STAG

REPAIR OPERATIONS MANUAL

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SERVICE DIVISION

TRIUMPH MOTORS

BRITISH LEYLAND UK LIMITED

COVENTRY ENGLAND

A MEMBER OF THE BRITISH LEYLAND MOTOR CORPORATION

Purchasers are advised that the specification details set out in this Manual apply to a range of vehicles and not to any one. For the specification of a particular vehicle, purchasers should consult their Distributor or Dealer.

The Manufacturers reserve the right to vary their specifications with or without notice, and at such times and in such manner as they think fit. Major as well as minor changes may be involved in accordance with the Manufacturer's policy of constant product improvement.

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INTRODUCTION

The purpose of this manual is to assist skilled mechanics in the efficient repair and maintenance of British Leyland vehicles. Using the appropriate service tools and carrying out the procedures as detailed will enable the operations to be completed in the time stated in the 'Repair Operation Times'.

Indexing

For convenience, the manual is divided into a number of divisions. Page 01–3 lists the titles and reference number of the various divisions.

A list of the operations within each division appears in alphabetical order on the page preceding each division.

Operation Numbering

A master index of numbered operations has been compiled for universal application to all vehicles manufactured by the British Leyland Motor Corporation and, therefore, because of the different specifications of various models, continuity of the numbering sequence cannot be maintained throughout this manual.

Each operation described in the manual is allocated a number from the master index and cross-refers with an identical number in the 'Repair Operation Times'. The number consists of six digits arranged in three pairs.

Each instruction within an operation has a sequence number and, to complete the operation in the minimum time, it is essential that the instructions are performed in numerical sequence commencing at 1 unless otherwise stated. Where applicable, the sequence numbers identify the relevant components in the appropriate illustration.

Emission Control and Air Conditioning Equipment

With the exception of Sections 17 and 82, all remaining sections of this manual relate to basic vehicles not fitted with *anti-pollution* or *air conditioning* equipment. Where an operation is affected by the presence of this equipment, refer also to Anti-pollution (Section 17) and Air-conditioning (Section 82), as appropriate.

Service Tools

Where performance of an operation requires the use of a service tool, the tool number is quoted under the operation heading and is repeated in, or following, the instruction involving its use. An illustrated list of all necessary tools is included in section 99.

References

References to the left- or right-hand side in the manual are made when viewing from the rear. With the engine and gearbox assembly removed, the 'timing cover' end of the engine is referred to as the front. A key to abbreviations and symbols is given on page 01–5.

Amendments

Revised and additional procedures resulting from changes in the vehicle specifications will be issued as additional pages.

The circulation of amendments will be confined to Distributors and Dealers of British Leyland Motor Corporation Limited.

REPAIRS AND REPLACEMENTS

When service parts are required it is essential that only genuine British Leyland Stanpart or Unipart replacements are used.

Attention is particularly drawn to the following points concerning repairs and the fitting of replacement parts and accessories.

Safety features embodied in the car may be impaired if other than genuine parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the vehicle manufacturer's specification. Torque wrench setting figures given in the Repair Operation Manual must be strictly adhered to. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed. Owners purchasing accessories while travelling abroad should ensure that the accessory and its fitted location on the car conform to mandatory requirements in their country of origin.

The car warranty may be invalidated by the fitting of other than genuine British Leyland parts. All British Leyland Stanpart or Unipart replacements have the full backing of the factory warranty.

British Leyland Distributors and Dealers are obliged to supply only genuine service parts.

ABBREVIATIONS AND SYMBOLS

Across flats (bolt size)	A.F.
After bottom dead centre	A.B.D.C.
After top dead centre	A.T.D.C.
Alternating current	a.c.
Amperes	amp
Ampere-hour	Ah
Before bottom dead centre	B.B.D.C.
Before top dead centre	B.T.D.C.
Bottom dead centre	B.D.C.
Brake horse-power	b.h.p.
Brake mean effective pressure	b.m.e.p.
British Standards	B.S.
Carbon monoxide	CO
Centigrade (Celsius)	C
Centimetres	cm
Cubic centimetres	cm^3
Cubic inches	in^3
Cycles per minute	c/min
Degree (angle)	deg. or °
Degree (temperature)	deg. or °
Diameter	dia.
Direct current	d.c.
Fahrenheit	F
Feet	ft
Feet per minute	ft/min
Fifth	5th
Figure (illustration)	Fig.
First	1st
Fourth	4th
Gallons (Imperial)	gal
Gallons (U.S.)	U.S. gal
Grammes	g
High compression	h.c.
High tension (electrical)	h.t.
Horse-power	hp
Hundredweight	cwt
Inches	in
Inches of mercury	inHg
Independent front suspension	i.f.s.
Internal diameter	i.dia.
Kilogrammes (force)	kgf
Kilogrammes (mass)	kg
Kilogramme centimetre	kgf cm
Kilogramme metres	kgf m
Kilogrammes per square centimetre	kg/cm^2
Kilometres	km
Kilometres per hour	km/h
Kilovolts	kV
King pin inclination	k.p.i.
Left-hand	L.H.
Left-hand steering	L.H.Stg.
Left-hand thread	L.H.Thd.
Low compression	l.c.
Low tension	l.t.
Maximum	max.
Metres	m
Microfarad	mfd
Midget Edison Screw	MES
Miles per gallon	m.p.g.
Miles per hour	m.p.h.
Millimetres	mm
Millimetres of mercury	mmHg
Minimum	min.
Minus (of tolerance)	—
Minute (of angle)	′
Negative (electrical)	—
Number	No.
Ohms	ohm
Ounces (force)	ozf
Ounces (mass)	oz
Ounce inch (torque)	ozf in
Outside diameter	o.dia.
Overdrive	O/D
Paragraphs	para.
Part Number	Part No.
Percentage	%
Pints (Imperial)	pt
Pints (U.S.)	U.S. pt
Plus or minus	±
Plus (tolerance)	+
Positive (electrical)	+
Pounds (force)	lbf
Pounds (mass)	lb
Pounds feet (torque)	lbf ft
Pounds inches (torque)	lbf in
Pounds per square inch	lb/in^2
Radius	r
Ratio	:
Reference	ref.
Revolutions per minute	rev/min
Right-hand	R.H.
Right-hand steering	R.H.Stg.
Second (angle)	″
Second (numerical order)	2nd
Single carburetter	SC
Society of Automobile Engineers	S.A.E.
Specific gravity	sp. gr.
Square centimetres	cm^2
Square inches	in^2
Standard	std.
Standard wire gauge	s.w.g.
Synchronizer/synchromesh	synchro.
Third	3rd
Top dead centre	T.D.C.
Twin carburetters	TC
United Kingdom	UK
Volts	V
Watts	W
Screw threads	
American Standard Taper Pipe	N.P.T.F.
British Association	B.A.
British Standard Fine	B.S.F.
British Standard Pipe	B.S.P.
British Standard Whitworth	B.S.W.
Unified Coarse	U.N.C.
Unified Fine	U.N.F.

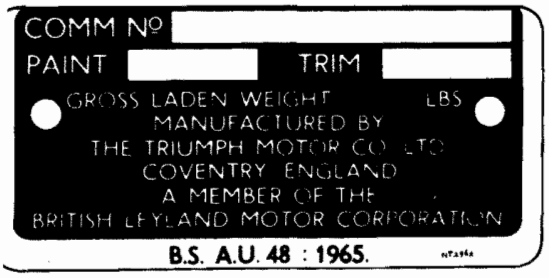


Fig. 1

LOCATION OF COMMISSION AND UNIT NUMBERS

The Commission Number (*Fig.* 1) is the identification number which is required for registration and other purposes. It is stamped on a plate attached to the left-hand side door pillar (*Fig.* 2) and is visible when the door is opened, e.g. **LD 1234 L C BW.** On U.S.A. Market cars the commission number is also stamped on a small plate visible through the left-hand side of the windscreen. The significance of this example is as follows:**

LD — this prefix denotes 'Stag' model range.
1234 — is the accumulated total build of this model.
L — denotes Left-Hand Steering.
(No letter is given to Right-Hand Steering models.)
C — denotes body type, e.g. Convertible.
BW — denotes Borg-Warner Transmission. Alternatively:
O — would denote Overdrive.
(No letter is given where a manual gearbox is fitted.)

The commission number-plate also bears code symbols for identification of the vehicles exterior colour, trim material and trim colour. Refer to page 04–6.

The Engine Number (*Fig.* 3) is stamped on a machined flange on the left-hand bank of the cylinder block and is visible between nos. 6 and 8 exhaust ports, e.g. **LD 27 HE.** On later models the engine number is stamped on a casting flange where the engine joins the transmission unit and is visible by looking down onto this flange. The significance of this example is as follows:**

LD — this prefix denotes the model range.
27 — is the total built of this type.
H — denotes high compression. Alternatively:
L — would denote low compression.
E — denotes engine unit.

The Gearbox (manual) Number (*Fig.* 4) is stamped on the left-hand side of the housing.

The serial and type (prefix 9EZ) numbers of Borg-Warner units (*Fig.* 5) appear on a green plate affixed to the left-hand side of the transmission casing.

The Rear Axle Number (*Fig.* 6) is stamped on the hypoid housing flange.

Important: In all communications relating to Service and Spares it is essential to quote commission number, paint and trim codes and unit number (if applicable).

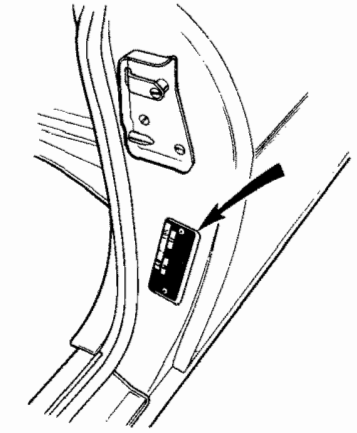


Fig. 2

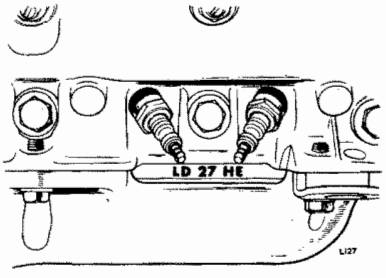


Fig. 3

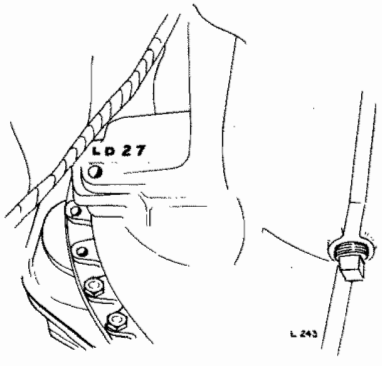


Fig. 4

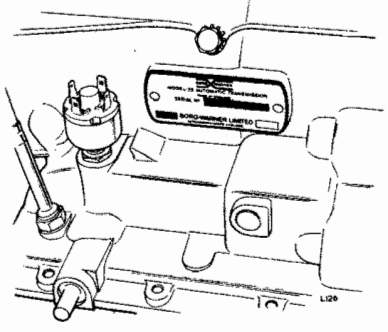


Fig. 5

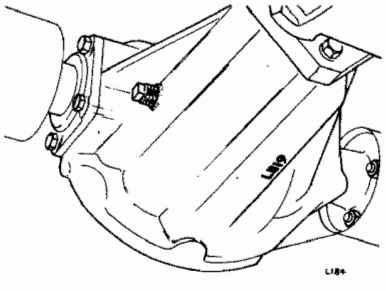


Fig. 6

AMENDMENTS

** To assist in identifying amendments on revised pages, two stars (**) will be inserted at the beginning and end of the amended paragraph, section, instruction or illustration.

To ensure that a record of amendments to this manual is available, this page will be re-issued with each set of revised pages. The amendment number, date of issue, appropriate instructions and revised page numbers will be quoted.

Revised pages must be inserted in place of existing pages carrying the same number, and the old pages discarded.

Additional pages or complete major assembly groups may be issued. In such cases the new pages must be inserted immediately following the existing pages carrying the next lowest number.

Issue Code	Filing Instructions				Issue Code	Filing Instructions			
	Discard	Issue	Insert	Issue		Discard	Issue	Insert	Issue
02/73	01—2	1	01—2	2	02/73	12.17.16	1	12.17.16.	2
	01—6	1	01—6	2		12.21.26	1	12.21.26	2
	01—7	1	01—7	2		12.29.12 Sheet 2	1	12.29.12 Sheet 2	2
	04—1	1	04—1	2		12.29.18	1	12.29.18	2
	04—3	1	04—3	2		12.29.34 Sheet 2	1	12.29.34 Sheet 2	2
	04—5	1	04—5	2		12.45.01	1	12.45.01	2
	05—1	1	05—1	2		12.53.01	1	12.53.01	2
	06—1	1	06—2	2		12.60.14	1	12.60.14	2
	06—3	1	06—4	2		17—1	1	17—1	2
	06—5	1				17.15.00	1	17.15.00	2
	09—1	1	09—1	2		17.15.13	1	17.15.13	2
	10—1	1	10—1	2		17.20.00 Sheet 2	1	17.20.00 Sheet 2	2
	10.00.01	1	10.00.01	2		17.20.01	1	17.20.07	2
	10.00.03	1	10.00.03	2		17.30.01	1	17.30.00	2
	10.10.01 Sheet 2	1	10.00.05	1		17.30.25	1	17.30.05	2
	10.10.01 Sheet 4	1	10.00.07	1				17.35.01	1
	10.10.01 Sheet 6	1	10.00.09	1		19.10.01	1	19.10.01	2
	10.10.03 Sheet 2	1	10.00.11	1		19.15.02 Sheet 2	1	19.15.02 Sheet 2	2
	10.10.03 Sheet 4	1	10.00.13	1		19.15.18 Sheet 3	1	19.15.18 Sheet 3	2
	10.10.06 Sheet 2	1	10.00.15	1		19.55.01	1	19.55.01	2
	10.10.12	1	10.00.17	1		26.00.01	1	26.00.01	2
	10.10.12 Sheet 3	1	10.00.19	1		26.10.01	1	26.10.01	2
	10.10.24	1	10.00.21	1		26.25.21	1	26.25.21	2
	10.10.24 Sheet 3	1	10.00.23	1		26.40.01	1	26.30.46	2
			10.00.25	1		26.50.01	1	26.45.09	2
	12.10.14 Sheet 3	1	12.10.14 Sheet 3	2		26.50.06 Sheet 2	1	26.50.06 Sheet 2	2
	12.17.01	1	12.17.01	2		30.10.26	1	30.10.26	2

Issue Date	Filing Instructions			
	Discard	Issue	Insert	Issue
02/73	30.15.02	1	30.15.02	2
	33.00.01	1	33.00.01	2
	37.10.01	1	37.10.01	2
	37.12.19 Sheet 2	1	37.12.19 Sheet 2	2
	37.20.25 Sheet 2	1	37.20.25 Sheet 2	2
	37.20.25 Sheet 4	1	37.20.25 Sheet 4	2
	37.20.25 Sheet 7	1	37.20.25 Sheet 7	2
	40.10.01	1	40.10.01	2
	40.20.01	1	40.20.01	2
	40.20.10	1	40.20.10	2
	40.20.10 Sheet 4	1	40.20.10 Sheet 4	2
	40.22.01	1	40.22.01	2
	51.25.19 Sheet 2	1	51.25.19 Sheet 2	2
	51.25.19 Sheet 4	1	51.25.19 Sheet 4	2
	57—1	1	57—1	2
	57.00.02	1	57.00.01	2
			57.00.02 Sheet 2	1
			57.00.05	1
	57.10.01	1	57.10.01	2
	57.10.13	1	57.10.13	2
	57.10.23	1	57.10.23	2
	64.35.05	1	64.35.05	2
	70.00.01	1	70.00.01	2
	70.10.10	1	70.10.10	2
	70.10.26	1	70.10.26	2
	70.20.02	1	70.20.02	2
	70.35.01	1	70.35.01	2
	70.35.09	1	70.35.09	2
	76—1	1	76—1	2
			76.10.01 Sheet 1	1
			76.10.01 Sheet 3	1
	76.10.05	1	76.10.44	2
	76.16.01	1	76.16.01	2
			76.16.34	1
	76.22.01	1	76.22.01	2
	76.28.01	1	76.28.01	2

Issue Date	Filing Instructions			
	Discard	Issue	Insert	Issue
02/73	76.31.28	1	76.31.01	2
	76.37.39	1	76.34.01	2
			76.40.27	2
	76.49.01	1	76.49.01	2
			76.58.18	2
	76.61.08	1	76.61.14	2
	76.61.20	1	76.67.14	2
	76.70.26	1	76.70.27	1
	76.81.01	1	76.76.05	1
			76.81.01 Sheet 2	2
	80.15.03	1	80.15.03	2

ENGINE

Number of cylinders	8, in 'V' configuration
Bore of cylinders	86 mm (3·385 in)
Stroke of crankshaft	64·5 mm (2·539 in)
Displacement	2997 cm² (182·9 in²)
**Maximum power: 1972 USA only	127 b.h.p. at 6,000 rev/min
U.S.A. pre 1972 and other markets	145 b.h.p. net at 5,500 rev/min
Maximum torque: 1972 USA only	1,705 lbf in at 3,200 rev/min, equivalent to 117 lbf/in² b.m.e.p.
U.S.A. pre 1972 and other markets	2,040 lbf in at 3,500 rev/min, equivalent to 140 lbf/in² b.m.e.p.**
Timing chains	R.H. bank: 9·52 mm (0·375 in) pitch × 104 pitches L.H. bank: 9·52 mm (0·375 in) pitch × 106 pitches

Lubrication

Oil warning-light	Extinguishes at 3 to 5 lb/in² (0·21 to 0·35 kg/cm²) oil pressure

COOLING SYSTEM

Thermostat	82°C (180°F)
**Pressure	13 lbf/in² (0·91 kgf/cm²) up to Commission Nos. LD 10195/LE 10,001 20 lbf/in² (1·41 kgf/cm²) from Commission Nos. LD 10195/LE 10,001**

FUEL SYSTEM

Fuel pump	S.U. AUF 303 Pressure 2·7 lbf/in² (0·19 kgf/cm²)
Carburetters	Refer to Engine Tuning Data

CLUTCH

Driven plate: Diameter	9 in (228·6 mm)
**Facing material	H 26**
Number of damper springs	6

Manual	**O/D top*	*Top*	**O/D 3rd*	*3rd*	*2nd*	*1st*	*Reverse*
Gear ratios	0·82 : 1	1·00 : 1	1·135 : 1	1·386 : 1	2·10 : 1	2·995 : 1	3·369 : 1
Overall ratios	3·04 : 1**	3·70 : 1	4·20 : 1**	5·13 : 1	7·77 : 1	11·08 : 1	12·47 : 1

Overdrive (Optional)	Laycock de Normanville, operative on 3rd and top gears
Overall ratio	0·82 : 1

Automatic (Optional) — Borg-Warner type 35

	**3rd*	*2nd*	*1st*	*Reverse*
Gearbox conversion	1·00–2·27	1·45–3·29	2·39–5·44	2·09–4·76
Overall ratio	3·70–8·41	5·37–12·20	8·85–20·14	7·75–17·62**

Maximum change-up speeds (full throttle, i.e. seven-eighths of pedal movement)

1st to 2nd gear	34 to 42 m.p.h. (54 to 67 km/h) } In relation
2nd to 3rd gear	64 to 70 m.p.h. (102 to 112 km/h) } to load

Pre-set down-change speeds ('kick-down')

3rd to 2nd gear	56 to 66 m.p.h. (90 to 105 km/h) } In relation
3rd to 2nd gear or 2nd to 1st gear	24 to 30 m.p.h. (38 to 48 km/h) } load

FINAL DRIVE

Ratio	3·7 : 1 (37 : 10)

EFFECTIVE GEARING (MANUAL TRANSMISSION)

Engine speeds (rev/min) at road speeds of:

	O/D Top	*Top*	*O/D 3rd*	*3rd*	*2nd*	*1st*	*Reverse*
10 m.p.h.	432	527	599	730	1,107	1,580	1,178
10 km/h	279	328	372	454	687	980	1,102

(Goodyear G.800 185/70 HR—14 tyres)

Engine speeds (rev/min) at road speeds of:

	O/D Top	*Top*	*O/D 3rd*	*3rd*	*2nd*	*1st*	*Reverse*
10 m.p.h.	414	505	578	705	1,070	1,530	1,720
10 km/h	258	314	359	438	665	950	1,070

(Michelin XAS 185 HR—14 tyres)

ROAD SPEED DATA

Road speeds at 1,000 rev/min engine speed:

In Top gear	19 m.p.h. (30·4 km/h)	Tyres Goodyear G.800 185/70 HR—14
In O/D Top gear	23·1 m.p.h. (37 km/h)	
In Top gear	19·8 m.p.h. (31·6 km/h)	Tyres Michelin XAS 185 HR—14
In O/D Top gear	24·1 m.p.h. (38·5 km/h)	

STEERING

Steering-wheel diameter	16 in (407 mm)
Steering-wheel turns (lock to lock): 1972	3
Pre 1972	4**
Steering-column adjustment	4 in (102 mm) approx. axially 2 in (51 mm) approx. vertically

BRAKE SYSTEM

Front	Calliper disc brakes Disc diameter: 10·625 in (270 mm) **Lining material: DON 225 FG or DON 227**
Rear	Self-adjusting drum brakes 9 in dia. × 2·25 in wide (228 mm × 57 mm) of leading and trailing shoe type Lining material: DON 202 GG Wheel cylinder diameter 0·6875 in (17·46 mm)
Servo	Direct-acting servo providing 3 : 1 nominal boost ratio
Front lining area	24 in² (150 cm²)
Rear lining area	78 in² (504 cm²)
Total lining area	102 in² (658 cm²)
Front swept area	220 in² (1420 cm²)
Rear swept area	127 in² (819 cm²)
Total swept area	347 in² (2240 cm²)

WHEELS

Steel disc type	5J, flat hump, safety ledge rims
Wire wheels	5½J flat ledge rims

TYRES

	Goodyear G.800, 185/70 HR—14 or Michelin XAS, 185 HR—14
Pressures: Front	26 lbf/in² (1·82 kgf/cm²)
Rear	30 lbf/in² (2·10 kgf/cm²)

CHASSIS DATA

Wheelbase	8 ft. 4 in (2540 mm)
**Track (4-up condition): Front Disc wheels	4 ft 4·5 in (1330 mm)
Wire wheels	4 ft 5·25 in (1350 mm)
Rear Disc wheels	4 ft 4·875 in (1342 mm)
Wire wheels	4 ft 5·375 in (1360 mm)**
Wheel alignment (unladen): Front	$\frac{1}{16}$ to $\frac{1}{8}$ in toe-in (1·6 to 3·17 mm)
Rear	0 to $\frac{1}{16}$ in toe-in (0 to 1·6 mm)

Camber and Castor

	Camber Front:	*Camber* Rear	*Castor*	*King-pin inclination*
**Unladen	1°+ive±1°	1½°+ive±1°	2°±1°	10½°±1°
Laden (4-up condition)	¼°−ive±¾°	1½°−ive±¾°	2½°±½°	11¾°±¾°**

**Ground clearance (4-up condition)	4 in (102 mm)
Turning circle (between kerbs)	33 ft 6 in (10·2 m)**

ELECTRICAL EQUIPMENT

Spark plugs	Champion N–11Y
Gap	0·024 to 0·026 in (0·625 to 0·660 mm)
Battery	12-volt
Capacity	56 amp.hr at 20-hour rate
Polarity	Negative earth
Alternator	Lucas 11AC ventilated type 540 watts output. Vee belt drive
**Distributor	Lucas type 35 D8, with centrifugal and vacuum advance control**
Coil	Lucas type 16C6, 6-volt, with ballast resistor
Starter motor	Lucas type M418G, pre-engaged type
Wiper motor	Lucas type 16W, 2-speed. Self-parking

OVERALL DIMENSIONS

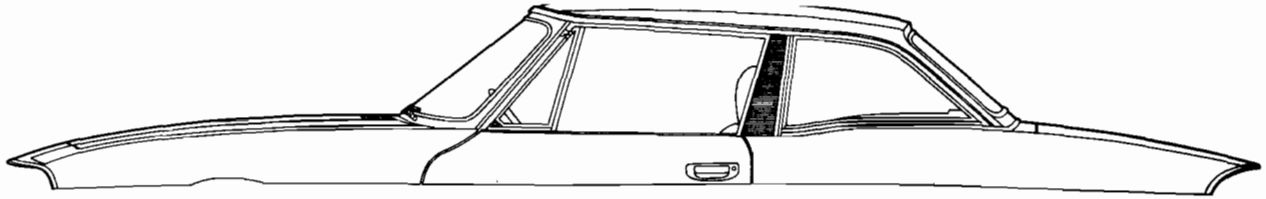
Length	173·7 in (4420 mm)
Width	63·5 in (1612 mm)
Height (unladen):	
Soft top erect	49·5 in (1258 mm)
**Hard top	49 in (1245 mm)**
Top of screen	48 in (1220 mm)

WEIGHTS (approx.)

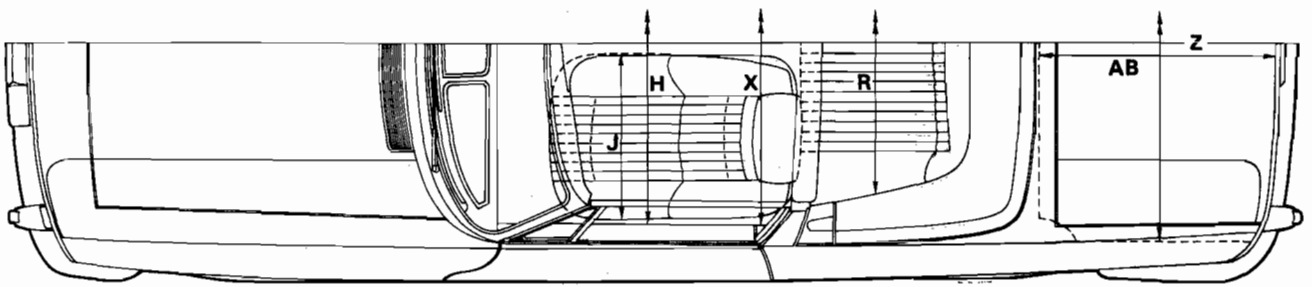
**Dry (excluding extra equipment)	2640 lb (1200 kg)
Basic unladen (including tools, fuel, oil, and water)	2807 lb (1275 kg)
Kerb (including optional extras, automatic transmission or overdrive, air conditioning, hard top)	3020 lb (1375 kg)
Maximum gross vehicle weight	3750 lb (1700 kg)**

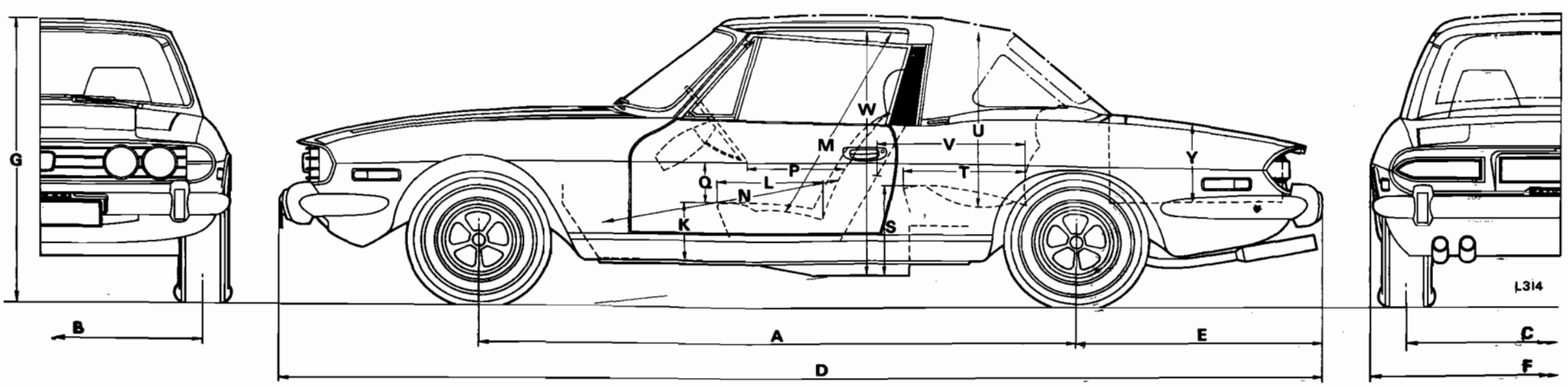
**TOWING INFORMATION

Maximum recommended trailer weight	25 cwt (1275 kg) when the trailer being towed is equipped with brakes 3·94 cwt (200 kg) when the trailer being towed is not equipped with brakes—provided that the total car and trailer laden weights do not exceed the maximum gross vehicle weight
Maximum starting gradient (fully laden car and trailer)	5·9 } with car engine in peak condition**
Maximum climbable gradient (fully laden car and trailer)	4·4 }



HARDTOP VERSION





VEHICLE DIMENSIONS

Dim.	Description	mm	inches
A	Wheelbase	2540	100·0
B	Front track	1330	52·5
C	Rear track	**1342**	52·88
D	Overall length	**4420**	173·7
E	Rear overhang	1038	40·86
F	Overall width	**1612**	63·5
G	Overall height	**1258**	49·5
H	Width door to door	1324	52·0
J	Front seat width	558	22·0
K	Front seat height floor to cushion	216	8·5
L	Front seat depth	483	19·0
M	Head-room from front seat cushion	876	34·5
N	Front seat squab to clutch pedal:		
	Max.	1002	39·5
	Min.	850	33·5
P	Steering-wheel clearance from front seat squab:		
	Max.	470	18·5
	Min.	242	9·5
Q	Steering-wheel clearance from front seat cushion:		
	Max.	204	8·0
	Min.	153	6·0

Dim.	Description	mm	inches
R	Rear seat effective width	1015	40·0
S	Rear seat height floor to cushion	279	11·0
T	Rear seat depth	**407	16·0**
U	Head-room from rear seat cushion	**818	32·5**
V	Rear seat squab to back of front seat:		
	Max.	712	28·0
	Min.	560	22·0
W	Maximum interior height	1130	44·5
X	Maximum interior width	1320	52·0
Y	Luggage compartment height:		
	Max.	330	13·0
	Min.	204	8·0
Z	Luggage compartment depth:		
	Max. (between wheel arches)	736	29·0
	Min. (to wheel arches)	533	21·0
AB	Luggage compartment width:		
	Max.	1370	54·0
	Min. (between wheel arches)	890	35·0

PAINT AND TRIM CODING SYSTEM

The commission number plate bears code symbols for identification of the vehicle's exterior colour, trim material id trim colour.

olour Code

Nine basic colours are allocated a number as shown in the table. Shades of these colours are classified as 1st shade, id shade, 3rd shade, etc. The number of each shade prefixes the basic colour to indicate the shade colour. Dual colours e identified by two code numbers separated by a stroke, e.g. 19/26 denotes 'White' and 'Wedgwood', the predominant lour being white, this symbol being quoted first.

The main trim material is identified by prefixing the colour code number with a letter, e.g.:

Leathercloth — No prefix letter
Leather — Prefix letter H
Cloth — Prefix letter C

Basic colour	Basic colour number	1st shade	2nd shade	3rd shade	4th shade	5th shade	6th shade	** 7th shade **	** 8th shade **	** 9th shade **	** 10th shade **	** 11th shade **	** 12th shade **
Black	01	11											
Red	02	12 Matador	22 Cherry	32 Signal	42 Burgundy	52 Scarlet	** 62 Inca Red **	** 72 Pimiento **	** 82 Carmine **	** 92 Magenta **			
Brown	03	13 Light Tan	23 Sienna	** 33 New Tan **	** 43 Saddle Tan **	** 53 Dark Brown **	** 63 Chestnut **						
Yellow	04	14 Jonquil	24 Wimpey	34 Jasmine	** 44 Beige **	** 54 Saffron **	** 64 Mimosa **						
Green	05	15 Cactus	25 Conifer	35 Olive	45 Lichfield	55 Laurel	** 65 Emerald **						
Blue	06	16 Midnight	26 Wedg-wood	36 Dark Blue	46 Renoir	56 Royal	66 Valencia	** 76 Print Blue **	** 86 Navy Blue **	** 96 Sapphire **	** 106 Mallard **	** 116 Ice **	** 126 French **
Purple	07	17 Damson	27 Shadow Blue										
Grey	08	18 Gunmetal	28 Dark Grey	38 Phantom	48 Dolphin	58 Shadow Blue	68 Slate	** 78 Grey **					
White	09	19 White	29 Sebring White	** 39 Honey-suckle **									

Thus: Paint 19/26 Trim 16 denotes that the vehicle is painted 'White' and 'Wedgwood', and trimmed in leathercloth oloured Midnight Blue.

NOTE: Acrylic paints bear the suffix 'A'.

ENGINE

Type	O.h.c. V8
Capacity	2997 cm³
**Compression ratio: U.S.A. 1972 only	8·0 : 1
U.S.A. pre-1972 and other markets	8·8 : 1
Idle speed (hot): U.S.A. markets	800 to 850 rev/min
European markets	700 to 750 rev/min
Fast idle speed (cold)	1,100 to 1,300 rev/min**
Firing order	1–2–7–8–4–5–6–3
No. 1 cylinder	R.H. bank—front
**Valve clearance: Inlet	0·008 to 0·010 in (0·15 to 0·20 mm)
Exhaust	0·016 to 0·018 in (0·41 to 0·46 mm)**
Valve clearance adjustment	Pallets between valve and cam followers
Location of ignition timing marks	Scale on front cover—notch on pulley
Note: Engine is timed on No. 2 cylinder, L.H. bank—front	
**Ignition timing: Static—U.S.A. market	10° B.T.D.C.
European market	14° B.T.D.C.
Dynamic	See 86.35.00**

IGNITION DISTRIBUTOR

Make/type	Lucas 35D8	
Rotation viewed on rotor	Anti-clockwise	
**	*Single Contact Breaker*	*Double Contact Breaker*
Contact breaker gap	See 86.35.00	See 86.35.00
Dwell angle	26° to 28°	34° to 38° (U.S.A. market) 29½° to 33½° (European market)
Capacitor capacity	0·18 to 0·25 mfd	0·18 to 0·25 mfd
Centrifugal advance	See 86.35.00	See 86.35.00
Vacuum advance	See 86.35.00	See 86.35.00**

SPARKING PLUGS

Make/type	Champion N–11Y
Gap	0·025 in (0·64 mm)

IGNITION COIL

Make/type	Lucas 16C6
Primary winding resistance	1·43 to 1·58 ohms

BALLAST RESISTOR

Make/type	Lucas 3BR
Resistance	1·3 to 1·4 ohms

CARBURETTER

	U.S.A. Market	*European Market*
**Make/type: 1970	Two Stromberg 175 CDSE	Two Stromberg 175 CD2S
1971	Two Stromberg 175 CDSEV	Two Stromberg 175 CDS Two Stromberg 175 CDS(E)V
1972	Two Stromberg 175 CDSEV	Two Stromberg 175 CDS(E)V
Main jet	0·100 in (2·54 mm)	0·100 in (2·54 mm)
Venturi	1·75	1·75
Needle: 1970	B1BF	B1AQ
1971	B1BF	B1AQ
1972	B1AQ	B1AQ
Float height	0·67 to 0·71 in (16 to 17 mm)	0·629 to 0·669 in (16 to 17 mm)**

Engine		kgf m	lbf ft
**Accelerator mounting bracket assembly to inlet manifold	¼" U.N.C.	0·7 to 1·0	5 to 7
Adjusting link to alternator	5/16" U.N.F.	2·2 to 2·8	16 to 20
Alternator to boss on timing cover	5/16" U.N.F.	2·2 to 2·8	16 to 20
Camshaft bearing cap and cover stud	5/16" U.N.C./U.N.F.	0·15 to 0·30	1 to 2
Camshaft bearing cap stud	5/16" U.N.C./U.N.F.	1·4 to 2·0	10 to 14
Camshaft cover to cylinder head	¼" U.N.C.	0·15 to 0·30	1 to 2
Carburetter adaptor attachment	⅜" U.N.F.	3·3 to 4·4	24 to 32
Carburetter to adaptor	5/16" U.N.C./U.N.F.	2·1 to 2·8	15 to 20
Chain wheel to camshaft	¼" U.N.F.	1·0 to 1·4	7 to 10
Chain wheel to idler shaft	⅜" U.N.F.	4·1 to 5·2	30 to 38
Clutch extension housing to cylinder block	5/16" U.N.F.	2·2 to 3·0	16 to 22
Clutch to flywheel	5/16" U.N.F.	2·2 to 3·0	16 to 22
Connecting rod bolt	⅜" U.N.F.	5·2 to 6·4	38 to 46
Crankshaft pulley to crankshaft	⅝" U.N.F.	12·4 to 16·6	90 to 120
Crankshaft to cylinder block sealing detail	¼" U.N.F.	1·0 to 1·4	7 to 10
Cylinder head attachment bolt	7/16" U.N.C.	6·2 to 7·6	45 to 55
Cylinder head attachment stud	7/16" U.N.C.	6·2 to 7·6	45 to 55
Distributor attachment	¼" U.N.F.	1·0 to 1·4	7 to 10
Elbow to carburetter	5/16" U.N.C.	2·1 to 2·8	15 to 20
Engine mounting bracket to cylinder block R.H./L.H.	5/16" U.N.F.	2·2 to 3·0	16 to 22
Exhaust manifold attachment	⅜" U.N.C.	See Note†	
Exhaust manifold outlet stud	5/16" U.N.F.	1·4 to 1·9	10 to 14
Fan coupling to crankshaft	⅜" U.N.F.	3·6 to 4·7	26 to 34
Fan coupling to fan	5/16" U.N.F.	1·4 to 1·9	10 to 14
Flywheel to crankshaft	⅜" U.N.F.	4·8 to 6·2	35 to 45
Idler shaft keep plate screw	5/16" U.N.F.	2·2 to 3·0	16 to 22
Inlet manifold attachment	5/16" U.N.C.	2·1 to 2·8	15 to 20
Lifting eye to cylinder head	5/16" U.N.C.	2·1 to 2·8	15 to 20
Main bearing caps to block	7/16" U.N.F.	6·9 to 9·0	50 to 65
Oil filter to block	⅜" U.N.F.	2·1 to 2·8	15 to 20
Oil pressure indicator switch	⅛" Dryseal	0·7 to 1·0	5 to 7
Oil pump assembly to cylinder block	5/16" U.N.F.	2·2 to 3·0	16 to 22
Oil sump drain plug	⅜"×18 Dryseal	2·8 to 3·5	20 to 25
‡Oil sump to cylinder block	5/16" U.N.F.	2·1 to 2·8	15 to 20
Quadrant to timing cover	5/16" U.N.C.	2·1 to 2·8	15 to 20
Sparking plug	14 mm	1·9 to 2·8	14 to 20
Suction pipe to cylinder block	¼" U.N.F.	0·8 to 1·4	6 to 10
Timing chain cover attachment	5/16" U.N.F.	2·1 to 2·8	15 to 20
Timing chain tensioner to cylinder block	¼" U.N.F.	1·0 to 1·4	7 to 10
Timing cover support bracket and chain guide to cylinder block	5/16" U.N.F.	2·1 to 2·8	15 to 20
Timing cover to cylinder head	5/16" U.N.F.	2·1 to 2·8	15 to 20
Transfer block oil gallery	⅜" U.N.F.	3·6 to 4·7	26 to 34
Water elbow retaining	5/16" U.N.F.	2·1 to 2·8	15 to 20
Water pump cover	5/16" U.N.F.	2·1 to 2·8	15 to 20
Water pump retaining bolt	5/16" U.N.C.	1·4 to 1·9	10 to 14
Water transfer housing to cylinder head	5/16" U.N.C.	2·1 to 2·8	15 to 20

† Outer 4 sets tightened to 16 to 22 lbf ft (2·2 to 3·0 kgf m). Inner 3 sets tightened to 26 to 34 lbf ft. (3·6 to 4·7 kgf m)

‡ Should maintain a minimum of 18 lbf ft (1·1 kgf m) after a settling period.**

		kgf m	lbf ft
Gearbox			
**Cap to top cover	¼" U.N.F.	1·0 to 1·4	7 to 10
Change speed lever attachment	5/16" U.N.C.	1·0 to 1·4	7 to 10
Clutch slave cylinder to gearbox extension housing	5/16" U.N.F.	2·1 to 2·8	15 to 20
Countershaft and reverse shaft to gearbox, rear of countershaft	5/16" U.N.C.	1·4 to 1·9	10 to 14
Countershaft end cover to gearbox	5/16" U.N.C.	2·1 to 2·8	15 to 20
Drain plug (magnetic)	⅜" × 18 Dryseal	2·1 to 2·8	15 to 20
Front end cover to gearbox	5/16" U.N.C.	2·1 to 2·8	15 to 20
Fulcrum pin to gearbox	⅜" U.N.F.	2·8 to 3·5	20 to 25
Gearbox casing to clutch housing extension	5/16" U.N.F.	2·1 to 2·8	15 to 20
Gearbox casing to clutch housing extension	⅜" U.N.F.	3·6 to 4·7	26 to 34
Gearbox extension to gearbox	5/16" U.N.C.	2·1 to 2·8	15 to 20
†Gearbox extension to rear mounting	5/16" U.N.F.	1·5 to 2·2	11 to 16
Mainshaft flange to shaft	¾" U.N.F.	12·4 to 16·6	90 to 120
Oil level plug	⅜" × 18 Dryseal	2·8 to 3·5	20 to 25
Propeller shaft attachment	⅜" U.N.F.	3·6 to 4·7	26 to 34
Selector cover plate to gearbox	¼" U.N.F.	0·8 to 1·4	6 to 10
Selector to shaft	5/16" U.N.F.	1·0 to 1·4	7 to 10
Speedometer driven gear and bracket to extension	¼" U.N.F.	0·8 to 1·4	6 to 10
Starter motor to engine extension	⅜" U.N.C.	3·6 to 4·7	26 to 34
Top cover to gearbox	5/16" U.N.C.	2·1 to 2·8	15 to 20
Overdrive			
Cap to top cover and overdrive switch bracket	¼" U.N.F.	0·8 to 1·2	6 to 9
Overdrive unit retaining	5/16" U.N.C.	2·1 to 2·8	15 to 20
Speedometer driven gear to overdrive rear cover	5/16" U.N.C.	0·8 to 1·2	6 to 9
Borg-Warner Transmission			
Blanking plate to pedal bracket clutch master cylinder	5/16" U.N.F.	2·1 to 2·8	15 to 20
Drive plate attachment to converter	⅜" U.N.F.	3·6 to 4·7	26 to 34
Gear lever knob locknut	5/16" U.N.F.	0·8 to 1·2	6 to 9
Kick-down cable trunnion to mounting bracket	¼" U.N.F.	1·0 to 1·4	7 to 10
Oil cooler mounting bracket to longitudinal member	5/16" U.N.F.	2·1 to 2·8	15 to 20
Oil cooler to mounting bracket L.H./R.H.	¼" U.N.F.	1·0 to 1·4	7 to 10
Propeller shaft to axle extension flange only	⅜" U.N.F.	3·6 to 4·7	26 to 34
Selector lever bolt	¼" U.N.F.	1·0 to 1·4	7 to 10
Selector lever to spindle	5/16" U.N.F.	2·1 to 2·8	15 to 20
Selector lever to unit	5/16" U.N.F.	2·1 to 2·8	15 to 20
Speedometer drive attachment	¼" U.N.C.	0·7 to 1·0	5 to 7
Spindle to selector box	¼" U.N.F.	1·0 to 1·4	7 to 10
Starter motor to engine adaptor and converter housing	⅜" U.N.F.	3·6 to 4·7	26 to 34
Torque converter housing through adaptor to engine	5/16" U.N.F.	2·1 to 2·8	15 to 20
Torque converter housing to adaptor	5/16" U.N.F.	2·1 to 2·8	15 to 20
Torque converter housing to adaptor and engine	5/16" U.N.F.	2·1 to 2·8	15 to 20

† Stud fitting torques as follows:
7 to 9 lbf ft (1·0 to 1·2 kgf m)—Standard; 5 to 7 lbf ft (0·7 to 1·0 kgf m)—Overdrive; 11 to 14 lbf ft (1·5 to 1·9 kgf m)—Borg-Warner.**

ear axle		kgf m	lbf ft
*Axle extension coupling flange to shaft	$\frac{5}{8}$" U.N.F.	12·4 to 16·6	90 to 120
Axle extension to axle	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Crown wheel retaining	$\frac{3}{8}$" U.N.F.	5·2 to 6·4	38 to 46
Hypoid bearing caps to housing	$\frac{3}{8}$" U.N.F.	4·1 to 5·2	30 to 38
Hypoid housing to rear cover	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hypoid pinion attachment slotted nut	$\frac{5}{8}$" U.N.F.	12·4 to 16·6	90 to 120
Inner axle shaft housing to hypoid housing	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Inner axle shaft to driving flange	$\frac{5}{8}$" U.N.F.	12·4 to 16·6	90 to 120
Oil level plug	3"×18 Dryseal	2·8 to 3·5	20 to 25
Propeller shaft attachment	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Rear axle housing cover attachment	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Rear axle mounting plate assembly to body	$\frac{3}{8}$" U.N.F.	2·8 to 3·5	20 to 25
ront Suspension			
Anti-roll bar fixing	$\frac{5}{16}$" U.N.F.	0·4 to 0·6	3 to 4
Anti-roll bar link to bar	$\frac{3}{8}$" U.N.F.	1·5 to 2·2	11 to 16
Anti-roll bar link to lower wishbone	$\frac{7}{16}$" U.N.F.	4·1 to 5·2	30 to 38
Ball joint to vertical link	$\frac{1}{2}$" U.N.F.	4·8 to 6·9	35 to 50
Calliper to vertical link	$\frac{7}{16}$" U.N.F.	6·9 to 9·0	50 to 65
Damper strut to top mounting	$\frac{5}{8}$" U.N.F.	3·0 to 4·2	22 to 30
Damper unit and calliper to vertical link	$\frac{7}{16}$" U.N.F.	6·9 to 9·0	50 to 65
Damper unit to studs in body turret	$\frac{5}{16}$" U.N.F.	1·4 to 2·0	10 to 14
Damper unit to vertical link	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Disc to hub	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Front suspension cross-member to body	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Hub to stub axle	$\frac{1}{2}$" U.N.F.	See Note†	
Lower strut to body	$\frac{1}{2}$" U.N.F.	4·1 to 5·2	30 to 38
Lower strut to lower wishbone	$\frac{7}{16}$" U.N.F.	6·9 to 9·0	50 to 65
Lower wishbone to cross-member	$\frac{1}{2}$" U.N.F.	8·3 to 11·1	60 to 80
Stub axle to vertical link	$\frac{1}{2}$" U.N.F.	6·9 to 9·0	50 to 65
Tie-rod levers to vertical link	$\frac{7}{16}$" U.N.F.	6·9 to 9·0	50 to 65
ear Suspension			
Brake backplate to trailing arm	$\frac{5}{16}$" U.N.F.	1·5 to 2·2	11 to 16
Damper to trailing arm and body	$\frac{3}{8}$" U.N.F. Clamp nut	2·6 to 3·3	18 to 24
	Locknut	1·5 to 2·2	11 to 16
Driving flange to outer axle shaft	$\frac{5}{8}$" U.N.F.	12·4 to 16·6	90 to 120
Inner driving flange to rear hub and axle shaft assembly	$\frac{3}{8}$" U.N.F.	3·6 to 4·7	26 to 34
Mounting rebound rubber and sub-frame to floor	$\frac{7}{16}$" U.N.F.	5·2 to 6·6	38 to 48
Mounting rubber to sub-frame	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Rear brake-drum to flange	$\frac{1}{4}$" U.N.F.	0·7 to 1·0	5 to 7
Rear sub-frame member to axle extension assembly	$\frac{1}{2}$" U.N.F.	8·3 to 11·1	60 to 80
Rear sub-frame strap ends to floor	$\frac{7}{16}$" U.N.F.	6·9 to 9·0	50 to 65
Rear sub-frame to body inner	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
:Rear sub-frame to body outer	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Road wheel retaining stud	$\frac{7}{16}$" U.N.F.	8·3 to 11·1	60 to 80
Trailing arms to mounting bracket	$\frac{7}{16}$" U.N.F.	5·2 to 6·2	38 to 48
Wire wheel extension attachment	$\frac{7}{16}$" U.N.F.	7·6 to 9·0	55 to 65

† Tighten to 5 lbf ft and unscrew 1 flat.
‡ When up to 1 shim only is fitted use $3\frac{1}{4}$" long bolt.
When 2 to 8 shims are fitted use $3\frac{5}{8}$" long bolt.**

		kgf m	lbf ft
Steering			
**Column assembly to dash	¼" U.N.F.	0·8 to 1·2	6 to 9
†Lock to steering-column	5/16" U.N.C.	Tighten to shear	
Mounting bracket to cross-member	7/16" U.N.F.	4·1 to 5·2	30 to 38
Mounting bracket to rack	7/16" U.N.F.	4·1 to 5·2	30 to 38
Outer ball joint to tie-rod lock nut	⅝" U.N.F.	3·9 to 5·2	28 to 38
Pinion housing stud	5/16" U.N.F.	2·1 to 2·8	15 to 20
Steering-column clamp lever bolt	¼" U.N.F.	0·4 to 0·6	3 to 4
Steering-column mounting bracket to facia	5/16" U.N.F.	1·4 to 2·0	10 to 14
Steering-column support tube assembly to column housing	5/16" U.N.F.	2·1 to 2·8	15 to 20
Steering-column to lower column	5/16" U.N.F.	2·1 to 2·8	15 to 20
Steering-column to rack	5/16" U.N.F.	2·1 to 2·8	15 to 20
Steering-wheel retaining nut	11/16" dia. × 26 t.p.i.	3·3 to 4·4	24 to 32
Tie-rod ends to steering levers	7/16" U.N.F.	4·8 to 6·2	35 to 45
Chassis			
Exhaust mounting bracket to rear sub-frame	5/16" U.N.F.	2·1 to 2·8	15 to 20
Engine mounting to body	⅜" U.N.F.	3·3 to 4·4	24 to 32
Fixing L.H. to R.H. silencer	5/16" U.N.F.	2·1 to 2·8	15 to 20
Front engine mounting rubber to bracket	⅜" U.N.F.	3·6 to 4·7	26 to 34
Front exhaust pipes to intermediate pipes	5/16" U.N.F.	0·7 to 1·1	5 to 8
Front exhaust pipes to rear engine cross-member	5/16" U.N.F.	2·1 to 2·8	15 to 20
Gearbox mounting bracket to rear mounting rubber and rubber to cross-member	5/16" U.N.F.	1·5 to 2·2	11 to 16
Rear engine cross-member to frame	⅜" weld bolt	2·1 to 2·8	15 to 20
Rear engine mounting bracket to gearbox	5/16" U.N.F.	1·5 to 2·2	11 to 16
Tailpipe attachment	5/16" U.N.F.	2·1 to 2·8	15 to 20
Brake and Clutch Pipes			
Four-way connection to front hose	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Nylon clutch pipe assembly 3/16" box	7/16" U.N.F. nut	1·0 to 1·2	7 to 9
Pipe assembly (bent) hose to L.H. wheel cylinder—rear	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) hose to R.H. wheel cylinder—rear	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) master cylinder to P.D. valve:			
Front—L.H. Stg.	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
	7/16" U.N.F. nut	1·0 to 1·2	7 to 9
Front—R.H. Stg.	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
	7/16" U.N.F. nut	1·0 to 1·2	7 to 9
Rear—L.H. Stg.	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Rear—R.H. Stg.	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) P.D. valve to L.H. hose bracket front	7/16" U.N.F. nut	1·0 to 1·2	7 to 9
	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) P.D. valve to R.H. hose bracket front	7/16" U.N.F. nut	1·0 to 1·2	7 to 9
	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) P.D. valve to three-way rear	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Pipe assembly (bent) three-way to R.H. hose bracket rear	⅜" U.N.F. nut	0·7 to 1·0	5 to 7
Three-way attachment to body	¼" U.N.F. × 1⅛" long bolt	1·0 to 1·2	7 to 9

† Designed to shear at 12 to 15 lbf ft (1·6 to 2·1 kgf m).**

Body		kgf m	lbf ft
**Blanking safety harness holes front floor and transmission tunnel	$\frac{7}{16}$" U.N.F.	3·3 to 4·4	24 to 32
Boot lock to lid	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Bonnet fastener to bonnet rear	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Bonnet hinge to body	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Bracket to trunk lid and hinge to tonneau assembly	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Brake master cylinder to body	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Brake pressure differential warning actuator fixing	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Bumper bracket to body side	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Clutch master cylinder and reservoir support bracket to pedal mounting bracket	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Console support bracket bottom fixing	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Front bumper brackets to body front	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Front bumper bracket to bumper	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Front bumper to bumper and over-rider	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Front bumper to side attachment bracket	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Fuel pump and bracket assembly to body	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hand brake ratchet to levers	$\frac{3}{8}$" U.N.F.	2·5 to 3·3	18 to 24
Hard top fixings to rear deck	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Harness to dash top reinforcement	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hinge, door attachment	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hinge, lower L.H. and R.H., to 'A' post	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hinge, upper L.H. and R.H., to 'A' post	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Hoodstick bolts	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Hoodstick bolts	$\frac{5}{16}$" U.N.F.	1·4 to 2·0	10 to 14
Ignition coil to rear of inlet manifold	$\frac{5}{16}$" U.N.C.	2·1 to 2·8	15 to 20
Petrol filter attachment	$\frac{1}{4}$" U.N.F.	0·7 to 1·0	5 to 7
Petrol tank drain plug	$\frac{5}{8}$" × 18 t.p.i. plug	4·1 to 5·2	30 to 38
Radiator to body	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Rear bumper attachment to body	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Rear bumper bracket to bumper	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Rear bumper bracket to bumper and over-rider	$\frac{3}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Rear floor frame bolt	$\frac{3}{8}$" U.N.F.	2·8 to 3·5	20 to 25
Safety harness fixing bracket to plate to tunnel	$\frac{7}{16}$" U.N.F.	3·3 to 4·4	24 to 32
Safety harness fixing eyebolt rear harness	$\frac{7}{16}$" U.N.F.	3·3 to 4·4	24 to 32
Seat slides to floor	$\frac{5}{16}$" U.N.F.	1·4 to 2·0	10 to 14
Soft top to body	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Trunk lid hinge to body	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Trunk lid hinge to mounting bracket	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Trunk lid lock striker assembly	$\frac{1}{4}$" U.N.F.	0·7 to 1·0	5 to 7
Vacuum pipe banjo bolt	$\frac{5}{8}$" U.N.F.	3·3 to 4·4	24 to 32
Vacuum switch adaptor to radiator	$\frac{3}{4}$" U.N.C.	0·7 to 1·0	5 to 7
Vent pipe filter to body	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Body—Miscellaneous			
Air conditioner unit fixing to body	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Air conditioner unit support	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Condenser to body bottom flange of condenser	$\frac{1}{4}$" Acme	0·8 to 1·2	6 to 9
Condenser mounting bracket to condenser	$\frac{1}{4}$" U.N.F.	0·8 to 1·2	6 to 9
Vacuum tank retaining	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Miscellaneous (Skid Plate)			
Attach rear sub-frame skid plate inner	$\frac{3}{8}$" U.N.F.	2·8 to 3·5	20 to 25
Attach rear sub-frame skid plate outer	$\frac{3}{8}$" U.N.F.	2·8 to 3·5	20 to 25
Bracket to floor and skid plate rear to bracket	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Front and inter skid plates to bracket assemblies	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Inter and rear skid plates to bracket assembly 153926	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Skid plate bracket assembly to front cross-member	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Skid plate bracket to front cross-member	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20
Skid plate bracket assembly to rear cross-member	$\frac{5}{16}$" U.N.F.	2·1 to 2·8	15 to 20**

RECOMMENDED LUBRICANTS—BRITISH ISLES

(The products recommended are not listed in order of preference)

COMPONENT	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	REGENT/ TEXACO	SHELL
Engine Carburetter Dashpots and Oil-can	BP Super Visco-Static **20-50**	Castrol GTX	Duckhams Q20-50	Uniflo	Mobiloil Super 10W/50 or Mobiloil Special 20W/50	Fina Super Grade Motor Oil S.A.E. 20W/50	Havoline Motor Oil 20W/50	Shell Super **Multigrade**
Gearbox and Overdrive Rear Axle	BP Gear Oil S.A.E. 90 EP	Castrol Hypoy	Duckhams Hypoid 90	Esso Gear Oil GX 90/140	Mobilube HD 90	Fina Pontonic **XP 90-140**	Multigear Lubricant EP 90	Shell Spirax 90 EP
Front and Rear Hubs Brake Cables Grease Gun	BP Energrease L2	Castrol LM Grease	Duckhams LB 10	Esso Multi-purpose Grease H	Mobilgrease MP	Fina Marson HTL 2	Marfak All Purpose	Shell Retinax A
Borg-Warner Transmission Power Steering	BP Autran B	Castrol TQF	'Q' Matic	Esso Glide	Mobil ATF 210	Fina Purfimatic 33F	Texamatic Type 'F'	Shell Donax T7

RECOMMENDED LUBRICANTS—OVERSEAS

(The products recommended are not listed in order of preference)

COMPONENT	Air temp. °C	Air temp. °F	API Designation	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	TEXACO	SHELL
Engine	over 30	over 80	**SD or SE	*BP Super Visco-Static	Castrol GTX, †XLR, or **Castrol Super 20W-50**	Q20-50	Esso Extra Motor Oil 20W/50	Mobiloil Super 10W/50 Mobiloil Special 20W/50	Fina Supergrade Motor Oil 20W/50	Havoline 20W/50	Shell Super Motor Oil **
Carburetter Dashpots	30 to 0	80 to 30	SD or SE			Q10-50	Uniflo				
Oil-can	0 to −20	30 to −4	SD or SE		Castrolite or **Castrol GTZ**	**Q10-40**	Esso Extra Motor Oil 10W/30	Mobiloil Super 10W/50	Fina Supergrade Motor **Oil 10W/40**	Havoline 10W/30	
	below −20	below −4	SD or SE **		Castrol 5W/20	**Q5-30**	Esso Extra Motor Oil 5W/20	Mobiloil 5W/20	Fina Supergrade **5W/30**	Havoline 5W/20	**
Gearbox and Overdrive Rear Axle	over 0	over 30	GL4	BP Gear Oil S.A.E. 90 EP	Castrol Hypoy	Duckhams Hypoid 90	Esso Gear Oil GX 90	Mobilube HD 90	Fina Pontonic MP S.A.E. 90	Multigear Lubricant EP 90	Shell Spirax 90 EP
	below 0	below 30	GL4	BP Gear Oil S.A.E. 80 EP	Castrol Hypoy 80	Duckhams Hypoid 80	Esso Gear Oil GX 80	Mobilube HD 80	Fina Pontonic MP S.A.E. 80	Multigear Lubricant EP 80	Shell Spirax 80 EP
Front and Rear Hubs Brake Cables Grease Gun				Energrease L2 or †MP	Castrol LM Grease or †MP Grease	Duckhams LB 10	Esso Multi-purpose Grease H	Mobilgrease MP	Fina Marson HTL 2	Marfax All-purpose	**Shell Retinax A or †Darina AX**
Borg-Warner Transmission Power Steering				BP Autran B	Castrol TQF	Q-matic	Esso Glide	Mobil ATF 210	Fina Purfimatic 33F	Texamatic Type 'F'	Shell Donax T7

* Oils marked thus are available in multigrade forms with viscosity characteristics appropriate to ambient temperature range in individual markets.
† U.S.A. Markets.

