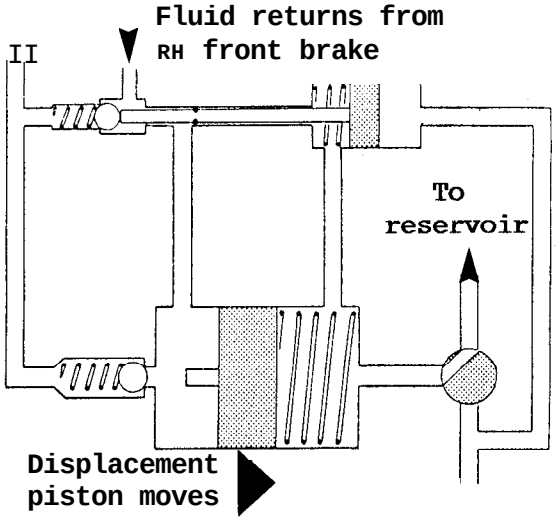
Pressure in the right hand front brake circuit remains constant regardless of increasing brake pedal pressure.



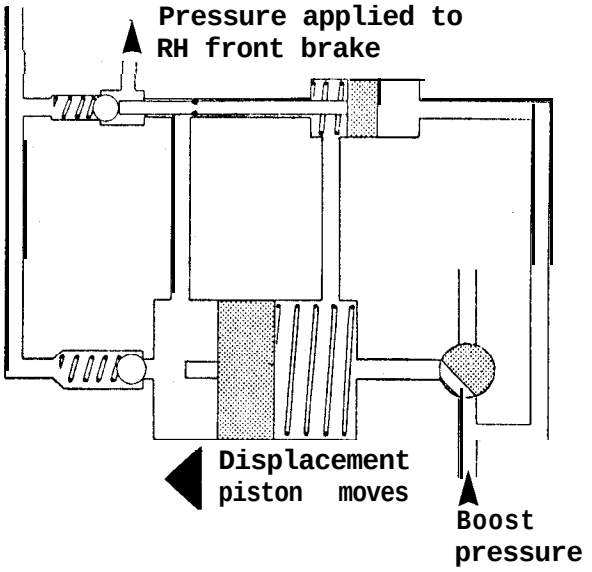
Pressure Release & Re-apply

If the ABS controller determines that pressure needs to be reduced to prevent wheel lock, the solenoid poppet valve is opened (see displacement cylinder operation) to bleed pressure from the underside of the displacement piston and allow it to move down the cylinder under the force of brake line pressure,

Pressure release



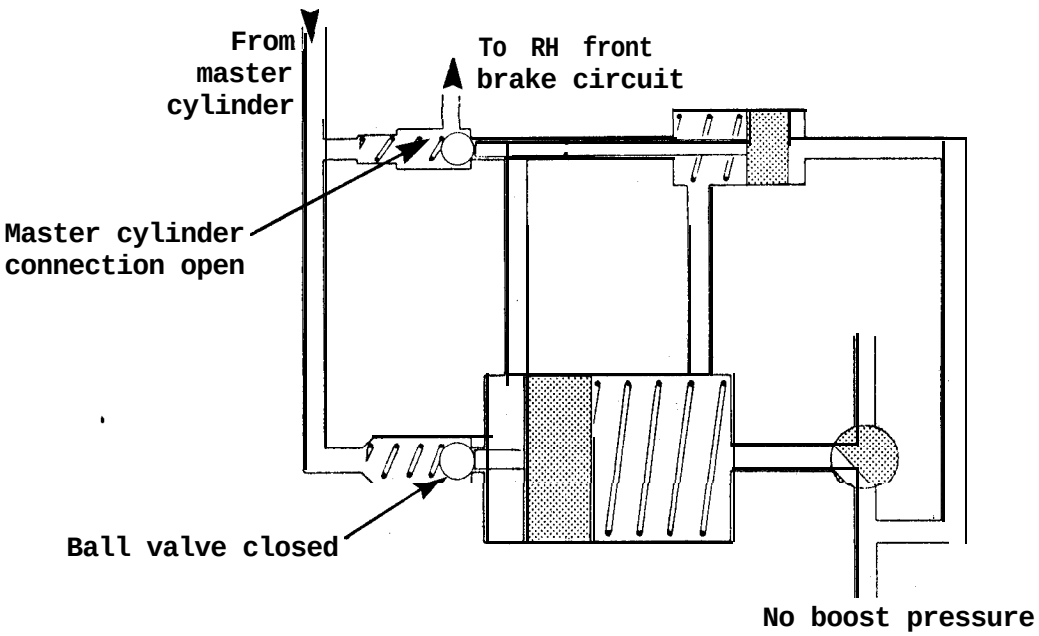
Re-apply



When pressure needs to be restored, boost pressure is re-admitted to the displacement cylinder to push the piston back and return the displaced fluid back into the brake line. When the displacement piston has fully returned, the pressure on the underside of the isolation piston becomes sufficient to release its ball valve and open the direct connection between master cylinder and RH front brake circuit.

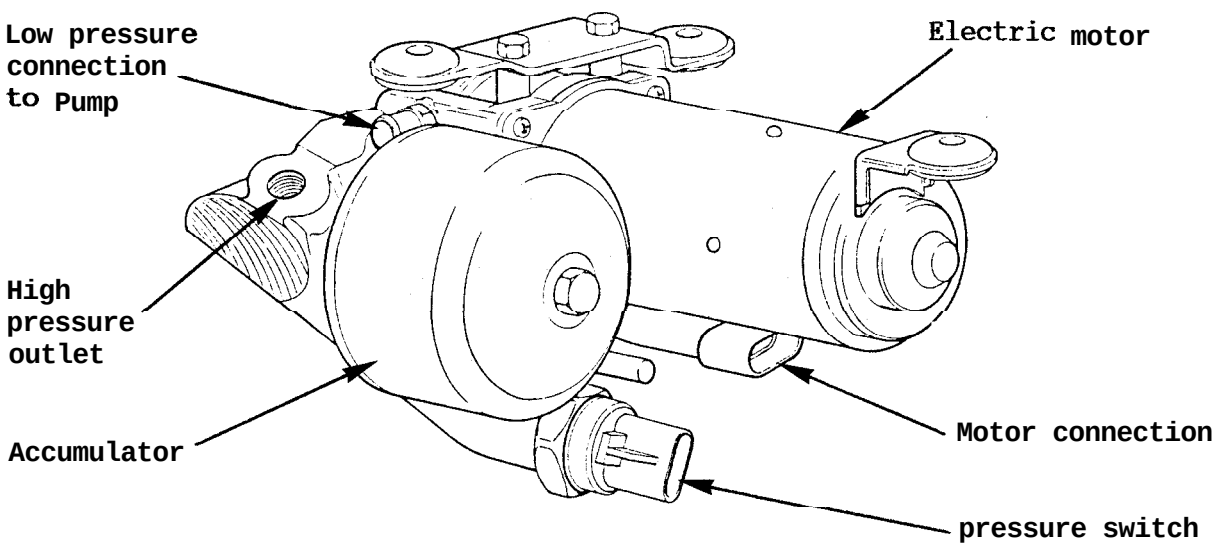
Accumulator Pressure Failure Mode

If no boost pressure is available, increasing pedal pressure will move the displacement piston sufficiently to close its ball valve, but the isolation ball valve will maintain the connection between master cylinder and brake circuit. Only unassisted non-antilock operation of the front brakes will be available in this condition.



Pump/Accumulator Assembly

The pump/accumulator assembly is rubber mounted to a support bracket at the driver's side of the front luggage compartment. The assembly consists of an electric motor, rotary pump, accumulator and pressure switch.

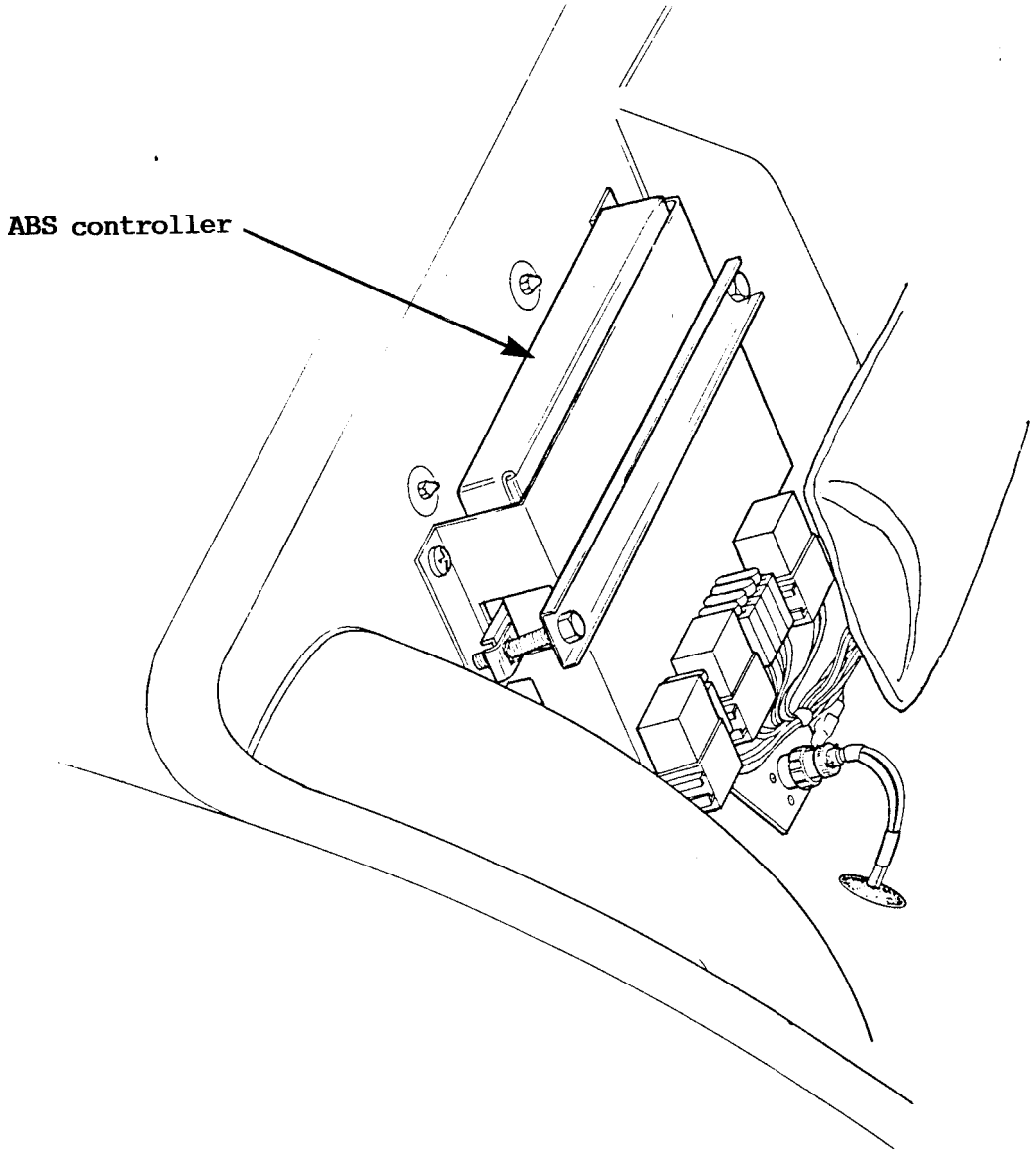


The motor turns the three piston rotary pump and supplies brake fluid under pressure to the accumulator where it is stored and maintained at a pressure of between 15,200 kPa and 18,600 kPa (2,200 and 2,700 psi). The accumulator stores pressurised fluid so that the pump does not need to run for three to five normal brake applications. A rubber diaphragm within the accumulator separates the fluid from nitrogen gas which is precharged to approximately 8275 kPa (1200 psi). A pressure switch fitted into the end cover of the pump/accumulator assembly closes below 15,200 kPa (2,200 psi) to energise the pump motor, and opens at 18,600 kPa (2,700 psi) to turn off the pump.

A pressure relief valve is fitted to prevent dangerously high pressures being produced in the event of a control system failure. The valve is fitted in the booster/master cylinder assembly and opens at a pressure of approximately 23,500 kPa (3,400 psi) to bleed excessive pressure back into the fluid reservoir. The valve reseals at approximately 18,600 kPa (2,700 psi).

Antilock Brake Controller

The antilock brake controller is a microprocessor mounted on the passenger side bulkhead in the front luggage compartment. The controller is the central component in the ABS, and its primary function is to monitor the speed of each wheel during braking, and determine whether any wheel is approaching lock up.



The controller monitors the status of the brake pedal switch, and receives signals from the four wheel speed sensors. When the brake pedal is depressed, and the brake switch is closed, the controller is alerted that the brakes have been applied, and monitors the four individual wheel speeds. If the controller detects that the deceleration of any wheel has exceeded a threshold value, or that a wheel or wheels are not decelerating equally, it will pulse the corresponding solenoid rapidly on and off to adjust the hydraulic pressure supplied to that brake and attempt to equalise the individual wheel deceleration rates. The pressure is modulated in each individual front circuit, and in the combined rear circuit according to the signal received from the rear wheel with the least grip. This type of ABS configuration is commonly called an 'Independent Front, Select Low Rear, 3-Channel System'.

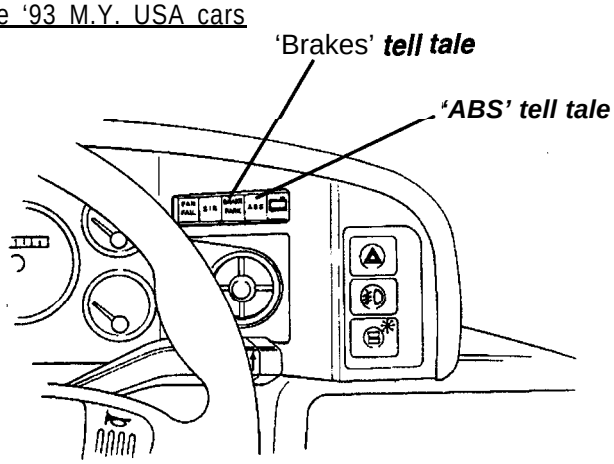
Self diagnostic capabilities

The antilock brake controller has diagnostic capabilities which allow it to detect malfunctions in itself or its related circuitry. The controller runs tests to detect malfunctions at different times during vehicle operation. For example, when the ignition is first switched on, a clicking sound can be briefly heard. This is the initialisation cycle, when the contoller cycles the enable relays and solenoids on and off in order to check for faults. While the vehicle is operating, the controller is constantly monitoring and performing tests on wheel speed data, accumulator switch status, and the condition of the solenoids and relays.

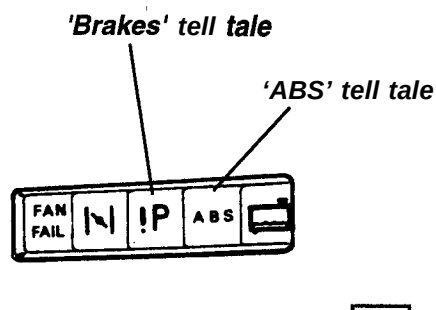
In the event that the controller detects a malfunction, the controller stores a diagnostic code and notifies the driver that a malfunction exists by lighting the ABS tell tale lamp. The ABS tell tale will flash if the detected problem does not immediately hamper ABS operation. However, a flashing ABS lamp indicates that repairs must be made to the system as soon as possible.

NOTE: PROLONGED VEHICLE OPERATION WITH A FLASHING ABS TELL TALE MAY FURTHER DAMAGE THE ABS AND MAY CAUSE COMPLETE ABS FAILURE.

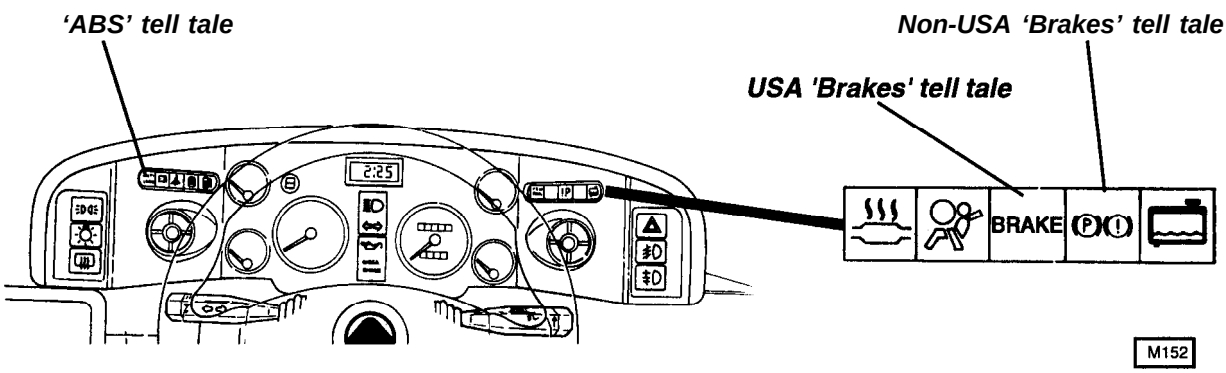
Pre '93 M.Y. USA cars



Pre '93 M.Y. non-USA araohics



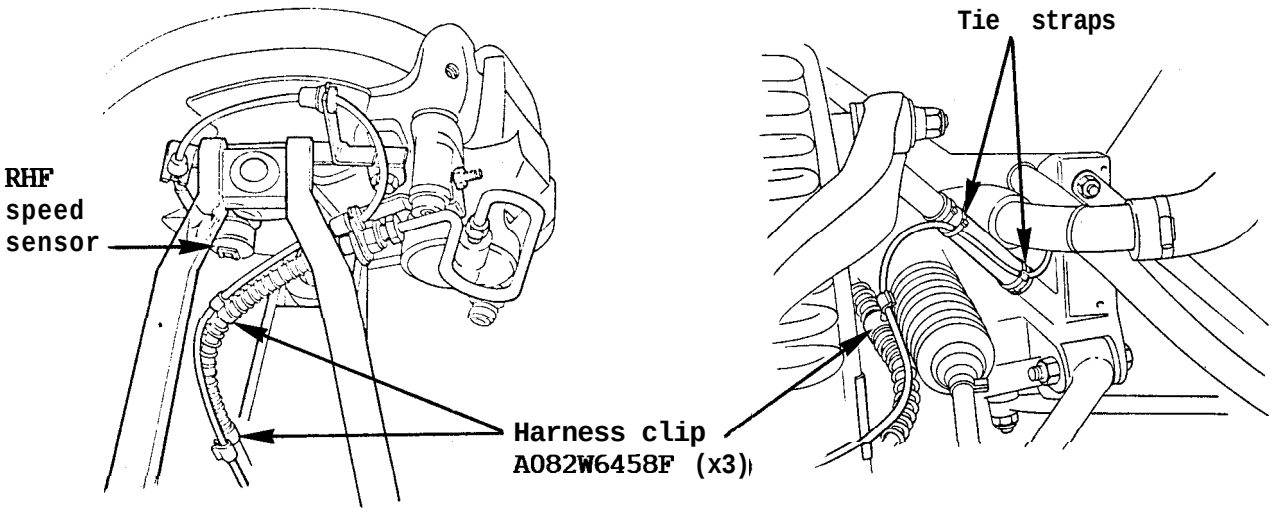
'94 M.Y. onwards



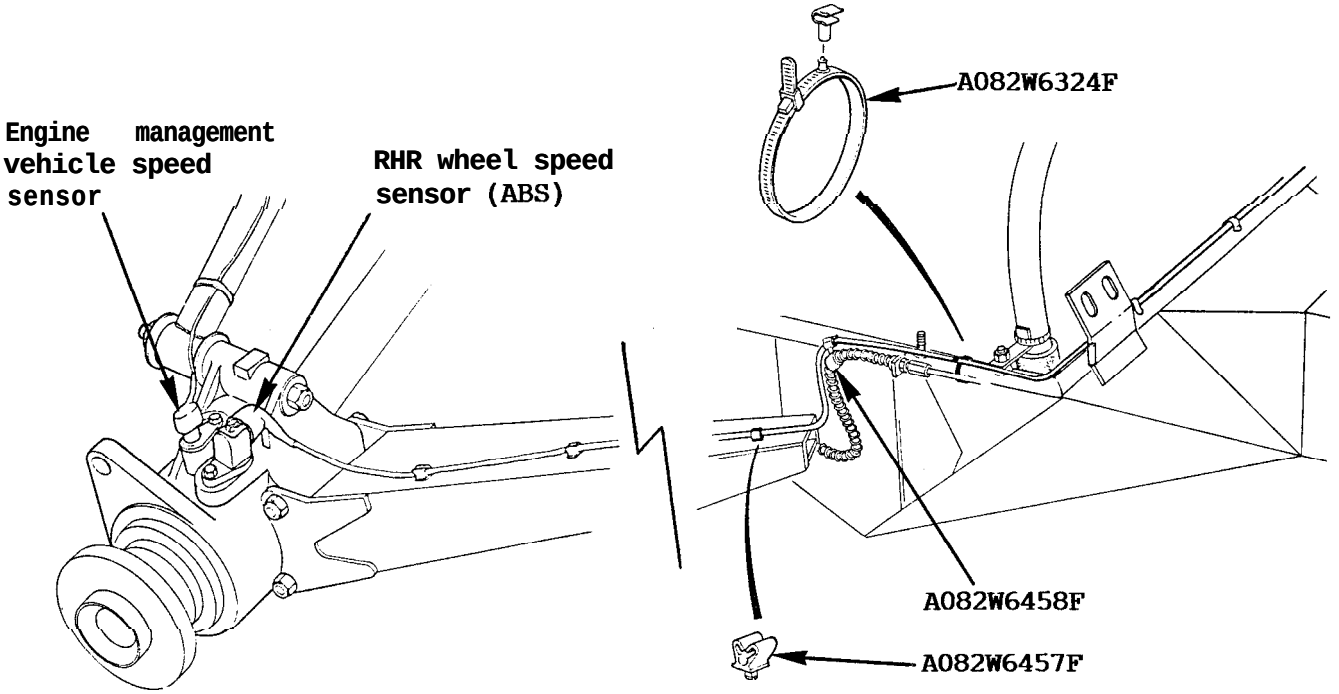
A solid ABS tell tale indicates that a problem has been detected that affects the operation of ABS. If the problem is determined to be in the portion that controls the two front wheels, the controller will shut down that part of the ABS, so that normal non anti-lock power assisted braking is available on the front wheels, with ABS continuing to operate on the rear wheels. If the problem is detected as being elsewhere in the system, the whole ABS will be shut down, with normal non anti-lock power assisted braking operating on all four wheels.

Wheel Speed Sensors

A wheel speed sensor is mounted on each of the four wheel hubs. The sensors for the front wheels are mounted on the brake disc shields which are themselves bolted to the hub carriers. A toothed ring pressed onto each front hub, passes close to the sensor, and generates a pulsing A.C. voltage, the frequency of which is a measure of the wheel speed.

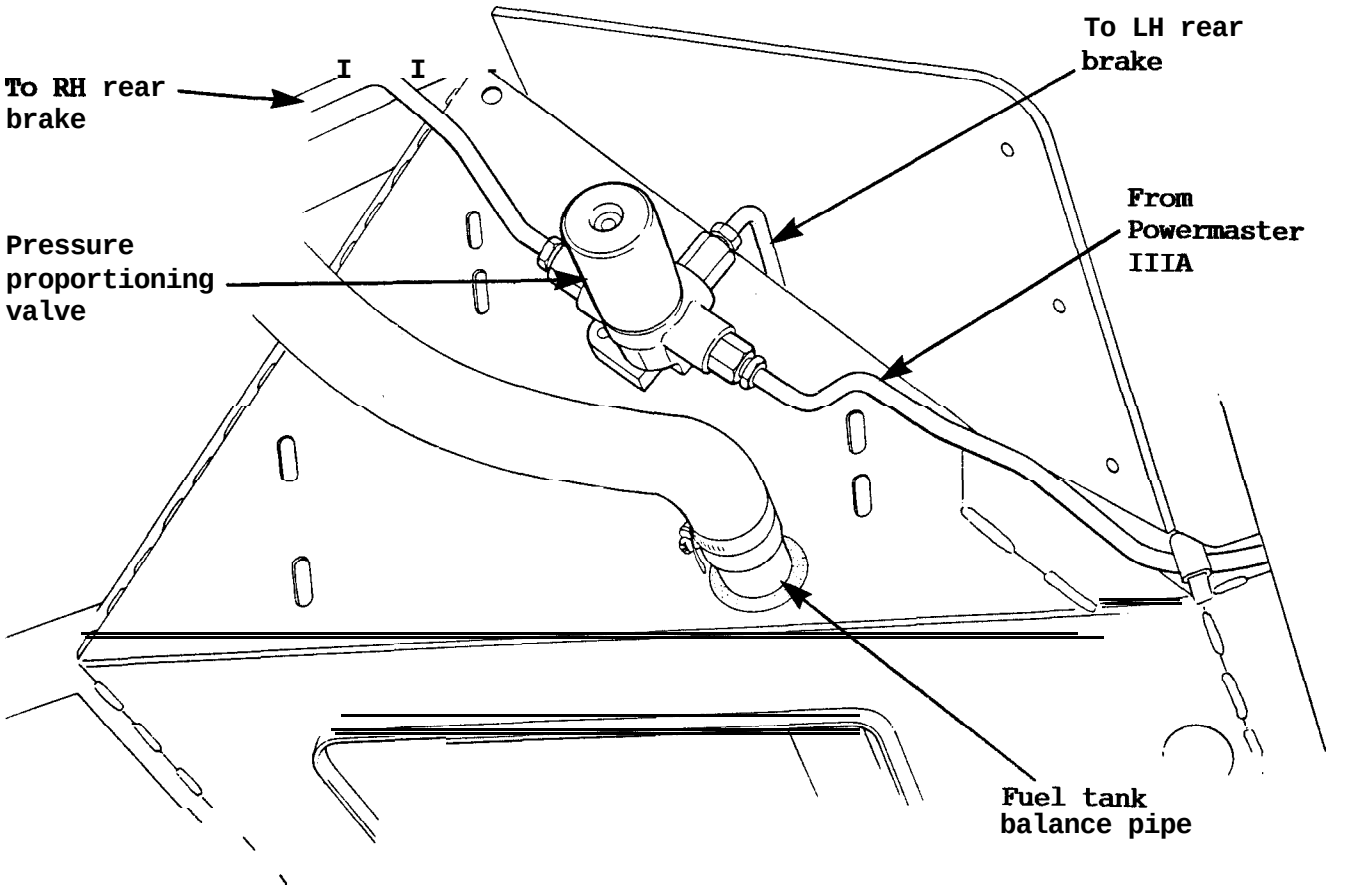


At the rear, the sensors are mounted on the hub carriers, and the toothed rings are integral with the driveshaft outboard C.V. joints. It is most important not to mix up the wheel speed sensors, or the engine management vehicle speed sensor also mounted on the RH rear hub carrier. See section JF.19 for identification.



Pressure Prooortionina Valve (TMC/Bendix brakes only)

If the brakes are vigorously operated when the accumulator is charged and the vehicle is stationary (at which time the ABS does not operate to control brake line pressure), the very high pressures produced in the boost chamber and rear brake circuit .could result in the rear brakes being applied with a force sufficient to overadjust the parking brake mechanism contained within the caliper piston. In order to prevent this possibility, and the consequent brake drag and pad wear, a pressure proportioning valve is fitted into the rear brake circuit, and is located at the right hand front of the engine bay.



The valve is designated 70/.1 which indicates:

i) at brake line pressures up to 70 bar, the valve has no effect, with input pressure equal to output pressure from the valve.

ii) as input pressure increases above 70 bar, the rise in output pressure is limited to 0.1 of the input pressure increase.

JF.14 - HYDRAULIC DIAGNOSIS

CAUTION: The 'Tech 1' scanner tool **MUST** be used to check for fault codes (see section JF.25) before attempting **ANY** of the following diagnostic procedures. The diagnostic codes of the **DM ABS-IIIA** system help pinpoint problem components or areas. The following tests should only be used if a diagnostic chart directs the technician to this section or a problem exists, but no codes have been set.

ABS. IIIA DIAGNOSTIC CODE TO HYDRAULIC DIAGNOSIS TEST REFERENCE CHART

TEST TO BE PERFORMED	FAULT CODE (see section JF.25)							
	A023 A024 A025	A026 A027 A028	A061 A035	A044 A045 A046 A047	A048 A049 A050 A051	A056	A059	A062
Inspect	1	1	1	1	1	1	1	1
A. ABS Release Function Check	2					6		
B. ABS Hold Function Check		2				5		
C. Low or No Boost Pressure Check			2			2	3	
D. Pump Run Time Too Long			3				4	
E. Pump Off Time Too Short						3		
F. External Leakage Check						4	2	
G. Pump Motor Operation								2

IMPORTANT: If referred to this section from a section JF.25 diagnostic code, complete the tests noted below the appropriate code number in numerical order. For example, if referred to this section from code A023, first complete the inspect steps (1) and then the ABS Functional Check (2). If using this section because the ABS-IIIA system is malfunctioning, but no codes have been set, complete the following tests **in the order in which they appear.** BEGIN DIAGNOSIS IN THIS SECTION WITH THE INSPECT STEPS.

INSPECT

1. Fluid level when system is depressurized. To depressurize the unit, turn off the ignition or disconnect the battery. Then **FIRMLY** apply and release the brake pedal a minimum of 40 times. The accumulator is discharged when a hard pedal feel is obtained.

2. Brake lines, brake hoses, master cylinder/booster assembly, pump/accumulator assembly and brake calipers for leakage.

3. Brake lines, and brake hoses for excessive wear, heat damage, punctures, tears, interference with other parts, missing clips or holders, poor connections or blockage.

4. Calipers and caliper pins for rust or corrosion.

5. Calipers for proper sliding action.

6. Caliper pistons for movement during brake application and sufficient retraction upon brake release.

7. Front speed sensors for proper mounting and connections.

a. Front speed sensor rings for broken teeth or poor mounting.

9. Front speed sensor ring air gap. Gap should be 0.6 ▪ 1.4 mm (0.025 ▪ 0.055 in.) and is adjustable by shims.

10. Rear speed sensor connections.

1 1. Rear speed sensors for proper installation or damage.

12. Brake pedal travel after system is depressurized. Pedal should NOT bottom near the floor. See section JF.3 - ABS Brake Characteristics.

13. Worn or missing isolator bushings on the pump/accumulator mounting bracket which may cause objectionable pump motor noise.

14. High pressure line on Powermaster IIIA which may be rubbing against other engine compartment parts.

Amber 'ABS' Tell Tale Lamp

If the amber ABS tell tale lamp stays on after the initial bulb check, or lights during a brake application, see section JF.25 for diagnosis.

Red 'Brakes' Tell Tale Lamp

If the red brake warning lamp stays on after the initial bulb check, possible causes include: parking brake applied; malfunctioning parking brake switch; wiring; low fluid level; malfunctioning fluid level sensor; loose or damaged connectors or wiring; low accumulator pressure.

1. Turn ignition off.

2. Fit 'Tech 1' scanner tool to ALDL connector (see section JF.25).

3. Turn ignition on. Using scan tool, read brake pressure state.

4. If brake pressure is OK, (1600 psi or greater) go to step 6. If brake pressure is low (not OK), scan controller for codes.

5. If no codes are found, continue performing hydraulic diagnosis tests beginning with test A. (ABS System Functional Check)

6. Disconnect fluid level sensor connector from the reservoir. Apply foot brake and completely release parking brake.

7. Does the red 'brakes' tell tale lamp stay on? If so, check the parking brake switch, wiring and connectors.

a. If the parking brake switch, wiring and connectors are good, inspect the wiring and connectors to the fluid level sensor.

9. Connect the fluid level sensor connector. Does the red 'brakes' tell tale lamp light? If so, check for low fluid level, external leaks or malfunctioning fluid level sensor.

A. ABS RELEASE FUNCTION CHECK

Test Description: While manually operating the system, this test determines whether the system applies braking force to all the wheels AND allows a wheel to rotate when the ABS reduces brake pressure to that wheel.

Symptoms: Wheel lock during braking; vehicle pulls to one side.

Possible Causes: Caliper or parking brake stuck; low or no boost pressure; master cylinder malfunction; loose or damaged wires or connectors.

1. Fit 'Tech 1' scanner tool to the ALDL connector.

2. Have assistant sit in the driver's seat to operate the brakes and scanner tool during the following procedures.

3. Raise vehicle on a lift.

4. Turn on ignition. Put transmission in neutral. Do NOT apply brakes. Try to rotate each wheel. If all wheels do not rotate, check operation of the parking brake and brake calipers.

   NOTE: The front wheels should turn with little or no resistance. However, the rear wheels will have some resistance to rotation caused by the differential and transmission. 'No wheel rotation' exists when a wheel cannot be turned using hand force.

5. Apply medium pressure to the brakes. Again try to rotate each wheel. No wheel should rotate.

6. If either of the front wheels rotate, replace the master cylinder/booster assembly because the master cylinder is malfunctioning.

7. If the rear wheels rotate, a low or no boost pressure condition exists. See test C. (Low or no Boost Pressure Check)

a. Have assistant apply the foot brake moderately and using the 'Tech 1' tool, energize the release solenoid for a specific wheel. Test wheel rotation for the appropriate solenoid and:
   - listen for the sound of fluid being forcefully sprayed in the reservoir; - note pedal travel;
   - note whether the pump runs constantly or at frequent intervals while the solenoids are energized. Test other release solenoids in the same way.

   NOTICE: During this test, the Powermaster IIIA master cylinder/booster assembly will not reduce brake line pressure to zero psi. Approximately 10 psi will be left in the brake lines under these conditions. Therefore, some drag may be noticed when testing wheel rotation. This drag is normal and should not be confused with a wheel that does not rotate (cannot be turned with hand force).

9. With the release solenoid for a specific wheel energized, the respective wheel should rotate. In addition, while the solenoid is energized: it should not be possible to hear fluid being forcefully sprayed in the reservoir; the brake pedal should not steadily sink to the floor; the pump should not run constantly or frequently.

10. If any deviations are noted in test 9, check the wiring and connections to the appropriate solenoid. If necessary, replace the Powermaster IIIA wiring harness if any of the wires or connections to the appropriate solenoids aredamaged. Perform steps 8 through 10 again.

1 1. If test 9 results are still unsatisfactory, replace the respective solenoid and perform steps 8 through **10** again.

12. If test 9 results are still unsatisfactory, replace the master cylinder assembly.

B. ABS HOLD FUNCTION CHECK

Test Description: This test checks the hold function of the ABS system.

Symptoms: Vehicle pulls to one side; accumulator pressure exhausts during an ABS stop (red 'brakes' tell tale comes on); wheel locks during braking; consistently rough stops.

Possible Causes: Solenoids leaking or malfunctioning; master cylinder/booster assembly malfunctioning.

1. Fit 'Tech 1' scanner tool to the ALDL connector.

2. Have assistant sit in the driver's seat to operate the brakes and scanner tool during the following procedures. Keep transmission in neutral throughout test.

3. Raise vehicle on a lift.

4. Turn on ignition and allow unit to pressurize.

5. Using the 'Tech 1', test the hold function of the rear brakes by energizing only the rear hold solenoid. Then apply the brakes moderately. Listen for the sound of fluid being forcefully sprayed in the reservoir, note pedal travel and note whether the pump runs constantly or at frequent intervals while the solenoid is energized.

6. With the rear hold solenoid energized, try to turn a rear wheel. The wheel should turn with only differential and transmission resistance for 6 or more seconds before the brakes begin to apply. In addition: it should not be possible to hear fluid being forcefully sprayed in the reservoir; the brake pedal should not steadily sink to the floor; and the pump should not run constantly or frequently. If the rear brakes apply in 5 seconds or less, or if there are any other deviations from the above conditions, replace the rear solenoid and perform steps 5 and 6 again.

7. If the brakes still apply in 5 seconds or less or if test 6 results are still unsatisfactory, replace the master cylinder/booster assembly.

8. Moderately apply the brakes. Using the 'Tech 1' tool, test the hold function of one of the front wheel brakes. While the solenoid is energized, listen for the sound of fluid being forcefully sprayed in the reservoir, note pedal travel and note whether the pump runs constantly or at frequent intervals. Test the hold function of the other front hold solenoid in the same way.

9. Try to turn the appropriate front wheel. The wheel should turn freely for 6 or more seconds before the brake begins to apply.
In addition: it should not be possible to hear fluid being forcefully sprayed in the reservoir; the brake pedal should not steadily sink to the floor; and the pump should not run constantly or frequently.
If the rear brakes apply in 5 seconds or less, or if there are any other deviations from the above conditions, replace the appropriate front solenoid and perform steps 8 and 9 again.

10. If the brake continues to apply in 5 seconds or less. or test 9 results are still unsatisfactory, replace the master cylinder/booster assembly.

C. LOW OR NO BOOST PRESSURE CHECK

Symptoms: Red 'brakes' tell tale lamp lit: amber ABS warning lamp lit: frequent pump running; pump not running.

Possible Causes: Internal master cylinder/booster assembly leak; malfunctioning check valve; malfunctioning pump; malfunctioning pump relay; malfunctioning pressure switch; fuse blown; loose or damaged wiring; low fluid level (boost side); reversed polarity at motor (motor runs backwards); reversed polarity at relay coil (motor won't run).

1. Turn off ignition and depressurise the accumulator.

2. Fit 'Tech 1' scanner tool to ALDL connector.

3. Perform an 'ABS pump power up test' using the Tech 1

4. Note the **TOTAL** pump run time. This is the time between ignition on and pump shut off. (If the pump does not run, see section JF.25)

5. If the total pump run time is 40 seconds or less, the system is developing satisfactory boost pressure. If the total pump run time is more than 40 seconds, see test D. (Pump Run Time Too Long)

6. Determine the pump off time by moderately applying the brakes and holding the brake pedal in the applied position. The pump off time is the time between brake apply and pump run. (Pump run test may also be performed via 'Tech 1')

7. If the pump off time is 50 seconds or less, a problem may exist in the master cylinder/booster assembly. See test E. (Pump Off Time Too Short).
If the pump off time is more than 50 seconds, the master cylinder/booster assembly is adequately holding boost pressure.

D. PUMP RUN TIME TOO LONG

Symptoms: Pump run time from no pressure to the high limit switch point takes longer than 40 seconds.

Possible Causes: Defective battery; malfunctioning charging system or electrical circuits other than ABS circuits; low accumulator precharge; pressure switch malfunctioning; damaged master cylinder/booster assembly; malfunctioning pump; low fluid level (boost side).

1. Turn off ignition. Disconnect wiring harness at the pump connector. Turn on ignition. Using a digital volt/ohmeter, check voltage of Pin A to ground.

2. If less than 12 volts exist at Pin A, check the battery, charging system and non ABS electrical circuits for damage.

3. Turn off ignition. Reconnect pump harness. Depressurise the accumulator.
WARNING: Ensure the accumulator is fully depressurised (apply brake pedal hard and release up to 40 times with ignition off) before removing accumulator.

Remove accumulator and install pressure gauge T000T1 112. Install accumulator on pressure gauge adaptor.

4. Turn ignition on to let pump run for 15 seconds. Turn ignition off and apply the brake pedal hard and release up to 40 times to de-pressurise accumulator.

5. Observe pressure gauge while turning on ignition. Is there a sudden jump in pressure from 0 psi to 500 psi or more almost immediately after the ignition is turned on? (This initial jump in pressure is the amount of accumulator precharge). If not, the accumulator must be replaced because the precharge is too low.

6. Note pressure when the motor shuts off or a high pressure limit is reached. Is this pressure more than 2,900 psi? If so, replace the pressure switch.

7. Using the 'Tech 1', monitor the pump state while applying the brakes slowly until the pump begins to run. Note the low pressure point when the pump turns on.

a. Does the motor turn on at 2,000 to 2,400 psi? If not, replace the pressure switch since it is turning on the motor at too low a point. DEPRESSURISE the accumulator before removing the switch.

9. If the pressure switch functions properly, visually check the pump outlet in the reservoir to ensure it is not blocked. DO NOT APPLY THE BRAKES WITH THE RESERVOIR COVER REMOVED. If the outlet is clear, attach one end of a clear plastic hose over the relief valve in the reservoir. Hold the other end of the tube (pointing downward) in the rear reservoir chamber and turn on the ignition. If fluid flows through the tube into the reservoir, the relief valve is leaking and should be replaced. If fluid does not flow through the tube, replace the master cylinder/booster assembly.

E. PUMP OFF TIME TOO SHORT

Symptom: Pump is off for too short a period of time causing pump to cycle frequently.

Possible Causes: Excessive internal leakage; low precharge accumulator; leaking solenoid(s); damaged master cylinder/booster assembly.

1. Turn off ignition. Depressurise the accumulator.

WARNING: Ensure the accumulator is fully depressurised (apply brake pedal hard and release at least 40 times with ignition off) before removing accumulator.

Remove accumulator and install pressure gauge TOOOT1112. Install accumulator on pressure gauge adaptor.

2. Turn ignition on to let pump run for 15 seconds. Turn ignition off and apply the brake pedal hard and release up to 40 times to de-pressurise accumulator.

3. Observe pressure gauge while turning on ignition. Is there a sudden jump in pressure from 0 psi to 500 psi or more almost immediately after the ignition is turned on? (This initial jump in pressure is the amount of accumulator precharge). If not, the accumulator must be replaced because the precharge is too low.

4. Allow the system to pressurise until the pump shuts off. With ignition still on, determine the pump off time by moderately applying the brakes and holding the pedal in the applied position. The pump off time is the time between brake apply and pump run. (Pump run test may also be performed via 'Tech 1')

5. Refer to the chart below to determine whether the accumulator or master cylinder/booster assembly should be replaced. If pump off time is less than 50 seconds, check accumulator precharge. If accumulator precharge is less than 600 psi, replace the accumulator. If precharge is 600 psi or greater and the pump off time is less than the corresponding chart value, replace the master cylinder/ booster assembly.

Accumulator Precharge (psi)	Pump Off-time (seconds)
1200	60
1100	55
1000	50
900	45
800	40
700	35
600	30
Less than 600	Replace accumulator

F. EXTERNAL LEAKAGE CHECK

Symptom: Any dampness or dripping of brake fluid on the master cylinder/booster assembly, pump/ accumulator assembly, brake lines, proportioning valve or calipers.

Possible Causes: Leaking O-ring seal(s), poor connections, over-filled front chamber of reservoir.

1. Depressurize the accumulator.

2. Clean and remove the reservoir cover and diaphragm assembly. Check the fluidlevels.

3. If the front reservoir chamber level is high, drain fluid to restore proper level.

4. If the rear chamber fluid level is high, drain fluid to restore to proper level. A high rear chamber fluid level may be caused by filling the reservoir without depressurising the system.

5. Clean and dry the master cylinder/booster assembly, pump/accumulator assembly and other brake system parts so that the source of a leak may be more easily detected.

6. Install the reservoir cover and diaphragm assembly.

7. Turn on the ignition and pump the brakes. Check for leaks. Tighten any loose connections. Repair calipers or brake lines as necessary. If leakage occurs on the master cylinder/booster assembly, tighten connections if possible, or replace the unit. Depressurize the accumulator and check the fluid levels in the reservoir chambers.

8. If the level in the front reservoir chamber is high, see G (Fluid Leaking into Front Chamber). If the level in the rear reservoir chamber is high, replace the master cylinder/booster assembly.

G. PUMP MOTOR OPERATION

1. Turn off the ignition and depressurise the accumulator.

WARNING: Ensure the accumulator is fully depressurised (apply brake pedal hard and release up to 40 times with ignition off) before removing the accumulator.

Remove the accumulator and install pressure gauge T000T1112. Install accumulator on the pressure gauge adaptor.

2. Turn on the ignition and allow the pump to run for at least 20 seconds. Turn off ignition and check for leaks, correcting as necessary. Depressurise the accumulator.

3. Using the 'Tech 1' tool, perform the 'Total Pump Run Time Test'. Observe the pressure gauge while turning on the ignition. Is there a sudden jump from 0 to 3500 kPa (0 to 500 psi) or more almost immediately after the ignition is turned on? (This initial jump in pressure is the amount of accumulator precharge) If not, and the pump motor is running, perform step 9 of test D 'Pump Run Time Too Long'. If the jump in pressure is to less than 4150 kPa (600 psi), replace the accumulator.

4. Note the pressure at which 'Tech 1' indicates "OK" pressure. If this pressure is not within the 11,700 to 13,100 kPa (1700 to 1900 psi) range, replace the accumulator pressure switch. Note the pressure at which the pump turns off. If it is not within the 17,900 to 20,000 kPa (2600 to 2900 psi) range, replace the accumulator pressure switch. If the pump continues to run but maintains a constant pressure, perform step 9 of test D 'Pump Run Time Too Long'.

NOTE: When depressing the brake pedal to cause the pump to run, press the pedal slowly and carefully until the pump just begins to run. Do not continue to press the pedal after the pump begins to run, or pump run times which are too short may be missed.

5. When the pump has stopped, press the brake pedal until the pump begins to run. If this pressure is not within the 14,150 to 15,850 kPa (2050 to 2300 psi) range, replace the accumulator.

6. If: accumulator pressure switch points are al! within range, and; accumulator precharge is greater than 4150 kPa (600 psi), and; battery voltage is greater than 11.8 volts when the pump is running: if the total pump run time is greater than 40 seconds, replace the pump and motor assembly.

H. FLUID LEAKING INTO FRONT CHAMBER

Symptom: Front reservoir chamber becomes overfilled causing leakage past the reservoir cover.

Possible Causes: Reservoir cover and/or diaphragm leaking; damaged master cylinder/booster assembly.

1. Depressurise the accumulator.

2. Drain brake fluid in the front reservoir below the divider between the two master cylinder ports.

3. Install the reservoir cover and diaphragm assembly. Turn on the ignition and pump the brakes several times.

4. Again depressurise the accumulator. Remove the reservoir cover and diaphragm. Note the level of fluid in the front reservoir.

5. If the fluid level has risen in the front chamber, replace the master cylinder/booster assembly.

6. If the fluid level drops or stays the same, replace the reservoir cover and diaphragm assembly,

JF.15 - BRAKE FLUID RESERVOIR

Low Fluid Level Switch: The low fluid level switch may be removed from the reservoir without draining the fluid. Disconnect the harness plug, and squeeze the locking tabs on the end of the sensor opposite to the connector plug. Withdraw the sensor.

To refit the sensor, push into position until the tabs snap into place, and connect the harness plug.

Reservoir: Before removing the reservoir, thoroughly clean the reservoir and surrounding area to reduce the possibility of dirt ingress during or after removal.

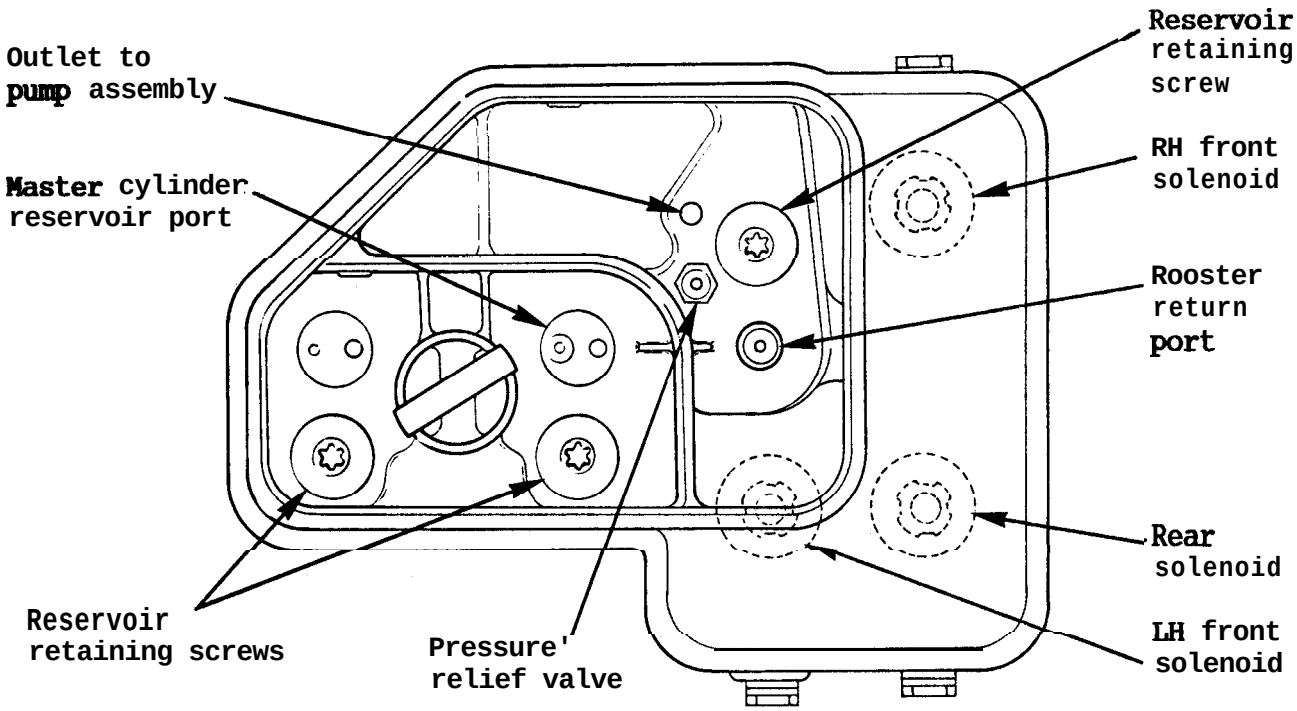
1. Depressurise the accumulator by turning off the ignition and FIRMLY applying the brake pedal 40 times. A noticeable change in pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

2. Release the reservoir cover, and use a syringe to remove as much fluid as possible from the reservoir, Discard fluid.

3. Protect the surrounding area of bodywork and electrical connections from fluid drips when the reservoir is removed. Unplug low fluid level switch.

4. Use a suitable container or shop towel to catch fluid, and disconnect from the reservoir the fluid supply hose from reservoir to pump assembly.

5. Use a Torx spline wrench to release the three screws inside the reservoir, securing the reservoir to the master cylinder assembly, and carefully lift the reservoir off the solenoids.



6. Before re-fitting the reservoir, thoroughly inspect the solenoid seals for damage, and correctly position the reservoir sealing gasket on the master cylinder assembly.

7. Carefully fit the reservoir over the solenoids, and fit the three securing screws. Torque tighten to 4 • 5 Nm (35 • 45 lbf.in).

8. Refit the low pressure hose to the reservoir, and connect the low fluid level switch.

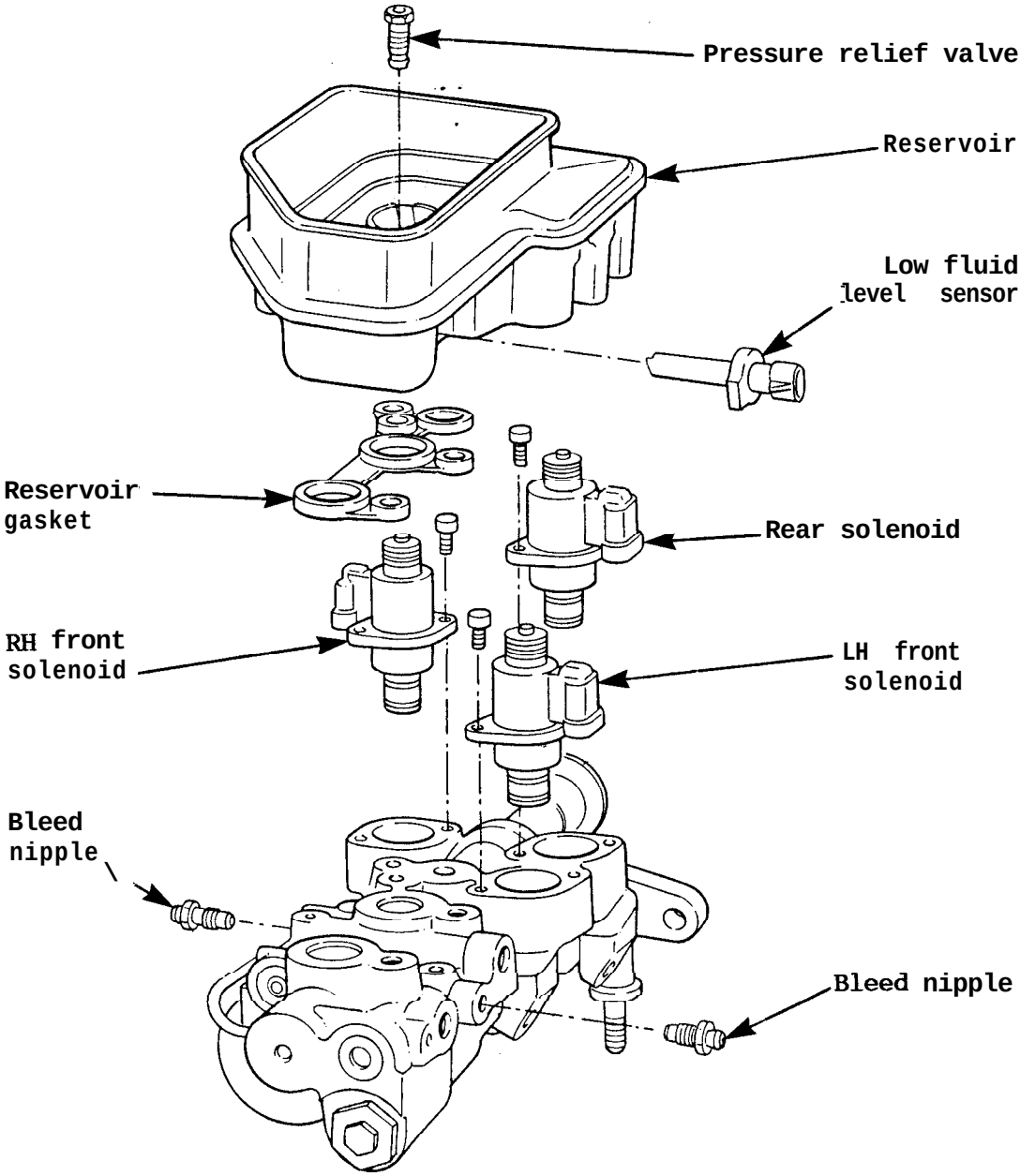
9. Refill the reservoir with new DOT 4 fluid and bleed the system as in JF.8.

JF.16 • SOLENOID VALVES

The solenoid valves, one for each front circuit and one for the combined rear circuit, may be removed from the master cylinder/booster assembly after removing the fluid reservoir.

1. Remove the brake fluid reservoir (see section JF.15).

2. Unplug the electrical connector from the solenoid, and use a Torx spline wrench to remove the two solenoid retaining screws. Withdraw the solenoid.



3. Before refitting the solenoid, check that both '0' rings on the lower end of the solenoid are in place and in good condition. Check the condition of the solenoid top seal, and replace any seal if in doubt.

4. Lubricate the '0' rings with clean DOT 4 fluid before inserting the solenoid into its bore in the master cylinder/booster assembly.

IMPORTANT: Ensure that the correct solenoid is fitted into the correct position - the two front solenoids (identical, with black connector sockets) are fitted in the right hand and left hand front positions, and the rear solenoid (tan or grey connector) is fitted in the left hand rear position.

5. Retain the solenoid with the two Torx screws, and tighten to 4 - 5 Nm (33 - 45 lbf.in).

6. Refit reservoir (see section JF.15) and bleed brake system (JF.8).

JF.17 • MASTER CYLINDER/BOOSTER ASSEMBLY

Servicing of the master cylinder/booster- assembly is limited to the fluid reservoir components, and the solenoid valves as previously described. .The master cylinder, displacement cylinders and isolation valves are not serviceable, and if found to be faulty, must be rectified by fitting a replacemnt master cylinder/booster assembly.

To Remove:

1. **Depressurise the accumulator** by turning off the ignition and FIRMLY applying the brake pedal up to 40 times. A noticeable change in pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

2. Release the reservoir cover, and use a syringe to remove as much fluid as possible from the reservoir. Discard fluid.

3. Protect the surrounding area of bodywork and any electrical equipment from fluid drips during the course of unit removal. Unplug the harness from the low fluid level switch and the three solenoids.

4. Use a suitable container or shop towel to catch fluid, and disconnect from the reservoir the fluid supply hose from reservoir to pump assembly.

5. Ensure that the accumulator has been fully depressurised before disconnecting the high pressure pipe from pump/accumulator to master cylinder/booster (M10thread).
   NOTE: After disconnecting any brake pipes, always plug both the pipe end and the port to prevent dirt ingress and reduce fluid spillage.

6. Disconnect the two front brake pipes (Ml2 and Ml3 thread) and the single rear brake pipe (Ml4 thread) from the master cylinder/booster.

7. From within the driver's footwell, remove the clevis pin connecting the brake pedal to the pushrod.

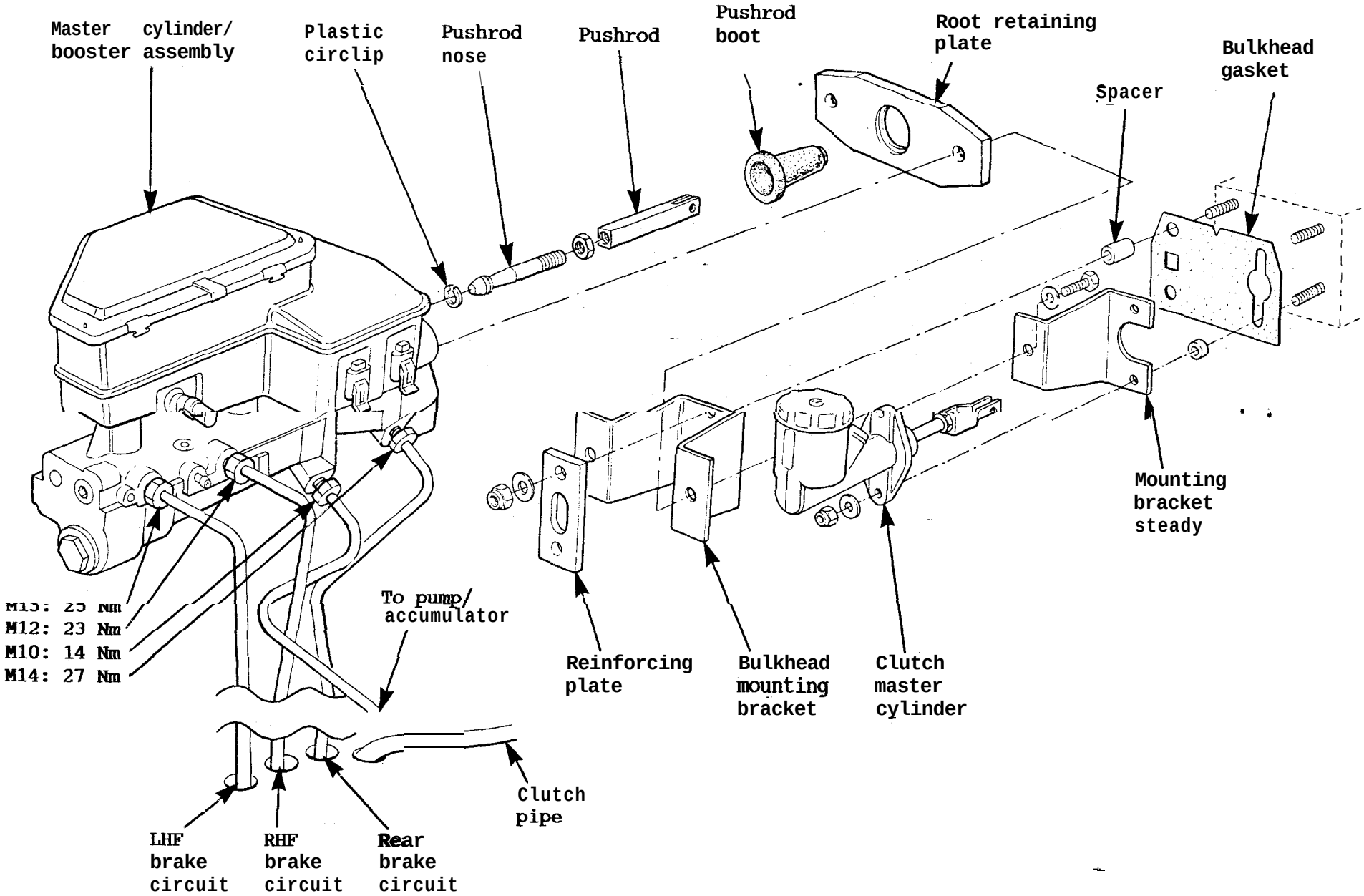
8. Remove the two bolts securing the unit to the bulkhead mounting bracket, and withdraw the master cylinder/booster assembly and pushrod from the car.

9. Slacken the pushrod locknut, and screw the pushrod off the pushrod nose. Remove the pushrod nose boot. If it is necessary to remove the pushrod nose from the unit (e.g. if fitting a replacement master cylinder/booster assembly), the plastic retaining clip will be damaged during removal and must be renewed. Order at the same time as the main unit.

To Refit:

1. If necessary, fit the pushrod nose into the master cylinder/booster assembly, and retain with a new plastic circlip. Fit the pushrod nose boot. Screw the locknut and pushrod onto the pushrod nose.

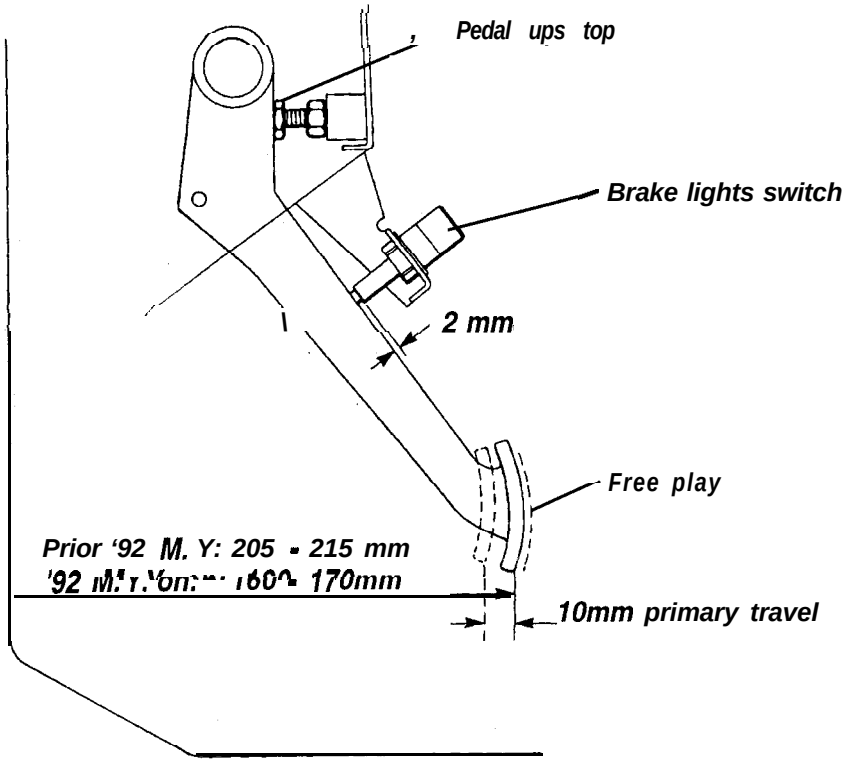
2. Fit the boot carrier plate over the pushrod and locate the boot and plate correctly against the master cylinder/booster assembly. Fit the master cylinder/booster assembly to the bulkhead mounting bracket, passing the pushrod through the bulkhead gasket. Secure the unit with the two 3/8" UNC bolts and flat washers with Permabond Al38 (A074B6009V) applied to the threads. Torque tighten to 33 Nm (25 Ibf.ft).


Master cylinder/ booster assembly
Plastic circlip
Pushrod nose
Pushrod
Pushrod boot
Root retaining plate
Spacer
Bulkhead gasket
Mounting bracket steady
M12: 23 Nm
M10: 14 Nm
M14: 27 Nm
To pump/ accumulator
Reinforcing plate
Bulkhead mounting bracket
Clutch master cylinder
Clutch pipe
LHF brake circuit
RHF brake circuit
Rear brake circuit

3. Before adjusting the brake pedal pushrod length, first remove the stop light switch (twist ¼ turn counterclockwise) and adjust the brake pedal height. Measure horizontally from the steel pedal pad to the bulkhead. as shown in the diagram, and adjust the pedal upstop to achieve the specified dimension:

   cars prior to '92 M.Y.: 205 - 215 mm
   cars '92 M.Y. onwards: 160 - 170 mm

   Check that the brake pedal pivots freely and does not stick or bind.



4. Adjust the effective length of the pushrod by screwing the pushrod nose in or out of the pushrod until the clevis pin can be fitted freely without preloading the pushrod - the pedal should 'rattle' with a few millimetres of free play. Check that the pedal travels about 10 mm before a noticable increase in resistance.

5. Fit the brake light switch into its mounting bracket, and set so that when twisted ¼ turn clockwise to retain, there is about 2 mm of the white plunger visible. The brake lights should come on after about 7 mm of pedal movement. Note that the ABS requires a signal from the stop switch as an indication of brake application before the system will operate.

6. Fit the two front brake pipes (Ml2 & Ml3 thread) and the single rear brake pipe (Ml4 thread) to the master cylinder/booster assembly. Tighten all unions:

   Ml2 - 23 Nm (17 lbf.ft)
   Ml3 - 25 Nm (18 lbf.ft)
   Ml4 - 27 Nm (20 lbf.ft)

7. Fit the high pressure supply pipe (Ml0 thread) from the accumulator to the master cylinder/booster, and torque tighten to 14 Nm (10 lbf.ft).

8. Fit the pump supply hose to the reservoir and tighten the hose clip.

9. Reconnect the harness to the low fluid level switch, and to the three solenoids.

10. Fill the reservoir with DOT 4 fluid and bleed the brake system (see section JF.8).

JF.18 ▪ PUMP/ACCUMULATOR ASSEMBLY

The pump/accumulator assembly is located at the right hand side of the front luggage compartment. The pump is suspended from its mounting bracket on three bonded rubber bushes in order to provide some noise isolation. The accumulator is screwed into an alloy 'end plate' which connects with the pump, houses the (non serviceable) non return valve, and provides take off points for the pressure switch and high pressure pipe to the master cylinder/booster assembly.

To Replace Pressure Switch

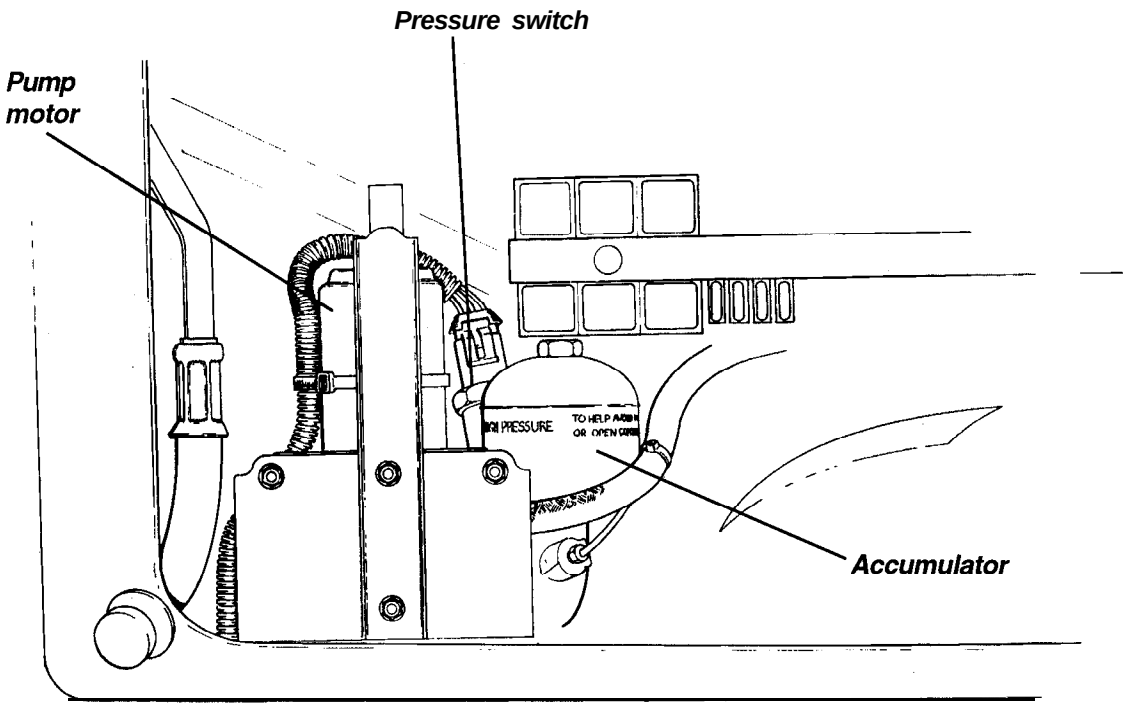
The pressure switch fitted in the endplate of the accumulator, controls the system hydraulic pressure and the running of the electric pump. The switch was recalibrated during 1993 to reduce seal friction in the booster/master cylinder assembly, with the new switch identified by a grey (previously black) plastic body. All cars should be updated to the new type switch.

1. **Depressurise the accumulator** by turning off the ignition and FIRMLY applying the brake pedal up to 40 times. A noticeable change in pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

2. Before unscrewing the pressure switch from the pump/accumulator endplate, have the new switch ready and prepared for fitment to avoid the necessity to bleed the hydraulic system:
   Lubricate the '0' ring supplied with the new pressure switch using DOT 4 brake fluid and fit the ring onto the new switch.

3. On LHD cars, it may be necessary to release the relay bracket fixings for sufficient access to the pressure switch in the pump/accumulator endplate.
   Disconnect and unscrew the pressure switch from the endplate extension beneath the accumulator using a long reach 39 mm (1½ in) socket - available under T000T1238F. Use a shop towel to absorb any escaping fluid.

4. Screw the new switch and '0' ring into the endplate and torque tighten to 20 - 27 Nm (15 - 20 lbf.ft). Connect the harness plug to the switch.



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To Replace Accumulator

NOTE: The accumulator is a nitrogen-charged pressure vessel which holds brake fluid under high pressure. No re-charging or other repairs can be made. If the pre-charge is diagnosed as being low (section JF.14) the unit must be replaced.

1. **Depressurise the accumulator** by turning off the ignition and FIRMLY applying the brake pedal 40 times. A noticeable change in pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

2. Unscrew the accumulator from the endplate using a 17 mm socket.

3. Fit a new '0' ring on the accumulator spigot and lubricate with DOT 4 fluid. Screw the accumulator into the endplate and tighten to 31 ▪ 35 Nm (23 ▪ 26 lbf.ft).

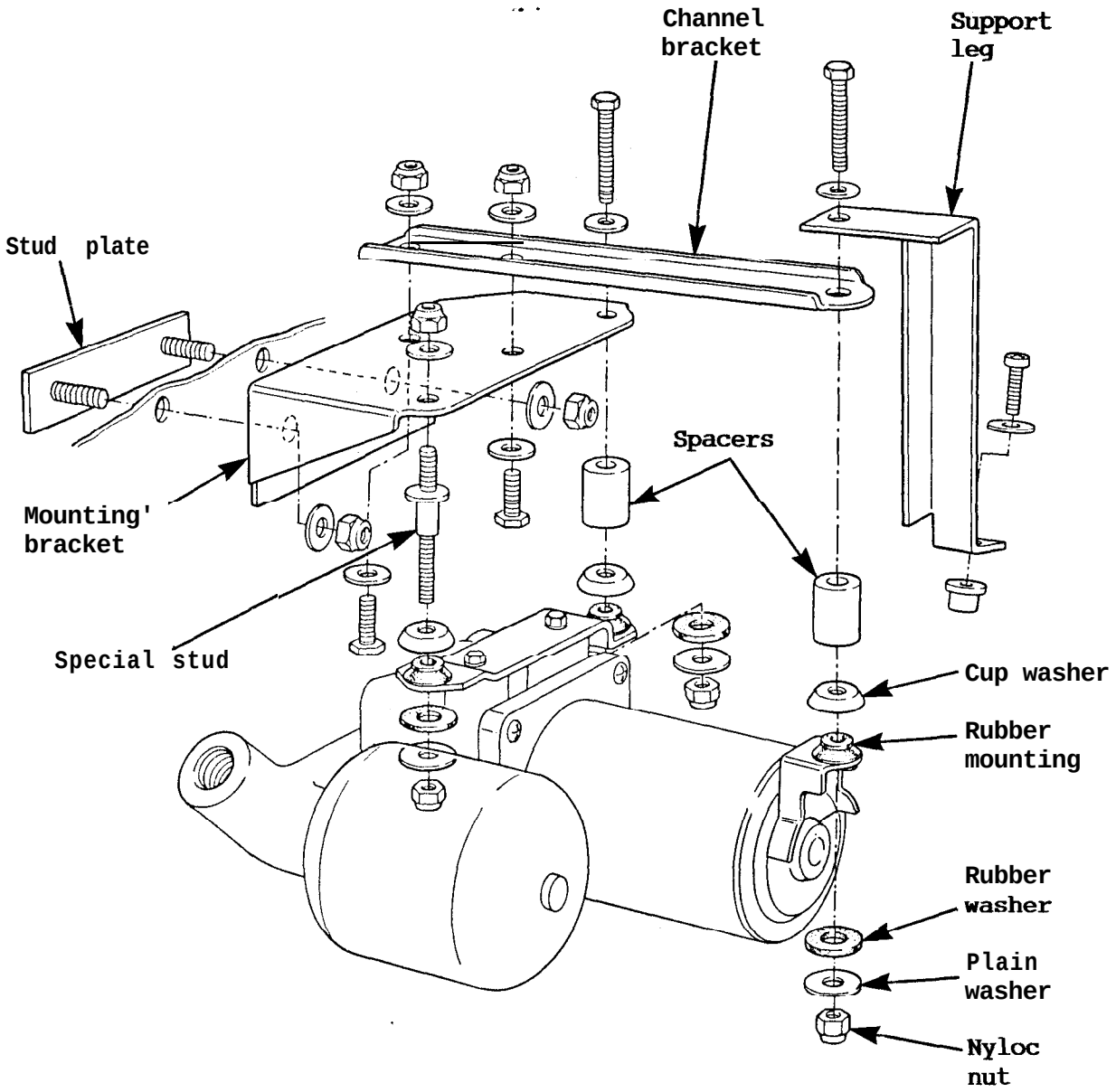
4. Bleed the brake system as in JF.8.

To Replace Pump/Accumulator Assembly

1. **Depressurise the accumulator** by turning off the ignition and FIRMLY applying the brake pedal 40 times. A noticeable change in pedal feel (to a hard pedal) will occur when the accumulator is completely discharged.

2. Disconnect the harness from the pump motor and pressure switch.

3. Use a shop towel to absorb brake fluid, and disconnect the fluid supply hose from the pump. Remove the high pressure bundy pipe from the pump end plate and master cylinder/booster.



4. Remove the three pump assembly fixings (M5/M6). Remove the mounting bracket support leg, and on RHD cars, the top channel to allow the pump/accumulator assembly to be withdrawn.

5. When replacing the pump/accumulator assembly, ensure that the assembly sequence at each mounting point is correctly maintained, with the washers, rubber washers, spacers and cup washers positioned as shown in the illustration.

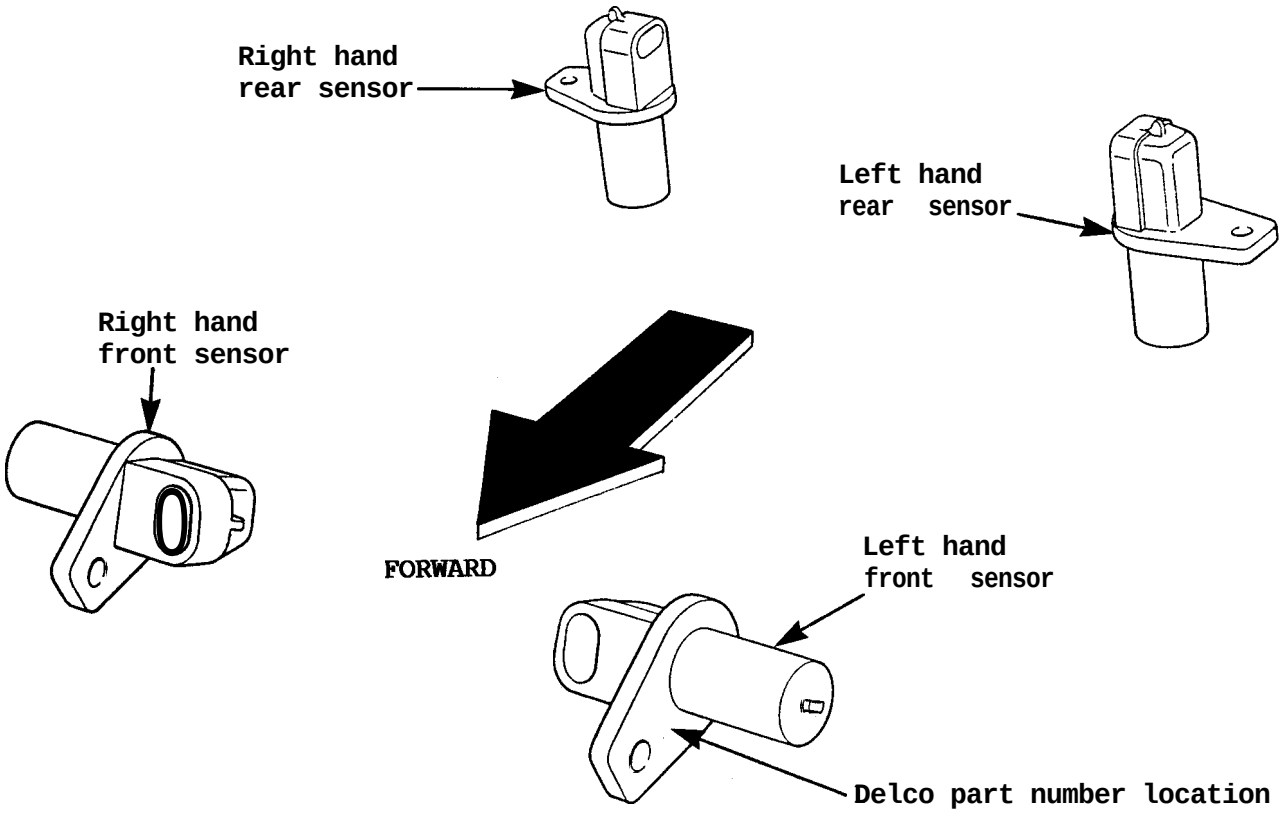
6. Connect the low pressure fluid supply hose, and the high pressure bundy pipe. Tighten the bundy pipe tube nuts to 13 - 20 Nm (10 - 15 lbf.ft).

7. Plug in the pump and pressure switch electrical connectors.

8. Bleed the brake system as detailed in section JF.8.

JF.19 - WHEEL SPEED SENSORS

Three variations of the wheel speed sensor are used in the anti-lock brake system. On the front sensors, the mounting hole is offset in relation to the pole piece and electrical connector axis, at an angle of 45° in opposite directions for the left and right hand side. The mounting hole on both rear sensors is in line with the pole piece. Note that the right hand rear hub carrier on fuel injected cars is also fitted with a separate vehicle speed sensor which may be identified by its staight electrical connector. It is most important not to fit a sensor in the wrong position, or incorrectly connect the harness.



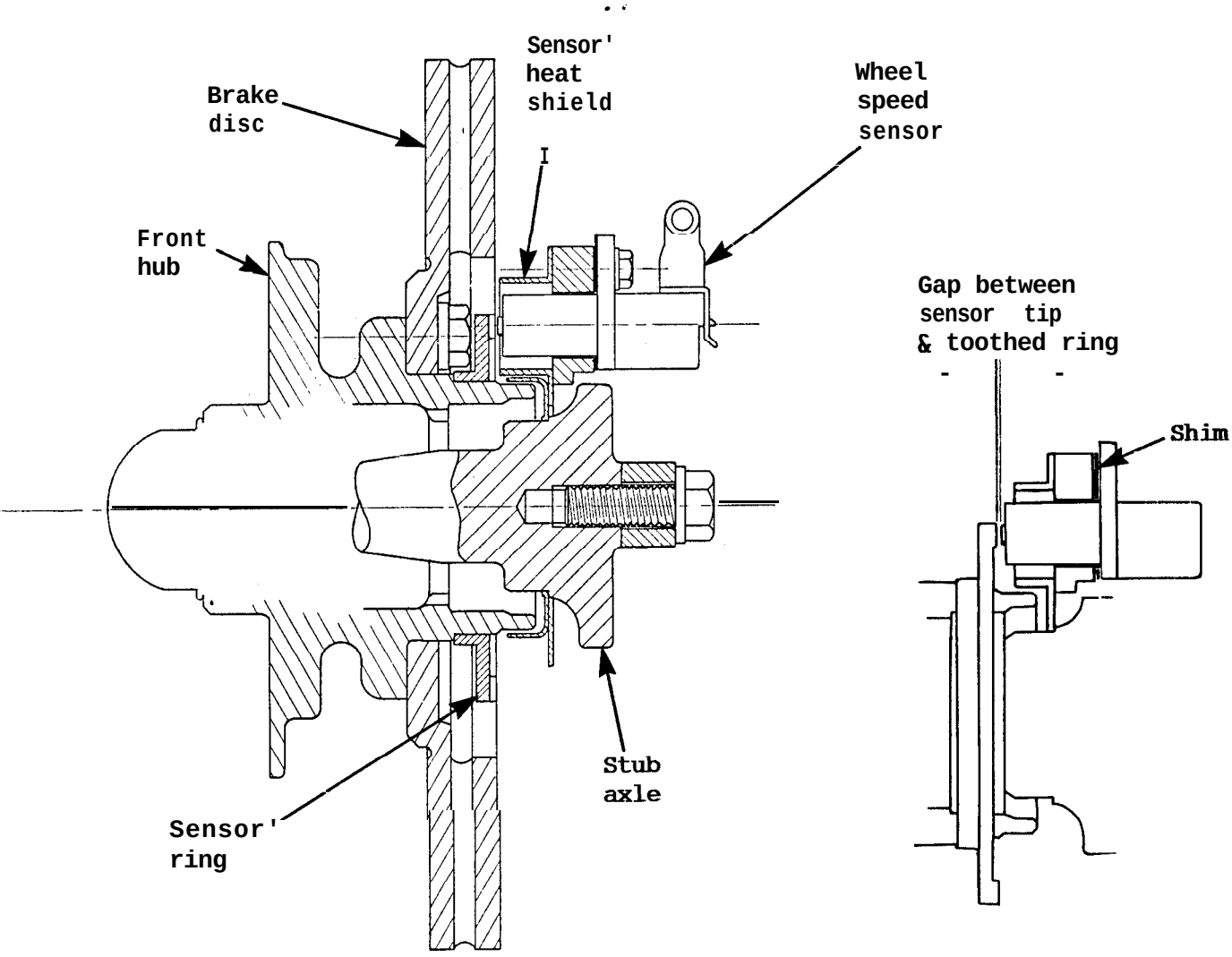
For identification of the sensors, refer to the diagram and to the Delco part number moulded on the underside of the mounting flange:

Right hand front sensor:	10456052
Left hand front sensor:	10456053
Rear sensor (RH & LH):	10456051 or 10456099 or 10456151

Front Wheel Speed Sensors

The front wheel speed sensors are secured to the brake disc shields, themselves bolted to the front suspension uprights. The gap between the sensor tip and the pole wheel is critical, and must be adjusted if necessary using shims. Before checking the gap, ensure that the taper roller front wheel bearings are correctly adjusted - see Service Notes section CD.5 or CF.4.

Gap between sensor tip and pole wheel = 0.6 - 1.4 mm (0.024 - 0.055 in).



To adjust the gap, release the single screw securing the sensor, and if applicable, the remaining screw securing the shim pack to the disc shield. Shims are available in thicknesses of 0.75 mm (0.030 in), 0.95 mm (0.037 in), and 1.25 mm (0.050 in). Add or delete shims as necessary to achieve specification, and secure the shims with the M6 setscrew. Fit the sensor into position and tighten its M6 setscrew to 9 Nm (6.5 lbf.ft). Recheck gap.

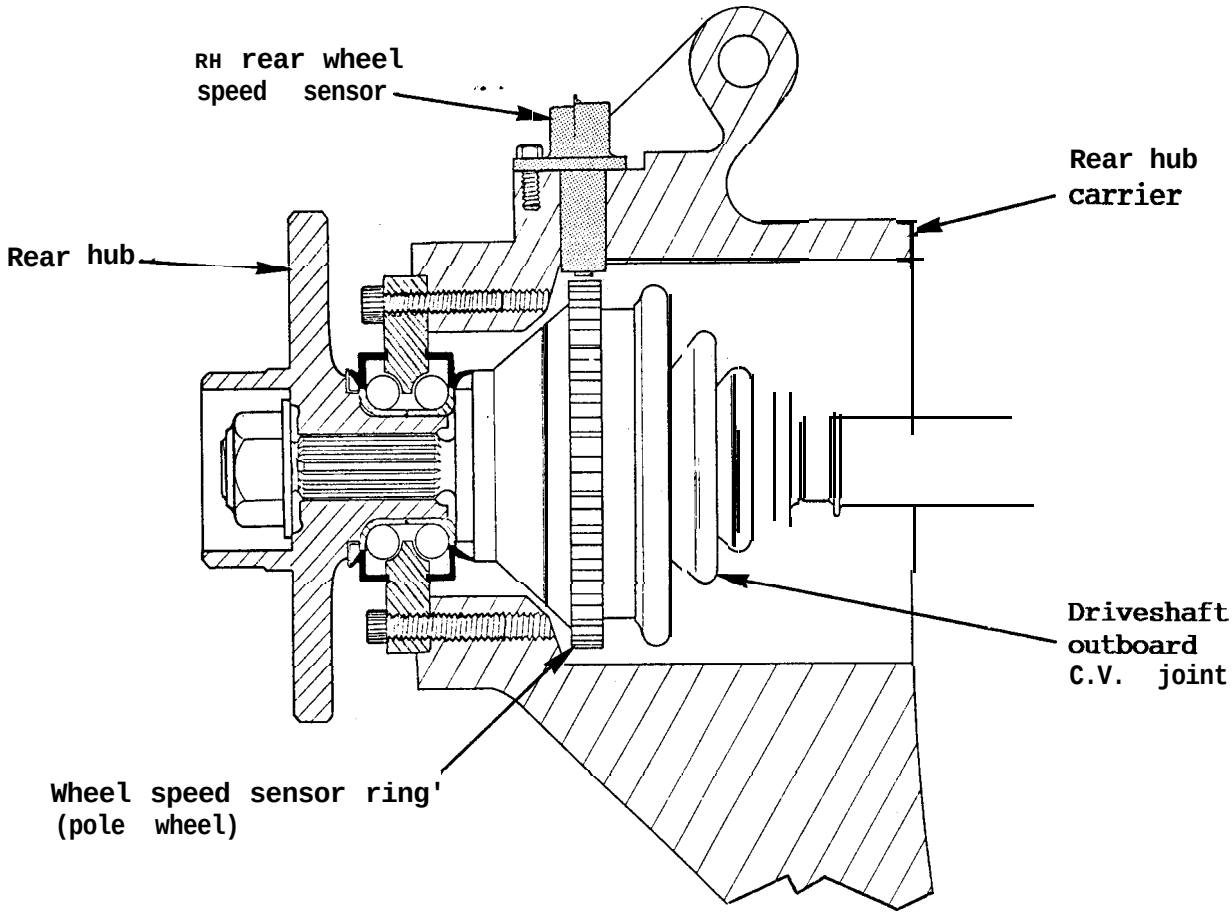
The pole wheel is pressed onto the hub, and must be removed if the brake disc is to be replaced. See section JF.11.

Rear Wheel Speed Sensors

The rear wheel speed sensors are mounted in the cast alloy rear suspension uprights, with the pole wheels pressed onto the outboard driveshaft C.V. joints.

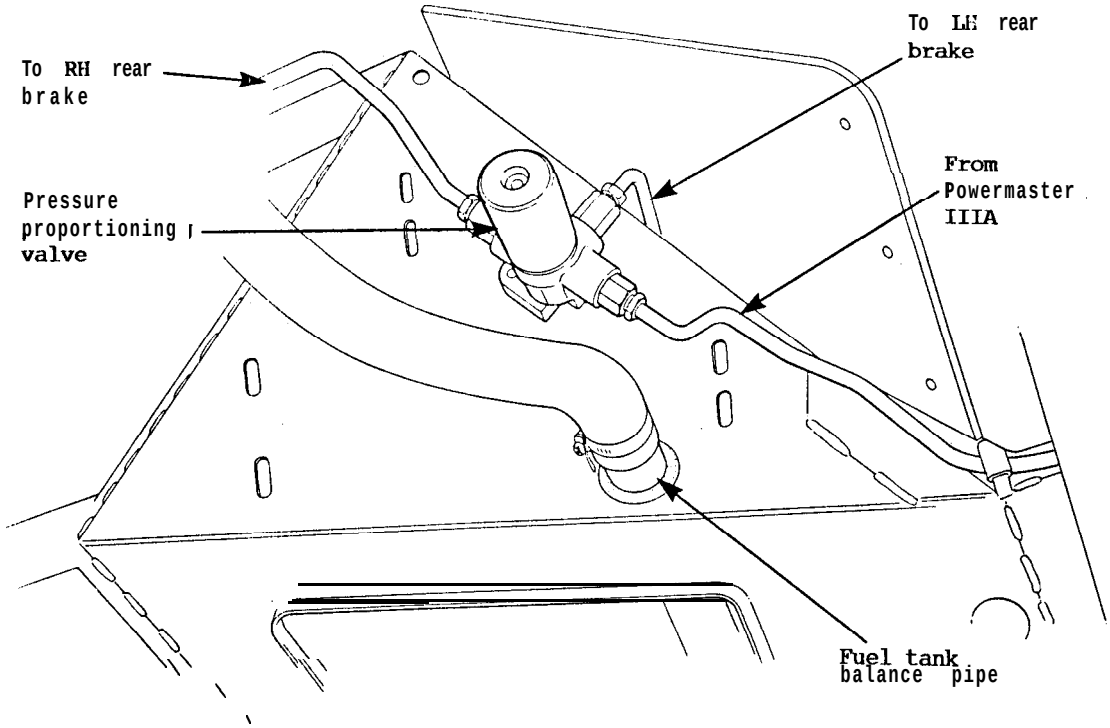
The gap between sensor tip and pole wheel should be 0.6 - 1.4 mm (0.024 - 0.055 in). There is no provision for adjustment, and if the gap is found to be outside specification, check for an incorrectly seated sensor, displaced pole wheel or faulty wheel bearings.

Note that on fuel injected cars, the right hand rear hub carrier also houses a vehicle speed sensor for the engine management system. The electrical connector on this sensor, has a vertical axis.



JF.20 • PROPORTIONING VALVE

The proportioning valve is fitted into the rear brake circuit at the right hand front of the engine bay, and under normal circumstances has no effect on the standard or anti-lock braking system. The purpose of the valve is to prevent over adjustment of the rear caliper parking brake mechanism if abnormally high



pressures are produced in the rear brake line, such as may occur if the pedal is vigourously pressed with the vehicle stationary (when the ABS does not operate to control pressures). The valve also serves to divide the supply into separate right and left hand circuits.

To replace the valve, use a 17 mm wrench to prevent the adaptors from turning whilst the brake pipe sleeve nuts are released. Use a shop towel to absorb any escaping fluid, and cap the pipe ends and valve ports immediately after disconnection. Release the valve fixing screw and remove the valve.

JF.21 - ABS CONTROLLER, RELAYS & FUSES

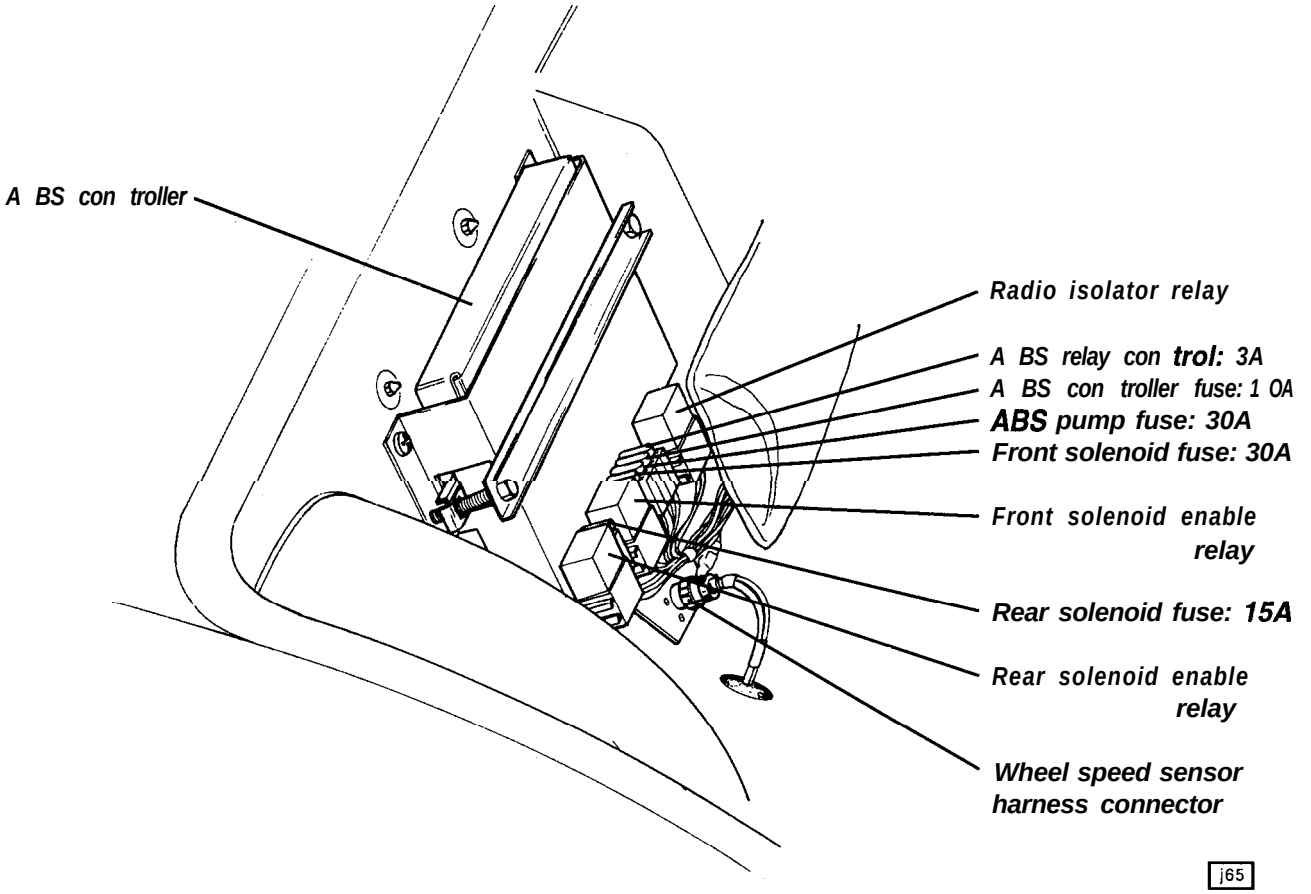
The ABS controller, or electronic control unit (ECM), is mounted on the passenger side front bulkhead in the front luggage compartment. The mounting bracket uses a clamping channel to secure the ECM to the bracket, and also carries a row of relays and fuses, and on pre 'revised harness' cars, the wheel speed sensor harness connector socket.

The relays are:
- radio isolator (only on pre 'revised harness' cars);
- front solenoid enable;
- rear solenoid enable.

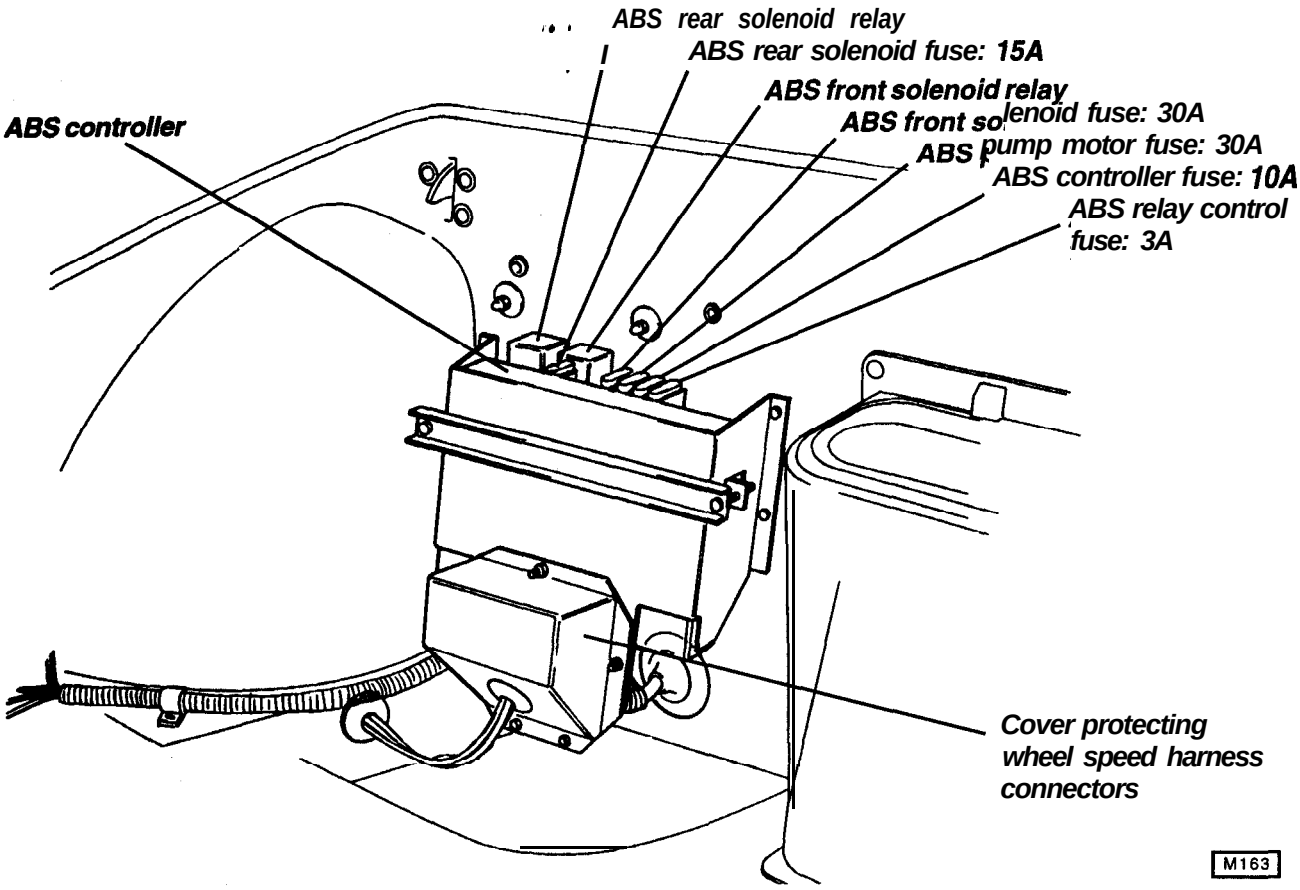
The fuses are:
- ABS relay control (3A)
- ABS controller fuse (10A)
- ABS pump fuse (30A)
- front solenoid fuse (30A)
- rear solenoid fuse (15A)

To remove the ABS controller, slacken the two clamping bolts, and slide the controller out of the bracket sufficiently to disconnect the electrical plug.

Early Cars: Passenger side front bulkhead

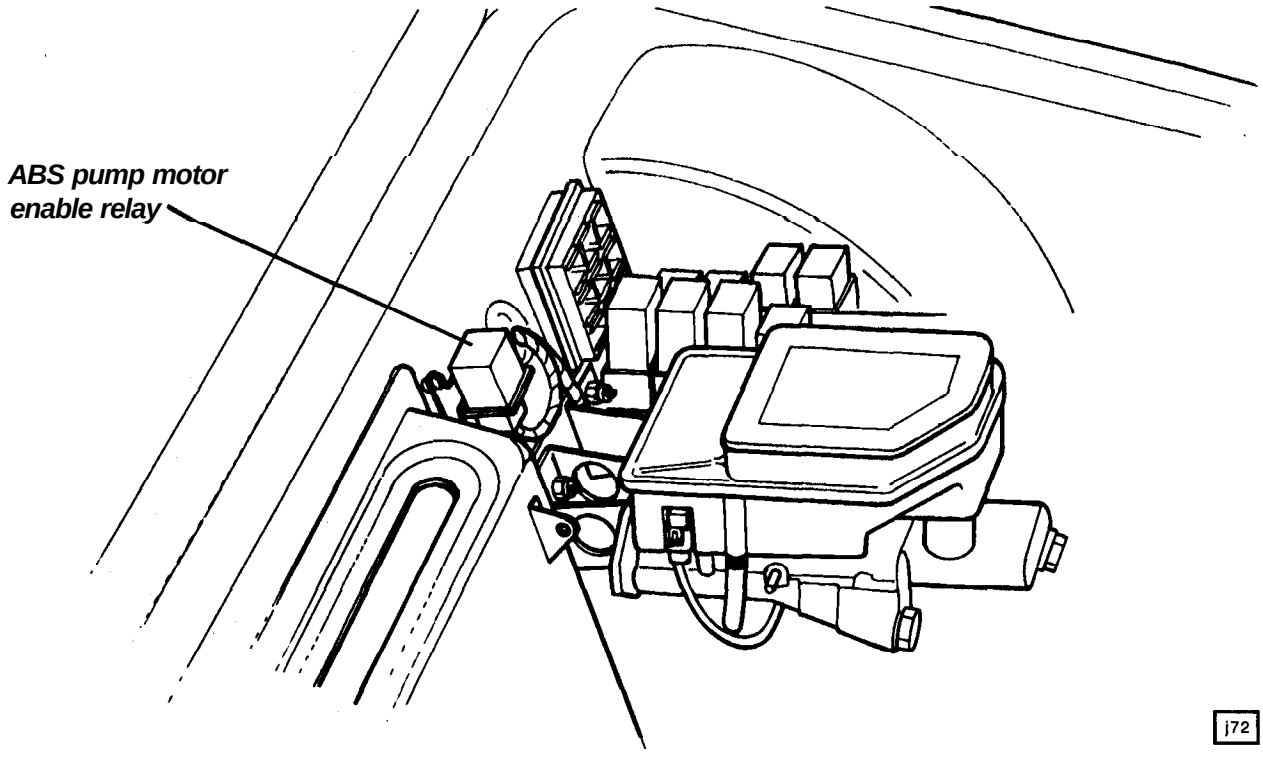


'Revised Harness' Cars: Passenger side front bulkhead



The ABS pump motor enable relay is fitted on the driver's side of the front bulkhead, adjacent to the main vehicle fusebox.

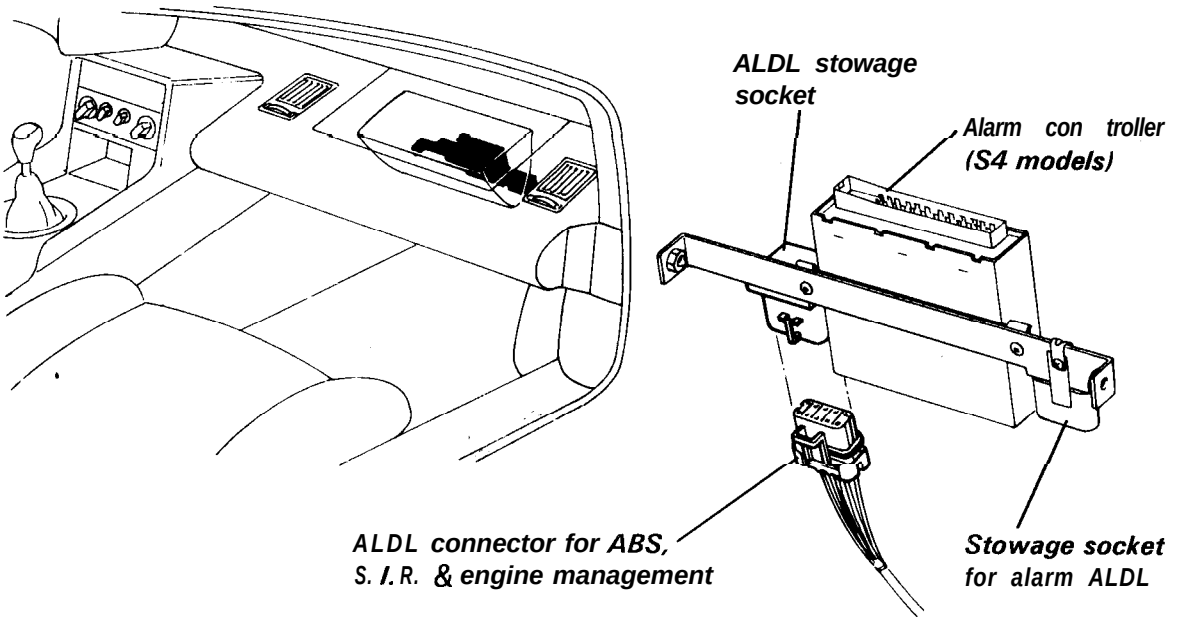
LHD shown (RHD sym. opposite)



Note that the lamp driver module (operates the ABS tell tale lamp) is taped to the fascia harness near to the wiper motor.

ALDL Connector

The Assembly Line Diagnostic Link (ALDL) connector is a ten way electrical connector plug which provides a means of communication between the ABS controller and electronic test/diagnostic equipment such as a 'Tech 1' scanner tool. The connector plug is attached to the fascia harness and is secured when not in use in a stowage socket on the inboard side of the back of the glovebox, or on S4 models to the alarm controller mounting bracket in the same area. This connector is also used for engine management diagnosis, and on cars so equipped, for S.I.R. (Supplementary Inflatable Restraint) diagnosis.



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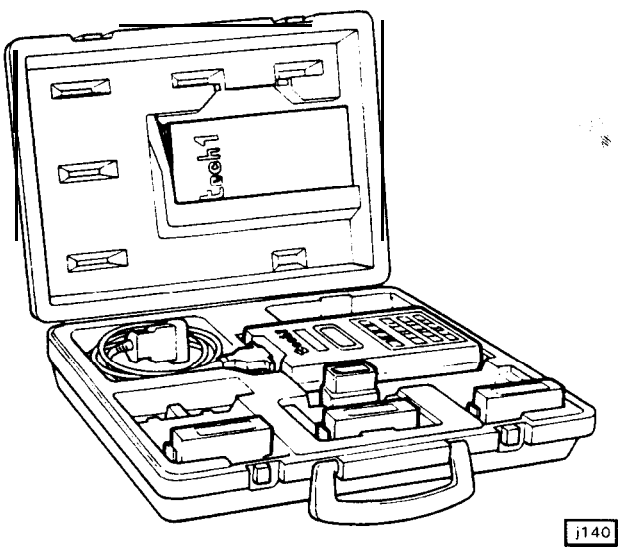
Note that on Esprit S4 models, a similar connector is located at the outboard end of the glovebox, and is used solely for diagnosis of the vehicle alarm system.

JF.22 - SPECIAL TOOLS

'Tech 1' Diagnostic Scanner Kit TOOOT0896

Plugs into ALDL connector and displays stored trouble codes and sensor readings. Kit includes scanner, connector lead, self-test adaptor, operator's manual and carrying case. Cartridge must be ordered separately.



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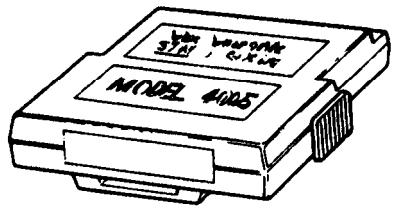
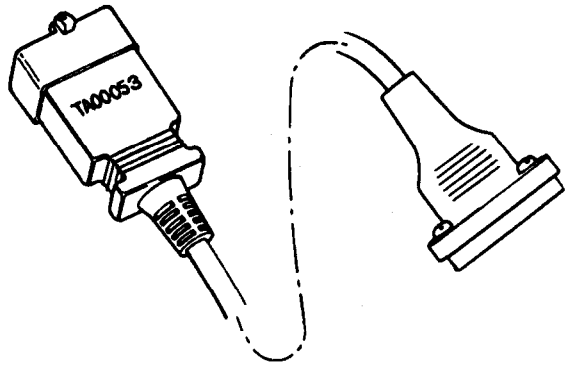
ARS **Cartridge.** 'Tech 1' scanner **T000T1115/1**

Plugs into Tech 1 scanner and contains data. . for Esprit ABS diagnostics.
Identified by 'LOTUS 1991 BRAKE' and 'Part Number **TK02380'** printed on the label.



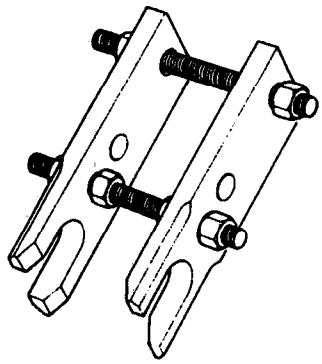
Connector Lead. **'Tech 1'** scanner **T000T0897/2**

Included in 'Tech 1' kit TOOOT0898.
Connects Tech 1 to ALDL socket.
The **/2** lead, which is also compatible with Elan models, is identified by 'TA00053' embossed in gold lettering on the ALDL end connector.



Rear Caliper Spreader T000T0556

Used to spread wings of carrier bracket when replacing rear caliper cylinder.



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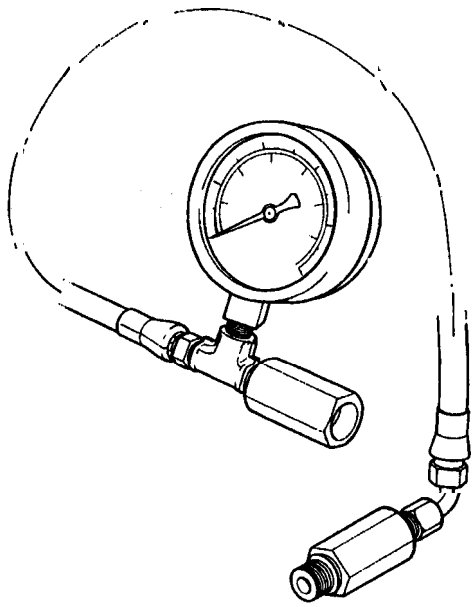
Pressure **Gauge T000T1** 112

Used in hydraulic diagnosis to test pump and accumulator and check for internal leakage in master cylinder/booster assembly.



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Section JF.25
DM- ABS IIIA
ANTILOCK BRAKE SYSTEM

Some operations in this section require that the hydraulic lines, hoses and Fittings be disconnected for inspection of testing purposes. This brake System uses a hydraulic accumulator which, when fully charged, contains Brake fluid at high pressure. Before disconnecting any hydraulic lines, hose or fittings, be sure that the accumulator is fully depressurized. Failure to depressurize the hydraulic accumulator may result in personal injury.

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TROUBLE CODE DIAGNOSIS

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Trouble Code Diagnosis

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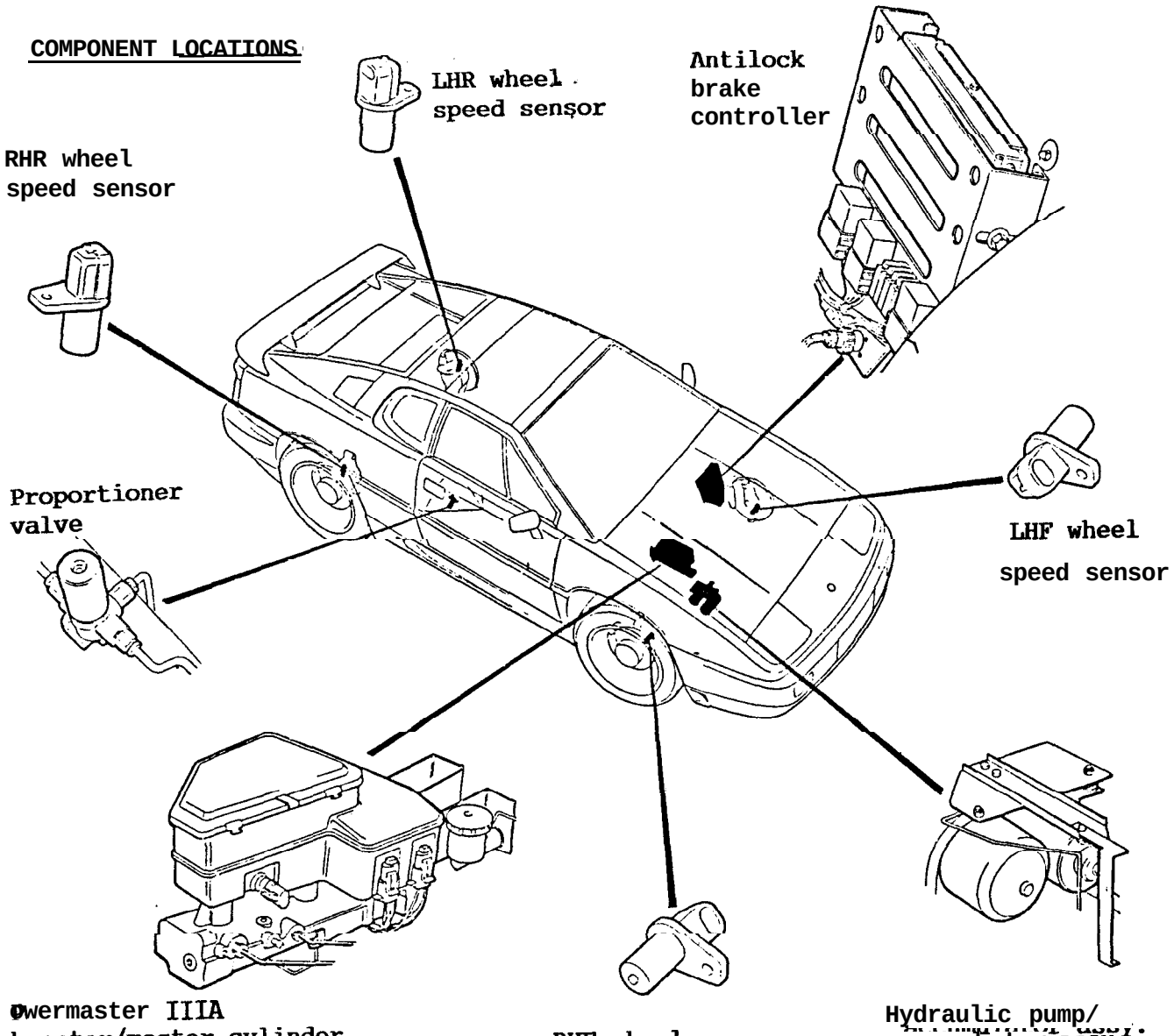
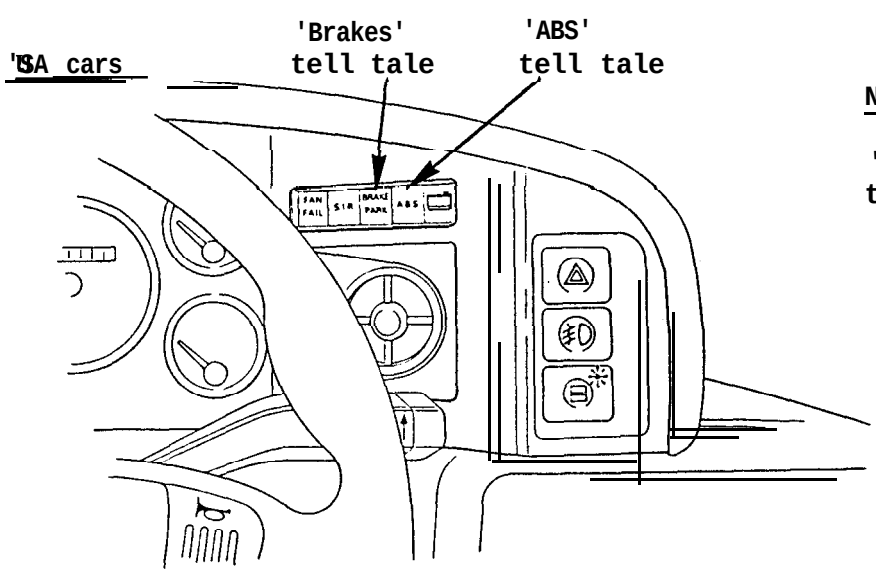
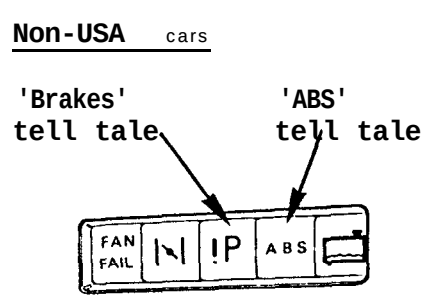
Trouble Code Diagnosis

COMPONENT LOCATIONS

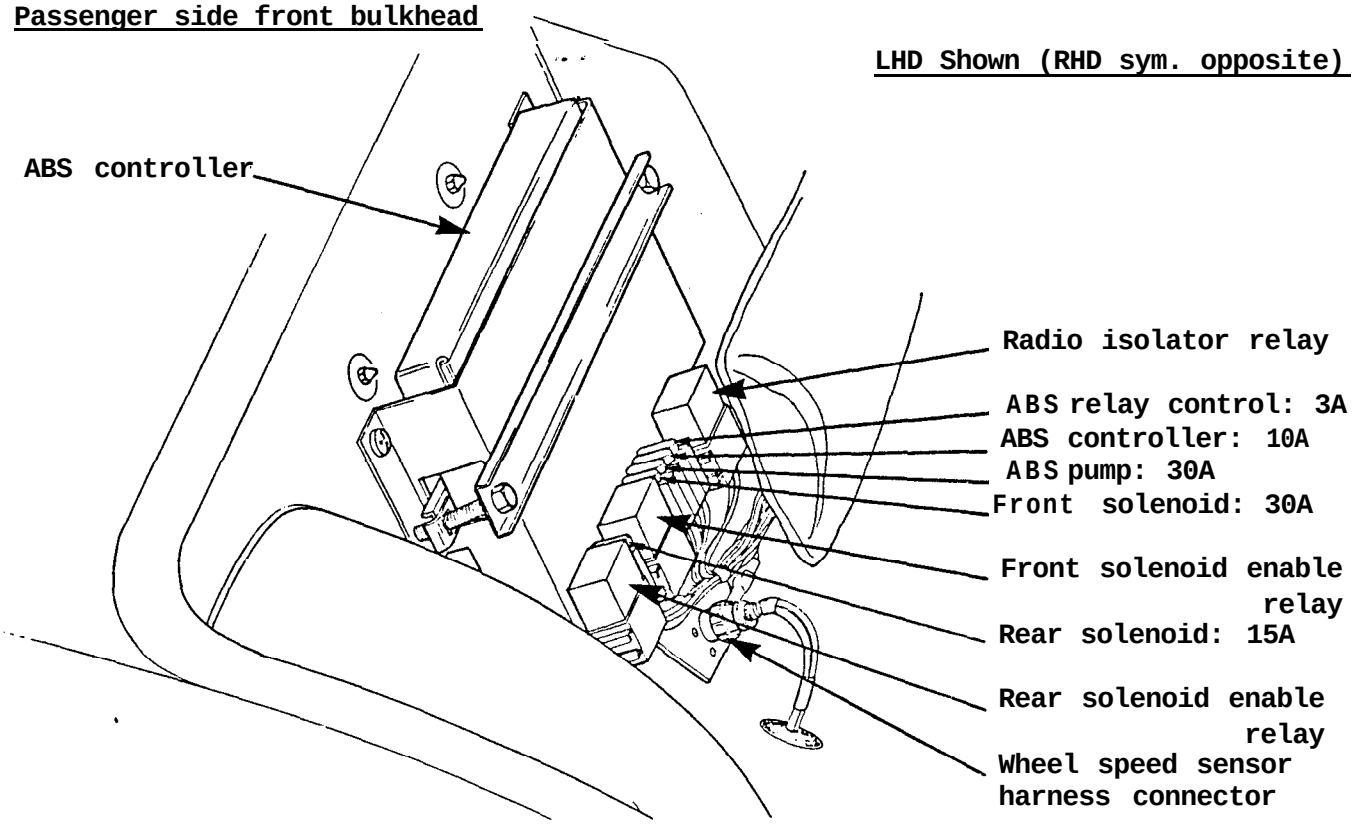






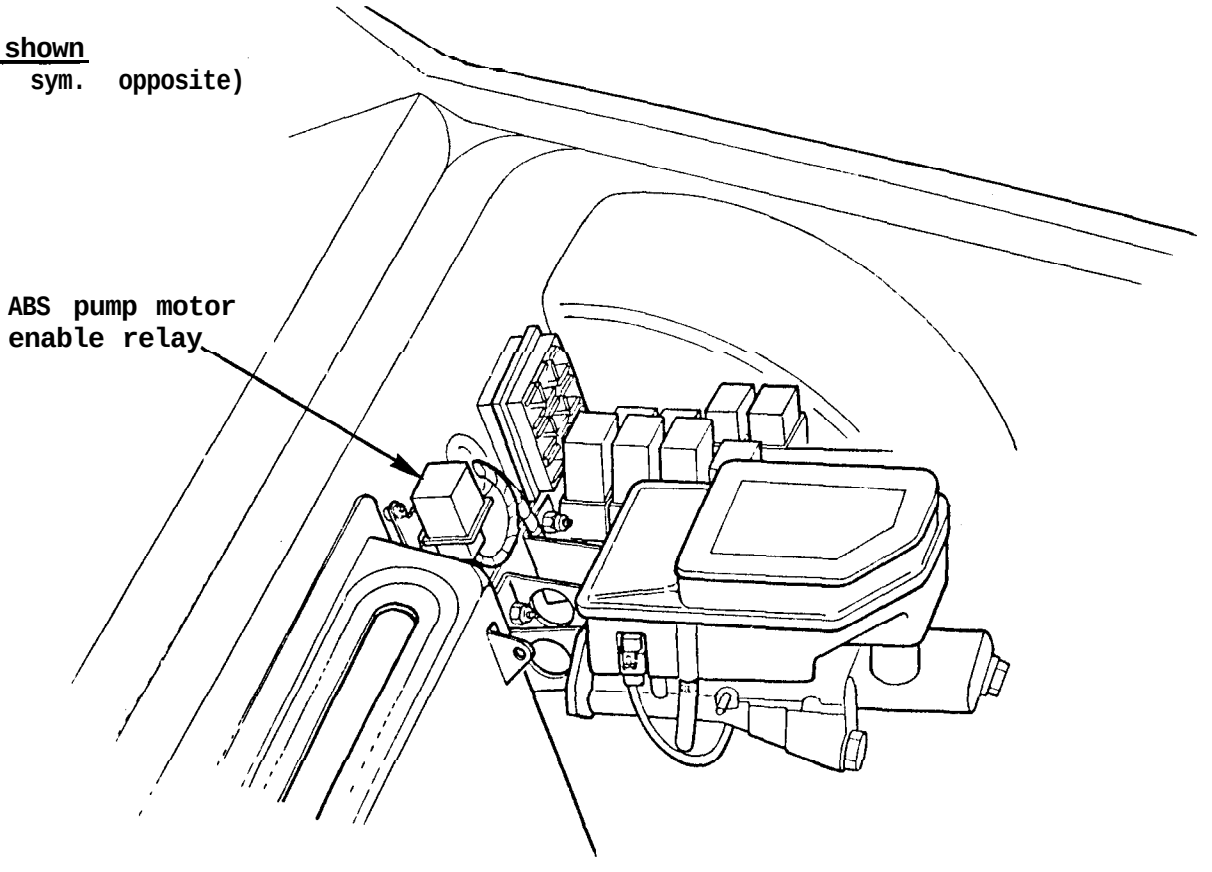
Passenger side front bulkhead

LHD Shown (RHD sym. opposite)



Driver's side front bulkhead

LHD shown
(RHD sym. opposite)



SYSTEM OPERATION

The Delco-Moraine Antilock Brake System (ABS) is designed to reduce the tendency of a wheel or wheels to lose traction (lockup) during braking. This results in improved vehicle braking performance by decreasing vehicle stopping distance, and assisting the driver in maintaining directional stability.

The ABS system accomplishes improved braking performance by: 1) Regulating the amount of braking force at any wheel to a value which will prevent locking. The ABS system prevents the wheels from losing traction and shortens stopping distance. A wheel which is rolling generally provides a shorter stopping distance than one which is sliding or skidding. 2) By keeping all four wheels at or near the same speed during braking, the ABS system helps the driver maintain directional stability.

It is important to remember that Antilock Brake Systems can improve braking performance, but cannot compensate for excessive speed, worn tires, worn brake components or driver error.

Under normal driving conditions, the Antilock Brake System does not operate; the vehicle uses its standard braking system. The Antilock Brake System will only operate when the ABS Controller detects an impending wheel lockup. The ABS Controller is able to detect this by monitoring the Brake Switch state and the four individual wheel speeds. When the brake pedal is depressed, the controller is alerted that the brakes have been applied and monitors each wheel speed. If the controller detects an impending wheel lockup or determines that a wheel or wheels are not decelerating equally, the controller will pulse the corresponding solenoids on and off rapidly. This activity can occur independently on each front wheel and on the rear wheel that begins to lock up first (select low). An ABS configuration of this type is commonly called a "Select Low 3-Channel System." When the solenoids are turned on and off, brake hydraulic pressure is applied or released at each wheel to equalize the individual wheel deceleration rates so that all the wheels are decelerating at the same speed or rate. When the Antilock Braking System is in operation, a clicking sound can be heard. This sound is the solenoids pulsing on and is a normal condition.

NOTICE: The -Antilock Brake System cannot increase the brake pressure above the master cylinder pressure applied by the driver and can never apply the brakes by itself.

CIRCUIT OPERATION

The Delco-Moraine Antilock Brake Electrical System consists of an ABS Controller, four 'wheel speed sensors, the Brake Switch, Pump Motor Relay, ABS Tell Tale, Brake Tell Tale, Accumulator Pressure Switch, a Front Enable and a Rear Enable Relay, one Rear Solenoid, two Front Solenoids, Serial Data Line, Lamp Driver Module and associated wiring. Refer to Figure 3 on page 14 for Electric Schematic Diagram.

ABS CONTROLLER

The ABS Controller is the central component in the Antilock Brake System. The controller's primary function is to monitor the speed of each wheel and determine if any wheel is approaching lockup during braking. If such a condition is detected, the controller will pulse the appropriate solenoids to adjust brake pressures for maximum stopping control without locking the wheels.

The ABS Brake Controller also monitors itself and other ABS components for malfunctions. If the controller detects a malfunction, it will store a trouble code in its memory and will warn the driver by turning on or flashing the ABS Tell Tale. The trouble code can later be accessed by the service technician using the TECH 1 connected to the ALDL-Plug.

FRONT ENABLE RELAY

During normal operation, the Front Enable Relay applies voltage to the front solenoids.

This occurs once the ABS Controller has completed the initialization cycle and has detected no faults in the ABS system. The controller will then energize the Front Enable Relay by grounding its coil. The relay contacts close and voltage is applied to the Front Solenoids from Fuse "E".

If during the initialization cycle or vehicle operation the controller detects a fault or loses power or ground, the controller will de-energize the Front Enable Relay by removing its ground. The ABS Tell Tale will light since it is grounded through the relay contacts.This is a failsafe feature to insure that the operator is warned that ABS has been disabled. It also prevents front solenoid operation by removing power to the solenoids in the event a solenoid is shorted to ground.

REAR ENABLE RELAY

The Rear Enable Relay operates in the same manner as the Front Enable Relay except that it applies voltage to the rear solenoids and will not ground the ABS Tell Tale when it is de-energized.

FRONT AND REAR SOLENOIDS

When the Enable Relays are energized, voltage is applied to the solenoids. If the solenoid controls are closed, ground is applied and the solenoids are energized. During an ABS stop, the controller pulses the solenoid controls on and off several times a second. This rapid cycling of the solenoids applies and releases brake pressure at the affected wheel, preventing lockup.

WHEEL SPEED SENSOR

The Wheel Speed Sensors generate an AC voltage as a magnetic toothed ring passes a stationary coil. The frequency of this AC voltage is used to determine the speed of each wheel. By comparing the wheel speeds during braking, the ABS Controller is able to determine if a wheel lockup is about to occur.

BRAKE SWITCH

When the brake pedal is depressed, the Brake Switch closes and voltage is applied to the brake apply input of the ABS Controller. This signals the controller that the brakes have been applied, and the controller will now activate ABS if it determines it is needed.

PUMP MOTOR CIRCUIT

The pump motor circuit consists of a Pump Motor, Pump Motor Relay, Accumulator Pressure Switch and ABS Controller. When the ignition is in RUN, voltage is,applied to the Pump Motor Relay coil from ABS fuse "A". If accumulator pressure drops below approximately 2200 PSI,the Accumulator Pressure Switch closes, grounding the Pump Motor Relay coil and energizing the relay. The relay contacts close, allowing voltage to be applied to the Pump Motor and the "Pump On Input" Terminal at the ABS Controller. The Pump Motor will continue to run until accumulator pressure reaches approximately 2700 PSI, when the accumulator switch contacts open causing the Pump Motor Relay to de-energize. The ABS Controller does not control the operation of the pump motor but does monitor the Pump motor circuit for proper operation by way of the Pump On Input. If the controller detects a problem in the Pump motor circuit such as excessively long pump run times or no pump runs after several brake applications, the controller will set a code and warn the driver.

ABS TELL TALE

A flashing ABS Tell Tale indicates that the system has been degraded by a malfunction but that the driver still has ABS capabilities. If the indicator is on all the time this signals the driver that the malfunction will not allow proper operation of the Antilock Brake System and that the controller has shut the system down, reverting to the vehicle's base brake system.

NOTICE: Prolonged vehicle operation with a flashing ABS tell tale may further damage the ABS system and may cause complete ABS system failure.

LAMP DRIVER MODULE

The Lamp Driver Module turns on the Brake Tell Tale when accumulator pressure falls below approximately 1800 PSI. The Lamp Driver Module is grounded at Terminal C through the accumulator switch. When accumulator pressure falls below approximately 1800 PSI the switch opens. The Lamp Driver Module senses the Accumulator Pressure Switch is no longer grounded, and turns on the Brake Tell Tale by grounding it.

SELF DIAGNOSTIC CAPABILITIES

The ABS Controller has diagnostic capabilities which allow it to detect malfunctions in itself or its related circuitry. The controller runs tests to detect malfunctions at different times during vehicle operation. For example, when the ignition is first turned to run, a clicking sound can be heard. This is the initialization cycle. At this time, the controller turns on the enable relays and cycles the solenoids to detect a malfunction within the relay circuitry. While the vehicle is operating, the ABS Controller is constantly monitoring and performing tests such as wheel speed data, state of the Accumulator Switch and the condition of the solenoids and relays. In the event the controller detects a malfunction, the controller will store a diagnostic code and notify the driver that a malfunction exists by turning on or flashing the ABS Tell Tale.

DIAGNOSIS

Diagnosis of an Antilock Brake System malfunction involves two basic steps. These steps must be followed in order to isolate the fault accurately, determine its cause, and repair the condition with the least amount of diagnostic time. The proper diagnostic procedure consists of a Pre-Diagnosis Inspection, followed by determining if any current trouble codes have been set in the ABS Controller's memory.

PRE-DIAGNOSIS INSPECTION

Pre-Diagnosis Inspection consists of a quick visual check of specific system components which could create an apparent ABS system malfunction. Performing this quick inspection of the system prior to diagnosing specific symptoms may result in isolation of a simple failure which may be the cause of an inoperative system. This should be the first step in analyzing a customer complaint. Refer to the chart on page 11 for the Pre-Diagnosis Inspection.

TROUBLE CODES

In the process of controlling the Antilock Brake System the ABS Controller continually monitors operating conditions for possible system malfunctions. By comparing system conditions against standard operating limits, certain circuit and component malfunctions can be detected. A four-digit numerical "Trouble Code" is stored in computer memory when a problem is detected by this self-diagnostic system.

These "Trouble Codes" can later be accessed by the service technician with the TECH **1.**

In order to access the trouble codes, connect the TECH 1 to the ALDL Connector and follow the TECH 1 manufacturer's instructions to read the codes. A current code indicates that the malfunction occurred during the current ignition cycle. History codes are malfunctions which do not currently exist but could possibly aid in determining the cause of an intermittent condition.

After the trouble codes have been read, proceed to the appropriate trouble code diagnosis

NOTE: Always turn off the Ignition prior to initial troubleshooting to ensure all diagnostic data is preserved. If the ignition is not turned off prior to reading fault codes, any information stored for a fault in the last drive cycle will be lost.

ADDITIONAL DIAGNOSTIC CAPABILITIES

In addition to being able to set troubles codes, the ABS Controller is equipped with a sophisticated on-board diagnostic system. The on-board diagnostic system, when accessed with the TECH **1,** is designed to aid the service technician in identifying the source of a fault as specifically as possible and whether or not the fault is intermittent. Refer to the Figure 2 on page 12 for the TECH 1 ABS Data List.

ABS SNAPSHOT

The ABS snapshot feature can be used to identify deviations in data which may cause a trouble code to set intermittently. The snapshot feature will store the ABS data list parameters for a period of time before, during and after a trigger. A trigger can be set to take a snapshot for any ABS code, a specific ABS code or at your command. Refer to the TECH 1 instructions on how to utilize this feature.

MANUAL RELAY AND SOLENOID CONTROL

This feature allows the front and rear enable relays and the individual hold and release solenoids to be commanded on or off and will also display the actual output or voltage level (HI or LO) at that particular terminal on the TECH 1. The solenoids can only be commanded on for a 60 second period. After this period the solenoids will automatically be turned off to cool, Refer to the TECH **1** instructions on how to utilize this feature.

ENHANCED DIAGNOSTICS (TECH 1 MODE:F1: CODE HISTORY)

This feature can be used to determine if a trouble code is intermittent, identify how intermittent the trouble code is and give information regarding vehicle operating conditions when the most recent trouble code was set. The enhanced diagnostic feature will display the following information when accessed.

- The first five (5) trouble codes that occurred in the order in which they occurred.This information can be used to identify situations where the conditions explain the occurrence of a later fault. An example is an intermittent wheel speed sensor which fails code AO48, then further degrades such that no signal is present and now fails code A044.
- How often each of the first five (5) trouble codes have occurred. This information identifies intermittent fault conditions and the degree of intermittence. If a trouble code , sets **1** out of 35 drive cycles, an unusual condition may have been encountered, such as a severe pot hole, that caused the fault. Up front, you know special diagnosis techniques are needed to identify the cause. if the trouble code occurred 10 out of 15 drive cycles, your chances of identifying the fault are much greater and recreation is probably much easier. Again, you know this before any attempt is made to identify the cause. If the trouble code occurs every drive cycle, the fault is "HARD" or easy to duplicate. Diagnosis should be easier.
- The last trouble code that set is identified specifically. This trouble code is what brought the customer in for repair. Additionally, the following information identifies what was happening when the last trouble code set.

  The speed the ABS controller believes the vehicle was going at the time the fault occurred. An unreasonable number here may lead you to suspect wheel speed sensor problems.

  The state of the brake switch at the time of the trouble code sets (ON, OFF or OPEN). This will identify if any braking was being done when the fault occurred.

NOTICE: Only the state of the brake switch is known. The brake pedal may have simply been depressed or shorted, and no actual vehicle deceleration was occurring.

The status of the system brake pressure. If the system pressure was LOW, a leak may exist **or** a pump problem may exist that adversely affects the braking performance of the system.

Whether or not the brake had been depressed this ignition cycle. If the brake switch circuit was OPEN, no brake input will be seen. Also, many drivers do not depress the brake when starting the car but do prior to putting the car in gear. If no brake input was seen prior to the fault and the brake switch circuit is ON or OFF, this information tells you the fault was probably detected shortly after the ignition switch was turned on.

Whether or not an ABS stop was in progress when the fault occurred. This may point to a fault caused by additional stresses or vibration the vehicle encountered when in the ABS stop.

How many drive cycles (a drive cycle occurs when the ignition is on and vehicle is driven faster than 10 MPH) since the last trouble code set. If zero (0) drive cycles have occurred, the customer drove in with the fault detected (ABS Warning Light probably flashing or on continuously). If five (5) drive cycles have occurred, no fault was present when the vehicle arrived for service. If no fault has occurred for 40 drive cycles, and only occurred once based on the intermittent information, the fault may have occurred under unusual circumstances and a true "fault" may not exist,

NOTE: If no ABS trouble codes have been set for 50 drive cycles, the ABS controller will clear itself of all fault information.

NOTE ON INTERMITTENTS

The diagnostic procedures in this section may or may not be helpful in determining the cause -of intermittent problems in the Antilock Brake System electrical components. In most cases, the fault must be present to locate the problem effectively using the trouble trees.

Most intermittent problems are caused by faulty electrical connections or wiring. When an intermittent failure is encountered:

- Check for history codes which may be stored in the ABS Controller. If a history code is stored this may indicate the circuitry which has the intermittent condition. Move the related connectors, harness and components in an effort to induce the failure.
- Enter the Enhanced Diagnostic feature. This feature will help determine how intermittent the fault is and may help you determine certain conditions that cause the fault to occur.
- Set the ABS snapshot to trigger on the intermittent trouble code and use the enhanced diagnostic feature to recreate the conditions that may cause the intermittent code to set. Review the ABS snapshot data to determine the cause of trigger.
- Check for poor mating of connector halves or terminals not fully seated in the connector body (backed out).
- Utilize the TECH 1 snapshot data while manipulating wiring and connectors. Observe the data parameters sudden changes.
- Check for improperly formed or damaged terminals. All connector terminals in a problem circuit should be carefully reformed to increase contact tension.
- Check for poor terminal to wire connection. This requires removing the terminal from the connector body to inspect.

ANTILOCK BRAKE SYSTEM SERVICE PRECAUTIONS

The Antilock Brake System is designed to withstand normal current draws associated with vehicle operation. However, care must be taken to avoid overloading any of these circuits. In testing for opens and shorts, do not ground or apply voltage to any of the circuits unless instructed to do so by the diagnostic procedures. These circuits should only be tested using a High Impedance Multimeter if they remain connected to the Antilock Brake Controller. Power should never be removed or applied to the controller with the key in the RUN position. Before removing or connecting battery cables, fuses or connectors always turn the ignition to the LOCK position.

Some operations in this section require that hydraulic lines, hoses and fittings be disconnected for inspection or testing purposes. This brake system uses a hydraulic accumulator which, when fully charged, contains brake fluid at high pressure. **Before disconnecting any hydraulic lines, hoses or fittings, be sure that the accumulator is fully depressurized. Failure to depressurize the hydraulic accumulator may result in personal injury.**

ANTILOCK BRAKE SYSTEM DIAGNOSTICS CAN NOT BE ENTERED

If the ABS Tell Tale is lit but diagnostics cannot be entered with the TECH **1,** proceed to the diagnosis on page 16. This condition indicates that the ABS Controller has lost power, ground or the serial data line.

PRE-DIAGNOSIS INSPECTION		
ITEM	**INSPECT FOR:**	**CORRECTIVE ACTION**
BRAKE FLUID RESERVOIR, HYDRAULIC PUMP/ACCUMULATOR POWER MASTER III A ASSEMBLY, BRAKE CALIPERS AND BRAKE HOSES AND LINES	– LOW BRAKE FLUID LEVEL – EXTERNAL LEAKS – BINDING OR STICKING CALIPERS	– FILL RESERVOIR – REPAIR LEAKS AS REQUIRED – REPAIR AS NEEDED
PARKING BRAKE	– FULL RELEASE	– RELEASE PARKING BRAKE – ADJUST CABLE IF REQUIRED
BATTERY	– ADEQUATE CHARGE	– CHARGE OR REPLACE BATTERY AS REQUIRED – SERVICE CHARGING SYSTEM AS REQUIRED
FUSES • ABS FUSE "A" 3 AMP • STOP FUSE "C" 15 AMP . TALE FUSE "B" 5 AMP . CONTROLLER FUSE "G" 10 AMP . REAR ENABLE RELAY FUSE "D" 15AMP . PUMP MOTOR RELAY FUSE "F" 30 AMP . FRONT ENABLE RELAY FUSE "E" 30 AMP	– BLOWN FUSE	– REPLACE FUSE AND VERIFY OPERATION
CONNECTORS • ABS CONTROLLER . PUMP MOTOR RELAY . PUMP MOTOR . ACCUMULATOR PRESSURE SWITCH . REAR ENABLE RELAY . FRONT ENABLE RELAY . RIGHT FRONT SOLENOID . LEFT FRONT SOLENOID • REAR SOLENOID . WHEEL SPEED SENSORS • LAMP DRIVER MODULE . DIODE	– PROPER ENGAGEMENT OF CONNECTOR – LOOSE WIRES IN CONNECTOR	– PROPERLY ENGAGE CONNECTORS – REPAIR LOOSE WIRES
GROUND J2-A, J2-B	– CLEAN AND TIGHT CONNECTION	– TIGHTEN – REPAIR LOOSE WIRES
TELL TALES OPERATIONAL DURING BULB TEST . ABS TELL TALE • BRAKE TELL TALE	– ILLUMINATED DURING ENGINE CRANKING	– CHECK CONNECTIONS – REPLACE BULB AND VERIFY OPERATION

Figure 1 - Pre-Diagnosis Inspection

IGNITION "ON" / ENGINE "OFF" / INITIALIZATION MODE FINISHED

TECH 1 ABS DATA LIST		
TECH 1 POSTION	**UNITS DISPLAYED**	**TYPICAL DATA VALUE**
FRONT WHL SPEEDS	MPH or KPH	0 MPH (Standing vehicle)
REAR WHL SPEEDS	MPH or KPH	0 MPH (Standing vehicle)
VEHICLE SPEED	MPH or KPH	0 MPH (Standing vehicle)
BRAKE FUSE INPUT	LOW / HIGH /CIRCUIT OPEN	HIGH
ABS BATT VOLTAGE	VOLTS	> 11.0 Volts
ABS BATT VOLTAGE	OK FOR OPER / LOW	OK FOR OPER
ABS WARNING LITE	OFF / ON/FLASHING	OFF
BRAKES AVAILABLE	ANTI-LOCK/BASE BRAKES ONLY/REAR ABS ONLY	ANTI-LOCK
BRAKE SWITCH	ON /OFF/CIRCUIT OPEN	OFF (Brake Pedal not depressed) ON (Brake Pedal depressed)
PUMP MOTOR	ON / OFF/CIRCUIT OPEN	OFF
BRAKE PRESSURE	OK (> 1800 PSI) CIRCUIT OPEN LOW (< 1800 PSI)	OK (> 1800 PSI)
FRT ENABLE RELAY	ON / OFF	ON
REAR ENABL RELAY	ON / OFF	ON
LF HOLD SOLENOID	ON /OFF	OFF
LF HOLD SOL FDBK	HIGH / LOW	HIGH
LF RELEASE SOL	ON / OFF	OFF
LF REL SOL FDBK	HIGH / LOW	HIGH
RF HOLD SOLENOID	ON / OFF	OFF
RF HOLD SOL FDBK	HIGH / LOW	HIGH
RF RELEASE SOL	ON / OFF	OFF
RF REL SOL FDBK	HIGH / LOW	HIGH
REAR HOLD SOL	ON/OFF	OFF
REAR HOLD SOL FB	HIGH / LOW	HIGH
REAR RELEASE SOL	ON/OFF	OFF
REAR REL SOL FB	HIGH / LOW	HIGH

Figure 2 - TECH 1 ABS Data List

NOTICE:

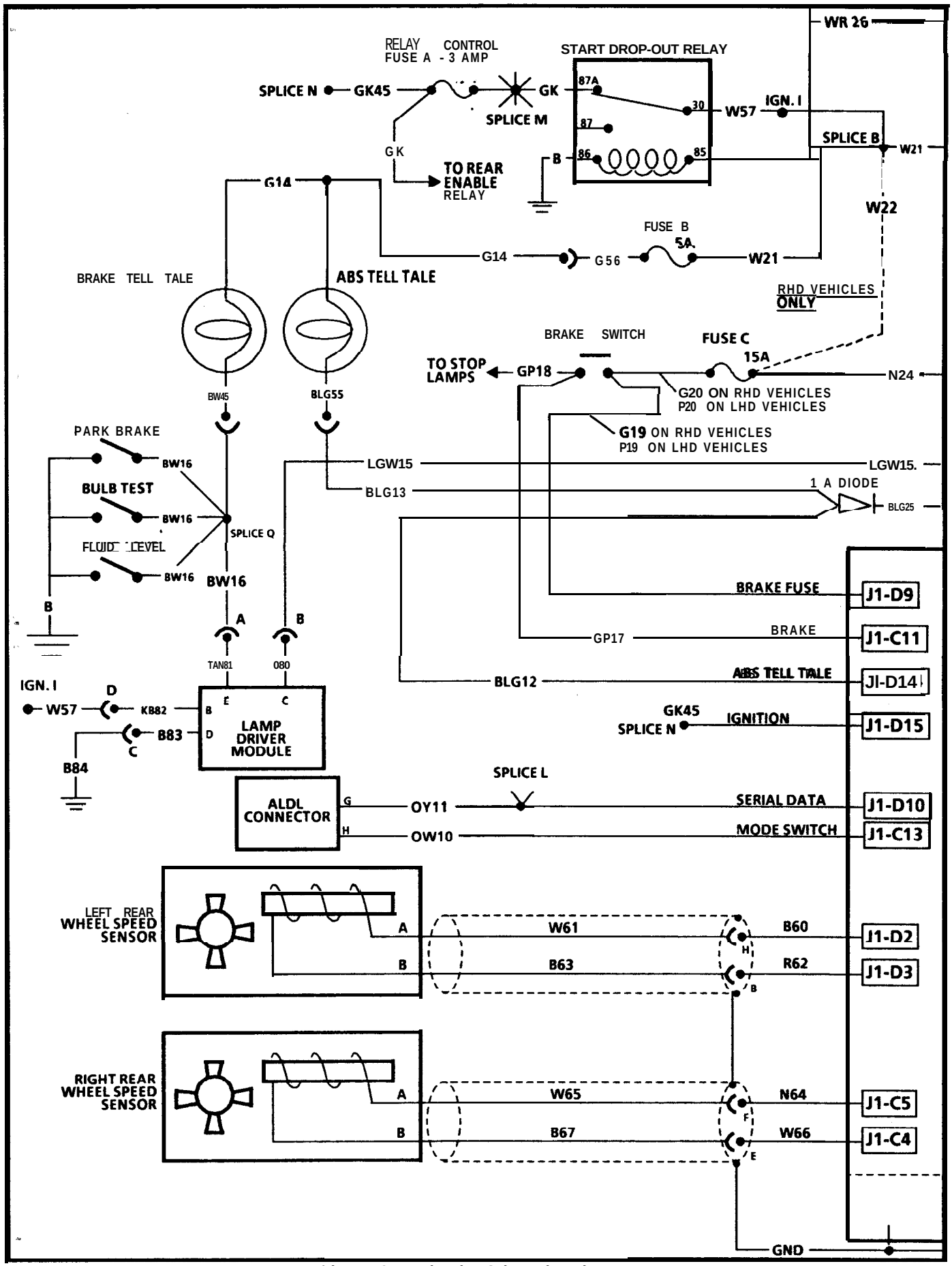


Figure 3 - Electric Schematic Diagram

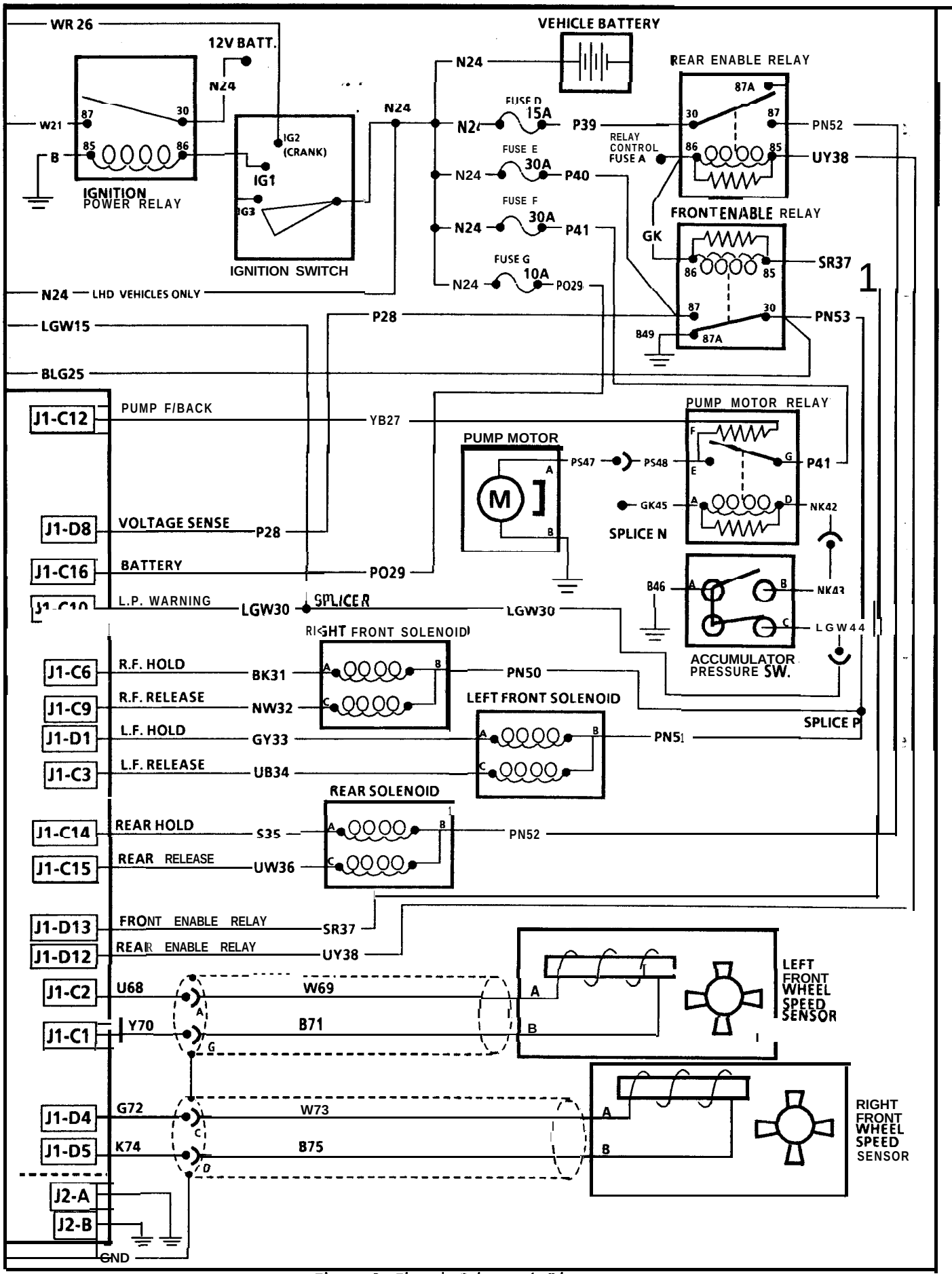
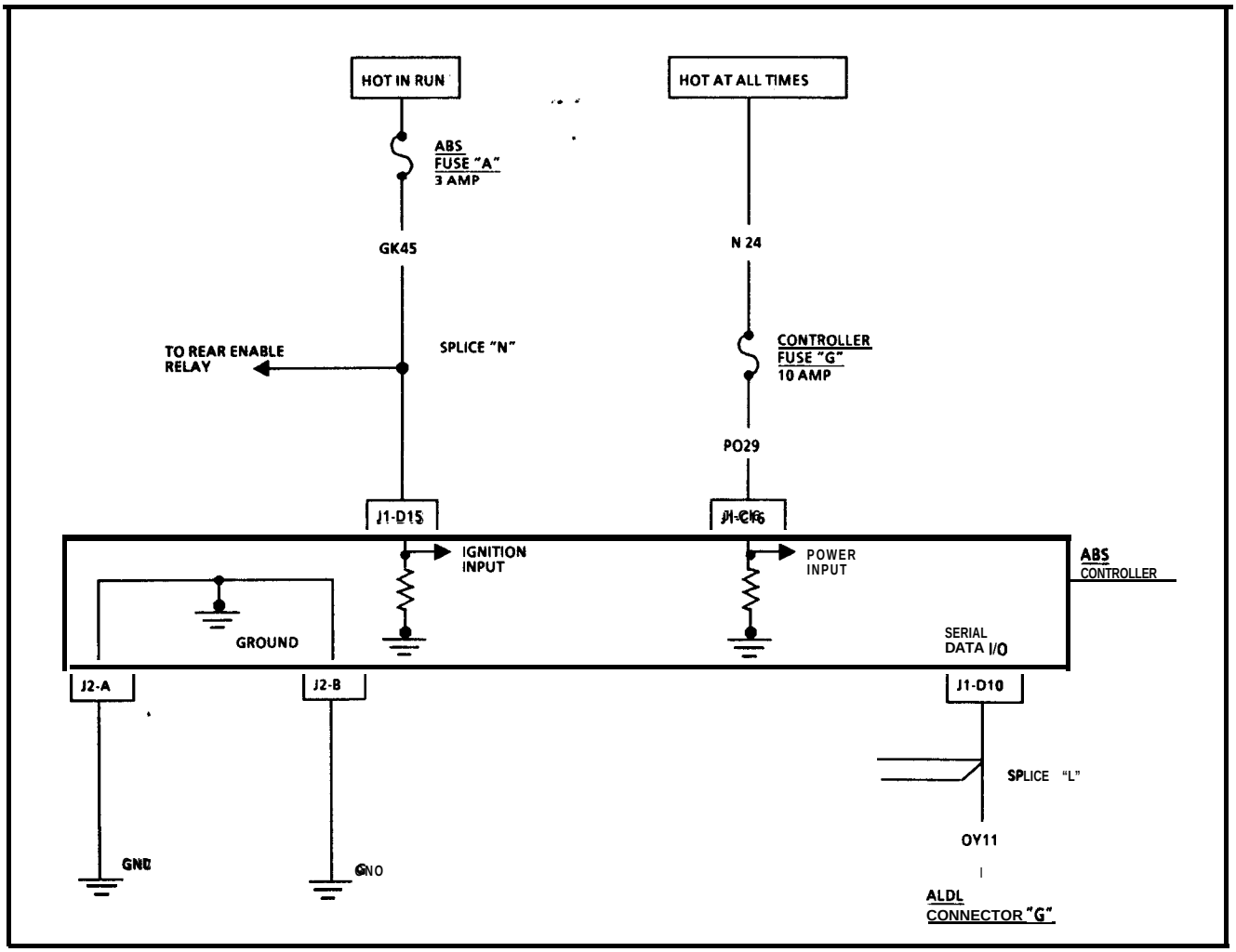


Figure 3 - Electric Schematic Diagram



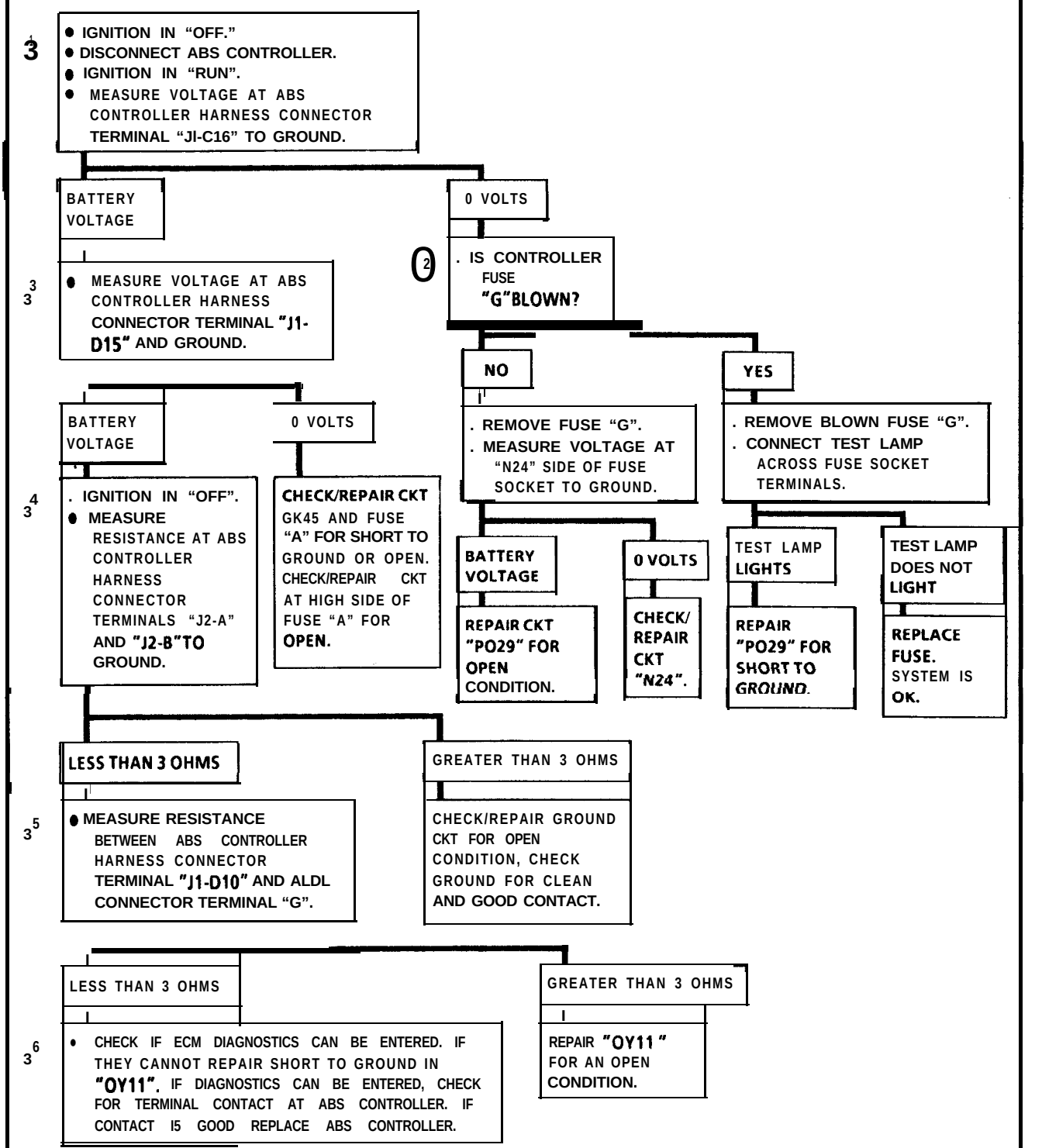
ANTILOCK BRAKE SYSTEM DIAGNOSTICS CANNOT BE ENTERED

The Antilock Brake System will be disabled and the ABS Tell Tale will be on if a loss of power or ground occurs at the ABS Controller. A loss of power or ground at the controller or an open or shorted serial data line will also prevent access to the Antilock Brake System's diagnostics.

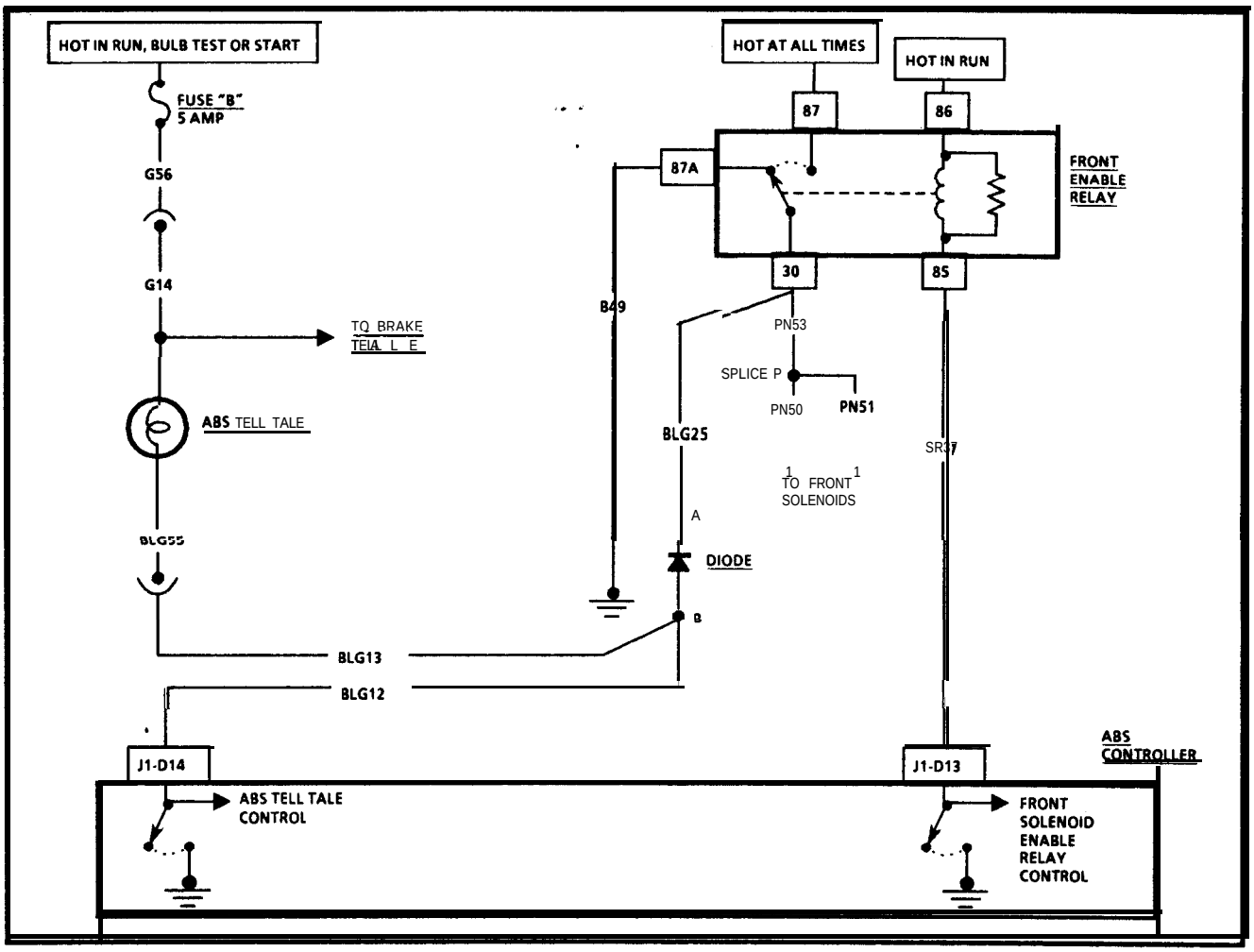
Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Determines if voltage is being applied to the ABS Controller at Terminal J1-C16.
2. Indicates whether the fault is due to open condition or a possible short to ground in PO 29.
3. Determines if voltage is being applied to ABS Controller at Terminal Jl-D15.
4. A measurement of greater than 3 ohms indicates an open condition in the ABS Controller's ground circuits.
5. A measurement of greater than 3 ohms indicates an open condition exists in the data line OY11. If an open condition exists in the data line, the controller would be unable to communicate with the TECH 1.
6. If a short to ground existed in OY11, communication with the ECM would not be possible. If communication with the ECM is possible, a poor terminal connection at the ABS Controller is indicated or the controller is defective.

ANTILOCK BRAKE SYSTEM DIAGNOSTICS CANNOT BE ENTERED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A001

ABS TELL TALE OPEN OR SHORTED TO GROUND

When the Front Enable Relay is energized, its contacts close. This opens the ground path from the ABS Tell Tale. Voltage from Fuse "B" should now be present at terminal **"J1-D14"**.

CODE A001 will set when all of the following conditions exist:

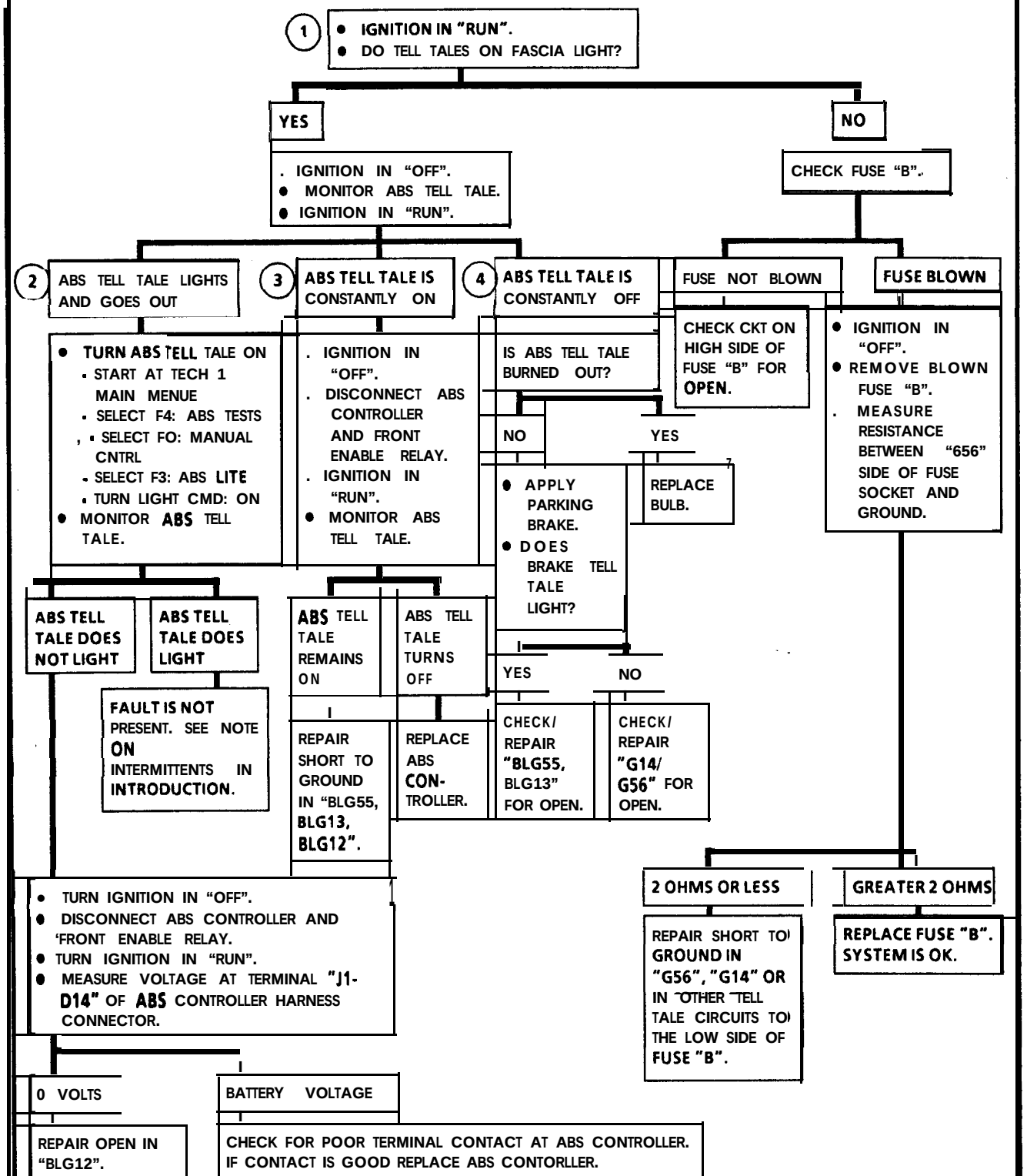
- The Front Enable Relay is energized.
- The ABS Tell Tale Control is open.
- The ABS Controller senses no voltage at terminal "Jl-D14".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

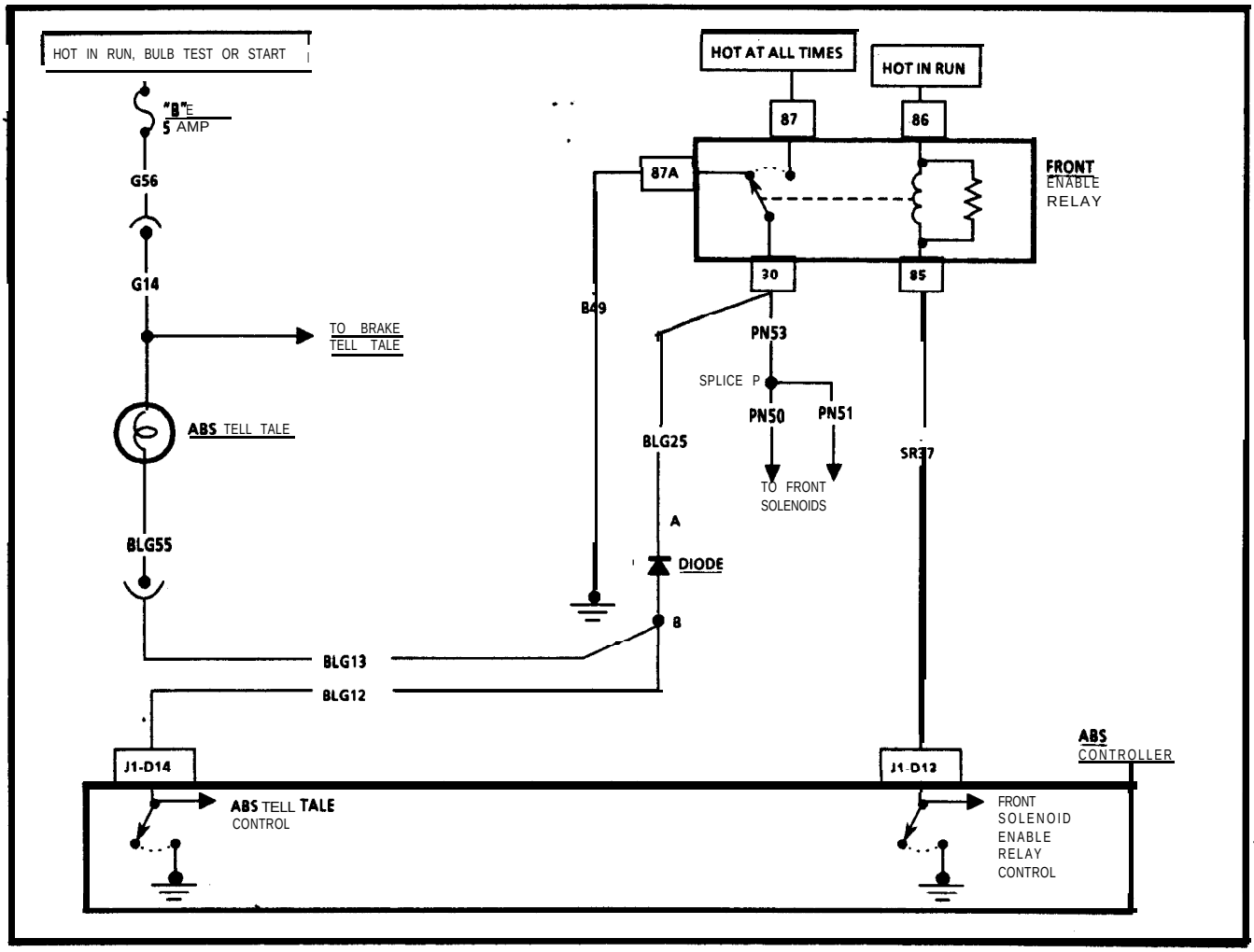
1. If the ABS Tell Tale lights, the circuit to Fuse "B" is good.
2. If the ABS Tell Tale lights and goes out, an open circuit **"BLG12"** or an intermittent fault exists.
3. If the ABS Tell Tale is constantly on, a short to ground in circuits "BLG55, **BLG13, BLG12"** or an internal ABS Controller fault exists.
4. If the ABS Tell Tale is constantly off, an open condition in "BLG55, **BLG13",** or **"G14/G56",** or a burned out bulb is the failure.

CODE A001

ABS TELL TALE OPEN OR SHORTED TO GROUND



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE.
NHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A002

ABS TELL TALE SHORTED TO BATTERY OR DIODE SHORTED

The Diode prevents battery voltage from being applied to the ABS Tell Tale when the Front Enable Relay is energized. If the ABS Controller is inoperative, the Diode allows the ABS Tell Tale to be grounded through the deenergized Front Enable Relay.

CODE A002 will set during system initialization when all of the following conditions exist:

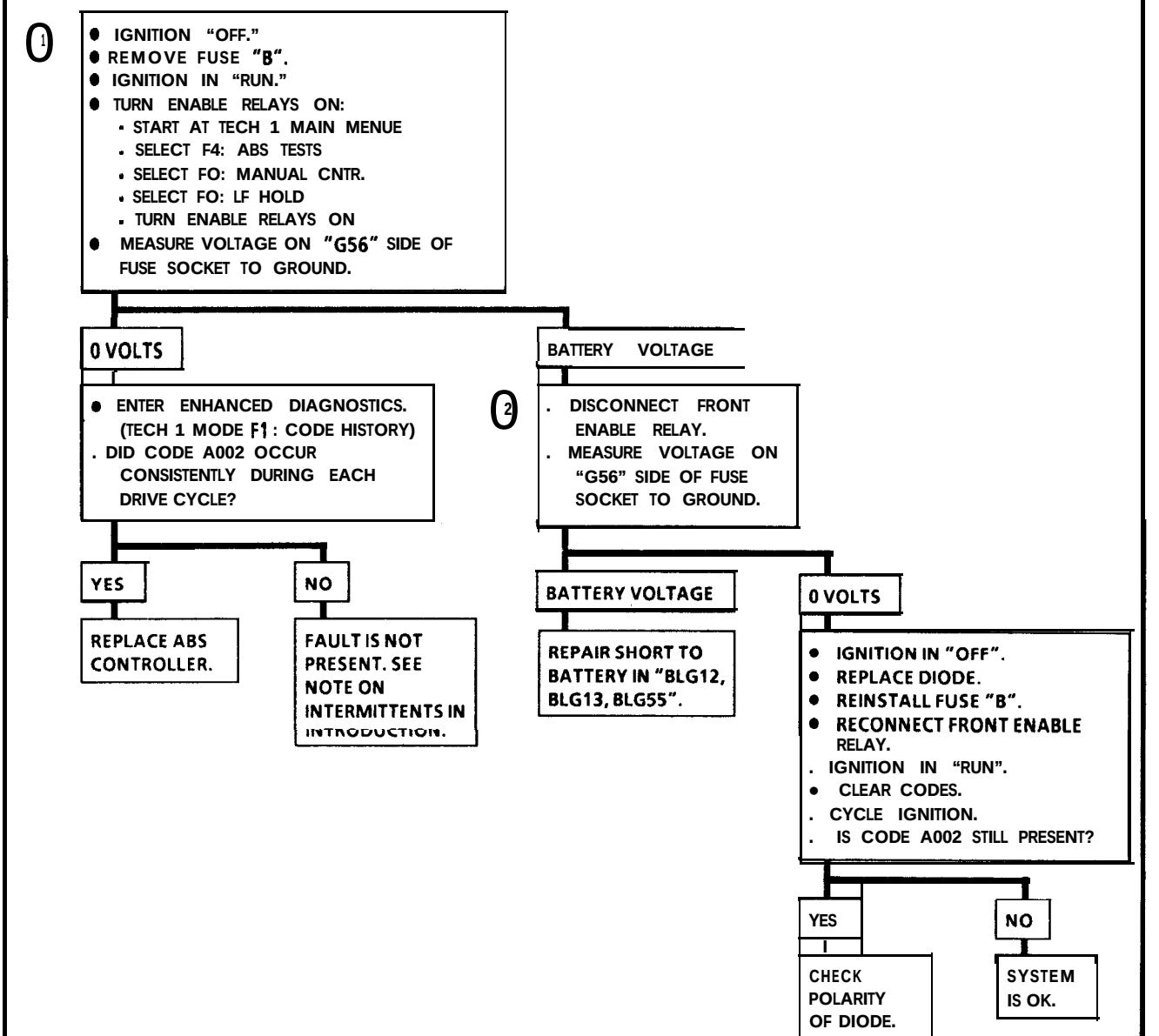
- The Front Enable Relay is energized.
- The ABS Tell Tale Control is closed.
- The ABS Controller senses battery voltage at terminal "Jl-D14".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

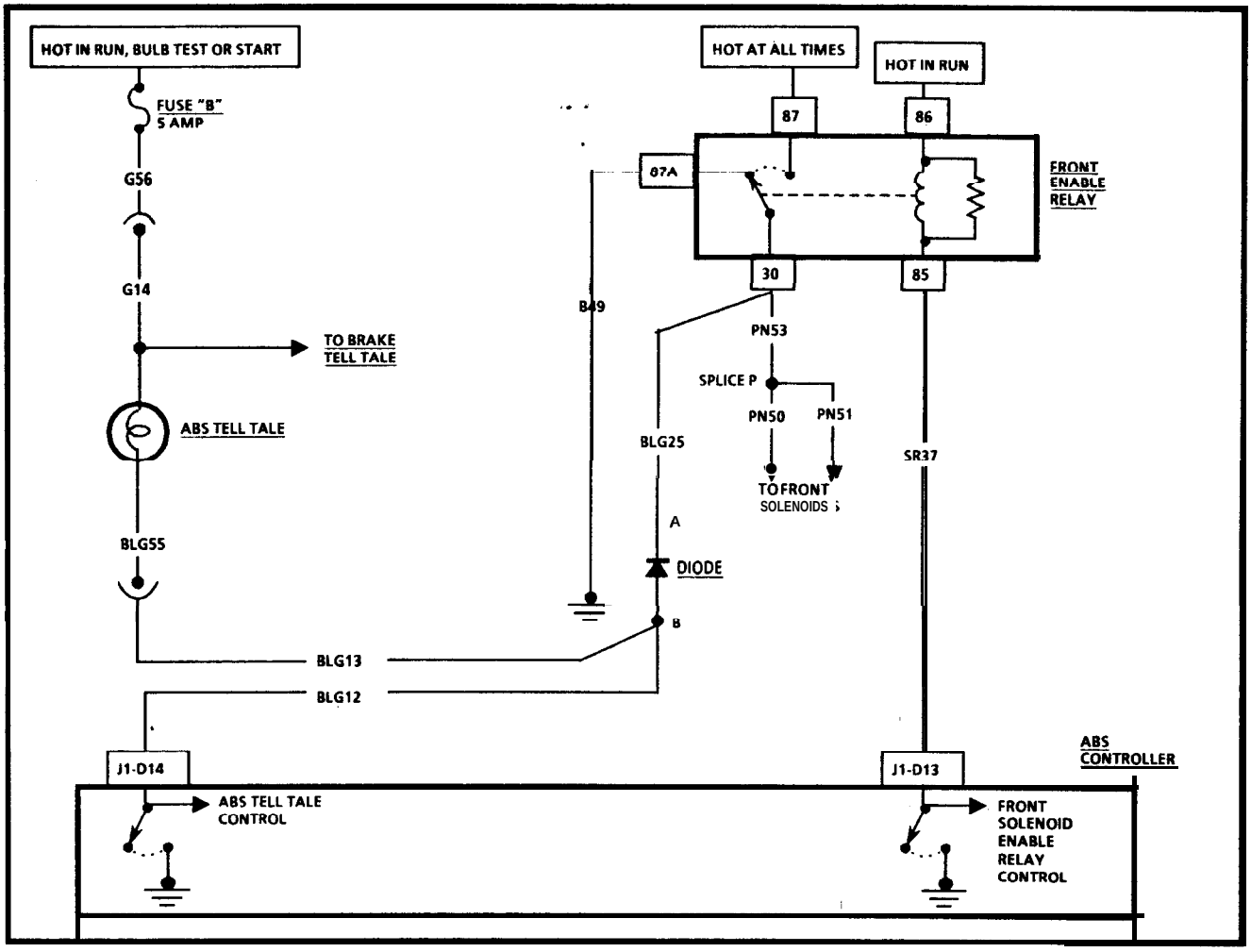
1. Isolates the ABS Tell Tale circuit from its power source and therefore determines whether another voltage source is shorted into the circuit or whether the ABS Controller is defective.
2. Determines whether the Diode is shorted or whether a short to battery exists in "BLG13, BLG12, BLG55".

CODE A002

ABS TELL TALE SHORTED TO BATTERY OR BRAKE DIODE SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A003

DIODE OPEN OR GROUND OPEN

If the ABS Controller loses power or ground, the ABS Tell Tale is grounded through "BLG55 and BLG13", the Diode, the open contacts of the Front Enable Relay "30" to "87A" and GND . The Diode prevents Battery Voltage from being applied to the ABS Tell Tale when the Front Enable Relay is energized.

CODE A003 will set during system initialization when all of the following conditions exist:

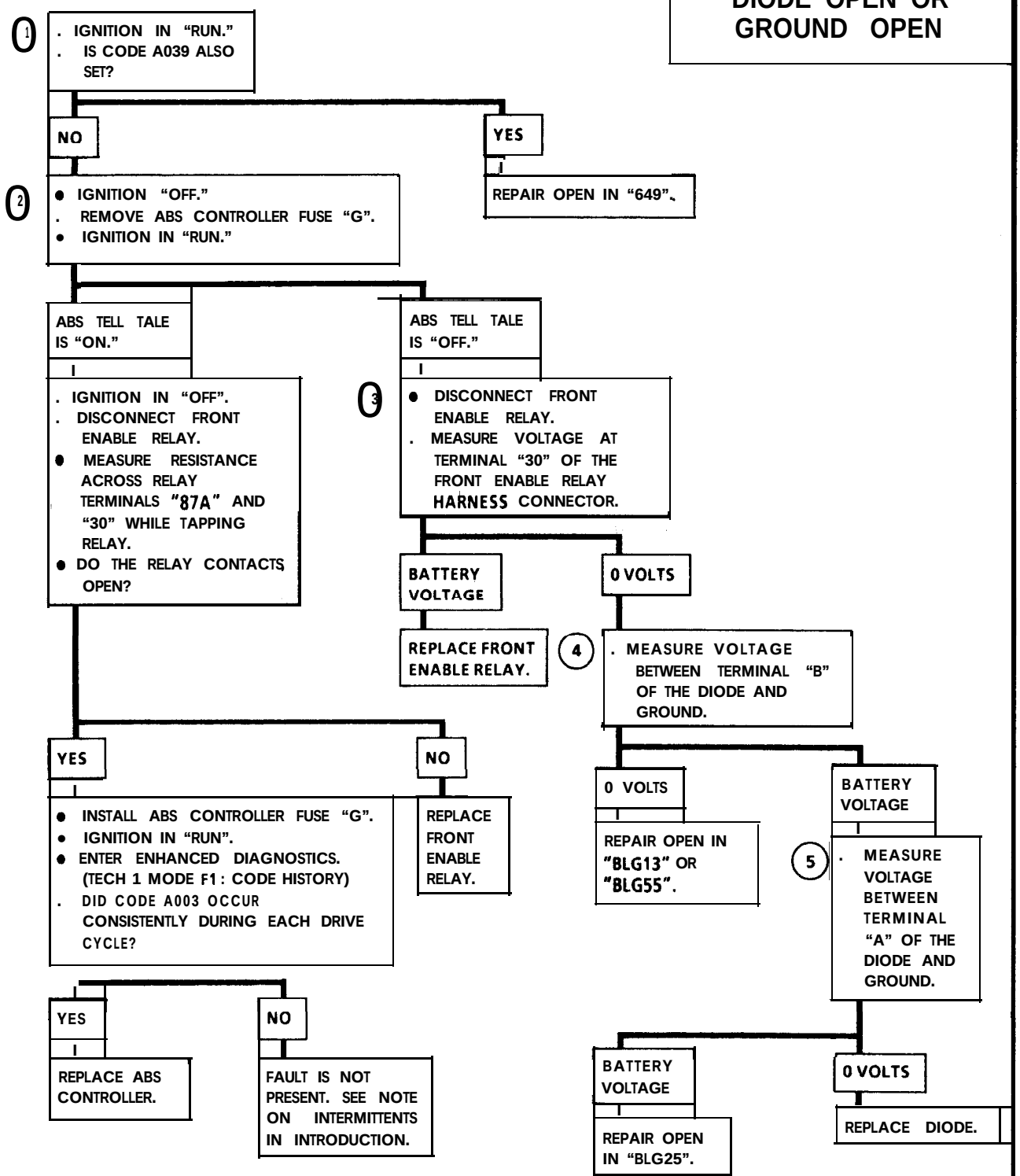
- The Front Enable Relay is deenergized.
- The ABS Tell Tale Control is open.
- The ABS Controller senses battery voltage at terminal "Jl-D14".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If code A039 is also set, the connection between relay terminal "87A" and GND must be open.
2. Determines if an open condition exists or if a possible intermittent condition exists.
3. Checks if the open condition exists between ABS Tell Tale and the Front Enable Relay.
4. Indicates if an open condition exists in "BLG13, BLG55" between ABS Tell Tale and the Diode.
5. Determines if an open condition exists in "BLG25" to Front Enable Relay, or in the Diode.

CODE A003

DIODE OPEN OR GROUND OPEN



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE, WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.

CODE A004

ENABLE RELAY OR SOLENOID FAULT DETECTED

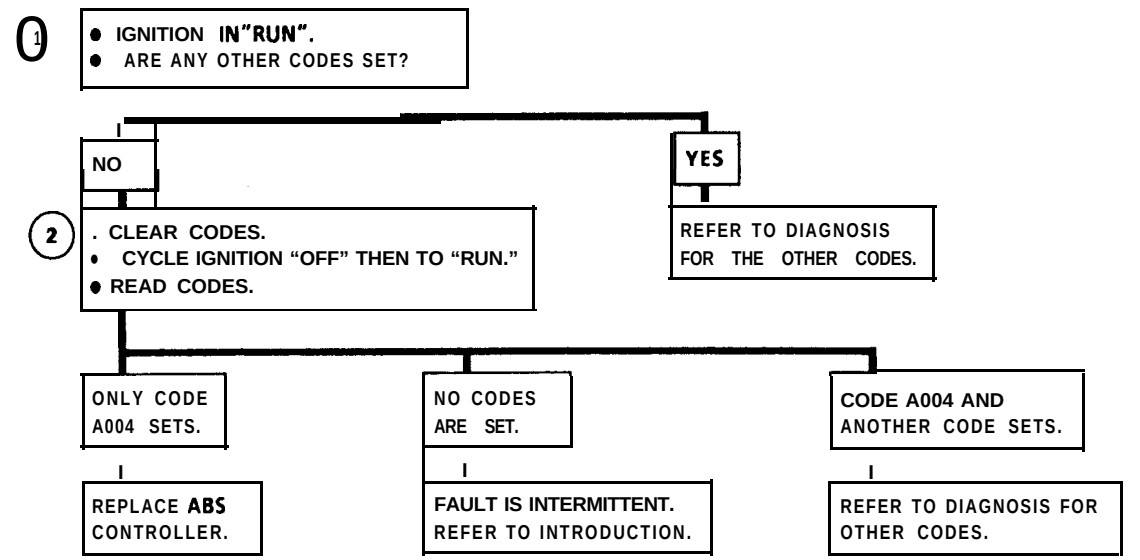
CODE A004 is a pretest which the ABS Controller uses in order to detect that a malfunction has occurred in the solenoid or enable relay circuits. Once the Controller has set Code A004 it will initiate a series of tests in order to pinpoint the malfunction. Code A004 will always set along with another Code. The other code which is set will indicate the nature of the malfunction and where it occurred.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

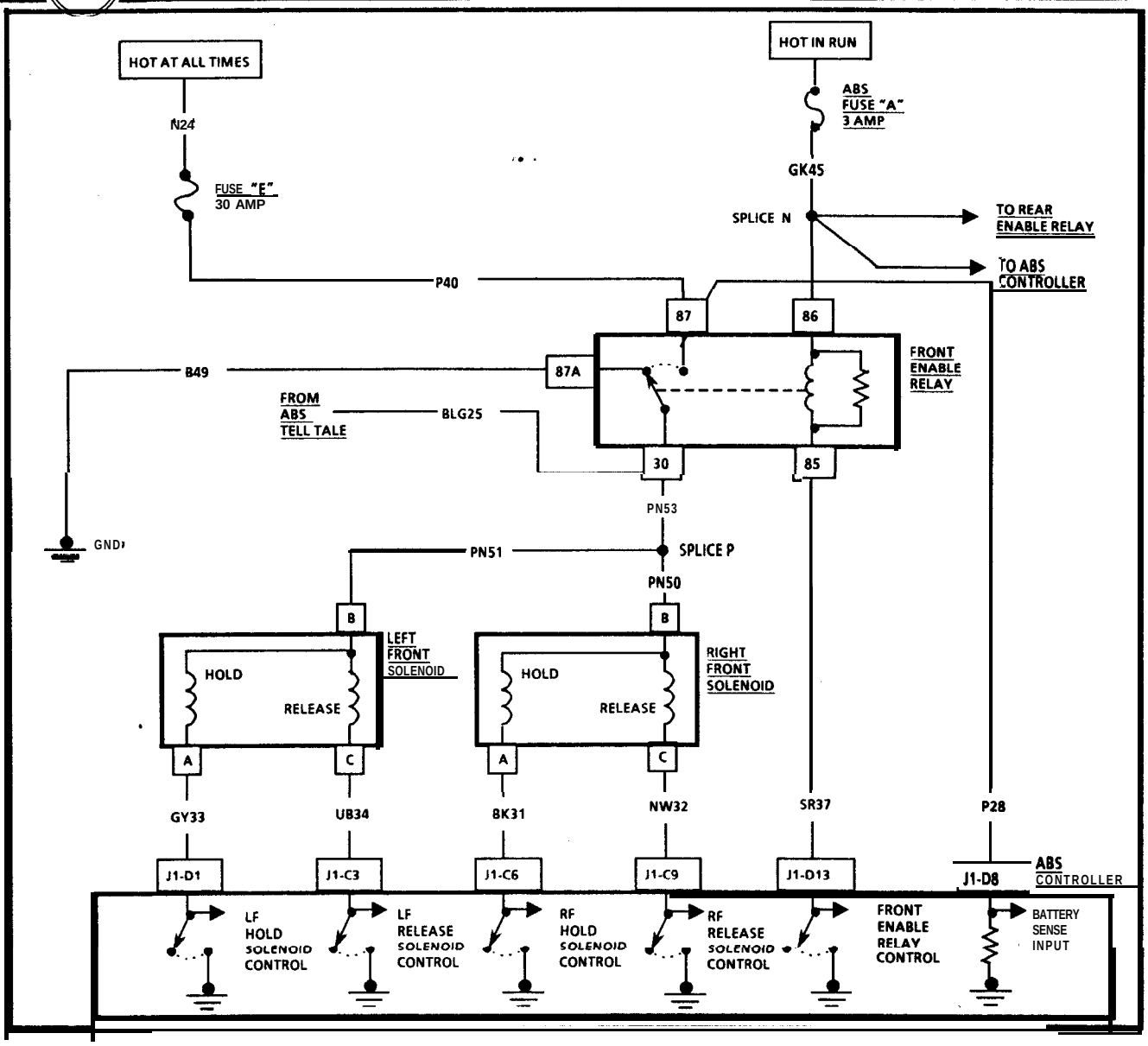
1. If another code is set a fault exists in the solenoid or enable relay circuits. The other code will indicate the nature of the malfunction and where it occurred.
2. If Code A004 sets and no other codes have been set, an internal malfunction in the ABS Controller is indicated.

CODE A004

ENABLE RELAY OR SOLENOID FAULT DETECTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A005

FRONT ENABLE RELAY COIL OPEN, CONTACTS OPEN, FUSE OPEN

If the Ignition is in "RUN" and the ABS Controller does not detect any faults, the Controller will close the Front Enable Relay Control. This grounds the Front Enable Relay Coil and the Relay becomes energized. The contacts close, and voltage is applied from Fuse "E" to the Left Front Solenoid and the Right Front Solenoid. If the ABS Controller is not closing any of the Solenoid Controls, the ABS Controller will sense battery voltage at terminals "Jl-Dl, Jl-C3, Jl-C6, and J1-C9".

CODE A005 will set when all of the following conditions exist:

- The Front Enable Relay Control is closed (Front Enable Relay energized).
- The ABS Controller senses no voltage at terminals "Jl-Dl, Jl-C3, Jl-C6 and J1-C9".

TEST DESCRIPTION: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A043 is set, refer to code A043.
2. If Code A007 is also set, none of the solenoids are receiving voltage. This indicates a problem in "PN50, PN51", "PN53".
3. If the test lamp lights, it shows that "GK45, SR37", and the ABS Controller are good. This indicates that the fault is in the Front Enable Relay or connector, or the fault is intermittent.
4. This determines if Code A005 was set due to a hard failure or an intermittent condition.
5. If voltage is present at terminal "J1-D13", all external circuits must be good. This indicates an internal problem with the ABS Controller.
6. If voltage is present at Front Enable Relay, but not at terminal "J1-D13", an open in "SR37" is indicated.

CODE A005

FRONT ENABLE RELAY COIL OPEN CONTACTS OPEN, FUSE OPEN

(1) • IGNITION IN "RUN."
• IS CODE A043 ALSO SET?

NO

(2) • IS CODE A007 ALSO SET?

NO

(3) • REMOVE FRONT ENABLE RELAY.
• CONNECT A TEST LAMP ACROSS TERMINALS "85" AND "86" OF THE FRONT ENABLE RELAY HARNESS CONNECTOR.
• TURN ENABLE RELAYS ON:
  - START AT TECH 1 MAIN MENUE
  - SELECT F4: ABS TESTS
  - SELECT FO: MANUAL CNTRL
  - SELECT FO: LF HOLD
  - TURN ENABLE RELAYS ON.

TEST LAMP DOES NOT LIGHT

(5) . IGNITION "OFF."
• DISCONNECT ABS CONTROLLER. TEST LAMP STILL CONNECTED.
. IGNITION IN "RUN."
• MEASURE VOLTAGE AT TERMINAL "J1-D13" OF ABS CONTROLLER HARNESS CONNECTOR.

0 VOLTS

(6) • DISCONNECT TEST LAMP.
. MEASURE VOLTAGE TO GROUND AT TERMINAL "86" OF FRONT ENABLE RELAY HARNESS CONNECTOR.

0 VOLTS

REPAIR OPEN "GK45".

BATTERY VOLTAGE

REPAIR OPEN IN "SR37".

BATTERY VOLTAGE

CHECK FOR GOOD TERMINAL CONTACT AT ABS CONTROLLER. IF GOOD, REPLACE ABS CONTROLLER.

YES

REFER TO CODE A043

YES

CHECK TERMINAL "30" AT THE FRONT E. RELAY AND TERMINAL "B" AT LEFT AND RIGHT FRONT SOLENOID FOR A CLEAN AND TIGHT CONECTION. ALSO, TEST "PN51 ", "PN53" AND "PN50" IF OPEN OR SHORTED TO GROUND.

TEST LAMP LIGHTS

(4) . ENTER ENHANCED DIAGNOSTICS. (TECH 1 MODE F1 : CODE HISTORY)
. DID CODE A005 OCCUR CONSISTENTLY DURING EACH DRIVE CYCLE?

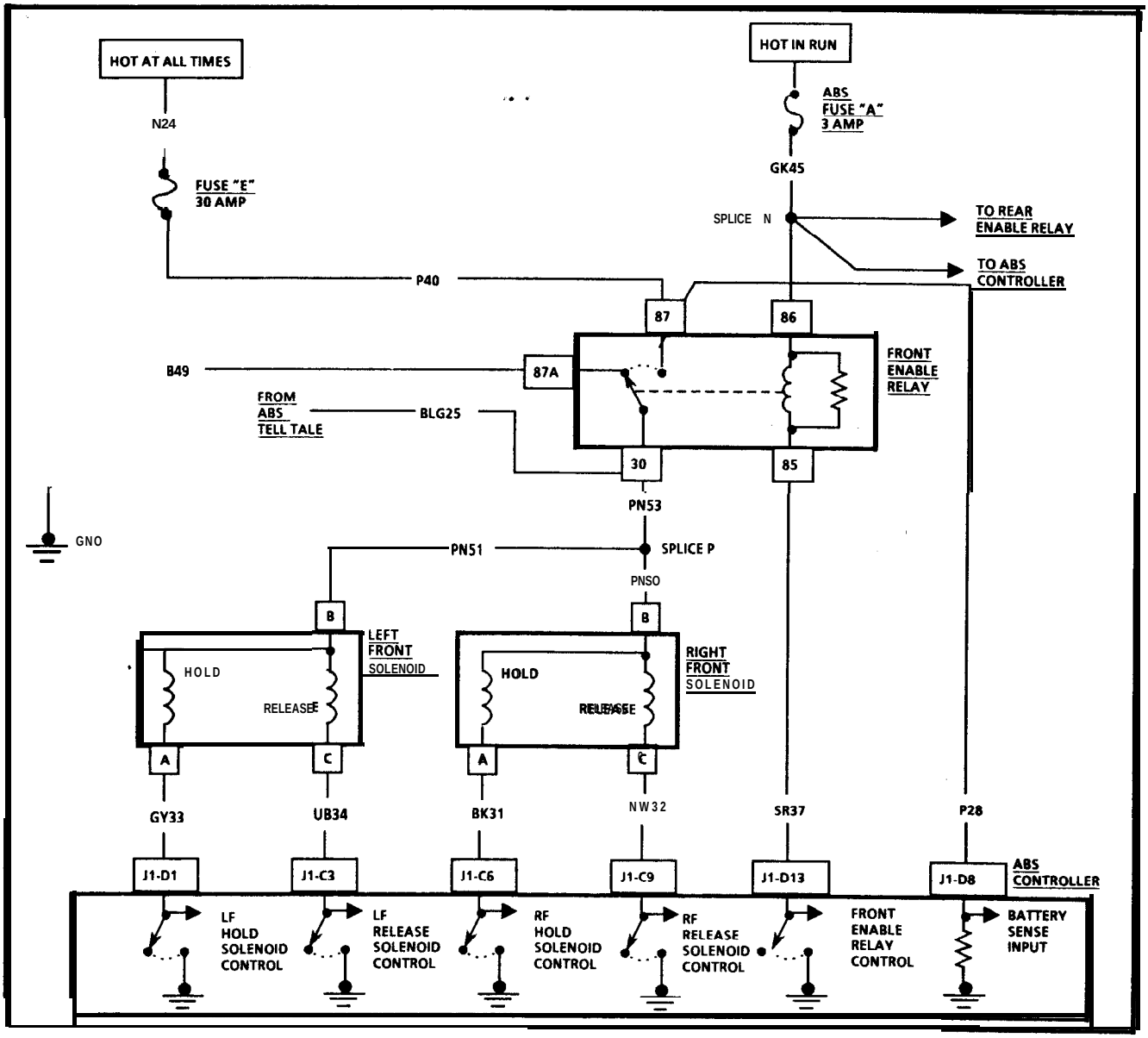
YES

REPLACE FRONT ENABLE RELAY.

NO

FAULT MAY NOT BE PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.-

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A006

FRONT ENABLE RELAY COIL SHORTED TO BATTERY

Battery Voltage is applied to the Front Enable Relay and "SR37" whenever the Ignition is in "RUN" and the Front Enable Relay Control is open.
When the Front Enable Relay Control is closed, ground is applied to terminal "85" of the Front Enable Relay. "SR37" is now grounded, so voltage is no longer present at terminal "J1-D13" of the ABS Controller. CODE A006 will set when all of the following conditions exist:

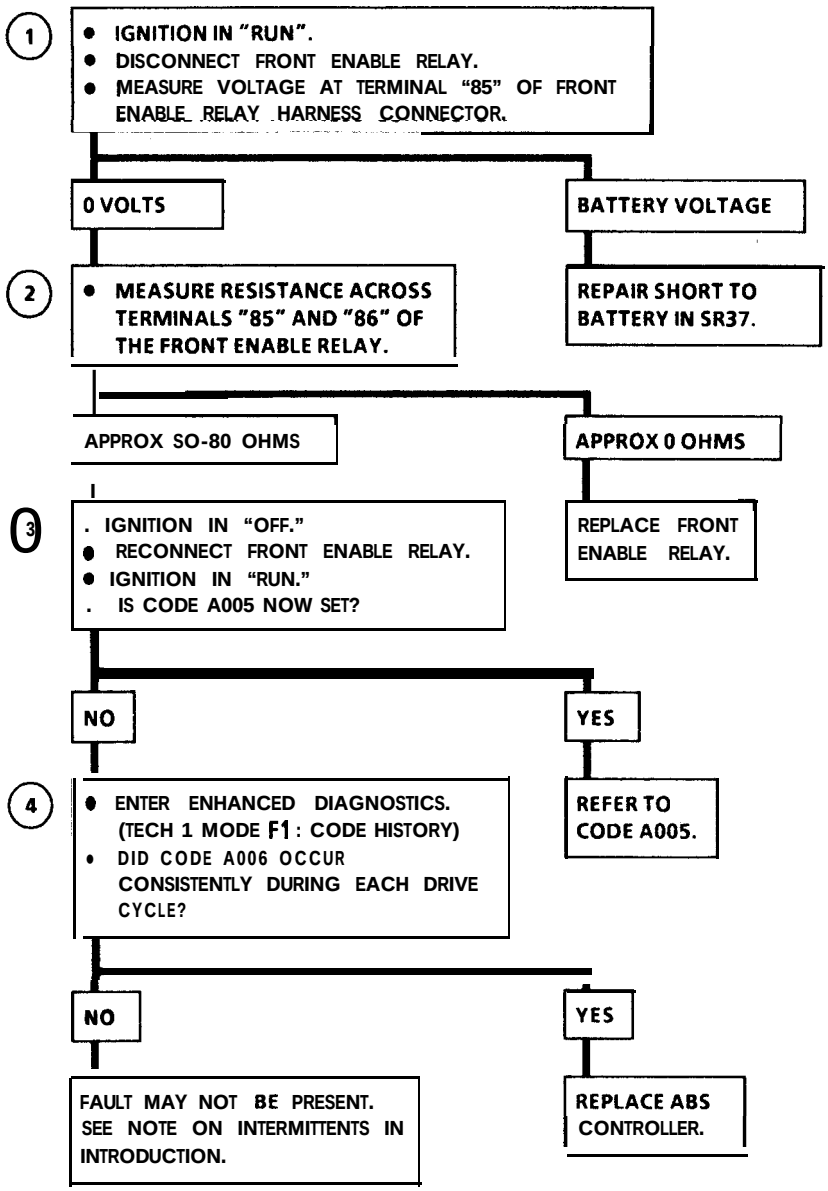
- The Front Enable Relay control is closed (Front Enable Relay energized).
- The ABS Controller senses Battery voltage at Terminal "Jl-D13".
- The ABS Controller senses no voltage at Terminals "J1-D1, Jl-C3, Jl-C6 and J1-C9".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

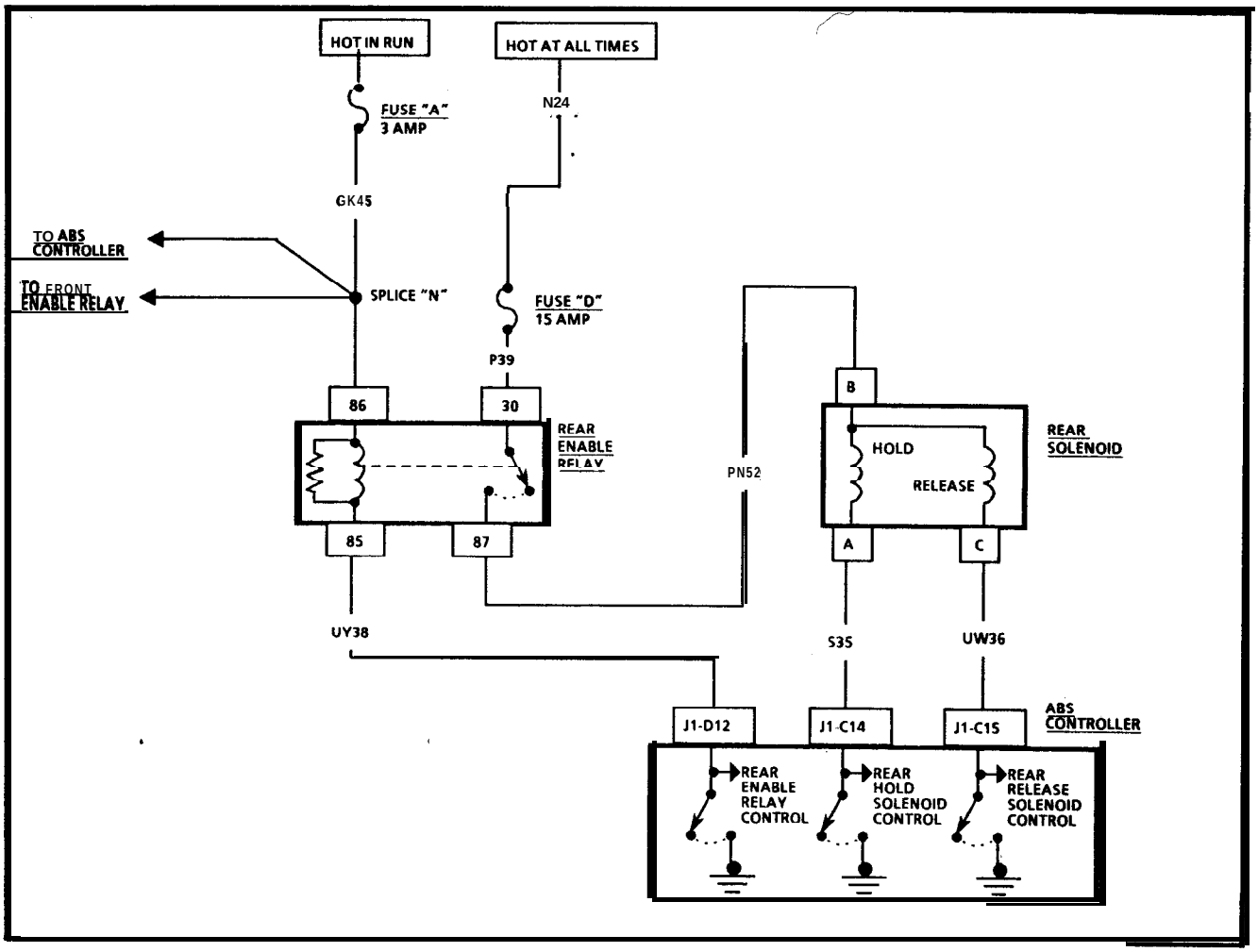
1. With the Front Enable Relay disconnected it can be determined whether a short to Battery exists in "SR37" (Battery voltage present at Terminal "85" of Front Enable Relay connector).
2. Determines if a short exists internally in the Front Enable Relay.
3. It is possible for an open Relay Coil to set this Code. Code A005 will now set if this fault is present.
4. If Code A006 is a consistent failure, the ABS Controller is faulty.

CODE A006

FRONT ENABLE RELAY COIL SHORTED TO BATTERY



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A007

REAR ENABLE RELAY COIL OPEN, CONTACTS OPEN, FUSE OPEN

If the Ignition is in RUN and the ABS Controller does not detect any faults, the ABS Controller will close the Rear Enable Relay Control. This grounds the Rear Enable Relay and the Relay becomes energized. The contacts close, and voltage is applied from the Fuse "D" to the Rear Solenoid. If the Controller is not closing either of the Rear Solenoid Controls, the ABS Controller will sense **Battery voltage** at terminals **"J1-C14" and "J1-C15"**.

CODE A007 will set when all the following conditions exist:

- The Rear Enable Relay Control is closed (Rear Enable Relay energized).
- The ABS Controller senses no voltage at Terminals "Jl-C14" and "Jl-C15".

Test Description: The following provides an explanation of the procedures being followed in the trouble tree.

1. If Code A005 is also set, none of the Solenoids are receiving voltage. This indicates a problem with PN52.
2. Code A054 will set if the relay coil circuit is open. Diagnostics are covered under code A054.
3. Determines if power feed to Relay contacts is good.
4. If Battery voltage is measured, PN52 and Rear Solenoid are good.
5. Determines if open exists in Rear Solenoid or in PN52, S35, UW36.
6. This determines if Code A007 was set due to a hard failure or an intermittent condition.
7. Checks for short to ground in P39.
8. If test lamp lights, a short to ground in PN52 is indicated.
9. Checks for good power feed to Fuse "D".

CODE A007

REAR ENABLE RELAY COIL OPEN, CONTACTS OPEN, FUSE OPEN

1. • IGNITION IN "RUN."
   • IS CODE A005 ALSO SET?

NO

2. . IS CODE A054 ALSO SET?

YES

CHECK TERMINAL "87" OF REAR ENABLE RELAY AND TERMINAL "8" OF REAR SOLENOID FOR A CLEAN AND TIGHT CONNECTION. ALSO TEST "PN52" FOR OPEN OR SHORTED TO GROUND.

NO

3. • IGNITION IN "OFF".
   • DISCONNECT REAR ENABLE RELAY.
   • IGNITION IN "RUN".
   • MEASURE VOLTAGE TO GROUND AT TERMINAL "30" OF REAR ENABLE RELAY HARNESS CONNECTOR.

YES

REFER TO CODE A054.

0 VOLTS

• CHECK FUSE "D".

FUSE BLOWN

7. • REMOVE BLOWN FUSE.
   . CONNECT TEST LAMP ACROSS FUSE SOCKET TERMINALS.

TEST LAMP DOES NOT LIGHT

TEST LAMP LIGHTS

REPAIR SHORT TO GROUND IN "PN39".

0

FUSE NOT BLOWN

9. . REMOVE FUSE.
   . MEASURE VOLTAGE AT "N24" SIDE OF FUSE SOCKET.

0 VOLTS

REPAIR OPEN IN "P39".

BATTERY VOLTAGE

REPAIR OPEN IN "N24" BETWEEN BATTERY AND FUSE "D".

BATTERY VOLTAGE

4. . CONNECT TEST LAMP ACROSS TERMINALS "87" AND "30" OF REAR ENABLE RELAY HARNESS CONNECTOR.
   • TURN REAR HOLD SOLENOID "ON" AND ENABLE RELAYS "OFF"
   - START AT TECH 1 MAIN MENUE
   - SELECT F4: ABS TESTS
   - SELECT FO: MANUAL CNTRL
   - SELECT F2: RER HOLD
   - TURN CMD STATE:ON
     TURN ENAB RELAYS:OFF

TEST LAMP LIGHTS

6. • ENTER ENHANCED DIAGNOSTICS. (TECH 1 MODE F1 : CODE HISTORY).
   . DID CODE A007 OCCUR CONSISTENTLY DURING EACH DRIVE CYCLE?

YES

REPLACE REAR ENABLE RELAY.

NO

FAULT MAY NOT BE PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

0

TEST LAMP DOES NOT LIGHT

5. . IGNITION IN "OFF"
   • DISCONN. REAR SOL.
   • MEASURE RESISTANCE ACROSS TERMINALS "8" AND "C" AND "8" AND "A" OF REAR SOL.

APPROX 3 OHMS

REPAIR OPEN IN "PN52" OR IN BOTH CKT "S35 AND "UW36".

INFINITE OHMS

REPLACE REAR SOLENOID.

0

8. • INSTALL REAR ENABLE RELAY
   . CONNECT TEST LAMP ACROSS FUSE "D" SOCKET TERMINALS.
   . DISCONNECT REAR SOLENOID
   . TURN ENABLE RELAYS ON:
   - START AT TECH 1 MAIN MENUE
   - SELECT F4: ABS TESTS
   - SELECT FO: MANUAL CNTRL
   - SELECT FO: LF HOLD
   - TURN ENAB RELAYS ON.

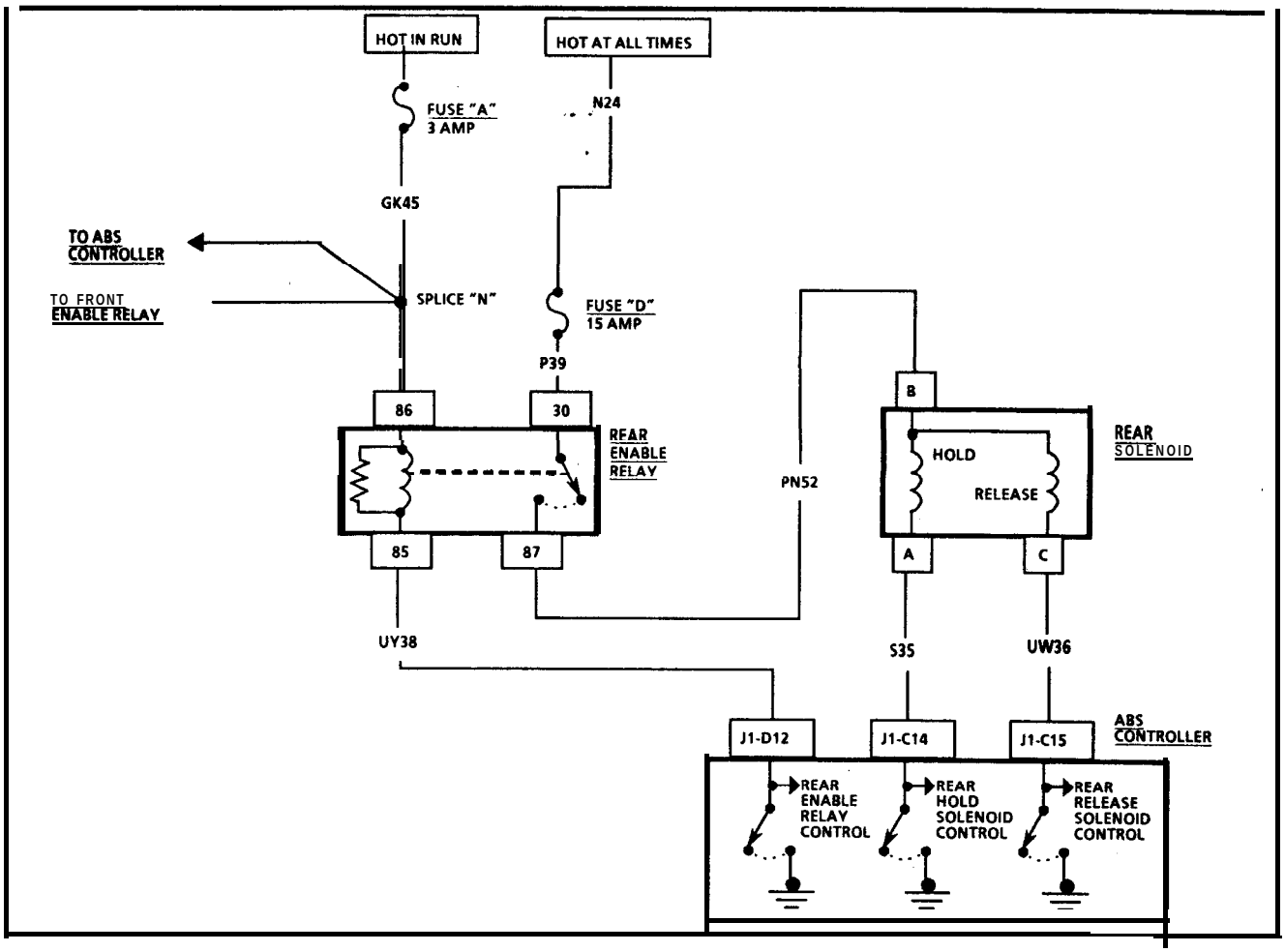
TEST LAMP DOES NOT LIGHT

REPLACE FUSE. SYSTEM IS OK.

TEST LAMP LIGHTS

REPAIR SHORT TO GROUND IN "PN52".

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A008

REAR ENABLE RELAY COIL SHORTED TO BATTERY

Battery voltage is applied to the Rear Enable Relay and UY38 whenever the Ignition is in RUN and the Rear Enable Relay Control is open. When the Rear Enable Relay Control is closed, ground is applied to terminal "85" of the Rear Enable Relay. UY38 is now grounded, so voltage is no longer present at terminal "J1-D12" of the ABS Controller.

CODE A008 will set when all the following conditions exist:

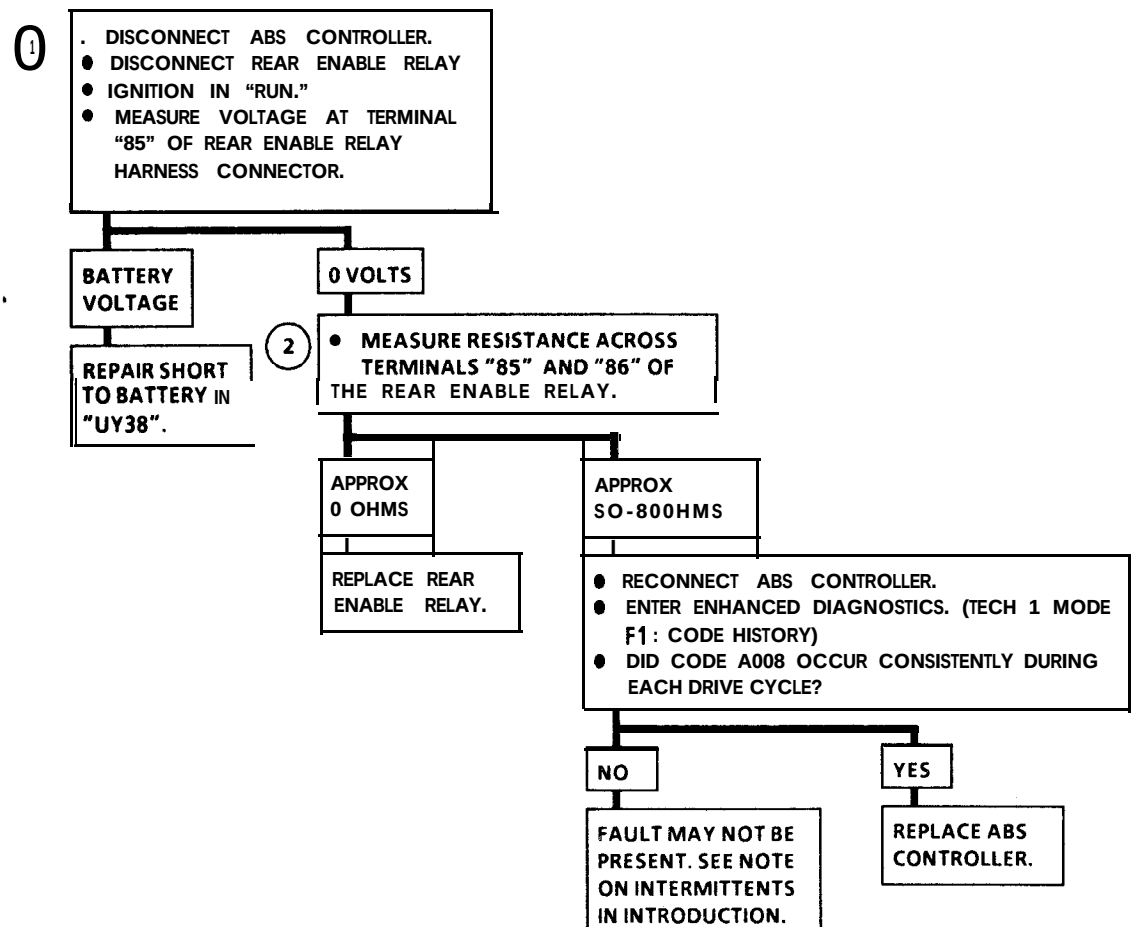
- The Rear Enable Relay Control is closed (Rear Enable Relay energized).
- The ABS Controller senses Battery voltage at Terminal "Jl-D12".
- The ABS Controller senses no voltage at Terminals "J1-C14" and "J1-C15".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

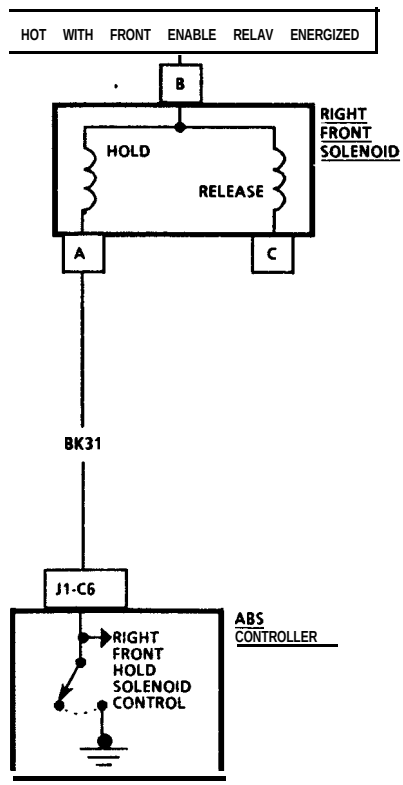
1. With the Rear Enable Relay disconnected it can be determined whether a short to Battery exists in the UY38 (Battery voltage present at Terminal "85" of Rear Enable Relay harness connector).
2. Determines if a short exists internally in the Rear Enable Relay or whether the ABS Controller is defective.

CODE A008

REAR ENABLE RELAY COIL SHORTED TO BATTERY



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEARCODES AND VERIFY OPERATION.



CODE A009

RIGHT FRONT HOLD SOLENOID OPEN OR SHORTED TO GROUND

When the Front Enable Relay is energized, voltage is applied to the Right Front, Solenoid. If the ABS Controller determines that the Right Front Hold Solenoid should be activated, it will close the Right Front Hold Solenoid Control. Ground is now applied at terminal A of the Right Front Solenoid, so the Right Front Hold Solenoid is on.

CODE A009 will set when all the following conditions exist:

- The Front Enable Relay is energized.
- The Right Front Hold Solenoid control is open.
- The ABS Controller senses no voltage at terminal "Jl-C6".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A012 is also set, the power feed to the Right Front Solenoid is open.
2. Voltage at terminal **"J1-C6"** will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with Controller disconnected, short is internal to Controller.
5. PN50, PN53 is OK if the test lamp lights. Open must be internal to solenoid.
6. If continuity to ground through the Front Enable Relay contacts is present, open must be internal to Controller.
7. Determines if open is in Solenoid or **"BK31"**.

CODE A009

RIGHT FRONT HOLD SOLENOID OPEN OR SHORTED TO GROUND

1. ● IGNITION IN "RUN."
   ● IS CODE A012 ALSO SET?

NO

2. ● TURN RIGHT FRONT HOLD SOLENOID "OFF" AND ENABLE RELAYS "ON":
   - START AT TECH 1 MAIN MENUE
   - SELECT F4: ABS TESTS
   - SELECT FO: MANUAL CNTRL
   - SELECT F1 : RF HOLD
   - TURN CMD STATE: OFF
   - TURN ENAB RELAY: ON

FEEDBACK STATE LOW

3. ● IGNITION IN "OFF".
   ● DISCONNECT RIGHT FRONT SOLENOID.
   ● IGNITION IN "RUN".
   ● CONNECT TEST LAMP BETWEEN TERMINALS B AND A OF RIGHT FRONT SOLENOID HARNESS CONNECTOR.
   ● TURN ENABLE RELAYS "ON", AND RF HOLD SOL. "OFF" (SEE ②).

TEST LAMP DOES NOT LIGHT

6. ● IGNITION IN "OFF".
   ● RECONNECT RIGHT FRONT SOLENOID.
   ● DISCONNECT ABS CONTROLLER.
   ● MEASURE RESISTANCE FROM TERMINAL "J1-C6" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

INFINITE OHM5

37 ● DISCONNECT RIGHT FRONT SOLENOID.
   ● MEASURE RESISTANCE BETWEEN TERMINALS "A" AND "B" OF RIGHT FRONT SOLENOID.

APPROX 3 OHM5

REPAIR OPEN IN "BK31".

10 OHM5 OR LESS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT I5 GOOD, REPLACE ABS CONTROLLER.

INFINITE OHMS

REPLACE RIGHT FRONT SOLENOID.

FEEDBACK STATE HIGH

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENT5 IN INTRODUCTION.

YES

5. ● DISCONNECT RIGHT FRONT SOLENOID.
   ● CONNECT TEST LAMP BETWEEN TERMINAL B OF RIGHT FRONT SOLENOID HARNESS CONNECTOR AND GROUND.
   ● TURN ENABLE RELAYS "ON" (SEE ②.)

TEST LAMP DOES NOT LIGHT

REPAIR OPEN IN "PN50, PN53" BETWEEN RIGHT FRONT SOLENOID AND FRONT ENABLE RELAY.

TEST LAMP LIGHTS

REPLACE RIGHT FRONT SOLENOID.

TEST LAMP LIGHTS

4. ● IGNITION IN "OFF".
   ● DISCONNECT ABS CONTROLLER AND TEST LAMP.
   ● MEASURE RESISTANCE FROM TERMINAL "J1-C6" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

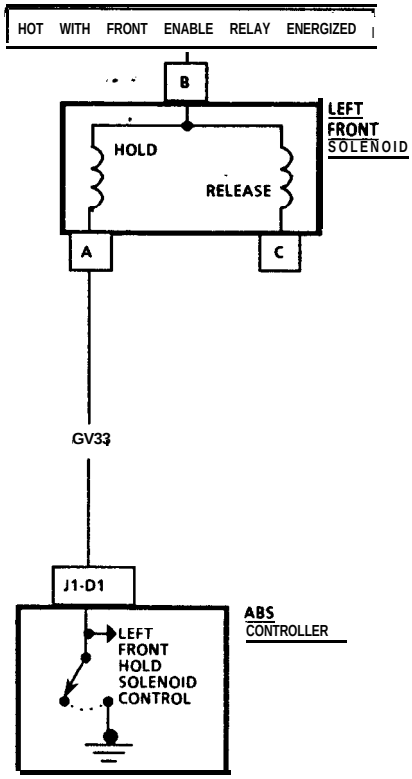
INFINITE OHMS

REPLACE ABS CONTROLLER.

10 OHM5 OR LESS

REPAIR SHORT TO GROUND IN "BK31".

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODE5 AND VERIFY OPERATION.



CODE **A010**

LEFT FRONT HOLD SOLENOID OPEN OR SHORTED TO GROUND

When the Front Enable Relay is energized, voltage is applied to the Left Front Solenoid. If the ABS Controller determines that the Left Front Hold Solenoid should be activated, it will close the Left Front Hold Solenoid Control. Ground is now applied at terminal A of the Left Front Solenoid, so the Left Front Hold Solenoid is on.

CODE A010 will set when all the following conditions exist:

- The Front Enable Relay is energized.
- The Left Front Hold Solenoid Control is open.
- The ABS Controller senses no voltage at Terminal **"Jl-Dl".**

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A013 is also set, the power feed to the Left Front Solenoid is open.
2. Voltage at terminal "Jl-Dl" will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with controller disconnected, short is internal to Controller.
5. PN51, PN53 is OK if the test lamp lights. Open must be internal to solenoid.
6. If continuity to ground through the Front Enable Relay Contacts is present, open must be internal to Controller.
7. Determines if open is in solenoid or "GY33".

CODE A01 0

LEFT FRONT HOLD SOLENOID OPEN OR SHORTED TO GROUND

(1) • IGNITION IN "RUN."
• IS CODE A013 ALSO SET?

- NO
- YES

(2) • TURN LEFT FRONT HOLD SOLENOID "OFF" AND ENABLE RELAYS "ON":
• START AT TECH 1 MAIN MENUE
• SELECT F4: ABS TESTS
• SELECT FO: MANUAL CNTRL
• SELECT FO: LF HOLD
• TURN CMD STATE: OFF
• TURN ENAB RELAYS: ON

(5) . DISCONNECT LEFT FRONT SOLENOID.
. CONNECT TEST LAMP BETWEEN TERMINAL "B" OF LEFT FRONT SOLENOID HARNESS CONNECTOR AND GROUND.
. TURN ENABLE RELAYS "ON." (SEE ②).

- TEST LAMP DOES NOT LIGHT → REPAIR OPEN IN "PN51, PN53" BETWEEN LEFT FRONT SOLENOID AND FRONT ENABLE RELAY.
- TEST LAMP LIGHTS → REPLACE LEFT FRONT SOLENOID.

- FEEDBACK STATE LOW
- FEEDBACK STATE HIGH → FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

(3) . IGNITION IN "OFF".
• DISCONNECT LEFT FRONT SOLENOID.
• IGNITION IN "RUN".
• CONNECT TEST LAMP BETWEEN TERMINALS "B" AND "A" OF LEFT FRONT SOLENOID HARNESS CONNECTOR.
• TURN ENABLE RELAYS "ON" AND LF HOLD SOLENOID "OFF" (SEE ②).

- TEST LAMP DOES NOT LIGHT

(6) • IGNITION IN "OFF".
• RECONNECT LEFT FRONT SOLENOID.
• DISCONNECT ABS CONTROLLER.
• MEASURE RESISTANCE FROM TERMINAL "J1-D1 " OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

- INFINITE OHMS

(7) • DISCONNECT LEFT FRONT SOLENOID.
. MEASURE RESISTANCE BETWEEN TERMINALS "A" AND "B" OF LEFT FRONT SOLENOID.

- APPROX 3 OHMS → REPAIR OPEN IN "GY33".
- INFINITE OHMS → REPLACE LEFT FRONT SOLENOID.

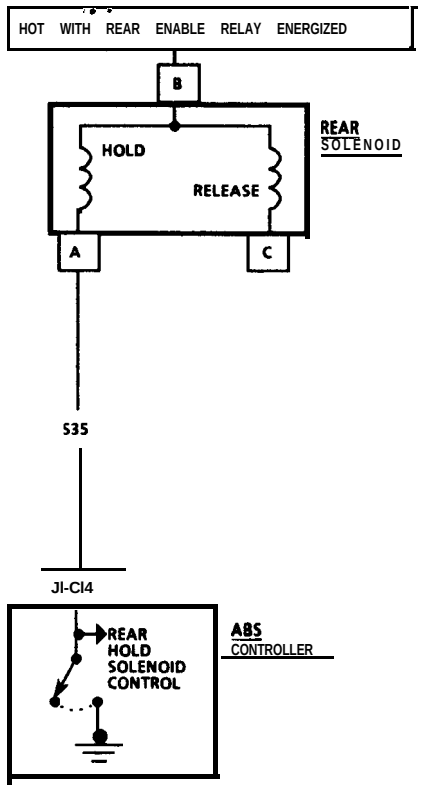
- 10 OHMS OR LESS → CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

- TEST LAMP LIGHTS

(4) . IGNITION IN "OFF".
. DISCONNECT ABS CONTROLLER AND TEST LAMP.
. MEASURE RESISTANCE FROM TERMINAL "J1-D1" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

- INFINITE OHMS → REPLACE ABS CONTROLLER.
- 10 OHMS OR LESS → REPAIR SHORT TO GROUND IN "GY33".

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A01 1

REAR HOLD SOLENOID OPEN OR SHORTED TO GROUND

When the Rear Enable Relay is energized, voltage is applied to the Rear Solenoid. If the ABS Controller determines that the Rear Hold Solenoid should be activated, it will close the Rear Hold Solenoid Control. Ground is now applied at terminal A of the Rear Solenoid, so the Rear Hold Solenoid is on.
CODE A01 1 will set when all the following conditions exist:

- The Rear Enable Relay is energized.
- The Rear Hold Solenoid Control is open.
- The ABS Controller senses no voltage at Terminal "Jl-C14".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A014 is also set, the power feed to the Rear Solenoid is open.
2. Voltage at terminal **"J1-C14"** will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with ABS Controller disconnected, short is internal to ABS Controller.
5. PN52 is OK if the test lamp lights. Open must be internal to solenoid.
6. If test lamp lights, Rear Hold Solenoid and **S35** are good. Open must be internal to ABS Controller.
7. Determines if open is in Solenoid or S35.

CODE A01 1

REAR HOLD SOLENOID OPEN OR SHORTED TO GROUND

(1) ● IGNITION IN "RUN."
● IS CODE A014 ALSO SET?

NO

(2) ● TURN REAR HOLD SOLENOID "OFF" AND ENABLE RELAYS "ON":
- START AT TECH 1 MAIN MENUE
- SELECT F4: ABS TESTS
- SELECT FO: MANUAL CNTRL
- SELECT F2: RER HOLD
- TURN CMD STATE: OFF
- TURN ENAB RELAYS: ON

FEEDBACK STATE LOW

(3) ● IGNITION IN "OFF".
● DISCONNECT REAR SOLENOID.
IGNITION IN "RUN".
. CONNECT TEST LAMP BETWEEN TERMINALS "B" AND "A" OF REAR SOLENOID HARNESS CONNECTOR.
● TURN ENABLE RELAYS "ON" AND REAR HOLD SOLENOID "OFF" (SEE ②).

TEST LAMP DOES NOT LIGHT

(6) ● IGNITION IN "OFF".
. RECONNECT REAR SOLENOID
● DISCONNECT ABS CONTROLLER.
● DISCONNECT REAR ENABLE RELAY.
● CONNECT A FUSED JUMPER BETWEEN TERMINALS "87" AND "30" OF REAR ENABLE RELAY HARNESS CONNECTOR.
● CONNECT TEST LAMP TO GROUND AT TERMINAL "J1-C14" OF ABS CONTROLLER HARNESS CONNECTOR.
. IGNITION IN "RUN".

(7) TEST LAMP DOES NOT LIGHT

● IGNITION IN "OFF".
● DISCONNECT REAR SOLENOID.
● MEASURE RESISTANCE BETWEEN TERMINALS "A" AND "B" OF REAR SOLENOID.

APPROX 3 OHMS

REPAIR OPEN IN "S35".

INFINITE OHMS

REPLACE REAR SOLENOID.

TEST LAMP LIGHTS

REPLACE REAR SOLENOID.

FEEDBACK STATE HIGH

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

TEST LAMP LIGHTS

(4) ● IGNITION IN "OFF".
. DISCONNECT ABS CONTROLLER AND TEST LAMP.
● MEASURE RESISTANCE FROM TERMINAL "J1-C14" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

INFINITE OHMS

REPLACE ABS CONTROLLER.

10 OHM5 OR LESS

REPAIR SHORT TO GROUND IN "S35".

YES

(5) ● DISCONNECT REAR SOLENOID.
● CONNECT TEST LAMP BETWEEN TERMINAL "B" OF REAR SOLENOID HARNESS CONNECTOR AND GROUND.
. TURN ENABLE RELAYS "ON." (SEE ②).

TEST LAMP DOES NOT LIGHT

REPAIR OPEN IN "PN52" BETWEEN REAR SOLENOID AND REAR ENABLE RELAY.

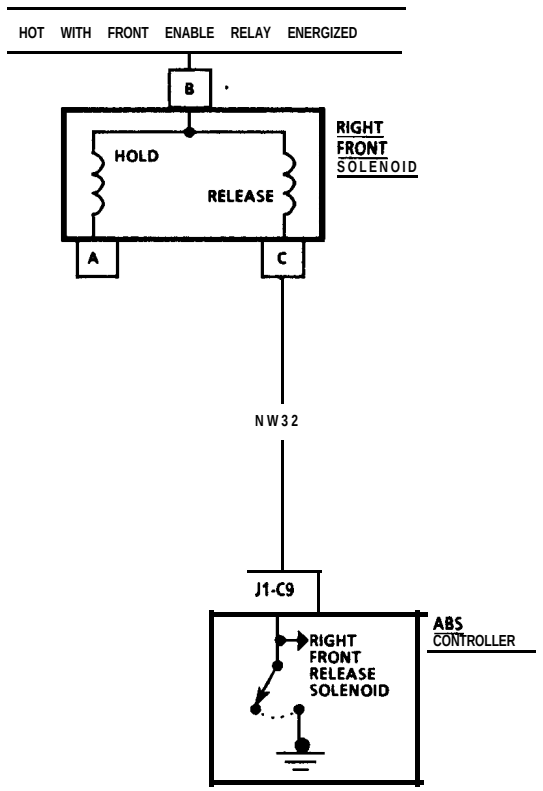
TEST LAMP LIGHTS

REPLACE REAR SOLENOID.

TEST LAMP LIGHTS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A01 2

RIGHT FRONT RELEASE SOLENOID OPEN OR SHORTED TO GROUND

When the Front Enable Relay is energized, voltage is applied to the Right Front Solenoid. If the ABS Controller determines that the Right Front Release Solenoid should be activated, it will close the Right Front Release Solenoid Control. Ground is now applied at terminal C of the Right Front Solenoid, so the Right Front Release Solenoid is on.

CODE A012 will set when all the following conditions exist:

- The Front Enable Relay is energized.
- The Right Front Release Solenoid Control is open
- The ABS Controller senses no voltage at Terminal "J1-C9".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A009 is also set, the power feed to the Right Front Solenoid is open.
2. Voltage at terminal "J1-C9" will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with ABS Controller disconnected, short is internal to ABS Controller.
5. PN50, PN53 is OK, if the test lamp lights. Open must be internal to solenoid.
6. If continuity to ground through the Front Enable Relay is present, open must be internal to ABS Controller.
7. Determines if open is in Solenoid or NW32.

CODE A012

RIGHT FRONT RELEASE SOLENOID OPEN OR SHORTED TO GROUND

1 • IGNITION IN "RUN."
• IS CODE A009 ALSO SET?

NO

2 • TURN RIGHT FRONT RELEASE SOLENOID "OFF" AND ENABLE RELAYS "ON":
- START AT TECH 1 MAIN MENUE
- SELECT F4: ABS TESTS
- SELECT FO: MANUAL CNTRL
- SELECT F5: RF RELEASE
- TURN CMD STATE: OFF
- TURN ENAB RELAYS: ON

YES

5 . DISCONNECT RIGHT FRONT SOLENOID.
. CONNECT TEST LAMP BETWEEN TERMINAL "B" OF RIGHT FRONT SOLENOID HARNESS CONNECTOR AND GROUND.
• TURN ENABLE RELAYS "ON" (SEE ②).

TEST LAMP DOES NOT LIGHT

REPAIR OPEN IN "PN50, PN53" BETWEEN RIGHT FRONT SOLENOID AND FRONT ENABLE RELAY.

TEST LAMP LIGHTS

REPLACE RIGHT FRONT SOLENOID.

FEEDBACK STATE LOW

3 • IGNITION IN "OFF".
• DISCONNECT RIGHT FRONT SOLENOID.
• IGNITION IN "RUN".
• CONNECT TEST LAMP BETWEEN TERMINALS "B" AND "C" OF RIGHT FRONT SOLENOID HARNESS CONNECTOR.
• TURN ENABLE RELAYS "ON" AND RF RELEASE SOLENOID "OFF" (SEE ②).

FEEDBACK STATE HIGH

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENT5 IN INTRODUCTION.

TEST LAMP DOES NOT LIGHT

6 • IGNITION IN "OFF".
• RECONNECT RIGHT FRONT SOLENOID.
• DISCONNECT ABS CONTROLLER.
• MEASURE RESISTANCE FROM TERMINAL "J1-C9" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

TEST LAMP LIGHTS

4 • IGNITION IN "OFF".
. DISCONNECT ABS CONTROLLER AND TEST LAMP.
. MEASURE RESISTANCE FROM TERMINAL "J1-C9" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

INFINITE OHMS

7 • DISCONNECT RIGHT FRONT SOLENOID.
• MEASURE RESISTANCE BETWEEN TERMINALS "C" AND "B" OF RIGHT FRONT SOLENOID.

10 OHMS OR LESS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

APPROX 3 OHMS

REPAIR OPEN IN "NW32".

INFINITE OHM5

REPLACE RIGHT FRONT SOLENOID.

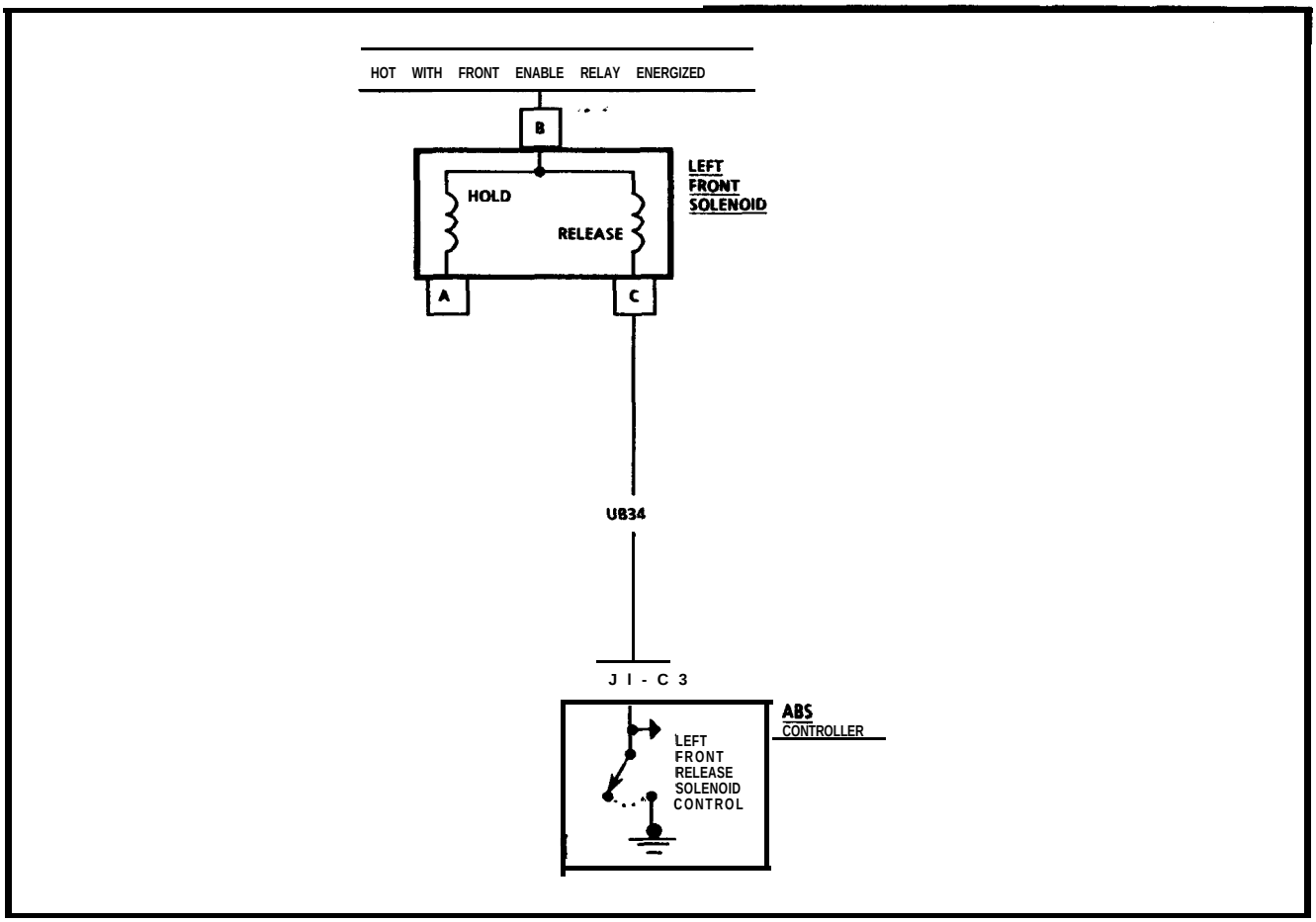
INFINITE OHMS

REPLACE ABS CONTROLLER.

10 OHMS OR LESS

REPAIR SHORT TO GROUND IN "NW32".

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A01 3

LEFT FRONT RELEASE SOLENOID OPEN OR SHORTED TO GROUND

When the Front Enable Relay is energized, voltage is applied to the Left Front Solenoid. If the ABS Controller determines that the Left Front Release Solenoid should be activated, it will close the Left Front Release Solenoid Control. Ground is now applied at terminal C of the Left Front Solenoid, so the Left Front Release Solenoid is on.

CODE A013 will set when all the following conditions exist:

- The Front Enable Relay is energized.
- The Left Front Release Solenoid Control is open.
- The ABS Controller senses no voltage at Terminal **"J1-C3".**

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A010 is also set, the power feed to the Left Front Solenoid is open.
2. Voltage at terminal **"J1-C3"** will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with controller disconnected, short is internal to controller.
5. PN51, PN53 is OK **if the** test lamp lights. Open must be internal to solenoid.
6. If continuity to ground through the Front Enable Relay is present, open must be internal to Controller.
7. Determines **if open** is in solenoid or UB34.

CODE A013

LEFT FRONT RELEASE SOLENOID OPEN OR SHORTED TO GROUND

1. IGNITION IN "RUN."
   - IS CODE A010 ALSO SET?

NO

2. TURN LEFT FRONT RELEASE SOLENOID "OFF" AND ENABLE RELAYS "ON":
   - START AT TECH 1 MAIN MENUE
   - SELECT F4: ABS TESTS
   - SELECT FO: MANUAL CNTRL
   - SELECT F4: LF RELEASE
   - TURN CMD STATE: OFF
   - TURN ENAB RELAYS: ON

FEEDBACK STATE LOW

3. IGNITION IN "OFF".
   - DISCONNECT LEFT FRONT SOLENOID.
   - IGNITION IN "RUN".
   - CONNECT TEST LAMP BETWEEN TERMINALS "B" AND "C" OF LEFT FRONT SOLENOID HARNESS CONNECTOR.
   - TURN ENABLE RELAY5 "ON" AND LF RELEASE SOLENOID "OFF" (SEE ②).

TEST LAMP DOES NOT LIGHT

6. IGNITION IN "OFF".
   - RECONNECT LEFT FRONT SOLENOID.
   - DISCONNECT ABS CONTROLLER.
   - MEASURE RESISTANCE FROM TERMINAL "JI-C3" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

INFINITE OHMS

7. DISCONNECT LEFT FRONT SOLENOID.
   - MEASURE RESISTANCE BETWEEN TERMINALS "C" AND "B" OF LEFT FRONT SOLENOID.

APPROX 3 OHMS

REPAIR OPEN IN "UB34".

INFINITE OHMS

REPLACE LEFT FRONT SOLENOID.

10 OHMS OR LESS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

YES

5. DISCONNECT LEFT FRONT SOLENOID.
   - CONNECT TEST LAMP BETWEEN TERMINAL "B" OF LEFT FRONT SOLENOID HARNESS CONNECTOR AND GROUND.
   - TURN ENABLE RELAYS "ON" (SEE ②).

TEST LAMP DOES NOT LIGHT

REPAIR OPEN IN "PN51, PN53" BETWEEN LEFT FRONT SOLENOID AND FRONT ENABLE RELAY.

TEST LAMP LIGHTS

REPLACE LEFT FRONT SOLENOID.

FEEDBACK STATE HIGH

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

TEST LAMP LIGHTS

4. IGNITION IN "OFF".
   - DISCONNECT ABS CONTROLLER AND TEST LAMP.
   - MEASURE RESISTANCE FROM TERMINAL "JI-C3" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

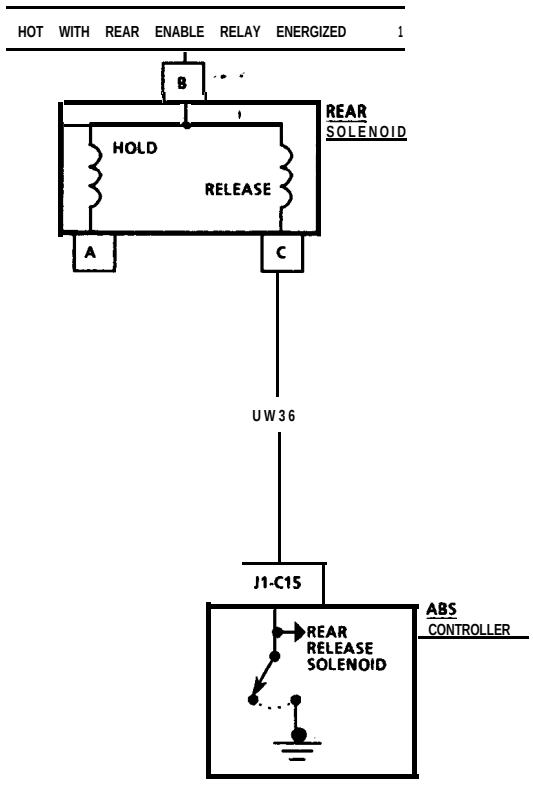
INFINITE OHMS

REPLACE ABS CONTROLLER.

10 OHMS OR LESS

REPAIR SHORT TO GROUND IN "UB34".

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODE5 AND VERIFY OPERATION.



CODE A014

REAR RELEASE SOLENOID OPEN OR SHORTED TO GROUND

When the Rear Enable Relay is energized, voltage is applied to the Rear Solenoid. If the ABS Controller determines that the Rear Release Solenoid should be activated, it will close the Rear Release Solenoid Control. Ground is now applied at terminal C of the Rear Solenoid, so the Rear Release Solenoid is on.
CODE A014 will set when all the following conditions exist:

- The Rear Enable Relay is energized.
- The Rear Release Solenoid Control is open.
- The ABS Controller senses no voltage at terminal "J1-C15".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A011 is also set, the power feed to the Rear Solenoid is open.
2. Voltage at terminal "Jl-C15" will cause the TECH 1 to display a HIG feedback. A LOW feedback indicates that voltage is not present.
3. A short to ground must be present if the test lamp lights.
4. If short to ground does not exist with controller disconnected, short is internal to controller.
5. PN52 is OK if test lamp lights. Open must be internal to solenoid.
6. If test lamp lights, Rear Release Solenoid and UW36 are good. Open must be internal to controller.
7. Determines if open is in Solenoid or UW36.

CODE A014

REAR RELEASE SOLENOID OPEN OR SHORTED TO GROUND

1
- **IGNITION IN "RUN."**
- **IS CODE A011 ALSO SET?**

NO

2
- TURN REAR RELEASE SOLENOID "OFF" AND ENABLE RELAYS "ON":
  - START AT TECH 1 MAIN MENUE
  - SELECT F4: ABS TESTS
  - SELECT FO: MANUAL CNTRL
  - SELECT F6: REAR RELEASE
  - TURN CMD STATE: OFF
  - TURN ENAB RELAYS: ON

FEEDBACK STATE LOW

3
- IGNITION IN "OFF".
- DISCONNECT REAR SOLENOID.
- IGNITION IN "RUN".
- CONNECT TEST LAMP BETWEEN TERMINALS "B" AND **"C"** OF REAR SOLENOID HARNESS CONNECTOR.
- TURN ENABLE RELAYS "ON" AND REAR RELEASE SOLENOID "OFF" (SEE ②).

TEST LAMP DOES NOT LIGHT

- IGNITION IN "OFF".
- RECONNECT REAR SOLENOID.
- DISCONNECT ABS CONTROLLER.
- DISCONNECT REAR ENABLE RELAY.
- CONNECT FUSED JUMPER BETWEEN TERMINALS "87" AND "30'" OF REAR ENABLE RELAY HARNESS CONNECTOR.
- CONNECT TEST LAMP TO GROUND AT TERMINAL **"J1-C15"** OF ABS CONTROLLER HARNESS CONNECTOR.
- IGNITION IN "RUN".

TEST LAMP DOES NOT LIGHT

- IGNITION IN "OFF".
- DISCONNECT REAR SOLENOID.
- MEASURE RESISTANCE BETWEEN TERMINALS "C' AND "B" OF REAR SOLENOID.

APPROX 3 OHMS

REPAIR OPEN IN "UW36".

INFINITE OHMS

REPLACE REAR SOLENOID.

TEST LAMP LIGHTS

4
- IGNITION IN "OFF".
- DISCONNECT ABS CONTROLLER AND TEST LAMP.
- MEASURE RESISTANCE FROM **TERMINAL "J1-C15"** OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.

INFINITE OHMS

REPLACE ABS CONTROLLER.

10 OHMS OR LESS

REPAIR SHORT TO GROUND IN **"UW36".**

TEST LAMP LIGHTS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

5
- DISCONNECT REAR SOLENOID.
- CONNECT TEST LAMP BETWEEN TERMINAL **"B"** OF REAR SOLENOID HARNESS CONNECTOR AND GROUND.
- TURN ENABLE RELAYS **"ON"** (SEE ②).

TEST LAMP DOES NOT LIGHT

REPAIR OPEN IN "PN52." BETWEEN REAR SOLENOID AND REAR ENABLE RELAY.

TEST LAMP LIGHTS

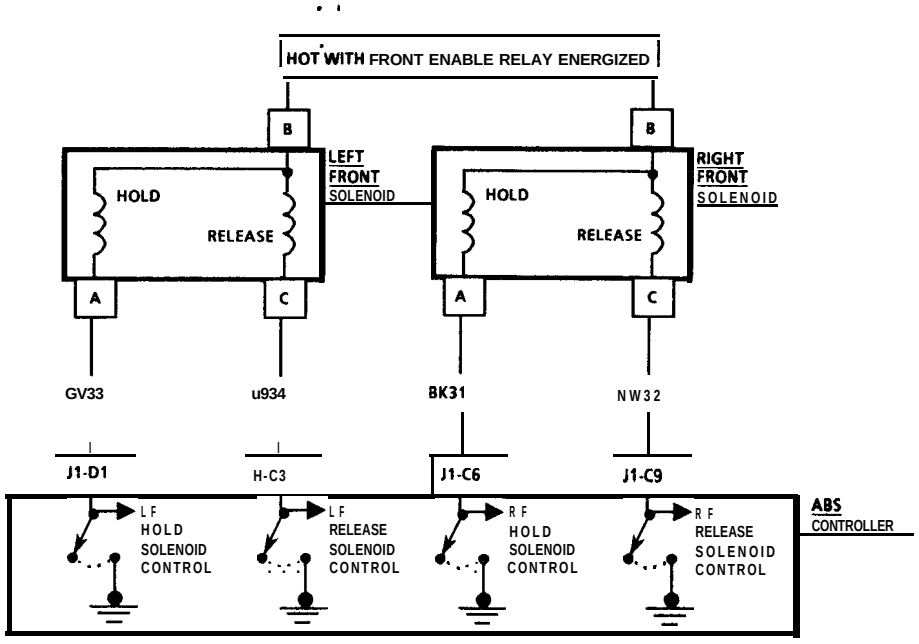
REPLACE REAR SOLENOID.

YES

FEEDBACK STATE HIGH

FAULT IS NOT PRESENT. **SEE** NOTE ON INTERMITTENTS IN INTRODUCTION.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A01 5

ONE OR MORE FRONT SOLENOIDS SHORTED

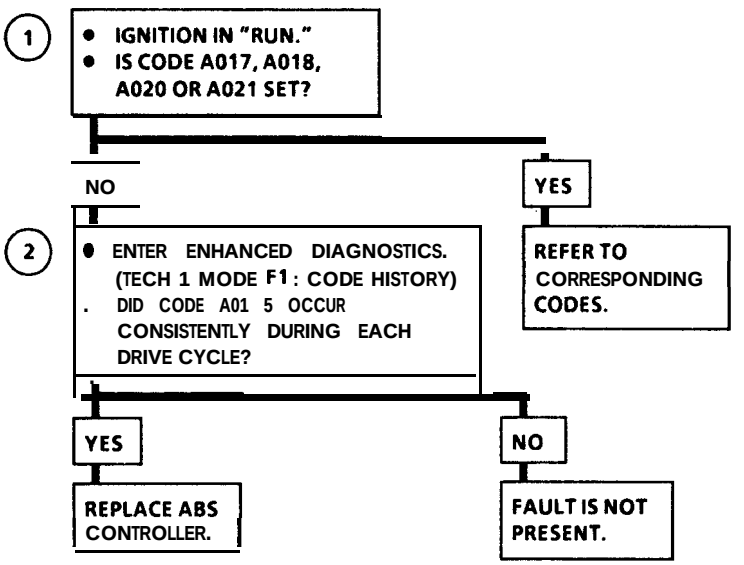
CODE A015 will set when the ABS Controller senses Battery voltage at Terminal **"J1-D1, J1-C3, J1-C6 or J1-C9"** when the corresponding Solenoid Control is closed.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

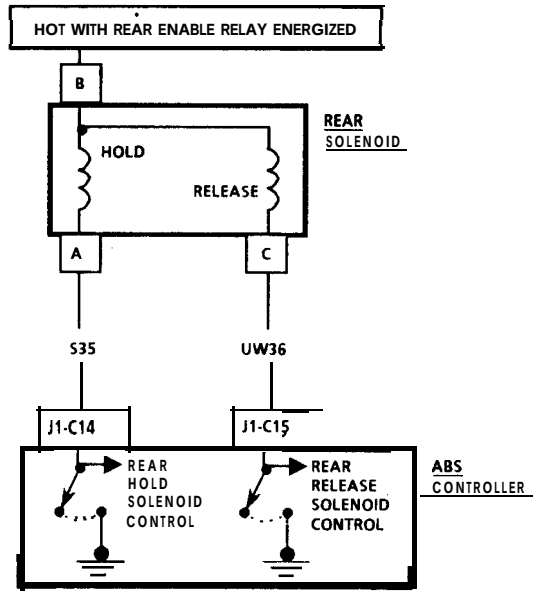
1. The reason for refering to these codes is that the fault that caused Code A015 to set will be linked to a specific circuit.
2. If the failure is consistent, ABS Controller has an internal fault.

CODE A01 5

ONE OR MORE FRONT SOLENOIDS SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A01 6

ONE OR BOTH REAR SOLENOIDS SHORTED

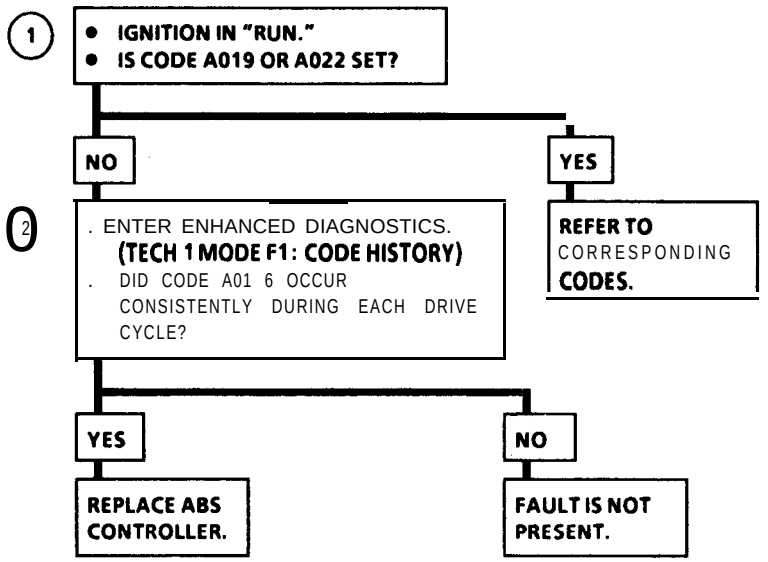
CODE A016 will set when the ABS Controller senses Battery voltage at Terminal "J1-C15 or "J1-C14" when the corresponding Solenoid Control is closed.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

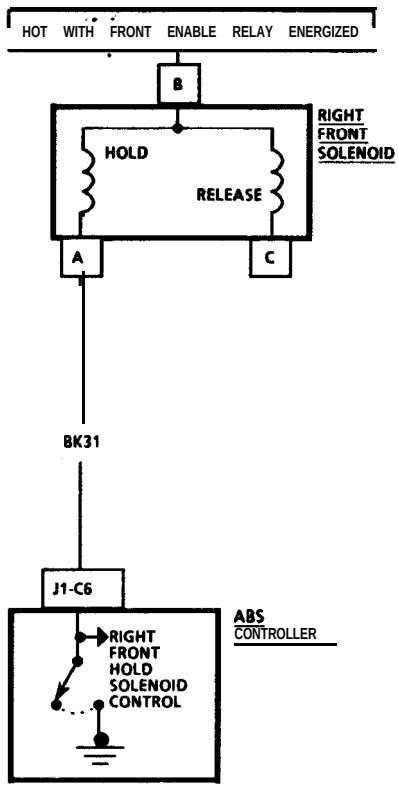
1. The reason for refering to these codes is that the fault that caused Code A016 to set will be linked to a specific circuit.
2. If the failure is consistent, ABS Controller has an internal fault.

CODE A016

ONE OR BOTH REAR SOLENOIDS SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A017

RIGHT FRONT HOLD SOLENOID SHORTED

When the Front Enable Relay is energized, voltage is applied to the Right Front Solenoid. If the **Right** Front Hold Solenoid Control is closed, ground is applied to BK31. This activates the Right Front Hold Solenoid.

CODE A017 will set during initialization when all the following conditions exist:

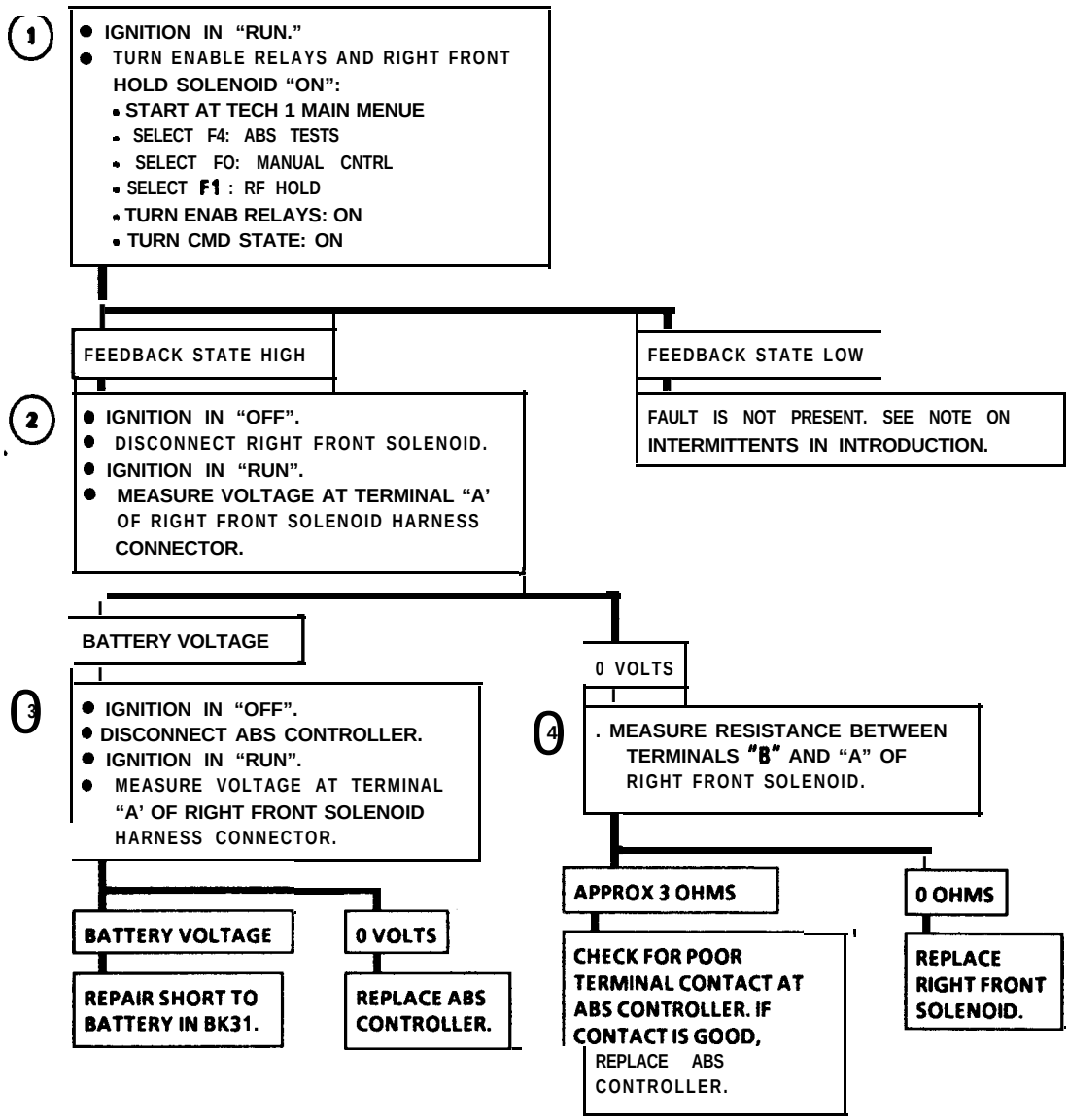
- The Front Enable Relay is energized.
- The Right Front Hold Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal "J1-C6".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

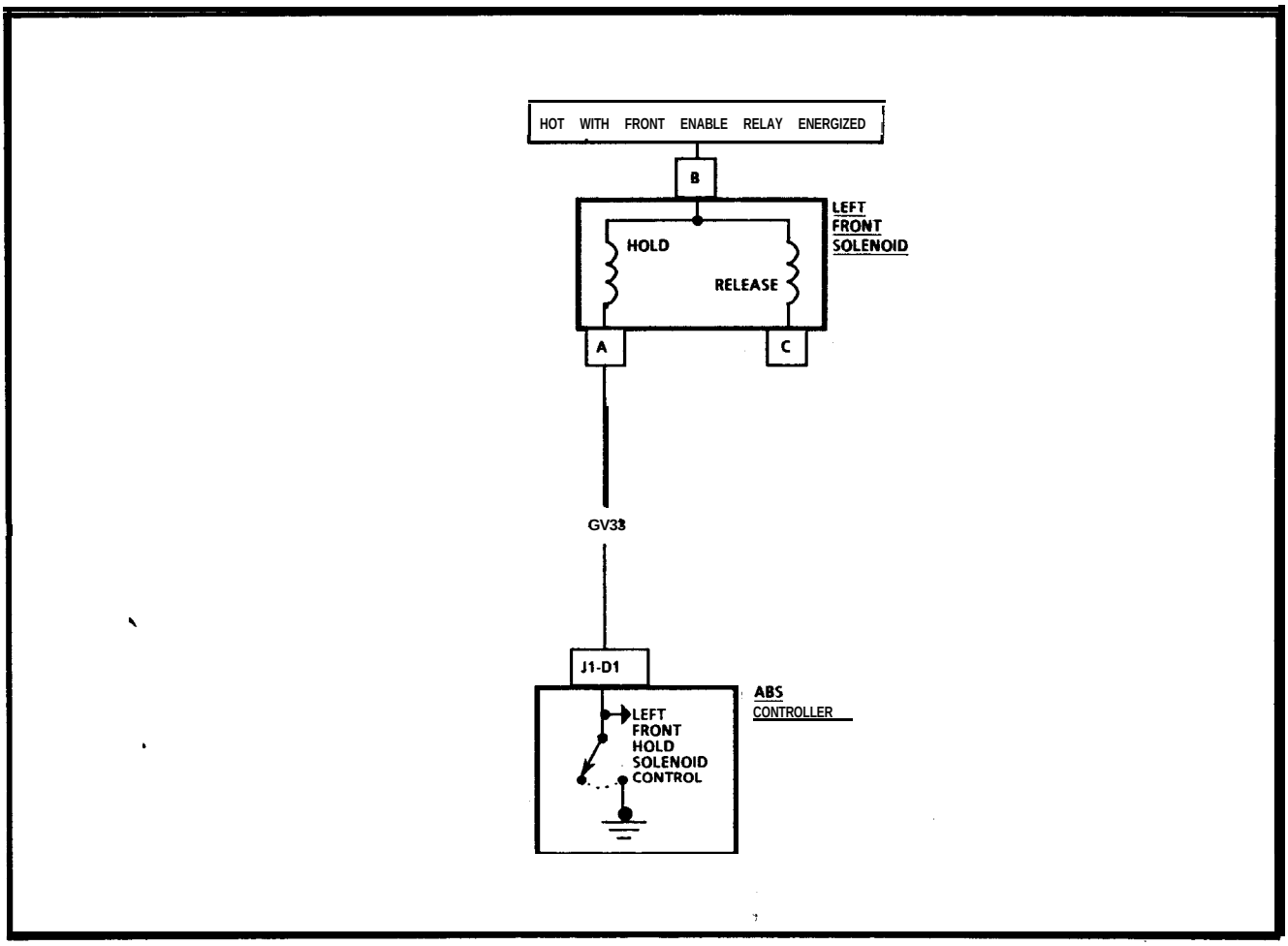
1. This determines if condition that set code A017 is still present.
2. Determines if short to Battery exists.
3. Determines if short to Battery is in BK31 or internal to the ABS Controller.
4. If Right Front Solenoid is not shorted, fault must be internal to the ABS Controller.

CODE A01 7

RIGHT FRONT HOLD SOLENOID SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A018

LEFT FRONT HOLD SOLENOID SHORTED

When the Front Enable Relay is energized, voltage is applied to the Left Front Solenoid. If the Left Front Hold Solenoid Control is closed, ground is applied to GY33. This activates the Left Front Hold Solenoid.

CODE A018 will set during initialization when all the following conditions exist:

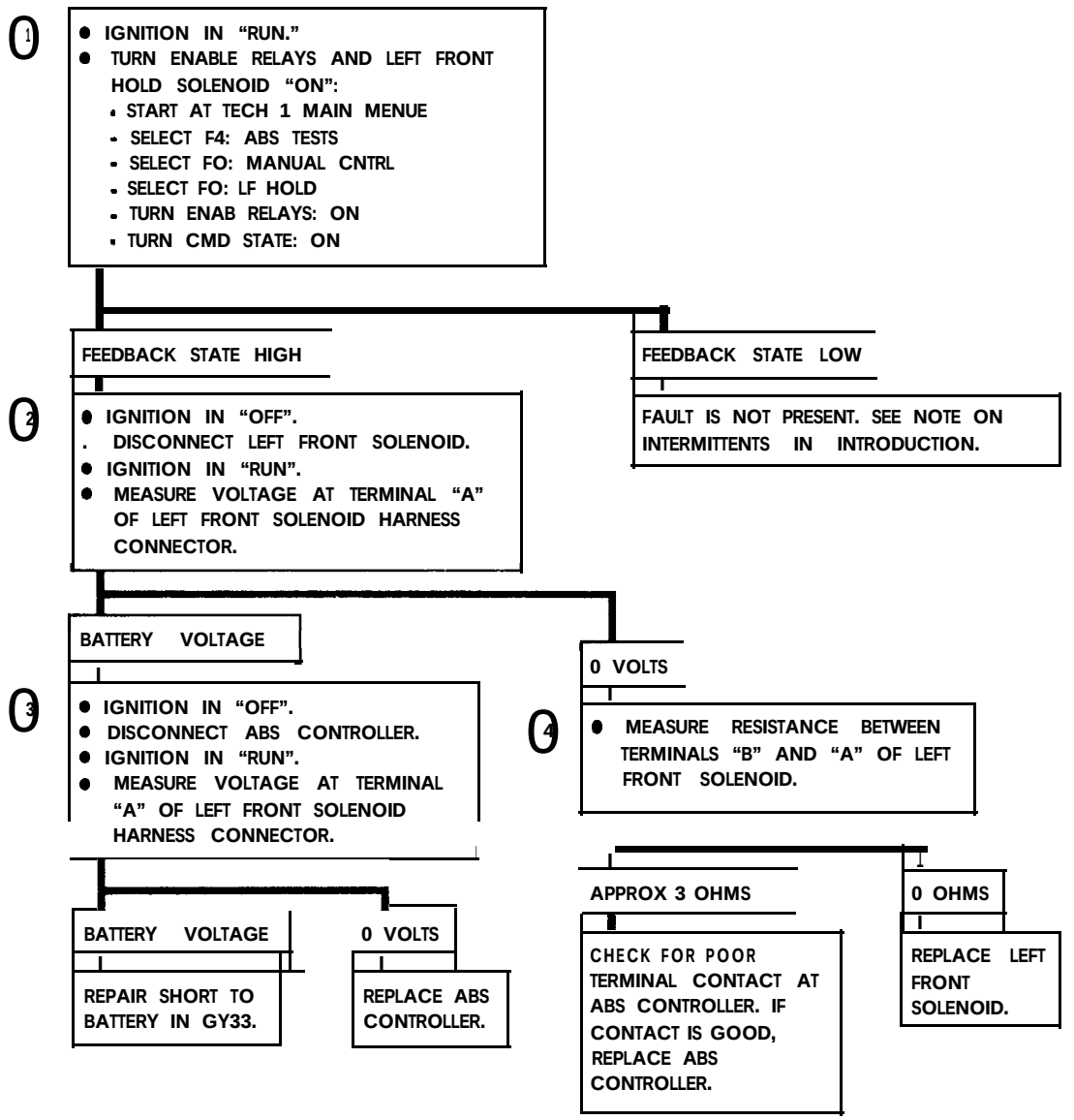
- The Front Enable Relay is energized.
- The Left Front Hold Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal "J1-D1".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

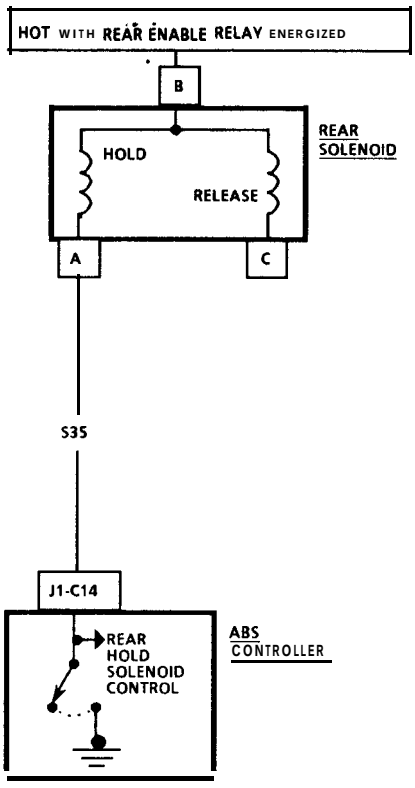
1. This determines ifcondition that set code A018 is still present.
2. Checks if short to Battery is in GY33 or internal to ABS Controller.
3. Determines if short to Battery is in GY33 or internal to the ABS Controller.
4. If Left Front Solenoid is not shorted, fault must be internal to the ABS Controller.

CODE A018

LEFT FRONT HOLD SOLENOID SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A019

REAR HOLD SOLENOID SHORTED

When the Rear Enable Relay is energized, voltage is applied to the Rear Solenoid. If the Rear Hold Solenoid Control is closed, ground is applied to S35. This activates the Rear Hold Solenoid.
CODE A019 will set during initialization when all the following conditions exist:

- The Rear Enable Relay is energized.
- The Rear Hold Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal "Jl-C14".

Test Description; The following provides an explanation of the procedures being followed in the facing trouble tree.

1. This determines if condition that set code A019 is still present.
2. Checks if short to Battery is in S35 or internal of ABS Controller.
3. Determines if short to Battery is in S35 or internal to the ABS Controller.
4. If Rear Solenoid is not shorted, fault must be internal to the ABS Controller.

CODE A019

REAR HOLD SOLENOID SHORTED

1

- IGNITION IN "RUN."
- TURN ENABLE RELAYS AND REAR HOLD SOLENOID "ON":
  - START AT TECH 1 MAIN MENUE
  - SELECT F4: ABS TESTS
  - SELECT FO: MANUAL CNTRL
  - SELECT F2: RER HOLD
  - TURN ENAB RELAYS: ON
  - TURN CMD STATE: ON

FEEDBACK STATE HIGH

FEEDBACK STATE LOW

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

2

- IGNITION IN "OFF".
- DISCONNECT REAR SOLENOID.
- IGNITION IN "RUN".
- MEASURE VOLTAGE AT TERMINAL "A" OF REAR SOLENOID HARNESS CONNECTOR.

BATTERY VOLTAGE

0 VOLTS

3

. IGNITION IN "OFF".
. DISCONNECT ABS CONTROLLER.
. IGNITION IN "RUN".
- MEASURE VOLTAGE AT TERMINAL "A" OF REAR SOLENOID HARNESS CONNECTOR.

BATTERY VOLTAGE

REPAIR SHORT TO BATTERY IN GY33.

0 VOLTS

REPLACE ABS CONTROLLER.

4

. MEASURE RESISTANCE BETWEEN TERMINALS "B" AND "A" OF REAR SOLENOID.

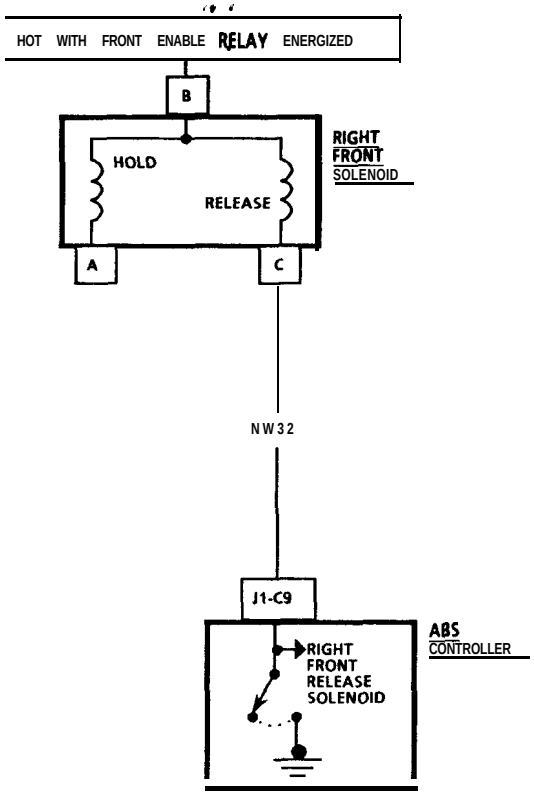
APPROX 3 OHMS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.

0 OHMS

REPLACE REAR SOLENOID.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A020

RIGHT FRONT RELEASE SOLENOID SHORTED

When the Front Enable Relay is energized, voltage is applied to the Right Front Solenoid. If the Right Front Release Solenoid Control is closed, ground is applied to NW32. This activates the Right Front Release Solenoid.

CODE A020 will set during initialization when all the following conditions exist:

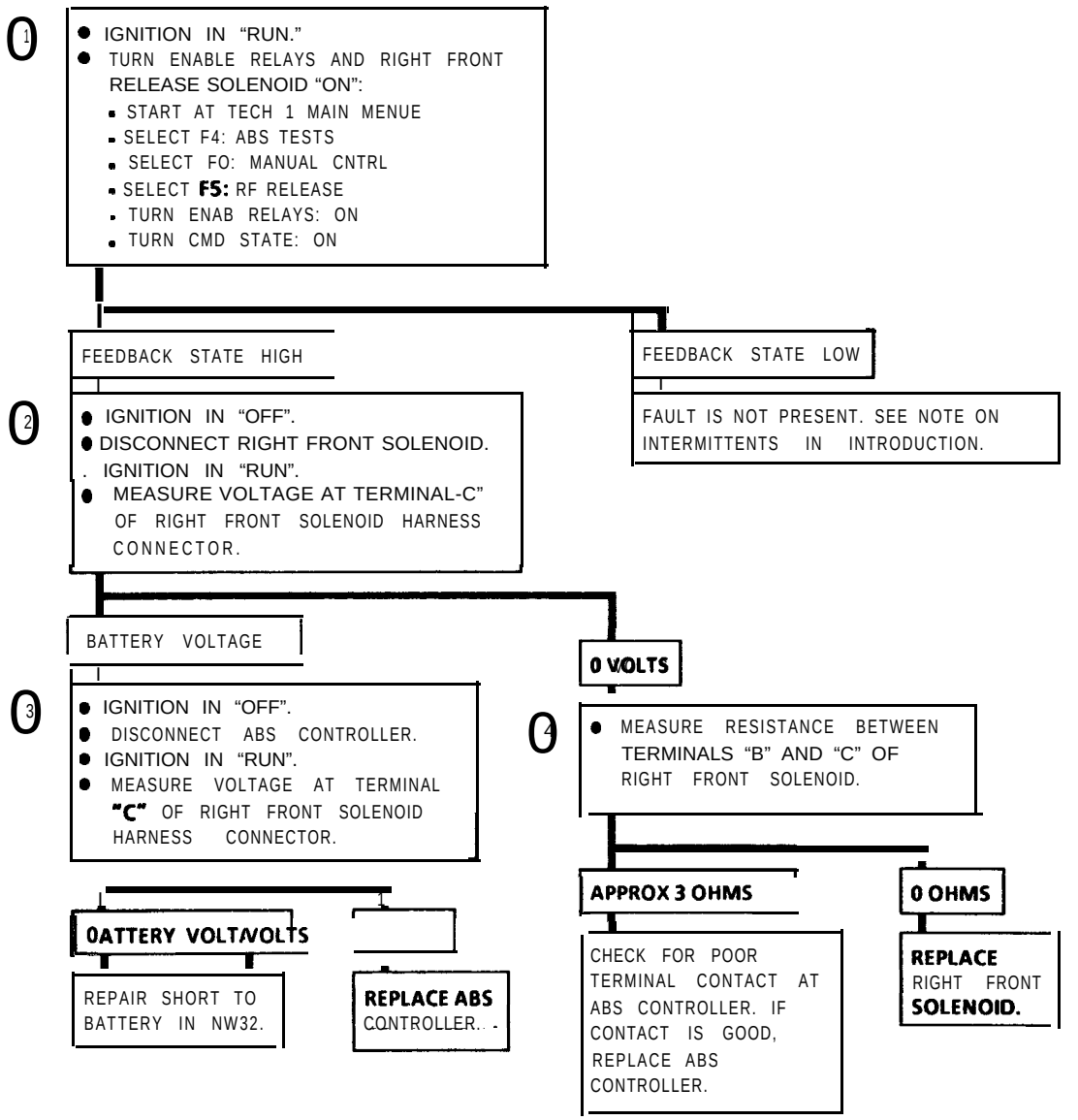
- The Front Enable Relay is energized.
- The Right Front Release Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal "J1-C9".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

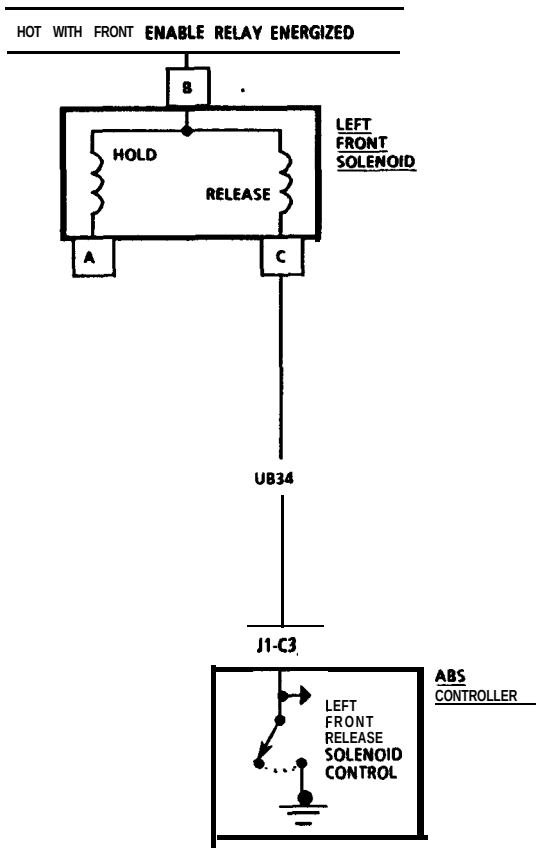
1. This determines ifcondition that set Code A020 is still present.
2. Checks if short to Battery exists.
3. Determines if short to Battery is in NW32 or internal to ABS Controller.
4. If Right Front Solenoid is not shorted, fault must be internal to ABS Controller.

CODE A020

RIGHT FRONT RELEASE SOLENOID SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A021

LEFT FRONT RELEASE SOLENOID SHORTED

When the Front Enable Relay is energized, voltage is applied to the Left Front Solenoid. If the Left Front Release Solenoid Control is closed, ground is applied to UB34. This activates the **Left** Front Release Solenoid.

CODE A021 will set during initialization when all the following conditions exist:

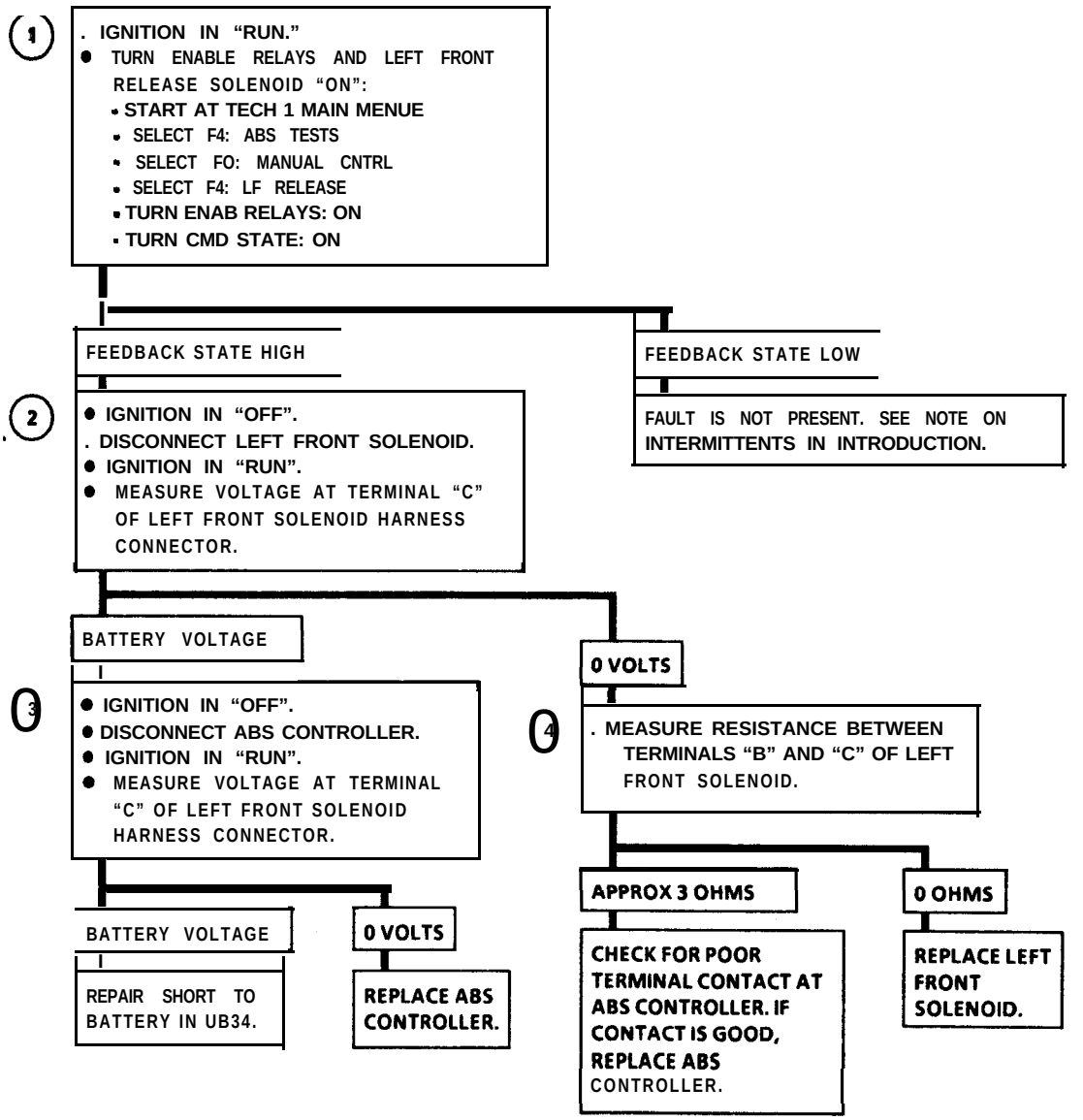
- The Front Enable Relay is energized.
- The Left Front Release Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal **"J1-C3".**

Test Description: The foliowing provides an explanation of the procedures being followed in the facing trouble tree.

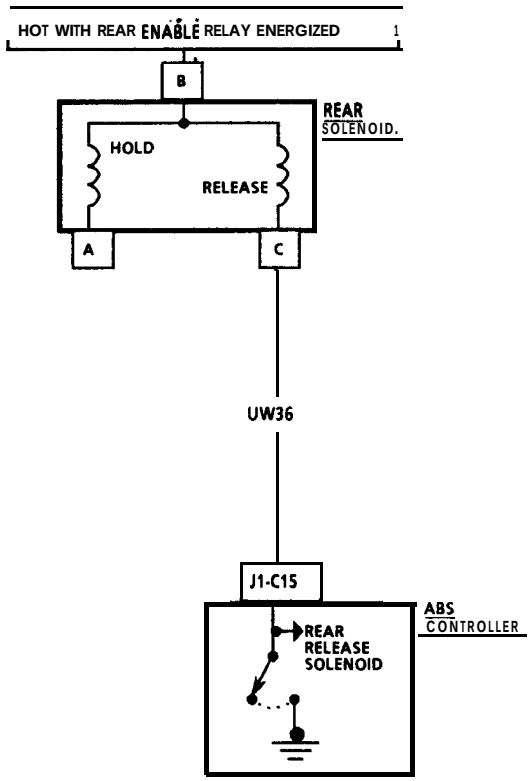
1. This determines if condition that set Code A021 is still present.
2. Checks **if short** to Battery exists.
3. Determines if short to Battery is in UB34 or internal to ABS Controller.
4. If Left Front Solenoid is not shorted, fault must be internal to ABS Controller.

CODE A021

LEFT FRONT RELEASE SOLENOID SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A022

REAR RELEASE SOLENOID SHORTED

When the Rear Enable Relay is energized, voltage is applied to the Rear Solenoid. If the Rear Release Solenoid Control is closed, ground is applied to UW36. This activates the Rear Release Solenoid.

CODE A022 will set during initialization when all the following conditions exist:

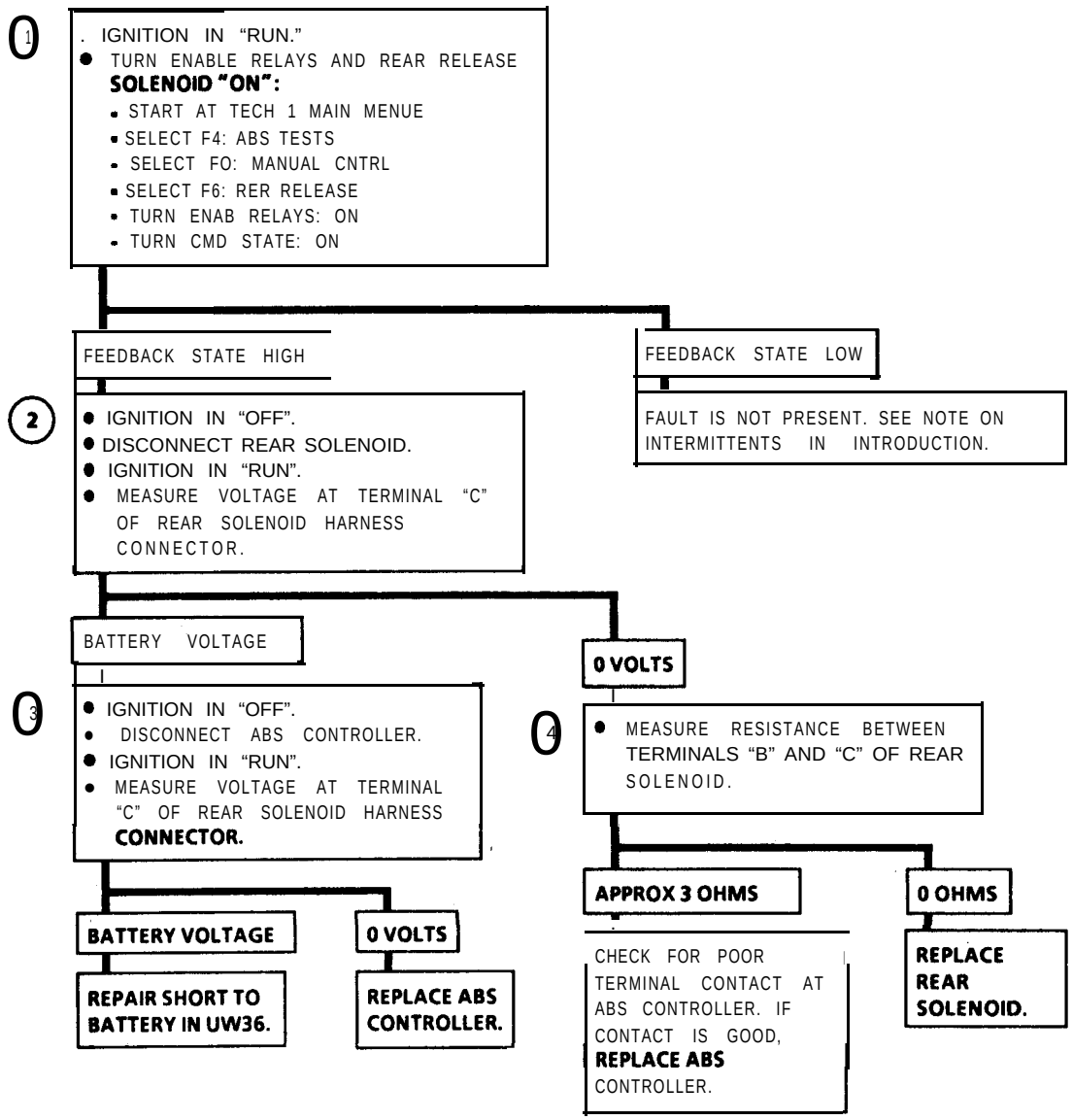
- The Rear Enable Relay is energized.
- The Rear Release Solenoid Control is closed.
- The ABS Controller senses Battery voltage at Terminal **"J1-C15".**

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

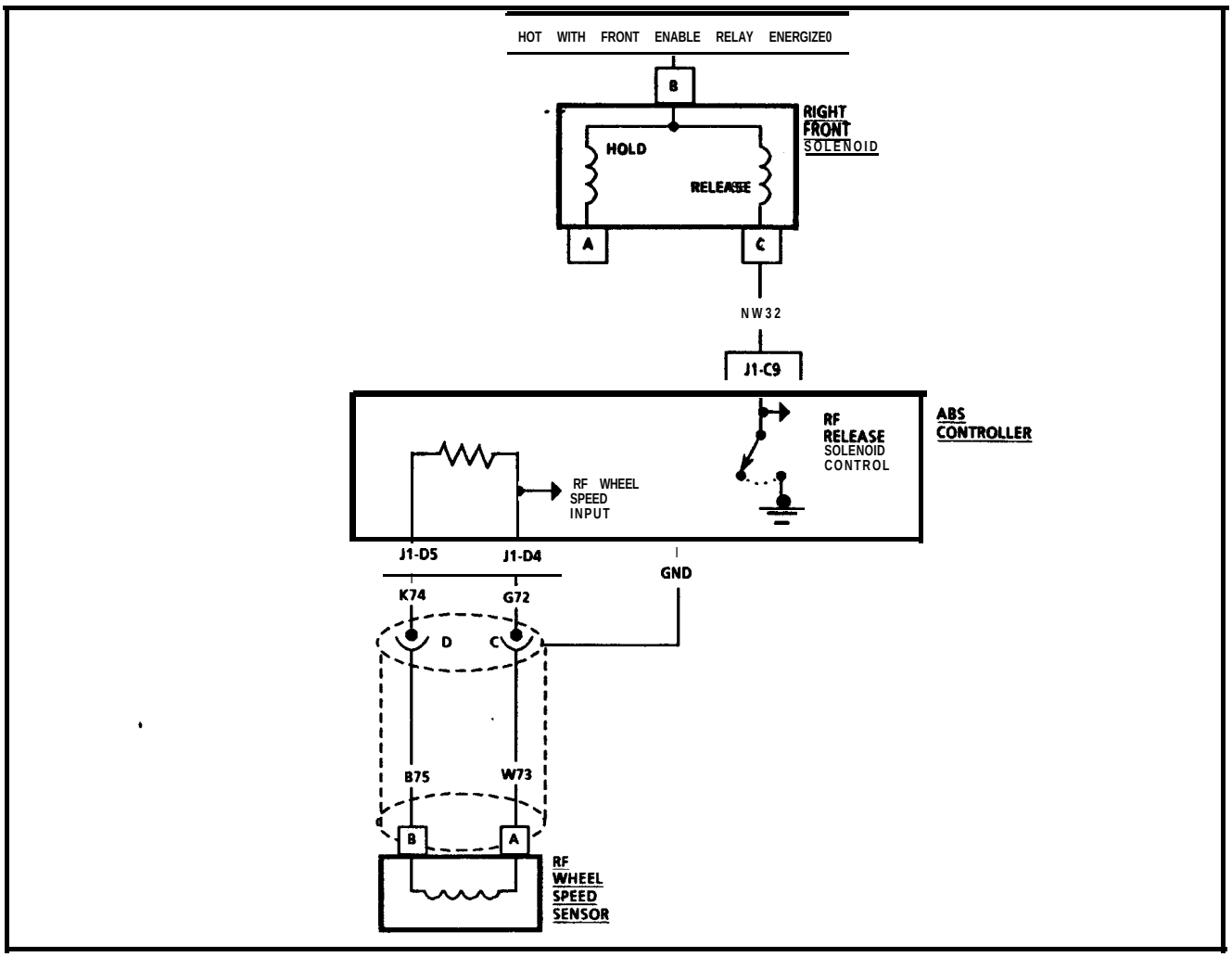
1. This determines if condition that set Code A022 is still present.
2. Checks if short to Battery exists.
3. Determines if short to Battery is in UW36 or internal to ABS Controller.
4. If Rear Solenoid is not shorted, fault must be internal to ABS Controller.

CODE A022

REAR RELEASE SOLENOID SHORTED



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, Is GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A023

RIGHT FRONT RELEASE SOLENOID ENERGIZED TOO LONG

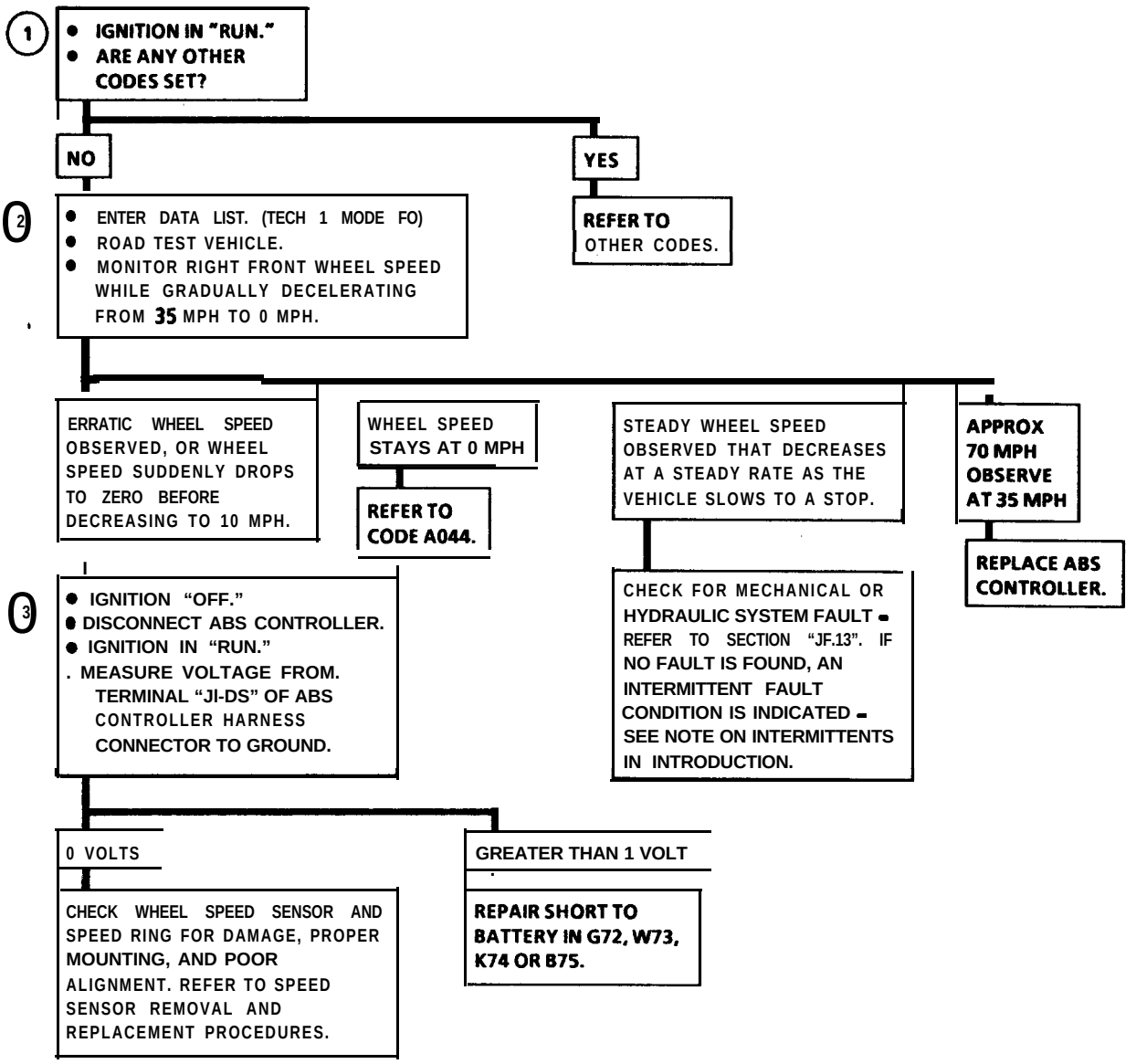
By monitoring the Right Front Wheel Speed Sensor, the ABS Controller can determine if the Right Front Wheel is locking up. If this condition occurs, the controller will activate the Right Front Release Solenoid by closing the Right Front Release Solenoid Control. The Solenoid Control will be closed until the Controller determines that the Right Front Wheel has increased to an acceptable speed.
CODE A023 will set when the ABS Controller senses that the Right Front Release Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

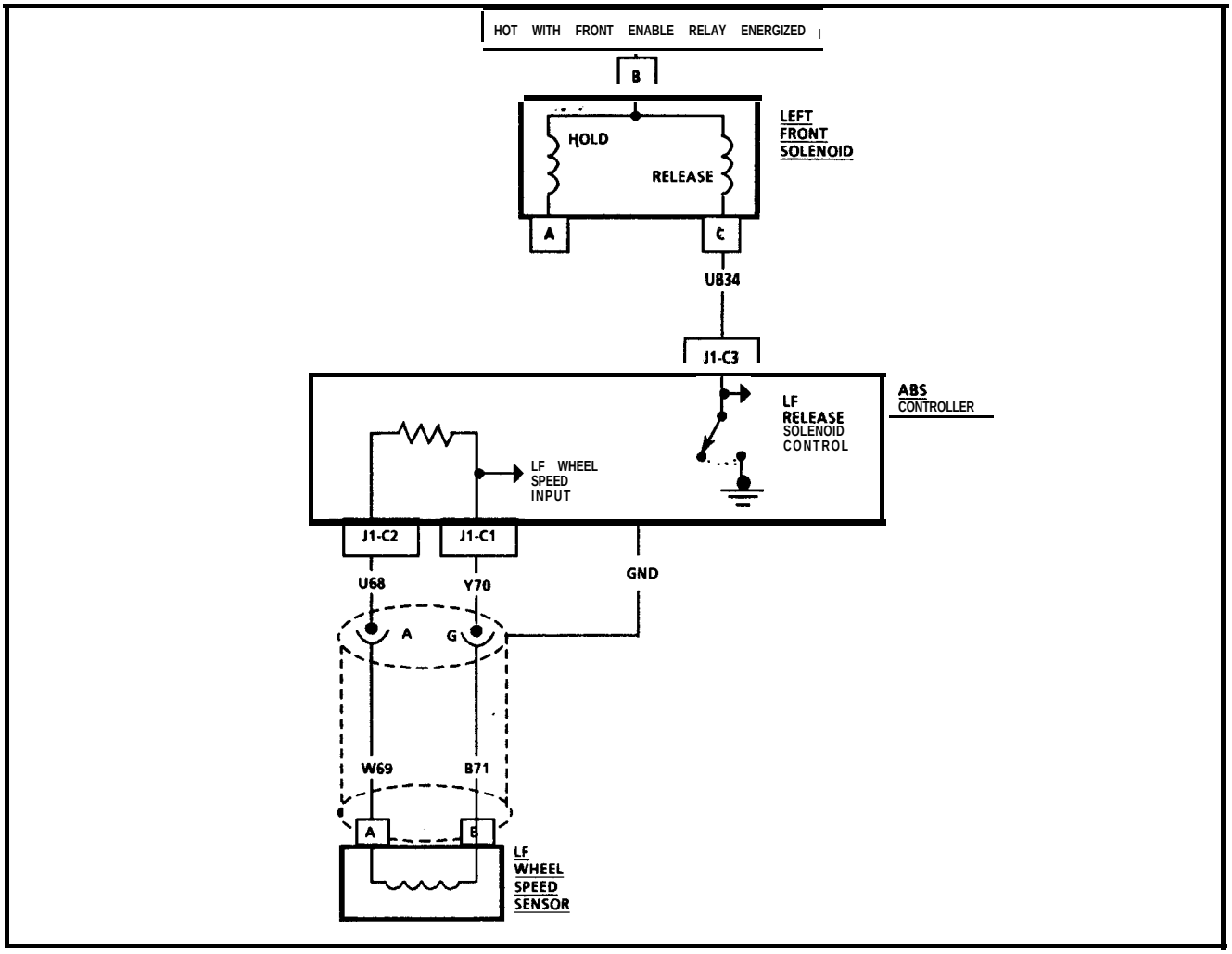
1. If any other codes are set they should be addressed first. The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the Right Front Wheel Speed input, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds.
   If the wheel speed input is found to be steady at a low speed a mechanical or hydraulic problem is indicated - refer to Section **"JF.13"**. A wheel speed that stays at 0 MPH indicates an open. Refer to Code A044.
3. This checks for a possible short to voltage on G72, W73, K74 or **B75**.

CODE A023

RIGHT FRONT RELEASE SOLENOID ENERGIZED TOO LONG



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A024

LEFT FRONT RELEASE SOLENOID ENERGIZED TOO LONG

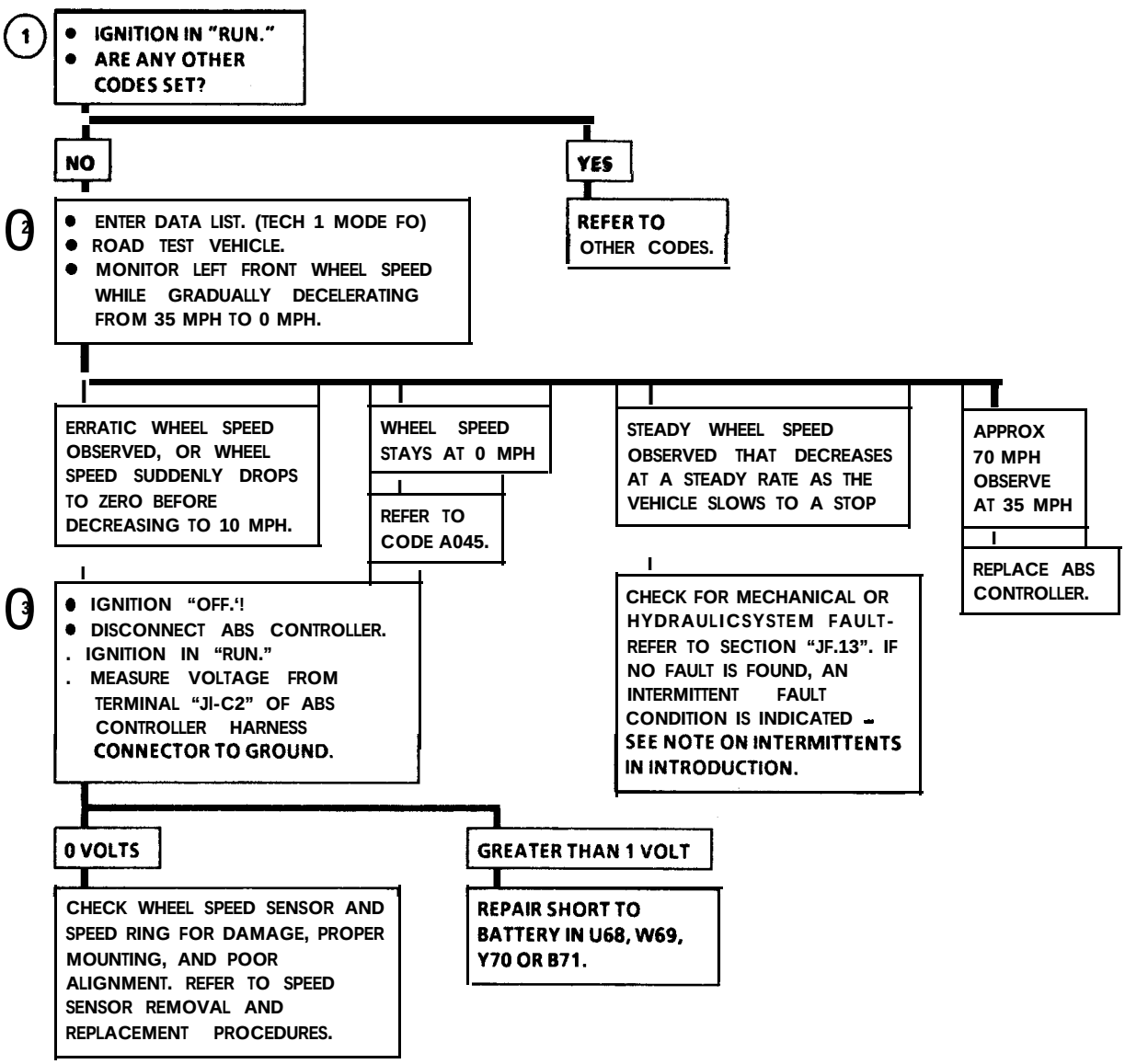
By monitoring the Left Front Wheel Speed Sensor, the ABS Controller can determine if the Left Front Wheel is locking up during an ABS stop. If this condition occurs, the Controller will activate the Left Front Release Solenoid by closing the Left Front Release Solenoid Control. The Solenoid Control will be closed until the Controller determines that the Left Front Wheel has increased to an acceptable speed.
CODE A024 will set when the ABS Controller senses that the Left Front Release Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

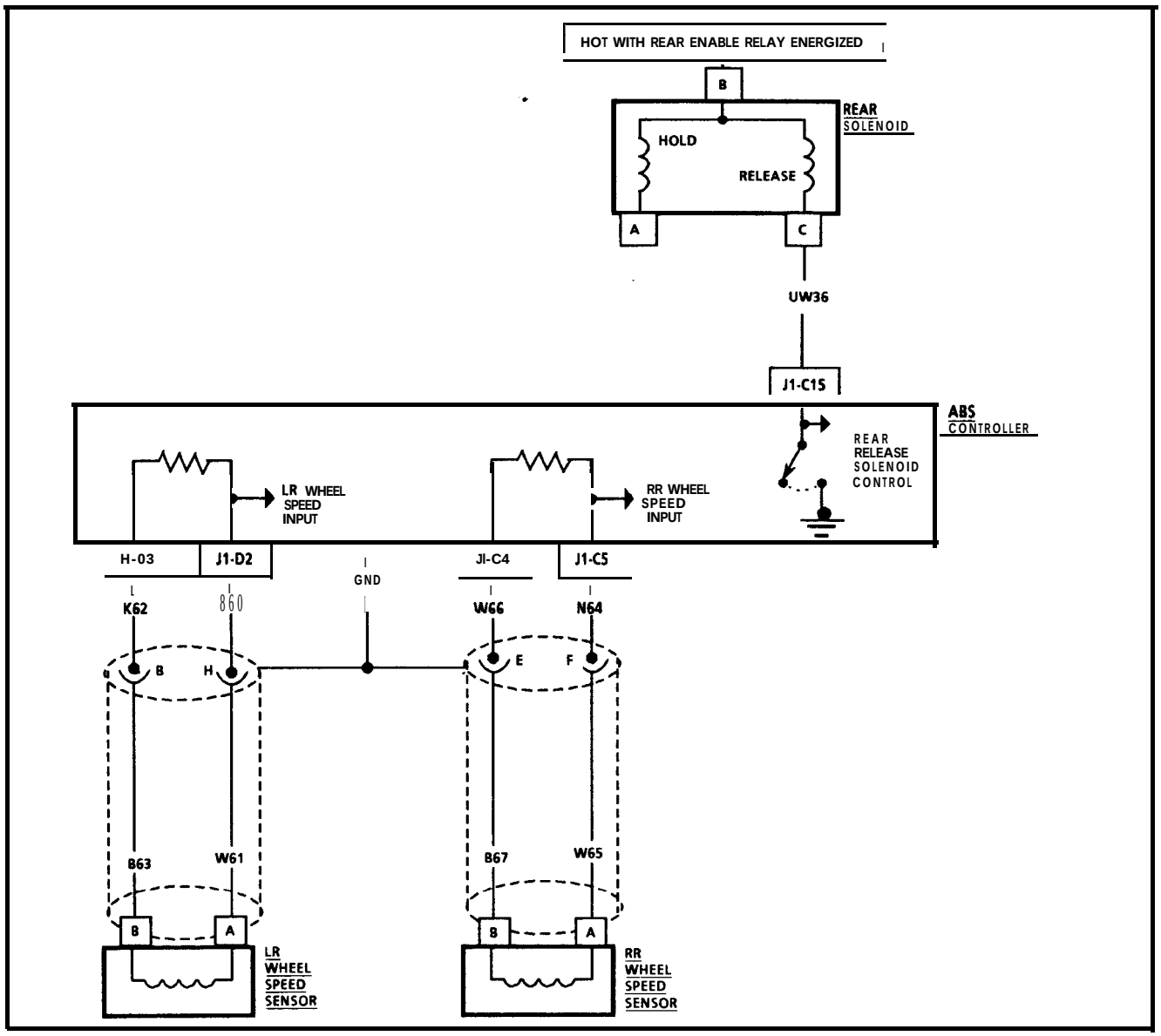
1. If any other codes are set they should be addressed first: The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the Left Front Wheel Speed input, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds. if the wheel speed input is found to be steady at a low speed a mechanical or hydraulic problem is indicated - refer to Section "JF. 13". A wheel speed that stays at 0 MPH indicates an open - refer to Code A045.
3. This checks for a possible short to voltage on U68, W69, Y70 or B71.

