Lotus

esprit

All Models

Workshop Manual

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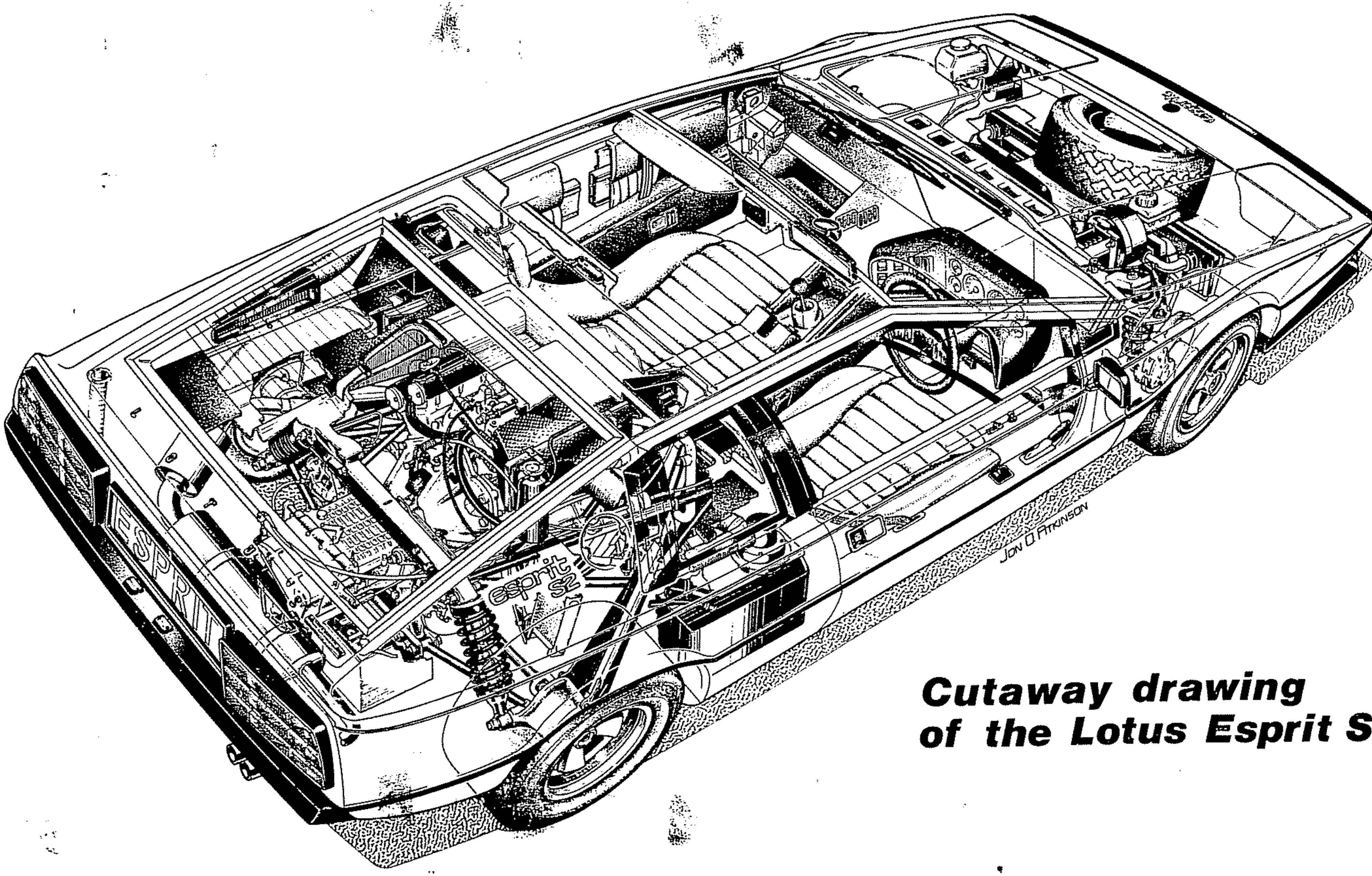


Cutaway drawing of the Lotus Esprit S2

GENERAL

This Workshop Manual is produced primarily for Lotus Dealers to give repair and maintenance information on the Lotus Esprit car. It is divided into sections giving comprehensive information in some sections on the main sub-assemblies and in others cover. only the features which will require maintenance. If special tools are required these will be shown at the end of the relevant section. Service Bulletins and Parts Bulletins will be ussued when necessary to update the manual.

MANUAL FORMAT

The manual is divided into sections which are identified by letters. These letters are also used in the 'Service Parts List' and the 'Labour Schedule', where the part numbers (e.g. A907E or A079F) carry the identifying letters for the ENGINE, letter 'E' and TRANSMISSION, letter 'F'. The sections in this manual are as follows:

INTRODUCTION
TECHNICAL DATA
A - CHASSIS
B - BODY
C - FRONT SUSPENSION
D - REAR SUSPENSION
E - ENGINE
F - TRANSMISSION
G - HUBS, WHEELS, TYRES
H - STEERING
J - BRAKING SYSTEM
K - COOLING SYSTEM
L - FUEL SYSTEM
M - ELECTRICAL EQUIPMENT
O - LUBRICATION/MAINTENANCE
P - HEATING/VENTILATION
Q - CLUTCH
S - EXHAUST SYSTEM

VEHICLE IDENTIFICATION

All cars are identified by a Chassis (Car) Number, and this number will be found on the Identification Plate which is located in the front compartment on the rear bulk-head. The engine number is duplicated on the right-hand rear of the cylinder block, above the starter motor. In all communication with the Factory, the Chassis Number MUST BE QUOTED IN FULL.

An example of the Chassis (Car) Number is given below, together with the full identification breakdown.

76 05 100 G	Chassis (Car) Number
76 05	Denotes year and month of manufacture (1976, May)
100	Denotes the number
G	Denotes the Territory the car is destined for

G = Deomestic and Eurpean
H = North America
J = Rest of World

CONTENTS

DIMENSIONS

Wheelbase	244 cm	(96 ins)
Track - Front	151.13 cm	(59.50 ins)
- Rear	151.13 cm	(59.50 ins)
Overall Length (European Spec.)	419 cm	(165 ins)
Overall Length (North American Spec.)	426 cm	(167.71 ins)
Overall Width	186 cm	(73.25 ins)
Overall Height	111 cm	(43.75 ins)
Ground Clearance	15.24 cm	(6 ins)
Turning Circle (Between Kerbs)	11.58 m	(38 ft)
Kerb Weight (European Spec.)	913 kg	(2012.82 lbs)
Kerb Weight (North American Spec.)	1052.35 kg	(2320 lbs)

CAPACITIES

Engine (Inc. Filter) - Dry	5.95 litres	(10.5 imp pts., 12.6 US pts)
- Refill	4.83 litres	(8.5 imp pts., 10.2 US pts)
Difference between high and low dipstick marks:	0.85 litres	(1.5 imp pts., 1.8 US pts)
Transmission	2.25 litres	(4 imp pts., 4.8 US pts)
Cooling System	10.8 litres	(19 imp pts., 22.8 US pts)
Fuel Tank	67 litres	(14.75 imp gal, 17.7 US gal)

ENGINE

GENERAL

Engine Type	907, Twin overhead camshafts
Number of cylinders	4
Firing order	1-3-4-2
Capacity	1973 cc. (120.4 cu ins)
Stroke	69.2 mm (2.72 ins)
Bore (nominal)	95.2 mm (3.75 ins)
Compression-ratio - European Spec.	9.5:1
- North American Spec.	8.4:1
Compression - Pressure (At sea level)	
- European Spec.	11.65/12.65 kg cm sq (160/180 lbs in sq.)
- North American Spec.	10.55/11.95 kg cm sq (150/170 lbs in sq.)
Engine number location	on top rear of cylinder block adjacent to starter mounting

BELT TENSIONS

Toothed timing belt (133 teeth)

With both types of belt tensioners set the belt tension to an average reading of 90 - 95 units cold (120 - 125 units hot). Check toothed belt tension between auxiliary and inlet camshaft pulley, with Burroughs Gauge Type BT-33-86A 5-20.

IMPORTANT: Check the belt tension with number 1 or 4 cylinder at TDC after rotating engine at least one full turn clockwise (normal running direction). Repeat this operation twice to obtain specified average reading.

V-belt compressor	-	9 mm (0.35 ins) Deflection
Other V-belts	-	12 mm (0.50 ins) Deflection

CYLINDER HEAD

Material	Aluminium alloy
Gasket	Steel asbestos DV
Head depth	82.04 ± .254 mm (3.23 ± .01 ins)
Combustion chamber depth	12.192/12.573 mm (0.480/0.495 ins)
Max. permissible metal removal (To correct warping)	Nil

Valve Timing	European Spec.	North American Spec.
Inlet opens	30° B.T.D.C.	26° B.T.D.C.
Inlet closes	50° A.B.D.C.	66° A.B.D.C.
Exhaust opens	50° B.B.D.C.	66° B.B.D.C.
Exhaust closes	30° A.T.D.C.	26° A.T.D.C.

Valve M.O.P. (Maximum opening point)

European Spec.	Inlet 102.5° A.T.D.C. Exhaust 102.5° B.T.D.C.
North American Spec.	Inlet 100° A.T.D.C. Exhaust 110° B.T.D.C.
Angle of valve seats	45°

VALVES

Head diameter - inlet	35.56 mm (1.40 ins)
- exhaust	30.86 mm (1.215 ins)
Stem diameter - inlet/exhaust	7.137 mm (0.281 ins)
Stem clearance in guide - inlet	0.0076/0.0457 mm (0.0003/0.0018 ins)
- exhaust	0.0076/0.0584 mm (0.0003/0.0023 ins)
Valve clearance (cold) - inlet	0.127/0.178 mm, 0.005-0.007 ins
- exhaust	0.254/0.305 mm, 0.010-0.012 ins

Valve Seat Inserts

Bore in head:

Standard	- Inlet	37.2364/37.2618 mm (1.466/1.467 ins)
	- Exhaust	34.29/34.3154 mm (1.350/1.351 ins)
+0.0254 mm (0.001 in)	- Inlet	37.2618/37.2872 mm (1.467/1.468 ins)
	- Exhaust	34.3154/34.3408 mm (1.351/1.352 ins)
+0.0508 mm (0.002 in)	- Inlet	37.2872/37.3126 mm (1.468/1.469 ins)
	- Exhaust	34.3408/34.3662 mm (1.352/1.353 ins)
+0. 127 mm (0.005 in)	- Inlet	37.3634/37.3888 mm (1.471/1.472 ins)
	- Exhaust	34.417/34.4424 mm (1.355/1.356 ins)

Outside diameter of seats

Standard	- Inlet	37.2813/37.3507 mm (1.4695/1.4705 ins)
	- Exhaust	34.3789/34.4043 mm (1.3535/1.3545 ins)
+0.0254 mm (0.001 ins)	- Inlet	37.3507/37.3761 mm (l.4705/1.4715 ins)
	- Exhaust	34.4043/34.4297 mm (l.1345/1.3555 ins)
+0.0508 mm (0.002 in)	- Inlet	37.3761/37.4015 mm (1.4715/1.4725 ins)
	- Exhaust	34.4297/34.4551 mm (1.3555/1.3565 ins)
+0. 127 mm (0.005 in)	- Inlet	37.4523/37.4777 mm (1.4745/1.4755 ins)
	- Exhaust	34.5059/34.5313 mm (1.3585/1.3595 ins)

Valve Springs

Type		Dual
Free length	- Inner	37.465 mm (1.475 in)
	- Outer	46.863 mm (1.845 in)

Rate - Inner (Compressed by 12 mm; 5 in = 13.6 kg; 30 lbs)
- Outer (Compressed by 12 mm; 5 in = 28.57 kg; 63 lbs)

Valve Guides

Length	- Inlet	53.34 mm (2.100 in)
	- Exhaust	53.34 mm (2.100 in)
Internal diameter (to ream after fitting)		7.1450/7.1704 mm (0.2813/0.2823 in)

Valve Guides (cont.)

Bore in head	Inlet & Exhaust
Standard	11.9126/11.9253 mm (.4690/.4695 in)
+.0254 mm (.001 in)	11.938/11.9507 mm (.4700/.4705 in)
+.0508 mm (.002 in)	11.9634/11.9761 mm (.4710/.4715 in)
+.127 mm (.005 in)	12.0396/12.0523 mm (.4740/.4745 in)
Outside diameter of guide	
Standard	11.938/11.9507 mm (.4700/.4705 in)
+.0254 mm (.001 in)	11.9634/11.9761 mm (.4710/.4715 in)
+.0508 mm (.002 in)	11.9888/12.0015 mm (.4720/.4725 in)
+.127 mm (.005 in)	12.065/12.0777 mm (.4750/.4755 in)

CAMSHAFTS

End float	- Dimension	.0254/.2032 mm	(.001/.008 in)
	- Controlled by	Selective thrust washers	
Running clearance		.0254/.0635 mm	(.001/.0025 in)

CAM FOLLOWERS

Bore in camshaft housings	34.925/34.9402 mm	(1.3750/1.3756 in)
Outside diameter	34.904/34.912 mm	(1.3742/1.3745 in)

AUXILIARY SHAFT

Running Clearance	.025/.065 mm	(.0009/.0025 in)
End float	.0127/.0381 mm	(.0005/.0015 in)

CRANKSHAFT

Balance (inc. flywheel & clutch)		Within 14.42 gr. cm.	(.2 oz in)
Diameter	- Main journal (No. 1 to 4 inc.)	63.487/63.513 mm	(2.4995/2.5005 in)
	- Main journal (No.5 only)	63.500/63.513 mm	(2.500/2.5005 in)
	- Crankpin	50.736/50.762 mm	(1.995/1.9985 in)
End float	- Dimension	.076/.203 mm	(.003/.008 in)

CRANKSHAFT (cont.)

End flwt - Controlled by	Selective thrust washers on rear main bearing
Bearings (main) - Number	5
- Type	Steel backed, leaded bronze
- Static clearance*	.025/.075 mm (0.0010/0.0030 ins)
Max. undersize for regrind	.508 mm (.02 in)

* Bearing clearance is measured with Plastigage.

FLYWHEEL

Max. run-out (lateral)	.101 mm (.004 in)
Starter ring gear - Run-out - Lateral	.406 mm (.016 in)
- Radial	.152 mm (.006 in)

CONNECTING ROD

Type	'I' section
Material	Steel forging
Distance between centres	(139.7 mm (5.5 in) $\pm$ .0254 mm (.001 in)
Bearings (big end) - Type	Steel backed, leaded bronze
- Static clearance*	.0254/.0813 mm (.001/.0032 in)
- End float on crankpin	.1016/.254 mm (.004/.010 in)
Small end bore (bushed)	25.405/25.410 mm (1.0002/1.0004 in)

Permissible weight variation between rods 2 grammes in any set

* Bearing clearance is measured with Plastigage.

GUDGEON (PISTON) PIN

Type	Fully floating
Location	Circlips
Diameter	25.40 mm (1.00 in)
Class of fit	Finger push at 20°C (68°F)

PISTON AND LINER

Piston - Type	Solid skirt
- Material	Aluminium alloy

PISTON AND LINER (cont.)

Piston - Identification	Flat top - 9.5: 1 European
	Dished top - 8.4: 1 Federal
- Length	75.260 mm (2.963 in)
- Compression height	40.919/41.021 mm (1.611/1.615 in)
- Rings - Compression	2
- Oil Control	1
- Diometer - Grade 'A'	95.1662/95.1789 mm (3.7367/3.7472 in)
- Grade 'B'	95.1789/95.1916 mm (3.7472/3.7477 in)
- Gudgeon pin bore offset	1.524 mm (.06 in) towards thrust face
Piston clearance in cylinder liner	.0965/.1219 mm (.0038/.0048 in)
Piston ring gap - Top	.381/.508 mm (.015/.020 in)
- Second	.483/.609 mm (.019/.024 in)
- Scraper (rails)	.381/1.143 mm (.015/.045 in)

Permissible weight variation between pistons 3 grammes.

Piston ring to groove clearance

- Compression	.0381/.0889 mm (.0015/.0035 in)
- Oil Control	.0381/.0635 mm (.0015/.0025 in)

* Measured at grade diameter

Piston grade diameter at	15.0876 mm (.594 in) up from skirt edge
Cylinder liner - Type	Slip-fit, wet
- Material	Cast iron
- Internal diameter:	
- Grade 'A'	95.2754/95.2881 mm (3.7510/3.7515 in)
- Grade 'B'	95.2881/95.3008 mm (3.7515/3.7520 in)
- Fitted height above Block (liner nip)	.0762/.127 mm (.003-0.005 in)
- Permissible variation between adjacent liners	.0254 mm (.001 in)

LUBRICATION SYSTEM

Oil pressure under normal operating condition (Hot)

a) Not below 5 lbs/sq in (0.35 kg cm sq) at idle speed

b) Not below 35 lbs/sq in (2.46 kg cm sq) at 3.500 R.P.M.

LUBRICATION SYSTEM (cont.)

c) Not below 45 lbs/sq in (3.16 kg cm sq) at 6.500 R.P.M. ond above

Filter - full flow disposoble canister type

Pump - Type	Eccentric rotor
- Drive	Toothed belt
- Inner/outer rotor clearance	.15 mm (0.006 in) Mox.
- Inner/outer rotor float	.0127/.0281 mm (.0005/.0015 in)
Type of system	Wet Sump

FUEL SYSTEM

Fuel Filter	AC-Delco (Paper Element)
Fuel Pump - Type	S. U. Type "AUF 301" (Electric)
- Pressure	.27 ± .01 kg cm sq (3.8 ± .2 lbs in sq)

Carburettor - European Specification

Type and number	Dellorto Dhla 45E (two)
Slow running speed	950-1000 r.p.m.
Idle CO level (hot)	1.5-3.0%
Identification	Green Paint spot on "Dellorto' cast label and no vacuum take off on rear carburettor.

SETTINGS

Choke	36	Starter Jet	70
Main Jet	160	Main Emulsion Tube	7772-8
Main Air Corrector	230	Starter Emulsion Tube	7482-1
Idle Jet	50L	Flwt Setting Height	16.5/17.0 mm
Idle Jet Holder	7850.7	Needle Volve	170
Pump Jet	40H/38V	Float Assembly	7298-02

Carburettor North American Specification

Type and number	Zenith 175 CD 2SE (two)
Slow running speed	950-1000 r.p.m.
Idle CO level (hot)	3.5-4.5%
Identification	Red point on oir volve housing, and internal/external float vent valves.

Needle	B.I.D.K.
Spring colour	Blue
Damper Oil	Engine Oil
Fast Idle Setting	2.16/2.41 mm (.085/.095 in) Between starter cam and screw head in "off" position

IGNITION SYSTEM

Type	Coil and distributor
Number 1 cylinder	nearest to water pump
Ignition advance control	fully automatic

Ignition timing:

With engine number prefix letters	CC, CD
Eurooean soec. with Dellorto Carburettors -	Nominal static 7° BTDC Noadvance up to 1000 r.p.m. Full advance is at a nominal 2500 engine r.p.m. Set distributor to give 25° BTDC ignition timing at between 3.500 and 4.000 r.p.m. This will give an idle r.p.m. figure between 7°-11° BTDC because of distributor tolerances.

North American Spec. with Zenith-CD Carburettors

Static ign. timing 8° BTDC	at idle (950-1000 r.p.m.) 0° (TDC)
Coil (type)	Lucas 45232E
Spark plug - Type European Spec.	NGK - BP6ES
North American	NGK - BP5ES
- Gap	.584 mm (.023 in)

DISTRIBUTOR

European specification with engine number prefix letters CC, CD.

Type	Lucas 43D4	or Lucas 25D4
Despatch No.	41623	or 41584 (vac capsule not used)

Advance characteristic:	No advance up to 1000 engine r.p.m. Full advance of 16° (Crankshaft) at

Cont'd

	2500 engine r.p.m.
	allow ±2 for distributor tolerances

North American Specification

Type	Lucas 25D4 or Lucas 45D4
Despatch No.	41634A or 41626
Advance characteristic:	
Crankshaft r.p.m.	Crankshoft degrees
Below 1000	No advance
at 2000	8°)
at 4000	18°) $\pm 2^\circ$
at 5000	22°)
at 6000	26°)
Direction of rotation from drive end (all)	Clockwise
Drive (all)	offset dog
Contact breaker gap (all)	.35/.40 (.014/.016 in)'
Firing angles	0°, 90°, 180°, $270^\circ \pm 1^\circ$
Cam dwell angle	$60^\circ \pm 3^\circ$ (25D4), $52^\circ \pm 4^\circ$ (43 & 45D4)
Firing order	1-3-4-2
Condenser capacity	.18/.23 m.f.d.

COOLING SYSTEM

Type	Centrifugal pump and electric fan operated by thermal switch.
Radiator cap relieve valve pressure	.70 kg cm sq (10 lbs in sq)
Thermostat nominal opening temperature	82°C - winter, 74°C - summer
Impeller vanes to water pump housing clearance	.508/.762 mm (.020/.030 in)
Cooling system anti-freeze/inhibitor	Shell safe or union carbide "UT 184" Minimum of 25% all the year round More in cold climate (up to 66% maximum)
Radiator Type	Crossflow aluminium

CLUTCH

Make and type	Borg & Beck, diaphragm spring
	Single dry plate
Operation	Hydraulic
Master Cylinder bore diameter	15.87 mm (.625 in)
Slave Cylinder bore diameter	22.22 mm (.875 in)
Drive plate - diameter	21.59 cm (8.5 in)
- number of springs	6
Free play at release lever	3 mm (. 12 in)

TRANSMISSION

Type	Manual 5 forward gears
	(All synchromesh) and reverse

Internal Ratios		M.P.H. &	K.P.H. per 1000 r.p.m.
Fifth	.76:1	21.85	35.16
Fourth	.97:1	17.15	27.59
Third	1.32:1	12.58	20.24
Second	1.94:1	8.56	13.77
First	2.92:1	5.69	9.15
Reverse	3.46:1	-	
Final drive	4.375:1	-	-

Speedometer Gears - Driving Gear	5 Starts
Driven Gear	17 Teeth

FRONT SUSPENSION

Type	Independent by twin upper wishbones with single lower link and anti-roll bar providing lower location. Coil springs and telescopic shock absorber units.
Front Hub End Float	.08/.13 mm (.003/.005 in)

FRONT SUSPENSION (cont.)

		Dom/Eur	Fedeml
Front Spring	- Colour Code	None	Green
	- Number of Effective Coils	9	10.5
	- Length, Free	35.30 cm	34.6 cm
	- Coil Diameter	10.00 cm	10.00 cm
	- Rate	55.14 kg/2.5 cm	63.63 kg/2.5 cm

STEERING

Type Manual rack and pinion, with energy absorbing saginaw steering column

Steering angles	- camber*	0° to $-\frac{1}{2}^{\circ}$
	- caster	3° to $3\frac{1}{2}^{\circ}$
	- swivel pin (kpi)	9°
	- toe in*	3 to 5 mm (1/8 - 3/16 in)

* At ride height (2 people in car)

Lock angles	Front 32° Rear 33°
Turns (Lock to lock)	2-7/8

REAR SUSPENSION

Type Independent, by diagonal trailing orrn ond lateral link with fixed length drive shafts. Coil springs ond telescopic shock absorbers.

		Dom/Eur	Federal
Rear Spring	- Colour Code	None	Green/Yellow
	- Number of Effective Coils	10	10.5
	- Length, Free	34.80 cm	34.29 cm
	- Coil Diameter	8.92 cm	9.04 cm
	- Rote	67.14 kg/2.5 cm	85.91 kg/2.5 cm

Camber angle* 0° to $-\frac{1}{2}^{\circ}$

Toe-in* 4 mm (5/32 in) max $^{+\,0mm}_{-\,1.5mm}$ $^{+\,0in}_{-\,1/16\,in}$ at each wheel

* At ride height (2 people in car)

BRAKES

Type		Girling hydraulic with type 28 supervac servo. split front to rear systems, discs all round.
Eront brakes	- Disc diameter	250 mm (9.7 in)
	- Disc thickness	12.7 mm (.50 in)
	- Minimum thickness	11.7 mm (.46 in)
	- Total disc run out	0.09 mm (.0035 in) TIR
	- Lining area per brake	75 sq cm (11.63 sq in)
	- Braking area per brake	630 sq cm (97.01 sq in)
Rear brakes	- Disc diameter	275 mm (10.82 in)
	- Disc thickness	10 mm (0.393 in)
	- Minimum thickness	9 mm (0.354 in)
	- Total disc run out	0.09 mm (0.0035 in) TIR
	- Lining area per brake	64 sq cm (9.92 sq in)
	- Braking area per brake	68 sq cm (105.2 sq in)
Handbrake	- Mechanical rear wheel only.	

WHEELS AND TYRES

		Series I
Wheel Type		Bolt on Alloy
	- Size - front	6 JK x 14
	- Size - rear	7 JK x 14
Tyres	- Type	Dunlop "SP Sport Super"
	- Size - front	205/60 VR x 14 (Radial)
	- Size - rear	205/70 VR x 14 (Radial)
Tyre Pressures	European Spec	
	- Front	1.3 kg sq cm (18 lb sq in)
	- Rear	1.9 kg sq cm (27 lb sq in)

ELECTRICAL EQUIPMENT

Battery Type		
- Capacity	44 amp hr @ 20 hr Rating	
- Voltage/Polarity	12V Negative	
Headlamps	4 - 5¾" diameter units two in each hwdlamp pod.	
Headlamp - RHD inner 50 (Main		Sealed beam
outer 60W (Dip) 37.5 (Main)		Sealed beam
- LHD inner / outer	Halogen H1 and H4	
- North American inner	No 1	Sealed Beam
outer	No 2	Sealed Beam
Sidelamp	5W	
Front and Rear Indicators	21W	
Stop Lamps	21W	
Tail Lamps	5W	
Number plate lamps	6W	
Panel Lamps	3W	
Interior Lamps	6W	
Warning Lamps	2W	Capless
Reverse Lamps	21W	Festoon

Alternator: Lucas 18 ACR (45 amp)

Starter Motor: Type Lucas 3M100
Drive Pre-engaged

Fuses — Located inside the glove box. Seven circuits ore protected by fuses; headlomps motor, offside side lights, nearside side-lights, ignition controlled circuits, auxiliary controlled circuits and two permanent live circuits.

TORQUE LOADING FIGURES

ENGINE	Kg m	lbs ft
Cylinder head (tighten cold)		
both pairs (front and rear) nuts	9.7	70
3 pairs (in middle) nuts	10.4	75
Sparking plugs	3.31-3.87	24-28
Camshaft covers	.42-.55	3-4
Camshaft housings	1.93-2.21	14-16
Camshaft sprockets	3.46	25
Main bearing housing - 12 mm	7.60	55
- 8 mm	1.93-2.21	14-16
Crankshaft pulley	8.02-8.29	58-60
Connecting rod (big end) caps	11.61-11.89	84-86
Flvwheel	6.50-6.77	47-49
Clutch Assembly	2.21-2.48	16-18
Oil sump to main bearing housing (all)	.96-1.10	7-8
Auxiliary housing to cylinder block	1.80-2.07	13-15
Auxiliary shaft sprocket	3.46	25
Oil pick-up pipe union	7.6	55
Retaining nut (belt tensioner)	3.46-4.15	25-30
All other 6 mm nuts or setscrews	.96-1.10	7-8
Stud - Cylinder head to cylinder block - 12 mm	5.53	40
- Main bearing housing - 8 mm	1.66	12
- Main bearing housing - 12 mm	5.53	40
- Camshaft housing to cylinder head - 8 mm	1.66	12
- Sump to main bearing housing - 6 mm	.69	5
- All other non-specified 8 mm studs	1.66	12
Exhaust manifold to cylinder head	1.93-2.21	14-16
Inlet manifold to cylinder head	1.93-2.21	14-16
Banjo bolt (fuel line to carburettors)	2.2	16

Clutch	Kg m	lbs ft
Clutch Housing to Gearbox	4.98	36
Clutch Assembly to Flywheel	2.21-2.48	1618

Gearbox		
Driveshaft Housing to gearbox 7 mm *	2.8	20.3
" " " " 9 mm	4.0	28.9
Georbox mtg bracket to gearbox	12.97-13.80	94-100
Top cover to gearbox	0.96-1.24	7-9
Rear cover to gearbox	0.96-1.24	7-9

* Use avdelbond A 138

FRONT SUSPENSION

	Kg m	lbs ft
Upper wishbone pivot to chassis *	6.91-8.29	50-60
Upper ball joint to wishbone	3.04-3.31	22-24
Ball joint to vertical link, upper	5.93-6.53	43-48
" " " " " lower	9.11-9.94	66-72
Lower link to chassis *	6.91-8.29	50-60
Anti-roll bar to wishbone	4.15-4.84	30-35
Anti-roll bar to chassis	6.91-8.29	50-60
Damper - Lower link	4.15-4.84	30-35
- Top stem mounting +		

* Tighten with suspension at ride height (2 people in car)

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

BRAKES

	Kg m	lbs ft
Servo nuts/pedal box nuts	1.11-1.38	8-10
Master cylinder to servo	2.07-2.63	15-19

STEERING

	Kg m	lbs ft
Steering unit clamp screws	1.66	12–14
Upper column lower bolts	1.11–1.66	8–12
Intermediate column clamp bolts	2.21–2.76	16–20
Steering column lock retaining bolts *		
Steering wheel retaining nut	4.15–4.84	30–35
Tie-rod locknuts	6.91–8.29	50–60
Ball joint to steering arm nuts	4.15–4.84	30–35

* 'Break-off' type

REAR SUSPENSION

	Kg m	lbs ft
Radius arm to rubber mounting	5.53–6.22	40–45
Hub carrier to radius arm *	4.15–4.84	30–35
Hub carrier to radius arm lower link * and damper	6.91–8.29	50–60
Damper top stem mounting C		
Caliper to mtg bracket	4.15–4.84	30–35
Brkt 3 hole to chassis	6.91–8.29	50–60
Drive Shaft to Adaptor	4.15	30
Drive Shaft Adaptor/Rear Disc/to gearbox	8.29–11.04	60–80
Rear radius arm mounting to chassis ⌿	3.04	22

* Tighten with suspension at ride height (2 people in car)

\+ 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 Loctite 270 or Avdelbond A-138 with new lockwashers.

HUBS

	Kg m	lbs ft
Front hub spindle nut *	2.49	18
Front hub to brake disc	3.87-4.15	28-30
Rear hub nut +	27.65	200
Wheel nuts	9.0	65

* Tighten nuts to this torque looding whilst rotating hub to ensure bedding of toper rollers. Slacken nut back 3 slots before inserting split pin.

\+ After reaching required Torque Loading nut must be FURTHER tightened to enable split pin to be fitted. This is IMPORTANT, ond nut must NOT be slackened to insert the pin.

Torque Wrenches

Torque wrenches in daily use should be checked at intervals, NOT EXCEEDING 3 months, to ensure that accuracy is maintained.

MODEL S2 CHARACTERISTICS

WHEELS AND TYRES (SERIES 2)

Wheel type		Bolt on Alloy
	Size - front	7JK x 14
	Size - rear	7.5JK x 14
Tyres Type		Dunlop "SP Sport Super"
	Size - front	205/60VR x 14 (Radial)
	Size - rear	205/70VR x 14 (Radial)
	Size - spore	185/70HR x 13 (Radial)
Tyre Pressures		
	Front	1.3kg/sq cm (18 lbs/sq in)
	Rear	1.9kg/sq cm (27 lbs/sq in)
	Spare	2.1kg/sq cm (30 lbs/sq in)

DISTRIBUTOR

North American Specification (Except California)

The 'Lumenitiori' distributor (A907E0900J) is basically a Lucas distributor with the contact breaker arid condenser replaced by an Infra-red Sensor. Unit and a four bladed chopper fitted in place of the contact breaker. An electronic module is wired between the distributor and the coil to complete the electronic ignition system. All Esprits built to this specification have a prefix letter H on the engine number.

Ignition Timing

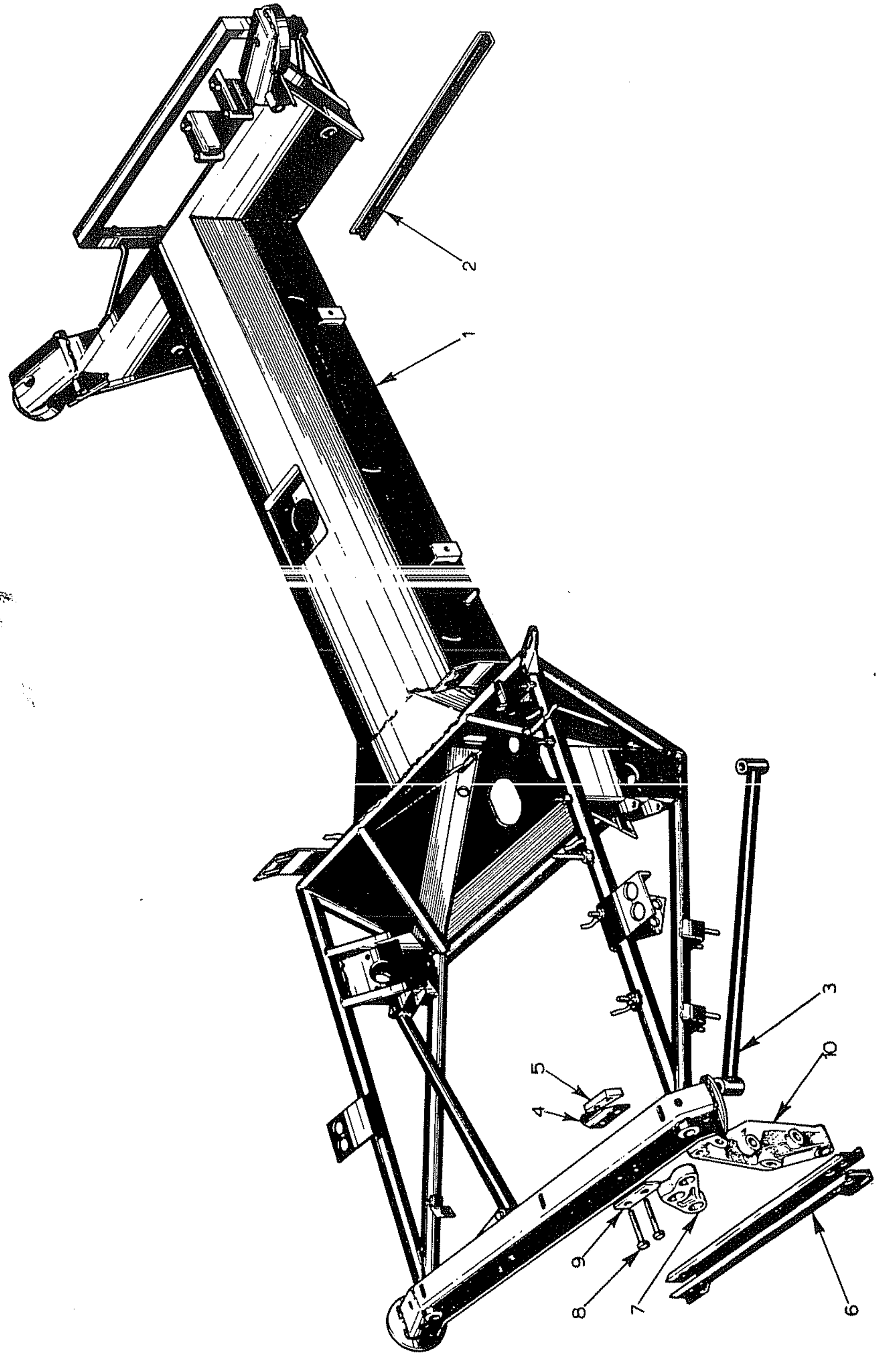
Static ignition timing	10° BTDC
At idle speed	-2° BTDC
At 3000 rpm	24° - 26° with vacuum blocked off.

Commemorative Vehicles

For these vehicles the Lumenition distributor Part No. A907E0901J is used, as the engine is fitted with Dellorto carburetters. The power module A075M0335F is located on the engine bay side of the right-hand fuel tank well. Ignition timing is as the current specification given in the TECHNICAL DATA for Dellorto carburetters, and the test procedure for the Lumenition equipment is standard for both distributors, see ENGINE section.

SECTION **A**

Description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KEY TO FIG. 1

1. Chassis Assembly
2. Closing Plate/Mounting Bracket
3. Bracing Strut Assembly, RH
4. Bracing Strut Bracket, RH
5. Tapping Plate Bracing Strut, RH
6. Cross Beam, Rear Suspension, Assembly
7. Gear-box Mounting, 3 Hole, RH
8. Bolt ½" UNF x 3"
9. Tabwasher
10. Caliper Suspension Bracket, RH

GENERAL DESCRIPTION

The chassis unit is a prefabricated steel backbone type, linking the front and rear suspensions and having a centre box section.

A cross-member is welded to the front of the chassis and this carries the front suspension arid steering mountings. At the rear of the chassis is a welded steel framework on which is mounted the engine and transmission.unit and the rear suspension.

ACCIDENT DAMAGE

Damage to the chassis caused through a collision can subject other parts of the chassis and parts of fhe body to abnormal loads. This increases the possibility of chassis or body failure and also incipient failure may be initiated. Incipient failure is by far the more dangerous, as having rio visible effect, the part may be assumed to be in good conditiori and then fail in future service.

If the car's suspension or steering is damoged, then consideration must be given to secondary or shock damage. For example, all mountings arid mechanism attachments should be carefully examined for both rnis-alignment and micro-cracks. It is recommended that a new chassis is fitted if the front suspension fulcrum pins are badly bent or damaged. This also applies to the upper wishbone and/or lower links if these are badly damoged.

Inspect the main unit mounting points thoroughly if the vehicle has been involved in a collision where the body sustains severe damage. Look for distortion of the chassis, broken welds and possible shift of the body on the chassis mountings.

A new chassis must be fitted when the chossis is severely damaged by a broadside impact or fire. Do not patch, bend or stretch the chassis to effect a repair as any high temperatures will only weaken the structure.

FRONT SUSPENSION FULCRUM PINS

The fulcrum pins are in fact, bolts. New bolts may be fitted, provided that no excessive damage has been sustained by the chossis fulcrum sleeves, upper wishbones or lower links. Whotever repair is carried out on the chassis must be the responsibility of the repairer. Reference should be mode to section C 'Front Suspension' to assist in the replacement of the fulcrum pins.

SECTION B

KEY TO FIG. I

1. Body Shell
2. Door Assy, RH
3. Sill, Outer LH
4. Sill, Outer RH
5. Grille, Radiator Duct
6. Headlamp Pod, LH
7. Headlamp Pod, RH
8. Finisher, Windscreen, Top
9. Finisher, Windscreen, LH
10. Finisher, Windscreen, RH
11. Spoiler Panel
12. Rear Valance
13. Front Bumper, Dom/Eur
14. Front Bumper, Federal
15. Rear Bumper, Dom/Eur
16. Rear Bumper, Federal
17. Plinth, Rear Bumper, Federal
18. Panel, Battery Cover
19. Rear ¼ Window Frame, Top/Sides, LH
20. Rear ¼ Window Frame, Bottom, LH
21. Finisher, Rear ¼ Window Sill
22. Door Seal
23. Side Capping Rail, RH
24. Finisher, Side Capping Rail, RH
25. Waist Lirie Finisher, Body
26. Waist Line Finisher, Door
27. Finisher 'A' Post/Front ¼ Light, RH
28. Engine Cover
29. Finisher "BC" Post, RH
30. Bonnet

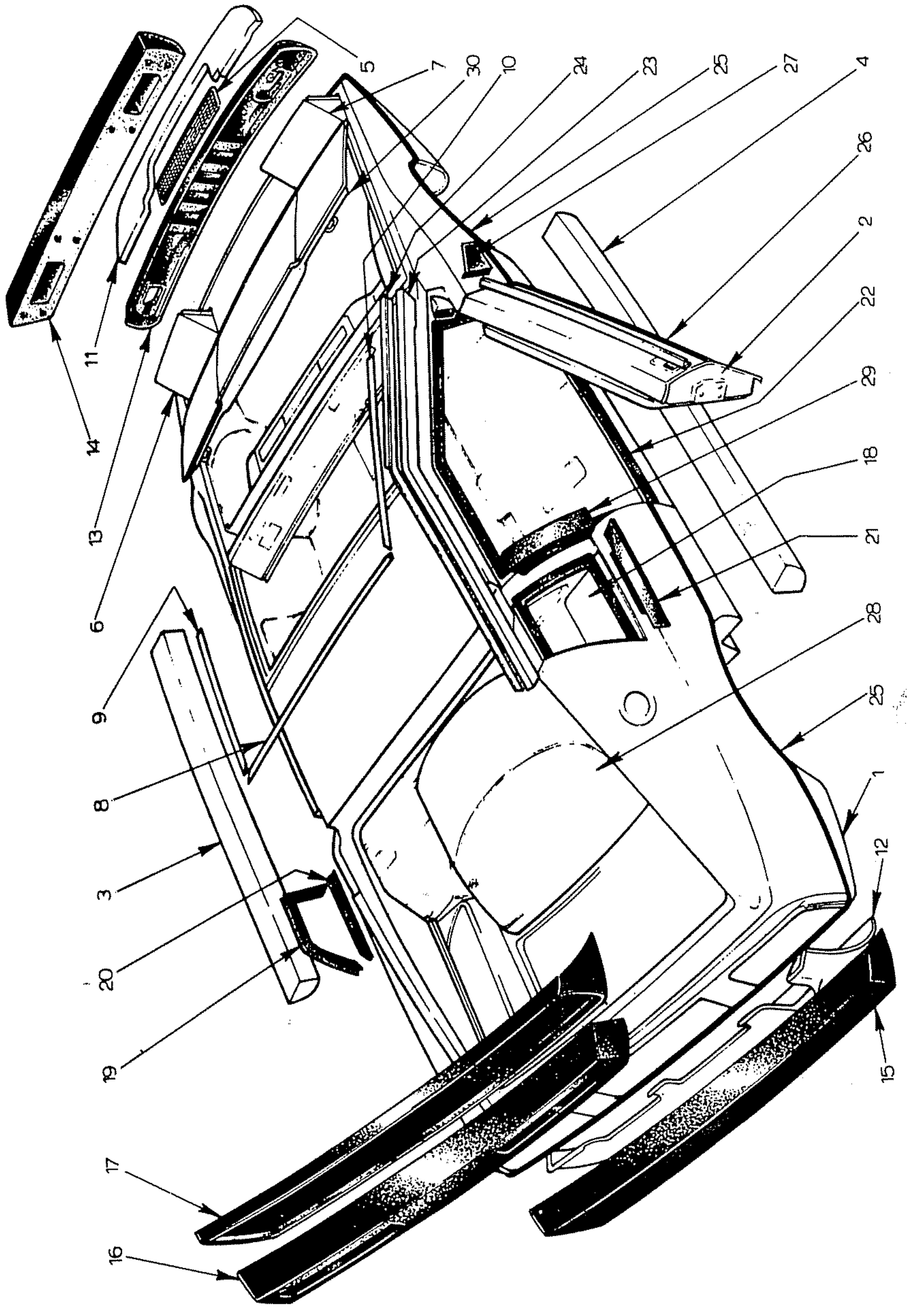


Fig. 1 - Body Components

GENERAL DESCRIPTION

The body of the vehicle comprises a one-piece moulded glass fibre reinforced plastic (G.F.R.P.) shell which straddles a steel backbone chassis and is attached to it at various points.

Whilst the chassis carries all the major structural loads, the body is used to carry or transfer the remainder, and when ttie body and chassis are mounted together, each contributes to the strength and torsional stiffness of each other. The body-shell is laminated basically as an upper and lower moulding, which is then brought together in manufacture to form one piece.

The nature of the design of ail body panels and joints, is such that there are no critical or highly stressed bonds or joints in the body-shell itself.

BODY CARE

Wtien washing rne vehicle, use plenty of colde never attempt to remove dust or mud from the bodywork when dry, as this will damage the finish. Special preparations are marketed for adding to the washing water; the use of these mild 'detergents', as directed by the manufacturers, will expedite washing. Use only preparations of reputable manufacture. When dust and mud have been removed with sponge and water, finally dry with a chamois leather. Provided that the car is kept clean by frequent washing, it will be found that polishing is almost unnecessary. The bodywork can if desired, be protected with a good soft wax polish, using a haze remover first to remove all 'traffic film' and old polish.

During ttie winter months many countries use salt on the roads to assist in the clearance of ice and snow. Thoroughly wash the bodywork, the underside of the body and wings arid the chassis, either weekly or more frequently, depending on local conditions, to remove any salt deposit and prevent its corrosive action. The fibreglass coachwork will not, of course be affected by any corrosive action, but the metal parts attached could be.

BRIGHT METAL

The attractive appearance of bright metal can be preserved if it is cleaned regularly. Each week wash with soap and water solution, rinse thoroughly with clean water and dry off. For further protection, apply a good-quality wax polish.

WINDSCREEN CLEANING

When washing the windscreen, the wiper blade may only be lifted away from the screen a small distance, to avoid damaging the pantograph mechanism. Never push the blade across the windscreen as this will damage the mechanism.

UPHOLSTERY AND ROOF LINING

Normal cleaning consists of an occasional light wipe over with a cloth dampened in a mild soap and water solution; it is important that the cloth is only damp, not soaked.

ALLOY WHEELS

It is recommended that the alloy wheels are washed with the same preparation used to wash the bodywork. Use a brush having nylon bristles only. During the winter months, particularly when salt has been used on the roads for the dispersal of snow and ice, remove all wheels including the spare wheel, and wash thoroughly to remove all accumulated road filth from wheels and tyres.

DE-WAXING

The vehicle is protected with 'Lacroe' Autoprotective wax, this is indicated by a label on the windscreen. To de-wax proceed in the following manner:-

1. Wash the vehicle by hand or machine to remove dust and dirt particles. Wipe off surplus water.
2. Polish by hand with a soft clean cloth or buff with a machine all surfaces, including glass, chrome and rubber. Completely polish each panel or section before starting the next.

   NOTE: Do not remove wax using a polish, as most polishes are water based and Lacroe is not.

ACCIDENT REPAIRS

ASSESSING ACCIDENT DAMAGE

All damage to the body must be classed as structural. However, inside this broad classification the damaged area can be further defined as either:

(a) High stressed, (b) Moderate stressed, or (c) Low stressed,

and on that definition depends the original construction and therefore the repoir method to be employed.

KEY TO FIG.2

1. Body Section, Mid-Nose, Full Section
2. Body Section, Mid-Nose, RH Section
3. Body Section, Mid-Nose, LH Section
4. Body Section, Full Nose, Full Section
5. Body Section, Full Nose, RH Section
6. Body Section, Full Nose, LH Section
7. Roof

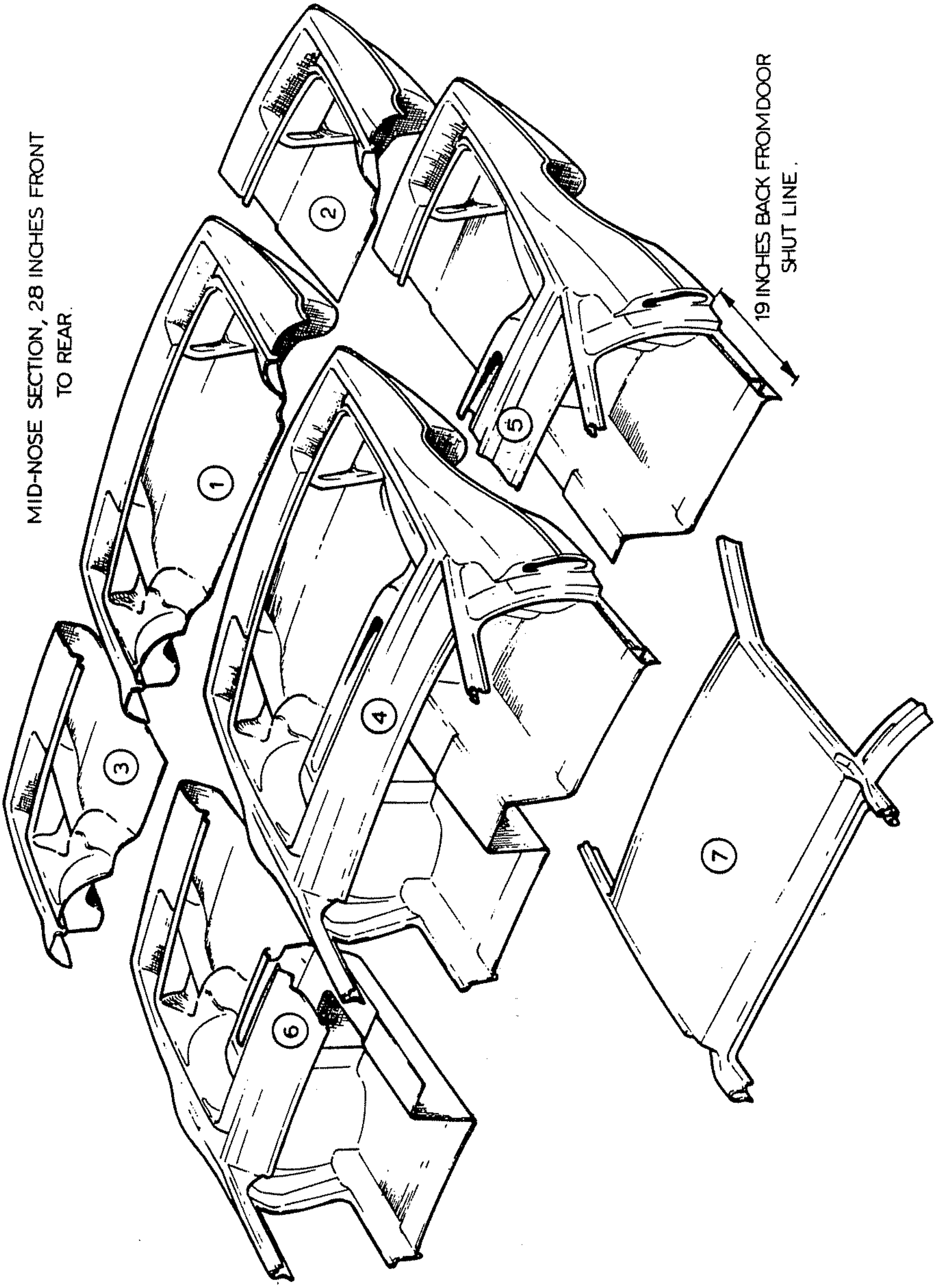


Fig. 2 - Front Body Sections

KEY TO FIG.3

1. Body Section, Short Rear, Full Section
2. Body Section, Short Rear, RH Section
3. Body Section, Short Rear, LH Section
4. Body Section, Full Rear, Full Section
5. Body Section, Full Rear, RH Section
6. Body Section, Full Rear, LH Section
7. Bulkhead, Upper
8. Bulkhead, Centre
9. Bulkhead, Lower

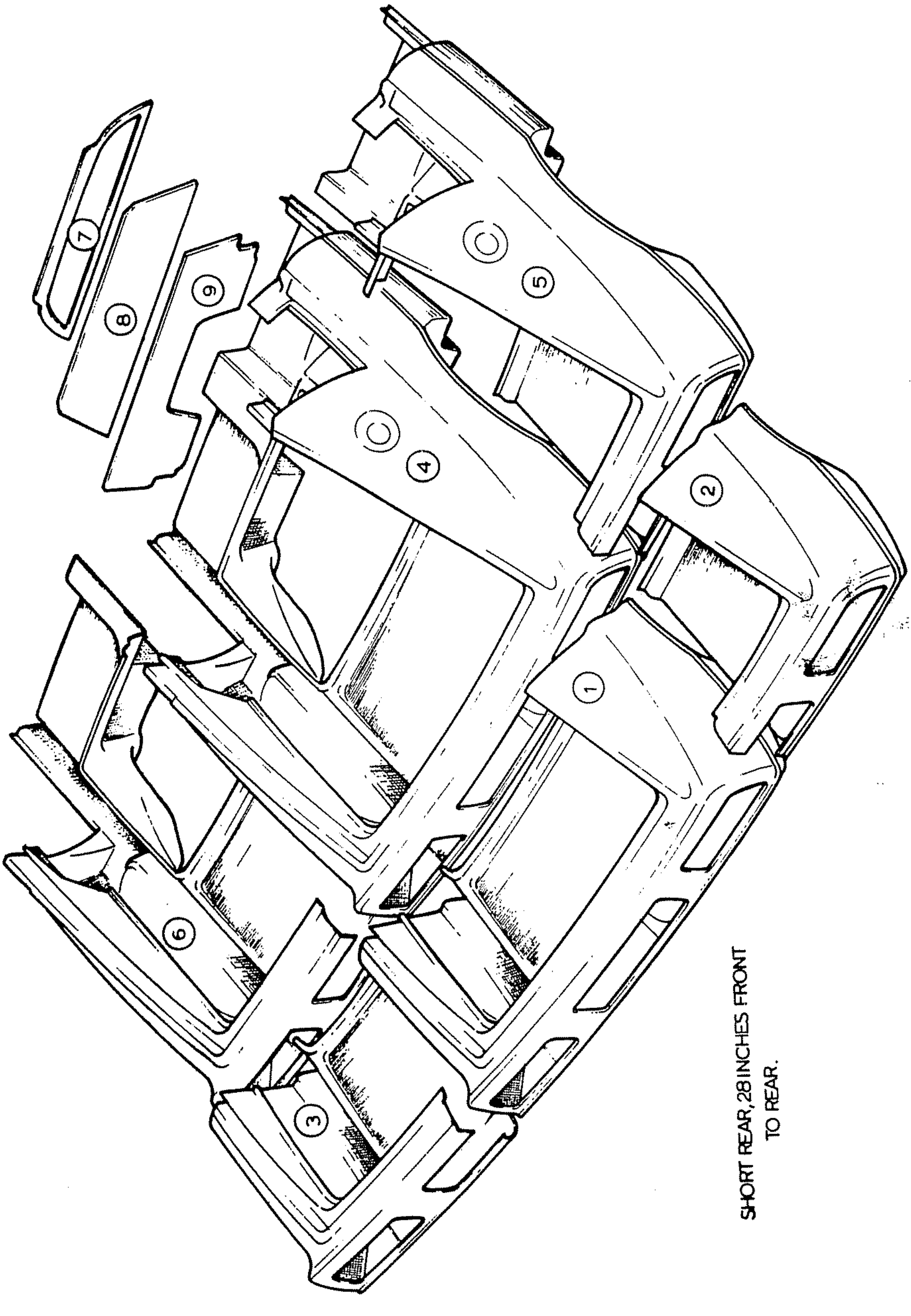


Fig. 3 - Rear Bcdy Sections

As a general rule there should be a bond wherever two panels touch, or wherever they close on important points. It is usually possible to check these bonds both visually and physically for fractures or breaks. Ascertain the cause of damage and the direction of impact and examine all panels or bonds which may have been affected. A front end impact, for example, may easily cause the bonds ot the bulkhead to split without the defect being easily visible.

To facilitate a closer examination it may be necessary to remove parts and components to determine the extent of the damage. When determining the size of the replacement panels to be ordered, make sure the new panels, when cut-in, will be attached to firm GFRP material; avoid badly crazed areas arid badly burnt areas.

Fire damage is the most difficult to assess but generally only the obviously burnt or charred sections will need to be replaced or reinforced.

RESIN MIX (Accelerated Hand Lay-Up)

Resin - Port Number X036 B 6206V
Catalyst - Part Number X036 B 6344V (Butinox M50)

Mix hardener (catalyst) into the resin in the proportions of 15 cc of catalyst to 1 kg (2 lb) of resin. Mix ratio (I:150).

For Gel coats mix 20 cc of catalyst with 1 kg (2 lb) of gel.

BASIC BONDS AND JOINTS

Cut off the damaged portion after marking for re-positioning of the new panel. Clean, and prepare both existing and new panels, removing all road filth and underseal from the existing panel. Cut the new panel to fit, lining up with the previously marked positioning lines. Mate the two parts to be joined, using packing as necessary to achieve a perfect match. Joiriirig plates (of angled section) should be attached to the exterior of the panel with the aid of self-tapping screws. Using chopped-strand glass fibre mat of 3 oz weight, together with the resin and hardener, lay-up by hand from the underside of the joint, ensuring an overlap of 3-4 in (or 8 to 10 cm), and leave to harden in a temperature of not less than 15^{o}C.

When the repair has fully cured (hordened), and NOTE BEFORE, remove the joining plates from the exterior surface. Sand out the top exposed joint, feathering outwards from the join line, removing any old paint in the process. Fill the depression with rovings and resin, and whilst still wet, lay over o thin layer of chopped-strand mat and apply more resin + hardener (1 oz weight). Allow to dry ond fully cure. Sand down and fill any imperfections with filler (Port No. A036 B 6203V), and allow to dry. Finally, sand down with carborundum paper to prepare for painting.

HEADLAMP BOWLS AND SURROUNDS

Where severe damage to the headlamp bowl and surround has occurred it is generally found more economical to fit a replacement bowl and section. It is essential for the correct operation of the headlamp assembly that the replacement section is correctly positioned, the bowl being attached to the pivot bobbins of the new section and tested for clearance in the up-and-down position before being bonded to the car.

The bowl should be fixed in the most convenient position by taping in place before laminating in the new section. Accessibility is restricted in this area and it may be found mare advantageous to work through the actual lamp unit hale.

Alternatively where a less serious impact has occurred and the lamp surround can be satisfactorily repaired without resorting to a replacement section it is recommended that a small jig be made to embrace both pivot mounting bolts, of the bowl width. These can be screwed into the body bobbins serving to correctly locate them whilst providing sufficient access to bond them in and perform the desired repoir.

SUPERFICIAL DEFECT REPAIRS

PIN HOLES OR AIR VOIDS

It is difficult to overcome air voids and pin holes when a hand lay-up repoir is carried out, but, as all body components are heated to 82°C (180°F), the maximum service temperature, before painting, these imperfections will show up. Any air voids located in this manner con be opened up from the surface ond filled with o stopper or filler.

The air voids and pin holes can be opened up using one or both of the following methods:

(a) Enlarging the hole by gonging or 'picking-out'.

(b) Drilling or routing out, leaving a large hole with near parallel sides.

If after repairing pin holes the paint surface sinks over the repair, this may have been caused by the filler shrinking.

Wheri cellulose paint stopper is used, overfill as this stopper has o high rate of shrinkage. Depressions in the paint surface when using o polyester stopper are usually caused by painting too soon after the repair. Therefore, before rubbing down and pointing make sure the stopper has cured completely, leave for as long as possible before rubbing down.

DISTORTION OR WRINKLING

Distortion or wrinkling are usually caused by exposure to severe heat. This can cause the resin to soften slightly and in doing so give way to any inbuilt or associated stresses. In all such cases technical advice should be sought from Lotus Cars Ltd.

SPLIT BONDS

Small splits in bonds, such as those around the door can occur and are caused mainly by excessive flexing of the panels or by vibration: these should be arrested before they can extend and become serious. The split should be peeled open a little further, roughen up the inside flange surfaces with a hacksaw blade arid insert the appropriate type of bonding resin before clamping up. Clamping pressure should always be applied evenly, using a small slip of wood or rnetal if dimpling of the panel surface is to be avoided. Where possible, all splits should be laminated from the inside.

REPLACEMENT SECTIONS

Where the repair of a damaged vehicle calls for replacement sections or panels it is recommended that these be obtained direct from Lotus Cars Ltd.

Standard sectional repair moulds cater for the repair of damage in any area of the body unit. These ore so designed that they can be used individually or connected together for the monufocture of the required section of the body. These are also used for locatirig new sections correctly relative to the existing panels. These moulds ore deliberately left uriframed so as to accommodate slight discrepancies ond have been made on a standard painted body shell to allow for average paint thickness.

Due to the material used in coristruction of the body unit, cases of severe damage can often be economically repaired, i.e. where damoge has been severe enough to destroy virtually the whole front end of the vehicle, as for as the bulkheod for instance, it is possible to graft on a new complete section.

Before cutting away the damaged parts or ordering replacement sections, the proposed method of repair, positioning of joint lines, overlaps etc. should be ascertained. Determine a method for the correct positioning of replacement sections and before cutting away damoged parts check on any prominent features from which measurements can be made and scribe these clearly on to the panels which are to be left intact. Use masking tape or chalk to define the lines on which it is proposed to cut the panels and study these lines thoroughly to see that:

(a) any damoged or slightly damaged panel which would be useful in the aligning of another major panel will not be removed or,

(b) on single skinned areas in particular the proposed outline traverses longitudinal, lateral and horizontal definition points to assist easy lining up of the new panel in all three places.

When repairs have been carried out in the vicinity of the front wheelarches, ensure the tyres do not foul the front lower flange when the wheels ore on full lock.

Underseal the wheelarch area to a depth of .125 in (3 mm) using "3M" material, or its equivalent in consistency, to prevent gel-coat crazing caused by small stones etc., thrown up by the wheels.

POSITIONING REPLACEMENT PANELS

(a) Line up flat surface (e.g. undetry or floor area) using long wooden beams bolted to undamaged area.

(b) Line up main contours (e.g. wing sections) using splints and bolt into position with flat or curved steel straps.

BOBBINS (METAL INSERTS)

Considerable use is made of die-cast metal inserts, which ore oval in configuration and commonly known as 'bobbins'

These are designed to carry high loads in most directions and also offer the advantage of being accurately located in the mountings.

Two basic forms are employed as follows:

Large (structural) bobbins - with 3/8 in or 7/16 in holes (plain or threaded).
Small (semi-structural) bobbins - with ¼ in or 5/16 in holes (plain or threaded).

The following advice is given on dealing with bobbin failures.

Bobbins Pulling Out

This could be caused by overloading e.g. accident damage. Where the bobbin and its surrounding area is accessible from the rough side of the laminates either naturally or by cutting non-weakening access holes, the remedy is to improvise a local mould in wood or glass fibre of the body surrounding the finished side of the bobbin.

Difficulty may be experienced in temporary re-locating the bobbin and its surrounding laminate in its original position. A local mould of the smooth side of the surrounding area (for example 6 in (15 cm) beyond in all directions) should eliminate this trouble. Re-registering can be achieved by drilling holes through mould and body and through the bobbin before removing the repair mould.

Additional 4 in (10.2 cm) square patches to make up to:- $\frac{1}{4}$ in and 5/16 in bobbins: the equivalent of 5 x $1\frac{1}{2}$ oz layers.

3/8 in and 7/16 in bobbins: the equivalent of 7 x 1.4 oz layers.

NOTE: Number of patches to be determined from the above.

The bobbin can then be directly laminated on the old mounting by using the techniques described arid overlapping the new laminate on to the old by several inches (centimetres) whenever possible.

The iarger bobbins are used oniy where rhe loadings are known ro be high, e.g. body mountings, seat attachments, etc. Smaller bobbins are used as a locatory point or a blind attachment point.

Typical instances such as non-structural applications are headlamp pivots. In these cases loose bobbins can be repaired by more localised and less exacting means, e.g. forcing in a dough mixture around and behind the bobbin; winding tape around it, etc.

Stripped Threads

Whilst their oval section will prevent these bobbins from turning in normal use they may loosen if too much tightening pressure is applied, or when an attempt is made to tap them out to a large diameter. if a thread is damaged or stripped an attempt should be made to drill the thread clear and use a bolt and lock nut or drill oversize and fit helicoil insert. When fitting an initial check should be made with each bolt before tightening. Only U.N .C. bobbins are employed and particular care should be paid

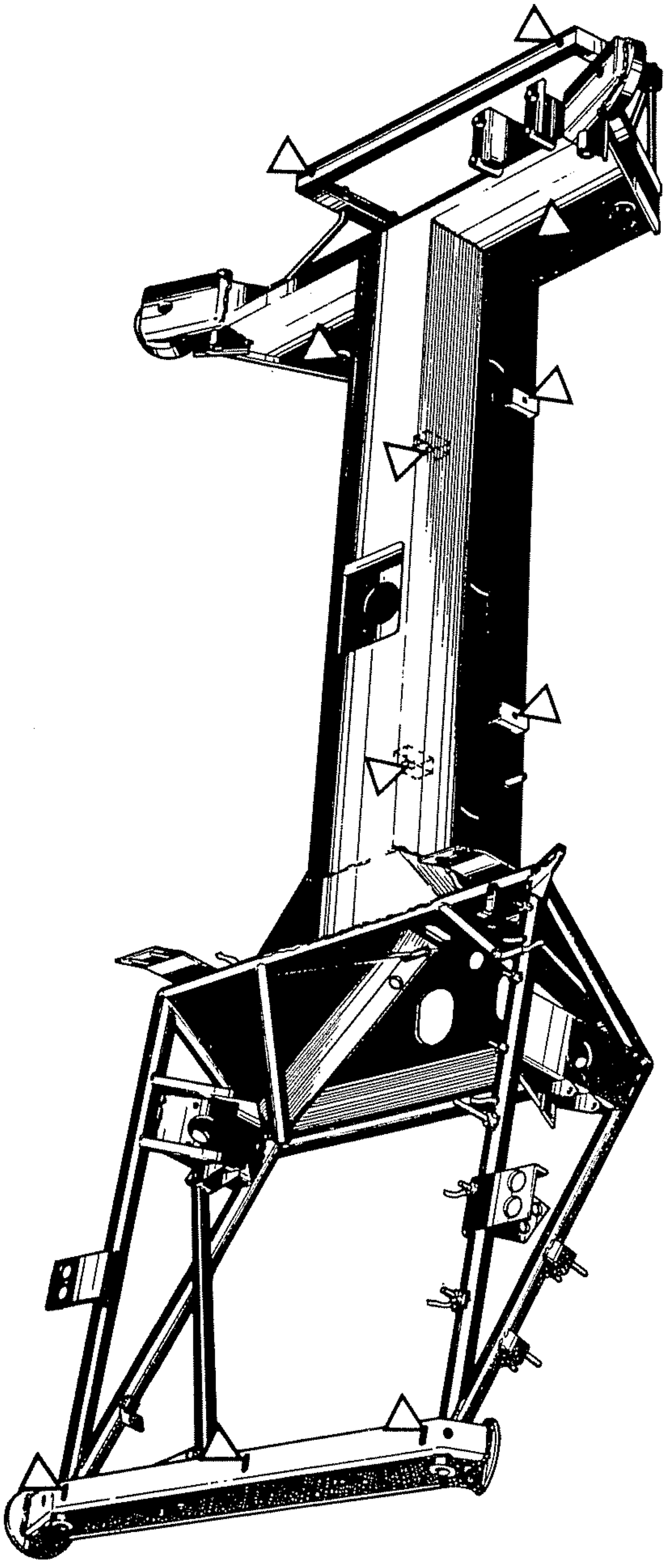


Fig. 4 - Body Mountings

to t only U.N.C. bolts to them. Where the bolts ore porticulorly tight this may be due to resin within the threaded portion of the bobbin which can be remedied by tapping out.

Only the correct length of the bolt should be used, i.e. those whose threod engages with the full depth of the bobbin. No attempt should be mode to pull items up under heavy load with a small engagement of thread. To avoid tightening up onto the plain shank of the bolt it is recommerided that only setscrews be used, i.e. those threaded all the way up to the head.

Laminating New Bobbin

Firstly the laminates from the basic mounting surface must overlap arid interleave with the laminates around the bobbins. Secondly the laminate rnust be well built up under the bobbin to prevent the bobbiri from pulling out in a downward direction. This surrounding laminate should in itself comprise a tight ring around the bobbin to prevent it from bursting out under diagonal loads but if in doubt one or two layers ot tape or cloth should be wound round the waist of the bobbin. Finally plasticine or similar plugs should be used during laminating to keep the resin out of the bobbin threads. When properly laid the visible rough side wall will be nearly vertical in line with the bobbin top profile. In effect a strong reinforcing ring of laminate surrounds the bobbin and this ring must be properly connecied to the basic laminate.

Loyup Around Bobbins

(a) It is important that build-up around bobbins is as previously described as bobbins by nature of their application are subjected to higti loads, and will break out of the surrounding fibre glass if not bonded in correctly.

(b) Bobbins must be bolted to mould after "mould release agerit" has been applied and prior to Gel-coat application. Care must be taken to ensure that it sits well down on to the mould, ond that the bobbin is positioned correctly in accordarice with the specification concerned. DO NOT apply Gel-coat to the bobbin surfaces or sides.
It is essential to keep the Gel-coat to a minimum thickness to prevent "crazing" and desirable that the general layup thickness tapers gradually away from the bobbins.

Remember that tensile applications are the most demanding and require continuity of layup, that the above instructions be strictly adhered to, that the safety of the vehicle may be dependent upon the correctness of the application of these operations.

BODY MOUNTING POINTS

When mounting the body to chassis unit, o clearonce between the rearmost mounting brackets and body behind the engine may be observed. Should this condition occur it is essential not to tighten the body down onto the brackets as consequential stressing of the body shell rearwards of the door opertures may open the door opertures and result in jamming and misfitting of the door.

Spacing washers of 16 swg must be inserted, packing out until tightening can be effected without straining.

PAINT PROCEDURE

The two procedures following cover cellulose and polyurethane paint finishes. To identify the finish check paint code prefix on chassis plate, a code letter 'L' indicates cellulose finish and code letter 'S' polyurethane finish.

TO PAINT CELLULOSE ('L' code)

1. Vacuum clean to remove all dust, solvent wipe and tack rag.
2. Spray one cross coat of polyurethane (part No. 36B 6136) mixed 5 parts to 1 part catalyst (part No. 36B 613'7). This may be thinned with up to 5% of thinner (part No. 368 6138) to give 45-55 seconds No.4 cup at 65°F (18.3°C). Flash-off 5 minutes.
3. Spray one further coat of polyurethane mixed as above. Flash-off 10 minutes.
4. Force dry 50 minutes at 130-140°F (54-60°C). Then allow to cool.
5. Wet flat with "360" or "400" grade paper, using o copious supply of water to remove rubbing sludge as this can seriously affect inter-coat adhesion if allowed to dry on the body surface. Wash down thoroughly.
6. Dry off thoroughly. Areas rubbed through must be spot-primed with polyurethane.
7. Solvent wipe and finally tack rag.

8. Spray door shuts and edges.
9. Apply 2 cross coats of colour keeping wet, using thinner (Part No. 368 6142) to give 23-24 seconds No.4 cup at 65°F (18.3°C) with 5 minutes flash between coats. Flash-off 10 minutes.
10. Force dry 50 minutes <u>minimum</u> at 130-140°F (54-60°C). Allow to cool.
11. Wet flat with "400" grade paper and wash and dry off thoroughly.
12. Solvent wipe and tack rag.
13. Spray door shuts and edges.
14. Apply 2 cross coats of colour keeping wet, using thinner (Part No. 368 6142) to give 23-24 seconds No.4 cup at 65°F (18°C) with 5 minutes flash between coats. Flash-off 10 minutes.
15. Force dry 50 minutes <u>minimum</u> at 130-140°F (54-60°C).
16. Inspect and rectify with "600" grade paper.
17. Polish with compound (coarse then fine).
18. [illegible] with [illegible] wax polish (WW/ 14)

NOTE: If a fast thinner is used in cold or hurnid conditions, or lack of adequate air movement or heating exists in a spraying area, a defect known as "Blushing or Blooming" can occur on finish colour (a milky dulling of the paint appearing soon after application, whilst the film is hardening). This is caused by the precipitation of atmospheric moisture due to the surface temperature of a newly applied paint film being lowered by solvent evaporation.

When "Blushing or Blooming" is seen on the colour coats, it is also probable that any surfaces applied under the same conditions will also be affected by moisture precipitation. This is not usually visible since surfaces normally dry to a matt finish, but blistering of the paint system or faulty inter-coat adhesion may well occur later.

TO PAINT POLYURETHANE ('S' code)

Always quote chassis paint code when moking enquiries or ordering paint.

Code Number	Colour
S01	White
S02	Signal Red
S03	Lemon Yellow
S04	Orange

The point materiol used is ICI P.407 two-pack polyurethone, which is a synthetic resin requiring the addition of a catalyst or activator. Unlike cellulose, polyurethane will not reflow with the original coat and so spot repairs or ponel blow-ins are not easily achieved. Therefore, only complete panels should be resprayed, mosking to the nearest panel edge or styling line.

Where a body repair is carried out and fillers are used, it is important that the filler is primed using thin single coats of matching 407 Polyurethane point. Allow 15 minutes flash off between coats and 3 hours before applying top coats. Non visual areas, such as rebates etc., can be painted with a matching air drying nitrocellulose paint eg. ICI Belco P030 line. To achieve the best results follow the procedure below.

CAUTION Personnel in the spray area MUST wear protective clothing and air fed masks or graphite type filter masks when this rnateriol is being sprayed.

1. Flat entire panel surface using 320 paper.
2. Spot prime any filled areas using original polyurethone colour material. Allow to cure and flat.
3. Spmy 2 single coats of colour, allow 20 minutes flash off between coats and 30 minutes after final coat.
4. Cure at 50°C for 50 minutes or 6 hours at roam temperature (20°C).
5. Wet flat using 1200 paper before polishing with Teecut/2B mixture.
6. Use Mirror Glaze MGM3 polish and machine polish all resprayed surfaces to a high gloss. Wax and polish.

PAINTING EQUIPMENT

The recommended spraying equipment using a Binks Bullows "230" Gun with colour is:

1. Air nozzle 63.PB
2. Air pressure 65-70 lb/in^2 (4.57-4.92 kg/cm^2)
3. Material nozzle 446.
4. Paint pressure 12-15 lb/in^2 (0.84-1.05 kg/cm^2)
5. Needle valve 39.

PAINT REMOVAL

Under no circumstances must "Paint Stripper" be used to remove paint from glassfibre-reinforced plastic (G.F.R.P.) bodies as this will attack the gel-cat, which MUST of course remain intact.

The recommended methods for removing paint are as follows:

1. Wash off with a slow thinner.
2. Wet flot with an appropriate grade of paper dependent on the amount of paint to be removed. Paper heavier than "240" grade must not be used.

BONNET (HOOD)

TO REMOVE

1. Open the bonnet and unscrew the support strut from the borinet, taking care that the shockproof washer under each screw is riot misplaced.
2. With the aid of an assistant, release the bolts securing the bonnet to the hinge bracket, and remove the bonnet.

KEY TO FIG. 5

1. Bonnet Assembly
2. Hinge Blade (Single Motor Headlamp System)
3. Hinge Pin (Single Motor Headlamp System)
4. Hinge Blade (Two Motor Headlamp System - see BJA for detail)
5. Support Stay, bonnet
6. Latch Bracket, Bonn3t Lock
7. Latch Disc, Bonnet Lock
8. Grille, Bonnet
9. Bonnet Seal
10. Bonnet/Plenum Chamber Seal
11. Cross Shaft, Bonnet Lock, RHD
12. Cross Shaft Bracket
13. Bush and Clip Assembly.
14. Clevis Pin, Rod
15. Clevis Pin, Pivot
16. Rod, Bonnet Lock
17. Striker, Bonnet Catch
18. Reinforcement Plate

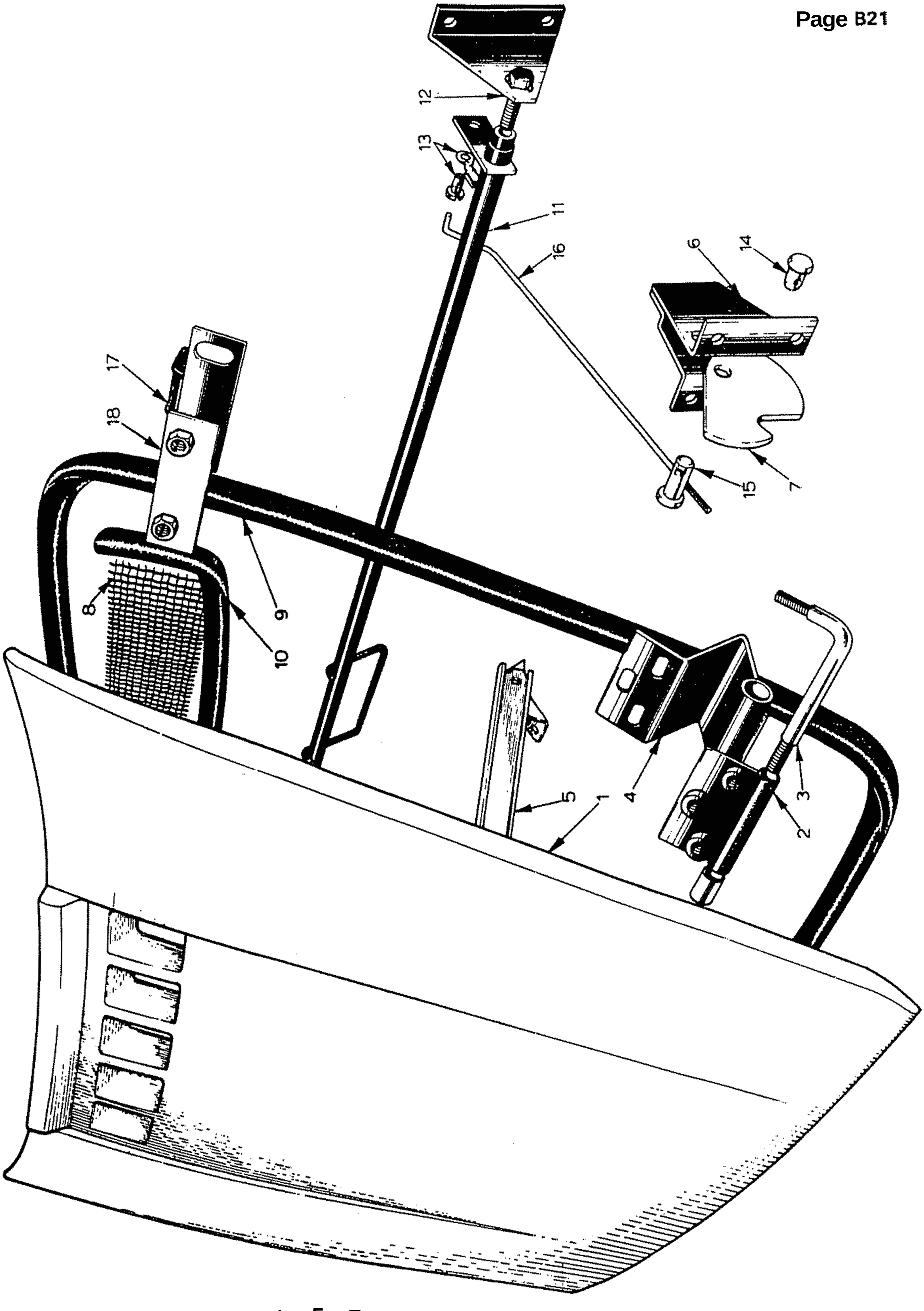


Fig. 5 - Front Compartment (Bohnet)

TO REPLACE

1. Replacement is a reversal of the removal procedure, taking care that the hinge bracket bolts are refitted in the original positions.

ADJUSTMENTS

1. To adjust the front height of the bonnet to align with the front of the body, reposition the nuts securing the hinge bracket pivot bolts to the body.
2. Sideways alignment is achieved by adjusting ttie position of the hinge brackets an the pivot bolts. Ensure the bonnet fits with an equal gap all round when closed before locking all nuts.

BONNET CATCHES

1. The catch pieces on the bonnet lid must line up with catches located an the bulkhead.
2. Ensure the release handle, located under the dash board on the driver's side, is always kept free. Do not fit any electrical equipment such as cassette player or radio telephone, over the handle.
3. The catches must hit the catches pieces in the middle, otherwise distortion of the bonnet lid may result. To adjust, loosen the catch pieces, move to desired position and tighten bolts.

TAILGATE

TO REMOVE

1. Lift the tailgate and allow the gas struts to support the tailgate. Apply a cranked ring spanner to one of the hinge nuts through the space between the side capping rail and body, taking care not to damage the capping rail.
2. With the aid of o second operator unscrew the hinge bolt from within ttie car, after removing the interior trim. When the hinge nut has been removed, allow the hinge bolt to support this side of the tailgate while removing the hinge nut on the other side in the same manner.

3. Disconnect gas support struts, one on each side, from the ball assemblies on the tailgate by removing the retaining springs. Now, support the tailgate while the second operator removes both hinge bolts and the tailgate can be lifted clear of the car.

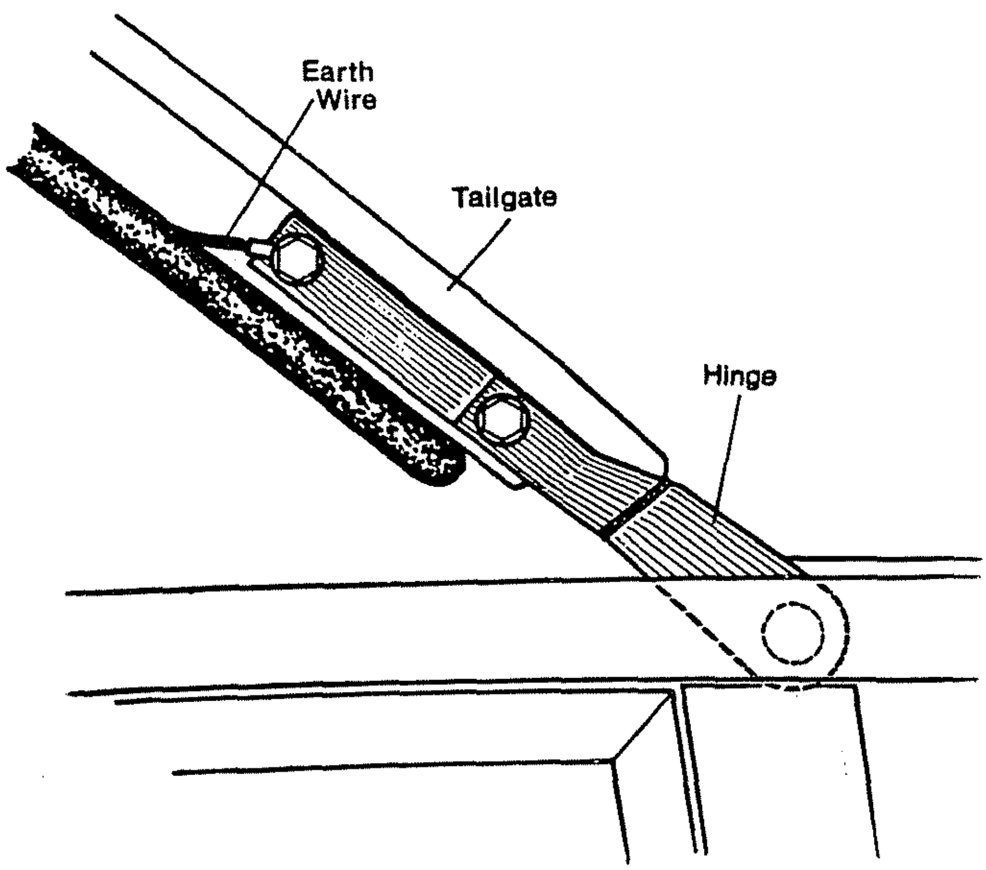


Fig. 6 - Tailgate Hinge

TO REPLACE

1. Reverse the removal procedure.

TAILGATE RELEASE MECHANISM

The mechanism comprises of a cable assembly running from a remote controlled release handle in the rear of the door aperture on the driver's side. From the handle, the cable passes to a lever (in the rear middle of the boot (trunk) opening). The cable can be adjusted at the adjuster fitted on the boot (trunk) lock lever.