RECOMMENDED HYDRAULIC FLUIDS

**Clutch and Brake Reservoirs: Lockheed Super Heavy Duty Brake Fluid, or Unipart 550 Brake Fluid.
Where this proprietary brand is not available other fluids which meet S.A.E. J.1703 specification may be used.**

RECOMMENDED FUEL

The Triumph Stag engine is designed to operate on fuel having a minimum octane rating of 97 (Research Method); this is equivalent to the British Standard 4-star rating.

Where such fuels are not available and it is necessary to use fuels of lower or unknown rating, the ignition timing must be retarded from the specified setting, just sufficiently to prevent audible detonation (pinking) under all operating conditions, otherwise serious damage to the engine may occur.

The use of lower octane fuels will result in loss of engine power and efficiency.

IMPORTANT: When cars for the U.S.A. market enter the United States the ignition timing must be set to suit the use of the recommended grade of fuel AND TO COMPLY WITH REGULATIONS ON EMISSIONS FROM THE CRANKCASE AND EXHAUST.

ANTI-FREEZE SOLUTIONS

Only solutions which meet B.S.I. 3152 specification may be used.

** **Anti-freeze concentration**		25%	30%	35%	50%
Anti-freeze quantities (approximate)	Imp. pints	4·74	5·5	6·5	9·25
	U.S. pints	5·75	6·5	7·75	11·25
	Litres	2·75	3·25	3·75	5·25
Complete protection: Vehicle may be driven away immediately from cold.		−12°C 10°F	−16°C 3°F	−20°C −4°F	−36°C −33°F
Safe limit: Coolant in mushy state. Engine may be started and vehicle driven away after short warm-up period.		−18°C 0°F	−22°C −8°F	−28°C −18°F	−41°C −42°F
Lower protection limit: Prevents frost damage to cylinder head, block and radiator. Engine should NOT be started until thawed out.		−26°C −14°F	−32°C −25°F	−37°C −35°F	−47°C −53°F
Specific gravity at 60°F (15°C)		1·045	1·054	1·062	1·075 **

CAPACITIES

**Fuel tank: 1972 L.H. Steering models	12¾ gal (15·3 U.S. gal, 58·0 litres)
Other models	14 gal (16·5 U.S. gal, 63·5 litres)**
Engine sump	8 pints (9·6 U.S. pints, 4·5 litres)
Engine sump (drain and refill)	8 pints (9·6 U.S. pints, 4·5 litres)
**Engine sump (drain and refill with filter change)	9 pints (10·8 U.S. pints, 5·1 litres)**
Engine oil filter	1 pint (1·2 U.S. pints, 0·56 litre)
Gearbox (from dry)	2·25 pints (2·7 U.S. pints, 1·28 litres)
Gearbox and overdrive (from dry)	3·75 pints (4·5 U.S. pints, 2·13 litres)
**Automatic transmission (including oil cooler)	14·25 pints)17·0 U.S. pints, 8·0 litres)**
Rear axle (from dry)	2 pints (2·4 U.S. pints, 1·13 litres)
Power steering reservoir	1·25 pints (1·5 U.S. pints, 0·7 litre)
**Cooling system (with heater)	18·5 pints (22·3 U.S. pints, 10·5 litres)**

MAINTENANCE OPERATIONS

Lubrication Chart 10.00.01

Pre-Delivery Inspection 10.10.01

Routine Maintenance Operations

- 1,000 miles (1600 km) Free Service 10.10.03
- 3,000 miles (5000 km) Service 10.10.06
- 6,000 miles (10000 km) Service 10.10.12
- 12,000 miles (20000 km) Service 10.10.24

Summary Chart 10.00.02

**** Weekly or before a long journey**

2. Check/top up engine oil level.
15. Check/top up cooling system level.

Every 6,000 miles (10000 km)

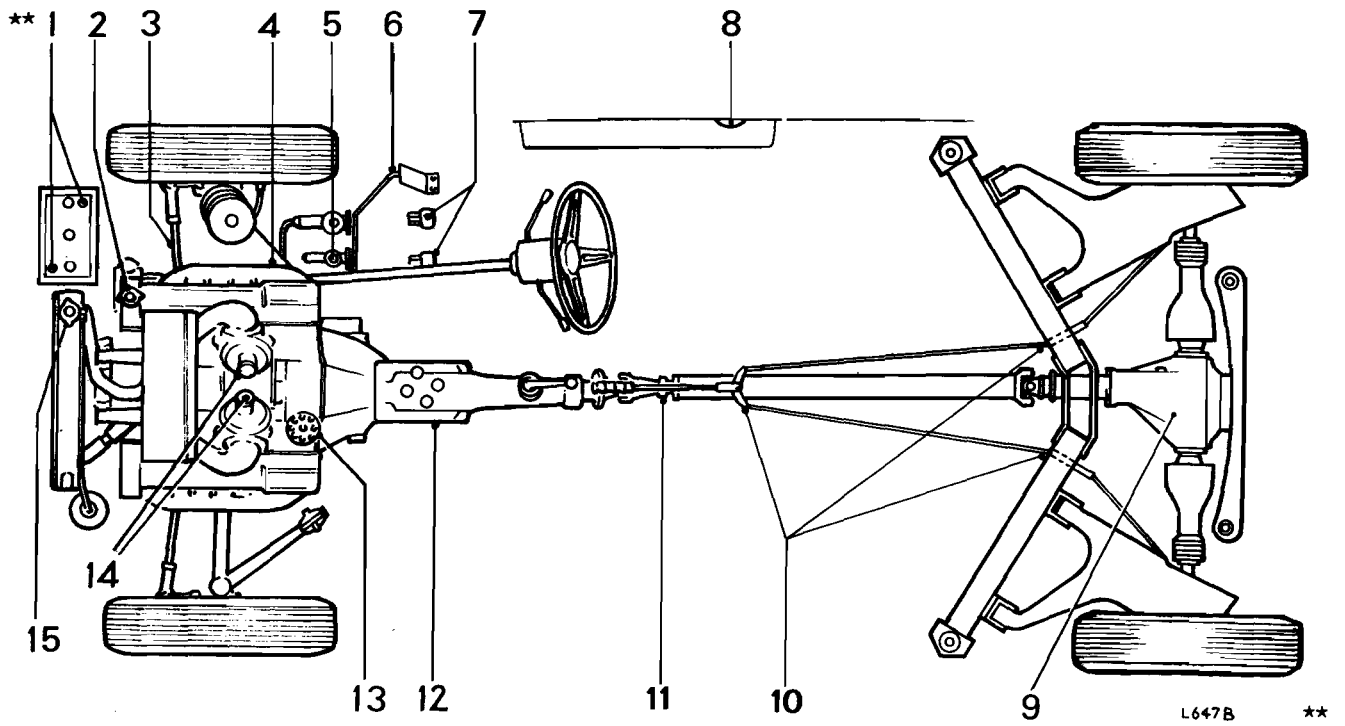
1. Lubricate battery terminals (petroleum jelly).
2. Change engine oil.
3. Lubricate steering rack and pinion.
5. Check/top up brake and clutch fluid reservoirs.
6. Lubricate accelerator pedal fulcrum (oil-can).
7. Lubricate clutch and brake pedal pivots (oil-can).
8. Lubricate all door, bonnet and boot locks and hinges.
9. Check/top up rear axle oil level.
10. Lubricate hand brake linkage and cable.
11. Lubricate propshaft sliding yoke (Manual only).
12. Check/top up gearbox oil level.
13. Lubricate distributor.
14. Check/top up carburetter piston damper(s) and lubricate throttle linkage.
15. Check/top up cooling system level.

Every 3,000 miles (5000 km)

2. Check/top up engine oil level.
5. Check/top up brake and clutch fluid reservoirs.
15. Check/top up cooling system level.

Every 12,000 miles (20000 km)

1. Lubricate battery terminals (petroleum jelly).
2. Change engine oil.
3. Lubricate steering rack and pinion.
4. Renew oil filter element.
5. Check/top up brake and clutch fluid reservoirs.
6. Lubricate accelerator pedal fulcrum (oil-can).
7. Lubricate brake and clutch pedal pivots (oil-can).
8. Lubricate all door, bonnet and boot locks and hinges.
9. Check/top up rear axle oil level.
10. Lubricate hand brake linkage and cable.
11. Lubricate propshaft sliding yoke (Manual only).
12. Check/top up gearbox oil level.
13. Lubricate distributor.
14. Check/top up carburetter piston damper(s) and lubricate throttle linkage.
15. Check/top up cooling system level.**



SUMMARY CHART

**

The Summary Chart below lists general recommendations for service operations and intervals. Overseas service engineers are advised to consult the 'Passport to Service' booklet supplied with the car for amendments to these recommendations that may be specially applicable to their local operating conditions OR that may be obligatory to meet regulations for a specific country.

Operation number	10.10.03	10.10.06	10.10.12	10.10.24
Interval in miles × 1,000	1	3	6	12
Interval in kilometres × 1,000	1·6	5	10	20
Operation Description				
ENGINE COMPARTMENT				
1. Check/top up engine oil level		X		
2. Check/top up cooling system	X	X	X	X
3. Check/top up brake fluid reservoir	X	X	X	X
4. Check/top up clutch fluid reservoir	X	X	X	X
5. Check/top up windscreen washer fluid reservoir	X	X	X	X
6. Check/top up battery	X	X	X	X
7. Check/top up carburetter piston(s) damper(s) (E)	X		X	X
8. Drain engine oil and refill	X		X	X
9. Renew oil filter element				X
10. Clean fuel pump sediment bowl	X			X
11. Lubricate distributor and check automatic advance (E)	X		X	X
12. Check/adjust/report condition of distributor points (E)	X		X	
13. Renew distributor points (E)				X
14. Check/adjust ignition timing, using electronic equipment (E)	X		X	X
15. Check/report ignition wiring for fraying, chafing and deterioration (E)	X		X	X
16. Check condenser and coil for breakdown on oscilloscope tune (E)			X	X
17. Clean/adjust sparking plugs (E)			X	
18. Renew sparking plugs (E)				X
19. Check/adjust torque of cylinder head nuts/bolts (E)	X			
20. Check/report cylinder compression (E)			X	X
21. Clean engine oil filler cap				X
22. Clean carburetter air cleaner elements (E)			X	
23. Renew carburetter air cleaner elements (E)				X
24. Check/adjust/report condition of all driving belts	X	X	X	X
25. Check security of starter motor and alternator retaining bolts	X			
26. Check security of engine mountings	X			
27. Check/adjust carburetter settings (E)	X		X	X
28. Overhaul carburetter at 24,000 miles (E)				
29. Change fuel filter (E)			X	X
30. Check fuel system for leaks (E)	X	X	X	X
31. Lubricate accelerator linkage/pedal fulcrum and check operation	X		X	X
32. Check battery condition; clean and grease connections			X	X
33. Check/report oil/fuel/fluid leaks (general) (E)	X	X	X	X
34. Check/report leaks from cooling and heater systems (E)	X	X	X	X
35. Evaporative and crankcase ventilations systems—check hoses and restrictors for blockage, security and deterioration (E)			X	X
36. Carbon canister—renew filter (E)				X
37. Carbon canister—renew—48,000 miles (E)				
38. Check/top up level of automatic transmission fluid	X		X	X
39. Check/top up power-assisted steering fluid reservoir	X	X	X	X
40. Check/report oil/fluid leaks from power-assisted steering	X	X	X	X
41. Check/top up air conditioning compressor fluid level				X **

Operation number	10.10.03	10.10.06	10.10.12	10.10.24
Interval in miles × 1,000	1	3	6	12
Interval in kilometres × 1,000	1·6	5	10	20
Operation Description				
UNDERBODY				
42. Check/top up level of manual gearbox and overdrive oil	X		X	X
43. Check/top up level of final drive unit oil	X		X	X
44. Lubricate all grease points except hubs	X		X	X
45. Lubricate steering rack and pinion			X	X
46. Lubricate hand brake linkage and cable guides			X	X
47. Check transmission, engine, final drive, suspension and steering unit for oil leaks and report	X	X	X	X
48. Check visually brake, fuel and clutch pipes, hoses and unions for chafing, leaks and corrosion and report	X	X	X	X
49. Check/report exhaust system for leakage and security (E)	X	X	X	X
50. Check security of suspension fixings, tie-rod levers, steering unit attachments and steering universal joint coupling bolts	X			X
51. Check security of propeller shaft and drive shaft universal coupling bolts	X			X
52. Check security of sub-frame or body mountings	X			
53. Check/report condition of steering unit/joints for security, backlash and gaiter condition	X	X	X	X
54. Lubricate exposed automatic gearbox selector linkage			X	X
EXTERIOR				
55. Adjust front hubs				X
56. Check/adjust front and rear wheel alignment with tracking equipment	X			
57. Check/report front and rear wheel alignment with tracking equipment			X	X
58. Inspect brake pads for wear, and discs for condition		X	X	X
59. Inspect and report brake linings for wear and drums for condition				X
60. Check security of road wheel fastenings	X	X	X	X
61. *Check that tyres are in accordance with manufacturer's specification		X	X	X
62. *Check visually and report depth of tread, cuts in tyre fabric, exposure of ply or cord structure, lumps or bulges	X	X	X	X
63. Check/adjust tyre pressures (including spare wheel)	X	X	X	X
64. Check/adjust/report headlamp alignment	X	X	X	X
65. Check, if necessary replace windscreen wiper blades		X	X	X
66. Fuel tank filler cap—check seal for security (E)	X		X	X
INTERIOR				
67. Check brake pedal travel and hand brake operation; adjust if necessary	X			
68. Check/report brake pedal travel and hand brake operation		X	X	X
69. Check operation of window controls, locks and bonnet release	X			
70. Check function of all electrical systems and windscreen washer	X	X	X	X
71. Lubricate clutch and brake pedal pivots			X	X
72. Lubricate all locks, door hinges, strikers and bonnet release	X		X	X
73. Check/report condition and security of seats and seat belts		X	X	X
74. Check/report rear view mirrors for looseness, cracks and crazing		X	X	X
ROAD TEST				
75. Road/roller test and report additional work required	X		X	X
76. Ensure cleanliness of controls, door handles, steering wheel etc	X	X	X	X

***Important**—If the tyres do not conform with legal requirements report to the owner.

Items marked (E) are particularly relevant to the emission and evaporative control systems and must receive attention at the recommended intervals to keep these systems in good order.

The maintenance Summary list on pages 10.00.02 and 10.00.03 gives details of mile and kilometre intervals for the following operations. The figure in parenthesis to the left of each heading refers to the item number on the summary list.

(1) Check/top up engine oil level

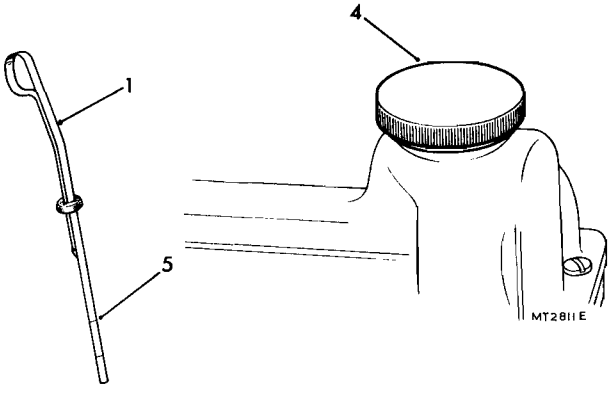
NOTE: Allow time for the oil to drain back into the sump after running the engine.

Stand the vehicle on level ground.

1. Withdraw the dipstick, wipe it clean and replace it in position.
2. Withdraw the dipstick again and note the oil level.
3. Wipe the dipstick clean and replace it in position.

If topping-up is necessary:

4. Remove the oil filler cap.
5. Add a recommended grade of oil, via the filler cap, to bring the level just below the high mark on the dipstick. **DO NOT OVERFILL.**
6. Replace the filler cap.
7. Allow time for the added oil to drain into the sump, then check the final oil level using the procedure in 1 to 3 above.



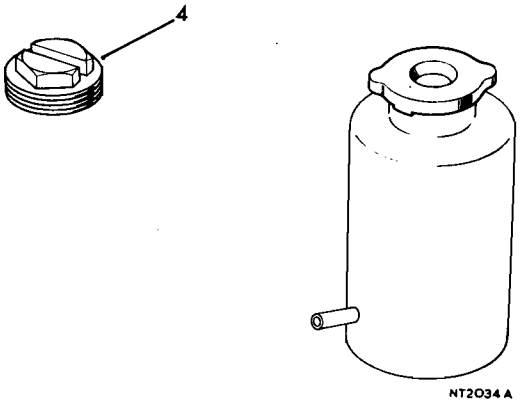
(2) Check/top up cooling system

WARNING: Do NOT remove the cooling system filler caps or plugs when the engine is hot.

1. Remove the radiator expansion tank cap.
2. If necessary top up the expansion tank with soft water to maintain the level at approximately half full.
3. Replace the cap.

If the expansion tank is empty:

4. Remove the cooling system filler plug.
5. Add soft water, via the filler plug, until the system is full.
6. Replace the filler plug.
7. Half fill the expansion tank with soft water, using the procedure in 1 to 3 above.
8. Run the engine until normal operating temperature is reached, allow engine to cool and re-check the cooling system level.



(3) Check/top up brake fluid reservoir

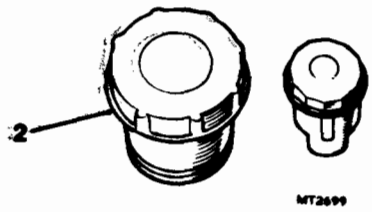
1. Check the fluid level against the mark on the side of the reservoir.

If topping-up is necessary:

2. Wipe clean the reservoir cap and surrounding area.
3. Remove the reservoir cap.
4. Add fluid to bring the level up to the mark on the side of the reservoir.

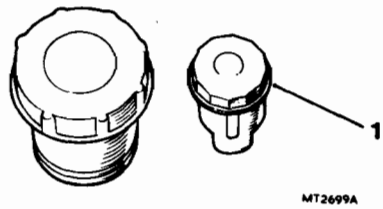
WARNING: Use only new fluid of the correct specification.
Do NOT use fluid of unknown origin,
or fluid that has been exposed to the atmosphere,
or fluid that has been discharged during bleeding operations.

5. Replace the reservoir cap.
6. Remove any spilled fluid with a clean cloth.
CAUTION: Paintwork can be damaged by direct contact with brake fluid.



(4) Check/top up clutch fluid reservoir

1. Wipe clean the reservoir cap and surrounding area.
2. Remove the reservoir cap.
3. Check the fluid level against the mark on the side of the reservoir.
4. If necessary, add fluid to bring the level up to the mark on the side of the reservoir.
WARNING: Use only new fluid of the correct specification.
Do NOT use fluid of unknown origin,
or fluid that has been exposed to the atmosphere,
or fluid that has been discharged during bleeding operations.
5. Replace the reservoir cap.
6. Remove any spilled fluid with a clean cloth.
CAUTION: Paintwork can be damaged by direct contact with clutch fluid.



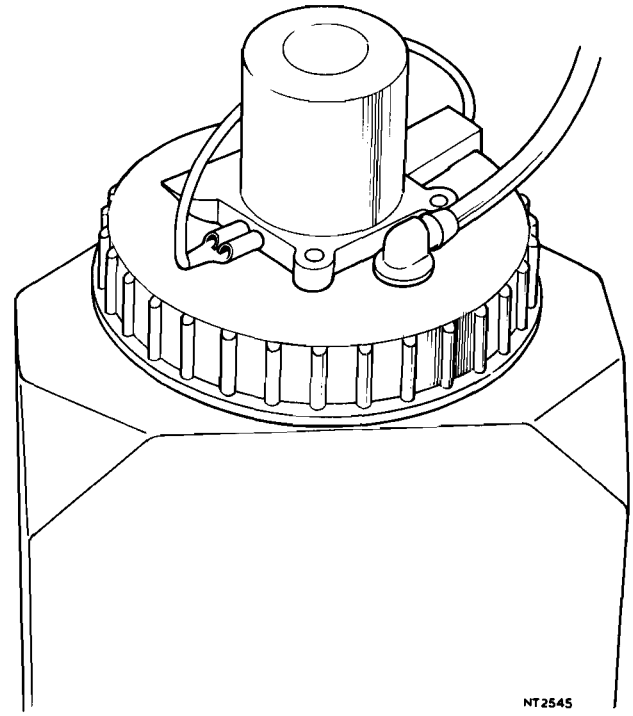
(5) Check/top up windscreen washer fluid reservoir

1. Check the fluid level in the translucent reservoir.

If topping-up is necessary:

2. Wipe clean the reservoir cap and surrounding area.
3. Remove the reservoir cap.
4. Add soft water to bring the level up to approximately 1 in (25·4 mm) from the top of the reservoir.
5. Replace the reservoir cap.

CAUTION: As a precaution against freezing conditions fill the reservoir with a mixture of one part methylated spirits and two parts water.
Do NOT use glycol anti-freeze solutions in the washer reservoir, as they may discolour the paintwork and damage the wiper blades and sealing rubbers.



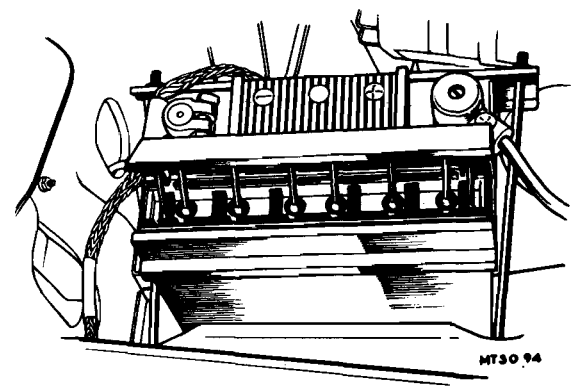
(6) Check/top up battery

Lucas Pacemaker type batteries.

1. Lift and tilt the battery cover.
2. Check the electrolyte level, which if correct should just cover the separators.

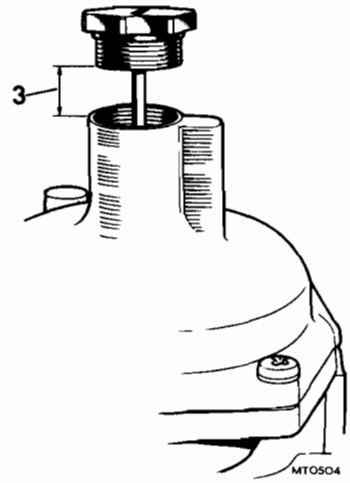
If topping-up is necessary:

3. Add DISTILLED WATER until the filler tubes are full and the trough is just covered.
4. Replace the battery cover.



(7) Check/top up carburetter piston dampers

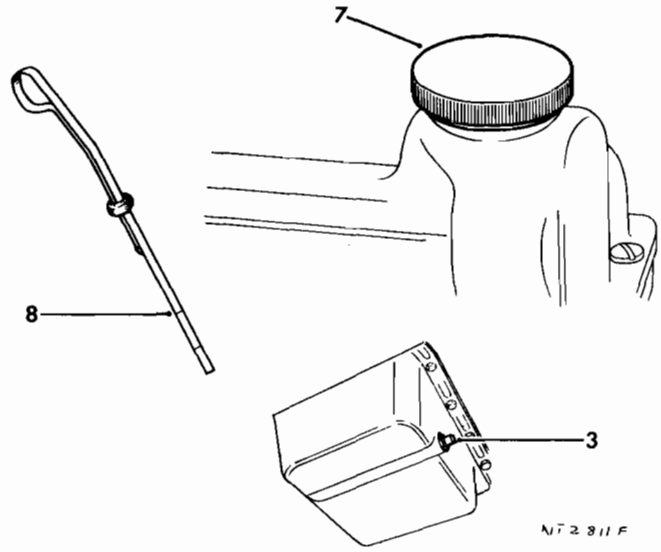
1. Unscrew the hexagon plug from the top of the carburetter.
2. Withdraw the plug and damper assembly from the carburetter.
3. Replace the plug and damper assembly to check the oil level, which if correct will offer resistance to the assembly when the bottom of the plug threads are ¼ in (6 mm) above the rim of the dashpot.
4. If necessary, again withdraw the plug and damper assembly and add a recommended engine oil, using an oil-can, until the oil level is correct.
5. Replace the plug and damper assembly.
6. Screw the hexagon plug firmly in position.



(8) Drain engine oil and refill

NOTE: This operation is best carried out when the engine is warm and with the vehicle standing level on a ramp or over a pit.

1. Wipe clean the engine drain plug and surrounding area.
2. Place a suitable receptacle under the drain plug.
3. Unscrew the drain plug slowly until oil begins to escape.
4. When the rate of oil flow lessens, remove the drain plug from the sump and allow the oil to drain completely.
5. Wipe clean the drain plug and replace it in the sump.
6. Tighten the drain plug to 20 to 25 lbf ft (2·8 to 3·5 kgf m).
7. Remove the oil filler cap.
8. Add a recommended engine oil, via the filler cap, to bring the level just below the high mark on the dipstick. **DO NOT OVERFILL.**
9. Replace the oil filler cap.
10. Allow time for the added oil to drain into the sump, then check the final oil level on the dipstick.



(9) Renew oil filter element

See 12.60.01 and 12.60.08.

(10) Clean fuel pump sediment bowl

See 19.45.15.

(11) Lubricate distributor and check automatic advance

Lubricate distributor—see 86.35.18.

Check automatic advance

1. Fit a strobe timing light in accordance with the timing light manufacturer's instructions.
2. Disconnect the vacuum pipe between the distributor and induction side of the engine.
3. Start the engine.

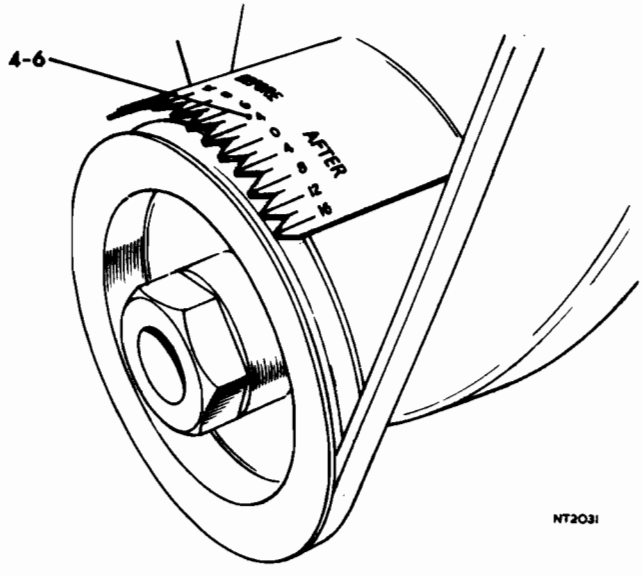
Check centrifugal advance

4. Using a second operator to vary the engine speed, check the apparant movement of the timing marks under the strobe light.
5. Re-connect the vacuum pipe.

Check vacuum advance

6. Repeat the procedure in 4 above, comparing engine timing with and without the vacuum pipe connected.
7. Stop the engine.

NOTE: If more accurate results are required electronic tuning equipment may be used in conjunction with the data on page 86.35.00. This is extra to normal service requirements.



(12) Check/adjust/report condition of distributor points

See 86.35.14.

(13) Renew distributor points

See 86.35.13.

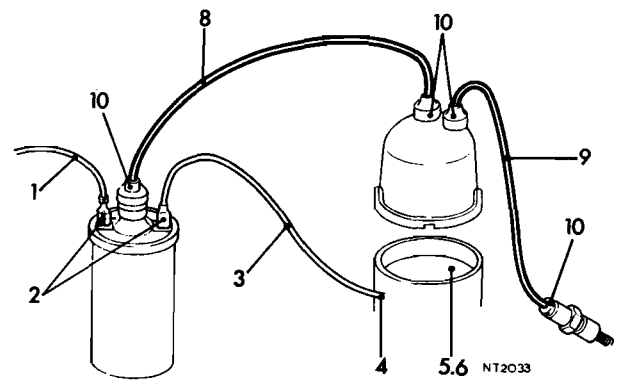
(14) Check/adjust ignition timing

See 86.35.16.

(15) Check/report ignition wiring for fraying, chafing and deterioration

Low tension circuit

1. Check the exposed wiring between the coil and ignition switch.
2. Check the ignition coil connections.
3. Check the wiring between the coil and distributor.
4. Check the distributor external connections.
5. Remove the distributor cap and check the internal wiring.
6. Check the internal distributor connections.
7. Replace the distributor cap.



High tension circuit

8. Check the lead between the coil and the distributor.
9. For each sparking plug in turn check the lead between the plug and distributor.
10. Check the high tension lead connections.
11. Report wiring condition.

(16) Check condenser and coil for breakdown on oscilloscope

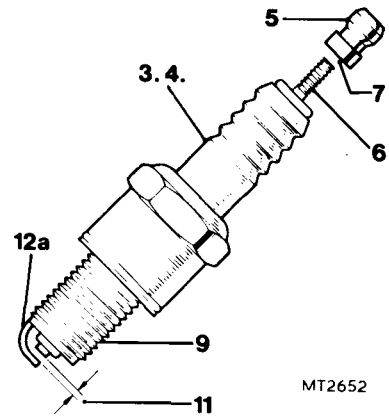
Using proprietary electronic testing equipment

1. Check the distributor condenser performance.
2. Check the ignition coil performance.

(17) Clean/adjust sparking plugs

For each sparking plug in turn

1. Remove the ignition high tension lead from the plug.
2. Unscrew the plug from the engine, using a special plug spanner or a box-type spanner.
3. Wipe clean the ceramic body of the plug.
4. Visually check the plug body for cracks, and renew the plug if cracks are present.
5. Unscrew the end terminal cap from the plug.
6. Clean the plug terminal threads with a wire brush.
7. Clean the cap threads, using a low-pressure air line.
8. Screw the end terminal cap firmly into position on the plug.
9. Clean the electrode area and the plug threads with a wire brush or sand blasting machine.
10. Visually check the electrode surfaces for damage, and renew the plug if damage is present.
11. Check the electrode gap, which if correct will just allow a 0·25 in (0·64 mm) feeler gauge to slide slowly between the electrodes under light pressure.



If adjustment is necessary

12. *a.* Using a suitable tool, carefully move the side electrode.
    b. Re-check the gap and repeat this procedure until the gap is correct.
13. Check the sealing washer for cracks and distortion, and renew the washer if necessary.
14. Refit the sparking plug to the engine.
15. Tighten the plug to 14 to 20 lbf ft (1·9 to 2·8 kgf m).
16. Refit the high tension lead to the plug.

(18) Renew sparking plugs

For each sparking plug in turn

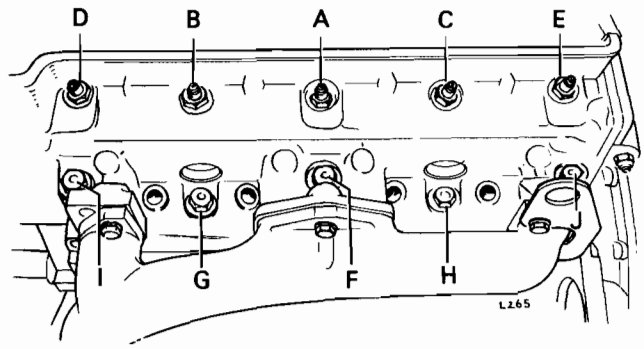
1. Remove the ignition high tension lead from the plug.
2. Unscrew the plug from the engine using a special plug spanner or a box-type spanner.
3. Discard the plug.
4. Visually check the new plug for damage to the body and electrodes; discard the plug if damage is present.
5. Check the electrode gap on the new plug, which if correct will just allow a 0·025 in (0·64 mm) feeler gauge to slide slowly between the electrodes under light pressure.

If adjustment is necessary:

6. *a.* Using a suitable tool, carefully move the side electrode.
   b. Re-check the gap and repeat this procedure until the gap is correct.
7. Check the sealing washer for cracks and distortion, and renew the washer if necessary.
8. Fit new sparking plug to the engine.
9. Tighten the plug to 14 to 20 lbf ft (1·9 to 2·8 kgf m).
10. Refit the high tension lead to the plug.

(19) Check/adjust torque of cylinder head nuts/bolts

1. Using the sequence shown, tighten the cylinder nuts to 45 to 65 lbf ft (6·2 to 7·6 kgf m).

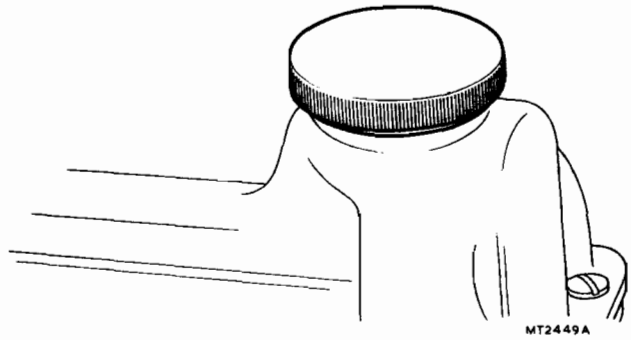


(20) Check/report cylinder compression

See 12.25.01.

(21) Clean engine oil filler cap

1. Remove the filler cap.
2. Clean the cap with clean petrol.
3. Allow the cap to dry.
4. Refit the filler cap.



(22) Clean carburetter air cleaner elements

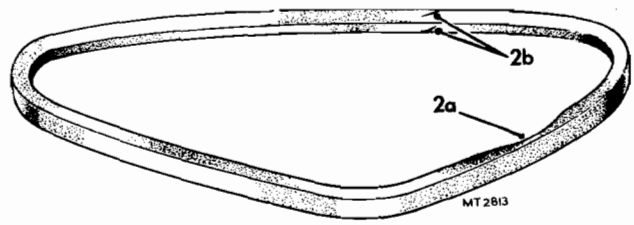
See 19.10.08.

(23) Renew carburetter air cleaner elements

See 19.10.08.

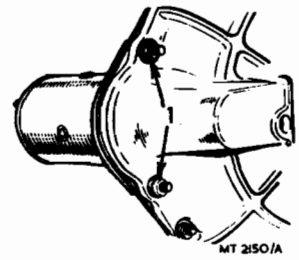
(24) Check/adjust/report condition of driving belts

1. Check and adjust—see 26.20.01.
2. Report condition where belt is visibly
   a. worn or
   b. damaged



(25) Check security of starter motor and alternator retaining bolts

1. Check the security of the starter motor retaining bolts, which if correct should be tightened to 26 to 34 lbf ft (3·6 to 4·7 kgf m).
2. Check the security of the alternator to adjusting link bolt, which if correct should be tightened to 16 to 22 lbf ft (2·2 to 3·0 kgf m).
3. Check the security of the alternator mounting bracket bolt, which if correct should be tightened to 16 to 22 lbf ft (2·2 to 3·0 kgf m).



(26) Check security of engine mountings

1. Check the security of the front engine mountings, which if correct should be tightened to 16 to 22 lbf ft (2·2 to 3·0 kgf m).
2. Check the security of the rear engine mountings, which if correct should be tightened to 11 to 16 lbf ft (1·5 to 2·2 kgf m).

(27) Check/adjust carburetter settings

See 19.15.02.

(28) Overhaul carburetter

See 19.15.18.

(29) Change fuel filter

See 19.25.01.

(30) Check fuel system for leaks

1. Check for leaks from the fuel system connections.
2. Check the fuel pipes for fractures and damage.
3. Check for leaks from the fuel tank(s), pump and carburetter(s).
   On vehicles fitted with an evaporative control system, additional checks are given under 17.15.01.

(31) Lubricate accelerator linkage/pedal fulcrum and check operation

1. Lubricate the accelerator linkage on the carburetter(s), using an oil-can.
2. Wipe away surplus oil from the linkage.
3. Check for roughness in the linkage operation.
4. Lubricate the accelerator pedal fulcrum, using an oil-can.
5. Wipe away surplus oil from the pedal fulcrum.
   CAUTION: Surplus oil on the pedal fulcrum can cause staining of the carpet.
6. Check the carburetter throttle response to initial movement of the accelerator pedal.

   If adjustment is necessary—see 19.20.05.

7. Check the carburetter throttle position with the accelerator pedal fully depressed.

   If adjustment is necessary—see 19.20.05.

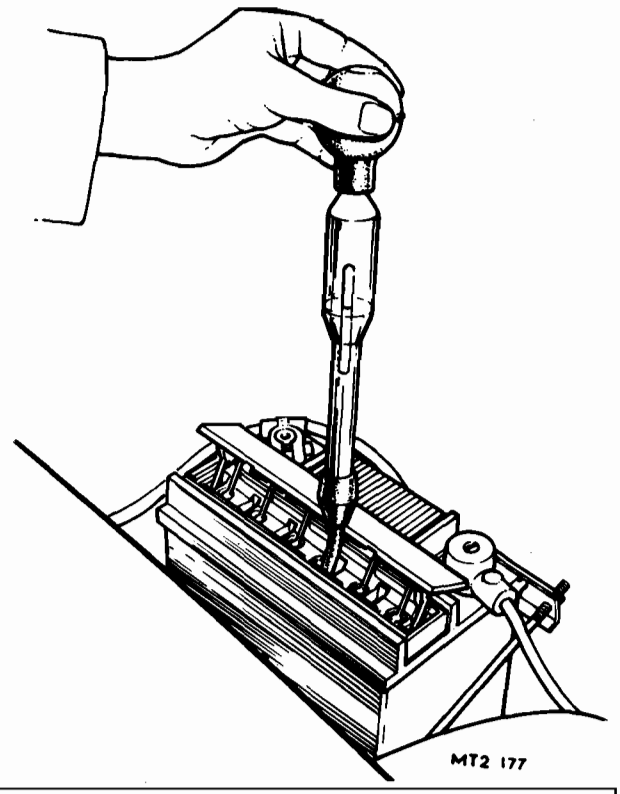
(32) Check battery condition; clean and grease connections

With battery in location

1. Check the battery and surrounding area for corrosion from the battery chemicals.
2. Clean off any corrosion found.
3. Check visually for cracks in the battery case.
4. Report any case cracks found.
5. Check the security of the terminal connections.
6. Coat the terminals with petroleum jelly.

For each cell in turn:

7. Check the electrolyte specific gravity, using an hydrometer, which if correct will approximate to the tabled readings below.
   NOTE:
   a. Do NOT check the specific gravity immediately after adding distilled water as a false reading may be obtained.
   b. Specific gravity readings approximately equal for each cell indicate a battery in good condition. Conversely, if one or more cells show a reading lower than the others the battery is approaching the end of its useful life.



Charge condition of cell—temperate climate			
Ambient Temperature °C	**Specific Gravity of Electrolyte**		
	Charged	**Half-charged**	**Discharged**
5	1·287	1·207	1·117
15	1·280	1·200	1·110
25	1·273	1·194	1·103
35	1·226	1·186	1·096
Charge condition of cell—tropical climate			
15	1·250	1·180	1·100
25	1·243	1·173	1·093
35	1·236	1·166	1·086
52	1·224	1·154	1·074

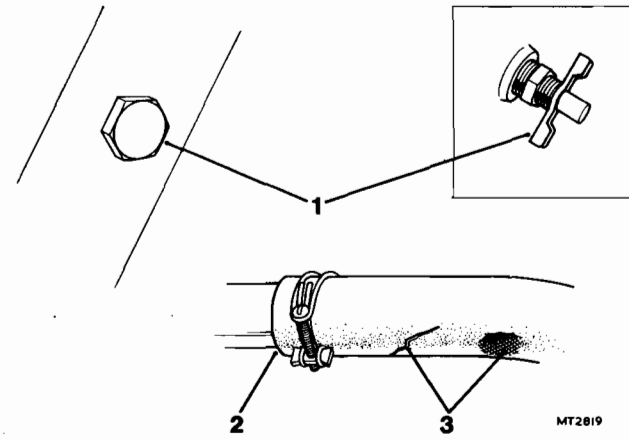
8. Check the voltage, using a heavy discharge tester, which if correct will give approximately equal readings for each cell.
   CAUTION: This check should **NOT** be made on a battery in a low state of charge as shown by procedure 7 as damage to the battery can result.
   NOTE:
   a. Before making this check on a battery that has just completed an operational journey, the headlamps should be switched on for two or three minutes to remove any surface charge.
   b. Voltage readings approximately equal for each cell indicate a battery in good condition. Conversely, if one or more cells show a reading lower than the others, or a reading that falls during the test, the battery is approaching the end of its useful life.

(33) Check/report oil/fuel/fluid leaks

1. Check for oil leaks from the engine and transmission.
2. Check for fuel leaks from the pump, carburetter, pipes, joints and unions.
3. Check for fluid leaks from the brake master cylinder, pipes, joints and unions.
4. Check for fluid leaks from the clutch master cylinder, pipes, joints and unions.
5. Report any leaks found.

(34) Check/report leaks from cooling and heater systems

1. Check for leaks from the engine and radiator drain taps/plugs (where fitted).
2. Check for leaks from the water hose joints.
3. Check for leaks from the water hoses through damage or porosity.
4. Check for leaks from the water pump, thermostat housing, radiator and heater unit.
5. Report any leaks found.



(35) Evaporative and crankcase ventilation systems—check hoses and restrictors for blockage, security and deterioration.

See 17.15.01 and 17.15.36.

(36) Carbon canister—renew filter (earlier models only)

See 17.15.07.

(37) Carbon canister—renew at 48,000 miles

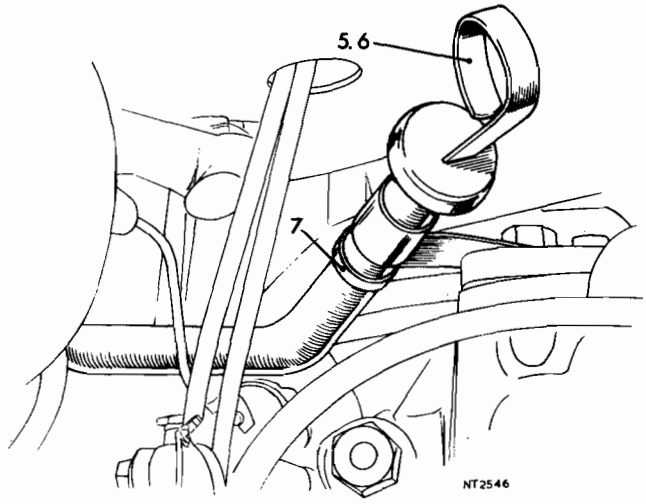
See 17.15.13.

(38) Check/top up level of automatic transmission fluid

1. Run the car at least 5 miles (8 km) or until the transmission has reached its normal operating temperature.
2. Park the car on level ground and apply the hand brake.
3. Move the selector lever to 'P'.
4. Open the bonnet and wipe clean the dipstick and surrounding area.
5. With the engine running at idling speed, withdraw the dipstick, wipe it clean and replace it in position.
6. Withdraw the dipstick again and note the fluid level.

If topping-up is necessary:

7. Add recommended fluid, via the dipstick tube, to bring the level just below the high mark on the dipstick.
   DO NOT OVERFILL.
8. Replace the dipstick.
9. Allow time for the added fluid to drain into the transmission sump, then check the final fluid level, using the procedure in 5 and 6 above.



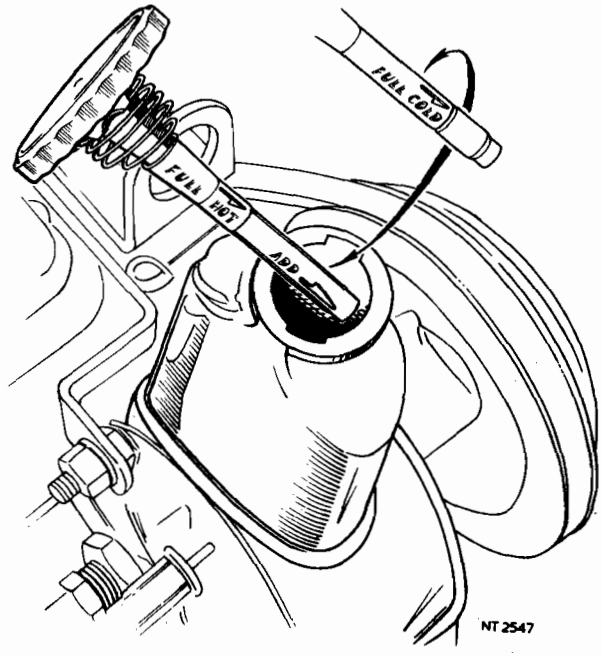
(39) Check/top up power-assisted steering fluid reservoir

Stand the vehicle on level ground.

1. Wipe clean the reservoir cap and surrounding area.
2. Remove the reservoir cap and dipstick.
3. Wipe the dipstick clean and replace it in position.
4. Withdraw the dipstick again and note the fluid level.
   NOTE: Two types of dipstick are used; on early models the level should be checked with the oil warm, i.e. immediately after use. If the level is checked cold, i.e. at ambient temperature, then an allowance must be made for the expansion of fluid when it reaches working temperature.
   On later models (illustrated) the dipstick is marked on each side; use the mark which is relevant to the fluid temperature.

If topping-up is necessary:

5. Add recommended fluid via the filler cap to bring the level just below the high mark on the dipstick.
   DO NOT OVERFILL
6. Replace the reservoir cap.

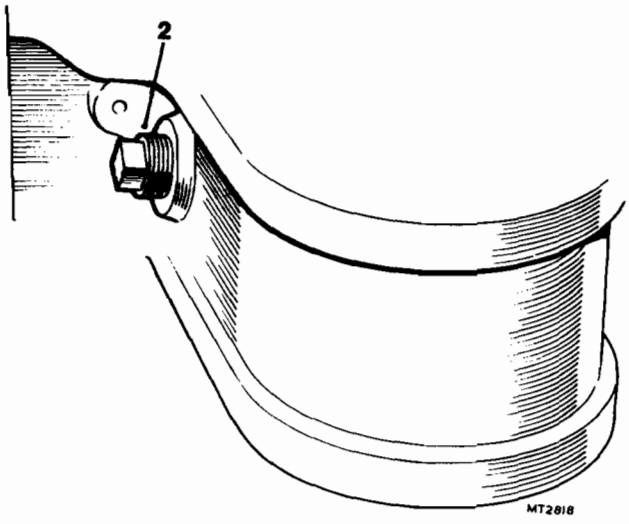


(40) Check/report oil/fluid leaks from power-assisted steering

(41) Check/top up air conditioning compressor fluid level

See 82.10.14.

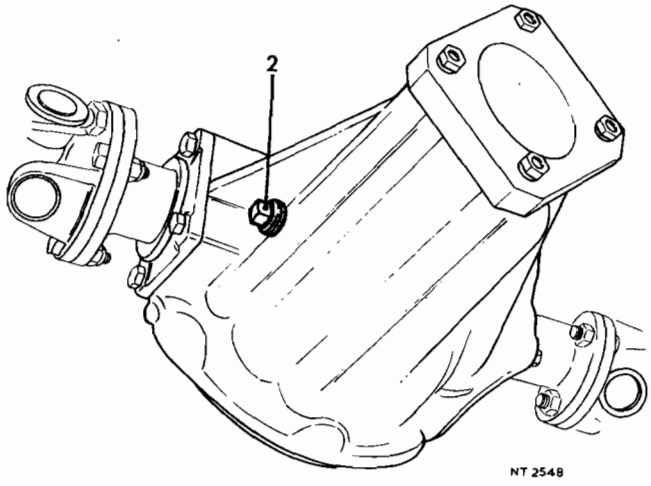
NOTE: OPERATIONS 42 TO 54 ARE BEST CARRIED OUT WITH THE CAR ON A RAMP OR OVER A PIT.



(42) Check/top up level of manual gearbox and overdrive oil

With vehicle standing level:

1. Wipe clean the gearbox filler plug and surrounding area.
2. Remove the filler plug.
3. Add new oil of the recommended grade, via the filler plug hole, until the oil level reaches the bottom of the hole.
4. Allow surplus oil to drain.
5. Replace the filler plug.
6. Tighten the plug to 20 to 25 lbf ft (2·8 to 3·5 kgf m).
7. Wipe away surplus oil.



(43) Check/top up level of final drive unit oil

With vehicle standing level:

1. Wipe clean the final drive unit filler plug and surrounding area.
2. Remove the filler plug.
3. Add new oil of the recommended grade, via the filler plug hole, until the oil level reaches the bottom of the hole.
4. Allow surplus oil to drain.
5. Replace the filler plug.
6. Tighten the plug to 20 to 25 lbf ft (2·8 to 3·5 kgf m).
7. Wipe away surplus oil.

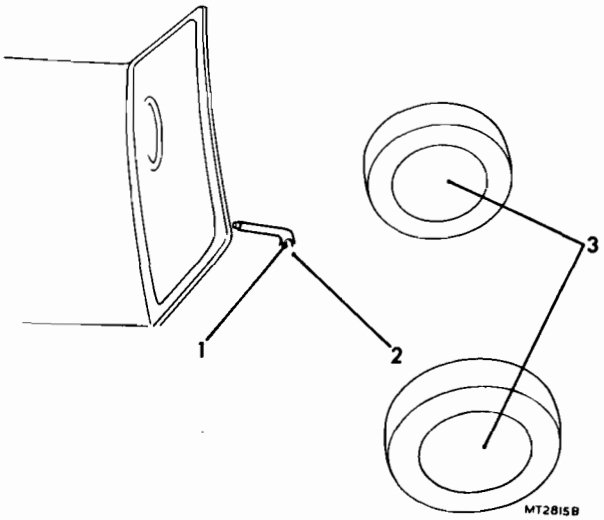
(44) Lubricate all grease points except hubs

(45) Lubricate steering rack and pinion

1. Wipe clean the plug and surrounding area.
2. Remove the plug.
3. Fit a suitable grease nipple to the plug hole.
4. Apply a grease gun to the nipple and stroke for five times only.
   CAUTION: Over-greasing can cause damage to the rubber bellows.
5. Remove the grease nipple.
6. Refit the plug
7. Wipe away surplus grease.

(46) Lubricate hand brake linkage and cables

1. Lubricate the hand brake pivot.
2. Smear grease around the hand brake lever cable connections, working it well into the clevis pin.
3. Smear grease around the brake-drum cable connections, working it well into the clevis pin.
4. Grease exposed sections of the inner cable to resist corrosion.



(47) Check engine, transmission, final drive, suspension and steering unit for oil leaks and report

(48) Check visually brake, fuel and clutch pipes, hoses and unions for chafing, leaks and corrosion and report

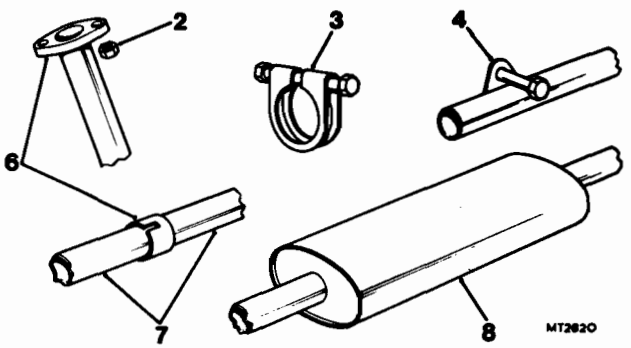
Check visually for chafing, leaks, and corrosion:

1. Brake and clutch pipes.
2. Brake and clutch hoses.
3. Brake and clutch pipe and hose unions.
4. Fuel pipes.
5. Fuel pipe unions.

6. Report any defects found.

(49) Check/report exhaust system for leakage and security

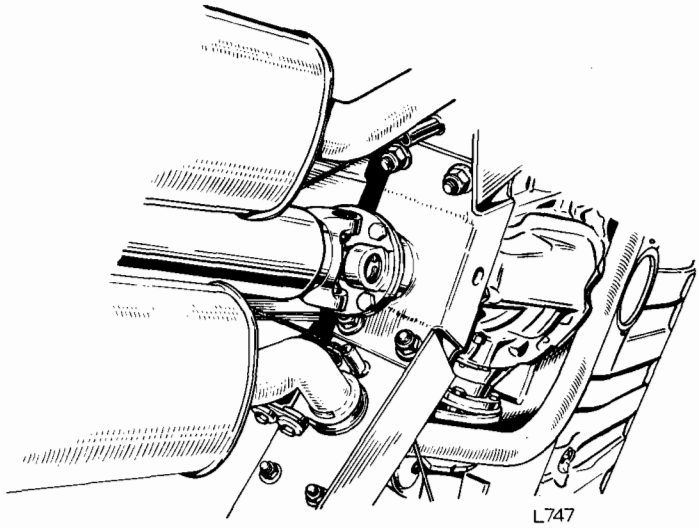
1. Place the car on ramp or over a pit.
2. Check the security of exhaust pipe to manifold nuts, which if correct should be tightened to 10 to 14 lbf ft (1·4 to 1·9 kgf m).
3. Check the security of exhaust pipe joint clips.
4. Check the security of exhaust system mounting bolts.
5. Using a second operator, run the engine at fast idle speed.
6. Check the exhaust system joints for leaks.
7. Check the exhaust pipes for leaks arising from damage or deterioration.
8. Check the exhaust silencers for leaks arising from damage or deterioration.
9. Stop the engine.
10. Report any defects found.



(50) Check security of suspension fixings, tie-rod levers, steering unit attachment and steering universal joint coupling bolts

Using page 06 *as a guide check the security of:*

1. Suspension fixings.
2. Tie-rod levers.
3. Steering unit attachment.
4. Steering universal joint coupling bolts.


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(51) Check security of propeller shaft and drive shaft universal coupling bolts

1. Check the security of propeller shaft coupling bolts, which if correct should be tightened to 26 to 34 lbf ft (3·6 to 4·7 kgf m).
2. Check the security of half shaft to final drive unit coupling bolts, which if correct should be tightened to 15 to 20 lbf ft (2·1 to 2·8 kgf m).

(52) Check security of sub-frame to body mountings

Using page 06 *as a guide:*

1. Check the security of sub-frame mounting bolts/nuts.

(53) Check/report condition of steering unit/joints for security, backlash and gaiter condition

1. Check the security of steering unit mounting and steering joints, using page 06 as a guide.
2. Check the steering for backlash.
3. Check the condition of steering gaiters.
4. Report any defects found.

(54) Lubricate exposed automatic gearbox selector linkage

(55) Adjust front hubs

See 60.25.13.

(56) (57) Check/adjust/report front and rear wheel alignment with tracking equipment

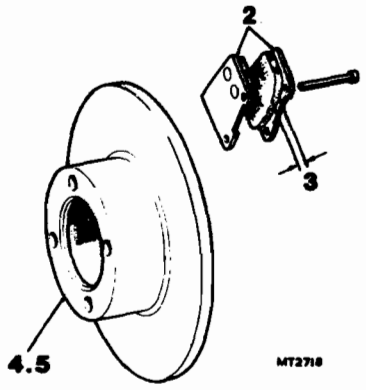
Front wheel alignment—see 57.65.01.

Rear wheel alignment—see 64.25.17.

(58) Inspect brake pads for wear and discs for condition

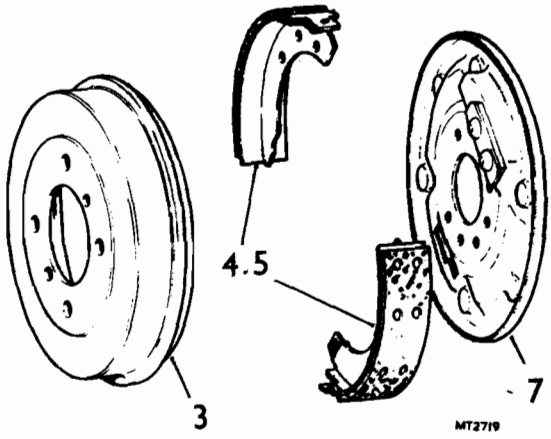
Front brakes

1. Jack up the front of the car and place safely on stands.
2. Remove the front brake pads—see 70.40.02.
   CAUTION: Do NOT depress the brake pedal while the pads are removed.
3. Report pad condition if the friction lining has been reduced to 0·125 in (3 mm) or if there is insufficient material to provide a thickness of 0·125 in (3 mm) at the completion of a further 3,000 miles (5,000 km) motoring.
4. Check the brake discs for excessive scoring and report this if present.
5. Check the brake discs for run-out and report this if it exceeds 0·007 in (0·178 mm).
6. Refit the front brake pads—see 70.40.02.
7. Lower the car off the stands.



(59) Inspect and report brake linings for wear and drums for condition

1. Jack up the car and place safely on stands.
2. Remove the road wheel—see 74.20.01.
3. Remove the brake-drum—see 70.10.03 (rear).
4. Check the brake linings for wear and report if the linings are excessively worn.
5. Check the brake linings for damage and contamination by oil or grease and report if the linings are damaged or contaminated.
6. Check the brake-drums for wear, scoring or other damage and report if the drums are excessively worn, scored or damaged.
7. Remove dust, oil and grease from the brake-drum and backplate.
8. Refit the brake-drum—see 70.10.03 (rear).
9. Refit the road wheel—see 74.20.01.
10. Lower the car off the stands.



(60) Check security of road wheel fastenings

Disc Wheels

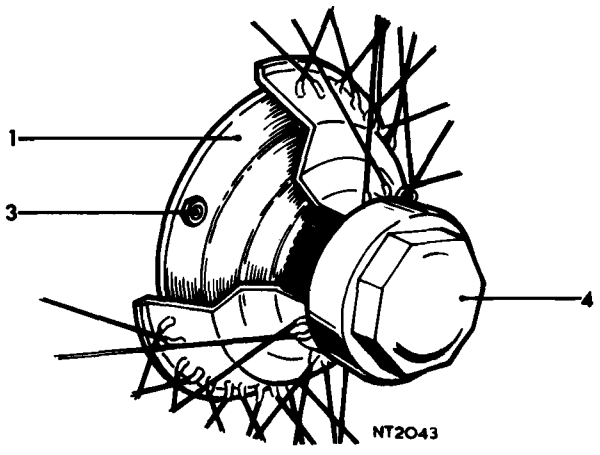
For each wheel in turn:

1. Check the tightness of the road wheel securing nuts, which if correct should be tightened to 60 to 80 lbf ft (8·3 to 11·1 kgf m).

Wire Wheels

For each wheel in turn:

1. Visually check that the adaptor is fitted on the correct side.
2. Remove the road wheel—see 74.20.01.
3. Check the tightness of the adaptor securing nuts, which if correct should be tightened to 55 to 65 lbf ft (7·6 to 9·0 kgf m).
4. Replace the road wheel—see 74.20.01, ensuring that the centre nut is correctly secured.



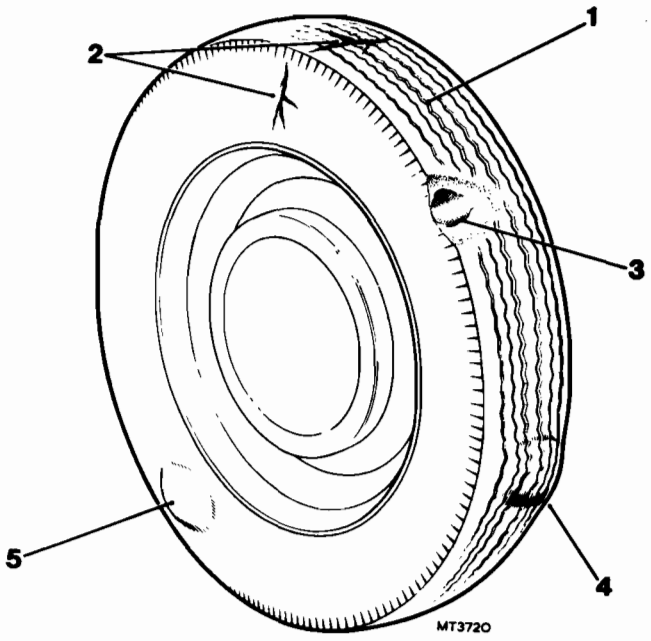
(61) Check that tyres are in accordance with manufacturer's specification

For each road wheel and spare wheel:

1. Check that the tyres are in accordance with the vehicle manufacturer's recommendations for type and size and report any deviation.
2. Check for mixing of cross-ply and radial-ply tyres and report if both types are present on the vehicle (including the spare wheel).