CODE A024

LEFT FRONT RELEASE SOLENOID ENERGIZED TOO LONG



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A025

REAR RELEASE SOLENOID ENERGIZED TOO LONG

By monitoring the Rear Wheel Speed Sensors, the ABS Controller can determine if a rear wheel is locking up during an ABS stop. If the condition occurs, the Controller will activate the Rear Release Solenoid by closing the Rear Release Solenoid Control. The Solenoid Control will be closed until the ABS Controller determines that both rear wheels have increased to acceptable speeds.

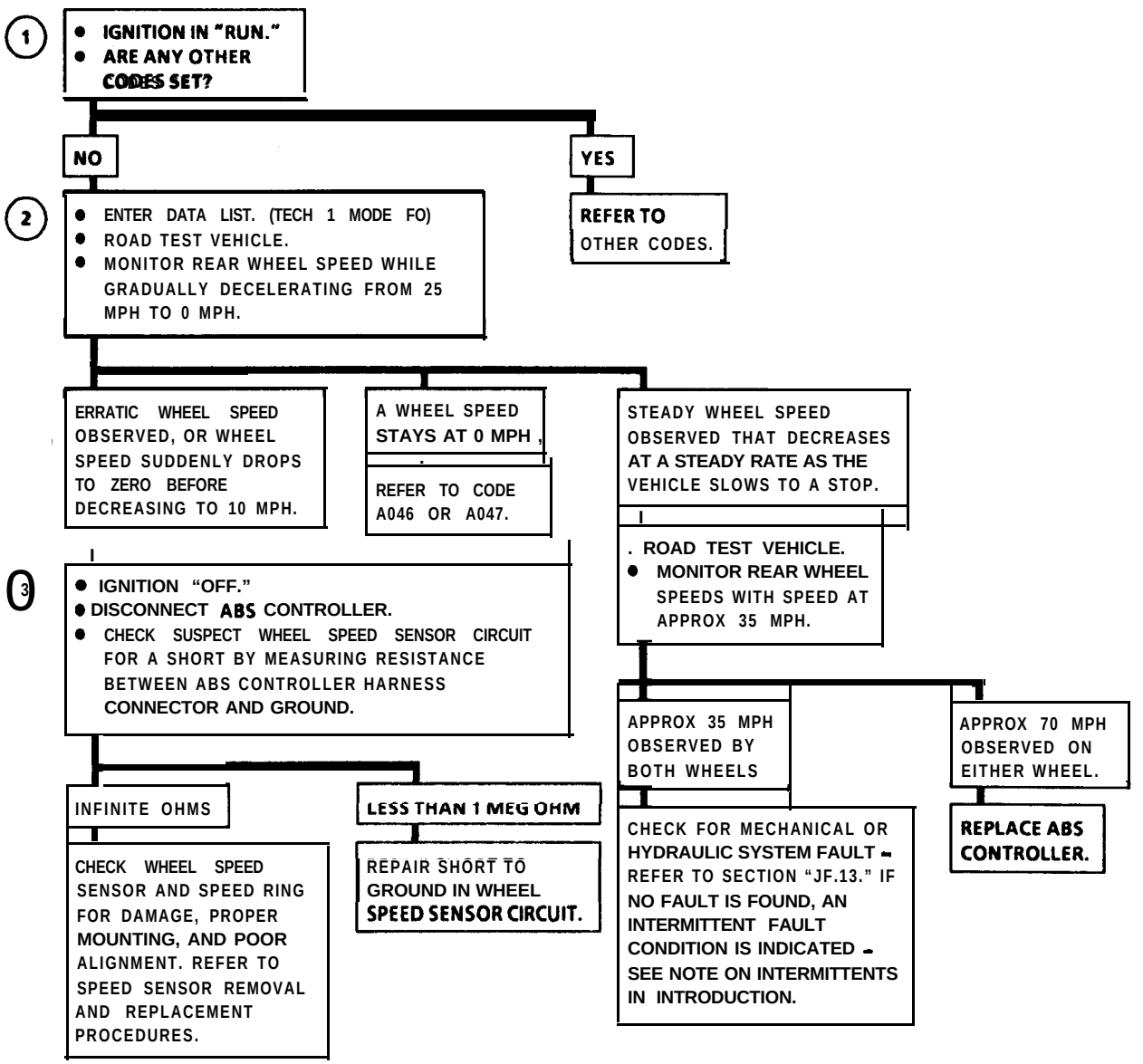
CODE A025 will set when the ABS Controller senses that the Rear Release Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

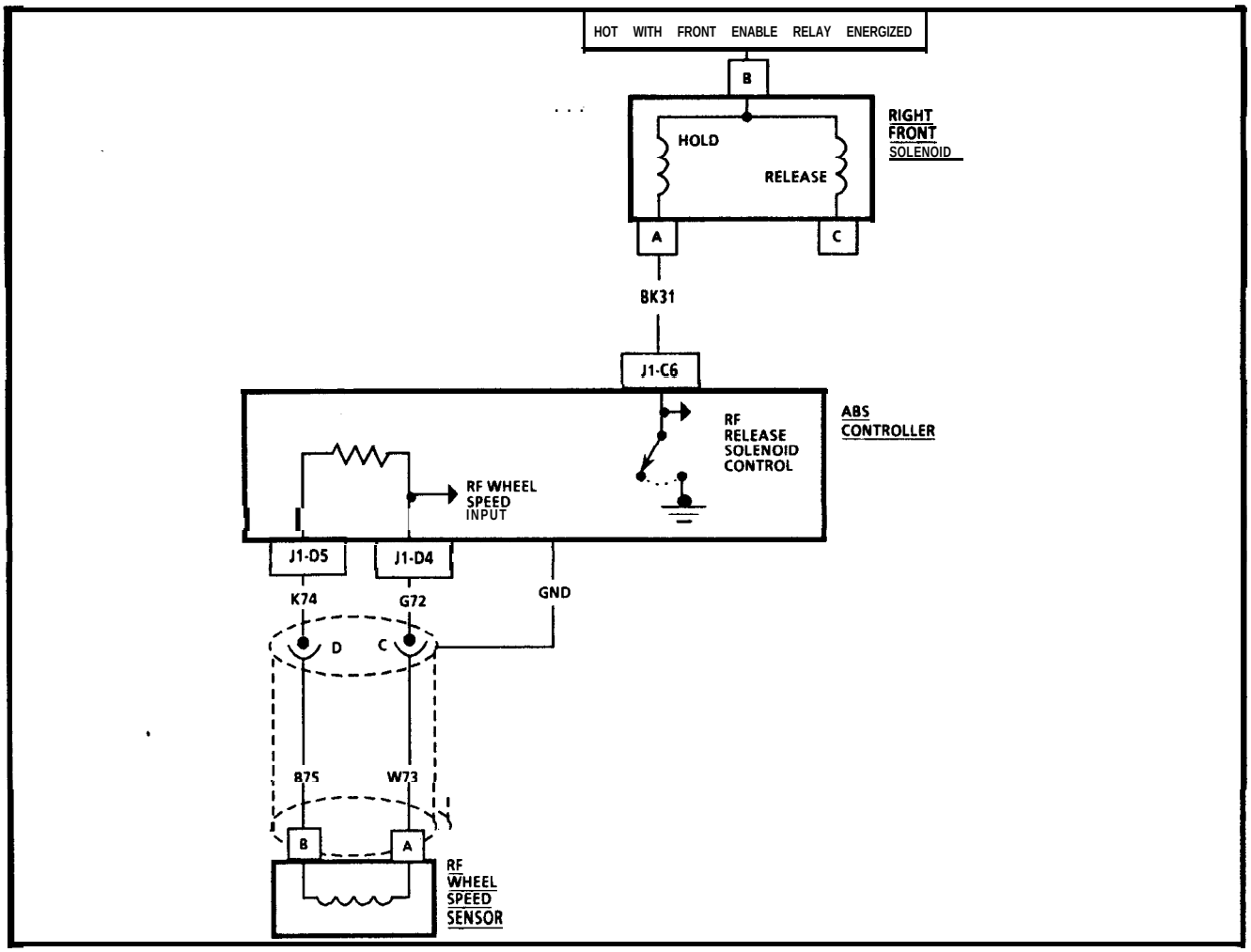
1. If any other codes are set they should be addressed first. The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the rear wheel speed inputs, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds. If the wheel speed input is found to be steady at low speed, a mechanical or hydraulic problem is indicated-refer to Section "JF.13". A wheel speed that stays at 0 MPH indicates an open - refer to Code A046 or A047.
3. This checks for a possible short to ground on the suspect Wheel Speed Sensor Circuit.

CODE A025

REAR RELEASE SOLENOID ENERGIZED TOO LONG



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A026

RIGHT FRONT HOLD SOLENOID ENERGIZED TOO LONG

By monitoring the Right Front Wheel Speed Sensor, the ABS Controller can determine if the Right Front Wheel is not decelerating properly during an ABS stop. If this condition occurs, the Controller will activate the Right Front Hold Solenoid by closing the Right Front Hold Solenoid Control. The Solenoid Control will be closed until the ABS Controller determines that the Right Front Wheel has decreased to an acceptable speed.

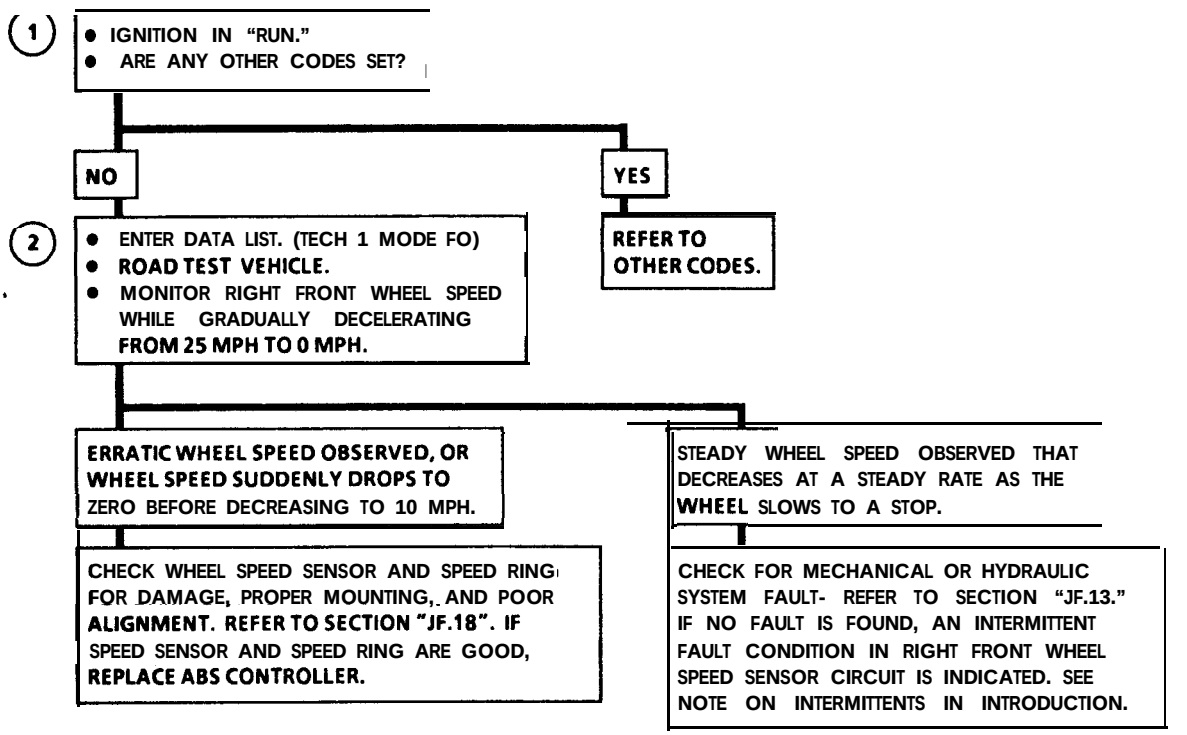
CODE A026 will set when the ABS Controller senses that the Right Front Hold Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If any other codes are set, they should be addressed first. The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the Right Front Wheel Speed input, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds. If the wheel speed input is found to be steady at a low speed, a mechanical or hydraulic problem is indicated.

CODE A026

RIGHT FRONT HOLD SOLENOID ENERGIZED TOO LONG



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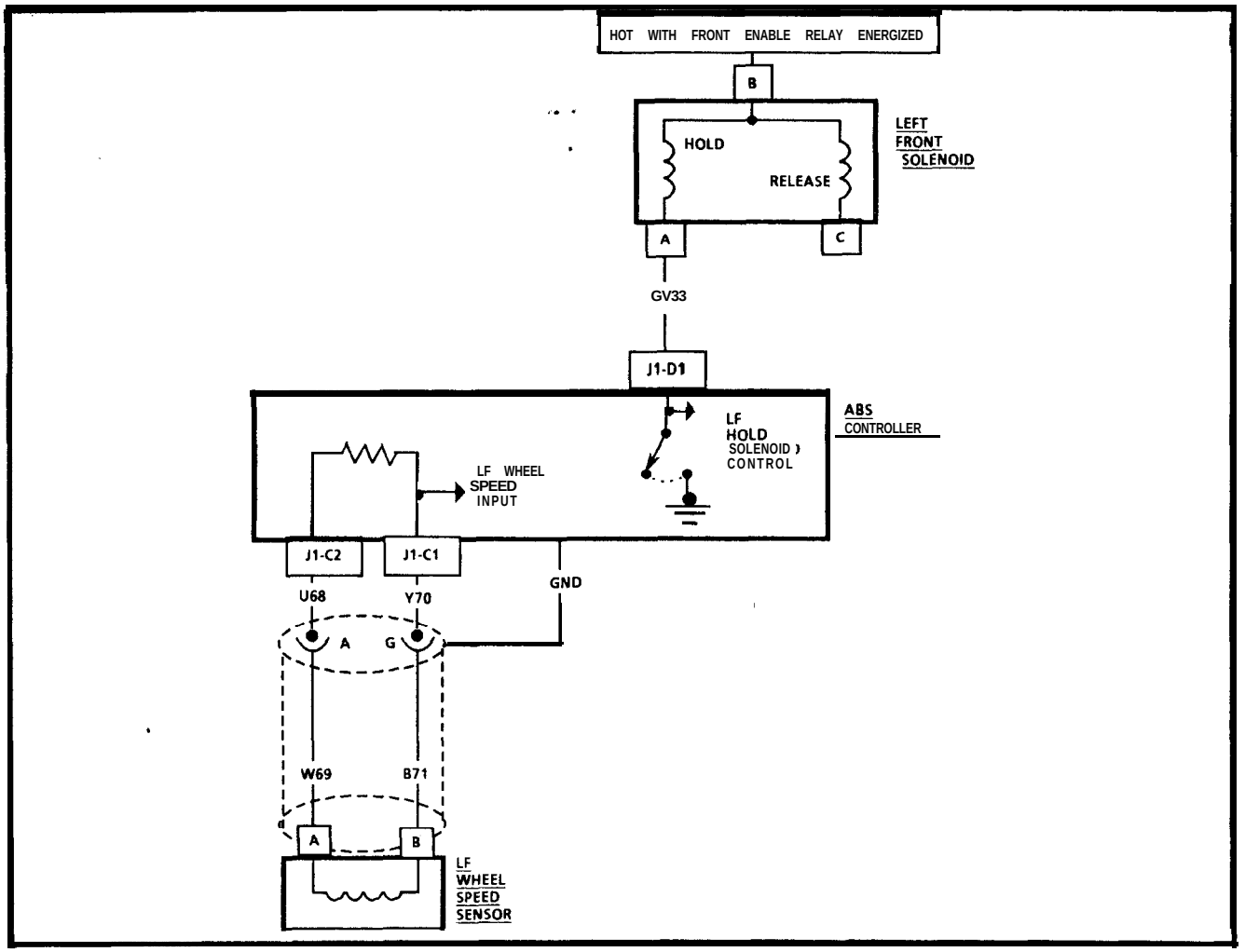


CODE A027

LEFT FRONT HOLD SOLENOID ENERGIZED TOO LONG

By monitoring the Left Front Wheel Speed Sensor, the ABS Controller can determine if the Left Front Wheel is not decelerating properly during an ABS stop. If this condition occurs, the ABS Controller will activate the Left Front Hold Solenoid by closing the Left Front Hold Solenoid Control. The Solenoid Control will be closed until the ABS Controller determines that the Left Front Wheel has decreased to an acceptable speed.

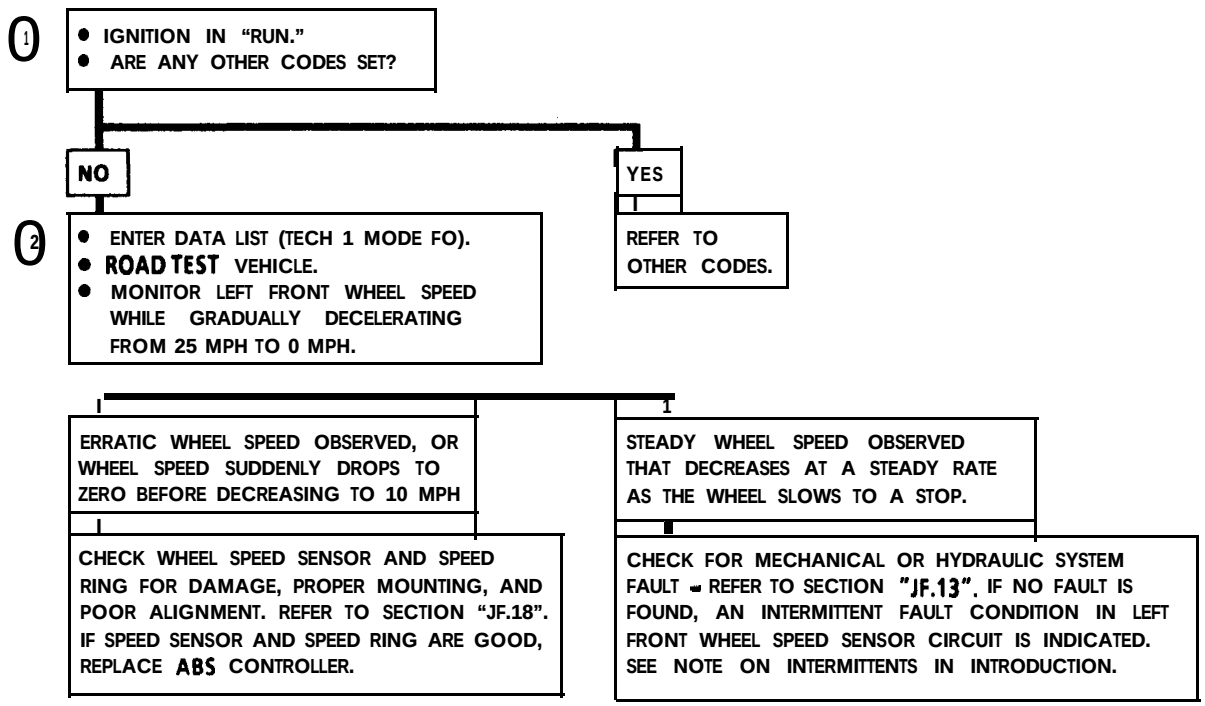
CODE A027 will set when the ABS Controller senses that the Left Front Hold Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If any other codes are set they should be addressed first. The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the Left Front Wheel Speed Input, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds. If the wheel speed input is found to be steady at a low speed, a mechanical or hydraulic problem is indicated.

CODE A027

LEFT FRONT HOLD SOLENOID ENERGIZED TOO LONG



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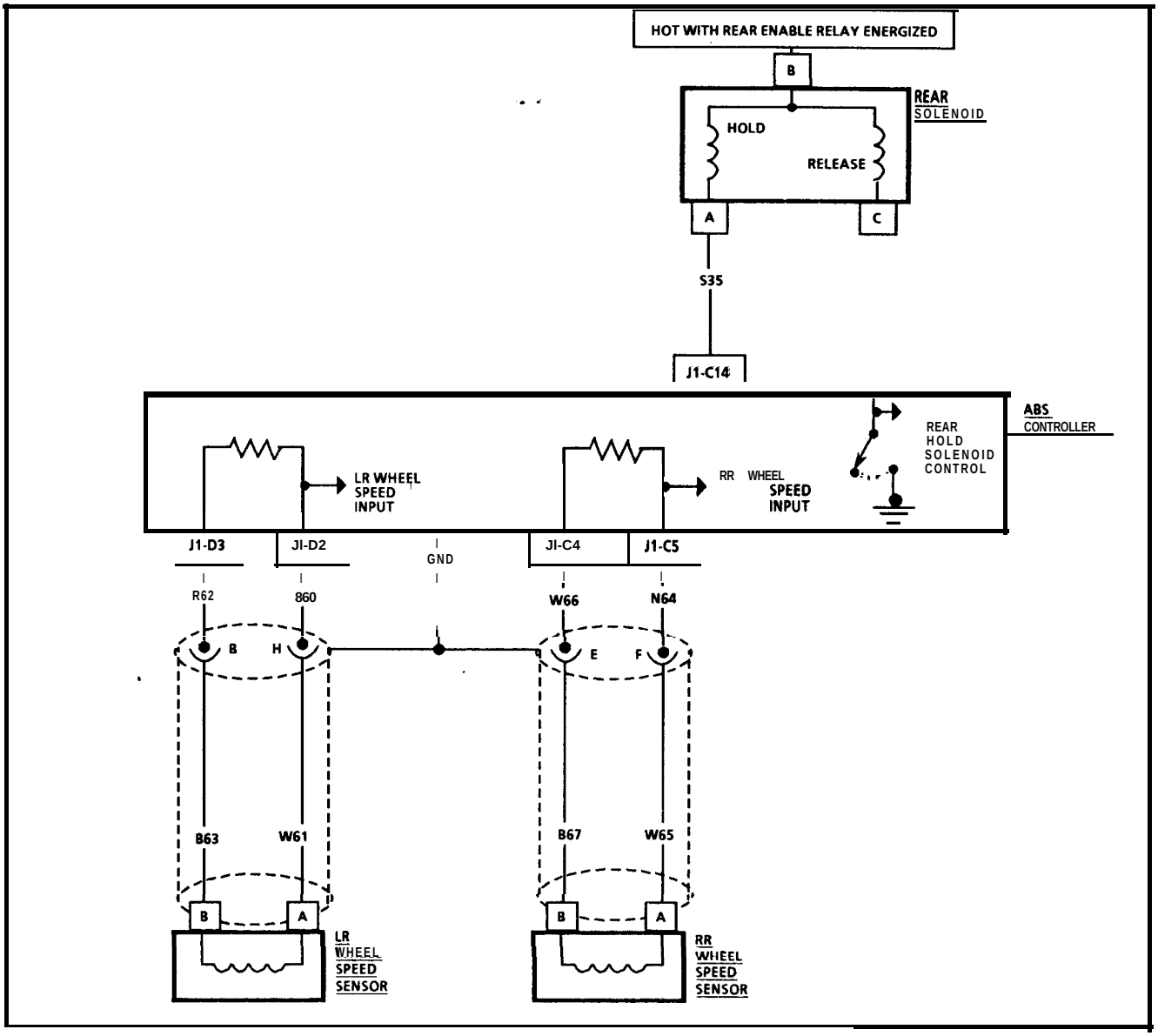


CODE A028

REAR HOLD SOLENOID ENERGIZED TOO LONG

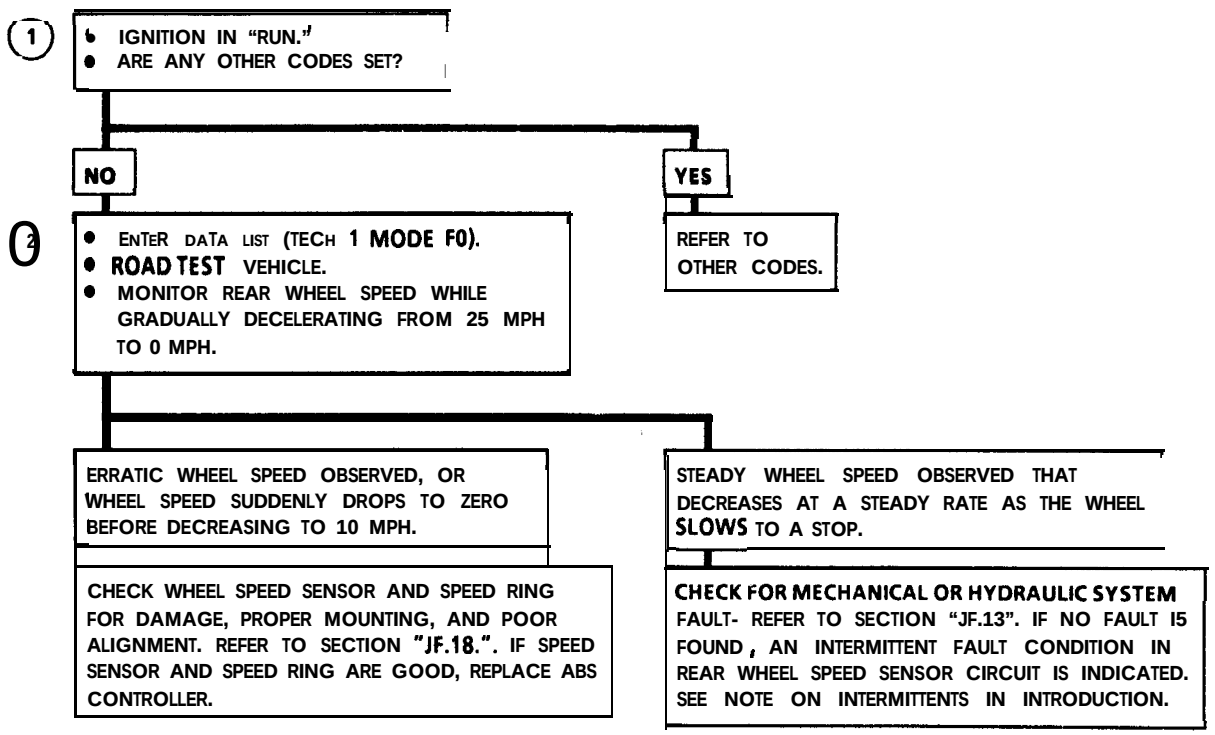
By monitoring the Rear Wheel Speed Sensors, the ABS Controller can determine if a Rear Wheel is not decelerating properly during an ABS stop. If this condition occurs, the ABS Controller will activate the Rear Hold Solenoid by closing the Rear Hold Solenoid Control. The Solenoid Control will be closed until the ABS Controller determines that the Rear Wheel has decreased to an acceptable speed.
CODE, A028 will set when the ABS Controller senses that the Rear Hold Solenoid has been energized longer than proper operation requires.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If any other codes are set they should be addressed first. The reason for this is that the fault that caused the solenoid to be energized too long will be better identified.
2. By examining the rear wheel speed inputs, it can be determined if the fault is due to erratic wheel speed inputs which occur only at low speeds. If the wheel speed input is found to be steady at low speed, a mechanical or hydraulic problem is indicated.

CODE A028

REAR HOLD SOLENOID ENERGIZED TOO LONG



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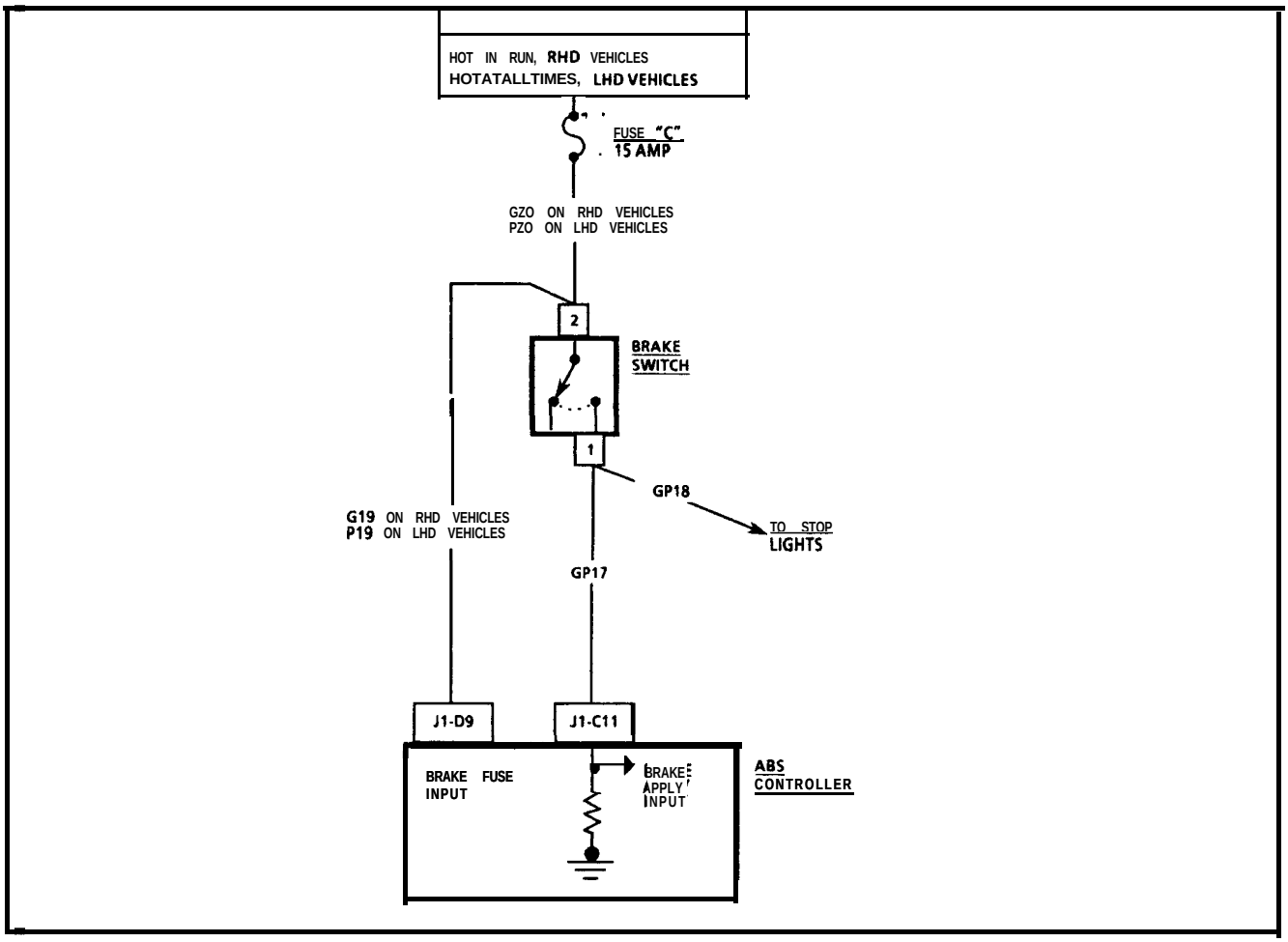


CODE A029

BRAKE SWITCH FUSE INPUT CIRCUIT OPEN

Voltage is applied through Fuse "C" to the Brake Switch and terminal **"J1-D9"** of the ABS-Controller. Code A029 will set when the following condition exists:

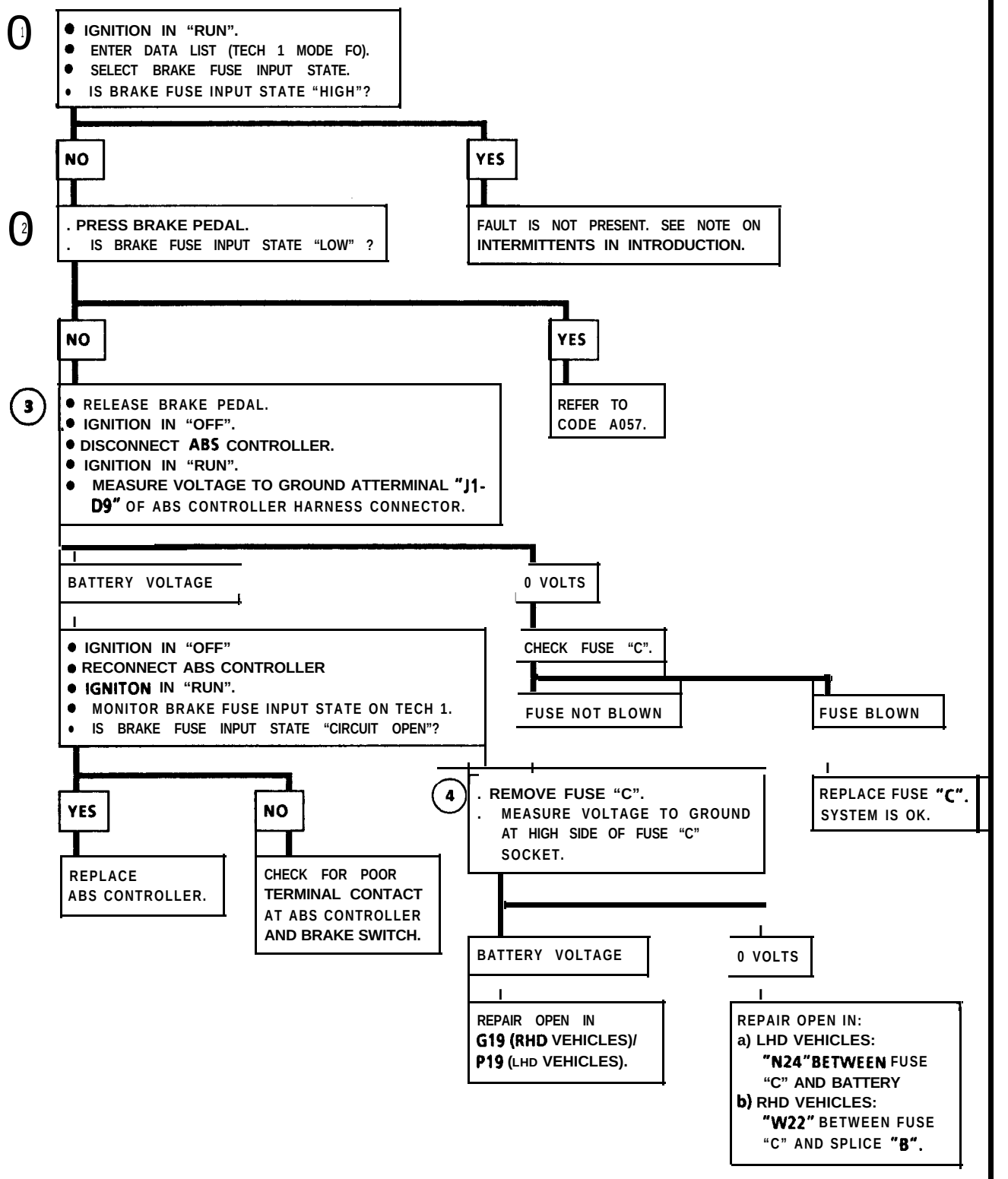
- Brake Switch Fuse Input circuit is open.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Confirms that a problem in the Brake Fuse Input CKT exists.
2. Determines if an open condition or a short to ground (blown Fuse "C", Code **A057)** exists.
3. Determines if the fault is internal of the ABS Controller.
4. Determines if the open condition is in **G19 / G20** (RHD-VEHICLES) / **P19/P20** (LHD-VEHICLES) or in N24 **(LHD-VEHICLES) / W22** (RHD-VEHICLES).

CODE A029

BRAKE SWITCH FUSE INPUT CIRCUIT OPEN



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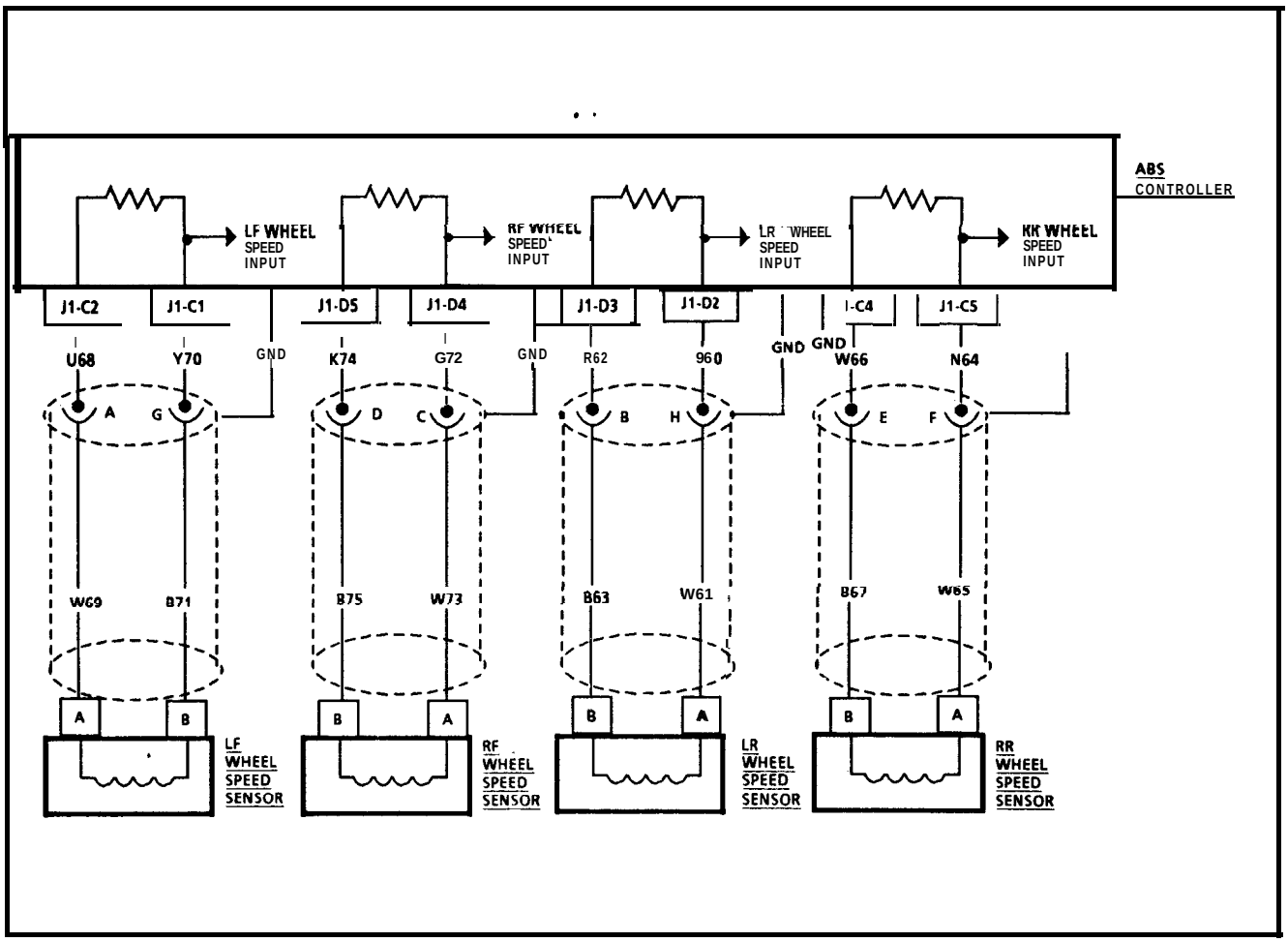


CODE A030

BOTH FRONT, OR ONE FRONT AND ONE REAR WHEEL SPEED SENSOR OPEN OR SHORTED TO GROUND

The ABS Controller monitors the Wheel Speed Sensors. If one or more wheel speed inputs are not receiving data from the Wheel Speed Sensor, the Controller cannot detect wheel lockup. When only one speed input is not receiving data, Code A044, A045, A046 or A047 will be set. This Code (A030) is set when more than one speed input is faulty.

CODE A030 will set when the ABS Controller senses that either both Front Wheel Speed Sensors or both a Front and a Rear Wheel Speed Sensor input are 0 mph for greater than 20 seconds.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. By observing all four Wheel Speed Sensor inputs (while driving vehicle), you can determine which Wheel Speed Sensor circuits are faulty (no wheel speed observed).

Faults can be diagnosed by refering to Codes A044, A045, A046, and A047 (right front, left front, right rear or left rear wheel speed = 0). In the case where an intermittent fault condition is indicated refer to introduction,

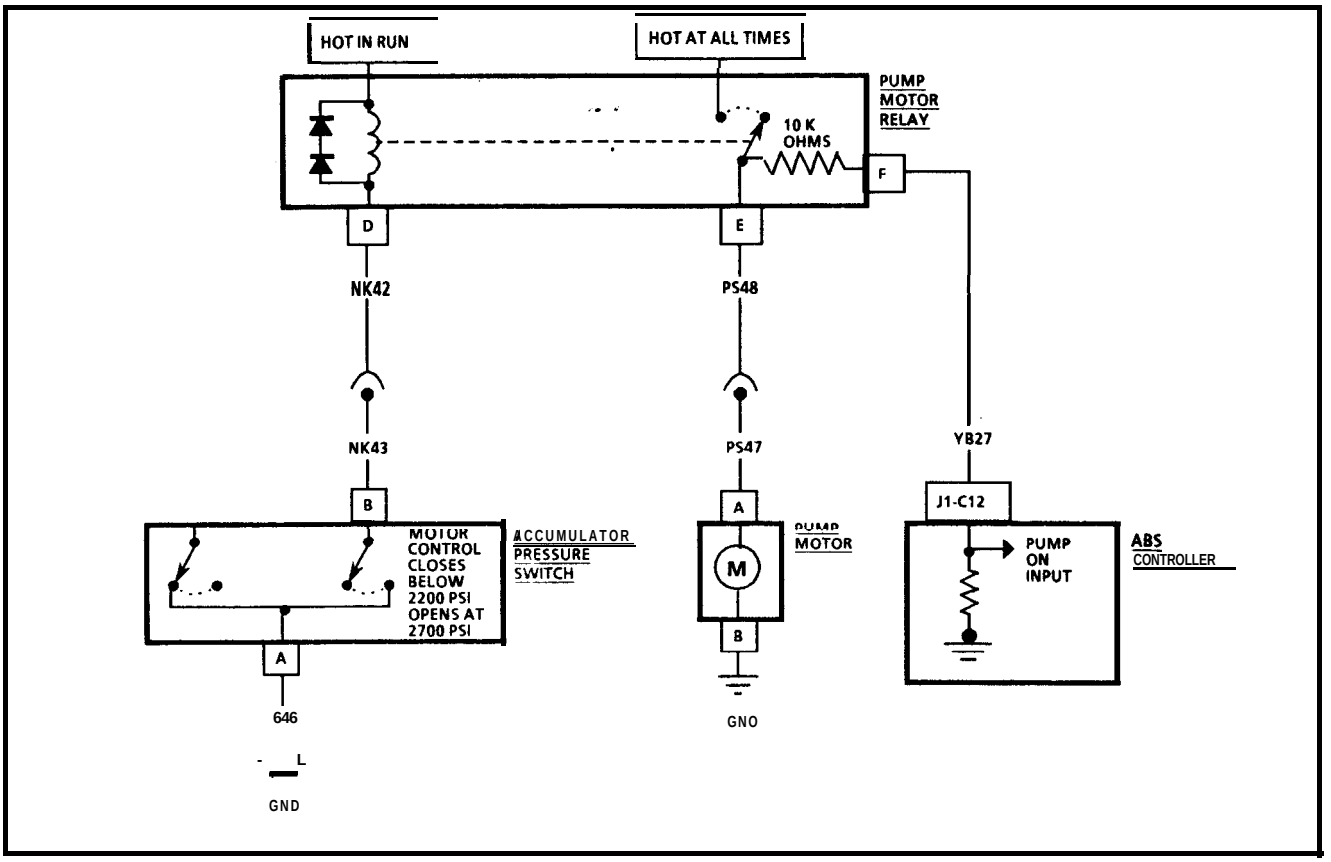
CODE A030

BOTH FRONT, OR ONE FRONT AND ONE REAR WHEEL SPEED SENSOR OPEN OR SHORTED TO GROUND

0 . IGNITION IN "RUN."
. ENTER DATA LIST (TECH 1 MODE FO).
● DRIVE VEHICLE AT 30 MPH AND OBSERVE WHEEL SPEED DATA.

NO WHEEL SPEED OBSERVED ON AT LEAST TWO OF THE SENSOR INPUTS.	NO WHEEL SPEED OBSERVED ON ONE WHEEL SPEED SENSOR INPUT. OTHER THREE WHEEL SPEEDS PRESENT.	WHEEL SPEED OBSERVED ON ALL WHEEL SPEED INPUTS.
REFER TO CODE A044 OR A045 (RIGHT OR LEFT FRONT WHEEL SPEED = 0) TO DIAGNOSE THE FRONT WHEEL SPEED SENSOR(S) WHICH HAD NO WHEEL SPEED OBSERVED. REFER TO CODE A046 OR A047 (RIGHT OR LEFT REAR WHEEL SPEED = 0) TO DIAGNOSE FAULT WITH REAR WHEEL SPEED SENSOR WHICH HAD NO WHEEL SPEED OBSERVED.	REFER TO EITHER CODE A044, A045, A046, OR A047 TO DIAGNOSE WHEEL SPEED SENSOR WHICH HAD NO WHEEL SPEED OBSERVED. AN INTERMITTENT FAULT CONDITION IS INDICATED IN ONE OF THE OTHER WHEEL SPEED SENSORS. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.	FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A031

OPEN PUMP MOTOR FEEDBACK CIRCUIT

Whenever the Pump Motor Relay contacts are open, the Pump On Input is grounded through the Pump Motor Relay and the Pump Motor. The Pump On Input will have voltage applied to it when the Pump Motor Relay Contacts are closed (the Pump Motor also has voltage applied to it). If the Pump On Input does not sense ground or the proper voltage, the ABS Controller will set Code A031.
CODE A031 will set when the ABS Controller detects an open condition in the Pump Motor circuit between the Pump Motor Relay and ground or detects an open condition in the Pump On Input circuit between the Pump Motor Relay and the ABS Controller.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A036 is also set, the problem is isolated to poor connections at either the Pump Motor Relay or connection to the ABS Controller terminal "Jl-C12".
2. Code A035, when set with Code A031, indicates that the Pump Motor circuit is open.
3. This step determines if the Pump Motor Feedback circuit is open.
4. If the Pump Motor State is always on, there must be an open in the Pump Motor circuit which is preventing the Pump Motor from operating.
5. Determines if the open condition exists in CKT between the Pump Motor and ground.
6. Battery voltage at terminal **"J1-C12"** indicates a problem with the connection at the Controller or the Controller itself.
7. Detects if circuit to Pump Motor is good. This would indicate a faulty Pump Motor.
8. Determines that the open condition is internal to the Pump Motor Relay if the resistance across Terminals "E" and **"F"** of the Pump Motor Relay is infinite.

CODE A031
OPEN PUMP MOTOR FEEDBACK CIRCUIT

1. • IGNITION IN "RUN."
   • IS CODE A036 ALSO SET?
   - NO → 2
   - YES → CHECK ABS CONTROLLER HARNESS CONNECTOR TERMINAL "J1-C12" AND PUMP MOTOR RELAY CONNECTOR FOR GOOD CONTACT.

2. . IS CODE A035 ALSO SET?
   - NO → 3
   - YES

3. • ENTER DATA LIST (TECH 1 MODE FC).
   . OBSERVE PUMP MOTOR STATE.
   • PUMP BRAKES (APPROX 25 TIMES).
   . IS PUMP MOTOR STATE: CIRCUIT OPEN?
   - NO → 4
   - YES → 6

4. . OBSERVE PUMP MOTOR STATE FOR 40 SECONDS. DO NOT PUMP BRAKES.
   . CHECK PUMP MOTOR STATE, WHEN PUMP MOTOR IS NOT RUNNING.
   - PUMP MOTOR STATE "OFF" → FAULT IS NOT PRESENT. . . SEE NOTE ON INTERMITTENTS IN INTRODUCTION.
   - PUMP MOTOR STATE "ON" CONSTANTLY. → 5

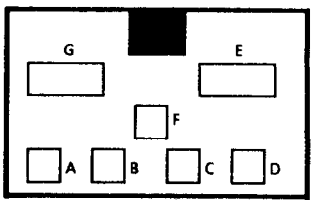
5. • IGNITION "OFF."
   . DISCONNECT PUMP MOTOR.
   . MEASURE RESISTANCE TO GROUND FROM TERMINAL B OF THE PUMP MOTOR HARNESS CONNECTOR.
   - 0 VOLTS → 8
   - LESS THAN BATTERY VOLT → CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE ABS CONTROLLER.
   - 10 OHMS → 3
   - INFINITE OHMS → REPAIR OPEN IN CONNECTION TO GROUND.

6. • IGNITION "OFF."
   . DISCONNECT ABS CONTROLLER.
   • IGNITION IN "RUN."
   . PUMP BRAKES UNTIL PUMP MOTOR TURNS "ON."
   . WITH PUMP MOTOR RUNNING MEASURE VOLTAGE AT TERMINAL "J1-C12" OF ABS CONTROLLER HARNESS CONNECTOR TO GROUND.
   - 0 VOLTS → 8
   - BATTERY VOLTAGE → CHECK FOR POOR TERMINAL CONTACT AT PUMP MOTOR. IF CONTACT IS GOOD, REPLACE PUMP MOTOR.

8. . IGNITION IN "OFF".
   . DISCONNECT PUMP MOTOR RELAY.
   • MEASURE RESISTANCE BETWEEN TERMINALS "E" AND "F" OF PUMP MOTOR RELAY.
   - APPROX 10,000 OHMS → REPAIR OPEN IN YB27.
   - INFINITE OHMS → REPLACE PUMP MOTOR RELAY.

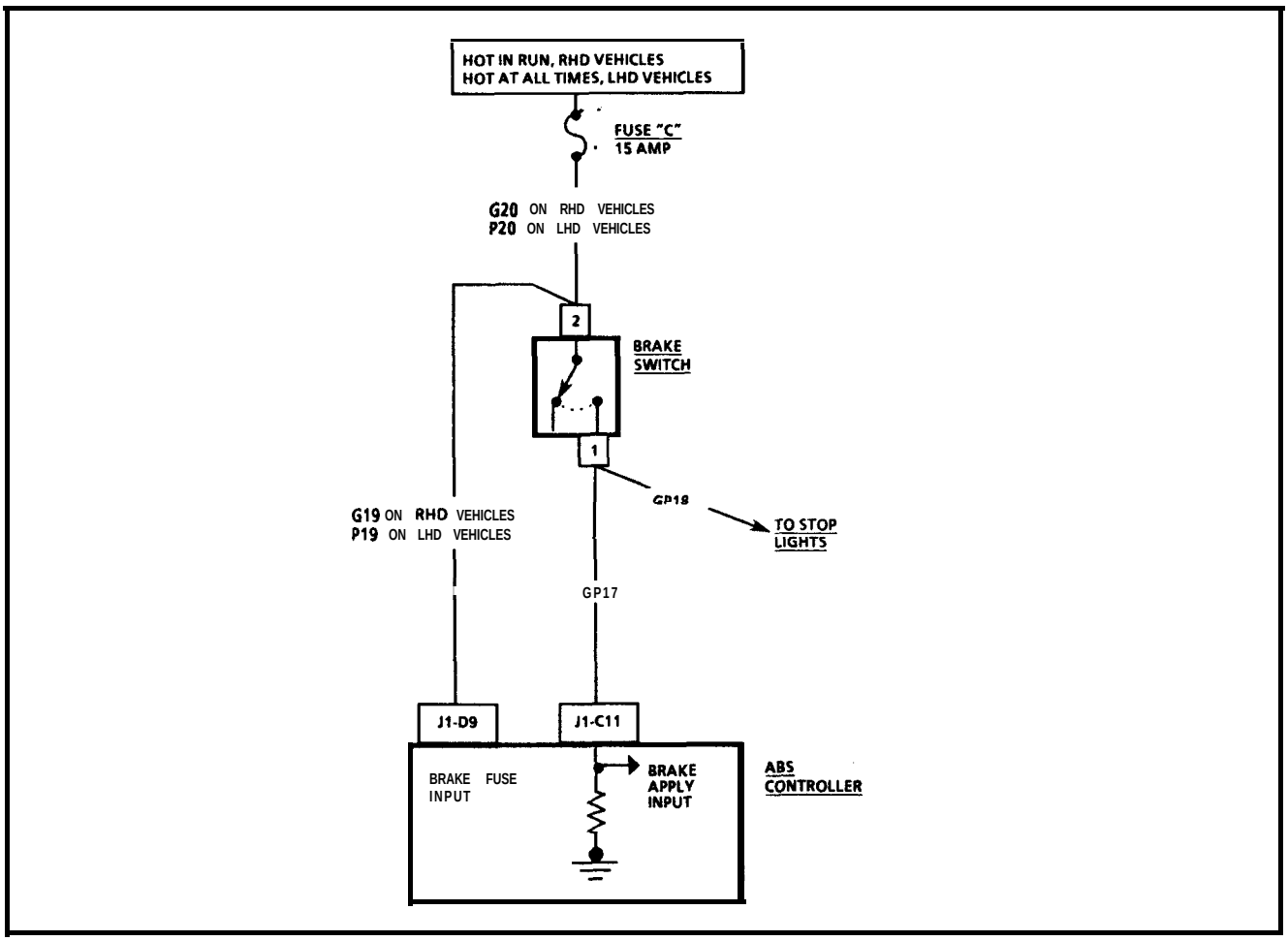
3. . IGNITION IN "RUN".
   • CONNECT VOLTMETER BETWEEN TERMINAL "A" OF PUMP MOTOR HARNESS CONNECTOR AND GROUND.
   • ENTER DATA LIST (TECH 1 MODE F0).
   • SELECT BRAKE PRESSURE STATE.
   • PUMP BRAKES UNTIL BRAKE PRESSURE STATE IS "LOW (< 1800 PSI)".
   . READ VOLTMETER.
   - 0 VOLTS → 8
   - BATTERY VOLTAGE → CHECK FOR POOR TERMINAL CONTACT AT PUMP MOTOR. IF CONTACT IS GOOD, REPLACE PUMP MOTOR.

8. • IGNITION IN "OFF".
   • DISCONNECT PUMP MOTOR RELAY.
   • MEASURE RESISTANCE BETWEEN TERMINALS "E" AND "F" OF PUMP MOTOR RELAY.
   - APPROX 10,000 OHMS → REPAIR OPEN IN PS47, PS48.
   - INFINITE OHMS → REPLACE PUMP MOTOR RELAY.



PUMP MOTOR RELAY

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A032

OPEN BRAKE SWITCH OR HYDRAULIC LEAK

Voltage is applied to the Brake Switch. When the Brake Switch is closed, voltage is applied to the Stop Lights and terminal "J1-C11" of the ABS Controller. If the Brake Apply Input receives voltage, the Controller determines that the brakes are being applied.

CODE A032 will set when all of the following conditions exist:

- The ABS Controller receives three pump on inputs without receiving a brake switch on input. This allows a brake switch fault to be detected without an Antilock Braking condition present.

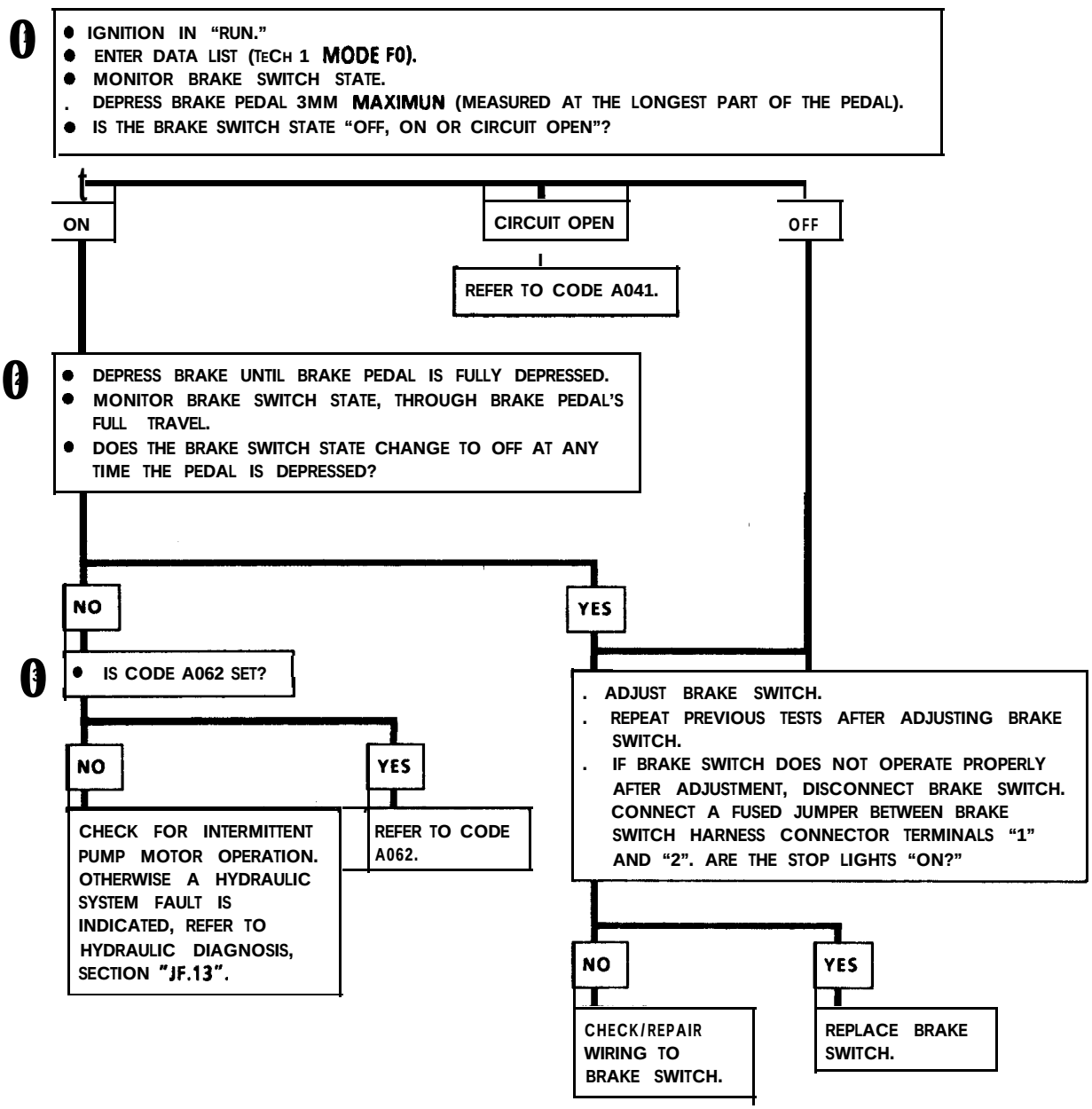
Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. & 2. Checks for an improperly adjusted or intermittent Brake Switch.

3. If Code A062 is also set, the pump motor was cycling too fast. See Code A062.

CODE A032

OPEN BRAKE SWITCH OR HYDRAULIC LEAK



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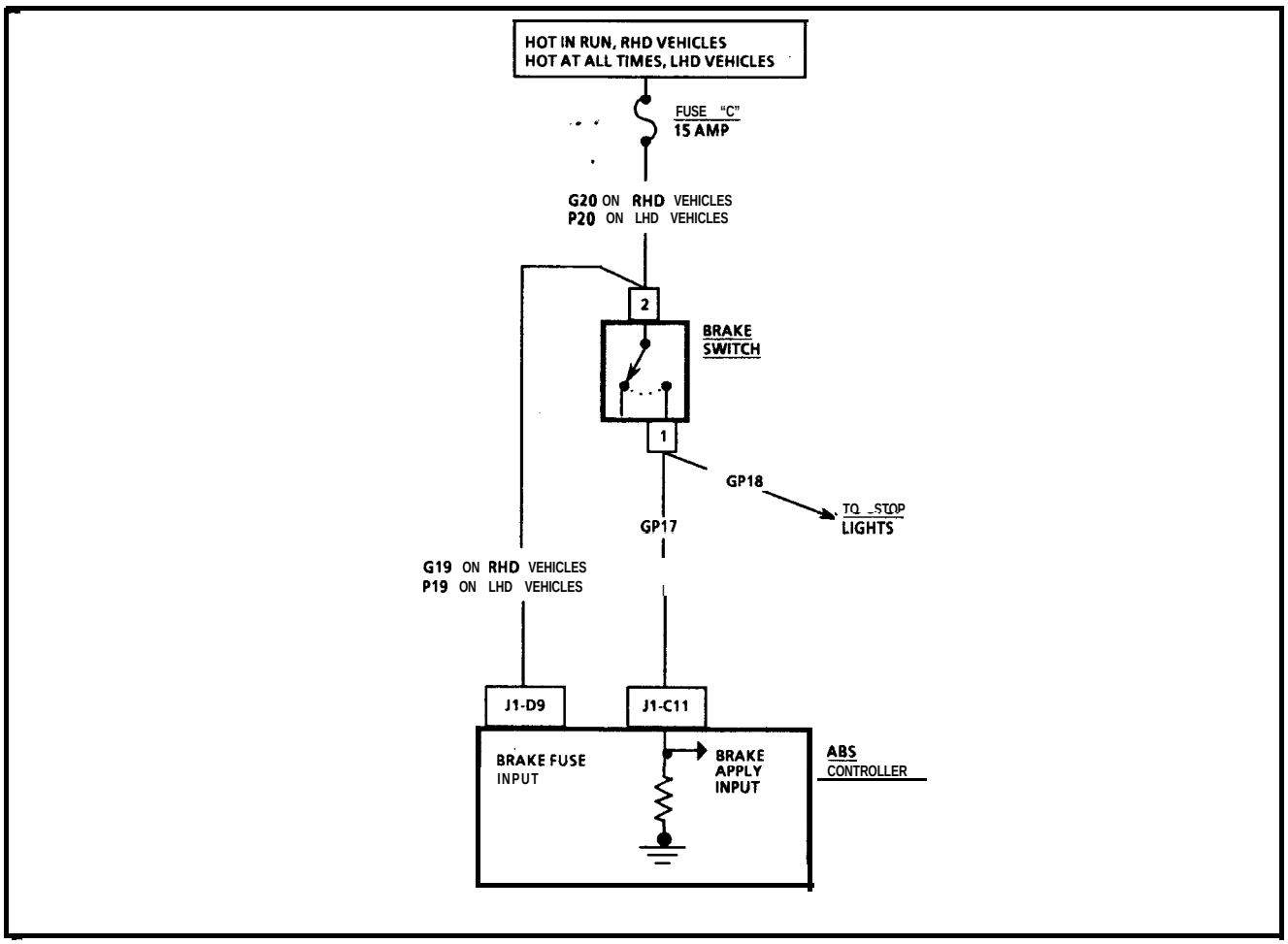

CODE A033

BRAKE SWITCH OPEN

Voltage is applied to the Brake Switch. When the Brake Switch is closed, voltage is applied to the Stop Lights and terminal "Jl-Cll" of the ABS Controller. If the Brake Apply Input receives voltage, the ABS Controller determines that the brakes are being applied.

CODE A033 will set when all of the following conditions exist:

- The ABS Controller senses no voltage at terminal "Jl-Cll" (brake apply input is low).
- The ABS Controller senses that two wheels (one of which is in the front) are decelerating at a rate greater than normally possible without using the brakes (vehicle is slowing down fast enough that the controller knows the brakes are being applied).

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. & 2. Checks for improperly adjusted or intermittent Brake Switch.

CODE A033

BRAKE SWITCH OPEN

(1)

- IGNITION IN "RUN."
- ENTER DATA LIST (TECH 1 MODE FO).
- MONITOR BRAKE SWITCH STATE.
- DEPRESS BRAKE PEDAL3 MM MAXIMUM (MEASURED AT THE LONGEST PART OF THE PEDAL).
- IS THE BRAKE SWITCH STATE "OFF, ON OR CIRCUIT OPEN"?

ON

CIRCUIT OPEN

REFER TO CODE A041.

OFF

(2)

- DEPRESS BRAKE UNTIL BRAKE PEDAL IS FULLY DEPRESSED.
- MONITOR BRAKE SWITCH STATE, THROUGH BRAKE PEDAL'S FULL TRAVEL.
- DOES THE BRAKE SWITCH STATE CHANGE TO "OFF" AT ANY TIME THE PEDAL IS DEPRESSED?

NO

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

YES

- ADJUST BRAKE SWITCH
- REPEAT PREVIOUS TESTS AFTER ADJUSTING BRAKE SWITCH.
- IF BRAKE SWITCH DOES NOT OPERATE PROPERLY AFTER ADJUSTMENT, DISCONNECT BRAKE SWITCH. CONNECT A FUSED JUMPER BETWEEN BRAKE SWITCH HARNESS CONNECTOR TERMINALS "1" AND "2". ARE THE STOP LIGHTS "ON?"

NO

CHECK/REPAIR WIRING TO BRAKE SWITCH.

YES

REPLACE BRAKE SWITCH.

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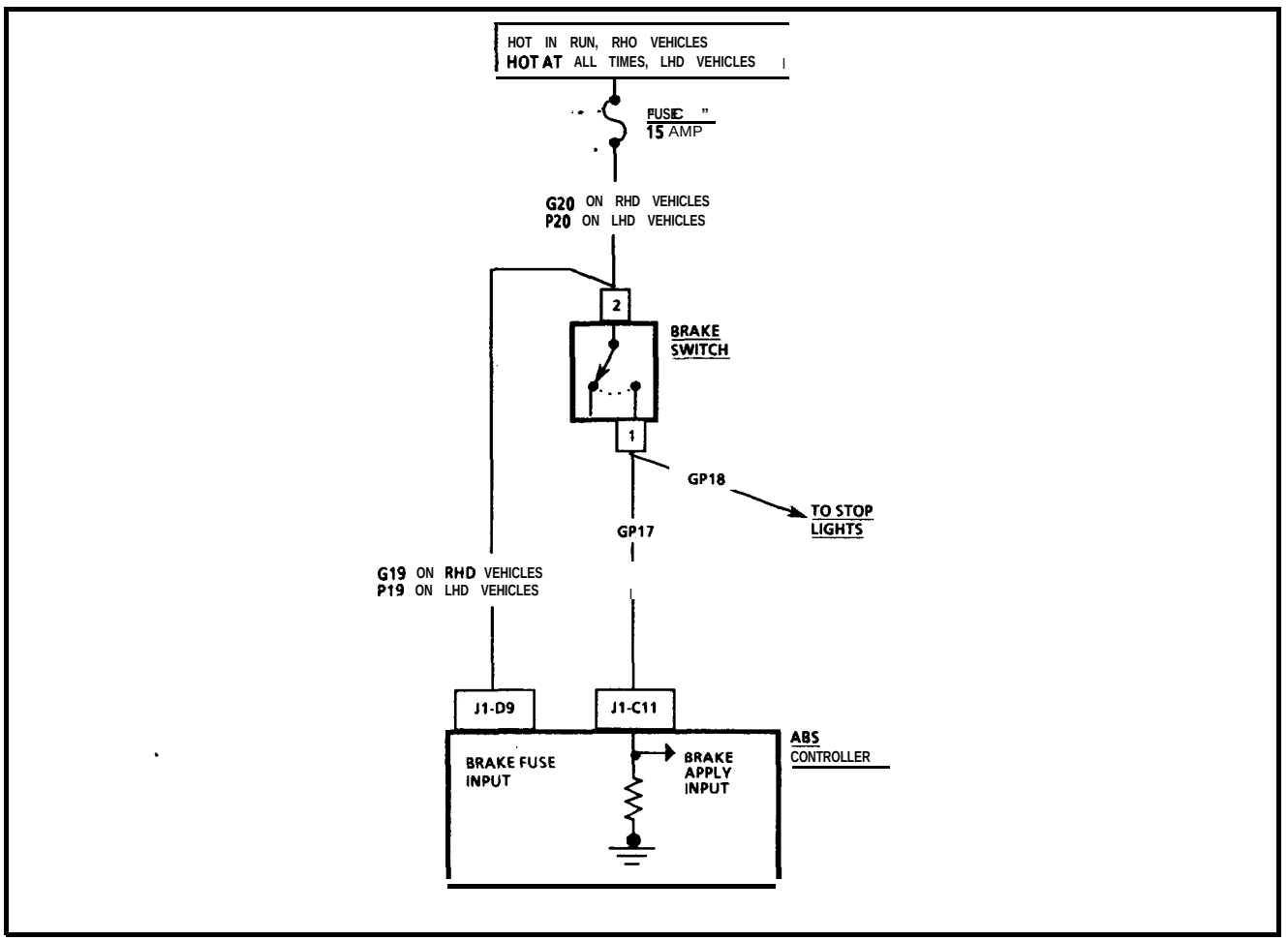


CODE A034

BRAKE SWITCH SHORTED

When the Brake Pedal is depressed, the Brake Switch closes. This applies voltage from the Stop Fuse "C" to the ABS Controller and the Stop Lights. Before the ABS Controller will initiate an Antilock Brake Stop, it must first sense voltage at the Brake Apply Input.

CODE A034 will set when all of the following conditions exist:

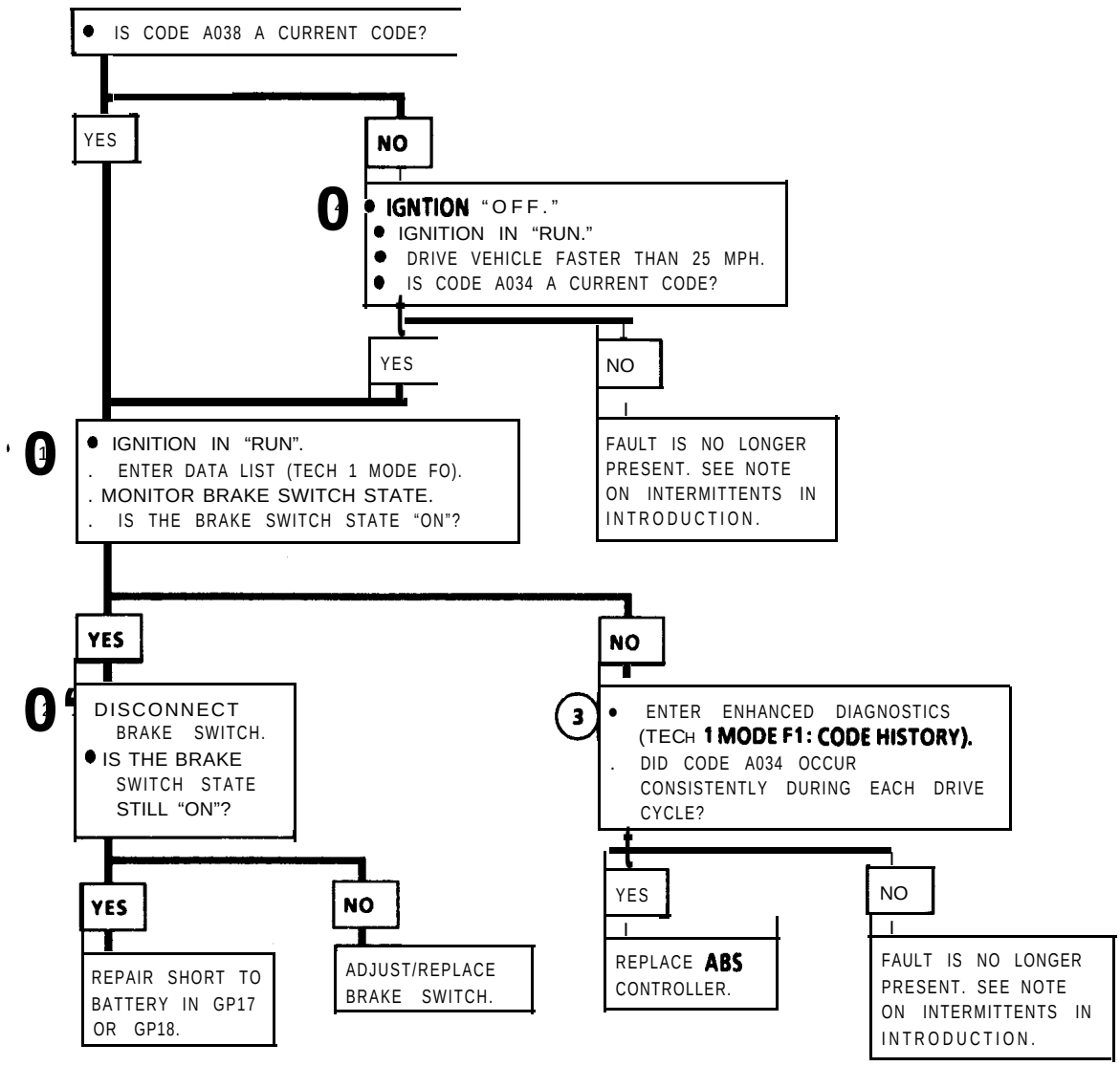
- The ABS Controller senses battery voltage at terminal "J1C-11" for a complete ignition cycle in which the vehicle speed surpasses 25 mph.
- The ABS Controller senses battery voltage at terminal "J1C-11" during any following ignition cycle in which the vehicle speed surpasses 25 mph.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Confirms that a short exists in the circuit (brake lights on).
2. Determines whether a short to Battery exists in the GP17 or GP18 or whether the Brake Switch is shorted or maladjusted.
3. If Code A034 is a consistent failure, but CKTS and Brake Switch are good, the ABS Controller must have an internal fault.
4. This step verifies that the code is not about to become a current code by passing the second condition (see above).

CODE A034

BRAKE SWITCH SHORTED



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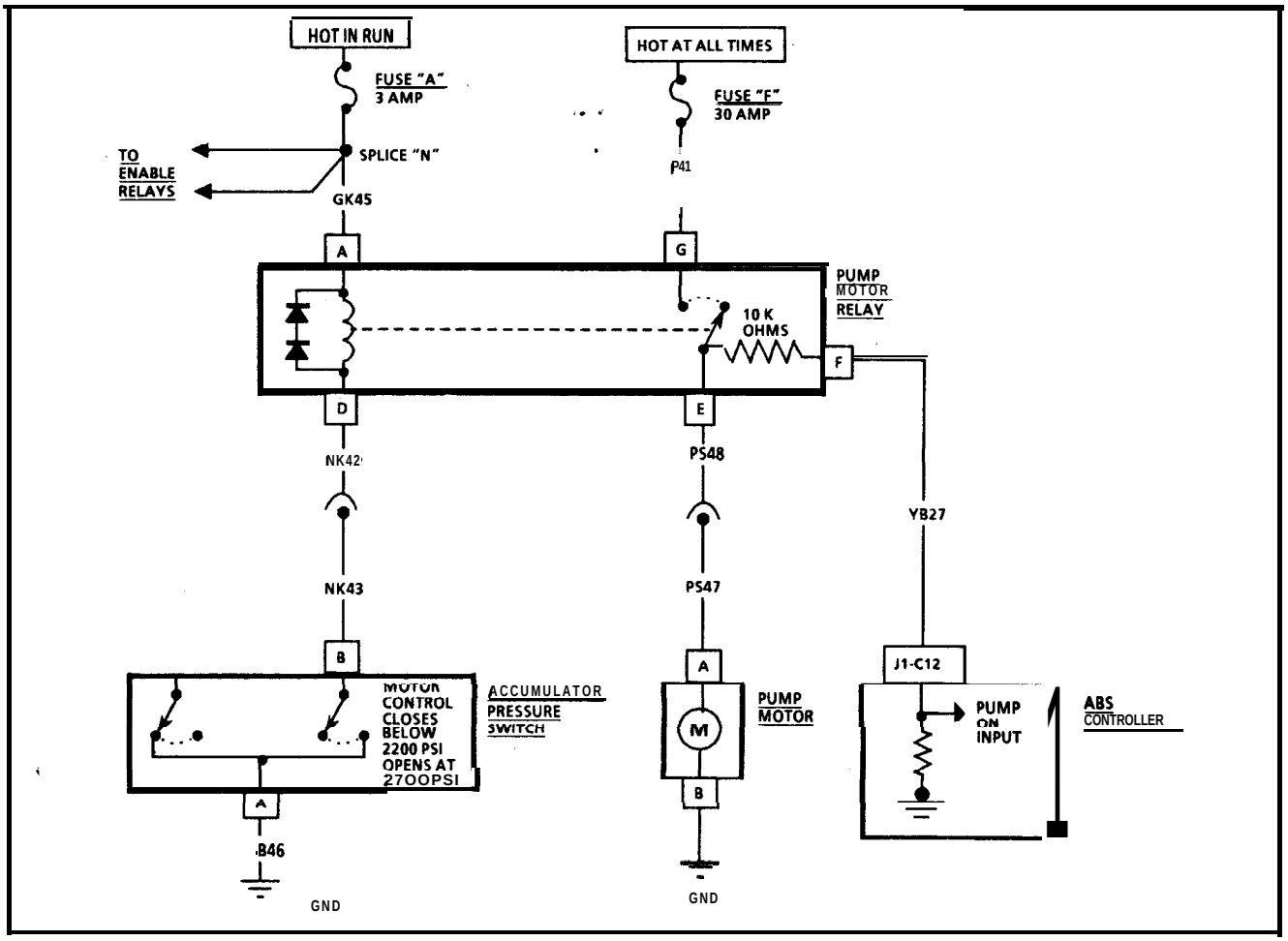


CODE A035

PUMP MOTOR RUNNING TOO LONG

The Accumulator Switch Motor Control closes when the pressure drops below 2200 PSI. This grounds the Pump Motor Relay Coil causing voltage to be applied to the Pump Motor and Pump On Input. Whenever the Pump Motor is on, the Pump On Input will have voltage applied to it.
CODE A035 will set when the ABS Controller senses voltage at Terminal "J1-C12" "Pump on input" for more than 3 minutes

.Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. When Code A035 and A031 are both set, the problem is isolated to the Pump Motor Circuit.
2. This step determines if the Pump Motor is running constantly (electrical fault), running longer than normal (hydraulic fault), or running too long intermittently.
3. It can be determined if the accumulator switch is causing the fault by disconnecting the accumulator switch and observing the Pump Motor State.
4. Determines if a short to ground exists in NK42, NK43 wire.
5. This step detects if a short to Battery exists by isolating the YB27 wire and ABS Controller from the Pump Motor Circuit.
6. Determines if a short to Battery exists in the PS47 or PS48 wire, or whether the Pump Motor Relay is defective.

CODE A035

PUMP MOTOR RUNNING TOO LONG

(1) • IGNITION IN "RUN."
• IS CODE A031 ALSO SET?

NO

YES → REFER TO CODE A031.

(2) . PERFORM NORMAL PUMP RUN CYCLE TEST:
• START AT TECH 1 MAIN MENUE
• SELECT F4: ABS TESTS
• SELECT F3: PUMP MOTOR
• SELECT FO: RUN CYCLE
• FOLLOW TECH 1 DIRECTIONS.

DISPLAY SHOWS:
"PUMP RUN TIMER • * PUMP RUNNING • * WAIT FOR PUMP TO STOP".
TECH 1 DOES NOT START TEST.

BOTH PUMP RUN TIMES ARE LESS THAN 10 SECONDS. → FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

AT LEAST ONE PUMP RUN TIME LONGER THAN 10 SECONDS. → HYDRAULIC SYSTEM FAULT IS INDICATED. REFER TO SECTION "JF.13".

(3) • ENTER DATA LIST (TECH 1 MODE F0).
• SELECT PUMP MOTOR STATE.
• DISCONNECT ACCUMULATOR PRESSURE SWITCH.
• OBSERVE PUMP MOTOR STATE.
• IS PUMP MOTOR STATE "ON"?

YES

(4) • MEASURE VOLTAGE TO GROUND AT TERMINAL "B" OF ACCUMULATOR PRESSURE SWITCH HARNESS CONNECTOR.

BATTERY VOLTAGE

(5) . DISCONNECT PUMP MOTOR RELAY.
. OBSERVE PUMP MOTOR STATE.
• IS PUMP MOTOR STATE "ON"?

NO

(6) . MEASURE VOLTAGE AT TERMINAL "E" OF PUMP MOTOR RELAY HARNESS CONNECTOR.

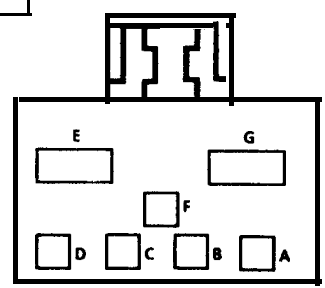
BATTERY VOLTAGE → REPAIR SHORT TO BATTERY IN PS47 OR PS48.

0 VOLTS → REPLACE PUMP MOTOR RELAY.

NO → CHECK FOR HYDRAULIC SYSTEM PROBLEM (REFER TO SECTION "JF.13"). IF NO PROBLEM IS FOUND, REPLACE ACCUMULATOR SWITCH.

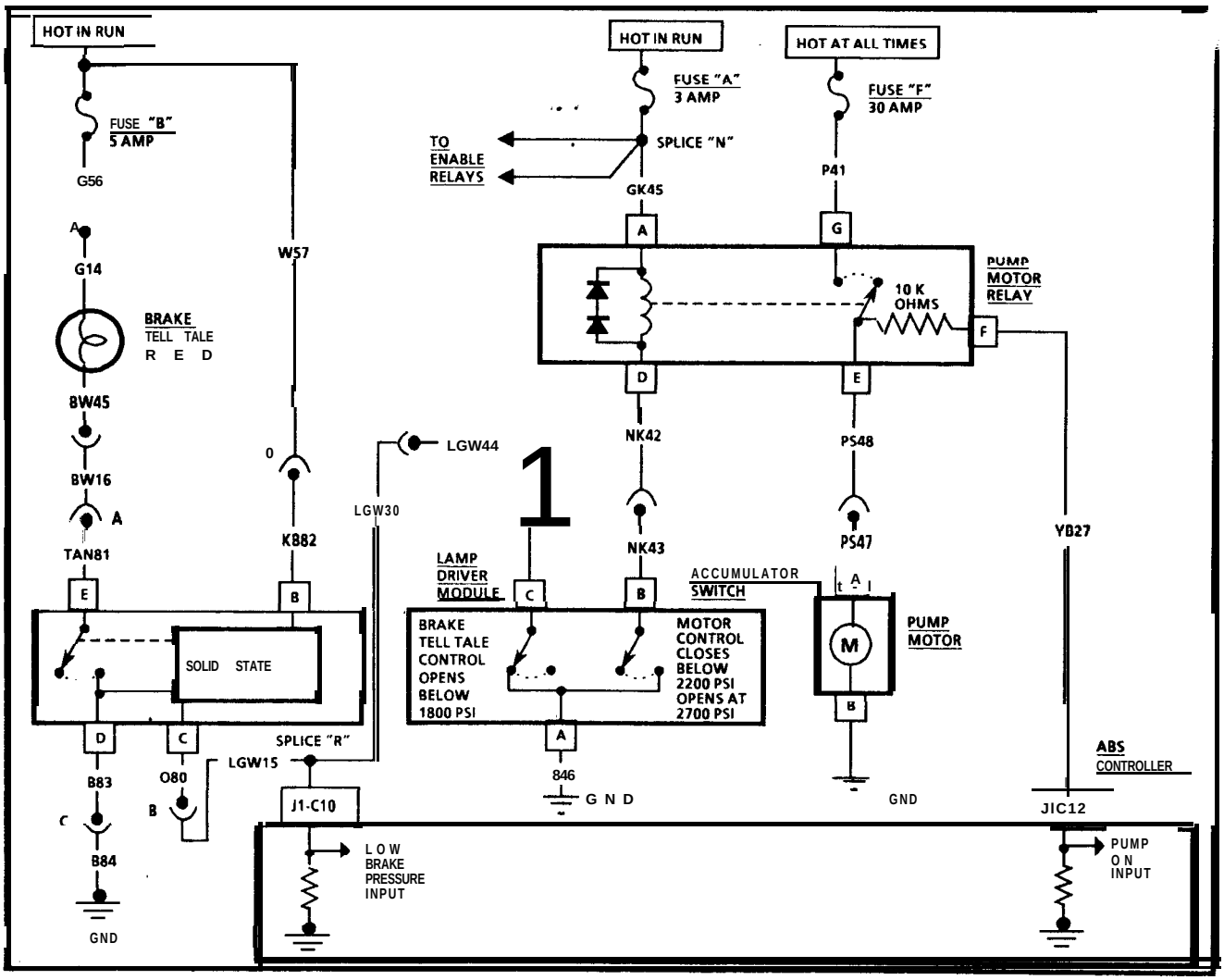
0 VOLTS → REPAIR SHORT TO GROUND IN "NK42, NK43" OR PUMP MOTOR RELAY COIL.

YES → CHECK FOR SHORT TO BATTERY IN "YB27". IF CKT "YB27" IS GOOD REPLACE ABS CONTROLLER.



PUMP MOTOR RELAY HARNESS CONNECTOR

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE **A036**

PUMP MOTOR WILL NOT RUN

The pump On Input will have voltage applied to it when the Pump Motor Relay contacts are closed. If the Brake Pressure drops below 1800 psi, the Accumulator Switch opens. This removes ground from the Lamp Driver Module. The Lamp Driver Module then closes the switch to turn on the Brake Tell Tale, and also applies voltage to the Low Brake Pressure Input of the ABS Controller.
Code A036 will set when all of the following conditions exist:

- The ABS Controller does not sense voltage at Terminal "J1-C12" (Pump on input).
- The ABS Controller senses voltage at Terminal "J1-C10" (Brake Tell Tale is on).

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A036 is also set, the problem is isolated to poor connections at either the Pump Motor Relay or connection of Pump Motor to GND.
2. By observing if the Pump Motor operates, the fault is isolated to either the Low Pressure Circuit or Pump Motor Relay Circuit.
3. Determines if fault is in Pump Motor Relay Circuit or Accumulator Switch Circuit.
4. This step checks if there is an actual fault present.
5. Battery voltage at Terminal "A" indicates a good Relay Coil power feed.
6. If Pump Motor operates, the fault is either a hydraulic system failure or faulty Accumulator Switch.
7. Checks for an open circuit between Accumulator Switch and ABS Controller terminal "J1-C10".
8. Determines if NK42, NK43 are open.
9. At this point, a good Relay Contact power feed indicates a faulty Pump Motor Relay.

CODE A036

PUMP MOTOR WILL NOT RUN

1 • IGNITION IN "RUN."
• IS CODE A031 ALSO SET?

NO

2 • ENTER DATA **LIST** (TECH **1 MODE F0).**
. MONITOR PUMP MOTOR STATE WHILE PUMPING BRAKES.
• DOES PUMP MOTOR STATE TURN "ON?"

NO

3 • DISCONNECT ACCUMULATOR PRESSURE SWITCH.
• JUMPER TERMINAL B OF ACCUMULATOR PRESSURE SWITCH HARNESS CONNECTOR TO GROUND.
. MONITOR PUMP MOTOR STATE ON TECH 1.

PUMP MOTOR STATE "OFF"

5 • JUMPER STILLCONNECTED.
• DISCONNECT PUMP MOTOR RELAY.
• MEASURE VOLTAGE TO GROUND AT TERMINAL "A" OF PUMP MOTOR RELAY HARNESS CONNECTOR.

BATTERY VOLTAGE

8 • JUMPER STILL CONNECTED.
• MEASURE VOLTAGE BETWEEN TERMINALS "A" AND "D" OF PUMP MOTOR RELAY HARNESS CONNECTOR.

BATTERY VOLTAGE

9 . MEASURE VOLTAGE TO GROUND AT TERMINAL "G" OF PUMP MOTOR RELAY HARNESS CONNECTOR.

BATTERY VOLTAGE

REPLACE PUMP MOTOR RELAY.

0 VOLTS

REPAIR OPEN IN NK42, NK43.

0 VOLTS

CHECK FUSE "F" AND P41, N24.

0 VOLTS

REPAIR OPEN IN GK45 BETWEEN RELAY AND SPLICE "N".

PUMP MOTOR STATE "ON"

6 . CONNECT FUSED JUMPER BETWEEN TERMINALS "B" AND "A" OF ACCUMULATOR PRESSURE SWITCH HARNESS CONNECTOR.
. OBSERVE PUMP MOTOR STATE ON TECH 1.

PUMP MOTOR STATE "ON."

CHECK FOR HYDRAULIC SYSTEM PROBLEM (REFER TO SECTION **"JF.13").** IF NO PROBLEM FOUND, REPLACE ACCUMULATOR SWITCH.

PUMP MOTOR STATE "OFF."

REPAIR OPEN IN **"B46".**

YES

CHECK CONNECTION OF PUMP MOTOR TO GROUND AND PUMP MOTOR RELAY CONNECTOR FOR GOOD CONTACT.

YES

4 . OBSERVE BRAKE PRESSURE STATE ON TECH 1, WHEN PUMP MOTOR HAS BEEN TURNED OFF.

BRAKE PRESSURE **LOW**

7 . DISCONNECT ACCUMULATOR PRESSURE SWITCH.
• JUMPER TERMINAL "C" OF ACCUMULATOR PRESSURE SWITCH HARNESS CONNECTOR TO GROUND.
• OBSERVE BRAKE PRESSURE STATE ON TECH 1.

BRAKE PRESSURE LOW

REPAIR OPEN IN **LGW30,** LGW44".

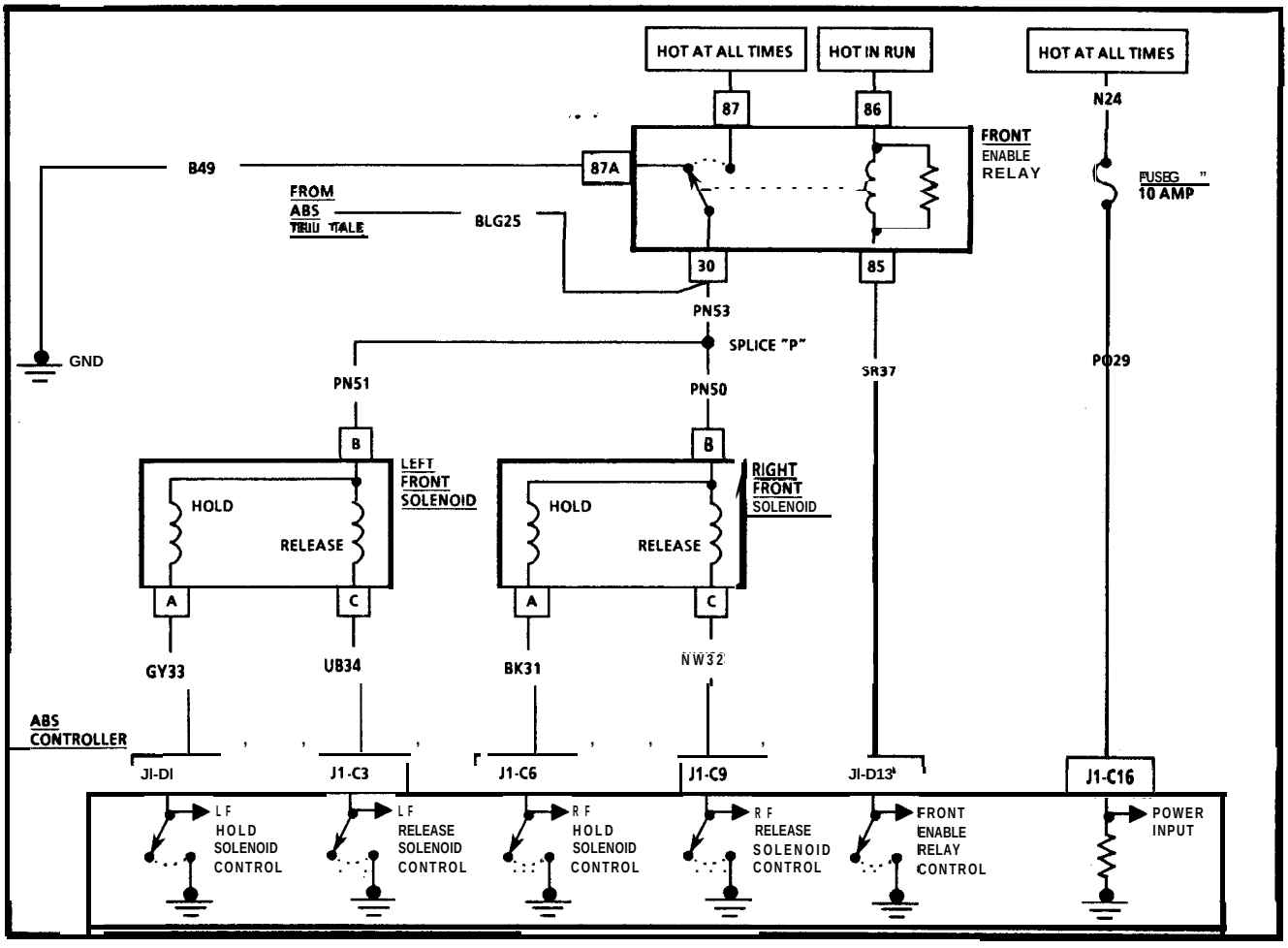
BRAKE PRESSURE OK

FAULT IS NOT PRESENT. SEE **NOTE ON** INTERMITTENTS IN INTRODUCTION.

BRAKE PRESSURE OK

CHECK FOR HYDRAULIC SYSTEM PROBLEM (REFER TO SECTION **"JF.13").** IF NO PROBLEM FOUND, REPLACE ACCUMULATOR SWITCH.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A037

FRONT ENABLE RELAY COIL SHORTED TO GROUND

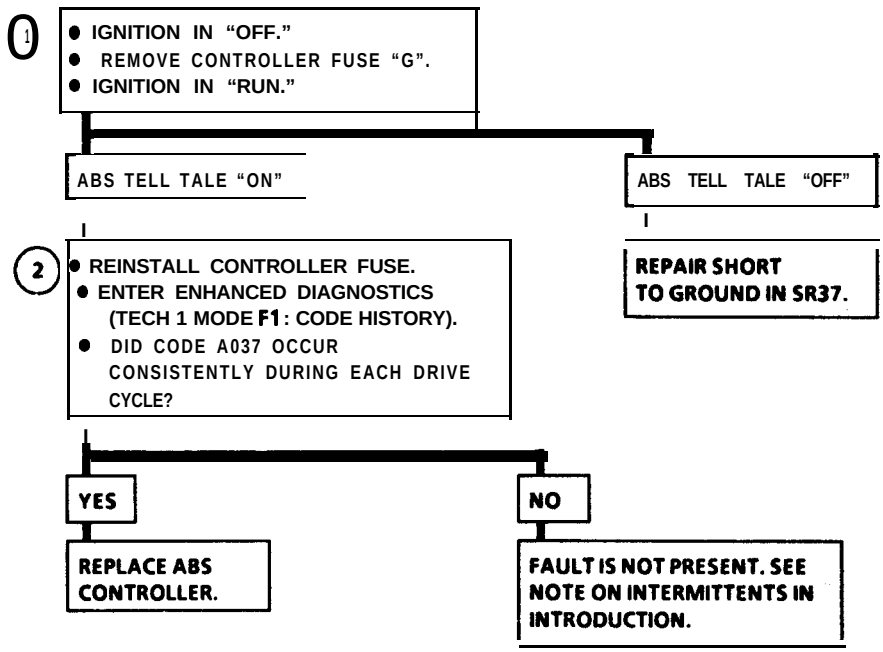
When the Front Enable Relay Control is open, the Front Enable Relay is deenergized. This prevents voltage from being applied to the Front Solenoids and Solenoid Controls. If the Front Enable Relay is deenergized and the Ignition is in "RUN," voltage should be present at Terminal "J1-D13".

CODE A037 will set during system initialization when all of the following conditions exist:

- The Front Enable Relay Control is open (Front Enable Relay deenergized).
- The ABS Controller senses no voltage at Terminal "Jl-D13".
- The ABS Controller senses Battery voltage at Terminals "Jl-Dl", "J1-C3", "J1-C6" and "J1-C9".

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. By isolating the Front Enable Relay Coil from its ground and observing the ABS Tell Tale, it can be determined whether the Front Enable Relay has deenergized (ABS Tell Tale lights) which indicates a possible defective ABS Controller or whether the Front Enable Relay has remained energized (ABS Tell Tale does not light) which indicates a short to ground in the SR37 wire.
2. If Code A037 is a consistent failure, the ABS Controller has an internal fault.



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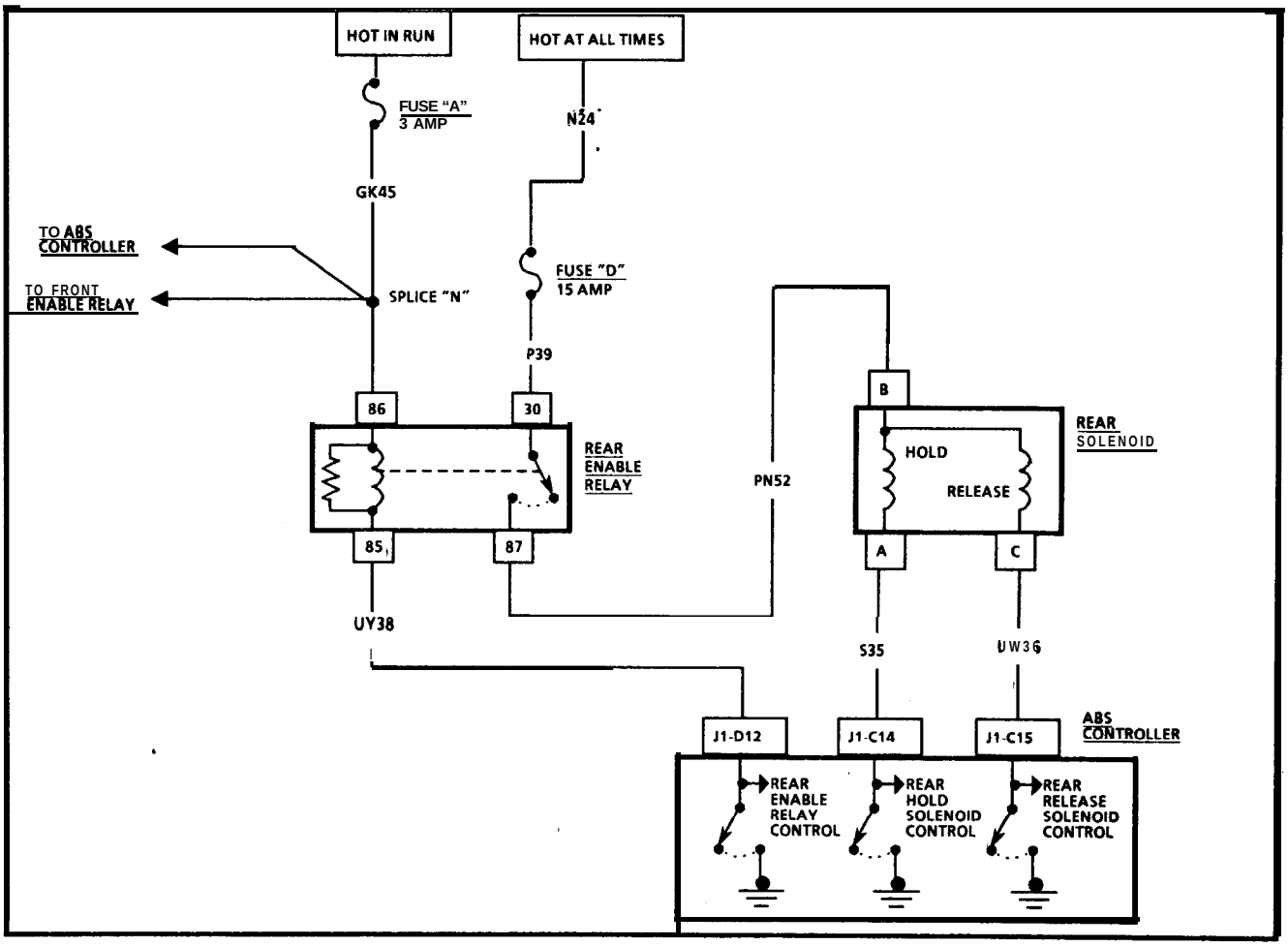


CODE A038

REAR ENABLE RELAY COIL SHORTED TO GROUND

When the Rear Enable Relay Control is open, the Rear Enable Relay is deenergized. This prevents voltage from being applied to the Rear Solenoid and Solenoid controls. If the Rear Enable Relay is deenergized and the Ignition is in "RUN," voltage should be present at terminal "Jl-D12".
CODE A038 will set during system initialization when all the following conditions exist:

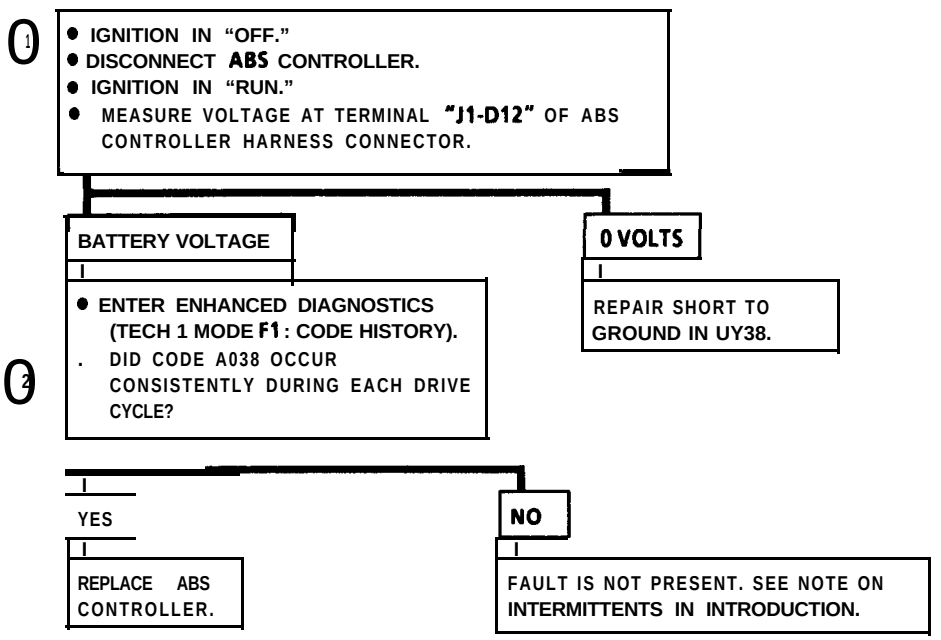
- The Rear Enable Relay control is open (Rear Enable Relay deenergized).
- The ABS Controller senses no voltage at Terminal "Jl-D12".
- ABS Controller senses Battery voltage at Terminal "Jl-C14" and "J1-C15".

Test Description: The following provides an explanation of the procedures being followed in the trouble tree.

1. By isolating the Rear Enable Relay Control from its ground and measuring the voltage at Terminal "J1-D12" of the ABS Controller connector it can be determined whether the Rear Enable Relay has deenergized (Battery voltage at Terminal "Jl-D12") which indicates a possible defective ABS Controller or whether the Rear Enable Relay has remained energized (0 volts at Terminal "J1-D12") which indicates a short to ground in the UY38 circuit.
2. If Code A038 is a consistent failure, the ABS Controller has an internal fault.

CODE A038

REAR ENABLE RELAY COIL SHORTED TO GROUND



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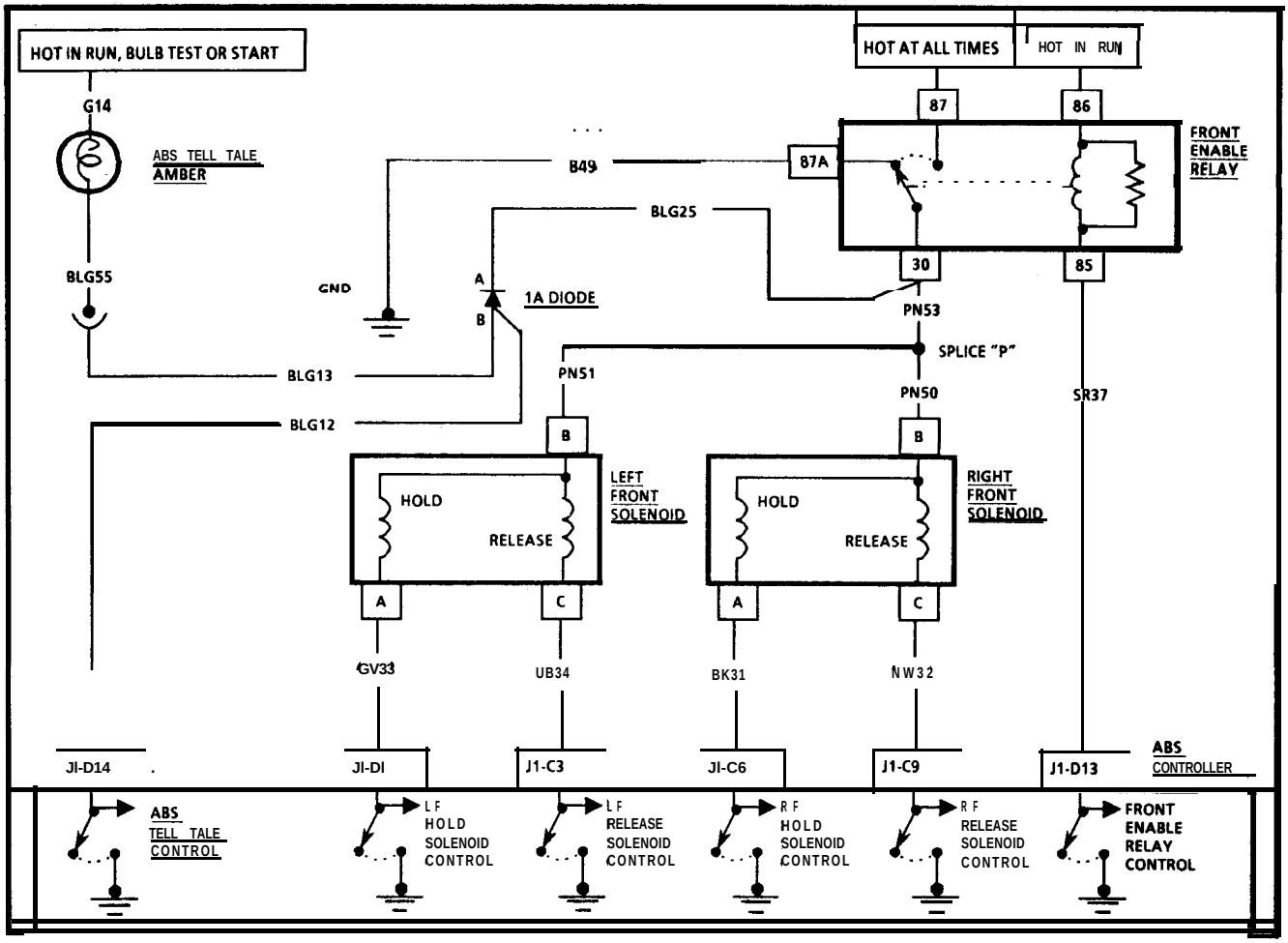


CODE A039

FRONT ENABLE RELAY CONTACTS SHORTED TO BATTERY OR RELAY GROUND OPEN

When the Front Enable Relay Control is open, the Front Enable Relay is deenergized. This prevents voltage from being applied to the Front Solenoids and Solenoid Controls. If the B49 from the Front Enable Relay is open, Battery voltage from the ABS Tell Tale will be applied to the solenoids even when the Front Enable Relay is deenergized.

CODE A039 will set during system initialization when all of the following conditions exist:

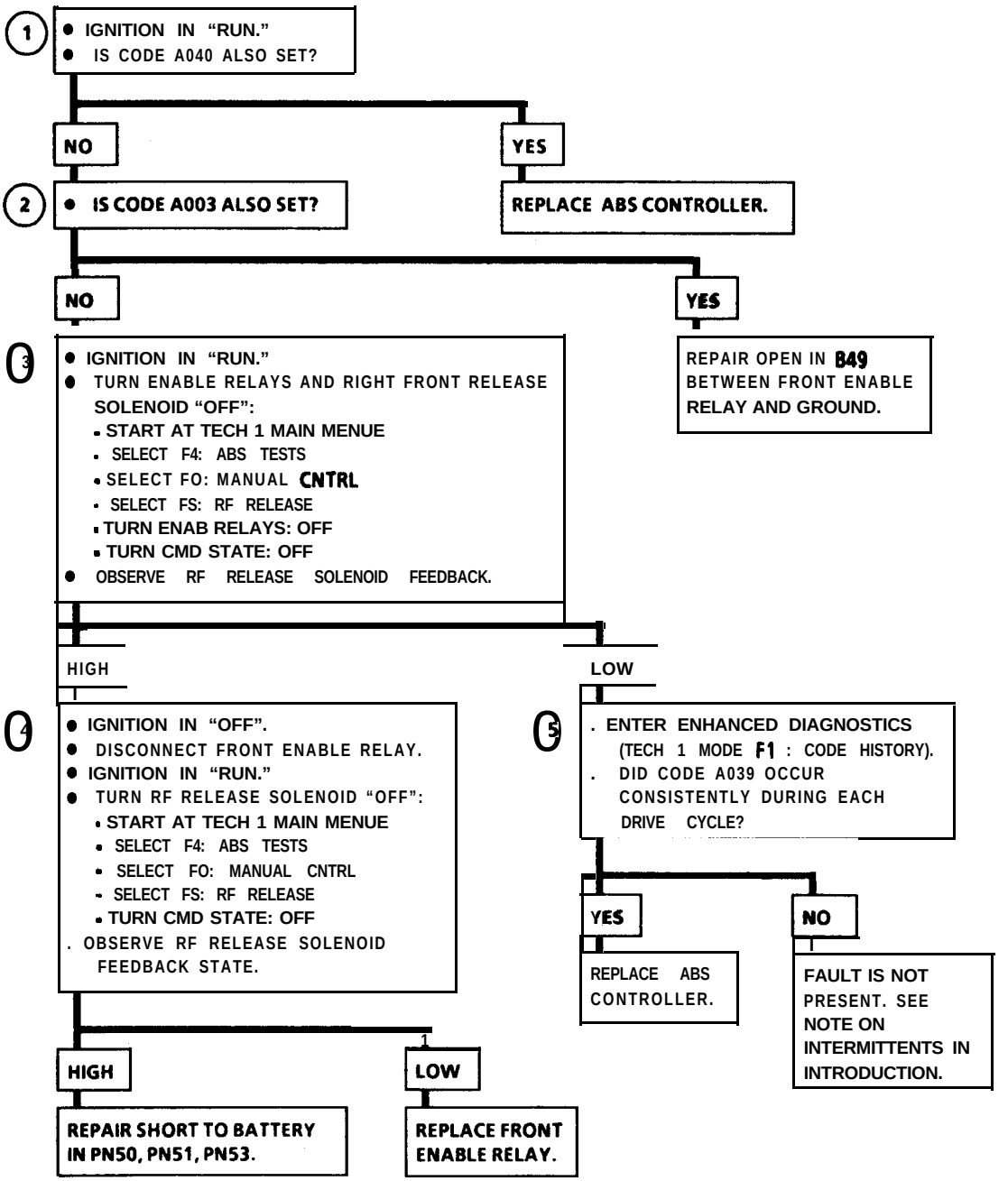
- The Front Enable Relay Control is open (Front Enable Relay deenergized).
- The ABS Controller senses Battery voltage at Terminals "Jl-Dl", "J1-C3", "J1-C6" and "J1-C9" (Front Solenoid controls).

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A040 is also set, the ABS Controller has an internal failure.
2. If Code A003 is also set, the ground B49 must be open.
3. Determines if a short to Battery is present in the circuit or if the ABS Controller is possibly defective.
4. Isolates a short to Battery in PN50, PN51, PN53 or determines if the Front Enable relay is defective.
5. If Code A039 is a consistent failure, the ABS Controller has an internal fault.

CODE A039

FRONT ENABLE RELAY CONTACTS SHORTED TO BATTERY



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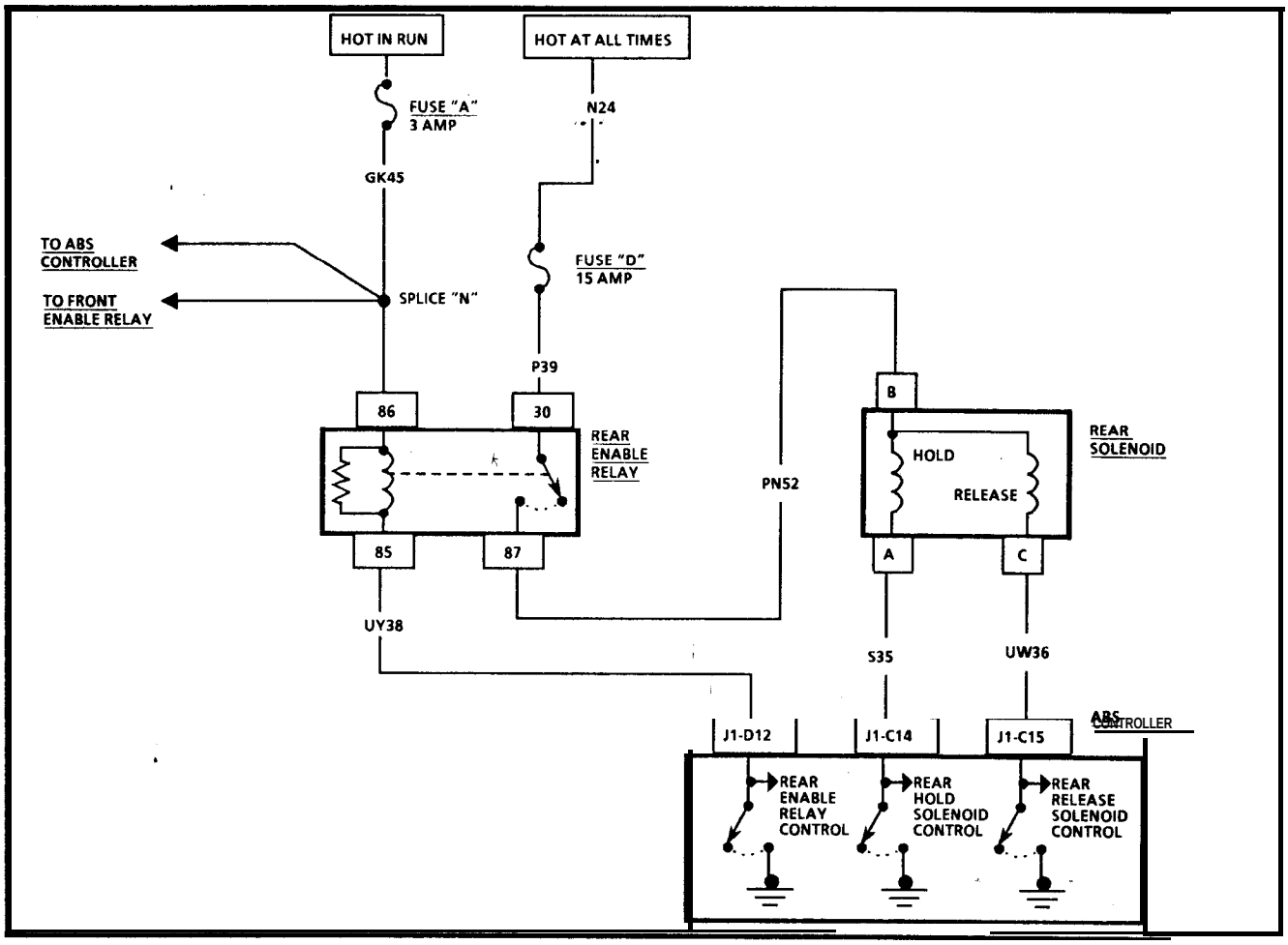


CODE A040

REAR ENABLE RELAY CONTACTS SHORTED TO BATTERY

When the Rear Enable Relay Control is open, the Rear Enable Relay is deenergized. This prevents voltage from being applied to the Rear Solenoid and Solenoid Controls.

CODE A040 will set during initialization when all the following conditions exist:

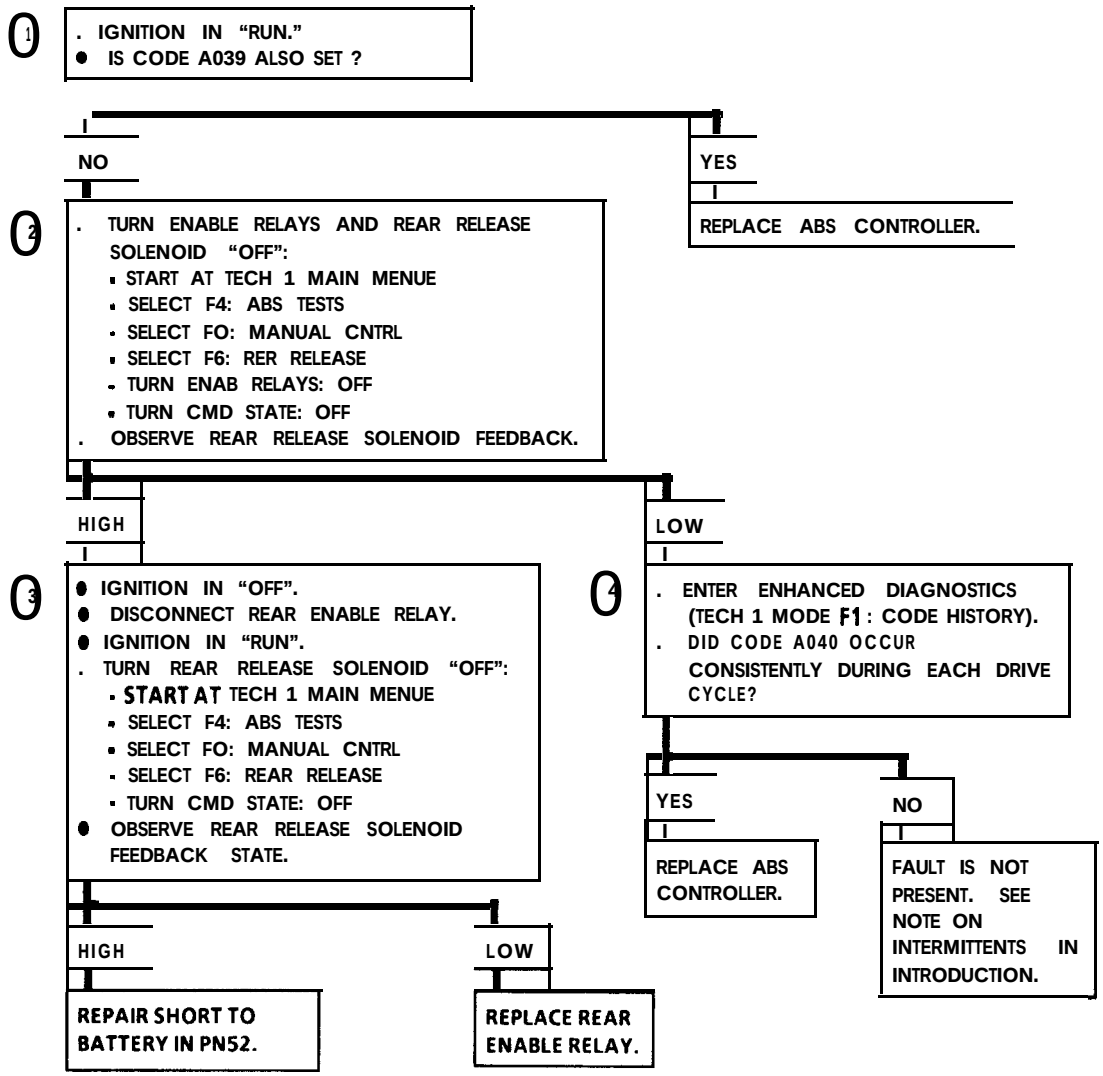
- The Rear Enable Relay Control is open (Rear Enable Relay deenergized).
- The ABS Controller senses Battery voltage at both terminals "J1-C14" and "Jl-C15".
- The ABS Controller senses Battery voltage at terminal "Jl-D12".

Test Description: The following provides an explanation of the procedures being followed in the trouble tree

1. If Code A039 is also set, the ABS Controller has an internal failure.
2. Determines if a short to Battery is present in the circuit or if the ABS Controller is possibly defective.
3. Isolates a short to Battery in the PN52 or determines if the Rear Enable Relay is defective.
4. If Code A040 is a consistent failure, the ABS Controller has an internal fault.

CODE A040

REAR ENABLE RELAY CONTACTS SHORTED TO BATTERY



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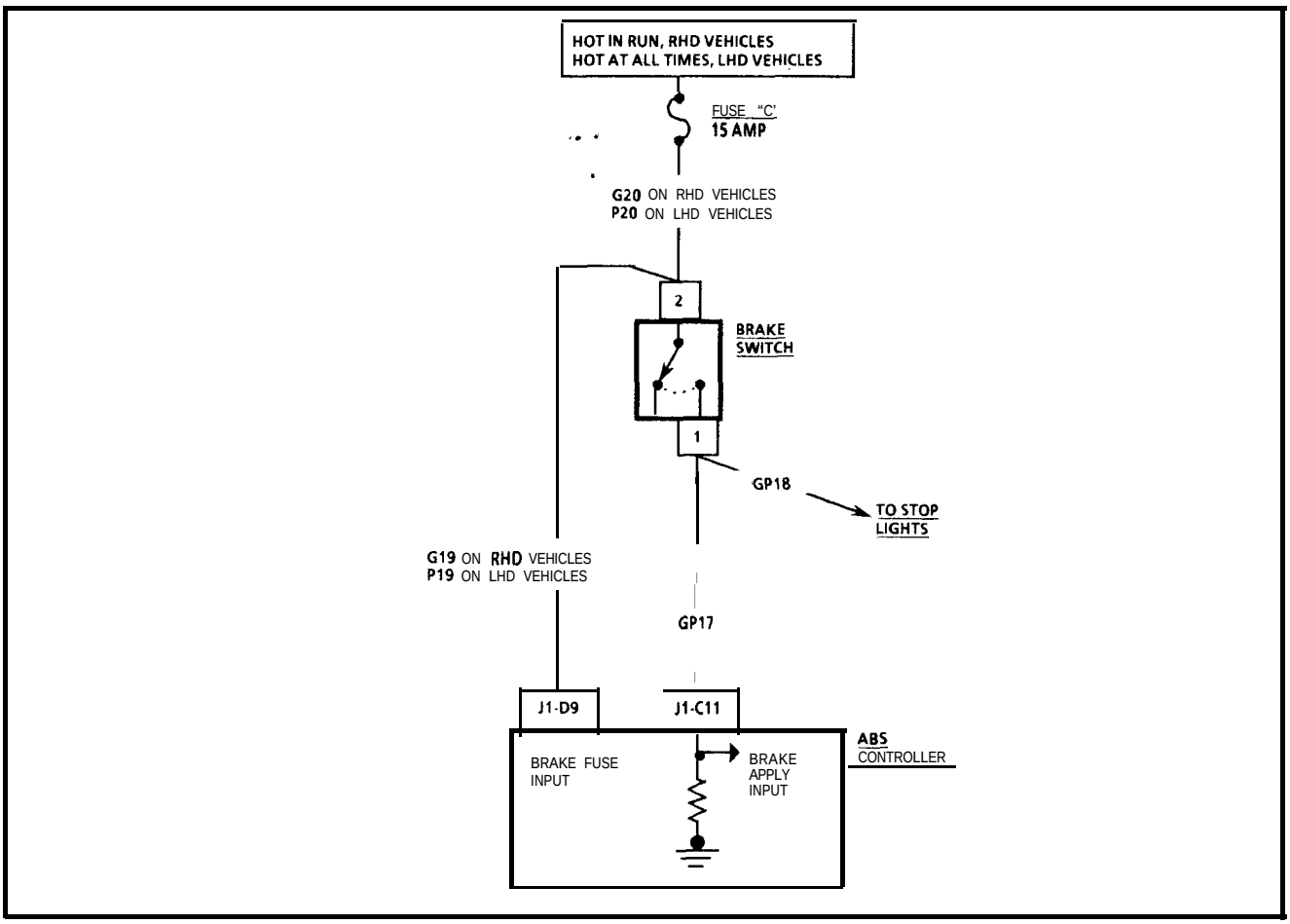


CODE A041

BRAKE SWITCH CIRCUIT OPEN

The ABS Controller determines that the Brake Pedal is pressed when battery voltage is sensed at the Brake Apply Input. If battery voltage is not present, the Controller should sense ground through "J1-C11, GP17" and the Stop Lights.

CODE A041 will set when all the following conditions exist:

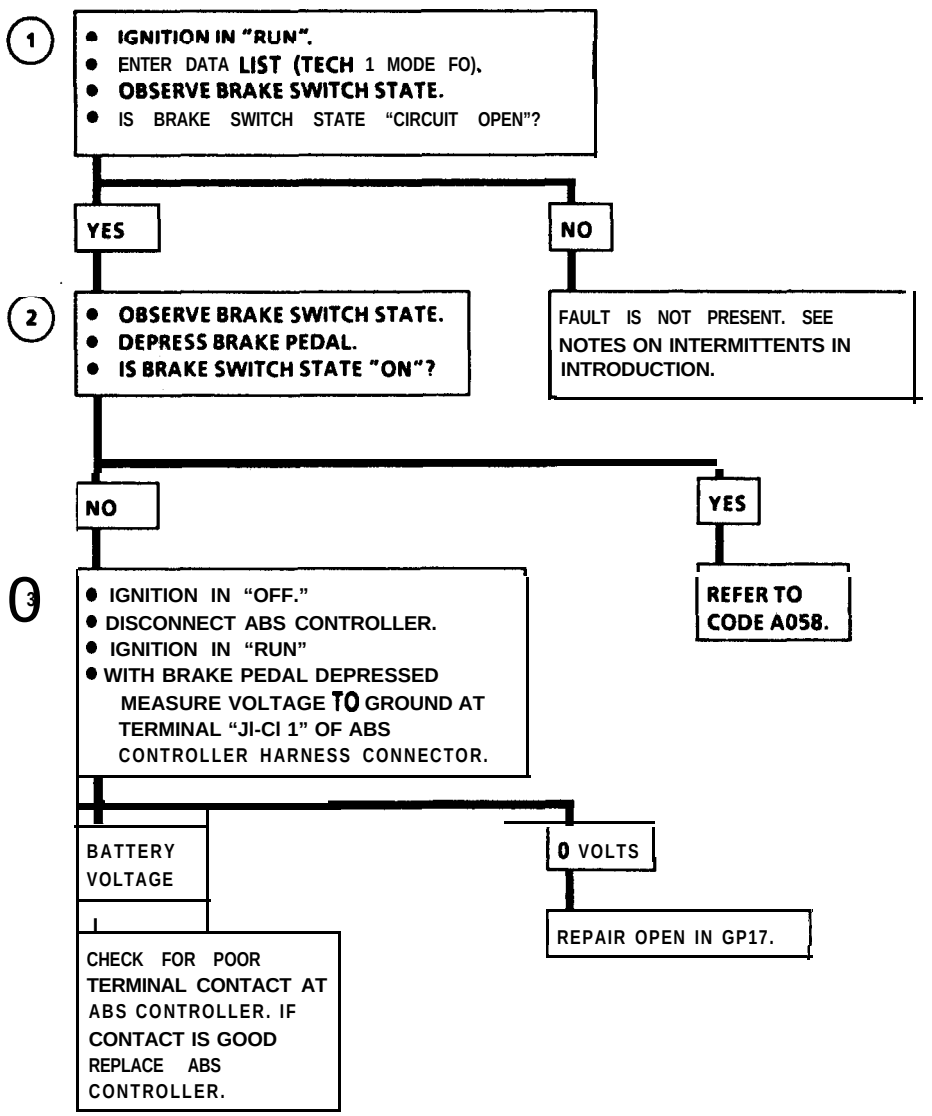
- Brake Switch is open (Battery voltage not sensed at Brake Apply Input).
- ABS Controller does not sense ground at Brake Apply Input (through "Jl-Cll, GP17, GP18" and brake light bulbs).

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. By observing the Brake Switch State it can be determined if the ABS Controller is sensing the proper input (a proper input at this point would indicate an intermittent fault condition).
2. Determines if the open condition exists in GP18 between the Brake Switch and the brake lights or if the open condition exists in GP17 between the Brake Switch and the ABS Controller "J1-C11".
3. Isolates the open condition to "GP17" between the Brake Switch and the ABS Controller if 0 volts was measured at Terminal "Jl-Cll" of ABS Controller. If Battery voltage was measured at Terminal "Jl-Cll" it indicates that the ABS Controller is defective.

CODE A041

BRAKE SWITCH CIRCUIT OPEN



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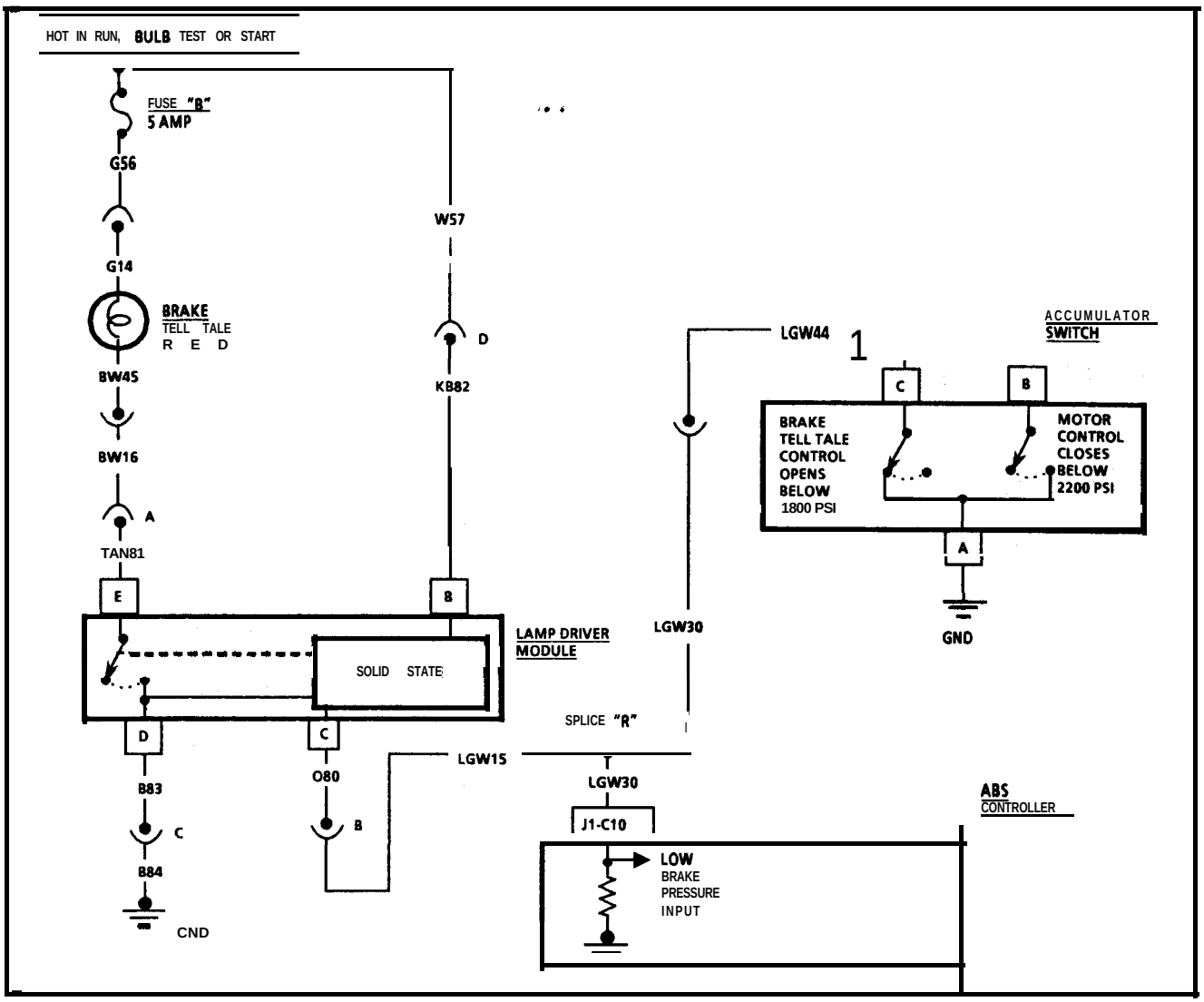


CODE A042

LOW BRAKE PRESSURE CIRCUIT OPEN

When the Low Pressure Switch in the Accumulator Switch is closed (pressure greater than approximately 1800 PSI), the ABS Controller senses ground at the Low Brake Pressure Input. If the Low Pressure Switch is open (pressure less than 1800 PSI) the Lamp Driver Module loses ground at terminal C. The Lamp Driver Module turns on the Brake Tell Tale and applies voltage to the Low Brake Pressure Input. If the ABS Controller does not sense ground or battery voltage at the Low Brake Pressure Input, it will set Code A042.

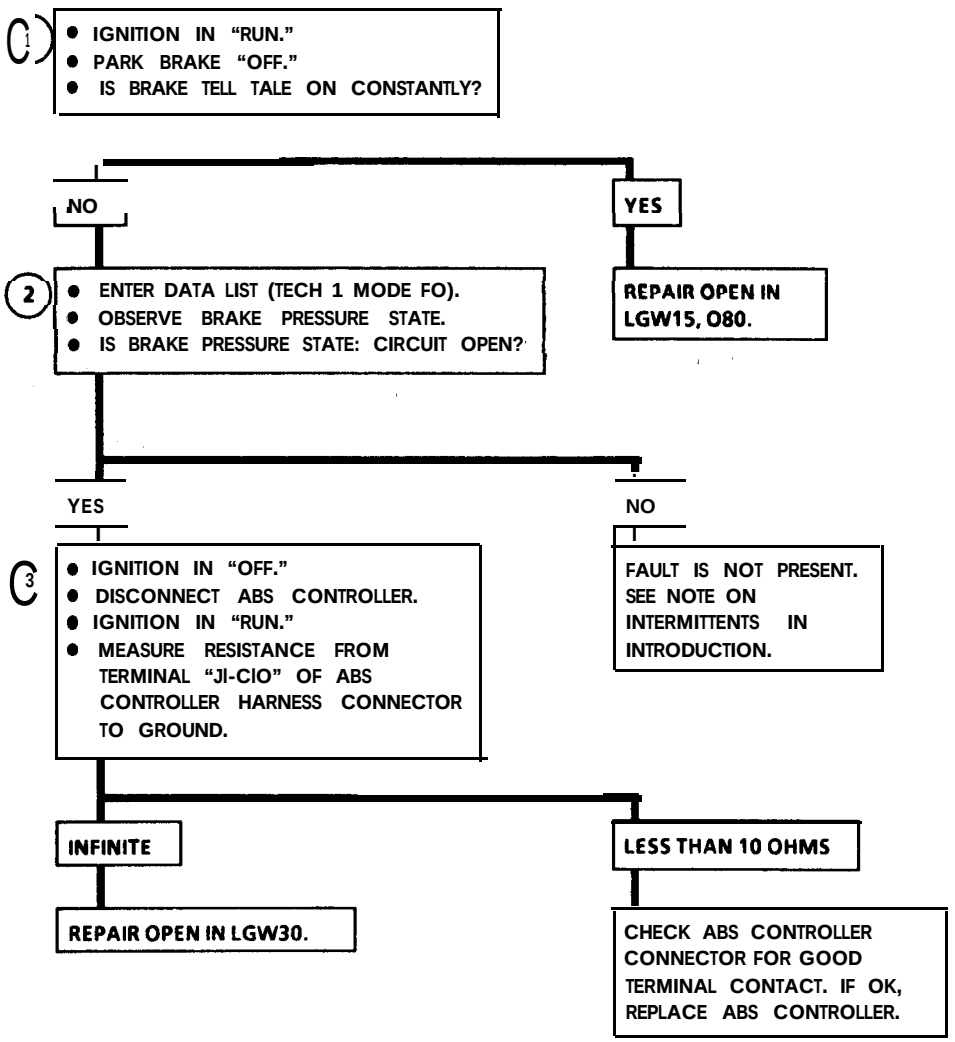
CODE A042 will set when the ABS Controller senses that an open condition exists in the LGW15, 080, LGW30 between the Controller and the Lamp Driver Module.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If the Brake Tell Tale lights constantly, there must be an open in the LGW15, 080 between the Lamp Driver Module and Splice "R".
2. Determines if open condition is currently present.
3. Isolates the open condition to LGW30 between Splice "R" and the ABS Controller or determines a defective ABS Controller.

CODE A042

LOW BRAKE PRESSURE CIRCUIT OPEN



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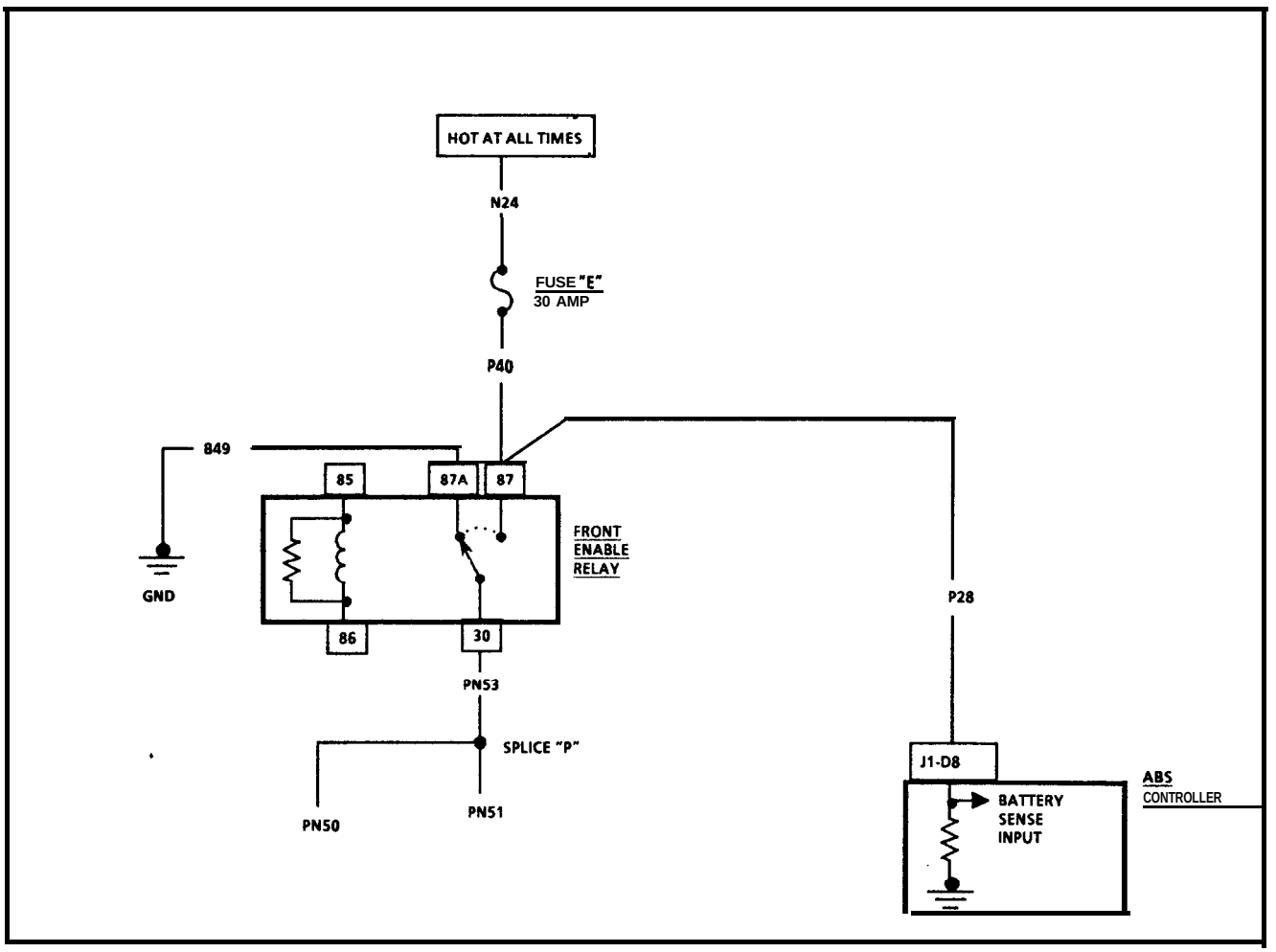

CODE A043

SYSTEM VOLTAGE IS LOW

Voltage from Fuse "E" is applied at ail times to the Front Enable Relay Terminal "87" and the ABS Controller Battery Sense input "J1-D8". Since the ABS Controller needs greater than 9.7 volts to properly operate, Code A043 is set when the applied voltage is less than 9.7volts
CODE A043 will set when the voltage being supplied to Terminal "J1-D8" of the ABS Controller is below 9.7 volts and vehicle speed has exceeded 10 mph.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Determines if the Battery or charging system is faulty, or isolates the problem to the Antilock Brake system.
2. If Code A005 is not set, the problem is in the P28.
3. Checks for short to ground in P40, P28.
4. Checks for short to ground in PN50, PN51. PN53.
5. Determines if open is present before or after Fuse "E".
6. Indicates if open is in P28 or possibly internal to Controller.
7. Determines if fault is a constant failure internal to ABS Controller or an intermittent.

CODE A043
SYSTEM VOLTAGE IS LOW

1. ● IGNITION IN "RUN."
● MEASURE VOLTAGE ACROSS BATTERY TERMINALS.

ABOVE 9.7 VO LTS

2. ● IS CODE AOOS ALSO SET?

BELOW 9.7 VOLTS

CHECK FOR PROPER GENERATOR OUTPUT AND TEST BATTERY AS NECESSARY.

YES

● CHECK FUSE "E".

FUSE BLOWN

3. ● IGNITION IN "OFF."
● DISCONNECT ABS
. CONTROLLER.
● REMOVE BLOWN FUSE "E".
. CONNECT TEST LAMP ACROSS FUSE "E" SOCKET TERMINALS.

TEST LAMP DOES NOT LIGHT

4. ● IGNITION IN "OFF"
● DISCONNECT FRONT ENABLE RELAY
. MEASURE RESISTANCE BEMEEN TERMINAL "30" OF FRONT ENABLE RELAY HARNESS CONNECTOR AND GROUND.

INFINITE

REPLACE FUSE 'E", SYSTEM IS OK.

10 OHMS OR LESS

CHECK TERMINAL "30" OF FRONT ENABLE RELAY HARNESS CONNECTOR AND **PN50, PN51,** PN53 FOR SHORT TO GROUND.

TEST LAMP LIGHTS

REPAIR SHORT TO GROUND IN **P40** OR **P28.**

FUSE NOT BLOWN

5. ● IGNITION IN "OFF."
● DISCONNECT FRONT ENABLE RELAY.
● REMOVE FUSE "E".
● IGNITION IN "RUN".
● MEASURE VOLTAGE TO GROUND AT N24 SIDE OF FUSE "E" SOCKET.

0 VOLTS

REPAIR OPEN IN N24.

BATTERY VOLTAGE

REPAIR OPEN IN **P40.**

NO

6. ● IGNITION "OFF."
. DISCONNECT ABS CONTROLLER.
. IGNITION "RUN."
● MEASURE VOLTAGE FROM ABS CONTROLLER HARNESS CONNECTOR TERMINAL 'JI-DB" TO GROUND.

BATTERY VOLTAGE

7. ● IGNITION IN "OFF".
● RECONNECT ABS CONTROLLER.
● IGNITION IN "RUN."
● ENTER DATA LIST (TECH 1 MODE FO).
. READ BATTERY VOLTAGE STATE.

0 VOLTS

REPAIR OPEN IN **P28.**

OK

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

LOW

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER. IF CONTACT IS GOOD, REPLACE **ABS CONTROLLER.**

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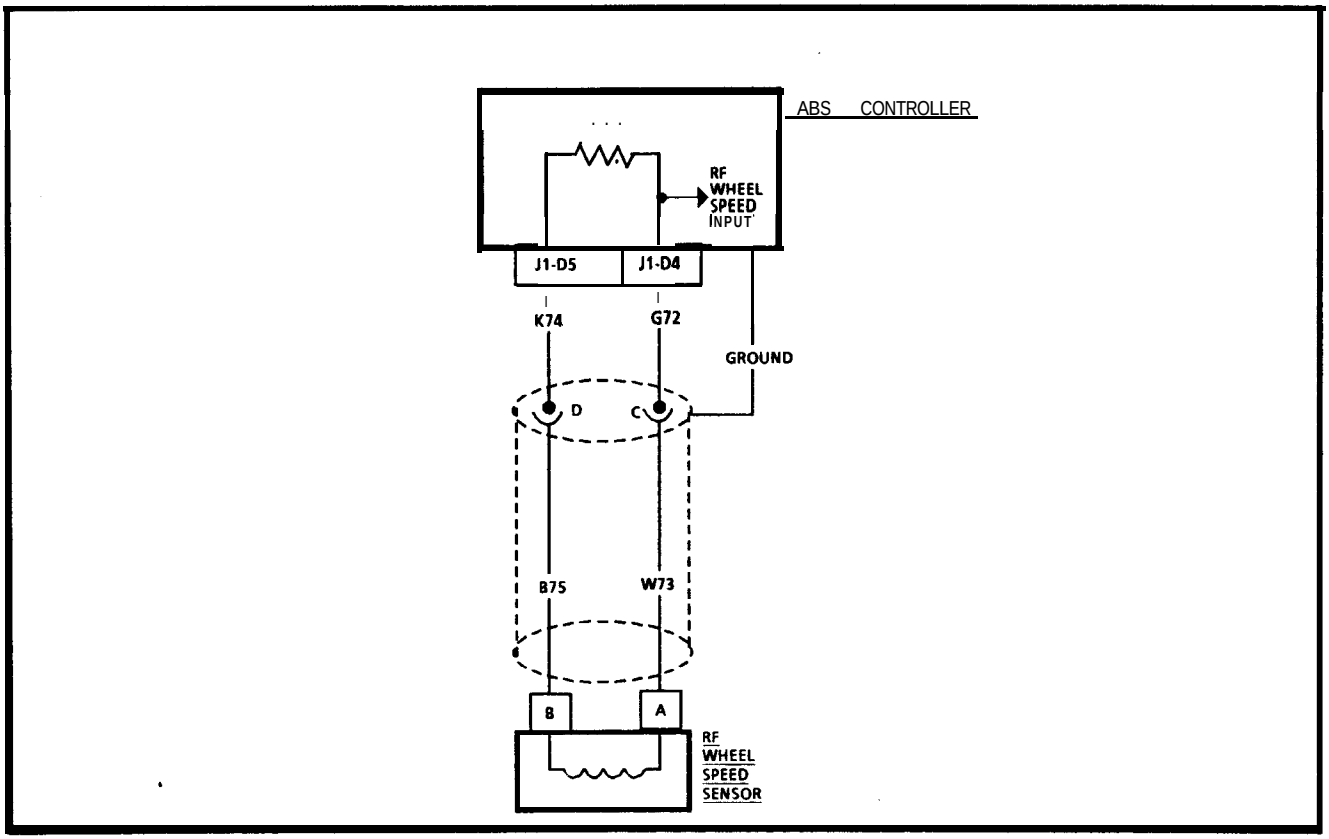


CODE A044

RIGHT FRONT WHEEL SPEED = 0

The Wheel Speed Sensor generates a signal that indicates the speed of the wheel. Voltage pulses are produced as the magnetic teeth pass a coil. The frequency of this AC voltage is used by the Controller to determine how fast the wheel is turning. By comparing this wheel speed to the other wheel speeds, the Controller can detect if wheel lock-up is about to occur.

CODE A044 will set when all of the following conditions exist:

- The ABS Controller senses the right front wheel speed to be 0 mph.
- The ABS Brake Controller senses that the other three wheel speeds are greater than 5 mph and are operating correctly.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.& 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured, Step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms is measured, the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector is eliminated.

CODE A044

RIGHT FRONT WHEEL SPEED = 0

(1) ● IGNITION IN "RUN."
● ENTER DATA LIST (TECH 1 MODE FO).
● MONITOR RIGHT FRONT WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

ERRATIC OR NO WHEEL SPEED OBSERVED

STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

(2) ● IGNITION IN "OFF".
● DISCONNECT THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
. IGNITION IN "RUN".
● CHECK FOR VOLTAGE BETWEEN TERMINAL "D" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "C" AND GROUND.
● IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "C" OR "D"?
NOTE: NORMAL INDICATION IS APPROX. 2.5 VOLT DC.

NO

(4) ● IGNITION "OFF."
● MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

YES

(3) ● IGNITION "OFF."
. DISCONNET ABS CONTRROLLER.
. IGNITION IN "RUN."
● REPEAT MEASUREMENT OF STEP (2).
● IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "C" OR "D"?

YES

REPAIR SHORT TO BATTERY IN K74 OR 672.

NO

REPLACE ABS CONTROLLER.

0 OHMS

● DISCONNECT ABS CONTROLLER.
● MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

BETWEEN 9000 AND 11000 OHMS

A

CONTINUED ON PAGE 107

INFINITE

B

CONTINUED ON PAGE 109

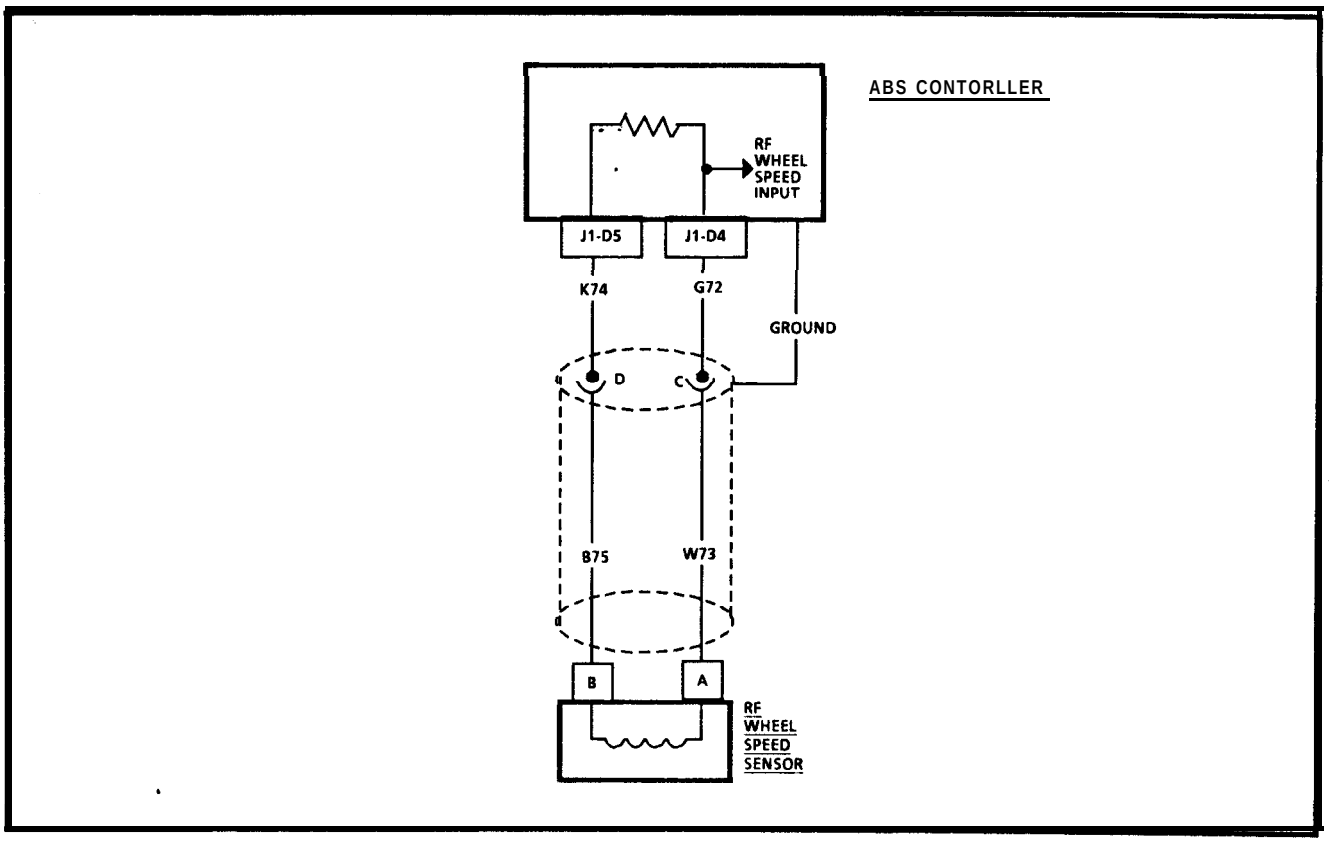
0 OHMS

REPAIR SHORT BETWEEN K74 AND G72.

INFINITE

CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A044

RIGHT FRONT WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).

7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A044

RIGHT FRONT WHEEL SPEED = 0

CONTINUED FROM PAGE 105

A

(5) • MEASURE RESISTANCE BETWEEN TERMINAL "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "C" AND GROUND.
. WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

(6) • MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

(8) • DISCONNECT RF WHEEL SPEED SENSOR.
• MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE RF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

(7) . DISCONNECT RF WHEEL SPEED SENSOR.
. MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE RF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

. DISCONNECT ABS CONTROLLER.
• REPEAT MEASUREMENT OF STEP (5).
. WAS EITHER MEASUREMENT LESS THAN 10 OHMS ?

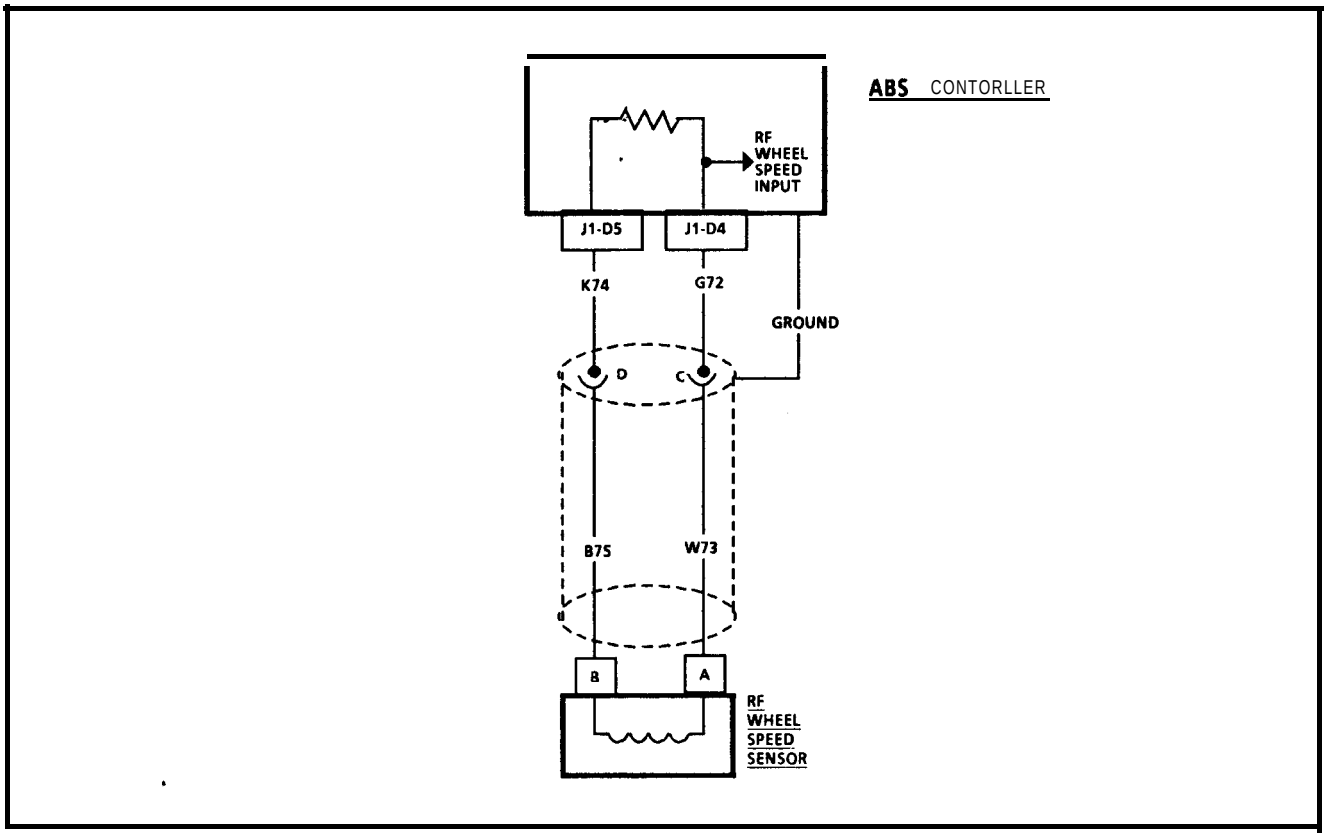
YES

REPAIR SHORT TO GROUND IN K74 OR 672.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A044

RIGHT FRONT WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With male of G72 connected to ground, the resistance from Terminal "J1-D4" to ground should be zero. If infinite resistance is measured, an open condition is indicated in G72.
11. With male of K74 connected to ground, the resistance from Terminal "Jl-D5" to ground should be zero. If infinite resistance is measured, an open condition is indicated in K74.

CODE A044

RIGHT FRONT WHEEL SPEED = 0

CONTINUED FROM PAGE 105

B

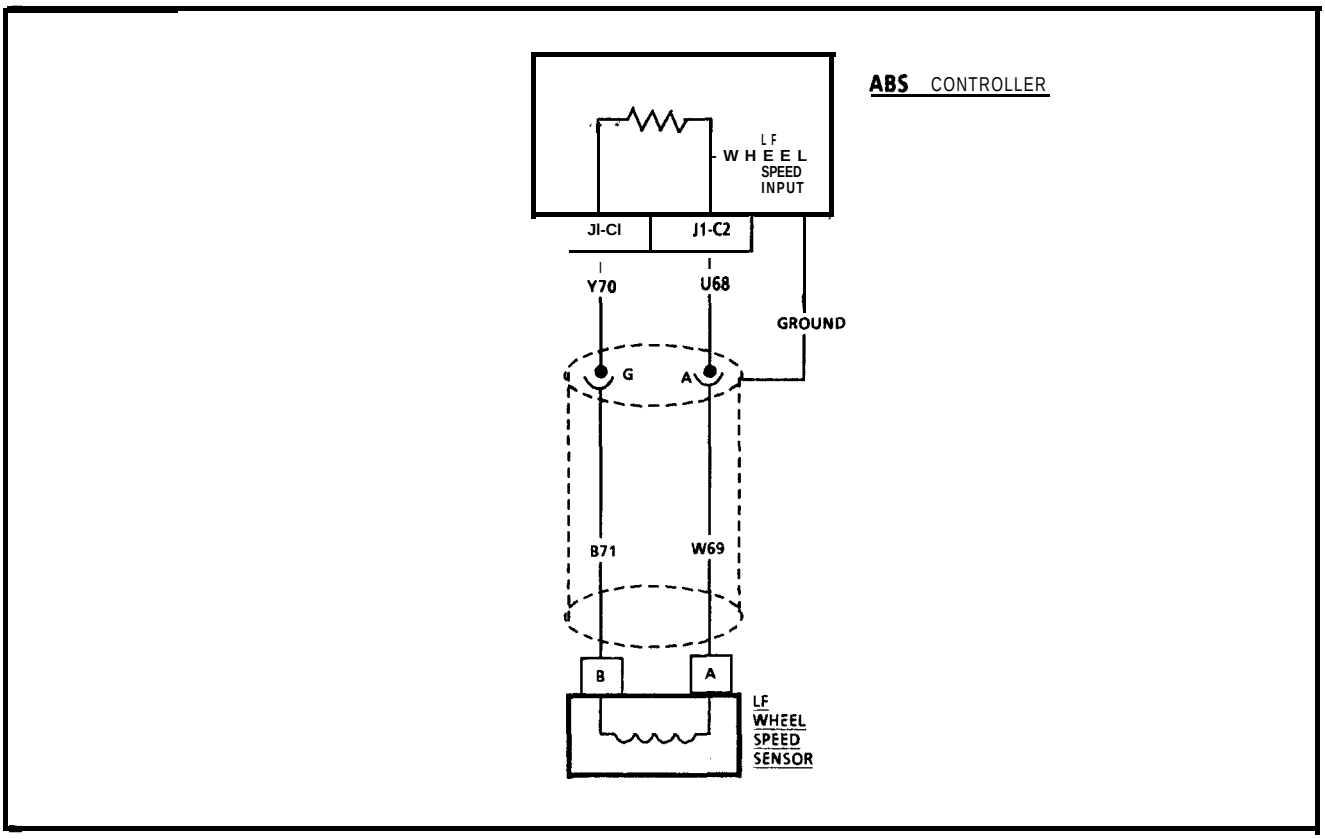
10 . CONNECT JUMPER BETWEEN TERMINAL "C" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
. DISCONNECT ABS CONTROLLER.
. MEASURE RESISTANCE BETWEEN TERMINAL "J1-D4" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

- 0 OHMS
- INFINITE → REPAIR OPEN IN G72.

11 . CONNECT JUMPER BETWEEN TERMINAL "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
. MEASURE RESISTANCE BETWEEN TERMINAL "J1-D5" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

- 0 OHMS → CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER, REPLACE ABS CONTROLLER IF CONTACT IS GOOD.
- INFINITE → REPAIR OPEN IN K74.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A045

LEFT FRONT WHEEL SPEED = 0

The Wheel Speed Sensor generates a signal that indicates the speed of the wheel. Voltage pulses are produced as the magnetic teeth pass a coil. The frequency of this AC voltage is used by the ABS Controller to determine how fast the wheel is turning. By comparing this wheel speed to the other wheel speeds, the ABS Controller can detect if wheel lock-up is about to occur.

CODE A045 will set when all of the following conditions exist:

- The ABS Controller senses the left front wheel speed to be 0 mph.
- The ABS Brake Controller senses that the other three wheel speeds are greater than 5 mph and are operating correctly.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.& 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured, Step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms is measured! the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector is eliminated.

CODE A045

LEFT FRONT WHEEL SPEED = 0

(1)
- IGNITION IN "RUN".
- ENTER DATA LIST (TECH 1 MODE F0).
- MONITOR LEFT FRONT WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

ERRATIC OR NO WHEEL SPEED OBSERVED

STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

(2)
- IGNITION IN "OFF".
- DISCONNECTTHE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
- IGNITION IN "RUN".
- CHECK FOR VOLTAGE BETWEEN TERMINAL "A" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "G" AND GROUND.
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "A" OR "G"?

NOTE: NORMAL INDICATION IS APPROX. 2.5 VOLT DC.

NO

YES

(4)
- IGNITION "OFF."
- MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

(3)
- IGNITION "OFF."
- DISCONNET ABS CONTRROLLER.
- IGNITION IN "RUN."
- REPEAT MEASUREMENT OF STEP (2).
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "A" OR "G"?

0 OHMS

BETWEEN 9000 AND 11000 OHMS

INFINITE

- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

A

CONTINUED ON PAGE 113

B

CONTINUED ON PAGE 115

YES

REPAIR SHORT TO BATTERY IN Y70 OR U68.

NO

REPLACE ABS CONTROLLER.

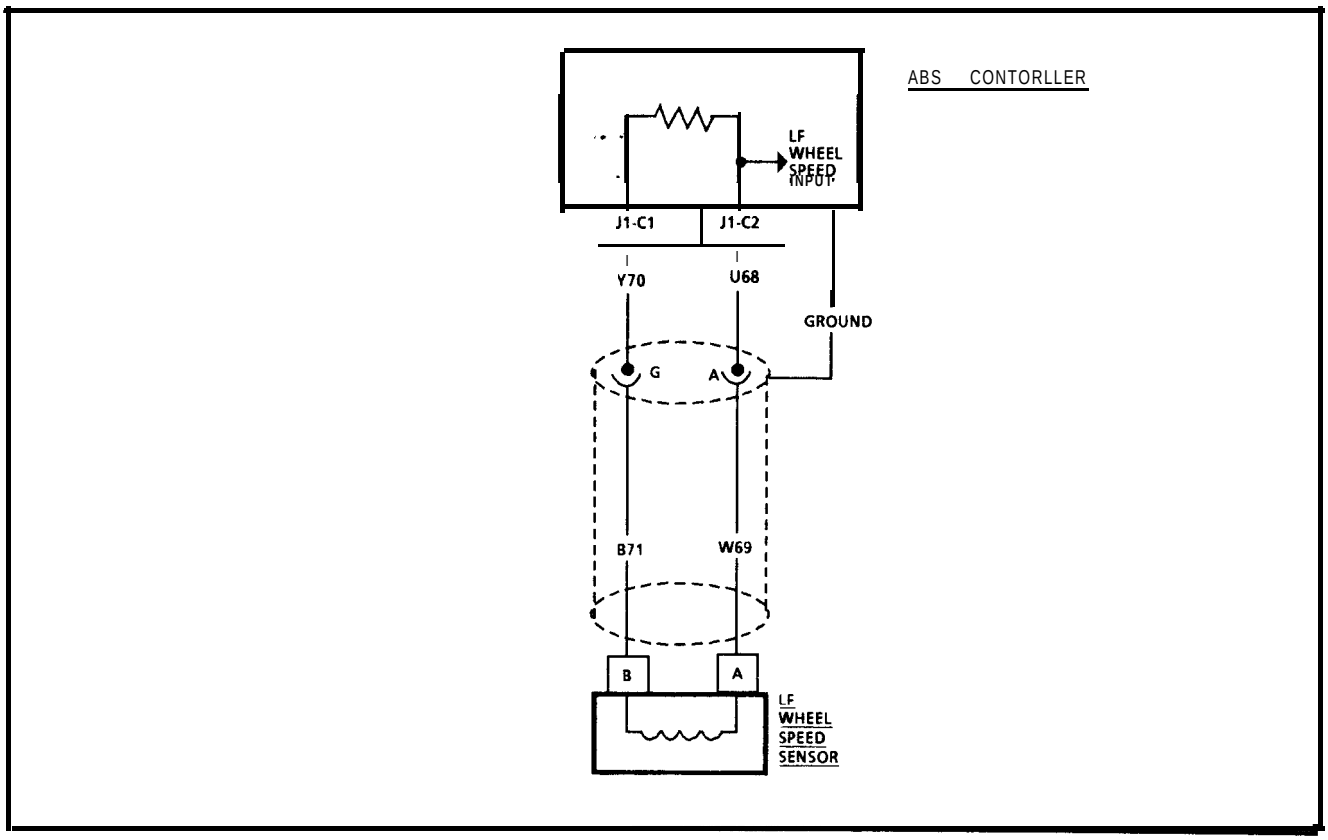
0 OHMS

REPAIR SHORT BETWEEN Y70 AND U68.

INFINITE

CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A045

LEFT FRONT WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A045

LEFT FRONT WHEEL SPEED = 0

CONTINUED FROM PAGE 111

A

⑤
- MEASURE RESISTANCE BETWEEN TERMINAL "A" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "G" AND GROUND.
- WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

⑥
- MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

⑧
- DISCONNECT LF WHEEL SPEED SENSOR.
- MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE LF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

⑦
- DISCONNECT LF WHEEL SPEED SENSOR.
- MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE LF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

- DISCONNECT ABS CONTROLLER.
- REPEAT MEASUREMENT OF STEP ⑤.
- WAS EITHER MEASUREMENT LESS THAN 10 OHMS ?

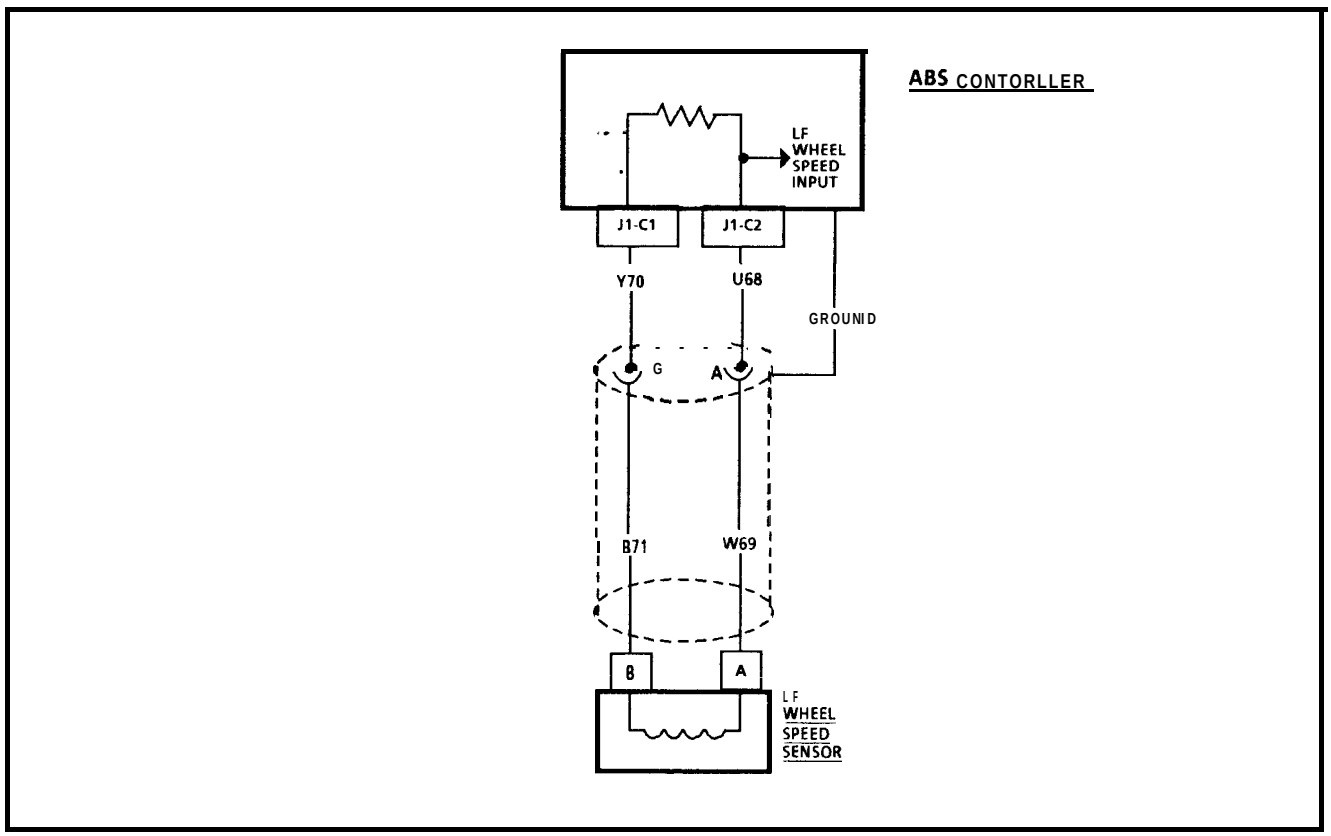
YES

REPAIR SHORT TO GROUND IN Y70 OR U68.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE,CLEAR CODES AND VERIFY OPERATION.



CODE A045

LEFT FRONT WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With male of Y70 connected to ground, the resistance from Terminal "Jl-Cl" to ground should be zero. If infinite resistance is measured, an open condition is indicated in Y70.
11. With male of U68 connected to ground, the resistance from Terminal "J1-C2" to ground should be zero. If infinite resistance is measured, an open condition is indicated in U68.

CODE A045

LEFT FRONT WHEEL SPEED = 0

CONTINUED FROM PAGE 111

B

10. CONNECT JUMPER BETWEEN TERMINAL "G" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
. DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-C1" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

0 OHMS

INFINITE

REPAIR OPEN IN Y70.

1. CONNECT JUMPER BETWEEN TERMINAL "A" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-C2" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

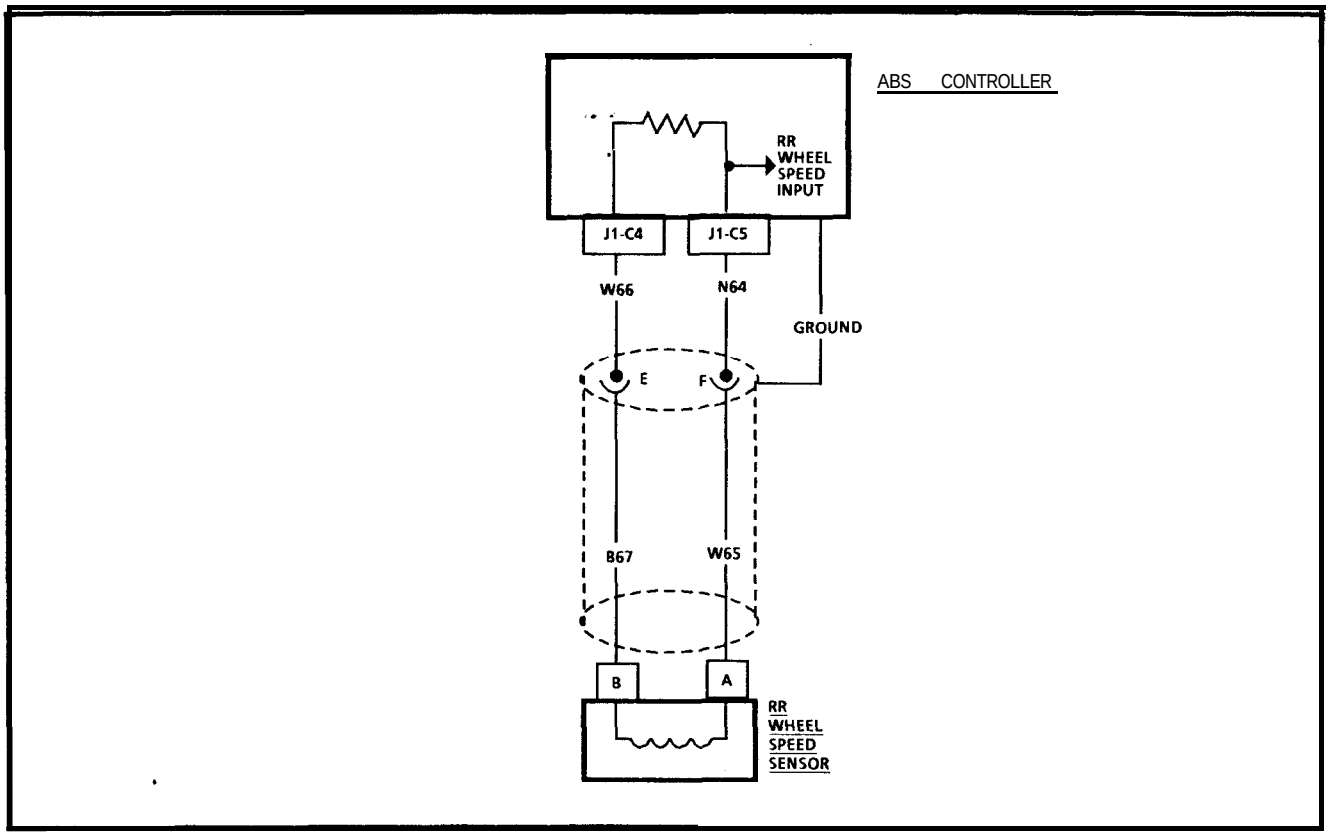
0 OHMS

INFINITE

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER, REPLACE ABS CONTROLLER IF CONTACT IS GOOD.

REPAIR OPEN IN U68.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A046

RIGHT REAR WHEEL SPEED = 0

The Wheel Speed Sensor generates a signal that indicates the speed of the wheel. Voltage pulses are produced as the magnetic teeth pass the coil. The frequency of this AC voltage is used by the ABS Controller to determine how fast the wheel is turning. By comparing this wheel speed to the other wheel speeds, the ABS Controller can detect if wheel lock-up is about to occur.

CODE A047 will set when all of the following conditions exist:

- The ABS Controller senses the right rear wheel speed to be 0 mph.
- The ABS Controller senses that the other three wheel speeds are greater than 5 mph and are operating correctly.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

I. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2. & 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms was measured, its possibility of a open or short in the circuit between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector has been eliminated.

CODE A046

RIGHT REAR WHEEL SPEED = 0

①
- IGNITION IN "RUN".
- ENTER DATA LIST (TECH 1 MODE FO).
- MONITOR RIGHT REAR WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

ERRATIC OR NO WHEEL SPEED OBSERVED

STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

②
- IGNITION IN "OFF".
- DISCONNECT THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
- IGNITION IN "RUN".
- CHECK FOR VOLTAGE BETWEEN TERMINAL "F" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "E" AND GROUND.
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "E" OR "F"?

NOTE: NORMAL INDICATION I5 APPROX. 2.5 VOLT DC.

NO

④
- IGNITION "OFF."
- MEASURE RESISTANCE ACROSS TERMINALS "F" AND "E" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

0 OHMS

- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE ACROSS TERMINALS "F" AND "E" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

0 OHMS

REPAIR SHORT BETWEEN N64 AND W66.

INFINITE

CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.

BETWEEN 9000 AND 11000 OHMS

A

CONTINUED ON PAGE 119

INFINITE

B

CONTINUED ON PAGE 121

YES

③
- IGNITION "OFF."
- DISCONNET ABS CONTRROLLER.
- IGNITION IN "RUN."
- REPEAT MEASUREMENT OF STEP ②.
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "E" OR "F"?

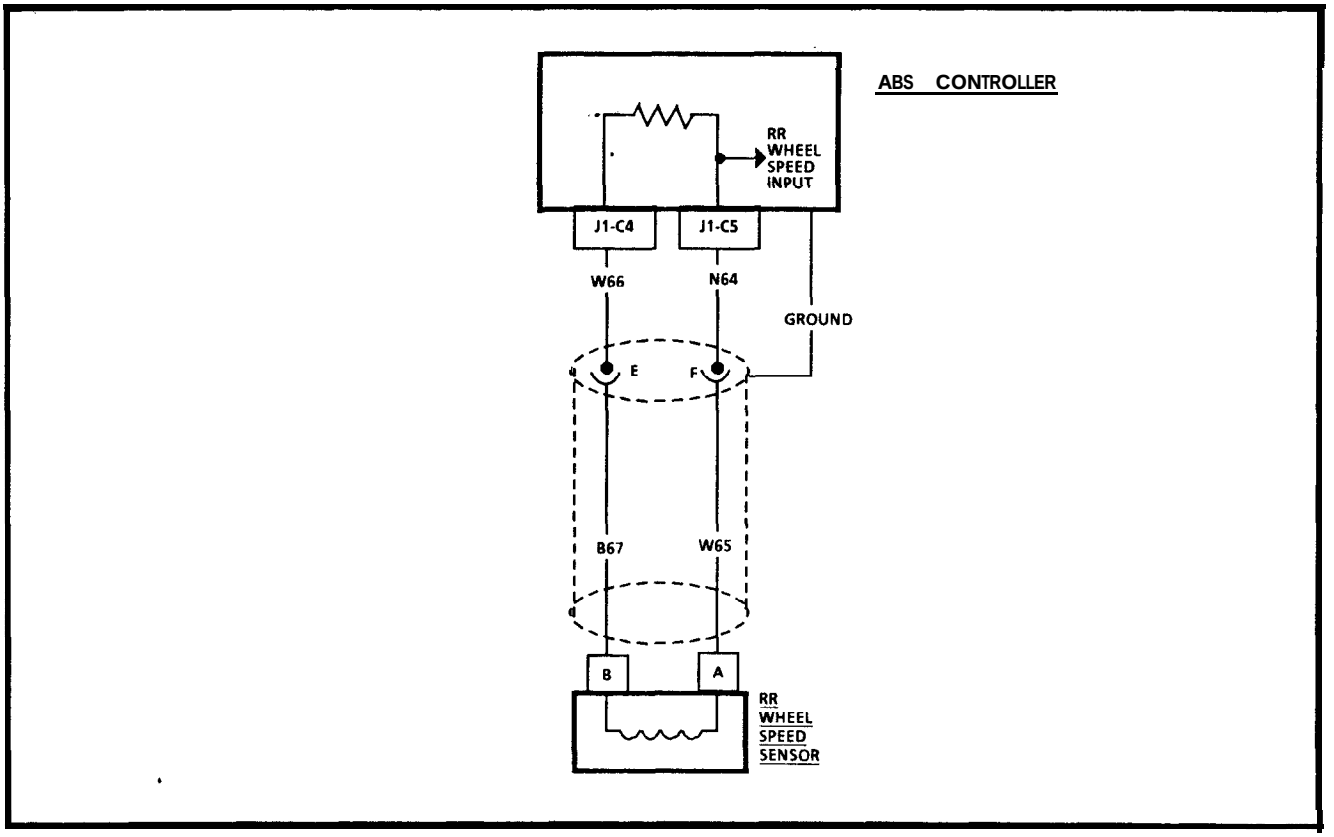
YES

REPAIR SHORT TO BATTERY IN N64 OR W66.

NO

REPLACE ABS CONTROLLER

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, I5 GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A046

RIGHT REAR WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A046

RIGHT REAR WHEEL SPEED = 0

CONTINUED FROM PAGE 117

A

⑤
- MEASURE RESISTANCE BETWEEN TERMINAL "F" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "E" AND GROUND.
- WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

⑥
- MEASURE RESISTANCE ACROSS TERMINALS "E" AND "F" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

⑧
- DISCONNECT RR WHEEL SPEED SENSOR.
- MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE RR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

⑦
- DISCONNECT RR WHEEL SPEED SENSOR.
- MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE RR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

- DISCONNECT ABS CONTROLLER.
- REPEAT MEASUREMENT OF STEP ⑤.
- WAS EITHER MEASUREMENT LESS THAN 10 OHMS ?

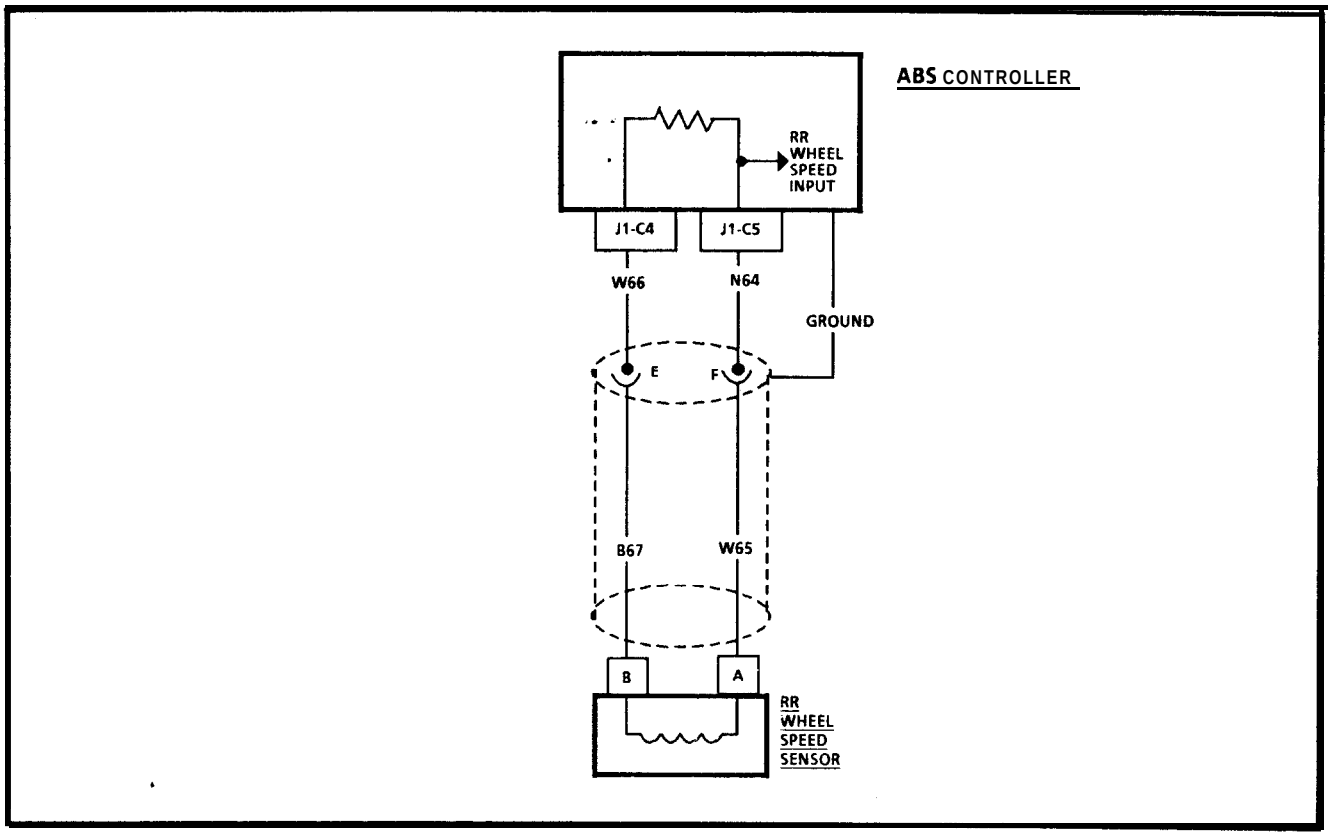
YES

REPAIR SHORT TO GROUND IN N64 OR W66.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A046

RIGHT REAR WHEEL SPEED = 0

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With male of N64 connected to ground, the resistance from Terminal "J1-C5" to ground should be zero. If infinite resistance is measured, an open condition is indicated in N64.
11. With male of W66 connected to ground, the resistance from Terminal "Jl-C4" to ground should be zero. If infinite resistance is measured, an open condition is indicated in W66.

CODE A047
LEFT REAR WHEEL SPEED = 0

CONTINUED FROM PAGE 123

A

5 • MEASURE RESISTANCE BETWEEN TERMINAL **"H"** ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL **"B"** AND GROUND.
• WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

6 • MEASURE RESISTANCE ACROSS TERMINALS **"H"** AND "B" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

• DISCONNECT LR WHEEL SPEED SENSOR.
• MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, **DIRT,ETC.** RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE LR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

7 . DISCONNECT LR WHEEL SPEED SENSOR.
. MEASURE RESISTANCE BETWEEN **TERMINAL "A"** AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

. DISCONNECT ABS CONTROLLER.
• REPEAT MEASUREMENT OF STEP ⑤.
. WAS EITHER MEASUREMENT LESS THAN 10 OHMS **?**

YES

REPAIR SHORT TO GROUND IN B60 OR R62.

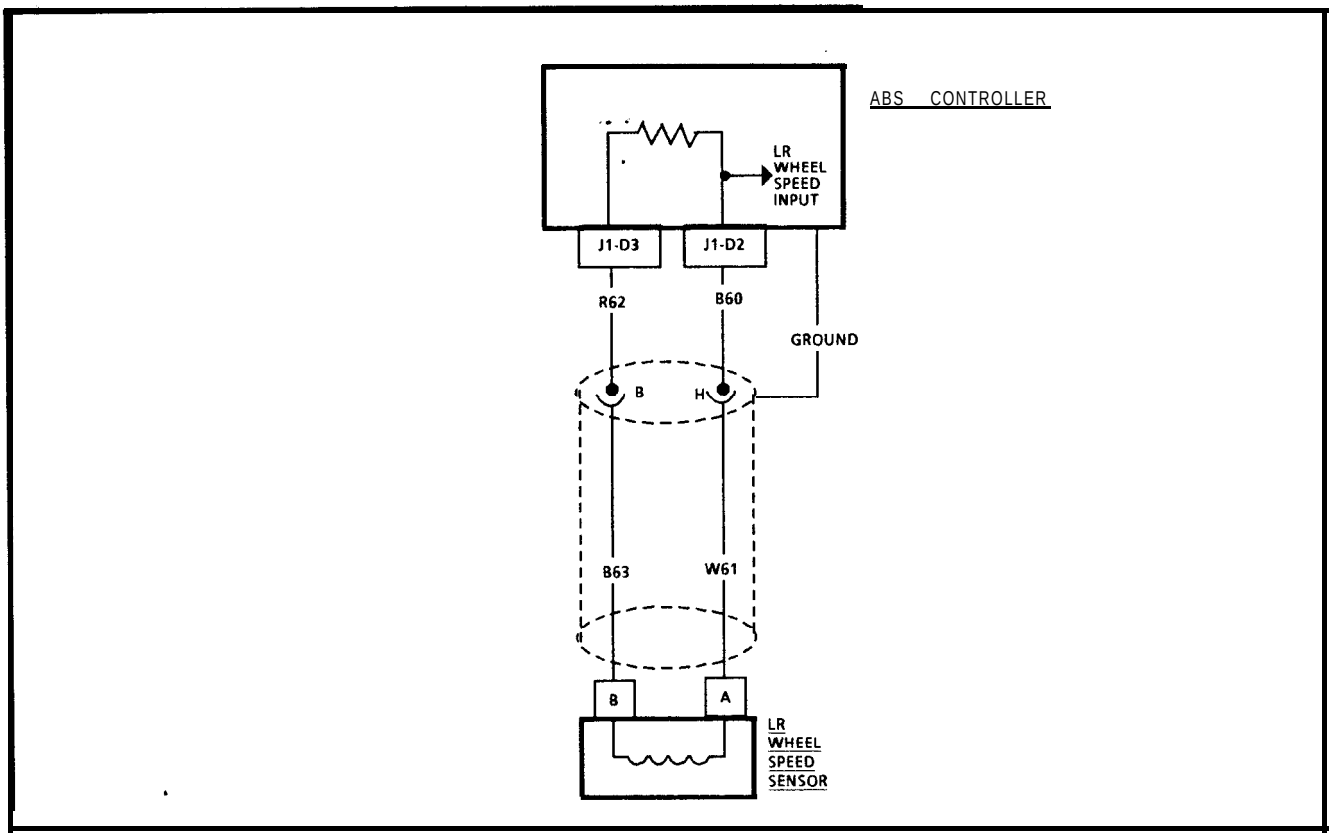
NO

REPLACE ABS CONTROLLER.

1 **MEGOHM** OR LESS

REPLACE LR WHEEL SPEED SENSOR.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A047

LEFT REAR WHEEL SPEED = 0

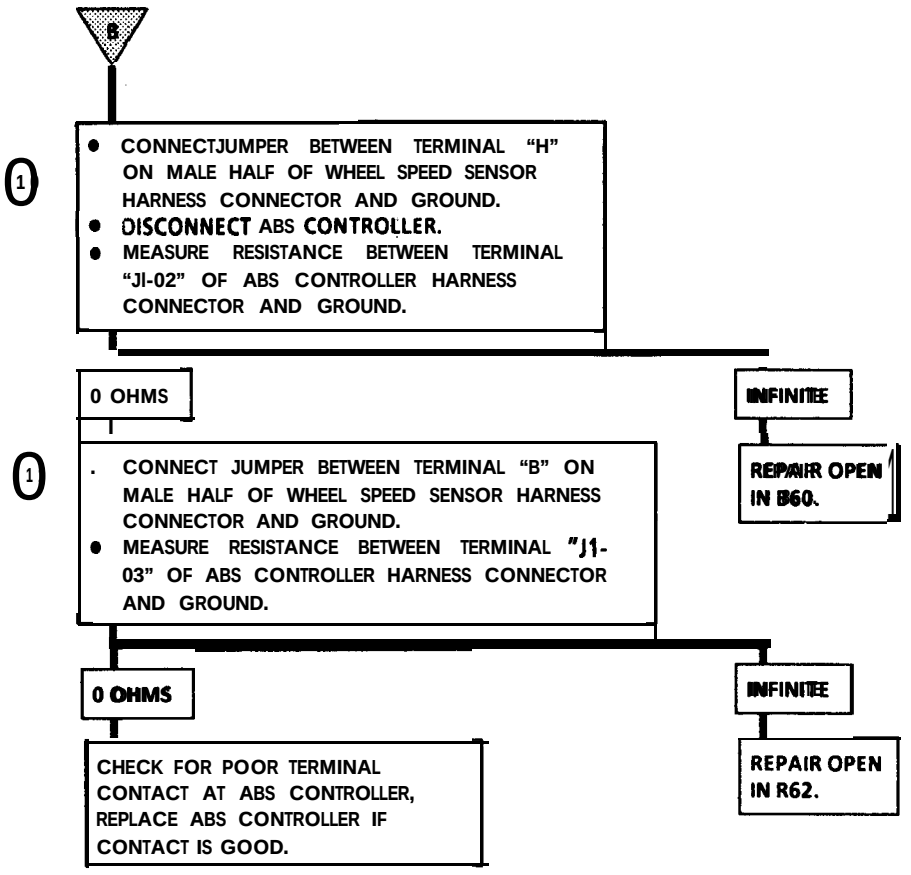
Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With Male of B60 connected to ground, the resistance from Terminal "J1-D2" to ground should be zero. If infinite resistance is measured, an open condition is indicated in B60.
11. With Male of R62 connected to ground, the resistance from Terminal "J1-D3" to ground should be zero. If infinite resistance is measured, an open condition is indicated in R62.

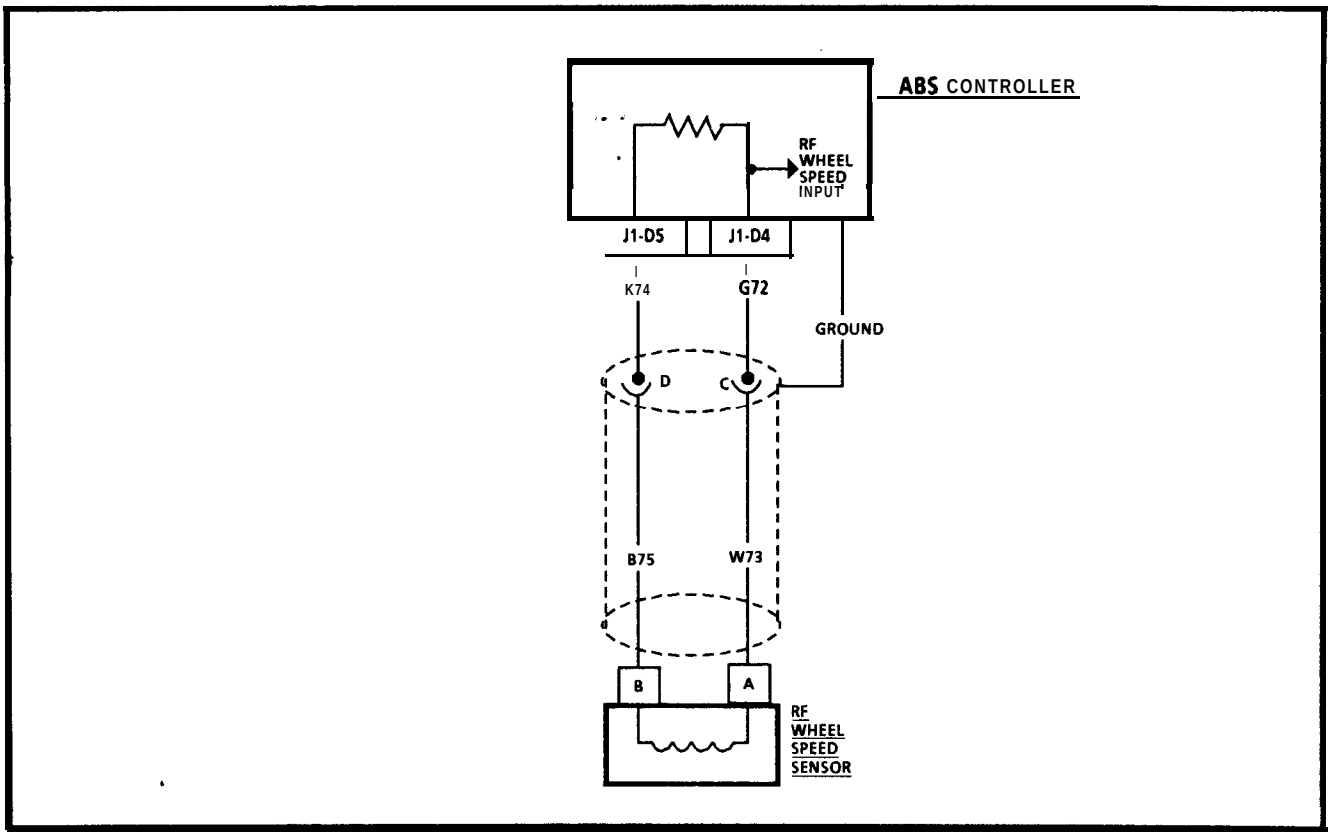
CODE A047

LEFT REAR WHEEL SPEED = 0

CONTINUED FROM PAGE 123



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. 00 NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

The ABS Controller uses the signal from the wheel speed sensor to detect if wheel lock-up is impending. If the frequency of the AC voltage produced by the wheel speed sensor indicates that the wheel is accelerating or decelerating faster than physically possible, the ABS Controller determines the signal is faulty and sets the code.

CODE A048 will set when all of the following conditions exist:

- The Brakes are not being applied (Brake Switch is off).
- The ABS Controller senses that the Right Front Wheel has accelerated or decelerated greater than physically possible.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.& 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured, Step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms is measured, the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector is eliminated.

CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

(1)
- IGNITION IN "RUN"
- ENTER DATA LIST (TECH 1 MODE FO).
- MONITOR RIGHT FRONT WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

ERRATIC OR NO WHEEL SPEED OBSERVED

STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

(2)
- IGNITION IN "OFF".
- DISCONNECT THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
- IGNITION IN "RUN".
- CHECK FOR VOLTAGE BETWEEN TERMINAL "D" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "C" AND GROUND.
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "C" OR "D"? NOTE: NORMAL INDICATION IS APPROX. 2.5 VOLT DC.

NO

YES

(4)
- IGNITION "OFF."
- MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

(3)
- IGNITION "OFF."
- DISCONNET ABS CONTRROLLER.
- IGNITION IN "RUN."
- REPEAT MEASUREMENT OF STEP (2).
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "D" OR "C"?

0 OHMS

BETWEEN 9000 AND 11000 OHMS

INFINITE

YES

NO

- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

A

CONTINUED ON PAGE 131

B

CONTINUED ON PAGE 133

REPAIR SHORT TO BATTERY IN K74 OR G72.

REPLACE ABS CONTROLLER.

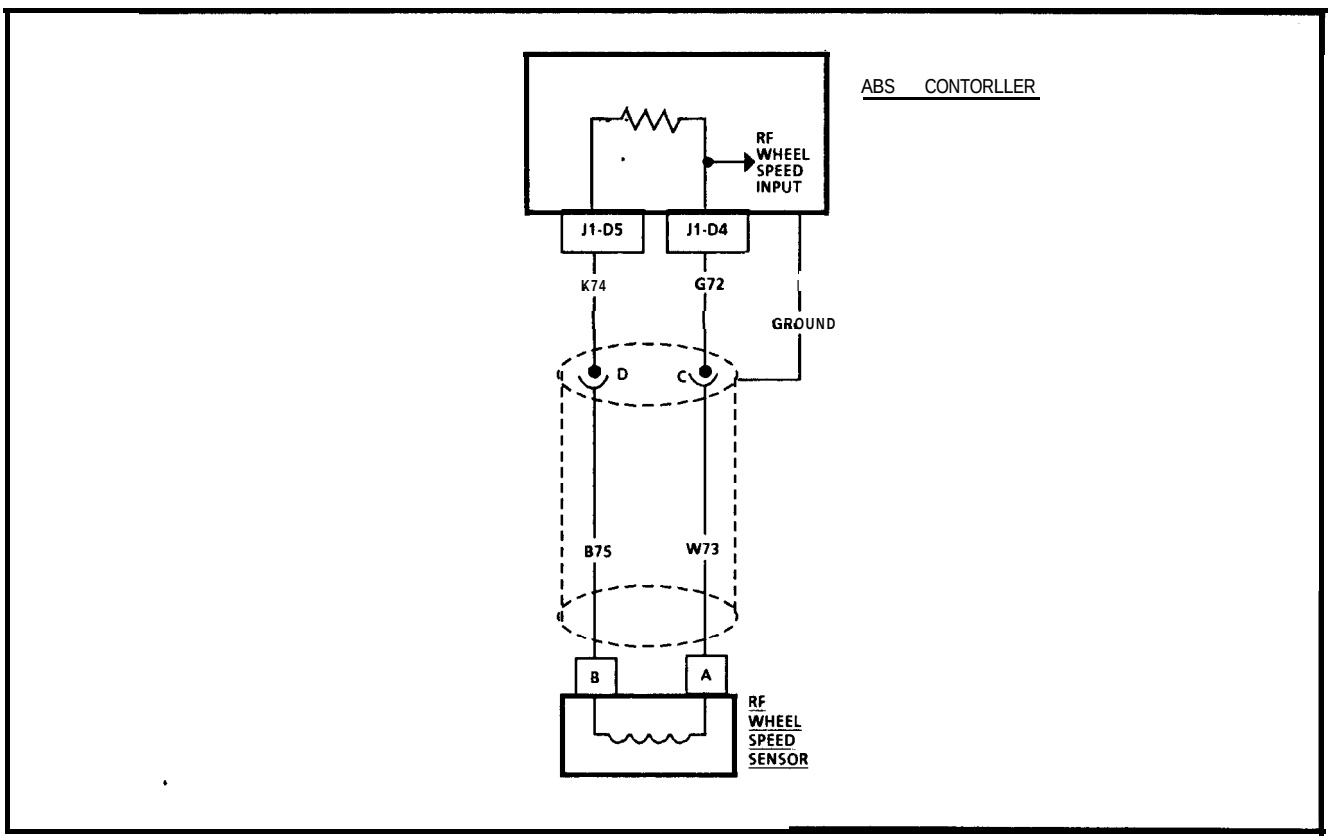
0 OHMS

REPAIR SHORT BETWEEN K74 AND 672.

INFINITE

CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

CONTINUED FROM PAGE 129

(4)

(5) • MEASURE RESISTANCE BETWEEN TERMINAL "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "C" AND GROUND.
• WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

(6) • MEASURE RESISTANCE ACROSS TERMINALS "C" AND "D" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

(8) • **DISCONNECT RF WHEEL SPEED SENSOR.**
• **MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.**

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE RF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

(7) • DISCONNECT RF WHEEL SPEED SENSOR.
• MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE RF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

• DISCONNECT **ABS** CONTROLLER.
• REPEAT MEASUREMENT OF STEP (5).
• WAS EITHER MEASUREMENT LESS **THAN** 10 OHMS ?

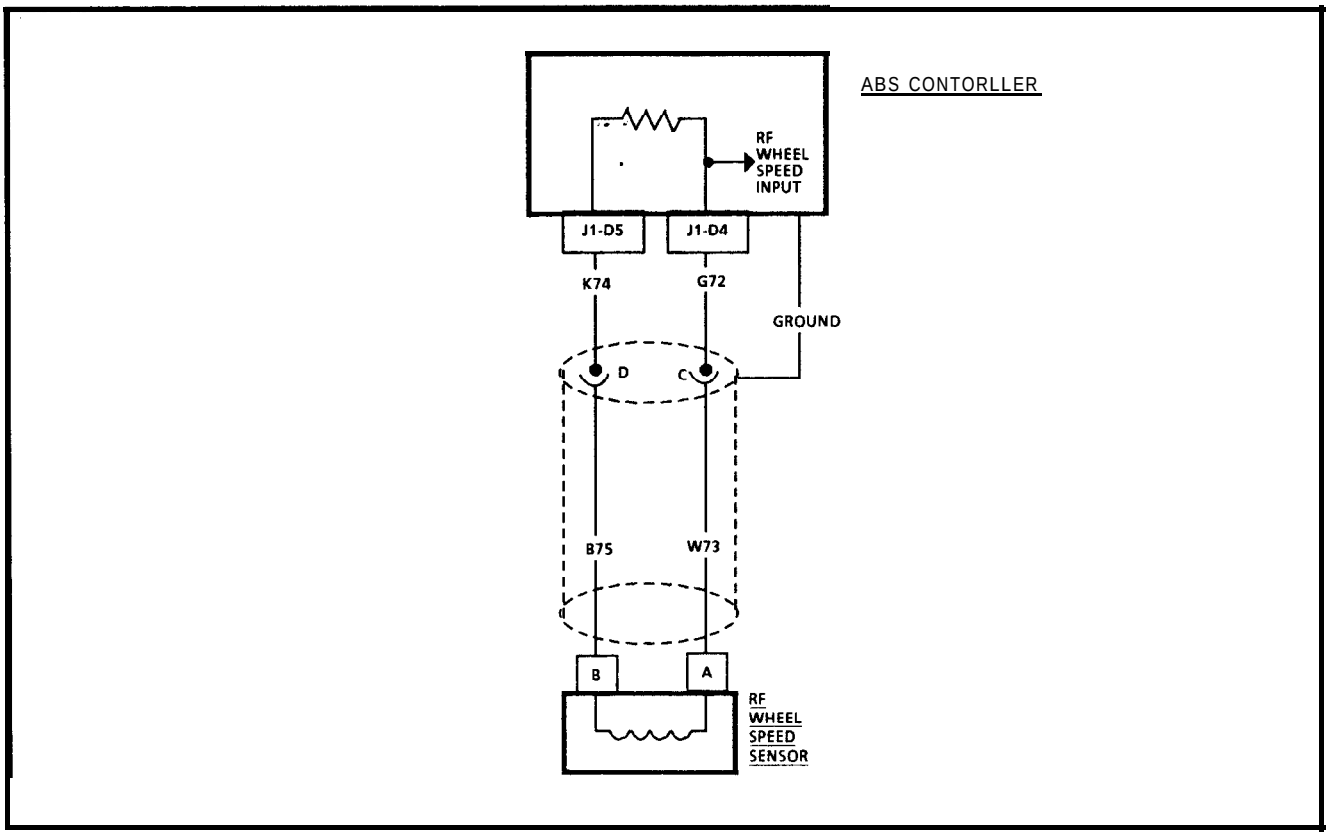
YES

REPAIR SHORT TO GROUND IN K74 OR 672.

NO

REPLACE **ABS** CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With male of G72 connected to ground, the resistance from Terminal "Jl-D4" to ground should be zero. If infinite resistance is measured, an open condition is indicated in G72.
11. With male of K74 connected to ground, the resistance from Terminal "J1-D5" to ground should be zero. If infinite resistance is measured, an open condition is indicated in K74.

CODE A048

EXCESSIVE RIGHT FRONT WHEEL ACCELERATION

CONTINUED FROM PAGE 129

B

10

- CONNECT JUMPER BETWEEN TERMINAL "C" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-D4" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

0 OHMS

11

- CONNECT JUMPER BETWEEN TERMINAL "D" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-D5" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

0 OHMS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER, REPLACE ABS CONTROLLER IF CONTACT IS GOOD.

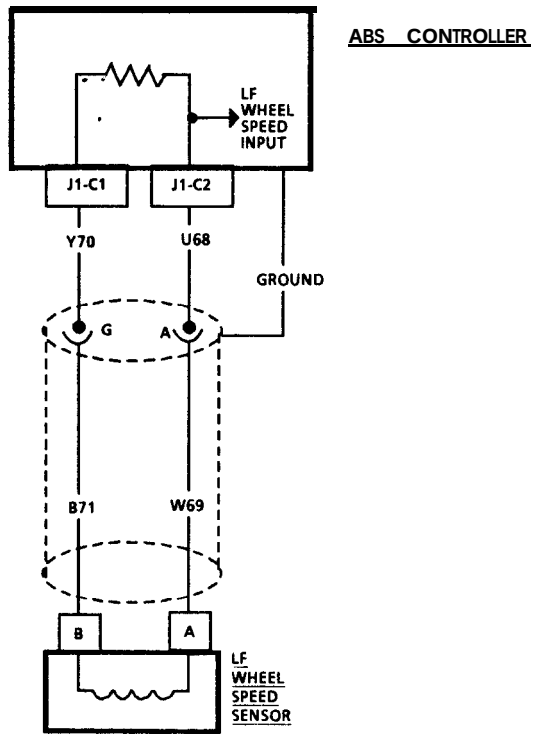
INFINITE

REPAIR OPEN IN G72.

INFINITE

REPAIR OPEN IN K74.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, I5 GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

The ABS Controller uses the signal from the Wheel Speed Sensor to detect if wheel lock-up is impending. If the frequency of the AC voltage produced by the wheel speed sensor indicates that the wheel is accelerating or decelerating faster than physically possible, the Controller determines the signal is faulty and sets the code.

CODE A049 will set when all of the following conditions exist:

- The Brakes are not being applied (Brake Switch is off).
- The ABS Controller senses that the Left Front Wheel has accelerated or decelerated greater than physically possible.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.& 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured, Step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms is measured, the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector is eliminated.

CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

(1)
- IGNITION IN "RUN".
- ENTER DATA LIST (TECH 1 MODE FO).
- MONITOR LEFT FRONT WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

ERRATIC OR NO WHEEL SPEED OBSERVED.

STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

(2)
- IGNITION IN "OFF".
- DISCONNECT THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
- IGNITION IN "RUN".
- CHECK FORVOLTAGE BETWEEN TERMINAL "A" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "G" AND GROUND.
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "A" OR "G"?

NOTE: NORMAL INDICATION IS APPROX. 2.5 VOLT DC.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

NO

YES

(3)
- IGNITION "OFF."
- DISCONNET ABS CONTRROLLER.
- IGNITION IN "RUN."
- REPEAT MEASUREMENT OF STEP (2).
- IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "A" OR "G"?

YES

REPAIR SHORT TO BATTERY IN Y70 OR U68.

NO

REPLACE ABS CONTROLLER.

(4)
- IGNITION "OFF."
- MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

0 OHMS

- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

0 OHMS

REPAIR SHORT BETWEEN Y70 AND U68.

INFINITE

CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.

BETWEEN 9000 AND 11000 OHMS

A

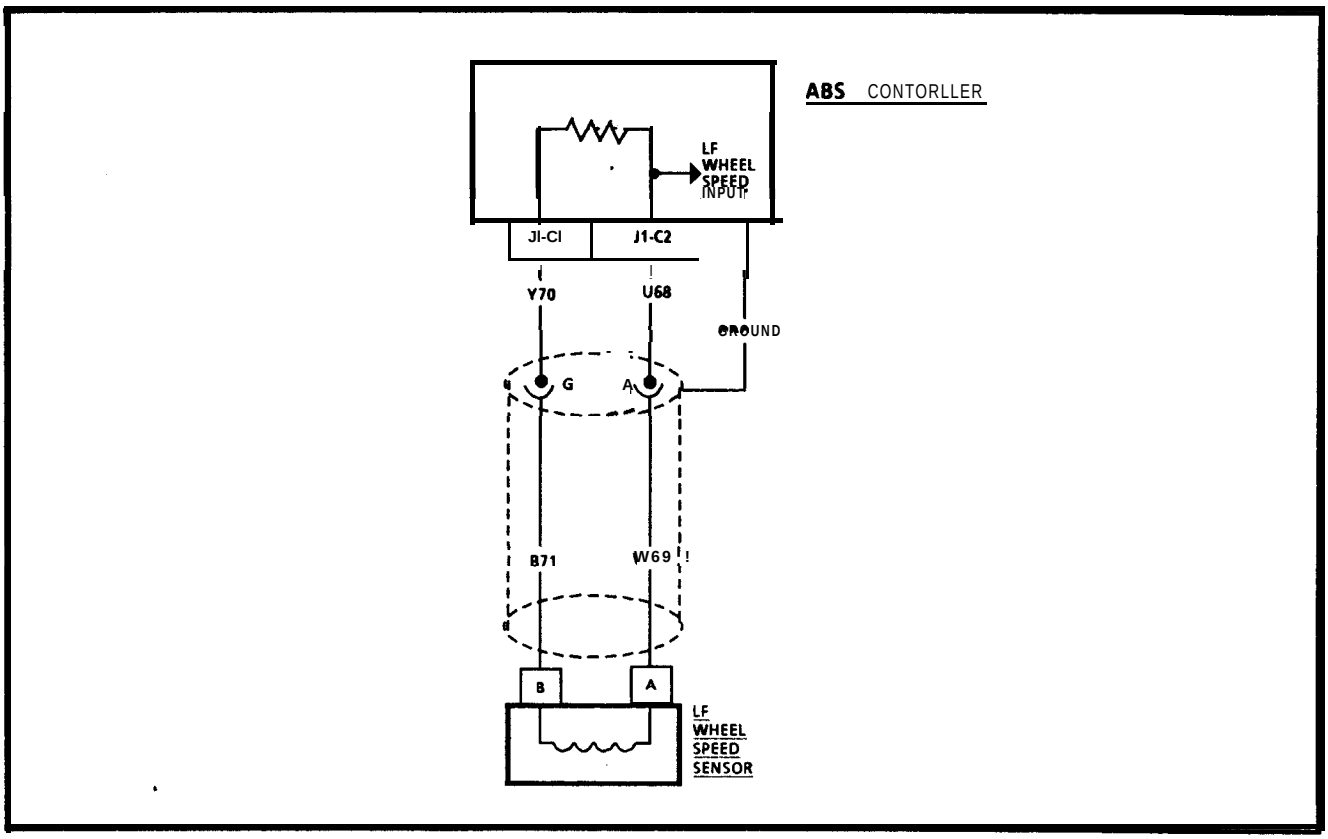
CONTINUED ON PAGE 137

INFINITE

B

CONTINUED ON PAGE 139

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground 998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

CONTINUED FROM PAGE 135

A

⑨ • MEASURE RESISTANCE BETWEEN TERMINAL "A" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "G" AND GROUND.
• WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

⑥ • MEASURE RESISTANCE ACROSS TERMINALS "A" AND "G" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

⑧ • DISCONNECT LF WHEEL SPEED SENSOR.
• MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE LF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

⑦ . DISCONNECT LF WHEEL SPEED SENSOR.
. MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE LF WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

. DISCONNECT ABS CONTROLLER
. REPEAT MEASUREMENT OF STEP ⑤.
• WAS EITHER
. MEASUREMENT LESS THAN 10 OHMS ?

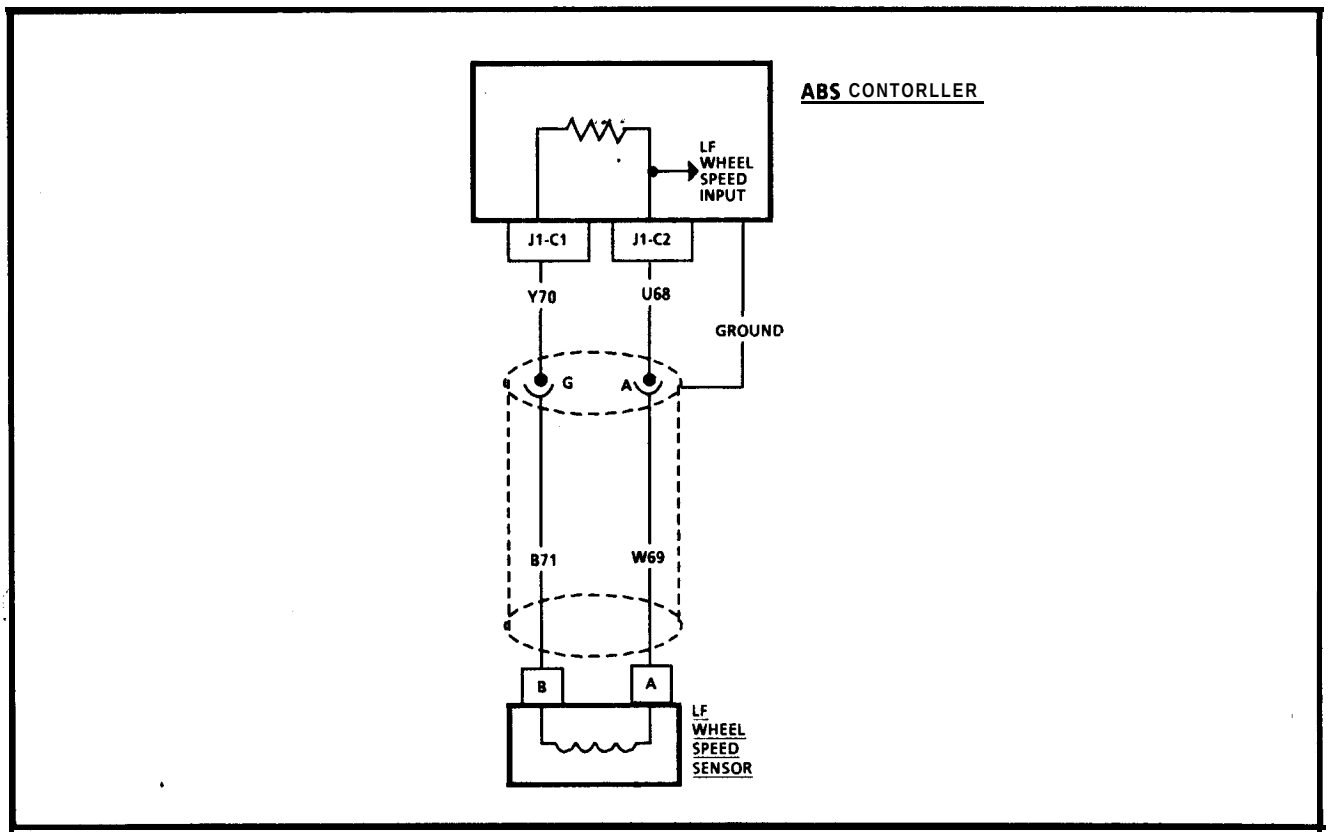
YES

REPAIR SHORT TO GROUND IN Y70 OR U68.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

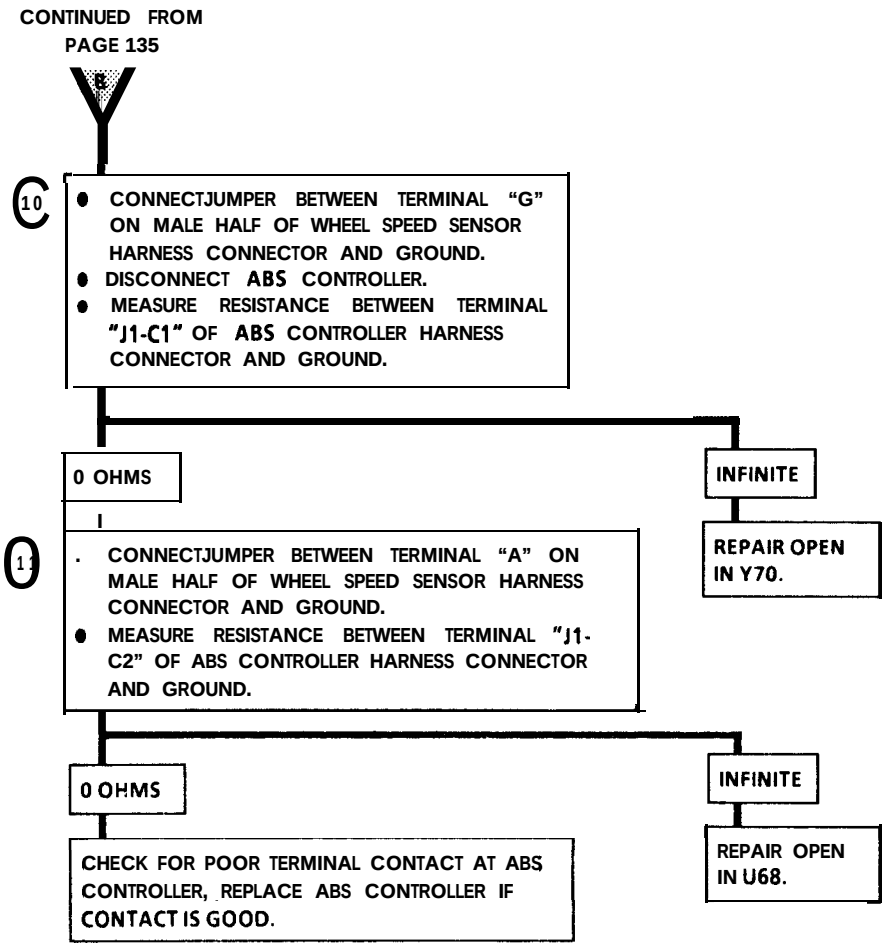
10. With male of Y70 connected to ground, the resistance from Terminal "Jl-Cl" to ground should be zero. If infinite resistance is measured, an open condition is indicated in Y70.

11. With male of U68 connected to ground, the resistance from Terminal "J1-C2" to ground should be zero. If infinite resistance is measured, an open condition is indicated in U68.

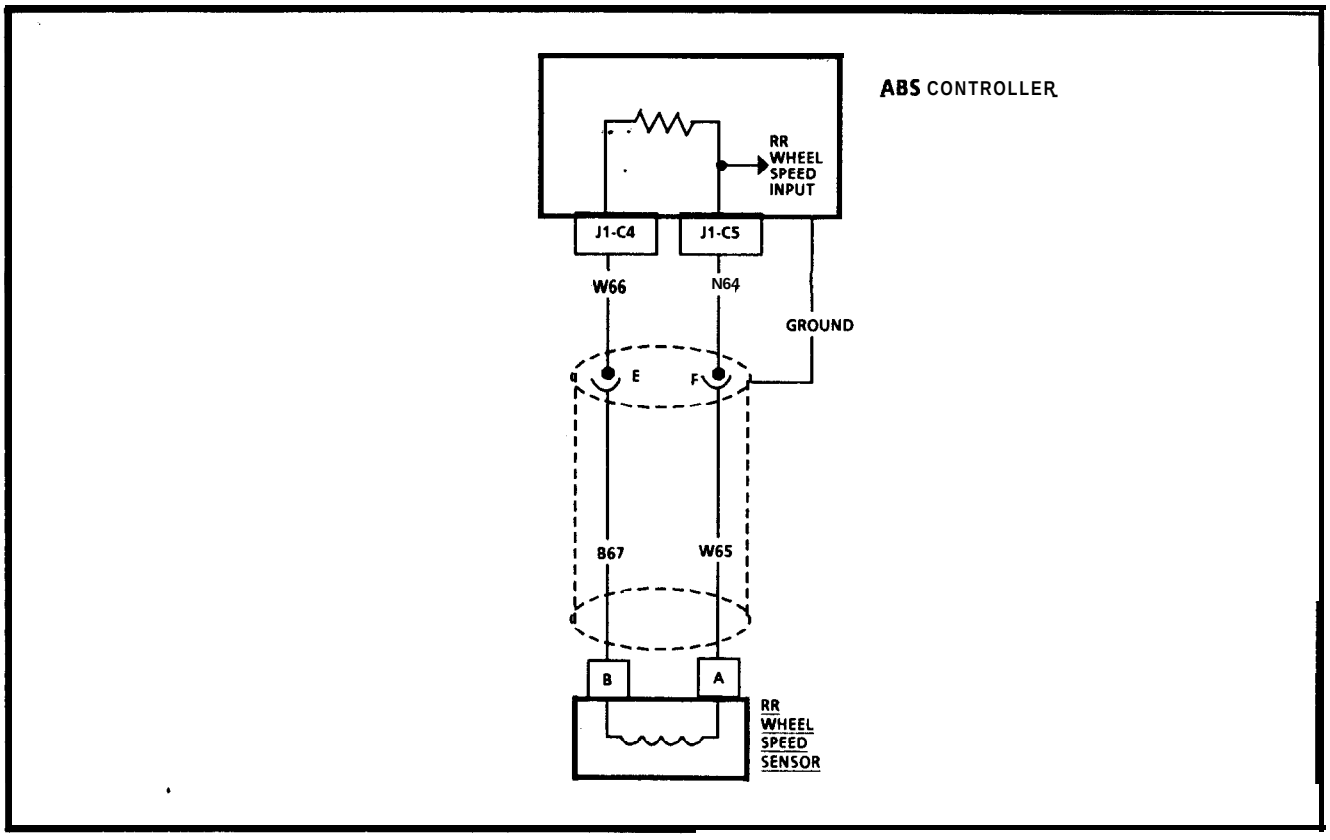
CODE A049

EXCESSIVE LEFT FRONT WHEEL ACCELERATION

CONTINUED FROM PAGE 135



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A050

EXCESSIVE RIGHT REAR WHEEL ACCELERATION

The ABS Controller uses the signal from the wheel speed sensor to detect if wheel lock-up is impending. If the frequency of the AC voltage produced by the wheel speed sensor indicates that the wheel is accelerating or decelerating faster than physically possible, the Controller determines the signal is faulty and sets the code.

CODE A050 will set when all of the following conditions exist:

- The Brakes are not being applied (Brake Switch is off).
- The ABS Controller senses that the Right Rear Wheel has accelerated or decelerated greater than physically possible.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.& 3. Step 2 determines if a short to battery is the fault. If battery voltage is measured, Step 3 isolates the short to the harness or controller.

4. If 9000 to 11000 ohms is measured, the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector is eliminated.

CODE A050

EXCESSIVE RIGHT REAR WHEEL ACCELERATION

1. • IGNITION IN "RUN."
   • ENTER DATA LIST (TECH 1 MODE FO).
   • MONITOR RIGHT REAR WHEEL SPEED WHILE GRADUALLY DECELERATING FROM 25 MPH TO 0 MPH.

- ERRATIC OR NO WHEEL SPEED OBSERVED
- STEADY WHEEL SPEED OBSERVED THAT DECREASES AT A STEADY RATE AS THE WHEEL SLOWS TO A STOP.

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

2. • IGNITION IN "OFF".
   . DISCONNECT THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT.
   • IGNITION IN "RUN".
   . CHECK FOR VOLTAGE BETWEEN TERMINAL "F" ON THE MALE HALF OF THE WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN CHECK FOR VOLTAGE BETWEEN TERMINAL "E" AND GROUND.
   • IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "E" OR "F"?
   NOTE: NORMAL INDICATION IS APPROX. 2.5 VOLT DC.

- NO
- YES

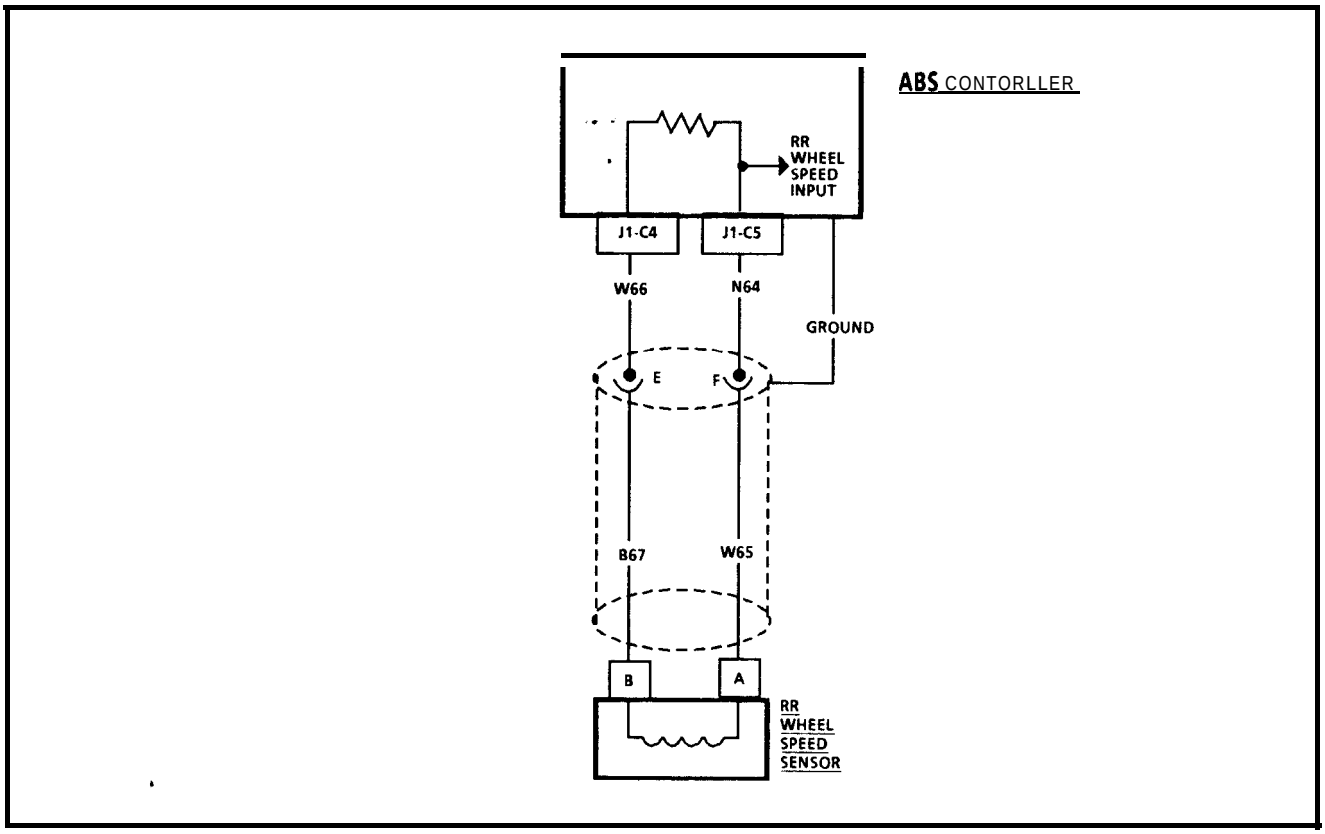
3. • IGNITION "OFF."
   . DISCONNET ABS CONTRROLLER.
   . IGNITION IN "RUN."
   . REPEAT MEASUREMENT OF STEP ②.
   . IS BATTERY VOLTAGE MEASURED AT EITHER TERMINAL "E" OR "F"?

- YES → REPAIR SHORT TO BATTERY IN N64 OR W66.
- NO → REPLACE ABS CONTROLLER.

4. • IGNITION "OFF."
   • MEASURE RESISTANCE ACROSS TERMINALS "F" AND "E" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

- 0 OHMS → • DISCONNECT ABS CONTROLLER. • MEASURE RESISTANCE ACROSS TERMINALS "F" AND "E" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.
  - 0 OHMS → REPAIR SHORT BETWEEN N64 AND W66.
  - INFINITE → CHECK FOR CLEAN TERMINAL CONTACT AT ABS CONTROLLER. REPLACE CONTROLLER IF TERMINAL IS GOOD.
- BETWEEN 9000 AND 11000 OHMS → A → CONTINUED ON PAGE 143
- INFINITE → B → CONTINUED ON PAGE 145

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A050

EXCESSIVE RIGHT REAR WHEEL SPEED ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A050

EXCESSIVE RIGHT REAR WHEEL ACCELERATION

CONTINUED FROM PAGE 141

(A)

(5) ● MEASURE RESISTANCE BETWEEN TERMINAL "F" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "E" AND GROUND.
● WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

(6) ● MEASURE RESISTANCE ACROSS TERMINALS "E" AND "F" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

● DISCONNECT RR WHEEL SPEED SENSOR.
. MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE RR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

● DISCONNECT RR WHEEL SPEED SENSOR.
. MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE RR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

● DISCONNECT ABS CONTROLLER.
. REPEAT MEASUREMENT OF STEP (5).
. WAS EITHER MEASUREMENT LESS THAN 10 OHMS ?

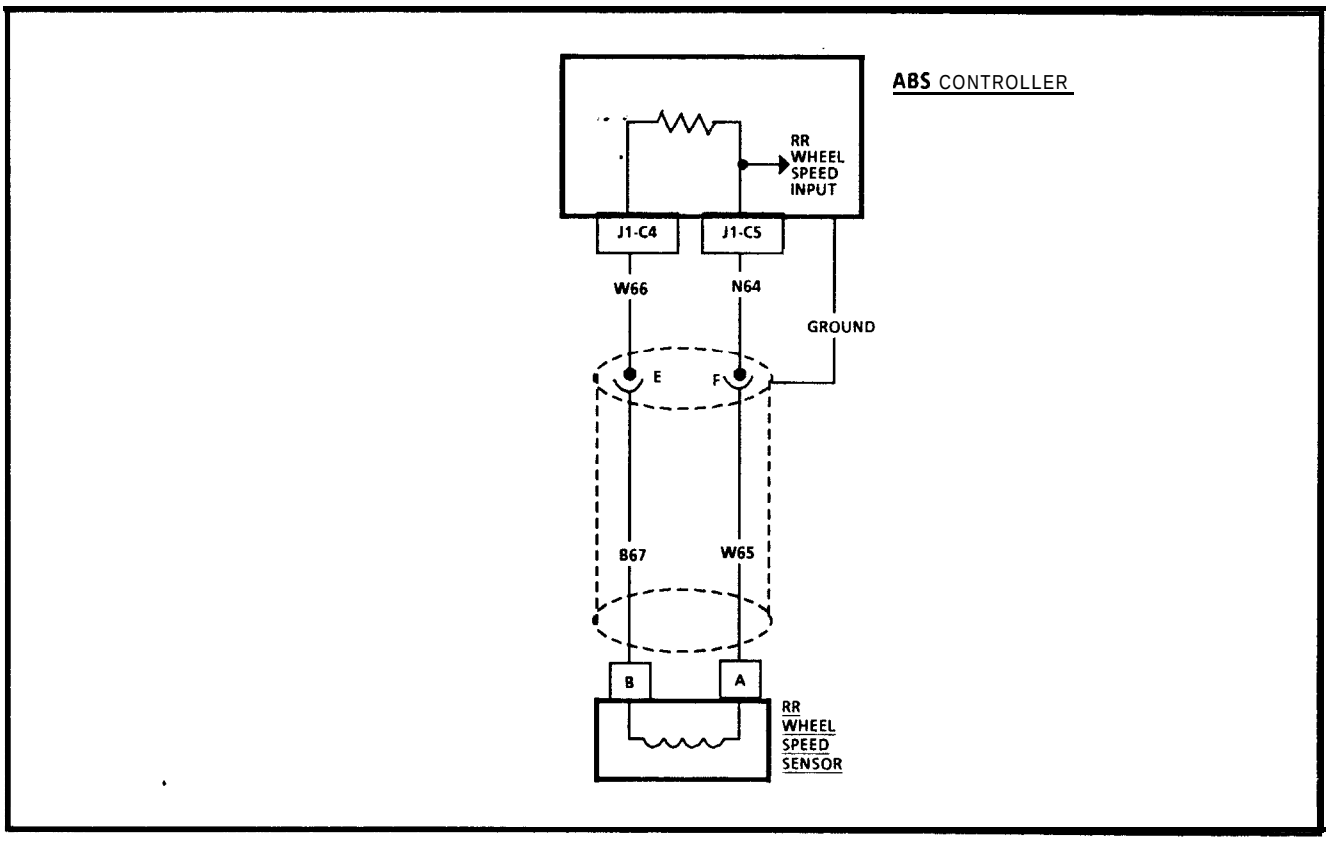
YES

REPAIR SHORT TO GROUND IN N64 OR W66.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE,CLEARCODES AND VERIFY OPERATION.



CODE A050

EXCESSIVE RIGHT REAR WHEEL SPEED ACCELERATION

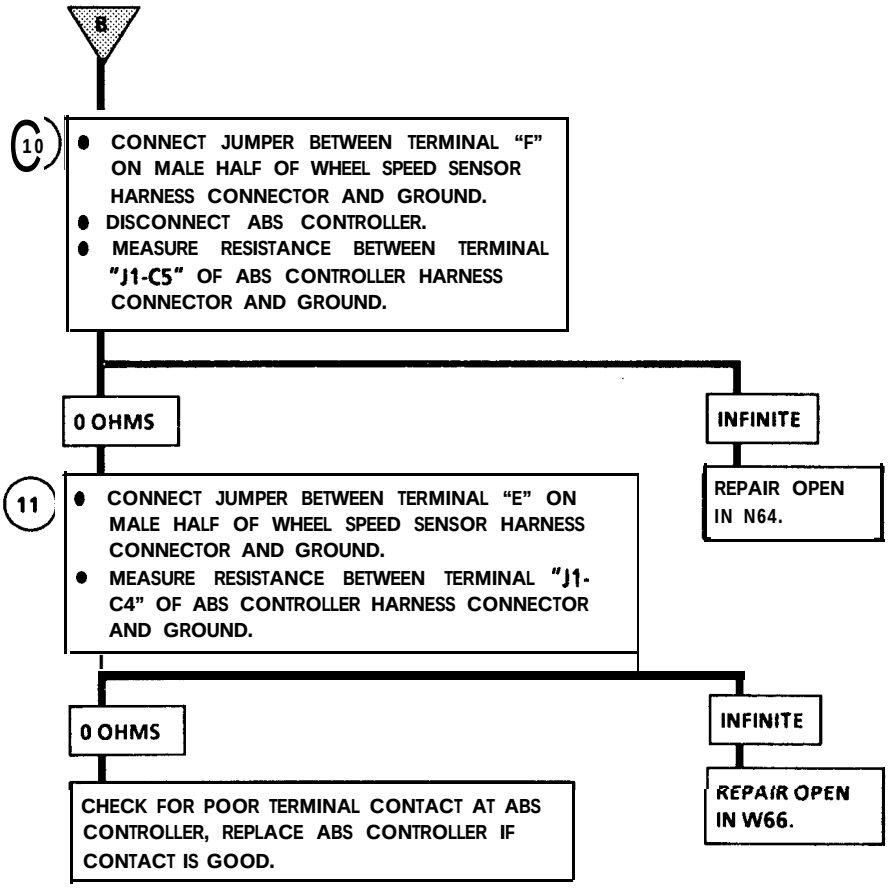
Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With male of N64 connected to ground, the resistance from Terminal "J1-C5" to ground should be zero. If infinite resistance is measured, an open condition is indicated in N64.
11. With male of W66 connected to ground, the resistance from Terminal "Jl-C4" to ground should be zero. If infinite resistance is measured, an open condition is indicated in W66.

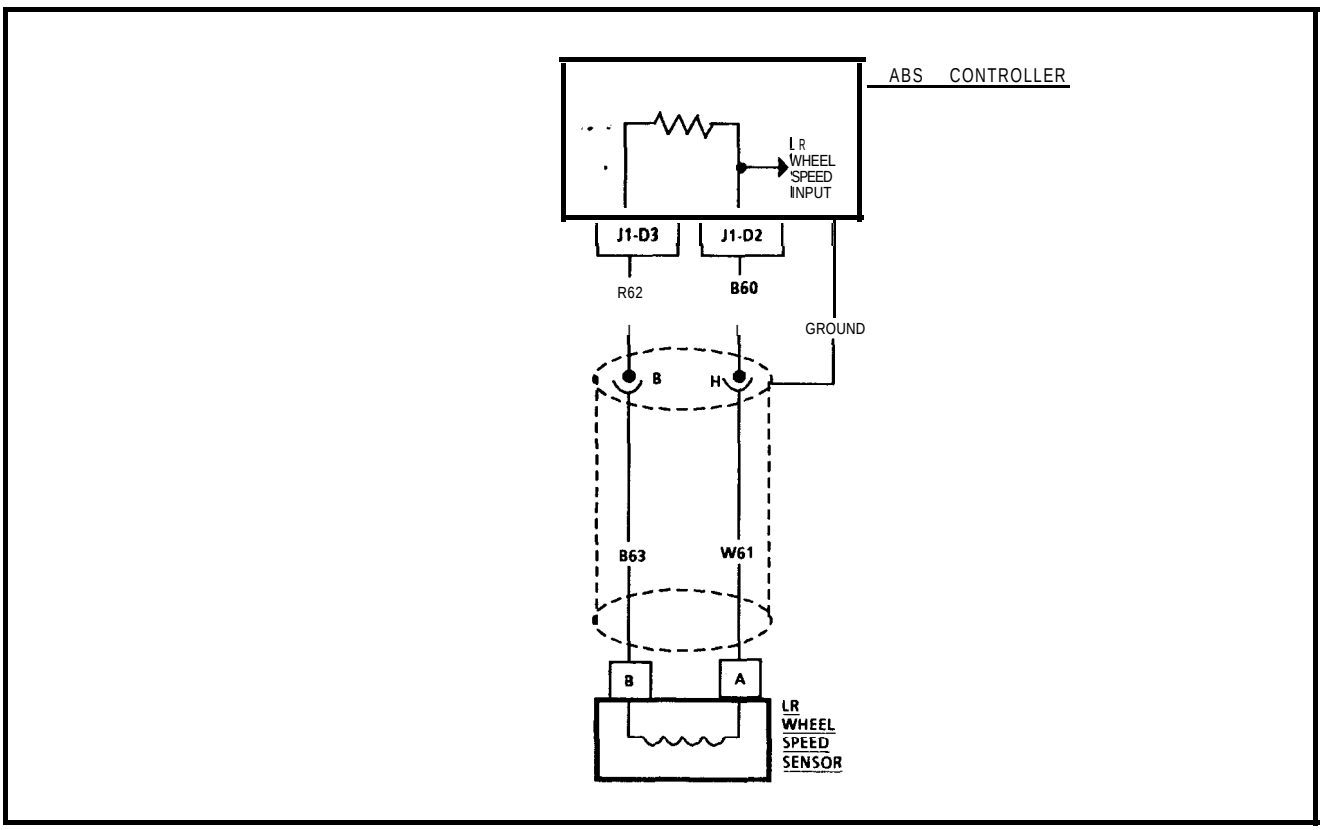
CODE A050

EXCESSIVE RIGHT REAR WHEEL ACCELERATION

CONTINUED FROM PAGE 141



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A051

EXCESSIVE LEFT REAR WHEEL ACCELERATION

The ABS Controller uses the signal from the wheel speed sensor to detect if wheel speed lock-up is impending. If the frequency of the AC voltage produced by the wheel speed sensor indicates that the wheel is accelerating or decelerating faster than physically possible, the ABS Controller determines the signal is faulty and sets the code.

CODE A051 will set when all of the following conditions exist:

- The Brakes are not being applied (Brake Switch is off).
- The ABS Controller senses that the Left Rear Wheel has accelerated or decelerated greater than physically possible.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

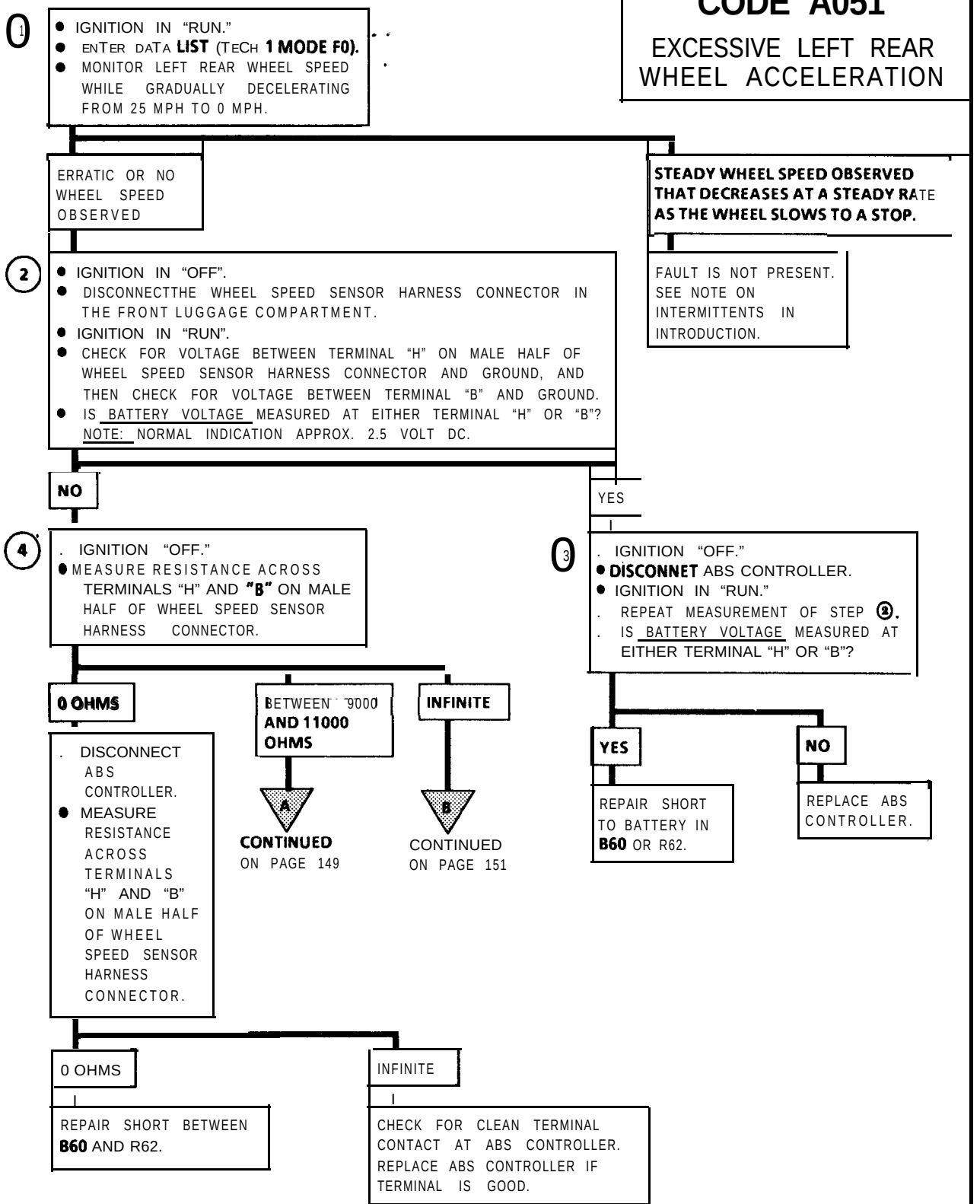
1. Observation of erratic or no wheel speed input indicates the fault is present and is not intermittent.

2.&3. Step 2 determines if a short to Battery is the fault. If Battery voltage is measured Step 3 isolates the short to the harness or controller.

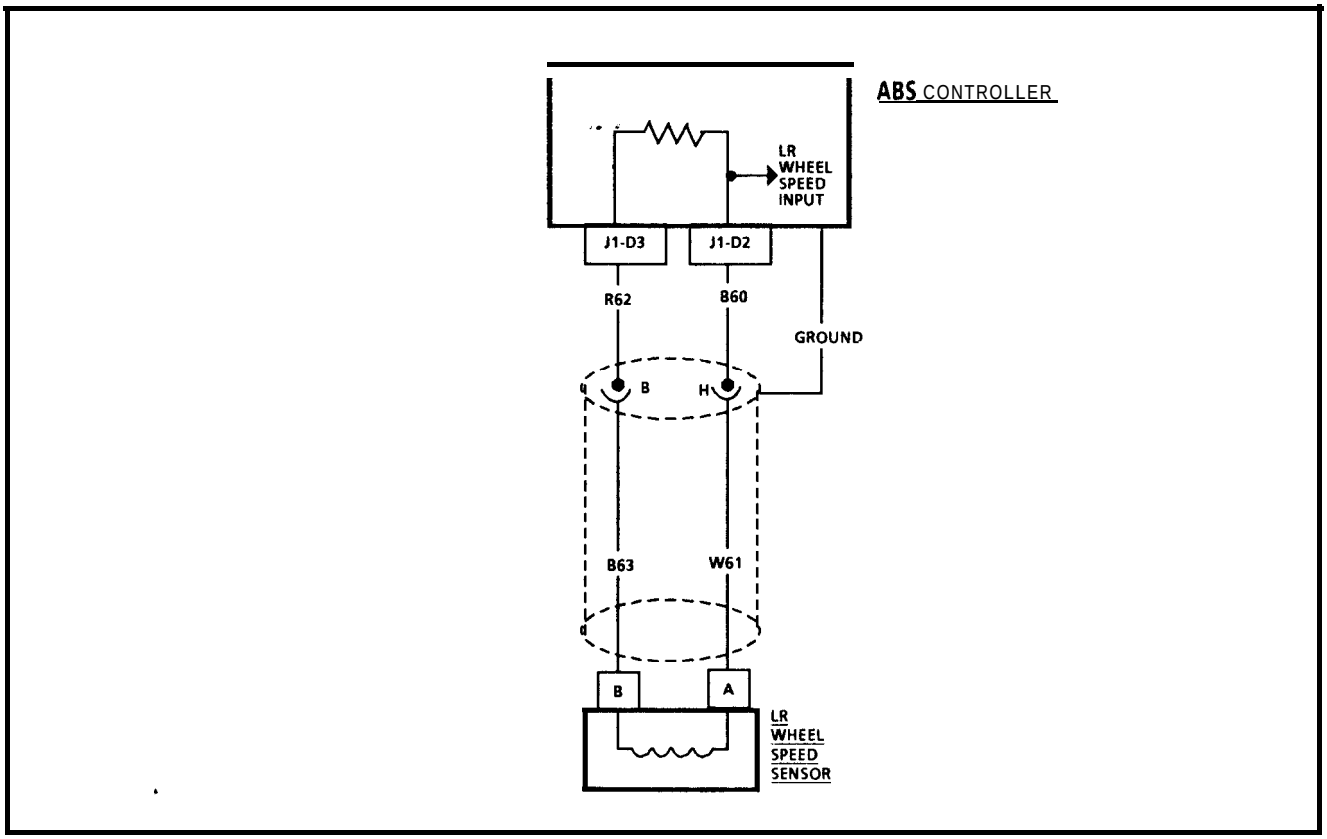
4. If 9000 to 11000 ohms were measured, the possibility of an open or short in the circuit between the ABS Controller and the male half of Wheel Speed Sensor Harness Connector has been eliminated.

CODE A051

EXCESSIVE LEFT REAR WHEEL ACCELERATION



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A051

EXCESSIVE LEFT REAR WHEEL ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

5. If more than 10 ohms is measured, the circuits between the ABS Controller and the male half of the Wheel Speed Sensor Harness Connector are OK. This isolates the fault to be between the Wheel Speed Sensor and the female half of the Wheel Speed Sensor Harness Connector. Since this area of the circuit is exposed to the elements and road debris, it should be carefully inspected for damage.
6. This procedure isolates the fault to a short to ground (998 to 1208 ohms) or open (above 1208 ohms) or a shorted sensor circuit (below 998 ohms).
7. & 8. Determines if the fault is in the harness or the Wheel Speed Sensor. If the harness between the Wheel Speed Sensor Harness Connector in the front luggage compartment and the Wheel Speed Sensor is defective, replace it. Do not attempt to repair it.

CODE A051
EXCESSIVE LEFT REAR WHEEL ACCELERATION

CONTINUED FROM PAGE 147

A

5. MEASURE RESISTANCE BETWEEN TERMINAL "H" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND, AND THEN MEASURE RESISTANCE BETWEEN TERMINAL "B" AND GROUND.
- WAS EITHER MEASURMENT LESS THAN 10 OHMS ?

NO

6.
- MEASURE RESISTANCE ACROSS TERMINALS "H" AND "B" ON FEMALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

8.
- DISCONNECT LR WHEEL SPEED SENSOR.
- MEASURE RESISTANCE ACROSS WHEEL SPEED SENSOR.

ABOVE 1208 OHMS OR BELOW 998 OHMS

CLEAN WHEEL SPEED SENSOR TERMINALS OF ANY MOISTURE, CORROSION, DIRT, ETC. RECHECK RESISTANCE ACROSS WHEEL SPEED SENSOR. IF RESISTANCE STILL MEASURES ABOVE 1208 OHMS OR BELOW 998 OHMS, REPLACE LR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

7.
- DISCONNECT LR WHEEL SPEED SENSOR.
- MEASURE RESISTANCE BETWEEN TERMINAL "A" AT WHEEL SPEED SENSOR AND GROUND.

INFINITE

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

1 MEGOHM OR LESS

REPLACE LR WHEEL SPEED SENSOR.

BETWEEN 998 AND 1208 OHMS

REPLACE HARNESS BETWEEN WHEEL SPEED SENSOR HARNESS CONNECTOR AND SPEED SENSOR.

YES

- DISCONNECT ABS CONTROLLER.
- REPEAT MEASUREMENT OF STEP ⑤.
- WAS EITHER MEASUREMENT LESS THAN 10 OHMS ?

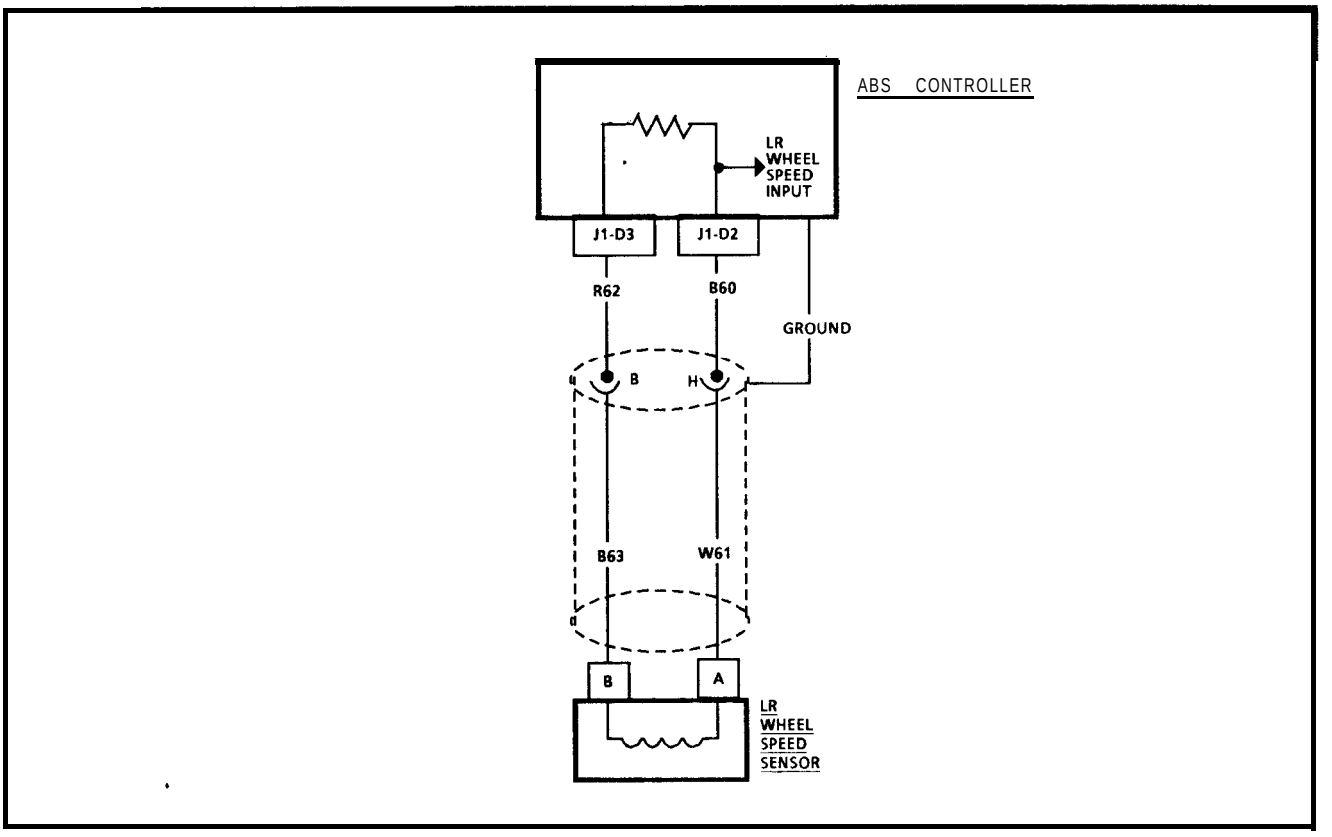
YES

REPAIR SHORT TO GROUND IN B60 OR R62.

NO

REPLACE ABS CONTROLLER.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A651

EXCESSIVE LEFT REAR WHEEL SPEED ACCELERATION

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

10. With Male of B60 connected to ground, the resistance from Terminal "Jl-D2" to ground should be zero. If infinite resistance is measured, an open condition is indicated in B60.
11. With Male of R62 connected to ground, the resistance from Terminal "J1-D3" to ground should be zero. If infinite resistance is measured, an open condition is indicated in R62.

CODE A051

EXCESSIVE LEFT REAR WHEEL ACCELERATION

CONTINUED FROM PAGE 147

B

10

- CONNECTJUMPER BETWEEN TERMINAL "H" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
- DISCONNECT ABS CONTROLLER.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-D2" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND.

0 OHMS

11

- CONNECT JUMPER BETWEEN TERMINAL "B" ON MALE HALF OF WHEEL SPEED SENSOR HARNESS CONNECTOR AND GROUND.
- MEASURE RESISTANCE BETWEEN TERMINAL "J1-D3" OF ABS CONTROLLER HARNESS CONNECTOR AND GROUND

0 OHMS

CHECK FOR POOR TERMINAL CONTACT AT ABS CONTROLLER, REPLACE ABS CONTROLLER IF CONTACT IS GOOD.

INFINITE

REPAIR OPEN IN 860.

INFINITE

REPAIR OPEN IN R62.

NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.

CODE A052

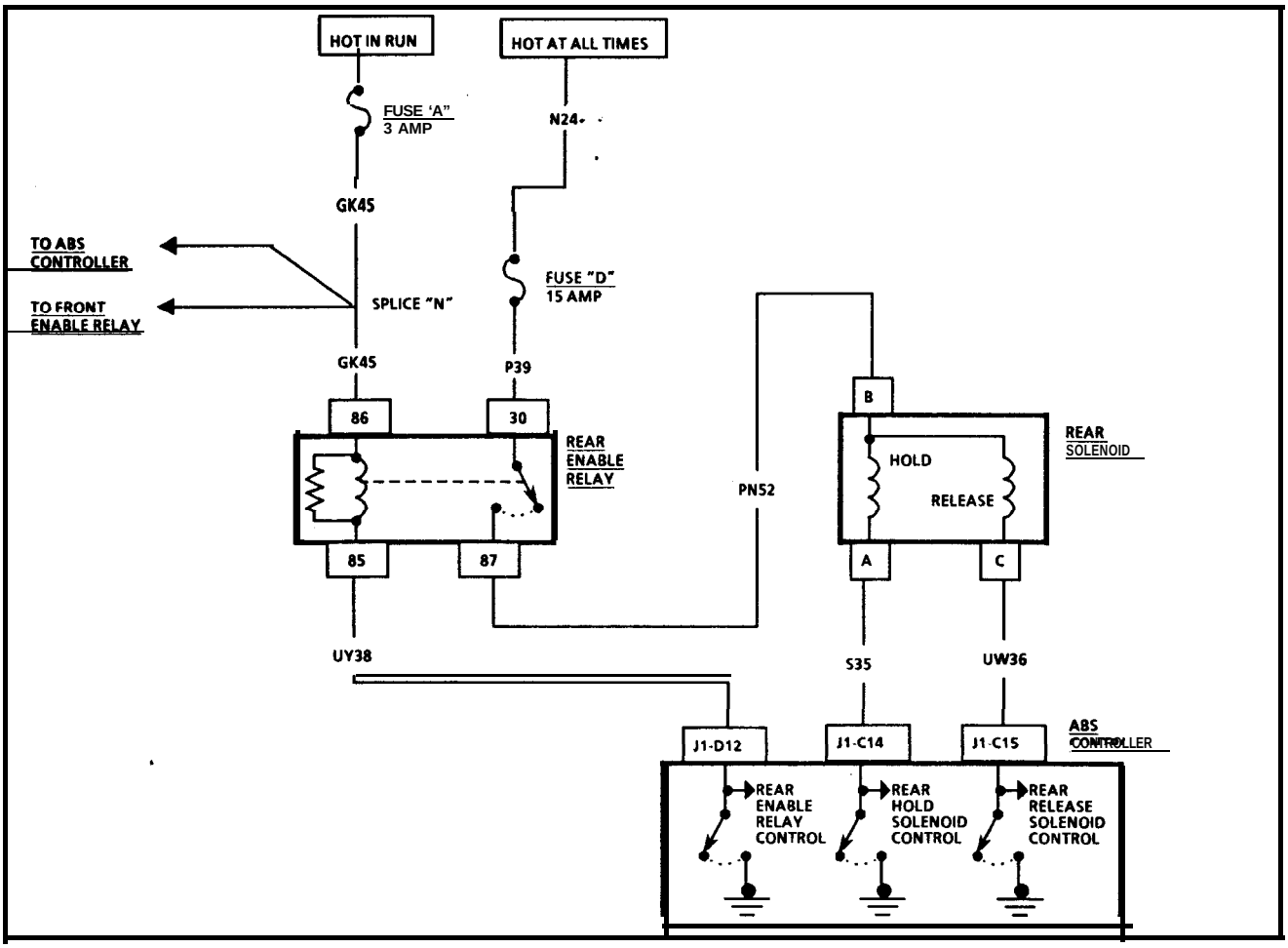
ABS CONTROLLER CALIBRATION ERROR

CODE A052 will set when the ABS Controller detects a malfunction internal to itself. If this code is set, replace the ABS Controller.

CODE A053

ABS CONTROLLER CALIBRATION ERROR

CODE A053 will set when the ABS Controller detects a malfunction internal to itself. If this code is set, replace the ABS Controller.



CODE A054

REAR ENABLE RELAY COIL CIRCUIT OPEN

When the ignition is in RUN, voltage is applied from the Fuse "A" to the Rear Enable Relay Coil. As long as the Rear Enable Relay Control is open, this voltage should also be present at Terminal "Jl-D12" of the Controller.

CODE A054 will set when all the following conditions exist:

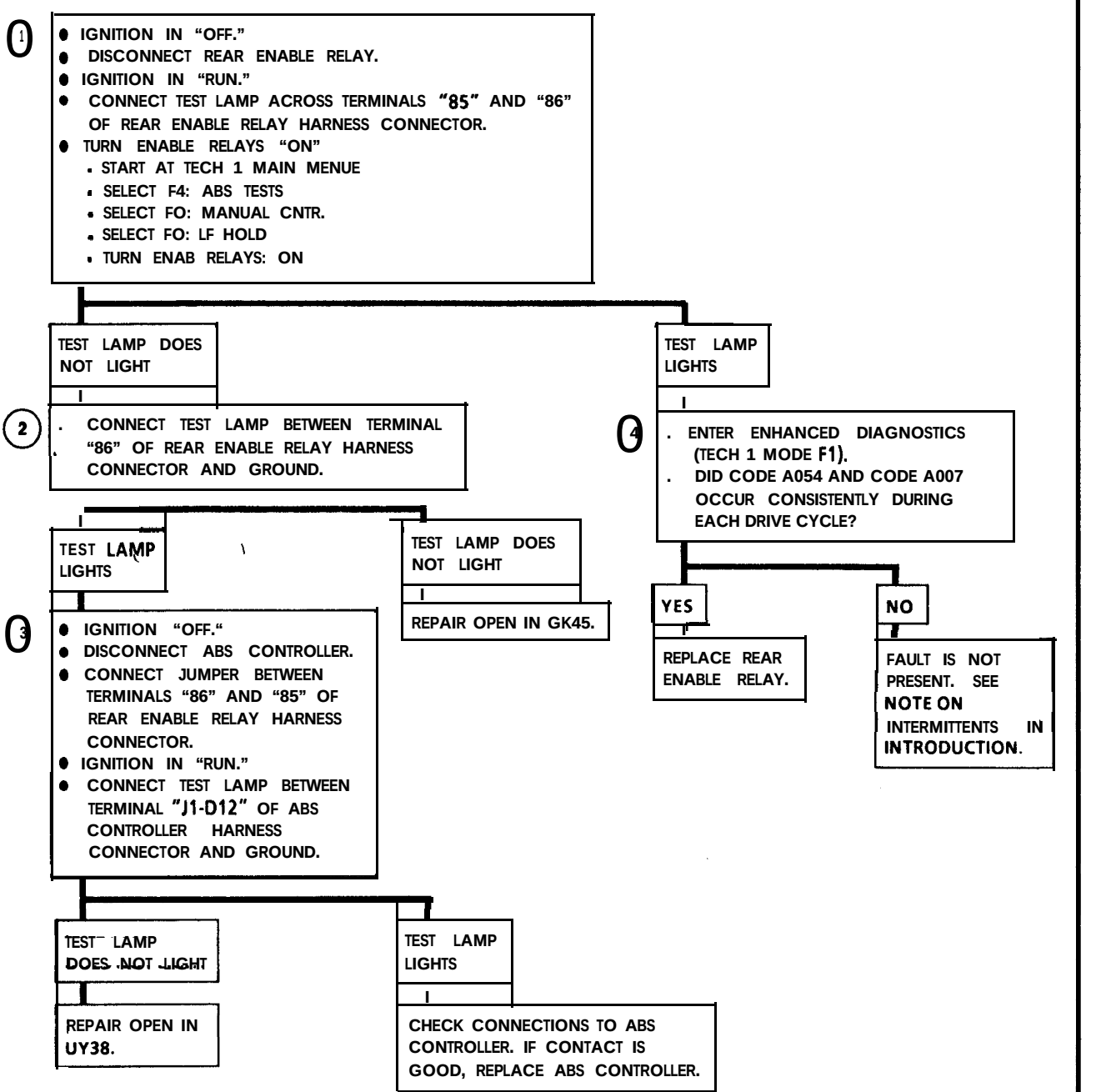
- The Rear Enable Relay Control is open (Rear Enable Relay deenergizedl.
- The ABS Controller senses no voltage at Terminal "Jl-D12".
- The ABS Controller senses no voltage at Terminals "J1-C14" and "Jl-C15".
- Codes A004 and A007 are current failures.

Test Description: The following provides an explanation of the procedures being followed in the trouble tree.

1. By monitoring the test lamp with the enable relays on, it can be determined if the power and ground circuits, as well as the Controller, are good.
2. If the test lamp does not light, the open must be in "GK45".
3. Voltage at Terminal "J1-D12" indicates a problem with the connection to the ABS Controller or the ABS Controller itself.
4. Determines if the Code was set due to a hard failure. At this point the hard failure must be in the Rear Enable Relay.

CODE A054

REAR ENABLE RELAY COIL CIRCUIT OPEN



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.

CODE A055

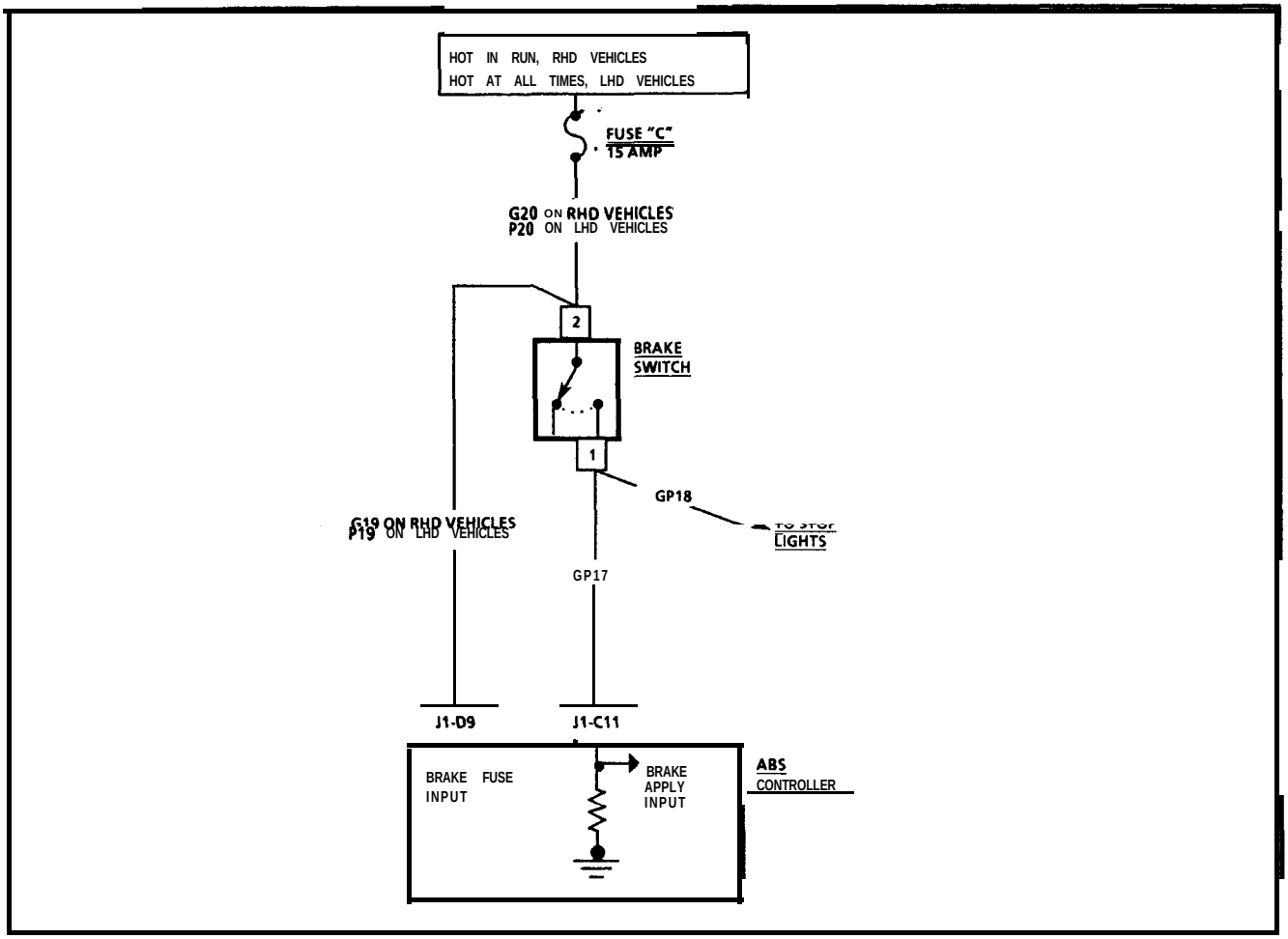
ABS CONTROLLER INTERNAL VOLTAGE FAULT

CODE A055 will set when the ABS Controller detects a malfunction internal to itself. If this code is set, replace the ABS Controller.

CODE A056

TEST 32 OR 33 FAILED LAST OR CURRENT IGNITION CYCLE

CODE A056 is the same as CODE A032. For further information. see page 80 .



CODE A057

BRAKE SWITCH FUSE INPUT IS LOW (GROUND)

Voltage is applied through Fuse "C" to the Brake Switch and terminal "J1-D9" of the ABS-Controller. Code A057 will set when the following condition exists:

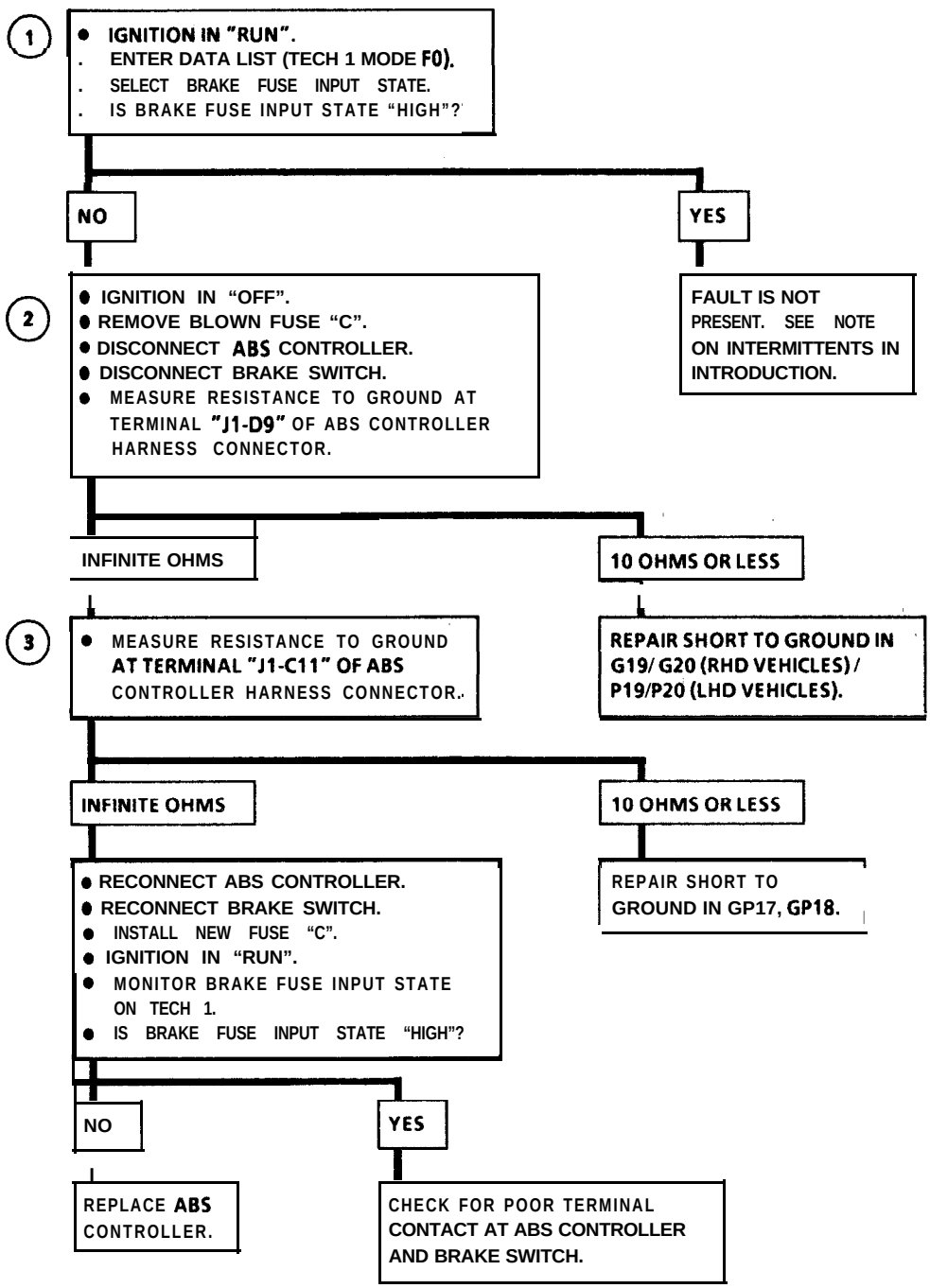
- Brake Switch Fuse Input is low (ground).

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

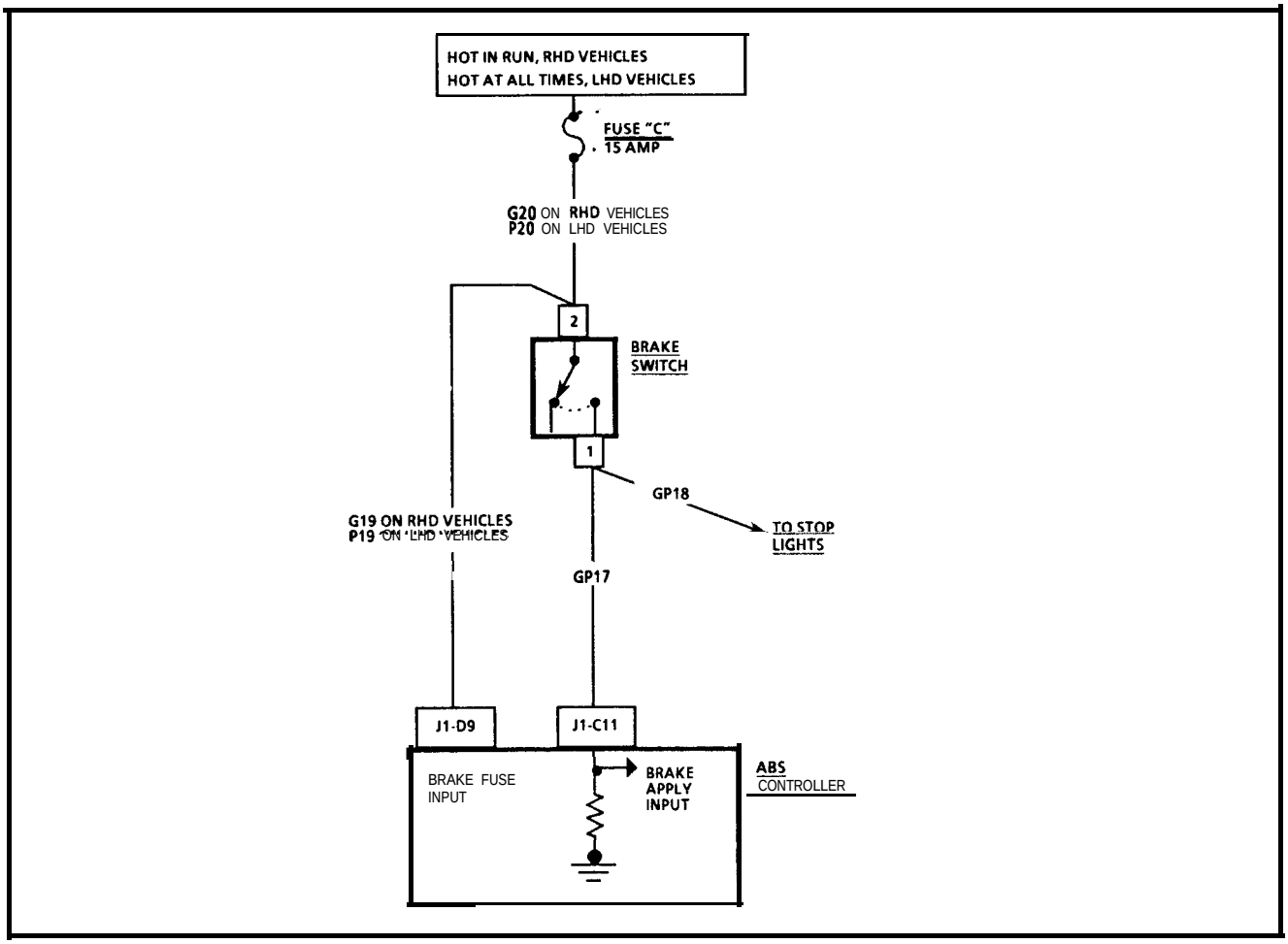
1. Confirms that a problem exists in the Brake Fuse Input CKT.
2. Determines if the short to grround is in G19/G20 (RHD VEHICLES) / P19/P20 (LHD VEHICLES)
3. Determines if the short to ground is in GP17, GP18.

CODE A057

BRAKE SWITCH FUSE INPUT IS LOW (GROUND)



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A058

BRAKE LIGHTS OPEN, GROUND OPEN

The ABS Controller determines that the Brake Pedal is pressed when battery voltage is sensed at the Brake Apply Input. If battery voltage is not present, the Controller should sense ground through "J1-C11, GP17, GP18" and the Stop Lights.

CODE A058 will set when all the following conditions exist:

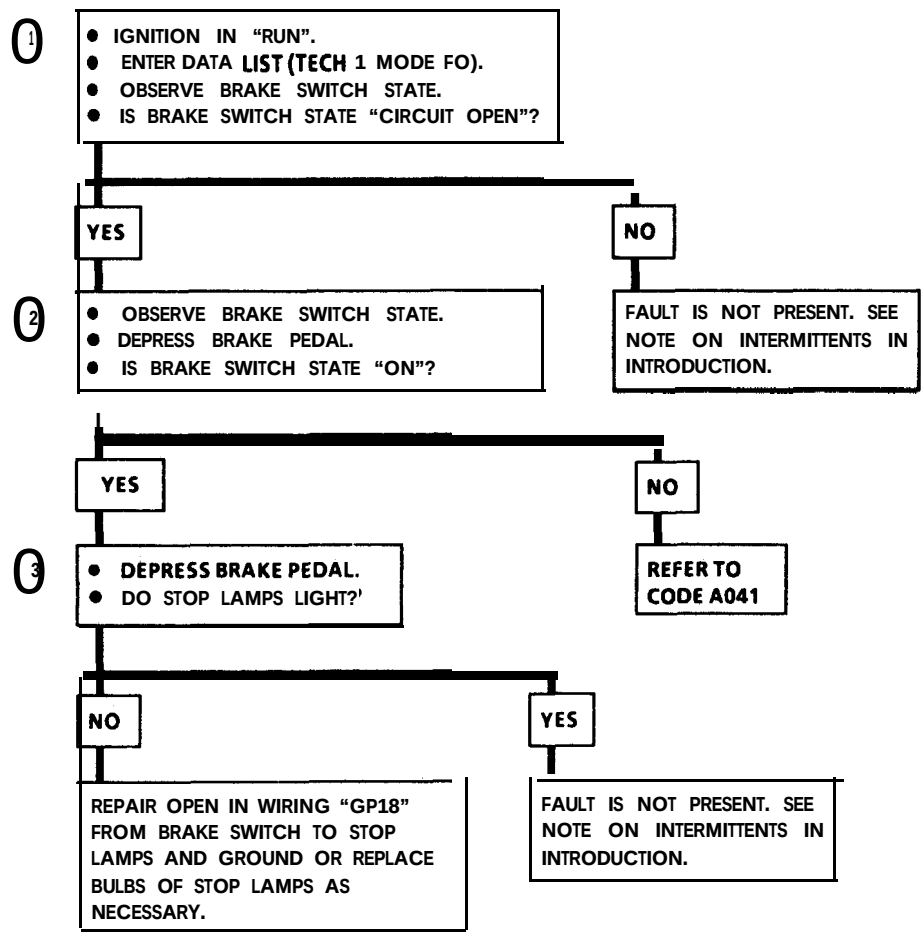
- Test 41 is failing.
- Brake Switch Fuse Input is high
- Brake Switch Circuit Input is high.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

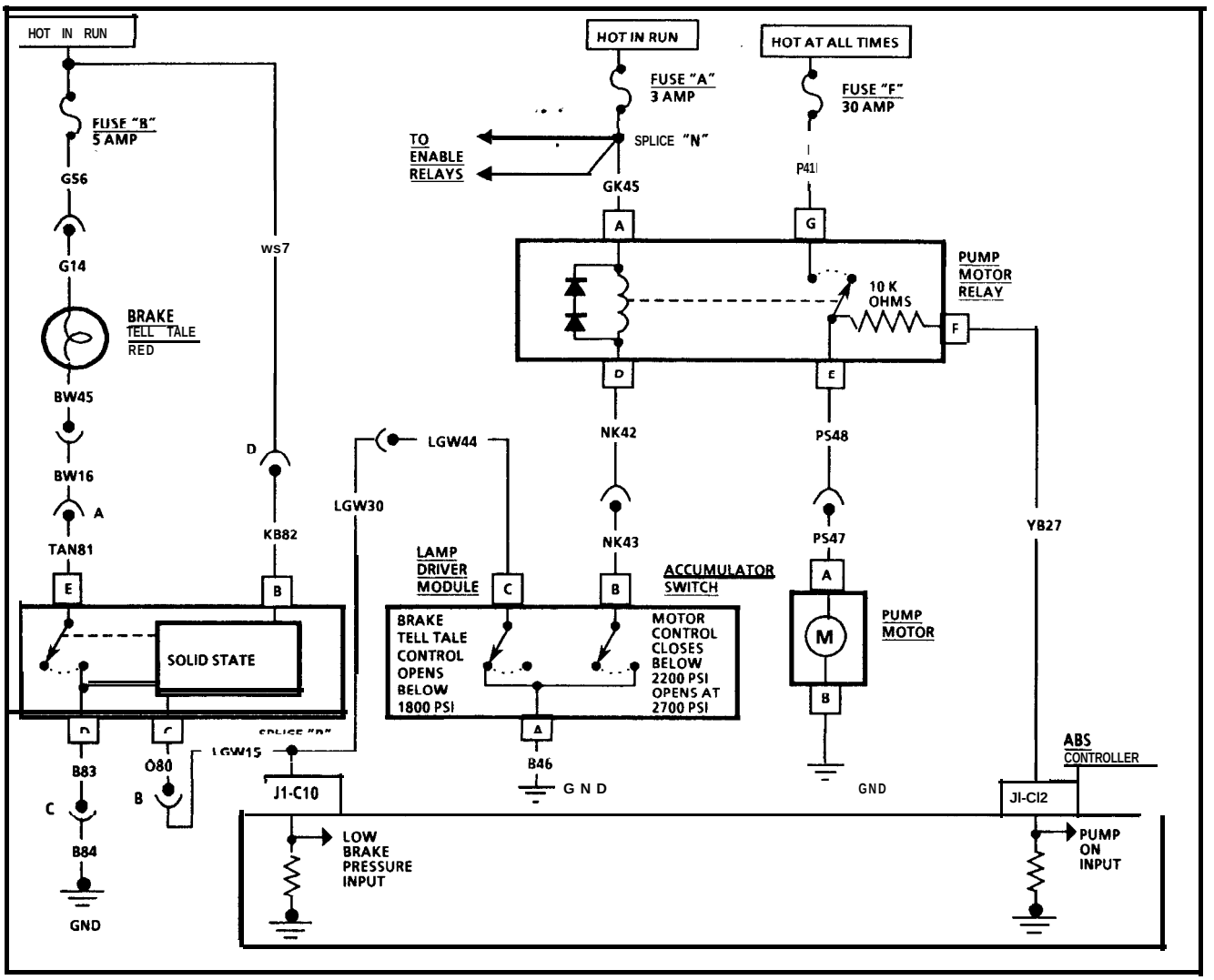
1. By observing the Brake Switch State it can be determined if the ABS Controller is sensing the proper input (a proper input at this point would indicate an intermittent fault condition).
2. Determines if the open condition exists in GP18 between the Brake Switch and the Stop Lights or if the open condition exists in GP17 between the Brake Switch and the ABS Controller "J1-C11" (Code A041).
3. Determines if the fault is an intermittent failure or if an open condition exsists in the wiring from the Brake Switch through the Stop Lamps to ground.

CODE A058

BRAKE LIGHTS OPEN, GROUND OPEN



AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A059

LOW BRAKE PRESSURE WHILE IN AN ABS STOP

CODE A059 will set when all of the following conditions exist

- The car is in an Antilock Brake stop.
- The Pump On Input senses voltage (pump running).
- The ABS Controller senses voltage at the Low Brake Pressure Input for greater than 10 seconds during and after the Antilock Brake stop.

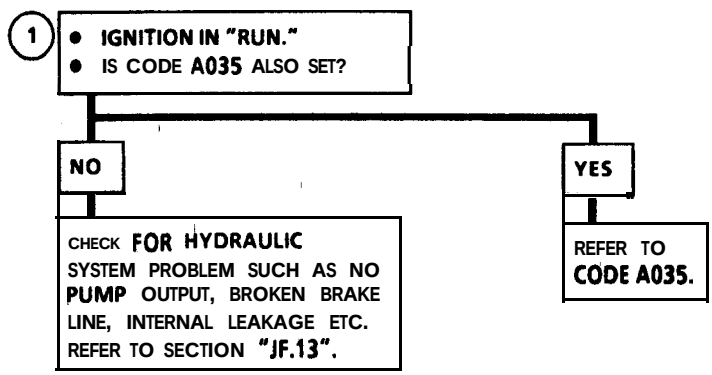
Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If Code A035 is also set, the fault is due to an electrical problem which can be diagnosed by referring to Code A035.

If Code A059 has not set along with any other codes, a hydraulic system fault is indicated and can be diagnosed by referring to Section "JF. 13". Possible causes are no pump output, broken brake line, internal leakage, etc.

CODE A059

LOW BRAKE PRESSURE WHILE IN AN ABS STOP

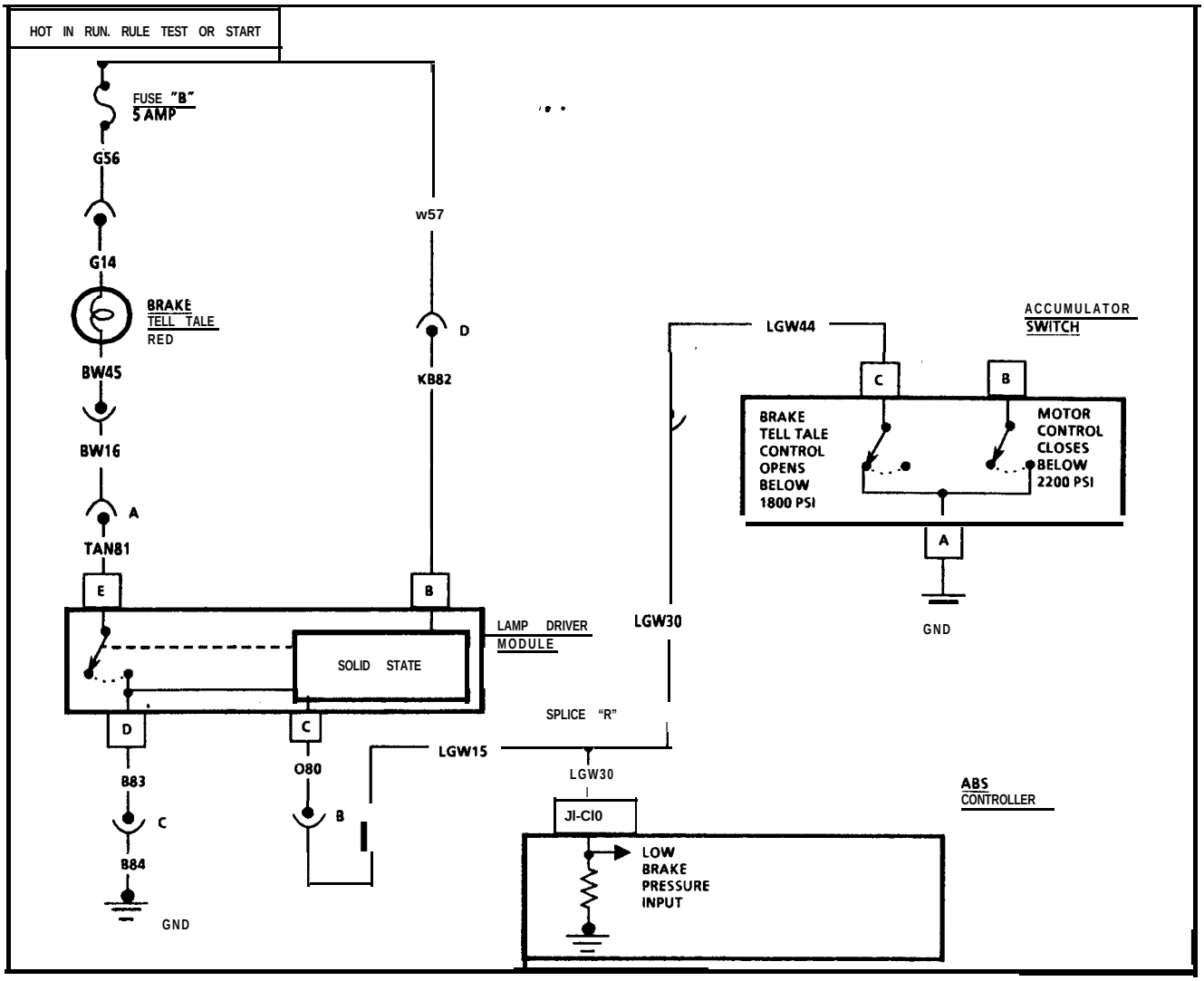


AN EXPLANATION OF EACH TEST PROCEDURE REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.

CODE A060

ABS CONTROLLER INTERNAL FAULT

CODE **A060 will set when the ABS Controller detects a malfunction internal to itself. If this code is set, replace the ABS Controller.**



CODE A061

SYSTEM WILL NOT BUILD PRESSURE

The Acummulator Pressure Switch Motor Control closes when the pressure drops below 2200 PSI. This grounds the Pump Motor Relay Coil causing voltage to be applied to the Pump Motor and Pump On Input, Whenever the Pump Motor is on, the Pump On Input will have voltage applied to it.

CODE A061 will set when all of the following conditions exist:

- Low pressure present when the ignition key is turned to "RUN".
- Low pressure present for 40 seconds.
- No more than 3 brake pedal actuations

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If the red Brake Tell Tale is not on, an open or short condition exists in the Lamp circuit.
2. If Brake Pressure State is low, the fault is due to an electrical problem which can be diagnosed by referring to Code A035.
3. The Powermaster III Test checks the hydraulic part of ABS.
4. If red Brake Tell Tale is not on, an open or short condition exists in the Lamp circuit.
5. Determines if a short to ground exists in G14, G56 or in other Tell Tale circuits to the low side of Fuse "B".
6. Determines if an open condition exists in W21.
7. Determines if the open condition exists in G14, G56 or BW45. BW16.

CODE A061

SYSTEM WILL NOT BUILD PRESSURE

3 ● IGNITION IN "RUN."
● RELEASE PARKING BRAKE.
● IS RED BRAKE TELL TALE ON?

YES

3 2 ● ENTER DATA LIST (TECH 1 MODE FO).
● MONITOR BRAKE PRESSURE CIRCUIT STATE ON TECH 1 DISPLAY.
● IS BRAKE PRESSURE STATE "LOW".

YES → ● IGNITION IN "OFF."
● REFER TO CODE A035.

NO

● PERFORM POWERMASTER III TOTAL.PUMP RUN TIME TEST:
▪ START AT TECH 1 MAIN MENUE
▪ SELECT F4: ABS TESTS
▪ SELECT F3: PUMP MOTOR
▪ SELECT F1: TOTAL TIME
▪ FOLLOW TECH 1 DIRECTIONS
● WAS PUMP ON (K-ON TO OFF) GREATER THAN 40 SECONDS?

NO → FAULT I5 NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

YES → REFER TO HYDRAULIC DIAGNOSIS IN SECTION "JF.13.

NO

0 4 ● LIFT PARKING BRAKE.
● IS RED BRAKE TELL TALE ON?

NO → ● CHECK FUSE "B".

YES → A

FUSE NOT BLOWN

. IS RED BRAKE TELL TALE BURNED OUT?

YES → REPLACE BULB. CHECK THAT RED BRAKE TELL TALE IS NOW ON. → A

NO

6 ● REMOVE FUSE "B"
. MEASURE VOLTAGE AT HIGH SIDE OF FUSE "B" SOCKET TO GROUND.

0 VOLTS

REPAIR OPEN IN W21 AND INSTALL FUSE "B". CHECK THAT RED BRAKE TELL TALE IS NOW ON. → A

BATTERY VOLTAGE

7 ● INSTALL FUSE "B"
● MEASURE VOLTAGE AT HIGH SIDE OF BRAKE TELL TALE SOCKET.

0 VOLTS

REPAIR OPEN IN G14, G56. CHECK THAT RED BRAKE TELL TALE IS NOW ON. → A

BATTERY VOLTAGE

REPAIR OPEN IN BW45, BW16. CHECK THAT RED BRAKE TELL TALE I5 NOW ON. → A

FUSE BLOWN

0 5 . IGNITION IN "OFF."
. REMOVE BLOWN FUSE "B".
. MEASURE RESISTANCE BETWEEN G56 SIDE OF FUSE "B" SOCKET AND GROUND.

2 OHMS OR LESS

REPAIR SHORT TO GROUND IN G14, G56 OR IN OTHER TELL TALE CKTs TO THE LOW SIDE OF FUSE "B" AND REPLACE FUSE. CHECK THAT RED BRAKE TELL TALE IS NOW ON. → A

GREATER THAN 2 OHMS

REPLACE FUSE. CHECK THAT RED BRAKE TELL. TALE IS NOW ON. → A

A

● MONITOR BRAKE PRESSURE STATE ON TECH 1.
● I5 BRAKE PRESSURE "OK"?

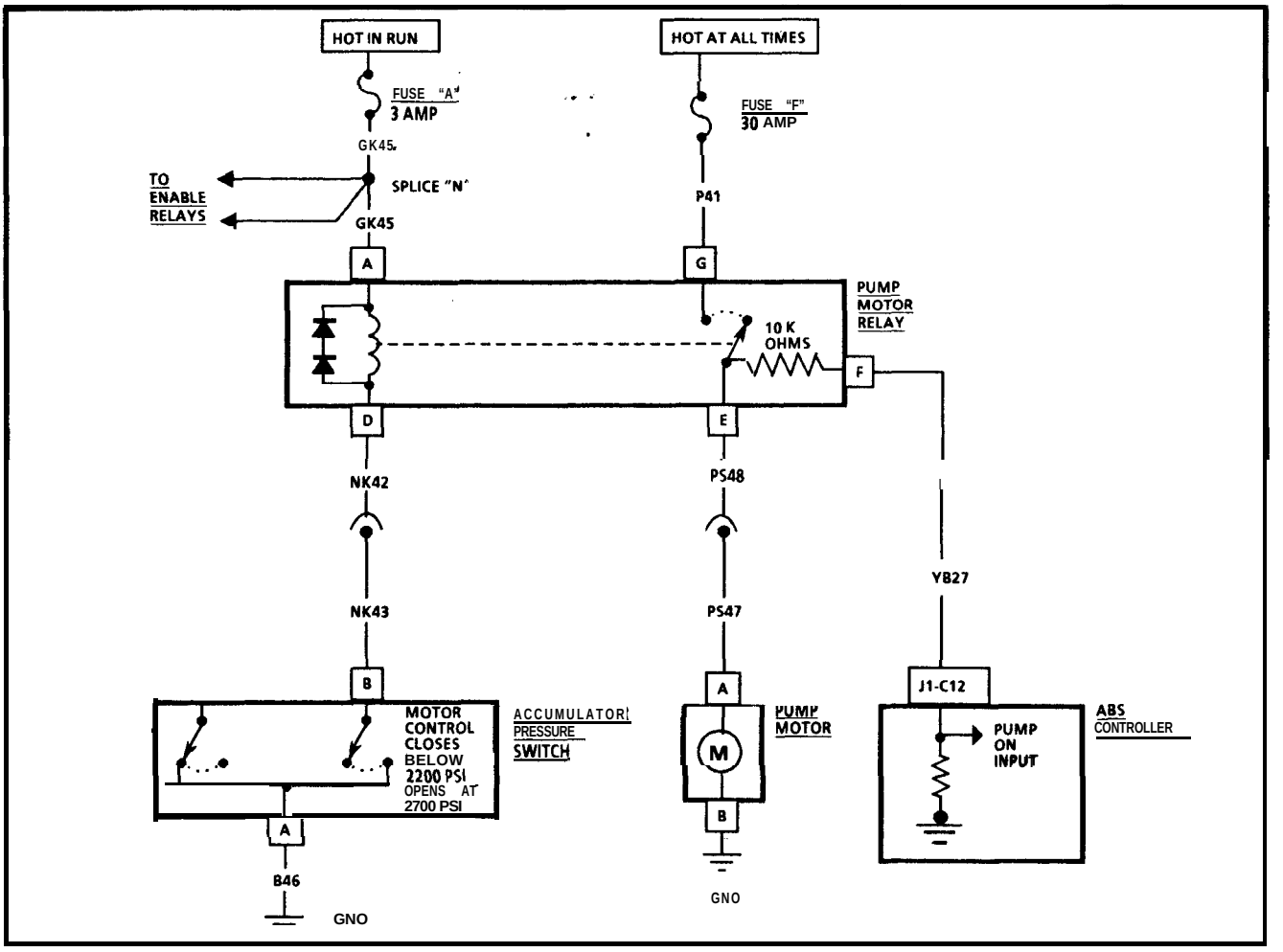
YES

FAULT IS NOT PRESENT. SEE NOTE ON INTERMITTENTS IN INTRODUCTION

NO

IF IGNITON IS TURNED TO RUN AND VERY LOW VOLTAGE (< ≈ 8 VOLTS) EXISTS, PUMP WILL BUILD PRESSURE, BUT IT MAY REQUIRE MORE THAN 40 SEC. CHARGE BATTERY AND RETEST.

AN EXPLANATION OF EACH TEST PROCEDURE REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE.
WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A062

LOW ACCUMULATOR PRE-CHARGE

The Accumulator is precharged to approximately 1200 PSI with nitrogen gas. The Pump Motor maintains system pressure between 2200 PSI and approximately 2700 PSI. The Accumulator Switch Motor Control closes when the pressure drops below 2200 PSI. This grounds the Pump Motor Relay Coil causing voltage to be applied to the Pump Motor and Pump On Input. Whenever the Pump Motor is on, the Pump On Input will have voltage applied to it. The Pump Motor will run until system pressure is restored to approximately 2700 PSI.

CODE A062 will set when the ABS Controller detects short pump run times of less than 1.4 seconds in duration.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If the pump run time from "OK pressure" to "pump off time" is less than six seconds a low accumulator precharge or poor accumulator switch point condition is indicated. Section "JF.13" contains tests with a pressure gage which will isolate the problem further.
2. If normal pump run cycle is less than 1.7 seconds, a miscalibrated accumulator switch or low accumulator precharge is indicated. Section "JF.13" contains tests with a pressure gage to check switch calibrations.

CODE A062

LOW ACCUMULATOR PRECHARGE

- IGNITION IN "RUN."
- IS CODE A031 ALSO SET?

NO

(1) PERFORM POWERMASTER III TOTAL PUMP RUN TIME TEST:
- START AT TECH 1 MAIN MENUE
- SELECT F4: ABS TESTS
- SELECT F3: PUMP MOTOR
- SELECT F1 : TOTAL TIME
- FOLLOW TECH 1 DIRECTIONS

- MONITOR PUMP MOTOR TIME FROM "OK PRESS" TO "OFF".
- WAS PUMP ON GREATER THAN 6 SECONDS?

YES

REFER TO CODE A031 FOR DIAGNOSIS.

NO

(2) PERFORM NORMAL PUMP RUN CYCLE TEST:
- START AT TECH 1 MAIN MENUE
- SELECT F4: ABS TESTS
- SELECT F3: PUMP MOTOR
- SELECT FO: RUN CYCLE
- FOLLOW TECH 1 DIRECTIONS

- IS ONE PUMP RUN TIME LESS THAN 1.7 SECONDS?

YES

REFER TO HYDRAULIC DIAGNOSIS IN SECTION "JF.13".

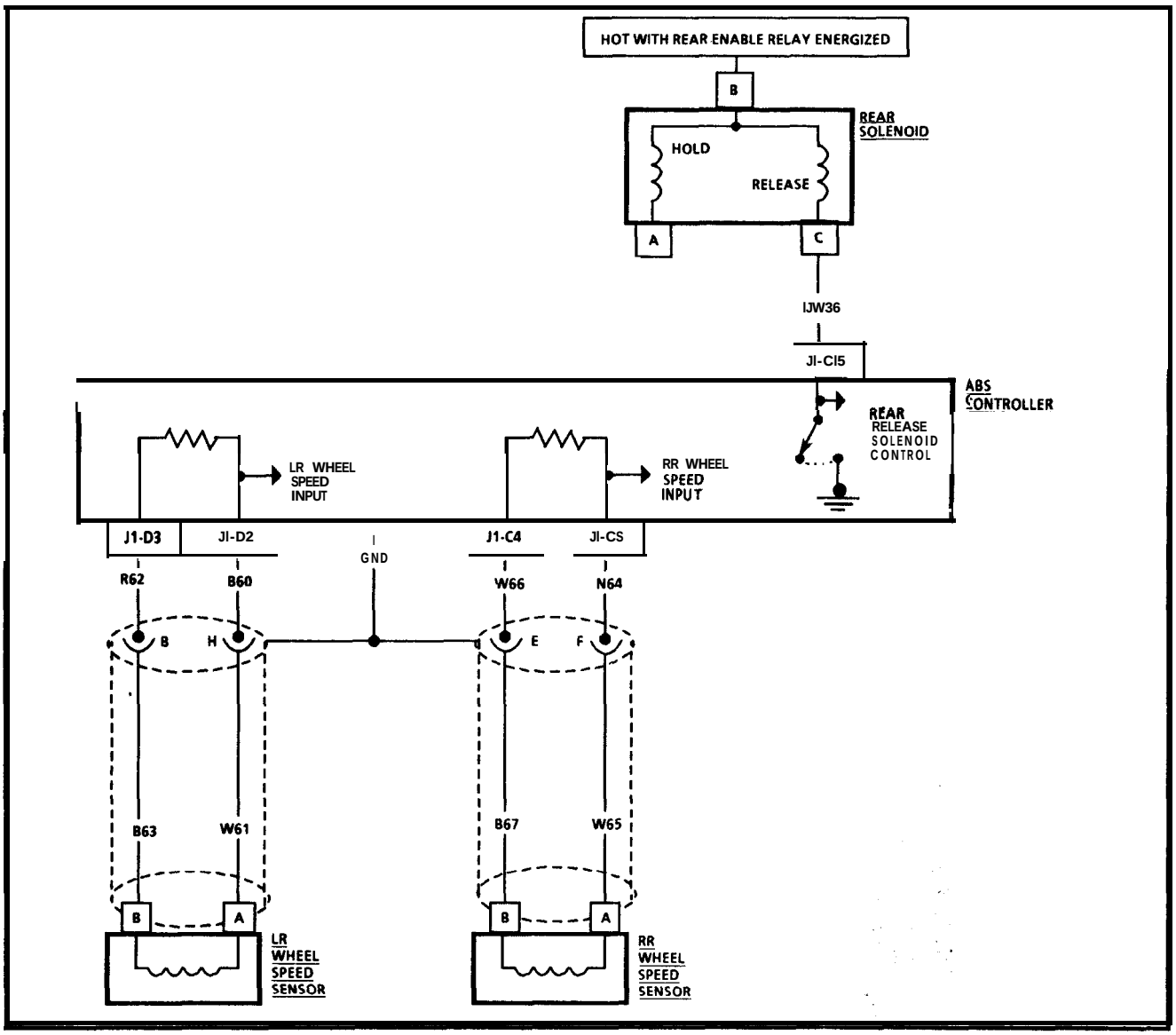
NO

REFER TO HYDRAULIC DIAGNOSIS IN SECTION "JF.13".

YES

CHECK FOR POSSIBLE INTERMITTENT ELECTRICAL FAULT. CHECK ACCUMULATOR SWITCH AND PUMP MOTOR RELAY FOR GOOD CLEAN TERMINAL CONTACTS. SEE NOTE ON INTERMITTENTS IN INTRODUCTION.

AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.



CODE A063

BOTH REAR WHEEL SPEED SENSORS OPEN

The ABS Controller monitors the Wheel Speed Sensors. If one or both rear wheel speeds are zero, the ABS Controller cannot accurately detect wheel lock-up. Since three good wheel speeds are needed to set Codes A046 or A047, these Codes cannot determine if both wheel speed sensors are faulty. Code A063 can detect if both Rear Wheel Speed Sensors are malfunctioning.

CODE A063 will set when all of the following conditions exist:

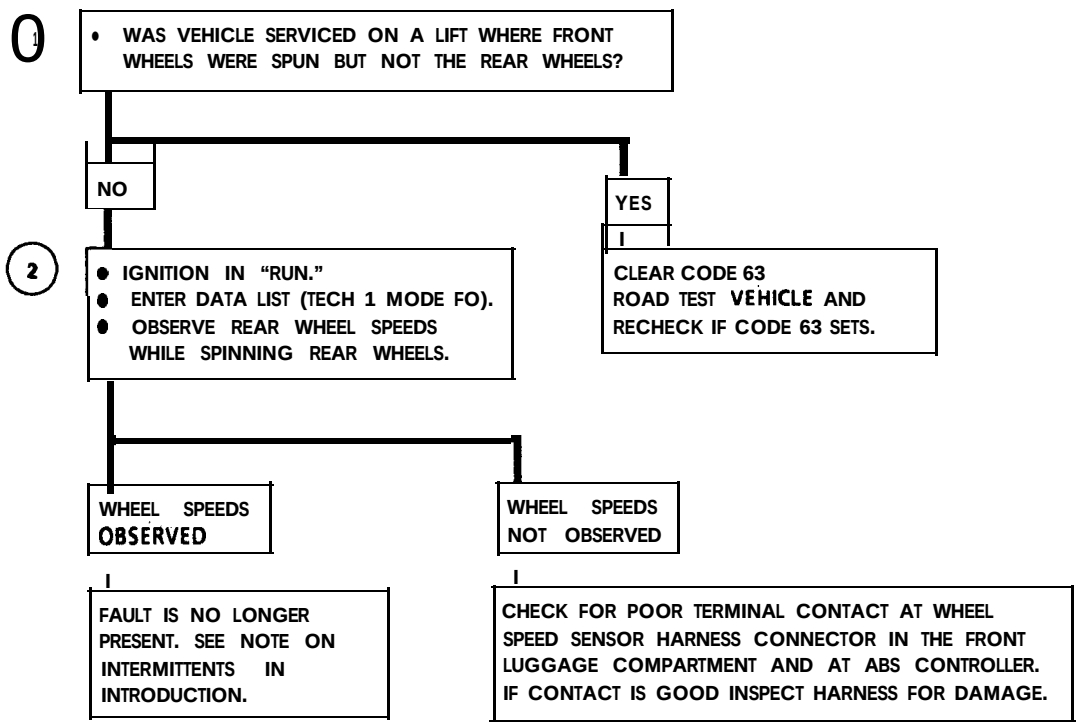
- The ABS Controller senses both front wheel speeds are greater than 10 mph and they are operating correctly.
- The ABS Controller senses both rear wheel speeds are 0 mph for more than 20 seconds.