KEY TO FIG.7

1. Tailgate Panel Assy
2. Tailgate Seal
3. Secondary Tailgate Seal
4. Finisher, Top
5. Finisher, Bottom
6. Finisher, LH
7. Finisher, RH
8. Mounting Clips
9. Hinge Blade, RH
10. Bolt
11. Bolt
12. Plunger Housing, Tailgate Lift
13. Spring, Tailgate Lift
14. Rubber Buffer, Tailgate Lift
15. Screw, Pozi
16. Gas Strut
17. Tailgate Lock
18. Bracket, Tailgate Lock, RHD
19. Striker, Tailgate Lock
20. Tapping Plate, Striker
21. Grommet
22. Cable, Tailgate Release
23. Lever, Tailgate Lock, RHD
24. Insert, Tailgate Release Handle
25. Clevis Pin
26. Lead, Heated Rear Screen

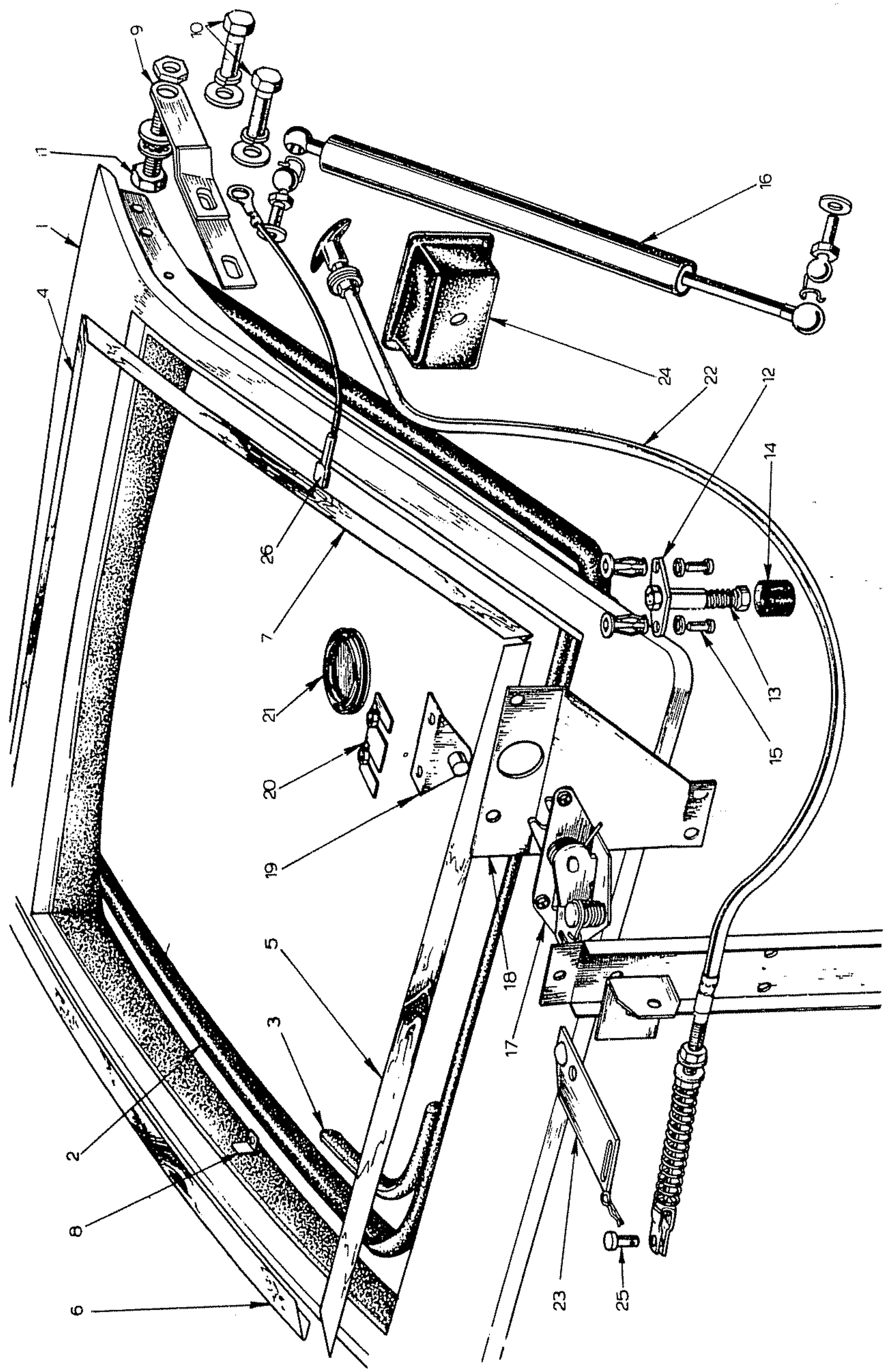


Fig. 7 – Tailgate Components

KEY TO FIG.8

1. Door Beam Assy
2. Hinge Bracket, Upper, LH
3. Hinge Bracket, Lower
4. Shim, Angled
5. Shim, Upper
6. Shim, Lower
7. Tie Rod, Hinge
8. Washer
9. Bush, Hinge Pin
10. Hinge Pin
11. Check Strap Assy, LH
12. Window Motor, LH
13. Bracket, Window Motor Mounting, LH
14. Door Wipe Seal, Long
15. Door Wipe Seal, Short, LH
16. Window Frame, LH
17. Silent Chonnel
18. Guide Rail, Window Lift, LH
19. Bracket, Carriage, Glass, LH

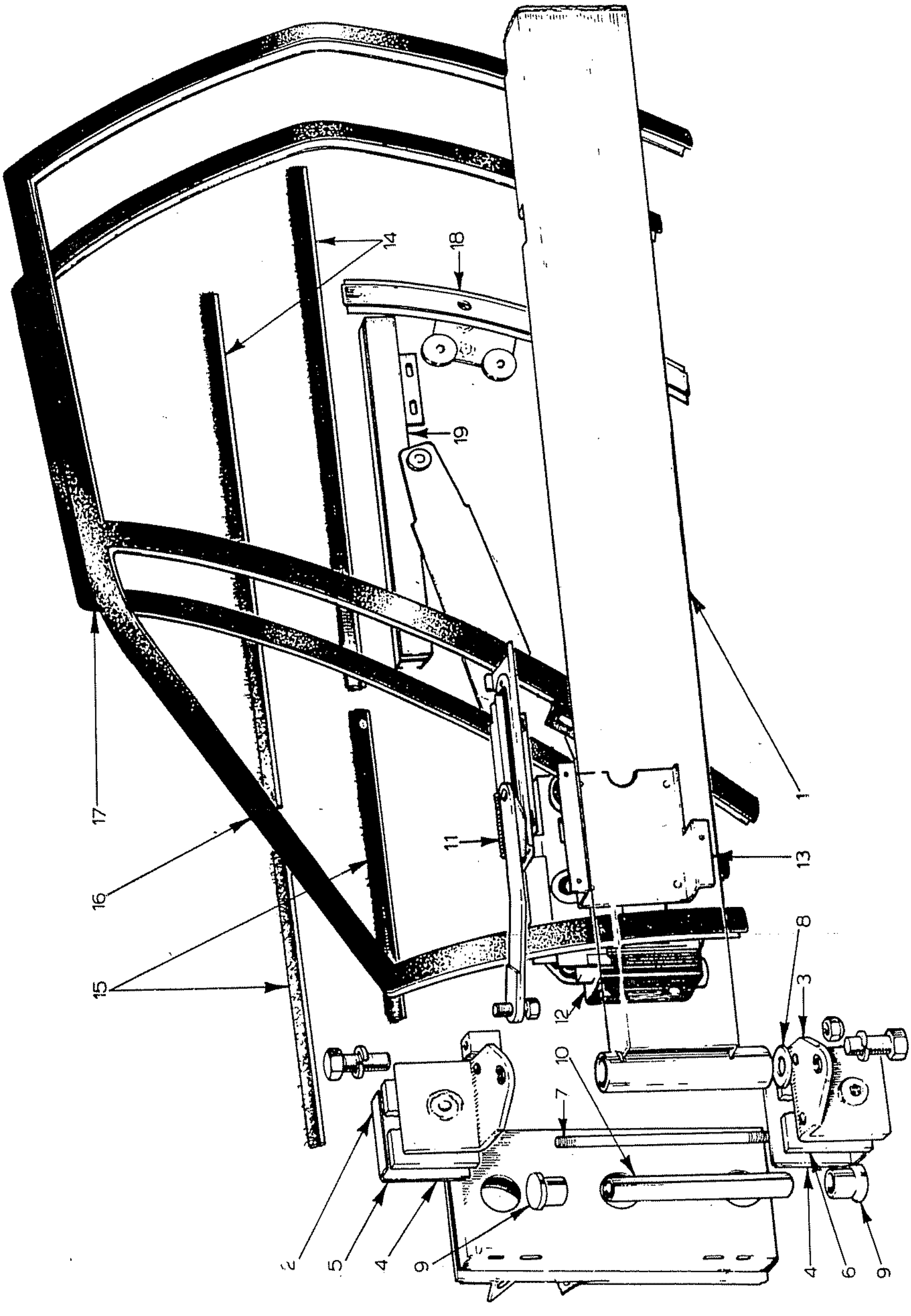


Fig. 8 – Door Components

DOORS

DOOR LOCK STRIKER ADJUSTMENT

The door lock striker should only be adjusted when the car is on its wheels on level

It is not necessary to disturb this component other than to fit a replacement, or to make an adjustment. To adjust, simply slacken the retaining screws, move the striker to the required position and tighten the securing screws.

DOOR LOCK STRIKER REMOVAL

1. Access to the tapping plates is via the tailgate opening. The left-hand tapping plate is removed by first unfixing and lifting the carpet panel behind the LH door post.
2. Unscrew the securing screws, while a second operator holds the topping plate and packing pieces, take care not to drop these as they may be difficult to retrieve.
3. The right-hand tapping plate is accessible after removal of the battery and battery support panel.

DOOR LOCK STRIKER REPLACEMENT

1. Reverse the removal procedure and adjust striker before finally tightening screws.

DOOR HINGES

Incorrect door adjustment or badly worn bushes can cause one or more of the following faults:

(a) Door rattles in lock area
(b) Window frame flutter
(c) Draughts and/or water leaks at door seal
(d) Lock fouling striker thus causing difficult door opening and closing.

Before commencing door adjustment, check hinge bushes for excessive wear, replace if necessary. The door should only be adjusted when the car is on its wheels on level ground.

DOOR ADJUSTMENTS

The Door Assembly can be adjusted by a small omount on the door beam in the following manner:

1. Loosen the two bolts securing the front end of the door assembly near the hinge.
2. Loosen the two bolts securing the back end of the door assembly about the door lock.
3. Move the door to the desired position and tighten up all bolts.
4. Adjust the lock striker if necessary.

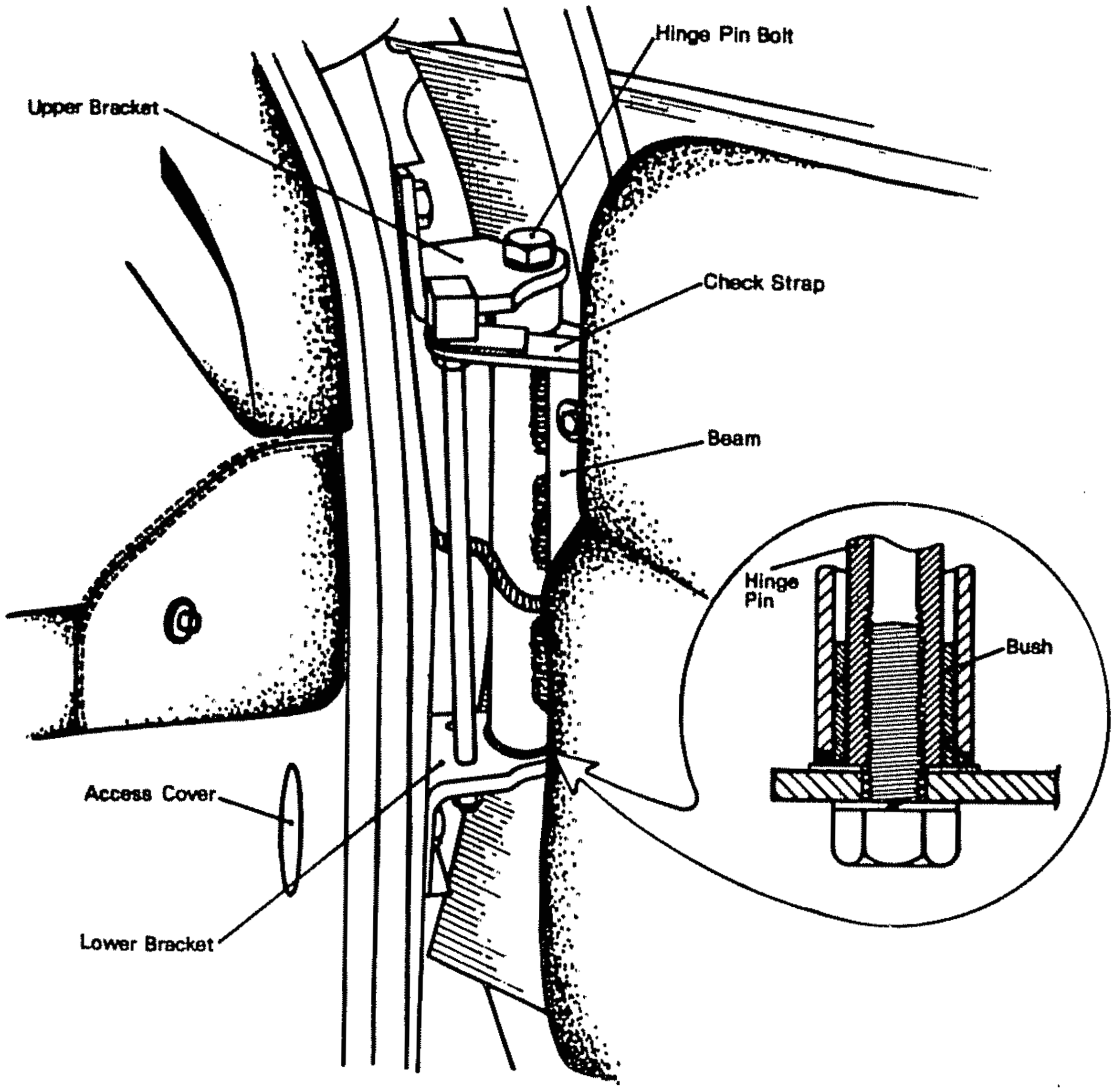


Fig. 9 - Door Hinge

KEY TO FIG. 10

1. Door Hondle, Exterior, RH
2. Bracket, Handle to Body
3. Door Handle, Interior, RH
4. Operating Flop
5. Pivot Pin
6. Door Lock, RH
7. Striker Plate
8. Rod, Interior Release to Clip, RH
9. Rod, Lock to Exterior Lock
10. Rod, Interior Lock to Clip
11. Rod, Exterior Release to Latch, RH
12. Rod, Lock to Clip
13. Adjuster Clip
14. Clip, "U", Door Lock
15. Push on Clip
16. Bush and Clip Assembly

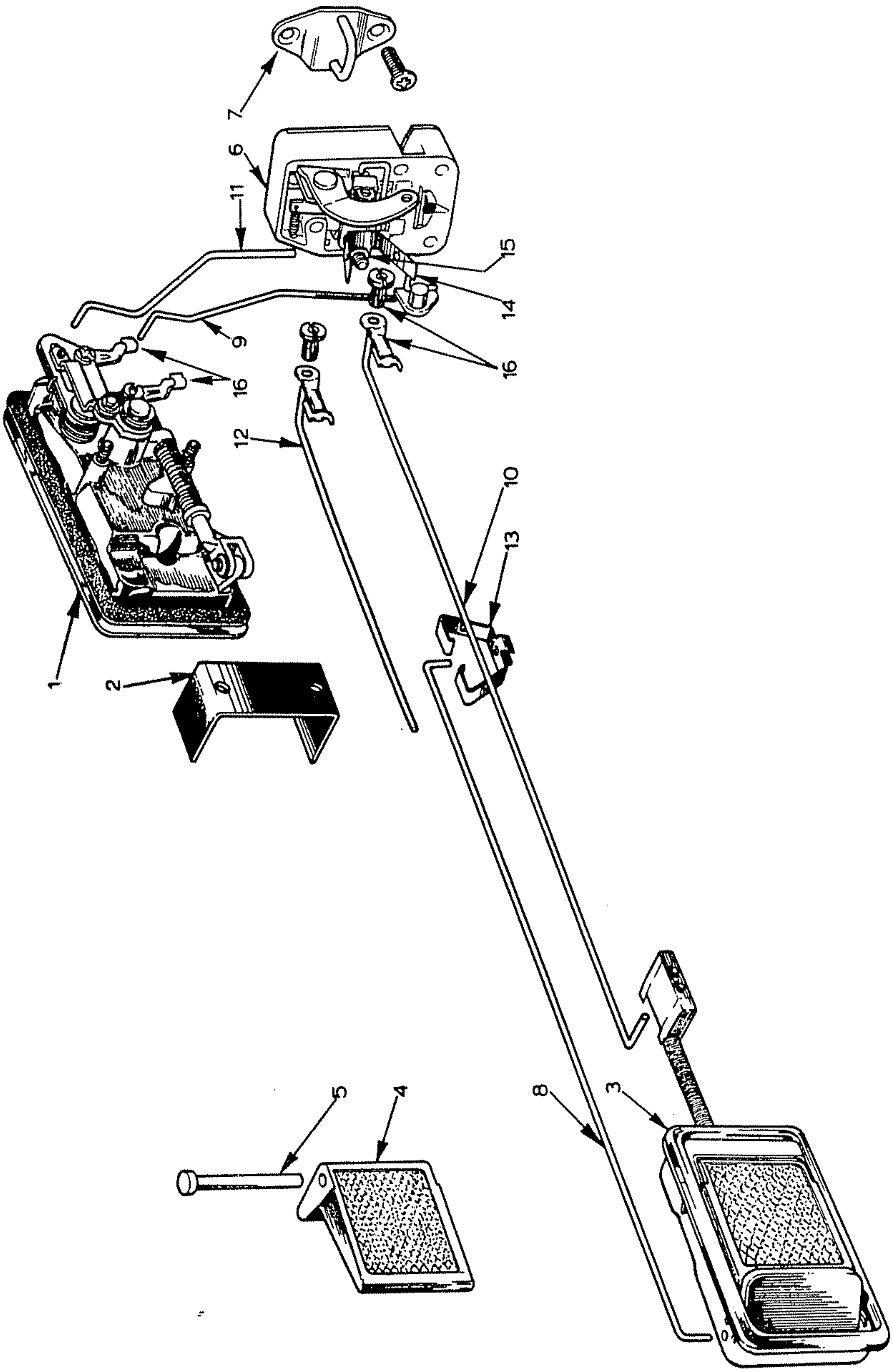


Fig. 10 - Door Lock Components

Vertical Adjustments

If the door assembly requires vertical adjustment, then loosen the two large clamping bolts securing to two hinge brackets just sufficient to allow up or down movement. Move the door assembly to the required position and tighten clamping bolts.

DOOR TRIM PANEL REMOVAL

1. Remove the trim inside the interior door handle, and loosen the three screws securing door handle assembly to the door. Remove the PVC trim surround in its two halves.

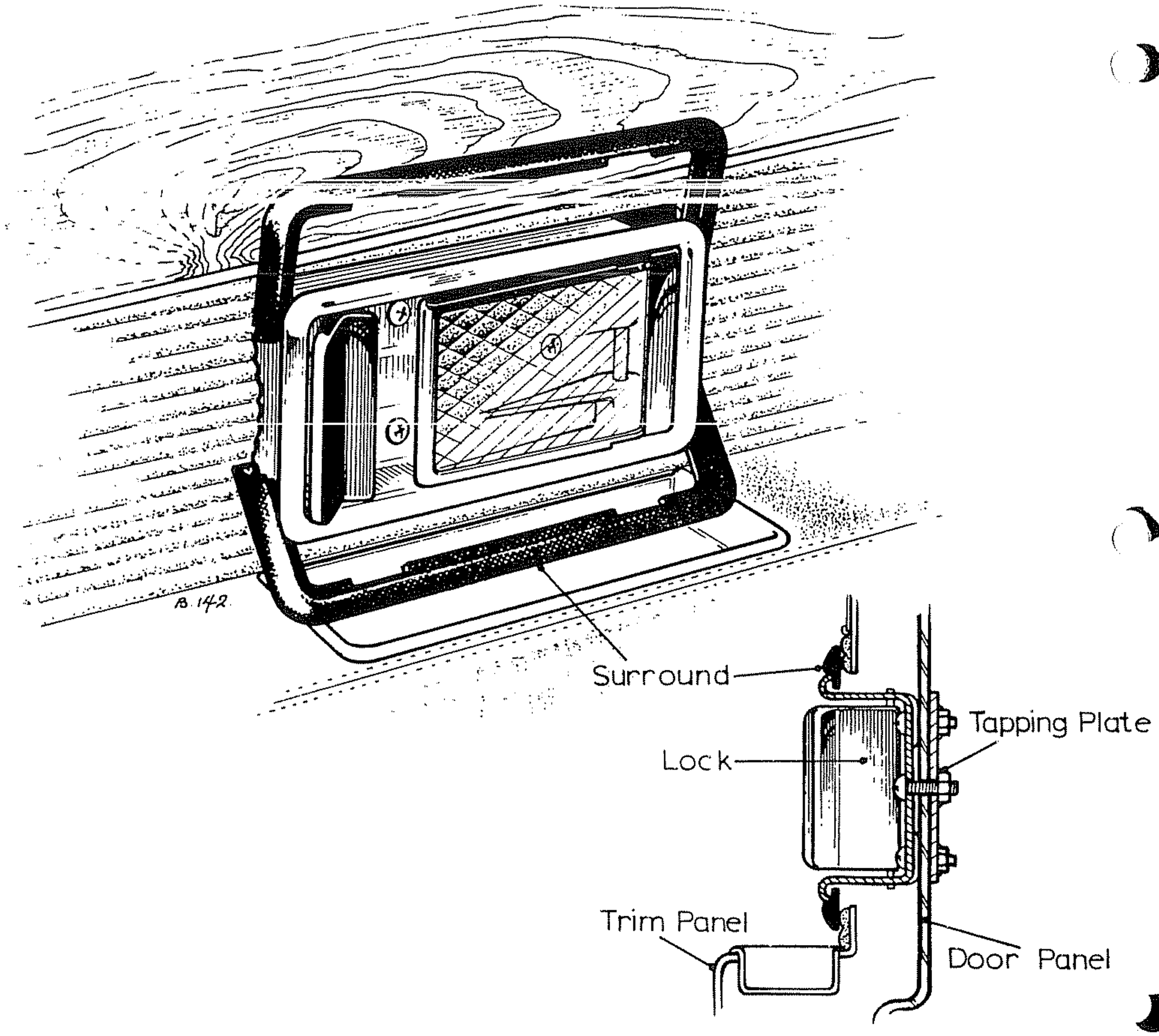


Fig. 11 - Interior door handle trim

2. Release the screws on the underside or lower part of the front and rear door shut edge securing the trim panel to the door.
3. Lift trim panel away from lower edge of door, push the panel up, unhook from top of door, and remove panel.

DOOR TRIM PANEL REPLACEMENT

1. Reverse the removal procedure, but check door lock operation, and opening and closing of door.

INTERIOR DOOR HANDLE REMOVAL

1. Remove the door trim panel.
2. Partly remove the PVC sheeting now revealed. Disconnect the locking flap (small) rod, and the lock operating rod from the nyloc block.
3. Release the three screws securing the handle to the door. Do NOT misplace the tapping plate inside the door.

INTERIOR DOOR HANDLE REPLACEMENT

1. Reverse the removal procedure.

EXTERIOR DOOR HANDLE REMOVAL

1. Remove the door trim panel.
2. Partly remove the PVC sheeting now revealed. Disconnect both lock operating rods from the door handle assembly. Remove the two nuts from the door handle mounting bracket.
3. From the exterior of the door, remove the handle together with its gasket.

EXTERIOR DOOR HANDLE REPLACEMENT

1. Reverse the removal procedure, but after refitting, check the lock operation for opening, closing, locking and unlocking.

WINDOW OPERATING MOTOR REMOVAL

1. Remove the door time panel, and the PVC sheeting.
2. Disconnect the cables from the motor.

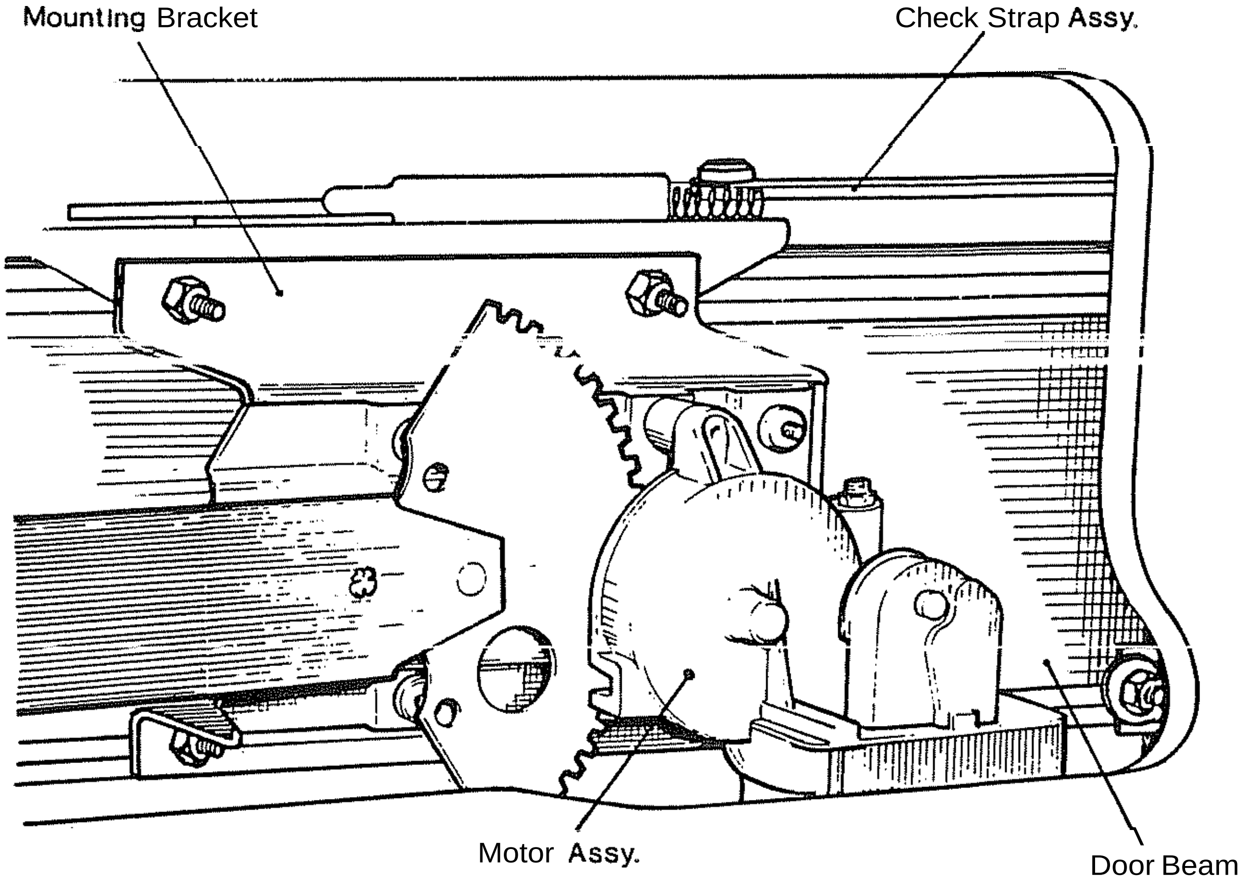


Fig. 12 - Window motor location

3. Support the window with a suitable piece of wood, or tape the glass to its frame, to avoid the possibility of the glass becoming dislodged from its operating channels.
4. Release the four bolts securing the motor mounting bracket to the door beam, and slide motor operating arm from the window channel. Remove motor together with its mounting bracket.

WINDOW OPERATING MOTOR REPLACEMENT

1. Reverse the removal instructions.

DOOR CHECK STRAP REMOVAL

1. Remove the door trim panel and the PVC sheeting.
2. Release the bolt securing the check strap to the door hinge and the two bolts securing the strap to the door beam. Remove the assembly.

DOOR CHECK STRAP REPLACEMENT

1. Reverse the removal procedure.

DOOR REMOVAL

1. Remove the door trim panel and partly remove the PVC rheeting. Disconnect the cables from the door window motor.
2. Remove the trim panel on the inside of the door hinge.
3. With the aid of a second operator, supporting the door, remove the hinge bolts.
4. Ease door from its location, pull adjusting shims from between body and hinges, and remove door assembly complete with hinges.

DOOR REPLACEMENT

1. Reverse the removal procedure, replacing all parts, and adjust hinges and lock striker as necessary.

SIDE CAPPING RAIL/FINISHER

TO REMOVE

1. Remove the quarter light by releasing the two bolts securing the stops attached to the top inside of the quarter light and lift clear of the bottom retaining strip.
2. Drill out the pop-rivets along the inside edge of the capping rail from the forward edge of the windscreen to the rear edge of the quarter light.

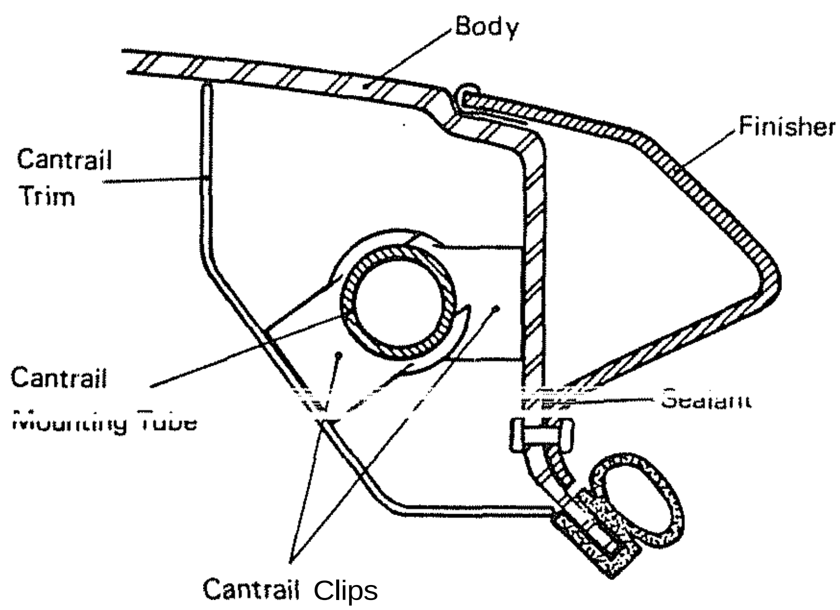


Fig. 13 - Side-capping rail/finisher

3. Using a suitable thin blade, cut through the sealant between the body and capping rail and then carefully lift away the capping roil releasing it from the finisher.

TO REPLACE

1. Clean the body surface where the capping rail is to be fitted ond apply sealant along the lower inner edge of the capping rail.
2. Feed the capping rail under the finisher ond check alignment along the length and at both ends. Clamp temporarily in position.

3. **Drill new fixing holes 0.125 in (3.17 mm) diameter, taking care not to drill near or on existing holes, as this could weaken the fixing. Pop-rivet the copping rail to body and remove any excess sealant using a suitable solvent.**

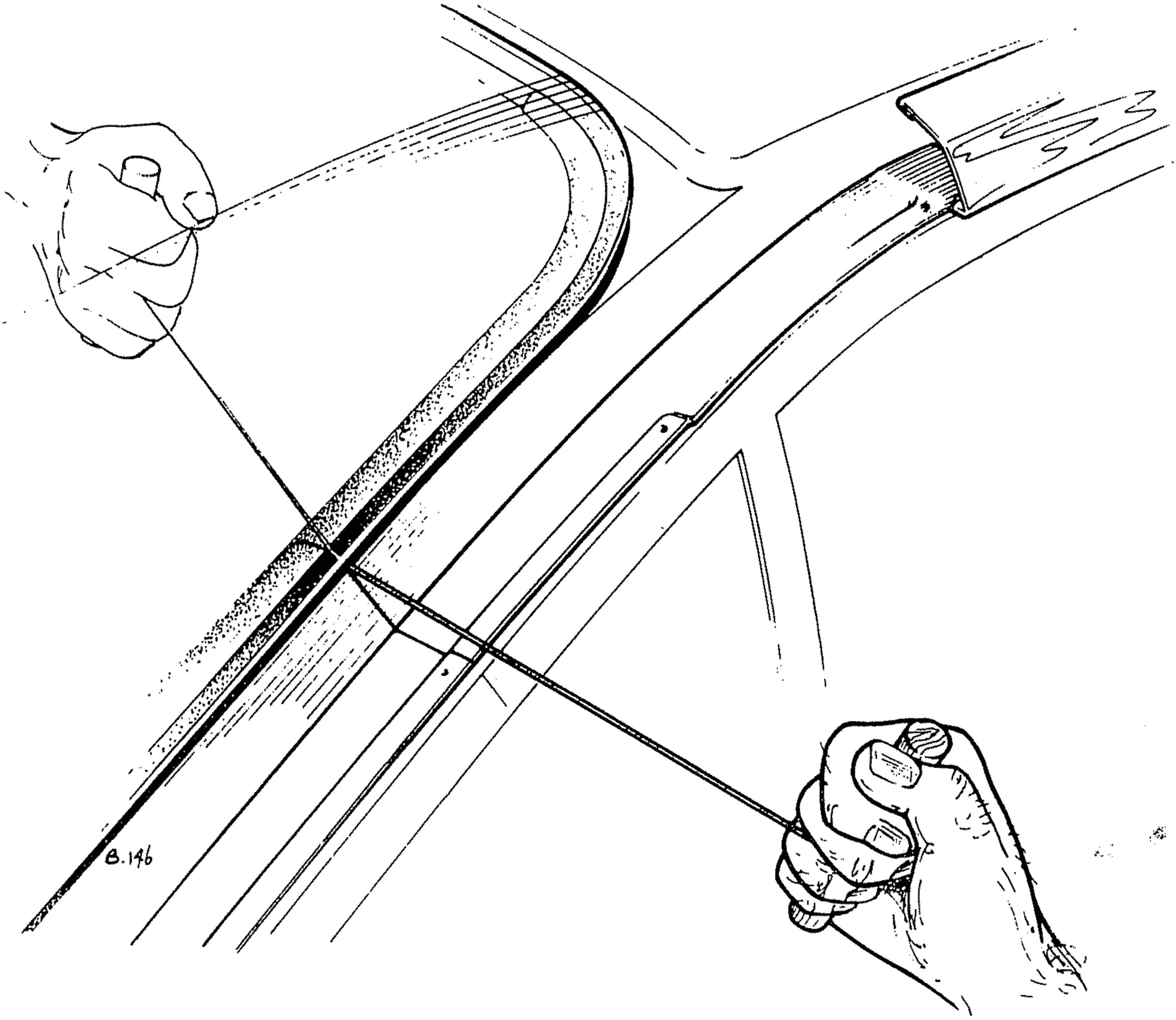


Fig.14 - Cutting windscreen 'Solbit' retainer

WINDSCREEN (WINDSHIELD)

TO REMOVE

1. Remove the wiper arm/blade assembly.
2. Remove sun visors, upper front headlining trim finisher and pull off trim.
3. Remove the three finishers from the top and sides of the windscreen. These can only be removed by prising off, which will damoge the finishers, therefore, new finishers will be required when refitting.
4. Drill a small diameter hole through the 'Solbit' sealing/retainer medium, near the 'A' post joint to the body. Insert a length of piano wire (or similar) approximately 1 yard (1 metre) long through the hole. With the aid of a second operator inside the car, use a sawing action with the wire and cut through the 'Solbit' to free the screen. Take care not to damage the interior trim during the cutting operation.

TO REPLACE

1. Remove remaining 'Solbit' from the body flange and wipe clean with methylated spirits (or similar). It is important to make sure these surfaces are perfectly clean before fitting a new windscreen.
2. Inspect all the trim clips for damoge or wear and replace where necessary. There are 13 clips (Part No. C079U4052) distributed around the sides and top of the windscreen; 4 each side and 5 along the top.

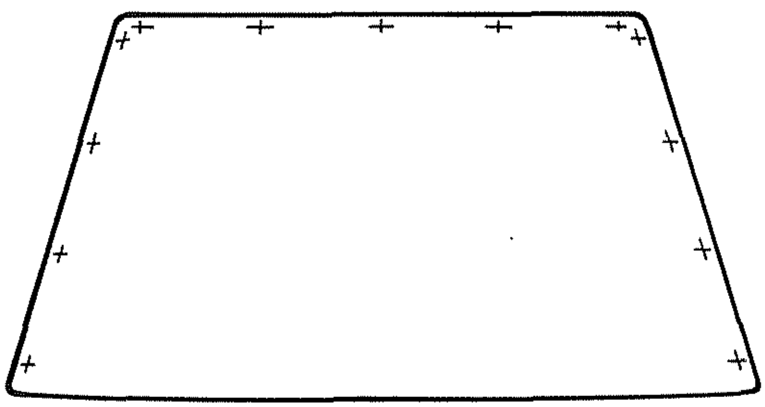


Fig. 15 - Location of windscreen positioning clips

Secure the clips with a **0.125** in (3.17 mm) pop-rivet, then seal the head of the rivet with o smear of sealant.

3. Apply a **0.75** in **(20** mm) wide band of 'Solbit' primer round the periphery of the screen and the body aperture.

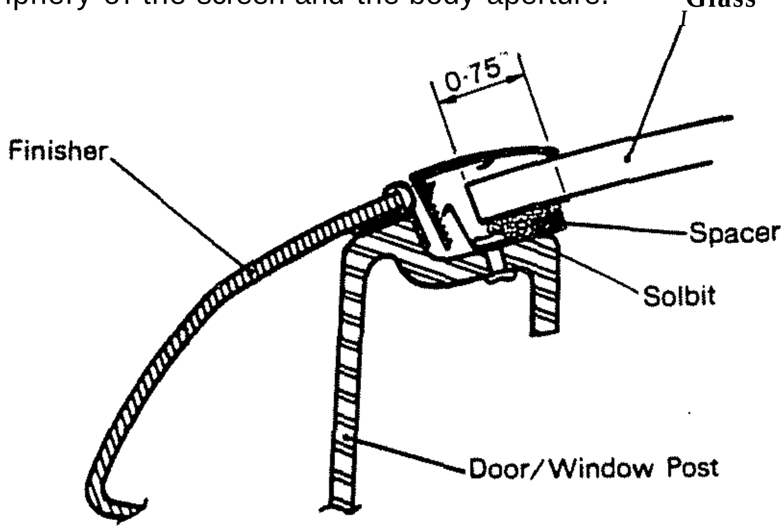


Fig **16** - Section through windscreen and fixing clips

4. Strip the ends of the 'Solbit' sealing/retaining medium to expose approximately 12 mm **(.5** in) of the internal heating wire. Connect the exposed ends to a variable current transformer (or two 12V batteries), and apply approximately **24** volts to the 'Solbit' until the surface is tacky. Disconnect 'Solbit' from transformer.

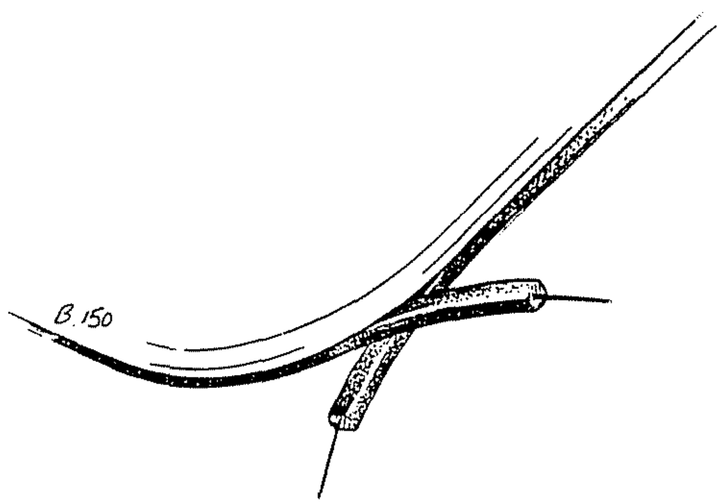


Fig. **17** - 'Solbit' retainer in position

5. Starting at a lower corner of the aperture, apply the 'Solbit' to the primed body flange. The 'Solbit' must be positioned over the flat

ends of the trim clips, and crossed at the end. Press into the surface of the 'Solbit' at regular intervals the small spacers on which the glass will rest.

6. With the aid of a second operator, lift screen into position on the body, ensuring that the screen is fitted so that it is resting on the spacers.
7. Connect the wire ends of the 'Solbit' to the transformer, switch on the current and apply hand pressure to the exterior of the screen, positioning the hands approximately 50 cm (or 18 in) from each edge on the horizontal centre line. As the 'Solbit' warms and starts to flow, continue to apply hand pressure (2–3 minutes), the screen will then be felt to move slowly inwards, stopping when it reaches the spacers. Do not apply pressure once the screen is against the spacers, as excessive pressure will cause the screen to crack. Continue to apply current for a further [illegible] minutes, then disconnect the transformer and using side cutters trim 'Solbit' flush with the screen.
8. The corner mitres on the windscreen finishers should be checked before fitting to ensure a snug fit when in place.
9. Fit the corner inserts (Part No. A079U4051) in the top left and right hand mitres and position the assembly on the retaining clips.
10. When satisfied the finishers are located correctly, press finishers dawn on to the retaining clips, starting from the corners first.
11. Water test the screen replacement, but only when the 'Solbit' is completely cold (approximately 2 hours after fitting), if satisfactory, continue the replacement process. If unsatisfactory, remove the screen and repeat operations 1 to 10 inclusive.
12. Dry off surplus water and replace wiper arm/blade assembly. Check operation of wiper/washer mechanism. Clean screen and its surrounding area. Re-paint lower edge of screen with black paint.
13. Replace upper front headlining finisher and both the sun visors.

HEADLAMPS

The headlamps are raised and lowered by an electric motor, which is located in the front compartment, next to the left hand lamp pod. A knurled knob protruding from the bottom of the motor can be turned by hand to raise the lamps in an emergency or for maintenance.

For maintenance purposes the headlamps can be raised electrically. This is achieved by switching on the lights, waiting until pods are up, then raising the bonnet lid (which operates a microswitch, turning off the power to the lamp bulbs). Under no circumstances should the microswitch be operated while the bonnet and pods are in the 'up' position. Take precautions to protect the microswitch from inadvertent operation during these circumstances.

HEADLAMP MOTOR REMOVAL

1. Disconnect the rod end link from the motor drive shaft.
2. Unscrew the three screws holding the headlamp motor mounting bracket and withdraw motor assembly.
3. The motor unit can now be unscrewed from the mounting bracket.

HEADLAMP MOTOR REPLACEMENT

1. Reverse the removal procedure, but be sure the rod end link is correctly located before tightening up the bracket fixing bolts.

LAMP POD REMOVAL

1. First remove the bonnet to gain access to the pad fixing screws.
2. Unscrew the two nyloc nuts on the bolts securing the pod to the cross-shaft. Loosen the clamping bolt holding the cross-shaft and pull the cross-shaft into the pod recess in the body to clear the pod fixing bolts.
3. Unscrew the nyloc nut securing the other side of the pod and pull the pod over the stub protruding through the body.
4. Disconnect the electrical wiring to the lamp.

LAMP POD REPLACEMENT

1. Reverse the removal procedure and adjust the position of the pod relative to the body.

KEY TO FIG. 18

1. Headlamp Motor Mounting Bracket, RoW
2. Headlamp Motor Mounting Bracket, Fed
3. Headlamp Motor Assy
4. Microswitches
5. Switch Plate
6. Long Link, Headlamp Operation
7. Short Link, Headlamp Operation
8. Rod End. Link Headlamp Actuation
9. Shoulder Bush
10. Cross shaft, LH
11. Cross shaft, RH
12. Cross shaft Coupling
13. Bearing Bracket, Headlamp Support Stay, RoW
14. Bearing Bracket, Headlamp Support Stay, Fed
15. Assy, Headlamp Jack Spring
16. Rubber Stop

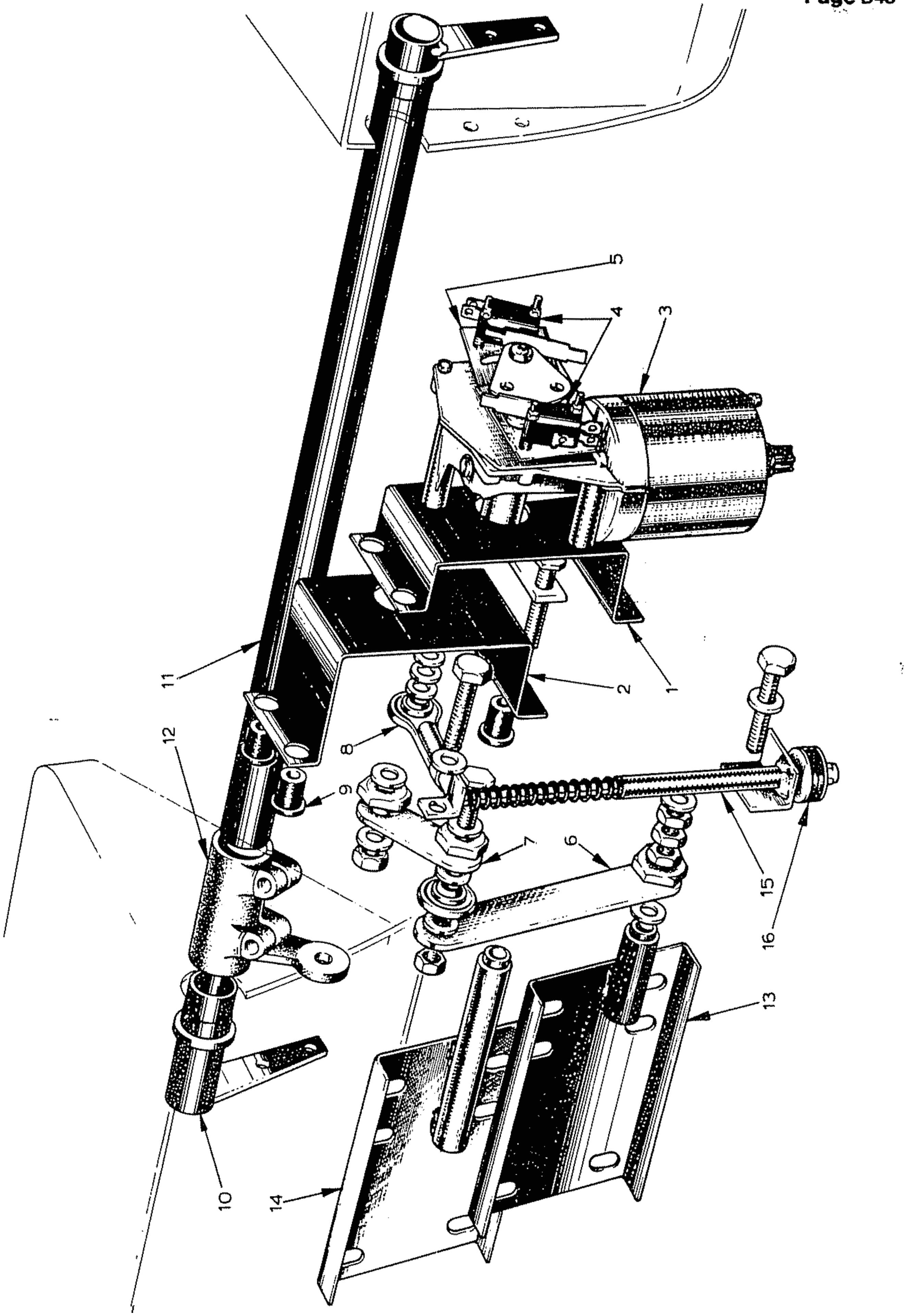


Fig. 18 - Headlamp Assembly - Single motor

KEY TO FIG.19

1. Headlamp Motor
2. Headlamp Motor Mounting Bracket
3. Headlamp Motor Rotary Link
4. Rod End
5. Connecting Link - Headlamp Actuation
6. Bracket - Rod End to Headlamp Pod
7. Bearing Housing, RH Pod
8. Glacier Bush
9. Water Shield
10. Hinge Pin, Pod and Bonnet
11. Hinge Blade, RH
12. Spring Clip
13. Pod Outer Pivot Pin
14. M 6 Jacknut
15. M6 x 30 Screw
16. M6 Locknut

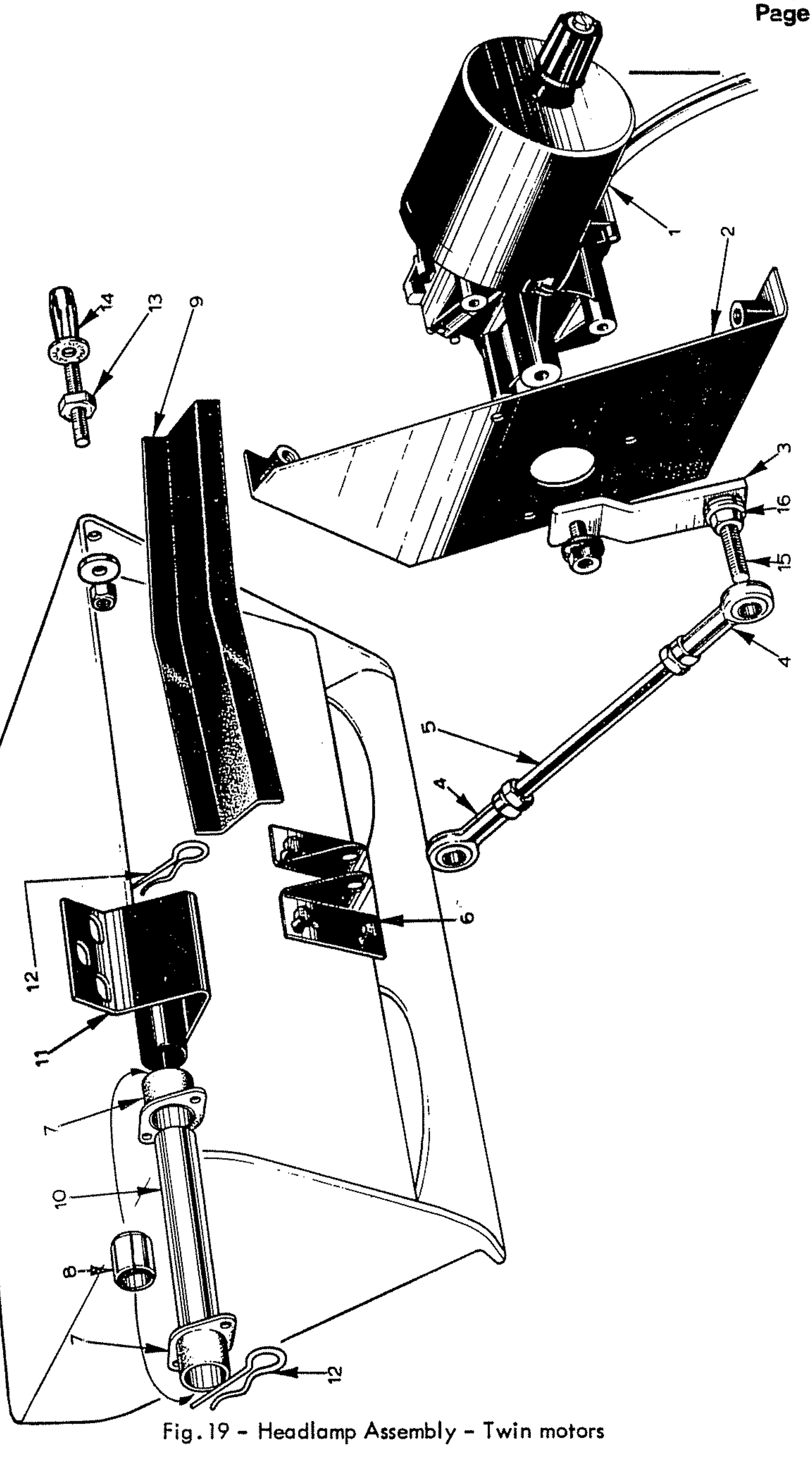


Fig. 19 - Headlamp Assembly - Twin motors

HEADLAMP POD ADJUSTMENTS

To adjust the 'up' positiori of the pod, the damper on the heodlomp jack spring ossembly, in the front comportment, can be repositioned by the nyloc nut on the jack spring shaft. Screwing in the nut closes down the pod and screwing out the nut opens up the pod.

Finally check the 'up' and 'down' free-play in the lamp pod ond adjust out as much free-play as possible using the odjustirig nut. Take core not to over or under adjust as this may bend the linkoge.

INSTRUMENT BINNACLE

All the instruments are contained in a binnacle fitted to the sloping front window sill over the steering column. Switches ond controls ore mounted on the angled side panels in the binnacle and the indicator lamps and meter on the centre panel.

TO REMOVE

1. Unscrew the switch panels on each side of the binnacle and dis-connect electrical connections.
2. The heater control ponel con now be uncoupled and the hoses dis-connected from the vents. To uncouple the heater control remove the two control knobs (pull off) ond unscrew the heater control lever ossembly from the back of the mounting plate.
3. Release the two bolts securing the front of the binnacle to the instrument panel mounting bracket. Remove the two self topping screws at the rear of the binnacle, near the windscreen. Lift the binnacle clear of the heater control lever ossembly, hoses, drive cables arid wiring.

TO REPLACE

1. Reverse the removal procedure.

SAFETY BELTS

The seat belt reel assemblies are located in the engine compartment and are fitted to the back of the bulkhead, one on each side.

TO REMOVE

1. Prise off the small cover, near the bottom of the reel assembly, to gain access to the fixing bolt. Remove the reel assembly fixing bolt (A) and the lower anchor bolt at (C).
2. Slide the belt fastening clip off the end of the belt (lower anchor plote). Feed the lower anchor plate through the feed slot in the bulkhead. Take care not to damage the feed slot trim when pulling through belt and anchor plate.
3. Remove the belt lock from the chassis centre section, by removing the screw at (B) and disconnect the 'Fasten Seat Belt' warning lamp wires.

TO REPLACE

1. Reverse the removal procedure, taking care the reel assembly is mounted vertically, this ensures the sensing weight is in the correct position.

NOTE: If a new reel assembly is fitted, check the belt runs from the reel the correct way up. The belt can be mode to run up the other way by pulling the belt out as far as it will go, folding the belt diagonally on itself and allowing the belt to return on the reel, carefully feeding the double layer until it clears the slot.

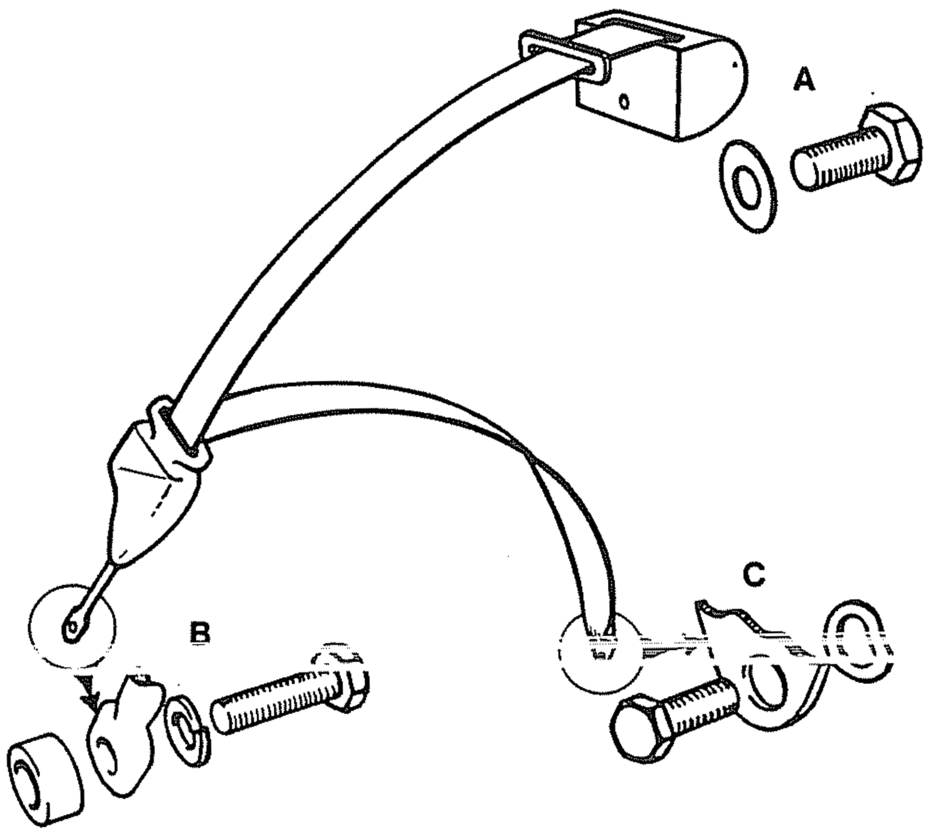


Fig.20 - Safety Belt fixings

TESTING

1. The reel will lock when the car is stopped suddenly or accelerated hard. **Any** change of speed in any direction, which includes turning, will lack the reel.

2. The reel should run free when the car is stationary and when the car is travelling at a constant speed.

3. The recommerided method of testing the seat belts on the road is to use a brake testing meter. The rneter should give a reading of 50% when the reel is locked.

   If a deacceleration greater than 50% is required to lock the reel, then the belt must be replaced.

FRONT BUMPER

TO REMOVE

1. Remove both headlamp pod assemblies and disconnect the wires from both side/indicator lamp assemblies. It is not necessary to disconnect the side/indicator lamp assemblies on car with the Federal specification.
2. From inside the headlamp pod accesses and front compartment, remove the bumper mounting bolts with their washers. Unscrew the self tapping screws securing the bottom of the Eur/Domestic front bumper.
3. Remove the front bumpers and on Eur/Domestic cars remove the side/ indicator lamp assemblies from the bumper.

NOTE: Federal front bumpers are secured with eight bolts and all others are secured with 2 fixing bolts, the side/indicator lamp fixing screws and 5 self tapping screws along the bottom of the bumper.

TO REPLACE

1. Reverse the removal procedure, but first clean the surfaces on the body which come in contact with bumper and apply sealant to the bumper before fitting. Fit the finishing strip.
2. Reconnect the wires to the side/indicator lamps where applicable and check the lamps function correctly.
3. Replace headlamp pod ossemblies.

REAR BUMPER

TO REMOVE

1. From inside the engine compartment remove the rear trim panel and unscrew the bumper mounting bolts and washers.
2. Remove the bumper assembly.

NOTE: Federal rear bumpers are secured with 6 studs, washers and nuts, and all other rear bumpers are secured with 2 bolts.

TO REPLACE

1. Reverse the removal procedure, but first clean the surfaces on the body which come in contact with bumper and apply sealant to the bumper before fitting. Refit trim panel in the engine compartment.

VALENCE

TO REMOVE

1. Unscrew the 2 self tapping screws and 7 bolts and washers.

TO REPLACE

1. Reverse removal procedure.

EXTERNAL B/C POST FINISHER

TO REMOVE

1. Remove the quarter light (see Page 53), partly remove the door seal alongside the finisher.
2. Drill out the pop-rivets securing the finisher to the body and prise off the finisher, taking care not to damage the side capping rail.

TO REPLACE

1. Reverse the removal procedure, but first clean the surfaces on the B/C post and apply sealant before fitting.

NOTE: If a new finisher is fitted check the alignment of the fixing holes; drill new holes if necessary. Ensure the top of the finisher fits snugly against the side capping rail.

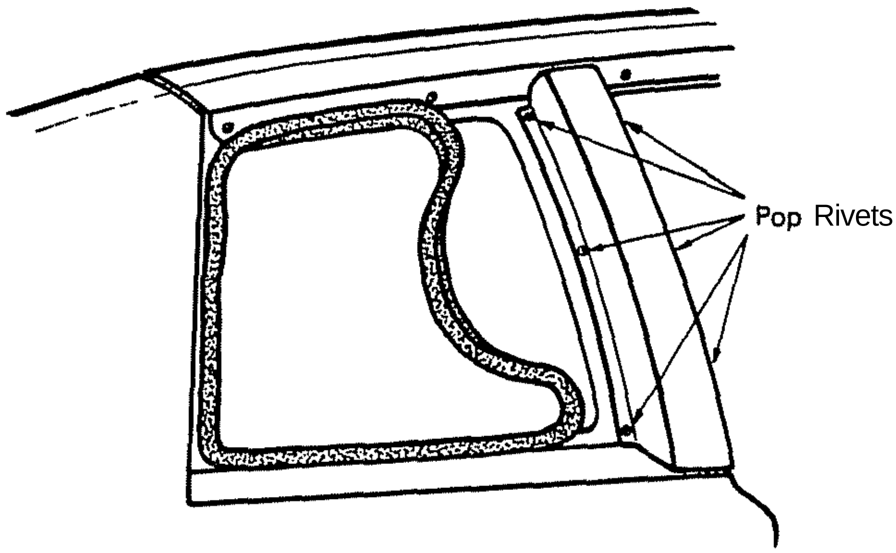


Fig.21 - External B/C Post Finisher

FRQNT SEAT

TO REMOVE

1. Slide the seat fully backward. From the front end of both seat runners, release the nuts with their flat washers from the seat runner mounting bolts. (The nuts are on the underside of the body.)
2. Do not remove the bolts at this stage.
3. Slide the seat fully forward and release the nuts and washer from both rear mounting bolts.
4. Disconnect the seat sensor wires (if fitted). Remove the seat assembly.

TO REPLACE

1. Reverse the removal procedure.

2. Connect the seat sensor wires (if fitted).
3. Apply underseal to the seat mounting bolts, nuts and washers, to prevent possible water entry.

DOOR LOCK

TO REMOVE

1. Remove the door trim panel and PVC sheeting from the door.
2. Remove the exterior door handle assembly (A)
3. Disconnect both remote control rods (E and F) from the lock assembly.
4. Release the four bolts securing the lock (B) to the door and remove the lock assembly together with the two rods (C & D).

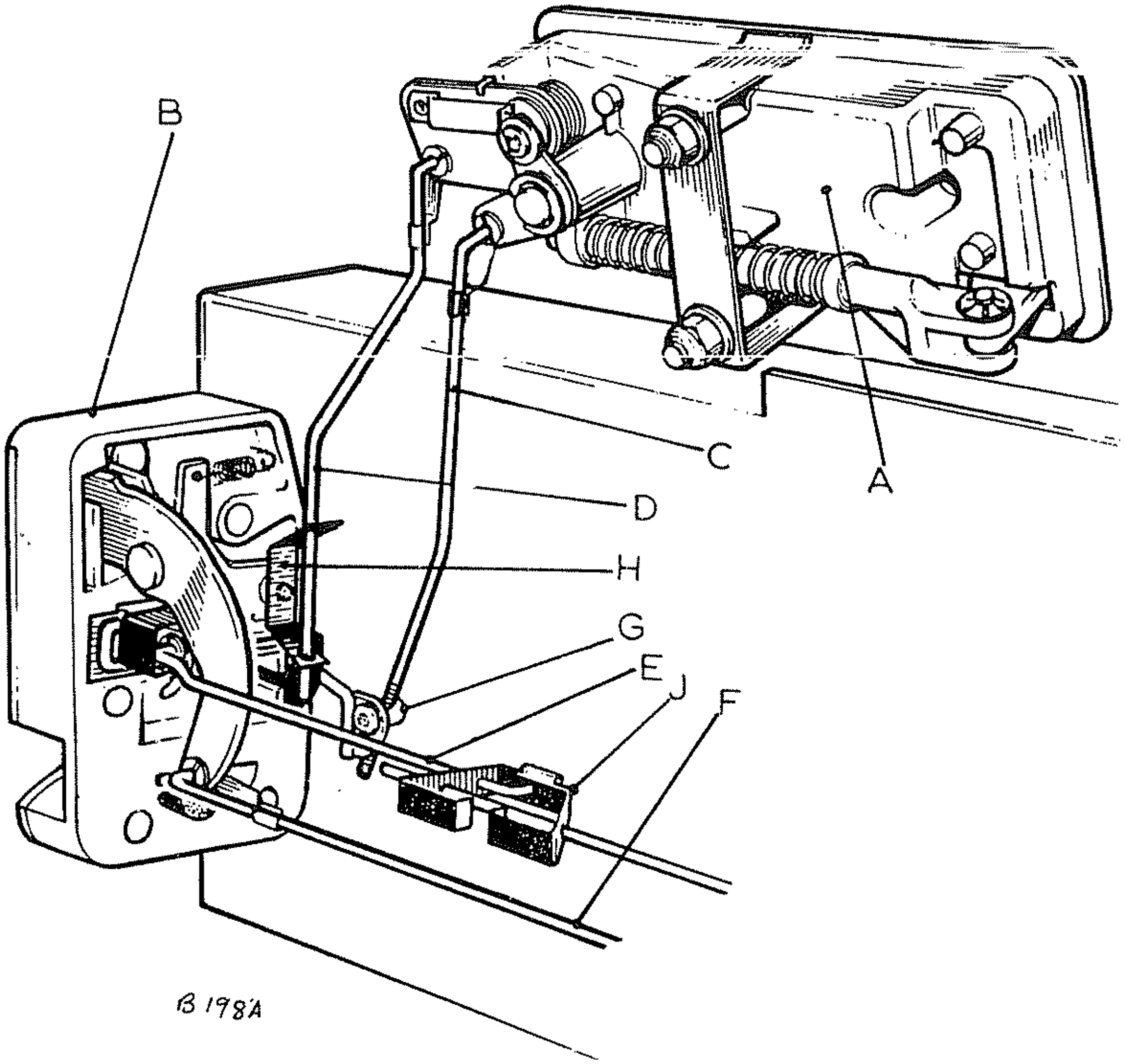


Fig.22 - Door lock and linkages

KEY TO FIG.22

A. Exterior Door Handle
B. Door Lock
C. Locking Rod to Exterior Hondle
D. Releose Rod to Exterior Handle
E. Locking Rod to Interior Handle
F. Release Rod to Interior Handle
G. Adjustable Cocking Rod to Exterior Handle
H. Clip Adjustable Release Rod to Exterior Handle
J. Clip Adjustable Locking Rod to Interior Handle
K. Clip Adjustable Release Rod to Interior Handle

TO REPLACE

1. Reverse the removal procedure, but before replacing the PVC sheeting and the door trim panel, with the car on its wheels on level ground, ensure that the door lock and the door handler are functioning correctly. If not, adjust the control rods as necessary.
2. To adjust the locking rod (C) from the exterior door handle to the lock assembly, disconnect the rod from the exterior door handle and screw it in or out as required (G).
3. All the other rods can be adjusted on their connecting clips (H, J & K).

REAR QUARTER LIGHT

TO REMOVE

1. From inside the engine compartment, remove the two fixing screws securing the two tobs attached to the inside top of the quarter light. Carefully ease the two tobs through the quarter light opening while pulling the top of the quarter light out. When the tabs are free of the opening, lift the quarter light assembly off the sill finisher ledge.

TO REPLACE

1. Reverse the removal procedure. Check the rubber seal around the opening for damage, replace if necessary.

DOOR WINDOW FRAME

TO REMOVE

1. Remove the door trim panel, the window operating motor, the exterior door handle ond the door lock assembly.

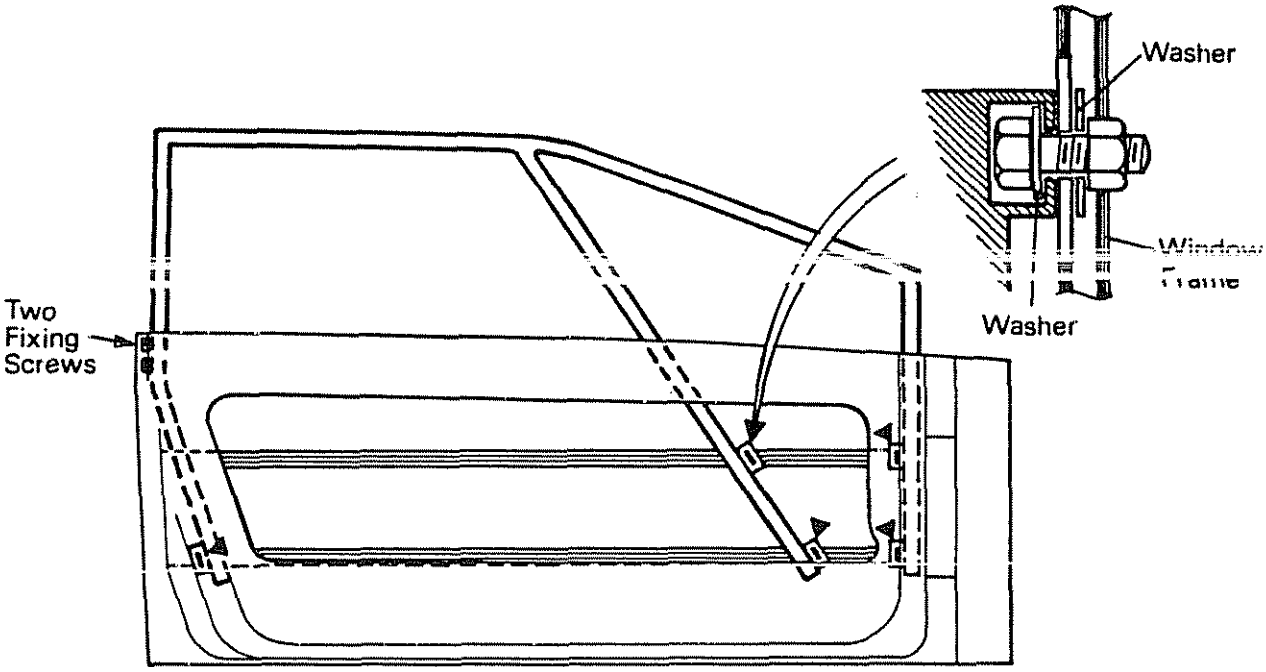


Fig.23 - Window Frorne fixing bolts

2. Access to the bolts securirig the window frame is through the access hole in the door shell. The bolt heads ore retained in longitudinal slots in the door beam, therefore, it will be necessary to carefully lift the frame off the bolts before withdrawing the window frame together with the window gloss.
3. Further dismantling of the window frame should be carried out on o felt covered bench.

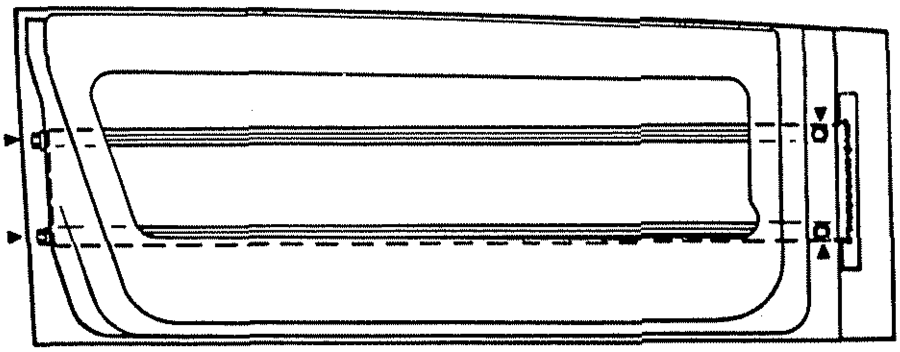


Fig.24 - Door Shell fixing bolts

TO REPLACE

1. Reverse the removal procedure, fine adjustment of the position of the window frame can be achieved using the movement in the door beam slots.
2. Ensure that the door, window motor and locks are functioning correctly when fully assembled.

DOOR SHELL

TO REMOVE

1. Remove the door window frame.
2. Remove the two bolts at the front inside edge and the two bolts at the rear edge of the door, securing the shell to the door beam.
3. Slide off the door shell from the door beam.

TO REPLACE

1. Reverse the removol procedure.

NOTE: Assemble door assembly in the following order:

(a) Fit the door beam to the car

(b) Fit the door shell to the beam

(c) Fit the window frame

FRONT QUARTER LIGHT GLASS (DOOR)

TO REMOVE

Remove the door window frame and place it on a felt covered bench. To remove the glass from the window frame, soak the 'Solbit' sealing/retainer medium in "Solbit-Primer" for approximately one hour and remove the glass, or if the glass cannot be removed break the glass.

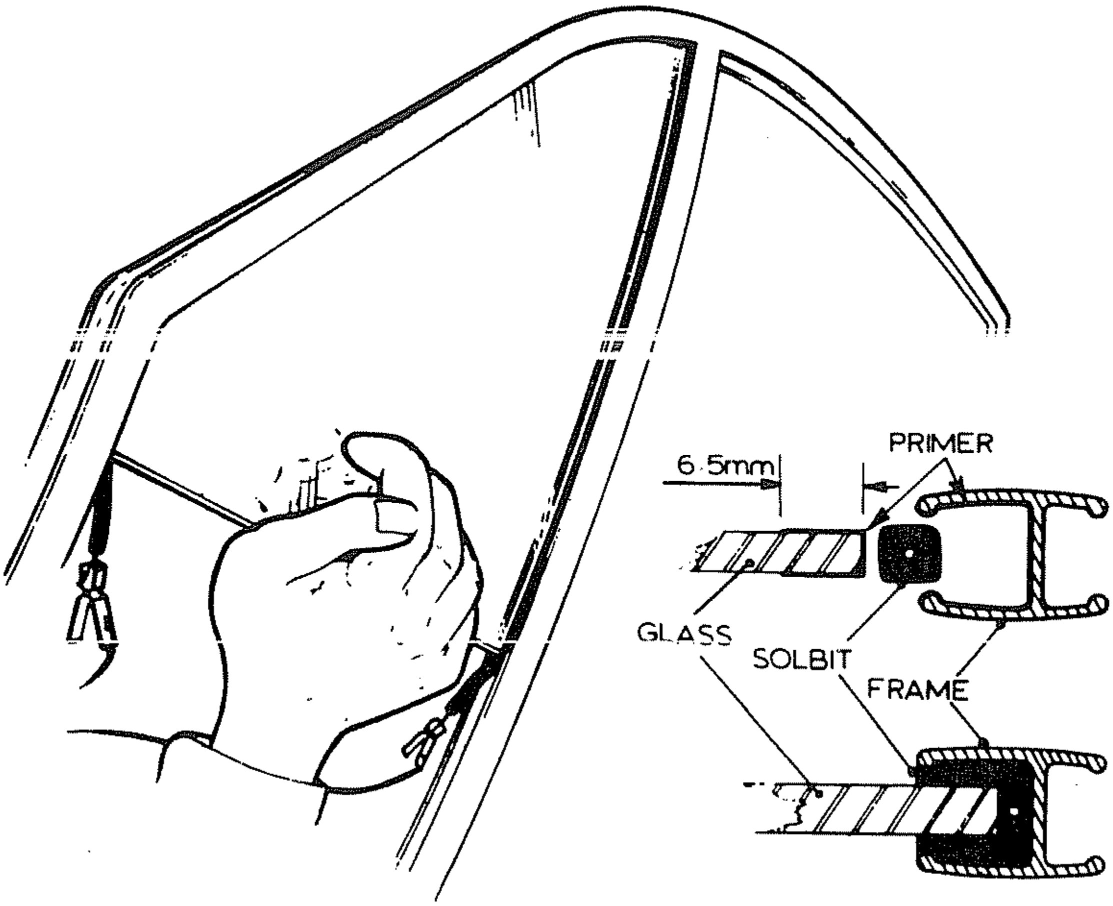


Fig.25 - Fitting Quarter Light Glass

Remove remaining glass and 'Solbit'from inside the quarter light channels in the window frame.

TO REPLACE

Clean the new glass with methylated spirit around the front and rear edge of the glass. Apply 'Solbit-Primer' to the edge of glass and a *0.25* inch wide band on both sides of the front and rear of the glass.

Apply 'Solbit-Primer' to the quarter light channel in the window frame.

Strip ends of 'Solbit' to expose approximately 0.5 inch of internal copper wire.

Connect the ends to a variable transformer or a battery, and apply 6 volts to the 'Solbit' until its surface is tacky.

Disconnect the power source and position the 'Solbit' on the primed edge of the glass.

Introduce glass and 'Solbit' into the window frame and push home, until the 'Solbit' contacts the window frame.

Clamp window frame into its correct shape when applying electrical heating to ovoid distorting the frame.

Connect the copper wire ends of the 'Silbit' to the 6 volt power source, apply pressure to the lower edge of the glass, and as the 'Solbit' starts to flow push the glass fully into the window frame.

Connect the copper wire ends of the 'Solbit' to the 6 volt power source, apply pressure to the lower edge of the gloss, and as the 'Solbit' starts to flow push the glass fully into the window frame.

Keep the gloss central in the window frame channel, and continue to apply current for a further 6 minutes while smoothing out excessive 'Solbit' protruding from the window channel. This must leave a smooth, unbroken, constant level surface with the edge of the window frame.

Disconnect the power source from the 'Solbit'.

Using side cutters, trim the 'Solbit' flush with the corners of the glass.

Replace the door window frame.

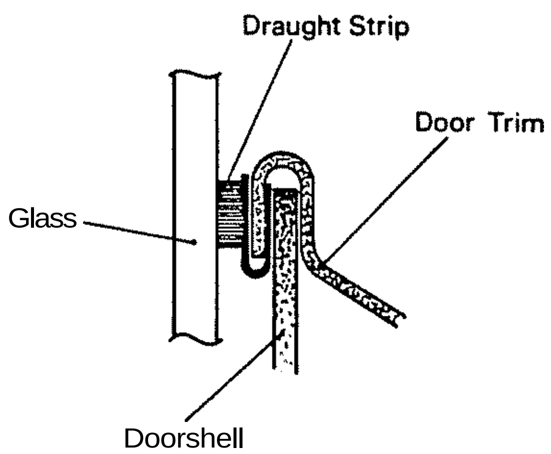


Fig. *26* Section through Internal Finisher

DOOR TO WINDOW FINISHERS

TO REMOVE INTERNAL FINISHER

1. Remove the door trim panel to which the internal finisher is fitted.
2. East off the finisher from the door trim panel.

TO REPLACE

1. Apply sealant along the edge of the door. trim panel and press on finisher and refit door trim panel.

TO REMOVE EXTERNAL FINISHER

1. Remove the door trim panel to gain access to the three fixing studs securing the external finisher. Loosen the nuts on the studs ond lift off the finisher from the door.
2. The rubber seal can be replaced by drilling out the 13 pop-rivets and fitting o new seal with pop-rivets.

TO REPLACE

1. Apply sealant along the top edge of the door and locate the finisher in the three slots, with washers against the nuts. Push down on the finisher above each slot and tighten nuts, ensuring the finisher is not distorted and the rubber seal lies against the glass when raised.
2. Refit the door trim panel.

MODEL S2 CHARACTERISTICS

An air scoop is fitted to the rear of each rear quarter light, one feeds air into the engine cover and the other to the airbox, via the engine compartment. The side panels in the engine compartment are sealed with vents into the engine compartment.

ENGINE COVER

The engine cover in the model S2 vehicle is sealed against the engine compartment floor and hos an access hatch for routine maintenance. Moulded into the top of the cover are recesses for the wheel jack ond tools.

TO REMOVE

1. Raise the tailgate, remove the tonneau cover and release the clips securing the service hatch. Lift up hatch.
2. Unscrew wire clip securing the flexible ducting tube to the airbox and pull out the ducting tubes from the engine cover.
3. Unclip the elastic straps from both sides of the cover and the two on the inside at the rear of the cover.

TO REPLACE

1. Reverse the removal procedure.

ENGINE COMPARTMENT AIR FLOW

Air to the airbox is first picked up through the left hand air scoop, where it is expelled into the engine compartment through the left hand side panel vent, see figure 27. Air is drawn through the right hand side ponel vent, through the flexible ducting to the airbox.

The right hand air scoop is connected via o flexible ducting to the engine cover. Federal vehicles and those used in high ambient climates are fitted with a fan in the ducting, which is controlled by a temperature sensor on the airbox under the engine cover.

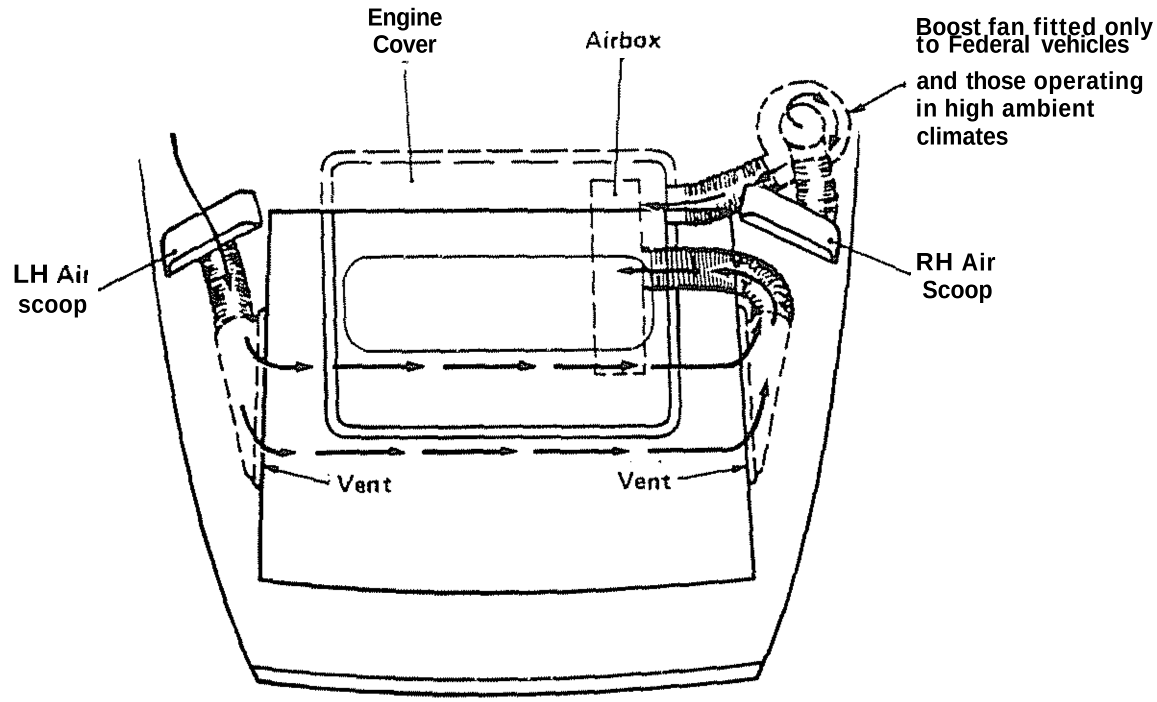


Fig.27 Engine Compartment Air Flow

LEATHER UPHOLSTERY

Leather trim is available in many colours for the model 52. To clean, wipe over occasionally with o cloth damped in warm soopy water. It is important that the **soap** used is a mild, non-caustic scap, such as roiier soap. Follow this by clean water applied on a' fresh clean cloth; ovoid flooding the surface of the leather. Then dry and polish leather surface using a soft dry cloth, After approximately one year it is recommended that the leather is treated with 'Connolly's Cee Bee Hide Food', follow the instruction on the container.

CAUTION: Under no circumstances should petrol, detergents, furniture creams and polishes be used.

WINDSCREEN AND TAILGATE GLASS

If a new glass is to be fitted for any reason a complete kit, Part No. A075B6158J-1 will be required for each screen.

TO REMOVE

1. For a windscreen remove the wiper arm/blade assembly, sun visors, upper front heodlining trim finisher and pull off trim. For the tailgate glass remove the electrical connections to the tailgate glass heater.

2. Remove the finishers from around the glass. These can only be removed by prising off, which will damage the finishers, therefore, new finishers will be required when refitting.

3. Drill a small diameter hole through the sealing/retainer material, near the 'A' post joint to the body. Insert a length of piano wire (or similar) approximately 1 yard (1 metre) long through the hole. With the aid of a second operator inside the car, use a sawing action with the wire and cut through the sealing/retainer material to free the screen. Take care not to damage the interior trim during the cutting operation.

4. Remove any remaining sealing/retainer material and the trim clips. Wipe the body flange with methylated spirit or similar until the surface is perfectly clean. If traces of sealing/retaining material (such as Solbit) are still visible use Wipe Cleaner No. 4 to remove and wipe dry.

TO REPLACE

1. Apply glass primer over the cleaned body flange area, fit new trim clips and where applicable seal the pop rivet heads. Wipe over pap rivets and clips with Wipe Cleaner No. 4 and wipe dry. Apply glass primer over the cleaned area and after primer has dried seal over rivets with Betaseal 71904.

2. Place glass an body flonge and position correctly on the vehicle centre line Mark position with tape from glass to body, cut tape so that relocation of correct position can be achieved by lining up on tape:

   NOTE: On windscreens place tape in line with the lower edge of the glass to give a neot edge to the bonding material when tape is removed.

3. Clean laminated edges of glass using a sharp knife. With the special paper from the repair kit cut in two, clean with one half soaked in Wipe Clean No. 4 the perimeter of the glass to the depth of the primer applicator. Also clean the edges of the glass and the body flange. Using the other half of the special paper superficially wipe dry the areas cleaned.

4. Shake primer container for at least 30 seconds before opening. Pour glass primer into plastic container and push home the insert and felt applicator into the neck of the container. Cut applicator holder using a sharp knife to produce a 20mm wide application of primer around the perimeter of the glass.

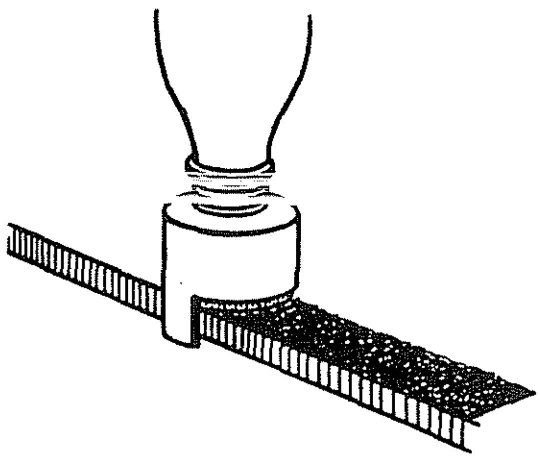


Fig. 28 Application of Glass Primer

5. Apply glass primer around perimeter and laminated edge of glass until a deep black colour is achieved. Allow to air dry until dry to the touch.

NOTE: In order to cover bus-bar connections on the heated tailgate glass, stop the primer short of the tag and gently bend tag upwards. Use masking tape to continue the line of the primer beyond the tags and prime the area. When primer dry remove tape and clean up edges if necessary.

CAUTION: Should primed surface need repairing, wait 5 minutes for it to dry before applying more primer.

6. Remove the desiccant container from the bottom of the sealant cartridge and cut application nozzle with stop and outlet to required shape of sealant bead.

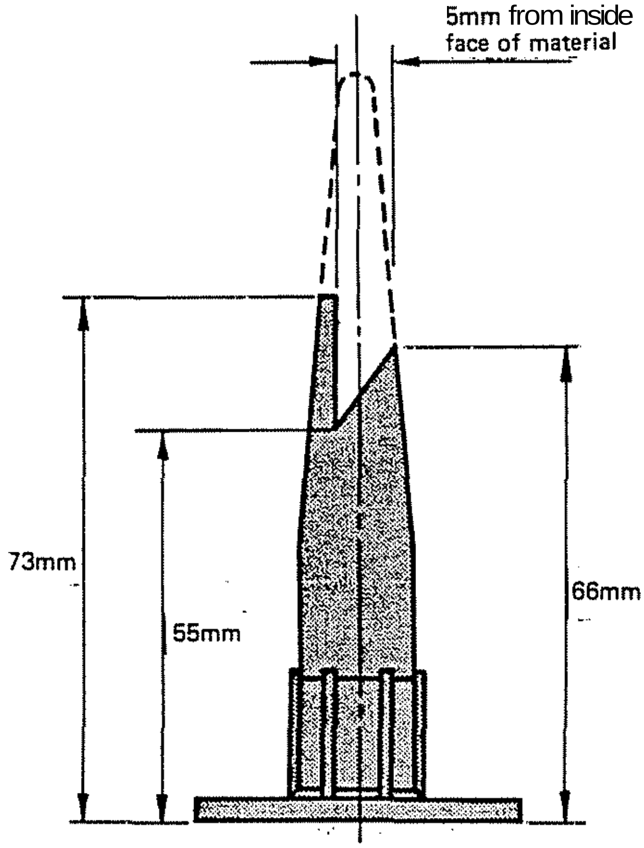


Fig. 29 Sealant Application Nozzle

Instructions for Cutting Nozzle

(a) Cut the nozzle length to the 73mm dimension.

(b) Cut into the centre line of the nozzle at the 66mm dimension and then cut down centre line from the 73mm dimension.

(c) Check the dimension to the inside face of the material is 5mm. If not, enlarge opening by cutting away more material until 5mm is reached.

(d) Cut down to the 55mm dimension and then make the angled cut from the 66mm to the 55mm dimension.

7. Pierce membrane in cartridge thread, screw on application nozzle and insert in cartridge gun.

8. Extrude a continuous bead of sealant on the perimeter of the glass, using the edge of the glass and the shape of the nozzle as a guide. When extruding the bead of moterial hold the gun at about 45° to the glass and leaning slightly inboard. This will give the bead the correct dimensions and also make the top of the bead collapse inboard of the glass/body

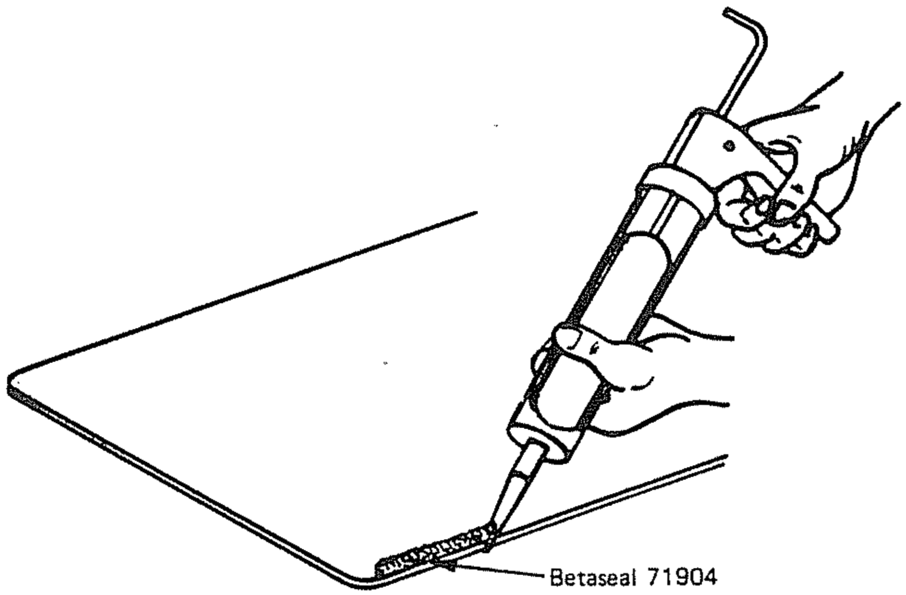


Fig. 30 Application of Betaseal with Hand Gun

assembly, therefore reducing the amount of material squeezed out of the seal at assembly.