WARNING: It is illegal in the U.K. and highly dangerous to mix cross-ply and radial-ply tyres on the same axle or to fit radial-ply tyres to the front wheels only.

(62) Check visually and report depth of tread, cuts in tyre fabric, exposure of ply or cord structure, lumps or bulges



For each road wheel and spare wheel:

1. Check the tread depth, which if correct should show 1 mm (0·039 in) of tread (excluding wear bars) over three-quarters of the breadth for the entire circumference of the tyre.

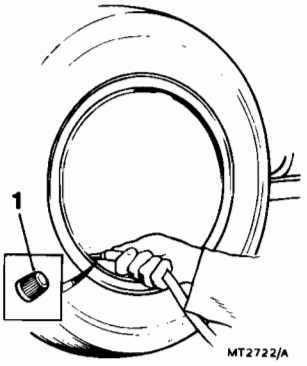
WARNING: It is illegal in the U.K. to use a car of this type fitted with tyres that have a tread depth below this minimum or tyres on which the tread is worn level with the wear indicator bars.

Check for:

2. Cuts in the tyre fabric.
3. Exposure of the ply or cord structure.
4. Lumps or bulges in the tyre circumference.
5. Lumps, bulges or other damage on the tyre walls.

WARNING: It is illegal in the U.K. to use a car fitted with tyres in a damaged condition.

(63) Check/adjust tyre pressures (including spare wheel)



With all tyres at ambient temperature:

1. Remove the protective dust cap.
2. Using a tyre pressure gauge tested for accuracy, check the tyre pressure.
   Recommended tyre pressures:
   26 lb/in² (1·82 kg/cm²) Front
   30 lb/in² (2·10 kg/cm²) Rear
3. Adjust the tyre pressure as necessary.
4. Replace the dust cap or renew if missing.

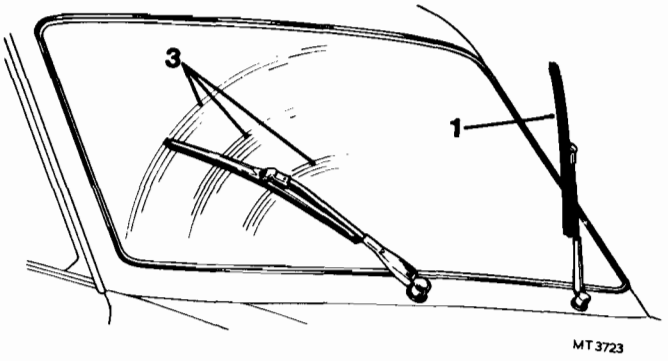
WARNING: It is illegal in the U.K. to use a car with the tyres inflated to a pressure that is not suitable for the use to which the vehicle is put.

(64) Check/adjust/report headlamp alignment

See 86.40.18.

(65) Check, if necessary replace, windscreen wiper blades

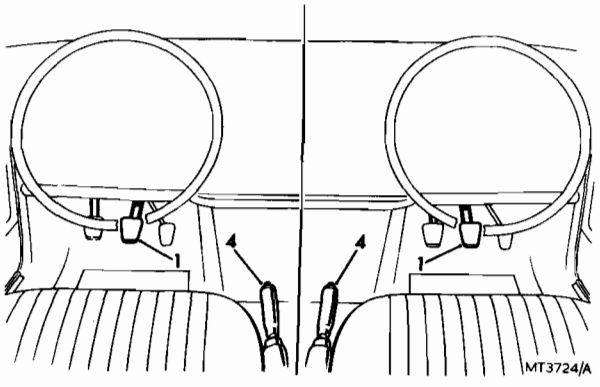
1. Examine each wiper blade in turn for damage.
2. With the wiper blades in position and the windscreen wet, operate the wiper motor.
3. Check the wiper blade operation for smearing and adequate removal of dirt.
4. Stop the wiper motor.
5. If the checks in procedures 1 and 3 are not satisfactory, replace one or both wiper blades as necessary—see 84.15.05.



(66) Fuel tank filler cap—check seal for security
See 17.15.01.

(67) Check brake pedal travel and hand brake operation: adjust if necessary.

1. With the hand brake in the 'off' position, check the brake pedal for sponginess and excessive travel.
2. If the brake pedal has spongy operation, bleed and adjust the brakes—see 70.25.01.
3. If brake pedal travel is excessive, adjust the brakes —see 70.25.03.
4. With the foot clear of the brake pedal, check the hand brake for excessive travel.
5. If hand brake travel is excessive, adjust the hand brake—see 70.35.10.



(68) Check/report brake pedal travel and hand brake operation.

1. With the hand brake in the 'off' position, check the brake pedal for spongy operation and excessive travel.
2. Report brake pedal condition.
3. With the foot clear of the brake pedal, check the hand brake for excessive travel.
4. Report hand brake operation.

(69) Check operation of window controls, locks and bonnet release

Check operation of:

1. Window raising and lowering controls.
2. Internal door locks.
3. External door locks.
4. Luggage compartment lock.
5. Bonnet release controls.

6. Report any defects found.

(70) Check function of all electrical systems and windscreen washer

In sequence, check operation of:

1. Side, tail and headlamps (including headlamp dip/main-beam and 'flash' controls).
2. Instrument panel illumination.
3. Interior light.
4. Horn(s).
5. Auxiliary lights.
6. Clock.
7. Window controls.
8. Map-reading/glovebox lamp.

With ignition circuits energized, check operation of:

9. All warning lights (including 'hazard' warning lights if fitted).
10. Fuel level indicator.
11. Heater blower motor.
12. Windscreen washers.
13. Windscreen wipers.
14. Direction indicators.
15. Brake lights.
16. Reversing lights.
17. Cigar-lighter.
18. Heated back-light and warning lamp.
19. Start the engine and note that the oil pressure warning light has extinguished.

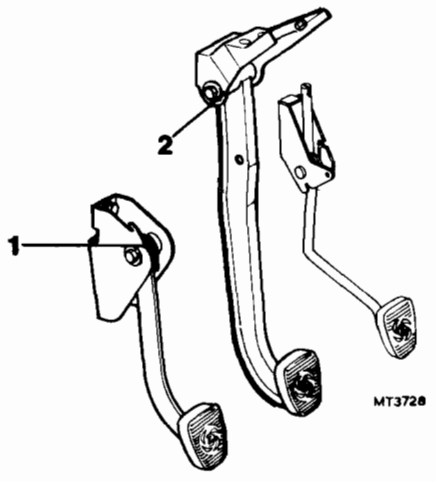
Check operation of:

20. Charging system warning light, battery condition indicator and tachometer, in relation to engine speed.
21. Temperature indicator.
22. Radio (if fitted).
23. Switch off the engine and return the ignition switch to the auxiliary position, then re-check the function of any fitted accessories, e.g. radio and cigar-lighter, that are supplied with power from this switch position.
24. Report any defects found.

(71) Lubricate clutch and brake pedal pivots

Using an oil-can, lubricate:

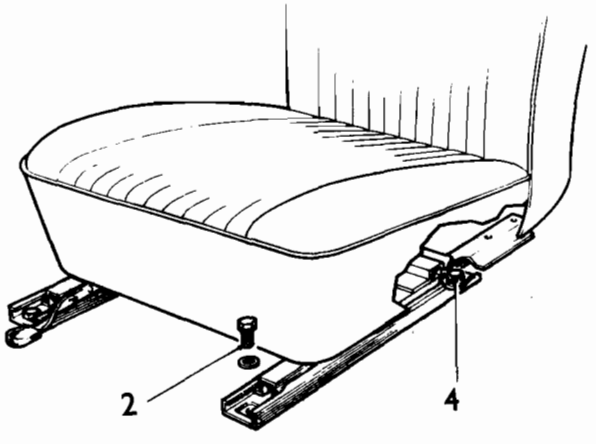
1. The clutch pedal pivot.
2. The brake pedal pivot.
3. Wipe away surplus oil to prevent staining the carpet.



(72) Lubricate all locks, door hinges, strikers and bonnet release

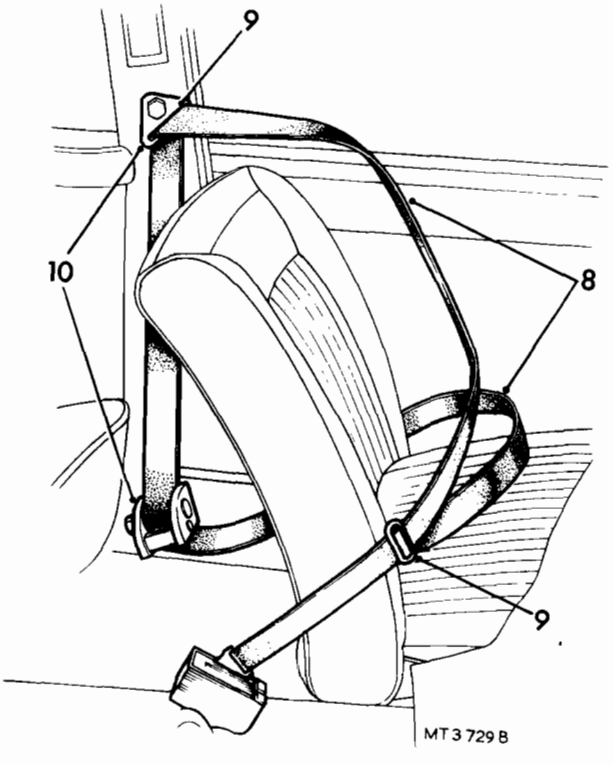
Using an oil-can, lubricate:

1. Door locks.
2. Door hinges.
3. Door strikers.
4. Luggage compartment lock.
5. Bonnet release mechanism.
6. Wipe away surplus oil.



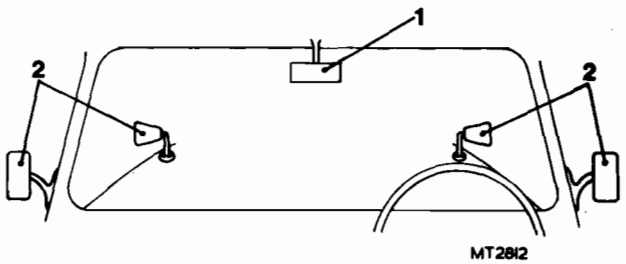
(73) Check/report condition and security of seats and seat belts

1. Move the driver's seat back to its fullest extent.
2. Check the security of the front bolts holding the seat runner to the floor.
3. Move the driver's seat forward to its fullest extent.
4. Check the security of the rear bolts holding the seat runner to the floor.
5. With the seat in the middle position, check the security of the seat in the runner.
6. Repeat the procedure in 1 to 5 for the passenger seat.
7. Check the seat tipping and lock mechanisms.
8. Check the seat belts for wear and damage.
9. Check the seat belt connections for wear and damage.
10. Check the security of seat belt anchorage bolts, which if correct should be tightened to 24 to 32 lbf ft (3·3 to 4·4 kgf m).
11. Report any defects found.



(74) Check/report rear view mirrors for looseness, cracks and crazing

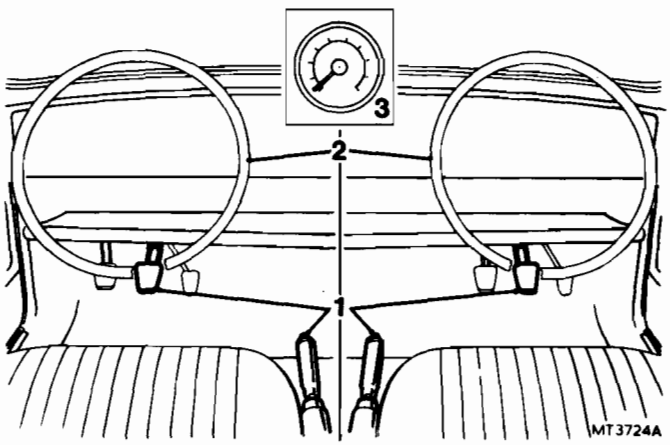
1. Check the interior mirror for looseness, cracks and crazing.
2. Check the external mirrors (when fitted) for looseness, cracks and crazing.
3. Report on the condition of mirrors.



(75) Road/roller test and report additional work required

In addition to the general road test, pay particular attention to:

1. The efficiency and function of the foot brake and hand brake.
2. The function of the steering mechanism.
3. The function of the speedometer.



(76) Ensure cleanliness of controls, door handles, steering-wheel, etc.

1. Check the steering-wheel, gear lever, bonnet release control and fascia controls, etc., for dirt and damage attributable to the service just completed.
2. Check door trims, locks and window controls for dirt and damage attributable to the service just completed.
3. Check the seats, carpets and pedal rubbers for dirt and damage attributable to the service just completed.

ENGINE OPERATIONS

Camshaft cover—remove and refit	12.29.42*
Camshafts	
—remove and refit—both	12.13.01*
—L.H.	12.13.02*
—R.H.	12.13.03*
Connecting rod bearings	
—remove and refit—extra each	12.17.18
—one	12.17.17
—set	12.17.16
Connecting rods and pistons	
—overhaul	12.17.10*
—remove and refit	12.17.01*
Crankshaft	
—end-float—check and adjust	12.21.26
—remove and refit	12.21.33*
Crankshaft pulley	
—remove and refit—auxiliary drive	12.21.02*
—pulley	12.21.01*
Crankshaft rear oil seal—remove and refit	12.21.20
Cylinder block—rebore	12.25.23
Cylinder block drain taps—remove and refit	12.25.07
Cylinder head nuts and bolts—tighten	12.29.27
Cylinder heads	
—overhaul—both heads	12.29.18
—L.H. head	12.29.19
—R.H. head	12.29.20
—remove and refit—both gaskets	12.29.01*
—both heads	12.29.10*
—L.H. gasket	12.29.02*
—L.H. head	12.29.11*
—R.H. gasket	12.29.03*
—R.H. head	12.29.12*
—renew casting—both heads	12.29.22*
—L.H. head	12.29.23*
—R.H. head	12.29.24*
Cylinder pressure—check	12.25.01

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.

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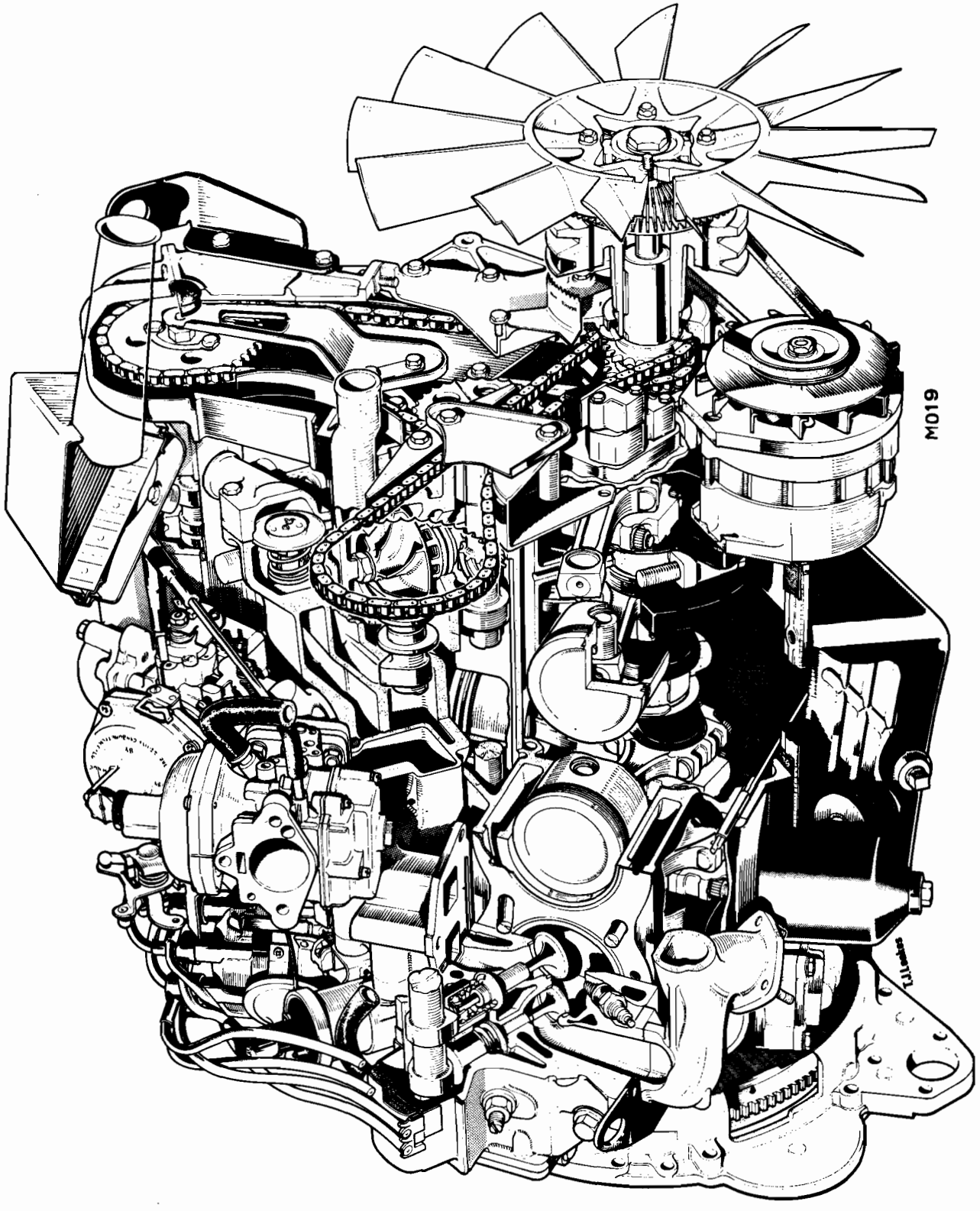
Decarbonize, reface valves and seats, grind-in valves and tune engine	12.29.21*
Drive plate—remove and refit	12.53.13
Engine and gearbox assembly	
—remove and refit	12.37.01*
—remove, change ancillary equipment and refit	12.37.03*
Engine assembly—strip and rebuild	12.41.05*
Engine mounting	
—remove and refit—front L.H.	12.45.01
—front R.H.	12.45.03
—front set	12.45.04
—rear cross-member	12.45.06
—rear set	12.45.10
Engine tune—check and adjust distributor points, sparking plugs, ignition timing, tune carburetter and road test	12.49.02*
Flywheel—remove and refit	12.53.07
Flywheel housing—remove and refit	12.53.01
Jackshaft—remove and refit	12.10.14*
Main bearings	
—remove and refit—each	12.21.40
—set	12.21.39
Oil filter assembly—external	
—overhaul	12.60.08
—remove and refit	12.60.01
—renew element	12.60.02
Oil pick-up strainer—remove and refit	12.60.20
Oil pressure relief valve—remove and refit	12.60.56
Oil pump	
—overhaul	12.60.32
—remove and refit	12.60.26
Oil sump—remove and refit	12.60.44
Oil transfer housing—remove and refit	12.60.14
Pistons and/or rings	
—remove and refit—engine set	12.17.03*
—extra each	12.17.06
—L.H. bank	12.17.04*
—R.H. bank	12.17.05*

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.

continued

Spigot bearing—removing and refit	12.21.45
Starter ring gear—remove and refit	12.53.19
Tappet—remove and refit—set	12.29.57*
Timing chain and gears	
—remove and refit—both chains	12.65.14*
—both chains and gears	12.65.12*
—L.H. chain	12.65.15*
—R.H. chain	12.65.16*
—timing gears (camshaft)	12.65.22*
Timing chain gear cover—remove and refit	12.65.01*
Timing chain guides—remove and refit	12.65.50*
Timing chain tensioners	
—overhaul—both tensioners	12.65.36*
—inner tensioner	12.65.37*
—outer tensioner	12.65.38*
—remove and refit—both tensioners	12.65.28*
—inner tensioner	12.65.30*
—outer tensioner	12.65.29*
Timing gear cover oil seal—remove and refit	12.65.05*
Valve clearance—check and adjust	12.29.48*
Valve gear—remove and refit	12.29.34
Valve guides	
—remove and refit—exhaust	12.29.71
—inlet	12.29.70
Valve seats	
—remove and refit—exhaust	12.29.77
—inlet	12.29.76
Valve timing—check	12.65.08*
Valves—inlet and exhaust—remove and refit	12.29.62

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.


M019

JACKSHAFT

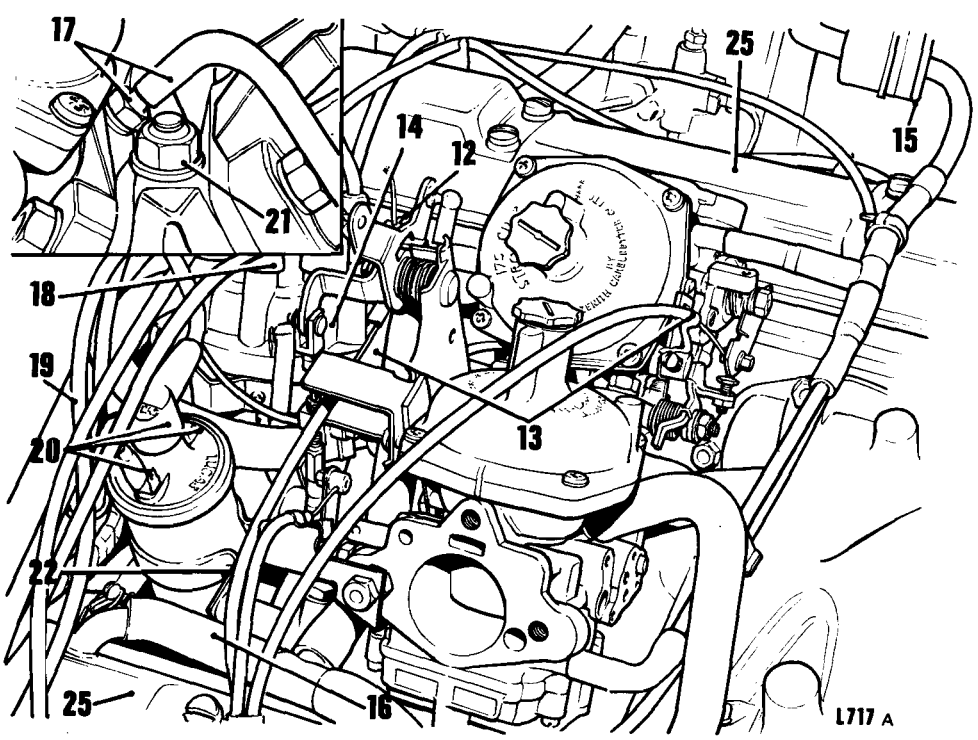
—Remove and refit **12.10.14**

Service tools: S4235A-10, S349

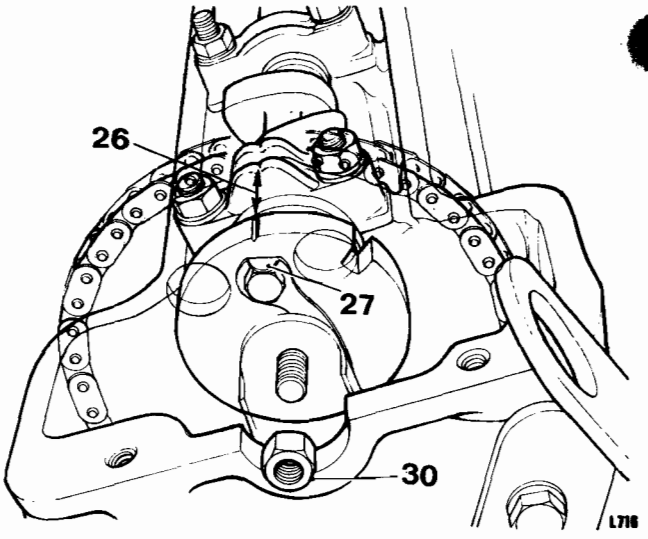
Removing

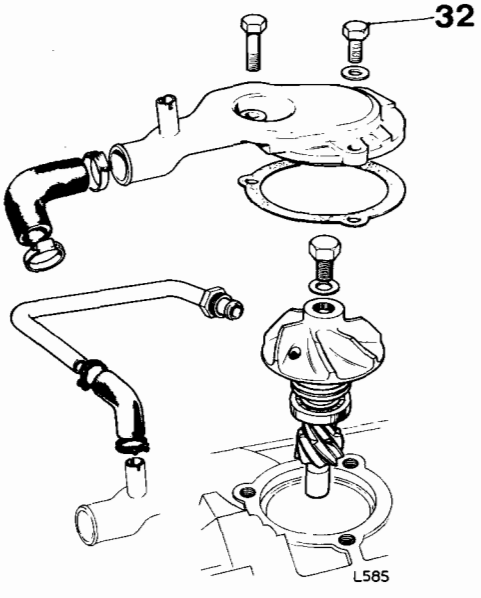
1. Lift the bonnet, fit wing covers and isolate battery.
2. Remove the bonnet (for ease of replacement mark position before removing three bolts each side plus stay).
3. Drain the coolant; remove the radiator and hoses. 26.40.01.
4. Remove the fan and Torquatrol unit. 26.25.21.
5. Remove three bolts securing the steering pump bracket, move the pump to one side, and remove the belt.
6. Remove the alternator and belt. 86.10.02.
7. Remove the pulleys (replace centre bolt for use with claw extractor).
8. Remove five front sump bolts (to front cover) and slacken the remainder to allow the sump to drop approximately 0·25 in (5 mm).
9. Remove 10 bolts securing the front cover to the cylinder block and two securing the cover to each cylinder head.
10. Remove the front cover (located on two dowels), carefully avoiding damage to the head and sump gaskets.
11. Remove three front cover to cylinder block gaskets.
12. Disconnect throttle cable.
13. Disconnect choke cables (2).
14. Disconnect kick-down cable (automatic transmission only).
15. Disconnect fuel feed pipe at filter (plus clips to L.H. cam cover).
16. Disconnect engine breather pipe from R.H. cam cover.
17. Disconnect vacuum advance pipe and union—from carburetter.
18. Disconnect h.t. leads and distributor cap—remove cap.
19. Disconnect brake servo pipe—from manifold.
20. Disconnect coil leads.
21. Remove centre nut and plain washer retaining carburetter pedestal, lift off assembly complete with air cleaner.
22. Remove R.H. (outboard) bolt securing coil to manifold, slacken inner bolt and move coil to provide access to manifold bolt.
23. Remove bolts securing inlet manifold to cylinder head.

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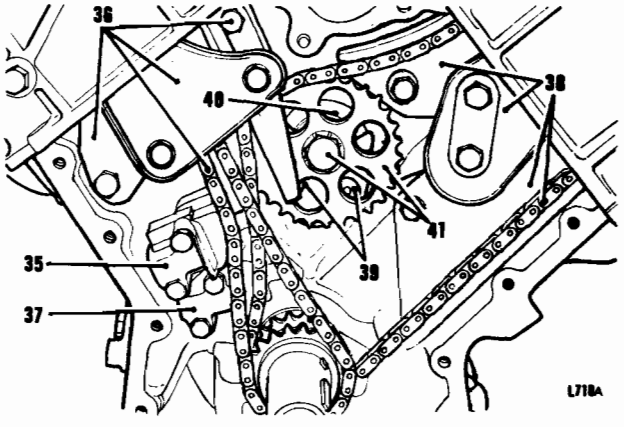
24. Lift off inlet manifold.
25. Remove cam covers.
26. Turn engine (use crankshaft centre bolt) until line on camshaft flange aligns with groove in front bearing cap.
27. Knock back tabs and slacken upper bolts attaching camshaft gear to each camshaft.
28. Turn engine until lower bolts are accessible; de-tab and remove bolts.
29. Turn engine to position in 26 above.
30. Use a nut from a camshaft bearing cap to secure camshaft gear to support bracket on each bank.
31. Remove upper bolts and lockplates from each camshaft.





32. Remove three bolts securing water pump cover to cylinder block; remove cover.
33. Remove water pump, using tool S4235A-10 if necessary.
34. Remove distributor, using tool S349.

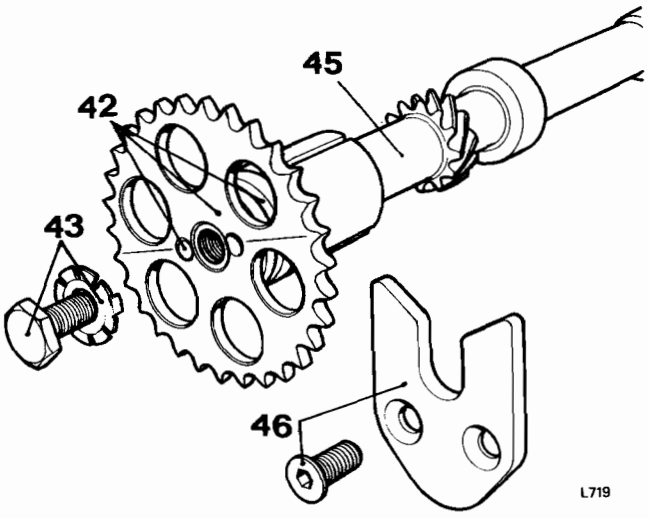
35. Remove outer chain tensioner and distance piece.
36. Remove outer chain guides, support bracket and chain.
37. Remove inner chain tensioner.
38. Remove inner chain guides, support bracket gear and chain.
39. Remove two hexagon recessed screws and lift off keeper plate.
40. Withdraw jackshaft carefully, taking care not to damage bearing surfaces.
41. Remove gear by de-tabbing and removing bolt.

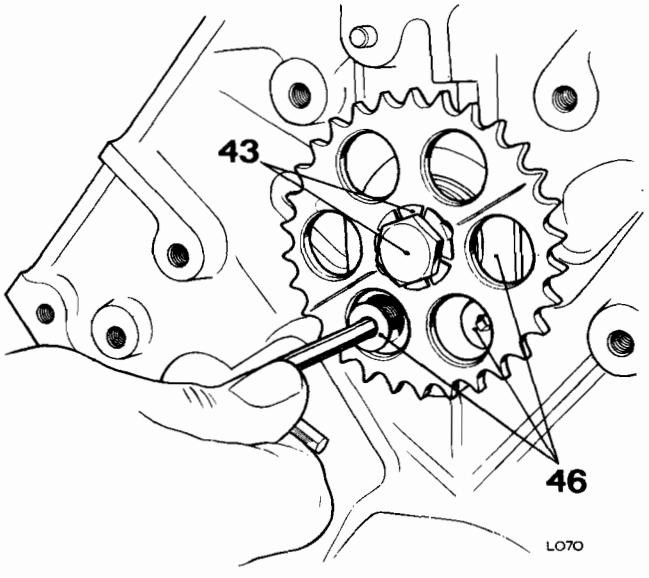


continued

Refitting

42. Ensure mating faces of gear and flange are flat and that dowel is undamaged.
43. **Fit gear to jackshaft with bolt and tab washer ensuring that dowel does not pick up and prevent the even seating of gear to flange. Torque: 30 to 38 lbf ft (4·1 to 5·2 kgf m).**
44. Check run-out of gear to jackshaft.
    CAUTION: This operation may be carried out using 'V' blocks and gauge or 'in situ': excessive run-out will cause undue wear on gear and chain; the cause must be investigated and corrected before proceeding.
45. Fit jackshaft.
46. **Fit keeper plate, securing with two hexagon recessed screws. Torque: 16 to 22 lbf ft (2·2 to 3·0 kgf m).**
47. Fit L.H. bank chain guides, support bracket, gear, chain and tensioner, fit gear to camshaft—adjust chain tension. 12.65.15.
48. Fit R.H. bank chain guides, support bracket, gear, chain and tensioner, fit gear to camshaft, adjust chain tension. 12.65.16.
49. Reverse 1 to 25, noting:
    a. Refill power steering system.
    b. Adjust drive belt.
    c. Run engine, check for leaks and coolant level.



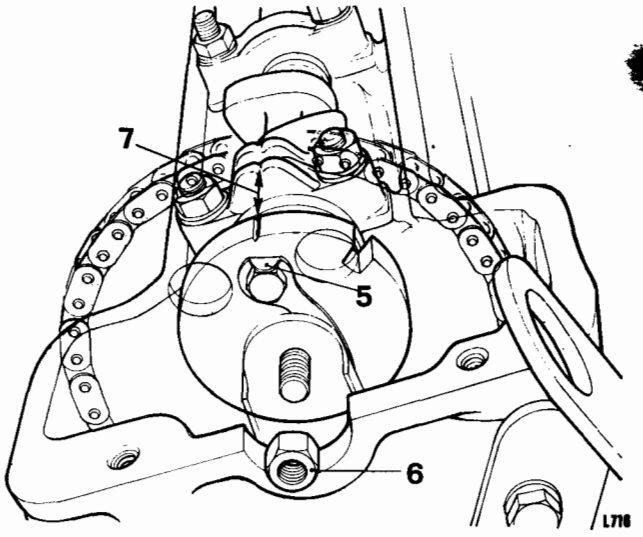


DATA

Jackshaft journal diameter	.. ..	1·4560 to 1·4565 in (36·982 to 36·995 mm).

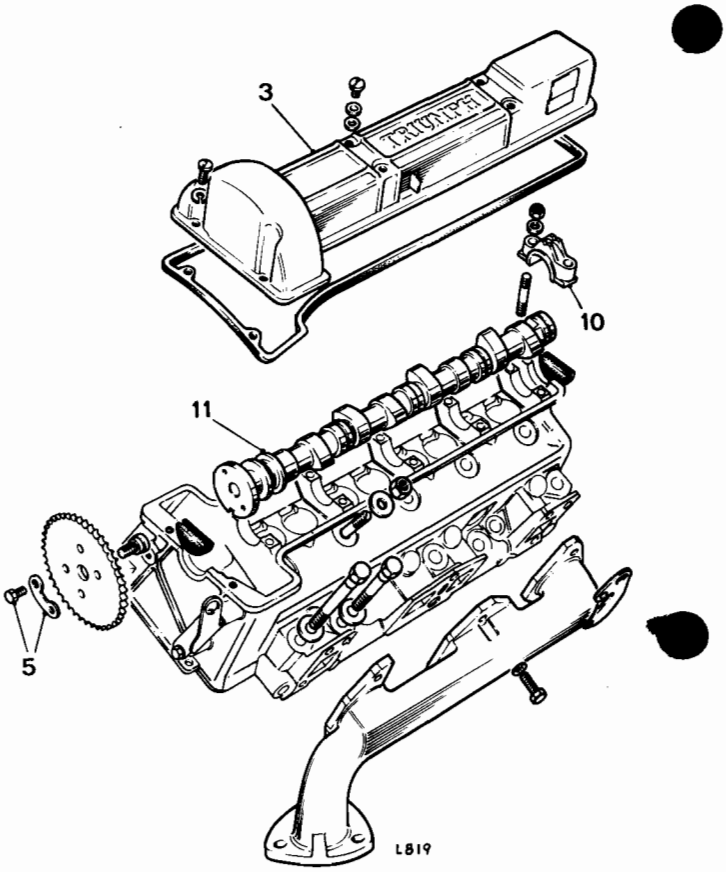
CAMSHAFTS

—Remove and refit	12.13.01
Camshaft—L.H.	12.13.02
Camshaft—R.H.	12.13.03



Removing

1. Lift bonnet; fit wing covers.
2. Remove air cleaner and adaptor elbows from carburetter (3 bolts each side).
3. Remove camshaft covers.
4. Turn engine to align grooves on front camshaft bearings with line on camshaft flanges.
5. Knock back tabs, and slacken upper bolts attaching camshaft gears to camshafts.
6. Turn engine until lower bolts are accessible; de-tab and remove bolts.
7. Turn engine to position in 4 above.
8. Use a nut from a camshaft bearing cap to secure camshaft gear to support bracket on each bank.
9. Remove upper bolts and lockplates from each camshaft.
10. Remove camshaft bearing caps (do not mix one bank with the other).
    CAUTION: The camshaft bearings are line-bored and must be replaced in their original positions.
11. Lift off camshafts.



Refitting

12. Fit camshafts in cylinder head with line on front flange uppermost.
    CAUTION: This position must be maintained until the camshaft is connected by chain to the crankshaft.
13. Fit camshaft bearing caps to their original positions.
14. **Fit nuts and washers where possible and pull down evenly; fit remaining nuts and washers—tighten. Torque: 10 to 14 lbf ft (1·4 to 1·9 kgf m).**
15. Fit upper bolts and new lockplates to secure gears to camshaft.
16. **Turn engine, fit and tighten other camshaft gear bolts, tab over lockplates. Torque: 7 to 10 lbf ft (1·0 to 1·4 kgf m).
17. Turn engine; tighten first camshaft gear bolts, tab over lockplates. Torque: 7 to 10 lbf ft (1·0 to 1·4 kgf m).**
18. Remove nuts from support brackets, replace on camshaft bearing caps. Check and adjust valve clearance as required. 12.29.48.
19. **Fit camshaft covers. Torque: 1 to 2 lbf ft (0·15 to 0·3 kgf m).**
20. Fit air cleaner and adaptor elbows to carburetters.
21. Remove wing covers, close bonnet.

DATA

Diameter of journals	1·230 to 1·235 in (31·242 to 36·369 mm).

CONNECTING RODS AND PISTONS

—Remove and refit **12.17.01**

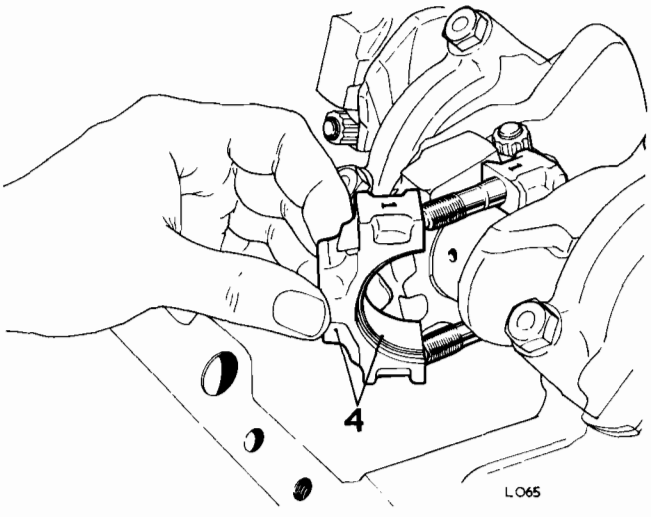
Service tools: S350, 38U3

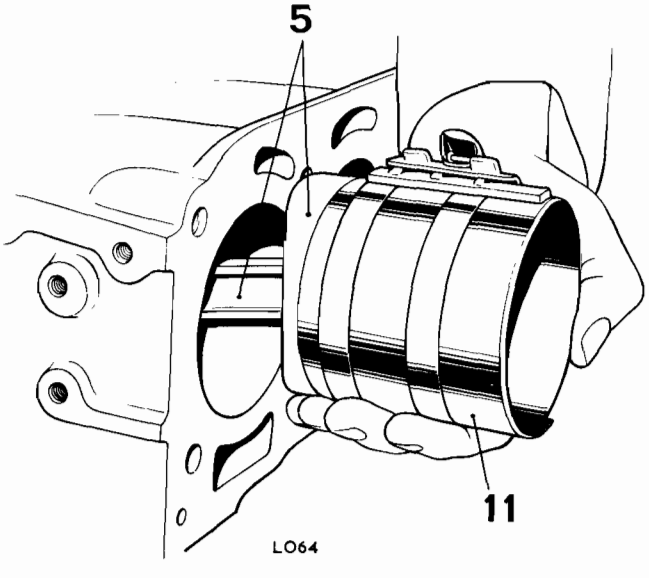
Removing

1. Remove cylinder heads. 12.29.01.
2. Remove sump. 12.60.44.
3. Remove connecting rod nuts on one accessible big-end.
4. Remove big-end cap and bearing shell.
5. Withdraw piston and connecting rod through cylinder bore, taking care to avoid damage to bore.
6. Repeat on remaining connecting rod / piston assembly, turning engine as necessary to provide access.

CAUTION: Do not intermix connecting rods and caps. Do not attempt to fit L.H. bank assemblies to R.H. bank or vice versa.

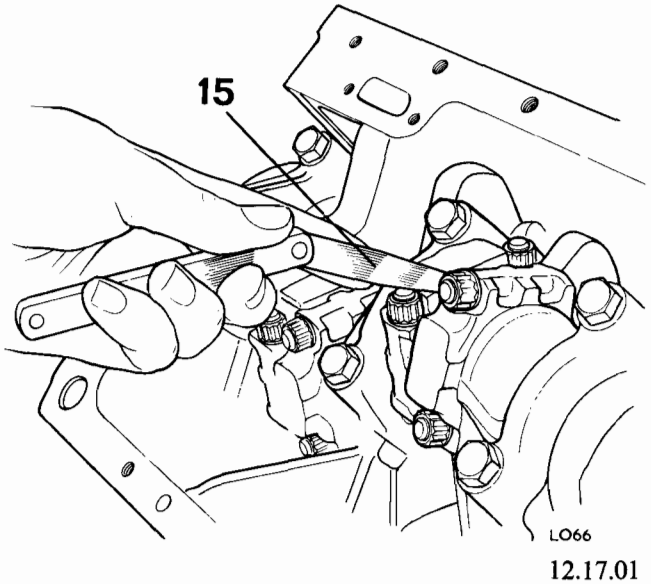
NOTE: Refer to operation 12.17.10 for connecting rod/ piston overhaul.





Refitting

7. Ensure pistons and connecting rods are assembled correctly. 12.17.10.
8. Clean and lightly oil pistons, bores and bearings.
9. Ensure that piston ring gaps are evenly spread on the non-thrust side of piston—inboard.
10. Ensure that the triangle on the piston is towards the front of the engine.
11. Using ring clamp tool 38U3, feed one assembly into its correct bore ensuring that no damage to bores or crank occurs; turn crank to allow big-end to feed onto the crank journal and ensure that big-end bearing is in its correct position.
12. Fit big-end cap and shell bearing.
13. **Fit and tighten big-end nuts. Torque: 38 to 46 lbf ft (5·2 to 6·4 kgf m).**
14. Repeat on remaining connecting rod/piston assemblies, turning engine as necessary to provide access.
15. Check connecting rod end-float by inserting a feeler gauge between each pair of big-ends. End-float: 0·015 to 0·024 in (0·38 to 0·61 mm).
16. Fit sump. 12.60.44.
17. Fit cylinder heads. 12.29.01.



PISTONS AND/OR RINGS—ENGINE SET

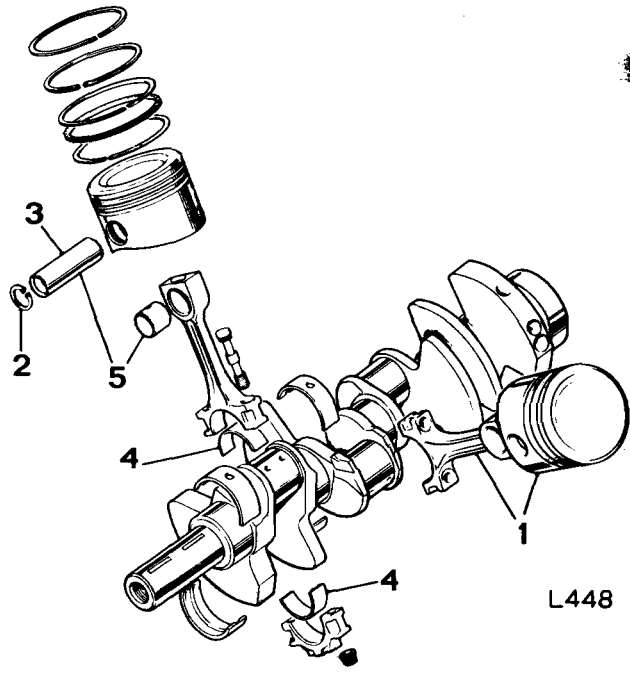
—Remove and refit	**12.17.03**
Pistons and/or rings—L.H. bank	**12.17.04**
Pistons and/or rings—R.H. bank	**12.17.05**
Pistons and/or rings—extra each	**12.17.06**

Removing

1. Remove connecting rods and pistons as required. 12.17.01.
2. Remove pistons and/or rings as required. 12.17.10.

Refitting

3. Fit pistons and/or rings to connecting rod. 12.17.10.
4. Fit connecting rods and pistons. 12.17.01.



CONNECTING RODS AND PISTONS

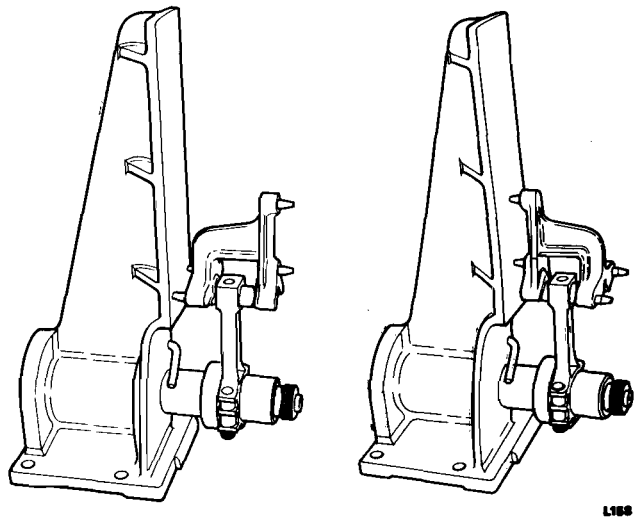
—Overhaul	**12.17.10**

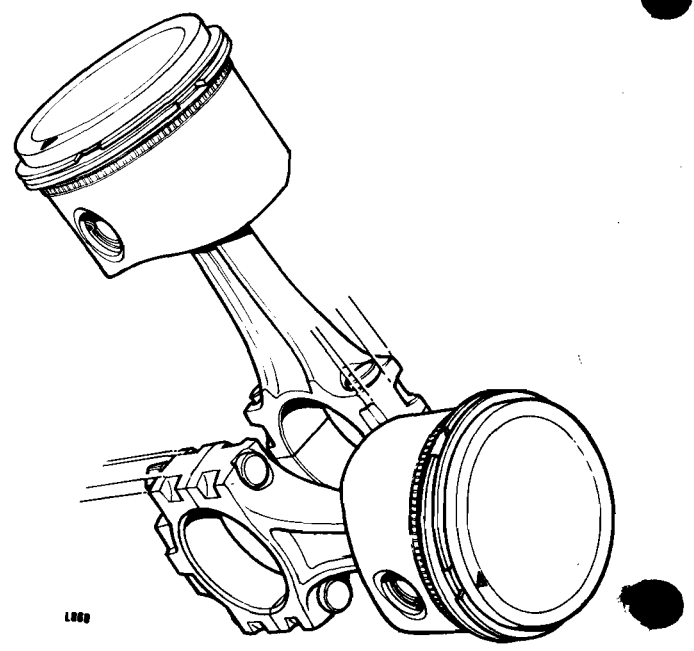
Special tools: S350, 38U3, 336/3

1. Remove connecting rod and piston assembly. 12.17.01.
2. Remove circlips.
3. Remove gudgeon pin—do not mix components.
4. Remove big-end shell bearings.
5. Check small-end bush and gudgeon pin for wear; if necessary, renew.
6. To renew small-end bush: use a press with suitable mandrel to remove old and fit new bush.
8. Check piston ring gaps in cylinder bore. See Data.
9. Check piston dimensions to grade and bore. See Data.
10. Check connecting rods for bend and twist using tool 336/3. See Data.
11. Fit oversize pistons and/or rings as necessary: gap rings accordingly.
12. Fit one circlip to piston.

CAUTION: The connecting rods are offset and chamfered on one side only; this side fits adjacent to the crankshaft. Thus each pair of big-ends are fitted to the crank journal with **non-chamfered** sides together.

13. Assemble pistons to connecting rods as follows:
    L.H. bank: chamfer on big-end opposite to front of piston.
    R.H. bank: chamfer on big-end in line with front of piston.
14. The gudgeon pin must be a thumb push-fit in assembly.
15. Fit remaining circlip.
16. Space piston ring gaps evenly on non-thrust side of piston.
17. Fit shell bearings to big-ends.
18. Fit connecting rods and pistons. 12.17.01.





CONNECTING ROD BEARINGS—Set

—Remove and refit 12.17.16

Connecting rod bearings—one 12.17.17

Connecting rod bearings—extra each 12.17.18

Removing

1. Remove sump. 12.60.44.
2. Remove nuts on one big-end bearing only.
3. Remove bearing cap.
4. Turn engine to push piston to T.D.C., continue turning until crankshaft journal is clear of big-end.

CAUTION: Do not push piston higher than T.D.C. as the top ring may be released which will require the head to be removed.

5. Remove shell bearings from cap and connecting rod.

Refitting

6. Fit shell bearings to cap and connecting rod.
7. Lightly oil bearing surfaces.
8. Pull connecting rod onto crankshaft journal.
9. Fit bearing cap.
10. **Fit and tighten nuts. Torque: 38 to 46 lbf ft (5·2 to 6·4 kgf m).**
11. Repeat on remaining assemblies.
12. Check connecting rod end float.
13. Fit sump. 12.60.44.

DATA

	inches	mm
Connecting rods		
End-float (on crank)	0·015 to 0·024	0·38 to 0·61
Maximum connecting rod bend	0·0015	0·4
Maximum connecting rod twist (measured in length of gudgeon pin)	0·0045	0·114
Small-end bush i.dia. (fitted)	0·8752 to 0·8755	22·230 to 22·238
Piston		
Dia. of top land	3·3630 to 3·3650	85·42 to 85·47
Cylinder bore	3·3853 to 3·3864	85·99 to 86·01
GRADE F		
Bore—cylinder	3·3853 to 3·3858	85·99 to 86·00
Skirt diameter*	3·3828 to 3·3833	85·92 to 85·94
GRADE G		
Bore—cylinder	3·3859 to 3·3864	86·00 to 86·01
Skirt diameter*	3·3834 to 3·3839	85·94 to 85·95
Ring grooves width:		
Compression ring—top	0·0812 to 0·0802	2·06 to 2·03
Compression ring—2nd	0·1196 to 0·1206	3·04 to 3·06
Oil control ring	0·157 to 0·158	3·99 to 4·01
Pistons are available +0·020 in		
Piston rings		
Compression ring—top:		
Height	0·0777 to 0·0787	1·97 to 2·00
Gap	0·013 to 0·018	0·33 to 0·46
Compression ring—2nd		
Height	0·1171 to 0·1181	2·97 to 3·00
Gap	0·010 to 0·015	0·25 to 0·38
Oil control ring:		
3-part ring	Spring centre to butt	
2 outers: gap	0·015 to 0·055	0·38 to 1·40
Gudgeon pin		
Length	2·915 to 2·920	74.04 to 74·17
Diameter	0·8749 to 0·8751	22·22 to 22·23

* Piston skirt to be graded at bottom of skirt only. Piston grades are stamped on piston crown and cylinder block.

DATA

Crankshaft

Journal diameter (mains)	2·1260 to 2·1265 in (54·00 to 54·01 mm)
Fillet radius	0·110 to 0·120 in (2·79 to 3·05 mm)
	0·070 to 0·080 in (1·78 to 2·03 mm)
Crankpins diameter	1·750 to 1·7505 in (44·45 to 44·46 mm)
Fillet radius	0·100 to 0·120 in (2·54 to 3·05 mm)
End-float	0·003 to 0·011 in (0·08 to 0·28 mm)
Regrind crank to maximum undersize	0·030 in (0·762 mm)
Maximum ovality and taper not to exceed	0·002 in (0·05 mm)
Main and big-end bearings are available	—0·010, 0·020, 0·030 in (0·25, 0·50, 0·76 mm) undersize

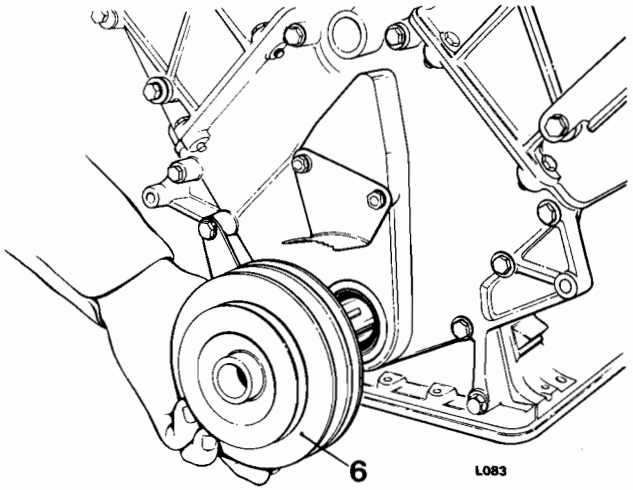
CRANKSHAFT PULLEY

—Remove and refit **12.21.01**

Crankshaft pulley—auxiliary drive **12.21.02**

Removing

1. Remove bonnet. 76.16.01.
2. Remove radiator. 26.40.01.
3. Remove fan and Torquatrol unit. 26.25.21.
4. Slacken drive belt tensions and remove belts.
5. Replace pulley centre bolt and use claw extractor to withdraw pulley assembly to limit of bolt head.
6. Remove bolt and lift off pulley assembly.
7. Separate pulleys (held by boss, located by dowel).



Refitting

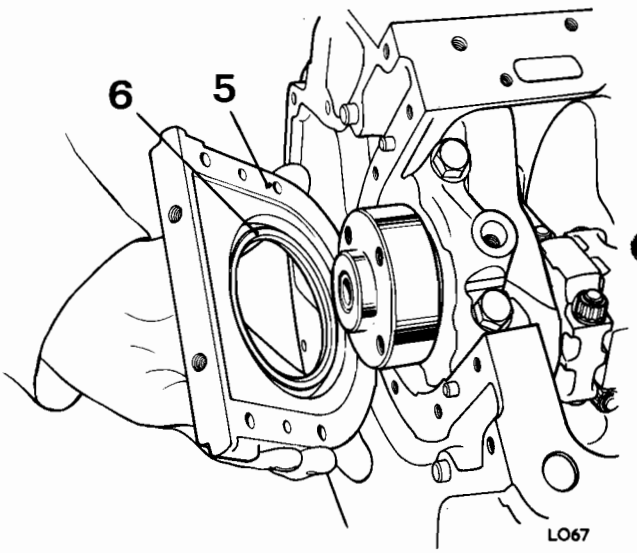
8. Assemble pulleys to crankshaft, lining up keyways. Use hide hammer on centre boss only.
9. Fit and tension drive belts.
10. Fit fan and Torquatrol unit. 26.25.21.
11. Fit radiator and hoses. 26.40.01.
12. Fill radiator.
13. Fit bonnet. 76.16.01.
14. Run engine: check for leaks; check coolant level.

CRANKSHAFT REAR OIL SEAL

—Remove and refit **12.21.20**

Removing

1. Remove gearbox 37.20.01; automatic 44.20.01.
2. *a.* Remove clutch assembly (manual 33.10.01).
   b. Remove converter assembly (automatic 44.17.07)
3. Remove flywheel/drive plate. 12.53.07/12.53.13.
4. Remove two centre rear bolts in sump.
5. Remove six bolts to release seal housing.
6. Knock out seal.



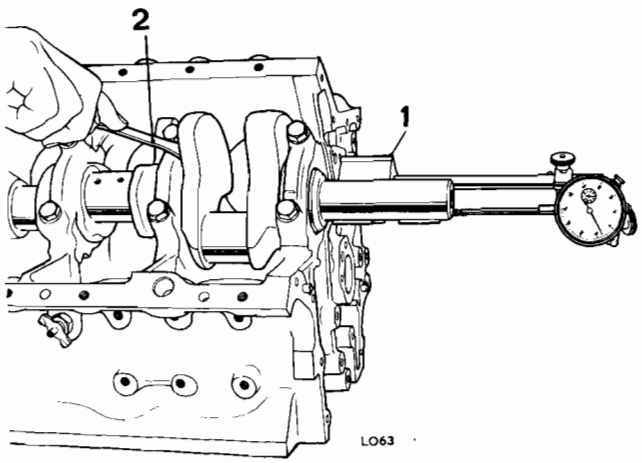
Refitting

7. Clean faces of cylinder block and seal housing.
8. Fit new seal to housing, gently tapping back face of seal flush with the seal housing.
9. Fit new gasket to cylinder block.
10. Fit seal housing, locate on two dowels.
11. **Fit six bolts. Torque: 7 to 10 lbf ft (1·0 to 1·4 kgf m).
12. Fit two sump bolts. Torque: 15 to 20 lbf ft (2·1 to 2·8 kgf m).**
13. Fit flywheel/drive plate 12.53.07/12.53.13, using six new bolts.
14. *a.* Fit clutch assembly (manual 33.10.01).
    b. Fit converter assembly (automatic 44.17.10).
15. Fit gearbox 37.20.01; automatic 44.20.01.
16. Check oil level.

CRANKSHAFT END-FLOAT

—Check and adjust **12.21.26**

Operation performed during Engine-Strip and Rebuild 12.41.05; Crankshaft—Remove and Refit 12.21.33.

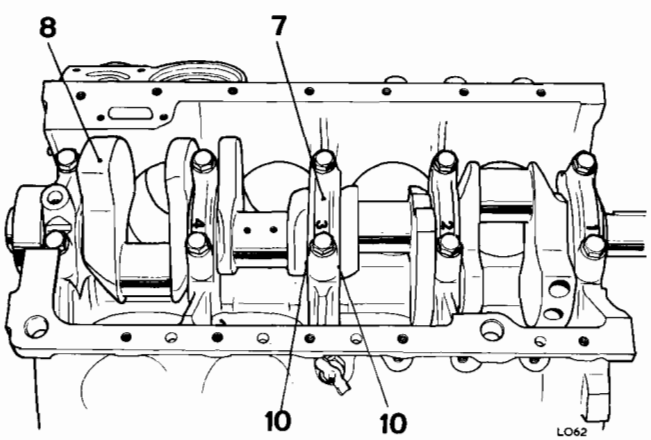


1. Fit magnetic dial gauge indicator to front of cylinder block with indicator rod on end of crankshaft.
2. Force the crank rearwards using a screwdriver between a crank throw and a bearing cap.
3. Zero dial on gauge.
4. Force crank forward; dial should read between 0·003 and 0·011 in (0·07 and 0·28 mm).
   NOTE: Alternatively lever crankshaft forward and check end-float with feeler gauge at rear of journal.

CRANKSHAFT

—Remove and refit **12.21.33**

Removing



1. Remove engine and gearbox. 12.37.01.
2. Remove gearbox 37.20.01; automatic 44.20.01.
3. Remove sump.
4. Remove connecting rod caps and bearings, turning the crankshaft as necessary to facilitate removal.
5. Push connecting rods and pistons to the limit of crankshaft throws.
6. Remove timing chains. 12.65.14.
7. Remove crankshaft main bearing caps.
8. Remove crankshaft, thrust washers and bearing shells.

Refitting

9. Fit shell bearings—oil lightly.
10. Fit crankshaft, caps and bearings with thrust washers each side of No. 3 bearing (by metal faces towards crankshaft).
11. Check crankshaft end-float. 12.21.26.
12. Turn crankshaft to T.D.C. position.
13. Fit timing chains. 12.65.14.
14. Fit connecting rods and bearings. 12.17.16.
15. Fit rear crankshaft oil seal housing. 12.21.20.
16. **Fit sump. Torque: 15 to 20 lbf ft (2·1 to 2·8 kgf m).**
17. Fit flywheel/drive plate. 12.53.07/12.53.13.
18. Fit clutch converter assembly. 33.10.01/44.17.10.
19. Fit gearbox 37.20.01 automatic 44.20.01.