Test Description: The following provides an explanation of the procedures being followed in the facing trouble tree.

1. If the front wheels were spinning while the vehicle was being serviced on a lift code, A063 would set. The code should be cleared and the vehicle road tested to insure this was the reason code A063 set.
2. Determines whether the fault is due to a hard failure or a possible intermittent failure.

CODE A063

BOTH REAR WHEEL SPEED SENSORS OPEN



NOTE: IF THE HARNESS BETWEEN THE WHEEL SPEED SENSOR HARNESS CONNECTOR IN THE FRONT LUGGAGE COMPARTMENT AND THE WHEEL SPEED SENSOR IS DEFECTIVE, REPLACE IT. DO NOT ATTEMPT TO REPAIR IT. AN EXPLANATION OF EACH TEST PROCEDURE, REFERENCED BY A CIRCLED NUMBER, IS GIVEN ON THE FACING PAGE. WHEN ALL DIAGNOSIS AND REPAIRS ARE COMPLETE, CLEAR CODES AND VERIFY OPERATION.

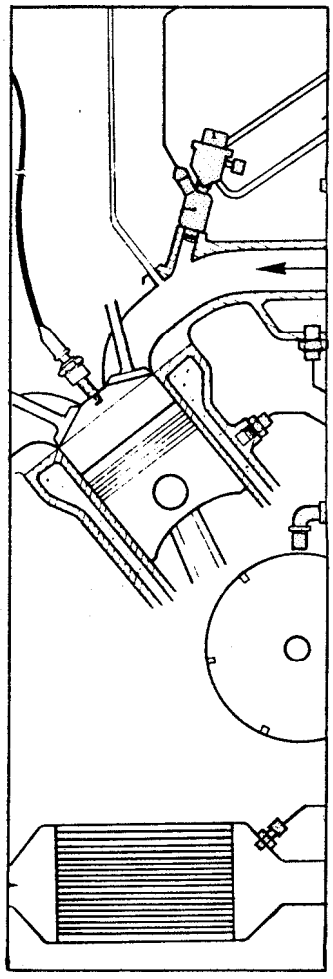
ENGINE MANAGEMENT & FUEL INJECTION

SECTION EMH - ELECTRONIC M.P.F.I. with INTERCOOLER

SECTION EMH.l- INTRODUCTICN

SERVICE NOTES
Section EMH

To be read in conjunction with Service Notes manual B082T0327Z Esprit & Esprit Turbo '88 M.Y. onwards.



Electronic M.P.F.I. With Chargecooler

LOTUS CARS. LTD
Norwich, Norfolk, England NR14 8EZ Telephone (0953) 608000
Telefax (0953) 606884 Telex 97401

Part No. D082TO327J

LOTUS CARS LTD

Hethel, Norwich, Norfolk, England, NR14 8EZ. Telephone (0953) 608000

Telefax (0953) 606884

Telex 97401

DM/md

January 1989'

FOR THE ATTENTION OF THE SERVICE MANAGER

Sir/Madam,

Please find enclosed Service Notes manual D082T03272, which covers the Electronic Multi-Point Fuel Injection system fitted to Esprit Turbo S.E. models with chargecooler.

This manual is designated 'Section EMH' and forms part of the Engine Management and Fuel Injection section of Service Notes manual B082T0327Z (Esprit and Esprit Turbo, 1988 Model Year Onwards). Note that this new manual EMH, is additional to, and does not replace manual EMG (C082T0327Z) which covers cars without chargecooler.

Yours faithfully,

Dave Massey

Dave Hassey
Technical Author

EMH.1 -A EMH SECTICNS EXPLAINRD

Introduction - EMH.1

This section starts with a general description of the fuel injection and engine management system to provide an overview of the system and its components.

The operation of the 'Check Engine' light is explained, and how to read trouble codes without a scanner tool. The 'Tech 1' scanner tool is introduced and its operation and advantages explained. Further tools required for full diagnostic/ repair procedures are also listed.

Basic Function - Systems and Components - Em.2

This section explains the function of each individual canponent and where it is fitted in order that a thorough understanding of the operation of the system my be gained.

Individual Component Diagnosis and Replacemnt - EMEI.3

This section contains the circuit diagrams, fault findinu charts and test procedures necessary to diagnose faults in each component. Replacement procedures and torque figures are also included.

Trouble Code Diagnosis Using 'Tech 1' Tool - EMH.4

'Trouble codes' are numbers which relate to certain types of fault as detected by the on-vehicle self diagnostic system. The 'Tech 1' tool is ah electronic scanner which plugs into the on-vehicle diagnostics and displays trouble codes stored by the electronic control module.

If a 'Tech 1' tool is available, this section should be used to diagnose any problem by following three basic steps.

i) Are the on-vehicle diagnostics working? This is established by performing the "Diagnostic Circuit Check" contained at the front of the section. ALWAYS START HERE.

If the oh-vehicle diagnostics are not working, this procedure will refer to another chart in section EMH.4 to correct the problem. If the on-vehicle diagnostics are O.K. the next step is:

ii) Is there a trouble code stored? If a trouble code is stored, refer directly to the trouble code chart of that number in section EMH.4. This will determine if the fault is still present. If no trouble code is stored, the third step is:

iii) 'Scan' serial data. This involves using the 'Tech 1' tool to read the information available fran the serial data stream. Information on the 'Tech 1' tool and the meaning of the displays is contained in section EMH.1 - G.

This procedure, which takes only a short time will result in problem diagnosis being made in the most cost effective and reliable manner.

Fault Diagnosis With Intermittent or No Trouble Codes - EMH.6

If a problem is diagnosed as being 'intermittent' the trouble code charts in section EMH.4 should be used only as a guide, or good components may be needlessly replaced. Section EMH.6 helps to diagnose intermittent problem and driveability problem which do not cause a trouble code to be set.

EMH.1-B GENERAL DESCRIPTION

The electronic multi-point fuel injection system used on the Lotus Esprit Turbo Intercooler is a General Motors fully electronic, processor controlled

system, using a separate fuel injector in the intake tract of each cylinder. An additional pair of injectors in the intake plenum, supplement fuel delivery during periods of maximum demand. The injectors are supplied with fuel at constant pressure (relative to intake manifold pressure) from a common fuel rail, with the guantity of fuel delivered to the engine being controlled by the length of time for which the solenoid operated injectors are opened. The four port injectors are 'pulsed' in two pairs (1/4 and 2/3) normally once every engine revolution, with half of the fuel requirement for each cylinder's canbustion being supplied by each pulse. The injectors are controlled by a processor called an Electronic Control Module (E.C.M.) which calculates the amount of fuel required by the engine under the operating conditions at any particular time. This information is fed into the E.C.M. by a series of sensors measuring air and coolant temperature, inlet manifold pressure, throttle position, engine and vehicle speed and the exhaust gas oxygen content. On the basis of these signals and others, the E.C.M. also controls the ignition timing, turbocharger boost pressure, engine idle speed, radiator cooling fans and a/c canpressor clutch.

The Direct Ignition (D.I.) system does away with the conventional distributor and uses two separate ignition coils, a flywheel position sensor, an ignition module and Electronic Spark Timing (E.S.T.) control circuitry incorporated into the E.C.M. This type of distributorless ignition system uses a 'waste spark' method of distribution wherein cylinder pairs 1/4 and 2/3 are provided with a spark every revolution, i.e. on both compression stroke and exhaust stroke. At engine cranking speed the ignition module (part of the ignition coil pack) alone controls the spark advance, but at speeds above 700 rpm, the E.C.M. takes over ignition timing control based on inlet manifold air pressure, air temperature, coolant temperature, engine speed and detection of the onset of detonation.

In addition to these functions, the E.C.M. monitors the signals received fran the various sensors and compares them with pre-programmed tolerance bands to enable it to recognise 'faults' in the system and light a 'check engine' tell tale lamp on the fascia. This informs the driver that a fault has been detected and furthermore stores in its memory a 'trouble code' for the particular type of fault detected in order that a technician may access the code and be guided to the problem area.

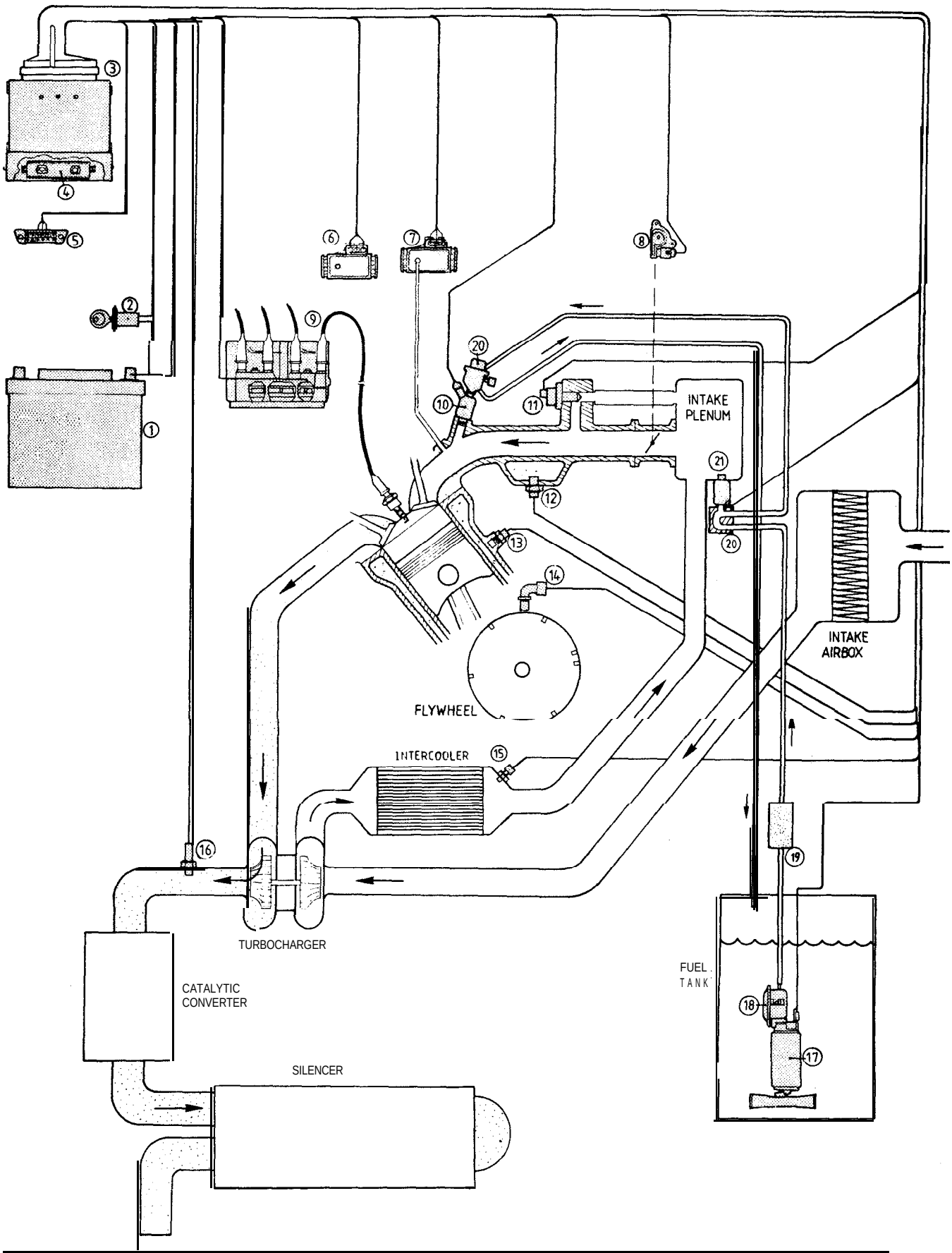
A facility is also provided for the data monitored by the E.C.M. to be tapped via a hand held electronic scanner (known as the 'Tech 1' tool) with an LCD display panel. This tool aids rapid fault diagnosis by displaying all sensor readings and trouble codes.

For details of the charge air cooling system (intercooler), see Service Notes section KC.

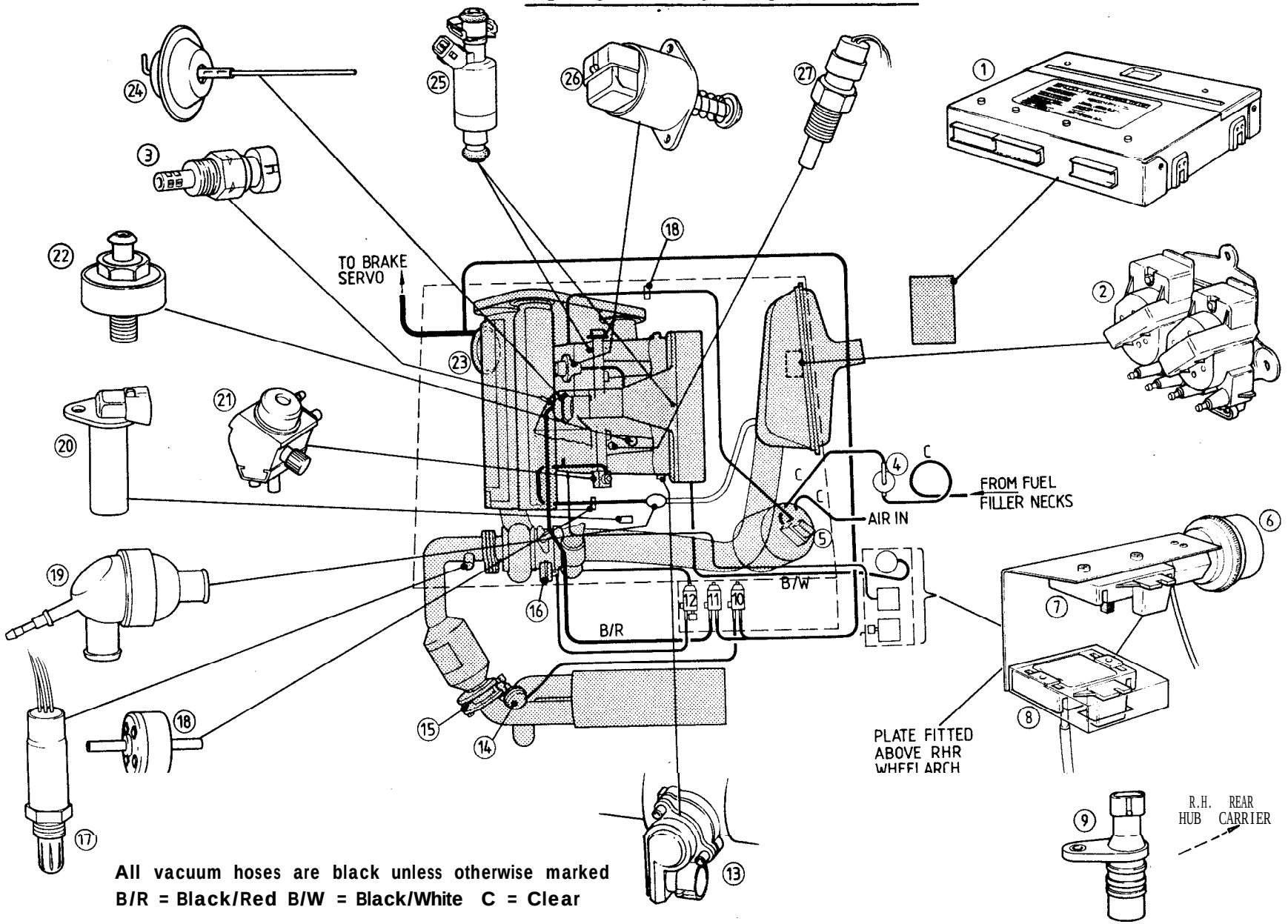
Key to Schematic Diagram

1. Battery
2. Ignition switch
3. Electronic Control Module (ECM)
4. Mem-Cal cartridge
5. Assembly Line Diagnostic Link (ALDL)
6. Barometric sensor
7. Manifold Air Pressure (MAP) sensor
8. Throttle Position Switch (TPS)
9. Direct Ignition (DI) module and H.T. coils
10. Fuel injector (4 off)
11. Idle Air Control (IAC) valve
12. Coolant Temperature Sensor (CTS)
13. Knock sensor
14. Flywheel sensor
15. Mass Air Temperature (MAT) sensor
16. Oxygen (02) sensor
17. Fuel pump
18. Pulsator
19. Fuel filter
20. Plenum nozzle
21. Fuel rail & pressure regulator

Schematic Diagram



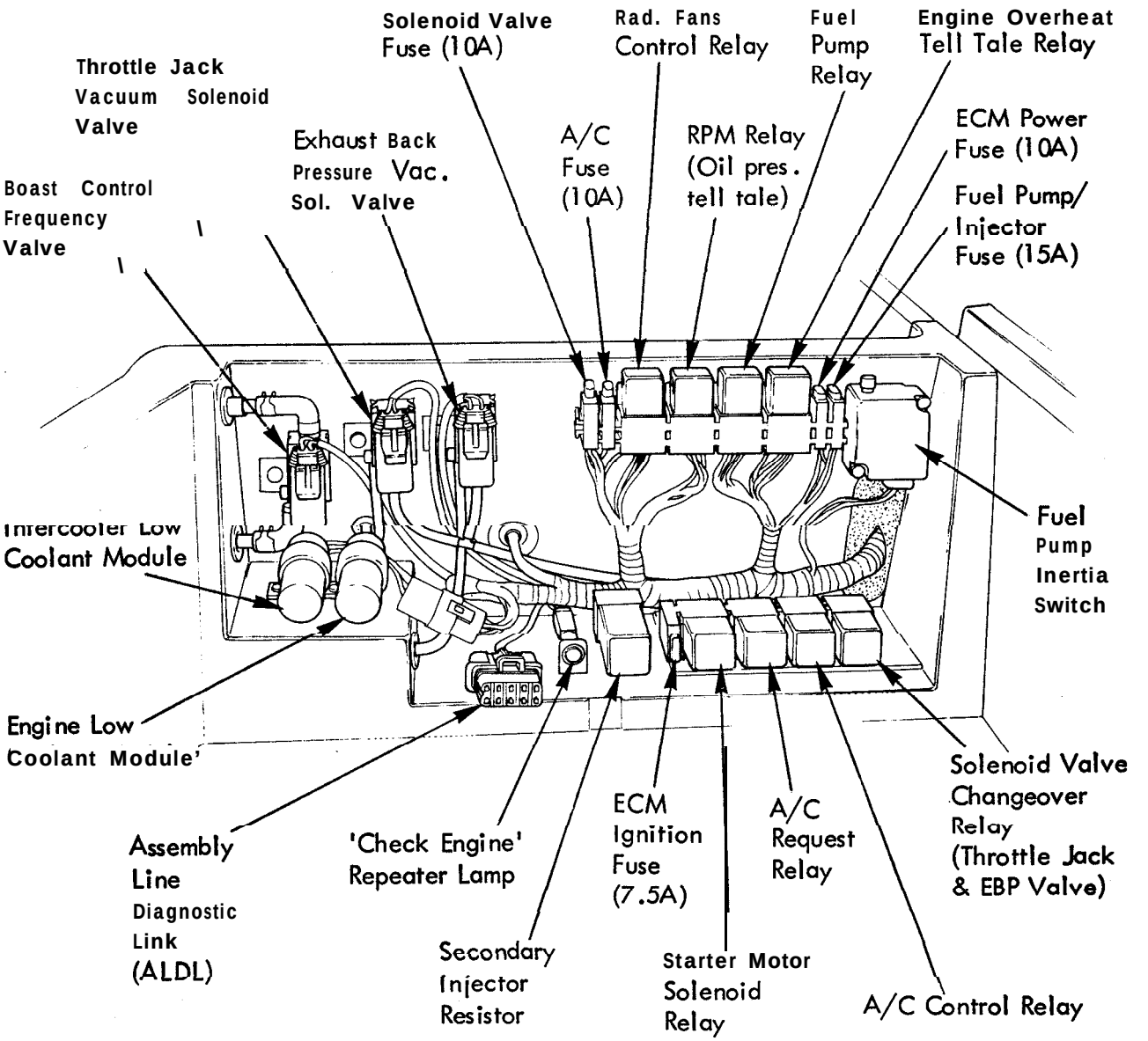
COMPONENT LOCATION DIAGRAM



Key to Component Location Diagram

1. Electronic Control Module (ECM)
2. Direct Ignition (DI) module & H.T. coils
3. Mass Air Temperature (MAT) sensor
4. Roll-over valve
5. Charcoal canister
6. Boost gauge transducer
7. Barometric pressure sensor
8. Manifold Air Pressure (MAP) sensor
9. Vehicle Speed Sensor (VSS)
10. Exhaust Back Pressure (EBP) valve solenoid
11. Throttle jack solenoid valve
12. Boost control solenoid valve
13. Throttle Position Sensor (TPS)
14. Exhaust Back Pressure (EBP) valve capsule
15. Exhaust Back Pressure (EBP) valve
16. Turbo wastegate actuator
17. Exhaust oxygen (02) sensor
18. One-way valve
19. Crankcase breather valve
20. Flywheel sensor
21. Fuel pressure regulator valve
22. Knock sensor
23. Vacuum pump
24. Throttle Jacking Capsule (TJC)
25. Fuel injector
26. Idle Air Control (IAC) valve
27. Coolant Temperature Sensor (CTS)

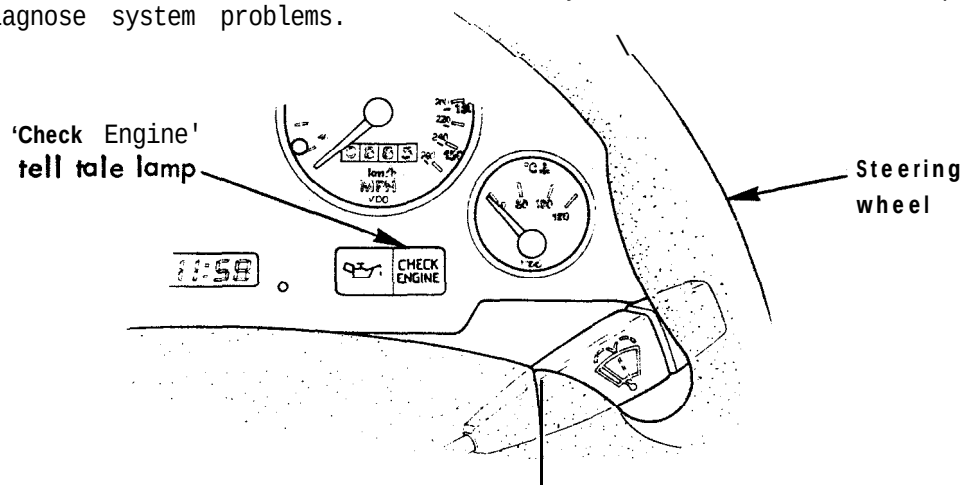
Engine Bay Relay Box Canponent Identification



EMH.l - C 'CHECK ENGINE' LIGHT

A 'check engine' tell tale lamp is provided in the instrument binnacle with a repeater lamp in the engine bay relay box. The function of these lamps is as follows:

i) To tell the driver that a problem has occurred and that the vehicle should be taken for check/repair as soon as is practicable.
ii) To enable the technician to read out any 'trouble codes' and help diagnose system problems.



As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. If, however, the lamp remains on, or comes on whilst driving, this indicates that the self diagnostic system has detected a problem and a trouble code has been stored in the memory. If the fault cures itself, or is no longer detected, the lamp will go out in most cases after about 10 seconds but will remain lit for 10 seconds after engine start up for the next 50 starts to indicate that an intermittent fault has been detected. If no further fault or recurrence is detected during this period, the lamp will no longer light and the stored trouble code will be erased from the memory.

Trouble Codes

Trouble codes may be categorised as either 'intermittent' or 'hard' where an 'intermittent' code is one which was set by a detected fault no longer present, and a 'hard' code is one where the fault still exists. The trouble code charts in section EMH.4 are designed to use this discrimination to aid diagnosis.

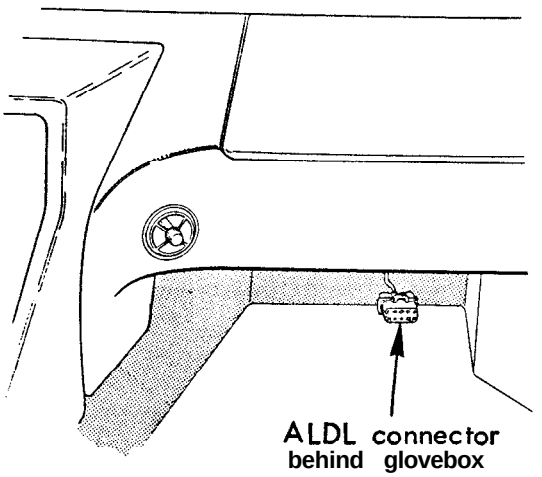
On the facing page of each trouble code chart are the readings the E.C.M. expects to receive from the relevant sensors. If these readings are outside of the specification, the check engine tell tale will be lit and a trouble code stored in the memory. The trouble code indicates in which CIRCUIT a problem was detected. Such a circuit would include the sensor, the wiring and connectors to it, and the E.C.M.

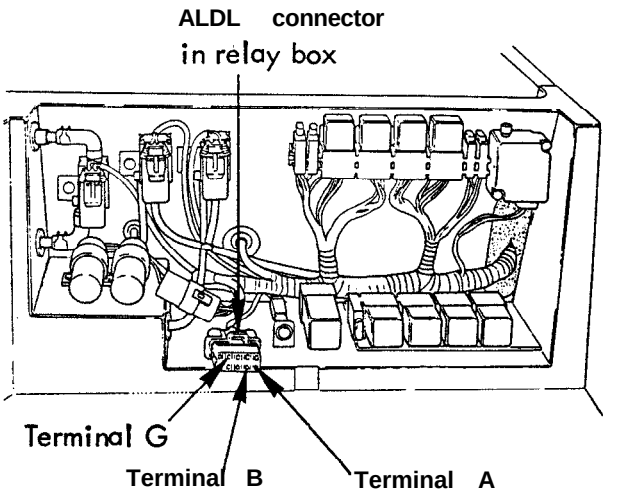
In order to read any trouble codes stored in the memory, it is necessary to use the Assembly Line Diagnostic Link (A.L.D.L.) connector.

EMH.1 - D ASSEMBLY LINE DIAGNOSTIC LINK (ALDL) CONNECTOR

Two ALDL connectors are fitted: one in the engine bay relay box, and one beneath the fascia, behind the glovebox. The connector socket is used:

i) at the end of the production line to check out the engine management system;





ii) to connect the hand held diagnostic scanner tool ('Tech 1'). Data is read via terminal G.

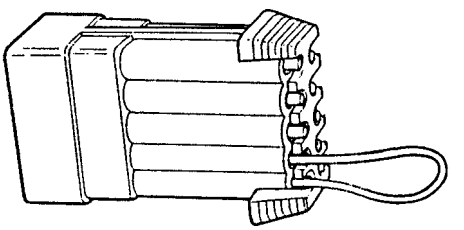
iii) to read stored trouble codes without a scanner tool

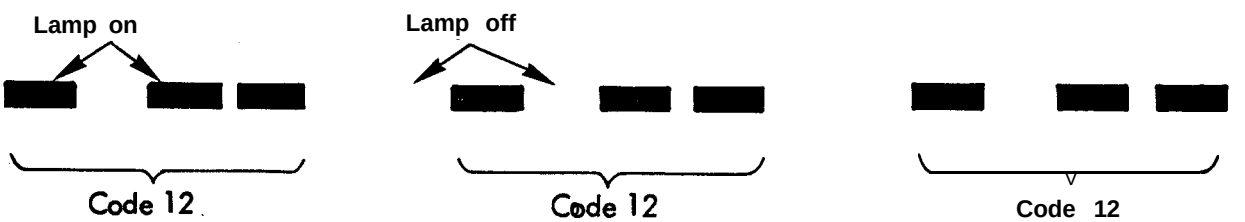
EMH.1 - E DIAGNOSTIC MODE (no scanner tool)

If the diagnostic terminal (B) of the ALDL connector is grounded by using a link wire to terminal A (or using bridging connector TOOOT0909) with the isnition **on** and the engine stopped, the **system** will enter the diagnostic mode, and:

i) Display a code 12 by flashing the 'Check Engine' tell tale,' and relay box repeater lamp to indicate that the diagnostic mode is operating. Codes are displayed by the lamp quickly flashing the first digit of the (two digit) number with a short pause before the second digit is similarly flashed.
For example, code 12 would consist of one flash, followed by a short pause then two flashes in quick succession. If no trouble codes are stored, code 12 will continue to be flashed repeatedly until the diagnostic terminal is ungrounded.

Bridging plug
TOOOT0909





ii) If one or more trouble codes are stored, code 12 will flash 3 times, followed by a short pause before the first trouble code is flashed 3 times in succession, then the next trouble code (if any), until code 12 is again flashed to Complete the cycle.
The trouble code charts in section EMH.4 **may** then be referred to for guidance in diagnosing the problem, using suitable instruments (e.g. high input impedance voltmeter) in place of the 'Tech 1' tool when necessary.

iii) Energise all ECM controlled relays and solenoids except the fuel pump relay.

iv) Fully extend the idle air control (IAC) valve.

Note that trouble codes can only be displayed with the engine stopped. Grounding the diagnostic terminal with the engine running provides the 'field service mode' described below.

EMH.l - F FIELD SERVICE MODE (no scanner tool)

If the diagnostic terminal (B) of the ALDL connector is grounded with the engine running, the system will enter the field service mode, and the flashing of the check engine light will indicate whether the system us running 'open' or 'closed loop'.

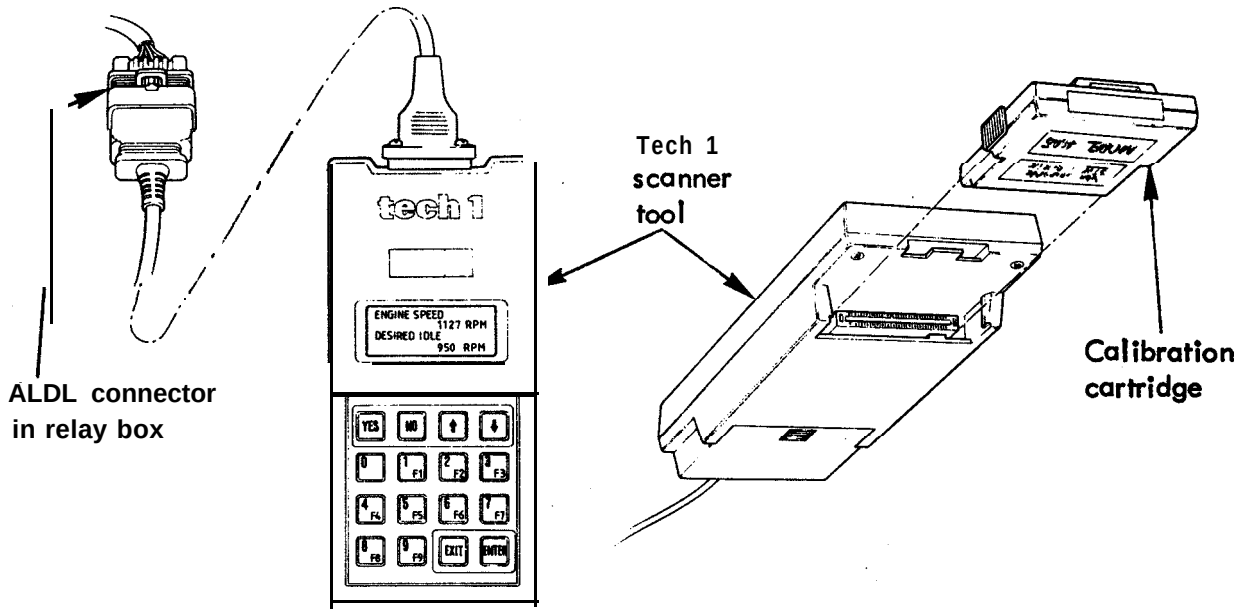
In open loop mode, the exhaust gas oxygen sensor is not operative and the fuel delivery is controlled by programmed values in the ECM. The check engine light flashes 2.5 times per second.

In closed loop mode, the oxygen sensor is operating and is continually adjusting fuel delivery via the ECM for optimum performance with the minimum of harmful emissions. The check engine light flashes once per second staying OUT for a greater proportion of the time if the system is too LEAN and staying ON for the **most** of the **time** if the **system is too** RICH.

While the system is in field service mode, no new trouble codes can be stored in the ECM, and the closed loop timer is by-passed (i.e. specified time delay before going closed loop, does not operate).

EMH.1- G 'TECH 1' SCANNER TOOL

The 'Tech 1' is a hand held electronic scanner tool with an LCD display panel which, by plugging into the ALDL connector, is able to display (numerically) any stored trouble codes and allow a quick check of sensors and switches which are



inputs to the ECM. Any pair of sensor inputs may be displayed simultaneously either in the workshop, or if necessary whilst driving on the road.

The "Tech 1' scanner tool does not make the use of diagnostic charts unneccessary. It is used in conjunction with the charts to identify in which circuit a problem is located, and in some cases the tool can provide information that is extremely difficult, or indeed impossible to obtain using other equipment

'Snapshot' Mode

This facility is extremely useful for diagnosing driveability or intermittent problem which may not set a trouble code.

The tool is plugged in and observed whilst the car is driven, and a continually updated block of data covering the latest time period, from all the sensors is stored in the memory. When the driveability problem is encountered, or the intermittent fault occurs, the 'snapshot' may be triggered manually or autcxnatically, and a further block of sensor data is recorded for a similar time period after the trigger point. Back in the workshop, the readings from each of the sensors may be recalled and assessed before, during and after the trigger point. A variation in sensor reading at the trigger point may indicate a problem area, if necessary comparing readings with a known good vehicle.

Data Displays Available on the Tech 1 Tool

ENGINE SPEED: Displays engine rpm. Often useful if extra reference pulses are suspected. A sudden high rpm indication while at a steady throttle would indicate electrical interference in the reference circuit. This interference is usually caused by ECM wires too close to ignition secondary wires.

DESIRED IDLE: Indicates the rpm to which the ECM is trying to control idle speed

COOLANT TEMP: Displays engine temperature in degrees Centigrade and Fahrenheit. After engine is started the temperature should rise steadily to about 85 - 95°C then stabilise when the thermstat opens.

AIR TEMP: (MAT) Displays tertperature of air at the outlet of the intercoooler. Should read close to ambient air temperature when the engine is cold, and rise as underhood and engine temperature increases.

MAP: * Manifold Air Pressure) The MAP sensor produces a low signal voltage when inlet manifold pressure is low (high vacuum) and a high voltage when the pressure is high (low vacuum). With the ignition on and the engine stopped, the manifold pressure is equal to atmospheric pressure and the signal voltage will be approximately 2.4 volts.

BARO: * This value will vary depending on barometric pressure and altitude, but should display a pressure reading similar to the MAP sensor with the engine stopped, and a voltage of approx. twice that of the MAP sensor.

* MAP and Baro Sensors have a coloured plastic insert visible in the connector cavity. Sensors with the same insert colour are identical in calibration. The harness electrical connector colour should also be the same as the sensor colour insert.

IDLE AIR COTNROL: (IAC) This system is used to control engine idle speed to the desired rpm, for different operating conditions. In this mode, the numbers will indicate what position the ECM thinks the valve is in. The ECM moves the IAC in counts and it is the count number which is displayed on the Tach 1 tool.

THROT POSITION: Displays TPS output in volts.
THROTTLE ANGLE: Displays throttle opening as a percentage.
OXYGEN SENSOR: The reading will be in millivolts (mv) with a range from 1 to 999 mv. If the reading is consistently below 350 the fuel system is running lean as seen by the ECM, and if the reading is consistently above 550 the system is running rich.
INJ PULSE WIDTH: In this position, the reading is given in milliseconds which is the on time that the ECM is commanding to the injectors.
SPARE ADVANCE: Displays ignition advance in degrees.
MPH KPH: Displays vehicle speed. Useful for checking speedometer accuracy.
FUEL INTEGRATOR: BLOCK LEARN: The normal readings for these positions are around 128. If higher, it indicates that the ECM is adding fuel to the base fuel calculation because the system is lean, and if the numbers are below 128 the ECM is taking out fuel from the base calculation because the system is rich. The integrator is short term corrective action while the block learn portion (which is a long term correction) will only change if the integrator has seen a condition which lasts for a calibrated period of tin-e.
OPEN/CLOSED LOOP: This position will indicate whether the engine control system is operating in open or closed loop. The system goes closed loop after a certain amount of run time, when coolant terqerature is high enough, and the oxygen sensor becomes active.
BLOCK LEARN CELL: There are twenty-two different cells which the ECM learns at depending on rpm and MAP. This parameter will display what cell the ECM is using for the fuel calculation at the time.
KNOCK RETARD: Indicates the number of degrees the ECM is retarding the Electronic Spark Timing.
KNOCK SIGNAL: Displays a "YES" when knock is detected by the ECM and displays a "NO" when knock is not detected.
BATTERY VOLTAGE: Displays the battery voltage detected at the ECM ignition input.
PURGE DUTY CYCLE: Displays charcoal canister valve duty cycle.
A/C REQUEST: Displays the state of the A/C signal line to the ECM. Should read "YES" whenever the A/C is requested.
A/C CONTROL: Displays "ON" when the ECM has'commanded the A/C clutch "ON".
REFERENCE PULSES: Should display "YES" when engine is running.
SYNC PULSES: Should cycle 0,1,2 with engine idling.
ODM FAULT A: Displays "NO" if no fault detected.
ODM FAULT B: Displays "NO" if no fault detected.
FAN: Displays "ON" when the cooling fans have been commanded. "ON".
OVERHEAT RELAY: Should display "INACTIVE" at coolant temps below 110°C.
RPM OIL RELAY: Should display "OPEN" below 1600 rpm to disable oil pressure tell tale.
THROTTLE JACK SOL: Should display "OFF" except when EBP valve is operating.
WASTEGATE SOL: Should display "INACTIVE" when vehicle is stationary.
WASTEGATE D.C.: Displays wastegate vacuum solenoid valve duty cycle as a percentage. Should sisplay '0' at idle.
SECONDARY INJECT: Should display 'INACTIVE' at idle.
SECONDARY INJ DC: Displays secondary injector duty cycle as a percentage. Should be '0' at idle.
PROM ID: In this position, information is used for assembly verification only. PROM ID is useful only when the vehicle is equipped with the original ECM and PROM or Mem-Cal.
TIME FROM START: Displays time in minutes and seconds since ignition switch on.

EMH.1 -H CLEARING TROUBLE CODES

A trouble code will remain stored in the ECM memory after the fault has been rectified (or does not recur) until the engine is started 50 tiaras, or the code is cleared using the programme provided in the 'Tech 1' tool, or if the battery voltage is disconnected from the ECM for 30 seconds.

CAUTION: To prevent ECM damage, the ignition key must be 'OFF' when disconnecting or reconnecting power to the ECM (e.g. battery cable, ECM pigtail, ECM fuse, jumper cables, etc.).

Trouble codes should be cleared after repairs have been completed. Some diagnostic charts will require codes to be cleared before using the chart in order that the ECM be allowed to set the code during the test and identify the problem more quickly.

Note that when clearing trouble codes with the 'Tech 1' tool, the ignition should first be switched off for 10 seconds.

EMH.1 - I ECM LEARNING ABILITY

The ECM has a 'learning' ability which enables it to make corrections for minor variations in the fuel system and for engine condition in order to maintain the optimum fuel delivery at all tines.

If the battery is disconnected, or the power supply to the ECM interrupted, these 'learned' settings will be erased in addition to any stored trouble codes, and after reconnection of the power, integrator and block learn values of 128 will be used for initial fuel calculations by the ECM. When first starting the engine after reconnecting the battery or ECM power supply, it may be necessary to partially depress the accelerator pedal, and to release the accelerator very slowly when first returning to idle, in order for the ECM to re-learn the idle air control (IAC) valve position.

The time taken to complete the integrator and block learn re-learning process will vary from vehicle to vehicle, and will also depend on driving conditions. Gentle driving at steady throttle openings will speed the process. There is unlikely to be any significant difference in engine performance or driving characteristics during this period.

When clearing trouble codes the 'Tech 1' tool should always be used so that the trouble code(s) only is cleared, and not any other ECM memories.

EMH.1 - J BASIC PRECAUTIONS

THE LOTUS ESPRIT 2.2L TURBO IS CERTIFIED BY THE UNITED STATES ENVIRONMENTAL AGENCY AS CONFORMING TO THE REQUIREMENTS OF THE REGULATIGNS FOR THE CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES. THIS CERTIFICATION IS CONTINGENT ON CERTAIN ADJUSTMENTS BEING SET TO FACTORY STANDARDS. IN MOST CASES, THESE ADJUSTMENT POINTS HAVE BEEN EITHER PERMANENTLY SEALED AND/OR MADE INACCESSIBLE TO PREVENT INDISCRIMINATEORROUXNE ADJUSTMENT IN THE FIELD. FOR THIS REASON, TBE FACTORY PROCEDURE FOR TEMPORARILY REMOVING PLUGS, CAPS, ETC., FOR THE PURPOSES OF SERVICING THE PRODUCT, MUST BE STRICTLY FOLLOWED AND, WHEREVER PRACTICABLE, RETURNED TO THE ORIGINAL INTENT OF THE DESIGN.

Chocking Drive Wheels

The vehicle drive wheels should always be securely chocked whenever performing system diagnoses with the engine running.

Warm Up Engine

In order for the exhaust gas oxygen sensor to operate and control the fuel delivery in 'closed loop' mode, in which mode all diagnostic checks are performed, the coolant temperature must be raised above 20° C by running the engine at part throttle for several minutes dependent on ambient and engine temperature.

Visual/Physical Inspection

Before embarking on any other diagnostic procedures, it is most important to carry out a thorough and comprehensive visual and physical check of all vacuum pipes/hoses and wires for correct routing, and any signs of pinches, cuts, chafes, poor connections, etc. Do not overlook the more inaccessible areas.

Fuel System

All parts of the fuel feed line between the tank and fuel pressure regulator valve remain under pressure even after switching off the ignition. It is most important that before releasing any fuel connection or component, the fuel pressure relief procedure and safety precautions detailed in EMH.3 - I are followed.

Ignition System

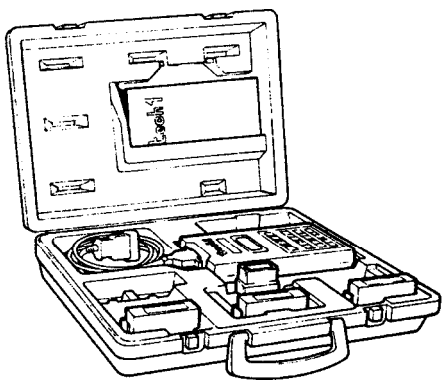
Be aware that the ignition coil output to the spark plugs is in the region of 50 kV, which if received as a 'shock', could in rare circumstances cause medical distress to persons with a weak heart.

EMH.1 - K SPECIAL TOOLS

'Tech 1' Diagnostic Scanner Kit T000T0896

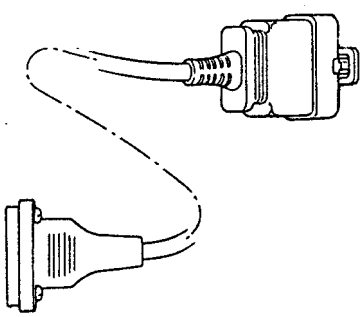
Plugs into ALDL connector and displays stored trouble codes and sensor readings.

Kit includes scanner, cartridge, lead, self-test adaptor, operator's manual and carrying case.

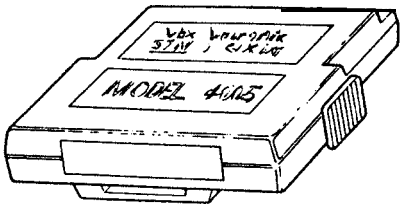


Connector Lead, 'Tech 1' Scanner M00T0897

Included in 'Tech 1' kit M00T0896
Connects Tech 1 to ALDL socket.

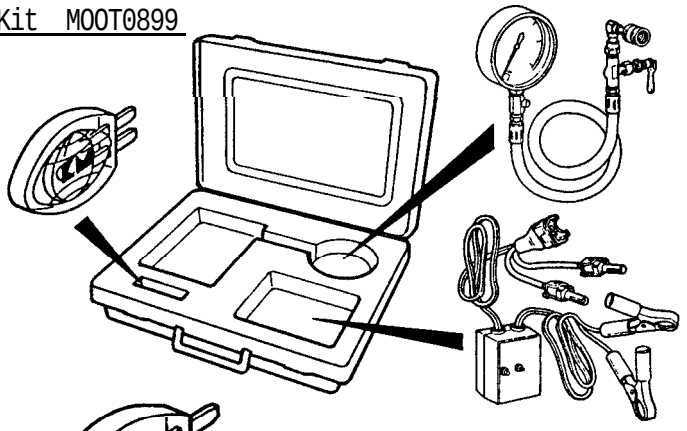


Calibration Cartridge, 'Tech 1' Scanner T000T0898



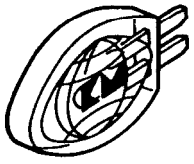
Included in 'Tech 1' kit T000T0896
Cartridge is specific to Lotus applications.
Plugs into Tech 1 scanner

Fuel Pressure and Injector Diagnostic Kit M00T0899



Used to diagnose fuel system problems. Kit includes; fuel pressure gauge, to check pump delivery pressure and compare individual injector pressure drop; injector test light, to check electrical circuit to an injector: injector tester, to energise an individual injector for a precise time period.

Injector Test Light M00T0900



Included in kit T000T0899.
Used to check electrical circuit to an injector.

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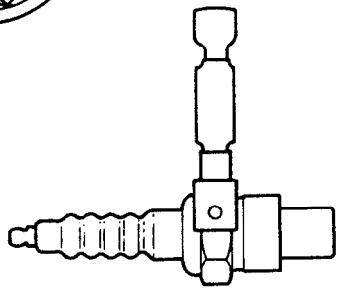
Spark Tester T000T0901

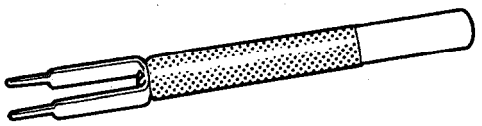


Used to check available secondary ignition voltage.

Connector Test Adaptor Kit T000T0902

Used to make electrical test connections in Weather Pack, Metri-Pack and Micro-Pack connector blocks.

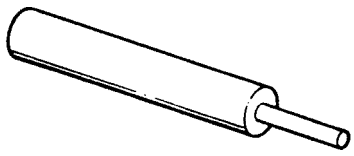
Metri-Pack Terminal Remover T000T0903



Used to remove terminals from connector blocks.

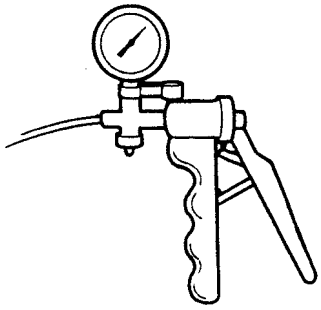
Weather-Pack Terminal Remover T000T0904

Used to remove terminals from conhector blocks



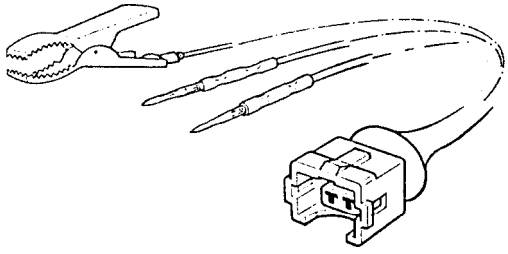
Vacuum Pump T000T0907

Used to operate and diagnose faults in vacuum operated components.



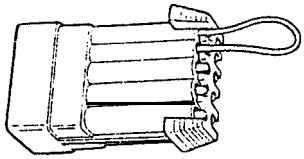
Injector Test Lamp Adaptor MOOT0930

Used to connect injector tester lamp to battery and injector harness.



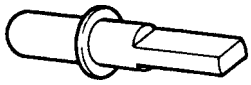
ALDL Bridging Connector T000T0909

Used to bridge ALDL connector terminals B and A to enter diagnostic mode or field service mode without 'Tech 1'.



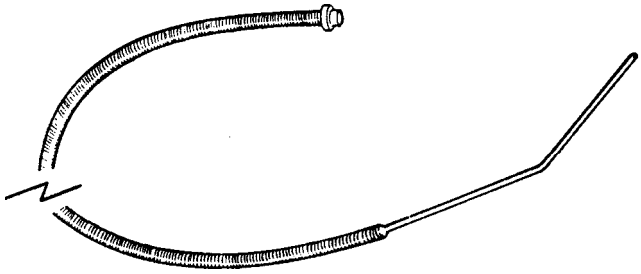
Pressure Regulator Valve Plug T000T0910

Used to blank off pressure regulator return port when measuring fuel supply pressure.



Exhaust Sample Pipe T000T0501

Used to connect pressure gauge to exhaust system to measure exhaust back pressure.



EMH.1 -L HARNESS CONNECTOR BLOCKS

Because of the very low voltage and current levels used in the electronic engine management system, most connectors in the engine compartment are protected against moisture and dirt which could create oxidation and deposits on the terminal.

Take care when probing connector blocks or replacing terminals, to avoid shorting between adjacent terminals, since this can result, in some circumstances, in damage being caused to the electronic components. Always use jumper wires between connectors for circuit checking. Never probe through the Weather-Pack seals.

When diagnosing, open circuits are often difficult to locate by sight because oxidation or terminal misalignment are hidden by the connectors. Merely wiggling a connector on a sensor or in the wiring harness my correct the open circuit condition. This should always be considered when an open circuit or failed sensor is indicated. Intermittent problem may also be caused by oxidised or loose connections.

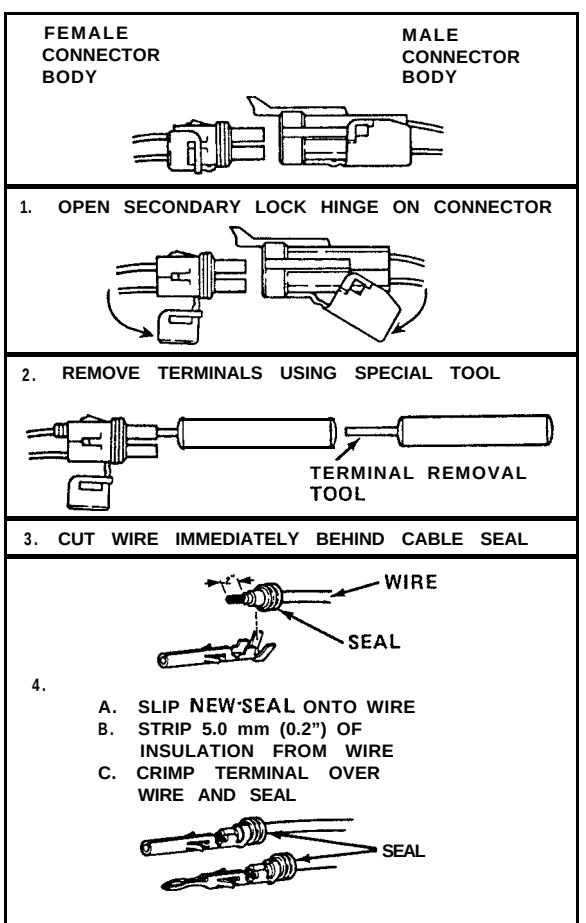
Before making a connector repair, be certain of the type of connector. Weather-Pack and Compact Three connectors look similar but are serviced differently.

Weather-Pack Connector

The diagram shows a Weather-Pack type connector and the tool T000T0904 required for removing the pin and sleeve terminals. If removal of a terminal is attempted using any other tool, it is likely that the terminal will be bent or deformed. These terminals cannot be straightened once bent.

Ensure that the connectors are properly seated and all of the sealing rings in place when connecting leads. The hinge type flap provides a backup, or secondary locking feature for the connector. They are used to improve the connector reliability by retaining the terminals if the small terminal lock tangs are not positioned properly.

Weather-Pack connections cannot be replaced with standard connections. Instructions are provided with Weather-Pack connector and terminal packages.



Compact Three Connectors

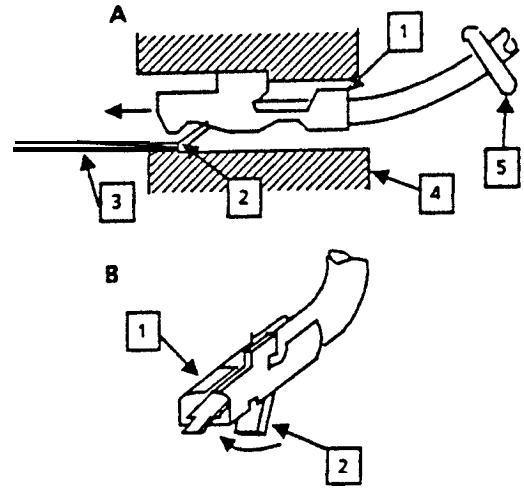
The Compact Three connector which looks similar to a Weather-Pack connector is not sealed and is used where resistance to the environment is not required.

Use standard methods when repairing a terminal. Do not use the Weather-Pack terminal tool T000T0904.

Metri-Pack Series 150 Connectors

Some connectors used to connect various sensors to the ECM harness use terminals called "Metri-Pack".

They are also called "Pull-to-Seat" terminals because, to install a terminal on a wire the wire is first inserted through the seal (5) and connector (4). The terminal is then crimped on the wire and the teminal pulled back into the connector to seat it in place.



1. Metri-Pack series 150 female terminal
2. Locking tang
3. Tool T000T0903
4. Connector body
5. Seal

To remove a terminal:

1. Slide the seal back on the wire,
2. Insert tool (3) T000T0903 or equivalent, as shown in insert "A" and "B" to release the terminal locking tab (2).
3. Push the wire and terminal out through the connector. If re-using the terminal, reshape the locking tang (2).

EMH.1 - M ABBREVIATIONS AND GLOSSARY OF TERMS

A/F	Air/Fuel ratio.
ALDL	Assembly Line Diagnostic Link. Connector block located in engine bay relay box. Used for verification of management system at the factory and for connection of 'Tech 1' diagnostic scanner tool.
Batt +ve	Battery positive terminal (12 volts).
Cal-Pak	Calibration Package incorporated into Mem-Cal. Allows fuel delivery in the event of a PROM or ECM malfunction.
CCP	Controlled Canister Purge. ECM controlled charcoal canister purge valve.
CEL	Check Engine Light. Tell tale lamp on fascia. Warns driver fault has been detected and can flash fault codes when diagnostic terminal of ALDL connector is grounded.
CKT	Circuit.
Closed Loop	ECM fuel control using oxygen sensor feedback.
CO	Carbon Monoxide.
CTS	Coolant Temperature Sensor.
Diagnostic Terminal	Lead of ALDL connector which is grounded to display stored trouble codes.
DI	Direct Ignition. Uses no distributor.
DVM (10meg)	Digital Voltmeter with 10 million ohm resistance.
ECM	Electronic Control Module. Computer controlling injection and engine management.
EECS	Evaporative Emissions Control System. Prevents fuel vapours escaping directly into atmosphere.
ESC	Electronic Spark Control. Retards ignition timing when detonation is detected.
EST	Electronic Spark Timing. ECM control of ignition timing.
HC	Hydrocarbons. Exhaust pollutant.
High Impedance Voltmeter	Used on circuits with very low current flow, as meter does not affect current in circuit under test.
Hg	Mercury. A calibration material used to measure vacuum.
IAC	Idle Air Control valve. Controls airflow past throttle plates to control idle speed.

MAP	Manifold Absolute Pressure.
MAT	Mass Air Temperature. Sensor in intake airbox.
Mem-Cal	Memory Calibrator. Cartridge fitted into ECM. Contains calibrations specific to a particular model variant.
MFI	Multiport Fuel Injection. System using individual injectors for each cylinder.
Mode	A particular state of operation.
NC	Normally Closed. State of relay contacts of solenoid plunger when no voltage is applied.
No	Normally Open. State of relay contacts or solenoid plunger when no voltage is applied
NOX	Nitrogen Oxides. Exhaust gas pollutant.
02	Oxygen. Oxygen sensor is fitted into exhaust system to control fuel delivery.
Open Loop	ECM fuel control without use of oxygen sensor.
PCV	Positive Crankcase Ventilation. System prevents crankcase fumes passing directly into atmosphere.
PROM	Programmable Read Only Memory. Contained within Mem-Cal.
TPS	Throttle Position Sensor.
VSS	Vehicle Speed Sensor.
Wastegate	Device used to control proportion of exhaust gas fed into turbocharger. Limits boost pressure.
WOT	Wide Open Throttle.

Circuit Diagram Cable Colour Code

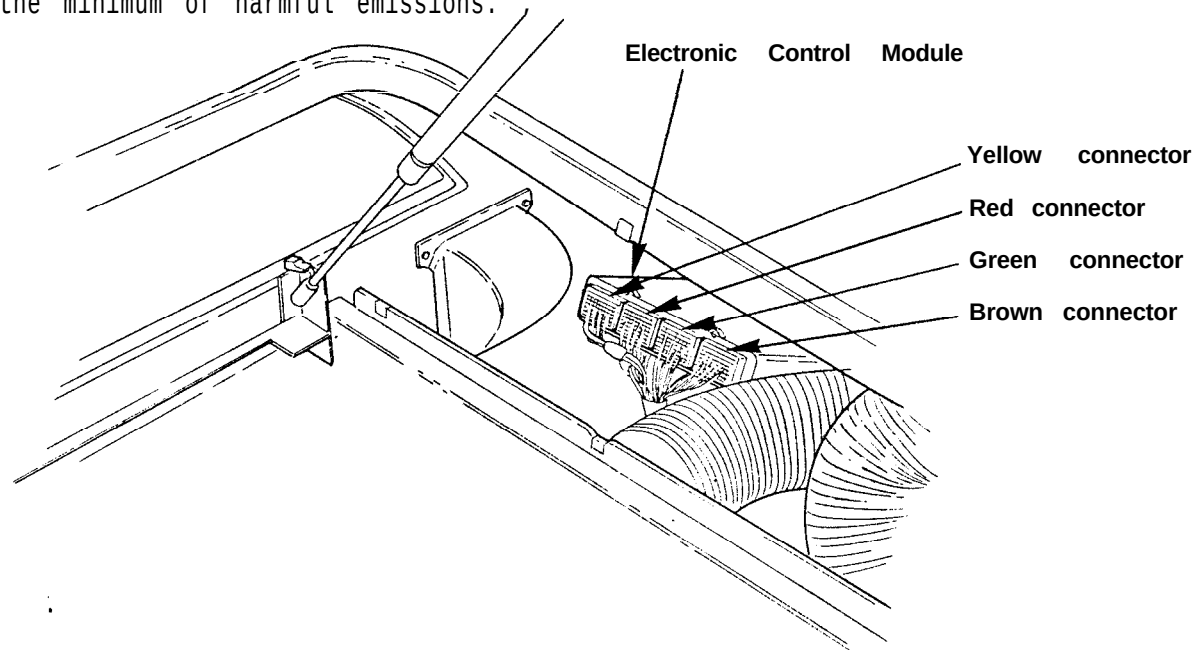
B	Black	0	Orange	U	Blue
G	Green	P	Purple	W	White
K	Pink	R	Red	Y	Yellow
LG	Light Green	S	Slate		
N	Brown	T	Tan		

SECTION EMH.2

BASIC FUNCTION - SYSTEMS & COMPONENTS

ENH.2 - A ELECTRONIC CONTROL MODULE (ECM)

The Electronic Control Module (ECM), located on the right hand fuel tank board, is the controlling computer for the fuel injection and engine management system. It constantly monitors data received from various sensors and controls engine operation to provide optimum performance and driveability consistent with the minimum of harmful emissions.



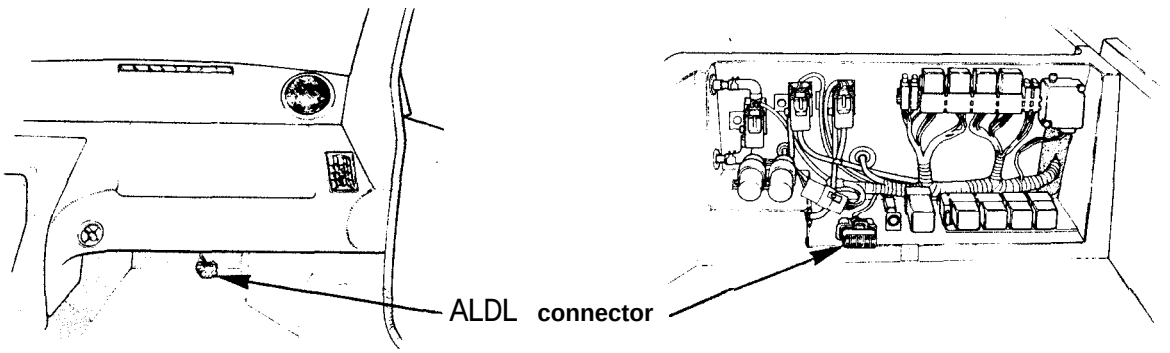
The different paramaters sensed and the systems controlled are as follows:-

PARAMETERS SENSED	Fue	SYSTEMS CONTROLLED: Delivery	Idle Speed	Spark Timing	Canister Purge	Boost Control	Throttle Jacking	Exhaust Back Pressure	Radiator Fans	Air Conditioning
Engine Speed	X	X	X	X	X	X	X	X		X
Vehicle Speed		X	X		X				X	X
Coolant Temp.	X	X	X	X		X	X	X	X	X
Mass Air Temp.	X	X	X							
Manif old Pressure	X	X	X	X	X	X	X	X		
Barometric Pressure	X	X	X							
Throttle Position	X	X	X		X	X	X	X		X
Battery Voltage	X	X							X	
Injector Voltage	X									
Exhaust Oxygen	X			X						
Engine Detonation			X		X					
A/C Request		X							X	X
Flywheel Position	X		X							
Time	X	X	X	X	X	X	X	X		X

The ECM controls most output circuits by switching the ground circuit through Quad Driver Modules (QDMs). A QDM is a group of electronic switches which can independently control up to four outputs.

ALDL Connector Plug

The ECM can also recognise operational problems and alert the driver via a 'Check Engine' tell tale lamp on the fascia, whilst storing a 'trouble code' to help the technician make rapid fault diagnosis. An 'Assembly Line Diagnostic Link' (ALDL) connector plug in the engine bay relay box (and behind the fascia



glovebox) is provided for use both at the end of the assembly line to check for correct system operation, and in service, for diagnostic purposes. A special hand held electronic scanner tool ('Tech 1') plugs into this connector and enables all the sensor readings to be displayed, together with any stored trouble codes. See Section EMH.l for a full explanation of using the diagnostic facility.

Mem-Cal

The ECM consists of two principal parts:-

Controller. This is the main body of the ECM and includes the basic control circuits.

- Mem-Cal. This is a "Memory and Calibration" cartridge which plugs into the controller. It is specific to the particular model year of the vehicle, and contains the functions of the PROM - programmable read only memory, Cal-Pak - calibration package designed to allow fuel delivery in the event- of malfunction in the controller or PROM, as a 'get you home' facility, and ESC - electronic spark control module.

Use of a Voltmeter in Diagnostic Procedures

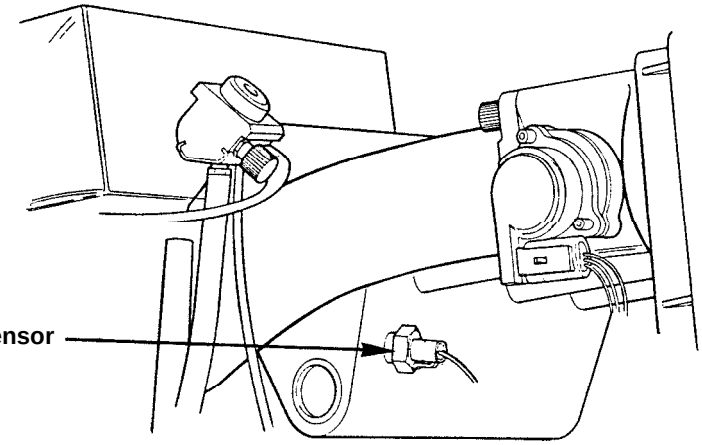
The ECM powers various sensors and switches with either 5 or 12 volts derived via resistances in the ECM which are so high in value that a test light will not function when connected to the circuit. In some cases even conventional voltmeters will not give an accurate reading because the meter resistance is too low, and the current used by the meter itself is significant enough to affect the characteristics of the circuit being measured. It is therefore essential to use a 10 megohm input impedance digital voltmeter to ensure accurate voltage readings are obtained.

EMH.2 - B ENGINE COOLANT TEMPERATURE SENSOR

The ECM requires a coolant temperature input signal in order to increase fuel delivery and maintain driveability during the cold running and warm-up phase. The signal from this switch is used for many different parameters within the engine management system to control and switch various components dependent on

engine temperature.

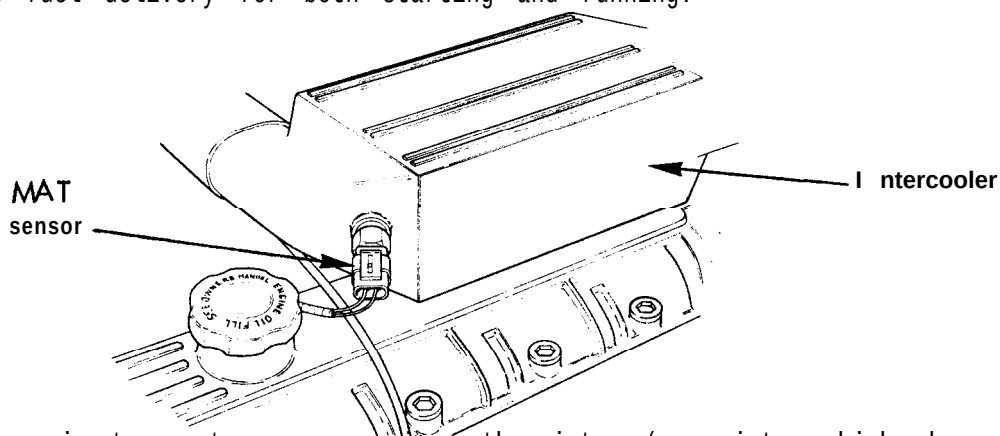
The sensor is a thermistor (a resistor which changes value with temperature) mounted in the inlet manifold water jacket. Low coolant temperature produces a high resistance (100,000 ohms at minus 40°C) while high temperature causes low resistance (70 ohms at 130°C).



The ECM supplies a 5 volt signal to the coolant temperature sensor through a resistor in the ECM and monitors the terminal voltage. Since this forms a series circuit to ground through the coolant sensor, high sensor resistance (low temperature) will result in high ECM terminal voltage. When the coolant sensor's resistance is low (high temperature), the terminal voltage will be drawn lower. This terminal voltage indicates engine coolant temperature to the ECM.

EMH.2 - C MASS AIR TEMPERATURE (MAT) SENSOR

The Mass Air Temperature (MAT) sensor is fitted into the outlet side of the intercooler to sense the temperature of air being consumed by the engine. The ECM uses this signal in conjunction with others to calculate air density and the appropriate fuel delivery for both starting and running.



The mass air temperature sensor is a thermistor (a resistor which changes value with temperature) similar to the coolant temperature sensor. Low temperature produces a high resistance (100,000 ohms at minus 40°C) while high temperature causes low resistance (185 ohms at 100°C). The ECM supplies a 5 volt reference signal to the MAT sensor, and by treasuring the sensor output voltage is able to calculate the sensor resistance, and thereby the airbox air temperature.

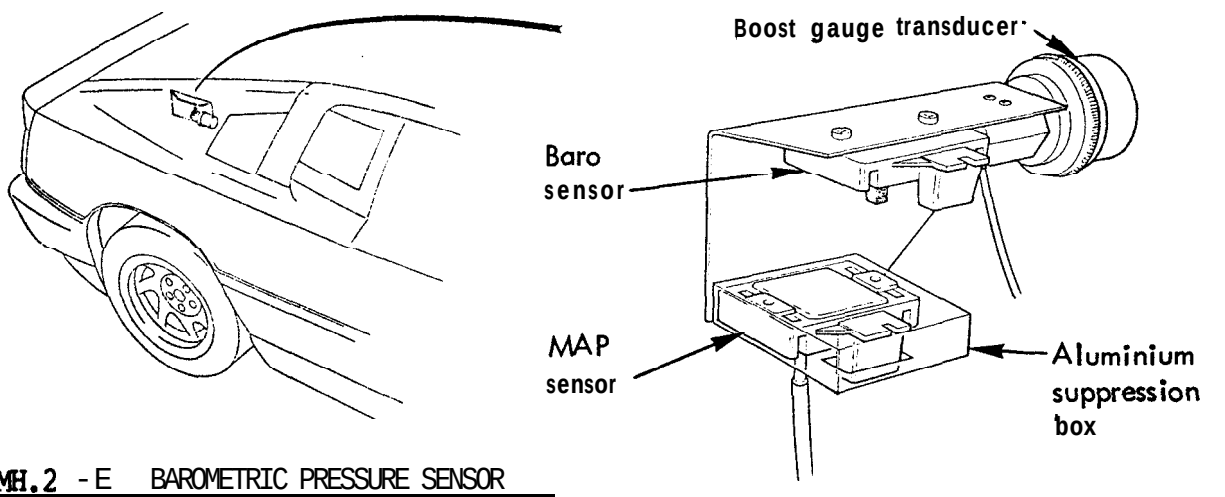
Low air temperature produces a high sensor resistance for a higher fuel requirement.

EMH.2 - D MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

The ECM uses an inlet manifold pressure signal to help interpret engine operating conditions and fuel requirements. The MAP sensor is mounted below the barometric sensor on a plate above the right hand rear wheelarch and is connected by hose to a vacuum rail integral with the inlet manifold and connecting with each intake tract.

Note that manifold absolute pressure is the OPPOSITE of manifold vacuum. For example, a closed throttle on engine overrun would produce a low manifold absolute pressure (high vacuum) signal. The ECM sends a 5 volt reference signal to the MAP sensor, and by measuring the sensor output voltage is able to calculate manifold pressure.

High manifold pressure produces a high sensor resistance for a higher fuel requirement. If the MAP sensor fails, the ECM will substitute a value and use the throttle position sensor and other sensors to control fuel delivery.



EMH.2 - E BAROMETRIC PRESSURE SENSOR

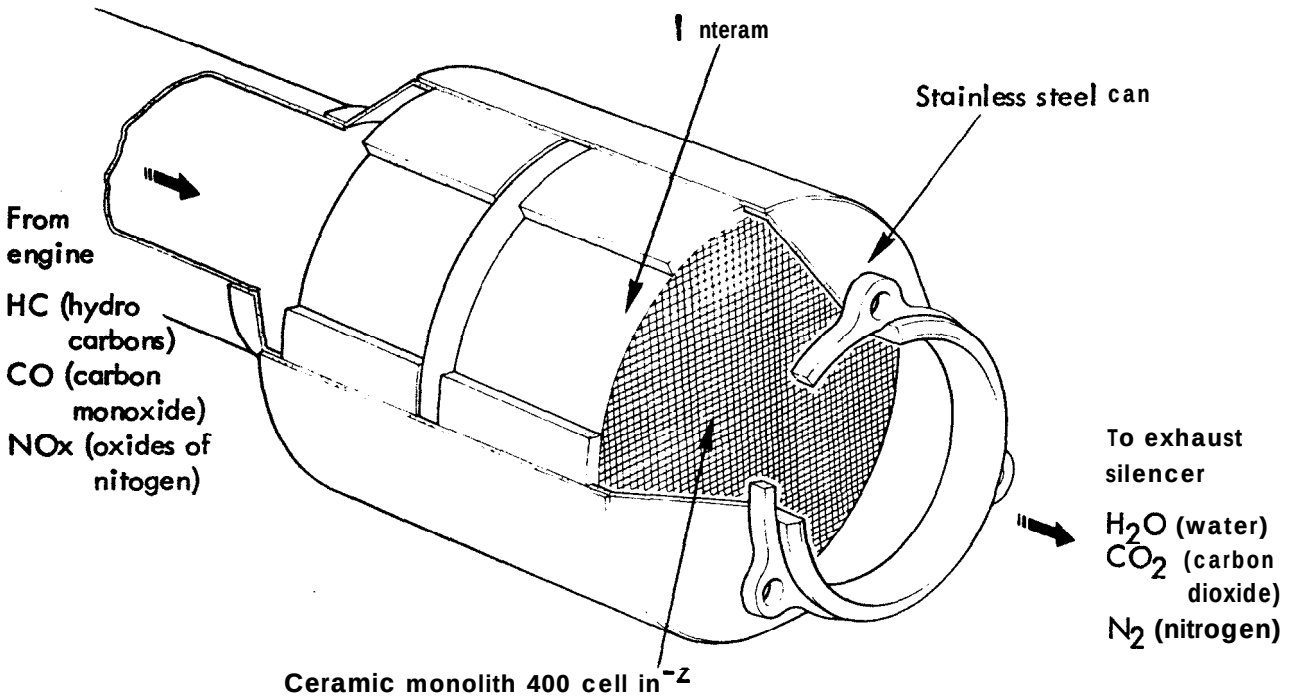
A barometric pressure signal is used by the ECM to regulate fuel delivery relative to atmospheric pressure, and to accommoda te operation of the vehicle at high altitude.

The barometric sensor is mounted above the MAP sensor on a plate above the right hand rear wheelarch. The ECM sends a 5 volt reference signal to the sensor, and by measuring the sensor output voltage is able to calculate the sensor resistance, and thereby the barometric pressure.

Low barometric pressure (high altitude) produces a low sensor resistance for a lower fuel requirement. If the barometric sensor should fail, a fixed value would be substituted by the ECM

EMH.2 - F CATALYTIC CONVERTER & EXHAUST GAS OXYGEN (02) SENSOR

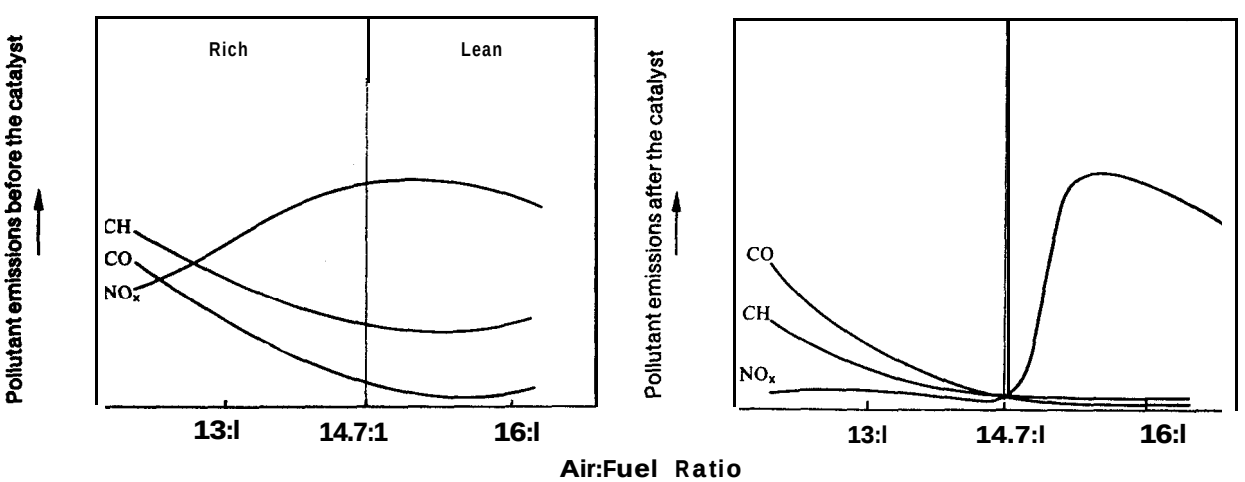
A catalytic converter is fitted into the exhaust system in order to reduce missions of the three major exhaust gas pollutants; hydrocarbons, HC; carbon monoxide, CO; and oxides of nitrogen, NOx. A 'three way' catalytic converter is used, which contains two oxidizing catalysts and a reducing catalyst. A catalyst accelerates a chemical reaction without changing its own properties. The two oxidizing catalysts, platinum and palladium use the presence of oxygen in the exhaust gas to convert HC and CO to water vapour and carbon dioxide. In order for this reaction to be efficient, a minimum amount of oxygen is necessary in the exhaust gas. The leaner the mixture supplied to the engine, the more



oxygen in the exhaust gas, and the richest air/fuel ratio which supplies sufficient oxygen is 14.7:1.

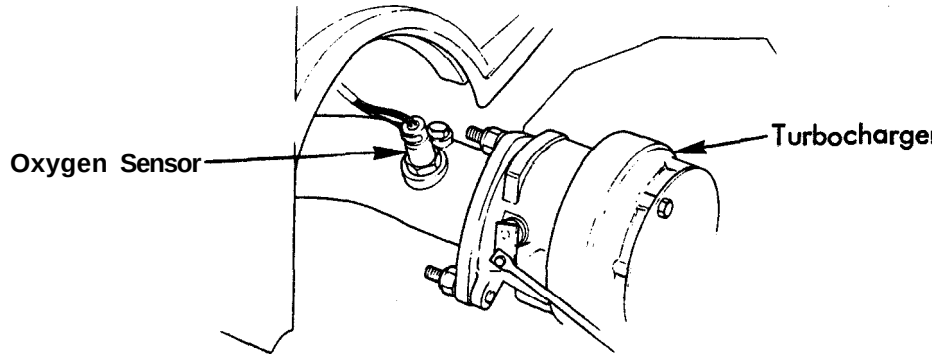
The reducing catalyst is rhodium, which helps remve oxygen from NOx to leave nitrogen. Fbr this to occur efficiently, the leanest air/fuel ratio is 14.7:1.

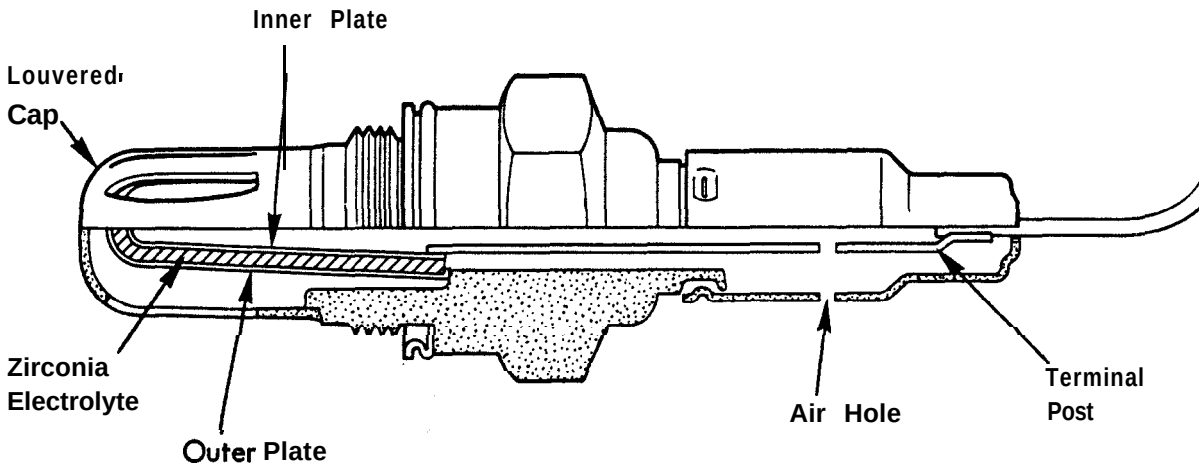
Therefore it can be seen that to maintain a high conversion efficiency of the Hc, Co and NOx, the air/fuel ratio must be maintained as closely as possible to 14.7:1. This ratio, sometimes called the 'stoichiometric ratio', permits efficient combustion with minimum fuel consumption and maximum driveability.



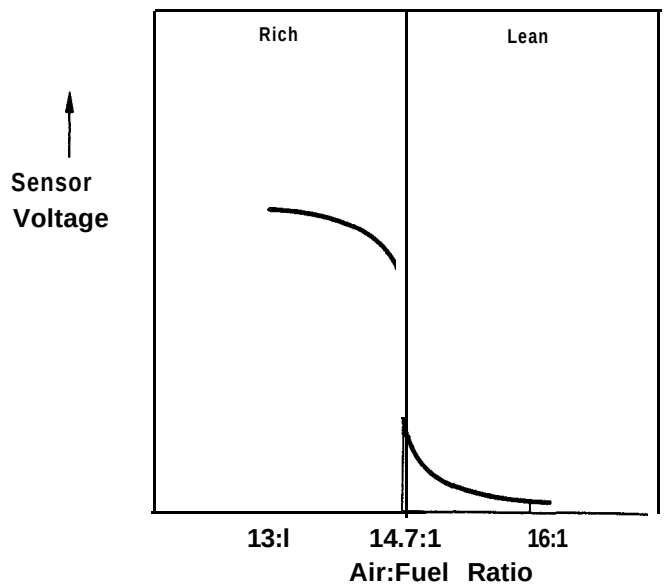
In order to gauge the air/fuel ratio being supplied to the engine, an oxygen (02) sensor is fitted into the exhaust outlet pipe from the turbocharger. This sensor consists of a zirconia electrolyte sandwiched between two platinum plates, with a louvred protective cap. One plate is in contact with the outside air, and the other with the exhaust gas. The difference between the number of oxygen ions which build up on each plate give rise to a voltage being developed

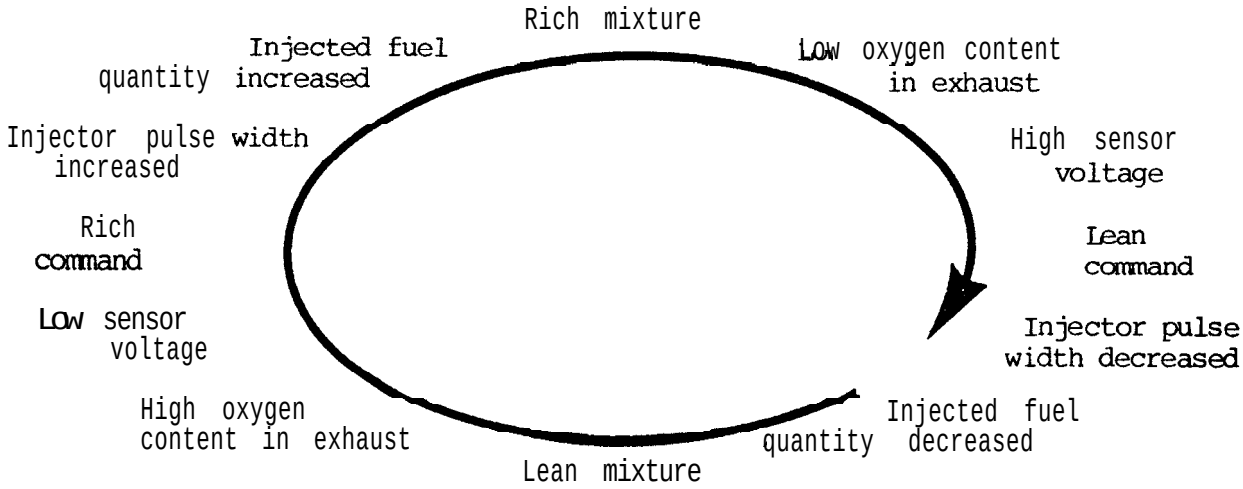
across the plates which varies from around 100 to 900 millivolts dependent on the oxygen content of the exhaust. If the air/fuel ratio is rich (less exhaust oxygen) the sensor voltage will be high, and if the air/fuel ratio is lean, the sensor voltage will be low.





The sensor characteristic is designed to produce a large voltage difference at an air/fuel ratio of 14.7:1 so that the ECM can determine whether the mixture being supplied is too rich or too lean, and the correction command necessary.



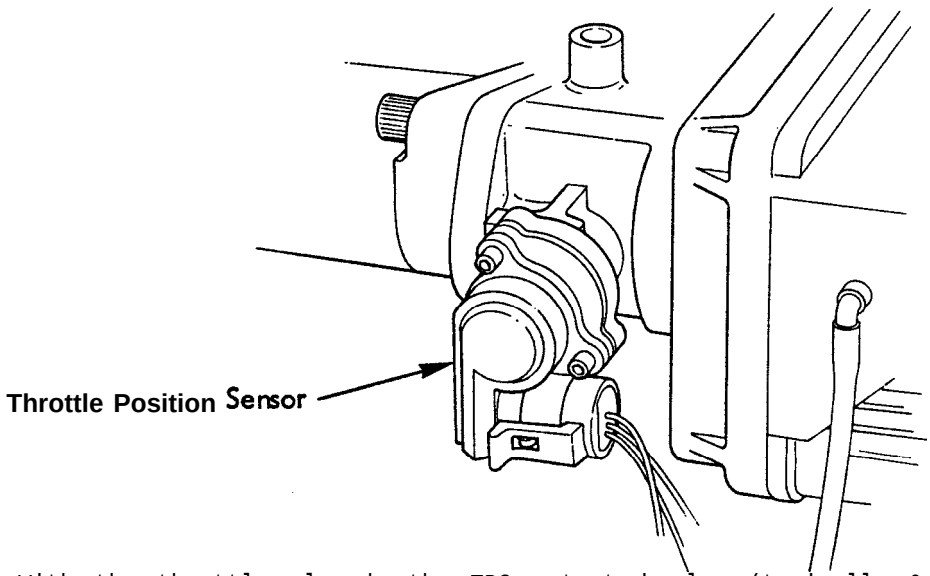


low 02 voltage (lean mixture) = rich command
high 02 voltage (rich mixture) = lean command

See also section EMH.2 - J.

EMH.2 - G THROTTLE POSITION SENSOR (TPS)

The throttle position sensor is a potentiometer fitted to the rear end of the throttle spindle on number 4 throttle body. The ECM supplies 5 volts to the sensor and by montoring the voltage on a returning signal line, the ECM is able to determine throttle position and calculate the fuel requirement.



With the throttle closed, the TPS output is low (typically 0.5 volt), but increases as the throttle is opened until at wide open throttle, output voltage is typically 4.5 volts. This signal is one of the most important inputs used by the ECM for fuel control and for many of the ECM controlled outputs. If a fault is detected and a trouble code set, the ECM will substitute an artificial default value for the TPS signal to enable the vehicle to 'limp hone'. This mode may result in a high idle speed.

EMH.2 - H AIR CONDITIONING & RADIATOR FAN CONTROL

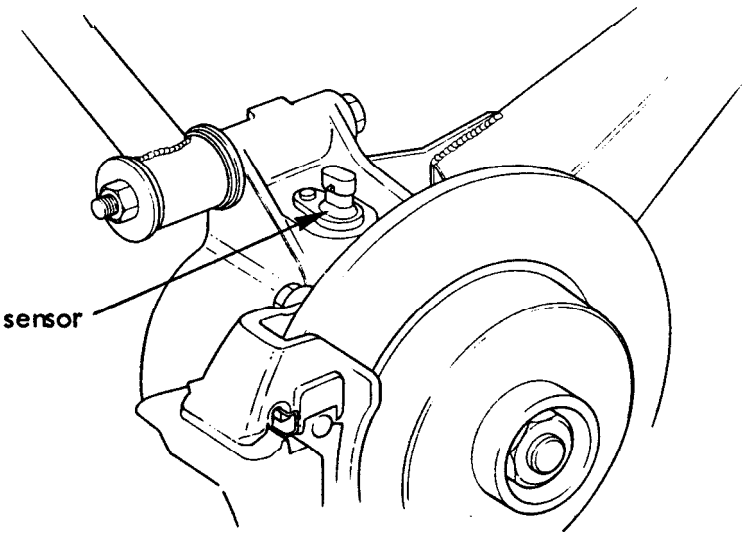
When the air conditioning is switched on, the ECM receives the signal from the thermistor control unit requesting operation of the compressor. Before energising the a/c compressor, the ECM first amends the idle speed setting via the idle air control valve to compensate for the extra loading on the engine. The radiator fans (3 off) are energised to cool the condenser whenever the compressor is operating.

Some engine operating conditions will override the a/c request signal and switch off the air conditioning. These include: engine speeds below idle to help prevent stalling: wide open throttle to make available full engine power: near maxim vehicle speed to increase engine cooling system margins: low coolant temperature to improve driveability.

The three radiator fans are energised by the ECM at approximately 90°C coolant temperature as sensed by the coolant tenperature switch in the inlet manifold water jacket. The fans are also switched on when the a/c compressor is operating (at speeds below 35 mph) to cool the condenser, and as an engine safety precaution, whenever the 'check engine' tell tale lamp indicates that a fault has been detected. The fans will not operate if battery voltage is sensed as being too low.

EMH.2 - I VEHICLE: SPEED SENSOR (VSS)

Vehicle speed information is supplied to the ECM by the vehicle speed sensor which is a permanent magnet generator mounted on the right hand rear hub carrier. The generator, in conjunction with a toothed ring attached to the driveshaft, produces a pulsing AC voltage whenever the vehicle speed is over about 3 mph (5km/h) and which increases in value and frequency with increasing vehicle speed.

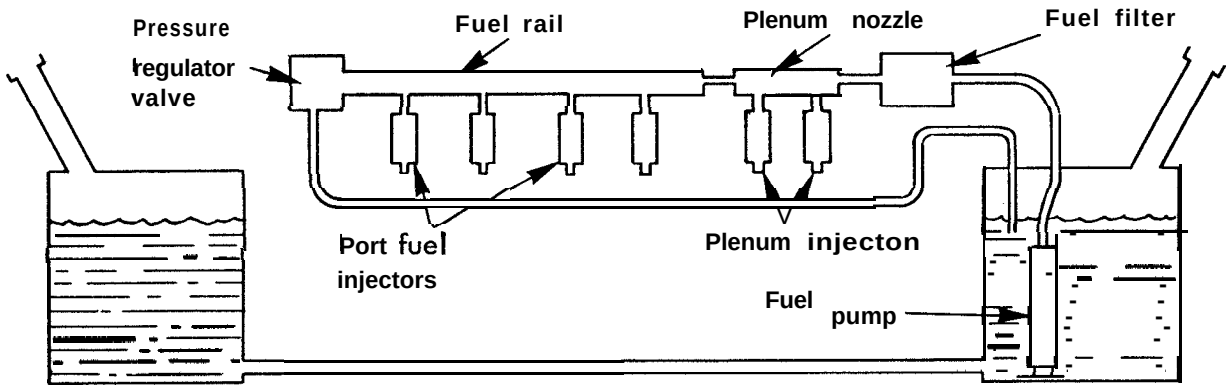


This information is used by the ECM to control the a/c and radiator fans under certain conditions (see EMH.2 - H) and the boost control solenoid valve (see EMH.2 - T).

Em.2 - J FUEL CONTROL SYSTEM

Fuel is stored in twin fuel tanks, one ahead of each rear wheel arch, with a balance pipe interconnecting the two tanks. A submerged electric pump within

the RH tank pumps fuel through an in line canister filter to the plenum air inlet nozzle. A passageway within the nozzle supplies the two auxiliary injectors with fuel before emerging at an outlet union. This union is connected with the front end of the fuel rail which supplies each of the 4 port fuel injectors. At the rear end of the fuel rail is a pressure regulator valve, which by controlling the quantity of fuel returned to the right hand tank, is able to maintain a constant pressure differential across the injectors. Fuel is thus continuously flowing around the circuit with the fuel pump supplying a quantity of fuel over and above thatrequiredatmaximumdemand. This continuous flow helps prevent high fuel temperatures and reduces the possibility of vapour locks.



The ECM pulses the port injectors in pairs (1 with 4 and 2 with 3) normally once every engine revolution, with half of the fuel necessary to each cylinder's combustion being delivered by each injector pulse.

Modes of Operation

The ECM uses voltage inputs from several sensors to determine how much fuel to deliver to the engine. The fuel may be delivered in any one of several different 'modes' with the ECM controlling which mode is appropriate according to the readings it receives from the sensors at that particular time.

Startinu Mode

When the ignition is first turned on, the ECM turns on the fuel pump relay for two seconds to pressurise the system ready for starting. The ECM also checks the coolant temperature sensor and throttle position sensor readings and determines the appropriate air/fuel ratio for starting. This ranges from approximately 0.8:1 at minus 40°C to 16.8:1 at 104°C engine coolant temperature.

The ECM controls the quantity of fuel delivered by changing the injector 'pulse width' i.e. length of time the injector is energised and opened.

Clear Flood Mode

Provision is made for clearing a flooded engine as follows:

If the throttle is held fully open and the engine cranked, the ECM will shut off the injectors completely for as long as engine speed is below approximately 650 rpm. If throttle opening becomes less than 75% the ECM returns to the starting mode.

Run Mode

The run node has two possible conditions: 'Open Loop' or 'Closed Loop'.

OPEN LOOP:

When the engine is first started, the system goes into 'Open Loop' operation.

In 'Open Loop', the ECM ignores the signal from the oxygen (02) sensor, and calculates the air/fuel ratio based on inputs from the coolant temperature and manifold absolute pressure (MAP) sensors.

The system will stay in 'Open Loop' until the following conditions are met:

i) The 02 sensor has varying voltage output, showing that it is hot enough to operate properly. (This depends on temperature.)
ii) The coolant temperature sensor is above a specified temperature.
iii) A specific amount of time has elapsed after starting the engine.

CLOSED LOOP:

The specific values for the above conditions vary with different engines, and are stored in the memory calibration module (Mem-Cal). When these conditions are met, the system goes into 'Closed Loop' operation. In 'Closed Loop', the ECM calculates the air/fuel ratio (injector on-time) based on the signal from the 02 sensor. This controls the air/fuel ratio very close to 14.7:1.

Acceleration Mode

The ECM responds to rapid changes in throttle position and manifold absolute pressure and provides extra fuel.

High Speed/Boost Mode

At engine speeds over 4,800 rpm and boost pressures in excess of 0.68 bar (10 lb/sq.in), a pair of auxiliary injectors in the intake plenum chamber, supply additional fuel to the engine and augment that from the port injectors.

Deceleration Mode

The ECM responds to changes in throttle position and manifold pressure and reduces the amount of fuel. When deceleration is very rapid, the Em can cut off fuel completely for short periods.

Battery Voltage Correction Mode

When battery voltage is low, the ECM can compensate for the weak spark delivered by the direct ignition (DI) module by:

- Increasing the injector pulse width
- Increasing the idle rpm
- Increasing' ignition dwell time

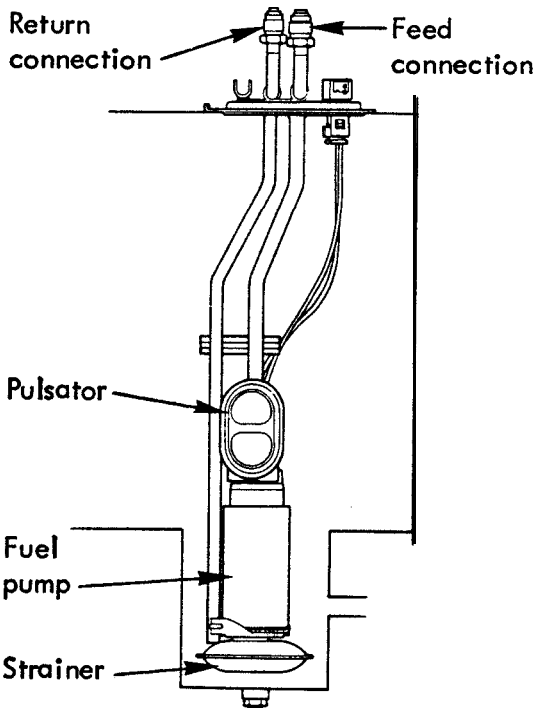
Fuel Cut-Off Mode

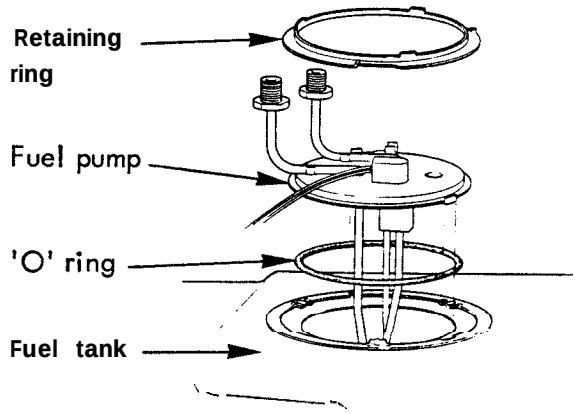
No fuel is delivered by the injectors when the ignition is 'OFF'. This prevents dieseling. Also, fuel is not delivered if no reference pulses are received from the ignition module, which means the engine is not running. This prevents flooding.

EMH.2 -K FUEL PUMP

The fuel pump is a roller vane type, high pressure electric pump mounted submerged within the RH fuel tank. The pump supplies fuel at a pressure of 211 - 379 kPa (30.5 - 55 psi) dependent on operating conditions, through an in line filter located at the right hand front of the engine bay, to the fuel rail assembly.

A fuel strainer is attached to the fuel pump inlet line and prevents dirt particles from entering the fuel line and tends to separate water from the fuel. A pulsator is fitted above the fuel pump and is connected to its outlet line to





reduce pressure pulsations in the supply line. The whole assembly of pump, strainer and pulsator is fixed by the supply and return pipes, to a mounting plate secured by cam ring to the top face of the RH tank. The pump is able to deliver 4 - 5 times the engine's maximum requirement, so that fuel is constantly circulated through the in-line fuel filter, plenum nozzle, fuel rail, and via the fuel pressure regulator, back to the RH tank. This fuel circulation helps avoid excessive fuel temperature with the consequent risk of vapour locks.

When the ignition is switched on, the ECM energises the fuel pump which will continue to run for as long as the ECM receives ignition pulses from the ignition Mule (engine cranking or running). If no ignition pulses are received, the ECM switches off the pump either 2 seconds (approximately) after the ignition was switched on, or about 10 seconds after a stall.

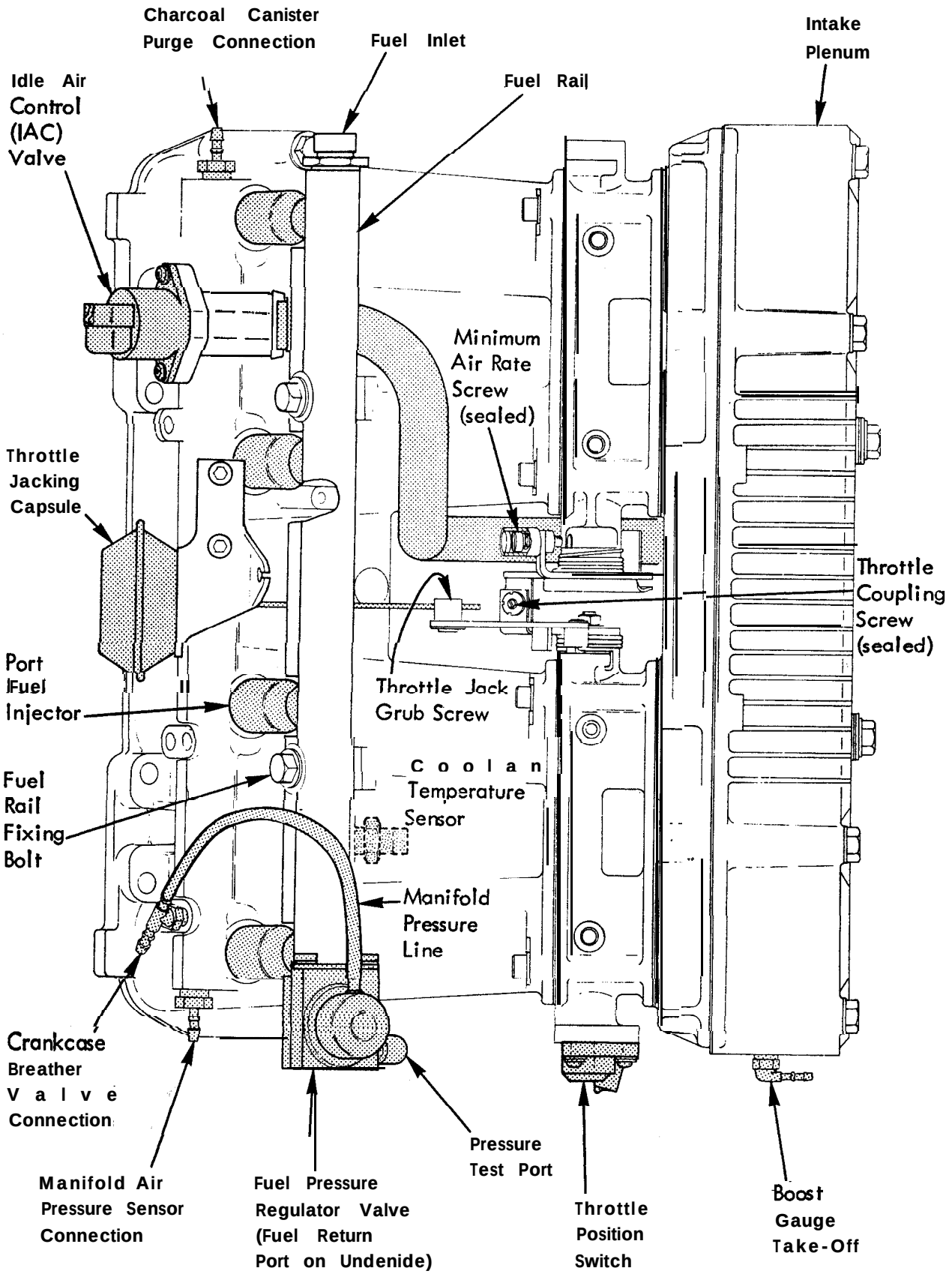
ENH.2 - L FUEL RAIL & PRESSURE REGULATOR

The cast aluminium fuel rail receives fuel at its forward end (via the plenum nozzle) and supplies all four injectors with fuel, the pressure of which is controlled by the fuel pressure regulator fitted to the rear end of the rail.

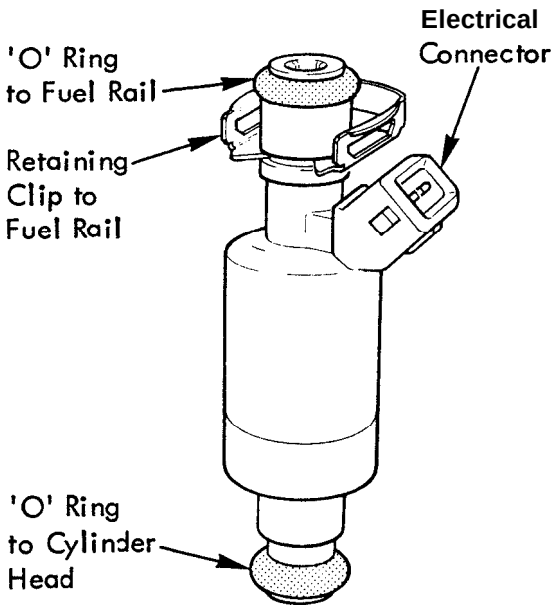
The pressure regulator assembly is a diaphragm operated relief valve with fuel pump pressure acting on one side of the diaphragm, and regulator spring pressure and intake manifold pressure on the other. The function of the regulator is to maintain a constant pressure differential across the injectors at all tines. i.e. a constant difference between fuel pressure supplied to the injector , and inlet manifold pressure at the port injector nozzle. By using an inlet manifold pressure signal to supplement regulator spring pressure in the valve, the valve is able to regulate fuel supply pressure in accordance with engine load.

The pressure regulator is not adjustable and is serviced as a complete assembly.

Inlet Manifold Assembly



EMH.2 -M FUEL INJECTORS



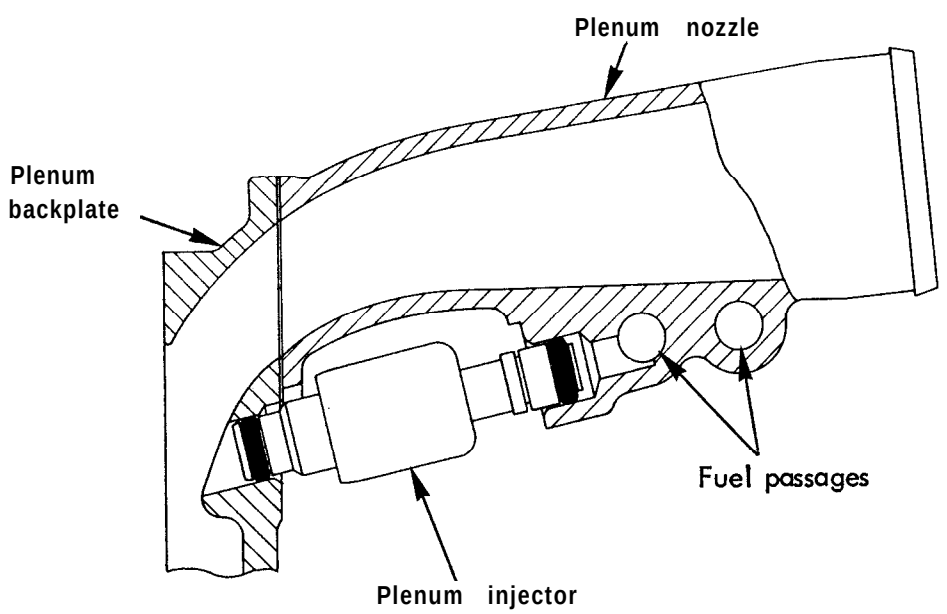
Port Injectors

The port fuel injector assembly is a solenoid-operated device, controlled by the electronic control module (ECM), that maters pressurized fuel to a single engine cylinder. The ECM energizes the low impedance (2.0 ohms) solenoid to open a normally closed ball valve. This allows fuel to flow into the top of the injector, past the ball valve, and through a recessed flow director plate at the injector outlet. The director plate has six machined holes that control the fuel flow, generating a conical spray pattern of finely atomized fuel at the injector tip. Fuel from the tip is directed at the intake valve, causing it to become further atomised and vapourised before entering the combustion chamber.

The ECM uses three injector driver circuits, with one circuit controlling port injectors 1 and 4, one controlling 2 and 3 and a third circuit controlling the two plenum injectors. Each port injector circuit pulses its two injectors simultaneously once every crankshaft revolution, with half of the fuel necessary for each cylinders combustion delivered by each injector pulse. For minimum fuel supply conditions however, such as idle, a single pulse every two engine revolutions is supplied.

The ECM receives an engine speed and crankshaft position signal twice per engine revolution from the ignition module, and uses these to trigger the 'alternate pairs' injector timing sequence. Each injection pulse occurs only when both inlet valves for that pair of cylinders, are closed.

Plenum Injectors



The two identical plenum injectors share a similar construction to the four port injectors, but are of a higher impedance (16 ohms) and lower flow rate. They may be identified by a blue clip around the top of the injector, and by the part number etched onto the injector body:

Port injector - etched with no. 5235364
Plenum injector - etched with no. 5235434 + blue clip.

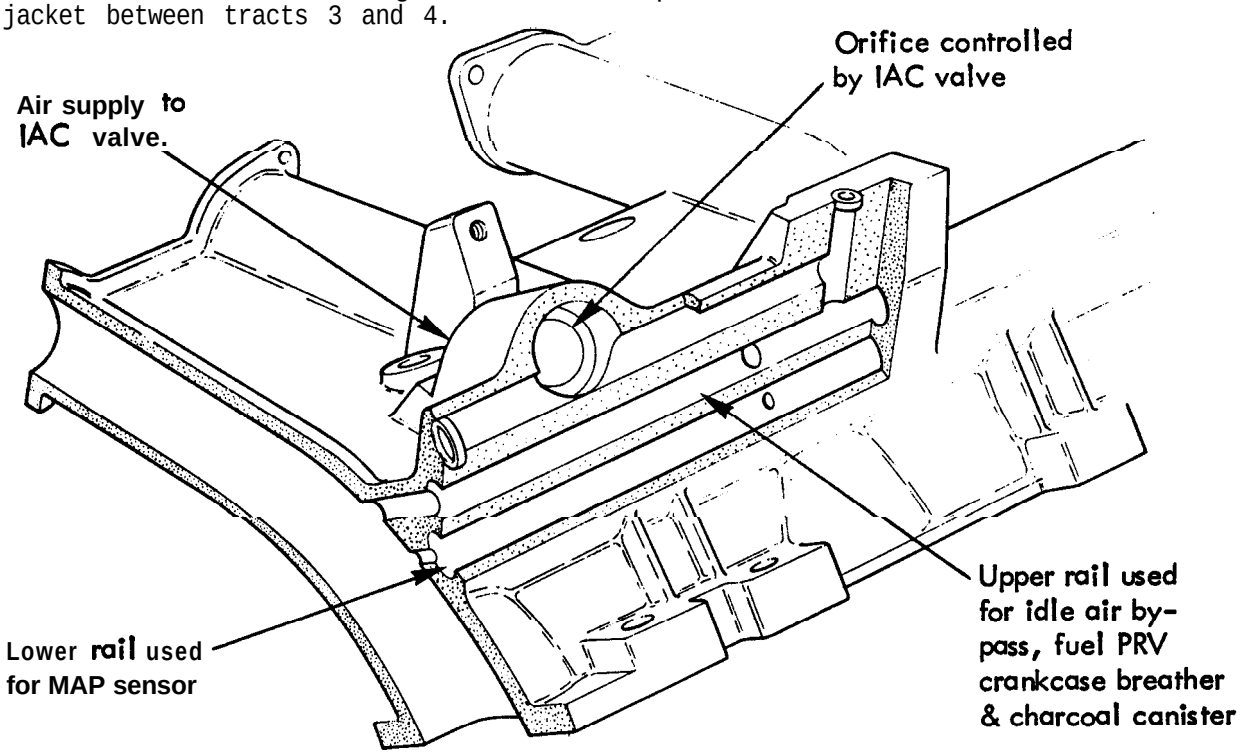
These injectors operate at a fixed frequency of 128 Hz, with the quantity of fuel delivered dependent on the ECM controlled pulse width. Injection takes place only at high engine speeds and boost pressures, with minimum values of 4,800 rpm and 0.7 bar (10 lb/sq.in). Pulse width increases as engine speed and boost pressure rise above these figures.

An engine protection system will operate if the plenum injectors fail; if a lean condition is detected while the ECM is commanding the injectors 'on', the boost control solenoid valve is de-energised to drop boost pressure to the capsule controlled maximum of 0.65 bar (9.5 lb/sq.in)

EMH.2 - N THROTTLE BODIES/INLET MANIFOLD ASSEMBLY

The Esprit Turbo engine is fitted with an intake system which uses a separate throttle valve for each of the four cylinders. Seperate throttle body assemblies for cylinders 1/2 and 3/4 are mounted on a common inlet manifold and the complete assembly is mass flowed at the factory to balance the airflow past each of the throttle plates using the interlinkage screw, throttle by-pass screws, and the throttle stop screw. These adjustments are then sealed and should not be tampered with in service.

The intake manifold uses an integral vacuum rail to provide signals for the MAP sensor, fuel pressure regulator and crankcase breather system. A similar passageway is used for charcoal canister purging, and further passages are provided for the idle air control valve. A water jacket surrounds the manifold to warm the throttle bodies and prevent icing up of the throttle plates in very cold conditions. The engine coolant temperature sensor is fitted into this jacket between tracts 3 and 4.

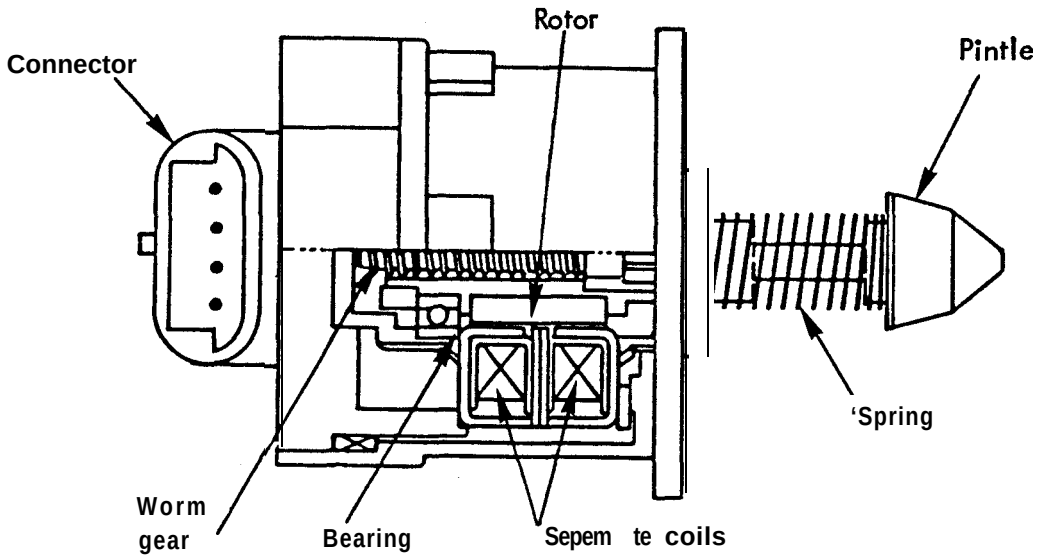


Note that the throttle stop screw alone does not control the minimum air flow rate at idle, since the idle air control (IAC) valve 'learns' what additional airflow is needed to maintain the specified idle speed.

ENH.2 - 0 IDLE AIR CONTROL (IAC) VALVE

The purpose of the idle air control (IAC) valve assembly is to control engine idle speed, while preventing stalls due to changes in engine load.

The IAC valve is mounted on the inlet manifold and controls an airway between the intake plenum (to which it is connected by hose) and the intake manifold tracts downstream of the throttle plates. By moving a conical valve (called a pintle) towards the orifice (to decrease air flow) or away from the orifice (to increase air flow), a controlled amount of air is allowed to by-pass the throttle plates. If rpm is too low, more air is bypassed around the throttle valves to increase rpm. If rpm is too high, less air is bypassed to decrease rpm.



The electronic control module (ECM) moves the IAC valve in small steps called "Counts". These can be measured by the 'Tech 1' scanner tool.

During idle, the proper position of the IAC valve is calculated by the ECM, based on battery voltage, coolant temperature, engine load, and engine rpm. If the rpm drops below specification, and the throttle valve is closed, the ECM senses a near stall condition and calculates a new valve position to prevent stalls.

The ECM "learns" the proper positioning of the IAC valve and retains this information in memory. This means that disconnecting power to the ECM can result in incorrect idle control or the necessity to partially depress the accelerator when starting. Refer to note regarding clearing memory in Section EMH.l - H.

If the IAC valve is disconnected and reconnected while the engine is running, the resulting idle rpm may be wrong, and resetting of the IAC valve will be required.

The ECM resets the IAC valve by seating it (fully extended) to establish the zero count position and then drawing it back to the desired position. This will occur only once during each ignition cycle, when vehicle speed increases above 20 mph on moderate acceleration. The IAC valve will not be reset again until the ignition has been turned "OFF", the engine restarted and the car then driven above 20 mph. When servicing the IAC valve, it should only be disconnected or

connected after the ignition has been off for at least 10 seconds. This allows time for the ECM to move the IAC valve to the 170 count position where it is "parked" while the ignition is "OFF". If this procedure is not followed, the ECM will lose track of IAC valve position resulting in starting or idle control problems.

EMH.2 - P DIRECT IGNITION (DI)

The Direct Ignition (DI) system does not use the conventional distributor and coil. This ignition system consists of two separate ignition coils and an ignition module mounted on a base plate.

A crankshaft sensor, related connecting wires, and the electronic spark timing (EST) portion of the ECM make up the remainder the the system.

A distributorless ignition system, such as this one, uses a "waste spark" method of spark distribution. Each cylinder is paired with its opposite number (i.e. 1 with 4 and 2 with 3) with each pair of plugs being connected to a single, double-ended coil such that a spark occurs simultaneously in the cylinder coming up on the compression stroke and in the cylinder coming up on the exhaust stroke.

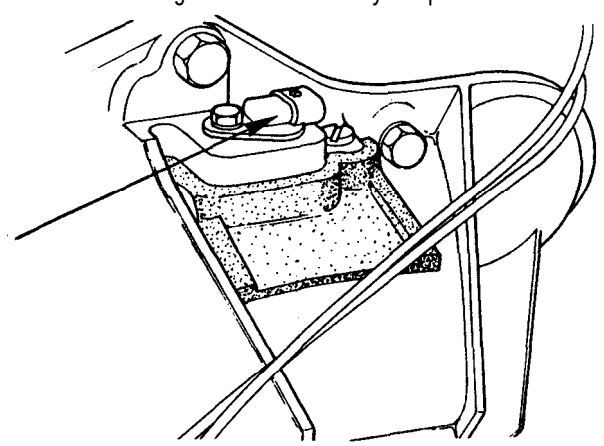
The cylinder on the exhaust stroke requires very little of the available energy to fire the spark plug. The remaining energy will be used as required by the cylinder on the compression stroke. The same process is repeated when the cylinders reverse roles.

Because of the direction of current flow in the primary winding and thus, in the secondary winding, one plug fires from the centre electrode to the side electrode while the other fires fran side electrode to centre electrode.

It is possible in a no load condition for one plug to fire even though the 'spark plug lead from the same coil is disconnected from the other spark plug. The disconnected spark plug lead acts as one plate of a capacitor, with the engine being the other plate. These two "capacitor plates" are charged as a current surge (spark) jumps across the gap of the connected spark plug. The "plates" are then discharged as the secondary energy is dissipated in an oscillating current across the gap of the spark plug still connected.

Ezm.2 - Q FLYWHEEL SENSOR

A magnetic sensor mounted in the top of the clutch housing and protruding to within 1.5 mm of the flywheel rim, has a voltage pulse induced in it each time a machined slot in the flywheel periphery passes the sensor. There are 6 such slots equi-spaced (60° apart) around the flywheel rim, phased such that one slot passes the sensor when pistons 1/4 are at TDC. A seventh slot, positioned at 10° before the next slot, serves to generate a 'sync-pulse'.

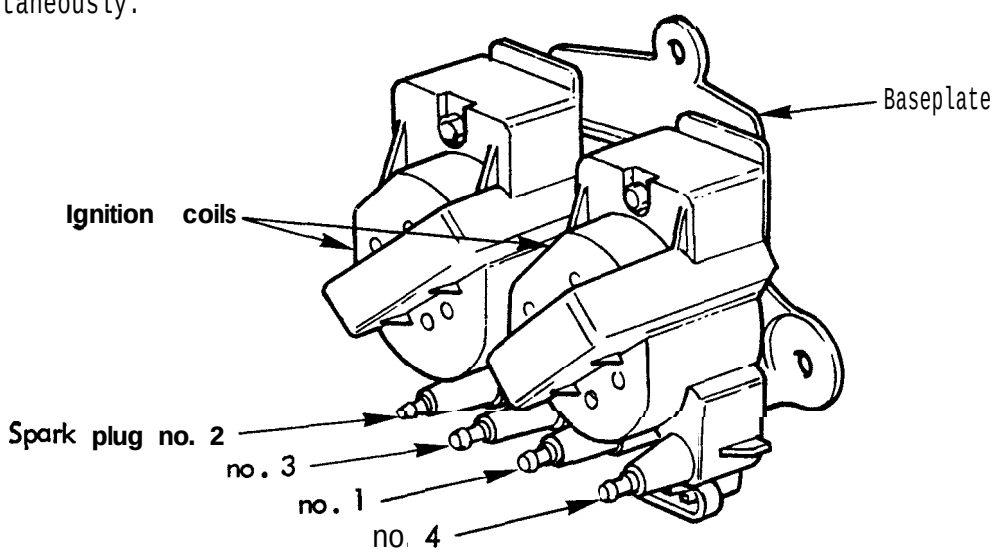


These pulses are received by the ignition module (located with the ignition coils) which by noting the frequency of the pulses is able to determine engine rpm, and by comparing the tin-e interval between individual pulses can recognise the positional 'sync' pulse. The ignition module uses this information to control ignition timing during engine cranking and also sends reference signals to the ECM at the rate of one every 180° of crankshaft rotation (2 per engine revolution).

These'signals inform the ECM of engine speed and position, which it uses to control fuel delivery and, at speeds over 700 rpm, the ignition timing.

EMH.2 -R IGNITIONMODULE & HT COILS

The ignition module and HT coils are mounted as a unit to a chassis bracket at the RH side of the engine bay. Each coil provides the spark for two plugs simultaneously.



The ignition module monitors the flywheel sensor signals and sends reference signals to the ECM so that correct spark and fuel injector control can be maintained during all driving conditions. During cranking, the ignition n-cdule monitors the 'sync-pulse' to begin the ignition firing sequence and below 700 rpm the module controls spark advance by triggering each of the two coils at a pre-determined interval based on engine speed only.

Above 700 rpm the ECM controls the spark timing (EST) and compensates for all driving conditions. The ignition module must receive a 'sync-pulse' and then a flywheel signal in that order to enable the engine to start.

EMH.2 - S ELECTRONIC SPARK TIMING (EST)

The electronic spark timing function is incorporated into the ECM 'Mem-Cal' cartridge. The ignition module sends a square wave signal, generated from the flywheel sensor pulses, to the ECM which interprets engine speed and crankshaft position. While the engine is being cranked, the ignition module controls spark timing. This is referred to as Bypass Timing Mode because the ignition module 'bypasses' the ECM. When engine speed exceeds 700 rpm the ECM applies a 5 volt signal to the module which then switches spark timing control from the module to the ECM.

In this mode the ECM uses various sensor inputs to determine the optimum

ignition timing and sends a square wave signal to the ignition module which then triggers the ignition coils.

If a fault is detected. in the EST circuit, a trouble code will be set, and the ignition module will switch into bypass mode to enable the engine to continue running, albeit with reduced performance.

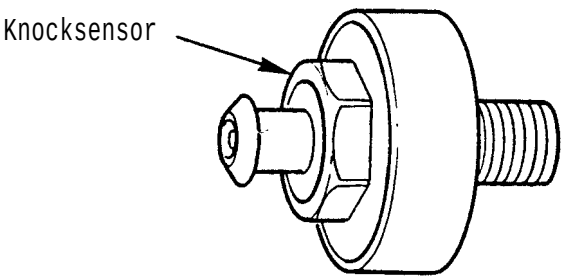
JIMH.2 -T ELECTRONIC SPARK CONTROL (ESC) & BOOST CONTROL

This system comprises an engine 'knock' sensor mounted in the right hand side of the cylinder block, a turbo boost control solenoid valve, and an ESC module which is incorporated into the ECM 'Mem-Cal' cartridge.

The ignition timing required for optimum performance can lead, under certain operating conditions, to detonation of the fuel mixture in the combustion chamber, causing excessive heat and pressures and a characteristic 'knocking' noise. If allowed to continue unchecked, major engine damage can occur. The FSC system allows the engine to adhere as closely as possible to the optimum ignition timing and turbo boost settings without a damaging level of detonation. When the knock sensor detects the onset of detonation, the ECM first rapidly retards ignition timing to a safe level, and then progressively advances ignition until detonation is again detected (if at all), and the cycle repeats. If however, retarding the ignition does not stop the detonation, the ECM also rapidly reduces boost pressure before slowly allowing it to build up again.

Knock Sensor

The knock sensor is mounted in the cylinder block and is able to identify the detonation 'knocking' noise and produce and AC output voltage which increases with the severity of the knock. The ECM monitors this signal and adjusts the electronic spark timing (EST) and boost pressure as necessary to reduce detonation to a safe level.



Boost Control Solenoid Valve

The turbo boost control solenoid valve is located in the engine bay relay box and is fitted in the turbo wastegate capsule control pressure line. When the solenoid valve is de-energised, the control pressure line is intact and the wastegate capsule controls maximum boost pressure to 0.65 bar (9.5 lb/sq. in.). If the solenoid valve is energised the wastegate capsule is vented to atmosphere so that the capsule spring acts to keep the wastegate closed at all times.

The solenoid valve functions as a frequency valve, which is switched by a square wave signal of constant frequency (32 Hz) but varying pulse width (Pulse Width Modulation). The proportion of time for which the valve is energised controls the amount of 'extra' boost that may be developed before the wastegate opens. The operation of the valve is inhibited both at cold and at excessively hot engine coolant temperatures. At throttle angles below 75%, the control pressure line is intact (solenoid de-energised) with boost limited by the capsule to 0.65 bar (9.5 lb/sq.in)

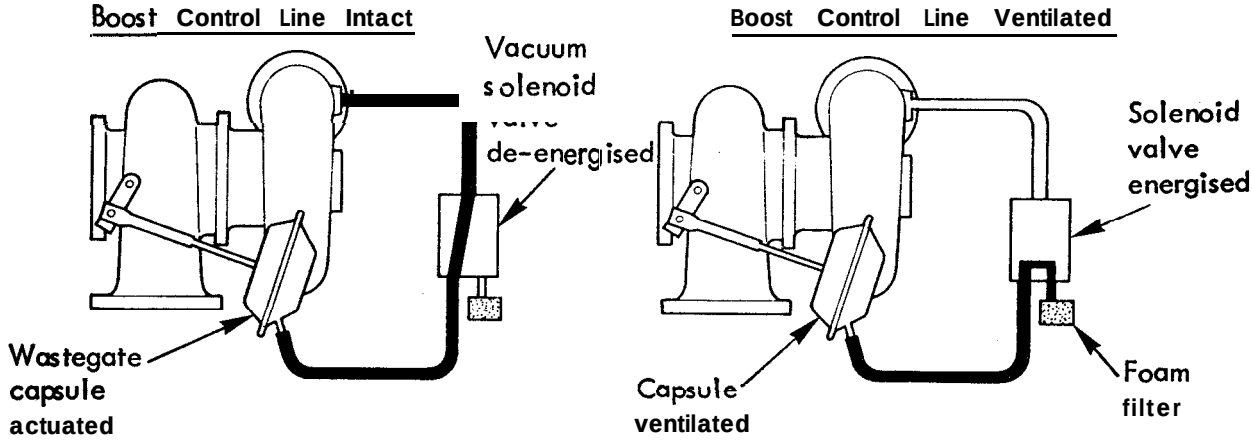
At coolant temperatures between 75°C and 115°C, and at throttle angles greater than 75%, the solenoid valve is activated and the pulse width modulated to allow up to 0.84 bar (12 lb/sq.in) of boost to be developed. Under wide open throttle transient conditions, a short duration of additional boost up to 1.00 bar (14.7 lb/sq.in) may occur.

The ECM will reduce pulse width to lower boost pressure if the knock sensor detects detonation (see above). As an engine safeguard, in case of a boost control system failure, the ECM will shut off the fuel pump and ignition if boost pressure in excess of 1.01 bar (15 lb/sq.in) is detected for more than three seconds. Fuel and ignition are reinstated below 0.61 bar (9 lb/sq.in).

All quoted pressures are approximate and at sea level.

The boost control system is an open loop adaptive system, whereby the solenoid valve pulse width to be used at any particular time is taken from a set of calibration tables, with functions of barometric pressure, throttle position and engine speed. The actual boost pressure is then measured and compared with that demanded. Any error between demanded boost and actual boost is corrected, and the correction value recorded and stored in a table in the ECM memory. This correction table is used next time those operating conditions are mat to speed the attainment of the correct pulse width for the required boost pressure. This 'adaptive' method maintains accurate control of boost pressure. If the power supply to the ECM is interrupted, the correction table in the memory will be erased, and must be re-learned in the course of normal driving.

Note that because the ECM monitors boost pressure via the MAP sensor, maximum boost pressure is controlled to absolute values which are independent of atmospheric pressure. For this reason, the maximum readings of the boost gauge in the instrument panel will tend to rise with increasing altitude and decreasing atmospheric pressure.



EMH.2 - u EVAPORATIVE EMISSION CONTROL SYSTEM (EECS)

This system uses a charcoal canister to absorb fuel vapours from the fuel tanks when the vehicle is not operating. When the engine is running, the fuel vapour is purged from the charcoal by a flow of air through the unit, which is then cons& in the normal combustion process.

Vapour Canister

This is located at the RH rear of the engine bay, beneath the cooling system headertank. Fuel vapour from both fuel tank filler necks is routed via a roll-over valve (to prevent fuel spillage if the car is inverted) to the canister port labelled 'tank'. Any liquid fuel collects in a reservoir in the bottom of the canister to protect the integrity of the carbon bed above. Ambient air

enters the canister through an air tube in the top and mixes with the vapour before being drawn through the controlling solenoid valve into the intake manifold.

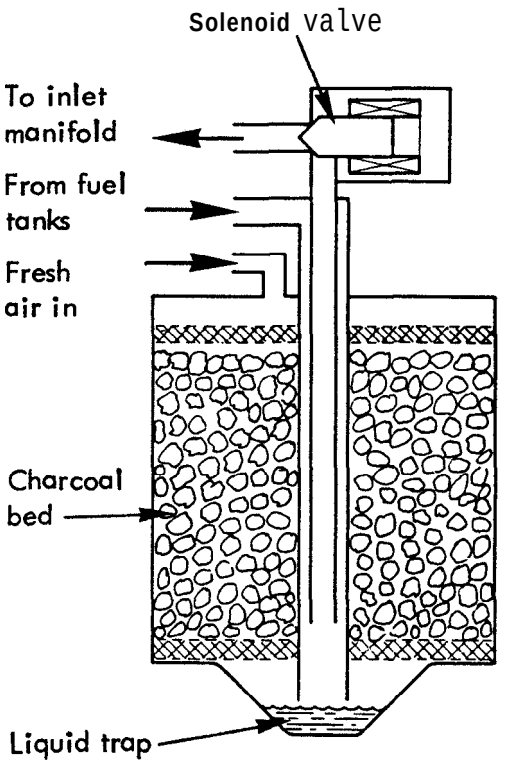
Control System

A solenoid valve mounted on top of the canister and controlling the purge line, uses pulse width modulation to control purge. This signal is supplied by the ECM which opens and closes the normally closed solenoid valve many times a second.

Under cold engine or idle conditions, the solenoid valve remains closed and no purging takes place. The ECM energises the solenoid valve and allows purging when:

i) the engine is warm
ii) the engine has been running for a specified period of tine.

The pulse width of the solenoid valve signal is controlled by the ECM, which uses various sensors including an exhaust oxygen (02) signal to determine the quantity of vapour which may be fed into the engine under the operating conditions at that time.

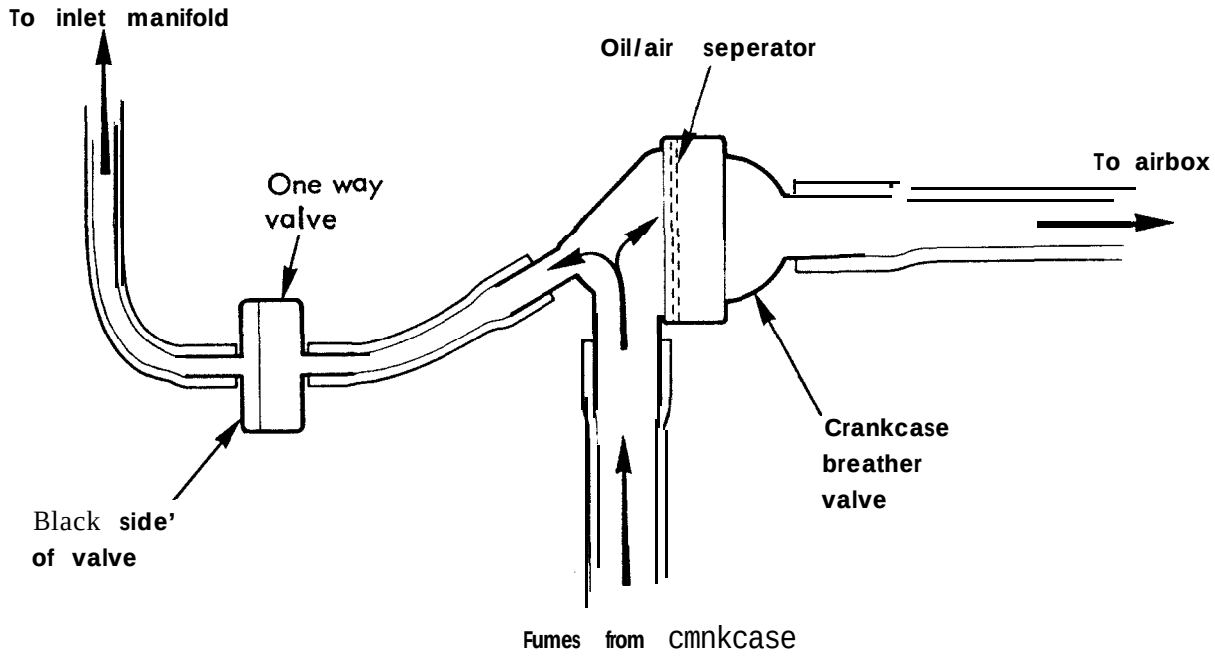


EMH.2 - V CRANKCASE BREATHER VALVE

The crankcase breather valve is green in colour and is connected between the crankcase breather spigot at the rear of the block, and the airbox. It contains and oil/air separator.

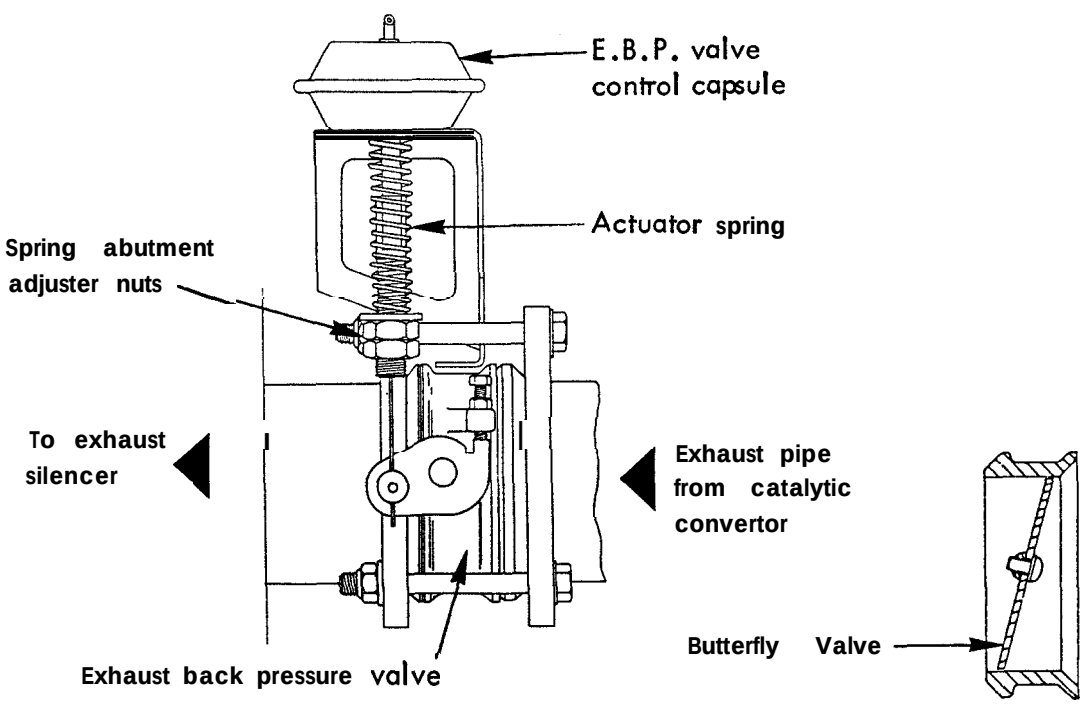
Crankcase emissions developed during normal running are able to vent through the breather valve into the airbox, from which they are drawn into the engine and consumed in the normal combustion process. In order to prevent these fumes, under low airflow engine idle conditions, escaping though the inlet trunking to atmosphere, the crankcase side of the valve is also connected via a small bore hose to the inlet manifold. This enables the small quantity of crankcase fumes developed at idle to pass directly into the manifold and suppresses the flow of fumes through the valve to the airbox.

A one way (non-return) valve is fitted into the bleed line between valve underside and manifold to prevent reverse flow when manifold pressure exceeds crankcase pressure. The black side of the valve must be fitted towards the manifold.



EMH.2 - W EXHAUSTBACK PRESSUREVALVE & THROTTLE JACK

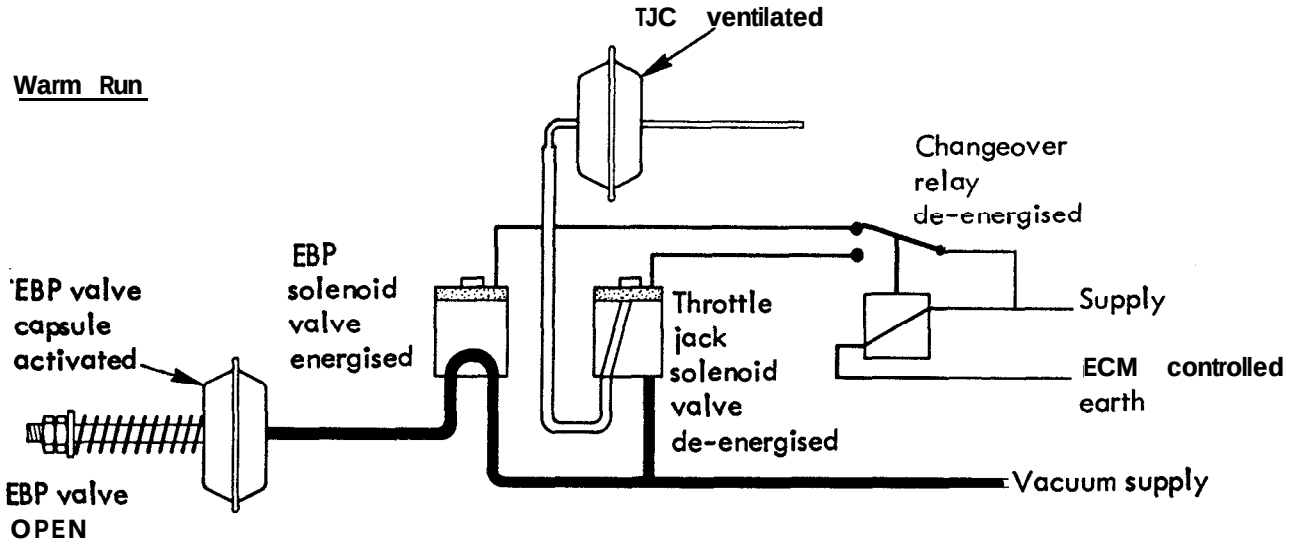
The exhaust back pressure valve is a butterfly valve fitted between the catalytic convertor and silencer. Its purpose is to restrict exhaust gas flow on a cold engine and speed the warm-up cycle to achieve good driveability and low emissions in the minimum time. The valve is sprung to the closed position and when operating, the spring loading is balanced against the exhaust back pressure which tries to open the valve. When a vacuum pump feed is applied to its vacuum capsule, the valve is held fully open.

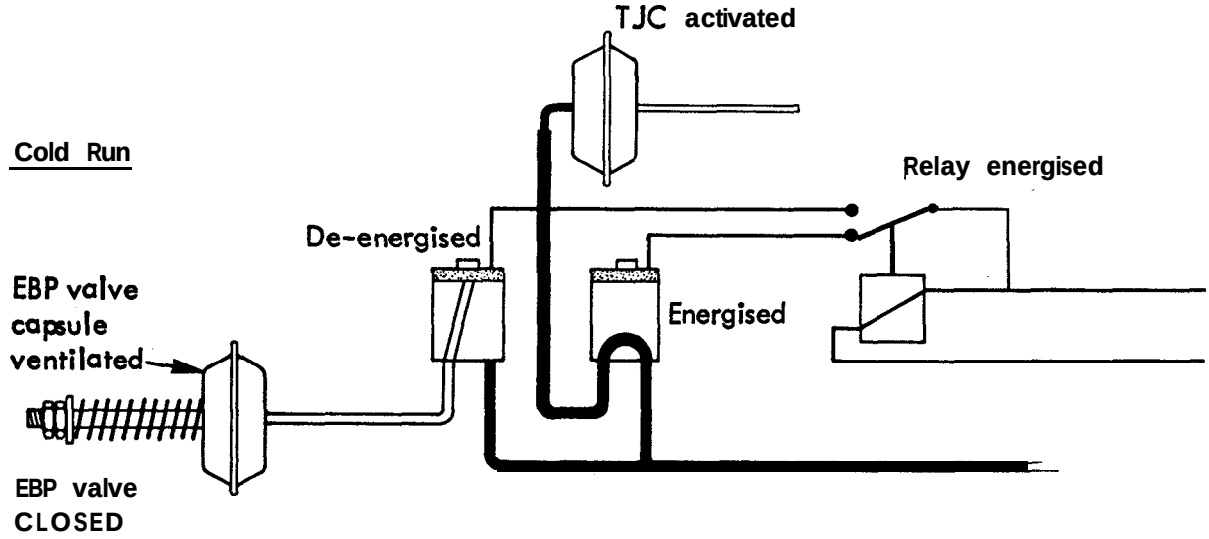


In order to maintain engine idle speed when the exhaust back pressure valve is closed, a throttle jacking capsule is provided. The capsule, mounted on a bracket fixed to the inlet manifold, is connected by rod to the throttle linkage such that when a vacuum is applied to the capsule, the throttle is opened sufficiently to compensate for the restricted exhaust and enable the engine to idle.

The vacuum pump feed to both the back pressure valve and throttle jacking capsule is controlled by two vacuum solenoid valves located in the engine bay relay box. When each valve is energised a vacuum feed is supplied to that component. The two solenoid valves are controlled by the ECM via a changeover relay, such that when the back pressure valve solenoid is energised (vacuum supplied, EBP valve opened) the throttle jacking solenoid is de-energised (no vacuum supplied, no throttle jacking) and vice versa.

The ECM uses signals from various sensors in order to open the back pressure valve during engine cranking, and close the valve during cold running until the engine has warmed sufficiently. In order that full vehicle performance may be available when necessary however, the valve may be opened by vigorous driving techniques.





SECTION EMH.3

COMPONENT DIAGNOSIS & REPLACEMENT PROCEDURE

EMH.3-A ELECTRONIC CONTROL MODULE

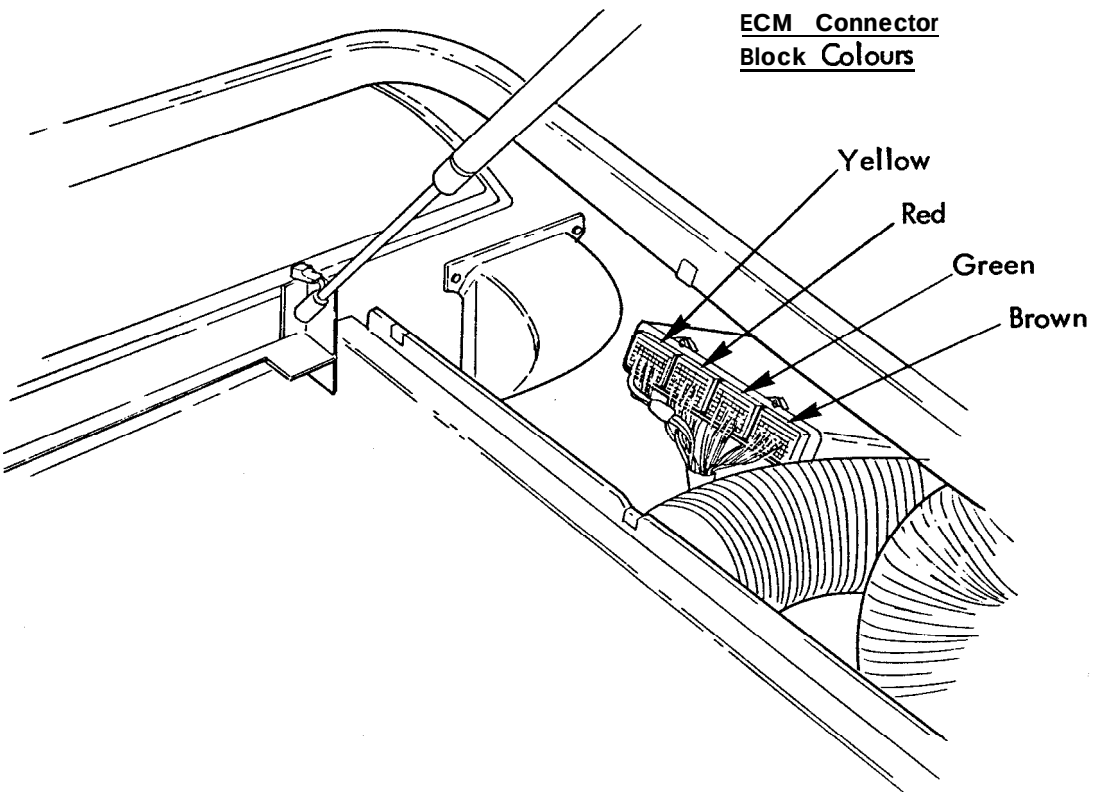
On the Lotus Esprit Turbo, the Electronic Control Module (ECM) is serviced only as a complete assembly, including the Mem-Cal cartridge. The Mem-Cal is not serviced as a seperate item, but only as part of the sealed ECM assembly. The Mem-Cal access cover on the ECM is sealed at the factory, and if the seal is broken, the engine warranty is invalidated.

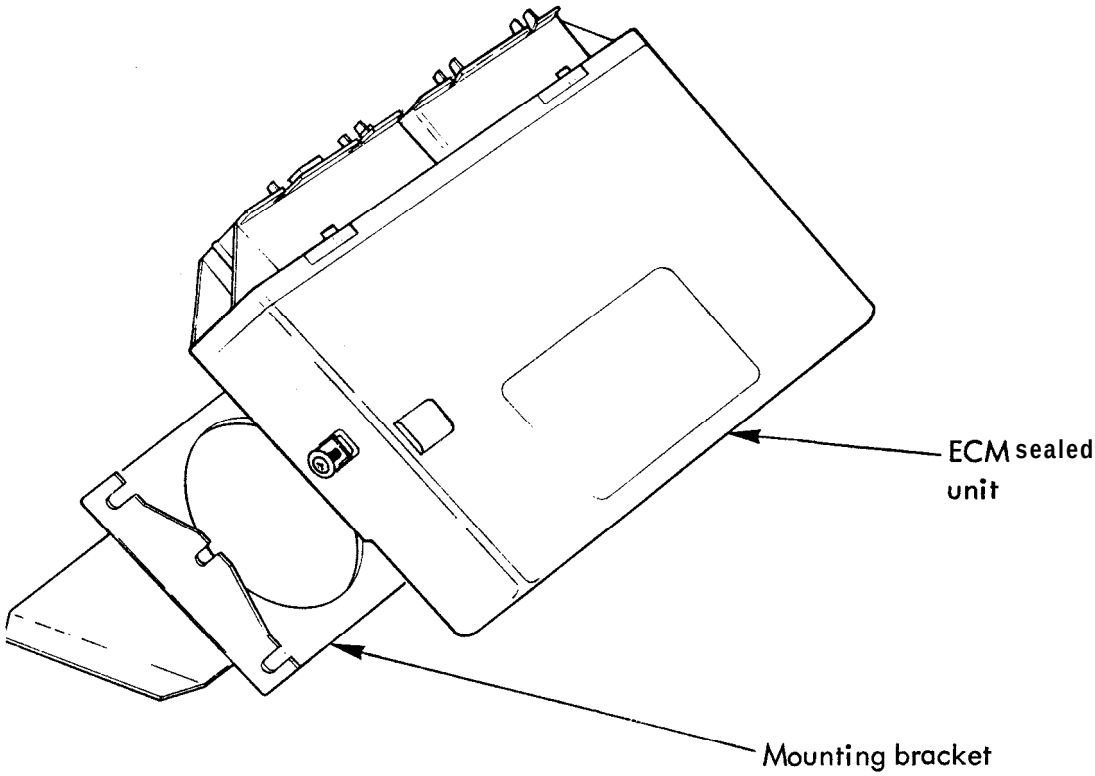
A trouble code 51 indicates that the ECM is not receiving correct data from the Mem-Cal. The complete ECM sealed assembly should be replaced.

Caution: To prevent internal ECM damage, the ignition must be "OFF" when disconnecting or reconnecting power to ECM (for example, battery cable, ECM pigtail, ECM fuse, jumper cables, etc.). The ignition should be "OFF" for at least 10 seconds before disconnecting power to the ECM so the IAC valve has tine to move to engine "OFF" position.

Replacement of ECM/'Mem-Cal' Assembly

1. Ensure ignition is switched off for at least 10 seconds before disconnecting negative battery lead.
2. Remove the RH rear quarter window trim panel.
3. Release all harness connectors from the ECM and remove the ECM from its mounting bracket.
4. Refit the ECM to its mounting bracket, fit the quarter window trim panel and reconnect battery.





*Functional Check

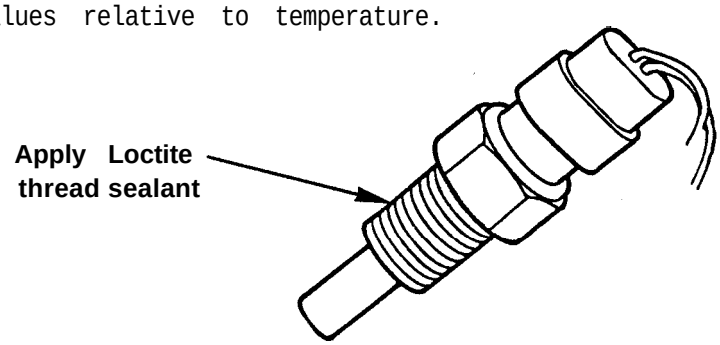
Turn on ignition and enter diagnostics. Code 12 should flash at least 3 times (if no other codes are present). This indicates that the ECM and Mem-Cal installed correctly and functioning.

If trouble codes 42, 43 or **51** are displayed, or if the 'check engine' light comes on constantly with no codes, the ECM should be considered defective and replaced.

EMH.3 - B ENGINE COOLANT TEMPERATURE SENSOR

The coolant temperature sensor is fitted in the inlet manifold water jacket, beneath and between tracts 3 and 4.

A 'Tech 1' scanner tool displays the engine temperature in degrees Celsius. After the engine is started, the temperature should rise steadily to about 82°C then stabilise when the thermostat opens. If the engine has not been run for several hours (overnight) the coolant temperature and MAT temperatures should be close to each other. A fault in the coolant sensor circuit should set a Code 14 or **15.** The code charts in section EMH.4 also contain a chart to check for sensor resistance values relative to temperature.



To Replace

Drain sufficient coolant to empty manifold water jacket, release electrical connector and unscrew from manifold.

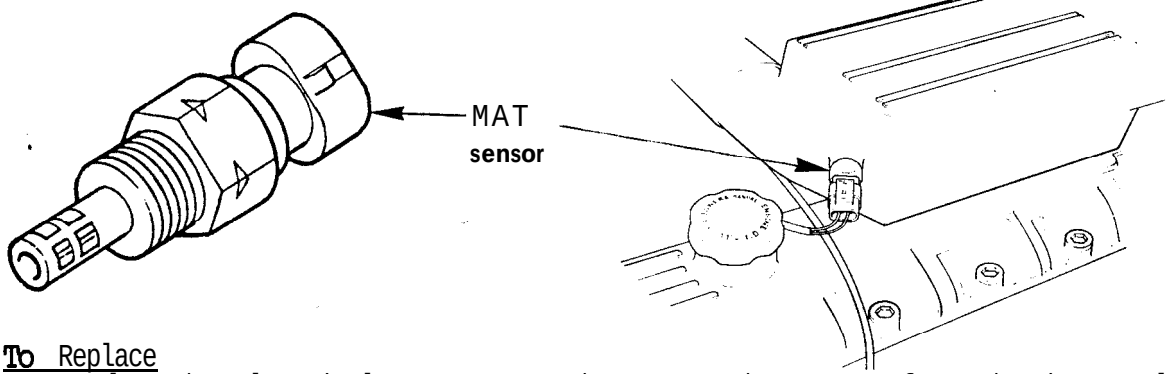
Note: Take care when handling the sensor as any damage may seriously affect the operation of the engine management system.

Before refitting a sensor, apply Loctite thread sealant only to the thread, (pre-applied on a new sensor) carefully fit into the manifold, and torque tighten to 20 Nm (15 lbf.ft). Refit electrical connector and refill with the approved coolant mixture.

EMH.3 -C MASS AIR TEMPERATURE (MAT) SENSOR

The MAT sensor is fitted into the outlet side of the intercooler.

A 'Tech 1' scanner tool displays the temperature of the air entering the engine, which should be close to ambient air temperature when engine is cold, and rise as engine bay temperature increases. If the engine has not been run for several hours (overnight), the readout of MAT sensor temperature and coolant temperature should be close to each other. A failure in the MAT sensor circuit should set a Code 23 or 25. The code charts in section EMH.4 also contain a chart to check for sensor resistance values relative to temperature.



To Replace

Unplug the electrical connector and unscrew the sensor from the intercocler.

When refitting, apply 1½ turns of teflon tape to the threads of the sensor and torque tighten to 20 Nm (15 lbf.ft).

ENH.3 -D MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

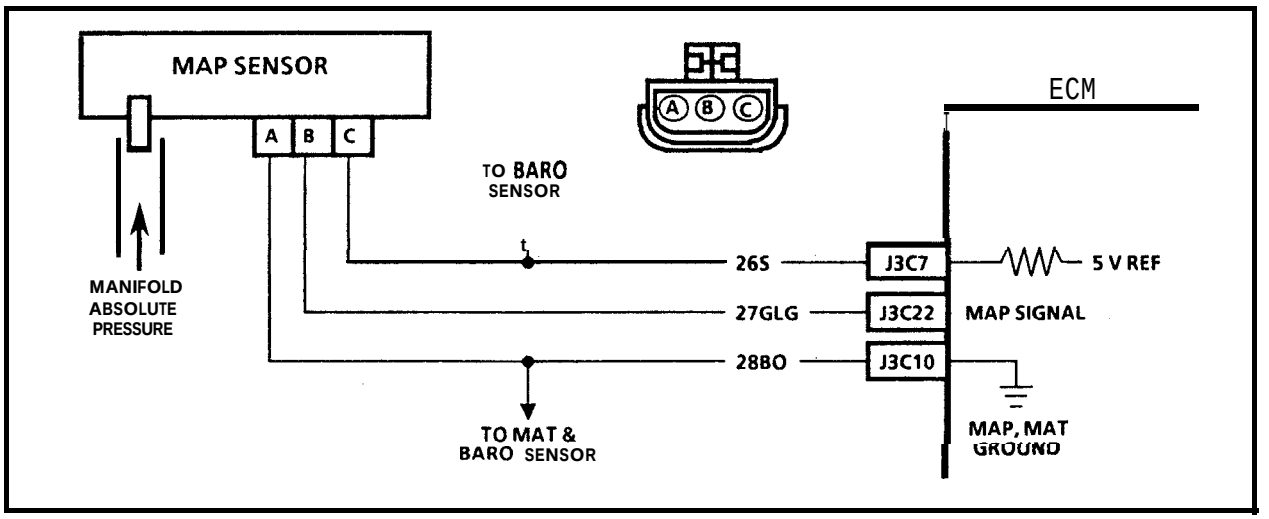
The MAP sensor is fitted below the barometric sensor on a plate above the RR rear wheelarch.

A 'Tech 1' scanner tool displays manifold pressure in kPa and MAP sensor signal voltage. Low pressure (high vacuum) displays a low voltage while a high pressure (low vacuum) displays a high voltage. A failure in the MAP sensor circuit should set a Code 33 or 34 and using the applicable trouble code chart (section EMH.4) will lead to the cause of the problem. A Code 33 may be set if a rough or unstable idle exists.

Fbr access to the MAP sensor, release the two screws securing the mounting plate to the RR side of the tailgate aperture, and withdraw the plate sufficiently to permit access to the electrical and pressure hose connections. Note that the MAP sensor is fitted below the barometric sensor and has an orange insert fitted into the base of the electrical connector socket. An aluminium box screens the MAP sensor from electrical interference.

Circuit Description

The MAP sensor is a solid state sensor which is provided with a 5 volt reference source and an earth, and produces an output signal voltage to indicate intake manifold pressure.



Diagnostic Chart

1. . IGNITION 'ON', ENGINE 'OFF'
'TECH 1' TOOL SHOULD INDICATE ATMOSPHERIC PRESSURE AND APPROX. 2.5 V
. COMPARE WITH READINGS FROM BARO. SENSOR: PRESSURE SHOULD BE ABOUT THE SAME, MAP VOLTAGE HALF OF BARO. VOLTAGE.
IS IT?

YES

NO — CHECK BAROMETRIC PRESSURE READING WITH KNOWN BAROMETER. IF SIGNIFICANT DIFFERENCE, SEE SECTION EMH.4 CODE 33/34

2. . DISCONNECT VACUUM HOSE AT MANIFOLD VACUUM RAIL AND CONNECT HAND VACUUM PUMP.
APPLY VARIOUS VACUUMS TO THE
. SENSOR AND NOTE OUTPUT VOLTAGE.
SHOULD BE IN ACCORDANCE WITH CHART
IS IT?

YES

NO

3. NO TROUBLE FOUND. CHECK SENSOR HOSE FOR LEAKAGE OR RESTRICTION. ENSURE HOSE SUPPLIES VACUUM ONLY TO SENSOR

CHECK SENSOR HOSE AND CONNECTIONS FOR LEAKAGE OR RESTRICTION. IFNOFAULT FOUND, REPLACE MAP SENSOR

Vacuum (kPa)	Output Voltage
0	2.3 to 2.5
20	1.6 to 1.8
40	1.0 to 1.2
60	0.5 to 0.7

Test Description

Numbers below refer to underlined numbers on diagnostic chart.

1. Checks MAP sensor output voltage to ECM when manifold is at atmospheric pressure.
2. Checks that output voltage varies correctly with pressure. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.
3. Check vacuum hose to sensor for leaks or restriction. Ensure no other vaccum devices are connected to the MAP hose.

To Replace

Release the electrical connection and pressure hose and the two fixings securing the sensor to the mounting plate.-

Fit and secure the new sensor to the plate, refit electrical connector and pressure hose, and check that the connections to the barometric sensor and boost gauge have not been disturbed before refitting the mounting plate to the body.

EMH.3 -E BAROMETRIC PRESSURE SENSOR

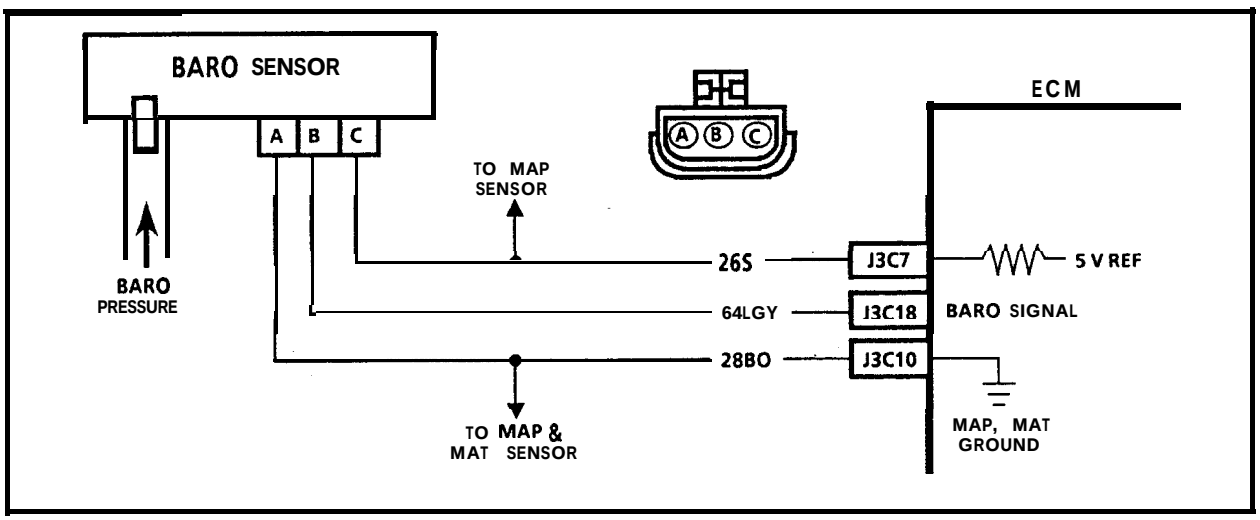
The barometric pressure sensor is fitted above the MAP sensor on a plate above the RH wheelarch.

A 'Tech 1' scanner tool displays barometric pressure in kPa and barometric sensor signal voltage. Low pressure displays a low voltage, and a high pressure displays a high voltage. A failure in the barometric sensor circuit should set a Code 31 and using the applicable trouble code chart in section EMH.4 will lead to the cause of the problem.

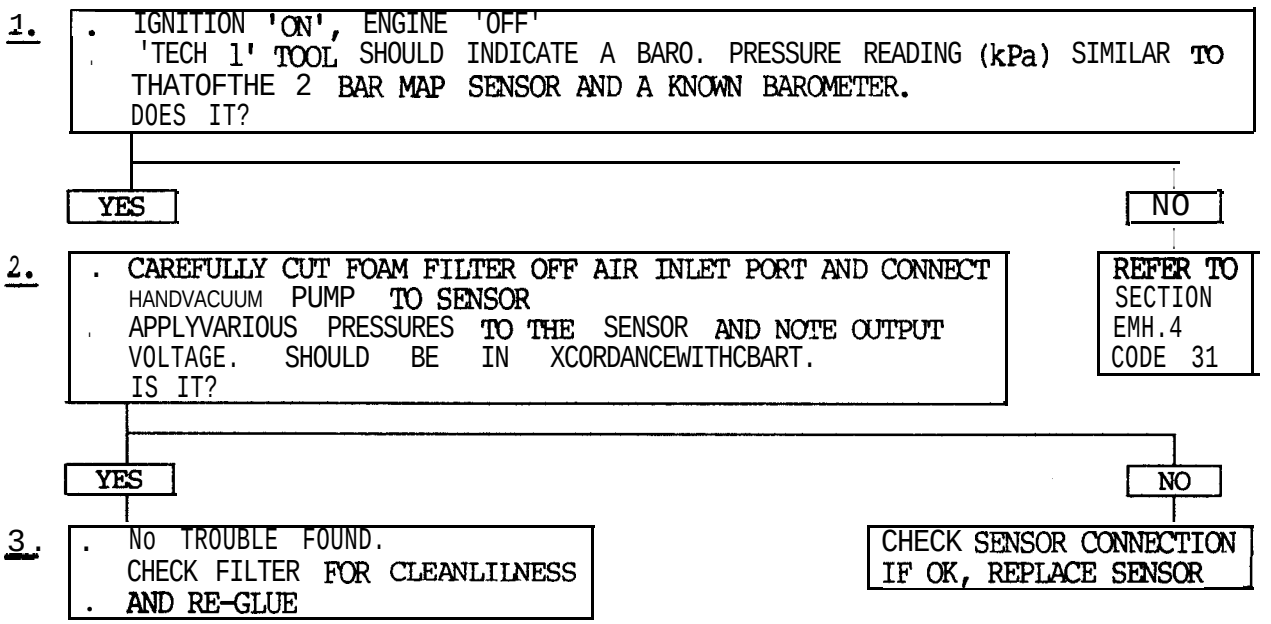
For access to the baro. sensor, release the two screws securing the mounting plate to the RR side of the tailgate aperture, and withdraw the plate sufficiently to permit access to the electrical connector and fixing screws. Note that the baro. sensor is fitted above the MAP sensor, has a foam filter glued to its air inlet port and has a blue insert fitted into the base of the electrical connector socket.

Circuit Description

The barometric sensor is a solid state sensor which is provided with a 5 volt reference source and an earth, and produces an output signal voltage to indicate barometric pressure.



Diagnostic Chart



Pressure (kPa)	Output Voltage
0	4.7 to 4.9
20	3.2 to 3.4
40	2.1 to 2.3
60	1.0 to 1.2

Test Description

Numbers below refer to underlined numbers on diagnostic chart.

1. Check baro. sensor reads atmospheric pressure as recorded on known barometer.

2. Checks that output voltage varies correctly with differing pressure. Upon applying vacuum to the sensor, the change in voltage should be instantaneous. A slow voltage change indicates a faulty sensor.

To replace

Check that the foam filter is fitted over the air intake port before fixing the sensor by its two screws to the mounting plate.

Fit electrical connector and check that the electrical and pressure hose connections to the MAP sensor and boost gauge transducer have not been disturbed before refitting the mounting plate to the body.

EMH.3 - F EXHAUST OXYGEN (02) SENSOR

The exhaust oxygen (02) sensor is located in the exhaust outlet pipe from the turbocharger.

The 'Tech 1' scanner tool has several displays that indicate the state of the exhaust gases: 02 voltage, integrator and block learn. See section EMH.1 - G for information on these displays.

A problem in the 02 sensor circuit, or fuel system, should set a code 13 (open circuit), Code 44 (lean indication) or Code 45 (rich indication). Refer to

the applicable trouble code chart in section EMH.4 if any of these codes are stored in the memory.

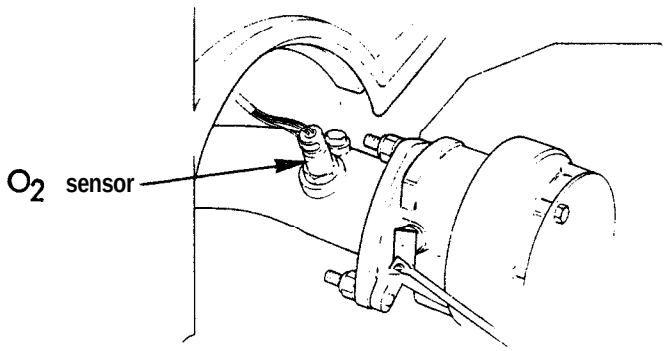
To Remove

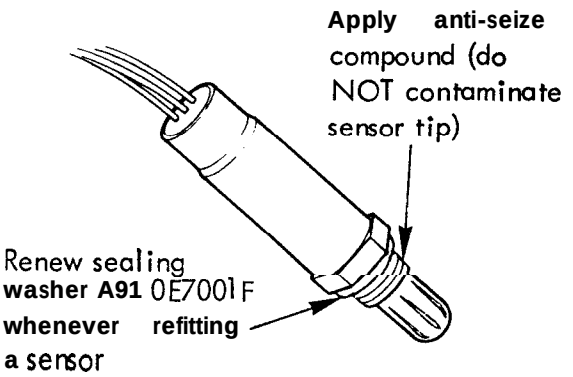
Caution:

i) The oxygen sensor uses a permanently attached pigtail and connector. This pigtail should not be removed from the oxygen sensor. Damage or removal of the pigtail or connector could affect the proper operation of the oxygen sensor.

ii) Take care when handling the oxygen sensor. The in-line electrical connector and louvred end must be kept free of grease, dirt or other contaminents. Also, avoid using cleaning solvents of any type. IX not drop or roughly handle the oxygen sensor.

Release the electrical connector and unscrew the 02 sensor from the exhaust pipe.





Important:

A special anti-seize compound is used on the oxygen sensor threads. The compound consists of a liquid graphite and glass beads. The graphite will burn away, but the glass beads will remain, making the sensor easier to remove.

New sensors will already have the compound applied to the threads. If a sensor is removed from an engine, and, if for any reason, it is to be re-installed, the threads must have anti-seize compound applied before re-installation.

To Replace

Ensure that the threads of the sensor are coated with anti-seize compound A910E6966 or equivalent, use a new washer, and fit into the exhaust pipe; torque tightening to 38 - 46 Nm (28 - 34 lbf.ft). Mate electrical connector.

EMH.3 -G THROTTLE POSITION SENSOR (TPS)

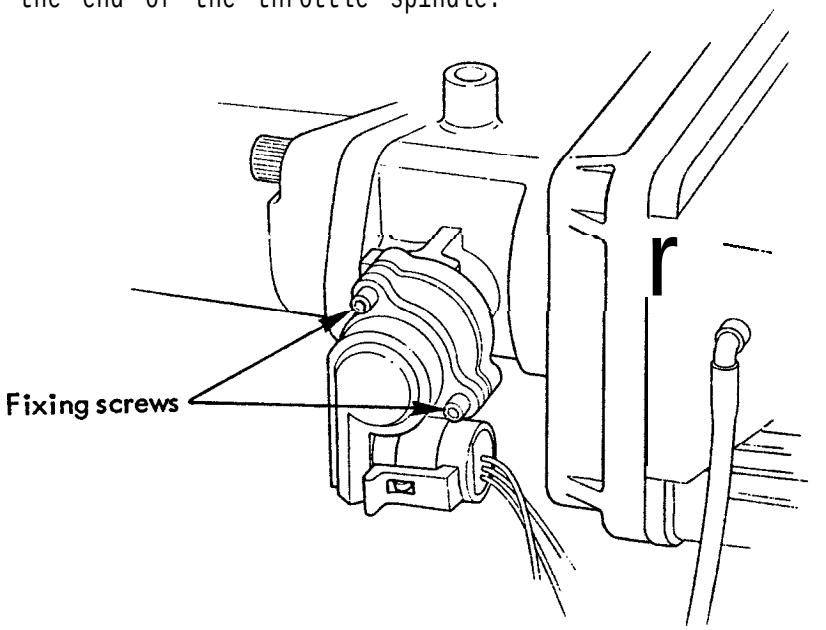
The throttle position sensor is fitted to the rear end of the throttle spindle on the throttle body.

A 'Tech 1' scanner tool displays throttle position in volts. The 'Tech 1' tool should display 450 - 650 millivolts with the throttle closed (as at idle) and ignition "ON". Voltage should increase at a steady rate as the throttle opens. Voltage should be near 5.0 volts at wide open throttle (WOT).

The electronic control module (ECM) has the ability to auto-zero the throttle position sensor (TPS) voltage if it is below about 0.9 volt (900 mV). This means that any voltage less than 0.9 volt will be determined by the ECM to be 0% throttle. 'Tech 1' tools also have the ability to display the throttle angle and should display 0% when the throttle is closed, and increase smoothly to almost 100% at WOT. A failure in the TPS or circuit should set a Code 21 or 22.

To Remove

Unplug electrical connector, release the two fixing screws and withdraw the switch from the end of the throttle spindle.



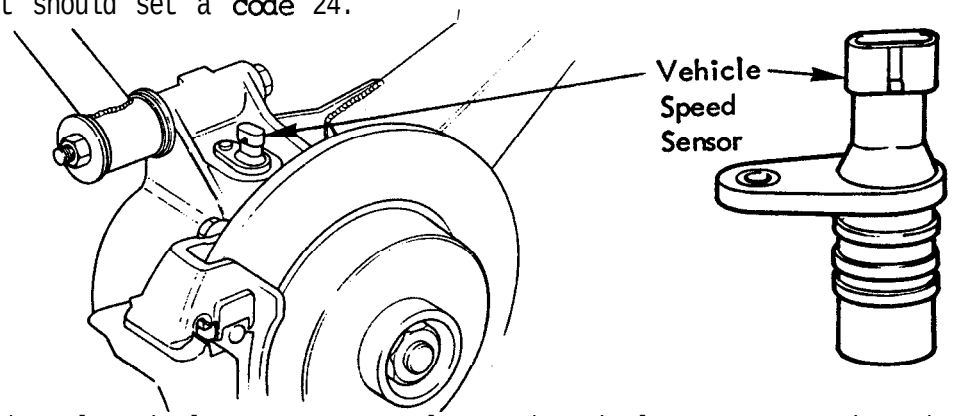
To Replace

Fit the switch on to the end of the throttle spindle, and retain with the two fixing screws. Select 'TPS' on the 'Tech 1' tool and adjustthepositionof the switch to obtain a 450 - 650 mV reading before tightening the screws.

EMH.3 -H VEHICLE SPEED SENSOR (VSS)

The vehicle speed sensor is fitted on the top of the RH rear hub carrier and is accessible after removal of the road wheel.

A 'Tech 1' scanner tool MPH display should closely match the speedometer reading with the drive wheels turning. A failure in the vehicle speed sensor (VSS) circuit should set a code 24.



To Replace

Unplug the electrical connector, release the single screw securing the sensor to the hub carrier, and withdraw sensor.

Ensure 'O' ring (blue) is fitted to the sensor before refitting. Push into location and retain with single fixing screw, torque tightening to 8 - 12 Nm (6 - 9 lbf.ft).

After fitment check air gap between sensor tip and toothed ring. Specification = 1.3 - 2.3 mm.

EMH.3 -1 FUEL CONTROL SYSTEM

Some failures in the fuel system will result in a condition where the "Engine Cranks But Won't Run". If this condition exists, see chart EMH.4 - 3. This chart will determine if the problem is caused by the ignition system, ECM or fuel pump circuit. If it is determined to be a fuel problem, Chart lMH.4 - 5 or EMH.4 - 7 should be used. This includes the injectors, pressure regulator, fuel pump and fuel pump relay. The fuel system wiring schematic diagram is covered on the facing page of Chart EMH.4 - 5.

Any malfunction in the fuel control system usually results in either a rich or lean exhaust condition. This is sensed, via the oxygen sensor, by the ECM which changes the fuel calculation (injector pulse width) based on 02 sensor input. The change made to the fuel calculation will be indicated by a change in the integrator values which can be monitored by a 'Tech 1' tool. The normal integrator values are around 128 counts at normal running temperature and steady vehicle speed (cruise), and if the 02 sensor detects a lean condition, the ECM will add fuel. This will result in integrator values above 128 counts. If integrator values deviate from 128 consistently for a certain time period the ECM will add counts to the block learn values, which may also be displayed by the 'Tech 1' tool. By adding counts to the BLM, the integrator values should decrease until they again read about 128 counts.

Variations in block learn values are normal because all engines are not exactly the same. However, if the block learn values deviate from those in EMH.4 data list, and integrator values deviate from 128 by more than ± 10 counts for a long time period at steady speed, a system problem may exist. If the block learn values are greater than 154 counts and there is a driveability symptom, see Code 44 for items which can cause a lean exhaust condition.

If the block learn values are less than 100 counts and there is a driveability symptom, see Code 45 for items which can cause the exhaust to run rich. If a driveability symptom exists, also refer to the particular symptom in Section EMH.6 for additional items to check.

WARNING - Safety Precautions

i) To minimise the risk of fire and personal injury, relieve the fuel system pressure before servicing the fuel rail or any related component. See 'Fuel Pressure Relief Procedure' below.

ii) To reduce the possibility of sparks occurring when a fuel line is disconnected, or when fuel vapour is present, the negative battery cable should be disconnected before work is commenced.

iii) When fuel lines are disconnected, absorb any escaping fuel in an absorbent cloth and dispose of safely.

Fuel Pressure Relief Procedure

This procedure should be used prior to disconnecting any part of the fuel line except the unpressurised return line.

1. Remove the RH rear quarter window trim panel and unplug the fuel pump electrical connector.

2. Start engine and allow to run for a few seconds until it stops from lack of fuel.

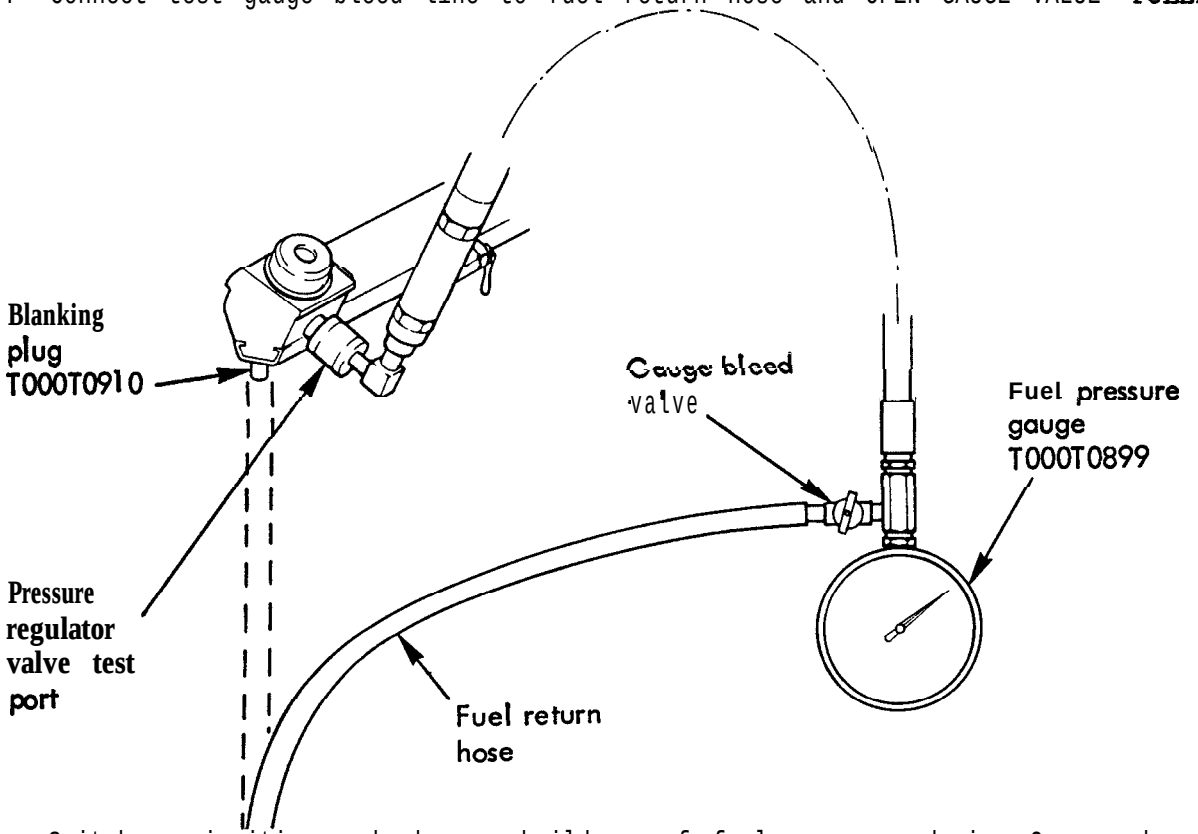
3. Crank engine for 3 seconds to dissipate remaining fuel pressure in supply line. Fuel connections are now safe for servicing.

4. When work has been completed, re-connect fuel pump and refit trim panel.

EMH.3 - J FUEL PUMP

To establish if fuel pump performance is satisfactory, proceed as follows:

1. Relieve system fuel pressure as detailed in section EMR.3 - I.
2. Remove blanking cap from the pressure test port on the fuel pressure regulator valve, and fit fuel pressure gauge T000T0899.
3. Disconnect fuel return hose from pressure regulator valve, and fit blanking plug T000T0910 into valve port.
4. Connect test gauge bleed line to fuel return hose and OPEN GAUGE VALUE FULLY.



5. Switch on ignition and observe build up of fuel pressure during 2 second period for which the pump runs.
6. Progressively close the gauge bleed valve whilst repeating operation (5) until a pressure of 420 kPa (61 lb/sq.in) is recorded. If this pressure cannot be achieved, check the in line fuel filter and pump intake strainer for blockage, and if O.K., replace the fuel pump.

CAUTION: Do not perform this test with the gauge bleed valve fully closed, or potentially damaging pressures may be produced.

On reassembly, refit regulator valve test port cap and tighten to 11 - 15 Nm (8 - 11 lbf.ft). Do not forget to remove the return port blanking plug.

To Remove Fuel Pump

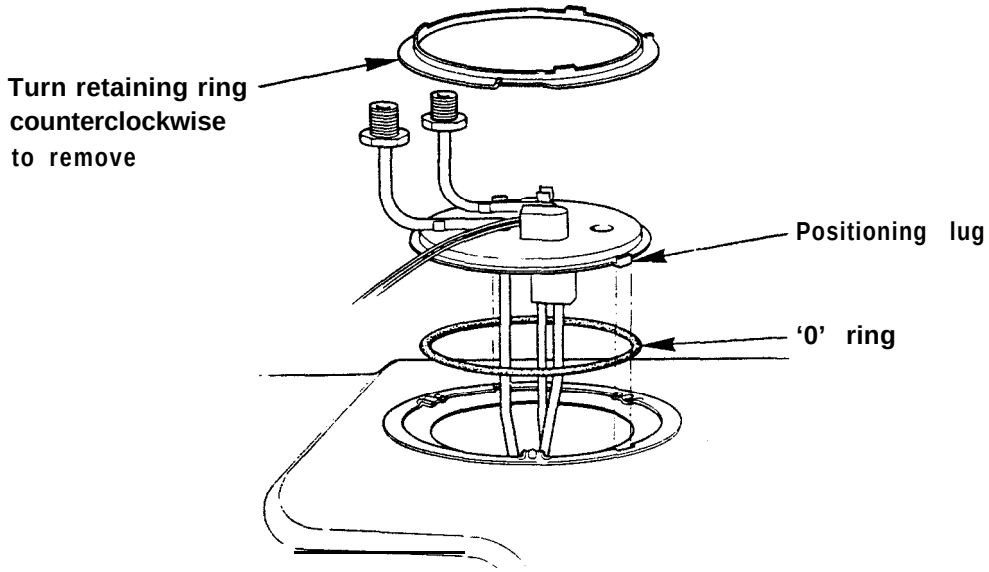
The fuel pump is located, submerged within the RH fuel tank.

1. Remove the RH rear quarter window trim panel.

2. Carry out fuel pressure relief procedure as detailed in section EMH.3 - I before disconnecting negative battery cable.

3. Disconnect fuel feed and return lines from fuel pump assembly. Unplug electrical connector.

4. Use a special tool or a suitable drift and light hammer to turn and release the fuel pump assembly retaining ring and withdraw complete fuel pump assembly using an absorbent cloth to catch dripping fuel.



5. Temporarily cap fuel tank aperture to reduce fire risk.

To Replace

1. Check condition of sealing 'O' ring in recess around tank aperture, and replace if necessary.

2. Fit pump assembly into tank, locating strainer into well at the bottom of tank and tab on top plate in recess on tank collar.

3. Fit retaining ring and turn fully clockwise until against stop.

4. Connect fuel feed and return pipes and electrical connector plug.

5. Refit quarter trim panel.

mH.3 -K FUEL RAIL, PRESSURE REGULATOR & INJECTORS

The system operates in an acceptable pressure range of 211 - 379 kPa (30.5 - 55 lb/sq.in) depending on engine conditions, with engine running. If the pressure is too low, poor performance and a Code 44 could result. If the

pressure is too high, excessive odour and Code 45 could result. Chart EMH.4 - 7 should be used to diagnose fuel pressure irregularities.

Important: When servicing any part of the fuel rail assembly, take care to prevent dirt and other contaminants from entering the fuel passages. Fittings should be capped, and holes plugged during servicing.

Pressure Regulator

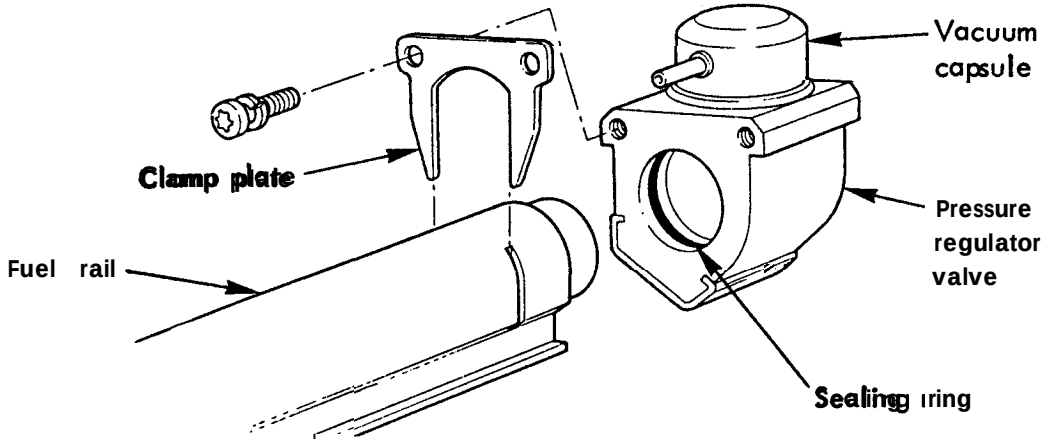
If as a result of using chart EMH.4 - 7, the pressure regulator is determined as being faulty, proceed as follows:

1. The pressure regulator is mounted on the rear end of the fuel rail, and is serviced as an assembly.

2. Relieve the fuel pressure in the fuel rail by following the procedure detailed in EMH.3 - I.

3. Release the fuel return hose from the underside of the valve, using an absorbent cloth to collect any escaping fuel. Release the pressure sensing hose fran the top of the valve.

4. Remove the two screws securing the valve assembly clamp plate to the fuel rail and carefully withdraw the valve from the rail spigot.



5. Before replacing the valve assembly, renew the sealing ring in the valve connecting spigot bore, and lubricate with clean engine oil.

6. Carefully push the valve over the fuel rail spigot and press against the rail whilst the clamp plate is fitted behind the rail collar and the two fixing screws are fitted and tightened to 4.5 - 6.5 Nm (40 - 58 lbf.in).

7. Refit fuel return hose to port on underside of valve and the pressure sensing hose to the top of the valve.

Fuel Rail & Injectors - Removal and Replacement

Before removing the fuel rail assembly, it is recommended to use a spray type engine cleaner such as AC Delco X-30A following package instructions to help prevent dirt ingress into the open ports of the disassembled assembly.

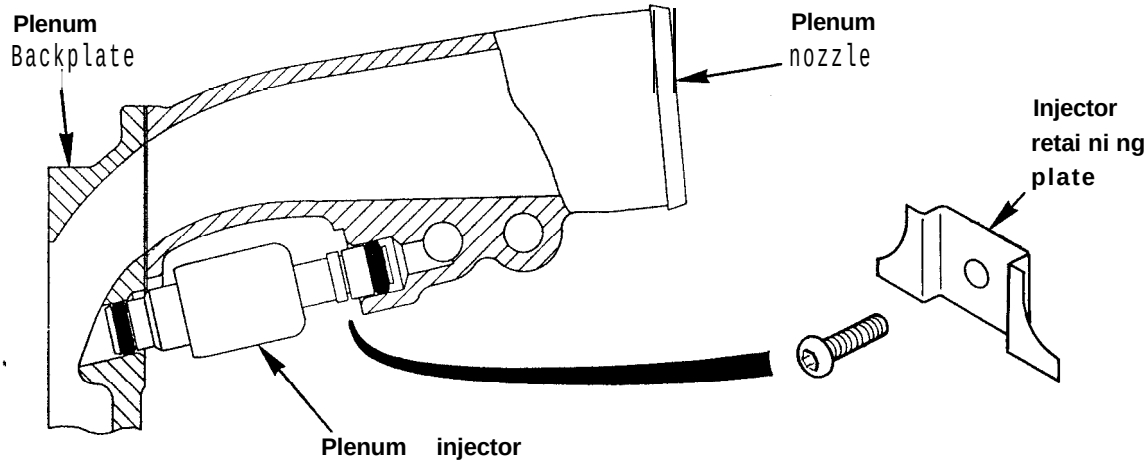
1. Relieve the pressure in the fuel system by following the procedure detailed in EM-I.3 - I.

2. Release the hose clips connecting the intercooler to the turbo compressor and intercooler. Disconnect the MAT sensor. Release the two rubber mountings, and move the intercooler aside sufficiently to permit access to the fuel rail and plenum nozzle.

3. Disconnect the harness plugs from both plenum injectors and release the two fuel pipes from the plenum nozzle, using an absorbent cloth to soak up any escaping fuel.

4. Remove the two bolts securing the plenum nozzle to the backplate and cover, and carefully withdraw the nozzle and injectors from the plenum backplate.

5. Release the M4 button head screw securing the injector retaining plate to the nozzle, and withdraw both injectors.



6. Use an airline to blow any dirt from around the port injectors, and disconnect the electrical plug from each injector.

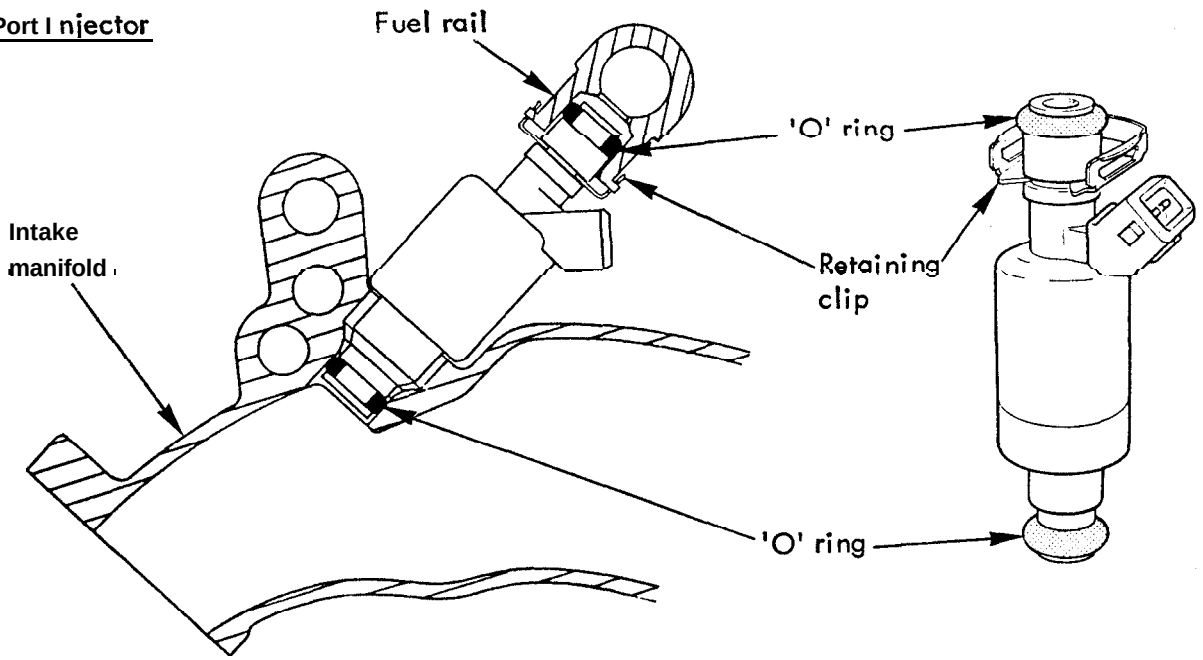
7. Using a back-up wrench to prevent the fuel rail inlet connector fran turning, release the fuel inlet pipe from the front of the rail. Use an absorbent cloth to soak up any escaping fuel. Release the fuel return hose and pressure sensing hose from the pressure regulator at the rear end of the rail.

8. Remove the two fixing screws securing the rail assembly to the manifold and carefully withdraw the rail complete with the 4 injectors from the engine
Caution: Take care to prevent damage to the injector electrical connector sockets and injector spray tips.

9. Remove each injector from the fuel rail by spreading the open end of the clip and sliding off. Discard the clip. Withdraw the fuel injector from the rail.
Note: i) Each fuel injector is serviced only as a complete assembly, and since it is an electrical component, must not be immersed in any cleanser.
ii) Do not attempt to remove the fuel inlet adaptor from the front end of the rail, since it is retained by staking of the rail end.

10. Replacement
Before re-assembly, fit new 'O' rings to the top and bottom of each injector and lubricate with clean engine oil. Renew fuel rail inlet connection 'O' ring and lubricate with clean engine oil.

Port Injector



Note that the port and plenum injectors are visually similar, but may be identified by the number etched on the injector body, and by the blue clip around the top of the plenum injectors.

Port injector - etched with no. 5235364
Plenum injector - etched with no. 5235434 + blue clip.

Take great care not to mix up the two types, or damage may be caused to the system.

11. Fit new injector retainer clips to each port injector with the open end of the clip facing at 90° to the electrical connector. Push each injector into the fuel rail far enough to engage the retaining clip in its machined slot. Position injectors 1 & 2 with the electrical socket uppermost, and injectors 3 & 4 with the socket lowermost.

12. Carefully fit the fuel rail and injectors to the engine pushing the injectors into the inlet manifold bores until the bolt holes on the rail and manifold are aligned. Fit the two retaining bolts and torque tighten to 8.7 Nm (6.4 lbf.ft).

13. Plug in each fuel injector electrical connector.

14. Fit the two plenum injectors into the plenum nozzle with their electrical connectors facing outermost. Apply Permabond A121 thread locking compound to the M4 button head screw, and fit the injector retaining plate and screw.

15. Fit a new gasket on the nozzle to plenum backplate jointface. Offer the nozzle up to the plenum, and carefully feed the two injectors into their holes in the plenum backplate. Fit and tighten the two bolts clamping the plenum cover/backplate/nozzle.

16. Plug in the two plenum injector harness connectors. Connect the fuel pipes to the nozzle and to the fuel rail, and torque tighten to 30 Nm (22 lbf.ft), using a back up wrench on the fuel rail inlet connection to prevent the union from turning.

17. Refit the intercooler and connecting hoses. Re-connect MAT sensor.

18. Connect the fuel return and pressure sensing lines to the pressure regulator.

19. Energise the fuel pump and check for leaks.

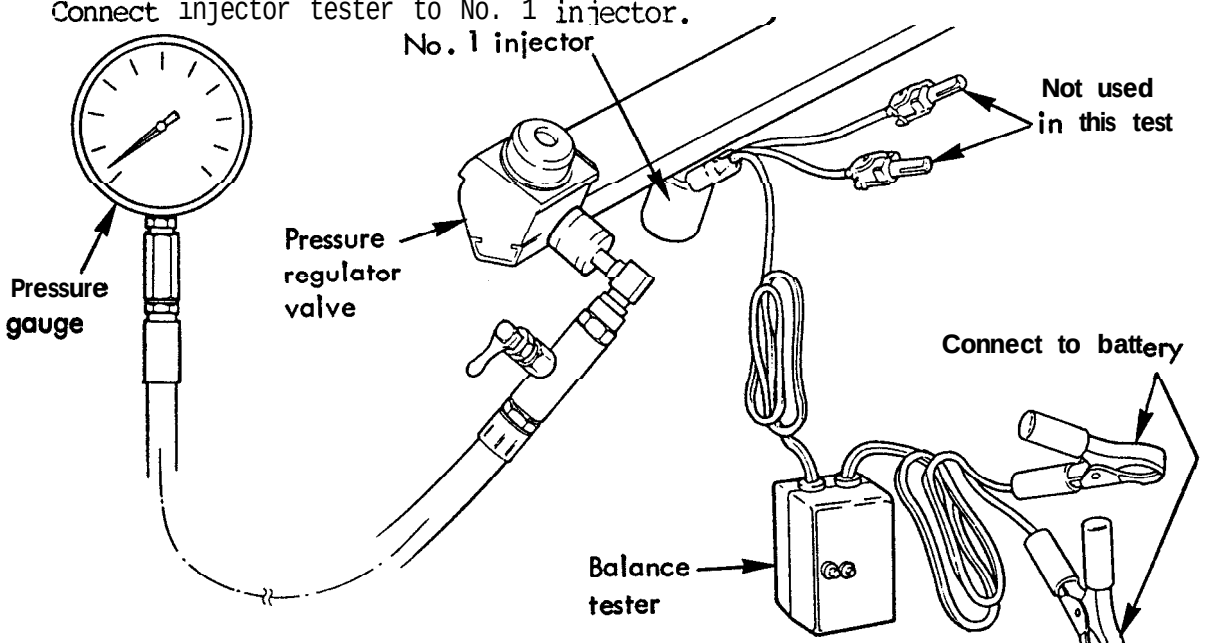
Port Injector Balance Test

The injector balance tester is a tool contained within the fuel injection diagnostic-kit TOOOT0899 which is used to turn an injector on for a precise period of tin-e, thus spraying a measured amount of fuel into the manifold. This causes a drop in fuel rail pressure which can be recorded and compared between each injector. Any injector with a pressure drop that is 10kPa (or more) greater or less than the average drop of the other injectors should be considered faulty and replaced.

1. Allow an engine cool down period of 10 minutes to avoid irregular readings due to 'hot soak' fuel boiling.

2. Relieve fuel pressure in the fuel rail as detailed in EMH.3 - I, and connect the fuel pressure gauge to the pressure regulator test port. Switch on ignition (repeatedly if necessary) and bleed all air from the pressure gauge.

3. Switch ignition off for at least 10 seconds to complete ECM shutdown cycle. Connect injector tester to No. 1 injector.



4. Turn on ignition, and record steady fuel pressure reading. (If reading is not steady, refer to chart EMH.4 - 7.) Turn off ignition.

5. Energise the tester once, and note pressure drop at lowest point. (Disregard any slight pressure increase after drop hits low point.) By subtracting this second pressure reading from the initial pressure, the individual pressure drop may be calculated.

6. Transfer the tester to the other port injectors in turn and repeat steps 4 & 5 recording the readings. Good injectors will record virtually the sane

pressure drop. Retest any injector that has a pressure difference of 10 kPa from the average of the other 3 injectors. Replace any injector that also fails the retest.

CAUTION: The entire test should not be repeated more that once without running the engine to prevent flooding. (This includes any retest on faulty injectors.)

EMH.3 - L THROTTLE BODIES

The throttle bodies are assembled to the plenum backplate and then balanced at the factory as a set, using mass air flow measuring techniques. The throttle plate air by-pass screws or throttle coupling balance screw should NOT be tampered with. The throttle bodies/plenum backplate assembly is supplied as a single service item, and must not be disassembled.

The throttle stop screw (minimum air rate) is also calibrated at the factory, with no subsequent adjustment being necessary under normal circumstances. This adjustment should not be considered as controlling the minimum idle speed, since the idle air control valve operates to increase or decrease airflow past the throttle plates to control idle speed as commanded by the ECM.

If there is a complaint of high idle speed, vacuum leaks should be considered the most likely cause. Because the electronic control module (ECM) 'learns' idle air control (IAC), it is even less likely that a stalling complaint would be due to incorrect minimum air rate. In either case, the 'Symptoms' section EMH.6 and IAC valve check CHART EMH.3 - M should be referred to.

If it is determined that the minimum air rate is suspect, be sure the IX valve is not 'lost' (not actually at the location indicated by current IAC 'counts'). The IAC valve could be 'lost' if ECM power has been interrupted with the ignition 'ON', or the IX valve has been disconnected with the engine running since the last reset, as described in section EMH.2 - 0.

The minimum air rate may be checked using the following procedure:

1. Block drive wheels, apply parking brake.
2. Connect 'Tech 1' scanner tool.
3. Start engine and allow to reach operating temperature (about 82° C) and 'Closed Loop'.
4. With A/C and all electrical accessories 'OFF', allow idle to stabilise.
5. Use 'Tech 1' tool to display IX valve counts - if between 5 - 45 counts, throttle plate stop screw adjustment is acceptable. It is important to allow idle speed to stabilise to assure correct counts are determined.

If counts in step 5 are too low, check for intake air (vacuum) leaks at hoses, throttle body and intake manifold, or damaged throttle lever, and correct asnecessary. Also refer to Code 35 and associated 'Diagnostic Aids' in section EMH.4.

If no vacuum leaks or other causes of excessive air into the intake are found, refer to the 'Throttle Plate Stop Screw (minimum air rate) Adjustment Procedure' below.

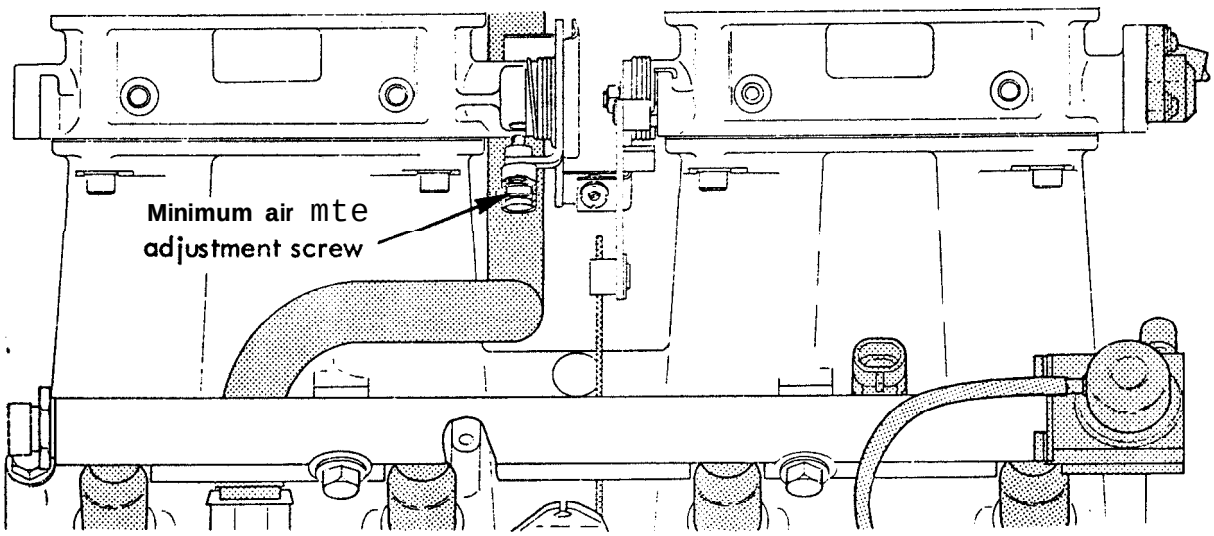
If counts in step 5 are too high, check for damaged throttle lever or airflow restriction by the throttle plate. If no problem is evident, remove intake plenum cover and clean residue from inside of throttle body bores and from edges

of throttle plates. Use a lint free cloth with a suitable cleaner such as AC Delco Carburettor Tune-Up Conditioner or equivalent. Do not use solvents containing methyl ethyl ketone. Re-check IAC valve counts, per the preceding procedure. If counts are still too high, refer to 'Throttle Plate Stop Screw (Minimum Air Rate) Adjustment Procedure

Throttle Plate Stop Screw (Minimum Air Rate) Adjustment Procedure

Important: It is extremely unlikely that this adjustment will ever be necessary on a throttle body that has not been tampered with after production! Review the procedure detailed above before proceeding.

Remove the throttle plate stop screw anti-tamper plug and, in small increments, (e.g. 1/8 turn) adjust the screw as necessary to achieve a 'Tech 1' scan count of between 25 - 40. Allow idle to stabilise between each incremental adjustment.



More throttle plate opening = lower IAC valve counts
less throttle plate opening = higher IAC valve counts

If it is necessary to change the adjustment more than one turn either way, other causes of incorrect idle speed should be investigated as described above. Ensure that the anti-tamper plug is refitted after any adjustment.

EMH.3 -M IDLE AIR CONTROL (IAC) VALVE

A 'Tech 1' scanner tool will display idle air control (IAC) valve position in 'Counts' or steps. '0' steps indicate the electronic control module (ECM) is commanding the IAC valve to be fully extended to a fully seated position. This condition is usually caused by a vacuum leak. The higher the number of counts, the more air is being allowed to pass the IX valve. If the IX valve is unable to control the-idle speed within calibrated limits, the ECM will cause a Code 35 to set. The accoqanying code chart (in section EMH.4) should be used to diagnose the IX system. Refer to 'Rough, Unstable, or Incorrect Idle, Stalling' in the Symptoms Section EMEI.6 for other possibilities for the cause of idle problems.

For schematic wiring diagram and diagnostic chart, refer to Code 35 in section EMH.4.

To Remove

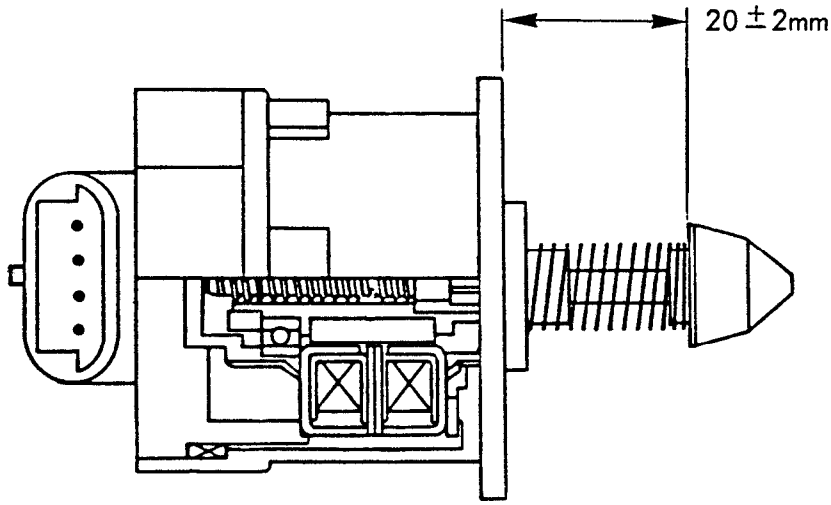
1. Release the electrical connector, remove the two retaining screws and withdraw the valve from the manifold.

2. Remove the mating spigot 'O' ring and discard.

Note: As the IX valve is an electrical component, it must not be soaked in any liquid cleaner or solvent, or damage may result.

To Replace

The IAC valve used on the Esprit Turbo has a dual taper pintle. Check that any replacement valve has the correct part number and pintle shape. The IAC valve plunger position is preset at the factory, and should require no adjustment before fitting. However, to check that no mal-adjustment has occurred in transit, it is advisable to check the plunger extension before fitment, in order to speed the 'learning' process. If necessary, move the plunger in or out until the specified extension is achieved, as shown in the diagram.



1. Fit a new IX valve 'O' ring and lubricate with engine oil.

2. Clean the IAC valve sealing surfaces on the manifold and fit the valve in position. Fit and tighten the two retaining screws to 3.4 Nm (30 lbf.in).

3. Refit electrical connector, start engine and allow to reach operating temperature.

Important: No physical adjustment of the IX valve assembly is required after installation. The IAC valve 'learns' its correct position via the ECM when the car is driven normally above 20 mph. See section EBlH.2 - 0.

EMH.3 -N DIRECT IGNITION

The ECM uses information from the MAP and coolant sensors in addition to rpm to calculate spark advance as follows:

- Low MAP Output Voltage = More spark advance
- Cold engine = More spark advance
- High MAP Output Voltage = Less spark advance
- Hot engine = Less spark advance

Therefore, detonation could be caused by low MAP output or high resistance in the coolant sensor circuit.

Poor performance could be caused by high MAP output or low resistance in the coolant sensor circuit.

If the engine cranks but will not run or immediately stalls, CHART EMH.4 - 3 must be used to determine if the failure is in the DI system or the fuel system.

If the symptom is engine miss and the DI system is suspected, the following diagnostic chart should be used.

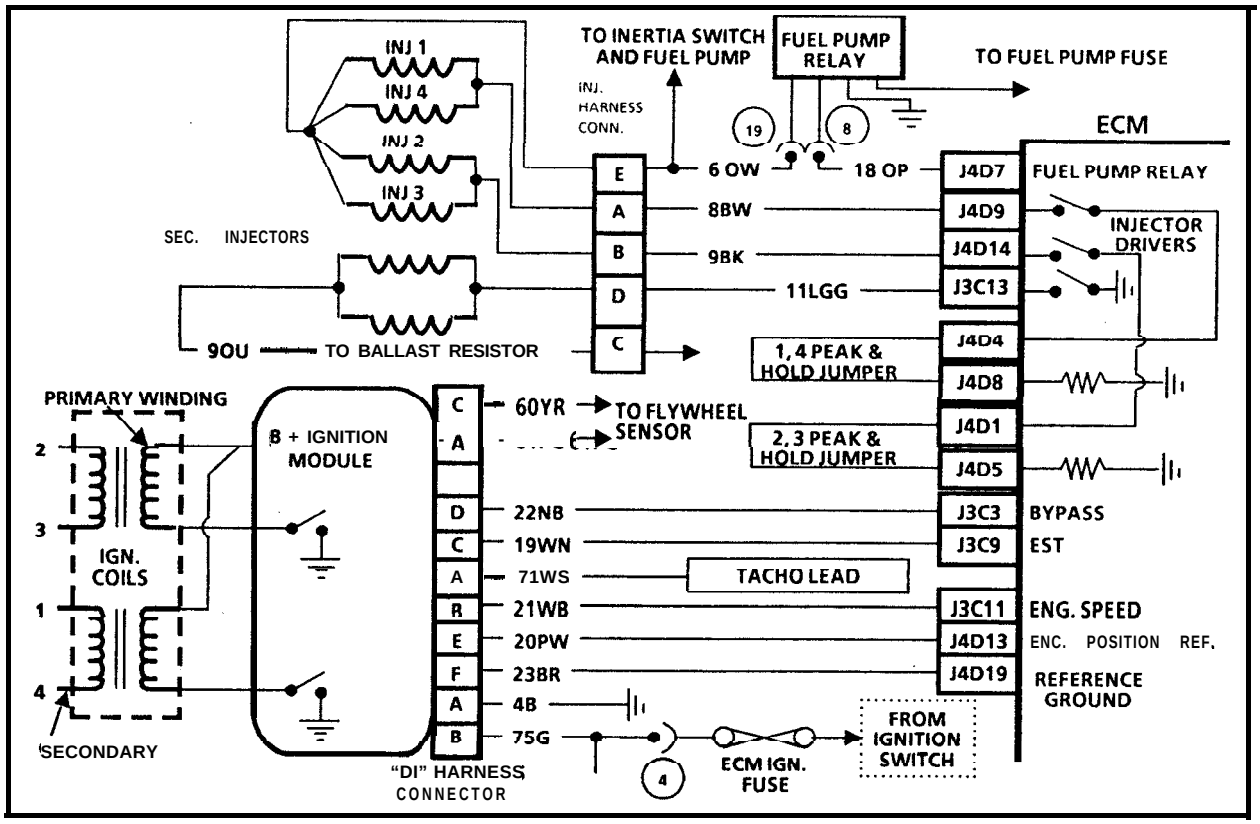
Code 42: If Code 42 is set, the code chart in section EMH.4 must be used for diagnosis. If the symptom is 'Engine Misses' and the ignition system is suspected, the following diagnostic chart should be used.

Code 41: Code 41 is set if the engine speed signal is not received by the ECM. Refer to the trouble code chart in section EMH.4.

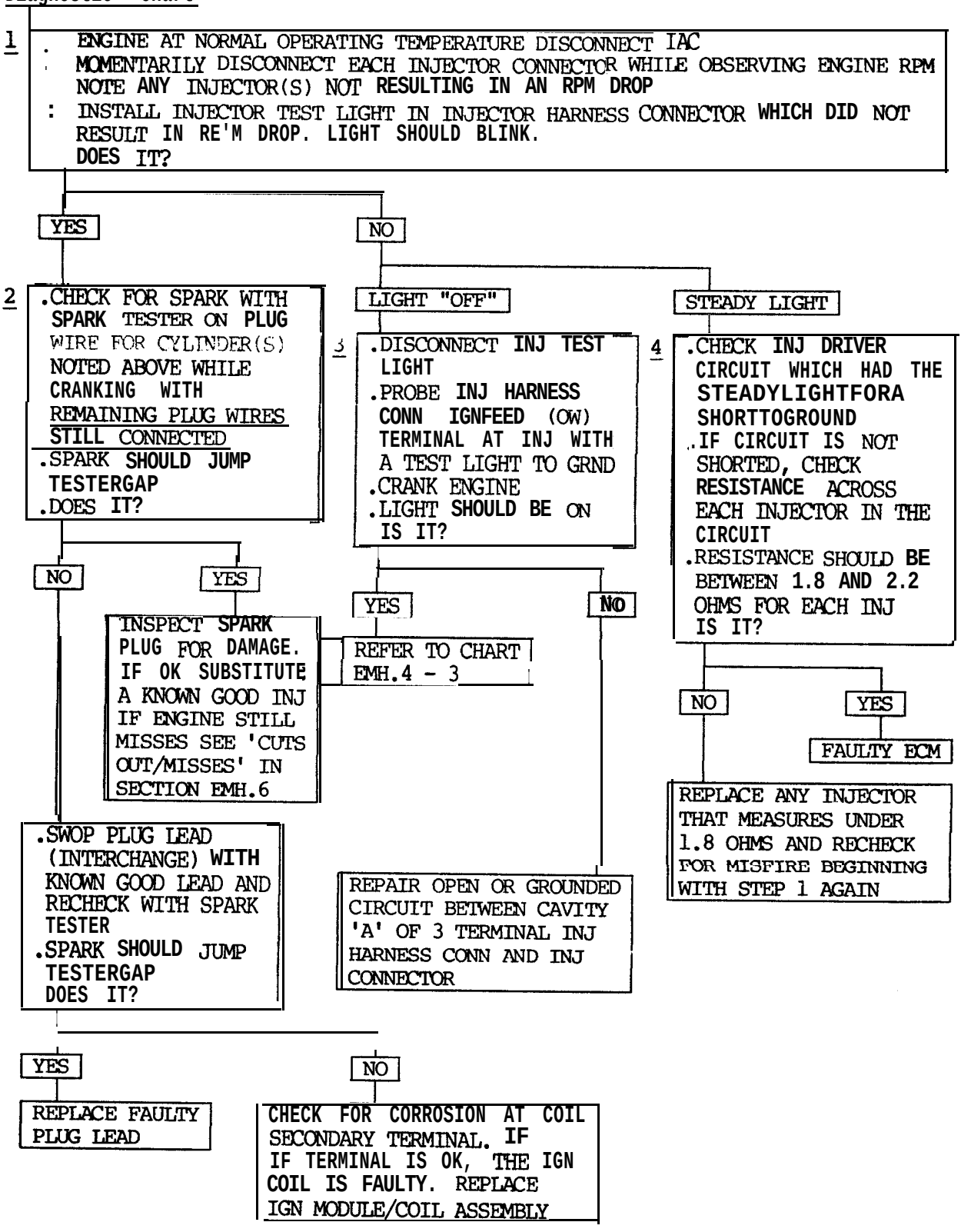
Setting Timing

Because the reluctor wheel is an integral part of the flywheel and the sensor is mounted in an accurately located, fixed position, timing adjustment is not possible or necessary.

D.I. System Circuit



Diagnostic Chart



Test Description: Numbers below refer to underlined numbers on the diagnostic chart.

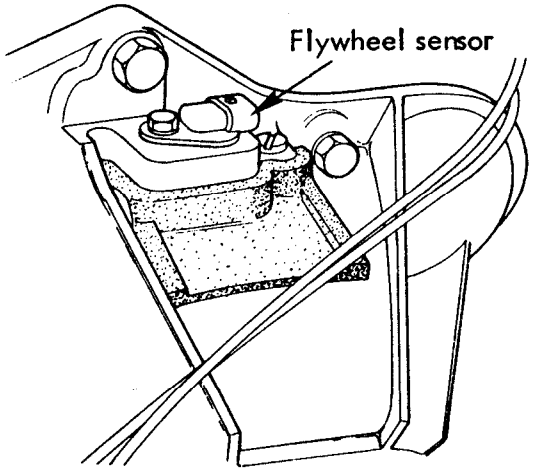
1. This checks for equal relative power output between the cylinders. Any injector, which when disconnected did not result in an rpm drop approximately equal to the others, is located on the misfiring cylinder.

2. If a plug lead is faulty, the other plug on that coil may still fire at idle. This step tests the system's ability to produce at least 25,000 volts at each spark plug.

3. Check for ignition voltage feed to injector and for an open injector driver circuit.

4. An injector driver circuit shorted to ground would result in the test light 'ON' steady, and possibly a flooded condition which could damage engine. A shorted injector (less than 2 ohms) could cause incorrect ECM operation.

EMH.3 - O FLYWHEEL SENSOR

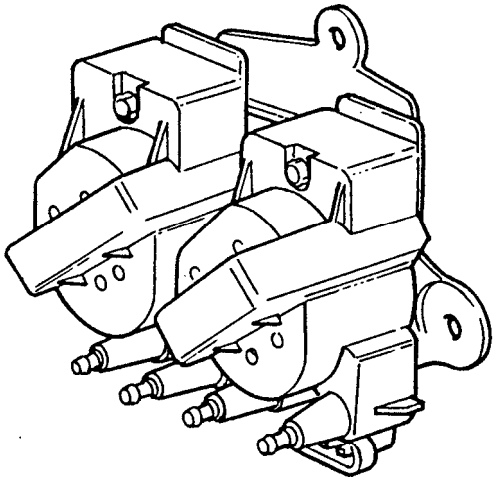


The flywheel sensor is mounted at the top of the clutch housing, adjacent to the engine timing pointer. The toothed ring (reluctor) is incorporated into the flywheel, and takes the form of slots machined in the flywheel periphery. No provision for timing adjustment is made, or indeed necessary.

To remove the sensor, release the electrical connector, remove the single fixing screw and withdraw from the clutch housing.

Before refitting, check condition of the sealing (brown) 'O' ring, replacing if necessary, lubricate the 'O' ring lightly with engine oil, and push the sensor into its location. Fit the single fixing bolt and torque tighten to 6 - 10 Nm (55 - 90 lbf. in.). The air gap between the sensor tip and flywheel should be 1.3 - 2.3 mm.

EMH.3 - P IGNITION MODULE & HT COILS



The ignition module and the two high tension coils are assembled as a sealed unit which is serviced only as a complete assembly.

If any of these components are diagnosed as being faulty, (see section EMH.3 - N) the complete assembly must be replaced.

The assembly is mounted on a base-plate, itself secured to a chassis bracket at the right hand side of the engine bay with 3 fixing bolts. To remove the unit, disconnect the 4 spark plug leads and the 3 harness connector sockets, release the 3 fixing bolts and withdraw the assembly from the car.

EMH.3 - Q ELECTRONIC SPARK TIMING (EST)

The following is a brief description of each of the EST circuits:

- Engine Position Reference Circuit 20
  The flywheel sensor generates a signal to the ingition module which results in a reference pulse (square wave signal) being sent to the ECM. The ECM uses this signal to calculate crankshaft position, engine speed, and injector pulse width. The engine will not start or run if this circuit is open or grounded.
- Reference Ground - Circuit 23
  This wire is grounded through the module and insures that the ground circuit has no voltage drop between the ignition module and the ECM which could affect performance.

- Bypass - Circuit 22
  While the engine is being cranked, the ignition module controls spark timing. This is known as bypass timing mode because the ignition module 'bypasses' the ECM. When the engine reaches 700 rpm, the ECM applies 5 volts to the bypass circuit which switches spark timing control from the ignition module to ECM controlled electronic spark timing (EST). This switching action also changes the resistance on the EST circuit, through the module to the ground, as noted in the EST circuit description. If the bypass circuit is open or shorted to ground, a code 42 will be set, and the ignition module will operate in bypass timing mode. Bypass timing may cause poor performance and reduced fuel economy, and the 'Check Engine' light will be 'ON', except as noted in the EST circuit description.

- EST - Circuit 19
  The ECM sends the electronic spark timing (EST) pulses to the ignition module on this circuit, and also monitors these pulses. This signal is similar to the ignition reference pulse square wave except that the ECM uses sensor inputs to determine the pulse timing to control spark advance. When the engine is below 700 rpm, the ignition module controls spark timing (operating bypass mode), and does not use the EST pulses.
  The resistance to ground from the EST input through the ignition module is less than 500 ohms in bypass mode, resulting in lower EST pulse voltage. When the engine reaches 700 rpm, the 5 volt signal on the bypass circuit switches the ignition module to EST mode. The resistance to ground through the ignition module from the EST input increases to over 8000 ohms, resulting in a higher EST pulse voltage.
  If the EST circuit is grounded, the EST pulse voltage will remain low after the 5 volt bypass signal is applied (above 700 rpm), causing Code 42 to be set. The engine will continue running in bypass mode with the 'Check Engine' light 'ON'.
  If the EST circuit is grounded after the engine is running, the ignition module will switch itself back to bypass timing after it sends a certain number of reference pulses to the ECM with no corresponding return of EST pulses. The engine will continue running if rpm is high enough and load is low enough, with Code 42 set and the 'Check Engine' light 'ON'.
  An open or grounded bypass circuit will have an effect on the EST pulse voltage similar to a grounded EST circuit. The ignition module will not receive the 5 volt bypass signal and will remain in or return to bypass mode. The low resistance to ground in bypass mode will result in lower EST pulse voltage, causing Code 42 to set and the 'Check Engine' light to be 'ON'. An open EST circuit is only recognised by the ECM when the engine is cranking,

because the EST pulse voltage is expected to be low at that time, due to the low resistance through the ignition nodule. With an open EST circuit, the pulse voltage will be high while cranking. Code 42 will be set, the ignition module will operate in bypass mode, and the 'Check Engine' light will be 'ON'.

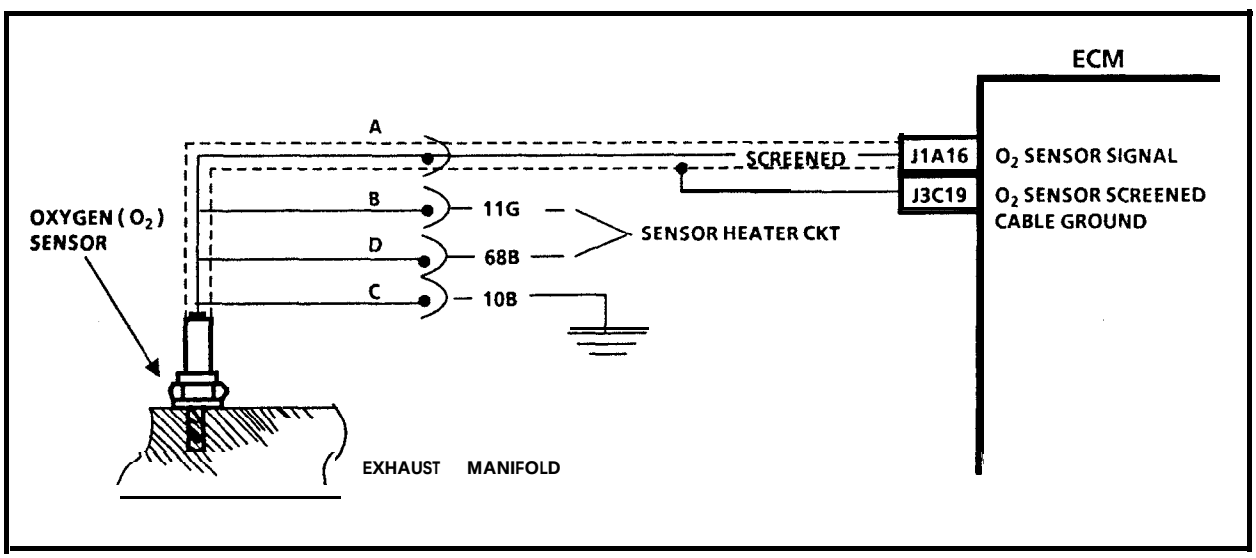
If the EST circuit opens after the engine is running, the ignition module will switch itself back to bypass mode after it sends a certain number of reference pulses with no corresponding return of EST pulses. The ignition module will operate in bypass mode and the engine will remain running if rpm is high enough and load is low enough. However, the EST pulse voltage will remain high, as expected, and the ECM will not recognise the open SST circuit. The 'Check Engine' light will remain 'OFF', although bypass timing may result in poor performance and reduced fuel econcxny. The ECM will recognize the open EST circuit the next time the engine is cranked.

EMH.3 - R ELECTRONIC SPARK CONTROL (ESC) & BOOST CONTROL

The 'Tech 1' tool has two positions to help diagnose a problem in this circuit. 'Knock signal' is used to monitor the input signal from the knock sensor. In this position, a 'YES' is displayed when knock is being detected and a 'NO' when it is not. 'Knock Retard' displays how much the ECM is retarding spark timing in crankshaft degrees.

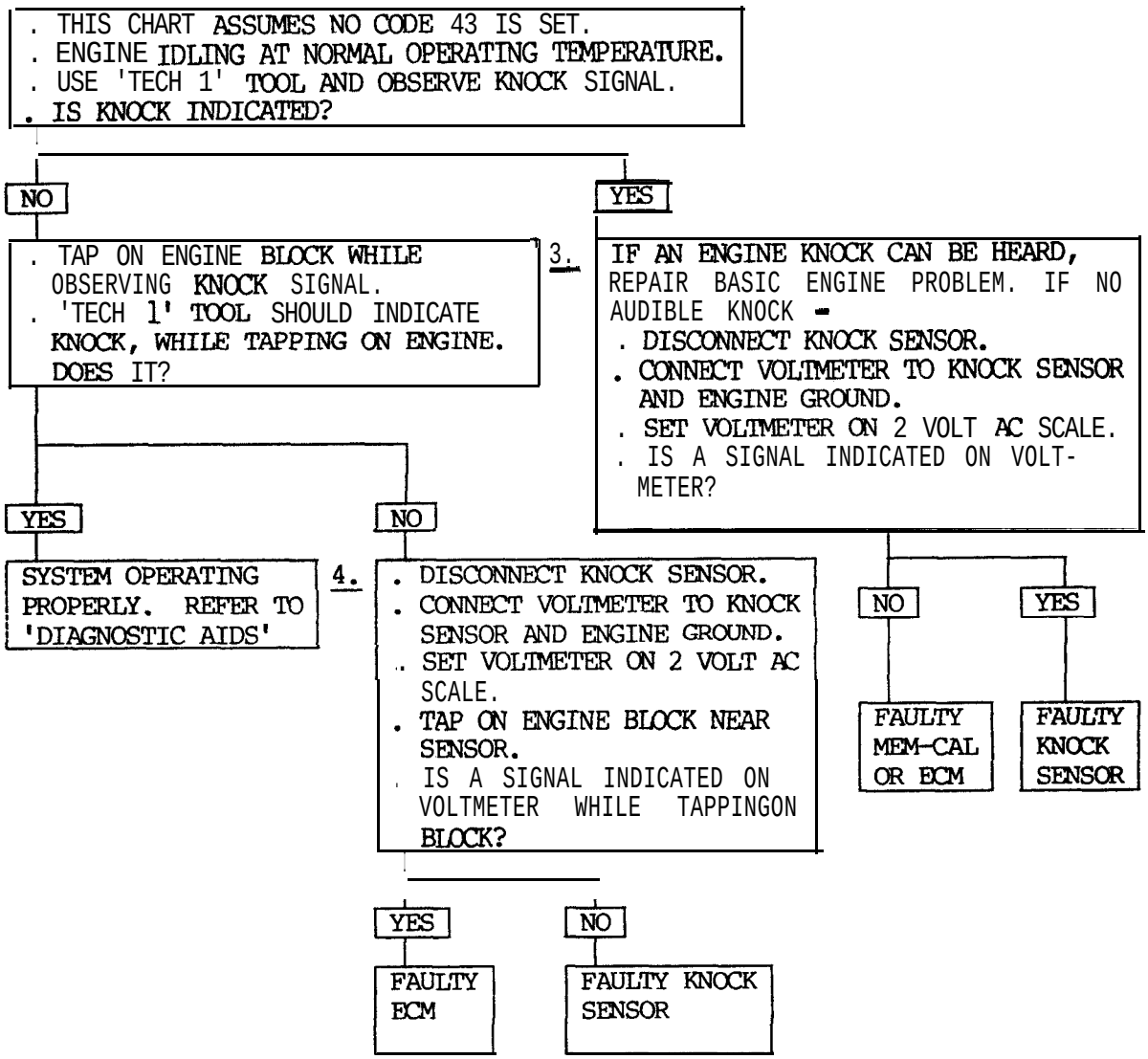
Any problem associated with the knock sensor or its wiring should set a Code 43. To establish whether the knock sensor is functioning correctly, refer to Code 43 in section EMH.4.

Circuit Description



The knock sensor is used to detect engine detonation and the ECM will retard the electronic spark timing based on the signal being received. The circuitry within the knock sensor causes the ECM's 5 volts to be pulled down so that Circuit 37 would measure about 2.5 volts. The knock sensor produces an AC signal which rides on the 2.5 volts DC voltage. The amplitude and frequency are dependent upon the knock level. The ESC portion of the Mem-Cal then sends a signal to other parts of the ECM which adjust the spark timing (and boost pressure) to reduce detonation.

Diagnostic Chart - Knock Sensor



Test Description: Numbers below refer to underlined numbers on the diagnostic chart.

1. With engine idling, there should not be a knock signal present at the ECM because detonation is not likely under a no load condition.

2. Tapping on the engine block should simulate a knock signal to determine if the sensor is capable of detecting detonation. If no knock is detected, try tapping on engine block closer to sensor before replacing sensor.

3. If the engine has an internal problem which is creating a knock, the knock sensor may be responding to the internal failure.

4. This test determines if the knock sensor is faulty or if the ESC portion of the Mem-Cal is faulty. If it is determined that the Mem-Cal is faulty, be sure that it is properly installed and latched into place. If not properly installed, repair and retest.

Diagnostic Aids

While observing 'knock signal' on the 'Tech 1' tool, there should be a 'YES' display when detonation can be heard. Detonation is most likely to occur under high engine load conditions.

Turbo Roost Control

The pulse width modulated turbo boost control vacuum solenoid valve is located at the left hand end of the engine bay relay box.

In order to establish whether the boost control system is reacting to a knock signal, it is necessary to drive the car with an assistant who can observe the 'Tech 1' tool.

The tool should be set to display both ESC (knock retard) and MAP (manifold absolute pressure), and the car driven until a knock retard is registered. At the same time as a knock retard is displayed, the MAP reading should reduce slightly showing that the pulse width modulation of the frequency valve has been changed to reduce turbo boost pressure.

Knock Sensor Replacement

The knock sensor is fited into the RH side of the engine block. To remove the sensor, release the electrical connector and unscrew sensor from block.

When refitting, note that the sensor uses a taper thread, and should be fitted DRY to a torque tightness of 17 - 21 Nm (13 - 15 lbf.ft).

EMH.3 - S EVAPORATIVE EMISSION CONTROL SYSTEM (EECS)

Circuit Description

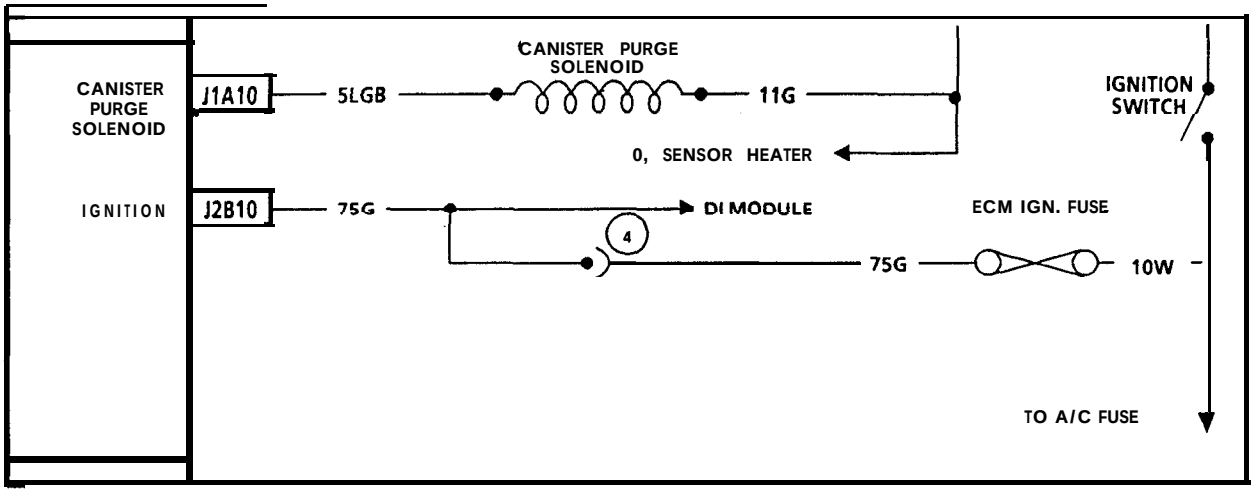
Canister purge is controlled by a solenoid that allows manifold vacuum to purge the canister when energised. The electronic control module (ECM) supplies a ground to energise the solenoid (purge 'ON'). The purge solenoid control by the ECM is pulse width modulated (turned 'ON' and 'OFF' several times a second). The duty cycle (pulse width) is determined by 'Closed Loop' feedback from the 02 sensor. The duty cycle is calculated by the ECM and the output commanded when the following conditions have been met:

- Engine run time after start up is more than one minute
- Coolant is at normal running temperature.

Also, if the diagnostic test terminal is grounded with the engine stopped, the purge solenoid is energised (purge 'ON').

The ECM has a diagnostic capability to set a Code 26 in the event of a disconnected or shorted wire.

Circuit Schematic



Symptoms of Incorrect Operation

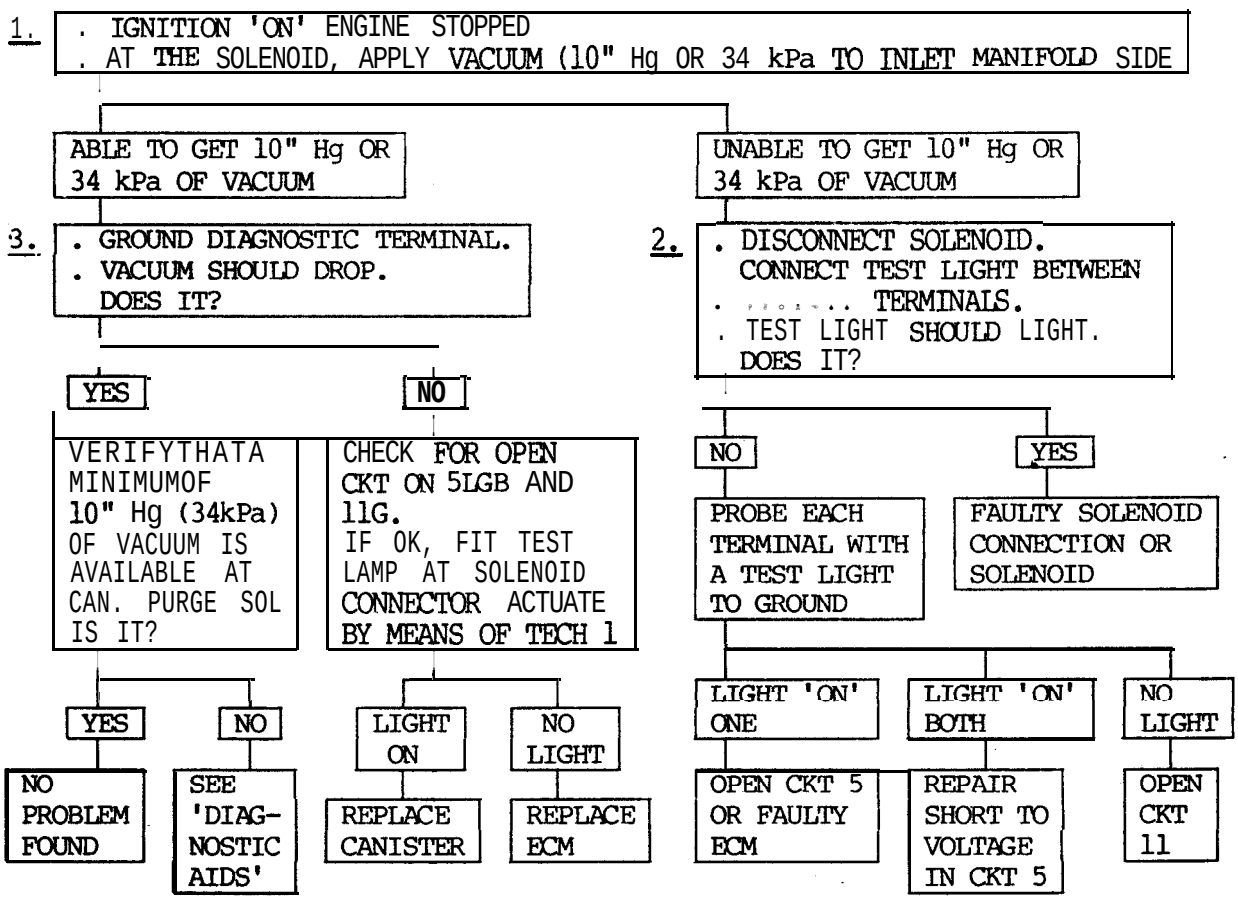
Poor idle, stalling and poor driveability can be caused by:
- Inoperative purge solenoid
- Damaged canister
- Hoses split, cracked and/or not connected to the proper tubes.

Evidenceof fuel loss or fuelvapour odour can be caused. by:
- Liquid fuel leaking from fuel lines, or fuel pump
- Cracked or damaged canister
- Disconnected, mis-routed, kinked, deteriorated or damaged vapour hoses or control hoses.

If the solenoid is always open, the canister can purge to the intake manifold at all times. This can allow extra fuel at idle or during warm up, which can cause rough or unstable idle, or too rich operation.

If the solenoid is always closed, the canister can become over-loaded, resulting in fuel odour.

Diagnostic Chart



Test Description: Numbers below refer to underlined numbers on the diagnostic chart.

1. Checks to see if the solenoid is opened or closed. The solenoid is normally de-energised in this step, so it should be closed.

2. Checks for a complete circuit. Normally there is ignition voltage on Circuit 11 and the ECM provides a ground on Circuit 5.

3. Completes functional check by grounding test terminal. This should normally energise the solenoid opening the valve which should allow the vacuum to drop (purge 'ON').

Diagnostic Aids:

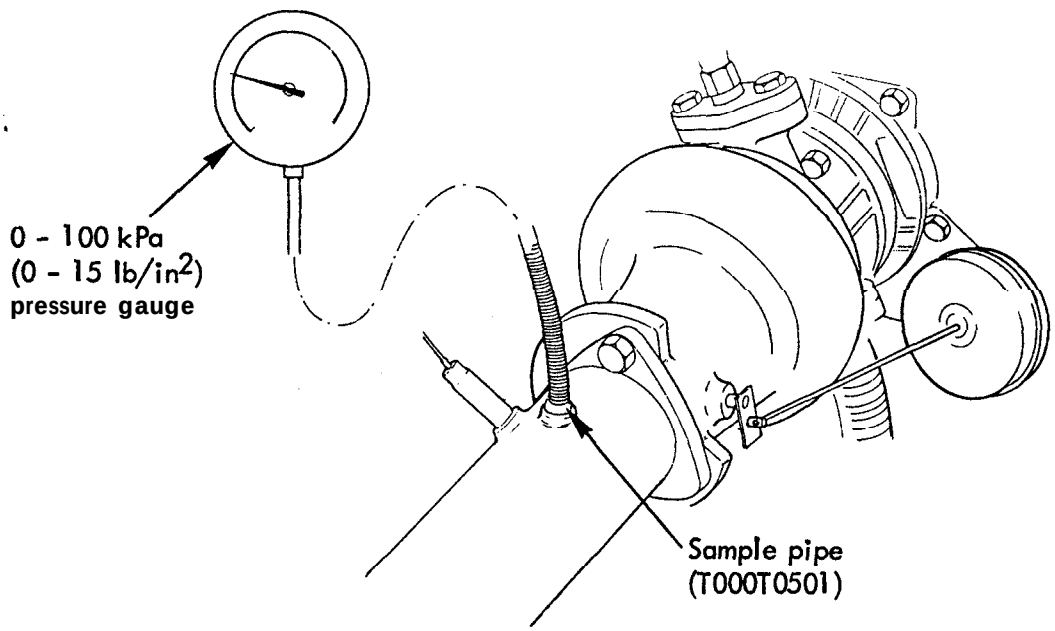
Make a visual check of vacuum hose(s). Check manifold vacuum rail for possible cracked, broken, or plugged vacuum block. Check engine for possible mechanical problem.

EMH.3 - T EXHAUST BACK PRESSURE VALVE & THROTTLE JACK

Exhaust Back Pressure Valve Check/Adjust Procedure

With the engine at normal running temperature:

1. Fit an exhaust sample probe (TOOOT0501) into the take off port provided in the exhaust pipe adjacent to the turbocharger outlet. Connect this pipe to a 0 - 100 kPa (0 - 15 lb/sq.in) pressure gauge.

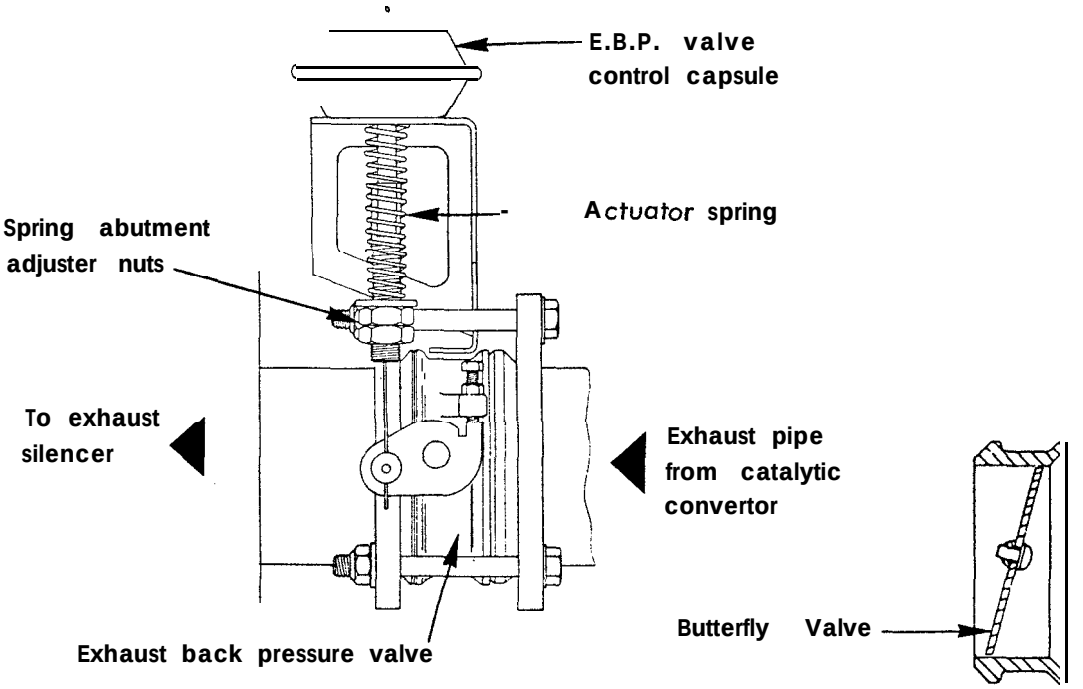


2. Disconnect and plug the vacuum from the exhaust back pressure (EBP) valve control capsule to permit the valve to close.

3. Manually raise engine speed to 2,600 rpm and check exhaust back pressure reading on the gauge.
Specification = 14 - 27 kPa (2 to 4 lb/sq.in)

4. If necessary, adjust the EBP valve spring abutment nuts to achieve the specified back pressure. Ensure nuts are locked together when the correct setting has been attained.

5. Reconnect vacuum pipe to the EBP valve control capsule.

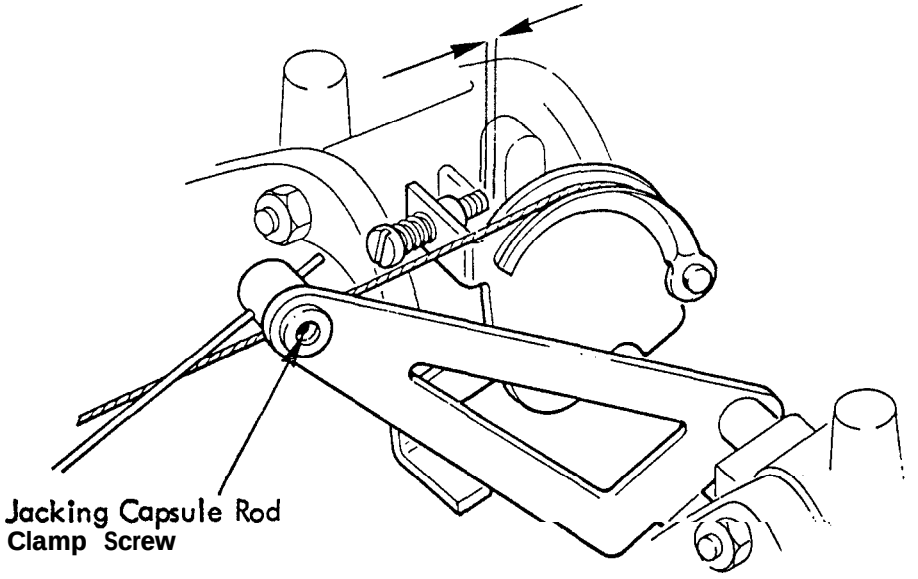


Throttle Jacking Capsule Check/Adjust Procedure

With the engine stopped:

1. Use a hand operated vacuum pump (T000T0907) connected directly to the throttle jacking capsule (TJC) to fully operate the throttle jack.

2. Measure the gap between the minimum air rate adjustment screw and its throttle body abutment.
Specification = 1.3 ± 0.1 mm (0.050 ± 0.005 in.)



If necessary, slacken the grub screw securing the capsule rod to the throttle lever, and adjust to achieve specification.

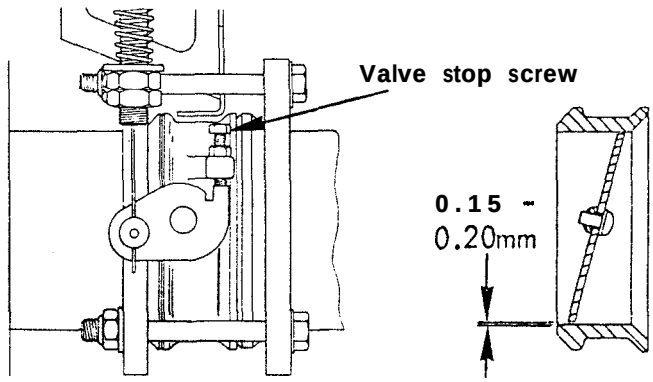
3. Reconnect vacuum pipe to capsule.

To Replace Exhaust Pack Pressure Valve

The valve assembly is clamped between the conical joints of the exhaust outlet pipe of the catalytic converter, and the inlet pipe of the silencer using three bolts.

To remove the valve, first slacken the grub screw securing the valve operating arm to the capsule rod, release the three clamp bolts and carefully withdraw the valve assembly, sliding off from the capsule rod.

Before refitting a valve, first check for free movement of the valve from fully closed to fully open. Using a narrow gauge, check the clearance between the valve plate and body with the valve fully closed, and if necessary, adjust the stop screw to provide a clearance of 0.15 - 0.20 mm (0.006 - 0.008 in.).



Fit the valve to the vehicle, sliding the vacuum capsule actuating rod through the trunnion on the valve operating arm. Before tightening the three clamp bolts, check that the valve spindle axis is positioned at 90" to the actuator rod. Push the rod against its spring pressure slightly before tightening the trunnion grub screw.

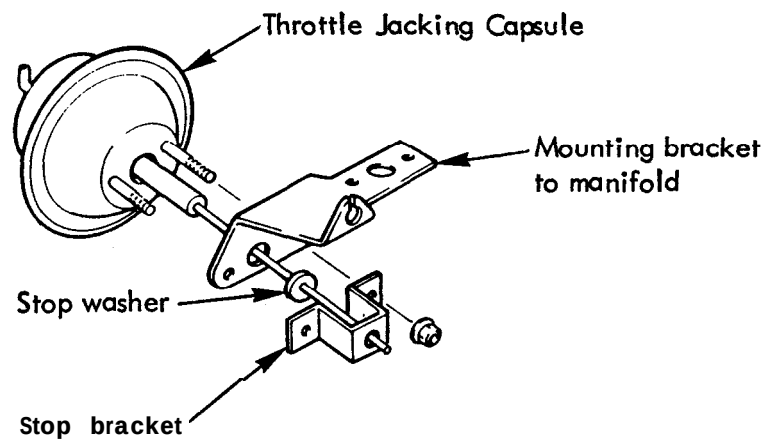
Check the setting of the back pressure spring abutment nuts as detailed above.

To Replace Throttle Jacking Capsule

1. Release the throttle cable nipple from the quadrant, disconnect the capsule vacuum hose, and slacken the capsule rod grub screw.

2. Release the two screws securing the capsule mounting bracket to the inlet manifold and carefully remove the assembly, withdrawing the capsule rod from its trunnion.

3. Release the two nuts securing the capsule and stop bracket to the mounting bracket and remove the capsule.



4. On re-assembly, do not omit the stop washer when fitting the capsule and stop bracket to the mounting bracket.

5. Fit the assembly to the manifold, feeding the actuator rod through its trunnion, and tightening the two bracket fixing screws.

6. Refit the throttle cable and capsule vacuum pipe. Adjust capsule rod as detailed above.

SECTION EMH.4

TROUBLE CODE DIAGNOSIS USING "TECH 1" TOOL

BASIC PROCEDURE

If you have not reviewed the basic information on how to use the diagnostic procedures, see introduction Section EMH.1. The facing page of each chart in Section EMH.4 will provide a general circuit description, and in some instances, alternate diagnostic steps or other diagnostic aids specific to that chart or circuit.

DIAGNOSTIC CIRCUIT CHECK

The "Diagnostic Circuit Check" verifies the system is functioning correctly. Some special considerations to keep in mind while making the "Diagnostic Circuit Check" are:

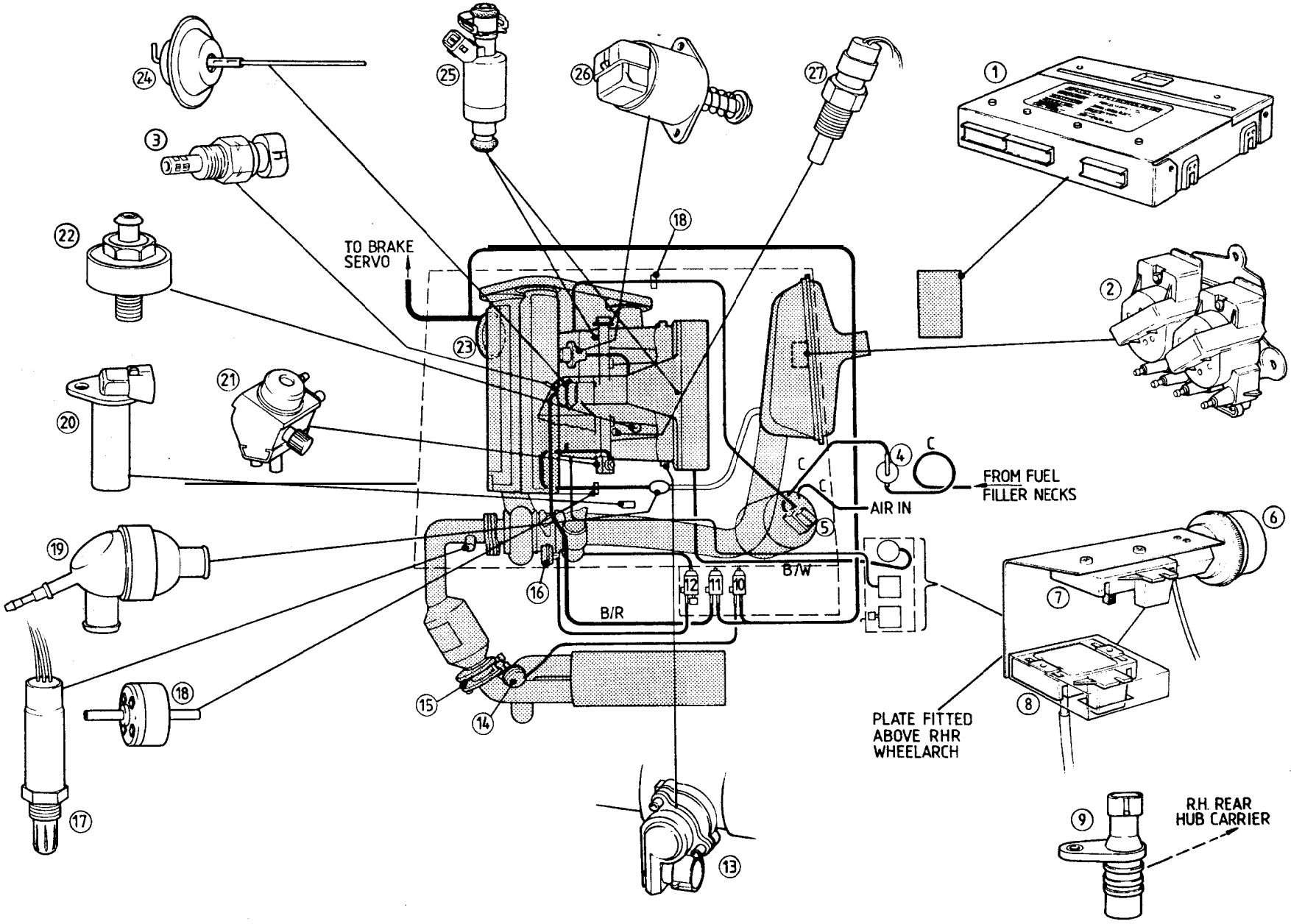
Blocking Drive Wheels

The vehicle drive wheels should always be blocked and the emergency brake set while checking the system.

Cold Oxygen Sensor

The oxygen sensor will cool off rapidly after the engine has been shut off. This will put the system into "Open Loop" when the engine is restarted. "Closed Loop" operation should be achieved again after a short period, if the oxygen sensor heater is functioning properly.

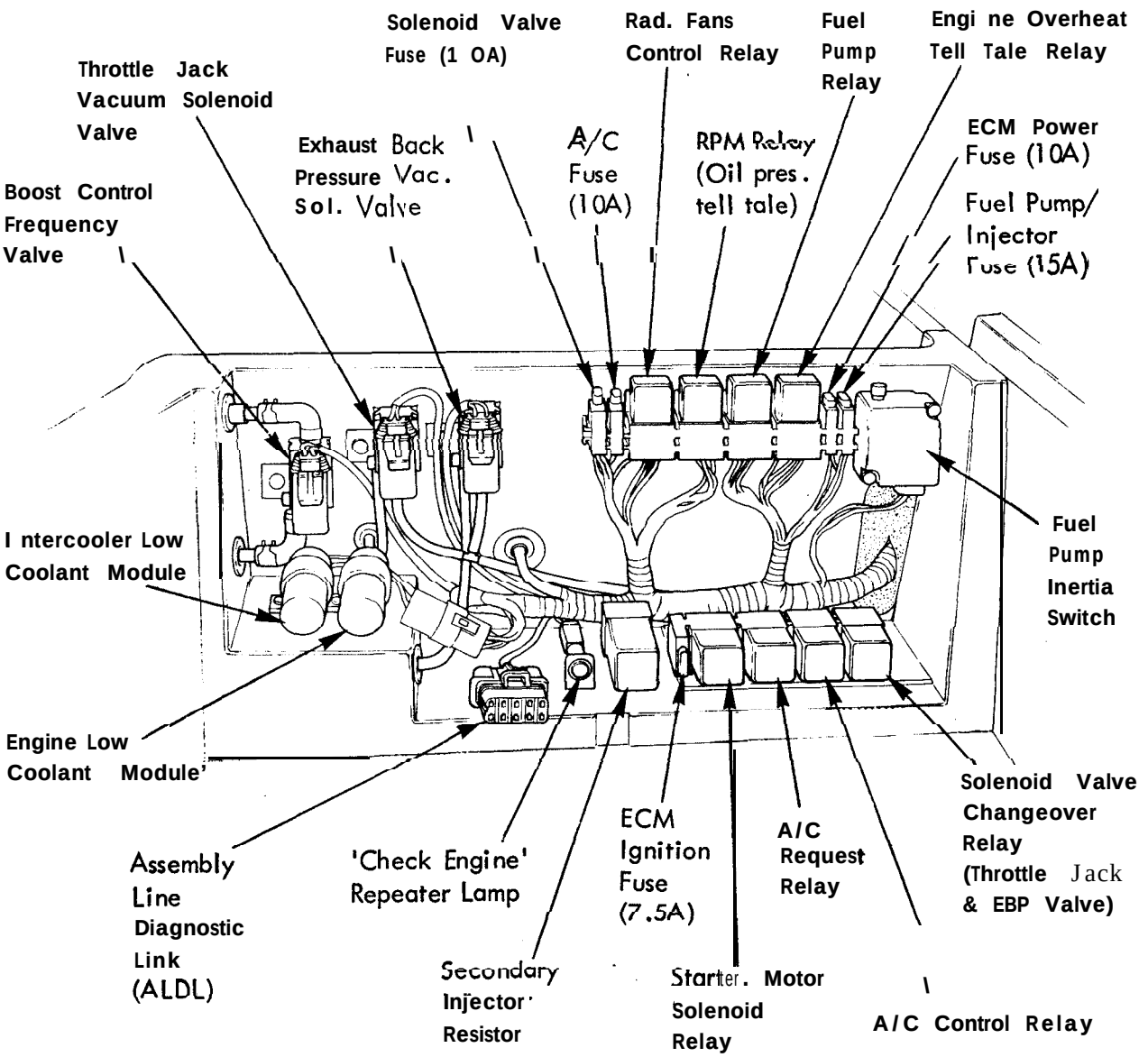
SECTION EMH.4 - TABLE OF CONTENTS

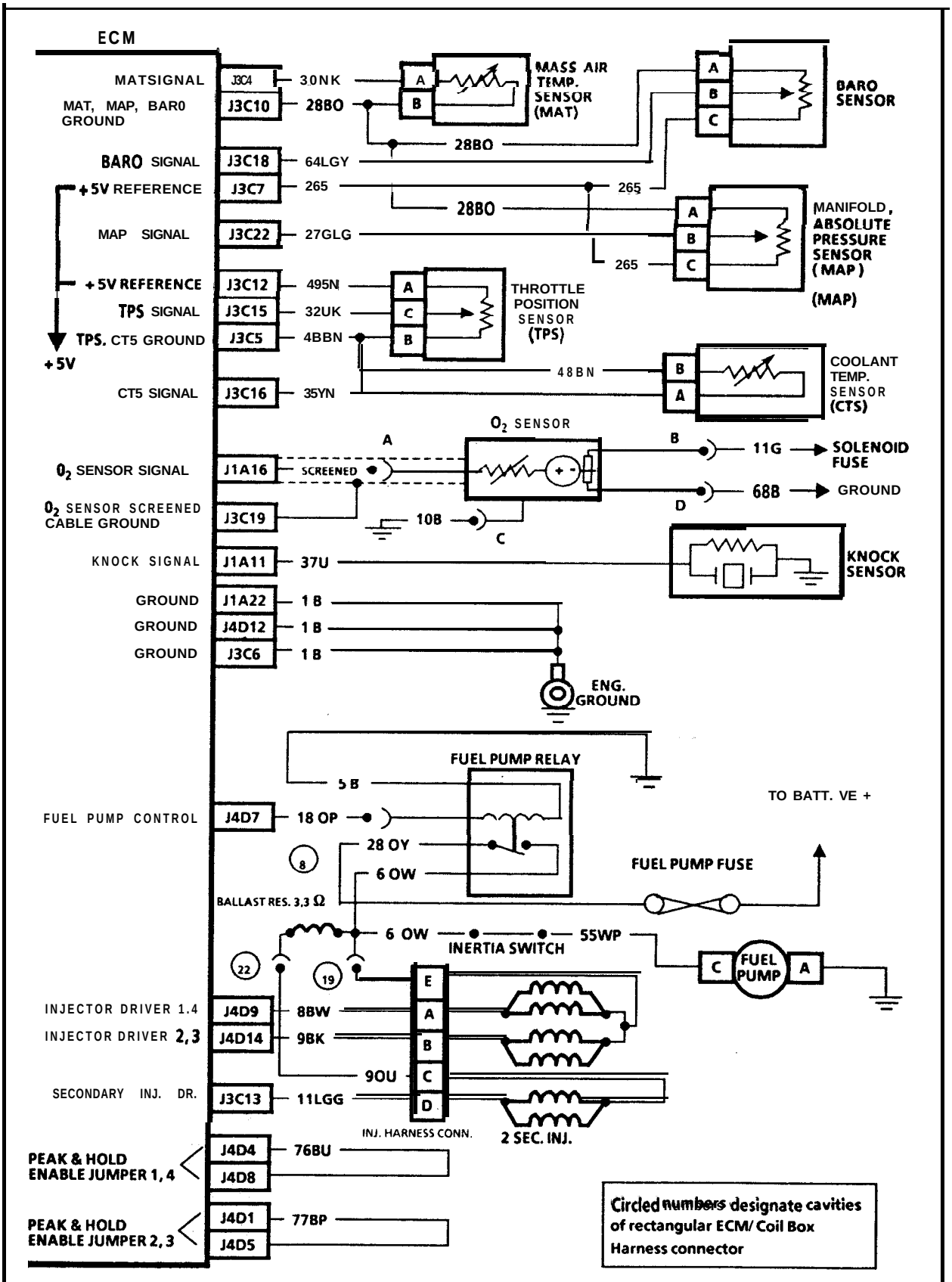

TO BRAKE SERVO
FROM FUEL FILLER NECKS
AIR IN
B/W
B/R
PLATE FITTED ABOVE RHR WHEELARCH
R.H. REAR HUB CARRIER

Key to Component Location Diagram

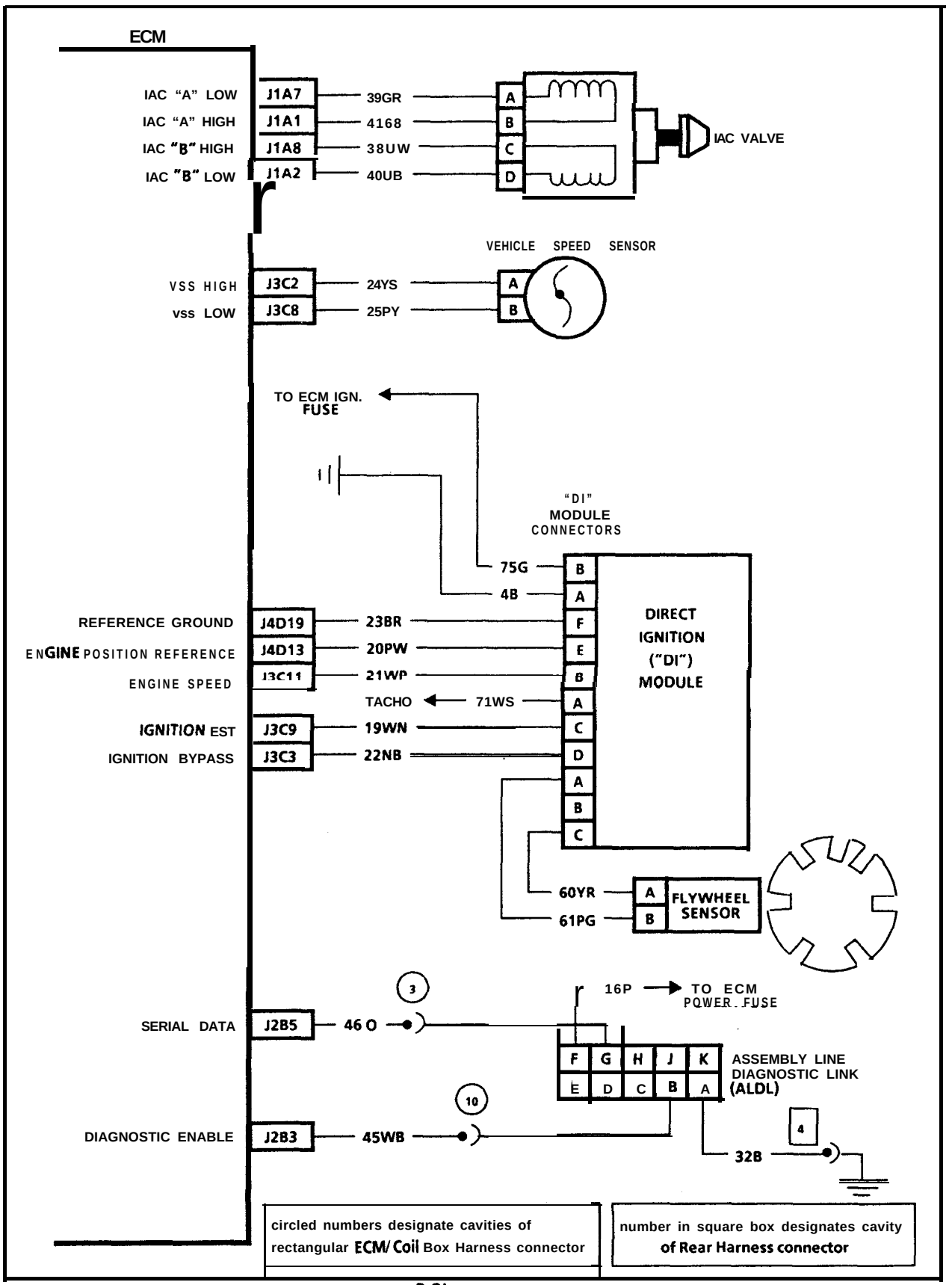
1. Electronic Control Module (ECM)
2. Direct Ignition (DI) module & H.T. coils
3. Mass Air Temperature (MAT) sensor
4. Roll-over valve
5. Charcoal canister
6. Boost gauge transducer
7. Barometric pressure sensor
8. Manifold Air Pressure (MAP) sensor
9. Vehicle Speed Sensor (VSS)
10. Exhaust Back Pressure (EBP) valve solenoid
11. Throttle jack solenoid valve
12. Boost control solenoid valve
13. Throttle Position Sensor (TPS)
14. Exhaust Back Pressure (EBP) valve capsule
15. Exhaust Back Pressure (EBP) valve
16. Turbo wastegate actuator
17. Exhaust oxygen (02) sensor
18. One-way valve
19. Crankcase breather valve
20. Flywheel sensor
21. Fuel pressure regulator valve
22. Knock sensor
23. Vacuum pump
24. Throttle Jacking Capsule (TJC)
25. Fuel injector
26. Idle Air Control (IAC) valve
27. Coolant Temperature Sensor (CTS)

Engine Bay Relay Box Canponent Identification

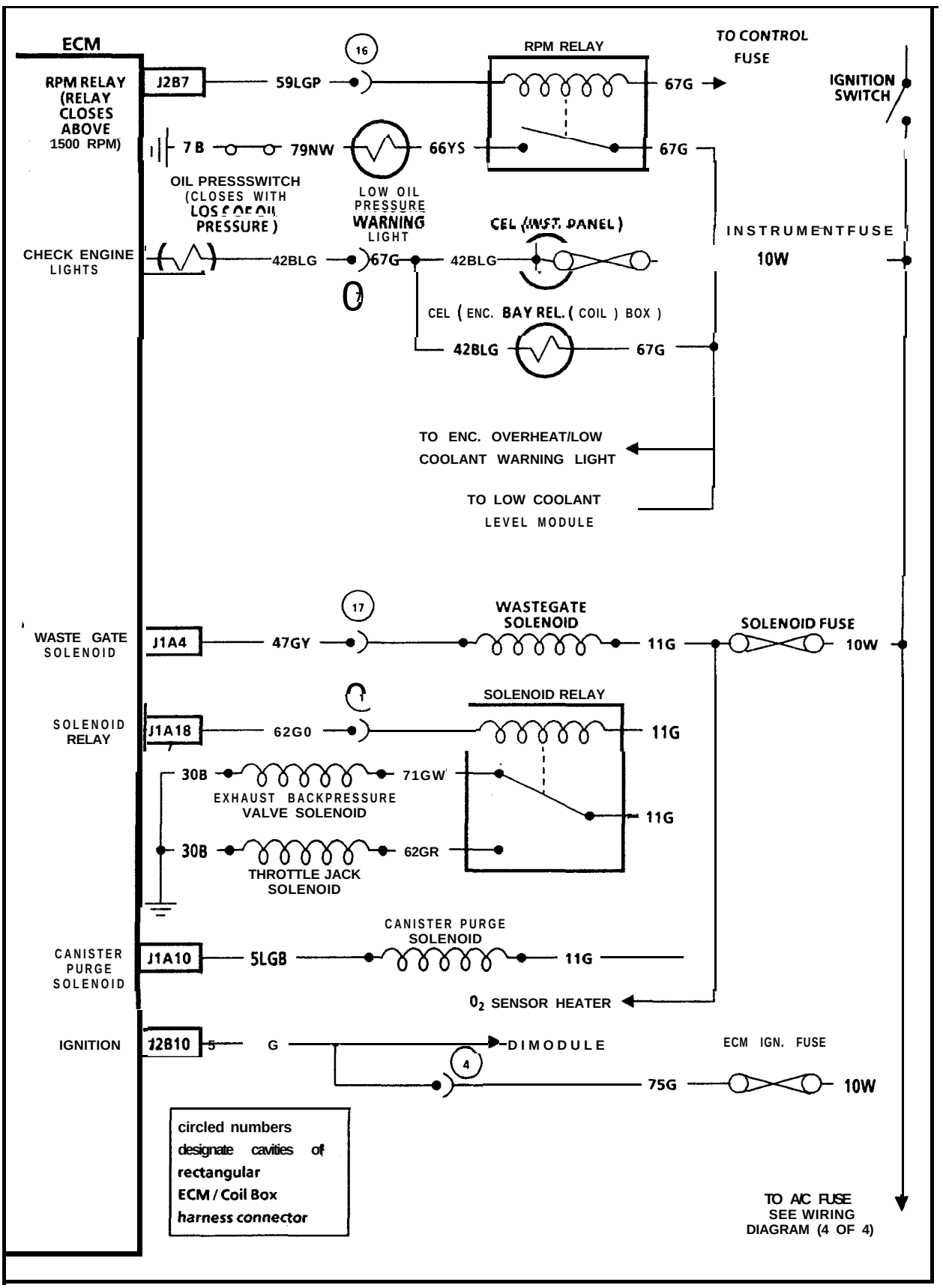




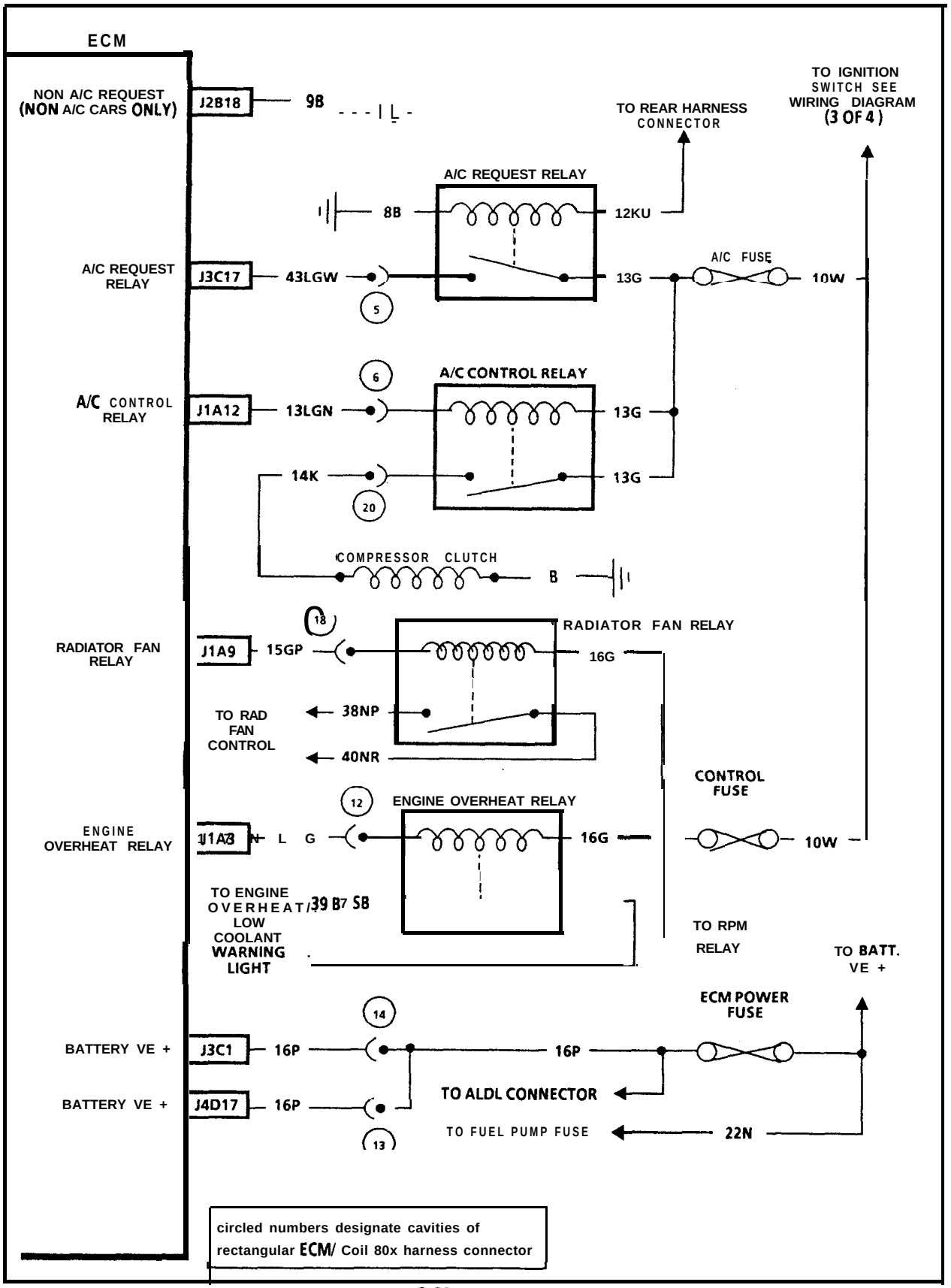
ECM Wiring Diagram. (1 of 4) - 2.2L INTERCOOLED TURBO LOTUS ESPRIT



ECM Wiring Diagram (2 of 4) • 2.2L INTERCOOLED TURBO LOTUS ESPRIT



ECM Wiring Diagram (3 014) • 2.2L INTERCOOLED TURBO LOTUS ESPRIT



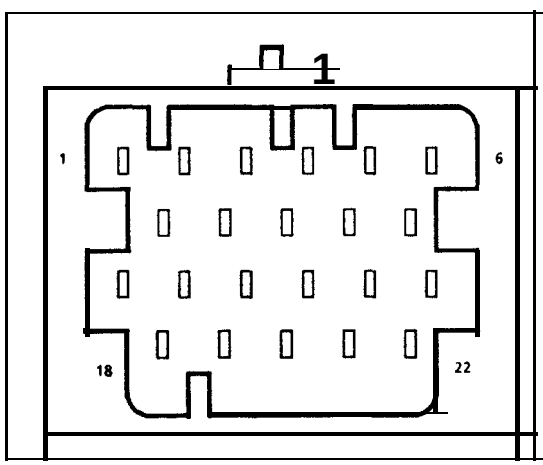
ECM Wiring Diagram (4 of 4) • 2.2L INTERCOOLED TURBO LOTUS ESPRIT

ECM CONNECTOR TERMINAL FRONT VIEW

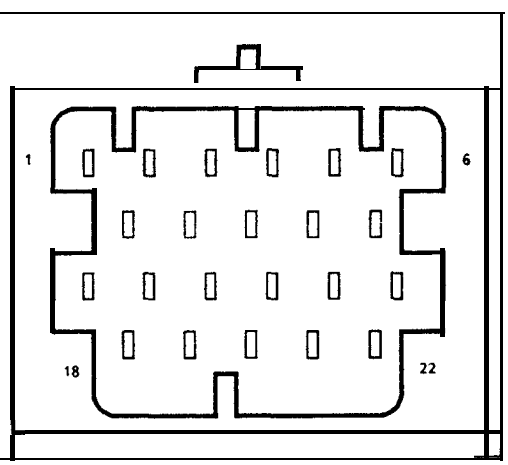
Some tests require to measure voltage at the Electronic Control Module (ECM) harness connector. In order to do that one out of 4 connectors need to be disconnected while the others stay installed.

Always turn "OFF" ignition before disconnecting or installing the ECM connectors.

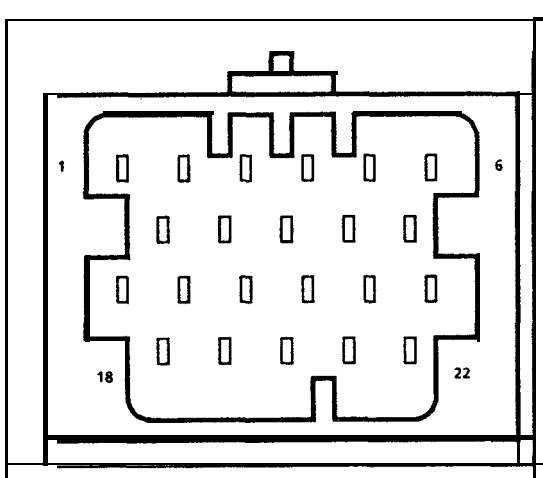
CONNECTOR J1 (A) YELLOW



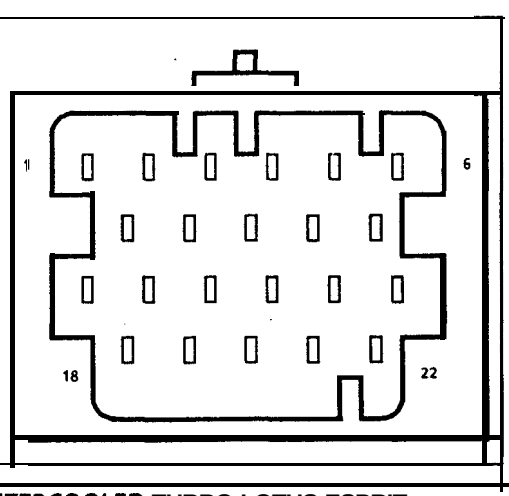
CONNECTOR J2 (B) RED



CONNECTOR J3 (C) GREEN



CONNECTOR J4 (D) BROWN



ECM Connector Terminal View - 2.2 L INTERCOOLED TURBO LOTUS ESPRIT

DIAGNOSTIC CIRCUIT CHECK

The Diagnostic Circuit Check is an organized approach to identifying a problem created by an electronic engine control system malfunction. It must be the starting point for any driveability complaint diagnosis, **because** it directs the service technician to the next logical step in diagnosing the complaint.

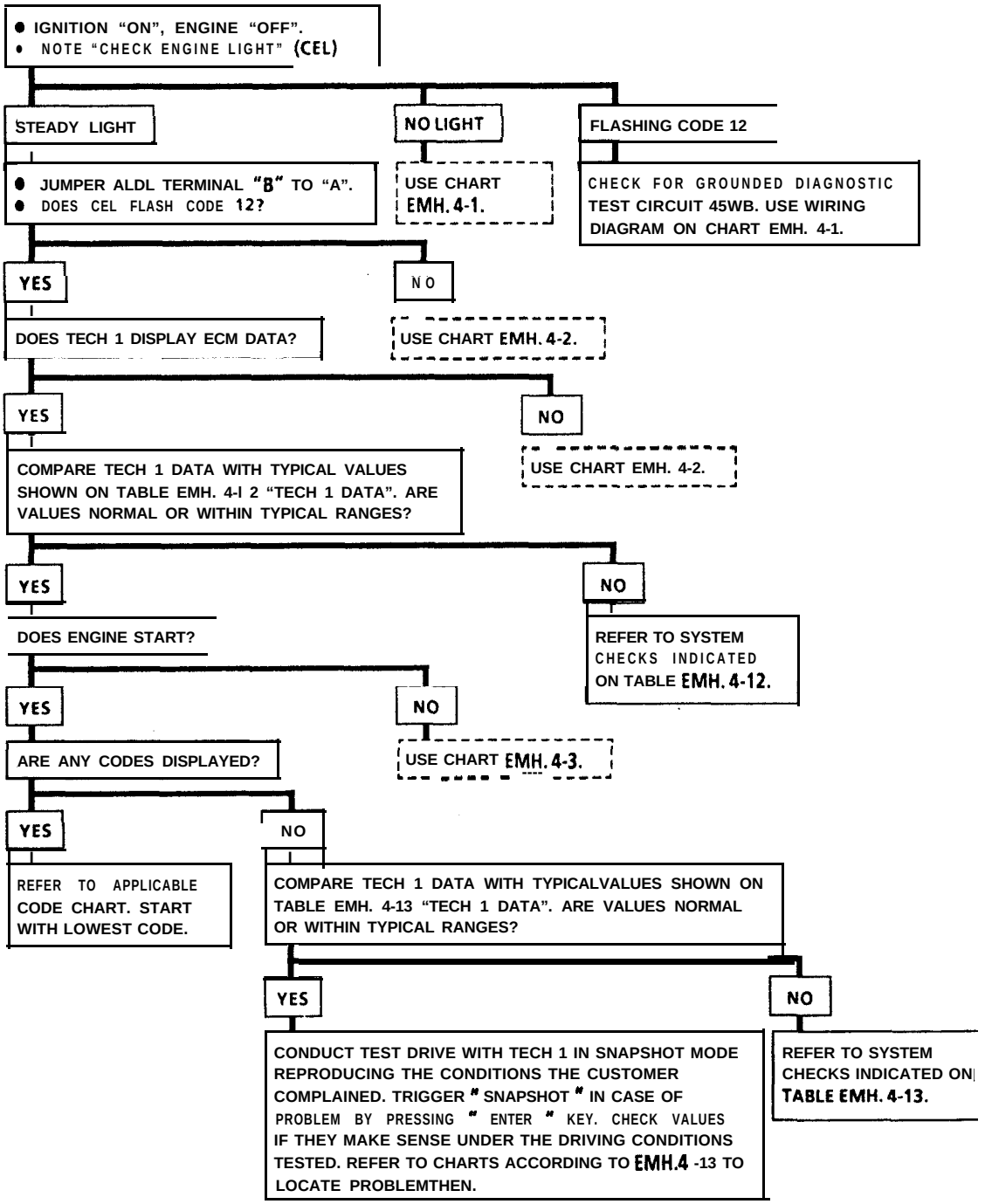
The TECH 1 data listed in the tables EMH.4 - 1'2 and EMH.4 - 13 may be used for comparison, after completing the diagnostic circuit check and finding the on-board diagnostics functioning properly and no trouble codes displayed. The "Typical Values" are an average of display values recorded from normally operating vehicles and are intended to represent what a normally functioning system would typically display. Figure EMH. 4 -12 is intended to check a cold engine while fig. EMH. 4 - 13 is valid for engine running at idle.

IF THE TECH 1 DISPLAYS FAULTY DATA IT SHOULD NOT BE USED, AND THE PROBLEM SHOULD BE REPORTED TO THE MANUFACTURER. THE USE OF A FAULTY TECH 1 CAN RESULT IN MISDIAGNOSIS AND UNNECESSARY PARTS REPLACEMENT.

Only the parameters listed in EMH.4-12 and EMH.4-13 are used in this manual for diagnosing. If TECH 1 reads other parameters, check if the correct Lotus cartridge is inserted. Check engine according EMH.4-12 first and correct problems referring to the charts specified. if all values are within the range illustrated, start engine, run it up to normal operating temperature and proceed checking according to EMH.4 - 13.

DIAGNOSTIC CIRCUIT CHECK

2.2L INTERCOOLED TURBO LOTUS ESPRIT



TECH 1 DATA

Enq. "OFF" / Ign. "ON" / Enq. Cold (parked overnight)

TECH 1 Position	Units Displayed	Typical Data Value (Range)	If Data Out Of Range, Refer To. . .
Engine Speed	RPM	0	
Desired Idle	RPM	depends on coolant	
Coolant Temp.	C/F	close to ambient	Code 14 / 15 Charts
Mass Air Temp.	C/F	ambient	Code 23 / 25 Charts
MAP	kPa/V	close to baro	Code 33 / 34 Charts
BARO	kPa/V	dep. on altitude and baro	Code 31 Chart
Idle Air Control	Counts	170	
Engine Speed	RPM	0	
Throt Position	V	0.45 - 0.70 (closed)	Code 21 / 22 Chart
Throttle Angle	%	0 closed, >95 at WOT	Code 21 / 22 Chart
Oxygen Sensor	mV	approx. 455	Code 13
Inj. Pulse Width	msec	depends on coolant	
Spark Advance	DEG	75	
MPH KPH	MPH KPH	0	
Fuel Integrator	Counts	128	
Block Learn	Counts	not valid	
Open/Closed Loop	Open/Closed Loop	Open Loop	
Block Learn Cell	#Cell	19	
Knock Retard	DEG	0	
Knock Signal	NO/YES	NO	
Battery Voltage	V	approx 12.0	check battery voltage
Purge Duty Cycle	%	0	
A/C Request	YES/NO	NO'	check A/C select switch
A/C Control	OFF/ON	OFF	check A/C select switch
Reference Pulses	YES/NO	NO	
Sync Pulses	Counts	not valid	
QDM Fault A	YES/NO	NO	Code 26 Chart
QDM Fault B	YES/NO	YES (re - check with engine running, see EMH.4 - 13)	
Fan	OFF/ON	OFF	Code 26 Chart
Overheat Relay	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
RPM Relay	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Engine Speed	RPM	0	
Throt Jack Sol.	OFF/ON	OFF	Code 26 Chart
Throt Position	V	0.45 - 0.70 (closed)	Code 21 / 22 Chart
Wastegate Sol.	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Wastegate D.C.	%	0	Code 26 Chart
Secondary Inject.	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Secondary Inj. DC	%	0	Code 26 Chart
PROM ID	#	subject to change during model year	
Time From Start	0 : 00	varying	

TABLE EMH.4 - 12 - 2.2 L INTERCOOLED TURBO LOTUS ESPRIT TECH 1 DATA

TECH 1 DATA

Idle / Upper Radiator Hose Hot/Closed Throttle / "Closed Loop" / A/C "OFF"

TECH 1 Position	Units Displayed	Typical Data Value (Range)	If Data Out Of Range, Refer To.. .
Enqine Speed	RPM	985	Code 35 Chart
Desired Idle	RPM	985	"Kick down " engine speed from elevated. idle.
Coolant Temp.	C / F	80 - 100 / 176 - 212	Code 14 / 15 Charts
Mass Air Temp.	C / F	15 - 35 / 59 - 95	Code 23 / 25 Charts
MAP	kPa / V	45...75	Code 33 / 34 Charts
BARO	kPa / V	70 - 10313.2 - 4.9	Code 3 1 Chart
Idle Air Control	Counts	20-40	Code 35 Chart
Engine Speed	RPM	985	Code 35 Chart
Throt Position	V	0.45 - 0.70 (closed)	Code 2 1 / 22 Chart
Throttle Anale	%	0 (closed)	Code 2 1 / 22 Chart
Oxygen Sensor	mV	50 - 1000, varying	Code 13 / 44 / 45 Charts
Inj. Pulse Width	msec	2.5 - 3.5	Check other Data Values
Spark Advance	DEG	5 - 11	Check other Data Values
MPH KPH	MPH KPH	0	Code 24 Chart
Fuel Integrator	Counts	120 - 140, varying	Code 13 / 44 / 45 Charts
Block Learn	Counts	90 - 150	Code 13 / 44 / 45 Charts
Open/Closed Loop	Open/Closed Loop	Closed Loop	Code 13 / 44 / 45 Charts
Block Learn Cell	#Cell	19	Throt.. Position Data
Knock Retard	DEG	0	Code 43 Chart
Knock Signal	NO/YES	NO	Code 43 Chart
Battery Voltage	V	13.5 - 14.5	check battery voltage
Purge Duty Cycle	%	0 - 100. varying	
A/C Request	i-ES/NO	NO	check A/C select switch
A/C Control	OFF/ON	OFF	check A/C select switch
Reference Pulses	YES/NO	YES	
Sync Pulses	Counts	0 - 2, varyi nq	
QDM Fault A	YES/NO	NO	Code 26 Chart
QDM Fault B	YES/NO	NO	Code 26 Chart
Fan	OFF/ON	OFF(ON above 93°)	Code 26 Chart
Overheat Relav	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
RPM Relay	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Engine Speed	RPM	985	Code 35 Chart
Throt Jack Sol.	OFF/ON	OFF	Code 26 Ch art
Throt Position	V	0.45 - 0.70 (closed)	Code21 / 22 Chart
Wastegate Sol.	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Wastegate D.C.	%	0	Code 26 Chart
Secondary Inject.	INACTIVE/ACTIVE	INACTIVE	Code 26 Chart
Secondary Inj. DC	%	0	Code 26 Chart
PROM ID	#	subject to change during model vear	
Time From Start	0 : 00	varying	

TABLE EMH.4 - 13 - 2.2 L INTERCOOLED TURBO LOTUS ESPRIT TECH 1 DATA

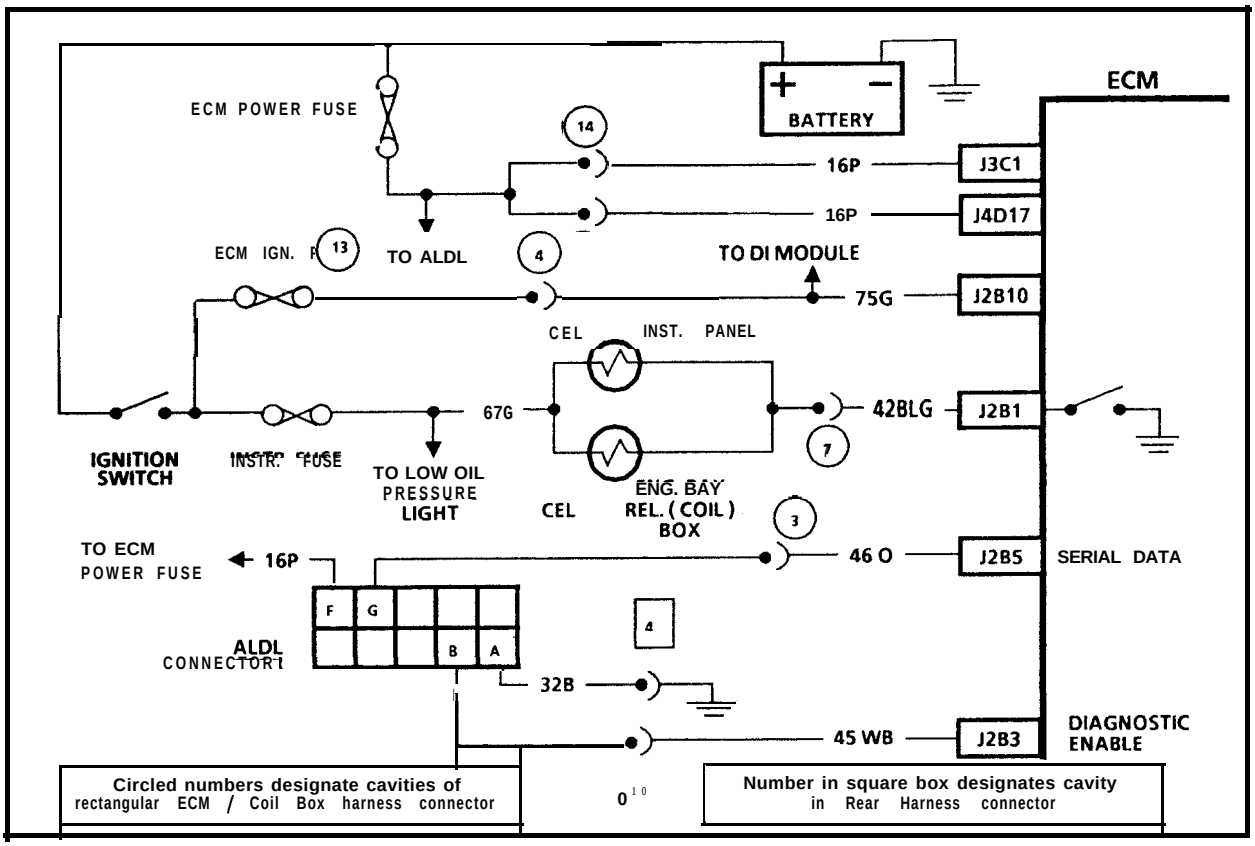


CHART EMH. 4-1

NO "CHECK ENGINE LIGHT"
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

There should always be a steady "Check Engine Light" (CEL) when the ignition is "ON" and engine stopped. Battery voltage is supplied through the ignition switch directly to the light bulb. The electronic control module (ECM) controls the light and turns it "ON" by providing a ground path through CKT 42BLG to the ECM.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. If the fuse is blown, locate and repair short to ground.
2. Using a test light connected to 12V (VE +) probe each of the system ground circuits to be sure a good ground is present. See ECM terminal end view in front of this section for ECM pin locations of ground circuits.

Diagnostic Aids:

Engine runs OK, check:

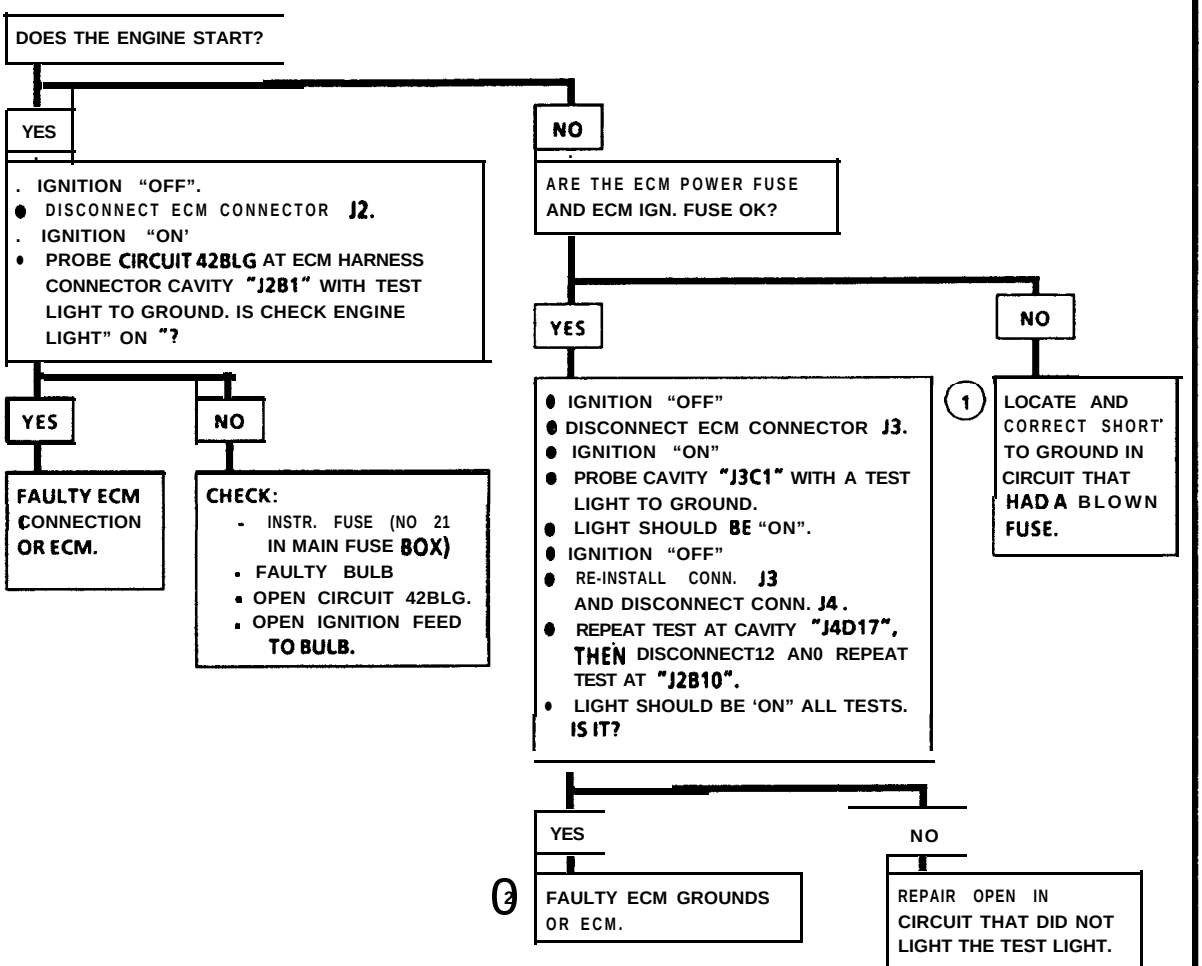
- Faulty light bulb.
- Instrument fuse blown; this will result in the loss of "CEL" and low oil pressure light on the Inst. Panel.

Engine cranks but will not run.

- ECM Power fuse open.
- ECM fuse open.
- Poor connection to ECM.
- Poor ECM ground.
- Battery CKT 16P to ECM open
- Ignition circuit 75G open

CHART EMH. 4-1

NO "CHECK ENGINE LIGHT"
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

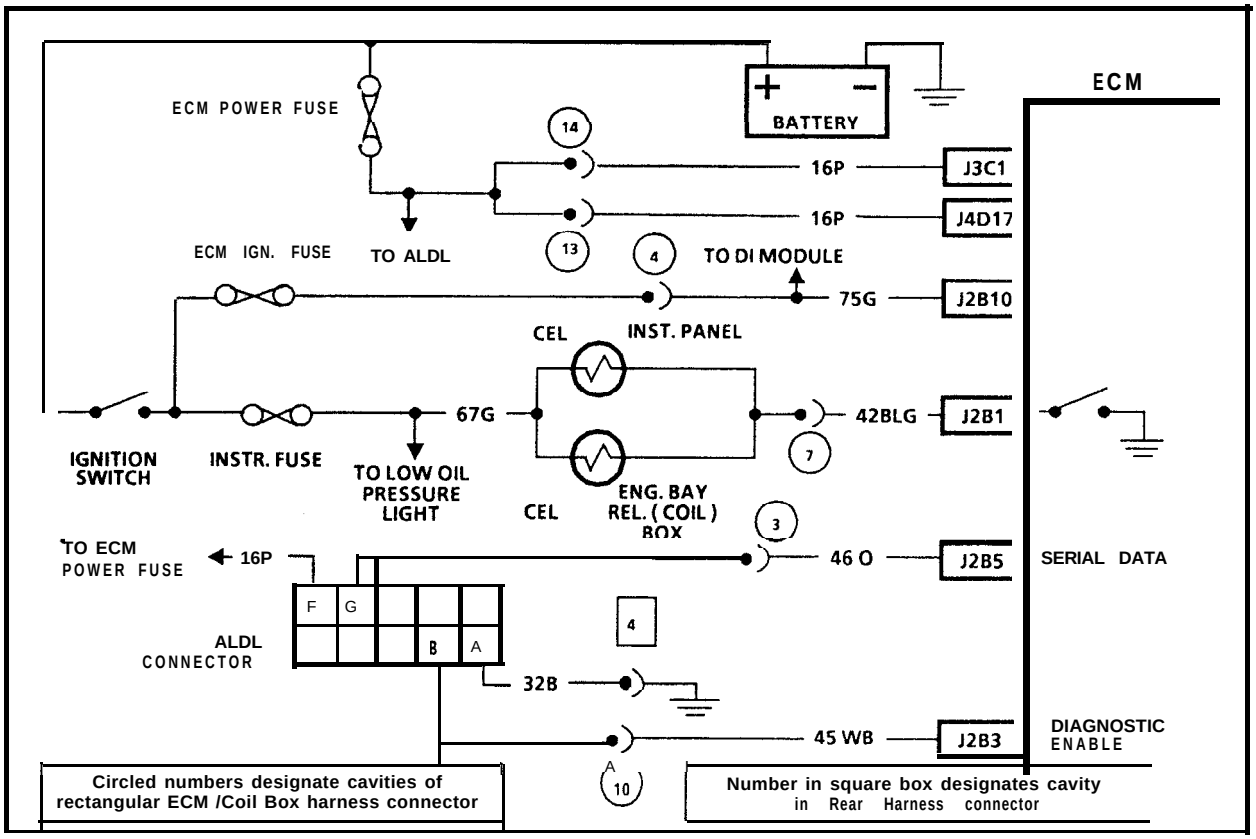


CHART EMH. 4-2

NO ALDL DATA OR WON'T FLASH CODE 12 "CHECK ENGINE LIGHT" "ON" STEADY 2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

There should always be a steady "Check Engine Light" when the ignition is "ON" and engine stopped. Battery ignition voltage is supplied to the light bulb. The electronic control module (ECM) turns the light "ON" by grounding circuit 42BLG at the ECM.

With the diagnostic terminal grounded, the light should flash a Code 12, followed by any trouble code(s) stored in memory.

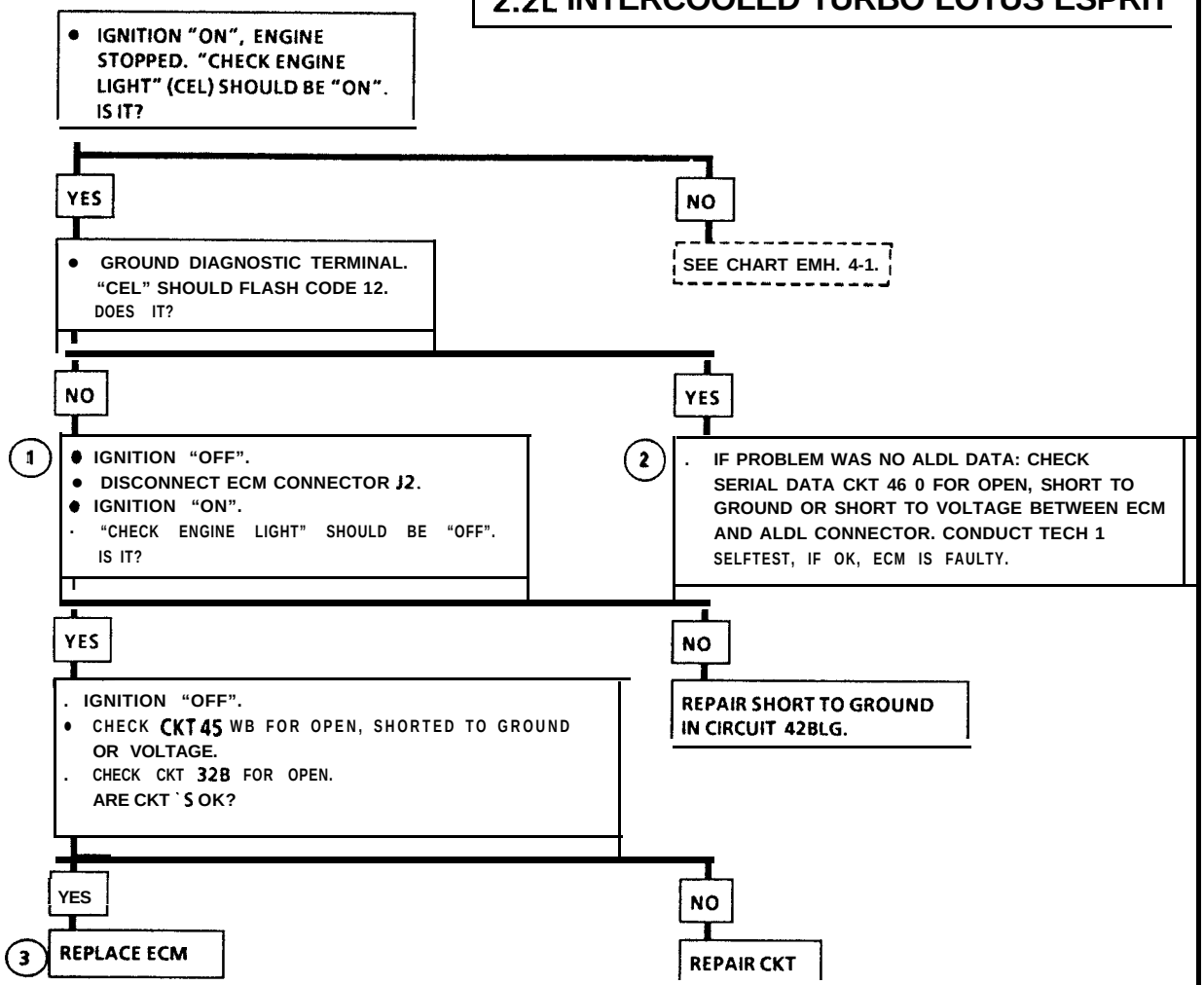
A steady light suggests a short to ground in the light control circuit 42BLG, or an open in diagnostic circuit 45WB.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Light "OFF" with circuit 42BLG disconnected from ECM indicates that ground circuit was completed through the ECM, not through external short to ground.
2. If there is a problem with the ECM that causes the Tech 1 to not read Serial data, the ECM should not flash a Code 12. If Code 12 is flashing, check for CKT 45WB short to ground. If Code 12 does flash, be sure that the TECH 1 is working properly on another vehicle. If the TECH 1 is functioning properly, check CKT 460 for open or short to ground or voltage. If CKT 460 is OK, the ECM may be the fault for the "NO ALDL" symptom.
3. At this point, the "Check Engine Light" wiring is OK. The problem is a faulty ECM.

CHART EMH. 4-2

NO ALDL DATA OR WON'T FLASH CODE 12 "CHECK ENGINE LIGHT" "ON" STEADY 2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

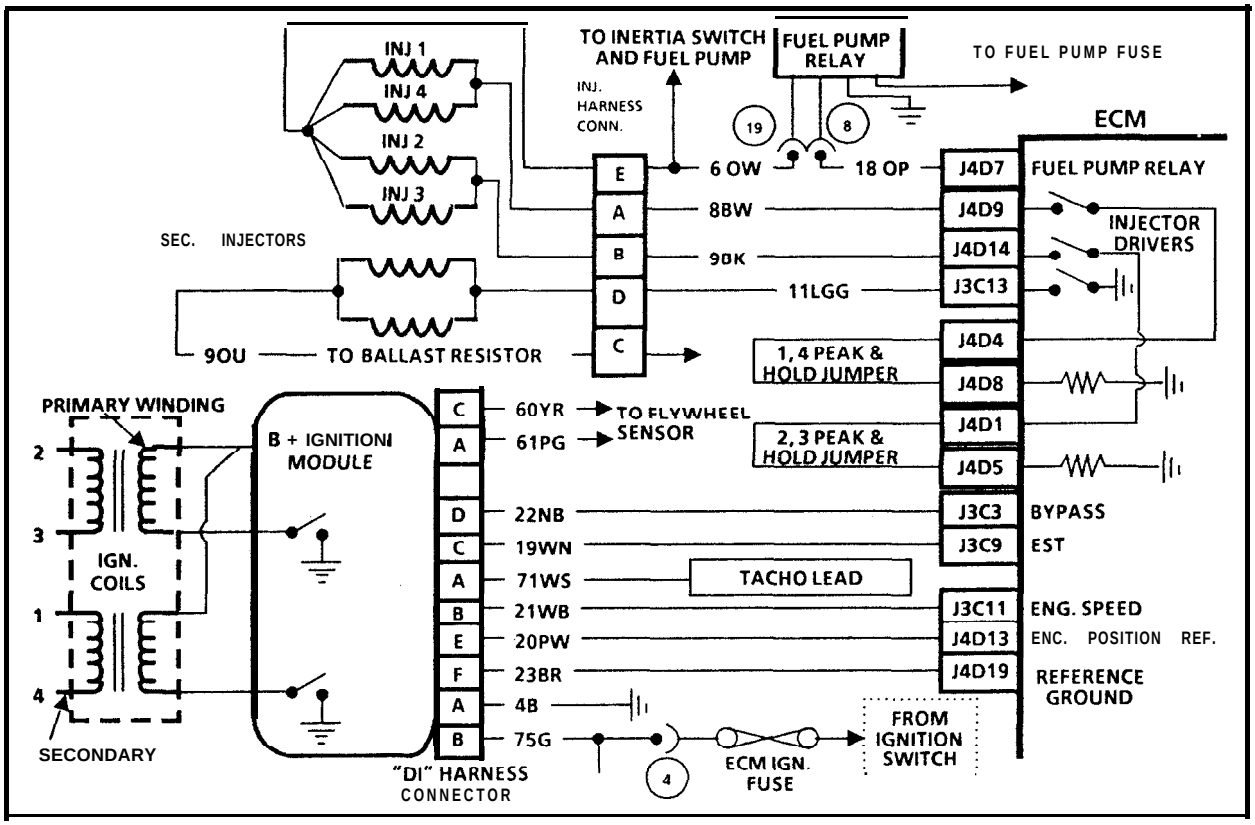


CHART EMH. 4-3

(Page 1 of 3)

ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Condition:

Engine cranks but won't run, or engine may start, but immediately stops running. Battery condition and engine cranking speed are OK and there is adequate fuel in the tank.

Circuit Description:

This engine is equipped with a distributorless ignition system called the " Direct Ignition" system (DI). The primary circuit of the DI consists of two separate ignition coils, an DI (ignition) module and flywheel sensor as well as the related connecting wires and the EST (electronic spark timing) portion of the ECM. Each secondary circuit consists of the secondary winding of the coil, spark plug wires and spark plugs.

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

1. This step verifies that "CEL" operation, on-board diagnostics, cranking rpm, TPS and coolant sensor signals are normal. A blinking test light verifies that the ECM is receiving the DI reference signal and is attempting to activate the injectors.
2. This step checks injector harness and injectors for opens or shorts. Resistance should measure half that of one injector due to parallel circuit.
3. By installing spark plug jumper leads and testing for spark on two adjacent plug leads (do not use 2 & 3 as they are on same coil), each ignition coil's ability to produce at least 25,000 volts is verified.
4. Checks to see if fuel pump and relay are operating correctly (fuel pump only "ON" 2-3 seconds) and fuel pressure is within proper range.
5. This step determines whether harness or injector is cause of incorrect resistance. Nominal injector resistance is 1.9 to 2.1 ohms at 60°C (140°F). Resistance will increase slightly at higher temperatures.

Diagnostic Aids:

Check For:

- TPS binding or sticking in wide open throttle position *or* intermittently shorted *or* open.
- Water or foreign material in fuel.
- Low Compression.
- Verify that only resistor spark plugs are used.

NOTICE: FUEL SYSTEM IS UNDER PRESSURE TO AVOID FUEL SPILLAGE, REFER TO FIELD SERVICE PROCEDURES FOR TESTING OR REPAIRS REQUIRING DISASSEMBLY OF FUEL LINES OR FITTINGS.