9. Position the rubber spacer blocks on each corner of the screen as snown in fig. 31. Spacer block **Part** No. A075U0588Z, 8 off, size 4mm x 4mm x 10mm.

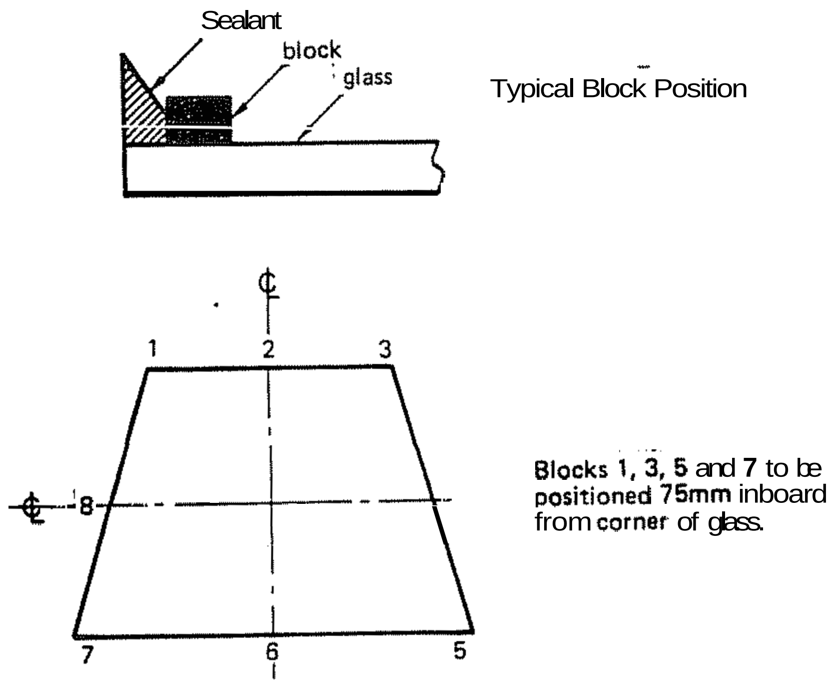


Fig. 31 Position of Rubber Spacing Blacks

10. Gently lower the glass onto the body flange, locating the correct position by lining up on the tape.

NOTE: This operation can be made easier by using rubber suction pads.

Press gently all round the edge of the windscreen in order to ensure perfect adhesion of the sealant to the body.

11. Support the glass at the top using tank tape and the lower edge with blocks made from wood, rubber or similar. This support is necessary to stop any; slippage of the screen while the sealant is curing. If any surplus sealant is squeezed outboard of joint, 'paddle' the sealant back into the seal area with a wooden spatular or similar.

12. Before replacing any bright trim carry out a water test on the glass. If a leak is detected, mark the position and dry thoroughly using a blow dryer or similar. Extrude a small amount of sealant on the suspect area, paying special attention to any trim fixing clips.

NOTE: Rubber spacing blocks can be left between the glass and body if the blocks do not interfere with the fixing of the bright trim. If blocks are removed fill the gaps with sealant.

13. Allow 6 hours for sealant to cure before fitting bright trim. Any attempt to fit bright trim before sealant is thoroughly cured could distrub the water seal around the trim fixing clips.

SECTION C

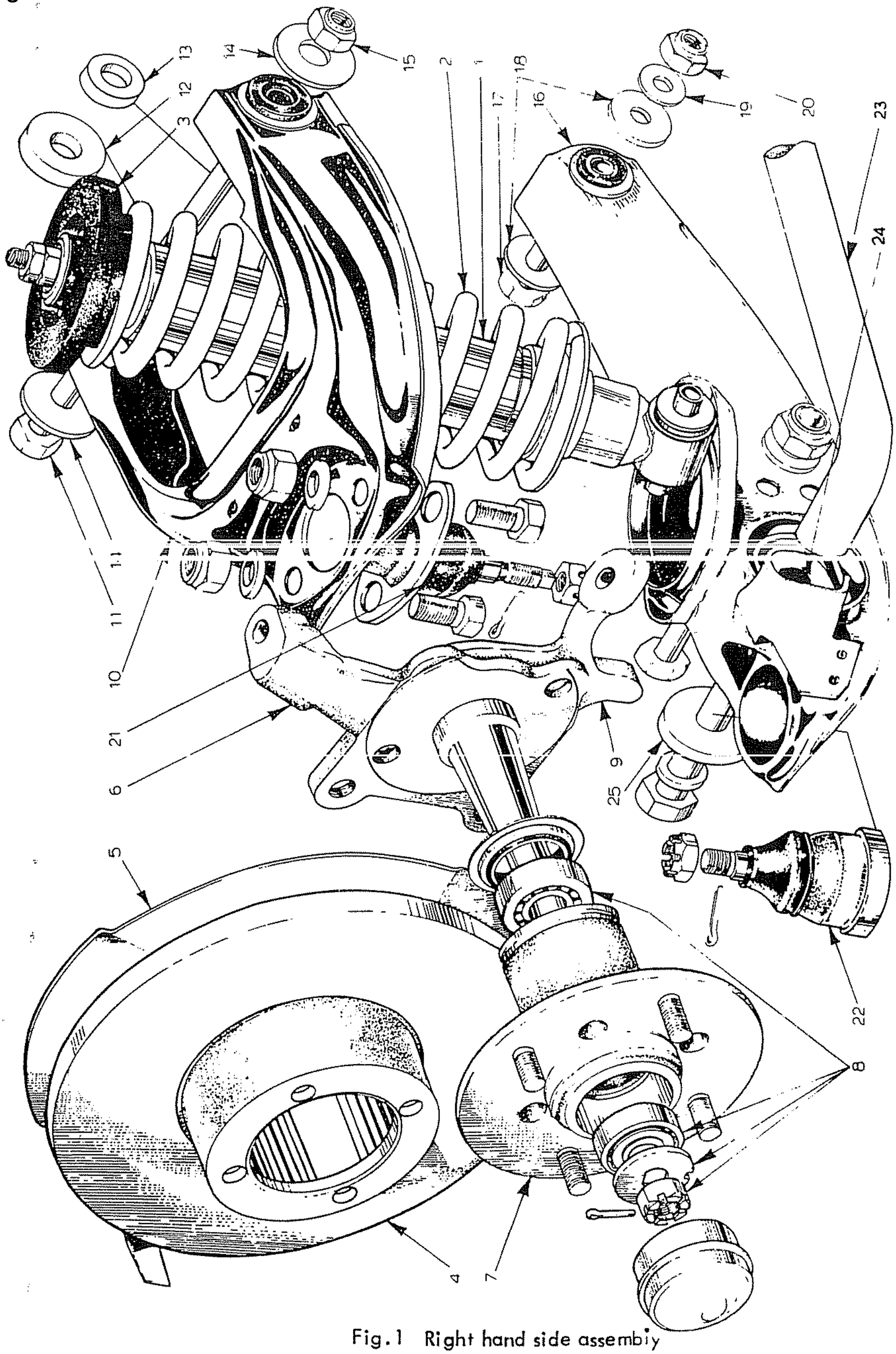


Fig. 1 Right hand side assembly

KEY TO FIG.l

1. Front Damper
2. Front Spring
3. Rubber Seat, Front Spring
4. Front Brake Disc
5. Dust Shield, Front Brake, R.H.
6. Vertical Link, R.H.
7. Front Hub
8. Bearing Kit
9. Steering Arm R.H.
10. Upper Wishbone, R.H.
11. Pivot Bolt, Upper Wishbone
12. Washer, Inner
13. Wosher, Inner
14. Washer, Outer
15. Nut, Nyioc, M12
16. Lower Wishbone, R.H.
17. Pivot Pin, Lower Wishbone
18. Washer
19. Washer
20. Nut, Nyloc, M12
21. Ball Joint, Upper
22. Ball Joint, Lower
23. Anti-roll Bar
24. Bush, Anti-roll Bar
25. Washer, 40 o/d, 10 i/d × 3.5 mm

GENERAL DESCRIPTION

The front suspension is of the fully independent type with twin upper wishbones, single lower links (track control arms) and on onti-roll bar giving location for the lower links and controlling the castor angle. Telescopic dampers with concentric road springs are used.

The upper end of the dampers are attached to the chassis, and the lower ends to the single lower links. A stub-axle, carrying the hub ossembly, is secured to the vertical link, the steering arms and the broke calipers.

The onti-roll bar is attached by its ends to the lower links and is secured to the chassis through rubber insulation mountings.

NOTE: All repairs requiring the removol of the coil springs, necessitates the use of spring clamps, otherwise extreme difficulty, and/or personal injury may occur in dismantling and re assembling the parts.

SUSPENSION AND STEERING GEOMETRY

Under normal service conditions, it should only be necessary to check the front wheel alignment. A full geometry check is only necessary following the rectification of repair damage io ihe front suspension or sieering, or if excessive iyre wear is evideni, or steering difficulties experienced.

The only angles which are adjustable are those for the wheels alignment. The castor, camber and steering axis (KPI) are set during production and are non-adjustable.

Prepomtlon of Vehicle

To prepare the vehicle for front wheel alignment checks and adjustment, load the vehicle with weights on the front-to-rear centre line to bring it to ride height (see Torque Loading in TECHNICAL DATA).

ANTI-ROLL BAR

To Remove

1. Remove the front road wheels.
2. Remove the bolts securing each anti-roll bor clamp to the chassis.

3. Remove the bolts securing each end of the anti-roll bar and lift oway the anti-roll bar complete with the rubber mountings.

To Replace

1. Check the bushes in the lower links for wear, replace if worn badly.
2. Fit onti-roll bar to the lower links, pushing the bar through each bush until it reaches the back plate and securing with bolt and washers.

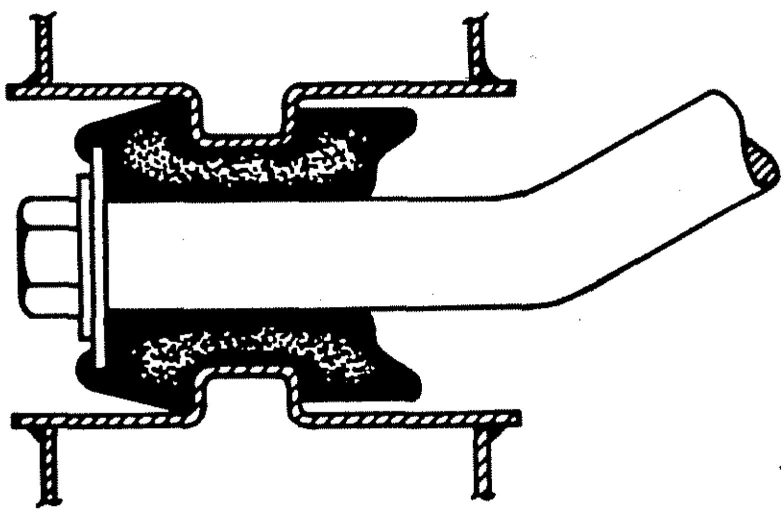


Fig.2 - Anti-roll bar mounting

3. Secure the anti-roll bar with its clamps to the chassis and tighten all bar fixing screws to the torque loadings specified in the TECHNICAL DATA.
4. Replace the rood wheels.

LOWER LINK

To Remove

1. Remove the road wheel and the anti-roll bar.
2. Apply clamps to the coil spring and carefully compress the spring.
3. Support the hub assembly and remove the damper lower mounting bolt.
4. Unscrew nut securing the lower link ball joint to the vertical link and lift hub assemblies clear of the ball joint.
5. Remove the bolt, washers and nut securing the inner end of the lower link

to the chassis and withdraw lower link.

To Replace

1. Reverse the removal procedure and before tightening the bolts/nuts ensure the suspension is under normal load conditions (upper wishbone and lower link horizontal). This will ensure that the damper bushes in the front suspension are in an almost torsionless state, when the front suspension is normally loaded. Tighten all bolts/nuts to the torque loadings specified in the TECHNICAL DATA.

COIL SPRING

~~To Remove~~

NOTE: The spring abutts the chassis at the top and the lower link at the bottom, therefore a spring compressor or clamps are ESSENTIAL in the dismantling process.

1. Remove the road wheel and compress the spring.
2. Remove the lower link, as previously described, taking care to support the hub assembly.
3. Carefully withdraw the compressed spring and release clamps.

To Replace

1. Check the rubber abutment ring is in good order and replace if necessary.
2. Reverse the removal procedure and tighten bolts to the torque loading specified in the TECHNICAL DATA.

DAMPER

To Remove

1. Remove the road wheel.
2. Remove the damper lower mounting bolt, washers and nut.
3. Release the lock nut on the damper top mounting and remove nuts and mounting rubber, while supporting the damper. Withdraw the damper through the lower link arm.

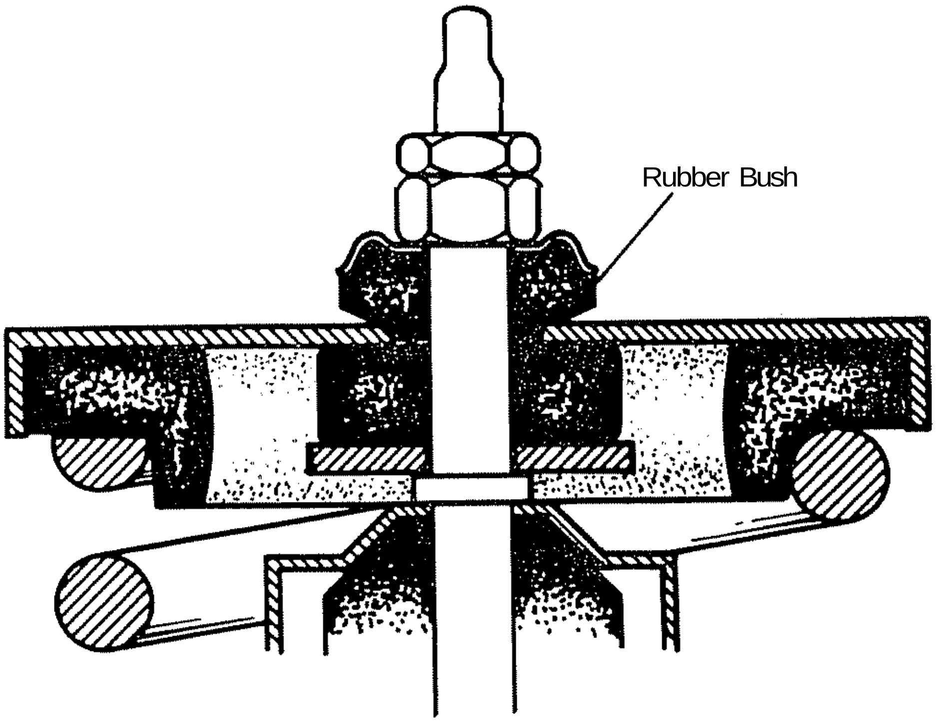


Fig.3 - Damper Top Mounting

To Replace

1. Place the seating washer and lower mounting rubber on the damper spindle. Offer the damper up through the lower link arm and locate the damper spindle in the top mounting hole.
2. Fit moulded rubber bush, metal cup washer, nut and locknut, and tighten to the instructions given in the TECHNICAL DATA (Top stem mounting).

UPPER WISHBONE

To Remove

1. Remove the rood wheel and prepare to support the suspension unit on an axle stand or trestle.

   NOTE: As a precaution fit spring clamps to the spring and tighten sufficient to prevent further extension of the spring.
2. Unscrew the upper ball joint and allow the suspension unit to rest on the stand.

3. Remove the carpet in the footwell which covers the access hole to the pivot bolt.
4. Remove the nut securing the pivot bolt and withdraw the pivot bolt through the hole in the bulkhead.

To Replace

1. Reverse the removal procedure taking care to ensure the washers are fitted in the correct order. Before tightening the bolts/nuts ensure the suspension is under normal load conditions (upper wishbone and lower link horizontal). This will ensure that the damper bushes in the front suspension are in an almost tonionless state, when the front suspension is normally loaded. Tighten all bolts/nuts to the torque loadings specified in the TECHNICAL DATA.

FRONT HUB

To Remove

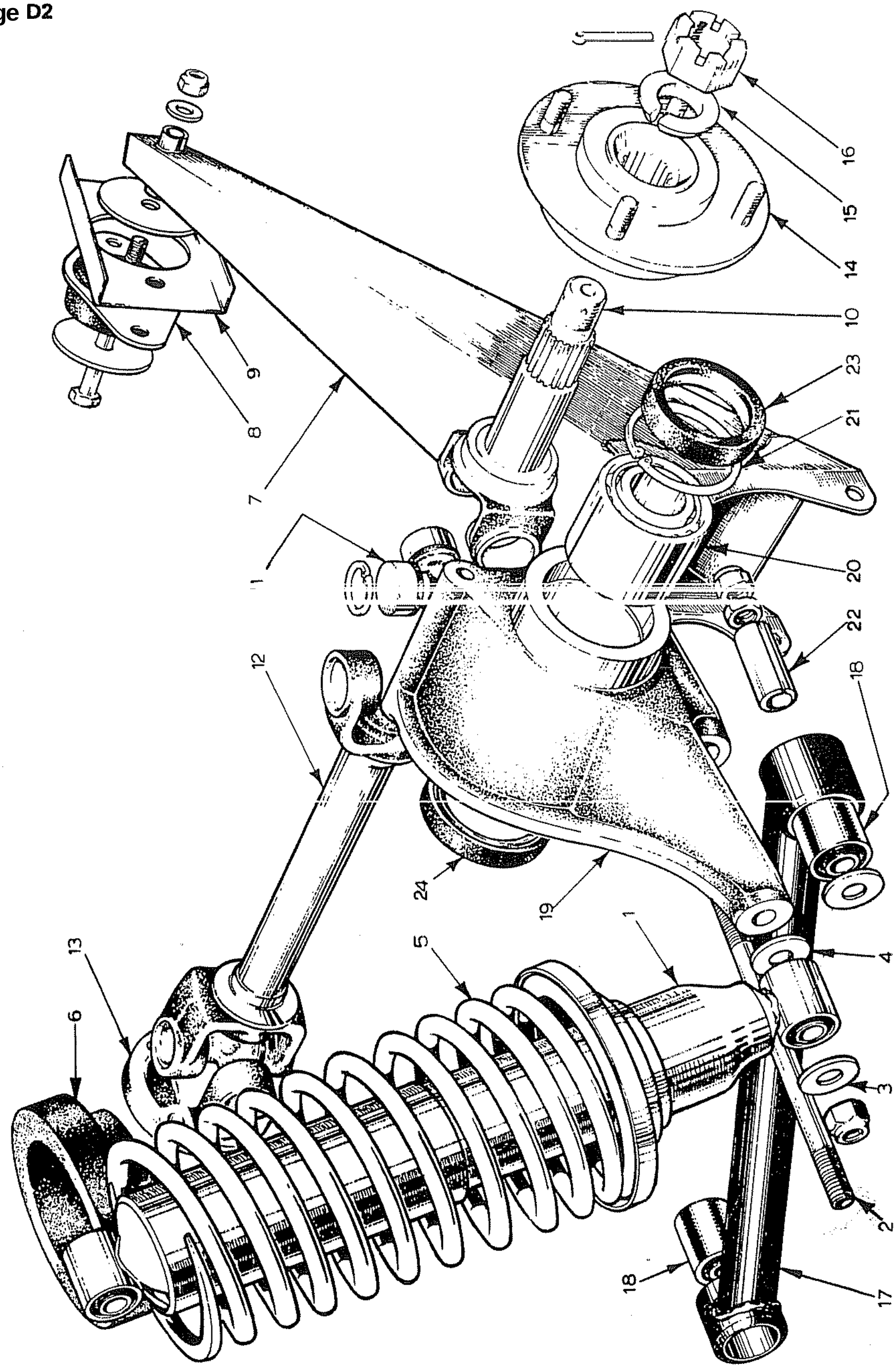
1. Remove the road wheel.
2. Unscrew brake caliper and support the assembly ensuring that the flexible hose is not kinked.
3. Lever off hub cap and remove split pin from the castle nut.
4. Unscrew castle nut, remove together with washer.
5. Withdrawthe hub assembly together with brake disc from the vertical link.

To Replace

1. Fit a new sealing ring to the hub and apply onti-friction bearing grease to all bearing races and the friction surface of the sealing ring; also fill the hub cavity.
2. Reverse the removal procedure and tighter: all bolts/nuts to the torque loadings specified in the TECHNICAL DATA. Adjust the hub end float to the figure also given in the TECHNICAL DATA.
3. Rotate the hub while tightening the hub spindle nut to bed-in the taper rollers. Lock the hub nut with a new split pin and fit the dust cover.

WARNING: When fitting the brake caliper moke sure the flexible hose is not twisted or kinked.

SECTION D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KEY TO FIG. I

1. Rear Damper
2. Study, Lower Damper Mounting
3. Penny Washer, Mild Steel
4. Penny Washer, Hard Steel
5. Rear Spring
6. Rear Spring Insulator
7. Radius Arm Assy, LH
8. Rubber Mounting, Radius Arm
9. Plate Reinforcing, Radius Arm Mounting
10. Shaft, Outboard
11. Joint, Universal
12. Shaft, Intermediate
13. Flange, Driveshaft
14. Rear Hub Assy
15. Cone, Hub Retention
16. Hub Nut
17. Lower Link Assy
18. Bush, Lower Link
19. Rear Hub Carrier
20. Bearing, Rear Hub
21. Circlip, Bearing Retaining
22. Spacer, Adjustable
23. Seal, Outer
24. Seal, Inner

GENERAL DESCRIPTION

The rear suspension is a fully independent diagonal trailing arm system. Radius arms (trailing orms) are attached to the chassis by a flexible mounting ot the front end and to the bearing housing at the rear. The bearing housings in turn are attached to the chassis at the rear by lower lateral links; the driveshofts serving as the upper links. Telescopic dampers with concentric springs attached to the bearing housing and the chassis complete the rear suspension.

BEARING HOUSING & DRIVESHAFT ASSEMBLY

To Remove

1. Remove the road wheel and support the hub assembly.
2. Release the locking top washers and remove the bolts securing the driveshaft flange to the differential driveshaft adapter.
3. Remove the lower damper mounting stud, this will release the damper/coil spring assembly and the lower link assembly.
4. Unscrew the radius arni assembly from the bearing housing and lift away the bearing housing assembly together with the driveshaft.

To Replace

1. Reverse the removal procedure. Tighten all bolts/nuts to the torque loadings specified in the TECHNICAL DATA, ensuring that the hardened plain washers are fitted between the bearing housing arid bottom end of the damper. See figure 3.

   NOTE: Ensure that specified bolts ONLY are used to secure the driveshaft to the differential output shaft. Use new locking plates (washers) and lock bolt by bending the locking plate around the head of the bolt.

RADIUS ARM

To Remove

1. Remove the road wheel.
2. Remove the nut securing the radius arm on the pivot mounting bolt.

3. Unscrew the radius arm assembly from the bearing housing and allow the radius arm to swing downward clear of the bearing housing.
4. Withdraw radius arm, taking core not to lose the washers and nut.

To Replace

1. Reverse the removal procedure, ensuring all bolts/nuts are tightened to the torques specified in TECHNICAL DATA. See illustration for the correct position of the washers.
2. Check the rear wheel toe-in and adjust if necessary, see 'Rear Wheel Toe-in'.

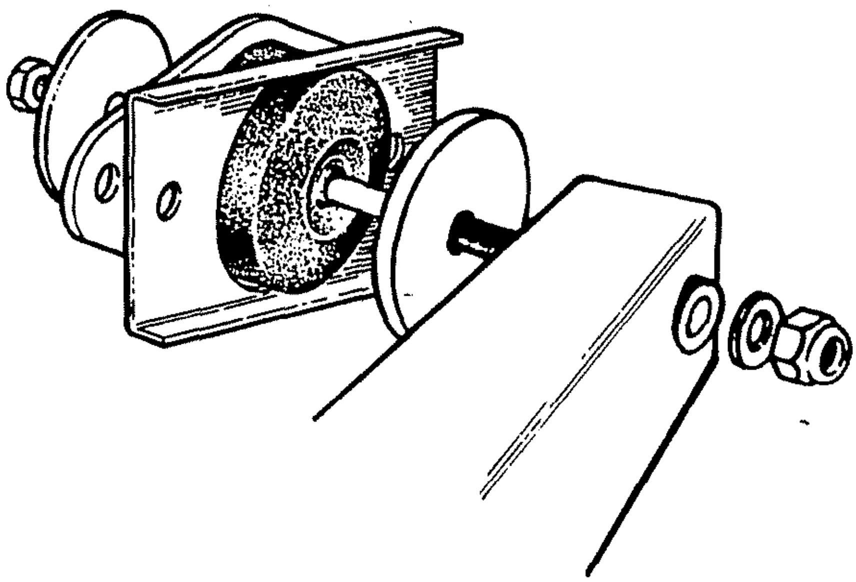


Fig.2 Radius arm to chassis mounting

RADIUS ARM MOUNTING

To Remove

1. Remove the road wheel.
2. Remove the nut securing the radius arm to its pivot mounting bolt.
3. Ease the radius arm from the mounting bolt, noting the amount of spacers on each side of the arm, this is necessary to achieve correct toe-in when re-fitting (see TECHNICAL DATA).
4. Release the two bolts securing the mounting to the chassis, and remove bolts, lock washers, plain washers, reinforcing plate and mounting.

To Replace

1. Reverse the removal procedure, tighten all bolts/nuts to the torques specified in the TECHNICAL DATA.

REAR WHEEL TOE-IN

To Adjust

1. The correct rear wheel toe-in data is given in the TECHNICAL DATA section.
2. Remove the radius arm from its pivot mounting bolt (on the side to be adjusted) and add or delete spacers between the arm and the mounting to achieve the correct toe-in.

   NOTE: When removing or replacing the securing nut from its mounting bolt, it is necessary to prevent the bolt turning in the rubber mounting using a spanner on the head of the bolt.
3. When checking the rear wheel toe-in, the car should be at ride height (see 'Rear Suspension' under Torque Loading Figures in the TECHNICAL DATA section).

LOWER LINK

To Remove

1. Remove the road wheel and support the hub assembly.
2. Remove the lower damper mounting stud, this will release the lower link arm and the damper/coil spring assembly.
3. Remove the bolt securing the inside end of the lower link to the chassis.

LOWER LINK

To Replace

See next page

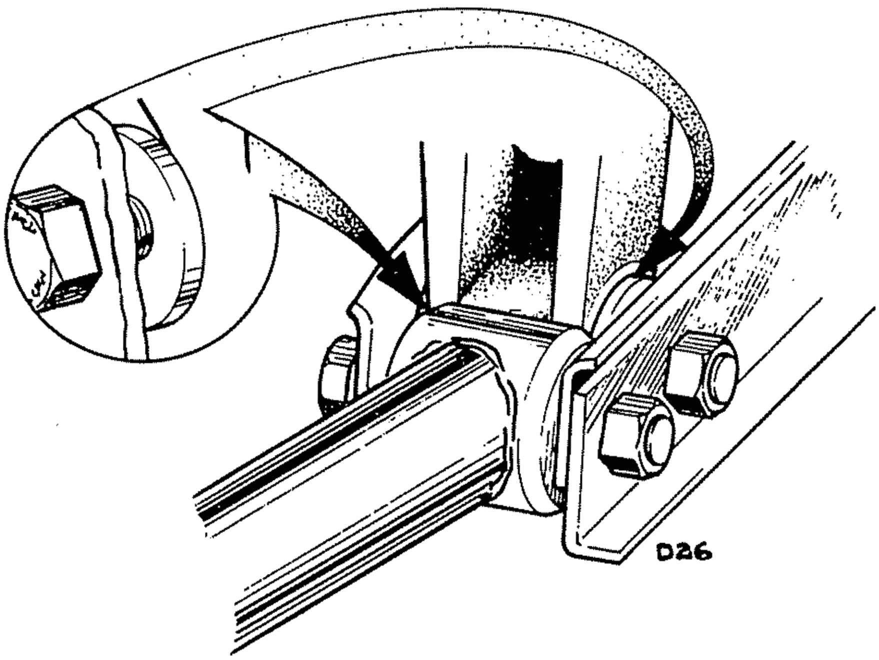


Fig. 3 Lower link inner ottachment

To Replace

1. Reverse the removal procedure, taking care to fit washers in correct order (see illustration) and tighten all bolts/nuts to the torques specified in the TECHNICAL DATA.

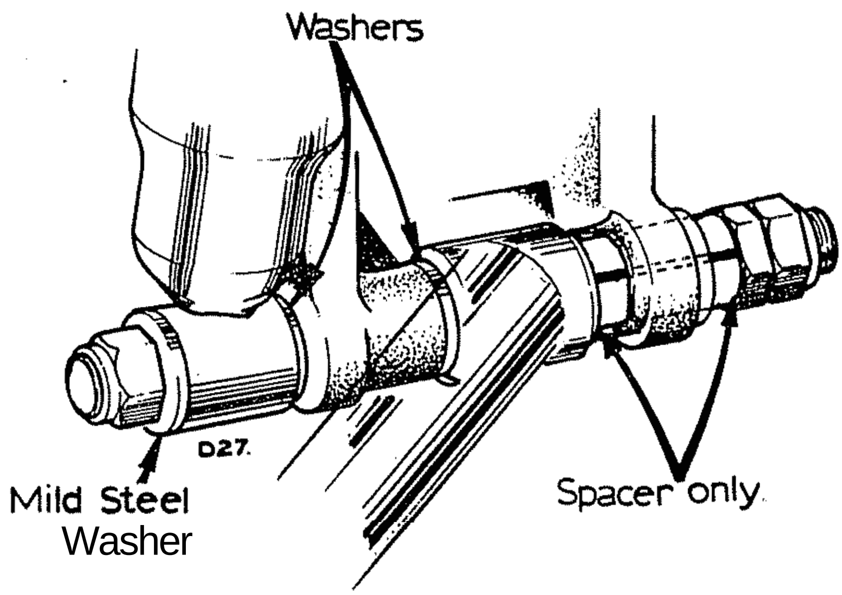


Fig.4 Lower link hub ottachment

. .EEL BEARINGS

To Remove

1. Remove bearing housing and drive shaft assembly as previously described.
2. Remove the hub as described in Section G.
3. With the bearing housing/driveshaft assembly on the bed of a press, press out the driveshaft assembly from the outside (hub side) of the housing.
4. Remove both oil seals and the circlip securing the bearing.
5. Using a suitable spaca (**e.g.** a length of tube) press outer track of bearing from the housing.

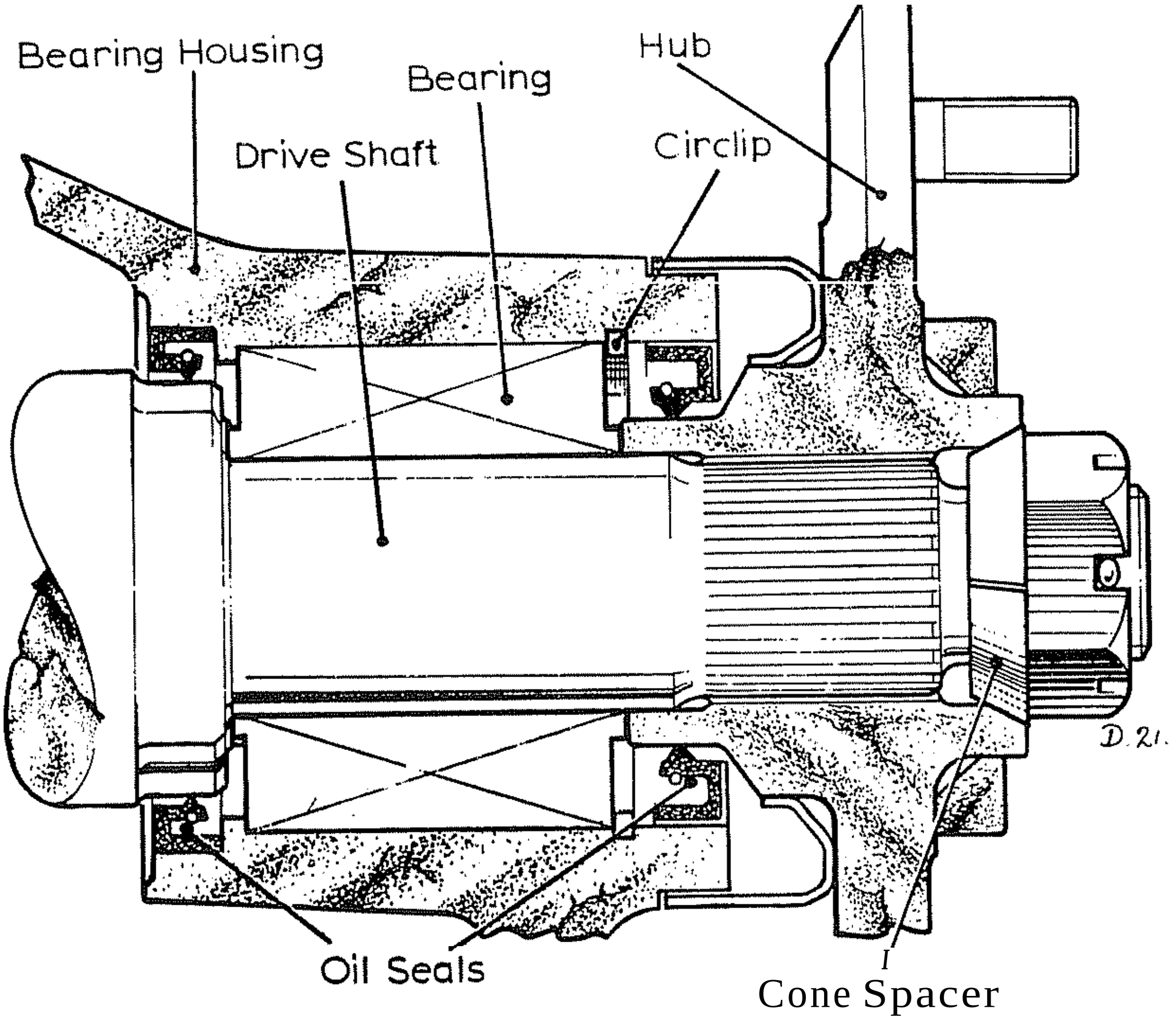


Fig.5 Hub bearing

To Replace

1. Before fitting the new beoring in the housing, pre-heot the hub casting to 75°C to 100°C for 5 minutes. A convenient method of doing this is to immerse the costing for 10 minutes in boiling water.
2. Press in new bearing from the hub side of the housing, until the bearing is in contact with the shoulder in the housing. Apply lood to the outer track of the bearing only.
3. Refit circlip and allow housing to cool naturally to ambient temperature. Replace both oil seals.
4. Refit the hub as described in Section G.
5. Refit bearing housing and driveshaft assembly to the car. Tighten all bolts/ nuts to the torques specified in TECHNICAL DATA.

DAMPER & SPRING ASSEMBLY

To Remove

NOTE: The spring abutts the chassis at the top, therefore, it is essential that a spring compressor is used when removing the spring.

1. Remove the road wheel.
2. Remove the lower damper mounting stud, this will release the damper/ spring assembly and the lower link assembly.
3. Compress the spring and secure with clamps.
4. Unscrew nut and bolt securing the tope of the damper to the chassis and withdraw domper, spring (compressed) and spring mounting rubber.

To Replace

1. Reverse the removal procedure and replace rubber spring mounting if damaged. Tighten all bolts to the torque loadings specified in the TECHNICAL DATA.

SECTION E

GENERAL DESCRIPTION

The engine, which is inclined at 45^{o} to the vertical from the centre-line of the crankshaft, is a die-cast all-alloy, four cylinder with cast iron wet liners, in line, twin overhead camshaft unit operating on the four-stroke cycle with cross-flow cylinder head. Pent roof combustion chambers are used with 4 valves (two inlet and two exhoust) having separate ports, per cylinder. The valves have replaceable guides and seat inserts and ore at an inclusive angle of 38^{o}. They are operated by the cam-shafts acting directly on the cam followers (tappets), the camshafts being driven at half engine speed by o toothed belt. The camshafts end float is taken by a thrust washer at the rear end of each shaft. The toothed driving belt also drives the auxiliary shaft, this in its turn driving the oil pump and ignition distributor.

The crankshaft, of cast iron construction and dynamically balanced, runs in 5 steel-backed leaded bronze lined main bearings, end float being controlled by split thrust washers located in the cylinder block on either side of the rear main bearing

[illegible]

valve opens, oil is passed back into the inlet side of pump. From the pump the pressurised oil flows through the full-flow filter to the oil gallery. The oil gallery passes along the right-hand side of the engine, from where oil is taken to feed the crankshaft main bearings and through drillings in the webs of the crankshaft to the big-end bearings. Oil is also token forward along the oil galley to the auxiliary shaft, then subsequently to the camshaft bearings and valve gear. Lubrication of the little end bushes, the gudgeon pins and the non-thrust sides of the cylinder liners is by oil mist. A threaded outlet on the oil gallery cover, approximately opposite the fourth main bearing, feeds oil to the pressure gauge.

Oil Level

BEFORE checking oil level, allow a full five minutes for oil to return to sump.

The correct level is to the upper mark on the dipstick, which is located at the right-hand rear of the oil sump. When checking the oil level the car should be standing on an even surface and the dipstick withdrawn, wiped, replaced and finally withdrawn and checked, the depth of the oil on the end of the dipstick indicating the level of the oil in the sump. If the addition of oil is necessary, remove the filter cap on the inlet camshaft cover and add new engine oil of correct grade (see TECHNICAL DATA) until the dipstick indicates that the oil in the sump has reached the required level. Do NOT overfill. Replace the oil filler cap securely otherwise an oil loss could occur, with the resultant failure of the entire engine lubrication system. With a new engine the oil, together with the filter, should be changed at the FIRST 500 miles (800 km) and thereafter at EVERY subsequent 5,000 miles (8,000 km) if the oil appears to be excessively dirty BEFORE this distance has been covered, it should be changed and a new oil filter fitted.

The sump capacity is given in TECHNICAL DATA. Where possible, drain the oil when the engine is warm then any sediment which may be in the oil will be drained more easily.

Oil Filter

A full-flow canister oil filter of the 'throw-away' type is screwed to on adaptor on the auxiliary housing; the pressurised lubricating oil passes through the filter before entering to the oil gallery.

ENGINE TUNE

1. Pull off the sparking plug leads and remove the plugs. Check the cylinder compressions. Cleon the plugs and reset the gaps to the dimensions given in TECHNICAL DATA, or if the electrodes are badly burnt, fit new plugs and re-connect the leads.
2. Remove the ignition distributor cop and examine the contact-breaker points. Replace the points if badly eroded, or excessive metal transfer is evident. Adjust the points gap to the dimension given in TECHNICAL DATA and refit the distributor cap.
3. Remove the air cleaner element and clean (or replace if necessary).
4. Disconnect the fuel feed pipe at the carburetters ond check the fuel flow.
5. When DELLORTO carburetters are fitted proceed as follows:
   - (a) Remove floot chamber cover and withdraw the float assembly.
   - (b) Remove all jets and blow clear with an air line. DO NOT use wire, os this will enlarge the jet orifice.
   - (c) Remove the needle valve and valve body and blow clean with an air line.
   - (d) Clean the float and float chamber using clean petrol.
   - (e) Replace all jets, needle valve body and needle valve.
   - (f) Using a new gasket, fit to float chamber cover, replace float assembly. Check float setting. Refit float chamber cover.
6. When ZENITH-STROMBERG carburetters are fitted proceed as follows:
   - (a) Remove the carburetters from the engine and carefully place on a clean bench.
   - (b) Release centre-plug from the base of each carburetter.
   - (c) Remove floot chambers by releasing the retaining screws and with-drawing in a vertical motion to ovoid damage to the float mechanism. Remove float chomber gasket and toke out Floats.
   - (d) Remove needle volve from floot chomber cover and remove 'O' ring from base centre-plug.
   - (e) Thoroughly wash all removed parts in clean petrol.
   - (f) Refit needle volve into float chamber cover using a new washer and replace floot assembly.
   - (g) Refit float chambers with a new gasket and fit new 'O' ring to base

centre-plug ond replace securely.

(h) Refit carburetters to engine using new gaskets ond top up domper reservoirs with oil.

7. Reconnect the fuel pipes ot the carburetters.

8. Check and adjust the valve clearances and valve timing.

9. Check tension of the toothed timing belt and adjust if necessary.

10. Check the ignition timing, adjusting if necessary.

11. Adjust the engine slow-running speed and mixture (see TECHNICAL DATA).

COMPRESSION CHECK

1. Warm the engine to its normal operating temperature. Switch 'off' the engine and remove all sporking plugs. 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. I 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, re-connect the sparking plug leads and reset throttles.

CAMSHAFT COVERS

To Remove

1. Release the bolts with their washers from the top of the cover and lift off the cover. Remove the gasket and discard. Note when removing the inlet camshaft cover, it will be first necessary to release the throttle cable bracket, and breather pipe. For engines fitted with air injection, disconnect the hose from the air pump to the diverter valve.

To Replace

1. Apply 'Silastic' to both sides of a new gasket, or to the gasket mating faces of both the camshaft cover and the camshaft housing, place gasket onto the comshaft housing, then replace cover and tighten bolts to the specified

torque loading. Replace the throttle cable bracket, breather pipe, and where applicable the air rail assembly, diverter valve and air hose.

NOTE: When replacing the exhaust cover, first insert the two bolts in the rear end.

CAMSHAFTS

To Remove

1. Remove the camshaft covers as previously described.
2. Check all valve clearances (see VALVE CLEARANCES) noting any which require adjustment.
3. Set the engine in the timing position (No. 1 piston at T.D.C.).

NOTE: Remove the distributor cap and mark position of rotor arm against the body. With the camshafts removed, the belt will almost certainly move, thus turning the auxilinrv sprocket and 'losing' the T.D.C. position of the distributor rotor arm.

4. Slacken the toothed drive belt (see CAMSHAFT DRIVING BELT), after first releasing the drive belt tensianer. Remove belt from camshaft sprockets.
5. Insert small bar magnets across each of two cam followers, to hold the cam followers in their respective bores.
6. Remove the ten nuts and washers (release the nuts diagonaiiy inwards irom the outside) securing the camshaft housing and remove the housing. Care MUST be taken to avoid dropping any nuts or washers down the inside front of the camshaft housing.
7. Repeat the process for the other housing. BEFORE removing the exhaust camshaft housing, first remove the cooling system header tank.
8. Remove the magnets and release cam followers from their locations. Place them in their respective fitting positions, noting that the cam follower shims are almost always 'stuck' to the underside of the cam follower. If they are not, then they will be 'stuck' to the top of the valve stems. Keep the shim with its respective cam follower.
9. Hold the camshaft sprocket in a vice having fibre-protected jaws and support the camshaft housing with the other hand. Remove the two bolts and washers which secure the rear cover to the housing, and remove cover with its 'O' ring. Release the thrust washer retaining bolt and washer, and remove

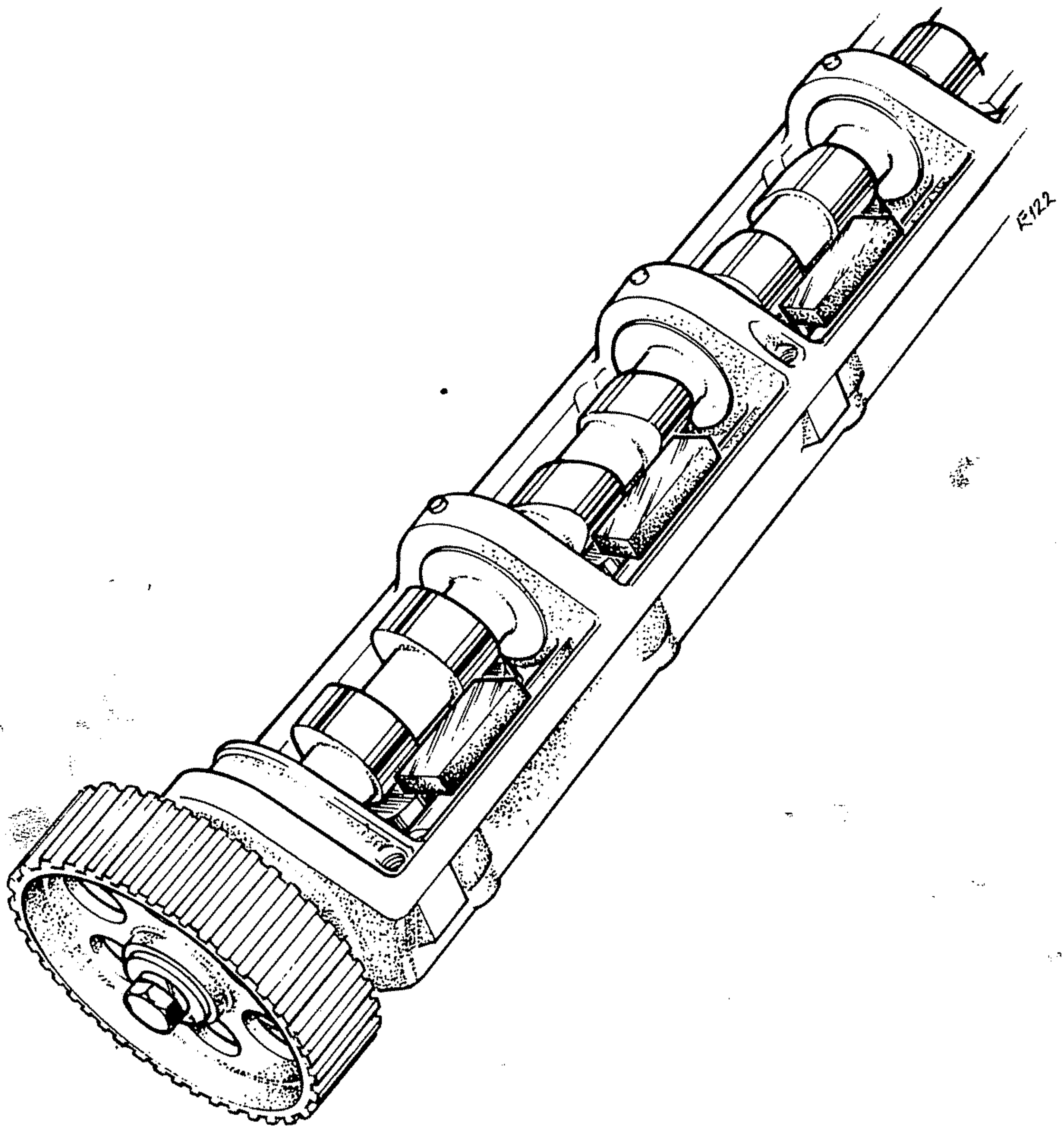


Fig. 1 View showing cam followers held by magnets

thrust . Remove bolt and washers securing the sprocket to the camshaft.

10. Remove the assembly from the vice, and pull off the camshaft sprocket.

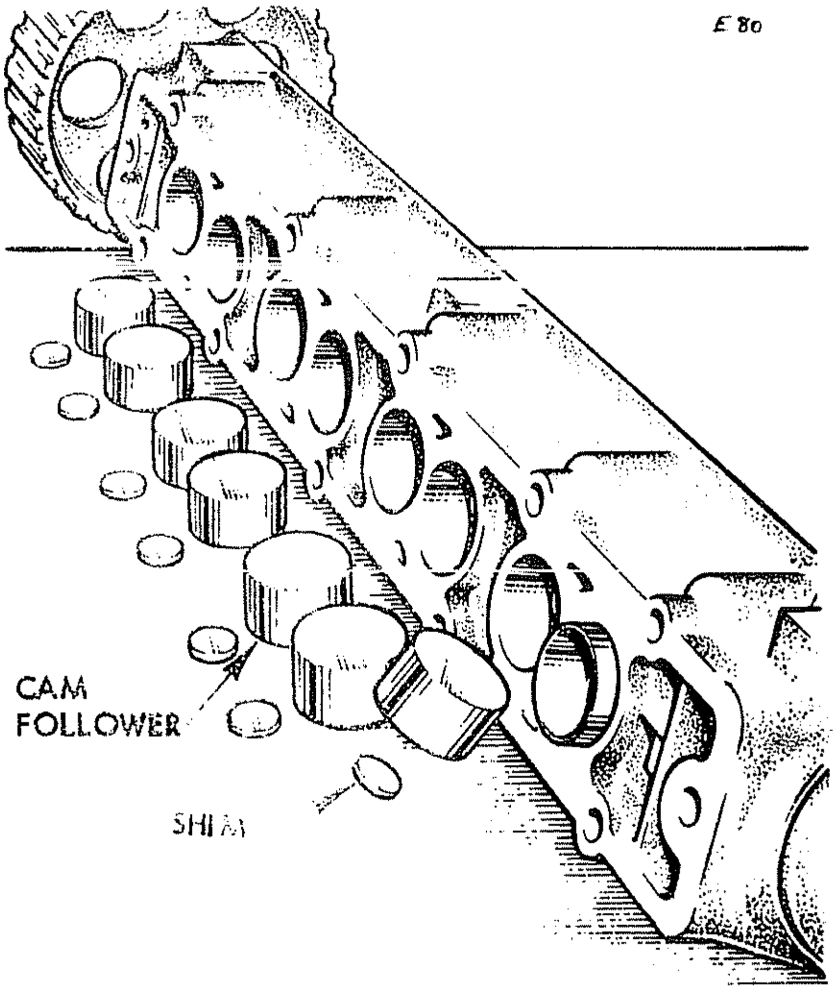


Fig. 2 Camshaft housing, cam followers & Shims

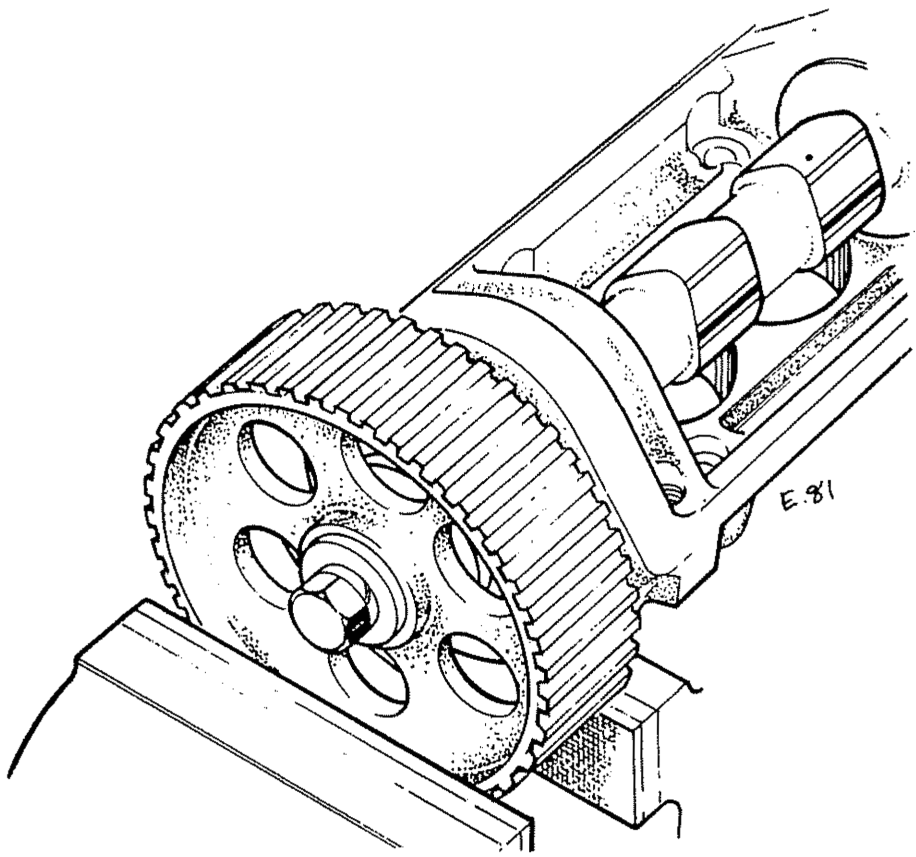


Fig.3 Cornshoft sprocket held in vice

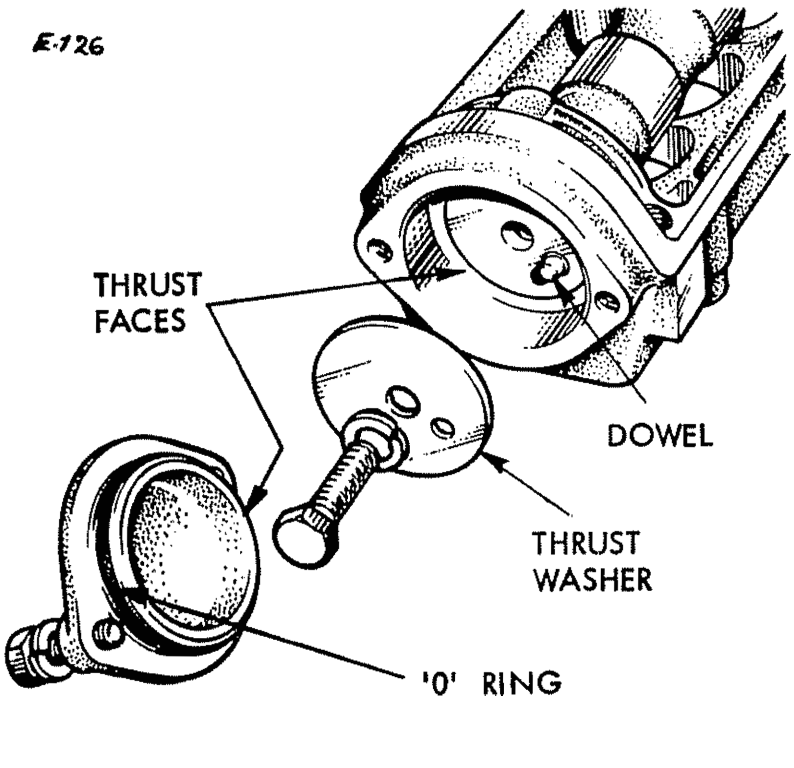


Fig.4 Camshaft thrust wosher & 'O' ring

11. With the oid of o two-legged puller, attached to the rear of the camshaft housing, screw in the centre bolt to push out the camshaft towards the front of housing, together with its oil seal.

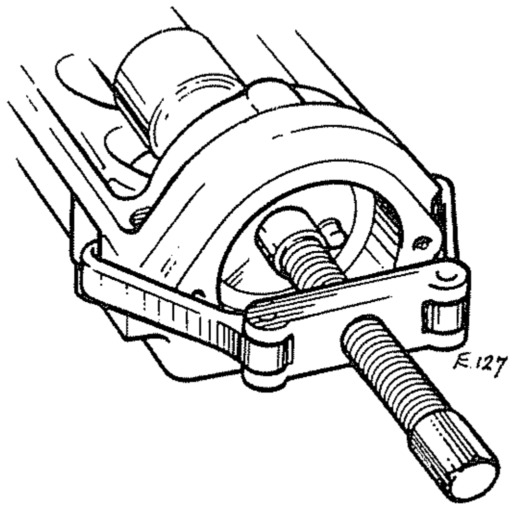


Fig. 5 Releasing the camshaft

12. Repeat the process for the other camshaft and sprocket.

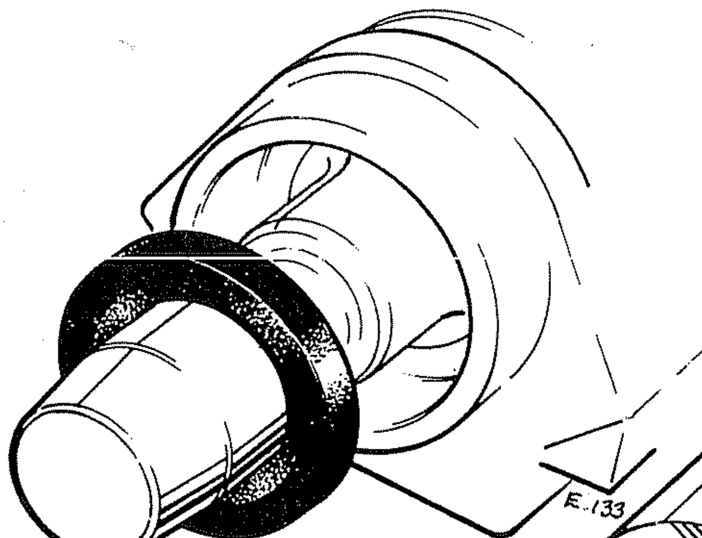


Fig.6 Using Tool '72A' to align camshaft oil seal

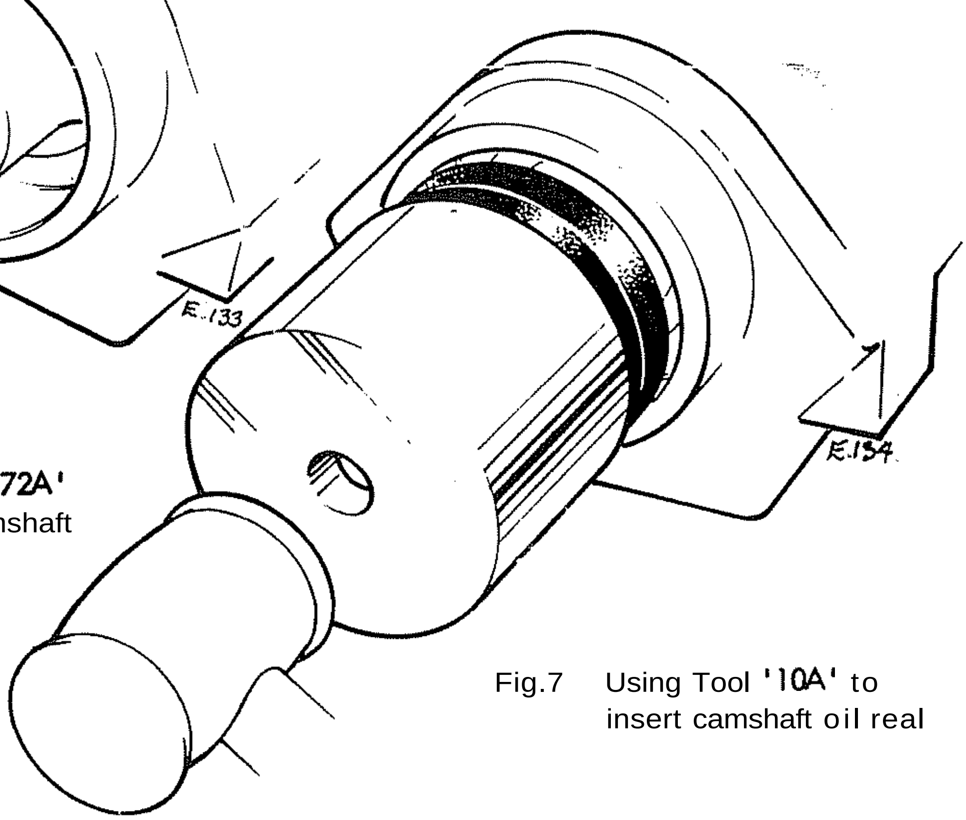


Fig.7 Using Tool '10A' to insert camshaft oil real

To Replace

1. Smear a little graphite grease on the bearing surfaces of the camshaft housing, insert camshaft into its housing from the front and fit a new front oil seal. Ensure oil seal is flush with outer face of housing, and NOT fitted up to the shoulder on the inside of the housing, as the oil drain hole will be blocked.

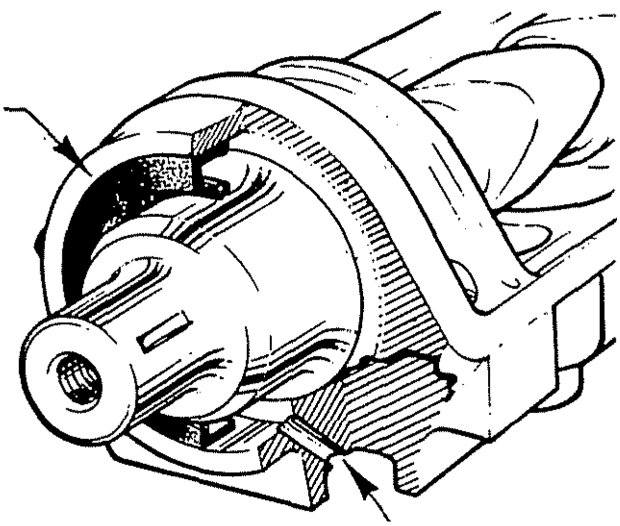


Fig.8 Camshaft oil seal fitted

2. If it has been removed, refit the Woodruff key to the front end of the camshaft and replace camshaft sprocket together with its large plain washer, spring washer and retaining bolt. It is ESSENTIAL that the correct sprocket is fitted to its correct comshoft, i.e. relevont 'EX' timing marks on sprocket to exhaust and relevant 'IN' timing marks on sprocket to inlet camshoft.
3. Fit the selective thrustwosher with its retaining bolt, and spring washer, ensuring that it is located on the dowel protruding from the rear end of the camshaft.
4. Hold the camshaft sprocket in the vice (see CAMSHAFTS 'To Remove' instruction 10). Tighten thrust washer ond sprocket retaining bolt to the torque loading specified in the TECHNICAL DATA. Replace rear cover with new 'O' ring, tightening the bolts to their specified torque loading. Check that the camshoft end-floot is that stated in the TECHNICAL DATA. If the end-float is outside this tolerance, replace the selective thrust washer.
5. Replace cam follower shims on the ends of the valve stems, these being greased with graphogen grease on the valve stem side. Replace the cam followers into their respective bores in the comshoft housing, after an

application of graphogen grease. DO **NOT** use magnets when refitting housings as these will disturb the position of the shims.

6. Seol between the cylinder head and cam housing with loctite 504 gosket eliminator and on 'O' ring fitted over the roll pin dowel. Before applying new gasket eliminator ensure all old gosket eliminator is removed from the mating surfoces of the cylinder head and cam housing. Take core not to scratch seoling surfaces, use a blunt scraper, such as the flat end of a metal rule. Degrease and clean the mating surfaces using trichloroethylene, methylated spirit, acetone or similar. Lay o thin continuous bead of gasket eliminator (approx. 1/16 in to 3/32 in wide) in the middle of the sealing surface on the cam housing, following the outer surface around the stud holes. Fit 'O' ring on cylinder heod dowel arid carefully place cam housing on cylinder head studs and secure with washers and nuts. Tighten the nuts to the specified torque loadings, diagnonally outwards from the centre.
7. Check and adjust valve clearances, if necessary as described in the VALVE CLEARANCES.
8. Refit camshaft drive (toothed) belt, check tension and ignition timing, and adjust as necessary.
9. Replace camshaft covers as previously described.
10. Replace 'V' belt(s) and belt guard as described in the BELT GUARD.

VALVE CLEARANCES

To Check

1. Remove both camshaft covers as previously described.
2. Turn engine until heel of the cam is on the cam follower of the valve to be checked. Using a feeler gauge, determine the clearance between the cam follower and the cam heel. The correct clearance is given in the TECHNICAL DATA.
3. Check all valve clearances, noting any which require adjustment.

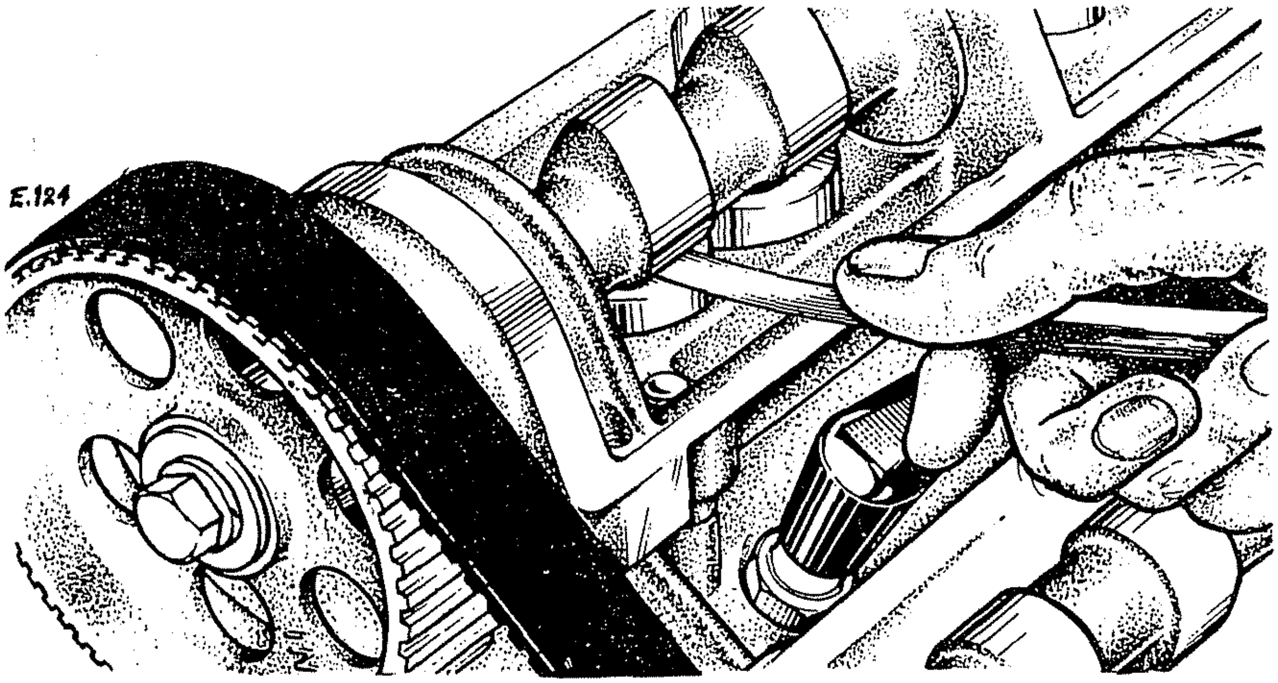


Fig.9 Checking cam follower clearances

To Adjust

NOTE: If valve clearances are to be verified with no gasket eliminator between the mating surfaces of cylinder head ond cam housing, then add 0.0015in to each valve clearance.

1. Remove the camshafts intact in their housings.
2. Remove each adjusting shim where the clearance requires adjustment. Substitute a shim giving the correct clearance, which has been greased on its face abutting the valve stem. ONLY use ONE shim to each valve.

   NOTE: A Thinner shim will increase the valve clearance, whereas a thicker shim will decrease the clearance.
3. Replace the camshcfts after adjustment and recheck the clearance. If the clearance is still incorrect, then the whole of the above proceduru MUST be carried out again.

   NOTE: Do NOT turn the camshafts with No. 1 piston at T.D.C., as this'will cause the valves to be bent. Turn the crankshaft back through 90° to bring the pistons half-way down the cylinders. Do NOT turn the crankshaft BEYOND 90° back, as this will also cause the valves to be bent whilst the camshaft driving belt is off.

CAMSHAFT DRIVING BELT (TOOTHED BELT)

The camshaft driving belt is fitted with an automatic belt tensioner assembly (early vehicles are fitted with manual adjusters). Check the adjustment of the driving belt at service intervals and if the belt is removed or a new belt is fitted.

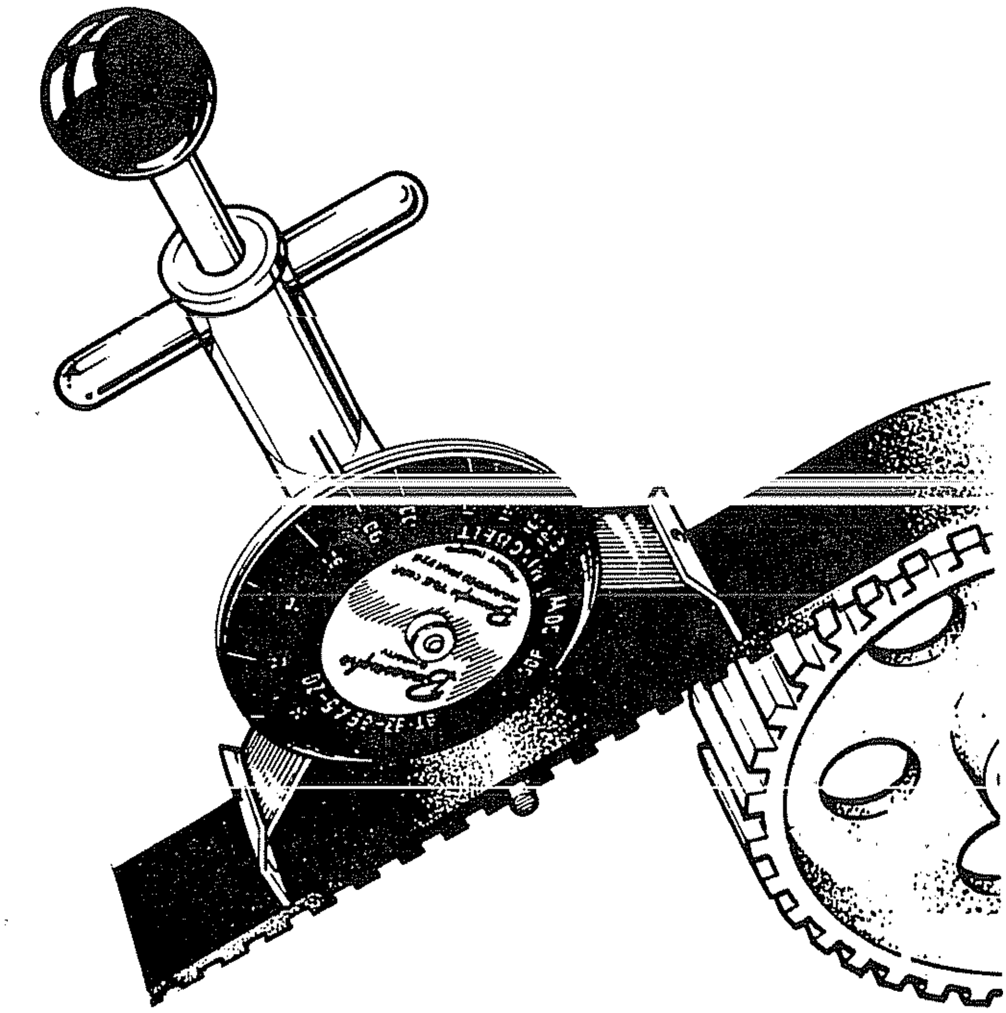


Fig. 10 Burrough's gauge in position

Belt Tension Check

Check the belt tension using a Burrough's Gauge BT-33-86A 5-20 fitted between the auxiliary shaft sprocket and the inlet cam shaft sprocket. Check TECHNICAL DATA for the correct tension.

1. Fully extend the hook by pushing handle completely down.
2. Insert the belt between nose piece and hook, ensuring hook is between belt teeth.

3. Release handle with a rapid action. A slow release will result in a high reading, which is caused by a small amount of internal friction stopping the hook returning fully. Read off the tension in pounds indicated by the pointer on the handle. Repeot several times to ensure a correct reading.

4. Rotate the engine crankshaft by hand approximately 120° in the direction of rotation. Repeat operations 1, 2 and 3 taking the average of three readings for the mean belt tension.

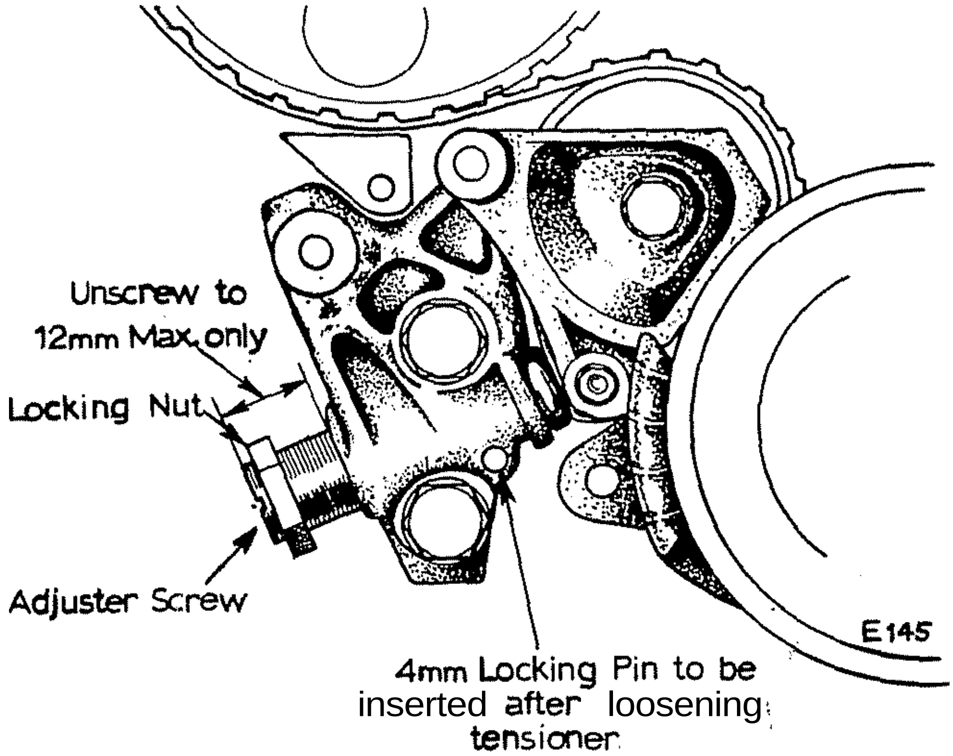


Fig. 11 Automatic belt tensioner

To Remove Timing Belt

1. Set the engine in the timing position with number one cylinder piston at T.D.C. Align the timing mark on the crankshoft 'V' pulley or flywheel with timing pointer. At this point the marks on the camshaft sprocket should also be aligned with each other (figure 12).

2 Loosen the alternator fixing bolts and remove the 'V' drive belt and the crankshaft 'V' pulley.

3 For manual adjusters release the belt tension and remove the driving belt.

4. For automatic adjusters remove the alternotor odjusting strap, together with the nut ond bolt. Swing the olternotor up ond secure in the'up' position to allow access to the tensianer adjusting screw. Accessibility can be improved if the olternator is completely removed.
5. Slacken off locknut and release adjusting screw by turning counter-clockwise until the adjusting screw is protruding a maximum of 12 mm (0.5 in) from the tensioner hawing

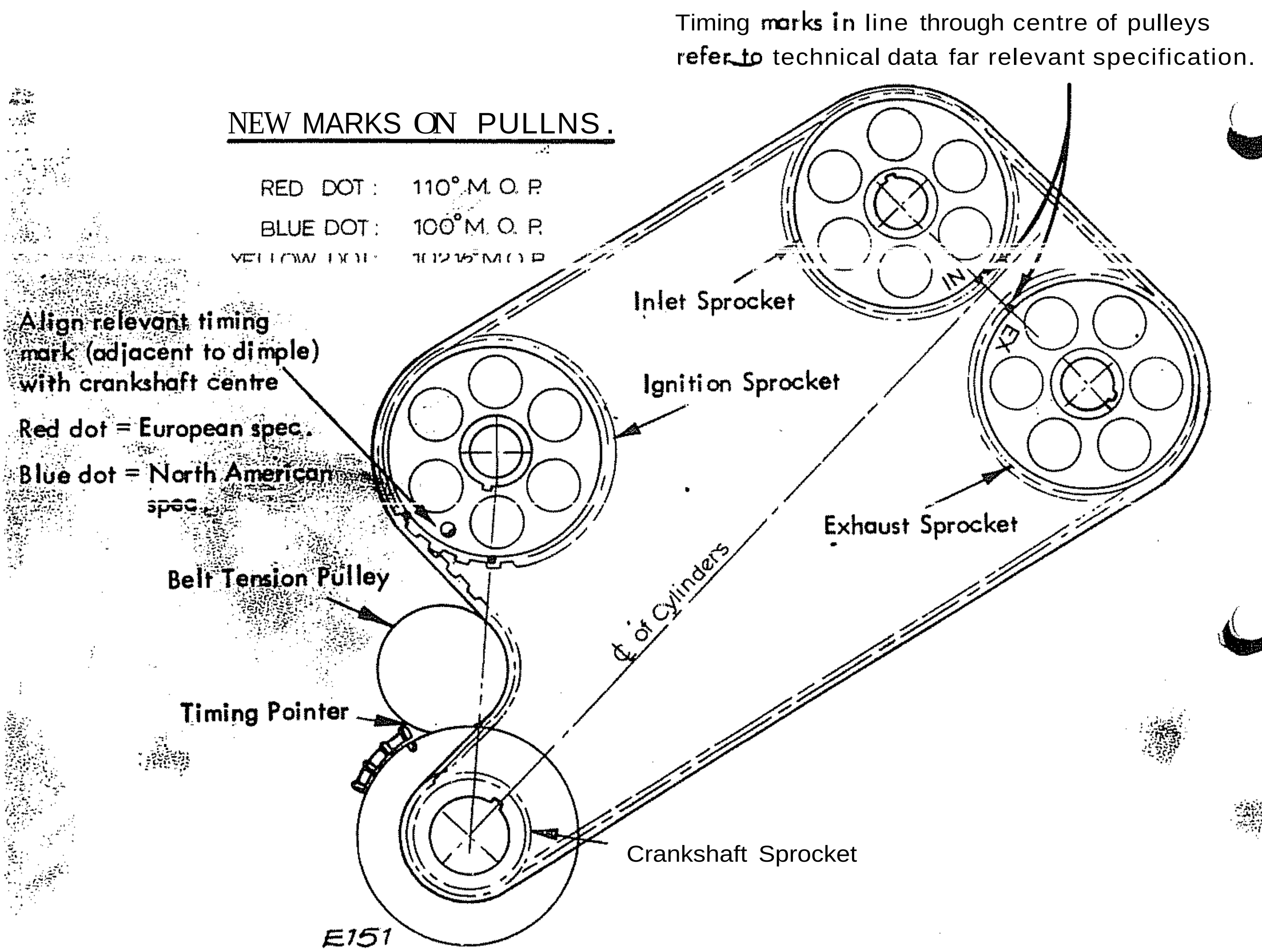


Fig. 12 Sprocket positions with Number 1 cylinder at TDC

6. Force idler wheel towards tensioner body, this can be achieved by pulling on the timing belt, until the groove on the piston lines up with the locking pin hole in the housing. Insert a 4 mm diameter pin in the hole and release the belt. The pin will prevent the assembly being forced apart by the tension spring.

WARNING: The locking pin **MUST** be fitted to the tensioner housing every time the toothed belt is removed or slackened off.
Do not under ony circumstances attempt to remove the locking pin from the tensioner assembly, unless the unit is fitted to the engine with the belt in position.

To Replace

1. Reverse the removal procedure. Before refitting the drive belt check the following:

   (a) Rotor arm is in correct position, with number one cylinder piston at T.D.C.
   (b) Exhaust and Inlet sprocket are correctly located, see figure **12.**
   (c) Crankshaft sprocket or flywheel TDC mark is in line with pointer, see figure **12.**
   (d) Ensure the peg on the inside of the rubber buffer (fitted to the tensioner body) is centred in the adjuster piston hole.

2. Fit toothed belt to pulleys. Pull the belt sufficient to force the idler bearing on tensioner towards tensioner body. Remove locking pin and release pressure on belt.
3. If on auxiliary pulley snubber is fitted, adjust it for a clearance of 0.4 mm ±0.1 mm (.016 ± .004 in) between the pad and toothed belt.
4. Refit crankshaft 'V' pulley and adjust belt tension.

To Adjust

NOTE: Do NOT attempt adjustment of the belt if the engine is hot. The ambient temperature of the engine should be between 15°C to 25°C for the following adjustment procedures.

1. Turn adjusting screw in a clockwise direction until the specified tension is recorded on the Burroughs Gauge (see Technical Data).
2. Ensure crankshaft is at TDC, after rotating o minimum of one turn clockwise.
3. Tighten adjusting screw locknut and refit alternator.

DRIVING BELT TENSIONER

To Remove

1. Set engine in the timing position with number one piston at T.D.C.
2. Align the timing marks on the crankshaft 'V' pulley or flywheel with timing pointer (figure 12).
3. Loosen the alternator fixing bolts and remove 'V' drive belt and the crankshaft 'V' pulley.
4. For manual adjusters:

   (a) Release the securing nut and washer retaining the tensioner pulley and slacken the drive belt.

   (b) Fully remove the tensioner securing nut and washer, then pull the adjuster from out of the front cover. The adjuster is a sliding fit on its locating stud in the cylinder block.

5. For autornatic adjusters:

   (a) Remove the alternator together with the adjusting strap arid fixirtg nuts and bolts.

   (b) Release the tension on the driving belt.

   (c) Remove the lower fixing bolt and remove the nuts securing the adjuster to the fixing stud, slide off the automatic adjuster.

CYLINDER HEAD

To Remove

1. Disconnect the battery.
2. Drain the cooling system (Section K).
3. Release the clips or screws securing the air trunking to the air box and remove the air box outer cover together with the air clearter element.
4. Discortrtect the water hoses from the connections on the engine. Disconnect the throttle arid choke cables from the engine.
5. Remove the inlet manifold together with the carburetters (see INLET MANIFOLD).
6. Remove the sparking plug leads from the plugs and secure clear of the working area.

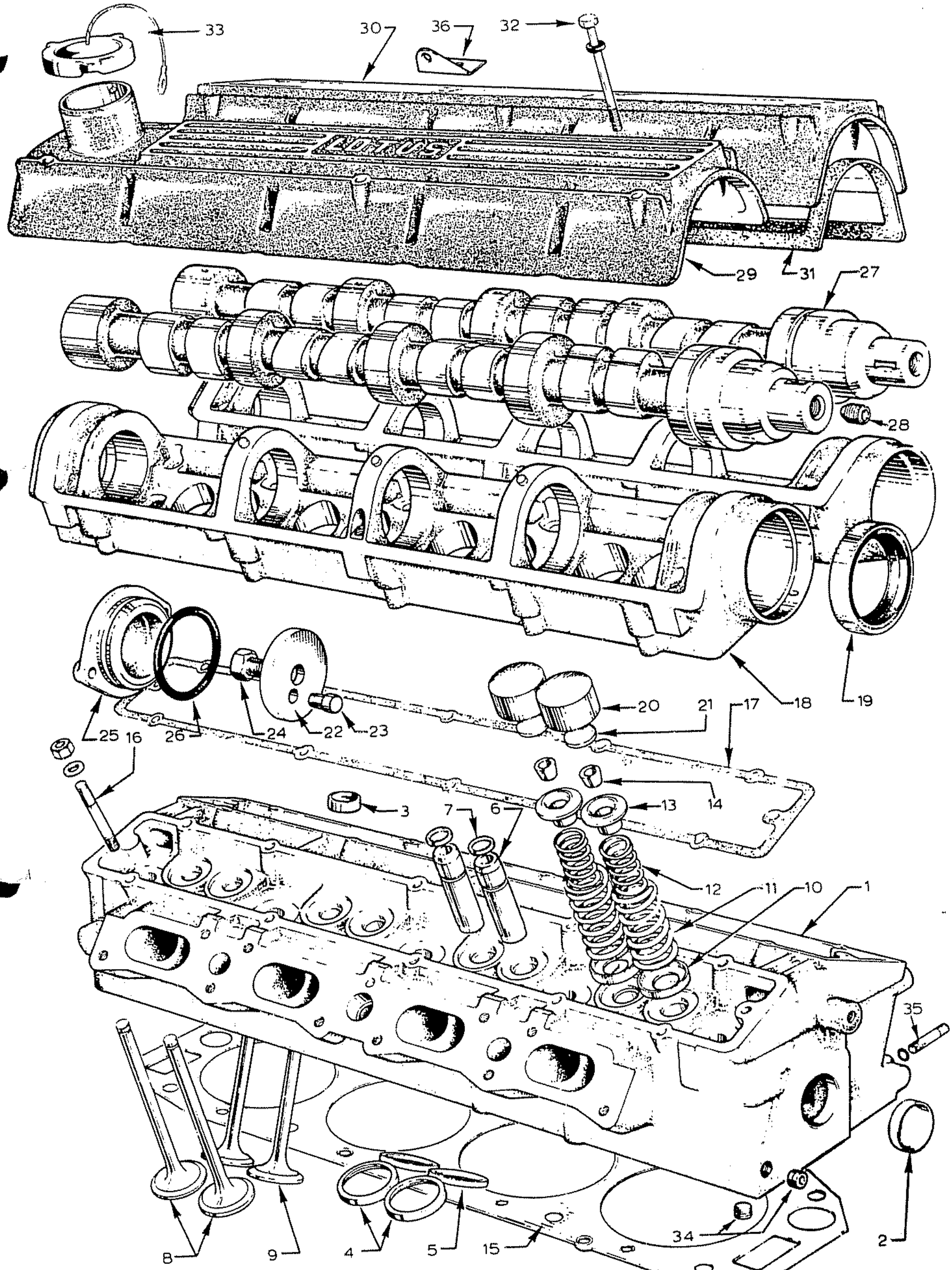


Fig. 13 Cylinder head components

7. Remove both cornshaft carrier housing previously described in **CAMSHAFTS.**
8. Release the exhaust downpipe from the exhaust manifold and remove monifold (see Section S).
9. Remove the water pump (see WATER **PUMP** removal).
10. Loosen the cylinder head nuts evenly, starting with the outer nuts and work inward diagonally. See figure **14**, start at the highest number and progress downward. Remove nuts and washers. Remove the cylinder head and the cylinder head gasket.

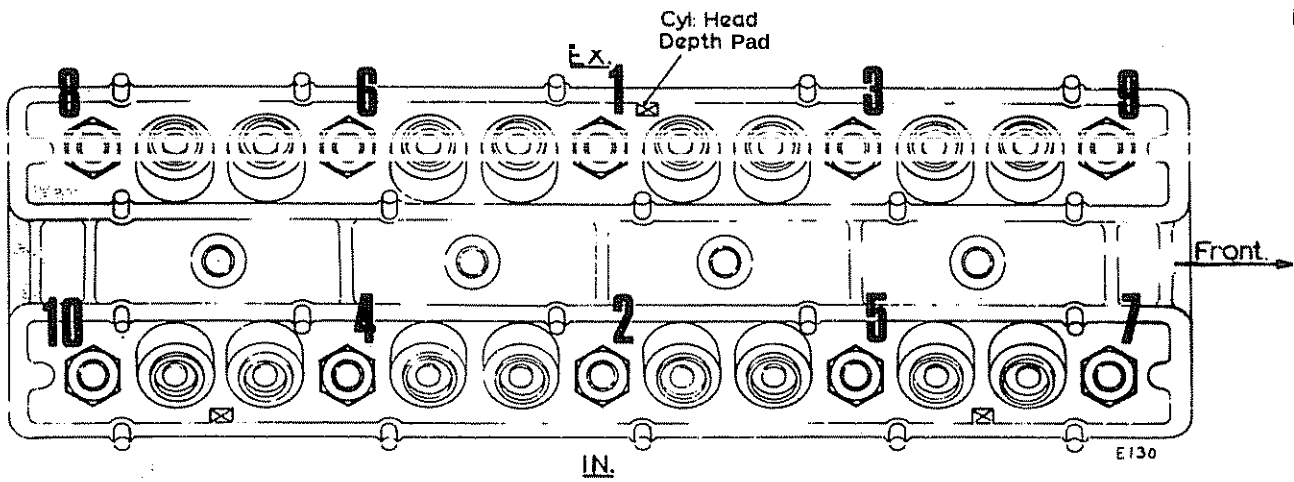


Fig. **14** Cylinder Heod Nuts tightening/loosening sequence

WARNING: Do NOT loy the cylinder head face down on the bench unless it is covered with protective material, otherwise the mating face of the cylinder head could be damaged.
Do NOT turn the engine without first fitting cylinder liner clamps otherwise the location of the liners could be disturbed.