MAIN BEARINGS—SET 12.21.39

Main bearings—each 12.21.40

—Remove and refit

Removing

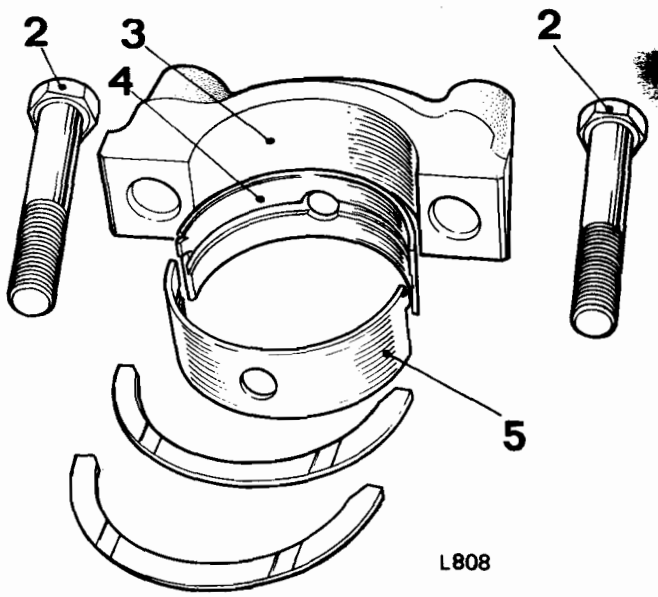
1. Remove sump. 12.60.44.
2. Remove bolts securing main bearing caps.
3. Remove bearing caps.
4. Remove bearings shells from caps.
5. Remove shells from cylinder block bearings.

Refitting

6. Oil the bearing shells.
7. Push the shells into the cylinder block—tag last—locating the tag in recess.
8. Fit shells to bearing caps, locating with tag.
9. Fit bearing caps into position using a hide hammer as required.

NOTE: Bearing caps have numbers offset to one side: these should be fitted adjacent to corresponding numbers on cylinder block.

10. Fit and tighten securing bolts. Torque 50 to 65 lbf ft (7 to 9 kgf m).
11. Fit sump. 12.60.44.



L808

SPIGOT BEARING

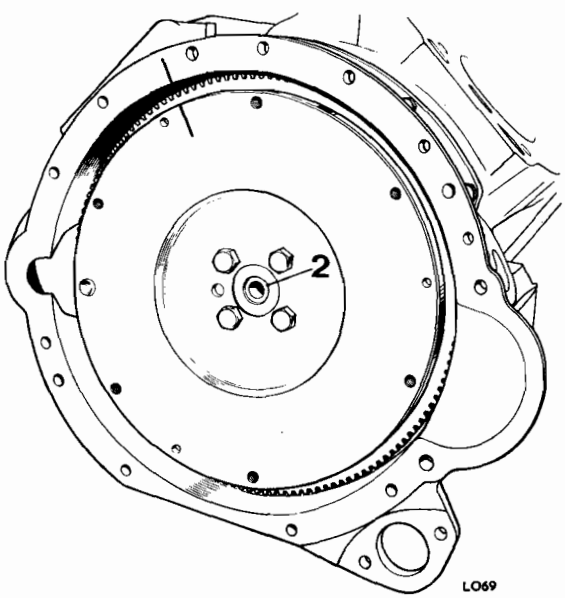
—Remove and refit 12.21.45

Removing

1. Remove clutch assembly. 33.10.01.
2. Remove spigot bearing using a suitable extractor.

Refitting

3. Fit spigot bearing flush with crankshaft.
4. Refit clutch assembly. 33.10.01.



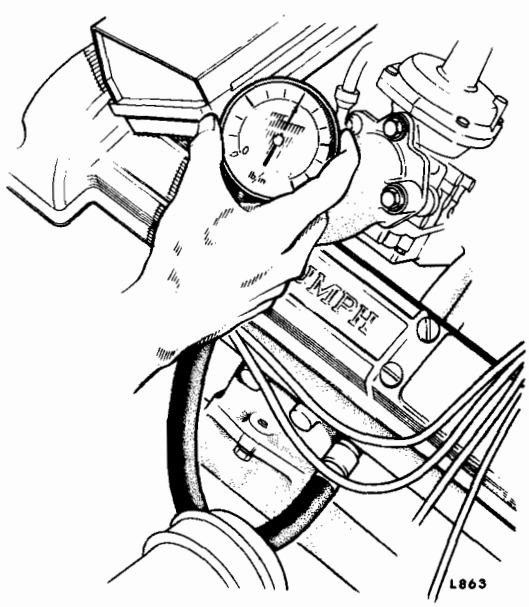
LO69

CYLINDER PRESSURE

—Check 12.25.01

1. Run engine until normal running temperature is attained.
2. Remove sparking plugs.
3. Fit compression gauge to one cylinder.
4. Turn engine on starter motor with throttle open.
5. Note reading on gauge.
6. Repeat on all cylinders.

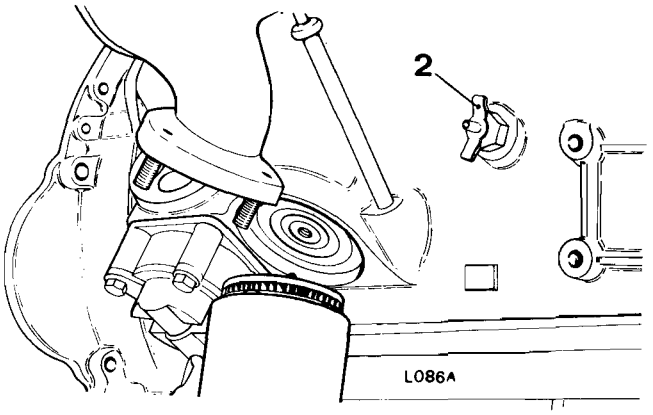
NOTE: All cylinders should have pressures within 10 lb/in² (0·70 kg/cm²) differential.



L863

CYLINDER BLOCK DRAIN TAP(S)

—Remove and refit **12.25.07**



NOTE: The cylinder block drain taps are situated below each exhaust manifold and are accessible from below.

Removing

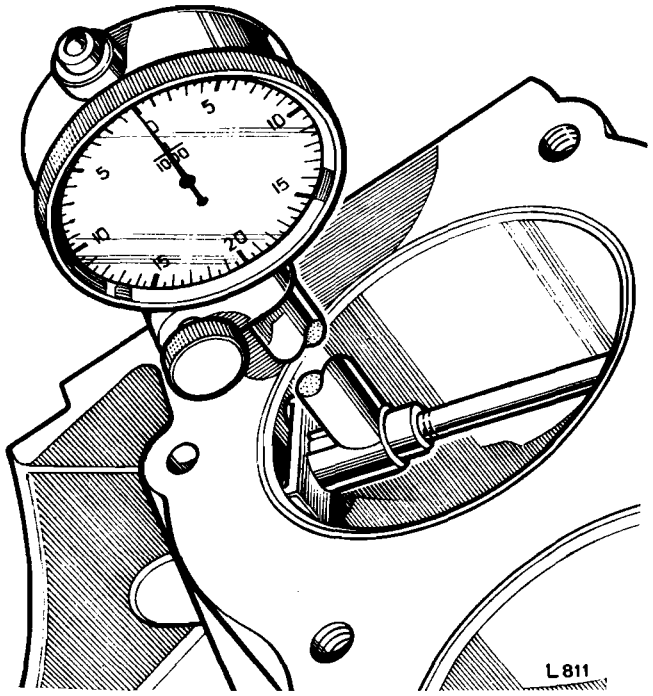
1. Drain coolant.
2. Remove tap and adaptor assembly.

Refitting

3. Fit tap and adaptor assembly.
4. Fill cooling system.
5. Run engine, check coolant level.

CYLINDER BLOCK

—Rebore **12.25.23**



1. Strip engine. 12.41.05.
2. Rebore to dimensions in Data.

NOTE: Cylinders over 0·020 in oversize may be sleeved to bring them back to original size by the following method:

a. Bore out cylinder block to 3·5146 to 3·5156 in.
b. Remove sharp corners from top face of cylinder bore.
c. Lightly oil liner—**DO NOT USE GREASE.**
d. Press liner into block with 3 to 4 tonf maximum load until flush with cylinder block.
e. Rebore liner to standard size (see Data).
f. Check alignment of jackshaft bores.

3. Rebuild engine, noting 12.41.05.
   a. Fit new pistons to rebored dimensions.
   b. Check alignment of connecting rods. 12.17.10.

DATA

Original bore size—grade F	3·3853 to 3·3858 in
Original bore size—grade G	3·3859 to 3·3864 in
Maximum rebore	+0·020 in

CYLINDER HEADS

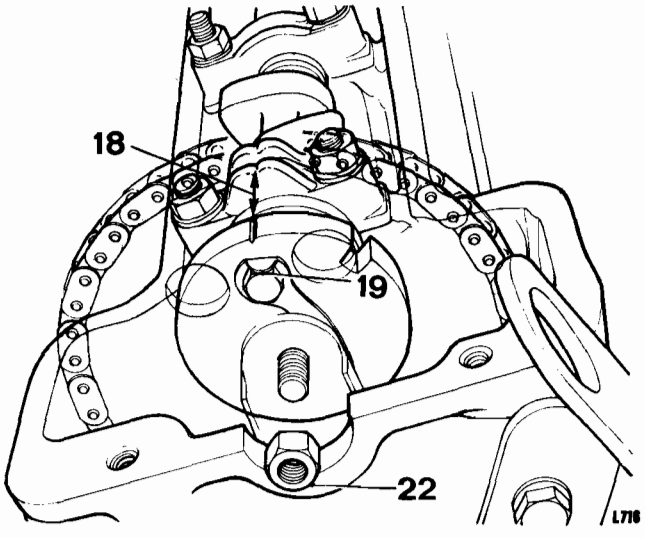
—Remove and refit	**12.29.10**
Cylinder head gaskets	**12.29.01**
Cylinder head gasket—L.H.	**12.29.02**
Cylinder head gasket—R.H.	**12.29.03**
Cylinder head—L.H.	**12.29.11**
Cylinder head—R.H.	**12.29.12**

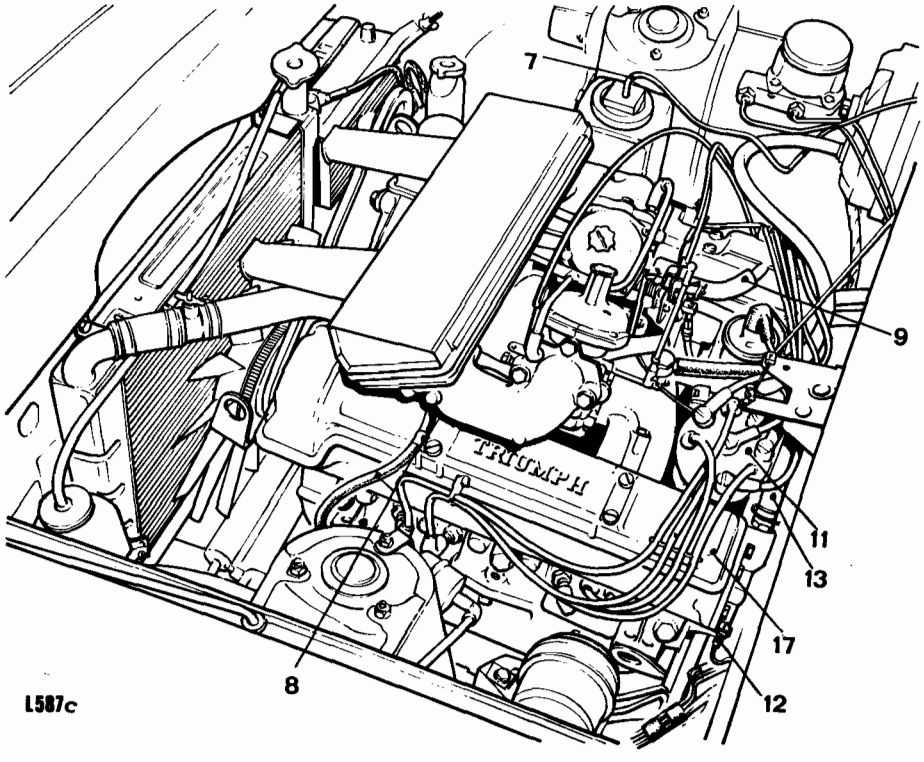
Service tool: S350

Removing

1. Open bonnet; fit wing covers.
2. Drain coolant.
3. Isolate battery.
4. Disconnect throttle cable.
5. Disconnect choke cables (2).
6. Disconnect kick-down cable (automatic transmission only).
7. Disconnect windscreen washer bottle—remove bottle.
8. Disconnect fuel pipe from filter (plus clip to L.H. cam cover).
9. Disconnect engine breather pipe from R.H. cam cover.
10. Disconnect vacuum advance pipe and union from carburetter.
11. Disconnect h.t. leads, clips and distributor cap; remove cap.
12. Disconnect temperature transmitter leads from each water transfer housing.
13. Disconnect heater hose from rear of L.H. head.
14. Disconnect brake servo pipe from inlet manifold.
15. Remove centre nut and plain washer retaining carburetter pedestal; lift off assembly complete with air cleaner.
16. Remove bolt securing gearbox dipstick tube to R.H. cylinder head (automatic transmission only).
17. Remove camshaft covers.
18. Turn engine until line on front camshaft flange aligns with groove in front bearing cap.

continued

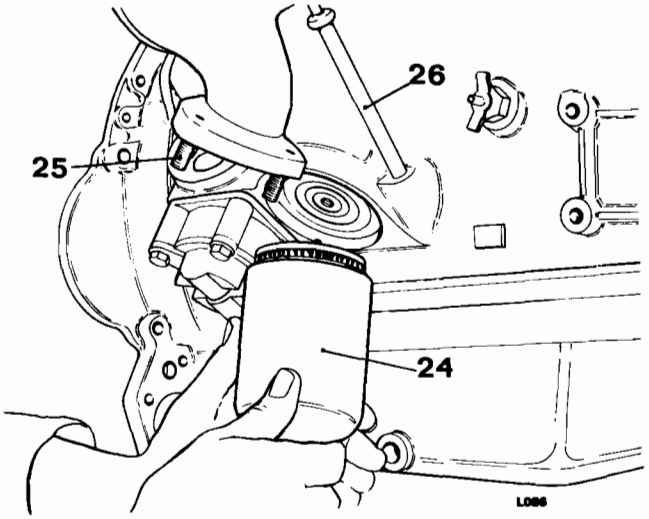


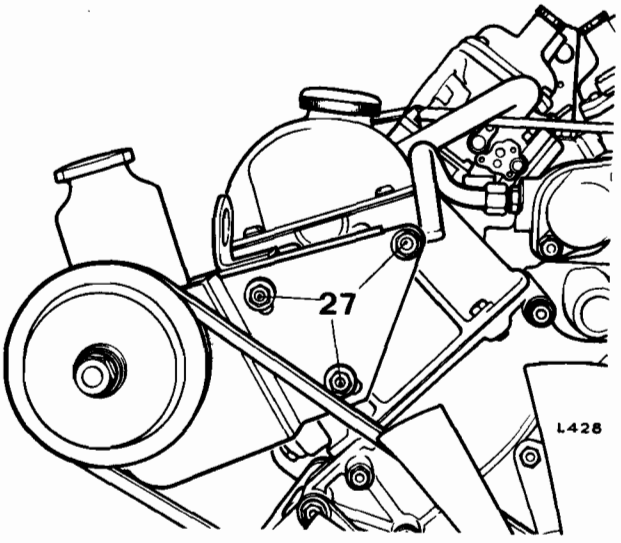


19. Release tabs and slacken upper bolts securing camshaft gears to camshafts.
20. Turn engine until lower bolts are accessible, de-tab and remove bolts.
21. Turn engine to position in 8 above.
22. **Use a nut from a camshaft bearing cap to secure camshaft gear to support bracket on each bank. Tighten the nut securely to prevent the possibility of gear to bracket movement which will allow the chain to slacken and the tensioner to expand.**
23. Remove upper bolt and lockplate from each camshaft.

Working below the vehicle for operations 24 *and* 25:

24. Remove oil filter.
25. Remove nuts and washers securing exhaust downpipes to manifold flanges.
26. Remove engine dipstick.
27. Release power steering pump (three bolts securing bracket to head), move pump to side.
28. Remove R.H. (outboard) bolt securing coil to manifold, slacken inner bolt and move coil to provide access to inlet manifold bolt.
29. Remove bolts securing inlet manifold to cylinder heads.
30. Remove cylinder head nuts, bolts and washers, reversing sequence given in 12.29.27.
31. Remove cylinder head studs using screwdriver or tool S350 where required.
32. Lift off heads.
33. Remove gaskets.

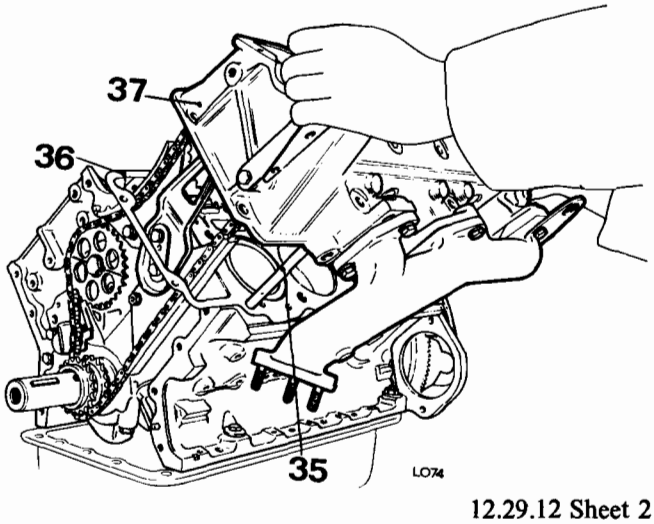


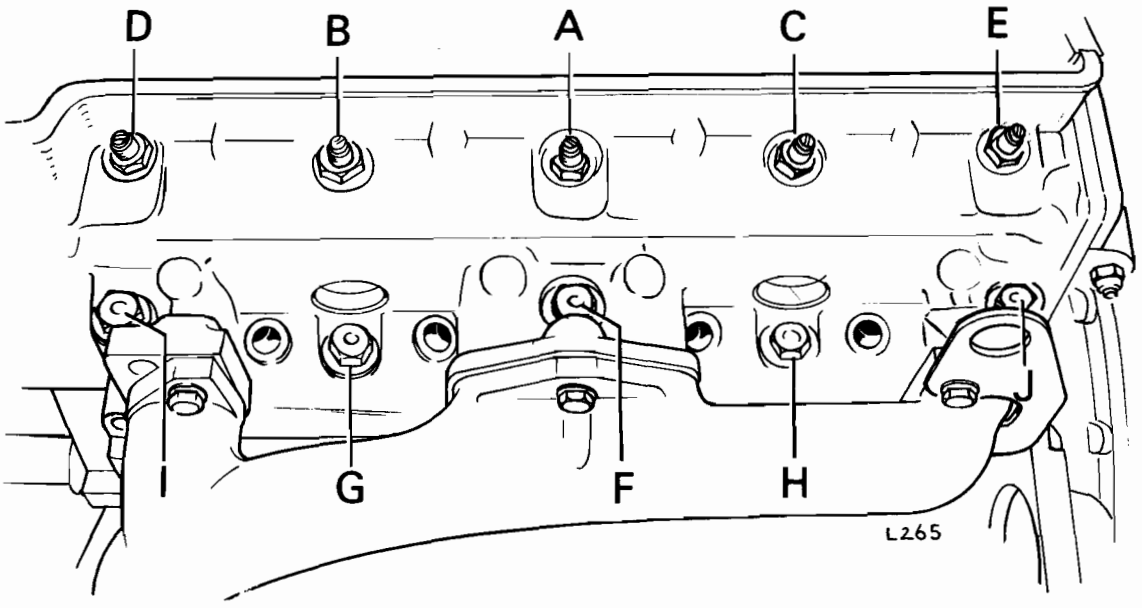


Refitting

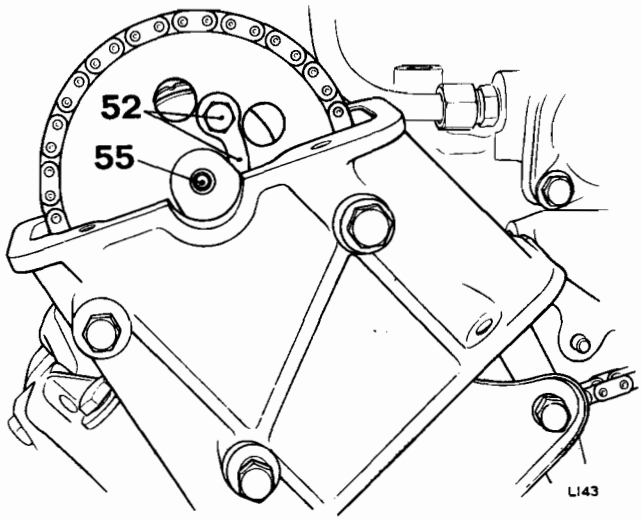
34. Clean all gasket faces.
35. Fit two dummy studs into the G and H bolt hole positions ($2\frac{1}{2}$ in by $\frac{7}{16}$ U.N.C. studs with screwdriver slots at the top) in L.H. bank.
36. Fit cylinder head gasket.
37. Fit cylinder head.
38. Fit cylinder head studs using a screwdriver—remove dummy studs.
39. Fit nuts, washer and bolts, washer plus two bolts to front cover.
40. Tighten nuts and bolts in accordance with 12.29.27.
41. Fit inlet manifold gaskets to L.H. cylinder head.
42. **Fit inlet manifold; secure with bolts. Torque: 15 to 20 lbf ft (2·1 to 2·8 kgf m).**
43. Perform operations 35 to 39 on R.H. bank.
44. Fit inlet manifold gaskets to R.H. cylinder head.
45. **Fit and tighten inlet manifold attachment bolts. Torque: 15 to 20 lbf ft (2·1 to 2·8 kgf m).**
46. Tighten cylinder head nuts and bolts in accordance with 12.29.27. Torque: 45 to 55 lbf ft (6·2 to 7·6 kgf m).

continued





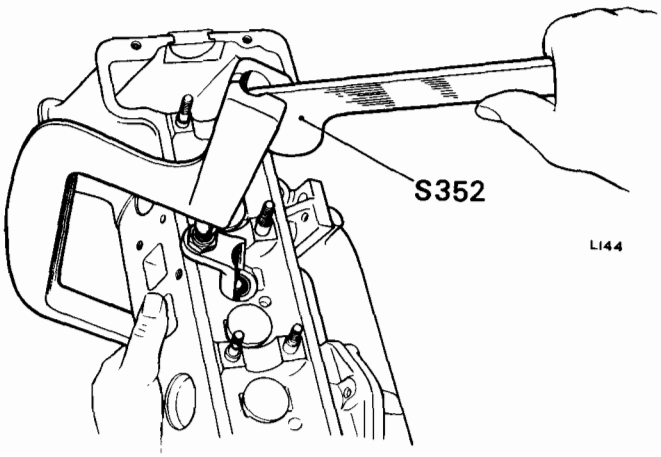
47. Reposition coil; fit and tighten bolts.
48. Fit power steering pump and belt—adjust tension.
49. Replace engine dipstick.
50. Fit gaskets and exhaust down-pipes to manifold flanges—tighten nuts.
51. **Fit oil filter. Torque: 15 to 20 lbf ft (2·1 to 2·8 kgf m).**
52. Fit upper bolts and new lockplates securing camshaft gears to camshaft.
53. **Turn engine; fit and tighten other camshaft gear bolts, tab over lockplates. Torque: 7 to 10 lbf ft (1·0 to 1·4 kgf m).
54. Turn engine; tighten first camshaft gear bolts, tab over lockplate. Torque: 7 to 10 lbf ft (1·0 to 1·4 kgf m).**
55. Remove nuts from support brackets. Replace on camshaft bearing caps.
56. Fit camshaft covers. Torque: 1 to 2 lbf ft (0·14 to 0·3 kgf m).
57. Fit bolt securing dipstick tube to cylinder head (automatic transmission only).
58. **Fit carburetter and air cleaner assembly; secure with plain washer and nut. Torque: 24 to 32 lbf ft (3·3 to 4·4 kgf m).**
59. Connect brake servo pipe.
60. Connect heater hose—L.H. head.
61. Connect temperature transmitter leads.
62. Connect h.t. leads, clips and distributor cap.
63. Connect vacuum advance pipe union to carburetter.
64. Connect engine breather pipe.
65. Connect fuel feed pipe (plus clip to L.H. cam cover).
66. Connect windscreen washer bottle—connect leads.
67. Connect kick-down cable (automatic transmission only).
68. Connect choke cables (2).
69. Connect throttle cable—adjust linkage.
70. Connect battery.
71. Refill coolant, run engine, check for leaks, check coolant level, remove wing covers, close bonnet.



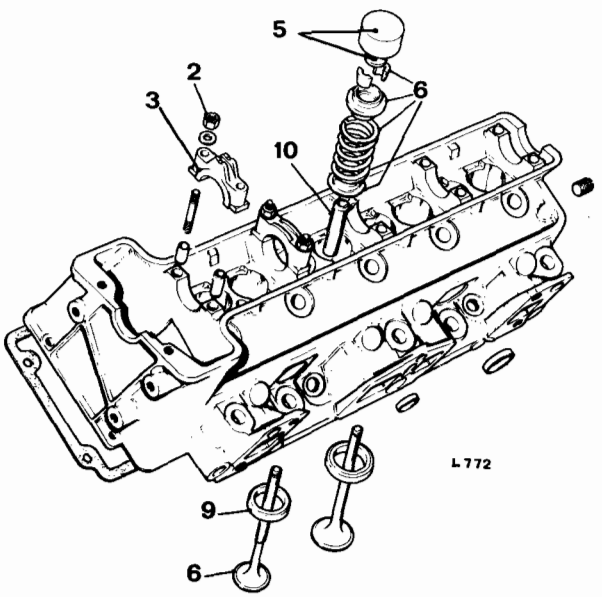
CYLINDER HEADS

—Overhaul	**12.29.18**
Cylinder head—L.H.	**12.29.19**
Cylinder head—R.H.	**12.29.20**

Service tool: S352



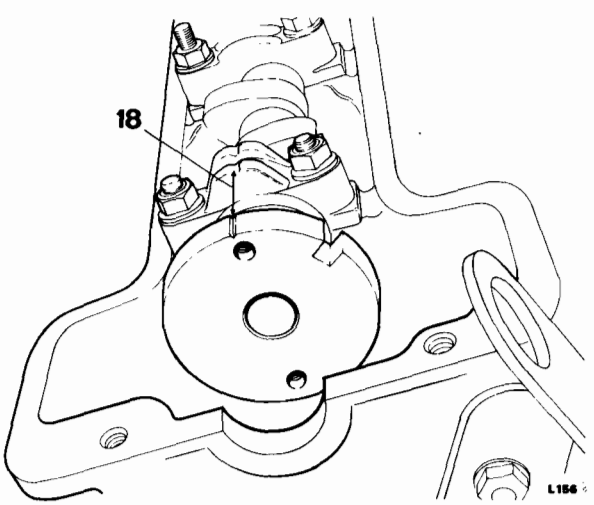
1. Remove cylinder heads. 12.29.10.
2. Remove camshaft bearing nuts, slackening evenly until spring tension is released.
3. Remove camshaft bearing caps.
4. Remove camshaft.
5. Remove tappets and pallets.
6. Using Service tool S352 remove valve cotters, collars, springs, valves and spring seats.
   NOTE: Keep all components in sets and refit to original positions unless new components are fitted.
7. Remove exhaust manifold.
8. Remove all carbon from combustion chamber, exhaust ports and cylinder head face.
9. Recut or renew valve seats as required. 12.29.76/77.
10. Renew valve guides as required. 12.29.70/71.
11. Grind-in valves and remove all trace of paste.
12. Fit exhaust manifold.
13. Using tool S356 fit valves, spring seats, springs, collars and cotters.
    NOTE: Fit valve springs with closer coils to head.
14. Fit tappets and pallets—assemble dry.
15. Fit camshaft.
    NOTE: L.H. bank camshaft has an annular groove on the periphery of the camshaft gear flange.
16. **Fit bearing caps, nuts and tighten evenly to ensure satisfactory settling of the shaft. Torque: 10 to 14 lbf ft (1·4 to 1·9 kgf m).**
17. Adjust valve clearances. 12.29.48
18. Turn camshaft to the fitting position, i.e. line on shaft flange in line with groove in front bearing cap.
    CAUTION: It is imperative that the camshaft is aligned as above before the head is fitted otherwise valve and/or piston damage will result.
19. Fit cylinder heads. 12.29.10.



DECARBONIZE, REFACE ALL VALVES AND SEATS, GRIND-IN VALVES, TUNE ENGINE

Service tool: S352 **12.29.21**

1. Operation 12.29.18.
2. Remove sparking plugs, renew or clean and set as necessary. 86.35.01.
3. Check ignition timing and points, correcting as necessary. 86.35.
4. Tune carburetters. 19.15.02.

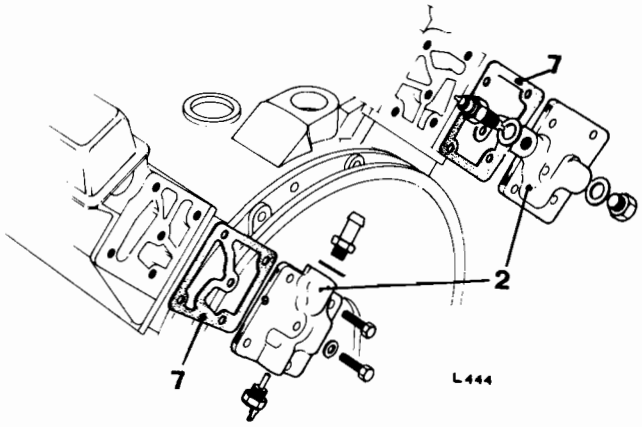


CYLINDER HEADS

—Renew casting **12.29.22**

Cylinder head—L.H. **12.29.23**

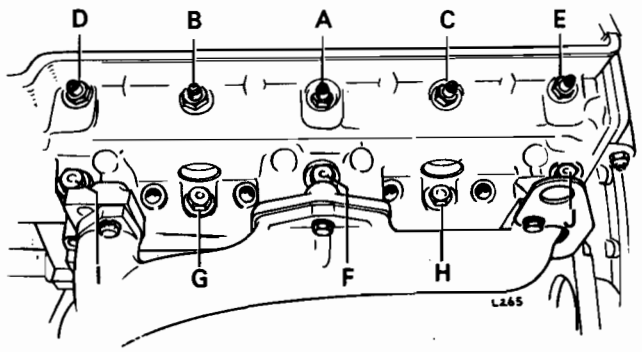
Cylinder head—R.H. **12.29.24**



1. Remove cylinder heads. 12.29.10.
2. Remove water transfer housings.
3. Remove exhaust manifolds. 30.15.10/11.
4. Remove valve gear. 12.29.34.
5. Remove spark plugs.
6. Clean new casting.
7. Fit water transfer housing and gasket (coat gasket with jointing compound).
8. Grind-in valves—remove all grinding paste.
9. Fit valve gear. 12.29.34.
10. Fit exhaust manifolds. 30.15.10/11.
11. Fit cylinder heads. 12.29.10.
12. Fit new spark plugs.
13. Check ignition timing and points, correcting as necessary. 86.35.
14. Tune carburetters. 19.15.02.

CYLINDER HEAD NUTS—BOLTS

—Tighten **12.29.27**



CAUTION: To avoid cylinder head distortion the following sequence **must** be followed.

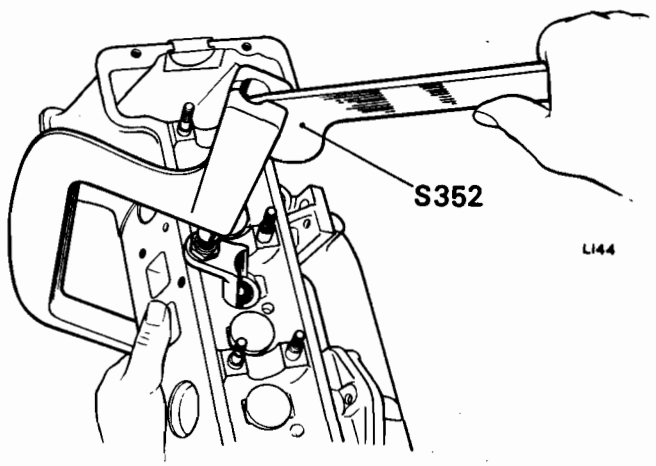
1. Tighten cylinder head nuts as follows: A, B, C, D, E.
2. Tighten cylinder head bolts as follows: F, G, H, I, J.
3. Tighten two bolts securing front cover to cylinder head. Tighten 1 and 2 to torque 45 to 55 lbf ft (6·2 to 7·6 kgf m).

NOTE: Fit cylinder head studs to full depth of thread, finger-tight.

VALVE GEAR

—Remove and refit **12.29.34**

Service tools: S352 with 18G 106 or RG 6513A



Removing

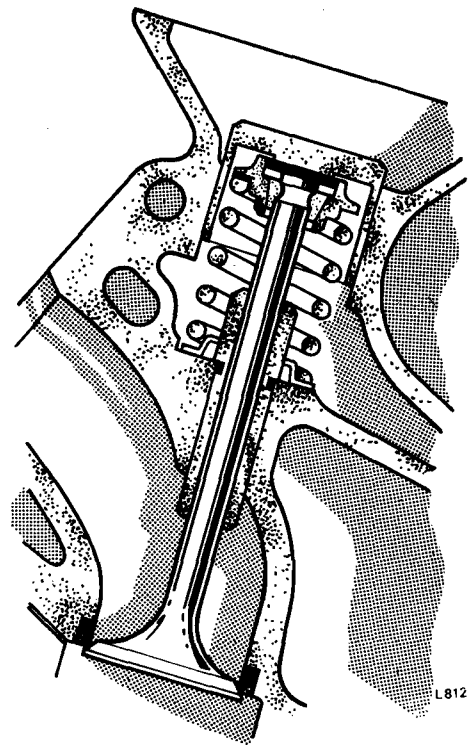
1. Remove cylinder head. 12.29.01.
2. Remove camshaft bearing caps; slacken nuts evenly until spring pressure is released.
3. Remove camshaft.
4. Remove tappets and pallets.
5. Use Service tool—remove valve cotters, collars, springs, valves and spring seats.

NOTE: Keep all components in sets to ensure correct replacement.

continued

Refitting

6. Fit valves, spring seats, springs, collars and cotters.
   NOTE: The valve springs are fitted with close coils to head.
7. Fit tappets and pallets.
8. Fit camshaft.
9. Fit camshaft bearing caps and nuts.
10. **Tighten bearing cap nuts progressively to torque 10 to 14 lbf ft (1·4 to 1·9 kgf m).**
11. Check valve clearances. 12.29.48.
12. Turn camshaft to the fitting position, i.e. line on shaft flange aligned with groove in front bearing cap.
    CAUTION: It is imperative that the camshaft is aligned as above otherwise valve and/or piston damage will result.



CAMSHAFT COVER

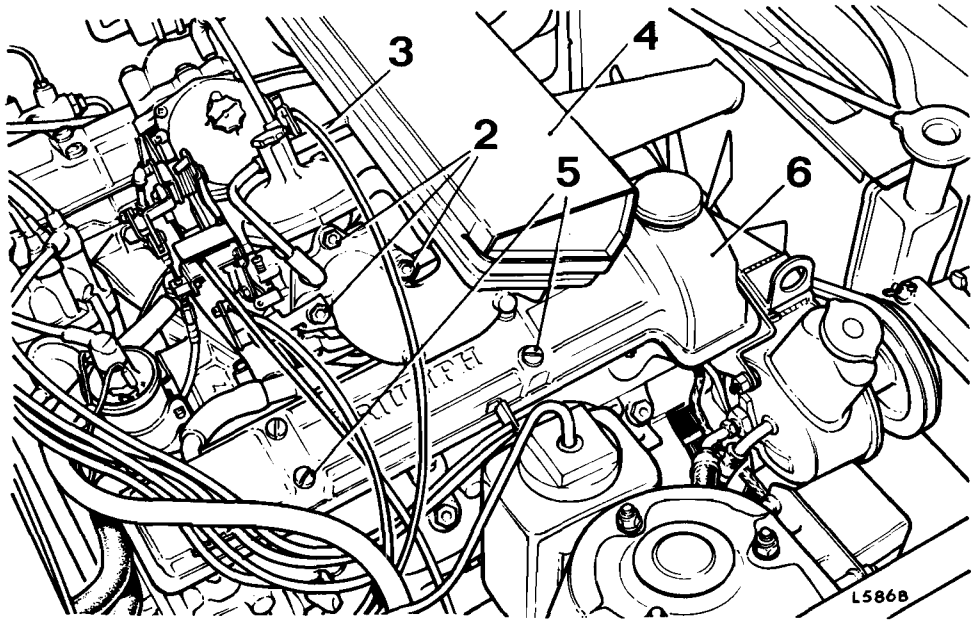
—Remove and refit **12.29.42**

Removing

1. Lift bonnet; fit wing covers.
2. Remove three bolts each side securing air cleaner adaptor to carburetters.
3. Disconnect carburetter to air cleaner pipe.
4. Lift off air cleaner complete with adaptor elbows.
5. Remove slotted nuts and screws securing camshaft cover to cylinder head.
6. Remove camshaft cover.

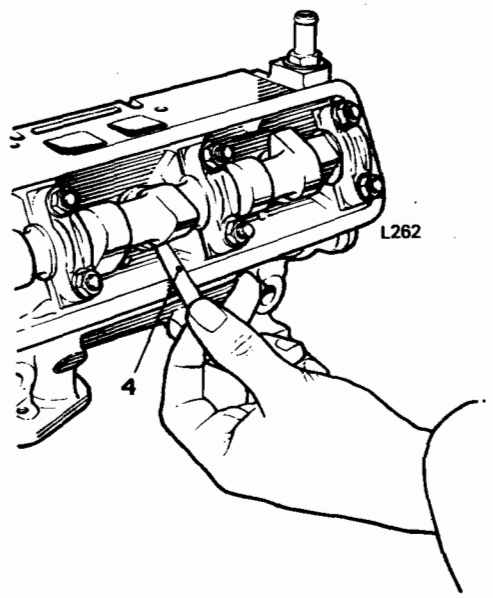
Refitting

7. Ensure camshaft cover gasket is seated correctly.
8. Fit camshaft cover.
9. Fit slotted nuts and screws. Torque 1 to 2 lbf ft (0·14 to 0·30 kgf m).
10. Fit air cleaner/adaptor assembly.
11. Fit and tighten bolts securing above assembly to carburetters.
12. Remove wing covers; close bonnet.



VALVE CLEARANCE

—Check and adjust **12.29.48**



NOTE: This operation may be performed with the cylinder head on the engine or on the bench.

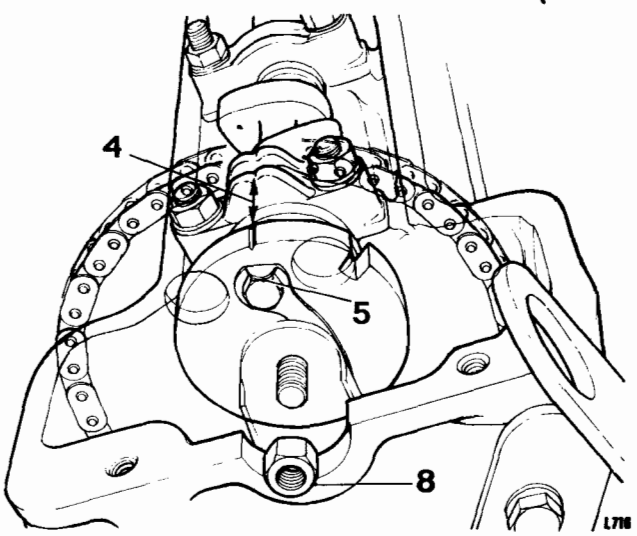
1. Remove air cleaner and elbows. 19.10.01.
2. Remove distributor cover and h.t. leads.
3. Remove camshaft covers and half grommets in cylinder heads.
4. Use feeler gauges to check clearances between each cam heel and tappet. Record the clearances of each valve and its location.

NOTE: When on the bench, the hexagon, forward of the rear camshaft bearing may be used to turn the camshaft.

CAUTION: Do not turn the camshaft when the cylinder head is on the engine and disconnected from the crankshaft, otherwise damaged valves and/or pistons will result.

Where valve clearances are within the following limits omit operations 5 to 19:

*Exhaust 0·016 to 0·018 in (0·406 to 0·457 mm)
Inlet 0·008 to 0·010 in (0·203 to 0·254 mm)**



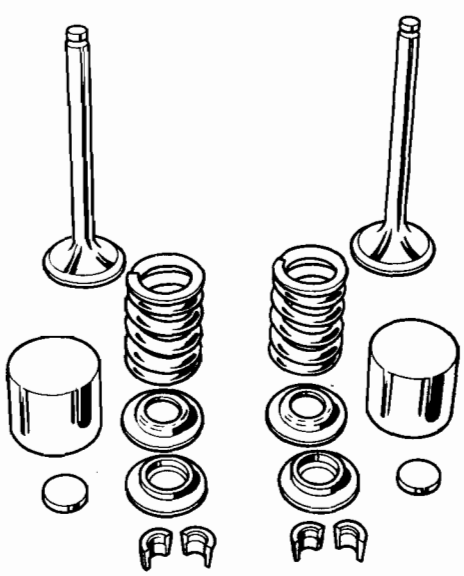
5. On one bank: release lockplate, slacken bolts securing camshaft gear to camshaft.
6. Use a camshaft bearing nut to secure camshaft spigot bolt to support plate.
7. Turn the engine as required to remove two bolts securing camshaft gear to camshaft but do not remove last one until the line on the camshaft flange is aligned with the groove in front bearing cap, i.e. No. 2 cylinder T.D.C. firing.
8. Remove camshaft bearing nuts, caps and lift off camshaft.
9. Remove each tappet and pallet requiring alteration to clearance. Keep in correct numbered sequence.
10. With a micrometer, measure and record the thickness of each pallet.
11. Using the following as an example, select the appropriate pallet to give the correct valve clearance, e.g.:

a. Recorded valve clearance (exhaust valve) .. .. 0·022 in
Required valve clearance .. 0·017±0·001 in
i.e. excess valve clearance .. +0·005 in
Recorded pallet thickness .. 0·090 in

Pallet required .. .. 0·095 in

b. Recorded valve clearance (inlet valve) .. .. .. 0·004 in
**Required valve clearance .. 0·009±0·001 in
i.e. insufficient valve clearance −0·005 in**
Recorded pallet thickness .. 0·100 in

Pallet required .. .. 00·95 in

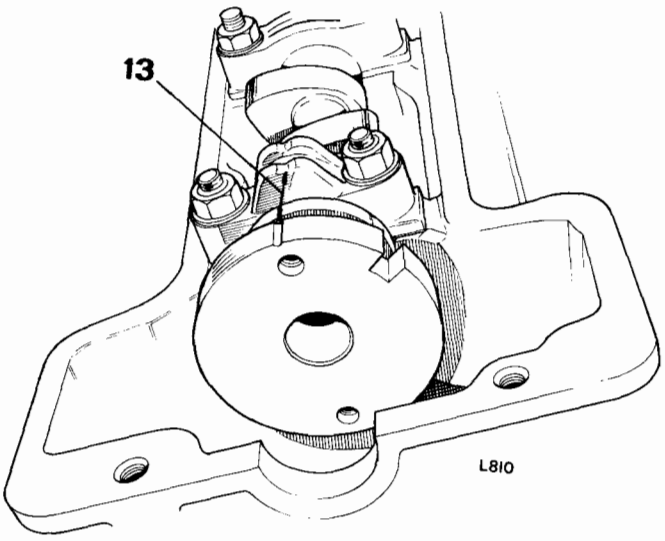


continued

12. Select correct pallets; fit pallets and tappets.
13. Fit camshaft (line on camshaft flange aligned with groove on front bearing cap).
14. Fit bearing caps and nuts; tighten down evenly.
15. Fit lockplates and bolts securing camshaft gear.

CAUTION: Do not turn the engine until camshaft and crankshaft are connected by drive chain.

16. Re-check valve clearances; repeat operations 7 to 15 if necessary.
17. Tighten camshaft gear bolts; tab over.
18. Remove nut securing camshaft gear spigot to support bracket.
19. Repeat operations 5 to 18 on other bank.
20. Fit cylinder head grommets—oil tappets and cams.
21. Fit camshaft covers with gaskets correctly seated.
22. Fit distributor cover and h.t. leads.
23. Fit air cleaners and elbows. 19.10.01.



TAPPETS (SET)

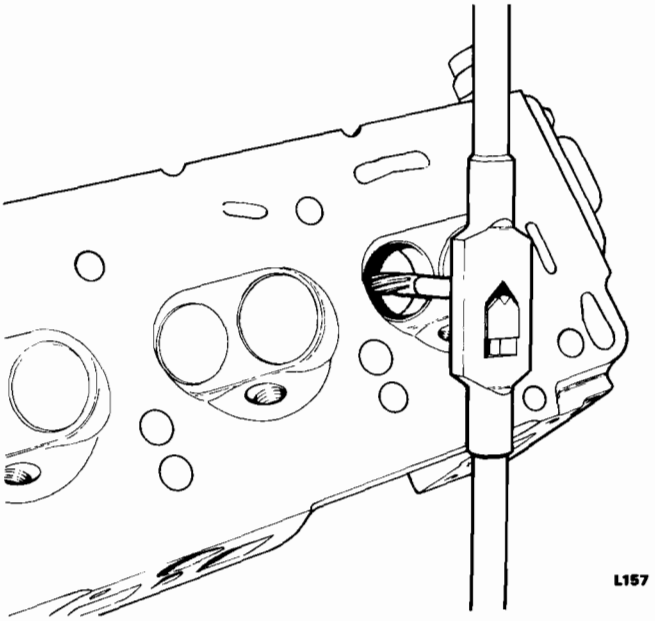
—Remove and refit **12.29.57**

Removing

1. Remove camshaft. 12.13.02 L.H.; 12.13.03 R.H.
2. Lift out tappets, note position for correct replacement.

Refitting

3. Fit tappets.
4. Fit camshaft. 12.13.02 L.H.; 12.13.03 R.H.
5. Check valve clearance. 12.29.48.



VALVES—INLET AND EXHAUST

—Remove and refit **12.29.62**

See operation 12.29.34.

VALVE GUIDES—INLET **12.29.70**

VALVE GUIDES—EXHAUST **12.29.71**

—Remove and refit

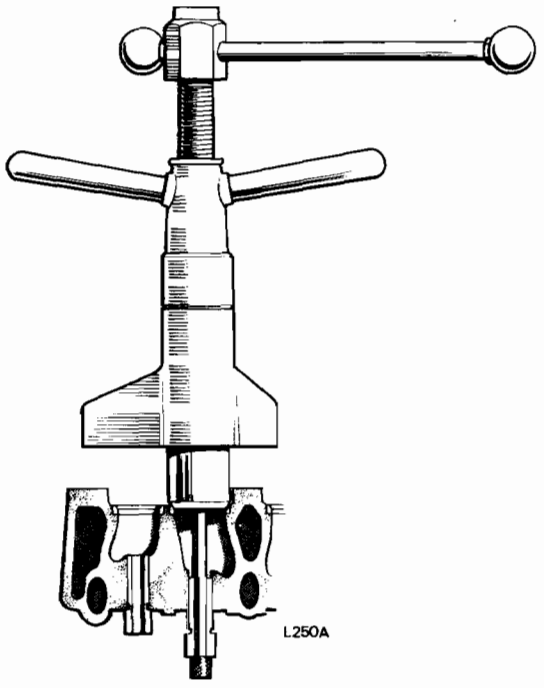
Service tools: S60A-8 with 60A and S60A-2

Removing

1. Remove cylinder head. 12.29.02 L.H.; 12.29.03 R.H.
2. Remove valve gear. 12.29.34.
3. Pull guide out to camshaft side of head, using Service tool.

Refitting

4. Fit guides, pulling towards combustion chamber using Service tool.
5. Ream fitted guides with 0·3125 in reamer.
6. Fit valve gear. 12.29.34.
7. Fit cylinder head. 12.20.01.



INLET VALVE SEATS 12.29.76

EXHAUST VALVE SEATS

—Remove and refit 12.29.77

Removing

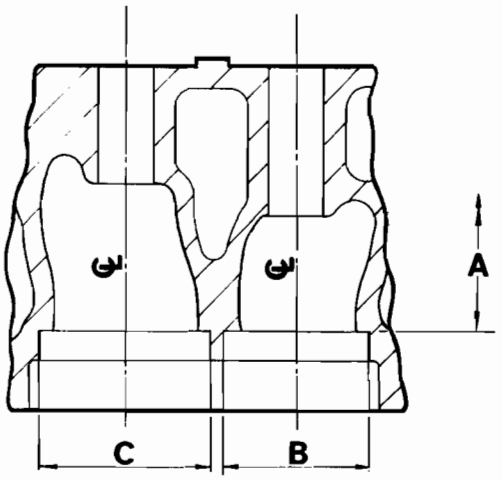
1. Remove cylinder head. 12.29.02 L.H.; 12.29.03 R.H.
2. Remove valve gear. 12.29.34.
3. Machine valve seats to remove.

Refitting

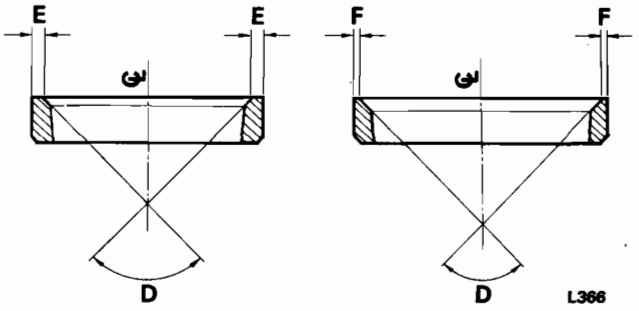
4. Machine valve seat bores to:
   Depth 'A': 4·863 to 4·867 in (123·52 to 123·62 mm) measured from centre line of camshaft to limit of bore).
   Diameter—Exhaust 'B': 1·329 to 1·330 in (33·76 to 33·78 mm).
   Diameter—Inlet 'C': 1·519 to 1·570 in (33·58 to 33·88 mm).
5. Heat cylinder head evenly to 180°C maximum.
6. Press valve seats squarely into position.

NOTE: Valve seat part Nos.: Inlet 150862; exhaust 150863.

7. Re-cut valve seats to:
   Valve seat angle 'D': 89° total.
   Land on valve seat face inlet 'E': 0·062 to 0·063 in (1·57 to 1·60 mm).
   Land on valve seat face exhaust 'F': 0·077 to 0·078 in (1·95 to 1·98 mm).
8. Grind-in valves.
9. Fit valve gear. 12.29.34.
10. Fit cylinder head. 12.29.02 L.H.; 12.29.03 R.H.



L160



L366

ENGINE AND GEARBOX ASSEMBLY

—Remove and refit 12.37.01

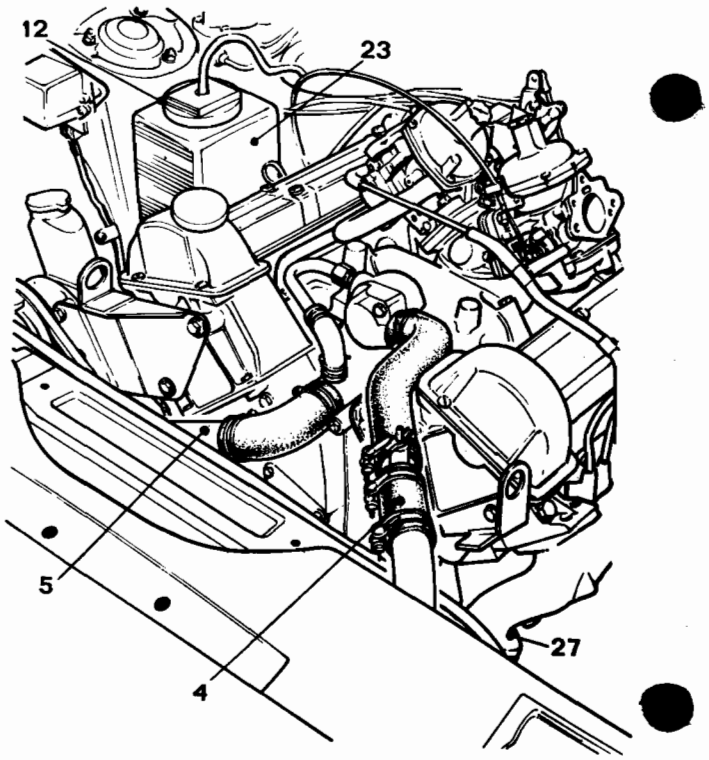
NOTE: The vehicle must be positioned under a hoist and preferably over a pit or ramp. Alternatively, high stands will be required.

Removing

1. Remove the bonnet (three bolts each side plus stay).
2. Isolate the battery.
3. Drain coolant (tap on radiator plus two on cylinder block).
4. Disconnect top hose from radiator and the bottom hose from radiator and water pump.
5. Remove bottom hose assembly.
6. Remove radiator (two bolts top, two nuts bottom) complete with overflow bottle.

NOTE: Lower fan guard will come away with radiator nuts.

7. Remove centre bolt from fan pulley.
8. Lift off fan and Torquatrol unit.



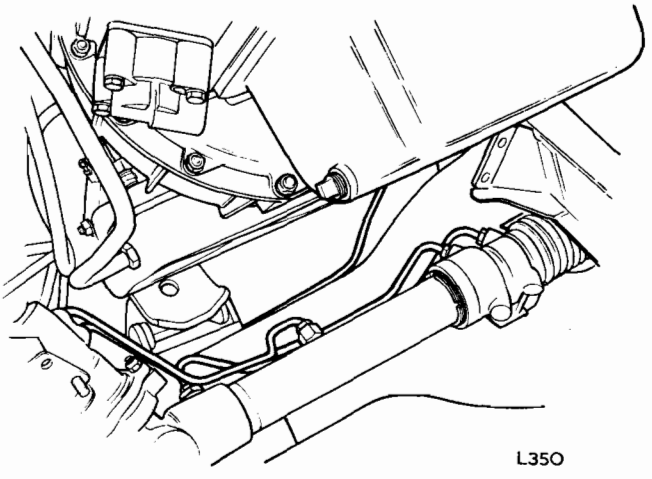
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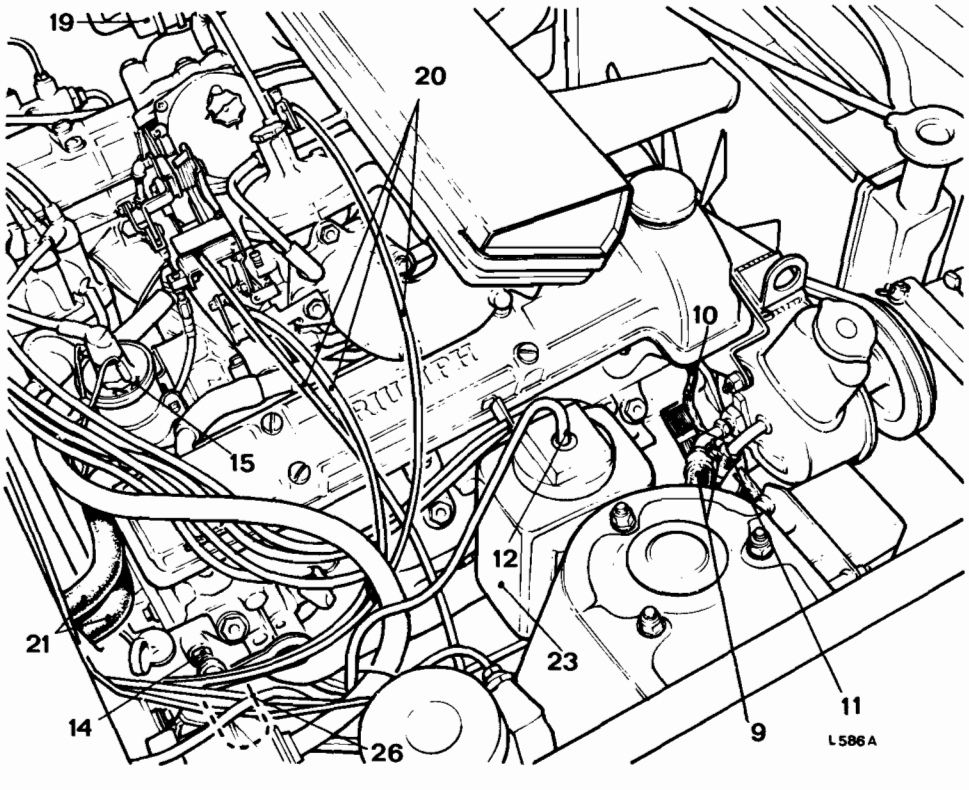
9. Disconnect pipes from steering rack and pump and allow system to drain. Plug all ports in rack and pump to prevent the ingress of dirt.
10. Remove earth strap from alternator mounting bracket.
11. Disconnect alternator.
12. Disconnect windscreen washer bottle.
13. Disconnect water temperature transmitters (each head).
14. Disconnect oil pressure transmitter.
15. Disconnect coil.
16. Disconnect ballast resistor.
17. Disconnect starter motor.
18. Disconnect gearbox cables from junction at L.H. side of bulkhead.
19. Disconnect fuel pipe from filter.
20. Disconnect accelerator and choke cables from carburetter.
21. Disconnect two heater hoses at bulkhead.
22. Disconnect servo hose from inlet manifold.
23. Remove windscreen washer bottle.
24. Raise the vehicle front by approximately 18 inches.

NOTE: If the vehicle is not on a ramp, situate stands below the frame outriggers to the rear of the front wheels.

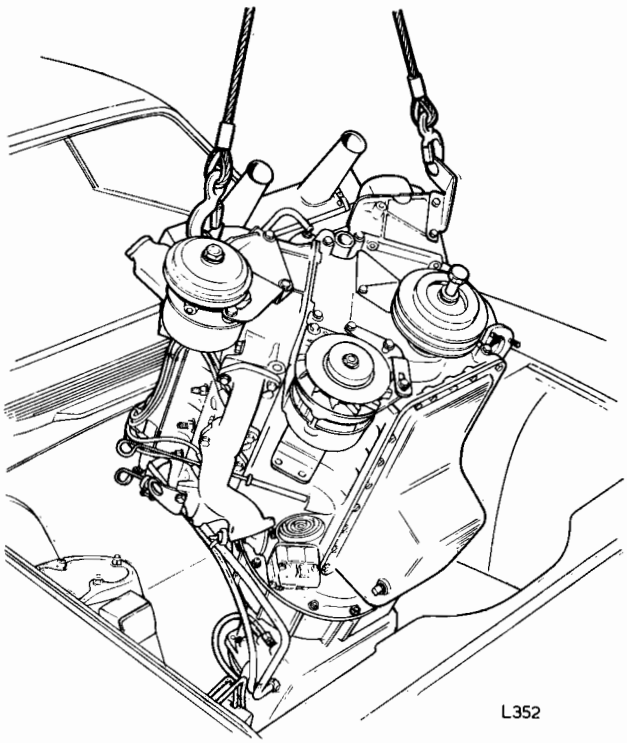
25. Drain engine and gearbox oils (on automatic transmission remove dipstick tube to effect draining).
26. Remove oil filter.
27. Remove front exhaust pipes and silencers.