CHART EMH. 4-3

(Page 1 of 3)
ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED LOTUS ESPRIT

3
- FUEL PUMP FUSE AND ECM FUSE OK.
- FUEL QUANITY OK.
- IGNITION "ON", THROTTLE CLOSED.
- "CHECK ENGINE LIGHT" SHOULD BE "ON". (IF NOT SEE CHART EMH. 4-1).
- IF TECH 1 INDICATES "NO ALDL". SEE CHART EMH. 4-2
- TPS SIGNAL VOLTAGE SHOULD BE ABOUT 0.45 TO 0.65 V. (IF NOT SEE CODE 21 CHART)
- COOLANT TEMP. SHOULD BE BETWEEN -30°C & 100°C. (IF NOT SEE CODE 14 OR 15 CHART).
- CHECK REFERENCE PULSES OR CRANK RPM WHILE CRANKING ENGINE. (IF "NO" REFERENCE PULSES OR RPM IS "0", BEGIN AT STEP #10 ON CHART EMH. 4-3 PAGE 3 OF 3).
- DISCONNECT 5 TERM. INJ. HARNESS CONNECTOR AND CONNECT INJECTOR TEST LIGHT TOOOT0900 WITH TEST ADAPTER TOOOT0930 BETWEEN CAVITIES "E" AND "A" ON ECM SIDE OF HARNESS.
- CRANK ENGINE AND OBSERVE INJ. TEST LIGHT. (SHOULD BLINK)
- PERFORM TEST AGAIN WITH INJECTOR TEST LIGHT BETWEEN CAVITIES "E" AND "B".
- LIGHT SHOULD BLINK ON BOTH TESTS. DOES IT?

YES

NO → SEE CHART EMH. 4-3 (2 OF 3)

2
- WITH DVM ON 200 OHM SCALE, MEASURE RESISTANCE BETWEEN CAVITIES "E" AND "A" ON INJECTOR SIDE OF 5 TERMINAL INJECTOR HARNESS CONNECTOR.
- PERFORM MEASUREMENT AGAIN BETWEEN CAVITIES "E" AND "B".
- RESISTANCE MEASUREMENT SHOULD BE BETWEEN ABOUT .9 TO 1.2 OHM* ON EACH TEST. IS IT?

YES

NO

3
- REMOVE TEST LIGHT FROM INJ HARNESS.
- CHECK FOR SPARK WITH SPARK TESTER TOOOT0901 ON 2 ADJACENT PLUG WIRES 1&2, THEN 3&4 (NOT 2 & 3) WHILE CRANKING WITH REMAINING PLUG WIRES STILL CONNECTED.
- SPARK SHOULD JUMP TESTER GAP ON ALL WIRES. DOES IT?

0
- DISCONNECT INJECTORS ON CIRCUIT(S) WITH INCORRECT RESISTANCE (CAVITY "A" -INJECTORS #1 AND #4, CAVITY "B" -INJECTORS #2 AND #3).
- WITH DVM ON 200 OHM SCALE, MEASURE RESISTANCE OF EACH INJECTOR.
- RESISTANCE SHOULD BE ABOUT 1.9 TO 2.1 OHMS* IS IT?

YES

NO

4
- INSTALL FUEL PRESS. GAUGE AND NOTE PRESS. AFTER IGN. "ON" FOR 2 SECONDS.
- PRESSURE SHOULD BE 280-325 kPa (40.547 PSI) AND HOLD WHEN PUMP STOPS. DOES IT?

YES

NO

- INSTALL NEW SPARK PLUG WIRE WHERE NO SPARK WAS OBSERVED.
- REPEAT TEST. SPARK SHOULD JUMP TESTER GAP ON ALL WIRES. DOES IT?

YES

NO

REPAIR OPEN, SHORT OR POOR CONNECTION IN HARNESS.

REPLACE INJECTOR WITH INCORRECT RESISTANCE AND CONFIRM NO OPEN OR SHORT IN INJECTOR HARNESS.

YES

NO

SEE " DIAGNOSTIC AIDS" ON FACING PAGE

SEE CHART EMH. 4-5 PAGE 1 OF 2

YES

NO

FAULTY SPARKPLUG WIRES OR POOR CONNECTION

FAULTY "DI" MODULE CONNECTIONS OR MODULE.

INJECTOR

*NOTE: INJECTOR RESISTANCE SPECIFICATION IS AT 60°C (140°F) AND MAY BE SLIGHTLY HIGHER IF THE INJECTOR IS HOTTER.

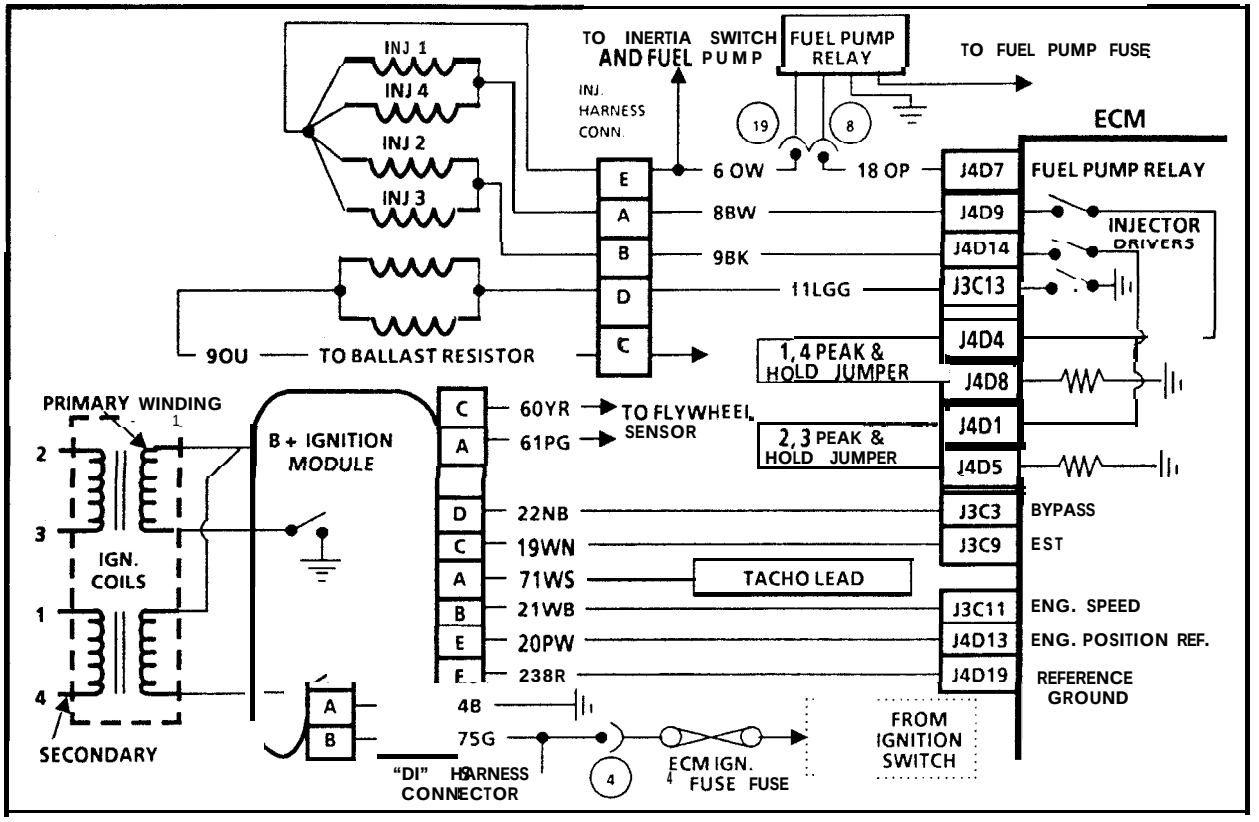


CHART EMH. 4-3

(Page 2 of 3)

ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Condition:

Engine cranks but won't run, or engine may start, but immediately stops running. Battery condition and engine cranking speed are OK and there is adequate fuel in the tank.

Circuit Description:

This engine is equipped with a distributorless ignition system called the "Direct Ignition" system (DI). The primary circuit of the DI consists of two separate ignition coils, an DI ignition module and flywheel sensor as well as the related connecting wires and the EST (electronic spark timing) portion of the ECM. Each secondary circuit consists of the secondary winding of the coil, spark plug wires and spark plugs.

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

6. Battery voltage should be available at cavity "E" for 2 or 3 seconds and the ECM should switch the fuel pump "ON" for the same time after ignition is turned "ON" (and when ECM is receiving ignition reference pulses, as while cranking or running). The ignition must be turned "OFF" for at least 10 seconds to assure that the ECM powers down and will then switch the fuel pump back "ON" for 2-3 seconds when ignition is turned back "ON".
7. Light "ON" one circuit only indicates power is available at cavity "E", but grounded circuit is not being completed on the other circuit. This could be due to open circuit or ECM not switching the injector driver circuit to ground.
8. Steady light indicates ground circuit is always completed and is not being switched. This could be due to short to ground in circuit, or faulty ECM injector driver.
9. The ECM grounds the fuel pump relay CKT 18 OP through terminal J4D7. If this CKT is open or the ECM is defective the fuel pump doesn't run and the injector harness CKT 6 OW is not powered.

CHART EMH. 4-3

(Page 2 of 3)
ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED TURBO LOTUS ESPRIT

FROM CHART EMH. 4-3 (1 OF 3)

NO LIGHT ON BOTH

- REMOVE INJ. TEST LIGHT FROM INJECTOR HARNESS.
- PROBE CAVITY "E" WITH 12 VOLT TEST LIGHT TO GROUND.
- TURN IGNITION "OFF" FOR 10 SECONDS AND THEN BACK "ON"
- TEST LIGHT SHOULD BE "ON" FOR 2-3 SECONDS. IS IT?

NO

YES

SEE CHART EMH. 4-3 PAGE 3 OF 3

NO LIGHT ON ONE

- CHECK INJECTOR DRIVER CIRCUIT (FROM CAVITY "A" OR "B" TO ECM) WHICH HAD NO LIGHT FOR OPEN OR POOR CONNECTION AT ECM. IS CIRCUIT OPEN?

YES

REPAIR CIRCUIT

NO

FAULTY ECM

STEADY LIGHT ON ONE OR BOTH

- CHECK INJECTOR DRIVER CIRCUIT (FROM CAVITY "A" AND/OR "B" TO ECM) WHICH HAD STEADY LIGHT FOR SHORT TO GROUND.
- IS CIRCUIT SHORTED TO GROUND?

YES

REPAIR CIRCUIT

NO

FAULTY ECM

- DISCONNECT FUEL PUMP RELAY
- PROBE FUEL PUMP RELAY BASE TERM. CKT 18 OP WITH TEST LIGHT CONNECTED TO GROUND.
- TURN IGNITION "OFF" FOR 10 SECONDS AND THEN BACK "ON".
- TEST LIGHT SHOULD BE "ON" FOR ABOUT 2 SECONDS. IS IT?

YES

SEE CHART EMH. 4-5 PAGE 1 OF 2

NO

- CHECK FOR OPEN CKT 180P. IS CKT OK?

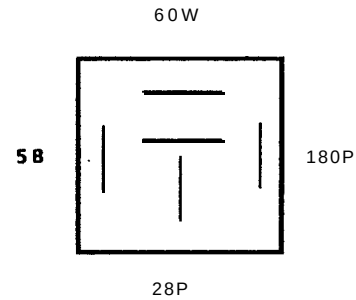
YES

POOR CONNECTION OR FAULTY ECM

NO

REPAIR CIRCUIT

FUEL PUMP RELAY BASE



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

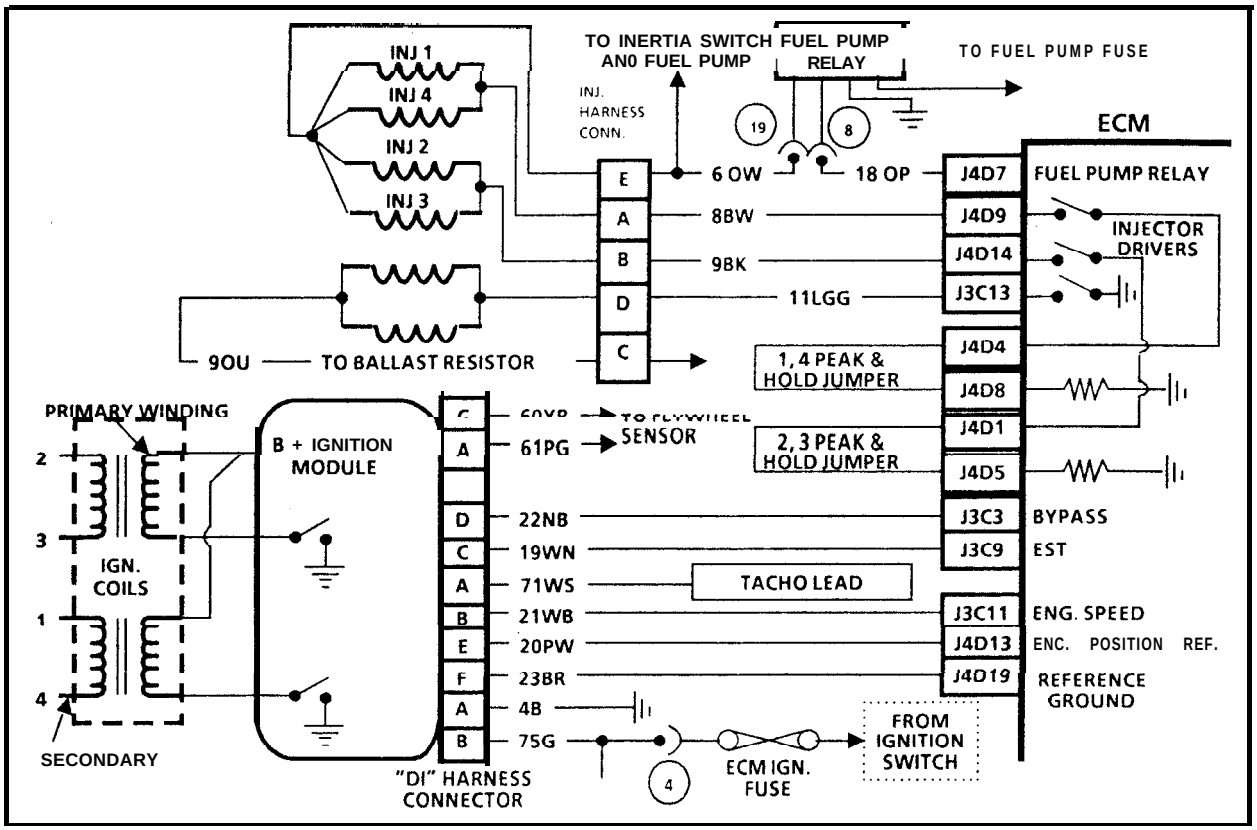


CHART EMH. 4-3

(Page 3 of 3)

ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The "Direct Ignition" system (DI) uses a waste spark method of distribution. In this type of system the ignition module triggers the #1-4 coil pair resulting in both #1 and #4 spark plugs firing at the same time. #1 cylinder is on the compression stroke at the same time #4 is on the exhaust stroke, resulting in a lower energy requirement to fire #4 spark plug. This leaves the remainder of the high voltage to be used to fire #1 spark plug. On this application, the flywheel sensor is mounted to, and protrudes through the clutch housing to within approximately 1.3mm of the flywheel reluctor. Since the reluctor is a machined portion of the flywheel and the sensor is mounted in a fixed position on the clutch housing, timing adjustments are not possible or necessary.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

10. Battery voltage should be available at terminal "B" of the DI 2 pin connector, and terminal "A" should be a good ground.
11. The test light to 12V simulates a reference signal to the ECM which will result in an injector test light blink for every other touch of the test light, ifcircuit 20 PW, the ECM and the injector driver circuit are all functioning properly.
12. The flywheel sensor should output a voltage as the crankshaft turns. If no voltage is produced, the indication is a poor sensor connection or faulty sensor.
13. The flywheel sensors core is a magnet, therefore, it should be magnetized and the resistance should be within a range of 950 to 1200 ohms.

CHART EMH. 4-3

(Page 3 of 3)

ENGINE CRANKS BUT WON'T RUN
2.2L INTERCOOLED TURBO LOTUS ESPRIT

FROM CHART EMH. 4-3 PAGE 2 OF 3 *TEST LIGHT "ON"*

10
- IGNITION "OFF", DISCONNECT 2 PIN DI HARNESS CONNECTOR.
- IGNITION "ON", CONNECT A TEST LIGHT BETWEEN HARNESS TERMINALS "A" AND "8" (CIRCUITS 75G AND 48).
- TEST LIGHT SHOULD BE "ON". IS IT?

YES

0 1
- RECONNECT 2 PIN CONNECTOR, DISCONNECT 6 PIN DI AND INJECTOR HARNESS CONNECTOR
- CONNECT INJ. TEST LIGHT TOOOT0900 FROM INJ. HARNESS CDNN. PIN A TO 12 VOLTS WITH INJ. TEST LIGHT ADAPTER TOOOT0930.
- CONNECT A TEST LIGHT TO 12 V AND REPEATEDLY TOUCH TO DI HARNESS TERMINAL "E".
- REPEAT TEST WITH INJ. TEST LIGHT CONNECTED TO INJ. HARNESS CONNECTOR PIN 8. INJECTOR TEST LIGHTSHOULD BLINK ON BOTH PINS . DOES IT ?

YES

NO

- CHECK INJECTOR DRIVER CKT 8BW & 9BK FOR OPEN OR SHORT TO VOLTAGE. ARE CIRCUITS OK?

NO

REPAIR INJECTOR DRIVER CIRCUITS

YES

CHECK CKT 20PW FOR OPEN OR SHORT TO GROUND OR TO VOLTAGE. IF CKT 20PW IS OK, FAULT IS A POOR CONNECTION AT ECM TERMINAL "J4D13" OR FAULTY ECM.

NO

OPEN CKT 75G OR POOR CONNECTION AT ECM / COIL 80X HARNESS CONNECTOR CAVITY 4 OR FUSE.

YES

OPEN CKT 4B

0 1
- CONNECT DVM (2 VOLT A.C. SCALE) BETWEEN TERMINAL "A" AND "C" OF CIRCUITS FROM FLYWHEEL SENSOR CKT 60YR AND 61PG.
- CRANK ENGINE AND OBSERVE VOLTAGE.
- READING SHOULD BE GREATER THAN 20 mV. IS IT?

NO

0 1
- REMOVE FLYWHEEL SENSOR FROM ENGINE BLOCK.
- WITH DVM IN 2K POSITION, MEASURE RESISTANCE ACROSS SENSOR TERMINALS (RESISTANCE SHOULD BE BETWEEN 950 AND 1200 OHMS).
- VERIFY THAT SENSOR IS STILL MAGNETIC AND INSPECT FOR DAMAGED TERMINALS. IS SENSOR OK?

NO

REPLACE FLYWHEEL SENSOR

YES

REPAIR FLYWHEEL SENSOR HARNESS

YES

FAULTY DI MODULE

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

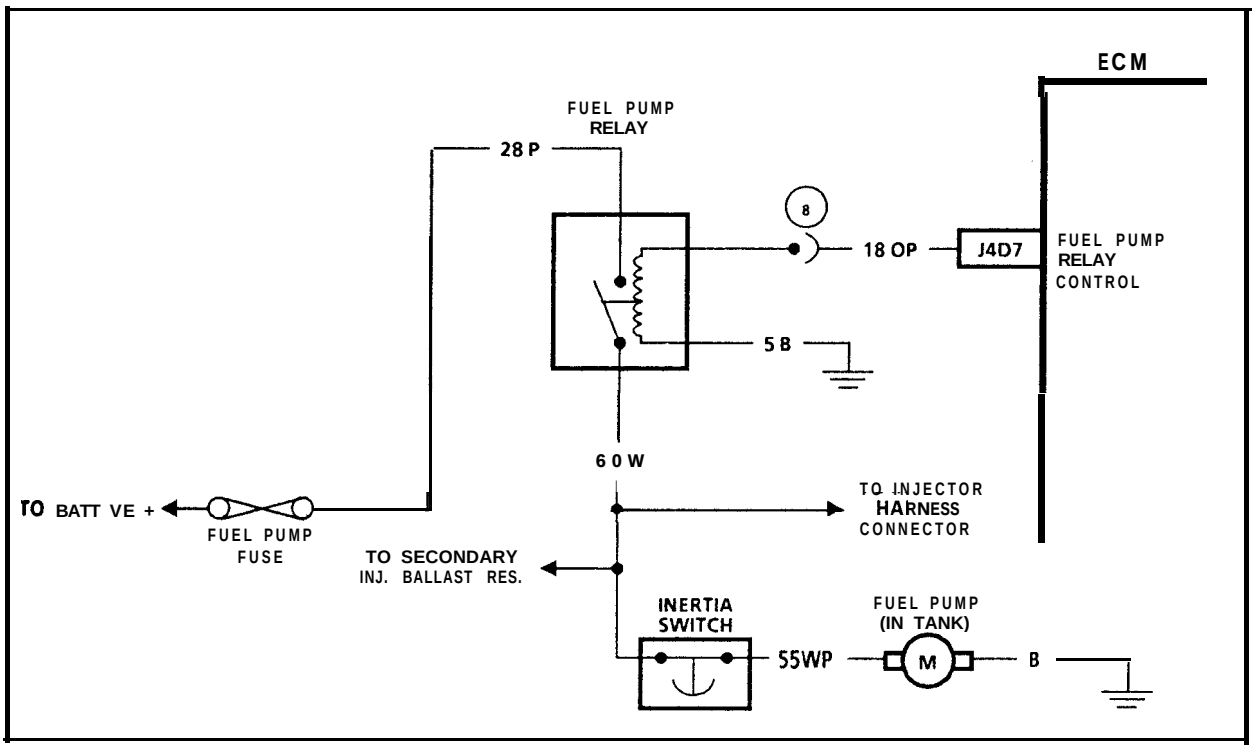


CHART EMH. 4-5

(Page 1 of 2)
ENGINE CRANKS BUT WON'T RUN
(FUEL PUMP CIRCUIT)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

When the ignition switch is turned "ON", the electronic control module (ECM) turns "ON" the in-tank fuel pump. It will remain "ON" as long as the ECM is receiving ignition reference pulses from the Direct Ignition module (DI).

If there are no reference pulses, the ECM will shut "OFF" the fuel pump about 2 seconds after key "ON", or about 10 seconds after reference pulses stop.

The pump delivers fuel to the fuel rail and injectors, then to the pressure regulator, where the system pressure is controlled to 280 - 325 kPa (40.5 - 47 psi) with engine stopped, or 211 - 379 kPa (30.5 - 55 psi) with engine running, dependent on operating conditions. Excess fuel is returned to the tank.

Improper fuel system pressure will result in one or all of the following symptoms:

- Cranks but won't run.
- Code44
- Code45
- Cuts out, may feel like ignition problem.
- Poor fuel economy, loss of power.
- Hesitation.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Checks for 12 volts from ignition relay.

CHART EMH. 4-5

(Page 1 of 2)

ENGINE CRANKS BUT WON'T RUN
(FUEL PUMP CIRCUIT)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

FROM CHART EMH. 4-3 PAGE 1 OF 3 OR 2 OF 3

- REMOVE FUEL PUMP RELAY
- IGNITION " ON "
- PROBE CKT 28 P AT FUEL PUMP RELAY BASE WITH A TEST LIGHT TO TERM. 58. LIGHT SHOULD BE " ON ".

LIGHT " OFF "

- IGNITION " ON "
- PROBE CKT28 PAT FUEL PUMP RELAY BASE WITH A TEST LIGHT TO GROUND. LIGHT SHOULD BE " ON ".

LIGHT "OFF"

CHECK FOR OPEN CKT 28P. IF OK, FUEL PUMP FUSE BLOWN

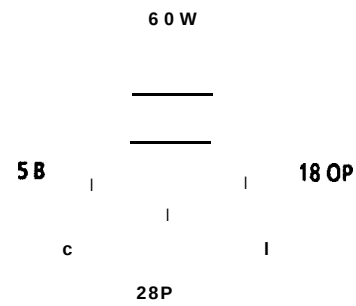
LIGHT "ON"

REPAIR OPEN CKT 5B

LIGHT " ON "

SEE CHART EMH. 4-5 PAGE 2 OF 2

FUEL PUMP RELAY BASE



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

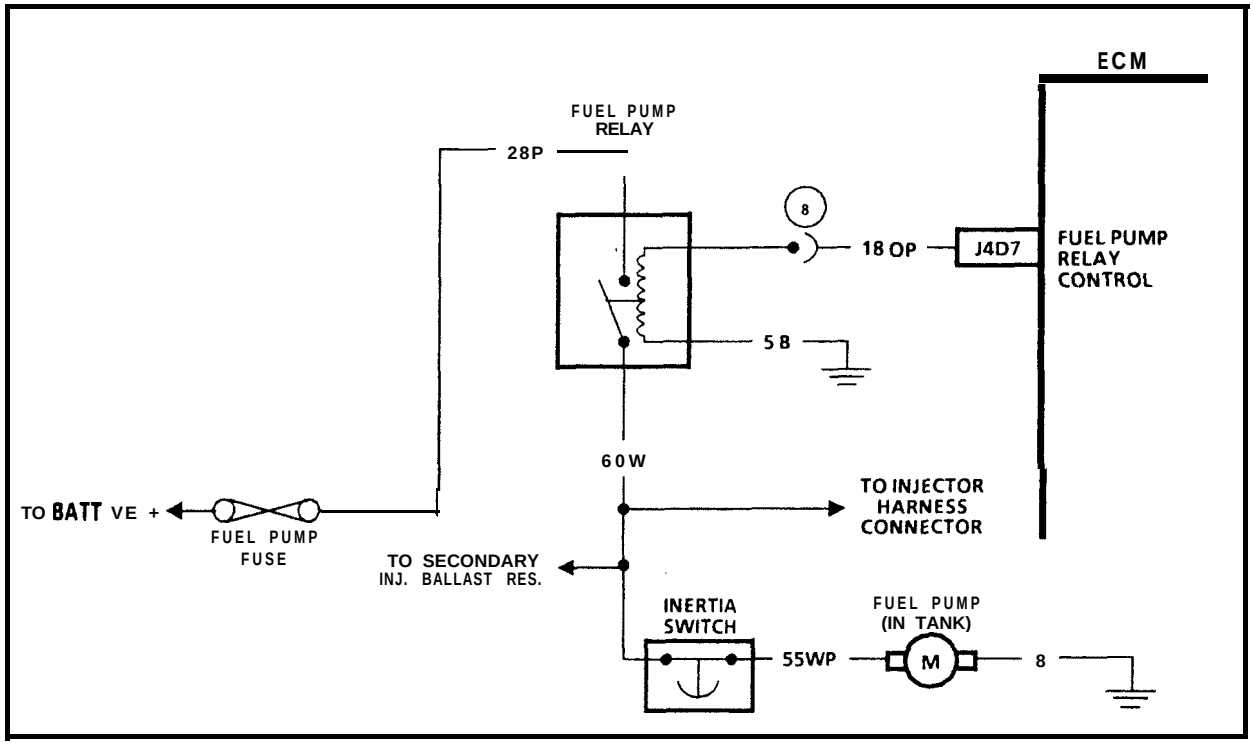


CHART EMH. 4-5

(Page 2 of 2)
ENGINE CRANKS BUT WON'T RUN
(FUEL PUMP CIRCUIT)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

When the ignition switch is turned "ON", the electronic control module (ECM) turns "ON" the in-tank fuel pump. It will remain "ON" as long as the ECM is receiving ignition reference pulses from the Direct Ignition module (DI).

If there are no reference pulses, the ECM will shut "OFF" the fuel pump about 2-3 seconds after key "ON", or about 10 seconds after reference pulses stop.

The pump delivers, fuel to the fuel rail and injectors, then to the pressure regulator, where the system pressure is controlled to 280 - 325 kPa (40.5 - 47 psi) with engine stopped, or 211 - 379 kPa (30.5 - 55 psi) with engine running, dependent on operation conditions. Excess fuel is returned to the tank.

Improper fuel system pressure will result in one or all of the following symptoms:

- Cranks but won't run.
- Code44
- Code45
- Cuts out, may feel like ignition problem.
- Poor fuel economy, loss of power.
- Hesitation.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

4. Checks for fuel pump running when 12 volts are applied to CKT 6 OW.
   Note: It may be necessary to remove the fuel cap to hear the fuel pump run.
5. Inertia switch may be open by hard bump or accident.

CHART EMH. 4-5

(Page 2 of 2)

ENGINE CRANKS BUT WON'T RUN

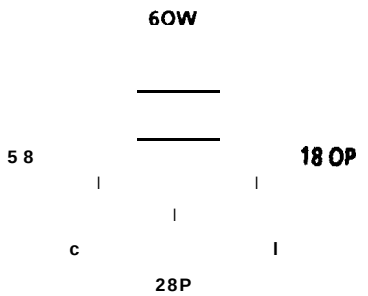
(FUEL PUMP CIRCUIT)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

FROM CHART EMH. 4-5 (1 OF 2)

- IGNITION "ON"
- JUMPER CKTS 28 P AND 6 OW AT FUEL PUMP RELAY BASE
- LISTEN FOR FUEL PUMP RUNNING
- REMOVE JUMPER. PRESSURE SHOULD HOLD WHEN FUEL PUMP STOPS.

FUEL PUMP RELAY BASE



FUEL PUMP NOT RUNNING

- CHECK FOR OPEN INERTIA SWITCH

INERTIA SWITCH CLOSED

- CHECK FOR OPEN CKT 55WP OR FUEL PUMP GROUND. IF OK, REPLACE FUEL PUMP.

INERTIA SWITCH OPEN

- CLOSE SWITCH, FUEL PUMP SHOULD RUN NOW. IF PUMP IS STILL NOTRUNNING, FAULT IS INERTIA SWITCH OR POOR CONNECTION.

FUEL PUMP RUNNING, PRESSURE OK

PROBLEM WAS FAULTY FUEL PUMP RELAY. SYSTEM SHOULD BE OK NOW.

FUEL PUMP RUNNING, PRESSURE NOT OK

SEE CHART EMH. 4-7 PAGE 1 OF 2

CLEAR CODES AND CONFIRM "CLOSED LOOP- OPERATION AND NO "CHECK ENGINE LIGHT".

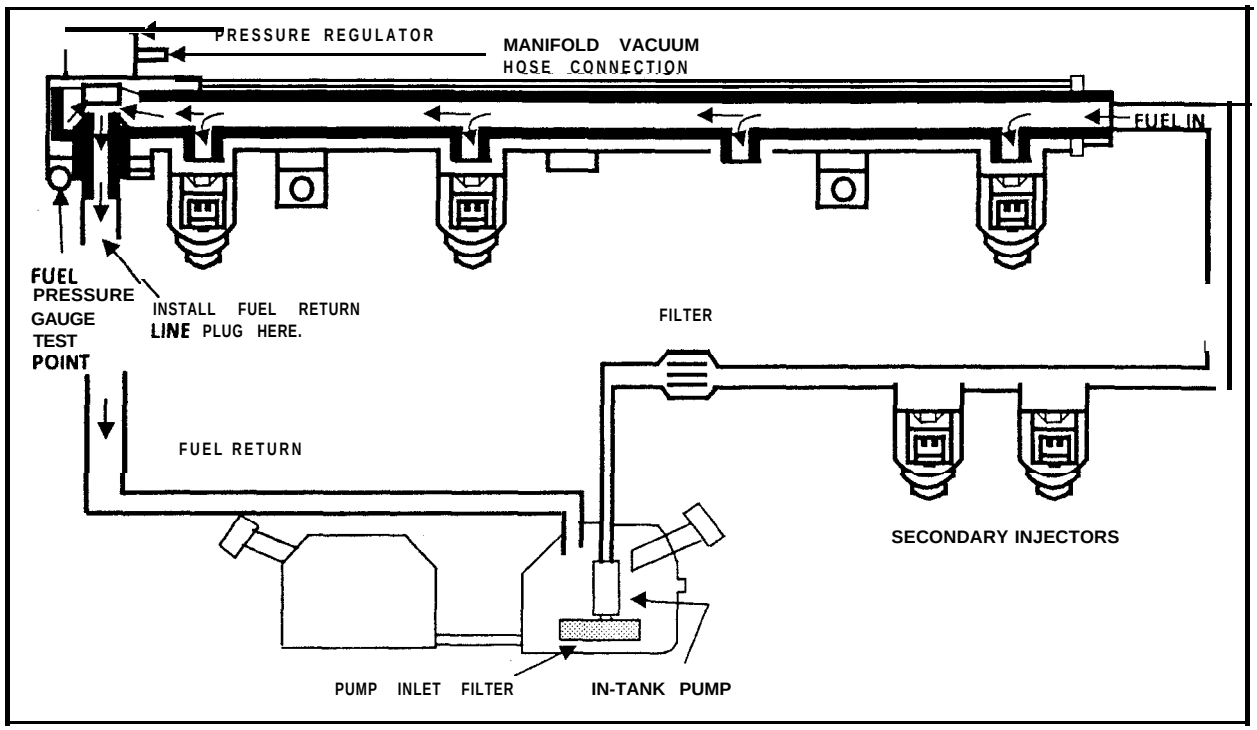


CHART EMH. 4-7

(Page 1 of 2)

FUEL SYSTEM DIAGNOSIS
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

When the ignition switch is turned "ON", the electronic control module (ECM) will turn "ON" the in-tank fuel pump. It will remain "ON" as long as the engine is cranking or running, and the ECM is receiving reference pulses. If there are no reference pulses, the ECM will shut "OFF" the fuel pump in about 2 seconds after ignition "ON" or 10 seconds after reference pulses stop.

The pump delivers fuel to the fuel rail and injectors, then to the pressure regulator, where the system pressure is controlled to about 211 - 379 kPa (30.5 - 55 psi) depending on engine operating conditions. Excess fuel is then returned to the fuel tank.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Wrap a shop towel around the fuel pressure connector to absorb any small amount of fuel leakage that may occur when installing the gage. Ignition "ON" pump pressure should be 280-325 kPa (40-47 psi). This pressure is controlled by spring pressure within the regulator assembly.
2. When the engine is idling, the manifold pressure is low (high vacuum) and is applied to the fuel regulator diaphragm. This will offset the spring and result in a lower fuel pressure. This idle pressure will vary somewhat depending on barometric pressure, however, the pressure at idle should be less indicating pressure regulator control.
3. Pressure that continues to fall quickly is caused by one of the following:
   - In-tank fuel pump check valve not holding.
   - Fuel pressure regulator valve leaking.
   - Injector(s) sticking open.
4. An injector sticking open can best be determined by checking for a fouled or saturated spark plug(s). If a leaking injector can not be determined by a fouled or saturated spark plug the following procedure should be used.
   - Remove fuel rail and secondary injector carrier.
   - Lift fuel rail and sec. injector carrier out just enough to leave injector nozzles in the ports,

CAUTION: *BE SURE INJECTOR(S) ARE NOT ALLOWED TO SPRAY ON ENGINE AND THAT INJECTOR RETAINING CLIPS ARE INTACT. THIS SHOULD BE CAREFULLY FOLLOWED TO PREVENT FUEL SPRAY ON ENGINE WHICH WOULD CAUSE A FIRE HAZARD.*

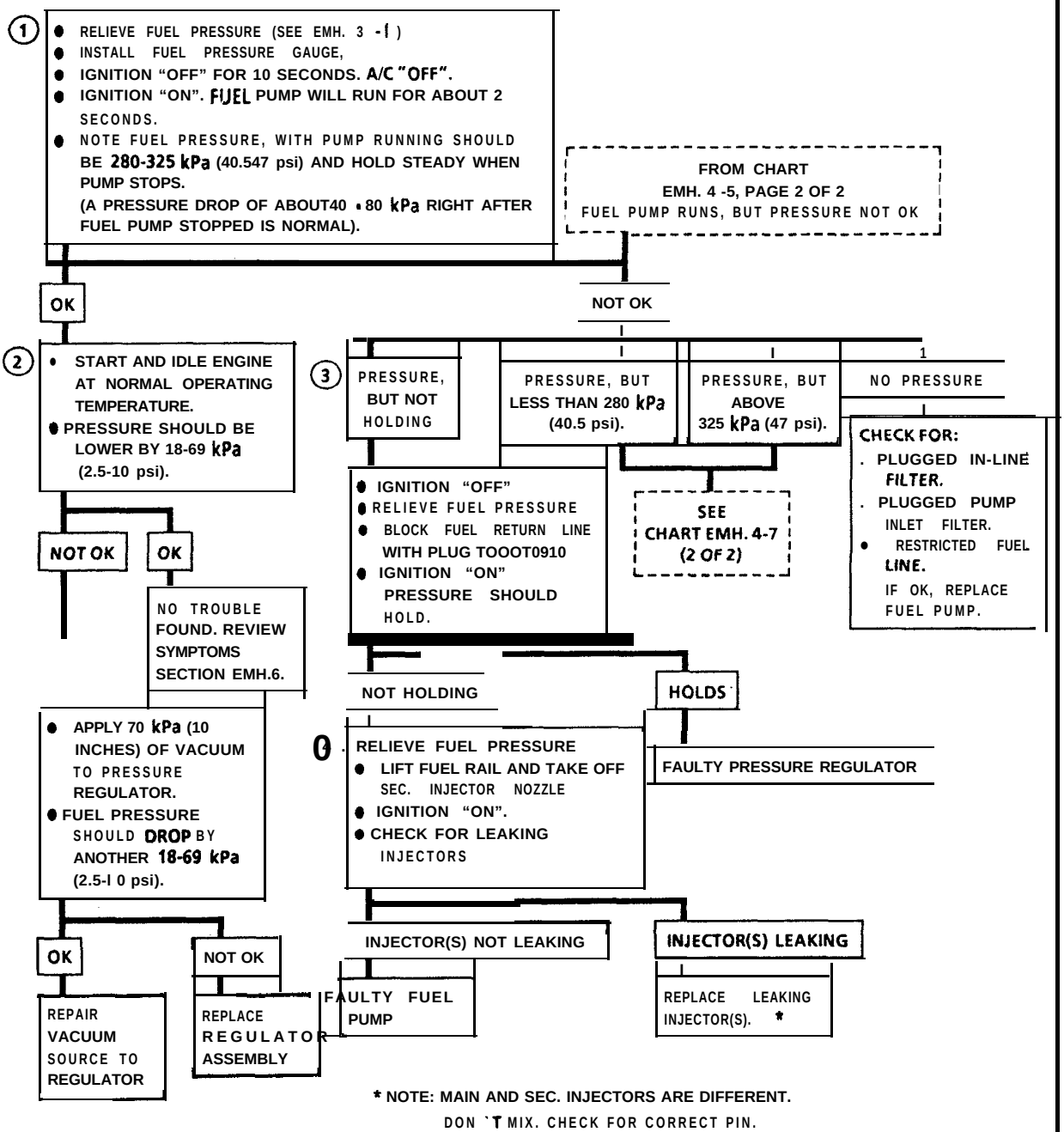
   - Pressurize the fuel svstem and observe for injector(s) leaking.

NOTE:

*THE **IGNITION** MAY HAVE TO BE CYCLED "ON" MORE THAN ONCE TO OBTAIN MAXIMUM PRESSURE. ALSO, IT IS NORMAL FOR THE PRESSURE TO DROP SLIGHTLY WHEN THE PUMP STOPS.*

CHART EMH. 4-7

(Page 1 of 2)
FUEL SYSTEM DIAGNOSIS
2.2L INTERCOOLED TURBO LOTUS ESPRIT



*** NOTE: MAIN AND SEC. INJECTORS ARE DIFFERENT.**
DON `T MIX. CHECK FOR CORRECT PIN.

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

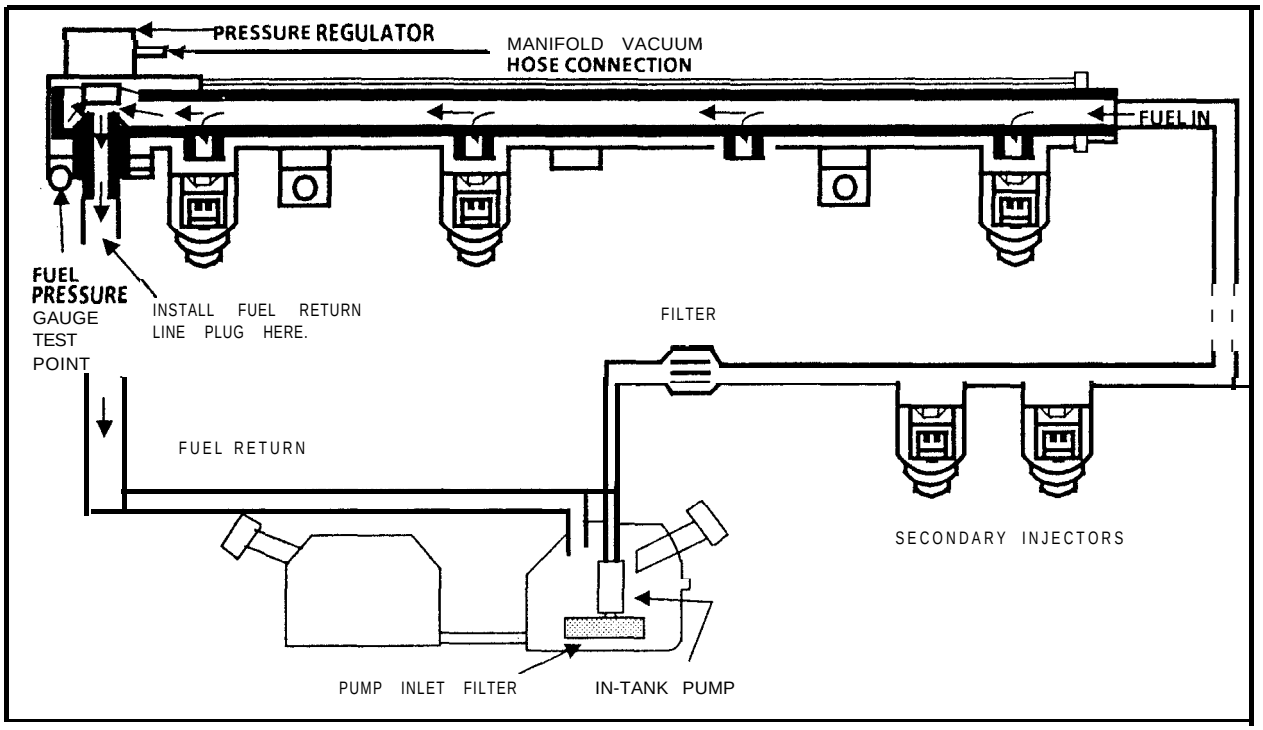


CHART EMH. 4-7

(Page 2 of 2)

FUEL SYSTEM DIAGNOSIS
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

When the ignition switch is turned "ON", the electronic control module (ECM) will turn "ON" the in-tank fuel pump. It will remain "ON" as long as the engine is cranking or running, and the ECM is receiving reference pulses. If there are no reference pulses, the ECM will shut "OFF" the fuel pump in about 2 seconds after ignition "ON" or 10 seconds after reference pulses stop.

The pump delivers fuel to the fuel rail and injectors, then to the pressure regulator, where the system pressure is controlled to **about 211 -** 379 kPa (30.5 - 55 psi) depending on engine operating conditions. Excess fuel is then returned to the fuel tank.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

5. Pressure below 280 kPa (40.5 psi) may cause a lean condition and may set a Code 44. It could also cause hard starting cold and poor driveability. Low enough pressure will cause the engine not to run at all. Restricted flow may allow the engine to run at idle, or low speeds, but may cause **a** surge and stall when more fuel is required, as when accelerating or driving at high speeds.
6. Restricting the fuel return line allows the fuel pump to develop its maximum pressure (dead head pressure). When B +, (about 12 volts) is applied to the pump relay terminal, pressure should be above 420 kPa (61 psi).
7. This test determines if the high fuel pressure is due to a restricted fuel return line or a pressure regulator problem. High fuel pressure may cause a rich condition and may set a Code 45 or cause driveability problems.

CHART EMH. 4-7

(Page 2 of 2)

FUEL SYSTEM DIAGNOSIS 2.2L INTERCOOLED TURBO LOTUS ESPRIT

CAUTION: TO REDUCE THE RISK OF FIRE AND PERSONAL INJURY, IT IS NECESSARY TO RELIEVE THE FUEL SYSTEM PRESSURE BEFORE SERVICING THE FUEL SYSTEM. (TO DO THIS):

- DISCONNECTTHE FUEL TANK HARNESS CONNECTOR.
- CRANK ENGINE. ENGINE WILL START AND RUN UNTIL FUEL SUPPLY REMAINING IN FUEL PIPES IS CONSUMED. ENGAGE STARTER FOR 3.0 SECONDS TO ASSURE RELIEF OF ANY REMAINING PRESSURE.
- CONNECT THE **FUEL TANK** HARNESS CONNECTOR.

UNLESS THIS PROCEDURE IS FOLLOWED BEFORE SERVICING FUEL PIPES OR CONNECTIONS, FUEL SPRAY COULD OCCUR.

FROM CHART EMH. 4-7 (1 OF 2)
PRESSURE OUT OF SPEC.

LOW PRESSURE

3[5] ● CHECK FOR RESTRICTED IN-LINE FILTER.
● IS FILTER OK?

YES

3[6] ● IGNITION "ON".
● BLOCK FUEL RETURN LINE WITH PLUG TOOOT0910
. PUT TEST GAUGE **BLEED** LINE INTO FUEL RETURN LINE, GAUGE VALVE FULLY OPEN.
● JUMPER CKTS 28 P AND 6 OW AT FUEL PUMP RELAY BASE.
● SLOWLY CLOSE VALVE UNTIL MAX. PRESSURE IS REACHED, **BUT** DON `T EXCEED MAX. ALLOWEDGAUGE PRESSURE. READ PRESSURE
● PRESSURE SHOULD **BE** ABOVE 420 **kPa (61psi).** IS IT?

YES

CHECK FOR RESTRICTED OR KINKED PRESSURE LINE. IF LINE IS OK, IT'S A FAULTY FUEL PRESSURE REGULATOR.

NO

CHECK IN-TANK FOR:
- FAULTY FUEL PUMP
- INCORRECT PUMP

NO

REPLACE FILTER ANDRE-TEST

0

HIGH PRESSURE

● CHECK FOR RESTRICTED FUEL RETURN LINE FROM FUEL PRESSURE REGULATOR TO FUEL PUMP.
IS FUEL LINE RESTRICTED OR KINKED?

NO

IT'S A FAULTY FUEL PRESSURE REGULATOR.

YES

LOCATE AND REPAIR RESTRICTED FUEL RETURN LINE TO FUELTANK.

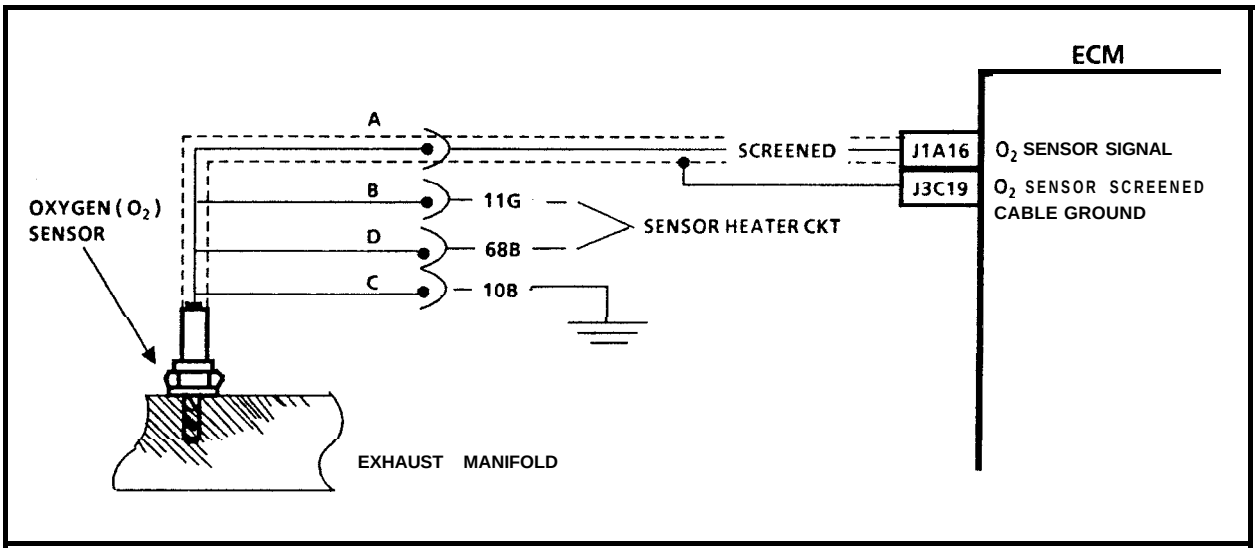
CLEAR **CODES** AND **CONFIRM "CLOSED LOOP" OPERATION** AND **NO "CHECK ENGINE** LIGHT".

2.2L INTERCOOLED TURBO LOTUS ESPRIT TROUBLE CODES

This chart. is a summary of possible trouble codes on the 2.2L Intercooled Turbo Lotus Esprit: The "CHECK ENGINE LIGHTS" are switched "ON" and a code stored when the ECM detects any of the problems listed below. For more information and diagnostic procedures refer to the following charts.

CODE	COMPONENT/CIRCUIT	INDICATION
13	Oxygen Sensor	Sensor or circuit is open
14	Coolant Temp Sensor	High temperature indicated
15	Coolant Temp Sensor	Low temperature indicated
21	Throttle Position Sensor	Signal voltage to ECM high
22	Throttle Position Sensor	Signal voltage to ECM low
23	Mass Air Temp. Sensor	Low temperature indicated
24	Vehicle Speed Sensor	incorrect signal to ECM
25	Mass Air Temp. Sensor	High temperature indicated
26	Quad Driver Modul	Wiring and / or component fault
31	Barometric Pressure Sensor	Signal voltage low or high
33	Manifold Absolute Pressure	Signal voltage high
34	Manifold Absolute Pressure	Signal voltage low
35	Idle Air Control Valve Control	Idle speed error
41	Engine Speed Signal Circuit	Engine speed signal missing
42	Electronic Spark Timing	Ignition module /circuit fault
43	Electronic Spark Control	Detonation circuit failure
44	Oxygen Sensor	Lean exhaust indicated
45	Oxygen Sensor	Rich exhaust indicated
51	MEM -CAL Error	ECM / MEM-CAL fault
53	Battery Voltage High	Above 17.1 volts at ECM
65	Fuel Injector circuit	injector circuit failure

2.2L INTERCOOLED TURBO LOTUS ESPRIT TROUBLE CODES



CODE 13

OXYGEN SENSOR CIRCUIT (OPEN CIRCUIT) 2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM supplies a voltage of about .45 volt between terminals "J1A16" and "J3C19". (If measured with a 10 megohm digital voltmeter, this may read as low as .30 volt.) The O_2 sensor varies the voltage within a range of about 1.0 volt if the exhaust is rich, down through about .10 volt if exhaust is lean.

The sensor is like an open circuit and produces no voltage when it is below 360°C (600° F). An open sensor circuit or cold sensor causes "Open Loop" operation. A not functional sensor heater causes a delayed "Closed Loop " operation.

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

1. Code 13 will set under the following conditions:
   - Engine running at least 40 seconds after start.
   - Coolant temperature at least 42.5°C (40.1°F).
   - No Code 21 or 22.
   - O_2 signal voltage steady between .34 and .54 volt.
   - Throttle position sensor signal above 6% for more time than TPS was below 6%. (About .3 volt above closed throttle voltage)
   - All conditions must be met and held for at least 20 seconds.

   If the conditions for a Code 13 exist, the system will not go "Closed Loop".
2. This will determine if the sensor is at fault or the wiring, ECM is the cause of the Code 13.
3. Use only a high impedance digital volt ohmmeter for this test. This test checks the continuity of the screened 0_2 sensor signal CKT .
4. If the screened cable ground or sensor ground CKT 10 B is open, the ECM 0_2 sensor signal voltagecould be over .6 volt.

Diagnostic Aids:

Normal voltage as displayed by Tech 1 varies between 100 mV to 999 mV (.1 volt to 1.0 volt) while in "Closed Loop".

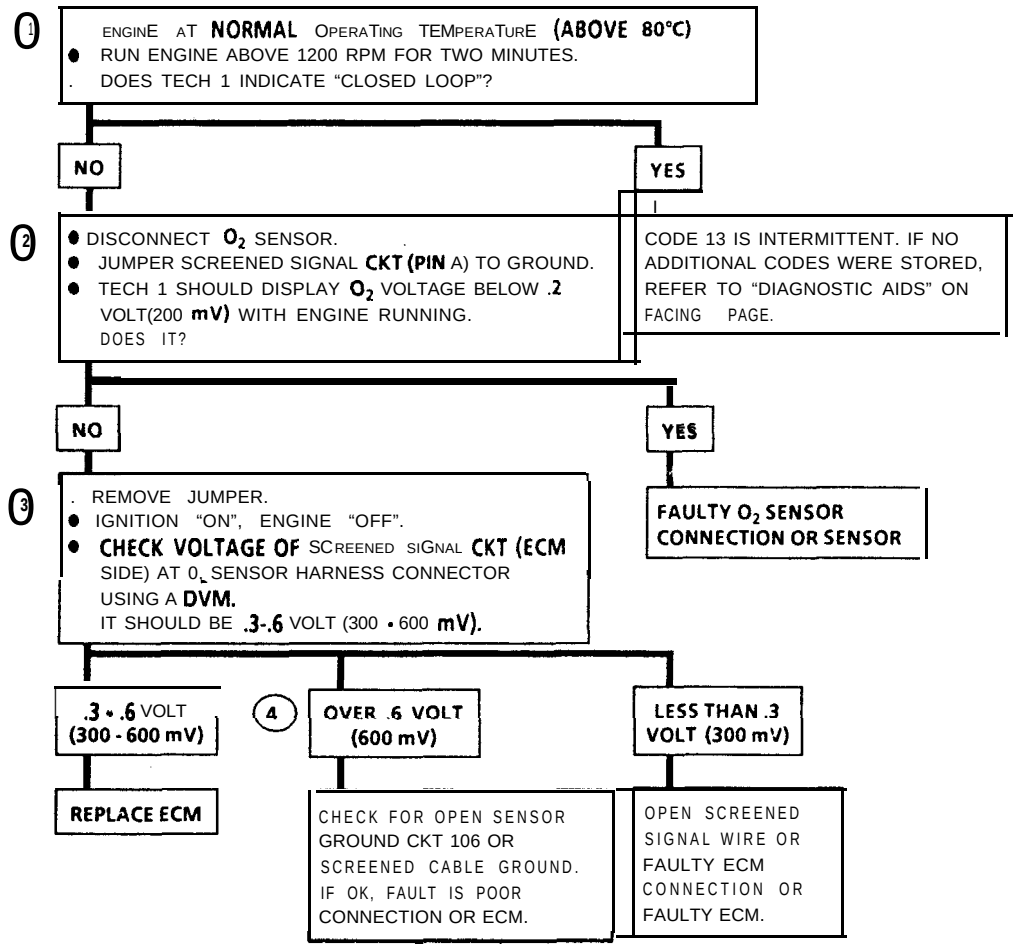
Code 13 sets in 20 seconds if voltage remains between .35 volt and .54 volt, but the system will go "Open Loop" in about 15 seconds.

If code 13 is intermittent:

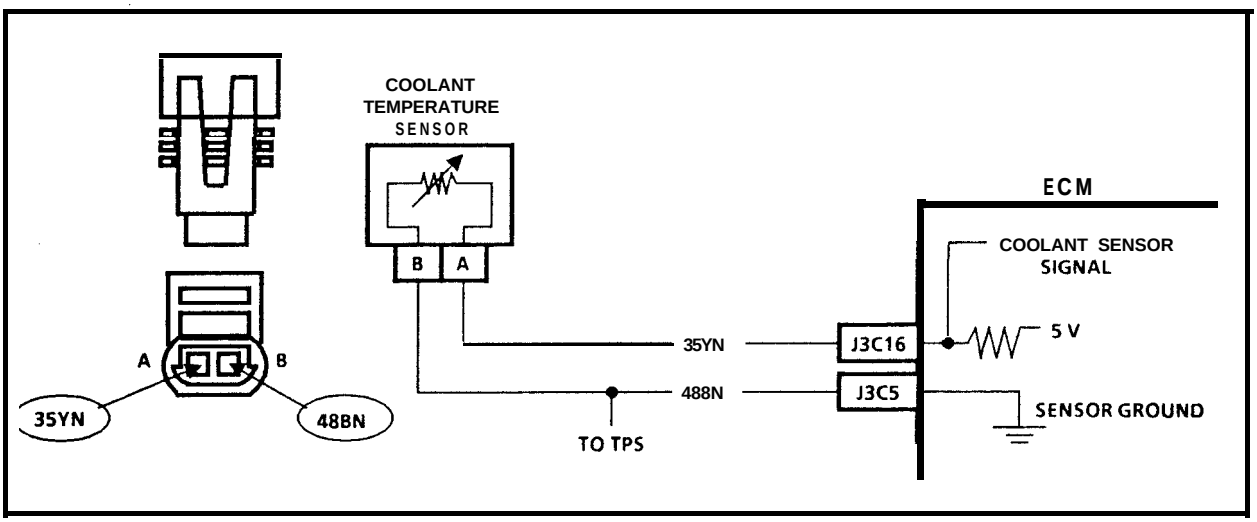
- Check (wiggle) ECM connector pins JlA16 and J3C19, 0_2 sensor wires and connector while watching "OXYGEN SENSOR" voltage and "OPEN/CLOSED LOOP" on TECH 1 display. Voltage should continue to vary.
- Clear Code and conduct a test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 13.
- Refer to "Intermittents" in Section EMH. 6.

CODE 13

OXYGEN SENSOR CIRCUIT
(OPEN CIRCUIT)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 14

COOLANT TEMPERATURE SENSOR CIRCUIT
(HIGH TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The coolant temperature sensor uses a thermistor to control the signal voltage at the ECM. The ECM applies a voltage on 35YN to the sensor. When the engine is cold the sensor (thermistor) resistance is high, therefore ECM terminal "J3C16" voltage will be high.

As the engine warms, the sensor resistance becomes less, and the voltage drops. At normal engine operating temperature, the voltage will measure about 1.5 to 2.5 volts at ECM terminal "J3C16".

Coolant temperature is one of the inputs used to control:

- Fuel delivery
- Engine Spark Timing (EST)
- Idle Air Control (IAC)
- Evaporative Emission Control (Canister Purge) System (EECS)
- Radiator Fan

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 14 will set if:
   - Signal voltage indicates a coolant temperature above 140°C (285°F).
   - Engine running longer than 128 seconds
2. This test will determine if CKT 35YN is shorted to ground which will cause the conditions for Code 14.

Diagnostic Aids:

Check harness routing for a potential short to ground in CKT 35YN.

The Tech 1 displays engine temperature in degrees celcius. After engine is started, the temperature should rise steadily to about 82°C, and then stabilize when thermostat opens.

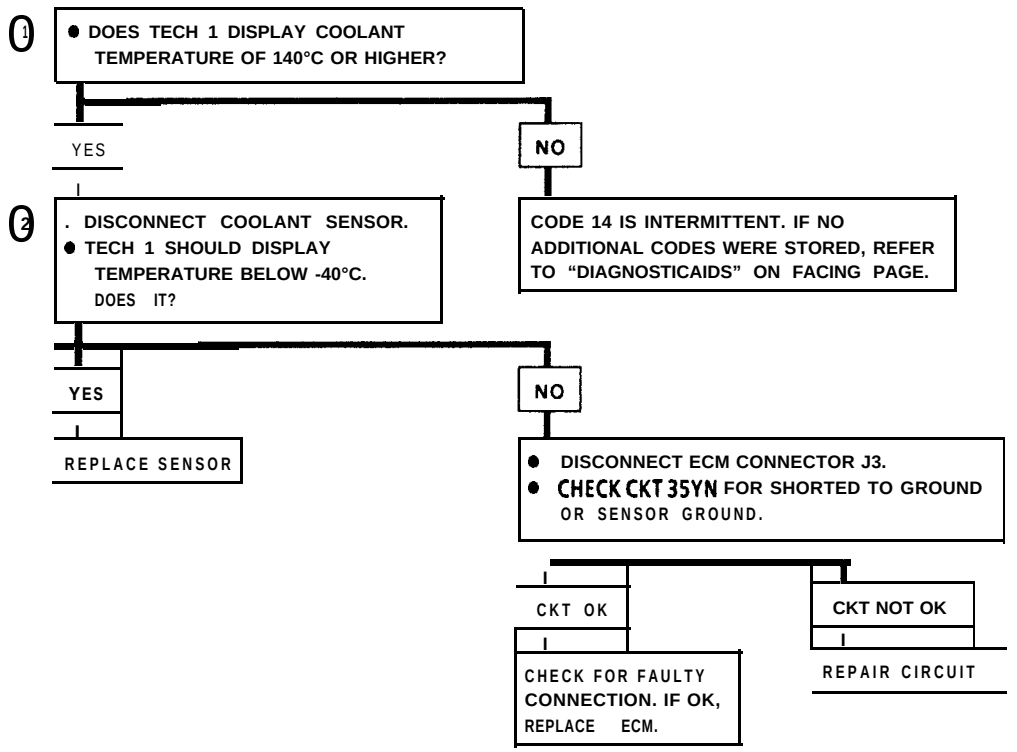
Verify that engine is not overheating and has not been subjected to conditions which could create an overheating condition (i.e. overload, trailer towing, hilly terrain, heavy stop and go traffic, etc.). The "Temperature To Resistance Value" scale at the right may be used to test the coolant sensor at various temperature levels to evaluate the possibility of a "shifted" (mis-scaled) sensor. A "shifted" sensor could result in poor driveability complaints.

If Code 14 is intermittent:

- Check (wiggle) ECM connector pins J3C16 and J3C5, sensor wires and connector while watching "COOLANT TEMP" on TECH 1 display. Temperature should be stable.
- Clear Code and conduct a test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 14.
- Refer to "Intermittents" in Section EMH. 6.

CODE 14

COOLANT TEMPERATURE SENSOR CIRCUIT (HIGH TEMPERATURE INDICATED) 2.2L INTERCOOLED TURBO LOTUS ESPRIT



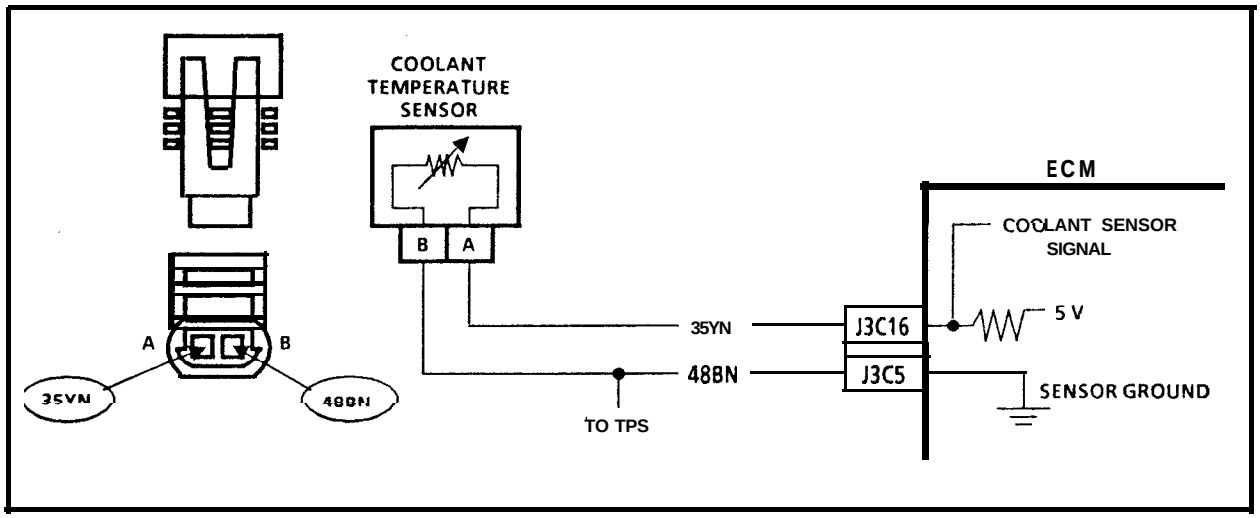
DIAGNOSTIC AID

COOLANT SENSOR

TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)

°F	°C	OHMS
210	100	185
160	70	450
100	38	1.800
70	20	3,400
40	4	7,500
20	-7	13,500
0	-18	25,000
-40	-40	100,700

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 15

COOLANT TEMPERATURE SENSOR CIRCUIT
(LOW TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The coolant temperature sensor uses a thermistor to control the signal voltage at the ECM. The ECM applies a voltage on CKT 35YN to the sensor. When the engine is cold, the sensor (thermistor) resistance is high, therefore, ECM terminal "J3C16" voltage will be high.

As the engine warms, the sensor resistance becomes less, and the voltage drops. At normal engine operating temperature the voltage will measure about 1.5 to 2.0 volts at ECM terminal "J3C16".

Coolant temperature is one of the inputs used to control:

- Fuel delivery
- Engine Spark Timing (EST)
- Idle Air Control (IAC)
- Evaporative Emission Control (Canister Purge) System (EECS)
- Radiator Fan

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 15 will set if:
   - Signal voltage indicates a coolant. temperature less than -44°C (-47°F) for 20 seconds.
   - Engine has been running for 1 minute.
2. This test simulates a Code 14. If the ECM senses the low signal voltage (high temperature) and the Tech 1 reads more than 130°C, the ECM and wiring are OK.
3. This test will determine if CKT 35YN is open. There should be about 5.0 volts present at sensor connector if measured with a DVM.

Diagnostic Aids:

The Tech 1 displays engine temperature in degrees celcius. After engine is started the temperature should rise steadily to about 82°C, and then stabilize when thermostat opens.

A faulty connection, or an open in CKT 35YN or CKT 48BN can result in a Code 15.

Codes 15 and 21 stored at the same time could be the result of an open CKT 48BN.

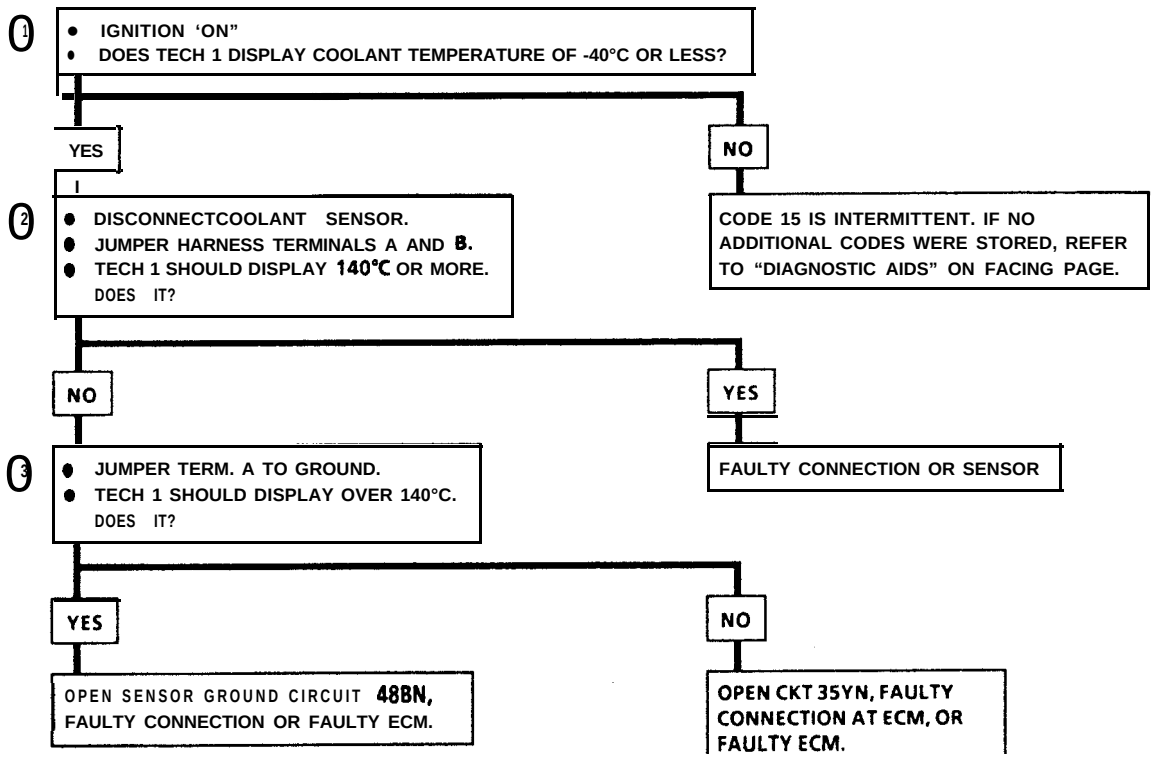
The "Temperature to Resistance Value" scale at the right may be used to test the coolant sensor at various temperature levels to evaluate the possibility of a "shifted" (mis-scaled) sensor. A "shifted" sensor could result in poor driveability complaints.

If Code 14 is intermittent:

- Check (wiggle) ECM connector pins J3C16 and J3C5,sensor wires and connector while watching "COOLANT TEMP" on TECH 1 display. Temperature should be stable.
- Clear Code and conduct a test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 15.
- Refer to "Intermittents" in Section EMH. 6.

CODE 15

COOLANT TEMPERATURE SENSOR CIRCUIT (LOW TEMPERATURE INDICATED) 2.2L INTERCOOLED TURBO LOTUS ESPRIT



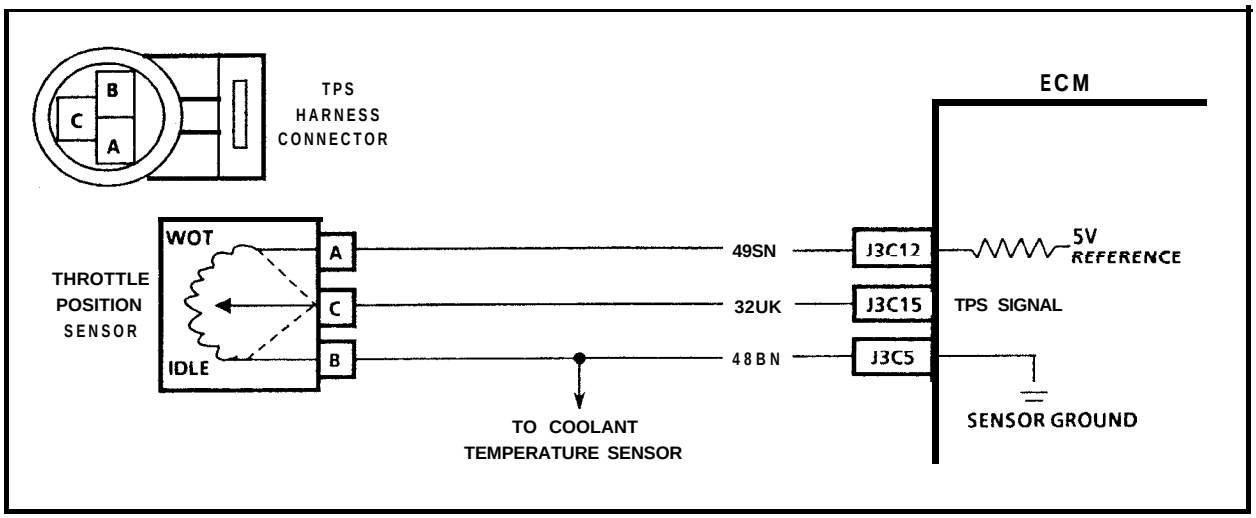
DIAGNOSTIC AID

COOLANT SENSOR

TEMPERATURE TO RESISTANCE VALUES (APPROXIMATE)

°F	°C	OHMS
210	100	185
160	70	450
100	38	1,800
70	20	3,400
40	4	7,500
20	-7	13,500
0	-18	25.000
-40	-40	100.700

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 21

THROTTLE POSITION SENSOR (TPS) CIRCUIT (SIGNAL VOLTAGE HIGH)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The throttle position sensor (TPS) provides a voltage signal that changes relative to the throttle opening. Signal voltage will vary from about 0.45 to 0.70 volt at idle to about 4.5 volt at wide open throttle (WOT).

The TPS signal is one of the most important inputs used by the ECM for fuel control and for most of the ECM control outputs.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 21 will set if:
   - Engine speed is less than 1500 RPM.
   - MAP less than 90 kPa.
   - TPS signal voltage greater than approximately 4.0 volts (78%)
   - Above conditions exist for over 3 seconds.

   OR
   - TPS voltage greater than 4.9 volts.

   With throttle closed the TPS should read about **0.45** to **0.70** volt. If it doesn't, check adjustment.
2. With the TPS disconnected, the TPS voltage should go low if the ECM and wiring are OK.
3. Probing CKT 48BN with a test light checks the TPS ground circuit because an open or very high resistance ground circuit will cause a Code 21.

Diagnostic Aids:

The Tech 1 displays throttle position in volts. It should display 0.45 to 0.70 volt with throttle closed and ignition "ON" or at idle. Voltage should increase at a steady rate as throttle is moved toward wide open throttle (WOT).

The Tech 1 will also display throttle angle %, 0% = closed throttle, >95% = WOT.

An open in CKT 48BN will result in a Code 21. Codes 15 and 21 stored at the same time could be the result of an open CKT 48BN. "Scan" TPS while depressing accelerator pedal with engine stopped and ignition "ON". Display should vary from 0 .45 to 0.70 volt when throttle is closed, to over 4.5 volts when throttle is held wide open.

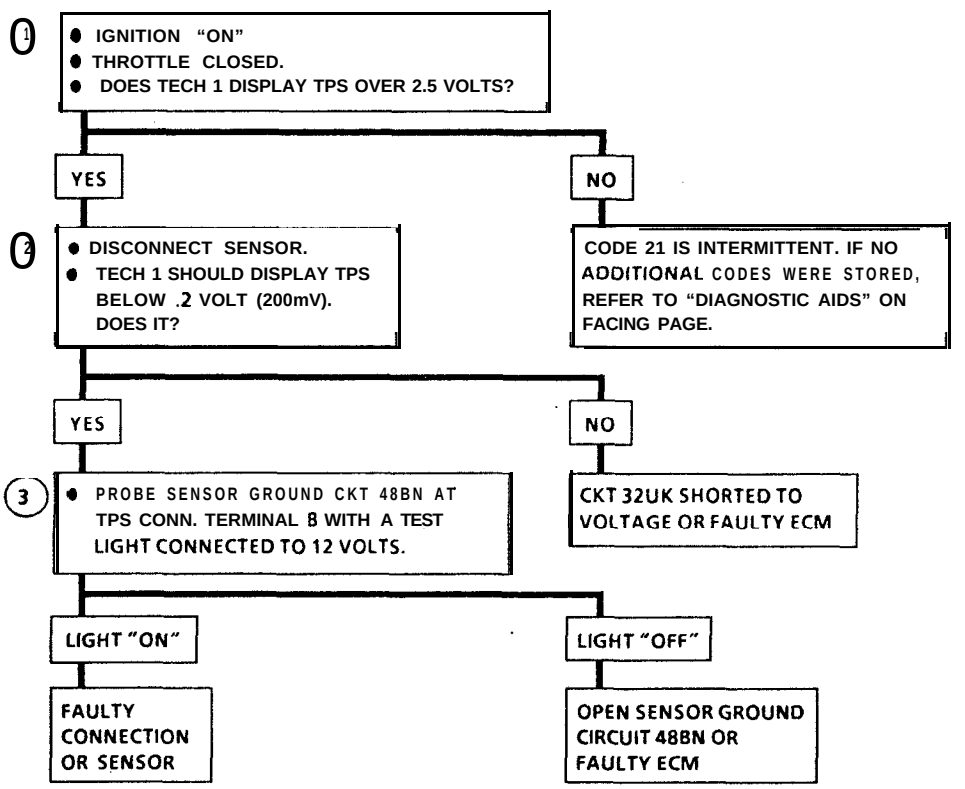
Check condition of connector and sensor terminals for corrosion, and clean or replace as necessary. If corrosion found, check condition of connector seal, repair and/or replace if necessary.

If Code 21 is intermittent:

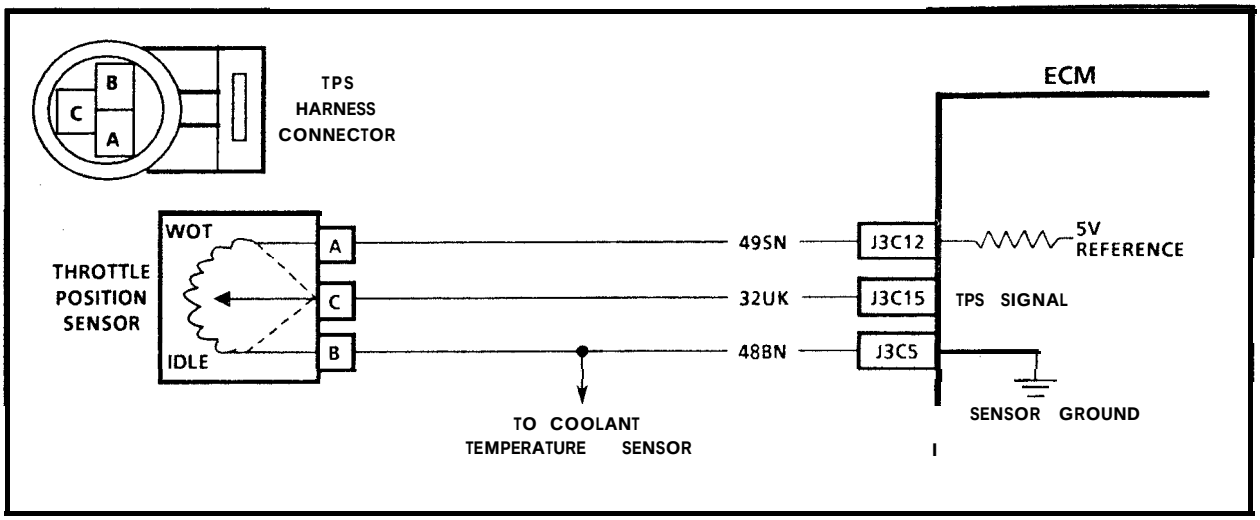
- Check (wiggle) ECM connector pins J3C12, J3C15, sensor wires and connector while watching "THROT POSITION" on TECH 1 display. Voltage should be constant.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 21.
- Refer to "Intermittents" in Section EMH. 6

CODE 21

THROTTLE POSITION SENSOR (TPS) CIRCUIT
(SIGNAL VOLTAGE HIGH)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 22

THROTTLE POSITION SENSOR (TPS) CIRCUIT
(SIGNAL VOLTAGE LOW)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The throttle position sensor (TPS) provides a voltage signal that changes relative to the throttle opening. Signal voltage will vary from about 0.45 to 0.70 volt at idle to about 4.5 volts at wide open throttle (WOT).

The TPS signal is one of the most important inputs used by the ECM for fuel control and for most of the ECM control outputs.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 22 will set if:
   - Engine is running
   - TPS signal voltage is less than about .15 volt.
2. Simulates Code 21, high signal voltage. If ECM recognizes high signal voltage, the ECM and wiring are OK:
3. ECM should supply 5 Volts on CKT 49 SN

Diagnostic Aids:

"Scan" TPS while depressing accelerator pedal with engine stopped and ignition "ON". Display should vary from about 0.45 to 0.70 volt when throttle is closed, to about 4.5 volt when throttle is held wide open.

Also, Tech 1 will display throttle angle %: 0% = closed throttle; >95% = WOT.

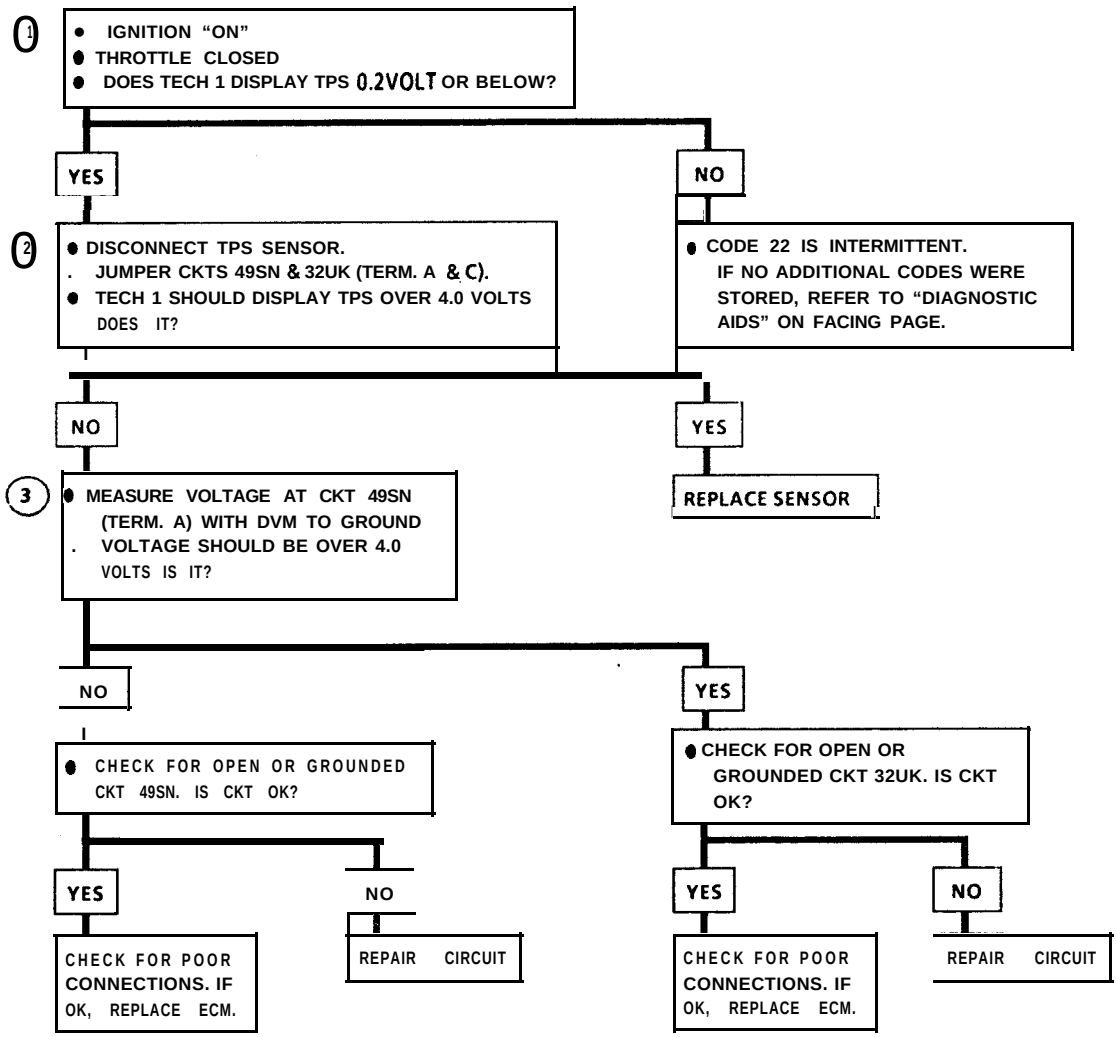
Should check condition of connector and sensor terminals for corrosion, and clean and/or replace as necessary. If corrosion is found, check condition of connector seal and repair or replace if necessary.

If Code 22 is intermittent:

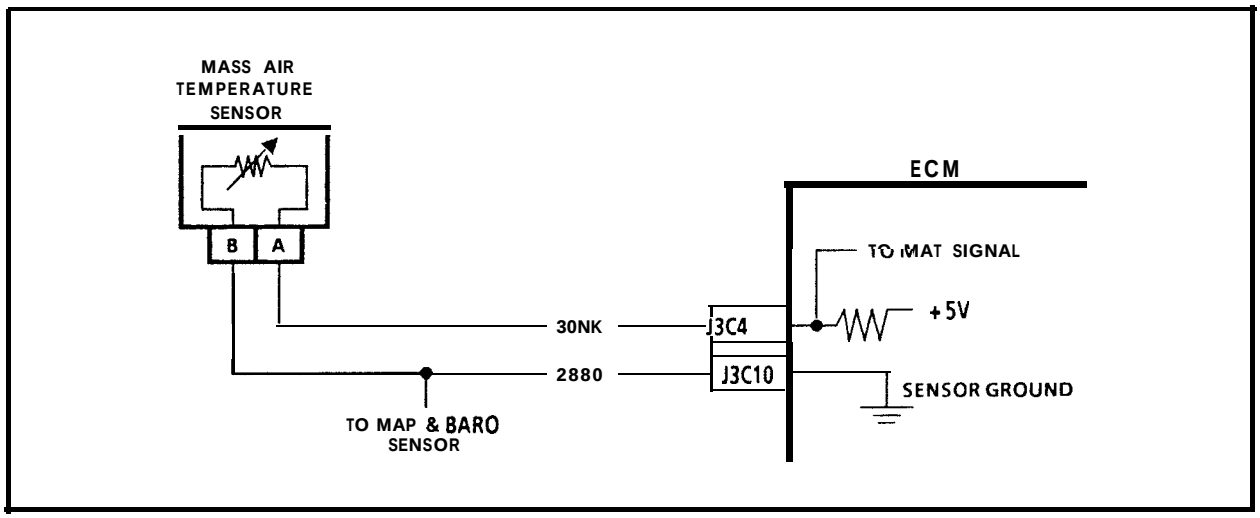
- Check (wiggle) ECM connector pins J3C12, J3C15 and J3C5, sensor wires and connector while watching "THROT POSITION" on TECH 1 display. Voltage should be constant.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 22.
- Refer to "Intermittents" in Section EMH. 6.

CODE 22

THROTTLE POSITION SENSOR (TPS) CIRCUIT
(SIGNAL VOLTAGE LOW)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 23

MASS AIR TEMPERATURE (MAT) SENSOR CIRCUIT
(LOW TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The MAT sensor uses a thermistor to control the signal voltage at the ECM. The ECM applies a voltage (about 5 volts) on CKT 30NK to the sensor. When the air is cold the sensor (thermistor) resistance is high, therefore the ECM terminal "J3C4" voltage will be high. If the air is warm the sensor resistance is low, therefore the ECM terminal "J3C4" voltage will be low.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 23 will set if:
   - A signal voltage indicates a mass air temperature below -35°C (-31°F).
   - Time since engine start is 320 seconds or longer.
   - Vehicle speed less than 15 mph.
2. A Code 23 will set due to an open sensor, wire, or connection. This test will determine if the wiring and ECM are OK.
3. This will determine if the signal CKT 30NK or the ground CKT 28B0 is open.

Diagnostic Aids:

The Tech 1 displays temperature of the air entering the engine , which should be close to ambient air temperature when engine is cold, and rise as underhood temperature increases.

A faulty connection, or an open in CKT 30NK or CKT 28B0 can result in a Code 23.

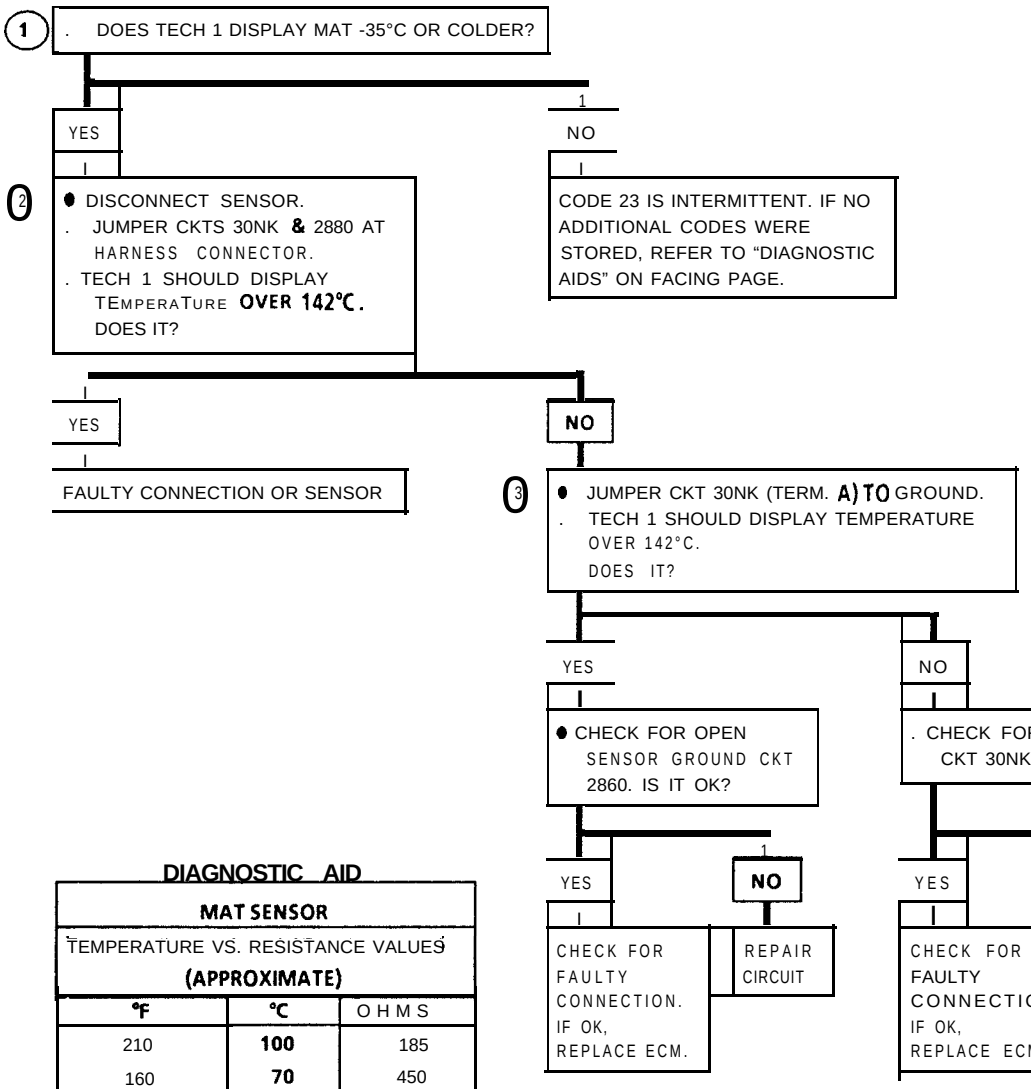
Codes 23 and 33 stored at the same time, could be the result of an open CKT 28B0. The "Temperature to Resistance Values" scale at the right may be used to test the MAT sensor at various temperature levels to evaluate the possibility of a "slewed" (mis-scaled) sensor. A "slewed" sensor could result in poor driveability complaints.

If Code 23 is intermittent:

- Check (wiggle) ECM connector pins J3C4 and J3C10, sensor wires and connector while watching "MASS AIR TEMP" on TECH 1 display. Temperature should be constant.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode while watching "MASS AIR TEMP". Vehicle speed must be less than 15 mph.
- Refer to "Intermittents" in Section EMH. 6.

CODE 23

MASS AIR TEMPERATURE (MAT) SENSOR CIRCUIT
(LOW TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



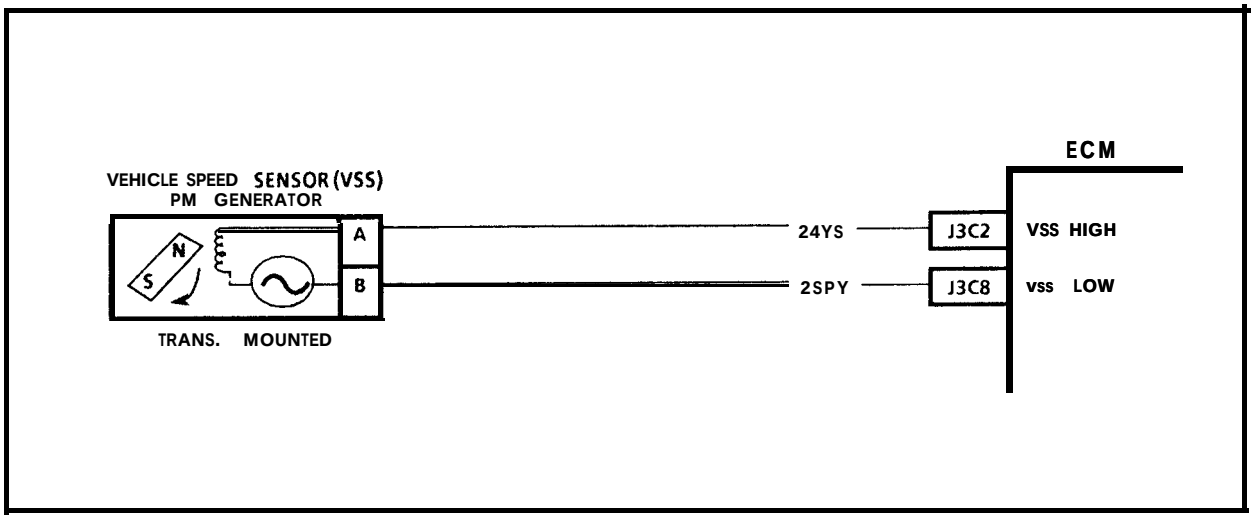
DIAGNOSTIC AID

MAT SENSOR

TEMPERATURE VS. RESISTANCE VALUES
(APPROXIMATE)

°F	°C	OHMS
210	**100**	185
160	**70**	450
100	**38**	1,800
70	**20**	3,400
40	**4**	7.500
20	**-7**	13,500
0	**-18**	25.000
-40	**-40**	100,700

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 24

VEHICLE SPEED SENSOR (VSS) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

Vehicle speed information is provided to the ECM by the vehicle speed sensor (VSS) which is a permanent magnet (PM) generator that is mounted in the transmission. The PM generator produces a pulsing voltage whenever vehicle speed is over about 3 mph, (5 kph). The AC voltage level and the number of pulses increases with vehicle speed. The ECM then converts the pulsing voltage to mph which is used for calculations and the mph can be displayed with Tech 1. Output of the generator can also be seen by using a digital voltmeter on the AC scale while rotating the generator.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 24 will set if vehicle speed is less than 2 mph when:
   - Engine speed is between 1600 and 4800 rpm.
   - TPS is greater than 5%.
   - MAP signal between 65 and 207 kPa.
   - All conditions met for 10 seconds.
   - No Code 21, 22, 33 or 34.

These conditions are met during a road load operation. Disregard Code 24 that sets when drive wheels are not turning.

Diagnostic Aids:

Tech 1 should indicate a vehicle speed whenever the drive wheels are turning greater than 3 mph, (5 kph).

Check CKT 24YS and 25PY for proper connections. Be sure they are clean and tight and the harness is routed correctly.

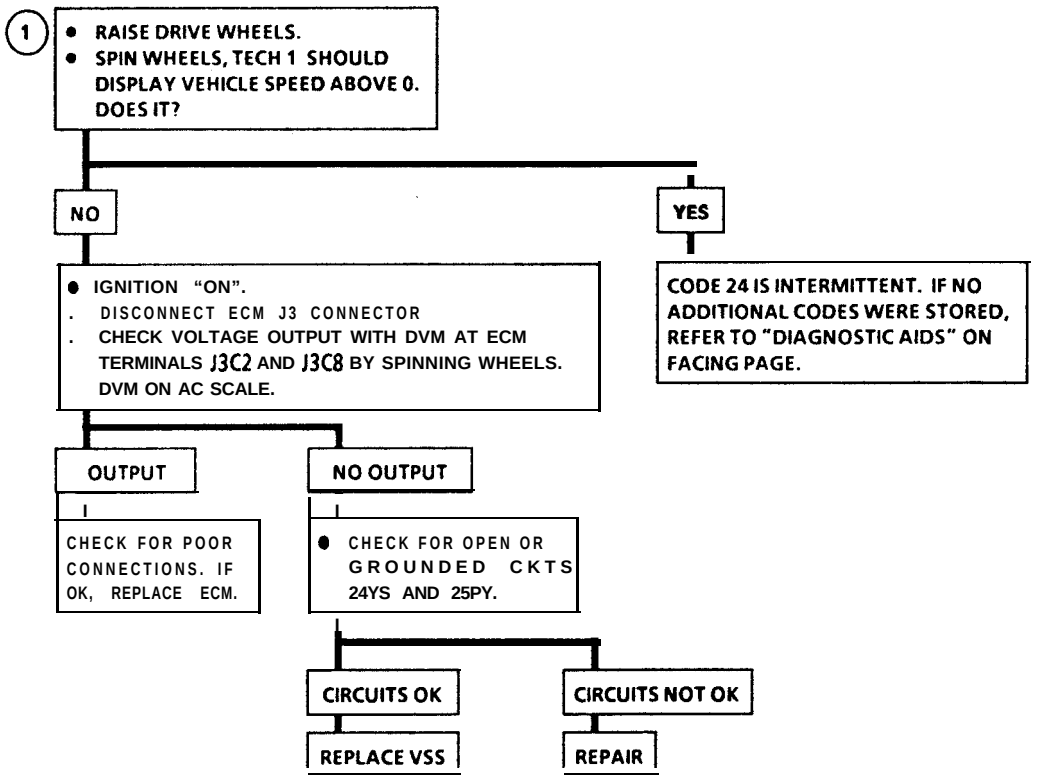
If Code 24 is intermittent:

- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode watching "MPH KPH" display. Vehicle speed displayed on TECH 1 should always be approx. speedometer reading.
- Refer to "Intermittents" in Section EMH. 6.

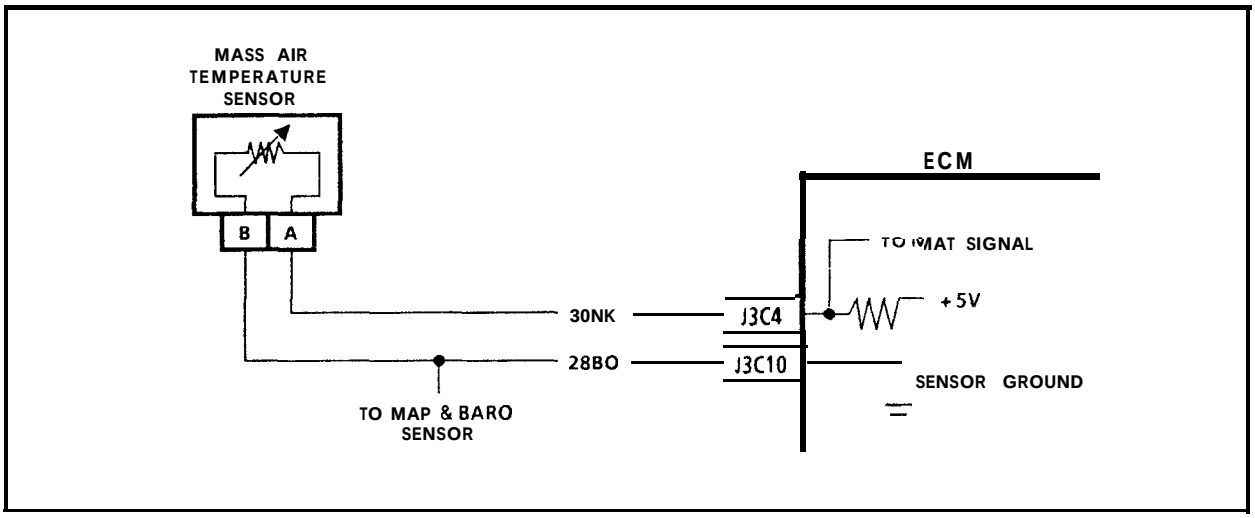
CODE 24

VEHICLE SPEED SENSOR (VSS) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

DISREGARD CODE 24 IF SET WHILE DRIVE WHEELS ARE NOT TURNING.



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 25

MASS AIR TEMPERATURE (MAT) SENSOR CIRCUIT
(HIGH TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The mass air temperature sensor uses a thermistor to control the signal voltage to the ECM. The ECM applies a voltage of about 5 volts on CKT 30NK to the sensor. When air is cold, the sensor (thermistor) resistance is high, therefore, the ECM terminai "J3C4" voltage is high. As the air warms, the sensor resistance becomes less, and the voltage drops. As the incoming air gets warmer, the sensor resistance decreases, causing ECM terminal "J3C4" voltage to decrease.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 25 will set if:
   - Signal voltage indicates a mass air temperature greater than about 142°C.
   - Vehicle speed is greater than 15 mph.
   - Time since engine start is 320 seconds or longer.
2. Determines if fault is in the sensor or the wiring,

Diagnostic Aids:

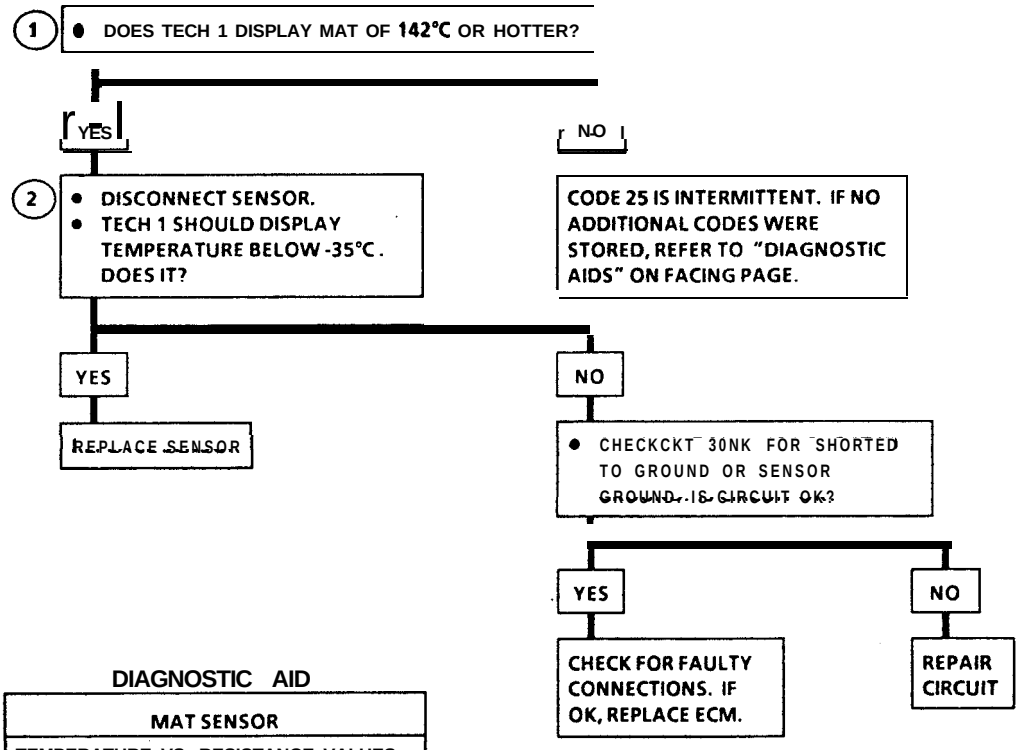
The "Temperature To Resistance Value" scale at the right may be used to test the MAT sensor at various temperature levels to evaluate the possibility of a "slewed" (mis-scaled) sensor. A "slewed" sensor could result in poor driveability complaints.

If Code 25 is intermittent:

- Check (wiggle) pins J3C4 and J3C10 at ECM and sensor wires and connector while watching "MASS AIR TEMP" on TECH 1 display. Temperature should be stable.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. In case of a drastic change of MAT reading trigger manually by pressing TECH 1 "ENTER" key.
- Refer to "Intermittents" in Section EMH.6.

CODE 25

MASS AIR TEMPERATURE (MAT) SENSOR CIRCUIT
(HIGH TEMPERATURE INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



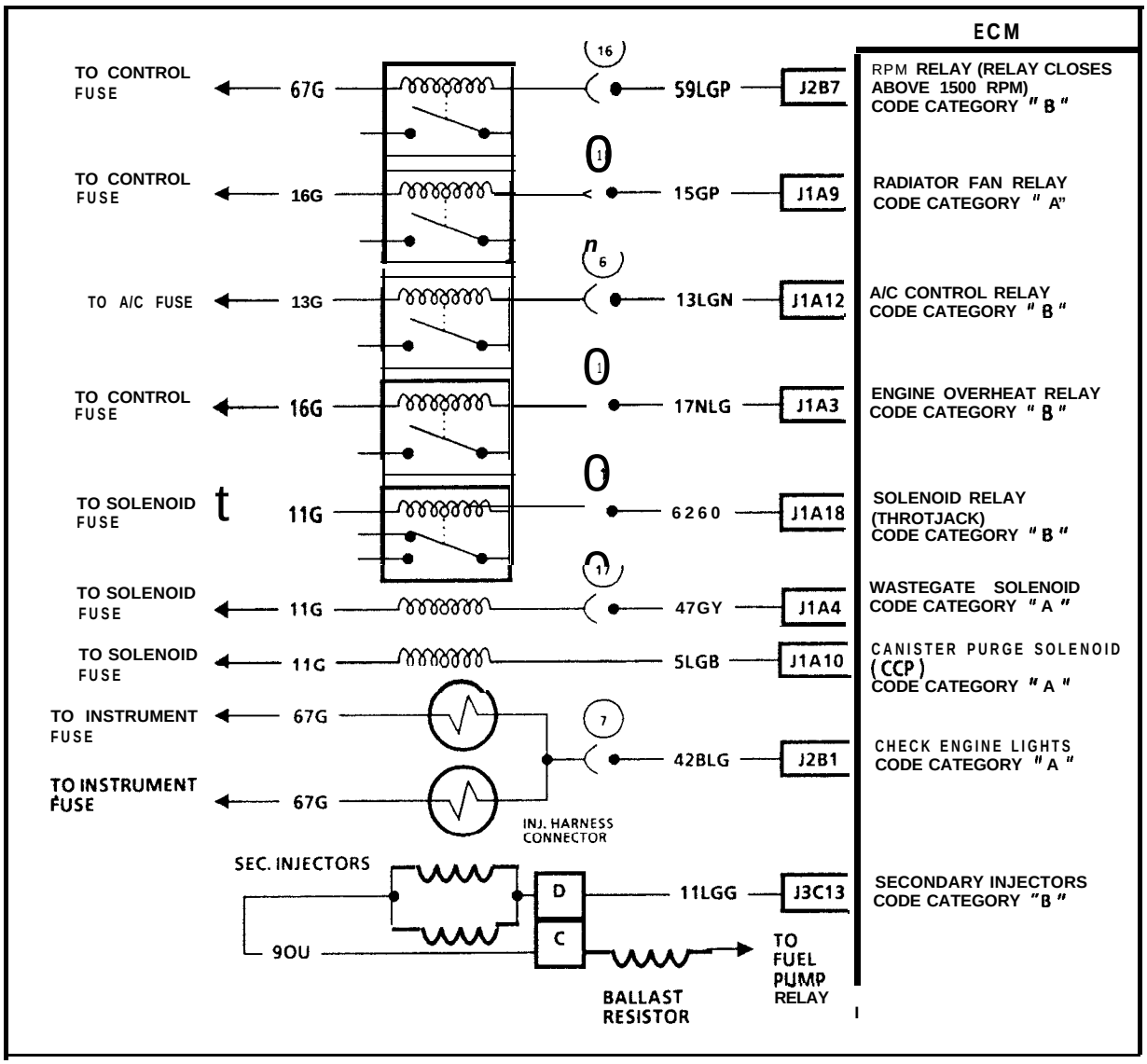
DIAGNOSTIC AID

MAT SENSOR

TEMPERATURE VS. RESISTANCE VALUES (APPROXIMATE)

°F	°C	OHMS
210	100	185
160	70	450
100	38	1,800
70	20	3,400
40	4	7,500
20	-7	13,500
0	-18	25,000
-40	-40	100,700

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 26

(Page 1 of 3)

QUAD-DRIVER (QDM) CIRCUIT

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM controls most components with electronic switches which complete a ground circuit when turned "ON". These switches are called quad-driver modules (QDM's) which can independently control up to 4 outputs (ECM terminals). When an output is "ON", the terminal is grounded and its voltage will be low. When an output is "OFF", its terminal voltage will be high.

QDM's are fault protected. If a relay or solenoid coil is shorted, having very low or zero resistance, or if the circuit is shorted to voltage, it would allow too much current. The QDM senses this and the output turns "OFF" to protect the QDM. The result is high output terminal voltage when it should be low. If the circuit from B+ or the component is open, terminal voltage will be low, even when output is commanded "OFF". Either of these faults will send a fault signal indicating Code 26, if present for 20 seconds or longer.

Test Description:

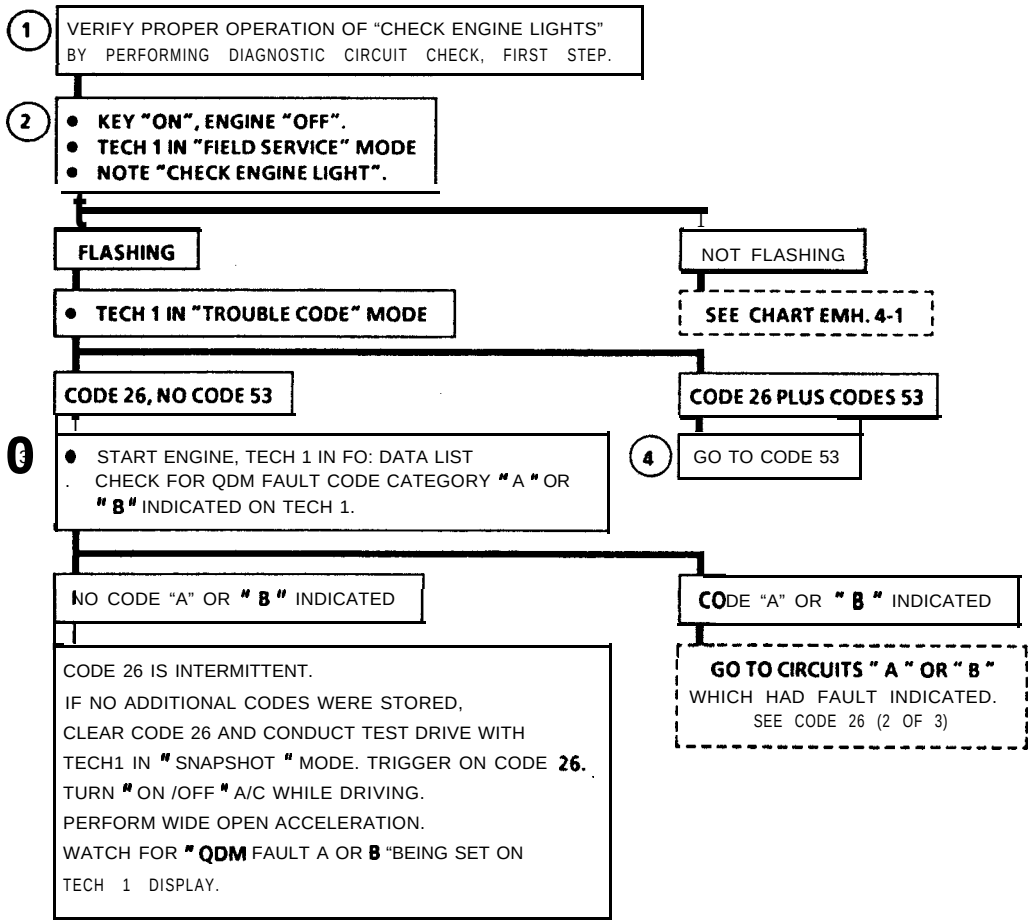
See Code 26, page 2 of 3.

Diagnostic Aids:

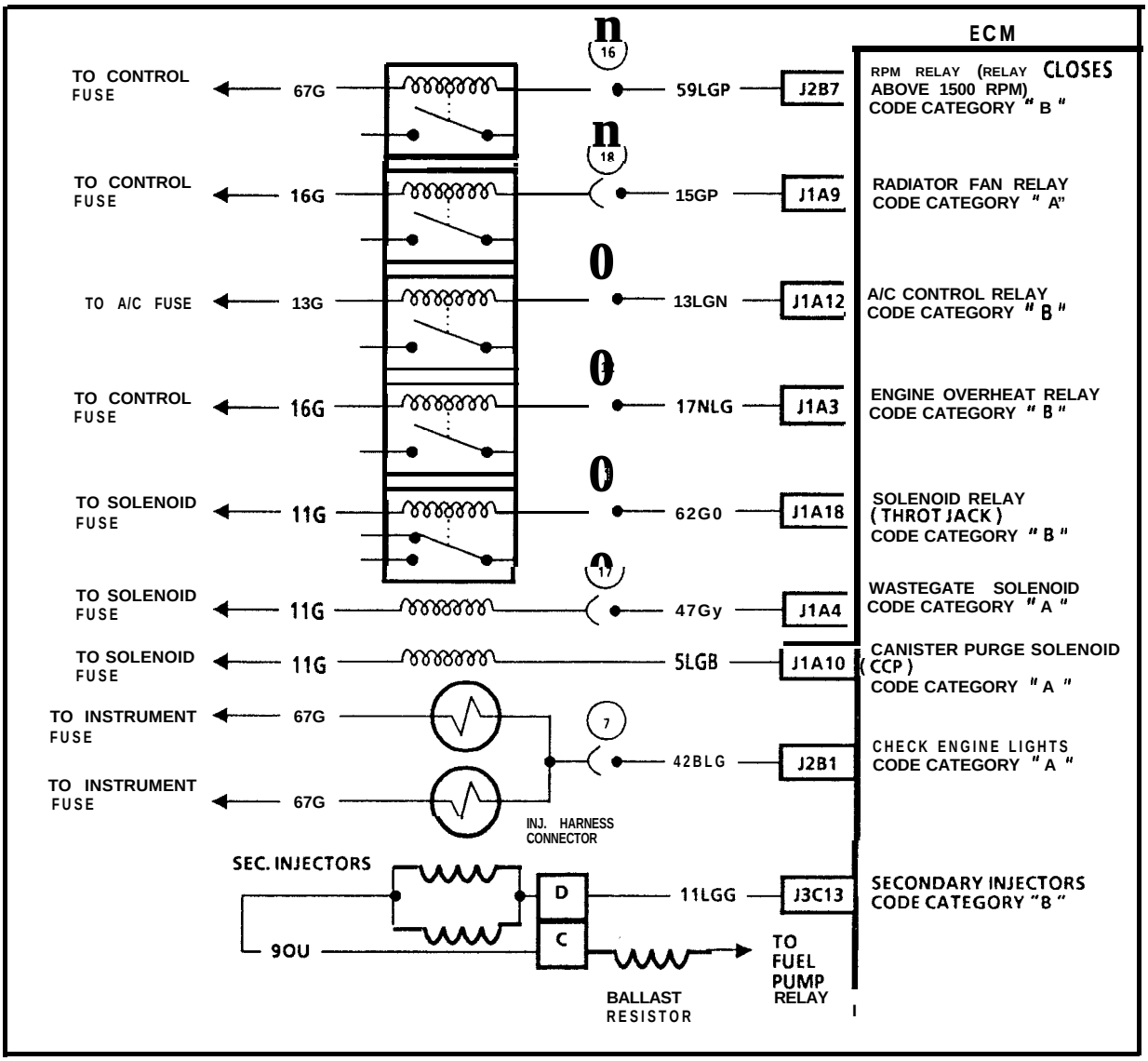
See Code 26, page 2 of 3.

CODE 26

(Page 1 of 3)
QUAD-DRIVER (QDM) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 26

(Page 2 of 3)

QUAD-DRIVER (QDM) CIRCUIT

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Test Description: Numbers below refer to circled numbers.

1. The "Check Engine Light" is controlled by one QDM output and must be checked per diagnostic circuit check procedures.
2. The Tech 1 grounds the diagnostic test terminal which causes QDM outputs to be turned "ON". This should turn "ON" the "Check Engine Light".
3. Code category "A" or "B" set in Tech I "Data List" leads to the circuits to be checked.
4. Code 53 should be corrected to see if Code 26 is then eliminated. Code 53 indicates a high battery voltage which could cause higher current flow.

Diagnostic Aids:

Intermittent open or ground in controlled circuit will cause Code 26 if present continuously for 20 seconds or longer. An intermittent problem however will be indicated instantaneously on TECH 1 display "QDM Fault A or B ".

Note: TECH 1 will always display " QDM Fault B - YES " with engine NOT running even if no problem exists, re - check with engine running is necessary.

CODE 26

(Page 2 of 3)
QUAD-DRIVER (QDM) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

- DISCONNECT BOTH SECONDARY INJECTORS.
- USE FACING PAGE WIRING DJAGRAM FOR SPECIFIC TERMINALS TO BE TESTED.
- KEY "ON", ENGINE "OFF", TECH 1 IN "FIELD SERVICE-MODE.
- REMOVE CONNECTORS FROM RELAYS / SOLENOIDS IN SUSPECTED CIRCUITS "A " OR " B ".
- PLACE TEST LIGHT ACROSS TERMINAL FOR IGNITION/B + AND ECM DRIVER CIRCUIT.
- LIGHT SHOULD BE "ON"
- EXIT "FIELD SERVICE" MODE.
- LIGHT SHOULD BE "OFF".
- REPEAT TEST AT ALL RELAY /SOLENOID CONNECTORS EITHER CODE C ATEGORY " A " OR " B ".

LIGHT IS NOT TURNED "ON" WHEN TECH 1 IS IN FIELD SERVICE MODE

- CONNECT TEST LIGHT FROM IGNITION/B + CKT TO GROUND OF CONNECTOR WHICH FAILED TEST.
- NOTE LIGHT.

"ON"

- IGN. OFF
- DISCONNECT ECM CONNECTORS J1 AND J2.
- CHECK FOR OPEN IN DRIVER CIRCUIT.

OK

FAULTY ECM CONNECTION OR ECM

NOT OK

REPAIR OPEN IN CIRCUIT BETWEEN RELAY / SOLENOID AND ECM.

"OFF"

FAULT IS OPEN IN IGNITION/B + CIRCUIT TO RELAY / SOLENOID OR SHORT TO IGN.OR B + IN DRIVER CKT.

LIGHT IS NOT TURNED "OFF" WHEN FIELD SERVICE MODE IS EXITED.

- DISCONNECT ECM CONNECTORS J1 AND J2.
- NOTE LIGHT.

"ON"

REPAIR GROUNDED CIRCUIT BETWEEN RELAY / SOLENOID AND ECM.

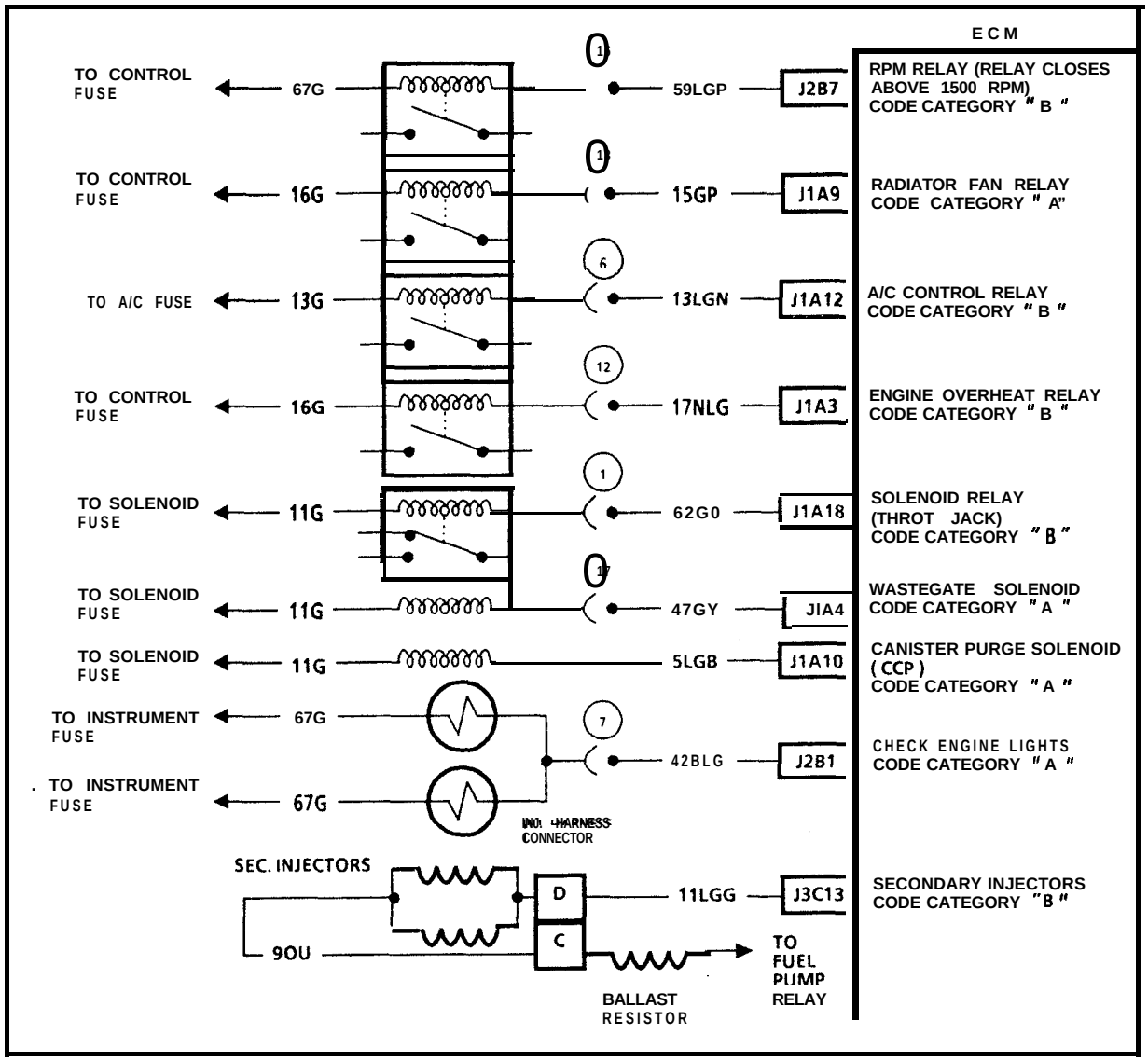
"OFF"

REPLACE ECM

LIGHT IS TURNED " ON " AND "OFF"

SEE CODE 26 PAGE 3 OF 3

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 26

(Page 3 of 3)

QUAD-DRIVER (QDM) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Test Description: Numbers below refer to circled numbers.

5. All relays, solenoids and the secondary injectors can be actuated by the TECH 1. The test on the sec. inj. CKT is conducted with the inj. test light to avoid fuel injection at this test step. Test light should flash.
6. Installation of one injector only makes it easier to determine which one is faulty.

Diagnostic Aids:

Intermittent open or ground in controlled circuit will cause Code 26 if present continuously for 20 seconds or longer. An intermittent problem however will be indicated instantaneously on TECH 1 display "QDM Fault A or B " with engine running.

Note: TECH 1 will always display " QDM Fault B - YES " with engine NOT running even if no problem exists, re - check with engine running is necessary.

CODE 26

(Page 3 of 3)

QUAD-DRIVER (QDM) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

FROM CODE 26
PAGE 2 OF 3

5

. EXIT FIELD SERVICE MODE
- RE- INSTALL RELAYS/SOLENOIDS.
. INSTALL INJ. TEST LIGHT TOOT0900 AT ONE SECONDARY INJ. CONNECTOR..
- START ENGINE
. SELECT F4: SINGLE TESTS • F2: OUTPUTS
- DEPENDING ON WHAT QDM FAULT WAS INDICATED IN FO:DATA LIST, PRESS EITHER "F1", "F2", ETC. ON CATEGORY "A" OR "FO", "F4", ETC. ON CATEGORY "B" PROBLEMS.
- THE COMPONENTS ARE ACTUATED FOR 5 SECONDS. CHECK FUNCTION VISUALLY OR ACOUSTICALLY. ARE ALL SOLENOIDS, RELAYS AND TEST LIGHT ACTUATED BY TECH I?

YES

6
3

- RE -INSTALL 0 N E SEC. INJ. CONNECTOR.
- ACTUATE SEC. INJ. BY PRESSING "F6" KEY ON TECH 1.
- WATCH "OXYGEN SENSOR" VOLTAGE ON TECH 1. SYSTEM SHOULD RUN RICH.
- REPEAT TEST WITH OTHER INJECTOR, THE FIRST ONE DISCONNECTED AGAIN. OXYGEN VOLTAGE SHOULD BE ABOVE 600 MV ON BOTH TESTS. IS IT ?

SOLENOID OR RELAY NOT ACTUATED.

FAULTY CONNECTIONS OR SOLENOID / RELAY

INJ. TEST LIGHT NOT ACTUATED.

CHECK FOR OPEN CKT 90U.
CHECK CKT 11 LGG FOR OPEN, SHORTED TO GROUND OR TO 90U.
IF OK, FAULT IS ECM CONNECTION OR ECM.

YES

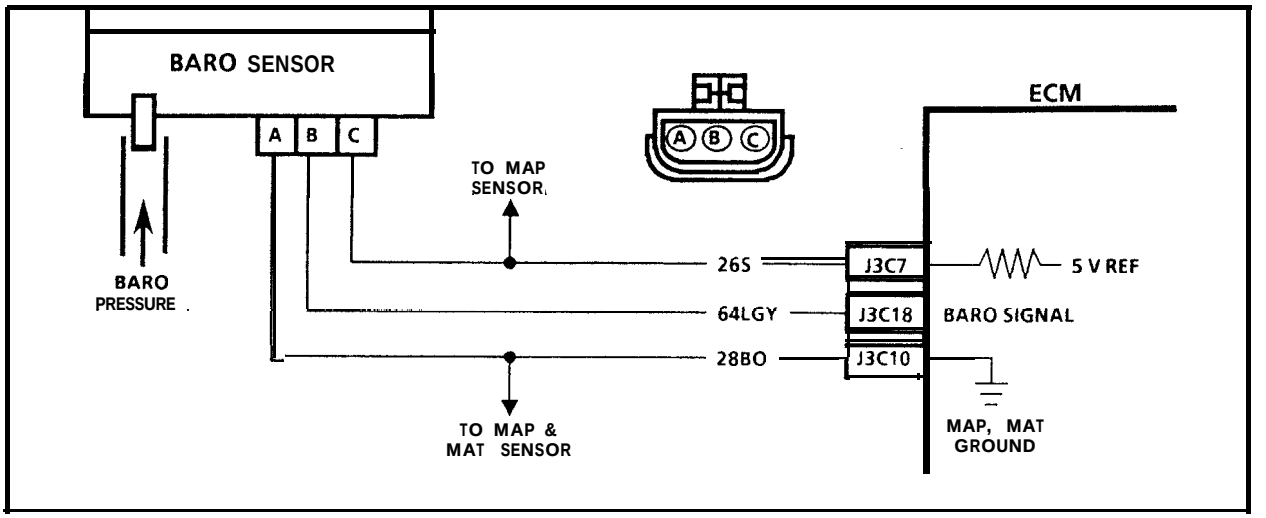
CODE 26 IS INTERMITTENT.
IF NO ADDITIONAL CODES WERE STORED,
CLEAR CODE 26 AND CONDUCT TEST DRIVE WITH TECH1 IN "SNAPSHOT" MODE. TRIGGER ON CODE 26.
TURN "ON /OFF" A/C WHILE DRIVING.
PERFORM WIDE OPEN ACCELERATION.
WATCH FOR "QDM FAULT A OR B" BEING SET ON TECH 1 DISPLAY.

NO

FAULTY CONNECTIONS OR SECONDARY INJECTOR •

• NOTE : SECONDARY INJECTORS ARE DIFFERNT FROM MAIN INJECTORS. DON `T MIX.

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 31

(Page 1 of 2)

BARO SENSOR CIRCUIT (SIGNAL VOLTAGE LOW OR HIGH)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The Baro Pressure Sensor responds to changes in barometric pressure. The ECM receives this information as a signal voltage that will vary from about 2.5 to 4.9 volts depending on atmospheric pressure and altitude.

If the Baro Sensor fails, the ECM will substitute a fixed value.

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

1. Code 31 will set when:
   - Reading lower than 55 kPa (2.3 volts)
   - or
   - Reading more than 104 kPa (4.92 volts)
   - Above conditions met for 10 seconds.
2. About 5 volts should be supplied by the ECM on Terminal C, CKT 26S.
3. A faulty MAP sensor can pull down 5 volt reference voltage on CKT 26 S.

Diagnostic Aids:

If Code 31 is intermittent:

- Intermittents on circuits 26S, 64LGY, 28BO can cause a Code 3 1.
- Check (wiggle) ECM connector pins J3C7, J3C18 and J3C10, sensor wires and connector while watching "BARO" on TECH 1 display. Voltage should be constant.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 31.

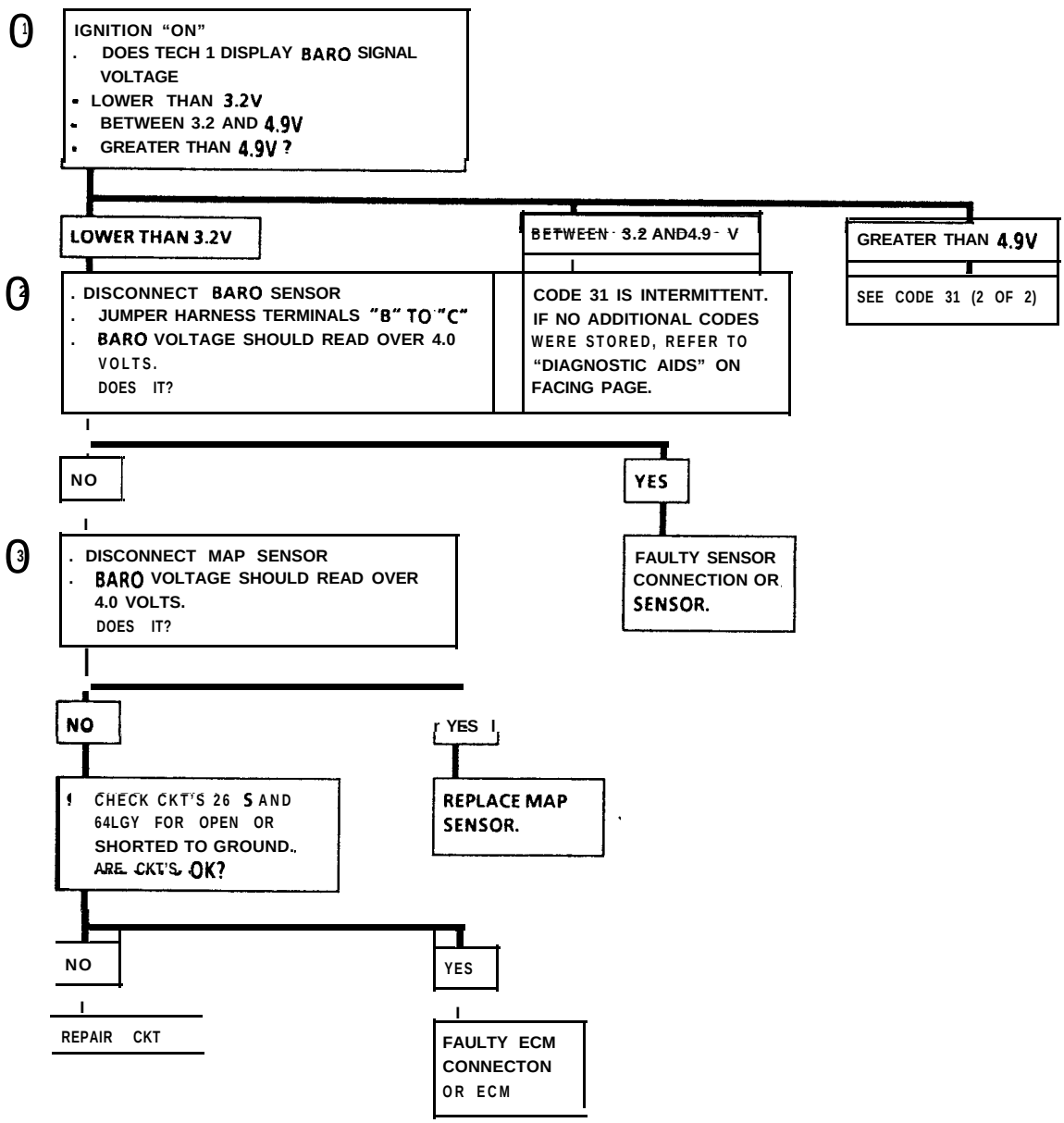
CODE 31

(Page 1 or 2)

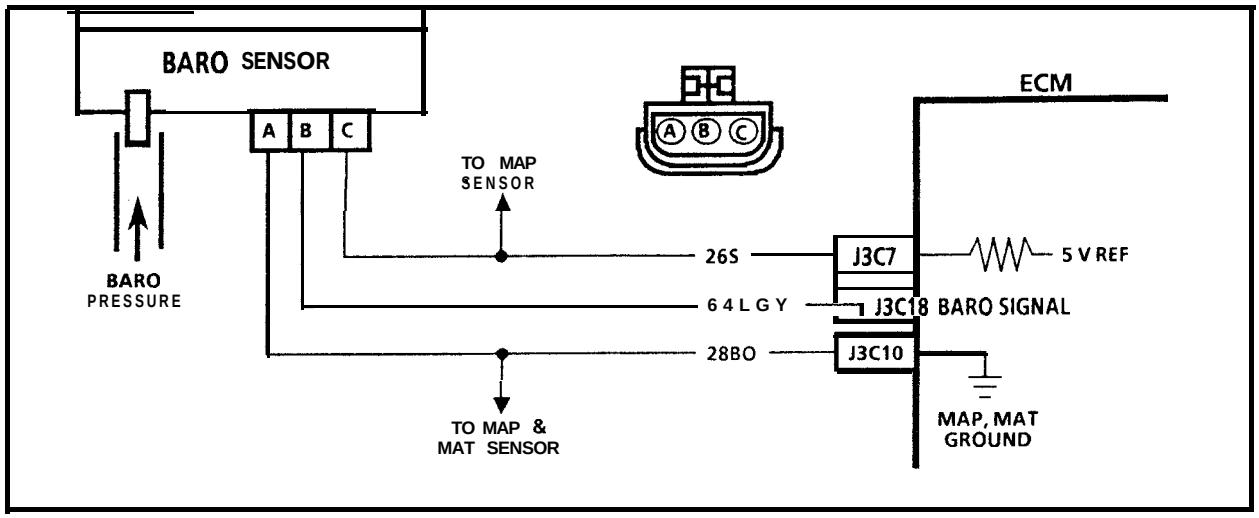
BARO SENSOR CIRCUIT

(SIGNAL VOLTAGE LOW OR HIGH)

2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 31

(Page 2 of 2)

BARO SENSOR CIRCUIT

(SIGNAL VOLTAGE LOW OR HIGH)

2.21 INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The Baro Pressure Sensor responds to changes in barometric pressure. The ECM receives this information as a signal voltage that will vary from about 2.5 to 4.9 volts depending on atmospheric pressure and altitude.

If the Baro Sensor fails, the ECM will substitute a fixed value.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

4. This test determines if sensor ground is faulty.

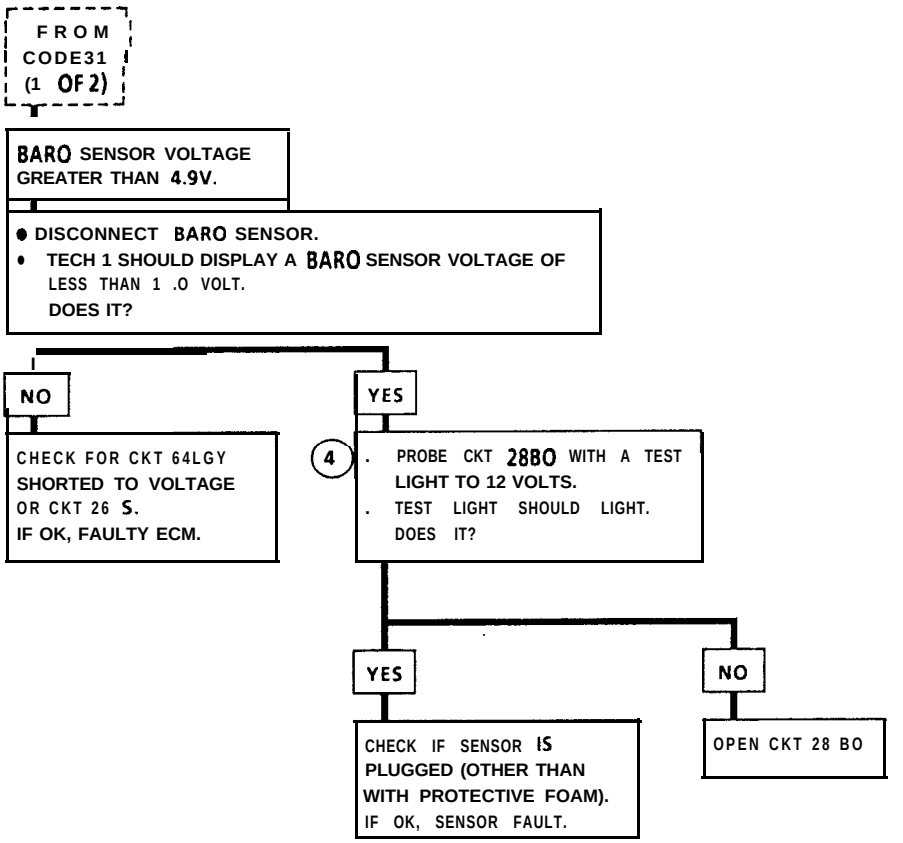
CODE 31

(Page 2 of 2)

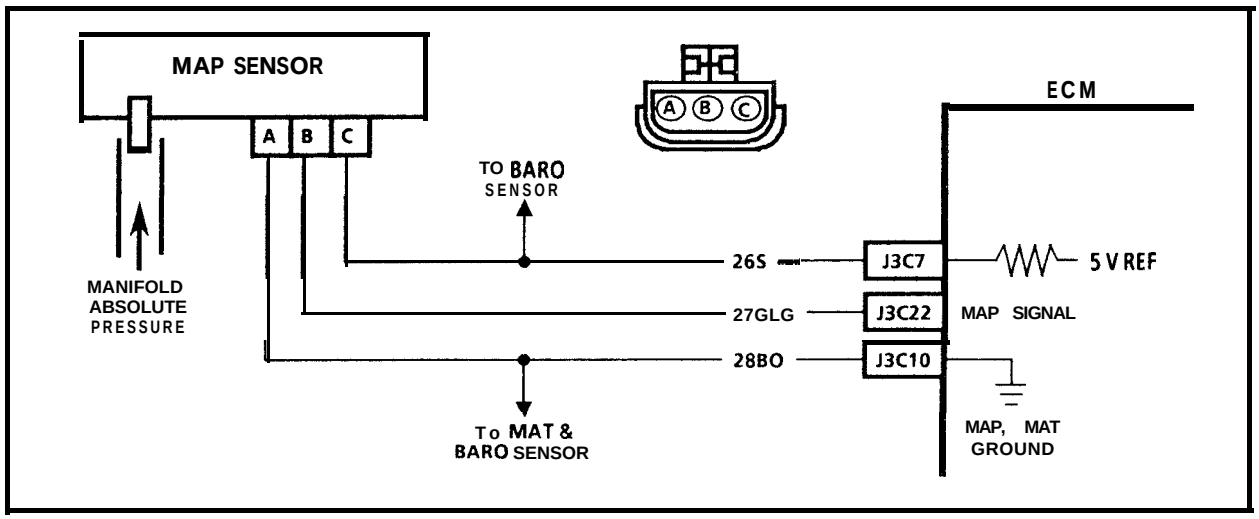
BARO SENSOR CIRCUIT

(SIGNAL VOLTAGE LOW OR HIGH)

2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT
(SIGNAL VOLTAGE HIGH - LOW VACUUM)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The manifold absolute pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1.3 to 1.7 volts at idle, when manifold pressure is low (high vacuum), to 4.9 volts at wide open throttle (low vacuum or high pressure).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the throttle position sensor (TPS) and other sensors to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 33 will set when:
   - Engine running.
   - MAP signal greater than 90 kPa.
   - TPS less than 0.4%.
   - VSS less than 1 mph.
   - Above conditions met for 20 seconds.

   or
   - Engine running.
   - MAP signal above 204 kPa.
2. With the MAP sensor disconnected, the ECM terminal "J3C22" voltage should be low if the ECM and wiring are OK.

Diagnostic Aids:

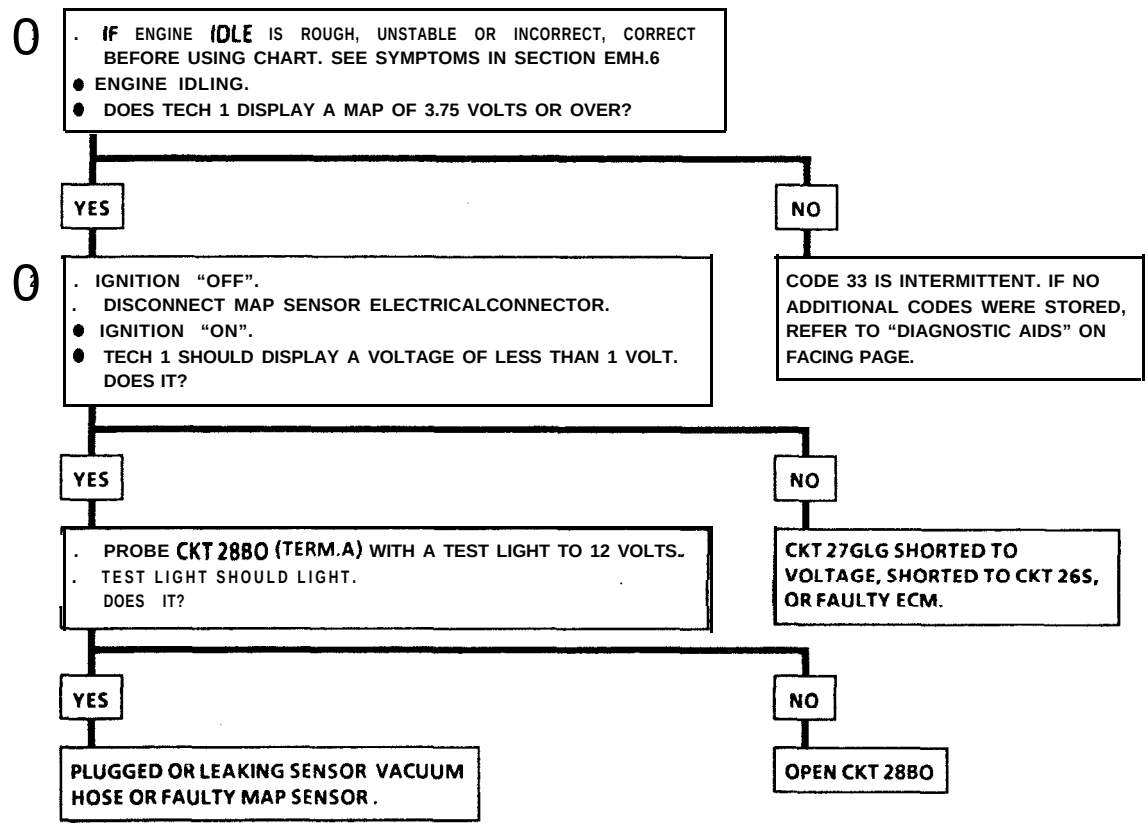
An intermittent open in CKT 28B0 can cause a Code 33.

If Code 33 is intermitted:

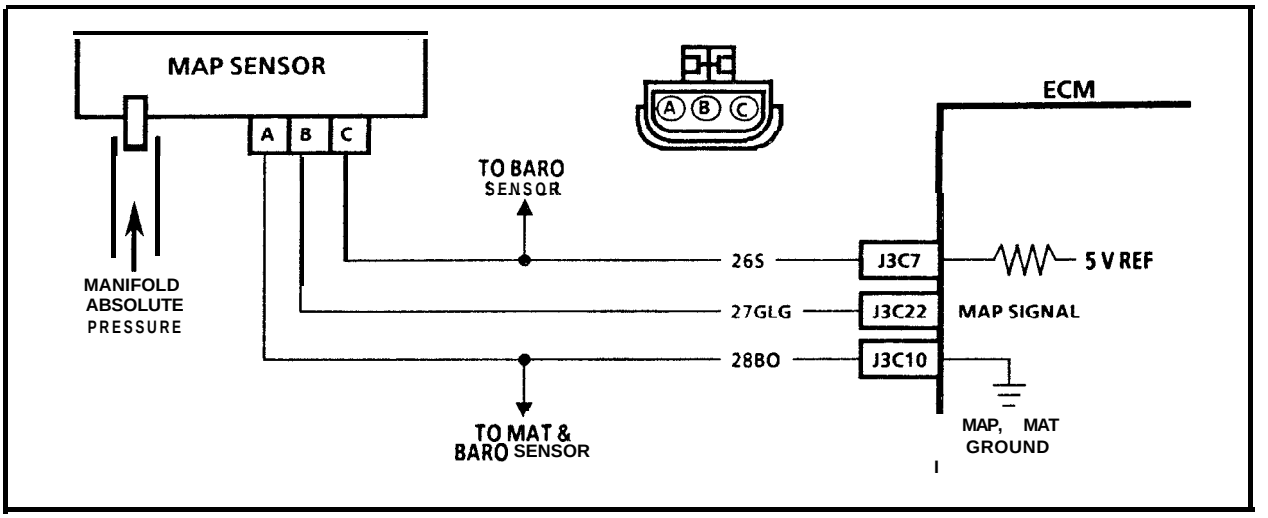
- Check (wiggle) ECM connector pins J3C7, J3C22 and J3C10, wiring and sensor connector while watching "MAP" on TECH 1 display. Voltage should not increase above 3.75 volts.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 33.
- Refer to "Intermittents" in Section EMH. 6.

CODE 33

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT
(SIGNAL VOLTAGE HIGH - LOW VACUUM)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT
(SIGNALVOLTAGE LOW - HIGH VACUUM)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The manifold absolute pressure (MAP) sensor responds to changes in manifold pressure (vacuum). The ECM receives this information as a signal voltage that will vary from about 1.3 to 1.7 volts at idle, when manifold pressure is low (high vacuum), to 4.9 volts at wide open throttle (low vacuum or high pressure).

If the MAP sensor fails, the ECM will substitute a fixed MAP value and use the throttle position sensor (TPS) and other sensors to control fuel delivery.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 34 will set when:
   - Engine speed less than 600 rpm.
   - MAP less than 50 kPa.
   - Above conditions for at least 0.5 seconds.

   or
   - Engine speed greater than 600 rpm.
   - TPS greater than 15%
   - MAP less than 50 kPa.
   - Above conditions met for 0.5 seconds.
2. An internally shorted Baro sensor pulls down the 5 volts reference voltage causing a low MAP sensor signal.

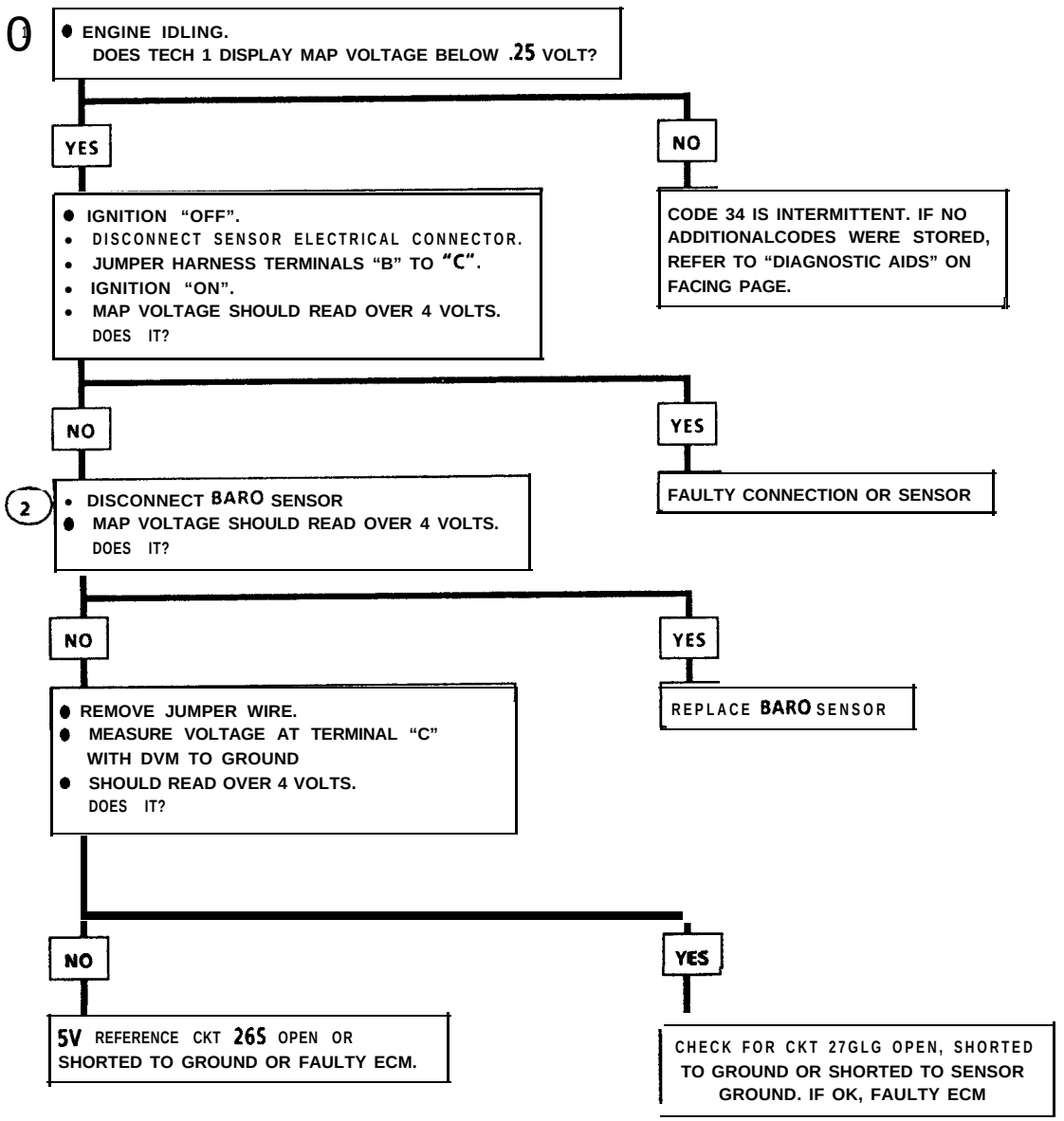
Diagnostic Aids:

If Code 34 is intermitted:

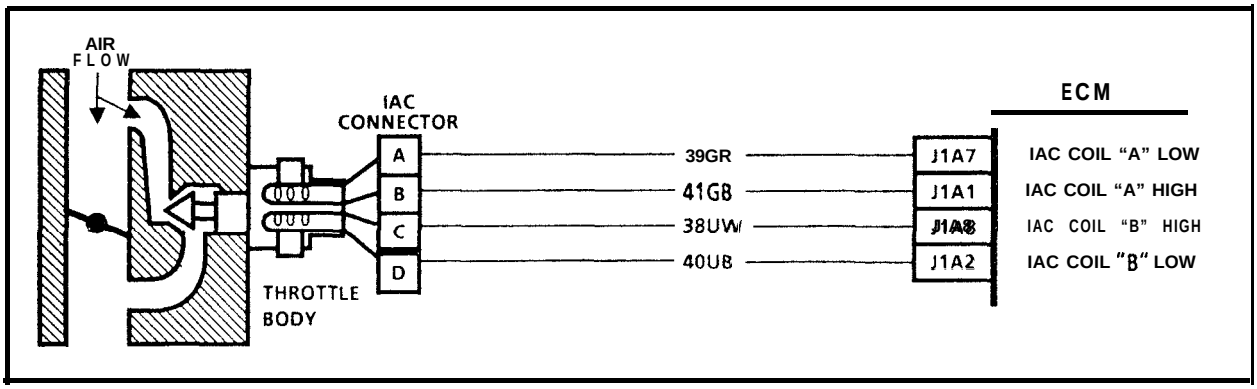
- Check (wiggle) pins J3C7 and J3C22, sensor wiring and connector while watching "MAP" on TECH 1 display. Voltage should not drop.
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 34.
- Refer to "Intermittents" in Section EMH. 6.

CODE 34

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR CIRCUIT
(SIGNAL VOLTAGE LOW - HIGH VACUUM)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 35

IDLE SPEED ERROR
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

Code 35 will set, when the closed throttle engine speed is 200 rpm above or below the desired idle speed for 20 seconds. The ECM controls idle rpm with the IAC valve. To increase idle rpm, the ECM moves the IAC valve in, allowing more air to bypass the throttle plate. To decrease rpm, it moves the IAC valve out, reducing air flow by- passing the throttle plate. The Tech 1 will read the ECM commands to the IAC valve in counts. The higher the counts, the more air allowed (higher idle). The lower the counts, the less air allowed (lower idle).

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

1. Run test, even if engine will not idle. If idle is too low, the Tech 1 will display 80 or more counts, or steps. If idle is high, it will display "5" counts or less. Occasionally an erratic or unstable idle may occur. Engine speed may vary 200 rpm or more up and down. Disconnect IAC. If the condition is unchanged, the IAC is not at fault.
2. When the engine was stopped, the IAC Valve retracted (more air) to a fixed "Park" position for increased air flow and idle speed during the next engine start. The Tech 1 will display about 170 counts ***on*** engine stopped, ignition "ON".
3. The IAC valve should extend as the ECM commands idle speed to decrease to desired rpm. The engine usually runs about 1200 RPM on a hot restart, so " kick down " in order to reach the normal desired idle speed which is 1000RPM.
4. The test light will confirm the ECM signals by a steady or flashing light on all circuits.
5. There is a remote possibility that one of the circuits is shorted to voltage, which would have been indicated by a steady light. Disconnect the ECM and turn the ignition "ON" and probe terminals to check for this condition.
6. An inoperative exhaust backpressure valve or misadjusted throttle jack can cause incorrect idle speeds. (See EMH. 3 - T and Code 26 charts).

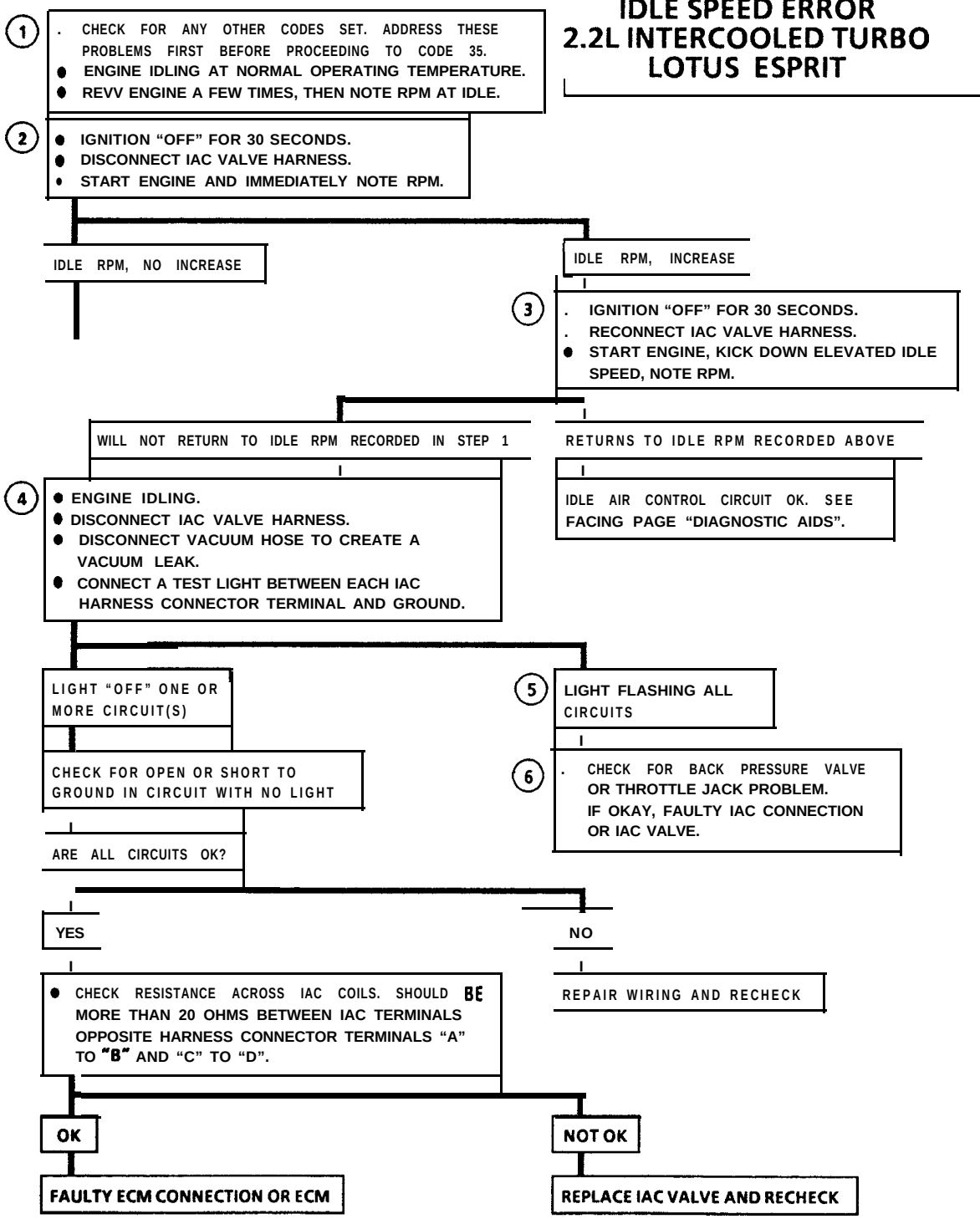
Diagnostic Aids:

A slow unstable idle may be caused by a system problem that cannot be overcome by the IAC. Tech 1 counts will be above 60 counts if idle is too low, and "0" counts if idle is too high. If idle speed is excessively high, check for and correct any trouble code problem or vacuum leak.

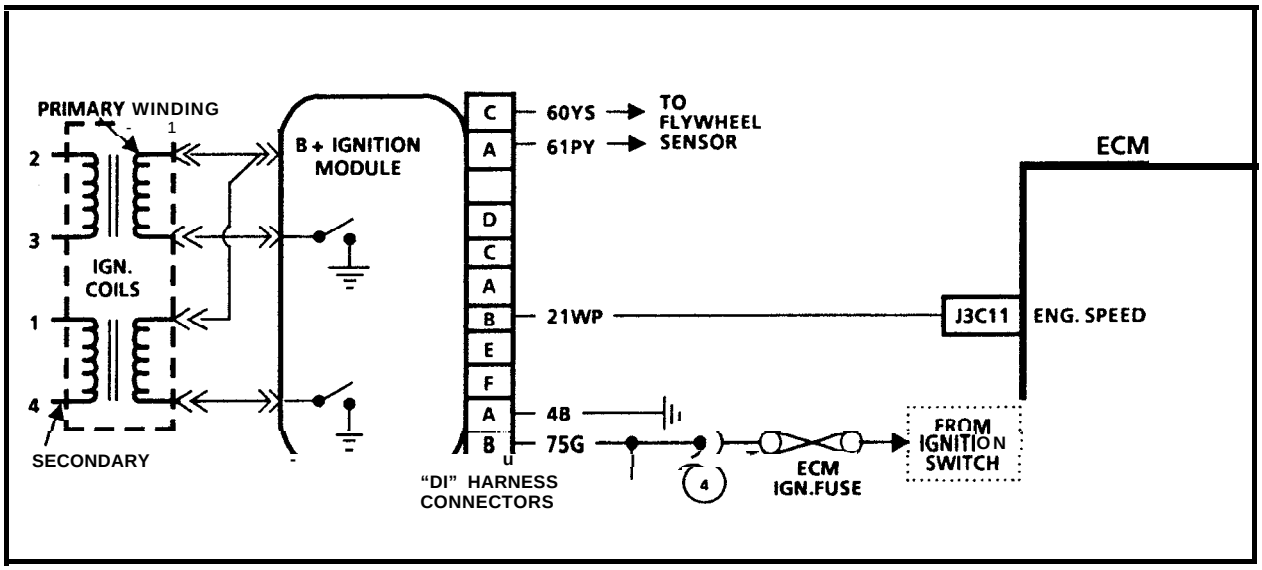
- Svstem too lean (High Air/Fuel Ratio)
  Idle speed may be too high or too low. Engine speed may vary up and down, disconnecting IAC does not help. May set Code 44.
  The Tech 1 and/or voltmeter will read an oxygen sensor output less than 300 mV (.3 volt). Check for low regulated fuel pressure or water in fuel. A lean exhaust, with an oxygen sensor output fixed above 800 mV (.8 volt), will probably be caused by a contaminated sensor (usually silicone). This may also set a Code 45.
- Svstem too rich (Low Air/Fuel Ratio)
  Idle speed too low. Tech 1 counts usually above 80. System obviously rich and may exhibit black smoke exhaust. The Tech 1 will read an oxygen sensor signal fixed above 800 mV.
  Check:-High fuel pressure
  - Injector leaking or sticking
- Intake Manifold - Remove IAC and inspect bore for foreign material or evidence of IAC valve seat or pintle damage.
- Refer to "Rough, Unstable, Incorrect Idle or Stalling" in "Symptoms" in Section EMH. 6.
- Check (wiggle) IAC pins at ECM and valve while watching "IDLE AIR CONTROL" on TECH 1 display. Should be fairly stable.

CODE 35

IDLE SPEED ERROR 2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 41

ENGINE SPEED SIGNAL MISSING
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The engine speed signal is a 5 volt digital input to the ECM which occurs at a frequency of once per engine revolution. It is generated by the integrated direct ignition system module. The signal is used by the ECM to set the alternating firing of the injectors.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 41 will set under the following conditions:
   The ECM does not receive signal pulses for more than 8 engine revolutions during crank,
   or
   it does not receive signal pulses for 4 successive engine revolutions during engine run.
2. The DI module supplies 5 volts on CKT **21WP,** which should be present when ignition is "ON".
3. The engine speed signal is a square wave type signal. The average voltage measured with a DVM should be above 0 volt.

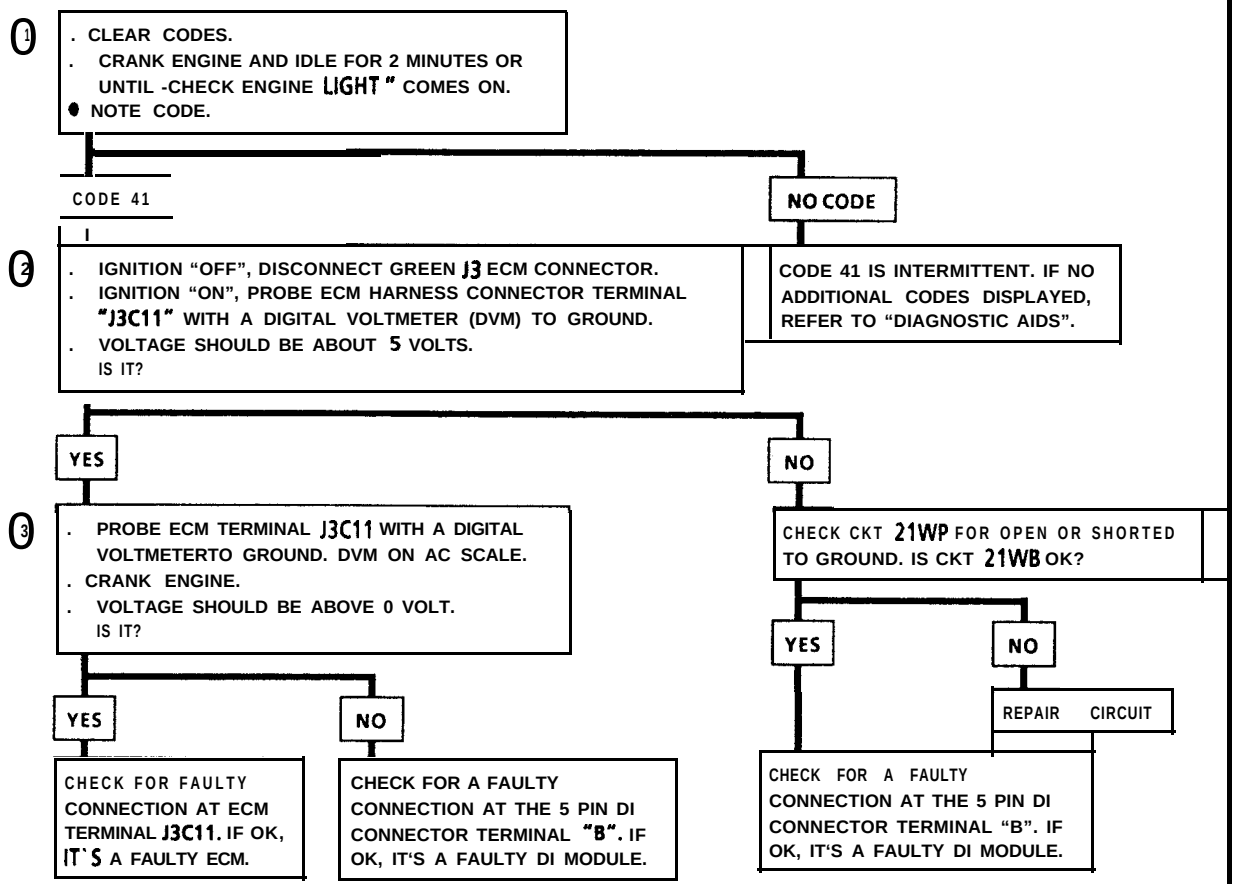
Diagnostic Aids:

An intermittent may be caused by a poor connection, rubbed through wire insulation, or a wire broken inside the insulation.

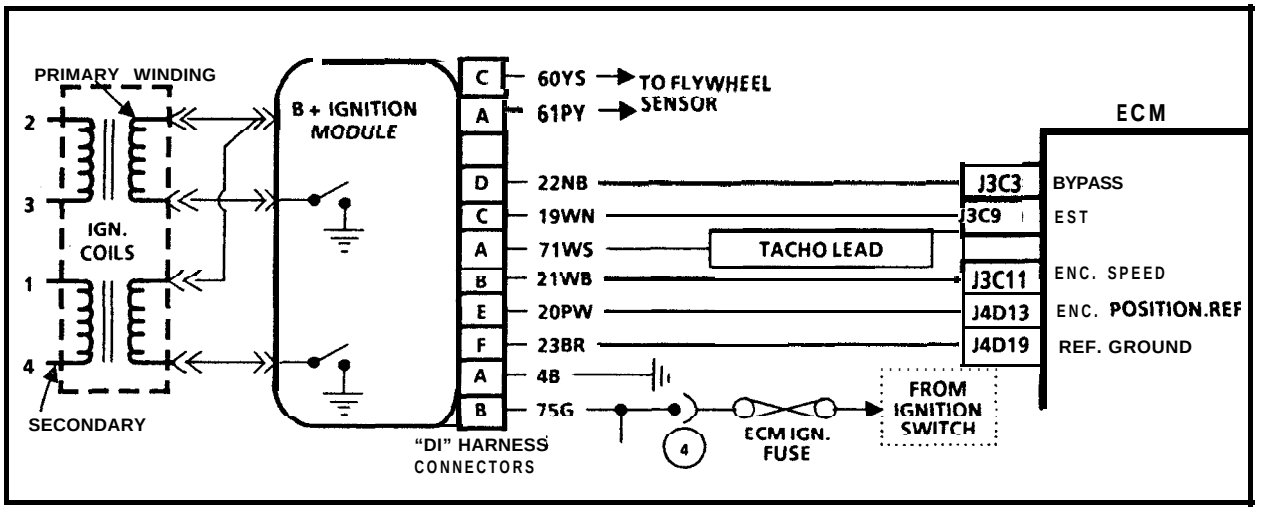
- Clear code and check (wiggle) pin **J3C11** at ECM, wiring and DI module connector in order to see if code resets..
- Conduct a test drive with TECH 1 in "Snapshot" mode. Set trigger on Code 41.

CODE 41

ENGINE SPEED SIGNAL MISSING
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 42

ELECTRONIC SPARK TIMING (EST) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ignition module sends a reference signal to the ECM when the engine is cranking or running. While the engine is under 700 rpm, the ignition module controls the ignition timing. When the engine speed exceeds 700 rpm, the ECM sends a 5 volts signal on the "bypass" CKT 22NB to switch the timing to ECM control through the EST CKT 19WN.

An open or ground in the EST or "bypass" circuit will set a Code 42 and cause the engine to run on module or "bypass" timing. This will result in poor performance and poor fuel economy.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Checks to see if ECM recognizes a problem. If it doesn't set Code 42 at this point, it is an intermittent problem and could be due to a loose connection.
2. With the ECM disconnected, the ohmmeter should be reading less than 500 ohms, which is the normal resistance of the ignition module. A higher reistance would indicate a fault in CKT 19WN, a poor ignition module connection or a faulty ignition module.
3. If the test light was "ON" when connected from 12 volts to ECM harness terminal "J3C3", either CKT 22NB is shorted to ground or the ignition module is faulty.
4. Checks to see if ignition module switches (this simulates switching from "bypass" to "EST" timing) when the bypass circuit is energized through the test light. If the ignition module actually switches, the ohmmeter reading should shift to over 8000 ohms.
5. Disconnecting the ignition module should make the ohmmeter read as if it were monitoring an open circuit (infinite reading). If the ohmmeter has a reading other than infinite, CKT 19WN is shorted to ground.

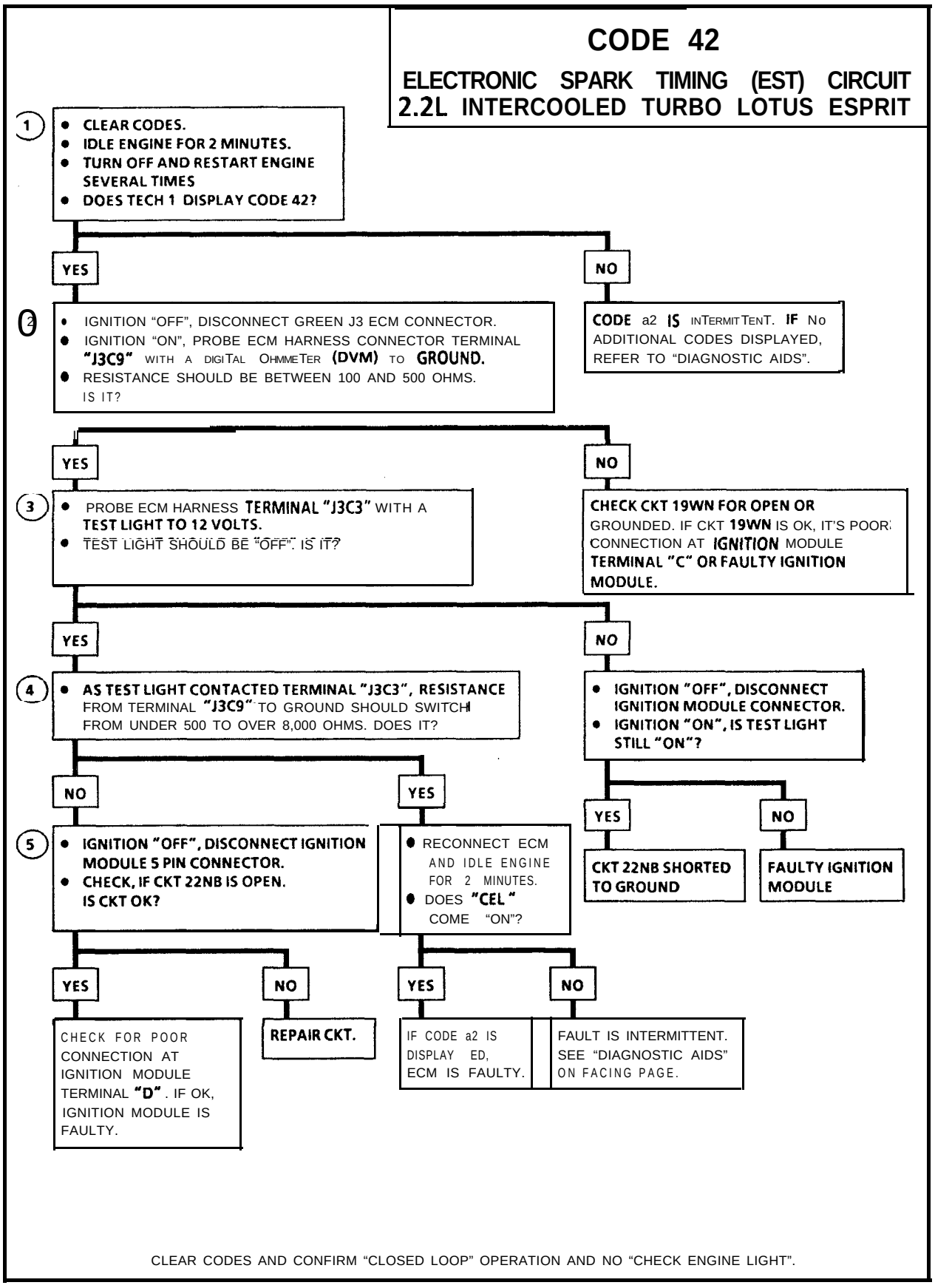
Diagnostic Aids:

An intermittent may be caused by a poor connection, rubbed through wire insulation, or a wire broken inside the insulation.

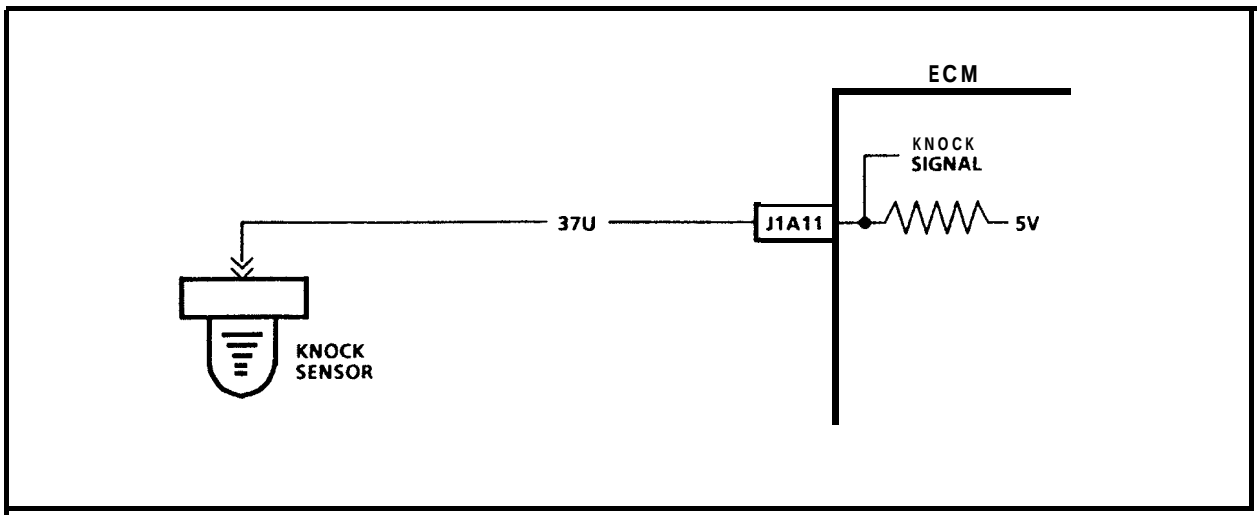
- Inspect ECM harness connectors for backed out terminals "J3C3" or "J3C9", improper mating, broken locks, improperly formed or damaged terminals, poor terminal to wire connection, and damaged harness.
- Run engine while checking (wiggling) 5 pin DI connector, ECM connector pins J3C3, J§C9 and wiring with TECH 1 in "Snapshot" mode. Set trigger on Code 42.
- Crank and turn off engine several times with TECH 1 in "Snapshot" mode. Code might be set during crank only.

CODE 42

ELECTRONIC SPARK TIMING (EST) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 43

ELECTRONIC SPARK CONTROL (ESC) CIRCUIT
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The knock sensor detects engine detonation and the ECM retards the electronic spark timing based on the signal being received. The circuitry within the knock sensor causes the ECM 5 volts to be pulled down so that, under a no knock condition, CKT 37U would measure about 2.5 volts. The knock sensor produces an AC signal which rides on the 2.5 volts DC voltage. The amplitude and signal frequency are dependent upon the knock level.

The ECM performs two tests on this circuit to determine if it is operating correctly. If either of the tests fail, a Code 43 will be set.

- If there is an indication of knock for 3.67 seconds over a 3.9 second interval with the engine running.
- If ECM terminal "J1A11" voltage is either above about 3.75 volts (indicating open CKT 37U), or below about 1.25 volts (indicating CKT 37U is shorted to ground) for 5 seconds or more.

Test Description:

Numbers below refer to circled numbers on the diagnostic chart.

1. If the conditions for the test, as described above, are being met, the the check engine light will be turned "ON" again and Code 41 stored. The Tech 1 could indicate "YES" when the knock signal position is selected as well. If an audible knock is heard from the engine, repair the internal engine problem, because normally, no knock should be detected at idle.
2. Tapping close to the sensor should produce a knock signal. Try different locations around sensor, **don't hit sensor itself.**
3. The ECM has **a** 5 volts signal through a pull-up resistor which should be present at the knock sensor terminal.
4. This test determines if the knock sensor is faulty or if the **ECM** is faulty.

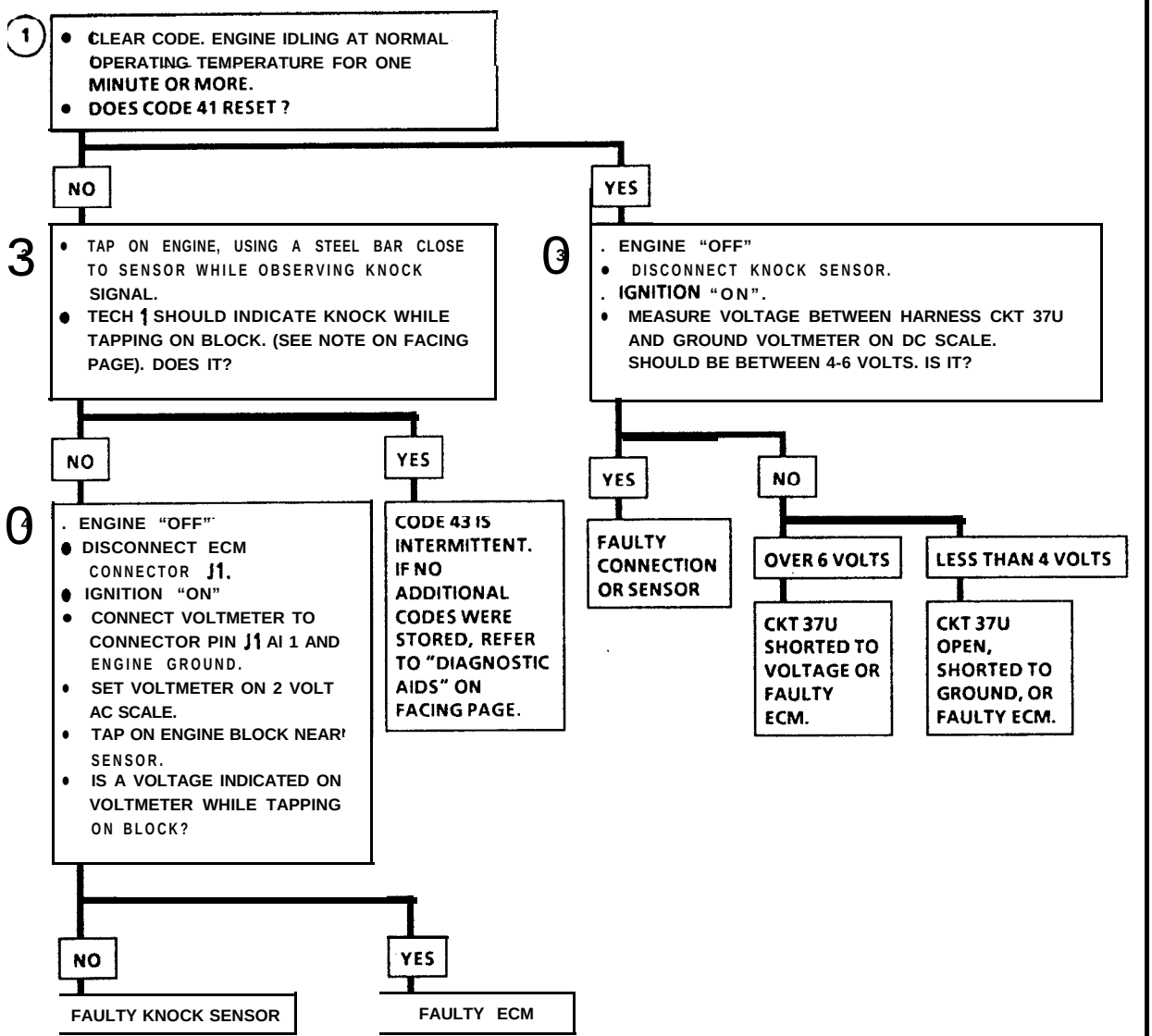
Diagnostic Aids:

If Code 43 is intermittent:

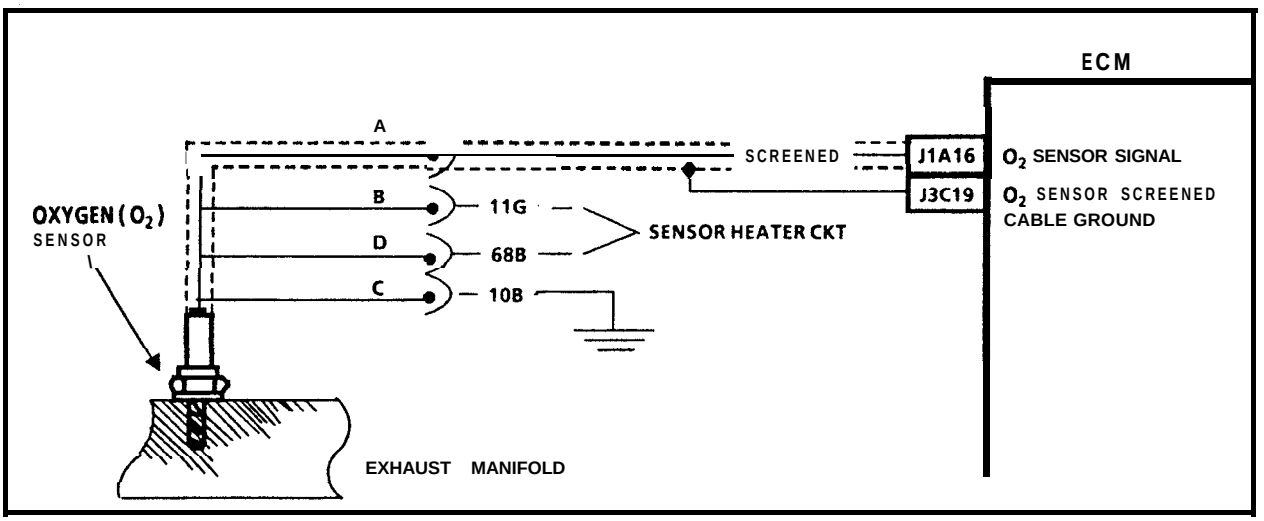
- Check (wiggle) CKT 37U at ECM connector and sensor with TECH 1 in "Snapshot" mode and "KNOCK SIGNAL" on display. There should be no Code set and no knock signal indicated.
- Refer to "Intermittents" in Section EMH. 6.
- Mechanical engine knock can cause a knock sensor signal. Abnormal engine noise must be corrected before using this chart.

CODE 43

ELECTRONIC SPARK CONTROL (ESC) CIRCUIT 2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 44

OXYGEN SENSOR CIRCUIT
(LEAN EXHAUST INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM supplies a voltage of about .45 volt between terminals "J1A16" and "J3C19". (If measured with a 10 megohm digital volt meter, this may read as low as .30 volt.) The O_2 sensor varies the voltage within a range of about 1 volt if the exhaust is rich, down through about .10 volt if exhaust is lean.

The sensor is like an open circuit and produces no voltage when it is below 360" C (600" F). An open sensor circuit or cold sensor causes "Open Loop" operation.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 44 is set when the O_2 sensor signal voltage on O_2 sensor signal CKT
   - Remains below .3 volt for 50 seconds or more.
   - The system is operating in "Closed Loop".
   - No Code 33 or 34.
   - "Closed Loop" integrator active.
2. This test is to see if the sensor is at fault for the lean indication or if there is an ECM wiring problem.

Diagnostic Aids:

The Code 44 or lean exhaust is most likely caused by one of the following:

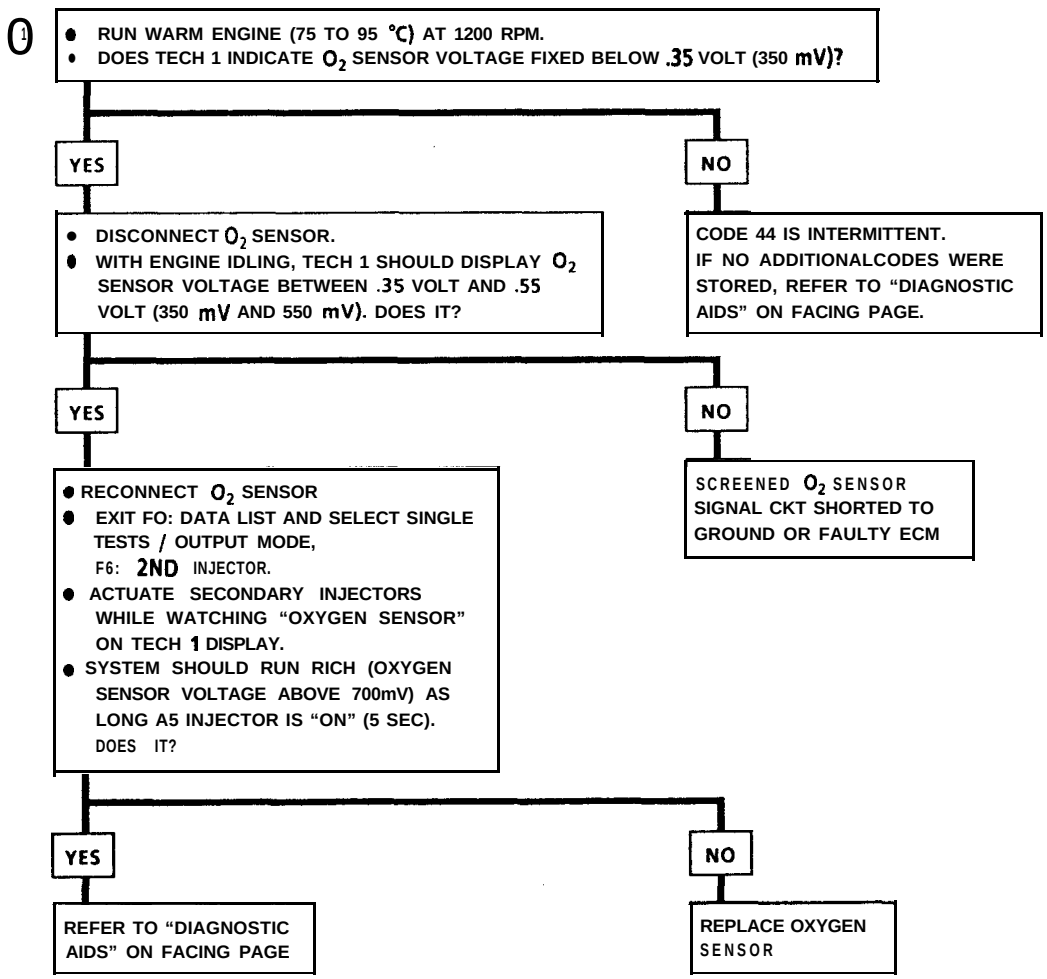
- Fuel Pressure - System will be lean if pressure is too low. It may be necessary to monitor fuel pressure while driving the car at various road speeds and/or loads to confirm.
- MAP Sensor - An output that causes the ECM to sense a lower than normal manifold pressure (high vacuum) can cause the system to go lean. Disconnecting the MAP sensor will allow the ECM to substitute default values for the MAP sensor. If the rich condition is gone ("FUEL INTEGRATOR" returns to 120-140 counts) when the sensor is disconnected, substitute a known good sensor and recheck.
- Fuel Contamination - Water, even in small anounts, near the in-tank fuel pump inlet can be delivered to the injector. The water causes a lean exhaust and can set a Code 44.
- Engine Misfire - A cylinder misfire will result in unburned oxygen in the exhaust, which could cause Code 44.

If Code 44 is intermittent:

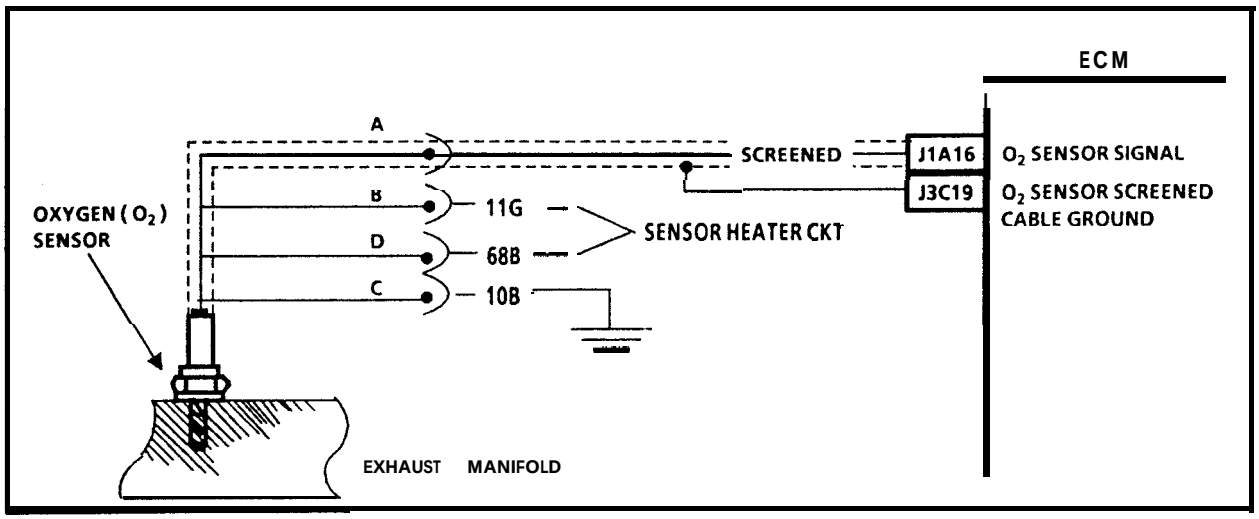
- Clear Code and conduct test drive with TECH 1 in "Snapshot" mode. Watch "OXYGEN SENSOR" on TECH 1 display - voltage should continously toggle from low to high and back at a constant engine speed and load.
- Refer to "Intermittents" in Section EMH. 6.

CODE 44

OXYGEN SENSOR CIRCUIT
(LEAN EXHAUST INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 45

OXYGEN SENSOR CIRCUIT
(RICH EXHAUST INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM supplies a voltage of about .45 volt between terminals "J1A16" and "J3C19". (If measured with a 10 megohm digital voltmeter, this may read as low as .30 volt.) The O_2 sensor varies the voltage within a range of about 1 volt if the exhaust is rich, down through about .10 volt if exhaust is lean.

The sensor is like an open circuit and produces no voltage when it is below 360" C (600" F). An open sensor circuit or cold sensor causes "Open Loop" operation

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 45 is set when:
   - O_2 voltage is above .75 volt.
   - No Code 33 or 34.
   - Fuel system in "Closed Loop".
   - TPS above 5%.
   - Above conditions met for 30 seconds.
2. This test checks the connections to the ECM for the fault.

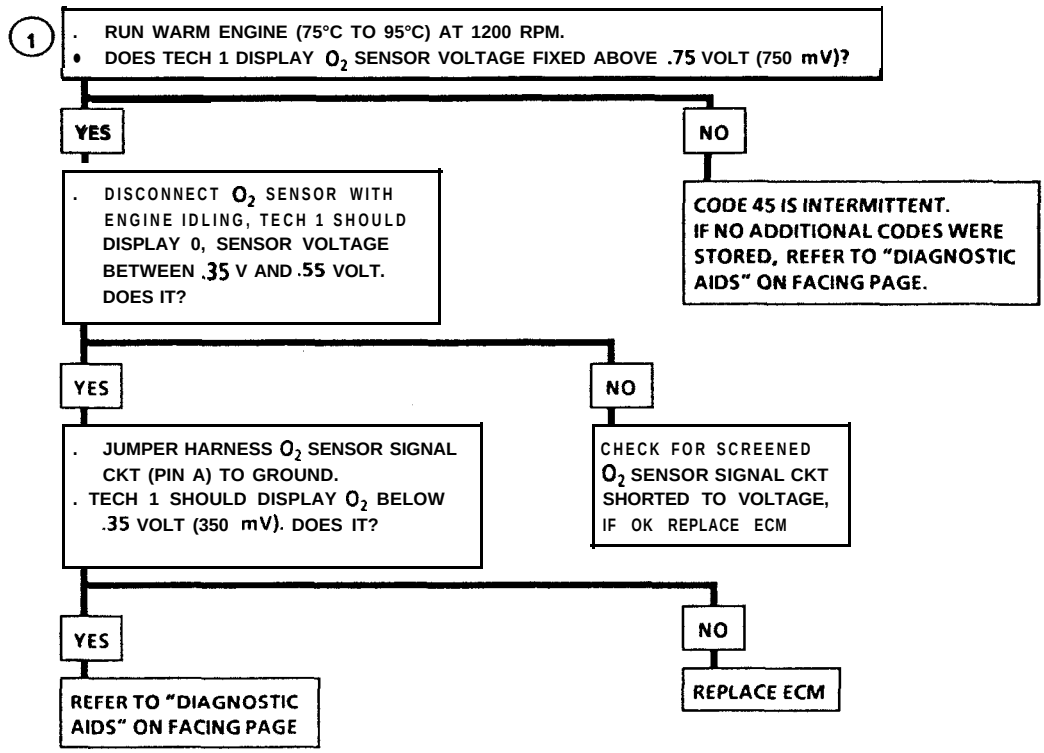
Diagnostic Aids:

The Code 45 or rich exhaust is most likely caused by one of the following:

- Fuel Pressure - System will go rich if pressure is too high. The ECM can compensate for some increase. However, if it gets too high, a Code 45 will be set. See "Fuel System" diagnosis CHART EMH. 4-7.
- Leaking Injector - See CHART EMH. 4-7.
- HE1 Shielding - An open reference ground CKT 23BR may result in EM1 or induced electrical noise, The ECM looks at this noise as distributor pulses. The additional pulses result in a higher than actual engine speed signal. The ECM then delivers too much fuel causing system to go rich. Engine tachometer will also show higher than actual engine speed which can help in diagnosing this problem.
- Canister Purge - Check for fuel saturation. If full of fuel, check canister control and hoses.
- MAP Sensor - An output that causes the ECM to sense a higher than normal manifold pressure (low vacuum) can cause the system to go rich. Disconnecting the MAP sensor will allow the ECM to set a fixed value for the MAP sensor. Substitute a different MAP sensor if the rich condition is gone while the sensor is disconnected.
- Pressure Regulator - Check for leaking fuel pressure regulator diaphragm by checking for the presence of liquid fuel in the vacuum line to the regulator.
- TPS - An intermittent TPS output will cause the system to go rich due to a false indication of the engine accelerating.
- O_2 Sensor Contamination - Inspect oxygen sensor for silicone contamination from fuel or use of improper RTV sealant. The sensor may have a white powdery coating and result in a high but false signal voltage (rich exhaust indication). The ECM will then reduce the amount of fuel delivered to the engine causing a severe surge driveability problem.
- Clear Code and conduct a test drive with TECH 1 in "Snapshot" mode. Set trigger on "ANY CODE".
- Watch for intermittent "TPS" and "MAP" signal problem while driving.

CODE 45

OXYGEN SENSOR CIRCUIT
(RICH EXHAUST INDICATED)
2.2L INTERCOOLED TURBO LOTUS ESPRIT

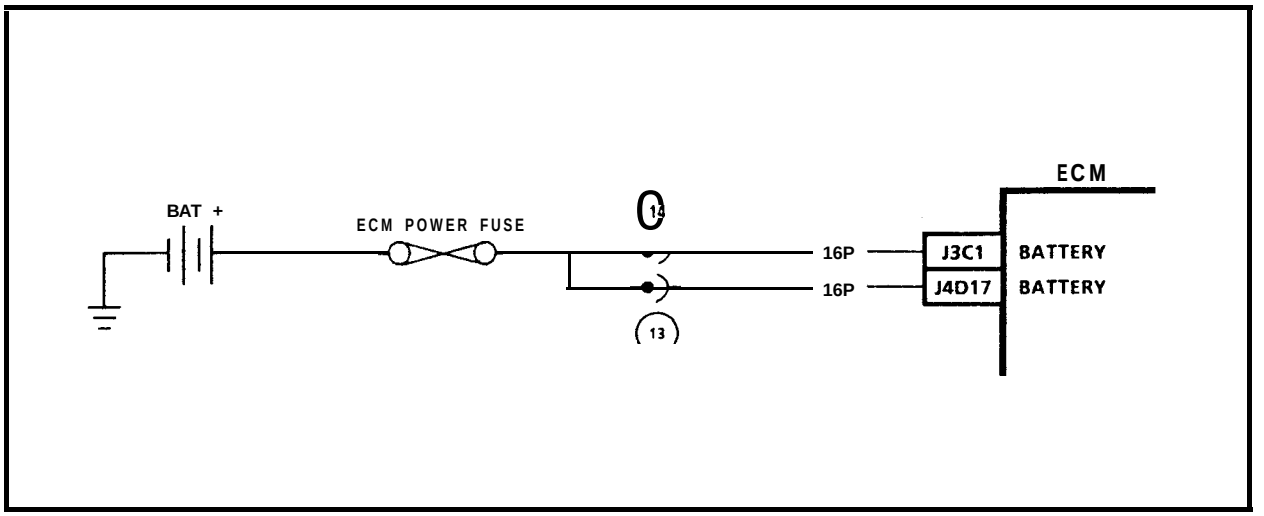


CODE 51

MEM-CAL ERROR
2.2L INTERCOOLED TURBO LOTUS ESPRIT

THE ECM ON THE INTERCOOLED LOTUS ESPRIT TURBO IS A SEALED UNIT, AND NO ACCESS TO THE MEM-CAL IS POSSIBLE. IF CODE 51 IS DISPLAYED, THE COMPLETE ECM SHOULD BE REPLACED.

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 53

BATTERY VOLTAGE TOO HIGH
2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

Code 53 will set when the ignition is "ON" and ECM terminal "J3C1" and "J4D17" voltages are more than 17.1 volts for about .2 seconds.

During the time the failure is present, all ECM outputs will be disengaged. (The setting of additional codes may result).

Test' Description: Numbers below refer to circled numbers on the diagnostic chart.

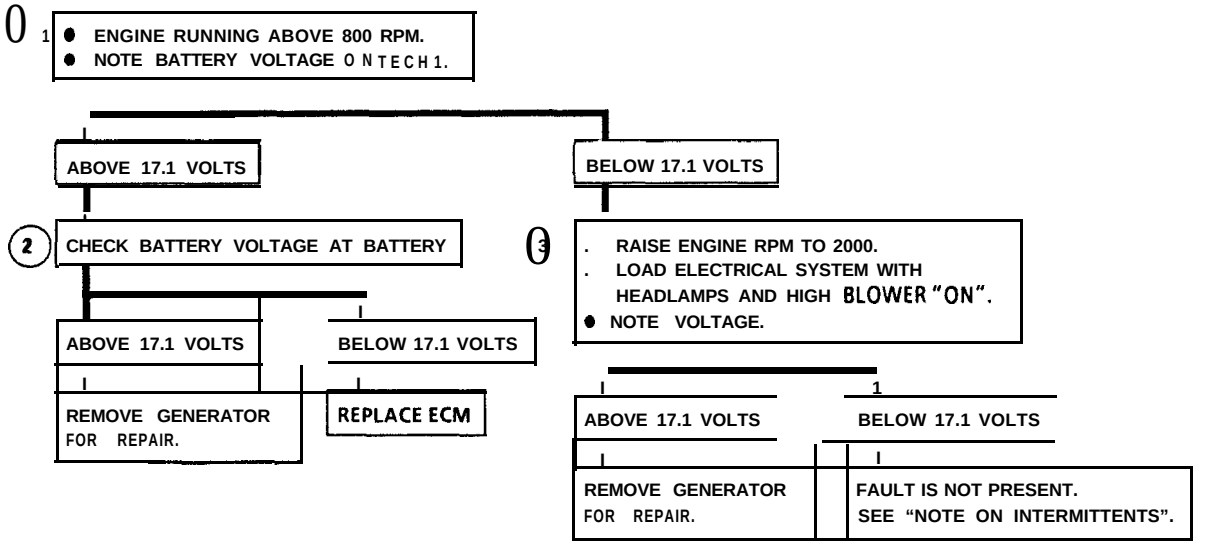
1. Normal battery output is between 10 - 17.0 volts.
2. Checks to see if the high voltage reading is due to the generator or ECM. With engine running, check voltage at the battery. If the voltage is above **17.1** volts, the ECM is OK.
3. Checks to see if generator is faulty under load condition. If the voltage is above 17.1 volts, check alternator output.

Note On Intermittents:

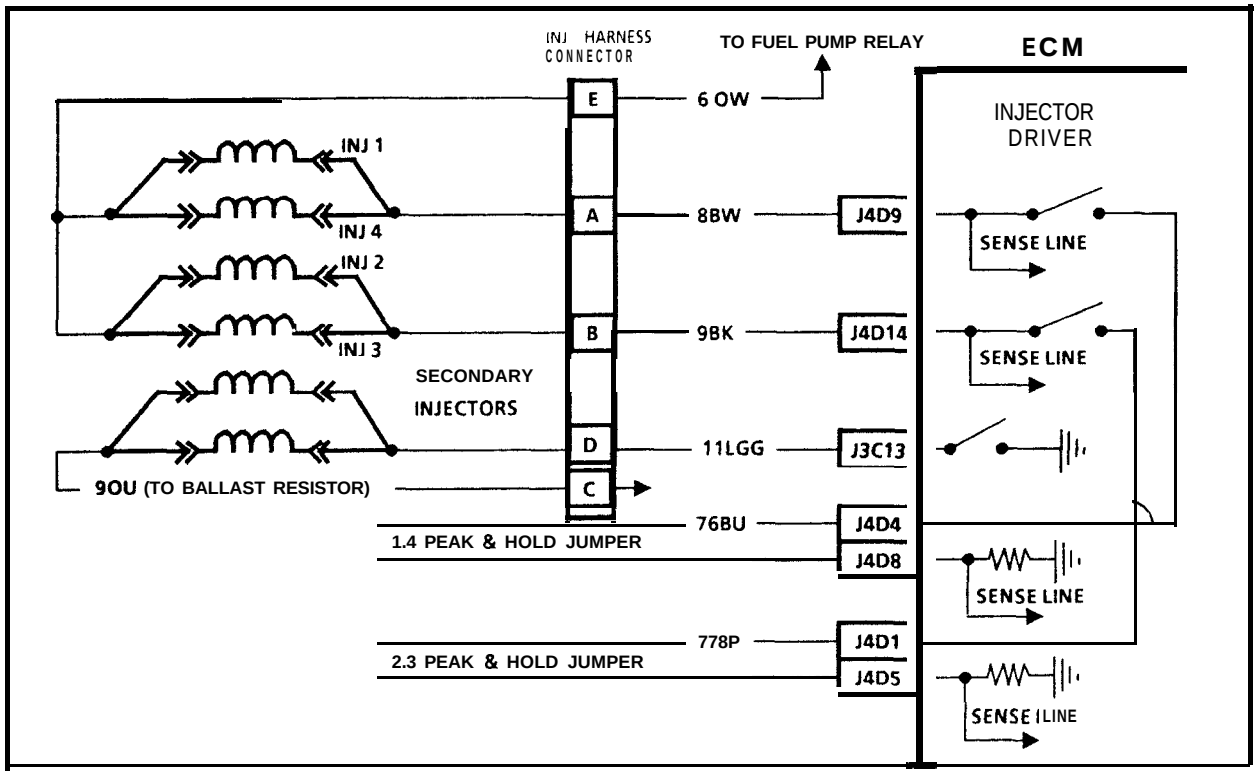
Charging battery with a battery charger and starting engine, may set Code 53. If code sets when an accessory is operated, check for poor connections or excessive current draw.

CODE 53

BATTERY VOLTAGE TOO HIGH
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 65

(Page 1 of 2)

FUEL INJECTOR CIRCUIT (INJECTORS 1 TO 4 ONLY)

(LOW CURRENT)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM has three injector driver circuits, each of which controls a pair of injectors (1/4, 2/3 and the two secondary injectors). The ECM monitors the current in the driver circuits for injectors 1/4 and 2/3 (NOT sec. injectors) by measuring voltage drop through a fixed resistor and is able to control it. The current through these two drivers is allowed to rise to a "peak" of 4 amps to quickly open the injectors and is then reduced to 1 amp to "hold" them open. This is called "peak and hold". If the current can't reach a 4 amp peak, Code 65 is set as noted below. This code is also set if an injector driver circuit is shorted to voltage.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

1. Code 65 sets when:
   - 4 amp injector driver current not reached on either circuit.
   - Battery voltage greater than 9 volts.
   - Injectors commanded "ON" longer than a calibrated pulse width.
   - Above conditions met for 20 seconds.
2. Tests ECM and harness wiring to the 5 terminal injector harness connector.
3. Tests for open or shorted injector harness or injector. A shorted harness or injector will not cause Code 65.
4. Results of step 2 will determine which branch to follow on page 2.
5. Checks remainder of circuit from injectors to ECM as both harnesses were confirmed OK in steps 2 and 3.
6. This step determines whether harness or injector is cause of incorrect resistance. Nominal injector resistance is 1.9 to 2.1 ohms at 60°C (140°F). Resistance will increase slightly at higher temperatures.
7. Checks for grounded "peak and hold" jumpers. This fault would allow injectors to pulse but would not allow "peak and hold" operation as current would not flow through the resistor in the ECM .

Diagnostic Aids:

See Code 65, page 2 of 2.

CODE 65

(Page 1 of 2)

FUEL INJECTOR CIRCUIT (LOW CURRENT)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

NOTE: IF ENGINE "CRANKS BUT WON'T RUN", DO NOT USE THIS CHART. REFER TO CHART EMH. 4-3.

1. . CLEAR CODE
   • IDLE ENGINE FOR 1 MINUTE.
   • DOES TECH 1 INDICATE CODE 65?

   YES → 2
   NO → CODE IS INTERMITTANT REFER TO "DIAGNOSTIC AIDS."

2. • ENGINE "OFF".
   . DISCONNECT 5 TERMINAL INJECTOR HARNESS CONNECTOR.
   . CONNECT INJECTOR TEST LIGHT TOOOT0900 WITH TEST ADAPTER TOOT0930 BETWEEN CAVITIES "E" AND "A", ECM SIDE.
   . CHECK FOR BLINKING TEST LIGHT WHILE CRANKING.
   . REPEAT CHECK WITH TEST LIGHT CONNECTED BETWEEN CAVITIES "E" AND "B", ECM SIDE. TEST LIGHT SHOULD BLINK ON BOTH TESTS. DOES IT?

   YES → 3
   NO → 4

3. • WITH DVM ON 200 OHM'S SCALE, MEASURE RESISTANCE BETWEEN CAVITIES E AND A (FOR INJECTORS 1, 4) AND BETWEEN CAVITIES E AND B (FOR INJECTORS 2, 3) ON INJECTOR SIDE OF 5 TERMINAL INJECTOR HARNESS CONNECTOR. RESISTANCE SHOULD BE BETWEEN ABOUT 0.9 TO 1 .1 OHMS ON EACH CHECK. IS IT?

   YES → 5
   NO → 6

4. NOTE WHETHER TEST LIGHT WAS "OFF" ON ONE OR "ON" STEADY ON ONE IN PREVIOUS STEP AND REFER TO PAGE 2 OF THIS CHART.

   → SEE CODE 65 (2 OF 2)

5. CHECK FOR POOR CONNECTIONS OR CRIMPS AT 5 TERMINAL INJECTOR HARNESS CONNECTOR. ARE CONNECTIONS OK?

   YES → 7
   NO → REPAIR CONNECTIONS

6. • DISCONNECT INJECTORS IN CIRCUIT WITH HIGH (OR ZERO) RESISTANCE IN PREVIOUS STEP.
   . WITH DVM ON 200 OHM SCALE, MEASURE RESISTANCE OF EACH INJECTOR (1.4 OR 2, 3). RESISTANCE OF EACH INJECTOR SHOULD BE ABOUT 1.9 TO 2.1 OHMS*. IS IT?

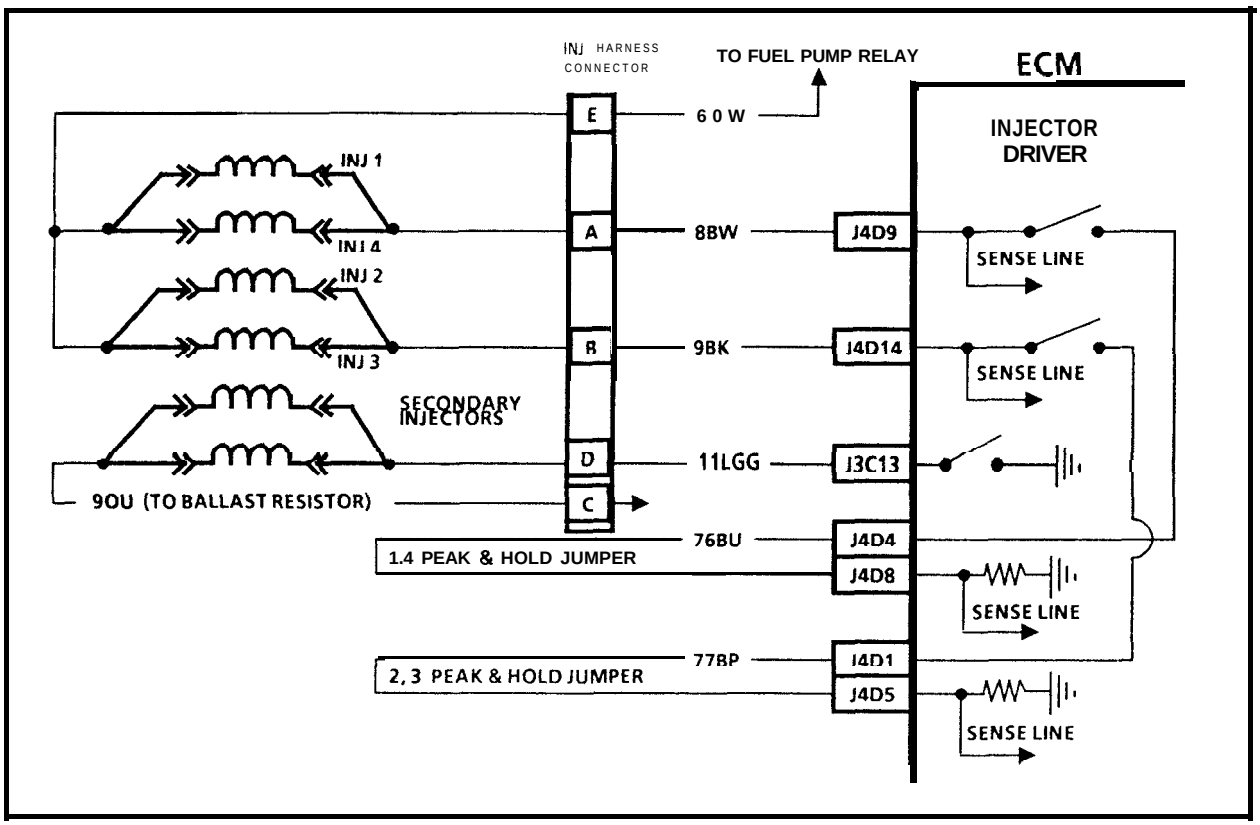
   YES → REPAIR OPEN CIRCUIT OR FAULTY CONNECTION IN INJECTOR HARNESS. (IF RESISTANCE WAS ZERO IN STEP 3, REPAIR SHORTED INJECTOR HARNESS).
   NO → REPLACE INJECTOR WITH HIGH (OR ZERO) RESISTANCE.

7. . IGNITION "0 FF"
   • DISCONNECT ECM BROWN D CONNECTOR.
   . CONNECT TEST LIGHT TO 12 VOLT SOURCE.
   . IGNITON "ON"
   • PROBE ECM HARNESS CAVITIES "J4D4", "J4D8, "J4D1" AND "J4D5". TEST LIGHT SHOULD BE "OFF", IS IT?

   YES → REPLACE ECM
   NO → REPAIR SHORT TO GND IN CKT'S 76BU, 77BP

*NOTE: INJECTOR RESISTANCE SPECIFICATION IS AT 60°C (140°F) AND MAY BE SLIGHTLY HIGHER IF INJECTOR IS HOTTER.

CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".



CODE 65

(Page 2 of 2)

FUEL INJECTOR CIRCUIT (INJECTORS 1 TO 4 ONLY)

(LOW CURRENT)

2.2L INTERCOOLED TURBO LOTUS ESPRIT

Circuit Description:

The ECM has three injector driver circuits, each of which controls a pair of injectors (1/4, 2/3 and the two secondary injectors). The ECM monitors the current in the driver circuits for injectors 1/4 and 2/3 by measuring voltage drop through a fixed resistor and is able to control it. The current through these two drivers is allowed to rise to a "peak" of 4 amps to quickly open the injectors and is then reduced to 1 amp to "hold" them open. This is called "peak and hold". If the current can't reach a 4 amp peak, Code 65 is set as noted below. This code is also set if an injector driver circuit is shorted to voltage.

Test Description: Numbers below refer to circled numbers on the diagnostic chart.

8. This checks for short to voltage in injector driver circuits. It is necessary to crank the engine to assure voltage to CKT 60W.
9. Determines whether injector driver CKT's 8BW and 9BK are shorted to ground.
10. This checks the continuity of the circuits to determine if CKT's 8BW and 9BK are OK.
11. Checks for good continuity of "peak and hold" jumpers CKT's 77BP and 76BU.

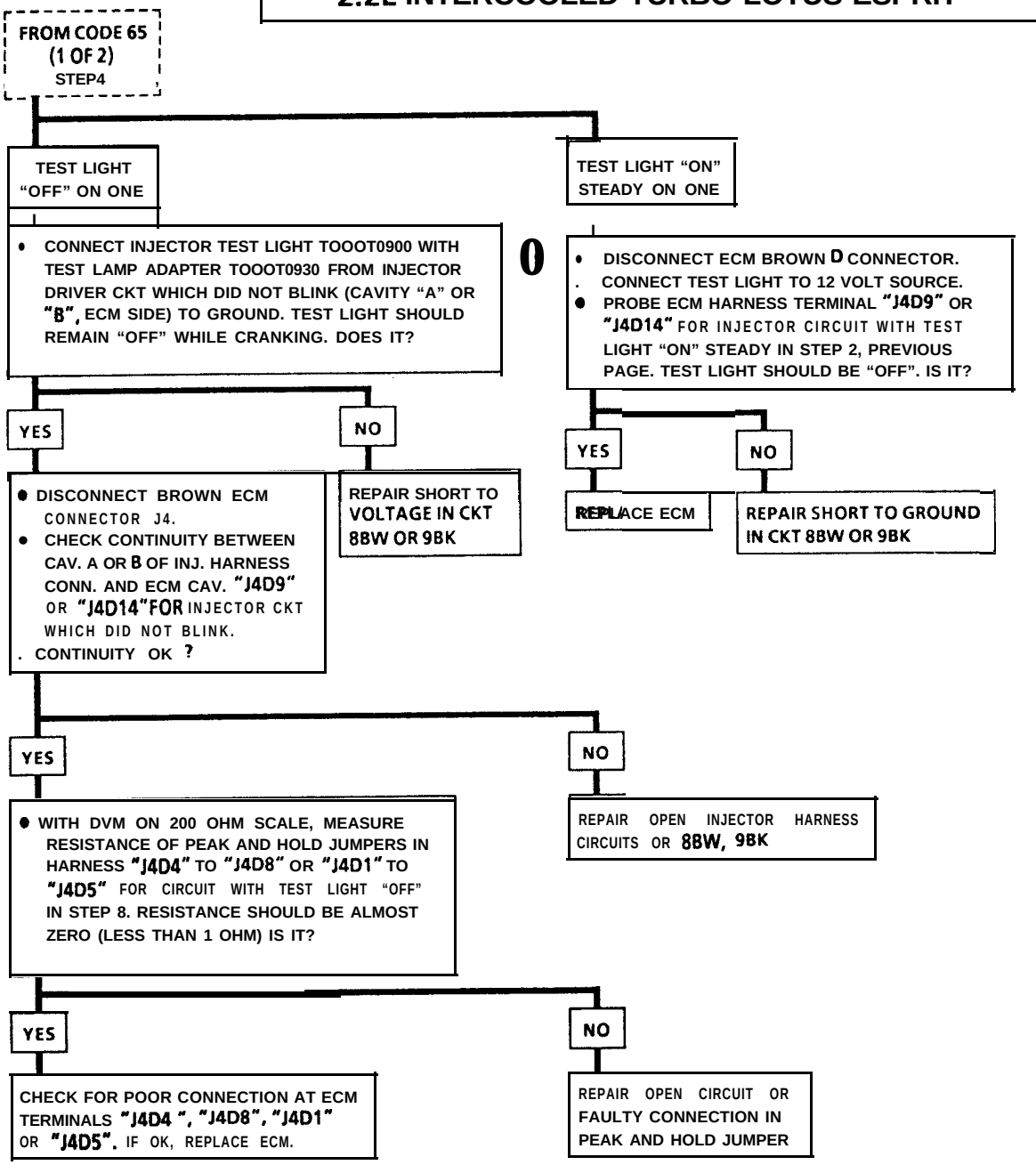
Diagnostic Aids:

Open injector harness CKT's open or CKT's 8BW, 9BK shorted to voltage will cause Code 65 and will also cause a misfire due to an inoperative pair of injectors. CKT's 77BP and 76BU shorted to ground will cause Code 65 while allowing the injectors to pulse. An intermittent- problem would have to be present for at least 20 seconds to set Code 65.

CODE 65

(Page 2 of 2)

FUEL INJECTOR CIRCUIT
(LOW CURRENT)
2.2L INTERCOOLED TURBO LOTUS ESPRIT



CLEAR CODES AND CONFIRM "CLOSED LOOP" OPERATION AND NO "CHECK ENGINE LIGHT".

SECTION EMH.6

FAULT DIAGNOSIS WITH INTERMITTENT OR NO TROUBLE CODES

TABLE OF CONTENTS

PERFORMING SYMPTOM DIAGNOSIS

The DIAGNOSTIC CIRCUIT CHECK should be performed before using this section. The purpose of this section is to locate the source of a driveability or emissions problem when other diagnostic procedures cannot be used. This may be because of difficulties in locating a suspected sub-system or component.

Many driveability related problems can be eliminated by following the procedures found in Service Bulletins. These bulletins supersede this manual. Be sure to check all bulletins related to the complaint or suspected system.

If the engine cranks but will not run, use CHART EMH.4-3.

The sequence of the checks listed in this section is not intended to **be** followed as on a stepby-step procedure. The checks are listed such that the less difficult and time consuming operations are performed before more difficult ones.

Most of the symptom procedures call for a careful visual and physical check. ***The importance of this step*** **cannot** ***be stressed too strong/y.*** It can lead to correcting a problem without further checks, and can save valuable time. This procedure includes checking the following.

- Vacuum hoses for splits, kinks, and proper connections.
- Throttle body and intake manifold for leaks
- Ignition wires for cracking, hardness, proper routing, and carbon tracking
- Wiring for proper connections, pinches, and cuts

INTERMITTENTS

Definition: Problem may or may not activate the "Check Engine Light" or store a trouble code.

DO NOT use the trouble code charts in Section EMH.4 for intermittent problems other than a guide to the circuitry probably causing the problem. The fault must be present to locate the problem. If a fault is not present, the use of trouble code charts may result in the replacement of good parts.

- Most intermittent problems are caused by faulty electrical connections or wiring. Perform careful checks of suspected circuits for
  - Poor mating of the connector halves and terminals not fully seated in the connector body (backed out)
  - Improperly formed or damaged terminals All connector terminals in problem circuit should be carefully reformed to increase contact tension.
  - Poor terminal to wire connection. This requires removing the terminal from the connector body to check as outlined in the introduction to Section EMH.l - L.
  - Check (wiggle) suspected circuit wiring and connectors while watching TECH 1 data on display. See EMH.4-13 TECH 1 DATA for typical data values at idle speed.
- If a visual and physical check does not locate the cause of the problem, the car can be driven with a voltmeter connected to a suspected circuit or a Tech 1 tool may be used performing a test called "Snapshot".

See Tech 1 manual for further explanation. An abnormal voltage reading while the problem occurs indicates that the problem may be in that circuit.

- Check for loss of trouble code memory. To check, disconnect the TPS and allow the engine to idle until the "CheckEngine Light" (CEL) turns "ON." Code 22 should be stored and kept in memory when the ignition is turned "OFF" for at least 10 seconds. If not, the ECM is faulty.
- An intermittent CEL and no trouble codes may be caused by
  - Electrical system interference caused by a defective relay, ECM driven solenoid, or switch. They can cause a sharp electrical surge. Normally, the problem will occur when the faulty component is operated.
  - Improper installation of electrical options, such as lights, 2-way radios, etc.
  - EST wires which should be routed away from spark plug wires, ignition system components, and generator. Ground wire from ECM to ignition system which may be faulty.
  - Ignition secondary wire shorted to ground.
  - 'Check Engine Light" and diagnostic test terminal circuits intermittently shorted to ground.
  - Faulty ECM.

HARD START

Definition: Engine cranks well but does not start for a long time. Engine does eventually start, but may or may not continue to run.

Perform careful visual and physical check as described at the beginning of Section EMH.6. Perform "Diagnostic Circuit Check".

. CHECK

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve

If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom.

If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following.

- Cracks
- Wear
- Improper gap
- Burned electrode
- Heavy deposits

Fuel for poor quality, "stale" fuel, and water contamination.

- Ignition wires for shorts or faulty insulation.

Ignition coil connections.

Fuel pump relay. Connect test light between fuel pump relay base terminal 18OP and battery voltage. Light should be "ON" for 2 seconds following ignition "ON."

- Secondary ignition voltage output with tester TOOOT0901.
- Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits. Visually inspect ignition system for moisture, dust, cracks, burns, etc.

For faulty ECM and ignition grounds.

- Spray plug wires with fine water mist to check for shorts.
- Idle Air Control system. Use Code 35 chart.

Fuel system for restricted filter or improper pressure.

Injectors (main and secondary) for leakage.

Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.

TPS for sticking or binding. TPS voltage should read 0.45 to 0.70 volt on the Tech 1 or measured with a digital voltmeter.

Injector balance by performing injector balance test.

- In-tank fuel pump check valve. A faulty valve would allow the fuel in the lines to drain back to the tank after the engine is stopped.

Inoperative / jammed exhaust backpressure valve.

For the possibility of an exhaust restriction or improper valve timing by performing the following test.

1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
2. Run engine at 1000 rpm and record vacuum reading.
3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6-1.
5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.

Engine valve timing and compression.

ROUGH, UNSTABLE, OR INCORRECT IDLE, STALLING

Definition: The engine runs unevenly at idle. If severe, the car may shake. Also, the idle speed may vary (called "hunting"). Either condition may be severe enough to cause stalling. Engine idles at incorrect speed.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

. CHECK

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

If the engine speed dropped equally (within 50 rpm) on all cylinders, proceed through the causes listed. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following.

- Cracks
- Wear
- Improper gap
- Burned electrode
- Heavy deposits

Throttle for sticking shaft or binding linkage. This will cause a high TPS voltage (open throttle indication) and the ECM will not control idle. TPS voltage should be about 0.45 to 0.70 volt with throttle closed.

Ignition wires for shorts or faulty insulation

Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.

Secondary ignition voltage output with TOOOT0901 spark tester.

ECM and ignition system for faulty grounds

Proper operation of EST.

Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.

Fuel system for restricted filter or improper pressure.

injectors for leakage.

For vacuum leaks at intake manifold gasket

Idle Air Control system. Use Code 35 chart.

Electrical system voltage. IAC valve will not move if voltage is below 9 volts or greater than 17.8 volts. Also check battery cables and ground straps for poor contact. Erratic voltage will cause the IAC valve to change its position, resulting in poor idle quality.

Evaporative emission control (canister purge) system for proper operation.

TPS reading at closed throttle should be stable; any variation of signal output causes idle speed instability.

MAP sensor output. Check sensor by comparing it to the output on a similar vehicle if possible. MAP end Baro sensor "kPa" output on Tech 1 should be close at ign."on", engine "off".

Inoperative / jammed exhaust backpressure valve on a warm engine.

Throttle jack does not open throttle to increase idle speed running cold when exhaust backpressure valve is closed.

Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication). The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.

Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.

A/C refrigerant pressure for high pressure. Check for overcharging.

Generator output voltage. Repair if less than 9 volts or more than 17.1 volts.

Engine valve timing and compression. For worn or incorrect basic engine parts such as cam, heads, pistons, etc. Also check for broken or weak valve springs.

For the possibility of an exhaust restriction or improper valve timing, perform the following test.

1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
2. Run engine at 1000 rpm and record vacuum reading.
3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6 - 1.
5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.

- Injector balance by performing injector balance test.
- For overheating and possible causes. Look for the following:
  * Restricted air flow to radiator, or restricted water flow through radiator.
  * Faulty or incorrect thermostat
  * Inoperative electric radiator fan circuit

- If the system is running RICH (block learn less than 90), refer to "Diagnostic Aids" on facing page of Code 45.
- If the system is running LEAN (block learn greater than 150), refer to "Diagnostic Aids" on facing page of Code 44.

POOR GAS MILEAGE

Definition: Gas mileage, as measured by an actual road test, is noticeably lower than expected. Gas mileage is noticeably lower than it was during a previous actual road test.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

. CHECK

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

  If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following.
  - Cracks
  - Burned electrode
  - Wear
  - Heavy deposits
  - Improper gap
- Proper operation of EST.
- Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.
- Spark plugs for correct heat range.
- Fuel for poor quality, "stale" fuel, and water contamination.
- Fuel system for restricted filter or improper pressure.
- Injectors for leakage.
- For vacuum leaks at intake manifold gasket
- Air cleaner element (filter) for dirt or plugging.
- Idle Air Control system. Use Code 35 chart.
- Canister purge system for proper operation.
- Throttle shaft or TPS for sticking or binding. TPS voltage should read about 0.45 to 0.70volt on a Tech 1 with the throttle closed.
- MAP sensor output. Check sensor by comparing it to the output on a similar vehicle if possible.
- Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication). The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.
- Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.
- Vehicle speed sensor (VSS) input with Tech 1 to make sure reading of VSS matches that of vehicle speedometer.
- A/C relay operation. A/C should cut out at wide open throttle.
- A/C refrigerant pressure for high pressure. Check for overcharging.
- Injector balance by performing injector balance test.
- Generator output voltage. Repair if less than 9 volts or more than 17.1 volts.
- Radiator fan operation.
- Thermostat for incorrect heat range or being inoperative.
- Engine valve timing and compression.
- For worn or incorrect basic engine parts such as cam, heads, pistons, etc.
- For the possibility of an exhaust restriction or improper valve timing by performing the following test.
  1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
  2. Run engine at 1000 rpm and record vacuum reading.
  3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
  4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6 - 1.
  5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.
- Check driver's driving habits and vehicle conditions which affect gas mileage.
  - Is A/C "ON" full time (Deliquidifier mode "ON")?
  - Are tyres at correct pressure?
  - Are excessively heavy loads being carried?
  - Is acceleration often heavy?
  - Are the wheels aligned correctly?
  - Is the speedometer calibrated correctly?
  - Are the vehicle brakes dragging?
  - Is the brake switch applying excessive force on the brake pedal?
- If the system is running RICH, (block learn less than 90), refer to "Diagnostic Aids" on facing page of Code 45.

DETONATION/SPARK KNOCK

Definition: A mild to severe ping, usually worse under acceleration. The engine makes sharp metallic knocks that change with throttle opening.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

● **CHECK**

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more tylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following.

- Cracks
- Wear
- Improper gap
- Burned electrode
- Heavy deposits

- For turbocharger wastegate mechanical or control circuit problem. Follow diagnostic chart for Code 26.
- Ignition wires for shorts or faulty insulation
- Spark plugs for correct heat range
- Fuel for poor quality, "stale" fuel, and water contamination
- Fuel system for restricted filter or improper pressure.
- For excessive oil entering combustion chamber. Oil will reduce the effective octane of fuel.
- For vacuum leaks at intake manifold gasket
- MAP sensor output. Check sensor by comparing it to the output on a similar vehicle, if possible. "KPa" reading of Baro and MAP ***sensors*** should be close at ignition "on", engine "off'.
- Coolant sensor for a shift in calibration.
- Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication). The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.
- Vehicle speed sensor (VSS) input with Tech 1 to make sure reading of VSS matches that of vehicle speedometer.
- Vehicle brakes for dragging.
- For overheating and possible causes. Look for the following.
- Low or incorrect coolant solution.
  Loose water pump belt.
- Restricted air flow to radiator or restricted water flow through radiator.
- Faulty or incorrect thermostat.
- Inoperative electric cooling fan circuit.
- Engine valve timing and compression.
- For worn or incorrect basic engine parts such as cam, heads, pistons, etc.
- For the possibility of an exhaust restriction or improper valve timing by performing the following test.
  1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
  2. Run engine at 1000 rpm and record vacuum reading.
  3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
  4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6 - 1.
  5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.

- Remove internal engine carbon with top engine cleaner.
- If the system is running LEAN at road load (block learn greater than 1501, refer to "Diagnostic Aids" on facing page of Code 44.

LACK OF POWER, SLUGGISH, OR SPONGY

Definition: Engine delivers less than expected power. There is little or no increase in speed when the accelerator pedal is depressed partially.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

- **CHECK**
  - For possibility of misfiring, crossliring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
    1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
    2. Note drop in engine speed.
    3. Repeat for all four cylinders.
    4. Stop engine and reconnect idle air control valve.

  If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following:

  - Cracks
  - Burned electrode
  - Wear
  - Heavy deposits
  - Improper gap

  Ignition wires for shorts or faulty insulation.

  Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.

  - Secondary ignition voltage output with TOOOT0901 tester.
  - Ignition coil connections.
  - ECM and ignition system for faulty grounds. Proper operation of EST.
  - Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.

  Turbocharger wastegate electrical or mechanical problem.

  Spark plugs for correct heat range.

  Fuel for poor quality, "stale" fuel, and water contamination

  - Fuel system for restricted filter or improper pressure. Use CHART EMH.4 7.
  - For vacuum leaks at intake manifold gasket.
  - Air cleaner element (filter) for dirt or plugging.
  - Throttle shaft or TPS for sticking or binding. TPS voltage should read about 0.45 to 0.70 volts on Tech 1 with the throttle closed.
  - MAP sensor output. Check sensor by comparing it to the output on a similar vehicle if possible. Baro and MAP sensor "KPa" reading should be close at ignition "on", engine "off ".
  - Inoperative secondary injectors (no or not enough fuel at WOT accelleration, high boost and engine speed). See CODE 26 chart.
  - Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication) . The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.
  - Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.
  - Vehicle speed sensor (VSS) input with Tech 1 to make sure reading of VSS matches that of vehicle speedometer.
  - Engine for improper or worn camshaft.
  - A/C relay operation. A/C should cut out at wide open throttle.
  - A/C refrigerant pressure for high pressure. Check for overcharging.
  - Generator output voltage. Repair if less than 9 volts or more than 17.1 volts.
  - Radiator fan operation.
  - Vehicle brakes for dragging
  - Engine valve timing and compression.
  - For worn or incorrect basic engine parts such as cam, heads, pistons, etc.

- For the possibility of an exhaust restriction or improper valve timing by performing the following test.
  1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
  2. Run engine at 1000 rpm and record vacuum reading.
  3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
  4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6 - 1.
  5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.
- For overheating and possible causes. Look for the following:
  - Low or incorrect coolant solution.
  - Loose water pump belt.
  - Restricted air flow to radiator, or restricted water flow through radiator.
  - Faulty or incorrect thermostat.
  - Inoperative electric cooling fan circuit.

- If the system is running RICH (block learn less than 90), refer to "Diagnostic Aids" on facing page of Code 45.
- If the system is running LEAN at part throttle (block learn greater than 150), refer to "Diagnostic Aids" on facing page of Code 44.

SURGES AND/OR CHUGGLE

Definition: Engine power variation under steady throttle or cruise. Feels like the car speeds up and slows down with no change in the accelerator pedal.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

. Perform "Diagnostic Circuit Check".

- **CHECK**
  - For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
    1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
    2. Note drop in engine speed.
    3. Repeat for all four cylinders.
    4. Stop engine and reconnect idle air control valve.

  If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If there is no spark, see chart **EMH.4-3"** If spark is present, remove the spark plugs from the cylinder(s) and check for the following:

  - Cracks
  - Burned electrode
  - Wear
  - Heavy deposits
  - Improper gap

  - Ignition wires for shorts or faulty insulation.
  - Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.
  - Secondary ignition voltage output with TOOOT0901 tester.
  - ECM and ignition system for faulty grounds.
  - Proper operation of EST.
  - Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.
  - Spark plugs for correct heat range.
  - Fuel for poor quality, "stale" fuel, and water contamination.
  - Fuel system for restricted filter or improper pressure.
  - Injectors for leakage (see chart **EMH.4-7** and **EMH.3-K.**
  - Injector balance by performing injector balance test.
  - For vacuum leaks at intake manifold gasket.
  - Idle Air Control system. Use Code 35 chart.
  - Electrical system voltage. IAC valve will not move if voltage is below 9 volts or greater than 17.8 volts. Also check battery cables and ground straps for poor contact. Erratic voltage will cause the IAC valve to change its position, resulting in **poor** idle quality.
  - Evaporative emission control (canister purge) system for proper operation.
  - Throttle shaft or TPS for sticking or binding. TPS voltage should read about 0.45 to 0.70 volt on Tech 1 with the throttle closed.
  - MAP sensor output. Check sensor by comparing it to the output on a similar vehicle, if possible. Baro and MAP sensor **"kPa"** reading on Tech 1 should be close at ignition "on", engine "off ".

- Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication). The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.
- Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.
- Vehicle speed sensor (VSS) input with Tech 1 to make sure reading of VSS matches that of vehicle speedometer.

A/C relay operation. A/C should cut out at wide open throttle.

- For the possibility of an exhaust restriction or improper valve timing by performing the following test:
  1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.
  2. Run engine at 1000 rpm and record vacuum reading.
  3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 2500 rpm.
  4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6 - 1.
  5. Disconnect exhaust pipe from engine and repeat Steps 3 & 4. If vacuum still drops more than 3" Hg with exhaust disconnected, check valve timing.
- Engine valve timing and compression.
- For worn or incorrect basic engine parts such as cam, heads, pistons, etc.

- If the system is running RICH (block learn less than 901, refer to "Diagnostic Aids" on facing page of Code 45.
- If the system is running LEAN (block learn greater than 1501, refer to "Diagnostic Aids" on facing page of Code 44.

CUTS OUT, MISSES

Definition: Steady pulsation or jerking that follows engine speed, usually more pronounced as engine load increases. The exhaust has a steady spitting sound at idle or low speed.

Perform careful visual and nhvsical check as described at the beginning of Section EMH.6.
Perform "Diagnostic Circuit Check".

CHECK

Ignition wires for shorts or faulty insulation.
Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.
Secondary ignition voltage output with tester TOOOT0901.
Ignition coil connections.
ECM and ignition system for faulty grounds.
Proper operation of EST.

- Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.

Spark plugs for correct heat range.

- Fuel for poor quality, "stale" fuel, and water contamination.

Fuel system for restricted filter or improper pressure.
Throttle shaft or TPS for sticking or binding. TPS voltage should read about 0.45 volt to 0.70 on Tech 1 or DVM with the throttle closed.

- Injector balance by performing injector balance test.
- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following:

- Cracks
- Burned electrode
- Wear
- Heavy deposits
- Improper gap

HESITATION, SAG, STUMBLE

Definition: Momentary lack of response as the accelerator is pushed down. Can occur at all vehicle speeds. Usually most severe when first trying to make the car move, as from a stop sign. May cause the engine to stall if severe enough.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

. CHECK

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following:

- Cracks
- Wear
- Improper gap
- Burned electrode
- Heavy deposits

Ignition wires for shorts or faulty insulation.

- Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.

Secondary ignition voltage output with TOOOT0901 tester.

ECM and ignition system for faulty grounds

Proper operation of EST.

Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.

Spark plugs for correct heat range

Fuel for poor quality, "stale" fuel, and water contamination.

Fuel system for restricted filter or improper pressure.

For vacuum leaks at intake manifold gasket.

- Air cleaner element (filter) for dirt or plugging.
- Idle Air Control system. Use Code 35 chart. Check electrical system voltage. IAC valve will not move if voltage is below 9 volts or greater than 17.8 volts. Also check battery cables and ground straps for poor contact. Erratic voltage will cause the IAC valve to change its position, resulting in poor idle quality.
- Emission evaporative (canister purge) system for proper operation.
- Throttle shaft or TPS for sticking or binding TPS voltage should read about 0.45 to 0.70 volt on Tech 1 with the throttle closed.
- MAP sensor output. Check sensor by comparing it to the output on a similar vehicle, if possible.
- Coolant sensor for a shift in calibration. Use Code 14 or Code 15 chart.
- A/C relay operation. A/C should cut out at wide open throttle.
- Injector balance by performing injector balance test.
- Oxygen sensor for silicone contamination from contaminated fuel or use of improper RTV sealant. The sensor will have a white, powdery coating and will cause a high but false signal voltage (rich exhaust indication). The ECM will reduce the amount of fuel delivered to the engine, causing a severe driveability problem.
- A/C refrigerant pressure for high pressure. Check for overcharging,
- Generator output voltage. Repair if less than 9 volts or more than 17.1 volts.
- Inoperative secondary injectors (no or not enough fuel at WOT acceleration, high boost and engine speed). See Code 26 chart.
- Vehicle brakes for dragging.
- Engine valve timing and compression.
- For the possibility of an exhaust restriction or improper valve timing by performing the following test:
  1. With engine at normal operating temperature, connect a vacuum gauge to any convenient vacuum port on intake manifold.

2. Run engine at 1000rpm and record vacuum reading.
3. Increase engine speed slowly to 2500 rpm. Note vacuum reading at steady 200 rpm.
4. If vacuum at 2500 rpm decreases more than 3" Hg from reading at 1000 rpm, the exhaust system should be inspected for restrictions. Use CHART EMH.6-1.
5. Disconnect exhaust pipe from engine ande repeat Steps 3 & 4. If vacuum still drops more than 3" Hg wigh exhaust disconnected, check valve timing.

- For worn or incorrect basic engine parts such as cam, heads, pistons,ect.
- For overheating and possible causes. Look for the following:
  * Low or incorrect coolant solution.
  * Restricted air flow to radiator, or restricted water flow through radiator.
  * Faulty or incorrect thermostat.
  * Inoperative electric radiator fan circuit.

- If the system is running RICH (block learn less than 90), refer to "Diagnostic Aids" on facing page of Code 45.
- If the system is running LEAN at part throttle (block learn greater than 150), refer to "Diagnostic Aids" on facing page of Code 44.

EXCESSIVE EXHAUST EMISSIONS OR ODORS

Definition: Vehicle fails an emission test or vehicle has excessive "rotten egg" smell. (Excessive odors do not necessarily indicate excessive emissions).

Perform careful visual and physical check as described at the beginning of Section EMH.6.
Perform "Diagnostic Circuit Check".

- **CHECK**
  - Vacuum leaks.
  - Faulty coolant system and/or coolant fan operation.
  - Remove carbon with top engine cleaner. Follow instructions on can.
- If the system is running RICH (block learn less than 90), refer to "Diagnostic Aids" on facing page of Code 45.
- If the system is running LEAN (block learn greater than 150), refer to "Diagnostic Aids" on facing page of Code 44.
- If emission test indicates excessive NO,, check for items which cause car to run lean or too hot.
- If emission test indicates excessive HC nd CO or exhaust has excessive odors, caheck For items which cause car to run RICH.
  - Incorrect fuel pressure. Use CHART EMH.4-7.
  - Fuel loading of evaporative vapor canister.
  - Crankcase breather valve plugging, sticking, or blocked breather hose. Check for fuel in crankcase.
  - Catalytic converter lead contamination (Look for removal of fuel filler neck restrictor.)
  - Improper fuel cap installation.
  - Faulty spark plugs, plug wires, or ignition components.

DIESELING, RUN-ON

Definition: Engine continues to run after key is turned "OFF", but runs very roughly. (If engine runs smoothly, check ignition switch).

Perform careful visual and physical check as described at the beginning of Section EMH.6.
Perform "Diagnostic Circuit Check".

- **CHECK**
  Injectors for leakage.

BACKFIRE

Definition: Fuel ignites in intake manifold or in exhaust system, making a loud popping sound.

Perform careful visual and physical check as described at the beginning of Section EMH.6.

Perform "Diagnostic Circuit Check".

. CHECK

- For possibility of misfiring, crossfiring, or cutting under load or at idle. Locate misfiring cylinder(s) by performing the following test.
  1. Start engine. Disconnect idle air control valve. Remove one spark plug wire from a spark plug and ground it against the engine.
  2. Note drop in engine speed.
  3. Repeat for all four cylinders.
  4. Stop engine and reconnect idle air control valve.

  If the engine speed dropped equally (within 50 rpm) on all cylinders, refer to "Rough, Unstable, or Incorrect Idle, Stalling" symptom. If there was no drop or excessive variation in engine speed on one or more cylinders, check for spark on the respective cylinder(s) with spark tester TOOOT0901. If spark is present, remove the spark plugs from the cylinder(s) and check for the following:
  - Cracks
  - Wear
  - improper gap
  - Burned electrode
  - Heavy deposits

  Intake manifold gasket for leaks.

  Spark plugs. Look for wetness, cracks, improper gap, burned electrodes, and heavy deposits.

  Ignition system for moisture, dust, cracks, burns, etc. Spray plug wires with fine water mist to check for shorts.

  ECM and ignition system for faulty grounds

  Secondary ignition voltage output, with TOOOT0901 tester

  For vacuum leaks at intake manifold gasket

  Engine valve timing and compression.
- For worn or incorrect basic engine parts such as cam, heads, pistons, etc.

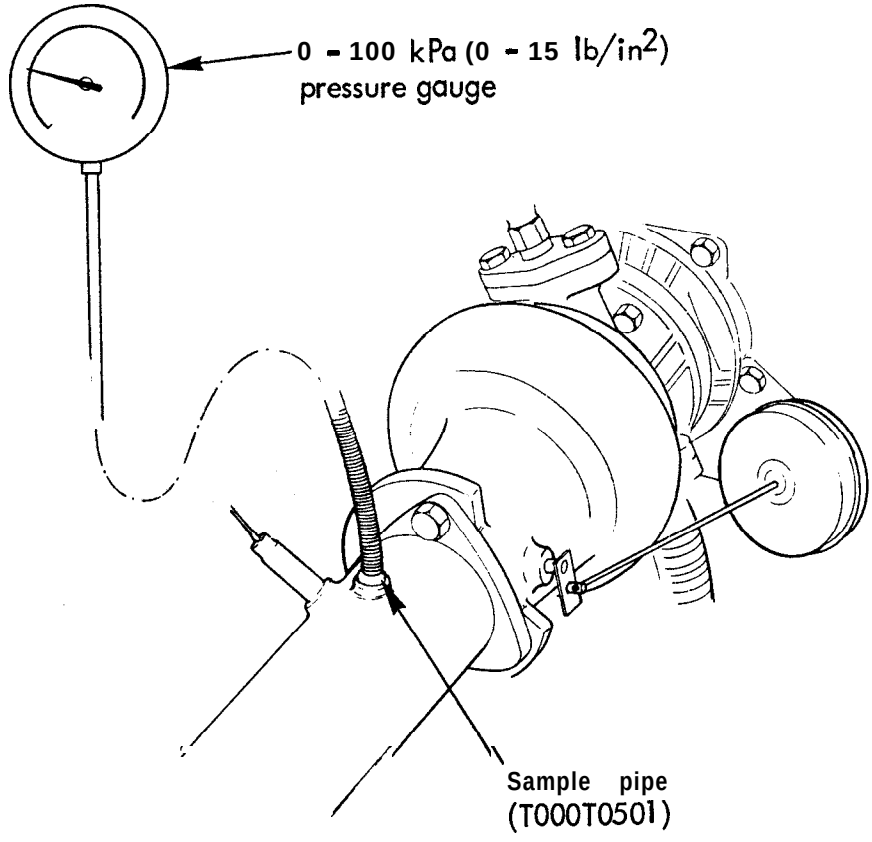
CHART EMH. 6-1

RESTRICTED EXHAUST SYSTEM CHECK

ALL ENGINES

Proper diagnosis for a restricted exhaust system is essential before any components are replaced. The following procedure may be used for diagnosis.

CHECK:



DIAGNOSIS:

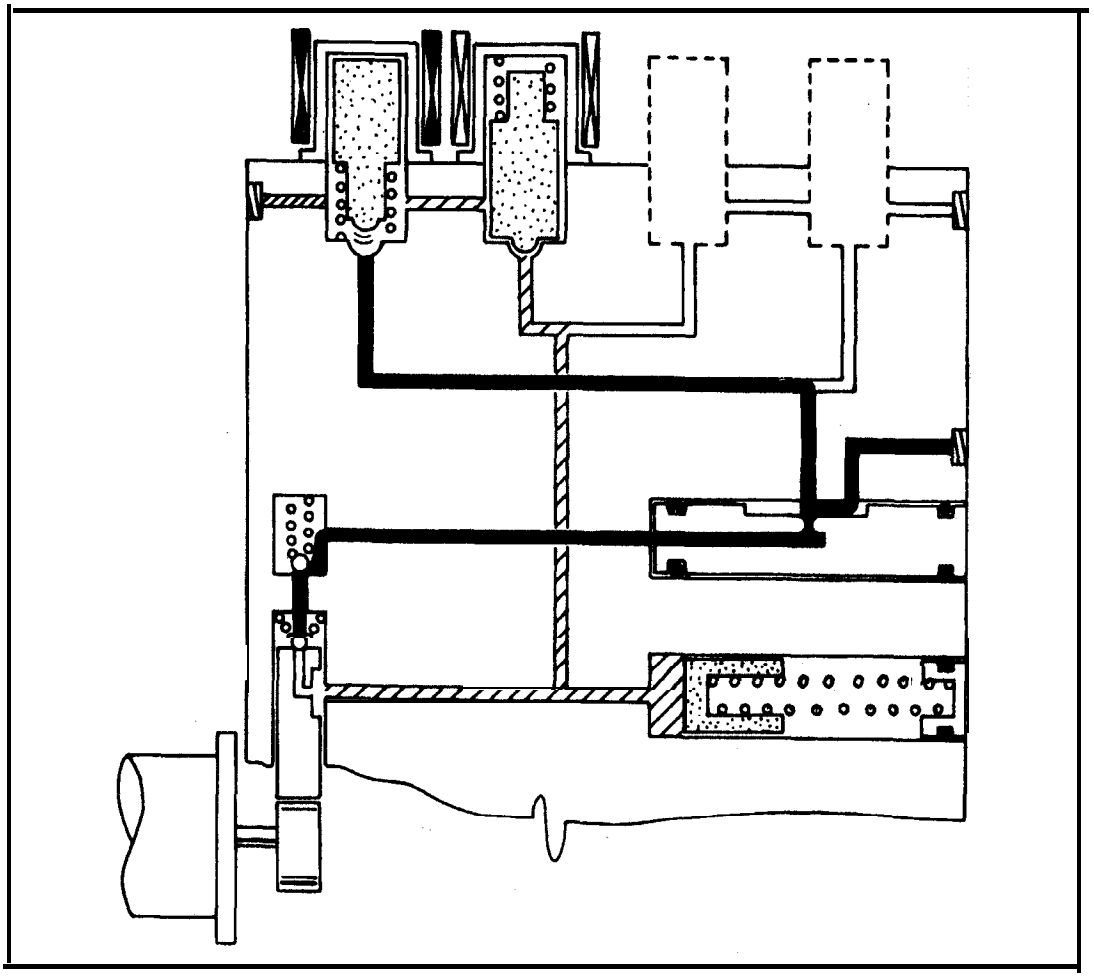
1. With the engine idling at normal operating temperature, observe the exhaust system backpressure reading on the gauge. Reading should not exceed 8.6 kPa (1.25 psi).
2. Increase engine speed to 2000 rpm and observe gauge. Reading should not exceed 20.7 kPa (3 psi).
3. If the backpressure at either speed exceeds specification, a restricted exhaust system is indicated. Refer to sections EMH.2 - Wand EMH.3 -T
4. Inspect the entire exhaust system for a collapsed pipe, heat distress, or possible internal muffler failure.
5. If there are no obvious reasons for the excessive backpressure, the catalytic converter is suspected to be restricted and should be replaced using current recommended procedures

SERVICE NOTES

Section JG

Esprit '96 M.Y. Onwards

Braking System with Kelsey-Hayes ABS 415



LOTUS CARS LTD

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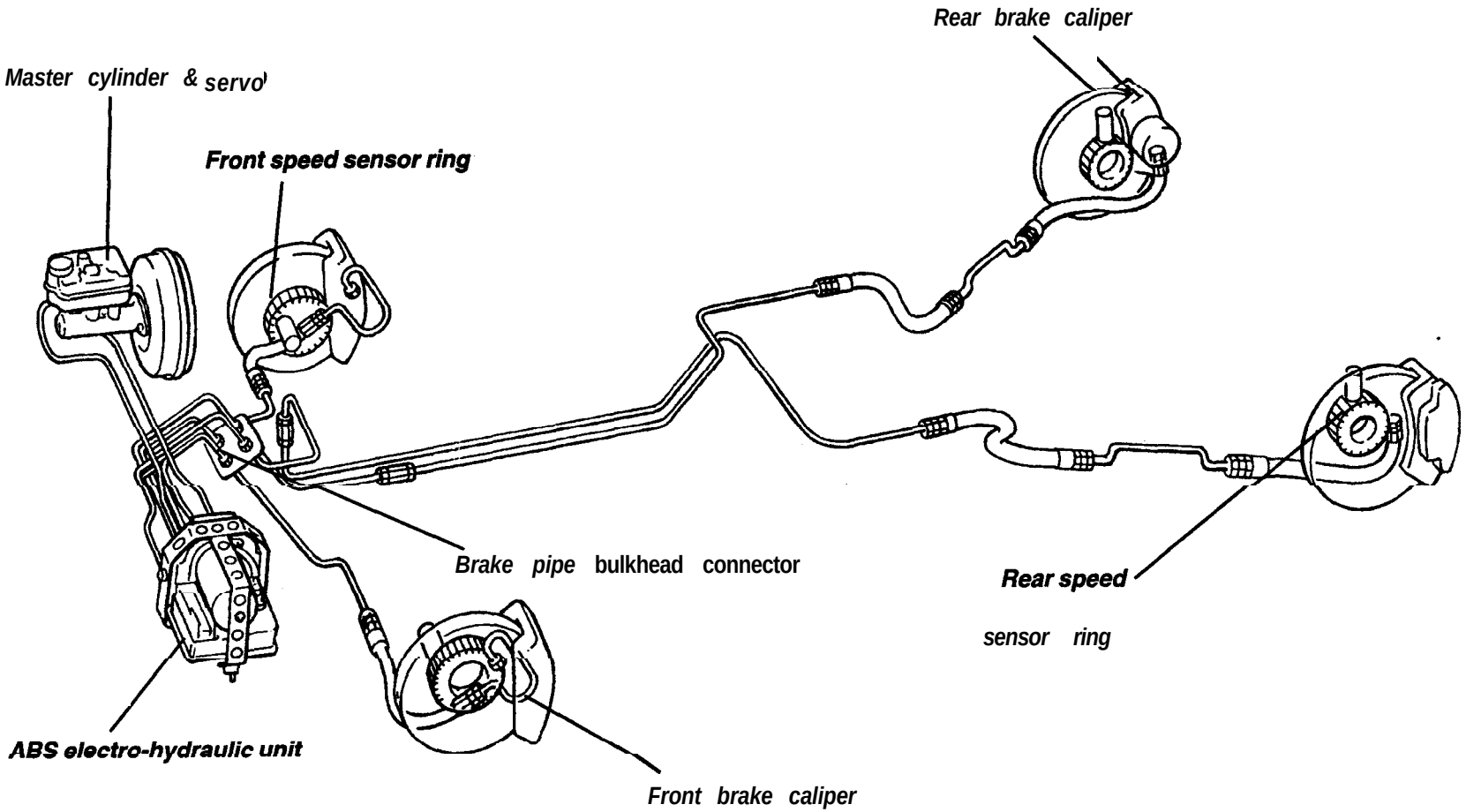
Part Number **M082T0327J**

BRAKING SYSTEM

SECTION JG - ESPRIT V8 WITH KELSEY HAYES ABS



BRAKING SYSTEM - GENERAL LAYOUT

j151

JG.I · GENERAL DESCRIPTION

The '97 model year V8 engined Espritrange uses ventilated disc brakes on all four wheels, operated by a tandem master cylinder and vacuum servo,, with anti-lock control by a Kelsey-Hayes microprocessor based system. Brembo four piston fixed type calipers are used at the front, and Brembo single piston sliding calipers on the rear, with the cable operated parking brake actuating the rear caliper pistons mechanically. The parking brake lever is mounted on the body sill and uses a balancing linkage to actuate individual cables to each rear caliper, both of which incorporate an automatic adjustment mechanism to compensate for pad wear.

The braking system is designed to enhance brake system performance during high speed driving, with good fade and pad wear characteristics. However, as is usual with high performance brake pad materials, the brakes do require a relatively long bedding-in period, and have a higher friction level when heated to normal working temperature, than when cold. Consequently, the brake pedal effort may feel higher during the running-in period (up to 1,000 miles) and when the brakes are cold.

A Kelsey-Hayes Antilock Brake System (ABS) is used to reduce the tendency of any wheel to lose traction (lock) while braking. This feature is especially advantageous when braking on slippery road surfaces and in bad driving conditions, by aiding vehicle stability, maintaining steering capability, and in many cases reducing the stopping distance. The ABS is an 'add on' system such that the base brake system can continue to operate normally should any fault develop in the anti-lock system.

Under normal circumstances, the hydraulic power brake system of the vehicle operates without input from the ABS, with brake pressures governed by the force applied to the brake pedal. The ABS microprocessor receives signals from wheel speed sensors at each of the four wheel hubs, and interprets this data to determine if any wheel is tending to lock up. If imminent lock up is determined, the microprocessor commands solenoid valves in an electro-hydraulic unit to reduce the pressure in that particular brake circuit in order to restore wheel speed to that providing the maximum braking force consistent with continued wheel rotation.

When the ABS is operating, indication to the driver is provided by a 'pulsing' sensation felt at the brake pedal as fluid is pumped between the master cylinder and hydraulic control unit, and also by audible clicking of the relays and switches. These signals indicate to the driver that maximum retardation is being approached, and that driving style should be modified to suit the conditions. To minimise stopping distance using the ABS facility, the driver should press the brake pedal steadily and firmly, and allow the ABS to modulate hydraulic pressure. The driver should not attempt to emulate this action by using cadence braking techniques and 'pumping' the brake pedal.

During ABS operation, the wheels may appear to lock momentarily as the wheel speed changes rapidly, and some tyre noise (intermittent screeching) may be heard. This noise is normal and will vary with road and tyre conditions. However, a wheel that completely locks and stays locked for more than one or two seconds is not normal, and indicates that the vehicle should be serviced as soon as possible. The ABS cannot operate properly if the base brake system is faulty, and will also be affected by dragging brakes, faulty wheel bearings or other related faults.

The ABS controller oonstantly monitors the anti-lock system for faults, and lights a fascia tell tale if a problem is detected. Information stored in the computor's memory may be accessed via a hand held electronic scanner, in order to facilitate diagnosis of system faults (see later).

JG.2 - TELL TALE LAMPS

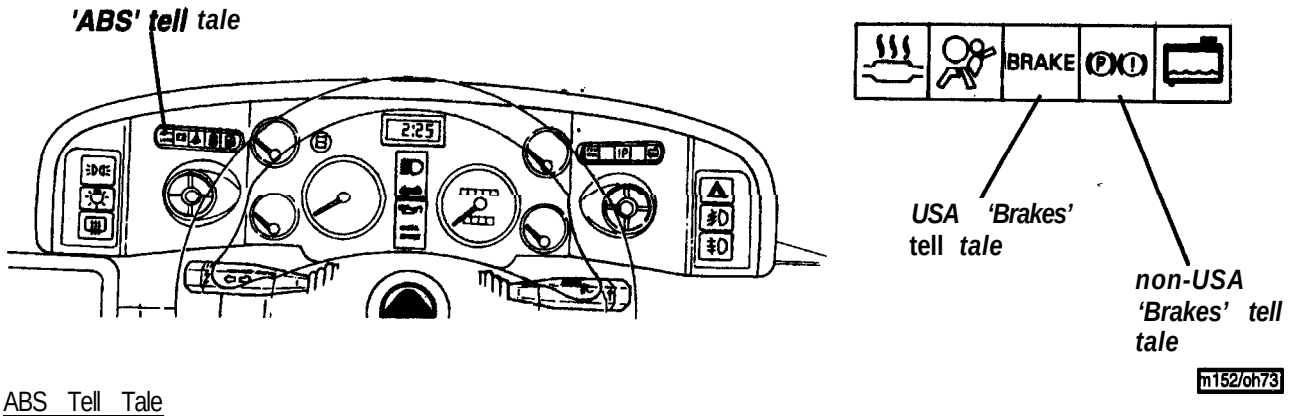
Two tell tale lamps are provided on the fascia to warn of problems in the brake system.

Brakes Tell Tale

This tell tale will glow red with the ignition switched on, under either or both of the following conditions:

i) When the parking brake is applied.
ii) If the brake fluid level in the master cylinder reservoir is low.

Under normal circumstances, the tell tale should light when the ignition is switced on, and go out when the parking brake is released. If the lamp stays on, or comes on whilst driving, the car should be stopped immediately, as this may be an indication of low brake fluid level caused by a hydraulic leak. A button on the reservoir cap allows the tell tale circuit to be tested.



ABS Tell Tale

The ABS tell tale warns the driver of problems in the anti-lock system. The lamp should light for about 4 seconds following ignition switch on, and then go out. If the lamp remains lit, or comes on whilst driving, a fault in the ABS is indicated. The **base** brake system will continue to operate normally, but without ABS regulation. The car can be driven but should be checked and repaired at the earliest opportunity.

JG.3 - FRONT BRAKE PAD REPLACEMENT

Pad thickness may be checked after removing the road wheel, but without disturbing the caliper.

Standard pad thickness; 9.0 mm
Minimum pad thickness; **2.5** mm

Front Pad **Replacement**

1. Remove the front road wheels. At each front caliper:

2. Using a hammer and suitable small diameter drift, knock out the lower pad retaining pin towards the inside. Remove the pad spring clip, and knock out the upper retaining pin.

3. Withdraw the pads and measure the lining thickness. Renew the axle set of pads if any lining thickness is below 2.5 mm.

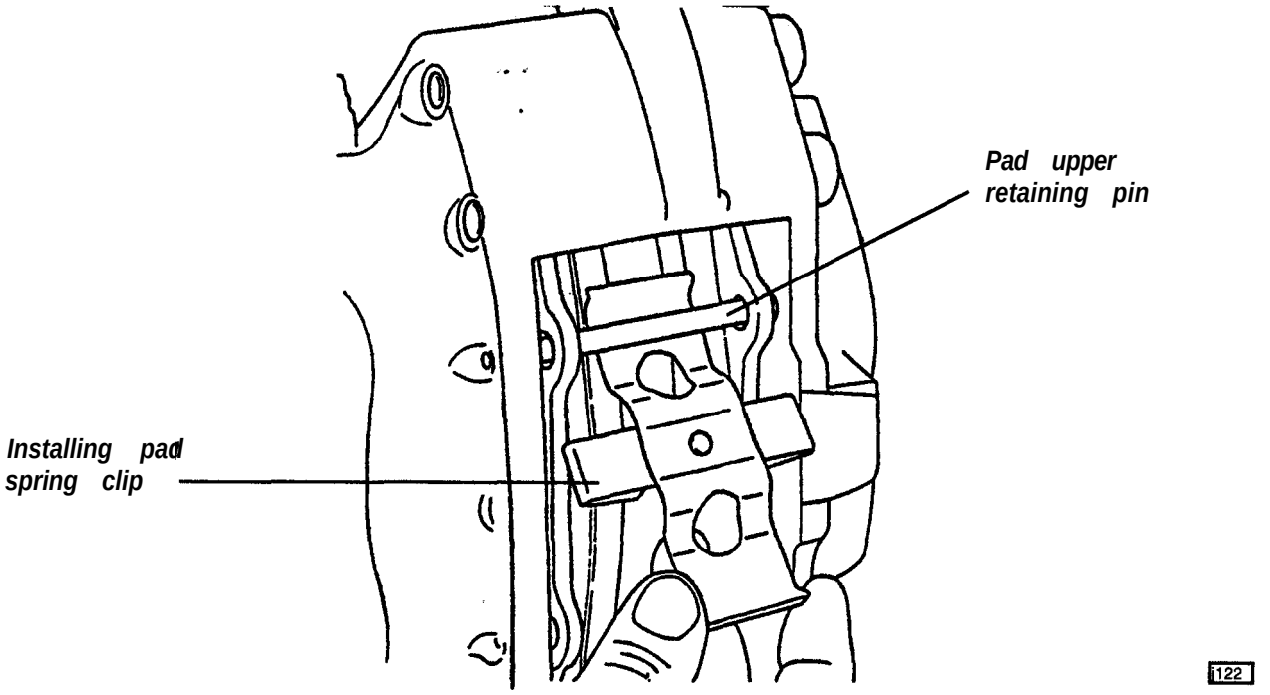
4. Before refitting the pads, inspect the piston boots for splits, cracks or other damage, and for any signs of fluid leakage or wetness. If any of these symptoms are evident, a new caliper should be fitted.

5. If refitting the existing brake pads, refit each pad in the same position as originally fitted.

6. Before fitting new pads the pistons must be pushed back into the caliper. This action will return fluid to the reservoir, which may overflow if already near full; remove fluid beforehand if necessary to prevent overflow. Take care not to damage the surface of the brake discs, or the piston rubber boots when pressing back the pistons.

7. Instal the brake pads into the caliper, and fit the top retaining pin from the inboard side until the small end of the pin is engaged in the outboard caliper half.

8. Hook one end of the pad spring clip under the upper retaining pin, and press down the other end whilst the lower pin is inserted. Use a pin punch to ensure that both pad retaining pins are fully installed such that the pin retaining rings are locked into the caliper bores. Check that the spring clip is **centred** in the caliper aperture and is preloading both brake pad backplates.



9. Refit the road wheels and press the brake pedal several times to set the brake pad position. Check the brake fluid level in the reservoir, and top up if necessary.

10. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

JG.4 • REAR BRAKE PAD REPLACEMENT

Pad thickness may be checked after removing the road wheel, but without disturbing the caliper.

Standard pad thickness; **9.5** mm
Minimum pad thickness; **2.5** mm

Tools required: Piston Retraction Tool TOOOT1242

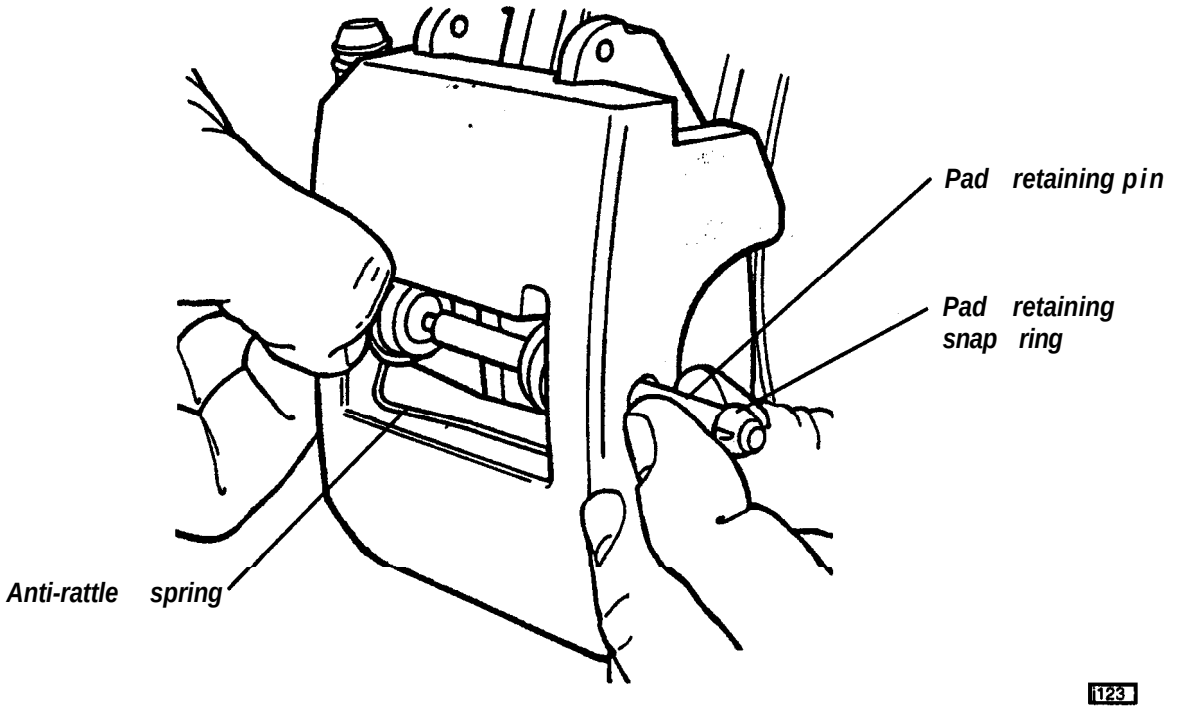
1. Remove the rear road wheels.

2. At each rear corner: using a suitable pin punch, knock the pad retaining pin out of the caliper towards the outside.
WARNING: Take precautions as necessary to restrain the anti-rattle spring from flying off as the pin is withdrawn.

3. Remove the anti-rattle spring, and withdraw both brake pads from the caliper. Measure the thickness of the lining material, and renew the axle set of pads if any are below 2.5 mm.

4. Before refitting the pads, inspect the piston boot for splits, cracks or other damage, and for any signs of fluid leakage or wetness. If any such signs are apparent, the complete caliper should be replaced as Brembo do not recommend that this caliper be dismantled.

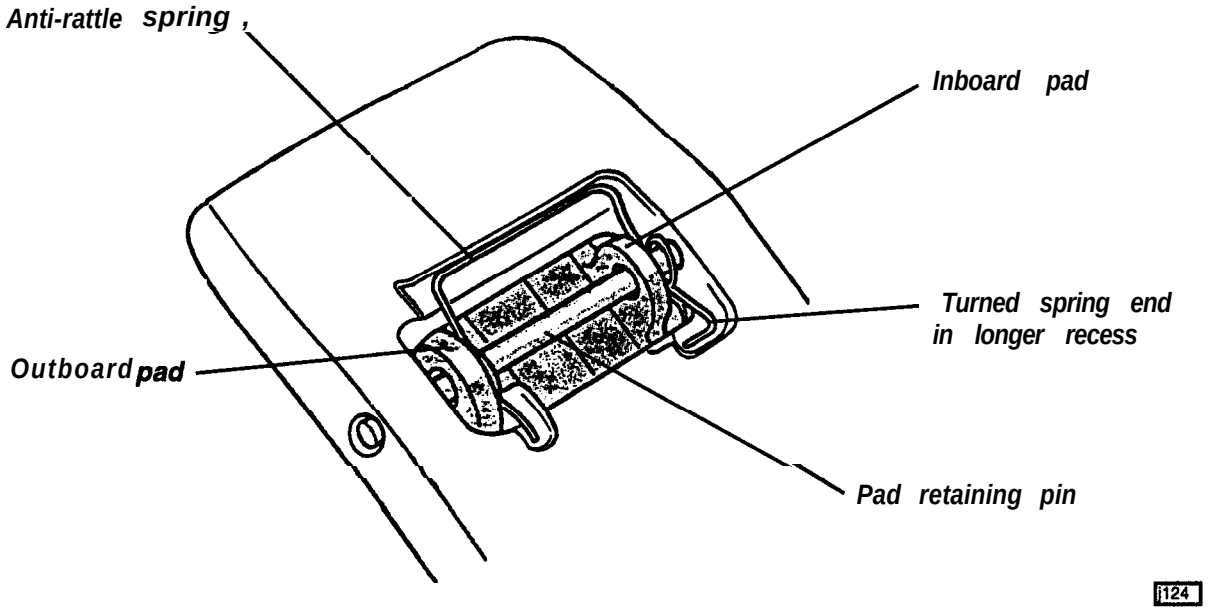
5. If refitting the existing brake pads, refit each pad in the same position as originally fitted.



6. Before fitting new rear pads, the caliper piston must be screwed back into the caliper down the parking brake actuation mechanism. This operation requires the use of special tool TOOOT1242 and the removal of the brake disc:

   Remove the single socket head screw retaining the brake disc, and remove the disc.
   Fit special tool TOOOT1242 into the holes in the caliper piston, and screw the piston back down the parking brake mechanism screwthread until fully bottomed.
   Refit the brake disc, and tighten the countersunk retaining screw to 12 Nm.

7. Slide the brake pads into the caliper. Position the pad anti-rattle spring in the caliper aperture, with the spring ends located in the recesses provided. Ensure that the spring is fitted the correct way up, with the turned spring end in the longer recess. Press the spring eyes into alignment whilst the pad



retaining pin is inserted through the caliper from the outside. Ensure that the pin passes through both eyes of the anti-rattle spring, and both brake pads, and that the pin is fully installed with the snap ring seated in the outboard side of the caliper.

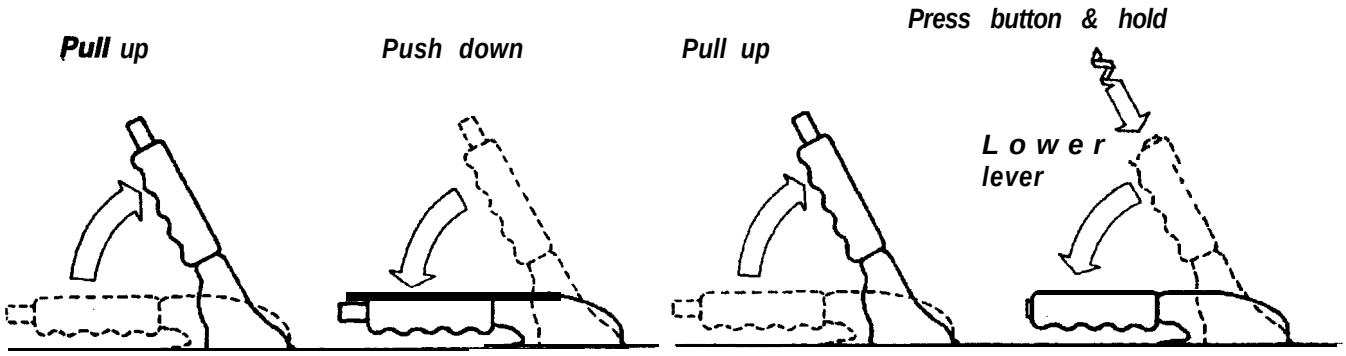
8. Refit the roadwheels and press the brake pedal several times to set the brake pad position. Check the fluid level in the reservoir and top up if necessary.

9. Ensure the customer is made aware that maximum braking efficiency will be achieved if, for the first few hundred miles, needless heavy braking is avoided, and the brake pads are allowed to 'bed in' fully before being used to their full potential.

JG.5 - PARKING BRAKE ADJUSTMENT

It is feature of the mechanically operated parking brake mechanism, that a large amount of parking brake lever travel is required in order for the brake to work efficiently and for the automatic adjustment to function. For this reason, a 'fold down' type parking brake lever is used to ease driver entry/exit.

The brake is applied by pulling the lever upwards in the usual manner. After application, the lever may be pushed down again (WITHOUT pressing the release button in the end of the handgrip) whilst the fascia tell tale lamp warns of parking brake application. To release the brake, pull the lever UP, press the release button and HOLDING THE BUTTON PRESSED IN, lower the lever fully.



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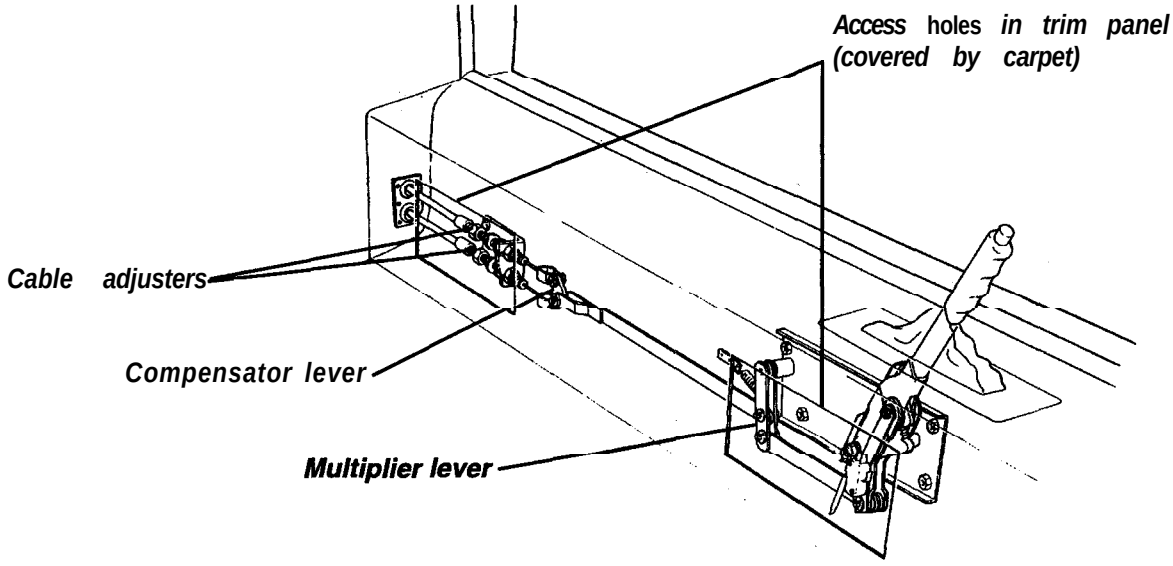
The parking brake lever is connected via a short link to a multiplier lever to increase leverage and reduce operator effort. The multiplier lever connects to an actuating link which uses a compensator lever to balance the force applied to each parking brake cable.



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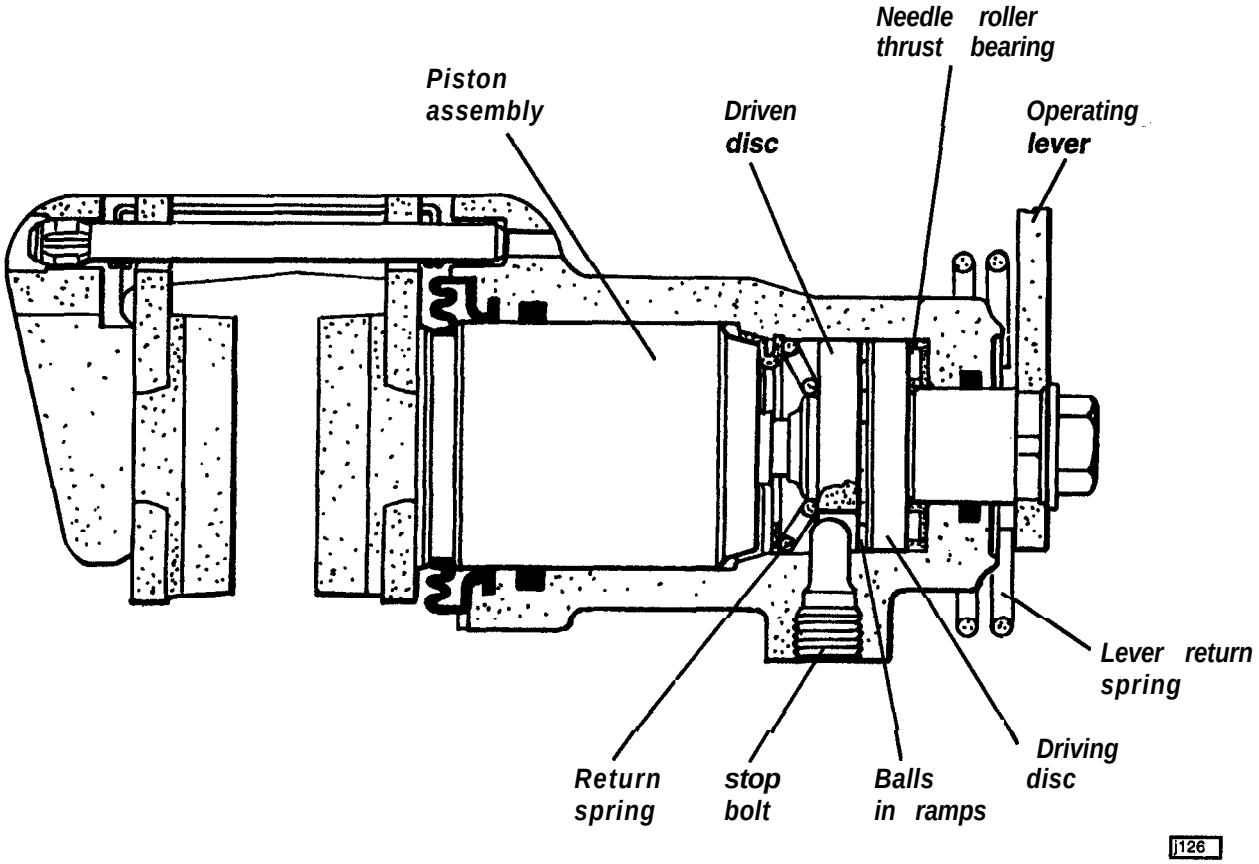
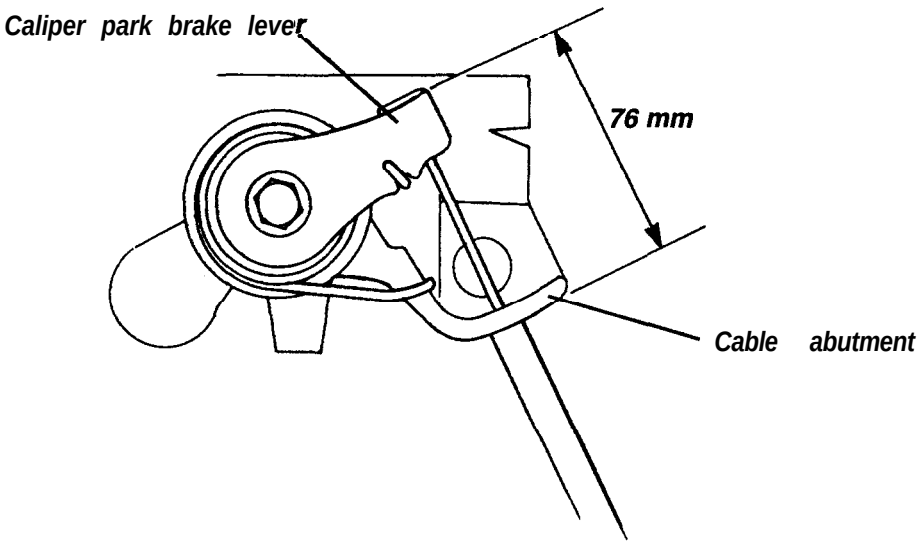
Parkina Brake Mechanism

The Brembo caliper uses two discs separated by hardened steel balls in ramps machined in the discs, to convert the rotation of the drive disc (to which the-parking brake lever is attached) into axial movement of the driven disc, whose rotation is restrained by a stopbolt. The axial movement of the driven disc is transmitted to the caliper piston by a screwthread mechanism which compensates for pad wear by rotation of the nut within the piston when the footbrake is applied.



For the auto adjustment system to function correctly, it is essential that each caliper parking brake lever is allowed to return fully when the brake is released, and is not prevented from doing so by maladjustment of the parking brake cable. To check that the caliper levers are fully returned; with the parking brake 'off', measure the distance between the cable abutment and caliper lever as shown.

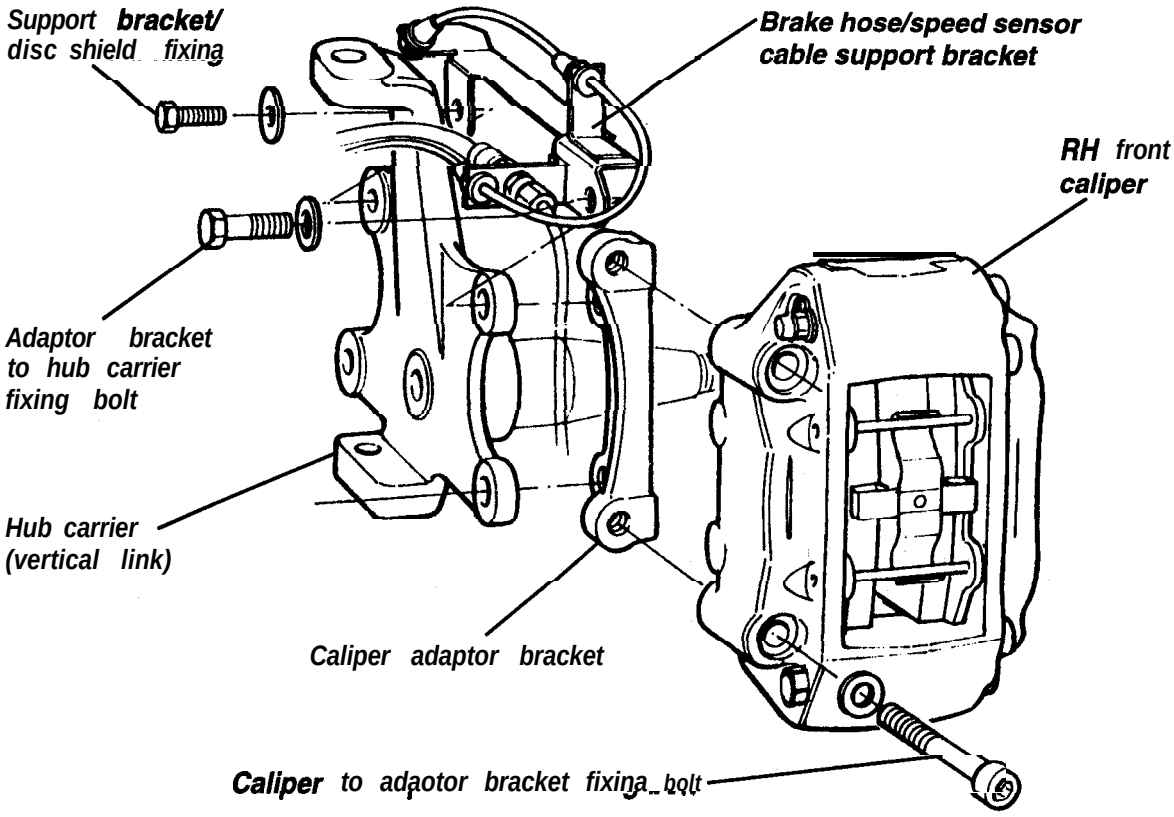


After verifying this dimension, any slack in the cables may be adjusted out at their forward abutment inside the driver's sill trim panel. For access to the cable adjusters, slide the driver's seat fully forward and lift the rear end of the sill carpet to expose the trim panel aperture. After adjustment, recheck the caliper lever 'off' dimension.

JG.6 • BRAKE CALIPERS

No attempt should be made to dismantle the pistons or seals of the Brembo calipers, or to separate the front caliper bodies. Any sign of hydraulic leakage from a unit should be rectified by renewal of the caliper.

The front calipers are secured by two cap head bolts to an adaptor bracket, itself fixed to the hub carrier by two bolts. When refitting a caliper, ensure that the brake hose/speed sensor cable support bracket is correctly fitted, and the sensor cable properly routed.



The only service operation which may be performed on the rear calipers, is the overhaul of the sliding pins, which may be replaced without disturbing the hydraulic connection:

1. Disconnect the parking brake cable from the caliper.

2. Remove the cap head bolt securing the bottom guide bush to the caliper adaptor plate.

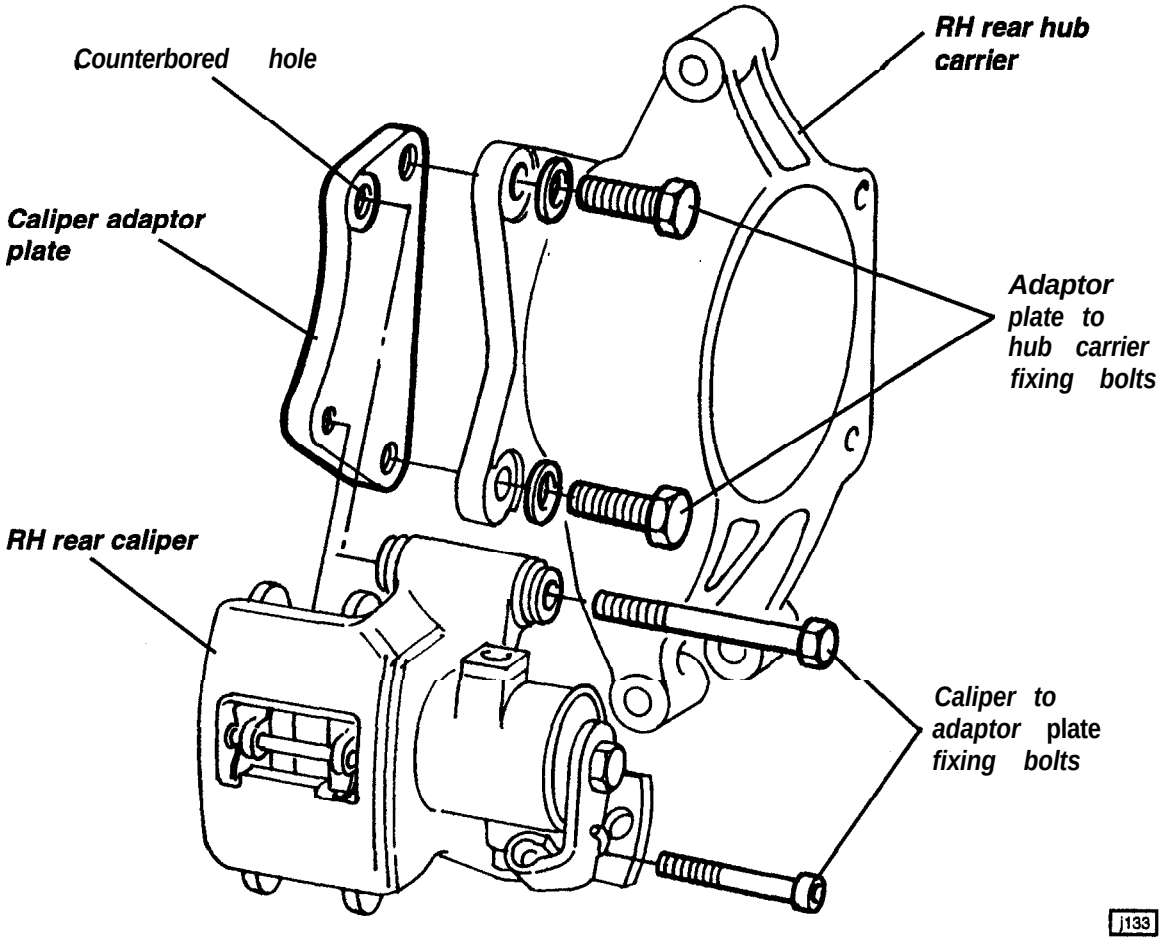
3. Remove the hex. head bolt securing the top guide bush to the caliper adaptor plate, and withdraw the caliper from the car with the brake hose still connected.

4. Slide out the lower steel guide sleeve and withdraw the bush/boot from the caliper. Pull the boots off the top steel guide bush and slide out the bush from the caliper.

5. Clean the guide bores in the caliper body with brake cleaner. Lubricate the new bushes and boots with silicone grease provided in the repair kit, and reassemble into the caliper in reverse order to disassembly. Note that if the caliper adaptor plate is removed, it must be refitted with the counterbored hole at the

inboard top position.

6. Refit the caliper to the adaptor plate, torque tightening the two fixings to:
Upper M10 bolt; 45 - 50 Nm (33 - 37 lbf.ft)
Lower M8 caphead; 26 - 30 Nm (19 - 22 lbf.ft)



7. Reconnect the parking brake cable and operate the brakes several times before driving the car.

JG.7 - BRAKE DISCS

The condition of the brake disc friction surface is a major factor in brake performance and feel, with a good surface quality and minimal run-out and thickness variation being required. After an extended lay up, some surface rust may develop on the discs which will cause a degradation in braking quality until the surfaces are cleaned up by normal brake action. Excessive run-out or thickness variation as a result of overheating or extended wear, may cause brake judder and/or extended pedal travel due to pad 'knock off'. It may be possible to rectify excessive surface rusting/pitting or warping by resurfacing both sides of the disc using specialist equipment, but on no account should the minimum thickness be transgressed.
NOTE: Ensure the front wheel bearings are correctly adjusted before measuring front disc run-out.

Brake disc thickness

Front	- nominal	28 mm (1.10 in)
	- minimum	25 mm (0.98 in)
Rear	- nominal	22 mm (0.87 in)
	- minimum	20.4 mm (0.80 in)

Maximum disc runout

Front	0.10 mm (0.004 in)
Rear	0.15 mm (0.006 in)

Maximum Thickness Variation

Front and rear	0.015 mm (0.0006 in)

Front Disc Replacement

Before fitting a new brake disc, ensure that any corrosion protective coating is removed from the braking surface of the disc with a suitable solvent. Otherwise contamination of the brake pads may occur resulting in initial poor brake performance.

The Brembo front brake discs are fitted on the outboard side of the front hubs, and are retained for convenience when the front wheels are removed, by a single socket head recessed screw. To remove a brake disc, release the front caliper fixing bolts and withdraw the caliper from the disc. Remove the retaining screw, and withdraw the brake disc.

When re-fitting, ensure scrupulous cleanliness of the disc to hub jointface before mounting the disc and retaining with the recessed screw. Refit the brake caliper.

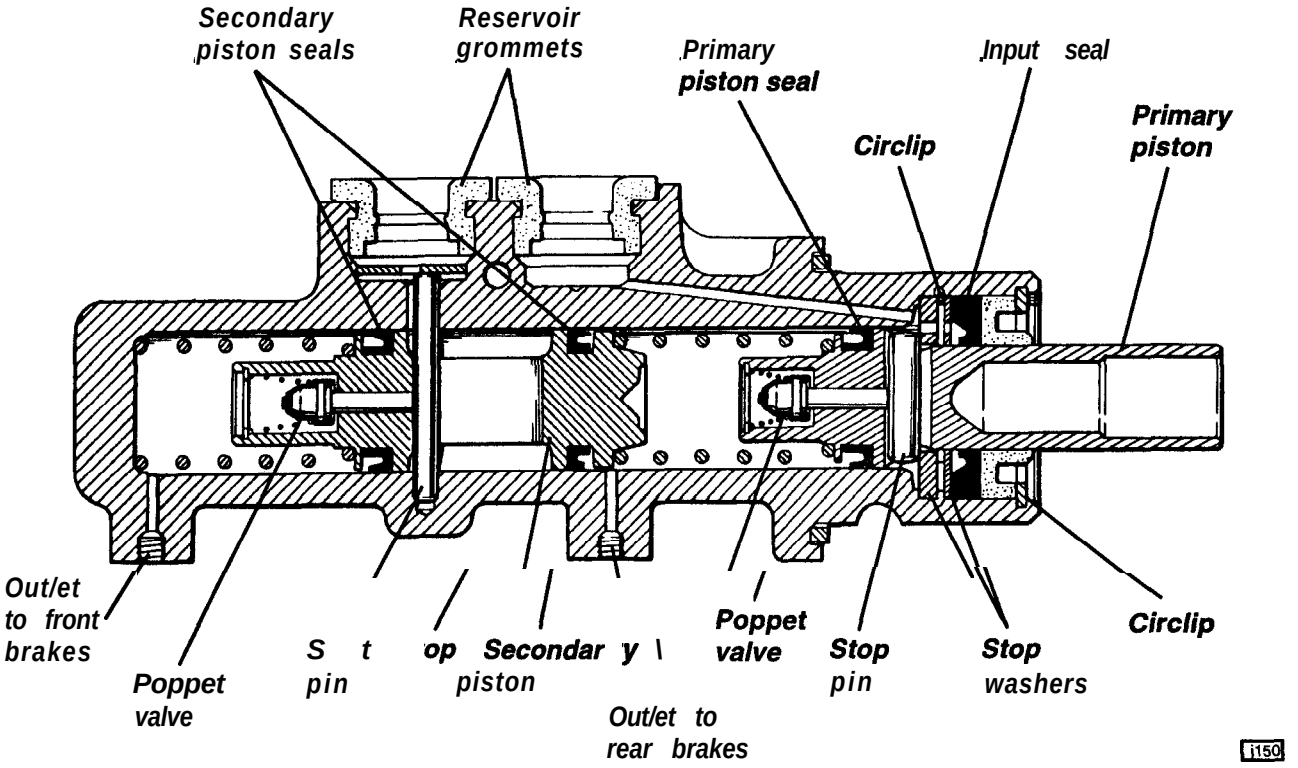
Rear Disc Replacement

The rear discs are mounted between the outboard side of the rear hubs and the roadwheels, and are retained for convenience when the roadwheels are removed, by a pair of countersunk 'Tom' headed screws. Removal of the rear brake pads allows sufficient clearance for the disc to be removed without otherwise disturbing the caliper.

. When refitting, ensure scrupulous cleanliness of the disc to hub jointface before mounting the discs and retaining with the two countersunk screws.

JG.8 - BRAKE MASTER CYLINDER

The tandem brake master cylinder serves independent hydraulic Circuits for the front and rear brake systems. The cylinder houses primary and secondary pistons, each of which is equipped with a poppet valve which is open in the 'at rest' position, and closes when the brakes are applied.



When the brakes are off, the primary and secondary pistons are pushed by their springs against the stop pins, which also serve to open the poppet valves and connect each brake circuit with the fluid reservoir. Application of the brakes causes the brake pedalpushrod to operate the brake servo, the output rod from which connects with the master cylinder primary piston. . Force applied to the primary piston is balanced between the primary and secondary pistons via the two piston springs, such that under normal circumstances, both pistons will move at a similar rate. Initial movement of the pistons allows their poppet valves to close; sealing off the master cylinder high pressure chambers from the reservoir, such that further movement of the piston displaces fluid from the master cylinder to the front and rear brake circuits.

In the event of a hydraulic leak in the rear circuit, the absence of, or reduced pressure in the master cylinder rear chamber, will allow the primary piston to close with, or contact the secondary piston which will continue to operate the front brakes, albeit with extended pedal travel. A failure in the front circuit will cause the secondary piston to bottom out against the end of the master cylinder, but allow continued rear brake operation with extended pedal travel.

If there is any fluid loss from the master cylinder, or if spongey brake operation or extended pedal travel is experienced which is not attributable to a caliper problem, the master cylinder should be examined for wear or damage. If the cylinder is dismantled for inspection, and the cylinder bore is found to be unmarked and showing no visible sign of wear, an overhaul seal kit should be fitted. Otherwise. the cylinder assembly should be renewed.

Master Cylinder Overhaul

1. Syphon off fluid from the reservoir to reduce spillage before disconnecting and capping the two outlet pipes. Plug the two cylinder ports, and unplug the low fluid sensor connector.

2. Release the two nuts securing the master cylinder to the servo, and withdraw the cylinder from the car. Take care not to drip fluid onto any paintwork. Tip out any remaining fluid from the reservoir.

3. Ensure that the working environment is spotlessly clean before undertaking disassembly. Secure the cylinder in a vise by the mounting flange.

4. Remove the reservoir retaining pin and clip, and carefully prise the two spigots of the reservoir from the sealing grommets in the cylinder.

5. Remove the circlip from the cylinder end, pull out the seal retainer, and carefully prise out the input seal. Remove the thin stop washer.

6. Press and hold the primary piston into the cylinder before removing the retaining circlip and thick stop washer. Withdraw the primary piston, stop pin and spring, complete with seal and poppet valve assembly.

7. Remove the two reservoir grommets from the top of the cylinder, and the washer from below the front grommet. Use a wooden spindle to press the secondary piston down the bore and allow the secondary piston stop pin to be withdrawn. Tap the cylinder on a wooden bench to withdraw the secondary piston and spring, complete with seals and poppet valve assembly.

6. Use a smooth rounded blade to remove the old piston seals, and carefully fit the new seals into the piston grooves the correct way round (refer to diagram). Fit the remaining parts of the overhaul kit following the directions supplied with the kit.

9. Carefully insert the secondary piston assembly and spring into the cylinder, taking great care not to damage the seals, or to scratch the cylinder bore. Retain with the stop pin, and fit the stop pin washer and both reservoir grommets.

10. Similarly fit the primary piston assembly and spring, including stop pin, and retain with the thick stop washer and circlip. Finally fit the thin stop washer, input seal, seal retainer and circlip.

11. Lubricate the reservoir spigots before fitting into the master cylinder grommets, and refit the reservoir retaining pin and clip. Refit the master cylinder assembly to the servo, tightening the two nuts to 17 • 23

Nm (13 - 17 lbf.ft). Fit the two brake pipes to the master cylinder, tightening to 12 - 14 Nm (9 - 10 lbf.ft).

12. Refill the reservoir with a non-mineral type DOT 4 fluid, and bleed the brake system in the usual way.

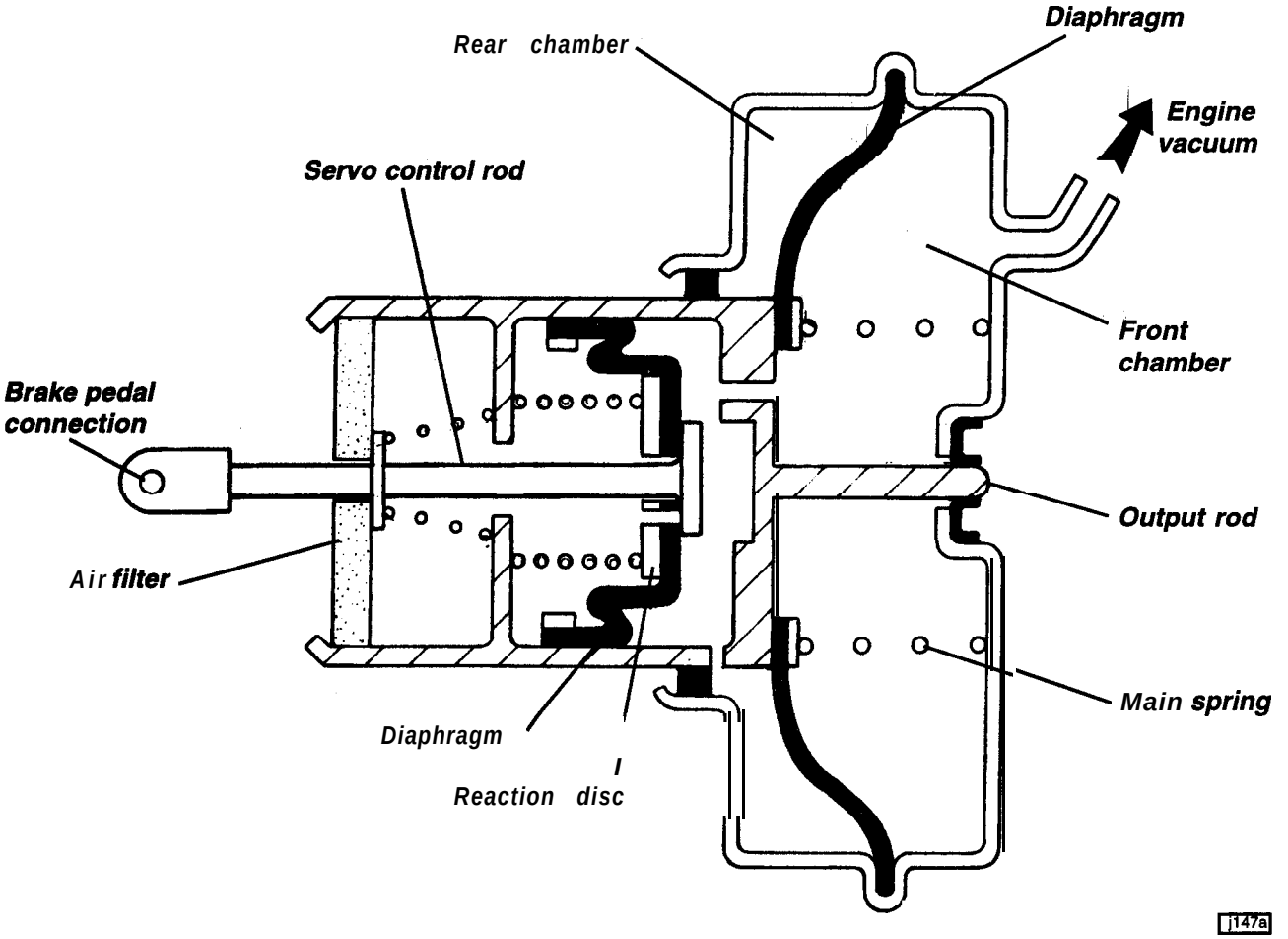
JG.9 - VACUUM SERVO UNIT

The 'Master-Vat' brake vacuum servo is, with the exception of the air filter and non return valve, a non-servicable sealed unit which if found to be faulty, must be replaced as an assembly. The air filter (surrounds the input push rod) should be replaced whenever the brake system is overhauled, and cleaned or replaced more frequently if the vehicle is operated in dusty conditions. A vacuum non-return valve is incorporated into the vacuum hose elbow connector in the front case of the servo unit, and a second in-line non-return valve is fitted into the supply line close to the engine. The elbow connector valve is a push fit into a grommet in the servo shell, and is supplied complete with the grommet.

The servo is fitted between the brake pedal and master cylinder and is of the 'suspended in vacuum' type, wherein a flexible diaphragm divides the space inside a steel shell into two chambers. The front chamber is connected, via a non-return valve, to the vacuum produced in the engine's inlet plenum chamber, When the brakes are 'off', this vacuum is also applied to the rear side of the diaphragm, which is held towards the rear of the shell by a spring. The brake pedal is connected to the brake servo control rod, which operates a control valve and reaction disc before pressing directly against the output rod.

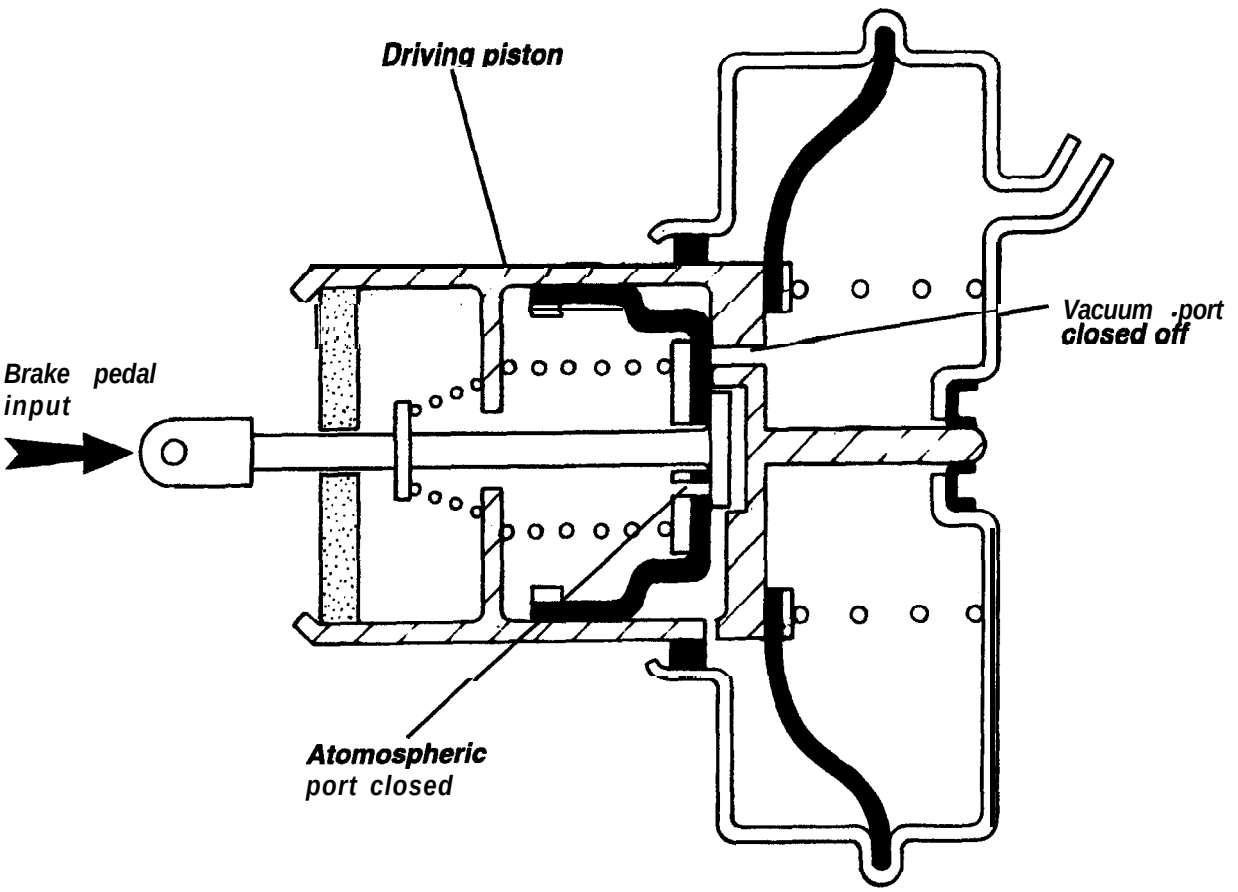
Brakes Off

In the simplified schematic diagram, with the brakes off, the diaphragm and driving piston are pushed to the left by the main spring, and the input rod is pushed to the left by its own spring, causing the control valve to close off the atmospheric port. Engine vacuum admitted to the right hand side of the diaphragm is also communicated to the left side of the diaphragm, and the unit is stable.



Initial Movement

Initial movement of the brake pedal causes the input rod to move to the right, and allows the control valve under the action of its spring, to close off the vacuum port in the driving piston. The atmospheric port remains closed.

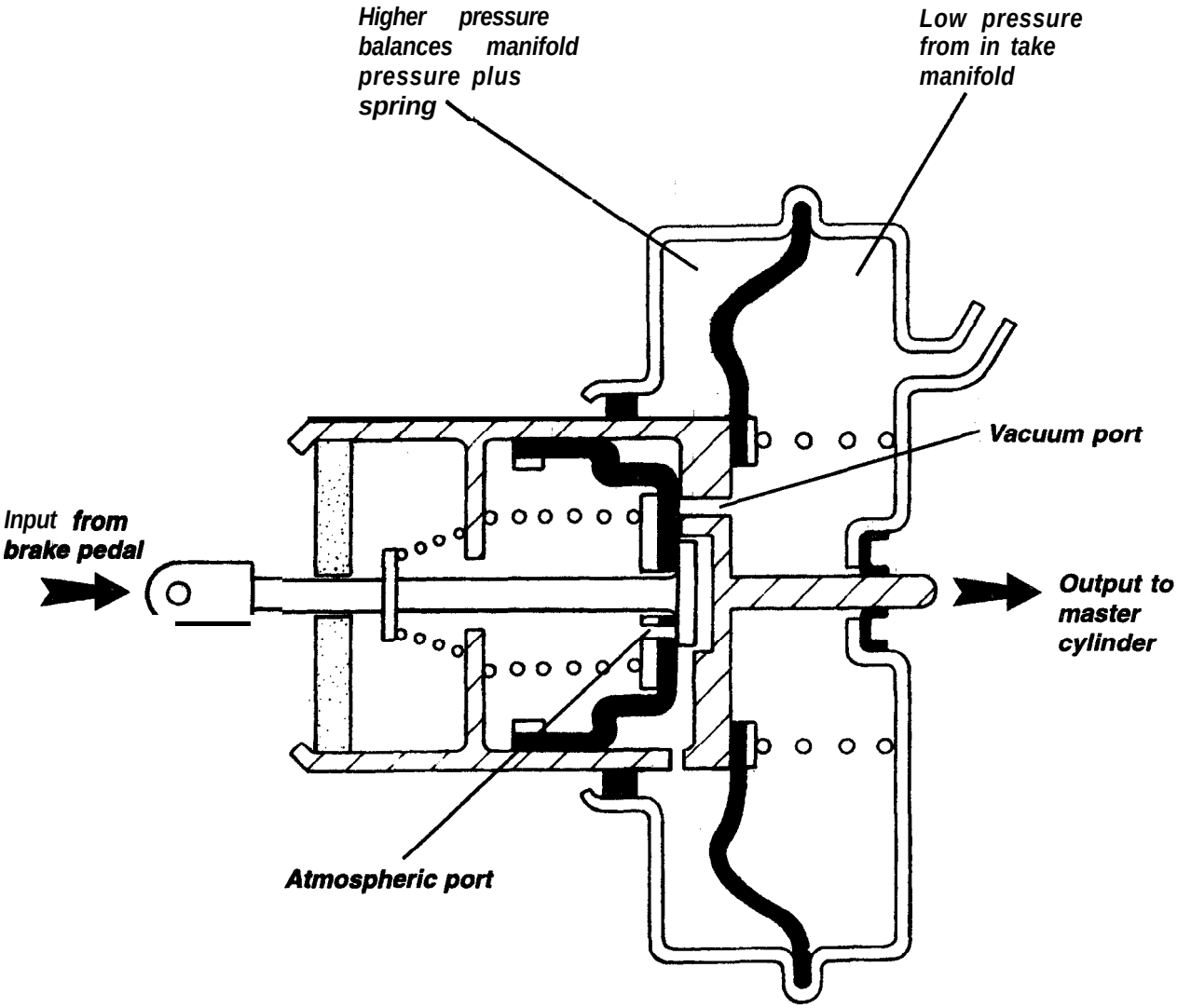


j147b

Pressure Balance

Further pressure on the brake pedal opens the atmospheric port and bleeds atmospheric pressure into the left hand chamber. This pressure imbalance causes the driving piston to move to the right, adding assistance to the force applied directly to the output rod (and the master cylinder) via contact between the input and output rods. When the force produced by the pressure differential across the diaphragm balances the reaction force of the main spring and master cylinder, movement of the driving piston ceases, with both control valve ports closed, and the system once again in equilibrium.