To Replace

1. Remove the cylinder liner clamps. Thoroughly clean bath the cylinder block and cylinder head mating faces (use Trichlorethelene or similar).
2. Fit new cylinder head gasket. The gasket is fitted with 'Wellseal' applied around the periphery of both sides of the oil pressure hole

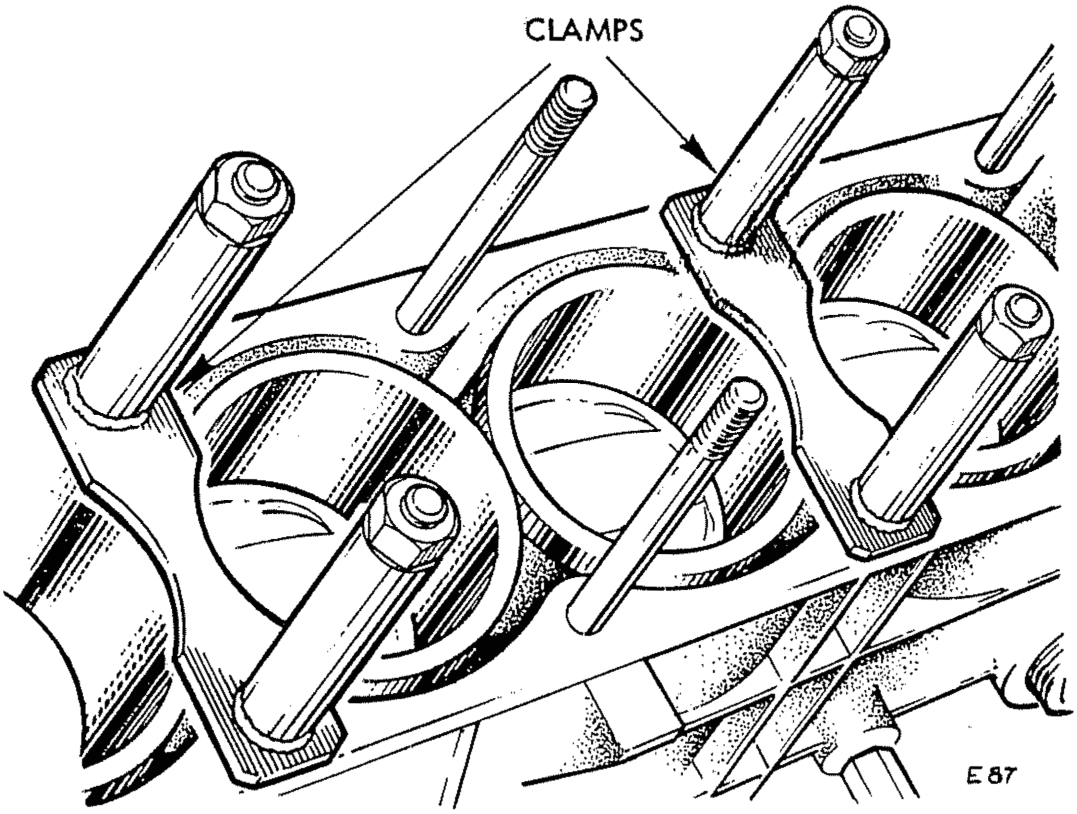


Fig. 15 Using Tool '02A' to retain cylinder liners

3. Fit the cylinder head assembly, plain washers and nuts. Tighten all nuts to the specified torque looding working diagonally outward from the centre (see figure 17).
4. Using new gaskets, refit the exhaust manifold and the exhaust down pipe (see Section S).
5. Replace the water pump.
6. Replace both camshaft carrier housings. Check volve clearances.
7. Replace camshaft drive (toothed) belt, spark plug leads and set static ignition timing (see CAMSHAFT DRIVING BELT replacement and adjustment).
8 Fit carburetters together with the inlet manifold, but do not fit air cleaner and cover at this stage.
9. Replace water hoses. Close coolant drain tap on radiator and refill the cooling system.
10. Check engine oil, start engine and allow to reach its normal operating temperature. Adjust slow running speed and mixture, and ignition timing.

Check for oil and coolant leaks while engine is running.

11. Refit the air cleaner element, the air box cover and the air trunking. Re-adjust the idle speed and mixture if necessary.

VALVES

To Remove

1. Remove the cylinder head.
2. Using a suitable valve spring compressor, compress the valve springs and extract the split collets. Release the valve spring compressor, and remove the volve spring retainer, valve springs and spring seat from each valve. Remove the valve.
3. Repeat the process for the remaining valves.

To Replace

1. Check the valve seats for condition, re-cutting as necessary, and check condition of volve guides. Grind in all valves.
2. Lightly lubricate the stem of the valve and insert into its guide.
3. Fit sprlng seat, valve springs, spring retainer. Place the valve spring compressor in position and compress the volve springs sufficiently to fit the split collets. Release the volve spring compressor. Check both halves of the collets are still in place and correctly seated.
4. Repeat the process for the remaining valves.
5. Replace the cylinder head followed by the comshaft housings. Re-check the volve clearances.
6. Replace camshaft covers and 'V' belts.

DECARBONISE CYLINDER HEAD AND PISTONS

To Remove

1. Remove cylinder head to a clean covered bench.
2. Remove the valves.
3. Remove all carbon deposits from the cylinder head combustion chamber faces, inlet and exhaust ports, piston crowns and volve heads. A ring of carbon

should be left oround the periphery of each piston crown. The TOP of the cylinder liners should NOT be touched.

4. Clean each valve thoroughly and carefully examine for pitting. Valves in a pitted condition should be refaced with a suitable grinder or new valves should be fitted. If the valve seats show any sign of pitting or unevenness, recut seats with a surface cutting tool. When using a cutting tool take care to remove only as much metal as is necessary to ensure a true surface. The removal of too much metal could cause difficulty in achieving the required valve clearance.

5. When grinding a valve onto its seating the valve should be smeared lightly with 'fine' or 'medium' carborundum paste and then lapped in with a suction type grinder after oiling the volve stem. Avoid the use of excessive quantities of grinding paste and ENSURE that it remains in the region of the valve seating only. A light coil spring placed under the head of the valve will assist considerably in the process of grinding. The valve should be ground to its seat with a semi-rotary motion and occasionally allowed to rise by the pressure of the light coil spring. This action assists in spreading the grinding operation until o dull, even, matt finish, free from any blemishes is achieved on the valve seat and volve face. On completion, the valve seats, guides and parts, should be cleoned with petrol then blown dry and cleaned with compressed oir. The valves should be woshed in petrol and all traces of grinding paste removed. Ensure that no grinding poste has entered the valve guides.

6. Lightly oil the valve stems, ond re-ossemble the valves in the cylinder head.

7. Refit cylinder head, comshaft housings not forgetting to check the valve clearances, comshoft covers, inlet and exhaust manifolds, carburetters, etc., which were removed for decorbonising.

VALVE SEAT INSERTS

To Remove

1. Remove the cylinder heod and dismantle as for decarbonising.

2. Remove the valve seat inserts by milling through, or almost through (this will depend upon the skill [illegible] the edge of the insert, whereupon the seat should collapse. [illegible] it [illegible] permissible

after milling to assist the removal by inserting a suitable drift through the appropriate port and gently tapping the seat frorn its recess. Ensure that the recess in the cylinder head is ENTIRELY FREE OF FOREIGN MATTER, otherwise the new insert will NOT seat fully in the recess.

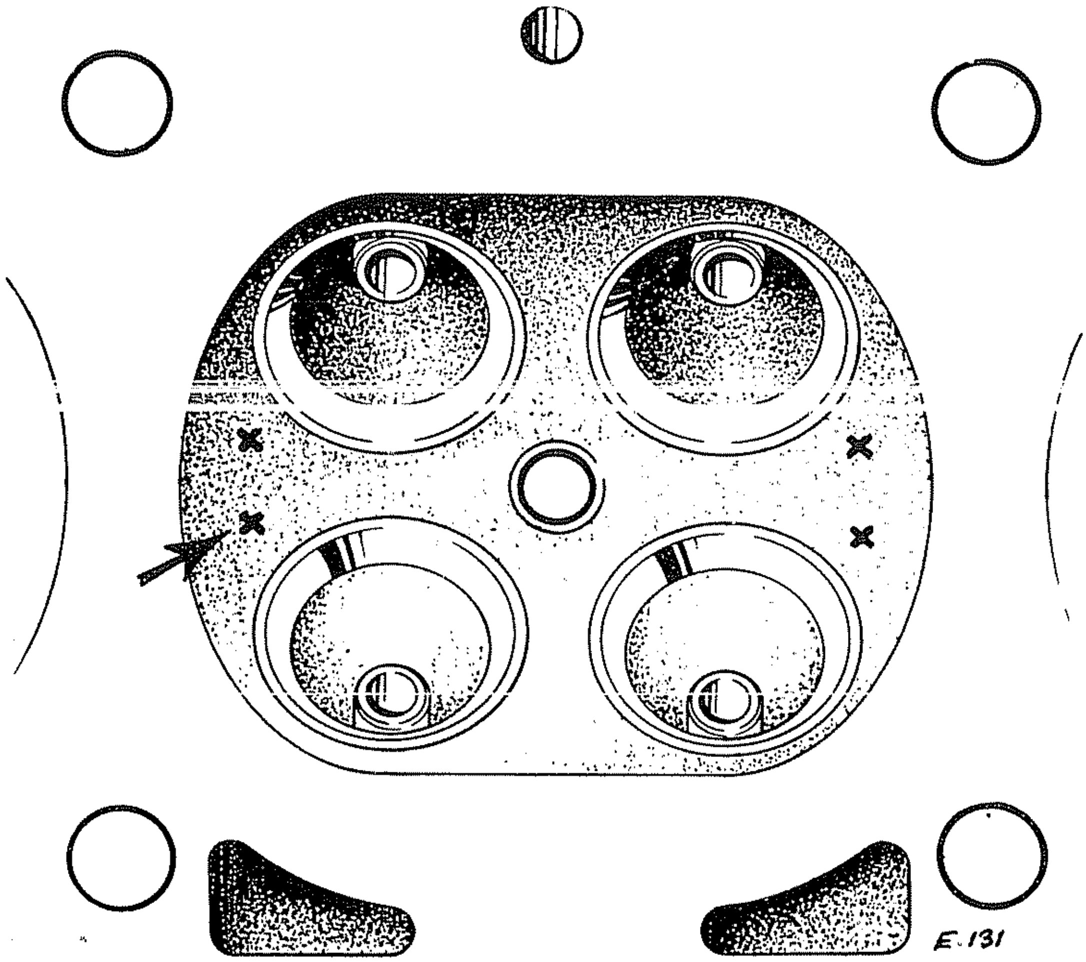


Fig. 16 Location of valve seat oversize stamping

To Replace

1. Check the combustion chamber adjacent to the respective seat for a 'C', 'D' or 'E' stamping, this indicating that that valve seat was fitted oversize in Production. If this stamping is visible, then that size (or larger) seat MUST be used as replacements. The letters 'C, D and E' refer to the prefix letters of the respective part numbers.

2. Heat the whole cylinder head to a temperature NOT EXCEEDING 200°C and freeze the insert with dry ice to a temperature NOT LESS THAN minus 80°C.
3. With the aid of Special Tool (05A or 06A), press the insert into place, ensuring that the seat FACES TOWARDS the combustion chamber. Allow the cylinder head to cool naturally in the air.
4. Re-build and refit the cylinder head.

VALVE GUIDES

Check the valve spring seat adjacent to each guide bore for a '1', '2' or '5' stamping. This refers to the amount of oversize of the guide (.001 in, .002 in, and .005 in, respectively).

If this stomping is visible, then that size guide MUST be used as replacements.

To Remove

1. Remove the cylinder head and dismantle as for decarbonising.
2. Heat the whole cylinder head to a temperature of between 100/150°C (212/303°F) and, with Special Tool (04A), knock the guides out of the head from the combustion chamber side.

To Replace

1. Heat the cylinder head to a temperature of between 100/150°C (212/303°F).
2. Locate a new circlip on the new guide and press the guide into its bore from the top, until the circlip seats completely in its recess. Care must be taken that the guides are NOT driven in further than this point. See TECHNICAL DATA for fitted height.
3. Ream the guide AFTER fitting, to the dimension given in TECHNICAL DATA. Recut the valve seat to ensure that it is concentric with the valve stern bore.
4. Re-build and refit the cylinder head to the engine.

CRANKSHAFT 'V' BELT PULLEY

To Remove

1. Remove all the 'V' belts.
2. Remove the set screw, spring washer and plain washer from the centre of the pulley. Pull off pulley, using a proprietary puller if necessary.

To Replace

1. Reverse the removal procedure. Check all 'V' belt tensions after replacing, and tighten bolts to the torques specified in TECHNICAL DATA.

CRANKSHAFT SPROCKET

To Remove

1. Set the engine in the timing position.
2. Remove the camshafts driving belt (toothed belt).
3. Remove the crankshaft 'V' belt pulley.
4. With the aid of Special Tool (170A), pull off the crankshaft toothed pulley, followed by the belt guide flange. Tighten the tool bolts finger-tight only.

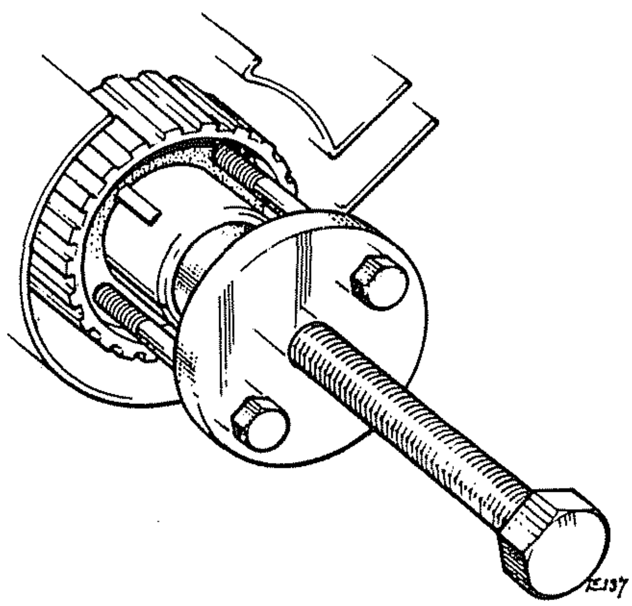


Fig.17 Using Tool '170A' to remove crankshaft sprocket

To Replace

1. Ensure that the engine has not been turned from the timing position.
2. Reverse the removal procedure. Check and adjust valve timing, ignition timing, belt tension and slow running.

FRONT COVER AND OIL SEAL

To Remove

1. Set the engine in the timing position.
2. Remove the crankshaft 'V' belt pulley.
3. Remove the camshafts driving belt (toothed belt).
4. Remove the cranksliaft sprocket.
5. Remove the camshafts drivebelt automatic tensioner and the alternator adjusting bracket.
6. Release the set-screws with their plain washers from around the periphery of the front cover. Pull off cover ond gasket, together with belt tensioner (manual tensioners only).
7. Remove the oil seal from the cover by pushing from its location.

To Replace

1. Using a new oil seal, with 'Wellseal' sealing compound applied to its outer diameter, insert into the front cover until flush with the rear face.
2. Apply jointing compound to both faces of a new gasket and replace front cover, with the aid of Special Tool (09A). For manual camshaft belt tensioners, ensure that the stud retaining the belt tensioner is centralised in the hole of the front cover. Secure cover with its set-screws and plain washers, tightening the screws to the specified torque loading (see TECHNICAL DATA).

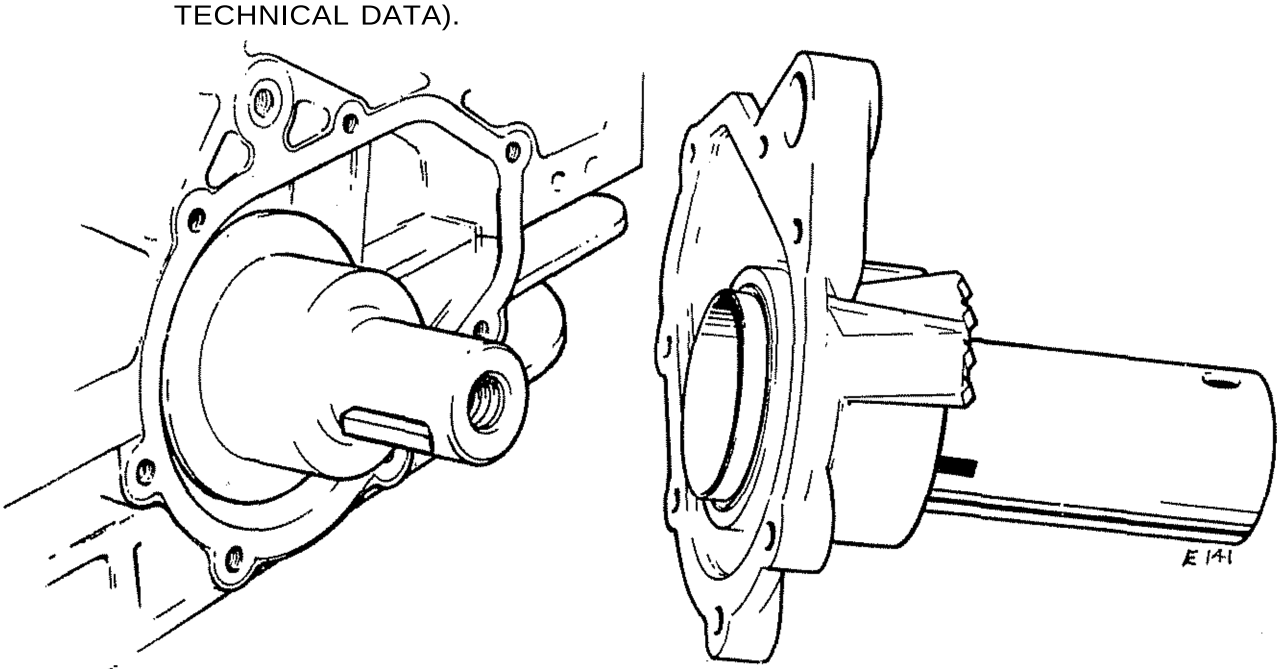


Fig. 18 Using Tool '09A' to locate front cover

3. Replace the remainder of the removed parts by reversing the removal procedure.

WATER PUMP

To Remove

1. Drain the cooling system.
2. Remove the 'V' belts.
3. Release the clips and remove all hoses from the water pump housing.
4. Release the bolts and remove bolts arid washers together with the water pump housing and gasket. Discard the gasket. Note that on some engines it may be necessary to first remove the auxiliary shaft pulley, in order to gain access to the water pump retaining bolts.
5. With the water pump assembly on o bench, remove the pulley and hub using a suitable press. The water pump is replaced as a complete unit, theretore, further dismantling is unnecessary.

To Replace

1. Measure the distance between the body mounting surface and the hub mounting surface of the old water pump, see figure 19.
2. Apply Loctite RC35 to the front of the bearing shaft or inside pulley hub, then press on the 'V' pulley hub to the dimerisiori of the old pump.
3. Support the pump shaft while pressing on the hub and also check the impellor to housing clearance, see figure 19. Refit the pulley.
4. Using a new gasket, to which a suitable joiriting compound has been used on both sides, refit the housing assembly to the engine, tightening all bolts to the loadings specified in TECHNICAL DATA.
5. Replace all hoses and tighten all securing clips.
6. Replace the 'V' belts.
7. Refill the cooling system and check for water leaks with the engine running. Check all hose clips and drain taps are tight.

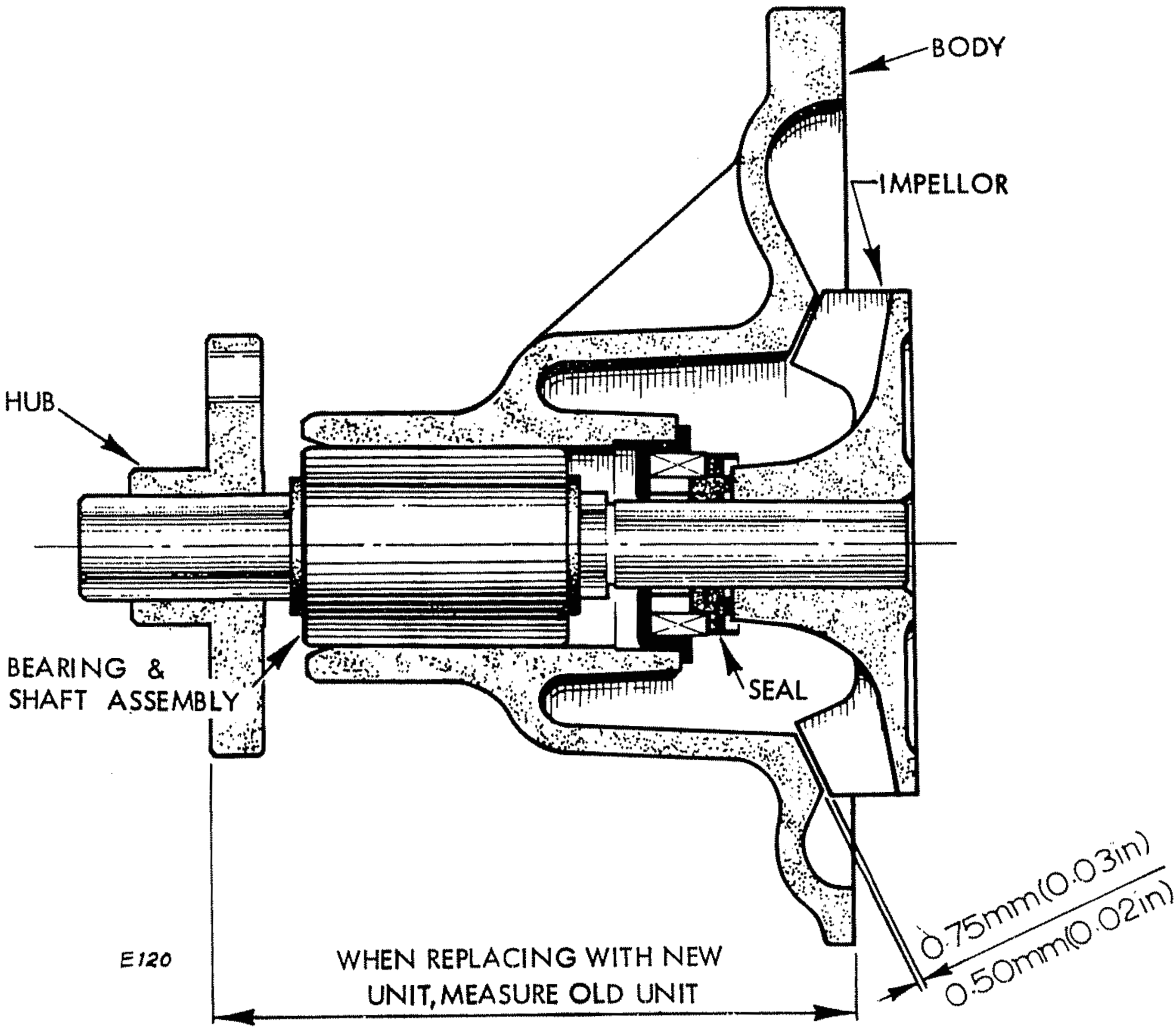


Fig.19 Water pump assembly

OIL FILTER

To Remove

1. Drain the oil rump.
2. To remove the filter, turn in an anti-clockwise (towards the cylinder block) direction. Discord the filter.

To Replace

1. Clean the mating face on the oil pump body. Pour o small amount of clean engine oil into the filter. Then apply a film of engine oil to the new seal

(supplied with filter), which is in contact with the oil pump body, locate filter on its adaptor ond screw on by HAND in a clockwise direction. When the filter 'seats' continue turning the filter for a further two-thirds to three-quarters of a turn to ensure an oil tight joint.

2. Refill the sump with oil, start the engine ond check for oil leaks at the filter to oil pump joint, if necessary tightening the filter further to give on oil tight joint.

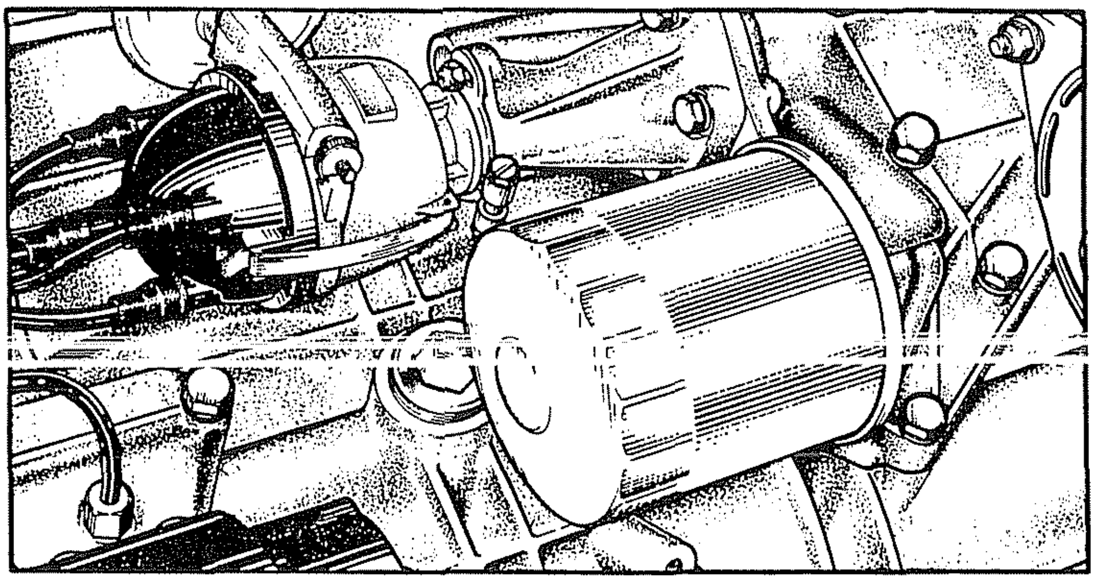


Fig.20 View showing oil pump, filter & ignition distributor

IGNITION DISTRIBUTOR

To Remove

1. Turn engine until at the timing position (see figure 15).
2. Remove the distributor cap.
3. Disconnect the low tension cable.
4. Discorinect the vacuum pipes to distributor.
5. Release the nut securing the distributor clamp to the oil pump housing, and withdrow distributor.
6. Ensure the spring is retained in the dog drive slot.

To Replace

1. Note that the driving dog on the distributor shaft is offset, therefore the

distributor cannot be incorrectly fitted. Before fitting the distributor, set the contact breaker gap to the specified clearance (see TECHNICAL DATA), then turn back the rotor arm until the points are about to open. Fit distributor into its location and secure the clamp. DO NOT OVERTIGHTEN. Check static ignition timing.

2. Reconnect the vacuum pipes, the low tension cable and the distributor cap.
3. Using a proprietary stroboscopic timing light, connect the leads in accordance with the manufacturers instructions.
4. Check that the mark on the crankshaft pulley is fully visible, marking with chalk or paint, if necessary. Start the engine and point the timing light at the timing marks on the flywheel or the crankshaft pulley adjacent to the timing scale on the front cover.
5. Progressively increase the engine speed to the mid-way position observing the timing mark, with the aid of the timing light, to check that the distributor advances the ignition timing. At this speed, adjust the ignition timing if necessary (see TECHNICAL DATA), by slackening the distributor clamp and turning the distributor body as necessary.
6. After making an adjustment, tighten the clamp sufficiently to hold the distributor in position. DO NOT OVERTIGHTEN. Remove the timing light.

OIL PUMP AND AUXILIARY HOUSING

To Remove

1. Set the engine to the timing position and remove camshaft driving belt. Mark position of rotor arm on the distributor before removing the toothed belt.
2. Remove the carburetters airbox backplate.
3. Remove ignition distributor cap with its cables.
4. Disconnect the low tension cable and remove distributor.
5. Remove the oil filter, and the alternator.
6. Fully release all the bolts securing the housing to the cylinder block, noting the position of the various bolts (some are longer than others) and remove the housing together with its gasket. Discard the gasket.
7. With the assembly on a clean bench, remwe the auxiliary shaft sprocket by releasing its central retaining bolt and washer.
8. Remove the bolts and washers retaining the oil pump body to the auxiliary housing and remove body with its gasket. Take care that the spring in the end of the auxiliary shaft and the outer pump rotor is not misplaced during

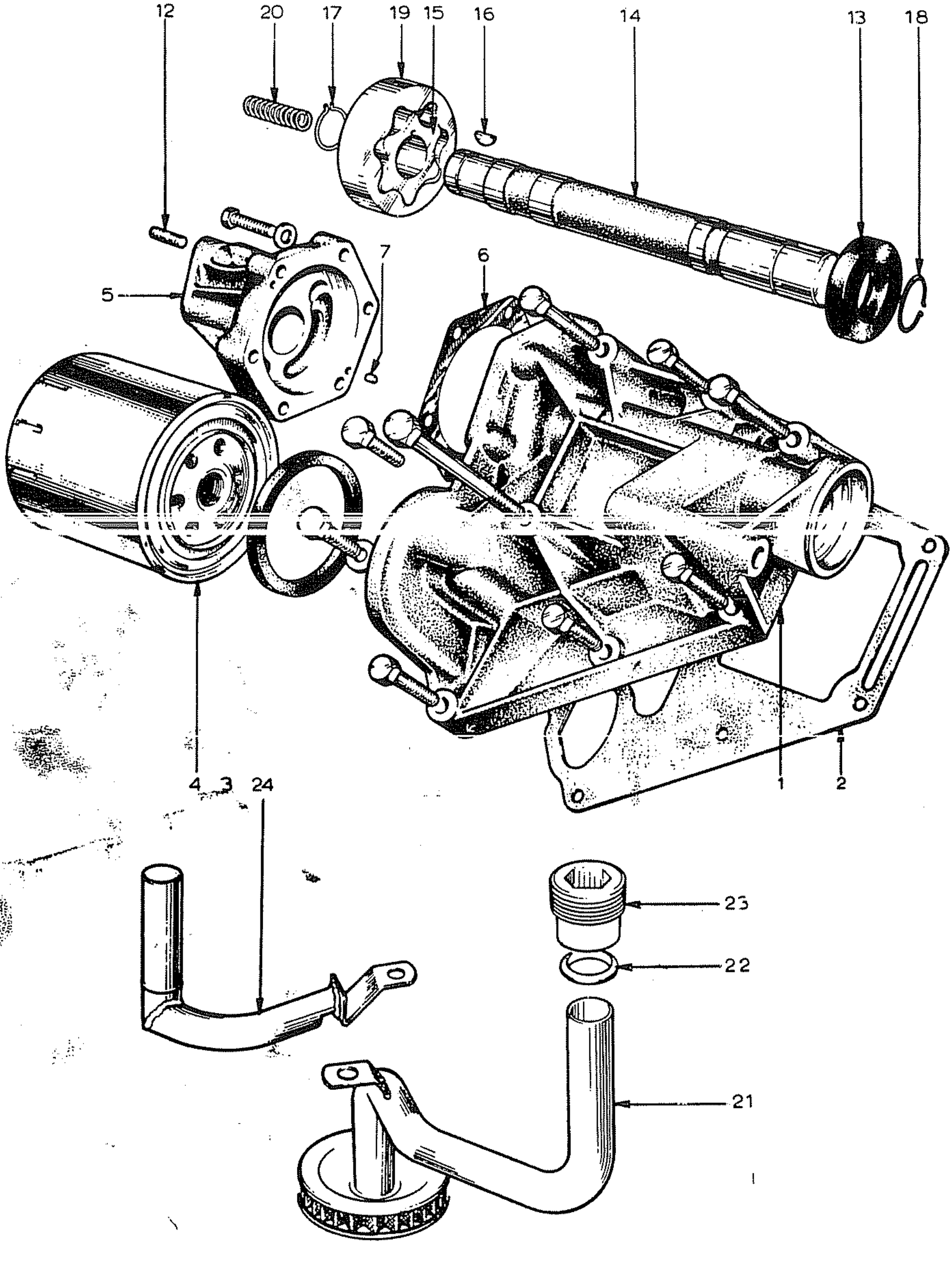


Fig.21 Oil pump/auxiliary housing components

this operotion. Discard the oil pump body gosket.

9. Remove the spring from the oil pump end of the auxiliary shaft. Remove the circlip securing the inner rotor of the oil pump to the shaft. Remove the circlip from the forward end of the shaft. Push shaft out of housing from the front end. Using o suitable drift, remove the oil seal.

To Replace

1. Using a new oil seal, press it into its location. The lip of the seal should of course be towards the housing.
2. Fit new key to the oil pump end of the shaft and using the new oil pump rotors, fit the inner one to the shaft. Fit a new circlip to secure.
3. Push the shaft into the housing from the oil pump end so that the shaft protrudes through the oil seal at the front end. Fit circlip.
4. Insert the ignition distributor shaft loading spring into the oil pump end of the auxiliary shaft. Apply 'Wellseal' jointing compound to both faces of the gasket which is fitted between the oil pump body and the auxiliary housing. Fit new outer pump rotor. Fit the oil pump body to the housing, tightening all bolts to the specified torque loading (see TECHNICAL DATA).
5. Using a new gasket to which a suitable compound has been added to both faces, refit the auxiliary housing to the cylinder block. Ensure that the retaining bolts are replaced in their original locations, otherwise it will be impossible to tighten them (with a resultant oil loss). Tighten bolts to torque loading given in TECHNICAL DATA.
6. Replace the oil filter.
7. Replace the auxiliary shaft sprocket on the shaft using a new key and with the dimple on pulley facing forward. Refit the securing bolt and washers.
8. Replace the ignition distributor.
9. Ensure that the crankshaft and camshaft ore still at the T.D.C. position (No.1 cylinder). Rotate the auxiliary shaft sprocket until the distributor rotor arm is in its No.1 position. Replace the camshaft drive belt.
10. Replace the low tension cable and the distributor cap. Replace oil filter and the olternator. Replace the carburetters airbox assembly. Re-check ignition timing.

INLET MANIFOLD

To Remove

1. Drain the cooling system.
2. Remove the airbox outer cover.
3. Disconnect the water hoses from the manifold.
4. Disconnect the breather pipe from the flame trap at the rear end of the air-box backplate. Disconnect the throttle and choke cables, and the vacuum pipes.
5. Disconnect the fuel feed pipe to the carburetters, and fit plug to main fuel pipe to prevent fuel draining from the tank.
6. Release the nuts and washers securing the manifold, and remove manifold.
7. Further dismantling of the manifold, such as removing the carburetters, may be carried out as desired on the bench.

To Replace

1. Reverse the removal procedure, but use a new gasket. Tighten all nuts to the specified torque loadings (see TECHNICAL DATA).

OIL SUMP

To Remove

1. Gain access to the sump by using a ramp, pit or jacks.
2. Using a suitable receptacle, release the drain plug and allow oil to drain from the sump. Remove the dipstick.
3. From around the periphery of the sump, remove the setscrews and nuts, with their plain washers, securing the sump and its gasket to the main bearing housing. Remove the sump by tilting it slightly towards the exhaust side of the engine in order to clear the oil strainer ond pick-up pipe assembly (this being attached to the underside of the main bearing housing).

To Replace

1. Thoroughly clean out any sludge which may have collected in the sump, BEFORE replacing the sump.

2. Use o new gosket ond apply jointing compound to both faces of the gosket. Tighten setscrews and nuts to the specified torque loading (see TECHNICAL DATA).
3. Refill the engine with the recommended oil.

CONNECTING ROD (BIG-END) BEARINGS

To Remove

1. Remove the sump.
2. Commencing with No. 1 (from radiator end) connecting rod, turn the crankshaft to facilitate removol of cop. Mark cop and rod.
3. Release the bolts by two or three turns ond top them to release the cap. Fully release the bolts and remove the cop.
4. Remove the upper ond lower big-end bearing shells from both the connecting rod ond the connecting rod cop.

To Replace

1. Replace the upper and lower big-end bearing shells by new parts in their appropriate locations.
2. Fit the cap to the connecting rod and tighten the bolts to the torque looding given in TECHNICAL DATA.
3. Replace the remaining big-end bearings by repeating the above process.
4. Replace the sump.

ENGINE TRANSMISSION ASSEMBLY

The engine and transmission unit should be removed from the vehicle as an assembly and the engine separated from the transmission unit on the bench or stand.

To Remove

1. Remove the tailgate.
2. Drain the cooling system.
3. Drain the oil from the gearbox.
4. Disconnect the battery.
5. In the engine compartment, disconnect the following.

All water hoses, throttle and choke cables; fuel feed pipe to the carburetters; vacuum pipes for brake servo systems; cables from alternator, starter motor, ignition distributor and temperature sender unit; oil pressure pipe.

6. Disconnect air trunking and remove airbox.
7. Disconnect the hydraulic pipe from the clutch slave cylinder on the bell-housing. Remove the speedometer cable from the LH side of the gearbox. Remove the rear valance, exhaust manifold, downpipe and silencer.
8. Fit slings and support the weight of the engine on suitable tackle.
9. Disconnect the gearshift linkage from the selector lever on the lefthand side of the gearbox.
10. Disconnect the cross-gate cable from the righthand side of the gearbox and the bellhousing.
11. Disconnect drive shafts, handbrake cables and the hydraulic pipes to the brake calipers.
12. Remove the bolts/nuts securing the engine mountings to the chassis, withdraw the righthand mounting bracket ond earthing strap.
13. Release the transmission unit mountings from the brackets on the chassis. Note number of shims between transmission and chassis mounting brackets for replacement. Lower the gearbox end of the assembly and remove whole assembly from under the rear end of the vehicle.
14. Remove all the bolts/nuts securing the engine to the transmission unit and carefully ease the two apart, taking core to withdraw the gearbox primary shaft as level as possible to reduce the possibility of bending the shaft.

To Replace

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

(a) Insert the same "umber of shims between the transmission ond chassis mounting brackets as noted on removal. If engine mountings are connected also shim to avoid any preloading when tightening bolts.

(b) Adjust the clutch release lever to the clearance given in TECHNICAL DATA and bleed the clutch and brake hydraulic systems and connect handbrake cables.

(c) Close the rodiotor drain tap, and refill the cooling system.

(d) Chec.. security of gearbox drain plug. Refill gearbox with recommended oil and replace filler/level plug.

(e) Check the gear linkage and cross-gate cable adjustments for correct selection of all gears, adjust if necessary.

(f) Check security of sump drain plug. Top up engine oil with one of the recommended oils if necessary. Replace filler cop securely (double notch), otherwise an oil loss could occur.

(g) Check, and adjust: Ignition timing
Slow running speed and idle mixture.

(h) Check tension of all 'V' belts.

(j) Check engine/gearbox assembly for oil, water and exhaust leaks, rectifying where necessary.

(k) Road test car and check operation of all engine/gearbox ancillaries and instruments.

FLYWHEEL AND RING GEAR

It is not necessary to remove the engine unit if the flywheel and ring gear only are to be removed. Access con be achieved by removing the transmission unit, see TRANSMISSION Section.

To Remove

1. Remove the clutch assembly from the flywheel (see Section Q).
2. Release the bolts from the centre of the flywheel and pull flywheel from its locating dowels on the crankshaft.
3. Cut between two adjacent teeth on the ring gear with a hacksaw and split the gear with a chisel.

NOTE: Under NO CIRCUMSTANCES must pressure be applied in attempting to remove the gear for re-positioning the gear on the flywheel.

To Replace

1. Check the face of the flywheel for signs of damage f o.. t ..utch driven plate. If evident, fit a new flywheel.
2. Heat the new ring gear evenly, to a temperature NOT EXC..L ..NG 315°C (600°F). Do NOT heat beyond this point, otherwise the wear ..sistance properties of the gear will be destroyed. Fit the gear ta the flywhee.. vith the chamfers on the leading face of the teeth relative to the normal direction of

rotation. Allow the ring geor to cool naturally in the air. DO NOT QUENCH.

3. Locate the flywheel squarely on the crankshaft flange and upon the locating dowels.
4. Apply the Loctite 'AV' to threads in crankshaft, then insert the securing bolts and tighten to the specified torque loading (see TECHNICAL DATA).
5. Check the flywheel run-out using a proprietary dial gouge. The total run-out should NOT EXCEED the figure given in TECHNICAL DATA.
6. Replace the clutch assembly.
7. Refit transmission unit.

CRANKSHAFT REAR OIL SEAL

To Remove

1. Remove the transmission unit from the vehicle.
2. Kemove the riywneei (see FLYWHEEL AND RING GEAR).
3. Remove the rear oil seal housing by releosing its eight securing setscrews.
4. Remove seal from the housing. Discard the gasket.

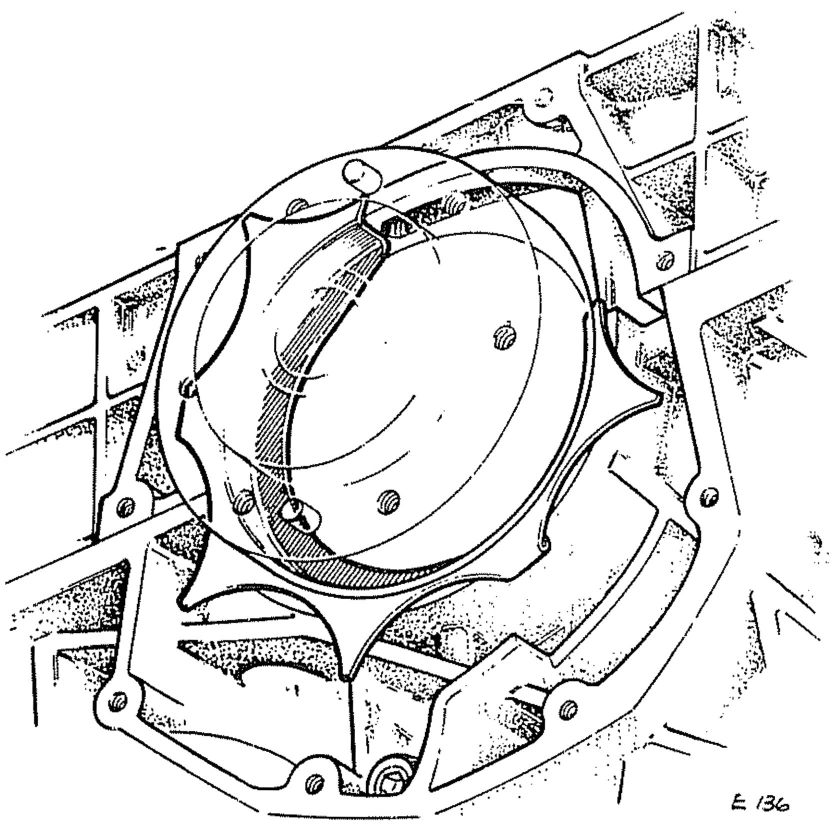


Fig.22 Location of spray shield

To Replace

1. With the lip of the seal towards the inner machined face of the housing, insert the new seal with the aid of a press, until its inner face is 2.54 mm (. 10 in) from the machined face, ensuring during this operation that the seal is entered squarely.
2. Ensure the spray shield is in its correct location on the cylinder block and main bearing housing, with its flange positioned between the two webs on the bearing housing. Lightly lubricate the lip of the seal, apply 'Wellseal' to both sides of a new gasket, and with the aid of Special Tool (84A), fit the oil seal housing over the flywheel flange of the crankshaft, securing with its setscrews. Tighten the setscrews to the torque looding given in TECHNICAL DATA.

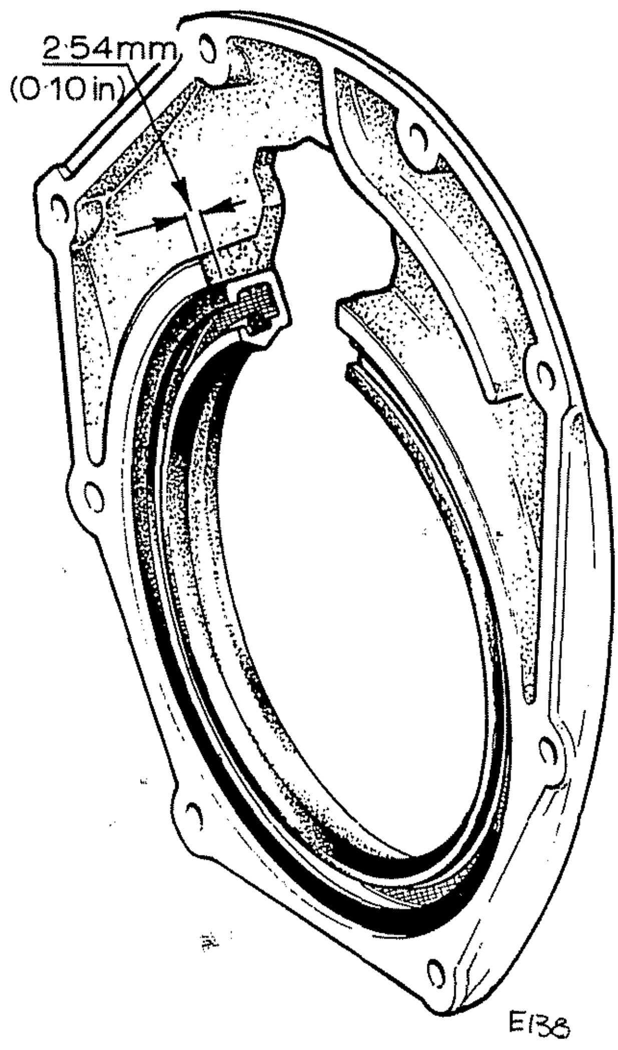


Fig.23 Rear oil seal and housing

3. Replace the flywheel
4. Replace tmnsmission unit in the car.

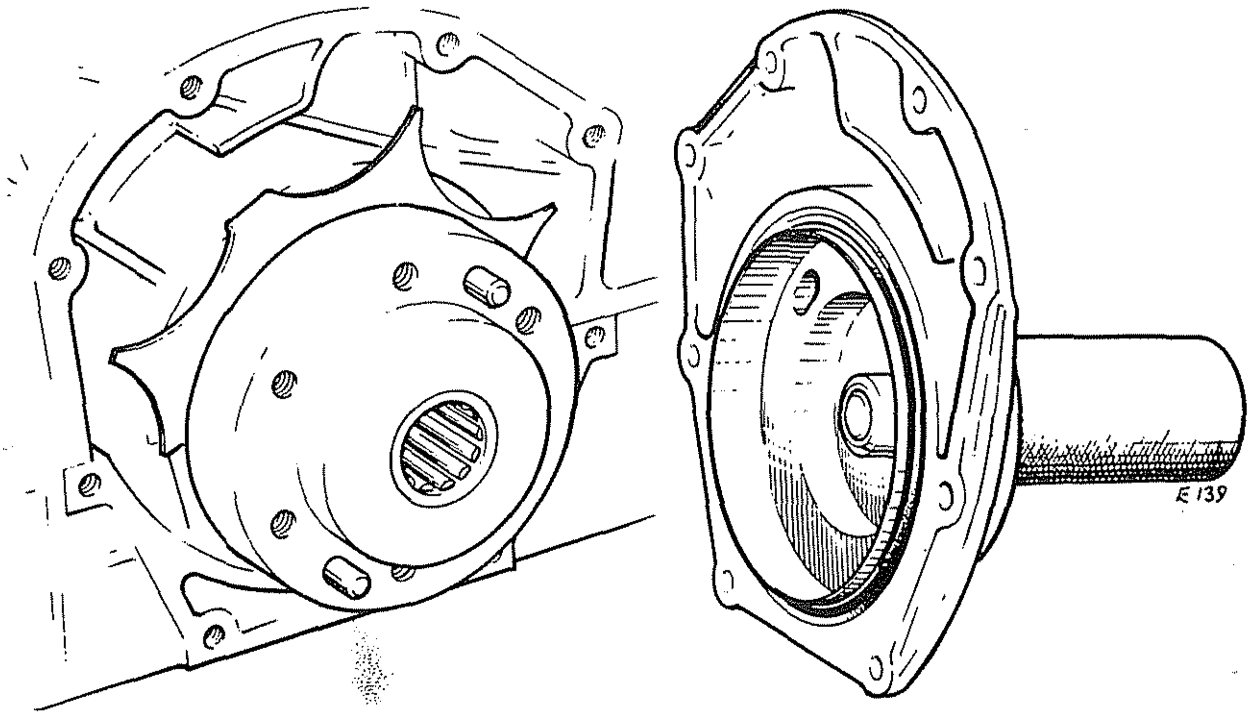


Fig. 24 Using Tool '84A' to fit rear oil seal housing

CRANKSHAFT

To Remove

1. Remove the engine/transmission unit assembly from the vehicle, separote the engine from the transmission unit and mount the engine on a suitable stand.
2. Remove the sump.
3. Remove the front cover.
4. Remove the rear oil seal housing.
5. Unscrew the connecting rod bearing cop bolts by two or three turns, and tap them to release the caps. Push the pistons up into the cylinder liners.
6. Remove the auxiliary housing. With the aid of Special Tool (83A) remove the union screw securing the oil pick-up pipe in the cylinder block.
7. Remove the ten nuts and woshers to the outside of the sump mounting face, followed by the ten large nuts and woshers adjacent to the main journals; all nuts should be released in sequence working diagonally inwards from the outside. Remove the oil pick-up pipe ond breother pipe from their locations in the main bearing housing and cylinder block. Lift off the main bearing housing. If the housing is tight, it is permissible to top lightly with a rubber mallet to eose removol. Remove the sproy shield from the rear of the cylinder block.

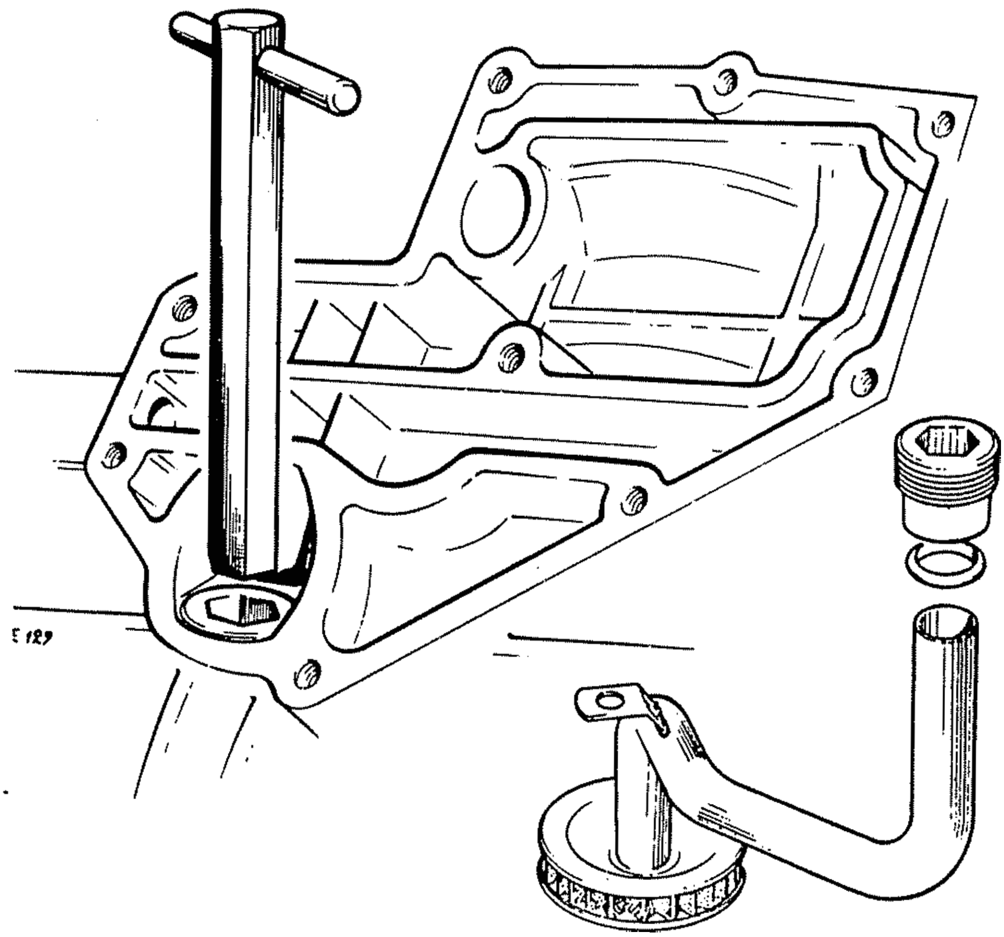


Fig.25 Oil pick-up pipe and union spanner

8. Lift out the crankshaft. Remove the main shell bearings from both the bearing housing and the cylinder block. Remove the thrust washers from the rear main bearing locations in the cylinder block.

To Replace

NOTE: On engines with a cross drilled crank (from engine No. 13277, including all Federal, North American spec. engines) the five main bearings in the bearing panel are plain without grooves or drilling.

1. Fit a new key to the front end of the crankshaft to retain the sprocket.
2. Fit a new spigot bearing and new flywheel dowels in the rear (flywheel) end of the crankshaft.
3. Check the top flanks at the rear of main bearing housing for a '+015' stamping, this indicating thot oversize bearings were fitted in Production. If this stamping is visible, then oversize* bearings MUST be used as replacements. Ensure that both the cylinder block and the main beoring housings

are clean, then fit new bearing shells. Apply a small amount of 'Cylesso' (or graphogen grease) to the bearing shells.

*Oversize refers to the outside dimension of the bearing shell.

4. Ensure that the crankshaft main journals are clean, then fit the crankshaft. Spin the crankshaft to ensure even distribution of the 'Cylesso'. Fit new selective thrustwashen to the rear main bearing so that the oil grooves (the 'copper' side) are towards the crankshaft. Check the end-float between the crankshaft and the thrustwashers (see TECHNICAL DATA). If the end-float is outside this tolerance, replace the selective thrust washers.

5. Apply 'Silastic' to shoulder on the spray shield. With the step of the shield facing towards the rear of the cylinder block, slide over the crankshaft between flywheel flange and rear of block. Turn the shield until it is flush with the block on the RH side from flywheel end. Push shield into its location at rear of cylinder block (see illustration.

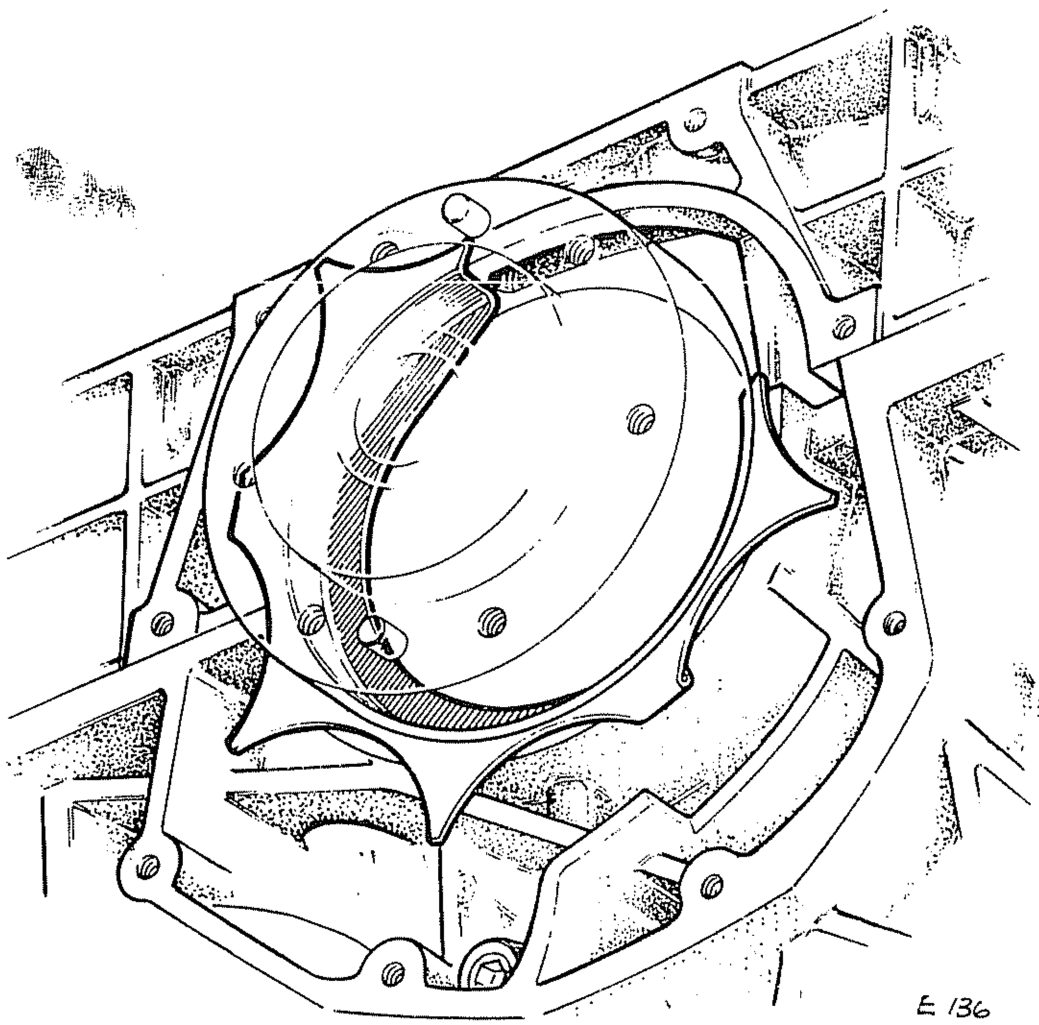


Fig. 26 Location of spray shield

6. Fit the locating dowels, one to each end stud on the RH side of the engine (LH side when engine is inverted). Ensure that the mating surfaces of both the cylinder block and bearing housing ore free of foreign matter, then apply 'Wellseal' jointing compound around the periphery of the joint. Fit the main bearing housing.

7. Replace all the plain washers and nuts to their studs securing the bearing housing to the cylinder block, tightening the nuts in sequence, diagonally outwards, to their specified torque loadings (see TECHNICAL DATA).

8. Ensure that the crankshaft connecting rod journals and the connecting rods and caps ore clean, then fit new bearing shells. Refit the connecting rods and their caps to their respective journals, after applying 'Cylesso' to the bearings. Tighten the bolts to their specified torque loadings (see TECHNICAL DATA).

9. The second from flywheel end, main bearing housing studs at both LH and RH side, should now have their 12mm nuts and washers removed, to enable the breather pipe mounting brackets to be mounted on these same studs.

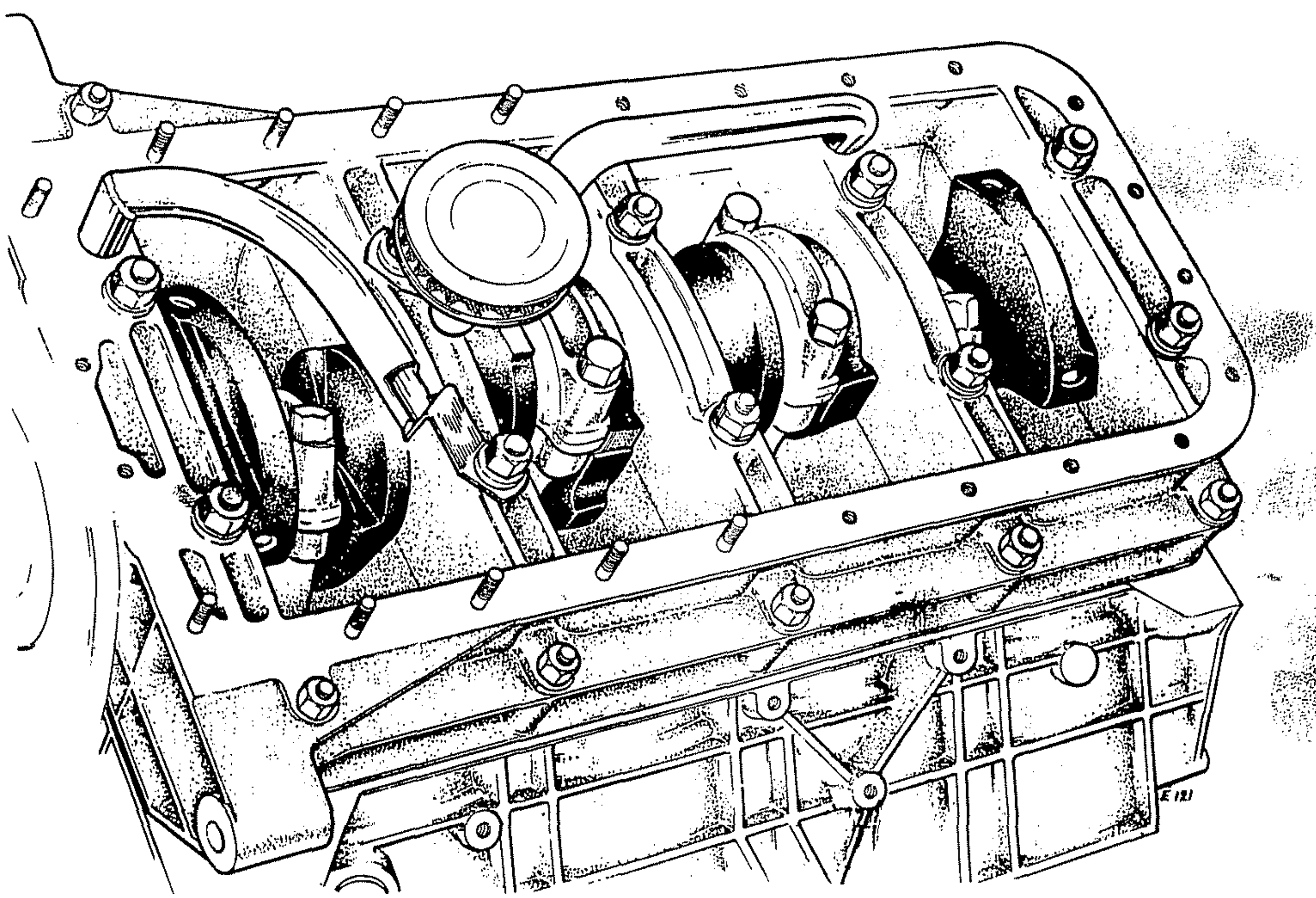


Fig.27 Engine inverted with sump removed

Through the drilling ot the rear end on the main bearing housing, push in the breather pipe until its mounting brocket is locoted on the RH stud. Fit washer and nut, tightening to its specified torque loading.

10. Through the drilling at the front end of the main bearing housing, push in oil pump pick-up pipe until its mounting brocket is locoted on the LH stud. Fit wosher ond nut, tightening to its specified torque loading. Apply engine oil to both sides of the plastic compression olive. From auxiliary housing end of cylinder block, push compression olive over the oil pick-up pipe, and fit the union screw. With the aid of Special Tool (83A), tighten the union screw to its specified torque loading (see TECHNICAL DATA).

11. Ensure sproy shield is in its correct location on cylinder block and main bearing housing, with its flonge positioned between the two webs on the main bearing housing. Replace the crankshaft rear oil seal.

12. Replace the front cover, crankshaft sprocket, sump and flywheel.

13. When a new cylinder block is being used, it will be necessary to fit the breather spout at the top rear of the RH side below the inlet manifold. Fit the bush, with its flange uppermost, into its location. Tap the breather tube into the bush until approximately 25mm (1.0 in) is left protruding. Ensure oil gallery and water jacket plugs are also fitted.

14. Refit the transmission unit to the engine, and replace engine/transmission assembly in the car.

PISTONS, PISTON RINGS, CONNECTING RODS AND CYLINDER LINERS

To Remove

1. Remove engine/transmission assembly and separate engine from the transmission unit.
2. Remove the cylinder head.
3. Remove the oil sump.
4. Remove the connecting rod bearing cops. Remove the ring of carbon from the top of liner wall. Push the piston up ond out of the cylinder liner, by the connecting rod. Remove the assembly to a bench.
5. Remove the piston rings. Extract the gudgeon pin circlips and push the pin out of the piston, thus releasing the connecting rod. Mark all components in relation to each other, and to the cylinder from which they were removed.
6. Using Special Tool (12A), withdraw the liners from the cylinder block.

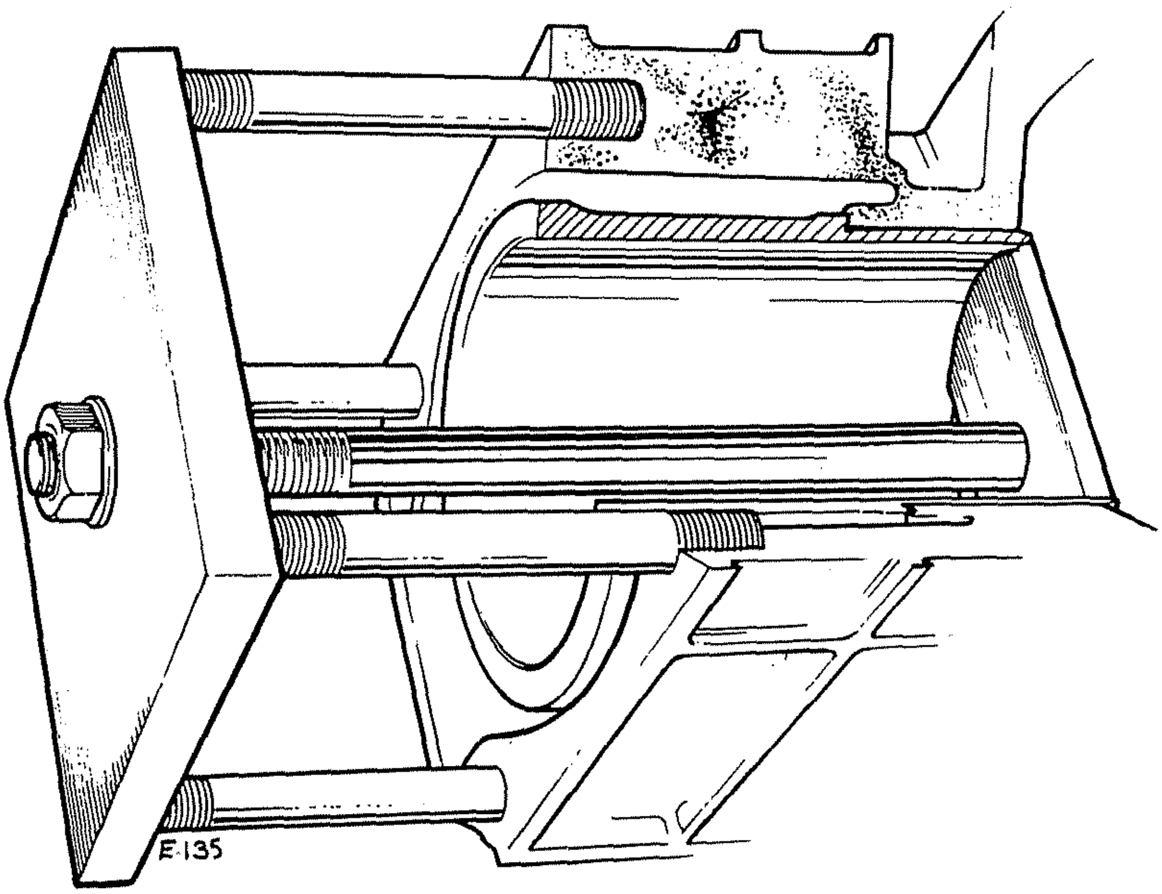


Fig.28 Using Tool '12A' to extract cylinder liners

To Replace

1. Clean piston and fit the connecting rod with 'FRONT' marks on both connecting rod and piston facing the same way. Secure the rod to the piston with its gudgeon pin and circlips.
2. If new rings are being fitted to an existing piston, first refit the connecting rod with 'FRONT' marks on both piston and connecting rod facing the same way. Secure the rod to the piston with its gudgeon pin and circlips.
3. The liners are fitted into the cylinder block with their 'flats' in a front-to-rear line. When replacing liners in the cylinder block, they MUST FIRST be fitted clean and dry, and pushed fully into their locations. At this point, the liner 'nip' should be checked; the 'nip' is the height of the liners ABOVE the cylinder block face and the height of the liners in relation to each other (see TECHNICAL DATA).
4. When the liner 'nip' is correct, withdraw the liners, apply 'Hylomar' on the liner flange to cylinder block mating face. Then replace liners.

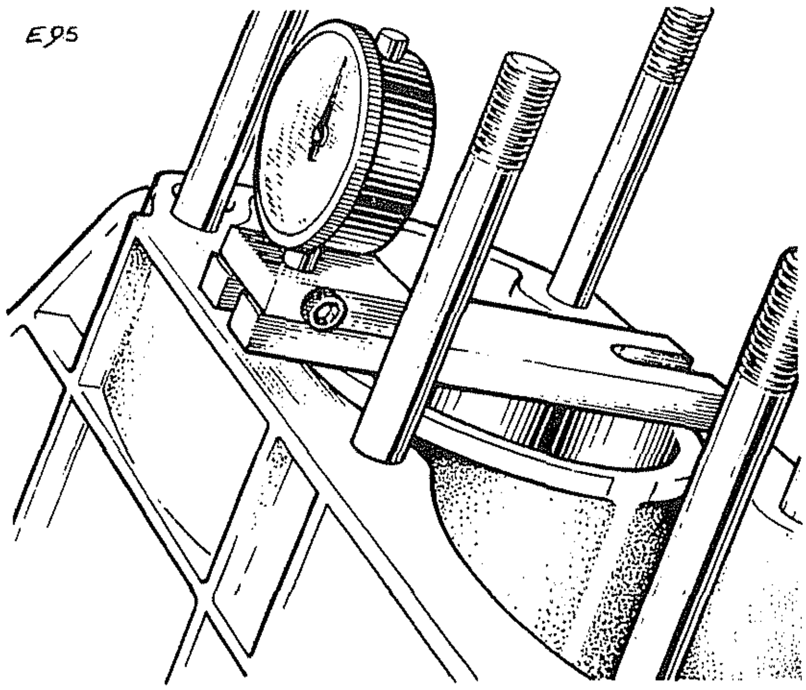


Fig.29 Using Tool '03A' to check cylinder liner height

5. Using a piston ring compressor, insert the piston into the liner with the 'FRONT' mark towards the front of the cylinder block. Fit cylinder liner clamps after replacing the pistons in the liners.

6. Fit new bearing shells to both connecting rod and cap, then refit the connecting rod caps securing with their bolts. Tighten all bolts to the specified torque loading (see TECHNICAL DATA).

7. Replace the oil sump.

8. Replace the cylinder head, after removing the cylinder liner clamps.

9. Replace engine in the car.

NOTE: When fitting piston rings proceed as follows:

A. Fit the oil control rings:

1. The oil control rings consist of an expander ring and two steel rails which are fitted above and below the expander ring. They MUST always be fitted BEFORE the compression rings are fitted, working from the piston crown downwards.

2. Fit the expander ring on the piston, ensuring that the coloured ends are butting.

3. Fit one end of a steel rails in to the groove below the expander ring,

holding the rail end with a thumb, whilst easing the rail over the piston and into its location.

4. Repeat operation '3' to fit the other steel rail above the expander ring.

5. Position the lower steel rail, 25mm (1.0 in) to the LEFT of the expander ring gap and the upper steel roil gap, 25mm (1.0 in) to the RIGHT of the expander ring gap.

B. Fit the second compression ring with the step on ring facing down towards piston skirt.

C. Fit the first compression ring. Position the oil control ring gap to the rear and the two compression ring gaps 120^{o} an either side of this.

Running In:

When new rings, or piston/liner sets hove been fitted, the running-in period must be 800 kilmetres (500 miles) (see Owners Handbook).

SPECIAL TOOLS

TOM) T 0002A — Cylinder Liner Clamps
To retain cylinder liners

TOM) G 0003A — Cylinder Liner Nip Gauge
To check liner height

TOM) T 0004 — Valve Guide Drift
To assemble/remove guides

TOM) T 0093A — Inlet Valve Seat Drift

T000 T 0094A — Exhaust Valve Seat Drift
For inserting valve seat

TOM) T 0009A — Front Cover Pilot
To locate front cover

T000 T 0010A — Camshaft Oil Seal Inserter
For inserting oil seal

TOM) T 0011A — Camshaft Oil Seal Extractor
For extracting oil seal

TOM) T 0012A — Cylinder Liner Extractor
For extracting liners

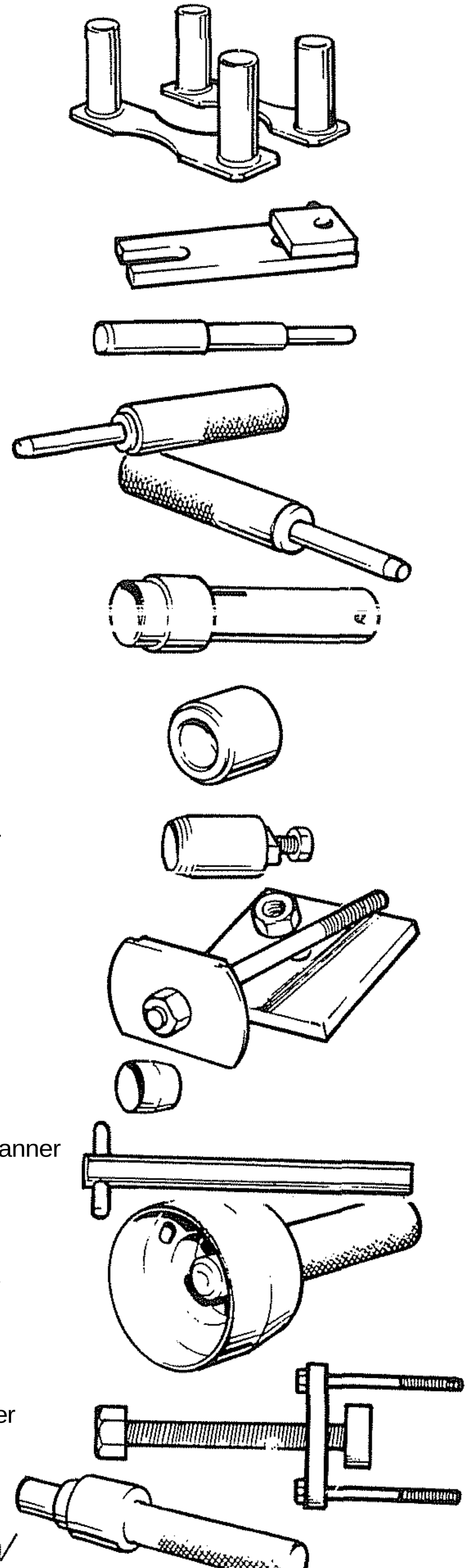
TOM) T 0072A — Camshaft Oil Seal Sleeve
For locating oil seal

TOM) T 0083A — Oil Pick-Up Pipe Union Spanner
For tightening union nut

T000 T 0084A — Rear Oil Seal Housing Pilot
To locate housing on re-assembly

T000 T 0170A — Crankshaft Sprocket Remover
For removal of sprocket

T000 T 024% — Spigot Bearing Inserter
For inserting spigot bearing/aligning clutch assembly



E 140

	Magnet Assembly (4 off x 2 in long)	To retain cam followers during dismantling
Type BT-33-86A 5-20	Burroughs Gauge	For checking timing belt

SEALERS, GREASE, LOCTITE, OIL

Part Number	Type	Application
A036 E 6038V	Silastic	Camshaft cover gasket
A907 E 6178V	Cylesso	Main and big-end journals
A907 E 6118V	Graphogen Grease	Cam followers and shims
A907 E 6119V	Wellseal	Crankshaft rear oil seal housing gasket, oil sump joint, cylinder head gasket and main bearing housing
A036 S 6175V	Hylamar	Cylinder liners to cylinder block
A907 E 6190V	Loctite 'RC40'	Manifold studs
A074 B 6009Z	Lactite 'RC35'	All push fits
A036 B 6370V	Loctite 'AV'	All studs not listed elsewhere, inc. idler pulley to bearing, flywheel bolts, carburetter trumpet nuts, oil sump to main bearing housing studs (6 mm).
A907 E 6184V	Loctite Primer 'T'	Idler pulley to bearing, all push fits, corburetter trumpet nuts.
A036 E 6025V	Duckhams 'Q' Motor Oil	Oil sump, Stromberg carburetter dampers, 'and all lubrication points (see also Section 'O').

NOTE: Loctite is NOT applied to the following studs:

(a) Cylinder head to cylinder black (12 mm)

(b) Main bearing housing (12 mm)

(c) Main bearing housing (8 mm)

(d) Camshaft housing to cylinder head (8 mm)

EMISSION CONTROL

&

Vehicles fitted with an emission control system hove an evaporation control system, anti-run-on system, exhaust emission control system and a crankcase vopour control.

Evaporation Control System

The evaporation control prevents petrol vopaur escaping to atmosphere from the fuel tank and carburetters. Vapour is routed through pipes to a charcoal canister when the engine is not running arid when the engine is running air is drawn through the canister, purging the petrol vapour from the charcoal. The air and petrol vapour mixture purged from the charcoal is routed to the carburetters and burned during engine combustion.

Anti Run-on System

An Anti Run-On valve (ARO) is fitted, this is linked to the oil pressure switch, ensuring the engine stops when the ignition is switched off. At the same time vents any evaporative emission from the carburetter float chambers.

The carburetters fitted ore Zenith 175CD2SE, the front carburetter (C907E0791F) and the rear carburetter (C907E0792F).

Exhaust Emission Control

Exhaust emissions from the engine are controlled using an air pump and exhaust catalyst converter. A vacuum pipe from the carburetters sense the amount the throttle is opened and this controls the amount of air injected into the exhaust ports.

The air pump is driven through a 'V' belt from a pulley attached to the exhoust cam shaft. Air is drawn through an oir filter by the pump and fed to a diverter valve, where air is diverted into the exhaust ports depending on the amount the throttle is opened.

A non-return valve ensures the exhaust gases do not c eote back pressure in the air line to the pump.

When fitting air injectors into cylinder head apply anti-seize paste (molybdenum disulphide paste) to the threads of the air injectors. Apply 'Firegum' or similar to the air rail unions when fitting to air injectors ond tighten to a torque loading of 15lb.ft. (2.07k.gm.).

EXHAUST CONCENTRATION TEST

1. Unscrew the plug fitted in the front end of the cotolytic converter ond fit adapter and sample pipe (Part No. T000T0321A).

2. Set the idle speed to 950-1000 r.p.m. with engine at normal running temperature.

3. Disconnect the air injection by removing the air outlet hose (between air pump and diverter valve) from the air pump and blank off the hose with plug (Port No. T000T0322A). Do not adjust idle speed with oir injection disconnected.

4. With exhaust concentration analyser attached to the sample pipe check the reading. Idle CO level at normal running temperature should be 3.5 - 4.5%. Adjust mixture as necessary. After every adjustment run the engine briefly at 2000 r.p.m. then check the mixture at idle speed. This is to ensure that the piston in the dash pots have settled correctly. For North American vehicles (except California), with a prefix H on the engine number and fitted with a "Lumenition" distributor, the idle CO level should be less than 1% with air on and 2 to 3.5% with air off.

PROCEDURE FOR TENSIONING PUMP DRIVE BELT

1. Slacken off the two pivot bolts under the pump just sufficient to allow movement of the pump.

2. Slacken off the two bolts on the tensioner.

3. Move air pump to obtain the correct belt tension (see TECHNICAL DATA). Tighten all fixing and tensioner bolts to a torque loading of 20lb.ft. (2.7k.gm) and recheck belt tension.

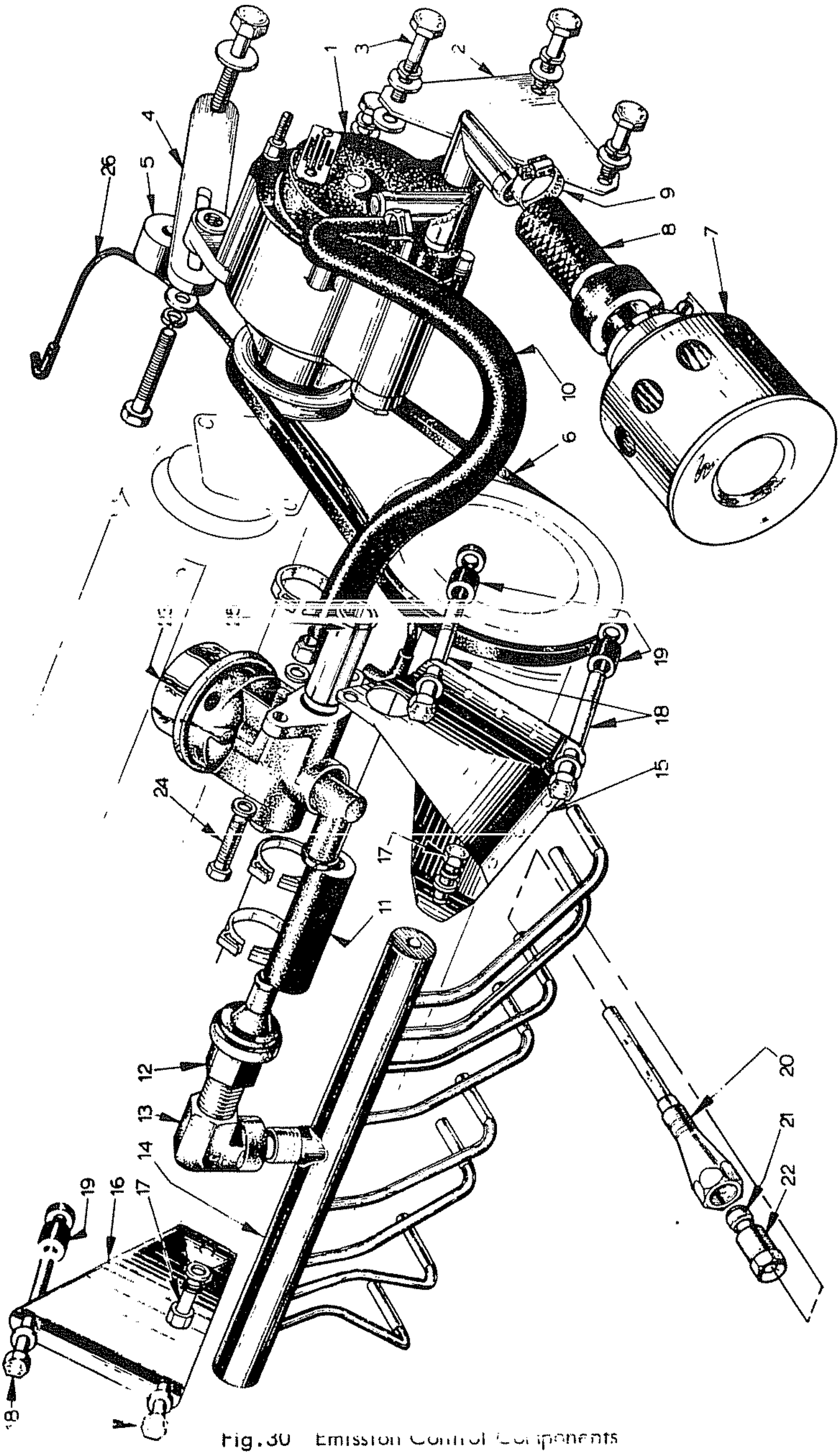


Fig.30 Emission Control Components

KEY TO FIG.30

1. Air Pump Assembly
2. Support Bracket, Air Pump
3. Bolt, M8
4. Tension Strap, Air Pump
5. Spacer, Tension Strap
6. 'V' Belt, Air Pump Drive
7. Air Filter
8. Hose, Air Pump Inlet
9. Hose Clip
10. Hose, Air Pump to Diverter Valve
11. Hose, Diverter Valve to Air Roil
12. Air Non-return Valve
13. Elbow
14. Air Rail Assembly
15. Mounting Bracket, Rear
16. Mounting Bracket, Front
17. Bolt
18. Bolt
19. Spocer
20. Air Injector
21. Olive
22. Union Nut
23. Diverter Valve
24. Screw M6
25. Inlet Pipe, Diverter Valve
26. Vacuum Pipe Assembly

LUMENITION DISTRIBUTOR

The 'Lumenition distributor' is basically o Lucas distributor with the contact breaker and condenser replaced by an Infra-red Sensor Unit (A907E6331F) arid o four bladed interrupter fitted in place of the contact breaker. A solid state power module (A075M0335F) is fitted on the rear RH wheelarch or RH body reinforcing channel in the rear compartment.

Before commencing the following tests remove the centre EHT lead to the distributor and secure it in a position 12mm (½ inch) from the engine costing. Remove the distributor cap and check an interrupter blade is riot covering the optical switch lamp. Switch on the ignition and proceed as follows:

1. To Test the Complete System.

   (a) Protect the exposed top of the distributor from strong sunlight.

   (b) Pass a piece of opaque material between the lenses of the optical switch and a spark should be observed between the EHT lead and the engine casting.

2. To Test the Power Module (and coil).

   (a) Uriplug ttie 3-way connector leading to the distributor.

   (b) Coririect the red wire in ttie Connector to the blue wire to the power module using a piece of wire. Brake the wire connection. A spark should be produced between ttie EHT lead and the engine casting.
   If no spark is produced, suspect the power module. If weak spark is produced suspect the coil.

3. To Test the Optical Switch.

   NOTE: The optical switch must be connected to a good power module.

   (a) Connect a voltmeter between the blue ond black wires to the 3-way connector

   (b) Check a voltage of approx. 1.8 volts is produced when the irifra-red beam is not interrupted.

   (c) When the beam is interrupted using o piece of opaque material the voltage drops to 0.3 volts.

NOTE: A voltage of 7.5 volts should be present on the red wire of the 3-woy connector.

CAUTION: Under no circumstances should o full positive feed be applied to any connection other than the red positive wire. Core should be token not to 'short' the coil terminals as this puts o full feed to the coil (brown) wire.

WARNING: EHT con be dangerous, hondle leads with core when ignition switch is ON.