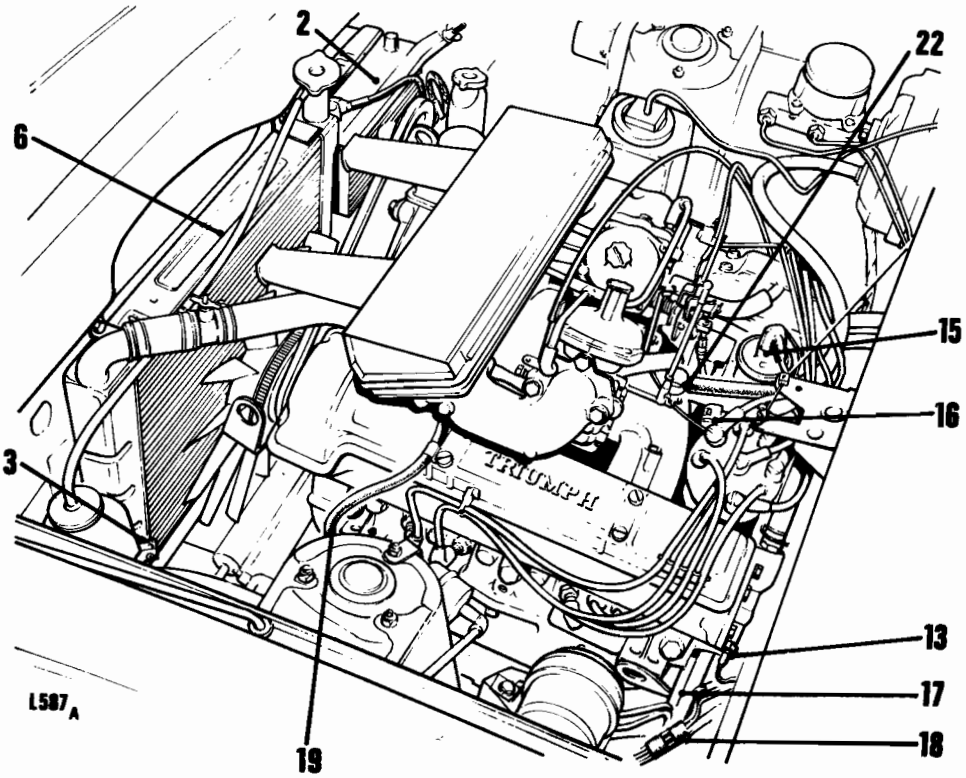
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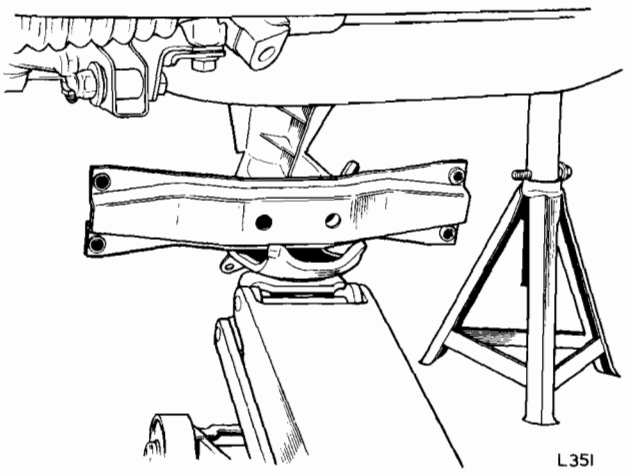
28. On automatic transmission vehicles:
    a. Disconnect gear control linkage (one clip).
    b. Remove oil cooler pipes at box and cooler plus clip to frame.
29. On manual gearbox models:
    a. Remove clutch cylinder.
    b. Remove gear lever.
30. Disconnect speedometer cable (collect spacer).
31. Lift one rear wheel on jack. Remove propeller shaft, plug rear of gearbox, lower wheel.
32. Place trolley jack below gearbox mounting cross-member; take weight.
33. Attach lifting sling to front lifting eyes on engine.
34. Remove bolts from front engine mountings (chassis connections).
35. Remove bolts securing gearbox mounting cross-member to frame (collect nylon spacers and large plain washers).
36. Raise engine at front to lift sump clear of cross-member.
37. Ease the engine forward whilst lowering the gearbox.
38. Carefully raise the engine and lower the gearbox until the unit is almost vertically suspended from front lifting brackets.
39. Lift unit clear of vehicle.

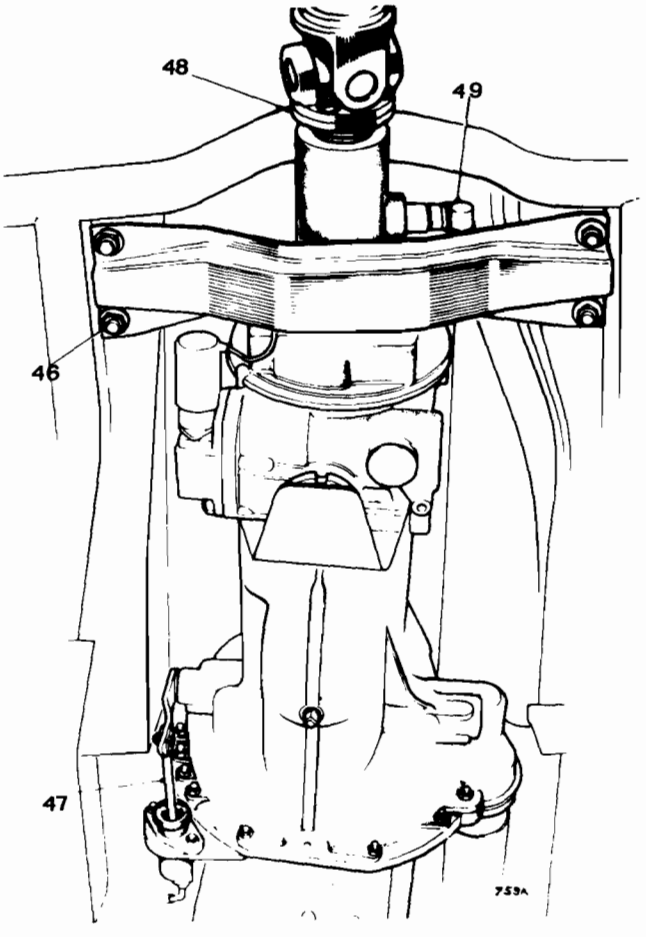




Refitting

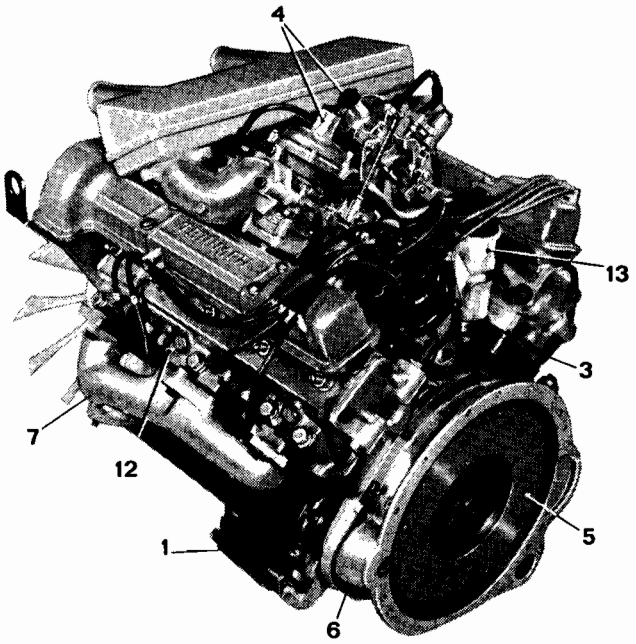
40. Attach sling and hoist to front lifting brackets.
41. Lift unit until suspended almost vertically from front lifting bracket.
42. Lower unit into engine compartment.
43. Place trolley jack below gearbox mounting cross-member.
44. Lower engine whilst raising and moving trolley jack back with gearbox until unit is situated in position for fitting mounting bolts.
45. Fit and tighten front engine mounting bolts and nuts.
46. Fit and tighten rear engine mounting nuts, nylon spacers and large plain washers (mountings consist of four rubber grommets, steel sleeves, nylon spacers, bolts, large plain washers and nuts).
47. On manual gearbox models:
    a. Fit clutch cylinder.
    b. Fit gear lever.
48. Raise one wheel; fit propeller shaft, and lower wheel.
49. Fit speedometer cable and spacer.
50. Connect gear control linkage and oil cooler pipes (automatic transmission).
51. Fit oil filter.
52. Fit front exhaust pipes and silencers and lower vehicle if on stands.
53. Fit windscreen washer bottle.
54. Connect servo hose.
55. Connect heater hoses.
56. Connect accelerator and choke cables.
57. Connect fuel supply pipe.
58. Re-connect gearbox junction at L.H. side of bulk-head.
59. Re-connect starter motor.
60. Re-connect ballast resistors.
61. Re-connect coil.
62. Re-connect oil pressure transmitter.
63. Re-connect water temperature transmitter.
64. Re-connect windscreen washer bottle.
65. Re-connect alternator.
66. Fit earth strap to alternator bracket.
67. Connect steering pipes.
68. Fit fan and Torquatrol unit.
69. Fit and tighten fan pulley centre bolt.
70. Fit radiator and fan guard.
71. Fit and tighten coolant hoses.
72. Fit bonnet.
73. Fill engine.
74. Fill gearbox.
75. Fill power steering system.
76. Fill radiator.
77. Connect battery.





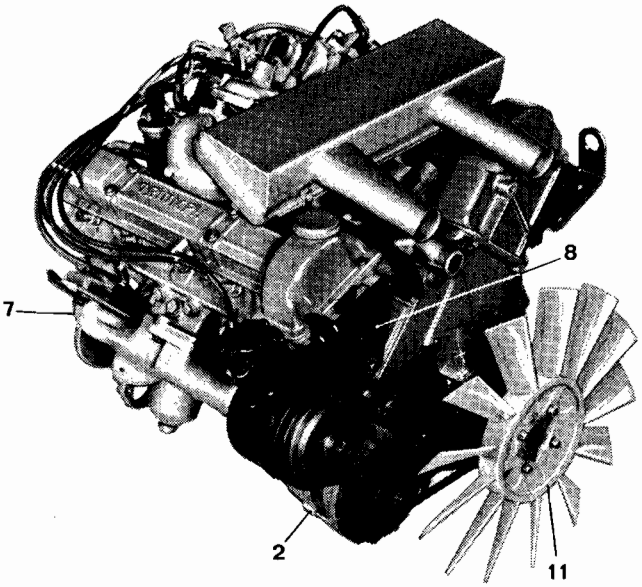
ENGINE AND GEARBOX ASSEMBLY

—Remove, change ancillary equipment and refit 12.37.03



Removing

1. Remove starter motor.
2. Remove alternator.
3. Remove distributor.
4. Remove carburetters.
5. Remove flywheel/drive plate.
6. Remove flywheel housing.
7. Remove exhaust manifolds.
8. Remove P.A.S. pump mountings.
9. Remove engine mounting brackets.
10. Remove dipstick.
11. Remove fan and Torquatrol unit.
12. Remove sparking plugs.
13. Remove coil.
14. Remove heater pipes.



Refitting

15. Refit all units in accordance with component operation numbers.

NOTE: This operation is for guidance when returning an engine for reconditioning. Tape all ports to prevent dirt entering engine.

ENGINE ASSEMBLY

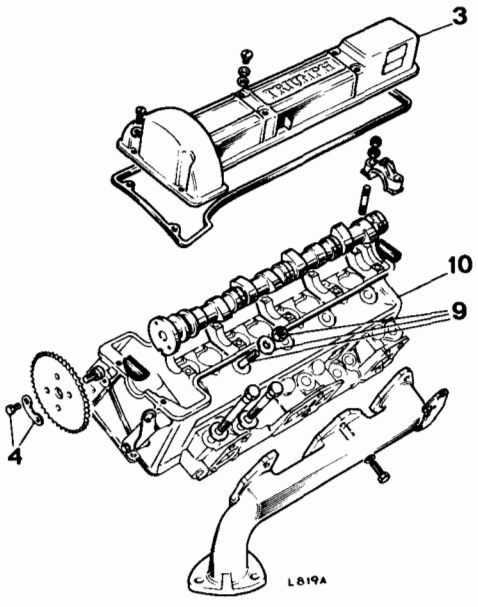
—Strip and rebuild **12.41.05**

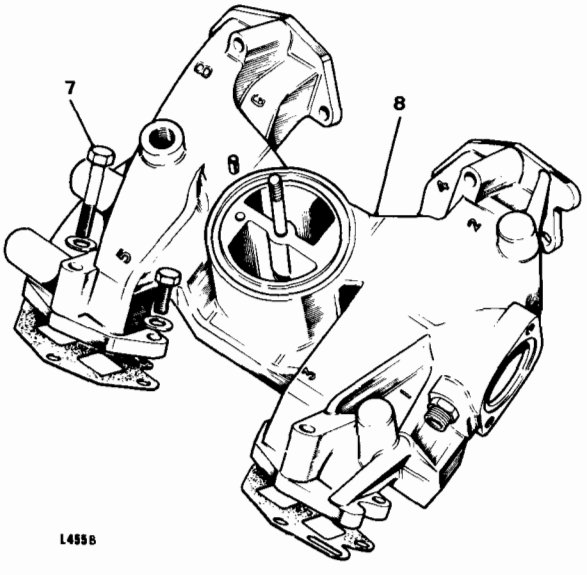
Service tools: 4235A; S4235A/6; 38U3; S350; S349; S352

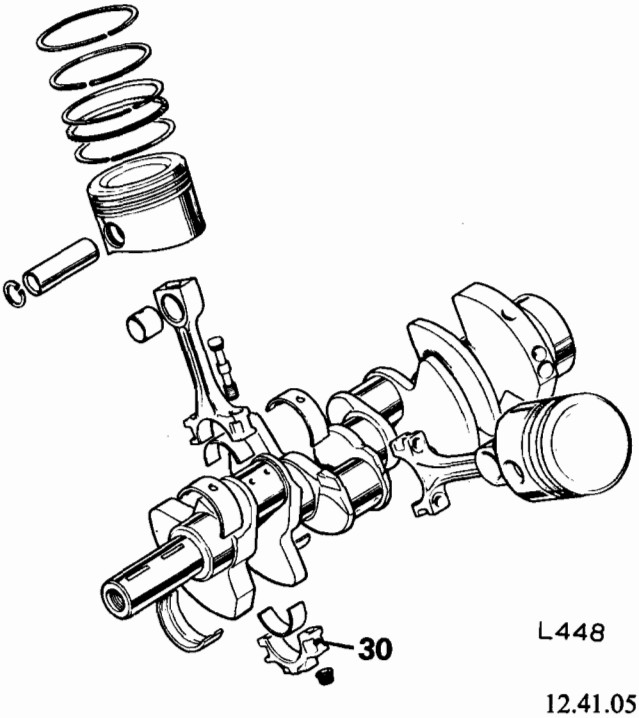
Stripping

1. Remove engine. 12.37.01.
2. Remove ancillary equipment. 12.37.03.
3. Remove cam covers.
4. Release lockplates from camshaft drive gear bolts, turn the engine to gain access to all bolts.
5. Screw one camshaft nut on each camshaft drive gear spigot.
6. Remove bolts and lockplates securing drive gears to camshafts.
7. Remove 12 inlet manifold securing bolts.
8. Remove inlet manifold.
9. On R.H. bank: remove cylinder head bolts, nuts and washers and, using tool S350, remove the studs (two bolts secure cylinder head to front cover).
10. Lift off cylinder head and gasket.
11. Perform operations 9 and 10 on L.H. bank.
12. Remove oil pump and hexagonal drive shaft.
13. Remove oil transfer housing.
14. Remove oil filter.
15. Remove coolant drain taps.
16. Remove three water pump cover bolts and lift off cover.
17. Remove centre bolt from water pump impeller and use tool S4235A/6 to remove pump.
18. Remove flywheel securing bolts.
19. Remove flywheel (use, if necessary, a flat plate across the flywheel housing with two holes drilled coincident with two opposite (clutch securing) holes in the flywheel. Use two long bolts as pullers to withdraw the flywheel).
20. Remove front cover bolts and lift off cover.
21. Remove R.H. chain tensioner, spacer and keep plate.
22. Remove R.H. chain guides, support bracket, gear and chain.
23. Remove L.H. chain tensioner and keep plate.
24. Remove L.H. chain guides, support bracket, gear and chain.
25. Remove jackshaft keep plate, using Allen key to remove screws.
26. Lift out jackshaft.
27. Lift engine onto flywheel cover.
28. Remove sump and gasket.
29. Remove oil strainer.
30. Remove caps from Nos. 1 and 2 connecting rods.
31. Push out piston and connecting rod assemblies, replace caps on connecting rods.
32. Repeat operations 30 and 31 on all assemblies.
33. Lift engine to crankshaft uppermost position.
34. Remove rear oil seal housing.

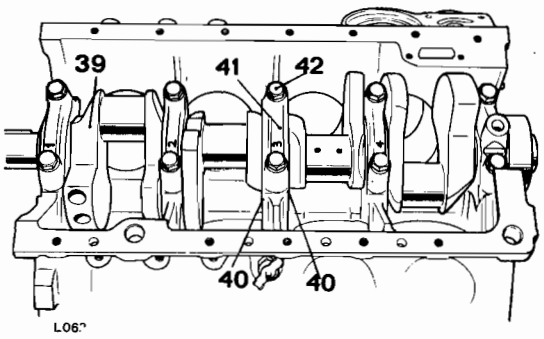
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35. Remove main bearing caps and thrust washers from centre bearing.
36. Remove crankshaft.
    Keep bearings and thrust washers in correct order.

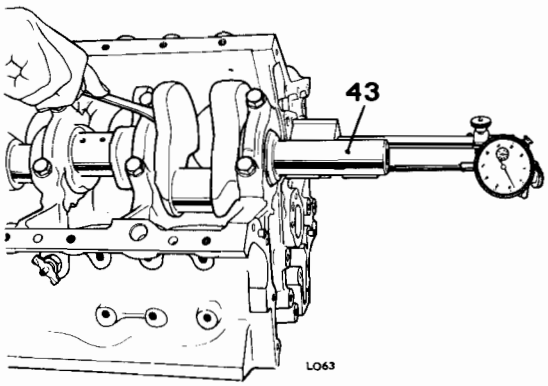


Rebuilding

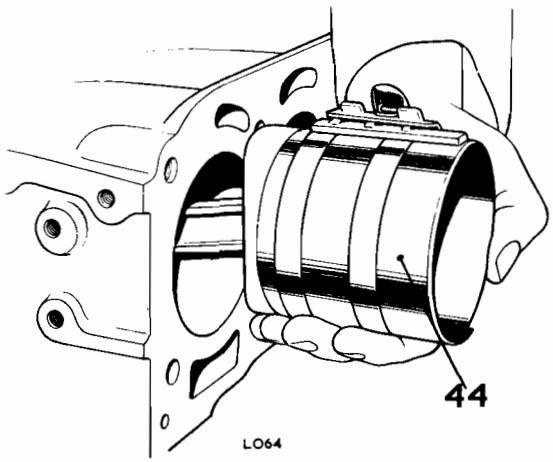
37. Ensure that all oil- and water-ways are clear and that all components and sub-assemblies are clean and dimensionally correct.

CAUTION: Apply oil to all internal moving parts and bearing surfaces as the engine is built. Tighten all nuts and bolts in accordance with the torque figures given. All sub-assemblies are dealt with under their respective headings.

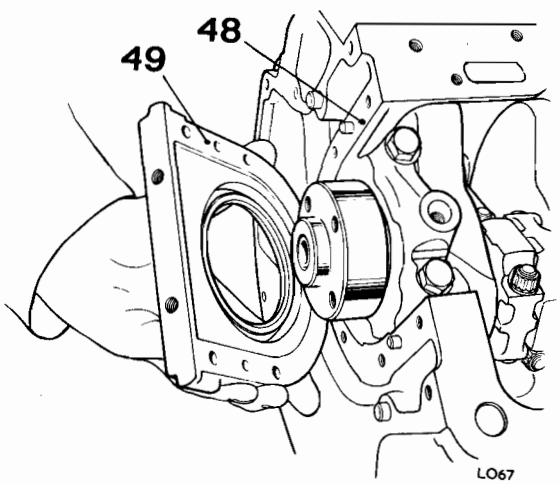
38. Insert main line-bearing shells to block and caps, noting that Nos. 1, 3 and 5 are wider bearings than Nos. 2 and 4. No. 5 bearing is not numbered.
39. Fit crankshaft.
40. Fit thrust washers to No. 3 bearing, bi-metal face to crank.
41. Fit main bearing caps with numbers on starter motor side of engine.
42. Fit bolts and tighten, continually checking for free rotation of crankshaft.
43. Check crankshaft end-float (0·003 to 0·011 in; 0·078 to 0·280 mm).

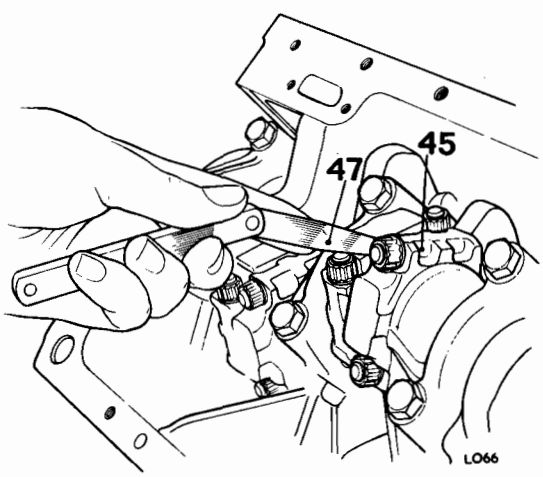


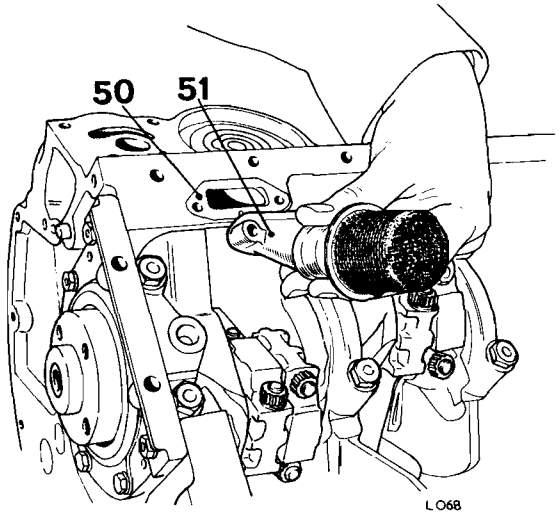
44. Using the ring compression tool 38U3, fit the connecting rod piston assemblies on the even bank, i.e. to rear of crankshaft journal.
45. Fit caps and tighten nuts.
46. Perform operations 44 and 45 on odd bank.
47. Check clearance between big-end bearings (0·015 to 0·024 in) and free rotation of crankshaft.
48. Fit rear oil seal housing gasket.
49. Fit rear oil seal housing, locating on the two dowels and using the two longest bolts at the sump end.

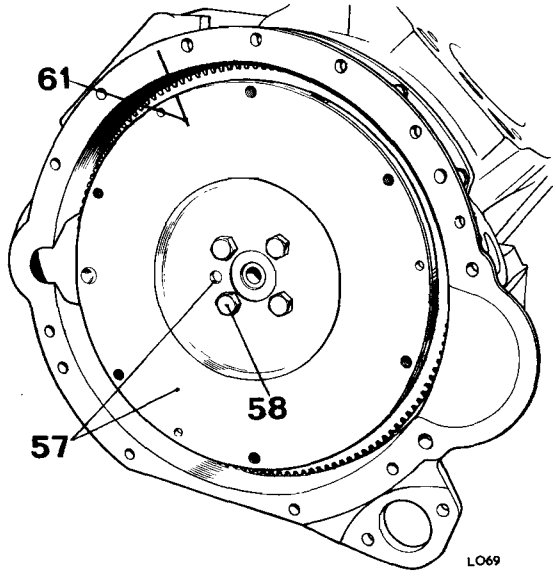


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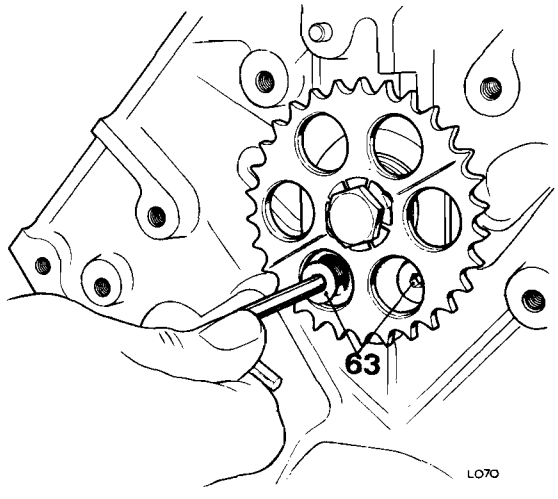




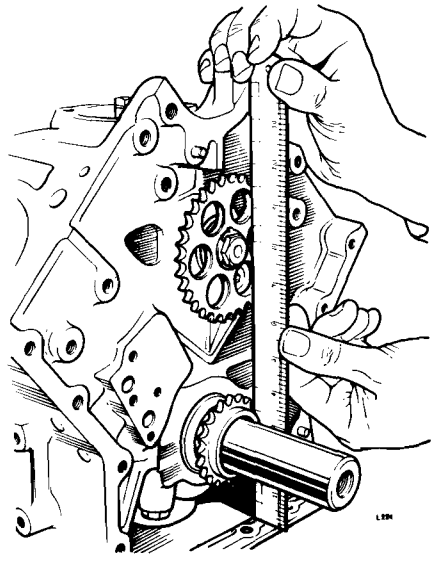




50. Fit gaskets for oil strainer.
51. Fit oil strainer and tighten the two securing bolts.
52. Fit sump gasket and sump.
53. Fit 14 sump bolts and 2 nuts; do not tighten.
54. Place engine on stand correct way up.
55. Fit flywheel cover, locating on the 2 dowels, 10 bolts and washers.



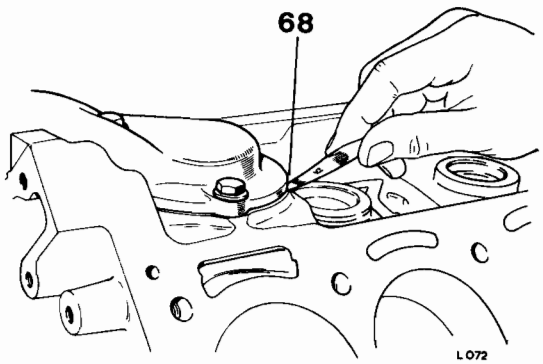
56. Fit and tighten flywheel housing bolts. Check for high spots on face.
57. Fit flywheel, locating on dowel.
58. Fit and tighten flywheel bolts.
59. Check flywheel run-out, not to exceed 0·2 mm T.I.R. at 10 cm radius (0·008 in T.I.R. at 4 in).
60. Turn flywheel until No. 2 cylinder (front L.H. band) is at T.D.C. mark.
61. Check that line on flywheel corresponds with line on flywheel housing.
62. Fit jackshaft and gear, threading the shaft carefully through the cylinder block to avoid damaging the bearing surfaces.



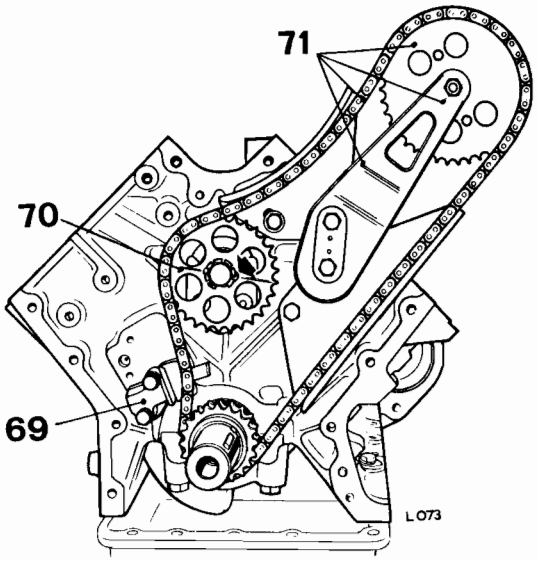
63. Fit jackshaft keeper plate and secure with two countersunk hexagon recessed screws.
64. Check jackshaft gear for run-out which may be caused by the dowel 'picking up'; run-out will cause excessive noise and chain wear.
65. Fit inner crankshaft gear, using shims to align the gear to the jackshaft gear.
66. When gear alignment is correct, remove the gear, fit Woodruff keys to crankshaft and fit inner and outer crankshaft gears.

continued

67. Fit the water pump ensuring that the spigot bearing is in good condition and that the pump gear engages and seats the pump correctly.
68. Check water pump housing clearances; fit requisite gaskets and secure with the three bolts. 26.50.03.



69. Fit inner chain tensioner and restrictor plate.
70. Align jackshaft gear with line slightly tilted down to L.H. bank and dowel to L.H. bank No. 2 cylinder T.D.C.
71. Fit L.H. bank chain guides, chain (longer chain), camshaft drive gear and support bracket. Do not tighten the curved tensioner or support bracket at this stage. Use spigot and camshaft bearing nut to hold gear to support bracket.

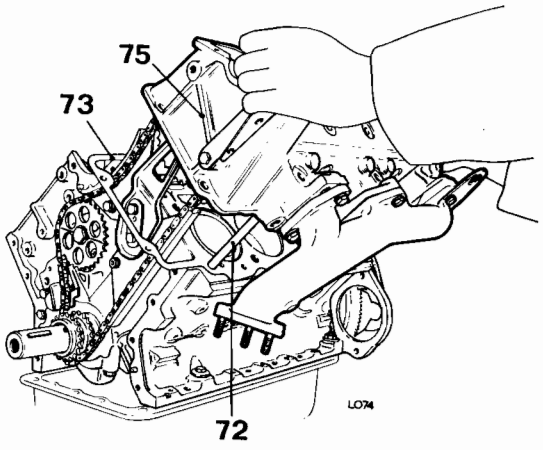


72. Fit one stud at either end of cylinder block to locate cylinder head and gasket.

NOTE: Cylinder head studs should be fitted to the full depth of threads, finger-tight only.

73. Fit cylinder head gasket.
74. Ensure that the camshaft is aligned correctly, i.e. line on camshaft flange in line with groove in No. 1 camshaft bearing.
75. Fit cylinder head.

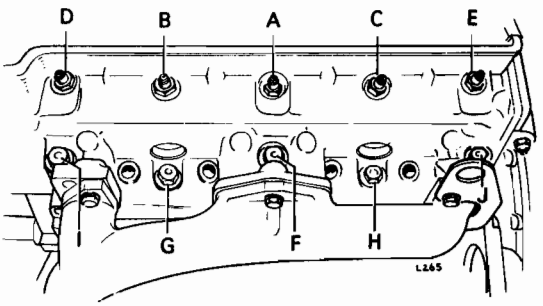
CAUTION: Do not turn the crankshaft or camshaft while the head is fitted and the camshaft gear is connected, otherwise the valves will be damaged by the pistons.



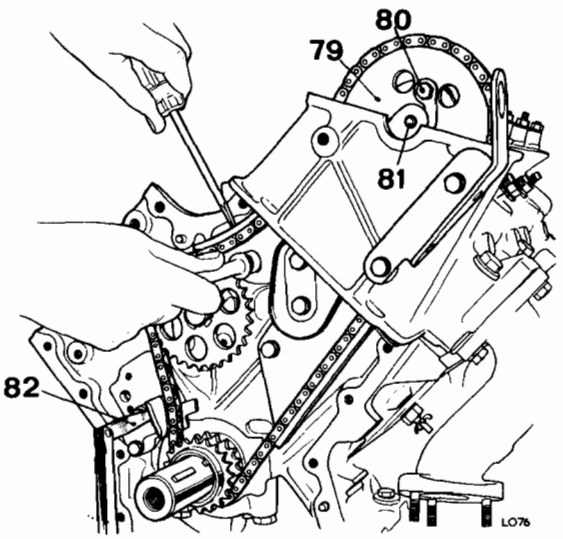
76. Fit remaining cylinder head studs, washers and nuts.
77. Fit cylinder head bolts and washers.
78. Tighten cylinder head nuts and bolts. 12.29.27.

CAUTION: It is imperative that the correct tightening sequence is followed; failure to do so **will** distort the cylinder head.

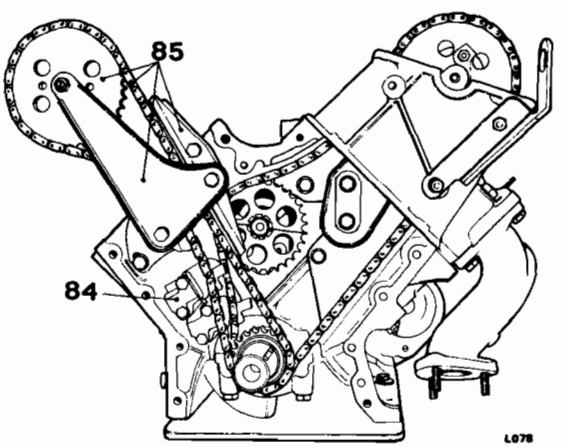
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79. Align camshaft gear to camshaft by disconnecting gear from support bracket and moving it round, one tooth at a time within the chain, until the bolt holes are aligned. Do not move jackshaft gear.
80. Fit top camshaft bolt and lockplate; carefully position lockplate to line up both holes, then tighten top bolt and tab over.
81. Centralize boss on the camshaft spigot within the hole in the support bracket (this must run freely within bracket without touching), tighten lower bolt in support bracket.
82. Use a 1 mm (0·040 in) feeler between the shoe and body of the chain tensioner to attain correct clearance; apply pressure to the curved chain guide and tighten bolts.
83. Remove feeler gauge and check that chain is located squarely on pads of the chain guides.

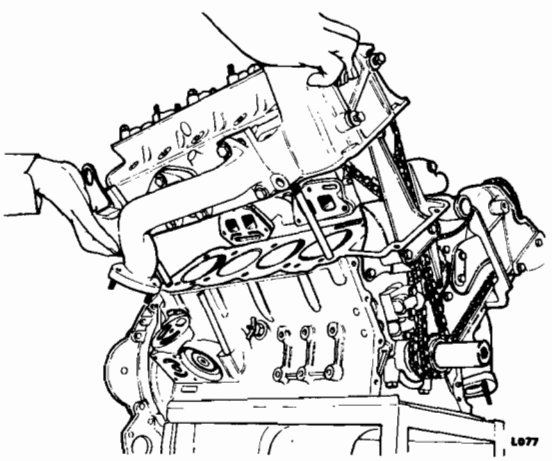


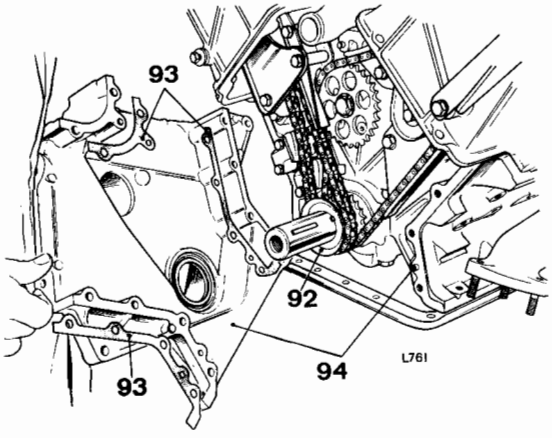
84. Fit outer chain tensioner, keeper and spacer. 12.65.29.
85. Fit R.H. bank chain, camshaft gear, chain guides and support bracket together with bolt spacers. Do not tighten bolts on curved guide or support bracket at this stage.
86. Ensure mating gasket faces of inlet manifold and cylinder head are clean; apply a smear of grease and attach gaskets.
87. Fit inlet manifold to L.H. head fitting longer (centre) bolts first, then shorter (outer) bolts; start all bolts before tightening.



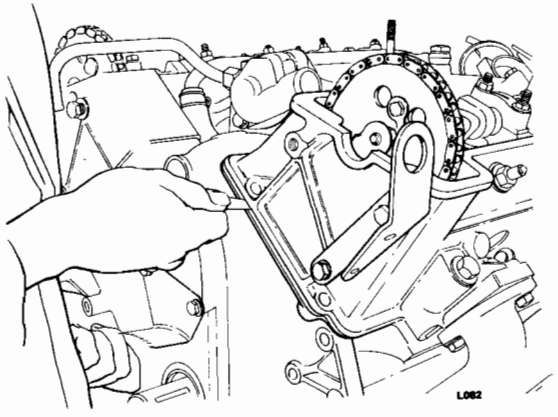
88. Perform operations 72 to 77 to R.H. bank.
89. Fit gasket between R.H. cylinder head and inlet manifold.
90. Fit and tighten bolts securing cylinder head to inlet manifold, ensuring that the gaskets remain in position.
91. Perform operations 78 to 83 to R.H. bank.

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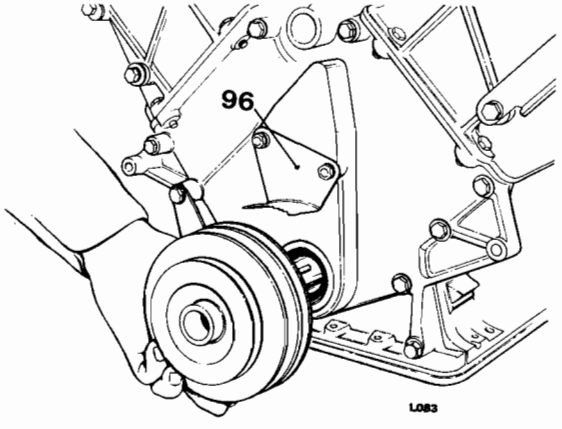




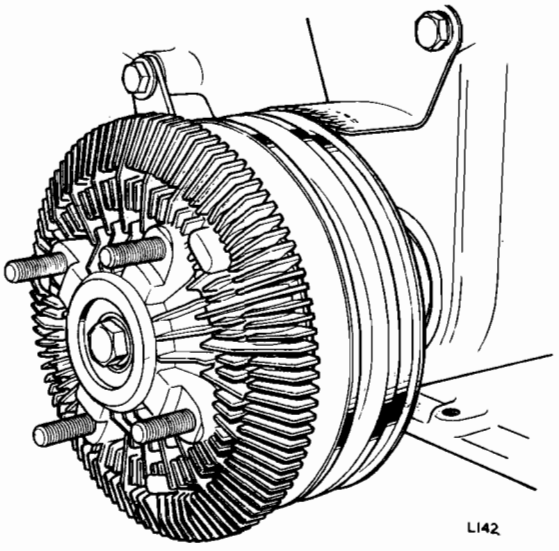
92. Fit oil thrower to crankshaft, dished face out.
93. Fit three timing cover gaskets, with smear of grease to retain in position at the front of cylinder block.
94. Fit timing cover, locating on the two dowels.



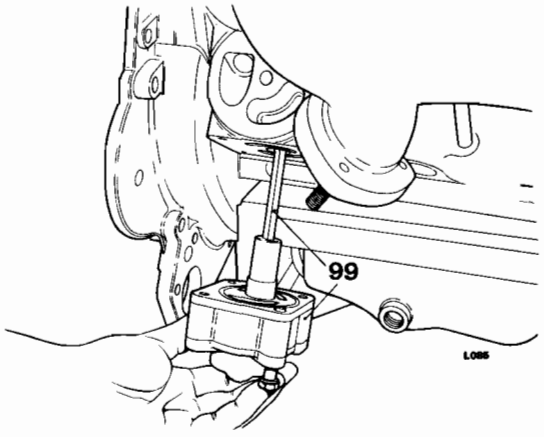
CAUTION: To prevent damaging the sump or head gaskets care must be taken fitting the front cover. It is good practice to use strips of shim steel to slot the cover between the gaskets.



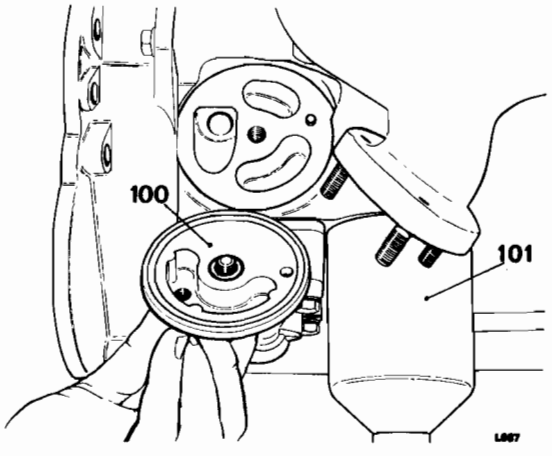
95. Fit timing cover bolts and alternator mounting bracket; start the cylinder head to front cover bolts first, then the sump to front cover bolts.
96. Fit crank pulley timing plate.



97. Fit crank pulley and Torquatrol unit.
98. Fit cam covers and gaskets.



99. Fit oil pump and hexagon drive shaft.



100. Fit oil transfer housing.
101. Fit oil filter.
102. Fit coolant drain taps.
103. Fit ancillary equipment. 12.41.02.
104. Fit engine. 12.41.01.

ENGINE MOUNTING—FRONT L.H.

—Remove and refit **12.45.01**

Removing

1. Working below the vehicle, support engine using a jack and block of wood below sump.
2. Remove four bolts securing engine mounting bracket to cylinder block.
3. Remove two bolts securing mounting to frame.
4. Raise engine to provide maximum clearance for mounting assembly between starter motor and frame.
5. Detach brake pipe from clips to cross-member.
6. Remove assembly by manœuvring between engine and frame.
7. Remove nuts securing mounting to bracket.

Refitting

8. Secure mounting to bracket.
9. Manœuvre assembly into position.
10. **Fit and tighten bolts to cylinder block and frame. Torque: 16 to 22 lbf ft (2·2 to 3·0 kgf m).**
11. Connect brake pipe to clips on cross-member.
12. Lower jack.

ENGINE MOUNTING—FRONT R.H.

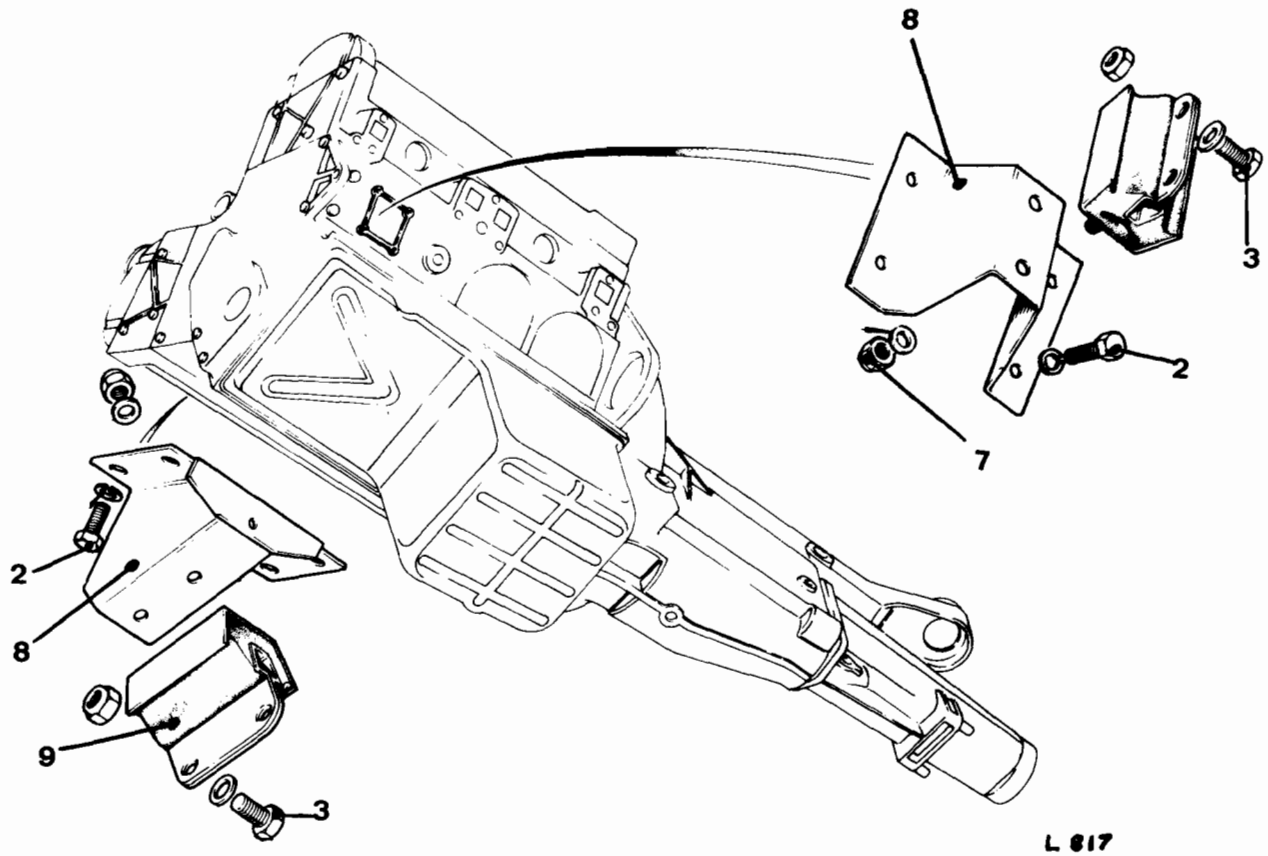
—Remove and refit **12.45.03**

Removing

1. Working below vehicle, support engine using jack and a block of wood below sump.
2. Remove four bolts securing mounting bracket to cylinder block.
3. Remove two bolts securing mounting to frame.
4. Drain steering pump.
5. Remove oil filter.
6. Disconnect two pipes to steering rack; plug ends and rack ports to prevent dirt entering the system.
7. Lift engine to provide maximum access.
8. Manœuvre mounting assembly clear of vehicle.
9. Separate mounting from bracket.

Refitting

10. Secure mounting to bracket.
11. Manœuvre mounting assembly into position.
12. **Fit and tighten bolts to cylinder block and frame. Torque: 16 to 22 lbf ft (2·2 to 3·0 kgf m).**
13. Remove plugs and connect pipes to steering rack.
14. Fit oil filter.
15. Remove jack.
16. Top-up engine with oil.
17. Refill steering pump.



ENGINE MOUNTINGS—FRONT SET

—Remove and refit **12.45.04**

See operations 12.45.01 and 12.45.03.

ENGINE MOUNTING—REAR CROSS-MEMBER

—Remove and refit **12.45.06**

Removing

Working below the vehicle:

1. Support rear of engine.
2. Remove four nuts securing cross-member to body.
3. Remove two nuts securing assembly to gearbox.
4. Lift off cross-member assembly complete.
5. Collect rubber washers, steel sleeves, nylon spacers.

Refitting

Reverse 1 to 5.

NOTE: The mounting bracket is secured by four bolts which are joined in pairs by a plate. When fitting cross-member the bolts may tend to go up into the car but can be pushed down without removing carpet. Where the bolts have to be renewed the front carpets will have to be taken out.

ENGINE MOUNTING—REAR SET

—Remove and refit **12.45.10**

Removing

1. Remove rear cross-member assembly. 12.45.06.
2. Remove two nuts holding each mounting to cross-member.

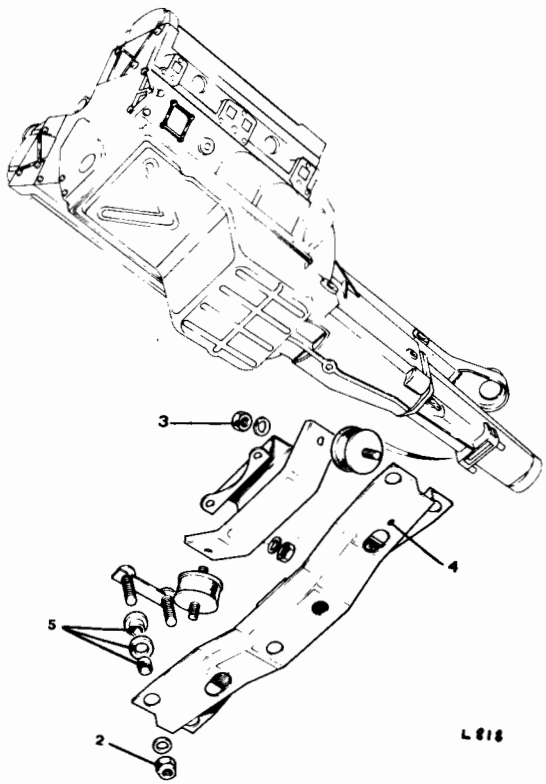
Refitting

3. Fit mounting between cross-member and mounting bracket.
4. Fit and tighten securing nuts.
5. Fit cross-member assembly. 12.45.06.

ENGINE TUNE

—Check and adjust distributor points, sparking plugs, ignition timing, tune carburetter, road-test **12.49.02**

1. Check condition and gap of distributor points; renew or adjust as necessary. 86.35.13.
2. Remove sparking plugs; check, adjust or renew as necessary. 86.35.01.
3. Check ignition timing; set as necessary. 86.35.
4. Tune carburetters. 19.15.01.
5. Road-test vehicle.

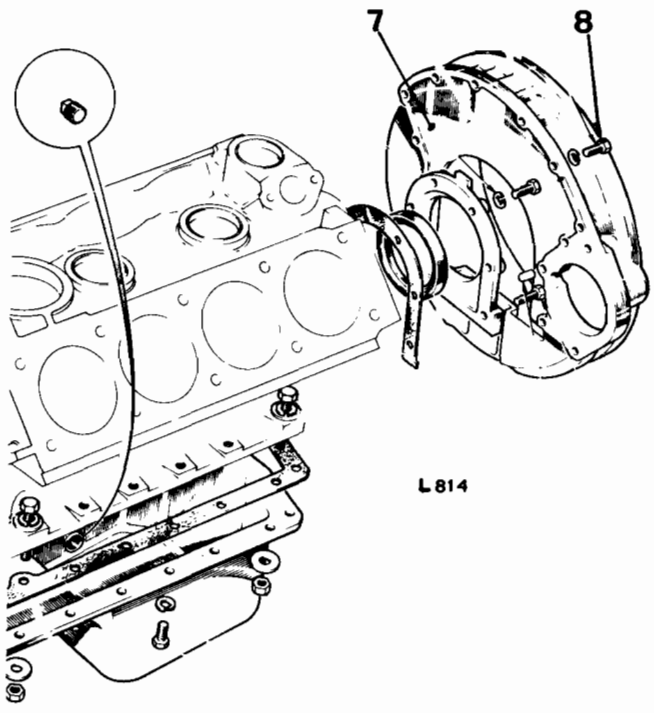


FLYWHEEL HOUSING

—Remove and refit **12.53.01**

Removing

1. Remove gearbox—manual 37.20.01; automatic 44.20.01.
2. Remove clutch assembly (33.10.01) or converter assembly (44.17.10).
3. Remove flywheel/drive plate—six bolts.
4. Remove starter motor.
5. Remove clutch cylinder.
6. Remove bolts securing flywheel housing to cylinder block.



Refitting

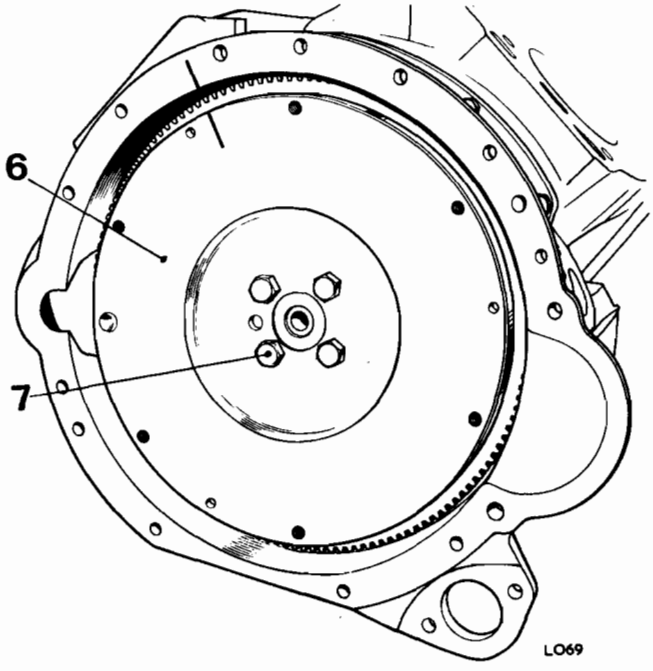
7. Locate housing to cylinder block on two dowels.
8. **Fit and tighten 10 securing bolts. Torque: 16 to 22 lbf ft (2·2 to 3·0 kgf m).
9. Fit flywheel/drive plate, locating on dowel; use new bolts and tighten to torque 35 to 45 lbf ft (4·8 to 6·2 kgf m).**
10. Check flywheel run-out—not to exceed 0·004 in at 4 in rad (0·1 mm at 10·1 cm). Drive plate run-out 0·040 in (1 mm) measured at starter ring face.
11. Fit starter motor.
12. Fit clutch cylinder.
13. Fit clutch (33.10.01) or converter (44.17.10).
14. Fit gearbox—manual 37.20.01; automatic 44.20.01.

FLYWHEEL

—Remove and refit (Manual gearbox only) **12.53.07**

Removing

1. Remove gearbox. 37.20.01.
2. Remove clutch assembly. 33.10.01.
3. Remove six bolts (four bolts early models) securing flywheel to crankshaft flange.



Refitting

5. Ensure that the dowel in the crank-flange is undamaged and the mating faces of the flywheel and flange are flat.
6. Fit flywheel to crank, locating on dowel.
7. Fit and tighten six **new** bolts (early models four **new** bolts) securing flywheel to flange.
   NOTE: The bolts have nylon inserts to lock them. Using bolts more than once creates a possibility of an oil leak from cylinder block to clutch; this expensive possibility does not warrant the re-use of these bolts.
8. Check flywheel run-out—not to exceed 0·008 in at 4 in rad (0·2 mm at 10·1 cm).
9. Fit clutch. 33.10.01.
10. Fit gearbox. 37.20.01.

DRIVE PLATE

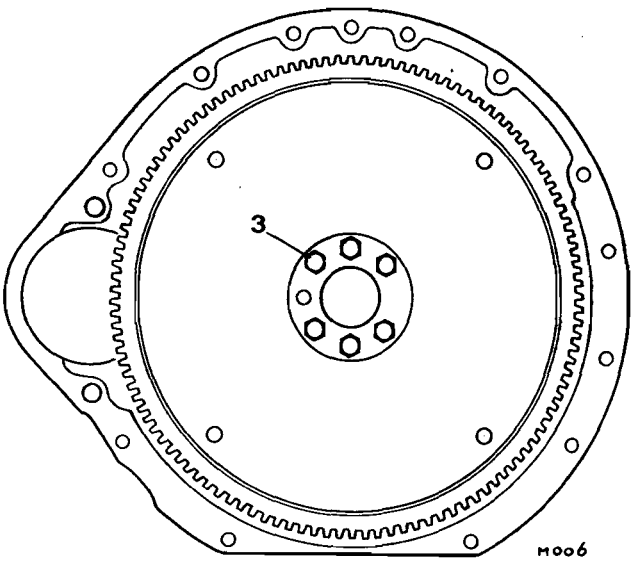
—Remove and refit **12.53.13**

Removing

1. Remove gearbox.
2. Remove converter assembly.
3. Remove bolts securing drive plate to crankshaft flange.

Refitting

4. Ensure that the dowel in the crank-flange is undamaged and the mating faces on flange and drive plate are flat.
5. Fit and tighten six **new** bolts (early models four **new** bolts)—drive plate to flange.
   NOTE: The bolts, which have nylon inserts, must be renewed to prevent the possibility of oil leaking through cylinder block.
6. Check drive plate run-out—not to exceed 0·040 in (1 mm) T.I.R. measured at starter ring face.
7. Fit convertor assembly. 44.17.10.
8. Fit gearbox. 44.20.01.



STARTER RING GEAR

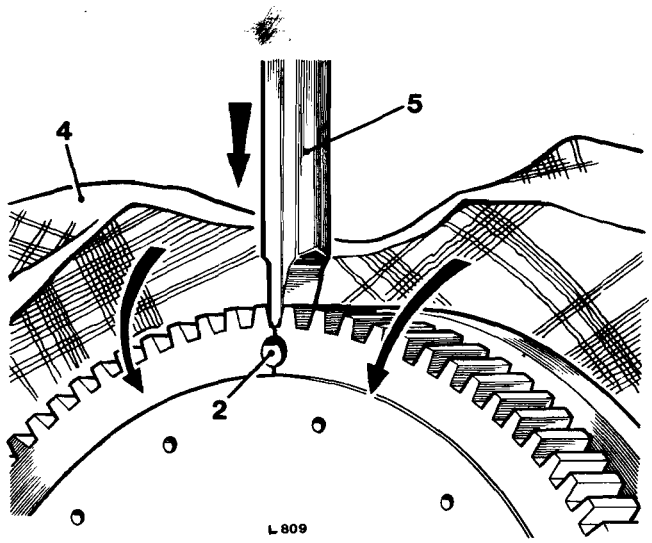
—Remove and refit **12.53.19**

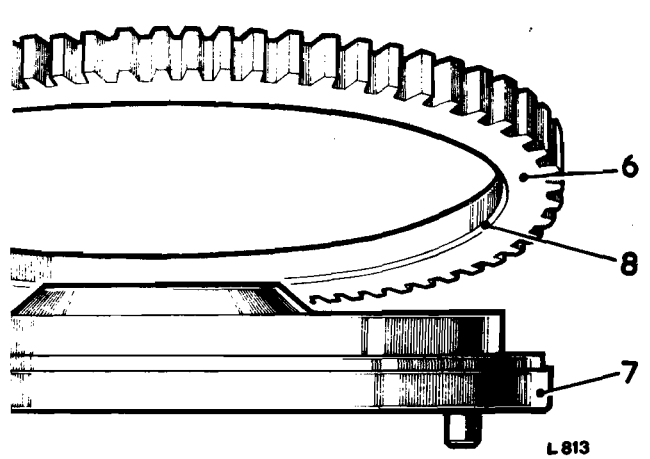
NOTE: On automatic transmission models the ring gear is welded to the drive plate and is not separately renewable.
See Drive plate—remove and refit. 12.53.13.

Manual gearbox models only

Removing

1. Remove flywheel. 12.53.07.
2. Drill a hole approximately 0·375 in (10 mm) between the root of any tooth and the inner rim of the ring gear. Drill sufficiently deep to weaken the ring without drilling the flywheel.
3. Secure the flywheel in a soft-jawed vice.
4. Place a heavy cloth over the ring gear for protection against flying fragments.
   ****WARNING: Take adequate precautions to avoid injury from flying fragments when splitting the ring gear.**
5. Place a chisel immediately above the drilled hole and strike sharply to split the ring gear.**



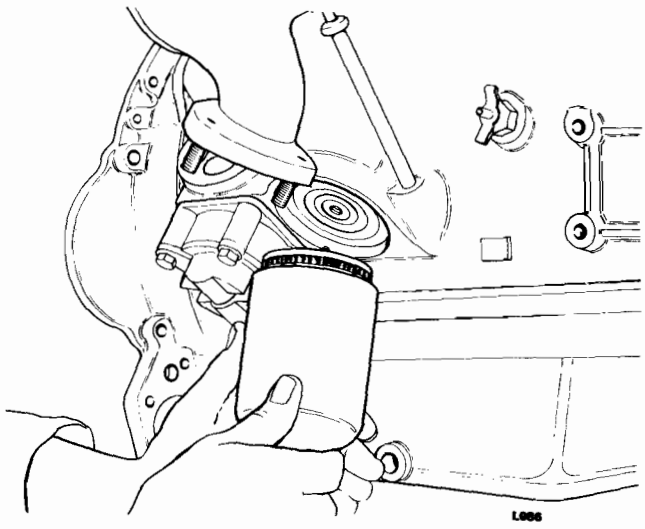


Refitting

6. Heat the starter ring uniformly to between 170 and 175°C (338 to 347°F); do not exceed higher temperature.
7. Place the flywheel flanged side down on a flat surface.
8. Locate the ring gear in position and hold until it contracts sufficiently to grip flywheel.
9. Allow the ring to cool gradually to avoid stress distortion. A maximum permissible gap of 0·025 in (0·6 mm) is allowed between flywheel and starter ring on one length of 6 in (15 cm) only.
10. Fit flywheel. 12.53.07.