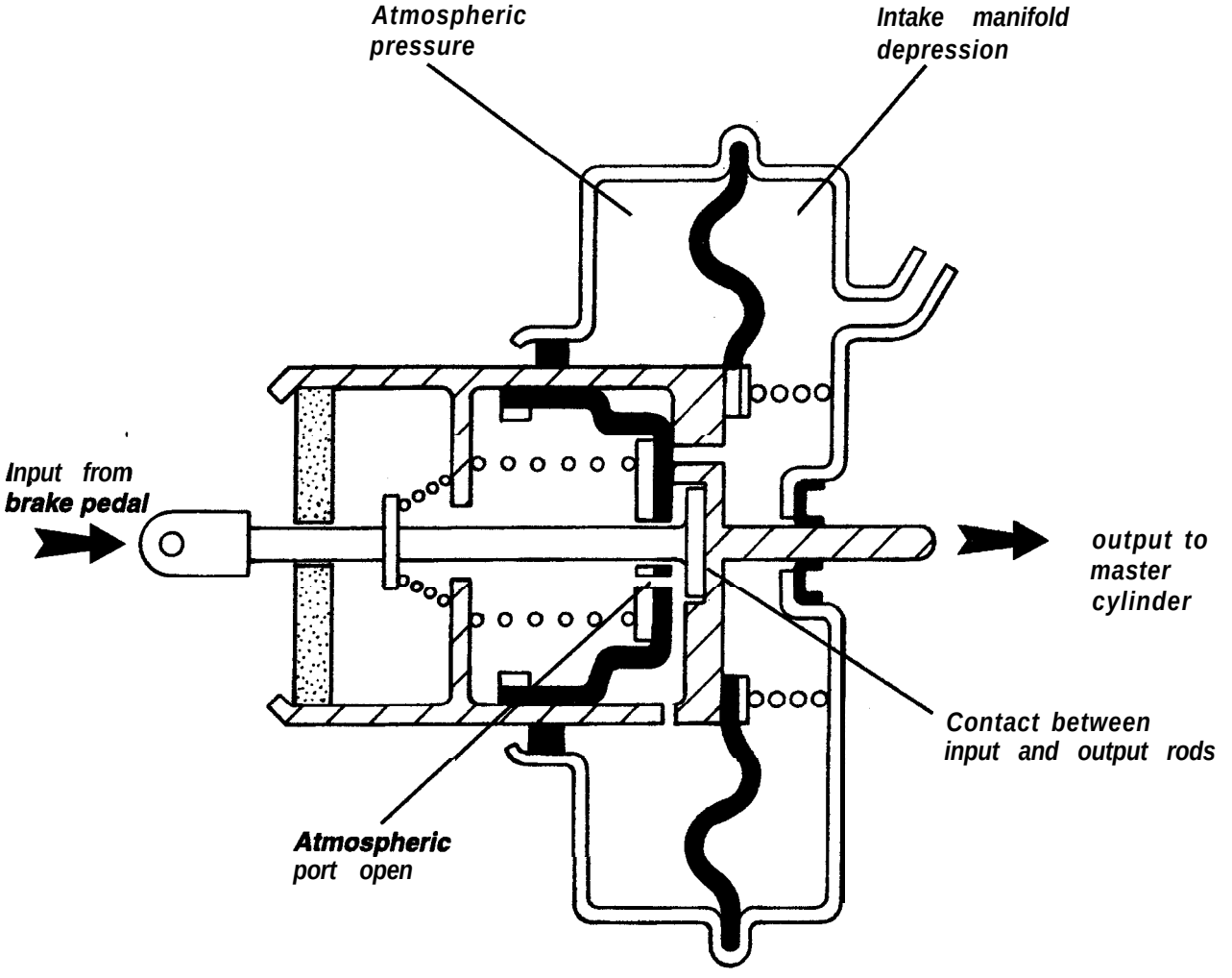
From this position of equilibrium, further pressure on the pedal will tend to open the atmospheric port and allow pressure in the left hand chamber to increase, and move the driving piston to the right before again stabilising. Any reduction in pedal pressure will tend to open the vacuum port and allow the higher pressure in the left hand chamber to bleed off into the right hand chamber, whose depression is kept constant by its connection with the intake plenum. The pressure imbalance is reduced, and the driving piston will move to the left under the action of the main spring, until equilibrium is again restored.



j147c

Maximum Assistance

If the pedal is pressed hard, the atmospheric port will be held open, so that the left hand chamber will be subject to full atmospheric pressure. This is full servo assistance which will, with 0.8 bar of vacuum available from the engine, increase the force applied to the master cylinder pushrod by approximately four times.



When pedal pressure is relaxed, the vacuum port in the driving piston will open and bleed the higher pressure from the left side of the diaphragm into the right hand chamber and thence into the engine plenum, collapsing the pressure differential across the diaphragm. The driving piston is moved fully to the left by the main spring.

The pliant reaction disc fitted between the input and output rods ensures a a graduated application of servo assistance and provides pedal feedback and 'feel' to the driver.

Ooerational Check

As a quick check of servo operation proceed as follows: With the engine stopped, press the brake pedal several times to exhaust the servo unit of vacuum. Keeping the pedal pressed (which should be 'hard' and 'high'), start the engine; The pedal should drop slightly as the servo vacuum builds up, and extra force is produced. If the pedal does not drop, it is most likely that there is a fault in the vacuum supply line. Check the vacuum hose, all connections and the non-return valve. If the vacuum supply is not defective, the servo unit should be replaced.

It is essential that the servo piston (and master cylinder piston) is allowed to return fully when the brakes are released, and is not pre-loaded by mal-adjustment of the input pushrod. Check that there is a small amount of free play at the pushrod when the brake pedal is released. Adjust the brake pedal upstop to attain a compatible pedal height with the correctly adjusted clutch pedal. Then adjust the brake servo pushrod (from within the front luggage compartment) so that the clevis pin may be freely inserted through the pushrod clevis and pedal.

To Replace Brake Servo Unit

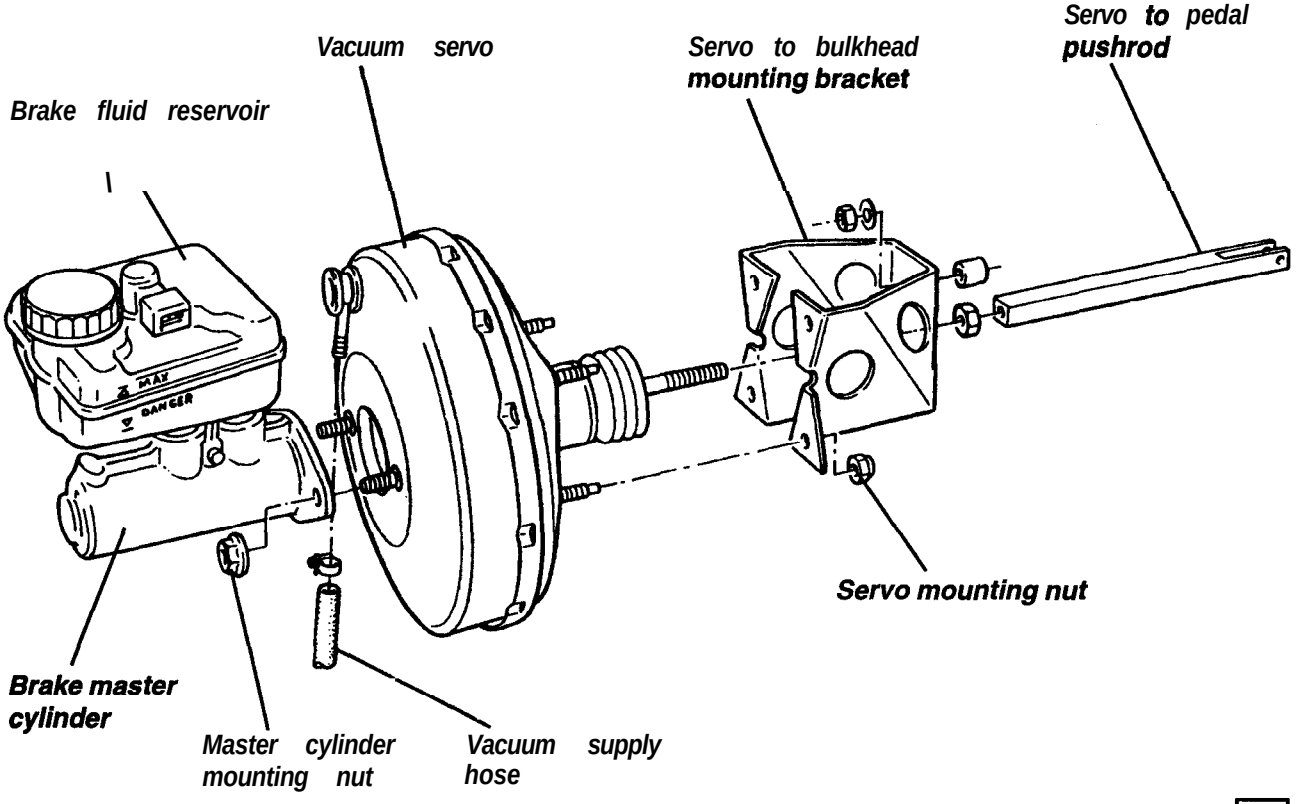
The servo unit may be removed from between the master cylinder and bulkhead mounting bracket without opening a hydraulic circuit:

1. From inside the driver's footwell, remove the clevis pin securing the brake pedal to the servo pushrod.

2. Remove the two nuts securing the master cylinder to the servo, and carefully withdraw the cylinder and support without straining the two brake pipes.

3. Disconnect the brake servo vacuum hose, and release the four nuts securing the servo to the bulkhead mounting bracket. Withdraw the servo assembly.

4. Replace the servo in reverse order to the above, tightening the servo mounting nuts to 23 Nm (17 lbf.ft), and the master cylinder fixing nuts to 17 ▪ 23 Nm (13 ▪ 17 lbf.ft). Check that there is a small amount of free play at the pushrod when the brake pedal is released ▪ see above.



j152

JG.10 - ABS THEORY OF OPERATION

The Kelsey-Hayes antilock brake system is an 'add on' type used to supplement the dual circuit, tandem master cylinder, vacuum servo assisted brakes fitted to the Esprit. A single electro-hydraulic unit comprising a hydraulic modulator, hydraulic pump, microprocessor and solenoid valve bank, is mounted in the front luggage compartment and plumbed into the front and rear brake circuit lines from the tandem master cylinder.

The microprocessor (ECM) receives signals from magnetic wheel speed sensors at each of the four wheel hubs, and interprets the individual wheel acceleration, deceleration, and comparative wheel speeds. From this data, the ECM is able to determine if any wheel is tending to lock up, and if imminent lock up is sensed, the microprocessor commands the relevant solenoid valves to reduce pressure in that particular brake circuit in order to restore wheel speed to that providing the maximum braking force consistent with continued wheel rotation. The system is able to monitor and independently control each of the four wheel brakes, and is referred to as a 4-channel system.

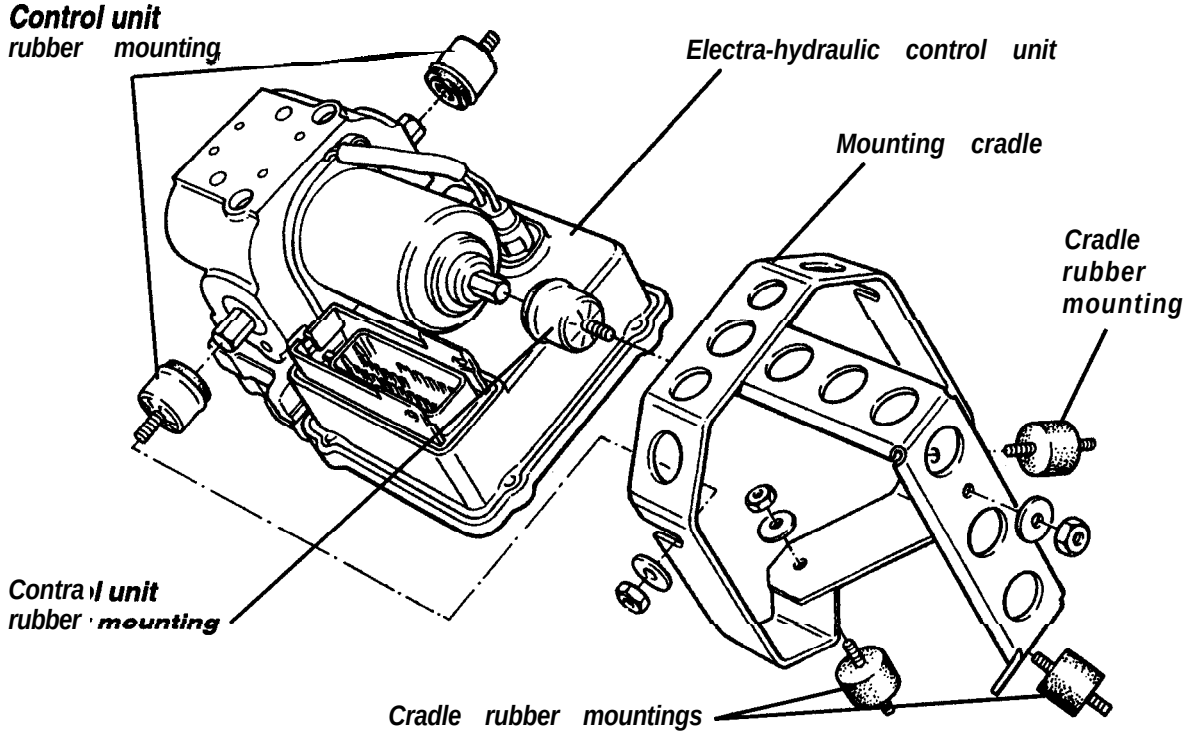
In order to achieve the required pressure modulation, three basic modes are used:

Pressure hold;
Pressure reduction;
Pressure increase;

In order to maintain the safety provision of two entirely independent hydraulic circuits, one for the front brakes, and one for the rear, the hydraulic elements of the control unit are doubled up, with no part of the system shared between the two circuits. For the pressure hold function, four isolation solenoid valves are used, one in the hydraulic circuit for each wheel brake. The pressure reduction function is achieved by a separate dump solenoid valve in each of the four wheel brake circuits, and the pressure increase provided for by a single electric motor operating two hydraulic pumps, one serving the front, and one the rear brake circuit. Separate low pressure accumulators are used for the front and rear circuits.

Electro-Hydraulic Control Unit

The electro-hydraulic control unit comprises an alloy valve block containing the four isolation valves, four dump valves, two hydraulic pumps and two accumulators, with the single pump motor screwed to the housing, and with a solenoid block and ECM unit attached to the underside. The complete assembly is flexibly mounted via three rubber isolator bushes to a steel cradle. The eight solenoid valves are grouped in two rows, with the valve plungers protruding in sealed canisters from the underside of the unit where each one is surrounded by a solenoid coil. The isolation and dump valves share a similar construction, but the spring loaded isolation valves are normally open, and the dump valves normally closed.



Anti-Lock Braking

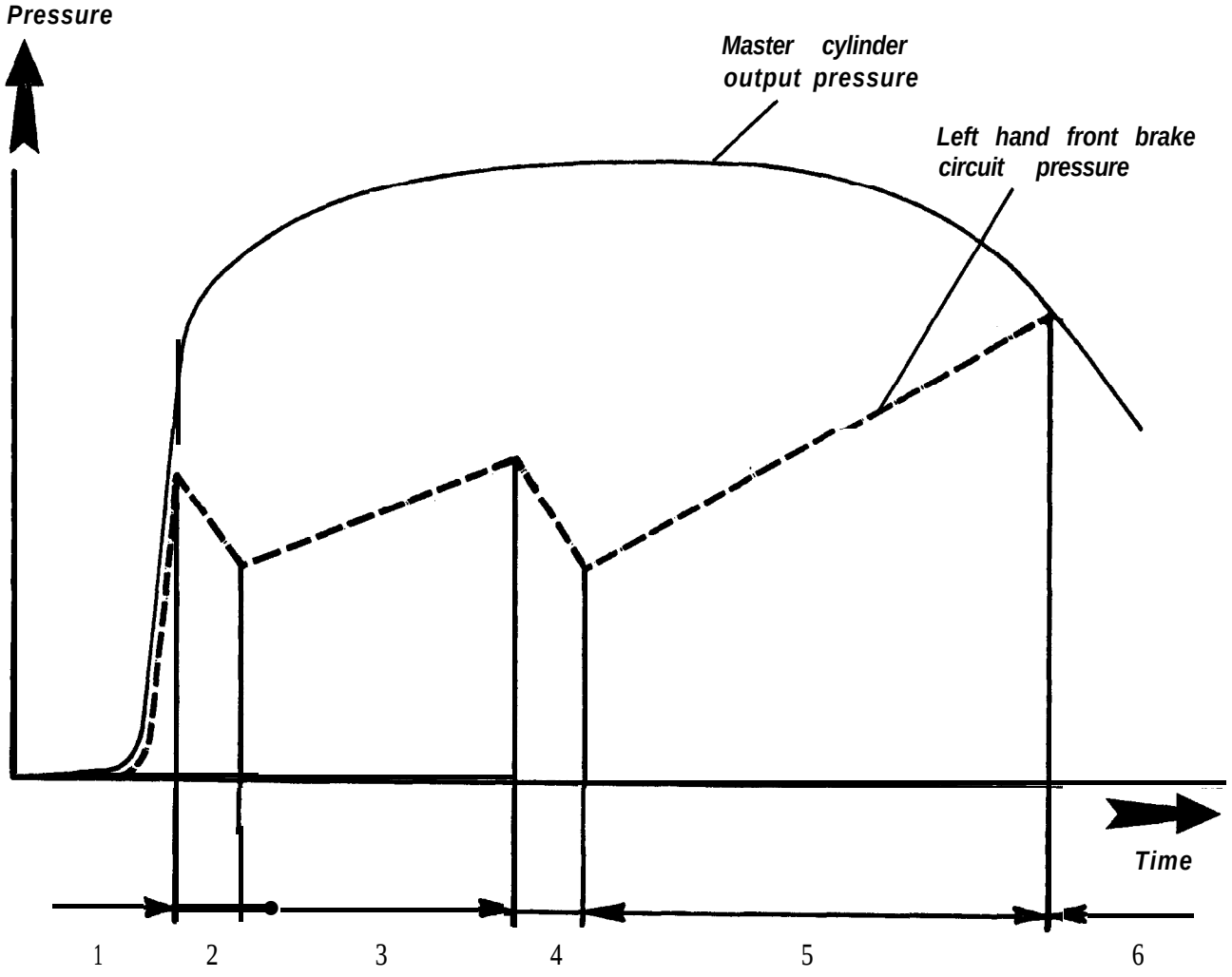
A high brake pedal pressure (or low road surface friction) may initiate the locking of one or more wheels. In the diagram below, a typical control strategy is shown:

1. Normal braking occurs until, as the applied pressure increases, the wheel speed signals received by the ECM indicate that the left hand front wheel is tending to lock (i.e. deceleration too rapid, too great a speed differential with other wheels).

2. The connection between the master cylinder and the LH front brake circuit is interrupted (by the isolation valve), and the pressure in the LH front circuit reduced (by the dump valve) until the wheel speed returns to an acceptable value.

3&4. The pressure is then allowed to increase (via the accumulator and pump) until locking is again sensed and a pressure reduction initiated.

5. After restoration of wheel speed, pressure is allowed to increase until, in this example, it meets the (falling) applied pressure, after which (6) normal braking is resumed, with the ABS once more inactive but constantly monitoring wheel speed.



i148

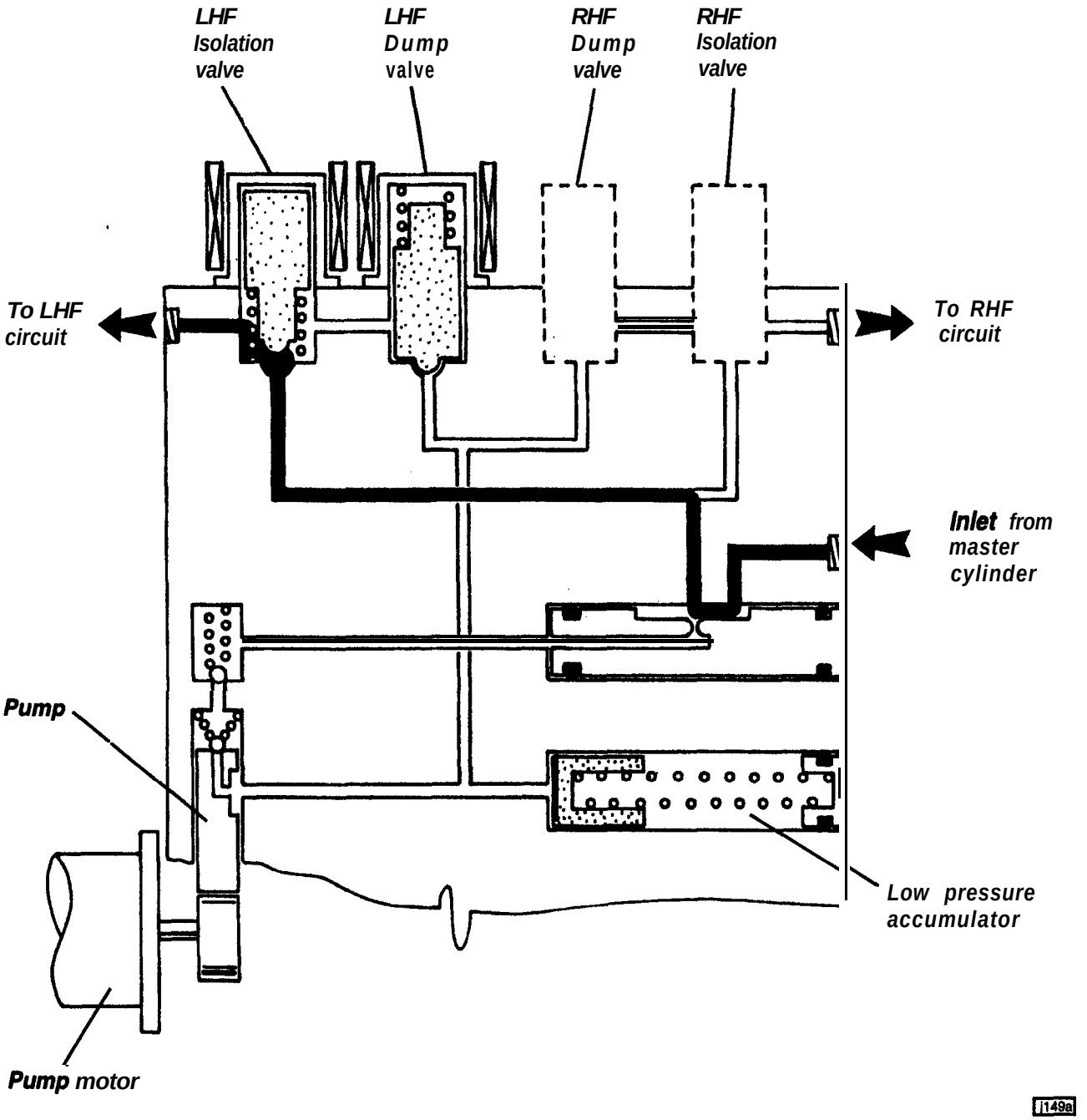
Sequence of Operation

In the following diagrams, one half of the hydraulic modulator is shown schematically, representing the front brake control circuit, with the sequence ofoperation described for the left hand front wheel brake. This sequence would be similar for any of the other three wheel brakes. A typical emergency braking event is described where, in this example, the left hand front wheel tends to lock. Note that the complete system is duplicated for the rear brake circuit, which remains completely independent of the front circuit.

Normal Braking

During normal braking, when the wheel speed sensors indicate no imminent wheel locking, the ABS is inactive. The solenoids are unenergised, so that the isolation valves are sprung open, and the dump valves sprung closed.

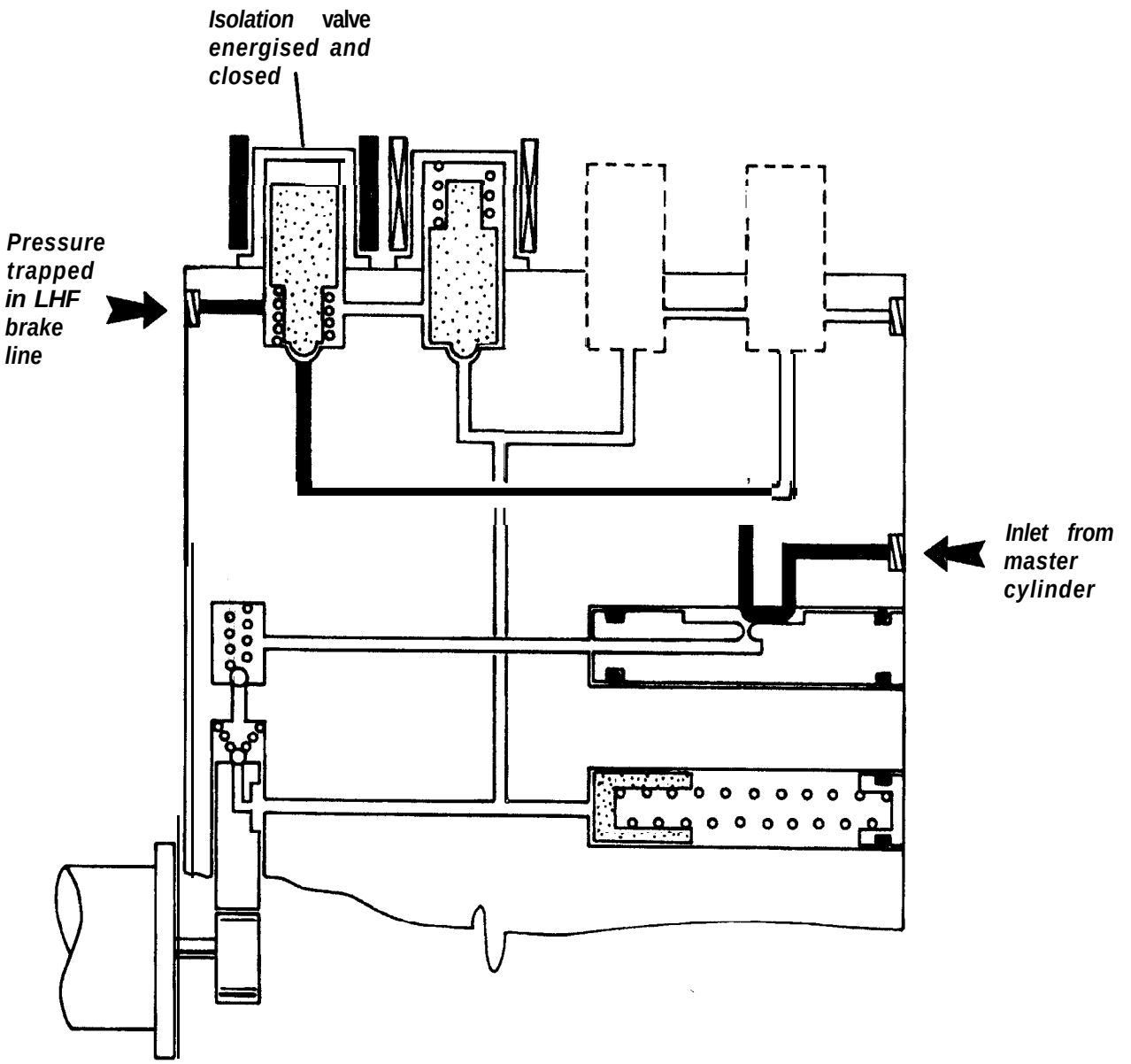
Hydraulic fluid from the master cylinder enters the modulator via the inlet port, by-passes the attenuator orifice, passes through the open isolation valve and out to the LH front wheel brake.



J149a

Pressure Isolation (Pressure Maintain)

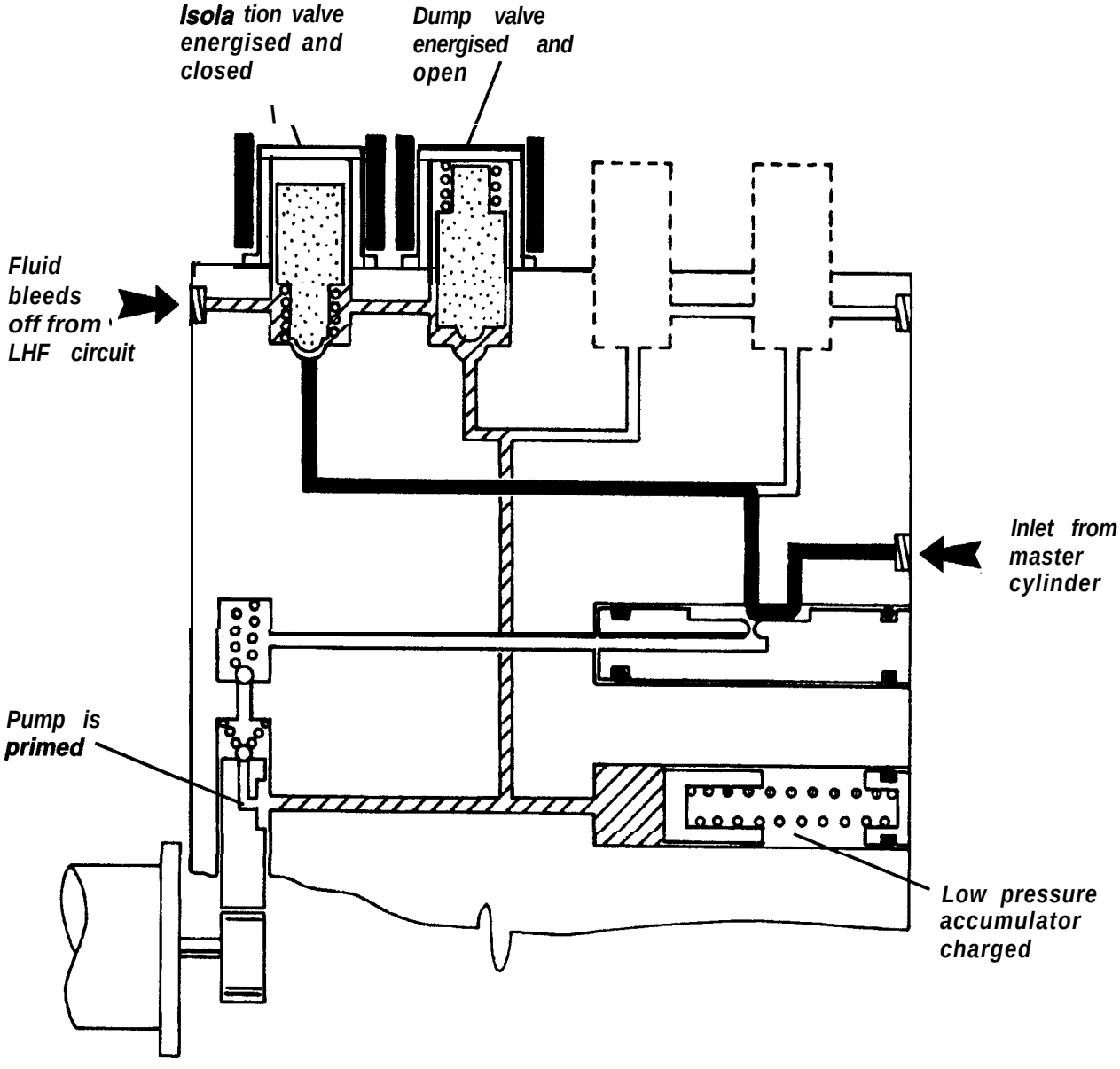
If signals received from the wheel speed sensors indicate imminent lock up of the LH front wheel, the first step in the anti-lock sequence is to isolate that wheel brake circuit from the master cylinder. The ECM energises the isolator valve solenoid, which closes the valve against spring pressure and maintains existing pressure in the left hand front brake circuit regardless of any increase in pedal pressure.



j149b

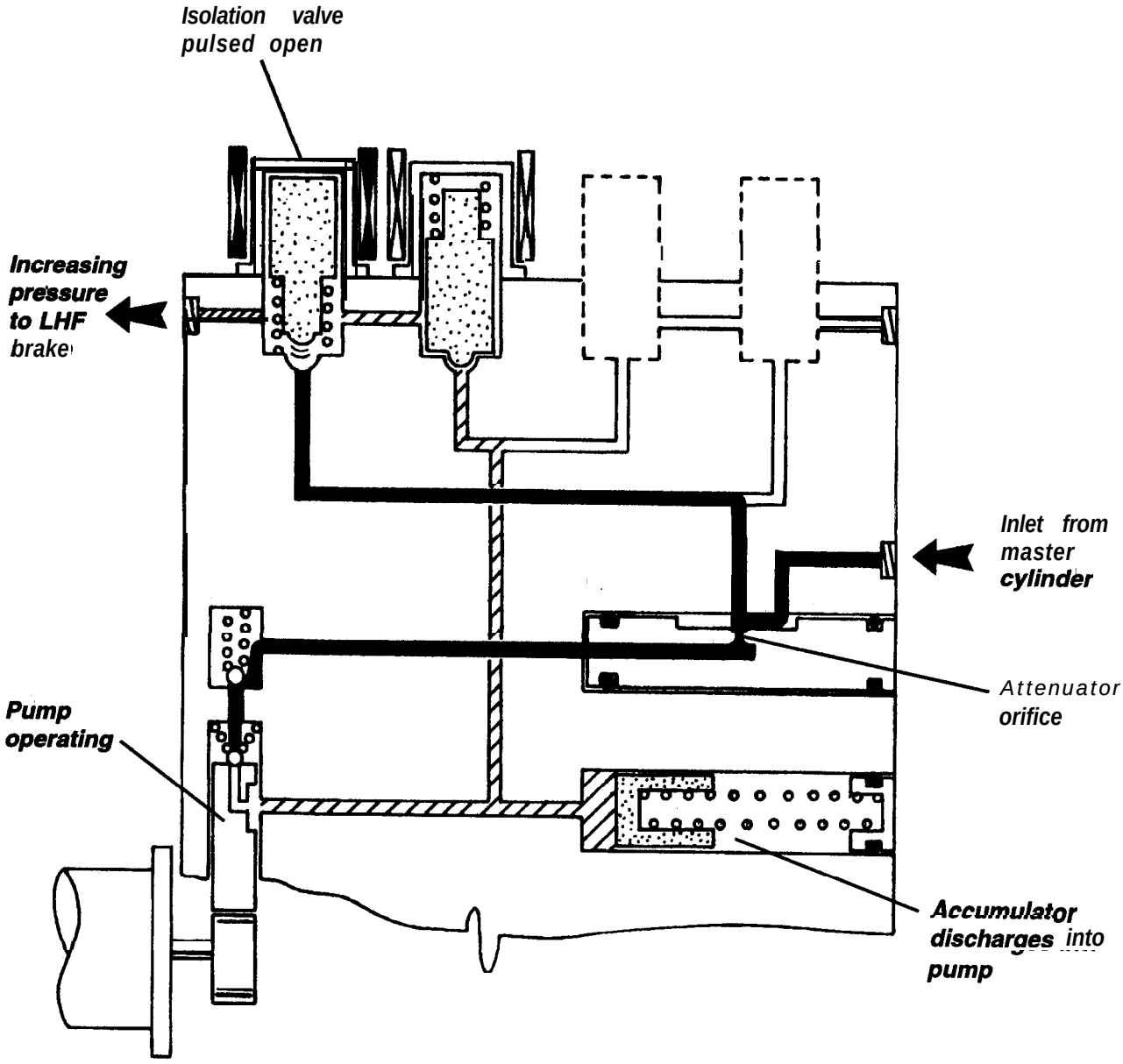
Pressure Reduction

Once the LH front wheel brake circuit has been isolated from the master cylinder, the pressure must be reduced in order to allow wheel speed to be restored. This pressure reduction is achieved by the ECM energising the dump valve solenoid, which then opens against spring pressure and bleeds off some of the fluid into the low pressure accumulator shared with the RH front circuit. Very short activation pulses are used to maintain close control of the pressure reduction, and to limit the reduction to that required to restore wheel speed. Fluid displaced from the wheel brake circuit is stored in the front brake accumulator against spring pressure, and is also used to prime the hydraulic pump.



Pressure Increase (M-apply)

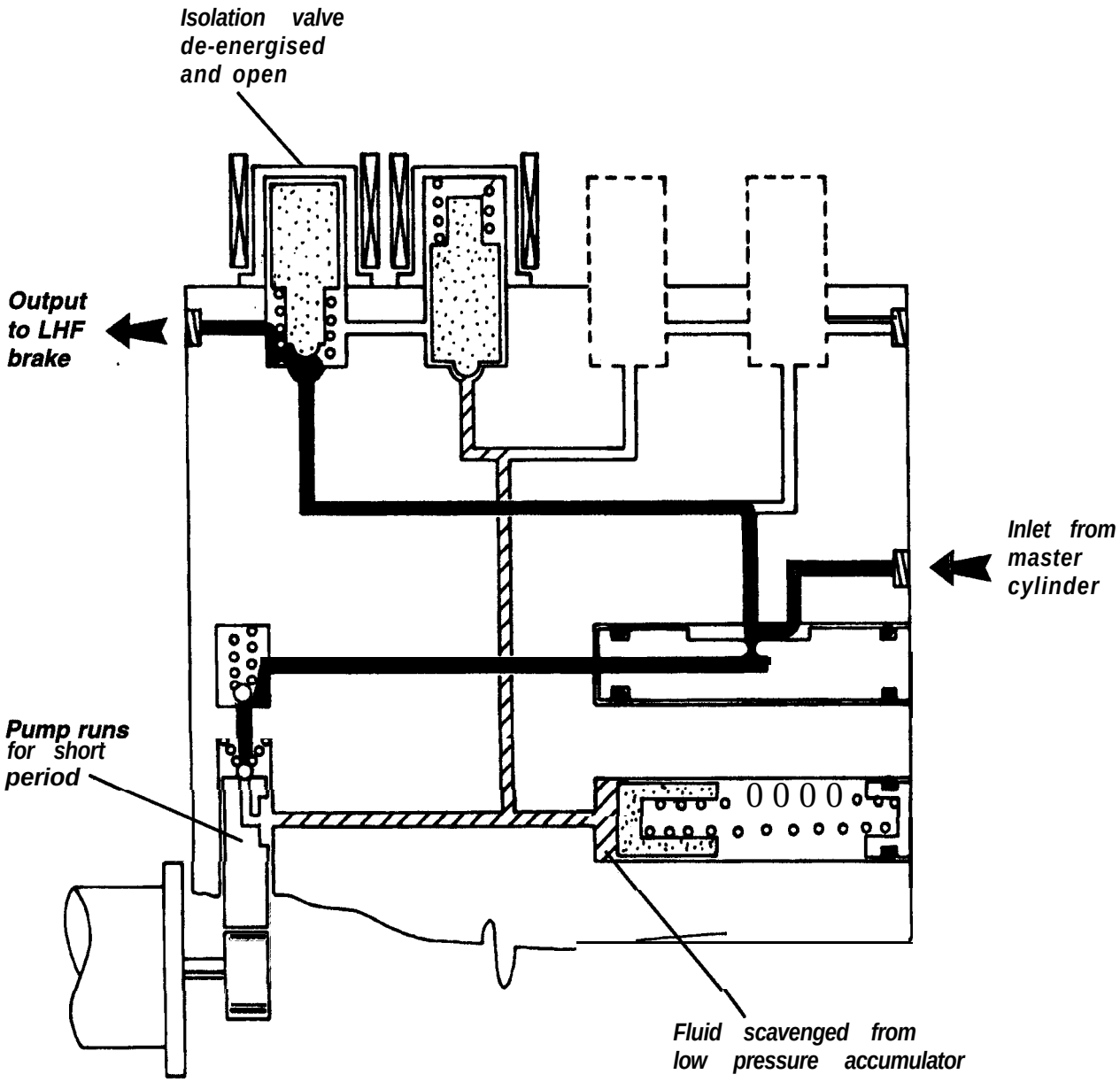
As soon as imminent wheel lock is detected by the ECM, and the ABS control system is activated, the pump motor is energised. When the dump valve is opened, and fluid is allowed to bleed off from the wheel brake circuit into the low pressure accumulator, this fluid is scavenged by the pump and returned back into the input circuit through an attenuator orifice. This action is the origin of the 'pedal pushing back' sensation felt by the driver, with the pressure pulsations from the pump damped and quietened by the restriction of the orifice. When wheel speed has been restored and the brake pressure is required to increase, the isolation valve is momentarily opened, to allow master cylinder/pump pressure to raise the pressure in the wheel brake circuit in increments. If imminent locking is again sensed, the isolation valve closes, the dump valve opens and the cycle repeats, with the whole process **occuring** several times a second.



j149d

Brake Release

When no further wheel locking is sensed by the ECM, the ABS becomes inactive with the isolation valve open (solenoid de-energised) to allow direct communication between the master cylinder and wheel brake circuit, and the dump valve closed (solenoid de-energised) to seal off the pressure relief circuit. The pump will remain running for a short time to help drain any fliuid from the accumulator, whose piston is returned to its start position under the action of the spring, and return the fluid to the master cylinder reservoir.



j149e

JG.ll ▪ ELECTRO-HYDRAULIC UNIT

The electro-hydraulic unit is located on the passenger side in the front luggage compartment, and is flexibly mounted in a support frame via three isolator rubber bushes. The support frame itself is fixed to the body via another three rubber bushes. A single 26 pin electrical connector plug is provided for the ECM and a separate 2 pin plug for the pump motor connections.

CAUTION: Do not disconnect or connect the main connector plug with the ignition switched on. Switch off the ignition and disconnect the main connector plug before carrying out any electrical welding operations on the car.

Hydraulic pipe connections to the unit comprise two input pipes from the master cylinder (one for the front circuit, one for the rear) and four output pipes, one for each of the wheel brakes.

To Remove Electra-Hydraulic Unit

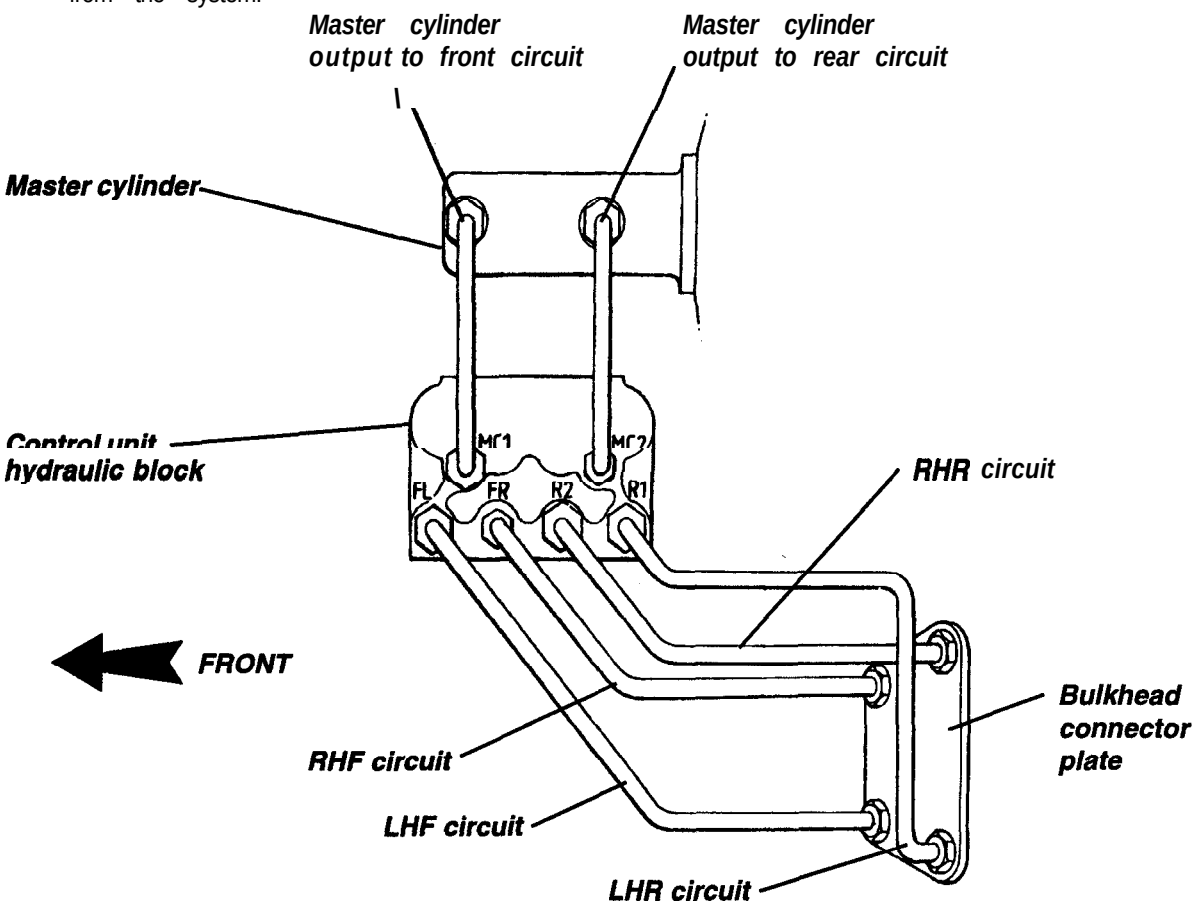
When removing the unit, beware of dripping brake fluid and take appropriate precautions to prevent damage to paintwork.

1. Switch off the ignition before opening the retaining clip, and unplugging the main electrical connector.

2. Label each of the hydraulic pipe connections before disconnecting from the unit and immediately capping the pipes and plugging the ports to reduce the spillage of brake fluid, and to prevent the ingress of dirt.

3. Release the three fixings securing the unit into the support cradle, and withdraw the complete electro-hydraulic unit. Beware of brake fluid dripping from the unit.

4. Refit the unit in the reverse order to removal, taking care to connect the brake pipes to the correct ports on the hydraulic block ▪ see diagram. Bleed the unit using conventional techniques until all air is expelled from the system.



j154

5. Verify correct connection by using the 'Tech 1' tool in actuator tests with the car on a wheel free lift. Check that operation of each solenoid valve affects the appropriate wheel.

Service Breakdown of Electro-Hydraulic Unit

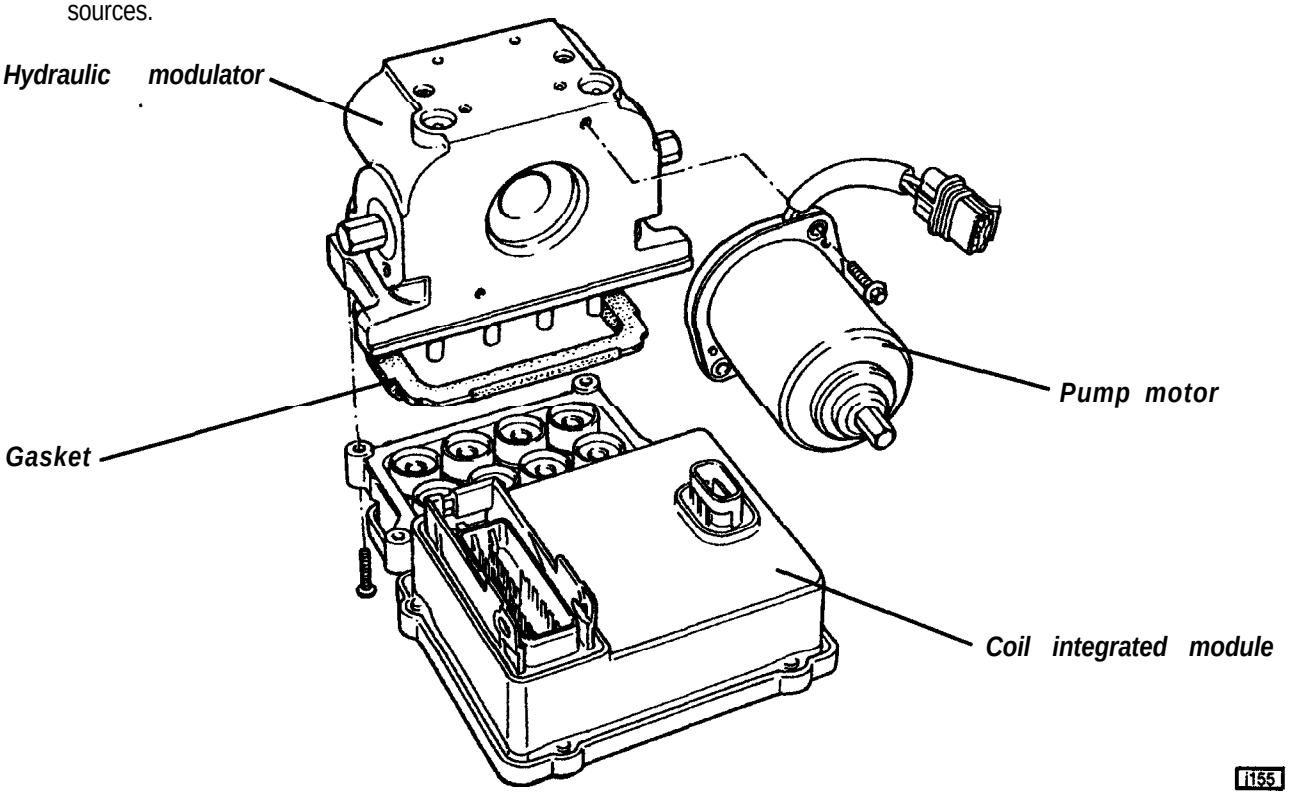
Service parts for this unit are limited to; the pump motor; the hydraulic modulator; and the coil integrated module which comprises the ECM and solenoid pack.

1. Unplug the 2-way connector between pump motor and module, and release the two motor fixing screws. Withdraw the motor from the hydraulic block.

2. Remove the four 'Torx' screws securing the module to the hydraulic block and withdraw the module from the solenoid valve spigots.

3. When refitting the module, check that the gasket is correctly located around the solenoid coil cluster, before mating with the hydraulic block and fitting the screws.

4. The pump motor uses an eccentric roller integrated onto the end of its shaft to drive the two reciprocating pump plungers in the hyraulic block. Check that the '0' ring is fitted on the motor spigot before inserting into the hydraulic block. Use a plastic or wooden implement to press the pump plungers into their bores to permit the roller to be fitted in-between. Retain with the two screws and plug in the electrical connector. *Note* that component parts are calibrated specifically for the Lotus Esprit. Do not use parts from other sources.



JG.12 -WHEEL SPEED SENSORS

A wheel speed sensor magnetic pick up is fitted to each of the four hubs, and is mounted in close proximity to the periphery of a toothed ring (pole wheel) which rotates with the wheel. The tip of the sensor is surrounded by a magnetic field, through which the teeth of the pole wheel pass when the road wheel is turning. The change in magnetic flux thus produced, induces an alternating voltage in the sensor coil, the frequency of which is proportional to the wheel speed. The voltage generated can vary from 100mV at walking speed to as high as 90V at maximum vehicle speed.

The sensors for the front wheels are mounted horizontally on the brake disc shields which are themselves bolted to the hub carriers. The sensors are handed, with the fixing hole offset 45° in relation to the pole piece and electrical connector axis. The toothed rings are pressed onto the inboard side of the front hubs.

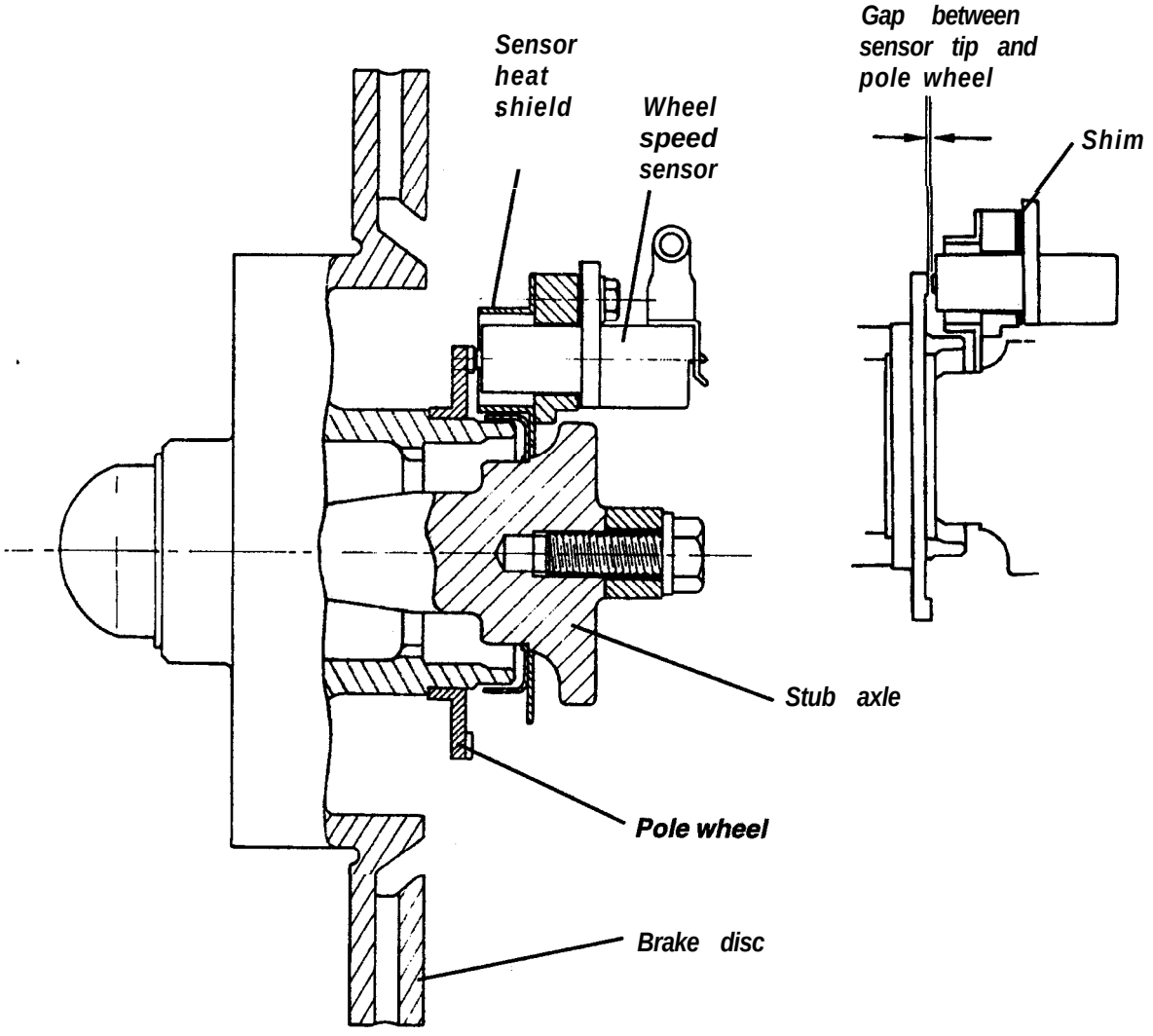
At the rear, the sensors are mounted in the tops of the hub carriers, with the toothed rings pressed onto the driveshaft outboard C.V. joints.

To ensure reliable operation of the sensors, each sensor should occasionally be removed and cleaned of any ferrous particles. The toothed rings should also be kept clean from a build up of dirt.

Front Sensor Gap

The gap between the sensor tip and the pole wheel is critical, and must be adjusted if necessary using shims. Before checking the gap, ensure that the front wheel taper roller bearings are correctly adjusted - see Service Notes section CF.4.

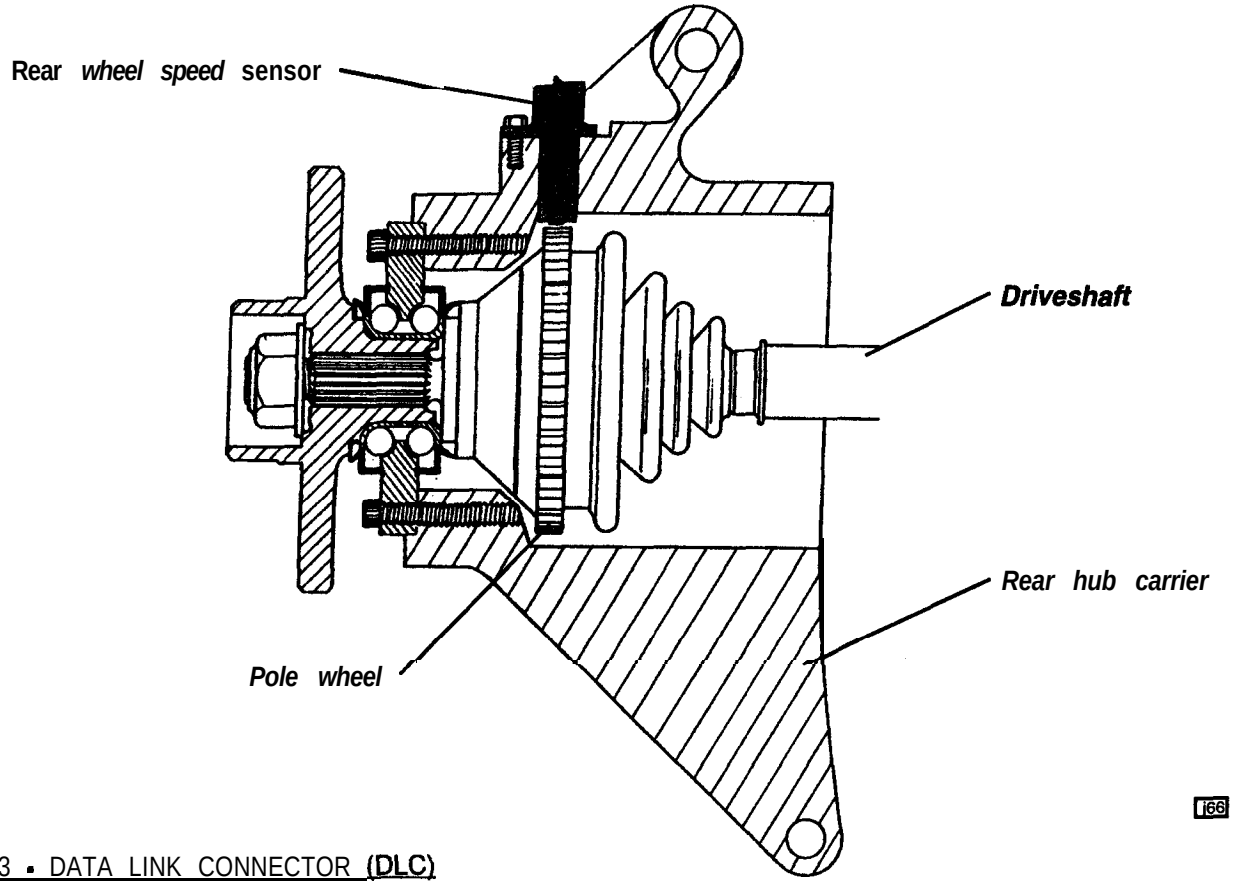
Gap between sensor tip and pole wheel = 0.6 - 1.4 mm (0.024 - 0.055 in).



To adjust the gap, release the single screw securing the sensor, and if applicable, the remaining screw securing the shim pack to the disc shield. The shims are 0.75 mm (0.030 in) thick. Add or delete shims as necessary to achieve specification, and secure the shims with the M6 setscrew. Fit the sensor into position and tighten its M6 setscrew to 9 Nm (6.5 lbf.ft). Recheck gap.

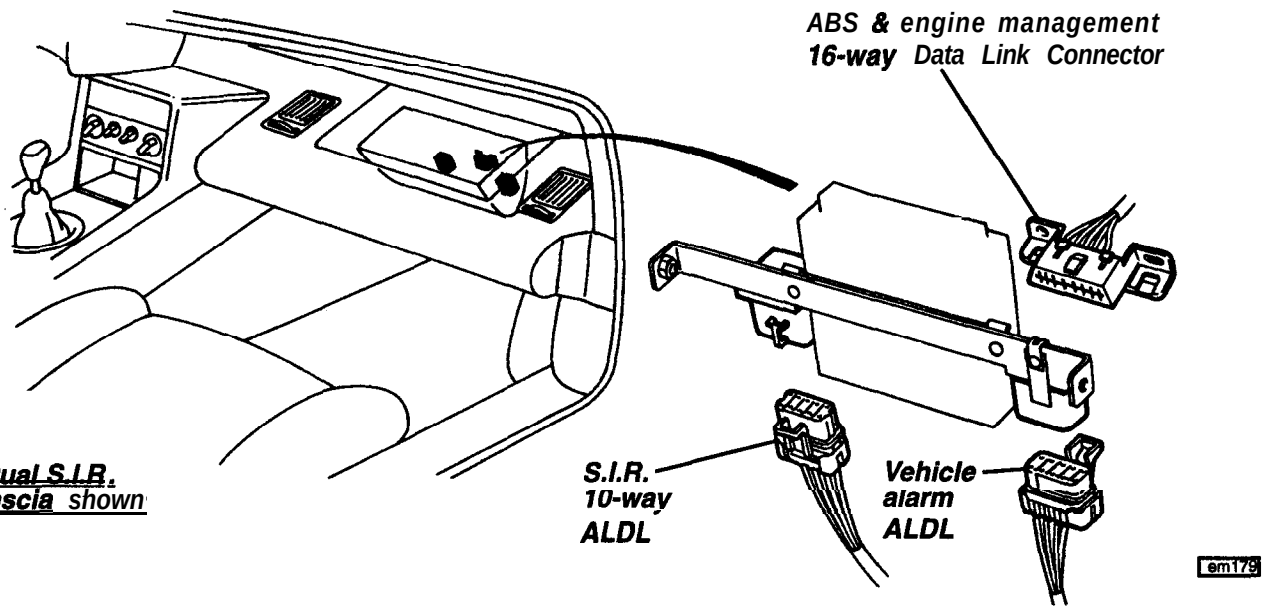
Rear Sensor Gap

The gap between sensor tio and pole wheel should be 0.6 - 1.4 mm (0.024 - 0.055 in). There is no provision for adjustment, and if the gap is found', to be outside specification, check for an incorrectly seated sensor, displaced pole wheel or faulty wheel bearings.



JG.13 - DATA LINK CONNECTOR (DLC)

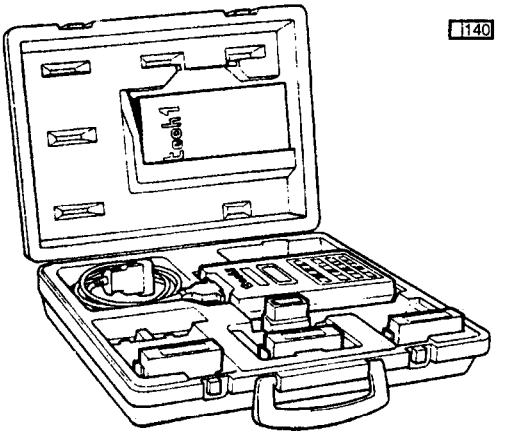
The Data Link Connector (DLC) is also sometimes referred to as an Assembly Line Diagnostic Link (ALDL), and is a 16 terminal electrical connector plug, complying with SAE J 1962, which provides a means of communication between the ABS and engine management electronic control units. The connector is used at the end of the factory production line in order to verify system operation, and in service, to connect electronic diagnostic equipment such as the Lotus specified 'Tech 1' hand held scanner tool.



The DLC is attached to the fascia harness and is located at the inboard side of the passenger under-fascia. Note that similar 10 terminal connectors are used for the S.I.R. (airbag) system (yellow), and for the vehicle security alarm (labelled 'Alarm'), and are located in a similar area. See illustration. A second 16-way DLC is fitted by the RH rear wheelarch. but only engine management data is available from this connector.

JG.14 ▪ SPECIAL TOOLS

'Tech 1' Diagnostic Scanner Kit T000T0896/2

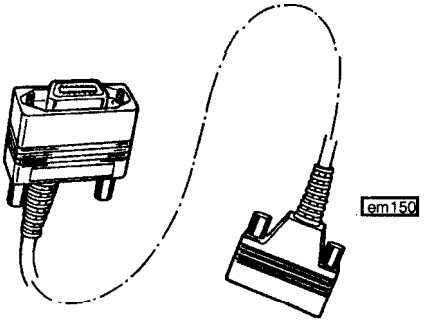


j140

Plugs into DLC and displays stored trouble codes and sensor readinas.

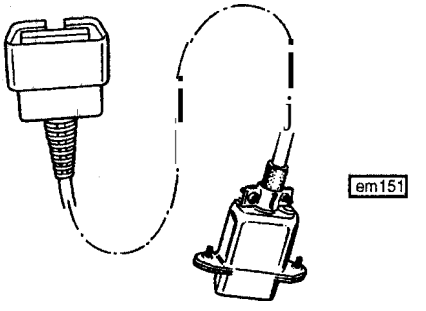
Kit includes scanner, lead, self-test adaptor, operator's manual and carrying case.

Connector Lead. 'Tech 1' Scanner TOOOT1312


em150

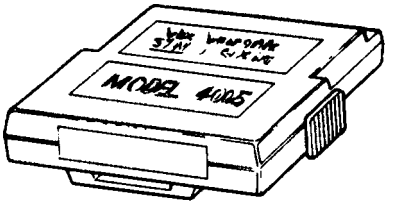
Included in 'Tech 1' kit T000T0896/2
Connects Tech 1 to adaptor cable TOOOT1306.

Adaptor Cable. Connector Lead to DLC T000T1306


em151

Included in 'Tech 1' kit T000T0896/2
Connects Tech 1 connector lead to data link connector.

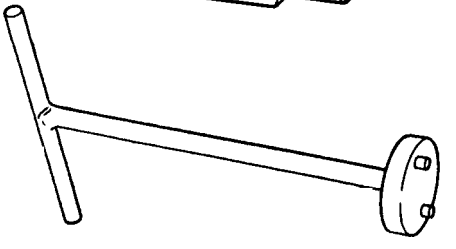
Calibration Cartridae. 'Tech 1' Scanner T000T1307



j140

Plugs into Tech 1 scanner and contains data for Esprit Kelsey Hayes ABS and V8 engine management. Identified by "LOTUS ESPRIT 1996 ECU".

Retraction Tool, Rear Caliper Piston TOOOT1242


j157

Used to retract the rear caliper pistons.
and enable the fitment of new brake pads

JG.15 - 'TECH 1' CHECKING PROCEDURES

1. Fault Codes

When the ABS controller detects a fault in the system, the following events occur;

i) The ABS tell tale is lit:
ii) The anti-lock system is switched out;
iii) A fault code is stored in the Non Volatile Random Access Memory (NVRAM) i.e. memory which is retained when the power supply is interrupted, or the battery disconnected.

Fault codes may be either Condition Latched, or Ignition Latched:

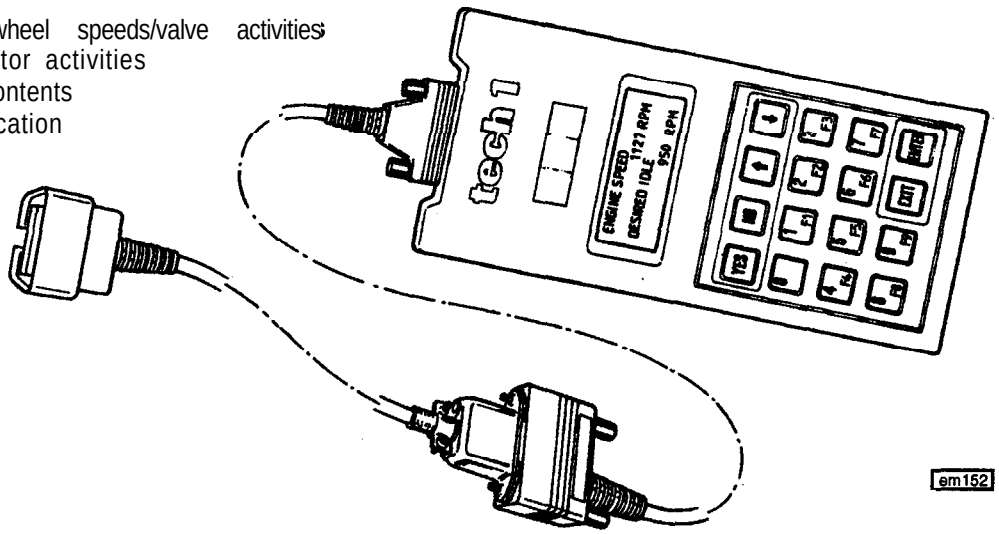
Condition Latched; With this type of fault, which is generally low or high voltage, the ABS tell tale will light, and the anti-lock system switch out, until such time as conditions return to normal, at which point the light will be extinguished, and the anti-lock be reinstated. The fault code will be stored only whilst the fault is present.

Ignition Latched; This type of fault, of which are most categories, will cause the tell tale to be lit and the anti-lock to be inhibited until such time as the fault is no longer detected at the moment of a subsequent switching on of the ignition. At this point, the lamp will be extinguished, and the ABS restored, but the fault code will be retained in the memory for the next 20 drive cycles i.e. ignition switched on and a minimum road speed of 5 mph attained.

Access to the diagnostic codes is available only by using the 'Tech 1' tool connected to the DLC (see JG.13). The 'Tech 1' is a hand held electronic scanner tool with an LCD display panel which is able to display any stored trouble codes and sensor readings as well as allowing manual operation of actuators.

The facilities available include:

- Clear fault codes
- View fault codes/wheel speeds/valve activities
- Generate valve/motor activities
- Read EEPROM contents
- Read ECU identification



Imoortant Notes

- Whenever the Tech 1 tool is connected, the ABS tell tale is lit and the anti-lock function is inoperative.
  Never connect or disconnect the harness plug to/from the control unit with the ignition switched on.
  Before charging or quickcharging, disconnect the battery from the vehicle electrical system.
- Never disconnect the battery from the vehicle electrical system with the engine running.
  Never use a quick-charger for starting.
  Take care when touching energised parts of the ignition system.
  ECMs must be removed prior to welding operations, or subjecting to oven temperatures above 80°C.
  When voltage testing, use only a high-resistance type meter.
  During test steps which involve the connection of contacts from harness plugs or control units with ground or battery voltage (+12V), exercise great care as incorrect contact can cause permanent damage to the ECM internal circuits.
- When measuring resistance from ground bearing wires to vehicle ground, the nominal value of 'less than 2 ohms' sometimes cannot be achieved. In this case, disconnect the negative (ground) post of the battery and measure the resistance to the vehicle earth lead.
- Always erase trouble codes from any control unit after a test is done.

2. Abbreviations & Definitions

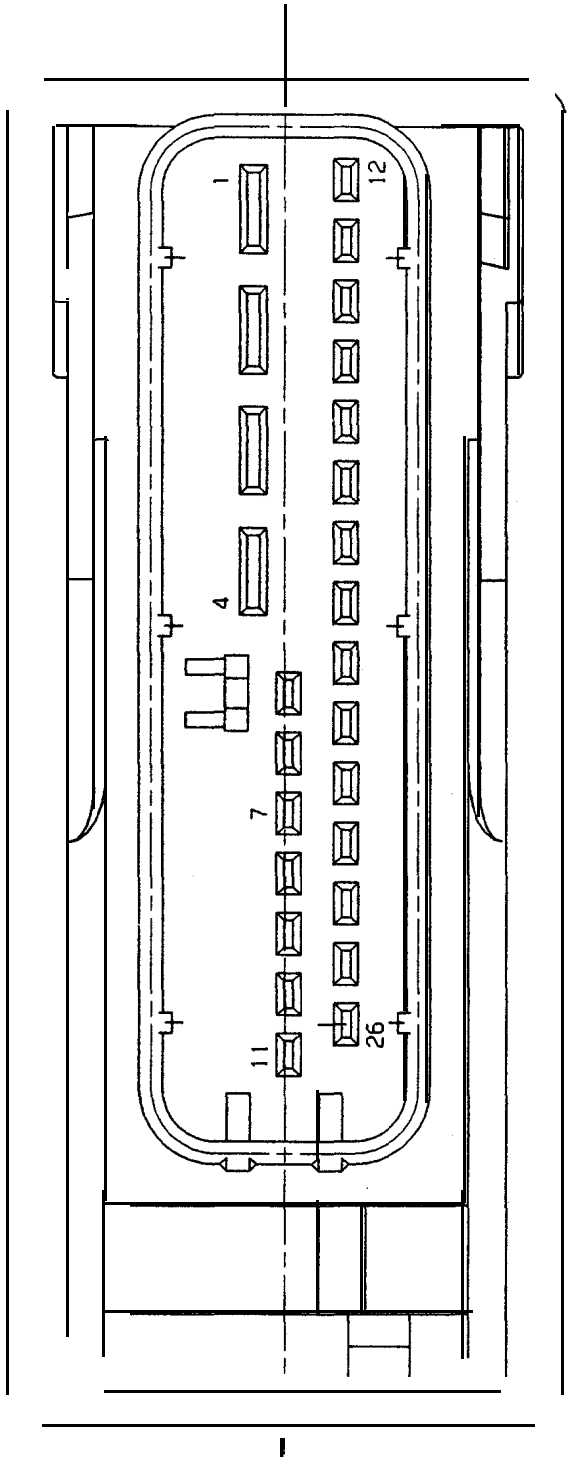
BATTERY VOLTAGE	System voltage
BRAKE LIGHT SW.	Brake light switch
FL WHEEL SPEED	Front left wheel speed
FR WHEEL SPEED	Front right wheel speed
RL WHEEL SPEED	Rear right wheel speed
RR WHEEL SPEED	Rear right wheel speed
FRONT WHL SPEEDS	Front wheel speed
REAR WHL SPEEDS	Rear wheel speed
VALVE RELAY CMD	Valve relay command
VAVLE RELAY FDBK	Valve relay feedback
RETURN PUMP CMD	Return pump command
RETURN PUMP FDBK	Return pump feedback
FL HOLD SOL. CMD	Front left solenoid hold command
FL HOLD SOL. FDBK	Front left solenoid hold feedback
FL REL. SOL. CMD	Front left solenoid release command
FL REL. SOL. FDBK	Front left solenoid release feedback
FR HOLD SOL. CMD	Front right solenoid hold command
FR HOLD SOL. FDBK	Front right solenoid hold feedback
FR REL. SOL. CMD	Front right solenoid release command
FR REL. SOL. FDBK	Front right solenoid release feedback
RL HOLD SOL. CMD	Rear left solenoid hold command
RL HOLD SOL. FDBK	Rear left solenoid hold feedback
RL REL. SOL. CMD	Rear left solenoid release command
RL REL. SOL. FDBK	Rear left solenoid release feedback
RR HOLD SOL. CMD	Rear right solenoid hold command
RR HOLD SOL. FDBK	Rear right solenoid hold feedback
RR REL. SOL. CMD	Rear right solenoid release command
RR REL. SOL. FDBK	Rear right solenoid release feedback

3. ECU Identification Number

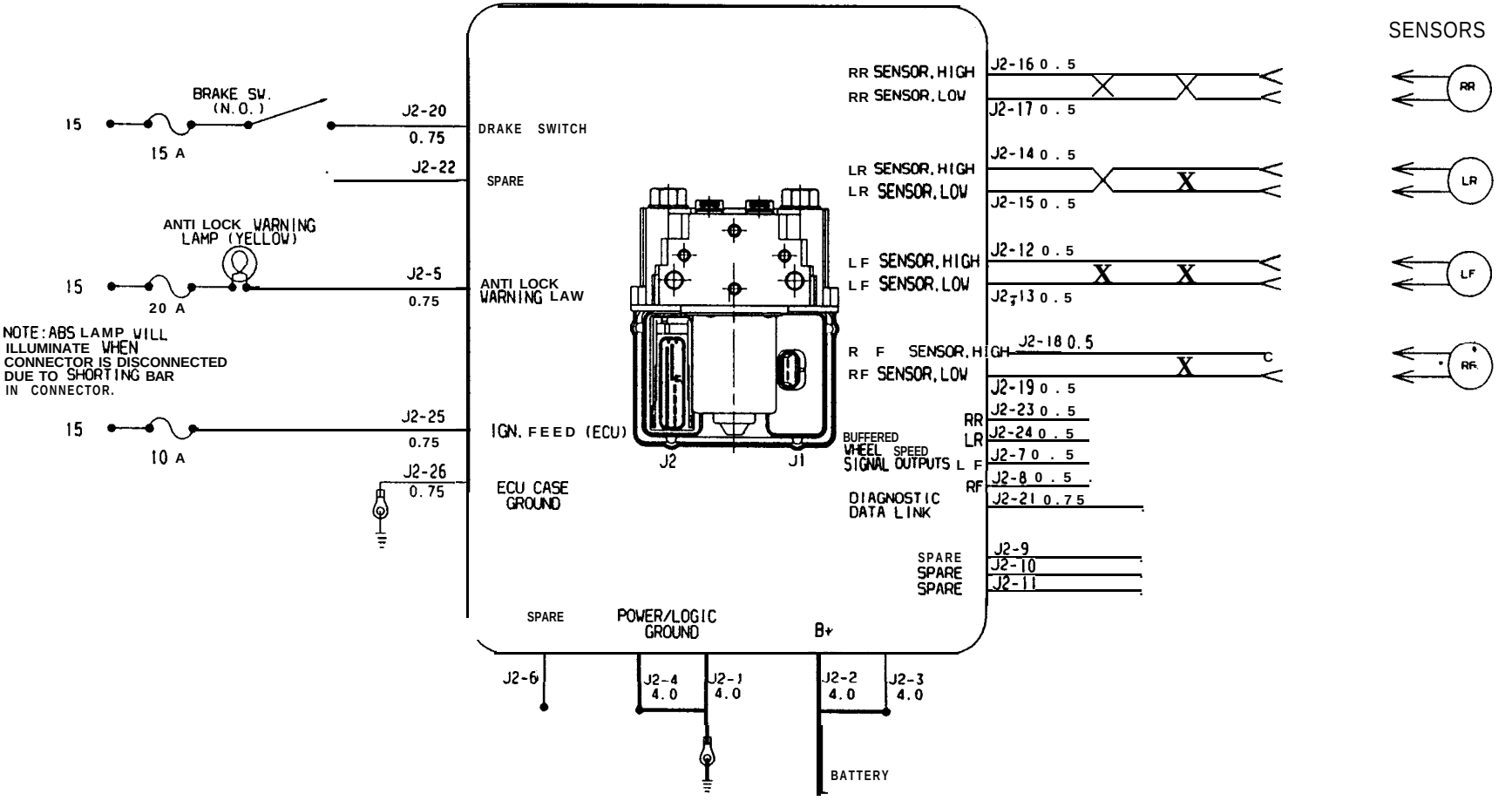
The ECU identification number for the Esprit V8 is:

97115585

4. Connector Plug Details



Pos	26pin	Description	type	cable.
1	J1-01	Vehicle Ground (Power & logic)	G	4,00
2	J1-02	Battery Plus	I	4,00
3	J1-03	Battery Plus	I	4,00
4	J1-04	Vehicle Ground (Power & logic)	G	4,00
5	J1-05	Yellow ABS Lamp LO	I	0,75
6	J1-06	not used	-	-
7	J1-07	Buffered wheel LF	O	0,75
8	J1-08	Buffered wheel RF	O	0,75
9	J1-09	not used	-	-
10	J1-10	not used	-	
11	J1-11	not used		
12	J1-12	Sensor LF HI	I	0,50
13	J1-13	Sensor LF LO	I	0,50
14	J1-14	Sensor LR HI	I	0,50
15	J1-15	Sensor LR LO	I	0,50
16	J1-16	Sensor RR HI	I	0,50
17	J1-17	Sensor RR LO	I	0,50
18	J1-18	Sensor RF HI	I	0,50
19	J1-19	Sensor RF LO	I	0,50
20	J1-20	Brake switch	I	1,00
21	J1-21	TxD / RxD	O/I	0,75
22	J1-22	not uesd	-	-
23	J1-23	Buffered wheel RR	O	0,75
24	J1-24	Buffered wheel LR	O	0,75
25	J1-25	Ignition	I	0,75
26	J1-26	Chassis Ground (CIM case ground)	G	0,75
27	J2-A	Pump Motor HI	O	4,00
28	J2-B	Pump Motor LO	G	4,00


BRAKE SW. (N.O.)
15
15 A
J2-20
0.75
DRAKE SWITCH
J2-22
SPARE
ANTI LOCK WARNING LAMP (YELLOW)
15
20 A
J2-5
0.75
ANTI LOCK WARNING LAW
NOTE: ABS LAMP WILL ILLUMINATE WHEN CONNECTOR IS DISCONNECTED DUE TO SHORTING BAR IN CONNECTOR.
15
10 A
J2-25
0.75
IGN. FEED (ECU)
J2-26
0.75
ECU CASE GROUND
J2
J1
RR SENSOR, HIGH
RR SENSOR, LOW
LR SENSOR, HIGH
LR SENSOR, LOW
LF SENSOR, HIGH
LF SENSOR, LOW
R F SENSOR, HIGH
RF SENSOR, LOW
J2-16 0.5
J2-17 0.5
J2-14 0.5
J2-15 0.5
J2-12 0.5
J2-13 0.5
J2-18 0.5
J2-19 0.5
BUFFERED WHEEL SPEED SIGNAL OUTPUTS
RR
LR
L F
RF
J2-23 0.5
J2-24 0.5
J2-7 0.5
J2-8 0.5
DIAGNOSTIC DATA LINK
J2-21 0.75
SPARE
SPARE
SPARE
J2-9
J2-10
J2-11
SPARE
POWER/LOGIC GROUND
B+
J2-6
J2-4 4.0
J2-1 4.0
J2-2 4.0
J2-3 4.0
BATTERY
SENSORS
RR
LR
LF
RF

5. Diagnosis

This section includes diagnostic procedures to be followed when checking or diagnosing faults in the ABS system, using the 'Tech 1' tool:

5.1 Fault Code Table
This table lists the fault (trouble) codes in numerical order, with their meaning, detection time before setting, and other information. May be used for quick reference.

5.2 A, Diagnostic System Check
This table guides the technician through the complete diagnostic procedure.

5.3 B-01, Connect Diagnostic Tester and Establish Communication.
Procedure for connecting the Tech 1 tool and entering ABS diagnostics.

5.4 B-02, Diagnostic Trouble Code Table
This table lists the trouble codes and the conditions required before the code will be set. Interpretation of the setting conditions will be a guide to diagnosis. The 'Remedy' column refers to a diagnostic procedure in section 'C' which contains complete procedural diagrams.

5.5 B-03, FO: Data List
This procedure should be used to work through the Data List programme on the Tech 1.

5.6 B-04, F5: Actuator Test
The procedure for working through the actuator test programme.

5.2 A, Diagnostic System Check

A, Diagnostic System Check

Test	Work Order Description	Nominal Value
TO1	Customer Complaint • Record customer complaint for later use **Uote:** Jse form: Refer to chapter 8, Attachment	
	Yes: T02 | **No: –**	
TO2	Preliminary Diagnostic Check (Visual Inspection) ◗ Verify battery condition ◗ Check all fuses ◗ Check all connections and plugs of the concerned Electronic System ◗ Check all ground connections ◗ Perform visual check of the concerned Electronic System using recorded Customer Complaint information ◗ Check the concerned system for fluid leaks ◗ After successful test/fault repair proceed to the next test step **Uote:** The battery must not be disconnected at this point of the Diagnostic System Check, as the control units of the vehicle could otherwise lose stored diagnostic information.	
	Yes: T03 | **No: –**	

A, Diagnostic System Check

Test	Work Order Description	Nominal Value
TO3	Connect Diagnostic Tester and Establish Communication • Connect diagnostic tester, select concerned Electronic System, establish communication and verify, that the correct control unit is installed Refer to table B–1 • After successful test/fault repair proceed to the next test step	
	Yes: T04	**No: –**
TO4	**F2** Diagnostic Trouble Codes • Read and record Diagnostic Trouble Codes (F2) including status **Note:** f a Diagnostic Trouble Code with status PRESENT is stored, perform troubleshooting in accordance with diagnostic rouble code table. After succesful fault repair and ignition switched off and on repeat this test step.	s a Diagnostic Trouble Code with status 'RESENT stored?
	Yes: B–2	**No: T05**

A, Diagnostic System Check		
Test	**Work Order Description**	**Nominal Value**
T05	FO Data List • Perform quick check data list (FO): Refer to table B-3 • After successful test/fault repair proceed to the next test step	
	Yes: T06	**No: –**
T06	F5 Actuator Test • Perform quick check actuator test (F5): Refer to table B-4 • After successful test/fault repair proceed to the next test step	
	Yes: T07	**No: –**
T07	Non ECU Supported System Operation • Perform checking of non ECU supported system operation: Refer to table B–5 • After successful test/fault repair proceed to the next test step	
	Yes: T08	**No: –**

A, Diagnostic System Check

Test	Work Order Description	Nominal Value
TO8	Intermittent System Operation • Evaluate Diagnostic Trouble Codes (F2) with status HISTORY or INTERMITTENT recorded in above test step: Refer to table B-2 • Clear Diagnostic Trouble Codes • Operate diagnostic tester in Snapshot Mode (set trigger to ALL TROUBLE CODES / INTERMITTENT) and the vehicle in the following conditions: Repeat the conditions under which, according to the above recorded Customer Complaint, the impaired vehicle performance occured; Move all wiring harnesses and other components effecting the concerned Electronic System back and forth; Drive the vehicle in different driving conditions (engine speed and engine load conditions); pay attention to unusual noise and other system irregularities: If a trigger event is detected by the diagnostic tester and a snapshot is stored, the data around the trigger point "0" should be evaluated/compared to the data listed in the test FO Data List (use TECH 15 for appropriate presentation of diagnsotic tester snapshot data): Refer to table B-3 If a Diagnostic Trouble Code gets stored use this information for further troubleshooting: Refer to table B-2 • After successful test/fault repair proceed to the next test step	
	Yes: T09	No: –

4, Diagnostic System Check		
Test	**Work Order Description**	**Nominal Value**
TO9	**Vehicle** End Test	
	f all above mentioned test steps have been performed and no malfunction has been detected, the concerned Electronic System is in perfect order. Nevertheless, perform the following Vehicle End Test: • Clear Diagnostic Trouble Codes • Turn ignition OFF and ON again • Drive the vehicle in different driving conditions (engine speed and engine load conditions) over a considerable distance. Pay attention to unusual noise and other system irregularities. • After test drive read again Diagnostic Trouble Codes	s a Diagnostic Trouble Code stored?
	Yes: B–2 | No: –	

5.3 B-01, Connect Diagnostic Tester and Establish Communication

B-01, Connect Diagnostic Tester and Establish Communication		
Test	**Work Order Description**	**Nominal Value**
TO1	Connect Diagnostic Tester • Before connecting the diagostic tester, observe the instructions of the diagnostic tester Operators Manual • Ignition OFF • Connect the diagnostic tester with the appropriate MSC program module and the required adapter to the diagnostic plug Refer to diagnostic tester Operators Manual • Ignition ON • Engine OFF	Diagnostic tester displays the program module entry screen in the approriate language
	Yes: T02	**No: C–1**
TO2	Select Concerned Electronic System and Establish Communication • Select Model Year: 1996 • Part Number: 97115585 • Select Electronic System or Engine: ABS 415 Anti-Lock Brake System	Communication established
	Yes: T03	**No: C–1**

IB-01, Connect Diagnostic Tester and Establish Communication

Test	Work Order Description	Nominal Value
TO3	**Verify** Installation of Correct **ECU**	
	• Compare the data of the Electronic System control unit shown on the diagnostic tester with the information presented in chapter 3.3 In addition, refer to the control unit listing of the actual TECH 15 CD or the newest Technical Information TI	Data matches
	Yes: –	**No: C–1**

5.4 B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE		
DTC	**Diagnostic Trouble Code Storage Condition**	**Remedy**
16	**FRONT LEFT SOL. VALVE CIRCUIT** • Ignition ON since 3.4 s • Valve relay is closed (brake actuated) • Voltage valve feedback is evaluated and indicates an implausible value (Valve circuit or driver output malfunction) **Effect:** • The ABS function is locked. **Concerned Terminals:**	S-12
17	**FRONT RIGHT SOL. VALVE CIRCUIT** • Ignition ON since 3.4 s • Valve relay is closed (brake actuated) • Voltage valve feedback is evaluated and indicates an implausible value (Valve circuit or driver output malfunction) **Effect:** • The ABS function is locked. **Concerned Terminals:**	z-12

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE		
DTC	**Diagnostic Trouble Code Storage Condition**	**Remedy**
19	VALVE RELAY CIRCUIT • Return pump and valve relay voltage feedback are evaluated and indicate an implausible value • The fault (circuit interruption/short circuit to ground) is recognised when the ignition is switched on with subsequent switch-on test, and also while travelling. • Above conditions must be fulfilled for at least 0.15 s **Effect:** • The ABS function is locked. **Concerned Terminals:**	c-10
25	DEFECTIVE TOOTH ON WHEEL SENSOR • The fault will be stored if the averaged speed of one wheel is at least 12 % above the speed of the other wheels for longer then 20 s. • Vehicle speed is greater than 20 km/h (12 mph) • ABS control not active • Above conditions must be fulfilled for at least 12 s **Effect:** • The ABS function is locked. **Concerned Terminals:**	c-9

B-02, F2: **DIAGNOSTIC** TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
28	**REAR LEFT SOL. VALVE CIRCUIT** • Ignition ON since 3.4 s • Valve relay is closed (brake actuated) • Voltage valve feedback is evaluated and indicates an implausible value (Valve circuit or driver output malfunction) **Effect:** • The ABS function is locked. **Concerned Terminals:**	c-12
29	**REAR RIGHT SOL. VALVE CIRCUIT** • Ignition ON since 3.4 s • Valve relay is closed (brake actuated) • Voltage valve feedback is evaluated and indicates an implausible value (Valve circuit or driver output malfunction) **Effect:** • The ABS function is locked. **Concerned Terminals:** -	C-12

3-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
32	**DROPOUTS IN SENSOR CIRCUITS** • ABS control active • ABS system is in pressure release mode • Wheel speed signal is monitored for implausible acceleration • Above conditions must be fulfilled for at least 9 s **Effect:** • The ABS function is locked. **Note:** The trouble code may also be recognised if the brake is mechanically defective. **Concerned Terminals:** –	c-9

B-02, **F2:** DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
35	**RETURN PUMP RELAY CIRCUIT** • Return pump and valve relay voltage feedback are evaluated and indicate an implausible value • The fault (circuit interruption/short circuit to ground) is recognised when the ignition is switched on with subsequent switch-on test, and also while travelling. (Short circuit to ground or circuit interruption) or (Return pump motor locked) **Effect:** • The ABS function is locked. **Concerned Terminals:**	c-11

IB-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
37	**BRAKE SWITCH CIRCUIT** • Vehicle speed is greater than 24 km/h (15 mph) • Brake switch (stop light) indicates continuously brake application since ignition ON • Above conditions must be fulfilled for at least 10 s or • ABS activation on all four wheels without brake switch indication • Above condition must be fulfilled for at least 1 s **Concerned Terminals:** 20. 1	C–4

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
39	FL WHEEL SENSOR BAD SIGNAL	c-5

- Incorrect signal from speed sensor
- Vehicle speed is greater than 4 km/h (2 mph)
- Above conditions must be fulfilled for at least 3 s

Effect:

- The ABS function is locked.

or

- Wheel speed signal is monitored for implausible acceleration
- Above condition must be fulfilled for at least 20 times

Effect:

- ABS is partially locked if only one sensor is concerned.

Concerned Terminals:
12, 13

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE		
DTC	**Diagnostic Trouble Code Storage Condition**	**Remedy**
41	**FL WHEEL SENSOR CIRCUIT** • Sensor is checked for open or short circuit to ground • Above condition must be fulfilled for at least 0.65 s **Effect:** • The ABS function is locked. **Note:** ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 12, 13	C–5

IB-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code-Storage Condition	Remedy
42	FR WHEEL SENSOR BAD SIGNAL	C-6
	• Incorrect signal from speed sensor • Vehicle speed is greater than 4 km/h (2 mph) • Above conditions must be fulfilled for at least 3 s **Effect:** • The ABS function is locked. or • Wheel speed signal is monitored for implausible acceleration • Above condition must be fulfilled for at least 20 times **Effect:** • ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 18, 19	

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
43	FR WHEEL SENSOR CIRCUIT • Sensor is checked for open or short circuit to ground • Above condition must be fulfilled for at least 0.65 s **Effect:** • The ABS function is locked. **Note:** ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 18, 19	C-6

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
44	XL WHEEL SENSOR BAD SIGNAL	C–7
	• Incorrect signal from speed sensor • Vehicle speed is greater than 4 km/h (2 mph) • Above conditions must be fulfilled for at least 3 s **Effect:** • The ABS function is locked. or • Wheel speed signal is monitored for implausible acceleration • Above condition must be fulfilled for at least 20 times **Effect:** • ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 14, 15	

IB-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
45	RL WHEEL SENSOR CIRCUIT • Sensor is checked for open or short circuit to ground • Above condition must be fulfilled for at least 0.65 s **Effect:** • The ABS function is locked. **Note:** ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 14, 15	c-7

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code, Storage Condition	Remedy
46	**RR WHEEL SENSOR BAD SIGNAL** • Incorrect signal from speed sensor • Vehicle speed is greater than 4 km/h (2 mph) • Above conditions must be fulfilled for at least 3 s **Effect:** • The ABS function is locked. or • Wheel speed signal is monitored for implausible acceleration • Above condition must be fulfilled for at least 20 times **Effect:** • ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 16, 17	C-8

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE

DTC	Diagnostic Trouble Code Storage Condition	Remedy
47	**RR WHEEL SENSOR CIRCUIT** • Sensor is checked for open or short circuit to ground • Above condition must be fulfilled for at least 0.65 s **Effect:** • The ABS function is locked. **Note:** ABS is partially locked if only one sensor is concerned. **Concerned Terminals:** 16, 17	C-8
48	**BATTERY VOLTAGE LOW** • The voltage at the control unit input (terminal 25) is less than 9.5 V • Vehicle speed is greater than 6 km/h (4 mph) **Effect:** • The ABS function is locked. **Concerned Terminals:** 25, 1	c-3

B-02, **F2:** DIAGNOSTIC TROUBLE CODE TABLE		
DTC	**Diagnostic Trouble Code-Storage Condition**	**Remedy**
49	**BATTERY VOLTAGE HIGH** • The voltage at the control unit input (terminal 25) is greater than 17 V **Effect:** • The ABS function is locked. **Concerned Terminals:** 25, 1	c-3
52	**CHECK LIGHT CIRCUIT** • Short to ground or interruption in circuit to control unit terminal 5 • Above condition must be fulfilled for at least 0.05 s **Effect:** • The ABS function is locked. **Concerned Terminals:** 5	c-13

B-02, F2: DIAGNOSTIC TROUBLE CODE TABLE		
DTC	**Diagnostic Trouble Code Storage Condition**	**Remedy**
55	**REPLACE ECU** • Control unit hardware failure (checksum fault, RAM defective) • The fault is stored directly on recognition. **Effect:** • The ABS function is locked. **Concerned Terminals:**	C-2
65	**VARIANT-CODING NOT PROGRAMMED** • Trouble code 65 is only present before the control unit is programmed (delivery state). It does not indicate the presence of a fault, but ensures that the system telltale remains activated after the control unit is installed in a vehicle for the first time, and until the control unit has been programmed correctly. **Effect:** • The ABS function is locked. **Concerned Terminals:**	C-2

B-03, FO: DATA LIST			
Test	**Work Order Description**		**Nominal Value**
T01	Tester Display **BATTERY VOLTAGE**		
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** 15,1		11 ... 13 V
	Yes: T02	**No: C-03**	
T02	Tester Display **BRAKE LIGHT SW.**		
	• Ignition ON • Engine OFF • All consumers turned off • Brake pedal actuated **Concerned Terminals:** 20,1		**INACTIVE** 0 V ACTIVE 12 V
	Yes: T03	**No: C-04**	

B–03, FO: DATA LIST

Test	Work Order Description	Nominal Value
TO3	Tester Display FL WHEEL SPEED	
	• Ignition ON • Engine OFF • Vehicle jacked-up and corresponding wheel slowly turned by hand	greater than 1 km/h greater than 1 mph
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph))	30 km/h 19 mph
	Concerned Terminals: 12, 13	
	Yes: T04 / **No: C–05**	
TO4	Tester Display FR WHEEL SPEED	
	• ignition ON • Engine OFF • Vehicle jacked-up and corresponding wheel slowly turned by hand	greater than 1 km/h greater than 1 mph
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph))	30 km/h 19 mph
	Concerned Terminals: 18, 19	
	Yes; T05 / **No: C–06**	

B-03, FO: DATA LIST

Test	Work Order Description" ·	Nominal Value
TO5	Tester Display RL WHEEL SPEED	
	• Ignition ON • Engine OFF • Vehicle jacked-up and corresponding wheel slowly turned by hand	greater than 1 km/h greater than 1 mph
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph))	30 km/h 19 mph
	Concerned Terminals: 14, 15	
	Yes: T06 / **No: C–07**	
TO6	Tester Display RR WHEEL SPEED	
	• Ignition ON • Engine OFF • Vehicle jacked-up and corresponding wheel slowly turned by hand	greater than 1 km/h greater than 1 mph
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph))	30 km/h 19 mph
	Concerned Terminals: 16, 17	
	Yes: T07 / **No: C–08**	

E-03, FO: DATA LIST

Test	Work Order Description	Nominal Value
TO7	Tester Display **FRONT WHL SPEEDS**	
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph)) **Concerned Terminals:**	30 km/h 19 mph
	Yes: T08 / **No: C-09**	
TO8	Tester Display **REAR WHL SPEEDS**	
	• Vehicle travelling (constant speed, approximately 30 km/h (19 mph)) **Concerned Terminals:** –	30 km/h 19 mph
	Yes: T09 / **No: C-09**	
T09	Tester Display **VALVE RELAY CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** –	INACTIVE
	Yes: T10 / **No: C-10**	

IB-03, FO: DATA LIST

Test	Work Order Description	Nominal Value
T10	Tester Display VALVE RELAY FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: T11 / **No: C–10**	
T11	Tester Display RETURN PUMP CMD	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE 12 V
	Yes: T12 / **No: C–11**	

IB-03, FO: DATA LIST

Test	Work Order Description	Nominal Value
T12	Tester Display RETURN PUMP FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	CNACTIVE **12 v**
	Yes: T13 / **No: C–11**	
T13	Tester Display FL HOLD SOL. CMD	
	• ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: T14 / **No: C–12**	
T14	Tester Display FL HOLD SOL.FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: T15 / **No: C–12**	

IB-03, FO: DATA LIST

Test	Work Order Description .	Nominal Value
T15	Tester Display **FL REL. SOL. CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	**INACTIVE**
	Yes: T16 / **No: C–12**	
T16	Tester Display **FL REL. SOL.FDBK**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	**INACTIVE**
	Yes: T17 / **No: C–12**	
T17	Tester Display **FR HOLD SOL. CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** -	**CNACTIVE**
	Yes: T18 / **No: C–12**	

B-03, FO: DATA **LIST**

Test	Work Order Description	Nominal Value
T18	Tester Display FR HOLD SOL.FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	CNACTIVE
	Yes: T19 / **No: C-12**	
T19	Tester Display FR REL. SOL. CMD	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	CNACTIVE
	Yes: T20 / **No: C-12**	
T20	Tester Display FR REL. SOL.FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	CNACTIVE
	Yes: T21 / **No: C-12**	

B-03, FO: DATA **LIST**

Test	Work Order Description'	Nominal Value
T21	Tester Display **RL HOLD SOL. CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** –	INACTIVE
	Yes: T22 / **No: C–12**	
T22	Tester Display **RL HOLD SOL.FDBK**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** –	INACTIVE
	Yes: T23 / **No: C–12**	
T23	Tester Display **RL REL. SOL. CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: T24 / **No: C–12**	

IB-03, FO: DATA LIST

Test	Work Order Description	Nominal Value
T24	Tester Display RR REL. SOL.FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	:NACTIVE
	Yes: T25 / **No: C–12**	
T25	Tester Display RR HOLD SOL. CMD	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: T26 / **No: C–12**	
T26	Tester Display RR HOLD SOL.FDBK	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	:NACTIVE
	Yes: T27 / **No: C–12**	

IB-03, FO: DATA LIST

Test	Work Order Description	Nominal Value
T27	Tester Display RR **REL. SOL. CMD**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:** -	INACTIVE
	Yes: T28 / **No: C–12**	
T28	Tester Display RR **REL. SOL.FDBK**	
	• Ignition ON • Engine OFF • All consumers turned off **Concerned Terminals:**	INACTIVE
	Yes: – / **No: C–12**	

5.6 B-04, F5: ACTUATOR TEST

IB-04, **F5:** ACTUATOR TEST

Test	Work Order Description	Nominal Value
T01	Tester Display VALVE **RELAY**	
	• Ignition ON • Engine OFF • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display. **Note:** The actuator is actuated at a frequency of 1 Hz. The test is completed after a maximum of 30 s. **Concerned Terminals:** –	Diagnostic tester displays alternately: INACTIVE ACTIVE Noise check: Clicking noise from the actuator
	Yes: T02	**No: C–10**

IB-04, **F5:** ACTUATOR TEST 1

Test	Nork Order Description .	Nominal Value
TO2	Tester Display RET.PUMP **RELAY**	
	• Ignition ON • Engine OFF • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display. **Uote:** After the relay is energised the return pump must operate for approximately 5 s. **Concerned Terminals:**	Noise check: Clicking noise from the relay **JALVE RELAY CMD** ACTIVE **JALVE RELAY FDBK** ACTIVE
	Yes: T03	**No: C–11**

IB-04, **F5:** ACTUATOR TEST

lest	Work Order Description	Nominal Value
TO3	Tester Display ?L SOL. VALVE	
	• Secure vehicle so that it cannot roll off. • Vehicle jacked-up so that the wheels can turn freely • Parking brake released • Selector lever in position N • Ignition ON • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display. **Uote:** During the last check in this Actuator Test (PRESSURE RELEASE function) – after the check of the return pump – a display inquires whether the wheel being checked can be turned. Compared to previous requests in the Actuator Test, the wheel can only be turned at this point with more force than in previous checks, However, the wheel should in no case lock. **Concerned Terminals:** -	Test okay?
	Yes: T04	**No: C–12**

IB-04, **F5:** ACTUATOR TEST 1

Test	Work Order Description.	Nominal Value
T04	Tester Display FR SOL. VALVE	
	• Secure vehicle so that it cannot roll off. • Vehicle jacked-up so that the wheels can turn freely • Parking brake released • Selector lever in position N • Ignition ON • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display. **Note:** During the last check in this Actuator Test (PRESSURE RELEASE function) – after the check of the return pump – a display inquires whether the wheel being checked can be turned. Compared to previous requests in the Actuator Test, the wheel can only be turned at this point with more force than in previous checks. However, the wheel should in no case lock. **Concerned Terminals:**	rest okay?
	Yes: T05	**No: C–12**

IB-04, **F5:** ACTUATOR TEST

Iest	Work Order Description	Nominal Value
TO5	Tester Display RL **SOL. VALVE**	
	• Secure vehicle so that it cannot roll off. • Vehicle jacked-up so that the wheels can turn freely • Parking brake released • Selector lever in position N • Ignition ON • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display. **INote:** During the last check in this Actuator Test (PRESSURE RELEASE function) – after the check of the return pump – a display inquires whether the wheel being checked can be turned. Compared to previous requests in the Actuator Test, the wheel can only be turned at this point with more force than in previous checks. However, the wheel should in no case lock. **Concerned Terminals:** -	'Test okay?
	Yes: T06	**No: C–12**

3–04, F5: ACTUATOR TEST

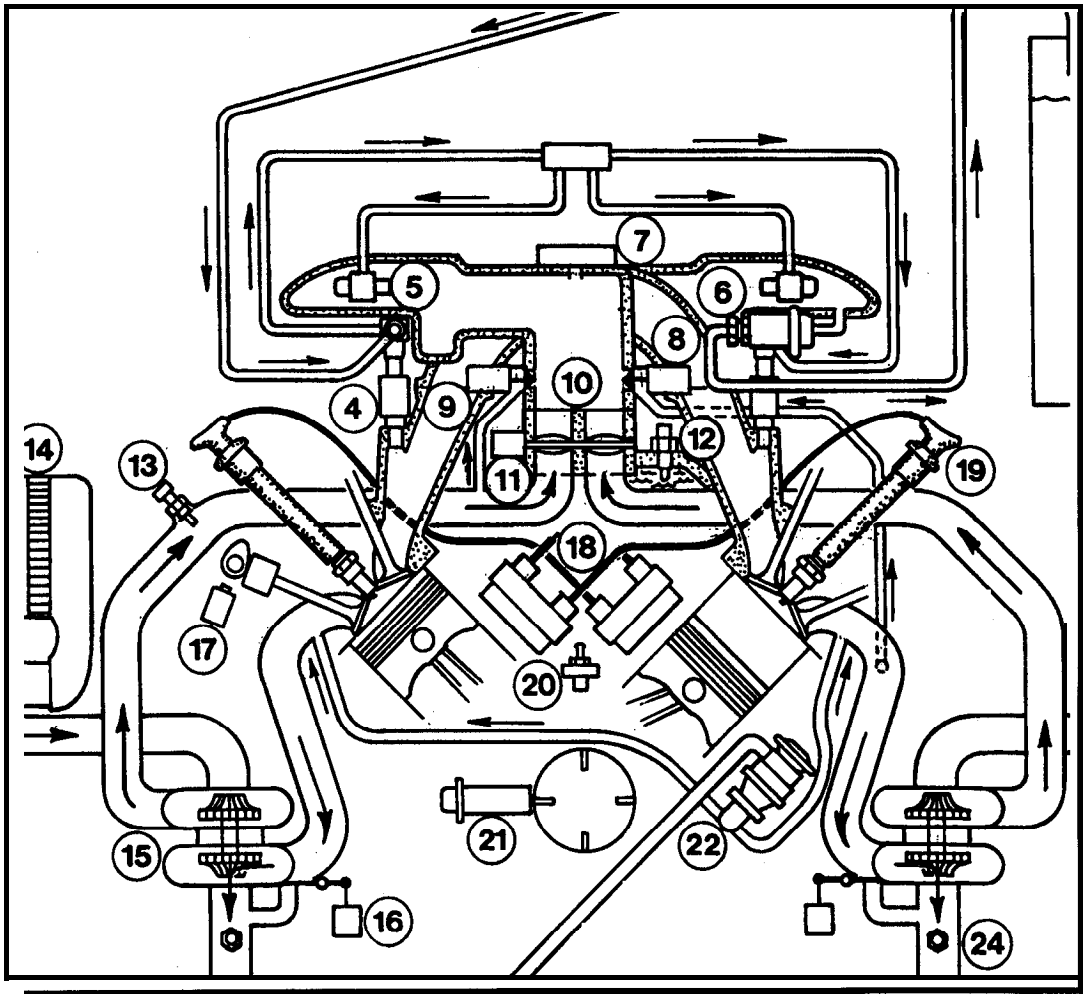
Test	Work Order Description .	Nominal Value
TO6	Tester Display **RR SOL. VALVE**	
	• Secure vehicle so that it cannot roll off. • Vehicle jacked-up so that the wheels can turn freely • Parking brake released • Selector lever in position N • Ignition ON • Press corresponding key in the system main menu to call up Actuator Test functions, select the desired test and confirm with YES. Follow the instructions in the diagnostic tester display.	
	Note: During the last check in this Actuator Test (PRESSURE RE-LEASE function) – after the check of the return pump – a display inquires whether the wheel being checked can be turned. Compared to previous requests in the Actuator Test, the wheel can only be turned at this point with more force than in previous checks. However, the wheel should in no case lock.	Test okay?
	Concerned Terminals: -	
	Yes: – **No: C–12**	

SERVICE NOTES

Section EMM

Esprit V8

Engine Management & Fuel Injection



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Part Number L082T0327J

Publication Part Number L082T0327J

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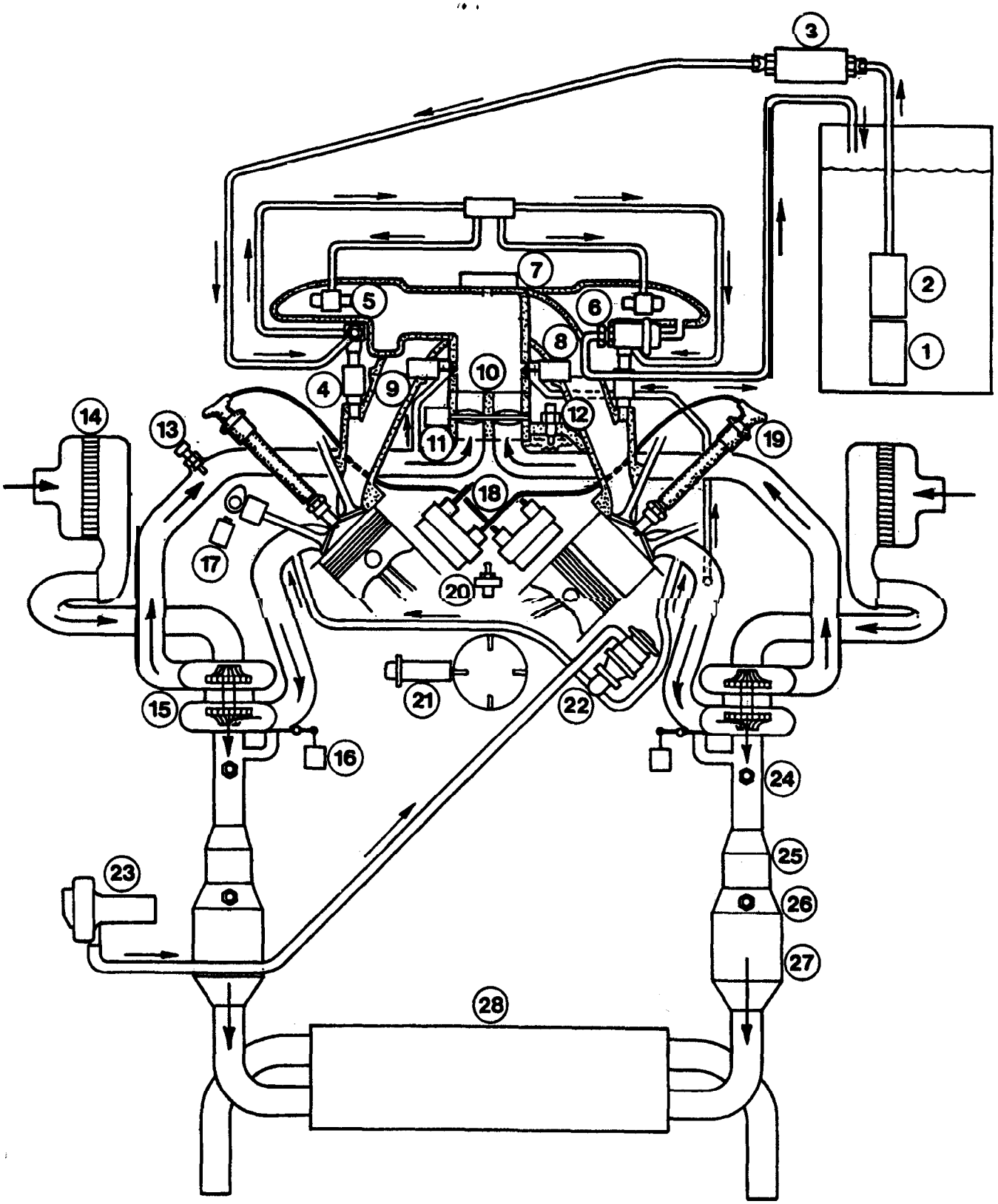
ENGINE MANAGEMENT & FUEL INJECTION

SECTION EMM - ESPRIT V8

SECTION EMM.I - INTRODUCTION

Schematic ***Diagram***



EMM.I ▪ A EMM SECTIONS EXPLAINED

Introduction ▪ EMM.I

This section starts with a general description of the fuel injection and engine management system to provide an overview of the system and its components. The operation of the malfunction indicator lamp is explained, together with the concept of the fault codes. The 'Tech 1' scanner tool is introduced, and its operation explained, together with other special tools required to service and diagnose the system.

Description of Operation ▪ EMM.2

This section explains the function of each individual component and where it is fitted, in order that the operation of the system may be thoroughly understood.

Individual Component Diagnosis & Replacement ▪ EMM.3

This section contains the circuit diagrams, fault finding charts and test procedures necessary to diagnose faults in each component. Replacement procedures and torque figures are also included.

Fault Diagnosis ▪ EMM.4

Individual component diagnosis and replacement procedures.

EMM.I ▪ B GENERAL DESCRIPTION

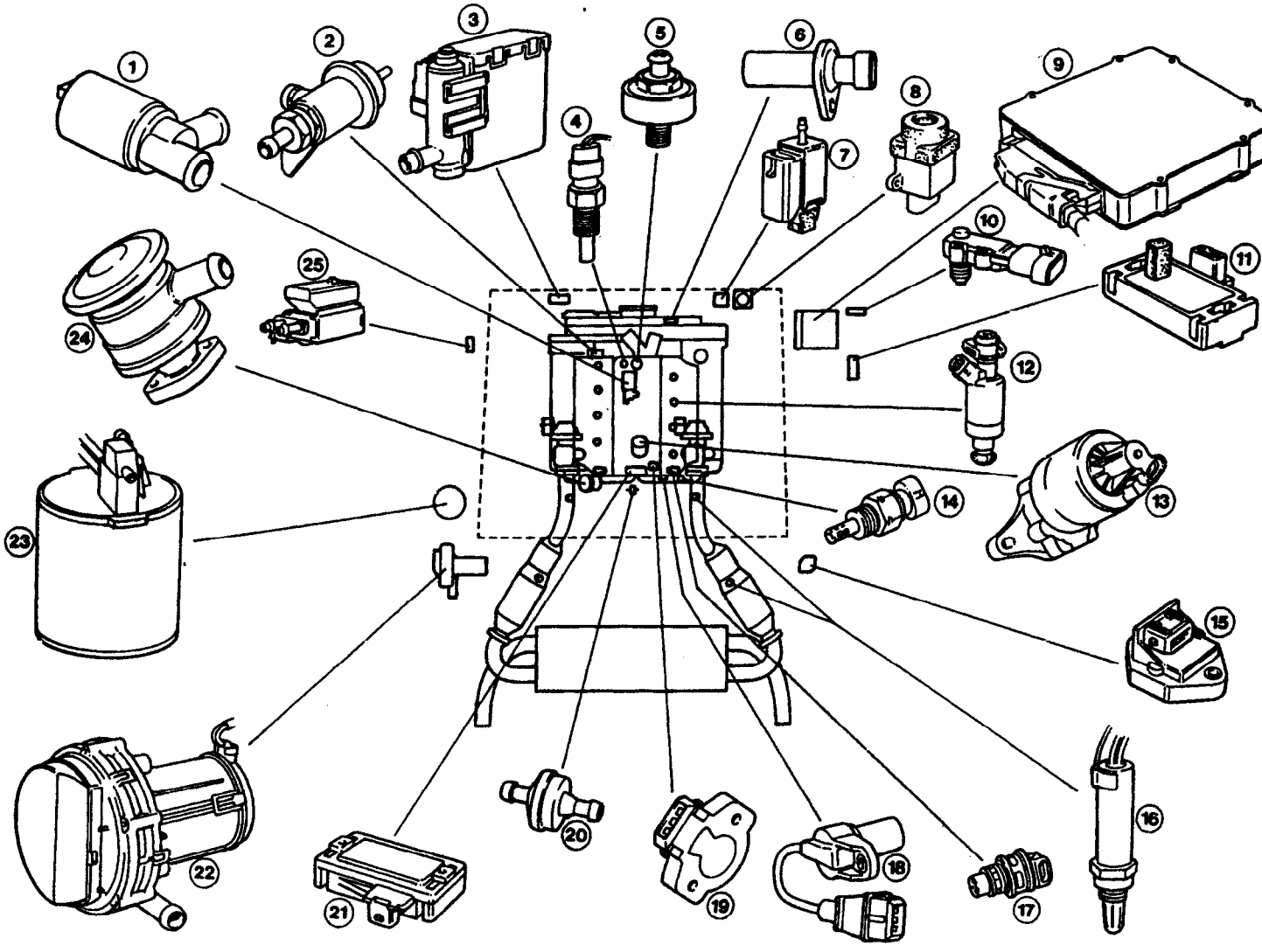
The engine management system used on the Lotus Esprit V8 is a Lotus designed fully electronic microprocessor based system controlling the fuel injection, ignition and emission control systems. Individual fuel injectors are used in the inlet tracts of all eight cylinders, and are operated sequentially for optimum efficiency, with a further pair of 'secondary' injectors mounted in the intake plenum to supply extra fuel only under conditions of maximum demand. The injectors are supplied with fuel at constant pressure (relative to inlet manifold pressure) from a common fuel rail, with the quantity of fuel delivered to the engine being controlled by the length of time (pulse width) for which the solenoid operated injectors are opened. The eight port injectors are normally pulsed once during each cylinder's complete cycle (sequential injection), with the main fuel delivery into the inlet port timed to occur just after the inlet valve closes, in order to cool the valve, and ensure full atdmisation of the fuel/air mixture. A second, shorter period of injection at the non-firing TDC, is used to top up the fuelling requirement wtien necessary.

The injectors are controlled by a processor called an Electronic Control Module (ECM) which calculates the amount of fuel required by the engine under the operating conditions at any particular time. Information is fed into the ECM by a series of sensors measuring air and coolant temperature, barometric and intake plenum gas pressure, engine and vehicle speed, throttle position and any detected combustion knock. This data is used by the ECM to calculate the quantity of fuel required, the ignition timing, allowable turbocharger boost pressure and idle speed. Various systems are used to minimise noxious combustion and evaporative emissions. Catalytic converters are used in the exhaust system for each cylinder bank, with oxygen feedback to

Key to Schematic Diagram

1. Primary fuel pump.
2. Secondary fuel pump.
3. Fuel filter.
4. Port fuel injector (x 8).
5. Plenum (secondary) fuel injector (x 2).
6. Fuel Pressure Regulator Valve (PRV).
7. Manifold Absolute Pressure (MAP) sensor.
8. Exhaust Gas Recirculation (EGR) valve.
9. Idle Air Control (IAC) valve.
10. Throttle body.
11. Throttle Position (TP) sensor.
12. Coolant Temperature Sensor (TPS).
13. Intake Air Temperature (IAT) sensor,
14. Air cleaner (x 2).
15. Turbocharger (x 2).
16. Wastegate capsule (x 2).
17. Camshaft sensor.
18. Ignition high tension coilpacks (x 2).
19. H.T. lead/plug cap/spark plug (x 8).
20. Knock sensor.
21. Crankshaft sensor.
22. Air injection (AIR) control valve.
23. Air pump.
24. Pre cat. oxygen (O_2) sensor (x 2).
25. Starter catalytic converter.
26. Post cat. oxygen (O_2) sensor (x 2).
27. Main catalytic converter (x 2).
28. Exhaust muffler.

Component *Location & Identification Diaaram*



Key to Component Location & Identification Diaaram

1. Idle Air Control (IAC) valve.
2. Fuel Pressure Regulator Valve (PRV).
3. Charcoal canister vent close valve.
4. Coolant Temperature Sensor (CTS).
5. Knock sensor.
6. Crankshaft sensor.
7. Wastegate solenoid valve.
8. Inertia switch.
9. Electronic Control Module (ECM).
10. Fuel tank pressure sensor.
11. Barometric (BARO) sensor.
12. Port fuel injector.
13. Exhaust Gas Recirculation (EGR) valve.
14. Intake Air Temperature **(IAT)** sensor.
15. Rough road sensor.
16. Oxygen **(O_2)** sensor.
17. Plenum (secondary) injectors.
18. Camshaft sensor.
19. Throttle Position (TP) sensor.
20. Non-return valve (breather).
21. Manifold Absolute Pressure (MAP) sensor.
22. Air pump.
23. Charcoal canister.
24. Air injection (AIR) control valve.
25. Air injection (AIR) solenoid valve.

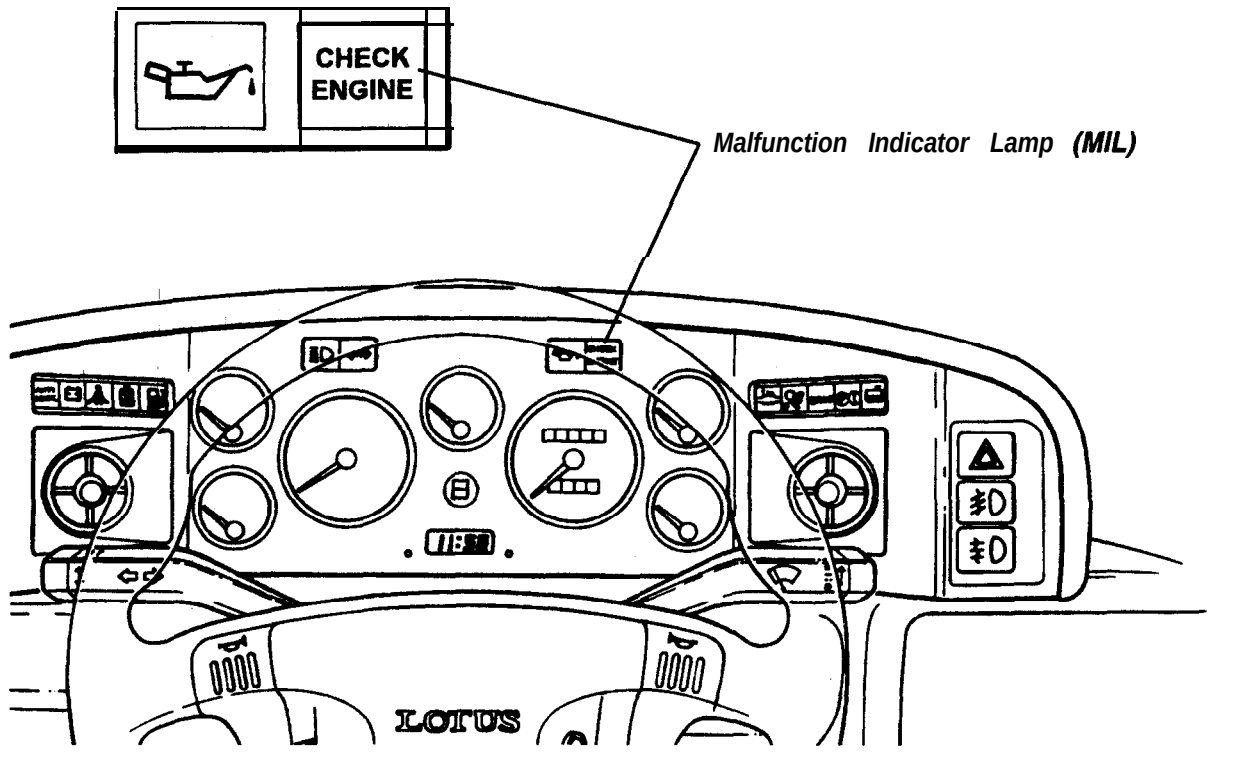
control the air fuel ratio to that required to ensure optimum catalyst efficiency. Exhaust gas recirculation (EGR) is used to reduce the emission of oxides of nitrogen. Evaporative emissions from the fuel tank are fed into a charcoal canister, and, under the control of the ECM, into the engine. The ECM also controls the switching of the radiator cooling fans and air conditioning, and provides a diagnostic function for the complete system.

The ECM monitors the signals received from the various sensors and compares them with pre-programmed tolerance bands to enable it to recognise 'faults' in the system and light a 'malfunction indicator lamp' (MIL), labelled 'Check Engine', on the instrument panel. This informs the driver that a fault has been detected and furthermore stores in its memory a 'trouble code' for the particular type of fault detected, which can then by accessed by a technician who will be guided to the problem area. A hand held electronic scanner tool ('Tech 1') with an LED display panel may be plugged into a special harness connector, and is able to communicate with the ECM and display trouble codes and sensor readings to facilitate speedy fault diagnosis.

The ignition system dispenses with the need for a distributor by using four 'double ended' H.T. coils mounted within the engine vee. The ECM uses signals received from an engine speed sensor reading from the crankshaft front pulley, and an engine position sensor reading from the rear end of the RH inlet camshaft, and fires the spark plugs in pairs once every crankshaft revolution, on the 'wasted spark' principle. The ECM controls ignition timing based on data including inlet air temperature and pressure, engine speed and throttle opening, and any detected detonation 'knock'.

EMM.I - C MALFUNCTION INDICATOR LAMP (MIL)

A 'malfunction indicator' lamp (MIL) with the legend Check Engine' is provided in the instrument panel in order to indicate to the driver that an engine management problem has occurred and that the vehicle should be taken for check/repair as soon as is practicable.



w57/oh35

As a bulb and system check, the lamp will light with the ignition on, and should go out when the engine is started. If, however, the lamp remains on, or comes on whilst driving, this indicates that the self diagnostic system has detected a problem and a trouble code has been stored in the memory. If the fault cures itself, or

is no longer detected, the lamp will go out after three engine start ups with no fault present. The trouble code will be stored in the ECM memory for the next 40 engine warm up cycles, to indicate to a technician that an intermittent fault has been detected. If no further fault or recurrence is detected during this period, the fault will be erased from the memory.

In the case of a fault which causes a sufficiently severe engine misfire that damage to a catalytic converter may be caused, the MIL will be flashed to indicate to the driver that the fault should be repaired with the utmost urgency.

Trouble Codes

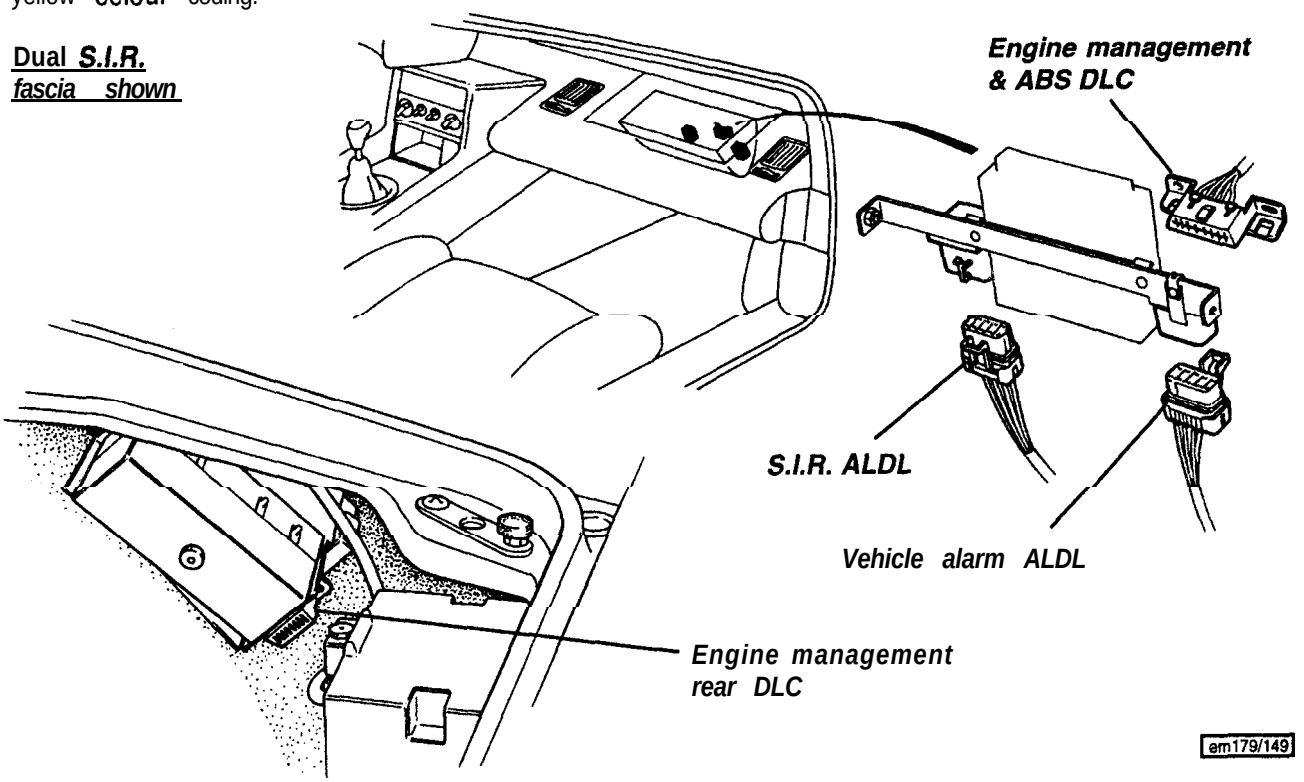
The trouble codes are listed in section EMM.4, and are followed by diagnostic procedures. Each trouble code indicates the ***circuit*** in which a problem has been detected, including the wiring, connectors, sensor and ECM. In order to read any trouble codes stored in the memory, it is necessary to use the Assembly Line Diagnostic Link (ALDL) connector.

EMM.I - D DATA LINK CONNECTOR (DLC)

To provide for communication with the electronic control modules (ECMs) used for various systems on the Esprit, special harness connector sockets, known as Data Link Connectors (DLCs), or Assembly Line Diagnostic Links (ALDLs) are fitted. These connectors are used at the end of the factory production line in order to verify system operation, and in service, to connect electronic diagnostic equipment such as the Lotus specified 'Tech 1' hand held scanner or any other OBD 2 service scanner tool. The data available and the location of these connectors is as follows:

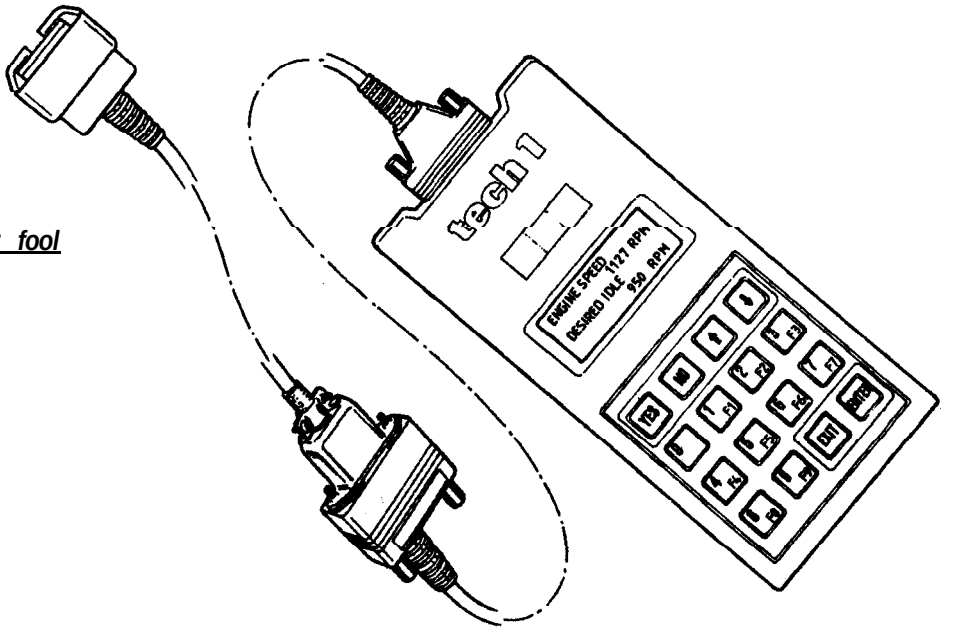
- Engine management and Anti-lock Brake System (ABS); Engine management; — Passenger footwell. Relay station, RH wheelarch, rear luggage compartment.
- Supplementary Inflatable Restraint (SIR) system; — Inboard end of passenger side under-fascia.
- Vehicle alarm system; — Outboard end of pass. side under-fascia.

Note that the engine management/ABS DLCs are 16 terminal connectors complying with SAE J 1962, whereas the SIR and alarm system ALDLs are 10 terminal connectors. All SIR harnesses are identified with yellow colour coding.



EMM.I • E 'TECH 1' SCANNER TOOL

The 'Tech 1' is a hand held electronic scanner tool with an LCD display panel which, by plugging into the Data Link Connector (DLC), is able to display any stored trouble codes and allow a quick check of sensors and switches which are inputs to the ECM. Any pair of sensor inputs may be displayed simultaneously either in the workshop, or if necessary whilst driving on the road.



em152

Tech 1 scanner fool
T000T0896/2

The 'Tech 1' is the Lotus defined scanner tool to aid fault diagnosis when used with the procedures defined in section EMM.4. This method will identify in which circuit a problerh is located, and in some cases the 'Tech 1' tool can provide information that is not available using any other non-digital system. Some of the operating modes are as follows:

Current Data • Data List

Readouts from sensors and relays are available:

Coolant Temp (°C); Displays coolant temperature as sensed by the coolant temperature sensor in the cylinder block coolant outlet jacket. Should be close to ambient when engine oompletely cold, and rise after engine start up to around 85 • 95°C normal running temperature. Should correlate with water temperature gauge.

Intake Air Temp (°C); Displays the temperature of engine intake air as sensed by the IAT sensor in the RH charge air duct. Should read close to ambient when engine competely cold, and rise after engine start up as engine bay temperature and boost pressure increases.

Engine Speed (RPM); Displays engine rpm as computed from the output of the front cover mounted crank-shaft sensor. Should correlate with tachometer.

Short FT B1 (%); Short term fuel trim for cylinder bank 1 (right hand). Primarily dependent on RH bank oxygen sensor readings. Normal reading is 0%, but will vary (up to +20%, -30%) with operating conditions. If a consistent deviation is required for longer than a specified period, the long term fuel trim will be amended to allow the short term trim to return to 0%.

Long FT B1 (%); Long term fuel trim for cylinder bank 1 (right hand). Normal reading is 0% but will vary with engine condition.

Short FT 82 ***(%);*** Short term fuel trim for cylinder bank 2 (LH). See 'Short FT B1'.

Long FT 82 ***(%);*** Long term fuel trim for cylinderbank 2 (LH). See 'Long FT B1'.

Ignition Advance (°); Displays ignition advance' in degrees before top dead centre.

MAP (kPaA); Displays manifold air pressure in kPa absolute, as detected by the MAP sensor at the top rear of the intake plenum. Absolute pressure is measured relative to absolute zero rather than to the atmospheric pressure that gauge pressures relate.

Throttle Pos (%); Displays throttle position as a percentage as determined by the TP sensor on the end of the

throttle spindle. Wide open throttle = 100%.
Calculated Load (%); Approximate percentage of full load being applied. **>80%** relates to full throttle at 6,500 rpm.
O2S BANK1 SEN1 (volts); Oxygen sensor, bank I, sensor 1. Voltage from the RH bank pre-cat 02 sensor. Readings consistently below 0.350 indicate a lean mixture (high oxygen content), and above 0.550 a rich mixture (low oxygen content).
O2FT BANK7 SEN1 (%); Oxygen sensor fuel trim, bank 1, sensor 1. Fuel trim required to correct air/fuel ratio. Should read same as 'Short FT B1'.
O2S BANK7 SEN2 (volts); Oxygen sensor, bank 1, sensor 2. Voltage from the RH bank post-cat ***02*** sensor.
O2S BANK2 SEN1 (volts); Oxygen sensor, bank 2, sensor 1. Voltage from the LH bank pre-cat 02 sensor. See above.
O2FT BANK2 SEN1 (%); Oxygen sensor fuel trim, bank 1, sensor 1. Fuel trim required to correct air/fuel ratio. Should read same as 'Short FT B2'.
O2S BANK2 SEN2 (volts); Oxygen sensor, bank 2, sensor 2. Voltage from the LH bank post-cat 02 sensor. See above.
Fuel System B1 (Op. Loop/C/. Loop); Indicates whether the RH cylinder bank is running open or closed loop (02 sensor feedback control).
Fuel System B2 (Op. Loop/Cl. Loop); Indicates whether the LH cylinder bank is running open or closed loop (02 sensor feedback control).
Vehicle ***Speed (km/h)***; Indicates vehicle speed in km/h as sensed by the ABS system. Should correlate with speedometer.
Air Status (Upstream); Indicates that air injection takes place upstream of catalyst.
M/L Status, (On/Off); Indicates whether the 'Check Engine' tell tale is being commanded on.
Number of Codes; Indicates number of DTCs currently set.
OBD Support; Indicates level of On Board Diagnostics supported.
Wastegate DC (%); Indicates the wastegate duty cycle as a percentage. 100% represents full time energisation of the wastegate solenoid valve for maximum boost.
Purge DC (%); Indicates the charcoal canister purge solenoid duty cycle as a percentage. 100% represents full purging.
EGR DC (%); Exhaust Gas Recirculation duty cycle. 100% represents full exhaust gas flow.
IDLE DC (%); Duty cycle of the Idle Air Control valve. 100% represents valve maximum opening for highest attainable throttle plate by-pass.
PW - RH BANK (mSec); Indicates the injector pulse width for the RH cylinder bank in milliseconds.
PW - LH BANK (mSec); Indicates the injector pulse width for the LH cylinder bank in milliseconds.
Rough Road Sens (volts); Output from rough road sensor in volts.
Knock Sensor (volts); Output from knock sensor in volts. Zero if no knock detected.
KNK IGN Retard (°); Indicates the number of degrees ignition retard being applied due to detected knock.
BARO Sensor (mBar); Barometric pressure from sensor on RH tank board.
Battery Voltage (volts); Vehicle main battery voltage.
IS Demand (RPM); Idle Speed demanded by the ECM, and towards which the IAC valve is attempting to control engine speed.
EGR Pos Feedback (volts); Identifies position of EGR valve by voltage feedback.
EGR Temp Sensor (°); Temperature of exhaust gas just after the EGR valve; used to verify exhaust gas flow.
Purge Vac Sensor (volts); Indicates the presence of vacuum in the fuel tank; used in purge flow diagnostics.
A/C ***Relay (Off/On)***; Indicates status of air conditioning relay.
A/R Relay (Off/On); Indicates status of air pump relay.
Recirc Relay (Off/On); Indicates status of coolant recirculation pump relay.
Fuel Pump Relay 7 ***(Off/On)***; Indicates status of primary fuel pump relay.
Fuel Pump Relay 2 ***(Off/On)***; Indicates status of secondary fuel pump relay.
FC 7 ***Relay (Off/On);*** Indicates status of fan control relay.
FC 2 ***Relay (Off/On);*** Indicates status of coolant tell tale relay.
M/L 7 Lamp (Off/On); Indicates status of Malfunction Indicator Lamp ('Check Engine').
Heater Relay (Off/On); Oxygen sensor heater control.
Purge Vent Solenoid (Off/On); Used in purge flow diagnostics.
Target Boost (kPa); Max. demanded boost at full throttle.
ECU ID 7; ECU reference.
ECU ID 2; ECU reference.

Current Data - Snapshot

This facility is extremely useful for diagnosing driveability problems which may not set a trouble code. The tool is plugged in and observed whilst the car is driven, and a continually updated block of data covering the latest time period, from all the sensors is stored in the memory. When the driveability problem is encountered, the 'snapshot' may be triggered manually or automatically, and a further block of sensor data is recorded for a similar time period after the trigger point. Back in the workshop, the readings from each of the sensors may be recalled and assessed before, during and after the trigger point. A. variation in sensor reading at the trigger point may indicate a problem area, if necessary comparing readings with a known good vehicle.

Freeze Data

Displays a limited data list captured when the MIL was activated.

DTCs (Diagnostic Trouble Codes)

In this mode, all the current DTCs are listed in the order set.

Clear Info

This clears any set DTCs and related diagnostic data.

O2S Results

The response of the Oxygen sensors is monitored and can be viewed on the Tech 1.

Readiness

Various tests on the engine management system are performed automatically. This mode indicates the current status of those tests.

On-Board Tests

Monitors all continuous or non-continuous test results.

Reset Data

Enables the learnt data of individual systems to be reset rather than clearing the entire learnt memory. Useful after replacing components such as the idle air control valve.

Output Tests

Output tests are used to independently switch ECM controlled devices. Individual fuel injectors can be energised; pulse width modulated components can be controlled; relays and lamps switched; each of the four ignition coils can be independently fired.

EMM.I - F CLEARING TROUBLE CODES

A trouble code will remain stored in the ECM memory after the fault has been rectified (or does not recur) until; i) 40 engine warm up cycles have been completed, or ii) the code is cleared using the programme provided in the 'Tech 1' tool.

CAUTION: To prevent ECM damage, the ignition Key must be 'OFF' when disconnecting or reconnecting power to the ECM (e.g. battery cable, ECM connector, ECM fuse, jumper cables, etc.).

Trouble codes should be cleared after repairs have been completed. Some diagnostic procedures will require codes to be cleared in order that the ECM be allowed to set the code during the test and identify the problem more quickly.

EMM.I • G ECM LEARNING ABILITY

The ECM has a 'learning' ability which enables it to make corrections for minor variations in the fuel system and for engine condition in order to maintain the optimum fuel delivery at all times.

If the ECM is replaced, or one of the memory resets acitvated using the Tech 1 tool, these settings must be re-learned. The time taken to complete the long and short term fuel trim learning process-will vary from vehicle to vehicle, and will also depend on driving conditions. Gentle driving at steady throttle openings will speed the process. There is unlikely to be any significant difference in engine performance or driving characteristics during this period.

When clearing trouble codes the 'Tech 1' tool, various options are available and should always be used so that the trouble code(s) only is cleared, and not any other ECM memories.

EMM.I • H BASIC PRECAUTIONS

THE LOTUS ESPRIT 3.5L V8 IS CERTIFIED BY THE UNITED STATES ENVIRONMENTAL AGENCY AS CONFORMING TO THE REQUIREMENTS OF THE REGULATIONS FOR THE CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES. THIS CERTIFICATION IS CONTINGENT ON CERTAIN ADJUSTMENTS BEING SET TO FACTORY STANDARDS. THESE ADJUSTMENT POINTS HAVE BEEN PERMANENTLY SEALED TO PREVENT INDISCRIMINATE OR ROUTINE ADJUSTMENT IN THE FIELD.

Chocking Drive Wheels

The vehicle drive wheels should always be securely chocked whenever performing system diagnoses with the engine running.

Warm Up Enaine (in verv cold climates)

In order for the exhaust gas oxygen sensor to operate and control the fuel delivery in 'closed loop' mode, in which mode all diagnostic checks are performed, the coolant temperature must be raised above -10°C by running the engine at part throttle for several minutes dependent on ambient and engine temperature.

Visual/Phvsical Insoection

Before embarking on any other diagnostic procedures, it is most important to carry out a thorough and comprehensive visual and physical check of all vacuum pipes/hoses and wires for correct routing, and any signs of pinches. cuts, chafes, poor connections, etc. Do not overlook the more inaccessible areas.

Suels t e m

All parts of the fuel feed line between the tank and fuel pressure regulator valve remain under pressure even after switching off the ignition. It is most important that before releasing any fuel connection or component, the fuel pressure relief procedure and safety precautions detailed in EMM.3 • I are followed.

Ianition Svstem

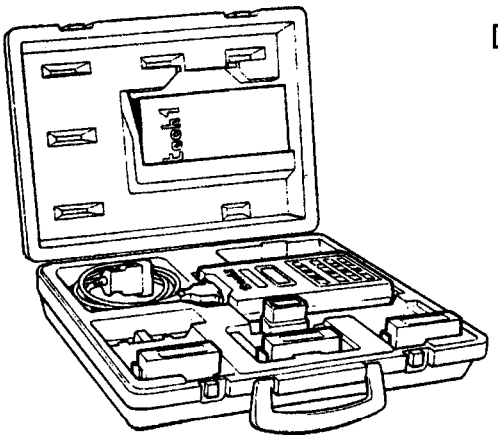
Be aware that the ignition coil output to the spark plugs is in the region of 50 kV, which if received as a 'shock', could in rare circumstances seriously jeopardise the health of anyone with a weak heart.

EMM.I ▪ I SPECIAL TOOLS

'Tech 1' Diagnostic Scanner Kit **T000T0896/2**

Plugs into DLC and displays stored trouble codes and sensor readings.

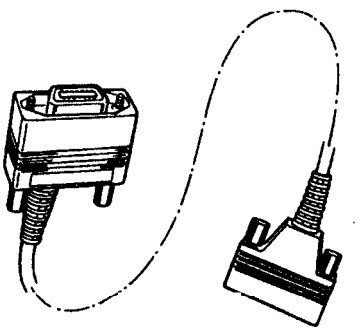
Kit includes scanner, lead, self-test adaptor, operator's manual and carrying case.



j140

Connector Lead. 'Tech 1' Scanner **T000T1312**

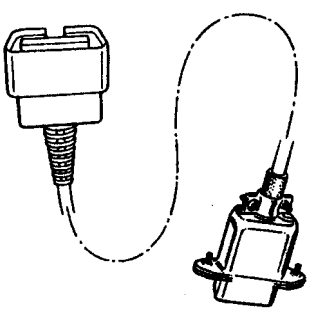
Included in 'Tech 1' kit **T000T0896/2**
Connects Tech 1 to adaptor cable TOOOT1306.



em150

Adaptor Cable. Connector Lead to DLC TOOOT1306

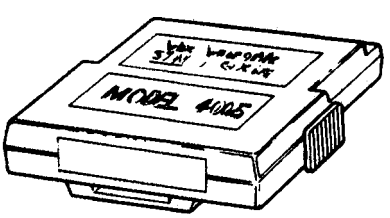
Included in 'Tech 1' kit **T000T0896/2**
Connects Tech 1 connector lead to data link connector.



em151

Calibration Cartridae. 'Tech 1' Scanner **T000T1307**

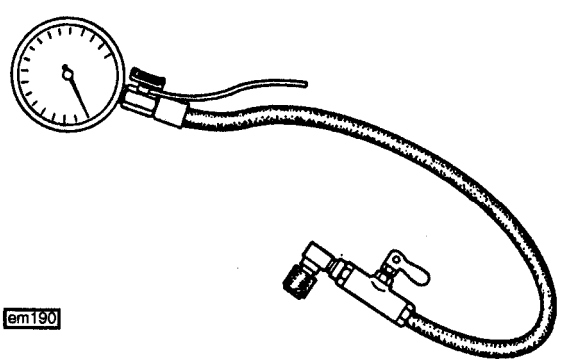
Plugs into Tech 1 scanner and contains data for Esprit V8 engine management, and anti-lock brake system. Identified by "LOTUS ESPRIT 1996 ECU".



j140

Fuel Pressure Gauae TOOOT1368

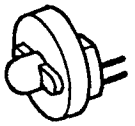
Used to diagnose fuel system problems. Gauge includes **Schraeder** valve connector and bleed tap.



em190

Jniector Test Liaht **T000T0900**

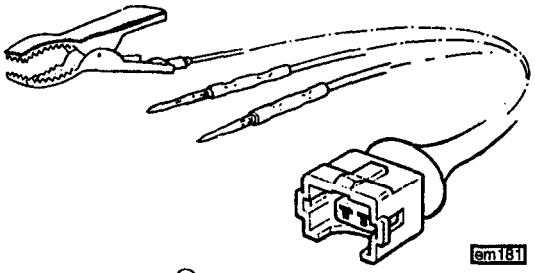
Included in kit TOOOT0899.
Used to check electrical circuit to an injector.



em175

Iniector Test Lamp Adaetor TOOOT0930

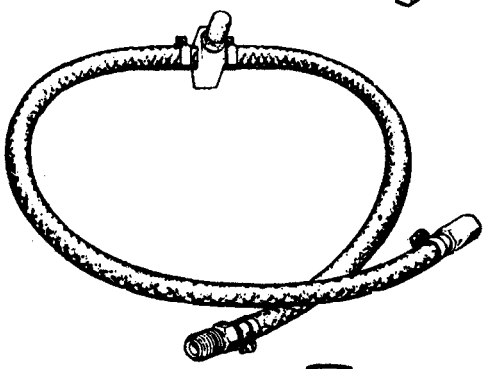
Used to connect injector tester lamp to battery and injector harness.



em181

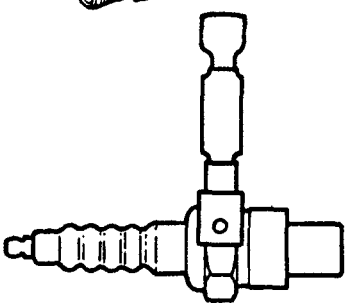
Fuel Pressure Test Hose T000T1359

Fitted between fuel filter and feed pipe to provide means of restricting fuel flow to test fuel pump performance.



Spark Tester T000T0901

Used to check available secondary ignition voltage.

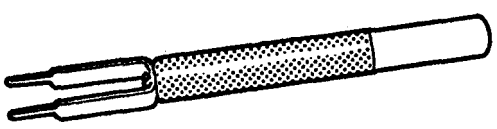


Connector Test Adaotor Kit TOOOT0902

Used to make electrical test connections in Weather Pack, Metri-Pack and Micro-Pack connector blocks.

Metri-Pack Terminal Remover T000T0903

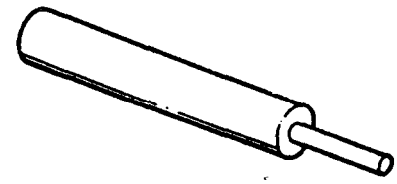
Used to remove terminals from connector blocks.



em175

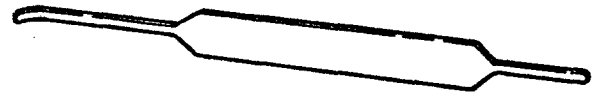
Weather-Pack Terminal Remover TOOOT0904

Used to remove terminals from connector blocks



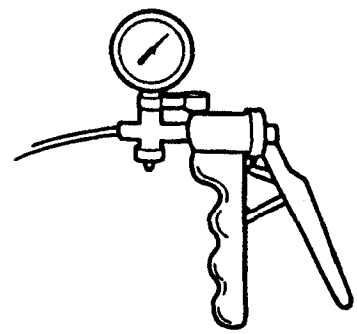
ECM Connector Terminal Remover TOOOT0905

Used to remove terminals from ECM connector.



Vacuum Pump TOOOT0907

Used to operate and diagnose faults in vacuum operated components.



em174

EMM.I -J HARNESS CONNECTORS

Because of the very low voltage and current levels used in the electronic engine management system, most connectors in the engine compartment are protected against moisture and dirt which could create oxidation and deposits on the terminal.

Take care when probing connector blocks or replacing terminals, to avoid shorting between adjacent terminals, since this can result, in some circumstances, in damage being caused to the electronic components. Always use jumper wires between connectors for circuit checking. Never probe through the Weather-Pack seals.

When diagnosing, open circuits are often difficult to locate by sight because oxidation or terminal misalignment are hidden by the connectors. Merely wiggling a connector on a sensor or in the wiring harness may correct the open circuit condition. This should always be considered when an open circuit or failed sensor is indicated. Intermittent problems may also be caused by oxidised or loose connections.

Before making a connector repair, be certain of the type of connector. Weather-Pack and Compact Three connectors look similar but are serviced differently.

Weather-Pack Connector

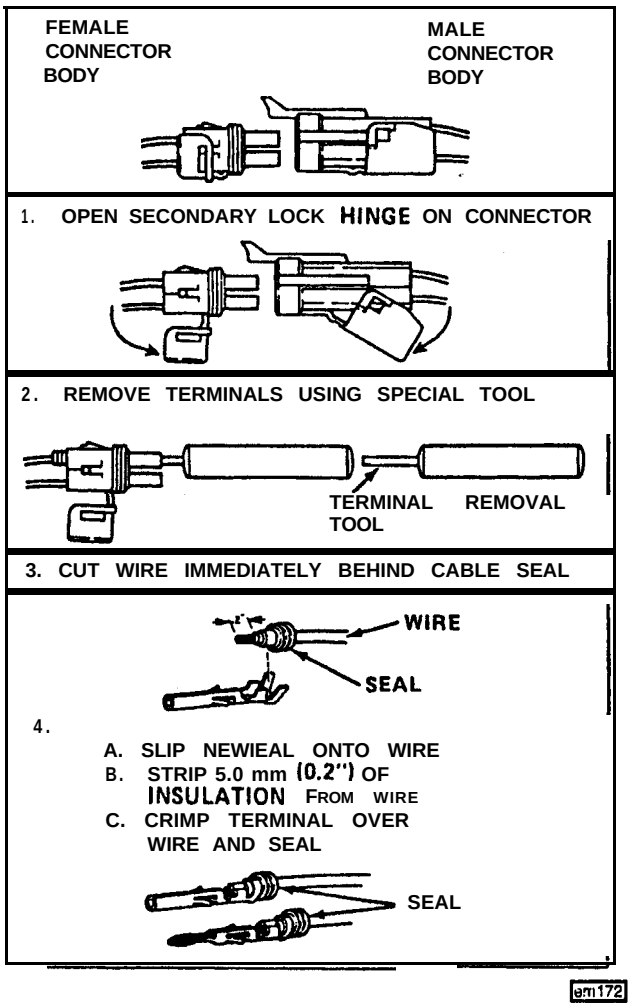
The diagram shows a Weather-Pack type connector and the tool TOOOT0904 required for removing the pin and sleeve terminals. If removal of a terminal is attempted using any other tool, it is likely that the terminal will be bent or deformed. These terminals cannot be straightened once bent.

Ensure that the connectors are properly seated and all of the sealing rings in place when connecting leads. The hinge type flap provides a backup, or secondary locking feature for the connector. They are used to improve the connector reliability by retaining the terminals if the small terminal lock tangs are not positioned properly.

Weather-Pack connections cannot be replaced with standard connections. Instructions are provided with Weather-Pack connector and terminal packages.

Compact Three Connectors

The Compact Three connector which looks similar to a Weather-Pack connector is not sealed and is used where resistance to the environment is not required. Use standard methods when repairing a terminal. Do not use the Weather-Pack terminal tool TOOOT0904.



em1172

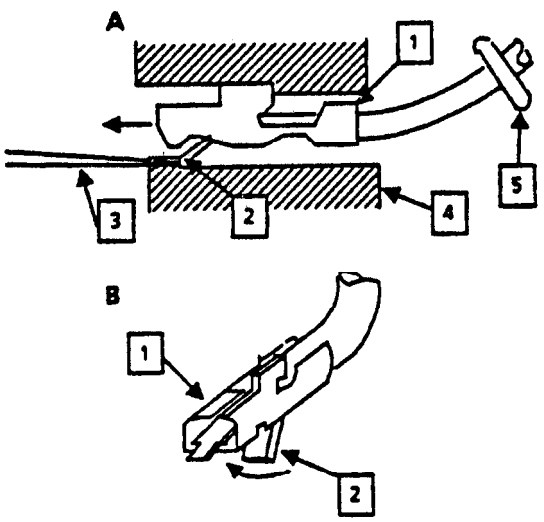
Metri-Pack Series 150 Connectors

Some connectors used to connect various sensors to the ECM harness use terminals called "Metri-Pack".

They are also called "Pull-to-Seat" terminals because, to install a terminal on a wire the wire is first inserted through the seal (5) and connector (4). The terminal is then crimped on the wire and the teminal pulled back into the connector to seat it in place.

To remove a terminal:

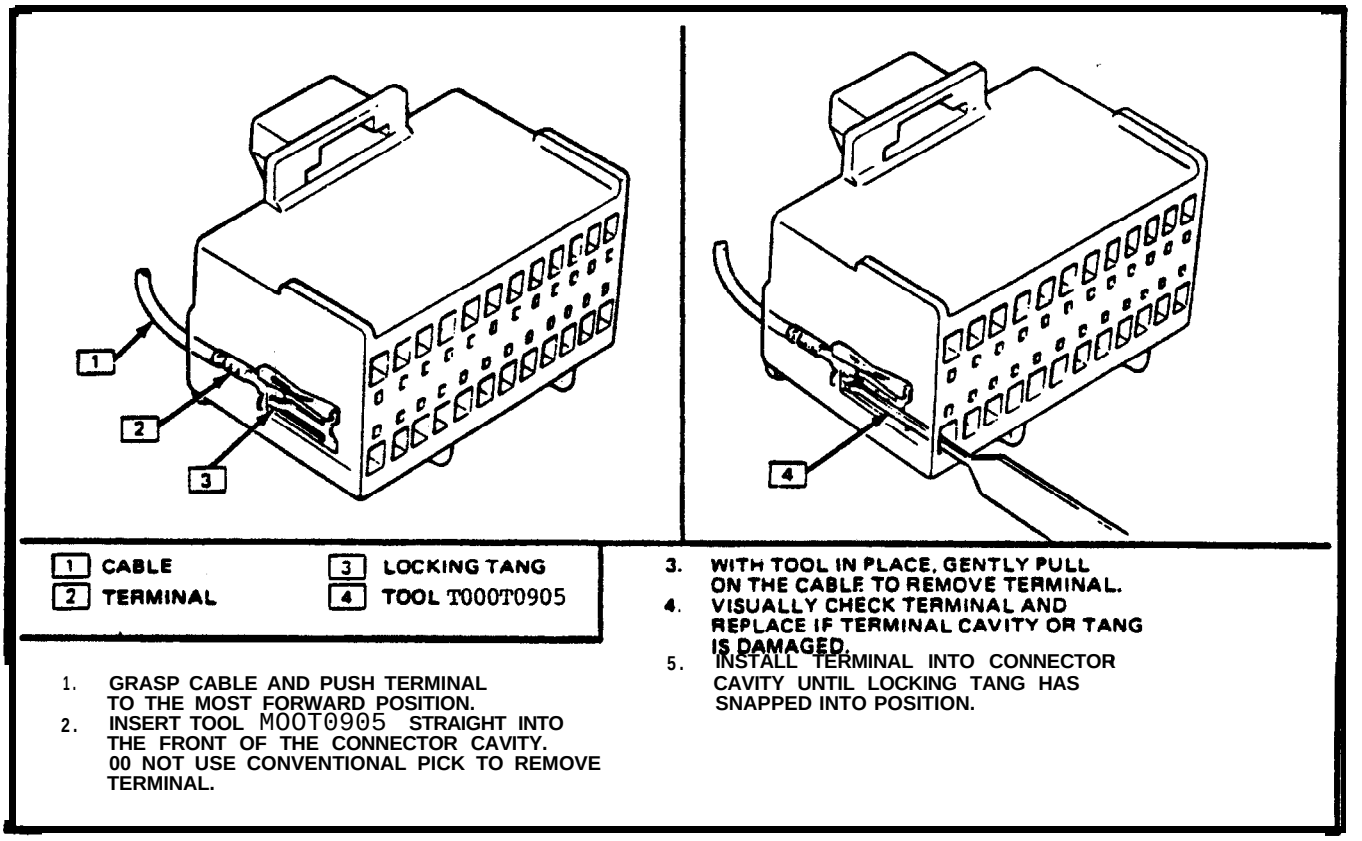
1. Slide the seal back on the wire;
2. Insert tool (3) TOOOT0903 or equivalent, as shown in diagrams 'A' and 'B' to release the terminal locking tab (2).
3. Push the wire and terminal out through the connector. If reusing the terminal, reshape the locking tang (2).



em173

Micro-Pack Connectors

The diagram shows a Micro-Pack connector used on the harness to ECM connection. Terminal replacement requires the use of tool TOOOT0905 in the manner shown.



em173

EMM.l ▪ K ABBREVIATIONS AND GLOSSARY OF TERMS

A/F	Air/Fuel ratio.
ALDL	Assembly Line Diagnostic Link. Previous term for Data Link Connector (DLC); see below.
Batt +ve	Battery positive terminal (12 volts).
CKT	Circuit.
Closed Loop	ECM fuel control using oxygen sensor feedback.
CO	Carbon Monoxide.
Diagnostic Terminal	Lead of ALDL connector which is grounded to display stored trouble codes.
DI	Direct Ignition. Uses no distributor.
DLC	Data Link Connector. Connector block located beneath passenger side fascia, and in rear relay station. Used for connection of diagnostic scanner tool such as 'Tech 1'.
DVM (1 Omeg)	Digital Voltmeter with 10 million ohm resistance.

ECM	Electronic Control Module. Computer controlling injection and engine management.
ECT	Engine Coolant Temperature sensor.
EECS	Evaporative Emissions Control System. Prevents fuel vapours escaping directly into atmosphere.
HC	Hydrocarbons. Exhaust pollutant.
High Impedance Voltmeter	Used on circuits with very low current flow, as meter does not affect current in circuit circuit under test.
Hg	Mercury. A calibration material used to measure vacuum.
IAC	Idle Air Control valve. Controls airflow past throttle plates to control idle speed.
IAT	Inlet Air Temperature. Sensor in the intake duct to the throttle body.
MAP	Manifold Absolute Pressure.
MFI	Multiport Fuel Injection. System using individual injectors for each cylinder.
MIL	Malfunction Indicator Lamp. Tell tale lamp in instrument panel to warn driver of faults detected by the on-board diagnostic system.
Mode	A particular state of operation.
NC	Normally Closed. State of relay contacts of solenoid plunger when no voltage is applied.
NO	Normally Open. State of relay contacts or solenoid plunger when no voltage is applied
NOx	Nitrogen Oxides. Exhaust gas pollutant.
02	Oxygen. Presence in exhaust gas is indication of intake air/fuel ratio.
02s	Oxygen sensor.
Open Loop	ECM fuel control without use of oxygen sensor.
PCV	Positive Crankcase Ventilation. System prevents crankcase fumes passing directly into atmosphere.
TP	Throttle Position sensor.
vss	Vehicle Speed Sensor.
Wastegate	Device used to control proportion of exhaust gas fed into turbocharger. Limits boost pressure.
WOT	Wide Open Throttle.

Circuit Diaaram Cable Colour Code

B	Black	LG	Light Green	P	Purple	T	Tan	Y	Yellow
G	Green	N	Brown	R	Red	U	Blue		
K	Pink	0	Orange	S	Slate	W	White		

SECTION EMM.2

DESCRIPTION OF OPERATION

EMM.2 - A ELECTRONIC CONTROL MODULE (ECM)

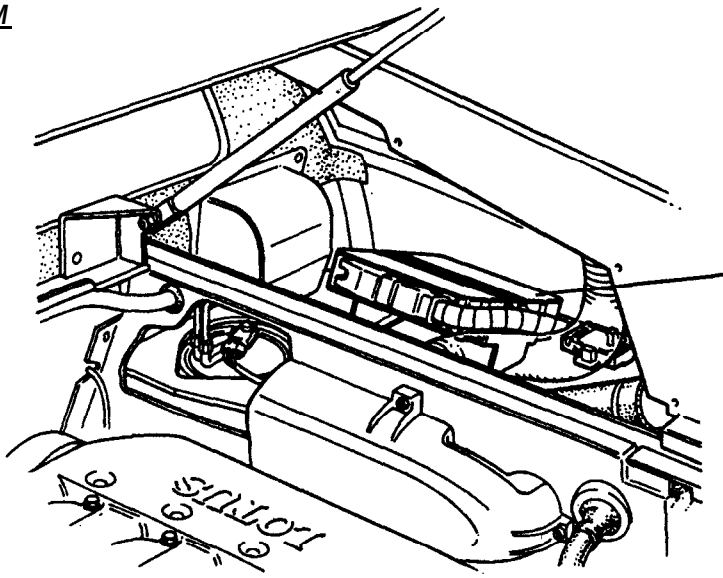
The Electronic Control Module (ECM), located oh the right hand fuel tank board, is the controlling computer for the fuel injection and engine management system. It constantly monitors data received from various sensors and controls engine operation to provide optimum performance and driveability consistent with the minimum of harmful emissions. The ECM can also recognise operational problems and alert the driver via a 'Malfunction Indicator Lamp' (MIL) on the fascia, whilst storing a 'trouble code' to help the technician make rapid fault diagnosis.

The different parameters sensed and the systems controlled are as follows:-

PARAMETER: SENSED	uel injection	Spark timing	Idle speed	Boost control	EGR	Canister purge	Air injection	Fuel pump	Coolant fans	Air conditioning	Diagnos
	SYSTEMS CONTROLLED										
Engine speed	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Engine position	✓	✓	✓								✓
MAP	✓	✓	✓	✓	✓	✓	✓	✓			✓
BARO	✓	✓	✓	✓	✓	✓	✓				✓
Throttle pos.	✓	✓	✓	✓	✓		✓			✓	✓
Coolant temp.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Inlet air temp.	✓	✓	✓	✓	✓			✓			✓
Bank 1 Pre cat oxygen	✓					✓					✓
Bank 2 Pre cat oxygen	✓					✓					✓
Bank 1 Post cat oxygen	✓										✓
Bank 2 Post cat oxygen	✓										✓
EGR position					✓						✓
Knock sensor		✓		✓							✓
Wheel speed	✓	✓	✓	✓	✓				✓		✓
Rough road											✓

c:\pm5\emh2_t1.tbl

Location of ECM



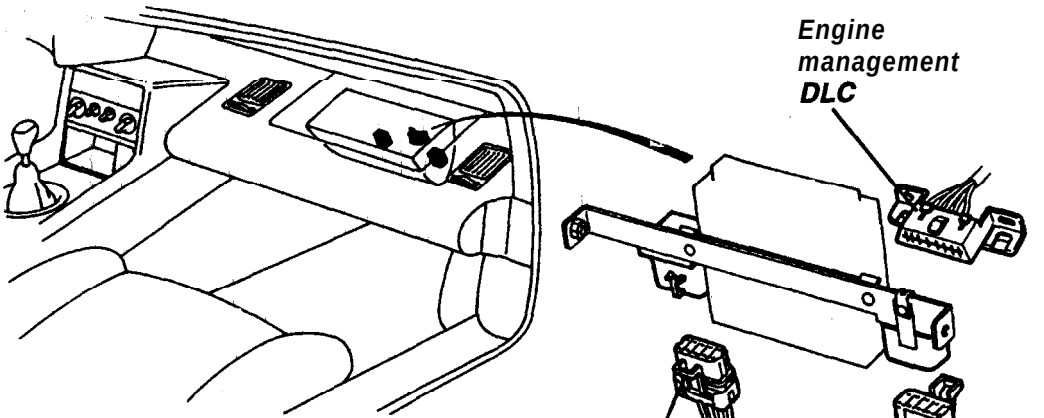
Electronic Control Module (with trim panel removed)

em141

Data Link Connector (DLC)

The Data Link Connector (DLC), is a connector socket on the engine management harness which allows electronic communication with the ECM using a scanner tool such as the Lotus specified 'Tech 1'. The DLC has the same function as the 'Assembly Line Diagnostic Link (ALDL)' used on earlier cars, but is of a different configuration, with 16 as opposed to 10 pins. Two DLCs are provided; one in the passenger footwell for use whilst the vehicle is being driven, and one in the rear luggage compartment for use whilst working on the engine. For fuller details of the DLCs and Tech 1 tool, see section EMM.I ▪ D and EMM.I ▪ E.

Dual S.I. R. fascia shown

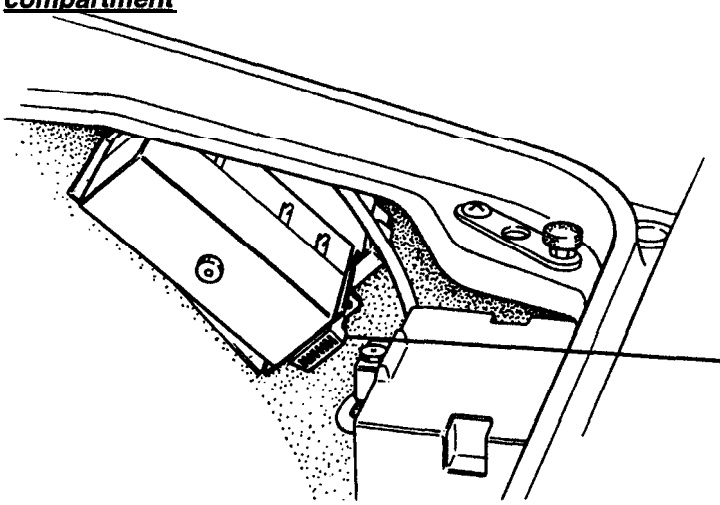


Engine management DLC

S.I.R. ALDL

Vehicle alarm ALDL

Rear luggage compartment



Engine management rear DLC

em179/149

ECM Calibration

The programming of the ECM is resident in EEPROM, and is calibrated only by the factory.

Use of a Voltmeter in Diagnostic Procedures

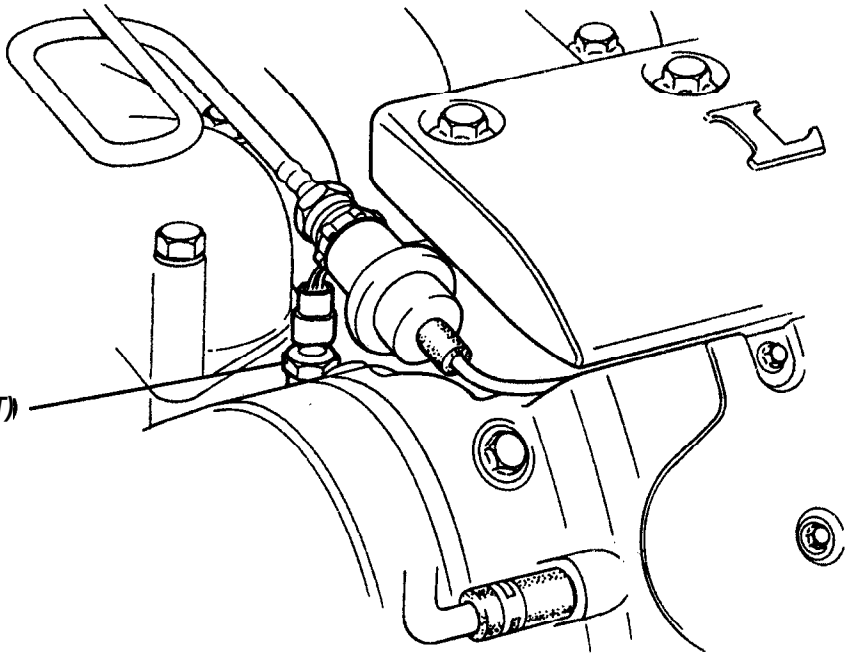
The ECM powers various sensors and switches with either 5 or 12 volts derived via resistances in the ECM which are so high in value that a test light will not function when connected to the circuit. In some cases even conventional voltmeters will not give an accurate reading because the meter resistance is too low, and the current used by the meter itself is significant enough to affect the characteristics of the circuit being measured. It is therefore essential to use a 10 megohm input impedance digital voltmeter to ensure accurate voltage readings are obtained.

EMM.2 ▪ B ENGINE COOLANT TEMPERATURE (ECT) SENSOR

The ECM requires a coolant temperature input signal in order to increase fuel delivery and maintain driveability during the cold running and warm-up phase. The signal from this sensor is used for many different parameters within the engine management system to control and switch various components dependent on engine temperature.

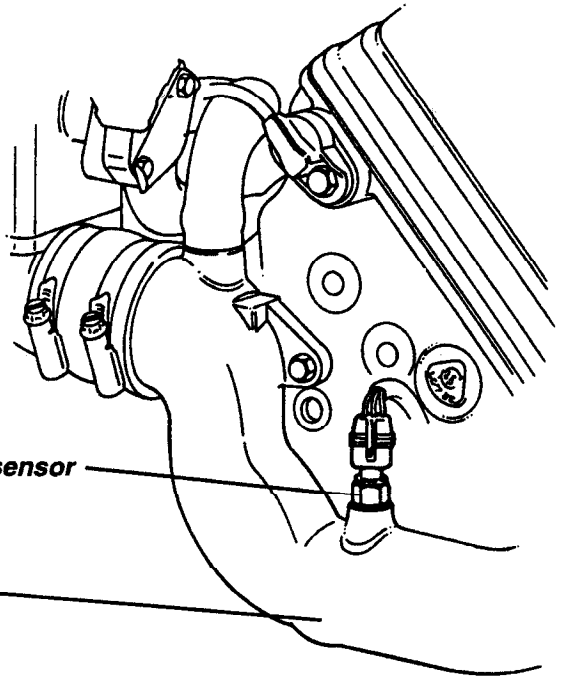
The sensor is a thermistor (a resistor which changes value with temperature) mounted in the cylinder block coolant outlet passage at the front of the block valley. Low coolant temperature produces a high resistance (100,000 ohms at minus 40°C) while high temperature causes low resistance (70 ohms at 130°C).

The ECM supplies a 5 volt signal to the coolant temperature sensor through a resistor in the ECM and monitors the terminal voltage. Since this forms a series circuit to ground through the coolant sensor, high sensor resistance (low temperature) will result in high ECM terminal voltage. When the coolant sensor's resistance is low (high temperature), the terminal voltage will be drawn lower. This terminal voltage indicates engine coolant temperature to the ECM.



EMM.2 ▪ C INLET AIR TEMPERATURE (IAT) SENSOR

The Inlet Air Temperature (IAT) sensor is fitted into the RH compressor duct between turbocharger compressor and throttle body, and monitors the temperature of air being consumed by the engine. The ECM uses this signal in conjunction with others to calculate air density and the appropriate fuel delivery for both starting and running.

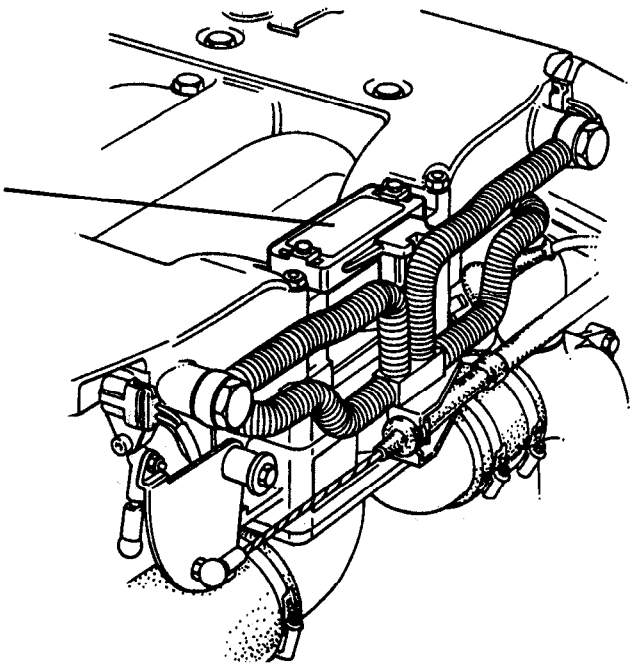


em144

The inlet air temperature sensor is a thermistor (a resistor which changes value with temperature) similar to the coolant temperature sensor. Low temperature produces a high resistance (100,000 ohms at minus 40%) while high temperature causes low resistance (185 ohms at 100°C). The ECM supplies a 5 volt reference signal to the IAT sensor, and by measuring the sensor output voltage is able to calculate the sensor resistance, and thereby the inlet air temperature. Low air temperature produces a high sensor resistance for a higher fuel requirement.

EMM.2 - D MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

The ECM uses an inlet manifold pressure signal to help interpret engine operating conditions and fuel requirements. The MAP sensdr is mounted directly onto the top rear of the intake plenum. 'Absolute' pressure is measured reletive to a complete vacuum, and is independent of atmospheric pressure.



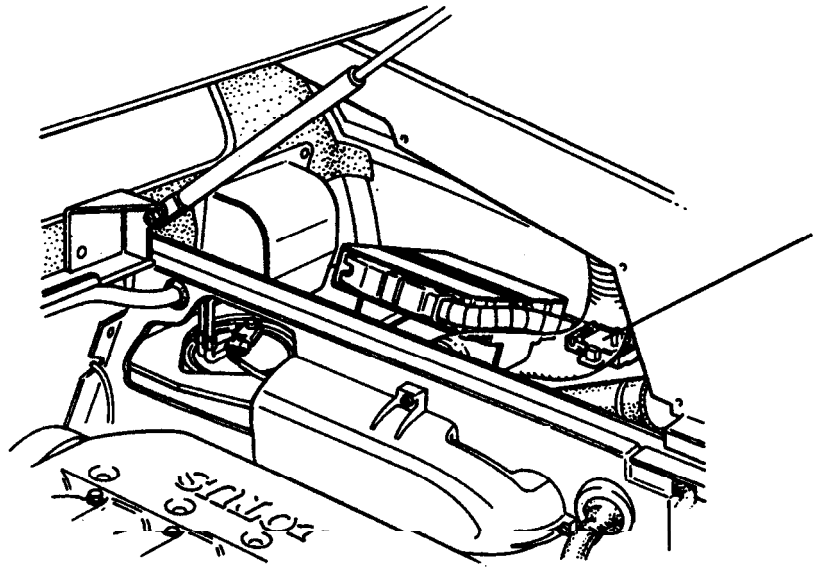
em146

Note that manifold absolute pressure is the OPPOSITE of manifold vacuum. For example, a closed throttle on engine overrun would produce a low manifold absolute pressure (high vacuum) signal. The ECM sends a 5 volt reference signal to the MAP sensor, and by measuring the sensor output voltage is able to calculate manifold pressure.

High manifold pressure produces a high sensor resistance for a higher fuel requirement. If the MAP sensor should fail, the ECM will substitute a default value and use the throttle position sensor and other sensors to control fuel delivery and provide a 'limp home' mode.

EMM.2 • E BAROMETRIC (BARO) PRESSURE SENSOR

A barometric pressure signal is used by the ECM to regulate fuel delivery reletive to atmospheric pressure, and to accommodate operation of the vehicle at high altitude. The barometric sensor is mounted above the RH fuel tank.



Barometric (BARO) sensor (trim panel removed)

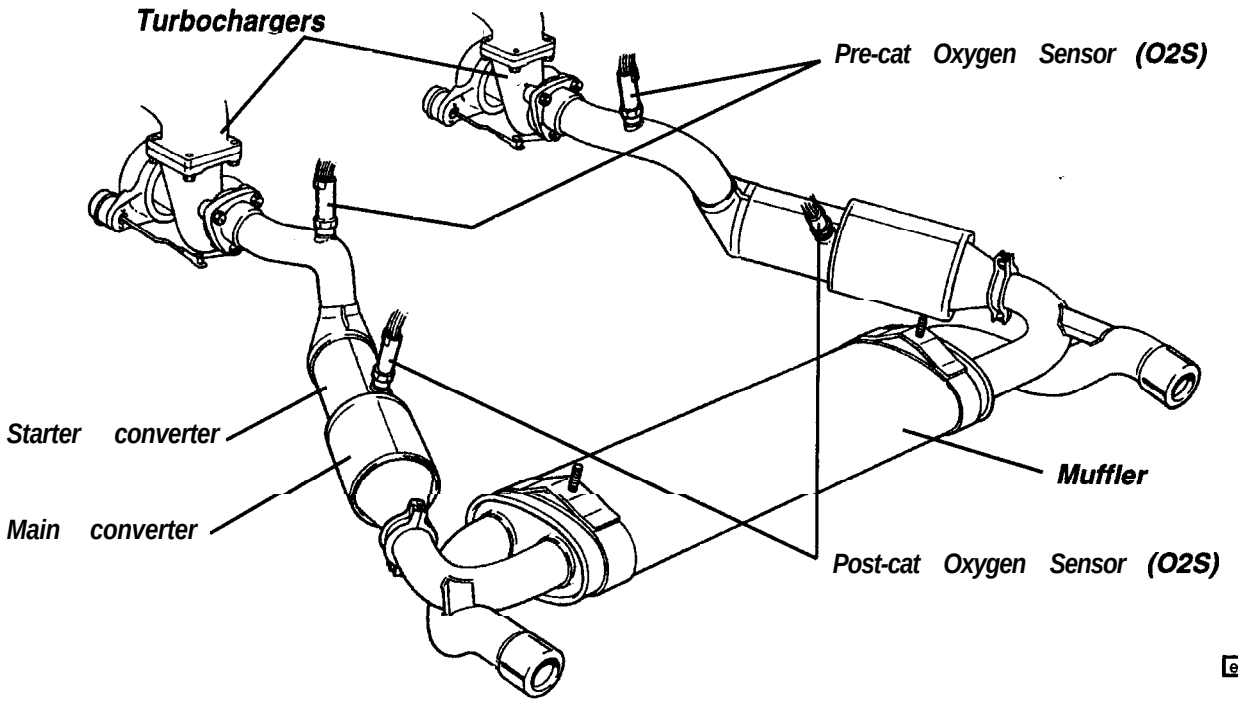
em141

The ECM sends a 5 volt reference signal to the sensor, and by measuring the sensor output voltage is able to calculate the sensor resistance, and thereby the barometric pressure. Low barometric pressure (high altitude) produces a low sensor resistance for a lower fuel requirement. If the barometric sensor should fail, a fixed default value would be substituted by the ECM.

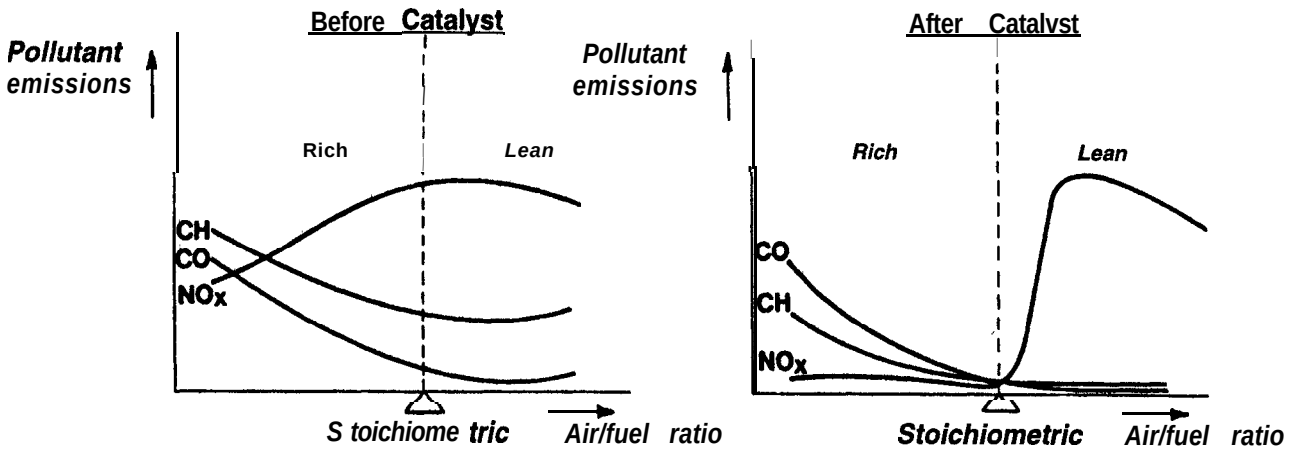
EMM.2 • F CATALYTIC CONVERTERS & EXHAUST GAS OXYGEN (02) SENSORS

Catalytic converters are fiied into the exhaust system of each cylinder bank, between the turbocharger and muffler. The function of the converters is to reduce emissions of the three major exhaust gas pollutants; hydrocarbons, HC; carbon monoxide, CO; and oxides of nitrogen, NOx. 'Three way' catalytic converters are used, with each unit containing two monolithic substrates coated with precious metal catalysts. The substrates are of honeycomb construction to provide a large surface area of the coating to be in contact with the exhaust gas. Note that the use of leaded fuel would contaminate the active coating, and render the converters ineffective.

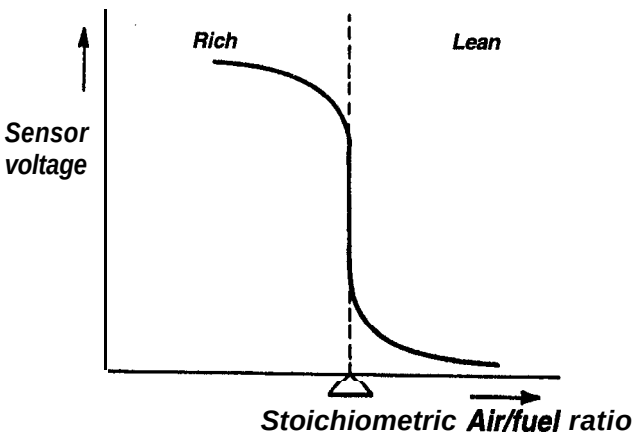
In order for the converters to carry out the required chemical reactions, a minimum temperature must first be attained. The first monolith in each converter is a low mass unit ('starter catalyst) providing fast initial reaction, and is closely followed by a larger unit whose attainment of operating temperature is speeded by the heat imparted into the exhaust gas by the starter catalyst.



The efficiency of conversion of HC, CO and NOx into carbon dioxide (CO_2) nitrogen (N_2) and water vapour (H_2O), is dependent on the amount of oxygen in the exhaust gas, which is a function of the air/fuel ratio supplied to the engine. A fuel rich air/fuel ratio results in a low exhaust gas oxygen content, and a lean mixture results in a high oxygen content. In order to maintain a high conversion efficiency of all three pollutants, the air/fuel ratio is maintained as closely as possible to the ideal, or 'stoichiometric' ratio.

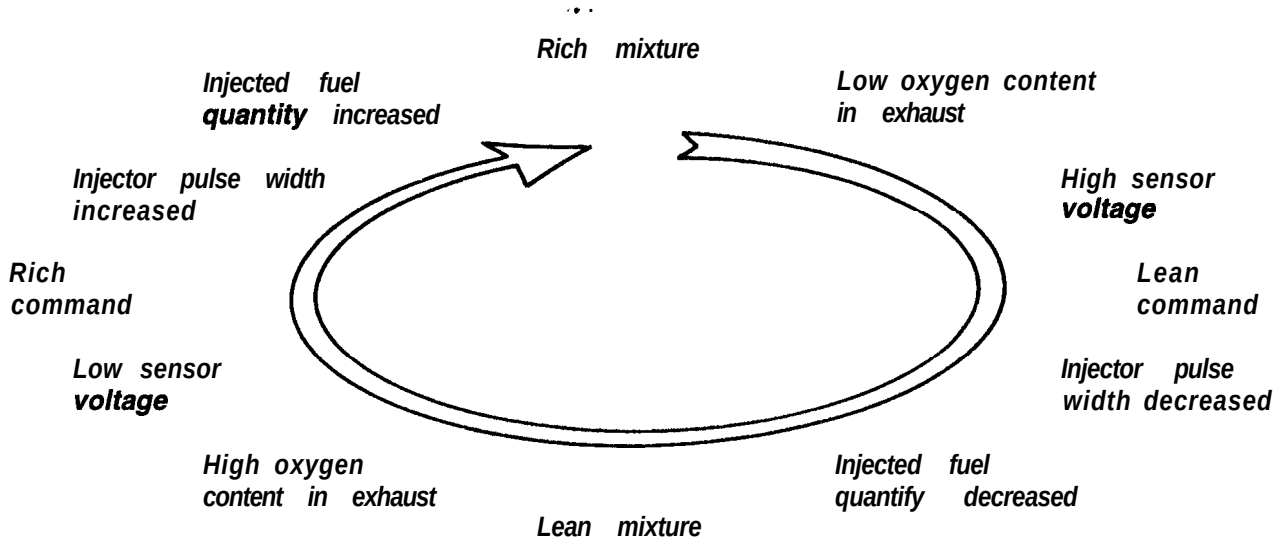


In order to achieve the required close control of air/fuel ratio, a 'closed loop' fuel control system is employed, with oxygen sensors at the inlet to each of the catalytic converters being used to measure the oxygen content of the exhaust gas. The voltage produced by the oxygen sensors can vary between (typically) 900 mV for very rich mixtures, and 100 mV for the leanest. The sensors are designed to be most sensitive around the stoichiometric condition, to enable the ECM to determine the necessary correction to be made to the fuel injection command.



em155

In this way, the air/fuel ratio is controlled in a rapid sequence of rich, lean, rich, lean, relative to the ideal stoichiometric ratio.



em154

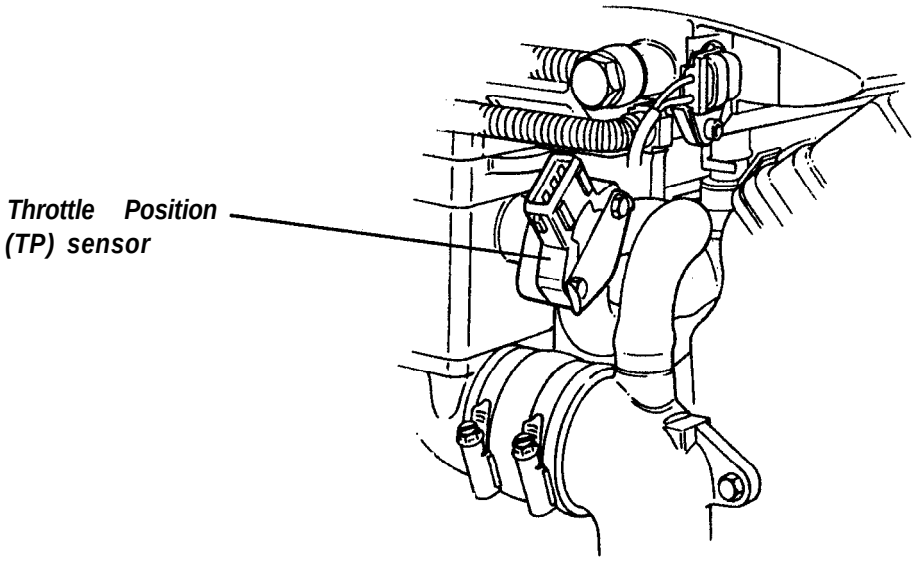
low 02 voltage (lean mixture) = rich command
high 02 voltage (rich mixture) = lean command

In order to determine whether the catalytic converters are functioning effectively, a 'post catalyst' O_2 sensor is fitted in the outlet of each starter converter, and by monitoring the exhaust gas oxygen content at this point, the ECM is able to determine converter efficiency. If this should fall below a pre-determined level, the MIL will be lit to alert the driver, and a fault code set.

EMM.2 • G THROTTLE POSITION (TP) SENSOR

The throttle position sensor is a potentiometer operated by the throttle spindle on the RH side of the throttle body. The ECM supplies 5 volts to the sensor and by monitoring the voltage on a returning signal line, the ECM is able to determine throttle position and calculate the fuel requirement.

With the throttle closed, the sensor voltage is low, but increases as the throttle is opened until at wide open throttle, output voltage is greater than 4.0 volts. This signal is one of the fundamental inputs used by the ECM for fuel control and for many of the ECM controlled outputs. If a fault is detected and a trouble code set, the ECM will substitute an artificial default value for the TP sensor signal to enable the vehicle to 'limp home'. This mode may result in a high idle speed.



em139

EMM.2 • H AIR CONDITIONING & RADIATOR FAN CONTROL

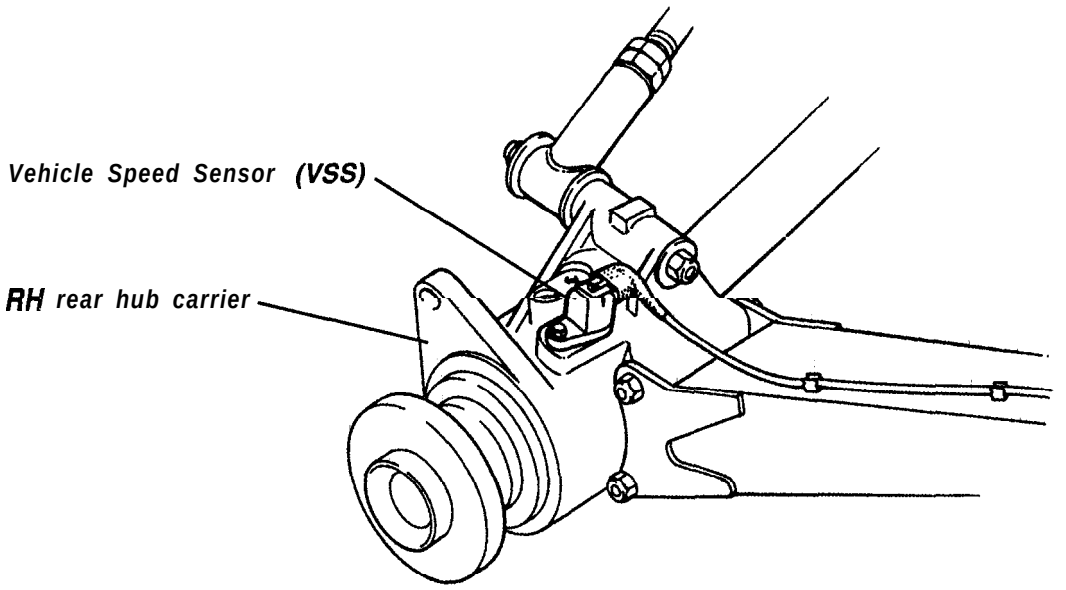
When the air conditioning is switched on, the ECM receives the signal from the thermistor control unit requesting operation of the compressor. Before energising the a.c. compressor, the ECM first raises the duty cycle of the idle air control valve to maintain idle speed with the extra loading on the engine. The radiator fans (3 off) are energised to cool the condenser whenever the compressor is operating.

Some engine operating conditions will override the a/c request signal and switch off the air conditioning. These include: engine speeds below idle to help prevent stalling; wide open throttle to make available full engine power; near maximum vehicle speed to increase engine cooling system margins.

The three radiator fans are energised by the ECM at approximately 100°C coolant temperature as sensed by the coolant temperature switch in the cylinder block water pump inlet. The fans are also switched on when the a/c compressor is operating to cool the condenser. The fans will not operate if battery voltage is sensed as being too low. During a 20 minute period after ignition switch off, coolant temperatures over 1 05°C, will cause the fans to run in conjunction with the coolant re-circulation pump.

EMM.2 • I VEHICLE SPEED SENSOR (VSS)

Each wheel hub is fitted with a permanent magnet sensor which uses a toothed ring attached to either the brake disc (front), or driveshaft (rear) to generate a pulsing AC voltage whenever the vehicle speed is above walking pace. The signal increases in both value and frequency with increasing vehicle speed. This data is used by the anti-lock brake system ECM to determine individual wheel speeds and interpret incipient wheel locking conditions. The right hand front wheel speed data is tapped from the ABS ECM to provide a vehicle speed signal to the engine management ECM.

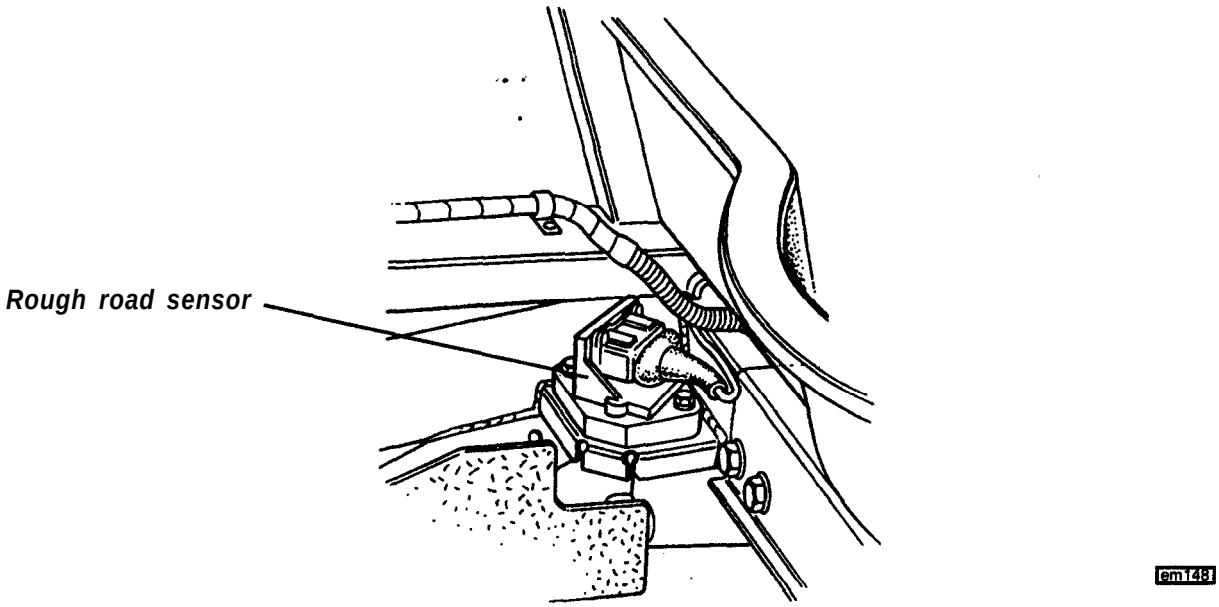


This information is used by the ECM to control the radiator fans (see EMM.2 • H), the boost control solenoid valve (see EMM.2 • T), and the exhaust gas recirculation (see EMM.2 • X).

EMM.2 • J ROUGH ROAD SENSOR

The ECM is able to detect a misfire from either a single cylinder, or a random misfire, and is also able to classify the level of misfire (which may not be apparent to the driver) as one liable to cause an increase in emissions, or one with the potential to damage the catalyst.

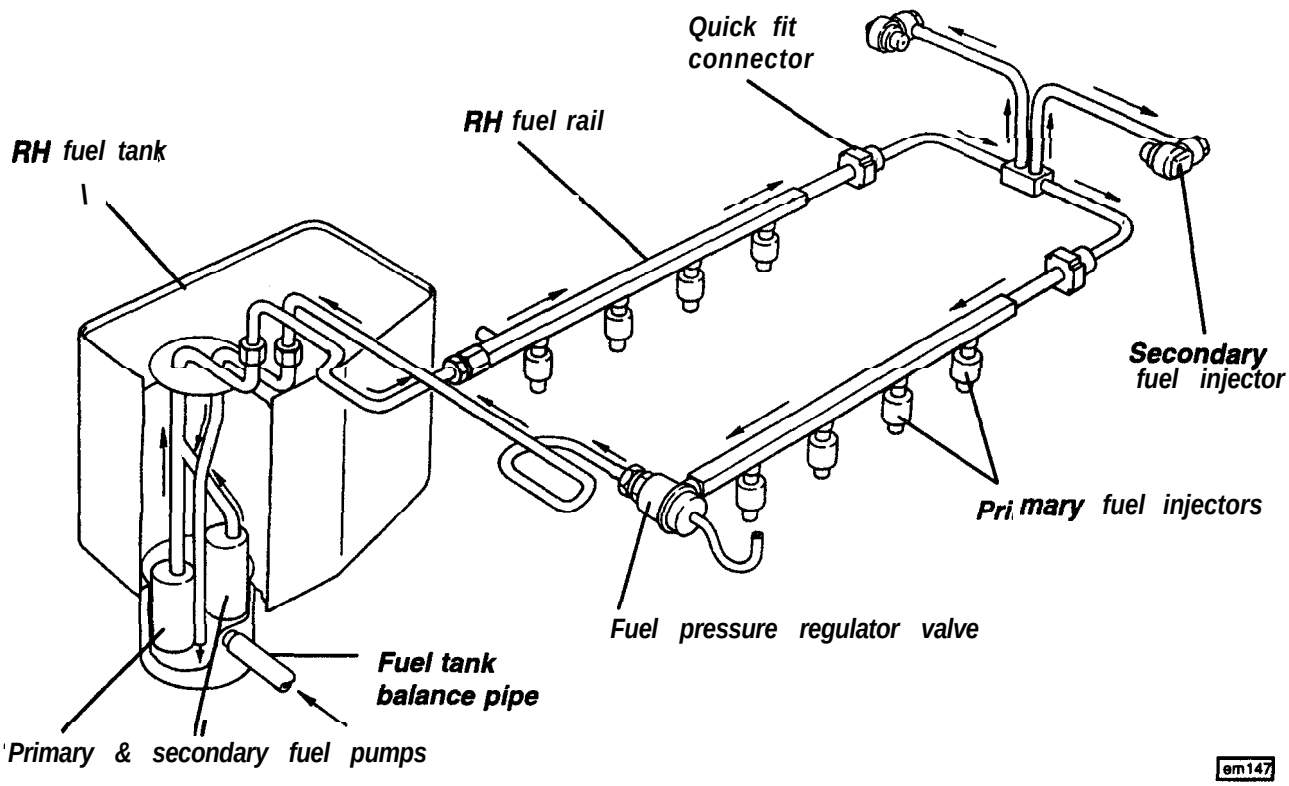
One of the signals used to determine misfire is the regularity of the impulses from the crankshaft sensor If the vehicle is driven on a rough (unsurfaced) road, it is possible that torsional fluctuations fed through the driveline from the rear wheels, could be erroneously interpreted as a misfire. In order to prevent this possibility,



a 'rough road' sensor is securely fixed to the chassis at the right hand rear of the engine bay, and which can by converting vertical acceleration into an electrical signal, enable the ECM to detect when the vehicle is being driven on a rough road. The 'misfire' signal from the crankshaft sensor is then disregarded by the ECM.

EMM.2 - K FUEL CONTROL SYSTEM

Fuel is stored in twin fuel tanks, one ahead of each rear wheel arch, with a balance pipe interconnecting the two tanks. A pair of roller vane electric pumps are connected in parallel and mounted submerged within the RH tank. Fuel is pumped through an in line canister filter to the front end of the RH fuel rail which supplies the four RH cylinder bank injectors.



The rear end of the RH rail is connected by a moulded synthetic pipe to the rear of the LH rail which supplies the four LH cylinder bank injectors, and mounts the fuel pressure regulating valve on its front end, from which excess fuel is returned to the RH tank. A connector in the pipe linking the rear of the two fuel rails, supplies the two secondary injectors which are mounted in the rear ends of the two intake plenum chambers.

The pressure regulator valve mounted on the front end of the LH fuel rail, incorporates a calibrated spring and pressure chamber in order to maintain fuel pressure at a specified level above plenum air pressure. Fuel is continuously flowing around the circuit; RH tank, RH fuel rail, LH fuel rail, regulator valve, RH tank; with the fuel pump supplying a quantity of fuel over and above that required at maximum demand. This continuous flow helps prevent high fuel temperatures and reduces the possibility of vapour locks.

The port fuel injectors, are solenoid operated and are opened individually when energised by the ECM for a short period during the compression stroke in the firing order sequence of 1,5,3,7,4,8,2,6. The amount of fuel injected is dependent on the length of time for which the injector is energised, which is referred to as the 'pulse width'.

Modes of Operation

The ECM uses voltage inputs from several sensors to determine how much fuel to deliver to the engine at any one time. The fuel may be delivered in any one of several different 'modes' with the ECM controlling which mode is appropriate according to the readings it receives from the sensors at that particular time.

Startina Mode

When the ignition is first turned on, the ECM turns on the fuel pump relay for three seconds to pressurise the system ready for starting. The ECM also checks the coolant and air temperature and pressure sensors to determine the appropriate air/fuel ratio for starting. A longer pulse width will be applied at lower temperatures.

Clear Flood Mode

Provision is made for clearing a fuel flooded engine as follows: If the throttle is held fully open and the engine cranked, the ECM will shut off the injectors completely for as long as engine speed is below approximately 650 rpm. If throttle opening becomes less than 75% the ECM returns to the starting mode.

Run Modes

A run mode may be in either 'open loop' or 'closed loop' operation:

OPEN LOOP:

When the engine is first started, the system operates in 'open loop' mode. In 'open loop', the ECM ignores the signal from the oxygen (O_2) sensor, and calculates the air/fuel ratio based on inputs from the coolant temperature and manifold absolute pressure (MAP) sensors.

The system will stay in 'open loop' until the following conditions are met:

i) The 02 sensor has varying voltage output, indicating that its temperature is up to operating range.

ii) A specific amount of time, dependent on start up coolant tempertature, has elapsed after starting the engine.

When all of these conditions are met, the system switches into 'closed loop' operation.

CLOSED LOOP:

In this mode the ECM controls the air/fuel ratio to stoichiometric based on the feedback signal from the O_2 sensors.

Acceleration Mode

The ECM responds to rapid changes in throttle position and manifold absolute pressure and provides extra fuel.

High Speed/Boost Mode

During periods of very high air flow, typified by a 130 mph road speed, a pair of secondary injectors in the intake plenum chamber supply additional fuel to the engine and augment that from the port injectors.

Deceleration Mode

The ECM responds to changes in throttle position and manifold pressure and reduces the amount of fuel. When deceleration is very rapid, the ECM can cut off fuel completely for short periods.

Battery Voltaae Correction Mode

When battery voltage is low, the ECM makes the following compensations:

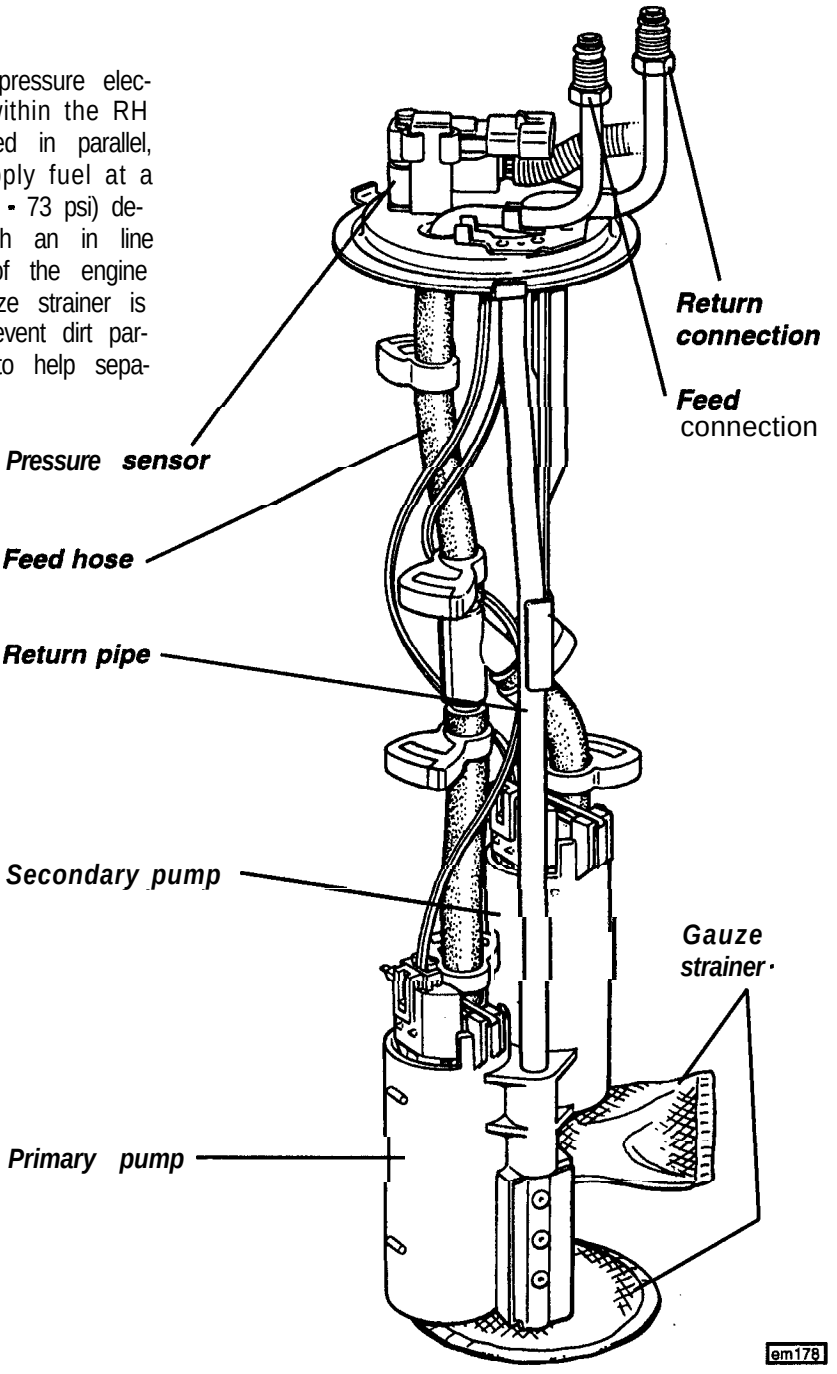
- The injector pulse width is increased to compensate for the slower injector solenoid operation.
- The idle rpm is increased to aid battery charging.
- The ignition dwell time is increased to maintain spark quality.

Fuel Cut-Off Mode

In order to prevent dieseling when the engine is switched off, the ECM turns off the injectors together with the ignition. Also, no fuel is delivered unless reference pulses are received from the crankshaft and camshaft sensors, which means that the engine is either cranking or running. This prevents flooding of a stalled engine. To safeguard the engine from damage, the ECM will shut off the injectors if an engine speed of 7,000 rpm is exceeded.

EMM.2 - L FUEL PUMPS

A pair of roller vane type, high pressure electric pumps are mounted submerged within the RH fuel tank. The two pumps are plumbed in parallel, and operated independently, and supply fuel at a pressure of between **310** - 500 **kPa** (45 - 73 psi) dependent on operating conditions, through an in line filter located at the right hand front of the engine bay, to the 'fuel rail assembly. A gauze strainer is attached to both fuel pump inlets to prevent dirt particles from entering the fuel line and to help separate any water from the fuel.



The two fuel pumps are mounted in a plastic housing and are fixed via the fuel return pipe to a mounting plate secured by cam ring to the top face of the RH tank. Both pumps operate as the engine is started, but thereafter, the secondary pump runs only when the ECM demands the additional fuel supply. Both pumps run at constant speed, with fuel delivery being always greater than the engine's requirement, with the excess fuel returned from the fuel pressure regulator valve to the RH tank. This constant circulation of fuel through the in-line fuel filter, fuel rails, and fuel pressure regulator valve, helps avoid high fuel line temperatures with the consequent risk of vapour locks.

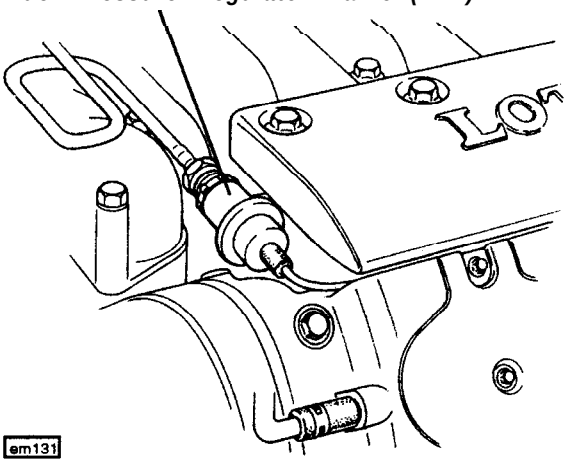
When the ignition is switched on, the ECM energises the primary fuel pump which will run continuously if an ignition pulse is present (engine cranking or running), or for 3 seconds only in the absence of an ignition pulse. The pump will switch off 3 seconds after a stall. The secondary pump runs during engine cranking for pump exercising purposes, and subsequently only during conditions of maximum demand, typified by 130 mph road speed.

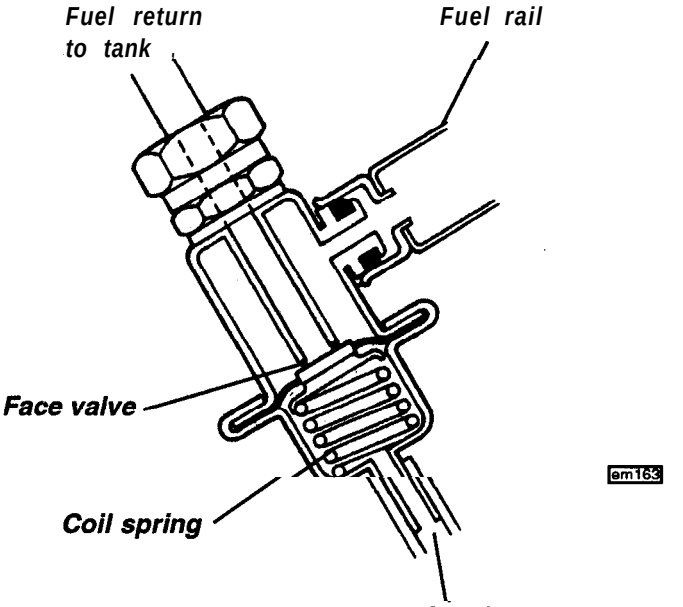
EMM.2 • M FUEL RAILS & PRESSURE REGULATOR

One fuel rail is used for each of the cylinder banks, and serves to link the four port injectors to provide a balanced fuel supply at common pressure, and also to retain the port injectors in their housings. The front end of the RH rail receives fuel from the supply pipe, and also has provision, via a Shraeder valve, for the connection of a fuel pressure test gauge. A moulded synthetic pipe connects the rear ends of the two fuel rails, and also the two secondary fuel injectors which are mounted in the rear of the intake plenum. After flowing through the LH fuel rail and pressure regulator valve, the fuel returns to the RH tank.

The fuel pressure regulator fitted to the front end of the LH fuel rail is a diaphragm operated relief valve with fuel pump pressure acting on one side of the diaphragm, and regulator spring pressure and intake plenum pressure on the other. The function of the regulator is to maintain a constant pressure differential across the injectors at all times. i.e. a constant difference between fuel pressure supplied to the injector, and inlet manifold pressure at the port injector nozzle. By using an intake plenum pressure signal to supplement regulator spring pressure in the valve, the valve is able to regulate fuel supply pressure in accordance with engine load. The pressure regulator is not adjustable and is serviced as a complete assembly.

Fuel Pressure Regulator* Valve *(PRV)





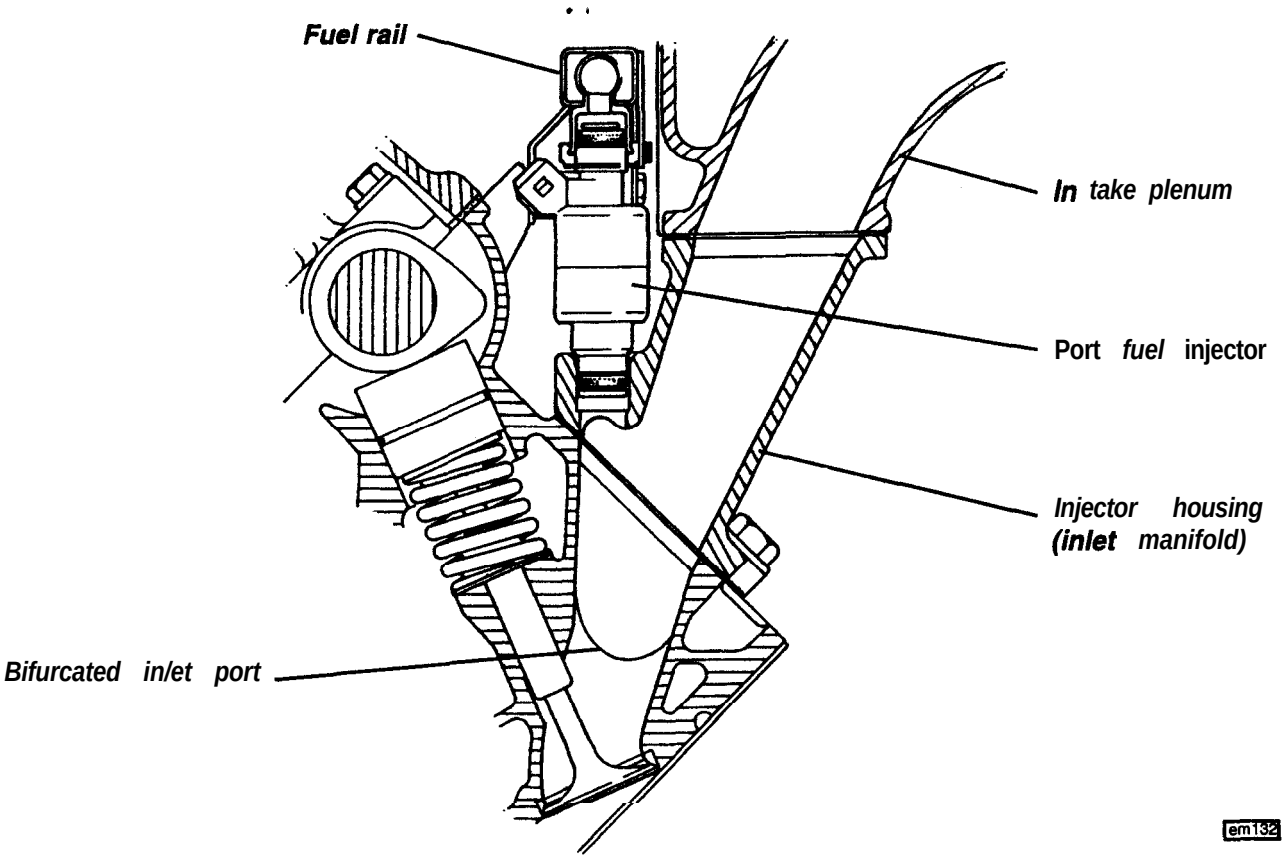
EMM.2 • N FUEL INJECTORS

Port Iniectors

The port fuel injector assembly is a solenoid-operated device, controlled by the electronic control module (ECM), that meters pressurised fuel to a single engine cylinder. The ECM energises the high impedance (12 ohms) solenoid to open a normally closed ball valve. This allows fuel to flow into the top of the injector, past the ball valve, and through a recessed flow director plate at the injector outlet.

The director plate has four machined holes that control the fuel flow, generating a dual spray pattern of

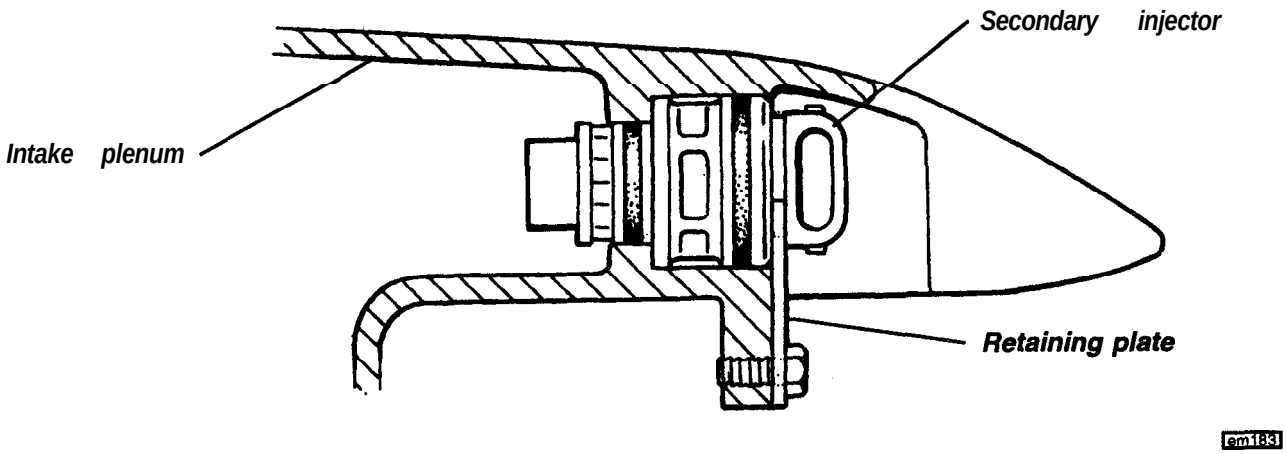
finely atomised fuel directed into each branch of the bifurcated port. Fuel strikes the back of the closed inlet valves and becomes further atomised and vapourised before entering the combustion chamber.



The ECM uses ten injector driver circuits, with separate circuits for each port injector and for the two secondary injectors in order to provide 'fully sequential' operation. Engine timing information is received by the ECM from the crankshaft front pulley sensor (four signals per crankshaft revolution), and from a sensor at the rear end of the RH inlet camshaft (one signal every two crankshaft revolutions). On the basis of this information, each port injector is pulsed during the compression stroke to inject into the closed intake port, and may also be pulsed a second time, dependent on fuel demand, during the period of valve overlap near TDC.

Plenum Injectors

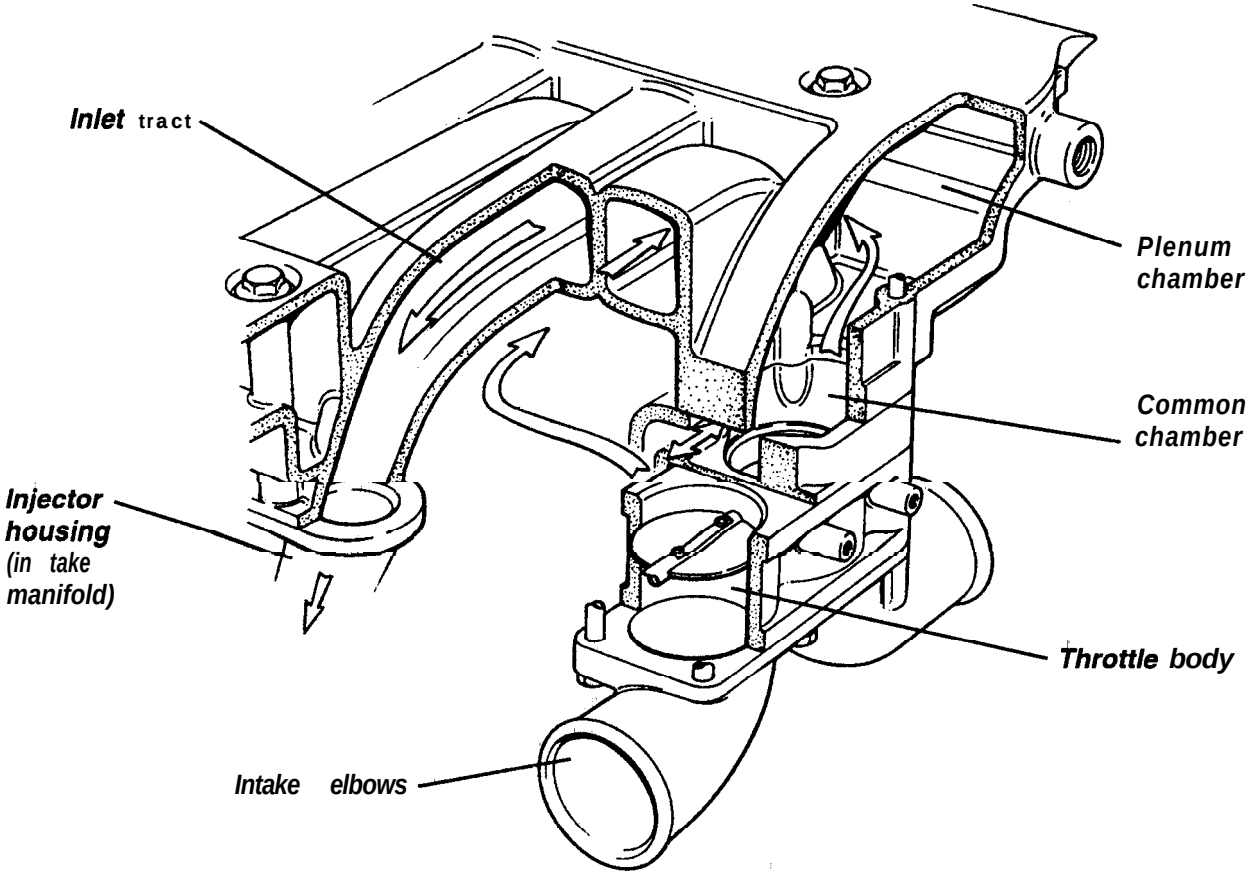
In order to supplement fuel delivery during periods of maximum demand, a pair of secondary injectors are fitted, one in the rear end of each intake plenum chamber.



The plenum injectors are not timed to engine position, but operate at a fixed frequency of 50 Hz, with the quantity of fuel delivered dependent on the ECM controlled pulse width. They also differ from the port injectors in having a lower impedance (2.0 ohms) and higher flow rate, and use a side entry for the fuel supply. Injection takes place only at high airflow rates, with the pulse width increasing with the airflow rate.

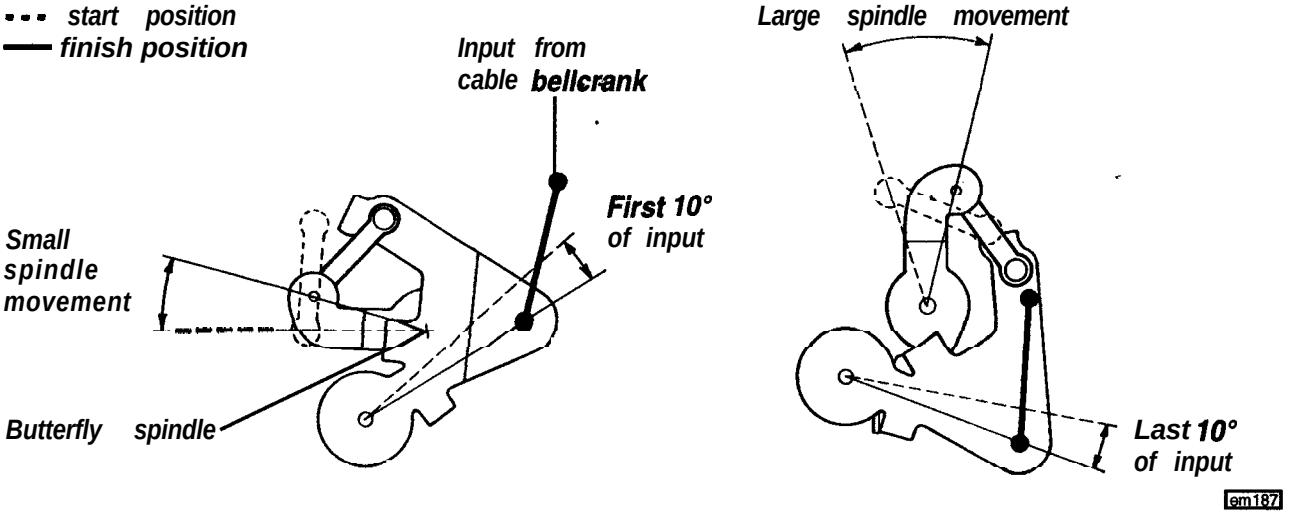
EMM.2 • 0 THROTTLE BODY & INTAKE PLENUM

Charge air from each turbocharger compressor is discharged via a cast alloy duct, to a throttle body at the rear of the engine. The throttle body contains two butterfly valves, one for each cylinder bank, operated by the throttle cable via a rising rate linkage. Air then flows into an intake plenum comprising a common chamber, two plenum chambers, and eight inlet tracts. The small common chamber sited immediately above the throttle body, allows air supplied from the two turbochargers to mix and balance pressures before separating into two plenum chambers, one mounted over each cylinder head's cam cover. From each plenum chamber, four inlet tracts lead to a short injector housing (intake manifold) on the opposite cylinder head.



The intake elbows, throttle body and EGR manifold are sandwiched to the underside of the plenum, and secured with two long studs lapped into the intake elbow, with nuts on the top surface of the plenum, and two bolts fitted from beneath and threaded into the plenum. The throttle position sensor is fitted onto the RH end of the throttle spindle.

Sensitivity to throttle opening on most engines is very high for the first 10°, and comparatively low for the last 10°. On the Lotus 918 engine, in order to optimise throttle control at small openings and provide quick response at wide settings, a rising rate throttle linkage fitted to the left hand side df the throttle body is designed to provide a more linear response to the throttle pedal. The throttle cable connects to a quadrant pivotted on the rear of the intake plenum, from which motion is transferred via a ball jointed link to a bellcrank lever operating in a 90° different vertical plane. The bellcrank lever is pivotted on the left side of the throttle body and is connected by a short link to the throttle spindle lever. Initial movement of the bellcrank lever causes the short link to rotate, producing little throttle lever movement, but with increasing bellcrank lever travel, the line of pull on the link straightens out and much greater throttle lever movement results.

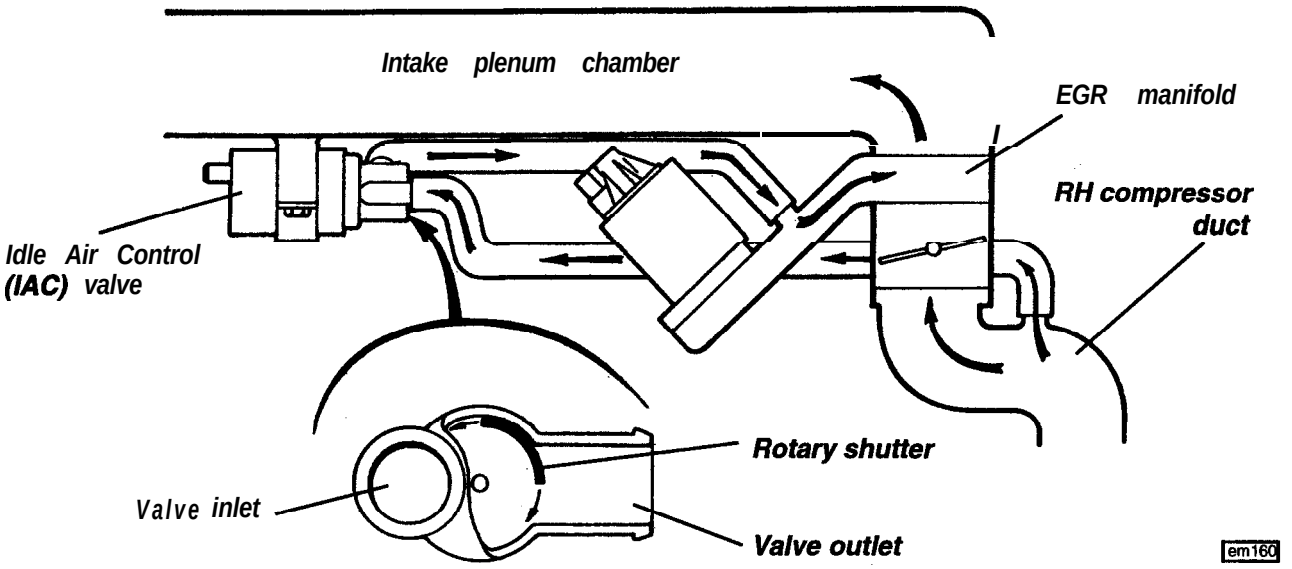


The IAC valve is mounted on the underside of the plenum, and is connected via hoses to the throttle body RH intake elbow, and the common chamber, such that when open, it allows air to by-pass the throttle valves.

The EGR manifold is sandwiched between the throttle body and the intake plenum, and mounts the EGR motor, as well as providing spigot connections for other systems e.g. idle air control. crankcase breather.

EMM.2 - P 'IDLE AIR CONTROL (IAC) VALVE

The purpose of the idle air control (IAC) valve assembly is to control engine idle speed under differing engine temperatures and loads. The valve assembly consists of a motor and a rotary shutter valve which controls the airflow by-passing the throttle plates.



The IAC valve is mounted on the underside of the intake plenum, and is connected by hose between the RH compressor duct and the EGR manifold which is sandwiched between the throttle body and plenum. The rotary shutter valve is sprung towards the closed position, and is opened by an electric motor under the control of the ECM. The valve motor is operated by a square wave signal from the ECM, with the 'on' time, or 'duty cycle' controlling the effective voltage to the motor and the degree of valve opening. A duty cycle of 35% represents a fully closed valve, and **100%,** fully open. In this way, the ECM is able to regulate throttle by-pass airflow in order to provide the desired idle under various operating conditions, amongst which are; raised idle speed with low coolant temperature and maintenance of idle speed with engine load from operation of air conditioning or power steering. The rotary shutter valve is sprung to a **pre-set** partially open position to allow engine idle in the event of a valve motor failure. The 'Tech 1' tool is able to display the IAC duty cycle.

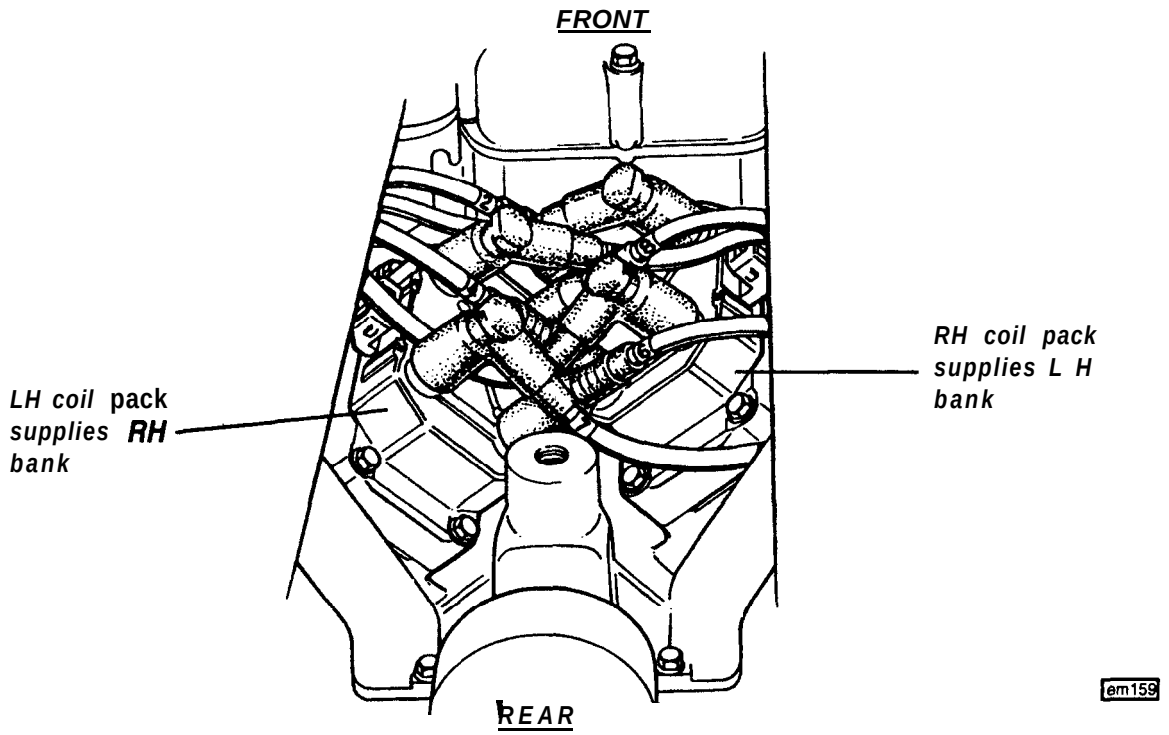
When the ignition is switched on, the ECM calculates the IAC duty cycle required to provide the necessary idle speed for the coolant temperature and other conditions pertaining at that time. During idle, the engine speed is monitored, together with coolant temperature, engine load and other relevent factors, and the duty cycle adjusted as necessary. The ECM 'learns' the normal duty cycle of the IAC valve and retains this information in its memory. See Sub-Section EMM.I - I; 'ECM Learning Ability'.

EMM.2 - Q DIRECT IGNITION (DI) SYSTEM & COILS

The Direct Ignition (DI) system fitted on the Lotus 918 engine, dispenses with the need for a distributor by using four double ended high tension coils, packaged as two twin coil assemblies mounted within the engine 'V', beneath the intake plenum. This 'waste spark' method of spark distribution groups pairs of cylinders sharing the same stroke phasing;

1 & 4,) LH coil pack
2 & 3,)
5 & 8, > RH coil pack
6 & 7, >

and fires each pair of spark plugs from a double ended coil such that a spark occurs simultaneously in the cylinder coming up on the compression stroke and in the cylinder coming up on the exhaust stroke. The cylinder on the exhaust stroke requires very little of the available energy to fire the spark plug, with the remaining energy being used as required by the cylinder on the compression stroke. The process is repeated when the cylinders reverse roles. Because the direction of current flow in the primary winding and thus, in the secondary winding, is constant, one plug fires from the centre electrode to the side electrode while the other fires from side electrode to centre electrode.



It is possible in a no load condition for one plug to fire even though the spark plug lead from the same coil is disconnected from the other spark plug. The disconnected spark plug lead acts as one plate of a capacitor, with the engine being the other plate. These two 'capacitor plates' are charged as a current surge (spark) jumps across the gap of the connected spark plug. The 'plates' are then discharged as the secondary energy is dissipated in an oscillating current across the gap of the spark plug still connected.

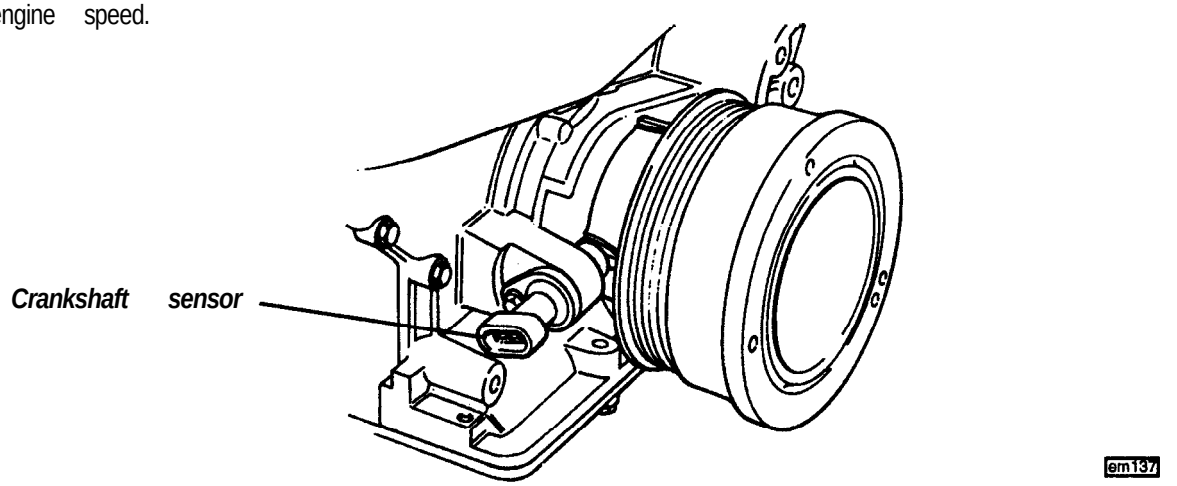
Engine timing information is received by the ECM from the crankshaft front pulley sensor (four pulses per crankshaft revolution), and from a sensor at the rear end of the RH inlet camshaft (one square wave signal every two crankshaft revolutions). The signal from the leading edge of the camshaft sector, indicates to the

ECM that the next crankshaft sensor pulse is the timing signal for no.1 cylinder. The ECM processes information gathered from these and other sensors to calculate engine speed, air density, throttle opening and more, to determine the optimum ignition timing from a set of tables contained in its memory.

Variation of the ignition timing is also used for the immediate control of idle speed, in conjunction with the slower acting control of the IAC valve. The ECM will retard the ignition if excessive detonation is detected by the knock sensor (see below).

EMM.2 • R CRANKSHAFT SENSOR

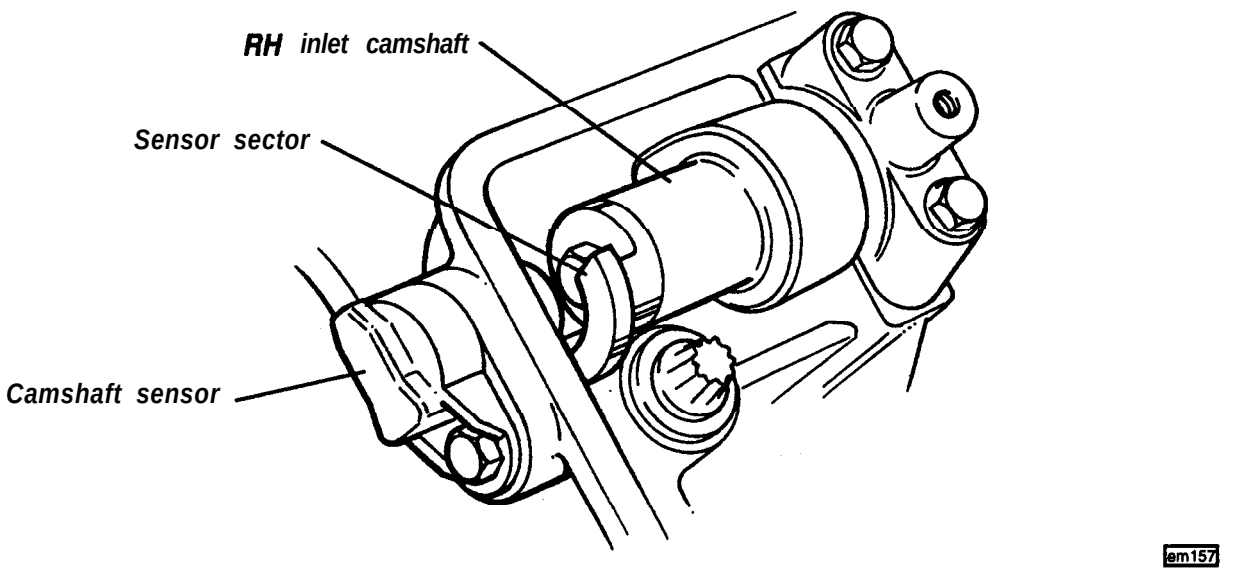
A magnetic sensor is mounted in a plinth integral with the engine front cover, and protrudes to within 1.5 mm of four vanes on the crankshaft front 'V' pulley/torsional vibration damper. A voltage pulse is induced each time a vane passes the sensor, and by monitoring the time interval between each pulse, the ECM is able to interpret engine speed.



The pulley/damper is keyed to the crankshaft, and the four vanes are arranged to pass the sensor at 10 degrees before each of the four top dead centre positions, representing the base ignition timing setting before processing by the ECM. Phasing of the ignition and injection timing is triggered by the camshaft sensor signal.

EMM.2 • S CAMSHAFT SENSOR

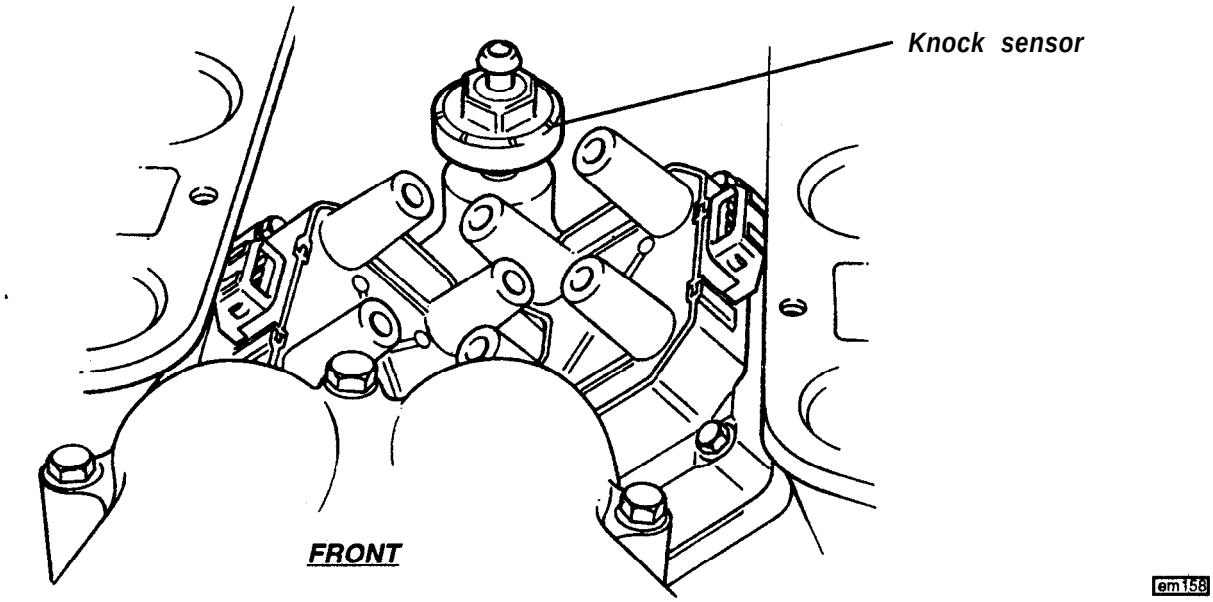
A magnetic sensor is mounted in the rear end of the right hand cylinder head, and protrudes to within 1.5 mm of a near semi-circular steel sector fixed to the rear end of the inlet camshaft.



The sector produces a square wave signal in the sensor when the engine is turning, and enables the ECM to recognise which of the crankshaft sensor voltage pulses corresponds to no.1 cylinder firing signal. This information is used to time the sequential fuel injection, and the spark timing.

EMM.2 - T KNOCK SENSOR

The ignition timing required for optimum performance can lead, under certain operating conditions;' to detonation of the fuel mixture in the combustion chamber, causing excessive heat and pressures and a characteristic 'knocking' noise. If allowed to continue unchecked, major engine damage can occur. A single knock sensor is mounted in the crankcase ventilation cover at the front of the crankcase 'V', and is able to identify detonation 'knock' and produce an AC output voltage which increases with the severity of the knock. The knock control strategy programmed into the ECM allows the engine to adhere as closely as possible to the optimum ignition timing and turbo boost settings without a damaging level of detonation.



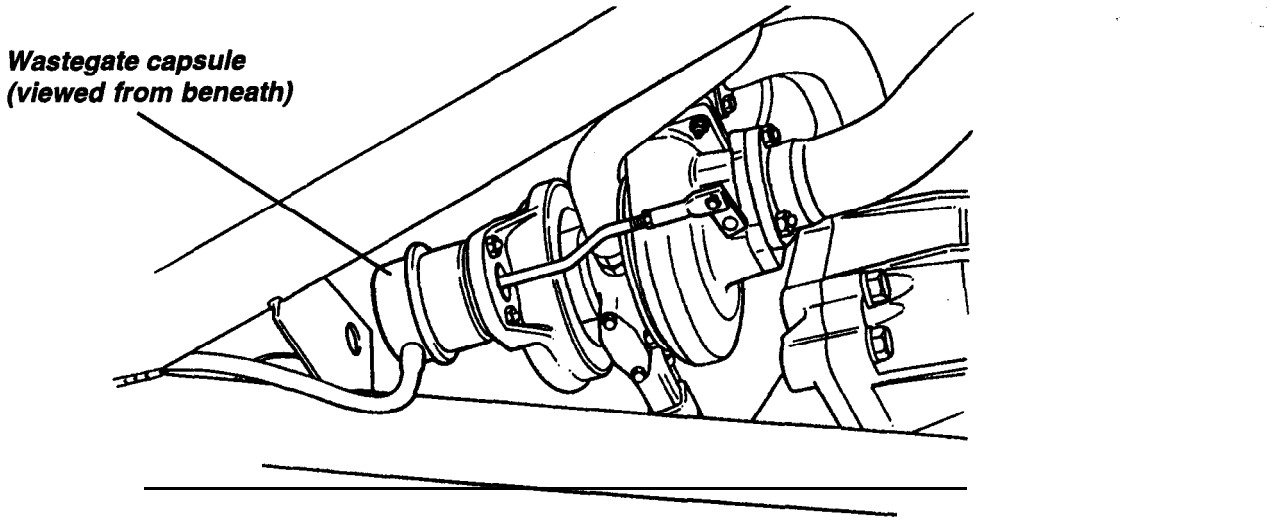
When the knock sensor detects the onset of detonation, the ECM first rapidly retards ignition timing to a safe level, and then progressively advances ignition until detonation is again detected (if at all), and the cycle repeats. If however, retarding the ignition does not stop the detonation, the ECM also rapidly reduces boost pressure before slowly allowing it to build up again (see Sub-Section EMM.2 - R).

EMM.2 - U BOOST CONTROL SOLENOID VALVE

Each of the two turbochargers is fitted with a flap type wastegate valve to divert exhaust gas away from the turbine wheel and control the build up of boost pressure. The flap valve is operated pneumatically by a spring loaded diaphragm capsule, connected by hose to the outlet from the turbocharger compressor. The spring in the capsule acts to keep the wastegate closed and allow boost pressure to be developed, but as pressure at the compressor outlet approaches 0.35 bar (5.0 lbf/in²), the pressure in the diaphragm capsule balances that applied by the spring, and the wastegate begins to open. This is the basic mechanically controlled maximum boost setting which cannot be reduced by the ECM. However, the opening of the wastegate can be delayed, and the boost pressure increased, by ventilating the pressure line between compressor and wastegate capsule.

If the pressure line is disconnected (ventilated) completely, the wastegate will remain closed under spring pressure and boost will be allowed to increase to the limits of the turbocharger system. In order to be able to control the 'additional' boost above the basic setting, a pneumatic solenoid valve is fitted in the pressure line between each compressor and wastegate capsule, and functions as a frequency valve, operated by a square wave signal of constant frequency (32 Hz) but varying pulse width (pulse width modulation). The proportion of time for which the valve is open and the pressure line ventilated, is controlled by the ECM and may be

displayed by the 'Tech 1' tool as a 'duty cycle' percentage figure. The higher the figure, the greater the ventilation time, and the greater the allowed boost. A single boost frequency valve is used to control both wastegate capsules, and is mounted at the RH front of the engine bay, alongside the safety inertia switch, with the pressure signal taken from the RH front of the.intake plenum.



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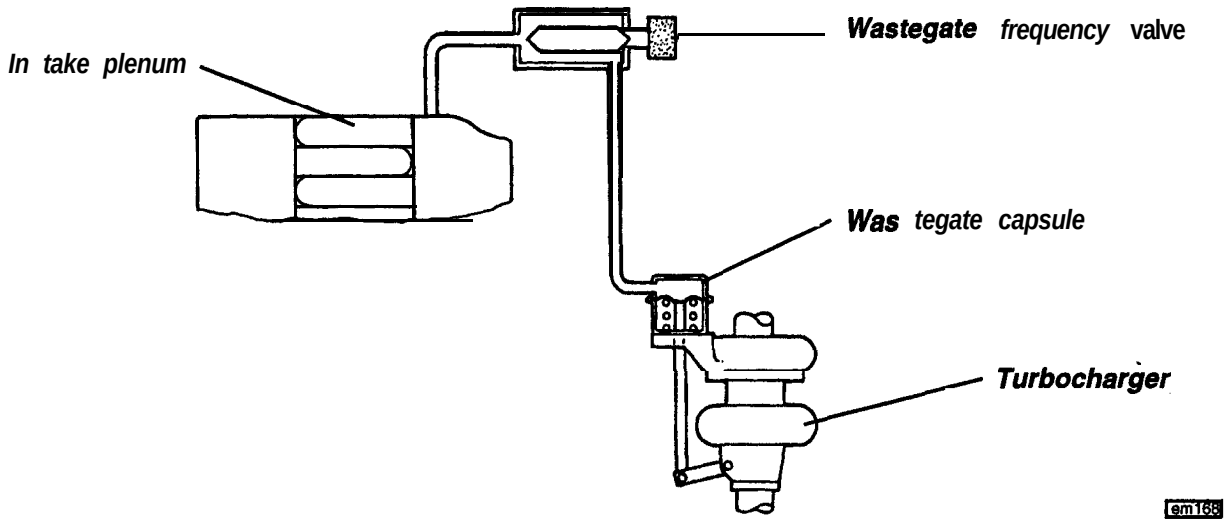

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The ECM requests extra boost only at normal running temperature, and at wide throttle openings as sensed via the TP sensor. Maximum boost will be applied at throttle openings over 95% (with a correspondingly high airflow), when the solenoid valve pulse width is modulated to allow up to 0.75 bar (11 lb/in²) to be developed. Under wide open throttle transient conditions, a short duration of additional boost up to 1 .O bar (15 lbf/in²) may occur.

The ECM will reduce pulse width to lower boost pressure if the knock sensor detects detonation (see above) which is not readily reduced by retardation of the ignition timing. As an engine safeguard, in case of a boost control system failure, the ECM will shut off the fuel injectors if boost pressure in excess of 1 .O bar (14.5 psi) is detected for more than 2 seconds. Fuel and ignition are reinstated below 0.7 bar (10 psi). All quoted pressures are approximate and at sea level.

The boost control system is an open loop adaptive system, whereby the solenoid valve pulse width to be used at any particular time is taken from a set of calibration tables, with functions of barometric pressure, throttle position and engine speed. The actual boost pressure is then measured and compared with that demanded. Any discrepency between demanded boost and actual boost is corrected, and the correction value recorded and stored in a table in the ECM memory. This correction table is used next time those operating conditions are met to speed the attainment of the correct pulse width for the required boost pressure. This 'adaptive' method maintains close control of boost pressure.

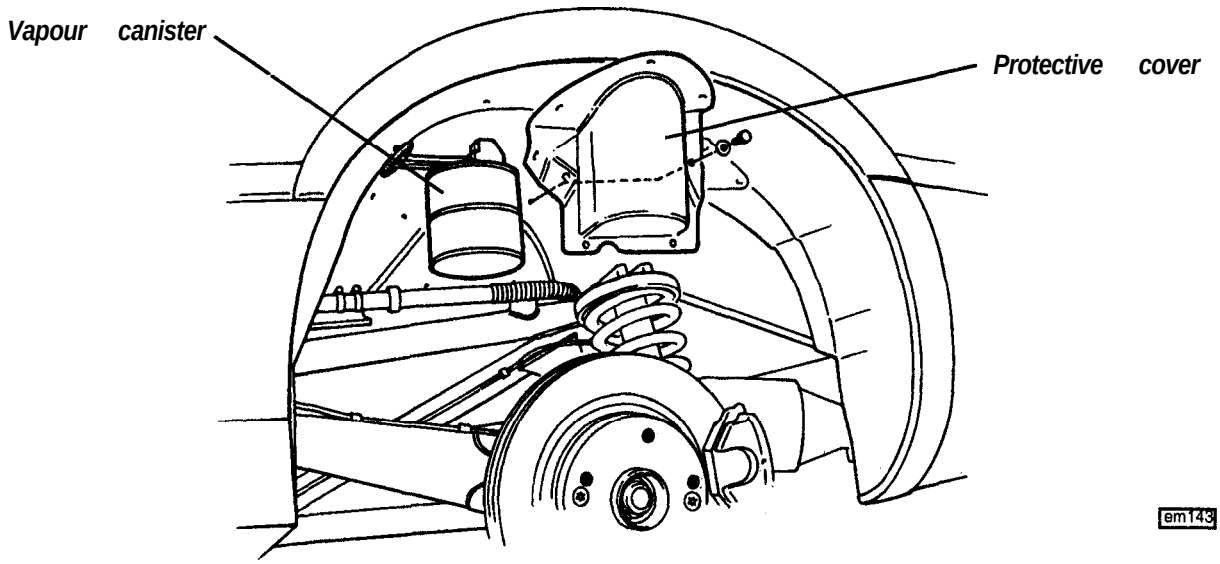
Note that because the ECM monitors boost pressure via the MAP sensor, maximum boost pressure is controlled to absolute values which are independent of atmospheric pressure. For this reason, the maximum readings of the boost gauge in the instrument panel will tend to rise with increasing altitude and decreasing atmospheric pressure.

EMM.2 • V EVAPORATIVE EMISSION CONTROL SYSTEM (EECS)

In order to prevent fuel vapour venting from the fuel tanks to atmosphere, the vent pipes from both tanks are routed to a canister filled with activated-charcoal, which adsorbs the fuel vapour. When the engine is running, the canister is connected to the intake plenum (via the EGR manifold), such that under 'no boost' conditions, fresh air is drawn through the canister to purge the charcoal of its adsorbed fuel, with the resultant gas then consumed by the engine in the normal combustion process.

Vapour Canister

This is mounted within the LH rear wheelarch, where it is protected by a plastic cover.



Fuel vapour from both fuel tank filler necks is routed via a roll-over valve (to prevent fuel spillage if the car is inverted) adjacent to the LH filler neck, to the canister port labelled 'tank'. A central tube in the canister connects this port to the underside of the charcoal bed, below which is a reservoir to collect any liquid fuel. The top side of the charcoal bed is connected via a port in the top of the canister, to atmosphere. A purging port, controlled by a solenoid valve on the top of the canister, connects the engine intake plenum with the tank vent and underside of the charcoal bed. When the ECM controlled solenoid valve is open, the depression in the engine intake draws air through the charcoal bed to purge the canister of vapour, and prepare the charcoal for further adsorption. A one-way valve in the pipe between canister and engine prevents gas back-flow when intake plenum pressure becomes positive under turbo boost conditions.

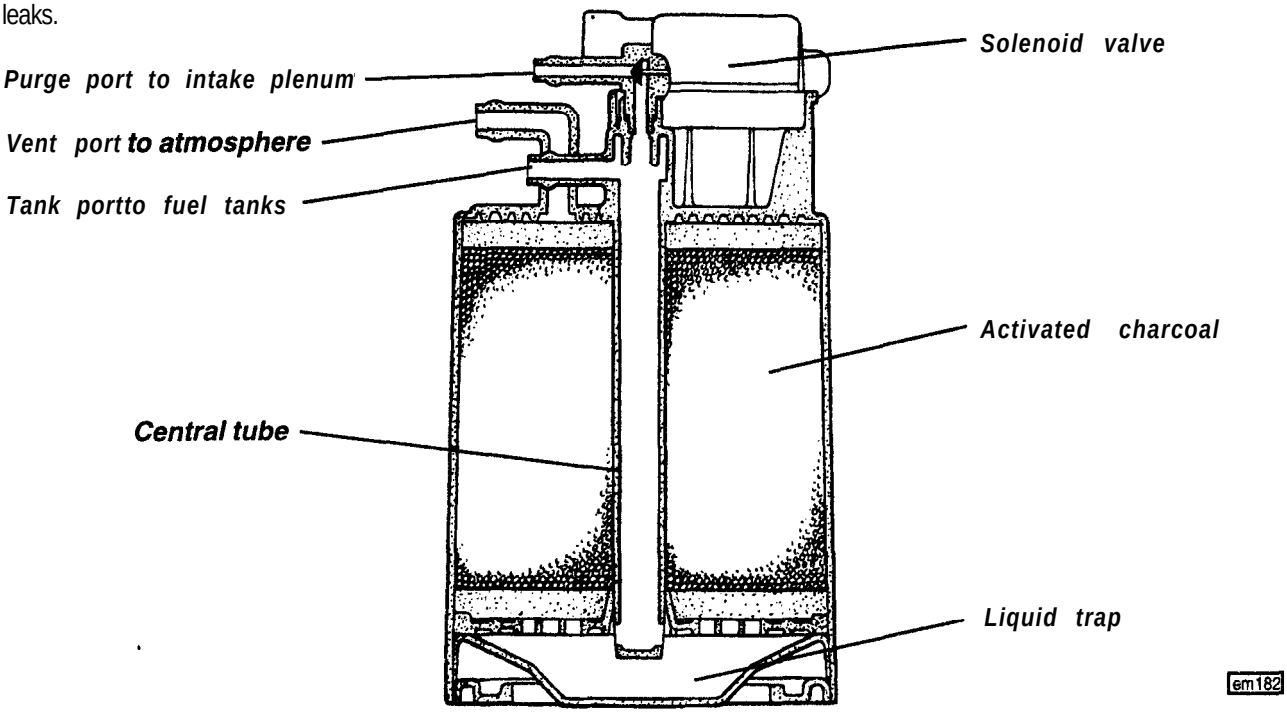
Control System

A solenoid valve mounted on top of the canister and controlling the purge line to the engine, uses pulse width modulation to control the amount of purging to take place at any one time. The square wave signal to the valve is supplied by the ECM which opens and closes the normally closed solenoid valve many times a second. Under cold engine conditions, the solenoid valve remains closed and no purging takes place. The ECM energises the solenoid valve and allows purging under the following conditions:

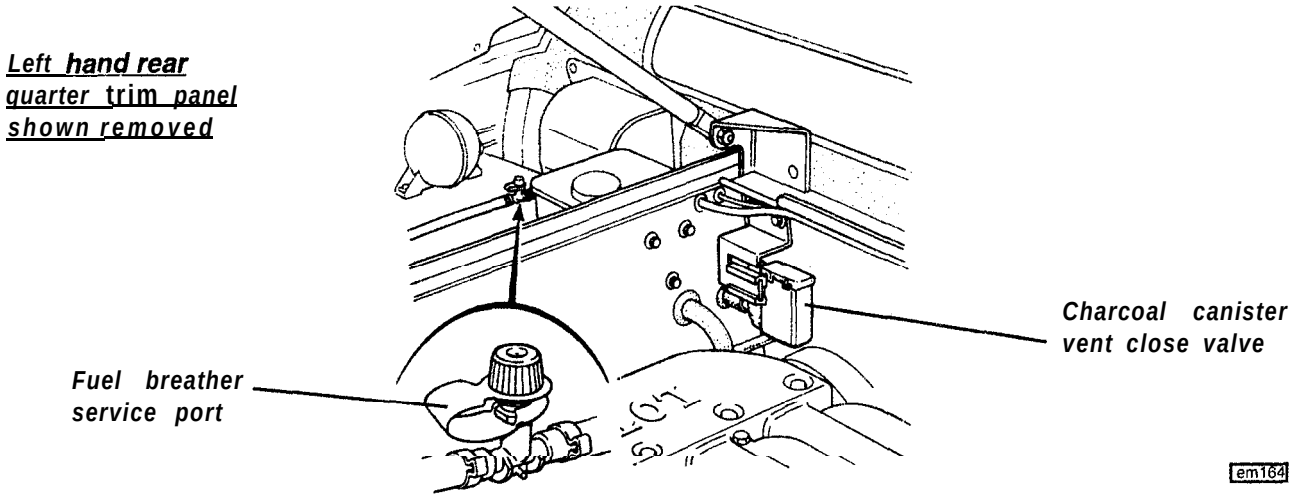
i) The engine is warm;
ii) Closed loop fuel control is operating.

The pulse width of the solenoid valve signal is controlled by the ECM, which uses various inputs including

an exhaust oxygen (O_2) signal to determine the quantity of vapour which may be fed into the engine under the operating conditions at that time. A pressure sensor spigotted into the top of the fuel pump mounting plate, monitors the fuel tank pressure and enables the ECM to check the evaporative emissions control system for leaks.



In order to be able to verify the integrity of the evaporative control system pipework, as may be required by an I.M. test in some areas of the USA, a service port is included in the purge line between the canister and the engine intake plenum, and a close valve on the vent line. This test is performed using the 'Tech 1' tool and supporting hardware, with the procedure defined in the Tech 1 test mode operating instructions.



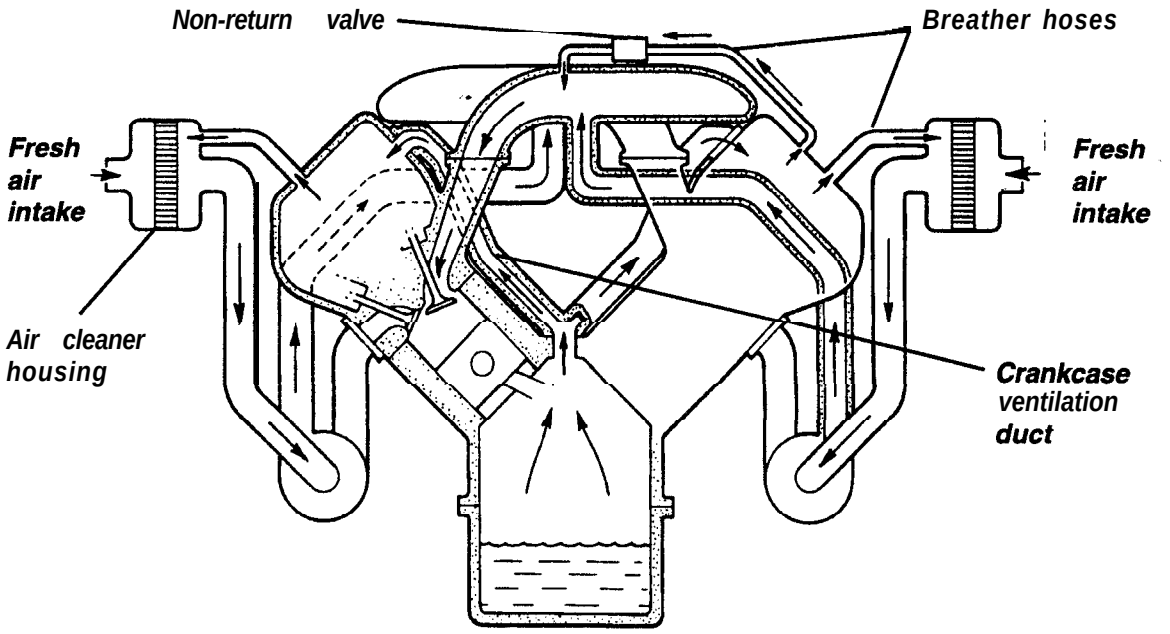
EMM.2 • W CRANKCASE BREATHER SYSTEM

Crankcase fumes are managed as follows:

Each cam cover is lined with a steel oil spray shield, the space above which is connected via a duct and hose to the crankcase breather cover in the centre of the 'V'.

This breather space is ventilated by a hose connecting a spigot on the front face of each cam cover to the adjacent 'clean side' air filter cover.

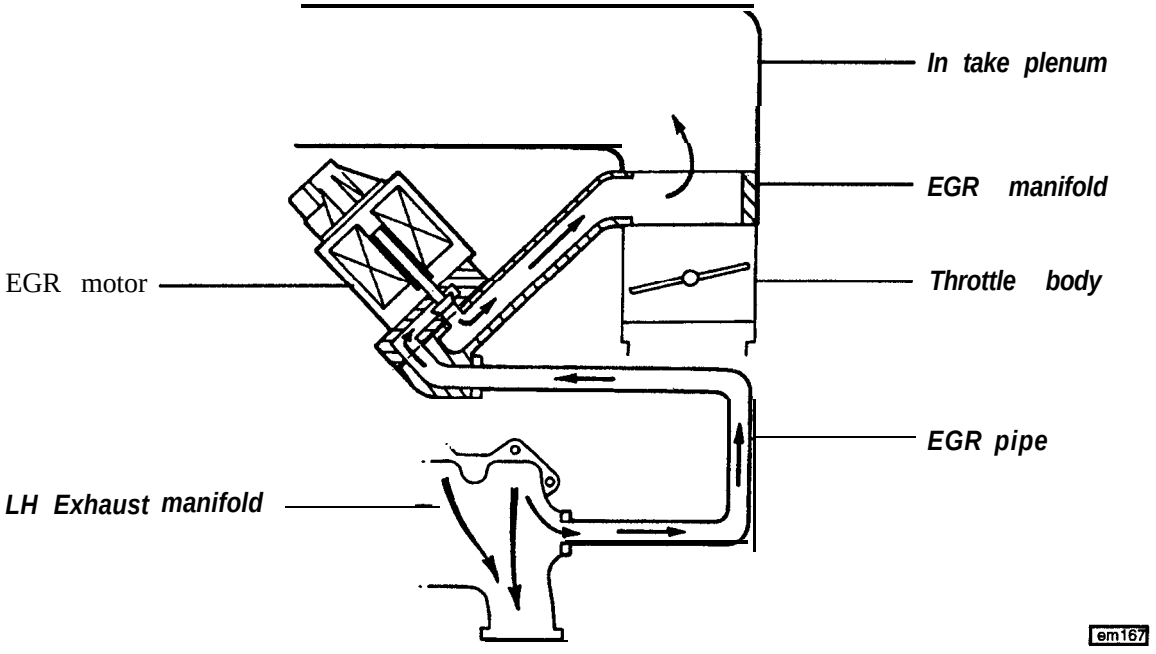
A small bore hose connects a spigot on the rear face of the RH cam cover, via a one way control valve, to the intake plenum common chamber.



Under light load running conditions, the small bore hose maintains a small negative pressure in the crankcase. Underboost conditions, intake plenum pressure becomes positive and the one way valve seals off this hose. Airflow through the intake ducting is then sufficient to induce a negative pressure in the hoses connected to the front of the cam covers.

EMM.2 - X EXHAUST GAS RECIRCULATION

The exhaust gas recirculation (EGR) system is used to lower NOx (oxides of nitrogen) levels caused by high combustion temperatures. Only a small amount of exhaust gas is fed back into the intake system to reduce combustion temperature; too much recirculation would result in poor combustion.



An EGR motor under the control of the ECM, is mounted on a manifold sandwiched between the throttle body and the intake plenum, and controls a port between the intake common chamber, and a flow of exhaust gas supplied from the LH exhaust manifold via a stainless steel pipe. The EGR motor is controlled by a square wave signal of constant frequency but varying pulse width (pulse width modulation) such that the valve open-

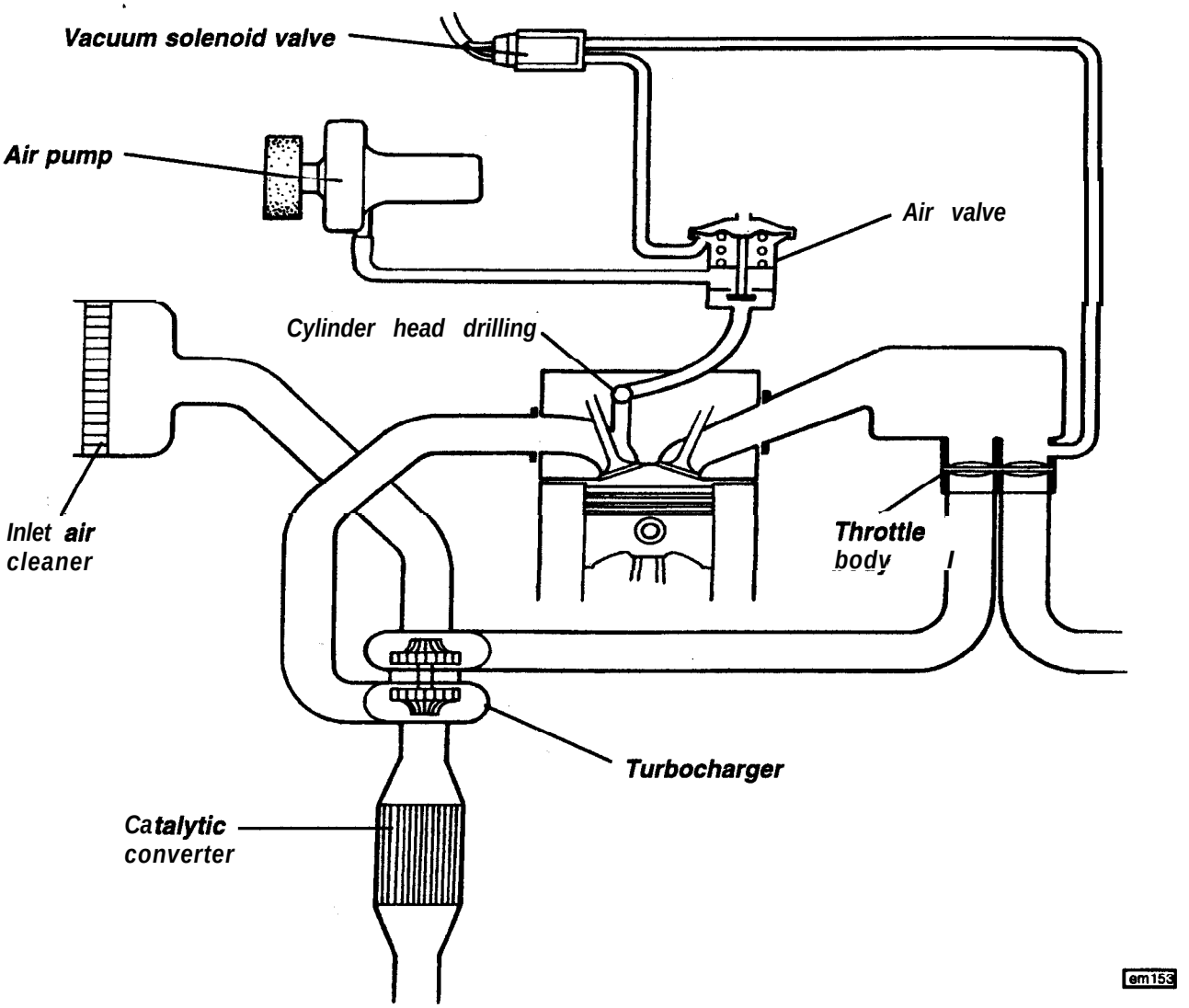
ing increases with increasing pulse width. The ECM will open the valve to allow recirculation under the following conditions:

- above a specified coolant temperature
- throttle opening above idle
  engine speed above idle
  MAP indicating engine under load
- above a certain vehicle speed
- above a certain inlet air temperature

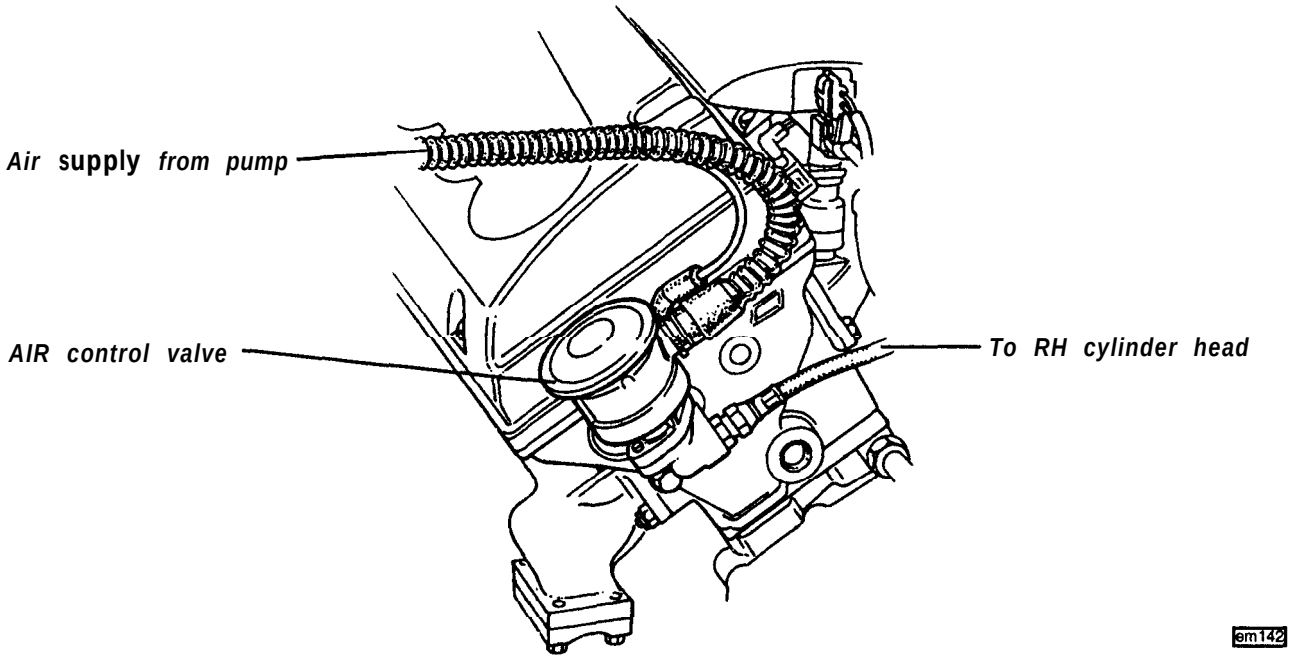
In order for the ECM to verify that EGR is taking place when commanded, a temperature sensor is fitted in the EGR manifold to monitor the temperature of the gas stream leaving the valve. The MIL will be activated and a trouble code set if the ECM commands exhaust gas recirculation and does not record an appropriate gas temperature.

EMM.2 - Y AIR INJECTION

The rich mixture required for a cold start results in high levels of CO and HC in the exhaust gas. The addition of air into the exhaust ports enables further oxidisation to take place using the oxygen content in the air to combine with the CO and HC to form CO2 and water vapour. This combustive reaction results in increased exhaust gas temperature which also speeds the warming of the catalytic converter to working temperature.



This air is introduced via a drilled gallery in each cylinder head terminating in outlets just downstream of the exhaust valve guides. Air is supplied by an impellor type electric pump mounted in the left hand rear of the rear luggage compartment, connected by hose to an air valve on the rear face of the LH cylinder head. The air valve controls the flow of air into the LH cylinder head gallery, and via a steel pipe to the RH cylinder head gallery. The spring loaded air valve is normally closed, and prevents exhaust gas from back flowing through the system to damage, and escape via, the air pump.



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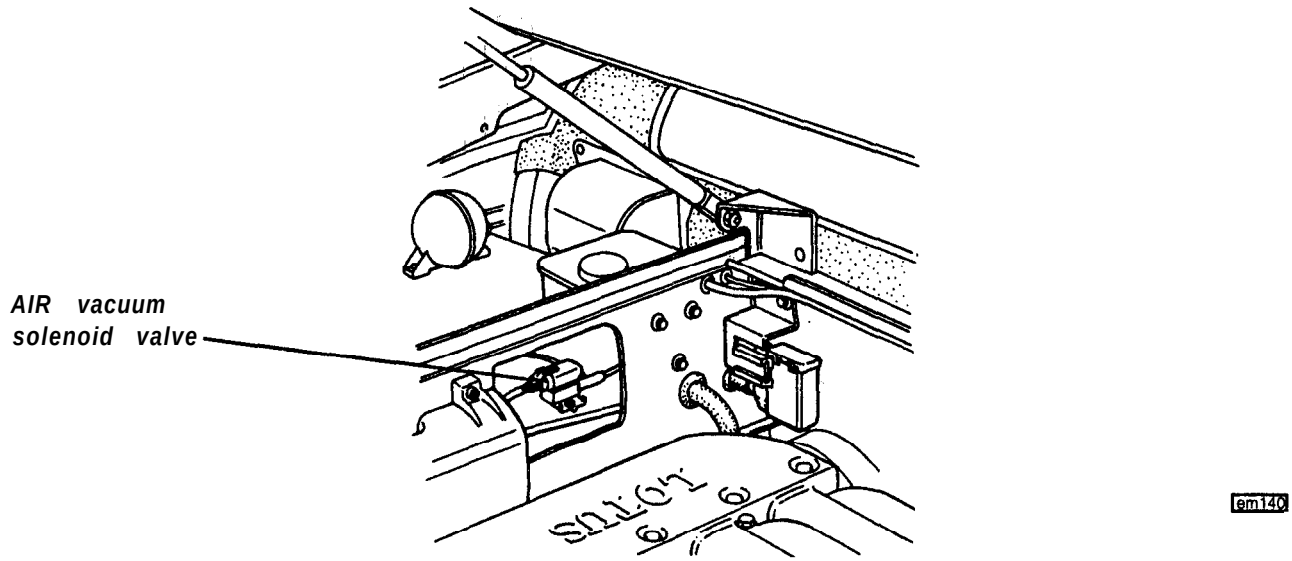
The air valve is opened when supplied with vacuum from a vacuum solenoid valve, located on the left hand fuel tank top board, whose supply port is connected to the front of the intake plenum. The ECM energises both the solenoid valve and the air pump for only a limited period of time (typically 1 - 2 minutes) following cold start, dependent on engine temperature and on the mass consumption of air as calculated by the ECM using IAT, MAP and RPM data.



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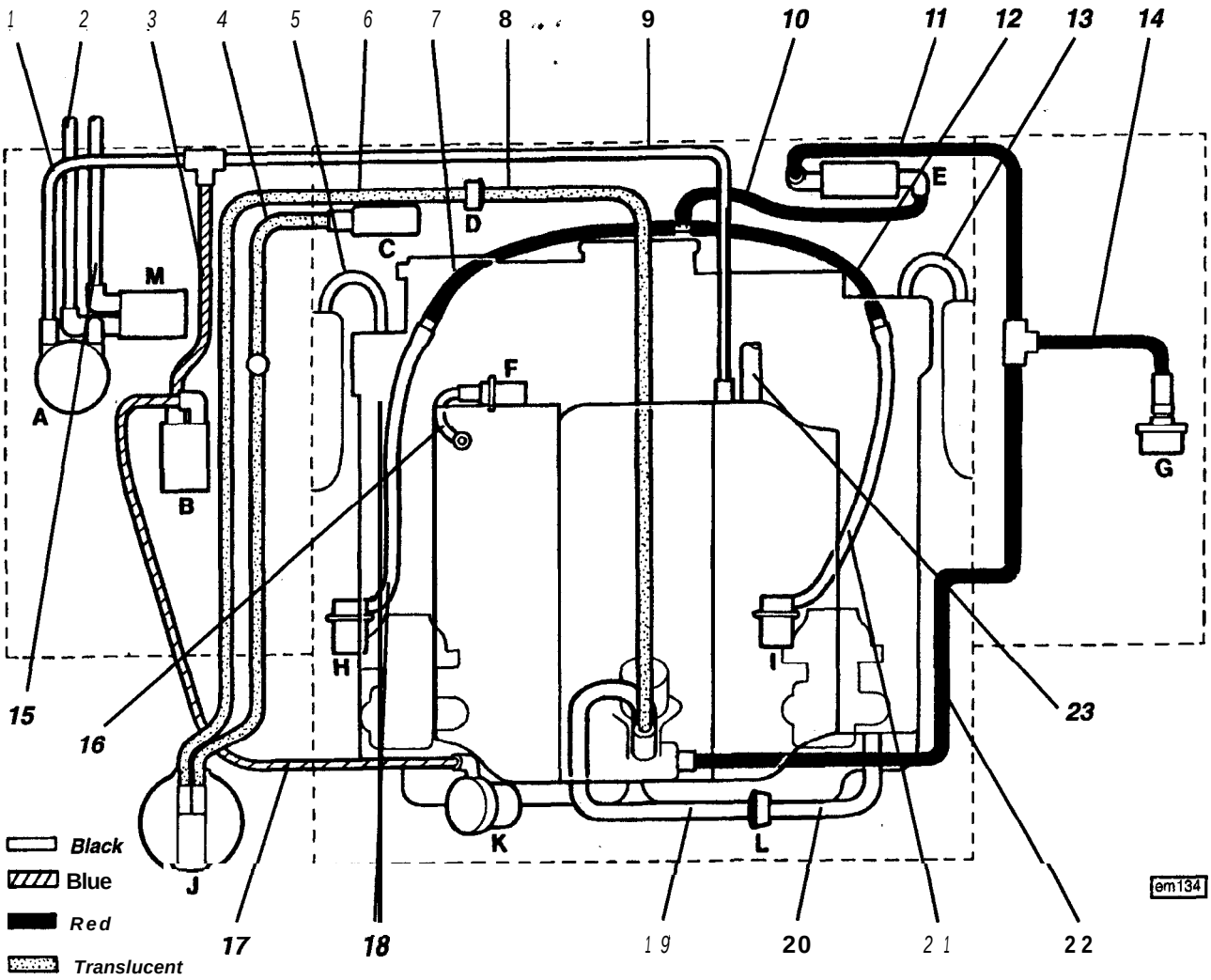
EMM.2 - 7 HOSE CONNECTION DIAGRAM



Key to Hose Connection Diagram

A	Vacuum reservoir, climate controls
B	Solenoid valve, air injection (AIR)
C	Canister close valve & filter
D	Non return valve, canister purge
E	Wastegate solenoid valve
F	Fuel pressure regulating valve
G	Boost gauge transducer
H	LH wastegate capsule
I	RH wastegate capsule
J	Charcoal canister
K	Air injection (AIR) control valve
L	Non return valve, crankcase breather
M	Coolant recirc. solenoid valve
1	Climate control feed, T-piece to reservoir
2	Climate control feed, reservoir to heater
3	(Blue) AIR, T-piece to solenoid valve
4	(Trans.) Evap. canister to close valve
5	Breather, cam cover to LH air cleaner
6	(Trans.) Purge, canister to EGR manifold
7	(Red) T-piece to LH wastegate reducer
a	(Trans.) Purge, EGR manifold to NRV
9	Climate and AIR supply
10	(Red) Wastegate solenoid to T-piece
11	(Red) T-piece to wastegate solenoid
12	(Red) T-piece to RH wastegate reducer
13	Breather, cam cover to RH air cleaner
14	(Red) T-piece to boost gauge transducer
15	Solenoid valve to recirc. diverter valve
16	Plenum to fuel pressure regulator valve
17	(Blue) AIR solenoid valve to control valve
18	Reducer to LH wastegate capsule
19	Breather, EGR manifold to non-return valve
20	Breather, non-return valve to cam cover
21	Reducer to RH wastegate capsule
22	(Red) Throttle body to T-piece
23	Brake servo supply

SECTION EMM.3

INDIVIDUAL COMPONENT DIAGNOSIS & REPLACEMENT

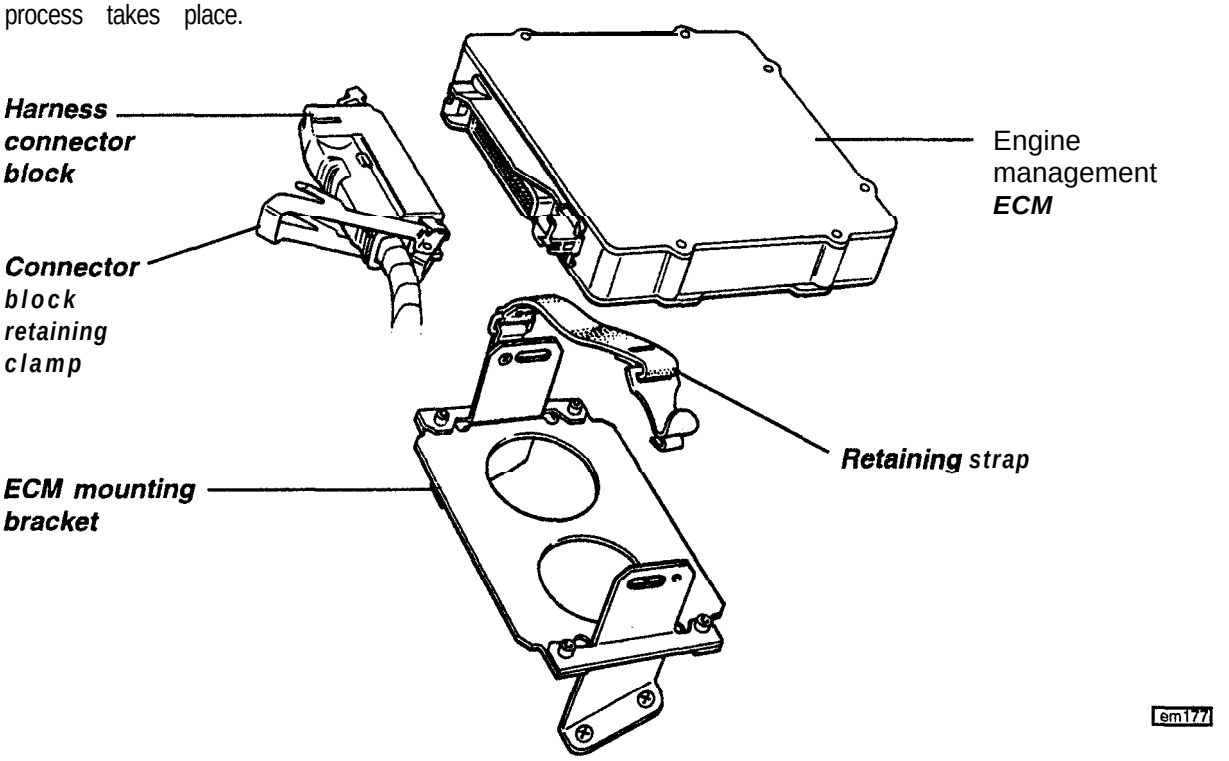
EMM.3 • A ELECTRONIC CONTROL MODULE (ECM)

The Electronic Control Module (ECM) is mounted on the top of the RH fuel tank board, and is serviced only as a complete assembly. Calibration data is stored in the ECM in electrically erasable programmable read only memory (EEPROM).

CAUTION: To prevent internal damage to the ECM, the ignition must be OFF when disconnecting or reconnecting power to the ECM e.g. battery cable, ECM fuse, using jumper cables, etc. Allow a few seconds after switching off the ignition for the ECM to gather re-start data before disconnecting the power.

To Replace ECM

1. Switch off the ignition and wait for a few seconds before disconnecting the negative battery cable.
2. Remove the RH rear quarter window trim panel.
3. Swing back the retaining clip, and unplug the harness connector plug from the ECM.
4. Unhook the retaining strap, and withdraw the ECM from its mounting bracket.
5. Fit the new ECM into the mounting bracket, and retain with the rubber strap. Plug in the harness connector block, and secure with the retaining clip.
6. Connect the vehicle battery.
7. Refit the quarter window trim panel.
8. Note that the optimum settings of some engine control parameters will have to be learned by the new ECM, and that for a short period, a change in performance characteristics may be noticed whilst this process takes place.



EMM.3 - B ENGINE COOLANT TEMPERATURE (ECT) SENSOR

The engine coolant temperature (ECT) sensor is mounted in the water pump intake chamber at the front of the cylinder block 'V'. The 'Tech 1' scanner tool displays engine temperature as read by the ECT in degrees Centigrade. If the engine has not been run for several hours, the ECT and intake air temperature (IAT) sensors

should indicate similar temperatures. After engine start up, the temperature should rise steadily to around 80°C then stabilise as the thermostat opens. A further slow rise in temperature to 100°C may be seen at which point the ECM switches on the radiator cooling fans, which remain energised until coolant temperature falls to approx. 95°C.

A fault in the coolant sensor circuit should set a Code PO1 16/P0117/P0118, the diagnosis of which are detailed in section EMM.4.

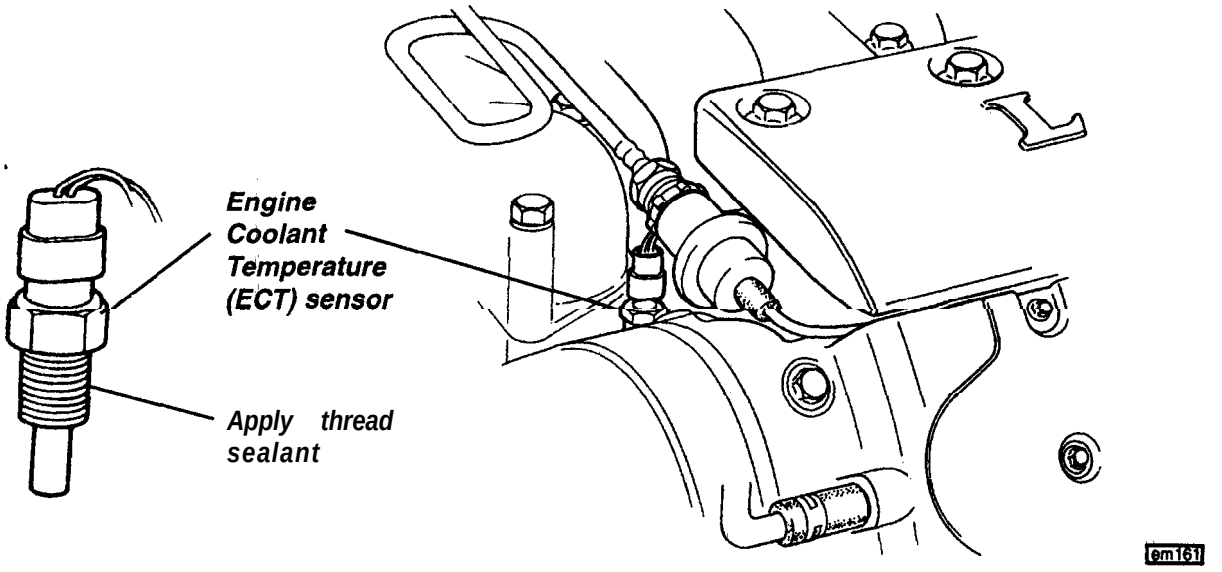
To test the sensor, immerse the sensor bulb in a liquid bath and measure the resistance between the two terminals using a resistance bridge with a maximum current of 1mA:

Bath Temp.	*Resistance*
15°C	4100 - 4750 ohms
128°C	77 - 84 ohms

To Replace ECT Sensor

1. Drain sufficient coolant to lower the level below that of the sensor.

2. Unplug the electrical connector, and unscrew the sensor from the cylinder block.



3. Apply a suitable thread sealing compound to the thread of the sensor (pre-applied on a new sensor), and screw into the block. Tighten to 20 Nm (15 lbf.ft), and refit the electrical connector.

4. Refill the cooling system with the specified coolant mix.

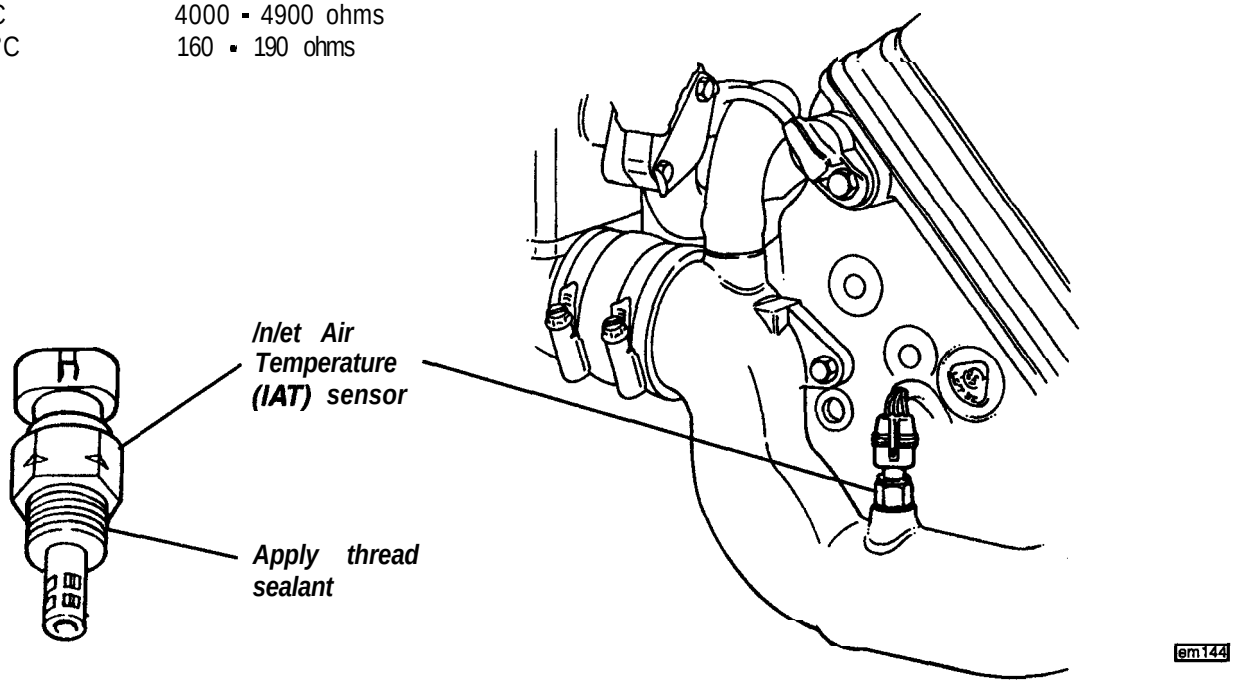
EMM.3 - C INTAKE AIR TEMPERATURE (IAT) SENSOR

The intake air temperature (IAT) sensor is fitted into the RH inlet elbow to the throttle body. The 'Tech 1' scanner tool is able to display intake air temperature as detected by the sensor, in degrees Centigrade, and should be close to ambient when the engine is cold. If the engine has not been run for several hours, the ECT and intake air temperature (IAT) sensors should indicate similar temperatures. The IAT reading will rise as engine and engine bay temperature increase, and will range from near ambient to 130°C under high boost conditions.

A failure in the IAT sensor circuit should set a Code P0111/P0112/P0113 the diagnosis of which are detailed in section EMM.4.

The resistance of the sensor when measured with a resistance bridge with a maximum current of 1 mA, and when subjected to a moving air column is as follows:

Air Temp.	Resistance
15°C	4000 - 4900 ohms
100°C	160 - 190 ohms

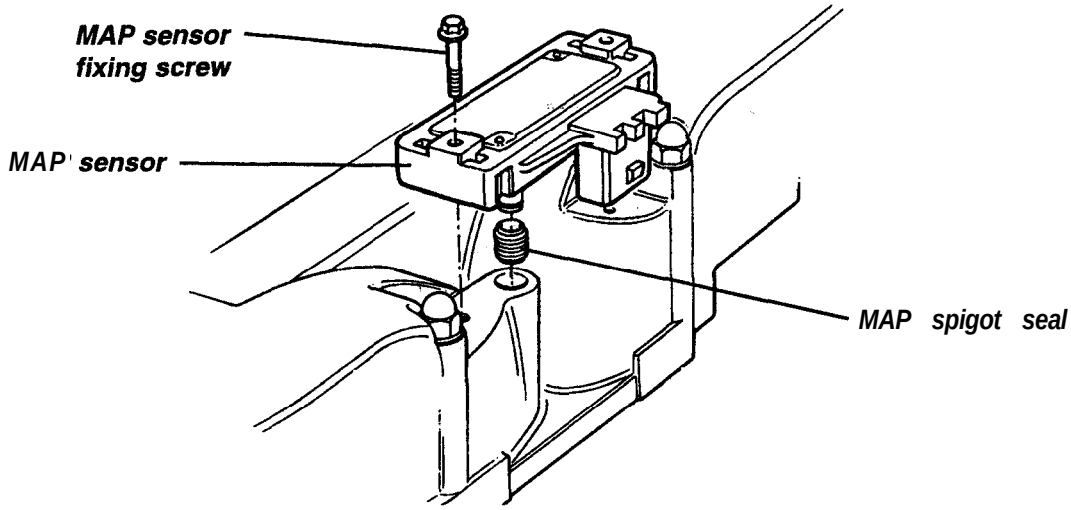


To Replace IAT Sensor

Unplug the electrical connector, and unscrew the sensor from the throttle body intake elbow. Before refitting, apply Teflon tape or other suitable thread sealant to the thread, and tighten to 20 Nm (15 lbf.ft).

EMM.3 - D MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

The manifold absolute pressure (MAP) sensor is fitted on the top rear of the intake plenum, and senses intake air pressure directly via a port in the plenum. The 'Tech 1' scanner tool is able to display MAP in both kPa and sensor voltage. With the engine stopped, the MAP sensor kPa should be similar to the BARO reading, and the voltage reading half that from the BARO sensor. Low pressure (high vacuum) displays a low voltage, and high pressure a high voltage, A failure in the MAP sensor circuit should set a Code /P0106/P0107/P0108, for which trouble code diagnosis is provided in section EMM.4.



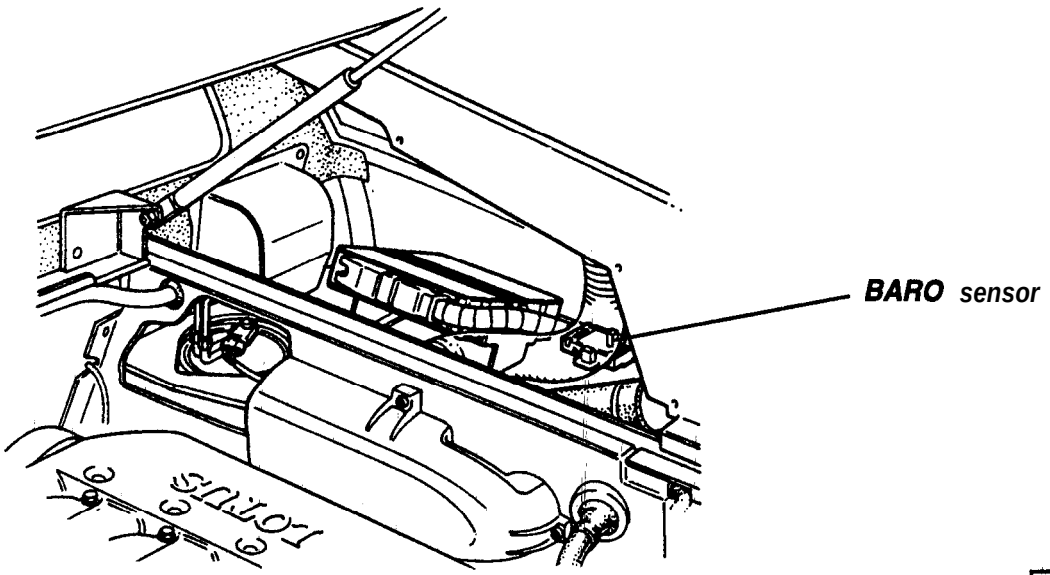
The MAP sensor is a fundamental source of information for the ECM to calculate the volume of air being consumed, and the consequent fuel requirement. If the MAP sensor should fail, the ECM will substitute a default value, and use other sources of data, including the throttle position sensor, to enable the car to 'limp home'.

To Reolace MAP Sensor

Unplug the electrical connector, remove the two M5 retaining screws and withdraw the sensor from the plenum. Before refitting the sensor, check that the seal around the sensing spigot is serviceable. Fit the sensor onto the plenum, and secure with the two screws. Refit the electrical connector.

EMM.3 ▪ E BAROMETRIC PRESSURE (BARO) SENSOR

The barometric pressure (BARO) sensor is mounted on the RH fuel tank board, and is used to establish the pressure baseline from which other system pressures are calculated. The 'Tech 1' scanner tool is able to display BARO in both kPa and sensor voltage. With the engine stopped, the BARO sensor kPa should be similar to the MAP sensor reading (compare also with a weather barometer), and the voltage reading twice that from the MAP sensor. Low pressure displays a low voltage, and high pressure a high voltage. A failure in the BARO sensor circuit should set a Code P1106/P1107/P1108, for which trouble code diagnosis is provided in section EMM.4.



em141

To Reolace BARO Sensor

Remove the RH rear quarter window trim panel and release the air intake trunking. Unplug the electrical connector, and remove the two screws securing the sensor to the tank board. Reverse this procedure to refit.

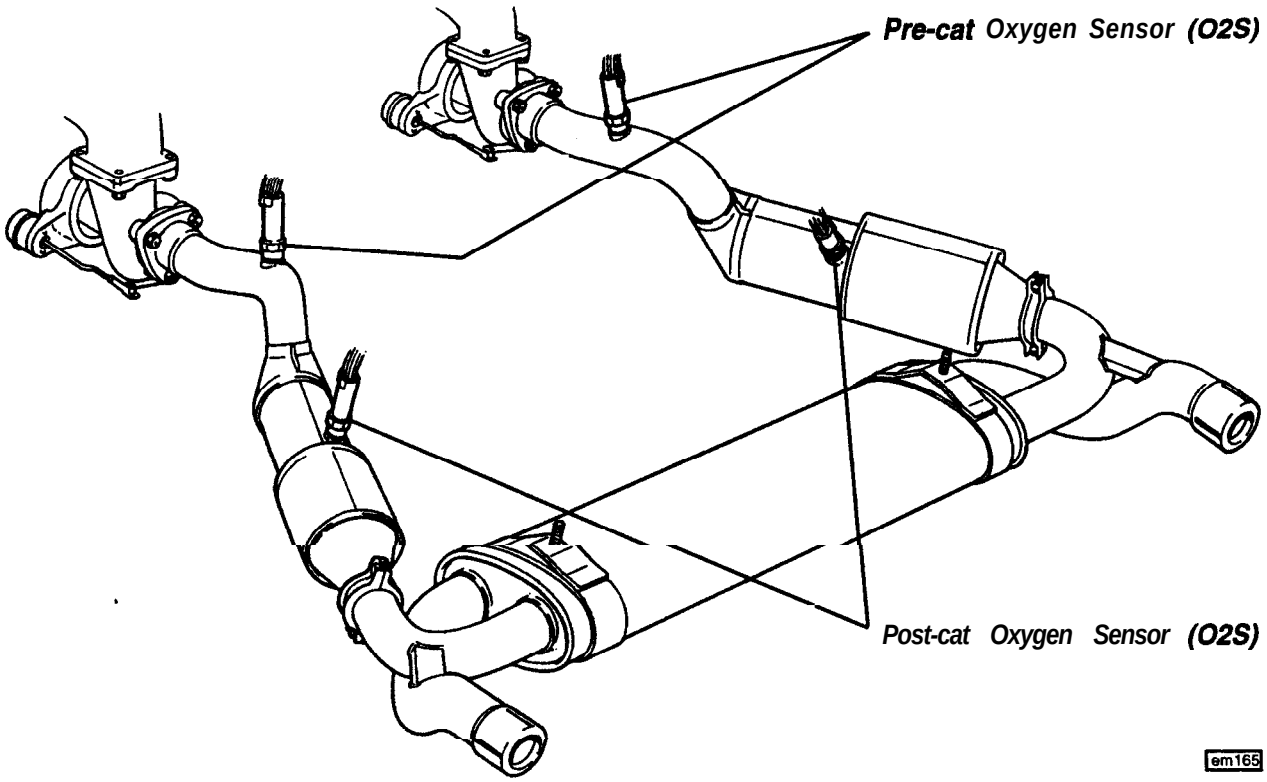
EMM.3 ▪ F CATALYTIC CONVERTERS & EXHAUST GAS OXYGEN SENSORS (O2Ss)

Pre and post converter oxygen sensors (O2Ss) are fitted in the exhaust systems from each cylinder bank, with the bosses for the sensors located on the top side of the exhaust system, immediately ahead of the starter converters (pre-cat) and between the starter and main converters (post-cat). The 'Tech 1' scanner tool has several displays that indicate the state of the exhaust gases: O2S voltage, integrator and block learn. See section EMM.l ▪ E for information on these displays.

Individual trouble codes apply to each of the four sensors, and are allocated as follows:

Codes PO130 to PO135 ▪ RH cylinder bank pre-cat sensor;
Codes PO136 to PO141 ▪ RH cylinder bank post-cat sensor;
Codes PO1 50 to PO1 55 ▪ LH cylinder bank pre-cat sensor;
Codes PO156 to PO161 ▪ LH cylinder bank post-cat sensor.

Associated trouble codes are PO1 25 for delayed switching to closed loop control, PO1 71/P0174 for a lean condition, and PO1 72/P0175 for a rich condition. Refer to the applicable diagnosis in section EMM.4 if any of these codes are stored in the memory.



To Replace Oxygen Sensor

All four of the sensors are the same, and are accessible from beneath the vehicle without disturbing the luggage compartment floor.

1. Unplug the O2S harness connector block: The pre-cat sensor connectors are located on a bracket on top of the front of the gearbox casing. Slide the connector rearwards to disengage from the bracket slot. The post-cat connector is located by a plastic push-pin into the chassis rear crossmember.

2. Unscrew the O2S, and take care to avoid damaging or contaminating the sensor tip. The louvered end of the sensor must be kept free of grease, dirt or other contaminents, including cleaning solvents of any kind.

3. Before replacing an O2S, note that an anti-sieze compound is used on the oxygen sensor threads. The compound consists of a liquid graphite and glass beads. The graphite will burn away, but the glass beads will remain, making the sensor easier to remove. New sensors have the compound pre-applied to the threads, but if a sensor is to be re-fitted, it is most important to apply a suitable anti-seize compound (A91 0E6966) to facilitate subsesquent removal.

4. Use a new washer (A910E7001 F) if necessary, apply anti-seize compound (A910E6966) to the threads WITHOUT contaminating the sensor tip, and tighten the sensor to 38 - 46 Nm (28 - 34 lbf.ft). Mate the electrical connector and relocate the connector block in the gearbox bracket (pre-cat sensor) or chassis rear crossmember (post-cat sensor)
   Note that each of the harness connector plugs is labelled with its O2S location. Ensure that all sensors are correctly connected.

EMM.3 - G THROTTLE POSITION (TP) SENSOR

The throttle position (TP) sensor is fitted to the right hand end of the throttle spindle on the throttle body. The 'Tech 1' scanner tool is able to display throttle position both as a percentage (wide open throttle = 100%) and as a voltage signal. The closed throttle voltage with the ignition switched on, should be 660 - 700 millivolts, increasing steadily to near 5.0 volts at wide open throttle (WOT).

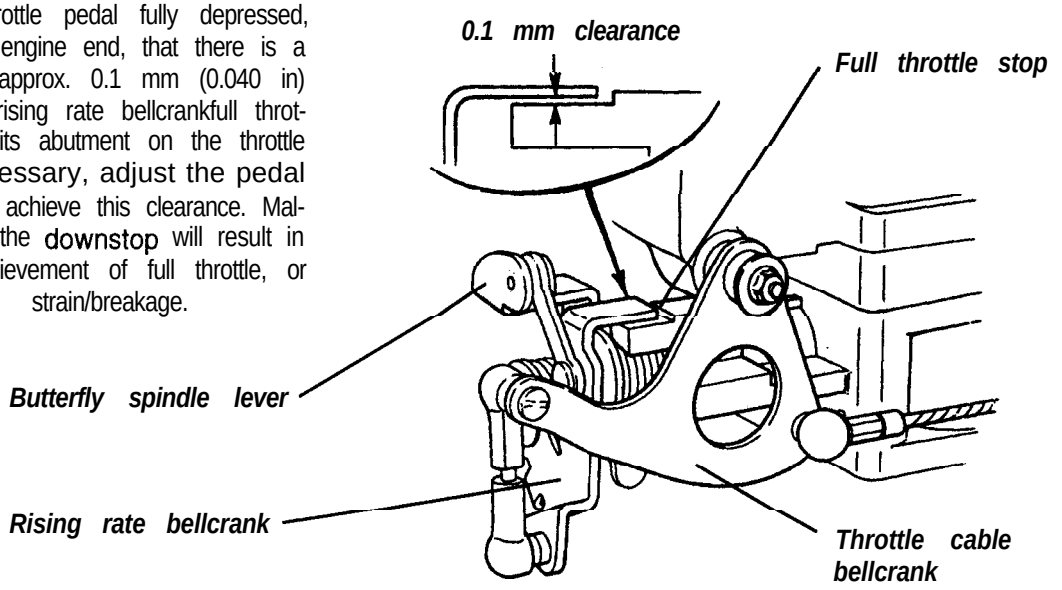
The ECM interprets the voltage signals received from the TP sensor, and has the ability to learn a new fully closed setting if this should change over a period of time. The electronic control of turbocharger boost pressure is dependent on throttle opening as sensed by the TP sensor. If the TP sensor does not register more than 95% at WOT, performance will be restricted by less than full electronic enhancement of boost pressure. A failure in the TP sensor or circuit should set a Code P0121/P0122/P0123.