SECTION F

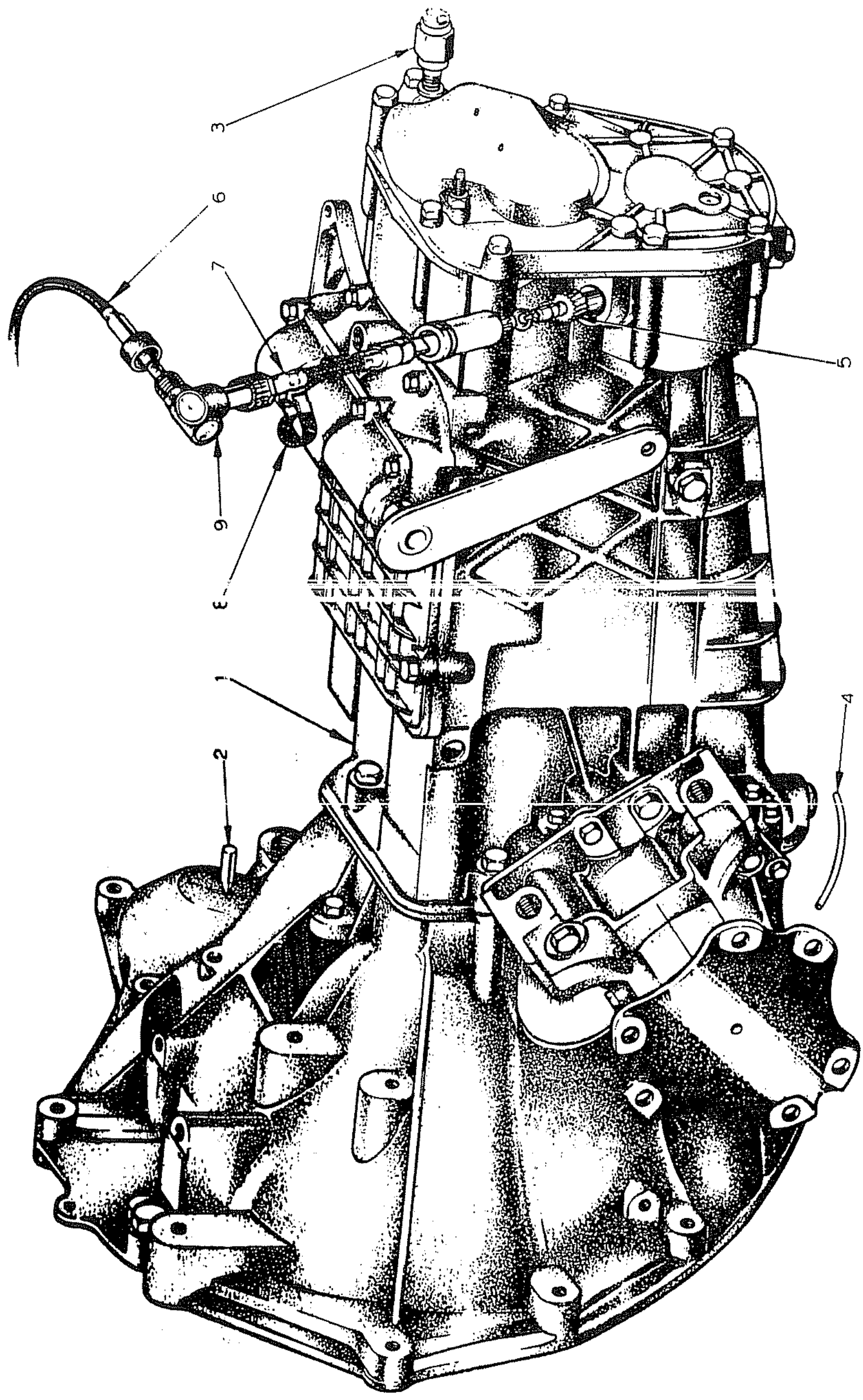


Fig. 1 - Transmission Assembly

KEY TO FIG.1

1. Gearbox housing
2. Pointer, engine tuning
3. Switch, reverse light
4. Gearbox drain tube
5. Speedometer pinion
6. Speedometer cable
7. Speedometer driveshaft
8. Retaining clip

GENERAL DESCRIPTION

The transmission is a single unit comprising a manual 5 speed gearbax, directly coupled to a differential drive and a clutch bellhousing containing the clutch operating mechanism.

The gearbox has five forward gears with synchromesh operation on all forward gears (constant mesh), while the reverse gear is of the spur gear.

The output shaft of the gearbox ends in a pinion which engages the crown wheel in the differential.

Four selector shafts are fitted across the top of the gearbox one far the 1st and 2nd gears, one for the 3rd and 4th gears, one far the 5th gear and one far the reverse gear. Selector forks are attached to the shafts and are moved into position far gear selection by the gear change lever through the gearbax crass-shaft.

GEARSHIFT LEVER AND GEAR CHANGE TUBE ASSEMBLY

The gearshift lever operation controls two functions on the gearbox cross-shaft; movement of the lever forward and backward moves the cross-shaft radially and movemerit from side-to-side moves the crdss-shaft across the gearbox.

When the gearshift lever is in an out of gear position the gearshift lever will take up a neutral centre position in the gate, held there by springs on the gearbox cross-shaft. The left-hand lever on the cross-shaft is coupled to the gearshift through a series of tubes and levers running through the centre chassis member and along the left-hand ride of the engine (see fig.2).

A bawden cable is connected from a lever arm on the gear shift assembly to an actuator arm on the gearbox casting (see fig.2).

To Remove

1. Remove the centre tunnel top assembly.
2. Unscrew the six screws securing the cover plate covering the recess in the chassis, which contains the gearshift assembly.
3. Remove the spirol pin connecting the bowden cable to the cross-gate lever clevis on the gear shift lever assembly.
4. Unscrew the four bolts holding down the gearshift lever assembly to the chassis

5. Lift the assembly to gain access to the pivot bolt, unscrew the bolt and lift out the gearshift lever assembly.

6. Remove bolt (item 13, fig.2) on the left-hand side of the engine and the bolt (item 9, fig.2) in the rear of the chassis box member. Withdraw the forward tube, lever arm and the intermediate tube as an assembly. Further dismantling con be carried out on the bench.

7. Remove the rear tube by unscrewing the bolt and nut securing the tube to the gearbox lever arm.

8. Remove the nut and shakeproof washer securing the bowden cable at the gearshift lever end of the cable. Note distance the outer cable protrudes into the chassis recess, for cable replacement.

P. Remove the clevis pin securing the bowden cable rod end to the cross gate lever on the gearbox.

10. Remove the nuts securing the cable to the bell housing. Attach to the gear-shift end of the bowden cable a wire 'pull-through' and pull out the cable from the gearbox end. Difficulty may be experienced when pulling the nut and washer through the grommet in the chassis, it is advised to remove the grommet at the same time.

To Replace

1. Reverse the. removal procedure, but before fitting the adjustable front tube see 'Adjustments'.

2. Before pulling through a new bowden cable ensure the shakeproof washer is fitted and the adjusting nut is in approximately the same position as the old cable, as once the cable is fitted it is not possible to make adjustments. A shakeproof washer must be fitted to the outerlocking nut.

Adjustments

1. Adjust the front tube for a measurement of 20.7/8 inches (530 mm) between the front edge of the odiusting nut and the centre line of the forward pivot hole. When correctly adjusted, approximately five threads of the adjusting screw will be exposed. Before finally locking the nut,, ensure the pivot holes ore aligned.

2. Adjust the rear tube with all other tubes in place and the gearshift lever in neutrol. Attach the adjustable link end of the rear tube ond with the gear

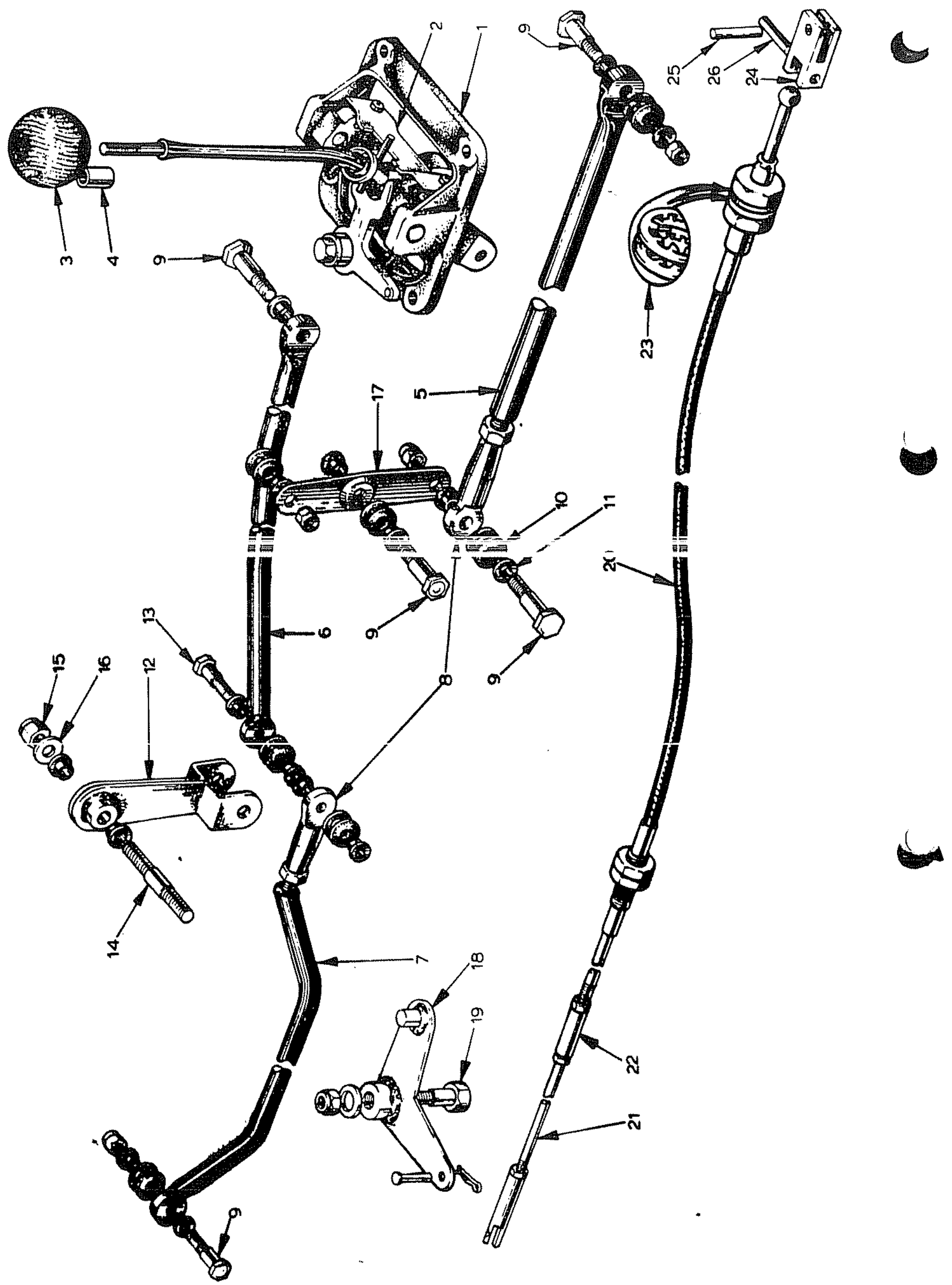


Fig. 2 – Gear Change Mechanism

KEY TO FIG.2

1. Gear lever assembly
2. Reverse gate
3. Gear lever knob
4. Spacer, Gear lever knob
5. Gear change tube, forward
6. Gear change tube, intermediate
7. Gear chonge tube, rear
8. Link, adjustable
9. Pivot pin
10. Rubber bush
11. Bearing
12. Gear chonge swing link
13. Pivot pin
14. Stub, swing link
15. Nyloc nut
16. Washer
17. Gear change, relay lever
18. Cross gate lever
19. Pivot pin
20. Cross gate cable
21. Cross gate cable rod
22. Adaptor
23. Washer
24. Clevis
25. Spirol pin
26. Spirol pin

selector lever in the neutral position, adjust length of the tube to Fit without moving the gear selector lever from the neutral position,

3. The bowden cable is adjusted by the clevis screwed to the end of the cable rod (bell housing end) and access is from under the rear of the vehicle. To adjust remove the clevis pin locking clip and remove clevis pin, release lock nut ond turn clevis to the desired position, tighten locknut and refit clevis pin and locking clip. The cable should be adjusted so that the gearshift lever in the neutral poaitlon is leaning slightly to the right-hand side of the vehicle, when sitting in the driving seat. Check all gears can be selected and re-adjust If necessary.

TRANSMISSION ASSEMBLY

To Remove

1. Raise the rear of the vehicle to a suitable height and support the chassis fmme m trestles. Before continuing thoroughly check the vehicle is m m and will withstand any movement caused by the removal of parts.
2. Remove both rear wheels and disconnect both driveshafts from adaptors.
3. Disconnect the battery, reverse light switch and remove the starter motor.
4. Drain the gearbox of oil.
5. Remove the rear gear change tube on the left of the transmission unit, together with the gear change swing link,
6. Disconnect the cross-gate cable at the lever on the right of the transmission unit by removing the clevis pin.
7. Remove the rear valance and the exhaust system up to the down pipe flange. Disconnect the brake pipes and handbrake cables from calipers.
8. Remove the clutch slave cylinder and the adjusting screw from the clutch release lever.
9. Remove all the bolts connecting the bell housing to the engine.
10. Loosen the large bolt on each gearbox mounting. Do NOT remove the bolts at this stage and make a note of the poritim and number of spacing washers between both mountings.
11. Support the gearbox and remove mounting bolts. Carefully separate the gearbox from the engine and remove. Take care not to damage the input shaft on removal.

Dismantling

1. Support the transmission unit on a suitable surface on a bench and remove the brake calipers and brake disc assemblies.
2. Remove the gearbox top cover together with the selector cross-shaft.
3. Remove the drive shaft bearing housing assemblies the adjusting washers and spacers. The location and order of the washers and spacers must be noted. Note particularly the large spacer on the RH housing.

To Replace

1. Reverse the dismantling and removal procedures, using new gaskets on the outlet shaft and new locking plates on the drive shaft flange bolts.
2. When fitting the gearbox mounting bolts, ensure that the correct number of spacing washers are between the gearbox mountings.
3. Bleed and adjust the clutch.
4. Reconnect gear linkage and crossgate cable, odjust as necessary.
5. Check and top up gearbox oil as necessary.
6. Check exhaust system for leaks and rectify if necessary.
7. Bleed brakes and adjust handbrake if necessary.

CLUTCH BELLHOUSING

To Remove

1. Remove the transmission assembly and driveshaft bearing housing assemblies.
2. From inside the bellhousing remove the four nuts and washers on the studs attached to the gearbox casting.
3. Remove the ten bolts securing the outer edge of the gearbox casting to the bellhousing.
4. Hold the differential in position against the bellhousing and pull away from the gearbox casting. Place the bellhousing on the bench with the differential uppermost and lift out the differential.

Dismantling

1. Slide off the fork arm the rubber dust excluder.
2. From inside the bellhousing remove the retaining spring and the thrust bearing assembly.

3. Remove the pin securing the fork to the ball joint and withdraw the fork.
4. Unscrew the fork ball pin and remove.

To Replace

1. Reverse the dismantling and removal procedures for the clutch bellhousing. Seal the mating faces with "Silastic". Tighten all bolts to specified torque.

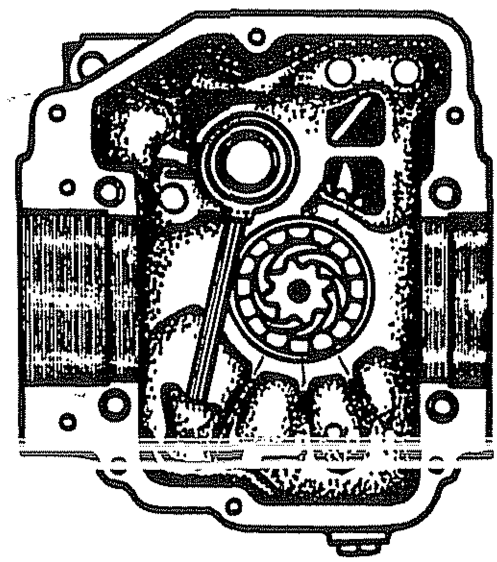


Fig.3 Front end of gearbox

DRIVE OR INPUT SHAFT

To Remove

1. Remove the clutch bellhouaing as prevlouxly described.
2. Remove the tube enclosing the input shaft together with the two 'O' rings. The tube should pull out from the oil return flange, but may come away attached to the flange.
3. Remove the oil return flange.
4. Remove the circlip retaining the front part of the Input shaft in the primary shaft. Take core not to loose the spring between the Input shaft and primary shaft. If the circlip is very difficult to remove and further dismantling is Intended, then remove Input shaft attached to the primary shaft. It will be easier to remove the circlip on the bench

To Replace

1. Reverse the removal procedure for the input shaft and clutch bellhousing.

GEARBOX REAR HOUSING

To Remove

1. Remove the transmission unit as previously described.
2. Remove the rear and top cover on the gearbox.
3. Remove the bolt securing the 5th gear synchro ossembly together with the deflector. To assist in the removal of the bolt, slacken the screws sec the reverse gear fork and engage two gears, e.g. 1st gear and rever
4. Remove the locking wire through the screw securing the 5th gear fork remove the screw.
5. Remove the 5th gear synchro assembly ond the 5th gear fork.
6. Remove the speedometer driver gear and connection socket.
7. Remove the eight screws securing the rear housing and withdraw the rear housina.

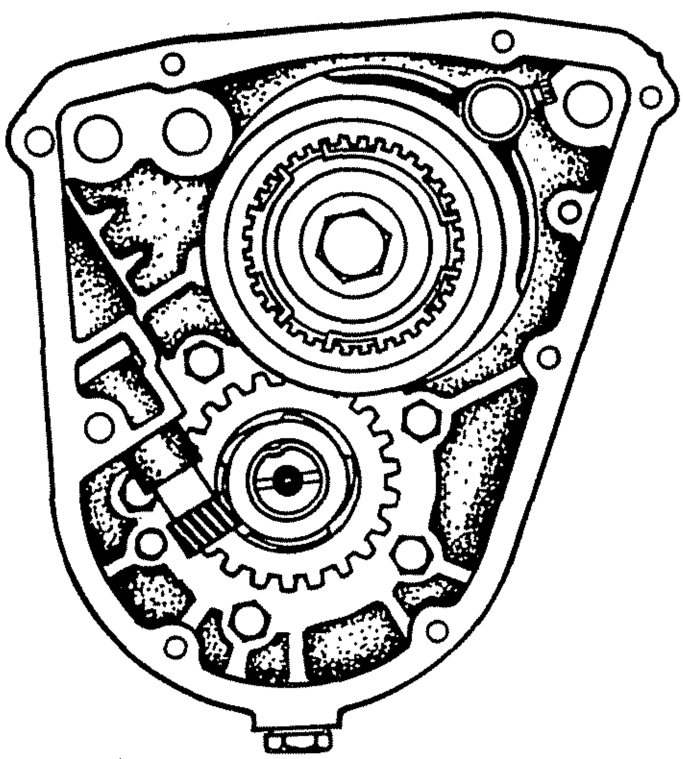


Fig.4 Rear housing with cover removed

To Replace

1. Reverse the removal procedure taking care to fix a locking wire to the 5th gear fork fixing screw. Tighten retaining bolt fw the synchro assembly to 14.5-16.5 kg m (105-120 lbs/ft). Seal all mating faces with "Silastic".

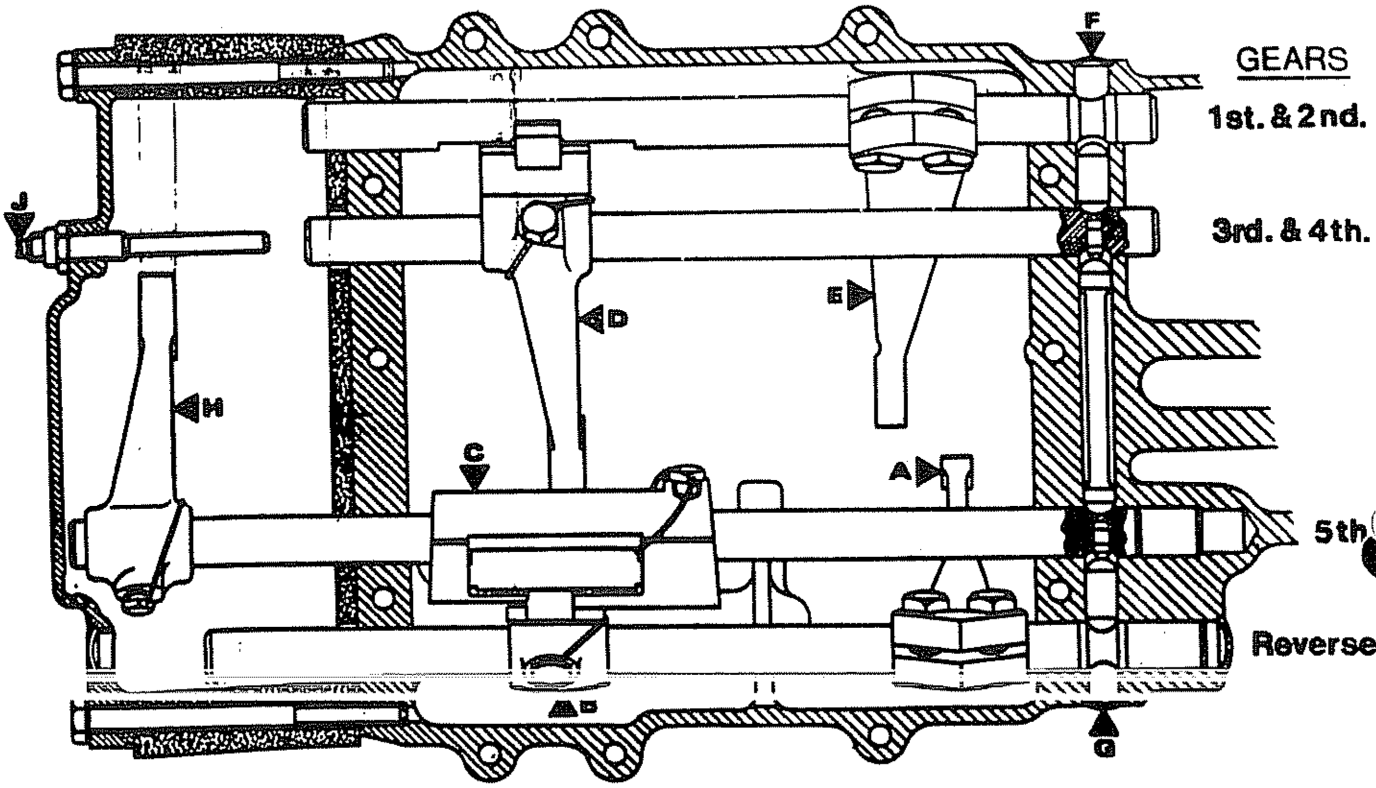


Fig.5 Gear selectors

GEAR SELECTORS REMOVAL (Figure 5)

1. Remove the transmission unit and gearbox rear housing as previously described, Remove the gearbox top cover together with the selector cross-shaft.

C

Reverse Gear Selector

1. Slacken the screws securing the fork (A) and the operating dog (B), first removing the locking wire, to the selector shaft.
2. Withdraw the selector shaft, removing the fork, the operating dog and rhaft locking ball and spring.

5th Gear Selector

1. Slacken the screw securing the 5th gear operating dog (C), after removing the locking wire.

2. Remove the shaft, the operating dog and shaft locking ball and spring, and the small interlock plunger inside the front end of the shaft.

3rd and 4th Gear Selector

1. Slacken the screw securing the fork (D) after removing the locking wire.
2. Remove the shaft, the fork, the shaft locking ball and spring, and the small interlock plunger inside the front end of the shaft.

1st and 2nd Gear Selector

1. Slacken the screws securing the fork (E).
2. Remove the shaft and the shaft locking ball and spring; the fork cannot be removed at this stage.

Interlock plungers

~~To Remove~~

1. Prise out the blanking plugs at potitions (F) & (G) and push out the interlock plungers, taking care to note the order and position of the plungers.

   NOTE: One long plunger between 3rd/4th and 5th selector shafts and shorter plungers between 1st/2nd and 3rd/4th selector shafts and 5th and reverse selector shafts.

GEAR SELECTOR REPLACEMENT

1st and 2nd Gear Selector

1. Locate the locking ball and spring in position.
2. Compress the spring ond ball assembly, using a 6 mm diameter rod.
3. Insert the gear selector shaft through the gearbox outer casting, the operating fork and into the differential end of the gearbox costing up to the neutral position.
4. Using a set of 1st and 2nd synchro gauges 3180-T locate the fork in the neutral position. The sets of gauges ore available in different thicknesses, select a set of gauges giving the least movement of the fork.
5. Tighten the two screws securing the fork to a torque of 4 kg/m (29 lb/ft) and remove the gauges.

3rd and 4th Gear Selector

1. Place the first interlock plunger in from the opening at (F) figure 5 and locate in the 1st and 2nd selector shaft notch.
2. Insert the gear selector shaft through the gearbox outer casting, fit locking ball and spring as previously described, the operating fork and into the differential end of the gearbox casting, taking care to correctly locate the small plunger inside the front end of the selector shaft.
3. Locate the operating fork on the selector shaft so that the notch on the shaft lines up with the screw hole and screw down the grub screw, lock with wire.

5th Gear Selector

1. Place the long interlock plunger in from the opening at (g) figure 5 and ensure that the fitted selector shafts are located in the 'neutral' position. This will allow the 5th gear selector shaft to be inserted into the differential end of the gearbox
2. Insert the gear selector shaft through the gearbox outer casting, fit the locking ball dnd spring as previously described, the 5th gear operating black and into the differential end of the gearbox casting, ensuring that the small interlock plunger is located inside the front end of the selector ahaft.
3. Locate the 5th gear operating block on the selector shaft so that the nokh on the shaft lines up with the screw hole in the block. Screw down the grub screw and lock with wire.

Reverse Gear Selector

1. Place the last interlock plunger in from the opening at (g) figure 5 and ensure that the fitted selector shafts are located in the 'neutral' position.
2. Insert the gear selector shaft through the gearbox outer casting, fit the locking ball and spring as previously described, the operating dog, the reverse gear fork and into the differential end of the gearbox casting.
3. Locate the reverse operating dog on the selector shaft so that the notch on the shaft lines up with the screw hole in the operating dog. Screw dawn the grub screw and lock with wire.
4. Position the reverse selector shaft in the neutral position with the notch in the operating dog vertical. Place the gauge 3188-T (3 mm) against the 1st gear idler and move the reverse intermediate gear, together with the reverse

fork, up against the gauge. Tighten the two locking screws to a torque of 4 kg/m (29 lb/ft).

4th Gear Stop Adjustment

1. Replace the 'Gearbox Rear Housing' as previously described.
2. Engage the 4th gear.
3. Gently push the slider against the fork. Measure the clearance x between the slider and the 4th gear pinion, using feeler gauges.
4. Place a shim of thickness x +0.5 mm between the pinion and slider. Tighten the screw of the stop (J in fig. 5) until it bears against the shaft of the 3rd and 4th gear fork.
5. Tighten the locknut on the stop screw and check the clearance.

Interlock Plungers

To Replace

1. Smear the bores of the interlock plungers with a sealing compound and knock in the blanking plugs at positions (F) and (G).

Final Assembly

1. Fit top cover on the gearbox and replace the transmission unit as previously described.

PRIMARY SHAFT (figure 7)

To Remove

1. Remove the Geor Selectors and the Input Shaft as previously described.
2. Remove the speedometer drive wheel using spanner 3179-T and pull the 5th gear drive pinion off the splined pinion shaft.
3. Release the forward bearing (bellhousing end) on the primary shoft by gently topping the rear end of the primary shaft.
4. Release the rear bearing on the primary shaft using the extractor 2400-T if necessary. Take care not to lose the balls from the race.

   NOTE: The inner bearing rings are in two halves on the primary shaft rear end and care should be taken to note where each is fitted.

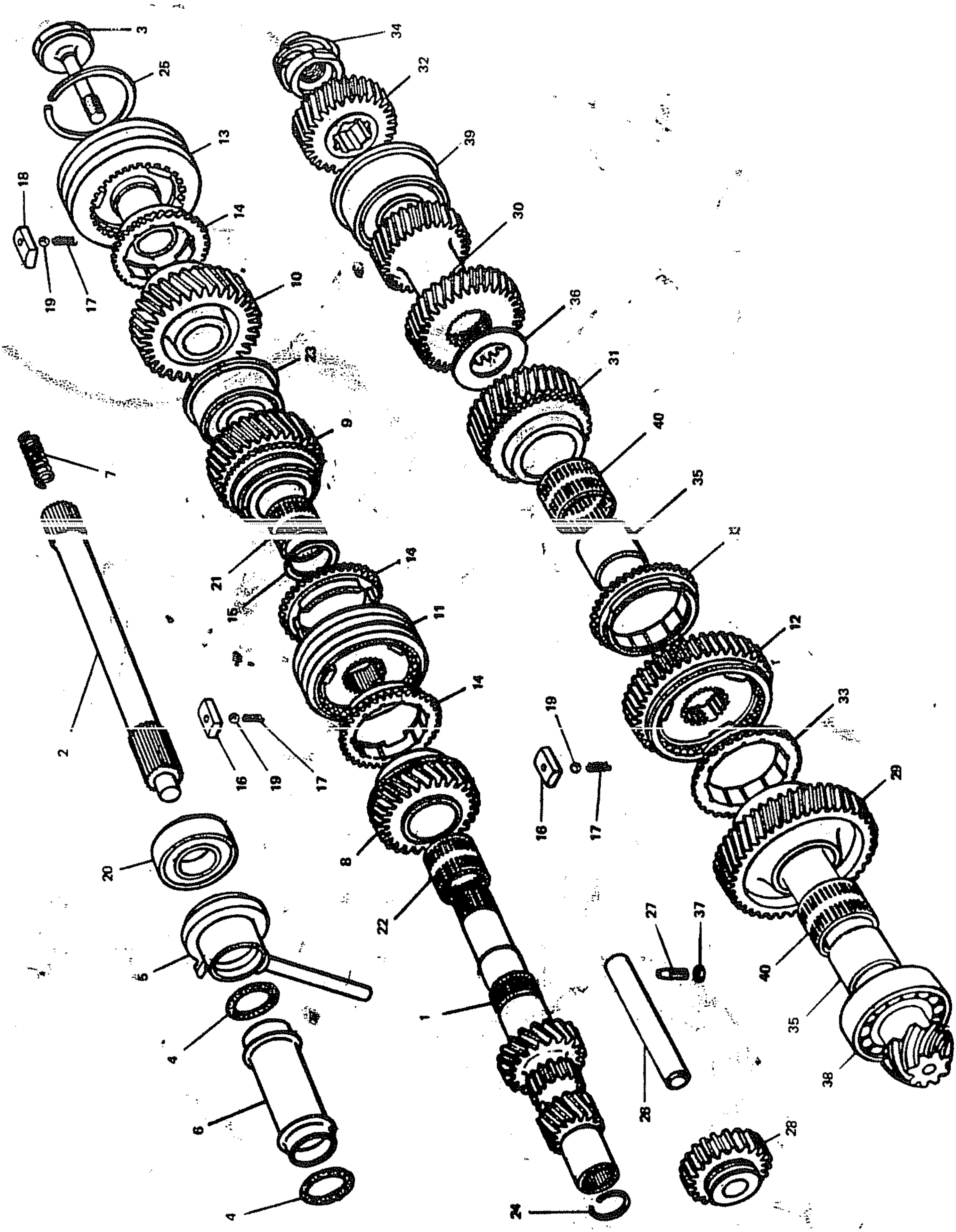


Fig.6 Gearbox gear train

KEY TO FIG.6

1. Primary shaft
2. Drive shaft (Input shaft)
3. Bolt and deflector
4. "O" ring
5. Flange
6. Support tube
7. Spring
8. 3rd gear pinion
9. 4th gear pinion
10. 5th gear pinion
11. 3rd and 4th gear synchro
12. 1st and 2nd gear synchro
13. 5th gear synchro
14. 3rd, 4th and 5th gear synchro-rings
15. Circlip
16. Setting pin
17. Spring
18. Setting pin, 5th gear
19. Synchro ball
20. Ball bearing
21. Needle bearing (4th/5th)
22. Needle bearing (3rd)
23. Double ball bearing
24. Circlip
25. Circlip
26. Reverse gear spindle
27. Screw
28. Reverse gear
29. 1st gear idler pinion
30. 3rd and 4th gear train
31. 2nd gear idler pinion
32. 5th gear driven pinion
33. 1st and 2nd synchro ring
34. Speedometer driver wheel
35. Bush
36. Washer
37. Nut
38. Roller bearing
39. Double ball bearing
40. 1st and 2nd needle bearing

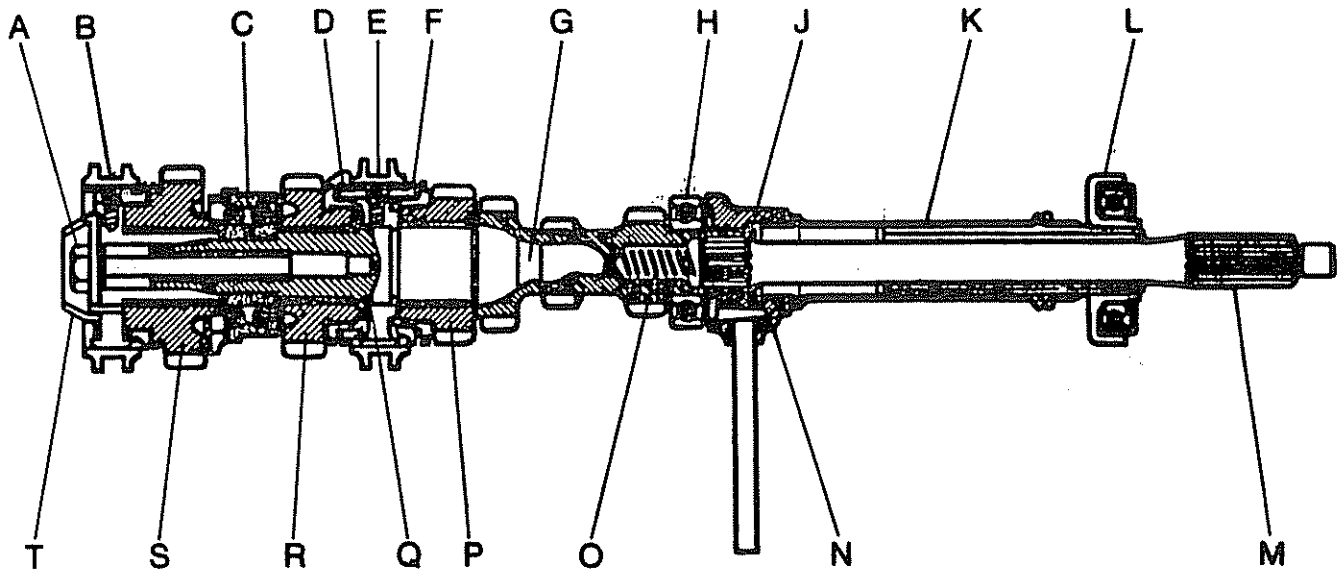


Fig.7 Primary shaft assembly

5. Move the primary mainshaft towards the bellhouring, separating the 4th gear loose pinion to gain access to the synchro hub assembly retaining circlip. Remove the circlip from the shaft using circlip pliers 3253-T, taking care to note the direction in which it is fitted.

6. Move the pinion shaft towards the bellhousing as described under heading 'Bevel Pinion' and allow gears to rest in the bottom of the casting to provide additional space to withdraw the primary rhaft.

7. The primary shaft can now be moved towards the bellhousing end until the rear end of the shaft is clear of the casting. Lift out the primary shaft assembly.

8. Remove the 1st and 2nd gear selector fork, (E) figure 5.

C

<u>Dismantling</u>

1. Slide off the 4th gear loose pinion with the synchro ring and the needle bearing cage.

2. Remove the synchroniser.

3. Slide off the 3rd gear loose pinion with the synchro ring and the needle bearing cage.

4. If the control shaft is fitted, remove the locking ring securing the control shoft to the primary shaft and remove the control shaft and spring.

To Replace

1. If the input shaft is disconnected, fit the spring **(Q),** then the input shoft (M) and secure with the circlip (J).

2. Fit the following onto the input shaft in the order shown.

   (a) 3rd gear idler (P) together with its needle bearing cage smeared with transmission oil.

   (b) Synchro ring (F).

   (c) Synchroniser (E) ensuring that the collar with a groove is towards the 3rd gear idler (P).

   (d) Using the circlip pliers 3253-T fit the circlip (Q). Moke sure circlip is fitted in the direction noted when removed.

   IMPORTANT: The maximum movement of the synchroniser (E) on the shoft must not exceed 0.10 mm. Adjustment of this movement is achieved by changing the circlip (Q) for one of a different thickness. Withdraw circlip from its groove.

   (e) Synchro ring (D).

   (f) 4th gear idler (K) together with its needle bearing cage smeared with transmission oil. Slide the synchroniser (E) across to engage the 4th gear idler.

3. Pass the input shaft end of the assembly through the top opening of the georbox, then forward through the bearing opening into the differential compartment and locate circlip in its groove. It may be necessary to remove the pinion shoft to provide additional space to move the primary shaft down into the casting. See under heading 'Bevel Pinion Shaft'.

4. Fit the double rear bearing (C) and the front bearing (H) using a tube 30 mm internal diameter, 300 mm long.

5. Replace the bevel pinion, see 'Bevel Pinion Shaft'.

6. Place the reverse gear wheel down into the gearbox with the fork groove towards the differential. Insert the intermediate shaft and line up the recess in the shaft with the grub screw. Smear the threads of the grub screw with a

locking compound and tighten screw and lock with nut.

7. Fit the 5th gear idler (S) together with its needle roller cage smeared with transmission oil, synchroniser (B) and operating fork assembly on the primary shaft. Secure with the deflector (T) and bolt (A) and tighten to 14.5 -16.5 kg/m (105-119 lb/ft).

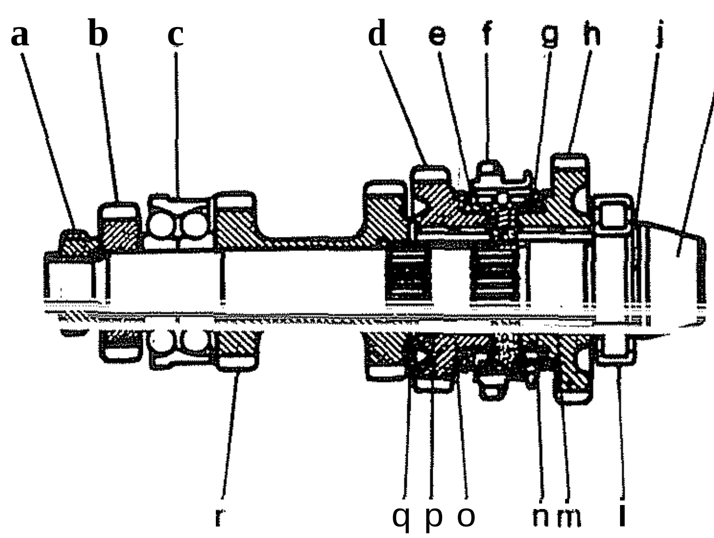


Fig.8 Bevel pinion assembly

BEVEL PINION SHAFT

To Remove

1. Remove the Primary Shaft as previously described.
2. Withdraw the bevel pinion through the gearbox casting into the differential housing.
3. As the bevel pinion is drawn through the costing, remove the gears, 1st and 2nd gear synchro, needle bearings and the adjusting washers and 3rd/4th gear train.

   NOTE: The two ball races and the inner bearing rings must be replaced in the same order, fix labels to indicate positions.

To Replace

1. Check all ports ore clean and there are no abrasive or metal particles adhering to the parts.
2. Fit the front roller beoring (I) on the pinion (k) using a suitable length (240 mm) of tubing (inside diameter 44 mm). Make sure the washer (j) is fitted against the pinion before pressing on beoring.
3. Feed the pinion shoft through the opening in the gearbox casting from the differential end.
4. Onto the shaft inside the gearbox costing first place the 1st gear loose pinion (h), together with its needle beoring cage (m) and inner bearing sleeve (n). Smear the bearing before fitting with transmission oil.
5. Next place onto the shaft the synchro ring (g), the synchroniser (9 with the reverse gear teeth facing the back of the georbox and the synchro ring (e).
6. Now slide on the 2nd gear loose pinion (d) together with its needle bearing cage (p) and inner beoring sleeve (o). Smear the bearing before fitting with transmission oil.
7. Finally place on the shaft the adjusting washer (q) and the double pinion (r) and push the shoft to the rear of the gearbox.
8. Fit the rear double bearing (c), taking core to assembly the double bearing races and beoring ring in the original positions.
9. Fit the 5th gear pinion (b) with the small shoulder on the pinion against the double bearing.
10. Using spanner **3179-T** and retaining tool 3181–T tighten the threaded speedometer drive wheel (A) to a torque of 20 to 22 kg/m (145 to 160 lbs/ft) If both shafts are fitted, then the shafts con be locked by selecting the reverse gear and any othergeor. Do not lock nut at this stage.
11. Before fitting the primary shaft and covers to the gearbox, check the pinion cone setting as defuiled in "Adjustments".

Adjustments

On the ground face of the bevel pinion is engraved a figure in millimetres. This figure represents the distance, which must be maintoined after adjustment, between the differential centre line ond the ground face of the bevel pinion.

This distance is different for each bevel pinion and is checked using the distance gauge fixture 3170-T fitted with dial gauge 2437-T. The fixture is designed so that the distance between the centre line of the ground contact faces (drive shaft bearing surfaces) and the faces of the probes is 60 mm. This figure is engraves on the fixture between the probes.

1. Fint calibrate the fixture.
   (a) Clean the bearing surfaces and the ground contoct faces of the fixing.
   (b) Place the fixture on a surface plate.
   (c) Zero the dial gauge with the large needle on 0.
   (d) Note the position of the totalising needle.
   Totalising needle between 4 and 5.
   Large needle at 0.
2. Offer the fixture up to the bearing surfaces of the drive shafts with the dial gauge stem not in contact with the ground face of the bevel pinion, unlock the gauge stem.
3. Rotate the fixture in the bearing surfaces, so the gauge stem passes over the ground face of the pinion, until the large needle of the dial gauge is about to change direction. Lock the needle positions and note the readings.
   Example: Totalising needle between 0 and 1.
   Large needle at 86.
4. Remove the fixture and place once again on the surface plate. Allow the dial gauge stem to return slowly, so the full revolutions can be counted. When the gauge stem comes to rest on the surface plate the measurement of the part revolution can be made.
   If the measurements for the example are:
   Conic distance 60 + **3.86** = **63.86** mm.
5. If the dimension engraved *on* the pinion for this example is 63.95 mm then the bevel pinion must be moved away from the differential centre line by:
   63.95 - 63.86 = 0.09 mm.
6. To adjust the bevel pinion remove the rear housing, the speedometer drive wheel and the 5th gear pinion.
7. Remove the bevel pinion as previously described.
8. Measure the thickness of the adjusting washer (q) figure 8 which for this example is: **2.81** mm. Replace this washer by another with a thickness

calculated in the following manner:

2.81 - 0.09 = 2.72 mm

As washers are available in thickness from 1.65 mm to 3.13 mm in steps of 0.04 mm, the nearest to the calculated thickness is 2.73 mm.

9. Fit the new adjusting washer (q) and replace the bevel pinion as previously described.

10. Check the adjustment, repeat instructions 1 to 4.

11. If adjustment is within the tolerance ±0.02 mm fit the 1st and 2nd gear operating fork.

Final Replacement

1. Replace the prirmry shaft as previously described, tighten speedometer drive wheel nut to specified torque as described in "bevel pinion shaft" and lock nut by peening it to the pinion.
2. Check that the pinions rotate freely when out of gear.
3. Apply sealing compound to cover mating surfaces and tighten all securing screws to the torque specified in the TECHNICAL DATA.

DIFFERENTIAL SHAFTS (Drive shafts)

Dismantle

1. Remove and dismantle the 'Clutch Bellhousing' as previously described.
2. Remove the grub screw securing the large nut which locks the bearing to the shaft.
3. Using the box spanner 1770-T unscrew and remove the large nut.
4. Drive the shaft out through the bearing.
5. Remove the grub screw in the top of the shaft housing and using the special spanner 1771-T, remove the locking ring securing the beoring to the shaft housing.
6. Gently tap out the two ball races.

   NOTE: The two ball races must be replaced in the some order, fix labels to indicate positions.
7. Drive out the double ballbearing outer ring using a tube of 65 mm external diameter.
8. Using the extractor 2405-T, draw the inner bearing rings from the shaft. Note positions.

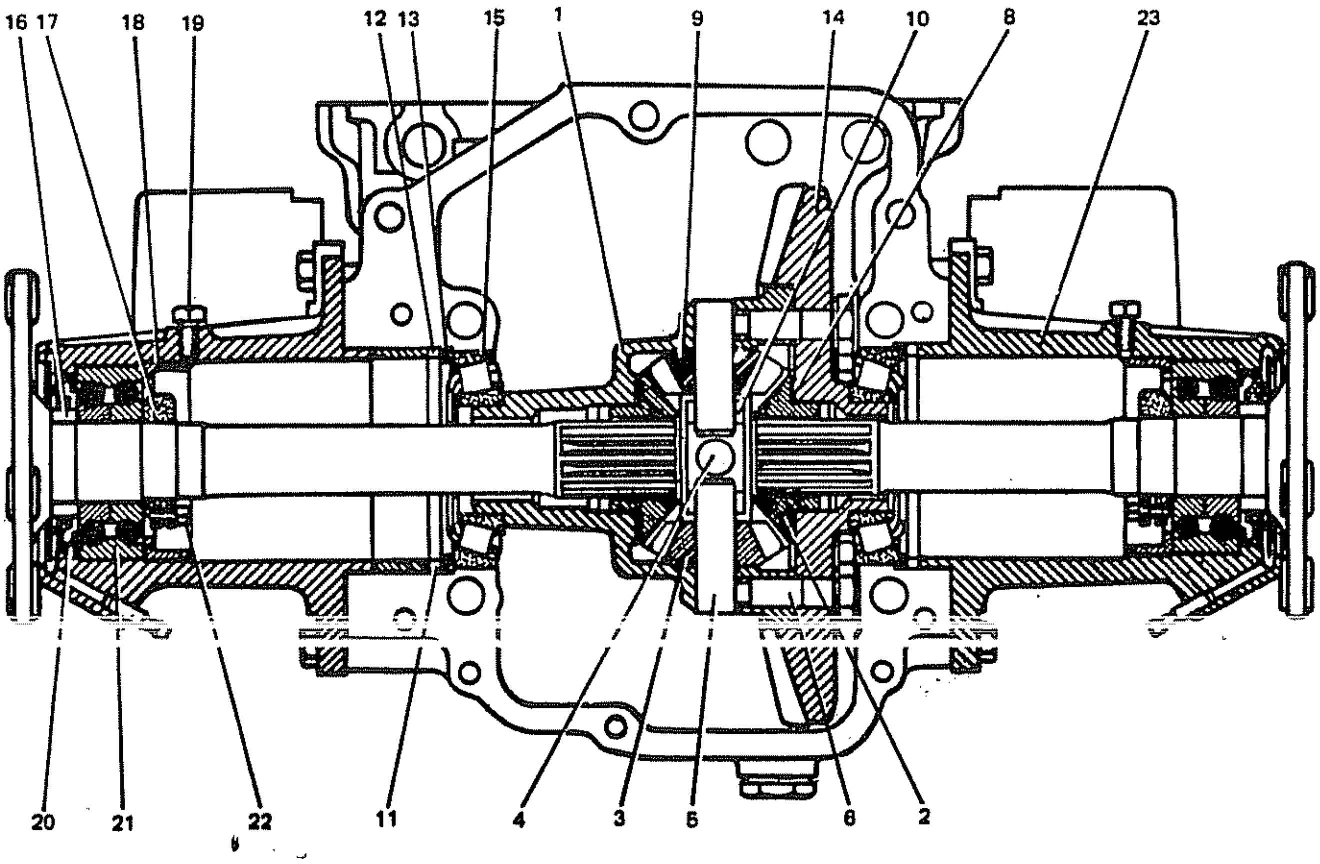


Fig.9 Differential assembly

9. Remove the sealing ring from the shaft housing.

10. Remove the ail retaining washer and bearing distance bush assembly from the shaft.

To Assemble

NOTE: The differential drive shaft on the left-hand side of gearbox is the shorter.

1. Fit the bearing (21) in the housing and tighten the nut (18) to 10 kg/m (72 lb/ft) using the spanner 1770-T. Lock the nut using the grub screw (19).

2. Fit the oil seal (20) using the tool 1772-T.

3. Position the oil retaining washer on the shaft. Fit the spacer (16) and position the mandrel 1869-T. Centralise the oil retaining washer with the mandrel centring bush and fit the spacer using a press.

KEY TO FIG.9

1. Satellite housing
2. Planet wheel
3. Satellite gear
4. Satellite spindle, long
5. Satellite spindle, short
6. Screw with dowel
7. Crown wheel screw
8. Planet wheel washer
9. Satellite gear washer
10. Crosshead bush
11. Distance piece
12. Distance washer
13. Adjusting washer
14. Crown wheel
15. Roller bearing
16. Spacer
17. Locking nut
18. Nut
19. Grub screw
20. Oil seal
21. Bearing
22. Grub screw
23. Output shaft housing

4. Fit the differential shaft into the housing and position using o tube of 30 mm inside diometer under a press. Tighten the bearing locking nut (17) to 15 kg/m (108 lb/ft). Tighten the grub screw (22) in the locking nut.
5. Assemble and replace the 'Clutch Bellhousing' as previously described.

DIFFERENTIAL CROWN WHEEL AND PINION

To Remove

1. Dismantle the 'Differential Shafts' as previously described.
2. Using the extmctw 2405–T remove the tapered roller bearings from each end of the crown wheel assembly.
3. Remove the eight screws (6) securing the crown wheel to the housing and remove the following:
   - (a) Crown wheel (14)
   - (b) Satellite spindle (4)
   - (c) Planet wheel (2) and thrust washer (8)
   - (d) Two satellite spindles (5)
   - (e) Satellite gears (3) and stop washers (9)
   - (f) Crosshead (10)
   - (g) Other planet wheel and thrust washer.

To Replace

1. Place in the satellite housing o thrust wosher (8), one planet wheel (2), one fixed thrust washer (9), one satellite gear (3) and the long spindle (4).
2. Rotate the planet wheel and check that the point of minimum clearance is 0.1 mm. If this is not so replace thrust washers until the minimum clearance is achieved. Remove the satellite and thrust wosher making a note of the position in the housing.
3. Repeat 1 and 2 for each satellite gear, taking care to fit the crosshead bwh (10) to support the short satellite spindles *(5).* Fit the dowel pin screws tempomrily to locate the short satellite spindles.
4. Fit all the satellite gears and thrust washers.
5. Place the second planet wheel with thrust washer in the crown wheel.
6. Locate the satellite housing in recess in the crown wheel and fit the eight screws. Take care the dowel screws are fitted in the correct holes.

Gradually tighten the screws, checking the pinions rotote freely, to o torque of 11.5 to 13 kg/m (83 to 94 lb/ft).

7. Check the minimum clearonce of the second planet wheel and this should be 0.1 mm. Change the thrust washer to achieve this clearance.

8. Using an oil gun, inject gearbox oil into the satellite housing lubricating all parts inside.

9. Fit the bearings on the satellite housing and crown wheel using mandrel 1769-T.

DIFFERENTIAL BEARINGS ADJUSTMENT

There are two methods by which adjustments can be made to the differential bearings. The first method uses a dial gauge to measure the thickness of the adjusting washers, which is directly related to the bearing stress. The second method measures the torque required to rotate the differential using a spring balance.

Method 1

1. Position the differential and bearings.
   - (a) Place the differential together with bearings in the end of the gearbox costing.
   - (b) Place the adjusting washer (13) and the distance washer (12), with a total thickness of 7 mm, against the left-hond differential bearing.
   - (c) Secure the differential in place using the two clamps MR630-64/16, tightening the nuts by hand only.
   - (d) Place a new paper gasket on the left-hand differential shaft housing, locate the drive shaft in the planet wheel and align the screw holes. Fit screws, taking care to fit the correct lengths and tighten.
   - (e) Place the gearbox casting on its left-hand side, supporting it in this position.
   - (f) Place against the right-hand differentiol bearing the adjusting washer (13) followed by the distance washer (12) and the distance piece (11). The total thickness (12) and (13) should not be less than 9 mm.
   - (g) Locate the right-hand differential drive shaft in the planet wheel and align the screw holes. Withoutagasket fitted on housing, fit the assembly in position and top lightly on the differential shaft.

(h) **Remove** the right-hond drive shaft, adjusting **washers** and distance piece.

2\. **Adjust** the **pre-load** on the differential bearings.

NOTE: The bearings must be fitted with o specified **pre-load.**

(a) Place gouge support 1754-T, fitted with dial gouge **2437-T, on** the collar of the right-hand drive shaft housing. Allow the probe of the gauge to touch the bearing **face** of the housing. Bring the **zero** of the movable dial of the gouge in line with the **large** needle. **Note** the position of the needle.

Example: Large needle reading = **0**
Small needle reading = **0**

(b) Place the dial gouge and support on the gearbox casting wlth the probe bearing on the distance piece. Take two **measurements.**

Example: Measurement A = **7.76** mm
Measurement B = 7.80 mm
Average A and B = $\frac{\mathbf{7.76} + 7.80}{\mathbf{2}}$ = **7.78 mm**

(c) Add to the **average** measurements the following **items:**

Thickness of the **seal**	=	0.10 mm
Streu on the bearing	=	0.30 mm
Total	=	**0.40 mm**

Example: **7.78** + 0.40 = 8.18 mm

Select an **adjusting** washer and o distance **washer with** a total **thickness** nearest to the **calculated thickness.** This **would** be for the **example used** 8.20 mm (the adjusting **washer has** a smaller inside diameter).

(d) Place the **selected washers** on the **right-hand** bearing, with the **adjusting** washer next to the bearing. Fit the **distance piece** ond flt the right-hand drive shaft **housing** with a paper **gasket between the** mating surfaces.

IMPORTANT: The thickness of the **washers** fitted **against** the left-hand and right-hand bearings corresponds to the **setting** of the **bearing stress** only.

To **adjust** the **backlash** these **washers** must be redlrtrlbuted to the left and to the right, without **changing** the **overall thickness.**

Example:	Left-hand bearing washers	=	7.00 mm
	Right-hand bearing washers	=	8.20 mm
	Overall thickness	=	15.20 mm

Method 2

1. Fitting the differential ossembly

   (a) Place the differential, fitted with beorings, in the end of the gearbox casting.

   (b) Secure the differential in place using the two clamps MR630-64/16, tightening the nuts by hand only.

   (c) Place new paper gaskets on the left-hand and right-hand drive shaft assemblies, together with any shims removed during dismantling. Locate the drive shafts in the planet wheel and align the screw holes. Fit screws, taking care to fit the correct lengths and tighten.

2. Adjust the pre-load an the bearings.

   NOTE: The bearings must be fitted with a specific pre-load. This can be checked by measuring the torque required to tom the differential.

   (a) To measure the torque fix and wind a length of cord around the differential satellite housing. Attach to the free end of the cord to a spring balance so the satellite housing can be rotated when the spring balance is pulled.

   (b) Take a reading from the balance when the satellite housing is just about to rotate. This reading should be within the following limits given for bearings which have previously been used and new bearings.

   (i) Bearings previously used should be within 4 to 6 kg. If the reading is less than 4 kg, increase the thickness of the adjusting washers. For readings in excess of 6 kg reduce the thickness of the adjusting washers.

   (ii) New bearings should be within 6 to 9 kg. If the reading is less than 6 kg, increase the thickness of the adjusting washers. For readings in excess of 9 kg reduce the thickness of the adjusting washers.

NOTE: An adjusting washer 0.10 mm thick corresponds approximately to a bearing stress of: 0.250 kg for new bearings
0.500 kg for used bearings

IMPORTANT: The thickness of the washers fitted against the left-hond and right-hond bearings corresponds to the setting of the beoring stress only.

To adjust the backlash these washers must be redistributed to the left and right, <u>without changing the overall thickness</u>.

BACKLASH ADJUSTMENT

To check the backlash adjustment both drive shaft housings must be fitted.

1. Measure the clearance between the crown wheel and pinion teeth i.e. backlash.
   - (a) Fit a dial gauge 2437-T to o support, fixed to the gearbox casting.
   - (b) Adjust the position of the diol gouge so that the measuring probe touches the flank of o tooth ot heel (outer edge of crown wheel) see figure . This should be achieved somewhere near maximum diameter of the crown wheel.
   - (c) Move the crown wheel to the extend of the backlash several times and measure the difference on the dial gauge.

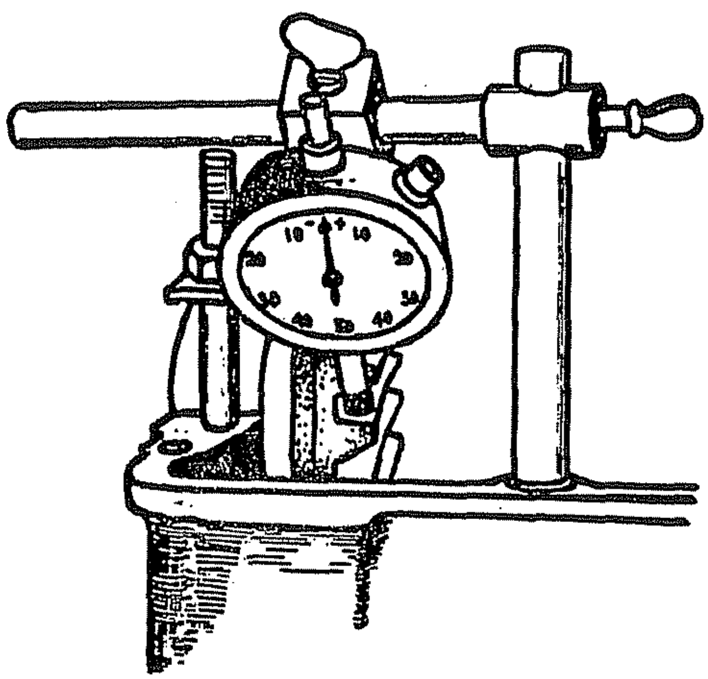


Fig. 10 Measuring crown wheel backlash

(d) Repeat the procedure on teeth at obout 90°, 180° and 270° around the crown wheel from the first measurement. The difference between any two measurements should not exceed 0.10 mm. If a reading exceeds this figure it will indicate the crown wheel is running out of true or is badly fitted.

(e) Make a note of the minimum clearance.

Example clearance = 0.73 mm

2. Adjust the backlash.

IMPORTANT: The clearance between the teeth is adjusted by redistributing the adjusting washers against the left-hand and right-hand bearings. Under no circumstances must the overall thickness of the washers be altered, see DIFFERENTIAL BEARINGS ADJUSTMENT.

(a) The clearance must be adjusted to within the limits 0.16 mm and 0.24 mm. Aim for an average clearance of 0.20 mm.

(b) Subtract this average clearance from the minimum reading noted; for the example given, this will be:

0.73 - 0.20 = 0.53 mm

therefore, for this example the clearance must be reduced by 0.53 mm.

NOTE: Moving a 0.15 mm adjusting washer from one side to the other, will change the clearance by 0.10 mm.

For the exomple therefore, the thickness of the washers to be moved

$$\frac{0.53 \times 0.15}{0.10} = 0.79 \text{ mm}$$

(c) **In** the example chosen, it is necessary to move the crown wheel towards the pinion by a distance of 0.79 mm.

To achieve this, the thickness of the washers against the right-hand bearing should be reduced to:

8.20 = 0.79 = 7.41 mm,

and the thickness of the washers against the left-hand bearing should be increased by the same amount.

7 00 + 0.79 = 7.79 mm

(d) Recheck the backlash measurement to verify that the difference between any two measurements, around the crown wheel, does not exceed 0.10 mm.

3. If backlash is within the tolerance, assemble the differential assembly, replace the Clutch Bellhousing and refit Transmission Unit.

SECTION G

GENERAL DESCRIPTION

The wheel and tyre assemblies have been specifically designed by Lotus Con in conjunction with the wheel arid tyre manufacturers, with both performance and styling in mind. The wheels are spigotted on to the hubs in order to ensure concentricity between axle ond tyre. Wheel and tyre assemblies are checked to a high standard of balance and true running, and when replacement tyres are fitted, these too must also be balanced to the same high degree otherwise, the performance and smooth running of the vehicle could be affected.

The spare wheel is stored in the front baggage comportment.

TYRES

It is recommended that the complete wheel and tyre assemblies are balanced at intervals of every 8,000 kilometres (5,000 miles), using a 'spigotted type' hub adaptor ONLY.

Maintain the tyres at the correct pressures (see TECHNICAL DATA). Under-inflation will cause excessive wear and ropid deterioration of the tyre walls, whilst over-inflation will have a detrimental effect on the handling and ride characteristics. Pressures should be checked at least once a week, or every 1,600 kilometres (1,000 miles).

In order to obtain the correct handling 'feel' and minimum feedback, it is very important that tyre uniformity, i.e. radial and lateral run-out is of the high standard set by Lotus Can Limited. If any difficulty is experienced with replacement tyres, reference should be made to the tyre manufacturer concerned.

SPARE WHEEL

The spare wheel is stored under the bonnet lid in the front baggoge compartment. A single bolt with a large washer secures the wheel to the floor of the compartment; this can be removed using the wheel nut wrench.

When replacing the spare wheel ensure the retaining bolt, with washer, is fully tightened down. Check the security of the wheel from time-to-time, as a loose spare wheel can cause damage.

FRONT HUBS (Fig. I)

To Adjust

1. Remove the road wheel.
2. Remove the dust cover (A) and extract the split pin (B) retaining the hub securing nut (C).
3. Tighten the hub nut to its specified torque loading (see TECHNICAL DATA), while rotating the hub to ensure bedding of the taper rollers. Slacken nut one 'flat' or until next costellation coincides with the split pin hole in the axle, then mount a dial gauge in such a position that its plunger is against the front face of the hub. Adjust hub nut as necessary to give the correct end-float (see TECHNICAL DATA), finally retaining the hub nut with a new split pin and replacing the dust cover the taper roller bearings MUST NOT run in a prestressed condition under any circumstances.
4. Refit the rwd wheel and tighten the wheel securing nuts to their specified torque loading (see TECHNICAL DATA).

To Remove

1. Remove the road wheel.
2. Detach the brake coliper, and attach with straps or string to the chassis, taking care NOT to stretch the flexible brake pipe.
3. Remove the dust cover (A) and the split pin (B) retaining the hub nut (C). Remove nut, washer (D) and the hub/disc assembly (E).
4. From the rear of the brake disc, remove the bolts which retain the disc to the hub, and remove disc.

To Replace

1. Clean the mating faces of both the hub ond the disc. These must be scrupulously clean to avoid the possibility of disc run-out. Fit disc to hub, tightening bolts to their specified torque loodings.
2. Check condition of hub bearings (F) ond seal (G), replacing if their condition demands this. Repack hub with recommended grease (see 'Lubrication/ Maintenance').
3. Fit the hub/disc assembly, plain washer and hub securing nut. Adjust the hub as given under 'To Adjust'. Fit new split pin to retain the nut, and replace the dust cover.

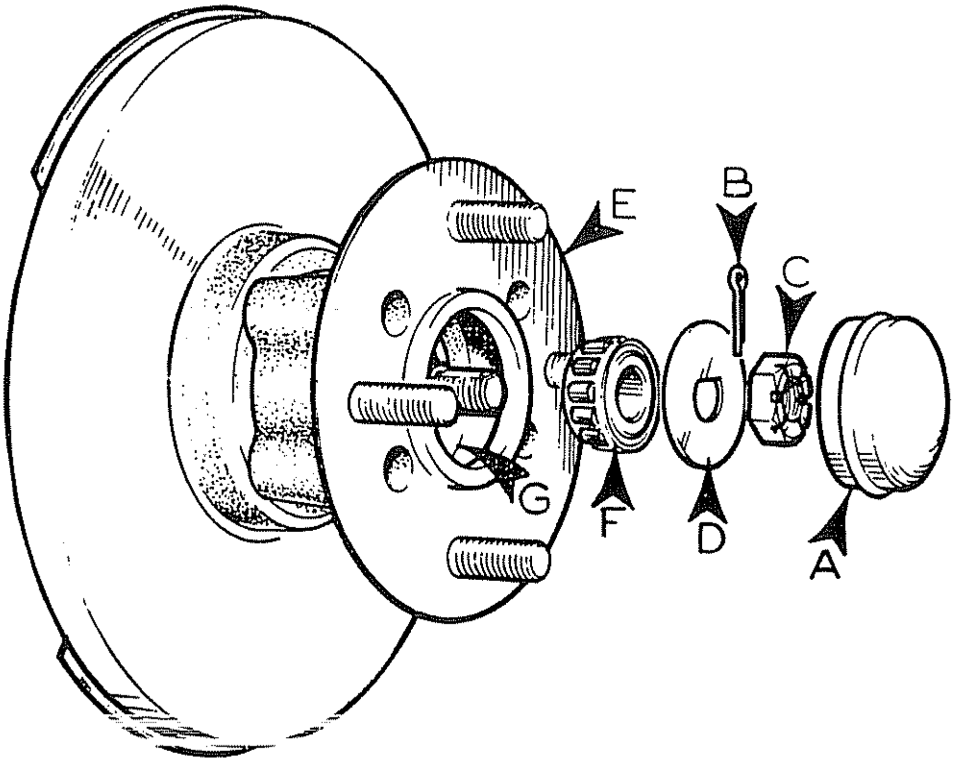


Fig. 1 Front hub

4. Refit the brake caliper and tighten the mounting bolts to their specified torque loading.
5. Refit the road wheel and tighten nuts to their specified torque loading.

NOTE: All Specifications and Torque Loadings will be found in TECHNICAL DATA.

REAR HUBS

To Remove

1. Remove the road wheel, split pin and hub retaining nut.
2. Tap loose, and remove the cone spacer.
3. Using a suitable puller, remove the hub from the spline on the driveshaft.

To Repluce

1. Slide hub on to the driveshaft spline. Check that the ground surface of the shaft and the cone inner bore of the hub, the surface of the castellated nut and spacer are ALL PERFECTLY CLEAN AND FREE FROM GRIT, ETC., then

fit the cone spacer with its tapered end towards the hob, followed by the hub retaining nut. Tighten the hub nut to its specified torque loading.

2. Fit a new split pin to retain the hub nut. Do NOT slacken the nut in order to insert the split pin; if necessary, tighten the nut.

3. Fit the road wheel and tighten its securing nuts to the specified torque loading.

NOTE: All Specifications and Torque Loadings will be found in TECHNICAL DATA.

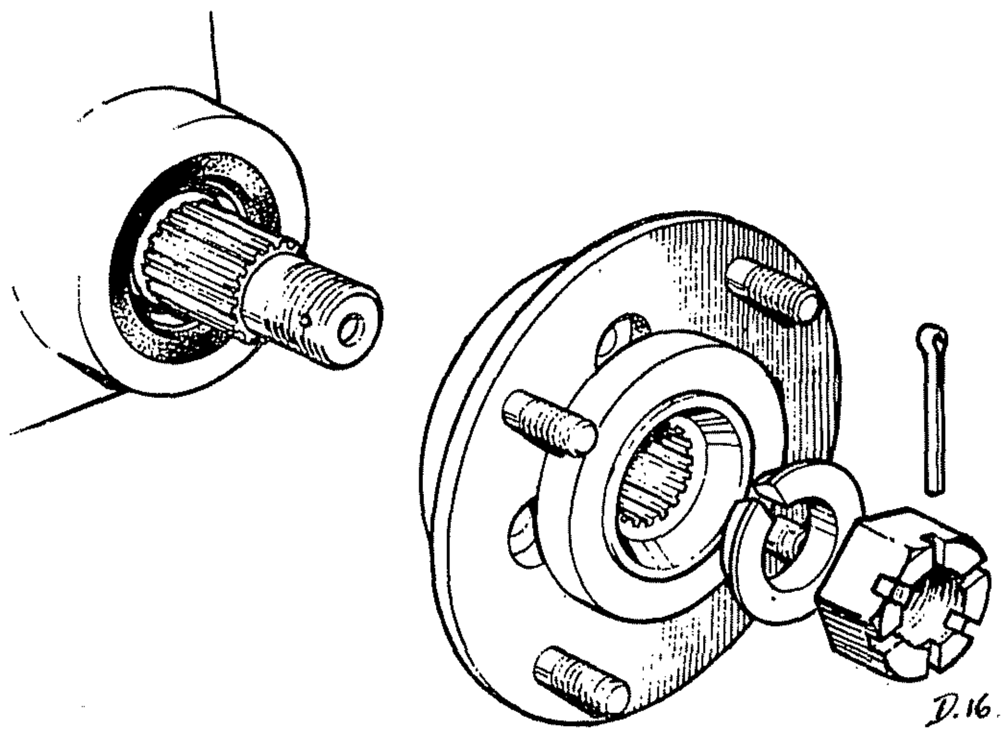


Fig.2 Rear hub

MODEL S2 CHARACTERISTICS

See TECHNICAL DATA for wheel and tyre differences.

Spare Wheel

The spore wheel supplied with this car is for EMERGENCY USE ONLY and should be replaced with the normal wheel and tyre as soon as possible. When the spare wheel is in use, differential tyre wear could be experienced ond the handling churacteristics of the vehicle will be modified. It is therefore advisable to observe the following recommendations:

1. Reduce road speeds to a moderate level and keep cornering loads to a minimum. 60 m.p.h. (100 k.p.h.) in the most favourable conditions is the recommended maximum speed, As a general rule, halve the speed that would normally be driven relative to the road conditions.

2. When following other vehicles, Lotus recommena that you observe the UK Highway Code or the American Safety Council guidelines for vehicle spacing; this advice not only applies to spare wheel usage, but equally to all other motoring situations.

3. Spore wheel tyre pressure: 30 psi (2.1kg/cm^2).

The spore wheel is carried in the front compartment and secured with one bolt to the floor. When replacing the spare wheel, it must always be secured to the front compartment floor to avoid any possible damage to components.

SECTION H

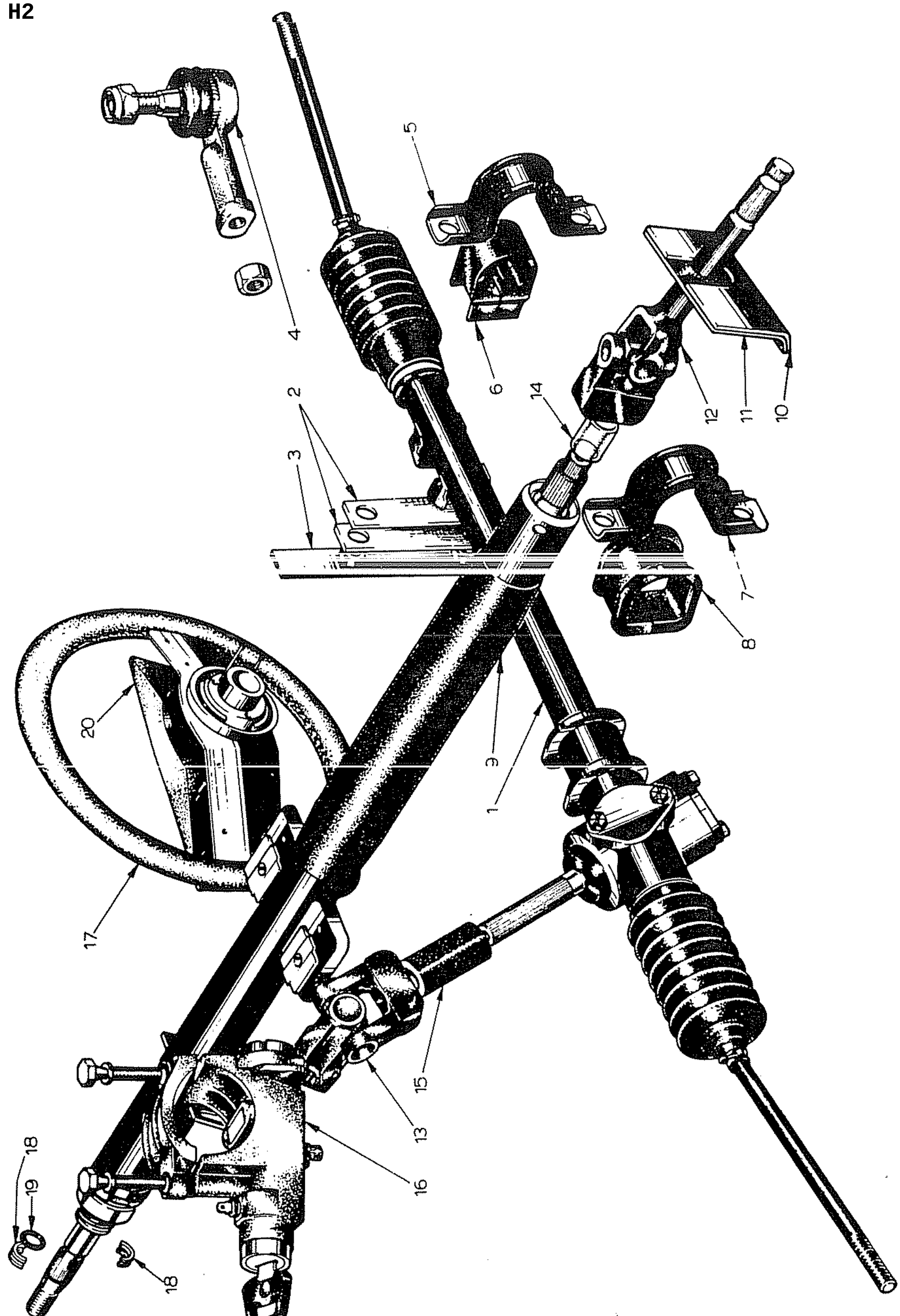


Fig. 1 Steering assembly

KEY TO FIG. I

1. Steering Unit
2. Shims, mounting plote
3. Mounting plote, steering unit
4. Track rod end
5. Clamp, non-pinion end
6. Bush, non-pinion end
7. Clamp, pinion end
8. Bush, pinion end
9. Steering column assembly
10. Seal plote, steering column
11. Gasket, seal plote
12. Intermediate steering column assembly
13. Universal joint
14. Spline protection sleeve, steering column
15. Spline protection sleeve, steering rack
16. Lock/ignition switch, steering column
17. Steering wheel
18. Collet, steering column
19. 'O' ring
20. Crash pad, steering wheel

GENERAL DESCRIPTION

The steering assembly comprises a collapsible type column, a short intermediate column and a steering unit of the rack and pinion type. The track rod ends terminate in ball-joints and these in turn are attached to the steering arms. The steering unit is attached to the chassis by two clamps with rubber bushes.

STEERING WHEEL

To Remove

1. Remove steering wheel trim from centre of the steering wheel by simply prising off.
2. Release the wheel securing nut now exposed, remove nut and plain washers and using a suitable puller, remove the wheel from the column.

To Replace

1. Ensure that the front road wheels ond indicator return cam on the column are in the straight-ahead position, then fit steering wheel on to the column (also in its straight-ahead position), ensuring that the splines are fully engaged and that the wheel sits down on the taper.
2. Fit the steering wheel, plain washers, retaining nut and tighten to its specified torque loading (see TECHNICAL DATA).
3. Replace the steering wheel trim.

INTERMEDIATE COLUMN

To Remove

1. Remove the front wheel from the side of the vehicle the steering column is fitted to gain access to the lower universal joint.
2. Remove the clamp bolts securing the universal joints from the upper and lower joints and remove the nut and bolt securing the seal plate. Slide the intermediate column from its location together with seal plate.

To Replace

NOTE: The intermediate steering column universal joints cannot be repaired, so must therefore, be replaced with new parts.

1. Ensure the front wheels and steering wheel ore in the straight-ahead position.
2. From inside the vehicle feed the intermediate shaft, spline end first, through the body and engage the spline in the lower universal joint. Slide the intermediote shaft back to engage the spline on the steering column.
3. Fit clamping bolts and nuts, taking care the grooves in the splined shafts are located by the bolts. Tighten clamping bolts to the torque loadings given in the TECHNICAL DATA.
4. Replace the rood wheel.

STEERING COLUMN

To Remove

1. Remove clamping bolt from the top universal joint at the bottom end of the steering column and disconnect the universal joint from the column.
2. Remove the two nuts on the 'U' clamp securing the steering column to the pedal box and remove 'U' clamp.
3. Remove the steering wheel and the column shroud, this is achieved by removing the four small screws, two on each side of the shroud and the large screw underneath.
4. Disconnect the battery. Release the cables from the ignition switch and unscrew the bolts securing the multi-purpose switches to the column.
5. Place a support under the binnacle and unscrew the 'U[1] clamp bracket supporting the bottom front edge of the binnacle; remove 'U' clamp.
6. Remove the two bolts together with the large washers securing the column to the scuttle, withdraw the column up through the scuttle.

To Replace

1. Replace steering column through the scuttle trim and secure to the scuttle using the two bolts and large washers.
2. Secure the lower end of the column with the 'U' clamp on the pedal box.
3. Fit the multi-purpose switches to the column and reconnect the cables.
4. Replace the 'U' clamp around the top of the column which supports the bottom front edge of the binnacle.
5. Fit" the column shroud and steering wheel.
6. Ensure the front wheels and steering wheel ore in the straight-forward position.

7. Engage the splined shaft at the bottom end of the column in the top universal joint and secure by the clamping bolt.
8. Tighten bolts to torque loadings specified in TECHNICAL DATA. Reconnect the battery and check the correct function of the switches.

STEERING COLUMN LOCK/IGNITION SWITCH

To Remove

1. Remove the steering column ossembly.
2. Drill out the lock/ignition switch clamp bolts and remove the lock assembly.

To Reploce

1. Fit new lock/ignition switch assembly, ensuring that the spigot locates with the hole in the column and secure clamp with the bolts provided. Tighten the bolts until the heads are shear off.
2. Replace the steering column assembly
3. To replace the ignition switch only, see Section 'M' ELECTRICAL EQUIP-MENT.

STEERING UNIT

To Remove

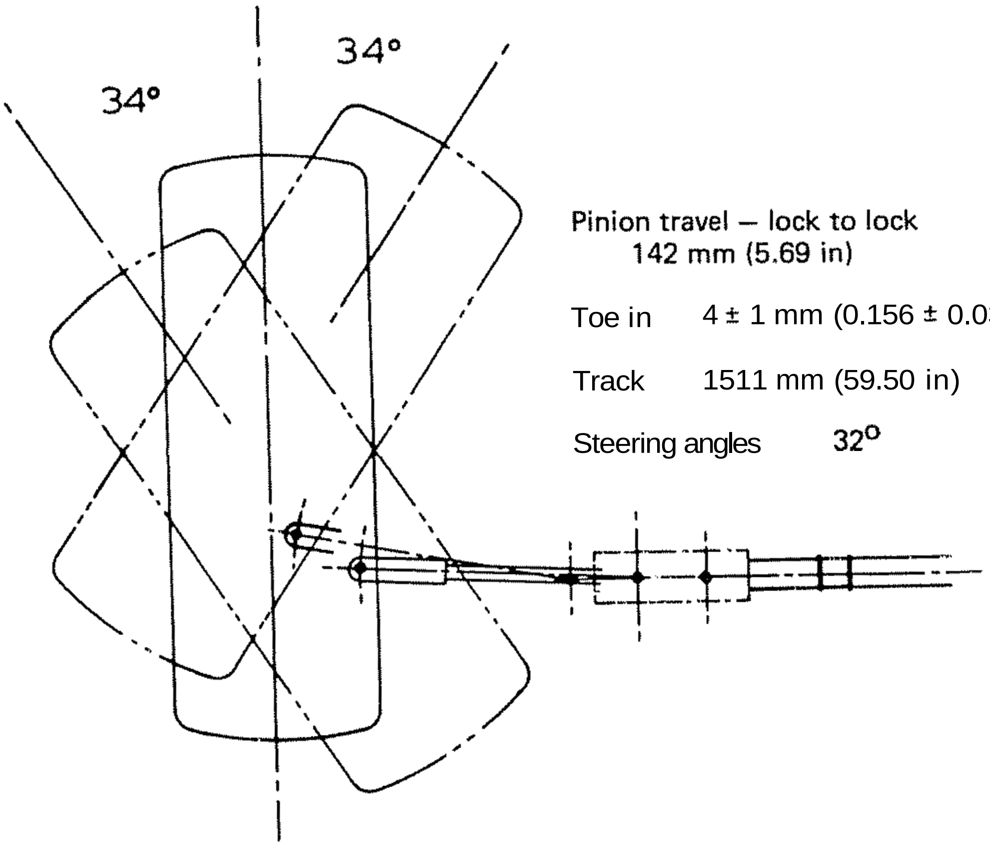
1. Support vehicle to allow adequate working space under the front of the vehicle arid remove the front rood wheels.
2. Remove the nuts and flat washers, and free the ball-joints from the steering arms.
3. Remove the intermedicte steering column.
4. From under the front of the vehicle, remove the two bolts from each steering unit clamp. Remove the clamps together with the steering unit, mounting rubbers and spocers. IMPORTANT - Retain any shims arid note the location.

To Replace

1. Reverse the removal procedure and tighten all bolts to the torques specified in TECHNICAL DATA. Take care in ensure shims ore refitted in the correct positions to maintain clearance between steering column universal joint, nuts/bolts and chassis.

2. Check and adjust front wheel toe-in at ride height, see TECHNICAL DATA.

WARNING: When the car is raised from the ground so that the front wheels ore clear, do NOT move the road wheels quickly from lock-to-lock, as this will cause an hydraulic pressure to build up within the steering unit, and may burst or blow off the bellows.



Pinion travel – lock to lock
142 mm (5.69 in)

Toe in 4 ± 1 mm (0.156 ± 0.031 in)

Track 1511 mm (59.50 in)

Steering angles 32°

Fig. 2 Steering geometry

SECTION J

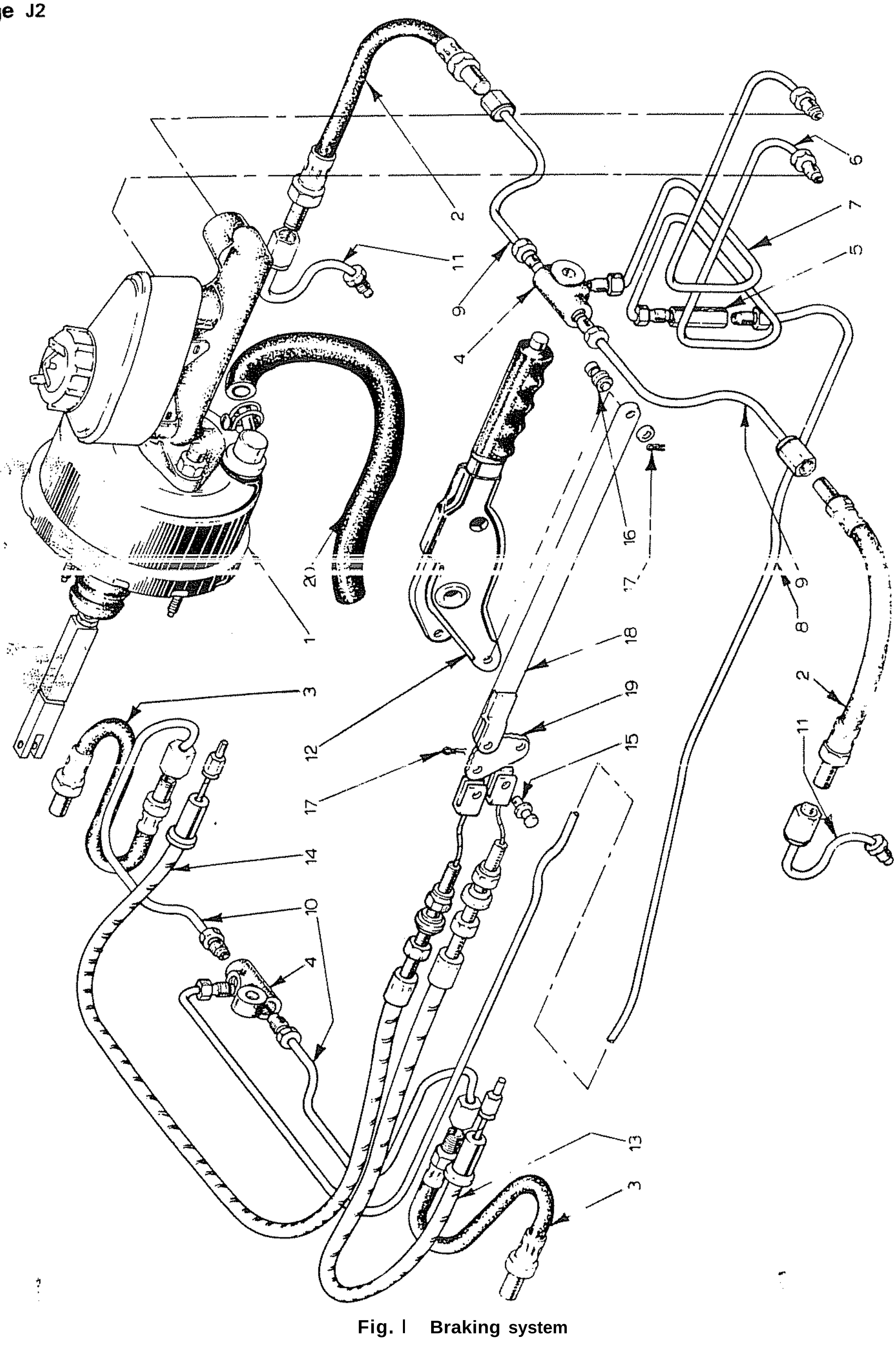


Fig. 1 Braking system

KEY TO FIG. 1

1. Brake Master Cylinder & Servo Assy
2. Front Hose
3. Rear Hose
4. 3 Way Union
5. Double Ended Union
6. Bundy Pipe, 21.0", Master Cyl to Double Ended Union
7. Bundy Pipe, 23.0", Master Cyl to Front 3 Way Union
8. Bundy Pipe, 131.5", Double Ended Union to Rear 3 Way Union
9. Bundy Pipe, 20.0", Front 3 Way Union to Front Hoses
10. Bundy Pipe, 26.5", Rear 3 Way Union to Rear Hoses
11. Bundy Pipe, 5.5", Front Hose to Front Caliper
12. Handbrake Assy
13. Handbrake Cable Assy, Short
14. Handbrake Cable Assy, Long
15. Clevis Pin, 5/16" x 9/16"
16. Clevis Pin, 1/4" x 7/8"
17. Retaining Pin
18. Actuation Rod, Handbrake
19. Compensator
20. Hose, Servo to Bundy

GENERAL DESCRIPTION

The braking system consists of a Type 28 Supervac servo unit attached to a tandem master cylinder with a bore of 19.05 mm (0.75 in) operating Type GA2 calipers with 250 mm (9.7 in) diameter discs at the front, arid Type 9CH sliding calipers with 275 mm (10.82 in) diameter discs at the rear; the rear brakes are mounted inboard.

The handbrake lever is coupled to the rear brake calipers via two cables, a compensator and an actuator rod.