OIL FILTER ASSEMBLY—EXTERNAL

—Remove and refit **12.60.01**



Removing

1. Unscrew centre bolt and withdraw filter unit complete.
2. Remove seal from annular groove in cylinder block.

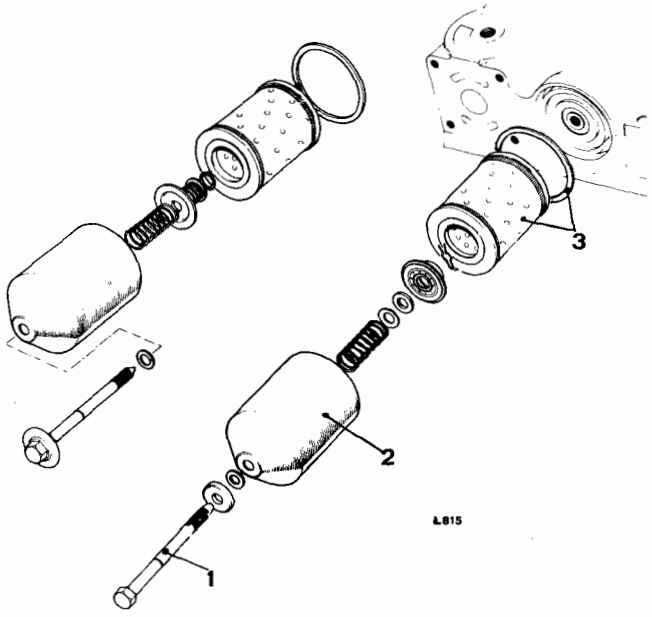
Refitting

3. Fit new seal to annular groove in cylinder block.
4. Fit unit in groove and tighten centre bolt.
5. Top-up with correct grade engine oil.

OIL FILTER ASSEMBLY—EXTERNAL

—Element—remove and refit **12.60.02**

—Overhaul **12.60.08**

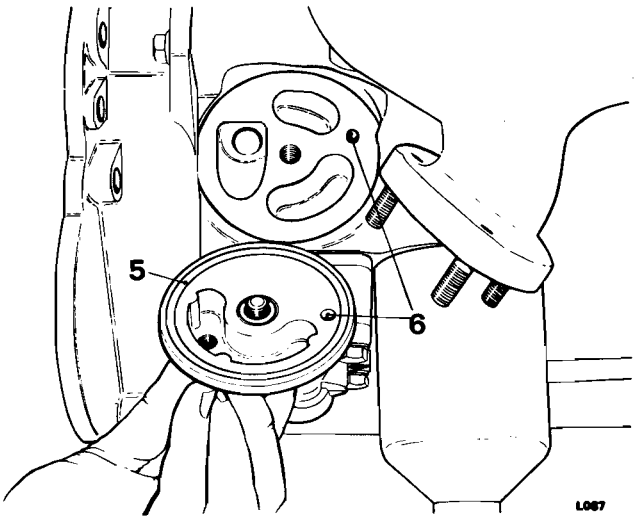


Working below the vehicle:

1. Unscrew the centre bolt in the filter.
2. Remove filter bowl complete with element, centre bolt and valve.
3. Discard element and 'O' rings (one from cylinder block groove).
4. Clean components; renew any defective part.
5. Fit new 'O' ring to cylinder block groove.
6. Fit new element.
7. Offer up filter and secure with centre bolt, ensuring that the filter bowl sits in the cylinder block groove squarely on the 'O' ring seat. **DO NOT OVER-TIGHTEN BOLT**—see torque figures.
8. Top-up engine with correct grade of oil.

OIL TRANSFER HOUSING

—Remove and refit **12.60.14**



Removing

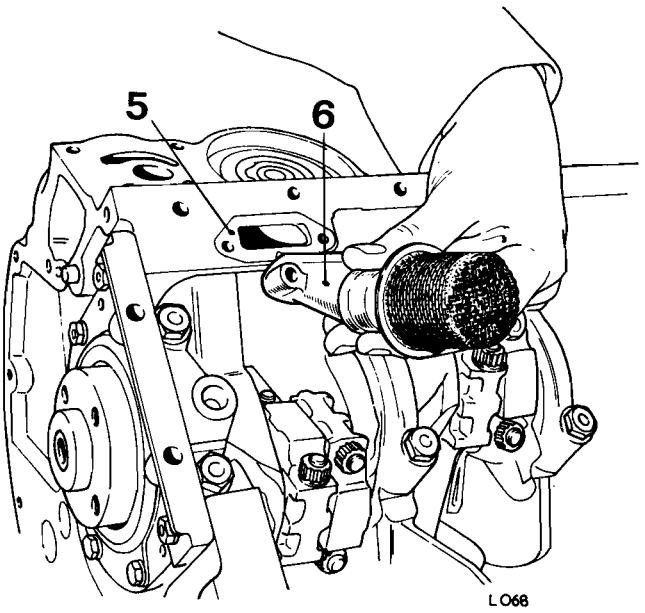
1. Remove R.H. front exhaust pipe. 30.10.10.
2. Remove cable to pressure warning switch.
3. Remove centre retaining bolt.
4. Remove 'O' ring seal from transfer housing.

Refitting

5. Fit new 'O' ring seal to groove in housing.
6. Fit housing to block locating on dowel.
7. Fit and tighten centre retaining bolt.
8. Fit cable to pressure warning switch.
9. Fit R.H. front exhaust pipe. 30.10.10.

OIL PICK-UP STRAINER

—Remove and refit **12.60.20**



Removing

1. Remove engine sump. 12.60.44.
2. Remove two bolts retaining strainer to cylinder block.
3. Remove gasket.

Refitting

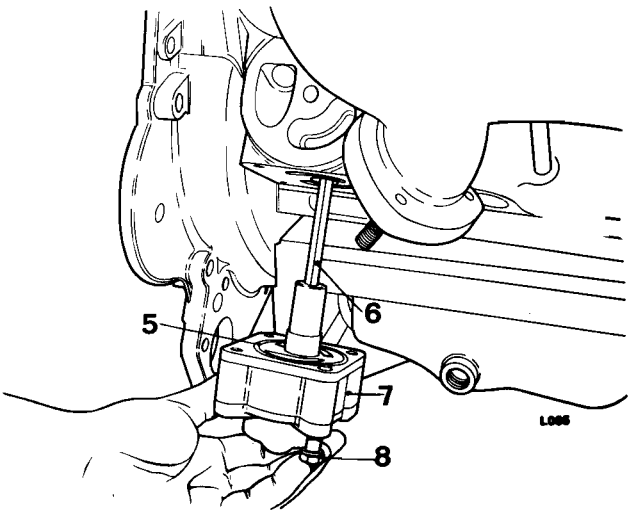
4. Wash strainer in fuel; blow dry with compressed air.
5. Fit new gasket.
6. Fit strainer; secure with two bolts.
7. Fit engine sump. 12.60.44.

OIL PUMP

—Remove and refit **12.60.26**

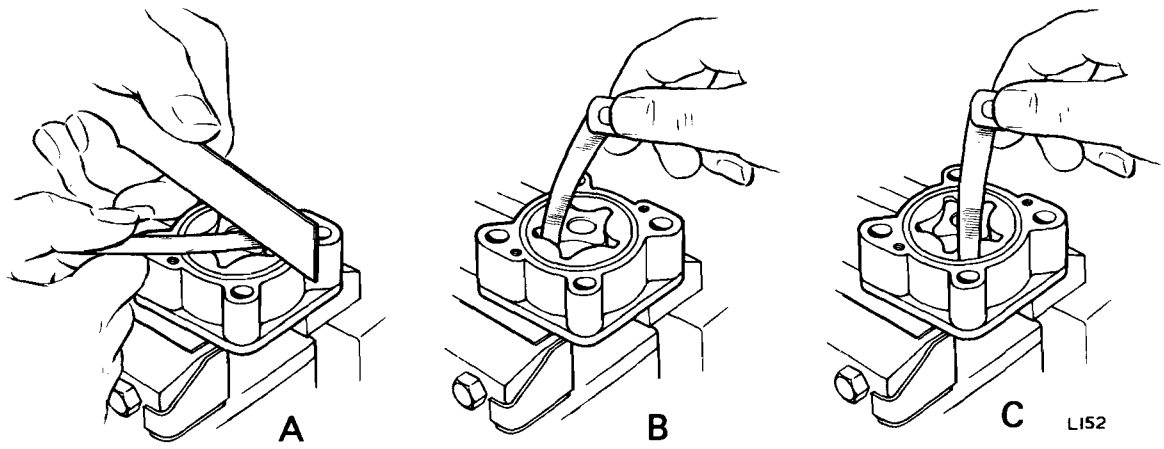
Removing

1. Remove R.H. front exhaust pipe. 30.10.10.
2. Remove four bolts securing pump to cylinder block.
3. Remove pump.
   NOTE: The hexagon drive shaft may or may not come away with the pump. If not, it may be removed with the help of long-nosed pliers.



Refitting

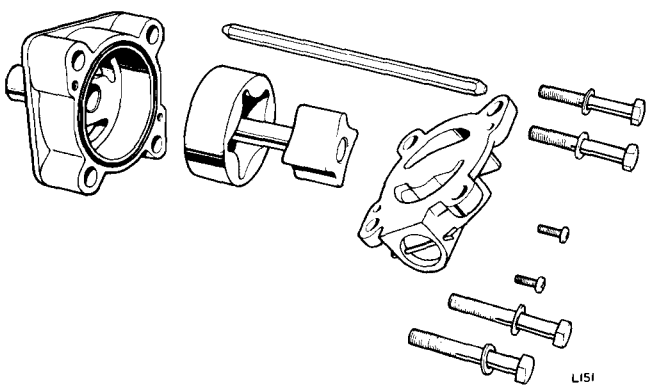
4. Check cylinder block and pump faces.
5. Fit 'O' ring to oil pump groove.
6. Fit hexagonal drive shaft.
7. Offer up pump, turn to engine hexagonal drive shaft with distributor.
   ****NOTE:** If a gasket is fitted between the oil pump and the cylinder block this must be replaced in good condition to prevent oil leaking from the pressure side of the pump.****
8. Fit and tighten the four securing bolts.
9. Top-up engine with correct grade of oil.



OIL PUMP

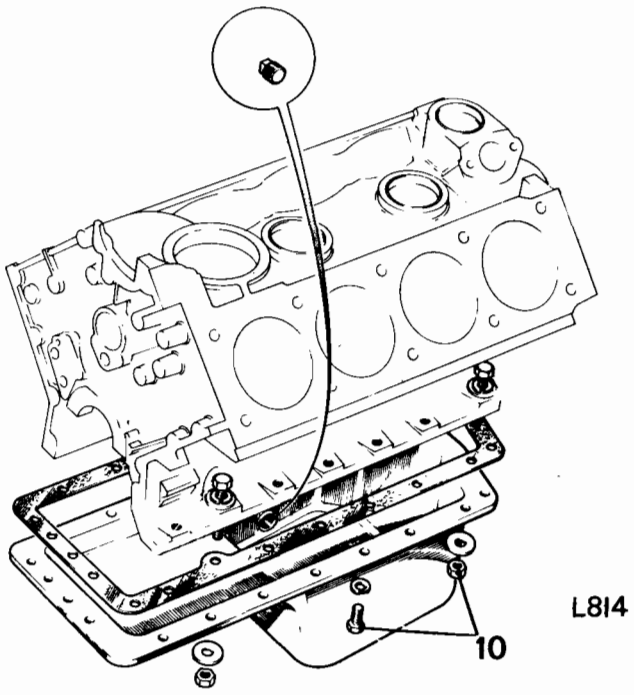
—Overhaul **12.60.32**

1. Remove the pump (12.60.26); dismantle, clean and dry the components.
2. Examine the end face for scoring and wear. The pressure relief valve and face may be skimmed lightly to remove surface scratches; ensure that it is perfectly flat.
3. Check the end-float of the rotors 'A'. This must not exceed 0·004 in (0·1 mm).
4. Check clearance between the rotors 'B'. This must not exceed 0·010 in (0·25 mm).
5. Check clearance between outer rotor and body 'C'. This must not exceed 0·008 in (0·2 mm).
6. Check the pump spindle bush for wear; renew if necessary. Fit a new pump if the above tolerances are exceeded.
7. Fit new 'O' ring to body interface.
8. Reassemble pump.
9. Refit pump. 12.60.26.



OIL SUMP

—Remove and refit **12.60.44**

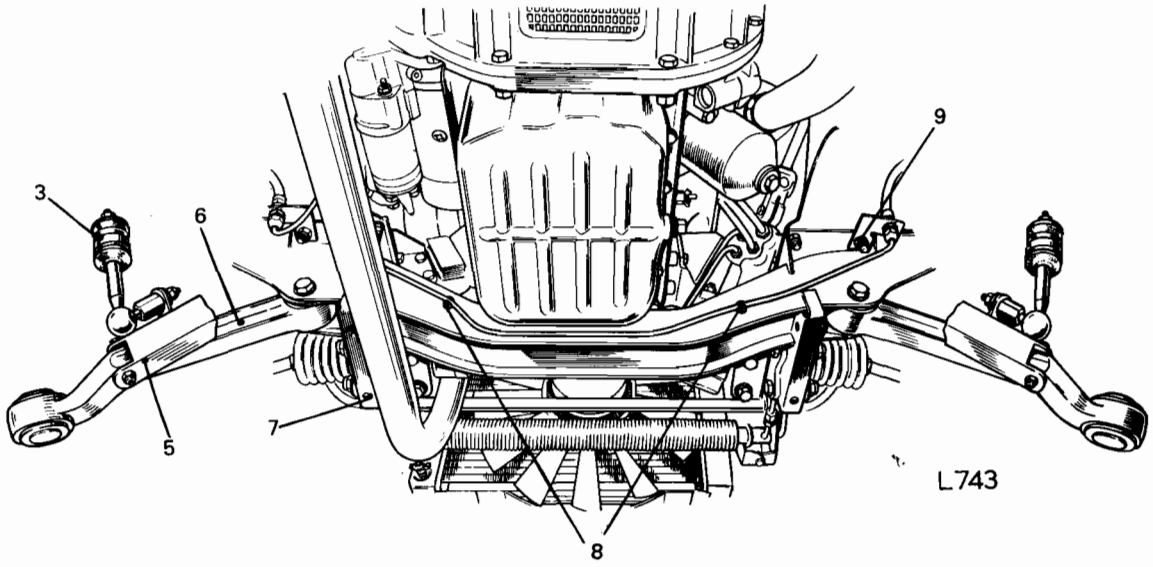


Removing

1. Drain oil.
2. Remove L.H. front exhaust pipe. 30.10.09.
3. Disconnect anti-roll bar links from anti-roll bar.
4. Jack up front of vehicle (place stands below the out-riggers, to the rear of the front wheels).
5. Disconnect radius rods from lower wishbone.
6. Disconnect lower wishbone from cross-member; push aside.
7. Disconnect steering rack from cross-member and allow it to drop slightly.
8. Unclip brake pipe from nylon clips on cross-member.
9. Remove cross-member (four bolts each side, plates on top of chassis-members).
10. Remove all sump bolts and two nuts; lower sump.

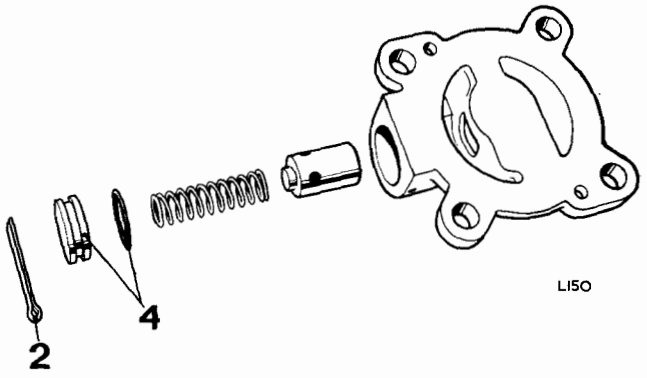
Refitting

11. Clean gasket faces; fit new gasket.
12. Lift sump into position and secure with bolts and nuts.
13. Fit cross-member (fit plates behind bolt heads, the two chamfered plates go inboard to accommodate chassis radii. Brake pipe brackets attach to the rear outer bolts).
14. Attach brake pipe to nylon clips on cross-member.
15. Position lower wishbone in cross-member hangers.
16. Couple radius rods to lower wishbones; do not tighten.
17. Fit bolts through from rear of lower wishbone to cross-member. Fit nuts; do not tighten.
18. Lower vehicle.
19. Fit steering rack to cross-member.
20. Tighten nuts and bolts on radius rods, lower wishbone and steering rack.
21. Fit anti-roll bar links.
22. Fit exhaust pipe. 30.10.09.
23. Fill engine with correct grade of oil.



OIL PRESSURE RELIEF VALVE

—Remove and refit **12.60.56**



Removing

1. Remove oil pump. 12.60.26.
2. Remove split pin in end cover of pump.
3. The component parts of the pump may be withdrawn from end cover.
4. Remove 'O' ring from locating plug.

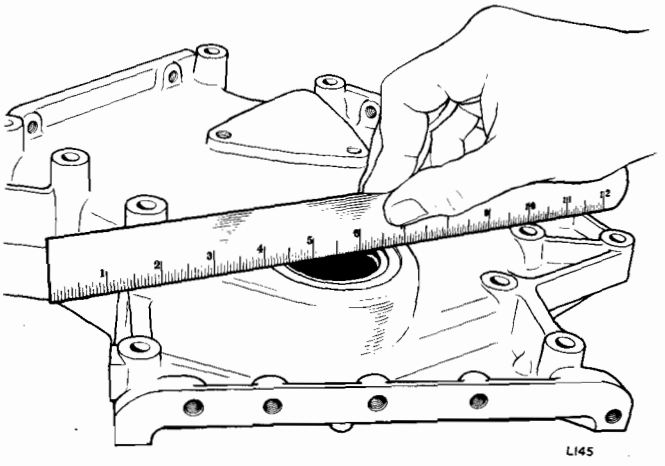
Refitting

5. Clean and examine all components, renewing as necessary.
6. Fit new 'O' ring to locating plug.
7. Assemble into end cover in the following order: relief valve, spring, locating plug and 'O' ring.
8. Press in and insert split pin to retain relief valve in end cover.
9. Fit oil pump. 12.60.26.

TIMING CHAIN GEAR COVER

—Remove and refit **12.65.01**

12.65.12 1 to 11, 55 to 69



TIMING GEAR COVER OIL SEAL

—Remove and refit **12.65.05**

Removing

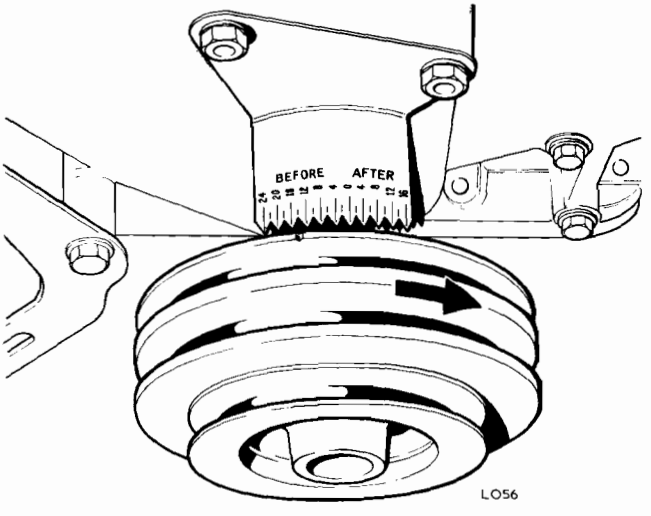
1. Remove timing cover. 12.65.01.
2. Knock out seal from cover.

Refitting

1. Fit new seal to cover, tapping gently and evenly into position until the back face of the seal is flush with front face of cover.
2. Fit front cover. 12.65.01.

VALVE TIMING

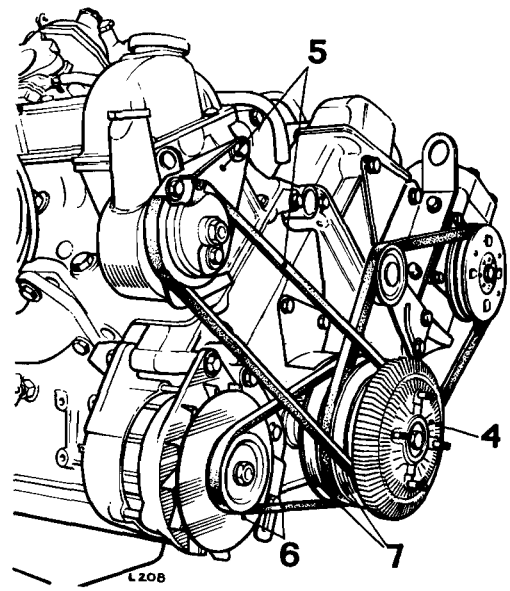
—Check **12.65.08**



1. Remove camshaft covers. 12.29.42.
2. Turn engine until T.D.C. groove cut in pulley is adjacent to T.D.C. mark on the scale.
3. Check that the line on the front flange of each camshaft aligns with the groove in front camshaft bearing cap.
4. Where valve timing is correct, replace camshaft covers. Where valve timing is incorrect, proceed as for Timing chain—Remove and refit. 12.65.15 L.H.; 12.65.16 R.H.

TIMING CHAIN AND GEARS

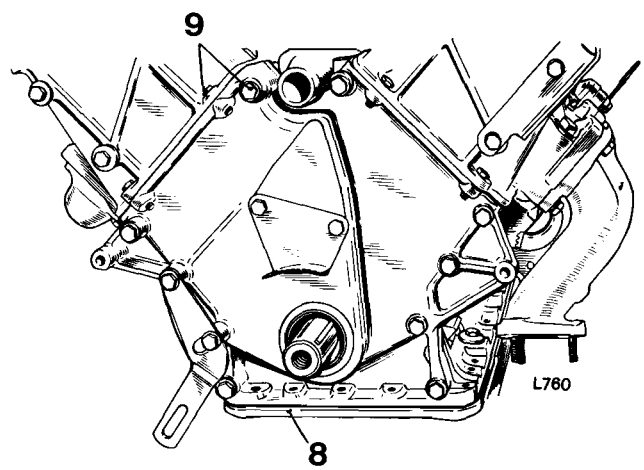
—Remove and refit	**12.65.12**
Timing chain(s) 1 to 25 and 36 to 66	**12.65.14**
Timing chain—L.H. 1 to 25 and 36 to 66	**12.65.15**
Timing chain—R.H. 1 to 23 and 45 to 66	**12.65.16**
Timing gears (camshaft drive only) 1 to 25 and 36 to 66	**12.65.22**

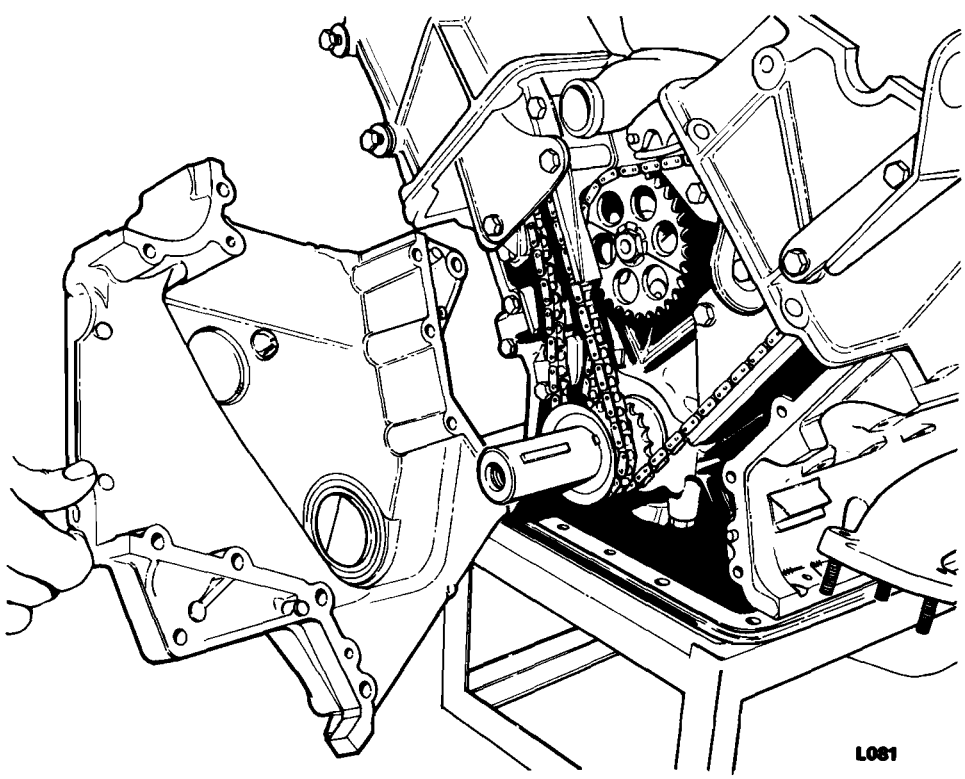


Removing

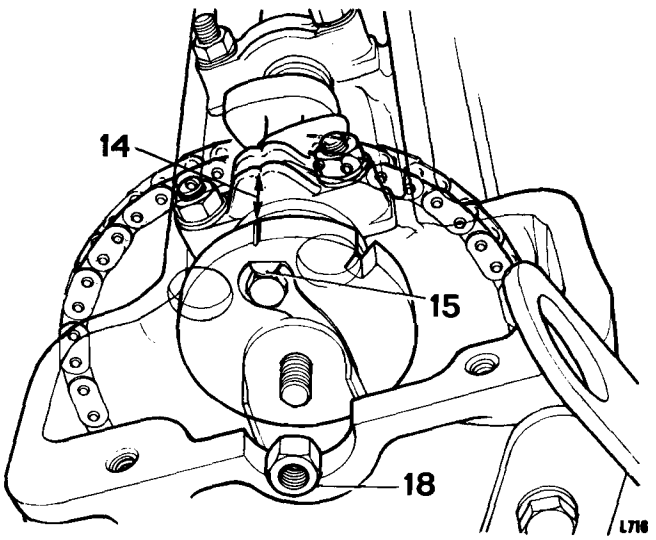
1. Lift bonnet; fit wing covers; isolate battery.
2. Remove bonnet (for ease of replacement, mark position before removing three bolts each side plus stay).
3. Drain coolant; remove radiator and hoses.
4. Remove fan and Torquatrol unit.
5. Release power steering pump (three bolts securing bracket to head); move pump to side; remove belt.
6. Remove alternator and belt.
7. Remove pulleys (replace centre bolt for use with claw extractor).
8. Remove five front sump bolts (to front cover) and slacken remainder to allow sump to drop approximately 0·25 in (5 mm).
9. Remove 10 bolts securing front cover to cylinder block and two to each cylinder head.
10. Remove front cover (located on two dowels) carefully to avoid damage to head and sump gaskets.
11. Remove three front cover to cylinder block gaskets.

continued

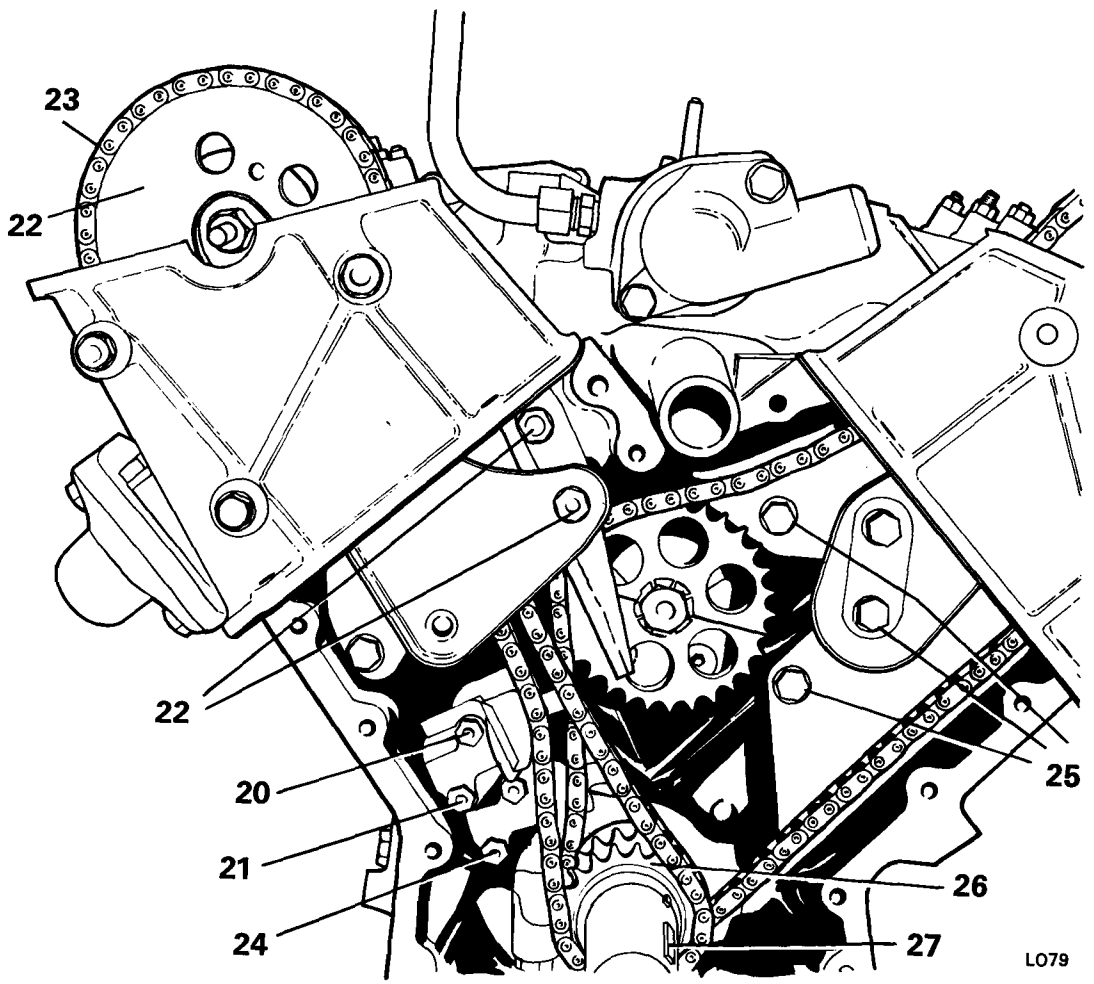


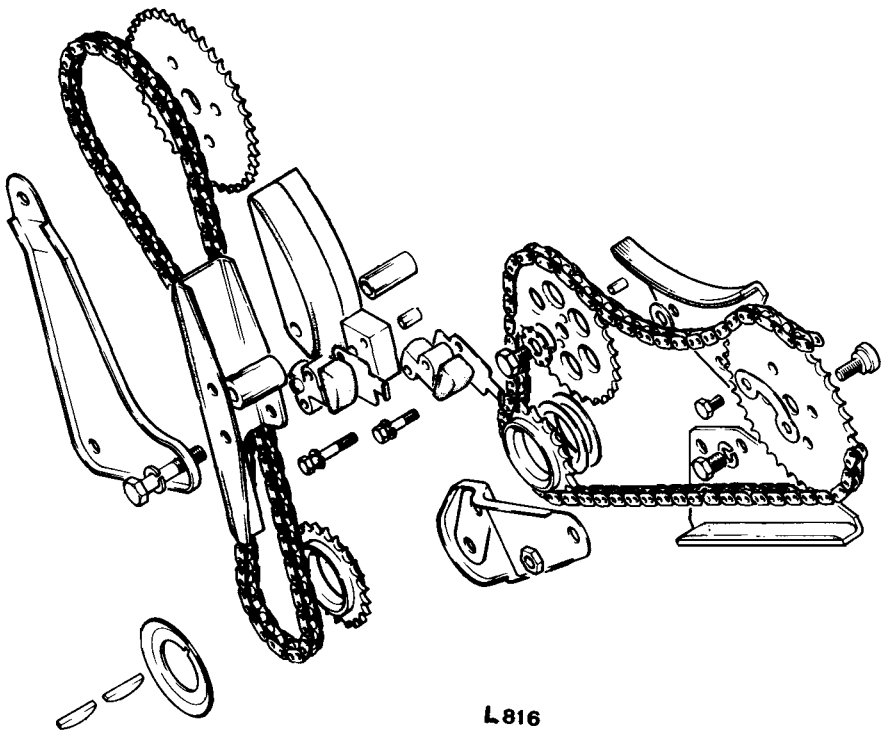


12. Remove air cleaner complete with adaptor elbows.
13. Remove camshaft covers.
14. Turn engine (use crankshaft centre bolt) until line on camshaft flange aligns with groove in front bearing cap.
15. Knock back tabs and slacken upper camshaft sprocket bolts.
16. Turn engine until lower bolts are accessible, detab and remove bolts.
17. Turn engine to position in 14 above.
18. Use a nut from camshaft bearing cap to secure each sprocket to support brackets.
19. Remove upper bolts and lockplates.
20. Remove two bolts securing outer chain tensioner and distance piece to cylinder block.
21. Remove outer chain tensioner and distance piece.
22. Remove bolts and take off outer chain guides and support brackets complete with camshaft sprocket.
23. Remove outer chain.
24. Remove bolts and lift off inner chain tensioner.
25. Remove bolts and lift off chain guides, support bracket complete with camshaft sprocket.
26. Remove crankshaft gears.
27. Remove drive keys from crankshaft.
28. Remove shims.



continued





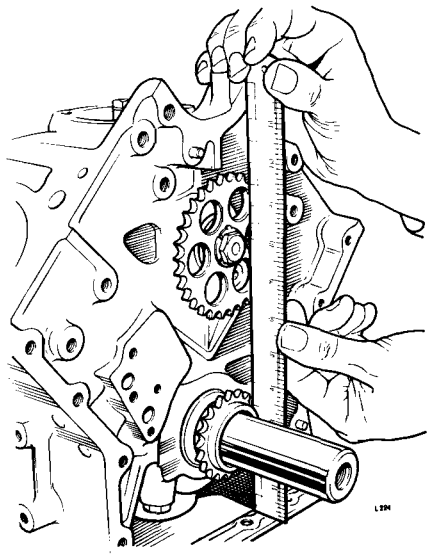
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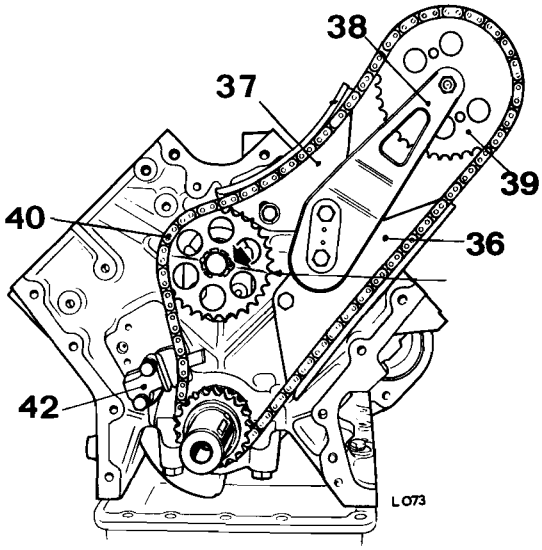
Refitting

29. Fit one crankshaft gear.
30. Use straight-edge to check alignment between crankshaft gear and jackshaft gear.
31. Use shims behind crankshaft gear to effect correct alignment.
32. Remove crankshaft gear.
33. Fit shims.
34. Fit drive keys to crankshaft, ensure their correct seating.
35. Fit crankshaft gears.
36. Fit L.H. (inner) straight guide.
37. Fit curved guide in temporary position.
38. Fit-support bracket.
39. Fit camshaft gear, securing with one bolt and lock-plate.
40. Fit chain over crankshaft, jackshaft and camshaft gears, ensuring:
    a. Scribed line on jackshaft is approximately horizontal with slight inclination down towards left-hand bank.
    b. Chain slackness is all on tensioner side.
41. Move curved guide into position; do not tighten bolts.
42. Fit chain tensioner, in fully retracted condition, together with restrictor plate. Locate on hollow dowel.

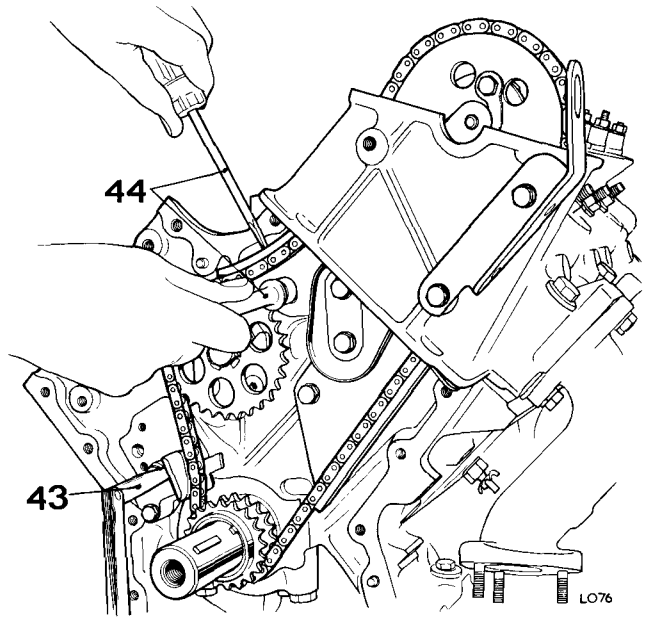
NOTE: To prevent actuation of tensioner when fitting, a small piece of cardboard, approximately 0·1 in (2·5 mm) thick, situated between shoe and body of tensioner, will prevent full retraction and consequent actuation of tensioner.

continued

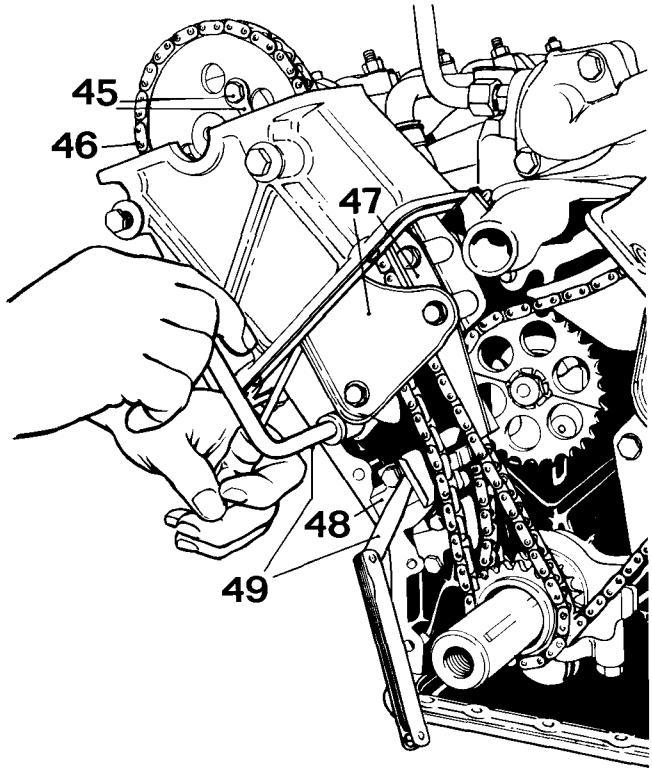




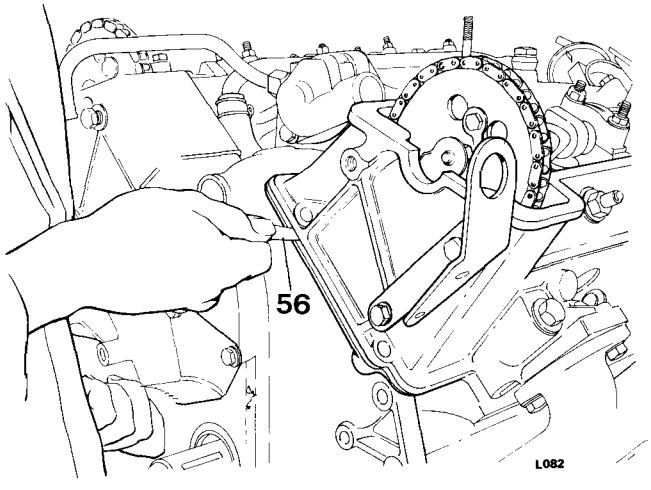
43. Place a 0·040 in (1 mm) feeler between shoe and body of chain tensioner.
44. Apply tension to curved guide to pull chain tight; tighten bolts on curved guide and support bracket, ensuring that hole in support bracket is equally spaced around spigot bolt in camshaft. Remove feeler.



45. Fit R.H. bank camshaft gear with one bolt and lockplate.
46. Fit chain over crank and camshaft gears; all slackness must be on tensioner side.
47. Fit support bracket and chain guides; do not tighten.
48. Fit chain tensioner, restrictor plate and spacer, locating on hollow dowel (see 42 above).
49. Repeat 43 and 44 on R.H. bank.
50. Turn engine, fit bolts in camshaft gears, tighten and bend lockplates over.
51. Turn engine, tighten camshaft bolts, bend over lockplates.
52. Turn engine over and check valve timing, chain tension and tensioners.



53. Fit camshaft cover.
54. Fit air cleaner and adaptor elbows.
55. Fit gaskets (three) to cylinder block.
56. Fit front cover using strips of shim steel to guide cover between head and sump gaskets. Locate on two dowels.
57. Fit bolts, cover to cylinder block, cover to cylinder head, sump to cover.
58. Tighten all bolts plus remaining sump bolts.
59. Fit pulley unit.
60. Fit alternator and belt; adjust tension.
61. Fit steering pump and belt; adjust tension.
62. Fit Torquatrol and fan unit.
63. Fit radiator and hoses.
64. Refil cooling system.
65. Fit bonnet.
66. Remove wing covers; close bonnet.



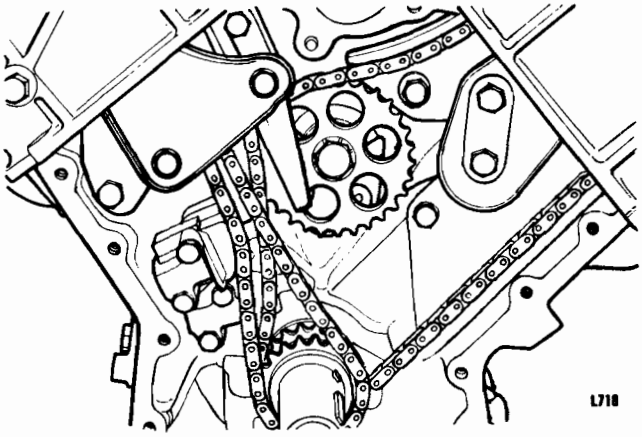
TIMING CHAIN TENSIONER(S) 12.65.28

Removing

1. Operation 12.65.12, 1 to 11, 20, 21, 24.

Refitting

2. Slacken bolts securing curved chain guides.
3. Operation 12.65.12, 42 to 44, 48, 49, and 55 to 66.



TIMING CHAIN TENSIONER—OUTER 12.65.29

Removing

1. Operation 12.65.12, 1 to 11, 20, and 21.

Refitting

2. Slacken bolts securing curved chain guide.
3. Operation 12.65.12, 48, 49, and 55 to 66.

TIMING CHAIN TENSIONER—INNER 12.65.30

Removing

1. Operation 12.65.12, 1 to 11, 20, 21, and 24.

Refitting

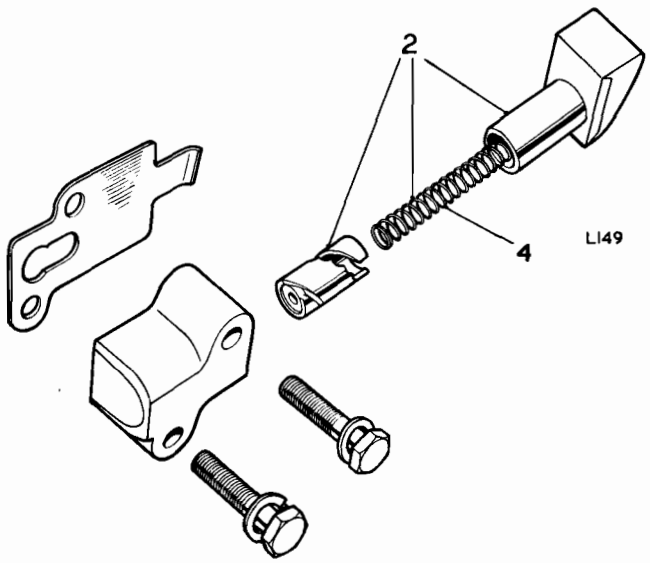
2. Slacken bolts securing curved chain guides.
3. Operation 12.65.12, 42 to 44, 48, 49, and 55 to 66.

TIMING CHAIN TENSIONER(S)

—Overhaul 12.65.36
Inner 12.65.37
Outer 12.65.38

1. Remove chain tensioners. 12.65.28.
2. Withdraw plunger, restraint cylinder and spring.
3. Wash all components and examine for wear, i.e. slipper wear and plunger/casting bore wear.
4. Place spring into bore restraint cylinder.
5. Fit spring and cylinder into bore of plunger, press and turn clockwise until the cylinder is fully inserted and the assembly remains retracted.
6. Fit above assembly into bore of body.

NOTE: To prevent actuation of tensioner when fitting, cut a horseshoe-shaped piece of cardboard (approximately 0·1 in (2·5 mm) thick) and interpose between head of tensioner and casting. Keep cardboard in position until tensioning the chain.



TIMING CHAIN GUIDES

—Remove and refit 12.65.50

Operation 12.65.12, 1 to 25, and 36 to 66

12.65.28

12.65.50

EMISSION CONTROL SYSTEM OPERATIONS

Air intake temperature control system
- —cold air duct—remove and refit 17.30.35
- —description and fault finding 17.30.00
- —flap motor and cover—remove and refit 17.30.15
- —function test 17.30.01
- —hose—cold air duct to air cleaner—remove and refit 17.30.40
- —hose—hot air duct to air cleaner—remove and refit 17.30.25
- —hot air duct—remove and refit 17.30.30
- —one-way valve—remove and refit 17.30.05
- —temperature sensor unit—remove and refit 17.30.10
- —vacuum pipe—sensor to flap motor—remove and refit 17.30.20

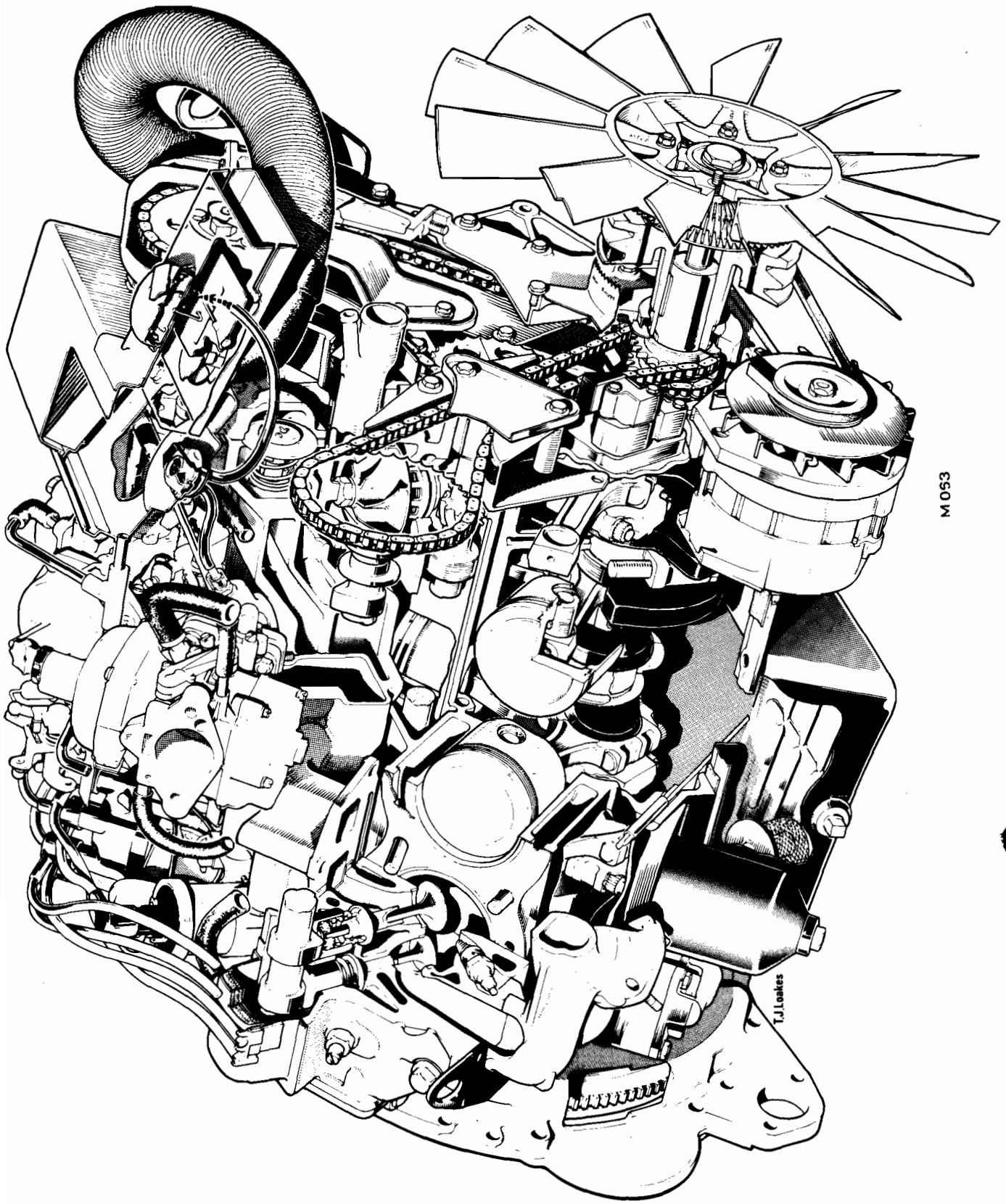
Carburetter system
- —by-pass valve L.H.—remove and refit 17.20.18
- —by-pass valve R.H.—remove and refit 17.20.19
- —description, adjustments and fault finding 17.20.00
- —emission pack—red—remove and refit 17.20.07
- —temperature compensator—L.H.—remove and refit 17.20.13
- —temperature compensator—R.H.—remove and refit 17.20.14
- —vacuum line vapour trap—remove and refit 17.20.28

CO levels at idle—check 17.35.01

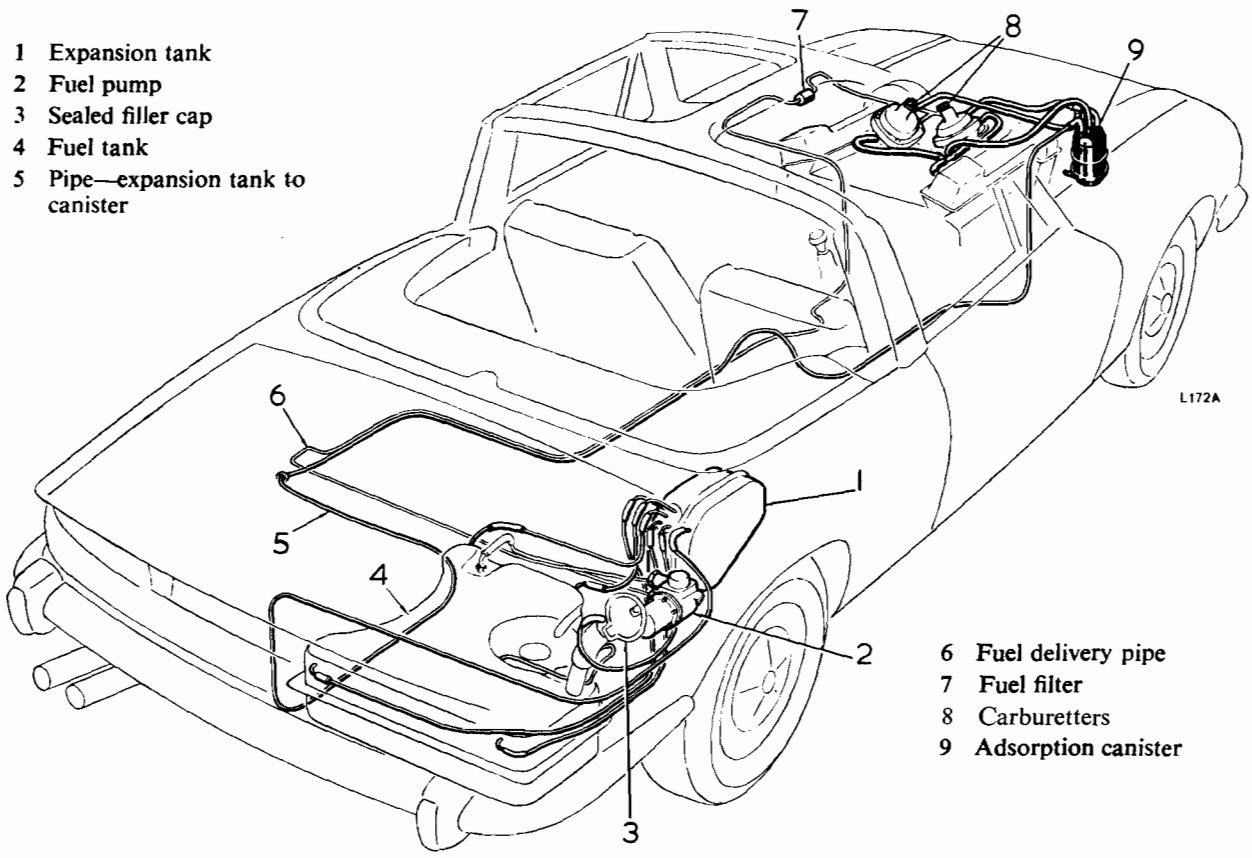
Evaporative loss control system
- —adsorption canister—remove and refit 17.15.13
  - —air filter—remove and refit 17.15.07
- —description 17.15.00
- —expansion tank—remove and refit 17.15.19
- —leak testing 17.15.01

Pipes
- —breather—expansion tank to filler—remove and refit 17.15.32
- —control—canister to expansion tank—remove and refit 17.15.24
- —control—fuel tank to expansion tank—remove and refit 17.15.28
- —purge—canister to crankcase breather 17.15.36

Running-on control valve—remove and refit 17.40.01


M053
T.J.Loakes

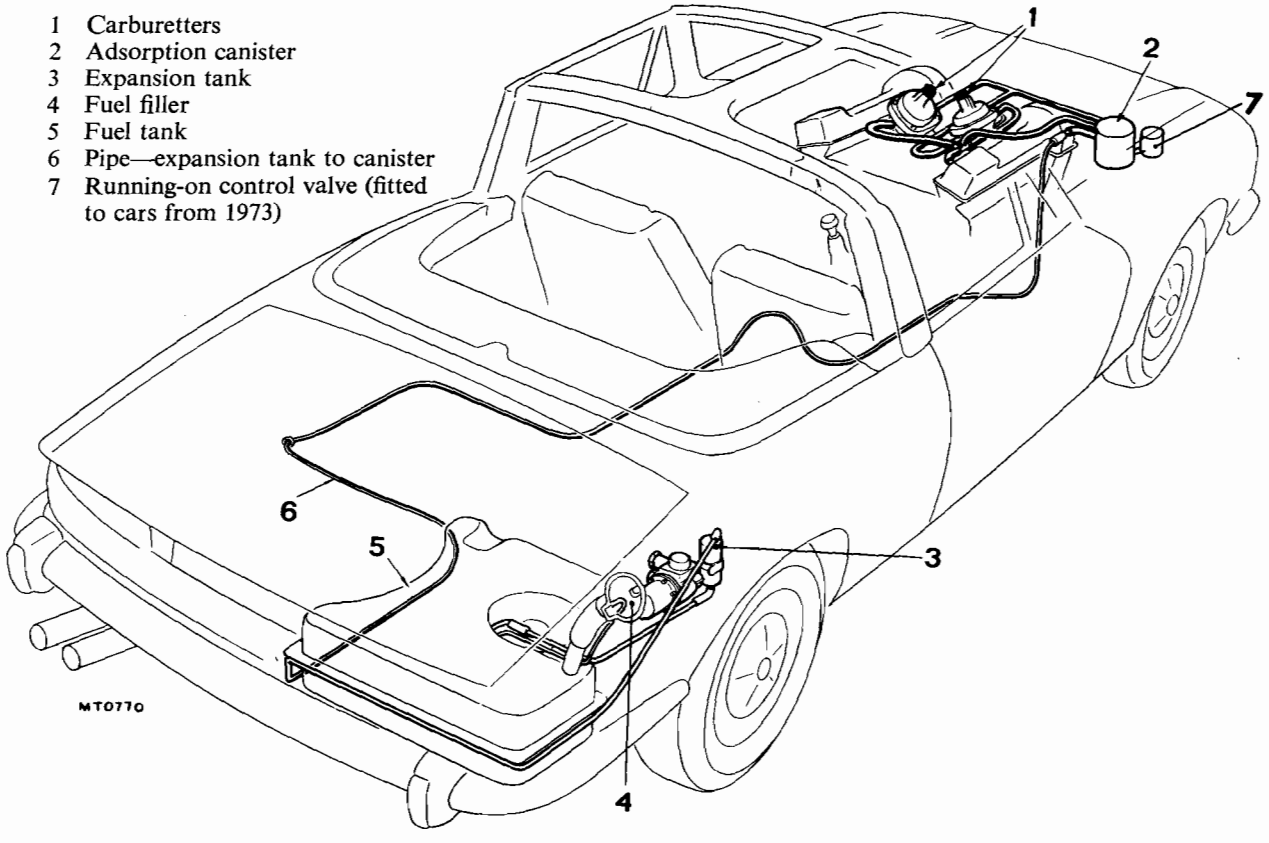
1 Expansion tank
2 Fuel pump
3 Sealed filler cap
4 Fuel tank
5 Pipe—expansion tank to canister



6 Fuel delivery pipe
7 Fuel filter
8 Carburetters
9 Adsorption canister

**Pre-1972 Evaporative Loss Control System

1 Carburetters
2 Adsorption canister
3 Expansion tank
4 Fuel filler
5 Fuel tank
6 Pipe—expansion tank to canister
7 Running-on control valve (fitted to cars from 1973)



Later Evaporative Loss Control System**

EVAPORATIVE LOSS CONTROL SYSTEM

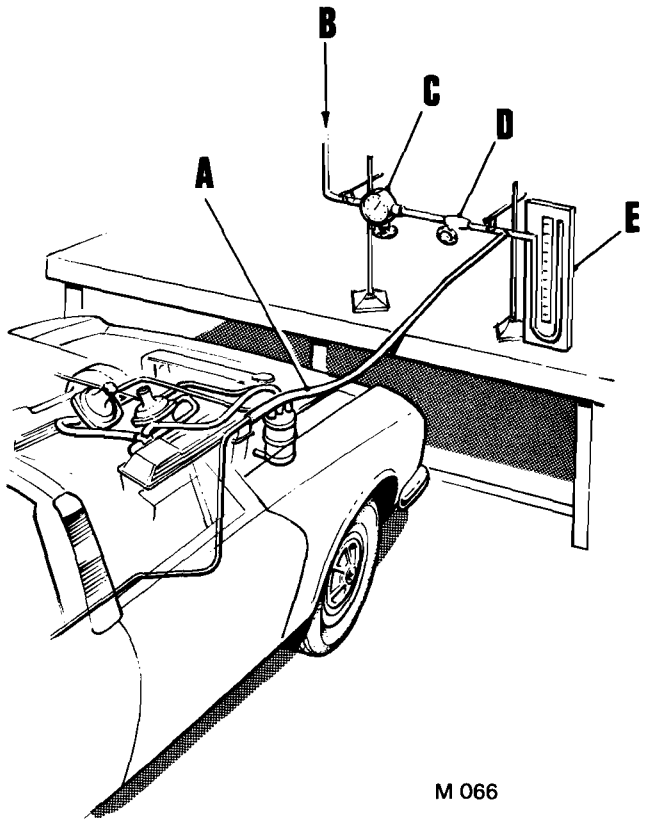
—Leak testing **17.15.01**

Test apparatus: Water manometer, pressure regulating valve, pressure sealing valve and pressurized air supply. An alternative to the manometer is an accurate pressure gauge reading 0 to 30 in of water with which a pressure relief valve or weak rubber connection will be necessary to protect against over-pressurizing the system.