The TP sensor is not adjustable, and if a reading of 95% cannot be achieved at full throttle, check the adjustment of the throttle cable and pedal downstop:

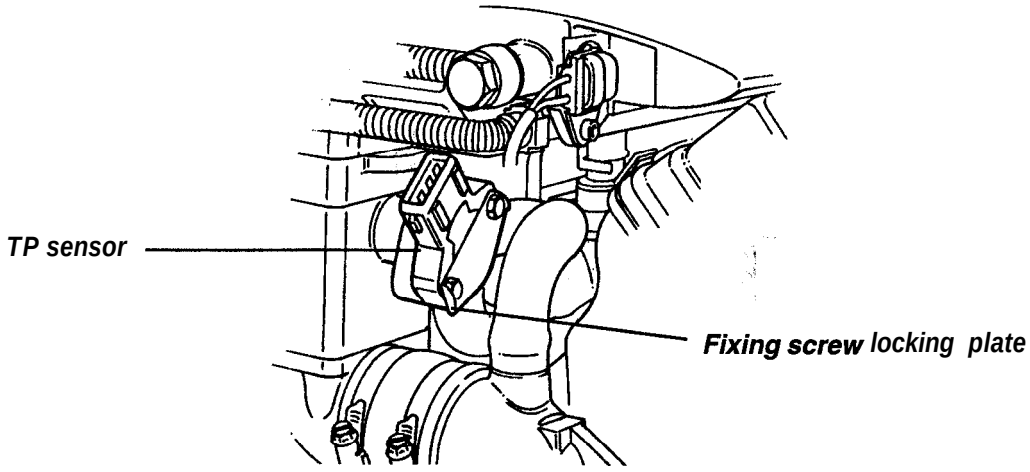
1. Check that there is minimal free play in the throttle cable, and adjust if necessary at the cable abutment on the engine: The throttle outer cable locates in a rubber isolator bush in the abutment bracket, with the cable position controlled by a spring clip fitted in one of a series of annular grooves in the cable.

2. Check that at full throttle pedal travel, there is metal to metal contact between the pedal downstop bolt and its body abutment. If necessary, remove carpets or mats.

3. With the throttle pedal fully depressed, check at the engine end, that there is a clearance of approx. 0.1 mm (0.040 in) between the rising rate bellcrankfull throttle stop and its abutment on the throttle body. If necessary, adjust the pedal downstop to achieve this clearance. Maladjustment of the downstop will result in either non-achievement of full throttle, or throttle cable strain/breakage.



4. With the throttle cable and pedal downstop adjusted as above, use the 'Tech 1' tool to check the throttle angle at WOT; Specification = 95 - 100%. Check the TP sensor voltage at idle; Specification = 660 - 700 mV.



To Replace TP Sensor

Unplug the electrical connector. Bend back the locking plate, release the two fixing screws and withdraw the sensor from the throttle spindle. Fit the new switch onto the throttle spindle, tighten the two fixing screws, and secure with the locking plate. Check the TP sensor readings with the Tech 1 tool as detailed above.

EMM.3 - H AIR CONDITIONING (A.C.) & RADIATOR FAN CONTROL (FC)

Information fed to the ECM for control of air conditioning and radiator fans is derived from the a.c. control module mounted at the front of the passenger footwell, and the engine coolant temperature (ECT) sensor fitted in the cylinder block intake to the water pump.

When the a.c. control module determines, via the a.c. temperature control and thermistor, that operation of the a.c. compressor is required, it outputs a positive signal (via a refrigerant low pressure cut out switch) to terminal 69 of the ECM. The ECM processes this request, and subject to other criteria, grounds terminal 65 to switch on the a.c. compressor relay and compressor clutch. Note that the interior fan must be manually selected before the a.c. circuit becomes acitve.

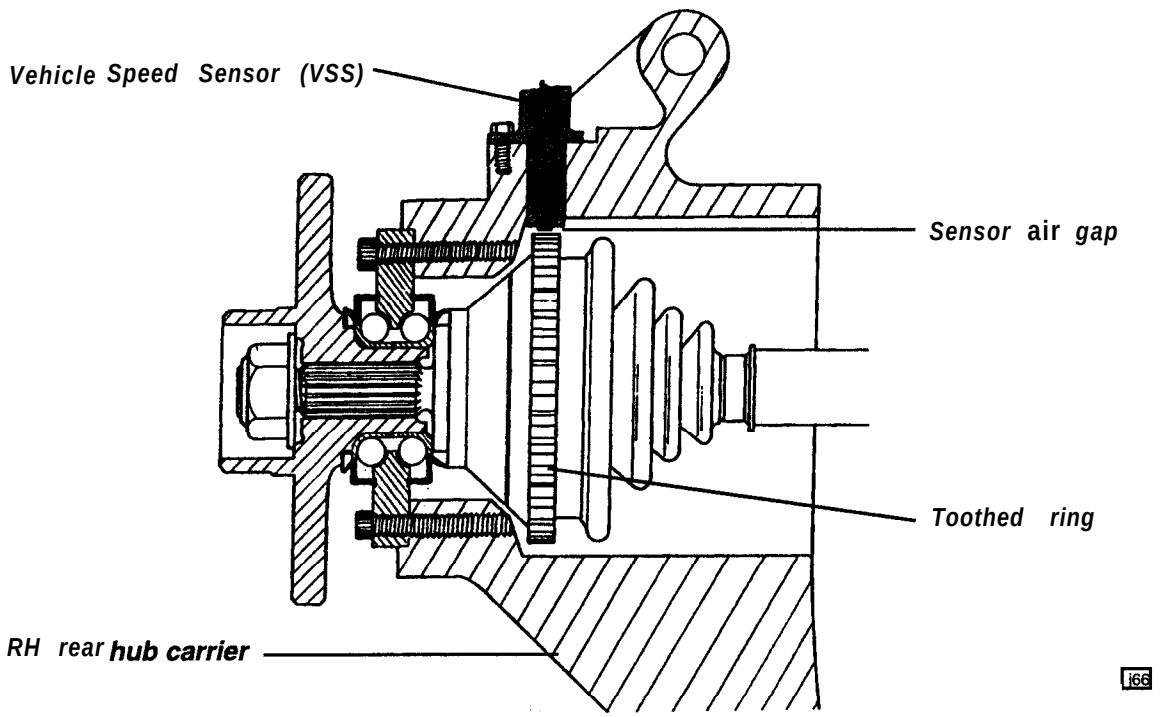
Engine coolant temperature information is received by the ECM at terminal 9, which it processes before grounding terminal 57 to energise the radiator fans relay, and/or terminal 61 to run the coolant recirculation pump.

Trouble codes relating to the a.c. control relay are P1460/P1461. Radiator fan related trouble codes are P1400 to P1403, and recirculation pump codes P1470/P1471. For diagnostic procedures refer to section EMM.4.

EMM.3 - I VEHICLE SPEED SENSOR (VSS)

A variable reluctance type vehicle speed sensor is fitted to each wheel hub in order to provide the anti-lock brake control module with individual wheel speed data. Vehicle speed information from the RH rear hub, in the form of a square wave signal, is supplied from the ABS control module to terminal 75 of the engine management ECM. Both the AC voltage level and number of pulses increase with vehicle speed, and are interpreted by the ECM into mph which can be displayed by the 'Tech 1' scanner tool. The Tech 1 speed display should closely match speedometer readings.

A failure in the wheel speed sensor itself, or its input into the ABS module will be signalled by the fascia mounted ABS tell tale lamp in addition to the engine management MIL. A failure in the VSS circuit should set a Code P0501 for which diagnostic procedures are provided in section EMM.4



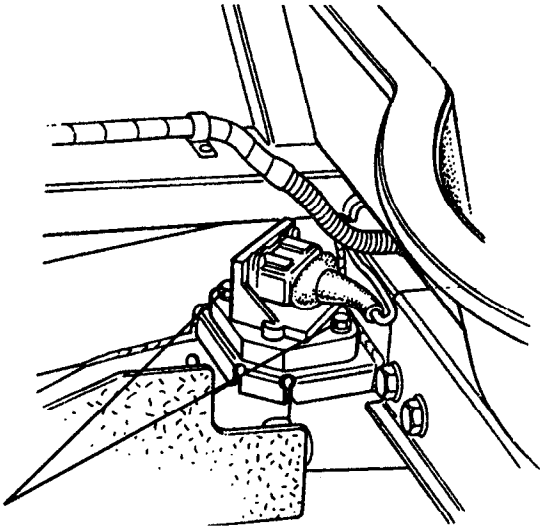
To Replace VSS

Unplug the electrical connector, release the single screw securing the sensor to the LH rear hub carrier, and withdraw the sensor. Cleah any accumulated dirt from the sensor ring teeth.

Ensure the '0' ring is fitted to the sensor before refitting. Push into its location and retain with the single fixing screw, tightening to 8 - 12 Nm (6 - 9 lbf.ft). After fitment, check the air gap between the sensor tip and the toothed ring. Specification = 1.3 - 2.3 mm.

EMM.3 -J ROUGH ROAD SENSOR

The rough road sensor is mounted to the chassis at the right hand rear corner of the engine bay, and has several possible trouble codes; P1 311/P1312/P1313. Refer to the diagnostic procedures in section EMM.4.



Sensor fixing screws em148

To replace the sensor, unplug the electrical connector and release the two fixing screws.

EMM.3 - K FUEL CONTROL SYSTEM

Some failures in the fuel system will result in a condition where the "Engine Cranks But Won't Run". If this condition exists, see chart EMM.4 - 3. This chart will determine if the problem is caused by the ignition system, ECM or fuel pump circuit. If it is determined to be a fuel problem, Chart EMM.4 - 5 or EMM.4 - 7 should be used. This includes the injectors, pressure regulator, fuel pump and fuel pump relay. The fuel system wiring schematic diagram is covered on the facing page of Chart EMM.4 - 5.

Any malfunction in the fuel control system usually results in either a rich or lean exhaust condition. This is sensed, via the oxygen sensors, by the ECM which changes the fuel calculation (injector pulse width) based on O_2 sensor input. The change made to the fuel calculation will be indicated by a change in the fuel trim values which can be monitored by a 'Tech 1' tool. The normal fuel trim values are around 0% at normal running temperature and steady vehicle speed (cruise), and if the O_2 sensor detects a lean condition, the ECM will add fuel. This will result in short term fuel trim values above 0%. If integrator values deviate from 0% consistently for a certain time period the ECM will add counts to the Block Learn Memory (BLM), or long term fuel trim values, which may also be displayed by the 'Tech 1' tool. By adding counts to the BLM, the short term fuel trim values should decrease until they again read about 0%.

Variations in block learn values are normal because all engines are not exactly the same. However, if the block learn values are more than ± 20% from zero and short term fuel trim values deviate from 0% by more than ± 15% for a long time period at steady speed, a system problem may exist. If the block learn values are greater than 20% and there is a driveability symptom, see Code P0171/P0174 for items which can cause a lean exhaust condition.

If the block learn values are less than -20% and there is a driveability symptom, see Code P0172/P0175 for items which can cause the exhaust to run rich. If a driveability symptom exists, also refer to the particular symptom in Section EMM.6 for additional items to check.

WARNING ▪ Safetv Precautions

To minimise the risk of fire and personal injury, relieve the fuel system pressure before servicing the fuel rail or any related component. See 'Fuel Pressure Relief Procedure' below.

To reduce the possibility of sparks occurring when a fuel line is disconnected, or when fuel vapour is present, the negative battery cable should be disconnected before work is commenced.

When fuel lines are disconnected, absorb any escaping fuel in an absorbent cloth and dispose of safely.

Fuel Pressure Relief Procedure

This procedure should be used prior to disconnecting any part of the fuel line except the unpressurised return line from the pressure regulating valve to the fuel tank.

i) If the engine is operative; disconnect the fuel pump feed, start the engine, and run until starved. Crank for a further 10 seconds to reduce any remaining fuel pressure.

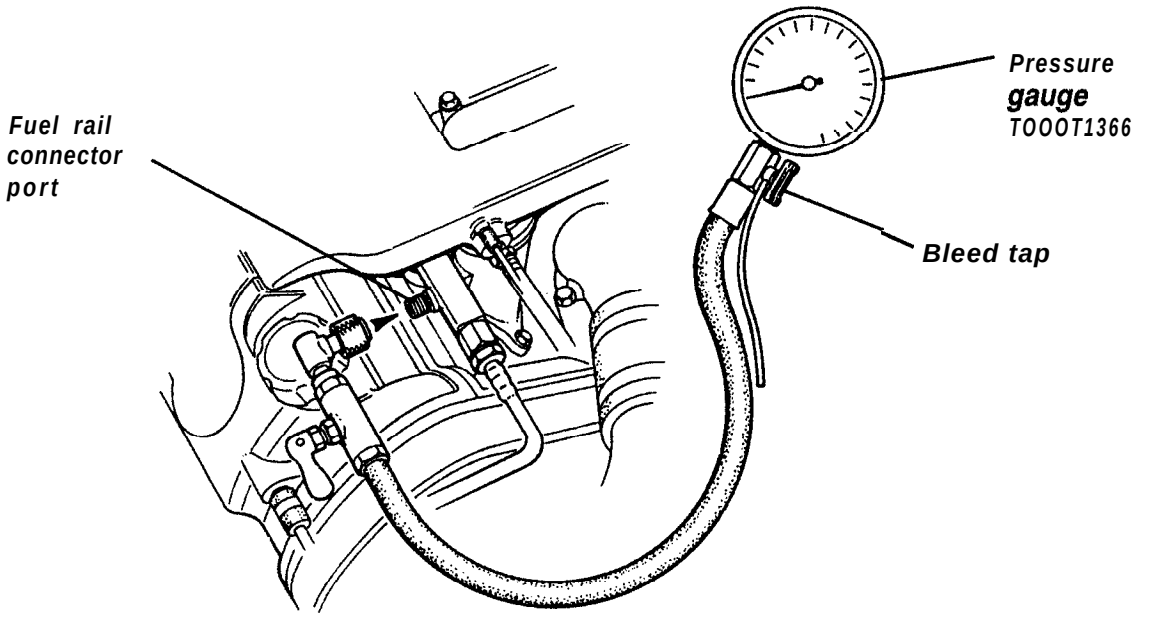
ii) If the engine is inoperative; connect fuel pressure gauge TOOOT1368 to the Shraeder type valve fitted at the front end of the RH fuel rail. Ensure that the gauge bleed tap is closed, and use a cloth to shield from any fuel spray as the connection is made. After connection, position the bleed line in a suitable receptacle and open the bleed tap to relieve the system of fuel pressure.

iii) The fuel line may now be opened using an absorbent cloth for protection from any residual fuel pressure, and to absorb the small amount of fuel draining from the line. Dispose of the cloth safely.

Fuel Pressure Test

In order to test system pressures and the performance of the fuel pump and pressure regulator valve, special tool pressure gauge TOOOT1368 should be used as follows:

1. Connect fuel pressure gauge TO0011368 to the Shraeder type valve fitted at the front end of the RH fuel rail. Ensure that the gauge bleed tap is closed, and use a cloth to shield from any fuel spray as the connection is made. After connection, position the bleed line in a suitable receptacle and open the bleed tap to bleed any air from the gauge line.



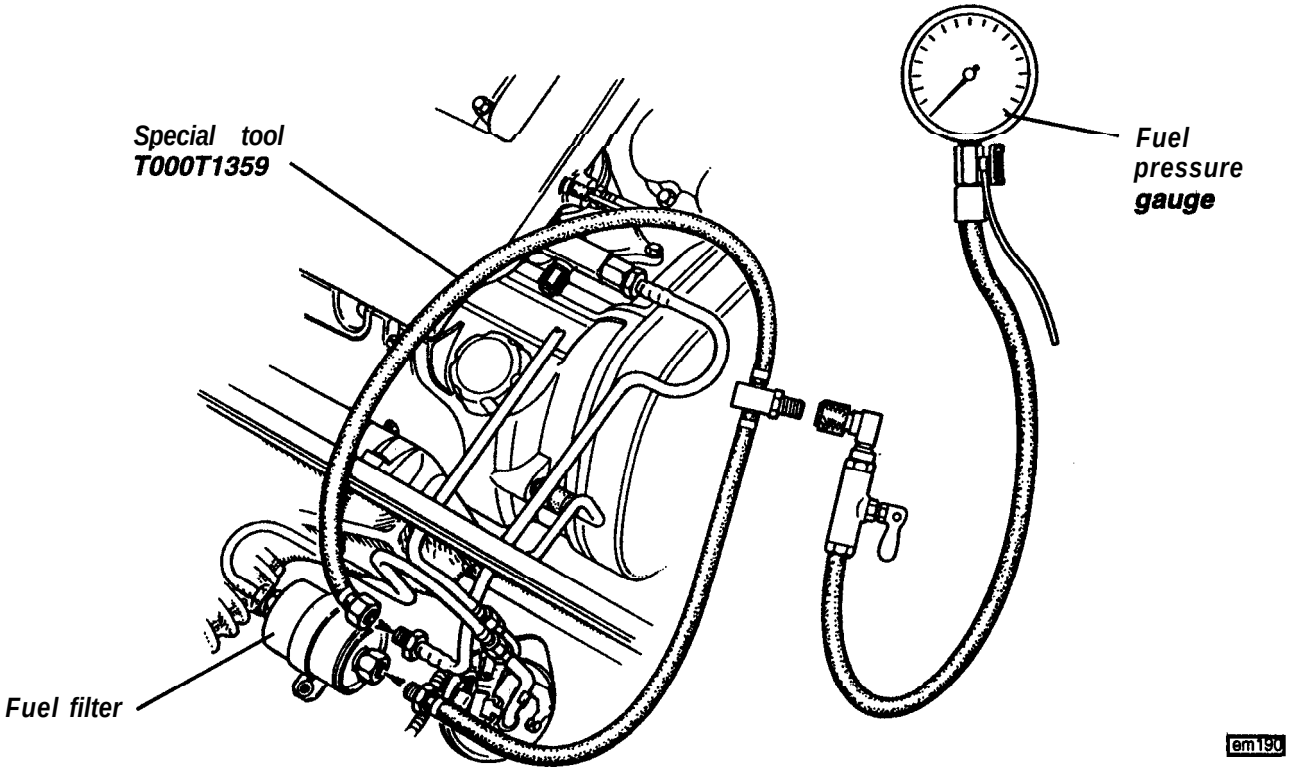
2. Observe the build up of pressure during the three second period for which the primary pump runs each time the ignition is switched on. Alternatively, use the 'Tech 1' scanner tool in 'Output Test' mode to run the primary pump. A stabilised pressure of between 380 kPa (55 lb/in*) and 420 kPa (61 lb/in*) should be recorded ***whilst the pump is running.*** Note that a pressure drop of 40 - 80 kPa (6 - 12 lb/in*) is normal when the pump stops.

If the pressure is below specification, the fuel pump or pressure regulator valve may be faulty. High pressure is likely to be caused by a faulty regulator valve or a blocked return line.

To test the fuel pumps assembly, proceed as follows:

3. Depressurise the fuel system by positioning the test gauge bleed line in a suitable container, and opening the bleed tap.

4. Release the fuel feed pipe from the outlet of the fuel filter, and fit special tool test hose TOOOT1359 between the filter and feed pipe. Transfer the test gauge to the valve on the test hose.



5. Re-bleed the gauge and repeat step (2) whilst progressively clamping off the hose between Shraeder valve and the fuel feed pipe. It should be possible to achieve a pressure of at least 500 kPa, but DO NOT ALLOW A PRESSURE OF 600 kPa TO BE EXCEEDED. Note that a pressure relief valve in the pump is designed to open at 700 - 900 kPa. If the minimum pressure cannot be achieved, check the filter for blockage by repeating the test with the test hose fitted between the tank and filter. If specification can still not be auhieved, check the fuel pump intake strainer, and if okay, replace the fuel pump assembly (see sub-section EMM.3 - L).

6. To test the secondary pump, repeat step (5) using the 'Tech 1' tool in 'Output Tests' to run the secondary pump. If specification can still not be achieved, check the fuel pump intake strainer, and if okay, replace the fuel pump assembly (see sub-section EMM.3 - L).

7. If the pumps are proven, but the pressure in step (2) is low, the pressure regulator valve should be replaced. If the pressure is high, check the return line for blockage or restriction, and if clear, replace the valve (see sub-section EMM.3 - N).

8. To test that the regulator valve increases fuel pressure with boost, connect a hand operated pressure pump to the valve pressure capsule (normally connected to the plenum). Apply an air pressure of 70 kPa (representing maximum boost pressure) to the capsule, and repeat step (2).
The stabilised fuel pressure should now be 450 - 490 kPa. If outside specification, replace the regulator valve.

9. If the fuel pressure tests are okay, but symptoms of fuel starvation are still present, it is possible that the pumps can meet the pressure requirements, but not the required volume. Testing for delivery volume can be hazardous: if the supply line and filter are unrestricted. the pumps assembly should be replaced.

EMM.3 - L FUEL PUMPS

If the test procedure in EMM.3 - K indicates that the fuel pumps assembly should be replaced, proceed as follows:

To Replace Fuel Pump Assembly

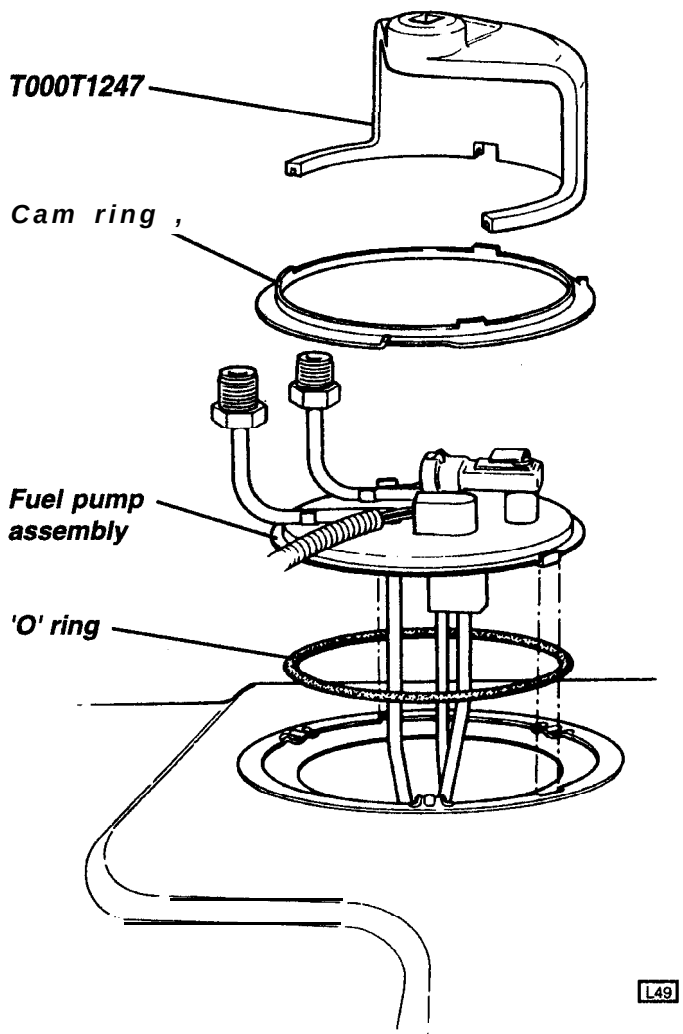
The dual fuel pump assembly is mounted submerged in a collector pot at the bottom of the RH tank, and is secured via the fuel return pipe to a plate clamped to the top face of the tank. Fuel feed and return connections are provided on the top plate together with an electrical connector plug for the pumps, and a pressure sensor used for verification of the evaporative emissions system.

1. Carry out the fuel pressure relief procedure detailed in section EMM.3 - J, and remove the RH rear quarter window trim panel.

2. Using an absorbent cloth for protection from spray and to absorb the small amount of escaping fuel, disconnect the two pipe connections from the fuel pump, and unplug the electrical connectors from the pump and pressure sensor.

3. Using tool T000T1247F, unscrew the fuel pump retaining cam ring, and withdraw the fuel pump assembly from the tank using an absorbent cloth to catch any dripping fuel.

4. Temporarily cap the fuel tank aperture to reduce the fire and contamination risk.



To Replace

1. Check the condition of the sealing '0' ring in the recess around the tank aperture, and replace if necessary.

2. Carefully feed the pump assembly into the tank, taking care not to damage the pump intake strainers, and locate the two positioning tabs on the top plate in the cut-outs in the tank collar.

3. Fit the retaining cam ring and turn fully clockwise using tool T000T1247F until the ring abuts its stop.

4. Connect the fuel feed and return pipes and the electrical connector plugs to the pumps and pressure sensor. Run the fuel pumps and check for leaks.

5. Refit the quarter trim panel.

EMM.3 - M THROTTLE BODY & INTAKE PLENUM

The throttle body assembly at the rear of the engine houses two butterfly valves mounted on a common spindle and operated by the throttle cable via a rising rate linkage. The assembly of the throttle plates is critical, such that any attempt to dismantle or rebuild the unit may result in a sticking throttle and /or poor closed throttle sealing. The closed throttle stop screw (minimum air rate screw) is set at the factory, and must not be disturbed. The opening of the idle air control (IAC) valve determines the airflow past the throttle plates to control idle speed as commanded by the ECM, and as long as the IAC valve does not approach the end of its travel in either direction, any normally encountered running condition should result in an idle speed as commanded by the ECM. An air leak in the inlet system downstream of the throttle body may result in the IAC being unable to reduce airflow sufficiently, with a high resultant idle speed.

To Replace Throttle Body & Intake Plenum

WARNING: Removal of the intake plenum requires the disconnection of the fuel feed to the secondary injectors. Pressure is maintained in the fuel lines after the engine is switched off in order to reduce the possibility of vapour pocket formation, and to speed engine restart. Before disconnecting a fuel line, carry out the fuel pressure relief procedure detailed in section EMM.3 - J.

1. Carry out the fuel pressure relief procedure before releasing the quick-fit connectors of the secondary injector pipe assembly from the rear end of the fuel rails; press the two red buttons on each connector to release the retaining clip, and withdraw from the rail, using a paper towel to absorb any fuel draining from the pipes.

2. Remove the air intake hose clips on the throttle body intake elbows, release the IAC valve hose from the RH compressor outlet duct, and remove the single screw fixing each duct to the cylinder head. Remove the hoses connecting the ducts to the throttle body intake elbows.

3. Release the harness connectors to the MAP (Manifold Absolute Pressure) sensor at the top rear of the plenum, the throttle position sensor at the right hand side of the throttle body, and to the two secondary Injectors.

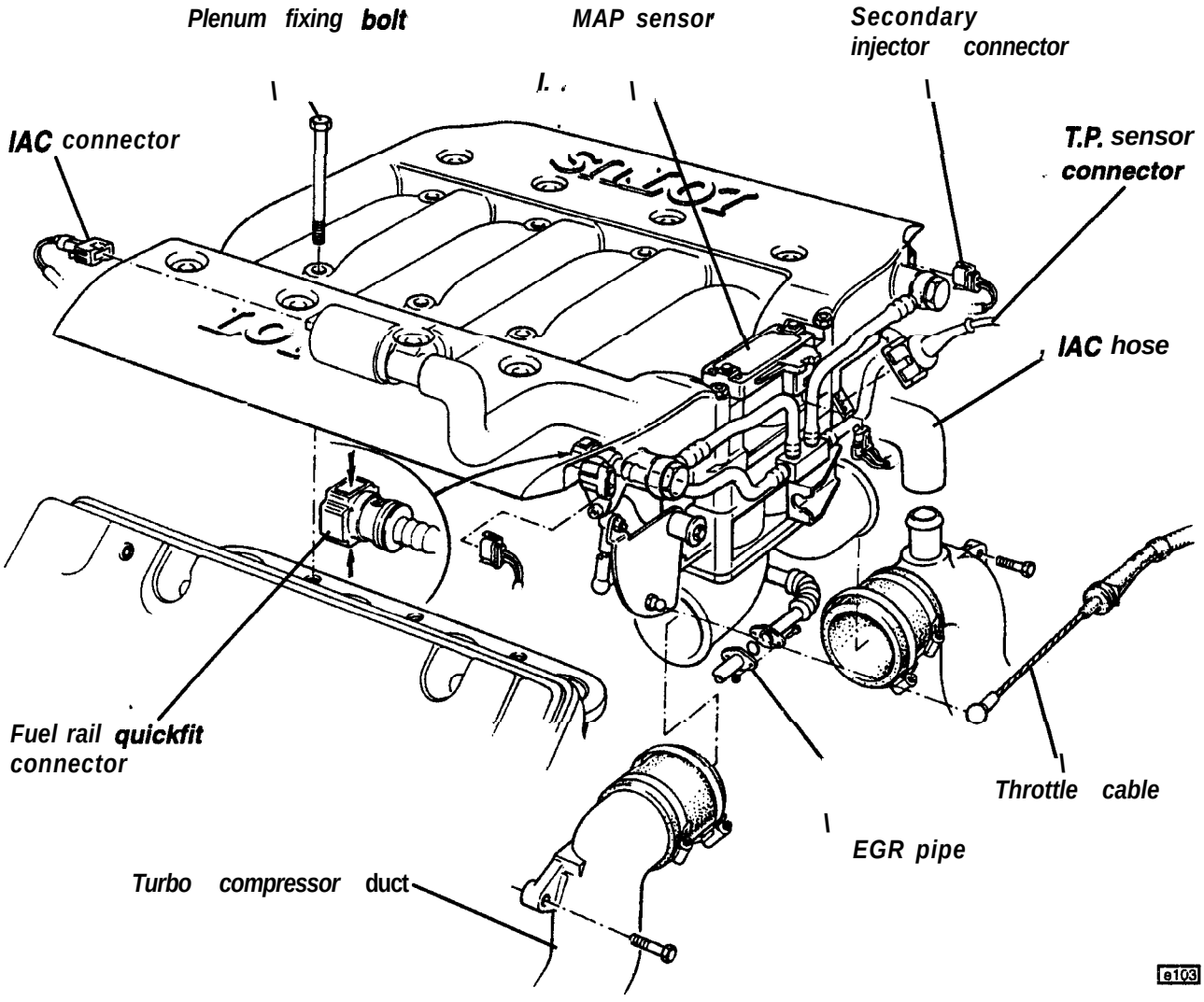
4. Disconnect the EGR (Exhaust Gas Recirculation) pipe at its joint near the throttle body intake elbows.

5. Release the throttle cable from the quadrant lever and the abutment on the throttle body. Release the clip securing the AIR pipe to the throttle cable abutment.

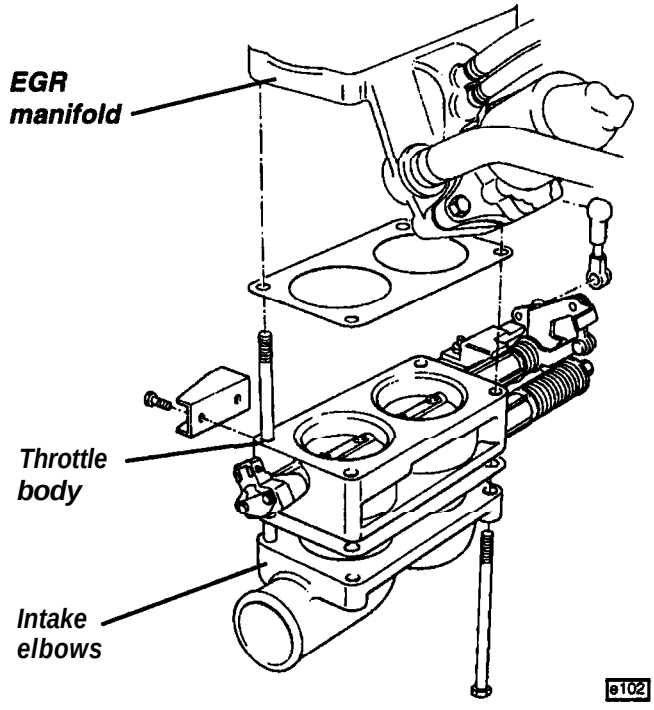
6. Release pipes and hoses:
   - From the front end of the plenum, disconnect the vacuum supply hose to the brake servo, and the adjacent small bore vacuum hose for the boost gauge and climate controls.
   - Disconnect the blue vacuum supply pipe from the 'T-piece for the AIR valve and wastegate control.
   - Release the hose between plenum and the fuel pressure regulator valve.
   - Disconnect the translucent EECS hose from the non-return valve on the cabin rear bulkhead.
   - Release the primary breather hose from the rear end of the RH cam cover.

7. Remove the 14 x M8 bolts securing the plenum, and lift the plenum sufficiently to enable disconnection of the following parts:
   IAC valve connector plug.
   EGR valve connector plug.
   EGR temperature sensor.

8. Withdraw the plenum. Take suitable precautions to prevent debris entering the inlet tracts.



9. The intake elbows, throttle body and EGR manifold are sandwiched to the underside of the plenum, and secured with two long studs tapped into the intake elbow, with nuts on the top surface of the plenum, two bolts fitted from beneath and threaded into the plenum, and two screws tapped into the throttle body. Before dismantling, first remove the EGR pipe from the EGR manifold, and disconnect the throttle linkage between bellcrank lever and relay disc.
If necessary, release the EGR valve from the manifold (2 fixing screws) and the IAC valve from its saddle on the underside of the plenum (2 screw retaining strap).



Re-assembly

Re-assemble in the reverse order to disassembly, with the following notes:

Ensure that all the hoses are fitted and secured to the EGR manifold before fitting the plenum assembly to the engine.

If one or both of the injector housings (inlet manifolds) has been disturbed, it is necessary to align both injector housings with the plenum joint face before tightening the fixing bolts to the cylinder head:

i) Slacken all the injector housing fixing bolts on both cylinder heads.

ii) Using new gaskets (dry) if necessary, fit the plenum onto the housings and tighten the plenum fixing bolts to 20 Nm (15 lbf.ft).

iii) Nip up the end two fixings securing each injector housing to the cylinder head.

iv) Remove the plenum and fully tighten all the injector housing fixings.

If necessary use new gaskets on the injector housings, and assemble dry. Tighten the plenum fixing bolts to 20 Nm (15 lbf.ft).

Before pushing on the two quickfit connectors of the secondary injector fuel pipe assembly, first lightly lubricate the spigot of each fuel rail with engine oil.

EMM.3 - N FUEL PRESSURE REGULATOR

The fuel system operates in an acceptable pressure range of 310 - 496 kPa (45 - 72 lb/in*) depending on engine conditions, with engine running. If the pressure is too low, poor performance and a Code P0171/P0174 could result. If the pressure is too high, excessive odour and Code P0172/P0175 could result. Diagnostic procedures are detailed in section EMM.4.

CAUTION: When servicing any part of the fuel rail assembly, take care to prevent dirt and other contaminants from entering the fuel passages. Fittings should be capped, and holes plugged during servicing.

Pressure Reaulator

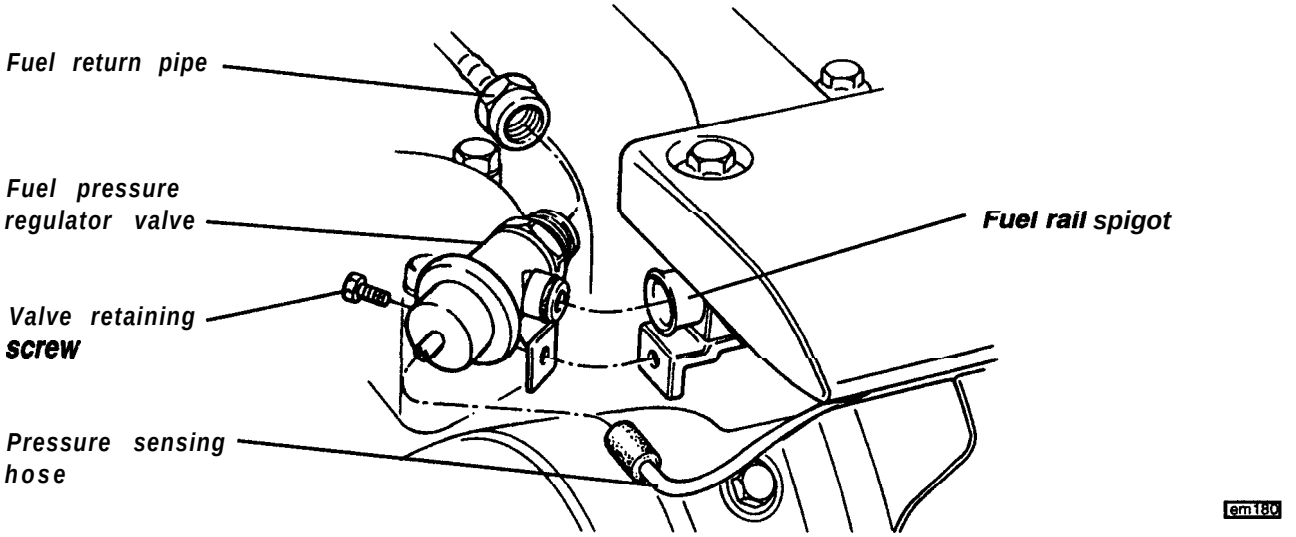
If as a result of using diagnostic procedures in section EMM.3 - K, the pressure regulator is determined as being faulty, proceed as follows:

1. The pressure regulator is mounted on the front end of the LH fuel rail, and is serviced as an assembly.

2. Relieve the fuel pressure in the fuel rail by following the procedure detailed in EMM.3 - K.

3. Release the fuel return pipe from the valve, using an absorbent cloth to collect any escaping fuel, and pull off the pressure sensihg hose from valve.

4. Remove the single M6 screw securing the valve to the fuel rail, and withdraw the valve.



5. Before replacing the valve assembly, examine the sealing ring on the valve spigot and renew if necessary. Lubricate the '0' ring with clean engine oil.

6. Carefully insert the valve spigot into the end of the fuel rail, and secure with the M6 setscrew.

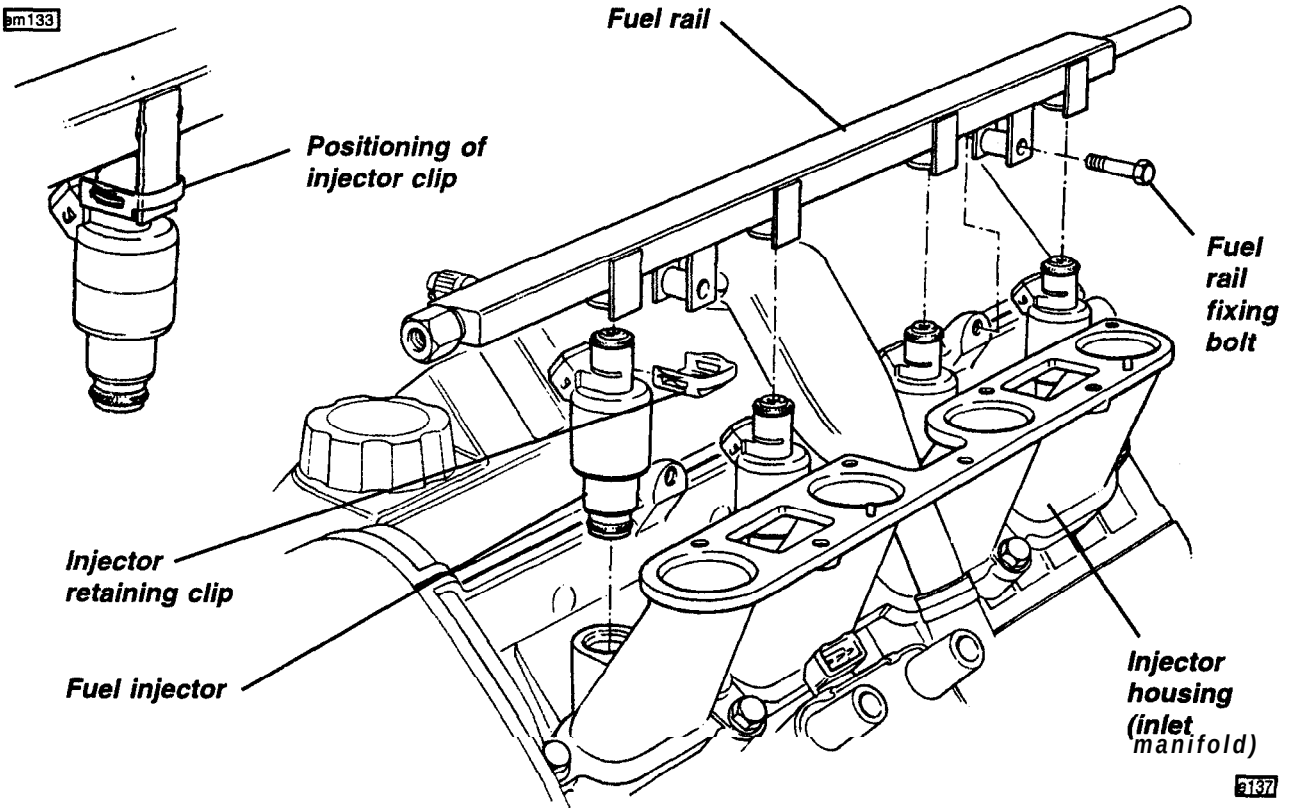
7. Refit the fuel return pipe and pressure sensing hose.

EMM.3 • 0 FUEL RAILS & INJECTORS

For access to the fuel rails and port injectors, the intake plenum must first be removed. See section EMM.3 - M. After removal of the plenum:

To remove a port fuel injector:

- Unplug the harness connector from each injector.
  Release the two bolts securing the fuel rail, and carefully withdraw the rail complete with the four injectors. Take suitable precautions to prevent the entry of dirt and debris via the injector housing.
- Remove an injector from the rail by prising off the retaining clip, and withdrawing the injector.
- If the rail is to be removed, disconnect the fuel feed pipe from the front end of the RH rail, or the fuel return pipe and pressure sensing hose to the regulator valve on the LH rail.



To refit a port fuel injector:

- Fit new '0' rings to the top and bottom of any removed injectors, and lubricate with clean engine oil.
  Fit new injector retainer clips to each port injector with the open end of the clip facing at **90°** to the electrical connector. Push each injector into the fuel rail far enough to engage the retaining clip in its machined slot..
  Carefully seat the four injectors into their housings, and fit the two screws securing the fuel rail to the cylinder head. Before tightening the screws, take care to position the rail so that the injectors are correctly aligned, and perpendicular to the rail.
- Reconnect the harness plugs to each injector.

When reconnecting the fuel feed and return pipes to the rail, take care to use a spanner on the rail or regulator valve to resist the tightening torque. Do not allow the rail to be twisted.

Secondary injectors: The secondary injectors are fitted into the rear of the intake plenum, and are accessible without disturbing the plenum:

WARNING: Carry out the fuel pressure relief procedure detailed in section EMM.3 - J before disconnecting the fuel feed pipe or removing an injector.

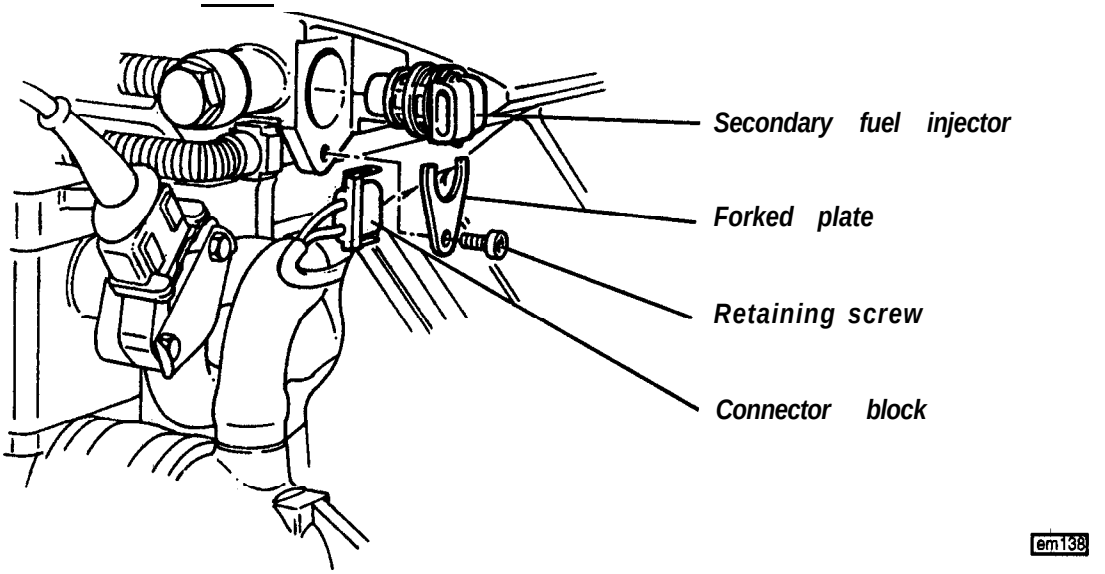
Unplug the harness connector from the injector.

After carrying out the fuel pressure relief procedure, release the single screw securing the injector retaining plate, and withdraw the injector from the plenum.

- Before refitting, renew the '0' rings, and lubricate with clean engine oil.

Carefully insert the injector fully into its bore, and retain with the forked plate. Tighten the plate fixing screw.

Reconnect the harness plug.



Port Injector Balance Test

The injector balance tester is a tool contained within the fuel injection diagnostic kit TOOOT0899 which is used to turn on an injector for a precise period of time, thus spraying a measured amount of fuel into the port. Alternatively, the 'Tech 1' scanner tool can by used in 'Output Test' mode to operate each injector in turn. Each time an injector is energised, a drop in fuel rail pressure occurs which can be recorded and compared between each injector. Any injector with a pressure drop that is 10 kPa (or more) greater or less than the average drop of the other injectors should be considered faulty and replaced.

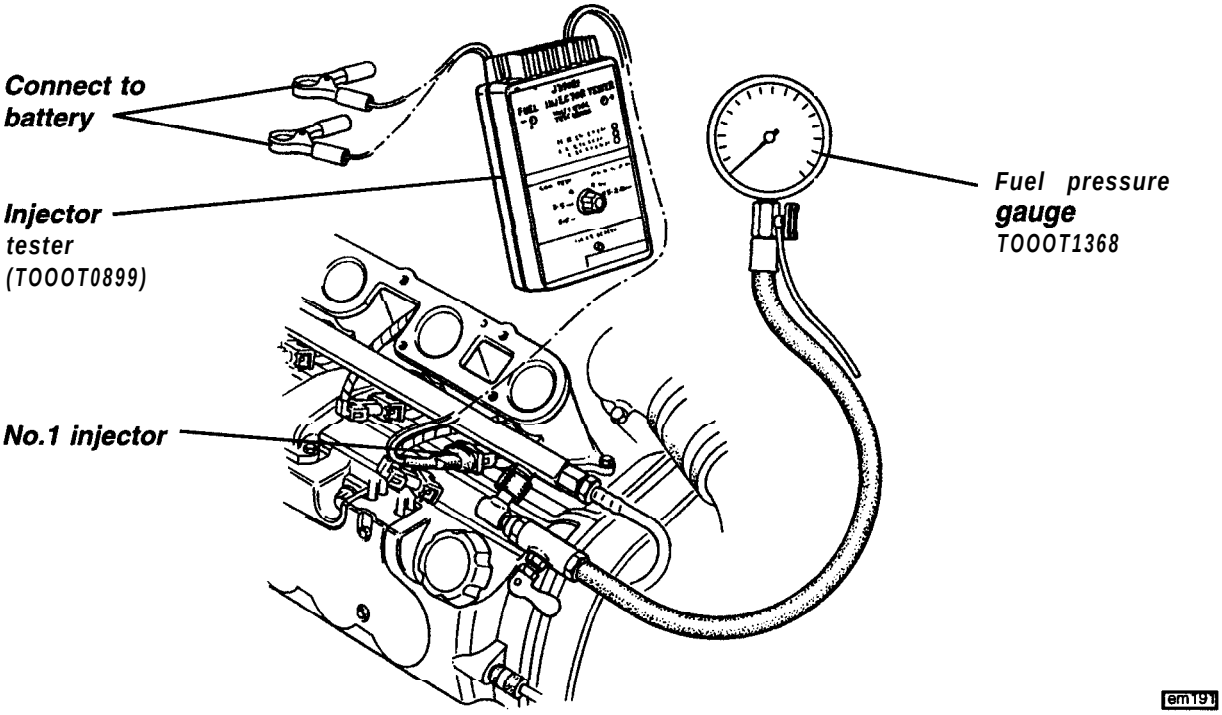
1. To obtain access to the port injector electrical connectors, it is necessary to remove the intake plenum: See sub-section EMM.3 - M.

2. Allow an engine cool down period of 10 minutes to avoid irregular readings due to 'hot soak' fuel boiling.

3. Remove the blanking cap from the pressure test port on the front end of the RH fuel rail. Using a cloth to shield from any fuel spray, screw on the connector of fuel pressure gauge TOOOT1368.

4. Using a suitable receptacle, bleed the gauge line of air whilst running the fuel pump using the 'Tech 1' tool in 'Output Tests' mode. Note that the primary pump will normally run for only three seconds each time the ignition is switched on.

5. Switch the ignition off for at least 10 seconds to complete the ECM shutdown cycle. Connect the injector tester (unless using 'Tech 1') to No. 1 injector.



6. Turn on the ignition, and record the steady fuel pressure reading. (If the reading is not steady, refer to chart EMM.4 - 7.) Turn off the ignition.

7. Energise the tester once, or use the 'Tech 1' tool to operate no.1 injector, and note the pressure drop at the lowest point. (Disregard any slight pressure increase after drop hits low point.) By subtracting this second pressure reading from the initial pressure, the individual pressure drop may be calculated.

8. Transfer the tester to the other port injectors in turn, or select injectors using 'Tech 1', and repeat steps 6 & 7 recording the readings. Good injectors will record virtually the same pressure drop. Retest any injector that has a pressure difference of 10 kPa from the average of the other 3 injectors. Replace any injector that also fails the retest.

CAUTION: The entire test should not be repeated more that once without running the engine to prevent flooding. (This includes any retest on faulty injectors.)

EMM.3 - P IDLE AIR CONTROL (IAC) VALVE

A 'Tech 1' scanner tool will display the 'duty cycle' of the idle air control (IAC) valve, representing the proportion of time for which the valve is energised by a square wave signal, and consequently the degree to which the valve is open. A 35% duty cycle indicates that the ECM is commanding the IAC to be fully closed, which is not a normal condition, and indicates an attempt to minimise airflow by-passing the throttle plates in order to lower idle speed. This condition is usually caused by an intake system air leak. The higher the duty cycle (up to 100%), the greater the valve opening and the greater the airflow by-passing the throttle plates.

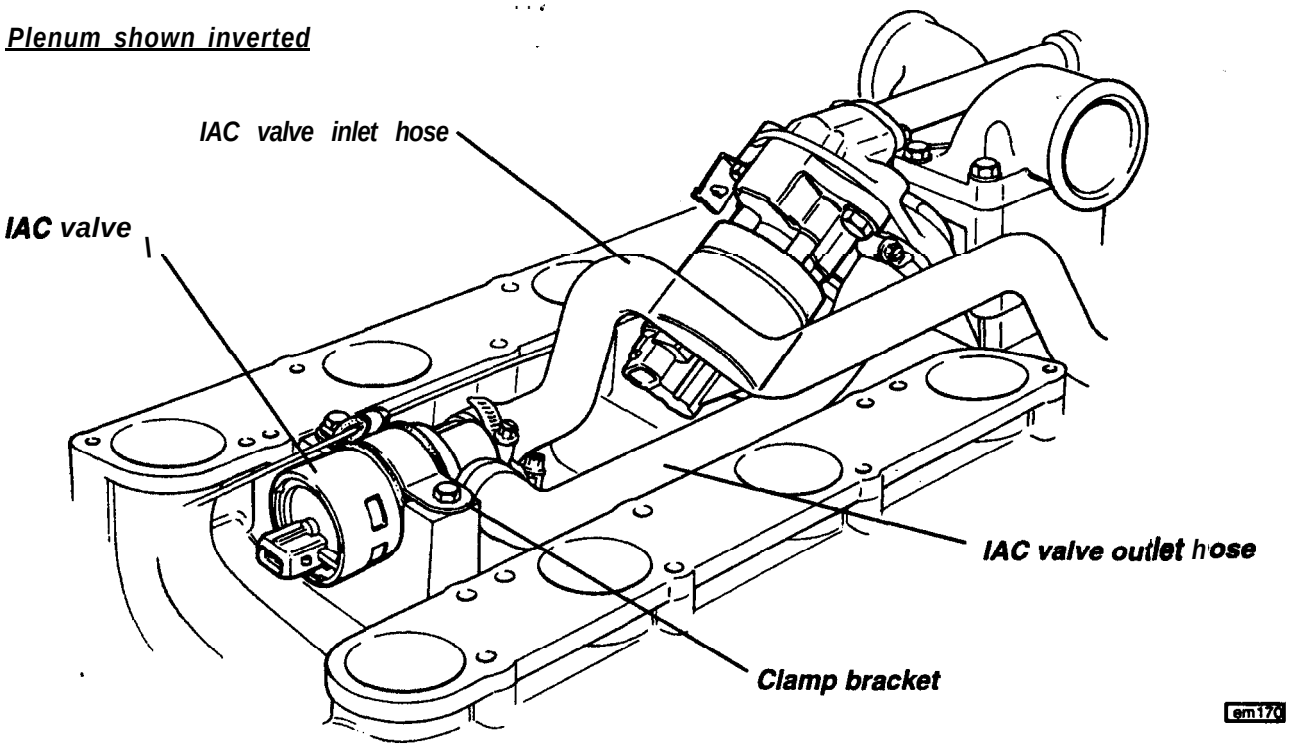
If the IAC valve is unable to control the idle speed within calibrated limits, the ECM will cause a Code P0506/P0507 to set. The procedures detailed in section EMM.4 should be used to diagnose IAC system problems. Refer to 'Rough, Unstable, or Incorrect Idle, Stalling' in the Symptoms Section EMM.6 for other possibilities for the cause of idle problems.

To Replace IAC Valve

The IAC valve is mounted on the underside of the intake plenum, and is connected between the RH compressor outlet duct and the EGR manifold. Access to the valve is available after removing the intake plenum assembly (see sub-section EMM.3 - M).

To remove the valve, release the two hoses, and the two screws securing the clamp bracket.

Note that no provision is made for servicing of the IAC valve itself. If determined to be faulty, the complete valve assembly should be renewed. Refit the valve in reverse order to removal.



Note: No manual adjustment of the IAC valve assembly is required after installation. The IAC valve 'learns' its correct position via the ECM as the vehicle idles at 0 mph. See section EMM.2 • 0.

EMM.3 - Q DIRECTIGNITION& COILS

The ECM uses information from the MAP and coolant sensors in addition to rpm to calculate spark advance as follows:

Low MAP output voltage	=	More spark advance
Cold engine	=	More spark advance
High MAP output voltage	=	Less spark advance
Hot engine	=	Less spark advance

Detonation; could be caused by low MAP output or high resistance in the coolant sensor circuit.
Poor performance; could be caused by high MAP output or low resistance in the coolant sensor circuit.
Engine cranks but will not run or immediately stalls; Diagnostic procedures in section EMM.4 must be used to determine if the failure is in the DI system or the fuel system.
Ignition Timing; Ignition timing is controlled by the ECM based on engine position information derived from a sensor mounted in a plinth on the engine front cover, and a pole wheel integral with the keyed crankshaft front pulley/vibration damper. No manual adjustment is possible. 'Tech 1' can display ignition advance.

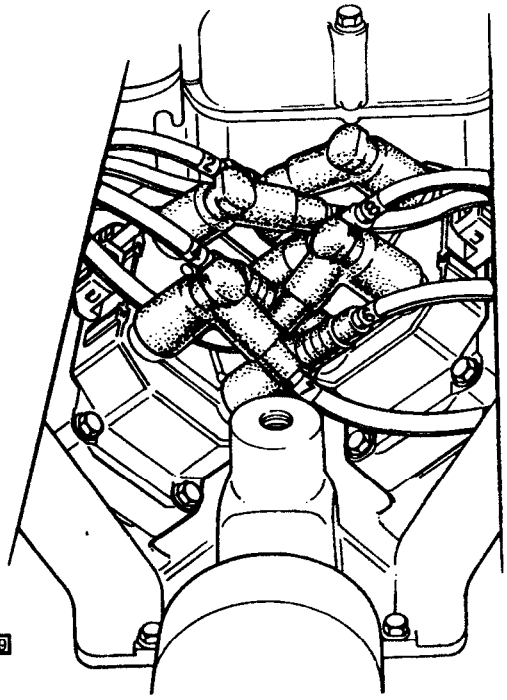
To Replace Ignition Coil Assembly

The two dual double ended coil assemblies are mounted on the breather cover at the front of the engine 'V'. The intake plenum must be removed for access to the coils.

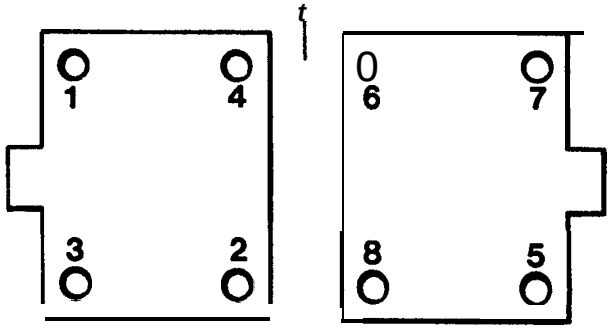
1. Remove the throttle body and intake plenum assembly as detailed in section EMM.3 • L.

2. For each of the two coil assemblies, unplug the low tension connector, and release the four fixings securing the coil assembly to the breather cover.

cylinders 5,6,7,8, and that on the LH side cylinders 1,2,3,4. Note that the plug leads for cylinders 5,6,7,8 are labelled 1,2,3,4, and that the numbers moulded on both coil assemblies should be disregarded. Use the following diagram to connect the spark plug leads: Note that straight connectors are used on the coil end of leads 2,4,6 & 8 (i.e. inboard terminals).and right angle connectors on the coil end of leads 1,3,7 & 5 (i.e. outboard terminals).


em159

Plug lead numbering



em176

The engine wiring harness branch supplying injectors 1,2,3,4 (RH cylinder bank) includes the low tension connector for the ignition coil pack mounted on the RH side (supplies spark plugs 5,6,7,8). The branch supplying injectors 5,6,7,8 (LH cylinder bank) includes the low tension connector for the ignition coil pack mounted on the LH side (supplies spark plugs 1,2,3,4).

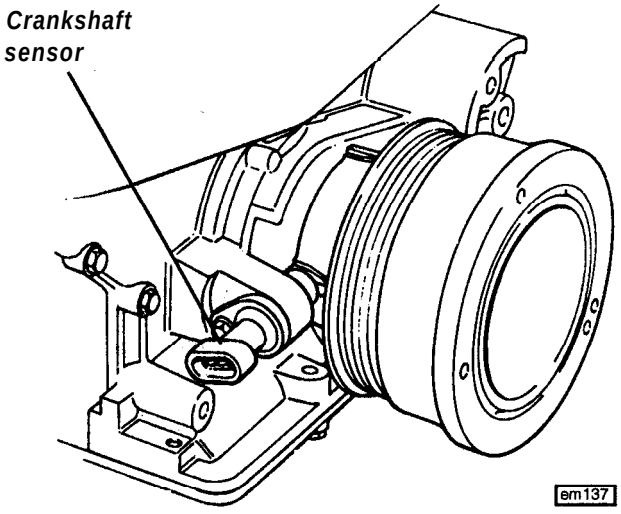
On re-assembly, use new gaskets on the injector housings, and assemble dry. Tighten the plenum fixing bolts to 20 Nm (15 lbf.ft). Tighten the secondary injector fuel feed banjo bolts to 30 Nm (22 lbf.ft).

DTCs P1301/P1302 will be set if a level of misfire occurs which is sufficient to cause a significant increase in vehicle emissions. Refer to the diagnostic procedures in section EMM.4.

EMM.3 • R CRANKSHAFT SENSOR

The crankshaft sensor is mounted in a plinth integral with the engine front cover, and is accessible from beneath the vehicle. The associated reluctor is incorporated into the crankshaft front pulley/torsional vibration damper, and takes the form of four equi-spaced vanes which pass closely to the tip of the sensor. No manual adjustment of the ignition timing is required, or is provided for.

To remove the sensor, release the electrical connector, remove the single fixing screw, and withdraw the sensor from the plinth.



em137

When re-fitting, lubricate the '0' ring on the sensor spigot with rubber grease. Push the sensor fully into its location, and retain with the single M6 screw and washer. Tighten to 8 Nm. Check the gap between sensor tip and reluctor vane, and if necessary, change the shim plate fitted between the sensor and plinth to achieve a gap of 2.2 - 2.4 mm.

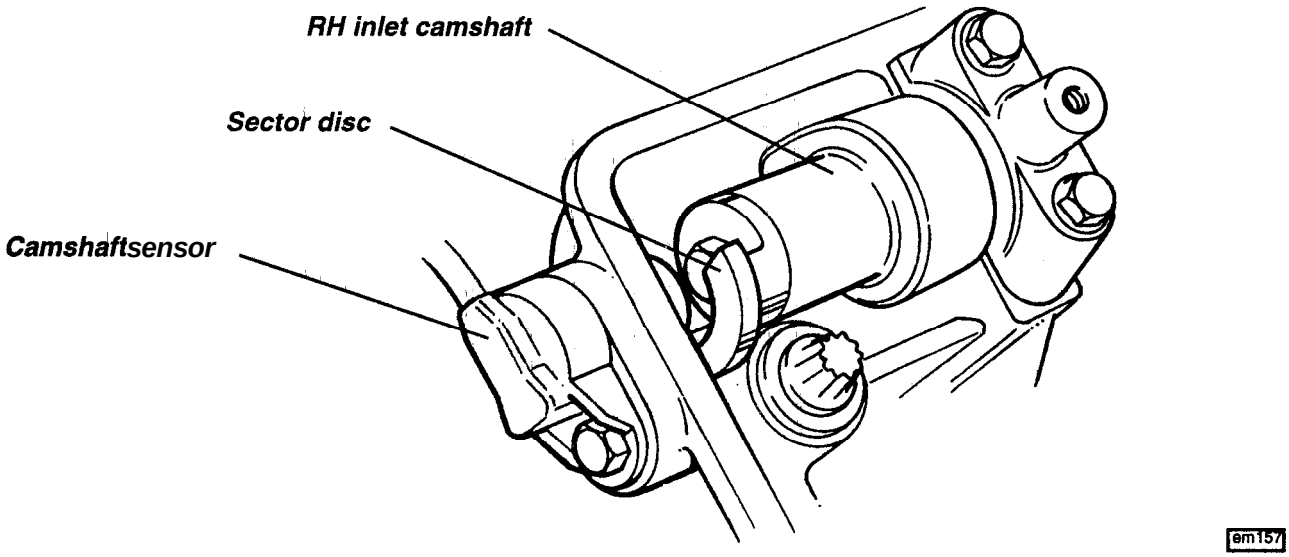
If it is necessary to remove the reluctor/front pulley, the sensor should first be removed to prevent damage. In order to release the front pulley bolt it is necessary to lock the crankshaft via theflywheel ring gear using either special tool TOOOT1249 if the transmission is removed, or TOOOT1358 fitted via the starter motor aperture. Remove the pulley retaining bolt and washer, and draw the pulley off the crankshaft nose.

Before re-fitting the pulley, examine the oil seal in the front cover, and check the corresponding sealing surface on the spigot of the pulley for a wear ridge. Replace parts as necessary. Lubricate the lip of the oil seal, and slide the pulley onto the crankshaft nose taking care to align the pulley keyway with the square key on the crankshaft. Fit the retaining bolt and washer, and tighten to 230 Nm (170 lbf.ft). Remove the flywheel locking tool and refit the sensor.

A fault with the crankshaft sensor should set a trouble code P0336. See section EMM.4 for the diagnostic procedure.

EMM.3 - S CAMSHAFT SENSOR

The camshaft sensor is fitted into the rear end of the RH cylinder head, with a corresponding sector disc fixed to the rear end of the RH inlet camshaft. To remove the sensor, unplug the connector in the flying lead, release the single fixing screw and withdraw the sensor from the cylinder head.



When re-fitting, check that the '0' ring is fitted onto the sensor spigot and is lubricated with rubber grease, and insert the sensor into its bore. Note that no shimming of the sensor is required. Fit and tighten the single screw and washer and mate the electical connector.

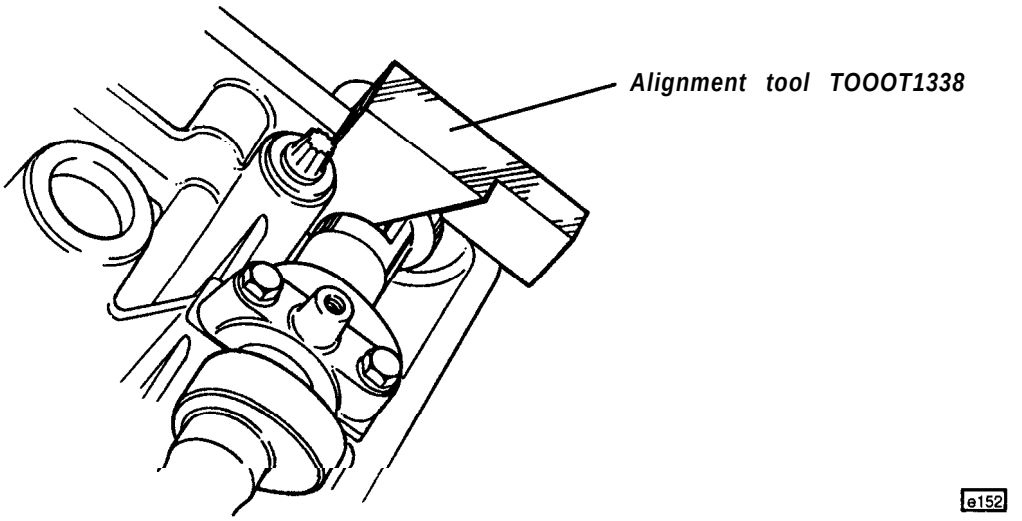
On some engines, the sector disc is fitted to the rear end of the RH inlet camshaft with a single bolt, whereas other engines use a camshaft with the sector disc machined directly onto the end of the shaft. Separate sector discs are not indexed to the camshaft, and must have their position correctly set before the clamping bolt is tightened. For access to the cam angle sector, the RH cam cover must first be removed:

1. Follow the procedure detailed in section EMM.3 - L to remove the intake plenum. It is not necessary to completely remove the plenum, such that much of the plumbing may remain undisturbed, but the plenum must be moved sufficiently to permit the removal of the RH cam cover.

2. Remove the spark plug cover, and disconnect the plug leads. Disconnect the breather hose from the front of the cam cover, and the hose between the breather spout and crankcase cover plate in the 'V'. Disconnect the small bore hose from the RH cam cover rear to the plenum.

Disconnect the small bore hose from the RH cam cover rear to the plenum.

3. Remove the 6 x M8 fixings securing the camcover, and lift off the cover.
4. A special tool TOOOT1338 is available to set the angle of the sector with the engine at the 'timing' position:
   - Set the engine to the timing position with the marked pulley vane aligned with the crankshaft sensor.
   - Check whether the camshaft tolerance pin TOOOT1345 can be inserted through the camshaft front bearing cap into the alignment hole in the shaft. It may be necessary to turn the crankshaft a further 360°.
   - With the positioning pin fitted, check the alignment of the sector relative to the cam housing joint face with tool TOOOT1338. If necessary, slacken the sector retaining bolt, adjust the sector position, and re-tighten the bolt.



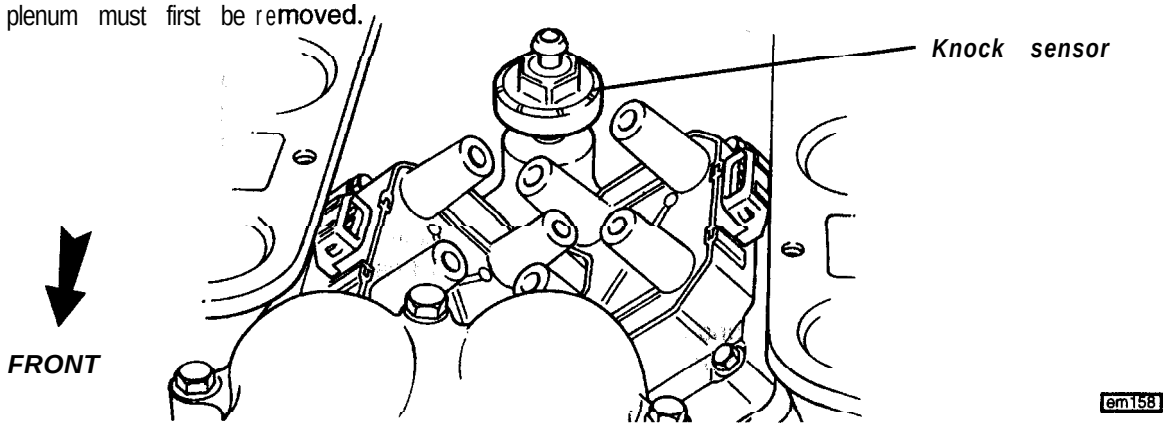
5. If the special tool is not available:
   - Mount a degree disc on the crankshaft front pulley and position the crankshaft at 55" BTDC no.1 (firing).
   - Check, or position the sector flat edge at 90" to the cam housing joint face, with the body of the sector to the LH side of the cam centreline. Tighten the sector retaining screw.

6. Refit the cam cover and plenum.

A fault with the camshaft sensor should set a trouble code P0341. See section EMM.4 for the diagnostic procedure.

EMM.3 - T KNOCK SENSOR

The single knock sensor is fitted in the crankcase breather cover at the front of the engine 'V'. For access, the intake plenum must first be removed.



The 'Tech 1' tool is able to display both the circuit voltage, indicating the level of knock detected, and the number of degrees by which the ignition timing is being retarded. A problem associated with the knock sensor or its wiring should set a Code P0326/P0327/P0328 for which diagnostic procedures are provided in section EMM.4.

The circuitry within the knock sensor causes the ECM's 5 volt output to the sensor to be pulled down so that the supply circuit measures about 2.5 volts. The knock sensor produces an AC signal which rides on the 2.5 volts DC voltage, with the amplitude and frequency dependent upon the knock level. The ECM processes this data and adjusts the spark timing (and boost pressure) to reduce detonation.

Testing the Knock Sensor

1. With engine idling, check for a knock signal with the Tech 1 tool. Detonation under no load idling is not likely. If knock is detected, there may be a mechanical problem producing a similar noise. Repair as necessary.

2. If knock is indicated at idle with no mechanical noise, unplug the sensor harness connector, and connect a voltmeter between the sensor and ground. Check for a signal on the 2 volt AC scale. A signal would indicate a faulty sensor, and no signal a faulty ECM.

3. If no knock is indicated at idle, simulate engine knock by tapping on the block near to the sensor with an iron bar, whilst observing the Tech 1 display. Knock detection indicates proper functioning of the sensor.

4. If no knock is detected in test 3, disconnect the harness connector and connect a 2 volt AC voltmeter between the sensor and ground. Simulate engine knock again using an iron bar. A voltage signal now indicates that correct data is being sent to the ECM ▪ suspect faulty ECM. No voltage signal suggests a faulty sensor.

5. Beware of mechanical problems with the engine that produce noise (e.g. de-primed hydraulic tappets) liable to be picked up by the knock sensor.

To Replace Knock Sensor

1. Refer to sub-section EMM.3 ▪ M to remove, or partially remove the intake plenum to provide sufficient access to the knock sensor.

2. Unplug the electrical connector from the knock sensor, and unscrew the sensor from the crankcase cover.

3. Refit the sensor DRY, noting that a taper thread is used, and tighten to 17 ▪ 21 Nm (13 -15 lbf.ft).

4. Reconnect the harness and refit the intake plenum.

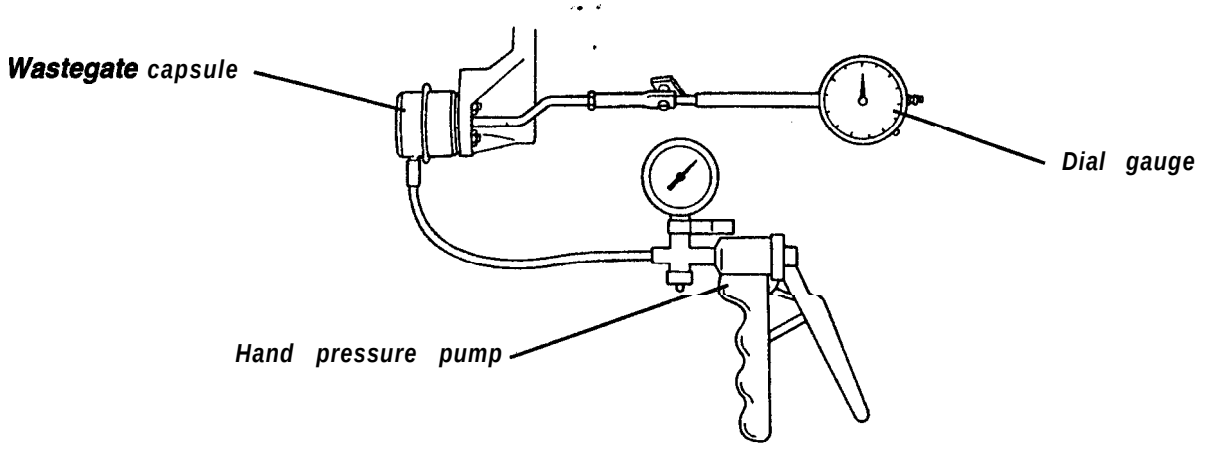
EMM. ▪ U TURBO BOOST CONTROL

Problems with turbo boost pressure may be mechanically or electronically derived. The base mechanical setting of the wastegate capsule should allow 0.35 bar (5.0 lb/in²) to be developed. If this cannot be achieved, the cause may be general engine condition and tuning, a broken wastegate capsule spring, seized or stiff wastgate linkage, or a leaking or burnt wastegate valve seat. Check cylinder compressions, valve timing and other basic tuning parameters, and for the free, spring loaded, operation of the wastegate. Inspection of the wastegate seat condition is possible after removal of the exhaust pipe from the turbocharger.

The wastegate capsule and actuating rod are calibrated by the turbocharger manufacturer and can be checked using a dial gauge and hand operated pressure pump with 0 ▪ 1 bar (15 lb/in²) pressure gauge:

- Mount the dial gauge against the end of the actuating rod.
- Connect the pressure pump directly to the capsule, and record the pressure required to produce an actuator rod movement of 0.4 mm (0.015 in).
  Specification = 0.34 ▪ 0.36 bar (4.9 ▪ 5.2 lb/in²).
- If necessary, adjust the actuator rod length after removing the 'C' clip and releasing the rod extension from the wastegate lever arm: shorten the rod to increase pressure; lengthen to lower pressure.
  CAUTION: Do not turn, twist or force the threaded actuator rod emerging from the capsule and affixed to

the diaphragm. Hold this rod stationary whilst slackening the locknut and screwing the extension piece on or off the actuator rod as required. Refit to the wastegate lever arm and recheck pressure setting.



The wastegate capsule may be removed by disconnecting the pressure hose, uncoupling the actuator extension from the wastegate lever arm, and releasing the two nuts securing the capsule to the mounting bracket.

If the problem is excessive boost pressure, the cause may be either mechanical or electronic. To verify the mechanical control, temporarily by-pass the solenoid valve and connect each wastegate capsule directly to the intake plenum. If over-boosting still occurs, the cause is mechanical. Check the following:

- free operation of wastegate linkage;
- integrity of wastegate capsule diaphragm (see checking procedure above);
- integrity of wastegate capsule pressure hose.

If the cause of over-boosting is electronic, check the solenoid valve and ECM control. The turbo boost control solenoid valve is located at the RH front of the engine bay and is connected between both wastegate capsules and the intake plenum. The valve is pulse width modulated by the ECM dependent on throttle opening, engine speed and knock signal. The 'Tech 1' scanner tool can display the duty cycle as a percentage of the time for which the valve is open: 0% = de-energised valve, intact pressure line to wastegate. 100% = valve energised 100% of time, pressure line fully ventilated. The 'Tech 1' tool is also able to conduct output tests on pulse width modulated components, including the wastegate solenoid valve.

A problem with the boost control circuit should cause a trouble code P1410/P1411/P1412 to be set. Refer to the diagnostic procedures in section EMM.4.

EMM.3 • V EVAPORATIVE EMISSION CONTROL SYSTEM (EECS)

Canister purge is controlled by a solenoid which, when energised, allows vacuum sourced from the EGR manifold to purge the canister. The ECM uses pulse width modulation to turn the valve on and off many times a second, with the proportion of 'on' time determining how much purging is allowed to take place. The solenoid is supplied with an ignition feed, with the ECM controlling the ground. The duty cycle (pulse width) is determined by 'closed loop' feedback from the O2S after the following conditions have been met:

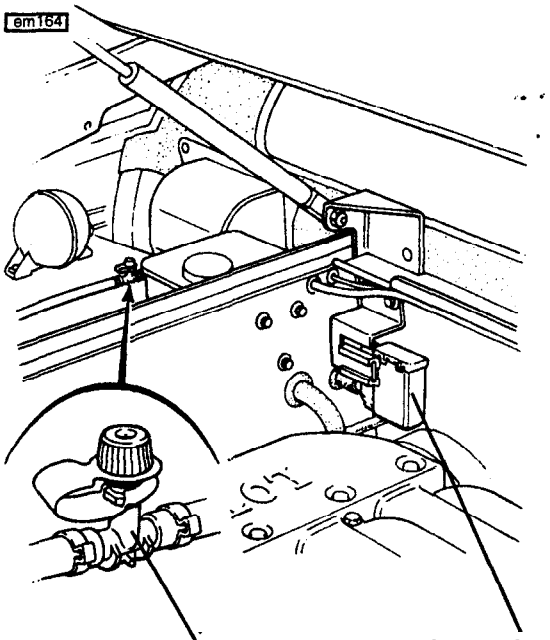
- Coolant is at normal running temperature.
- System is running in 'closed loop' mode.

In order to check the integrity of the fuel tank breather system, the ECM runs periodic leakage tests using a pressure sensor mounted in the top of the fuel pump mounting plate, and a solenoid valve controlling the atmospheric port of the charcoal canister. If any leakage is detected, the MIL will be activated.

To enable the USA Inspection and Maintenance tests to be performed, a test port is provided in the hose between the engine and the canister, and is located above the LH fuel tank.

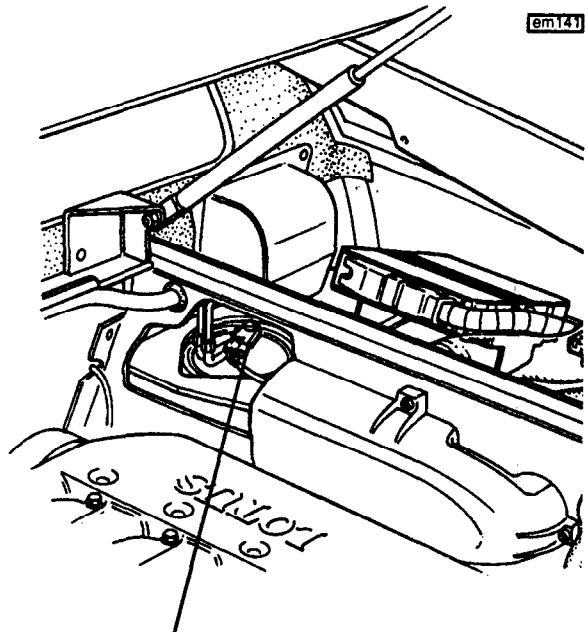
Various trouble codes (PO440 to P0453) are associated with the EECS, to indicate problems with purge flow, vent switching or pressure leakage. Refer to the diagnostic procedures in section EMM.4.

em164



Test port *Canister close valve*

em141



Tank pressure sensor

Symptoms of Incorrect Operation

Poor idle, stalling and poor driveability can be caused by:

Inoperative purge solenoid;

- Damaged canister;

Hoses split, cracked and/or incorrectly connected.

Evidence of fuel loss or fuel vapour odour can be caused by:

- Liquid fuel leaking from fuel lines, oi fuel pump;
- Cracked or damaged canister;

Disconnected, mis-routed, kinked, perished or damaged vapour hoses or control hoses.

If the solenoid is always open, the canister can purge to the intake manifold at all times. This can allow extra fuel at idle or during warm up, which can cause rough or unstable idle, or too rich operation. If the solenoid is always closed, the canister can become over-loaded, resulting in fuel odour.

The 'Tech 1' tool is able to operate the solenoid valve in 'Output Tests' 'PWM Control', and may be further tested as follows:

1. Switch on the ignition, disconnect the pipe from the solenoid valve and apply 34 kPa of vacuum to the valve. If 34 kPa cannot be attained, the valve may be open. Unplug the electrical connector and test again. If vacuum can now be attained, check the lead between valve and ECM for earthing.

2. If in test (1), vacuum can be attained, the valve is correctly closed. Check that it opens and the vacuum drops when the valve is energised using the Tech 1 tool. If it does not drop, check the 12V feed to the valve, and the ECM controlled earth.

To Replace Charcoal Canister

The canister is mounted in the LH rear wheelarch inside a protective plastic cover. Access is available with the wheel removed or on full droop. Release the fixings securing the cover to the body, and release the canister from the cover. Label the hoses before disconnecting from the canister.

EMM.3 - X EXHAUST GAS RECIRCULATION (EGR)

The pulse width modulated EGR valve andtemperature sensor are mounted on a manifold sandwiched between the throttle body and the intake plenum, and are accessible only after removing or lifting the front of the plenum.

Too much EGR flow tends to weaken combustion, causing the engine to run roughly or stop. With too much EGR flow at idle, cruise, or cold operation, any of the following conditions may occur:

Engine stops after cold start.
- Engine stalls after deceleration.

Car surges during cruise.
Rough idle. If the EGR valve is stuck open, the engine may not idle.

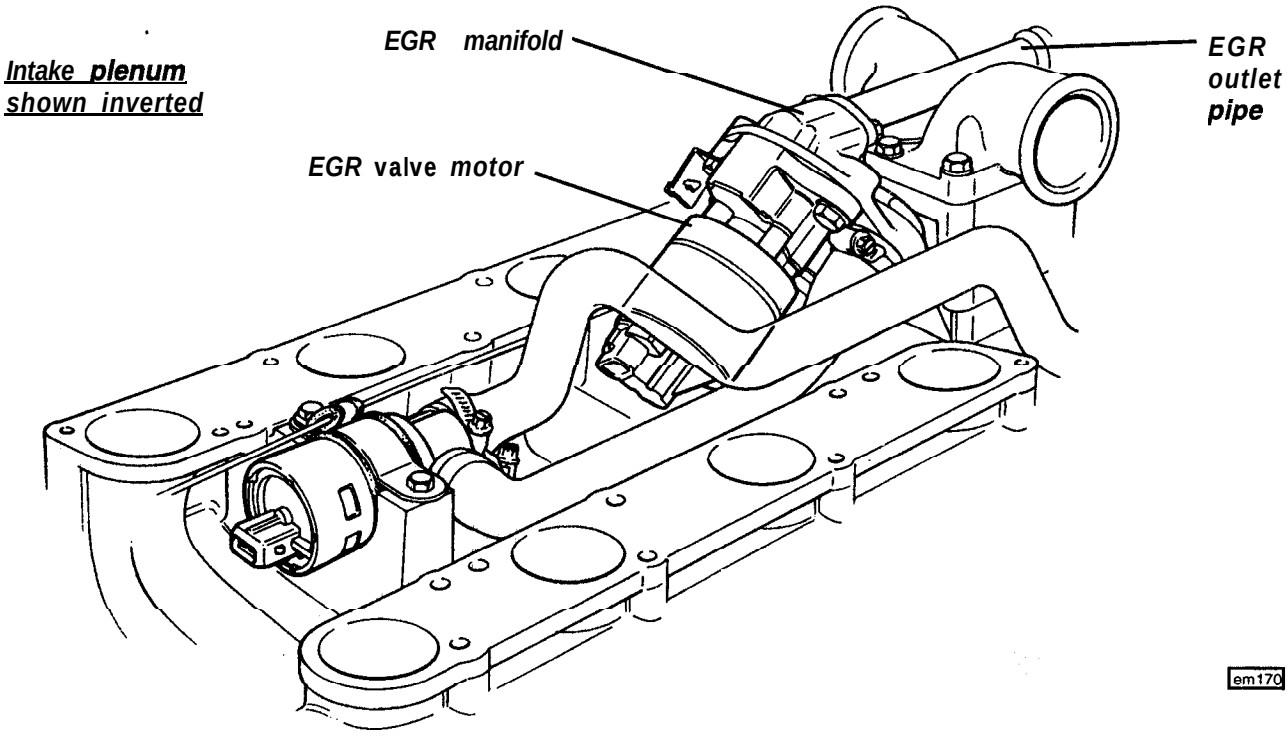
Too little, or no EGR flow allows combustion temperatures to become higher during acceleration and high load conditions, which could cause:

High emissions of NOx.
Engine detonation.

The 'Tech 1' tool is able to display the EGR duty cycle, and can also test the valve motor. Trouble codes associated with EGR are P0401/P0402/P1404 - P1407. Refer to the diagnostic procedures in section EMM.4.

To Replace EGR Valve:

1. Refer to sub-section EMM.3 - M to remove the intake plenum.



2. Unplug the electrical connector, release the two fixings securing the EGR motor, and withdraw the valve motor assembly from the EGR manifold.

5. If necessary, unscrew the EGR temperature sensor from the manifold.

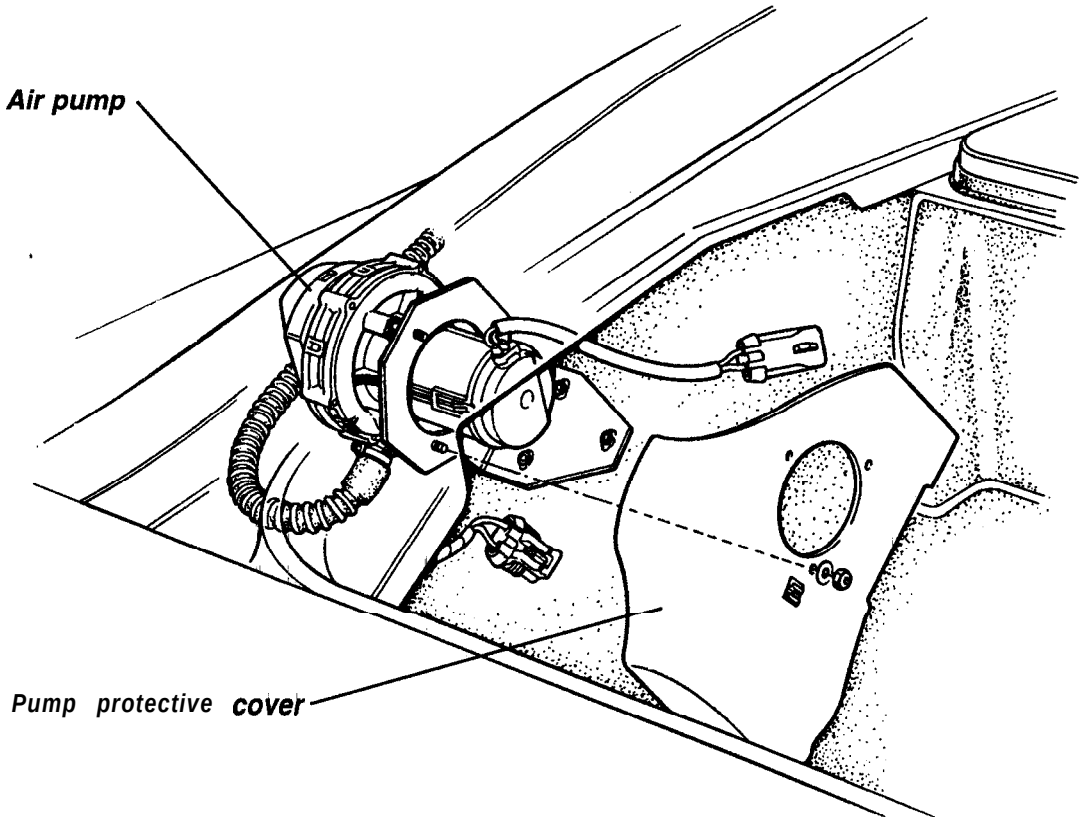
6. Reverse the removal procedure to refit the EGR valve and sensor.

EMM.3 - Y AIR INJECTION (AIR)

The air injection (AIR) system components comprise the air pump, vacuum solenoid valve and diverter valve. A failure in the AIR system, which operates for only a short period after cold start, may not be apparent to the driver, but could result in an increased level of CO and HC during this period. Trouble codes P0411/ PO41 3/P0414 are provided to alert the driver to this condition.

The diverter valve mounted on the rear face of the LH cylinder head, may be tested after removal of the valve from the engine, by applying a vacuum to the diaphragm chamber. The valve should be seen to open against its spring pressure.

The solenoid valve is mounted on the top of the LH fuel tank board, and should be energised by the ECM whenever the air pump is switched on. Vacuum should then be supplied from the front of the plenum to the diverter valve. The solenoid valve may be operated by the 'Tech 1' tool in output test PWM control, and the air pump (mounted on the rear of the LH rear wheelarch in the rear luggage compartment), in discrete control mode.



SECTION EMM.4

TROUBLE CODE DIAGNOSIS

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TROUBLE CODE DIAGNOSIS

The reading of trouble codes using the Lotus approved 'Tech 1', or any other OBD II scanner tool, is fully described in Section EMM.I. Section EMM.4 contains information on each trouble code, compiled in roughly numerical order, to explain under what conditions the code will be set, and the possible causes. Each table includes data under the following headings:

Description: Describes the rationale of the code.
Malfunction Criteria: The limits or conditions which must occur for the code to be set.
Secondary enable conditions: The conditions which must prevail before the test is run. In some cases, the malfunction test will be run only when certain other conditions apply.
Disabled by faults: Some trouble codes will be disabled if another code is already set.
Time required: The continuous time period for which the malfunction criteria must apply.
Potential failure modes: Suggests possible causes of the problem.
Limp home: Certain detected problems will cause the ECM to substitute a fixed value for a signal which is percieved as faulty, in order to enable the engine to. continue to run, albeit at a reduced level of performance.

NOTES

i) There are various market and vehicle specifications which may differ in the number of codes which are enabled. Section EMM.4 contains all the potential codes, many of which may not apply to certain markets.
ii) Some codes may be set and stored in memory to be accessed with the 'Tech 1' tool, but will not activate the 'Check Engine' light.
iii) These tables should be used only to diagnose set trouble codes. The absence of a set trouble code does not preclude a fault from being present.
iv) A trouble code will remain stored in the ECM memory after the fault has been rectified (or does not recur) until; a) 40 engine warm up cycles have been completed, or b) the code is cleared using the programme provided in the 'Tech1' tool.

Diagnostic Trouble Code Report - LSL350

Lotus' policy of continuous product improvement requires that all sources of data are explored and analysed to the potential benefit of Lotus customers past, present and future. Lotus dealers are requested to make full use of the Diagnostic Trouble Code Report Form (LSL350), a copy of which is included at the end of this section, in order to help with diagnosis and their own record keeping, as well as telefaxing the information to Lotus via Technical Service on (44) 01953 608257.

Note that any engine management related warranty claim must be accompanied by a completed Diagnostic Trouble Code Report form LSL350.

Manifold Absolute Pressure PO1 06/7/8

PO1 06 Circuit Range/Performance Problem

Description:	Rationality check, manifold pressure not too low at high throttle position
Malfunction Criteria:	Manifold pressure < 320 mBar **or** Manifold pressure > 960 mBar
Secondary enable conditions:	when (Throttle position > 40%) when {Throttle position < 14.8% } (Engine speed > 960 RPM) {Engine speed > 960 RPM }
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Connector - Intermittent wire failure - Blocked sensor port - Partial short to voltage or ground - Sensor damaged; check datalist for pressure with engine not running
Limp home:	If a fault is indicated a substitute value for manifold air pressure is used. If the engine is not running the substitute value is the barometric pres sure plus a constant (0 Kpa). If the engine is running the substitute value is taken from a series of lookup maps.
Note:	This fault will be indicated with. a 'check engine' light

PO107 Circuit Low Input

Description:	Out of limit voltage check
Malfunction Criteria:	MAP sensor voltage < 0.005V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Signal wire shorted to ground - Signal wire open circuit - Sensor disconnected - Reference voltage missing - Reference voltage wire shorted to ground - Reference voltage wire open circuit - Sensor failed - ECM input circuit failed
Limp home:	If a fault is indicated a substitute value for manifold air pressure is used. If the engine is not running the substitute value is the barometric pres sure plus a constant (0 Kpa). If the engine is running the substitute value is taken from a series of lookup maps.
Note:	This fault will be indicated with a 'check engine' light

PO1 08 Circuit High Input

Description:	Out of limit voltage check
Malfunction Criteria:	MAP sensor voltage > 4.907V
Secondary enable conditions:	Throttle position < 80%
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Signal wire shorted to 12V or reference 5V - Ground wire open circuit - Sensor failed - ECM input circuit failed

Limp home: If a fault is indicated a substitute value for manifold air pressure is used. If the engine is not running the substitute value is the barometric pres sure plus á Constant (0 Kpa). If the engine is running the substitute value is taken from a series of lookup maps.

Note: This fault will be indicated with a 'check engine' light

Intake Air Temperature P0111/2/3

P0111 Circuit Range/Performance Problem

Description: Rationality check, intake air too warm
Malfunction Criteria: Intake air temperature > 18°C
Secondary enable conditions:
- Water temperature < 10°C
- Engine run time > 30 seconds

Disabled by faults: None
Time required: 1 sec
Potential failure modes:
- Intermittent wire failure
- Partial short to voltage or ground

Limp home: If a fault is indicated a substitute value for air inlet temperature is used. The value is the lower of either the coolant temperature or 40°C.
Note: This fault will be indicated with a 'check engine' light

P0112 Circuit Low Input

Description: Out of limit voltage check
Malfunction Criteria: IAT sensor voltage < 0.562V
Secondary enable conditions: Engine running
Disabled by faults: None
Time required: 1 sec
Potential failure modes:
- Signal wire short circuit
- Sensor failed
- ECM input circuit failed

Limp home: If a fault is indicated a substitute value for air inlet temperature is used. The value is the lower of either the coolant temperature or 40°C.
Note: This fault will be indicated with a 'check engine' light

P0113 Circuit High Input

Description: Out of limit voltage check
Malfunction Criteria: IAT sensor voltage > 431 V
Secondary enable conditions: Engine running
Disabled by faults: None
lime required: 1 sec
Potential failure modes:
- Signal wire open circuit
- Sensor failed
- ECM input circuit failed

Limp home: If a fault is indicated a substitute value for air inlet temperature is used. The value is the lower of either the coolant temperature or 40°C.
Note: This fault will be indicated with a 'check engine' light

Engine Coolant Temperature PO116/7/8

PO116 Circuit Range/Performance' Problem

Description:	Rationality check, excessive time to warm up engine (Note: Closed loop fuel control operates after the total accumulated airflow into the engine has exceeded a limit. The limit is mapped against start-up coolant temperature)
Malfunction Criteria:	Coolant temperature < 40°C
Secondary enable conditions:	Engine runtime > 320 seconds
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	▪ Intermittent wire failure ▪ Partial short to voltage or ground
Limp home:	If a fault is indicated a substitute value for coolant temperature is used (60%)
Note:	This fault will be indicated with a 'check engine' light

PO117 Circuit Low Input

Description:	Out of limit voltage check
Malfunction Criteria:	CLT sensor voltage < 0.562 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	▪ Signal wire short circuit ▪ Sensor failed ▪ ECM input circuit failed
LImp home:	If a fault is indicated a substitute value for coolant temperature is used ((60%)
Note:	This fault will be indicated with a 'check engine' light

PO116 Circuit High Input

Description:	Out of limit voltage check
Malfunction Criteria:	CLT sensor voltage > 4.31 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	▪ Signal wire open circuit ▪ Sensor failed ▪ ECM input circuit failed
Limp home:	If a fault is indicated a substitute value for coolant temperature is used (60%)
Note:	This fault will be indicated with a 'check engine' light

Throttle Position P0121/2/3

PO1 21 Circuit Range/Performance Problem

Description:	Rationality check, Throttle not too high at low manifold pressure or too low at high manifold pressures
Malfunction Criteria:	(Throttle position > 88%) {Throttle position < 25% }
Secondary enable conditions:	(Manifold pressure < 1000 mBar) or {Manifold pressure >1200 mBar}
	(Vehicle speed > 30 MPH) {Engine speed > 1260 RPM }
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Intermittent wire failure • Partial short to voltage or ground
Limp home:	If a fault is indicated a substitute value for throttle position is used. If the engine is not running the substitute value is taken from a table referenced by manifold pressure.
Note:	This fault will be indicated with a 'check engine' light

PO1 22 Circuit Low Input

Description:	Out of limit voltage check
Malfunction Criteria:	TP sensor voltage < 0.0488 V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Signal wire shorted to ground • Signal wire open circuit • Reference voltage missing • Reference voltage wire shorted to ground • Reference voltage wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	If a fault is indicated a substitute value for throttle position is used. If the engine is not running the substitute value is taken from a table referenced by manifold pressure.
Note:	This fault will be indicated with a 'check engine' light

PO1 23 Circuit High Input

Description:	Out of limit voltage check
Malfunction Criteria:	TP sensor voltage > 4.97 V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Signal wire shorted to 12V or reference 5V • Ground wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	Closed loop fuel control is disabled
Note:	This fault will be indicated with a 'check engine' light

02 Sensor

P0131/2/3 P0137/8
PO1 51/2/3 PO1 57/8

PO131) - RH bank, pre catalyst sensor
P0137) Circuit Low Voltage - RH bank, post catalyst sensor
P0151) - LH bank, pre catalyst sensor
PO157) - LH bank, post catalyst sensor

Description:	N/A
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	N/A
Time required:	N/A
Potential failure modes:	N/A
Limp home:	N/A
Note:	Not implemented

PO132) - RH bank, pre catalyst sensor
PO138) Circuit High Voltage - RH bank, post catalyst sensor
PO152 .) - LH bank, pre catalyst sensor
PO158) - LH bank, post catalyst sensor

Description:	Out of limit voltage check
Malfunction Criteria:	02 sensor voltage > 2.0 V
Secondary enable conditions:	Duration above voltage > 1 sec
Disabled by faults:	None
Time required:	1 sec (2 trips required for PO1 38, PO1 58)
Potential failure modes:	- Signal wire shorted to voltage - Sensor failed - ECM input circuit failed
Limp home:	Closed loop fuel control is disabled
Note:	These faults will be indicated with a 'check engine' light

PO133) Circuit Slow Response - RH bank, pre catalyst sensor
PO153) - LH bank, pre catalyst sensor

Description:	Rationality check, slow switching
Malfunction Criteria:	- Lean to rich switch events < 4 or - Rich to lean switch events c 4 or - Average switch time lean to rich > 1000 mSec or - Average switch time rich to lean > 1000 mSec or - Ratio of average switch times >1.8 or - Ratio of average switch times < 0.2
Secondary enable conditions:	Throttle position between 3.5% and 10.5% Manifold pressure between 300 and 650 mBar engine speed between 1140 and 2250 RPM Change in purge flow demand < 99% Sensor ready, in closed loop control
Disabled by faults:	None
Time required:	5 sec; Two trips with the fault

Potential failure modes:	- Sensor contamination; poor / wrong quality fuel - Sensor gas slots blocked; exhaust deposits - Grounding-circuit problem
Limp home:	Closed loop fuel control is disabled
Note:	These faults will be indicated with a 'check engine' light

02 Sensor

PO1 34/5 PO1 40/1
PO1 54/5 PO1 60/1

PO134) PO140) PO154) PO160) Circuit No Activity Detected

- RH bank, pre catalyst sensor-
- RH bank, post catalyst sensor
- LH bank, pre catalyst sensor
- LH bank, post catalyst sensor

Description:	Rationality check, to see if the sensor is active (a non active sensor shows 0.5V nominal)
Malfunction Criteria:	02 sensor not ready
Secondary enable conditions:	Accumulated airflow through engine > 3800 grams
Disabled by faults:	None
Time required:	N/A (two trips required for post catalyst sensors)
Potential failure modes:	▪ Sensor contamination; poor quality fuel ▪ Sensor gas slots blocked; exhaust deposits ▪ Heater circuit failure ▪ Sensor failure ▪ ECM input circuit failure
Limp home:	Closed loop fuel control is disabled
Note:	PO134 and PO154 will set the check engine light PO140 and PO160 are available in USA vehicles only

PO135) P01 41) PO155) PO161) Heater Circuit Malfunction

- RH bank, pre catalyst sensor
- RH bank, post catalyst sensor
- LH bank, pre catalyst sensor
- LH bank, post catalyst sensor

Description:	Rationality check, to see if the sensor is active after a given run time (a non active sensor shows 0.5V nominal)
Malfunction Criteria:	(02 sensor not ready) {Integrated deviation from } ( ) or {nominal > 2.0 Volt }
Secondary enable conditions:	(Engine run time > mapped value) {Throttle position < 15% }
Disabled by faults:	None
Time required:	N/A (two trips required for post catalyst sensors)
Potential failure modes:	▪ If PO134 is not set then Sensor heater circuit failure is most likely, as the sensor is OK when hot. ▪ Sensor circuit failure ▪ Sensor failure ▪ ECM input circuit failure.
Limp home:	Closed loop fuel control is disabled
Note:	These codes only available in USA vehicles

Fuel Control System Too Lean Or Rich P0171/2 PO174/5

PO171) Too Lean - RH bank
PO174) - LH bank

Description:	Long term fuel trim too high
Malfunction Criteria:	Any of the long term trims > +19% (119%)
Secondary enable conditions:	Closed loop fuel control active
Disabled by faults:	PO1 31, PO1 35 disables PO1 71 P0151, PO155 disables PO174
Time required:	N/A (Two trips required for post catalyst sensors)
Potential failure modes:	- Fuel pressure problem - Air leakage into plenum / injector housing - Faulty injectors - 02 sensors poisoned - Air leakage into exhaust before 02 sensors - Excess EGR - valve stuck
Limp home:	Closed loop fuel control is disabled
Note:	These codes available in USA vehicles only

PO172) Too Rich - RH bank
PO175) - LH bank)

Description:	Long term fuel trim too low
Malfunction Criteria:	Any of the long term trims < -24.3% (75.7%)
Secondary enable conditions:	Closed loop fuel control active
Disabled by faults:	PO1 31, PO1 35 disables PO1 71 PO1 51, PO1 55 disables PO1 74
Time required:	N/A (Two trips required for post catalyst sensors)
Potential failure modes:	- Fuel pressure problem - Air leakage - Faulty injector/s - 02 sensors poisoned
Limp home:	Closed loop fuel control is disabled
Note:	These codes only available in USA vehicles

Injector Circuit Malfunction

PO201 - 0210

P0201 cylinder 1 (1)
P0202 Cylinder 2 (5)
P0203 Cylinder 3 (3)
P0204 Cylinder 4 (7)
P0205 Cylinder 5 (4)
P0206 Cylinder 6 (8)
P0207 Cylinder 7 (2)
P0208 Cylinder 8 (6)
P0209 Cylinder 9 [additional #1)
P0210 cylinder 10 (additional #2)

Description:	This is a circuit check, to see if an injector is in circuit.
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Injector state off Engine running
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Connectors • Wire open or short circuit • Relay faulty; injector control • Inertia switch disturbed (during maintenance or service) • Injector fault • ECM injector circuit failed
Limp home:	None
Note:	These faults will be indicated with a 'check engine' light. Early cars will have an alternative Code/Cylinder reference. This is indicated above by the number in brackets: PO207 Cylinder 7 (2)

Misfire PO300 - 0308

PO300	)	**- Random**
PO301	)	**- Cylinder 1**
PO302	)	**- Cylinder 2**
PO303	)	**- Cylinder 3**
PO304	) **Misfire Detected**	**- Cylinder 4**
PO305	)	**- Cylinder 5**
PO306	)	**- Cylinder 6**
PO307	)	**- Cylinder 7**
PO306	)	**- Cylinder 8**

Description: The detection system attempts to specify a single misfiring cylinder. If the engine misfire is severe, the system will indicate more than one cylinder. The DTC code storage will rank the cylinders into the most likely problem cylinder.

Malfunction Criteria: These codes will be displayed only if PI 301 is indicated.

Secondary enable conditions:
Rough road not detected
P0300-P0308 active
Battery voltage between 11 & 18 V
Engine speed between 750 & 3000 RPM
Knock not present
MAP between 350 & 1100 mBar
Coolant temperature between -6°C & +120°C

Disabled by faults: PO1 22, PO1 23, PO1 07, PO1 08, PO1 17, PO1 08, P0341, P0326, PO328

Time required: 200 revs continuously

Potential failure modes:
- Spark plug fault
- Plug lead loose or faulty
- Ignition coil circuit problems
- Ignition coil problem
- Low compression in cylinder

Limp home: None

Note:

Knock Sensor P0326/7/8

PO326 Circuit Range/Performance

Description:	Rationality checks
Malfunction Criteria:	Continuous knock seen for 20 secs or Sensor voltage < 0 V or > 5.0 V
Secondary enable conditions:	(Throttle position between 2% and 15%) (Coolant temperature between 80 and 100°C) (Engine speed between 1200 and 2010 RPM) (MAP between 300 and 600 mBar)
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	▪ Loose sensor ▪ Mechanical fault in engine (noise) ▪ Electrical interference
Limp home:	Retard ignition

PO327 Circuit Low Input

Description:	Circuit checks
Malfunction Criteria:	Knock voltage > 4.98 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	Disconnected.
Limp home:	Retard ignition

PO326 Circuit High Input

Description:	Circuit checks
Malfunction Criteria:	Knock voltage < 0.073 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	▪ Short to ground ▪ Engine earth problem; check earths on clutch. housing
Limp home:	Retard ignition

Engine Speed / Position Sensors

PO336
PO341

PO336 Crankshaft Position Sensor Circuit Range/Performance

Description:	Rationality checks - looks for intermittent loss of crank pulses
Malfunction Criteria:	Crankshaft pulses < 20
Secondary enable conditions:	Camshaft sensor pulses >3
Disabled by faults:	None
Time required:	Immediate
Potential failure modes:	• Connector • Incorrect sensor gap • Wiring circuit • Fault on rough road sensor; see codes P1311 - P1313
Limp home:	None. If a crank sensor circuit fault is present the engine will not fire or start. No fuel will be scheduled

PO341 Camshaft Position Sensor Circuit Range/Performance

Description:	Rationality checks - If there are no crankshaft sensor failures, there should be 8 crankshaft pulses for each camshaft signal. If there are more than 8 then a fault is indicated.
Malfunction Criteria:	Camshaft pulses < 3
Secondary enable conditions:	Crankshaft pulses > 20
Disabled by faults:	PO338
Time required:	Immediate
Potential failure modes:	• Connector • Sensor gap • Wiring circuit
Limp home:	None. If a crank sensor circuit fault is present the engine will not fire or start. However if the failure occurs during driving the engine will continue to run until the sync. is lost. This usually occurs when the engine is stalled or turned off.

Exhaust Gas Recirculation Flow P0401/2

PO401 Insufficient Flow Detected

Description:	This is a rationality check. If sufficient recirculated exhaust gas is demanded then there should be hot gas in the EGR manifold.
Malfunction Criteria:	EGR gas flow temperature < 58°C
Secondary enable conditions:	(Manifold pressure > 450 mBar) (Engine speed >1500 RPM) (EGR flow scheduled >3%)
Disabled by faults:	P1406 P1407
Time required:	7 secs; 2 trips required
Potential failure modes:	• Connector • Wiring circuit; 12 V feed • Wiring circuit; Control circuit • Blocked pipework • Broken pipework • Faulty valve
Limp home:	EGR disabled
Note:	This is only available in USA vehicles

PO402 Excessive Flow Detected

Description:	This is a rationality check. If sufficient recirculated exhaust gas is not demanded then we would expect to see cool gas in the EGR manifold.
Malfunction Criteria:	EGR gas flow temperature > 59°C
Secondary enable conditions:	(Start-up coolant temperature < 30°C) (Scheduled EGR < 1%) (Engine run time < 25 secs)
Disabled by faults:	P1406 P1407
Time required:	Up to 25 secs; 2 trips required
Potential failure modes:	• Connector • Wiring circuit; Control circuit • Faulty valve; stuck
Limp home:	EGR disabled
Note:	This is only available in USA vehicles

Secondary Air Injection System P0411/3/4

P041 1 Insufficient Flow Detected

Description:	This is a rationality check. If AIR is operating the 02 sensors will indicate lean; if they do not indicate lean, it is assumed that AIR is not flowing.
Malfunction Criteria:	Ratio of lean to rich time on bank 2 < 70%
Secondary enable conditions:	(Battery voltage > 12 v) (Accumulated airflow < 8000 grams) (Airflow < 40 g/sec) (02 sensors ready) (Air fuel ratio demanded > 12:1) (Not in closed loop fuel control) (Idling)
Disabled by faults:	P0107, P0108, P0117, PO118, P0131-P0135, P0151-P0155, P0171, PO1 72, PO1 74, PO1 75, P0300-P0308, PO41 3, P0414, P0441, P0442, P0444, P0445, P0447, P0448, P0452, P0453, P0506, P0507,
Time required:	3 sec. test is repeated 3 times to confirm failure on subsequent idles
Potential failure modes:	- Pipework blocked / kinked - Pump wiring open circuit (fuse) - Control valve open circuit - Control pipe disconnected
Limp home:	None
Note:	This is only available in USA vehicles

PO41 3 Switching Valve/Circuit Open

Description:	Circuit check
Malfunction Criteria:	Logic level low
Secondary enable conditions:	(Relay state Off) (Engine running)
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Connectors - Wire open circuit (fuse B7 blown?) - Relay missing - Relay faulty - ECM input circuit failed
Limp home:	None
Note:	This is only available in USA vehicles

PO41 4 Switching Valve/Circuit Shorted

Description:	Circuit check
Malfunction Criteria:	Logic level high
Secondary enable conditions:	(Relay state on) (Engine running)
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Connectors - Wire short circuit - Relay faulty - ECM input circuit failed
Limp home:	None

Catalyst System Efficiency

PO420
PO430

PO420) Below Threshold - RH bank
PO430) - LH bank

Description:	This is a check on the oxygen storage efficiency of the catalyst. The 02 sensors at rear of the catalyst check if the oxygen is being used effi ciently. The diagnostics analyse the amount of switching activity on the post 02 sensor.
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	P0117, P0118, P0131, P0135, P0151, P0155, P0171. P0172, P0174, PO1 75, P0300-P0308
Time required:	25 sec; 2 trips required
Potential failure modes:	Catalyst badly damaged resulting in poor emissions
Limp home:	None
Note:	This is only available in USA vehicles

Evaporative Emission Control System P0441/2 P0444/5

PO441 Insuff icient Purge Flow

Description:	This check requires a 'pass' on one of two tests. Fuel tank vacuum caused by purge system 'suck'. Or closed loop fuel control deviation caused by purge vapour induction.
Malfunction Criteria:	Fuel tank vacuum < 20 mBar
Secondary enable conditions:	(Barometric pressure > 753 mBar) (Coolant temp > 70°C) (Inlet Air temp < 50°C) (Start-up air temp < 40°C) (Start-up air temp and coolant temp difference < 10°C) (Purge duty cycle < 100%) (Engine at idle) (Tank pressure (positive) at start of test < 10 mBar) (AIR test (P411) completed)
Disabled by faults:	P0117, POl18, P0131, P0135, P0151, P0155, P0171, PO172, PO174, PO1 75, P0300-P0308
Time required:	Variable
Potential failure modes:	- Pipework open to atmosphere; leak check - Purge valve stuck closed
Limp home:	None
Note:	This is only available in USA vehicles

PO442 Leak Detected

Description:	Not implemented
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	N/A
Time required:	N/A
Potential failure modes:	N/A
Limp home:	N/A

PO444 Purge Control Valve Circuit Open

Description:	Circuit check
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Purge valve state off
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	- Connectors - Wire open circuit (fuse B7 blown?) - Relay missing - Relay faulty - ECM input circuit failed
Limp home:	None
Note:	This is only available in USA vehicles

PO445 Purge Control Valve Circuit Shorted

Description:	Circuit check
Malfunction Criteria:	Logic level high
Secondary enable conditions:	Purge valve state on
Disabled by faults:	None
lime required:	1 **sec**
Potential failure modes:	• Connectors • Wire short circuit • Relay faulty • ECM input circuit failed
Limp home:	None
Note:	This is only available in USA vehicles

Evaporative Emission Control System P0446/7/8

PO446 Vent Control Solenoid Performance

Description:	Fuel tank vacuum still present after the purge flow test
Malfunction Criteria:	Fuel tank vacuum c -15 mBar
Secondary enable conditions:	Flow test completed
Disabled by faults:	None
Time required:	10 secs after flow test
Potential failure modes:	- Stuck valve - Blocked pipework; not allowing vent to atmosphere via vent valve - Check orientation of roll over valve; must be vertical
Limp home:	None
Note:	This is available only in USA vehicles

PO447 Vent Control Circuit Open

Description:	Circuit check
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Valve state off
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	- Connectors - Wire open circuit - Relay missing - Solenoid faulty - ECM input circuit failed
Limp home:	None
Note:	This is available only in USA vehicles

PO448 Vent Control Circuit Shorted

Description:	Circuit check
Malfunction Criteria:	Logic level high
Secondary enable conditions:	Valve state on
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	- Connectors - Wire short circuit - Solenoid faulty - ECM input circuit failed
Limp home:	None
Note:	This is available only in USA vehicles

Fuel Tank Pressure Sensor P0451/2/3

PO451 Sensor Range/Performance

Description:	Rationality check - looks for vacuum in fuel tank at start up.
Malfunction Criteria:	Fuel tank pressure < -20 mBar
Secondary enable conditions:	Inlet air temperature > 20°C
Disabled by faults:	PO446
Time required:	1 sec; 2 trips required
Potential failure modes:	- Tank pressure sensor fault - Check orientation of roll over valve; must be vertical
Limp home:	None
Note:	This is available only on USA vehicles

PO452 Circuit Low Input

Description:	Circuit check
Malfunction Criteria:	Sensor voltage < 0.019 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	- Connector - Signal wire shorted to ground - Reference voltage wire shorted to ground - Sensor failed - ECM input circuit failed
Limp home:	None
Note:	This is available only on USA vehicles

PO453 Circuit High Input

Description:	Circuit check
Malfunction Criteria:	Sensor voltage > 4.31 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	- Signal wire open circuit - Sensor failed - ECM input circuit failed
Limp home:	None
Note:	This is available only on USA vehicles

Vehicle Speed Sensor PO501

PO501 Vehicle Speed Sensor Range/Performance

Description:	Rationality checks - looks at the road speed signals when the engine is in overrun, (engine braking). The vehicle speed signal is taken from the ABS system, which in turn uses the vehicle speed sensors. The engine management system uses only one channel - Rear right hand wheel speed.
Malfunction Criteria:	Vehicle speed < 5 MPH
Secondary enable conditions:	Throttle closed; MAP < 225 mbar (22.5 kPa); engine speed < 3000 rpm
Disabled by faults:	None
Time required:	2 seconds; 2 trips required
Potential failure modes:	- Connectors - Wiring short or open circuit - ABS system fault - Sensor fault.
Limp home:	Vehicle speed = 0 is assumed

Idle Speed Control P0506/7

PO506 RPM Lower Than Expected

Description:	Engine speed monitoring
Malfunction Criteria:	Deviation from target idle speed < -100 RPM
Secondary enable conditions:	(Battery voltage between 11 and 15V) (Engine idling) (Idle control integrator >1 8 gms/sec {lost control})
Disabled by faults:	P0442, PO445
Time requlred:	Once fault condition is met = 1 sec; 2 trips required
Potential failure modes:	• Connectors • IAC stuck / closed / blocked
Limp home:	None

PO507 RPM Higher Than Expected

Description:	Engine speed monitoring
Malfunction Criteria:	Deviation from target idle speed > +100 RPM
Secondary enable conditions:	(Battery voltage between 11 and 15 V) (Engine idling) (Idle control integrator c -18 gms/sec {lost control})
Disabled by faults:	P0442, PO445
Time required:	Once fault condition is met = 1 sec; 2 trips required
Potential failure modes:	• Connectors • Air leak into plenum • Stuck valve - Short to 12 V
Limp home:	None

ECM Integrity

P0601
P0606

PO601 Watchdog

Description:	This is a rationality check. The ECM will monitor it self for correct soft ware execution.
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	None
lime required:	**N/A**
Potential failure modes:	ECM fault
Limp home:	None

PO606 Checksum

Description:	This is a rationality check. The ECM will check sum it self for correct software
Malfunction Criteria:	**N/A**
Secondary enable conditions:	N/A
Disabled by faults:	None
Time required:	**N/A**
Potential failure modes:	ECM fault
Limp home:	None

Fuel Pump P1100/1/2/3

P1100 #1 Relay Or Circuit Open
P1102 #2 Relay Or Circuit Open

Description:	Open circuit check
Malfunction Criteria:	Feedback logic low
Secondary enable conditions:	Fuel pump off
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Connectors • Wire open circuit • Relay missing • Relay faulty • ECM input circuit failed
Limp home:	
Note:	This fault will be indicated with a 'check engine' light

P1101 #1 Relay Or Circuit Shorted
P1103 #2 Relay Or Circuit Shorted

Description:	Short circuit checks
Malfunction Criteria:	Feedback logic high
Secondary enable conditions:	Fuel pump state on
Disabled by faults:	None
lime required:	1 sec
Potential failure modes:	• Connectors • Wire short circuit • Relay faulty • ECM input circuit failed
Limp home:	
Note:	This fault will be indicated with a 'check engine' light

Barometric Pressure PI 106/7/8

P1106 Circuit Range/Performance Problem

Description:	Rationality check, difference between manifold pressure and barometric pressure before starting.
Malfunction Criteria:	Difference between MAP and Baro > 50 mBar
Secondary enable conditions:	Engine in stall (not running)
Disabled by faults:	PO1 06, PO1 07
Time required:	1 sec; two trips required.
Potential failure modes:	• Connector • Intermittent wire failure • Partial short to voltage or ground • Blocked sensor port • MAP sensor fault
Limp home:	The value of the manifold pressure in stall is substituted for Baro.
Note:	This fault will be indicated with a 'check engine' light

P1107 Circuit Low Input

Description:	Voltage out of range
Malfunction Criteria:	Baro sensor voltage < 1.875 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; two trips required.
Potential failure modes:	• Signal voltage missing • Reference voltage wire shorted to ground • Reference wire shorted to ground • Signal wire open circuit • Reference voltage wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	The value of the manifold pressure in stall is substituted for Baro.
Note:	This fault will be indicated with a 'check engine' light

P1108 Circuit High Input

Description:	Voltage out of range
Malfunction Criteria:	Baro sensor voltage > 4.99V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	1 sec; two trips required.
Potential failure modes:	• Signal wire shorted to 12V or reference 5V • Ground wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	The value of the manifold pressure in stall is substituted for Baro.
Note:	This fault will be indicated with a 'check engine' light

Misfire P1301/2

P1301 Misfire Level Causing Emisbions Increase

Description:	Misfire detected which could cause emissions increase by 1.5 X standard, or an I/M emissions failure. Fluctuations in crankshaft speed are used to determine misfire.
Malfunction Criteria:	Misfires on all cylinders evaluated over a 1000 engine revolution period > 3%
Secondary enable conditions:	Rough road not detected; P0300-P0308 active
Disabled by faults:	P0122, P0123, P0107, P0108, P0117, P0108, P0341, P0326, PO328
Time required:	1 sec; 2 trips required
Potential failure modes:	• Spark plug fault • Plug lead loose or faulty • Ignition coil circuit problems • Ignition coil problem • Low compression in cylinder
Limp home:	None
Note:	Only available on USA vehicles

P1302, Misfire Level Causing Catalyst System Damage

Description:	Misfire detected which could cause possible damage to the catalytic converter Fluctuations in crankshaft speed are used to determine misfire.
Malfunction Criteria:	Misfires on all cylinders evaluated over 200 revs > 10%
Secondary enable conditions:	Rough road not detected; P0300-P0308 active
Disabled by faults:	P0122, P0123, PO1 07, P0108, P0117, P0108, P0341, P0326, PO328
lime required:	200 revs continuously
Potential failure modes:	• Spark plug fault • Plug lead loose or faulty • Ignition coil circuit problems • Ignition coil problem • Low compression in cylinder
Limp home:	None
Note:	This fault will be indicated with a flashing 'check engine' light during the misfiring condition.

Rough Road Sensor P1311/2/3

PI311 Open Circuit

Description:	Open circuit detection,
Malfunction Criteria:	Sensor voltage > 4.99 V
Secondary enable conditions:	Engine running
Disabled by faults:	none
Time required:	1 sec; 2 trips required
Potential failure modes:	- Connector - Signal wire open circuit or shorted to 12V - Sensor failed - ECM input circuit failed
Limp home:	None
Note:	Only available in USA vehicles

P1312 Short Circuit

Description:	Short circuit detection,
Malfunction Criteria:	Sensor voltage < 0.18 V
Secondary enable conditions:	Engine running
Disabled by faults:	none
lime required:	1 sec; 2 trips required
Potential failure modes:	- Connector - Signal wire shorted to ground - Sensor failed - ECM input circuit failed
Limp home:	None
Note:	Only available in USA vehicles

P1313 Range/Performance Problem

Description:	Rationality checks
Malfunction Criteria:	Sensor voltage > 2.43 V-or < 0 V-
Secondary enable conditions:	Vehicle speed between 1 and 30 MPH
Disabled by faults:	none
Time required:	1 sec; 2 trips required
Potential failure modes:	- Connector - Short to 5V - Intermittent wire failure - Partial short to voltage or ground
Limp home:	Assume no signal
Note:	Only available in USA vehicles

Coolant Fan Relay

PI 400/1

P1400 #1 Short Circuit

Description:	N/A
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	N/A
lime required:	N/A
Potential failure modes:	N/A
Limp home:	N/A

P1401 #1 Open Circuit

Description:	N/A
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	N/A
Time required:	N/A
Potential failure modes:	N/A
Limp home:	N/A

Exhaust Gas Recirculation Sensors PI404 - 1407

P1404 Position Feedback Sensor Beyond Open Limit

Description:	Out of limit check.
Malfunction Criteria:	EGR position sensor voltage < 0.0977 V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Signal wire shorted to ground • Sensor failed • ECM input circuit failed
Limp home:	EGR disabled
Note:	This is only available in USA vehicles

PI405 Position Feedback Sensor Beyond Closed Limit

Description:	Out of limit check.
Malfunction Criteria:	EGR position sensor voltage > 4.93 V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	• Signal wire shorted to 12V • Signal wire open circuit • Reference voltage missing • Reference voltage wire shorted to ground • Reference voltage wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	EGR disabled
Note:	This is only available in USA vehicles

P1406 EGR Temperature Sensor Above High Limit

Description:	Out of limit check.
Malfunction Criteria:	EGR temperature sensor voltage > 4.64V
Secondary enable conditions:	None
Disabled by faults:	None
lime required:	1 sec
Potential failure modes:	• Signal wire open circuit • Sensor failed • ECM input circuit failed
Limp home:	None
Note:	This is only available in USA vehicles

P1407 EGR Temperature Sensor Below Low Limit

Description:	Out of limit check.
Malfunction Criteria:	EGR temperature sensor voltage < 0.586 V
Secondary enable conditions:	None
Disabled by faults:	None
Time required:	1 sec

Potential failure modes:
- Signal wire short circuit to ground
- Sensor failed
- ECM input circuit failed

Limp home: None

Note: This is only available in USA vehicles

Wastegate Control P1410/1/2

P1410 Solenoid Short Circuit

Description:	This is a circuit check, to see if the solenoid circuit is shorted.
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Solenoid state off
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	▪ Connectors ▪ Wire short circuit ▪ Solenoid faulty ▪ ECM input circuit failed
Limp home:	None

PI411 Solenoid Open Circuit

Description:	This is a circuit check, to see if the solenoid circuit is open
Malfunction Criteria:	Logic level high
Secondary enable conditions:	Solenoid state on
Disabled by faults:	None
Time required:	1 sec
Potential failure modes:	▪ Connectors ▪ Wire open circuit (fuse B7 blown?) ▪ Solenoid missing ▪ Solenoid faulty ▪ ECM input circuit failed
Limp home:	None

P1412 Boost Control Function

Description:	Rationality check ▪ If long term learns are too high or too low
Malfunction Criteria:	Boost learn > +45% or Boost learn < -45%
Secondary enable conditions:	Barometric pressure > 800 mBar
Disabled by faults:	None
Time required:	1 sec; 2 trips required.
Potential failure modes:	▪ Connectors ▪ Solenoid control pipework damaged / blocked ▪ Wastegate control arm stuck ▪ Exhaust system blockage
Limp home:	None
Notes:	See also codes P1425 and P1435

Battery Voltage PI 420/1

P1420 Too High

Description:	This is a circuit check, to see if the voltage is too high
Malfunction Criteria:	Battery voltage > 16 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	26 sec; 2 trips required
Potential failure modes:	Alternator or battery fault
Limp home:	None

P1421 Too Low

Description:	This is a circuit check, to see if the voltage is too low
Malfunction Criteria:	Battery voltage < 6.0 V
Secondary enable conditions:	Engine running
Disabled by faults:	None
Time required:	10 sec; 2 trips required
Potential failure modes:	Alternator or battery fault
Limp home:	None

PI425) Catalyst System Failing - RH bank
PI435) - LH bank

Description:	This is an intermediate check on the oxygen storage efficiency of the catalyst. The 02 sensor behind each of the catalysts checks if the oxygen is being used efficiently. The diagnostic works by analysing the amount of switching activity on the post 02 sensor.
Malfunction Criteria:	N/A
Secondary enable conditions:	N/A
Disabled by faults:	P0131, P0135, P0151, P0155, P0117, PO118 PO1 71, PO1 72, PO1 74, PO1 75, P0300-P0308
Time required:	25 sec; 2 trips required
Potential failure modes:	Exhaust system blocked
Limp home:	None
Note:	This is available only on USA vehicles - and will not in itself set a MIL but will be indicated on the service tool. If associated with a boost system failure (P1412) it is an indication of a blocked exhaust system.

Air Conditioning Control Relay PI 460/1

P1460 Open Circuit

Description:	Circuit check
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Relay state off
Disabled by faults:	None
Time required:	1 **sec;** 2 trips required
Potential failure modes:	• Connectors • Wire open circuit • Relay missing • Relay faulty • ECM input circuit failed
Limp home:	None

PI 461 Short Circuit

Description:	Circuit check
Malfunction Criteria:	Logic level high
Secondary enable conditions:	Relay state on
Disabled by faults:	None
Time required:	1 **sec;** 2 trips required
Potential failure modes:	• Connectors • Wire short circuit • Relay faulty • ECM input circuit failed
Limp home:	None

Coolant Recirculation Relay

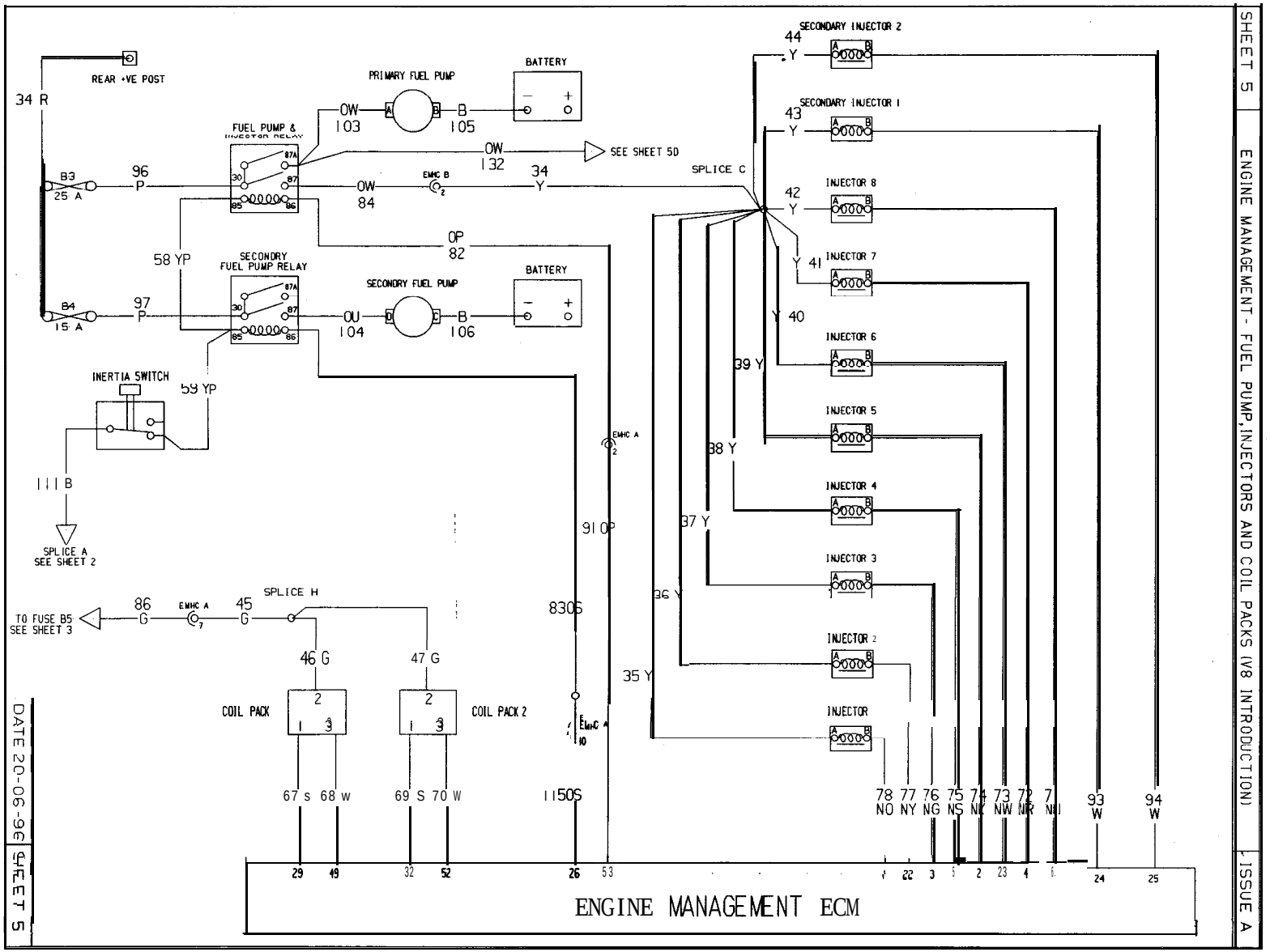
PI 470/1

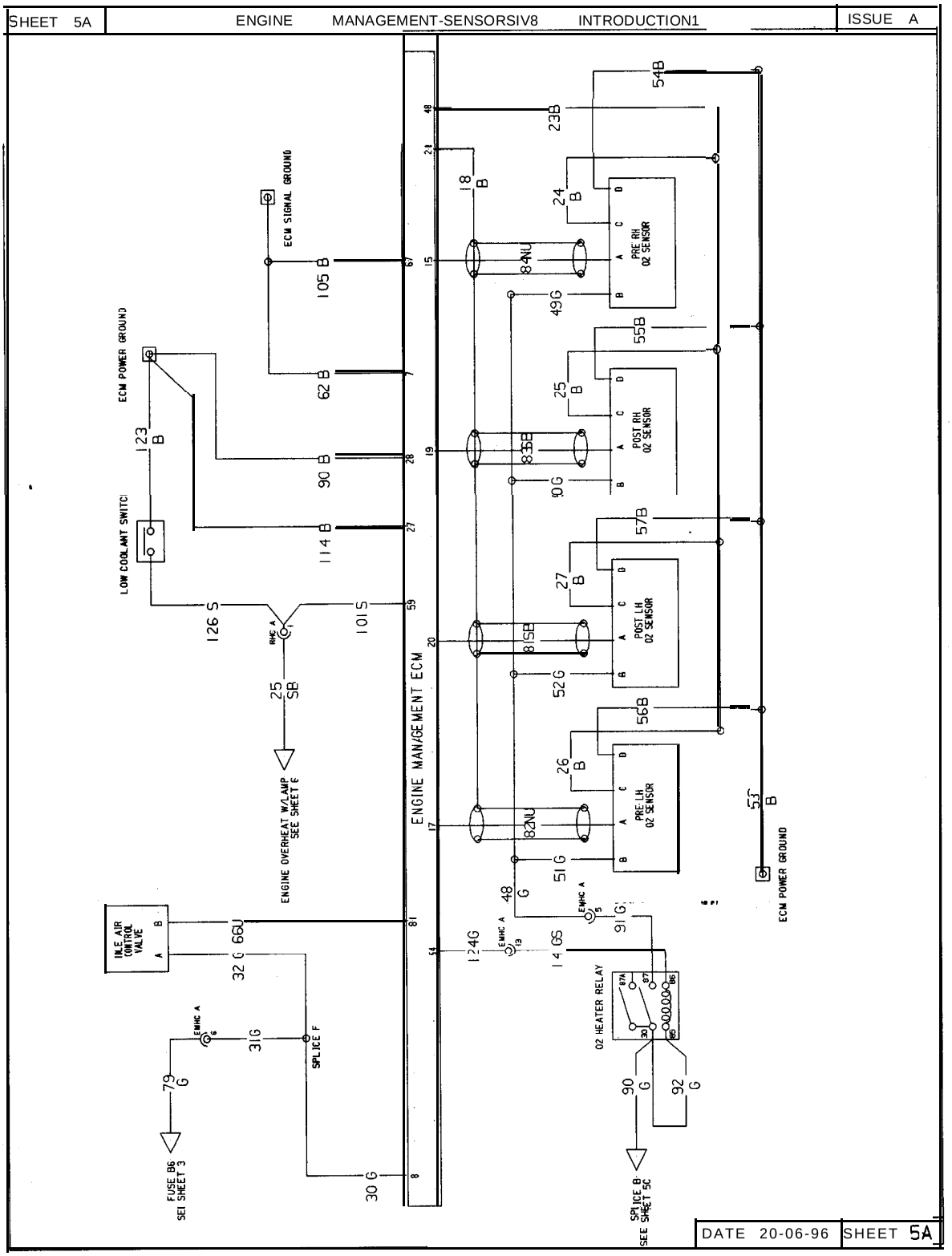
P1470 Open Circuit

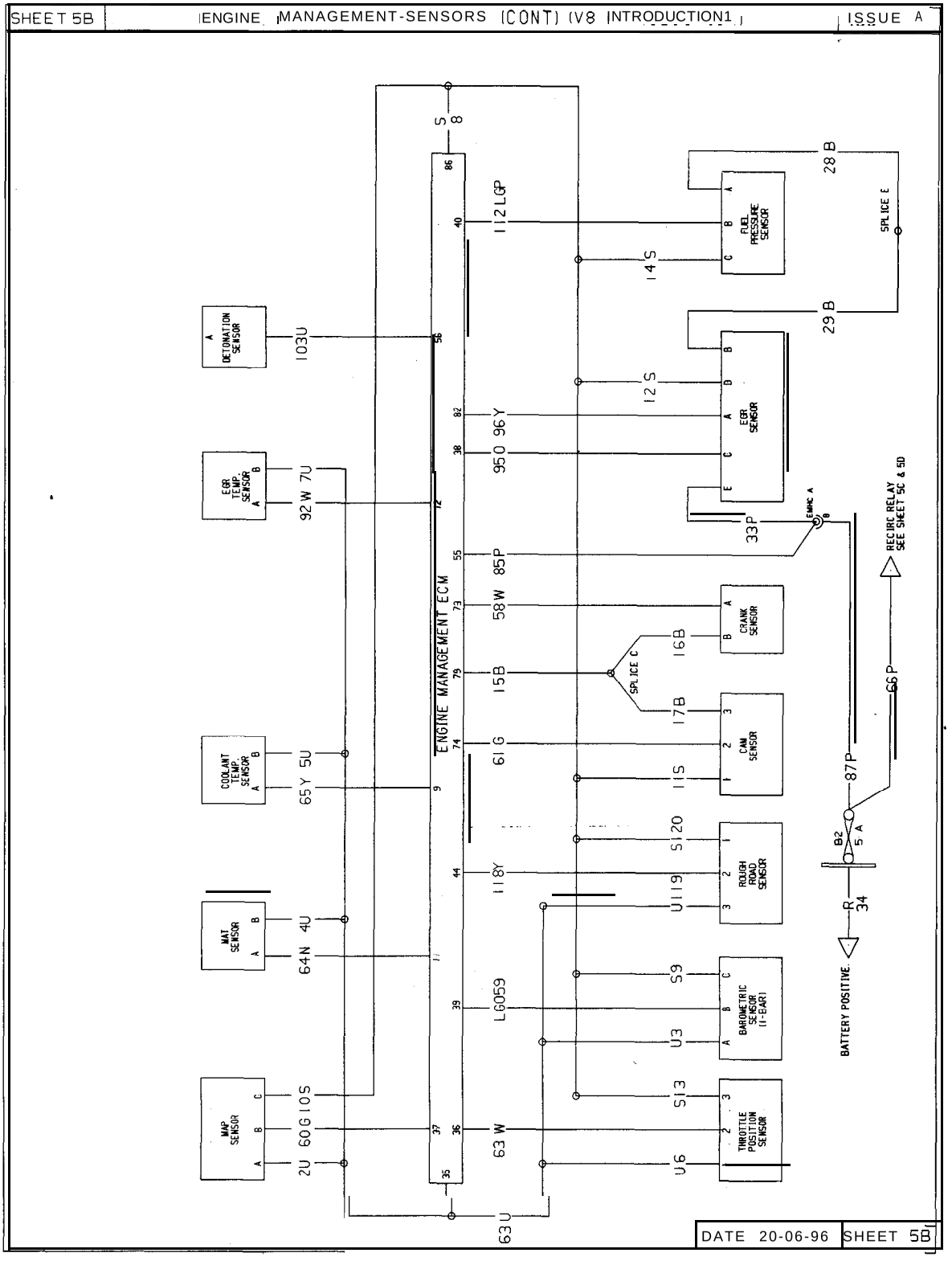
Description:	Circuit check
Malfunction Criteria:	Logic level low
Secondary enable conditions:	Relay state off
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	▪ Connectors ▪ Wire open circuit ▪ Relay missing ▪ Relay faulty ▪ ECM input circuit failed
Limp home:	None

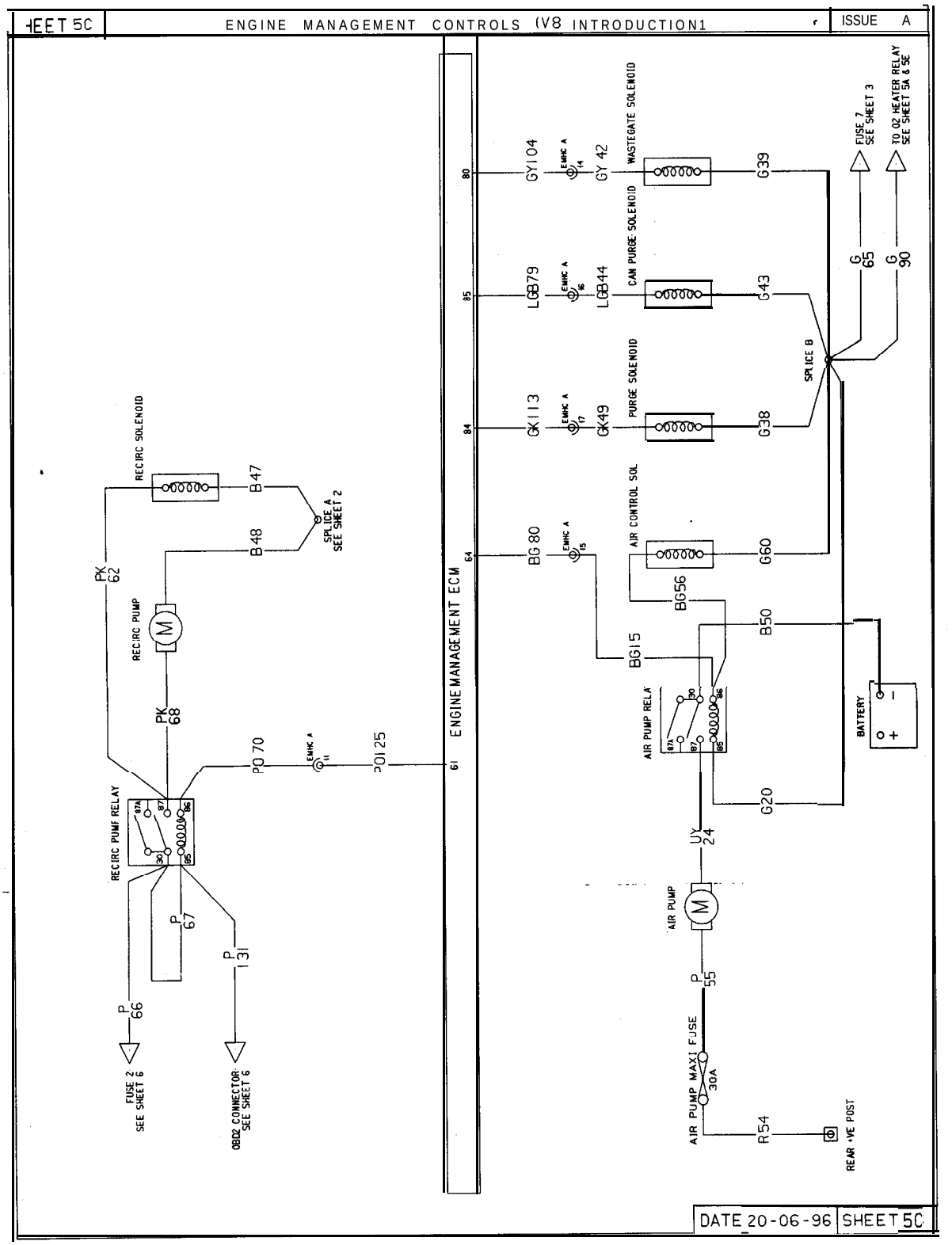
PI 471 Short Circuit

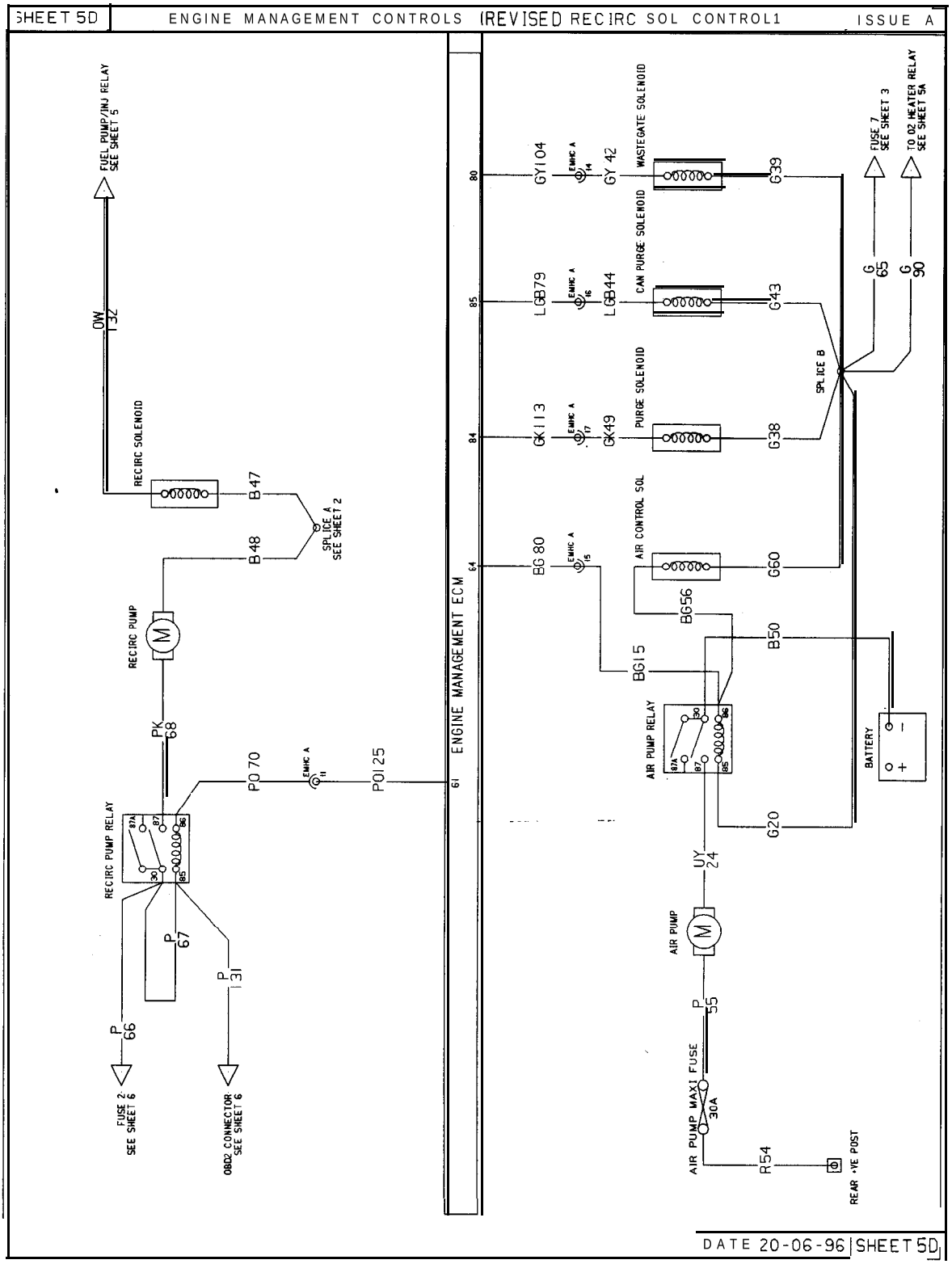
Description:	Circuit check
Malfunction Criteria:	Logic level high
Secondary enable conditions:	Relay state on
Disabled by faults:	None
Time required:	1 sec; 2 trips required
Potential failure modes:	▪ Connectors ▪ Wire short circuit ▪ Relay faulty ▪ ECM input circuit failed
Limp home:	None

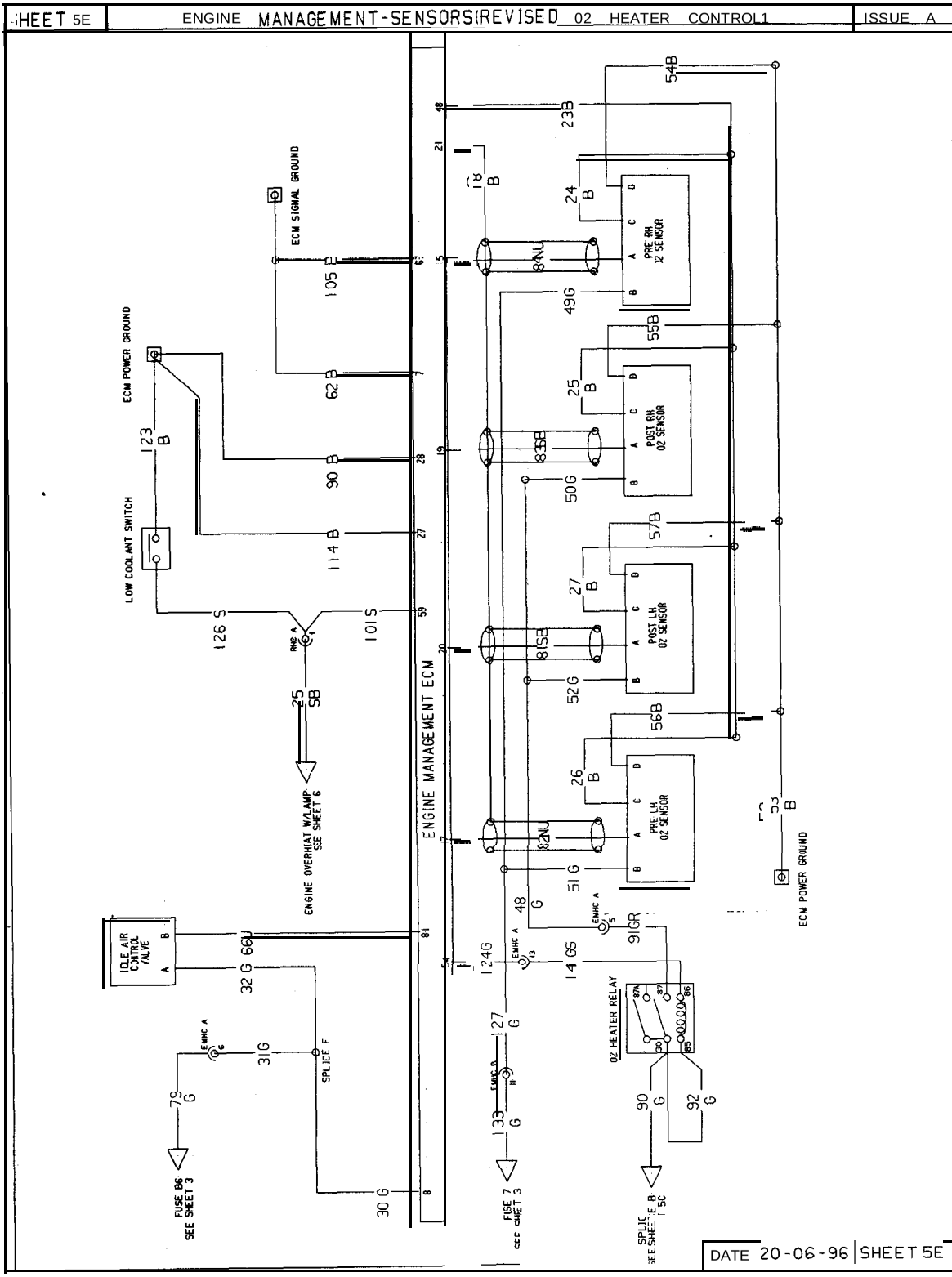

SHEET 5
ENGINE MANAGEMENT - FUEL PUMP, INJECTORS AND COIL PACKS (V8 INTRODUCTION)
ISSUE A
DATE 20-06-96
SHEET 5
REAR +VE POST
34 R
PRIMARY FUEL PUMP
BATTERY
FUEL PUMP & INERTIA RELAY
B3
25 A
96
P
0W
103
B
105
0W
132
SEE SHEET 5D
0W
84
EMIC B
34
Y
SPLICE C
0P
82
58 YP
SECONDRY FUEL PUMP RELAY
SECONDRY FUEL PUMP
BATTERY
B4
15 A
97
P
0U
104
B
106
INERTIA SWITCH
59 YP
111 B
SPLICE A
SEE SHEET 2
EMIC A
910P
SPLICE H
TO FUSE B5
SEE SHEET 3
86
G
EMIC A
45
G
8305
46 G
47 G
COIL PACK
COIL PACK 2
67 S
68 W
69 S
70 W
1150S
SECONDARY INJECTOR 2
44
Y
SECONDARY INJECTOR 1
43
Y
INJECTOR 8
42
Y
INJECTOR 7
41
Y
INJECTOR 6
40
Y
INJECTOR 5
39 Y
INJECTOR 4
38 Y
INJECTOR 3
37 Y
INJECTOR 2
36 Y
INJECTOR
35 Y
78 NO
77 NY
76 NG
75 NS
74 NK
73 NW
72 NR
7 NU
93 W
94 W
ENGINE MANAGEMENT ECM
29
49
32
52
26
53
22
3
2
23
4
24
25


SHEET 5A
ENGINE MANAGEMENT-SENSORSIV8 INTRODUCTION1
ISSUE A
ENGINE MANAGEMENT ECM
ECM SIGNAL GROUND
ECM POWER GROUND
LOW COOLANT SWITCH
PRE RH O2 SENSOR
POST RH O2 SENSOR
POST LH O2 SENSOR
PRE LH O2 SENSOR
IDLE AIR CONTROL VALVE
O2 HEATER RELAY
SPLICE F
ENGINE OVERHEAT W/LAMP SEE SHEET 6
FUSE B6 SEE SHEET 3
SPLICE B SEE SHEET 5C
DATE 20-06-96
SHEET 5A


SHEET 5B
ENGINE MANAGEMENT-SENSORS (CONT) (V8 INTRODUCTION1)
ISSUE A
ENGINE MANAGEMENT ECM
A DETONATION SENSOR
EGR TEMP. SENSOR
COOLANT TEMP. SENSOR
MAT SENSOR
MAP SENSOR
FUEL PRESSURE SENSOR
EGR SENSOR
CRANK SENSOR
CAM SENSOR
ROUGH ROAD SENSOR
BAROMETRIC SENSOR (I-EAR)
THROTTLE POSITION SENSOR
SPLICE C
SPLICE E
RECIRC RELAY SEE SHEET 5C & 5D
BATTERY POSITIVE
DATE 20-06-96
SHEET 5B


HEET 5C
ENGINE MANAGEMENT CONTROLS (V8 INTRODUCTION)
ISSUE A
ENGINE MANAGEMENT ECM
WASTEGATE SOLENOID
CAN PURGE SOLENOID
PURGE SOLENOID
AIR CONTROL SOL
AIR PUMP RELA
RECIRC SOLENOID
RECIRC PUMP
RECIRC PUMP RELAY
AIR PUMP
AIR PUMP MAXI FUSE
30A
BATTERY
SPLICE A
SEE SHEET 2
SPLICE B
FUSE 7
SEE SHEET 3
TO 02 HEATER RELAY
SEE SHEET 5A & 5E
FUSE 2
SEE SHEET 6
OBD2 CONNECTOR
SEE SHEET 6
REAR +VE POST
DATE 20-06-96
SHEET 5C


SHEET 5D
ENGINE MANAGEMENT CONTROLS (REVISED RECIRC SOL CONTROL)
ISSUE A
FUEL PUMP/INJ RELAY
SEE SHEET 5
OW 132
RECIRC SOLENOID
B47
B48
SPLICE A
SEE SHEET 2
RECIRC PUMP
PK 68
RECIRC PUMP RELAY
P 66
P 67
P 131
FUSE 2
SEE SHEET 6
OBD2 CONNECTOR
SEE SHEET 6
P070
EMHC A 11
P0125
61 ENGINE MANAGEMENT ECM
80 GY104 EMHC A 14 GY42 WASTEGATE SOLENOID G39
85 LGB79 EMHC A 16 LGB44 CAN PURGE SOLENOID G43
84 GK113 EMHC A 17 GK49 PURGE SOLENOID G38
64 BG80 EMHC A 15 AIR CONTROL SOL G60
BG56
BG15
B50
AIR PUMP RELAY
BATTERY
G20
UY 24
AIR PUMP
P 55
AIR PUMP MAXI FUSE 30A
R54
REAR -VE POST
SPLICE B
G 65
G 90
FUSE 7
SEE SHEET 3
TO O2 HEATER RELAY
SEE SHEET 5A
DATE 20-06-96 SHEET 5D


SHEET 5E
ENGINE MANAGEMENT-SENSORS(REVISED 02 HEATER CONTROL1
ISSUE A
ECM SIGNAL GROUND
ECM POWER GROUND
LOW COOLANT SWITCH
ENGINE OVERHEAT W/LAMP SEE SHEET 6
ENGINE MANAGEMENT ECM
IDLE AIR CONTROL VALVE
PRE RH O2 SENSOR
POST RH O2 SENSOR
POST LH O2 SENSOR
PRE LH O2 SENSOR
O2 HEATER RELAY
SPLICE F
FUSE B6 SEE SHEET 3
FUSE 7 SEE SHEET 3
SPLICE F B SEE SHEET 5C
ECM POWER GRNUND
DATE 20-06-96 SHEET 5E

DIAGNOSTIC TROUBLE CODE REPORT

Dealer ID: ..... **Date:** .....

VIN: ..... **Milage:** .....

Work carried out because:

Please tick ✓

The check engine light was on	☐
Customer complaint (but no warning light)	☐
Lotus Cars instructions	☐

Fault description / symptoms:

ECU ID (FO, F3):

Diagnostic Trouble codes (F2, DTCs):

P	0	1	0	1

(Example)

Freeze Data (F1):

Trouble code		I Lona FT B2	
Coolant Temp		MAP -- I--	
Engine speed		Calculated load	
Short FT B1		Fuel system B1	
Long FT B1		Fuel system B2	
Short FT B2		Vehicle speed	

Corrective action taken:

Lotus V-8 Parts

10.00 Body
11.00 Glazing and Seals
12.00 Exterior Fittings
13.00 Seats & Seat Belts
14.00 Pedal Box & Fascia
15.00 Interior Trim
16.00 Sound insulation
17.00 Electrical
18.00 Heating, Ventilation Air Cond.
19.00 Labels
30.00 Chassis
31.00 Suspension
32.00 Steering
33.00 Brakes
34.00 Wheels & Tires
40.00 Engine
41.00 Belts and Pulleys
42.00 Induction System
43.00 Emission Equipment
44.00 Fuel System
45.00 Exhaust
46.00 Cooling
47.00 Transmission
60.00 Special Tools

V-8 Parts
10.01 Body

10.01a Bodyshell
10.01b Front Body Repair Section
10.01c Rear Body Repair Section
10.07 Headlamp Pods & Release Mechanism
10.09 Front Bonnet & Release Mechanism
10.11a Tailgate & Release Mechanism
10.13 Engine Compartment, Cover, Seals
10.15 Door Shells, Beam, Hinges
10.17 Door Latch Mechanism
10.23 Bumpers, Spoilers, Sills, Valances, Fixings
10.31 Towing Strut/ Hook

V-8 Parts
11.00 Glazing and Seals

11.01 Windscreen, Door Glass Seals & Weather Strip
11.02 Door Window Lift Mechanism
11.05 Glass / Composite, Tilt Roof Panel

V-8 Parts
12.00 Exterior Fittings

12.01a Capping Rails, Air Scoops, Wind Deflector
12.02a Fuel Filler Flaps and Mechanism
12.05 Decals, Badges & Protective Film
12.06 License Plate Mounting
12.09 Exterior Driving Mirrors

V-8 Parts
13.00 Seats & Seat Belts

13.01 Seat Runners
13.02 Seat Assemblies, Lumbar Support
13.03 Seat Frames & Recline Mechanisms
13.09 Seat Foams & Suspension
13.27 Seat Belts

V-8 Parts
14.00 Pedal Box & Fascia

14.01 Pedal Box, Pedals, Throttle Cable
14.05 Fascia Structure & Supporting Hardware
14.07 Fascia Instrument Panel, Masks & Switch Panels
14.08 Center Console, Fixing & Fittings
14.10 Instrument Cowling
14.12 Passenger Fascia. SIR/Glovebox, 98 MY

V-8 Parts
15.00 Interior Trim

15.01 Roof Trim, Header Rail, Cant Rails, Sun Visors, 98 MY
15.11a Rear Bulkhead Tunnel Top, Storage Pocket, 98 MY
15.13 Front Door Trims
15.19 Center Tunnel Trim, Gear Lever Gaiters/Shrouds
15.24 Luggage Compartment Carpet
15.30 Carpeting & Mats

V-8 Parts
16.00 Sound

16.01 Passenger Compartment Sound Insulation (TBA)
16.02 Body Underside Sound Insulation (TBA)

V-8 Parts
17.00 Electrical

17.01 Harnesses, Leads
17.03 Horn, Inertia Switch, Fuses & Relays
1703a Main Relay Stations
1705 Interior Switches, Cigar Lighter
17.06 Engine Management & Sensors
17.07 Instruments, Tell Tales, & Displays
17.07a Instruments, Tell Tales, & Displays. ’98 MY on
17.11a Lamps front & rear (except headlights), Door switches
17.13 Headlamps
17.15 Headlamp lift Motor & Mechanism
17.21 Windscreen Wiper Motor, Wipers & Washers
17.21a Windscreen Wiper Motor, Wipers & Washers, ’98 MY
17.27 In car Entertainment
17.28 Earth Braids (Leads) & Suppression Devices
17.31 Battery, Clamps, & Cables
17.33 Security Alarm System

V-8 Parts
18.00 Heating, Ventilation, Air Conditioning

18.01 Heater / Air Conditioning Assemblies, Housing
18.03 AC Components, Pipes, Hoses
18.05 Heater, Pipes, Hoses
18.07a AC / Heater Interior Blower Motor
18.09 Driver Operated Controls
18.09a Driver Operated Controls ’98 MY
18.11 AC Vacuum Controls
18.13 Air Trunking & Ventilation

V-8 Parts
19.00 Lables

19.01 Labels, Certificates, Literature Ect.
19.01a Labels, Certificates, Literature Ect
19.03 Owner’s Handbooks & Service Notes Manuals

V-8 Parts
31.00 Suspension

31.01 Front Suspension Incl. Hubs
31.03 Rear Suspension Incl. Hubs

V-8 Parts
32.00 Steering

32.03 Power Steering unit , Reservoir , Plumbing
32.05 Upper Column , Wheel , Steering Lock

V-8 Parts
33.00 Brakes

V-8 Parts
40.00 Engine

40.00 Engine Assemblies
40.01 Engine Block , Oil Pick-up
40.02 Gaskets & Sealants , Top Overhaul Set
40.02a Gaskets & Sealants , Bottom Overhaul Set
40.03 Sump Assembly
40.05 Cylinder Head , Valves , Springs
40.07 Camshaft , Tappets , Cam Cover
40.08 Camshaft , Primary Drive
40.09 Pistons , Con-rods , Liners
40.10 Crankshaft , Bearings , Flywheel
40.13 Water Pump Assembly , Thermostat
40.15 Lubrication System
40.17 Ignition System , Spark plugs , Leads
40.19 Alternator and Starter Motor
40.20 Exhaust Manifolds & Turbochargers
40.23 AC Compressor
40.25 Power Steering Pump , Pulley , Mounting Bracket & Fixings

V-8 Parts
41.00 Belts and Pulleys

41.01 Camshaft Belts , Guards & Pulleys
41.03 Auxiliary Drive Belts & Pulleys
41.04 Belt Tensioner
41.05 Belt Guards

V-8 Parts
42.00 Induction Systems

V-8 Parts
43.00 Emission Equipment

43.01 Air Pump , Mounting Brackets & Fittings
43.03 Vacuum System , Houses , Pipes & Fittings

V-8 Parts
44.00 Fuel System

44.01 Fuel Tanks , Filler
44.01a Fuel Tanks , Filler ’98 MY
44.01c Fuel Tanks , Filler , USA ’00 MY ROW ’01 MY
44.03 Fuel Pump; Filler , Pipes
44.05 Charcoal Canister & Evaporative Loss System.
44.05a Charcoal Can. & Evap. Loss , USA ‘00MY , ROW ’01 MY

V-8 Parts
45.00 Exhaust

45.01 Exhaust System
45.01a Exhaust System , GT3
45.05 Heatshields
45.07 E.G.R. components , Valve , Manifold , Pipes

.

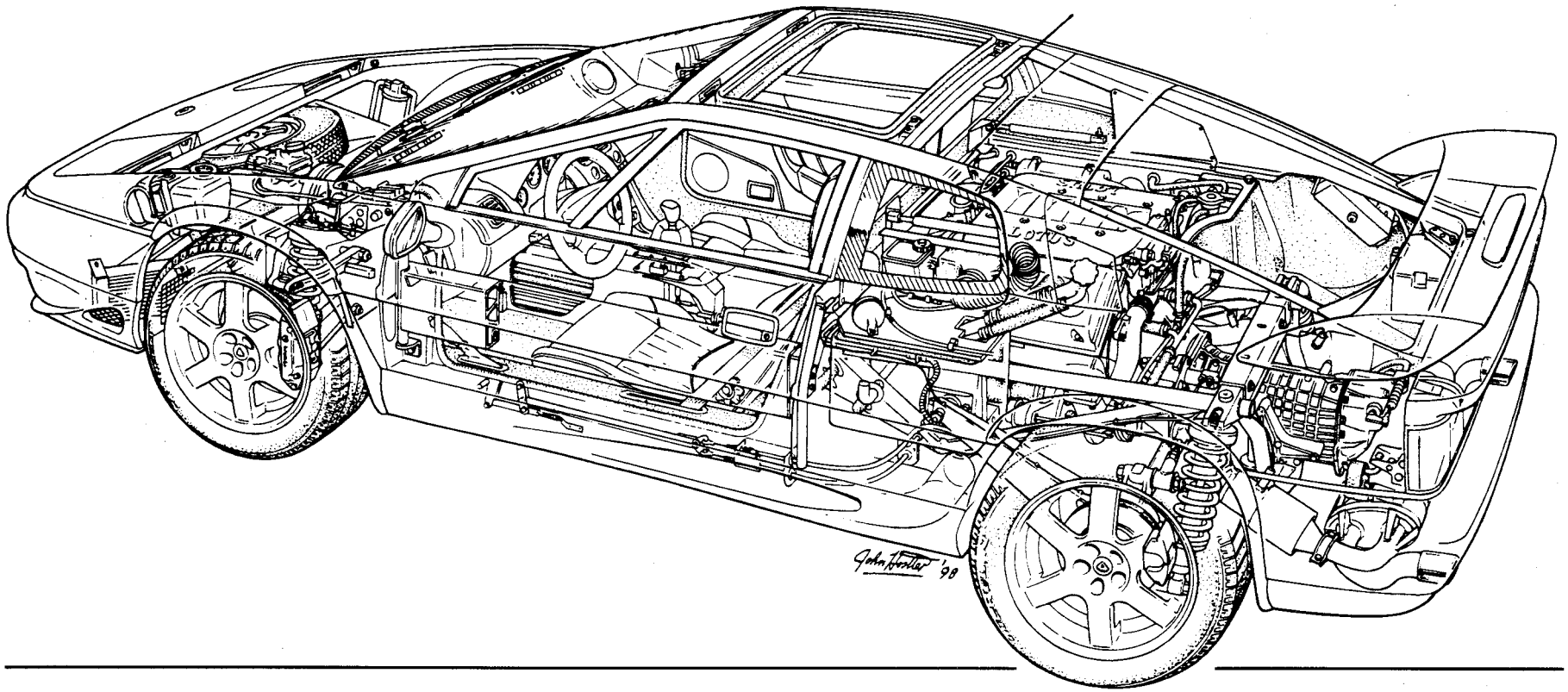
V-8 Parts
47.00 Transmission

47.01 Clutch & Release Mechanism
47.03 Transmission Assembly
47.05 Gearchange Mechanism , External
47.05a Gearchange Mechanism , External , ’98 MY (TBA)
47.06 Gear Selector Mechanism , Internal
47.07 Gears , Shafts & Bearings
47.11 Final Drive & Bearings
47.15 Driveshafts & Seals

V-8 Parts
60.00 Special Tools

60.01 Tool Kit
60.01a Diagnostic Equipment , e.g. Tech 1 Cartridge
60.02 Special Tools
60.02a Special Tools

ESPRIT SERVICE PARTS LIST



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Part Number N082T0325J

FOREWORD

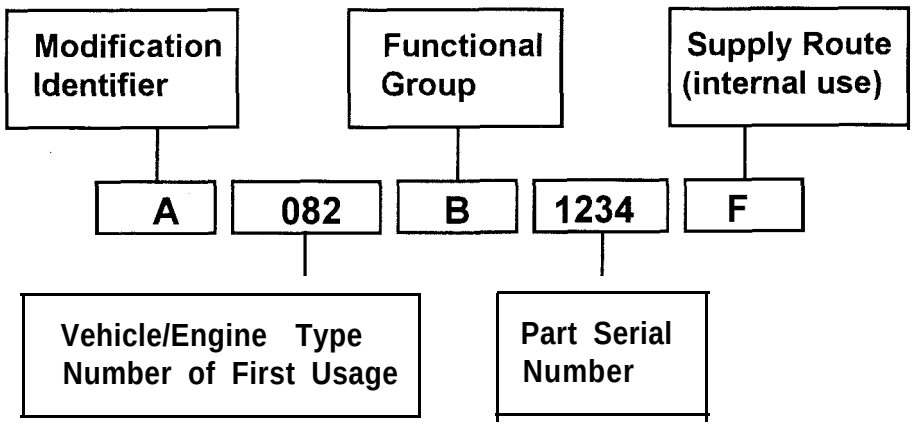
This publication has been designed for use by Lotus Dealers, and may be updated periodically by the issuing or update packages to the dealer network. Lotus policy is one of continuous product improvement and the right is reserved to alter specifications at any time without prior notice.
Whilst every care has been taken to ensure correctness of information, it is impossible to guarantee complete freedom from omissions and errors, or to accept liability arising from such errors or omissions, but nothing herein contained shall affect your statutory rights.

USE OF THE PARTS LIST

This parts list covers the Esprit range, 1996 model year onwards. The manual is arranged in function groups, as defined by the Contents page, and may sometimes use several versions of the same function group to accomodate model variations - take care to establish the full vehicle specification in order to properly identify the applicable parts list section.

PART NUMBERS

Part numbers used in this publication are in the format as follows:



Modification Identifier: This letter identifies a version or modification of the part. Part numbers with different prefix letters may or may not be interchangeable - refer to the remarks column.

Vehicle/Engine Type Number: The type number indicates either the model or engine type on which the part was first used.

026, 036, 045, 500 . . . . Elan
050....Elan+2
046, 054, 065, 074 . . . Europa
075....Elite S1
076....Eclat S1
079....Esprit S1/S2/S2.2
082....Esprit Turbo
083....Elite S2
084....Eclat S2
085....Esprit S3
089.. Excel
100....Elan 1990
111....Elise
340....340R

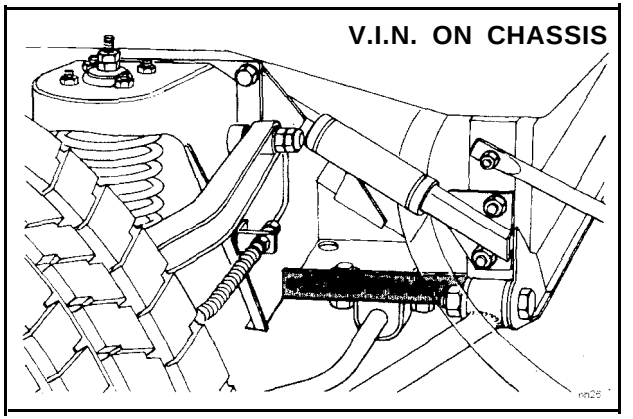
Functional Group: A single letter indicating the functional area of the parts first use

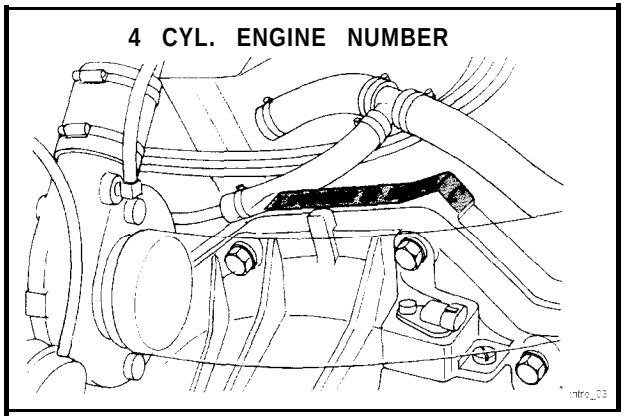
A = Chassis
B = Body
C = Front Suspension
D = Rear Suspension
E = Engine
F = Transmission
G = Wheels & Tyres
H = Steering
J = Brakes
K = Cooling
L = Fuel System
M = Electrics
P = Heater & AC
Q = Clutch
R = Final Drive
S = Exhaust
U = Hard Trim
V = Soft Trim
W = Standard Fixings

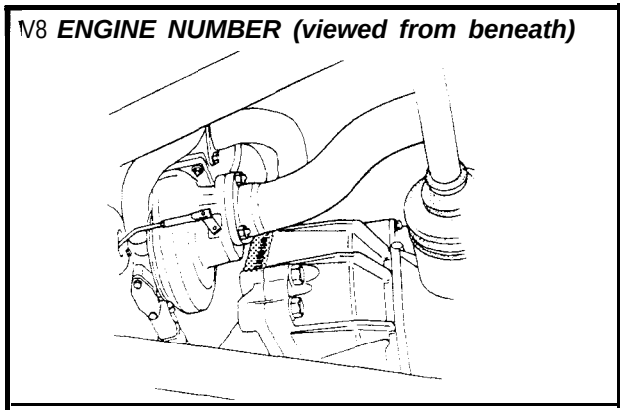
VEHICLE IDENTIFICATION NUMBER & ENGINE NUMBER

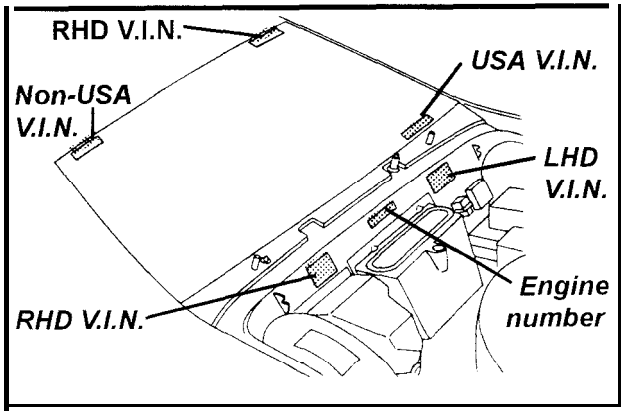
The Vehicle Identification Number (VIN) is stamped onto the chassis frame on the vertical surface of a flange between the inboard pivots of the right hand front suspension lower wishbone, viewable via the right hand front wheeiarch. The engine number on 4 cylinder cars is stamped onto a horizontal surface at the right hand rear of the cylinder block, and on V8 models on a vertical flange at the left hand rear of the cylinder block, Both VIN and engine numbers are duplicated on bar code labels fixed to the front bulkhead in the front luggage compartment, and on some vehicles the VIN is repeated for convenience on a label viewable through the windscreen.

Both numbers should always be quoted with any vehicle enquiries, as Factory records are filed against VIN, and specification change points are identified by VIN or engine number. The vehicle licence number may not accurately reflect vehicle age, and may be changed during the car's life, and are an unreliable method of identification.









There are three variations of the VIN: prior to '98 M Y there IS one for domestirc and non-USA export markets. which complies with European Economic Community (EEC) directives: and one for the USA which complies with requirements laid down by the National H ghway Traftic Safety Association (NHTSA) From '98 M.Y. a common coding is used The seventeen characters of the VIN are coded as follows:

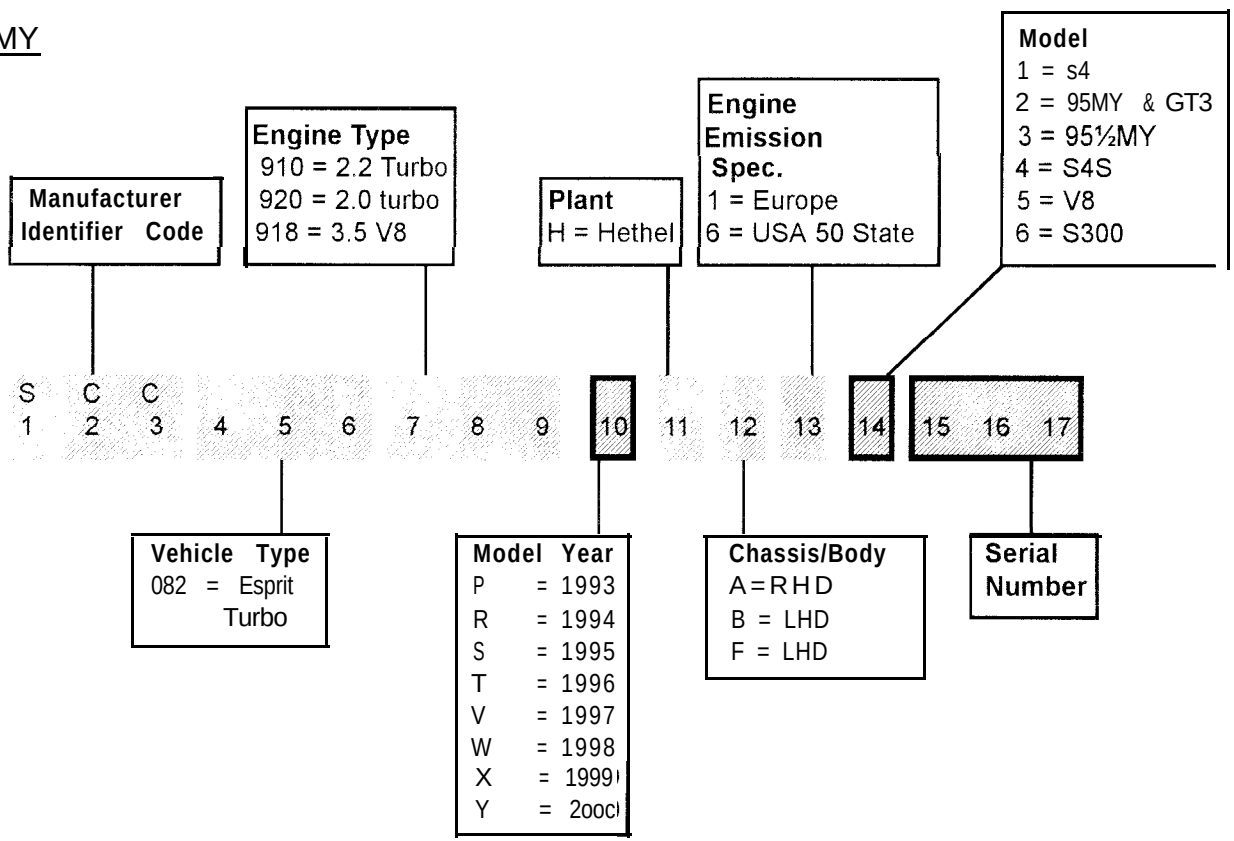
NOTES

1. Prior to '98 M Y different serial number sequences are used for the the following variants:

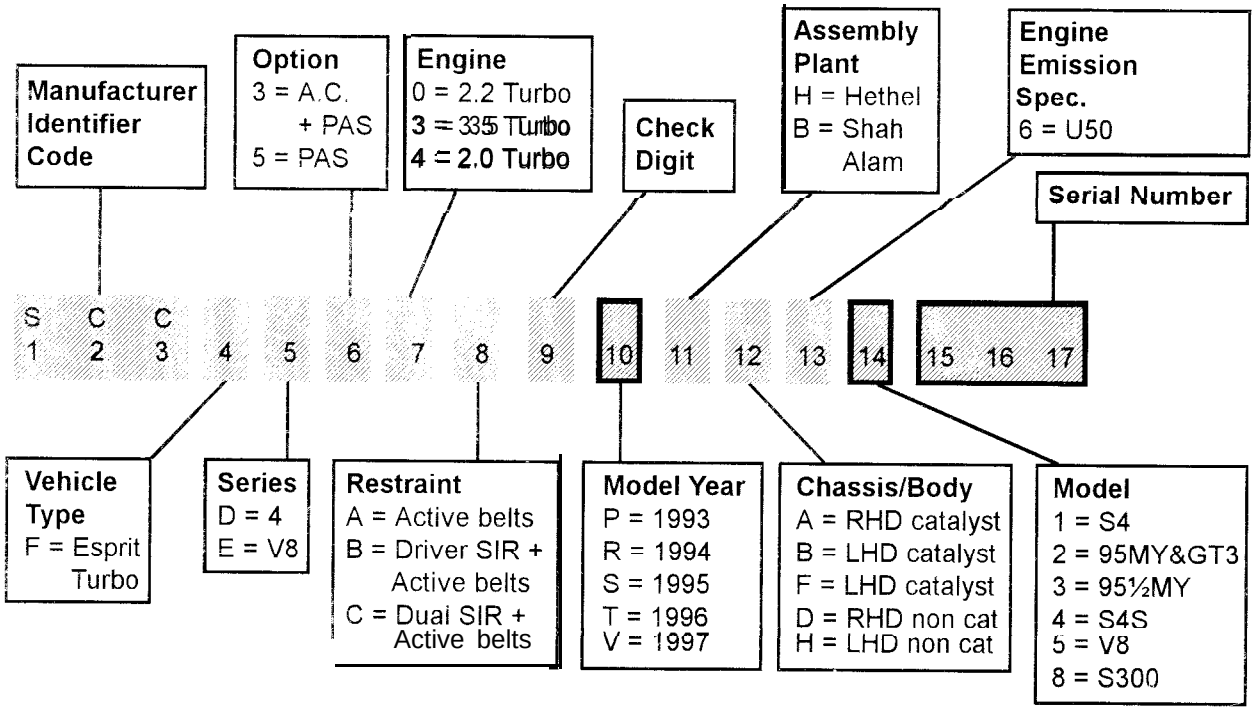
S4 prior to '95 M Y..	0001 to 0010, then 1011 onwards
S4 '95 M.Y. & GT3,	2000 onwards
S4S USA:	3000 onwards
S4S non-USA:	4000 onwards
sport 300:	8001 onwards
Esprit V8:	5009 onwards

2. For change point identification in this manual, only VIN characters 10 (model year) and 14 to 17, (serial number) will be listed. e.g.:
R 1242 ('94 model year S4, serial 1242)
R 8030 ('94 model year Sport 300, serial 8030)

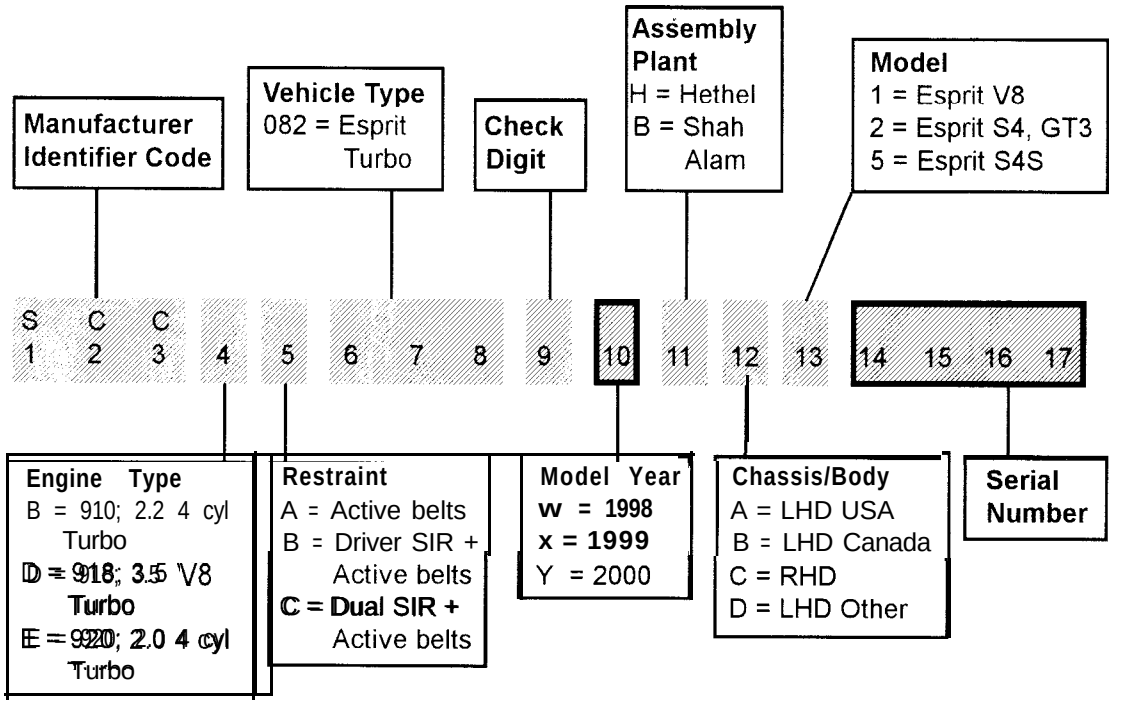
Non-USA Prior '98 MY



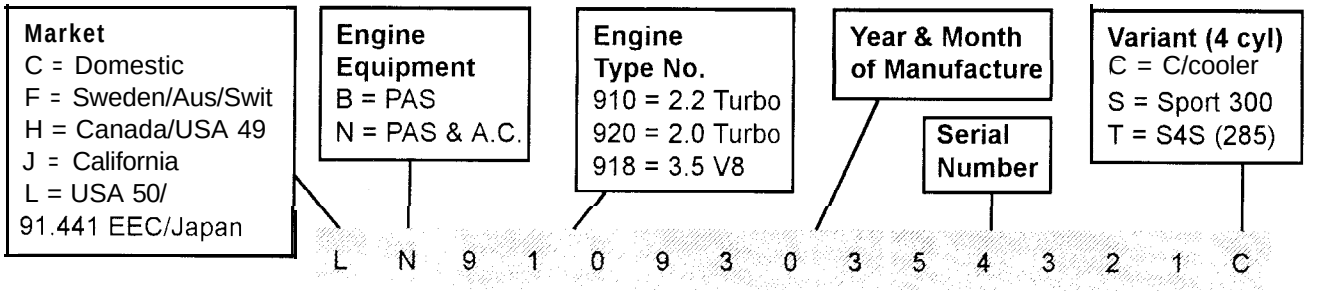
USA Prior '98 MY



‘98 MY onwards



Engine Number Coding



ESPRIT MODEL HISTORY '96 MY on

Esprit V8: May '96

Esprit V8; VIN: T 5009

As S4S with following principal changes:

New Lotus type 91 8 3.5 litre twin turbo V8 engine.

No chargecooiing. Lotus/vertronix engine management.

Kelsey-Hayes ABS-415 antiiock brake system.

Chassis modifications to accommodate engine and exhaust system

Cooling system includes recirculation pump and diverter valve

Larger capacity 'pull-type' clutch. Type UN1 027 transrnission with higher 5th ratio and reverse gear brake.

New one piece road wheels and restyled front spoiler.

New variable disolacement a.c. compressor.

Esprit GT3: October '96

Esprit GT3; WIN: T 2100 (not USA

Based on S4 model with following changes:

2 litre (type 920) 250 bhp engine.

No back pressure valve or throttle jack.

No tailgate mounted aerofoil. Swiss type rear transom spoiler lip,

Single fuel filler on LH side.

GT3 decals along door bottoms.

Sport 300 type seats with backs painted body coiour.

Cloth/vinyl interior trim. Senotex instrument masks. Body colour composite gear lever shroud.

Aluminium gear lever knob.

Optional panel lamps rheostat; alarm; door edge, bonnet and footwell lamps; lights on buzzer; one touch windows.

'97 M.Y. Esprit V8 & GT3: May '96

USA V8; VIN: V 5075 (May '96)

Non USA V8; VIN: V 5215 (Oct. '96)

GT3; VIN: V 2111 (Oct. '96)

Specification unchanged.

Introduction of V8 Twin Plate Clutch: February '97

Esprit V8: VIN: **V 5289**

Many cars also retro-fitted.

New lightweight fiywheei, low inertia twin plate clutch 'assembly. cast iron clutch housing, pedai downstop, re-caiibrated ECM.

'98 M.Y. Esprit V8 & GT3: October '97

Esprit V8; **YIN: w 5408 plus 5374 5382, 5385**

GT3; ViN: w 2200 plus 2192

As pevious with foilowing principal changes:

Restyled interior with compact instrument binnacle, new centre console and tunnei top.

Four instrument set, new tell tale clusters, Elrse style push switches. Deletion of boost and oil temperature gauges and time clock.

Cobra 6422 security system with remote operation.

Revised interior climate control system, with rotary selector switches and electro-pneumatic flap operation, Stepper motor water valve. New face lever

gas strut for tailgate

V8: New low effort clutch release system with new hydraulic cylinders and rigid pipe. Revised clutch fork and stiffer alloy clutch housing.

V8: Revised twin cable gearchange mechanism dispenses with translator. Modified transmission selector cross shaft. Adopted on GT3 together with lower final drive and iower 3rd gear in June '98 at VIN W 2272.

New Kelsey-Hayes EBC 430 anti-lock brakes electro-hydraulic control unit.

- Single fuel filler.

Esprit V8-GT: January '98

Esprit V8-GT; VIN: W 5442

As Esprit V8 with following principal changes:

No rear aerofoil.

Long type rear body spoiler.

Matt vinyl interior trim.

No a.c. (compressor retained for belt routing).

V8-GT decal in rear quarter windo

Esprit Sport 350: October '98

sport 350; VIN: W 5603

Limited edition of 50. As Esprit V8-GT with following principal changes: (Esprit V8 adopts V8 S.E. moniker to aid identification)

Lightweight handlay lower body half (except S.I.R. cars).

Carbon fibre 'GT1' style rear aerofoil with alloy end plates, Sculpted alloy mounting plinths.

Front spoiler extension skirt and rubber lip.

New Aluminium body colour with 'Sport 350' graphics on doors and sill treadplates. Blue decal tape in sill ducts and radiator air intake. Grilles in front valance coloured titanium.

Magnesium 'Crono' O.Z. wheels in charcoal, with Pirelli P Zero tyres, marginally wider on rear.

Larger A.P. Racing discs with curved vanes and cross drilling on both front and rear.

A.P. Racing 4-pot alloy front calipers, finished in blue with 'Lotus' lettering.

Seats with increased lateral support on cushion and backrest. Seat facings in blue Alcantara.

Centre console, instrument binnacle, gear lever tray & lower switch panel in satin finish carbon fibre. HRS switch moved to upper switch row.

Blue Alcantara door insert panels with body colour feature strips.

Anodised aluminium instrument mask, gear lever knob & gear lever gaiter ring. Aluminium plaque on windscreen landing with limited edition no.

Drilled alloy pads on brake & clutch pedals.

Monroe N65 dampers and stiffer springs front & rear.

Uprated anti-roll bar.

Increased wall thickness chassis tubes around engine bay

Re-calibrated ECM with re-profiled boost curves.

Blue painted cam covers

'99 M.Y. **Esprit V8 S.E., V8-GT, Sport 350 & GT3: November '98**

V8 models; VIN: X 5657

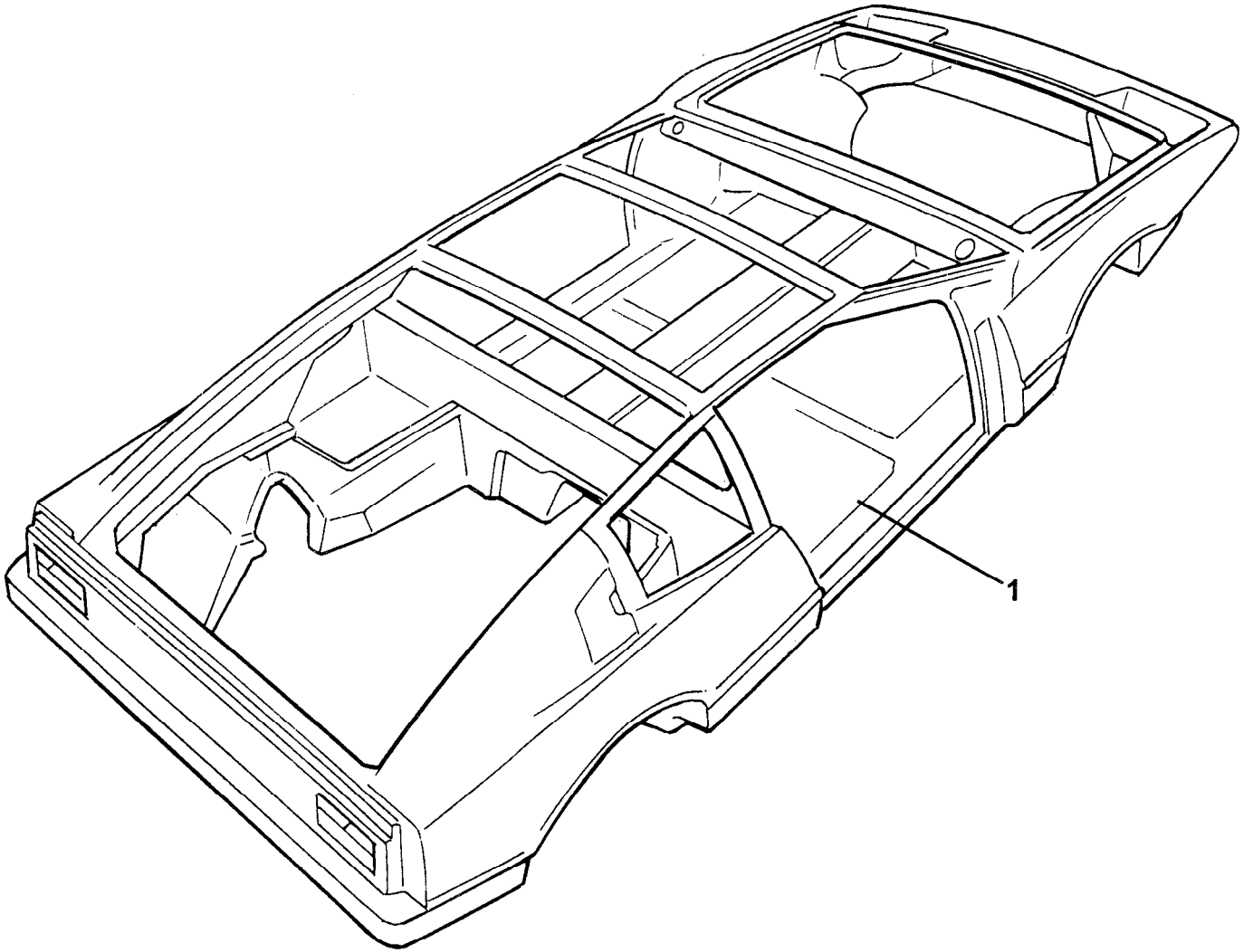
GT3; VIN: X 2287

Non-USA models unchanged. USA only:

Revised evaporative emission system.

Anodised aluminium instrument mask, gear lever knob & gear lever gaiter ring.

Drilled alloy pads on brake & clutch pedals.



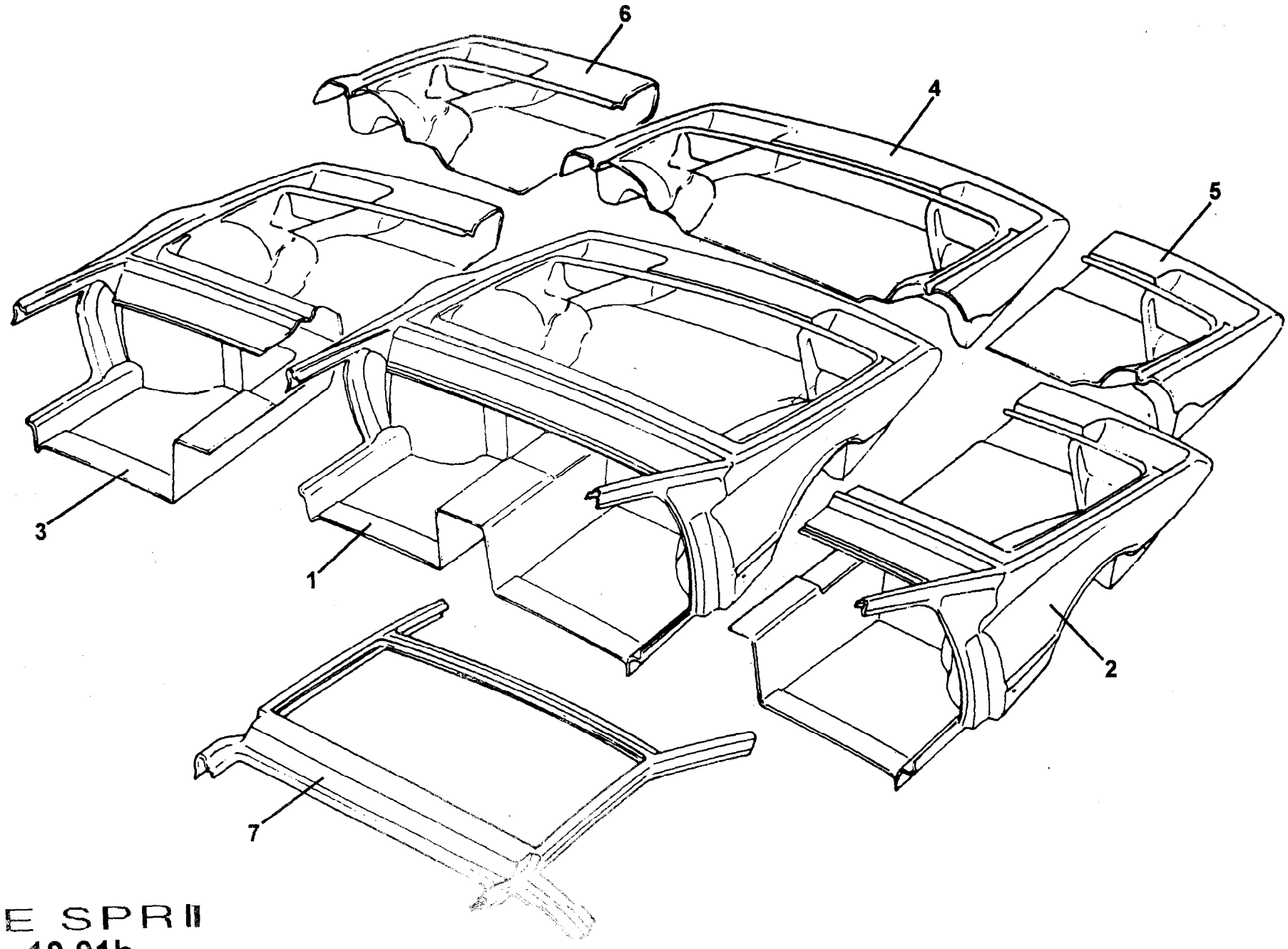
ESPRIT
10.01a

Function Code 10.01 a Bodyshell

Dep	Part Description	Remarks	Option	Part Number	QTY
01	Bodyshell, RHD	V8, prior to '98 MY	Domestic, driver SIR	**A082B5306J**	1
Ola	Bodyshell, RHD	V8, prior to '98MY	Domestic, non SIR	**A082B5313J**	1
Olb	Bodyshell, LHD	V8, prior to '98 MY	Euro., dual SIR	**A082B5309J**	1
Olc	Bodyshell, LHD	V8, prior to '98 MY	Euro., driver SIR	**A082853075**	1
Old	Bodyshell, LHD	V8, prior to '98 MY	Euro., non SIR	**A082B5332J**	1
Ole	Bodyshell, LHD	V8, prior to '98 MY	Federal, dual SIR	**A082B5314J**	1
Olf	Bodyshell, RHD	V8GT	Dom., driver SIR, glass roof	**A082B5444J** ,	1
Olg	Bodyshell, RHD	V8GT	Dom., non SIR, glass roof	**A082B5442J**	1
Olh	Bodyshell, RHD	V8, '98 MY on	Dom., driver SIR, glass roof	**A082B5440J**	1
Oli	Bodyshell, RHD	V8, '98 MY on	Dom., driver SIR, comp. roof	**A082B5450J**	1
Olj	Bodyshell, RHD	V8, '98 MY on	Dom., non SIR, glass roof	**A082B5438J**	1
Olk	Bodyshell, RHD	V8, '98 MY on	Dom., non SIR, comp. roof	**A082B5448J**	1
011	Bodyshell, LHD	V8GT	Euro., dual SIR, glass roof	**A082B5445J**	1
Olm	Bodyshell, LHD	V8GT	Euro., non SIR, glass roof	**A082B5443J**	1
Oln	Bodyshell, LHD	V8, '98 MY on	Euro., dual SIR, glass roof	**A082854395**	1
Olp	Bodyshell, LHD	V8, '98 MY on	Euro., dual SIR, comp. roof	**A082B5449J**	1
Olq	Bodyshell, LHD	V8, '98 MY on	Euro., non SIR, glass roof	**A082B5437J**	1
Olr	Bodyshell, LHD	V8, '98 MY on	Euro., non SIR, comp. roof	**A08285447J**	1

Function Code 10.01a Bodyshell

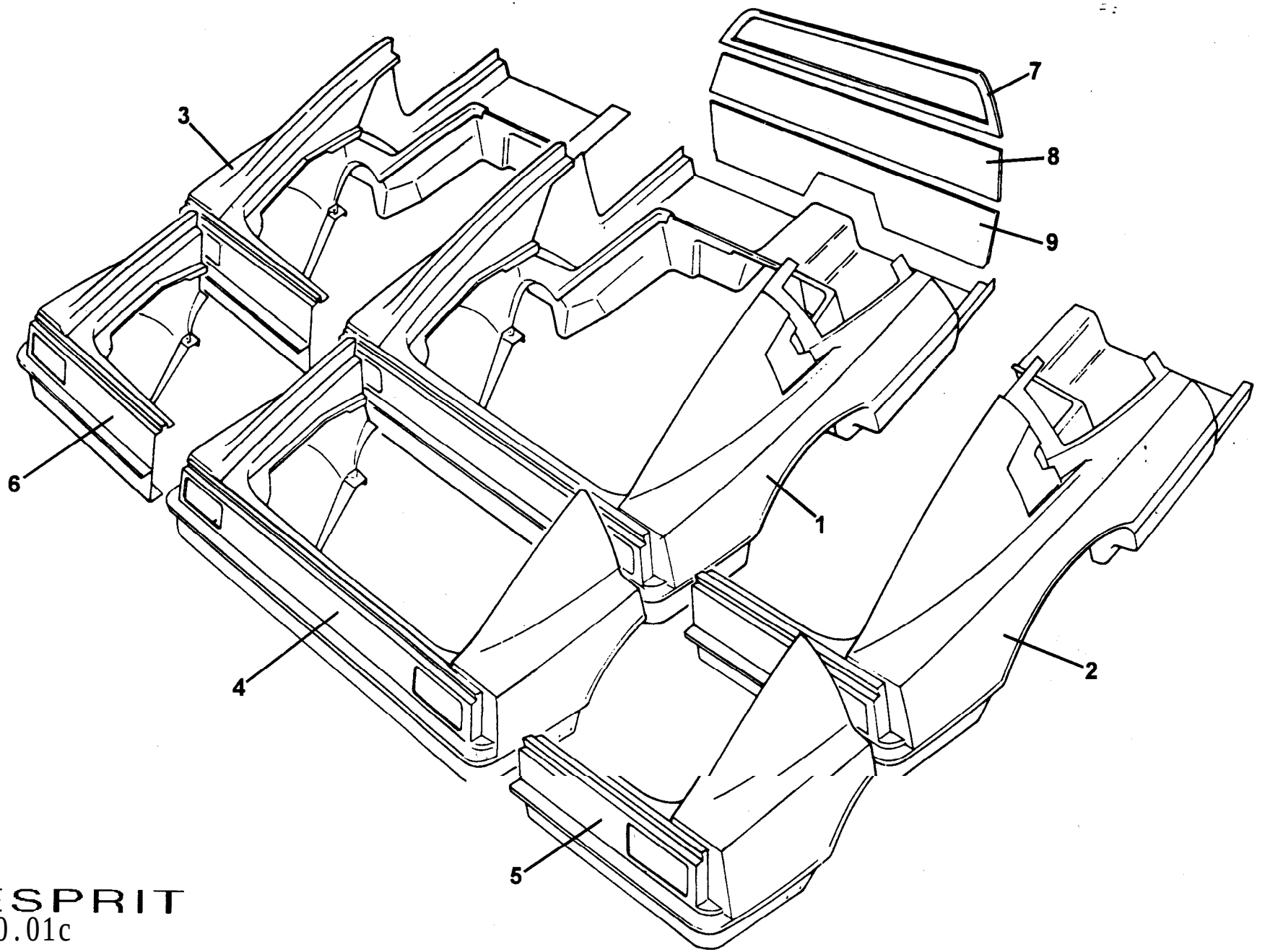
Dep	Part Description	Remarks	Option	Part Number	Qty
01s	Bodyshell, LHD	V8, '98 MY on	Federal, dual SIR, glass roof	**A082B5441J**	1
01t	Bodyshell, LHD	V8, '98 MY on	Federal, dual SIR, comp. roof	**A082B5451J**	1
01u	Bodyshell, RHD, (lightweight)	Sport 350	Non SIR	**A082B5508K**	1
01v	Bodyshell, LHD, (lightweight)	Sport 350	Non SIR	**A082B5506K**	1
01w	Bodyshell, RHD, (lightweight)	Sport 350	Non SIR, AC	**A082B5509K**	1
01x	Bodyshell, LHD, (lightweight)	Sport 350	Non SIR, AC	**A082B5507K**	1
		Note: Sport 350 with SIR uses standard V8 bodyshell for relevant territory			



E SPR II
10.01b

Function Code 10.01 b Front Body Repair Sections

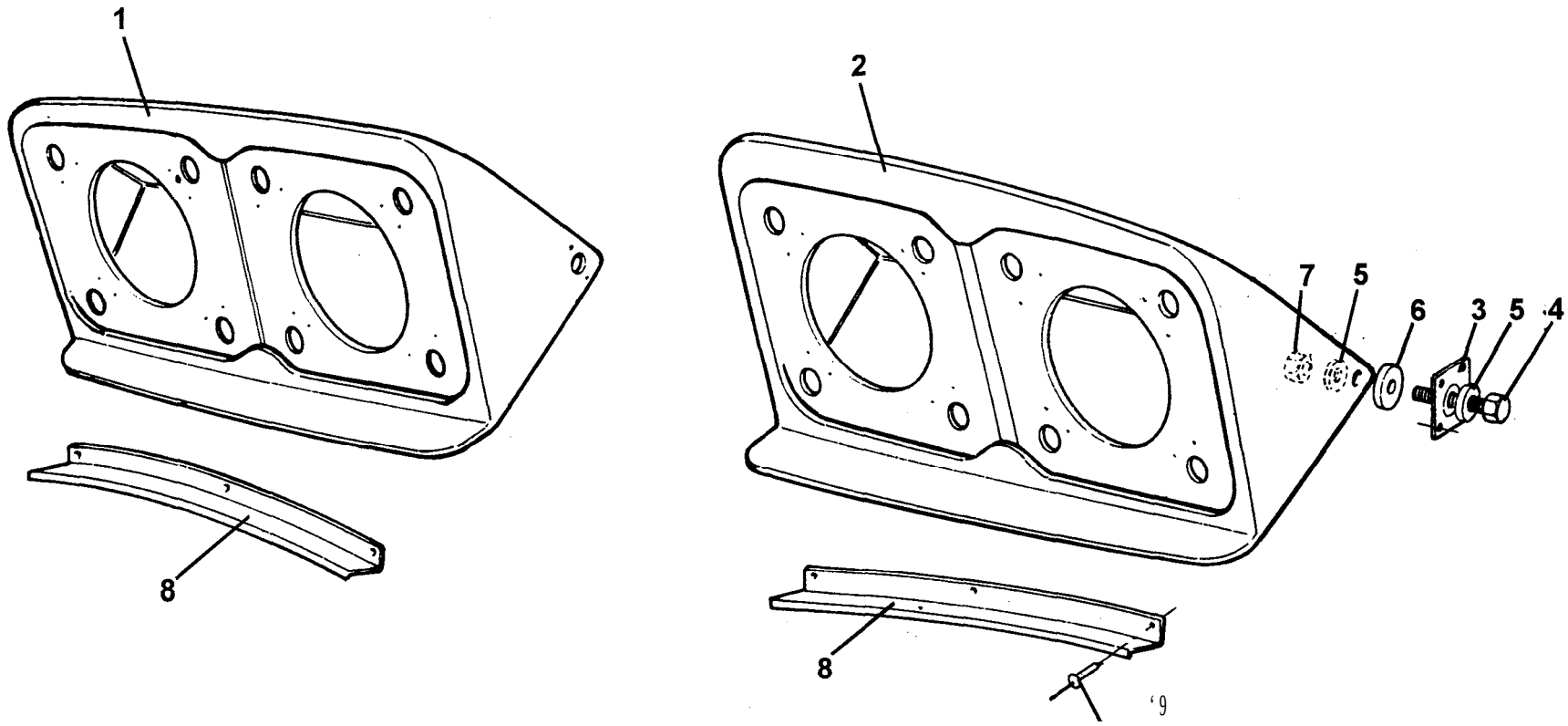
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Body Section, full nose, full width		RHD, SIR	A082B6356S	1
01a	Body Section, full nose, full width		RHD, non SIR	A082B6273S	1
01 b	Body Section, full nose, full width		LHD, SIR	A082B6358S	1
01c	Body Section, full nose, full width		LHD, non SIR	A082B6359S	1
02	Body Section, fuii nose, RH half		RHD, SIR	A082B6360S	1
02a	Body Section, full nose, RH half		RHD, non SIR	A08286361 S	1
02b	Body Section , full nose, RH half		LHD, SIR	A082B6362S	1
02c	Body Section, full nose, RH half		LHD non SIR	A082B6363S	1
03	Body Section, full nose, LH half		RHD, SIR	A082B6364S	1
03a	Body Section, full nose, LH half		RHD, non SIR	A082B6365S	1
03b	Body Section, full nose, LH half		LHD, SIR	A082B6366S	1
03c	Body Section, full nose, LH half		LHD, non SIR	A082B6367S	1
04	Body Section, mid nose, full width,			A082B6368S	1
05	Body Section, mid nose, RH half,			A082B6369S	1
06	Body Section, mid nose, LH half,			A082B6370S	1
07	Body Section, roof		Glass panel	A08286371 S	1
07a	Body Section, roof		Composite panel	A082B6272S	1



ESPRIT
10.01c

Function Code 10.01c Rear Body Repair Sections

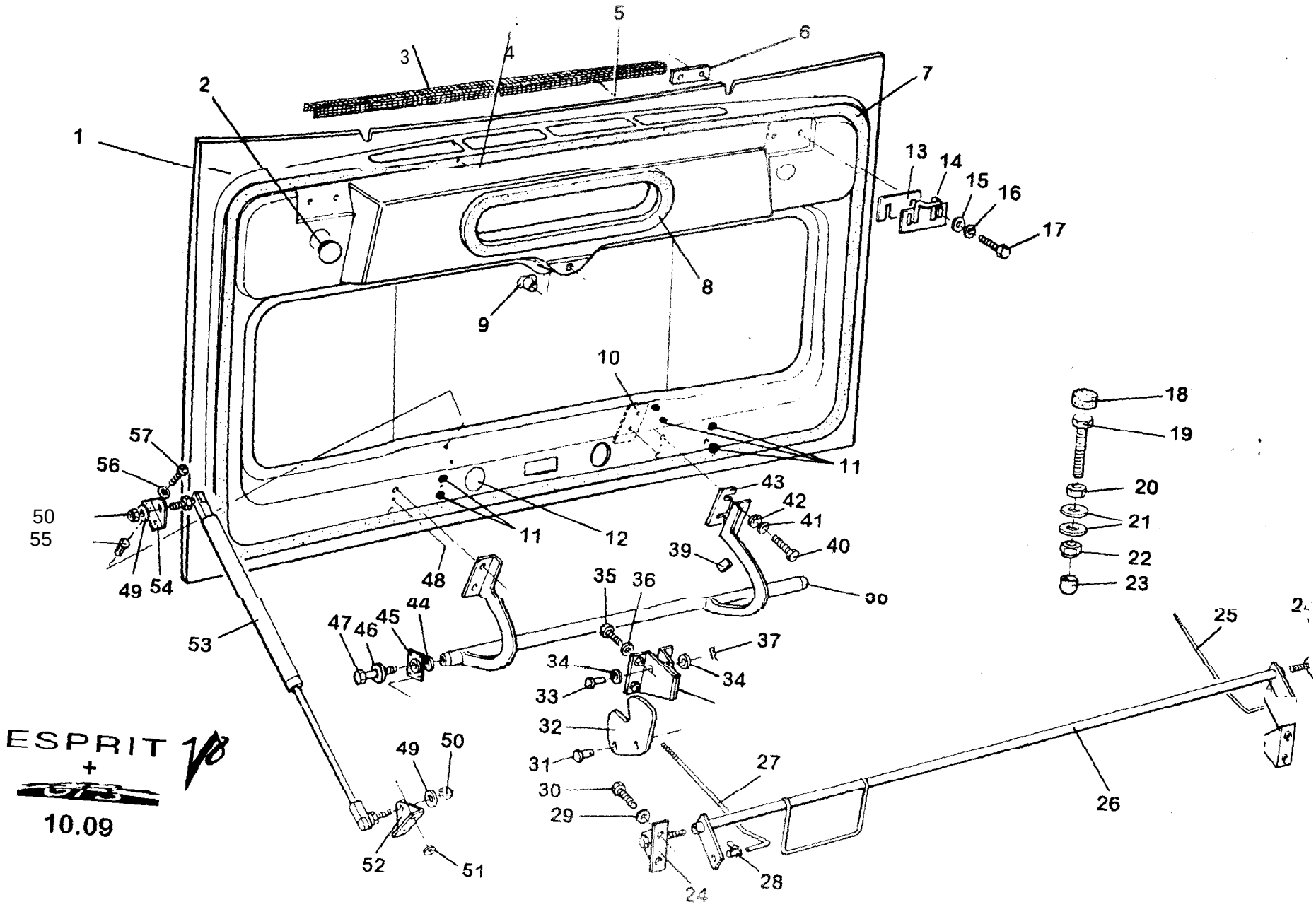
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Body Section, full rear, full width			A082B6373S	1
02	Body Section , full rear, RH half			A082B6374S	1
03	Body Section , full rear, LH half			A082B6375S	1
04	Body Section, short rear, full width			A082B6376S	1
05	Body Section, short rear, RH half			A082B6377S	1
06	Body Section, short rear, LH half			A082B6378S	1
07	Bulkhead, rear upper	Plywood		B082B4679F	1
08	Bulkhead, rear centre	Plywood		E079B4675F	1
09	Bulkhead, rear lower	Plywood		C082B4876F	1



ESPRIT
10.07

Function Code 10.07 Headlamp Pods & Pivots

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Headlamp pod, RH (6" dia. headlamps)		Except USA & Canada	**C082B4852K**	1
Ola	Headlamp pod, RH (5 3/4" dia. headlamps)		USA & Canada	**C082B4854K**	1
02	Headlamp pod, LH (6" dia. headlamps)		Except USA & Canada	**C082B4853K**	1
02a	Headlamp pod, LH (5 3/4" dia. headlamps)		USA & Canada	**C082B4855K**	1
03	Nut, nyloc, M6, pod outer pivot			**A075W3009Z**	2
04	Washer, flat, M6 x 18, outer pivot			**A075W4018Z**	4
05	Washer, flat, M6 x 25, outer pivot			**A075W4065Z**	2
06	Ball joint, pod pivot			**A082U5897F**	4
07	Setscrew, M6 x 30, pod outer pivot			**AO75W1032Z**	2
08	Water-shield, headlamp motor			**B079U4459K**	2
09	Pop rivet, water-shield to body			**A075W6071Z**	6
10	Cover, drain hole, pod well	Not illustrated		**A082B6141 K**	2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ESPRIT 1.8
10.09

Function Code 10.09 Front Bonnet 8 associated hardware.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Bonnet panel			A08285155K	1
Ola	Blackout film rear of bonnet			A082B5063K	1
02	Grommet, tapping plate access			A079U6033K	2
03	Grille, interior air intake			A082B5257K	1
04	Pop rivet, grille to bonnet			AO75W6092Z	3
05	Washer, pop rivet			A075W4001Z	3
06	Tapping plate, bonnet catch striker			AO79U1448F	2
07	Weather-seal, bonnet			A082U7058F	1
07a	Primer, bonnet seal			BO82U6199V	A/R
07b	Double sided tape, weatherseal to bonnet			AO82U6198V	1.2m
08	Seal, bonnet to heater plenum,		20mm thick	AO82U7304F	1
08a	Seal, bonnet to heater plenum,		25mm thick	AO82U7305F	A/R
09	Funnel, bonnet plenum drain			A082P6056F	1
10	Tapping plate, bonnet hinge			A089B2455F	2
10a	Pop rivet, tapping plate fix			AO75W609OZ	2
11	Grommet, blanking			A089U6056F	6
12	Grommet, bonnet lamp wiring unused hole blank			A079U6033F	1
13	Shim, striker to bonnet, 1.2 mm			A076U01882Z	A/R

Function Code 10.09 Front Bonnet & associated hardware.

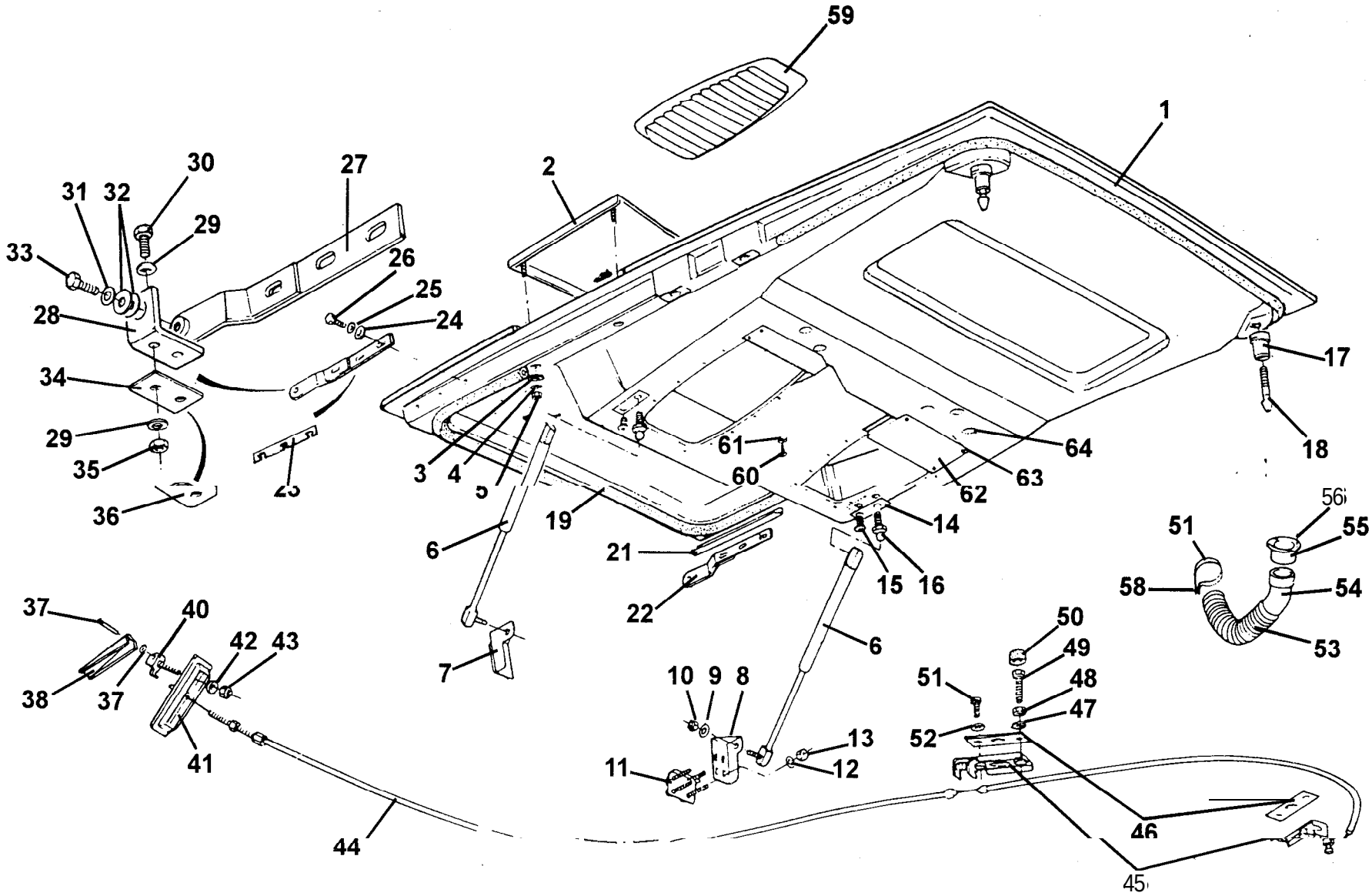
Dep	Part Description	Remarks	Option	Part Number	Qty
13a	Shim, striker to bonnet, 2.5 mm			A082U7415F	AIR
14	Striker, bonnet catch			A079U4266F	2
15	Washer, flat, M8, striker fix			A075W4021Z	4
16	Washer, spring, M8, striker fix			A075W4036Z	4
17	Setscrew, M8 x 25, striker fix			A079W1039Z	4
18	Buffer, bonnet front comer support			XO46B6113Z	2
19	Setscrew, M8 x 35, bonnet support buffer			A075WlO41Z	2
20	Locknut, M8, bonnet support buffer			A075W3O26Z	4
21	Washer, fiat, M8 x 16, bonnet support buffer			A075W4020Z.	2
22	Nut, nyloc, M8, bonnet support buffer			A075W301 OZ	2
23	Cap, harness protection			A082B6166F	2
24	Bracket, cross - shaft pivot			A079U4220K	2
25	Rod, bonnet lock, RH			B 082U5826F	1
25a	Rod, bonnet lock, RH		Dual S.I.R.	CO82U5826F	1
26	Cross - shaft, bonnet release		RHD	AO82U7681 F	1
26a	Cross - shaft, bonnet release		LHD Except Dual S.I.R.	A082U7680F	1
26b	Cross - shaft, bonnet release		Dual S.I.R.	A0 82U767OF	1
27	Rod, bonnet lock, LH			A082U7117F	1
28	Bush & clip, rod to cross shaft			A075U6033Z	2
29	Washer, flat, bracket to body			A075W4013Z	4
30	Setscrew, M6 x 12, bracket to body			A076W1027Z	4

Function Code 10.09 Front Bonnet & associated hardware.

Dep	Part Description	Remarks	Option	Part Number	Qty
31	Clevis pin, **latch rod to** disc			**B079U4219F**	2
32	Latch disc, bonnet lock			**AO82U7149F**	2
33	Clevis pin, latch disc to bracket			**A075W6033Z**	2
34	Bracket, bonnet latch			**A082U5825F**	2
35	Screw, 10 UNF x 3/4", bracket fix			**A075W5051** Z	6
36	Washer, flat, bracket fix			A075W4000Z	6
37	' R ' pin, **latch disc** clevis			A075W6I75 Z	2
36	Hinge bar, bonnet opening			**D085U5828F**	1
39	Edge clip, bonnet lamp wiring to hinge			A075W6047Z	3
40	Setscrew, M6 x 30, hinge to bonnet			**A075W1040Z**	4
41	Washer, spring, hinge to bonnet			**A075W4O35Z**	4
42	Washer, **flat,** M6 x 25, hinge to bonnet fix			**A075 W4021** Z	4
43	Shim plate, hinge to bonnet			**A076 U0600Z**	A/R
44	Spacer washer, flat, M6 x 12, hinge pivot			**AO75W4O13Z**	2
45	Ball joint, bonnet pivot			**A082U5897F**	2
46	Washer, spring, hing pivot bolt			**A075W4035Z**	2
47	Bolt, M6 x 36, hinge pivot			A075W2O29Z	2
46	Pop rivet, tapping plate fix			A075W6090Z	2
49	Washer, flat, M8 x 20, gas strut pivot			**A079W4019F**	1
50	Nut, nyloc, M8, gas strut pivot		RHD	A075W3010Z	2
50a	Nut, nyloc, M8, thin head, gas strut pivot		LHD	**A907E6284F**	2

Function Code 10.09 Front Bonnet & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
51	Washer, pop rivet, bracket to plenum			**A075W4009Z**	4
52	Anchor bracket, gas strut to plenum			**A082U7143F**	2
53	Gas strut, bonnet support			**B082U6158F**	1
54	Anchor bracket, gas strut to bonnet			**A082U7143F**	1
55	Jacknut, M5, bracket to bonnet			**A076W3043F**	2
56	Washer, spring, M5, bracket to bonnet			**A075W4045Z**	2
57	Setscrew, M5 x 20, bracket to bonnet			**A075W5084Z2**	



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Function Code 10.11 a Tailgate & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Tailgate	Without aerofoil mounting holes	V8 prior '98 MY, GT3, V8GT	**P691.1011.001AJ**	1
01 a	Tailgate	With aerofoil mounting holes	V8 '98 MY on, Sport 350	**A082B5424J**	1
02	Canopy, tailgate			**B082B5024J**	1
03	Spacer Washer, neoprene, canopy to tailgate			**A082W4115F**	20
04	Washer, flat, canopy fixing			A075W4000Z	8
05	Nyloc Nut, M5, canopy to tailgate			A075W3008Z	8
06	Gas Strut, tailgate support, RH & LH	For body mounted, or no aerofoil	V8 prior '98 MY, GT3, V8GT	**P691.1011.601AF**	2
06a	Gas Strut, tailgate support, RH	For tailgate mounted aerofoil	V8, '98 MY on, Sport 350	**A082U6169F**	1
06b	Gas Strut, tailgate support, LH, locking, (warning label)	For tailgate mounted aerofoil	V8, '98 MY on, Sport 350	**A082U6208F**	1
07	Anchor Bracket, strut to bulkhead, LH			**B082U7359F**	1
08	Anchor Bracket, strut to bulkhead, RH			**B082U7358F**	1
09	Washer, flat, M8 x 16, gas strut to anchor bracket			A075W4020Z	2
10	Nyloc Nut, M8.			**A907E6284F**	2
11	Studplate, anchor bracket to body			**B082U7125F**	2
12	Washer, flat, M6 x 15, studplate to anchor bracket			**A075W4015Z**	8
13	Nyloc Nut, M6, studplate to anchor bracket			AO75W3009Z	8
14	Spreader plate, gas strut bracket			**A082U7524F**	2
14a	Tapping Plate, gas strut to tailgate	'Not illustrated		**A082U7441 F**	2

Function Code 10.1 1aTailgate & Release Mechanism

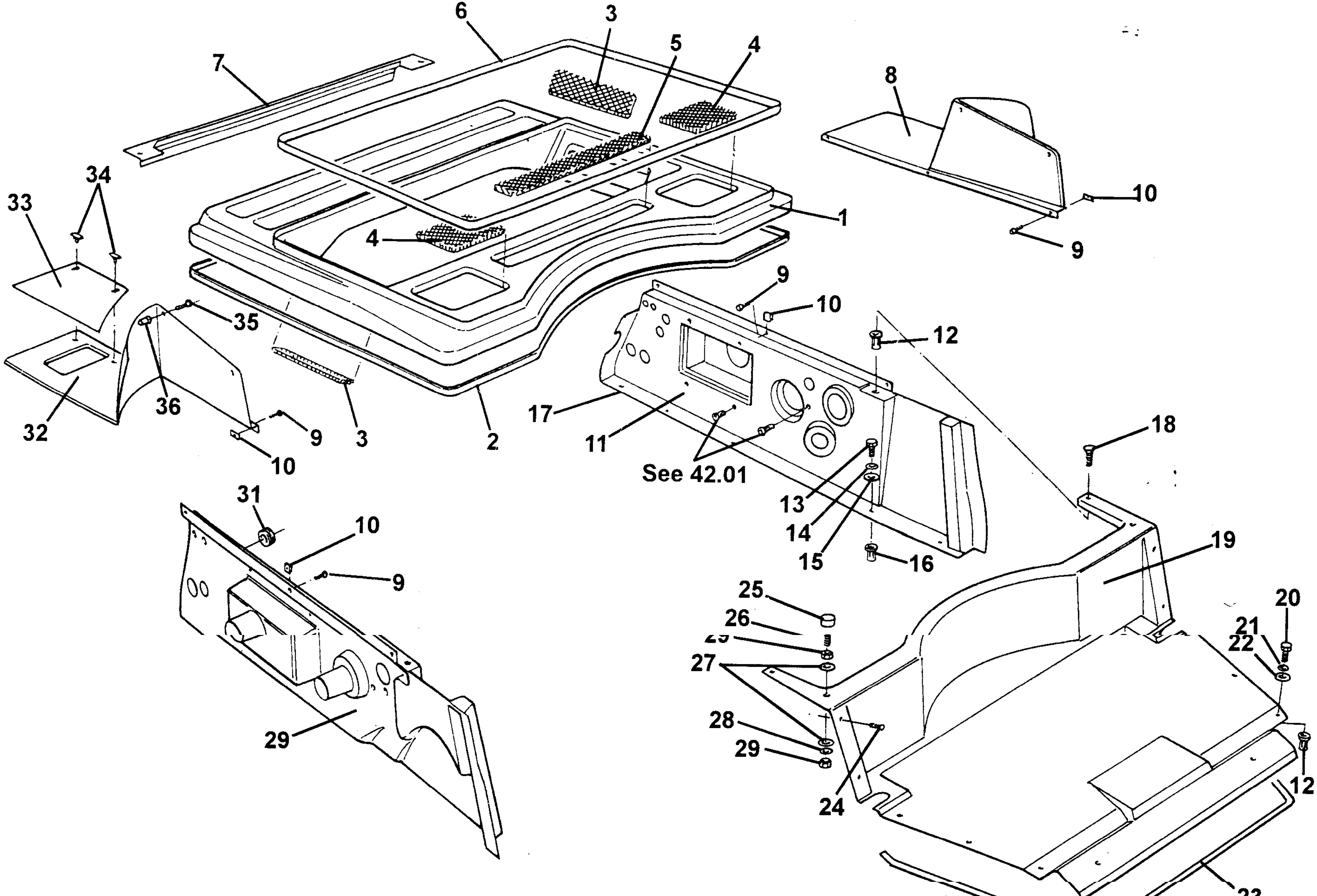
Dep	Part Description	Remarks	Option	Part Number	Qty
15	Screw, M8 x 16, fixing spreader to tapping plate			A082W7105F	2
16	Post Screw, M5 x 40, gas strut to tailgate			AI OOW7102F	2
17	Guide Sleeve, tailgate striker pin			B082U7544F	2
18	Striker Pin			B082U5900L	2
19	Weatherstrip Seal, tailgate			A082U7059F	1
20	Double Sided Tape, tailgate seal fixing	Not illustrated		A082U6198V	1.2M
21	Tapping Plate, RH			B082U7020K	1
21a	Tapping Plate, LH	Not illustrated		BO82U7021 K	1
22	Hinge Blade, tailgate, RH			CO82U5952F	1
23	Shim Plate, 1 .O mm, hinge blade to tailgate			A082U7399F	As req.
23a	Shim Plate, 2.0 mm, hinge blade to tailgate			A082U7398F	As req.
24	Washer, flat, M6, stainless, hinge fixing			A082W4133F	6
25	Washer, spring M6, hinge fixing			A075W4035Z	6
26	Screw, M6, stainless, hinge fixing			AI OOW7096F	6
27	Hinge Blade, tailgate LH			C082U5951 F	1
28	Pivot Bracket, tailgate hinge			CO82U595OF	2
29	Washer, flat, M8 x 16			A075W4020Z	6
30	Setscrew, M8 x 25, hinge bracket to body			A075W1039Z	4
31	Washer, flat, pivot bolt			A075W4024Z	4
32	Washer, shakeproof, pivot bolt			A075W4049Z	2
33	Pivot Bolt, tailgate hinge			A082W1077Z	2

Function Code 10.1 la Tailgate & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
34	Gasket, hinge bracket to body			A082U5955F	2
35	Nyloc Half Nut, M8, hinge bracket fixing			A907E6284F	4
36	Spreader plate, fixings to body			A862U7416F	2
37	Spirol Pin, release lever pivot			AO82W6235F	1
38	Lever, tailgate release			B062U4916F	1
39	Washer, flat, lever pivot			A075W401 1Z	1
40	Hinge bracket, release lever			A082U4915F	1
41	Recess moulding, release lever			AO82U7085F	1
42	Washer, large O/D, lever bracket fixing'			A075W4015Z	1
43	Nut, nyloc, M6, lever pivot			AO75W3009Z	1
44	Cable, tailgate release			C082U5995F	1
45	Slider assembly, tailgate latch			A082U6087F	2
46	Guide plate, tailgate striker			B082U7234F	2
47	Washer, shakeproof, M8			A075W4048Z	2
48	Locknut, M8			A075W3026Z	2
49	Setscrew, M8 x 35			A075WI04IZ	2
49a	Setscrew, M8 x 45	In place of M8 x 35 (item 49) if necessary		A075W1043Z	2
50	Buffer, tailgate abutment			A046B6113Z	2
51	Setscrew, M8 x 25, guide plate/slider fixing			A075W1039Z	2
52	Washer, shakeproof, M8			A075W4048Z	2

Function Code 10.1 1a Tailgate & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
53	Hose, tailgate gutter drain			A082U5015K	2
54	Elbow, tailgate gutter drain			A082B8079F	2
55	Adaptor, tailgate gutter drain	In rear corners of body aperture		A082U5821 K	2
56	Pop rivet, drain adaptor fixing			A075W6070Z	6
57	Clip, drain hose			A075W6236F	2
58	Pop rivet, clip to body			A075W6087Z	2
59	Louvre, tailgate vent			A082B5012F	2
60	Screw, M4 x 16, louvre to tailgate			A082W5141 F	22
61	Washer, flat, M4			AI OOW412OF	22
62	Drip Deflector, tailgate			A082B5352F	1
63	Pop Rivet, drip shield fixing			A075W6090Z	8
64	Grommet, rear screw fixings			A082U6235F	4



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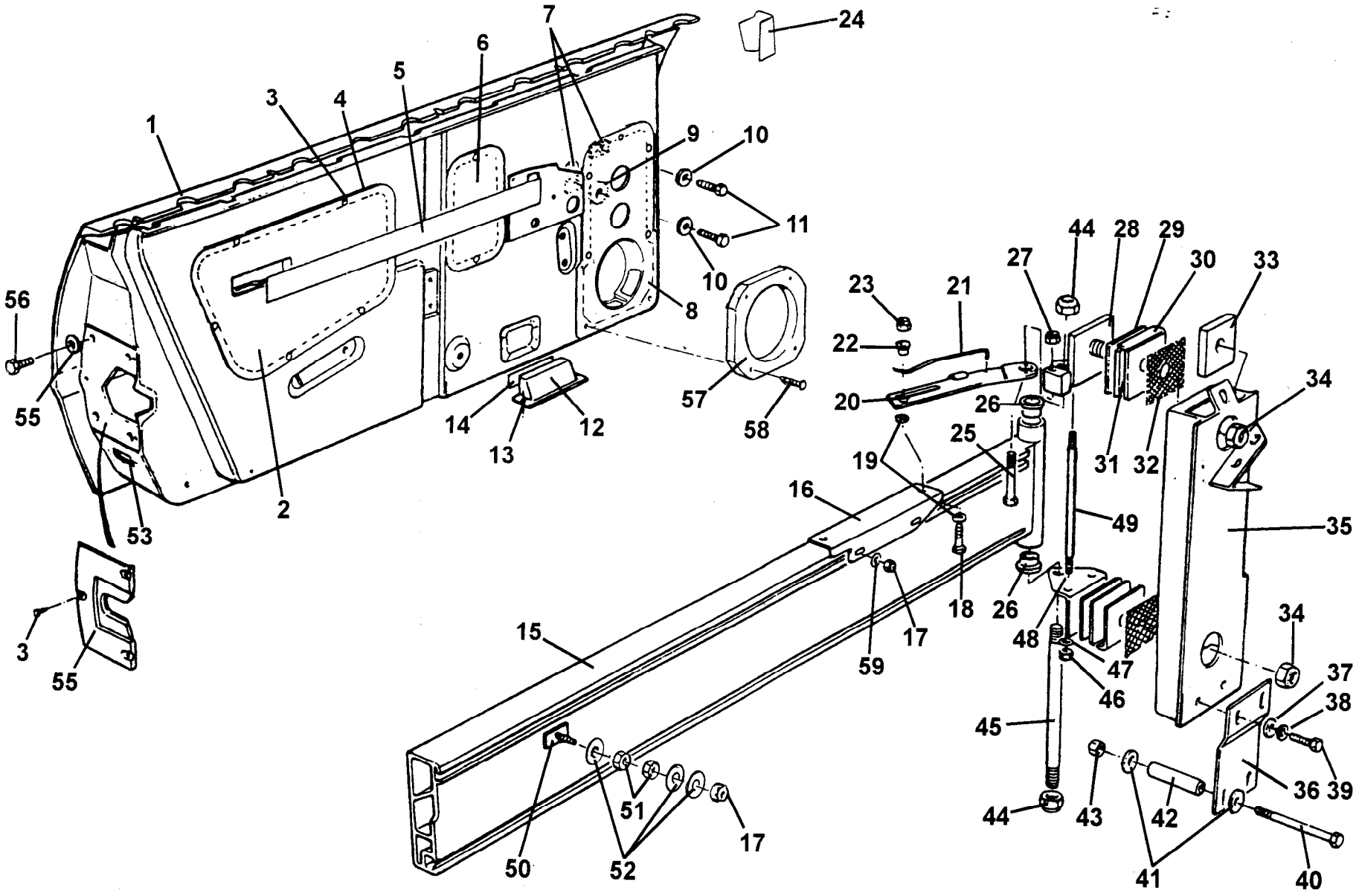
Function Code 10.13 Engine Compartment, Cover, Seals

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Engine Cover Assembly			A082B5334J	1
02	Seal, engine cover lid			A082U5882K	1
03	Grille, engine cover, side			A082U7778K	2
04	Grille, engine cover, front			A082U7779K	2
05	Grille, engine cover, centre			A082U7780K	1
06	Seal, engine cover to tailgate			A082U7450K	1
06a	Weather Seal			A089U6055F	1
07	Support, engine cover front			A082U7798J	1
08	Trim Cover, quarter rear, RH			A082B4786K	1
09	Screw, No 6 x 3/4", trim cover fix.			A075W50282	6
10	Spire Nut, trim cover fixing			A082W6255F	6
11	Sidewall Trim Panel, RH			B082B5318K	1
12	Jack Nut, M6			A075W3034Z	8
13	Setscrew, M6 x 25, hex. hd.			A075W1031 F	6
14	Washer, spring, M6			A075W4035Z	6
15	Washer, flat, M6 x 20 x 2.5			A075W4016Z	6
16	Rivnut, M6 x 60			BO82W3092F	6
17	Rubber, self adhesive 1" x I/8"			A036B6221V	.75m

Function Code 10.13 Engine Compartment, Cover, Seals

Dep	Part Description	Remarks	Option	Part Number	Qty
17a	Seal, sidewall cover	Not illustrated		A082B4805K	1
18	Screw, M6 x 18, hex.hd.			A079W7033F	2
19	Boot Floor/Bulkhead			A082B5324K	1
20	Setscrew, M6 x 18, hex. hd.			A075W1029Z	8
21	Washer, internal shakeproof, M6			A075W4046Z	8
22	Washer, flat, M6 x 12.1 x 1.4 mm			A075W4013Z	8
23	Seal ,foam, 19 mm x 3 mm			A082U6067F	2.2M
24	Screw, No 8 x ½"			A075W5034Z	4
25	Buffer			A046B6113Z	2
26	Setscrew, M8 x 25, hex. hd.			A075W1039Z	2
27	Washer, flat, M8 x 16.6 x 1.4 mm			A075W4020Z	4
28	Washer, spring, M8			A075W4036Z	2
29	Lock Nut, M8			B075W3026Z	4
30	Sidewall Trim Panel, LH			A08285317K	1
31	Grommet, thr'o sidewall panel			A082L6181F	1
32	Trim Cover, quarter rear, LH			A082B4785K	1
33	Access Cover, rear quarter, LH			A082U7810F	1
34	Clip, access cover retention			A082W6584F	2
35	Screw, M4 x 16 , rear quarter trim cover fix.			B082W5141F	4
36	Well Nut, M4, rear quarter trim cover fix.			B082W6350F	4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E S P R I T

10.15

Function Code 10.15 Door Shells, Beams, Hinges

Dep	Part Descrption	Remarks	Option	Part Number	Qty
01	Door Shell, LH		Non USA/Canada	A08288201 K	1
Ola	Door Shell, LH	Mirrors mounted further back	USA/Canada	A082B6195K	1
Olb	Door Shell, RH		Non USA/Canada	A082B6200K	1
01c	Door Shell, RH	Mirrors mounted further back	USA/Canada	A082B6194K	1
02	Access Panel, door shell rear, RH			A082U7499K	1
02a	Access Panel, door shell rear, LH			A082U7498K	1
03	Fastex Scrivet, 5 mm			AI 00W6479F	38
04	Foam Strip, access panel sealing			A082U6067F	4.7M
05	Foam Strip, door panel anti - rattle			A082U6065V	1.6M
06	Access Panel, door shell, centre			A082U7505K	2
07	Fixing Plate, M6, door front to beam			A079U4329K	4
08	Access Panel/Speaker Housing, ABS			A082B5411 K	2
09	Washer, spacing, shutline adjust			A075W4022Z	As req.
10	Washer, large O/D, door front to beam			A075W4017Z	4
11	Setscrew, M6 x 16, door front to beam			A075W1028Z	4
12	Housing, air outlet flap valve			A082P4352K	2
13	Scrivet, air outlet valve flap fixing			AI OOW6479F	-4
14	Flap, air outlet valve			A082P4351 K	2

Function Code 10.15 Door Shells, Beams, Hinges

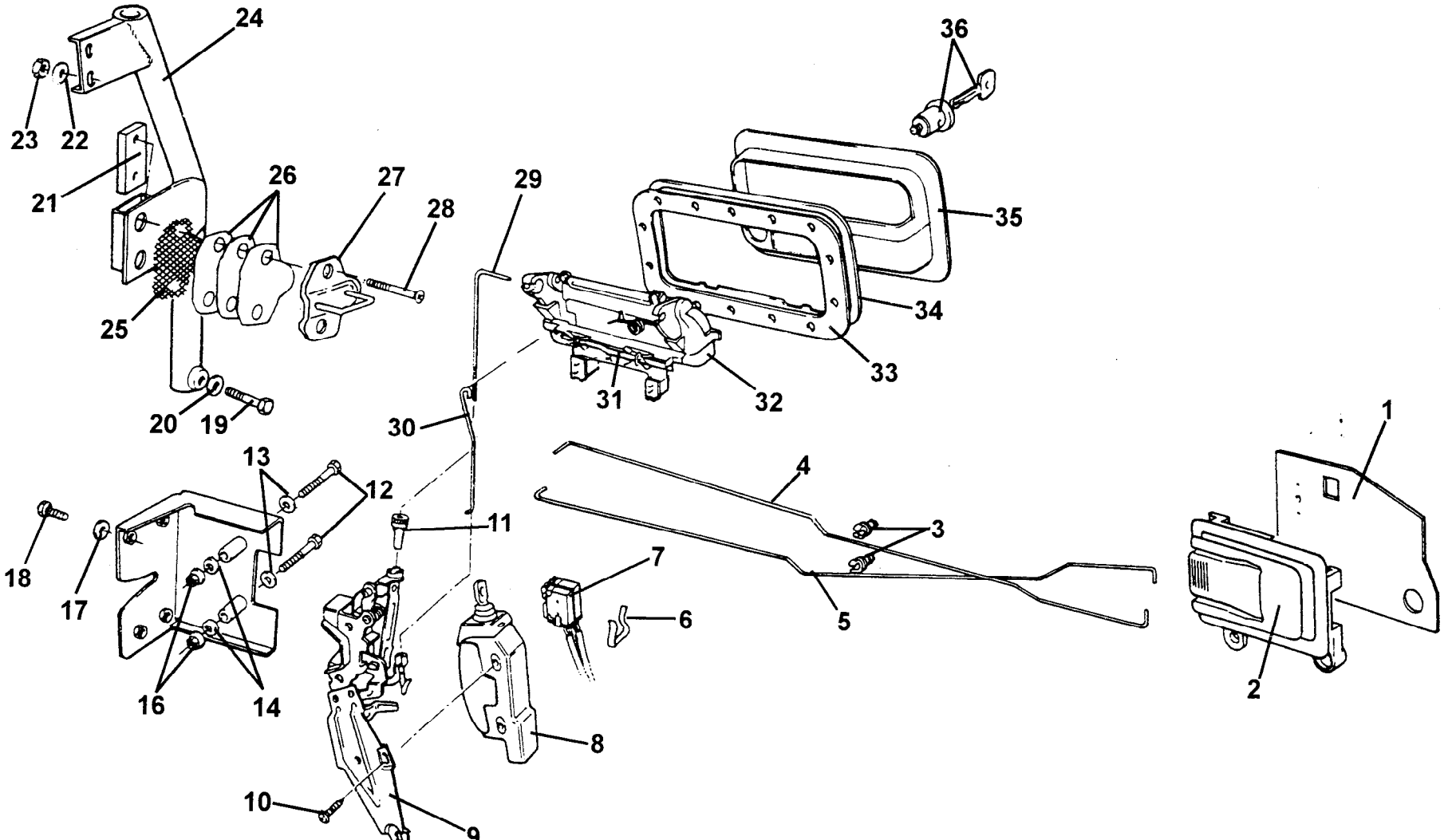
Dep	Part Description	Remarks	Option	Part Number	Qty
15	Door Beam, LH		Non USA/Canada	A082U6227J	1
15a	Door Beam, LH		USA/Canada	A082U6229J	1
15b	Door Beam, RH		Non USA/Canada	A082U6228J	1
15c	Door Beam, RH		USA/Canada	A082U6230J	1
16	Bracket, check strap guide to beam, LH			B082U5965F	1
16a	Bracket, check strap guide to beam, RH			BO82U5966F	1
17	Nyloc Nut, M6, bracket to beam			A075W3009Z	10
18	Setscrew, M6 x 30, guide to bracket			A075W2028Z	2
19	Washer, flat, guide to bracket			A075W4015Z	4
20	Check Strap, LH			A089U151 7F	1
20a	Check Strap, RH			A089U1516F	1
21	Spring, door check, LH			A089U1515F	1
21a	Spring, door check, RH			A089U1514F	1
22	Guide, check strap			A089U1518F	2
23	Nyloc Nut, M6, guide to bracket			A075W3009Z	2
24	Finisher, door shell / frame front, LH			A082U7013K	1
24a	Finisher, door shell / frame front, RH			A082U7014K	1
25	Bolt, M8 x 45, strap to hinge			A075W2040Z	2
26	Pivot Bush, door beam			CO79U4189F	4
27	Nyloc Nut, M8, strap to hinge			A075W301 OZ	2
28	Hinge Bracket upper, LH			BO82U7433F	1

Function Code 10.15 Door Shells, Beams, Hinges

Dep	Part	Description	Remarks	Option	Part Number	Qty
28a		Hinge Bracket, upper, RH			B082U7432F	1
29		Shim, 2.5mm, hinge to body			CO79U4091 F	As req.
29a		Shim, 1.2mm, hinge to body			CO79U4092F	As req.
30		Shim, angled edge, hinge to body			C079U4090F	4
31		Spacer, 5mm, hinge to body			A082U7144F	4
32		Shim, aluminium, hinge to body			A082U7199F	4
33		Clamp Plate, door hinge			E079U4340F	4
34		Nyloc Nut, ½" UNF, hinge to body			A079W3056F	4
35		Hinge Post, door, LH			E082U7251 F	1
35a		Hinge Post, door, RH			E082U7250F	1
36		Reinforcing Bracket, hinge post to sill			A082B4485K	2
37		Washer, flat, bracket to post			A075W4021Z	4
38		Washer, spring, bracket to post			A075W4036Z	4
39		Setscrew, M8 x 16, bracket to post			A075W1036Z	4
40		Bolt, M8 x 75, bracket to sill			A075W2046Z	4
41		Washer, large o/d, bracket to sill			A075W4021Z	8
42		Spacer Tube, bracket to sill			A082B4484F	4
43		Nyloc Nut, M8, bracket to sill			A075W301 OZ	4
44		Nyloc Nut, Ml2 , pivot pin			A075W3012Z	4
45		Pivot Pin, door beam			B079U4558F	2
46		Nyloc Nut, M8, tie rod to hinge			A079W3056Z	4

Function Code 10.15 Door Shells, Beams, Hinges

Dep	Part Description	Remarks	Option	Part Number	QtY
47	Washer, tie rod to hinge			A075W4020Z	4
48	Hinge Bracket, lower			**A082U7102F**	2
49	Tie Rod, upper to lower hinge brackets			A079U4328F	2
50	Studplate, M6, bracket to door beam			A082U5806F	6
51	Nut, M6			A075W3020Z	18
52	Washer, flat, M6 x 1.5			A075W4015Z	18
53	Plate, door switch/lamp mounting, LH			B082M4913F	1
53a	Plate, door switch/lamp mounting, RH			B082M491 2F	1
54	Finisher, rear door edge, LH			A082U7489K	**1**
54a	Finisher, rear door edge, RH			A082U4788K	1
55	Washer, large o/d, door rear to beam			A075W4021Z	6
55a	Washer, spacing, door rear to beam	If fitted, not illustrated		A075W4003Z	As req.
56	Setscrew, M8 x 20, door rear to beam			A075W1038Z	6
57	Speaker Frame, plywood			A082U7843F	2
58	Screw, pan hd. pozi., frame to door			A075W5013Z	8
59	Washer, flat, M6 x 3			A075W4014Z	4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Function Code 10.17 Door Latch Mechanism

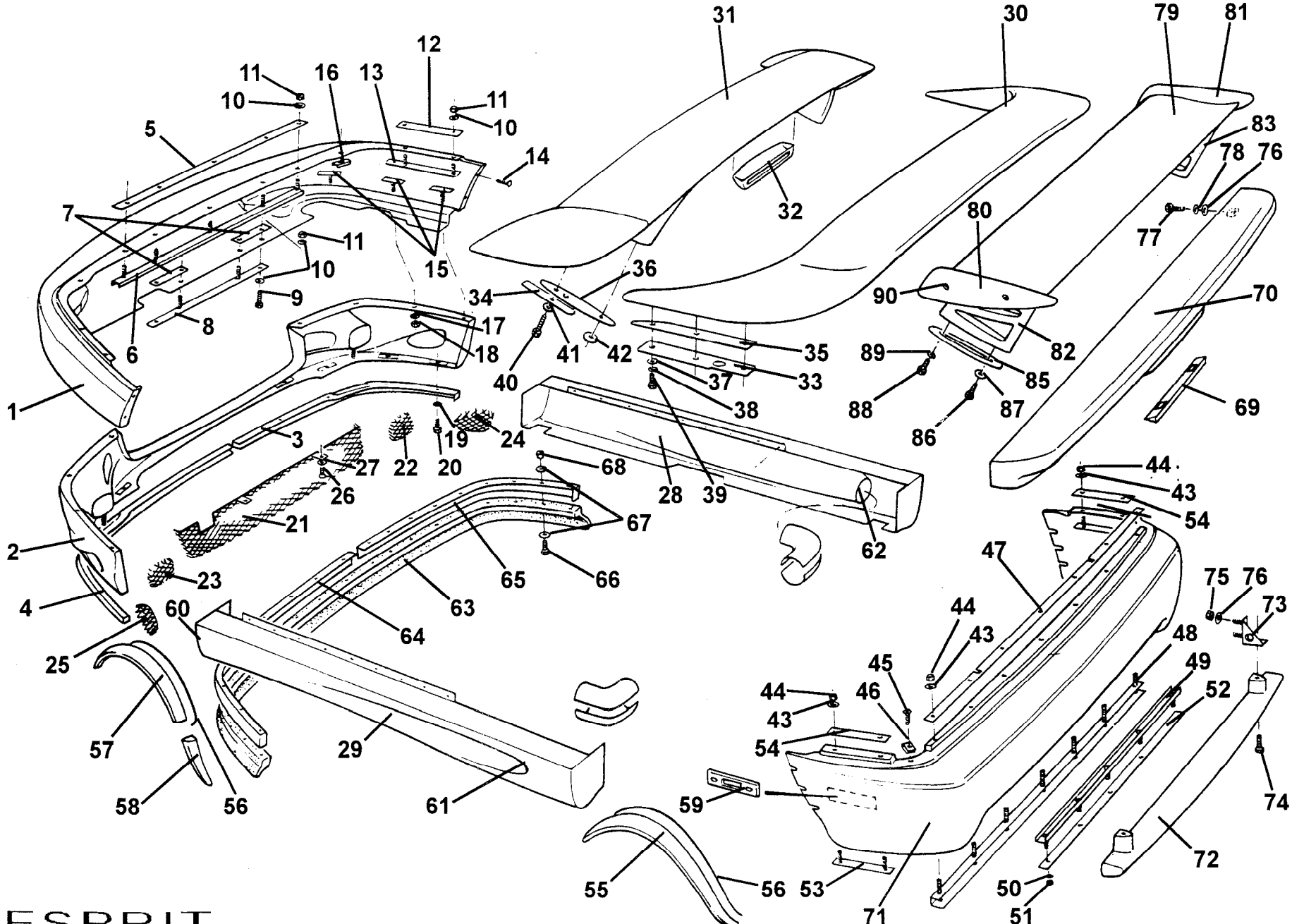
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Plate, interior handle mounting, LH			B082U7493F	1
Ola	Plate, interior handle mounting, RH	Not illustrated		BO82U7492F	1
02	Interior Door Handle, LH			A082U6247F	1
02a	Interior Door Handle, RH	Not illustrated		A082U6246F	1
03	Guide Clip, interior lock/ release rods			A075560272	4
04	Rod, interior release to latch, LH			A082U7463F	1
04a	Rod, interior release to latch, RH	Not illustrated		A082U7462F	1
05	Rod, interior release to latch, LH			BO82U7461 F	1
05a	Rod, interior release to latch, RH	Not illustrated		B082U7460F	1
06	Clip, micro switch retaining			A082M6525F	2
07	Micro Switch , driver's door			A082M4916J	1
07a	Micro Switch, passenger's door	Not illustrated		A082M4917J	1
08	CDL Motor, driver's side			A082U6245F	1
08a	CDL Motor, passenger's side	Not illustrated		A082U6244F	1
09	Latch Mechanism, LH door			A082U6243F	1
09a	Latch Mechanism, RH door	Not illustrated		A082U6242F	1
10	Screw, CDL motor to latch			A082W5197F	4
11	Adjuster Nut			A082U6269F	2

Function Code 10.17 Door Latch Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
12	Bolt, M8 x 50, hx. hd., latch bracket to beam			**AO75W2041 F**	4
13	Washer, flat, M8, latch bracket to beam			**A079W4019F**	4
14	Bracket, door latch to beam, LH			**A082U6231 F**	1
14a	Bracket, door latch to beam, RH	Not illustrated		**A082U6232F**	1
15	Washer. flat, latch to beam			**A082W4019F**	4
16	Nut, M8, kayloc,			**Al 00C6022F**	4
17	Washer, large O/D, door rear to beam			**A075W402IZ**	6
18	Setscrew, M8 x 20, hex. hd., door rear to beam			**A075W1038Z**	6
19	Setscrew, MI2 x 30, striker post bottom			**A079W1058F**	2
20	Washer, flat, M12, striker post bottom			**A075W4071 F**	2
21	Tapping Plate, door striker			**A082U7472F**	2
22	Washer, striker post top			A075W402IZ	4
23	Nyloc Nut, M8, striker post top			**A075W301** OZ	4
24	Striker Post, LH			G079U4381 F	1
24a	Striker Post, RH			G079U4382F	1
25	Friction Plate, striker to body			**-- A082U7477F**	2
26	Spacer, door latch striker			A082U6263F	6
27	Striker Plate, door latch			A082U6262F	2
28	Screw, M8 x 40, csk., striker plate fixing			AO82W7107F	4
29	Rod, exterior release to latch			A082U7466F	2
29a	Clip, exterior release rod to handle			A082U6267F	2

Function Code 10.17 Door Latch Mechanism

Dep	Part	Description	Remarks	Option	Part Number	Qty
30		Rod, exterior lock to latch, LH			CO82U7465P	1
30a		Rod, exterior lock to latch, RH	Not illustrated		C082U7464F	1
31		Spring Clip, handle mechanism retention			A082U6259F	2
32		Exterior Door Handle Mechanism			A082U6240F	2
33		Plate, exterior handle reinforcement	Bonded to door shell		B082U6233F	2
34		Gasket, exterior handle to door			A082U6241F	2
35		Mounting Escutcheon, exterior door handle, LH			A082U6239F	1
35a		Mounting Escutcheon, exterior door handle, RH	Not illustrated		A082U6238F	1
36		Lock Barrel & Keys, driver's door			A082U6300S	1
36a		Lock Barrel & Keys, passenger's door	Not ilustrated		A082U6301S	1
36b		Car Lock Set, LHD	Not illusrated		B082U6059F	1
36c		Car Lock Set, RHD	Not illustrated		B082H6060F	1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ESPRIT
10.23

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Bumper, front, RRIM			A082B5116K	1
Ola	Bumper, front, GFRP		USA : side marker cut outs	A082B5173K	1
02	Valance			A082B5358K	1
03	Lip Spoiler, RH			A082B5084K	1
04	Lip Spoiler, LH			A082B5083K	1
05	Washer plate			A082B4810F	1
06	Studplate			A082B4809F	1
07	Washer plate			B082B4818F	2
08	Studplate			A082B4820F	1
09	Setscrew			A075W1031 F	2
10	Washer, flat			A075W4015F	15
11	Nut, nyloc, M6			A075W3009Z	15
12	Washer Plate			A082B4814F	2
13	Studplate			A082B4813F	2
14	Screw, self tap. flg hd. pozi			A075W5074Z	4
15	Studplate			A082UJ732 F	6
16	Reinforcing Strip			A082B4812F	2
17	Washer, flat			A075W4015Z	6

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Nut, nyloc, M6			**A075W3009Z**	6
19	Washer, flat			**A075W4015F**	8
20	Setscrew			**A075W1031 F**	8
21	Intake Grille, black, front			**A082U7802F**	1
21a	Intake Grille, titanium, front		sport 350	**A082U7953F**	1
22	Intake Grille, black, RH			**A082U7804F**	1
22a	Intake Grille, titanium, RH		sport 350	**A082U7954F**	1
23	Intake Grille, black, LH			**A082U7805F**	1
23a	Intake Grille, titanium, LH		sport 350	**A082U7955F**	1
24	Outlet Grille, black, RH			**A082U7806F**	1
24a	Outlet Grille, titanium, RH		sport 350	**A082U7956F**	1
25	Outlet Grille, black, LH			**A082U7807F**	1
25a	Outlet Grille, titanium, LH		**sport 350**	**A082U7957F**	1
26	Setscrew, front grill fixing			**A075W4045Z**	2
27	Washer, shakeproof, front grill fixing			**AO82W5184F**	2
28	Sill Panel, including duct, RH			**B082B5163S**	1
29	Sill Panel, including duct, LH			**BO82B5164S**	1
30	Aerofoil, rear body mounted			**P691.1023.001AK**	1
31	Aerofoil, tailgate mounted		'98 MY on	**A082B5420J**	1
32	Cover, ABS, CHMSL		'98 MY on	**A082B5434K**	1
33	Spreader Plate	Bonded inside body	Prior to '98 MY	**P691.1023.002AK**	**2**

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

Dep	Part Description	Remarks	Option	Part Number	Qty
34	Spreader Plate	Bonded inside tailgate	'98 MY on	**A082U7882F**	2
35	Gasket		Prior to '98 MY	**P691.1023.003AK**	**2**
36	Gasket		'98 MY on	**A08285421 K**	2
37	Washer, flat			**A075W4013Z**	6
38	Washer, shakeproof			**A075W4048Z**	6
39	Setscrew, M6 x 20			**A075W1030Z**	11
40	Screw, M6 x 30, cap head, 12.9 grade			**A082W7171 F**	4
41	Washer, M6 x 15 , front fix			**A082W4133F**	2
42	Washer, M6 x 25, rear fix			**A075W4017FF**	**2**
43	Washer, flat, M6 x 12			**A075W4013Z**	16
44	Nut, nyloc, M6			**A075W3020Z**	16
45	Screw, countersunk			**A078W5087Z**	2
46	Captive nut, rear bumper top corner			**AI OOW8372F**	2
47	Washer plate			**A082U4816F**	1
48	Studplate		7 stud	**A082B5101 F**	1
49	Studplate		5 stud	**A082851 02F**	1
50	Washer, flat, M6 x 12			**A075W4013Z**	16
51	Nut, nyloc, M6			**A075W3020Z**	16
52	Washer plate			**A082B5103F**	1
53	Studplate			**A082B4817F**	2
54	Washer plate			**B08284818F**	**2**

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

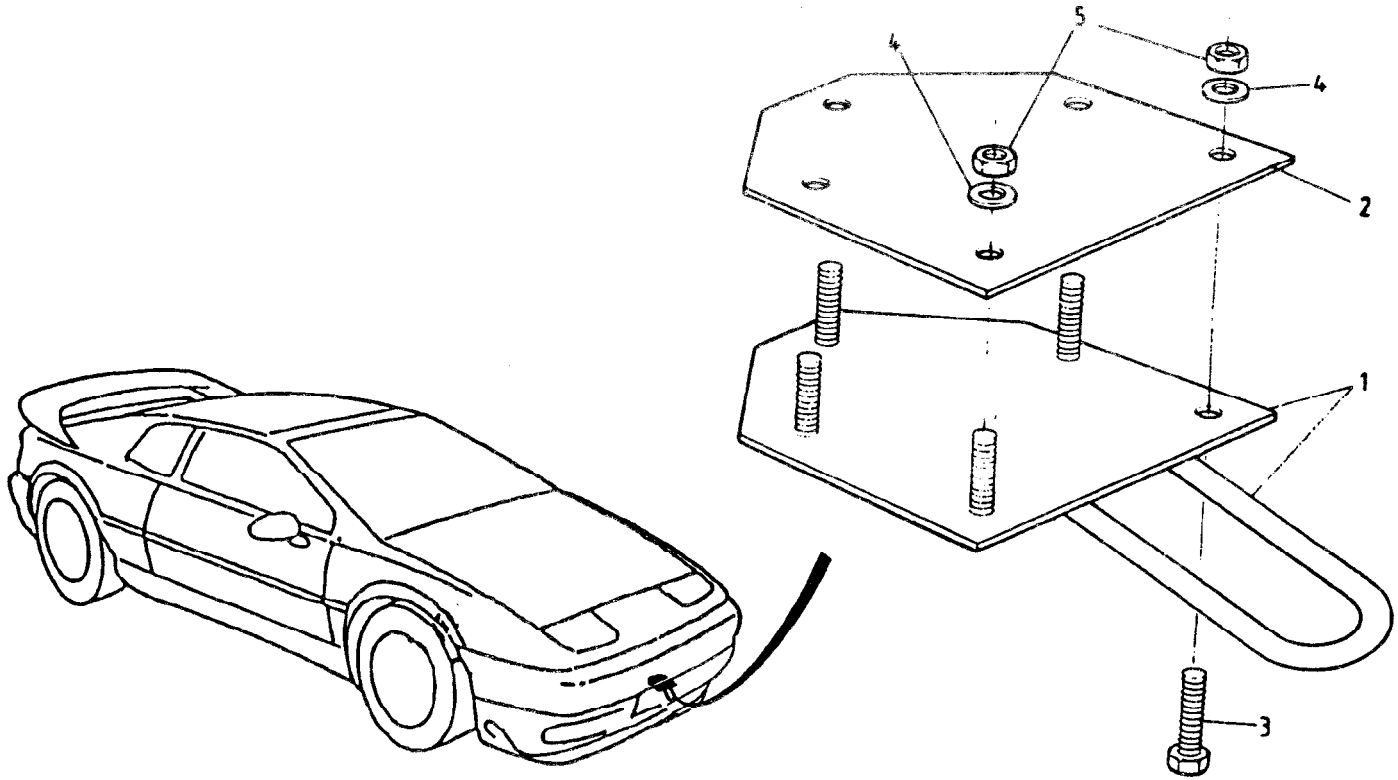
Dep	Part Description	Remarks	Option	Part Number	Qty
55	Rear Wheelarch Extension, LH			A082B5269K	1
55a	Rear Wheelarch Extension, RH			A082B5270K	1
56	Edging strip			P530.1023036AV	As req.
57	Front Wheelarch Extension, LH			A08285265K	1
57a	Front Wheelarch Extension, RH			A082B5266K	1
58	Spat, front lower wheelarch extension LH			A082B5273K	1
58a	Spat, front lower wheelarch extension RH			A082B5274K	1
59	Plate, side marker lamp mounting		USA specification	A082881 80K	4
60	Stone guard tape, LH			A082B5165K	1
60a	Stone guard tape, RH			A082B5166K	1
61	Stone guard tape, LH			A08285061 K	1
62	Stone guard tape, RH			A082B5062K	1
63	Lip Spoiler, flexible rubber		sport 350	A08285501 F	1
64	Spoiler Extension Panel, composite, LH		sport 350	A082B5493K	1
65	Spoiler Extension Panel, composite, RH		sport 350	A082B5494K	1
66	Setscrew, M6 x 25 hex. hd.		sport 350	A075W1031Z	18
67	Washer, flat M6		sport 350	A075W4015F	36
68	Nut, nyloc, M6		sport 350	A075W3009Z	18
69	Infill Panel, rear spoiler, licence plate lamps	Rectangular license plate	UK/Non USA, Prior '98 MY	B082B6232K	1
69a	Infill Panel, rear spoiler, licence plate lamps	Square licence plate	USA / Australia, prior '98'MY	C082B4935K	1
69b	Infill Panel, rear spoiler, licence plate lamps	Rectangular license plate	UK/Non USA, '98 MY on	A082B5419K	1

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

Dep	Part Description	Remarks	Option	Part Number	Qty
69c	Infill Panel, rear spoiler, licence plate lamps	Square licence plate	USA/Australia, 98 MY on	**A082B5488K**	1
70	Spoiler, rear body, short	Used with aerofoil	**V8**	**A0828551 7K**	1
70a	Spoiler, rear body, long	Used without aerofoil	V8GT, GT3	**A082B5258K**	1
71	Rear Bumper, RRIM		V8, Non USA	**A082B5279K**	1
71a	Rear Bumper, RRIM	With side marker lamp apertures	V8, USA	**A082B5488K**	**1**
71 b	Rear Bumper, RRIM		GT3	**A082B5118K**	1
71c	Foam, rear bumper	Not illustrated	V8, USA	**A082B5172K**	1
71d	Closing Panel, rear bumper to wheel housing, RH	Not illustrated	V8	**A082B5282K**	**1**
71e	Closing Panel, rear bumper to wheel housing, LH	Not illustrated	V8	**A082B5283K**	1
71f	Closing Panel, rear bumper to wheel housing, RH	Not illustrated	GT3	**A082B5206K**	1
71g	Closing Panel, rear bumper to wheel housing, LH	Not illustrated	GT3	**A082B5205K**	1
72	Aerofoil, rear valance	Twin exhaust outlets	V8 + V8-GT	**A082B5327K**	1
72a	Aerofoil, rear valance	LH Exhaust outlet	GT3, Except Australia	**B082B6244K**	1
72b	Aerofoil, rear valance	RH Exhaust outlet	GT3, Australia only	**B082B6241 K**	1
73	Bracket, aerofoil to body		--	**A082U7634F**	**2**
74	Setscrew, M6 x 25, aerofoil to bracket			**A075W1031 Z**	**2**
75	Nut, nyloc, M6			**A075W3020Z**	**4**
76	Washer, flat, M6 x 25			**A075W4017Z**	**9**
77	Setscrew, M6 x 20 hex. hd.			**A075W1036Z**	**5**
78	Washer, spring, M6			**A075W4046Z**	**7**
79	Aerofoil, carbon fibre, tailgate mounted		sport 350	**A082B5479F**	1

Function Code 10.23 Bumpers, Spoilers, Sills, Valances, Fixings

Dep	Part Description	Remarks	Option	Part Number	Qty
80	Aerofoil End Plate, alloy, LH		sport 350	808285481 F	1
81	Aerofoil End Plate, alloy, RH		sport 350	A082B5482F	1
82	Aerofoil Support Strut, alloy, LH		sport 350	A082U7951 F	1
83	Aerofoil Support Strut, aloy, RH		sport 350	A082U7952F	1
84	Gasket, aerofoil to strut	Not illustrated	sport 350	A082B5484K	2
85	Gasket, strut to tailgate		sport 350	A082B5483K	2
86	Screw, M6 x 25, button hd., strut to tailgate rear		sport 350	A075W7016Z	2
87	Washer, flat M6 x 25,		sport 350	A082W4131Z	2
88	Screw, M6 x 20, skt. hd., strut to tailgate front		sport 350	A082W7041Z	2
89	Washer, flat, M6		sport 350	A075W4015Z	2
90	Screw, M6 x 16, csk. cap hd., end plate fix.		sport 350	A082W718OF	4
91	Screw, M5 x 10, button hd., aerofoil to strut	Not illustrated	sport 350	A082W7179F	6
92	Pop rivet, sill to body fixing	Not illustrated		A075W6089Z	30
93	Tape, stone chip, front wheelarch, LH	Not illustrated		A082U7743K	1
94	Tape, stone chip, front wheelarch, RH	Not illustrared		A082U7742K	1
95	Tape, stone chip, rear wheelarch, LH, (black).	Not illustrated		A082U7711 K	1
96	Tape, stone chip, rear wheelarch, RH, (black).	Not illustrated		A082U771 OK	1
96	Protective Film, rear bumper, LH (Clear)	Not illustrated		A082U7851 K	1
97	Protective Film, rear bumper, RH (Clear)	Not illustrated		A082U7850K	1
98	Pop rivet, plastic, rear wheel arch extension	Not illustrated		A082W6528F	6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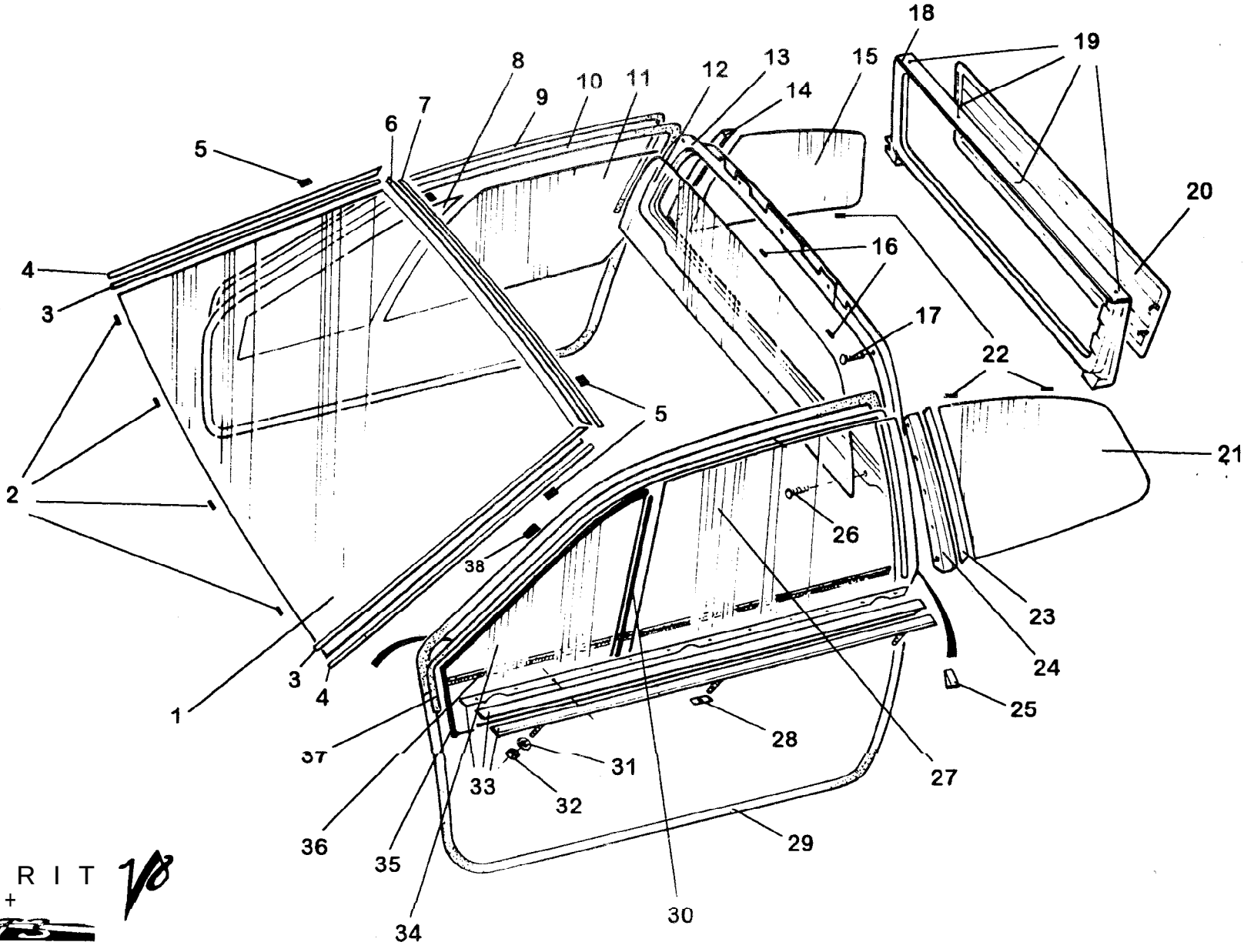
Function Code 10.31 Tow Hooks, Towing Hitches & Lifting Eyes.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Tow - Hook front			**B082B4957F**	1
02	Reinforcement Plate, Tow - hook fixing			**CO82B4714F**	1
03	Setscrew, M6 x 20 Tow - hook fixing			A075W1 0302	1
04	Washer M6 x 12 Tow - hook fixing			AO75W4013Z	5
05	Nut, Nyloc, M6, Tow - hook fixing			A075W3009Z	5



ESPRIT V8
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11.01

Service Parts List V8

Function Code 11 .0l Glazing, Weatherstrips, Door Seals etc.

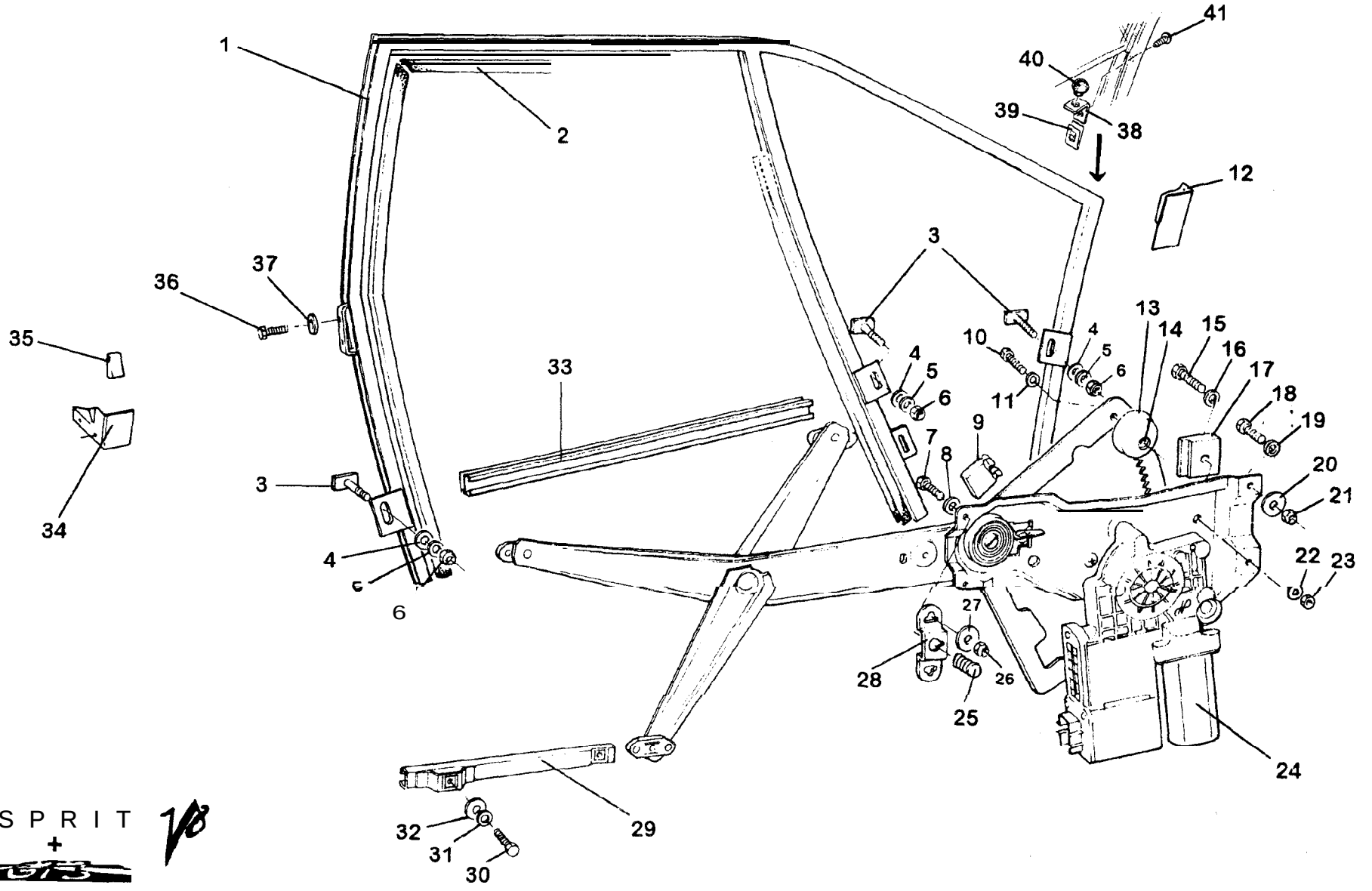
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Windscreen		Tinted	CO82U5791 F	I
01a	Windscreen		Clear, Australia Specification	B082U5790F	I
01 b	Fitting Kit	Used for windscreen, rear bulkhead glass, Tailgate glass, rear 1/4 windows & door glass		A075B81 58F	I
02	Spacer, 4 mm, windscreen			AO75UO588Z	6
03	Carrier, windscreen finisher, sides			AO82U7184F	2
04	Finisher, windscreen, RH & LH			AO82U7178F	2
05	Spacer, 6 mm, windscreen			AO75U7085F	4
06	Finisher, windscreen, Top			A082U7177F	I
07	Carrier, windscreen, Top			A082U7183F	I
08	Glass, front ¼ light, RH		Tinted	AO82U5794F	1
09	Secondry seal, door window frame			C082U5779F	2
IO	Weatherstrip, primary door seal			B079U4197F	2
I I	Drop Glass, door, RH		Tinted	B082U5782F	1
I2	Glass rear bulkhead, 7mm thick			B079U4032F	I
I3	Trim surround, bulkhead glass			A082B4762K	I
I4	Finisher, rear ¼ light window, RH			A082U5742K	1
I5	Glass, rear ¼ light, RH		Tinted	A082U5800F	I

Function Code 11 .0l Glazing, Weatherstrips, boor Seals etc.

Dep	Part Description	Remarks	Ovtion	Part Number	Qty
16	Spacer, 4 mm, bulkhead glass			A075U0588Z	6
17	Screw, No. 6 x 3/4", surround to bulkhead			A075W5028Z	5
18	Trim surround, Tailgate glass			B082U7449K	1
19	Plastic rivet, trim surround top edge fix			A082W6505F	5
20	Tailgate glass, heated			A082U7438F	1
21	Glass, rear ¼ light, LH		Tinted	A082U5801 F	1
22	Spacer, 4 mm, rear ¼ light window			A075U0588Z	8
23	Spacer, rear ¼ light window finisher, 1.5 mm			A082U7207K	AIR
23a	Spacer, rear ¼ light window finisher, 2.5 mm			A082U7209K	A/R
23b	Spacer, rear ¼ light window finisher, 3.0 mm			A082U7210K	AIR
24	Finisher, rear ¼ light window, LH			A082U5741 K	1
25	Fillet, door seal path			A082U8195F	4
26	Screw, No.6 x ½", surround to bulkhead			A075W5014Z	9
27	Drop Glass, door, LH		Tinted	B082U5795F	1
28	Spacer, waist seal carrier to door			A082U7353F	IO
29	Secondary Seal, door window frame			C082U5779F	2
30	Extrusion, door ¼ light glass			A082U7538V	0.8m
31	Washer, flat, waist seal to door			A075W4001Z	IO
32	Nut, Nyloc, M3, waist seal to door			A079W3060F	10
33	Seal & Carrier assembly, door waist exterior, LH			B082U7077J	1
33a	Seal & Carrier assembly, door waist exterior RH			B082U7076J	1

Function Code 11 .0l Glazing, Weatherstrips, Door Seals etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
34	Glass, front 1/4 light, LH		Tinted	**A082U5781 F**	1
35	Foam strip, door ¼ light **glass**		Fitted to ¼ light front edge	**A038B8221V**	0.8m
35a	Insert, door ¼ light glass front channel		LH inner RH outer	**A082U7551 K**	1
356	Insert, door ¼ light glass front channel		LH outer RH inner	**A082U7552K**	1
36	Sealing strip, door drop glass inner			**A089U6166B**	2.1m
37	Secondary seal, door window frame			C082U5779F	2
38	Spacer, front ¼ light frame			A075U0588Z	4



ESPRIT V8 +

11.02

Function Code 11.02 Door Window Lifts, Frames & Fixings.

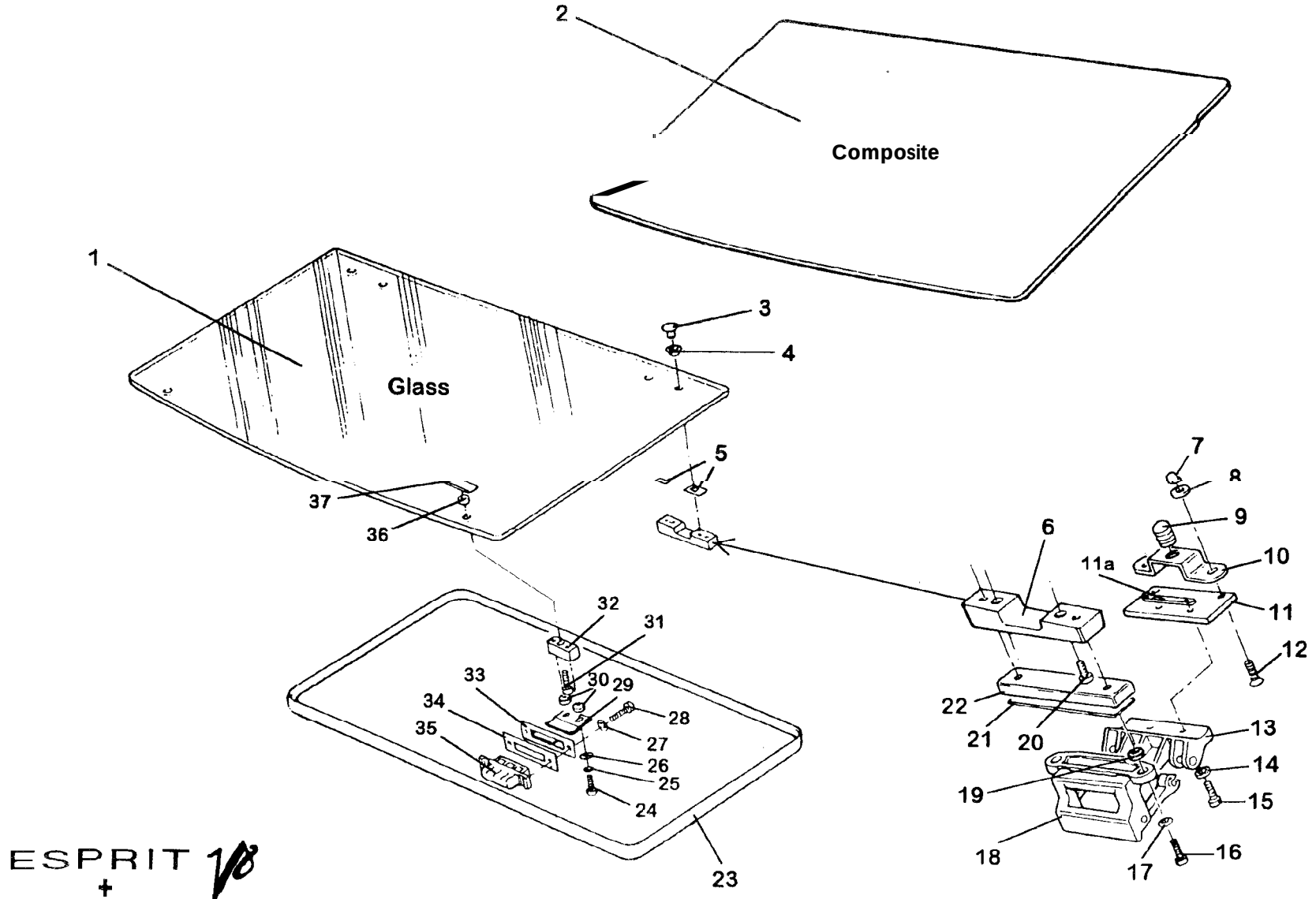
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Door window frame, LH		V8 + V8-GT + GT3	**G082U5783F**	1
Ola	Door window frame, RH		V8 + V8-GT + GT3	**G082U5784F**	1
02	Sealing channel, drop glass / window frame		V8 + V8-GT + GT3	**C082U5822J**	2
03	Studplate, M6 x 40, frame to doorbeam		V8 + V8-GT + GT3	B082U5974F	10
04	Washer, flat, M6 x 15, frame to door beam		V8 + V8-GT + GT3	**A075W4015Z**	6
05	Washer, shakeproof, frame to door beam		V8 + V8-GT + GT3	A075W4048Z	6
06	Nut, nyloc, M6, frame to door beam		V8 + V8-GT + GT3	**A075W3009Z**	6
07	Setscrew, M6 x 20, window lift motor rear fix		V8 + V8-GT + GT3	**A075W1030Z**	4
08	Washer, shakeproof, window lift motor		V8 + V8-GT + GT3	A075W4048Z	**4**
09	Down-stop, window regulator		V8 + V8-GT + GT3, Non USA	**A082M4994F**	2
09a	Downstop, window regulator		V8 + V8-GT + GT3	A082M4990K	2
10	Setscrew, M6 x 16, upstop fixing		V8 + V8-GT + GT3	**A075W1028Z**	2
11	Washer, spring, upstop fixing		V8 + V8-GT + GT3	A075W4035Z	2
12	Finisher, door shell /frame front, LH		V8 + V8-GT + GT3	**A075U7013K**	1
12a	Finisher, door shell /frame front, RH		V8 + V8-GT + GT3	**A075U7014K**	1
12b	Pop rivet, finisher to door	Not illustrated	V8 + V8-GT + GT3	A075W6071Z	6
13	Upstop, window regulator, eccentric adjuster		V8 + V8-GT + GT3	**A082U7531 F**	2
14	Nut, M6, upstop fixing		V8 + V8-GT + GT3	A075W3020Z	2

Function Code 11.02 Door Window Lifts, Frames & Fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
15	Setscrew, M8 x 25, reaction restraint fixing		V8 + V8-GT + GT3	A075M1 039Z	2
16	Washer, spring, reaction restraint fixing		V8 + V8-GT + GT3	A075W4036Z	2
17	Reaction restraint, regulator upstop		V8 + V8-GT + GT3	**A082U7532F**	2
18	Setscrew, M5 x 20 , window lift motor front fix		V8 + V8-GT + GT3	**A075W1025F**	4
19	Washer, flat, 15 mm o/d window lift motor front fix		V8 + V8-GT + GT3	**A075W4014Z**	**4**
20	Washer, flat, 25 mm o/d , window lift motor front fix		V8 + V8-GT + GT3	**A075W4004Z**	4
21	Nut, M5 nyloc, window lift motor front fix		V8 + V8-GT + GT3	**A075W3008Z**	4
22	Washer, flat, reaction restraint fixing		V8 + V8-GT + GT3	**A075W4020Z**	4
23	Nut, M8 nyloc, reaction restraint fixing		V8 + V8-GT + GT3	**A075W3021Z**	2
24	Window lift motor & regulator assembly, LH		V8 + VB-GT + GT3. Non USA	**A082U6255F**	1
24a	Window lift motor & regulator assembly, LH	No obstruction sensing	V8 + V8-GT + GT3. USA spec	**A082M4957F**	1
24b	Window lift motor & regulator assembly, RH		V8 + V8-GT + GT3. Non USA	**A082U6254F**	1
24c	Window lift motor & regulator assembly, RH	No obstruction sensing	V8 + V8-GT + GT3. USA spec	**A082M4956F**	1
25	Buffer, adjustable, door trim panel spacer	Also see section 15.13	V8 + V8-GT + GT3	**A082U6163F**	2
26	Nut, M6 nyloc, door trim panel spacer fix	Also see section 15.13	V8 + V8-GT + GT3	**A075W3009Z**	4
27	Washer, flat, M6, door trim panel spacer fix	Also see section 15.13	V8 + V8-GT + GT3	**A075W4015Z**	4
28	Bracket, door panel buffer mounting	Also see section 15.13	V8 + V8-GT + GT3	**B082U7098F**	2
29	Channel, window regulator reaction		V8 + VB-GT + GT3	**A082U6256F**	2
30	Setscrew, M6 x 12, reaction channel to door		V8 + V8-GT + GT3	**A075W1 027Z**	4
31	Washer, spring, reaction channel to door		V8 + V8-GT + GT3	**A075W4035Z**	**4**
32	Washer, flat, reaction channel to door		V8 + VB-GT + GT3	**B082W4018F**	4

Function Code 11.02 Door Window Lifts, Frames & Fixings.

Dep	Part Description	Remarks	Option	Part Number	amY
33	**Carrier, channel,** drop **glass**		V8 + V8GT + GT3	**A082U8237F**	2
33a	Shim, window lifting channel	Not illustrated	V8 + V8-GT + GT3	**A082U7626F**	2
336	Tape, adhesive, lift channel shim	Not illustrated	V8 + V8-GT + GT3	**A100B6142F**	Im
34	Finisher, door shell / frame rear, RH		V8 + V8-GT + GT3	**A082U7488K**	1
34a	Finisher, door shell / frame rear, LH		V8 + V8-GT + GT3	**A082U7489K**	1
34b	Rokut rivet, finisher to door shell	Not illustrated	V8 + V8-GT + GT3	**AI 00W6479F**	4
36	Fillet, door seal path	Also see section 11.01	V8 + V8-GT + GT3	**A082U6195F**	4
36	Setscrew, M5 x 16, frame to top rear of door		V8 + V8-GT + GT3	**A075W1088F** ,	4
37	Washer, flat, frame to top rear of door		V8 + V8-GT + GT3	**A082W4O98F**	4
36	Stop bracket, fit to window frame		V8 + V8-GT + GT3	**A082U7546F**	2
39	Spire nut, stop bracket		V8 + V8-GT + GT3	**A075W6014Z**	2
40	Stop button		V8 + V8-GT + GT3	**A075U6050F**	2
41	Screw, stop bracket fixing		V8 + V8-GT + GT3	**A075W5012F**	2



ESPRIT V8 GTS

11.05

Function Code 11.05 Glass / Composite - Roof "Lift Out" Panel.

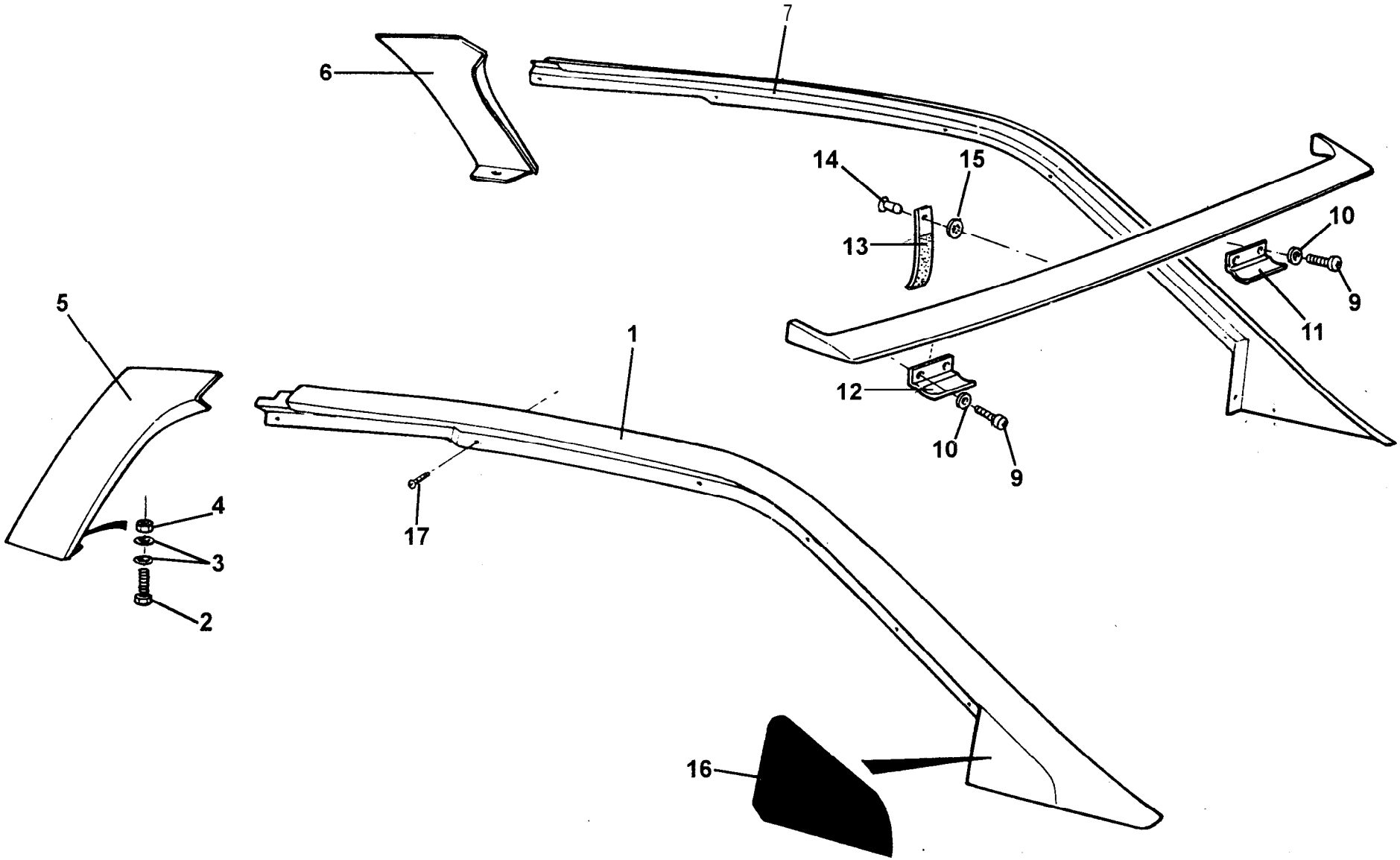
Dep	Part Description	Remarks	Option	Part Number	Qty
01	**Glass** Roof **Panel**	With obscuration band		**B082U5799F**	1
02	Composite Roof Panel		Includes headlining	**B082B4870K**	1
03	Cap nut, plinth to glass roof			**A082U6134F**	4
04	Sealing washer, cap nut			**A082U6138F**	4
04a	Neoprene tube, fixings / roof isolation	Not illustrated		**A082U6211 K**	25mm
05	Spacer, plinth to glass			**A082U5865F**	AIR
06	Plinth, handle to roof			**A082U7091 F**	2
07	Dome nut,, M5, buffer bracket fixing			**A082U3094F**	4
08	Washer, flat, buffer bracket fixing			**A082W4I07Z**	4
09	Rubber buffer, adjustable, roof abutment			**A082U6163F**	2
10	Bracket, rubber buffer			**A082U7098F**	2
11	Tapping plate, latch bracket to body, LH			**A082U7313F**	1
1 la	Tapping plate, latch bracket to body, RH			**A082U7312F**	1
12	Screw, M5 x 25, bracket & taping plate to body			**A078W5087Z**	4
13	Latch bracket, handle assembly			**B082U6161 F**	2
14	Washer, flat, latch bracket handle			**A082W4I07Z**	4
15	Screw, 10 UNF x ½" , latch bracket/ tapping plate			**A075W5059F**	4
16	Screw, M5 x 30, handle assembly to plinth			**A082W5142F**	4

Function Code 11.05 Glass I Composite · Roof "Lift Out" Panel.