All the pedals are mounted in the same pedal box, the bmke and clutch pedals being on a common spindle, and the throttle pedal spindle being located on a separate spindle.

FRONT BRAKE PADS

To Renew

Always change brake pads in wheel sets.

1. After raising the front of the vehicle, remove the front wheels.

WARNING: When both front wheels are raised, do NOT move the road wheels quickly from lock to lock, as this will cause hydraulic pressure to build up within the steering gear, which may cause the rubber bellows to bunt or blow off.

2. Remove any accumulated road filth from the area of the brake pads.
3. Pull out the pad retaining piri clips (A), withdraw the retaining pins (B) and remove the brake pads (C) with the shims (Fig.2). Note the position of the dust shield fitted over the brake pads.
4. To enable the new pads to be fitted, push the pistons in the calipers back into the bores. This action will cause hydraulic fluid to be returned to the master cylinder, which if it has recently been topped-up, may overflow. To avoid this, examine the fluid level and if necessary, remove a quantity of fluid BEFORE pushing the pistons back into ttie bores. DO NOT USE REMOVED FLUID FORTOPPING-UP PURPOSES.
5. Fit the new brake pads with the shims taking care that both are fitted correctly. The shims are marked with an arrow which MUST point in the directiori of forward rotation of the wheel. Replace the dust shield, refit the retaining pins and the locking clips.

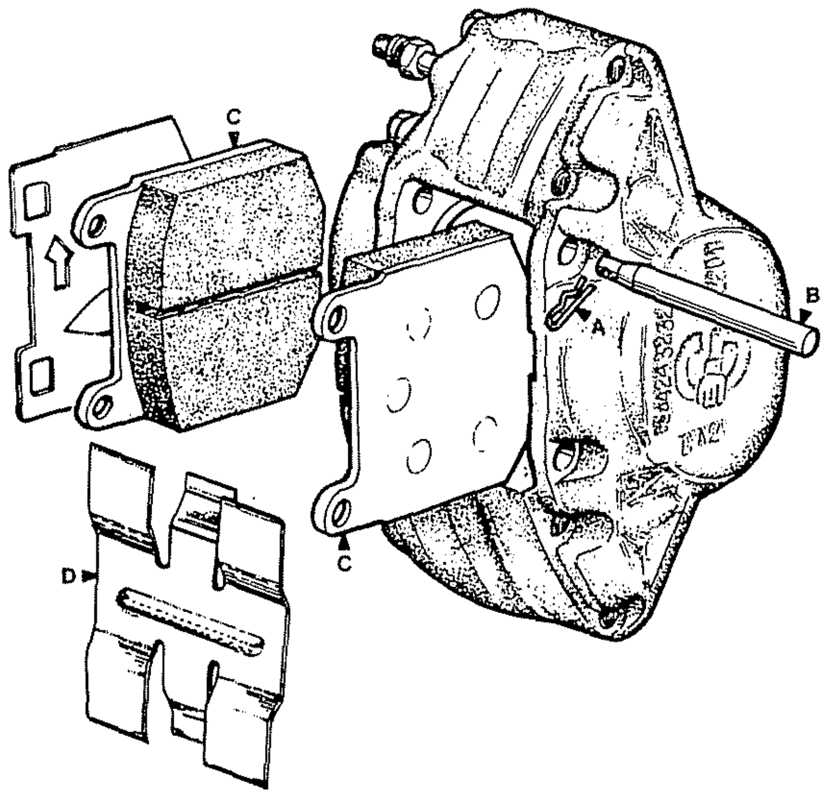


Fig.2 Front brake pods removal

6. Operate the brake pedal several times to bring the pads into correct operating position. Check that the pads ore free to move and that the retaining pins are not fouling the pads.

7. Replace the road wheels, lower the vehicle to the ground, check the brake fluid and top up if necessary. Tighten the wheel nuts to the specified torque loading.

IMPORTANT: After fitting new pads, care must be taken when braking; brake several times from 50 mph (80 kph) to 30 mph (50 kph) and only brake fully when system has cooled down. If brakes are applied too sharply when new pads have been fitted, the surface of the pods will burn and irregular braking will occur, resulting in loss of efficiency.

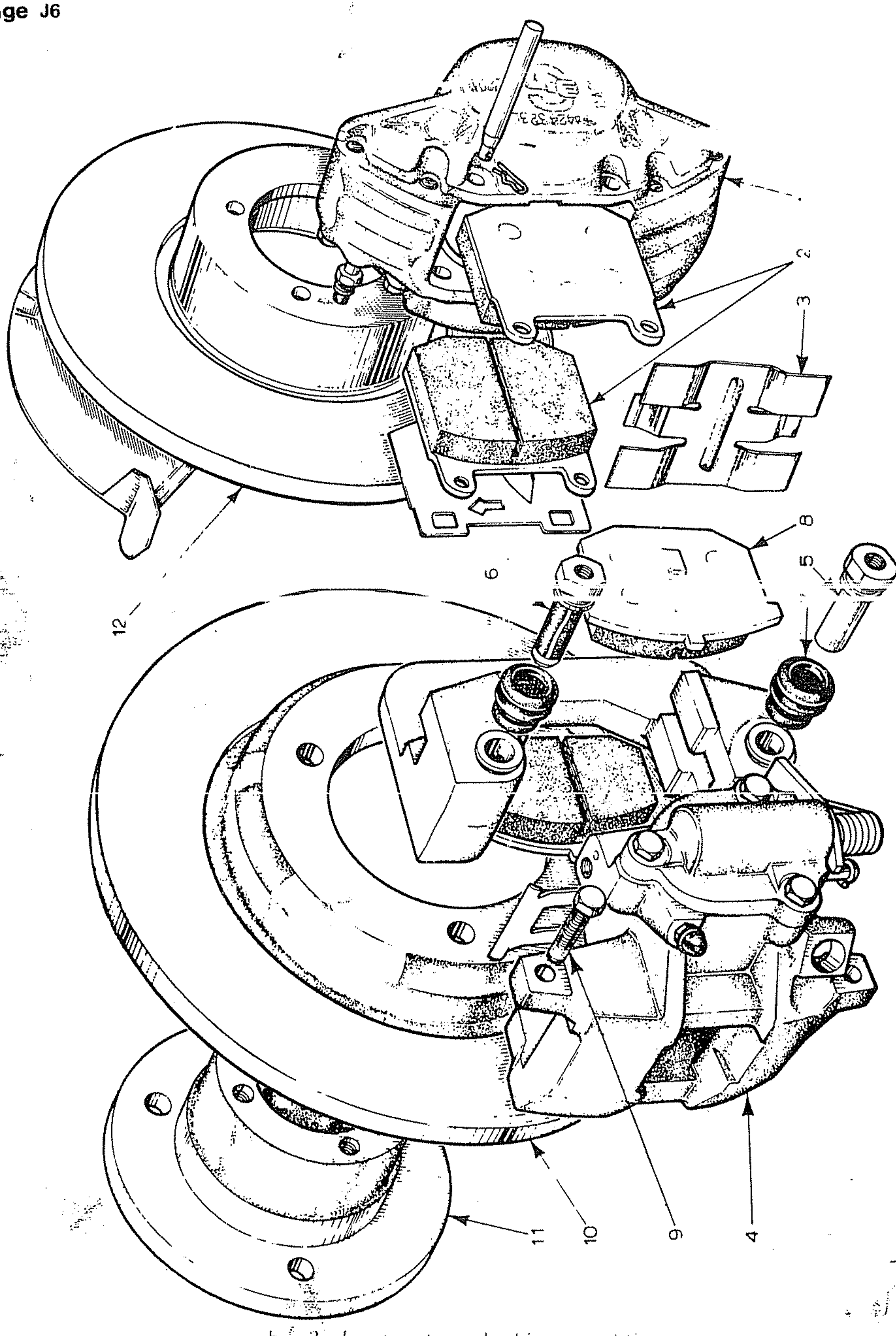


Fig.3 Front and rear braking assemblies

KEY TO FIG. 3

1. Front Coliper, RH
2. Front Brake Pads
3. Dust Shield, Front Caliper
4. Rear Caliper, RH
5. Bolt, Primary
6. Bolt, Secondary, (Bushed)
7. Rubber Sleeve
8. Rear Brake Pads
9. Bolts, Self-Locking
10. Rear Disc
11. Drive Shoft Adaptor
12. Front Disc

REAR BRAKE

Each rear broke hos o sliding caliper operated by a single hydraulic cylinder or hand-brake cable, located on the outside of the disc. As there is only one hydraulic cylinder in each brake, no bridging pipes ore required, this will reduce the risk of fluid vapourization.

Operation of the hondbrake

The operational force from the handbrake lever is tronsferred via an actuating rod, through a compensator, which couples the two cables to the rear brake calipers. Adjusters on each cable are accessible from inside the vehicle.

The hondbrake, when operated, pulls the lever on the caliper (see fig.4) in the direction of the arrow. This forces the outer pod on to the disc and through the sliding caliper pulls the inner pod onto the disc, the force is balanced between the pads.

As the pods wear the mechanical link (adjustable piston) to the outer pad is automatically adjusted. When a predetermined amount of pod wear has taken place, a ratchet system extends the mechanical link as the brakes are hydraulically operated, keeping the handbrake system in constant adjustment.

Resetting 'the adiustable piston

When new pads are fitted it is necessary to return the mechanically link (adjustable piston) to its original start position.

The adjusting mechanism is a notched spigot onto which four ratchet arms bears and four longitudinal slots in the spigot allows the piston heod to be returned to the start position. This is achieved by turning the piston head 45°, in either direction (see fig.4b) and pushing the piston back. Return the piston to the original position so the notched spigot engages the four ratchet arms.

Service arid repair

Apart from regular inspection of the pads for wear, which should be carried out every 8,000 Km (5,000 miles) the caliper requires no further attention.

It is recommended, however, that when the vehicle has completed 64,000 Km or three years use, whichever occurs first, ttie calipers should be overhauled. The broke fluid should be changed every 12 months.

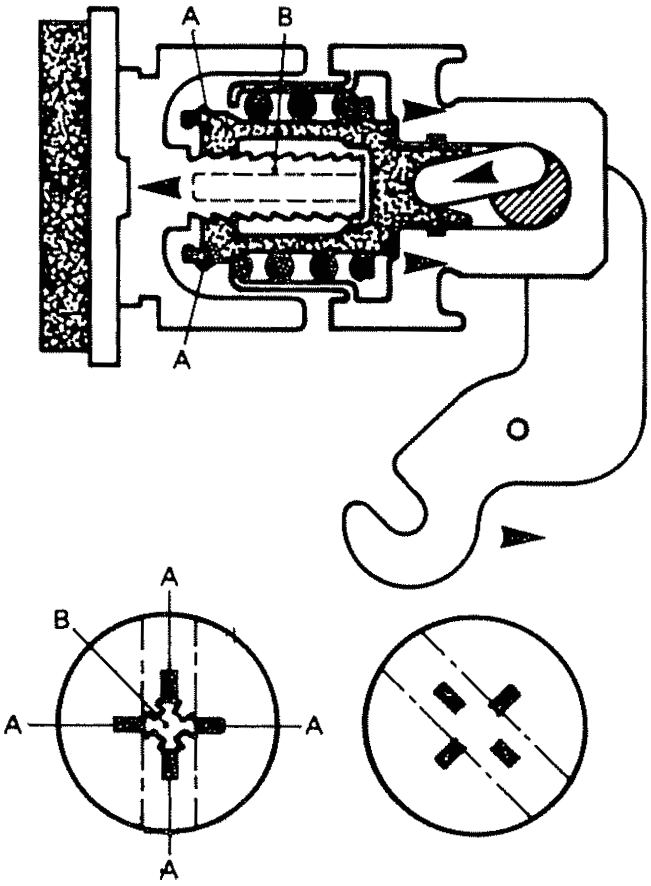


Fig.4 Rear brake adjuster

Fitting of new brake pads

When the brake pad linings have worn to 2 mm, the pads should be replaced. Always fit new pads in axle sets.

Unscrew and remove the 2 retaining self-locking screws fram the primary and secondary bolts with 13 & 17 mm spanners. Take care that the dust-covers are not damaged.

After removal of retaining screws, the hydraulic housing can radially be removed and pads pulled out. Support the calipers in such a woy to relieve any strain on the brake hose. Before fitting new pads, clean the area where the new pods are to be seated but take care not to damage the dust-covers. Ensure that the dust-covers and retaining rings are in good condition and fitted securely. While pushing primary and secondary bolts back into position, check for easy movement and release trapped air fram the dust-covers by lifting edge.

If the primary and secondary bolts prove difficult to move, completely remove together with the dust-covers. Clean all parts with GIRLING cleaning fluid or

spiritus. Examine the bolts for visible marks of damage or wear. If there is the slightest doubt about the condition of the parts, new bolts and dust-covers must be fitted. When replacing the two bolts, care must be taken to ensure that the bolt with the bushing is fitted to the secondary side (trailing) and the steel bolt to the primary side (leading in disc forward rotation). The two new bolts should be lightly smeared with grease "BP olex BR 9136".
Using the piston rotation tool turn the piston 45^{o} to release the automatic adiuster (see fig.4b). Remove some brake fluid from the fluid reservoir to avoid overflowing. Push the piston back to the start position and turn the piston to engage the ratchet of the adiuster (see fig.4a).

When replacing disc pads, the bolts should always be renewed (self locking type). First fit the primary side of the hydraulic housing together with the retaining screw to the guide bolt. (Tighten the retaining screw to torque 4.1-3.9 kpm (30-28 lb/ft.) Hold the hydraulic housing towards the carrier at a slight angle. Then push the caliper against the spring load of the pad retaining spring into the correct position enabling the second retaining screw to be fitted. (Tigthen the retaining screw to torque 4.1-3.9 kpm (30-28 lb/ft.)

Operate the brake pedal several tirnes to allow the adjusters to take up the correct brake operating position, check broke fluid and top up if necessary. The application of the brakes while stationary must not be overlooked as the brokes do not work correctly until pads are in the correct working position.

IMPORTANT: After fitting new pads, care must be taken when braking; brake several times from 50 mph (80 kph) to 30 mph (50 kph) and only brake fully when system has cooled down. If brokes are applied too sharply when new pods hove been fitted, the surface of the pads will burn and irregular braking will occur, resulting in loss of braking efficiency.

WARNING: If a caliper is damoged due to loss of brake fluid or mechanical defects a new coliper should be fitted. We recommend fitting an axle set.

BLEEDING THE BRAKING SYSTEM

1. Remove the fluid reservoir cap and fill up with clean fluid.

WARNING: Frequently check the level of fluid in the reservoir whilst bleeding the braking system.

2. Remove the dust cap from the right-hand front bleed nipple and fit a bleed pipe from the nipple to a suitable container. Immerse the end of the pipe in the container in clean fluid.
3. Slacken the bleed nipple by one turn and depress the brake pedal slowly noting the condition of the fluid entering the container.
4. Continue to operate the brake pedal until the fluid entering the container is clean and free of any air bubbles.
5. Depress the brake pedal once more slowly and close the nipple at the end of the stroke. Take care not to overtighten nipple.
6. Remove bleed pipe and replace dust cap.
7. Perform the same procedure on the left-hand front bleed nipple, followed by the right-hand rear then the left-hand rear.

WARNING: DO NOT USE fluid dispelled during bleeding for tapping up the master cyliner. Dispelled fluid contains air and the air contains water, therefore contamination would arise if fluid is re-used.

MASTER CYLINDER

To Remove

1. Place a receptacle under the master cylinder to collect any fluid escaping during removal.
2. Disconnect the two pipes from the master cylinder and insert plugs in the pipes to prevent ingress of foreign matter.
3. Disconnect the electrical connections to the reservoir cap.
4. Remove the two nuts and spring washers securing the master cylinder to the servo unit and remove the master cylinder.

To Replace

1. Reverse the removal procedure, then bleed the system as previously described. Tighten all the securing nuts to the torques specified in the TECHNICAL DATA.

SERVO UNIT

To Remove

1. Disconrrect the two pipes of the master cylinder, draining any fluid into a suitable receptacle. Insert plugs into the pipes to prevent the ingress of foreign matter.
2. Disconnect the electrical connections to the reservoir cap.
3. Disconnect the vacuum pipe from the non-return valve on the servo unii.
4. From inside the vehicle and beneath the scuttle, remove the split pin and clevis pin securing the master cylinder push-rod to the brake pedal.
5. From inside the front compartment, remove the four nuts arid washers securing the servo unit to the body mounted bracket.
6. Remove the servo unit/master cylinder as an assembly, further dismantling can be carried out on the bench as desired.

To Replace

1. Assemble the master cylinder to the servo unit.
2. Locate the assembly on the body mounted bracket, replace nuts and washers and tighten to the torque specified in the TECHNICAL DATA.
3. Reconnect the master cylinder push-rod to the brake pedal. Check that when the pedal is held against the stop, the holes in the clevis bar and brake pedal are aligned. Readjust length of clevis bar is necessary and fit clevis pin ond retain with split pin.
4. Connect the vacuum pipe to the non-return valve and refit the two hydraulic fluid pipes to the master cylinder, ensuring correct seating of the pipe end.
5. Bleed the complete system.

PEDAL BOX

To Remove

1. Disconnect the throttle cable and the clevis pins securing the brake and clutch push-rods from inside the vehicle.
2. Remove the servo unit and the clutch master cylinder.
3. Remove the steering column as described in the section STEERING.
4. Disconnect the electrical connections to the stop light switch on the top of the pedal box.

5. Unscrew the two nuts securing the servo mounting bracket and the four bolts securing the pedal box to the chassis. Remove the pedal box.

To Replace

1. Reverse the removal procedure. Tighten all bolts to the torque loadings specified in the TECHNICAL DATA.
2. Bleed the braking and clutch systems.

HANDBRAKE ASSEMBLY

Handbrake lever removal

1. Remove the carpet from the sill in which the handbrake lever is fitted.
2. Remove the retaining pin in the clevis pin connecting the lever to the actuator rod.
3. Unscrew the pivot bolt and remove the handbrake lever.

To Replace

1. Reverse the removal procedure.

Handbrake cable removal

1. Remove the carpet from the sill in which the handbrake lever is fitted.
2. Remove the retaining pin in the clevis pin connecting the cable end to the compensator.
3. Disconnect the cable from the lever arm on the rear coliper and withdraw the cable end. Release any clips holding down the cable, but do not remove complete cable.

To Replace

1. Tie new cable to the old cable and pull carefully through engine bulkhead.
2. Continue by following the reverse of the removal procedure.

Handbrake cable adjustment

1. Remove access cover from the sill. If excessive movement is apparent at the handbrake lever the cables can be adjusted using the adjusters shown in figure 5. Adjust each cable to achieve o vertical position of the compensator.

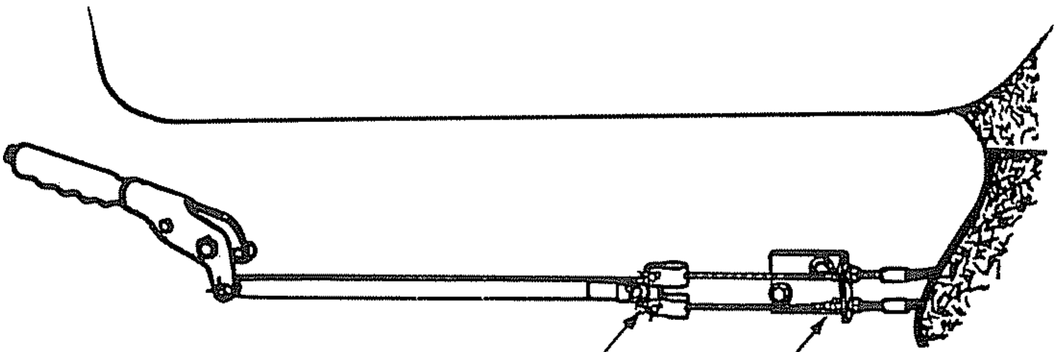


Fig. 5 Handbrake Cable Adjustment

SECTION K

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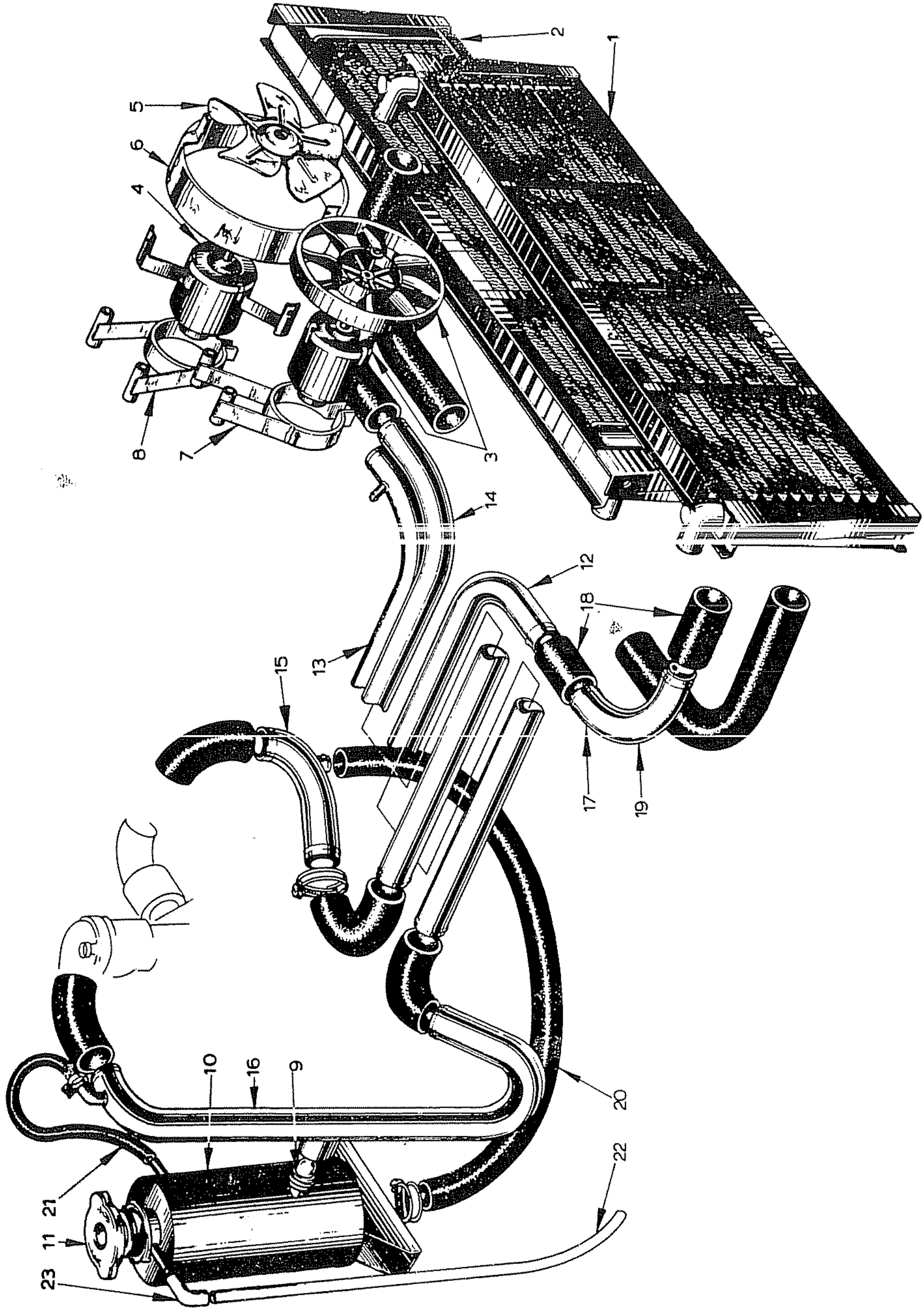
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KEY TO FIG. 1

1. Radiator, (Domestic/European)
2. Radiator, (Federal)
3. Motor Fan Assy, (Domestic/European)
4. Fan Motor, (Federal)
5. Fan, (Federal)
6. Fan Cowl, (Federal)
7. Fan Motor Mounting Bracket, (Domestic/European)
8. Fan Motor Mounting Bracket, (Federal)
9. Otter Switch, Radiator Fan (Thermostat)
10. Header Tank
11. Pressure Cap
12. Main Water Pipe, Radiator Feed
13. Main Water Pipe, Radiator Return (Domestic/European)
14. Main Water Pipe, Radiator Return (Federal)
15. Water Pipe, Main to Pump
16. Water Pipe, Thermostat to Main
17. Water Pipe, Radiator to Main (Federal)
18. Hose, Radiator to Main Pipe (Federal) (4 off)
19. Hose, Radiator to Main Pipe (Domestic/European)
20. Hose, Header Tank to Water Pipe
21. Hose, Air Bleed
22. Tube, Overflow
23. Elbow

GENERAL DESCRIPTION

The engine is connected to a cross-flow rodiotor and a constant head of woter being supplied **by** a remote header tank. To prevent over-heating electrically operated coolirig fans are provided, these being mounted on a squore section frame fixed to the chassis behind the radiator. A thermostat switch, fitted in the feed pipe from the main thermostat housing, controls the operation of the electric fans.

COOLING SYSTEM

To Drain

1 Set the air temperature control (lower) to HOT (fully backwards), with the engirie running in order to operate the woter tap. Switch "off" engine.

2. Remove the header tank cop.

Turn the radiator drain tap anti (counter) clockwise to open.

Tap in bottom right - Domestic.

Tap in bottom rear right - Federal.

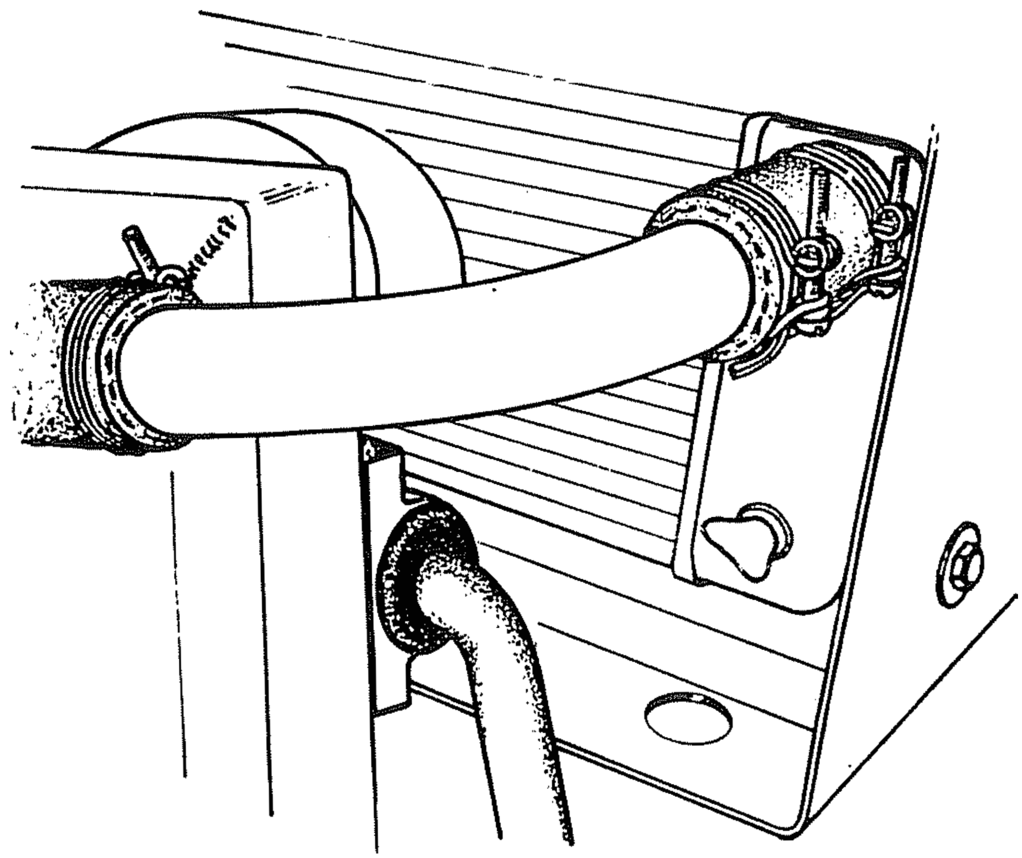


Fig.2 Radiator. drain tap

To Refill

1. Turn the radiator drain tap clockwise to close.
2. Check that the air temperature control is still at HOT.
3. Refill the cooling system to within 25 mm (1 in) from the bottom of the header tank filler neck.
4. Replace the header tank cap.
5. Check after filling to ensure that the heater, or the heater unit of the air conditioning system, is free of air locks. If necessary, release the feed hose clip (top of themostat) at the rear of the engine to expel any air, re-tighten the hose clip and top up header tank.

   NOTE: It is important that the cooling system should contain a corrosion inhibitor to protect the aluminium alloy of which the greater part of both the engine and the radiator are built.

COOLING SYSTEM INHIBITOR

We recommend a combined antifreeze/inhibitor which can be used all year round, in the following quantities:

North America	3.7 litres (6.5 Imp. pts; 7.8 US pts)
All other territories	2.4 litres (4.3 Imp. pts; 5.2 US pts)

Antifreeze/inhibitors which are recommended by Lotus Cars Limited are:

Shell	'Shell Safe'
Union Carbide	'UT 184'

Antifreeze mix 25% minimum in tempemte climates and in colder climates up to 60% maximum.

RADIATOR

To Remove

1. Drain the cooling system as described above.
2. Release the clips securing the hoses and disconnect from the radiator.
3. Unscrew the 3 screws securing the sides of the air duct to the body.
4. Remove the 3 bolts securing the bottom of the air duct to the chassis.
5. Carefully withdraw the air duct and front grille together with the radiator.
6. Remove the mdiator from the air duct assembly, taking care not to damage the radiator matrix which is constructed from aluminium.

To Replace

1. Reverse the removal procedure, but ensure foam rubber pads are correctly located before finally securing the radiator.

THERMOSTAT

To Remove

1. Drain the cooling system as previously described.
2. Disconnect the hose from the thermostat housing.
3. Remove the two bolts and lift off the thermostat housing.
4. Withdraw the thermostat.

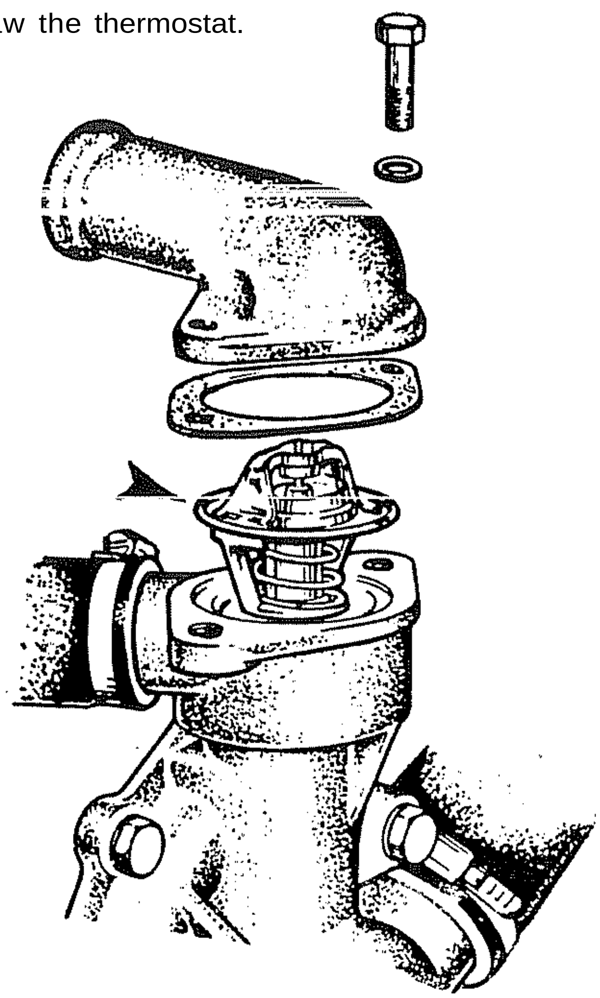


Fig.3 Thermostat removal

To Replace

1. Reverse the removal procedure, but note when refitting the thermostat the 'jiggle pin' is located adjacent to the inlet connection to the manifold; this ensures the thermostat is not fouled by the thermostat housing.

HEADERTANK

To Remove

1. Drain the cooling system as previously described.
2. Release the hose clips and remove all the hoses from the header tank.
3. Remove the nuts securing the tank and remove the tank.

To Replace

1. Reverse the removal procedure.

MODEL S2 CHARACTERISTICS

The cooling system for the model S2 when fitted with air conditioning has a radiator of different design with two fans and a 'Fan Failure' indication system.

Should a fault occur in the fan circuit the fan failure relay will de-energise and light the FAN FAILURE lamp on the instrument panel. This lamp will also give an indication that the Otto thermostat has actuated by pulsing momentarily, showing that the circuit is functioning correctly.

Radiator Removal from Vehicles with Air Conditioning

NOTE When removing the radiator only it is not necessary to disconnect the pressurised hoses from the condenser.

1. Drain the cooling system.
2. Release the clips securing the hoses and disconnect from the radiator. Disconnect electrical connections to fans.
3. Remove spare wheel to gain access to radiator and condenser top fixing bolts. Remwe the bolts.
4. Remove screws from under the front of vehicle supporting the, front end of the air duct.
5. Loosen the three bolts each side of the air duct assembly, before, finally removing the bolts.
6. Withdraw the whole assembly and place carefully on a clean surface.

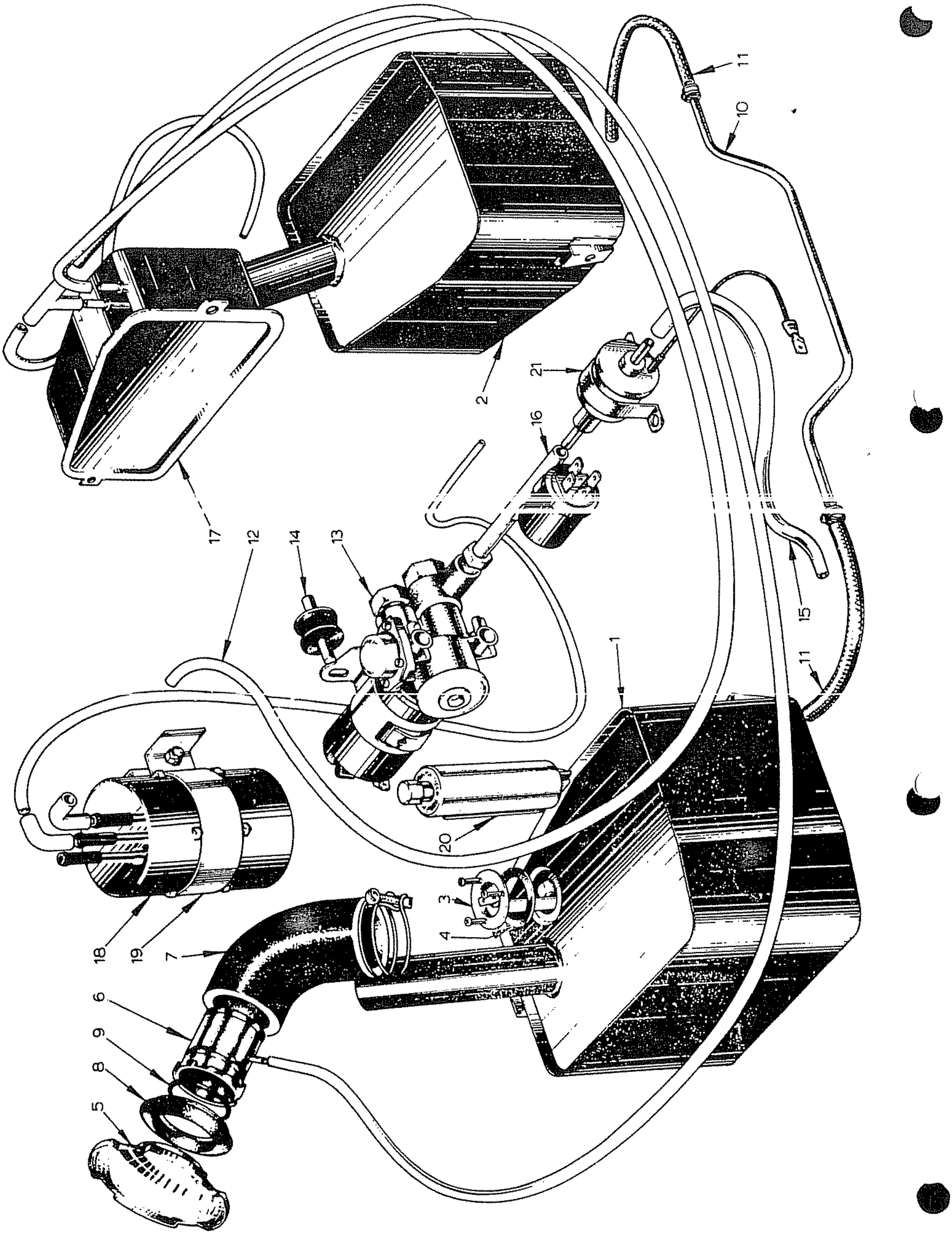
8

To Replace Radiator on Air Conditioned Vehicles

1. Reverse the removal procedure, but first locate radiator air duct assembly on the side bolts, then locate radiator and condenser top bracket screws before tightening all bolts and screws. Ensure foam pads are correctly located before finally tightening down.

SECTION L

3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KEY TO FIG.I

1. RH Fuel Tank
2. LH Fuel Tank
3. Sender Unit
4. Sender Unit Gasket
5. Filler Cap Assy
6. Filler Neck
7. Hose, Filler Neck to Tank
8. Grommet, Filler Neck
9. "O" Ring
10. Cross Feed Pipe
11. Flexible Cross Feed Pipe
12. Tank Vent Pipe
13. Fuel Pump
14. "Metalastik" Mount
15. Fuel Pipe - Tank to Filter/Flowlock
16. Fuel Pipe - Filter/Flowlock to Pump
17. Evapomtive Loss Tank
18. Charcoal Cannister
19. Mounting Bracket
20. inertia Switch
21. Filter/"Flowlock" Valve

GENERAL DESCRIPTION

The fuel system tanks are situated in the rear comportment, one each side of the engine under the floor ponelling. Recesses rnoulded into the body accommodate the tanks and access holes, covered by large rubber bungs, are reached from under the car. Two flush fitting filler caps are situated on the rear quarter panels; the filler necks are connected to the tank by rubber hoses retained with clips. A fuel gouge sender unit is fitted in the tap of the right-hand tank and the tanks are coupled via a connecting pipe to bottorn of each tank. Ventilation of the tanks is via the filler caps on European cars and via an evaparative loss system on Federal vehicles.

Incorpomted in the fuel line of some vehicles is a filter/flowback valve, which will switch off the petrol when the ignition is switched off. An incident, such as a collision, is sensed by the inertia switch which when operated will need resetting.

One of two carburation systems are fitted to the engine, there is the twin dual-barrel side-draught Dellorto carburetters or the twin Zenith carburetters, check the TECHNICAL DATA or the paragraphs relating to the carburetters in this section.

The air cleaner is of the replaceable paper element type, where the element is sandwiched between the two halves of the airbox. A flexible hose connects the airbox to atmosphere and on some vehicles twin flexible hoses are used to connect the airbox to a pienum chamber, through which air-is drawn.

CLEANING THE FUEL SYSTEM

1. Remove the air cleaner ond clean (or replace)?).
2. Disconnect the fuel supply pipe to the carburetters and the filter/flowback valve. Make sure the flexible fuel supply pipe from the pump does not fall and allow the fuel to drain from the tanks.
3. Replace the filter/flowlock valve if necessary.

Dellorto Carburetters

1. Remove the screws retaining the jet cover and gasket on each of the carburetters.
2. Remove the main and idling jet assemblies and blow the jets through using an air line.

WARNING: Do not use a probe or wire to clear the jets as this may enlarge or damage the jet orifice.

3. Remove the screws retaining the float chamber coven.
4. Remove the remaining jets and as in '2' above. Note that the pump jet is concealed beneath o plug on the outside of the carburetter, in front of the identification panels.
5. Clean the floats, float chambers and needle valves with petrol, and blow clean with an air line.
6. Check the float level and ensure floats are free to move. Replace all jets. Using new gaskets, replace the float chamber and jet covers. Check condition of 'O' rings on pump and idler jet assemblies, and replace if necessary.

Zenith Carburetters

1 Remove the carburetters from the engine.
2. Remove and clean the float chambers, floats and needle valves with petrol and blow clean with an air line.
3. Replace the needle valves and floats, and check the float level. Ensure the floats are free to move. Using a new gasket, replace the float chambers.
4. Using new gaskets, replace the carburetters on the engine.

?.

All Engines

1. Using on air line, blow through the disconnected fuel supply pipes. Refit the pipes.
2. Fit o new fuel filter if necessary.

FUEL TANKS

To Remove

1. Remove engine cover.
2. Remove engine compartment floor panels each side of the eng ne.
3. Disconnect and remove battery.
4. Drain the tank by disconnecting the flexible cross feed pipes under the tonks.
5. Disconnect the pipe between the tanks and the pump.

6. Release the clips and remove the rubber hoses connecting the fuel tonks to the filler necks, first disconnect the breother pipes from the fillet necks.
7. From each tank, remove the two bolts securing the tank in the body. One bolt is in the forward port of the rear wheel arch and the other belt on the inside (chassis side).

To Replace

1. Reverse the removal instructions.

FUEL TANK SENDER UNIT

To Remove

1. Remove the engine cover.
2. Remove the battery.
3. Remove RH engine compartment floor panel to gain access to the top of the RH fuel tank.
4. Visconnect sender unit electrical connections.
5. Unscrew the three screws securing the sender unit to the top of the tank.

To Replace

1. Fit a new sealing ring and coat the threads of the three retaining screws with Avdelbond-A-115 or similar. Ensure all threads are fitted, but take care that excess does not fall into tank. Tighten screws to 5 to 7 lbs/ft only (hand tight), do not overtighten as the gasket will distort and screw threads may strip.
2. Reverse the removal instructions from 4 to 1.

FUEL GAUGE

Detailed instructions for removal and replacement of the fuel gauge are given in Section ***M*** under the heading INSTRUMENTS.

FUEL ***PUMP***

To Remove

1. Disconnect the battery.
2. Remove the pipes from the pump which is accessible from under the LH side of the vehicle on the back of the engine bulkhead. Some vehicles have the petrol pump fitted under the RH engine compartment floor ponel. Insert a plug in the pipe from the tanks, otherwise the fuel will drain out.

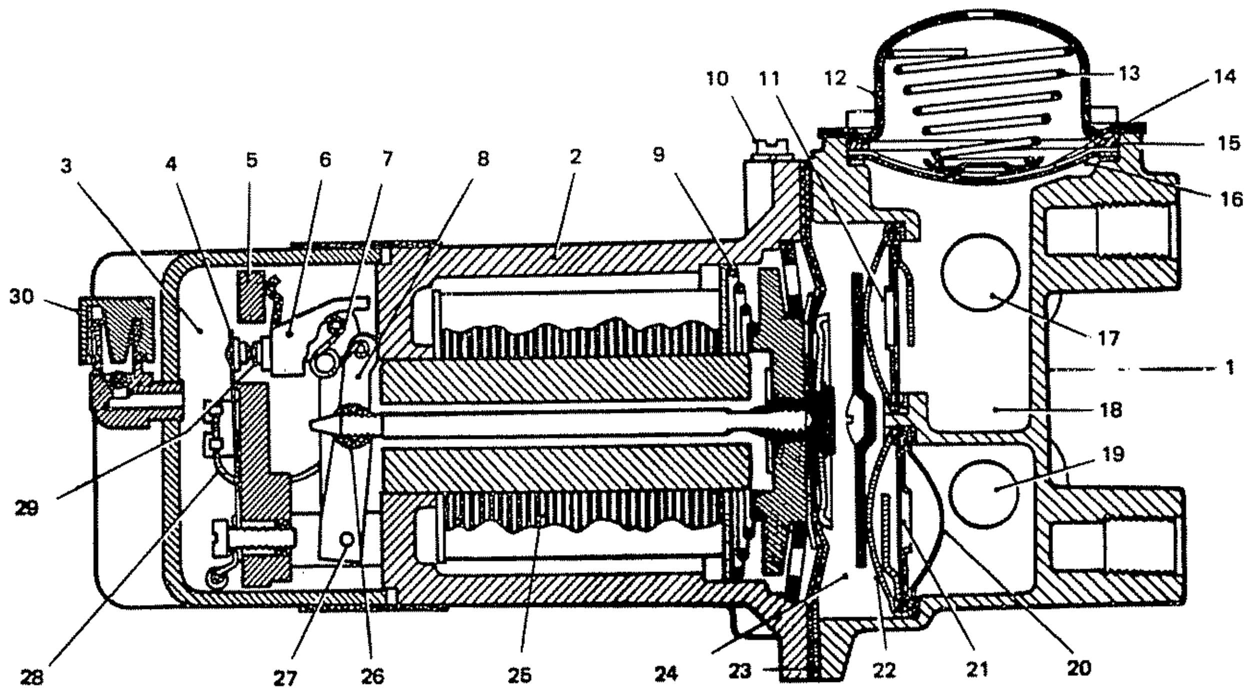


Fig.2 Cross section of fuel pump

KEY TO FIG.2

	Body casting	16.	Perforated diaphragm plate
2.	Coil housing	17.	Fuel outlet
3.	Contact breaker ossembly	18.	Delivery chamber
4.	Spring blode	19.	Fuel inlet
5.	Pedestal moulding	20.	Fuel filter
6.	Outer rocker	21.	Inlet volve assembly
7.	Toggle spring	22.	Valve cover
8.	Inner rocker	23.	Moin diaphragm
9.	Armature spring	24.	Main pumping chamber
10.	Earthing screw	25.	Coil
11.	Outlet volve ossembly	26.	Trunnion
12.	Vented cover	27.	Rocker spindle
13.	Spring	28.	Flexiblewire
14.	Plastic diaphragm/barrier	29.	Tungsten points
15.	'O' ring	30.	Non-return volve

3. Disconnect the electrical supply cable at the terminal on the pump. Unscrew the two bolk securing the pump to the bracket and where the pump is fitted under the RH engine compartment floor panel remove the nut securing the pump to a 'Metalastik' mounting.

To Clean

1. With the pump on a bench, remove the contact breaker cover. Clean the points by pulling a strip of very fine emergy cloth (or similor) between the points. Follow this by a strip of clean cardboard to remove any small particle of corundum. Replace the contact breaker cover.

To Replace

1. Reverse the removel instructions

FUEL FILTER

To Remove

1. The in-line filter valve is in the fuel feed pipe from the pump, therefore, it is advisable to hove a new valve available for fitting before removing the existing valve.
2. Lift the engine cover to gain access to the valve secured to chassis tubing on the RH side, on some vehicles this valve is situated under the RH engine compartment floor panel.
3. Release the two clips securing the valve to the fuel lines ond remove.

To Replace

1. Fit a new in-line filter valve, secure in position in the fuel pipe with the retaining clips. Ensure that IN connection on filter is towards the fuel supply.

FLOWLOCK VALVE

To Remove

1. The flowlock valve is in the fuel feed pipe from the filter, therefore, it is advisable to have a new flowlock valve available for fitting before removing the existing valve.

2. Lift the engine cover to gain access to the valve secured to the chassis tabular frame by a clamp.
3. Remove the fuel pipes from the valve and remove.

<u>To Replace</u>

1. Secure the flowlock valve in the clamp on the chassis and reconnect fuel pipes and tighten.

<u>ZENITH CARBURETTERS</u>

DESCRIPTION

These carburetters are of the constant depression (CD) type and opemte on the principle of varying the effective area of choke and jet orifice, in accordance with the degree of throttle opening, engine speed and engine lwd.

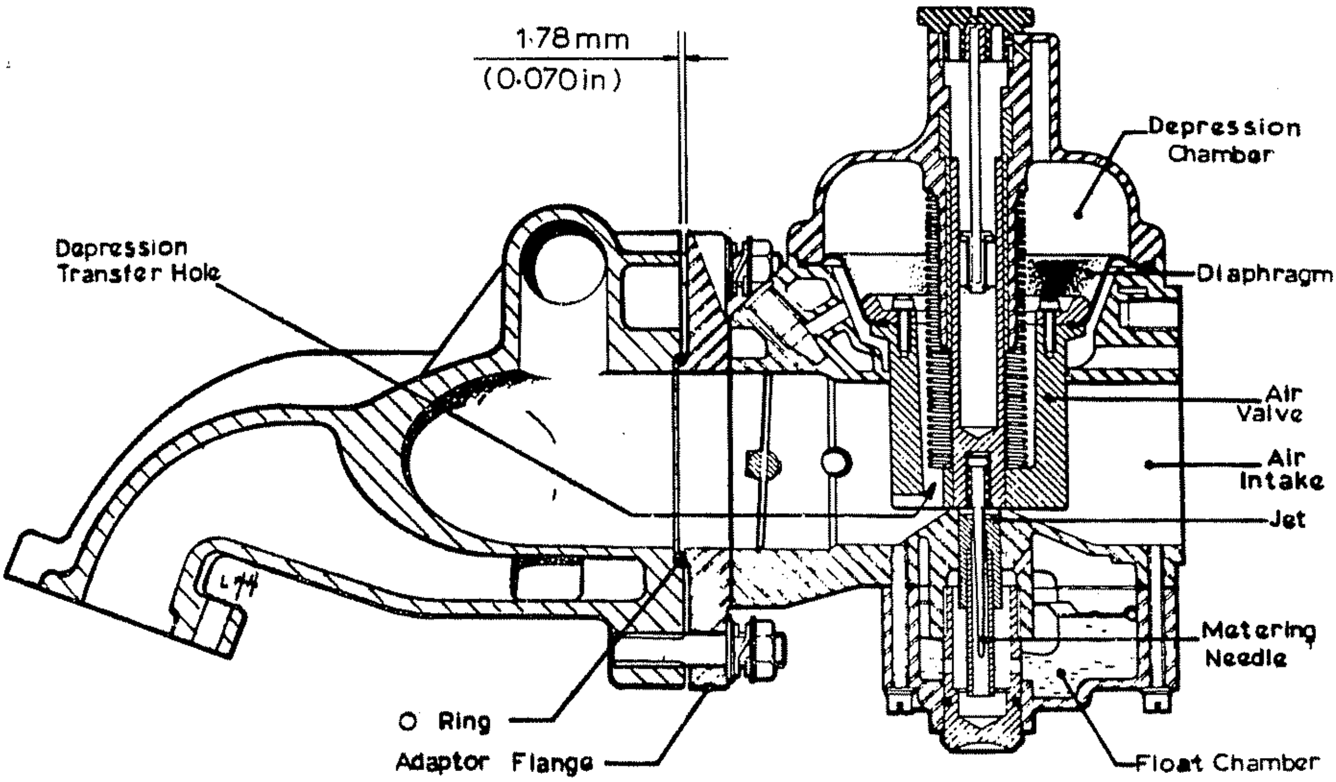


Fig. 3 Cross section of Zenith carburetter

Operation

The petrol inlet is a parallel tube connecting the two carburetters, into which a flexible fuel pipe from the 'Flowlock' valve is fitted. Fuel passes into the float chamber, via a needle valve, where the flow is controlled by the needle in the valve and twin floats mounted on a common arm. As the fuel level rises, the float lifts and by means of the float orm and tag, closes the needle onto its seating when the correct level has been attained. When the engine is running fuel is drawn from the float chamber, the float descends and more fuel is then admitted through the needle valve. In this manner, the correct level is automatically maintained the whole of the time the carburetter is in action.

Fuel in the jet orifice is maintained at the same level as that in the flwt chamber by means of crass drillings in the jet assembly.

Cold Starting

When the choke control on the tunnel switch panel is lifted up, it operates a lever at the side of the front corburetter; this rotates a disc in the starting device in which a series of holes of different diorneters are drilled. In the full rich position, all holes will be in communication with the storter circuit and provide the richest mixture. A cross-teed pipe feeds the rear corburetter. Petrol is drawn from the float chamber via a vertical drilling adjacent to the central main feed channels, through the starting device and into the carburetter body between the air valve and the throttle plate. Simultaneously, the cam on the starter lever will open the throttle beyond the normal idle position according to the setting of the fast-idle stop screw to provide a faster idle speed to prevent stalling when the engine is cold. As the choke on the tunnel switch panel is gradually released, fewer and/or smaller holes will provide the petrol feed from the float chamber, thereby progressively weakening the mixture strength to the point where the choke control is pushed fully down. Mixture is then governed by the Factory setting of the main orifice and idle speed determined by the setting of the throttle stop screw.

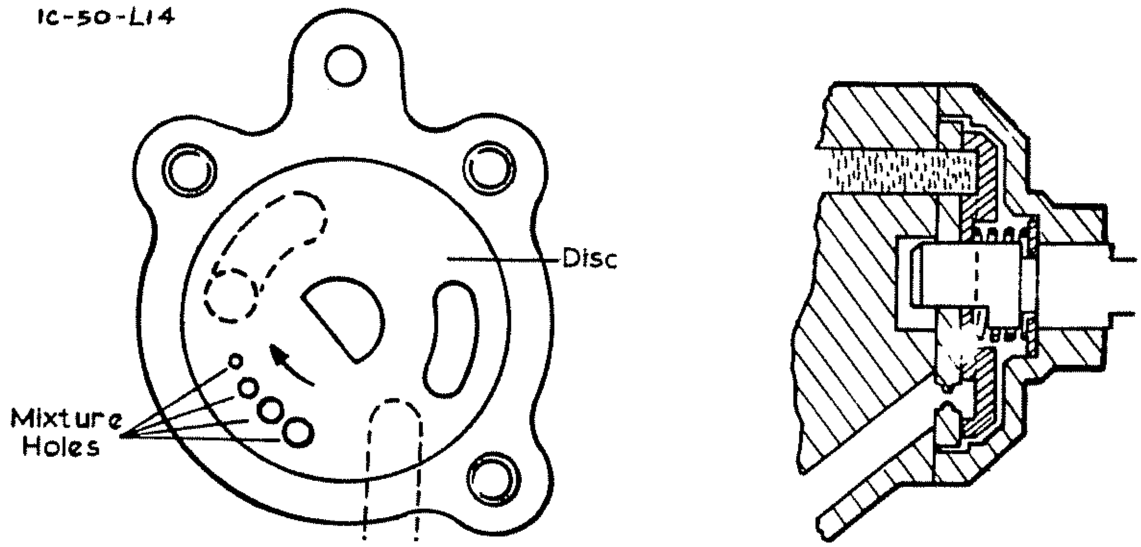


Fig. 4 Zenith starting device

NOTE: Do not pump, or hold oper the throttles, as this reduces the effectiveness of the cold start device (choke).

It is also important to note that there are two positions (Winter and Summer) on the starting limiting pin. This is the spring-loaded, knurled headed pin located on the side of each starter housing. Push down and turn through 90° by the screwdriver slot provided. In the 'Winter' position the slot will be horizontol when viewed from the side of the car, whereas in the 'Summer' position the slot will be vertical.

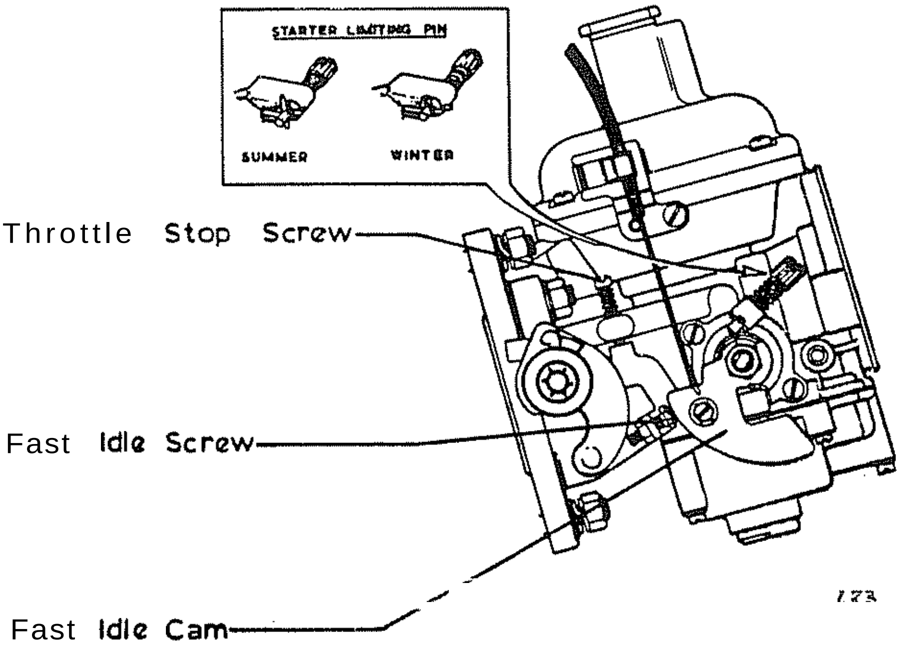


Fig.5 Zenith throttie iever setting

Idling

Fuel for idling is provided by the jet orifice, the amount being controlled by the jet/needle relationship established during manufacture. Idle speed is regulated by adjustment of the throttle stop screw, which limits the closure of the throttle when the accelerator pedal is released.

Normal Running

The jet/needle setting governs the correct idle mixture and mixture strength throughout the operational range of the engine. A feature of the assembly is the radially located needle, which is biased so that the needle is permanently in contact with one side of the jet, to ensure a consistent fuel flow from a given needle profile.

The jet/needle relotionship is set during production and SHOULD NOT be altered.

When the throttle is opened, air flow under the air volve increases ond a temporary rise in mixing chamber depression is transferred vio drillings in the air volve to the depression chamber which is seoled from the main body by a diaphragm. Pressure difference between the depression chamber and the under diaphragm chamber covses the air valve to lift. Thus any increase in engine speed or lood will enlarge the effective choke area until maximum air valve lift, since the oir volve lift is proportional to the rate of air flowing beneath it. Therefore, air velocity and pressure drop across the jet orifice remain approximately constant at all engine speeds.

As the air valve rises, it withdrows the tapered metering needle held in its base from the jet orificie, so that fuel flow is increased proportionate to the greater oir flow.

The metering needle is a varioble and machined to very close limits. It provides a mixture ratio for all speeds and loads in line with engine requirements that are determined by exhaustive tests on bench and rood during original manufacture. To maintain correct results, it is essential that only the recommended needle is used.

Temperature Compensator

Testing has shown the need for a temperature compensator, operating over a wide range of air valve lift, to cater for minor mixture strength variations caused through heat transfer to the carburetter castings.

An air flow channel is employed which permits some of the air passing through the carburetters to by-pass the bridge section. With the introduction of this air into the mixing chamber, the air valve, in order to maintain depression on its downstream side, rides in a lower position, thus giving a smaller fuel flow annulus. To adjust the quantity of air by-passed, a bimetallic blade is used to regulate the movement of a tapered plug.

Two screws attach the temperature compensator assembly to the carburetter and two seal are provided to ensure that no leakage can occur at the joint with the main body. THIS ASSEMBLY IS PRE-SET AND MUST NOT BE RE-ADJUSTED IN SERVICE. If it is suspected of malfunction and the tapered plug moves freely when tested corefully by hand with the engine both cold and hot, the compensator assembly should be changed for another of the correct specification.

Depression Valve

This valve was fitted to earlier vehicles only. It controls the admission of vacuum to the by-pass valve, thus ensuring smoother transition between deceleration and idle. The valve is pre-set and requires no attention in Service.

Throttle By-Pass Valve

The throttle by-pass valves are incorporated to prevent excessive rates of hydrocarbon and CO emission. Manifold depression, acting on the valve diaphragm will cause the valve to open when a pre-determined value is reached that will overcome the spring load.

The valve is pre-set, and providing that it is free from air leaks, should not normally require attention in Service.

Acceleration

At any point in the throttle range, a temporary enrichment is needed when the throttle is suddenly opened. To provide this, a hydraulic damper is arranged inside the hollow guide rod of the air valve.

The rod itself is tiiied with suitable oil (engine oil) to within a 6.35 mm (.025 in) of the end of the rod. When the throttle is suddenly opened, the immediate upward motion of the air valve is resisted by the damper. For this brief period, a temporary increase in the depression over the jet orifice is achieved and the mixture is enriched. Downward movement of the air valve is assisted by a coil spring.

Flexible Carburetter Mounting

When assembling the adaptor flange/carburettor assemblies to the inlet manifold, the 'O' rings should be located carefully and the nuts adjusted to give an even gap of 1.78 mm (.070 in) between the flange and the manifold.

ADJUSTING

There are three adjustments that can be made to Exhaust Emission carburetters in Service, and these are:

a. Idle Speed

b. Idle Emission

c. Fast - Idle

Synchronisation (figure 6)

1. Loosen the clamping bolt (1) on the throttle spindle coupling between the carburetters. Unscrew the throttle stop screws (2) to permit the throttle in each carburetter to fully close, then turn the stop screws until their points are just contacting the levers. Rotate the stop screws a further one-and-a-half complete turns each, to open the throttle an equal omount, and to provide a basis from which the final idle speed can be set.

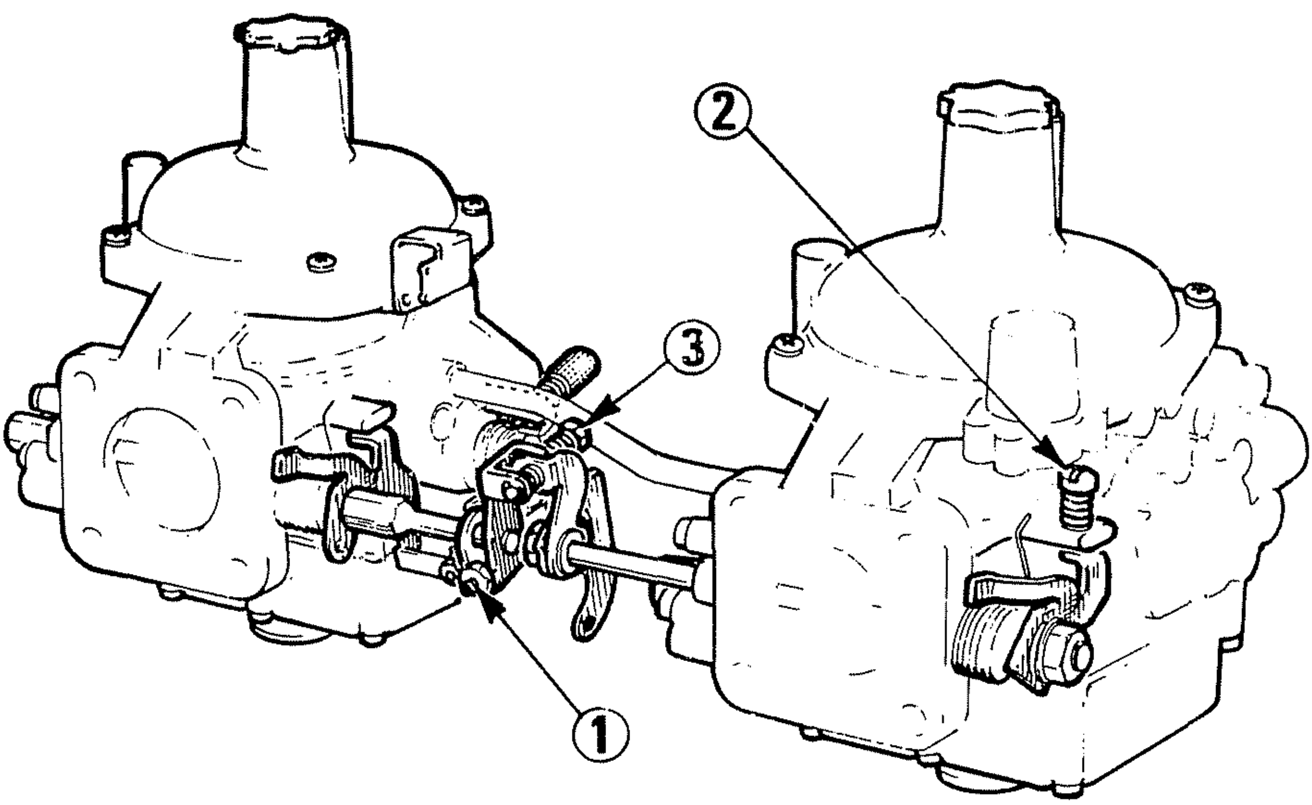
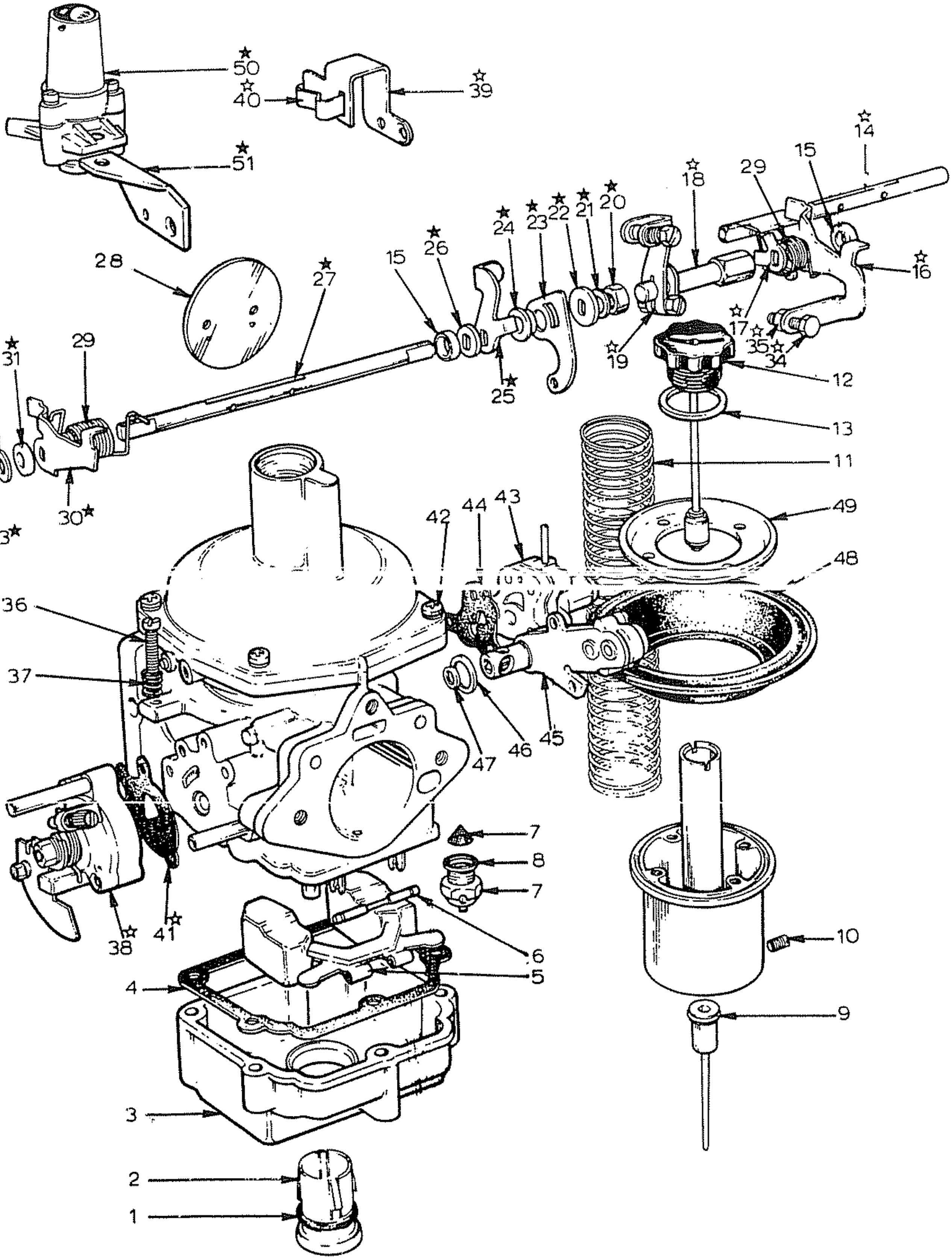


Fig.6 Zenith adjusting screws

2. Ensure fast-idle screw is clear of cam, otherwise incorrect synchronisation will result. Check also that the cold start lever is fully off against the stop, with the choke control on the tunnel switch panel pushed fully down. Adjust coupling and cable as necessary, using the balance screw (3) for fine adjustment.



☆ FRONT CARBURETTER ONLY
★ REAR CARBURETTER ONLY

Fig.7 Zenith carburetter components

KEY TO FIG /

1. 'O' ring seal
2. Sealing plug and 'O' ring
3. Float chamber
4. Gasket, float chamber
5. Flwt and arm assembly
6. Pivot, float
7. Needle valve and filter
8. Washer, needle valve
9. Metering needle assembly
10. Screw, metering needle
11. Spring, air valve
12. Damper assembly
13. Washer, damper
14. Throttle spindle, front
15. Seal, throttle spindle
16. Lever, throttle stop
17. Tab washer
18. Extension nut
19. Lever assembly
20. Nut
21. Washer, shakeproaf
22. Washer, spacing
23. Lever, throttle
24. Bush
25. Lever, pick-up
26. Washer
27. Throttle spindle, rear
28. Butterfly valve
29. Spring, throttle return
30. Lever, throttle stop
31. Washer
32. Washer, shakeproof
33. Nut
34. Screw, fost idle
35. Locknut, screw
36. Screw, throttle stop
37. Bracket, starter control
38. Starter control assembly
39. Bracket, starter control
40. Clip, bracket
41. Gasket , starter control
42. Screw, cover to body
43. By-pass valve assembly
44. Gasket, by-pass valve
45. Temperature compensator assembly
46. Seal
47. Seal
48. Diaphragm
49. Washer, diaphragm
50. Control valve
51. Bracket, control valve

3. Start engine ond worm to its normal operating temperature.
4. Remove the cover of the air cleaner. Using a 'Crypton Synchrocheck' (or similor instrument), adjust the throttles synchronisation, ond the idle speed to that given in TECHNICAL DATA. At this point, tighten the clamping bolt on the throttle spindle. Refit the cover of the air cleaner, and re-check the idling speed. Finally, adjust the fast-idle stop screw.
5. The idle mixture is adjusted by the metering needle adjusting screws in conjunction with a CO meter (e.g. 'Horiba Mexa 200', or similar). The screws are situated inside the air valves and are accessible after removing the black cap from the top of each carburetter. Using Special Tool (X036 S 6172Z) turn the screws anti (counter)-clockwise to WEAKEN, or clockwise to RICHEN the mixture, until the exhaust concentration is within the range given in TECHNICAL DATA.

Float Height

1. When correctly set, and with the carburetter inverted, measure to the highest point of the floats above the main body, with the fuel inlet needle on its seating, the measurement being 16/17mm. Care MUST be taken NOT TO TWIST OR DISTORT the float arms to ensure a constant float level.
2. To adjust the float height, bend the tag which contacts the end of the needle, ensuring that the tag is MAINTAINED AT RIGHT ANGLES to the needle in the closed position.

REMOVAL

To Remove

1. Remove the air cleaner cover (see AIR CLEANER 'To Remove').
2. Disconnect the choke cable, throttle cable and return spring.
3. DIrconnect the breather pipe from the flome trap at the rear of the air cleaner backplate.
4. Remove the air cleaner bockplate. Discard the gaskets between the backplate and the carburetters.
5. Disconnect the fuel supply pipe to the carburetters.
6. Release the nuts and washers securing each carburetter to the adaptor flanges. Pull off the carburetters as an assembly connected by the petrol

feed tube. Remove the gaskets and discard.

7. Further dismontling can be carried out as desired on a bench.

8. if it is suspected that an air leak is evident between the adaptor flanges and the inlet manifold, the 'O' rings may be damaged. Remove the flanges by releasing their retaining nuts and washers.

To Replace

1. Reverse the removal procedure, but use new 'O' rings between inlet manifold and adaptor flanges.

2. When replacing the flange retaining nuts and washers, note that there MUST be a clearance of .07 in (1.78 mm) between the adaptor flange and the manifold, otherwise, the carburetters will tilt with the possibility of cir leaks through the 'O' rings.

3. Always use new gaskets between adaptor flanges to carburetters and carburetters to airbox backplate.

CLEANING

The carburetters should be cleaned every 12,500 miles (20,000 km) using the YELLOW SERVICE PACK'', one for each carburetter. Each pack contains the following items:

a. Float chamber gasket.

b. 'O' ring for float chamber plug.

c. Needle valve washer.

d. Adaptor flange/carburetter gasket.

To Clean

1. Remove the carburetters from the engine, as previously described and place on o clean bench.

2. First, remove carburetters from inlet manifold, then place carburetters on a clean bench to keep the instruments and parts free from contamination and disconnect one carburetter from the other.

3. Hove a receptacle available into which fuel from each float chamber may be drained. Unscrew the large brass plug in the centre of the float chamber cover and allow fuel to drain into receptacle.

4. Unscrew the float chamber fixing screws, taking care not to lose the washers

and withdrow float chamber vertically away from body to clear the float mechanism. Toke off float chamber gasket. Unclip float pivot pin and, noting carefully the top in order to ensure correct re-assembly, take out floats. Unscrew hexagon bodied needle valve from carburetter body.

6. Take off 'O' ring from centre plug then thoroughly cleanse all ports that have so far been removed.
7. Refit needle valve into float chamber cover with new washer (thickness 1.6mm) and make sure it is screwed tightly into position.
8. Replace float assembly, after inspecting for damage or distortion, slide in pivot pin and clip assembly into position (see 'Float Height').
9. With the new gasket in position, refit float chamber and tighten the retaining screws securely from centre, outwards. Fit new 'O' ring to centre plug and replace tightly in position. Refit carburetters to adaptor flange with new gaskets supplied.
10. Top up damper reservoirs with the recommended oil (see Section 'O') to within ¼ in (6.35mm) of top of centre rod.
11. Refit carburetters and reset controls as described in ADJUSTING.

OVERHAUL

The carburetters should be overhauled every 25,000 miles (40,000 km) using the RED SERVICE PACK, one for each carburetter. Each pock contains the following items:

a. Float chamber gasket.
b. 'O' ring.
c. Needle valve.
d. Diaphragm.
e. Throttle spindle seals (2 off)
f. Temperature compensator seals (2 off)
g. Flange gasket.

To Overhaul

1. Remove the carburetters from the engine, as previously described and place on a clean bench.
2. Remove carburetters from inlet manifold, check carburetter induction flanges for flatness and face-up if necessary. Carry out similar procedure to that outlined for the 10,000 miles service in respect of float chamber cleanliness

and float setting. In this instance, however, fit the new needle valve assembly with a new washer.

3. Unscrew damper assembly from centre of cover. Unscrew the four cover fixing screws and carefully lift off cover. Remove air valve return spring then take out air valve and diaphragm assembly. Avoid possibility of corrosion to shaft from perspiration of hands by lifting upwards with the diaphragm.

4. Drain ail from damper reservoir (centre of guide rod). Slacken metering needle guide screw and withdraw metering needle from air valve by turning adjusting screw anti (counter)-clockwise with special tool (X036 S 6172 Z). Place the needle assembly wrefully to one side to avoid damage.

5. To fit the new diaphragm, unscrew the four screws holding the diaphragm retaining ring onto valve, making sure that the locating tag is recessed into the aperture provided. Drop in retaining ring and replace the four fixing screws tightly.

6. Take metering needle and check spring action in the housing at the top of the shank. Fit metering needle into base of air valve, lining up the keyway with the guide screw, and gently press into air valve. Once strong resistance to further entry is felt, draw the needle in further by turning the needle adjusting screw clockwise. Tighten the guide screw, ensuring that it locates in the keyway in the needle assembly. The needle should be drawn into the air valve until its shoulder is flush with the bottom face of the air volve. Shoulder alignment is extremely critical and this operation should be accurately carried out. Correctly fitted, the needle will oe biased away from the throttle and the shoulder of the needle will be exactly flush with the air valve face. To check that the correct needle is fitted, hold the housing and CAREFULLY pull out the needle. The needle identification can then be seen on its shank.

7. Carefully enter air valve and diaphragm assembly into the moin body, guiding the metering needle into the jet with a finger in the air intake. Locate the outer tag of diaphragm in aperture of top of body.

8. To check assembly, look down centre of air valves to see that the two depression transfer holes are parallel to the throttle spindle and that the metering needle is also biased away from the throttle.

9. Replace air valve return spring.

10. When refitting the cover, hold the air valve with finger or thumb in air intake and slide on cover, locating the screw holes. Tighten the four cover screws evenly then check movement of the air valve. Freedom of movement over the full travel is essential, and, when released from uppermost position, the air valve should fall with a sharp metallic click onto the carburetter bridge.

11. Top up damper reservoirs with the recommended oil (see Section 'O') to within ¼ in (6.35 mm) of top of centre rod.

12. Unscrew the two screws which retain the temperature compensator unit to the main body of the carburetter and withdraw the assembly. Take out the inner seal from carburetter body and remove outer seal from the valve. Change both seals and refit the assembly to the carburetter tightening the two retaining screws evenly.

13. Take off the compensator cover by removing the securing screws and check for free movement of [illegible] valve by lifting off [illegible] On releasing, the valve should return freely. Do not strain the bi-metal blade or attempt to alter the adjustment. Provided the valve is free, replace cover and fit screws.

14. To replace the throttle spindle seals, first take off any levers fitted to the spindle ends then carefully prise out the old seals noting how they are fitted. Slide new seals along spindle and press into body recess.

15. Refit carburetters and reset controls as described in ADJUSTING.

NOTE: During cleaning and overhauling the carburetters the following items should not be replaced or adjusted:

<u>Do Not Replace</u>	a.	Jet assembly
	b.	Air valve
	c.	Depression chamber cover
<u>Do Not Adjust</u>	a.	Depression valve
	b.	Temperature compensator
	c.	Air valve return spring loading

Should any of the above items require replacing then readjust the carburetters as described in ADJUSTING.

<u>Air Valve/Diaphragm Assembly</u>

A bead and locating tab is moulded to both the inner and outer radii of the diaphragm to ensure correct positioning of this item. The diaphragm is secured to the air valve by a ring and screws with lockwashers ond it is necessary to ensure the bead is correctly located and the screws fully tightened.

Location for the bead and tab on the outer radii of the diaphragm is provided by a location channel at the top of the main body. It is importont that location beods and tabs ore accurately positioned.

When refitting the suction chamber cover, place it occurotely so that the screw holes line up with those in the main body, as this will prevent any disturbance of the located diaphragm.

Air Valve Rod and Guide

The air valve rod and guide must be kept clean and should not be handled unduly if corrosion is to be avoided. A few drops of oil (see Section 'O') should be applied to the rod before fitting.

Float Chamber Removal

To prevent the leakage of fuel from the float chamber, a rubber 'O' ring is situated between the jet cover and the float chamber spigot boss. Care should be taken when removing the float chamber to avoid damage to the faces and floats.

DELLORTO CARBURETTERS

DESCRIPTION

These carburetters are of the dual barrel side-drought type, each consisting of two single barrel carburetters with two venturis in each barrel. A small auxiliary venturi is located in each barrel and they discharge fuel, except under certain conditions, into the narrowest sections of the large venturis. By using two ventirris in each barrel a greater depression is created than when a single venturi is employed. Also, the velocity of on airstream is higher ot the centre, and the velocity of this central core is used by the auxiliary Venturis, which discharge into the centre of the main venturis at the narrowest section.

The throttle plates in each carburetter are on a common spindle and the synchronising linkage between the corburetters ensures that the throttle plates in each carburetter open an identical amount. It should be remembered that one barrel supplies one cylinder only, since the inlet tracts are not interconnected. Apart from the throttle linkage, the carburetters are identical, and each carburetter is, in effect, two carburetters with duplicated main jets, idling jets, etc.

However, whilst each barrel has an accelerator pump jet, there is only one diaphragm type accelerator pump per carburetter, and this feeds both jets. To facilitate cold starting a progressive starting device is fitted, discharging mixture into both barrels on the engine side of the throttle plates. The idling jets, main and air correction jets, together with their emulsion tubes, are accessible after removing the small rectangular cover secured with screws to the top of the float chamber cover.

A common float chamber is incorporated in each carburetter with twirl floats, to reduce the effects of fuel surge, actuating o single needle valve which incorporated o damping device to prevent the needle from chattering on its seat. The floats straddle the centrally located jets, their position reducing the effects of the fuel surge which occurs when cornering, braking and accelerating. A gauze filter is fitted between the fuel entry point in the carburetter cover and the float chamber.

The following operating details apply, for simplification purposes, to one barrel of a carburetter. The supply to the other barrel is the same.

Starting (figure 8)

Fuel from the tank is delivered to the banjo, (2) then through the filter (1) to the float chamber, via the needle valve (15) and its seat (14). The fuel level is determined by the float (17). The float chamber is vented to the atmosphere at (4).

When the starter valve *(7)* is opened, the fuel, set by the jet (12) enters the emulsion tube (11), where it mixes with the air from the channel (16), the mixture passing into channel (6) mixing further with air from hole *(5).* Arriving at the valve chamber (8), the mixture spreads into the two channels (9) that flow into the main barrels (10), downstream of the throttle butterfly (13).

When the starter valve (7) is closed, the communication between the two main barrels and the starter device is disconnected, and by means of the partition (18) the two main barrels are separated (10).

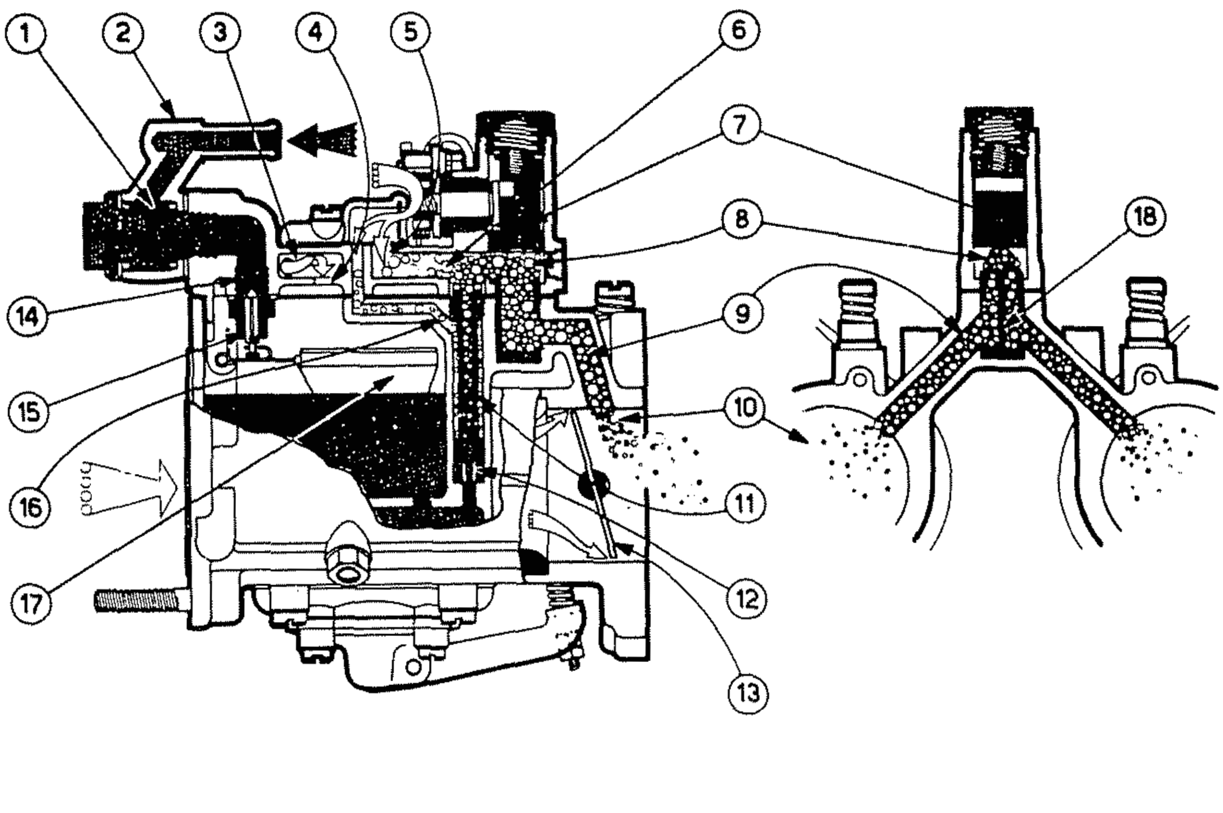


Fig.8 Dellorto starting circuit

Idle (figure 9)

The fuel from the float chamber, is set by the idle jet (20). This fuel mixes with the air from the emulsion tube (3) via the channels (19). The mixture then passes through the channels (21), to the adjustment screws (22), then having been metered, to the main barrels (10) downstream of the throttle valves.

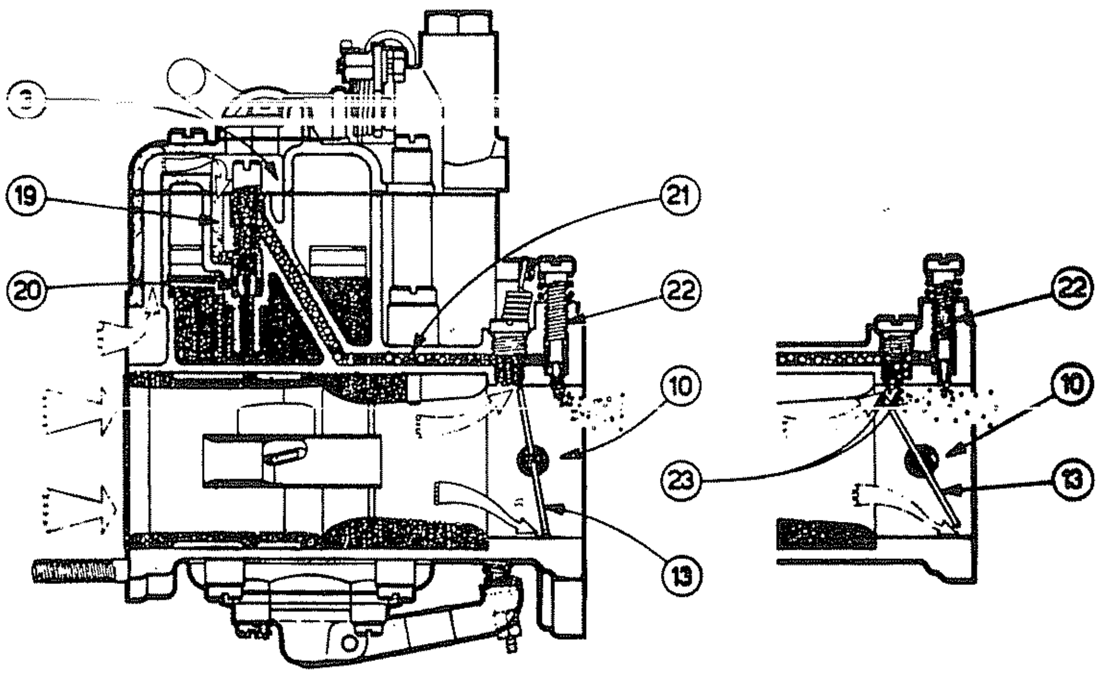


Fig.9 Dellorto idle and progression circuits

Progression

At the opening of the throttle valves (13) during the passage from idle to main, the mixture arrives at the main barrel8 (10) via the progression holes (23).