WARNING: During the test, pressure will be applied to the fuel tank breather system. The pressure, albeit very low, may displace pipe connections or cause an emission of fuel vapour. It is, therefore, very dangerous to allow smoking or naked lights in the test area, or exceed the pressure quoted.

Test procedure

1. At the carbon canister, detach the tube from the expansion tank and insert the pressurizing tube of the test apparatus.
2. Apply 20 in of water pressure to the system and close the sealing valve. DO NOT EXCEED 25 INCHES OF WATER PRESSURE.
3. After two minutes, check the pressure in the system. If this has fallen more than 2 in of water, investigation and rectification is necessary.



M 066

A. Pressurising tube
B. Air supply
C. Pressure regulating valve
D. Pressure sealing valve
E. Water manometer

ADSORPTION CANISTER AIR FILTER

Pre-1973 models only*

—Remove and refit **17.15.07**

Removing

1. Slacken nut on retaining clip bolt.
2. Lift canister and clip clear of slot in mounting bracket.
3. Unscrew base of canister.
4. Remove filter.

Refitting

5. Reverse 1 to 4.

****NOTE:** Later models (1973 on) do not have a replaceable filter.**

ADSORPTION CANISTER

—Remove and refit **17.15.13**

Removing

1. Remove nut and bolt on securing clip.
2. **Disconnect purge and feed pipes from the top of the canister.
2*a*. 1973 vehicles—remove running-on valve connecting pipe from bottom of canister.**
3. Remove canister.

Refitting

4. Reverse 1 to 3, ensuring that restrictor is fitted in canister nozzle.

EXPANSION TANK

—Remove and refit **17.15.19**

WARNING: During this operation fuel vapours may be released. It is, therefore, dangerous to smoke or to allow naked lights in the area of the vehicle.

NOTE: Two types of expansion tank system are used. For system identification please see illustrations 17.15.00.

Removing

1. Remove three screws and lift out R.H. trim panel in luggage compartment.
2. Remove two screws and lift out R.H. hinge trim.
3. **Disconnect pipe(s), expansion tank to fuel tank.
4. Disconnect pipe, filler neck to expansion tank (early models only).**
5. Disconnect pipe, expansion tank to canister.
6. **Remove, from position adjacent to hinge, one screw expansion tank to body (early models only).**
7. Slacken two screws clamping expansion tank mounting brackets.
8. Turn tank to disengage screws; lift out tank.

Refitting

9. **Reverse 1 to 8. Fit canister pipe to rear top connection—other pipes position immaterial (early models only); later models, pipe to fuel tank in lower connection.**

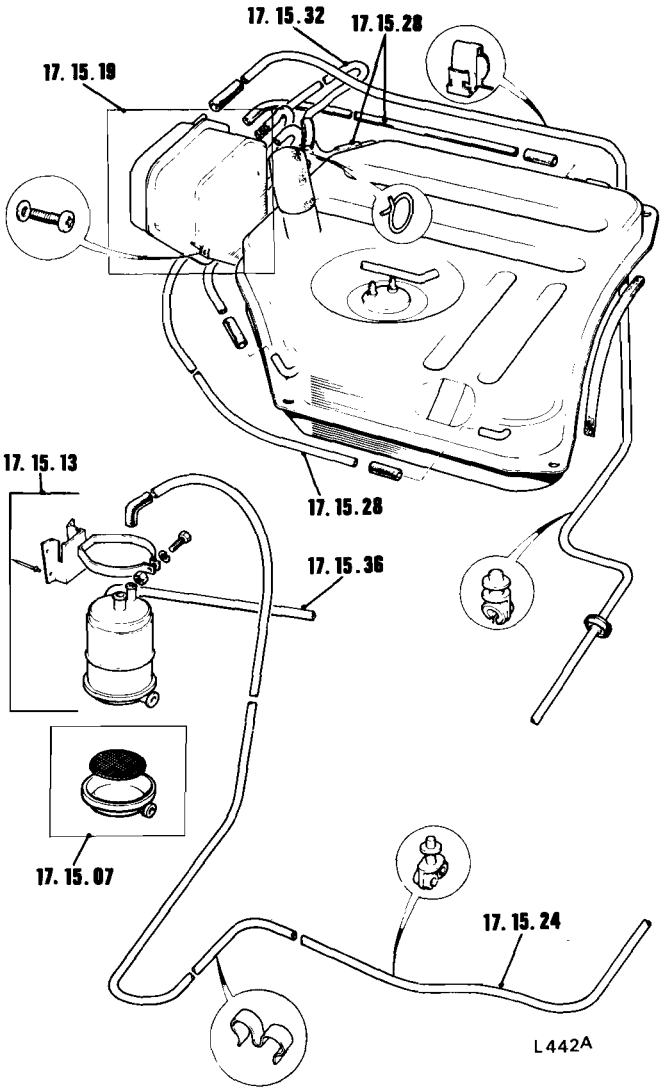
CONTROL PIPE—CANISTER TO EXPANSION TANK

—Remove and refit **17.15.24**

Control pipes—fuel tank to expansion tank **17.15.28**

Breather pipe—expansion tank to filler **17.15.32**

Purge pipe—canister to crankcase breather **17.15.36**



Note:

Gain access to expansion tank, fuel tank and filler pipes by removing luggage compartment floor and R.H. side trim. When refitting, press pipes into nylon clips to ensure firm location. Ensure that all pipes are connected securely making leakproof connections.

EXHAUST CONTROL—CARBURETTER SYSTEM

—Description, adjustments and fault finding 17.20.00

Description

The twin carburetters are Stromberg 175 CDSE which are designed to be highly efficient and sensitive to varying conditions. The following features are incorporated:

a. Jet assembly and needle biased to achieve consistent air to fuel ratio.
b. Temperature compensator assembly which progressively opens in line with increasing engine temperature to correct the mixture and maintain even running.
c. Throttle by-pass valve which is set to open at a predetermined manifold depression to admit air during deceleration.
d. Wire locked and sealed cover to discourage unauthorized tampering.

The carburetters are basically the ones used on non-emission vehicles with the exception of the features described in this section.

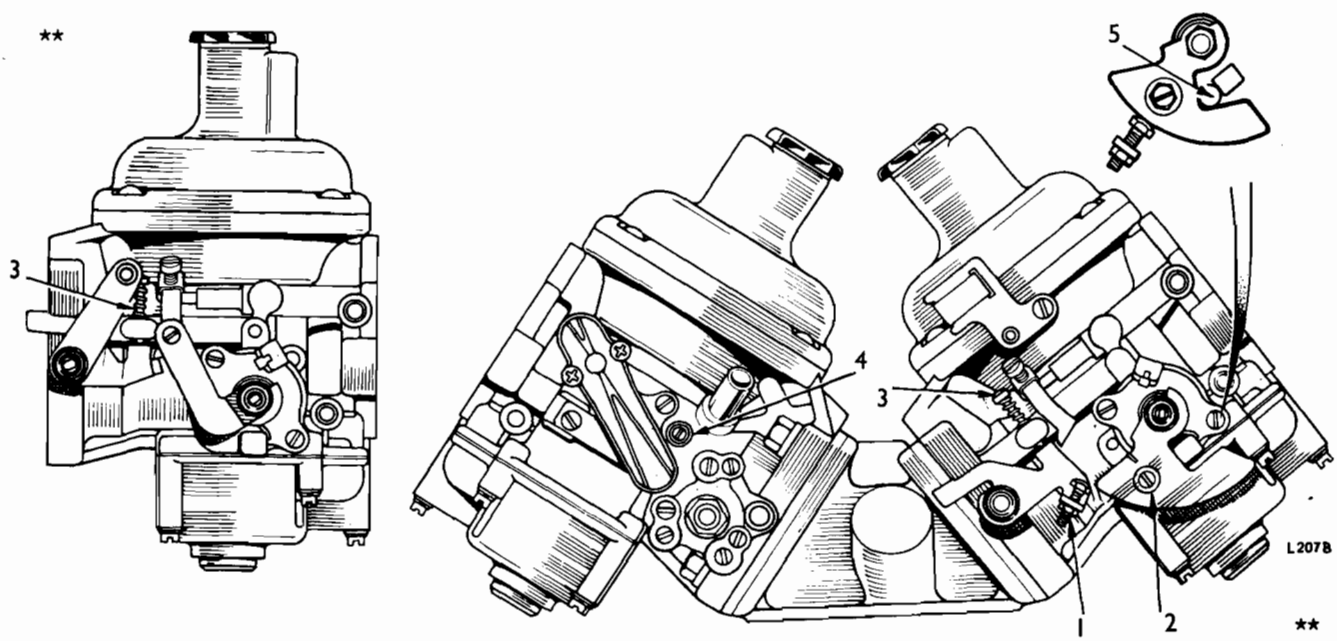
Adjustment

a. Idling speed: Ensure that the fast idle screw (1) is clear of the cam (2) and the choke lever is against its stop, with the fascia control pushed fully in. Unscrew the idling screw (3) until the throttle is just closed. Turn the screw one and a half turns to provide a datum setting. Start the engine and attain normal running temperature before final adjustment of the idling screws to achieve a constant 800 to 850 rev/min.

b. **Fast idling: Ensure that the choke lever is fully returned and the fascia control knob is pushed fully in. Insert a 0·3125 in ($\frac{5}{16}$) dia. bar between the cam and the cam stop. Start the engine and while it is still cold (69 to 86°F) pull the fascia control fully out to check the fast idle speed and, if necessary, adjust to 1,100 rev/min with the screw. Tighten the locknut and re-check the fast idling speed.**

c. Idle emission: An idle trimming screw (4) is provided to give very fine adjustment to compensate for the difference between a new, stiff engine and one that is 'run in'. THIS IS NOT AN ORDINARY MIXTURE ADJUSTING SCREW; it regulates a limited amount of air that can be introduced into the mixing chamber. It is important to remember that the car will not detect any difference between the extremes of adjustment. The setting should therefore only be made with the aid of an air/fuel ratio meter or a CO meter.
The CO level is 0·5 to 2·5 per cent, equivalent air/fuel ratio 14·4 : 1 to 13·6 : 1.

continued



1 Fast idle screw
2 Cam
3 Idling screw
4 Idle trimming screw
5 $\frac{5}{16}$ in bar

Emission control carburetters

EMISSION CARBURETTER—FAULT FINDING

NOTE: Before undertaking extensive carburetter servicing it is recommended that other engine factors and components such as cylinder compressions, valve clearance, distributor, sparking plugs, air intake temperature control system, etc., are checked for correctness of operation.

SYMPTOM	CAUSE	ACTION
1. Poor idle quality	*a.* Air leakage on indication manifold joints	Remake joints as necessary. Check idle carbon monoxide level with CO meter.
	b. Throttles not synchronized	Re-balance carburetters and re-set linkage.
	c. Air valve or valves sticking in piston guide-rods	Clean air valve rods and guides and reassemble. Check piston free movement by hand; unit should move freely and return to carburetter bridge with an audible click.
	d. Partially or fully obstructed float-chamber or diaphragm ventilation holes	Check that gasket(s) are not causing obstruction or piping obstructed.
	e. Incorrect fuel level caused by mal-adjusted float assemblies or worn or dirty needle valve	Reset float heights and clean or replace needle valves worn.
	f. Metering needle incorrectly fitted or wrong type of needle fitted	Ensure shoulder of needle is flush with face of air valve and that needle bias is correct.
	g. Diaphragm incorrectly located or damaged	Check location with air valve cover removed, piston depression holes should be in line with and face towards the throttle spindle. Renew diaphragm with correct type if damage is in evidence.
	h. Leakage from ignition advance or retard pipe connections	Re-make connections and re-check ignition settings.
	i. Temperature compensator faulty	With engine and carburetter cold, check that compensator cone is seated, and free to move off seat. If any doubt exists, replace unit with new assembly.
	j. After considerable service leakage may occur at throttle spindle or secondary throttle spindles	Replace spindle seals or spindles as required

continued

SYMPTOM	CAUSE	ACTION
2. Hesitation or 'flat spot' *a*, *b*, *c*, *d*, *e*, *f*, *g* and *h* plus:	Piston damper inoperative	Check damper oil level and top up with specified oil; re-check damper operation by raising piston by hand, whereupon resistance should be felt.
	Air valve spring missing or wrong part fitted	Check correct grade of spring and refit as required.
	Ignition timing incorrect	Check and reset as required.
	Throttle linkage operation incorrect	Check operation of linkage between carburetters and operation of secondary throttle links; reset or replace parts as required.
3. Heavy fuel consumption 1 and 2 plus:	Leakage from the fuel connections, float-chamber joints or sealing plug 'O' rings	Replace gaskets and 'O' rings as required.
4. Lack of engine braking	Faulty by-pass valve	Replace by-pass valve with new unit.
	Sticking throttles	Check throttle operation and reset as required.
	Ignition retard inoperative	Check ignition setting at idle and ensure correct functioning of retard system.
5. Lack of engine power	Damaged diaphragm	Inspect, and replace if incorrectly fitted or damaged.
	Low fuel flow	Check discharge from fuel pump. Inspect needle valve seating.

NOTE: To ensure compliance with exhaust emission legislative requirements the following items MUST NOT be changed or modified in any way:.

The fuel jet assembly; the air valve; the depression cover; the position of the fuel metering needle.

The following items must not be adjusted in service but should be replaced completely by factory-set units.

The temperature compensator; the air valve return spring; the by-pass unit; the starter assembly.

EMISSION PACK—RED 17.20.07

—Remove and refit

1. Fit the components of the pack in accordance with the overhaul procedure 19.15.17.

TEMPERATURE COMPENSATOR—L.H. CARBURETTER

—Remove and refit **17.20.13**

Removing

1. Remove two screws securing compensator to carburetter.
2. Lift off compensator and seal.

Refitting

3. Reverse 1 and 2; fit new seal.

TEMPERATURE COMPENSATOR—R.H. CARBURETTER

—Remove and refit **17.20.14**

As operation 17.20.13, plus remove air cleaner—see 17.30.10 1 to 5.

BY-PASS VALVE—L.H. CARBURETTER

—Remove and refit **17.20.18**

Removing

1. Remove three screws securing valve to carburetter.
2. Lift off valve and gasket.

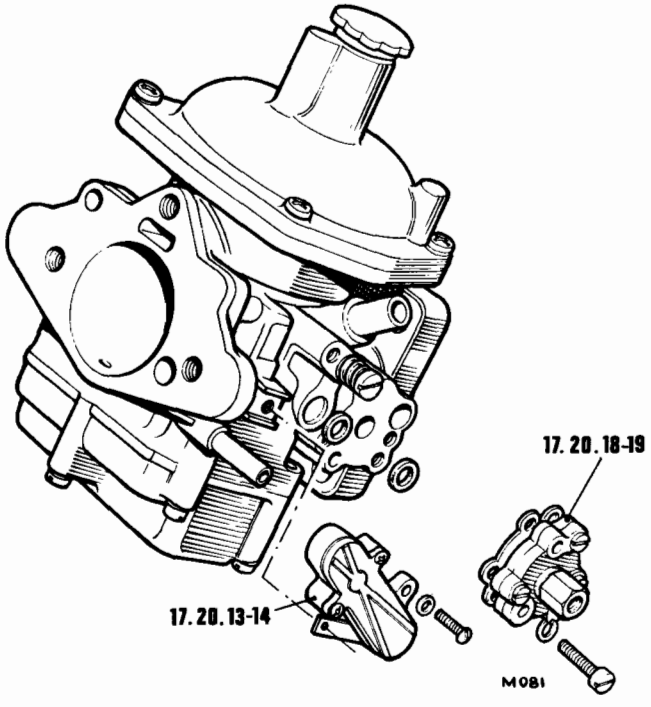
Refitting

3. Reverse 1 and 2; fit new gasket.

BY-PASS VALVE—R.H. CARBURETTER

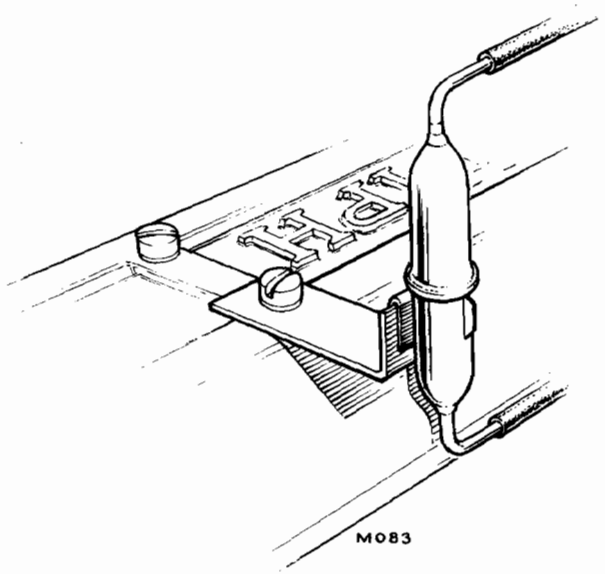
—Remove and refit **17.20.19**

As operation 17.20.18, plus remove air cleaner—see 17.30.10 1 to 5.



VACUUM LINE VAPOUR TRAP

—Remove and refit **17.20.28**



Removing

1. Disconnect vacuum pipes.
2. Pull unit and clip from mounting bracket.

Refitting

3. Reverse 1 and 2.

THERMOSTATIC SWITCH (Fitted to later cars only)

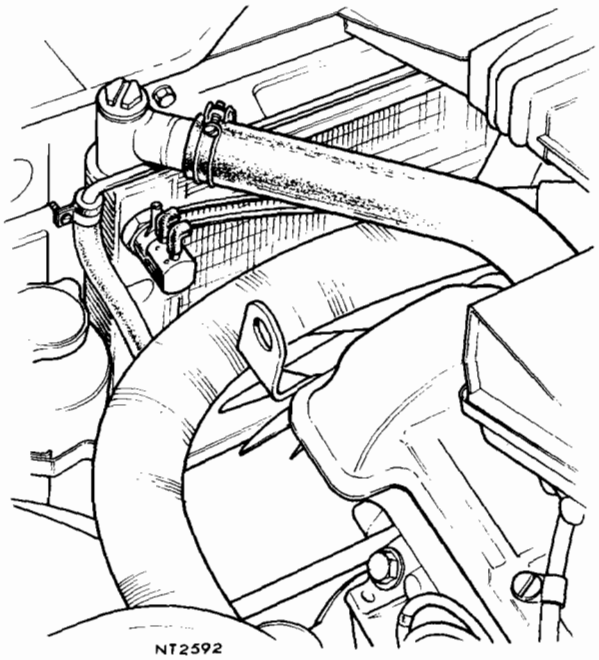
—Remove and refit **17.20.31**

Removing

1. Drain part of the coolant.
2. Disconnect the two vacuum pipes at the switch.
3. Unscrew the switch from the radiator, taking care to avoid damaging the radiator shell.

Refitting

4. Reverse operations 1 to 3; apply sealing compound to the thread of the switch.



AIR INTAKE TEMPERATURE CONTROL SYSTEM

—Description 17.30.00

The Stag carburetters are tuned to work most efficiently when the air intake temperature is above 68°F (20°C).

To maintain the intake temperature a temperature sensing device is incorporated in the air cleaner. The sensor allows inlet manifold vacuum to operate a flap valve in the air cleaner intake. The flap valve controls cold air, from forward of the radiators, and hot air, from a duct around the exhaust manifold, which mix in varying amounts to provide the correct air temperature. A one-way valve in the inlet manifold provides a delay factor when manifold depression is temporarily destroyed during sudden increases of engine speed.

AIR INTAKE TEMPERATURE CONTROL—FAULT FINDING

SYMPTOM	CAUSE	ACTION
Poor 'cold engine' running characteristics	Vacuum pipes disconnected or leaking	Re-connect or renew pipes.
	Temperature sensor leaking air	Renew sensor. 17.30.10
	Flap valve diaphragm leaking	Renew motor and cover. 17.30.15
	Flap valve stuck in cold air mode	Renew motor and cover. 17.30.15
	Hot air hose disconnected or leaking	Re-connect or renew hose. 17.30.25
	Sensor operating below required temperature	Renew sensor. 17.30.10
Flat spot or hesitation on acceleration with cold engine	One-way valve leaking	Renew valve. 17.30.05
Engine overheating	Flap valve stuck in hot air mode	Renew motor and cover. 17.30.15
	Sensor valve stuck or operating higher than required temperature	Renew sensor. 17.30.10

AIR INTAKE TEMPERATURE CONTROL SYSTEM

—Function test 17.30.01

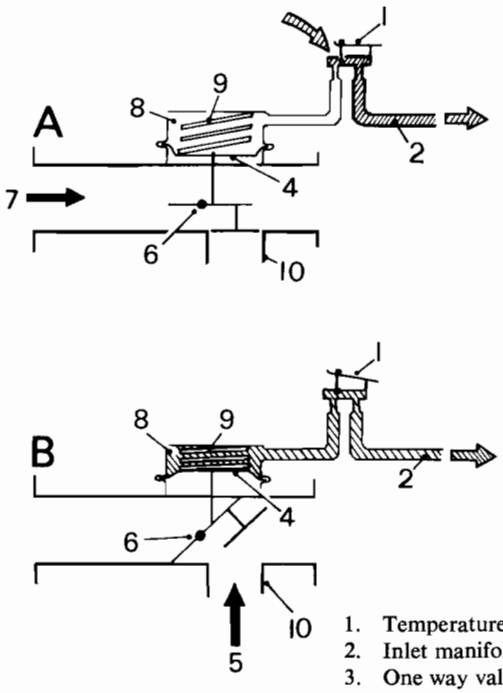
1. Inspect condition of inlet hose from exhaust scoop and vacuum pipe to sensor and control diaphragm. Renew as necessary.
   NOTE: A good seal is necessary on the vacuum pipes.
2. Remove the rubber snorkel extension tube from air cleaner.

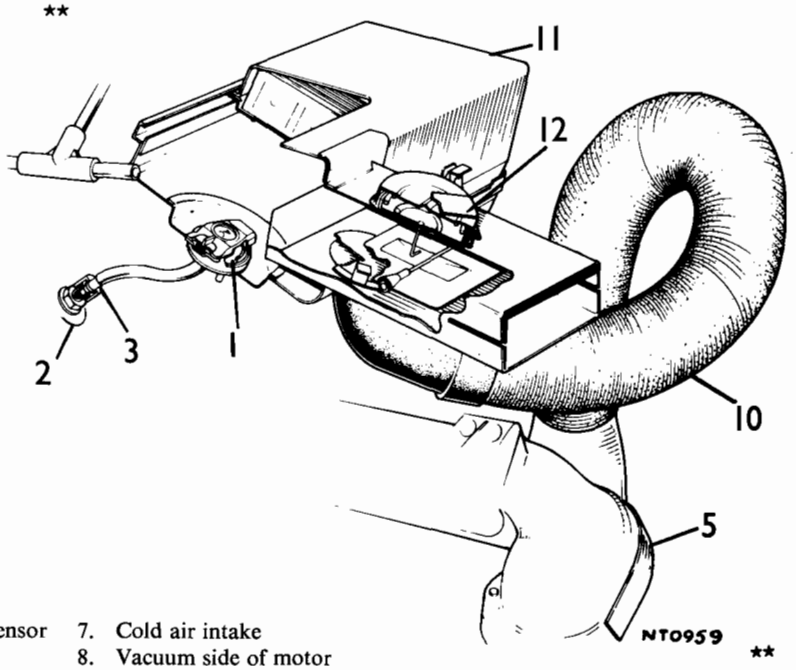
With engine and air cleaner cold (below 68°F (20°C)):

3. Check that flap valve is in cold air position, i.e. parallel with snorkel tube.
   NOTE: Flap valve position may be checked by touch or by using a mirror.
4. Start the engine and allow it to idle for a few seconds. The flap valve should move immediately to the warm air position.
5. With the flap valve in hot air position, attempt to lower engine vacuum by increasing engine speed suddenly and holding for a few seconds; check that flap valve has remained in hot air position.
6. Warm the engine and check the flap valve, which should move to the cold air position when under-bonnet temperature is above 68°F.
7. When the above test has been completed satisfactorily, refit snorkel extension tube.

Test analysis and action

8. If the flap valve is in warm air condition at start of test—see 3 above—change the motor and cover assembly. 17.30.15.
9. If tests 4 or 5 prove negative, then proceed as follows:
   a. Apply a minimum vacuum of 9 in of mercury direct to the motor nozzle; the valve should close immediately (hot air position).
   b. If the valve does not close, change the motor and cover assembly. 17.30.15.
   c. If the valve opens correctly, change the sensor unit. 17.30.10.
10. If test 6 proves negative, then proceed as follows:
    a. Remove non-return valve. 17.30.05
    b. Remove motor and cover assembly. 17.30.15.
    c. Connect non-return valve pipe to air flap motor nozzle.
    d. Connect threaded end of non-return valve to vacuum pump.
    e. Apply a minimum of 9 in of mercury and hold until diaphragm flap is fully down, i.e. closing snorkel end of air cleaner.
    f. Release vacuum and note time taken for flap to open fully. The time should not be less than 20 seconds.
    g. If necessary, repeat the test three or four times to enable the ball valve to seat. Renew valve if it fails test.





1. Temperature sensor
2. Inlet manifold
3. One way valve
4. Valve diaphragm
5. Hot air intake
6. Flap valve
7. Cold air intake
8. Vacuum side of motor
9. Return spring
10. Cold air hose
11. Air cleaner cover
12. Motor case

ONE-WAY VALVE

—Remove and refit **17.30.05**

Removing

1. Disconnect hot and cold air duct hoses.
2. Disconnect vacuum pipe to flap motor.
3. Release two clips and lift off air cleaner cover.
4. Remove element.
5. Remove six bolts and lift off air cleaner base.
6. Remove one-way valve, vacuum pipe and sealing washers.

Refitting

7. Reverse 1 to 6, ensuring that vacuum pipe is fed onto the sensor as the air cleaner is lowered into position.

TEMPERATURE SENSOR UNIT

—Remove and refit **17.30.10**

Flap motor and cover unit—1 to 3 **17.30.15**

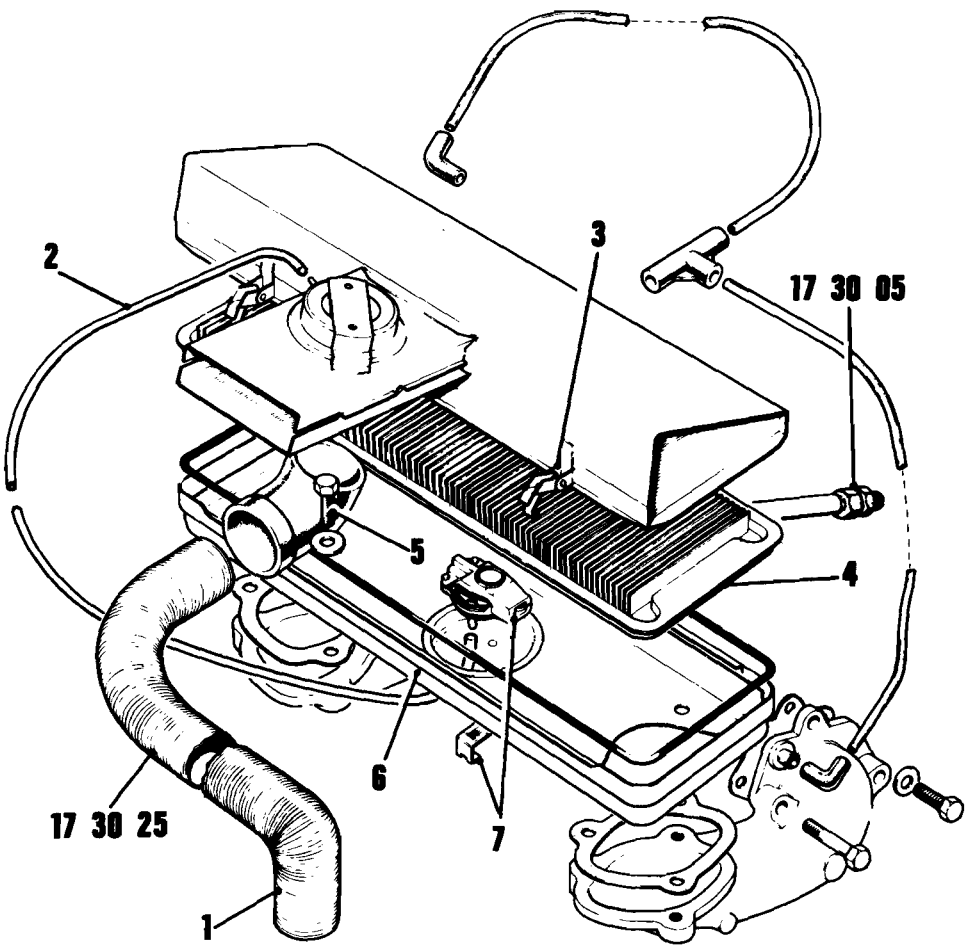
Vacuum pipe sensor to flap motor—1 to 6 **17.30.20**

Removing

1. Disconnect hot and cold air duct hoses.
2. Disconnect vacuum pipe to flap motor.
3. Release two clips and lift off air cleaner cover.
4. Remove element.
5. Remove six bolts and lift off air cleaner base.
6. Disconnect vacuum pipe to flap motor.
7. Prise off clip and remove sensor unit and foam seal.

Refitting

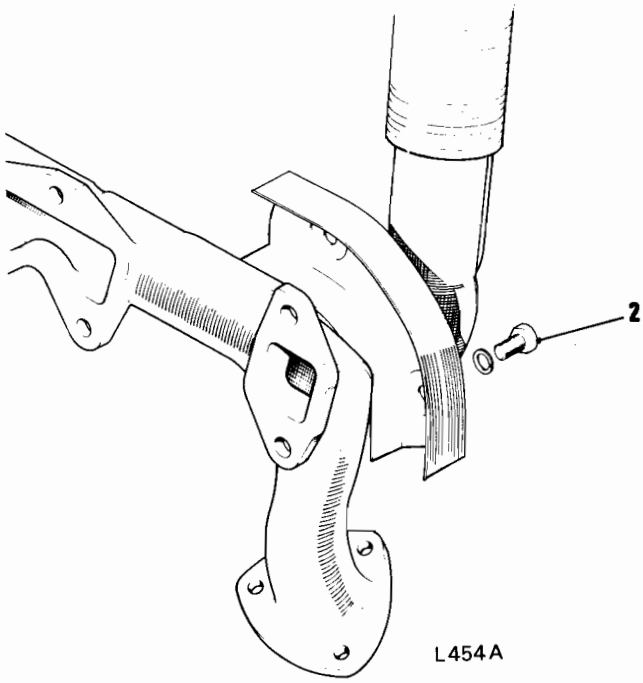
8. Reverse 1 to 7, ensuring that:
   a. Clip is undamaged.
   b. Foam seal is in position.
   c. Vacuum pipe is fed onto sensor when air cleaner base is fitted.



HOSE—HOT AIR DUCT TO AIR CLEANER

—Remove and refit **17.30.25**

1. The hose is fed over metal connections at both ends; ensure when refitting that it is not unduly kinked.



HOT AIR DUCT

—Remove and refit **17.30.30**

Removing

1. Disconnect hose from duct.
2. Remove two bolts securing duct to exhaust manifold (lower one from below vehicle) and lift off duct.

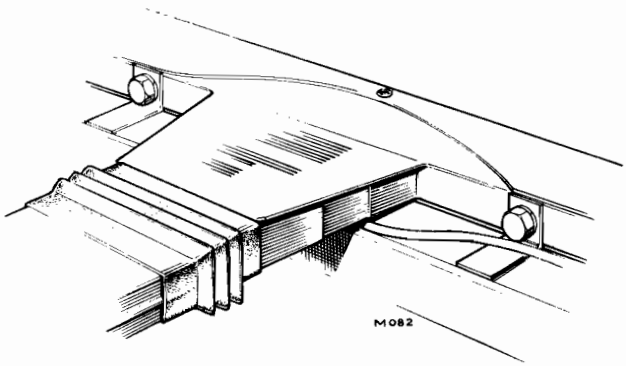
Refitting

3. Reverse 1 and 2.

COLD AIR DUCT

—Remove and refit **17.30.35**

Hose—cold air duct to air cleaner—1 **17.30.40**



Removing

1. Remove hose between duct and cleaner.
2. Remove two top radiator securing bolts.
3. Remove one screw from centre of duct.
4. Lift off duct.

Refitting

5. Reverse 1 to 4.

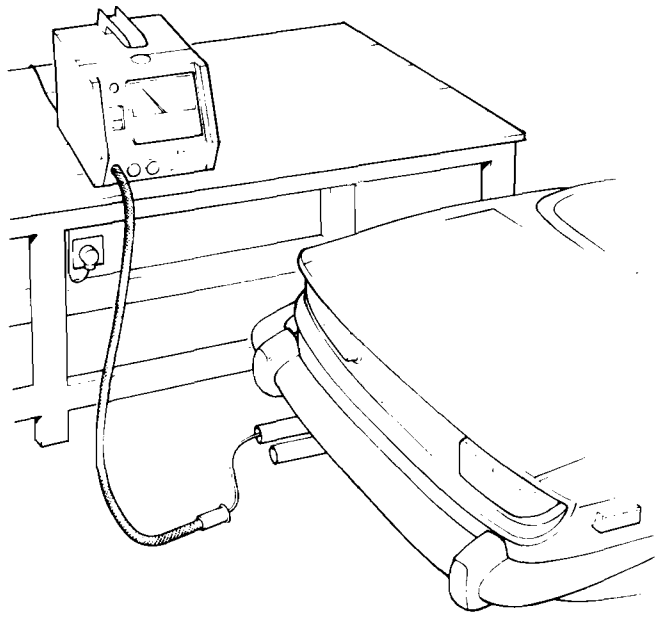
CO LEVELS AT IDLE

—Check **17.35.01**

Special tools: Approved infra-red gas analyser

1. Attain normal engine running temperature.
2. Set the idle speed to that quoted on the emission control label. 19.15.01.
3. Check the ignition timing; reset if necessary. 86.35.16.
4. Re-check the idle speed; adjust if necessary.
5. Insert the gas analyser probe as far as possible into the exhaust pipe.
6. Check the CO reading (compare with emission control label).
7. *a*. Adjust the mixture if necessary. 19.15.01.
   b. Check the idle speed; adjust if necessary.
8. Withdraw the analyser probe.
9. Switch off the ignition.

NOTE: Do not allow the engine to idle for longer than three minutes without a 'clear out' burst of one minute at 2,000 rev/min.



NT2 674

RUNNING-ON CONTROL VALVE

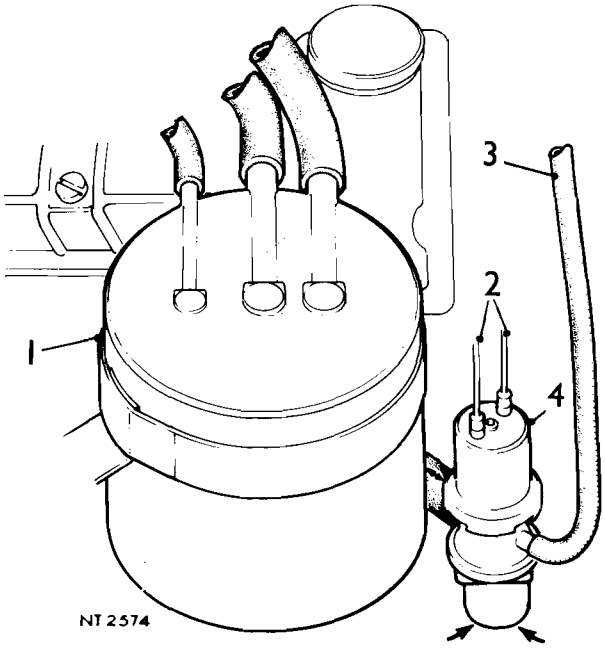
—Remove and refit **17.40.01**

Removing

1. Remove the carbon canister. 17.15.13.
2. Disconnect the two leads to the top of the valve.
3. Disconnect the vacuum signal pipe.
4. Remove the securing bolts and lift off the valve complete with mounting bracket.

Refitting

5. Reverse operations 1 to 4.



NT 2574

FUEL SYSTEM OPERATIONS

Air cleaner
—remove and refit 19.10.01*
—renew element 19.10.08*

Carburetters
—diaphragm—remove and refit 19.15.35
—float-chamber levels—check and adjust 19.15.32*
—float-chamber needle valve—remove and refit 19.15.24*
—overhaul—each 19.15.17*
—set 19.15.18*
—pedestal seal—remove and refit 19.15.14*
—remove and refit—L.H. 19.15.09*
—R.H. 19.15.10*
—Set 19.15.11*
—tune and adjust 19.15.02*

Fuel filler cap—remove and refit 19.55.08

Fuel filler lock—remove and refit 19.55.09

Fuel line filter (breather)—remove and refit 19.25.01*

Fuel main filter—remove and refit 19.25.02

Fuel pump
—data and description 19.45.00
—functional check 19.45.01
—overhaul 19.45.15
—remove and refit 19.45.08

Fuel tank—remove and refit 19.55.01*

Mixture control (choke) cable—remove and refit 19.20.13

Petrol pipes and hoses—remove and refit 19.40.02–38

Throttle cable—remove and refit 19.20.06

Throttle linkage—remove and refit 19.20.07

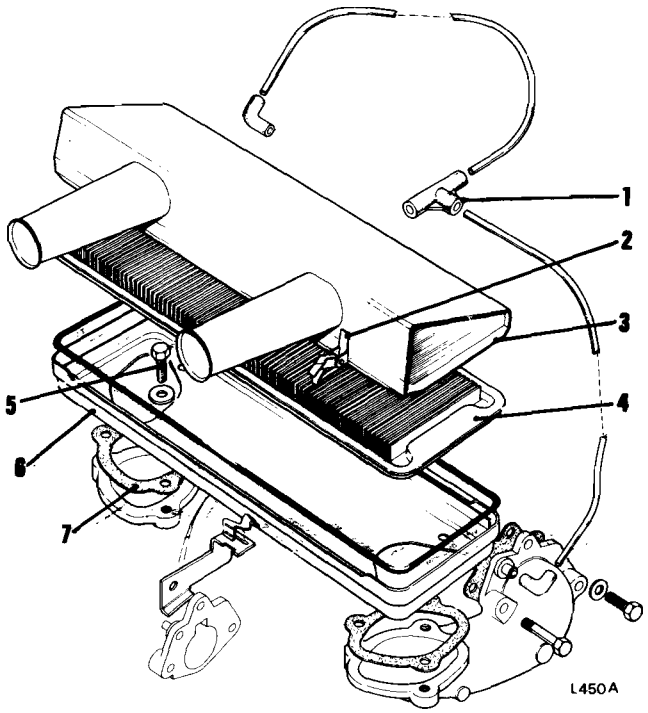
Throttle pedal—remove and refit 19.20.01

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.

AIR CLEANER

—Remove and refit **19.10.01**

NOTE: On later model cars an air cleaner using the temperature compensator system detailed in the Emission Control System section and listed under operation numbers 17.30.01; 17.30.05; 17.30.10; 17.30.15; 17.30.20; 17.30.25; 17.30.30; 17.30.35; and 17.30.40 is used.



Removing

1. Disconnect carburetter breather pipe from rear of air cleaner.
2. Unfasten two clips at front of air cleaner.
3. Remove air cleaner top covers.
4. Remove air cleaner element.
5. Remove six bolts securing air cleaner base to adaptor elbows.
6. Remove air cleaner base.
7. Remove two gaskets.

Refitting

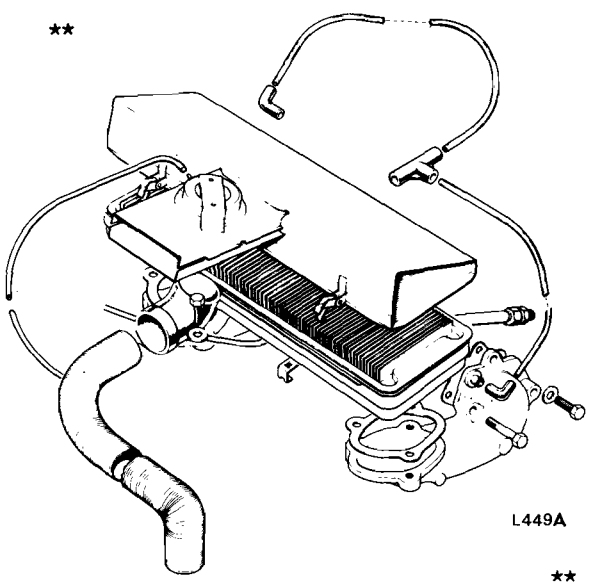
8. Reverse 1 to 7.

NOTE: Where the air cleaner is to be removed for access to other components it is more convenient to remove complete with air cleaner adaptor elbows, i.e.:

a. Remove three bolts securing each adaptor to carburetter.
b. Disconnect carburetter breather pipe.
c. Remove air cleaner complete with adaptor elbows.
d. Remove gaskets.

AIR CLEANER

—Renew element **19.10.08**



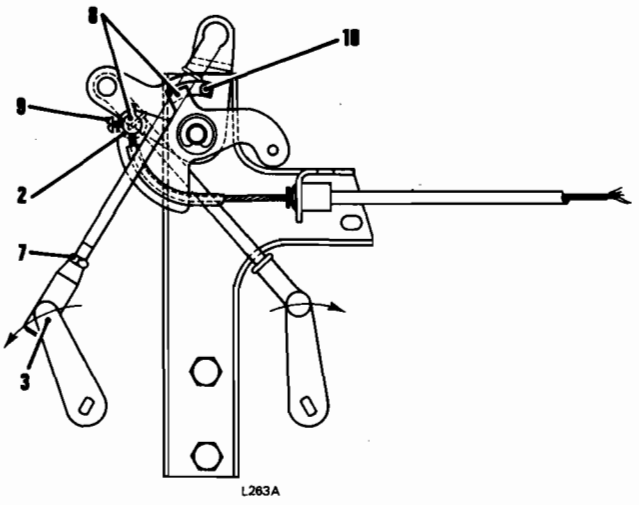
1. Unfasten clips at front of air cleaner.
2. Remove air cleaner top cover.
3. Remove element.
4. Clean air cleaner top and base covers.
5. Fit new element.
6. Fit top cover, ensure the mating lips are correctly positioned.
7. Fasten clips.

CARBURETTERS

—Tune and adjust 19.15.02

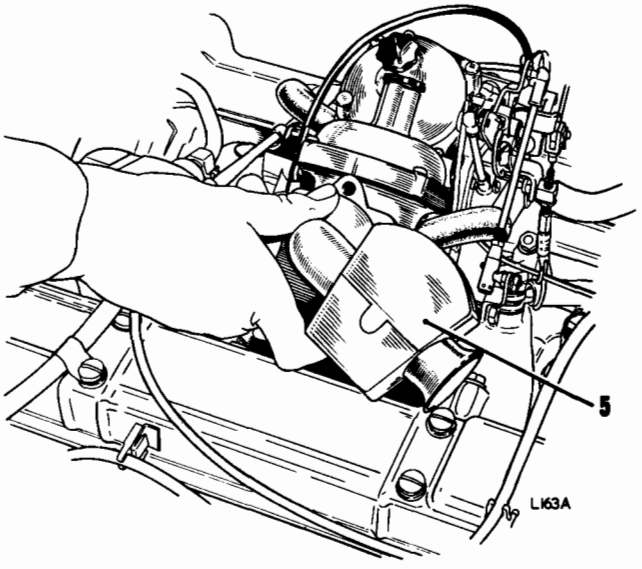
Service tools: S353; carburetter air-flow meter

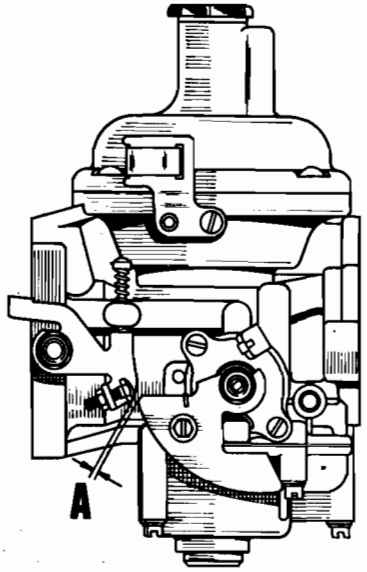
NOTE: The following operation assumes all adjustments to be incorrectly set. Omit directions not relevant.

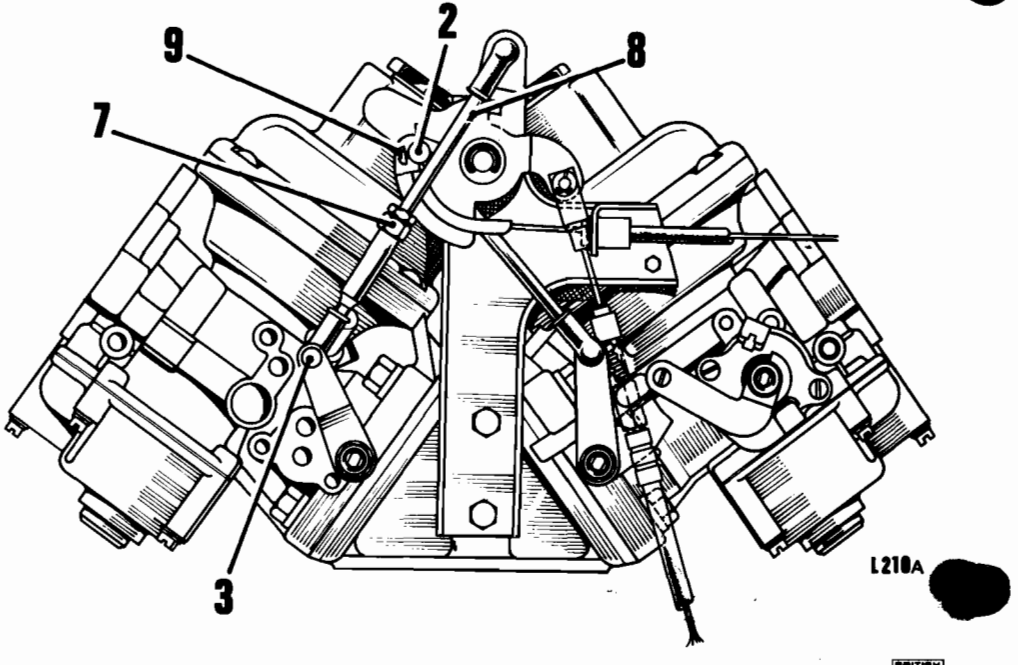


Setting control linkage

1. Remove air cleaner. 19.10.01.
2. Disconnect throttle cable from swivel pin.
3. Disconnect adjustable operating rod at butterfly spindle lever.
4. **Start engine, adjust slow running screws to give idling speed of 700 to 750 rev/min (800 to 850 rev/min U.S.A. market cars) at normal running temperature.**
5. Use air-flow meter to ensure both carburetters are breathing equally at idling speed.
6. Adjust operating rod to fit into butterfly spindle lever without altering engine speed or equalized breathing.
7. Fit and tighten adjusting rod and locknut.
8. Fit inner throttle cable through swivel pin and move driving tag of slave lever to L.H. side of slot in operating lever.
9. Tighten cable clamp screw.
   NOTE: To allow fast idling, without disturbing the otherwise closed position of the throttle linkage, a degree of 'lost motion' is incorporated into the linkage.
10. Check that sufficient lost motion exists in linkage by inserting a 5 mm (0·2 in) bar through slot in operating lever and hole in mounting bracket.
11. Raise engine speed to 1,500 rev/min. Check carburetters for equal breathing with air-flow meter.
    NOTE: If breathing is unequal at this stage the operating rod is incorrectly set and requires re-adjustment.

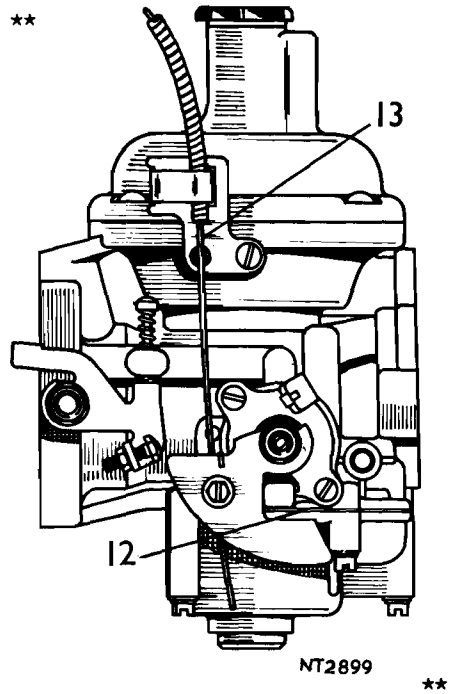






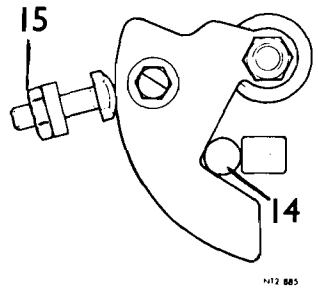
****Fast idle speed setting**

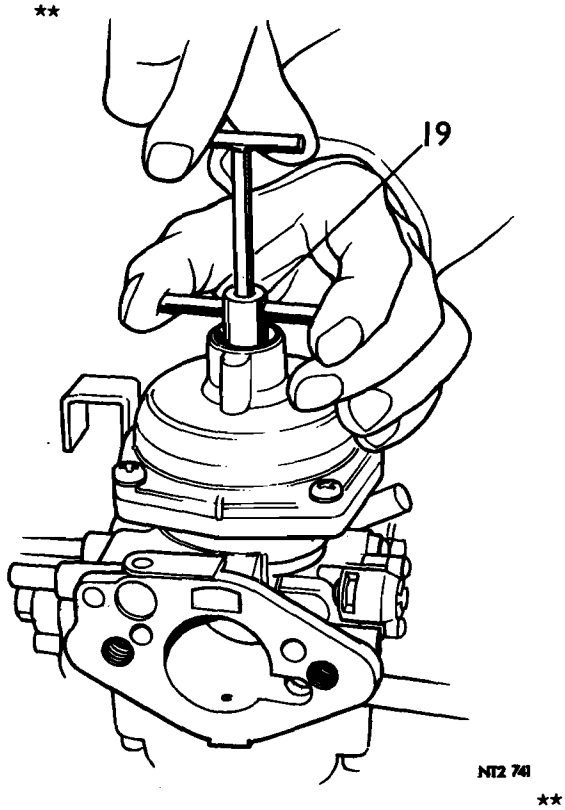
12. Check that the mixture control cam lever on both carburetters returns to its stop.
13. Ensure that the mixture control cables are so adjusted that they are not too slack or too tight.
14. Pull the mixture control knob out on the fascia and insert a $\frac{5}{16}$ in (7·937 mm) diameter bar between the cam and its stop on both carburetters in turn.
15. Slacken the fast idle screw locknut on both carburetters and adjust the screws so that they just touch their respective cams.
16. Remove the bar, push the control knob home and pull the control knob out again to check that the setting gives a fast idle speed of 1,100 to 1,300 rev/min. Make any necessary adjustments to the fast idle screw to achieve this setting whilst using synchro check meter to maintain the carburetters in balance.
17. Tighten the locknuts, stop the engine, and push the control knob fully home.**



Mixture—check and adjust

18.**Start engine, attain normal running temperature at idling speed.**
19. Lift each air valve in turn 0·8 mm (0·31 in); the immediate reaction of the engine must be noted as follows:
    A. Engine speed increases immediately .. .. .. Rich mixture
    B. Engine speed decreases or stalls .. .. Weak mixture
    C. Engine speed increases slightly then returns to normal .. Correct mixture
20. Where mixture requires adjustment, remove carburetter damper.





21. Slowly insert tool S353 into dashpots until outer tool engages in lugs in air valve and inner tool engages hexagon in needle adjuster plug.
22. Hold outer tool firmly and turn inner tool clockwise to enrich mixture, anti-clockwise to weaken mixture.
23. Check mixture as 19; adjust to correct mixture if necessary.
24. Top up dashpots if necessary; replace dampers.
25. Fit air cleaner. 19.10.01.
26. Check and, if necessary, adjust slow running to give idling speed of 600–650 rev/min using the idling screw on each carburetter—adjust each screw equally to avoid upsetting the equal breathing previously set.
27. Momentarily depress throttle pedal; if engine stalls or badly misses, enrich the mixture on each carburetter by a quarter turn.

CARBURETTER—L.H.

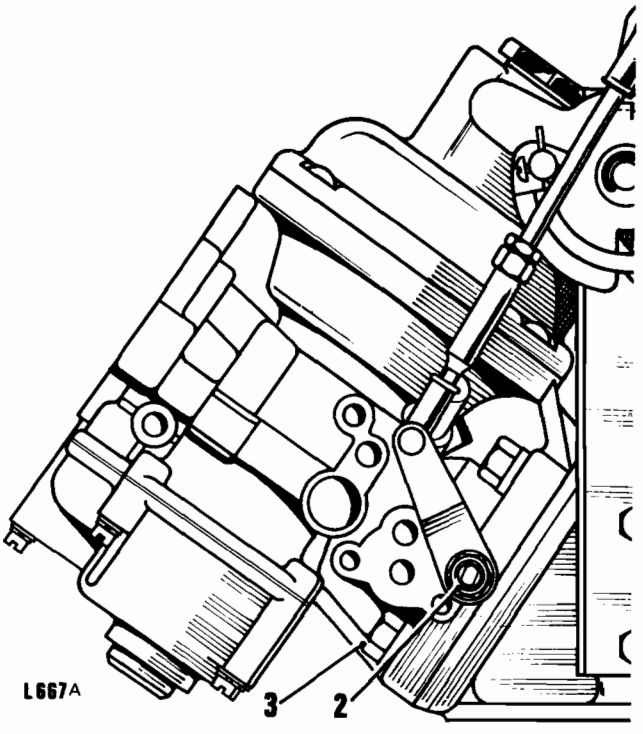
—Remove and refit **19.15.09**

Removing

1. Remove carburetters and pedestal assembly. 19.15.11.
2. Disconnect lever from spindle.
3. Remove four nuts securing carburetter to pedestal.
4. Lift off carburetter.

Refitting

5. Reverse 1 to 4.



CARBURETTER—R.H.

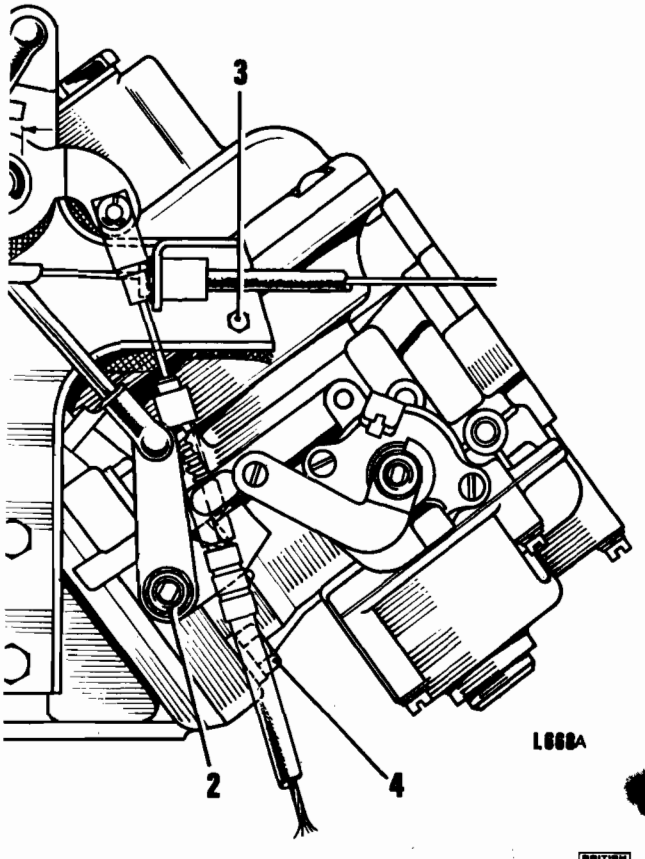
—Remove and refit **19.15.10**

Removing

1. Remove carburetter and pedestal assembly. 19.15.11.
2. Disconnect lever from spindle.
3. Remove screw, spring, plain washers and spacer securing linkage bracket to carburetter.
4. Remove four nuts securing carburetter to pedestal.
5. Lift off carburetter.

Refitting

6. Reverse 1 to 5.



CARBURETTER—CAR SET

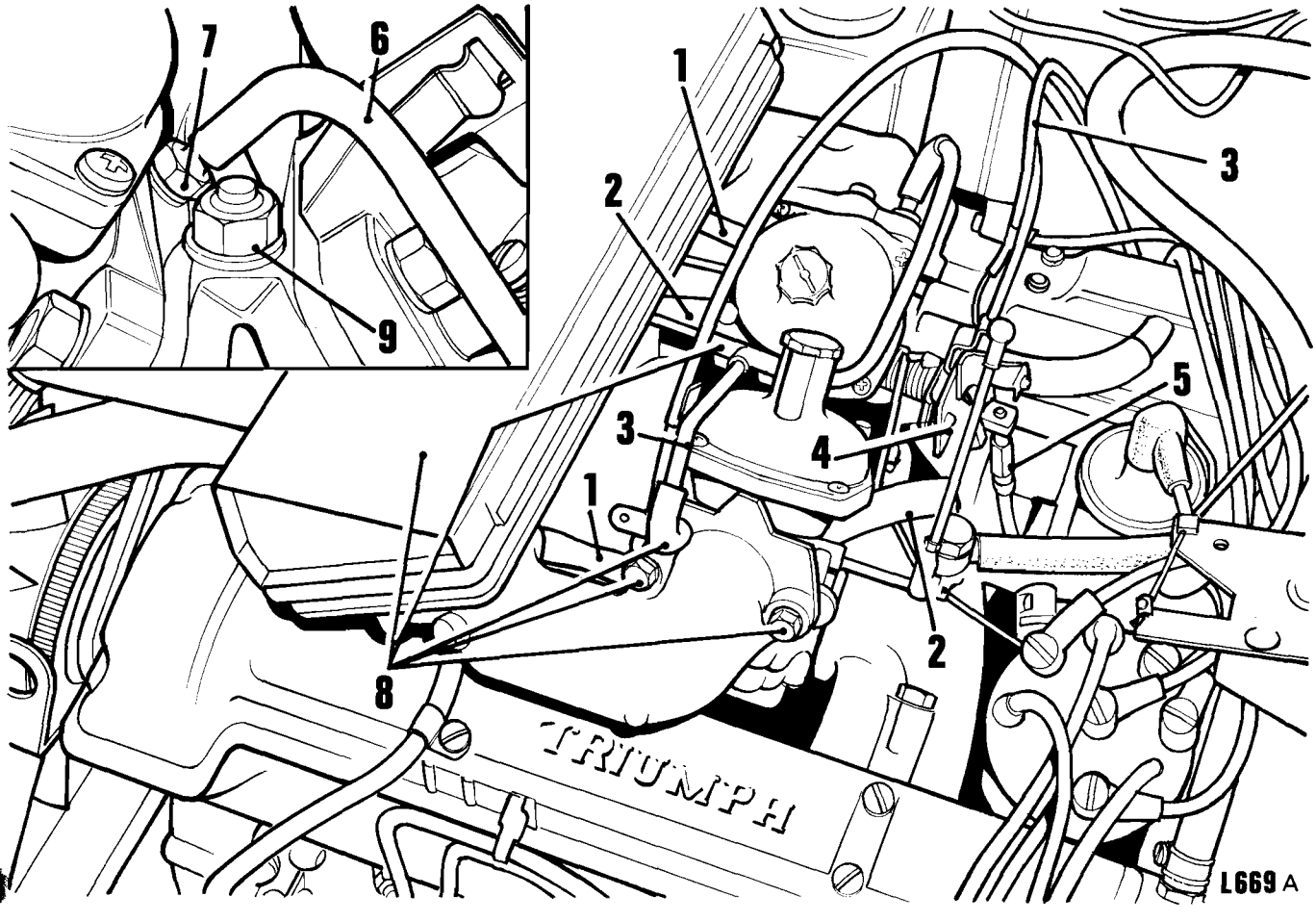
—Remove and refit **19.15.11**

Removing

1. Disconnect the fuel feed pipes from carburetter.
2. Disconnect the engine breather from each carburetter.
3. Disconnect the choke cables.
4. Disconnect the accelerator cable.
5. Disconnect kick-down cable (automatic transmission only).
6. Disconnect the vacuum pipe from R.H. carburetter.
7. Remove the vacuum advance union adaptor from R.H. carburetter.
8. Remove air cleaner complete with adaptor elbows (three bolts to each carburetter plus breather pipe).
9. Remove nut and washer retaining assembly to inlet manifold.
10. Lift off assembly complete.
11. Remove 'O' ring seal from inlet manifold.