Dep	Part Description	Remarks	Option	Part Number	Qty
17	Washer, flat, handle assembly to plinth			A082W4109F	4
18	Handle Assembly 'Autoroof			A082U6160F	2
18a	Spirol pin, 5/32" x 7/8", handle pivots	Not illustrated		A082W6351 F	8
19	Grommet, handle assembly to plinth			A082U6197F	4
20	Screw, 10 UNC x ½" , plinth to glass roof			B082W5120F	4
21	Shim, lmm, handle assembly to plinth			A082U7322F	AIR
21a	Shim, 3mm, handle assembly to plinth			A082U7322F	A/R
22	Spacer, handle assembly to plinth			B082U7138F ,	2
23	Weather strip, glass panel to body		Glass panel	A082U6123F	3m
23a	Weather strip, composite panel to body		Composite panel	A089U6055F	3m
24	Screw, 10 UNF x ½", tongue to glass roof			A075W5059Z	4
25	Washer, shakeproof, tongue to roof			A075W4045Z	4
26	Washer, flat, tongue to roof			A075W4000Z	4
27	Washer, flat, M5 x 12, recess to body (stainless)			A082W4129F	4
28	Screw, M5 x 25, slot recess to body (stainless)			A082W5185F	4
29	Tongue, roof front			A082U6101 F	2
30	Rubber washer, tongue to glass roof			A082W4115F	8
31	Screw, M5 x 10, tapping plate to plinth			A082W5079F	2
32	Plinth, tongue to glass roof			A082U4978F	2
33	Bracket, tongue anti-rattle			B082U5771 F	2
34	Gasket, slot recess to body			A082U6099F	2

Function Code 11.05 Glass I Composite, Tilt Roof Panel

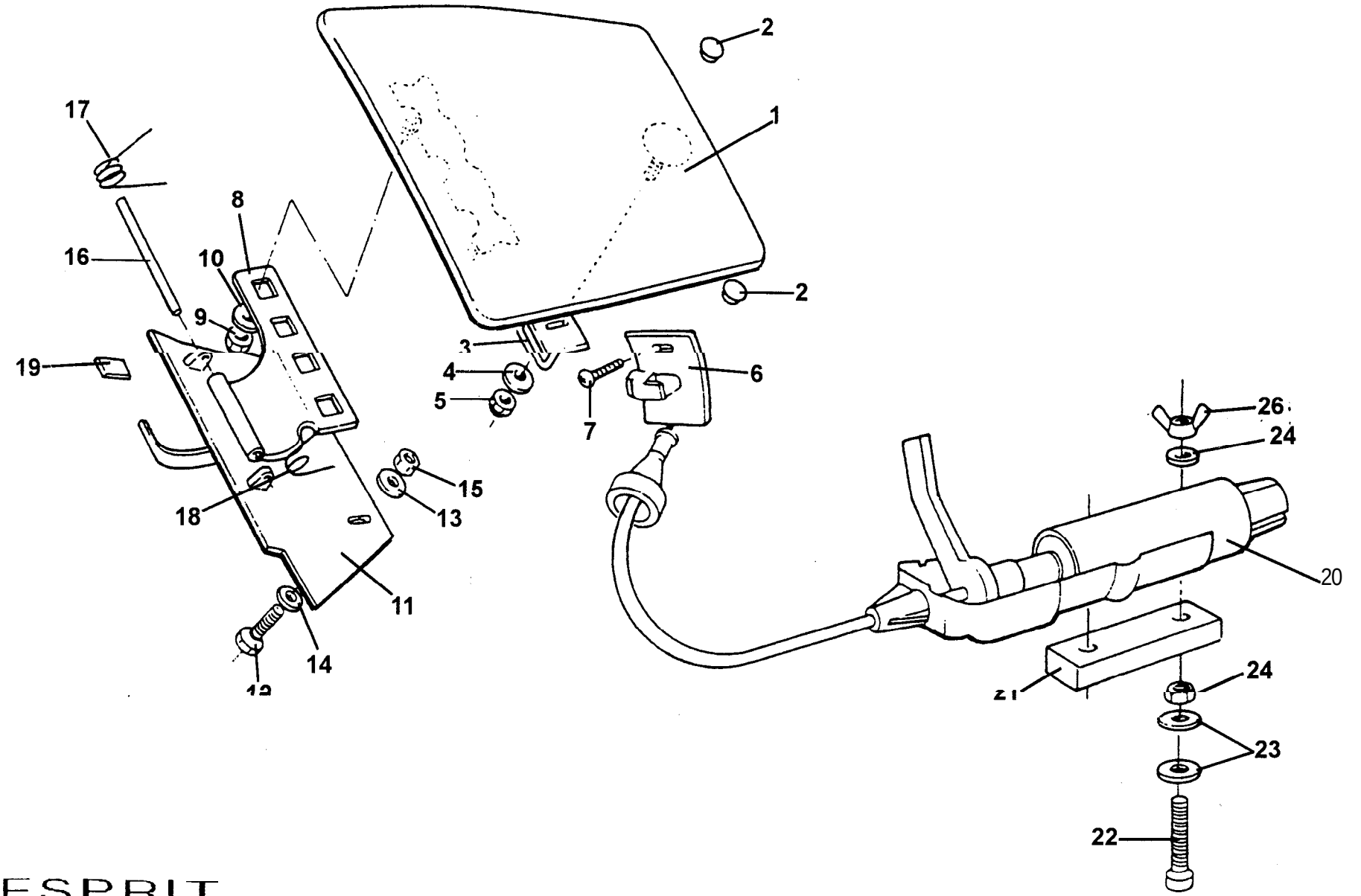
Dep	Part Description	Remarks	Option	Part Number	Qty
35	Slot recess, LH			A082U6097F	1
35a	Slot recess, RH			A082U6098F	1
36	Sealing ring, plinth to glass panel			A082U6103F	2
37	Tapping plate, tongue to glass panel			A082U61 OOF	2



ESPRIT
12.01a

Function Code 12.02a Fuel Filler Flaps and Mechanisms

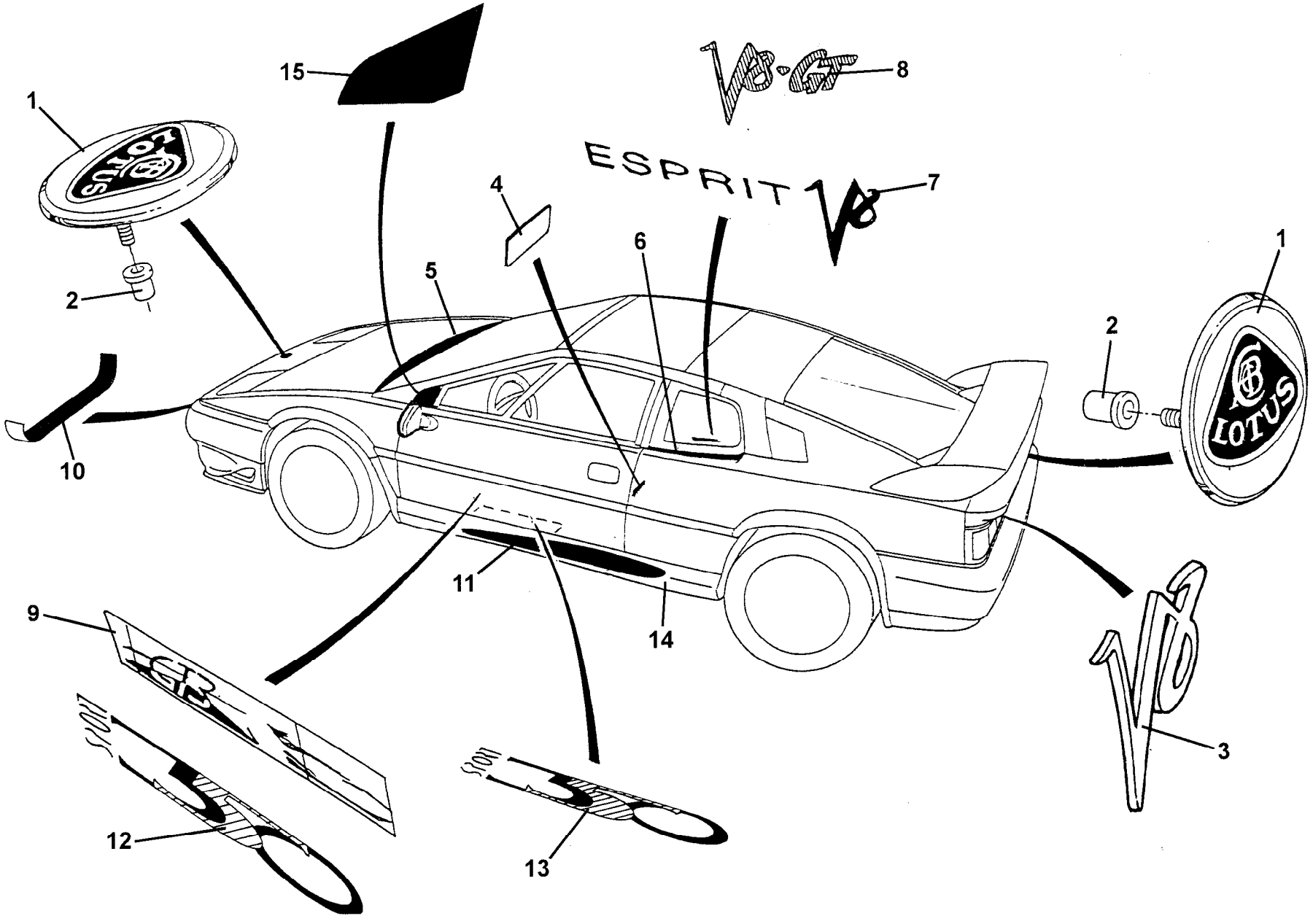
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel Filler Flap, LH			B082B4673K	1
Ola	Fuel Filler Flap, RH	Bonded closed, single filler (LH) '98 MY on		B082B4672K	1
02	Buffer, flap closure stop			A075U6050F	4
03	Striker, fuel filler flap		LH only, '98 MY on	A082U5814F	2
04	Washer, flat, M5, striker to flap		LH only, '98 MY on	A075W4000Z	2
05	Nut, nyloc, M5, striker to flap		LH only, '98 MY on	A075W3008Z	2
06	Latch assembly, flap release		LH only, '98 MY on	A082U6122F	2
07	Screw, No.6 x l/2", latch to body		LH only, '98 MY on	A089W5138F	2
08	Hinge, fuel filler flap, LH			B082B4695F	1
08a	Hinge, fuel filler flap, RH			B082B4694F	1
09	Nut, nyloc, M5, hinge to flap			A075W3008Z	4
10	Washer, flat, M5, hinge to flap			A075W4000Z	4
11	Bracket, hinge to body, LH			808284691 F	1
Ila	Bracket, hinge to body, RH			B082B4692F	1
12	Setscrew, M6 x 20, hex. hd., hinge to body			A075W103OZ	4
13	Washer, spacer, M6 x 20, hinge to body			A075W4016Z	4
14	Washer, flat, M6 x 12, hinge to body			A075W4013Z	4
15	Nut, nyloc,M6, hinge to body			A075W3069Z	4



ESPRIT
12.02a

Function Code 12.02a Fuel Filler Flaps and Mechanisms

Dep	Part Description	Remarks	Option	Part Number	Qty
16	Spirol pin, flap hinge			8082861 1IF	2
17	Hairpin Spring, fuel flap hinge, upper			A082U6144F	2
18	Hairpin Spring, fuel flap hinge, lower			A082U6133F	2
19	Buffer, flap open stop			A082U7052K	4
20	Solenoid, fuel filler flap release		LH only, '98 MY an	A082M6395F	2
21	Spacer, solenoid to body		LH only, '98 MY on	A082L41 63F	2
22	Screw, M6 x 30, cap hd., solenoid fixing		LH only; '98 MY on	A075W5091Z	4
23	Washer, flat, M6 x 15, solenoid fixing		LH only, '98 MY on	A075W4015Z	8
24	Nyloc Nut, M6, solenoid fixing		LH only, '98 MY on	A075W3009Z	4
25	Washer, shakeproof, solenoid fixing		LH only, '98 MY on	A075W4046Z	4
26	Wing Nut, M6, solenoid fixing		LH only, '98 MY on	A075W3033Z	4



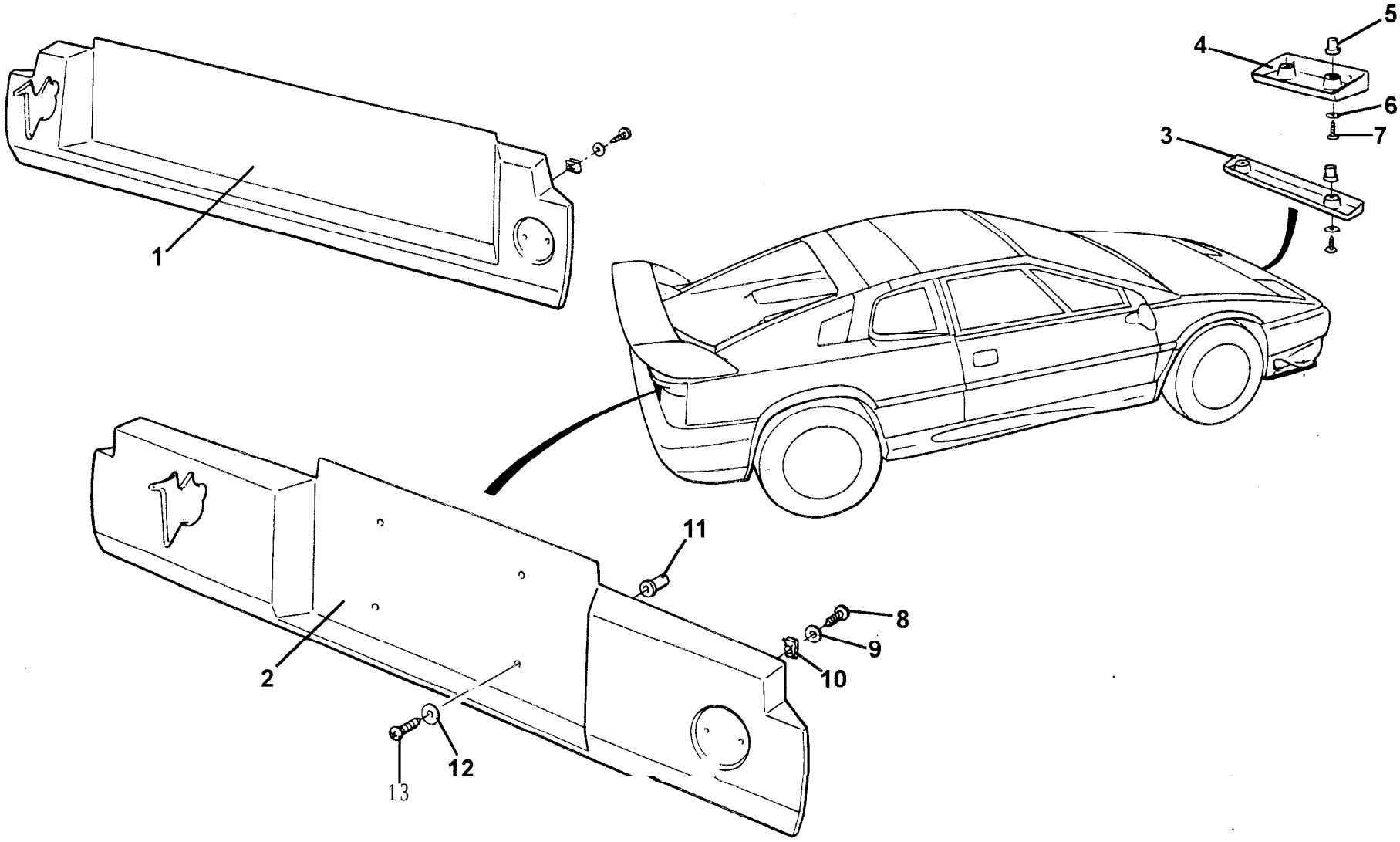
ESPRIT
12.05

Function Code 12.05 Decals, Badges 8 Protective Film

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Badge, Lotus logo	Nose/rear license plate plinth		A089U1816F	2
02		Rawlnut, M5, badge fixing			A075W6074F	4
03		Badge, V8, rear license plate plinth		V8, V8 GT, Sport 350	B082U7744F	1
04		Body tape, joint finisher	Fitted prior to paint		On request	As req.
05		Blackout Film, bonnet rear edge			A082B5063K	1
06		Blackout Film, below quarter window, LH			A082B5417K	1
06a		Blackout Film, below quarter window, RH			A082B5416K	1
07		Decal, Esprit V8, quarter window		V8, V8 GT	A082B5341 F	2
07a		Decal, Esprit, quarter window	As V8, cut off V8 logo	GT3, Sport 350	A082B5341 F	2
08		Decal, V8 GT, quarter window		V8 GT	A082B5455F	2
09		Decal Set, body side GT3, grey, LH		GT3	A082U7837F	a
09a		Decal Set, body side GT3, grey, RH		GT3	A082U7838F	1
10		Blue Decal Tape, radiator intake		sport 350	A082B5499F	1
11		Blue Decal Tape, sill duct, LH		sport 350	A082B5497F	1
11a		Blue Decal Tape, sill duct, RH		Sport 350	A082B5498F	1
12		Decal, Sport 350, doors		sport 350	A082B5495F	2
13		Decal, Sport 350, sill treadplates		sport 350	A082B5496F	2
14		Film, sill protection, LH		sport 350	A082B5513K	1

Function Code 12.05 Decals, Badges & Protective Film

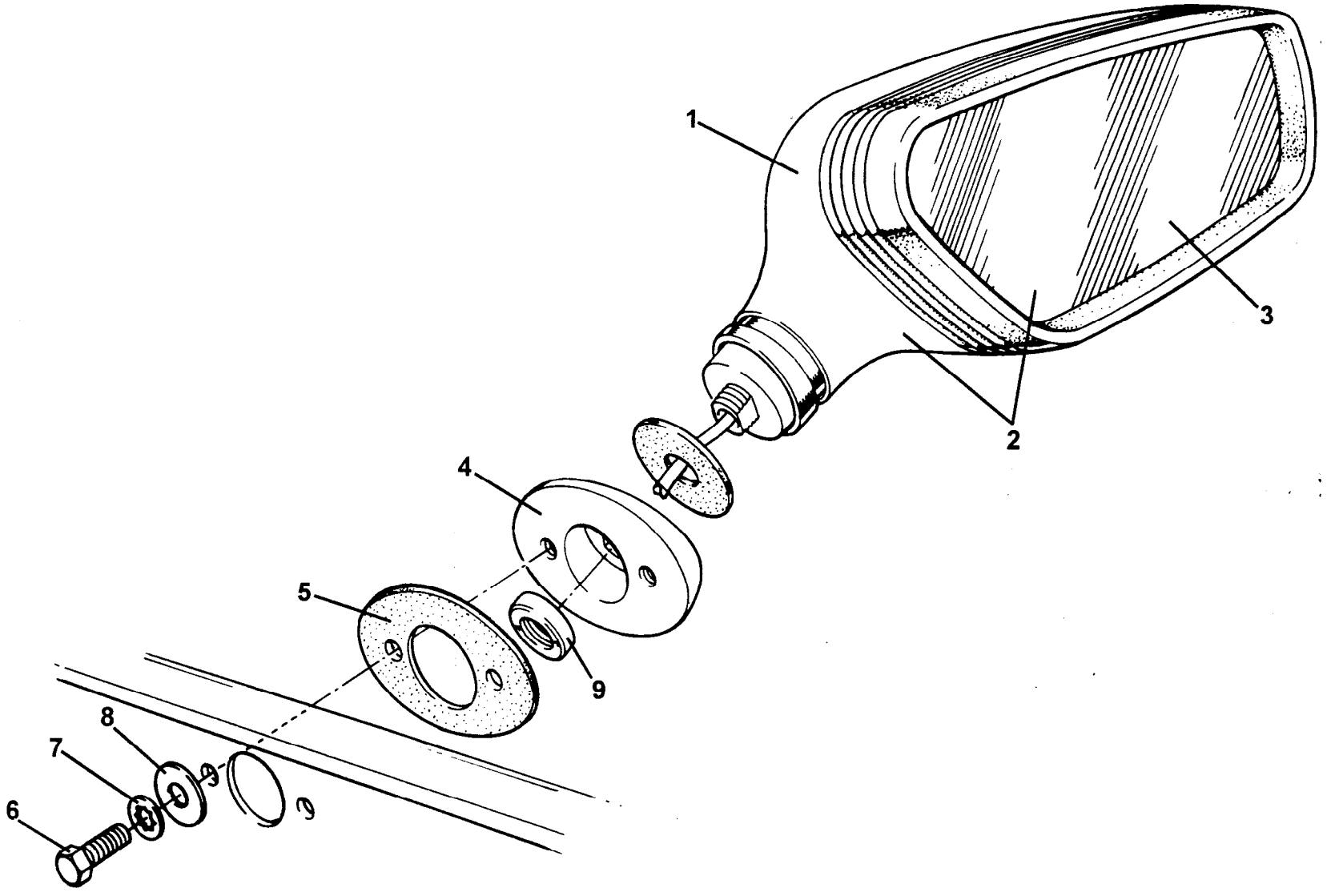
Dep	Part Description	Remarks	Option	Part Number	Qty
l4a	Film, sill protection, RH		sport 350	**A082B5512K**	I
15	Blackout Film, 'A' pillar cheater panel, LH			**A082B5065K**	1
15a	Blackout Film, 'A' pillar cheater panel, RH			**A082B5064K**	1
16	Decal, gearshift pattern, graphite	Fitted to gear lever tray, not illustrated	GT3, V8 GT, Sport 350	**A082U7848F**	1
16a	Decal, gearshift pattern, silver	Fitted to gear lever tray, not illustrated	GT3, V8 GT	**A082U7849F**	1



ESPRIT
12.07

Function Code 12.07 Licence Plate Mountings

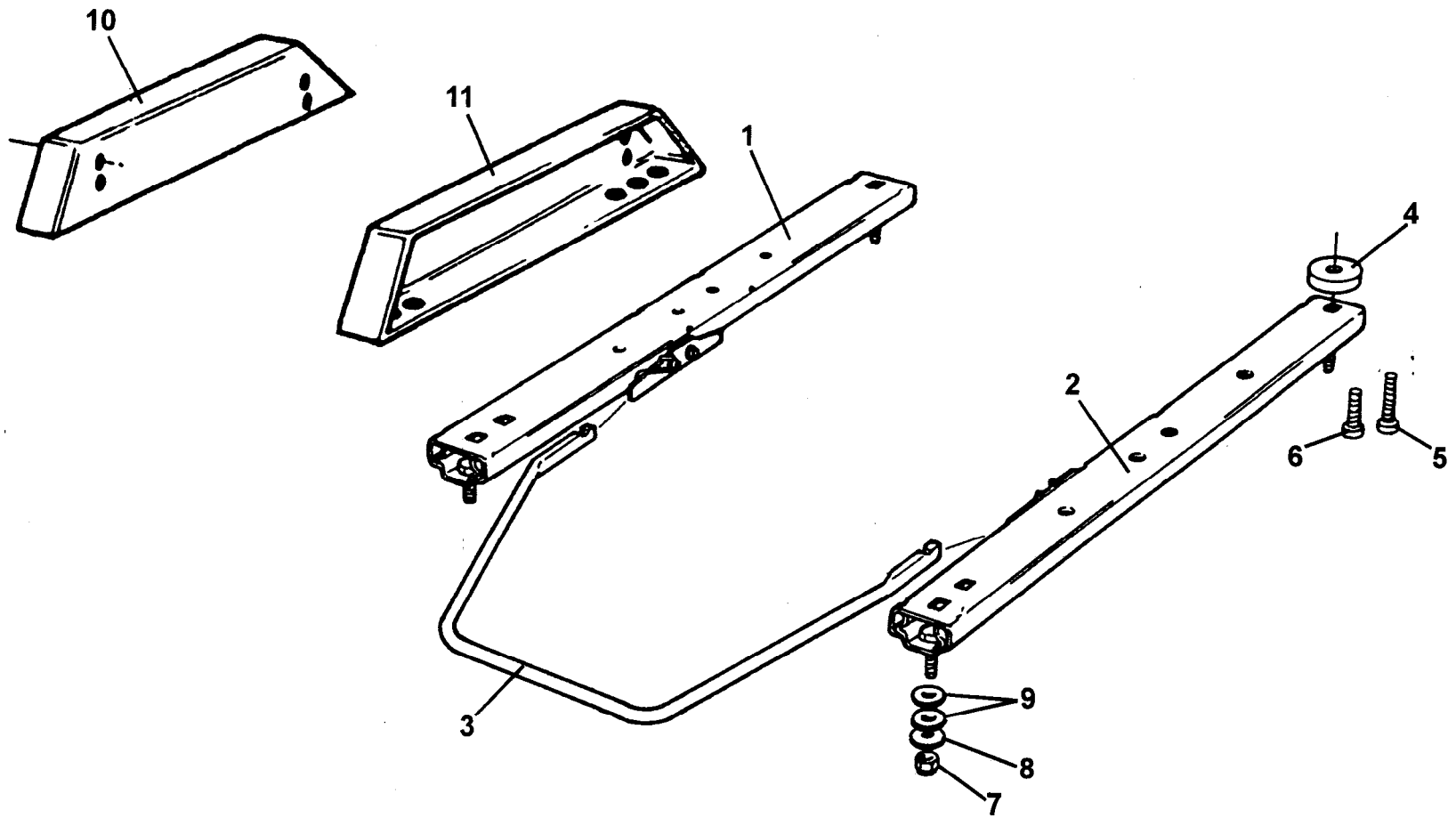
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Licence Plate Plinth, rear	Recess for V8 badge, rectangular license plate	V8, V8-GT	**A082B5381 J**	1
Ola	Licence Plate Plinth, rear	Rectangular licence plate	GT3	**P691 .1 207.00lAJ**	1
02	Licence Plate Plinth, rear	Recess for V8 badge, square license plate	V8, V8GT, USA	**A082B5380J**	1
03	Licence Plate Plinth, front	Rectangular license plate	V8, V8GT, GT3	**A082B5080K**	1
04	Licence Plate Plinth, front	Square license plate	V8, V8GT, USA	**A082B5188J**	1
05	Jacknut, M6			**A075W3034Z**	2
06	Washer, flat, M6 x 12.1			**A075W4013Z**	2
07	Screw, M6 x 16, pozi.			**A076W5090F**	2
08	Screw, M6 x 25, pozi.			**A075W5089Z**	4
09	Washer, flat, M6 x 12.1			**A075W4013Z**	4
10	Spire nut, No. 6			**A079W6024F**	4
11	Rivnut, M6			**A082W6318F**	4
12	Screw, M6 x ½", pozi.			**A075W5015Z**	4



ESPRIT
12.09

Function Code 12.09 Exterior Driving Mirrors

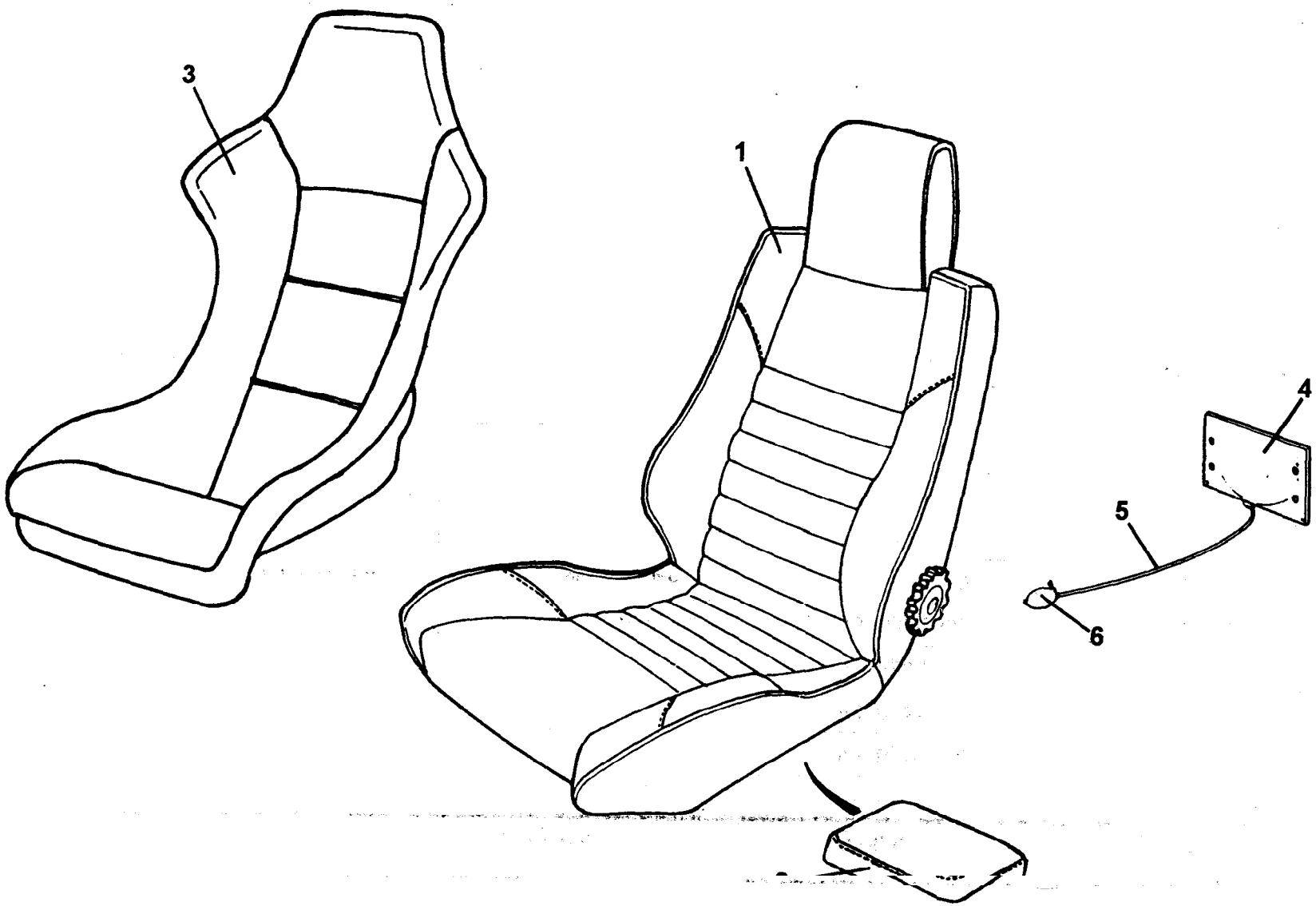
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Mirror Housing, RH			A082M6400F	1
Ola	Mirror Housing, LH			A082M6399F	1
02	Door Mirror Assembly, convex glass, RH		Except USA/Australia	A082M6402J	1
02a	Door Mirror Assembly, etched glass, RH		USA	A082M6403J	1
02b	Door Mirror Assembly, flat glass, RH		Australia	A082M6404J	1
02c	Door Mirror Assembly, convex glass, LH		Except USA/Australia	A082M6401 J	1
02d	Door Mirror Assembly, flat glass, LH		USA/Australia	A082M6405J	1
03	Glass/Carrier Assembly, convex glass, RH		Except USA/Australia	A082M6414J	1
03a	Glass/Carrier Assembly, etched glass, RH		USA	A082M6413J	1
036	Glass/Carrier Assembly, flat glass, RH		Australia	A082M6398J	1
03c	Glass/Carrier Assembly, convex glass, LH		Except USA/Australia	A082M6415J	1
03d	Glass/Carrier Assembly, flat glass, LH		USA/Australia	**A082M6397J**	1
04	Mounting Plinth, mirror to door			**A082U7113J**	2
05	Gasket, plinth to door			**A082U7123F**	2
06	Setscrew, M6 x 25 hex. hd.,mirror to door			**A075W1031 F**	4
07	Washer, spring, M6			**A075W4035Z**	4
08	Washer, flat, M6			**A075W4016Z**	4
09	Nut, special, mirror to plinth			A082U7115F	2



ESPRIT
13.01

Function Code 13.01 Seat Runners

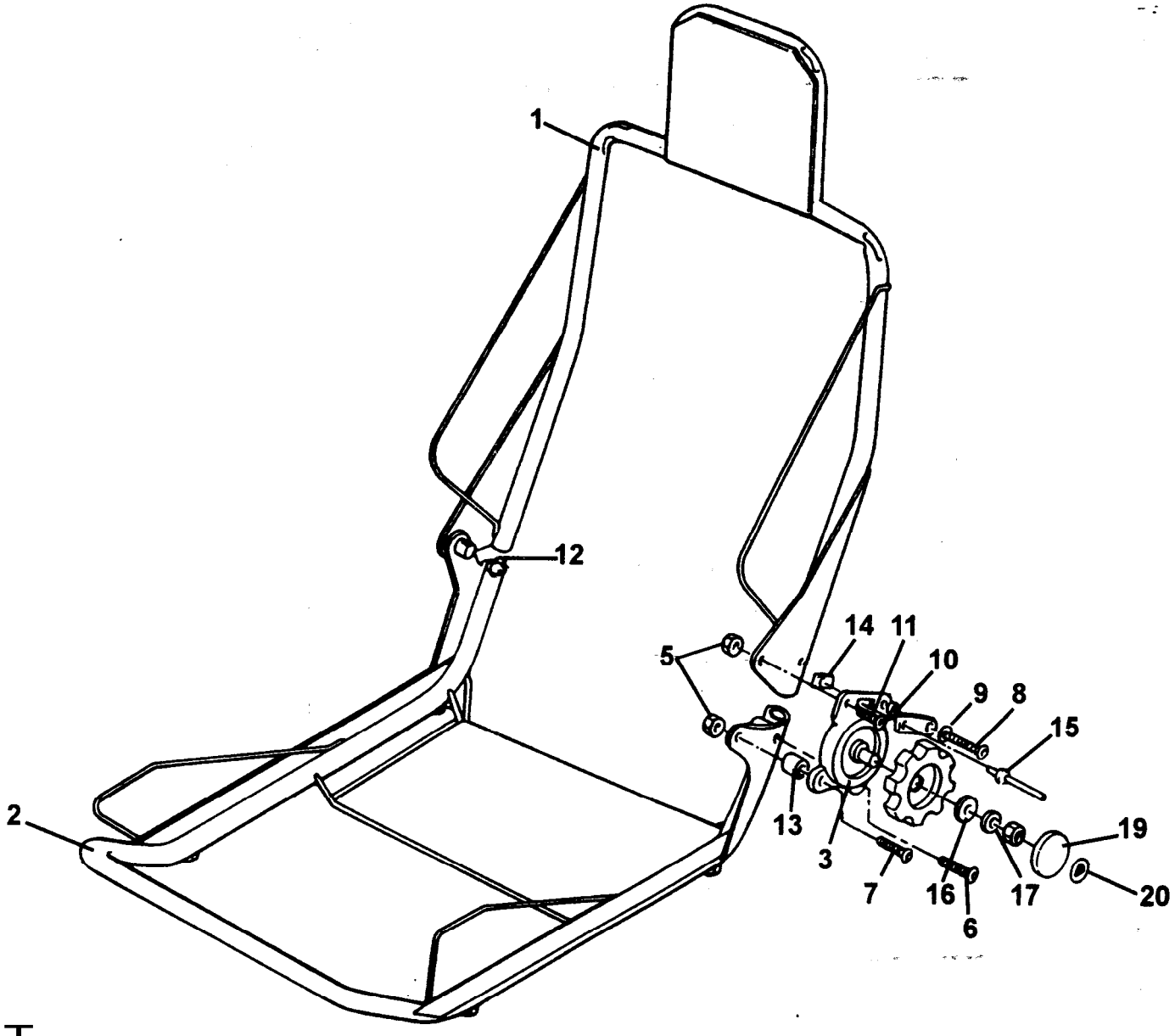
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Seat Runner, RH		V8, Sport 350	B089V3572K	2
02	Seat Runner, LH		V8, sport 350	B089V3571 K	2
03	Lift Bar, slide release		va, sport 350	C082V6183F	2
04	Spacer, 12mm, runner to seat frame		V8, Sport 350	A082U51 OOF	8
05	Setscrew, M8 x 30, hex. hd., runner to seat frame	Used with 12mm spacers	V8, sport 350	A075W9007F	8
06	Setscrew, M8 x 16, hex.hd., runner to seat frame	Used without spacers	V8, Sport 350	A075W9006F	8
07	Nyloc Nut, M8, runners to floor		V8, Sport 350	A075W301 0Z	8
08	Washer, flat, M8 x 25		V8, Sport 350	A075W4021Z	8
09	Washer. flat, M8 x 30		V8, Sport 350	A075W4108F	16
10	Mounting Plinth, sports seat, RH		V8 GT, GT3	P6911301006AF	2
11	Mounting Plinth, sports seat, LH		V8 GT, GT3	P6911301008AF	2



ESPRIT
13.02

Function Code 13.02 Seat Assemblies, Lumbar Support

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Seat Assembly, LH		V8	B082V8671 J	1
Ola	Seat Assembly, RH		V8	B082V8672J	1
01 b	Seat Assembly, LH		sport 350	A082V9095J	1
01c	Seat Assembly, RH		sport 350	A082V9096J	1
0 2	Bolster cushion		V8, Sport 350	A082V8688J	2
0 3	Sports Seat Assembly, LH		V8GT, GT3	A082V9093J	1
03a	Sports Seat Assembly, RH		V8GT, GT3	A082V9094J	1
0 4	Lumbar Support		V8, Sport 350	A089V6041 F	2
0 5	Tubing, pump to lumbar support		V8, Sport 350	A089V4331 F	2
06	Pump & Valve, lumbar support		V8, Sport 350	A089V6142F	2



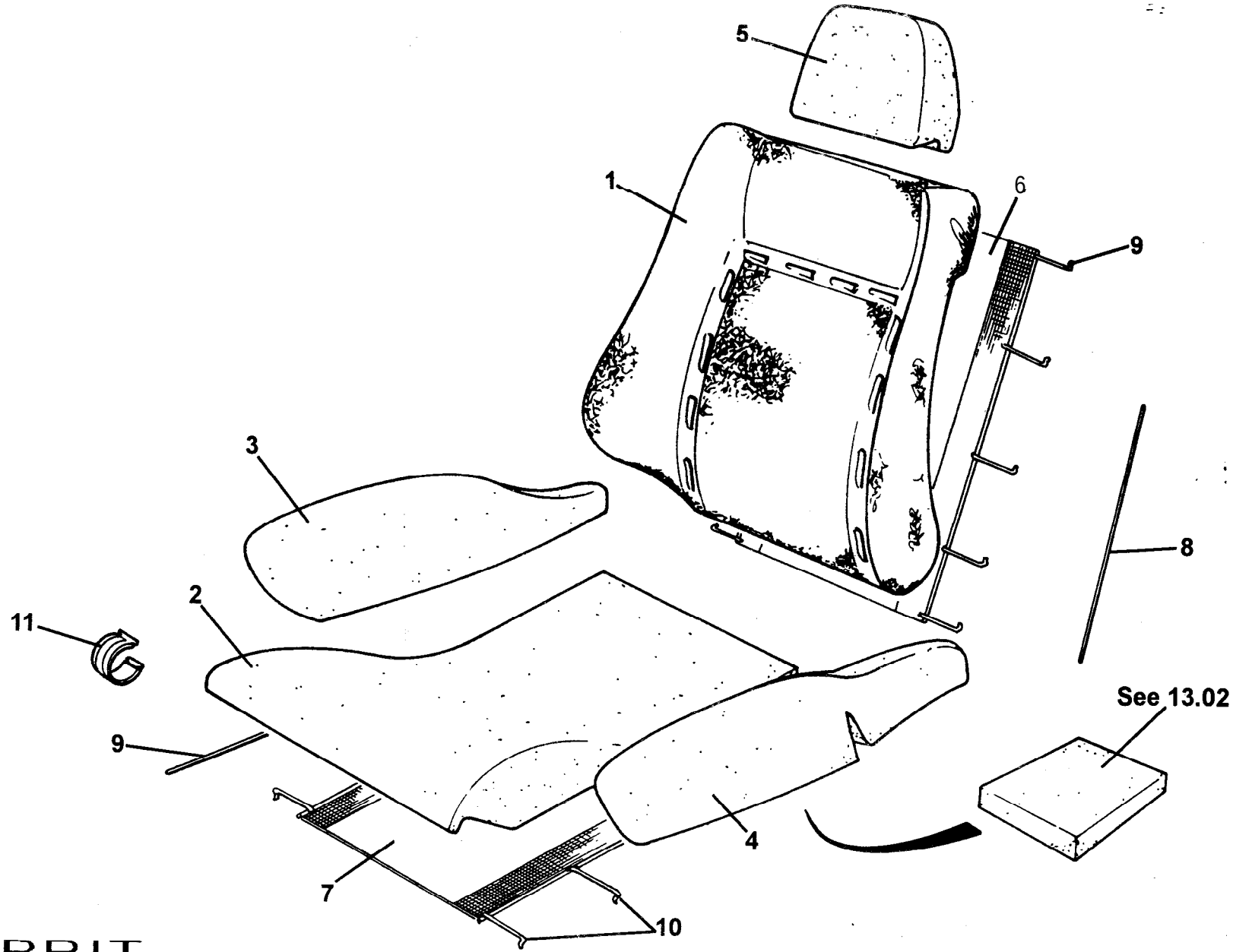
ESPRIT
13.03

Function Code 13.03 Seat Frames & Recline Mechanisms

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Seat Frame, backrest, LH		V8	A082V6181 F	1
Ola	Seat Frame, backrest, RH		V8	A082V6182F	1
Olb	Seat Frame, backrest, LH	Larger side frame extensions	sport 350	A082V9089F	1
01c	Seat Frame, backrest, RH	Larger side frame extensions	sport 350	A082V9088F	1
02	Seat Frame, cushion, LH		V8	A082V6179F	1
02a	Seat Frame, cushion, RH		V8	A082V6180F	1
02b	Seat Frame, cushion, LH	Larger side frame extensions	sport 350	A082V9091 F	1
02c	Seat Frame, cushion, RH	Larger side frame extensions	sport 350	A082V9090F	1
03	Seat Reclining Mechanism, LH		V8	A083V6066F	1
03a	Seat Reclining Mechanism, RH		V6	A083V6065F	1
04	Spring, anti-rattle	Not illustrated	V8	A083V6091 V	2
05	Nyloc Nut, M8		V8	A075W3010Z	8
06	Screw, M8 x 55, button hd., recline mech. fix.		V8	B082W7051 F	2
07	Screw, M8 x 30, button hd., recline mech. fix.		V8	A082W7050F	2
08	Screw, M8 x 50, button hd., latch pivot		V8	A082W7060F	2
09	Washer, flat, M8 x 16		V8	A075W4020Z	2
10	Nylon Insert, latch pivot		V8	A082W41 OOF	2
11	Screw, M8 x 25, button hd., recline mech. fix,		V8	A082W7062F	2

Function Code 13.03 Seat Frames & Recline Mechanisms

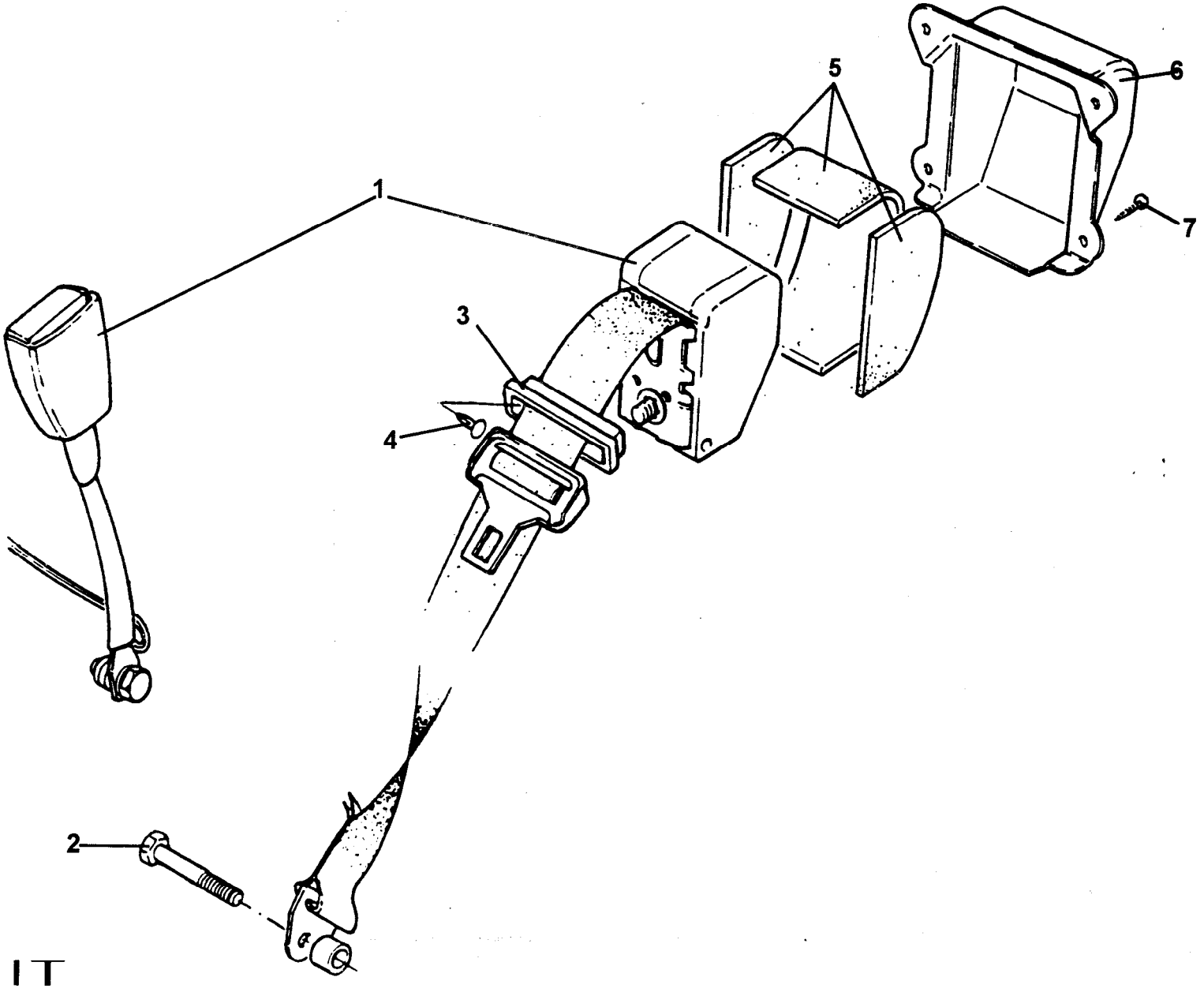
Dep	Part Description	Remarks	Option	Part Number	Qty
12	Clip, idler pivot		V8	A082V6153F	2
13	Spacer		va	A082V5921 F	4
14	Locking Plate, tilt pawl		V8	A082V5923F	2
15	Pop Rivet, locking plate fix.		V8	A075W6087F	2
16	Washer, drive plate clamp		V8	A089U6066F	2
17	Washer. recline mechanism shaft		V8	A089U6065F	2
18	Handwheel, seat recline		va	A083V6067F	2
19	Trim, handwheel centre		va	A083V6068F	2
20	Lotus Badge, handwheel centre		va	A089U1813F	2



ESPRIT
13.09

Function Code 13.09 Seat Foams & Suspension

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Backrest		V8	A082V8028F	2
02	Cushion Foam		V8	**A082V8098K**	**2**
03	Side Support Foam, RH		V8	**A082V81 OOK**	**2**
04	Side Support Foam, LH		**V8**	**A082V8099K**	2
05	Head Restraint Foam		V8	**A082V8033K**	2
06	Suspension Unit, backrest, 520mm		V8	**A082V6186F**	2
07	Suspension Unit, cushion, 490mm		V8	**A082V6185F**	2
08	Flexolator, backrest		V8	**A082V4782F**	**4**
09	Flexolator, cushion		V8	**A082V4783F**	**4**
10	Hook, suspension unit to frame		**V8**	**A082U6299F**	8
11	Tube Clip, trim to frame		V8	**B079W6120F**	**110**
12	Hogring	Not illustrated	**V8**	**A075W6076F**	**80**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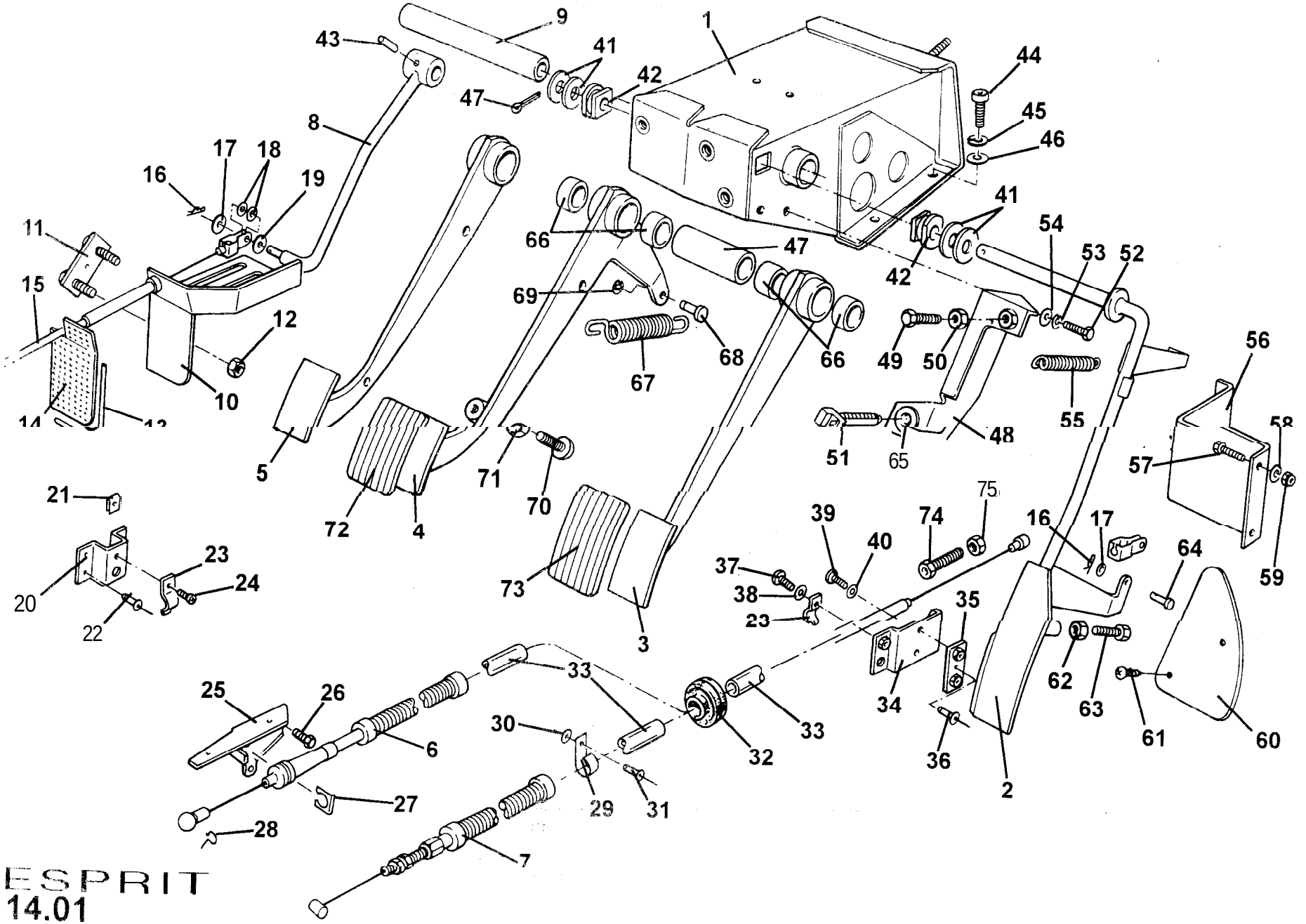
Function Code 13.27 Seat Belts

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Seat Belt Assembly		Europe/Australia	C082V7972F	2
01a	Seat Belt Assembly		USA, driver	B085V7166F	2
01b	Seat Belt Assembly		USA, passenger	A082V6222F	2
02	Bolt, 7/18 UNF x 3.25"			B079W201 8F	2
03	Bulkhead Finisher, seatbelt through bulkhead	Also see 15.11a		B075V06012K	2
04	Plastic Fastener, finisher fix.	Also see 15.11a		A075W6041 Z:	2
05	Foam Set, sound insulation, reel cover			A083V6104V	2
06	Reel Cover, engine bay			A082U474OK	2
07	Screw, No.6 x l/2", cover fix.			A075W5015Z	8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ESPRIT
14.01

Service Parts List

Function Code 14.01 Pedal Box, Pedals, Throttle Cable

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Pedal Box		V8, '98 MY, V8GT, Sport 350	B082J4355F	1
Ola	Pedal Box		V8, prior '98 MY, GT3	C082J4315F	1
02	Throttle Pedal, LHD			A082J4304F	1
02a	Throttle Pedal, RHD			B082J4303F	1
03	Brake Pedal			A0825441 0	1
04	Clutch Pedal		V8, V8GT, Sport 350	A082J4050F ,	1
05	Clutch Pedal		GT3	B082J4316F	1
06	Throttle Cable		V8, V8GT, Sport 350	A082J4398F	1
07	Throttle Cable, LHD		GT3	C082541 61 F	1
08	Lever Arm, throttle linkage			B082J4190F	1
09	Shaft, brake & clutch pedal pivot			B079J4003F	1
10	Footrest, RHD			A082U7795F	1
11	Studplate, footrest to tunnel			A082U7435F	1
12	Nyloc Nut, M8			A075W3010Z	2
13	Rubber Edging, footrest			AO85U608OV	As req.
14	Footrest Pad, rubber, RHD			A082U7795F	1
14a	Footrest Pad, drilled alloy		sport 350	P691.1401.010AK	1
15	Throttle Cable, RHD		GT3	A082J4309F	1

Function Code 14.01 Pedal Box, Pedals, Throttle Cable

Dep	Part Description	Remarks	Option	Part Number	Qty
16	'R' Clip, cable clevis retention			A075W6175F	1
17	Washer, cable clevis to lever			A075W4000Z	1
18	Wavy Washer, cable clevis to lever			A075W4087Z	2
19	Nylon Washer, anti-rattle			A089W4104F	1
20	Clamp Bracket, outer cable to tunnel			B082J4165F	1
21	Spire Nut, No. 6			A075W6014Z	1
22	Pop Rivet, clamp bracket to tunnel			A075W6071 F	4
23	Clamp, outer cable to tunnel bracket			A082P4244F	1
24	Screw, No. 6 x I/2"			A075W5014F	1
25	Abutment Bracket, cable to throttle body		V8, V8GT, Sport 350	A91 8E0227F	1
26	Setscrew, M6 x 12, hex. hd., brkt. to throttle body		V8, V8GT, Sport 350	A075W1027Z	2
27	'C' Clip Throttle Cable, cable abutment		V8, V8GT, Sport 350	A089J6017F	1
28	Spring Clip Throttle Cable, ball joint to lever		V8, V8GT, Sport 350	A082J6171 F	1
29	'P' Clip, cable to engine bay			A075W6228F	2
30	Washer, 'P' clip fixing			A075W4000Z	2
31	Pop Rivet, 'P' clip fixing			A075W6068F	2
32	Grommet, cable through bulkhead			A036861822	1
33	Conduit, throttle cable			A082L4244F	2.15M
34	Abutment Bracket, throttle cable front			A082J4230F	1
35	Nut Plate, bracket to tunnel			A082J4231 F	1
36	Pop Rivet, waterproof, nut plate fixing			A075W6071Z	1

Function Code 14.01 Pedal Box, Pedals, Throttle Cable

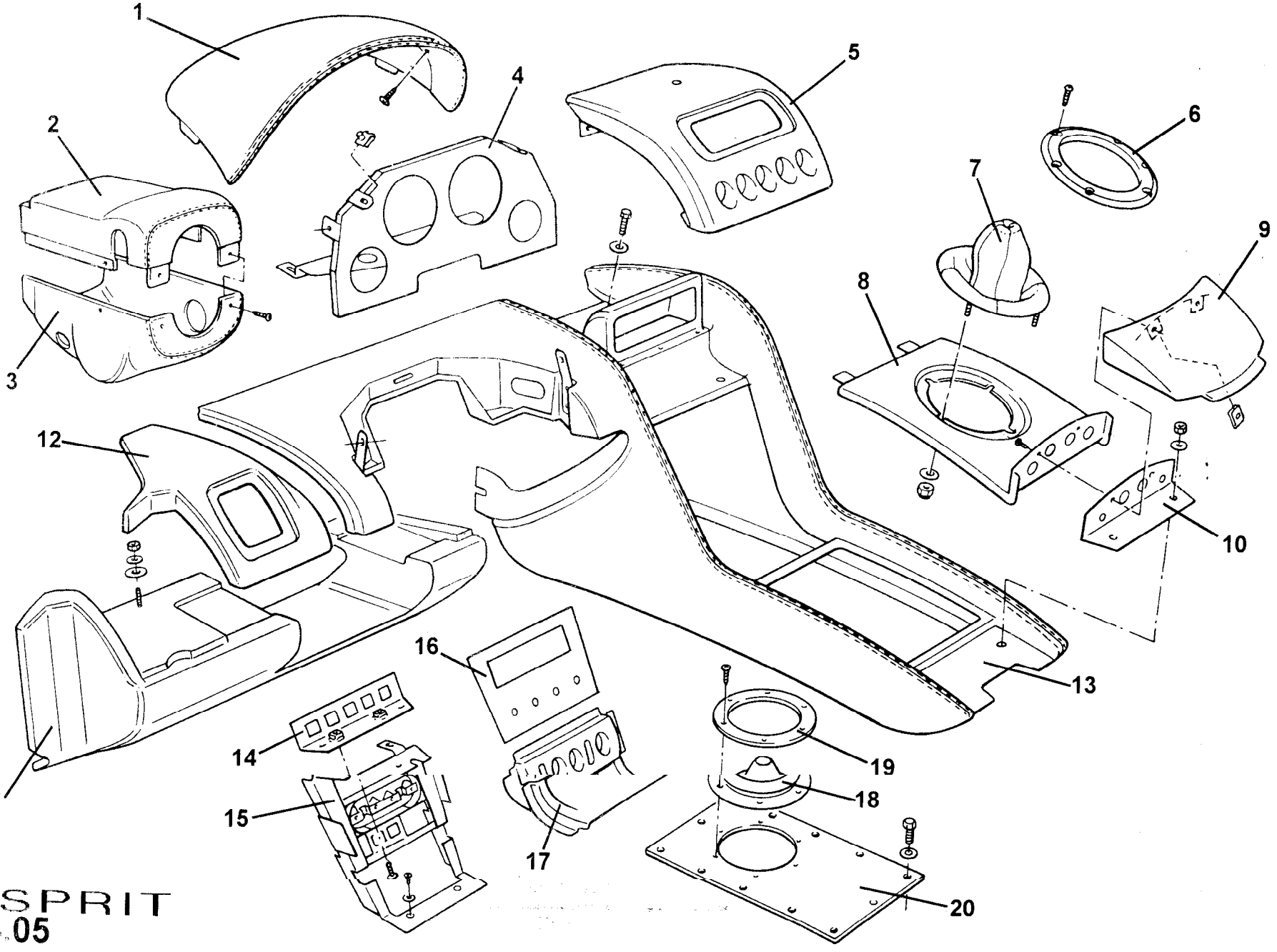
Dep	Part Description	Remarks	Option	Part Number	Qty
37	Setscrew, M5 x 10, pan hd. pozi			A082W5097F	1
38	Washer, shakeproof, M5			A075W4045Z	1
39	Setscrew, M5 x 16, pan hd. pozi.			A082W5107F	2
40	Washer, shakeproof, M5			A075W4045Z	2
41	Washer, fiat, throttle pedal pivot			A075W4005Z	4
42	Bush, throttle pedal pivot			A075J6005Z	2
43	Spirol Pin. M5 x 30, lever arm to pedal shaft			A082W6235F	1
44	Setscrew, M8 **x 20,** cap hd., **pedal** box to chassis			A111W7141F	4
45	Washer, spring, M8			A075W4048Z	4
46	Washer, flat, M8 x 16			A075W4020Z	4
47	Spacer, clutch/brake pedal pivots			A079J4005F	1
48	Bracket, throtlle downstop/brake light switch mtg.			A082J4348F	1
49	Bolt, M8, hex. hd., throttle upstop			A075W1040Z	1
50	Locknut, M8, throttle upstop			A075W3026Z	1
51	Brake Light Switch			A089M6019F	1
52	Setscrew, M6 x 18, bracket fix.			A075W1029Z	2
53	Washer, spring M6			A075W4035Z	2
54	Washer, flat, M6 x 12			A075W4013Z	2
55	Spring, throttle pedal return			A075J6029Z	1
56	Abutment Bracket, throttle downstop, LHD			A082J4317F	1
57	Setscrew, M6 x 16 hex. hd.			A075W1028Z	4

Function Code 14.01 Pedal Box, Pedals, Throttle Cable

Dep	Part Description	Remarks	Option	Part Number	Qty
58	Washer, flat, M6 x 25			A075W4017Z	4
59	Nyloc Nut, M6			A075W3009Z	4
60	Pad, throttle pedal downstop, RHD			A082V7807K	1
61	Screw, No.8 x 3/8, pan hd. pozi.			A075W5032Z	1
62	Nut, M8, downstop locking			A075W3072F	1
63	Bolt, M8 x 45, throttle downstop, RHD			A075W1043F	1
63a	Bolt, M8 x 50, throttle downstop, LHD			A079W1044F	1
64	Clevis Pin			A075W6030Z	1
65	Bush, brake light switch to bracket			A089M6020F	1
66	Bush, pedal pivots			A079J6025F	4
67	Spring, clutch pedal return			A0832J6075F	1
68	Pin, spring retention			A082Q0722F	1
69	Retaining Clip, pin to pedal			A082Q0723F	1
70	Setscrew, Ml0 x 45, button hd.. blk., clutch downstop			A082W7057F	1
71	Locknut, M10, clutch downstop			A075W3024Z	1
72	Pedal Pad, rubber, clutch			A079J6001F	1
72a	Pedal pad, drilled alloy, clutch		sport 350	P691 .1401.008AK	1
73	Pedal Pad, rubber, brake			A079J6001F	1
73a	Pedal Pad, drilled alloy. brake		sport 350	P691.1401.009AK	1
74	Adjuster Screw, throttle cable front abutment			A082J4229F	1
75	Locknut, adjuster screw			A075W607lZ	1

Function Code 14.01 Pedal Box, Pedals, Throttle Cable

Dep	Part Description	Remarks	Option	Part Number	Qty
7 6	Tie Wrap, throttle cable to breather pipe	Not illustrated	V8, V8GT, Sport 350	**A075W6038Z**	1



ESPRIT
14.05

Function Code 14.05 Fascia Structure & Supporting Hardware, '98 MY

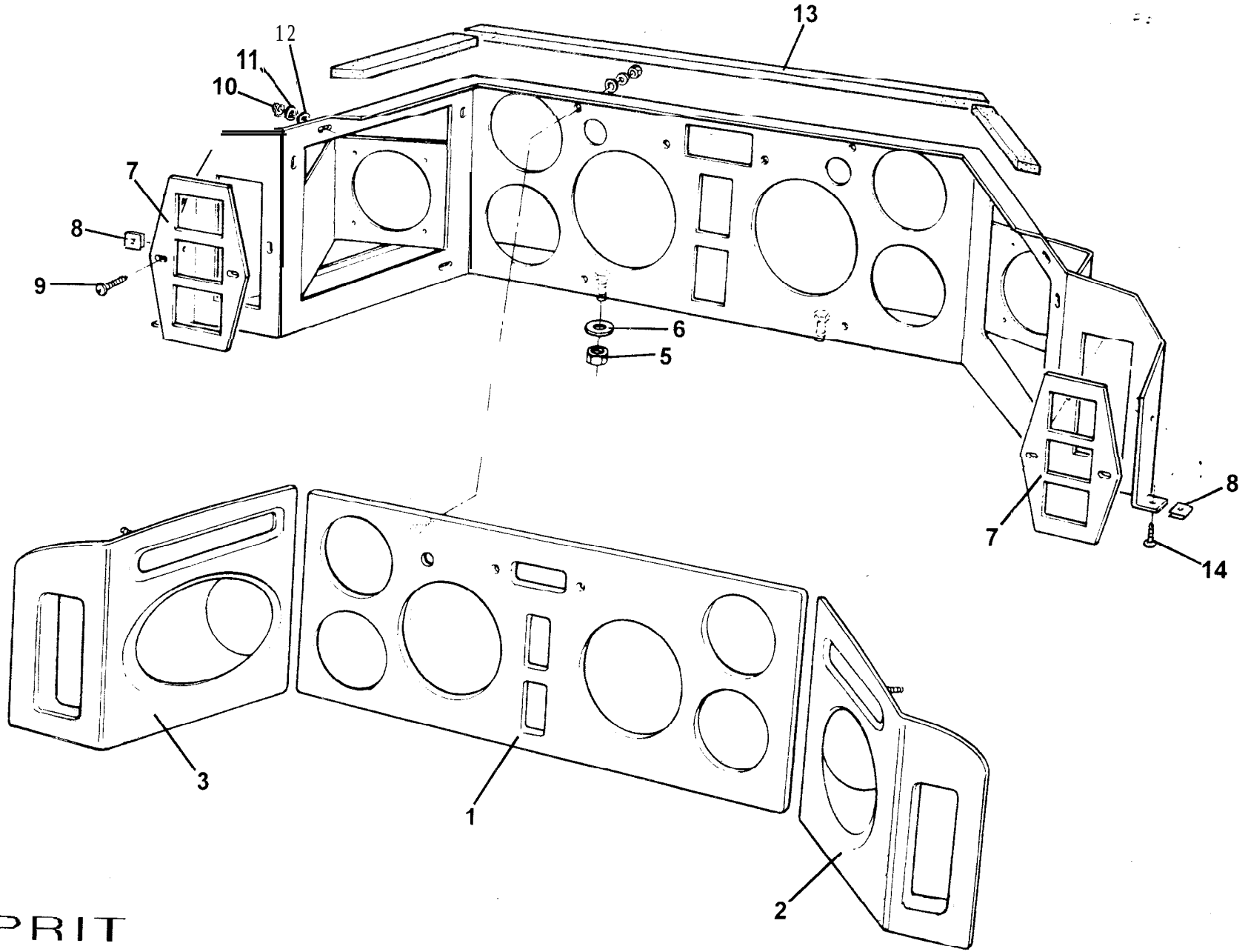
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Instrument Cowl		Vinyl	B082V8966J	1
Ola	Instrument Cowl		Leather	A082V8966J	1
Olb	instrument Cowl, carbon fibre		sport 350	A082V9045J	1
02	Steering Column Shroud, upper		Vinyl, Non SIR	B082V8959J	1
02a	Steering Column Shroud, upper		Leather, Non SIR	A082V8959J	1
02b	Steering Column Shroud, upper		Vinyl, SIR	B082V8960J --	1
02c	Steering Column Shroud, upper		Leather, SIR	A082V8960J	1
03	Steering Column Shroud, lower		Vinyl, GT3, V8 GT	B082V8962J	1
03a	Steering Column Shroud, lower		Leather, V8, Sport 350	A082V8962J	1
04	Instrument 'Panel			C082N4069F	1
05	Upper Console Switch Panel Trim, senotex finish			B082V8873K	1
05a	Upper Console Switch Panel Trim, carbon fibre		sport 350	A082V9050F	1
06	Gear Lever Gaiter Finisher Ring, polished alloy		GT3/V8GT	A082F4199F	1
06a	Gear Lever Gaiter Finisher Ring, anodised alloy		Sport 350/'99 MY USA	A082F4204F	1
07	Gear Lever Gaiter		Vinyl, GT3/V8GT	B082V9043J	1
07a	Gear Lever Gaiter		Leather, V8	A082V7586J	1
08	Gear Lever Tray/ Switch Panel Trim, senotex finish		V8	A082V8998K	1
08a	Gear Lever Tray/Switch Panel Trim, primer finish	For finisher ring item 6	GT3/V8GT	A082V9000K	1

Function Code 44.05 Fascia Structure & Supporting Hardware: '98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
08b	Gear !-ever Tray/ Switch Panel Trim, senotex finish	For finisher ring item 6a	V8, '99 MY USA	A082V9060K	
08c	Gear Lever Tray/Switch Panel Trim, carbon fibre		Sport 350	A082V9047F	1
3 9	Tunnel Switch Panel Cover		Vinyl	B082V8973J	1
09a	Tunnel Switch Panel Cover		Leather	A082V8973J	1
10	Tunnel Switch Panel/ Bracket			A082U7873F	1
11	Knee Bolster, driver, LHD		Vinyl	B082V8956J	1
11a	Knee Bolster, driver, LHD		Leather	AO82V8956J	1
11 b	Knee Bolster, driver, RHD		Vinyl	**B082V8958J**	1
11c	Knee Bolster, driver, RHD		Leather	**A082V8958J**	1
12	Fascia End Panel/Vent Hsg., driver's, LHD		Vinyl	**B082V8972J**	1
12a	Fascia End Panel/Vent Hsg., driver's, LHD		Leather	**A082V8972J**	1
12b	Fascia End Panel/Vent Hsg., RHD		Vinyl	**B082V8971 J**	a
12c	Fascia End Panel/Vent Hsg., RHD		Leather	A082V8971 J	1
13	Driver Fascia & Centre Console, LHD		Vinyl	**B082V8965J**	1
13a	Driver Fascia & Centre Console, LHD		Leather	**A062V8965J**	1
13b	Driver Fascia & Centre Console, RHD		Vinyl	**B082V8964J**	1
13c	Driver Fascia & Centre Console, RHD		Leather	**A082V6964J**	1
14	Upper Switch Panel/Bracket	Five switch apertures		**A082U7872F**	1
14a	Upper Switch Panel/Bracket	Six switch apertures	sport 350	**A082U7958**	
15	Lower Switch/Radio Mounting Frame, LHD			**A082U7865F**	1
15a	Lower Switch/Radio Mounting Frame, RHD			**A082U7866F**	

Function Code 14.05 Fascia Structure & Supporting Hardware, '98 MY

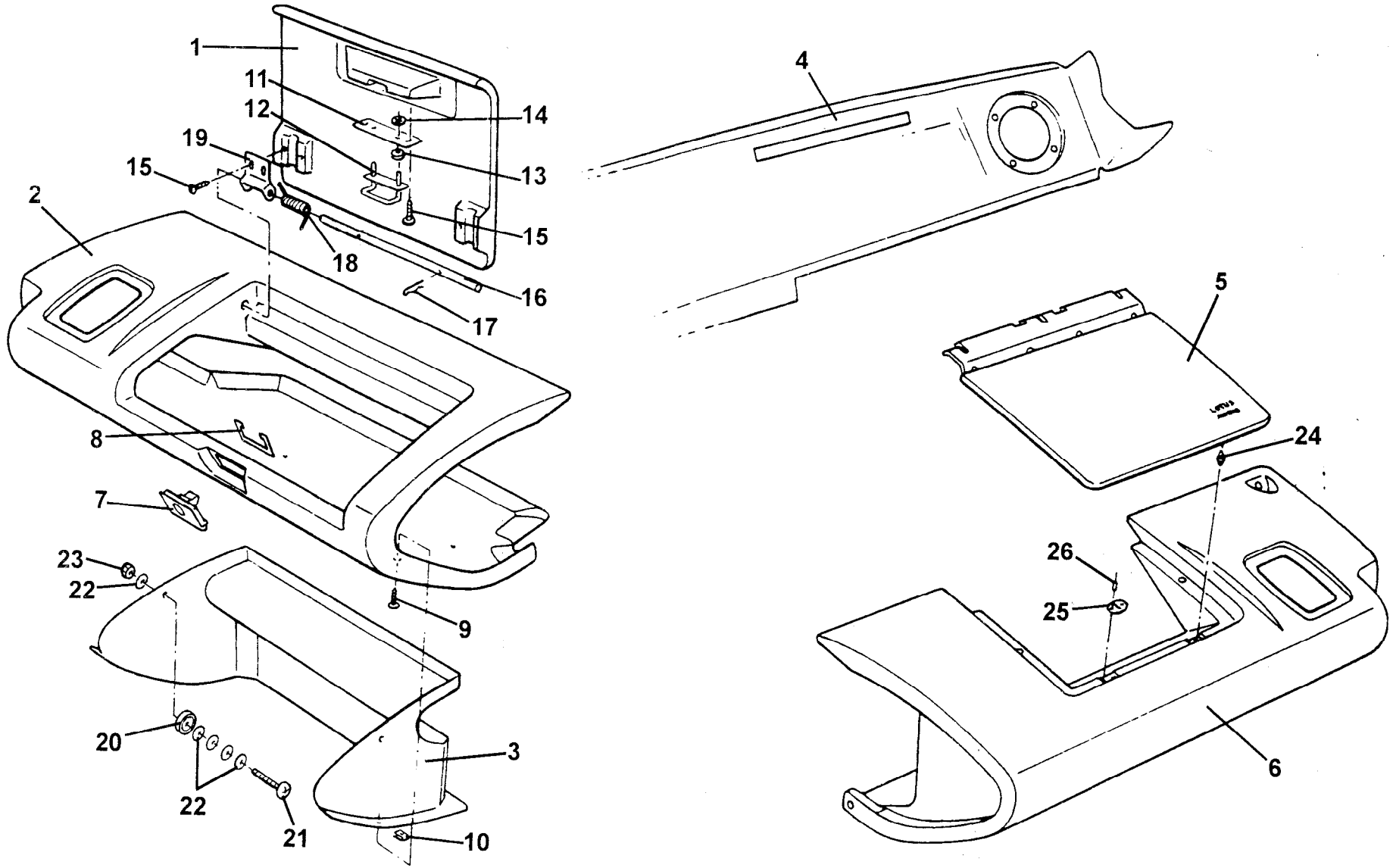
Dep	Part Description	Remarks	Option	Part Number	Qty
16	AC Control Panel			A082P4445F	1
16a	Heater Control Panel			A082P4446F	1
16b	Graphics Mask, AC controls			D082P4443F	1
16c	Graphics Mask, heater controls			D082P4444F	1
17	Lower Console Switch Panel Trim, senotex finish, LHD			A082V8891 J	1
17a	Lower Console Switch Panel Trim, senotex finish, RHD			A082V8890J	1
17b	Lower Console Switch Panel Trim, carbon fibre, LHD		sport 350	AO82V9051 F	1
17c	Lower Console Switch Panel Trim, carbon fibre, RHD		Sport 350	A082V905OF	1
18	Gear Lever Gaiter, rubber	Also see 47.05		B082F4114P	1
19	Gaiter Retaining Ring	Also see 47.05		A082F4116F	1
20	Cover Plate, gearchange mechanism	Also see 47.05		A082F411 5F	1



ESPRIT
14.07

Function Code 14.07 Fascia Instrument Panel, Masks & Switch Panels

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Instrument Mask walnut finish, centre section		V8, prior to '98 MY	A082U7706F	1
01a	Instrument Mask, senotex finish, centre section		GT3, prior to '96 MY	P691.1407.002AP	1
02	Instrument Mask, walnut finish, side section RH		V8, prior to '98 MY	A082U7704F	1
02a	Instrument Mask, senotex finish, side section LH		GT3, prior to '96 MY	P691.1407.003AP	1
03	Instrument Mask, walnut finish, side section LH		V8, prior to '98 MY	A082U7705F	1
03a	Instrument Mask, senotex finish, side section LH		GT3, prior to '96 MY	P691.1407.004AP	1
04	Instrument Panel		Prior to '96 MY	P691.1407.009AC	1
05	Nyloc Nut, M6, instrument panel to scuttle			A075W3009Z	2
06	Washer, flat, M6 x 20			A075W4016Z	2
07	Plate, switch mounting			B082U5918F --	2
08	Spire Nut, no. 6			A075W6014Z	6
09	Screw, no, 6 x ½", st. pozi.			A075W5012F	4
10	Nut, M4, mask to instrument panel			A075W3019F	10
11	Washer, spring, M4			A075W4086F	10
12	Washer, flat, M4			A075W4000Z	10
13	Foam, self adhesive, panel top	Cut to size		A082U6065V	As req.
14	Screw, no.6 x 1", st. pozi.			A082W5022F	2



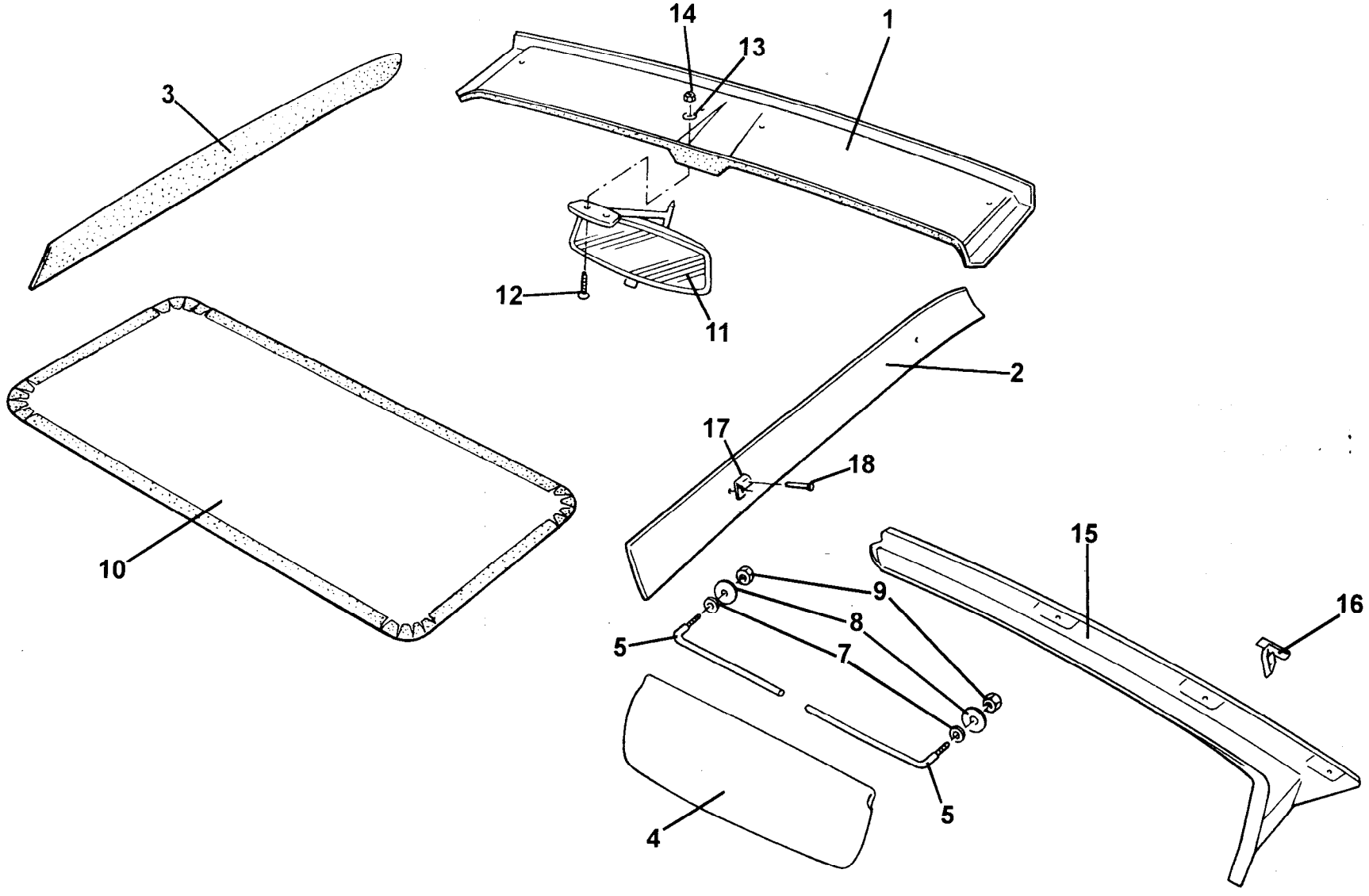
ESPRIT
14.12

Function Code 14.12 Passenger Fascia, SIR/Glovebox, '9% MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Glovebox Lid, RHD		Vinyl, Non SIR	B082V8938J	1
Ola	Glovebox Lid, RHD	Specify colourisuppiy sample	Leather, Non SIR	A082V8938J	1
02	Fascia Panel, passenger, glove box, RHD		Vinyl, Non SIR	B082V8922K	1
62a	Fascia Panel, passenger, glove box, RHD	Specify colour/supply sample	Leather, Non SIR	A082V8922K	1
03	Glovebox Inner Panel, RHD		Non SIR	A082V8901 K	1
04	Screen Landing		Vinyl	B082V8560K	1
04a	Screen Landing		Leather	A082V8560K	1
05	Passenger SIR Lid, LHD	Includes item 16	Vinyl, Non/Dual SIR	BO82V6382J	1
05a	Passenger SIR Lid, LHD	Includes item 16	Leather, Non/Dual SIR	A082V6382J	1
06	Fascia Panel/Knee Bolster, passenger SIR, LHD		Vinyl, Non/Dual SIR	B082V8955J	1
06a	Fascia Panel/Knee Bolster, passenger SIR, LHD	Specify colour/supply sample	Leather, Non/Dual SIR	A082V8955J	1
07	Latch Assembly, with keys	For car lock set see 10.17	RHD, Non SIR	B100V6004F	1
08	Retaining Clip, latch assy.		RHD, Non SIR	AI 00V6005F	1
09	Screw, No.8 x 3/4", flg. hd. pozi.		RHD,Non SIR	A075W5074Z	7
10	Spire Nut, No.8, inner panel fix.		RHD, Non SIR	A075W6016Z	5
11	Keeper Plate		RHD, Non SIR	A082V8933F	1
12	Latch Ring		RHD, Non SIR	A082V8936F	1
13	Grommet, 4mm I/D		RHD, Non SIR	A082V6249F	2

Function Code 14.12 Passenger Fascia, SIR/Glovebox, '98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
14	Starlock Fastener. latch ring fix.		RHD, Non SIR	Al 11 P6025F	2
15	Screw, No.8 x 3/8", pan hd. pozi., bracket fix.		RHD, Non SIR	**A075W50312**	**4**
16	Hinge Pivot Pin		RHD, Non SIR	A082V7944F	1
17	'R' Clip, 3/16, pivot pin fix.		RHD, Non SIR	**A082W6348F**	2
18	Hairpin Spring, glovebox hinge, LH		RHD, Non SIR	**A082V6251 F**	1
18a	Hairpin Spring, glovebox hinge, RH		RHD, Non SIR	**A082V6250F**	1
19	Hinge Pivot Bracket		RHD, Non SIR	**A082V8937F**	2
20	Downstop, glovebox lid		RHD, Non SIR	**A082M6468F**	2
21	Screw, M6 x 20, button hd.		RHD, Non SIR	**Al 00W7096F**	2
22	Washer, flat, M6 x 12 x 1.5		RHD, Non SIR	**B1 00W4127F**	**1 0**
23	Nyloc Nut, M6, thin		RHD, Non SIR	**A907E6285F**	2
24	Clip, 'snap off' SIR lid fix.	Supplied with lid	LHD, Non/Dual SIR	**A082U6304F**	2
25	Plate, clip retaining		LHD, Non/Dual SIR	**A082U7649K**	2
26	Pop Rivet, plate fix.		LHD, Non/Dual SIR	**A075W6091Z**	4



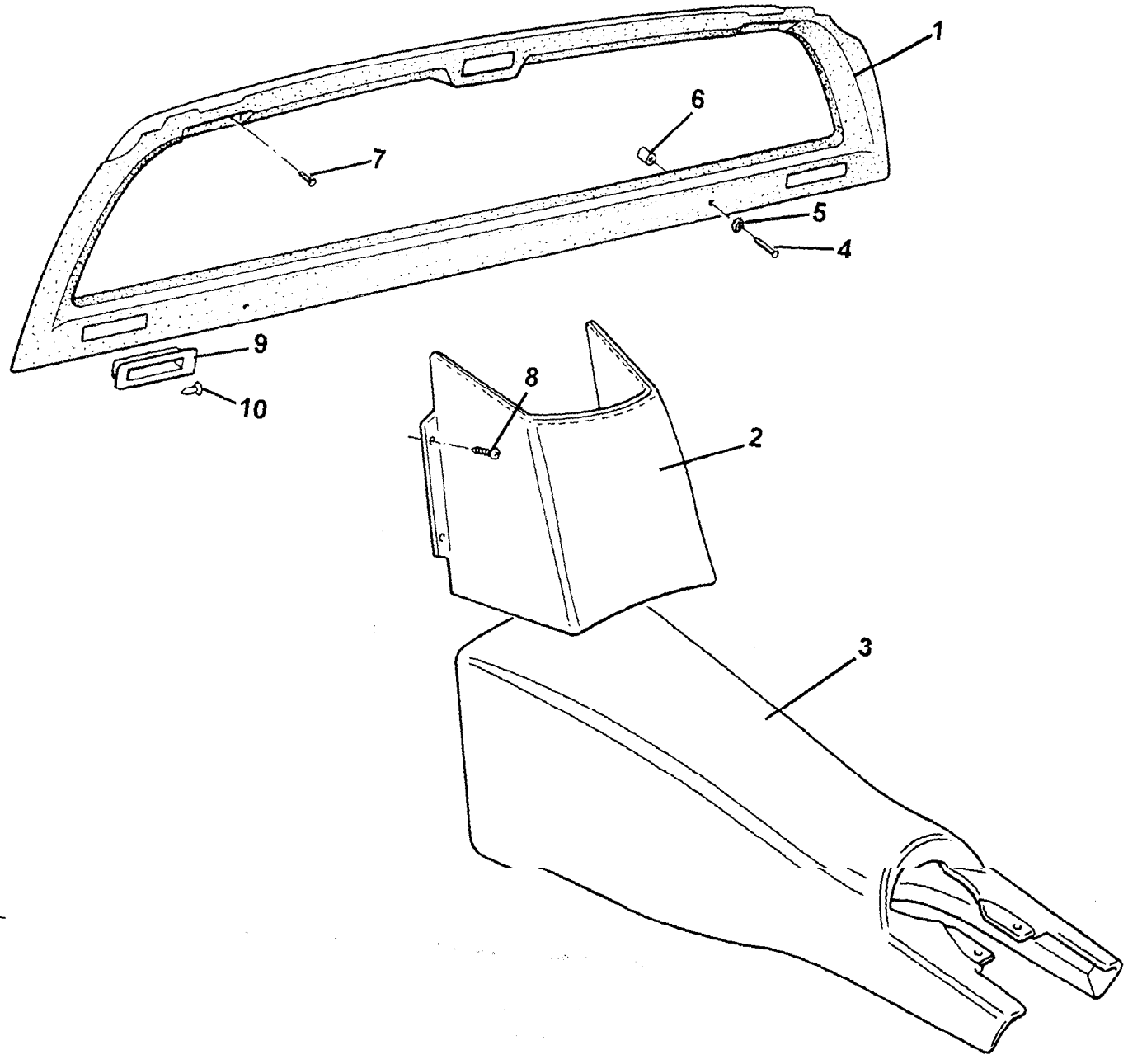
ESPRIT
15.01

Function Code 15.01 Roof Trim, Header Rail, Cant Rails, Sun Visors, '98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Header Rail, trimmed		Alcantara, black	C082V8976J	1
Ola	Header Rail, trimmed		Kestral	B082V8976J	1
01 b	Header Rail, trimmed	Specify colour/supply sample	Leather	A082V8976J	1
02	Cant Rail, trimmed, RH		Alcantara, black	C082V8979J	1
02a	Cant Rail, trimmed, RH		Kestral	B082V8979J	1
02b	Cant Rail, trimmed, RH	Specify colour/supply sample	Leather	A082V8979J	1
03	Cant Rail, trimmed, LH		Alcantara, black	C082V8985J	1
03a	Cant Rail, trimmed, LH		Kestral	**B082V8985J**	1
03b	Cant Rail, trimmed, LH	Specify colour/supply sample	Leather	A082V8985J	1
04	Sun Visor			A082V8940J	2
05	Mounting Rod, sun visor			A079V4361 F	4
07	Washer, flat, M6 x 15			A075W4015Z	8
08	Washer, flat, M6 x 17			A075W4017Z	8
09	Nyloc Nut, M6			A075W3009Z	8
10	Roof Trim, composite roof			A082V7696J	1
11	Interior Mirror			A079U6044F - -	1
12	Screw, M4, csk. pozi.			Al 00W5160F	2
13	Washer, flat	1		A075W4011 F	2

Function Code 15.01 Roof Trim, Header Rail, Cant Rails, Sun Visors, '98 MY

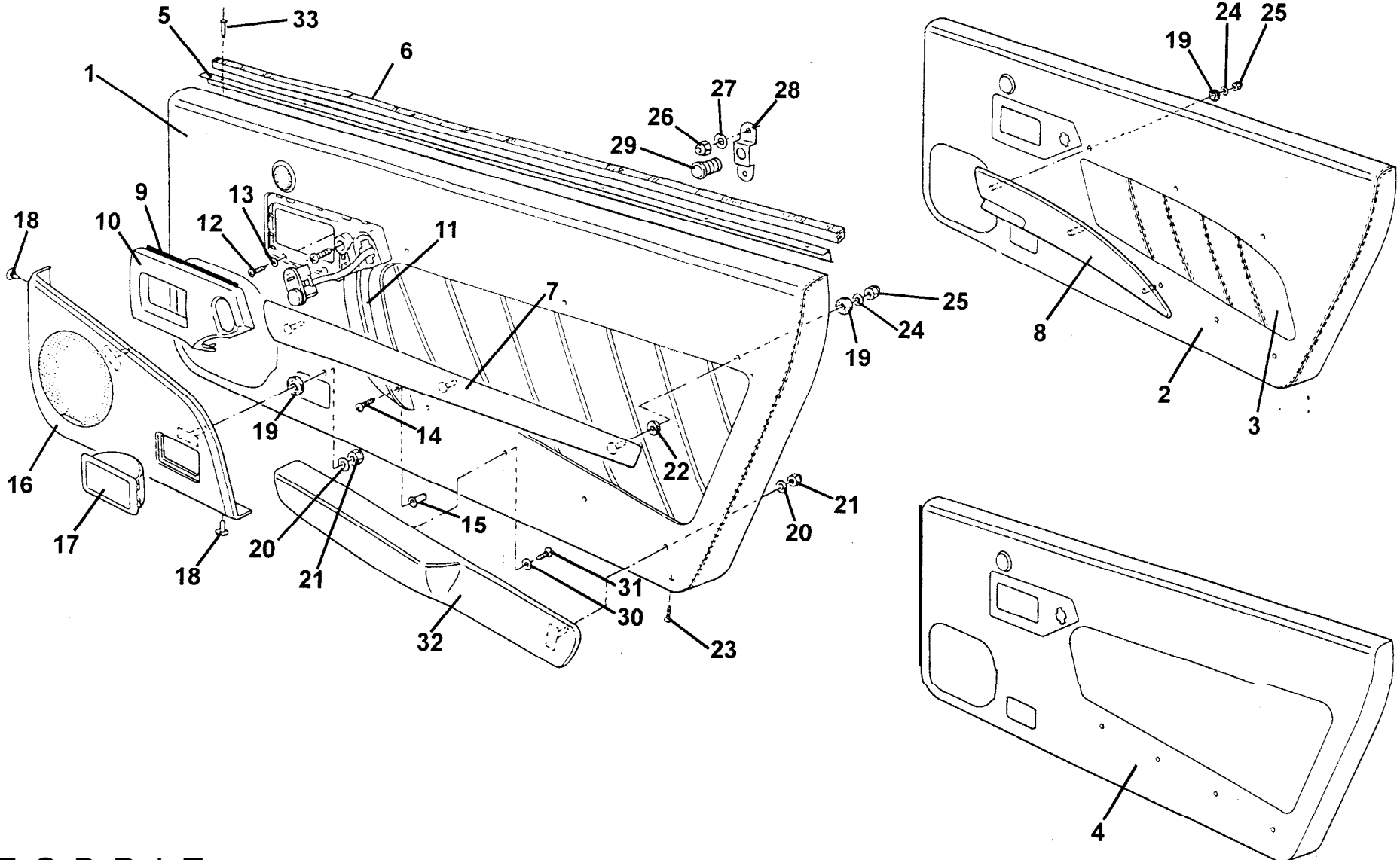
Dep	Part Description	Remarks	Option	Part Number	Qty
14	Nyloc Nut, M4			A075W3094F	2
15	'A' Post Trim, RH, LHD		Vynil	**B082V8969J**	1
15a	'A' Post Trim, RH, LHD	Specify colour/supply sample	Leather	**A082V8969J**	1
15a	'A' Post Trim, RH, RHD		Vynil	**B082V6970J**	1
15b	'A' Post Trim, RH, RHD	Specify colour/supply sample	Leather	**A082V6970J**	1
15c	'A' Post Trim, LH, LHD		Vynil	**B082V8967J**	1
15d	'A' Post Trim, LH, LHD	Specify colour/supply sample	Leather	**A082V8967J**	1
15e	'A' Post Trim, LH. RHD		Vynil	**B082V8968J**	1
15f	'A' Post Trim, LH, RHD	Specify colour/supply sample	Leather	**A082V8968J**	1
16	Retaining Clip, 'A; post fixing			**A075W6062Z**	6
17	Bracket, cant rail fix.			**C079U4749K**	4
18	Screw, No.6 x l/2", pozi.			**A075W5108F**	4



ESPRIT
15.11a

Function Code 15.11a Rear Bulkhead, Tunnel Top, Stowage Pocket, '98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Rear Bulkhead Window Surround, trimmed		Alcantara, black	C082V8978J	1
Ola	Rear Bulkhead Window Surround, trimmed		Kestral	B082V8978J	1
01 b	Rear Bulkhead Window Surround, trimmed	Specify colour/supply sample	Leather	A082V8978J	1
02	Rear Bulkhead Stowage Pocket		Vinyl	B082V8975J	1
02a	Rear Bulkhead Stowage Pocket	Specify colour/supply sample	Leather	A082V8975J	1
03	Tunnel Top Trim		Vinyl	B082V8974J	1
03a	Tunnel Top Trim	Specify colour/supply sample	Leather	A082V8974J	1
04	Screw, no.6 x 1.5", csk. pozi., surround fix.			A085W55108F	2
05	Upholstery Washer, plastic			A082W6482F	2
06	Spacer, nylon			A082U6162F	2
07	Screw, no.6 x 1 ", csk. pozi., pocket fix.			A075W5030Z	4
09	Screw, no.6 x 0.75", csk. pozi., handle recess			A075W5028Z	4
	Bulkhead Finisher, seatbelt though bulkhead	Also see 13.27		B075VO612K	2
10	Plastic Fastener, finisher fix.	Also see 13.27		A075W6041Z	4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Service Parts List

Function Code 15.13 Front Door Trims

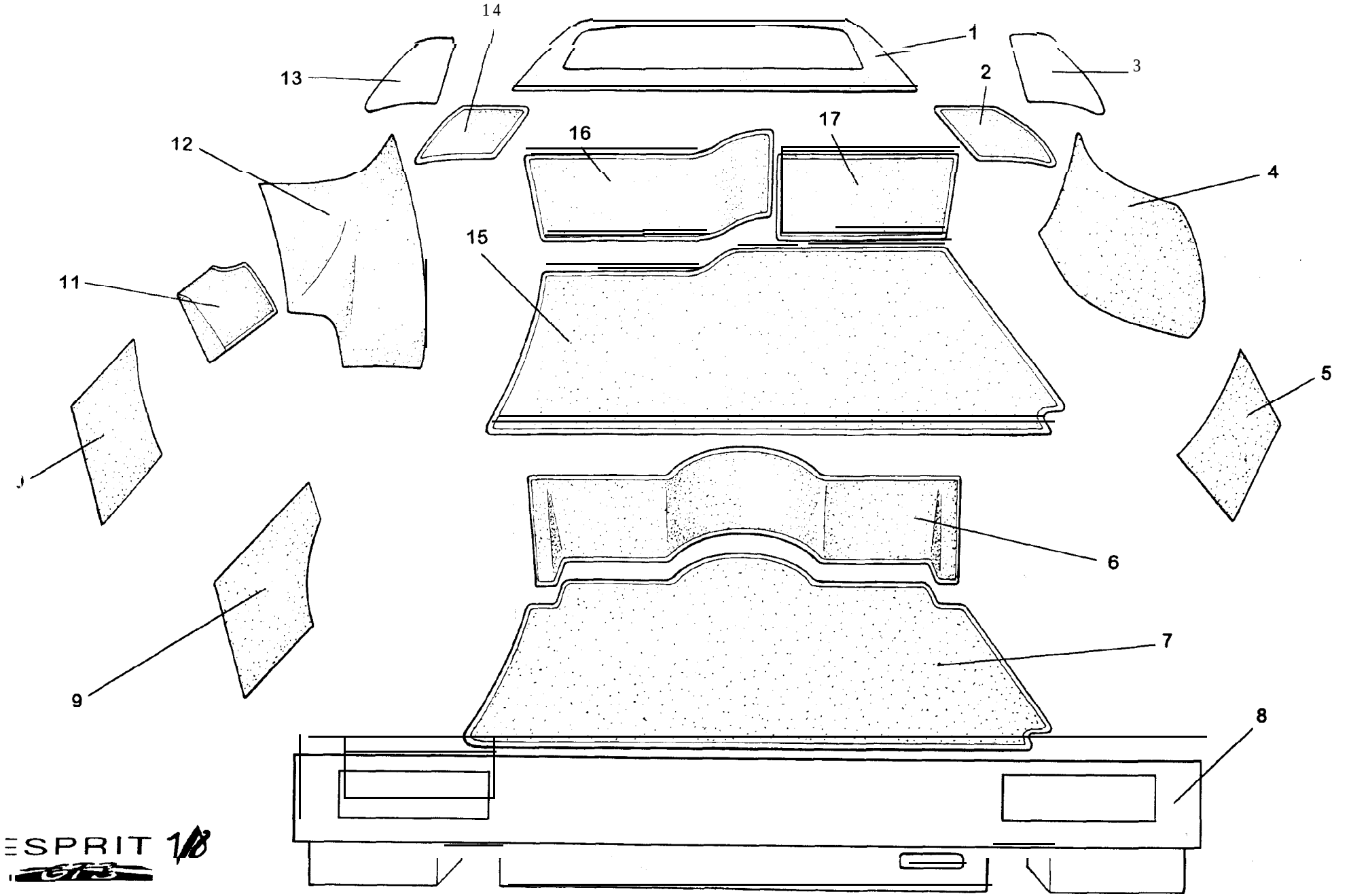
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Door Trim Panel, leather, RH	State colour, fits long finisher item 7/7b	V8, prior Jan. '98	**A082V8730J**	1
01a	Door Trim Panel, leather; LH	State colour, fits long finisher item 7a/7c	va, prior Jan. '98	**A082V8729J**	1
02	Door Trim Panel, leather, RH	State colour, fits short finisher item a	Va, Jan. '98 on	**A082V8732J**	1
02a	Door Trim Panel, leather, LH	State colour, fits short finisher item 8a	V8, Jan. '98 on	**A082V8731 J**	1
02b	Door Trim Panel, vinyl, RH	Fits short finisher item 8b (GT3 no finisher)	V8 GT, GT3, Jan. '98 on	**B082V8732J**	1
02c	Door Trim Panel, vinyl, LH	Fits short finisher item 8c (GT3 no finisher)	V8 GT, GT3, Jan. '98 on	B082V8731 J	1
03	Door Trim Insert, leather, RH		V8, Jan. '98 on	**A082V8816J**	1
03a	Door Trim Insert, leather, LH		V8, Jan. '98 on	**A082V8815J**	1
03b	Door Trim Insert, kestral, RH		V8 GT, GT3, Jan. '98 on	B082V8816J	1
03c	Door Trim Insert, kestral, LH		V8 GT, GT3, Jan. '98 on	**B082V8815J**	1
03d	Door Trim Insert, alcantara, blue, RH		sport 350	C082V8816J	1
03e	Door Trim Insert, alcantara, blue, LH		sport 350	C082V8815J	1
04	Door Trim Panel, vinyl/kestral, RH		GT3, prior Jan. '98	**B082V8730J**	1
04a	Door Trim Panel, vinyl/kestral, LH		GT3, prior Jan. '98	**B082V8729J**	1
05	Carrier, door trim panel seal			**A082V2897F**	2

Function Code 15.13 Front Door Trims

Dep	Part Description	Remarks	Option	Part Number	Qty
06	Brush Seal, trim panel to door glass	1 m per door		**B089V6166V**	2 m
07	Door Trim finisher, burr walnut, RH		V8, prior '98 MY	**A082U7740F**	1
07a	Door Trim finisher, burr walnut, LH		V8, prior '98 MY	**A082U7741 F**	1
07b	Door Trim Finisher, senotex, RH		V8, '98 MY to Jan. '98	**A082U7966J**	1
07c	Door Trim Finisher, senotex, LH		V8, '98 MY to Jan. '98	**A082U7967J**	1
08	Door Trim Finisher, senotex, RH	Commonised with V8 GT	V8, Jan. '98 on	**A082U7924J**	1
08a	Door Trim Finsher, senotex, LH	Commonised with V8 GT	V8, Jan. '98 on	**A082U7923J**	1
08b	Door trim finisher, RH, body colour	Supplied in primer	V8 GT, Sport 350	**A082U7926J**	1
08c	Door trim finisher, LH, body colour	Supplied in primer	V8 GT, Sport 350	**A082U7925J**	1
09	Foam seal, handle to trim panel			**A082U6065V**	As req.
10	Cover, interior release handle, RH		RHD	**A082U6252F**	1
10a	Cover, interior release handle, LH		RHD	**A082U6251 F**	1
10b	Cover, interior release handle, RH		LHD	**A082U6250F**	1
10c	Cover, interior release handle, LH		LHD	**A082U6253F**	1
11	Handle, door interior grab, RH			**A082U6248F**	1
11a	Handle, door interior grab, LH			**A082U6249F**	1
12	Screw, M6 x 16			**A076W5090F**	2
13	Washer, spring, M6			**A075W5090F**	2
14	Screw, M6 x 25			A075W5089Z	2
15	Jacknut, M6			A075W5089Z	2
16	Kick Plate & Speaker Grille, RH			**A082V8946J**	1

Function Code 15.13 Front Door Trims

Dep	Part Description	Remarks	Option	Part Number	Qty
16a	Kick Plate & Speaker Grille, LH			A082V8945J	1
17	Ashtray			A082W6200F	2
18	Fastener, kickplate fixing			A082W651 5F	4
19	Washer, rubber, large			A036L6019Z	20
20	Washer, flat, M5 x 25 x 1.25, blk.			A082W4098F	10
21	Nyloc Nut, MS			A075W3008 Z	6
22	Washer, rubber, small			A082W4I 15F	8
23	Screw, M5 x 16, door trim panel fixing			A082W51 84F	4
24	Washer, flat, 3/16 x 3/4, zn.			A075W4009Z	10
25	Nyloc Nut, M5			A100W3113F	10
26	Nyloc Nut, M6			A075W3009Z	4
27	Washer, flat, M6 x 15			A075W401 5Z	4
28	Bracket, door panel buffer mounting			B082U7098F	2
29	Buffer, adjustable, door trim panel spacer			A082U6163F	2
30	Washer, flat, M4			A082W4099F	6
31	Screw, No 6 x ½", armrest to door trim panel			A075W5014Z	6
32	Armrest, trimmed, vinyl, RH		GT3, V8 GT	B082V8324J	1
32a	Armrest, trimmed, vinyl, LH		GT3, V8 GT	B082V8325J	1
32b	Armrest, trimmed, leather, RH		V8, Sport 350	A082V8324J	1
32c	Armrest, trimmed, leather, LH		V8, Sport 350	A082V8325J	1
33	Pop Rivet, seal carrier fixing			A075W6088Z	14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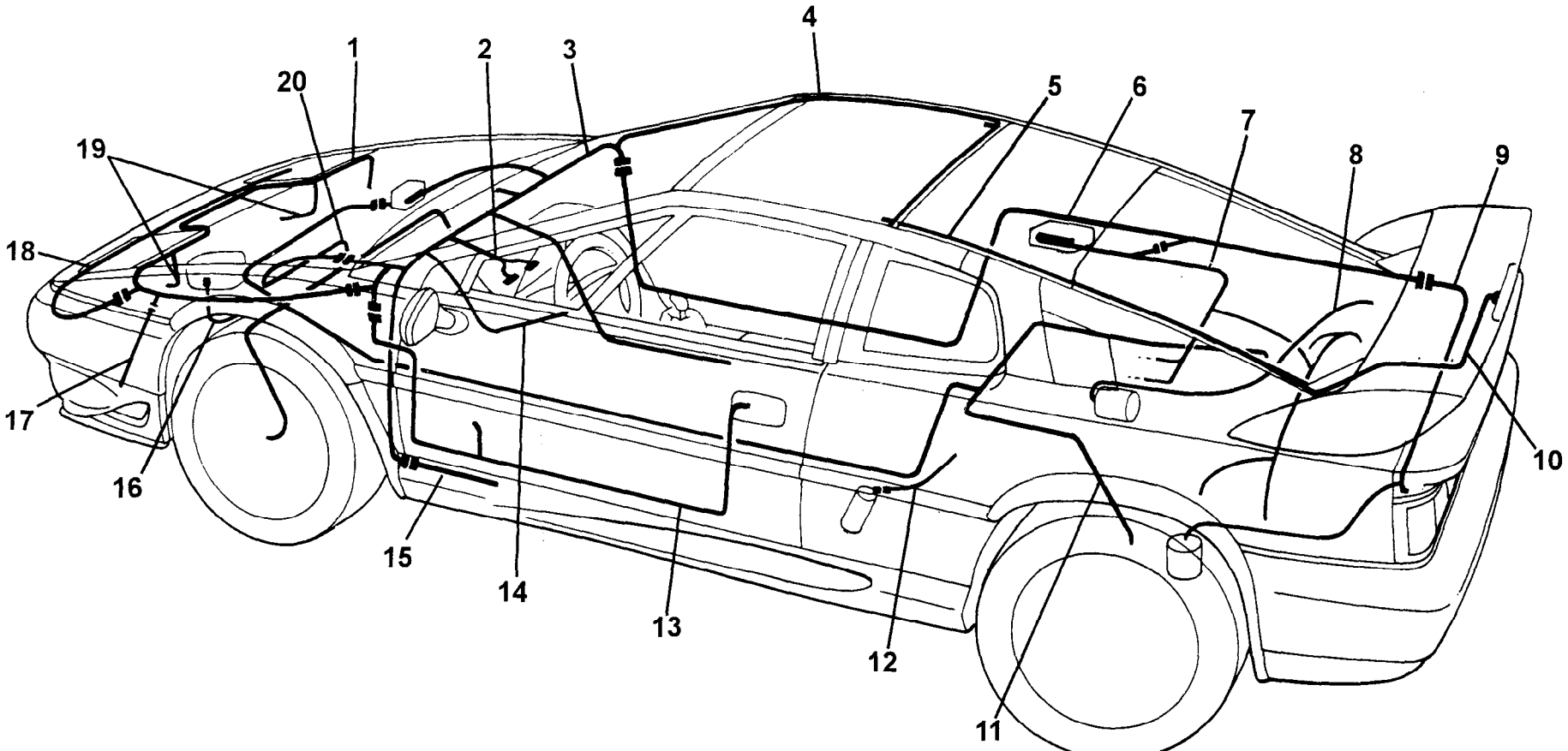
Function Code 15.24 Luggage Compartment Carpet

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Carpet, rear bulkhead		V8 + V8-GT+ GT3	A082V5892K	1
02	Carpet, trimmed rear quarter panel, flat piece, RH		V8 + V8-GT+ GT3	A082V9033S	1
03	Carpet, trimmed rear quarter panel, vertical, RH		V8 + V8-GT+ GT3	A082V9034S	1
04	Carpet, wheelarch, RH		V8 + V8-GT+ GT3	A082V7606K	1
05	Carpet, body side, RH		V8 + V8-GT+ GT3	A082V7604K	1
06	Carpet, rear bulkhead		V8 + V8-GT	A082V9035S	1
07	Carpet, Luggage compartment floor,		V8 + V8-GT	A082V9036S	1
08	Rear Transom Panel (Trimmed)	V8 shown (with cut outs)	V8 + V8-GT	A082V9037S	1
08A	Rear Transom Panel (Trimmed)		GT3	A082V7620J	1
09	Carpet, trimmed sidewall panel, LH		V8 + V8-GT	A082V9038S	1
10	Carpet, body side, LH		GT3	A082V7603K	1
11	Carpet, expansion bottle cover, (Trimmed)		GT3	A082V7623J	1
12	Carpet, wheelarch, LH		V8 + V8-GT+ GT3	A082V7605K	1
13	Carpet, trimmed rear quarter panel, upright piece, LH		V8 + V8-GT+ GT3	A082V9039S	1
14	Carpet, trimmed rear quarter panel, flat piece, LH		V8 + V8-GT+ GT3	A082V9040S	1
15	Carpet, luggage compartment floor		GT3	A082V9041 S	1
16	Carpet, Engine bay rear wall, (Trimmed)		GT3	A082V7617J	1
17	Carpet, removeable cover, (Trimmed)		GT3	A082V7618J	1



E S P R I T
17.01

Function Code 17.01 Harnesses, Leads

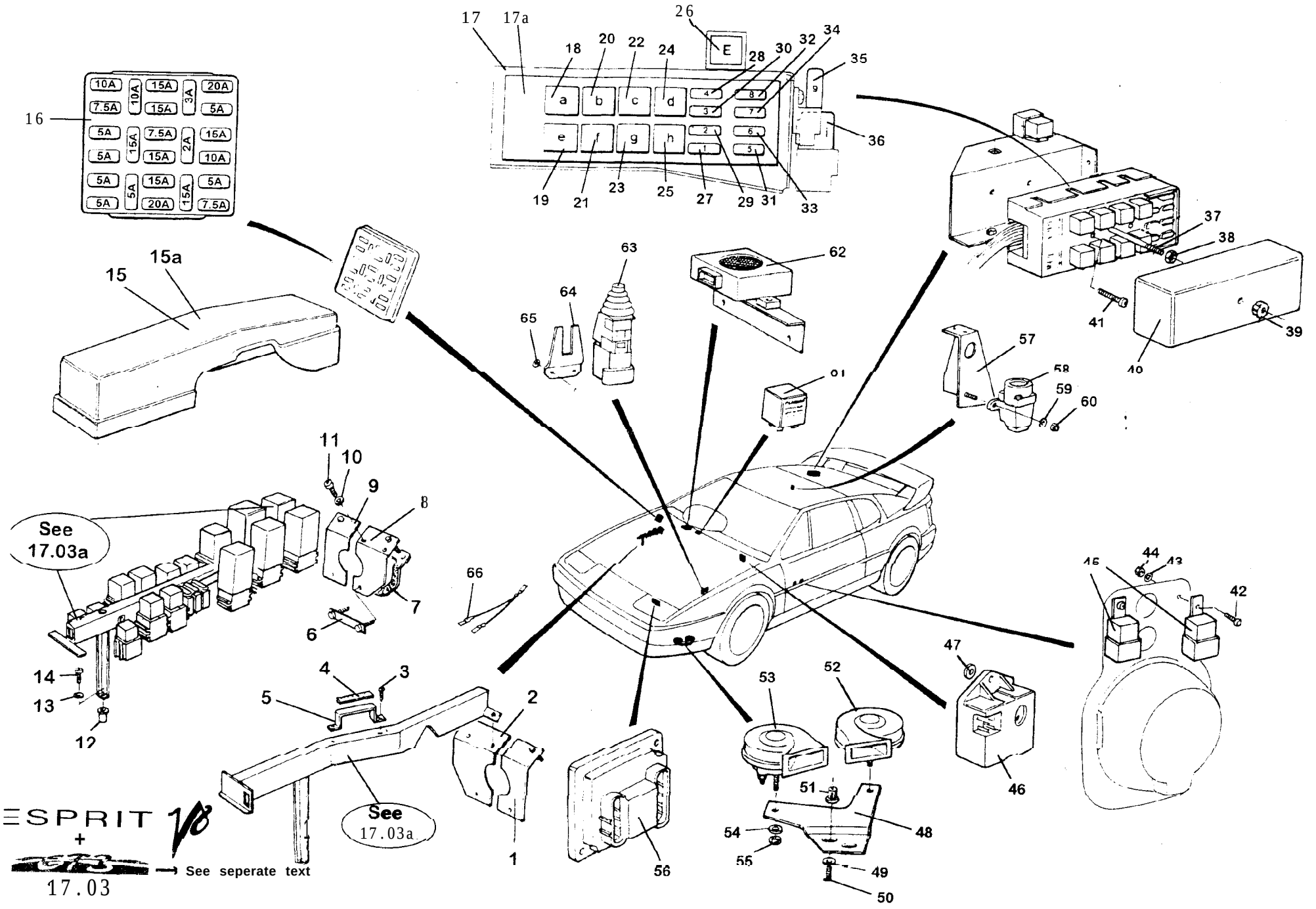
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Harness, front			B082M4950F	1
02	Harness, instrument panel, LHD		'98 MY	**A082M5047F**	1
02a	Harness, instrument panel, LHD		Prior to '98 MY	**C082M4943F**	1
02b	Harness, instrument panel, RHD		'98 MY	**A082M5048F**	1
02c	Harness, instrument panel, RHD		Prior to '98 MY	**C082M4944F**	1
03	Harness, fascia, LHD			**B082M5049F** ,	1
03a	Harness, fascia, RHD			**B082M5050F**	1
03b	Harness, fascia, RHD	With seat/ignition buzzer	Australia	**A082M5072K**	1
04	Cable, heated rear window	Cars with aerofoil	V8, Sport 350	**C082M4675F**	1
04a	Cable, heated rear window	Cars without aerofoil	V8 GT, GT3	-- **A082M4676F**	1
05	Harness, tailgate			**B082M4954F** ---	1
06	Harness, rear		V8, V8 GT, Sport 350, '98 MY	**C082M5014F**	1
06a	Harness, rear		V8, Oct. '96 on	**B082M5014F**	1
06b	Harness, rear		V8, Prior to Oct '96	**A082M5014F**	1
07	Harness, engine management	Fitted to engine		**C082M5012F**	1
08	Harness, starter			**A082M5013F**	1
09	Harness, rear lighting			**E082M4662F**	1
10	Harness, CHMSL	Tailgate mounted aerofoil	V8, Sport 350 '98 MY	**A082M5074F**	1

Function Code 17.01 Harnesses, Leads

Dep	Part Description	Remarks	Option	Part Number	Qty
10a	Harness, CHMSL	Body mounted aerofoil	V8, Prior to '98 MY	**A082M5022F**	1
11	Harness, wheel speed sensor, LHD			**A082M5017F**	1
11a	Harness, wheel speed sensor, RHD			**A082M5018F**	1
12	Harness, jumper, recirculation pump			**A082M5029K**	1
13	Harness, driver's door			**C082M4914F**	1
13a	Harness, passenger's door			**C082M4915F**	1
13b	Harness, door conversion, federal	Without one touch window lift	USA	**A082M4938F**	2
14	Harness, steering column		Non SIR	**B082M4918F**	1
14a	Harness, steering column		SIR	**C082M4833F**	1
15	Harness, parking brake switch			**A082M4874F**	1
16	Harness, washer bottle		'98 **MY**	**A082M5078F**	1
17	Harness, electric horns			**B082M6558F**	1
18	Harness, front bumper			**A082M4949F**	1
19	Harness, inboard headlamp			**A082M4241 F**	2
20	Harness, radiator fans, **LHD**			**B082M4968F**	1
20a	Harness, radiator fans, RHD			**B082M4969F**	1
21	Harness, OBD2 resister plug	Not illustrated		**A082M5036F**	1
22	Harness, driver SIR	Not illustrated	SIR	**E082M4797F**	1
22a	Harness, dual SIR	Not illustrated	Dual SIR	**A082M4951 F**	1
23	Harness, oil pressure switch	Not illustrated	GT3	**B082M4946F**	1
24	Harness, oil pressure switch	Not illustrated	V8	**A082M5044F**	1

Function Code 17.01 Harnesses, Leads

Dep	Part	Description	Remarks	Option	Part Number	Qty
25		Harness, Alpine radio, federal	Not illustrated	USA	A082M5037H	1



ESPRIT V8 +

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Service Parts List

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Mounting inner, cover plate		RHD	A082M4745F	1
02	Mounting outer, cover plate		RHD	A082M4742F	1
03	Screw, pozi No 6x ½"			A075W5012 F	2
04	Foam strip 10mm x 6mm self adhesive			A075W5012F	1
05	Bracket, relay cover support		RHD	A082M4894F	1
06	Stud plate			A082M4714F	1
07	Seal, relay mounting bracket			A082M4703F	1
06	Mounting, outer, cover plate		LHD	A082M4741 F	1
09	Mounting, inner, cover plate		LHD	A082M4743F	1
10	Washer, light spring, M5			A082M4097F	1
11	Screw, pozi, M5x16mm			A082M5117F	2
1 2	Rawlnut. M5			A075W6O74F	1
13	Washer, internal shakeproof, M5			A075W4045Z	1
14	Screw, pozi, M5 x20mm			A075W5084F	1
15	Cover, relay mounting bracket,		LHD	A082M5025J	1
15a	Cover, relay mounting bracket		RHD 'A' level R/B 'B'	B082M5026J	1
1 6	Fusebox			A089M6334F	1
16a	Fuseboxlid			A082M6194F	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
16b	Screw, M5 x 20, fusebox fix to bulkhead			A075W5084F	2
16c	Washer, M5 x 10			**A075W4011Z**	2
16d	Fuse, 2A grey/black			**A082M6316F**	1
16e	Fuse, 3A violet			**A082M6243F**	1
16f	Fuse, 5A tan			**A082M6245F**	7
16g	Fuse, 7.5A brown			A082M6246F	3
16h	Fuse, 10A red			A082M6247F	3
16i	Fuse, 15A Light blue			A082M6248F	6
16j	Fuse, 20A yellow			**A082M6249F**	2
17	Bracket, relay station holder			**A082M5021 F**	1
17a	Relay station, Rear, Part of loom			N/A	N/A
18	Relay, coolant pump			**B082M6182F**	1
19	Relay, oxygen sensor heater control			**B082M6182F**	1
20	Relay, Secondary fuel pump			**B082M6182F**	1
21	Relay, fuel filler flap			**B082M6182F**	1
22	Relay, primary fuel pump & injectors			B082M6182F	1
23	Relay, A.C compressor			**B082M6182F**	1
24	Relay, Ignition power			**B082M6182F**	1
25	Relay, starter motor			B082M6182F	1
26	Not applicable to V8 engine			N/A	NIA
27	Fuse, 25A, fuel filler flaps			A082M6250F	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
28	Fuse, 15A, secodary fuel pump			A082M6248F	1
29	Fuse, 5A, ECM &coolant pump			A082M6245F	1
30	Fuse, 25A, primary fuel pump & injectors			A082M6250F	1
31	Fuse, 15A, ignition coils			A082M6248F	1
32	Fuse, 10A, A.C. compressor & reverse lamps			A082M6247F	1
33	Fuse 10A, engine ignition supply			A082M6247F	1
34	Fuse, 7.5A, ignition coils			A082M6246F	1
35	Not V8 models			N/A	N/A
36	Not V8 models			N/A	N/A
37	Stud, relay cover fix			B082M4984F	1
38	Nut, M6, relay cover fix			A075W3020Z	1
39	Knob, knurled M6			A082W4648F	1
40	Cover, rear relay station			A082B5239K	1
41	Screw, pozi, M6 x 50mm, relay station fixing			A100W5145F	2
42	Screw, pozi, M5 x 10mm, window lift relay fixing			A082W5097F	2
43	Washer, l/8" x 3/8"			A075W4001Z	4
44	Nut, M5 nyloc			A075W3008Z	4
45	Relay, window lift			A100M6104F	4
46	Module, seat belt buzzer			A082W6608F	1
47	Washer, M5 x 16 x 1.6mm			A082W4115F	1
48	Bracket, horn mounting			A082M4934F	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
49	Washer, M5 x IO x 1.0 mm, flat, horn fixing			**A075W4011Z**	**2**
50	Setscrew, M5 x 20mm, horn fixing			**A075W1025F**	2
51	Jacknut, M5, horn fixing			**A076W3042F**	2
52	Horn, LO Note			**A100M6031F**	I
53	Horn, Hi Note			**Al 00M6030F**	1
54	Washer, M6 x I8 x 1.Omm, horn fixing			B082W4018F	2
55	Nut, plain, M6			**TBA**	2
56	Control module, Headlamp lift			**A082M6363F**	1
57	Bracket, inertia stitch & solonoid			**A082U7799F**	I
58	Inertia switch			**A082M6598F**	I
59	Washer, M4, flat			**A082W4099F**	2
60	Nut, M4 nyloc			**A075W3049F**	2
61	Flasher unit			**A083M6303F**	I
62	Module, logic			**C082M4866F**	I
63	Inertia stitch			**A082M6598F**	1
64	Bracket, inertia switch mounting			**A082U7687F**	I
65	Washer, I/8" x 3/8"			**A075W4001Z**	2
65a	Pop rivet			**A075W6090Z**	2

Service Parts List

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Mounting inner, cover plate		RHD	A082M4745F	1
02	Mounting outer, cover plate		RHD	A082M4742F	1
03	Screw, pozi No 6 x ½"			A075W5012F	2
04	Foam strip 10 mm x 6 mm self adhesive			A075W5012F	1
05	Bracket, relay cover support		RHD	A082M4894F	1
06	Stud plate			A082M4714F	1
07	Seal, relay moutimg bracket			A082M4703F	1
08	Mounting outer, cover plate		LHD	A082M4741 F	1
09	Mounting inner, cover plate		LHD	A082M4743F	1
10	Washer, light spring, MS			A082M4097F	1
11	Screw, pozi, M5 x 16 mm			A082M5117F	2
12	Rawlplug, M5			A075W6074F	1
13	Washer, internal shakeproof, M5			A075W4045Z	1
14	Screw, pozi M5 x 20 mm			A075W5084F	1
15	Cover, relay mounting bracket		LHD	A082M5025J	1
15a	Cover, relay mounting bracket		RHD	A082M5026J	1
16	Fusebox			A089M6334F	I
16a	Fusebox lid			A082M6194F	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

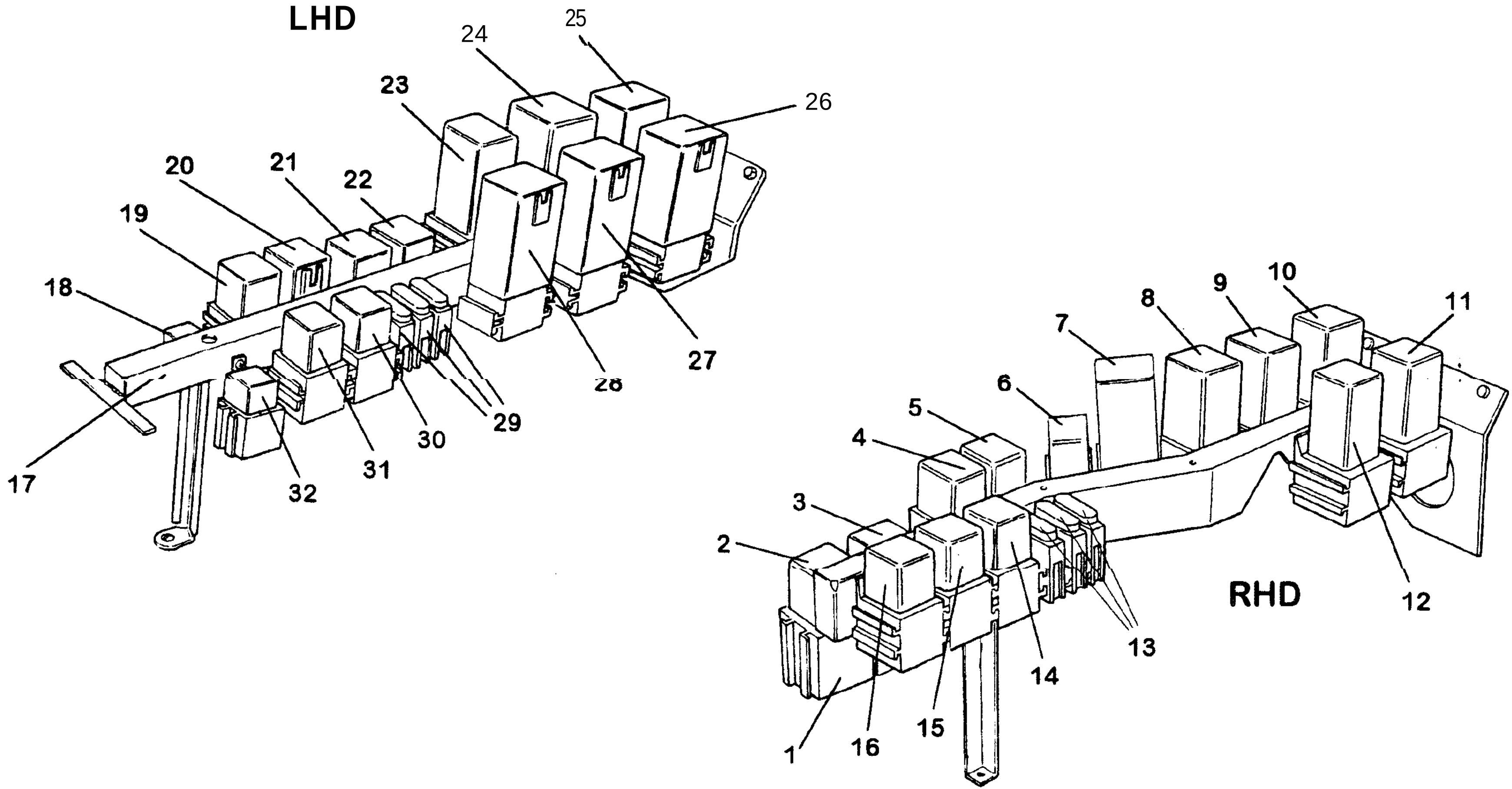
Dep	Part Description	Remarks	Option	Part Number	Qty
16b	Screw, M5 x 20 mm, fusebox fix to bulkhead			A075W5084F	1
16c	Washer, M5 x 10 mm			**A075W4011Z**	1
16d	Fuse, 2A grey/black			**A082M6316F**	1
16e	Fuse, 3A violet			**A082M6243F**	1
16f	Fuse, 5A tan			**A082M6245F**	7
16g	Fuse, 7.5A brown			A082M6246F	3
16h	Fuse, 10A red			**A082M6247F**	3
16i	Fuse, 15A light blue			**A082M6248F** ,	6
16J	Fuse, 20A yellow			**A082M6249 F**	2
17	Bracket, relay station holder			**Al 11 M6020F**	1
17a	**Relay** station, Rear, Part of loom			**N/A**	N/A
18	Relay, oil tell tail /& RPM			**C079M6141 F**	1
19	Relay, secondary injector resistor			**C079M6141 F**	1
20	Relay, Throttle jack / EBPV			**C079M6141 F**	1
21	Relay, fuel filler flap			**C079M6141 F**	1
22	Relay, fuel pump & injector relay			**B082M6182F**	1
23	Relay, a.c. compressor			**C079M6141 F**	1
24	Relay, ignition relay			**A082M6589F**	1
25	Relay, starter motor solenoid			**C079M6141 F**	1
26	Relay, vacuum pump control			**A082M6589F**	1
27	Fuse, 10A, ECM power			**A082M6247F**	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	QtY
28	Fuse, 7.5A, ECM & direct power			A082M6246F	1
29	Fuse, 25A, fuel filler flap			A082M8250F	1
30	Fuse, 15A, fuel pump & injection			A082M6248F	1
31	Fuse, 10A, a.c. compressor			A082M6247F	1
32	Fuse, 5A, throttle jack & EBPV solenoids			A082M6245F	1
33	Fuse, 7.5A, reverse lamps & vacuum pump			A082M6246F	1
34	Fuse, 10A, Evap. canister purge solenoid; 02 heater			A082M6247F	1
35	Fuse, 30A, vacuum pump			A082M6251 F	1
36	Module, vacuum pump control			A082M6669F	1
37	Stud, relay cover fix			B082M4984F	1
38	Nut, M6, relay cover fix			A075W302OZ	1
39	Knob, knurled M6			A082W6468F	1
40	Cover, rear relay station			A082B5239K	1
41	Screw, pozi, M6 x 50 mm, relaay fixing			A100W5145F	1
42	Screw, pozi, M5 x 10 mm, window lift relay fixing			A082M5097F	1
43	Washer, flat, I/8" x 3/8"			A075W4001 F	4
44	Nut, M5 nyloc			A075W3008Z	4
45	Relay, window lift			A100M6104F	4
46	Module, seat belt buzzer			A082W6608F	1
47	Washer, M5 x 16 x 1.6 mm			A082W4115F	1
48	Bracket, horn mounting			A082M4934F	1

Function Code 17.03 Fuses, Relays,Horn,Inertia switch etc. Also 17.03a

Dep	Part Description	Remarks	Option	Part Number	Qty
49	Washer, flat, M5 x 10 x 1.0 mm, horn fixing			A075W401 1Z	2
50	Setscrew, M5 x 20 mm, horn fixing			A075W1025F	2
51	Jacknut, M5, horn fixing			A076W3042F	2
52	Horn, Lo Note			Al 00M6031 F	1
53	Horn, Hi Note			Al 0M6030F	1
54	Washer, M6 x 18 x 1.0 mm, horn fixing			B082W4018F	2
55	Nut, plain, M6			TBA	2
56	Control Module, Headlamp lift			A082M6363F	1
57	Bracket, inertia stitch & solonoid			A082U7799F	1
58	Inertia switch			A082M6598F	1
59	Washer, flat, M4			A082W4099F	2
60	Nut, M4, nyloc			A075W3049F	2
61	Flasher unit			A083M6303F	1
62	Module, logic			C082M4866F	1
63	Inertia switch			A082M6598F	1
64	Bracket, inertia switch mounting			A082U7687F	1
65	,Washer, flat, I/8" x 3/8"			A975W400l Z	2
65a	Pop rivet			A075W6O9OZ	2



ESPRIT V8
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17.03a

Function Code 17.03a Main Relay Stations.

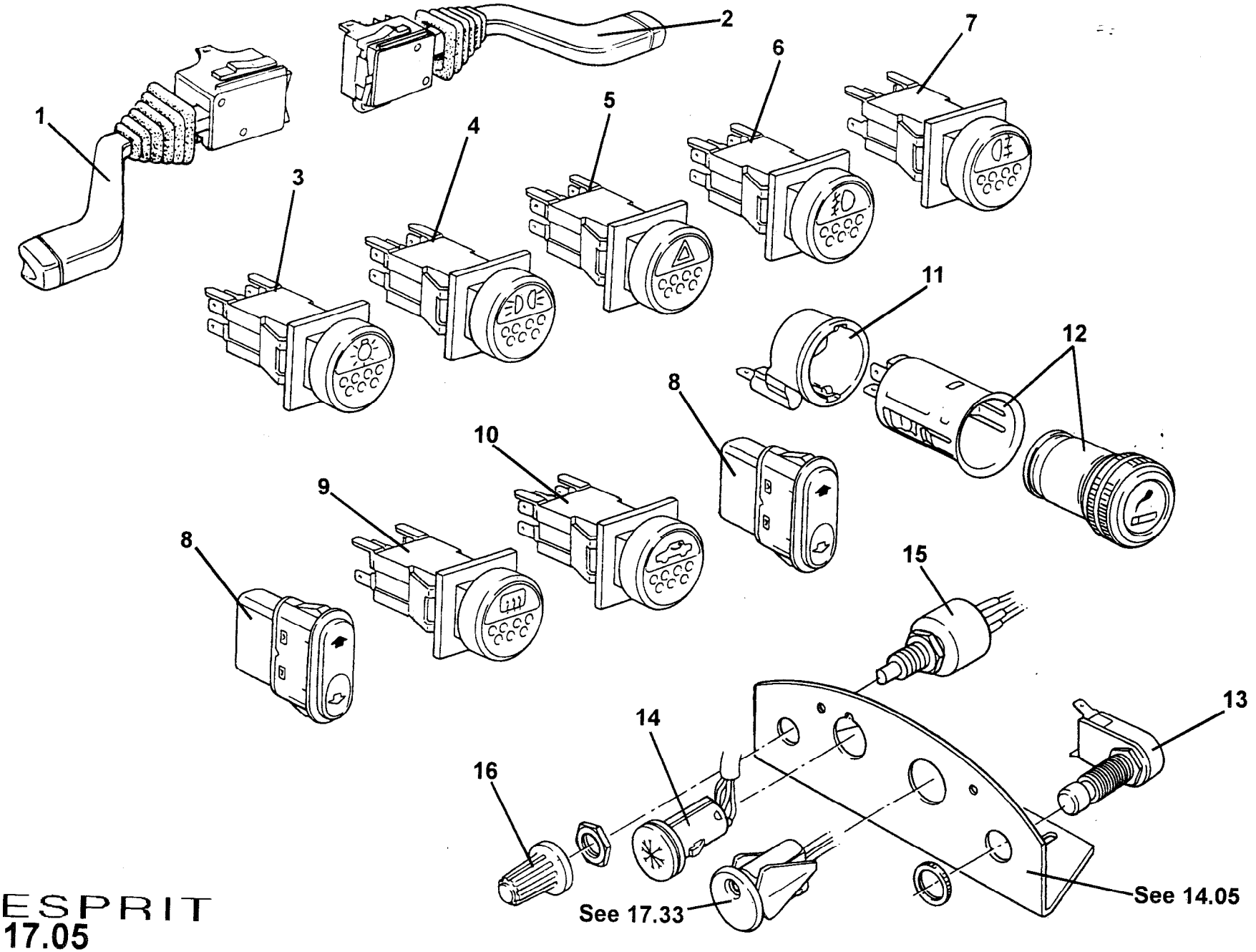
Dep	Part Description	Remarks	Option	Part Number	QtY
01	Bracket, relay mounting		RHD	C082M4739F	1
02	Relay, radiator fan			A082M6589F	1
03	Relay, ignition power			A082M6589F	1
04	Relay, headlights, dip beam			C079M6141 F	1
05	Relay, headlights, main beam		'E' mark	A082M6058F	1
06	Relay, start drop-out			C079M6141 F	1
07	Relay, rear fog lamp module			Al 11 M0067F	1
08	Relay, rheostat module			B082M4847F	1
09	Relay, low fuel delay module			D089M6330F	1
10	Relay, wash wipe delay module			A082M6457F	1
11	Relay, window voltage module			C082M6531 F	1
12	Relay, headlamp pod delay module			C082M6325F	1
13	Fuse, 15A, RH radiator fan	Light blue		A082M6248F	1
13a	Fuse, 15A, Centre radiator fan	Light blue		A082M6248F	1
13b	Fuse, 15A LH radiator fan	Light blue		A082M6248F	1
14	Relay, front fog lamp			C079M6141 F	1
15	Relay, horn			C079M6141 F	1
16	Relay, radio key-in			C079M6141 F	1

Function Code 17.03a Main Relay Stations.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Bracket, relay mounting, RHD			C082M4739F	1
02	Relay, radiator fan			**A082M6589F**	1
03	Relay, ignition power			**A082M6589F**	1
04	Relay, headlights, dip beam			**C079M6141 F**	1
05	Relay, headlights, main beam,		'E' Mark	**A082M6058 F**	1
06	Relay, start drop-out			**C079M6141 F**	1
07	Relay, rear fog lamp module			**Al 11 M0067F**	1
08	Relay, rheostat module			**B082M4847F**	1
09	Relay, low fuel delay module			**D089M6330F**	1
10	Relay, wash-wipe delay module			**A082M6457F**	1
11	Relay, window voltage module			C082M6531 F	1
12	Relay, headlamp pod delay module			C082M6325F	1
13	Fuse, RH radiator fan, 15A			**A082M6248F**	1
13a	Fuse, Centre radiator fan, 15A			A082M6248F	1
13b	Fuse, LH radiator fan, 15A			**A082M6248F**	1
14	Relay, front fog lamp			**C079M6141 F**	1
15	Relay, horn			**C079M6141 F**	1
16	Relay, radio key-in			**C079M6141 F**	1

Function Code 17.03a Main Relay Stations

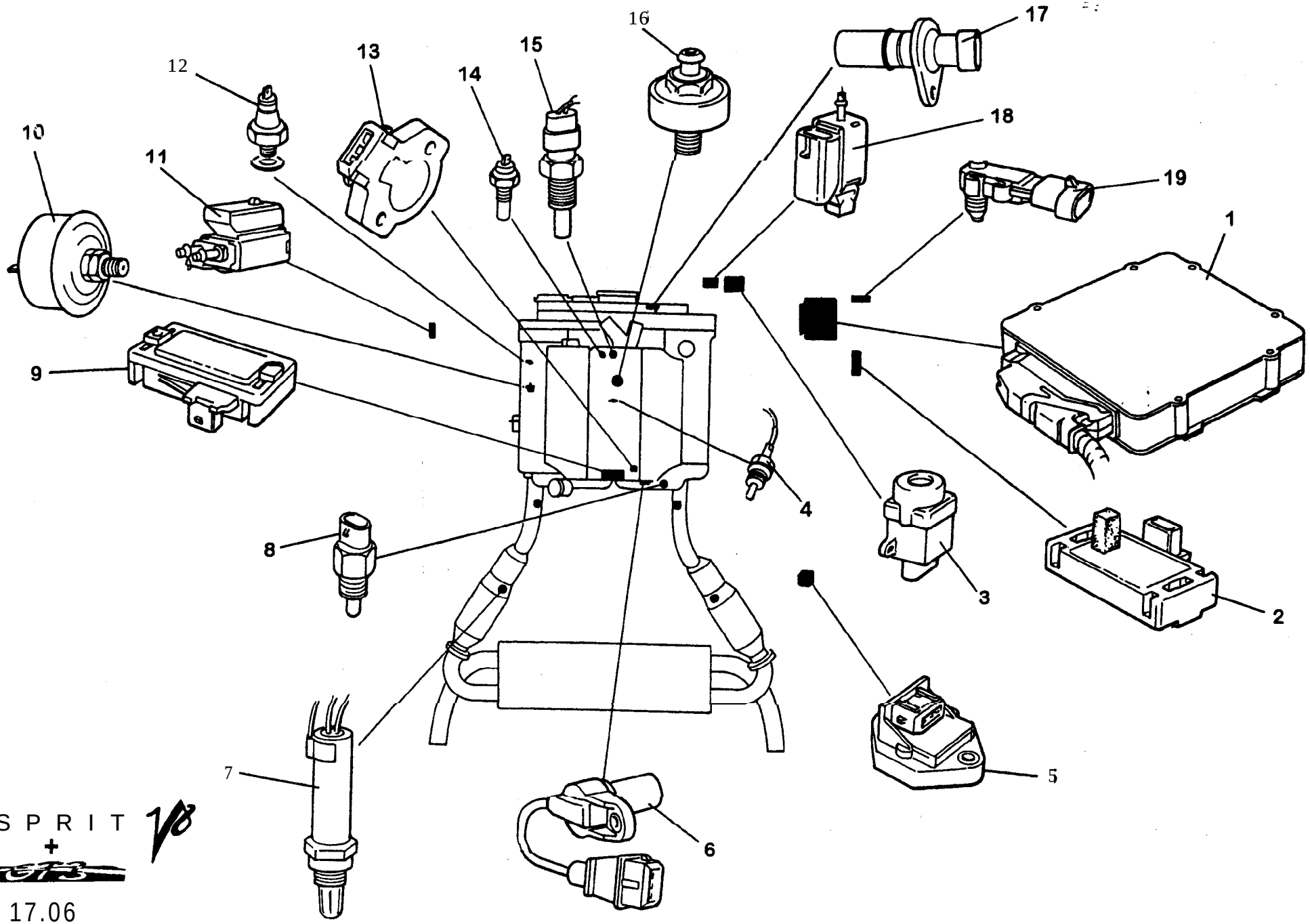
Dep	Part Description	Remarks	Option	Part Number	Qty
17	Bracket, relay mounting		LHD	C082M4739F	1
18	Relay, ignition power			A082M6589F	1
19	Relay, headlights, dip beam			C079M6141 F	1
20	Relay, headlights, main beam		'Dot' mark. USA	B082M6182F	1
21	Relay, start drop-out			CO79M6141 F	1
22	Relay, radio key-in			C079M6141 F	1
23	Relay, rheostat module			B082M4847F	1
24	Relay, low fuel delay module			D089M6330F	1
25	Relay, wash-wipe delay module			A082M6457F	1
26	Relay, window voltage module			C082M6531 F	1
27	Relay, headlamp pod delay module			C082M6325F	1
28	Relay, rear fog lamp module			Al 11 M0067F	1
29	Fuse, RH radiator fan, 15A			A082M6248F	1
29a	Fuse, Centre radiator fan, ISA			A082M6248F	1
29b	Fuse, LH radiator fan, 15A			A082M6248F	1
30	Relay, fog lamp			C079M6141 F	1
31	Relay, horn			C079M6141 F	1
32	Relay, radiator fan			A082M6589F	1



ESPRIT
17.05

Function Code 17.05 interior Switches, Cigar Lighter

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Column Switch, LH, indicators/dip/flash		Non SIR	Al 00M6048F	1
01 a	Column Switch, LH, indicators/dip/flash		SIR	A082M6455F	1
02	Column Switch, RH, windscreen wipe/wash		Non SIR	Al 00M6049F	1
02a	Column Switch, RH, windscreen wipe/wash		SIR	B082M6454F	1
03	Switch, sidelamps			A111M0001F	1
04	Switch, master lighting			Al 11 M0002F	1
05	Switch, hazard			A111M6016F	1
06	Switch, front fog			A082M6642F	1
07	Switch, rear fog			A111M6015F	1
08	Switch, window lift			A082M6646F	2
09	Switch, heated rear window			A111M6018F	1
10	Switch, AC recirculation		AC cars	Al 11 M6068F	1
11	Bezel, cigar lighter	Green		A082M6665F	1
12	Cigar Lighter			B100M6041 F	1
13	Switch, fuel flap release			A082M6643F	1
14	Switch, window obstruction sensing over-ride		Except USA	A082M6530F	1
15	Panel Lamps Rheostat Assembly	Includes item 16	V8	A082M4861 F	1
16	Knob, panel lamps rheostat		V8	A082M6475H	1



ESPRIT V8 GTS

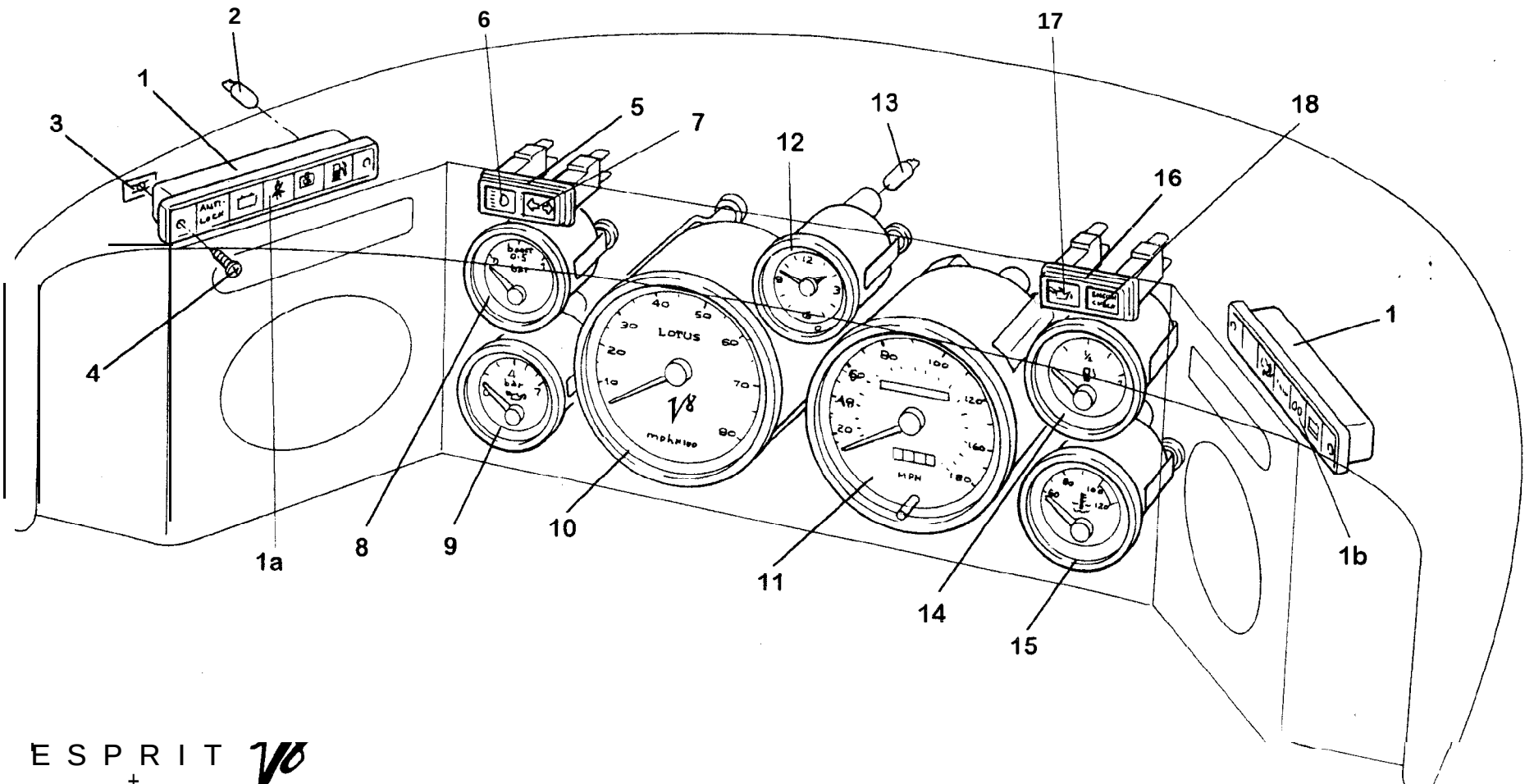
17.06

Function Code 17.06 Engine Management, ECM,Sensors, Incl fuel inj also 42.05.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Electronic Control Module (ECM)	Single Plate Clutch	UK & European - V8	**A918E0021S**	1
Ola	Electronic Control Module (ECM)	Single Plate Clutch	USA - V8	**A912E0022K**	1
01 b	Electronic Control Module (ECM)	Twin Plate Clutch	UK / European - V8	**A918E0282K**	1
01c	Electronic Control Module (ECM)	Twin Plate Clutch	USA - V8	**A918E0283K**	1
Old	Electronic Control Module (ECM)	Twin Plate Clutch	European Federal - V8	**A918E0285K**	1
Ole	Electronic Control Module (ECM)	Twin Plate Clutch	UK & European - V8-GT	**A918E0351 K**	1
Olf	Electronic Control Module (ECM)	Twin Plate Clutch	European Federal - V8-GT	**A918E0352K**	1
Olg	Electronic Control Module (ECM)	2.0 litre	GT3	**A920E0027K**	1
02	Baro Sensor			**A918E6081 F**	1
05	Sensor Rough Road			**A918E6052F**	1
06	Cam Sensor			**A918E6010F**	1
07	Oxygen Sensor			**B918E0322F**	4
08	Inlet Air Temperature (IAT) Sensor			**A918E6085F**	1
08a	Inlet Air Temperature (IAT) Sensor	2.0 litre	GT3	**A910E6927F**	1
09	MAP Sensor			**A910E6934F**	1
09a	Seal, Map Sensor	Not illustrated		**A918E6041 F**	1
10	Transducer Oil Pressure			**A082N4038F**	1
12	Oil Pressure Switch			**A082N4039F**	1

Function Code 17.06 Engine Management, ECM,Sensors, Incl fuel inj also 42.05.

Dep	Part Description	Remarks	Option	Part Number	Qty
13	Throttle position stitch (TP)			**A918E0005H**	1
14	Water Temperature Sensor			**A082N4040F**	1
15	Engine Coolant Temperature (ECT) Sensor			**A910E6928F**	1
16	Knock Sensor			**C910E6937F**	1
17	Ct-anshaft Sensor		A910E6939F R /B :	**A918E6080F**	1
18	Wastegate solenoid valve			**A082M6420F**	1
19	Fuel tank pressure sensor	Not currently **available**		**A082L6205H**	1



ESPRIT V8
+
GT3

Pre '98 M.Y.

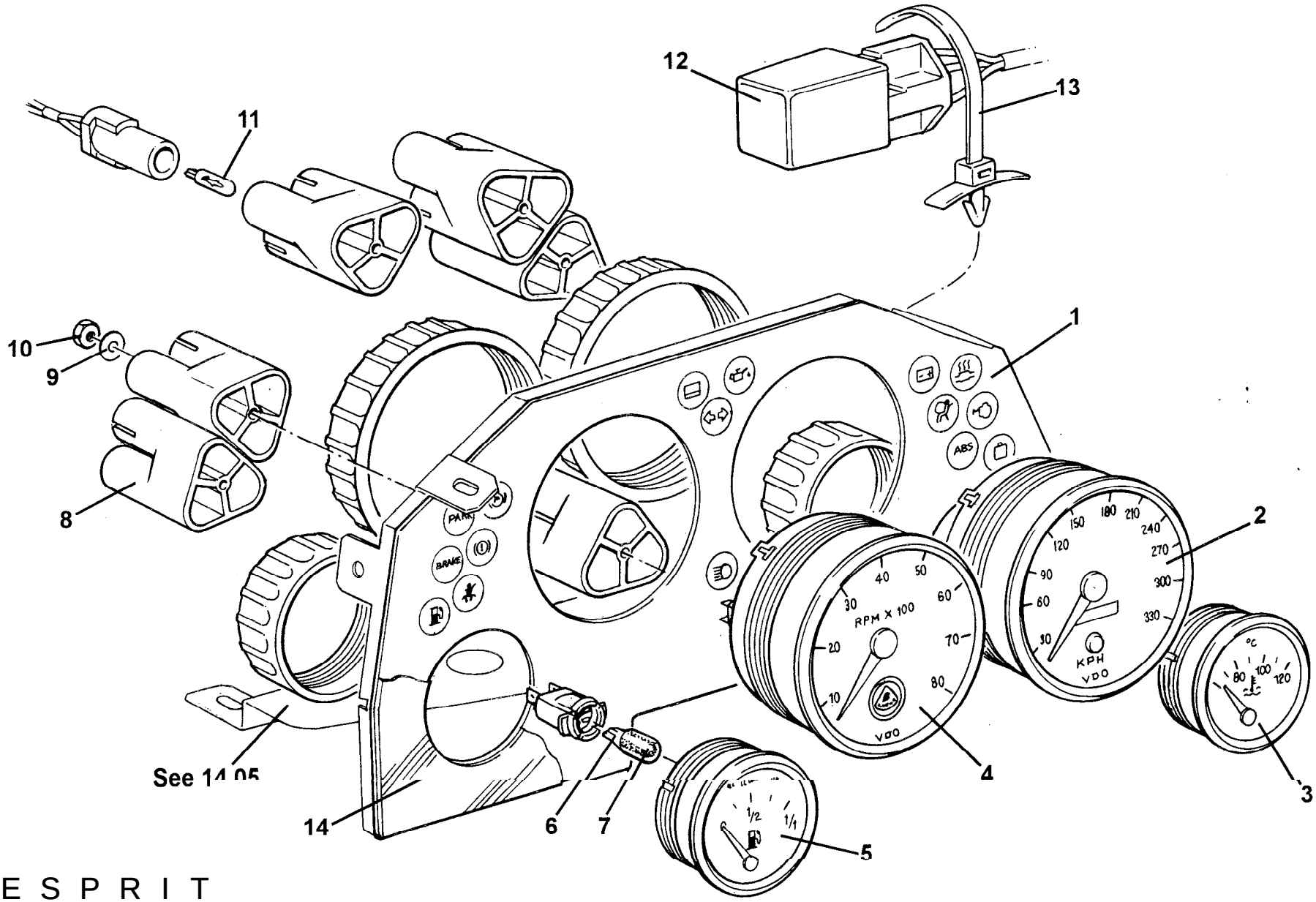
17.07

Function Code 17.07 Instruments, Senders, Tell tales, Clocks and Displays.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Tell tail lamp, housing			**B082N6019F**	2
Ola	Graphic strip, LH			**A082N4029F**	1
01 b	Graphic strip, RH			**A082N4028F**	1
02	Bulb 12v 2 w capless, tell tail warnings			**A082N8078S**	9
03	Spire nut			**A075W6013Z**	4
04	Screw			A075W5012Z	4
05	Tell tail lamp, duel.			**A082M6278F**	2
06	Lens, tell tail lamp, main beam			A082M6356F	1
07	Lens, tell tail lamp, directional indicator.			A082M6355F	1
08	Boost gauge			**A082N4036F**	1
09	Oil pressure gauge			**A082N4035F**	1
10	Tachometer		Pre '98 M.Y. V8	**A082N4050K**	1
1 Oa	Tachometer		'98 M.Y. V8 + V8 GT+ GT3	**A082N4058F**	1
10b	Tachometer		Pre '98 M.Y. GT3	**B082N4032F**	1
11	Speedometer, MPH		Pre '98 M.Y. V8 + GT3	**B082N4030F**	1
1 la	Speedometer, MPH		'98 M.Y. V8 + V8 GT+ GT3	**A082N4056F**	1
11 b	Speedometer, KPH (300)		Pre '98 M.Y.	**A082N4051 F**	1
1 1c	Speedometer, KPH (300)		'98 MY. V8 + V8 GT + GT3	**A082N4057F**	1

Function Code 17.07 Instruments, Tell Tales, & Displays

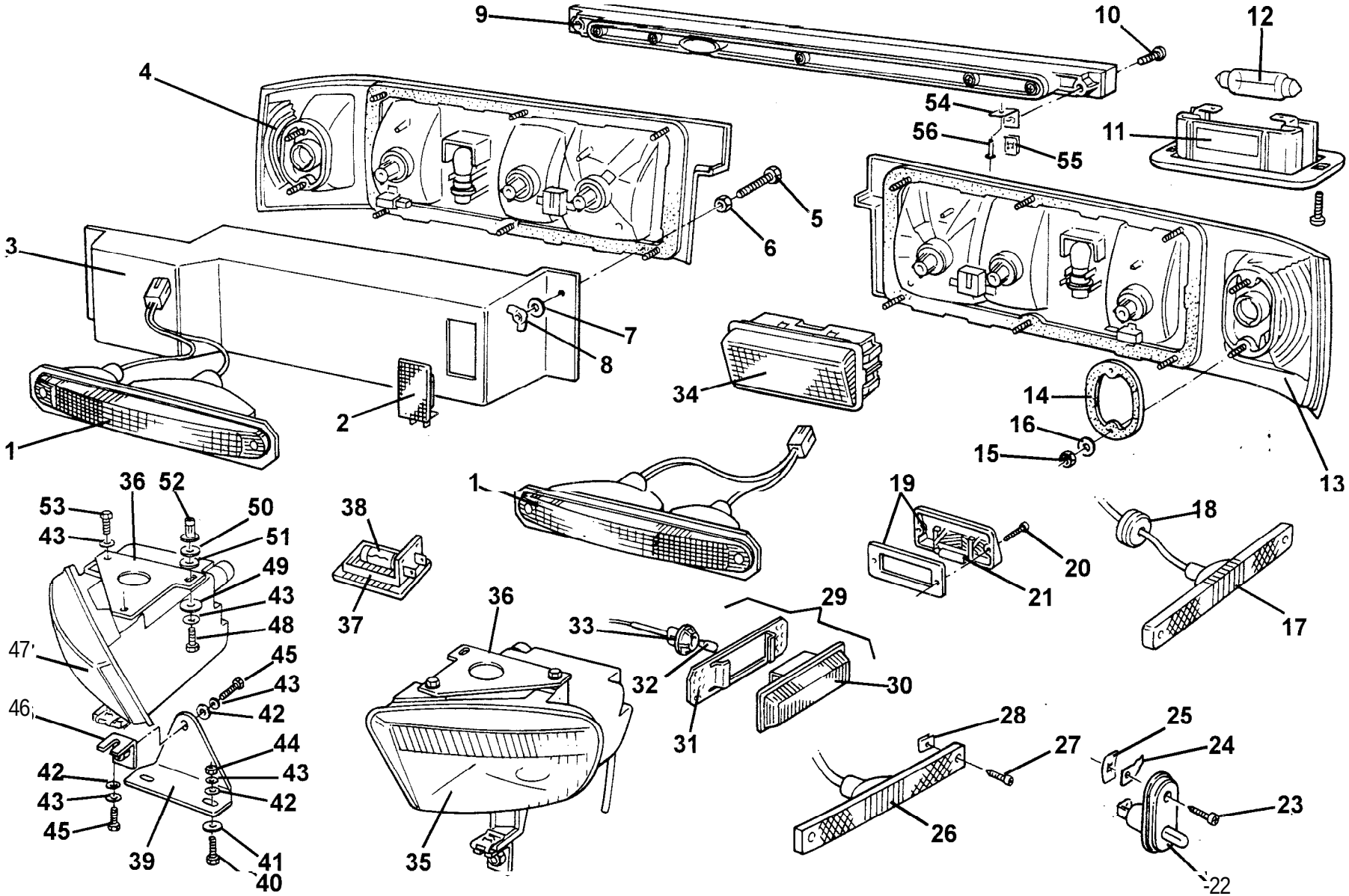
Dep	Part	Description	Remarks	Option	Part Number	Qty
11d		Speedometer, KPH (260)		Pre '98 M.Y. GT3	B082N4031 F	1
12		Time Clock, analogue type			B082N4037F	1
13		Bulb 12v 2 w capless, time clock			A082N6077S	1
14		Fuel Gauge		Pre '98 M.Y.	B082N4033F	1
14a		Fuel Gauge		Not USA. '98 M.Y. V8 + GT3	B082N4059F	1
14b		Fuel Gauge (Unleaded)		USA only, '98 M.Y.	B082N4070F	1
15		Water Temperature Gauge		Pre '98 M.Y.	A082N4034F	1
15a		Water Temperature Gauge		'98 M.Y. V8 + GT3	A082N4060F	1
16		Tell Tale Lamp, dual			A082M6278F	1
17		Lens, tell tale lamp, low oil pressure			A082M6279F	1
18		Lens, tell tale lamp, check engine			A082M4750F	1
19		Screw, end caps, PVC, loom protection	Not illustrated		A089M6336F	As req



E S P R I T
17.07a

Function Code 17.07a Instruments, Tell Tales, & Displays.'98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Graphic's Panel			A082N4063F	1
02	Speedometer, MPH	VDO		A082N4056F	1
02a	Speedometer, KPH	VDO		A082N4057F	1
03	Coolant Temperature Gauge	VDO		A082N4060F	1
04	Tachometer	VDO		A082N4058F	1
05	Fuel Gauge	VDO	Non USA prior to '01 MY	B082N4059F	1
05a	Fuel Gauge, unleaded graphic	VDO	USA	B082N4070F .	1
05b	Fuel Gauge, unleaded graphic	VDO, calibrated for smaller tanks	USA '00 MY on, non USA '01 MY on	A082L4336F	1
06	Bulb, 12v 2 w, capless, instrument illumination			A082N6077S	4
07	Bulb Diffuser Sleeve, green			A082N6069F	4
08	Bulb Holder, tell tale/warning lamps			A082N4068F	6
09	Washer, flat, M4 x 9 x 0.8			A082W4099F	6
10	Nut M4 nyloc, bulb holder fix.			A075W3049F	6
11	Bulb 12v 2 w, capless, tell tale/warning lamps			A082N6078S	18
12	Indicators Flasher Unit , 12v 42/98w			A083M6303F	1
13	Cable Tie, flasher unit fix.			A082W6519F	1
14	Instrument Mask, alloy		Sport 350/'99 MY USA	A082N4073F	1
15	Fuel Gauge Sender Unit	Not illustrated		A082M4061 F	1



ESPRIT
17.11a

Service Parts List

Function Code 17.07a Instruments, Tell Tales, & Displays'98 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Graphic's Panel			**A082N4063F**	1
02	Speedometer, MPH	VDO		**A082N4056F**	1
02a	Speedometer, KPH	VDO		**A082N4057F**	1
03	Coolant Temperature Gauge	VDO		**A082N4060F**	1
04	Tachometer	VDO		**A082N4058F**	1
05	Fuel Gauge	VDO	Non USA prior to '01 MY	**B082N4059F**	1
05a	Fuel Gauge, unleaded graphic	VDO	USA	**B082N4070F**	1
05b	Fuel Gauge, unleaded graphic	VDO, calibrated for smaller tanks	USA '00 MY on, non USA '01 MY on	**A082L4336F**	1
06	Bulb, 12v 2 w, capless, instrument illumination			**A082N6077S**	4
07	Bulb Diffuser Sleeve, green			**A082N6069F**	4
08	Bulb Holder, tell tale/warning lamps			**A082N4068F**	6
09	Washer, flat, M4 x 9 x 0.8			**A082W4099F**	6
10	Nut M4 nyloc, bulb holder fix.			**A075W3049F**	6
11	Bulb 12v 2 w, capless, tell tale/warning lamps			**A082N6078S**	18
12	Indicators Flasher Unit , 12v 42/98w			**A083M6303F**	1
13	Cable Tie, flasher unit fix.			**A082W6519F**	1
14	Instrument Mask, alloy		Sport 350/'99 MY USA	**A082N4073F**	1
15	Fuel Gauge Sender Unit	Not illustrated		**A082M4061 F**	1

Function Code 17.1 la Lamps front & rear (except headlamps), Door switches

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Lamp, front side/indicators			Cl 00M001 3F	2
02	Lamp, rear luggage compartment			A089M6032F	2
63	Cover, rear lamp, RH			A082M4886K	1
03a	Cover, rear lamp, LH			A082M4885K	1
04	Lamp, rear, RH	With fog lamps		A082M6334F	1
04a	Lamp, rear, RH	Without fog lamps	USA	A082M6336F	1
05	Setscrew, M6 x 40, hex. hd., cover fixing			A075W1034Z	4
06	Nut, M6, cover fixing			A075W3020Z	4
07	Washer, flat, M6 x 15, cover fixing			A082W4015F	4
08	Wing Nut, M6, lamp cover fixing			A075W3033Z	4
09	Central High Mounted Stop Lamp (CHMSL)			A082M6648F	1
10	Screw, No.6 x 1.25", self tapping, pozi., CHMSL fixing	For aerofoil mounted CHMSL		B082W5023F	2
10a	Screw, No.6 x 0.75", self tapipng, pozi., CHMSL fixing	For tailgate mounted CHMSL		B075W5027Z	2
11	Lamp, license plate illumination	Fit infill panel: A082B5419K prior A082M6144F R/B, 98MY on '98 MY		Al 11 M6002F	2
12	Bulb, 12v 5W, license plare lamp			A083M6292F	2
13	Lamp, rear, LH	With fog lamps		A082M6333F	1
13a	Lamp, rear, LH	Without fog lamps	USA	A082M6335F	
14	Gasket, rear turn lamp to body			A082M4692F	2

Function Code 17.1 la Lamps front & rear (except headlamps), Door switches

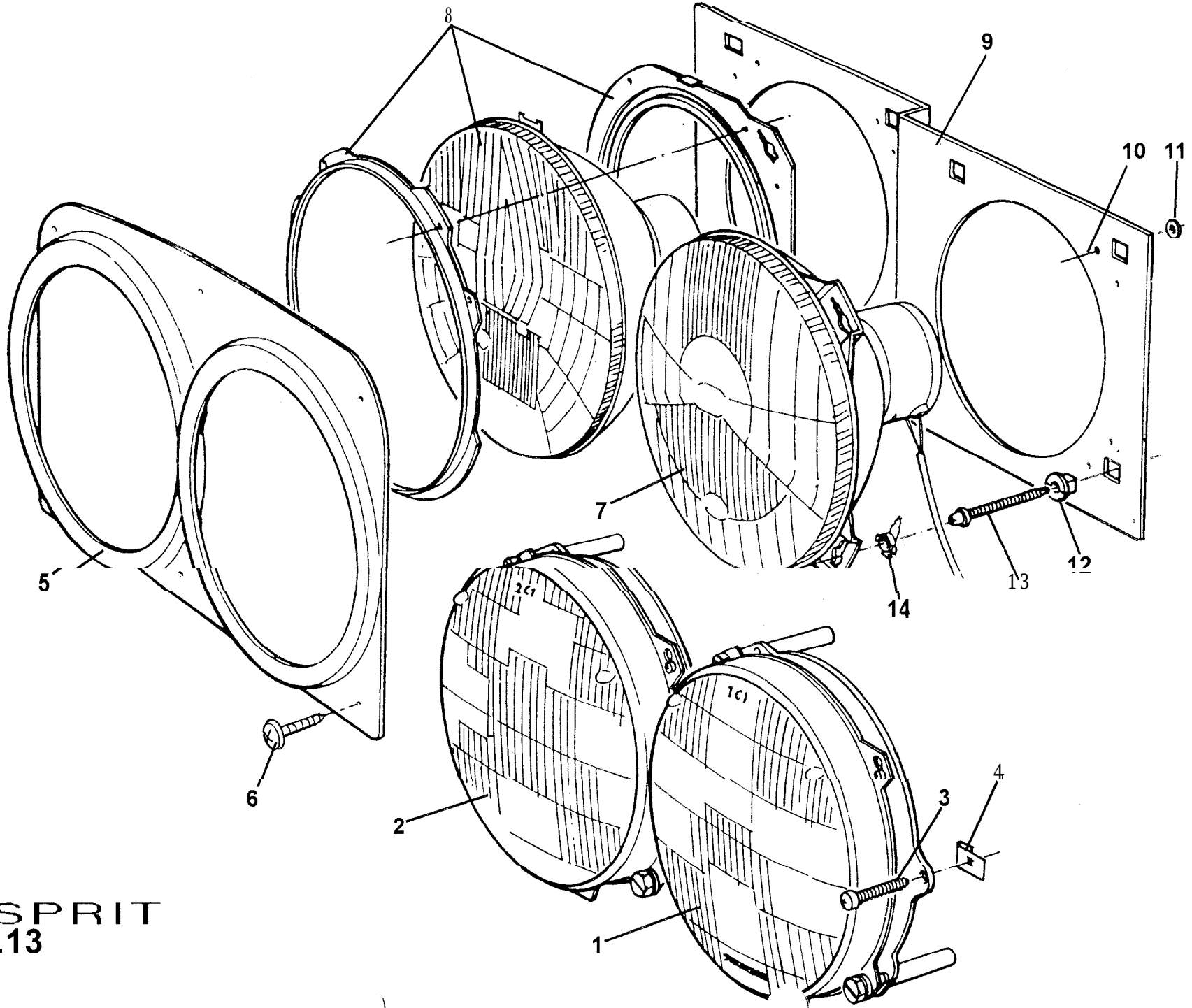
Dep	Part Description	Remarks	Option	Part Number	Qty
15	Nut, lamp to body			**B082M4707F**	16
16	Washer, fiat, Ml0 x 24, lamp to body			**A075W4023F**	16
17	Lamp, side marker, LH rear, red		USA	**A082M6581 F**	1
17a	Lamp, side marker, RH rear, red		USA	**A082M6580F**	1
18	Grommet, rear side marker lamp harness		USA	**A075U6043F**	2
19	Lamp, door edge warning red			**A082M6155F**	2
20	Screw, lamp to door			**A075W5012F**	4
21	Bulb, 12v 5w festoon, door edge warning lamp			**A083M6292F**	2
22	Door switch, courtesy lamp/seat buzzer		3 for USA spec.	**A082M6461 F**	2
23	Setscrew, No. 6 x ½," switch fixing		3 for USA spec.	**A089W5138F**	2
24	Terminal, blade to door switch		3 for USA spec.	**A082M6491 F**	2
25	Spire clip, No 6, switch fixing		3 for USA spec.	**A075W6013Z**	2
26	Lamp, side marker, LH front, amber		USA	**A082M6579F**	1
26a	Lamp, side marker, RH front, amber		USA	**A082M6578F**	1
27	Screw, M4 x 20, lamp to bumper		USA	**Al 00W5173F**	8
28	Spire Nut, M4, lamp to bumper		USA	**Al 00W6449F**	8
29	Lamp Assembly, side repeater			**B082M4930J**	2
30	Lens, side repeater			**A082M6535F**	2
31	Mounting plate, side repeater			**A082U7591 F**	2
32	Bulb, 12v 5w wedge base			**A082M6342F**	2
33	Bulb holder, side repeater lamp			**A082M6537F**	2

Function Code 17.1 la Lamps front & rear (except headlamps), Door switches

Dep	Part	Description	Remarks	Option	Part Number	Qty
34		Interior Lamp	On rear bulkhead	'98MY on	**A082M6644F**	1
35		Fog lamp, clear, LH			A082M4926J	1
35a		Fog lamp, yellow, LH		France	A082M4928J	1
36		Mounting Plate, lamp to bumper			A082M4922F	2
37		Lamp, front services bay/footwell illumination			**A089M6032F**	3
38		Bulb, services bar/footwell lamps			**A083M6292F**	3
39		Bracket, fog lamp to valence			**A082M4924F**	2
40		Screw, M6 x 20, button hd., bracket to valance			**AI 00W7096F**	4
41		Washer, flat, M6 x 15, screw to valance			**A075W4015Z**	4
42		Washer, flat, M6 x 12, lamp fixing			**A075W4013Z**	8
43		Washer, spring, M6, lamp fixing			**A075W4035Z**	10
44		Nut, M6			**A075W3020Z**	4
45		Screw, M6 x 16, lamp fixing			**A075W1028Z**	4
46		Bracket, lamp to valence bracket			**B082M4923F**	2
47		Fog lamp, clear, RH			**A082M4927J**	1
47a		Fog lamp, yellow, RH		France	**A082M4928J**	1
48		Screw, M6 x 25 , hex. hd., plate to bumper			**A075W1031Z**	2
49		Washer, flat, M6 x 20, plate to bumper			**A075W4016Z**	2
50		Spacer washer, 1.5 mm, plate to bumper			**A075W4015Z**	4
51		Spacer washer, 3.0 mm, plate to bumper			**A075W4014Z**	2
52		Jacknut, M6, plate to bumper			**A075W3031Z**	2

Function Code 17.1 la Lamps front & rear (except headlamps), Door switches

Dep	Part Description	Remarks	Option	Part Number	Qty
53	Screw, M6 x 16, hex. hd., plate to lamp			A075W1028Z	4
54	Bracket, CHMSL to tailgate canopy	For tailgate mounted CHMSL		A082U7945F	2
55	Spire Nut, No.6, CHMSL to bracket	For tailgate mounted CHMSL		B111W6632F	2
56	Pop Rivet, bracket to canopy	For tailgate mounted CHMSL		A075W6067Z	2



ESPRIT
17.13

Function Code 17.13 Headlamps

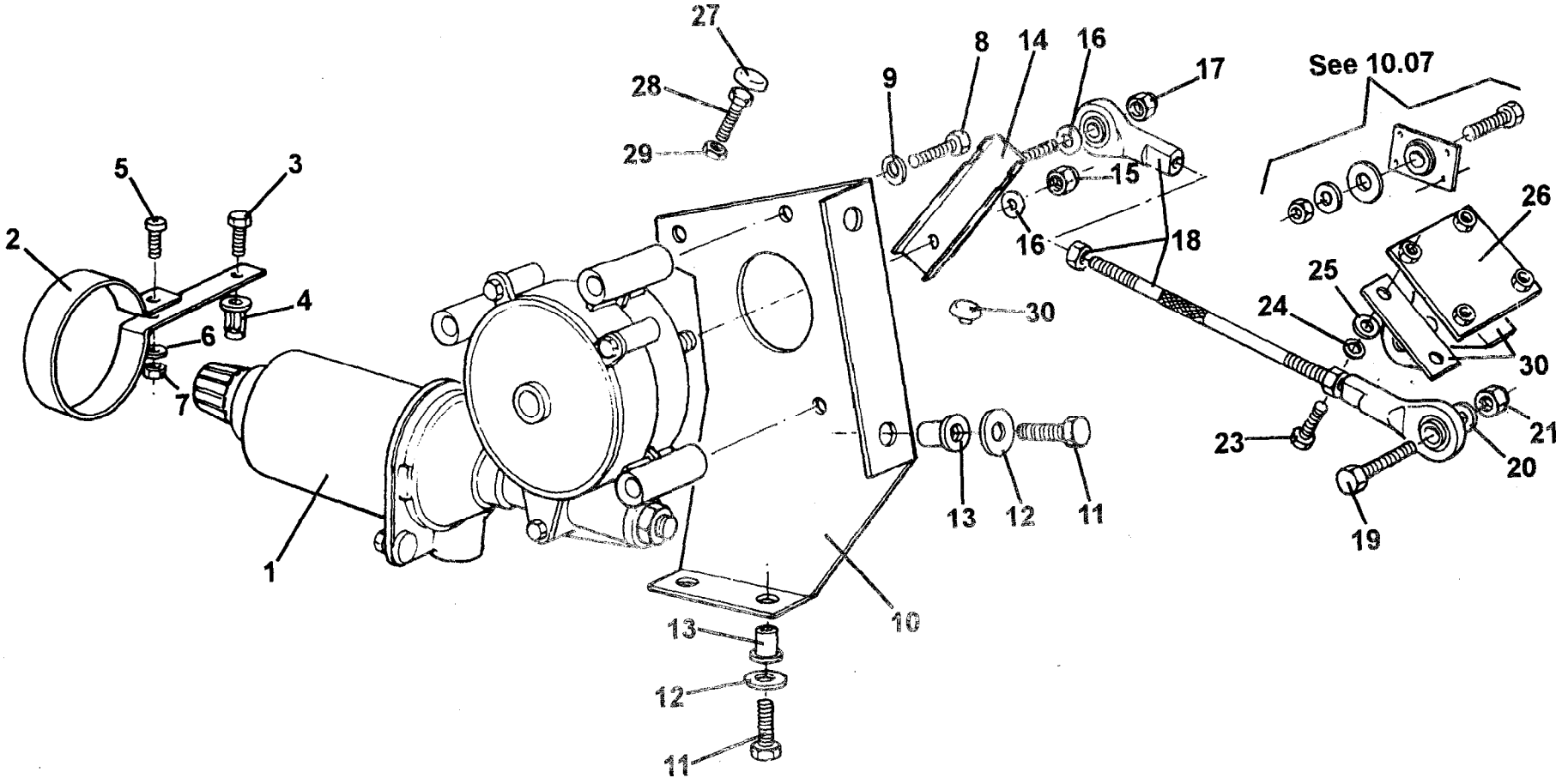
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Headlamp Assembly, 5.75", main only, inboard, LHD,	Lucas, D.O.T. marked lamps	USA, Canada, Australia, Japan	**A079M6055F**	2
Ola	Sealed Beam Unit, 5.75", main only, inboard, LHD	Lucas, D.O.T. marked lamps	USA, Canada, Australia, Japan	**A079M6038F**	2
01 b	Headlamp Assembly, 5.75", main only, inboard, LHD/RHD	Stanley, RHD Japan, D.O.T. marked lamps	USA, Canada, Australia, Japan	**AI 00M6099F**	2
02	Headlamp Assembly, 5.75", main/dip, outboard, LHD	Lucas, D.O.T. marked lamps	USA, Canada, Australia, Japan	**A079M6056F**	2
02a	Seated Beam Unit, 5.75", main/dip, outboard, LHD	Lucas, D.O.T. marked lamps	USA, Canada, Australia, Japan	**A079M6039F**	2
02b	Headlamp Assembly, 5.75", main/dip, outboard, LHD/RHD	Stanley, RHD Japan, D.O.T. marked lamps	USA, Canada, Australia, Japan	**AI 00M6098F**	2
03	Screw, pan hd., headlamp to pod	D.O.T. marked lamps	Canada, Australia, Japan	**A075W5043Z**	12
03a	Screw, flg. hd., black, No.8 x 0.75", headlamp to pod	D.O.T. marked lamps	USA	**A075W5074Z**	12
04	Spire Nut, headlamp to pod	D.O.T. marked lamps	Canada, Australia, Japan	**A075W6016Z**	12
04a	Spire Nut, No.8, headlamp to pod	D.O.T. marked lamps	USA	**A082W6525Z**	12
05	Mask, headlamp surround, RH	D.O.T. marked lamps (not illustrated)	USA, Canada, Australia, Japan	**A082B4858K**	1
05a	Mask, headlamp surround, LH	D.O.T. marked lamps (not illustrated)	USA, Canada, Australia, Japan	**A082B4859K**	1
5b	Mask, headlamp surround, RH	'E' marked lamps	U.K., Europe	**A082B4856K**	1
5c	Mask, headlamp surround, LH	'E' marked lamps	U.K., Europe	**A082B4857K**	1

Function Code 17.13 Headlamps

Dep	Part Description	Remarks	Option	Part Number	Qty
06	Screw, No.6 x 0.5", fig. hd., s/s., mask to pod		Common	**A089W5138F**	6
07	Headlamp Assembly, 6", main only, inboard, LHD/RHD	'E' marked lamps	U.K., Europe	**A082M6174F**	2
07a	Headlamp Assembly, 5.75", main only, inboard, LHD	'E' marked lamps	France (yellow)	**A082M6464F**	2
08	Headlamp Assembly, 6", main/dip, outboard, RH, RHD	'E' marked lamps, unit incl. carriage plate/bezel	U.K., Europe	**A082M481 OJ**	1
08a	Headlamp Assembly, 6", main/dip, outboard, RH, LHD	'E' marked lamps, unit incl. carriage plate/bezel	U.K., Europe	**A082M4808J**	1
08b	Headlamp Assembly, 6", main/dip, outboard, LH, RHD	'E' marked lamps, unit incl. carriage plate/bezel	U.K., Europe	**A082M4809J**	1
08c	Headlamp Assembly, 6", main/dip, outboard, LH, LHD	'E' marked lamps, unit incl. carriage plate/bezel	U.K., Europe	**A082M4807J**	1
08d	Bulb, halogen H1, main only	'E' marked lamps (not illustrated)	U.K., Europe	**A082M6288F**	2
08e	Bulb, halogen H4, main/dip	'E' marked lamps (not illustrated)	U.K., Europe	**A075M6126Z**	2
08f	Bulb, halogen H4, main/dip	'E' marked lamps (not illustrated) if fitted	U.K., Europe	**A079M6113F**	2
08g	Carriage Plate, outboard headlamp adjust, RH	'E' marked lamps (not illustrated)	U.K., Europe	**A082M4696F**	1
08h	Carriage Plate, outboard headlamp adjust, LH	'E' marked lamps (not illustrated)	U.K., Europe	**A082M4697F**	1
09	Plate, headlamp mounting to pod, RH	'E' marked lamps	U.K., Europe	**A082M4688F**	1
09a	Plate, headlamp mounting to pod, LH	'E' marked lamps	U.K., Europe	**A082M4687F**	1
09b	Plate, headlamp mounting to pod	'E' marked lamps	France	**A082M4851 F**	2
10	Pop Rivet, mounting plate to pod	'E' marked lamps	U.K., Europe	**A075W6069F**	32
11	Washer, pop rivet	'E' marked lamps	U.K., Europe	**A075W4062F**	32
12	Insert Bush, headlamp adjuster screw to plate	'E' marked lamps	U.K., Europe	**A082M6207F**	12

Function Code 17.13 Headlamps

Dep	Part	Description	Remarks	Option	Part Number	Qty
13		Adjuster Screw, headlamp aiming	'E' marked lamps	U.K., Europe	**A082M6206F**	12
14		Capsule, 0.25 turn, headlamp mounting	'E' marked lamps	U.K., Europe	**A085M6217F**	12



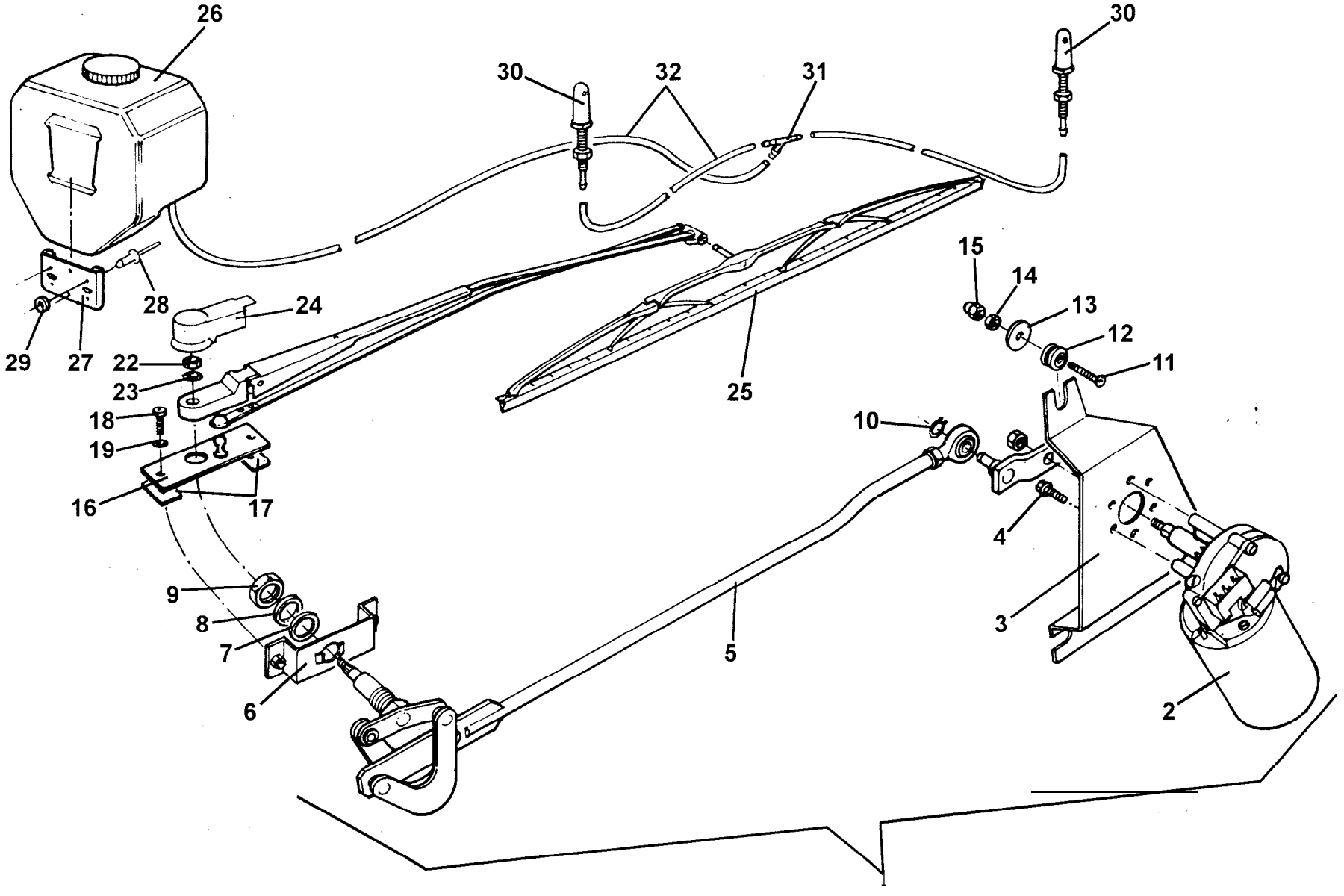
ESPRIT
17.15

Function Code 17.15 Headlamp Lift Motor & Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Motor, headlamp pod lift. RH			AI 00B6064F	1
Ola	Motor, headlamp pod lift. LH			AI 00B6063F	1
02	Steady Bracket, motor to body, RH			A082U5898F	1
02a	Steady Bracket, motor to body, LH			A082U5899F	1
03	Screw, M5 x 20, hex. hd., steady bracket clamping			A082W5097F	2
04	Jacknut, M5, steady bracket to body			A076W3042F ,	2
05	Screw, M5 x 10, pan. hd. pozi., steady braket clamping			A082W5097F	2
06	Washer, flat, steady bracket clamping			A075W401 1Z	2
07	Nyloc Nut, M5,steady bracket clamping			A075W3008Z	2
08	Setscrew, M6 x 16, hex. hd., motor to mounting bracket			A075W1028Z	6
09	Washer, shakeproof, motor to mounting bracket			A075W4046Z	6
10	Bracket, headlamp motor mounting, RH			A082U7228F	1
10a	Bracket, headlamp motor mounting, LH			A082U7229F	1
11	Setscrew, M6 x 20, hex. hd., bracket to body			A075W103OZ	8
12	Washer, flat, bracket to body			A075W4013Z	8
13	Rawlnut, M6 x 15, bracket to body			A075W6140F	8
14	Link, rotary, headlamp motor			A082U7231 F	2
15	Nyloc Nut, M6,rotary link to motor			A907E6285F	2

Function Code 17.15 Headlamp Lift Motor & Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
16	Washer, flat, rod ends			A075W4013Z	10
17	Nyloc Nut, M6,rod ends			A075W3009Z	2
18	Link Assembly, pod actuation			C082U5852F	2
19	Setscrew, M6 x 25, hex. hd., rod end to pod bracket			A075W1031 F	2
20	Washer, flat, s/s, rod end to pod bracket			A082W4133F	4
21	Nyloc Nut, M6,rod end to pod bracket			A907E6285F	2
22	Bracket, link to pod			A079U4454K	4
23	Setscrew, M6 x 18, hex. hd,, bracket to pod			A075W1029Z	8
24	Washer, shakeproof, bracket to pod			A075W4046Z	8
25	Washer, flat, bracket to pod			A075W4015Z	8
26	Tapping Plate, bracket to pod			A079U4517F	2
27	Buffer, adjustable stop			A082W6341 F	2
28	Nut, M5, adjustable stop			A075W3084Z	2
29	Setscrew, M5, hex. hd., adjustable stop			A082U7290F	2
30	Buffer, fixed stop			A082U6201 F	2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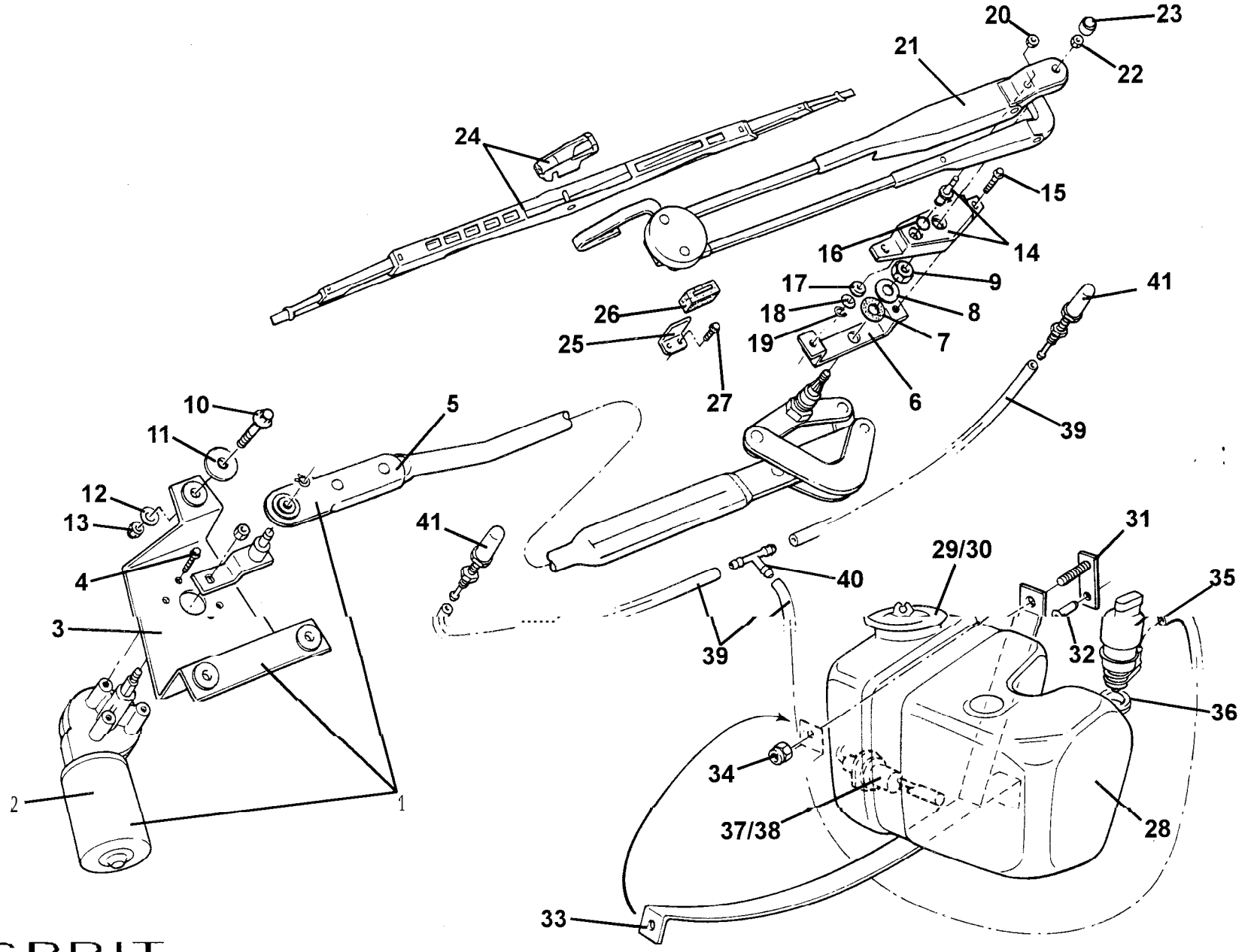
ESPR
17.21

Function Code 17.21 Windscreen Wiper Motor, Wipers & Washers

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Wiper Mechanism Assembly, LHD	includes items: 2 to 10		D082M4643F	1
Ola	Wiper Mechanism Assembly, RHD	Includes items: 2 to 10		D082M4628F	1
02	Wiper Motor, LHD			A082M4709S	1
02a	Wiper Motor, RHD			A082M4708S	1
03	Bracket, wiper motor mounting, LHD/RHD			A082M4629F	1
04	Bolt, flg. hd., motor to bracket			A082M6382H	3
05	Wiper Linkage Assembly, LHD			A082M4718S	1
05a	Wiper Linkage Assembly, RHD			A082M4719S	1
06	Fixing Plate, wiper spindle, LHD			C082M4633H	1
06a	Fixing Plate, wiper spindle, RHD			C082M4632H	1
07	Washer, rubber, M20, wiper spindle fixing			A082M6388H	1
08	Washer, flat, M20, wiper spindle fixing			A082M6387H	1
09	Nut, M20, wiper spindle fixing			A082M6386H	1
10	Circlip, linkage assembly to motor crank			A082M6383H	1
11	Screw, M5 x 30, mounting bracket to body			A082W5118F	3
12	Rubber Bush, mounting bracket to body			A082M6338F	3
13	Washer, flat, mounting bracket to body			A082W4098F	3
14	Locknut, M5, mounting bracket to body			A082W3088F	3

Function Code 17.21 Windscreen Wiper Motor, Wipers & Washers

Dep	Part	Description	Remarks	Option	Part Number	Qty
15		Nut, dome, M5, mounting bracket to body			A082W3086F	3
16		Mounting Plate, wiper ball joint			C082M4746F	1
17		Spacer, mounting plate to body			A082M4748F	1
18		Screw, M5 x 16, cap hd., mounting plate to body			A082W5184F	2
19		Washer, spring, M5, mounting plate to body			A082W413OF	2
20		Washer, flat, M5, mounting plate to body			A082W4129F	2
21		Wiper Arm Assembly, LHD			A082M6340F	1
21a		Wiper Arm Assembly, RHD			A082M6339F	1
22		Nut, M6, wiper arm to spindle			A082M6384H	1
23		Washer, wiper arm to spindle			A082M6385H	1
24		Head Cover, wiper arm			A082M6380F	1
25		Wiper Blade			A079M601 SF	1
26		Washer Pump & Reservoir Assembly			C079M601 OF	1
27		Mounting Bracket, washer reservoir			A075M6069Z	1
28		Pop Rivet, bracket to body			A075W6087Z	3
29		Washer, bracket to body			A075W4000Z	3
30		Jet, windscreen washer			A082M6369F	2
31		'T'-Piece, washer tubing			A075M6118F	1
32		Tubing, windscreen washer, 4mm			A050M6164V	2.6m



ESPRIT
17.21a

Function Code 17.21a Windscreen Wiper Motor, Wipers & Washers, '98 MY

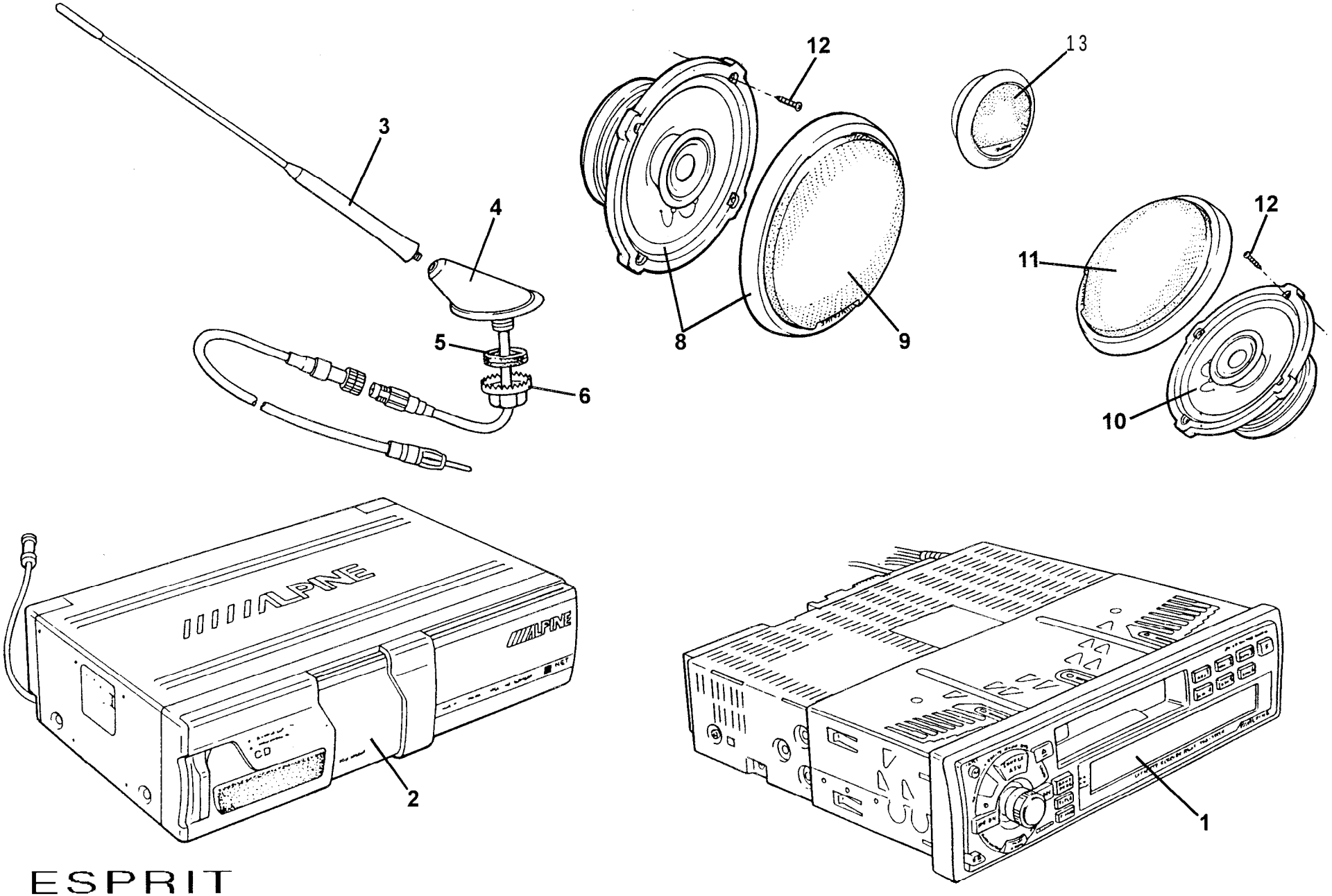
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Wiper Mechanism Assembly, RHD	includes items: 2 to 9		A082M5082F	1
Ola	Wiper Mechanism Assembly, LHD	includes items: 2 to 9		A082M5081 F	1
02	Wiper Motor			A082M5098F	1
03	Mounting Bracket, wiper motor			A082M5083F	1
04	Bolt, flg. hd., motor to bracket			A082M6382H	3
05	Wiper Linkage Assembly, LHD			TBA	1
05a	Wiper Linkage Assembly, RHD			TBA	1
06	Fixing Plate. wiper spindle, LHD			A082M5087F	1
06a	Fixing Plate. wiper spindle, RHD			A082M5086F	1
07	Washer, flat, rubber, M20, spindle to fixing plate			A082M6388H	1
08	Washer, flat, M20, spindle to fixing plate			A082M6387H	1
09	Nut, M20, spindle to fixing plate			A082M6386H	1
10	Screw, M5 x 30, flg. hd., bracket to body			A91 8W5209F	3
11	Washer, flat, M5 x 25 x 1.4			A082W4098F	3
12	Washer, flat, M5 x 10			A075W401 1Z	3
13	Nyloc, Nut, M5, half			AI 00W3113F	3
14	Pantograph Pivot Mounting Plate Kit, LHD	includes items: 16, 17, 18, 19		A082M5067F	1
14a	Pantograph Pivot Mounting Plate Kit, RHD	Includes items: 16, 17, 18, 19		A082M5068F	1

Function Code 17.21 a Windscreen Wiper Motor, Wipers & Washers, '98 MY

Dep	Part	Description	Remarks	Option	Part Number	Qty
15		Screw, M5 x 16, fig. hd., plate to body			A082W5184F	2
16		'0' ring, seal for pivot pin			A082M6653F	1
17		Thrust Washer, nylon, pivot pin to plate			A082Q0714F	1
18		Shim Washer, pivot pin to plate, 0.2/0.3mm x 10mm bore			A082M6652F	1
19		Circlip, pin to plate			A082M6649F	1
20		Nut, half, M8, pivot pin to pantograph			A111W3161F	1
21		Wiper Arm: LHD			A082M6651 F	1
21a		Wiper Arm, RHD			A082M6650F	1
22		Nut, M8 x 125, wiper arm to spindle			A907E6284F	1
23		Cover, wiper spindle nut			A082W6634F	1
24		Wiper Blade			A082M6654F	1
25		Bracket, wiper stop			A082M5080F	1
26		Buffer, wiper arm stop			Al 11 U0268F	1
27		Screw, M5 x 20 mm, wiper stop bracket to body			A082W5205Z	2
28		Washer Bottle	Includes fluid level sender & seal		A082M5104F	1
29		Cap, washer bottle			A082M6662F	4
30		Seal, washer bottle cap			A082U6201 F	1
31		Stud Plate, fixing washer bottle bracket to body			A082M5070J	1
32		Pop Rivet, stud plate fixing, washer bottle bkt			A075W6099F	1
33		Mounting Strap, washer bottle securing to body			A082U7881 F	1
34		Nyloc Nut, M5, washer bracket to body			A075W3008Z	2

Function Code 17.21a Windscreen Wiper Motor, Wipers & Washers, '98 MY

Dep	Part	Description	Remarks	Option	Part Number	Qty
35		Pump, washer bottle			**A082M6661 F**	1
36		Grommet, pump to bottle sealing			A082M6663F	1
37		Sender, washer fluid level	Part of item 29		**A082M6671 F**	1
38		Seal, screenwash level sender	Part of item 29		**A082M6672F**	1
39		Tubing, windscreen washer, 4mm			**A050M6164V**	2.6m
40		'T' piece, washer tubing			**A075M6118F**	1
41		Jet, windscreen washer			**A082M6369F**	2
42		Silicon Grease, pivot pin lubricating	Not illustrated		**A082M6299V**	As req.



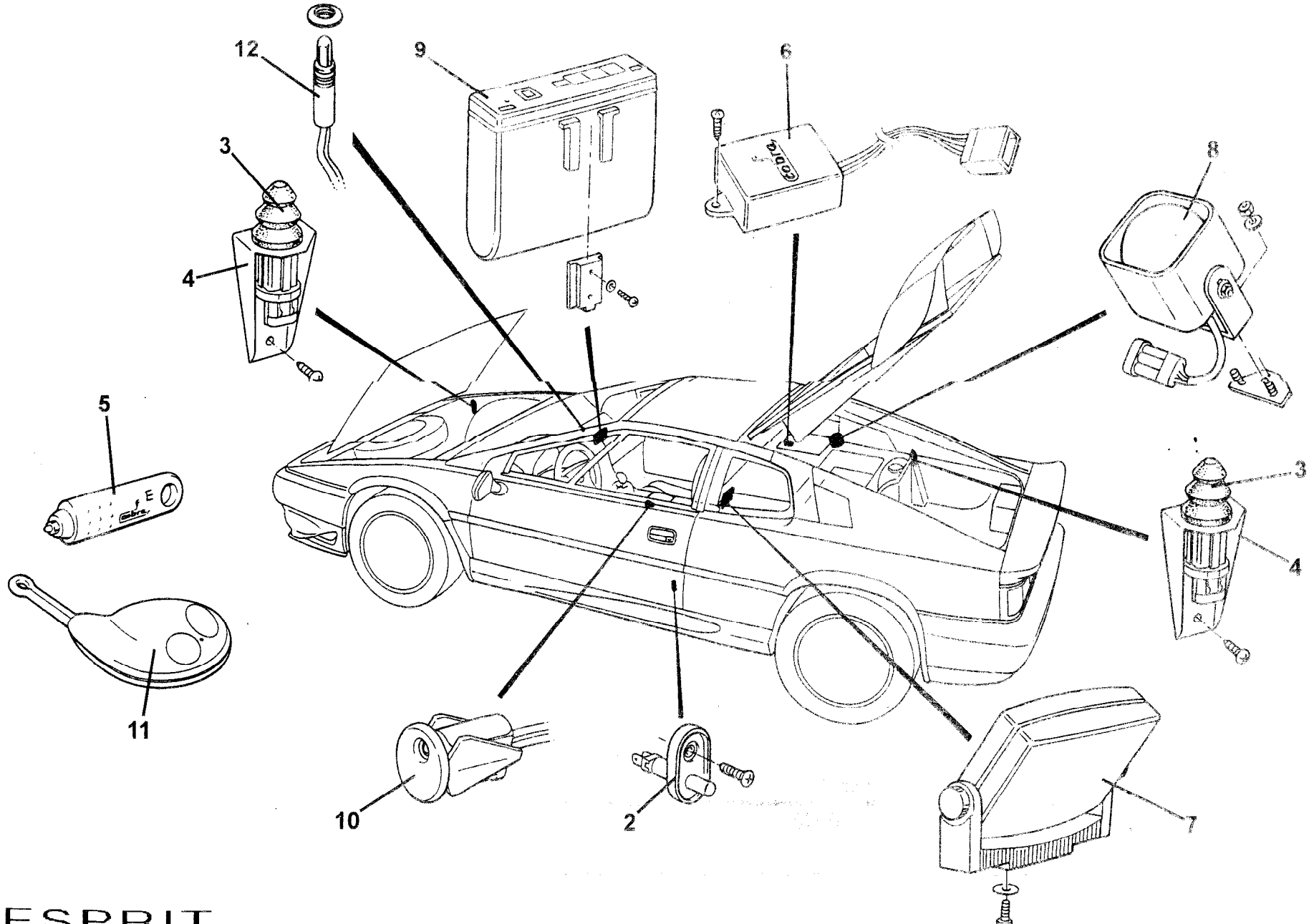
ESPRIT
17.27

Function Code 17.27 In Car Entertainment

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Radio/Cassette, Alpine		A082M6627F R/B	**A082M6676F**	1
Ola	Radio/Cassette, Alpine		Japan	**A082M6629F**	1
01b	Radio/CD player, Alpine		A082M6631 F R/B	**A082M6677F**	1
01c	Radio/CD player, Alpine	Federal spec.	USA, B082M6641F R/B	**C082M6641 F**	1
02	CD, autochanger, Alpine			**A082M6634F**	1
03	Aerial mast			**A082M6533F**	1
04	Aerial base			**A082M6534F**	1
05	Rubber Washer, mounting nut			**Al 11 M6033F**	1
06	Nut, aerial base to taigate			**A082M6555F**	1
07	Cable, aerial co-axial extension			**B082M4933F**	1
08	Speaker, bass, fitted in doors	Includes grille		**A082M6625F**	2
09	Grille, door bass speaker			**A082M6624F**	2
10	Speaker, front, fitted in fascia	Without grille		**A082M6640F**	2
11	Grille, front speaker			**B089M6080F**	2
12	Screw, No.8 x 3/4", pan pozi., speaker fixing			**A075W5037F**	16
13	Speaker Kit, tweeter, fitted in doors	Includes 2 speaker/grille assys.		**A082M6626F**	1

Function Code 17.27 In Car Entertainment

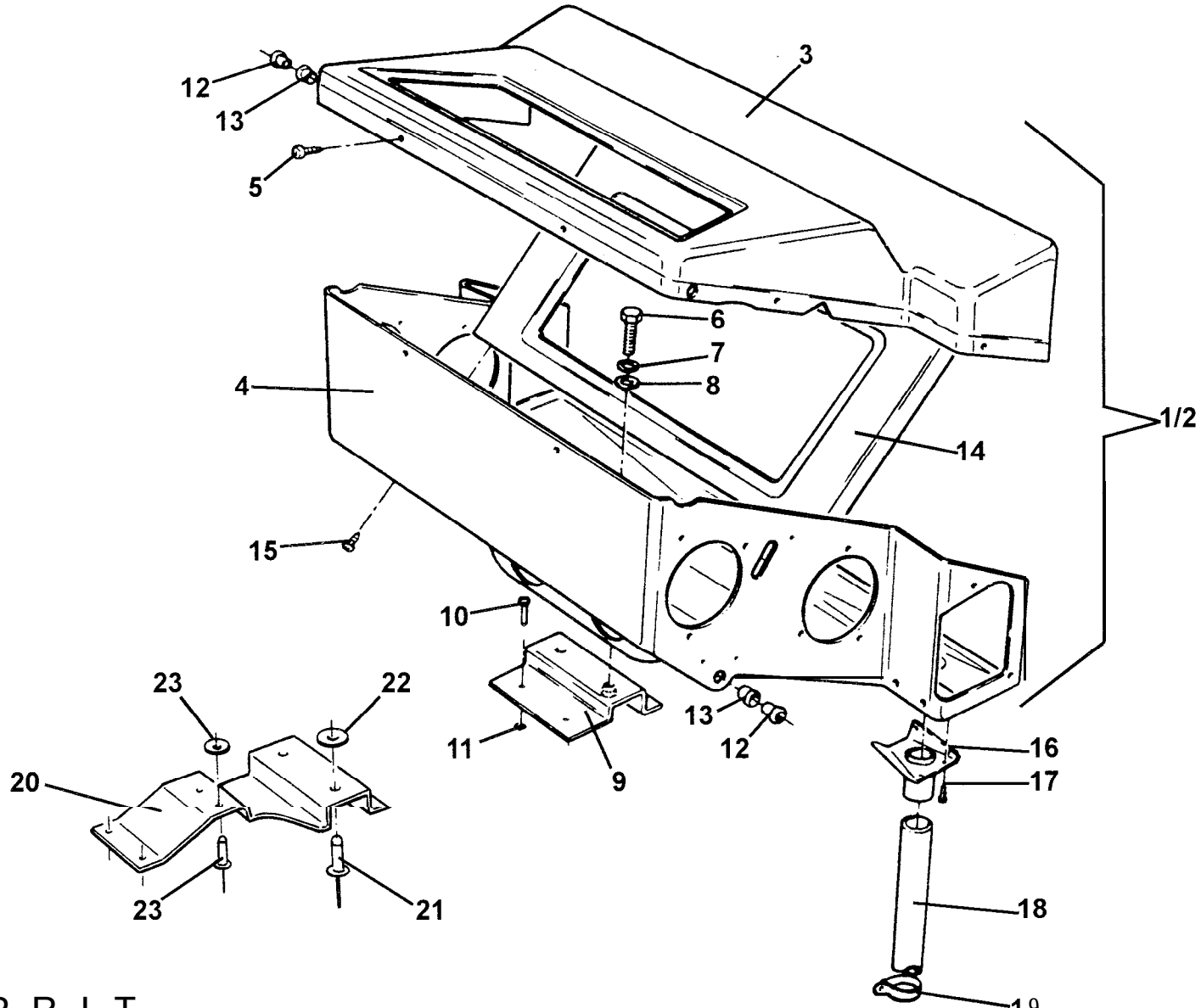
Dep	Part	Description	Remarks	Option	Part Number	Qty
		CD, autochanger	Not illustrated		A082M6634F	1



ESPRIT
17.33

Function Code 17.33 Security Alarm System

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cobra Alarm Kit 6422, 433MHz,	Not illustrated	'98 MY UK, Europe, Canada	A082M5061 F	1
Ola	Cobra Alarm Kit 6422, 433MHz,	Not illustrated	'98 MY Australia, A082M5062F R/B	**A082M5061 F**	1
01 b	Cobra Alarm Kit 6422, 433MHz,	Not illustrated	'98 MY USA, A082M5063F R/B	**A082M5061 F**	1
02	Microswitch, alarm activator, doors		'98 MY	**Al 11 M6035F**	2
03	Microwitch, alarm activator, bonnet & tailgate		'98 MY	**Al 11 M6037F**	2
04	Microwitch Mounting Bracket		'98 MY	**A082H5058F**	2
05	Touch Key		'98 MY	**A111M6101S**	1
06	Immobiliser Module, Cobra 6422	Order against transmitter no. (on controller)	'98 MY	**Al 11 M6104S**	1
07	Microwave Sensor		'98 MY	**Al 11 M6099S**	1
08	Siren Unit		'98 MY	**Al 11 M6098S**	1
09	Alarm Controller, Cobra 6422, with keys	Includes immobiliser, item 6	'98 MY	**Al 11 M6105S**	1
10	Touch Key Receptacle		'98 MY	**Al 11 M6102S**	1
11	Transmitter Key		'98 MY	**Al 11 M61OOS**	1
12	Alarm Tell-Tale LED	Includes leads & connector	'98 MY	**A111M6117S**	1



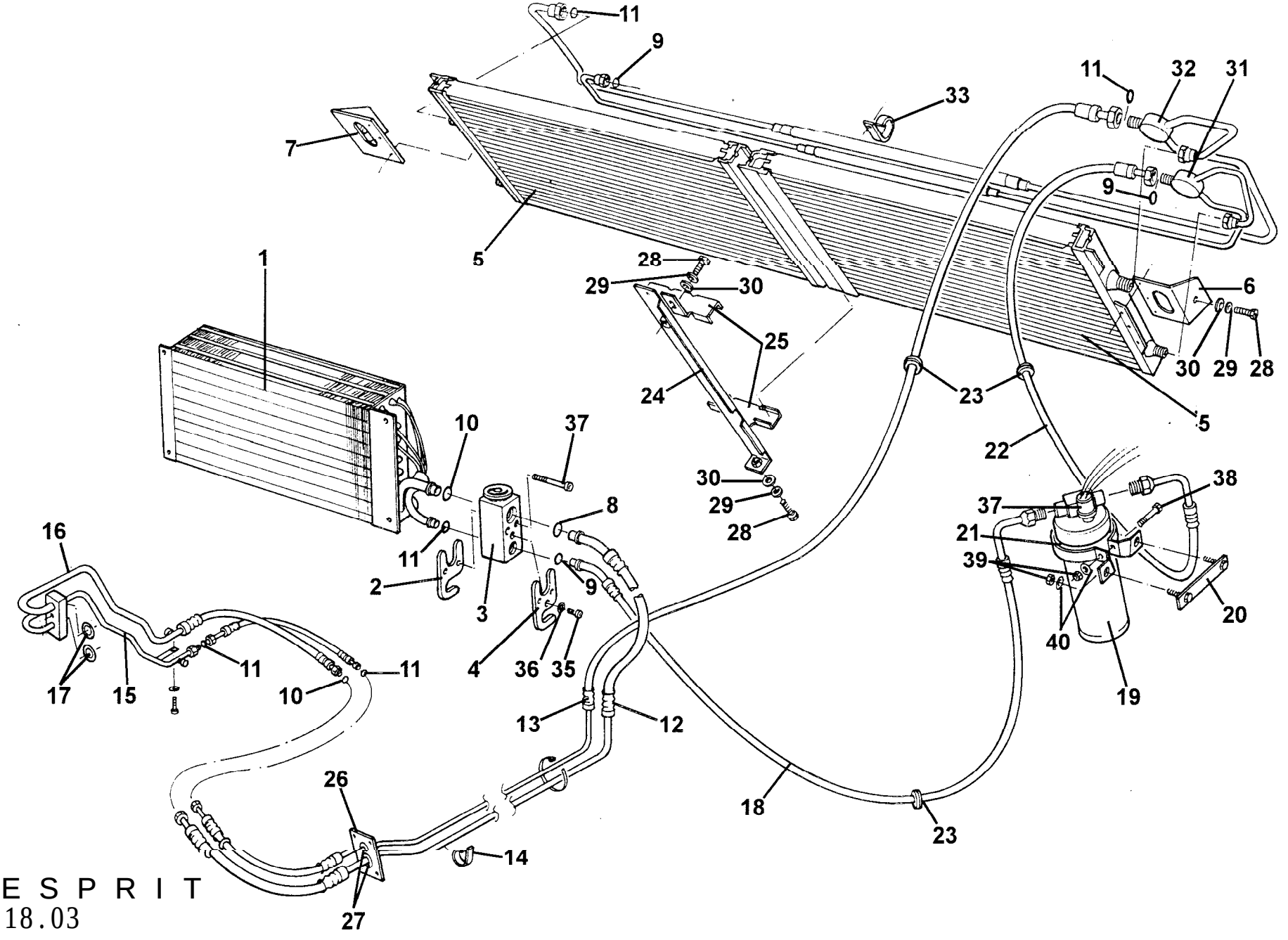
E S P R I T
18.01

Function Code 18.01 Heater/ Air Conditioning Assemblies, Housings

Dep	Pat-t Description	Remarks	Option	Part Number	Qty
01	Heater Assembly, LHD	Incl. heater matrix, vac. actuators, cables & controls	Heater cars	**A082P4291 F**	1
Ola	Heater Assembly, RHD	Incl. heater matrix, vac. actuators, cables & controls	Heater cars	**A082P4290F**	1
02	Heater/AC Assembly, LHD	Incl. evaporator, heater matrix, vac. actuators, cables & controls	AC cars	**B082P4289S**	1
02a	Heater/AC Assembly, RHD	Incl. evaporator, heater matrix, vac. actuators, cables & controls	AC cars	**B082P4288S**	1
03	Case, upper, heater only, LHD		Heater cars	**A079P4155K**	1
03a	Case, upper, heater only, RHD		Heater cars	**A079P4154K**	1
03b	Case, upper, AC/heater, LHD		AC cars	**B079P4108K**	1
03c	Case, upper, AC/heater, RHD		AC cars	**A079P4136K**	1
04	Case, lower, heater only, LHD		Heater cars	**A079P4157K**	1
04a	Case, lower, heater only, RHD		Heater cars	**A079P4156K**	1
04b	Case, lower, AC/heater, LHD		AC cars	**B079P4109K**	1
04c	Case, lower, AC/heater, RHD		AC cars	**B079P4137K**	1
05	Screw, upper to lower case			**A075W5032Z**	**9**
06	Setscrew, M6 x 12, case to mounting plate		Prior to '98MY	**A075W1027Z**	**2**
07	Washer, spring, M6, case to mounting plate		Prior to '98MY	**A075W4046Z**	**2**
08	Washer, flat, M6, case to mounting plate		Prior to '98MY	**A075W4013Z**	**2**

Function Code 18.01 Heater/ Air Conditioning Assemblies, Housings

Dep	Part Description	Remarks	Option	Part Number	Qty
09	Mounting Plate, case to body		Prior to '98MY	A079P4096Z	1
10	Pop Rivet, mounting plate to body			A075W6071Z	2
11	Washer, pop rivet to body			A075W4046Z	2
12	Bush, screen/footwell & mode flap pivot, inner			A089P0268F	4
13	Bush, screen/footwell & mode flap pivot, outer			A075P6064F	4
14	Closing Panel, mode flap			A079P4112K	1
15	Screw, closing panel to case			A075W5032Z	4
16	Drain Adapter			A079P4106Z	1
17	Pop Rivet, drain adaptor			A075W6090Z	4
18	Drain Tube, 5/8" PVC			A075U6083V	400mm
19	'P' Clip, drain tube			A075W6001 F	1
20	Mounting Plate, case to body		'98MY on	A082P4481 F	1
21	Pop Rivet, plate to case		'98MY on	A075W6087Z	2
22	Washer, 3/16 x 0.75", flat, pop rivet to case		'98MY on	A075W4009Z	2
23	Pop Rivet, plate to case		'98MY on	A075W6070Z	2
24	Washer, flat, 1/8 x 3/8", pop rivet to case		'98MY on	A075W4001Z	2
25	Pop Rivet, 'P' clip to body	Not illustrated		A075W6090Z	1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Function Code 18.03 AC Components, Pipes, Hoses

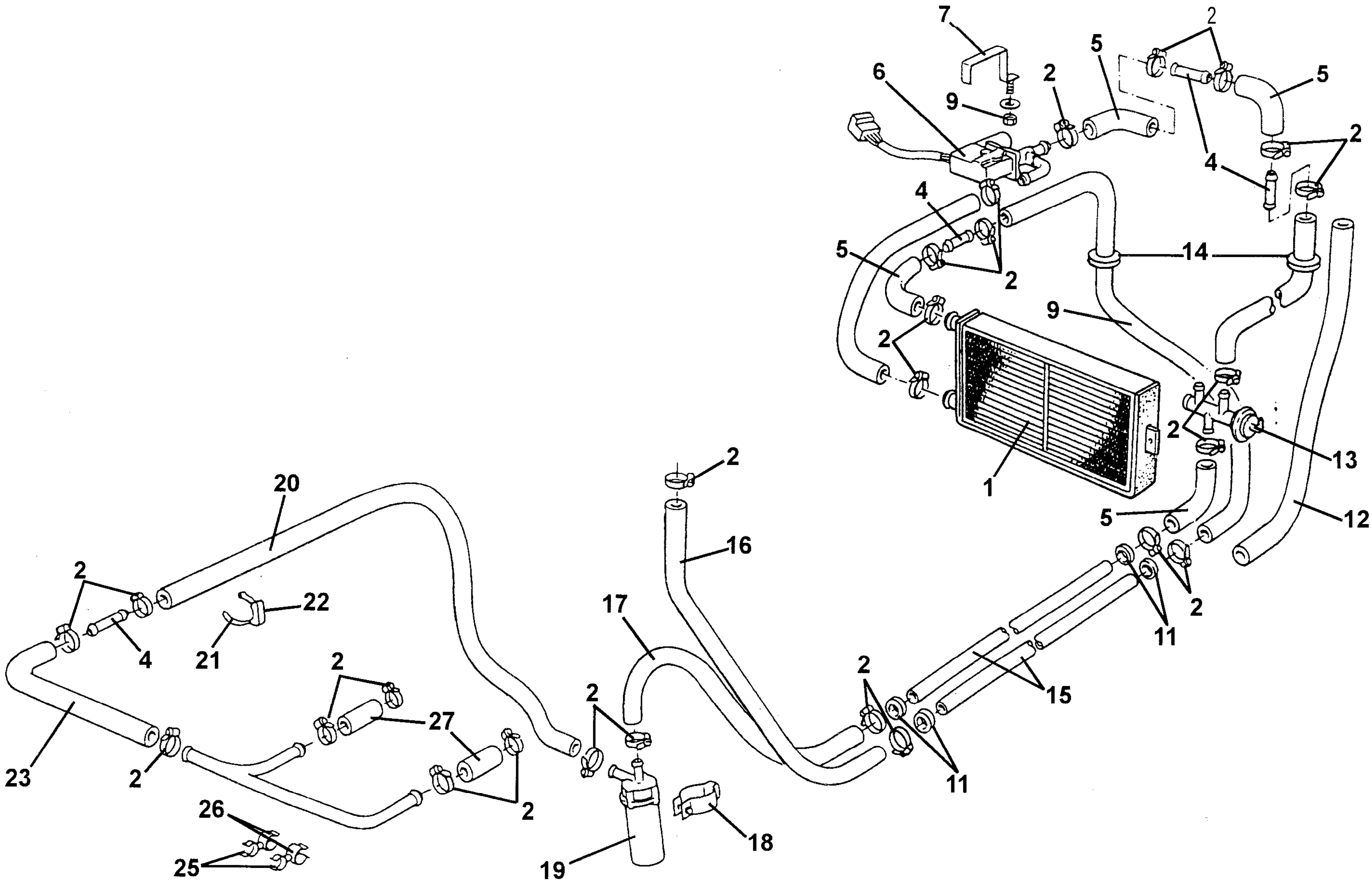
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Evaporator			A082P4399	1
02	Clamping Plate, evaporator to valve			A082P4401 F	1
03	Expansion Valve			A082P6073F	1
04	Clamping Plate, hoses to valve			A082P4402F	1
05	Condenser			A082P6066F	2
06	Bracket, Condenser Mounting R.H			A082P4395F	1
07	Bracket, Condenser Mounting L.H.			A082P4394F	1
08	'0' Ring			A082P6081 F	1
09	'0' Ring			A082P6078F	5
10	'0' Ring			A082P6080F	2
11	'0' Ring			A082P6079F	6
12	Hose Assembly, suction			A082P4386F	1
13	Hose Assembly, discharge			A082P4387F	1
14	'P' Clip, hose fixing			A075H6018Z	1
15	Hose Assembly, discharge			A082P4385F	1
16	Hose Assembly, suction		A082P4384F RIB	A082P4469F	1
17	'0' Rings, hose assembly			A082P6076F	2
18	Hose Assembly, receiver drier to expansion valve			A082P4381 F	1

Function Code 18.03 AC Components, Pipes, Hoses

Dep	Part Description	Remarks	Option	Part Number	Qty
19	Receiver Drier			**A082P4378F**	1
20	Stud Plate, receiver drier clamp to body			**A082P4407F**	1
21	Clamp, receiver drier rnounting			**A082P4396F**	1
22	Hose, condenser to reciever drier			**A082P4382F**	1
23	Grommet, hoses thro' body			**B075P6021 F**	3
24	Centre Stay, condenser mounting			**A082U7727Z**	1
25	Bracket, stay to condenser			A082U7724Z	2
26	Grommet Plate			**A082P4403F**	1
27	Grommet, pipes thro' plate			X036M6289Z	2
28	Bolt, M6 x 16, hex. hd., stay & bracket fix			**A075W1028**	4
29	Washer, spring, M6			**A075W4035F**	4
30	Washer, flat, M6			**A075W4015**	4
31	Pipe, discharge			**B082P4379F**	1
32	Pipe, suction			**A082P4383F**	1
33	'P' Clip,			**A075W6230**	1
34	Screw, M6 x 16, cap hd., skt., plate to connector			**A075W7017F**	1
35	Trianary Switch, receiver drier			**A082P6075F**	1
36	Washer, spring, M6			A075W4035Z	1
37	Screw, M5 x 40, cap hd., skt., plates to connector			**Al 00W7081 F**	2
38	Screw, M6 x 30, hex. hd., clamp to reciever drier			**A075W1032Z**	1
39	Washer, flat, M6 x 15 x 1.5, clamp fixing			**A075W4015F**	3

Function Code 18.03 AC Components, Pipes, Hoses

Dep	Part Description	Remarks	Option	Part Number	Qty
40	Nyloc Nut, M6, clamp fixing	-		A075W3009Z	3



ESPRIT
18.05

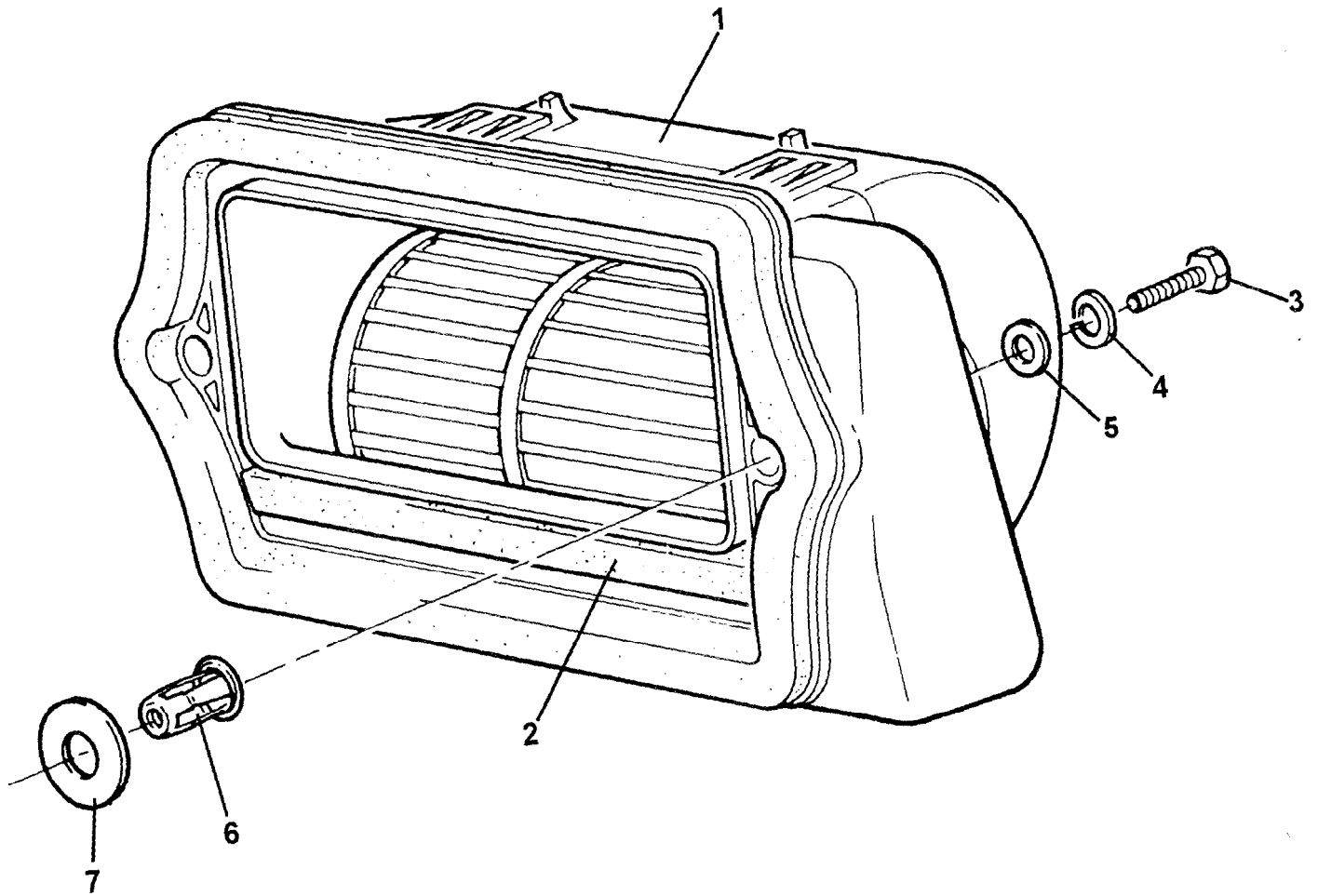
Service Parts List

Function Code 18.05 Heater, Pipes, Hoses

Dep	Part Description	Remarks	Option	Part Number	Qty
1	Heater Matrix			B075P6055F	1
2	Hose Clip, heater hoses			A079K6018F	25
3	Hose, valve to heater			B079P4142F	1
4	Connector Pipe			B075K011 1Z	4
5	Elbow Hose			A075P0189F	4
6	Water Valve			A082P4461 F	1
7	Clamping Bracket			A082P4471 IF	1
8	Nyloc Nut M5			A075W3008F	1
9	Hose, return from matrix			A079P4056F	1
10	Hose, feed to water valve, LHD	Cut to fit		A079P4056F	1
10a	Hose, feed to water valve, RHD	Cut to fit		A079P4056F	1
11	Grommet, heater pipes thro' chassis			B075P6021 F	2
12	Hose, feed, to water valve	Without recirculation system	GT3	A082K4295F	1
13	Diverter Valve, recirculation system			A082K4263F	1
14	Grommet, hoses thro' body			A079K6004F	4
15	Water Pipe, thro' chassis			A082P4200F	2
16	Hose, return, chassis pipe to engine			A082K4294F	1
17	Hose, feed, recirculation pump, to chassis pipe			A082K4282F	1

Function Code 18.05 Heater, Pipes, Hoses

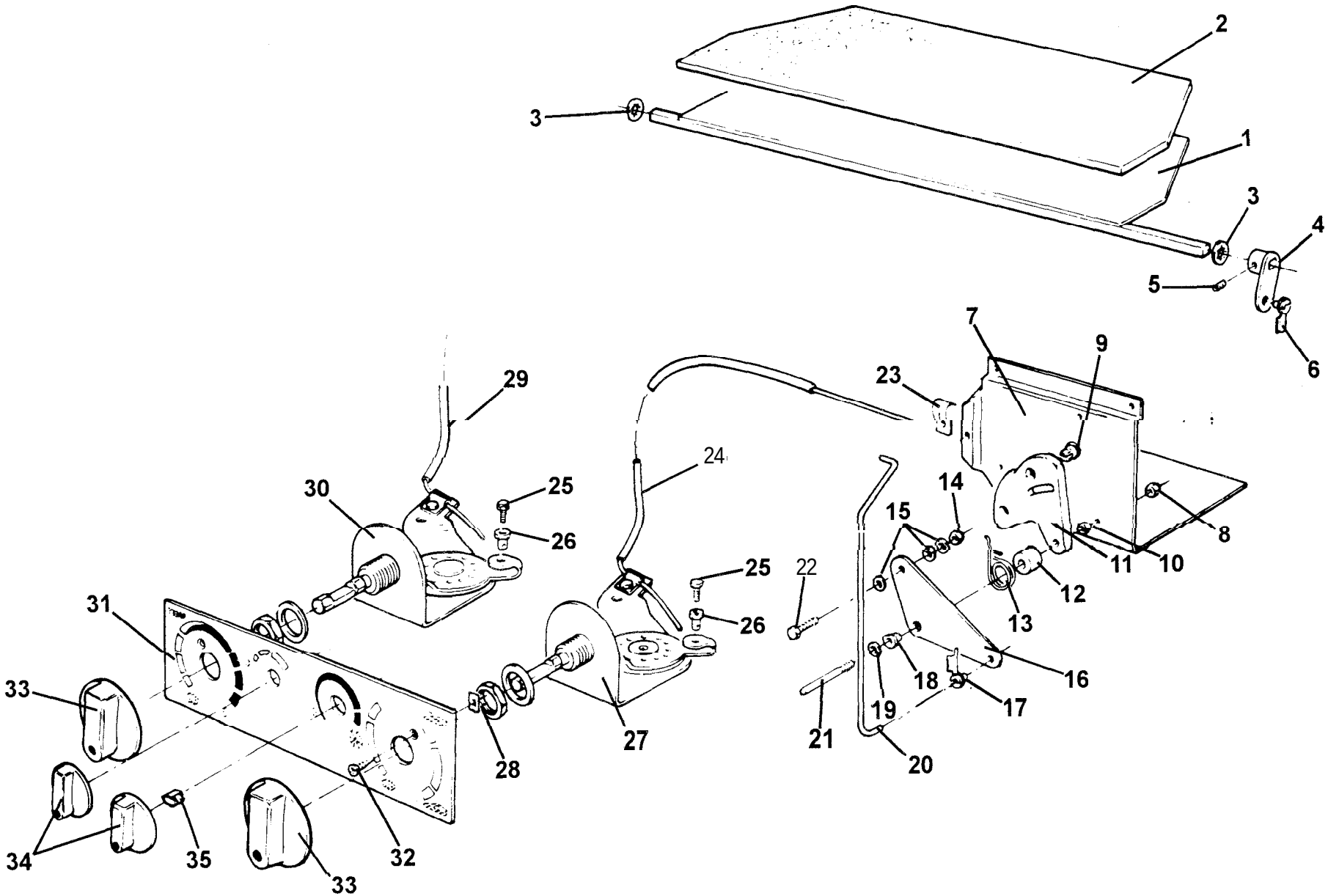
Dep	Part	Description	Remarks	Option	Part Number	Qty
18		Bracket, re-circ. pump mounting			B100K0040F	1
19		Recirculation Pump			A082K4263F	1
20		Hose, feed , connector to recirculation pump			A082K4283F	1
21		Cable Tie, hose retention			A082W6286F	1
22		Cradle, cable tie			A082W6293F	1
23		Hose, feed, 290mm, manifold pipe to connector	Cut to fit		B079P4056F	1
24		Manifold Pipe, heater feed			A079P4414F	1
25		Swivel Pipe Clip, female			A082W6615F	2
26		Swivel Pipe Clip, male			A082W6288F	2
27		Hose, 80mm, manifold pipe to engine	Cut to fit		A079P4056F	2



ESPRIT
18.07a

Function Code 18.07a AC/Heater Interior Blower Motor

Dep	Part	Description	Remarks	Option	Part Number	Qty
1		Interior Blower Motor Assembly			**A082M6619F**	1
2		Foam Seal, blower motor to bulkhead			**A082U6065V**	160mm
3		Setscrew, M6 x 30, motor to bulkhead			**A075W1032Z**	2
4		Washer, spring, M6, motor to bulkhead			**A075W4035Z**	2
5		Washer, flat, M6, motor to bulkhead			**A075W4015Z**	2
6		Jacknut, M6, motor to bulkhead			**A075W3034Z**	2
7		Washer, flat, M10, jacknut reinforcing			**A075W4025Z**	2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ESPRIT
18.09

Function Code 18.09 Driver Operated Controls

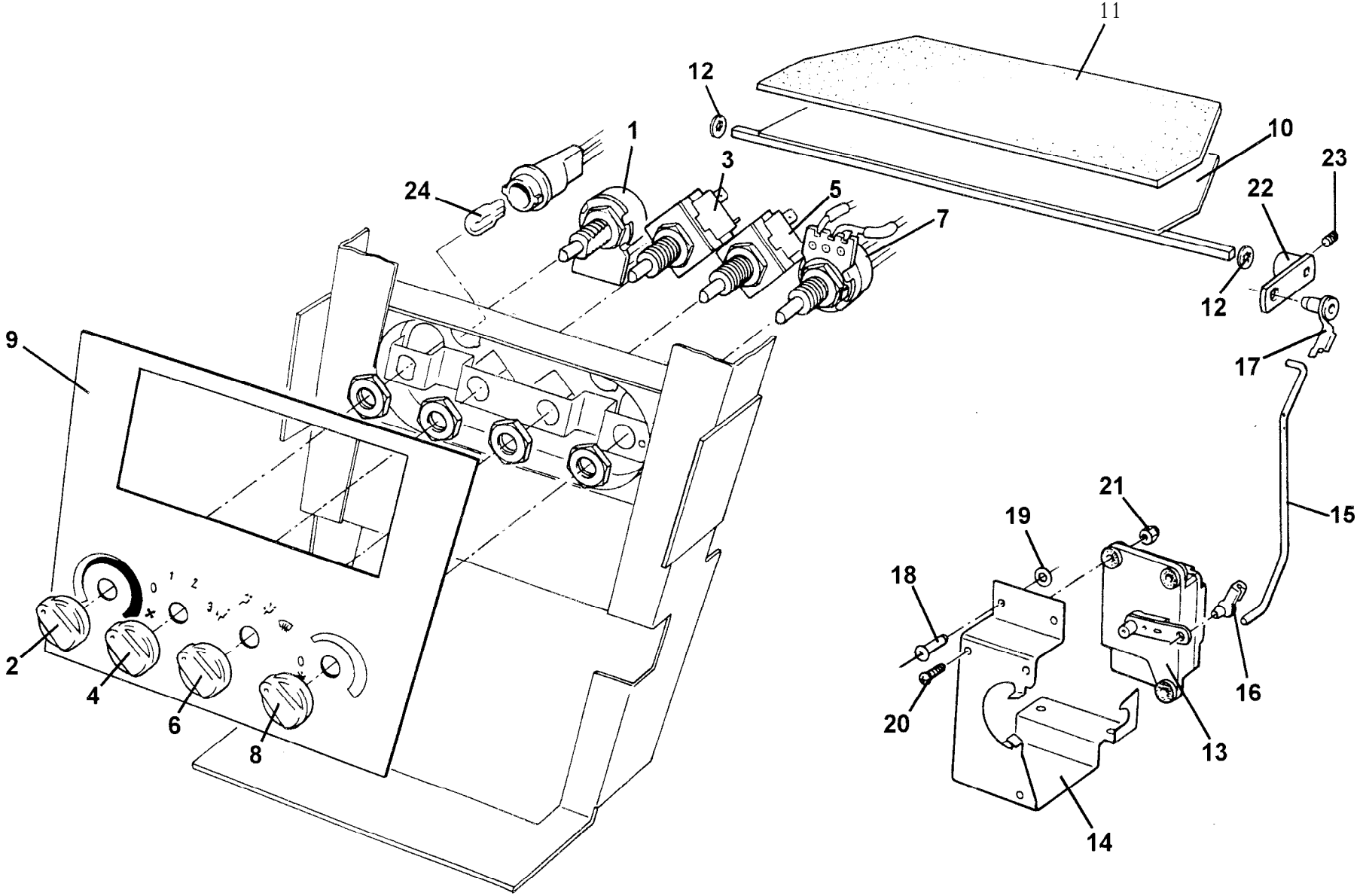
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Flap, screen/footwell, LHD			A079P4175F	1
Ola	Flap, screen/footwell, RHD			B079P4017F	1
02	Foam, screen/footwell flap			B036B6197V	1
03	Clip, screen flap pivot shaft ends			A075W6173F	2
04	Lever, screen flap operating			A079P4101 F	1
05	Grubscrew, lever to screen flap shaft			A075W7023Z	1
06	Clip, operating rod to screen flap			A075U6033F	1
07	Mounting Plate, control assy.			A082P4300F	1
08	Nyloc Nut, 10 UNF , pivot stud to plate			A075W3000Z	1
09	Trunnion, cable to cam			B075W6121 F	1
10	Nut, 10 UNF, pivot stud to plate			A075W3013Z	1
11	Cam, vacuum valve operating			B082P4281 F	1
12	Spacer, lever to cam			A075P0229F	1
13	Spring, cam return, LHD			A079P4103F	1
13a	Spring, cam return, RHD			B075P0176F	1
14	Nyloc Nut, 10 UNF , cam setscrew			A075W3000Z	1
15	Washer, cam setscrew			A075W4011 Z	3
16	Bellcrank lever, screen/footwell flap			A082P4184K	1

Function Code 18.09 Driver Operated Controls

Dep	Part	Description	Remarks	Option	Part Number	Qty
17		Clip, bellcrank lever to screen flap rod			A075U6033F	1
18		Bush, lever pivot			A075P0162K	1
19		Clip, lever pivot			A075M6173F	1
20		Rod, screen/footwell flap operating, LHB			A082P4246F	1
20a		Rod, screen/footwell flap operating, RHD			B079P4017F	1
21		Stud, 10 UNF, cam/lever pivot			A075P0225F	1
22		Setscrew, 10 UNF x 5/8", cam operating			A075W1001Z	
23		Clamp, cable to mounting plate			A082P4244F	1
24		Control Cable, air distribution, (black)			B082P4287F	1
25		Screw, Cable to nipple/trunnion			B074K6002Z	2
26		Nipple/Trunnion, rotary control			A074K6001Z	2
27		Rotary Control, air distribution			B082P4196F	1
28		Spire Nut, graphic panel fixing			A075W6014Z	2
29		Control Cable, temperature (green)			B082P4295F	1
30		Rotary control, temperature			B082P4196F	1
31		Graphics Panel, AC/heater			D082P4302F	1
31a		Graphics Panel, heater only			D082P4303F	1
32		Screw, No 6, graphic panel fixing			A075W5029Z	2
33		Knob, rotary controls / heat & distribution			A082P4349F	2
34		Knob, fan speed / fridge switch			A082P4350F	2
35		Spring Clip, Knob fixing			A082W6493F	2

Function Code 18.09 Driver Operated Controls

Dep	Part	Description	Remarks	Option	Part Number	Qty
36		Switch, refridgeration control	Not illustrated, see 18.09a		**A082M6221 F**	1
37		Switch, interior fan speed control	Not illustrated, see 18.09a		**A082M6223F**	**2**



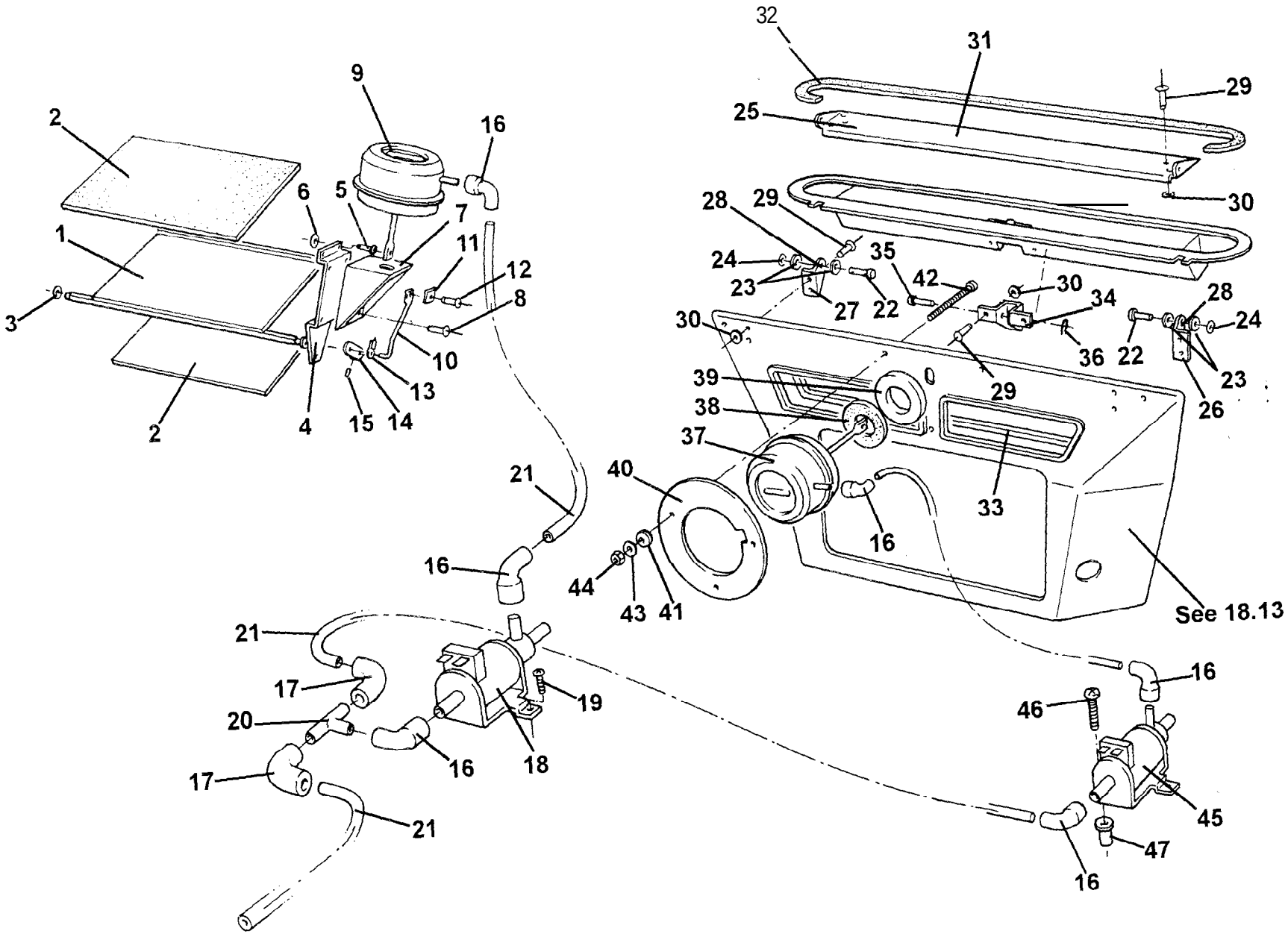
ESPRIT
18.09a

Function Code 18.09a Driver Operated Controls, '98MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Switch, temperature control			**A082M5076F**	1
02	Knob, temperature control			**A082P4350F**	1
03	Switch, fan speed	Also '96 & '97 MY		**A082M6223F**	1
04	Knob, fan speed			**A082P4350F**	1
05	Switch, distribution control			**A082M6223F**	1
06	Knob, distribution control			**A082P4350F**	1
07	Switch, refigeration control	Also '96 & '97 MY		**A082M6221 F**	1
08	Knob, refrigeration control			**A082P4350F**	1
09	Graphics Panel			**A082P4445F**	1
10	Flap, screen/footwell, RHD			**B079P4017F**	1
10a	Flap. screen/footwell, LHD			**B079P4015F**	1
11	Foam, screen/footwell flap			**B036B6197V**	1
12	Retaining Clip, flap pivot shaft			**A075W6173F**	2
13	Steppermotor, flap actuation	Comes with LHD bracket		**A082P4462F**	1
14	Bracket, steppermotor mounting	RHD only		**A082P4467F**	1
15	Rod, flap actuation			**A082P4460F**	1
16	Clip, rod to steppermotor lever			**A075U6033Z**	1
17	Clip, rod to flap lever			**A082U6267F**	1
18	Pop Rivet, bracket fix.			**A075W6090Z**	4
19	Washer, flat			**A075W4001** Z	4
20	Screw, pan hd. pozi., steppermotor fix.			**A082W5141 F**	2

Function Code 18.09a Driver Operated Controls, '98MY

Dep	Part Description	Remarks	Option	Part Number	Qty
21	Nyloc Nut			A075W3049F	2
22	Lever, flap actuation			A079P41 OOF	1
23	Grubscrew, lever to shaft			A075W7023Z	1
24	Bulb, panel illumination			A082M6077S	2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See 18.13

E S P R I T
18.11

Function Code 18.11 AC Vacuum Controls

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Mode Flap, LHD			CO79P4014F	1
Ola		Mode Flap, RHD			CO79P4176F	1
02		Foam Seal, mode flap			C079P4161K	2
03		Retaining Clip, mode flap pivots			A075W6173F	2
04		Mounting Plate, actuator bracket			B079P4093F	1
05		Pop Rivet, plate to case			A075W6090Z	5
06		Washer, flat, plate to case			A075W4001Z	5
07		Bracket, vacuum actuator mounting			B075P017OF	1
08		Pop Rivet, bracket to plate			A075W6071Z	4
09		Vacuum Actuator, mode flap			B075P6059F	1
10		Rod, actuator to mode flap			A075P0234F	1
11		Locking Tab, actuator to rod			A079P4149K	1
12		Pop Rivet, locking tab to lever			A075W6090Z	1
13		Clip, mode flap to lever			A075U6033F	1
14		Lever, mode flap operating			A079P41 OOF	1
15		Grub Screw, lever to flap rod			A075W7023Z	1
16		Elbow Connector, unequal bore			A075P6069F	7
17		Elbow Connector			A075P6079F	2

Function Code 18.11 AC Vacuum Controls

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Solenoid Valve, actuator control, mode flap		'98 MY on*	**A082M6666F**	1
19	Screw, No.8 x 3/8", pan hd, pozi., S/T, solenoid fixing		Non SIR cars,'98 MY on	**A075W5032Z**	2
19a	Nyloc Nut, M4, solenoid to SIR bracket	Not illustrated	SIR cars, '98 MY on	**A075W3049F**	2
20	'T' Piece, vac. hose connecting			**B075P6081 F**	1
21	Vacuum Hose	Cut to fit		**A075P6068V**	6 m
22	Clevis Pin, flap pivot			**A075P6027Z**	2
23	Washer, clevis pin to bracket			**A075W4001Z**	4
24	Spire Clip, clevis pin retention			**A075W6022Z**	2
25	Flap, fresh air/re-circ.			**A082P4273J**	1
26	Bracket, flap supporting, RH			**B082P4276F**	1
27	Bracket, flap supporting, LH			**B082P4277F**	1
28	Bush, flap support bracket			**A082P6058F**	2
29	Pop Rivet, brackets fixing			**A075W6071Z**	6
30	Washer, brackets fixing			**A075W4001Z**	6
31	Pivot Bracket, fresh air/re-circ. flap			**A082P4275F**	1
32	Foam Seal, flap to plenum			**B082P4265F**	1
33	Foam Seal, flap to body			**C082P4270F**	1
34	Pivot Bracket, actuator to flap			**A082P4275F**	1
35	Clevis Pin, bracket to rod			**A075P6027Z**	1
36	'R' Clip, 3/16", pin retaining			**A082W6348F**	1
37	Vacuum Actuator, fresh air/re-circ flap			**B075P6059F**	1

Function Code 18.11 AC Vacuum Controls

Dep	Part Description	Remarks	Option	Part Number	Qty
38	Pad, actuator insulating			A082P4341 F	1
39	Spacer, actuator mounting,			A082P4279F	1
40	Clamping Ring, actuator fixing			C082P4280F	1
41	Grommet, clamping ring			A082P6057F	3
42	Screw, M3 x 35, clamping ring to plrenum			A082W5122F	3
43	Washer, flat, M3, clamping ring to plenum			A075W4001 F	6
44	Nyloc Nut, M3, clamping ring to plenum			A079W3060F	3
45	Solenoid Valve, actuator control, fresh air/re-circ flap		'98 MY on*	A082M6666F	1
46	Screw, M4 x 20, pan hd., pozi., solenoid to bracket		'98 MY on	A075W5081 F	1
47	Rawlnut, M4, rubber, solenoid & bracket fix.	For bracket & modules see 17.03	'98 MY on	B082W6350F	1

*For vac. switches & hoses prior to '98 MY see Esprit '93 to '96 Parts List: M082T0325J

Function Code 18.13 Air Trunking & Ventilators

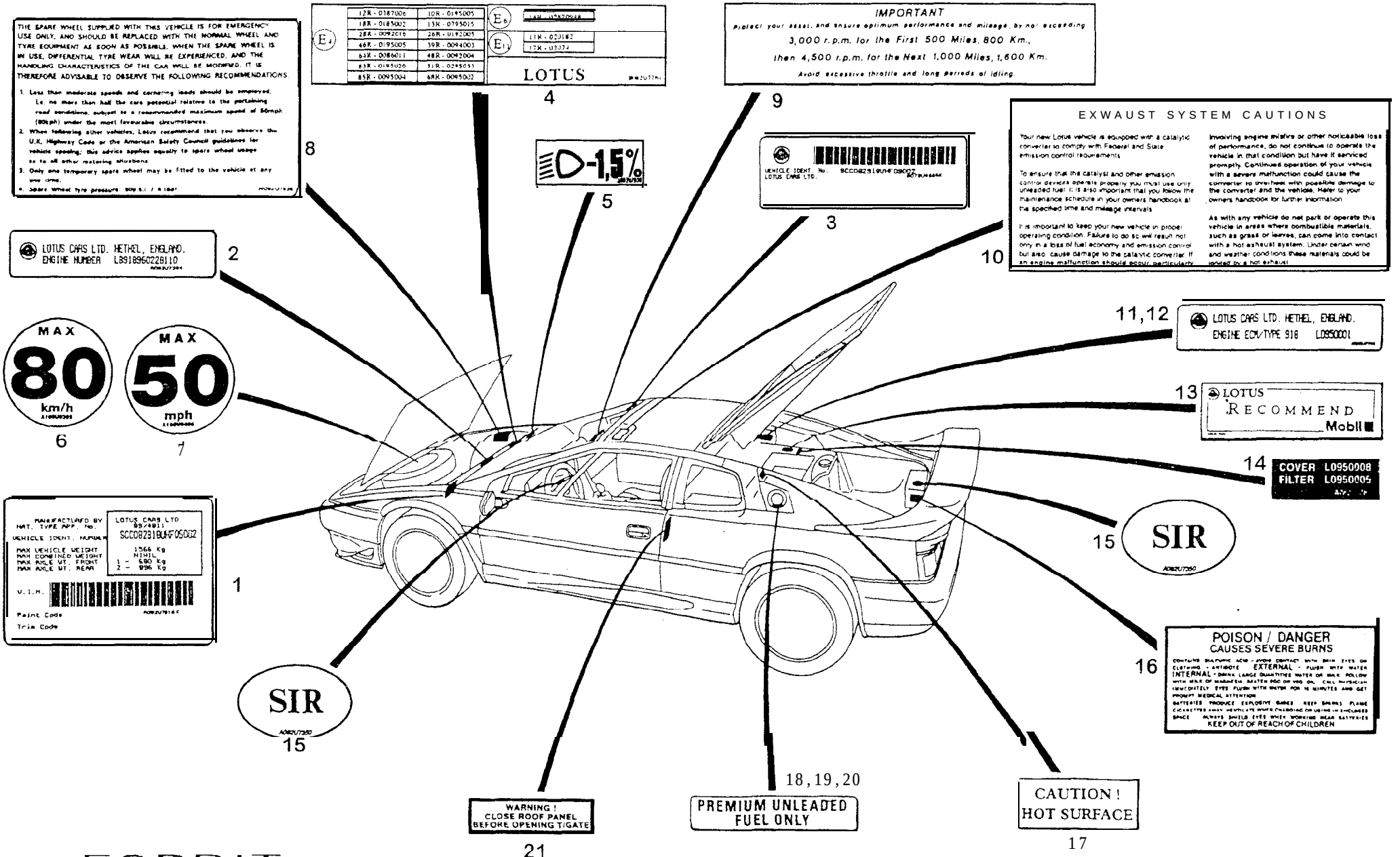
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Face Level Vent, LH			A082P6085F	1
02	Face Level Vent, centre			A082P6083F	1
03	Face Level Vent, RH			A082P6084F	1
04	Duct, adaptor to centre face level vent			A082P4424J	1
05	Adaptor, duct to casing, RHD			A082P4434K	1
05a	Adaptor, duct to casing, LHD			A082P4439K	1
06	Screw, No.8 x 0.5", adaptor to casing			A075W5034Z	4
07	Demist Duct, LH			A082P4459K	1
08	Demist Duct, RH			B079P4039F	1
09	Demist Vent, air directing	Bonded to ducts		B079P4039F	2
10	Screw, No.6 x 0.5", demist ducts to body			A075W5015Z	4
11	Spirenut, No.6, demist ducts to body			A075W6014Z	4
12	Hose, adaptor to demist duct			A079P6007V	I m
13	Hose Clip, demist hose to adaptor			AI 00E6082F	4
14	Adaptor, casing to demist hose			A079P4119K	2
15	Pop Rivet, adaptors to casing			A075W6090Z	18
16	Washer, flat, adaptors to casing			A075W4001Z	30
17	Hose, adaptor to outer face level vents			A079P4005V	0.8m

Function Code 18.13 Air Trunking & Ventilators

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Screw, No.6 x 3/8", face level vent hose fix.			A075W501 1Z	4
19	Adaptor, casing to outer face level vent hose			A079P4120K	2
20	Hose, adaptor to footwell			A075P6066V	1m
21	Screw, No.8 x 0.75", duct to casing			A075W5032Z	4
22	Hose Clip, footwel hose to adaptor			A075M6145F	2
23	Duct/Adaptor, footwell outlets			A079P4117K	1
24	'P' Clip, speaker cable			A075W6223F	2
25	Mounting Panel, interior blower motor			D082P4259K	1
26	Screw, No.8 x 0.5", panel to casing			A075W5031Z	4
27	Angle Bracket, panel to body			A082P4346F	1
28	Pop Rivet, bracket to panel			A075W6090Z	2
29	Washer, flat, pop rivet to panel			A075W4001Z	2
30	Screw, No.6 x 0.5", bracket to body			A075W5020F	2
31	Spire Nut, No.6, bracket to body			A075W6014Z	2
32	Adaptor, duct to footwell hose			A075P0150F	2
33	Blanking Panel, bulkhead aperture, RHD			A082P4272K	1
33a	Blanking Panel, bulkhead aperture, LHD			A082P4271 K	1
34	Foam Seal, plenum cover to bulkhead			A082U6067F	1.8m
35	Plenum Cover			B082B4808K	1
36	Adaptor, plenum cover to drain hose			A082P4283J	1
37	Screw, M5 x 20, flg. hd., plenum to bulkhead	Black finish		A082W5205F	7

Function Code 18.13 Air Trunking & Ventilators

Dep	Part Description	Remarks	Option	Part Number	Qty
38	Rawlnut, M5, plenum to bulkhead			**A075W6074F**	7
39	Tubing, plenum drain			**A075U6083V**	22cm
40	Snapper Clip, tube to plenum cover			**A082W6315F**	1
41	Grommet, drain tube thro' body			**A075P6096Z**	1
42	Ventilator, rear luggage compartment			**A082P4354F**	1
43	Plinth, ventilator mounting			**A082P4355F**	1
44	Pop Rivet, plinth to body			**A076W6099F**	8


THE SPARE WHEEL SUPPLIED WITH THIS VEHICLE IS FOR EMERGENCY USE ONLY, AND SHOULD BE REPLACED WITH THE NORMAL WHEEL AND TYRE EQUIPMENT AS SOON AS POSSIBLE, WHEN THE SPARE WHEEL IS IN USE, DIFFERENTIAL TYRE WEAR WILL BE EXPERIENCED, AND THE HANDLING CHARACTERISTICS OF THE CAR WILL BE MODIFIED. IT IS THEREFORE ADVISABLE TO OBSERVE THE FOLLOWING RECOMMENDATIONS
1. Less than moderate speeds and cornering loads should be employed, i.e. no more than half the care potential relative to the pertaining road conditions, subject to a recommended maximum speed of 80mph (80kph) under the most favourable circumstances.
2. When following other vehicles, Lotus recommend that you observe the U.K. Highway Code or the American Safety Council guidelines for vehicle spacing; this advice applies equally to spare wheel usage as to all other motoring situations.
3. Only one temporary spare wheel may be fitted to the vehicle at any one time.
4. Spare wheel tyre pressure 30lb.s.i. / 4 bar.
12R - 0387006
18R - 0185002
28R - 0092016
46R - 0195005
63R - 0086011
83R - 0195026
85R - 0095004
10R - 0195005
13R - 0795015
26R - 0192005
39R - 0094003
48R - 0092004
51R - 0295033
68R - 0095002
E6
E11
11R - 020182
12R - 03374
LOTUS
4
IMPORTANT
Protect your asset, and ensure optimum performance and mileage, by not exceeding
3,000 r.p.m. for the First 500 Miles, 800 Km.,
then 4,500 r.p.m. for the Next 1,000 Miles, 1,600 Km.
Avoid excessive throttle and long periods of idling.
9
D-1,5%
5
VEHICLE IDENT. No. SCC08231GUHF050027
LOTUS CARS LTD.
3
EXWAUST SYSTEM CAUTIONS
Your new Lotus vehicle is equipped with a catalytic converter to comply with Federal and State emission control requirements.
To ensure that the catalyst and other emission control devices operate properly you must use only unleaded fuel. It is also important that you follow the maintenance schedule in your owners handbook at the specified time and mileage intervals.
It is important to keep your new vehicle in proper operating condition. Failure to do so will result not only in a loss of fuel economy and emission control but also cause damage to the catalytic converter. If an engine malfunction should occur, particularly involving engine misfire or other noticeable loss of performance, do not continue to operate the vehicle in that condition but have it serviced promptly. Continued operation of your vehicle with a severe malfunction could cause the converter to overheat with possible damage to the converter and the vehicle. Refer to your owners handbook for further information.
As with any vehicle do not park or operate this vehicle in areas where combustible materials, such as grass or leaves, can come into contact with a hot exhaust system. Under certain wind and weather conditions these materials could be ignited by a hot exhaust.
10
LOTUS CARS LTD. HETHEL, ENGLAND.
ENGINE NUMBER L8918960228110
2
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MAX 80 km/h
6
MAX 50 mph
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11,12
LOTUS CARS LTD. HETHEL, ENGLAND.
ENGINE ECU/TYPE 918 L0950001
13
LOTUS RECOMMEND Mobil
14
COVER L0950008
FILTER L0950005
MANUFACTURED BY
MAT. TYPE APP. No.
LOTUS CARS LTD
SCC08231GUHF050027
VEHICLE IDENT. NUMBER
MAX VEHICLE WEIGHT 1566 Kg
MAX COMBINED WEIGHT NIHIL
MAX AXLE WT. FRONT 1 - 680 Kg
MAX AXLE WT. REAR 2 - 896 Kg
V.I.N.
Paint Code
Trim Code
1
SIR
15
SIR
15
POISON / DANGER
CAUSES SEVERE BURNS
CONTAINS SULPHURIC ACID - AVOID CONTACT WITH SKIN, EYES OR CLOTHING. - ANTIDOTE EXTERNAL - FLUSH WITH WATER INTERNAL - DRINK LARGE QUANTITIES WATER OR MILK. FOLLOW WITH MILK OF MAGNESIA, BEATEN EGG OR VEG OIL. CALL PHYSICIAN IMMEDIATELY. EYES FLUSH WITH WATER FOR 15 MINUTES AND GET PROMPT MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES. KEEP SPARKS, FLAME CIGARETTES AWAY. VENTILATE WHEN CHARGING OR USING IN ENCLOSED SPACE. ALWAYS SHIELD EYES WHEN WORKING NEAR BATTERIES.
KEEP OUT OF REACH OF CHILDREN
16
WARNING !
CLOSE ROOF PANEL
BEFORE OPENING T/GATE
21
18,19,20
PREMIUM UNLEADED
FUEL ONLY
CAUTION !
HOT SURFACE
17

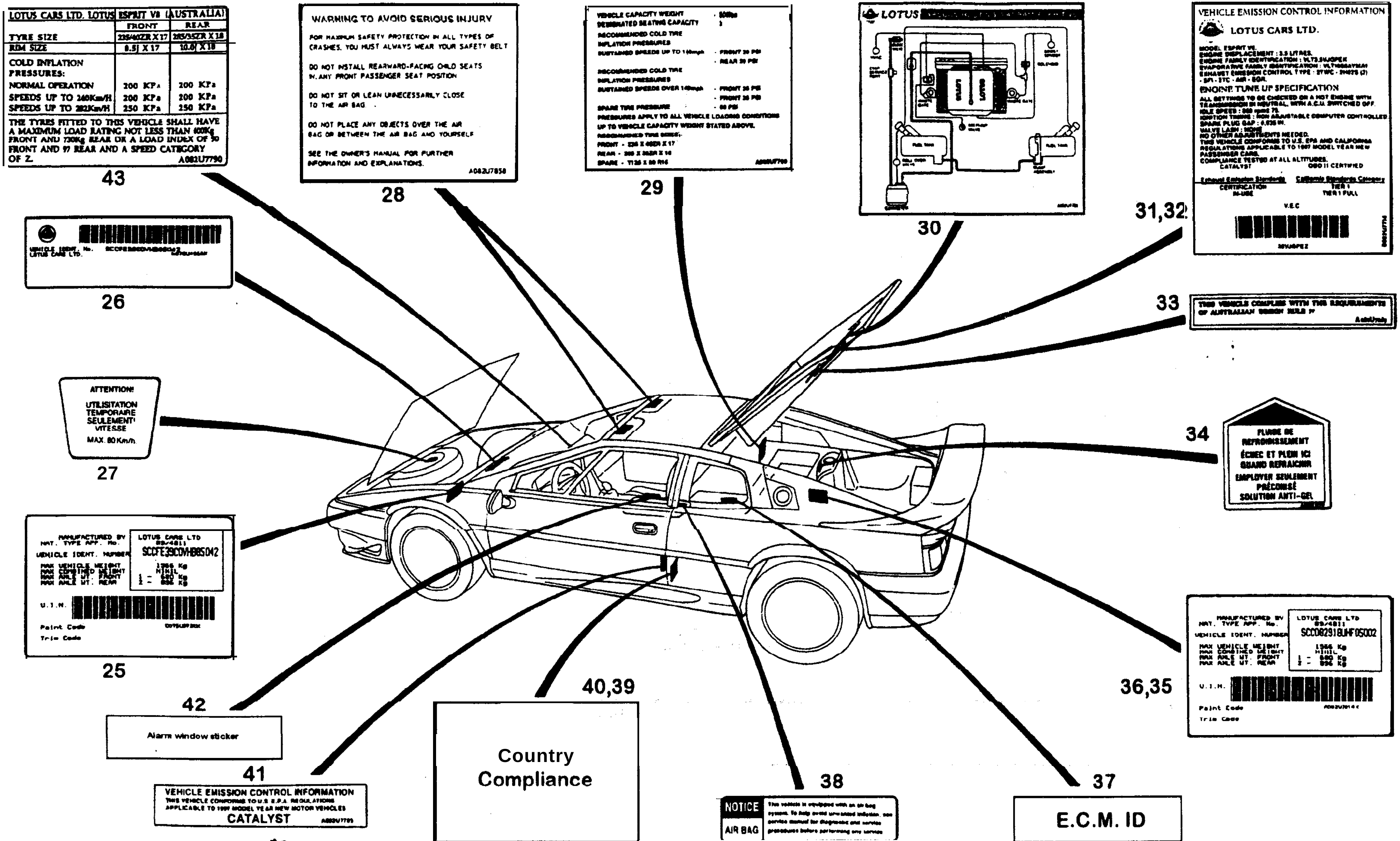
ESPRIT
19.01

Function Code 19.01 Labels,Certificates, Literature etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Label, VIN (main)			A082U7822K	1
02	Label, Engine Number			A082U7394K	1
03	Label, VIN	Fits to windscreen top		B079U4666 K	1
04	Label, 'E' mark			B082U7786F	1
05	Label, Headlamp levelling,			B082U7039F	1
06	Label, Spare wheel waming, 50 mph			A100U0406F	1
07	Label, Spare wheel warning, 80 kmh		European	A100U0892F	1
08	Label, Spare wheel, instructions for use			A082U7636F	1
09	Label, Running in', instructions			A076B0968F	1
10	Label, Exhaust system caution			C076U1139F	1
11	Label, E.C.M. ID		USA spec	A082U7808K	1
12	Label, E.C.M. ID		UK, Euro, Australia	A082U7879K	1
13	Label, recommended oil			A082U7826K	1
14	Label, Air Filter/Cover			A082U7787F	2
15	Label, SIR			A082U7350F	2
16	Label, Battery dangers, poisons, acids etc			A075M6143F	1
17	Label, Caution ! hot surface			A082U7455F	1
18	Label, Premium unleaded fuel only			A082U7800F	1

Function Code 19.01 Labels,Certificates, Literature etc.

Dep	Part	Description	Remarks	Option	Part Number	Qty
19		Label, Premium unleaded fuel only		French language	A082U4981 F	1
20		Label, Premium unleaded fuel only		Swedish language	A085U5095F	1
21		Label, Roof panel warning			A082U4978F	1
		Label, Chassis chart		Inc Belgian 'ETA' Number	B082U7813K	1
		Label, Compliance		Canada	A082U7859F	1
		Label, Layout - Chassis / VIN Label Base		Canada	A082U7400F	1
		Label, Layout - Chassis / VIN Label Base		Canada / French language	A082U7401 F	1
		Label, Fuel		Canada (Fits fuel filler flap)	A100U0401 F	2
		Label, Unleaded		Canada (Fits under fuel cap)	A082U4981 F	2
		Label, Spare wheel		Canada (Fits spare wheel cover)	A085U5087F	1
		Label, Anti - Freeze		Canada (Fits header tank)	A089U1811F	1
		Label, Fuel economy		UK spec	A082U7782K	1
		Label, Seat cover warning			A089U4954K	2



LOTUS CARS LTD. LOTUS ESPRIT V8 (AUSTRALIA)
FRONT REAR
TYRE SIZE 235/40ZR X 17 285/35ZR X 18
RIM SIZE 8.5J X 17 10.0J X 18
COLD INFLATION PRESSURES:
NORMAL OPERATION 200 KPa 200 KPa
SPEEDS UP TO 240Km/H 200 KPa 200 KPa
SPEEDS UP TO 282Km/H 250 KPa 250 KPa
THE TYRES FITTED TO THIS VEHICLE SHALL HAVE A MAXIMUM LOAD RATING NOT LESS THAN 600Kg FRONT AND 730Kg REAR OR A LOAD INDEX OF 90 FRONT AND 97 REAR AND A SPEED CATEGORY OF Z.
A082U7790
43
WARNING TO AVOID SERIOUS INJURY
FOR MAXIMUM SAFETY PROTECTION IN ALL TYPES OF CRASHES, YOU MUST ALWAYS WEAR YOUR SAFETY BELT
DO NOT INSTALL REARWARD-FACING CHILD SEATS IN ANY FRONT PASSENGER SEAT POSITION
DO NOT SIT OR LEAN UNNECESSARILY CLOSE TO THE AIR BAG
DO NOT PLACE ANY OBJECTS OVER THE AIR BAG OR BETWEEN THE AIR BAG AND YOURSELF
SEE THE OWNER'S MANUAL FOR FURTHER INFORMATION AND EXPLANATIONS.
A082U7858
28
VEHICLE CAPACITY WEIGHT
DESIGNATED SEATING CAPACITY
RECOMMENDED COLD TIRE INFLATION PRESSURES
RECOMMENDED COLD TIRE INFLATION PRESSURES
SPARE TIRE PRESSURE
PRESSURES APPLY TO ALL VEHICLE LOADING CONDITIONS UP TO VEHICLE CAPACITY WEIGHT STATED ABOVE.
29
LOTUS
30
VEHICLE EMISSION CONTROL INFORMATION
LOTUS CARS LTD.
ENGINE TUNE UP SPECIFICATION
31,32
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VEHICLE IDENT. No.
LOTUS CARS LTD.
ATTENTION!
UTILISATION TEMPORAIRE SEULEMENT
VITESSE MAX. 80 Km/h
27
34
FLUIDE DE REFROIDISSEMENT
EMPLOYER SEULEMENT PRÉCONISÉ SOLUTION ANTI-GEL
MANUFACTURED BY LOTUS CARS LTD
NAT. TYPE APP. No. 89/481
VEHICLE IDENT. NUMBER SCCFE39COVHB85042
MAX VEHICLE WEIGHT
MAX COMBINED WEIGHT
MAX AXLE WT. FRONT
MAX AXLE WT. REAR
V.I.N.
Paint Code
Trim Code
25
42
Alarm window sticker
41
VEHICLE EMISSION CONTROL INFORMATION
THIS VEHICLE CONFORMS TO U.S. E.P.A. REGULATIONS APPLICABLE TO 1997 MODEL YEAR NEW MOTOR VEHICLES
CATALYST
40,39
Country Compliance
38
NOTICE
AIR BAG
This vehicle is equipped with an air bag system. To help avoid unwanted inflation, see service manual for diagnostic and service procedures before performing any service.
37
E.C.M. ID
36,35
MANUFACTURED BY LOTUS CARS LTD
NAT. TYPE APP. No. 89/481
VEHICLE IDENT. NUMBER SCC082918UHF05002
V.I.N.
Paint Code
Trim Code

Function Code 19.01a Labels,Certificates ,Literature etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
25	Label, VIN /Chassis, Main		USA	**C075U0730K**	1
26	Label, VIN / Chassis, Secondary	Fits to windscreen top		B079U4666K	1
27	Label, Spare wheel instructions for use		French language	A085U5087F	1
28	Label, Warning - Air bag			A082U7858F	1
29	Label, Tyre loading			A082U7789F	1
29a	Label, Tyre loading		Australia	A082U7790L	1
30	Label, Vacuum routing diagram	'98 Model Year		B082U7788F	1
31	Label, Vehicle emission control diagram			C082U7784F	1
32	Label, Vehicle emission control diagram		Sweden	B082U7791 F	1
33	Label, Compliance A.D.R. 37		Australia	A082U7259F	1
34	Label, Coolant instructions		French	A089U1811F	1
35	Label, VIN		Belgium	TBA	1
36	Label, VIN		Sweden	**TBA**	1
38	Label, Air bag notice	Driver bag only		A082U7700F	1
39	Label, federal compliance		USA	E082U4958J	1
40	Label, federal compliance		Canada	A082U7859K	1
41	Label, Catalyst 1997		USA	B082U7785F	1
42	Label, Alarm window sticker			A082M4993 F	1

Function Code 19.01a Labels,Certificates ,Literature etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
	Label, Warning child seat	Attached to sun visor - visible		A082U6315F	1
	Label, Warning child seat	Attached to sun visor - non visible		A082U6316F	1
	Label, Warning child seat removable			A082U6317F	1
	Label, Child seat pictogram	Fitted to door jam		A082U6318F	1
	Label, Smog index		USA. '98 Model year	A082U7893F	1

ESPRIT V8
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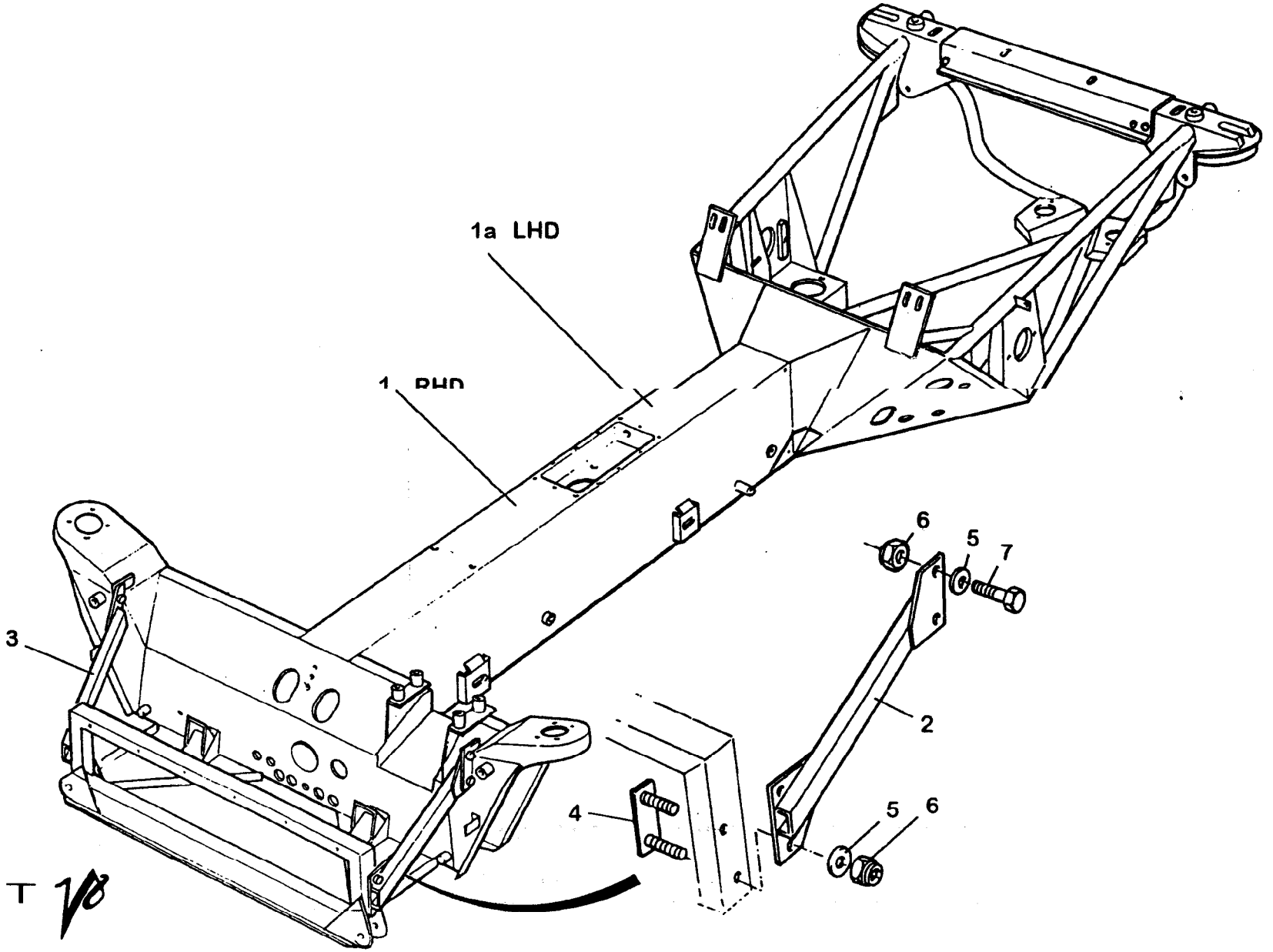
19.03

Service Parts List V8

Function Code 19.03 Owner's Handbooks & Service Notes Manuals.

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Owners Handbook		V8, Pre '98 M.Y.	AC82T0324J	1
Ola		Owners Handbook		V8, GT3	AD82T0324J	1



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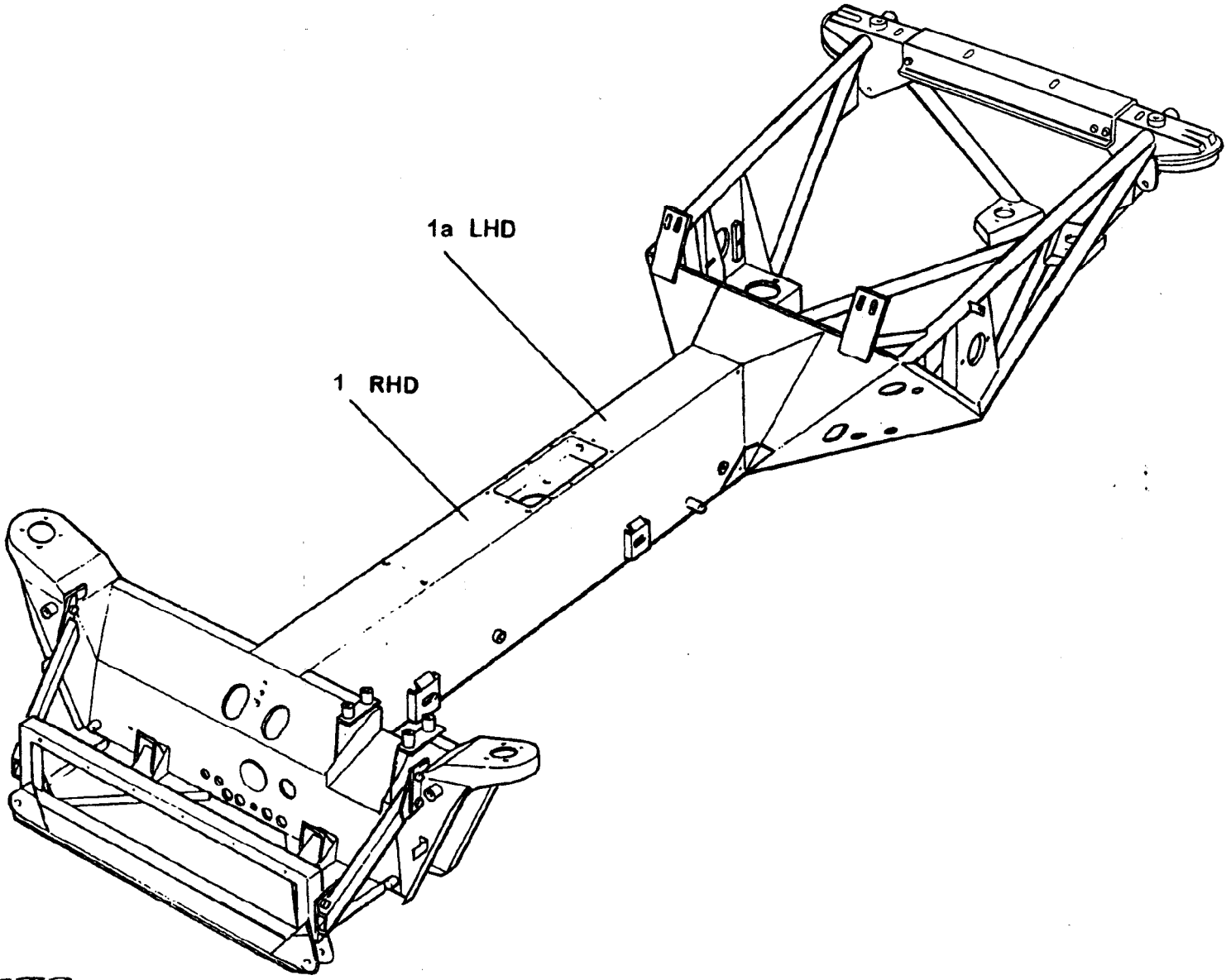
30.01

Service Parts List V8

Function Code 30.01 Chassis , Engine Bay Stiffener.

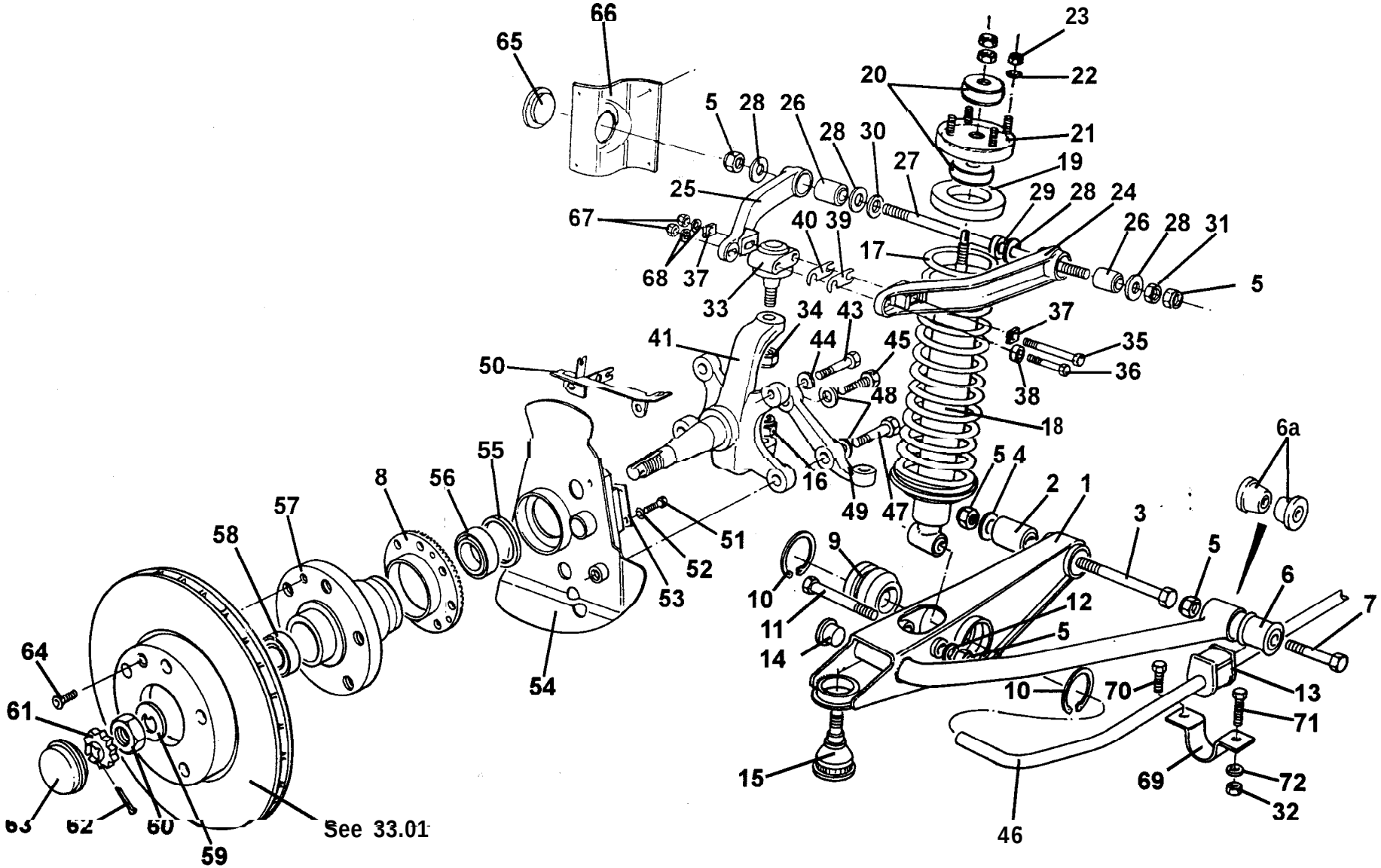
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Chassis Frame		RHD	**A082A4386F**	1
Ola	Chassis Frame		LHD	**A082A4385F**	1
02	Bracing strut, LH			**A082A4315F**	1
03	Bracing strut, RH			**A082A4316F**	1
04	Studplate to bracing strut			**A082M4311 F**	2
05	Washer Ml0 x 24, brace securing			**A075W4023F**	8
08	Nyloc nut M10, brace securing			**A075W3011Z**	8
07	Setscrew Ml0 x 25, brace securing			**A075W1048Z**	8


1a LHD
1 RHD

Service Parts List

Function Code 30.01a Chassis , GT3

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Chassis frame		RHD	C082A4368F	1
01 a		Chassis frame		LHD	C082A4369F	1


See 33.01

Function Code 31.01 Front Suspension Incl. Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Lower Wishbone, LH	With parallel front bush	GT3, prior VIN: W 2252, V8, prior VIN: W 5517	B082C4221 F	1
01 a	Lower Wishbone, LH	With conical front bush	GT3, from VIN: W 2252, V8 from VIN: W 5517	A082C4251 F	2
01 b	Lower Wishbone, RH	With parallel front bush	GT3, prior VIN: W 2252, V8, prior VIN: W 5517	B082C4220F	1
Olc	Lower Wishbone, RH	With conical front bush	GT3, from VIN: W 2252, V8, from VIN: W 5517	A082C4252F	1
02	Pivot Bush, lower wishbone rear			A075C6000F	2
03	Pivot Bolt, ½" UNF x 5 3/4"			A082A6048F	2
04	Washer, flat,			A075W4007Z	4
05	Nyloc Nut, ½" UNF			A075W3005F	10
06	Pivot Bush, lower wishbone front	Parallel	GT3, prior VIN: W 2252, V8, prior VIN: W 5517	A082D4084F	2
06a	Pivot Bush, lower wishbone front	Conical	GT3, from VIN: W 2252, V8, from VIN: W 5517	A082C4250F	4
07	Pivot Bolt, ½" UNF x 2 3/4"			A075W2097F	2
08	Pole Wheel, ABS sensor			A082J4192F	2
09	Bush, anti-roll bar			A082C6040F	2
10	Circlip, internal			A082C6039F	4
11	Bolt, ½" UNF x 3 ½", lower damper fix.			A079W2088F	2

Function Code 31.01 Front Suspension Incl. Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
12	Spacer, anti - roll bar clamp			A082C4093F	2
13	Split Bush, anti-roll bar to chassis			A082C4232F	2
14	Blanking Plug			A089U6089F	2
15	Ball Joint, lower			A089C6089F	2
16	Nyloc Nut, Ml4			A075W3069Z	2
17	Road Spring			A082C4247F	2
17a	Road Spring		Sport 350	A082C4256F	2
18	Damper			A082C4244F	2
18a	Damper		sport 350	A082C4255F	2
19	Insulator, front spring top			A082C4069F	2
20	Damper Bush Kit	Includes fixings		A082C6036F	2
21	Abutment Plate, spring/damper to chassis			B082C4057F	2
22	Washer, flat, M8			A075W4020F	8
23	Nut, M8, plate to chassis			A075W301 OF	8
24	Wishbone, leg upper, front			A082C4216F	2
25	Wishbone, leg upper, rear			A082C4217F	2
26	Pivot Bush, upper wishbone			X036C6004F	4
27	Pivot Stud, ½" UNF x 282mm			A082C4223F	2
28	Buffer Washer, upper wishbone bush			A075C0149D	8
29	Shim Washer, 6mm thick castor adjustment			A082C4093F	2
30	Shim Washer, 3mm thick castor adjustment			A082C4092F	2

Function Code 31 .01 Front Suspension Incl. Hubs

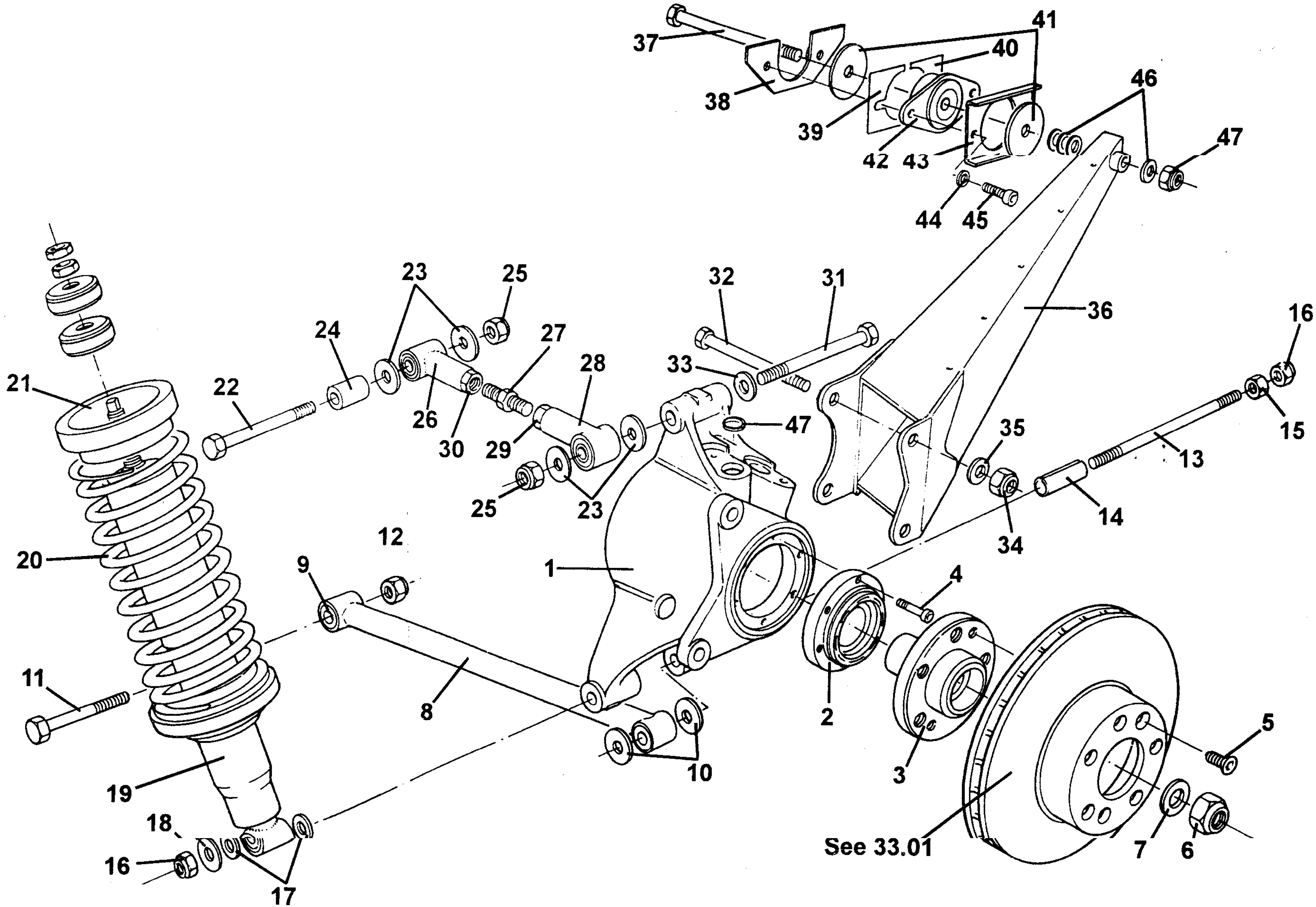
Dep	Part Description	Remarks	Odion	Part Number	Qty
31	Locknut, ½" UNF			A075W3017F	2
32	Nyloc Nut, MI2			A075W3012Z	4
33	Ball Joint, upper			A036C6007F	2
34	Nut, torqloc, 7/16" UNF			A075W3004F	2
35	Bolt, M8 x 122, hex., hd, inboard, upper ball joint fix.			A075W2050Z	2
36	Bolt, M8 x 85, hex. hd., outboard, upper ball joint fix.			A082W2121 F	2
37	Camber Adjustment Plate, 10.5mm			Al OOCOI 09F	4
37a	Camber Adjustment Plate, 12.5mm			A100C0110F	4
37b	Camber Adjustment Plate, 14.0mm			A100C0111F	4
37c	Camber Adjustment Plate, 11.5mm			Al OOCOI 25F	4
38	Spacer,			A082C4213F	2
39	Shimplate, castor adjustment, 1.5mm	Maximum 8 per side		B082C4090F	16
40	Shimplate, castor adjustment, 3.0mm	Maximum 4 per side		B082C4091 F	8
41	Hub Carrier, RH			A082C4134F	1
41a	Hub Carder, LH			A082C4135F	1
43	Setscrew, hex. hd.			A075W1039F	2
44	Washer, flat, MI2			A075W4021F	2
45	Setscrew, MI2 x 35, hex. hd.			A075W1059Z	2
46	Anti-Roll Bar, front, 16mm			D082C4222F	1
46a	Anti-Roll Bar, front, 17mm		sport 350	A082C4254F	1
47	Bolt, MI2 x 45, hex. hd.			A075W1061Z	2

Function Code 31.01 Front Suspension Incl. Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
48	Washer, spring, Ml2			A075W4069F	4
49	Steering Arm. RH			A082C4212F	1
49a	Steering Arm. LH			A082C4211 F	1
50	Multi Fixing Plate, RH			A082J4378F	1
50a	Multi fixing plate, LH			A082J4379F	1
51	Setscrew, M6 x 16, hex. hd.			A075W1028Z	1
52	Washer, flat			A075W4013F	1
53	Shimplate			B082C4200F	1
54	Shield, brake disc, RH			A082C4190F	1
54a	Shield, brake disc, LH			A089C4189F	1
55	Dust Seal			A089C8003F	1
56	Bearing, inner			A089C8004F	1
57	Hub, front			A082C4239F	2
58	Bearing, outer			A089C8005F	1
59	Washer, claw, bearing retaining			A089C8006F	2
60	Nut, bearing retaining			A089C8007F	2
61	Locking Cap, hub nut			A082C8009F	2
62	'Split Pin, hub nut retaining			A075W6222F	2
63	Grease Cap, front hub			A089C8008F	2
64	Screw, brake disc retention			A082J8007F	2
65	Grommet			A082B6057F	2

Function Code 31 .01 Front Suspension Incl. .Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
66	Cover, wishbone stud access			A079U4352K	2
67	Nyloc Nut, M8			A075W3010F	4
68	Washer, flat			A079W4019F	4
69	Clamp, anti-roll bar to chassis			A082C4047F	2
70	Setscrew, Ml2 x 35, hex. hd., anti-roll bar fixing			A079W1059F	2
71	Setscrew, Ml2 x 50, hex. hd., anti-roll bar fixing			AI 00W2116F	2



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ESPRIT
34.03

Function Code 31.03 Rear Suspension Incl. Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Hub Carrier, RH			**C082D4142K**	1
Ola	Hub Carrier, LH			CO8204141 **K**	1
02	Double Race Bearing, rear hub			**A082D6020F**	2
03	Hub, rear			**B082D6019F**	2
04	Bolt, cap head, bearing to hub carrier			**A082D4106F**	12
05	Screw, disc retention			**A082J8007F**	2
06	Nut, hub/driveshaft retention			**A082D6026F**	2
07	Washer, flat			**A082D6025F**	2
08	Lower link, less bushes			**A082D4083F**	2
09	Bush, lower link			**A082D4084F**	**4**
10	Snubber Washer. lower link mounting			**A079W4083F**	4
11	Bolt, ½" UNF x 2½", hex. hd., lower link to chassis			**A079W2097F**	2
12	Nyloc Nut, ½" UNF			A075W3005Z	**8**
13	Stud, ½" UNF x 8.75", lower link to hub carrier			B079D4024F	2
14	Split Spacer, hub carrier front lug			**B082D4079F**	2
15	Locknut, ½" UNF, lower link stud			**A075W3017Z**	2
16	Nyloc Nut, 7/16" UNF			A075W3004Z	6
17	Spacer Washer, damper lower fixing			A075W4028Z	4

Function Code 31.03 Rear Suspension Incl. Hubs

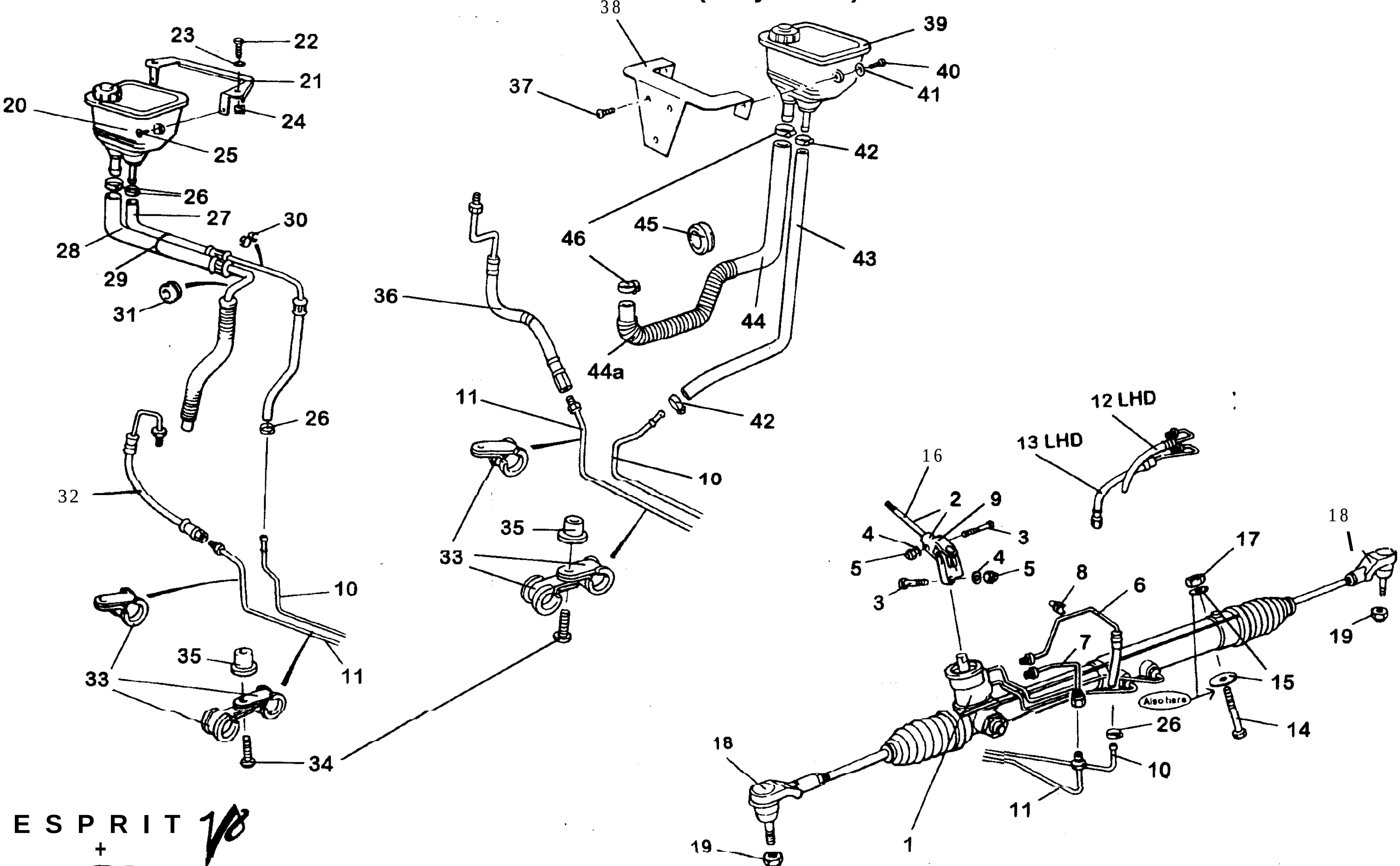
Dep	Part	Description	Remarks	Option	Part Number	Qty
18		Washer, flat			A075W4008Z	2
19		Damper			A082D4174F	2
19a		Damper		sport 350	A082D4179F	2
20		Road Spring			A082D4173F	2
20a		Road Spring		sport 350	A082041 80F	2
21		Insulator, road spring to chassis			A082D4122F	2
22		Bolt, ½" UNF x 4½", hex. hd., top link to chassis			A079W2023F	2
23		Snubber Washer, top link to inboard bush			A079W4083F	4
24		Spacer, top link to chassis			A082D4099F	2
24a		Clip, riveted to spacer			A91 8W6557F	2
25		Blanking Plug, 21 mm "D" type			A082D6039F	2
26		Adjustable Link, LH thread			A082D4165F	2
27		Link Adjuster			A082D6038F	2
28		Adjustable Link, RH thread			A082D6164F	2
29		Locknut, Ml6 x 1.5, RH thread			A082W3122F	2
30		Locknut, M16 x 1.5, LH thread			A082W3123F	2
31		Bolt, ½" UNF x 5½", top link to hub carder			A079W2091 F	2
32		Bolt, Ml0 x 130, hex. hd. radius arm to hub carrier			A075W2065F	4
33		Washer, hardened, top link to hub carrier			A074D6003Z	2
34		Nyloc Nut, Ml0			A075W3011Z	4
35		Washer, flat, Ml0 x 20			A075W4024Z	4

Function Code 31.03 Rear Suspension Incl. Hubs

Dep	Part Description	Remarks	Option	Part Number	Qty
36	Radius Arm, RH			C082D41 10J	1
36a	Radius Arm, LH			C082D4111 J	1
37	Bolt, 7/16" UNF x 4½", hex. hd., radius arm to chassis			A075W2087F	2
38	Mounting Plate			A082U7760F	2
39	Shim Plate, thick			C079D4051 K	2
40	Shim Plate, thin			A07904051 K	2
41	Snubber Washer, 7/16" x 1½"			A075W4006Z	4
42	Mounting Rubber, radius arm to chassis			P525.3103.600AF	2
43	Reinforcing Plate			C079D4013F	2
44	Washer, spring, M8			A075W4023F	4
45	Bolt, M8 x 40, hex. hd.			A075W2039D	4
46	Washer, toe- in adjustment			A075W4005Z	As req
47	Nyloc Nut, 7/16" UNF			A075W3004Z	2

(4 cylinder)

(8 cylinder)



ESPRIT V8
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32.00

Service Parts List V8

Function Code 32.00 Power Steering, Reservior, plumbing etc.

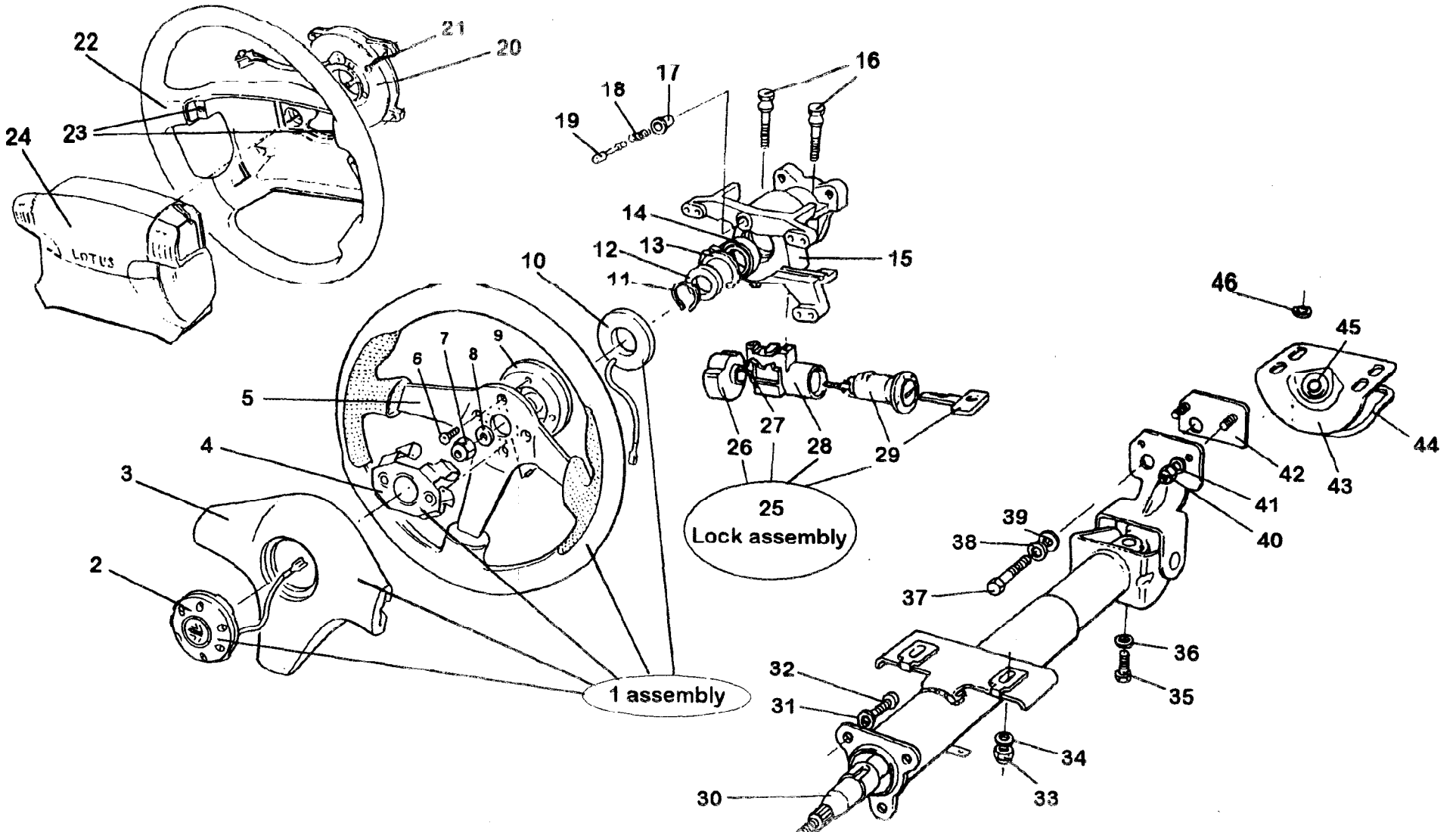
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Power assisted Rack & Pinion assembly		4 cylinder cars, RHD	**P691.3203.002AK**	**1**
Ola	Power assisted Rack & Pinion assembly		4 cylinder cars, LHD	**P691.3203.001AK**	1
01 b	Power assisted Rack & Pinion assembly		8 cylinder cars, RHD	**A082H6044F**	**1**
Olc	Power assisted Rack & Pinion assembly		8 cylinder cars, LHD	**A082H6043F**	**1**
02	Intermediate column & universal joint		RHD	**B082H4048 F**	1
02a	Intermediate column & universal joint		LHD	**B082H4049 F**	1
03	Pinch bolt, M8 x 40 mm, universal joint fixing			**A075W2039D**	2
04	Washer, Flat, u/j pinch bolt			**A075W4O2OZ**	2
05	Nut, M8 Nyloc, u/j pinch bolt			**A907E6284F**	2
06	Pipe, low pressure		4 cylinder cars, RHD	**B062 H4062 F**	1
07	Pipe, high pressure		4 cylinder cars, RHD	**A082H4061 F**	1
08	Clip, low pressure pipe to chassis front section			**A910E6592F**	1
09	Universal joint, intermediate shaft		4 & 8 cylinder cars	**B082H6042H**	1
10	Pipe, to reservoir hose			**A082H4057F**	1
11	Pipe, high pressure, pump to chassis underside			**A082H4056F**	1
12	Pipe, low pressure, rack assy to chassis pipe		LHD	**A082H4060F**	1
13	Pipe, high pressure. chassis to rack		LHD	**A082H4059F**	1
14	Bolt, Ml2 x 85 mm, rack assembly to chassis			**A082W2119F**	2

Function Code 32.00 Power Steering, Reservior, plumbing etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
15	Washer, Ml2 flat			AO75W4071 F	4
16	intermediate shaft		RHD	**A082H4050H**	1
16a	Intermediate shaft		LHD	**A082H4051 H**	1
17	Nut, Ml2 Nyloc			**A075W3012Z**	2
18	Track rod end			**A082H6063S**	2
19	Nut, Ml2 Nyloc, track rod end to steering arm			**A082H4036F**	2
20	Reservoir, PAS fluid			**A082H6045F**	1
21	Bracket, PAS reservoir mounting			**A082H4063F**	1
22	Screw, M6 x 40, bracket fixing			A082W7104F	2
23	Washer, M6 x 12, bracket fixing			**B100W4127F**	2
24	Cage nut, M6, bracket fixing			**Al 00W6362F**	2
25	Screw, No 6 x ½", reservoir to bracket			A075W5014Z	2
26	Hose clip, 12 - 20mm, PAS hose fixing			**A079M6132F**	3
27	Pipe, low pressure, chassis pipe to reservoir			**A082H4058F**	1
28	Hose, low pressure, reservoir to pump			**B082H4073F**	1
29	Tie wrap, low pressure pipes retention			**A075W6038Z**	1
30	Swivel clip			**A082W6331 F**	1
30a	Swivel clip			**A082W6338F**	1
31	Grommet, PAS hose thro' sidewall			**A082H6061 F**	1
32	Pipe, high pressure, pump to chassis pipe			**A082H4072F**	1
33	'P' clip, chassis pipe to chassis fixing			**A075Q26013Z**	3

Function Code 32.00 Power Steering, Reservior, plumbing etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
34	Screw, M5 x 20, 'P' clip fixing			**A075W5084F**	**3**
35	Rawinut, M5			**A075M6074F**	3
36	Pipe, high pressure, pump to chassis pipe			**A082H4072F**	1
37	Setscrew, PAS bracket fixing to bulkhead		8 cylinder cars	**A100B6148F**	3
38	Bracket, PAS reservoir mounting			A082M4074F	1
39	Reservoir, PAS fluid	Same as 4 cylinder cars (20 above)		**A082H6045F**	1
40	Screw, self tapping, PAS bracket fixing			**A075W5012F**	2
41	Washer, PAS bracket fixing			A075W4063Z	2
42	Clip, low pressure hose fixing, reservoir to chassis pipe			A079M6132F	2
43	Hose, low pressure, reservoir to chassis pipe			**A082H4071 F**	1
44	Hose, high pressure, PAS reservoir to pump			A082H4073F	1
44a	Heatshield, PAS pipes			A082H4076F	As req
45	Grommet, PAS hose, thro' sidewall		8 cylinder cars	**A082H6046F**	1
46	Clip, PAS hose fixing, reservoir to pump			**A075K6018F**	2
	Fluid, PAS			**Cl 00E6088V**	2litre



ESPRIT V8

32.05

Function Code 32.05 Upper Column &Wheel, Lock & Ignition Switch,

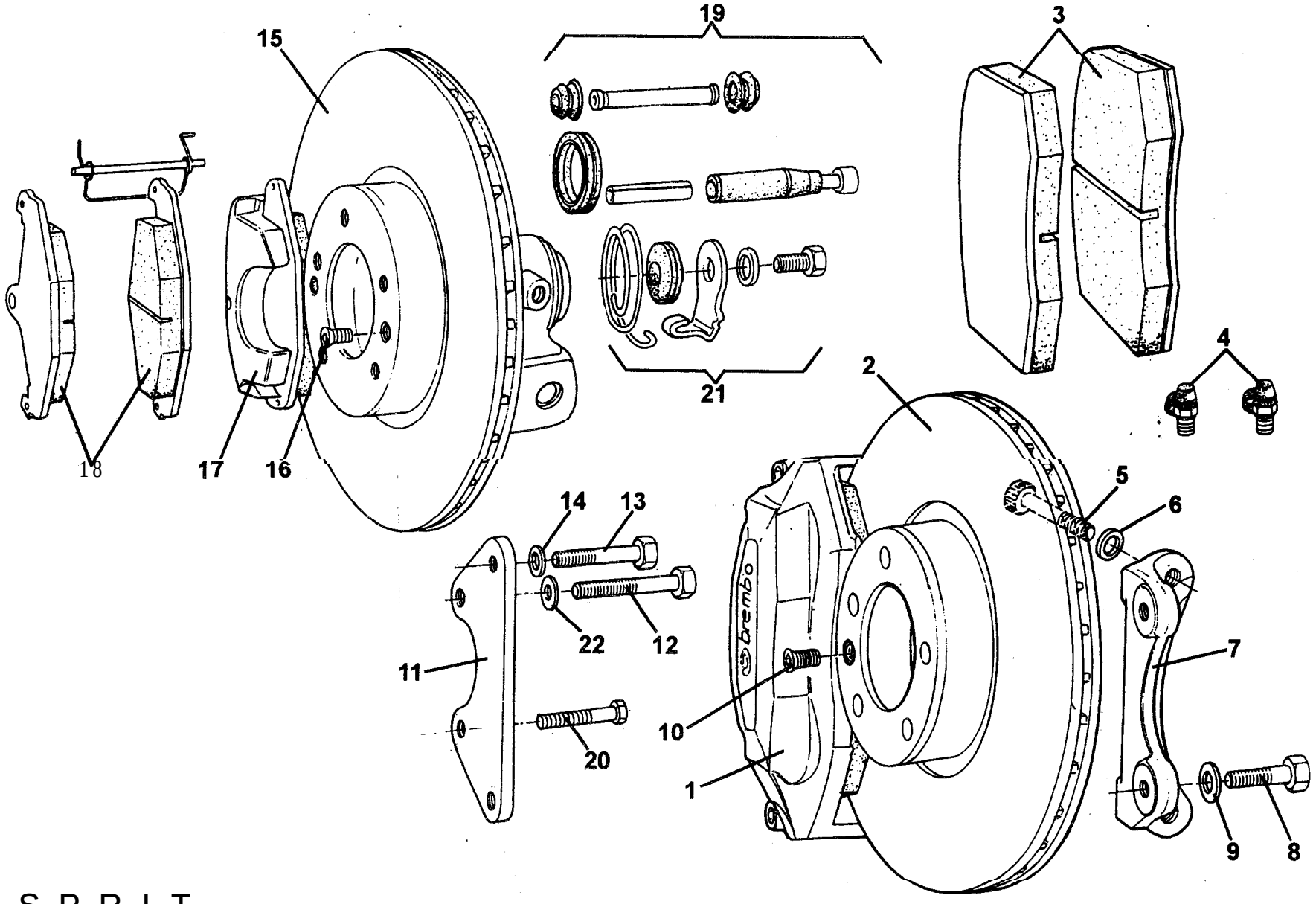
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Steering Wheel Assembly, Momo type		Non S.i.r. V8 + GT3	**A082H4080F**	1
Ola	Steering Wheel Assembly		S.i.r. V8 + GT3	**C082H4033F**	1
02	Horn button, Momo logo		Non S.i.r.	**TBA**	1
03	Crash pad, steering wheel centre		Non S.i.r.	**TBA**	1
04	Collapsible bracket		Non S.i.r.	**TBA**	1
05	Steering wheel only		Non S.i.r.	**SBA**	1
06	Screw, fixing steering wheel to boss		Non S.i.r.	**TBA**	4
07	Nut, Ml2 x 1.25 mm steering wheel to column fixing		Non S.i.r.	**A082H4036F**	1
08	Washer, ½" x 1 l/4" steering wheel to column		Non S.i.r.	**A075W4008Z**	1
09	Boss, steering wheel platform to column		Non S.i.r.	**TBA**	1
10	Horn ring, push connection		Non S.i.r.	**TBA**	1
11	Circlip			**A082H6036F**	1
12	Cushion			**A082H6035F**	1
13	Circlip, bearing retention			**A082M6308F**	1
14	Bearing, upper column support			**A082H6037F**	1
15	Column support / bearing carrier			**D082H4035G**	1
16	Shear head bolt, M6			**C082H4045F**	2
17	Horn bush			**C100H0029F**	1

Function Code 32.05 Upper Column & Wheel, Lock & Ignition Switch.

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Spring, horn pin			A100H6050F	1
19	Horn pin			A100H6013F	1
20	Rotary connector, (S.i.r, coil)		S.i.r. specification	A082M6456F	1
21	Screw, rotary connectir to column		S.i.r. specification	AO82W51 10F	4
22	Steering wheel		S.i.r. specification	C082H4033F	1
24	Inflator module, (airbag), driver's side		S.i.r. specification	A082H4034F	1
25	Lock set assembly		LHD	B082H6059F	1
25a	Lock set assembly		RHD	B082H6060F	1
26	Stitch, steering column lock			A082M6460H	1
27	Screw, allen head, ignition stitch			A082H6041 H	1
28	Housing, steering column lock			A082H6038H	1
29	Barrel & Keys			A082H6039H	1
29a	Lock set	Inc. barrels & keys for steering lock, doors & glovebox	LHD	A082H6059F	1
29b	Lock set	Inc. barrels & keys for steering lock, doors & glovebox	RHD	A082H6060F	1
30	Steering column			A082H6034F	1
31	Washer, spring M6			A075W4O35Z	3
32	Setscrew, M6 x 18mm			A075W1029Z	3
33	Nyloc nut, M8	Steering column to scuttle beam		A075W301OZ	2
34	Washer, flat M8 x 25 x 1.4 mm	Steering column to scuttle beam		AO75W4O2IZ	2

Function Code 32.05 Upper Column, Wheel, Steering Lock

Dep	Part Description	Remarks	Option	Part Number	Qty
33	Nyloc Nut, M8	Steering column to scuttle beam		A075W3010Z	2
34	Washer, flat M8 x 25 x 1.4 mm	Steering column to scuttle beam		A075W4021Z	2
35	Bolt, Ml0 x 32 x 1.25mm	Steering column U/J		C082H4044F	1
36	Washer, spring Ml0	Steering column U/J		A079W4070F	1
37	Setscrew, M8 x 20 mm	Steering column to pedal box		A075W1038Z	1
38	Washer, internal shakeproof M8	Steering column to pedal box		A075W4048Z	1
39	Washer, flat M8 x 25 x 1.4 mm	Steering column to pedal box		A075W4021Z	1
40	Nyloc Nut, M5			A075W3008Z	2
41	Washer, flat M5 x 10 x 1 mm			A075W4011Z	2
42	Spacer assembly	Steering column to pedal box		A082H4066F	1
43	Infill Panel	Steering column	RHD	A082B5048K	1
43a	Infill Panel	Steering column	LHD	A082B5047K	1
44	Foam Strip, 10 x 6mm, self adhesive	Steering column infill to floor		AI 00BO431V	As req.
45	Seal	Steering column/bulkhead		A082H6046F	1



E S P R I T
33.01

Function Code 33.01 Brake Discs & Calipers

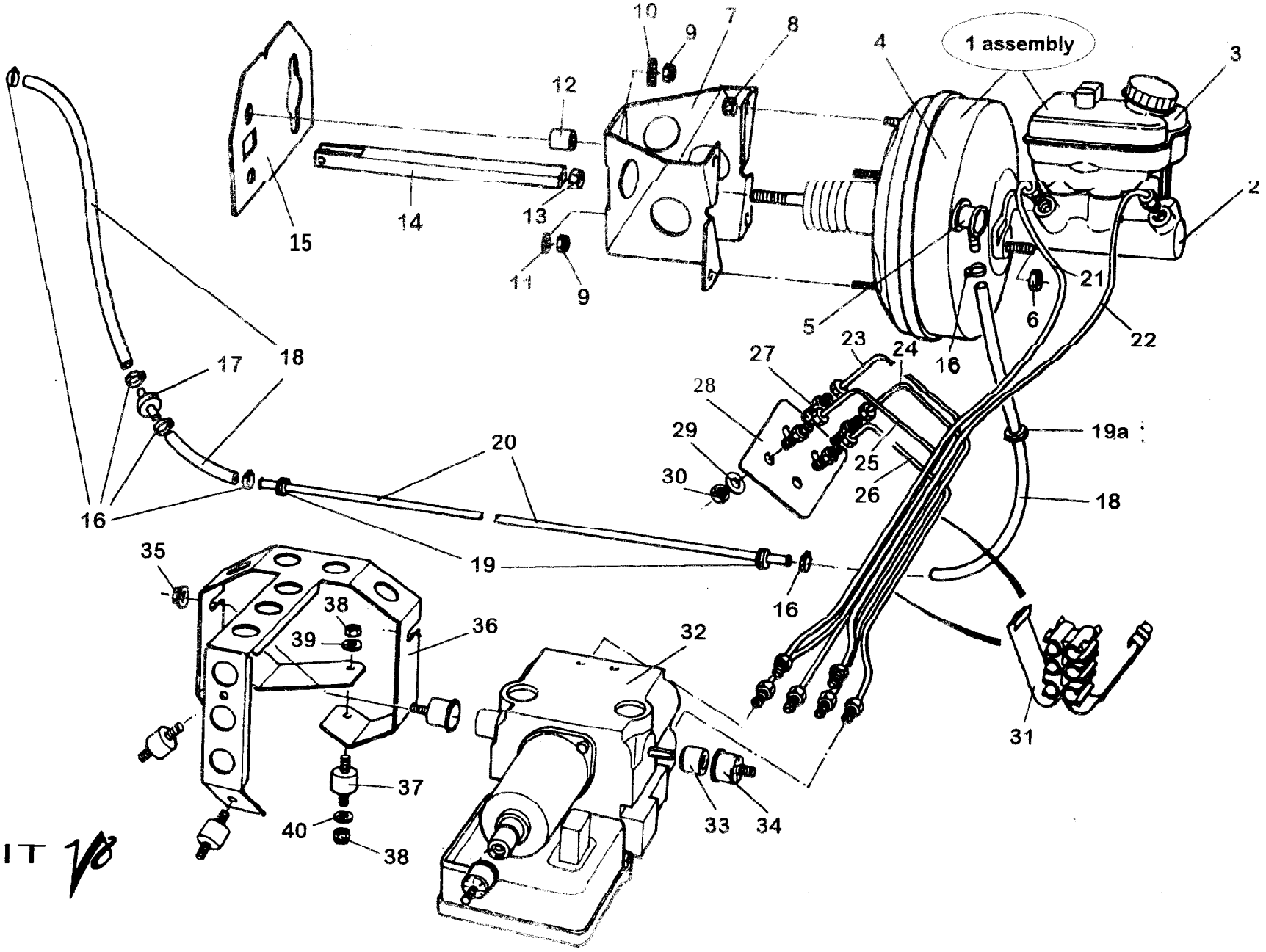
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Brake Caliper, front, RH	Includes brake pads		A082J4382F	4
01 a	Brake Caliper, front, LH	Includes brake pads		A082J4383F	1
01 b	Brake Caliper Assembly, AP Racing, front, RH	Includes mounting brackets	sport 350	A082J6192S	1
Olc	Brake Caliper Assembly, AP Racing, front, LH	Includes mounting brackets	sport 350	A082J6193S	1
02	Brake Disc, front			A082J4380F	2
02a	Brake Disc Assembly, front, 320mm, RH	Includes adaptor 'bell'	sport 350	A082J6204H	1
02b	Brake Disc assembly, front, 320mm, LH	Includes adaptor 'bell'	sport 350	A082J6205H	1
03	Brake Pad Set, front			A082J6156S	1
03a	Brake Pad Set, front	Includes anti-noise shim overlays	Sport 350, road	A082J6200S	1
03b	Brake Pad Set, front	Includes anti-noise shim overlays	Sport 350, track	A082J6201S	1
04	Bleed Nipple Kit, front & rear calipers	Includes 2 nipples & 2 dust covers		A082J616IS	2
05	Bolt, Ml2 x 65, brkt. to front caliper.			AI 00W7083F	4
05a	Bolt, M10, cap hd., brkt. to front caliper	Included in AP Racing kits	sport 350	A082561885	1
06	Washer, brkt. to front caliper			A082J4386F	4
07	Adaptor Bracket, front caliper mounting			A082J4376K	2
06	Bolt, Ml2 x 35, cap hd., brkt. to front hub carrier			A075W1059Z	4
06a	Bolt, M12, cap hd., brkt. to hub front carrier	Included in AP Racing kits	sport 350	A082J6195H	4
09	Washer, spring, brkt. to front hub carrier			A075W4069F	4

Function Code 33.01 Brake Discs & Calipers

Dep	Part Description	Remarks	Option	Part Number	Qty
10	Screw, M10, brake disc retention			A082J4381F	2
11	Adaptor Plate, rear caliper to hub carrier, LH			A082J4375F	1
11 a	Adaptor Plate, rear caliper to hub carrier, RH			A082J4374F	1
11 b	Adaptor Plate, rear caliper to hub carrier, LH	Used with 320mm rear discs	sport 350	B082J4469F	1
11 c	Adaptor Plate, rear caliper to hub carrier, RH	Used with 320mm rear discs	sport 350	B082J4468F	1
12	Setscrew, Ml0 x 80 mm, hex. hd., rear caliper to plate			A082W1113F	2
13	Setscrew, Ml2 x 32 mm, hex. hd., plate to rear hub carrier			A089J8017F	4
14	Washer, plate to rear hub carrier			A075W4028Z	4
15	Brake Disc, rear			A082D4160F	2
15a	Brake Disc Assembly, rear, 320mm, RH	Includes adaptor 'bell'	sport 350	A082J6206S	1
15b	Brake Disc Assembly, rear, 320mm, LH	Includes adaptor 'bell	sport 350	A082J6207S	1
16	Screw, brake disc retention			A082C6037F	4
17	Brake Caliper, rear, RH	Includes brake pads		A082J6150F	1
17a	Brake Caliper, rear, LH	Includes brake pads		A082J6151 F	1
18	Brake Pad Set, rear	Includes anti-rattle springs & pins		A082J6157S	1
18a	Brake Pad Set, rear	Includes anti-rattle springs & pins	Sport 350	A082J0154S	1
19	Sliding Pin Bush Kit, rear calipers	Includes sleeves, boots & seals		A082J6162S	2
20	Setscrew, M8 x 60 mm, hex. hd., caliper to plate			A082W1114F	2
21	Rear Caliper, park brake, lever kit, RH	Includes lever screw, washer & boot.		A082J616OS	1

Function Code 33.01 Brake Discs & Calipers.