Acceleration (figure 10)

When the throttle valves **(13)** are opened, the lever **(28)** attached to linkage (27), pushes a rod **(29)** and spring (34), this in turn actuating a lever **(32)** thus operating the diaphragm (31). The diaphragm is held in position by o spring **(30).**

The diaphragm pumps fuel in two separate circuits through the delivery valves (24) and the pump jets (26), then to the main barrels **(10)** when the throttle valves are closed, the diophrogrn returns to its off position, pushed by the spring (3), sucking fuel from the float chamber via volve (25) during this operation.

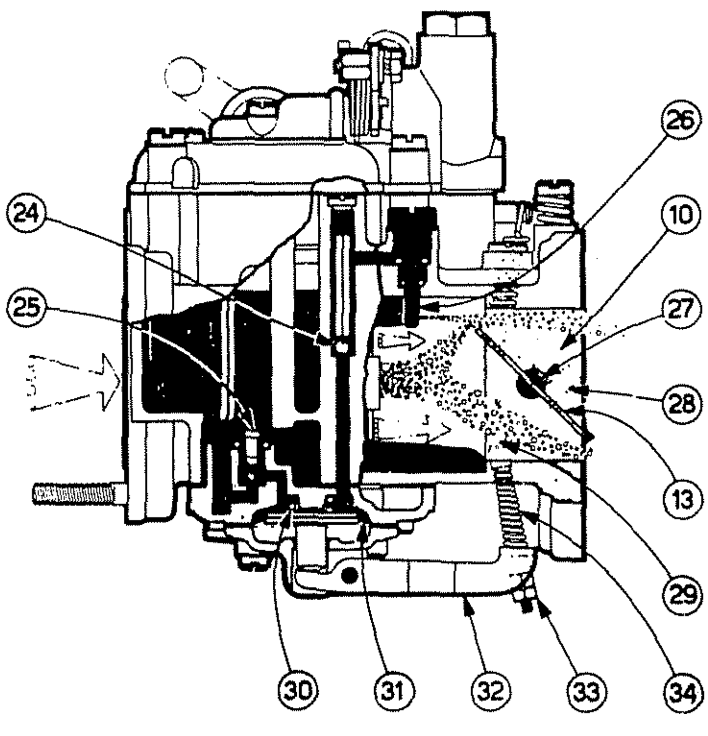


Fig. 10 Dellorto acceleration circuit

The nuts (33) are used to adjust the pump capacity.

Main (figure 11)

When the throttle valves (13) are opened, the fuel from the float chamber, set by the jets (37) enters the emulsion tubes (36) and mixes with the air set by the calibrating orifice (35). The mixture thus made, enters the channels (39), passes to the auxiliary venturi (38) where farther mixing with air from the main intake, the mixture passes to the main barrels (10).

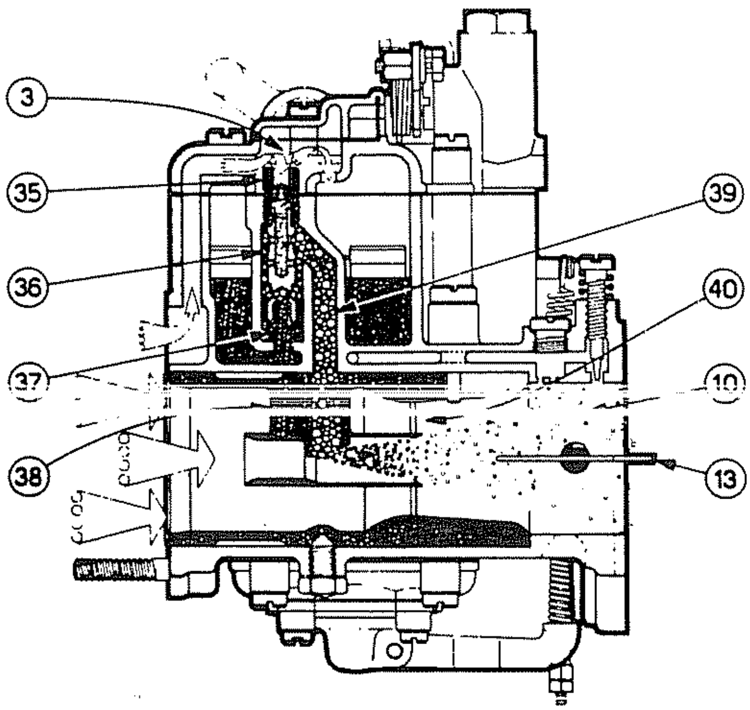


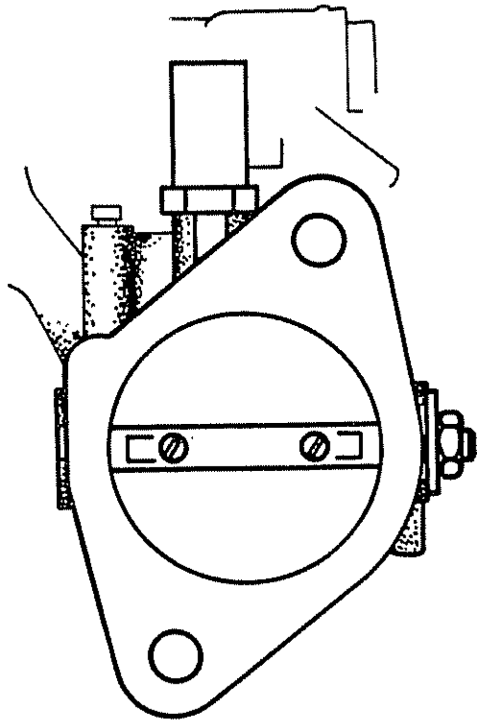
Fig. 11 Dellorto main circuit

ADJUSTING

Synchronisation (figure 12)

To obtain correct synchronisation of the carburetters, the following procedure is recommended:

1. Ensure the throttle levers are fully returning.
2. Release the adjustment screw for the throttle valves, making contact with the lever.
3. Release the screw (3) in the lever (4) to ensure that when pressure is applied to lever (1) on the rear carburetter, perfect closure of all throttle valves is achieved.
4. Still keeping the same pressure on lever (I), adjust screw (3) to hold lever



Anti-tamper adaptor in position on carburettor

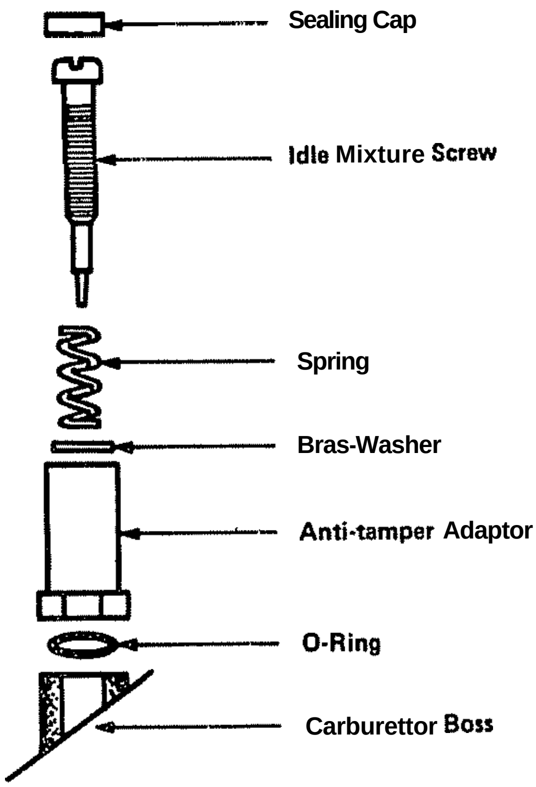


Fig. 12 Anti–tamper Device

in that position. The throttle valves should all close perfectly.

5. Give ONE FULL TURN to screw (2) so that it is now in contact with the lever.
6. Fully close the mixture screws (5), then 'back off' TWO FULL TURNS.
7. Start the engine and allow to reach its normal operating temperature.
8. Remove the top cover and the air cleaner. Using a 'Crypton Synchrocheck' (or similar instrument), adjust the throttles synchronisation, and the idle speed to that given in TECHNICAL DATA. If the engine now runs irregularly, adjust the mixture screws (5) in conjunction with a CO meter, to obtain regular tunning on all barrels. Turning the screw inwards WEAKENS the mixture, whereas turning the screw outwards RICHENS the mixture.
9. Finally, re-adjust the engine speed with the screw (2).

Anti-tamper device

The Dellorto carburettors are fitted with anti-tamper devices to prevent unauthorized adjustment of the idle mixture control. Fig. 12 shows the configuration of the device and to gain access to the mixture screw push out the centre disc of the sealing cap and remove the remaining ring section.

After the adjustment has been carried out by authorized personnel fit a new sealing cap (concave aide down). Make sure when fitting new sealing cap to apply pressure to the outer edge and not the centre.

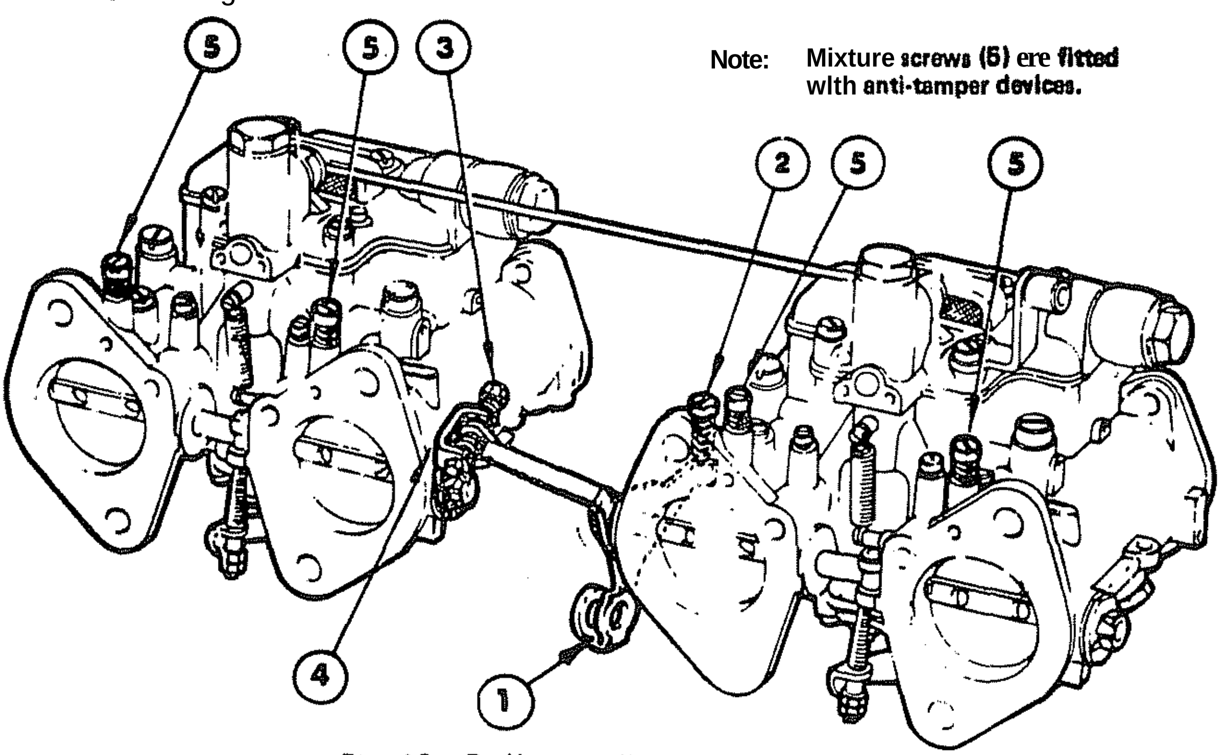


Fig. 13 Dellorto adjusting screws

Float Chamber Level

1. When correctly set, and with the float chamber cover in the vertical position with the floats hanging down, but with the tab of the floats in light contact with the needle, the measurement should be 16.5/17 mm, including the gasket (dimension 'A').

2. To adjust the float level, bend the float arms at 'C' to achieve this dimension.

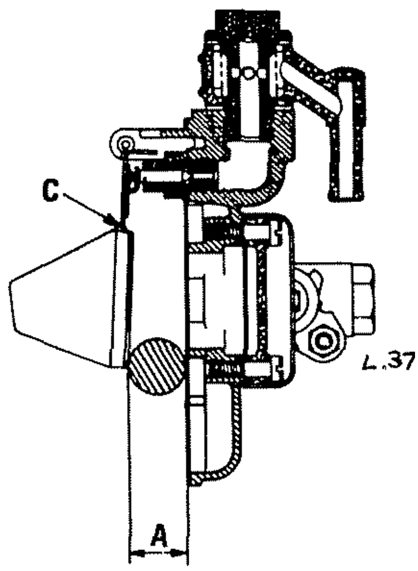


Fig. 14 Dellorto float chamber level dimension

REMOVAL

To Remove

1. Remove the air cleaner cover (see AIR CLEANER 'To Remove').
2. Disconnect the choke cable, throttle cable and return spring.
3. Disconnect the breather pipe from the flame trap ot the rear of the cleaner backplate.
4. Disconnect the fuel supply pipe to the carburetters.
5. Disconnect the vacuum pipe from the carburetters.
6. Release the nuts, plain woshers and thackeray washers or rubber springs securing the carburetters to the manifold. Pull off the carburetters as an assembly connected by the throttle linkage ond the air cleaner backplate.

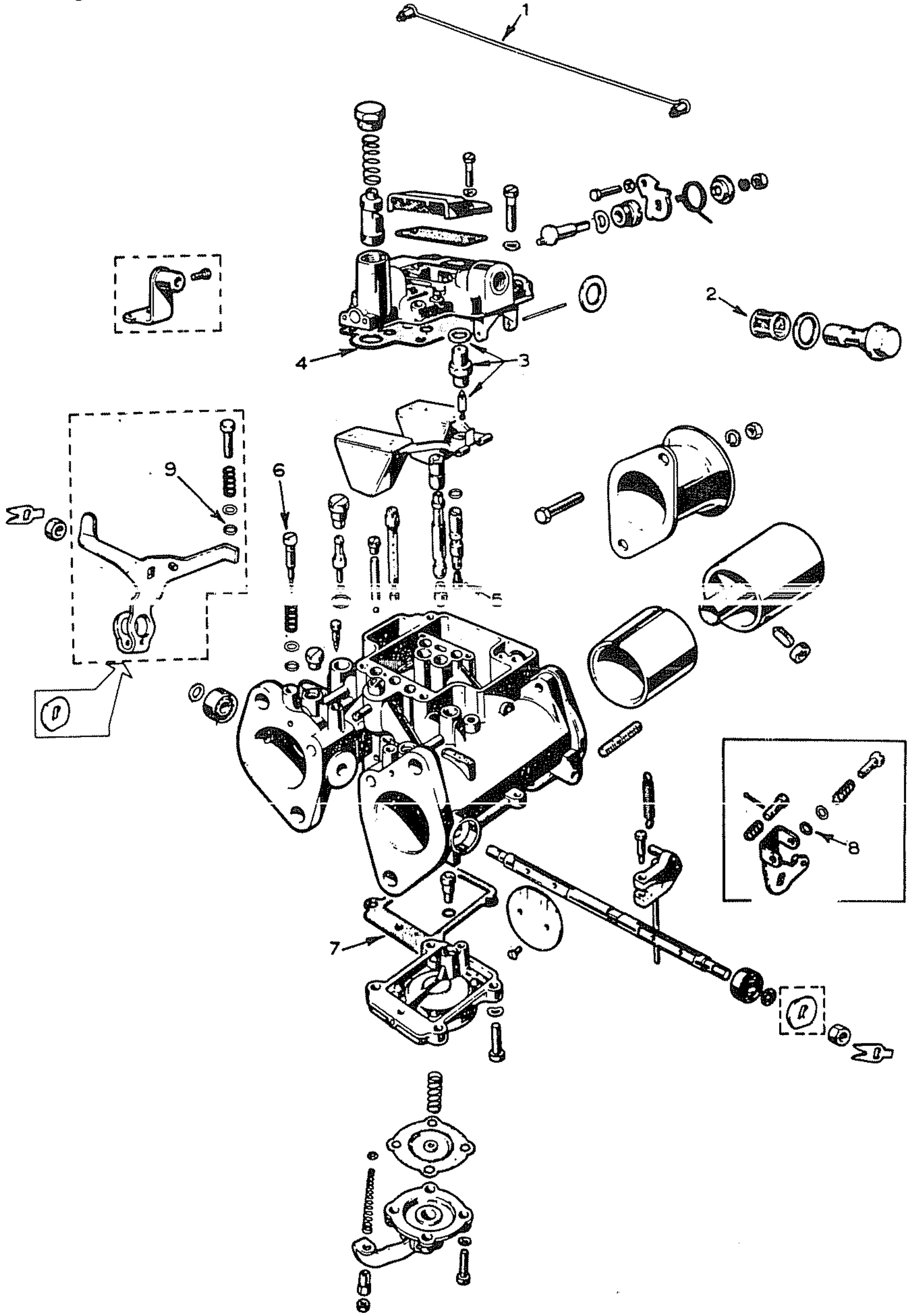


Fig. 15 Dellorto carburetter components

KEY TO FIG. 15

1. Connecting link
2. Fuel filter
3. Needle valve
4. Gosket, float chamber
5. Jet, slow running
6. Screw, idle mixture
7. Gosket, pump body
8. Rubber ring, throttle screws

Do NOT misplace the 'O' rings which are fitted at either side of the anti-vibration spacers.

7. Further dismantling can be carried out as desired on a clean bench.

__To Replace__

1. Reverse the removal procedure, but use new 'O' rings at either side of the anti-vibration spacen.

2. When replacing the securing nuts and washers, note that there *MUST* be a clearance of .04 in (1.00 mm) between the carburetter flange and the spacer, otherwise the carburetten will tilt with the possibility of air leaks through the 'O' rings becomirig misplaced.

CLEANING

1. Disconnect the tuel supply at the carburetters.
2. Remove the screws retaining the jet covers and gaskets from each carburetter.
3. Remove the main and idling jet assemblies, blowing them clean with an air line.

   WARNING: Do *NOT* use a probe or wire to clear the jets, as (his may enlarge or damage the jet orifice.
4. Remove the float chamber covers by releasing their securing screws.
5. Remove the remaining jets and clean as in '2' above. Note that the pump jet is concealed beneath a plug on the outside of the carburetter, in front of the identification panel. Clean the floats, float chambers and needle valves with petrol, and blow clean with an air line.
6. Check the float level, and ensure floats are free to move. Replace all jets. Using new gaskets, replace the float chamber and jet coven. Reconnect the fuel supply at the carburetters.

OVERHAUL

1. Remove the carburetters from the engine as previously described, and remove the air cleaner backplate joining the two carburetters together as an assembly.
2. Carry out the cleaning operation on the carburetters, together with any further dismantling and parts replacement as may be considered necessary to

mointain peak performance. If any doubts exist on the correct functioning of any port ALWAYS replace with new parts. When re-assembling the carburetters always use new seals and gaskets.

EVAPORATIVE LOSS CONTROL

To eliminate fuel vapourisation into the atmosphere, and thus comply with Federal Motor Vehicle Safety Standards, an 'evaporotive circuit' is incorporated into the fuel system of cars fitted with Zenith carburetters.

This 'evaporative circuit' consists basically of an activated charcoal canister which collects the fuel vapour given off from the fuel tank vents or the filler neck: Mounted alongside the fuel tank is o catch tank, for the purpose of prever neat' fuel reaching the charcoal canister, under conditions of extreme heat or violent vehicle manoeuvres. The catch tank cannot receive petrol via the filler necks of the main tank. Petrol vapour obsorbed by the charcoal canister is 'purged' by clean air while the engine is running, through throttle edge drillings in the corburetters.

The system is effectively maintained by renewing the charcoal canister at intervals of every ***25,000*** miles (or 40,000 km).

AIR CLEANER

To Remove

1. Release the bolts or clips retaining the cover to the body. Remove airbox cover.
2. Remove the element.
3. Clean the inside of the air cleaner body, and cover, of any accumulated dust, and oil. Avoid pushing any dust into the carburetter intakes.

To Replace

1. Ensure the seal is in good condition, i.e. NOT cracked, or damaged. Place the seal in position on the new, or cleaned existing element from which all dirt has been removed, the seal joint must be at the centre top as shown in illustration. Ensure the metal face of the element is towards the corburetters before replacing cover.
2. Replace the cover and secure with its bolts.

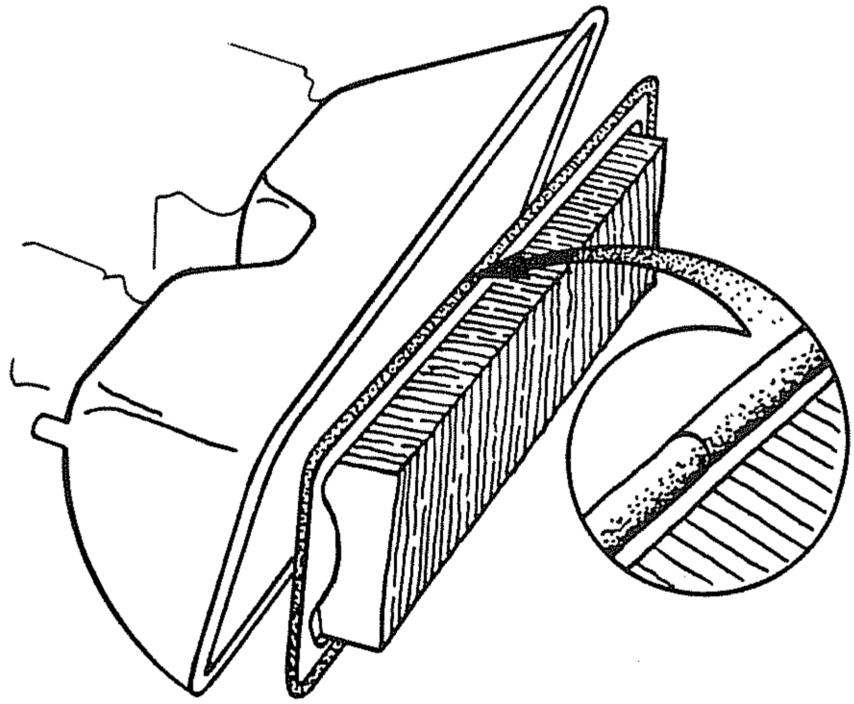


Fig. 16 Air cleaner

CHOKE CONTROL

To Remove

1. Disconnecr ine inner cabie ai ihe carburetiers.
2. Remove the tunnel top assembly, gearlever knob and switch panel assembly.
3. Pull up choke control on the tunnel switch panel exposing the inner cable end, pull cable through.
4. The outer casing is removed by first releasing it at the carburetters clamp, then releasing the clamp under the carpet on the tynnel housing and before pulling out outer casing see 'To Replace'.

To Replace

1. Replacement of the inner cable is the reversal of the removal procedure.
   To replace outer cable, first attachthe new outer cable to the old and then pull through, pulling through the new outer coble.

THROTTLE CABLE

To Remove

1. Disconnect the inner cable from its lever on the carburetters.
2. .Disconnect the outer cable from its bracket on camshaft cover.
3. Disconnect the inner cable from the accelerator pedal. (Relwse the inner cable from the clevis.)
4. Before pulling out the cable see 'To Replace[1].

To Replace

1. To replace the cable, first attach the new cable to the old and then pull through under the carpet.
2. Attach the clevis at the end of the cable using the pin to the throttle pedal.

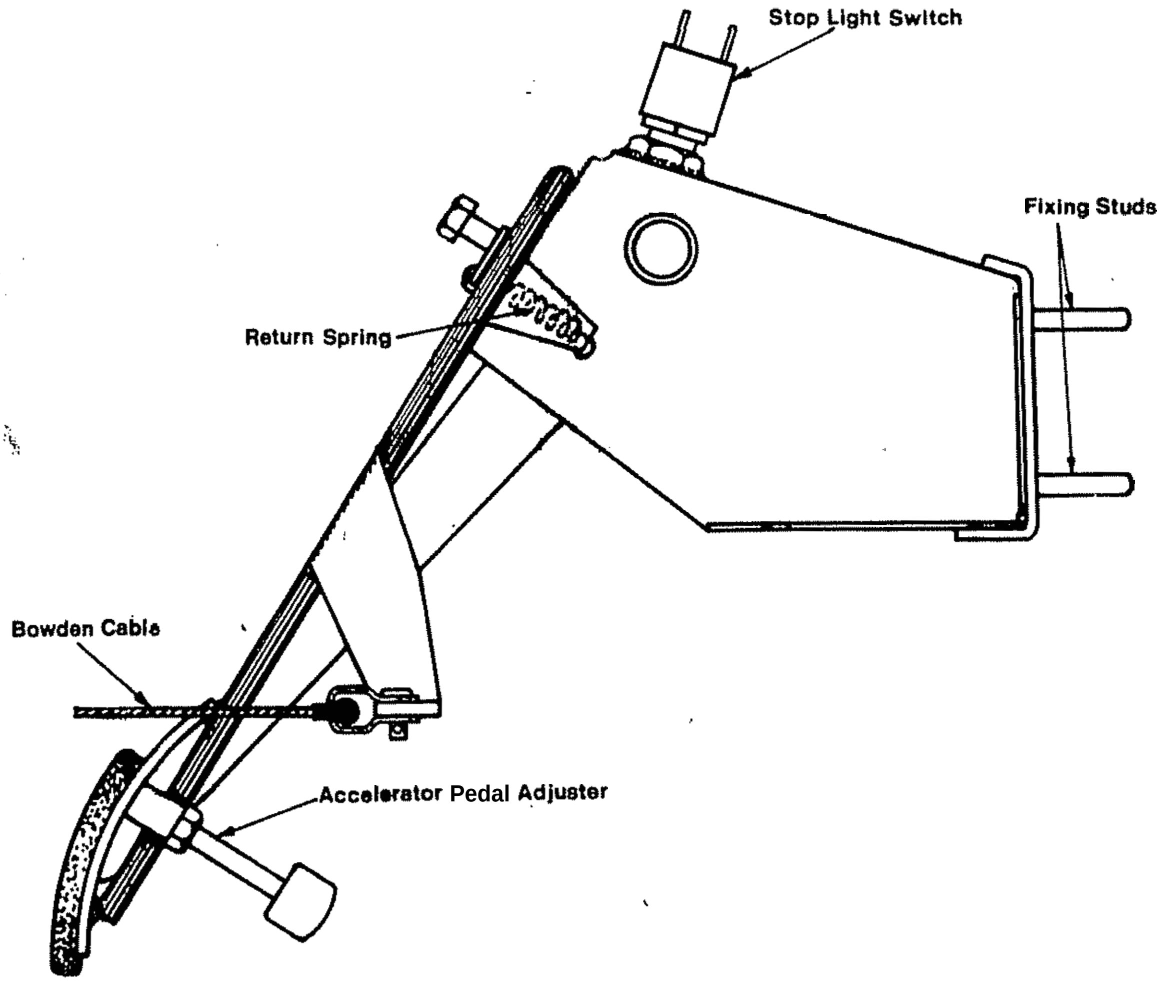


Fig. 17 Throttle (accelerator) pedal setting

3. Adjust the inner cable at the carburetters to give the correct free play (see below) between the inner cable and lever on the carburetters. Ensure

that FULL THROTTLE is obtainable and that when accelerator pedal is released, the throttles are all fully closed.

4. Finally tighten the locknuts securing the outer cable.

The Check Throttle Inner Cable Free Play

1. With the inner cable attached at both ends, ond at a point midway between the end of the outer cable and the lever on the carburetters, a movement of between 3/16 in to 1/4 in (or 4 mm to 6 mm) MUST be achieved WITHOUT moving the lever on the carburetters.

The Check Accelerator Pedal Travel

1. The stop under the pedal pad should be adjusted to touch the floor (with the carpets installed), when the throttles on the carburetters are FULLY C PEN.
2. If FULL TRAVEL cannot be achieved, the back stop for the pedal may be adjusted the MINIMUM AMOUNT NECESSARY, to give full throttle openings.

CARBURETTER FAULT FINDING

It is mssumed that all engine mechanical and/or ignition faults have been corrected, therefore the ONLY carburetter faults possible ore as follows:

ZENITH CARBURETTERS

Erratic or Poor Idling

1. Air valve sticking: Check free movement of spring-lwded metering needle, clean air valve rod and guides. Lubricate air valve rod and guide with a few drops of light oil.
2. Metering needle incorrectly fitted: Check that the shoulder of the needle is flush with the face of the air valve and that the needle is biased away from the throttle. Also, check identification to ensure correct needle fitting. Check that needle housing has not been distorted by over tightening its retaining screw.
3. Partially, or fully obstructed diaphragm and float chamber ventilation holes: Check that air box is correctly fitted and thot gaskets are not causing obstruction.

4. Diaphragm incorrectly located or damoged: Check location with depression cover removed. The depression holes at the base of the air valve should be in line with and towards the throttle spindle. Renew diaphragm if damage is evident. When replacing depression chamber cover the domper ventilation boss must be towards the air intake.
5. Temperature compensator not operating correctly: With engine AND carbu-retters cold, remove cover from temperature compensator assembly. Tapered valve should be seated in this condition. Check operation by carefully lifting the valve off its seat; when released, the valve should return quite freely. If any damage should have occurred that prevents the mechanical operation functioning correctly, the compensator unit should be replaced.
6. After reasonable service, inspect the throttle spindle seals and throttle spindle for fracture and wear respectively. Replace if necessary.
7. Leokage at induction manifold joints. Re-make joints, facing up flanges as required. Check that 'Q' rings, adaptor flanges to manifold ore correctly located.

Hesitation or Flat Spot

Possible causes are as given for 'Erratic or Poor Idling[1], but with the following additions:

1. Damper inoperative: Check oil level and top up with oil.
2. Air valve return spring missing, or incorrect port fitted: Rectify as necessary.

Heavy Consumption

Here again, any points that have been covered under the two previous headings can contribute to heavy fuel consumption plus the following:

1. Ensure choke cable returns the cold start lever to the fully off position when the choke control is pushed down. Adjust cable as necessary.
2. Ensure there is not a fuel leakage from the float chamber joint, or sealing plug 'O' ring, due to damage of either or both parts.

DELLORTO CARBURETTERS

Fuel Leakage

1. Float needle valve dirty, worn, or valve seat loose in its thread. Thoroughly clean fuel filter. and valve, and fully tighten valve seat.
2. Flwt not free, or heavy: Fit new float assembly.
3. Fuel feed pipes loose, or broken. Tighten pipe unions, or replace pipes.
4. Gaskets hardened, perished or loose: Fit new gaskets.
5. Fuel pump delivering under excessive pressure: Fuel pump to be checked and calibrated.

Cold Starting Difficulties

1. Abnormal level of fuel in float chamber: Check float level.
2. Starting device actuating cable tight, broken or unattached: Replace cable.
3. starter jet airry: Clean, or replace jet.

Irregular Firing of Engine

1. incorrect adjustment of mixture screws: See DELLORTO CARBURETTERS, ADJUSTING.
2. Idling jet dirty or loose: Clean and tighten jet.
3. Progression holes, or idling circuit ducts blocked: Thoroughly clean all orifices and ducts.
4. Air leak from mounting flange. Check mountings are correctly tightened. Replace 'O' rings if necessary.
5. Throttle spindle leaking air through its bearings: Replace spindle and bearings.
6. Throttle valves, or their control stocking: Free throttle valves and spindle.

Vehicle Lacking Power

1. Main jet, pump jet or emulsion tube, blocked or loose: Check, clean or replace defective parts.
2. Throttle valve not fully opening: Check throttle valve and linkage.
3. Air cleaner clocked: Clean, or replace filter.

Insufficient Acceleration

1. Accelerator pump defective, or faults in circuit: Overhaul pump and its circuit.
2. Emulsion tube blocked or defective: Replace emulsion tube.

MODEL S2 CHARACTERISTICS

FUEL TANK SENDER UNIT

To Remove

1. Remove the engine cover.
2. Remove RH engine compartment floor panel to gain access to the top of the RH fuel tank.
3. Disconnect battery terminals.
4. Disconnect sender unit electrical connections.
5. Remove clamping ring securing the sender unit in the top of the fuel tank.

To Replace

1. Fit a new seal, replace the clamping ring and tighten with care.
2. Reverse the removal instructions from 4 to 1.

SECTION M

GENERAL DESCRIPTION

The electrical system derives its 12 volts, negative earth, supply from a belt driven alternator and a lead/acid battery. Fuses protect the circuifs in the system, the fuses are located in the glove box in the facia. Wiring diagmms for Federal and Domestic vehicles will be found at the end of this section of the manual.

Component Locations

The location of components varies in some vehicles and to assist maintenance both location will be given:

Component	
Battery	a. RH of engine compartment under rear quarter light. b. RH rear engine compartment under plastic cover.
Indicator flasher unit Hazard flasher unit	Under dashboard on centre tunnel side of steering column.
Headlamp relays	Left hand front, near headlamp motor.
Rear Screen relay	Top right hand rear corner in passenger compartment under trim panel.
Fuses	Inside glove compartment
Fuel Pump	Near right hand side fuel tank.
Sender unit (Fuel tank)	In top of right hand fuel tank.
Sender unit (Oil pressure)	On right hand side of chassis, below air filter assy.
Coil	On underside of body, rear of clutch housing
Wiper motor	Under dashboard, forward of door pillar on drivers side.
Stop light switch	On top of pedal box inside footwell.
Horns (two)	One on each side under nose section.
Logic box (Fedeml only)	On scuttle beom under front facia.
Flowlock valve	Under engine compartment RH floor.
Radio speaker	Door panel opposite to driver.

Relays

Relays are wed to control the following functions:

C

1. Raising and lowering the headlamp pods when the lights are switched on and off respectively.
2. To flosh the headlights momentarily when the stalk switch is pulled back ogainst the bias spring.
3. To heat the rear screen when selected.
4. On Federal vehicles only a relay connects a ARO valve and oil pressure swttch to the supply.

BULBS AND LIGHT UNIT REPLACEMENT

Headlamps

1. Remove the front bezel from the pod by unscrewing the 4 screws.
2. Remove the cross-headed screws securing the front rim to the seating rim, and withdraw the front rim.
3. Lift the light unit from its location ond detach the adaptor (cable connector plug). In certain territories where detachable bulbs are used, the procedure for removal is almost identical to that given above (sealed beam unit), except that after detaching the slotted adaptor, the bulb is removed by dis-engagtng the two ends of its spring retaining clip from the tabs on the bulb seating rim.
4. Replacement of the light unit (or bulb) is a reversal of the removal procedure, but ensure that the adaptor is fully entered on the projections on the back of the unit.
5. Check altgnment.
6. Replace the front bezel.

Headlamps Beam Alignment

Each headlamp is provided with two trimming screws, one for adjustment in the vertical plane (A of Fig. I), and the other for adjustment in the lateral plane (B of Fig.1). Aiming pads are moulded integrally into the lamp glass, their purpose being to provide a reference plane for beam aiming, using either spirit-level, or optical type beam setters.

Front Flasher/Sidelamp

1. Remove the two screws from the front which retains the lens.

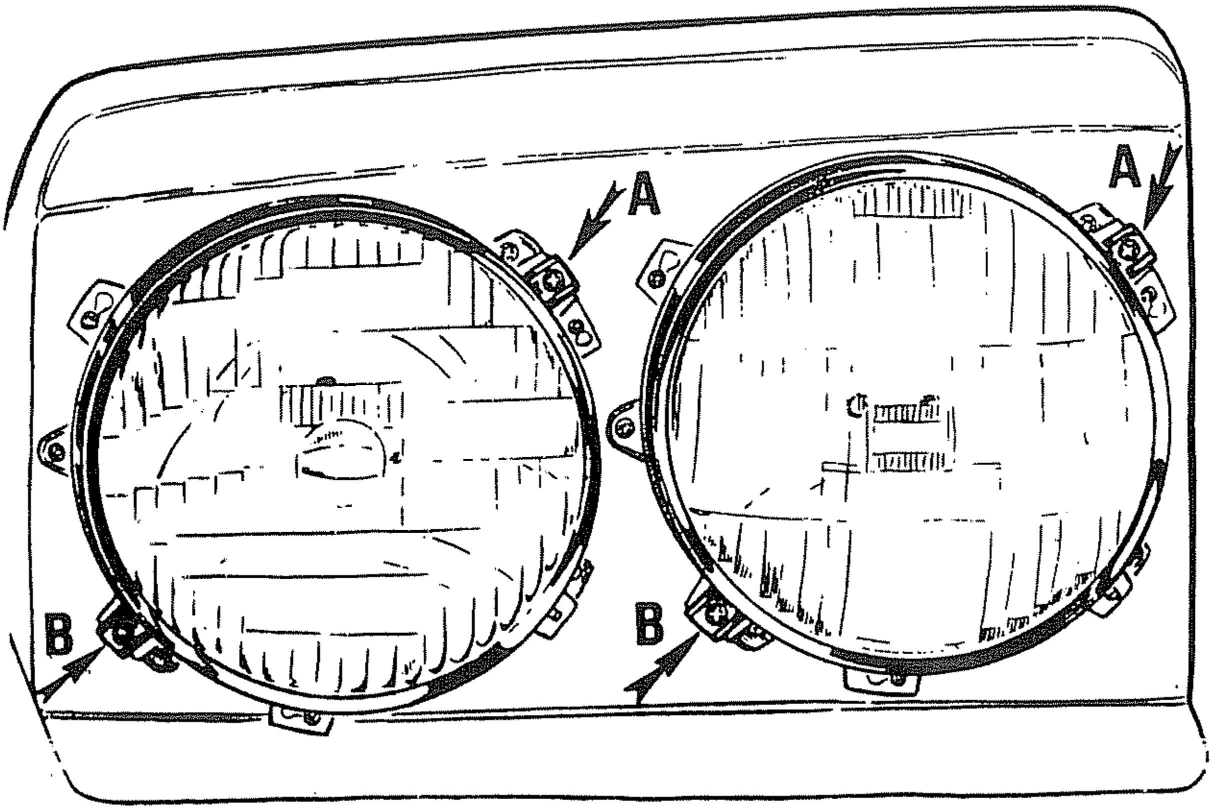


Fig. I Headlamp Trimming screws

2. Replace the bulbs as necessary, then refit lens, correctly positioning the foam rubber seal, securing the whale with the two screws.

Stop/Rear Flasher/Reverse Lamps

Series I vehicles

1. To gain access to the rear flasher and reverse lamps it is necessary to remove the four screws securing the rear and stop light lens. This lens has lips moulded along the edges to seal off and secure the inner edges of the other two lenses.
2. Unscrew the two screws retaining the other lens and lift off.
3. Replace the defective bulb(s). Note that the rear and stop bulb can be fitted one woy only.
4. Replace the lenses in the reverse order to above.

Series II vehicles

To gain access to the rear flasher, reverse lamps, rear and stop lights, lift [illegible] the bayonet type fixing on the defective bulb.

2. Replace defective bulb and refit banjo type fixing.

Number Plate Lamp

1. Remove the two screws which secure the combined lens/bulb holder.
2. Replace the bulb and refit the lens, securing with its screws.

Side Marker Lamp (when fitted)

1. With the aid of a small screwdriver inserted between the bezel and the rubber lamp body, 'peel' the bezel from its location.
2. Pull out the smaller of the two lenses.
3. Replace the defective bulb.
4. Replace the lens and bezel.

C

Interior Lamp

1. Remove the two screws securing the assembly.
2. Pull out the entire lamp assembly from its location to gain access to the bulb.
3. Clean off any corrosion which may be on the bulb connection terminals and fit a new bulb.

Instrument Panel Warning Lamp (see INSTRUMENTS for identification)

Veglia Instrument Panel

1. Remove the instrument binnacle, see BODY section.
2. From the rear top of the instrument panel pull out defective bulb(s) and replace.

Smith Instrument Panel

1. Remove Instrument panel and from rear of the panel pull out defective bulb(s) and replace.

   NOTE: Bulbs are of the capless type, which are removed by simply pulling out and replacing by pushing in.

Instrument Panel Illuminations (see INSTRUMENTS for identification)

Veglia Instrument Panel

1. Remove the instrument binnacle, see BODY section, to gain access to the

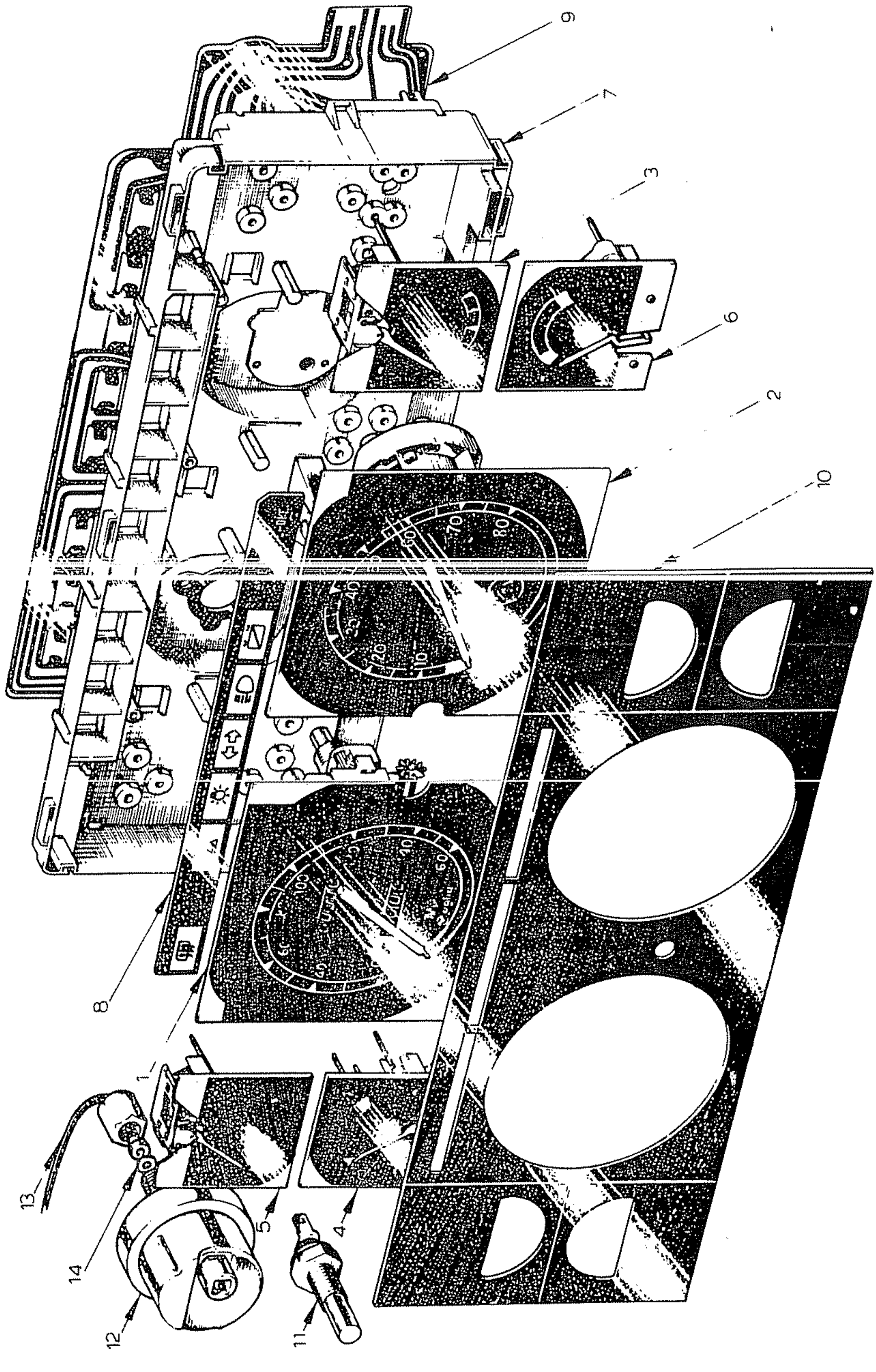


Fig. 2 - Veglia Instruments

KEY TO FIG. 2

1. Speedometer
2. Tachometer
3. Gauge, battery condition
4. Gauge, water temperature
5. Gouge, oil pressure
6. Gauge, fuel
7. Body
8. Warning light panel
9. Printed circuit
10. Front panel
11. Temperature transducer
12. Oil pressure transducer
13. Oil pipe
14. Seal

three panel illumination bulbs.

2. From the rear of the panel pull out defective bulb(s) and replace.

INSTRUMENTS

One of two instrument panels is fitted in the vehicle, check which is fitted before attempting any servicing.

Veglia Instrument Panel

Should any of the instruments become faulty in this instrument panel, it is necessary to replace the complete panel assembly.

To Remove

1. Remove the instrument binnacle, see BODY section.
2. Remove the drive cable from the rear of the speedometer and the electrical connectors from the circuit board.
3. Unscrew and remove complete panel from the mounting brackets on the scuttle.

Fitting a new print circuit

1. Cut the circuit track as shown in fig. 3 and insulate.

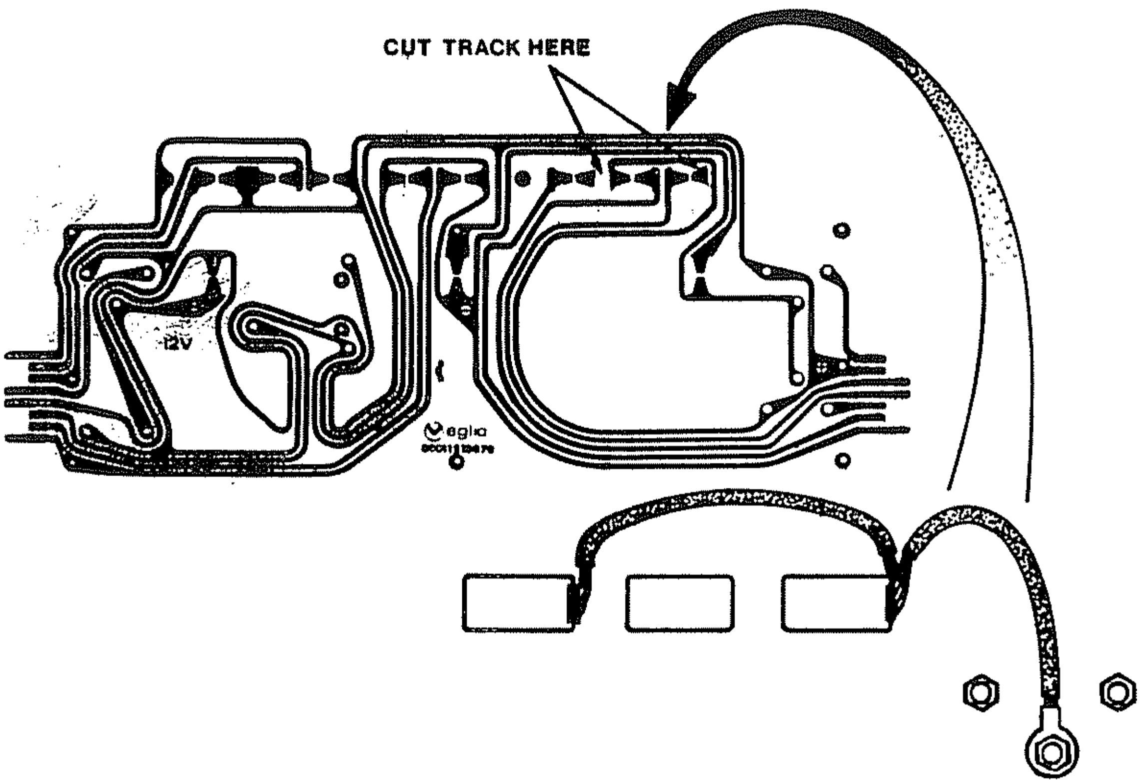


Fig. 3 Veglia printed circuit changes

2. With two pieces of wire connect the -ve terminal, lower of the group of three, to the RH side contacts (as viewed from rear) of the 'Hazard' and 'Heated Rear Screen' warning lamps. See figure 3 inset for connections.

To Replace

1. Reverse the removal procedure.

Smith Instrument Panel

Individual Instruments con be replaced on this instrument panel.

To Remove

1. Remove the fixing screws securing the panel to the binnacle and ease the panel forward.
2. Remove the drive cable from the rear of the speedometer and the electrical connecton from the circuit board.

To Replace

1. Reverse the removal procedure.

SWITCHES AND CONTROLS

The operation of all inatrument panel/steering column switches and controls is as follows:

Combined Ignition/Starter Switch

Insert ignition key and turn key to position II to switch on the ignition circuit and release the steering wheel lock. A further turn of the key against the spring pressure to position III will operate the starter motor. When the engine starts, release the key, which should spring back to position II. To remove the key, turn to position O, press burron under steering column and pull out key. This action will lock the steering column.

WARNING: Do not push or tow the car unless the key is inserted into the lock and turned to position I or II.

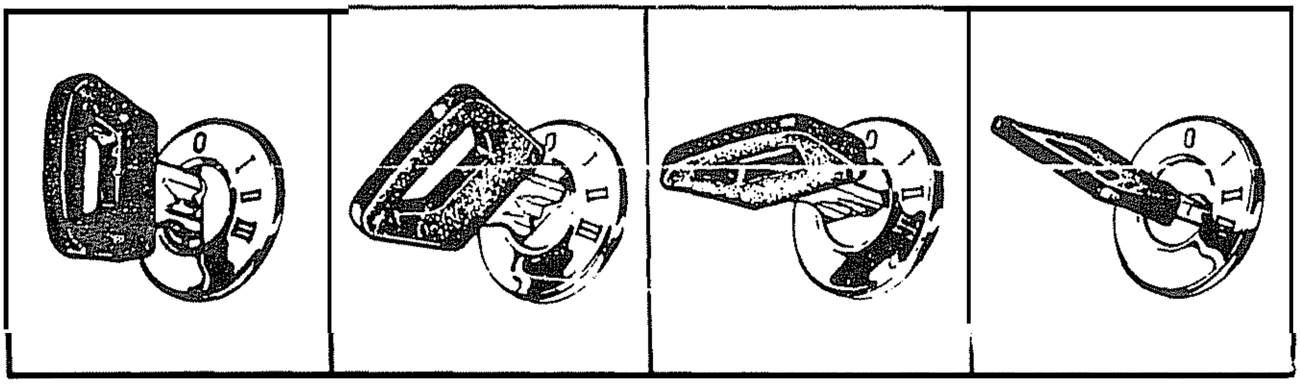


Fig.4 Combined ignition/starter switch

Combined Side, Rear and Headlamp Switch

The toggle switch for these functions is situoted in the top left-hand corner of the left hand switch panel, marked 'LIGHTS'. This is a two position switch, the first position with twitch on the side and rear lamps, and permit the instrument panel illumination to be selected. The second position switches on the headlights and at the same tlme operates the headlamp pod lift motor.

Direction Indicators, Headlamps and Horn Switch

1. **Horn - push** the switch stalk **towards** the column (A of **fig.5)** to **operate** the horn.
2. **Direction Indicators** - move switch **stalk** down until it **locks** to operate the **left-hand flashing indicators** (C of fig.5) and lift up stalk **for** right-**hand Indicators** (B of flg.5). **The** switch will cancel **automatically** when the steering wheel **is** returned after executing the turn. Flashing lamps in the **centre** of tho 'Warning Lights' panel will flash in **unison** with ***Indicators when operating.***

   NOTE: On right-hand drive vehicles the operation is reversed, i.e. rwitch **stalk** down the right-hand indicator will flash and with switch stalk **up** the left-hand indicator will flash.

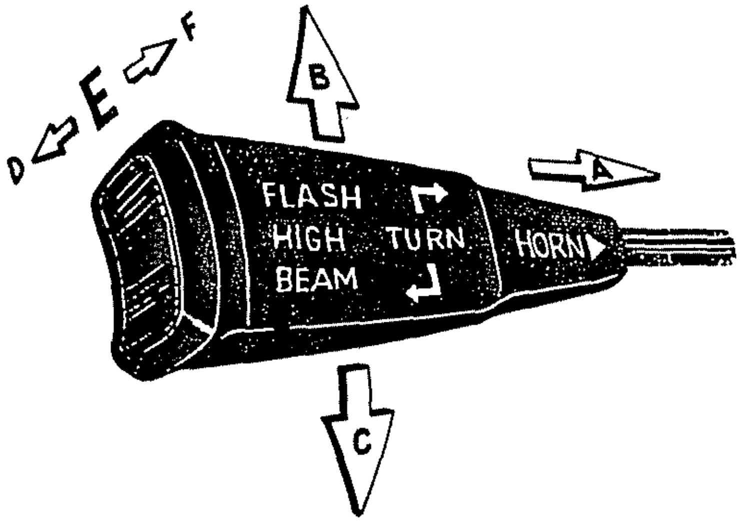


Fig.5 Direction indicators/headlamps/horn

3. Headlamps - the normal central position of the switch stalk (E of Fig.5) will give dipped headlights and with the switch pushed forward until it locks, full main beam will be selected. These functions are operative only when the lighting switch on the instrument binnacle is in its fully down position.

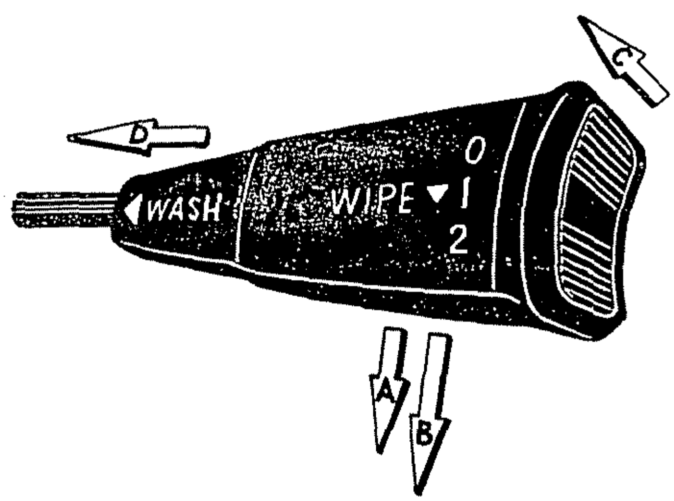


Fig. 6 Windscreen (windshield) wiper/washer control

Windscreen (Windshield) Wiper/Washer Control

1. Wiper - Move lever downwards until it locks in the first position '1' (A of fig. 6) for normal wiper speed. A high speed wiper action can be selected by moving the lever down further until it locks in the second position '2' (B of fig. 6). Move lever upward to the off position 'O'.

   NOTE: On right hand drive vehicles the operation is reversed, i.e. switch stalk up to '1' normal speed, stalk up to '2' high speed and return downwards to the off position 'O'.

   To 'flick wipe' the screen, lift the lever upwards (C of fig. 6) and hold for the duration of the wipe. On releose the lever will automatically cancel and return to the off position '0'; the wiper blade returning to its normal parked position.

   WARNING: Do NOT use wiper on dry screen.

2. Washer - To operate screen washer jets push stalk towards the steering column (D of fig. 6) and release. A hold of approximately one second duration will provide ample water for a normal screen wash. To improve the wiping of the screen add 55 cc of solvent (Part No. A075M6110Z) to the reservoir to help remove road dirt and grease.

Binnacle Illumination Lamps Switch

The switch which controls the binnacle illumination is situated in the bottom left-hand corner of the left-hand switch panel. A resistor is connected across the switch to set the illumination intensity to the correct level.

Door Window Operating Switches

The door windows are operated electrically arid ore controlled by switches mounted on the tunnel switch panel; the left-hand switch for the left-hand window and right-hand switch for the right-hand window. Each switch is a centre biassed toggle switch and when the forward edge of the switch is pressed the window is raised and the back edge when pressed lowers the window. Door windows can only be raised and lowered when the ignition key is in either the I or II position.

When a window is fully closed or opened a thermal overload becomes operative ond switches off the power to the motor. If any difficulty is experienced in lowering or roising the windows in extremely cold conditions, this can be remedied by using a de-icing fluid around the window seals. Do NOT use radiator anti-freeze solutions as these could have a disastrous effect on the window seals and body finish.

WARNING: Do not leave small children unattended in the vehicle when the ignition key is in either the I or II position. There is a danger of fingers inadvertently being trapped in the windows if switches are operated.

Heater Fan Switch

The heater fan switch is located in the top right-hand corner of the right-hand switch panel. It is a three position toggle switch giving a choice of two fan speeds 'slow' ond 'fast', and the thirdposition is OFF.

Hazard Warning Switch

The hazard warning switch is situated in the top right-hond position on the left-hand switch panel. When the switch is actuated all exterior direction indicators will flash together with the two indicators on the 'warning lights' panel.

NOTE: it is Illegal to operate the witch when the vehicle is in motion.

Rear Screen Demist/Defrost Switch

The demist/defrost switch is located on the bottom right of the right-hand switch panel. The witch when depressed operates a relay, which in turn connects the rear screen heater element to the supply. An indicator lamp on the 'warning lights' panel illuminates when this function is selected.

Interior Light Switches

There ore three switches in the interior light circuit, any one of which can illuminate the interior light. A switch in the bottom right of the left-hand switch panel can be used to illuminate the light when the doors are closed. The two other switches are operated by the doors when opened.

COLUMN MOUNTED SWITCHES

To Remove

1. Disconnect the battery terminals.
2. Remove the steering wheel (see Section 'H').
3. Release the screw from the underside of the column shroud and remove shroud by pulling off from column.
4. Release the bolts securing the switches to the column, disconnect the switch cables, and remove switches.

To Replace

1. Reverse the removal procedure, referring to the Wiring Diagrams for correct cable replacement.

IGNITION SWITCH

To Remove

1. The ignition switch can only be replaced in conjunction with the steering lock assembly - see Section H.

To Replace

1. Reverse the removal procedure, referring to the Wiring Diagrams for correct cable replacement.

RADIO

To Remove

1. Remove the radio control knobs and front panel.
2. Disconnect radio live and earth cables, and aerial lead and withdraw the radio from the rear and ease downwards by the side of the chassis tunnel a remove the centre tunnel top.

To Replace

1. Replacement is a direct reversal of the removal procedure. Refer to the Wiring Diagrams for correct cable replacement.

C

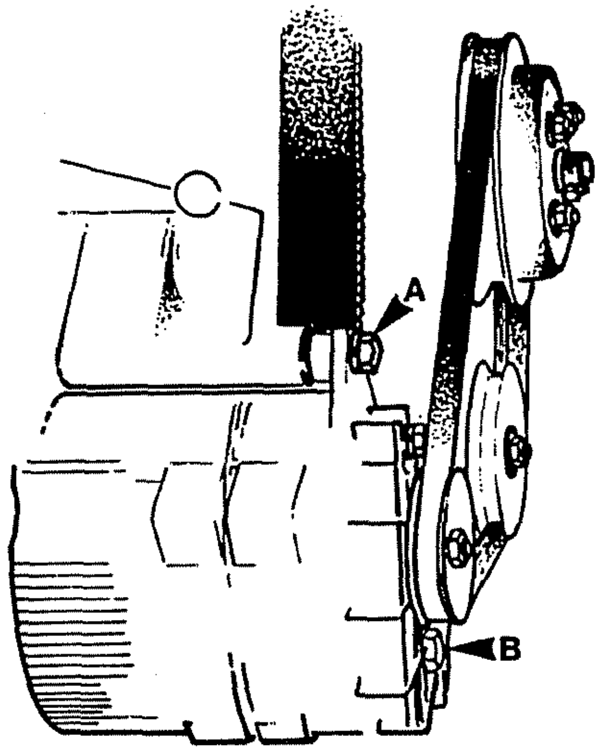


Fig.7 Alternator belt adjustment

ALTERNATOR BELT ADJUSTMENT

To Adjust

The altemator drive belt should be correctly tensioned to give a total movement of 12 mm (0.50 in) on the longest run of the belt.

Slacken the top mounting bolt (A of fig. 7) and the adjuster bolt (B of fig.7). Move the altemator until the correct tension is achieved, then tighten all bolts. Run engine briefly, switch off and recheck belt tension and readjust if necessary.

RADIO SUPPRESSION

When a radio is fitted the following suppressors should be fitted to reduce interference

COIL	2 microfarad capacitor mounted on bolt with cable to positive terminal.
FUEL PUMP	1 microfarad capacitor mounted on casing screw with cable to pump positive terminal.

SCREEN WIPE MOTOR — 1 microfarad capacitor to green feed cable with 'Scotchlock' connector and ring terminal to casing bolt.

ALTERNATOR — 3 mi... rod ccpocitor fitted by manufacturer.

FUSES

The fuses are mounted in two f.s. .nits inside the glove box. Access is achieved by prising off the covers, exposing four fuses in each unit with two spares in each. All fuses are 35 ampere and protect the following circuits:

Unit 1	1.	Heoc amp lift motor(s)
	2.	Headlamp full beam
	3.	Right-hand sidelights and panel illumination
	4.	Left-hand side
Unit 2	5.	Engine cooling fans
	6.	Heater motor., indicator flasher and reversing light
	7.	Horn and hazard flasher
	8.	Heoted rear screen

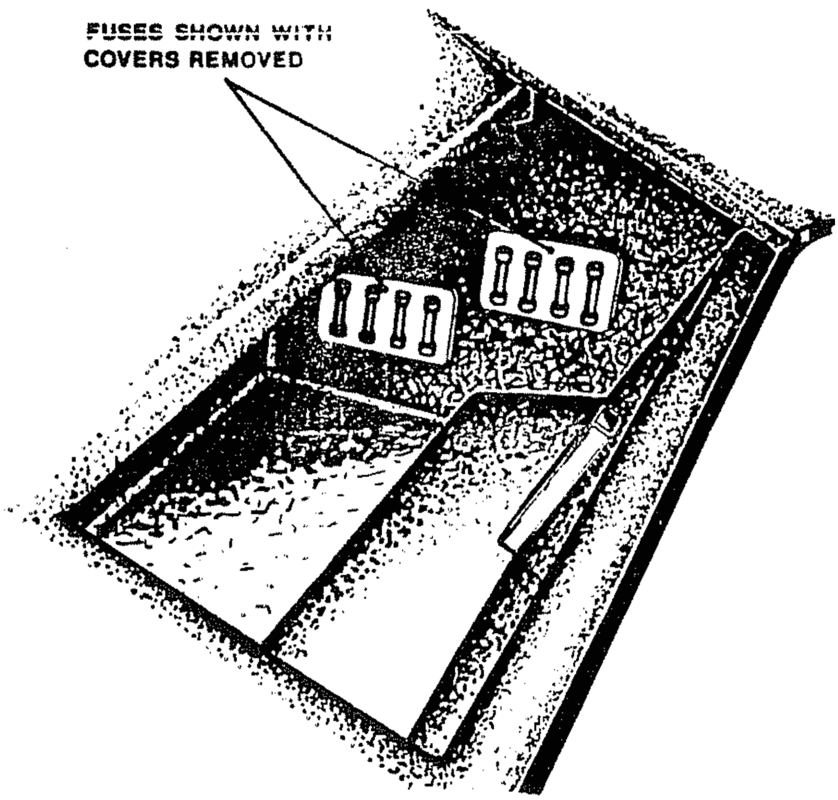


Fig. 8 Location of fuses

ALTERNATOR

To Remove

1. Disconnect both battery terminals.
2. Loosen the alternotor fixing bolts and move the alternator down to loosen the belt. Disconnect the electrical connections to the alternator, lift off the belt and remove the fixing bolts.

To Replace

1. Replacement is the reverse of the removal procedure. Adjust the belt tension as described in 'ALTERNATOR BELT ADJUSTMENT'.

Fault Finding

Before carrying out the fault finding procedure check the following conditions:

(a) Alternator is correctly fitted.

(b) Electrical connections to the alternator are correct.

(c) The armature is free to turn.

(d) The battery is fully charged.

(e) The belt tension is correct.

WARNINGS

(i) Do NOT disconnect the alternator or regulator when the engine is running.

(ii) Do NOT earth the field winding.

(iii) Disconnect both terminals to battery when installing or removing the alternator.

Motorola Alternator (14V, 55A)

(a) With the ignition turned off, connect a C–30V Voltmeter between one phase of the stator winding (positive on voltmeter) and ground (negative M voltmeter). The stator winding connection con be made through one of the top three holes in the bottom half of the rear covet. Disconnect voltmeter and reconnect between the phase of the stator winding (negative on voltage) and the positive terminal of the battery (positive on voltmeter). If the voltmeter registers o rwding (ignore very small readings) this will indicate o short circuit in the diode block.

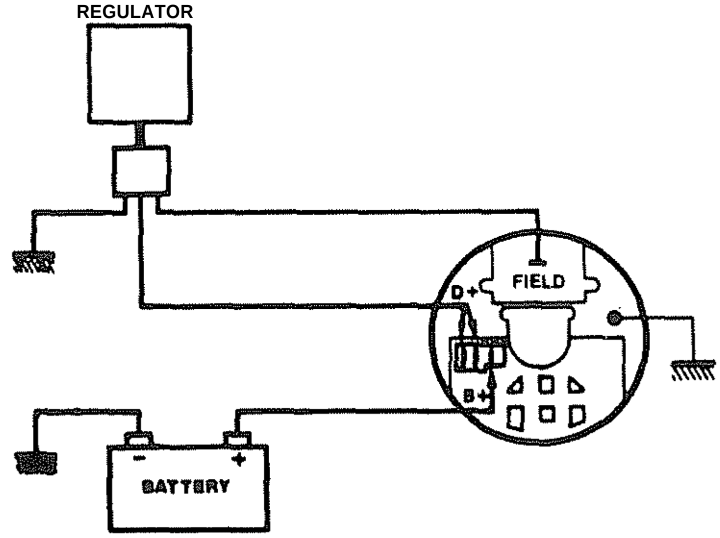


FIG. 8 ALTERNATOR CIRCUIT (MOTOROLA)

(b) Connect a 0-20V voltmeter between the output terminals (B+) and ground, and the positive terminal of the battery and ground. The voltmeter reodings should be the same and steady at 12 volts. If readings differ or are erratic, check for loose terminal fixings, broken wires or corroded terminals.

(c) Switch on ignition, with engine not running, and check the voltage at the field brush with the regulator unscrewed, but connected. Connect the voltmeter positive to the outer field brush and the voltmeter negative to ground. The reading should not be greater than 2 volts. If reading is more than 2 volts, check brushes and if reading is 0 volts check the regulator connections, ignitian lead to switch and indicator lamp.

(d) With ignition on and engine not running, check the regulator circuit by disconnecting the field lead and measuring the voltage across the field winding. The reading should be 2 volts maximum and if it is between 8 and 12 volts, then check the current output as in (e) and (f).

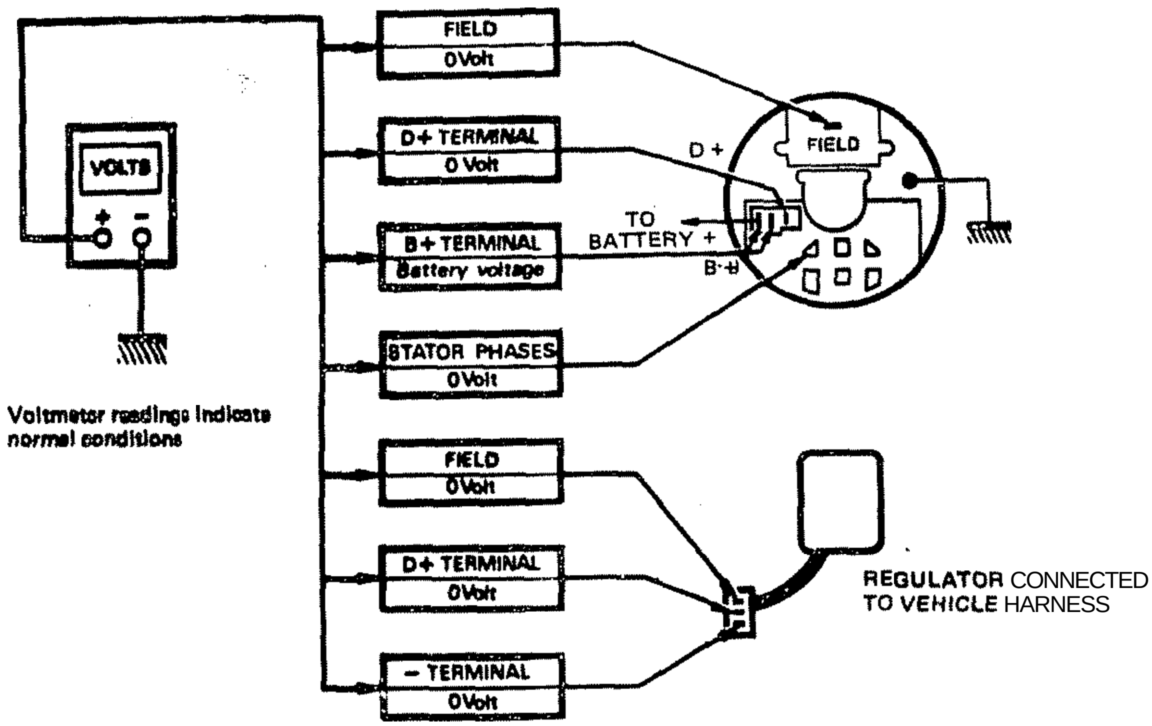
(e) Carry out a resistance check on the field winding to ensure it is not shorted out, as a short cwld damage the ammeter in the following test. If a resistance reading is obtained (approx. 1 to 2 ohms) then disconnect the field lead and connect a 0-3 amp ammeter between the output terminal (B+) and the field terrninal. Stort engine and set engine speed to just foster than idle ond a reoding of more than 1 omp should be obtained. If less than 1 amp, check brushes and slip rings.

(f) Switch off engine and disconnect ammeter and reconnect field. Run the engine at a speed just foster than idle, and using the 0-30V voltmeter check the voltage reading between the output terminal (B+) and ground, and the positive (+) terminol on the battery and ground. The readings should be **14.2** volts ±0.5V at 25°C. If there is a difference of more than 0.3 volts between the two readings, check the wiring and terminals for corrosion or breaks. If the reading is well below **19** volts, then carry out the following test (g).

(g) Switch off engine, disconnect field winding and connect field terminal to the output terminal (B+). With the 0-30V voltmeter connected between output terminol (B+) ond ground, run tne engine at a fast idle speed. If the reading on the voltmeter rises to between **14 and 16** volts, then the regulator is deflective and should be re–placed. If the reading is very low, replace the rectifier diodes, also check stator. Switch off engine.

(h) To check the stator, remove all electrical connections to the olternator and carry out an insulation check between the altemator housing and each of the stator windings, using an ohmmeter. The meter reading should be infinity.

FIG. 9 WITH IGNITION OFF



All Connections have to be used

FIG. 10 WITH IGNITION ON – ENGINE NOT RUNNING

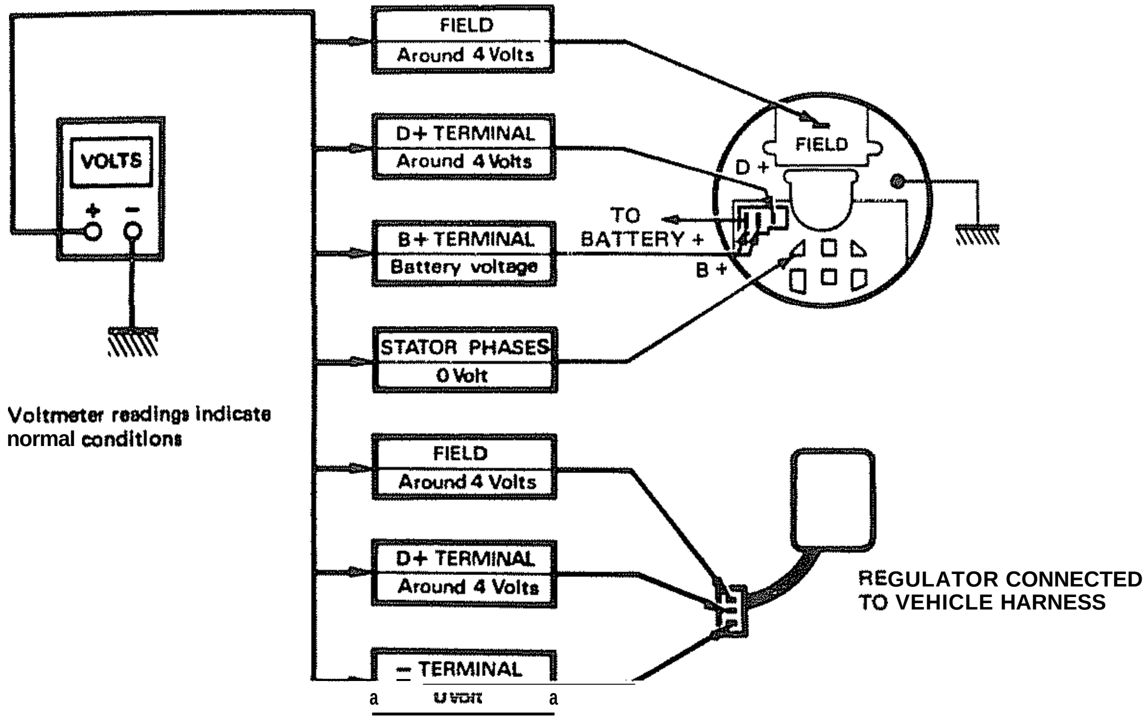
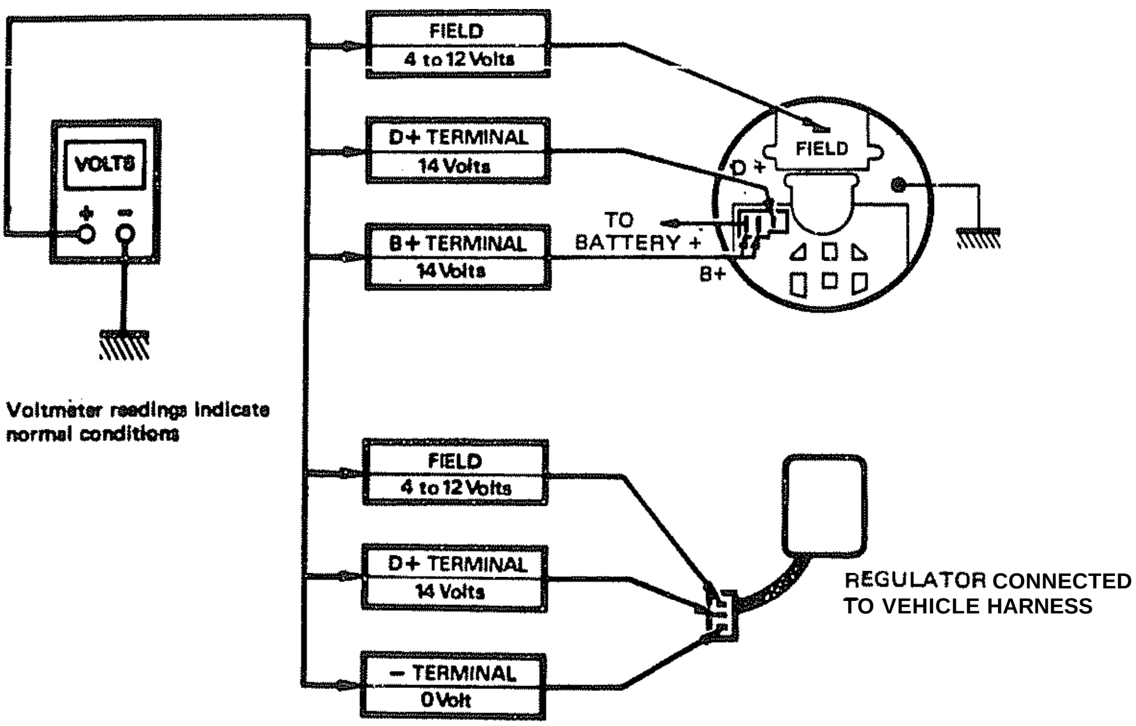


FIG. 11 WITH IGNITION ON – ENGINE RUNNING FASTER THAN IDLE



All Connections have to be used

Lucas Alternator (18ACR 45A)

(a) The Lucas alternator has been designed for minimum maintenonce during a service. Examine the brushes after 120,000 kilometres (75,000 miles) and renew if necessary.

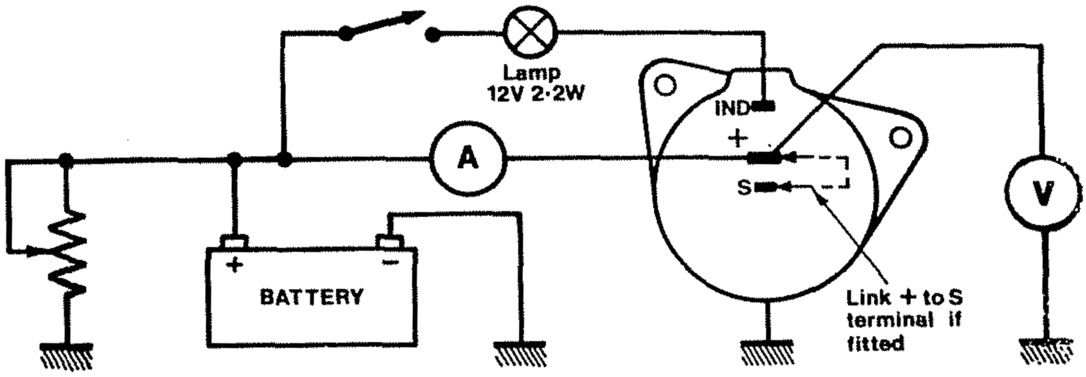


FIG. 12 ALTERNATOR TEST CIRCUIT

(b) Check the output of the alternator using the test circuit shown in fig. 12. Adjust the variable resistor for a voltage output of 13.5 volts at a steady engine speed. Compare the ammeter reading with the 'typical octput characteristics' graph (fig.13).

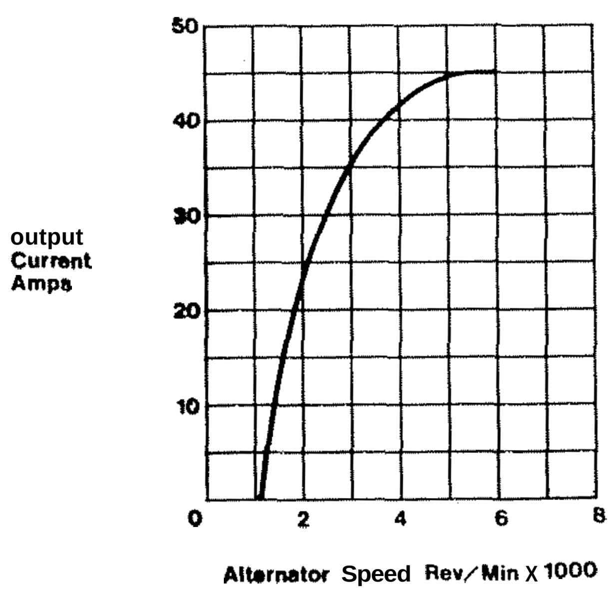


FIG. 13 LOAD GRAPH

If after checking all leads are connected correctly no output is obtained, fit a new alternator.

MODEL S2 CHARACTERISTICS

Iristrument Panel

The instrument panel in the model S2 is fitted with Smith's instruments and the switch panels with paddle lever type switches. Each switch is illuminated by a single light source, fed to the switches through fibreoptic strands. The brightness of the switch illumination is controlled by rotating the illumination switch on the right-hand control ponel in the binnacle.

Engine Bay Blower

An electric fan is introduced into the ducting on Federal vehicles and those used in high ambient climates. The fan is switched on when a temperature sensor, attached to the top of the air box, senses an increase in temperature.

Door Mirrors

The position of the mirror in each door mirror assembly con be controlled from inside the car using the four position joystick and the left and right mirror selector switch. Inside each mirror assembly ore motors controlling the vertical and horizontal planes of the minor. Where the wiring loom for the electrical control of the mirrors passes through the body aperture and the inner door panel a grommet (Part No. X036L6004Z) is fitted. A grommet (Part No. X036B6150Z) is fitted to protect the loom when passing through the inner door panel to the control switches.

The control switch connections are as follows:-

Black wire	to	terminal L
Yellow wire	to	terminal B
White wire	to	terminal Y
Blue wire	to	terminal W
Red wire	to	terminal R,

Centre terminol on the changeover switch is earth.

Wire connections to the mirrors ore made colour to colour and the earth connection to the chongeover switch is made colour to colour. The earth ring terminal is conriected to o 6mm bolt securing the window lift mechanism.

A 15 amp line fuse (red wire) protects the mirror drive circuit and power is derived from the ignition live terminal on the fuse box.

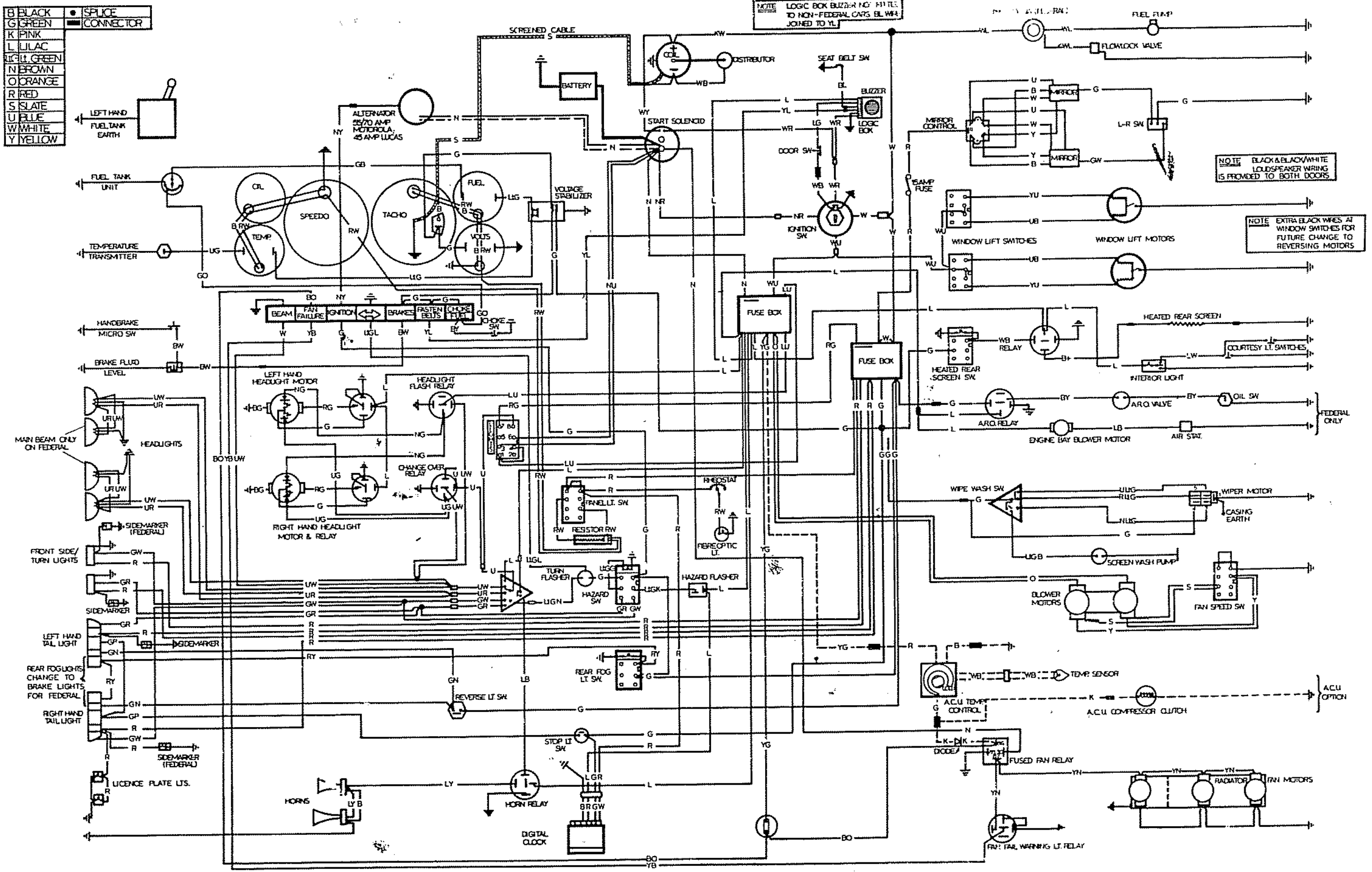
The mirror wiring loom is attached to the main loom behind the facia support beam, and is sealed where the loom passes through the polythene sealing on the inner door panel.

Clock

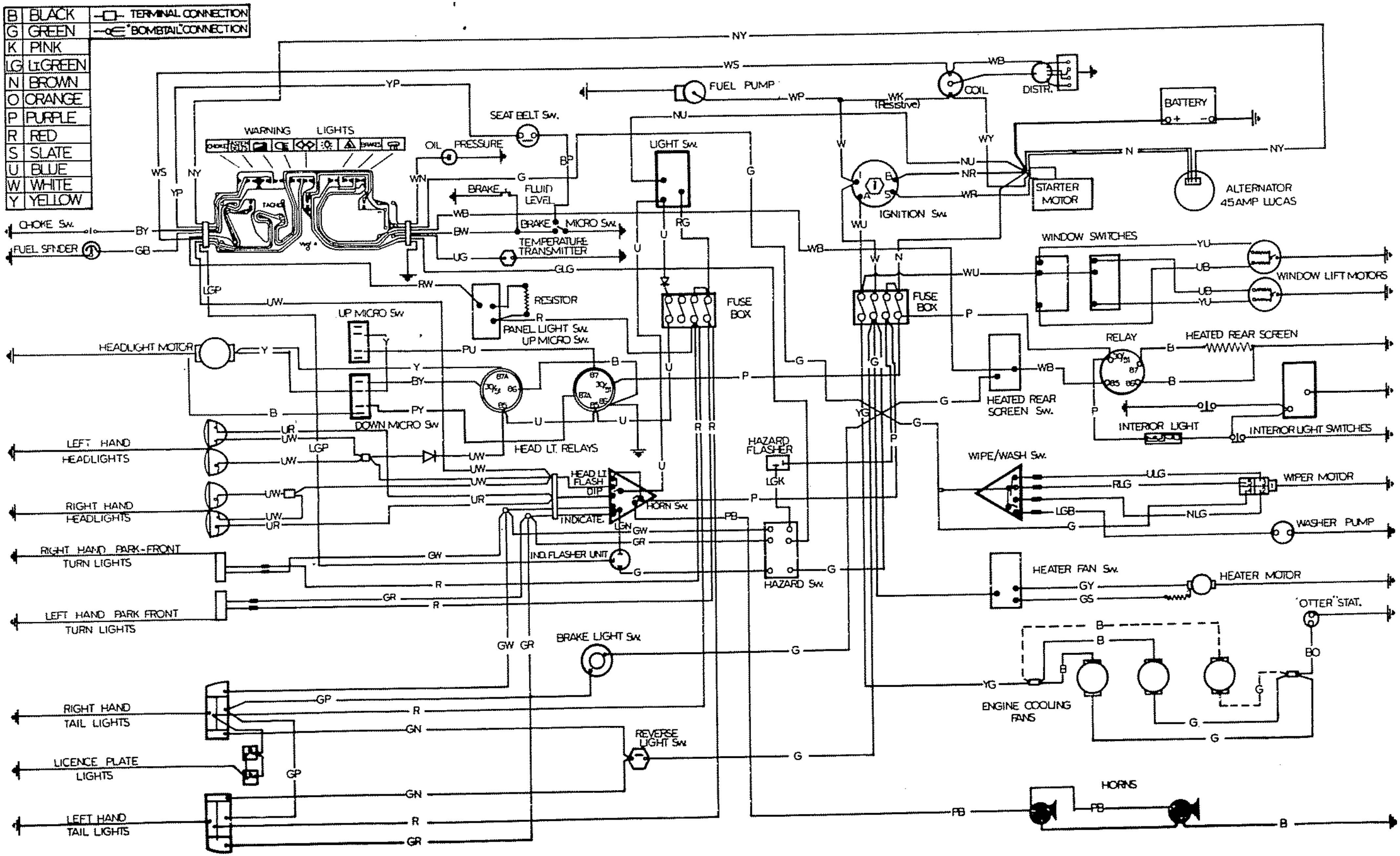
A digital clock with a light emitting diode display (L.E.D.) is fitted in the screen header rail, between the sun visors. Although the clock's quartz crystal timing circuit is operational at all times (when battery connected), the display is only lit when the ignition is switched on. Should the battery ever be disconnected, it will be necessary to reset the digits on the clock face. To reset hours push the rocking bar at the lower edge of the clock on the left hand side, push the right hand edge for minutes.

Loudspeakers

The model S2 has a loudspeaker fitted in each door prewired into the loom with connectors accessible behind the radio blanking plate.



S2 ESPRIT WIRING DIAGRAM (FEDERAL, DOMESTIC, R.O.W.)
FROM CHASSIS NO'S

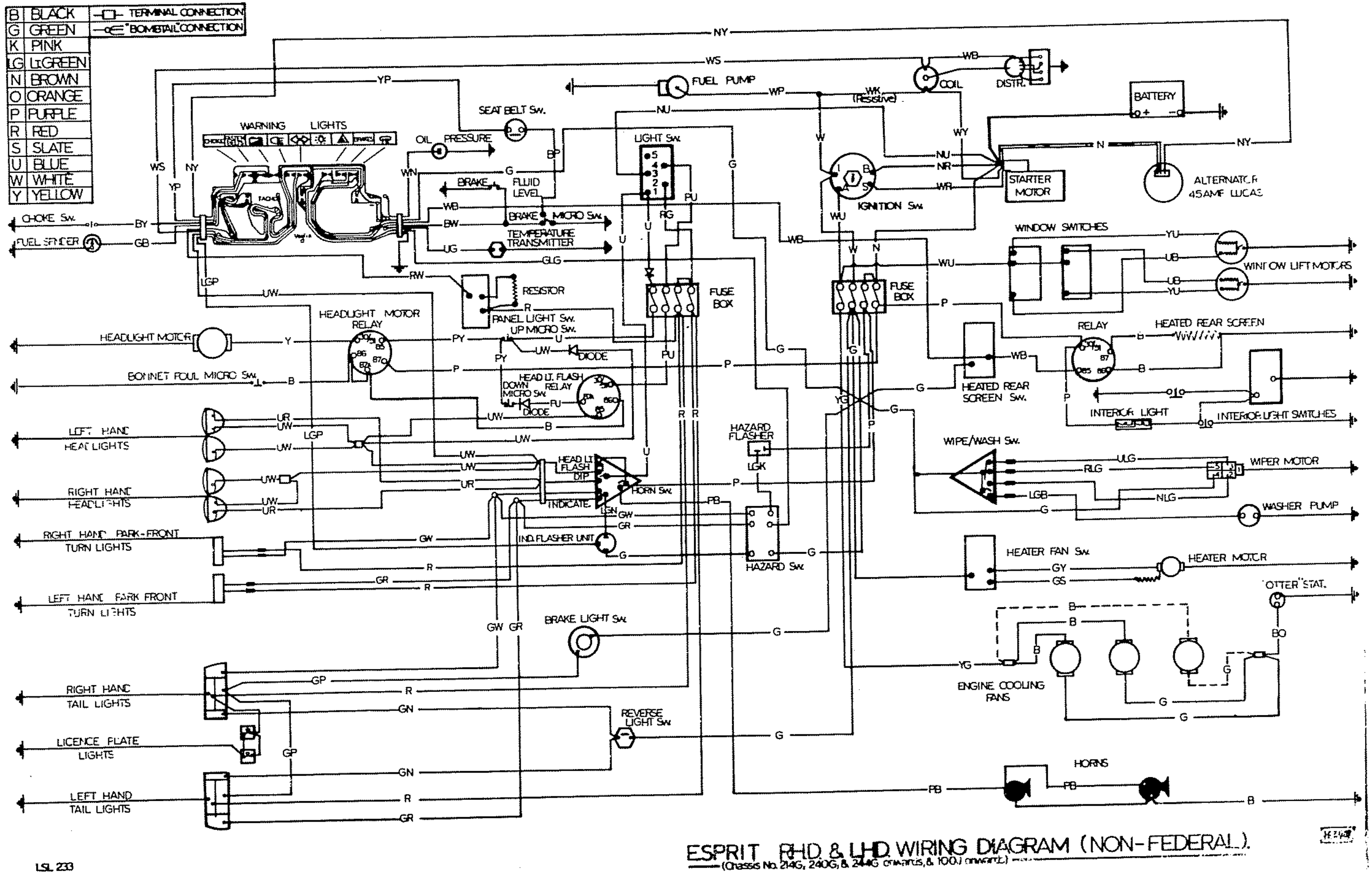


ESPRIT R.H.D. WIRING DIAGRAM (NON-FEDERAL).

(Up to Chassis No 243G except for 214G & 240G1)

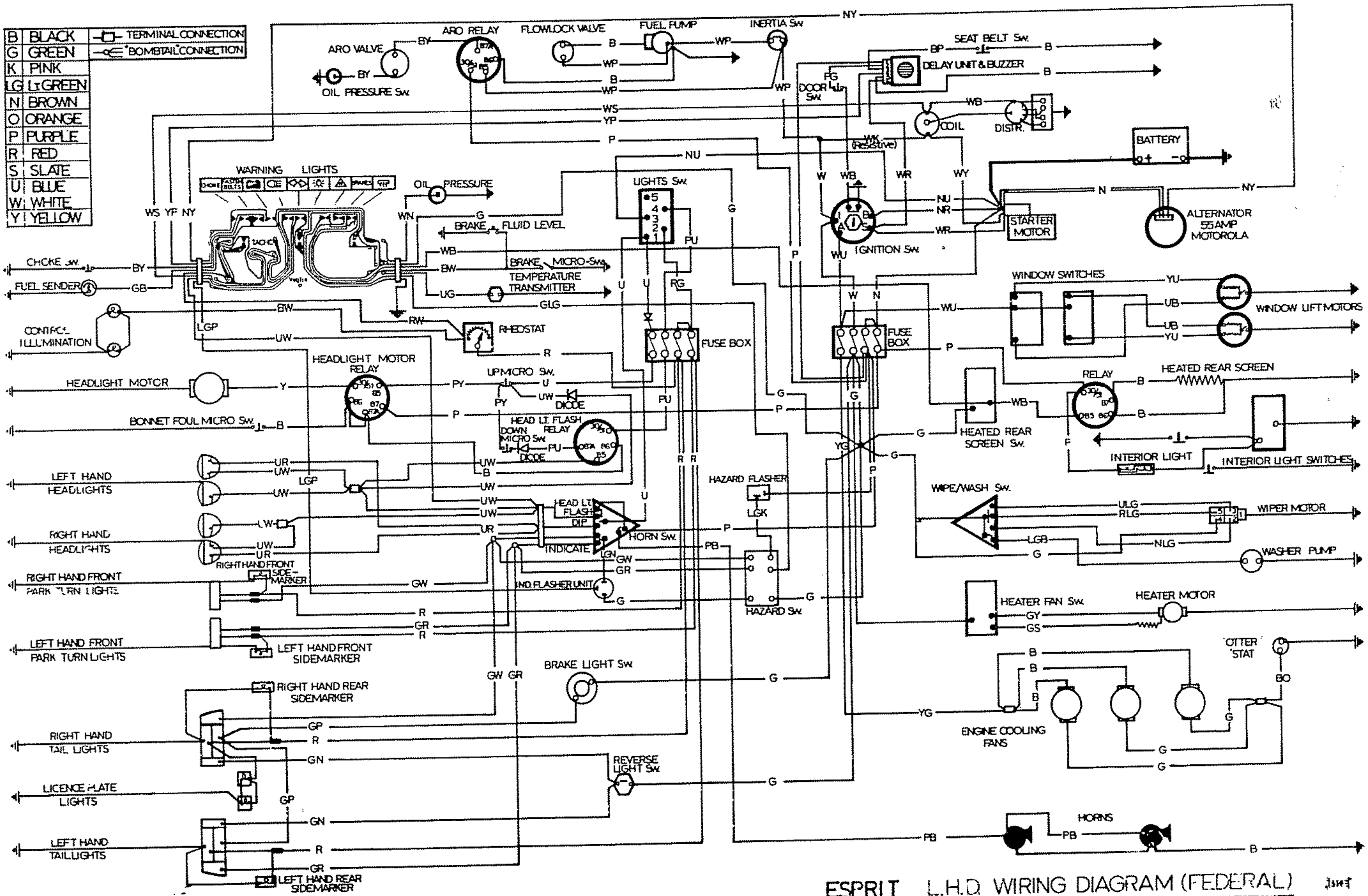
1147

LSL 232.



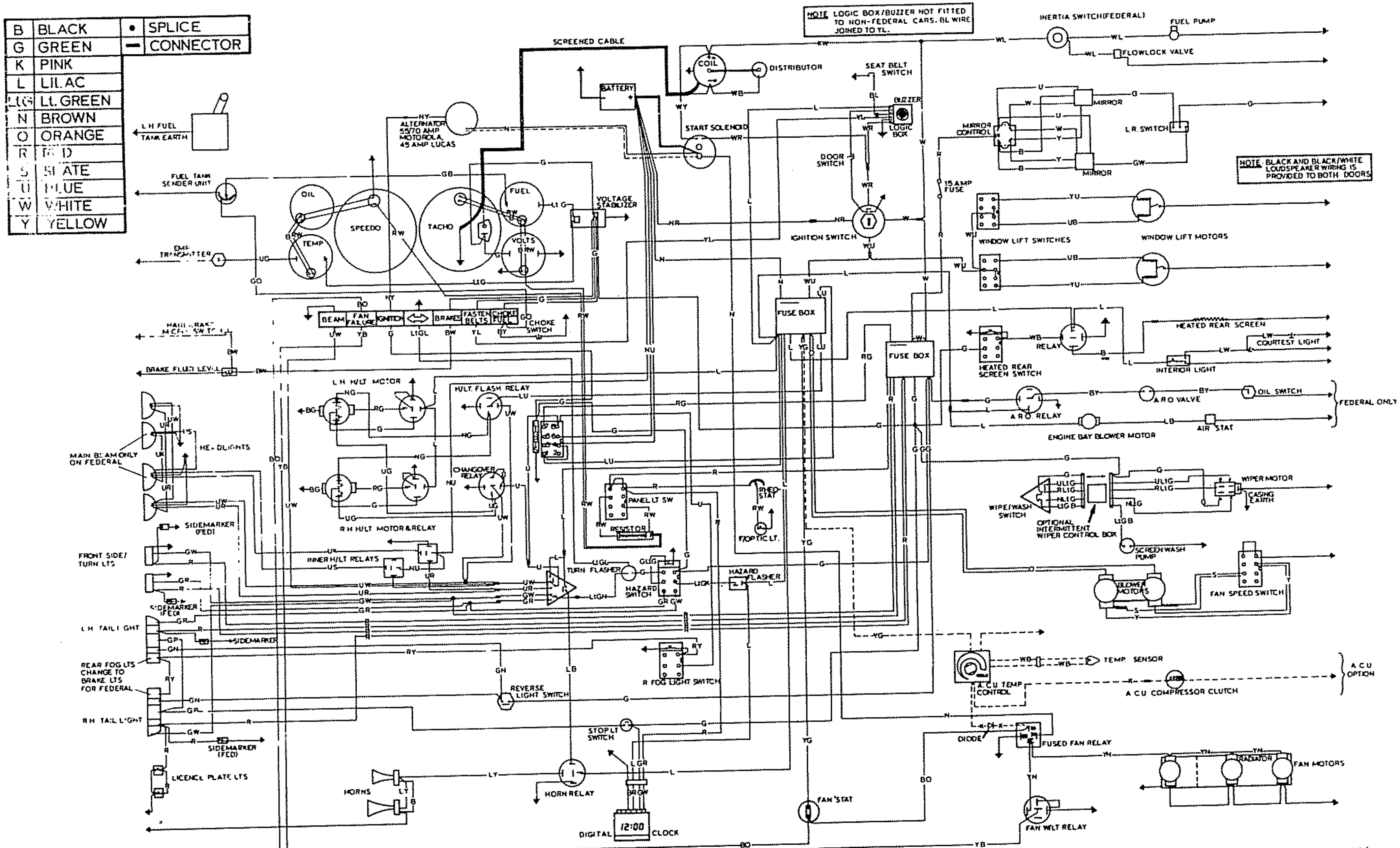
ESPRIT RHD & LHD WIRING DIAGRAM (NON-FEDERAL).

(Chassis No. 214G, 240G, & 244G onwards, & 1007 onwards)



ESPRIT L.H.D. WIRING DIAGRAM (FEDERAL)

LSL 234.



S2 ESPRIT WIRING DIAGRAM (DOMESTIC, FEDERAL, R.O.W.)

FROM CHASSIS NOs 861G, 852H, 300J, 243S & 242T

LSL 238

SECTION O

GENERAL

The Voucher Service commences with a FREE "After Sales Service". The Voucher for this Service will be accepted by the selling Dealer. This is carried out at 500 miles (800 kilometres). Further Vouchers ore included in the Owners Haridbook to cover lubrication and maintenance at intervals of every 5,000 miles (8,000 km) up to and including 50,000 miles (80,000 km).

PRE-DELIVERY INSPECTION

Mechanical

Check coolant level and check system for leaks. Check engine and transmission oil levels and check for leaks. Check security of engine oil filter. Check brake/clutch fluid reservoir level. Check fuel system for leaks. Completely fill fuel tanks arid check for leaks. Check clutch adjustment. Check tightness of wheel nuts. Check tyre pressure including spore. Check engine idling speed.

Electrical

Check battery electrolyte level. Check operation of all lamps. Check operation of horns and direction indicators. Check operation arid park position of windscreen wiper. Check operation of windscreen washer. Check operation of all instruments. Check operation of headlamps and door windows. Check operation of heater and fan. Check headlamp alignment and focussing.

Body

Check operation of doors and locks. Check bonnet and tailgate release mechanism. Check interior trim for damage and cleanliness. Check operation of seat belts. Check all bright work and paint for condition. Check presence of tool kit and literature pack.

Road Test

Carry out brief road test and submit report with any additional attention required. Submit a defect report where necessary.

Wash Car and Polish as Follows:

Cars are protected with 'Lacroe' Autoprotective Wax and con be identified by a label on the Windscreen:

'This car is paint protected with 'Lacroe'.

On cars protected with 'Lacroe' wax the following de-waxing procedure must be harried out.

1. Wash the car by hond or machine to remove dust and dirt particles. Wipe off surplus water.
2. Polish by hand with a soft clean cloth or buff with a machine. Work over car one panel at a time. The same procedure applies to gloss, chrome and rubber.
3. NOTE:
   Do not remove the wax by using another polish, as all polishes, except 'Lacroe' ore water based.

The pre-delivery inspection is to be declared subject to the following conditions:

a. It is responsibility of the supplying Distributor/importer/dealer to ensure that the car if delivered to the customer in the best possible condition.
b. All cost 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 Limited by the distributor/importer/dealer, may result in warranty claims on the particular car being rejected.

SCHEDULE OF FREE AFTER SALES SERVICE (500 miles, 800 km)

Lubrication

Drain engine and transmission oil, and refill with new oil. Fit new engine oil filter. Lubricate drive shaft universal joints, throttle linkage and controls, door locks and bonnet catches. Lubricate handbrake linkage.

Engine

Check valve clearances and adjust if necessary. Check torque loading of cylinder head nuts ONLY IF VALVE CLEARANCES REQUIRE ADJUSTMENT. Check toothed timing belt condition and tension, odjust if necessary. Ctieck ignition contact breaker points settings and ignition tiniing and adjust if necessary. Clean and reset spark plug points. Check alternator mounting bolts for tightness. Check all V-belt condition and tension, adjust if necessary. Check and adjust air conditioning compressor belt tension and check mounting bolts for tightness (when fitted). Check security of all fixings especially engine mounting bolts, exhaust manifold and system, and inlet manifold and carburetter mountings. Check ond adjust slow running mixture and idle speed. Check security and cleanliness of ignition harness joints including alternator and starter motor connections. Top up cooling system and check security and condition of all water hoses

Fuel System

Check fuel system for leaks, fuel pipe connections on carburetters, fuel pump, fuel tank and fuel filter for tightness.

Braking System

Check entire system for leaks and operation (including handbrake), and adjust if necessary. Check security of all brake pipes and vacuum pipe connections. Top up brake fluid reservoir, if low check for cause. Check operation of brake fail/hand-brake warning lamp.

Clutch

Check and if necessary top up clutch fluid reservoir. Check operation of clutch and adjust clearance if necessary.

Steering and Suspension

Check security of all steering connections, iricluding column clamps and mountings. Check steering unit and anti-roll bar mountings for tightness. Check front damper, wishbone arid ball joint mounting bolts to specified torque loadings. Check front and rear wheels alignment. Check rear radius arm, damper and lower link mounting bolts to specified torque loadings. Check and adjust front wheel bearings if necessary.

Electrical

Check operation and function of all electrical equipment including headlamps, cooling system fans, instruments, windscreen wiper, screen washer, and internal and external lamps. Check security of battery terminals and rnoin earth connections. Check electrolyte level of battery ond top up if necessary. Check headlamp alignment and focussing.

Wheels and Tyres

Check condition of all wheels, tyres and tyre volve assemblies. Set tyre pressures. Clean and balance all road wheels exclusing spare. Tighten all wheel nuts to specified torque loading.

Body

Check body condition generally including door adjustments, bonnet and tailgate adjustment (opening and closing), operation of door locks and tailgote lock. Check seat adjustment and operation of seat belts.

Air Conditioning (if fitted)

Check operation of controls, fan speeds and refrigerant for gassing.

Heater

Check operation of controls and fan speeds.

General

Check engine, Transmission and drive shafts mounting bolts to specified toque loadings. Ensure steering wheel and upholstery ore free from grease. Top up screen washer reservoir.

SCHEDULE OF 'A' SERVICE (5,000 miles, 8,000 kilometers)

Lubrication

Drain engine oil, refill the new oil, and fit the new filter. Top up transmission oil level. Lubricate drive shaft universal joints, throttle linkage and controls, door locks and bonnet catches. Lubricate handbrake linkage.

Engine

Check toothed timing belt condition and tension, adjust if necessary. Check condition of all 'V' belts. Clean air filter element (or replace). Check ignition contact breaker points settings and adjust if necessary. Check ignition timing and adjust if necessary. Clean ond reset spark plug points. Check alternator mounting bolts for tightness. Check all 'V' belt condition and tension, adjust if necessary. Check and adjust air conditioning compressor belt tension and check mounting bolts for tightness (when fitted). Check security of all fixings especially engine mounting bolts, exhaust manifold and carburetter mountings. Ctieck and adjust slow running mixture and idle speed. Check security and cleanliness of ignition harness joints including alternator and starter motor connections. Top up cooling system arid check security and condition of all water hoses.

Fuel System

Check fuel system for leaks, fuel pipe corinections on carburetters, fuel pump fuel tank and fuel filter. for. tightness.

Braking System

Check entire system for leaks and operation (including handbrake), and adjust if necessary. Check security of all broke pipes arid vacuum pipe connections. Top up brake fluid reservoir, if low check for cause. Check operation of brake fail/hand-brake warning lamp. Check front and rear brake pads for material remaining, if down to 2mm (0.08 in) MINIMUM, replace the pads. Check caliper mounting bolts are to their specified torque loading.

Clutch

Ctieck and if necessary top up clutch fluid reservoir. Check operation of clutch and adjust if necessary.

Steering and Suspension

Check security of all steering connections, including column clamps and mountings. Check steering unit and anti-roll bar mountings for tightness. Ctieck condition of anit-roll bar mounting rubbers. Check steering unit for oil leaks, and condition of rubber bellows. Check front damper, wishbone and ball joint mounting bolts to specified torque loadings. Check front and rear wheels alignment. Check rear radius arm, damper and lower link mounting bolts to specified torque loadings. Check all steering and front and rear suspension moving parts for wear. Check and adjust front wheel bearings if necessary

Electrical

Check operation and function of all electrical equipment including headlamps cooling system fans, screen wiper, screen washer and internal und external lamps. Check security of battery terminals und main earth connections. Check ele[illegible] battery and top up if necessary. Check headlamp alignment and focussing.

Wheels and Tyres

Check condition of all wheels, tyres and tyre valve assemblies. Set ryre pressures Clean and balance all road wheels excluding spare. Tighten all wheel nuts to specified torque loading.

Body

Check body condition generally including door adjustments, bonnet and tailgate adjustment (opening and closing), operation of door locks and tailgate lock. Check adjustment and operation of seat belts.

Air Conditioning (if fitted)

Check operation of controls, and fan speeds. Check Freon tor gassing

Heater (if fitted)

Check operation of controls, and fan speeds.

General

Check engine, transmission and drive shafts mountiny bolts to specified torque loadings. Check condition of all major mounting rubbers. Ensure steering wheel and upholstery are free from grease. Top up screen washer reservoir.

AT INTERVALS OF EVERY 25,000 MILES (OK 40,000 KILOMETRES), carry out the following additional operation:

Engine

Fit new toothed timing belt.

SCHEDULE OF 'B' SERVICE (10,000 MILES, 16,000 KILOMETRES)

Lubrication

Drain engine arid transmission oil and refill with new oil. Fit new engine oil filter. Lubricate drive shaft universal joints throttle linkoge arid controls, door locks and bonnet catches. Lubricate hondbrake linkage.

Engine

Check valve clearances and adjust if necessary. Check torque loading of cylinder head nuts ONLY IF VALVE CLEARANCES REQUIRE ADJUSTMENT. Check toothed timing belt condition arid tension, adjust if necessary. Check conditiori and tension of all 'V' belts, adjust if necessary. Clean air filter body top cover, and fit new element. Check ignition coritact breaker points condition, settings and adjust if necessary. Check ignition timing and adjust if necessary. Fit new spark plugs. Lightly lubricate distributor cam and weights. Check alternator mounting bolts for tightness. Check and adjust air conditioning compressor belt tension and check mounting bolk for tightness (when fitted). Check security of all fixings especially engine mounting bolts, exhaust manifold arid system, and inlet manifold and carbu-retter mountings. Check carburetters trumpet riuts for tightness (Dellorto). Check and adjust slow running mixture and idle speed. Check security and cleanliness of ignition harness joints including alternator and starter motor connections. Top up cooling system and check security and condition of all water hoses.

Fuel System

Fit new fuel filter. Check fuel system for leaks, fuel pipe connections on carburetters, fuel pump and fuel tank for tightness.

Braking System

Check entire system for leaks and operation (including handbrake), and adjust if necessary. Check security of all brake pipes and vacuum pipe connections. Top up brake fluid reservoir, if low check for cause. Check operation of broke fail/ handbrake warning lamp. Check front and rear broke pads for material remaining; if down to 2mm (0.08 in) MINIMUM, replace the pads. Check caliper mounting bolts ore to their specified torque loading.

P

Clutch

Check and if necessary top up clutch fluid reservoir.
Check operation of clutch and adjust if necessary.

Steering and Suspension

Check security of all steering connections, including column clamps and mountings. Check steering unit and anti-roll bar mountings, for tightness. Check condition of anti-roll bar mounting rubbers. Check steering unit for oil leaks, and condition of rubber bellows. Check front damper, wishbone and ball joint mounting bolts to specified torque loadings. Check front and rear wheels alignments. Check rear radius arm, damper and lower link mounting bolts to specified torque loadings. Check all steering and front and rear suspension moving parts for wear. Repack front hub bearings with grease and check condition of bearings and seals. Check front disc mounting bolts to their specified torque loading.

Electrical

Check operation and function of all electrical equipment including headlamps, cooling system fans, screen wiper, screen washer, and internal and external lamps. Check security of battery terminals and main earth connections. Check headlamp alignment and focussing. Check electrolyte level of battery and top up if necessary.

Wheels and Tyres

Check condition of all wheels, tyres and tyre valve assemblies. Set tyre pressures. Clean and balance all road wheels excluding spare. Tighten all wheel nuts to specified torque loading.

Body

Check body condition generally including door odjustments, bonnet and tailgate adjustment (opening and closing), operation of door locks and tailgate lock. Check seat odjustment and operation of seat belts.

Air Conditioning (if fitted)

Check operation of all controls, and fan speeds. Check Freon for gassing.

Heater (if fitted)

Check operation of all controls, and fan speeds.

General

Check engine transmission and drive shafts mounting bolts to specified toque loadings. Check condition of all major unit mounting rubbers. Ensure steering wheel and upholstery are free from grease. Top up screen washer reservoir.

RECOMMENDED LUBRICANTS

Engine (above and below 0°C) Mobil SHC must be used when no oil cooler is fitted,
When an oil cooler is fitted lubricants listed below may be used.

Lotus Cars Ltd. recommend Valvoline oils and greases, as follows:

Engine (above 0°C)	Valvoline HD 20W/50 All Climate or HP High Performance Oil
Engine (below 0°C)	Valvoline HD 10W/40 All Climate
Transmission	Valvoline X-18-SAE 80
Steering Unit	Valvoline X-18-SAE 90
Drive Shafts	Valvoline X-All Grease
Front Hubs	Valvoline Multilith No 2 Grease

Where Valvoline products are unobtainable, the lubricants listed below are approved:

	Duckhams	Texaco	Shell	Esso	Castrol	BP	Mobil
Engine (above 0°C)	Q 20W/50	Havoline 20W/50	Super 100	Uniflow 10W/50	GTX	Super Viscostatic 20W/50	Mobiloil Super
Engine (below 0°C)	Q 10W/40	Havoline 10W/40	Super 10W/30	Uniflow 10W/50	Castrolite	Super Viscostotic 20W/50	Mobiloil Super
Transmission	Hypoid 80/90	Multigear EP80	Spirax 80EP	Esso	Castrol	Energol EP SAE 80	Mobilube HD80
Steering unit	Hypoid 90	Multigear EP90	Spirax 90EP	Gear oil GX 85W/140	Hypoy	Energol EP SAE 90	Mobilube HD90
Drive shaft, front Hubs	Duckhams LB 10	Marfak All-purpose	Shell Retinax A	Esso Multi-grease	Castrol- Grease LM	BP Energrease L2	Mobilgrease MP

Brake Master Cylinder Reservoir: Castrol Girling Universal Brake ond Clutch Fluid

Servicing Intervals - After Sales Service at 800 Kilometres (500 miles)
- A Service, Every 8,000 Kilometres (5,000 miles)
- B Service, Every 16,000 Kilometres (10,000 miles)

For North American cars refer to Owners Handbook

SECTION P

GENERAL DESCRIPTION

The heater unit is designed to deliver fresh cir to either the windscreen for demisting, or to the interior of the vehicle, or a proportion to both, at any temperature between cold and hot dependent upon the position of the controls.

In addition to the above there are two independent face level vents, one in the scuttle sill and one in the binacle. These will deliver unheated air at ambient temperature by the ram effect of the vehicle when moving and is independent of the heater.

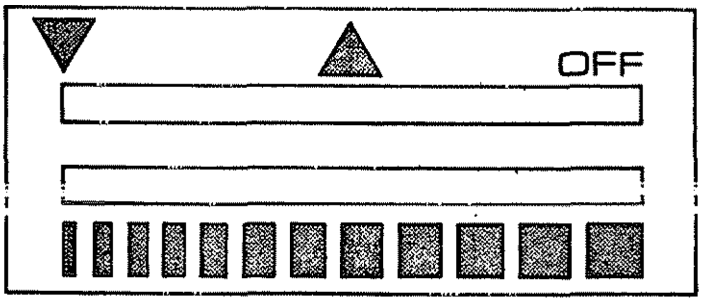


Fig.2 Heater controls

OPERATION OF CONTROLS

The air temperature from the heater is controlled by the lower lever. Air temperature is varied between hot, with the lever fully back, and external air (cold), with the lever fully forward.

Air flow to the screen and footwells is controlled by the upper lever in the following manner:

LEVER POSITION	AIR FLOW
Fully back (OFF)	OFF
Centre position ▲	Screen only
Between centre and fully forward	Screen and footwells
Fully forward ▼	Footwells only

A two position fan switch increases the air flaw speed, the first position being 'slow' speed and the second 'fast' speed.

Typical heater control positions are as follows:

Defrost

Move upper lever to the centre position.
Move lower lever backwards to the 'hot' position.
Switch fan speed switch to Fast.
Close face level vents for best defrost performance.

Hot air to screen and footwells

Move upper lever midway between the two arrow marks.
Move lower lever backwards to the 'hot' position.
Select fan speed to suit.

Hot air to footwell

Move upper lever to the forward position ▼.
Move lower lever backwards to the 'hot' position.
Select fan speed to suit.

Cold air to footwell

Move upper lever to the forward position ▼.
Move lower lever forwards to the 'cold' position.
Select fan speed to suit.

HEATER UNIT ASSEMBLY

To Remove

1. From inside the front compartment remove the twin blower unit side panels to reveal the four screws securing the blower unit.
2. Unscrew the four screws securing the twin blower unit to the bulkhead.
3. Disconnect the electrical connectors to the blower unit ond lift out blower.
4. Release the clips securing the flexible ducting to the heater box ond unscrew the clips on the water pipes. Place a suitable container under the heater water connections to catch any water which will drain from the pipes and heater when disconnected.
5. Disconnect the binacle heater controls at the heater box assembly.

6. Remove the four screws securing the heater box assembly to the inside of the bulkhead and remove the assembly from inside the vehicle.

To Replace

1. Reverse the removal procedure ond refill the cooling system.
2. Check the operation of the heater controls for full movement of the flaps and uniform seating of flops on the seals, adjust if necessary.

SECTION Q

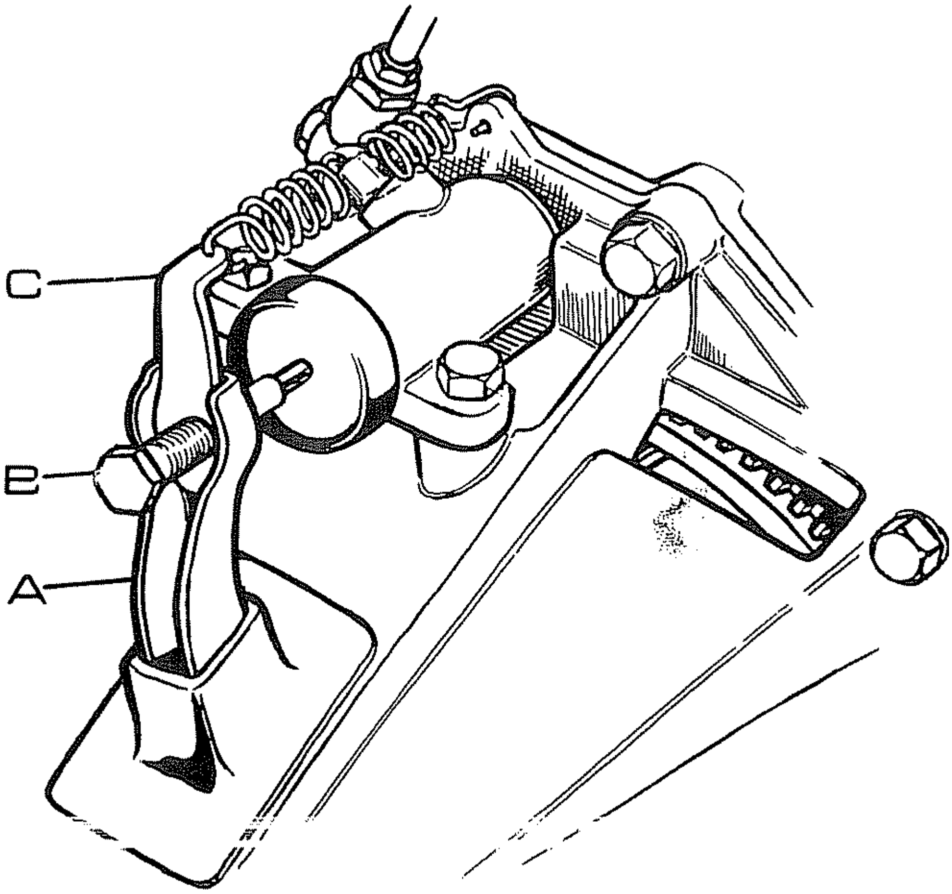


Fig. 1 Clutch lever adjustment

GENERAL

The clutch assembly comprises a diaphrogm spring type pressure plate with a single dry driven plate. The driven plate is free to slide along the splines of the transmission control shaft, the forward end of which forms a spigot to fit into the bearing in the centre of the crankshaft. The clutch cover, diaphragm spring and pressure plate can only be replaced as an assembly. The clutch release mechanism is hydraulically operated through a pendant pedal.

MAINTENANCE

The maintenance required for the clutch system is confined solely to checking the clutch 'free-play' at the specified intervals, see Section 'O'.

ADJUSTMENT (Fig. 2)

The clutch is correctly adjusted when a clearance of 3 mm (0.12 in) can be felt at the lever (A). If adjustment is required release the adjuster (B) by pulling the spring lug (C) back against the tension of the spring until the adiuster (B) can be turned easily. After adjustment release the spring lug (C) and the adjuster will be locked in position.

CLUTCH ASSEMBLY

To Remove

1. Remove the transmission unit from the vehicle, see Section 'F' ENGINE.
2. Remove the clutch assembly from the flywheel by progressively releasing the securing bolts around the periphery of the cover.

To Replace

1. With the aid of a dummy input shaft centralise the driven plate on the flywheel ENSURING the correct face is towards the flywheel.
2. Replace the clutch assembly on the flywheel, ensuring it is located on the dowels, and insert the bolts with spring washers. It is importont that the bolts ore tightened uniformly to ensure that no distortion occurs on the diaphragm springs. Tighten each bolt one turn at a time until the specified torque loading is reached (see TECHNICAL DATA). Remove the dummy input shaft.
3. Refit the transmission unit to the engine and check operotion of clutch.

CLUTCH DRIVEN PLATE

To Remove

1. Remove the clutch ossembly as previously described.

Inspect for Wear

Check the condition of the pressure plate surface and should it show any signs of distortion, scoring or overheoting it is recommended that it be replaced by a new assembly. It is essential to install a complete driven plate assembly if a new pressure plate is fitted. Worn facings on the drive plate will indicate some wear has also taken place on the springs, the spring seatings ond the hub splines. The ossembly could also be out of balance and no longer concentric.

Under no circumstances should any attempt be made to repoir or rectify faults on the driven plate, always replace if faulty.

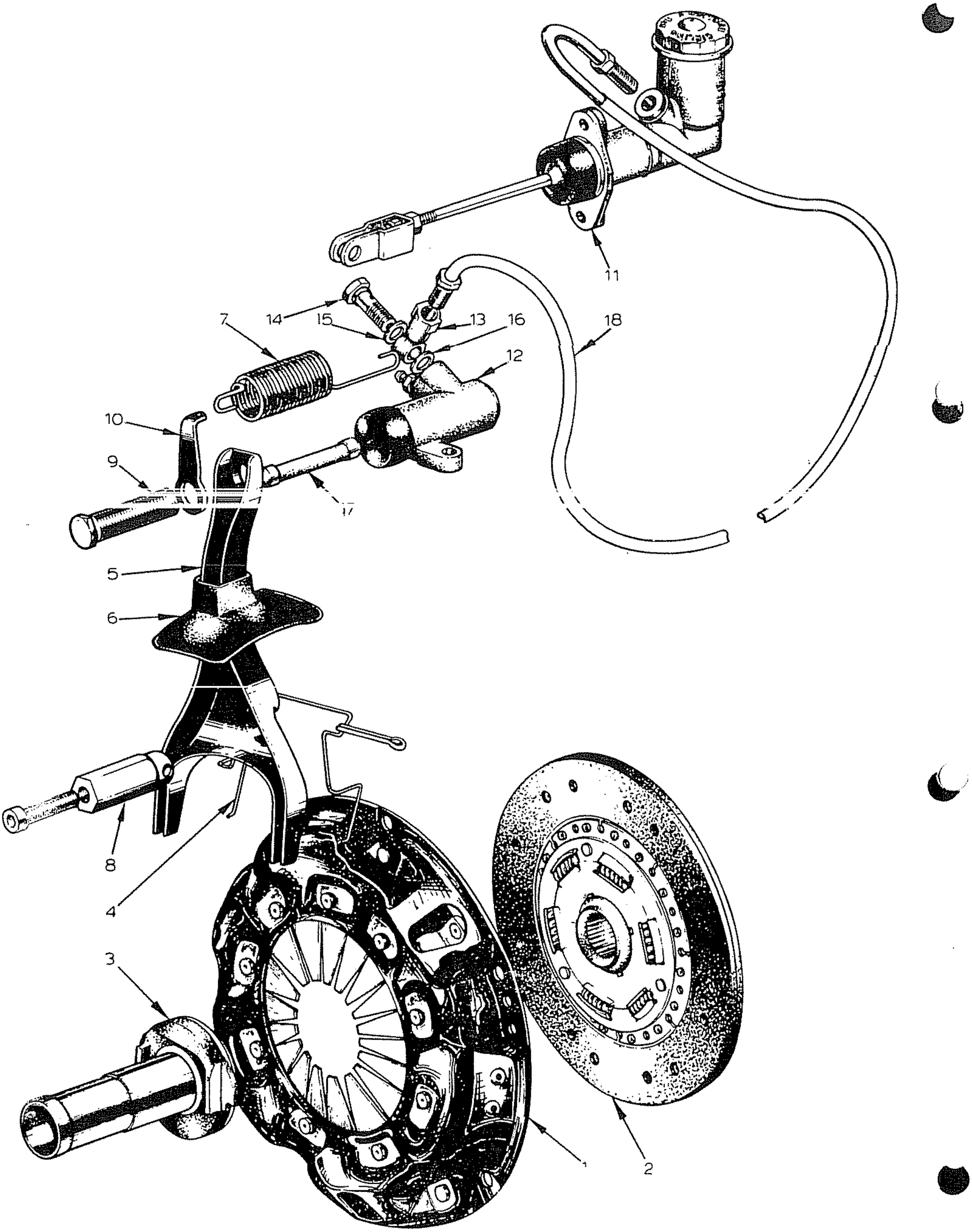


Fig.2 Clutch mechanism

KEY TO FIG.2

1. Cover assembly
2. Driven plate
3. Release bearing
4. Spring retaining release brg/fork
5. Release fork
6. Dust cover
7. Fork return spring
8. Ball pivot
9. Adjusting screw, fork
10. Fork spring lug
11. Clutch rmster cylinder
12. Clutch slave cylinder
13. Banjo union
14. Banjo bolt
15. Gasket, large I/D
16. Gasket, small I/D
17. Push rod
18. Flexible pipe

When the clutch has operated satisfactorily for some time the surface of the facings will have acquired a high polish, through which the groin of the facing moterial can be seen clearly. The polished facing is of a light colour when in perfect condition.

Under certain circumstances small quantities of lubricating oil may enter the clutch housirig and contaminate the surface facings. This will normally be burned off by the heat generated between the clutch surfaces during normal starting. The surface facings will darken slightly when this occurs and provided that the grain of the facing material cori still be distinguished clearly through the polished surface, the clutch performance will not be affected.

Should the amount of oil reaching the facings increase, then one or more of ttie coriditions listed below could exist.

(a) The oil may burn off leaving a carbon deposit on the surface of the facings, which will assume a high glaze and produce further slip. This will be very obvious, though a very thin deposit it generally hides the grain of ttie material.

(b) The oil may partially burn and leave a resinous deposit on the focings. This will produce a tendency for the clutch to be fierce and rnay also cause exterrsive spinning as the surface focings will stick to either the flywheel and pr'essure plate.

(c) A combination of the coriditions (a) and (b) will also produce a judder when the clutch is engaged.

(d) Large amounts of oil on ttie clutch surface facings will produce a dark soaked appearance on ttie facings. This will cause further slip and violent 'juddering'.

If any of the above conditions are experienced the clutch driven plate should be replaced by a new plate. Find the cause of the ingress of oil into the bellhousing and rectify. Make sure that the clutch and flywheel are thoroughly cleaned before assembly.

To Replace

1. Reverse the removal instructions.

RELEASE BEARING

To Remove

1. Remove the tronsmission unit from the vehicle (see Section 'F' ENGINE).
2. Pull the spring lug back against the return spring and remove the adjuster taking care not to lose the push-rod.
3. Remove the lever grommet (rubber seal) from the exterior of the bellhousing.
4. Release the split pin securing the fork to the ball pivot and remove the clip retaining the release bearing to the fork. Remove the fork.
5. Slide the release bearing off the transmission unit input shaft.

To Replace

1. Reverse the removal instructions.

The following modification was introduced to improve the durability of the clutch slave cylinder.

Early Vehicles (Gearbox No. up to 1164)

A modified slave cylinder (A079Q4005F) with an improved seal and two spacer washers (A075W4024F) are fitted. This slave cylinder is identified by a Red Spot and has its mounting pads machined to give a 4^{o} angle to the horizontal.

Vehicles (Gearbox No. 1236 onwards)

Are fitted with a slave cylinder (B079Q6002F) with an improved seal. The gearbox in this case is machined to produce the 4^{o} mounting angle to the horizontal.

Vehicles (Georbox No. 1165 to 1235)

These vehicles could be fitted with either installation, therefore check the slave cylinder mounting pods to verify which of the obove slave cylinders is used.

SECTION S

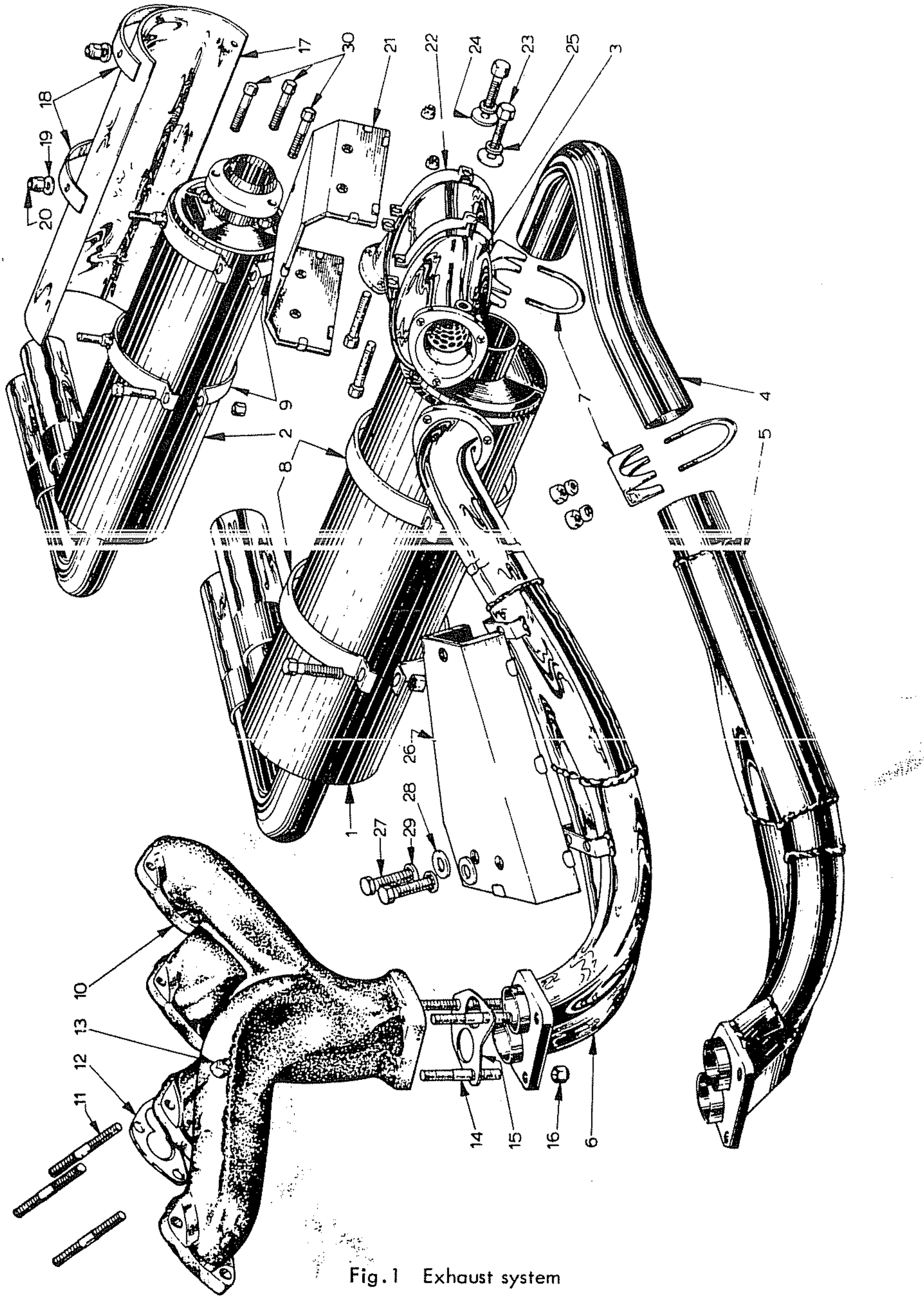


Fig.1 Exhaust system

KEY TO FIG. 1

1. Silencer - UK and Europe
2. Silencer - Federal
3. Catalyst - Fedeml Only
4. Intermediate Pipe - UK and Europe
5. Down Pipe Assy - UK and Europe
6. Down Pipe Assy - Federal
7. 1 7/8" Pipe Clamp
8. Silencer Mounting Strap - UK and Europe
9. Silencer Mounting Stmp - Federal
10. Exhaust Manifold
11. Stud, Manifold to Head
12. Gasket, Manifold to Head
13. Nut, Manifold to Head (Copperised)
14. Stud, Manifold to Down Pipe
15. Gasket, Manifold to Down Pipe
16. Nut, Manifold to Down Pipe (Stainless Steel)
17. Silencer Heat Shield (Fedeml)
18. Clamp Strap, Heat Shield (Federal)
19. Plain Washers 8mm
20. Self Lock Nuts
21. Catalyst Heat Shield Assy (Federal)
22. Catalyst Heat Shield Clamp (Fedeml)
23. Screw, Shield to Clamp
24. Penny Washer
25. Shakeproof Wosher
26. Down Pipe Heat Shield Assy (Federal)
27. Screw, M6 x l8
28. Penny Washer
29. Shakeproof Washer
30. Bolt, M8 x 30

GENERAL DESCRIPTION

The exhaust system comprises a manifold attached to twin downpipes terminating in a single pipe, fixed to an intermediate pipe for Domestic vehicles and a catalytic converter on Federal vehicles. Both systems have a single silencer mounted across the rear of the vehicle terminating in twin outlets. The systems are rigidly mounted to a bracket on the rear of the transmission casting.

DOWNPIPE

To Remove

1. Rernove the left-hand rear road wheel to gain access to the exhaust downpipe.
2. Remove the three nuts securing the twin downpipe to the manifold and remove the 'U[1] clamp (Domestic) and the three flange bolts (Federal) connecting the intermediate pipe. Remove the intermediate pipe or catalytic converter as necessary.
3. Lift out the twin downpipe and discard the manifold to downpipe gasket.

To Replace

1 Reverse the removal, use a new gasket between the downpipe arid manifold, and apply 'Firegum' or similar to the downpipe to intermediate joint (Domestic only).

SILENCER

So Remove

1. Unscrew the seven self tapping screws (9 screws on Federal vehicles) securing the rear valance. Remove the rear valance.
2. Unscrew the 'U' clamp securing the intermediate pipe to the silencer. Federal vehicles have a flange mounting secured by three bolts.
3. Remove the two silencer mounting straps. On Federal vehicles first remove the heat shield, held in place by two nuts and washers located on top of the mounting straps.
4. Break the joint sealing the silencer to the intermediate pipe (catalyst on Federal vehicles) and remove silencer. Take care during this operation not to apply any undue strain on the other parts of the exhaust system.

To Replace

1. Reverse the removal instructions, apply 'Firegum' or similar, to the pipe joint. Take care when refitting silencer mounting straps not to domoge the small heat shield fitted on gearbox mounting plate.

MANIFOLD

To Remove

1. Disconnect the downpipe from the monifold at the flange joint and discard the gasket.
2. Disconnect the downpipe from the front end of the primary silencer and remove.
3. Support the engine and release the LH engine mounting bracket, if necessary, to enable removal of the manifold.
4. Remove the nuts with their plain washers, securing the manifold to the cylinder head. Remove the manifold and discard the goskets.

To Replace

1. Reverse the removal instructions, but use new gaskets ot the manifold to cylinder head and manifold to downpipe flange joints, and new nuts also at these joints. Apply 'Firegum' or similar at the downpipe to primary silencer joint. The clamp on the downpipe to primary silencer joint must be so positioned that it will not project below the silencer.

SECTION T

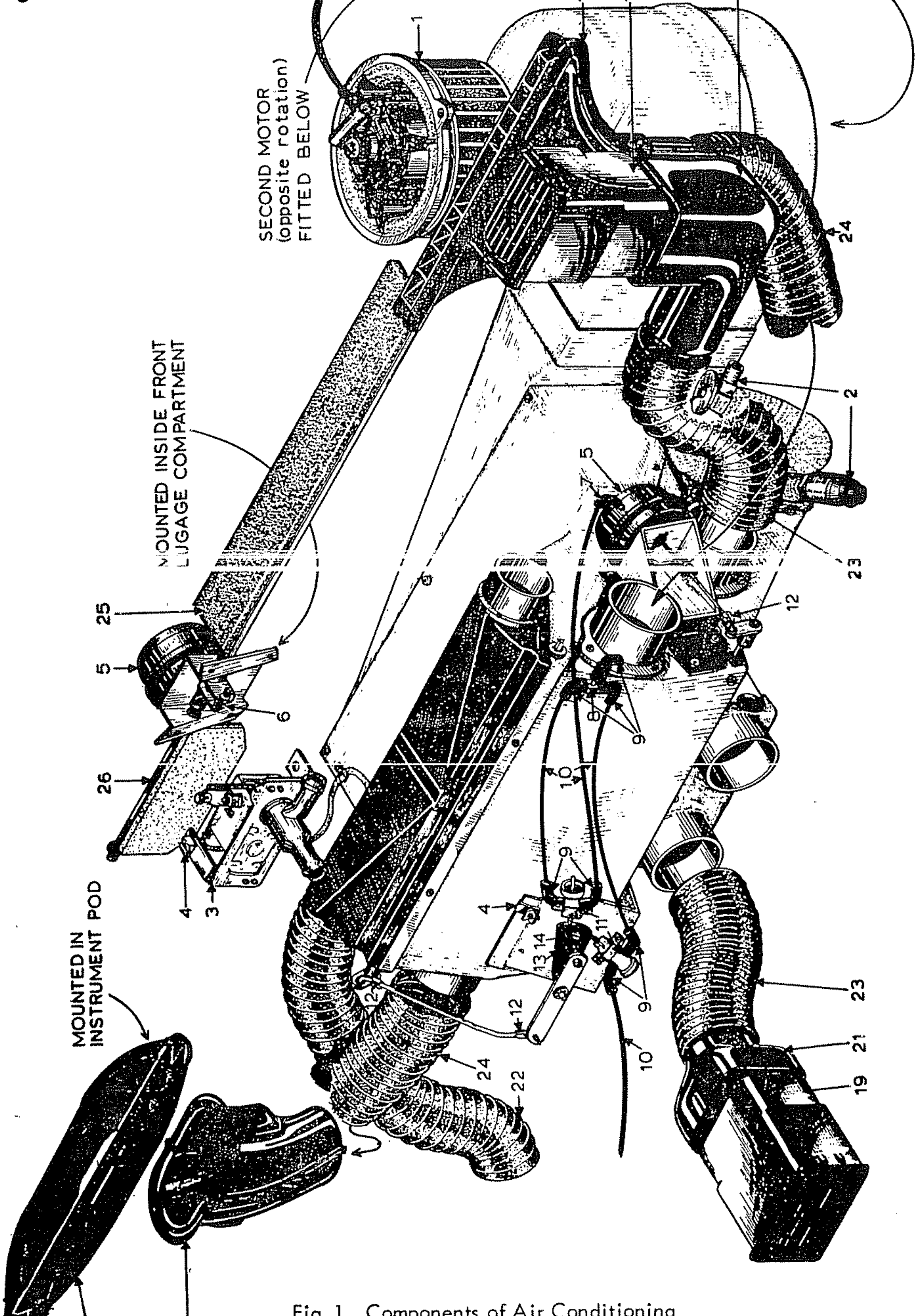


Fig. 1 Components of Air Conditioning

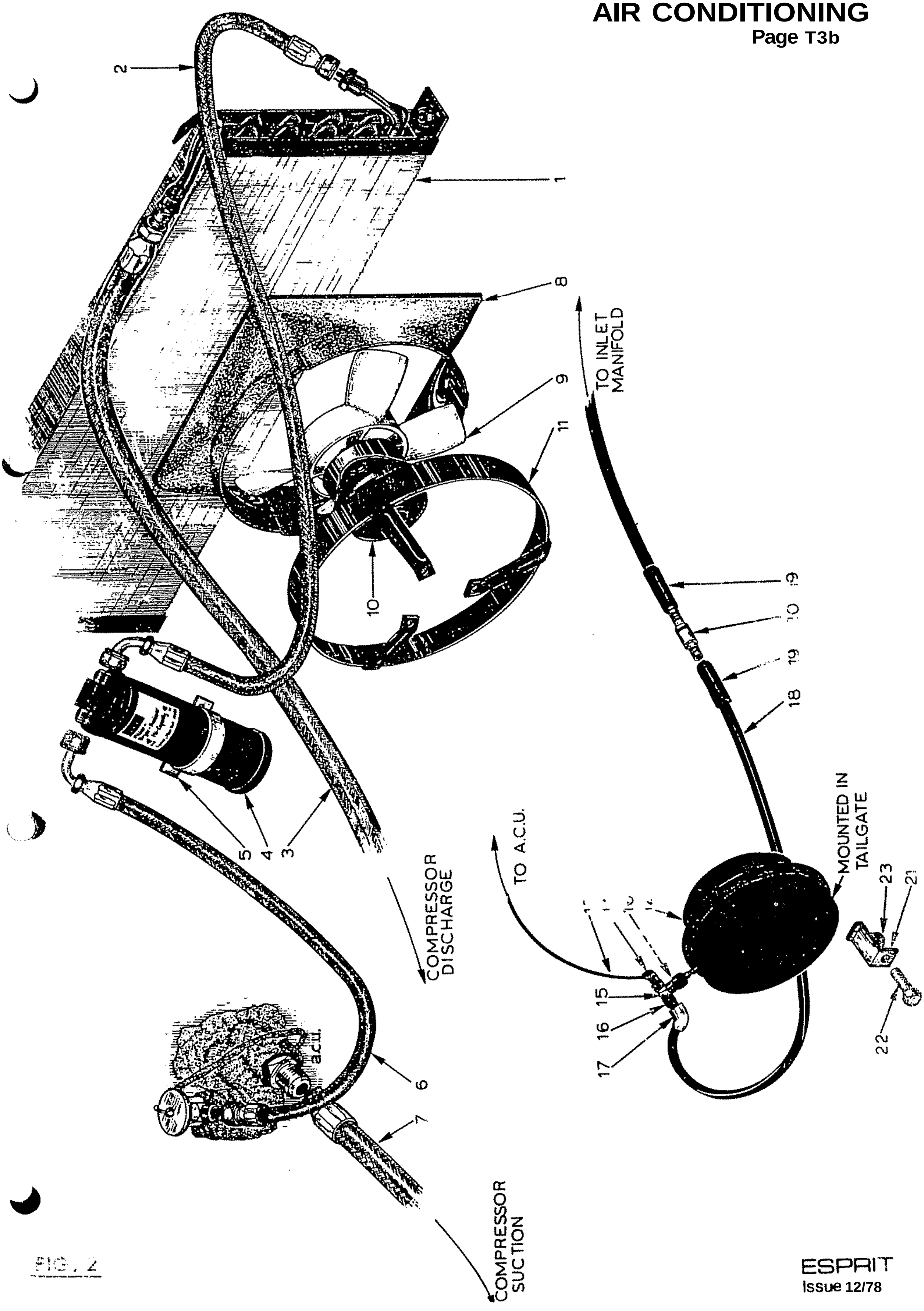
s drawing is the l.h.d. installation.

KEY TO FIG. 1

1. Blower Motor and Fan (C.W.)
2. Expansion Valve.
3. Water Valve.
4. Abutment Clip.
5. Vacuum Motor.
6. Clevis Pin, Vac. Motor/Flaps.
7. Elbow, Vac. Pipe.
8. Tee Piece.
9. Elbow, Vac. Pipe.
10. Vacuum Pipe.
11. Vacuum Switch.
12. Bush and Clip Assy.
13. Operating Cam.
14. Cable Trunnion.
15. Binnacle Vent.
16. Adaptor, Binnacle Vent.
17. Demist Outlet Vent.
18. Demist Duct.
19. Face Level Vent.
20. Adaptor, Face Level Vent.
21. Adaptor, Centre Vent.
22. Flexible Ducting, 1½"
23. Flexible Ducting 1 7/8"
24. Flexible Ducting 2¼"
25. Fresh Air Flap.
26. Recirculation Flap.

KEY TO FIG. 2

1. Condenser.
2. Hose, Condenser/Receiver-Drier.
3. Hose, Compressor/Condenser.
4. Receiver - Drier.
5. Bracket, Receiver - Drier.
6. Hose, Receiver - Drier / Expansion Valve.
7. Hose, Expansion Valve / Compressor.
8. Cowl, Condenser Fan (ABS).
9. Fan, 10".
10. Fan Motor.
11. Fan Cowl and Motor Mounting.
12. Vacuum Reservoir.
13. Vacuum Pipe.
14. Elbow.
15. "T" Piece.
16. Sleeve.
17. Elbow.
18. Vacuum Pipe.
19. Sleeve.
20. Non Return Valve.
21. Bracket, Vacuum Reservoir..
22. Bolt, 6mm x 16.
23. Nut, Nyloc, 6mm.



TO INLET MANIFOLD
TO A.C.U.
COMPRESSOR DISCHARGE
COMPRESSOR SUCTION
MOUNTED IN TAILGATE
A.C.U.
1
2
3
4
5
6
7
8
9
10
11
15
16
17
18
19
22
23

FIG. 2

GENERAL DESCRIPTION

With the air conditioning control 'ON' and engine running, the compressor clutch operates engaging the compressor. Low pressure vapour entering the compressor is converted into high pressure vapour at the output and discharged into a condenser. The vapour is cooled in the condenser changing into a liquid, from here it flows into the receiver-drier, where any foreign matter is expelled.

A sight glass following the receiver-drier provides a means of checking the system is full of refrigerant and operating correctly. High pressure liquid enters the expansion valve where it expands rapdily changing from high to low pressure liquid. As the refrigerant expands in the evaporator it begins to boil, absorbing heat from the core and cooling the air passing through to the passenger compartment. The compressor draws off the low pressure vapourised refrigerant completing the closed circuit and recycling the refrigerant

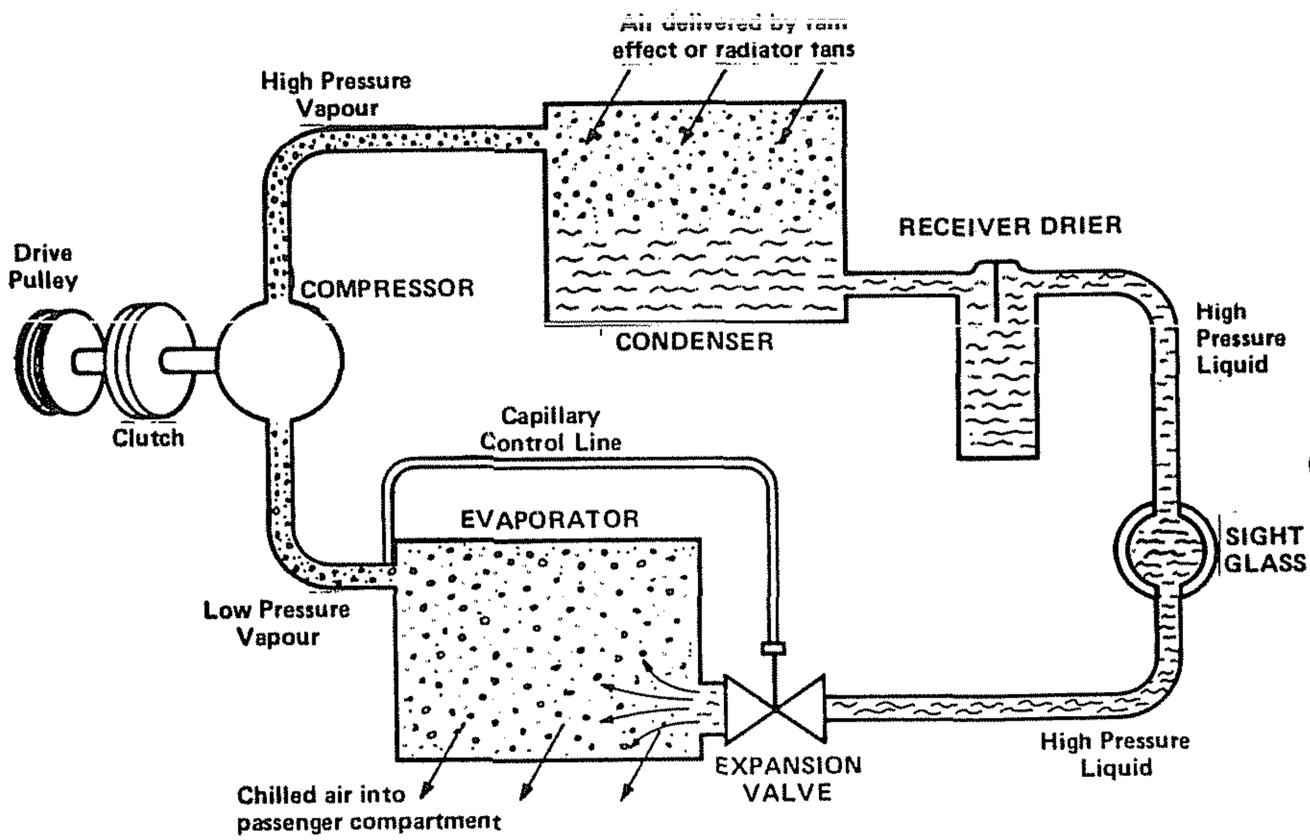


Fig.2 Refrigerant Circuit

CONDENSER

The condenser is located in front on right-hond side of engine radiator. Air passes over the condenser cooling fins, cooling the 'hot' high pressure refrigerant vapour bnd condensing it into a high pressure liquid. The construction of the condenser is similar to the engine radiator but is designed to withstand higher pressures.

RECEIVER-DRIER

Located in the front compartment on the right hand side its purpose is to ensure a supply of liquid refrigerant to the expansion volve in an operational condition. A drier is incorporated in the base of Receiver-drier which absorbs any moisture that entered the system during assembly. Any foreign motter in the refrigerant will also be trapped in the drier.

EXPANSION VALVE

The expansion valve is located at the side of the evaporator and thermostatically meters the flow of high pressure liquid refrigerant into the evaporator. The refrigerant supply is controlled by a capillary tube stropped to the outlet pipe of the evaporator, as the temperature changes at the outlet pipe so the refrigerant flow through the valve changes. When liquid to the core of the evaporotor exceeds requirement the outlet temperature drops, this is sensed via the capillary tube, closing down the expansion valve and reducing the flow of liquid refrigerant. The expansion volve is pre-set internally and has no external adjustment.

TEMPERATURE CONTROL SWITCH

The air conditioning temperature control switch is located on the right hand side of the instrument binnacle. Turning the control clockwise to the required temperature position will engage the compressor clutch and drive the compressor. When the compressor is running a red light (a light emitting diode above the temperature control switch) is illuminated.

The output from the temperature sensor in the evaporator is compared by an electronic comparator with the setting mode on the temperature control switch. When the temperoture sensed is greater than the setting, the compressor is engaged via the clutch and the red light is illuminated. The clutch will disengage when the ternperature is reached and the red light will extinguish.

The electronic comparator circuit board is attached to the rear of the temperature control switch and the whole unit is replaced if found to be faulty.

REFRIGERANT HANDLING

The refrigerarit used in the air conditioning system is 'Freon 12' arid the followirig precautions MUST ALWAYS BE OBSERVED:

1. Do NOT leave refrigerarit drums open - always make sure the caps are securely closed.
2. Do NOT transport drums of refrigeront in the passeriger compartment of a car.
3. Do NOT expose refrigerant drums to high temperature.
4. Do NOT weld or use a steam cleaner in close proximity of the air conditioning unit.
5. Do NOT discharge refrigerant vapour into an enclosed area where there is anaked flame. Heavy concentratioris of refrigerant when exposed to a naked flame produces a toxic gas, which will also attack metal.
6. Do NOT expose the eyes to vapourised or liquid refrigerant - ALWAYS wear safety goggles when handling refrigerarit.

REFRIGERANT PIPEWORK

The following precautions should be read carefully before carrying out any work on the refrigerant pipework:

1. When disconnecting any pipe or flexible connection, the system MUST FIRST BE DISCHARGED OF ALL PRESSURE.
   Open either connection of receiver-drier SLOWLY, cover union with a cloth, so that no injury will occur if liquid is present in the pipe. If pressure is noticed, ALLOW TO BLEED SLOWLY - slacken the union nuts a 'flat' at a time; allow pressure to bleed, slacken the nut a further 'flat', allow pressure to bleed, and so on until all pressure has been expelled (approximately 2 to 3 minutes).
   ALWAYS WEAR SAFETY GOGGLES WHEN OPENING REFRIGERANT CONNECTIONS.

2. Pipes, flexible end connections and components, MUST be capped immediately they ore opened to prevent the ingress of moisture and/or dirt.

3. All replacement components and flexible end connections ore sealed when new, and should only be opened IMMEDIATELY PRIOR TO FITTING, AND AT ROOM TEMPERATURE, to prevent condensotion of any moisture which may enter when the seoling is removed.

4. 'The receiver-drier should be the LAST component to be connected, this is to ENSURE optimum dehydration ond maximum moisture protection of the system.

5. Precautions MUST be taken to prevent damage to fittings and connections; minute damage could cause a leak due to the high pressures used in the system. ALWAYS USE TWO SPANNERS OF THE CORRECT SIZE (one on each union nut), when releasing or tightening pipes, or connections. This is particularly important with the pipes on the condenser as this unit is constructed from aluminium and copper.

6. All joints should be coated with refrigeration oil BEFORE making any connections, as this will aid seating.

7. All pipes and hoses MUST BE FREE from any kinking. The efficiency of the system con be impaired by a single kink, or restriction. Flexible hoses should not be bent too radius which is less thon ten times the diameter of the hose.

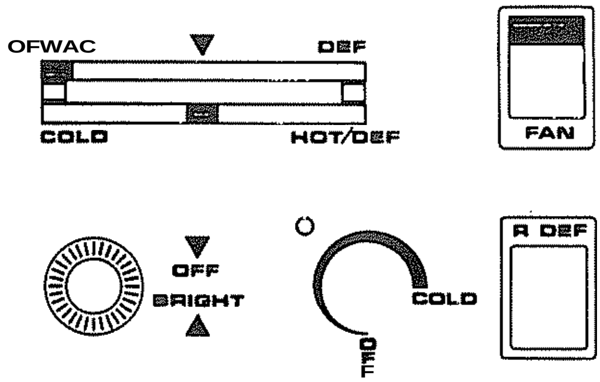
CONTROLS OPERATION

The air conditioning is controlled by o temperature control awltch situated on the right hand instrument panel. Turning the switch clockwise from the OFF position to the requlred setting, controls the temperature in the passenger compartment by automatically switching the compressor on and off.

When the compressor is running the red tight at top left hand side of the temperature control switch, will light. The upper lever on the right hand instrument panel controls the air distribution, ond the lower lever controls the air temperature.

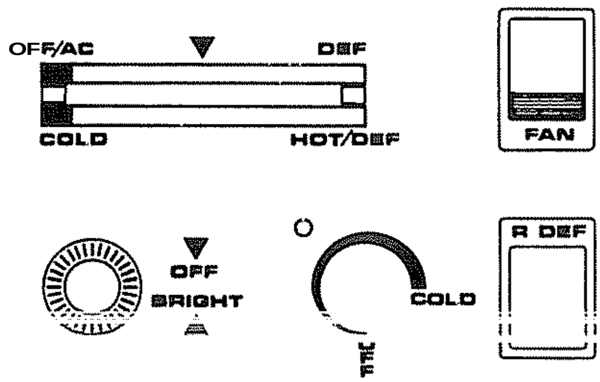
The FAN switch increases the air flow to slow speed when the switch is moved to the centre position and to fast speed when moved to the lower positlon.

A



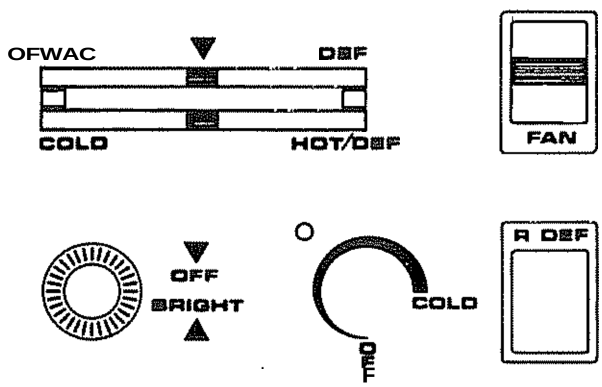
OFF

B



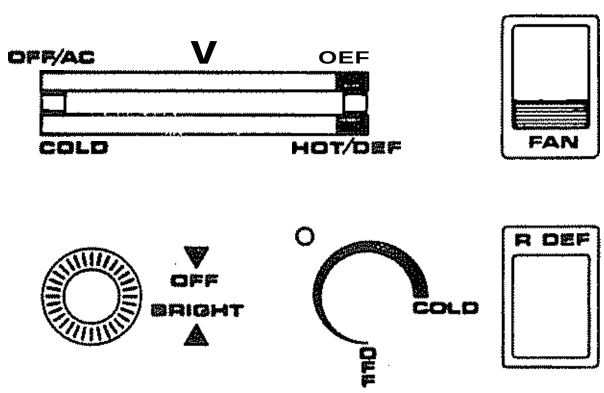
REFRIGERATED AIR

C



AMBIENT

D



DEFROST

Fig.3 Facia Controls

Typical control positions are as follows:

Maximum Refrigerated Air (pull down)

Move upper lever forward (OFF/AC) position.

Move lower lever forward (COLD) position.

Temperatvre Control Switched turned fully clockwise.

Switch fan speed to Fast.

This setting gives recirculating refrigerated air from the face level vents. For the best performance and comfort ensure all windows are closed.

WARNING: It is not recommended that the air flow from the face level vents be directed at persons during maximum refrigerated air conditions, as this can cause discmfort (i.e. cramp, e k.). Reduce fan speed.

NOTE: Under certain ambient conditions (especially high humidity) a white vapour will issue intermittently from the face level vents, this is normal and should cause no concern.

Defrost

Move upper lever backward (DEF) position.

Move lower lever backward (HOT/DEF) position.

Temperature Control Switch to OFF.

Switch fan speed to Fast.

Close face level vents for best defrost performance.

Air to Screen and Footwells

Move upper lever between the centre position and (DEF) position.

Move lower lever to temperature setting requlred.

Temperature Control Switch to OFF.

Select fan speed required.

De-humidifed air can be obtained in the heater mode with upper lever set to either footwells (▼) or defrost screen (DEF) and by switching on the Temperature Control Switch to maximum (COLD). The compressor will switch on, providing the ambient temperature of incoming air is above freezing point.

Fresh Air from Face Level Vents

Move upper lever between the centre position and (OFF/AC) position.

Move lower lever forward (COLD) position.

Temperature Control Switch to OFF.

Select fan speed to suit or use ram effect.

Fresh air may be obtained from both outboard face level vents, when the air conditioning unit is set in the heating mode.

CHARGING UNIT WITH REFRIGERANT

The procedure for charging the air condition system is supplied by the manufacturer of the ctiorging trolley used; follow this procedure carefully.

Before chorging the system it is first necessary to evacuate the system for the following reasons:

1. All air is removed from the system to ensure it can be fully charged.
2. All moisture is removed, which could be harmful to the system.
3. It provides a means of checking far leaks, which may occur in a faulty connection.

Evacuate the system to a vacuum to 28 inches of mercury (28in Hg) for NOT LESS THAN 20 minutes. The hold period of 20 minutes will allow any leaks to be seen easily and purge the system of any moisture.

The system is charged with 1.4kg (3lbs) of 'Refrigerant 12', which is made up from 'Freon 12' and 'Arcton 12'. After charging the system it must be checked for gassing, using the following procedure:

1. Start the engine and adjust engine rpeed to 1200 r.p.m.
2. Set the upper control lever in forward position to the OFF/AC position and the lower lever forward to the COLD position. Set FAN switch to fast speed and turn the temperoture control switch fully clockwise.
   Check when the temperoture control switch is turned clockwise towards the COLD position, that the cooling fans automatically switch 'on'.
3. View the refrigerant through the sight glass on the top of the receiver-drier, after 5 minutes running there should be no bubbles visible (gassing); an occasional bubble is however acceptable. If the ambient temperature is below 4°C, continuous gassing may occur, it is therefore advised to carry

out the checks in a covered garage.

4. Increase the engine speed to 2000 r.p.m. and check that the refrigerant passing the sight glass is clear of bubbles. If a continuous stream of bubbles still persists then, the refrigerant charge should be increased until the bubbles are no longer present.

5. Before disconnecting the service valves from the compressor, check the system for leaks using a leok detector capable of detecting a leak of 1 lb in 32 years. This leak standard applies to all connections except the following:

   1. Compressor front seal
   2. Uncapped Schraeder valves
   3. Sight glass

   The leak standard for the above is 1 lb in 10 years. It will therefore be necessary to have a leak detector capable of covering both standards. It is recommended that the leak test be performed in a halogen-free atmosphere with no significant droughts of air.

CONDENSER

To Remove

1. Depressurise the air conditioning system by slackening the union nut securing the pipe to the receiver-drier. Take the necessary precautions described under the heading 'Refrigerant Pipework'.

2. From under the front of the vehicle, release the pipes from each side of the condenser. Take the necessary precautions described under the headlng 'Refrigerant Pipework'.

3. Release the condenser from the mounting brackets and remove the condenser.

To Replace

1. Reverse the removal procedure. Before assembling the pipework add one fluid ounce of refrigerant oil to the system and lubricate the flared ends and union threads with refrigerant oil. See under heading 'Refrigerant Lubricants' for recommended refrigerant oils. DO NOT USE ANY OTHER LUBRICANT. Tighten all unions to a torque loading of 3.46-3.87 kg.m (25-28 lbs.ft.).

2. Recharge the system with refrigerant as previously described.

RECEIVER-DRIER

To Remove

1. Depressurise the system as previously described.

2. Release the inlet and outlet unions on the receiver-drier, using two spanners (one on each union). Cap off all pipes ond unions IMMEDIATELY the joints ore opened.

3. Release the clamp bolts securing the receiver-drier to the body and lift out unit from the clamp.

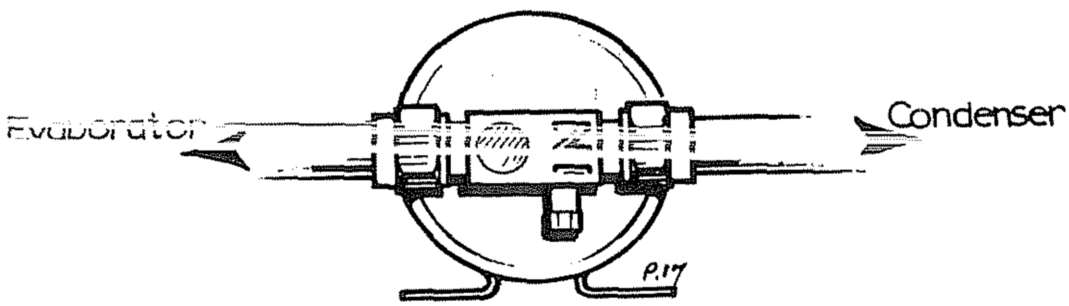


Fig. 4 - Connections on receiver-drier

To Replace

To Replace

1. Reverse the removal procedure, taking care to connect the union end marked 'IN' an the receiver-drier to the pipe to the condenser. Before connecting pipe unions add one ounce of refrigerant oil into the system. Lubricate the flared ends and union threads with refrigerant oil. See under heading 'Refrigerant Lubricants' for recommended refrigerant oils, DO NOT USE ANY OTHER LUBRICANT. Tighten all unions to a torque loading of 3.46-3.87kg.m (25-28 lbs.ft.).
2. Recharge the system with refrigerant as previously described.

AIR CONDITIONING UNIT

To Remove

. Drain the cooling system as described in the COOLING SYSTEM section of this manu
Disconnect the battery terminals.

From inside the front comportment remove the following:

2. Unscrew and remove the cover over the motor assembly on the front compartment bulkhead.

3. Disconnect the wires to the motor, unscrew the two screws securing the motor assembly and pull out the motor assembly.

4. Remove the vacuum pipe from the vent flap actuator and push back the wires, that were connected to the motor, through into the interior of the vehicle.

5. Unscrew the two screws securing the bracket holding the outboard end of the small vent flap. Release the other end of the flap, where it is retalned In the actuator mounting bracket, using an Allen Key. Remove the small vent flap.

6. Through the aperture now exposed, when small vent flap removed, remove the screw securing the water valve to the top of the pedal box. Release hose clip on inlet water hose, from underneath the vehicle, and pull off Inlet water hose. Do not remove the other hose on the valve, it is connected to the unit. Disconnect the control cable to the water valve at the solderless nipple.

. Unscrew and remove the four screws securing the dividing panel, these are located three, dawn one side and one near the top edge of the other side, Do not attempt to remove panel at this stage.

From inside the vehicle (passenger side) remove the following:

8 Remove the binnacle, facia and tunnel trim assemblies, together with the radio, if fitted. This will expose the two flexible hoses to the vents, pull off the flexible hoses from the top pipe connectors.

3. Unscrew the three screws securing the nozzle assembly and remove nozzle.

10. Disconnect drain pipe at bottom of unit on passenger side footwell.

11. Disconnect the two coolant pipes carrying Freon, taking the necessary precautions as specified under the heading REFRIGERANT PIPEWORK.

12. Remove the face level vent and pipe on the passenger ride. The vent is retained by spring back clips (one each side), using a screwdriver or similar from the underside of the Facia, close the clips and withdraw vent.

13. Unscrew the two screws securing the dimister, remove dimirter. It may be necessary to use a right-angled posidrive tool to gain access to the screws.

14. From inside the vehicle remove the two remaining screws securing the dividing panel on the front compartment bulkhead. These screws are situated along the lower edge of the panel. Pull back wheel arch carpet and felt as far as possible and cut through sealing compound around the panel with a knife. Remove panel from inside the front compartment by pulling out and to the aide of the vehicle.

15. Remove the bonnet release mechanism lever.

16. To simplify removal of the unit, remove the bottom support bracket completely. Remove the two screws securing the bracket to the base of the nozzle opening and remove the two rivets attaching the bracket to the tunnel.

17. From the tee connector in the vacuum control piping, remove the pipe from the engine. This pipe is identified as the pipe which is routed from the engine compartment with the refrigerant pipes.

<u>From the driver's side of the vehicle remove the following:</u>

18. Remove the return water hose (top connector).

19. Check that the control cable to the A/C lever in the binnacle is free. If attached unscrew the right-hand control panel in the binnacle and release the cable from the lever.

20. Disconnect the 2-pin plug carrying the black and white wires.

21. Ensure the flexible pipes to the binnacle vent and the dimister vent ore free and will not impede the withdrawal of the unit.

22. Pull through the motor power cables aver the top of the unit, taking care not to damage the connectors on the cable ends.

CAUTION:

Take care not to damage the capillary pipe to the water valve when removing the A/C unit from the vehicle.

23. Remove the air conditioning unit from the passenger side of the vehicle.

To Replace

1. Reverse the removal procedure. Make sure when theairconditioning unit is being relocated in the vehicle, the short control cable is fed corefully through the hole in the facia, avoid kinking.

2. After all control cables and pipes have been connected check for correct operation and make adjustments where necessary.

3. Clean the sealing surfaces around the dividing panel ond the bulkhead, ond apply new sealant taking particular care around the bottom of the panel.

4. When making the vacuum pipe connections use Avdel bond No. 2 or similar. With the engine running and before the bulkhead cover is fitted, check that the vacuum actuators operate the flaps correctly.

Fitting a new air conditioning unit

1. Ensure there is a clearance between the vacuum control valve assembly and the bonnet release bar. The air conditioning unit should be slightly tilted away from the valve assembly, make sure this is so before marking the position of the rivets for the bottom fixing bracket.

2. It is important that the new unit is positioned correctly. With the unit in the vehicle and the fan motor unit not fitted, the dimension from the inboard edge of the large hole in the bulkhead (passenger's side) to the end of the unit (where fan motor unit fits) must be within 195mm to 200mm.

COMPRESSOR

The compressor is factory charged wiih 6 ± 0.5 fluid ounces (175 ± 15cc) of refrigerant oil with a viscosity of 500. Only oils listed under RECOMMENDED REFRIGERANT OIL should be used when adding or changing the oil.

To Remove

1. Depressurise the air conditioning system by slackening the union nut securing the pipe to the receiver-drier. Take the necessary precautions described under the heading 'Refrigerant Pipework'.

2. Remove the pipe connections to the compressor, taking the necessary precautions described under the heading 'Refrigerant Pipework'.

3. Loosen arid remove the compressor drive belt and disconnect the electrical connections to the compressor clutch.

4. Remove the two nuts and bolts securing the compressar to the mounting bracket. Drain the oil from the compressor and measure the amount drained. Make a note of the amount of oil drained as this information is required when replacing the compressor.

To Replace

1. Reverse the removal procedure. Refill the compressor with the same amount of new oil as that drained during removal, plus an additional one fluid ounce. Before assembling the pipework lubricate the flared ends and union threads with refrigerant ail.

2. Recharge the system as previously described.

3. The compressor drive belt should be correctly tensioned to give a total movement of 9mm (0.35ins) on the longest run of belt.

To Fit New Compressor

The following procedure is to be used when replacing a compressor containing uncontaminated ail with a new compressor.

1. Drain the oil from the new compressor.

2. Drain and measure the oil from the old compressor.

3. Refill the new compressor with an amount of new oil equal to that drained from the old Compressor, plus an additional one fluid ounce (30cc) of new oil.

NOTE: Satisfactory operation of the compressor depends an there being sufficient oil in the system and too much oil will decrease the cooling efficiency.

RECOMMENDED REFRIGERANT OIL

The refrigerant oil recommended for use in the compressor and to lubricate flared pipe ends and union threads are:

Frigidair 525
Shell Clavus Oil 33
Texaco Capella E (Waxfree)
Sunisco 5
BP Energol LPT500

NOTE: (a) The above oils ore not given in any order of preference and all are equally suitable.

(b) Keep the oil contoiner tightly copped at all times.

Add additional oil in the following amounts for any of the system components listed which are being replaced:

Receiver-Driver	1 fluid oz.
Condenser	1 fluid oz.
Evaporator (air conditioning unit)	3 fluid ozs.

REFRIGERANT LEVEL CHECKING PROCEDURE

To check the refrigerant oil level during servicing of the Compressor or the system, proceed in the following manner:

1. Run the compressor at the engine idle speed for 10 minutes.
2. Recover all the refrigerant 12 from the compressor, belng careful not to lose any oil.
3. Place the angle gauge (Sankyo Part No. 32448) across the top of the top two mounting lugs. Centre the bubble in the level indicator and read off the mounting angle of the compressor to the nearest degree.
4. Remove the oil filler plug and looking through the plug hole, centre the internal parts as they move towards the rear of the compressor (discharge stroke). This will allow the dipstick to be inserted to its full length.

5. Insert dipstick (tool number 32447) with the angled 'stop' towards highest part of compressor, just inside the plug hole. Align the angled bottom of the 'stop' with the top surface of the oil filler hole, and insert the dipstick until it reaches the 'stop'.

6. Remove the dipstick and count the number of increments covered with oil.

7. Compare the measurement taken in 3 (compressor angle) and the oil level increment with those shown in following table.

Mounting Angle in Degrees	Acceptable oil level in Increments
0	4 to 6
10	6 to 8
20	7 to 9
30	8 to 10
40	9 to 11
50	9 to 11
60	9 to 12

8. If the increments indicated on the dipstick do not fall between the figures given in the above table, odd or subtract oil until the mid-range figure is achieved.

9. Refit oil filler plug and tighten to 6 to 9 ft. lbs. (0.8 to 1.2kg-m). Ensure the 0-ring is not twisted and that the 0-ring seating is clean before fitting. Do not overtighten if plug leaks, fit a new 0-ring. Re-charge the system with refrigerant as previously described.

REFRIGERANT QUICK-CHECK PROCEDURE

The following procedure can be used to quickly determine if the air conditioning system has its required charge of refrigerant. This check facilitates system diagnosis by pin-pointing the problem to the amount of charge in the system, or by eliminating this possibility from the overall diagnosis.

Start engine and 'run' at 1200 r.p.m. Set controls for maximum cold, with fan at fast speed

	Symptom	Cause	Remedy
a)	Continuous bubbles present in sight glass.	System low on charge.	Check with leok detector. Correct leak, if any, and fill system to correct charge.
b)	No bubbles. Sight glass clear.	System is either fully charged or empty.	Feel high and low pressure pipes of compressor. High pressure pipe should be warm, low pressure pipe should be cold.
c)	No appreciable temperature differential noted at compressor.	System empty, or nearly empty.	Switch 'off' engine. Re-charge system with refrigerant, and check with leok detector.
d)	Temperature differential noted at compressor.	Even though a differential is noted, there exists a possibility of overcharge. An overcharge filled system will result in poor cooling.	Check by disconnecting the compressor clutch connection (at upper front) while observing the sight glass.
	Refrigerant in sight glass remains clear for more than 45 secs., before foaming and settling away from glass.	System over-charged.	Verify with performance checks.
	Refrigerant foams and settles away from sight glass in less than 45 secs.	System correctly charged.	Continue checking out system using checks as previously given.