Dep	Part	Description	Remarks	Option	Part Number	Qty
21a		Rear Caliper, park brake, lever kit, LH	Includes lever screw, "washer & boot		**A082J5159S**	1
22		Washer, flat, Ml 0 x 20 x 3, top bolt rear caliper to plate	Used with 320mm discs	sport 350	**A111W4180F**	2
23		AP Racing Brake Upgrade Kit	Comprising items 24/25/26, plus hoses (see 33.03)	See S/N section JG	**A082J4489S**	1
24		AP Racing Front Brake Disc Kit	Comprising items 02a/02b/	See S/N section JG	**A082J6189F**	1
25		AP Racing Front Caliper Kit	Comprising items 01 b/01c/05a/ 8a/27/28, pus hoses (see 33.03)	See S/N section JG	**A082J6191 F**	1
26		AP Racing Rear Brake Disc Kit	Comprising items 15a/l5b/	See S/N section JG	**A082J6190F**	1
27		Anti-Rattle Clip, front caliper	Not illustrated, included in AP Racing kits		**A082J6194H**	2
28		Anti-Noise Shim Overlays, front pads	Not illustrated, included in AP Racing kits		**A082J6203H**	4



ESPRIT V8

33.03

Service Parts List

Function Code 33.03 Servo / M,cyl, ABS unit, Mountings & Fixings.

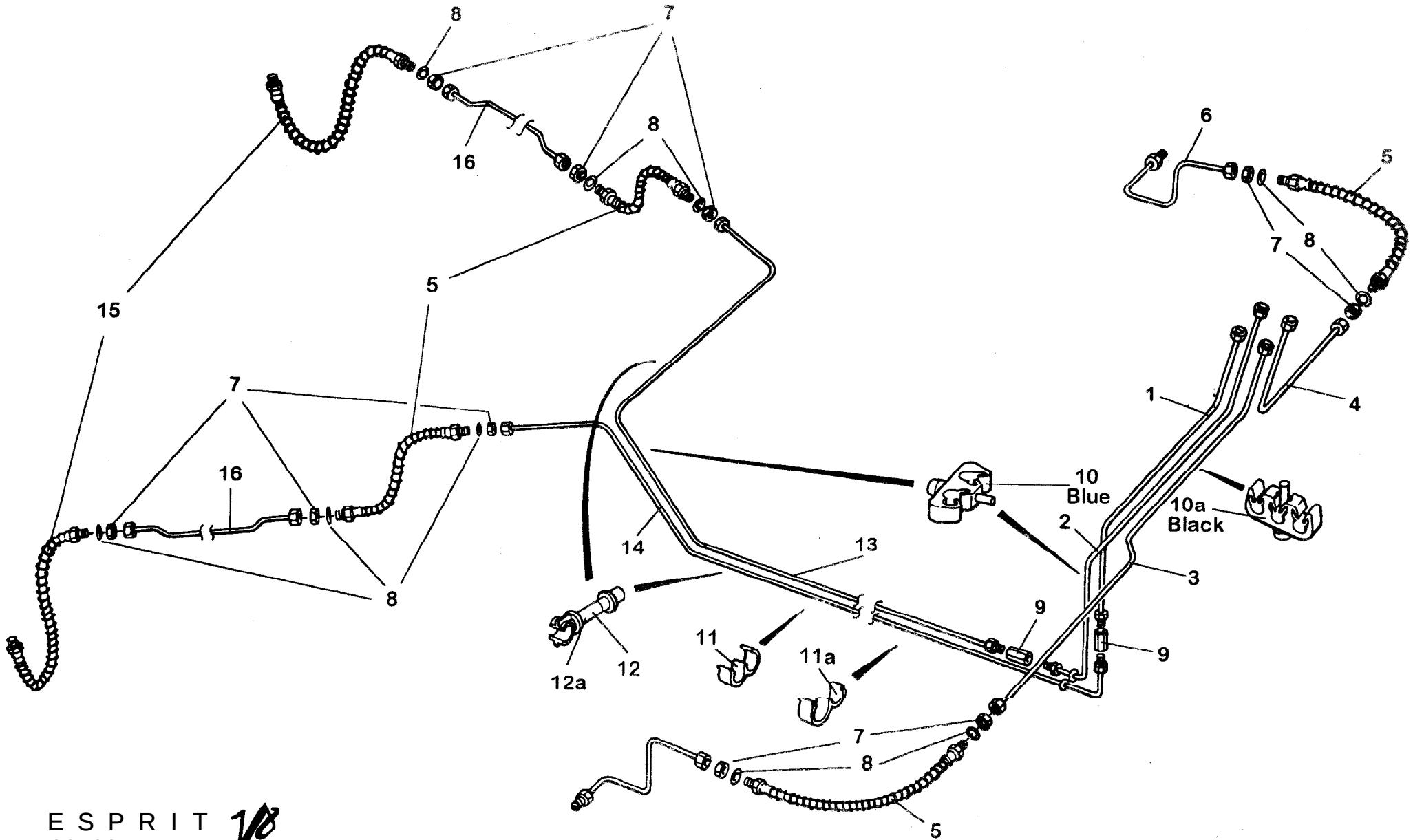
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Servo/brake Master/Cyl Assembly	Is replaced by : A082J4467F '98MY		A082J4409F	1
02	Master cylinder assembly			AO82J6182F	1
02a	Repair/seal kit			A082J6186S	1
03	Reservoir	'97 M.Y = A level '98 M.Y. = B level		A/B082J6183F	1
04	Servo assembly			A082J6184F	1
05	Non return valve & seal			A082J6185F	1
06	Nut, master cylinder to servo fixing			A082J6187F	2
07	Mounting bracket			A082J4416F	1
08	Nut, servo assembly to mounting bracket			A075W301 OZ	4
09	Nut, servo mounting bracket to pedal box			A075W4019F	2
10	Spacer, top mounting			A082J6170F	1
11	Washer, lower bolt fixing			A079W4019F	1
12	Spacer, servo bracket to pedal box			A079J4004F	2
12a	Washer, M8 x 16.6 x 1.4			A075W4020Z	2
13	Nut, push rod extension fixing			A075W3024Z	1
14	Push rod, brake pedal/servo			A082J4408F	1
15	Gasket, cyl mount			A082J4255F	1

Function Code 33.03 Servo / M,cyl, ABS unit, Mountings & Fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
16	Clip, vacuum hose			A079M6132F	6
17	Non return valve			A082J4401 F	1
18	Vacuum hose, 9.5mm bore	Black		A082J6124V	As req
19	Grommet. Vacuum bundy pipe tht'o chassis			X036L6004Z	2
19a	Grommet, servo vac pipe			X036B6167Z	1
20	Bundy pipe, servo vacuum, thr'o chassis			A082541 15F	1
21	Brake pipe, rear - master cylinder		LHD	A08254421 P	1
21a	Brake pipe, front - master cylinder		LHD	A082J4419P	1
22	Brake pipe, rear - master cylinder		RHD	A082J4420P	1
22a	Brake pipe, front - master cylinder		RHD	A082J4422P	1
23	Brake pipe, ABS unit to union plate	Common with No's 25/26		A082J4427P	1
24	Brake pipe, ABS unit to union plate			A08254428 P	1
25	Brake pipe, ABS unit to union plate	Common with No's 23/26		A082J4427P	1
26	Brake pipe, ABS unit to union plate	Common with No's 23/25		A082J4427P	1
27	Connector/union, brake pipes			A089J6013F	4
28	Fixing plate, brake pipes/bulkhead			A082J4405F	1
29	Washer, Ml0 Int S/proof			A075W4049Z	4
30	Lock nut, connector /union to fixing plate			A075J6017Z	4
31	6 way pipe clip			A082J6166F	2
32	ABS control unit, K/H model 415			A082J4399F	1

Function Code 33.03 Servo I M,cyl, ABS unit, Mountings & Fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
32a	Calibration cartridge, 'Tech 1' scanner	Plugs into Tech 1 scanner	*Eng Mgmt &Kelsey Hayes ABS 415 Pre'98M.Y.	TOOOT1 307F	1
32b	Calibration cartridge, 'Tech 1' scanner		Kelsey Hayes ABS 430, '98M.Y.	T000TI403S	1
33	Isolation bush, ABS control unit			A082J4402F	3
34	Isolation cap, ABS control unit			A082J4400F	3
35	Captive nut M6, isolation cap to mounting bracket			A082J6165F	3
36	Bracket, ABS control unit		RHD	A082J4396F	1
36a	Bracket, ABS control unit		LHD	A0825441 3F ,	1
37	Rubber bobbin mounting			A082J6170F	3
38	Nut, M6 nyloc			A075W3009Z	6
39	Washer, M6 x 15, top mounting			A075W4015Z	3
40	Washer, bottom mounting			B075W4018F	3
	Service notes, covering K/H 415, ABS system	Esprit V8 '96 model year onwards		M082T0327J	1
	Brake fluid, Castrol DOT 4			TBA	
	Grommet fitting kit, ABS module	'98 M.Y. not illustrated		A082J6181 F	1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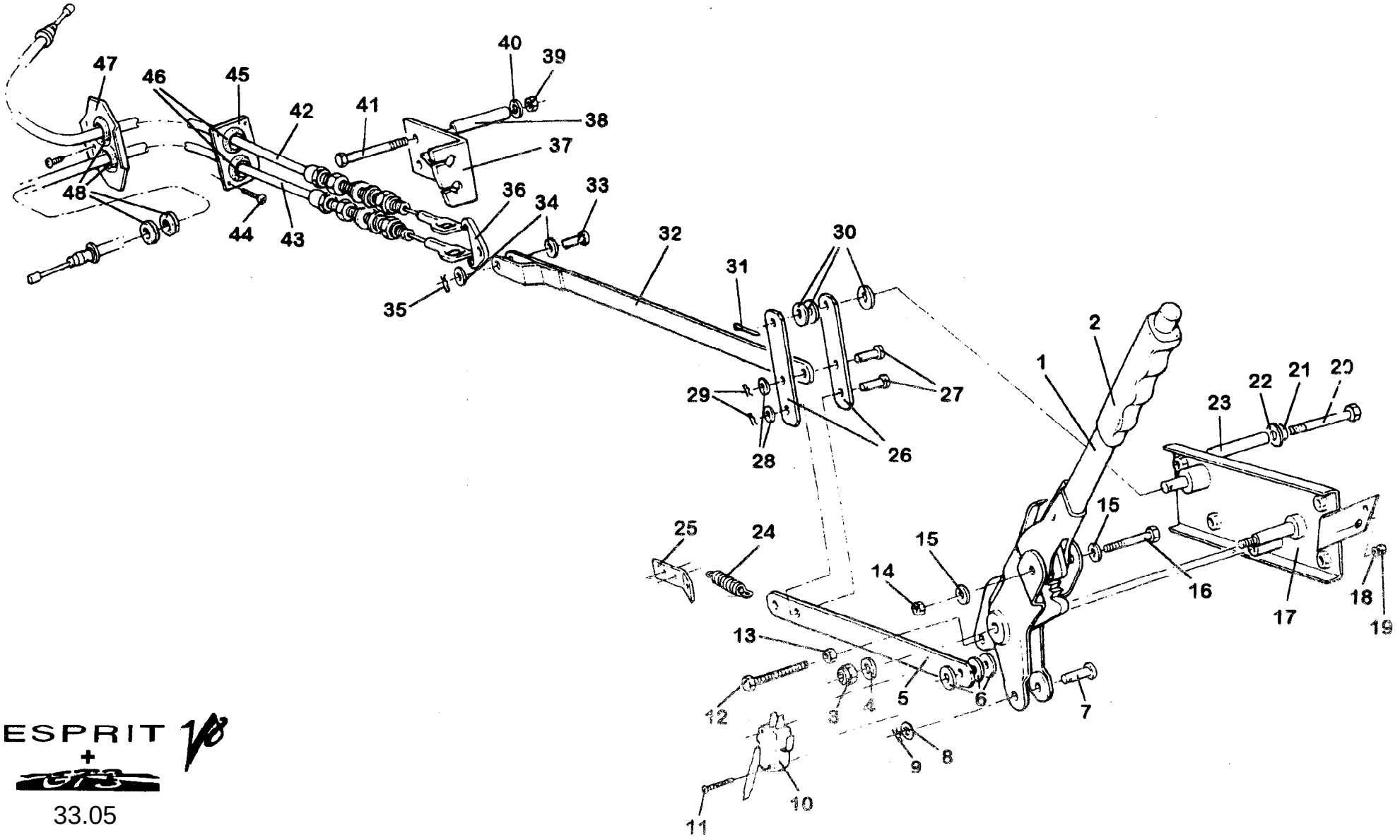
Function Code 33.03a Fluid Pipes & Hoses.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Bundy pipe, RHD	Connector to RH rear bundy pipe		A082J4430P	1
Ola	Bundy pipe, LHD	Connector to RH rear bundy pipe		A08254431 P	1
02	Bundy pipe, RHD	Connector to LH rear bundy pipe		A082J4432P	1
02a	Bundy pipe, LHD	Connector to LH rear bundy pipe		A082J4433P	1
03	Bundy pipe, RHD	to RH front flex hose		A082J4436P	1
03a	Bundy pipe, LHD	to RH front flex hose		A082J4438 P	1
04	Bundy pipe, RHD	to LH front flex hose		A082J4437P	1
04a	Bundy pipe, LHD	to LH front flex hose		A082J4437P	1
05	Flexi - Hose			A082J4388F	4
06	Bundy pipe, front			A082J4387F	2
07	Nut			A076J6017Z	10
08	Washer			A075W4049Z	10
09	Pipe connector			A079J6020F	2
10	Pipe holder	Blue colour		AI 00J6044F	1
10a	Pipe holder	Black colour		A082M6546 F	1
11	Twin pipe clip	Double small bore		A082M6547 F	3
1 la	Twin pipe clip	Large /small bore		A082W6548 F	9
12	Pipe clip	Large bore		A079M6124F	6

Function Code 33.03a Fluid Pipes & Hoses.

Dep	Part Description	Remarks	Option	Part Number	Qty
12a	Pipe clip	Small bore		A079J6027Z	7
13	Bundy pipe	connector to LH **rear** Flex hose		A082J4434F	1
14	Bundy pipe	connector to RH **rear** Flex hose		A082J4435F	1
15	Flexi - Hose			A082J4390F	2
16	Budy pipe, rear			A062541 62P	2



ESPRIT V8 + GTS

33.05

Service Parts List

Function Code 33.05 Parking Brake Mechanism

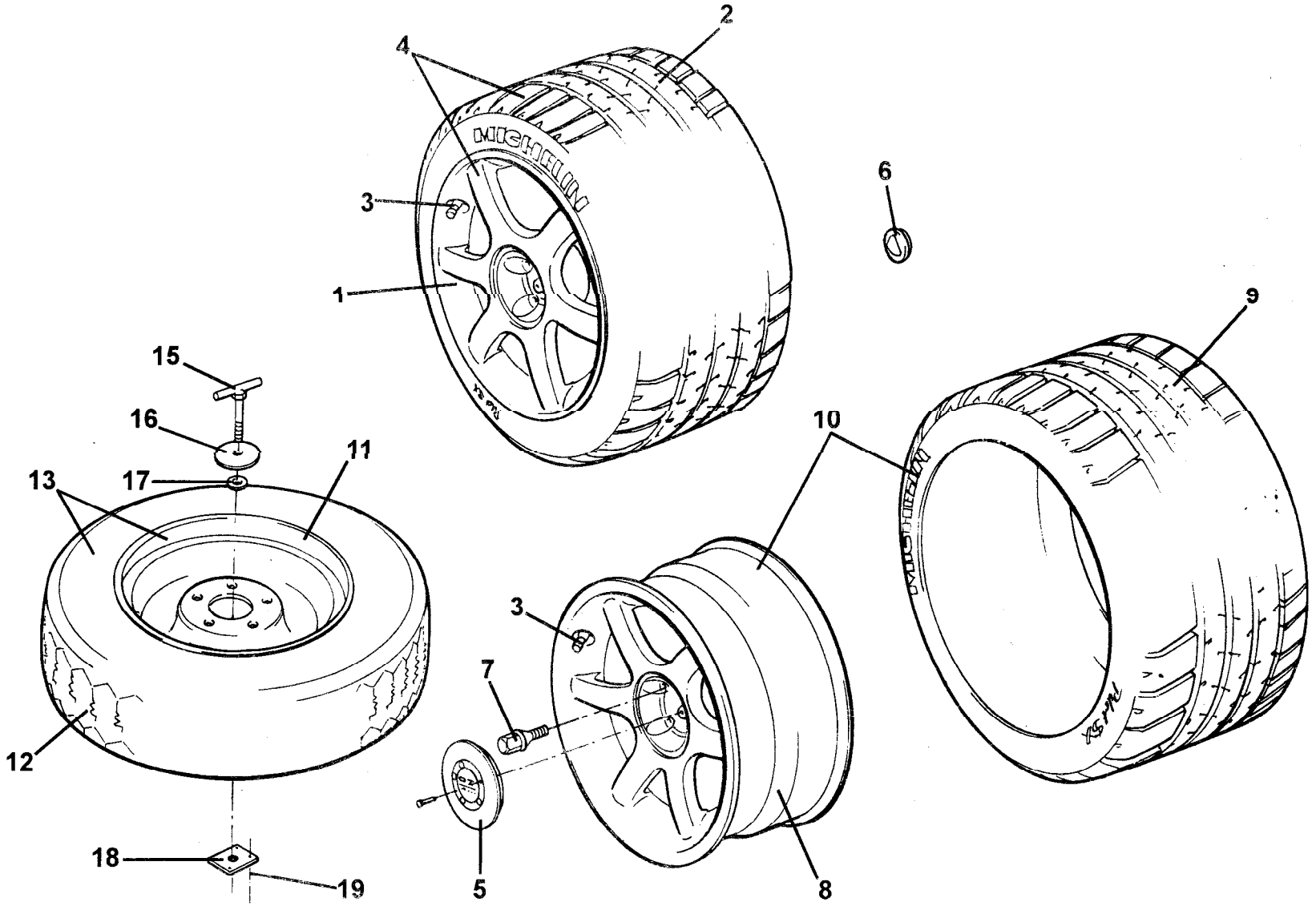
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Parking Brake Lever Assembly	'Fold down' type	V8 + GT3	A082J4157F	1
02	Hand grip, parking brake lever		V8 + GT3	A079J605OF	1
03	Nut, M8 Nyloc, Lever pivot			A075W3010F	1
04	Washer, flat, Lever pivot			A075W4019F	1
05	Link, hand lever to multiplier			A082J4122K	1
06	**Washer,** clevis pin			A075W4016Z	3
07	Clevis pin, hand lever to link			A079W6026F	1
08	Washer, clevis spring clip			A075W4015Z	1
09	'R' pin, clevis retention			A079W6175F	1
10	Microswitch, park brake tell tail			C075M6084F	1
11	Screw, M3 x 20 mm, stitch to bracket			A083W5163F	2
12	Setscrew, M6 x 30 mm, ratchet fix			A075W1 0322	1
13	Nut, M6 , ratchet fix			A075W302OZ	1
14	Nut, M6 nyloc, ratchet fix			A075W3009Z	1
15	Washer, flat, fold down pivot			A075W4013Z	2
16	Setscrew, M6 x 30, fold down pivot			A075W1032Z	1
17	Mounting plate, parking brake lever		RHD	D082B4478J	1
17a	Mounting plate, parking brake lever		LHD	D082B4479J	1

Function Code 33.05 Parking Brake Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Washer, microswitch to bracket			A075W4000Z	2
19	Nut, M3 nyloc, Microstitch to bracket			A079W3060F	2
20	Bolt, M8 x 75, plate fixing			A075W2046Z	4
21	Washer, spring, plate fixing			A075W4036Z	4
22	Washer, large o/d, plate fixing			A075W4021 Z	4
23	Spacer tube, plate fixing			A082B4484F	4
24	Spring, lever return			A082J6075F	1
25	Anchor bracket, return spring			A082J4159F	1
26	Connector, link to actuator rod			B082J4121 K	2
27	Clevis pin, multiplier lever to links			A075W6031 Z	2
28	Washer, multiplier clevis			A075W40I5Z	2
29	'R' pin, clevis retention			A075W6175Z	2
30	Washer, multiplier lever pivot			A075W4024Z	3
31	Split pin, multiplier lever pivot			A075W6009Z	1
32	Actuator rod, multiplier to compensator			A082J412OF	1
33	Clevis pin, actuator rod to compensator			A075W6033Z	1
34	Washer, clevis pin			A075W4020Z	2
35	'R' pin, clevis retention			A075W6175Z	1
36	Compensator, parking brake cables			A082J4294F	1
37	Abutment, parking brake cable front		RHD	E079J4022F	1
37a	Abutment, parking brake cable front		LHD	E079J4021 F	1

Function Code 33.05 Parking Brake Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
38	Spacer tube, abutment fixing			A082B4484F	2
39	Nut, M6 nyloc, abutment fixing			A075W301 OZ	2
40	' Penny ' washer, abutment fixing			A075W4021Z	2
41	Bolt, M8 x 75 mm, abutment fixing			A075W2046Z	2
42	Cable, parking brake, long, passenger side	2883 mm in length	V8 + GT3	A082J4372F	1
43	Cable, parking brake, short, drivers side	2425 mm in length	V8 + GT3	A082J4373F	1
44	Screw, grommet plate fixing			A075W5015Z	6
45	Grommet plate, parking brake cables			A079U4483F	1
46	Grommet, parking brake cables			A079U6033F	4
47	Grommet plate, into engine bay			A082J4392F	1
48	Grommet, cable thr'o chassis / cables th'o plate			A082L6181 F	4



ESPRIT
34.01

Function Code 34.01 Wheels, Tyres & Valves

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Front Wheel , OZ monobloc (6 spoke), 8.5J x 17 ET19	OZ badge	V8, V8GT	**A082G6108L**	2
Ola	Front Wheel , OZ monobloc (6 spoke), 8.5J x 17 ET19	Lotus badge	V8, V8GT, 2000 MY	**B082G6108F**	2
01 b	Front Wheel, OZ split rim (5 spoke), 8.5J x 17 ET1 9		V8, S4S	**B082G6091 F**	2
01c	Front Wheel, OZ monobloc (5 spoke), 7J x 17		GT3	**A082G6083F**	2
01 d	Front Wheel, OZ monobloc (5 spoke) 8.5J x 17 ET1 9	Magnesium	sport 350	**A082G611 0 L**	2
Ole	Front Wheel, AWI monobloc		V8	**A082G4108L ,**	2
02	Front Tyre, Michelin Pilot SX MXX3 235/40 ZR 17		V8 all models	**A082G6089S**	2
02a	Front Tyre, Goodyear Eagle GS-A, 215/40 ZR1 7		GT3	**A082G4092H**	2
02b	Front Tyre, Pirelli P Zero, 235/40 ZR17		sport 350	**A082G61 15H**	
03	Tyre Valve, for OZ monobloc wheels		V8, V8GT	**P691.3401.611 A H**	**4**
03a	Tyre Valve, for OZ split rim wheels		V8, S4S	**P691.3401.611AS**	**4**
03b	Tyre Valve, for AWI (V8) & OZ monobloc (GT3) wheels		V8, GT3	**A082G6027H**	4
03c	Tyre Valve, for OZ monobloc magnesium wheels		sport 350	**A082G6117H**	4
04	Wheel & Tyre Assembly, front OZ, 6 spoke	OZ badge	V8, V8GT	**A082G4113F**	**2**
04a	Wheel & Tyre Assembly, front OZ, 6 spoke	Lotus badge	V8, V8GT, 2000 MY	**B082G4113F**	2
04b	Wheel & Tyre Assembly, front OZ split rim		V8, S4S	**B082G4104F**	**2**
04c	Wheel & Tyre Assembly, front, OZ 5 spoke		GT3	**A082G4094F**	2
04d	Wheel & Tyre Assembly, front, OZ 5 spoke	Magnesium	sport 350	**A082G4117F**	**2**

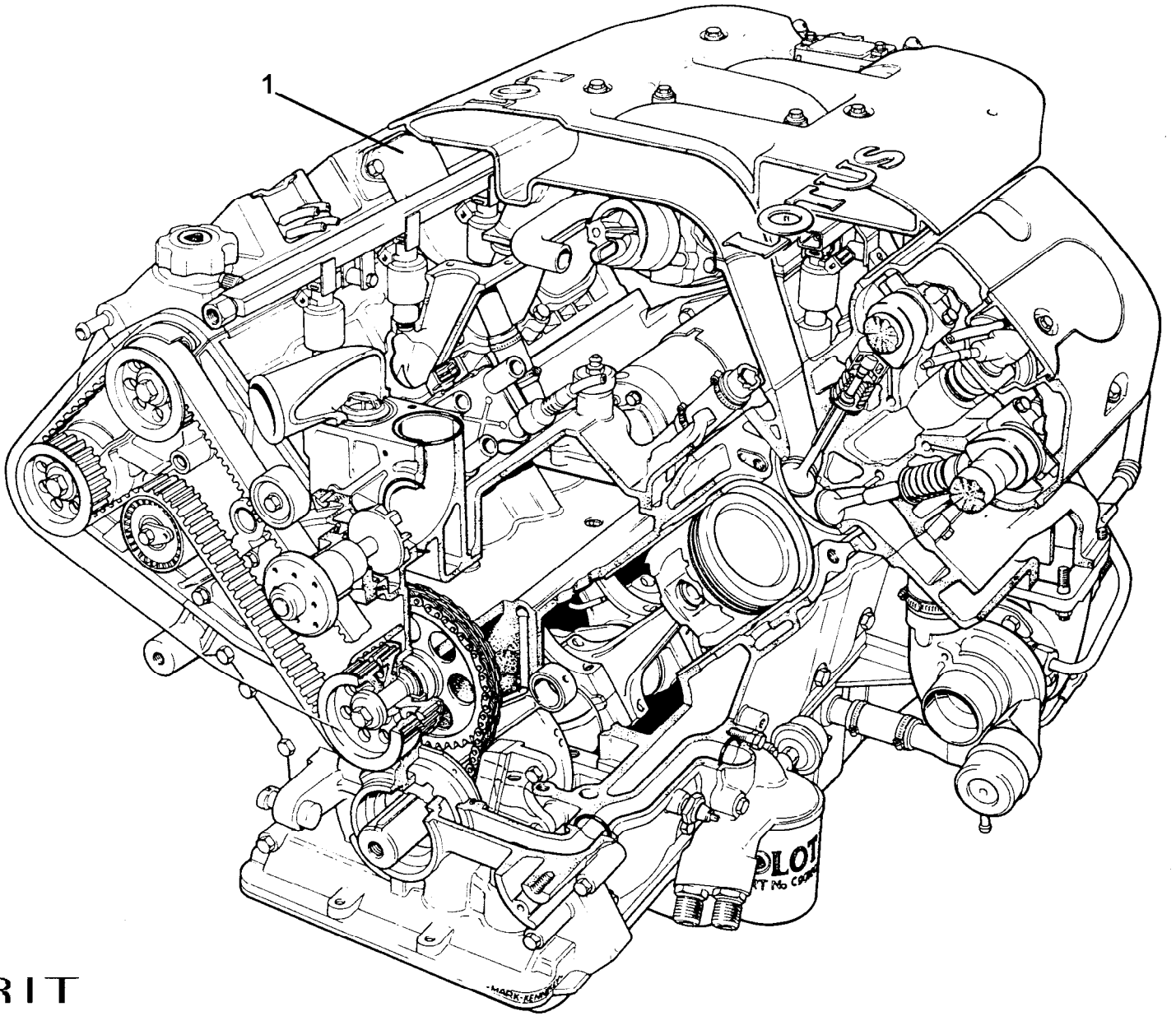
Function Code 34.01 Wheels, Tyres & Valves

Dep	Part Description	Remarks	Option	Part Number	Qty
04e	Wheel & Tyre Assembly, front, AWI monobloc		va	**A082G411 OF**	**2**
05	Wheel Centre Cover, OZ monobloc, OZ badge, rear	Includes fittings	V8, V8GT	**A082G6113S**	**2**
05a	Wheel Centre Cover, OZ monoboc, OZ badge, front	Includes fittiings	V8, V8GT	**A082G6112S**	2
05b	Wheel Centre Cover, OZ monobloc, Lotus badge, rear	Includes fittiings	V8, V8GT, 2000 MY	**A0892G6119S**	
05c	Wheel Centre Cover, OZ monoboc, lotus badge, front	Includes fittiings	V8, V8GT, 2000 MY	**A082G6118S**	
06	Wheel Centre, Lotus badge, AWI monobloc		va	**A082G4112F**	4
06a	Wheel Centre, Lotus badge, OZ monobloc		Sport 350, GT3	**A082G6071 F**	4
07	Wheel Bolt	Torque to 10daNM (74 ft/lb)	V8, V8GT, GT3	**A082G6038F**	20
07a	Wheel Bolt	For magnesium wheels	sport 350	**A082G6114F**	20
08	Rear Wheel, OZ monoblock (6 Spoke), 10J x 18 ET17	OZ badge	V8, V8GT	**A082G6109L**	2
08a	Rear Wheel, OZ monoblock (6 Spoke), 10J x 18 ET1 7	Lotus badge	V8, V8GT, 2000 MY	**B082G6109L**	2
08b	Rear Wheel, OZ split rim (5 spoke), 1 OJ x 18 ET17		va, S4S	**B082G6092F**	2
08c	Rear Wheel, OZ monobloc (5 spoke), 8.5J x 17		GT3	**A082G6084F**	2
08d	Rear Wheel, OZ monobloc (5 spoke), 10J x 18 ET17	Magnesium	sport 350	**A082G6111L**	2
08e	Rear Wheel, AWI monobloc		va	**A082G4109L**	2
09	Rear Tyre, Michelin Pilot SX MXX3 285/35 ZR 18		V8 all models	**A082G6090S**	2
09a	Rear Tyre, Goodyear Eagle GS-A, 245/45 ZR17		GT3	**A082G4093H**	2
09b	Rear Tyre, Pirelli P Zero, 295/35 ZR16		sport 350	**A082G6116H**	2
10	Wheel & Tyre Assembly, rear OZ, 6 spoke	OZ badge	V6, V8GT	**A082G4114F**	2
10a	Wheel & Tyre Assembly, rear OZ, 6 spoke	Lotus badge	V8, V8GT, 2000 MY	**B082G4114F**	2
10b	Wheel & Tyre Assembly, rear, OZ split rim.		va, S4S	**BO82G4105F**	2

Function Code 34.01 Wheels, Tyres & Valves

Dep	Part	Description	Remarks	Option	Part Number	Qty
10c		Wheel & Tyre Assembly, rear, 5 spoke		GT3	**A082G4095F**	2
10d		Wheel & Tyre Assembly, rear, OZ 5 spoke	Magnesium	sport 350	**A082G4118F**	2
10e		Wheel & Tyre Assembly, rear, AWI monobloc		V8	**A082G4111 F**	2
11		Spare Wheel, 4J x 16 H2	Temporary use only	V8	**A082G6085H**	1
12		Spare Tyre, Michelin Tex T125/80 R16	Temporary use only	V8	**A082G6086H**	1
13		Spare Wheel & Tyre Assembly	Temporary use only	V8	**A082G6087F**	1
14		Tyre Valve, spare wheel	Not illustrated	V8	**A082G6088H**	1
15		'T' Bolt, spare wheel retention		V8	**E082U4763F**	1
16		Clamp Plate, spare wheel retention		V8	**A075U0492Z**	1
17		'0' Ring, clamp plate to bolt		V8	**A91 2E6398F**	1
18		Tapping Plate, clamp bolt fixing		va	**A079U4341 K**	1
19		Pop Rivet, tapping plate to body		V8	**A075W6068Z**	4

* From VIN: W15630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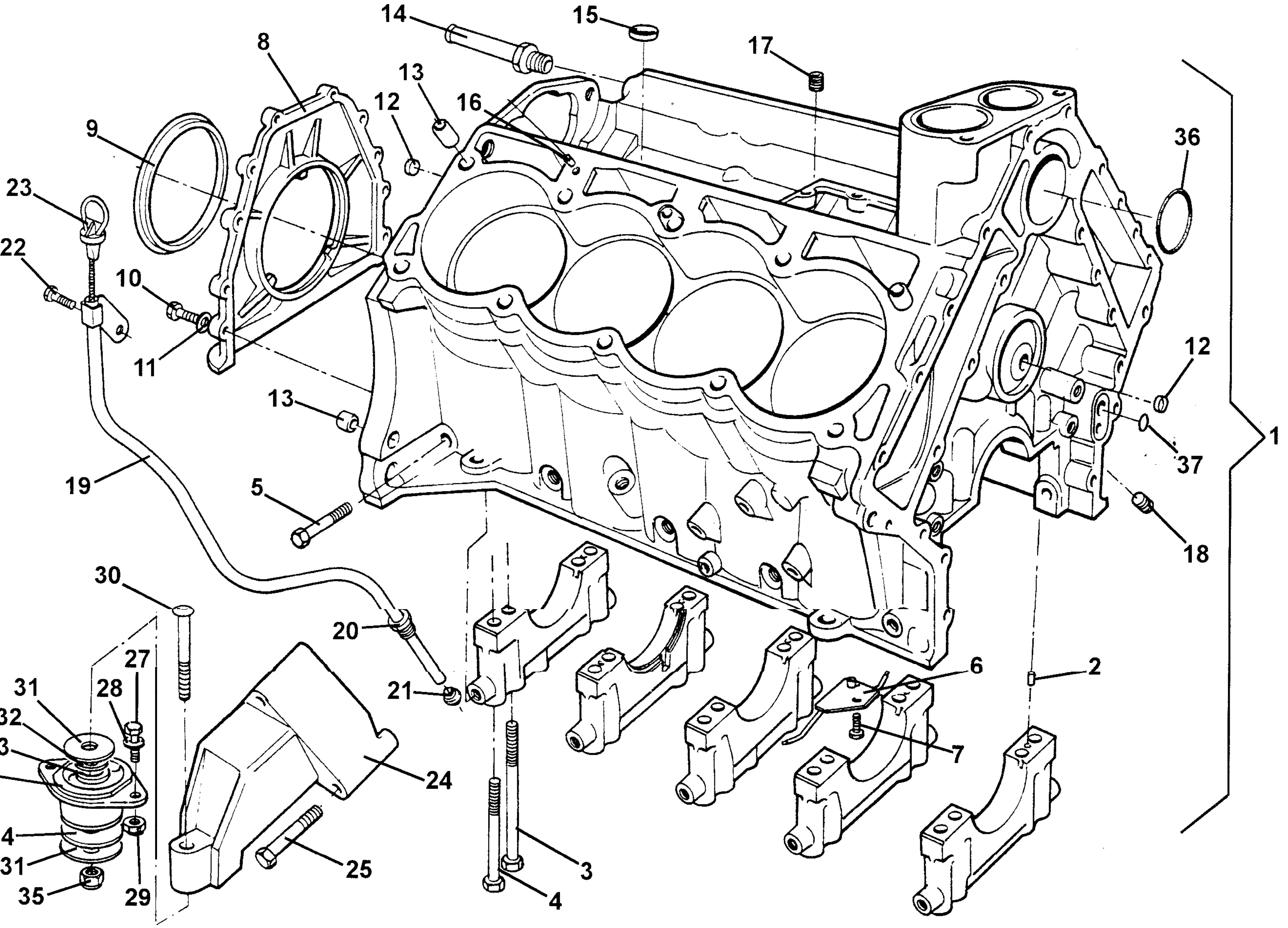
Function Code 40.00 Engine Assemblies

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Engine Assembly, V8	With EGR	USA, ROW 2001 MY on	A918E0207J	1
Ola	Engine Assembly, V8	Without EGR	European Specification	A91 8E0319J	1
01 b	Engine Assembly, 4 cylinder	2 litre, 240bhp	GT3	A91 0E2625J	1



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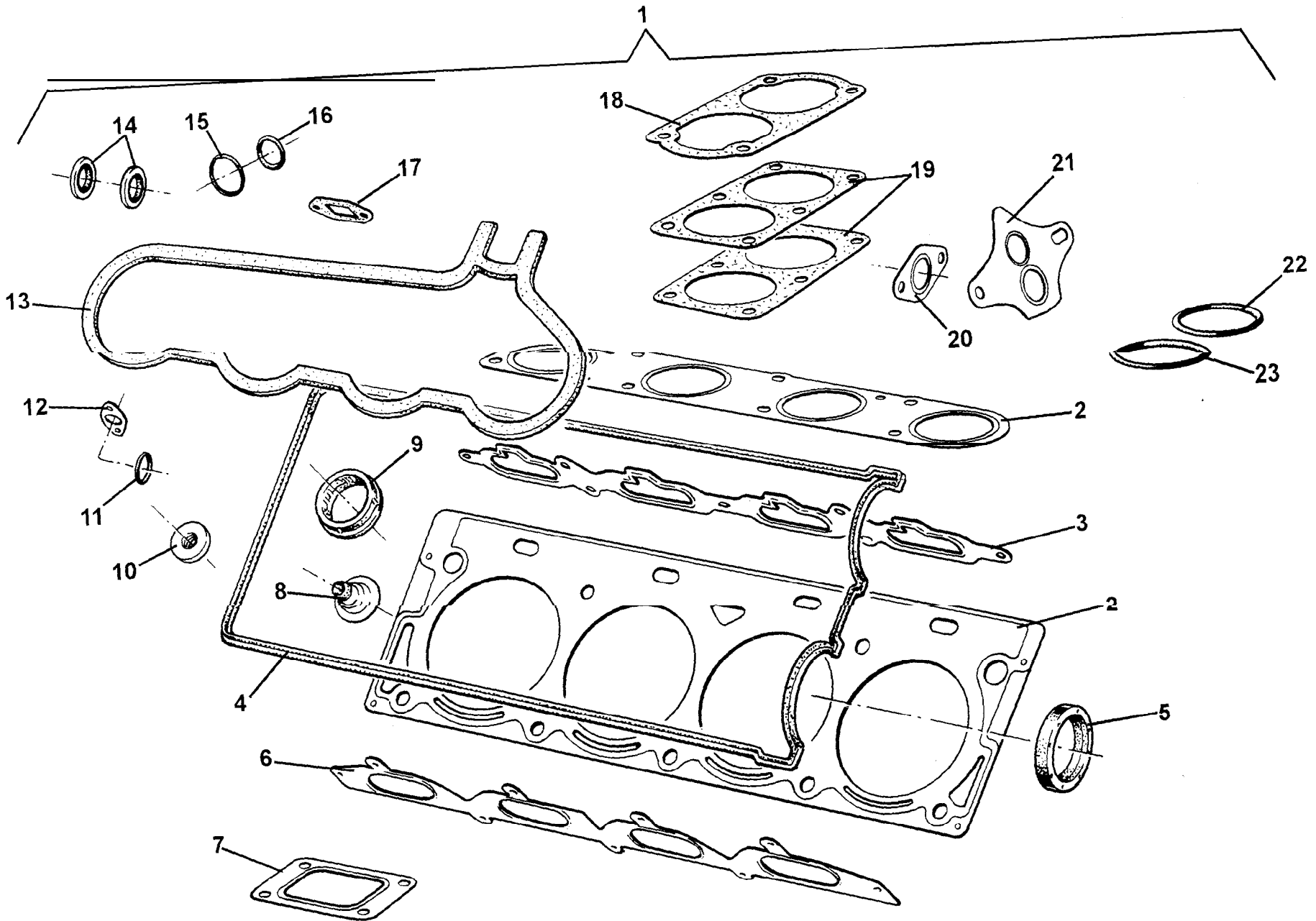
Function Code 40.01 Engine Block & Mounts

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cylinder Block Assembly	Includes main bearing caps		A91 8E0217J	1
02	Dowel, main bearing caps locating			**A91 8E6059F**	6
03	Bolt, inner main bearing caps securing			**A91 8E011 OF**	10
04	Bolt, outer main bearing caps securing			**A918E0111F**	10
05	Bolt, side main bearing caps securing			**A91 8E2170F**	10
06	Jet, oil, piston cooling			**A91 8E0244F**	4
07	Bolt, -jet securing			**Al 00W1 105F**	4
08	Cover, crankshaft rear oil seal			**A91 8E0143K**	1
09	Oil seal, rear crankshaft	Also see 40.02a		**A91 8E021 OF**	1
10	Bolt, cover to block			**A075W1030Z**	12
11	Washer, cover to block			**A075W4013Z**	12
12	Core Plug, 14mm, water jacket			**A91 8E6043F**	2
13	Dowel, locating, block to cylinder head	Also clutch housing locating, 2 off		**B907E6181 F**	6
14	Connector, brass, coolant hose			**A91 8E0103F**	**2**
15	Core Plug, 22mm, water jacket			**A907E6038Z**	1
16	Dowel, locating, head gasket			A918E6059F	2
17	Blanking Plug, l/8 x 27 NPTF, top of cylinder head			A91 8W6549F	1
18	Blanking Plug, 3/8 x 18 NPSF, LHS cyl .block			**A91 8W6562F**	1

Function Code 40.01 Engine Block & Mounts

Dep	Part Description	Remarks	Option	Part Number	Qty
19	DipstickTube			A91 8E0168F	1
20	Sleeve, tube to block			A91 8E6378F	1
22	Olive, tube to block			A91 2E6892F	1
22	Bolt, M6 x 12, hex. hd., dipstick tube to block			A075W1027Z	1
23	Dipstick-engine oii level			A91 8E0167F	1
24	Mounting Bracket, engine block			A91 8E9154F	2
25	Bolt, Ml0 x 65, hex. hd., bracket to block			A075W2056Z	6
26	Metalastic Engine Mount		V8, V8GT	A91 8E0267F	2
26a	Metalastic Engine Mount		sport 350	B085E6009F	2
27	Bolt, M8 x 20, hex hd., mount to chassischassis			A075W1038Z	4
28	Washer, flat, M8, mount to chassis			A075W4020Z	4
29	Nyloc Nut, M8, mount to chassis			A075W301 OZ	4
30	Bolt, Ml2 x 100, cap hd., mount to bracket			AI 00W7098F	2
31	Plain Washer			A079W4083F	2
32	Buffer Washer, stepped rubber inside			A085E6011 F	2
33	Plain Washer			A075W4008Z	2
34	Buffer Washer, rubber face upwards			A085E601 OF	2
35	Nyloc Nut, Ml2			A075W3012Z	2
36	‘0’ Ring, water pump	Also see section 40.15		A91 8E6019F	1
37	‘0’ Ring, oil gallery	Also see section 40.15		A91 8E6018F	1



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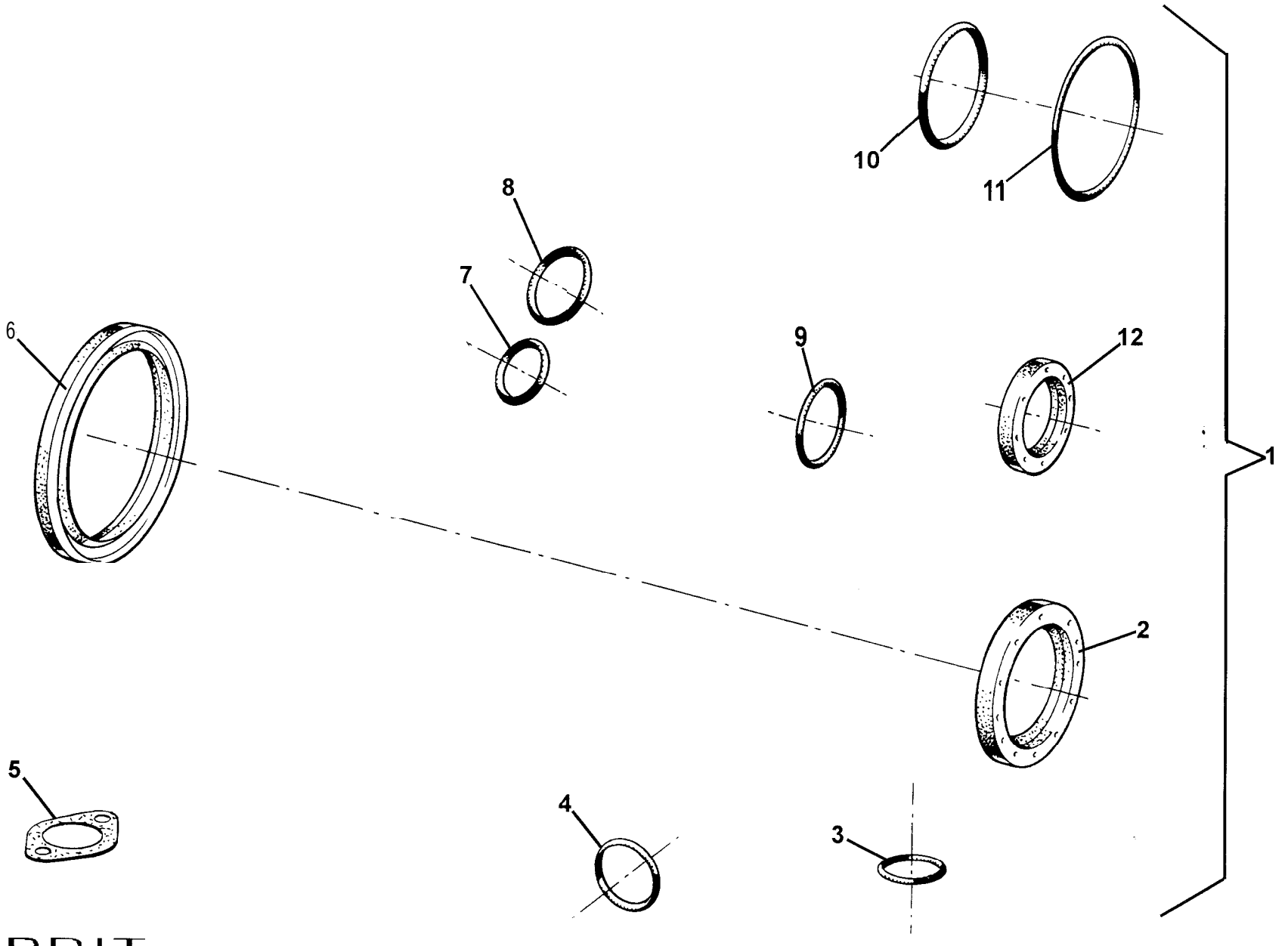
40.02

Function Code 40.02 Gaskets & Sealants, Top Overhaul Set

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Gasket Set, top overhaul			A91 8EO316S	1
02	Gasket, cylinder Head			A91 8E0029F	2
03	Gasket, inlet manifold			B918EOO27F	2
04	Gasket, camshaft cover			A91 8E0123F	2
05	Oilseal, camshaft			A91 8E6006F	4
06	Gasket, exhaust manifold to head			A91 8E0028F	2
07	Gasket, turbo to manifold			A91 8E0025F	2
08	Seal, valve stem			A91 8E0209F	32
09	Seal, spark plug bore			A91 8E0122F	8
10	Seal, camshaft cover bolt			A918E0124F	12
11	'0' Ring, air valve			A918E6024F	1
12	Gasket, air valve			A91 8E0031 F	1
13	Gasket, spark plug cover			B918E0342F	2
14	Seal/Dowty Washer, Ml 4			A91 8E6005F	4
15	'0' Ring, secondary injector			A918E6067F	2
16	'0' Ring, secondary injector			A91 8E6026F	2
17	Gasket, breather pipe			A918E0302F	2
18	Gasket, EGR, manifold to plenum			A91 8E0024F	1

Function Code 40.02 Gaskets & Sealants, Top Overhaul Set

Dep	Part Description	Remarks	Option	Part Number	Qty
19	Gasket, throttle body			A91 8E0026F	2
20	Gasket, EGR Flange			A91 8E0033F	4
21	Gasket, EGR valve			A91 8E0032F	1
22	'0' Ring, coolant connection			A91 8E6021 F	1
23	'0' Ring, thermostat/front Cover			A91 8E6019F	1
24	Gasket, plenum to manifold			A91 8E0023F	2



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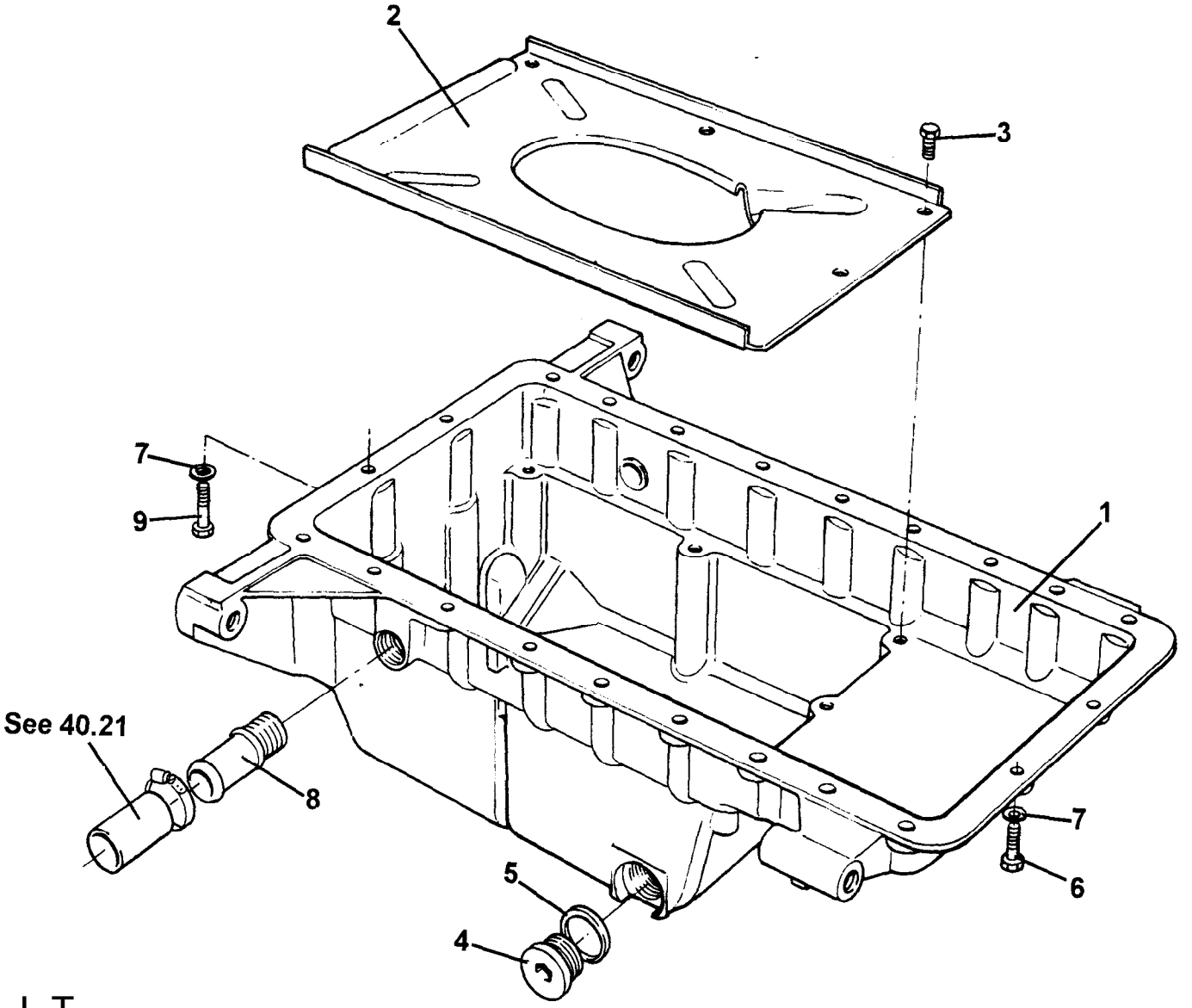
40.02a

Function Code 40.02a Gaskets & Sealants, Bottom Overhaul Set

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Gasket Set, bottom overhaul			A91 8E0317S	1
02		Oil Seal, crankshaft, front			A91 8E6007F	1
03		'0' Ring, oil pick up pipe			A91 8E6020F	1
04		'0' Ring, sump plug			A91 2E6694F	1
05		Gasket, turbo oil drain			A91 8E0030F	2
06		Oilseal, crankshaft, rear			A91 8E021 OF	1
07		'0' Ring, oil filter housing			A91 8E6023F	1
08		'0' Ring, oil filter housing			A91 8E6025F	1
09		'0' Ring, front cover to cylinder block oil gallery			A91 8E6018F	1
10		'0' Ring, front cover to water pump			A91 8E6019F	1
11		'0' Ring, front cover to water pump cover			A91 8E0094H	1
12		Oil Seal, idler shaft			A91 8E6006F	1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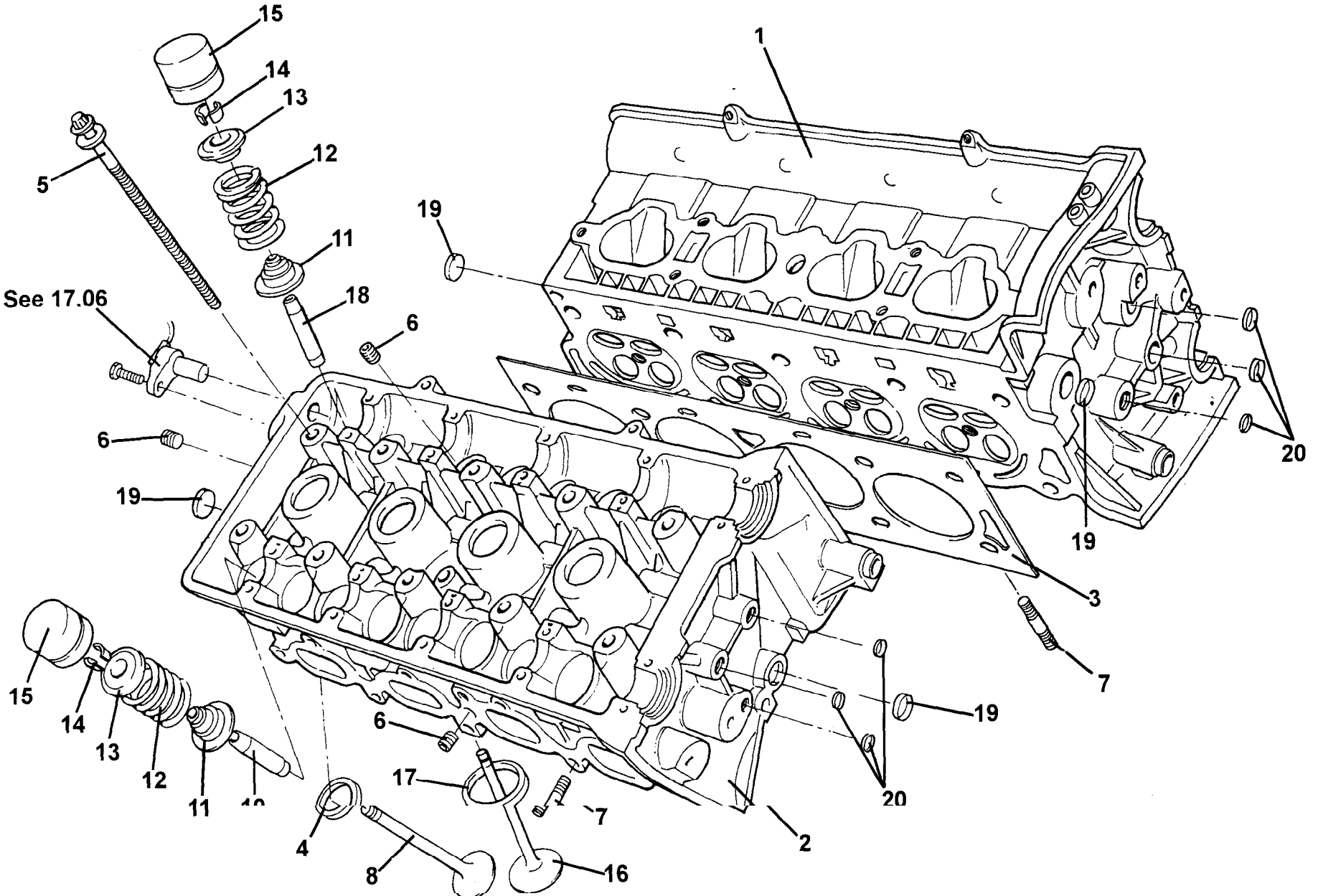
Function Code 40.03 Sump Assembly

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Oil Sump	Includes drain plug		**B918E0211J**	1
02	Baffle, sump			**A91 8E0166F**	1
03	Bolt, M6 x 12, hex. hd., baffle to sump			**A075W1027Z**	7
04	Oil Drain Plug		Prior to '98 MY	**A91 1 E6343F**	1
04a	Oil Drain Plug	With oil temperature sensor tapping*	'98 MY on	**A91 8E0349F**	1
05	'0' Ring, drain plug to sump			**A91 2E6694F**	1
06	Bolt, M8 x 25 , hex. hd., sump to block			**A075W1039Z**	20
07	Washer, flat, M8, sump to block			**A075W4020Z**	22
08	Spigot, turbo oil feed			**A91 8E0243F**	2
09	Bolt, M8 x 25, cap hd., sump rear to block			**A082U6136F**	2

*For sensor see 17.06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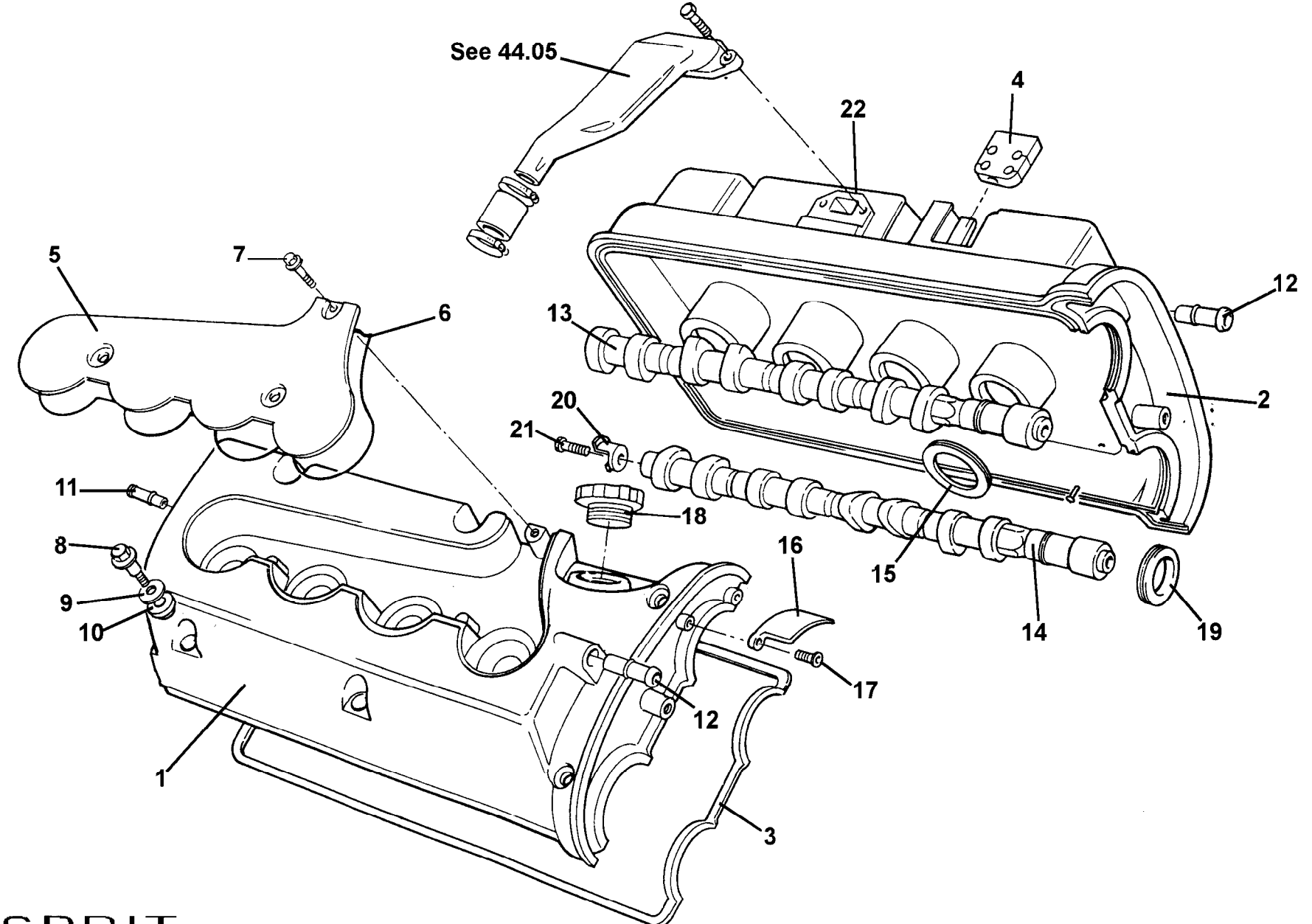
Function Code 40.05 Cylinder Head , Valves, Springs

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cylinder Head Assembly, RH	Incl. valves, springs, cam caps, studs & core plugs		**B918E0004J**	1
Ola	Cylinder Head, sub assembly, RH	Incl. cam caps, studs & core plugs		**A91 8E0202J**	1
02	Cylinder Head Assembly, LH	Incl. valves, springs, cam caps, studs & core plugs		**B918E0003J**	1
02a	Cylinder Head, sub assembly, LH	Incl. cam caps, studs & core plugs		**A91 8E0201 J**	1
03	Gasket, cylinder head	Also see 40.02		**A91 8E0029F**	1
04	Seat, exhaust valve			**A91 8E0082F**	16
05	Bolt, Ml 1 x 258 x 1.5 6g, cylinder head fix.			**A91 8E0112F**	20
06	Plug, oil gallery ¼ x 18 NPTF			**A91 2E7037Z**	8
07	Stud, exhaust manifold (M8 x 1.25 4H x 45)			**B918E0120F**	18
08	Valve, exhaust			**A91 8E0002F**	16
10	Valve Guide, exhaust			**A91 8E0107F**	16
11	Seat, valve spring			**A91 8E0209F**	32
12	Valve Spring			**A91 8E0159F**	32
13	Retainer, valve spring			**A91 8E0101 F**	32
14	Valve Retaining Collet			**A91 8E6000F**	64
15	Hydraulic Tappet			**A91 8E6004F**	32

Function Code 40.05 Cylinder Head , Valves, Springs

Dep	Part	Description	Remarks	Option	Part Number	Qty
16		Valve, inlet			**A91 8E0001 F**	16
17		Seat, inlet valve			**A91 8E0079F**	16
18		Guide, inlet valve			**A91 8E0076F**	16
19		Core Plug, 22mm, water jacket			**A907E6038Z**	4
20		Core Plug, 14mm, oil gallery/air rail			**A91 2E6043F**	7
21		Bolt. M6 x 40, hex. hd., cam caps to head	Not illustrated, cam caps part of head assembly		A075W2030Z	40
22		Washer, flat, M6, cam caps to head	Not illustrated, cam caps part of head assembly		**A075W4013Z**	40



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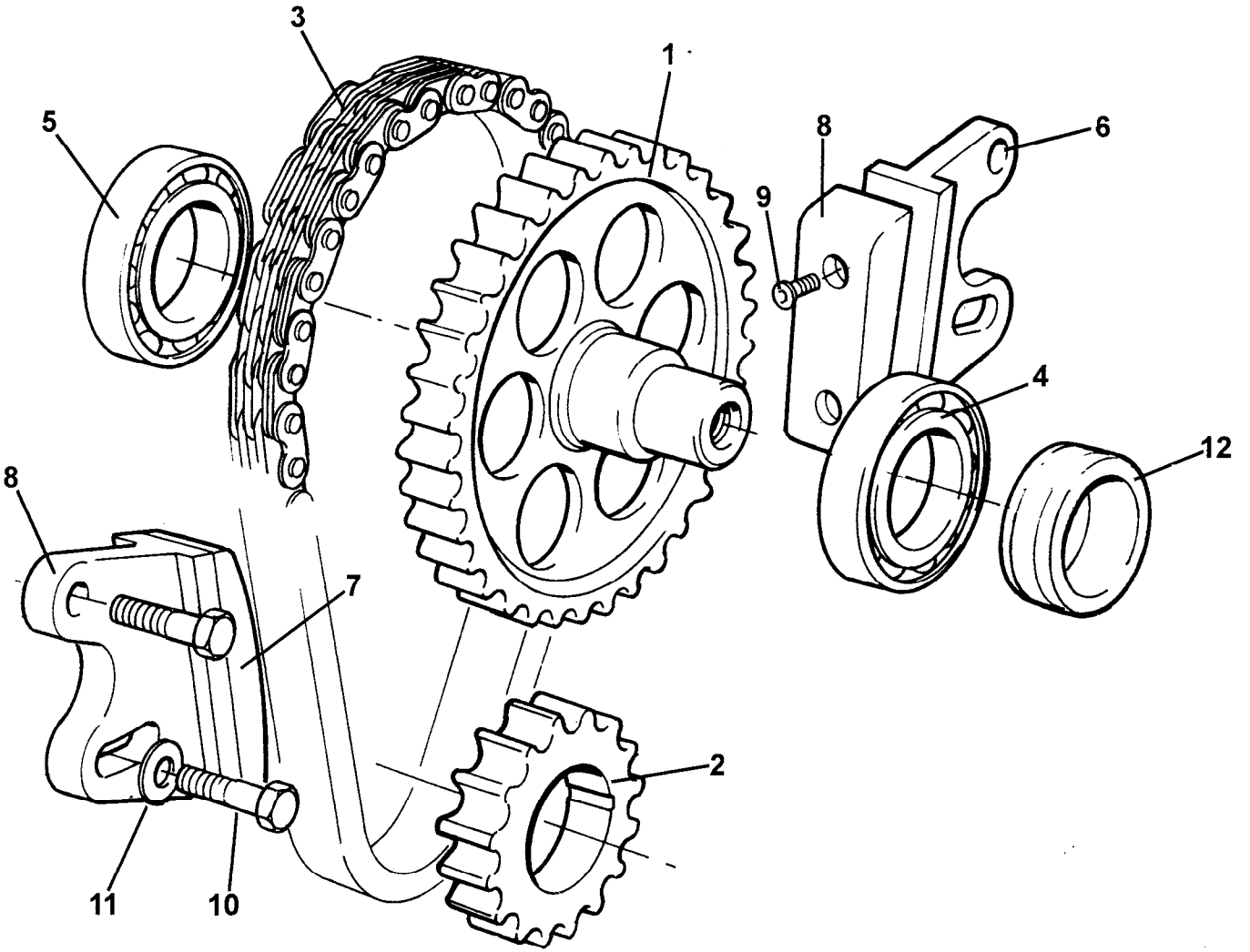
40.07

Function Code 40.07 Camshafts, Tappets, Cam Cover

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cam Cover Assembly, RH	With plug well drains, red finish	A91 8E0214J R/B	**A91 8E0126J**	1
02	Cam Cover Assembly, LH	With plug well drains, red finish	A91 8E021 3J R/B	**A91 8EOI25J**	1
02a	Cam Cover Assembly, RH	Blue finish	sport 350	**B918E0126J**	1
02b	Cam Cover Assembly, LH	Blue finish	sport 350	**B918E0125J**	**1**
03	Gasket, camshaft cover	Also see 40.02		**A91 8E0123F**	**2**
04	Spark Plug Lead Retainer			B918E0170F	2
05	Spark Plug Well Cover, RH	Red finish		**A91 8E01** 30K	**1**
.05a	Spark Plug Well Cover, LH	Red finish, not illustrated		**A91 8E0129K**	1
05b	Spark Plug Well Cover, RH	Blue finish	sport 350	**A91 8E0368L**	1
05c	Spark Plug Well Cover, LH	Blue finish, not illustrated	sport 350	**A91 8E0367L**	1
06	Seal, spark plug cover to cam cover	Also see 40.02		**A91 8E0342F**	**2**
07	Bolt, M6 x 16, flg. hd., plug cover to cam cover			**A91 8W5208F**	**6**
08	Shoulder Bolt, camshaft cover to head			**A91 8E0196F**	12
09	Retaining Washer, seal			**A082W4172F**	**12**
10	Seal, camshaft cover bolt	Also see 40.02		**A918E 0124F**	**12**
11	Pipe Connector, 7.8mm dia.			**A91 8E0304F**	**1**
12	Pipe Connector, 12.7mm dia.			**A91 8E0305F**	**2**
13	Inlet Camshaft , LH	Colour coded blue		**C918E0063F**	1

Function Code 40.07 Camshafts, Tappets, Cam Cover

Dep	Part Description	Remarks	Option	Part Number	Qty
13a	inlet Camshaft inlet, RH	Colour coded tan		**C918E0065F**	1
14	Exhaust Camshaft, LH	Colour coded white, integral sector, cam angle		**C918E0062F**	1
14a	Exhaust Camshaft, RH	Colour coded green		**C918E0064F**	1
15	Seal, spark plug bore	Also see 40.02		**A91 8E0122F**	8
16	Snubber, camshaft drive belt			**A918E0138F**	1
17	Screw, M6 x 16, csk., skt., hd.			**A91 8W7120F**	2
18	Oil Filler Cap			**A91 2E6965F**	1
19	Oil Seal, camshaft	Also see 40.02		**A91 8E6006F**	4
20	Sector, cam angle sensor		'B' level camshaft only	**A918E0177F**	1
21	Screw, M6 x 12, hex. hd., sector to camshaft		'B' level camshaft only	**A075W1027Z**	1
22	Silastic, clear, breather to cam cover	Replaces black loctite 5910		**A075U6044V**	20ml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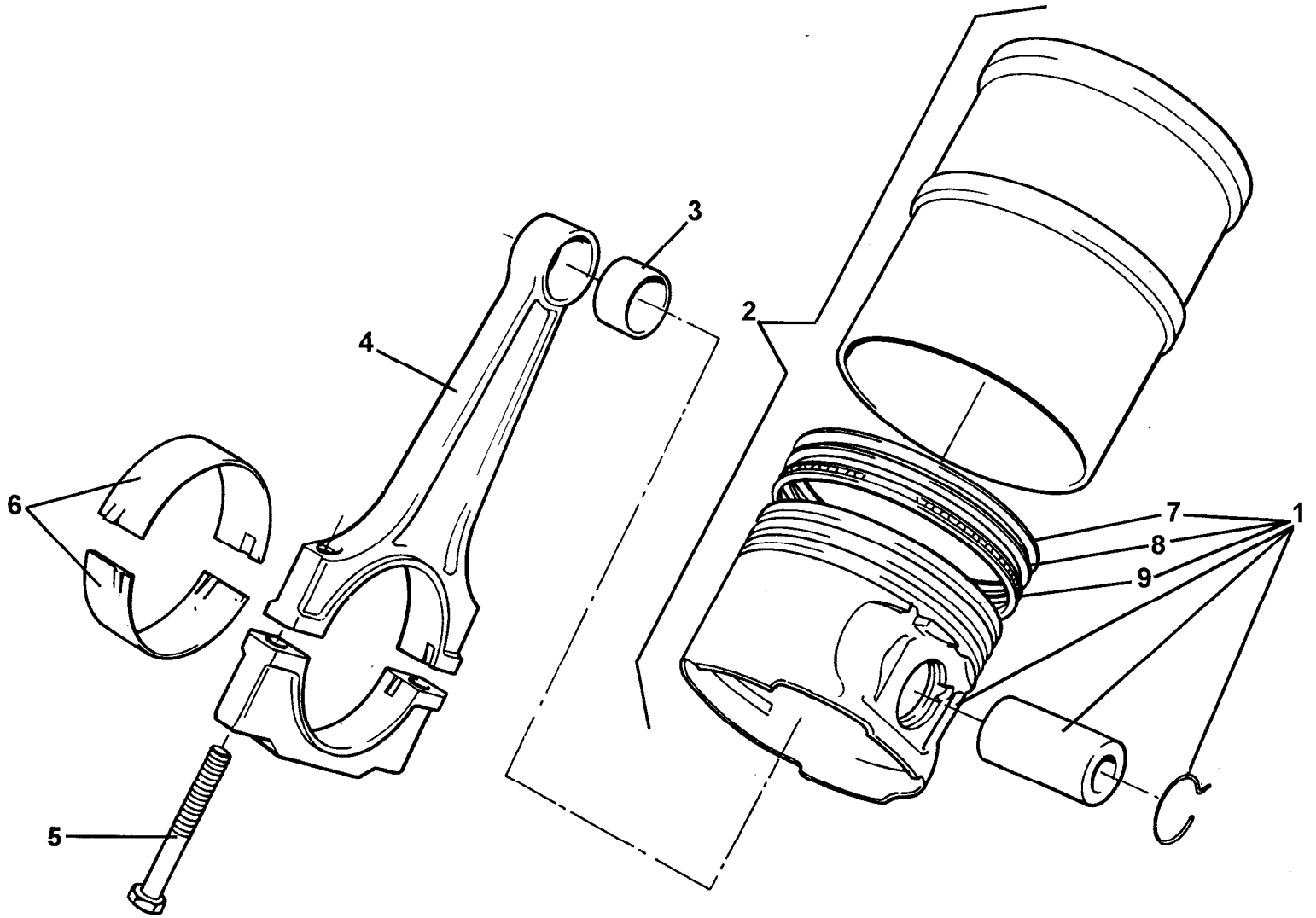
Function Code 40.08 Camshaft, Primary Drive

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Idler Sprocket			B91 8E0040F	1
02	Crankshaft Sprocket			A91 8E0041 F	1
03	Chain, primary drive			A91 8E0042F	1
04	Roller Bearing/Sleeve Assy., front, 55mm O/D	Fits early front cover with 55mm housing*		A91 8E0337F	1
04a	Roller Bearing, front, 50mm O/D	Fits late front cover with 50mm housing*		A91 8E6074F	1
05	Roller Bearing, rear			A91 8E6073F	1
06	Snubber Mounting			A918E0119K	2
07	Snubber, RH			A918E0116F	1
08	Snubber, LH			A918E0115F	1
09	Screw, M4 x 12, csk. skt. hd.			A918W7116F	4
10	Bolt, M8 x 25, hex. hd.			A075W1039Z	4
11	Washer, flat, M8			A075W4020Z	4
12	Spacer Sleeve, idler shaft oil seal			A91 8E0335F	1

* See Service Bulletin 1997/20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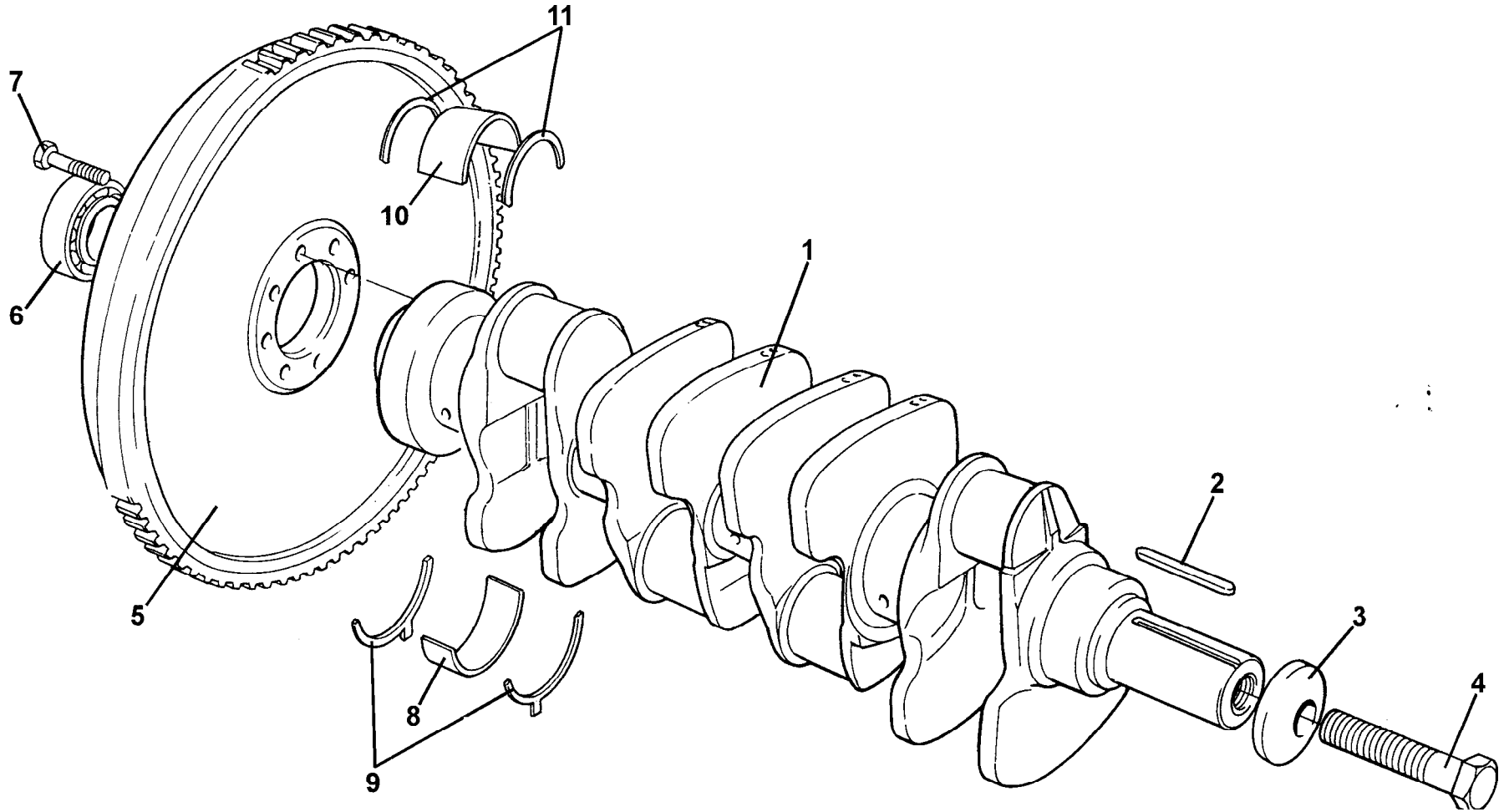
Function Code 40.09 Pistons, Con-rods, Liners

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Piston Assembly	Comprising: piston, ring set & gudgeon pin/circlips, please state 'A' or 'B' grade when ordering		**A91 8E0306J**	8
02	Piston and Liner Assembly	State 'A' or 'B' grade when ordering		**A91 8E0052F**	8
03	Bush, con-rod			**A91 8E0006F**	8
04	Con Rod Assembly	Includes bolts		**A91 8E0087F**	8
05	Bolt, con-rod, M8 x 1.25 4h x 44, Mn Ph	Part of con-rod assembly		**B918E0113F**	16
06	Shell, con rod ,standard			**A91 8E0011 F**	16
06a	Shell, con rod, -0.25mm			**A91 8E0016F**	As req.
06b	Shell, con rod ,-0.50mm			**A91 8E0017F**	As req.
07	Piston Ring, top			**A91 8E0054H**	8
08	Piston Ring, second			**A91 8E0055H**	8
09	Piston Ring, oil control			**A91 8E0056H**	8



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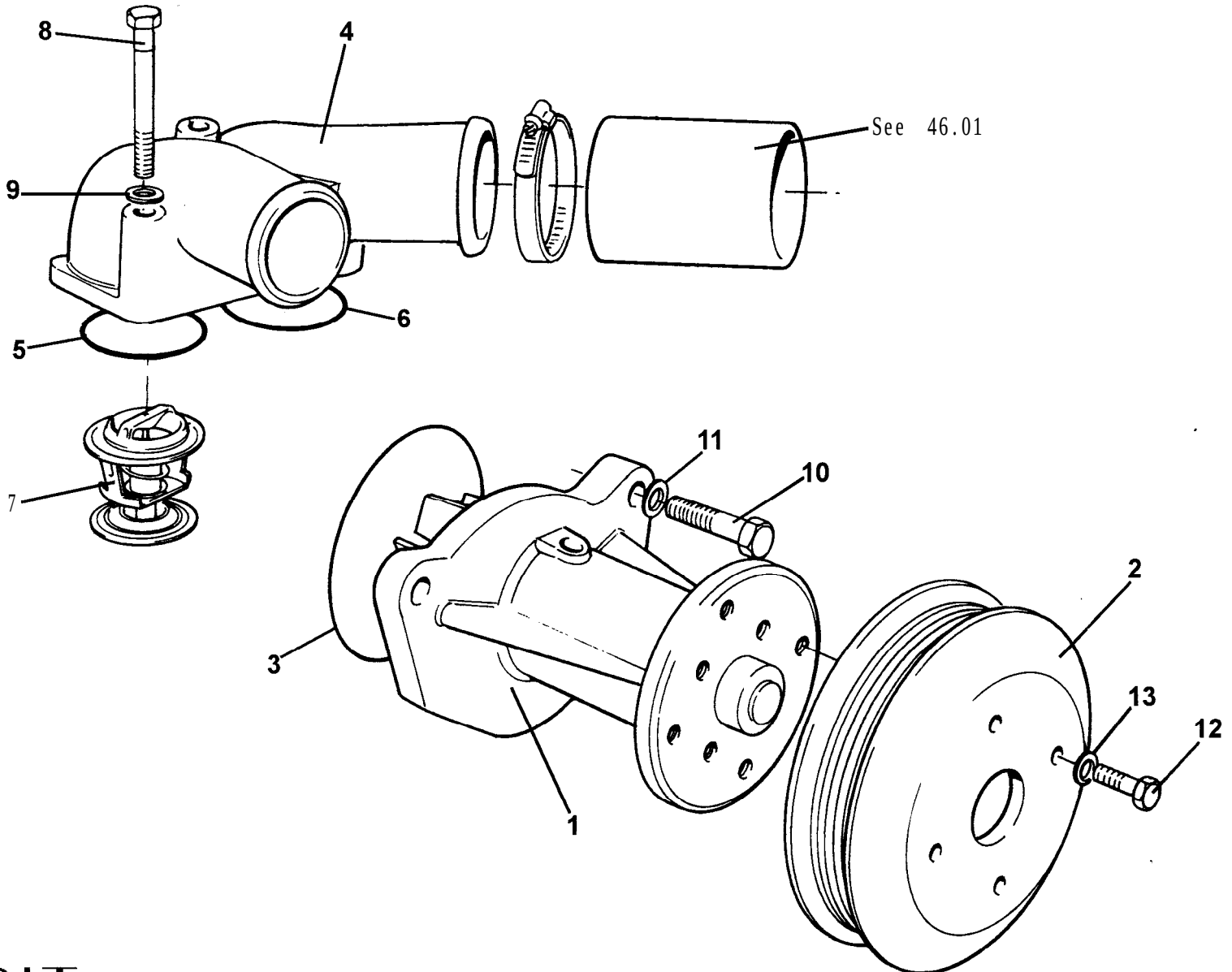
40.11

Function Code 40.11 Crankshaft, Bearings, Flywheel

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Crankshaft			C918E0019F	1
02	Key, square section, pulley locking			B918E0018F	1
03	Washer, crankshaft pulley			A918E0176F	1
04	Bolt, Ml6 x 150, hex. hd.			A918E0114F	1
05	Flywheel		Twin Plate clutch	A91 8E0325F	1
06	Spigot Bearing, first motion shaft			A91 2E6862F	1
07	Bolt, flywheel to crankshaft			A91 8E0043F	8
08	Bearing, main-lower, standard			A91 8E0007F	5
08a	Bearing, main-lower, 0.25mm			A91 8E0015F	5
08b	Bearing, main-lower, 050mm			A91 8E0013F	5
09	Bearing, main-upper, standard			A91 8E0008F	5
09a	Bearing, main-upper, 0.25mm			A918E0014F	5
09b	Bearing, main-upper, 0.50mm			A91 8E0012F	5
10	Thrust washer, lower, with tag			A91 8E0009F	2
11	Thrust Washer, upper, without tag			A91 8E001 OF	2
12	Grease, Esso Unirex N3, spigot bearing lubrication	Not illustrated		A91 2E6891 F	5gm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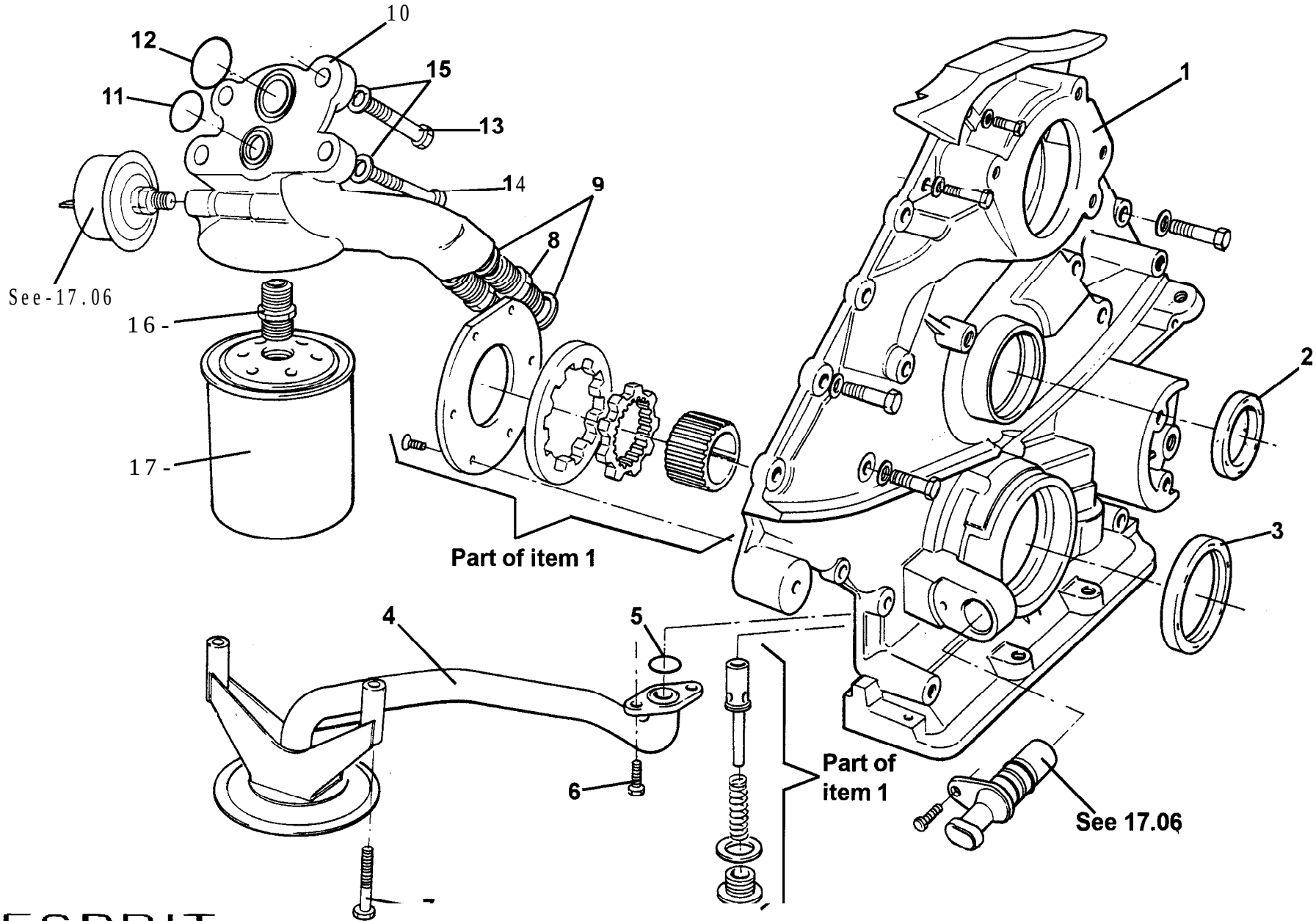
Function Code 40.13 Water Pump Assembly, Thermostat

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Water Pump Assembly			A91 8E0088F	1
02	Pulley, water pump			A91 8E0072F	1
03	'0' Ring, water pump to front cover	Also see 40.02		A91 8E0094H	1
04	Housing, thermostat			A91 8E0141 K	1
05	'0' Ring, thermostat housing, RH	Also see 40.02		A91 8E6019Z	1
06	'0' Ring, thermostat housing, LH	Also see 40.02		A91 8E6021 F	1
07	Thermostat, 82º			A91 8E6037F	1
08	Bolt, M8 x 60, hex. hd., housing to block			A075W2043Z	3
09	Washer, flat, M8, housing to block			A075W4020Z	3
10	Bolt, M8 x 25, hex. hd., water pump to front cover			A075W1039Z	3
11	Washer, flat, M8, water pump to front cover			A075W4020Z	3
12	Bolt,M6 x 16, hex. hd., pulley to water pump			A075W1028Z	4
13	Washer, flat, M6, pulley to water pump			A075W4013Z	4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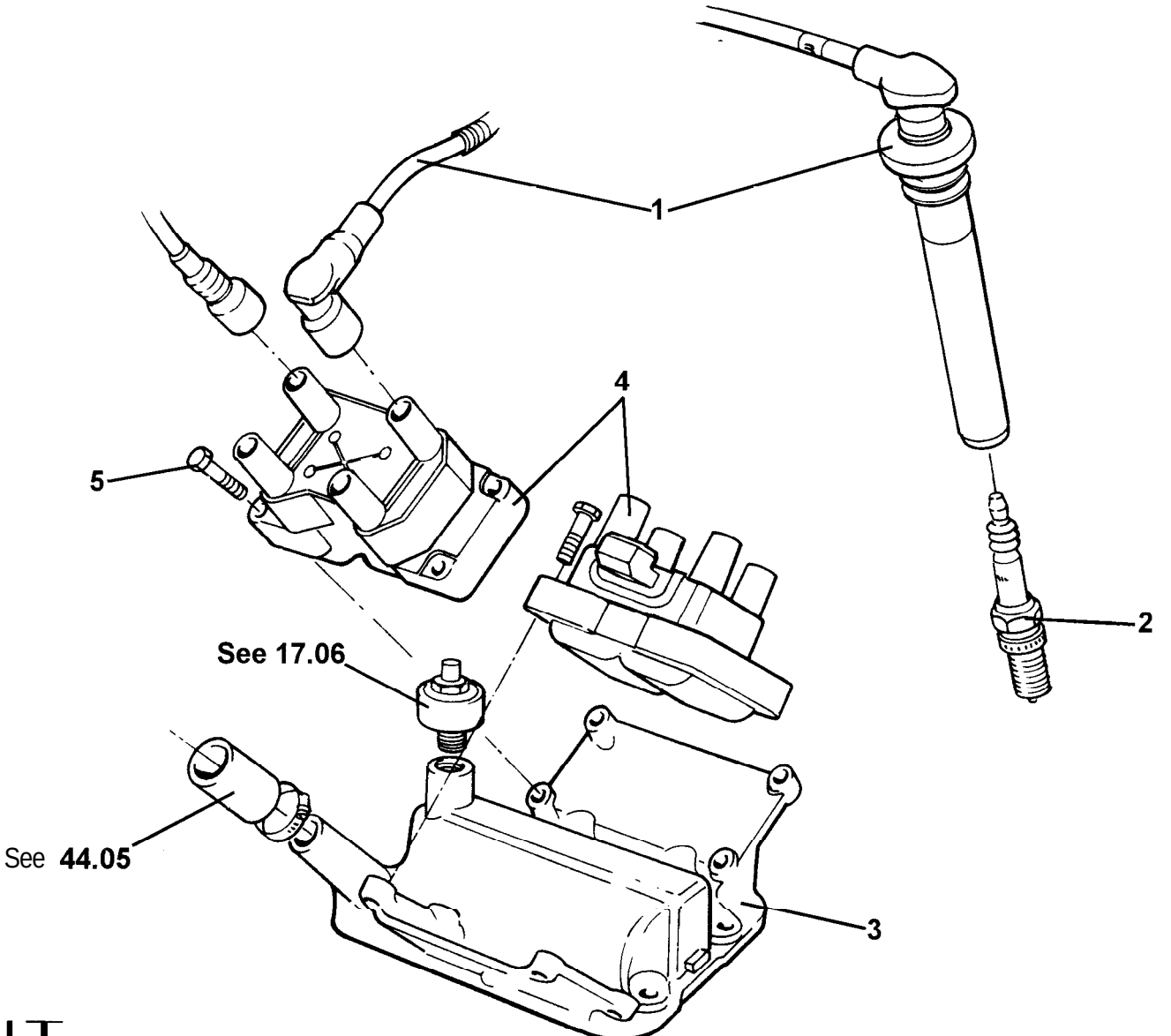
Function Code 40.15 Lubrication System

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Front Cover/Oil Pump/PRV Assembly			B918E0044F	1
02	Oil seal, camshaft idler shaft	Also see 40.02a		A91 8E6006F	1
03	oll seal, crank front	Also see 40.02a		A91 8E6007F	1
04	Oil Pick=Up Pipe			A918E0161F	1
05	'0' Ring, oil pick-up to front cover	Also see 40.02a		A91 8E6020F	1
06	Bolt, M6 x 12, hex. hd.,oil pick-up to block			A075W1027Z	2
07	Screw, M6 x 80, hex. hd.,oil pick-up to front cover			A082W2174F	2
08	Adaptor, oil cooler hose			A907E6300F	2
09	Sealing Washer, oil cooler adaptor			B907E6301 F	2
10	Oil Filter Housing Assy.	Includes adaptors &washers	Prior to '98 MY	A91 8E0215J	1
10a	Oil Filter, Housing Assy.	Includes adaptors, washers & blanking plug	'98 MY on	A91 8E0347J	1
11	'0' Ring, oil filter housing to block, lower	Also see 40.02a		A918E6023F	1
12	'0' Ring oil filter housing to block, upper	Also see 40.02a		A91 8E6025F	1
13	Bolt, M8 x 35, hex. hd., oil filter housing to block			A075W2038F	2
14	Bolt, M8 x 45; hex. hd., oil filter housing to block			A075W2040Z	2
15	Washer, flat, M8 x 16.6, oil filter housing to block			A075W4020Z	4
16	Adaptor, oil filter			A918E0104F	1
17	Oil Filter			C907E6000W	1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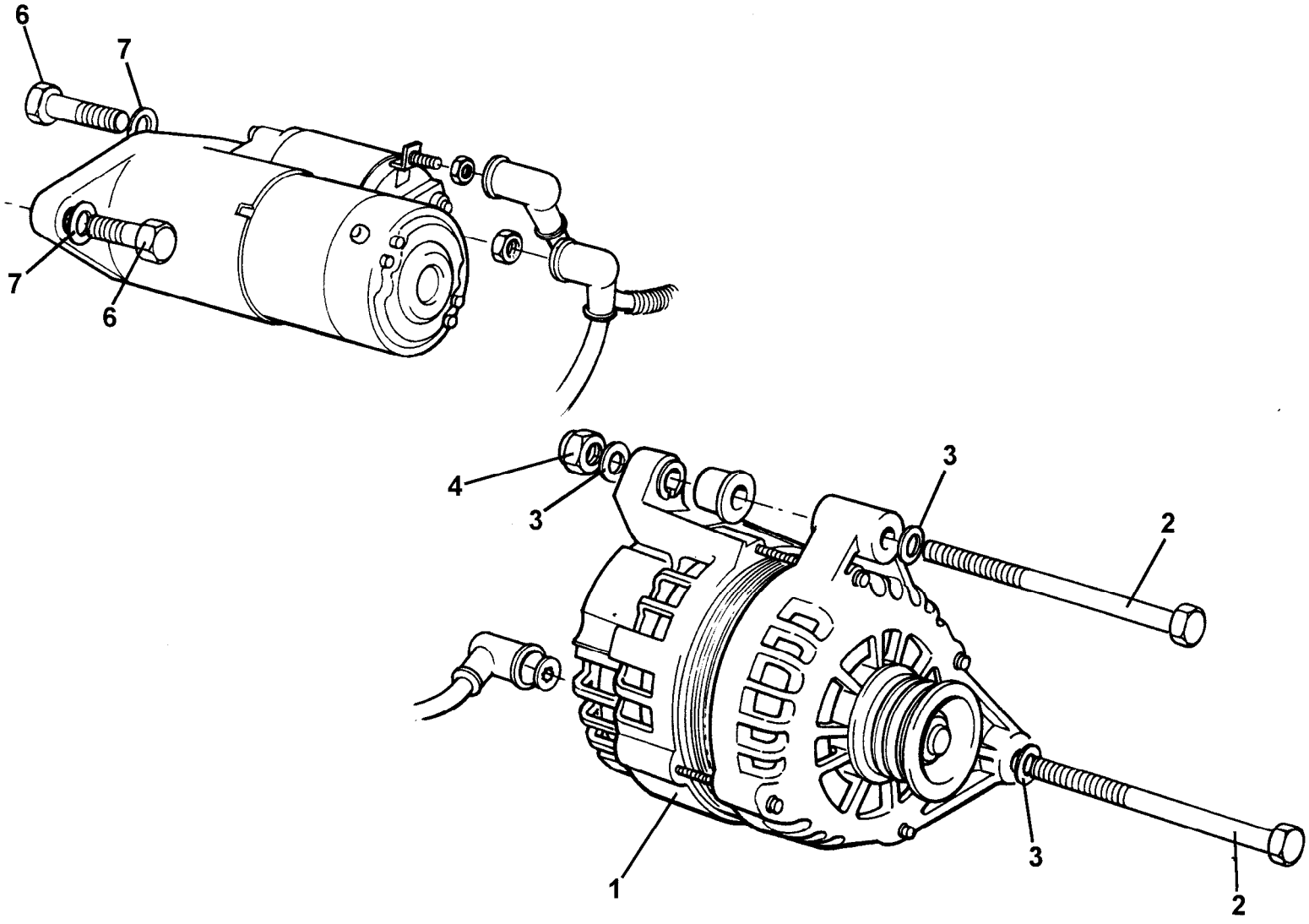
Function Code 40.17 Ignition System, Spark plugs, Leads

Dep	Part Description	Remarks	Option	Part Number	Qty
01	HT Lead Set	One per cylinder bank/coil pack		**A918E0095F**	2
Ola	Plug Lead No.1	Part of item 1		**A91 8E0096H**	2
01 b	Plug Lead No.2	Part of item 1		**A91 8E0097H**	2
01c	Plug Lead No.3	Part of item 1		**A91 8E0098H**	2
Old	Plug Lead No.4	Part of item 1		**A91 8E0099H**	2
02	Spark Plug	Part of item 1		**A91 8E6039F**	8
03	Breather Cover/Mounting Bracket, coil packs			**A918E0136F**	1
04	Coil Pack	One per cylinder bank		**A91 8E6009F**	2
05	Bolt, M6 x 30, hex. hd., coil to breather cover fix			**A075W1032Z**	8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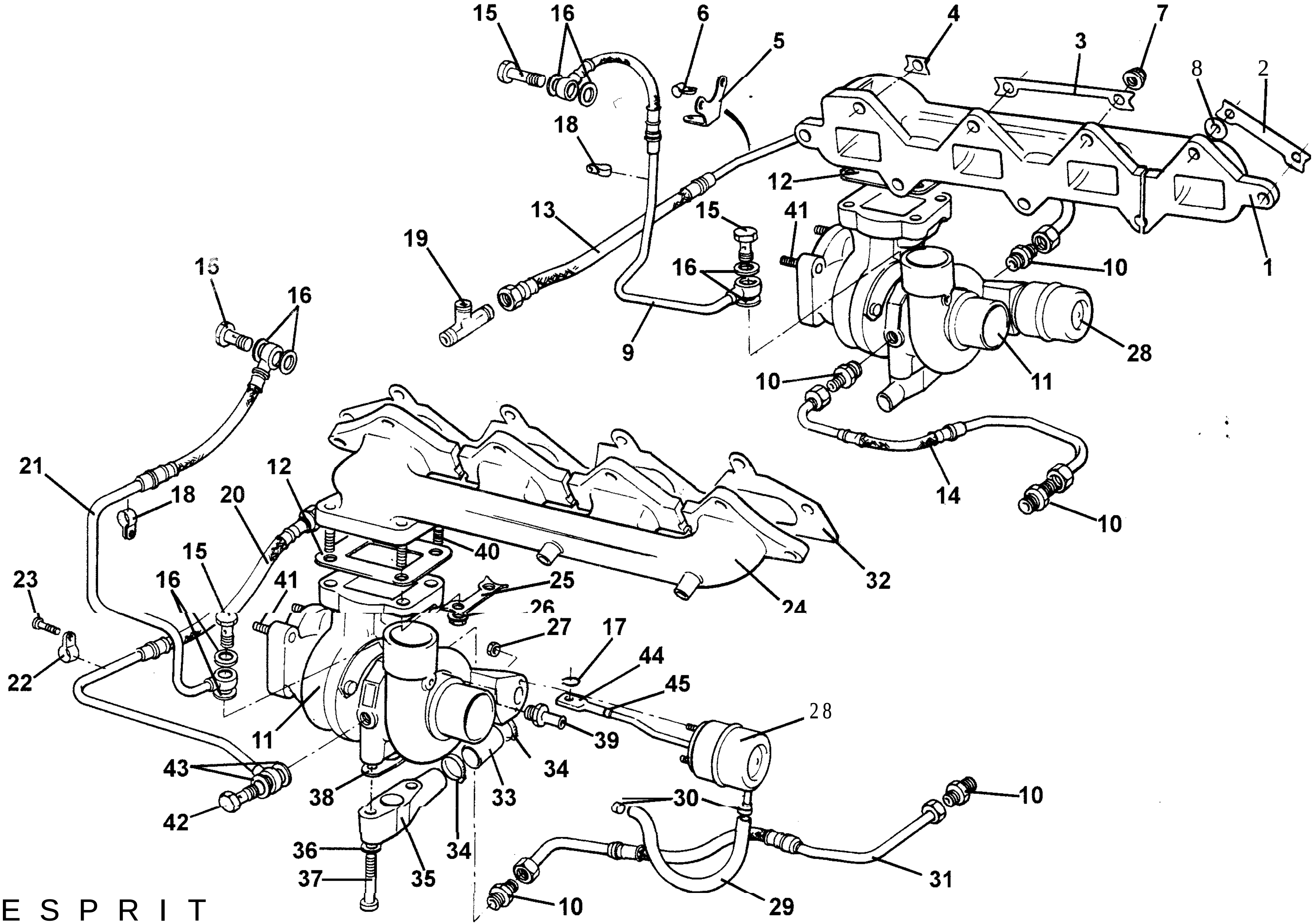
Function Code 40.19 Alternator and Starter Motor

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Alternator, 1 OOA			A91 8E6013F	1
02	Bolt, Ml0 x 130, hex. hd., alternator fixing			A075W2065F	2
03	Washer, flat, Ml 0, alternator fixing			A075W4024Z	4
04	Nut, Ml 0, alternator fixing			A075W3011Z	2
05	Starter Motor			A91 8E0198F	1
06	Bolt, Ml0 x 25, hex. hd. starter fixing			A075W1048Z	2
07	Washer, flat, Ml 0, starter fixing			A075W4024Z	2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Function Code 40.21 Exhaust Manifolds & Turbochargers

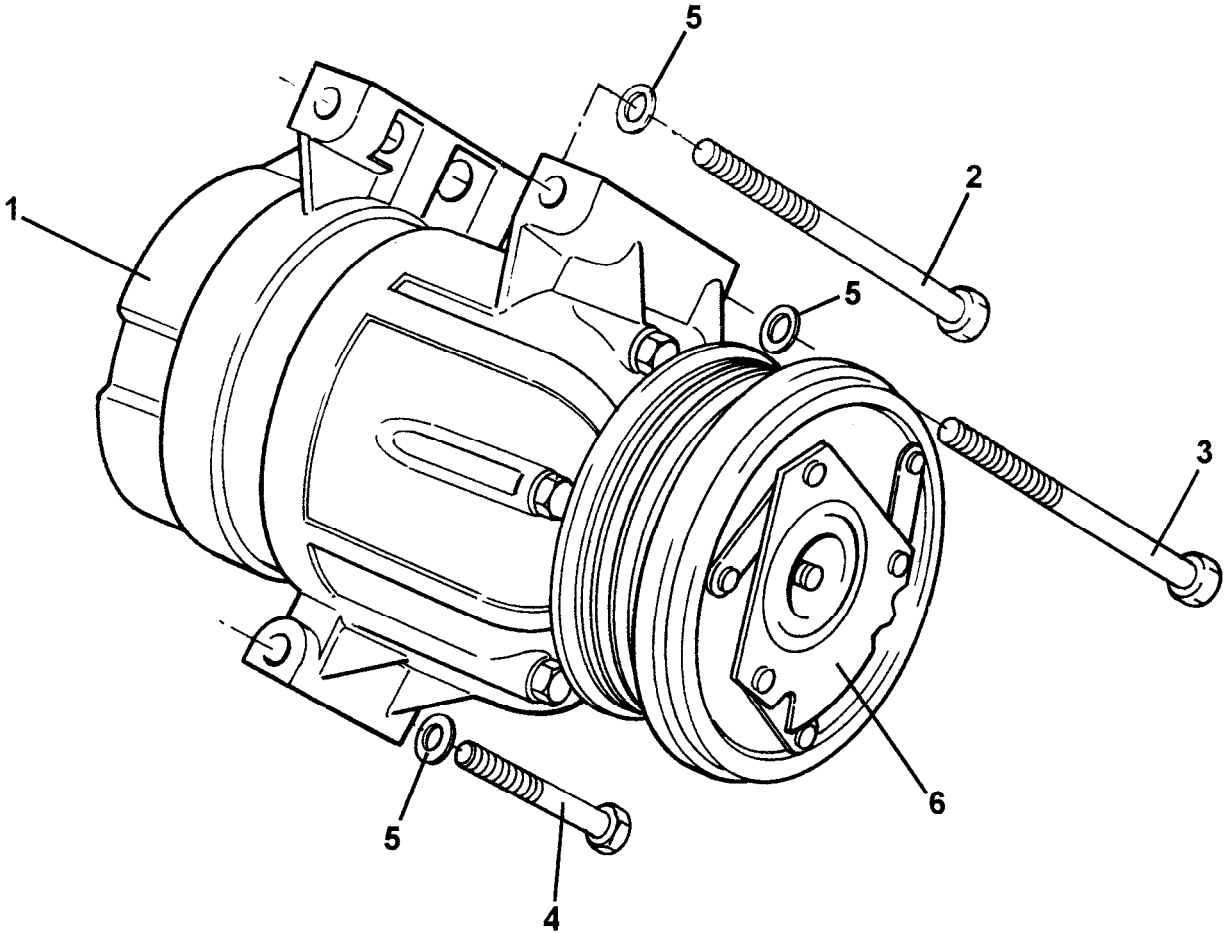
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Exhaust Manifold, LH			B918E0155K	1
02	Locking Plate, exhaust manifold			A91 8E0260F	4
03	Locking Plate, exhaust manifold			A91 8E0259F	3
04	Locking Plate, exhaust manifold			A91 8E0258F	6
05	Bracket Assembly, turbo coolant return pipe, LH			A91 8E0275F	1
06	'P' clip, 1 O/l 2mm			A91 8W6577F	1
07	Locknut, M8, copper, manifold to head			A075W3035Z	18
08	Washer, flat, M8 x 20			A079W4019F	18
09	Pipe Assembly, turbo coolant return, LH			A918E0191 F	1
10	Adaptor, oil/coolant pipes			A91 8E6089F	5
11	Turbocharger			A91 8E0060F	2
12	Gasket, turbo to manifold	Also see 40.02		A91 8E0025F	2
13	Pipe Assembly, turbo coolant supply, LH			A91 8E019OF	1
14	Pipe Assembly, turbocharger oil supply, LH			A918E0187F	1
15	Banjo Bolt, coolant pipes banjo fix.			A91 8E6086F	4
16	Washer, copper, coolant pipes banjo fix.			A91 8E6087F	8
17	Circlip, wastegate rod end retention			A91 OE7032S	2
18	'P' Clip, 8mm			A91 8W6578F	2

Function Code 40.21 Exhaust Manifolds & Turbochargers

Dep	Part Description	Remarks	Option	Part Number	Qty
19	'T' Piece, turbocharger coolant return			A91 8E0280F	2
20	Pipe Assembly, turbocharger oil supply, RH			A91 8E0194F	1
21	Pipe Assembly, turbocharger coolant return, RH			A91 8E0189F	1
22	'P' Clip, 1 O/l 2mm			A91 8W6577F	2
23	Bolt, M5 x 10, hex. hd., clip fixing			Al 00W1 105F	4
24	Exhaust Manifold, RH			A91 8E0156K	1
25	Locking Plate, turbocharger fixing			A91 8E0262F	4
26	Nut, Ml 0 x 1 5, kayloc, turbo to manifold			A91 8W3158F	8
27	Nut, M6, capsule to turbo			A075W3020Z	4
28	Waste Gate Capsule			A91 8E6078S	2
29	Hose, 420mm, wastegate capsule			A91 8E0276F	2
30	Clip, hose securing			A91 8W6565F	4
31	Pipe Assembly, turbo coolant supply, RH			A918E0188F	1
32	Gasket, exhaust manifold to head	Also see 40.02		A91 8E0028F	2
33	Hose, sump to turbocharger, RH (long)			A918E018lF	1
33a	Heatshield, 22mm OD, turbo oil drain hose protector	Not illustrated		A91 8E6071V	70mm
34	Clip, hose to turbocharger			B907E6085Z	4
35	Elbow, turbo oil drain			A91 8E0145K	2
36	Washer, flat, M8 x 17			A075M4020Z	4
37	Bolt, M8 x 40, hex. hd., elbow to turbo			A075W2039D	4
38	Gasket, elbow to turbo			A91 8E0030F	2

Function Code 40.21 Exhaust Manifolds & Turbochargers

Dep	Part Description	Remarks	Option	Part Number	Qty
39	Pipe Adaptor			A91 **8E6089F**	2
40	Stud, manifold to turbo	Part of items 1 & 24		**A918E0121F**	8
41	Stud, MI0 x 38. turbo to exhaust	Part of item 11		**A91 8E6082S**	6
42	Banjo Bolt, coolant pipe to turbo, RH			**A91 8E6064F**	1
43	Washer, copper, coolant pipe to turbo, RH			**A91 8E6090F**	1
44	Rod End, wastegate capsule			**A91 8E6091 S**	2
45	Locknut, rod end wastegate capsule			**A91 8E6092S**	2
46	Hose, sump to turbocharger, LH (short)	Not illustrated		**A91 8E0182F**	1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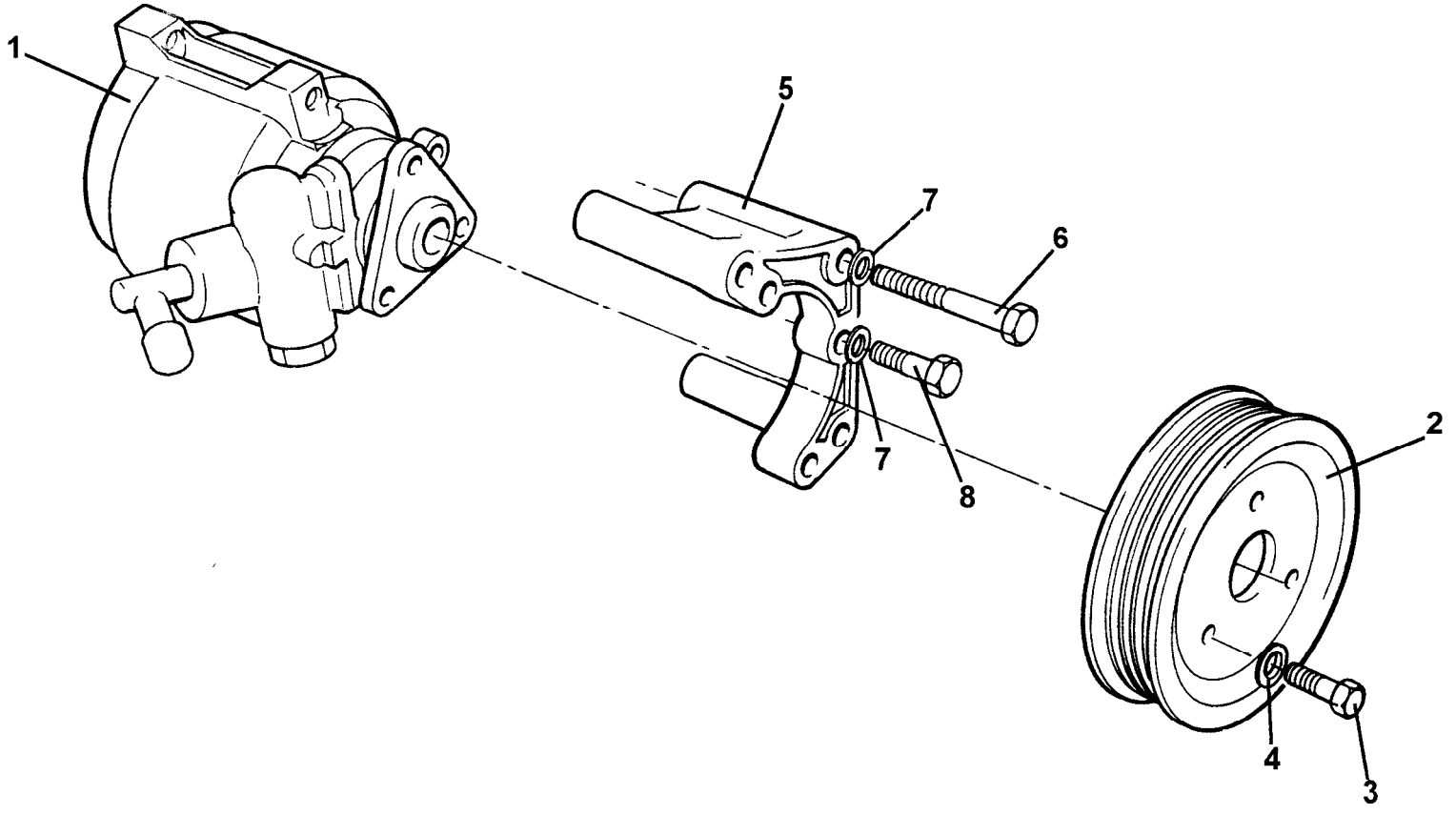
Function Code 40.23 AC Compressor

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Compressor, A.C	Type 1135153		**A082P4389F**	1
02	Bolt, Ml0 x 120, hex. hd.,compessor to block			**A075W2064Z**	1
03	Bolt, Ml 0 x 110, hex. hd.,compessor to block			**Al 00W2117F**	1
04	Bolt, M10 x 90, hex. hd.,compessor to block			**A075W2060F**	1
05	Washer, flat, M10, compressor to block			**A075W4024Z**	3
06	Pulley, AC compressor drive			**A082P4389F**	1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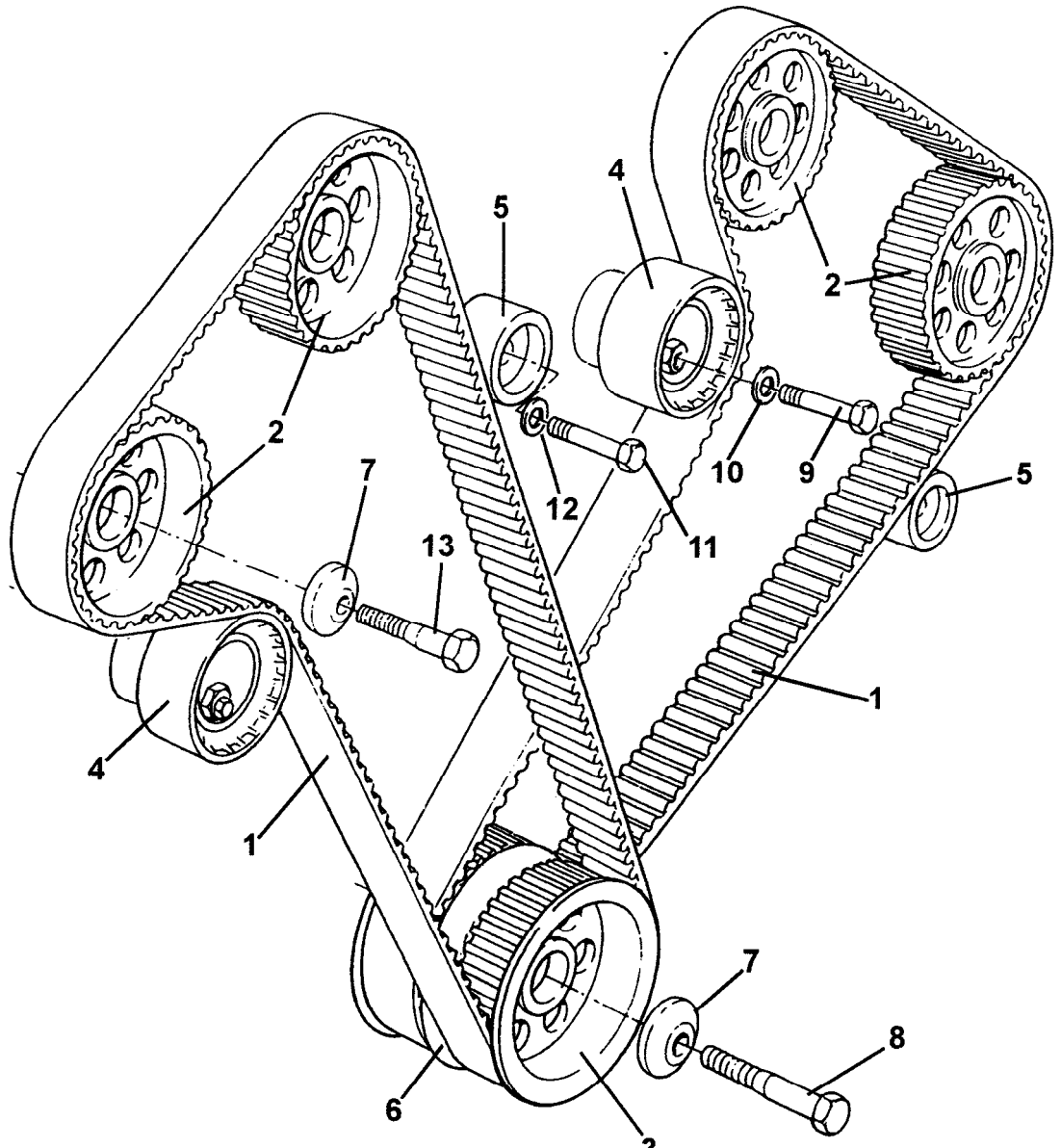
Function Code 40.25 Power Steering Pump, Pulley, Mounting Bracket & Fixings.

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Pump, power assisted steering			A91 8E0300K	1
02		Pulley, PAS pump			B918E0071 F	1
03		Bolt, M8 x 16, hex. hd., pulley to pump			A075W1036Z	3
04		Washer, M8 x 16.6, pulley to pump			A075W4020F	3
05		Bracket, pump mounting			A918E0148F	1
06		Bolt, 9/16" x 2.25", hex. hd., bracket to LH head			A075W2024F	3
07		Washer, flat, M8 x 16.6			A075W4020F	6
08		Bolt, M8 x 30, hex. hd., pump to bracket			A075W2037Z	3



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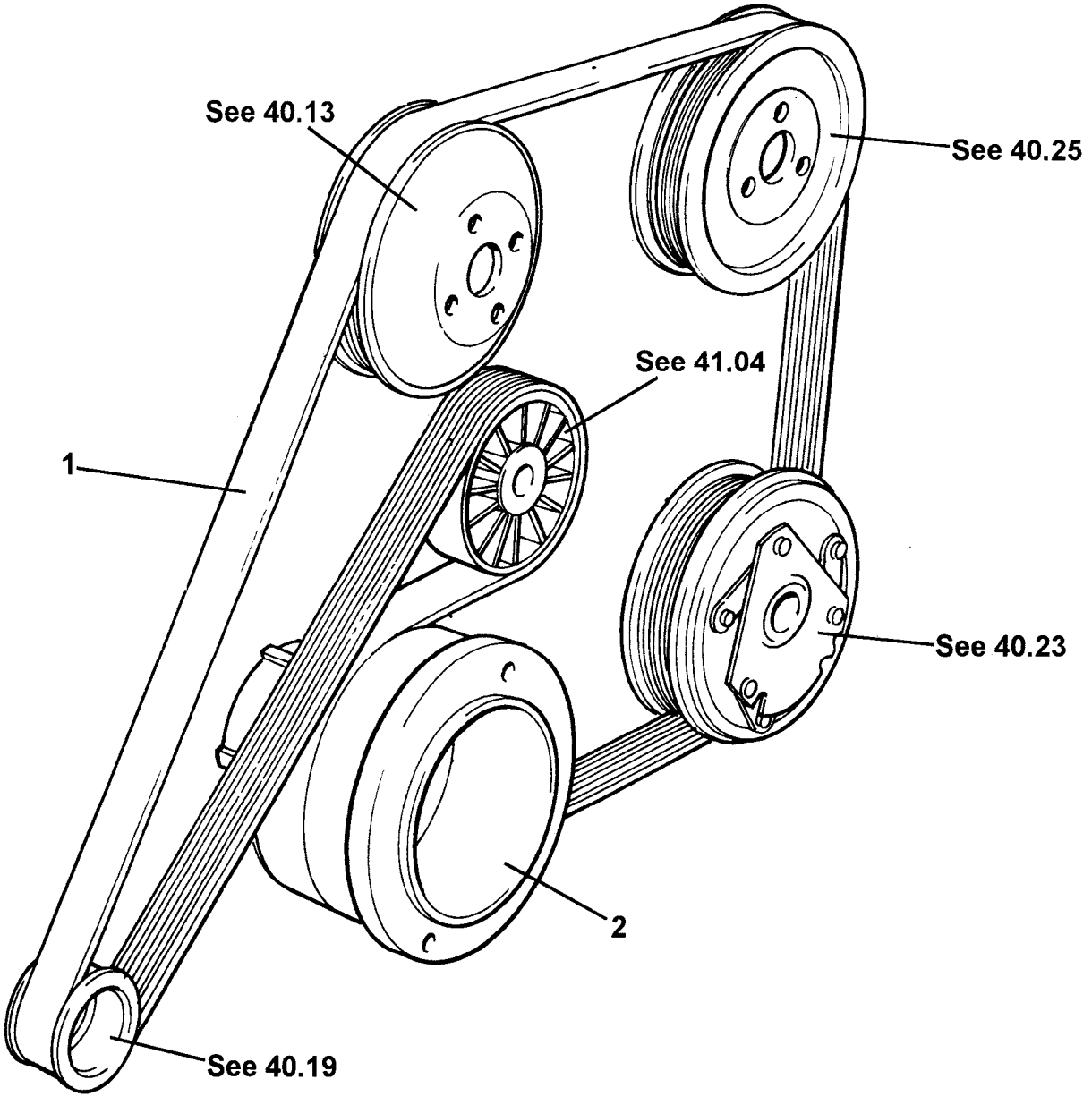
Function Code 41.01 Camshaft Drive Belts & Pulleys

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Belt-toothed camshaft drive	108 tooth 3/8 pitch		C918E0298F	2
02	Pulley, camshaft drive			A91 8E0294F	4
03	Pulley Assembly, primary shaft			A91 8E0259F	2
04	Tensione Assembly, timing belt			C918E0297J	2
04a	Tensioner Hub			D918E0293F	2
04b	Tensioner Drum			B918E6066F	2
05	Pulley, idler			A91 8E0219F	2
06	Flange/spacer, primary shaft			B918E0296F	1
07	Washer, special, M12, pulley to shaft/camshaft			A91 8E0102F	5
08	Bolt, Ml2 x 65, hex. hd., pulley to shaft			A91 8W5225F	1
09	Bolt, M8 x 60, hex. hd., tensioner to head			A91 8W2180F	2
10	Washer, flat, M8, tensioner to head			A079W4019F	2
11	Bolt, Ml 0 x 40, hex. hd., idler to head			A075W2052Z	2
12	Washer, flat, Ml 0, idler to head			A91 8E0269Z	2
13	Bolt, Ml2 x 70, hex. hd., pulley to camshaft			A91 8W2173F	4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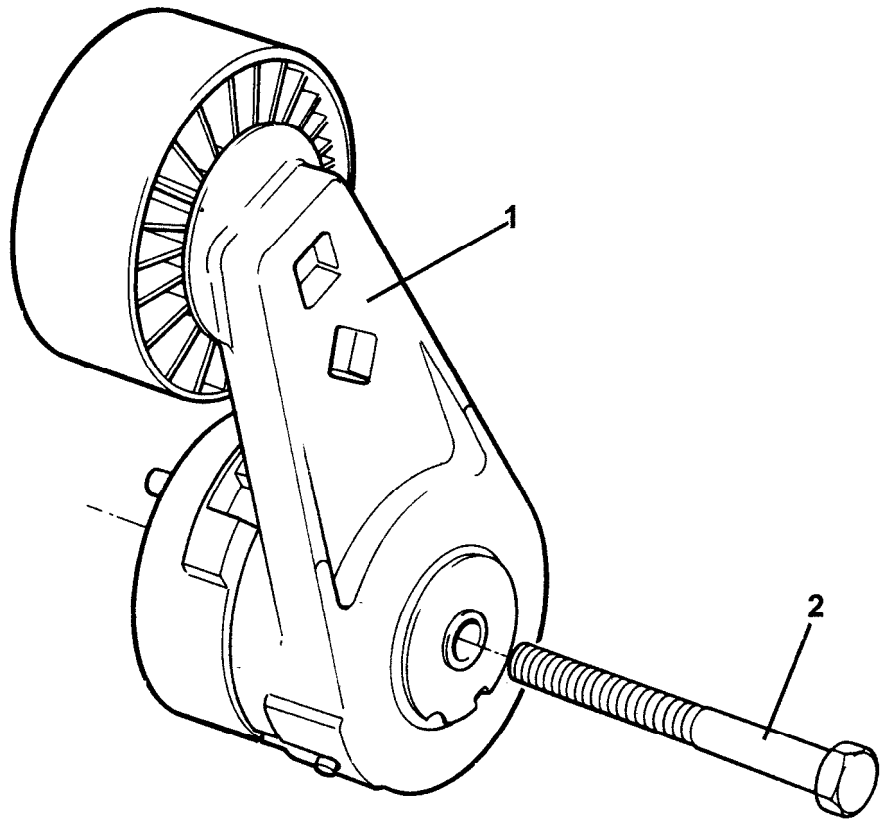
Function Code 41.03 Auxiliary Drive Belts & Pulleys

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Belt, ancillary drive			B918E0069F	1
02	Ancillary Drive Pulley/Vibration Damper			A91 8E0039F	1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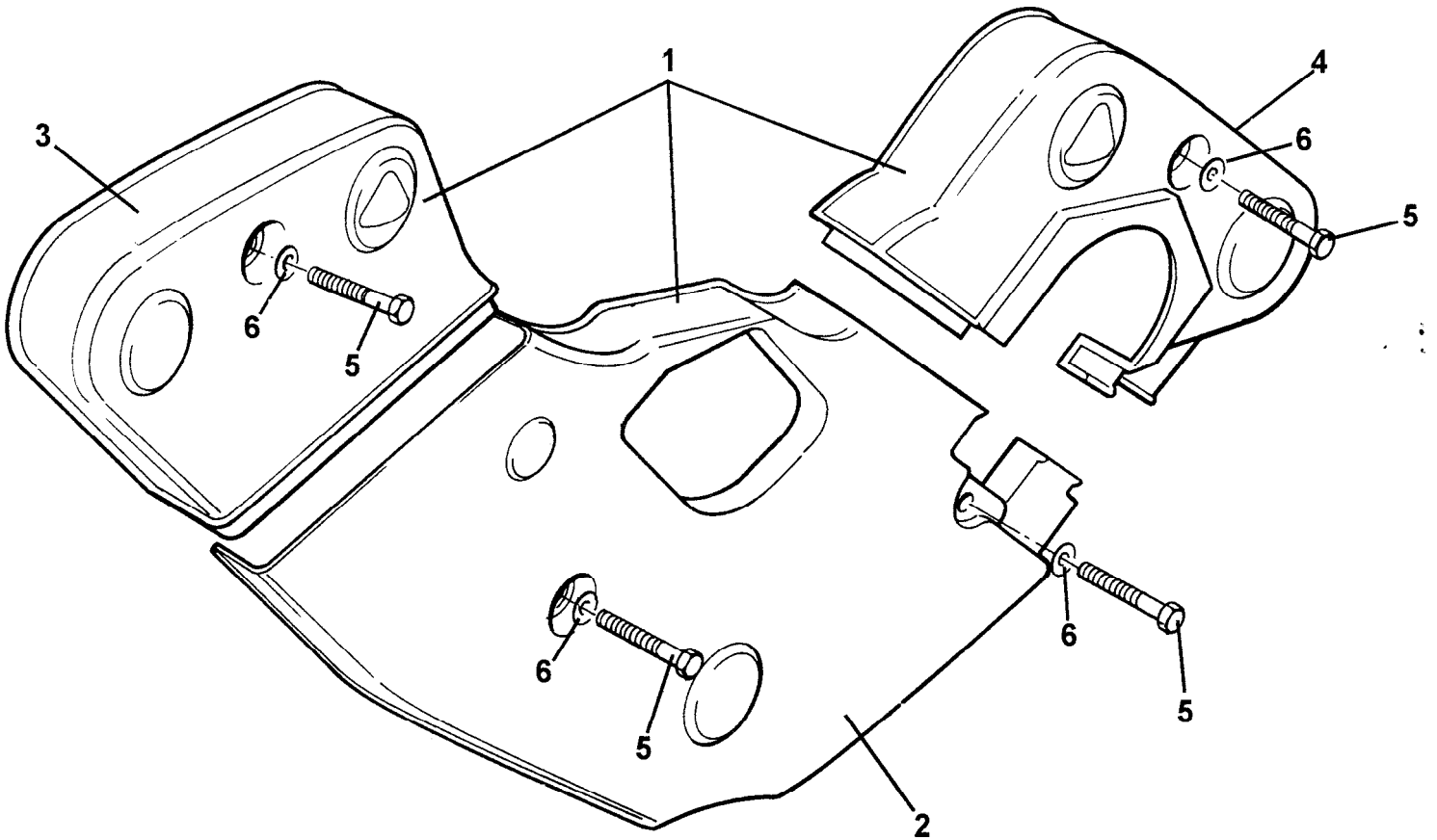
Function Code 41.04 Belt Tensioner

Dep	Part Description	Remarks	Option	Part Number	Qty
1	Tensioner, ancillary drive belt			A91 8E0175F	1
2	Bolt, Ml0 x 80, hex. hd., tensioner to engine			A075W2061Z	1



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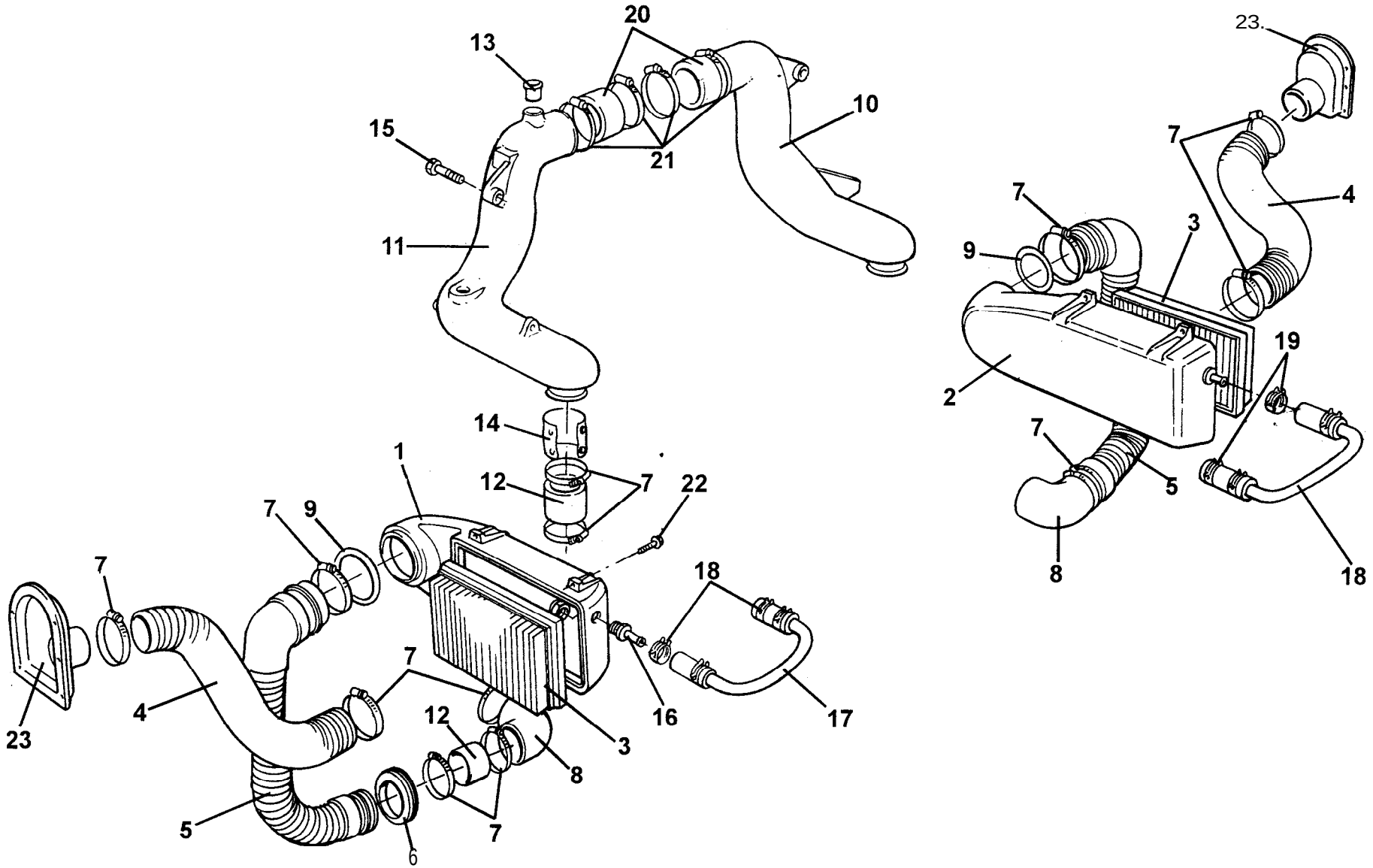
Function Code 41.05 Belt Guards

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cover Assembly, timing belts	Comprises items: 2, 3 & 4		A918E0242F	1
02	Cover, timing belts, centre section			A91 8E0241 F	1
03	Cover,timing belt, RH section			A91 8E0240F	1
04	Cover, timing belt, LH section			A91 8E0239F	1
05	Bolt, M6 x 55, hex hd., covers to engine			A075W2034Z	4
06	Washer, flat, M6 x 12.5, covers to engine			A075W4013Z	4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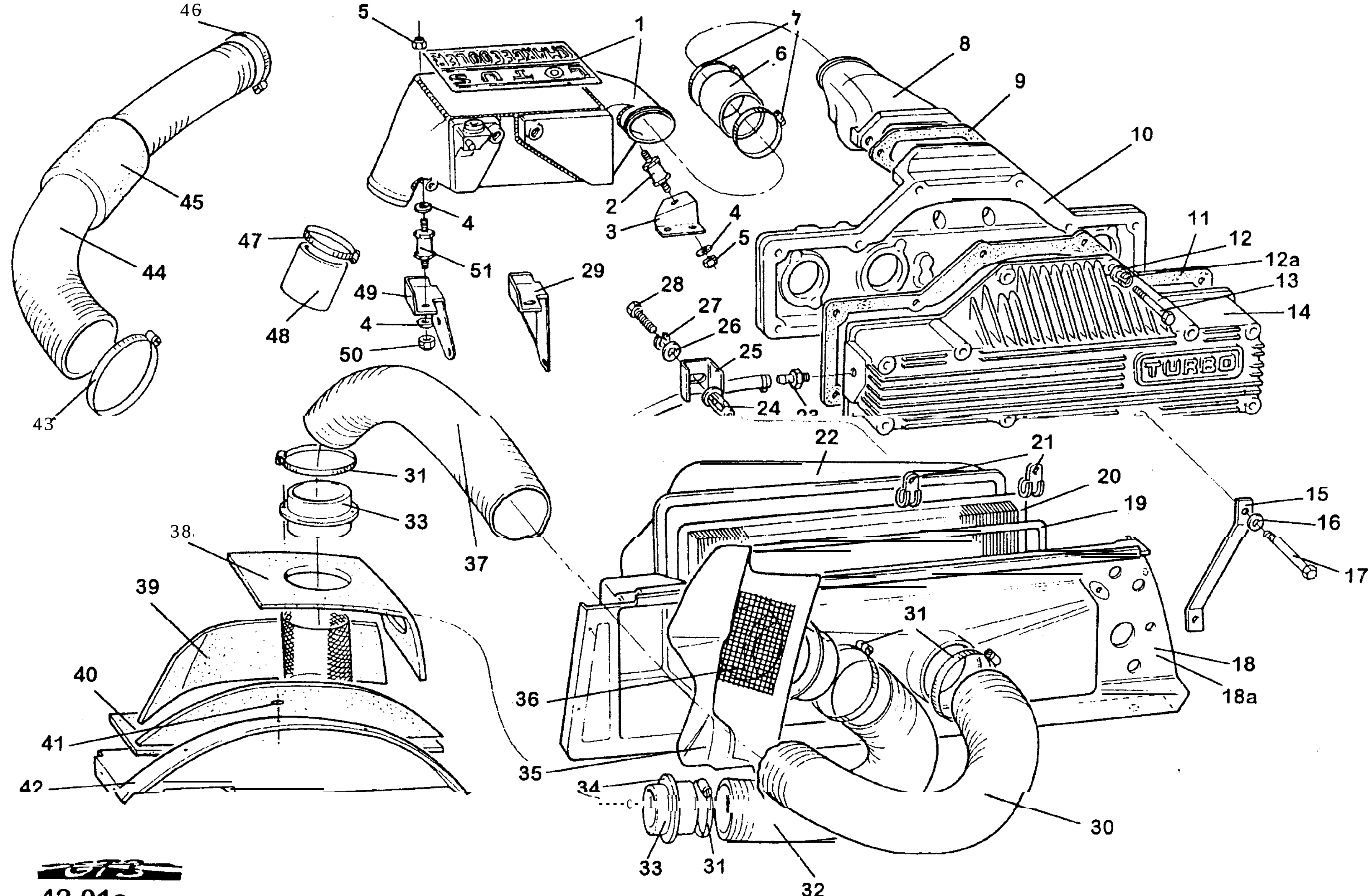
Function Code 42.01 Airboxes, Trunking & Air Filters

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Air Filter Housing, RH			A91 8E0256J	1
02	Air Filter Housing, LH			A918E0255J	1
03	Air Filter Element			A91 8E6042F	2
04	Hose, air intake to filter			A918E0246F	2
05	Hose, filter to turbo			A91 8E0221 F	2
06	Grommet, filter to turbo hose			A918E6060F	2
07	Hose Clip, 50/70mm			A91 0E6389F	12
08	Elbow, turbo inlet			B918E0248F	2
09	Seal ring, (white), filter housing			A91 8E0254F	2
10	Compressor Outlet Duct, RH			B918E0132K	1
11	Compressor Outlet Duct, LH			B918E0131 K	1
12	Hose, compressor to duct			A91 8E0249F	2
13	Outlet Spigot, IAC hose			B91 8E0105F	1
14	Heatshield Sleeve, compressor outlet hose			B918E0264F	1
15	Bolt, M8 x 1.24 x 60, hex. hd., duct fix.			B082W1114F	1
16	Connector, 12.7mm, filter housing to breather			A918E6035F	2
17	Breather Hose Assembly, cam cover, RH	Includes spring clips, item 18		A91 8E0274F	1
18	Breather Hose Assembly, cam cover, LH	Includes spring clips, item 18		A91 8E0273F	1

Function Code 42.01 Airboxes, Trunking & Air Filters

Dep	Part Description	Remarks	Option	Part Number	Qty
19	Spring Clip, breather hose assembly			**A082L6219F**	4
20	Hose, ducts to throttle body			**A91 8E0183F**	2
21	Hose Clip, 40/60mm			**A91 0E6082F**	4
22	Bolt, M5 x 30, flg. hex. hd., filter housing fix.			**A91 8W5209F**	10
23	Air Intake Duct			**A082B5336K**	2
24	Finisher Air Intake Duct	Not illustrated		**A082B5338K**	2



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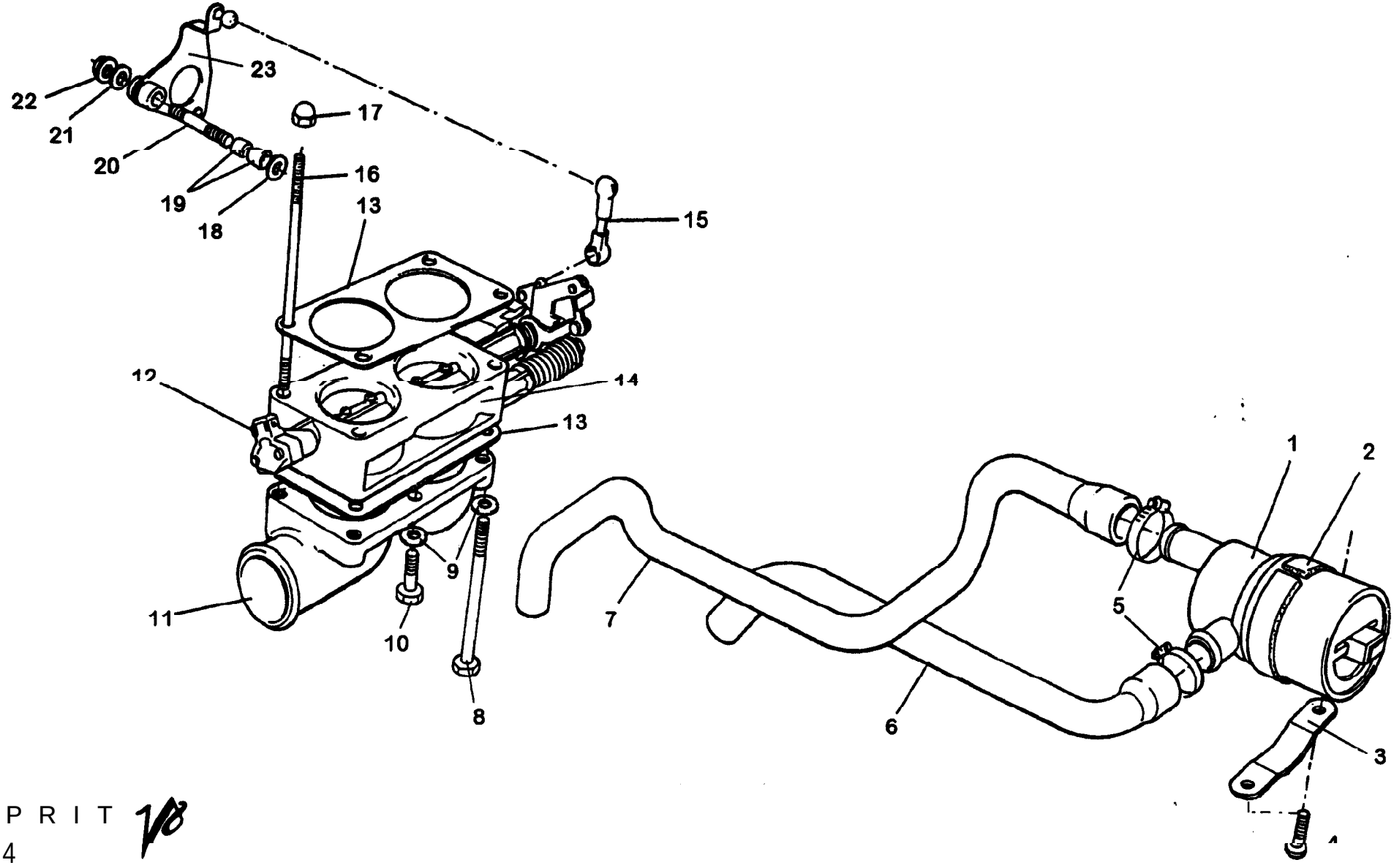
Function Code 42.04 Throttle Body incl. Throttle mechanism.

Dep	Part Description	Remarks	Option	Part Number.	Qty
01	Idle Air Control Valve			**A918E6011F**	1
02	Rubber sleeve	Cut to length		**A918E0179F**	1
03	Clamp, I.A.C.V. Restraint			**A918E0180F**	1
04	Bolt, clamp fixing			**A075W1027Z**	2
05	Clip 20/32			**B907E8085Z**	4
06	Hose I.A.C.V. to E.G.R. Manifold			**A918E0185Z**	1
07	Hose Inter-cooler to I.A.C.V.			**A91 8E0186Z**	1
06	Bolt, Throttle body - intake elbows, fixing			**A075W2049Z**	2
09	Washer			A075W4020Z	4
10	Bolt, Intake elbows to throttle body			A075W1 0382	2
11	Intake elbows			**B918E0139P**	1
12	Throttle Position Sensor			**A918E0005F**	1
13	Gasket Throttle Body / EGR manifold to plenum			**A918E0028K**	2
14	Throttle Body assembly			**C918E0074F**	1
15	Drop Link Throttle Linkage			**A91 8E8051 F**	1
16	Stud			**A918E0197F**	2
17	Dome nut			**A918W3145F**	2
18	**Washer**			**A918E8047F**	1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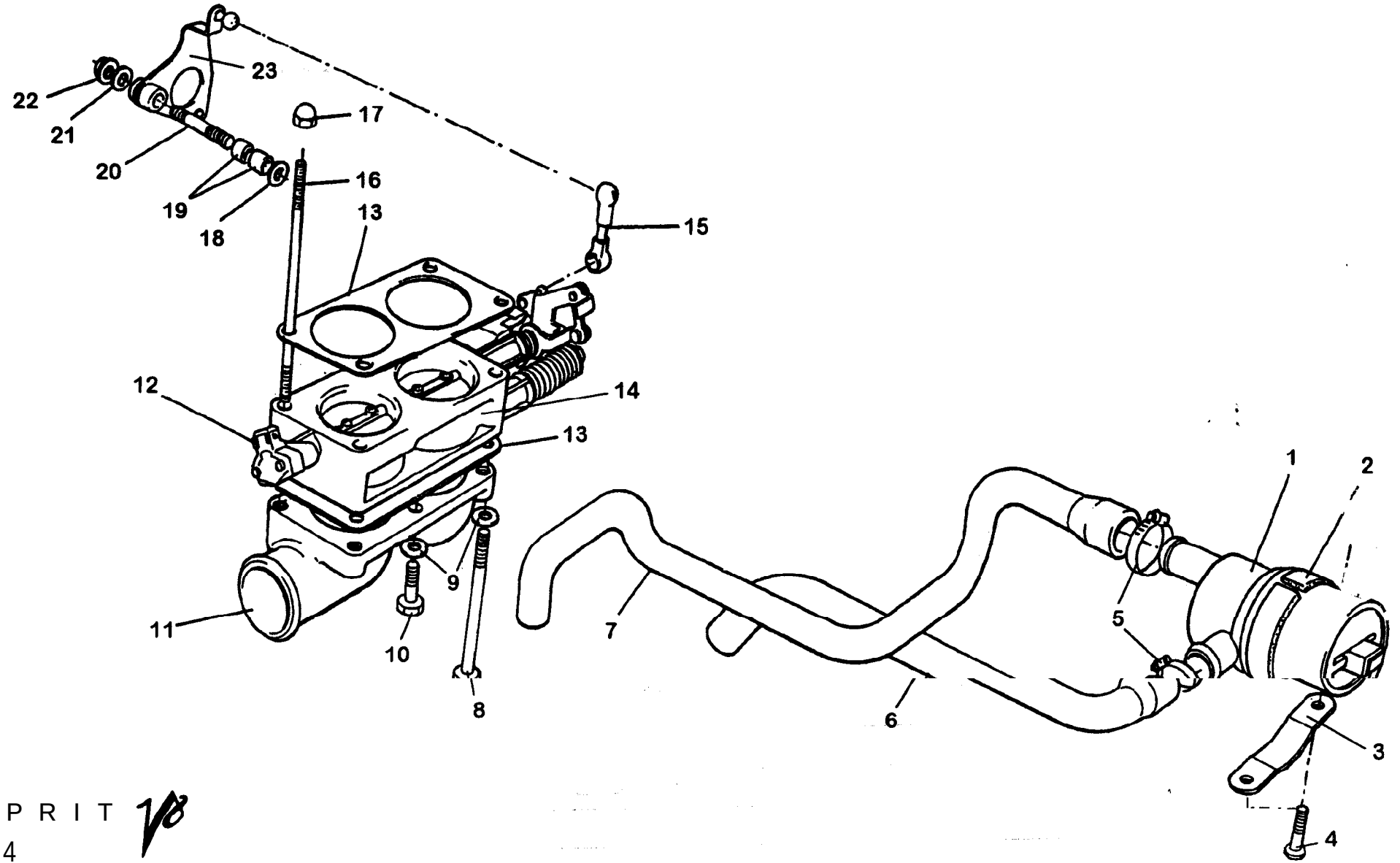
Function Code 42.04 Throttle Body incl. Throttle mechanism.

Dep	Part Description	Remarks	Option	Part Number	Qty
19	Bearing Throttle Lever Pivot			A918E8049F	2
20	Stud Throttle Lever Pivot M6			A918E6046F	1
21	Domed Nut M8	Stud throttle body to plenum,		A91 8W3145F	2
22	Nut Throttle Lever Pivot M8			A91 8E6050F	1
23	Lever Throttle Cable			B918E0288F	1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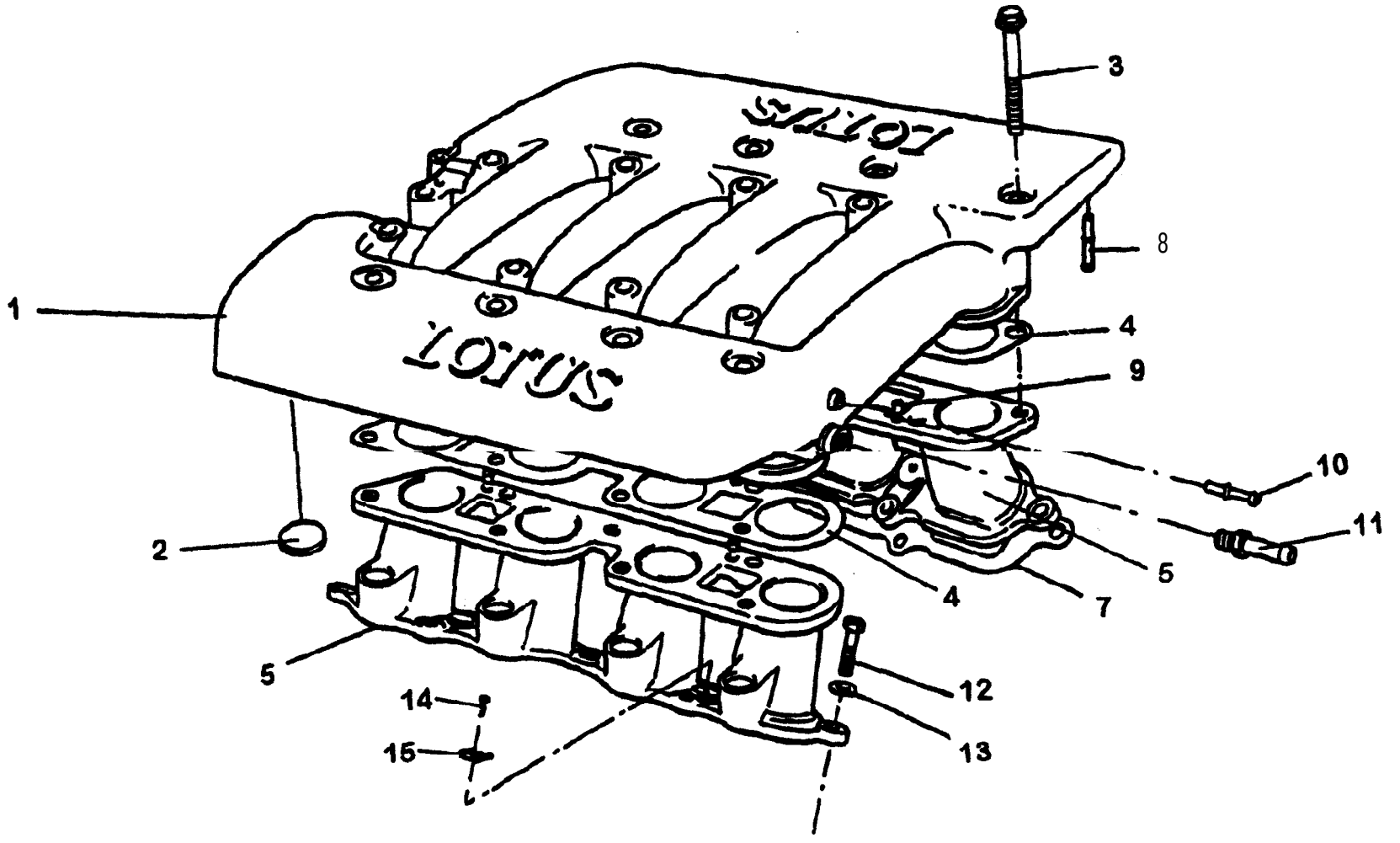
Service Parts List 98

Function Code 42.05 Fuel Injection system.also see section 17.06

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel Rail Assembly R.H.			A918E0038F	1
02	Fuel Rail Assembly L.H.			A918E0037F	1
03	Valve cap (dust cover)			TBA for AS0	1
04	Fuel regulator			A918E8015F	1
05	Setscrew, M6 x 12mm Hex HD	Fuel pressure regulator to fuel rail		A075W1 0272	1
06	'0' ring - 2.62 x 7.59mm	Fuel pressure regulator		A918E6070F	1
07	Fuel pipe assembly	Fuel pressure regulator return to pump		A082L4252F	1
06	Bolt Hex Head M6 x 36mm Long	Fuel rail to cylinder head		A075W2029Z	4
09	Clip, fixing, primary injector			A918E6003F	6
10	Primary injector			A918E8014F	8
11	'0' ring kit, primary injectors	Includes lla		TBA for AS0	16
12	Fuel pipe asembly	Fuel rails to secondary injectors/plenum		A918E0192F	1
13	Clip / clamp, fixing, secondary injector			A918E0020F	1
14	Secondary injector			A918E6018F	2
15	'0' Ring, secondary injector			A918E6067F	2
16	Bonded Washer, Ml4	Fuel pipe banjo Sealing		A918E6005F	4
17	Banjo Bolt Ml4 x 1.5	Fuel pipe to secondary injectors/plenum		A918E6064F	2

Function Code 42.05 Fuel Injection system. also see section 17.06

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Setscrew, M6 x 12mm, fixing.	Secondary injector to plenum		A075W1027Z	2
19	Bolt, MS x 30mm, flange HD	ECM mounting		A91 8W5209F	4
20	Spring Washer, 5mm	ECM mounting		A075W4045Z	4
21	ECM, mounting Bracket			AO82L4214F	1
22	Screw, fixing.	ECM mounting bracket		A075W5040F	4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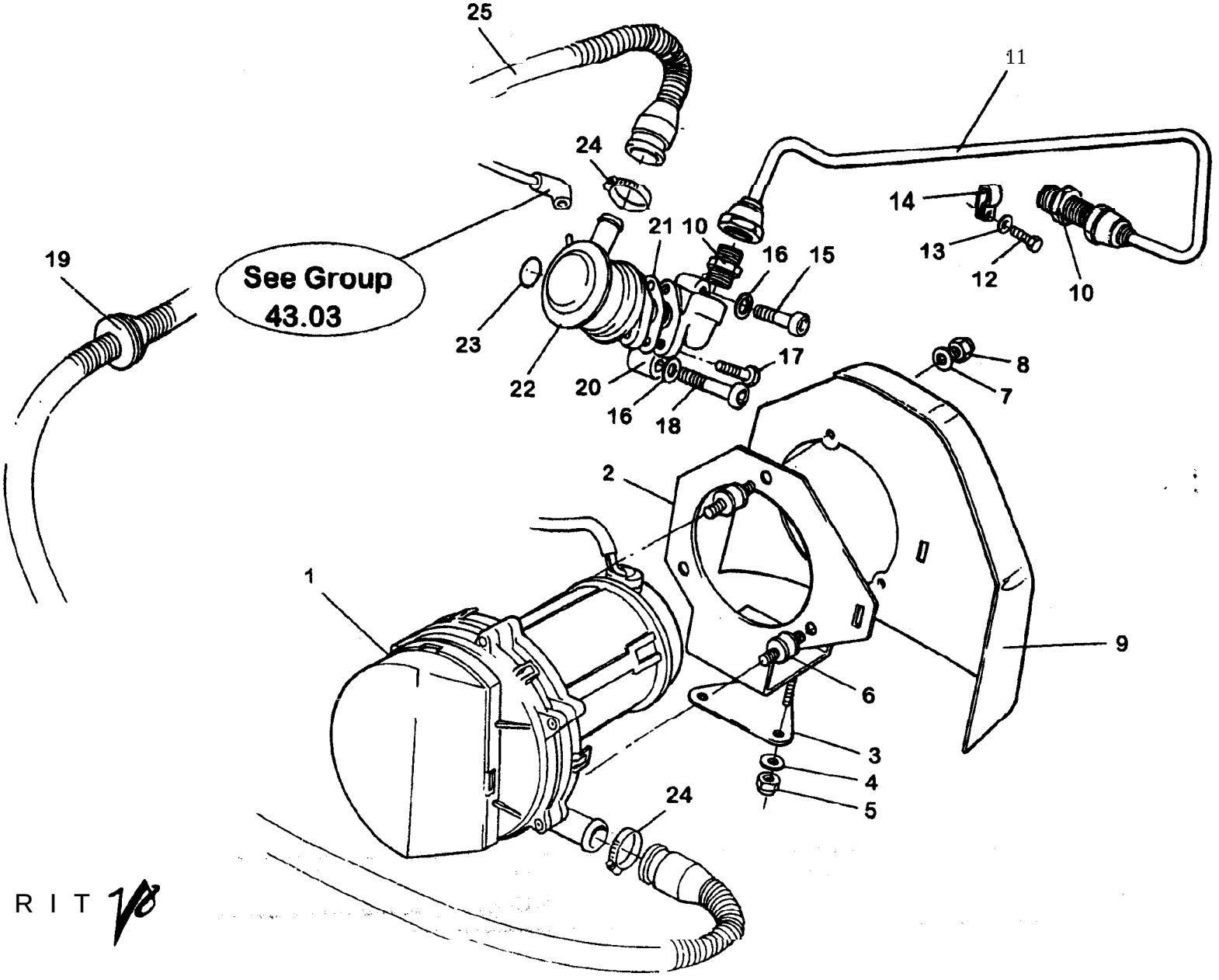
Function Code 42.07 Inlet Manifolds, Gaskets, Plenum & fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Plenum			A918E0134K	1
02	Plug Crankcase, 22mm Cup Plug	Fits into bottom of plenum assembly		A907E8038Z	5
03	Bolt Flange Head M8 x 100mm Long	Plenum to injector housing		A91 8W5207F	14
04	Gasket Plenum to Manifold			A91 8E0023F	2
05	Inlet manifold			A918E0l35K	2
06	Not issued			Not issued ,	0
07	Gasket Inlet Manifold to Head	Metal type		A918E0027F	2
08	Connector - 4.6 Dia			A918E0303F	2
09	Dowel Pin M5 x 14mm Long	2 each in LH/RH inlet manifold		A91 8E6059F	4
10	Not issued			Not issued	0
11	Connector, Brake Booster	Front of plenum		A91 8E0292F	1
12	Bolt Hex Head M8 x 25 Long			A075W1039Z	14
13	Washer M8 Flat Form "A"	Injector housing to cylinder head		A075W4020Z	14
14	Tie wrap, mount	1 per inlet manifold		A918E6038F	2
15	Screw, fixing tie wrap mount	1 per inlet manifold		A075W5079F	2
	Gasket compound - Advanced formula	Apply to inlet manifold gaskets		A918E6069F	As req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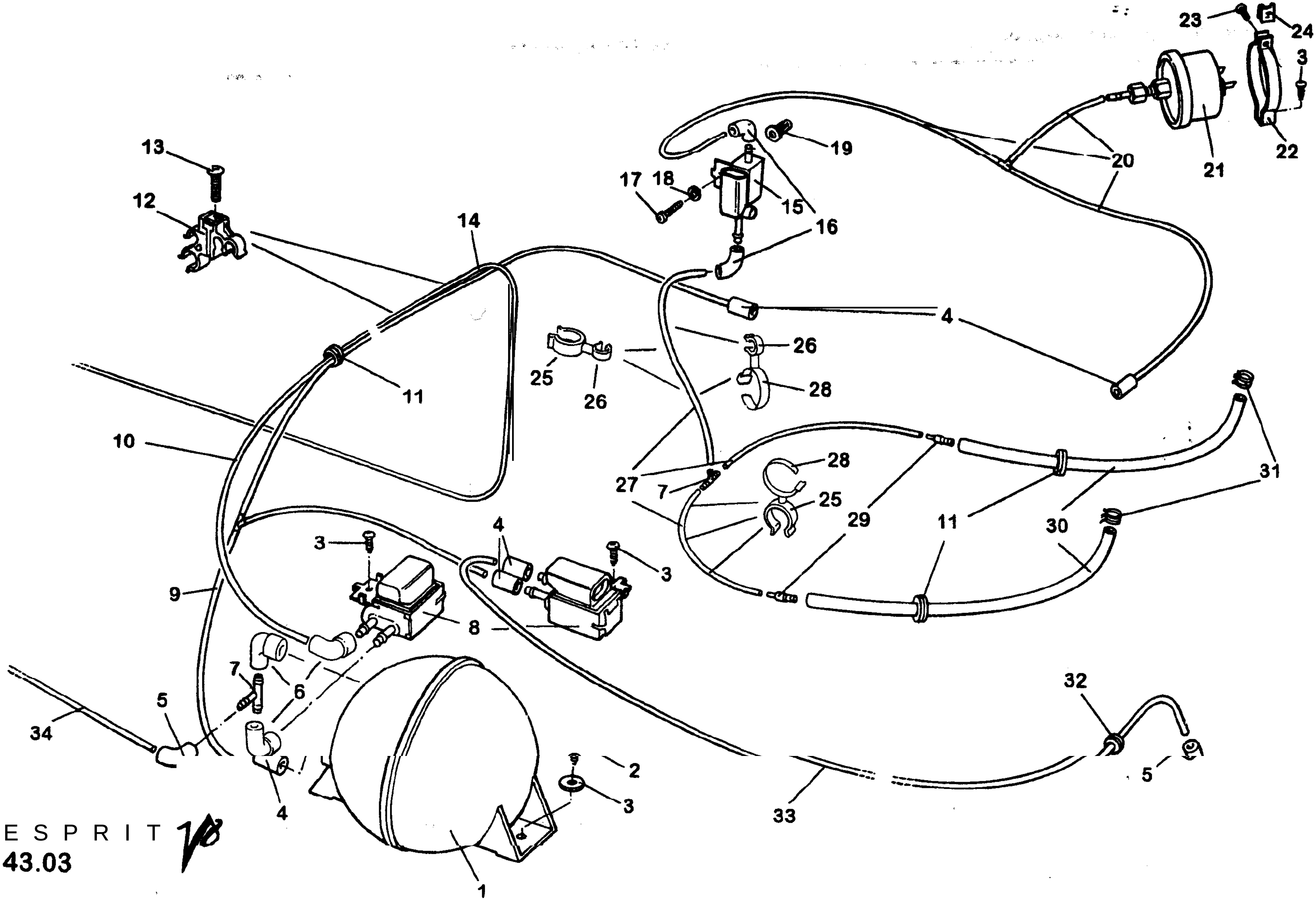
Function Code 43.00 Air Pump, Mounting brackets & Fittings.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Air pump assembly	Mounted under LHS wing space		A91 8E6053F	1
02	Bracket, air pump			A082L4211 F	1
03	Plate, air pump bracket			A082L4212F	1
04	Washer, flat, M6			A076W4013Z	3
05	Nyloc nut, M6			A075W3009Z	3
06	Anti vibration mount, air pump			A082L6214F	3
07	Washer, fiat, M6			A075W4O13Z	6
08	Nyloc nut, M6			A075W3009Z	6
09	Cover, air pump			A082B5374K	1
10	Adaptor, air pipe to manifold			TBA	2
11	Air pipe assembly			A918E0193F	1
12	Setscrew, MS			Al 00W1105F	1
13	Washer, M5			TBA	I
1 4	'P, clip, 10/12mm			A918W6577F	1
15	Setscrew, M8 x 30mm			A089W7052F	1
16	Washer, flat, M8			A075W4020Z	2
17	Setscrew, M8 x 16mm			A075W7017F	2
18	Setscrew, M8 x 5Omm			A918W7119F	1

Function Code 43.00 Air Pump, Mounting brackets & Fittings.

Dep	Part	Description	Remarks	Option	Part Number	Qty
19		Grommet, vac pipe			A082U6197F	1
20		Manifold, air valve			A918E0140K	1
21		Gasket, air valve			A918E0031F	1
22		Valve, air control			A918E0075F	1
23		'0' ring, air valve seal			A918E6024F	1
24		Hose clip, 27mm (16 to 25mm)			A079K6018F	2
25		Hose, air pump			A082U7757F	1
		Grommet, air pump sidewall	Not illustrated		A082H6048F	1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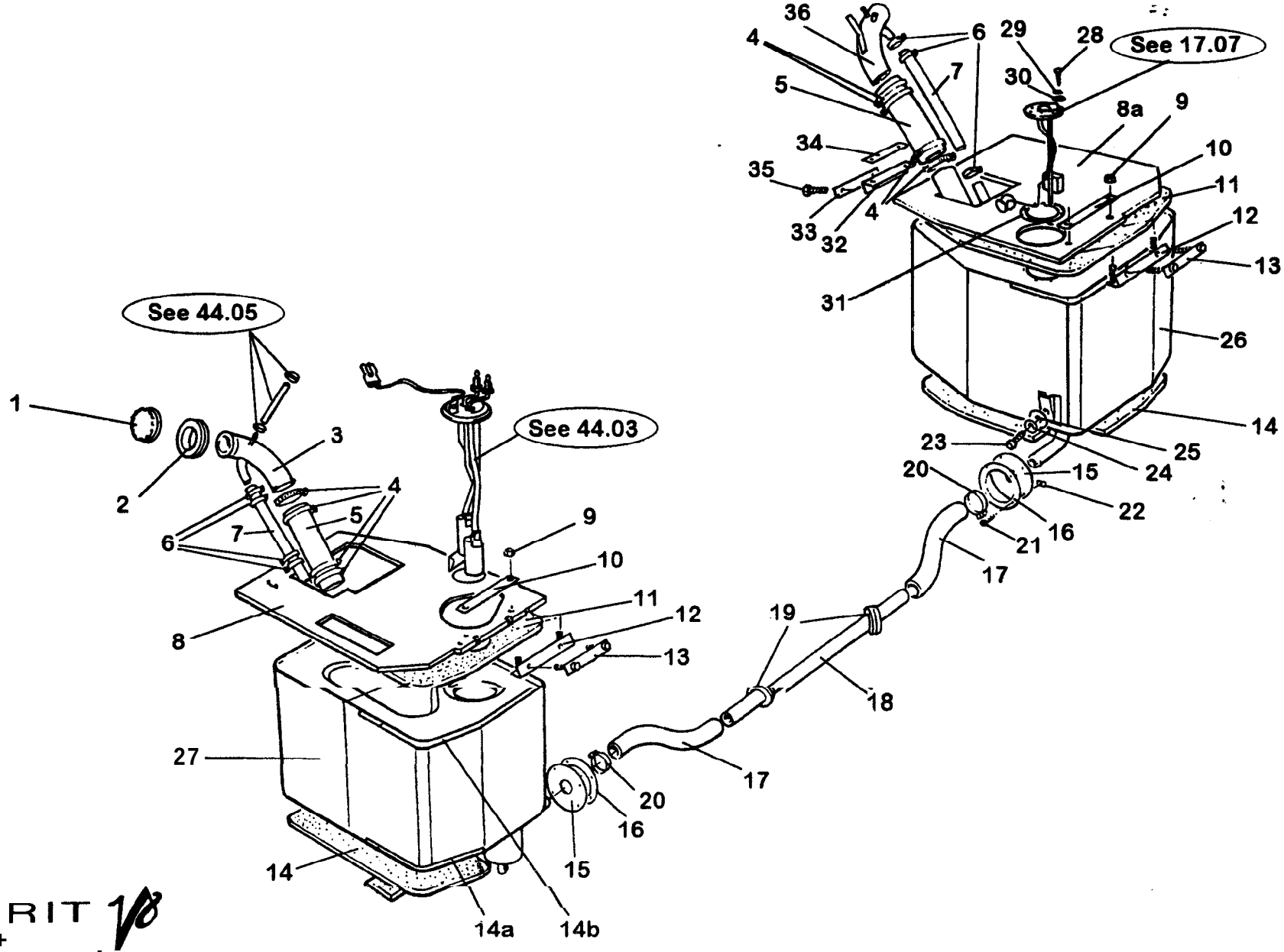
Function Code 43.03 Vacuum system, hoses,pipes,valves,clips etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Vacuum reservoir			**A100P6018F**	1
02	Fixing screw			**A075W5026Z**	**2**
03	Flat washer			**A075W4009Z**	**2**
04	Vacuum connection hose			A082 L4249 F	5
05	Elbow connector, 90°			**A075P6079F**	**2**
06	Elbow connector, 90°, unequal size ends			**A075P6069F**	**5**
07	'T' Piece connector			**A075P6081 F**	1
08	Solenoid valves			A082M6421 F	**2**
09	Vacuum pipe	Red		C082L4246F	1
10	Vucuum pipe, boost solenoid air pump			**A082L4254F**	1
11	Grommet,			**X036L6004Z**	**3**
12	Multi clip			**A918E6576F**	**3**
13	Setscrew, multi clip fixing			AI 00W7090F	**3**
14	Vacuum pipe			**TBA**	1
15	Solenoid valve			A082M6420F	1
16	El bow connector **90°**			**B912E6805F**	**2**
17	Bolt, solenoid mounting			A075W1 **025Z**	1
16	Flat washer			**A075W4011 Z**	1

Function Code 43.03 Vacuum system, hoses,pipes,valves,clips etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
I Q	Jacknut			A076W3043Z	I
20	Vacuum pipe	Blue/Black		B082L4247F	I
21	Boost sender	Fitted to RH tank board		A082N4042F	I
22	Bracket, boost sender	Fitted to RH tank board		A082M6611 F	I
23	Fixing screw, boost sender to tank board			A075W5040F	I
24	Spire nut, boost sender to tank board			Al 00W6364F	I
25	Swivel clip, female			A082W6587F	5
26	Swivel clip, male			A918W65681 F	4
27	Vacuum pipe	Red		A082L4248F	I
28	Tie wrap to swivel clip			A082W6587F	5
29	Pipe connectors, unequal size ends	White plastic		A912E6806F	2
30	Hose pipe			TBA	2
31	Hose clips			A079W6189F	2
32	Grommet			X036B6150Z	I
33	Vacuum pipe			TBA	As req
34	Vacuum pipe			A075P6068V	As req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Function Code 44.01 Fuel Tanks, Breathers & Sender unit,

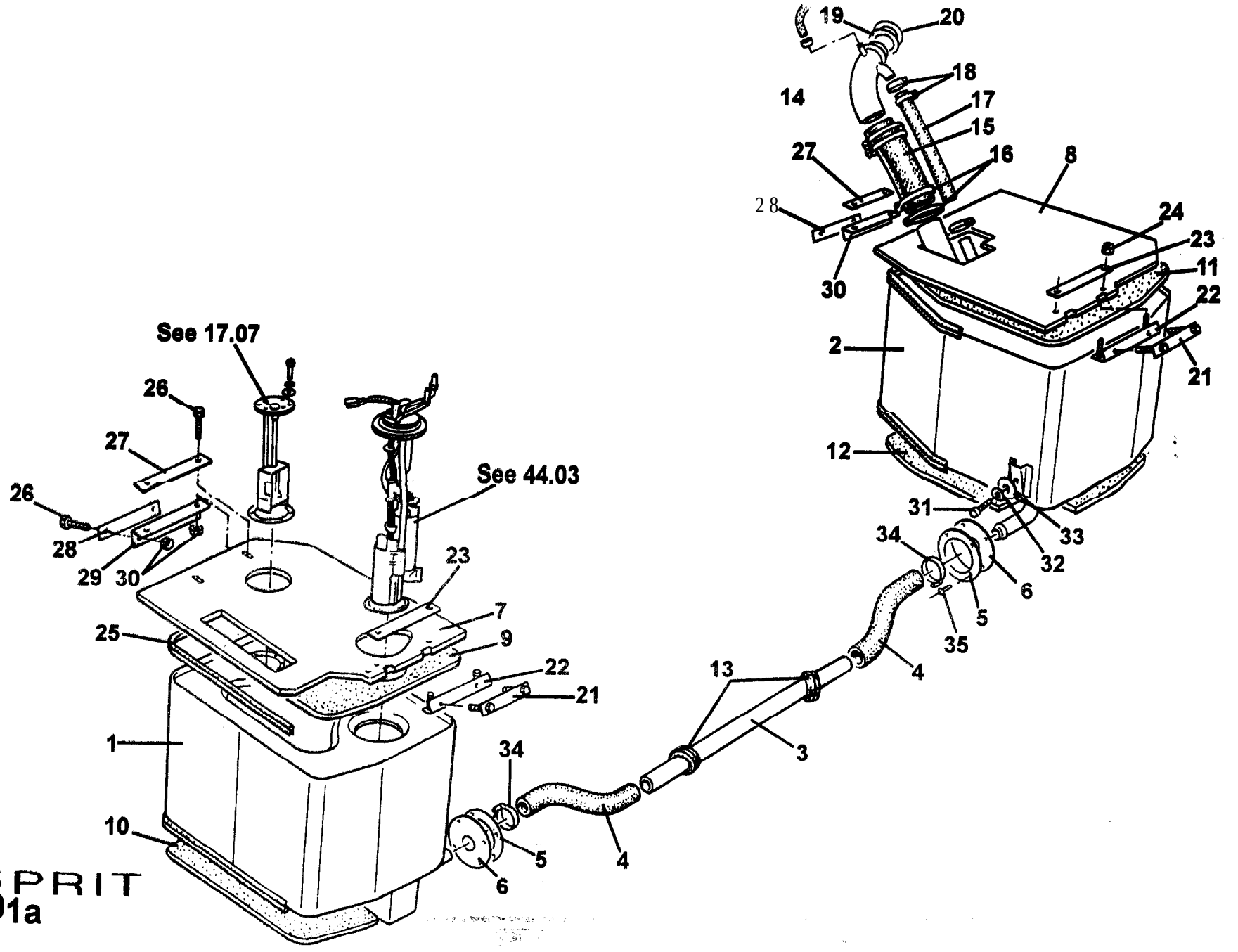
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel filler cap (torque limiting ratchet)			A082L 8188F	2
02	Grommet			A100L0077F	2
03	Fuel filler neck,RH			A082L4198F	1
04	Hose clip, fuel filler hose			A082L6198F	8
05	Hose, filler neck to tank			A082L4175F	2
08	Hose clip, filler vent hose			A075M6145F	8
07	Hose, filler venting			B082L4154F	2
08	Board, fuel tank top, RH			A918U7746F	1
08a	Board, fuel tank top, LH			A918U7745F	1
09	Nut, nyloc, bulkhead bracket fixing			A075W3010Z	2
10	Washer plate, bulkhead bracket to board			A082 U4678K	2
11	Foam, fuel tank clamping			A082L4173F	2
12	Bracket, tank board to bulkhead			A082U4675K	2
13	Studplate, bracket to bulkhead			A082U4677K	2
14	Foam, fuel tank seating			B082L41 19K	2
14a	Foam seal. tank bottom	880mm	V8 / GT3	A082L4265K	2
14b	Foam seal, tank top	810mm	V8 / GT3	A082L4264K	2
15	Grommet, crossover pipe thro' tank well			A082L4084Z	2

Function Code 44.01 Fuel Tanks, Breathers & Sender unit.

Dep	Part Description	Remarks	Option	Part Number	Qty
16	Ring, grommet fixing			A082L4065K	2
17	Hose, tank crossover pipe			B082L4062F	2
18	Crossover pipe, fuel tank interconnection			B082L4061 F	1
19	Grommet, crossover pipe thro' chassis			X046K6001Z	2
20	Hose clip, crossover pipe hose			A075M6145F	4
21	Screw, grommet ring fixing			TBA	8
22	Spire nut,			TBA	8
23	Setscrew, M8 x 16, fuel tank to body			A075W1 0362	2
24	Spring washer, fuel tank to body			A075W4036Z	2
25	Flat washer,, fuel tank to body			TBA	2
26	Fuel tank, LH		V8 + GT3	C082L4167F	1
27	Fuel tank, RH		V8	C082L4168F	1
27a	Fuel tank, RH		GT3	A082L4256F	1
27b	Edging strips, fuel tank anti - rattle	Not illustrated		AX75L6020V	A/R
26	Setscrew, M5 x 20, sender fixing			A075W1025F	5
29	Copper washer, M5, sender fixing	Replace on each disassembly		A082W4160F	5
30	Flat washer, M5 x 10, sender fixing			A074W4011Z	5
31	Gasket, fuel gauge sender unit			A082L6161 F	1
32	Bracket, tank board to wheelarch			A082U4676K	2
33	Washer plate			A082U4680K	2
34	Washer plate			A082U4679K	2

Function Code 44.01 Fuel Tanks, Filler

Dep	Part	Description	Remarks	Option	Part Number	Qty
35		Setscrew, M8 x 20, wheelarch bracket fixing			A075W1038Z	8
36		Fuel filler neck, LH			A082L4195F	1



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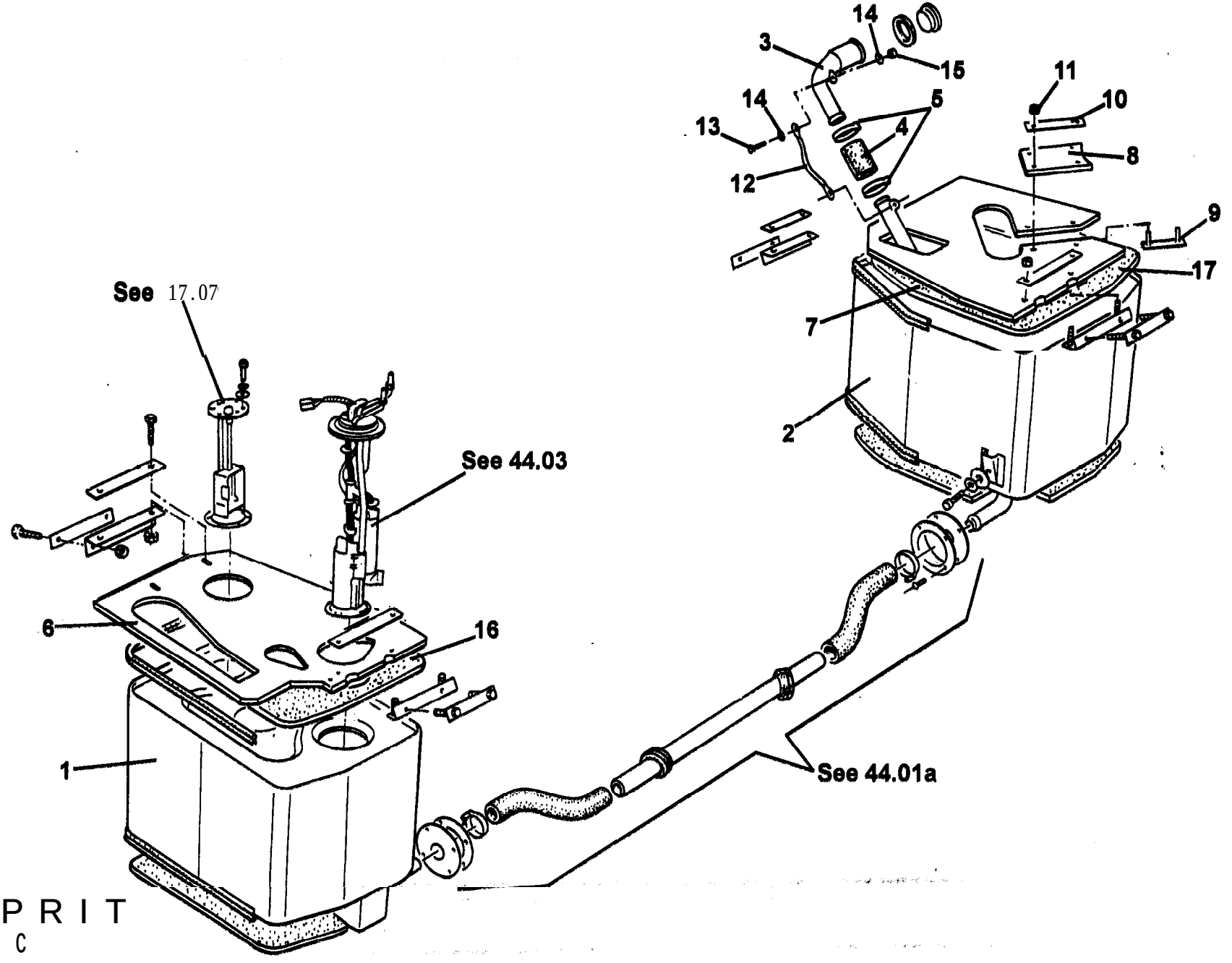
44.01a

Function Code 44.01a Fuel Tanks, Filler '98 MY on

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel Tank, RH, no filler		'98 MY on	A082L4268F	1
02	Fuel Tank, LH, with filler		'98 MY on	A082L4267F	1
03	Crossover Pipe, tank interconnection			B082L4061 F	1
04	Hose, crossover pipe to tanks		Non USA	B082L4062F	2
04a	Hose, crossover pipes to tanks		USA only	A082L4301 F	2
05	Grommet Retaining Ring			A082L4065K	2
08	Grommet, crossover pie through tank well			A082L4064Z	2
07	Tank Board, RH		'98 MY on	A082L4276F	1
08	Tank Board, LH		'98MY on	A082L4275F	1
09	Foam, tank top clamping, RH		'98 MY on	A082L4278F	1
10	Foam, tank seating, RH		'98 MY on	A082L4273F	1
11	Foam, tank top clamping, LH		'98 MY on	A082L4277F	1
12	Foam, tank seating, LH		'98 MY on	A082L4273F	1
13	Grommet, crossover pipe through chassis			X046K6001Z	2
14	Fuel Filler Neck			A082L4271 F	1
15	Hose, filler to tank			A082L4292F	1
18	Hose Clip, filler hose			A082L6198F	4
17	Breather Hose			B082L4291F	1

Function Code 44.01a Fuel Tanks, Filler '98 MY on

Dep	Part	Description	Remarks	Option	Part Number	Qty
18		Hose Clip, breather hose			**A075M6145F**	4
19		Grommet, filler neck through body			**A100L0077F**	1
20		Fuel Filler Cap			**A082L6168F**	1
21		Studplate, bracket to bulkhead			**A082U4677K**	2
22		Bracket, tank board to bulkhead			**A082U4675K**	2
23		Washer Plate, bulkhead bracket to board			**A082U4678K**	2
24		Nyloc Nut, bracket fix.			**A075W3010Z**	8
25		Edging Strip			**A075L602OV**	As req.
26		Setscrew, M8 x 20, hex. hd.			**A075W1038Z**	8
27		Washer Plate, wheelarch bracket to board			**A082U4679K**	2
28		Washer Plate, bracket to wheelarch			**A082U4680K**	2
29		Bracket, tank board to wheelarch			**A082U4676K**	**2**
30		Setscrew, M8 x 16, tank to body			**A075W1036Z**	2
31		Washer, spring, M8			A075W4036Z	2
32		Hose Clip, hose to tank/crossover			**A075M4284F**	4
33		Washer, flat, M8			A075W4020Z	2
34		Pop Rivet, grommet ring to body			A075W6092Z	8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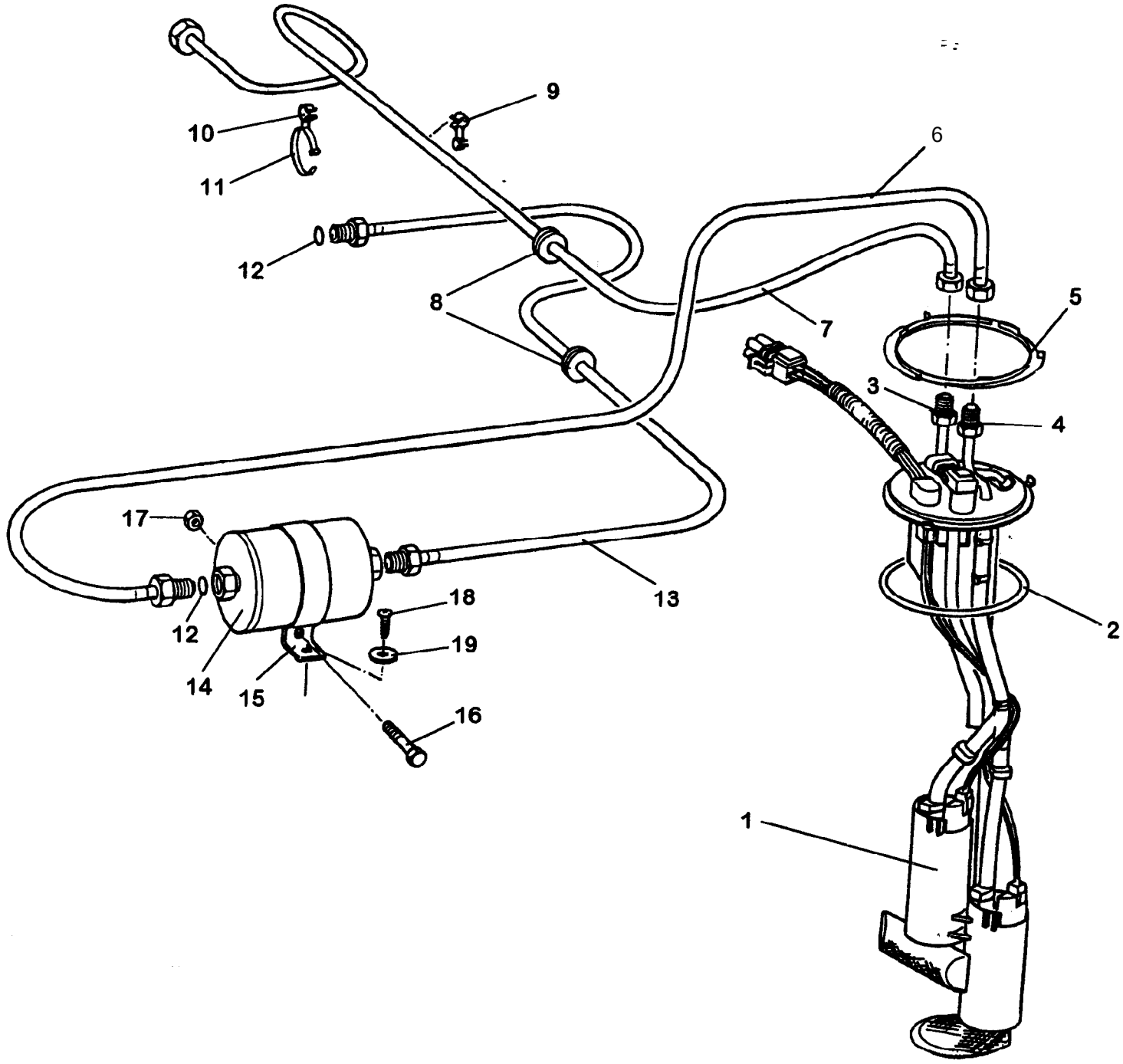
Function Code 44.01c Fuel Tanks, Filler, USA '00 MY

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel Tank, RH		USA	A082L4316F	1
02	Fuel Tank, LH		USA	A082L4315F	1
03	Fuel Filler Neck		USA	A082L4321 F	1
04	Hose, filler to tank		USA	A082L4326F	1
05	Oetiker Clip, filler hose		USA	A082L6236F	2
06	Tank Board, RH	For fixings see 44.01a	USA	A082L431 OF	1
07	Tank Board, LH	For fixings see 44.01 a	USA	A082L4309F	1
08	Bridging Panel, tank board, LH		USA	A082L4319F	1
09	Stud Plate		USA	A082L4329F	1
10	Spreader Plate		USA	A082L4330F	1
11	Nyloc Nut		USA	A075W3009Z	4
12	Earth Strap		USA	A082L4334F	1
13	Bolt, M6 x 12, hex. hd., strap fix.		USA	A075W1027Z	2
14	Washer, shakeproof, M6		USA	A075W4046Z	4
15	Nut, M6		USA	A075W3020Z	2
16	Foam, fuel tank clamping, RH		USA	A082L4312F	1
17	Foam, fuel tank clamping, LH		USA	A082L4311 F	1



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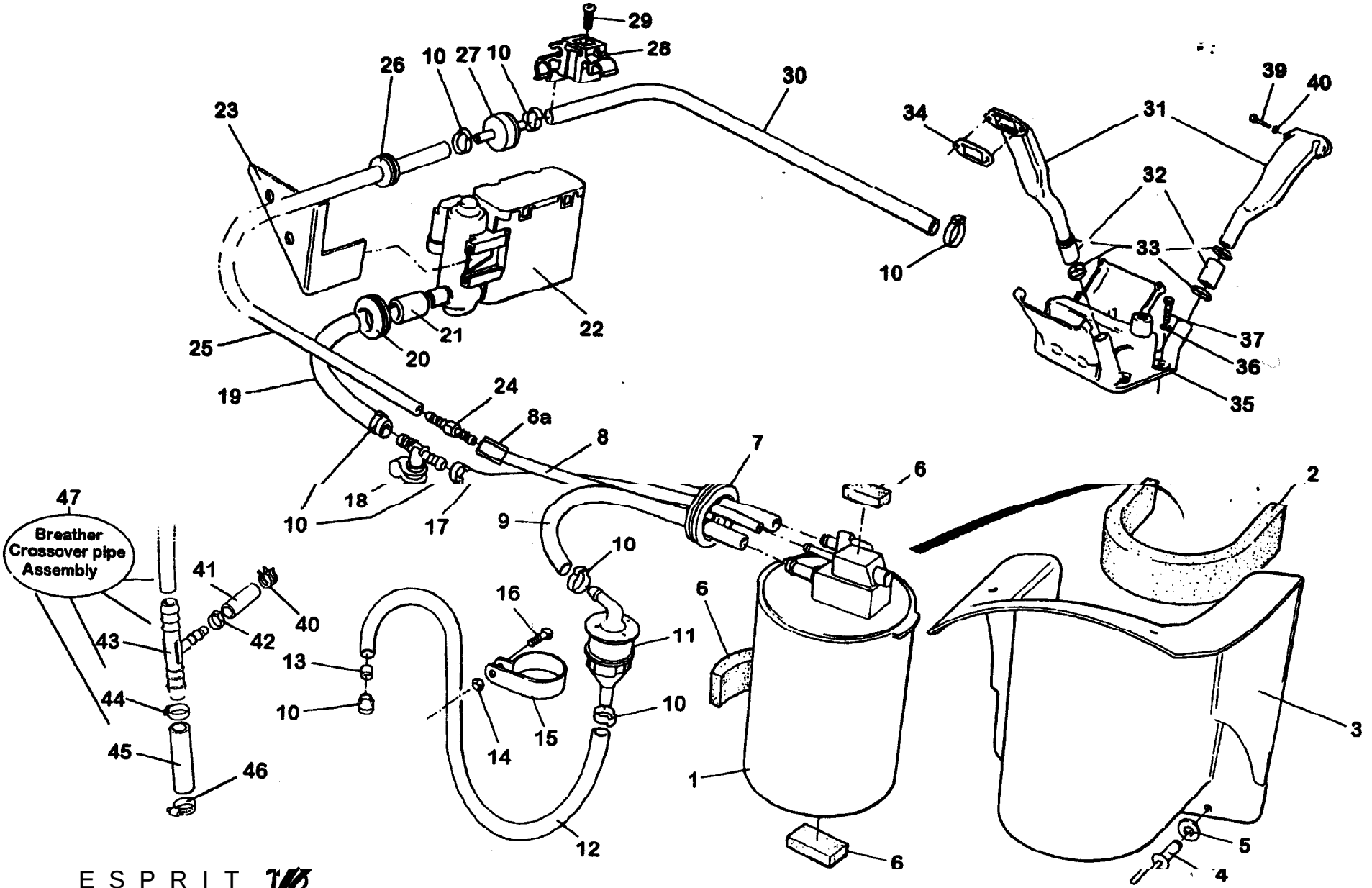
44.03

Function Code 44.03 Fuel Pump; Filtration;Feed & Return system.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Fuel pump assembly			AO82L4255F	1
02	Sealing ring			A082L6164F	1
03	'0' ring, pump output	Large		A082L6199F	1
04	'0' ring, pump return	Small		A082L6200F	1
06	Seal damping ring			A082L6163F	1
06	Fuel pipe, pump outlet from filter			A082L4202F	1
07	Fuel pipe, return via fuel rail			A082L4199F	1
06	Grommet, thro' sidewall			A082L6181 F	2
09	Pipe dip			TBA	1
09a	Swivel clip			TBA	1
10	Swivel clip			A082W6324F	1
11	Tie wrap to swivel clip			A082W6337F	1
12	'0' ring, fuel pipe connections			A082L6169F	5
13	Fuel pipe, outlet to filter			A082L4200F	1
14	Fuel filter			A082U4204F	1
15	Clamp, fuel filter			C082L4067F	1
16	Bolt, M5 x 40, clamp fixing			A079W2033F	2
17	Nut, M5 nyloc, clamp fixing			A075W3008F	2

Function Code 44.03 Fuel Pump; Filtration;Feed & Return system.

Dep	Part	Description	Remarks	Option	Part Number	Qty
18		Screw, filter clamp to board			A075W5040Z	2
19		Washer, flat			A075W4009Z	2


Breather Crossover pipe Assembly

Function Code 44.05 Charcoal canister & Evaporative Loss System.

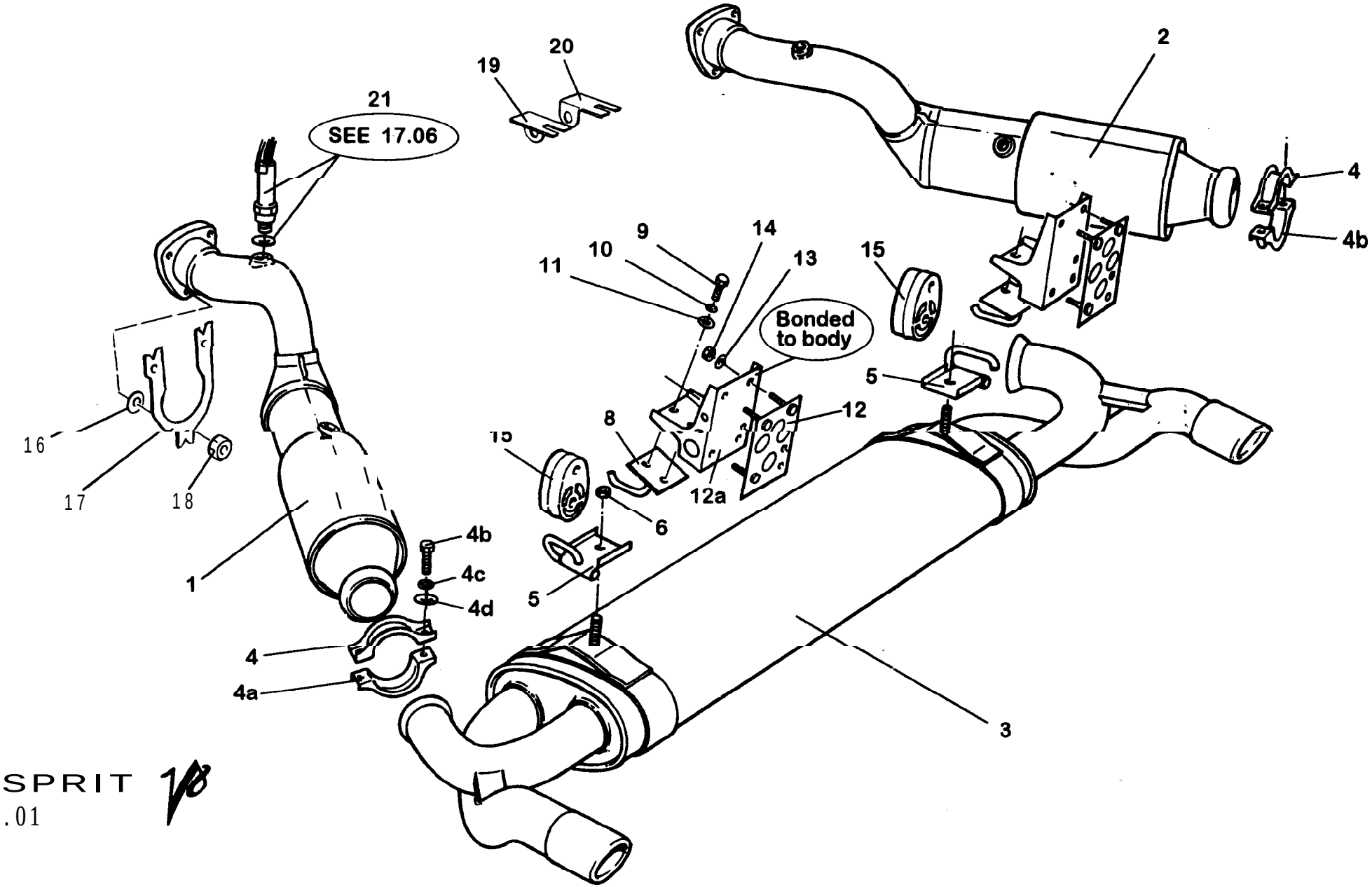
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Evaporative canister assembly	Locates inner rear wheelarch		A91 0E6944F	1
02	Insulation padding - charcoal canister			A082L4240F	1
03	Charcoal canister cover assembly			A082B534OF	1
04	Pop rivet, fixing, canister cover			A089W6297F	4
05	Flat washer			A100W4121F	4
08	Evap canister pads			A082 L4240 F	3
07	Grommet			A082P6046F	1
08	Pipe, 4mm , canister to pipe reducer			TBA	1
08a	Adaptor hose (connector), 40 mm length	Silicon material		A918E0332K	1
09	Pipe, canister To roll over valve			A082L4230F	1
10	Clip - oetiker 12.8G			A918W6541 F	2
11	Roll over valve	Nearside rear to bulkhead		A918E6064F	1
12	Pipe, roll over valve			A082L4231 F	1
13	Restrictor, roll over pipe			A082L4116F	1
14	Nut, nyloc, roll over valve fixing			Al 00W6362F	1
15	Clip, roll over valve fixing			A082W6550F	1
18	Bolt, roll over valve fixing			A075W3008Z	1
17	Pipe, canister to pressure valve			TBA	1

Function Code 44.05 Charcoal canister & Evaporative Loss System.

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Pressure **valve**			AO82L6209F	1
19	Pipe, pressure **valve** to vent closing valve			**TBA**	1
20	Grommet			**X036861672**	1
21	Pipe sleeve			**A082L4235F**	1
22	**Valve** - canister vent close			**A082L6210F**	1
23	Bracket, evap close valve	Fitted to LH bulkhead		**A082L4226F**	1
24	Reducing connector 6 - 4 mm, purge hose			**A912E6806F**	1
25	Pipe, purge canister To NRV			**A082L4232F**	1
26	Grommet, pipe to non return valve			**X036L6004Z**	1
27	Valve, non return			**A910E6863F**	1
28	Multi clip, pipe securing			**A918E6576F**	1
29	Fixing screw, multi clip			**AI 00W709OF**	1
30	Pipe, NRV to plenum			**A082L4233K**	1
31	Breather pipe			**TBA**	2
32	Joining sleeve			**TBA**	2
33	Clip, joining sleeve			**TBA**	4
34	Gasket, breather pipe			**TBA**	2
35	Breather gallery cover			**TBA**	1
36	Washer, BGC fixing			**TBA**	4
37	Bolt, BGC fixing			**TBA**	4
38	Bolt, breather fixing			**TBA**	4

Function Code 44.05 Charcoal Canister & Evaporative Loss System.

Dep	Part Description	Remarks	Option	Part Number	Qty
39	Washer, breather fixing			TBA	4
40	Hose clip	PO assy No 47	GT3	A082L6219F	3
41	Hose connector	PO assy No 47	GT3	A082L6220F	1
42	Hose clip	PO assy No 47	GT3	A082L6217F	1
43	T piece junction	PO assy No 47	GT3	B91 0E7006F	1
44	Hose clip	PO assy No 47	GT3	A082L6223F	2
45	Hose	PO assy No 47	GT-3	A082L4286F	1
46	Hose clip	PO assy No 47	GT3	A079K6018F	1
47	Fuel breather crossover pipe assembly	Includes No's 40,41,42,43,44, 45,46.	GT3	A082L4289F,	1



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45.01

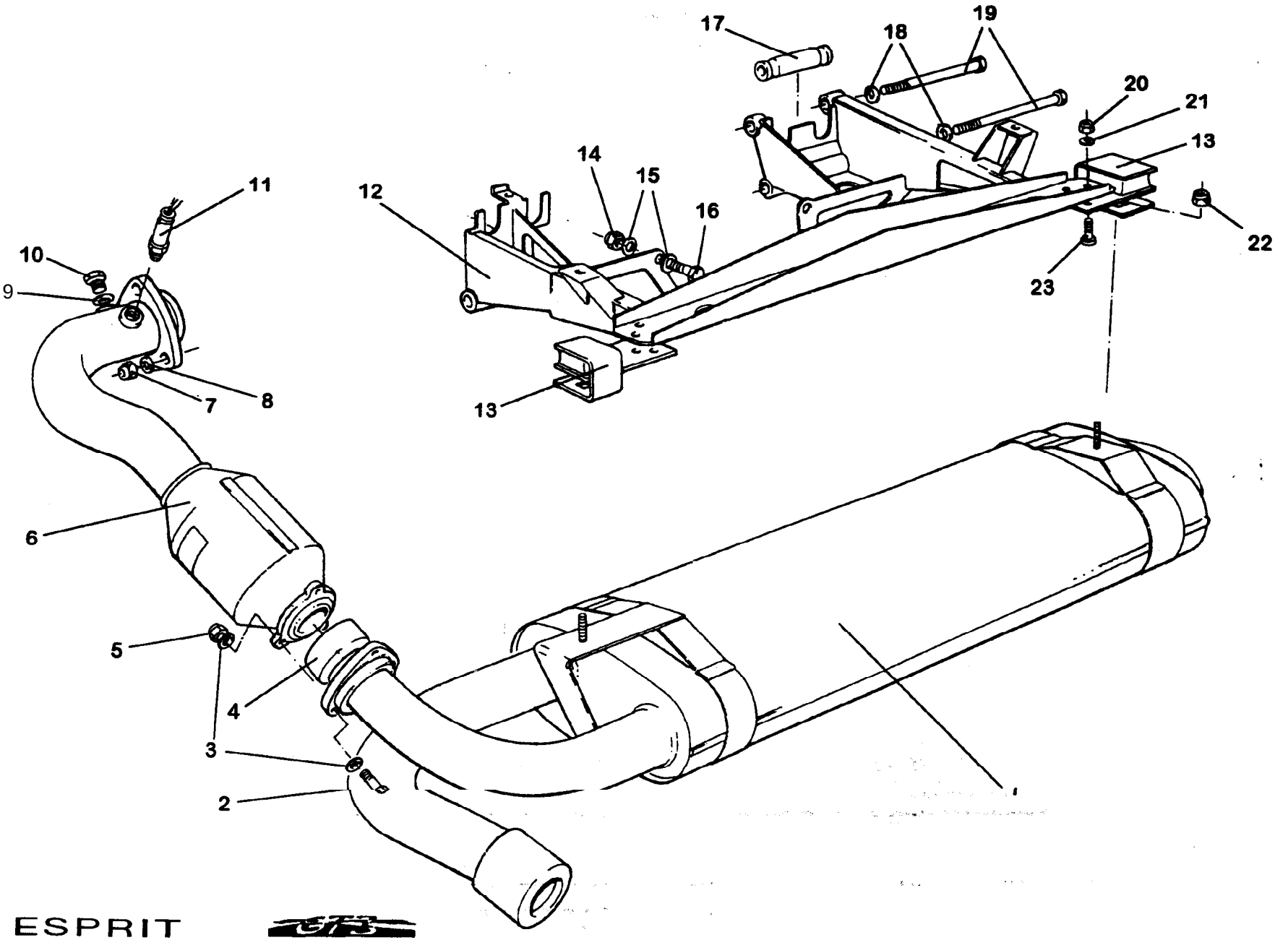
Service Parts List

Function Code 44.05a Charcoal Canister & Evaporative Loss System ,USA '00 MY

Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Fill Level Vent Valve, RH tank, long/black		USA	A082L6230F	1
02		Fill Level Vent Valve, LH tank, short/grey		USA	A082L6229F	1
03		Grade Valve		USA	A082L6231 F	1
04		Charcoal Canister		USA	A082L6228F	1
05		Tube Assembly, breather/crossover		USA	A082L4314F	1
06		Tube Assembly, breather to atmospere		USA	A082L4332F	1
07		Canister Vent Close valve		USA	A082L6210F	1
08		Hose, canister to close valve		USA	B082L4304F	1
09		Hose, canister to purge valve		USA	A082L4308F	1
10		Purge Solenoid Valve		USA	A082L6225F	1
11		Hose		USA	A082L4327F	2
12		Oetiker Clip		USA	A082L6235F	5
13		Blanking Cap, FLVV		USA	A082L4335F	2
14		Hose Clip		USA	A91 8W6583F	2
15		Hose		USA	A082L4328F	2
16		Oetiker Clip		USA	A082L6227F	2
17		Pipe, valves to crossover		USA	A082L431 7F	1

Function Code 45.01 Exhaust system.

Dep	Part Description	Remarks	Option	Part Number	Qty
09	Setscrew, M8 x 30 mm	Muffler hook mounting		**A075W1040Z**	4
10	Washer spring, M8	Muffler hook mounting		A075W4036Z	4
11	Washer flat, M8 x 20 x 2.5 m m	Muffler hook mounting		A079W4019F	4
12	Bracket	Muffler mounting		**A082B5342F**	2
13	Washer flat, M8 x 12.1 x 1.4mm	Muffler mounting		**A075W4013Z**	**6**
14	Nyloc nut, M6	Muffler mounting		A075W3009Z	6
15	Exhaust mounting, rubber			**A082S6057F**	2
16	Washer M8 x 16 x 1.4mm Flat	Turbo flange fixing		A075W4020Z	6
17	Lock tabplate	Flange fixing		**A082S4231 F**	2
18	Lock nut, M8, " Thermal "	Turbo / Exhaust fixing		**A082W4161 F**	6
19	Bracket, 02 sensor, LH			**A082S4211 K**	1
20	Bracket, 02 sensor, RH			**A082S4212K**	**1**
21	02 sensor	Also see section 17.06		**A91 0E0322F**	**4**



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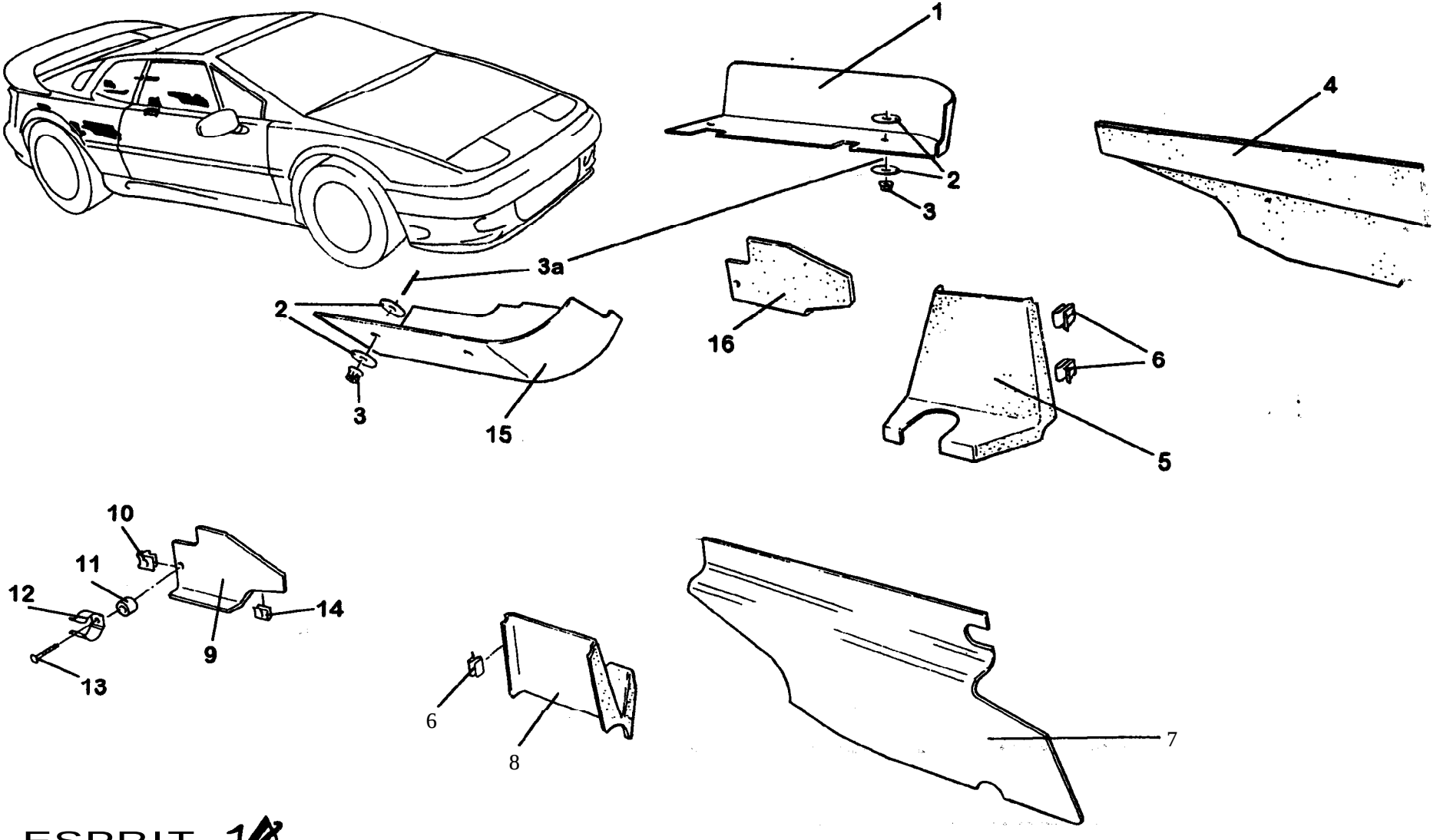
45.01 a

Function Code 45.01a Exhaust system, GT3

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Silencer	LH outlet	GT3 , Not Australia	A082S6055F	1
Ola	Silencer	RH outlet	GT3, Australia only	A082S6054F	1
02	Bolt, M8 x 75, silencer to catalyst			A075W2046Z	3
03	Washer, flat, M8 x 16, silencer to catalyst			A075W4O2OZ	6
04	Adaptor, catalyst to silencer			A082S4228F	1
05	Nut, M8, copper coated, silencer to catalyst			A075W3036Z	3
06	Catalytic converter		GT3	D082S6045F	1
07	Nut, M10, pipe to turbo			A082S6051 F	3
08	Washer, flat, Ml9 x 20, pipe to turbo			A075W4024Z	3
09	Copper washer, Ml0 x 16, sample port blanking			A079W4061 D	1
10	Setscrew, Ml0 x 15, sample port blanking			A082S6005F	1
11	Oxygen sensor, feedback control			B91 0E6930F	1
1 la	Sealing washer, oxygen sensor	Not illustrated		A91 OE7001 F	1
12	Cradle, Silencer support			FO82FO768F	1
13	Mounting rubber, Silencer to cradle			A082S6018F	2
14	Nut, M8, nyloc, cradle to gearbox cover			A075W301 OZ	2
15	Washer, flat, M8 x 16, cradle to gearbox cover			A075W4020Z	4
16	Bolt, M8 x 35, cradle to gearbox cover			A075W2038Z	2

Function Code 45.01a Exhaust system, GT3

Dep	Part Description	Remarks	Option	Part Number	Qty
17	Spacer / Retainer, gear change cable clamp			A082F4143F	1
18	Washer, flat, M8 x 18, cradle to gearbox			A075W4020Z	2
19	Bolt, M8 x 115, cradle to gearbox			A079W2047F	2
20	Nut, nyloc, M8, mounting rubber to cradle			**A075W3010Z**	8
21	Washer, flat, M8 x 18, mounting rubber to cradle			A075W4020Z	8
22	Nut, M10, silencer to mounting rubber			**A082S6051 F**	2
23	Setscrew, M8 x 25, mounting tubber to cradle			**A075W1 0392**	8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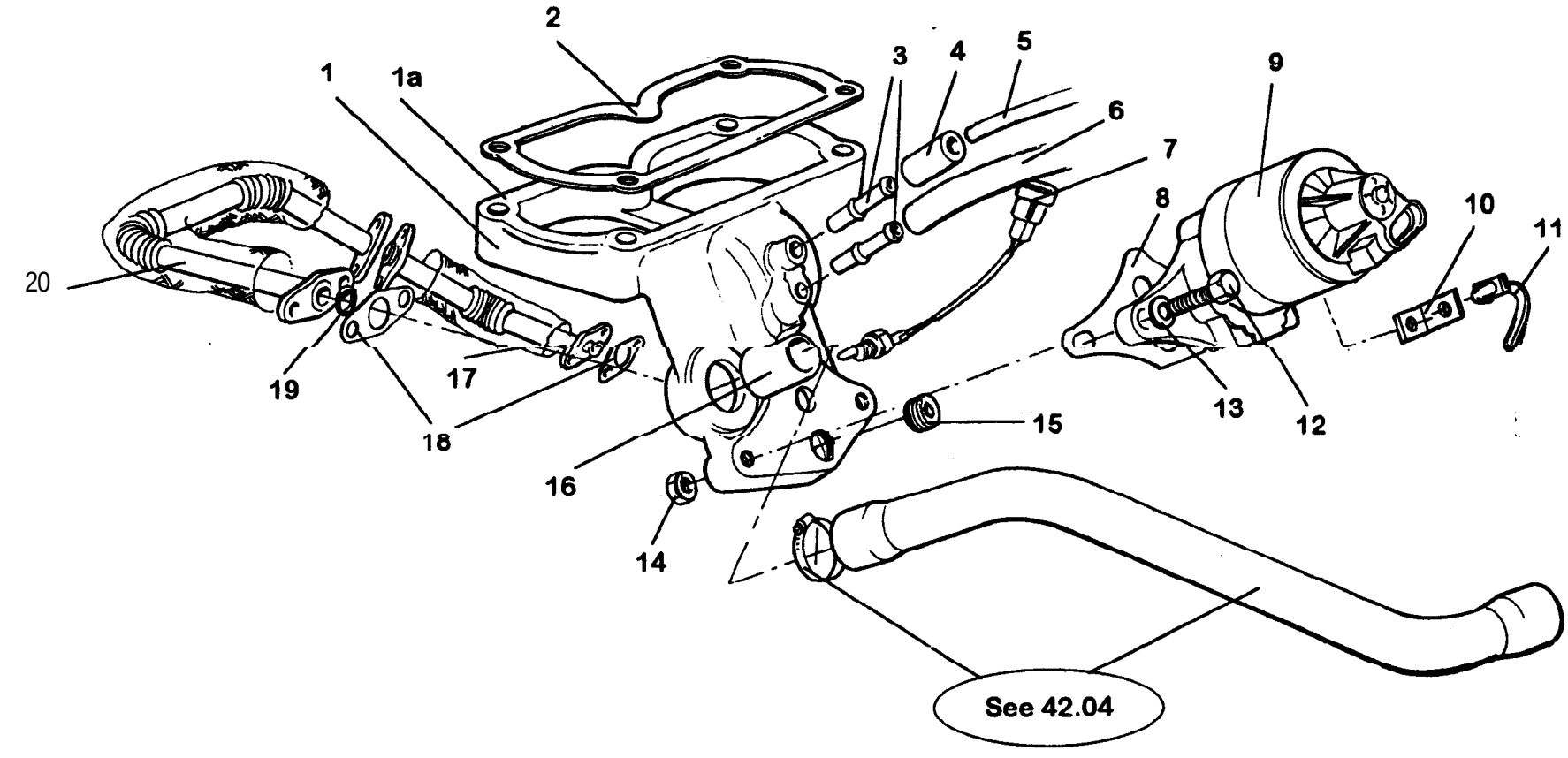
Function Code 45.05 Heatshields etc.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Heatshield, LHS engine			A91 8E0225F	1
02	Washer, engine H/shield mounting			A075W4017Z	4per side
03	Nut, M6 Kayloc, H/shield mounting			A100W3108F	2per side
03a	Stud, heatshield fixing			A918E0329F	2per side
04	Heatshield, fuel tank LH			A082U7771 K	1
05	Heatshield, engine mount LH			A082U7769K	1
06	Clips, heatshield mounting			A082W6559F	4per side
07	Heatshield, fuel tank RH			A082U7772K	1
06	Heatshield, engine mount RH			A082U7770K	1
09	Heatshield, upper rear wishbone R.H.			A082U7774K	1
10	Clip, heatshield mounting			A100W6449F	1 per side
11	Spacer, nylon			A082U6162F	1 per side
12	Clip, to mounting bolt spader			A918W6557F	1 per side
13	Setscrew, clip securing to H/shield			A075W5081F	1 per side

Function Code 45.05 Heatshields etc.

Dep	Part	Description	Remarks	Option	Part Number	Qty
14		Clip, stainless, heatshield mounting			A918W6558F	1 per side
15		Heatshield, RHS engine			A918EO228F	1
16		Heatshield, upper rear wishbone L.H.			A082U7773K	1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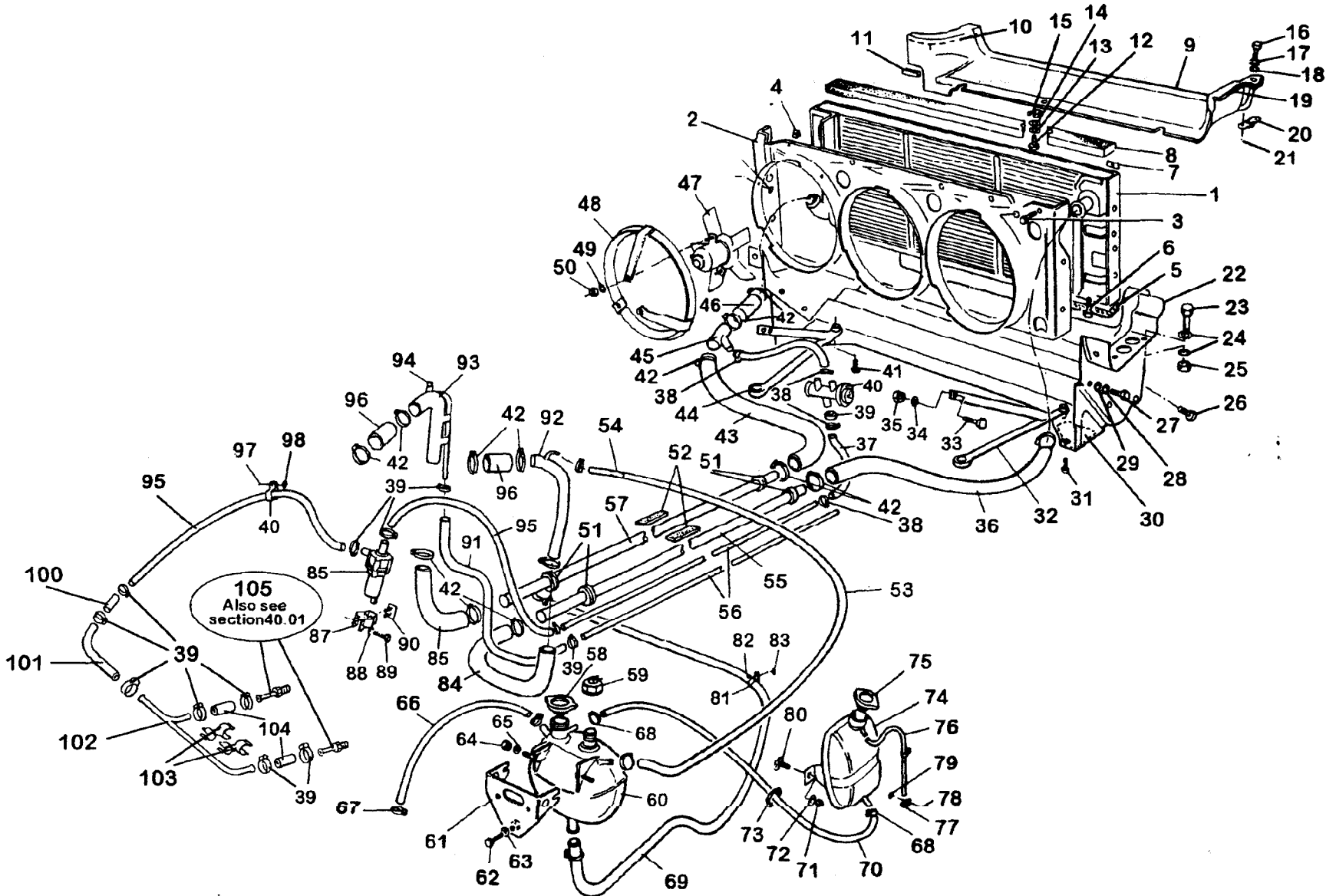
See 42.04

Function Code 45.07 E.G.R components, Valve, manifold, pipes & fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Manifold-EGR valve		Non USA	B918E0313JK	1
01a	EGR Manifold assembly		USA (federal spec)	A918E0220J	1
02	Gasket, EGR man to Plenum			A918E0024F	1
03	'Takeoff tube			A918E0304F	2
04	Connecting tube	cut to length		A918E0278F	1
05	Tubing	Cut to length		A075L6643V	1
06	Tubing	cut to length		A918E0278F	1
07	Temperature sensor, EGR		USA (federal spec)	A918E6040F	1
06	Gasket, EGR valve to manifold			A918E0032F	1
09	Valve Assembly, EGR			A918E6017F	1
10	Bracket - EGR Sensor			A918E0263F	1
11	Retaining dip, (for tie-wap)			A082W6520F	1
12	Bolt, securing EGR valve			A075W1041Z	2
13	washer			A075W1041Z	2
14	Nut			A075W3O21Z	2
15	Blanking plug		Non USA	A918W6562F	1
16	Comecting tube			B918E0105F	1
17	Pipe, single flexible joint			A918E0200F	1

Function Code 45.07 E.G.R components, Valve, manifold, pipes & fixings.

Dep	Part Description	Remarks	Option	Part Number	Qty
18	**Gasket**			**A91 8E0033F**	**2**
1 9	'o'ring			**A918E6026F**	1
20	Pipe. double flexible joint			**A918E0199F**	1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Also see
section40.01

Function Code 46.01 Engine Water Cooling System & Fan. Heater only models..

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Radiator assembly			A082K4237F	1
02	Cowl - radiator fans			E082K4102K	1
03	Screw, pozi No6x ½"	Cowl to radiator fix		A075W5014Z	4
04	Retaining clip	Cowl to radiator fix		A079W6187F	12
05	Foam seal	Radiator base		A089K0131 F	A/R
06	Drain plug	I/8" BSPT		B075K6011 F	2
07	Spire nut, No 6	Cowl to radiator fix		A075W6013Z	4
06	Foam seal	Top of radiator		A079K4001 F	1
09	Radiator duct			A082K5365K	1
10	Reinforcement, LH	Fits to duct		A082B5245K	1
11	Edging strip	Apply to radiator duct		A085U6080V	A/R
12	Screw, pozi M5 x 16mm	Radiator duct to housing / bumper		A082W5107F	5
13	Washer flat, 3/16" x 3/4" x 16g	Radiator duct to housing / bumper		A075W4009Z	5
14	Washer spring, MS	Radiator duct to housing / bumper		A082W4097 F	5
15	Speed clip /fix	Radiator duct to housing / bumper		Al 00W6372F	3
16	Setscrew, M6 x 25 mm	Radiator duct to tapping plate		A075W1031 F	2
17	Washer internal shakeproof, M6	Radiator duct to tapping plate		A075W4046Z	2
18	Washer flat, M6 x 25.5 x 1.4 mm	Radiator duct to tapping plate		A075W4017Z	2

Function Code 46.01 Engine Water Cooling System & Fan. Heater only models..

Dep	Part Description	Remarks	Option	Part Number	Qty
19	Reinforcement, RH	Fits to duct		**A082B5244K**	1
20	Tapping plate	Fits to front bumper		**808284811 F**	1
21	Pop rivet	Tapping plate to underbody		**A075W6071Z**	4
22	Radiator housing			**A082B5365K**	1
23	Setscrew, M8 x 25 mm	Radiator housing to body		**A075W1039Z**	4
24	Washer flat, M8 x 16.6 x 1.4 mm	Radiator housing to body		**A075W4020Z**	8
25	Nyloc nut, M8	Radiator housing to body		A075W3010Z	4
26	Jacknut, M5 short	Radiator duct to bumper		**A076W3043F**	2
27	Setscrew, M6 x 18 mm	Radiator fix		**A075W1029Z:**	4
28	Washer spring, M6	Radiator fix		**A075W4035Z**	4
29	Washer fiat, M6 x 25.5 x 1.4 mm	Radiator fix		**A075W4017Z**	4
30	Reinforcing plate, LH	Radiator duct		**B082U7295F**	1
30a	Reinforcing plate, RH	Radiator duct		**B082U7296F**	1
31	Setscrew, M8 x 25 mm	Brace to radiator		**A075W1081Z**	2
32	Radiator brace	Radiator duct to chassis, RH		**A082K4232F**	1
33	Setscrew, M8 x 20 mm	Brace to radiator		**A075W1038Z**	2
34	Washer flat, M8 x 16.6 x 1.4 mm	Brace to radiator		**A075W4020Z**	2
35	Nyloc nut, M8	Brace to radiator		**A075W301 OZ**	2
36	Hose, radiator inlet			**A082K4242F**	1
37	Hose, moulded	Fit to Recirc.diverter valve		**A075P0189F**	1
38	Clip, hose retention	Fit to Recirc. diverter valve		**A079K6018F**	2

Function Code 46.01 Engine Water Cooling System & Fan. Heater only models..

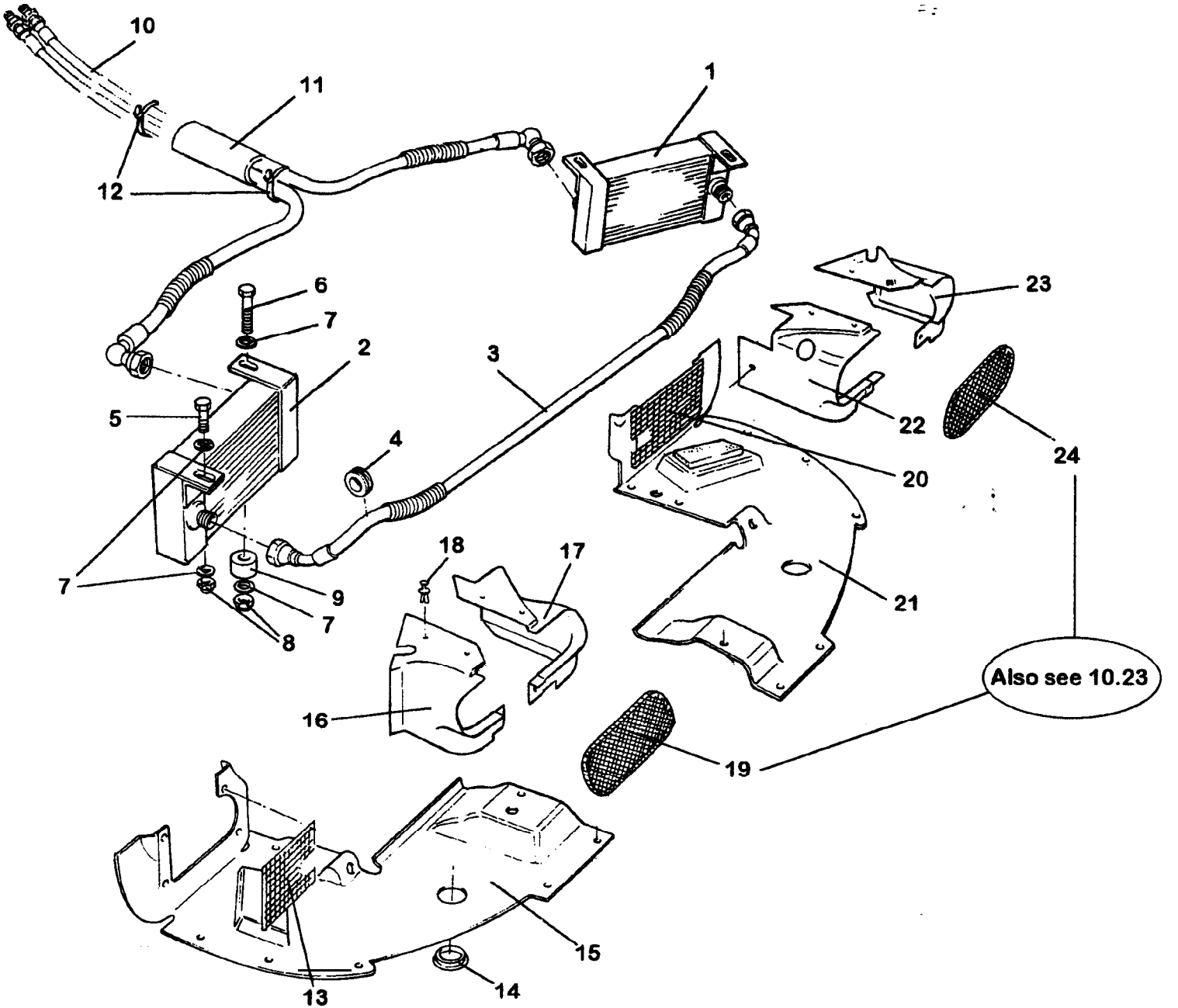
Dep	Part Description	Remarks	Option	Part Number	Qty
39	Grommet	Fit to Recirc.diverter valve		A079K6004F	1
40	Recirc. diverter valve			A082K4263F	1
41	Setscrew, M8 x 25 mm	Radiator housing to body		A075W1039Z	4
42	Hose clip, 32 - 50 mm			A079K6019F	2
43	Hose, radiator outlet			B082K4243F	1
44	Radiator brace	Radiator duct to chassis, LH		A082 K4231 F	1
45	Junction pipe connector	Recirc.diverter valve		A082K4276F	1
46	Hose, (Part of No 43)	From junction pipe to radiator outlet		B082K4243F	1
47	Radiator Fan & Motor assembly			B082K6065F	1
48	Mounting shroud (cowl)	Fan & Motor assembly		A079K4174F	1
49	Spacer (aluminium)	Fan motor to mounting		A907E0696Z	9
50	Nyloc nut, M6	Fan motor to mounting		A907E6285F	9
51	Grommet	Water rail through chassis		A082K6022F	6
52	Anti vibration pad	Water rail through chassis		A082A4286K	2
53	Bleed hose	Bleed to header tank		B082K4254F	1
54	Restictor, top hose bleed	Fits inside top hose bleed hose		A082K4286F	1
55	Main water pipe	Through chassis		A082K4239F	1
56	Water pipe	Through chassis		A082P4200F	2
57	Water return pipe	Through chassis		A082K4273F	1
58	Header tank pressure cap	Assembly of cap and seal		A082K4291 J	1

Function Code 46.01 Engine Water Cooling System & Fan. Heater only models..

Dep	Part Description	Remarks	Option	Part Number	Qty
58a	Pressure cap, 20psi / 140 kpa			A082K6074F	1
58b	Seal, pressure cap			A082K4290F	1
59	Water level switch	Fits to header tank		A082K6068F	1
60	Header tank			A082K6067F	1
61	Mounting bracket, header tank			A082K4267F	1
62	Setscrew, M6 x 16 mm	Mounting bkt fix		**A075W1082Z**	3
63	Washer flat, M6 x 25.5 x I.4 mm	Mounting bkt fix		A075W4017Z	3
64	Nyloc nut, M6	Mounting bkt fix		A075W3009Z	2
65	Washer flat, M6 x 18 x 1.0 m m	Mounting bkt fix		B082W4018F	2
66	Hose	Turbo outlet to header		A082K4287F	1
67	Hose clip, ½"	Turbo outlet to header		A075U6082F	2
68	Hose clip, ½"	Header tank to expansion tank		A075U6082F	2
69	Hose, header tank bottom	Through chassis		B082K4251 F	1
70	Hose, black PVC, 8 mm	Header tank to expansion tank		A082K4280K	1
71	Nyloc nut, M6	expansion tank fixing		A075W3009Z	2
72	Washer flat, M6x I8 x 1.0 mm	expansion tank fixing		B082W4018F	2
73	Tie wrap	Header tank hose top>bottom		A075W6038Z	1
74	Expansion tank			A082K6040F	1
75	Cap	Expansion tank		A082K6041 F	1
76	Overflow pipe	Fits to expansion tank		A082K4278K	1
77	'P clip	Overflow pipe fix		A075W6004Z	2

Function Code 46.01 Engine Water Cooling System & Fan. Heater only models..

Dep	Part Description	Remarks	Option	Part Number	Qty
99	hose connector			**TBA**	1
100	Hose connector (metal)			**B075K0111Z**	1
101	Hose pipe manifold			**A082P4414F**	1
102	Swivel pipe clips	Female		A82W6615F	2
102a	Swivel pipe clips	Male		**A089W6288F**	2
103	Hose		80mm of	**B079P4056F**	2
104	Outlet pipes (brass)	From cylinder heads		**A918E0103F**	2
105	hose, angled		290mm of the part number	**B079P4056F**	1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Also see 10.23
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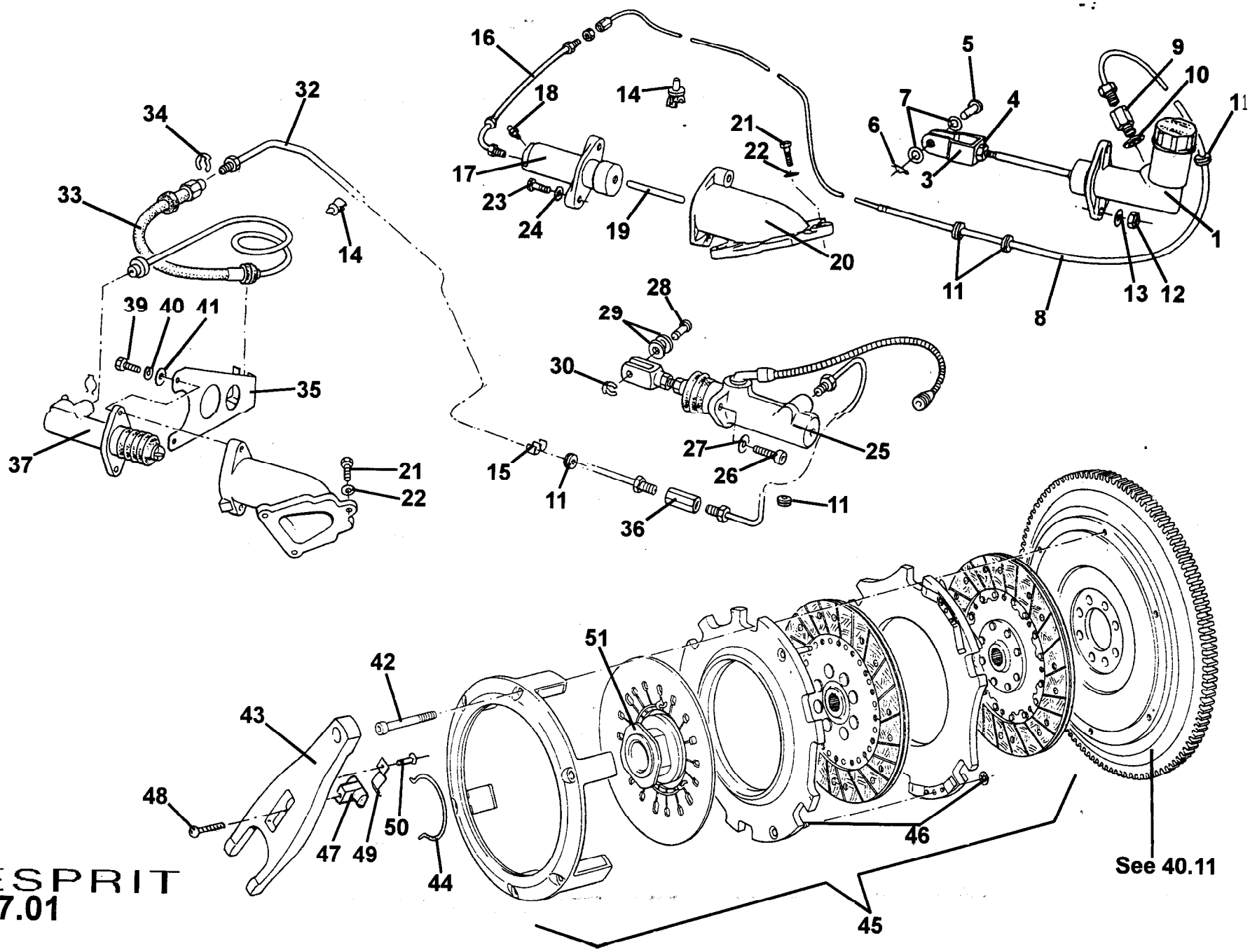
Service Parts List V8

Function Code 46.03 Oil coolers, pipes , grills, housings etc

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Oil Cooler - LH			**A082K4271 F**	**1**
02	Oil Cooler - RH			**A082K4270F**	1
03	Hose Assembly - RH Oil Cooler/LH Oil Cooler			**B082K4274F**	1
04	Grommet			**A082P6045F**	4
05	Bolt Hex Head M8 x 25mm	LH/RH oil cooler to body		A075W1039Z	2
06	Bolt Hex Head M8 x 40mm	LH/RH oil cooler to body		**A075W2039D**	2
07	Washer Flat M8 x 16.6 x 1.4	LH/RH oil cooler to body		**A075W4020Z**	4
06	Nut M8 Nyloc	LH/RH oil cooler to body		**A907E6284F**	4
09	Spacer 20mm	LH/RH oil cooler to body (one each side)		**A082K4288K**	2
10	Hose Assembly Oil Cooler/Engine	Oil cooler to oil filter housing		**B082K4264F**	2
11	Pipe protection	Cut to size		**A082E6022V**	**1**
12	Tie wrap	Hold pipes together, noise reduction		A075W6038Z	6
13	Grill, oil cooler RH	Fitted to duct platform		**A082U7824F**	1
14	Grommet			**A082U6073F**	2
15	Duct platform, RH			**A082B5364K**	**1**
16	Duct outer, RH			**A082B5368K**	1
17	Duct inner, RH			**A082B5388K**	1

Function Code 46.03 Oil cooler & Pipes

Dep	Part Description	Remarks	Option	Part Number	Qty
18	Scrivet, duct fixing			AI 00W6479F	6
19	Grill, RH	Also listed in section 10.23		A082U7804F	1
20	Grill, oil cooler LH	Fitted to duct platform		A082U7823F	1
21	Duct platform, LH			A082B5363K	1
22	Duct inner, LH			A082B5387K	1
23	Duct outer, LH			A082B5369K	1
24	Grill, LH	Also listed in section 10.23		A082U7805F	1
	Oil - cooler sealing Foam	Not illustrated		A089K0131 F	2 lengths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See 40.11

ESPRIT
47.01

Function Code 47.01 Clutch & Release Mechanism

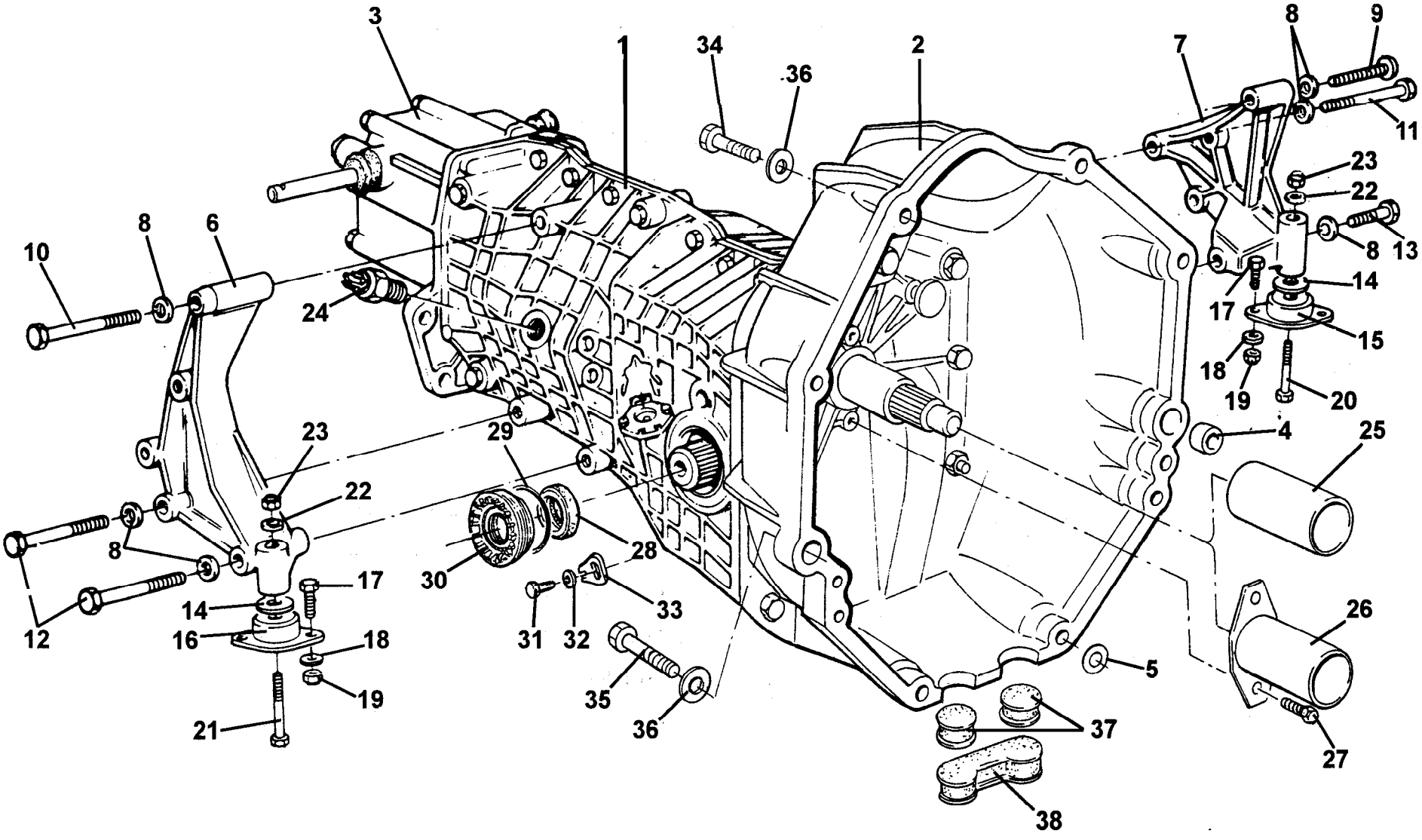
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Clutch master cylinder 5/8"		V8, prior to '98 MY	A082Q4035F	1
02	Push Rod, clutch master cylinder		V8, prior to '98 MY	A082J6140F	1
03	Clevis, pushrod to pedal		V8, prior to '98 MY	A082J6148F	1
04	Locknut, pushrod to clevis		V8, prior to '98 MY	A082J6149F	2
04a	Clip, pushrod retention	Not illustrated	V8, prior to '98 MY	A082Q4027F	1
05	Clevis Pin, clevis to pedal		V8, prior to '98 MY	A082J4197F	1
06	'R'. Clip, pin retention		V8, prior to '98 MY	A075W6175F	1
07	Washer, wavy, pin tensioning		V8, prior to '98 MY	A082W4103F	2
08	Clutch pipe assembly, front LHD		V8, prior to '98 MY	B082P4405F	1
08a	Clutch pipe assembly, front RHD		V8, prior to '98 MY	B082P4406F	1
09	Connector, clutch pipe to master cylinder		V8, prior to '98 MY	A082J6145F	1
10	Washer, flat, 3/8", copper		V8, prior to '98 MY	A082J6146F	1
11	Grommet, pipe through chassis			A082L6159Z	3
12	Nyloc Nut, M8		V8, prior to '98 MY	A075W301 OZ	2
13	Washer, flat, M8 x 16		V8, prior to '98 MY	A075W4020Z	2
14	Clip, pipe fixing			A075J6027Z	3
15	Clip, double, pipe fixing			AI 00J6044F	1
16	Braided Hose, bundy to slave cylinder	Includes banjo bolt & washers	V8, prior to '98 MY	A082Q4068F	1

Function Code 47.01 Clutch & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
17	Slave cylinder		V8, prior to '98 MY	A082Q6031 F	1
18	Bleed nipple		V8, prior to '98 MY	A082Q6025F	1
19	Push Rod, slave cylinder		V8, prior to '98 MY	A082Q4031 F	1
20	Slave Cylinder Mounting Bracket		V8, prior to '98 MY	A91 8E0216K	1
21	Bolt, bracket to bell housing			A075W1039Z	3
22	Washer, flat			A075W4020Z	3
23	Setscrew, M8 x 25, hex. hd. slave fixing		V8, prior to '98 MY	A075W1039Z	2
24	Washer, spring		V8, prior to '98 MY	A075W4036Z	2
25	Clutch master cylinder		V8, V8-GT, '98 MY on	A082Q0724F	1
28	Screw, M8 x 20, cap. hd. black, master cylinder to pedal box		V8, V8-GT, '98 MY on	A111W7I30F	2
27	Washer, spring, M8		V8, V8-GT, '98 MY on	A075W4032Z	2
28	Clevis Pin		V8, V8-GT, '98 MY on	A082Q0727F	1
29	Washer, flat, nylon		V8, V8-GT, '98 MY on	A082Q0714F	2
30	Clip, pin retention		V8, V8-GT, '98 MY on	A082Q0728F	1
31	Clutch pipe assembly, front LHD		V8, V8-GT, '98 MY on	A082Q0730K	1
31a	Clutch pipe assembly, front RHD		V8, V8-GT, '98 MY on	A082Q0729K	1
32	Clutch pipe, main		V8, V8-GT, '98 MY on	A082Q4069K	1
33	Hose & Pipe assembly		V8, V8-GT, '98 MY on	A082Q0725F	1
34	Clip, clutch flex pipe/main pipe		V8, V8-GT, '98 MY on	A082Q0728F	1
35	Clutch flexpipe bracket		V8, V8-GT, '98 MY on	A082Q4071 F	1

Function Code 47.01 Clutch & Release Mechanism

Dep	Part Description	Remarks	Option	Part Number	Qty
36	Connector, clutch pipe		V8, V8-GT, '98 MY on	**A079J6020F**	1
37	Slave cylinder		V8, prior to '98 MY	**A082Q0726F**	**1**
38	Slave Cylinder Mounting Bracket		V8, prior to '98 MY	**A082Q4059K**	1
39	Screw, M8 x 30, hex. hd.		V8, prior to '98 MY	**A075W2037Z**	2
40	Washer, spring, M8		V8, prior to '98 MY	**A075W4032Z**	2
41	Washer, flat, M8		V8, prior to '98 MY	**A075W4020Z**	2
42	Bolt, M8 x 60, cap hd., clutch to flywheel		Twin plate clutch	**A111W1166F**	6
43	Clutch Fork	For stiff alloy clutch housing	V8, prior to '98 MY	**A082Q4072K**	1
43a	Clutch Fork	For stiff alloy clutch housing	V8, V8-GT, '98 MY on	**A082Q4060K**	**1**
44	Snap Ring, clutch release bearing			**A082Q4042H**	1
45	Clutch Assembly, twin pate		V8, V8 GT	**B082Q0718F**	1
45a	Clutch Assembly, twin pate, retro fit kit		V8	**A082Q0720S**	1
46	Pin fixing kit		Twin plate clutch	**A0824071 9S**	1
47	Pivot, clutch fork		V8, V8-GT, '98 MY on	**A082Q4061 F**	1
48	Screw, M8 x 35, flg, skt. button hd., pivot fix.		V8, V8-GT, '98 MY on	**A91 0W7121 F**	1
49	Spring, clutch fork		V8, V8-GT, '98 MY on	**A082Q4062F**	**1**
50	Pop Rivet, spring to clutch fork		V8, V8-GT, '98 MY on	**A082W6302F**	1
51	Release Bearing, twin plate clutch		V8, V8-GT	**A082Q4041 H**	1
52	Heatshield, flexpipe coil, clutch pipe protection	Not illustrated	V8, V8-GT, '98 MY on	**A082Q4070F**	1
53	Clutch alignment tool, twin plate clutch	Not illustrated		**TOOT1 402F**	1
54	Service kit, slave cylinder	Not illustrated	V8, prior to '98 MY	**A082Q6024F**	**1**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E S P R I T
47.03

Function Code 47.03 Transmission Assembly

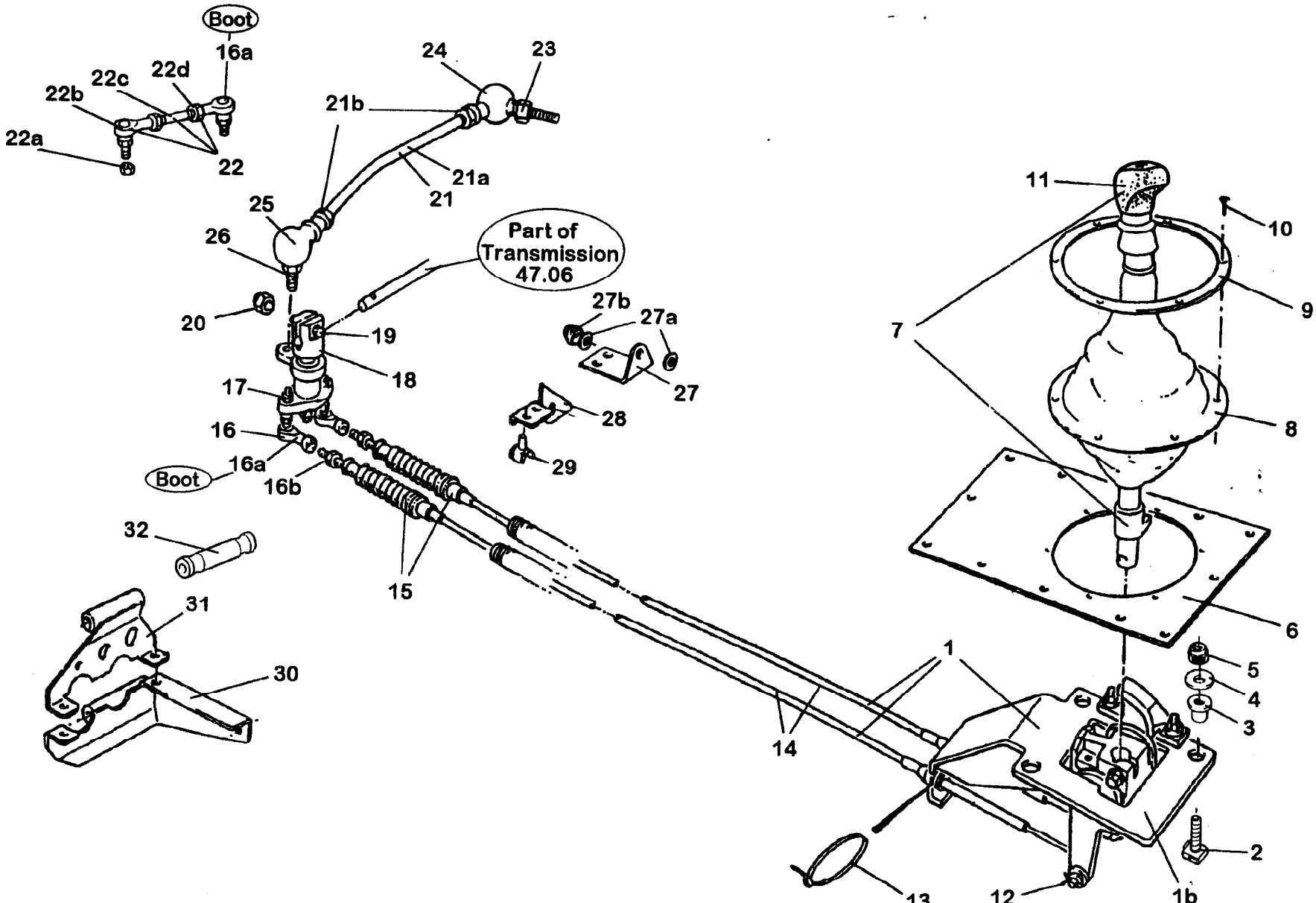
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Transmission Assembly	Type UN1 027	V8, prior to '98 MY	**A082F41 50F**	**1**
Ola	Transmission Assembly	Type UN1 027	V6, V8-GT, '98 MY on	**A082F4186F**	1
01 b	Transmission Assembly	Type UN1 026	GT3, prior to VIN: W2272	**A082F6522F**	1
01 c	Transmission Assembly	Type UN1 028	GT3, VIN: W2272 on	**A082F4187F**	1
02	Clutch (Bell) Housing. alloy	Single plate clutch	V8, B918E0150K R/B	**B082F4153J**	1
02a	Clutch (Bell) Housing, cast iron	Single plate clutch	V8	**B082F4153J**	**1**
02b	Clutch (Bell) Housing Assembly, alloy	Twin plate clutch	V8, prior to '98 MY	**A082Q4073J**	1
02c	Clutch (Bell) Housing Assembly, alloy	Twin plate clutch, includes release fork	V8, V8-GT, '98 MY on	**A082Q4064F**	1
02d	Clutch (Bell) Housing	Single plate clutch	GT3	**A082F4146S**	**1**
03	Rear Casing Assembly		V8, prior to '98 MY	**A082F6570S**	1
03a	Rear Casing Assembly		GT3	**A082F6553S**	**1**
03b	Rear Casing Assembly		V8, V8-GT, ,98 MY on, GT3, VIN W2272 on	**A082F**	1
04	Dowel, clutch hsg. to engine.			**B907E6181 F**	2
05	Shim, clutch housing to sump.			**A082F6358F**	2
06	Mounting Bracket, gearbox, RH			**A082F0766K**	**1**
07	Mounting Bracket, gearbox, LH.			**A082F0767K**	1
08	Washer, flat, Ml 0 x 20, bracket to gearbox.			**A075W4024Z**	6

Function Code 47.03 Transmission Assembly

Dep	Part Description	Remarks	Option	Part Number	Qty
09	Screw, Ml0 x 45, button hd., bracket to gearbox.			A082W7057F	1
I 0	Bolt, Ml9 x 80, hex. hd., bracket to gearbox.			A075W2061Z	1
11	Bolt, Ml0 x 65, hex. hd., bracket to gearbox.			A075W2056F	1
1 2	Bolt, Ml0 x 75, hex. hd., bracket to gearbox.			A075W2059Z	2
1 3	Bolt, Ml0 x 30, hex. hd., bracket to gearbox.			A075W1049Z	1
1 4	Washer, flat, M10, mounting to bracket.	LH: 1 off, RH: 2 off		A075W4006Z	1/2
1 5	Mounting Rubber, gearbox. LH	Marked: 17-l 917R		A91 8E0265F	1
1 6	Mounting Rubber, gearbox. RH	Marked: 17-l 917L		A91 8E0266F	1
1 7	Screw, M8 x 20, hex. hd., gearbox mounting to chassis.			A075W1038Z .	4
1 8	Washer, flat, M8 x 16, gearbox mounting to chassis.			A075W4020Z	4
1 9	Nyloc Nut, M8, gearbox mounting to chassis.			A075W301 OZ	4
20	Bolt, 7/16" UNF x 4½", mounting to bracket, LH.			A082F4113F	1
21	Bolt, 7/16" UNF x 4" , mounting to bracket , RH.			A082W4112F	1
22	Washer, flat, 7/16 UNF, gearbox mounting bolt.			A075W4005F	2
23	Nyloc Nut, 7/16" UNF, gearbox mounting bolt.			A075W3004Z	2
24	Reverse Lamp Switch (ball type).			A082F6564F	1
25	Sleeve, plain, clutch release bearing guide	Alloy bell housing	61 mm, single plate clutch	A082Q4033F	1
25a	Sleeve, plain, clutch release bearing guide	Alloy bell housing	59mm, twin plate clutch	A082Q4053F	1
26	Sleeve, flanged, clutch release bearing guide	Cast iron & later alloy bell housing		A082Q4049K	1
27	Screw, M6 x 10, hex. hd. sleeve fixing			A075W1027Z	2

Function Code 47.03 Transmission Assembly

Dep	Part Description	Remarks	Option	Part Number	Qty
28	Oil seal, drive shaft			**A082F6392F**	2
29	'0' ring, ring nut			**A082F6393F**	2
30	Ring nut, bearing adjusting			**A082F6391 F**	2
31	Screw, locking plate			**A082F6394F**	2
32	Washer			**A082F6378F**	2
33	Locking plate, ring nut			**A082F6396F**	2
34	Bolt, M10 x 45, hex. hd., bell housing to engine			**A075W2053Z**	8
35	Bolt, Ml0 x 55, hex. hd., bell housing to engine			**A079W2057F**	2
36	Washer, flat, MI0			**A075W4024F**	10
37	Bung, clutch housing		Early bell housing	**A082Q4055S**	2
38	Bung, clutch housing		Later bell housig	**A082Q4056K**	1
39	Gasket, gearbox to clutch housing	Not illustrated		**A082F6404F**	1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Function Code 47.05 Gearchange Mechanism - External.

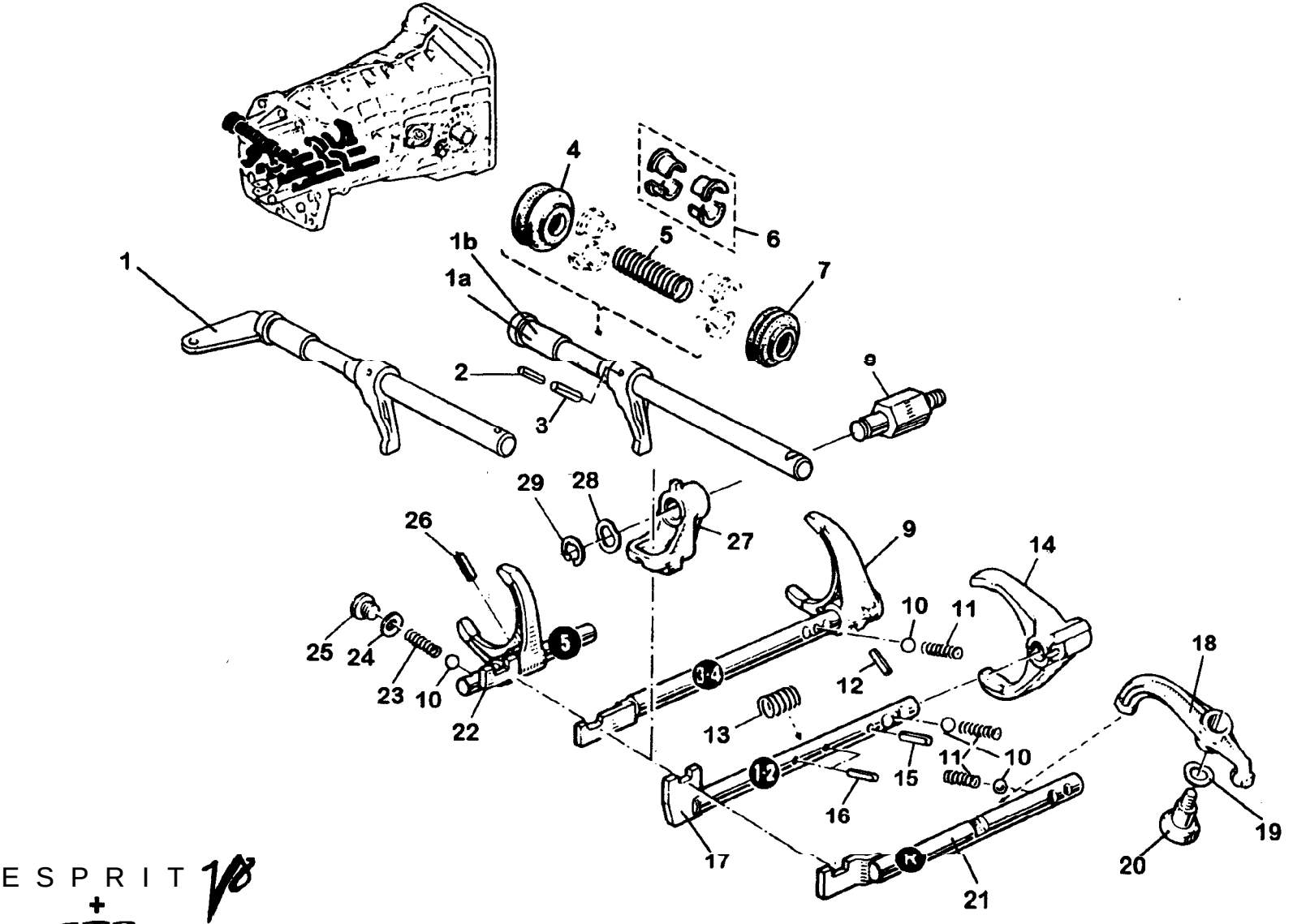
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Assembly Master Unit and Cables		V8	B082F4156F	1
01a	Assembly Master Unit and Cables		GT3	A082F6531 F	1
01 b	Master Unit Assembly		V8 Less cables	A082F4168H	1
01c	Master Unit Assembly		GT3 Less cables	A082F6532S	1
02	Captive stud, master unit to chassis			A082W6506F	4
03	Grommet, master unit to chassis			X036E6150Z	4
04	Washer, flat, M6 x 15, master unit to chassis			A075W4015Z	4
05	Nut, M6 Nyloc, master unit tochassis			A907E6285F	4
06	Plate , gear lever retainer			A082F4115F	1
06a	Bolt, gear lever retaining plate fixing	Not illustrated		A075W1036Z	12
06b	Washer, gear lever retaining plate fixing	Not illustrated		A075W4020Z	12
07	Gear Lever assembly (Inc. gear knob)		v6	A082F6520F	1
07a	Gear Lever assembly (Inc. gear knob)		GT3	A082F6520F	1
06	Gear lever gaiter			B082F4114F	1
09	Ring, gear lever grommet retainer			A082F4116F	1
10	Screw, gear lever retaining ring fixing			A075W5011Z	6
11	Gear lever knob		V8	A075F4063F	1
11a	Gear lever knob, polished aluminium		GT3	A082F4173F	1

Function Code 47.05 Gearchange Mechanism - External.

Dep	Part Description	Remarks	Option	Part Number	Qty
12	Split pin, gear-change cables to lever			A082F6371 F	2
13	Tie wrap, gear change cable to master unit		V8 - GT3	A089W6280F	1
14	Cable Gear Change		V8	B082F4151 H	2
14a	Cable Gear Change		GT3	A082F6551 S	2
15	Gaiter, gearchange cable			A082F6369F	2
16	Rod end, cable to translator			A082F6368F	2
16a	Boot, rod end protection			A082F4149F	4
16b	Locknut, M6, cable to rod end assembly			A082F6372F	2
17	Nut, M6 Nyloc, rod end to translator			A075W3009F	2
18	Translator assembly, gearchange			B082F6530F	1
19	Bolt translator clamp			B082F4144F	1
20	Nut, MI0 Nyloc, translator clamp			A075W3011 Z	1
21	Tie rod, translator to gearbox, M6 / M8	Less rod ends, Tie rod Replaced By No 21a + Ball joint No 26	V8	A082F4169F	1
21a	Tie rod, translator to gearbox, M8 / M8	Less rod ends	V8	B082F4169F	1
21b	Locknut, M8, rod ends to tie rod			A075W3026Z	2
22	Tie rod assembly		GT3	A082F6196H	1
22a	**Nut, M6,** Nyloc, tie rod ends		GT3	A075W3009Z	2
22b	Rod end, tie rod		GT3	A082F6368F	2
22c	Tie Rod		GT3	A082F6503F	1
22d	Locknut, M6, tie rod		GT3	A082F6372F	2

Function Code 47.05 Gearchange Mechanism - External.

Dep	Part Description	Remarks	Option	Part Number	Qty
23	Tie rod ball joint, M8 x M8, tie rod to gearbox		**V8**	**A082F6560F**	1
24	Boot, tie rod ball joint, M8		**V8**	**A082F4166F**	1
25	Boot, tie rod ball joint, M6		**V8**	**A082F4149F**	1
26	Tie rod ball joint, M8 x M6, tie rod to translator		V8	**A082F6561 F**	1
27	Bracket, cable support clips to clutch slave cylinder		GT3	**B082F4145F**	1
27a	Washer, flat, cable support bracket			**A075W4020Z**	2
27b	Nut, M8 Nyloc, bracket to clutch hsg			**A075W301 OZ**	1
27b	Bolt, cable support bracket to clutch slave cylinder, long	Not illustrated	GT3	**A07 5W1043Z,**	1
28	Bracket, cable support clips to clutch hsg/g/box		V8	**A082F6556F**	1
29	Clip, gear cable support			**A0910E6592F**	2
30	Bracket, gear change cable support, upper		V8	**A082F416OF**	1
31	Bracket, gear change cable support, lower		V8	**A082F4159F**	1
32	Cable retainer			**A082F4143F**	1



ESPRIT V8 + GTS

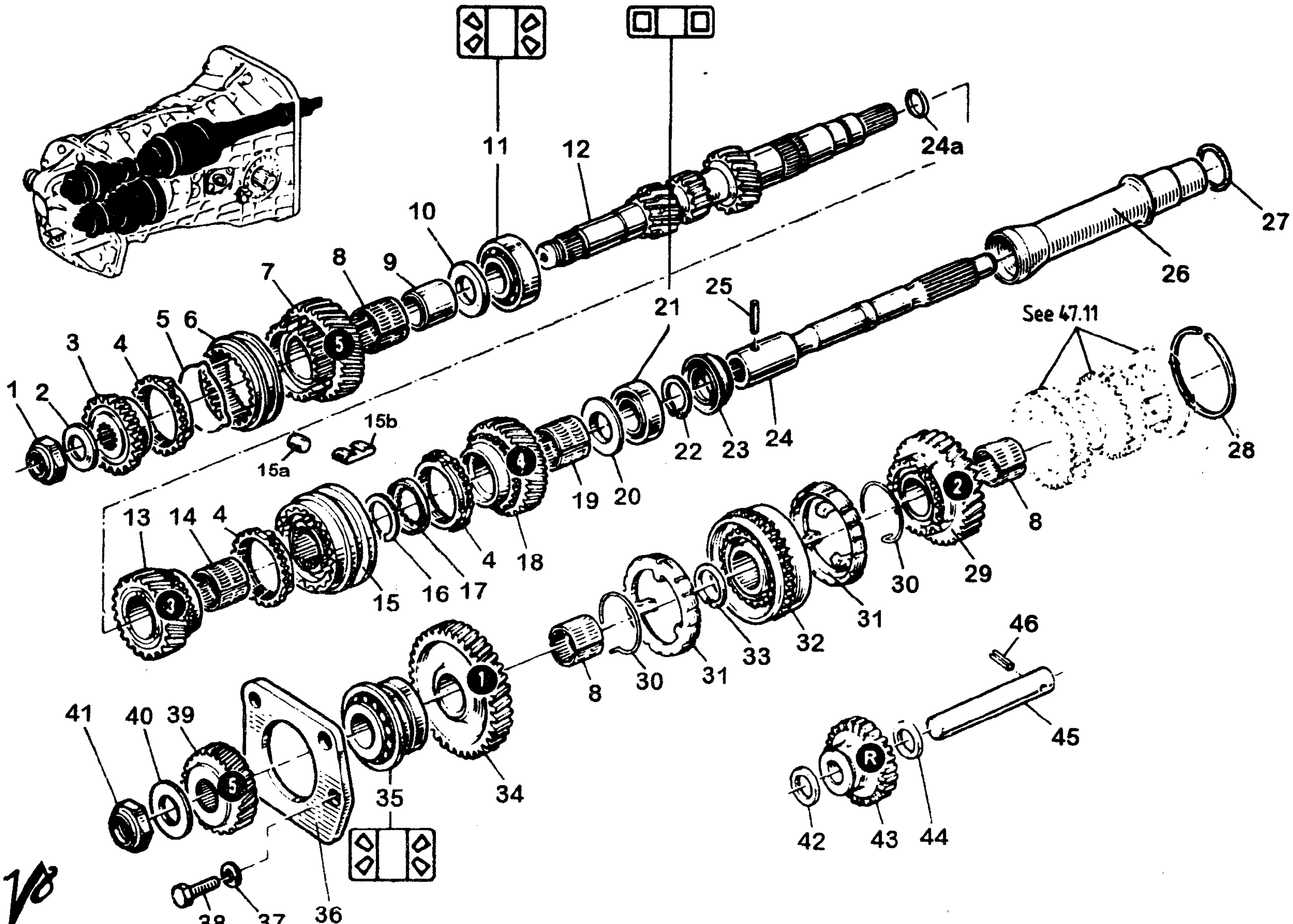
47.06

Function Code 47.06 Gear Selector Mechanism - Internal.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Cross shaft	Type UN1 026	GT3	A082F6547S	1
01a	Cross shaft	Type UN1 027	V8, Pre '98 M.Y.	A082F6575S	1
01b	Cross shaft	Type UN1 027	V8 + V8-GT, '98 M.Y.	A082F6576S	1
01c	Rear cover & cross shaft assembly	Type UN1 027, Not illustrated	V8, Pre '98 M.Y.	A082F6570S	1
02	Roll pin, 4 mm, selector finger to cross shaft			A082F6420F	1
03	Roll pin, 7 mm, selector finger to cross shaft			A082F6419F	1
04	Bellows seal, cross shaft, LH			A082F6423F	1
05	Spring, cross shaft positioning			A082F6424F	1
06	Collet set, cross shaft spring			A082F6425F	1
07	Bellows seal, cross shaft, RH			A082F6548S	1
08	Pivot shaft, interlock guide			A082F6431 F	1
09	Selector shaft & fork assembly, 3rd / 4th gear			A082F6413F	1
10	Ball, detent, selector shafts			A082F6407F	4
11	Spring, detent, 1st /2nd , 3rd /4th , reverse			A082F6406F	3
12	Roll pin, 6mm, 3rd /4th fork to shaft			A082F6418F	1
13	Spring, 2nd synchro assist			B082F6409F	1
14	Selector fork, 1st/ 2nd			B082F6412F	1
15	Roll pin, 6mm, 2nd selector fork			A082F6418F	1

Function Code 47.06 Gear Selector Mechanism - Internal.

Dep	Part Description	Remarks	Option	Part Number	Qty
16	Roll pin, 6mm, 2nd synchro assist spring			A082F6418F	1
17	Selector shaft, 1st / 2nd gears			B082F6408F	1
16	Lever, reverse shaft to gear			A082F6427F.	1
19	Wavy washer, reverse lever pivot			A082F6428F	1
20	Pivot bolt, reverse lever			A082F6424F	1
21	Selector shaft, reverse			B082F6405F	1
22	Selector shaft & fork assembly, 5th gear			A082F6414F	1
23	Spring detent, 5th gear			A082F6554F	1
24	Washer, detent plug			A082F641 5F	1
25	Plug, 5th detent spring retaining			A082F6416F	1
26	Roll pin, 5th fork to shaft			A082F6417F	1
27	Interlock guide, selector shafts			A082F6430F	1
28	Wavy washer, interlock guide pivot			A082F6432F	1
29	Circlip, interlock guide to pivot shaft			A082F6433F	1



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See 47.11

Function Code 47.07 Gears, Shafts & Bearings.

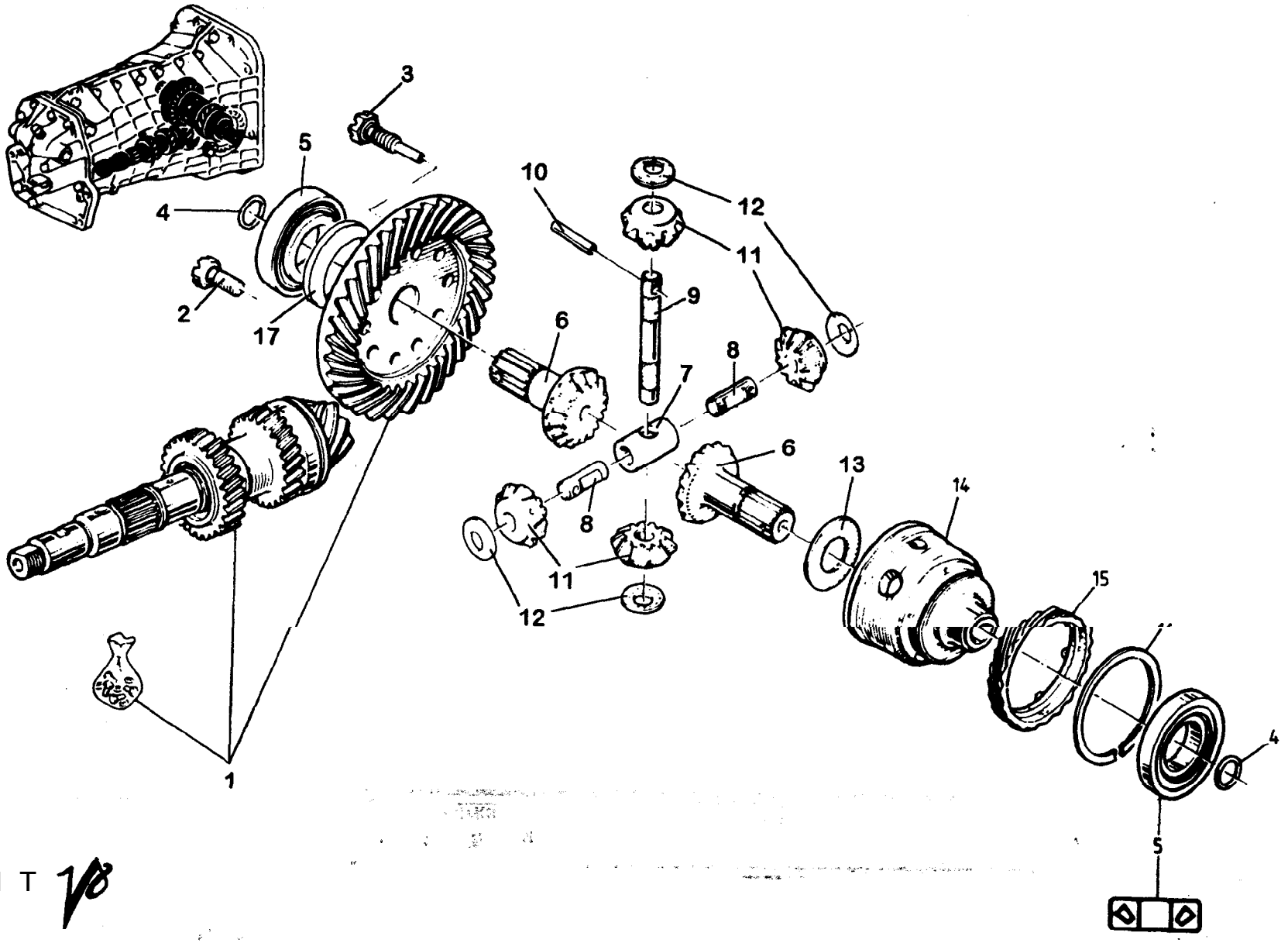
Dep	Part Description	Remarks	Option	Part Number	Qty
01	Nut, 5th synchro hub to primary shaft			A082F6462F	1
02	Washer, 5th synchro hub to primary shaft			A082F6461 F	1
03	Synchroniser hub, 5th gear			A082F646OF	1
04	Synchro ring, 3rd, 4th & 5th			A082F6440F	3
05	Spring clip, 5th synchro sleeve			A082B6459F	1
06	Sliding gear sleeve, 5th synchroniser			B082F6458F	1
07	5th Gear (Drive)	Type UN1 - 027, 41 teeth	V8 + V8-GT	A082F6566F	1
07a	5th Gear (Drive)	Type UN1 - 026, 39 teeth	GT3	A082F6457F	1
06	Needle race (pair) lst, 2nd & 5th gear			A082F6456F	3
09	Sleeve, 5th drive gear bearing			A082F6455F	1
10	Thrust washer, 5th drive gear			A082F6454F	1
11	Bearing , double taper, primary shaft rear			A082F6546S	1
12	Primary shaft	Type UN1 - 026	GT3	A082F6545S	1
12a	Primary Shaft	Type UN1 - 027	V6 + V8-GT	A082F6565S	1
13	Drive gear, 3rd, primary shaft	21 teeth	All	A082F6439F	1
14	Needle race (pair), 3rd gear			A082F6438F	1
15	Synchromesh assembly, 3rd / 4th gear			A082F6441 F	1
15a	Roller, 3rd / 4th gear synchroniser sleeve			A082F6443F	3

Function Code 47.07 Gears, Shafts & Bearings.

Dep	Part Description	Remarks	Option	Part Number	Qty
15b	Spring, 3rd / 4th gear synchroniser roller			A082F6442F	3
16	Circlip, 3rd / 4th synchro hub retaining			B082F6444F	1
17	Splined cup washer, circlip retaining			A082F6445F	1
18	Drive gear, 4th, primary shaft	27 teeth	All	A082F6447F	1
19	Needle race (pair), 4th gear			A082F6446F	1
20	Thrust washer, 4th drive gear			A082F6448F	1
21	Roller bearing, primary shaft front			A082F6449F	1
22	Circlip, roller bearing retention			B082F6450F	1
23	Lip seal, primary shaft front			A082F6451 F	1
24	Clutch shaft			B082F6452F	1
24a	'0' Ring, clutch shaft to primary shaft	Not illustrated		A082F6549S	1
25	Spring pin, clutch shaft to primary shaft			A082F6453F	1
26	Guide tube, clutch relaese bearing			A082F6482F	1
27	'0' Ring, guide tube sealing			A082F6483F	1
28	Split ring, sec., shaft front brg location			A082F6463F	1
29	Driven gear, 2nd, secondary shaft	35 teeth	All	A082F6464F	1
30	Spring ring, 1st / 2nd synchroniser			A082F6465F	2
31	Synchro ring, 1st / 2nd gear			A082F6466F	2
32	Synchroniser assembly, 1st / 2nd			A082F6467F	1
33	Circlip, 1st / 2nd synchroniser retaining			A082F6468F	1
34	Driven gear , 1st / 2nd, secondary shaft	37 teeth	All	A082F6469F	1

Function Code 47.07 Gears, Shafts & Bearings.

Dep	Part Description	Remarks	Option	Part Number	Qty
35	Bearing, dual taper roller, sec. shaft rear			**A082F6470F**	1
36	Retaining plate, sec. shaft rear bearing	Type UN1 - 027	V8 + V8-GT	A082F6567S	1
36a	Retaining plate, sec. shaft rear bearing	Type UN1 - 026	GT3	**B082F6471F**	1
37	Washer, retaining plate fixing bolt			**A082F6473F**	3
38	Bolt, retaining plate fixing			**A082F6472F**	3
39	Driven gear ,5th, secondary shaft	Type UN1 - 027, 31 teeth	V8 + V8-GT	**A089F6568S**	1
39a	Driven gear ,5th, secondary shaft	Type UN1 - 026 32 teeth	GT3	**A082F6474F**	1
40	Washer, sec. shaft nut to 5th gear			**A082F6475F**	1
41	Nut, secondary shaft securing			**A082F6476F**	1
42	Friction washer, 3mm, reverse gear, rear			**A082F7479F**	1
43	Reverse Gear (Synchronized)	Type UN1 - 027, 25 teeth	V8 + V8-GT	**A082F6569S**	**1**
43a	Reverse Gear	Type UN1 - 026, 25 teeth	GT3	**A082F6480F**	1
44	Friction washer, 5mm, reverse gear, front			**A082F6481 F**	1
45	Shaft, reverse idler gear			**A082F6478F**	1
46	Spring pin, reverse shaft retaining			**A082F6477F**	**1**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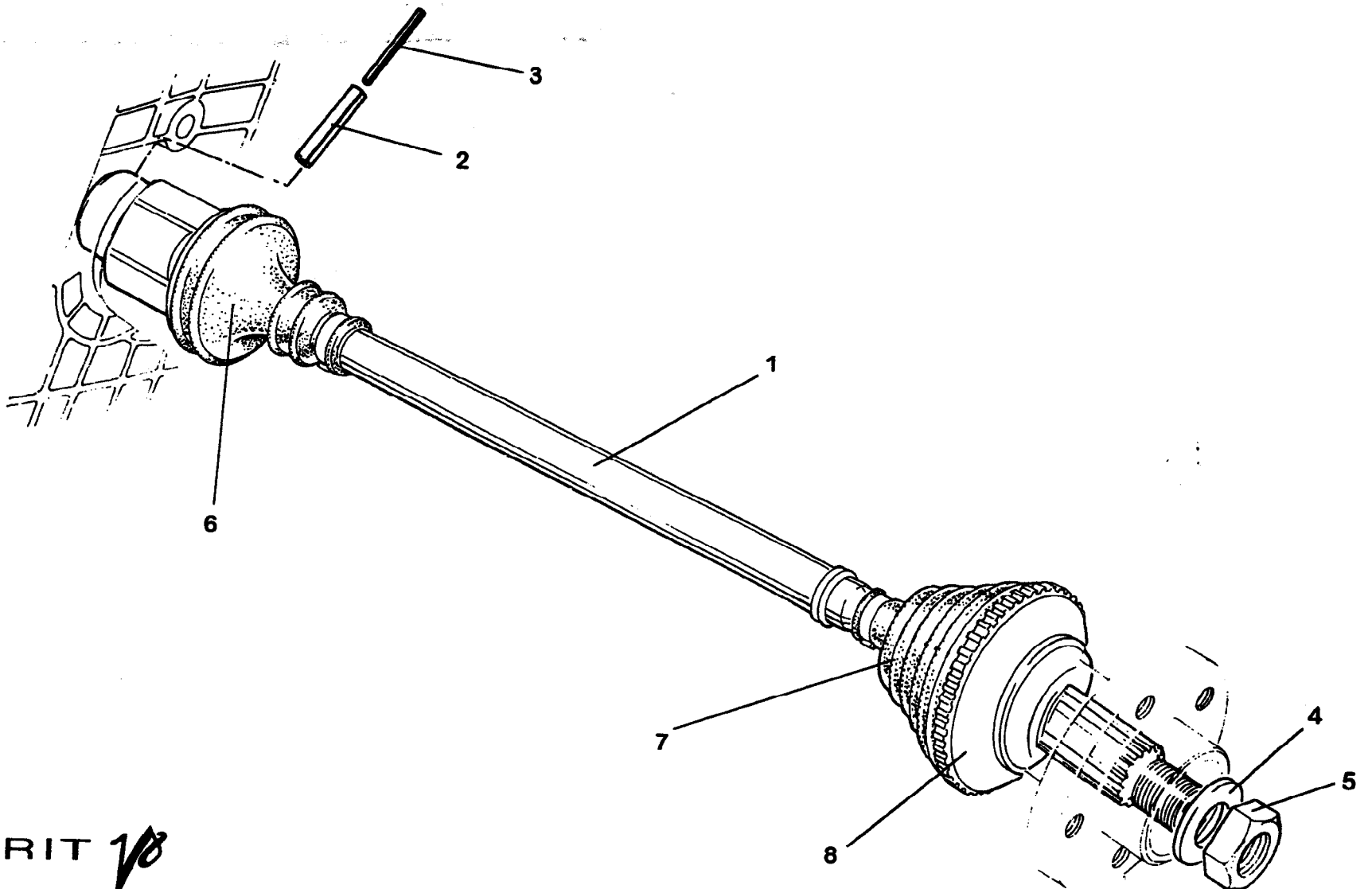
Function Code 47.11 Crownwheel & Pinion, & Brgs, Differential.

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Crownwheel & pinion (Inc bolts)			A082F6484F	1
02	Bolt, crownwheel to differential carrier			A082F6492F	8
03	Spigot bolt			A082F6495F	2
04	'O' ring, sungear shaft **seal**			A082F6494F	2
05	Bearing, taper roller, differential carrier			A082F6493F	2
06	Sun gear / output shaft			A082F6487F	2
07	Hub, planet gear half shafts			A082F6498F	1
08	Half shaft, planet gear			A082F6499F	2
09	Shaft, planet gear			A082F6490F	1
10	Roll pin, planet gear shaft retaining			A082F6491 F	1
11	Planet gear, differential			A082F6489F	4
12	Thrust washer, planet gear			A082F6488F	4
13	Thrust washer, sun gear			A082F6486F	1
14	Differential carrier			A082F6485F	1
15	Speedo drive gear	26 teeth		A082F6496F	1
16	Split ring, speedo drive retaining			A082F6497F	1
17	Shim washer, 1.2, backlash adjust, selective			A082F6524F	As req
17a	Shim washer, 1.3, backlash adjust, selective			A082F6525F	As req

Function Code 47.11 Crownwheel & Pinion, & Brgs, Differential.

Dep	Part	Description	Remarks	Option	Part Number	Qty
17b		Shim washer, 1.4, backlash adjust, selective			A082F6526F	As req
17c		Shim washer, 1.5, backlash adjust, selective			A082F6527F	As req
17d		Shim washer, 1.6, backlash adjust, selective			A082F6528F	As req
17e		Shim washer, 1.7, backlash adjust, selective			A082F6529F	As req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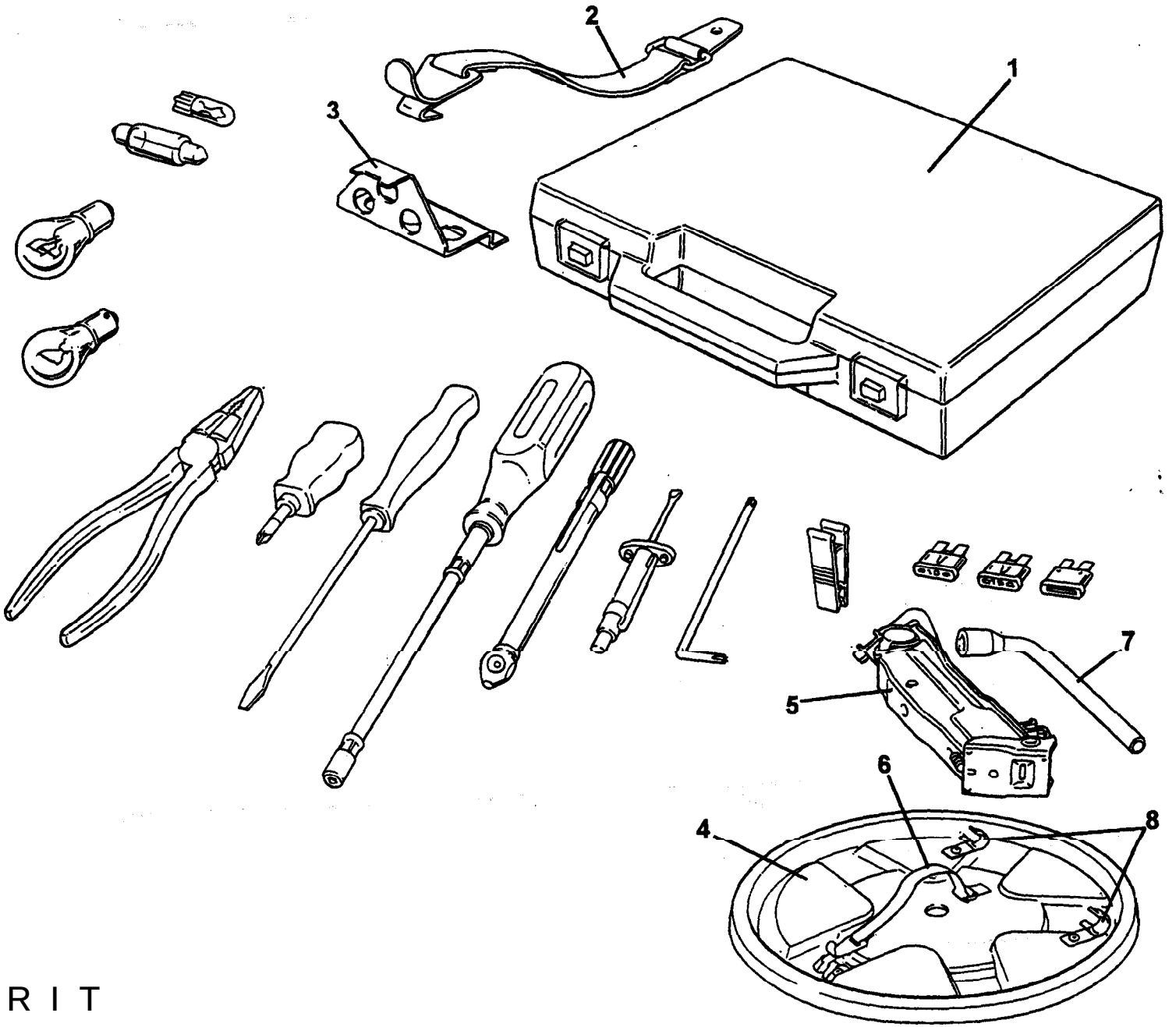
Function Code 47.15 Driveshafts & Seals

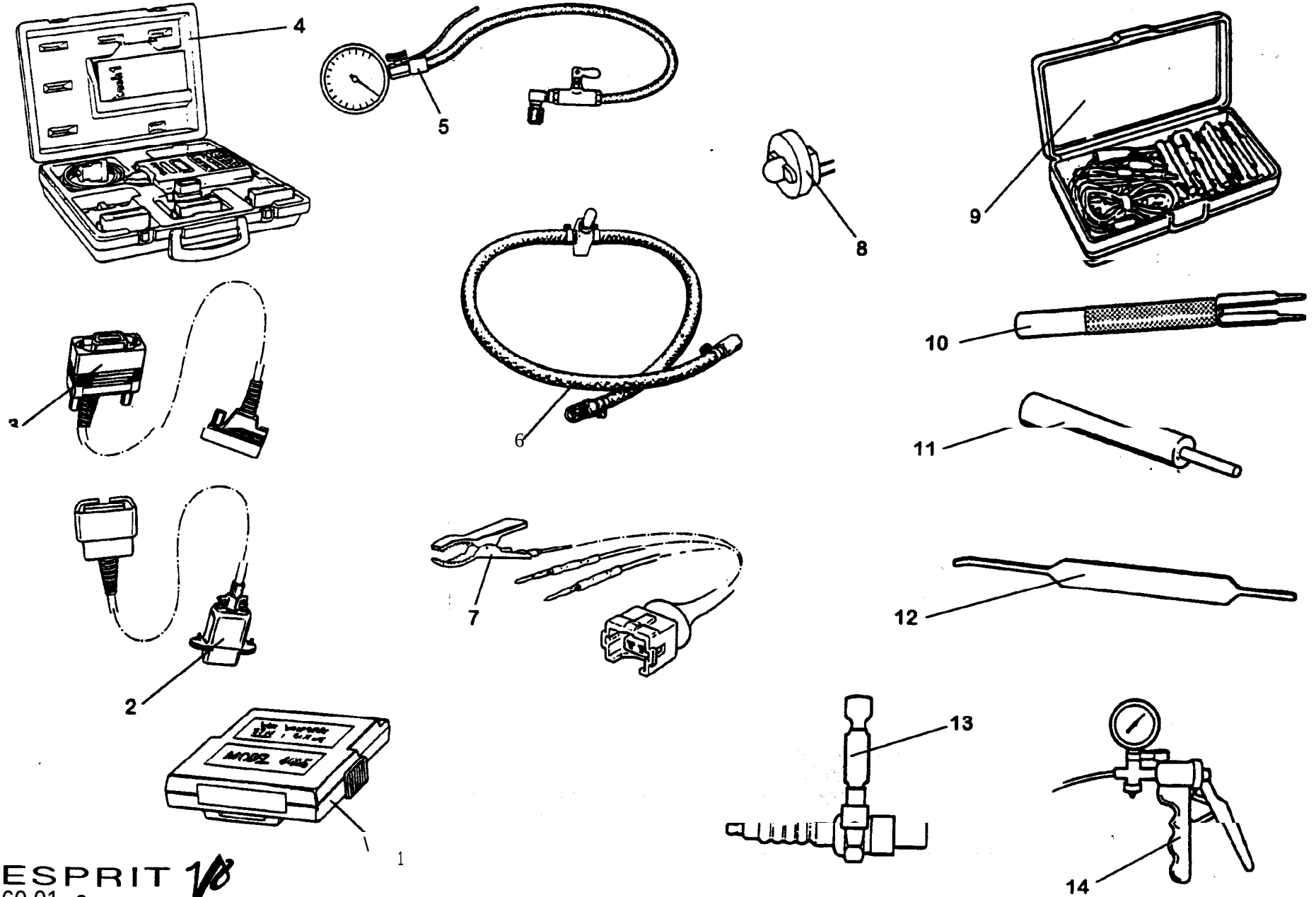
Dep	Part	Description	Remarks	Option	Part Number	Qty
01		Driveshaft			**A082D6037F**	2
02		Roll pin, outer, driveshaft securing			**A082D6024F**	2
03		Roll pin, inner, driveshaft securing			**A082D6023F**	2
04		Washer, hub /driveshaft retention	Also see section No 31.03		**A082D6025F**	2
05		Nut, hub/driveshaft retention	Also see section No 31.03		**A082D6026F**	2
06		Boot kit, inboard joint	Contains boot,locking clips & grease		**A082D6028F**	2
07		Boot kit, outboard joint	Contains boot,locking clips & grease		**A082D6029F**	2
08		Tooth ring, speed sensor	Included with D/shaft		**A082D6034H**	2



E S P R I T
60.01

Function Code 60.01 Tool Kit 8 Stowage

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Toolkit			A082T4016F	1
02	Strap, toolkit securing			A089U141 2F	1
03	Bracket, toolkit securing			A082T4017F	1
04	Spare Wheel Cover/Jack & Wheel Brace Stowage			A082T4015K	1
05	Lifting Jack	Includes handle		A082T6019F	1
06	Lifting Jack Securing Strap			A089U1412F	1
07	Wheel Brace, 19mm socket			C082T6016F	1
08	Clip, wheel brace retention			A082W6572F	2



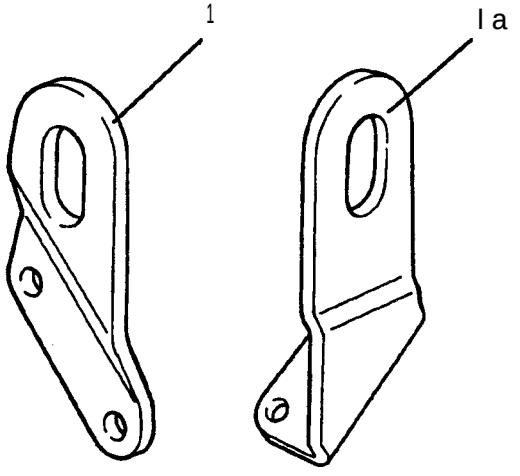
ESPRIT 1.8
60.01 a

Function Code 60.01a Diagnostic equipment, e.g. Tech 1 cartridge

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Calibration Cartridge, 'Tech 1' scanner	"Lotus Esprit 1992 ECU"	* Eng Mgmt & Kelsey Hayes ABS 415 Pre '98 M.Y.	**TOOOT1307F**	1
01a	Calibration Cartridge, 'Tech 1' scanner		Kelsey Hayes ABS 430, '98 M.Y.	**T000T1403S**	1
01 b	Calibration Cartridge, 'Tech 1' scanner	Driver / Passenger SIR system (version 1 .O)	Dual SIR (4 & 8 cyl)	**T000T1 237F**	1
01c	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (English)	Pre '98 M.Y.	**A082M6557S**	1
01d	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (German)	Pre '98 M.Y.	**A082M6562S**	1
01 e	Cali bration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Italian)	Pre '98 M.Y.	**A082M6563S**	**1**
01f	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (French)	Pre '98 M.Y.	**A082M6564S**	1
01g	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Norway)	Pre '98 M.Y.	**A082M6565S**	1
01 h	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Dutch)	Pre '98 M.Y.	**A082M6566S**	1
01i	Calibration Cartridge, 'Tech 1' scanner	**Megamoss** Alarm (Spanish)	Pre '98 M.Y.	**A082M6567S**	**1**
01 k	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Swedish)	Pre '98 M.Y.	**A082M6568S**	1
011	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Danish)	Pre '98 M.Y.	**A082M6569S**	1
01m	Calibration Cartridge, 'Tech 1' scanner	Megamoss Alarm (Portuguese)	Pre '98 M.Y.	**A082M6570S**	**1**
02	Adaptor Cable, connector lead to DLC	Connects Tech 1 connector lead to DLC	Incl in 'Tech 1' Kit TOOOT0898/2	**T000Tl306F**	1
03	Connector lead, 'Tech 1' scanner	Connects Tech 1 connector lead to adaptor cable T000Tl306F	Incl in 'Tech 1' Kit T000T0896/2	**T000T1312F**	1

Function Code 60.01a Diagnostic equipment, e.g. Tech 1 cartridge

Dep	Part Description	Remarks	Option	Part Number	Qty
04	'Tech I' Diagnostic scanner kit	Displays stored troubie codes & sensor readings	Inc's scanner ,lead,test adaptor, op's man & case	T000T0896/2	1
05	Fuel Pressure Gauge	For diagnosing fuel system probs		T000T1386F	1
06	Fuel pressure hose	Fits between fuel filter & feedpipe to restrict fuel flow to test pump		T000TI 3 5 9 F	1
07	Injector Test lamp adaptor	Used to connect injector test lamp to battery & injector harness		T000T0930J	1
06	Injector test light	Used to check electrical circuit to an injector		T000T0900F	1
09	Connector Test adaptor kit	Used to make electrical test connections in weather,metri & micro pack connector blocks		T000T0902F	1
10	Metri-pack terminal remover	Used to remove terminals from connector blocks		T000T0903F	1
11	Weather-pack terminal remover	Used to remove terminals from connector blocks		T000T0904F	1
12	ECM Connector terminal remover	Used to remove terminals from ECM connector		T000T0905F	1
13	Spark tester	Used to check available secondary ignition voltage		TOOOT0901 F	1
14	Vacuum Pump	Used to operate & diagnose faults in vacuum operated components		T000T0907F	1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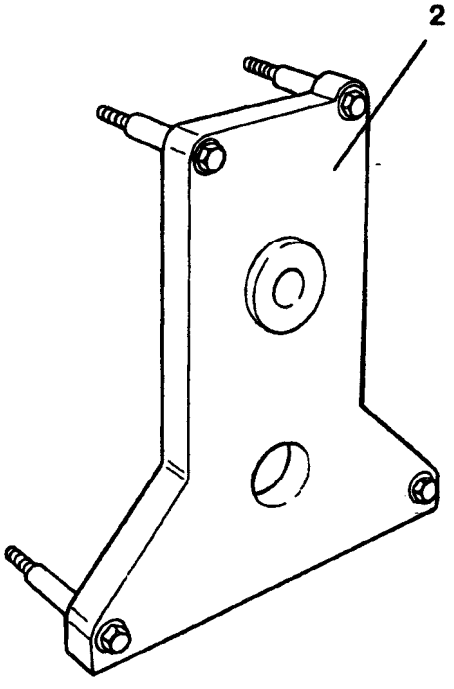
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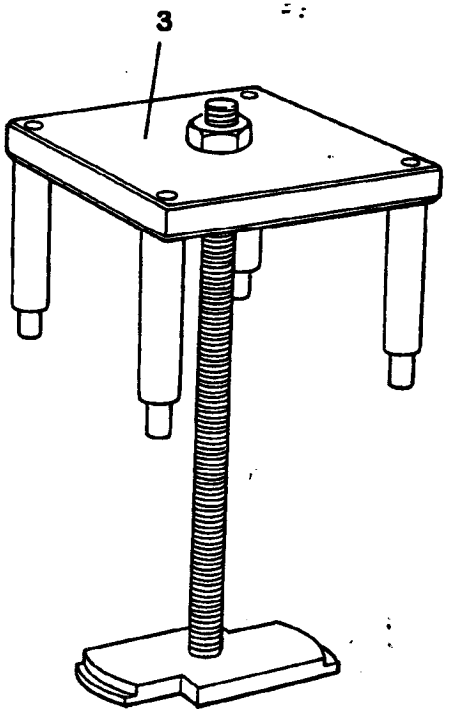
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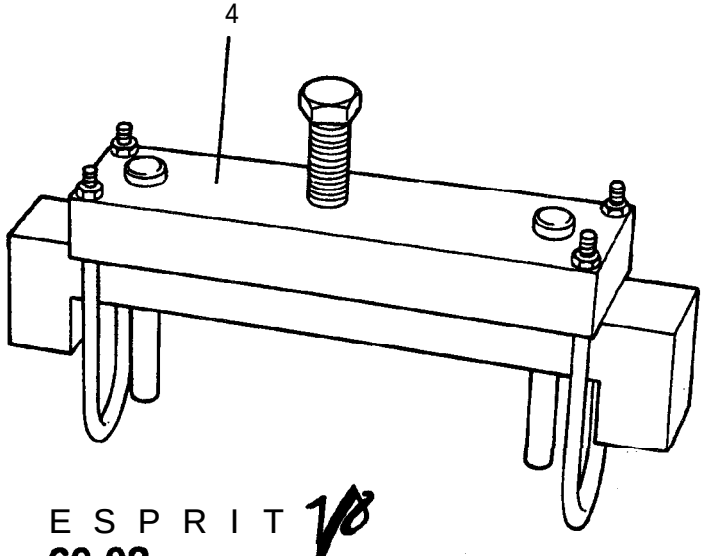
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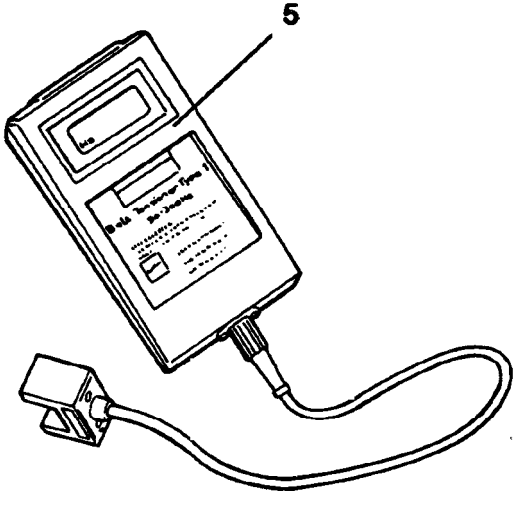
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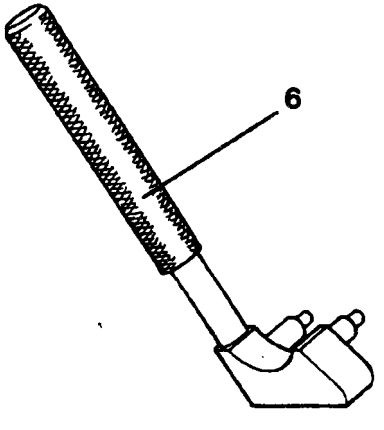
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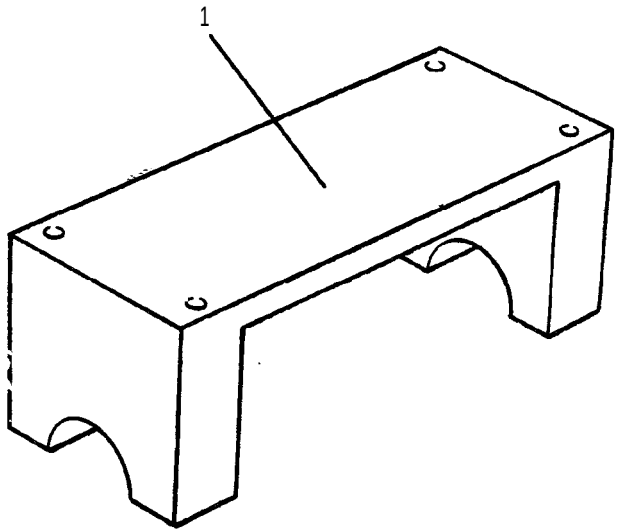
Function Code 60.02 Engine Tools I Special equipment

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Engine lifting bracket, rear			TOOOTI 343T	1
Ola	Engine lifting bracket, front			T000Tl342T	1
02	Locating plate, intermediate shaft			TOOOT1248 F	1
03	Cylinder liner extractor (Kit)			T000Tl357F	1
04	Main bearing cap puller			T000Tl369F	1
05	Clavis gauge, belt tensioning			T000Tl398F	1
06	Peg drive adaptor, tensioner hub			TOOOTI 380F	1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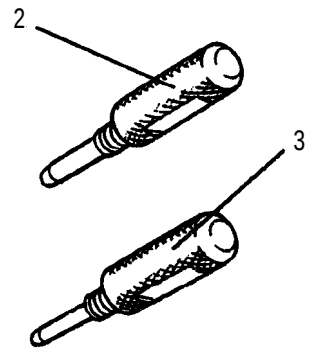
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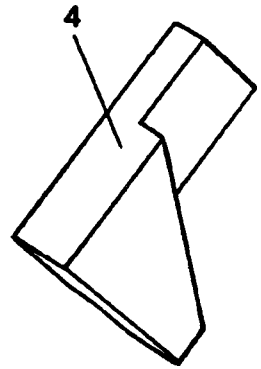
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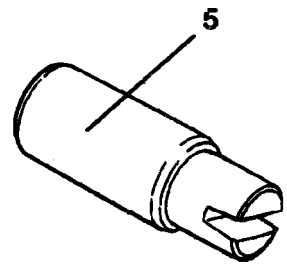
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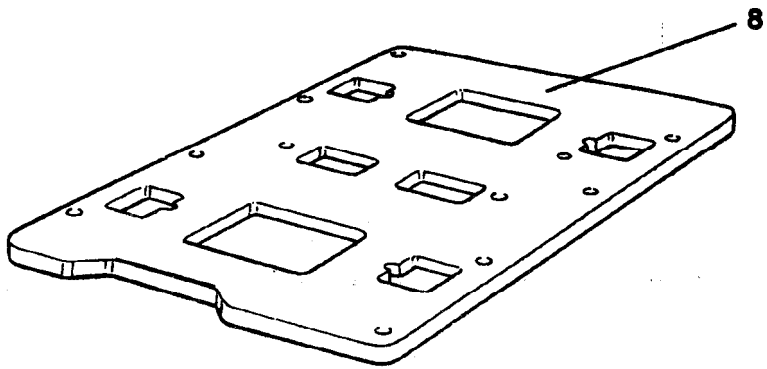
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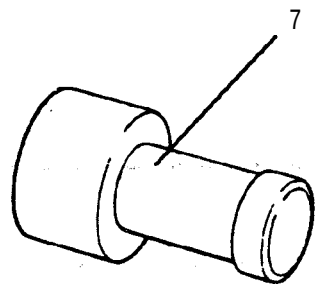
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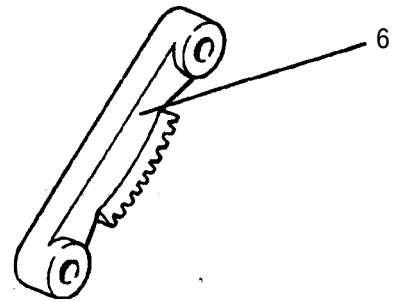
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Function Code 60.02a Engine Tools / Special equipment Cont'd

Dep	Part Description	Remarks	Option	Part Number	Qty
01	Locking cap, camshaft			T000T1336F	1
02	Location pin, camshaft timing			T000T1327F	1
03	Tolerance pin, camshaft timing			T000T1345F	1
04	Alignment tool, camshaft timing disc			T000T1338F	1
05	Crankshaft pin, camshaft timing			T000T1339F	1
08	Flywheel locking tool (transmission removed)			T000T1249F	1
06a	Flywheel locking tool (transmission fitted)	Not illustrated		T000T1358F	1
07	Alignment dolly, front cover			T000T1362F	1
08	Injector housing alignment plate			T000T1272F	1