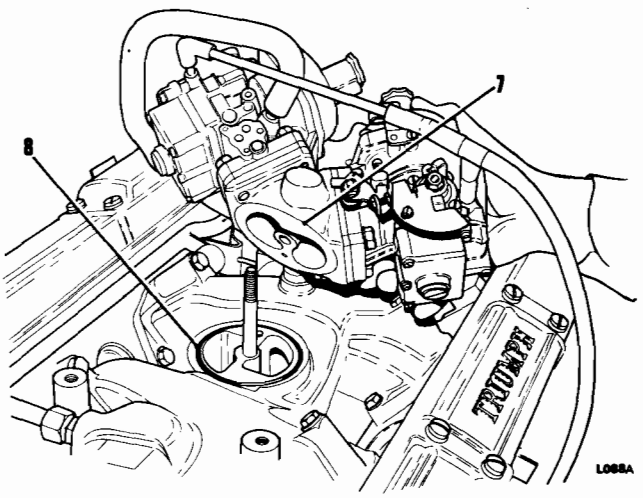
Refitting

12. Fit new 'O' ring to inlet manifold.
13. Reverse 1 to 10.



CARBURETTER PEDESTAL SEAL

—Remove and refit **19.15.14**

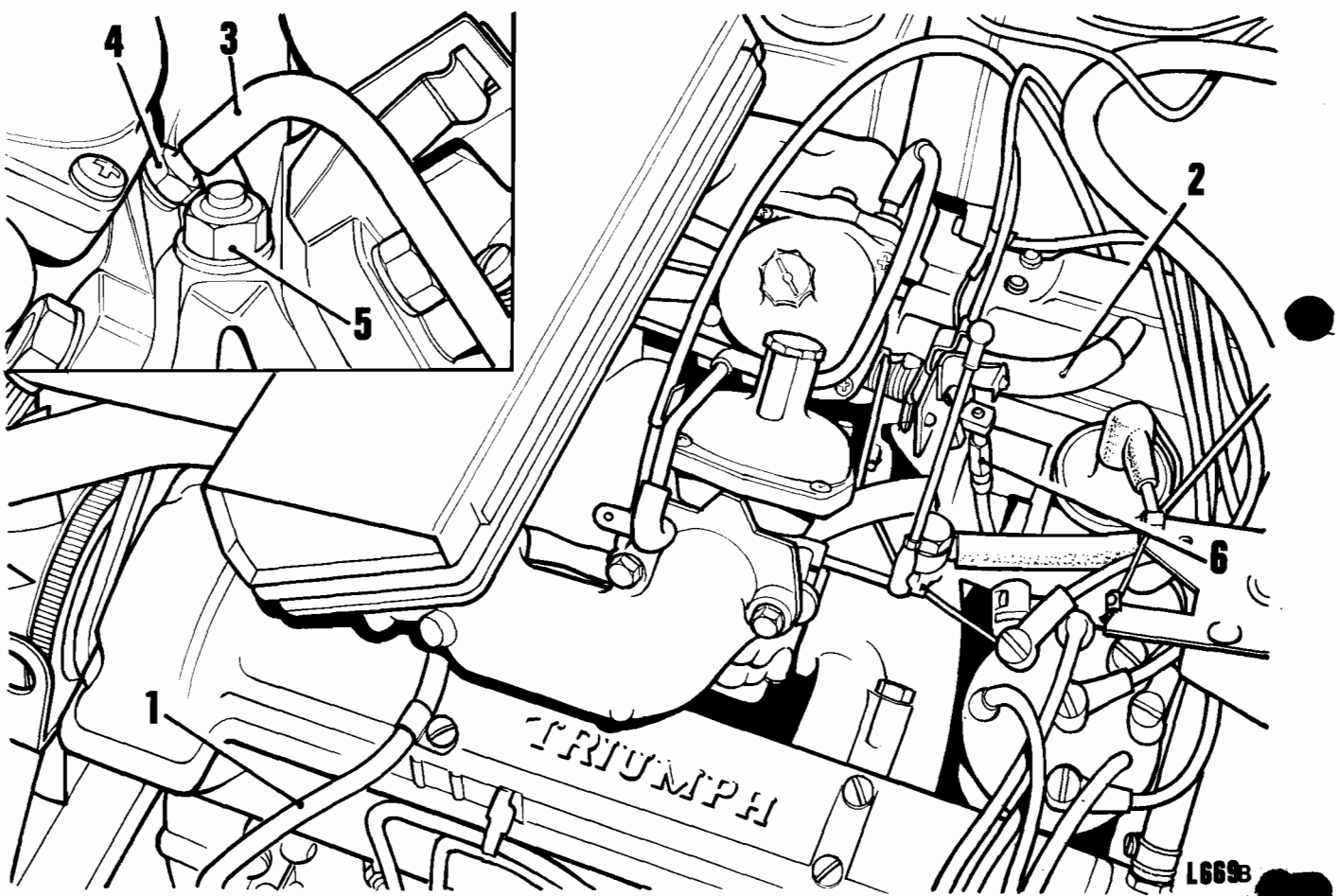


Removing

1. Disconnect fuel feed pipe from filter.
2. Disconnect engine breather pipe from R.H. cam cover.
3. Disconnect vacuum pipe from R.H. carburetter.
4. Remove vacuum adaptor union from R.H. carburetter.
5. Remove nut and washer retaining carburetter and pedestal assembly to inlet manifold.
6. Disconnect kick-down cable (automatic transmission only).
7. Lift complete assembly from centre stud.
8. Remove 'O' ring from inlet manifold.

Refitting

9. Clean groove for 'O' ring in inlet manifold.
10. Reverse 1 to 8.



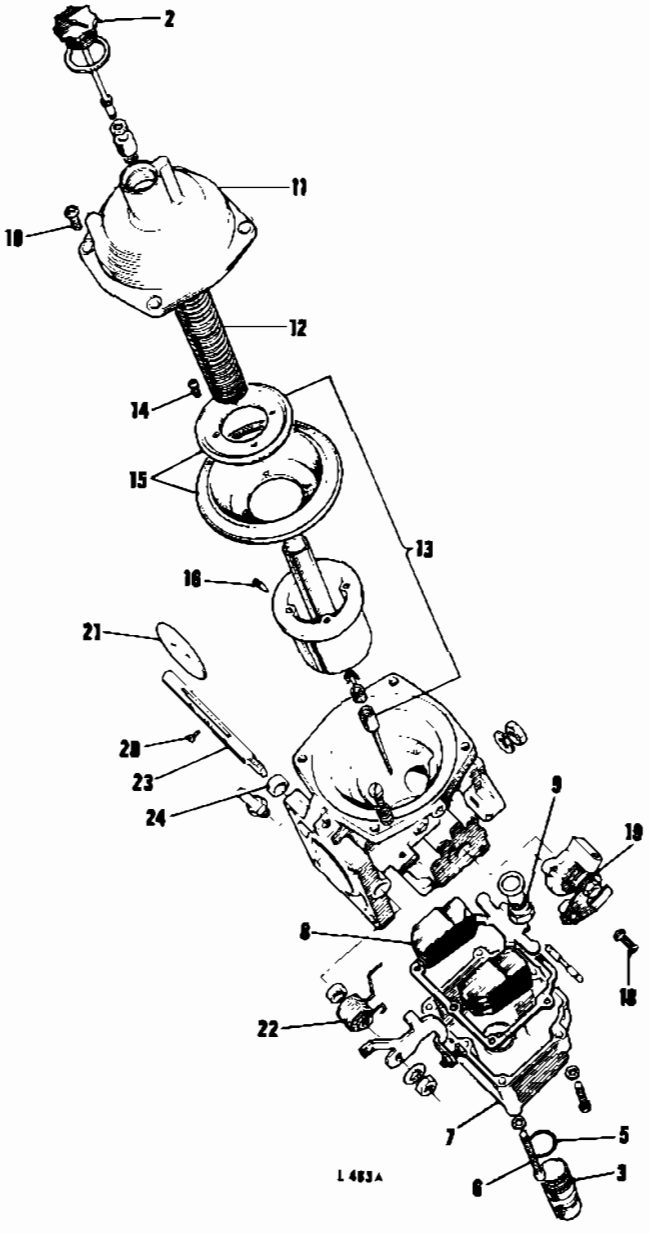
CARBURETTER—EACH

—Overhaul and adjust 19.15.17

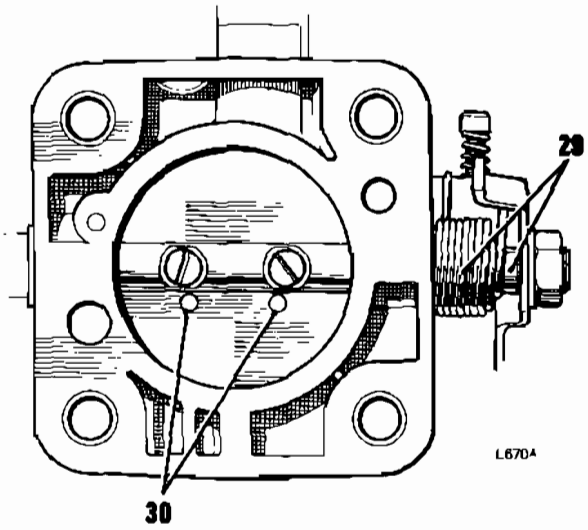
Carburetter—car set 19.15.18

Service tool S353

1. Remove carburetter. 19.15.09 L.H.; 19.15.10 R.H.
2. Remove damper.
3. Remove bottom plug.
4. Drain carburetter of oil and fuel.
5. Remove 'O' ring from plug.
6. Remove six screws securing float-chamber to body.
7. Remove float-chamber.
8. Remove float assembly by gently prising spindle from clip each end.
9. Remove needle valve.
10. Remove four screws securing top cover to body.
11. Remove top cover.
12. Remove spring.
13. Remove air valve assembly.
14. Remove four screws securing diaphragm and retaining ring to air valve assembly.
15. Remove diaphragm and retaining ring.
16. Slacken grubscrew in side of air valve.
17. Insert tool S353 in stem of air valve, turn anti-clockwise approximately two turns, withdraw needle and housing by pulling firmly and straight with the fingers.
18. Remove two screws securing starter box to body.
19. Remove starter box.
20. Remove two screws securing butterfly to spindle.
21. Turn spindle, remove butterfly.
22. Release spindle return spring.
23. Withdraw spindle and spring.
24. Remove spindle seals from body by hooking out with small screwdriver.
25. Wash all components in clean fuel, allow to drain dry or use clean compressed air. Place all components on a clean surface. Discard all seals and gaskets.
26. Examine the condition of all components for wear, paying special attention to needle and seat, air valve and diaphragm which should be renewed unless in exceptionally good condition.
27. Use clean compressed air to blow through all ports, needle valve and starter box.

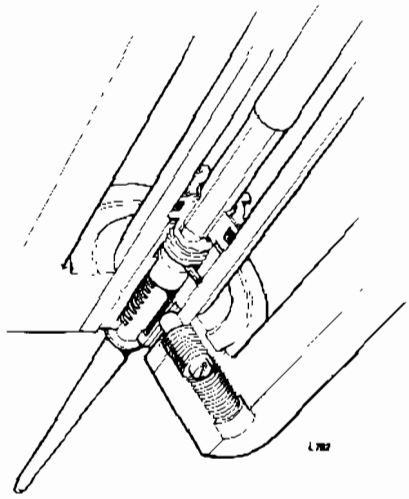


28. Fit spindle seals to body, tapping gently into position, with metal casing of seals flush with body of carburetter.
29. Insert spindle, loading and locating spindle return spring whilst so doing.
30. Insert butterfly with two protruding spots, outboard and below spindle, tighten screws.

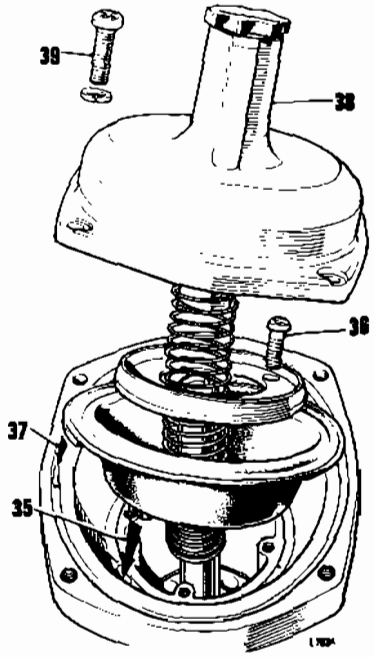


31. Fit starter box, tighten screws.
32. Insert needle housing assembly into the bottom of the air valve.
33. Fit tool S353, turning clockwise to engage threads of needle valve assembly with adjusting screw; continue turning until slot in needle housing is aligned with grub screw.
34. Tighten grub screw.

NOTE: The grub screw does not tighten on the needle housing but locates into the slot. This ensures that, during adjustment, the needle will remain in its operating position, i.e. biased, by a spring in the needle housing, towards the air cleaner side of the carburetter.



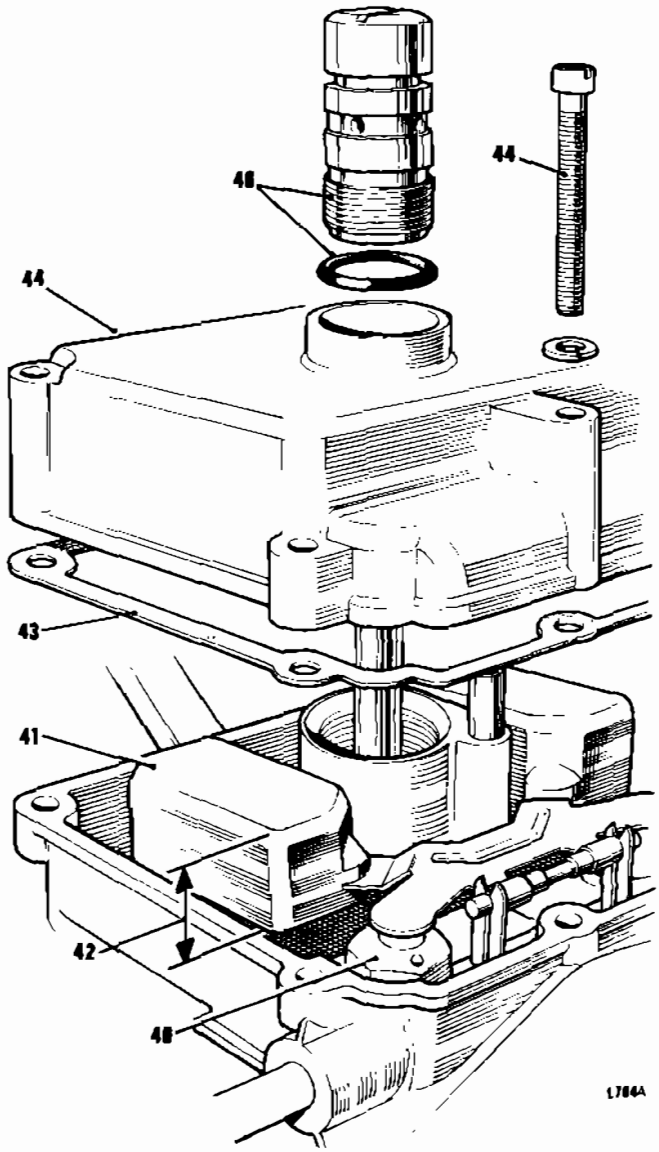
35. Fit diaphragm, locating inner tag into recess in air valve.
36. Fit diaphragm retaining ring; secure with four screws.
37. Fit air valve assembly, locating outer tag and rim of diaphragm in complementary recesses in carburetter body.
38. Fit carburetter top cover with bulge on housing neck towards air intake.
39. Fit and evenly tighten top cover screws.



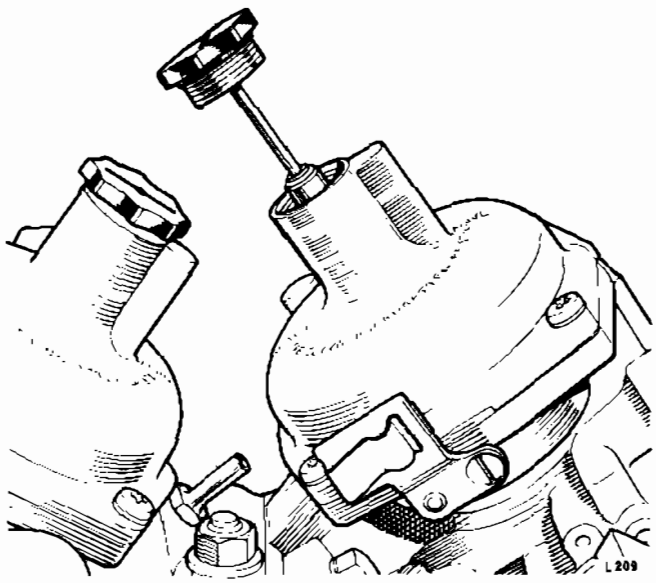
40. Fit needle valve and sealing washers; tighten.
41. Fit float assembly by levering pivot pin gently into position.
42. Check float height by measuring the distance between the carburetter gasket face and the highest point of the floats.

NOTE: The float heights must be equal and set to 16 to 17 mm (0·629 to 0·669 in). Adjust by bending tabs ensuring that tab sits on needle valve at right angles.

43. Fit float-chamber gasket.
44. Fit float-chamber, secure with six screws.
45. Fit 'O' ring to bottom plug.
46. Fit bottom plug.



47. Fit carburetter. 17.15.09 L.H.; 19.15.10 R.H.
48. Fill carburetter damper dashpot with seasonal grade of engine oil until, using the damper as a dipstick, the threaded plug is 6 mm (0·25 in) above the dashpot when resistance is felt.
49. Fit damper.
50. Tune carburetter. 19.15.01.



FLOAT-CHAMBER NEEDLE VALVE

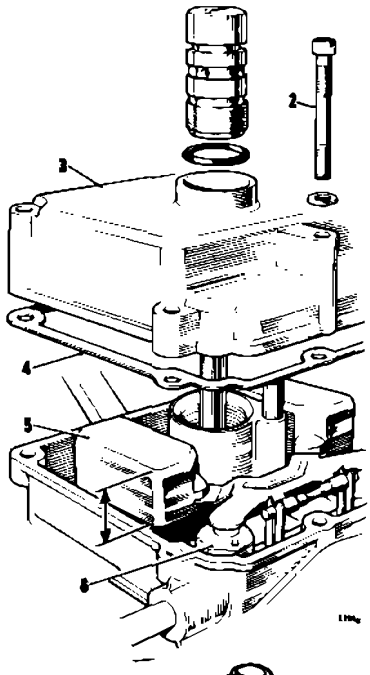
—Remove and refit **19.15.24**

Removing

1. Remove carburetter. 19.15.09 L.H.; 19.15.10 R.H.
2. Remove six screws securing float-chamber to body.
3. Remove float-chamber.
4. Remove gasket.
5. Remove float assembly by gently prising spindle from clip each end.
6. Remove needle valve.

Refitting

1. Reverse 1 to 6—renew gasket.



FLOAT-CHAMBER LEVELS

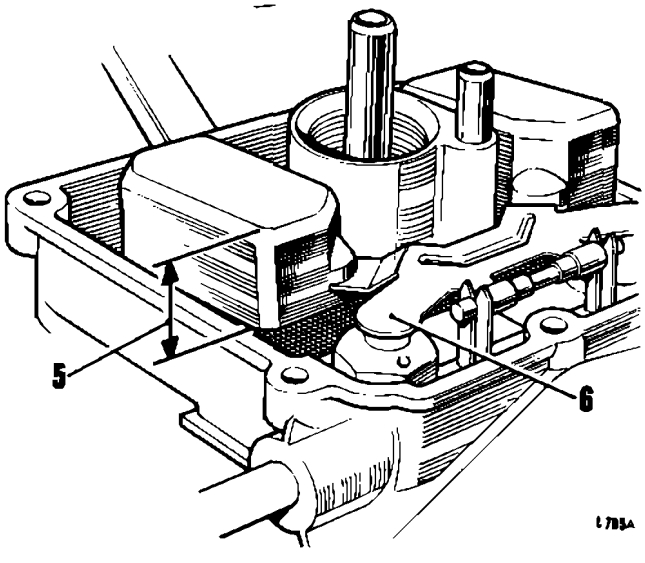
—Check and adjust **19.15.32**

1. Remove carburetters. 19.15.09 L.H.; 19.15.10 R.H.
2. Remove six screws securing float-chamber to body.
3. Remove float-chamber.
4. Remove gasket.
5. Check distance between gasket face on carburetter body to highest point of each float.

   NOTE: The height of each float must be equal and correct to datum setting which is 16 to 17 mm (0·629 to 0·669 in).**

To adjust

6. Bend tab over to obtain correct setting ensuring that the tab sits on needle valve at right angles.
7. Fit new gasket, reverse 1 to 3.



DIAPHRAGM

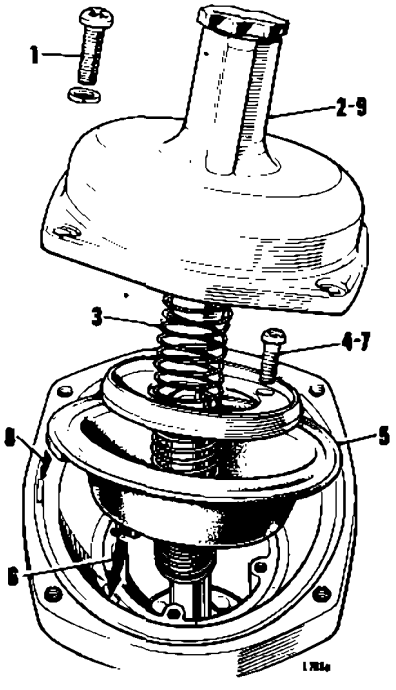
—Remove and refit **19.15.35**

Removing

1. Remove four screws securing top cover to carburetter body.
2. Lift off top cover.
3. Remove spring.
4. Remove diaphragm retaining plate (four screws).
5. Remove diaphragm.

Refitting

6. Fit diaphragm, locating inner tag in air valve recess.
7. Fit retaining plate, ensure correct diaphragm seating, tighten screws.
8. Locate diaphragm outer tag in recess in carburetter body, and rim bead in annular groove.
9. Fit top cover, evenly tighten securing screws.



THROTTLE PEDAL

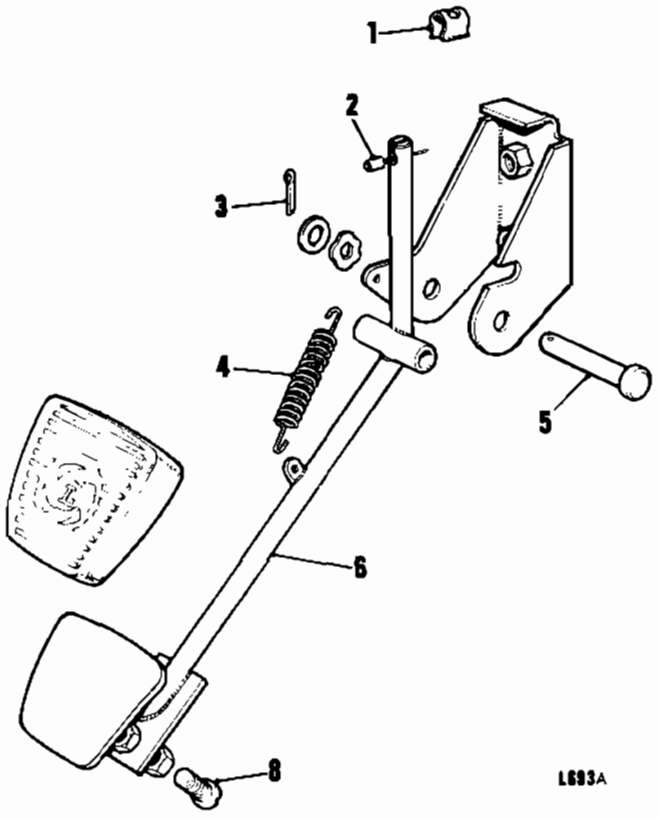
—Remove and refit **19.20.01**

Removing

1. Disconnect throttle cable clip from pedal.
2. Lift cable from pedal slot.
3. Remove split pin and washers securing pedal pivot pin.
4. Disconnect pedal return spring.
5. Withdraw pedal pivot pin.
6. Lift out pedal assembly.

Refitting

7. Reverse 1 to 6.
8. Press pedal hard to floor, ensure that throttles are fully open but that cables are not exerting pressure on linkage. Adjust pedal stop bolt if necessary to achieve this condition.



THROTTLE CABLE

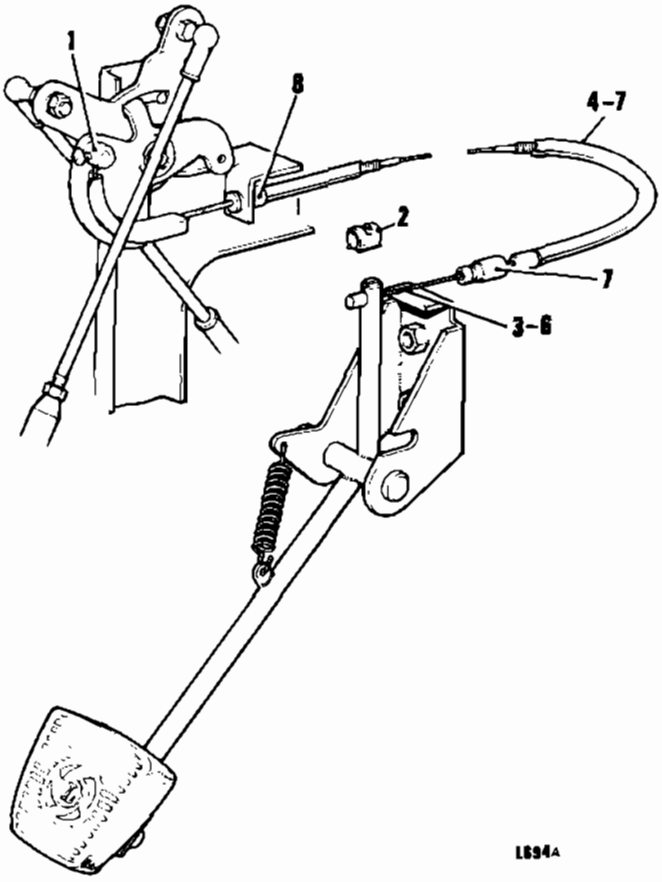
—Remove and refit **19.20.06**

Removing

1. Inside engine compartment—disconnect throttle cable from carburetter linkage.
2. Inside driving compartment—disconnect throttle cable clip from pedal lever.
3. Pull inner cable from outer.
4. Remove outer cable.

Refitting

5. Feed inner cable through bulkhead from driving compartment.
6. Connect cable and clip to pedal lever.
7. Feed outer cable over inner to abut against bulkhead.
8. Feed inner cable through linkage abutment.
9. Connect inner cable to linkage with a condition of no tightness, no play.

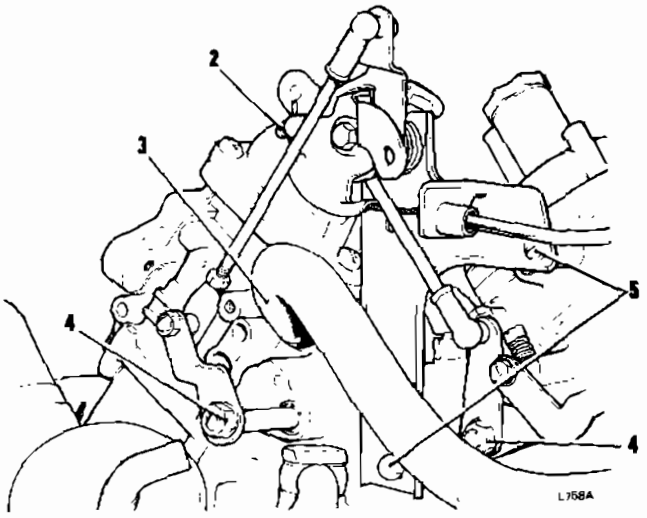


THROTTLE LINKAGE

—Remove and refit **19.20.07**

Removing

1. Open bonnet.
2. Disconnect accelerator cable.
3. Disconnect engine breather pipe from L.H. carburetter.
4. Disconnect throttle levers from throttle plate spindles.
5. Remove two hexagon-head and one slot-head screw securing linkage assembly to pedestal and R.H. carburetters.
6. Lift off linkage.



Refitting

7. Reverse 1 to 6.

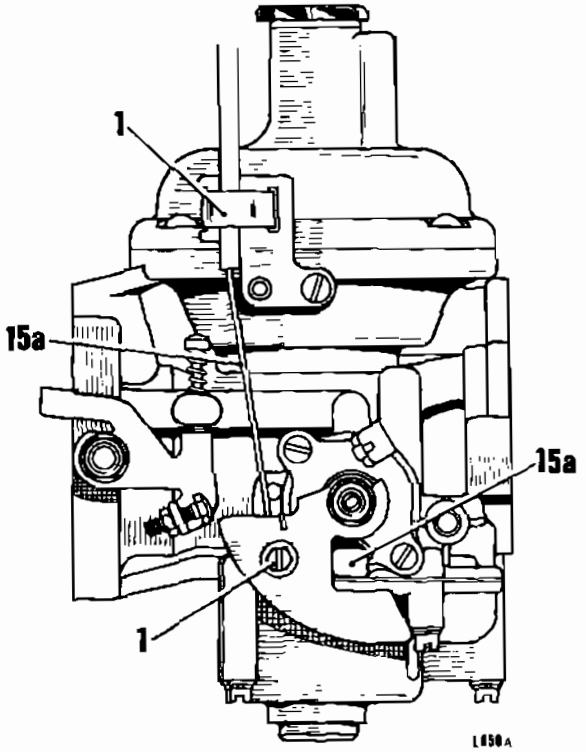
NOTE: See 19.15.02 for setting linkage.

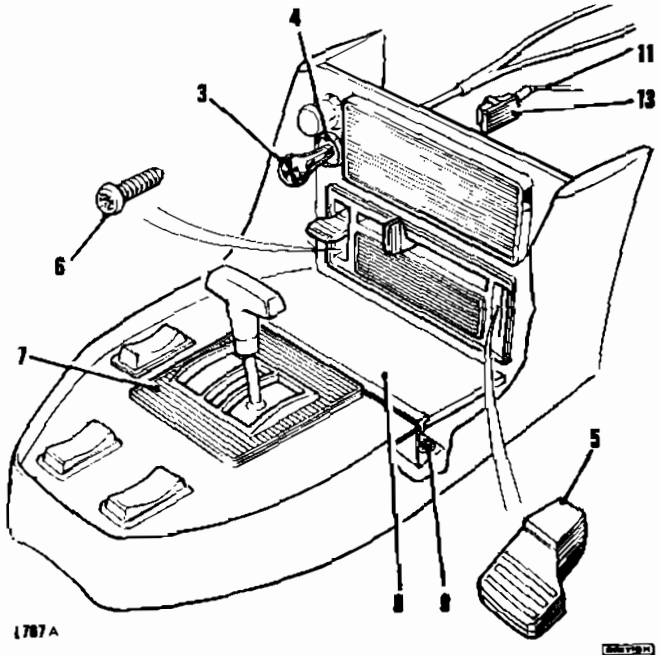
MIXTURE CONTROL (CHOKE) CABLE ASSEMBLY

—Remove and refit **19.20.13**

Removing

1. Disconnect choke cables from carburetters.
2. Disconnect battery.
3. Remove choke control knob (depress spring-loaded pin).
4. Remove bezel.
5. Remove three heater control knobs (pull off).
6. Remove four screws on heater control panel, lift out panel.
7. On automatic transmission models only: remove automatic transmission control lever gate panel (prise off, turn to slot over knob).
8. Remove front console panel (prise up from gear-lever end).
9. Remove two screws securing rear console panel.
10. Lift panel and pull console forward to gain access to choke cable.
11. Disconnect choke warning switch cable.
12. Pull choke cable through into driving compartment.
13. Remove choke warning switch.





Refitting

14. Reverse 1 to 13.
15. Check operation of choke, noting that:
    a. With knob pushed 'in' both choke levers are against their stops with no cable slackness.
    b. With knob pulled out both levers are turned equally.

FUEL LINE FILTER (BREATHER)

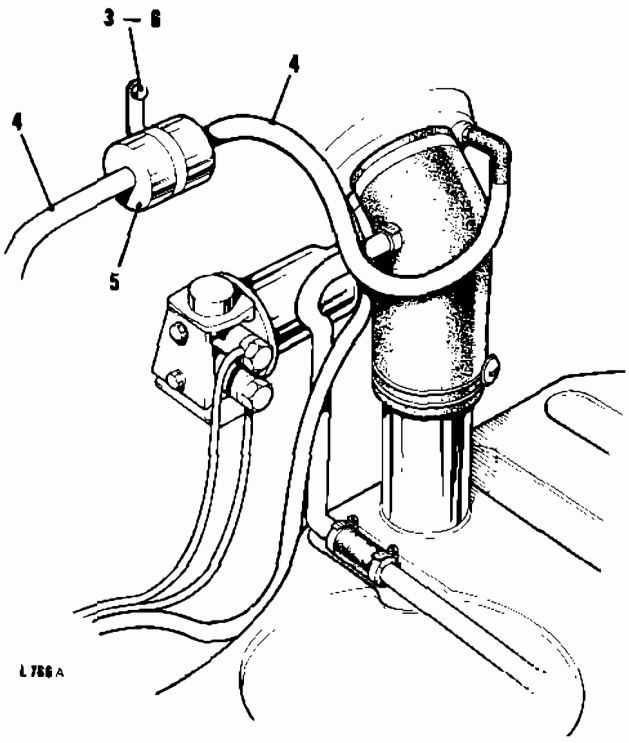
—Remove and refit **19.25.01**

Removing

1. Open luggage compartment.
2. Remove R.H. trim panel (three screws).
3. Slacken bolt securing filter clip.
4. Disconnect filter pipes.
5. Remove filter.

Refitting

6. Position filter with 'IN' side facing rear of vehicle.
7. Connect pipes.
8. Tighten filter clip bolt.
9. Fit R.H. trim panel.
10. Close boot.



FUEL MAIN FILTER

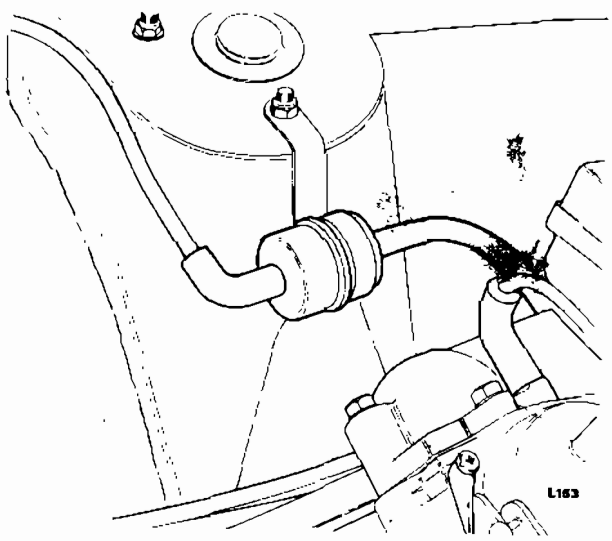
—Remove and refit **19.25.02**

Removing

1. Open bonnet.
2. Slacken bolt through filter retaining clip.
3. Disconnect fuel feed pipes.
4. Remove filter.

Refitting

5. Position filter with 'IN' side facing rear of vehicle.
6. Fit fuel feed pipes.
7. Tighten filter clip bolt.
8. Close bonnet.



FUEL PIPES 19.40.00

PETROL PIPE MAIN LINE—TANK END SECTION 19.40.02

PETROL PIPE MAIN LINE—CENTRE SECTION 19.40.03

PETROL PIPE MAIN LINE—ENGINE END SECTION 19.40.04

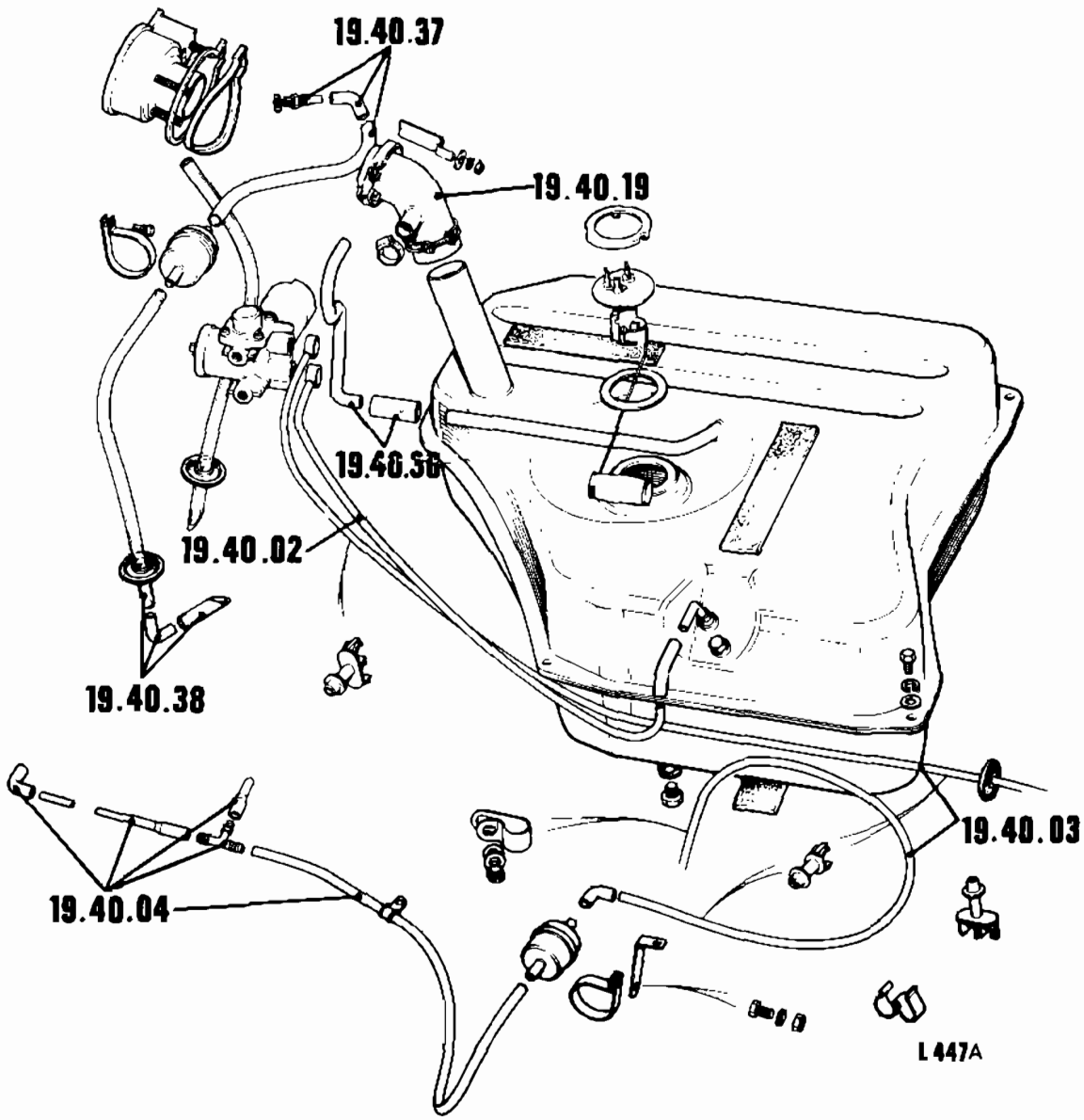
HOSE—FILLER TO TANK 19.40.19

PIPE—BREATHER—TANK TO FILLER 19.40.36

PIPE—BREATHER—FILLER TO FILTER 19.40.37

PIPE—BREATHER—FILTER TO ATMOSPHERE 19.40.38

NOTE: The pipes and hoses of the fuel system are illustrated with annotations showing operation numbers for removing and refitting. Detailed instructions on removing and refitting are omitted, as for the most part this is self-explanatory. Access to pipes to the tank, breather filter and fuel pump is gained by removing the luggage compartment floor and right-hand trim panel.



FUEL PUMP

Data and description

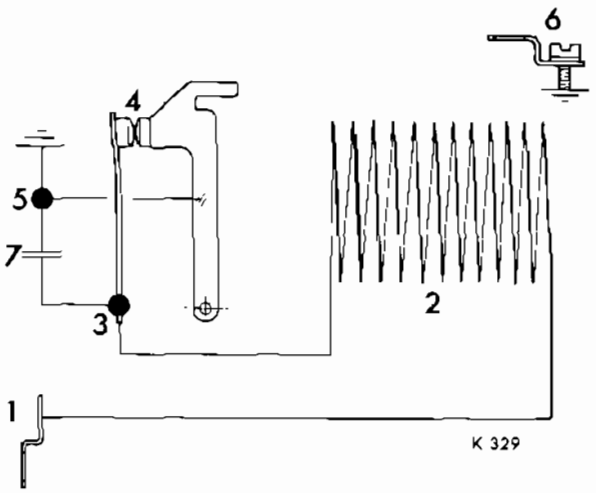
19.45.00

Manufacturer	S.U.
Type	AUF 306
Stanpart No.	150916
Maximum delivery	140 pints per hour at three feet above tank level (80 litres per hour at 1 metre above tank level)
Cut-off pressure	2·7 lb/in² (18·6 kN/m²)

A high pressure petrol pump is located on the right-hand side of the luggage boot behind the side trim panel. This situation in the vicinity of the fuel tank ensures freedom from vapour generation troubles even under the most severe conditions of high ambient temperature and high altitude operation.

The pump is attached to a flexible mounting unit employing the two tappings provided on the pump body. The rubber mountings make it essential to ensure that the harness earth connector is fitted.

The inlet connection is lowermost and feeds into an inlet air bottle provided by a chamber in the pump body. The fuel delivery is flow-smoothed by an air cushion separated from the outlet chamber by a plastic diaphragm. The outlet connection is uppermost.



1. Supply Lucar connector
2. Coil
3. Contact blade screw
4. Points
5. Earth screw
6. Earth Lucar connector
7. Condenser

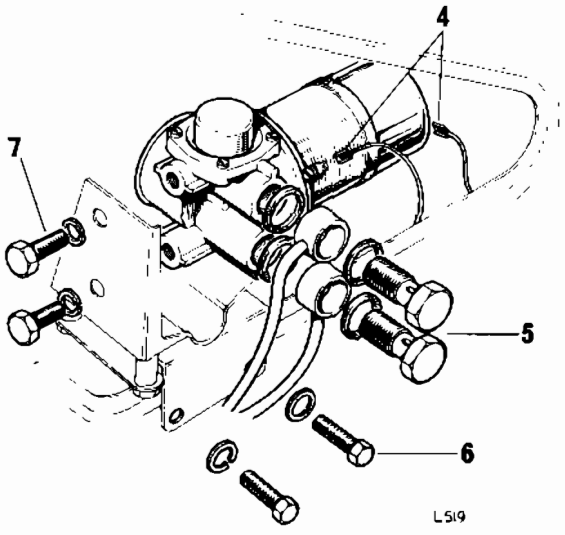
FUEL PUMP

Functional check **19.45.01**

1. Open bonnet and locate fuel pipe in-line filter.
2. Prepare for minor petrol spillage. Pull off inlet pipe to filter.
3. Connect suitable low pressure pressure gauge to pipe.
4. Switch on ignition. Fuel pump should operate to provide a line pressure of approximately 2·7 lb/in^2 (18·6 kN/m^2).

FUEL PUMP

—Remove and refit **19.45.08**



Removing

1. Open luggage boot lid. Remove floor carpet.
2. Remove L.H. floor panel and slide out R.H. floor panel.
3. Remove three screws and withdraw side trim panel.
4. Disconnect two Lucar connectors.
5. Prepare for minor petrol spillage. Remove two banjo bolts and four fibre washers.
6. Remove two bolts and washers. Withdraw fuel pump complete with flexible mounting unit.
7. Remove two bolts and washers and remove fuel pump.

Refitting

8. Reverse 1 to 7. Fit four new fibre washers when refitting banjo bolts.

FUEL PUMP

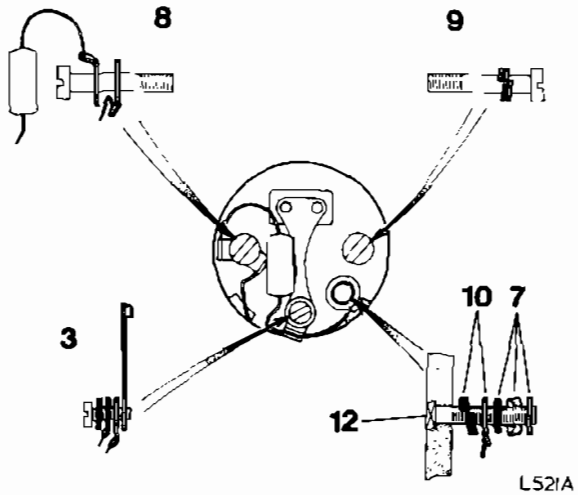
—Overhaul 19.45.15

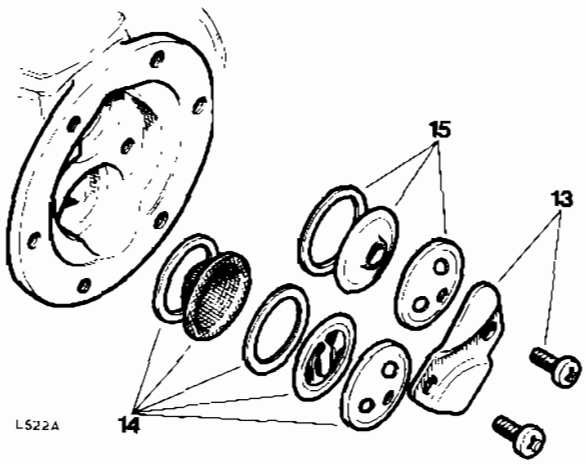
Dismantling

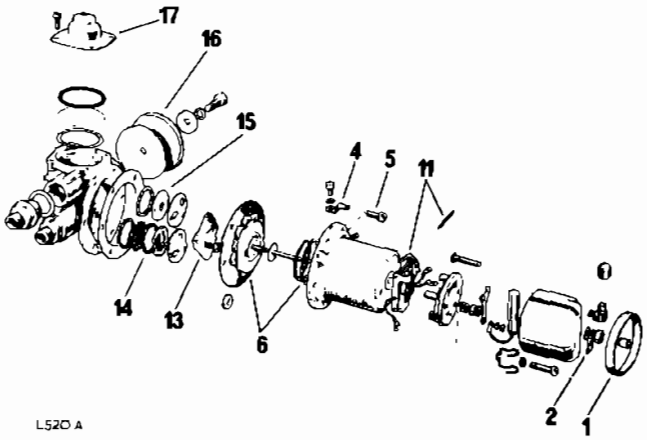
1. Unwind sealing tape and remove rubber sealing band.
2. Remove plastic insulating sleeve, nut, Lucar connector and shakeproof washer. Withdraw end cover.
3. Remove screw and washer. Lift wire tags and remove contact blade.
4. Remove screw, spring washer and Lucar earth connector.
5. Remove six screws and separate coil housing from pump body.
6. Unscrew diaphragm anti-clockwise until spindle releases from rocker mechanism. Withdraw assembly and remove spring.
7. Remove seal washer and nut. Using knife, detach lead washer.
8. Remove screw and condenser.
9. Remove screw and spring washer.
10. To detach pedestal from coil housing tip pedestal and remove tag and spring washer from stud.
11. Withdraw pin and remove rocker mechanism.
12. Withdraw stud.
13. On pump body remove two Pozidriv screws and lift out plate.
14. At inlet valve carefully lift out cap, inlet valve, washer, filter and washer.
15. At outlet valve carefully lift out cap, outlet valve and washer.
16. Remove bolt, spring washer and dished washer. Lift off cover and joint.

NOTE: Dismantling of the delivery flow smoothing device should only be undertaken if its operation is suspect and a pressure test can be performed after assembly. On this understanding proceed as follows:

17. Remove four screws. Lift off cover, rubber 'O' ring, diaphragm and washer.





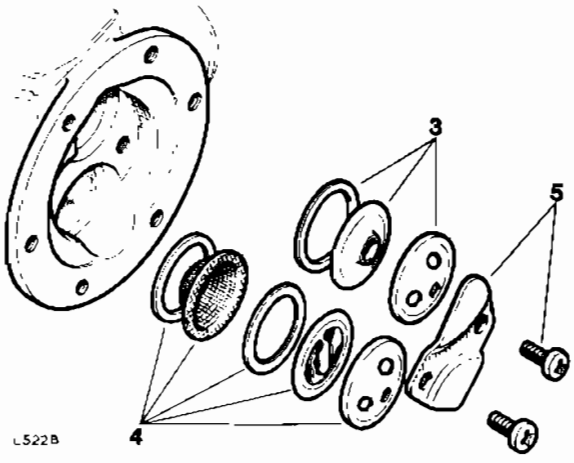


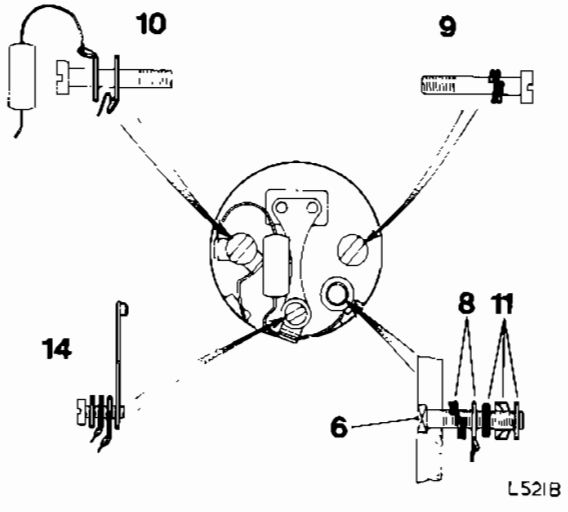
Reassembling

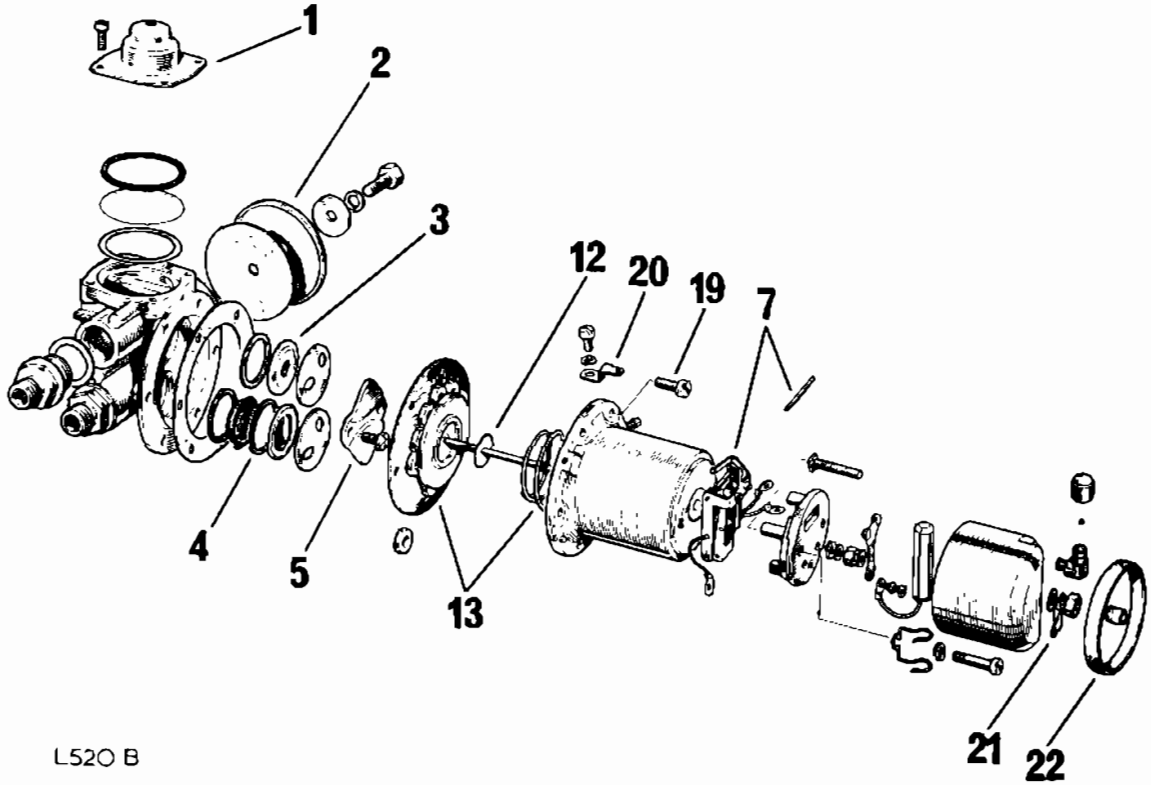
1. If necessary, assemble the delivery flow smoothing device as follows. Insert washer, diaphragm and rubber 'O' ring. Fit cover and secure with four screws.
2. Position joint and cover. Secure with dished washer, spring washer and bolt.
3. At outlet valve carefully insert washer, outlet valve with tongue towards pump body, and cap.
4. At inlet valve carefully insert washer, filter with concave surface towards coil housing, washer, inlet valve with tongue towards coil housing and cap.
5. Position plate and secure with two Pozidriv screws.
6. At contact pedestal insert stud.
7. Position rocker mechanism and insert pin.
8. Position spring washer and larger coil housing tag to stud. Position pedestal to coil housing.
9. Fit spring washer and screw.

NOTE: Pedestal may crack if screws are over-tightened.

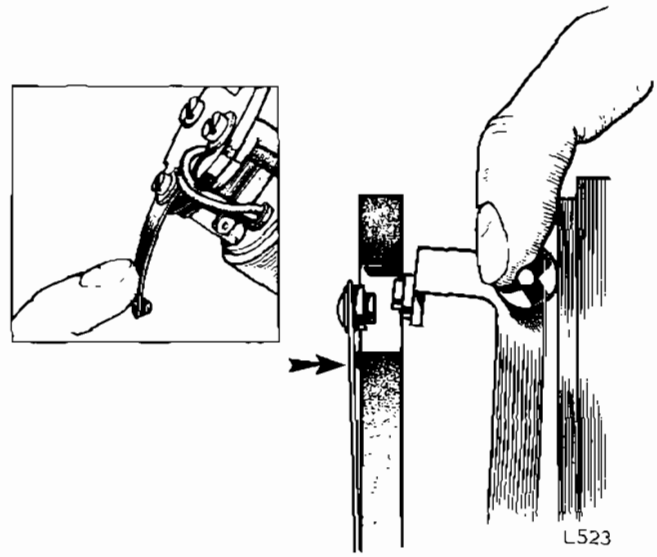
10. Assemble condenser tag and contact earth tag to screw. Fit to unit.
11. Fit new lead washer, nut with concave surface towards pedestal and seal washer.
12. Ensure impact washer is fitted to diaphragm assembly.
13. Fit spring with smaller diameter towards diaphragm. Engage diaphragm spindle to contact trunnion and screw in clockwise until rocker mechanism will not throw over.
14. Position contact blade and two tags. Secure with washer and screw.

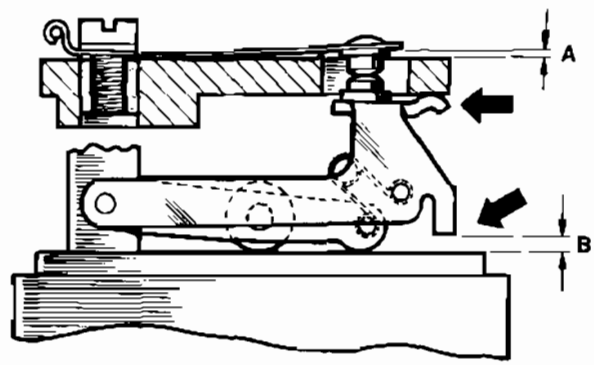




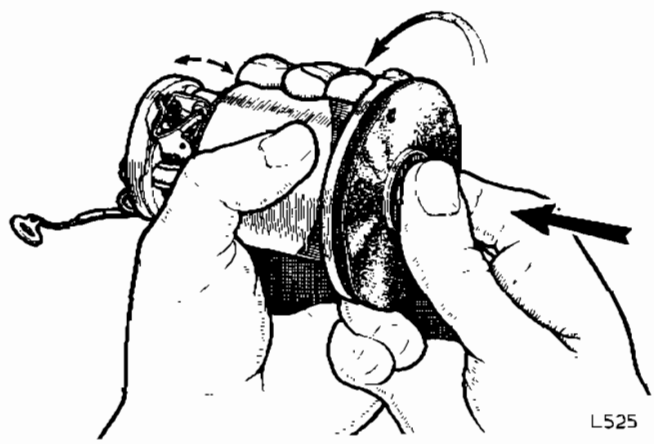


15. Adjust contact blade to achieve the following conditions:
    a. Contact blade points a little above rocker mechanism points when closed.
    b. When points make or break each pair wipes across the centre line of the other in a symmetrical manner.
    c. With rocker mechanism withdrawn towards coil housing, contact blade rests on pedestal ridge. Adjustment is by swinging blade clear of pedestal and bending so that blade will rest lightly on ridge. Over-bending will restrict rocker mechanism travel.
16. Check lift of contact blade tip dimension 'A' is 0·035±0·005 in (0·89±0·13 mm). Adjustment is by bending outer stop finger.
17. Check gap 'B' is 0·070±0·005 in (1·78±0·13 mm). Adjustment is by bending inner stop finger.
18. Hold unit horizontal. Press diaphragm to ensure rocker mechanism will not throw over. Press and release diaphragm while slowly unscrewing anti-clockwise until rocker mechanism just throws over. From this datum unscrew to align holes. Further unscrew to traverse four hole pitches to obtain correct setting.
19. Position gasket and coil housing to pump body. Secure with six screws.
20. Fit Lucar earth connector, spring washer and screw.
21. Fit end cover, shakeproof washer, Lucar connector, nut and plastic insulating sleeve.
22. Fit rubber sealing band and wrap with sealing tape.


L523

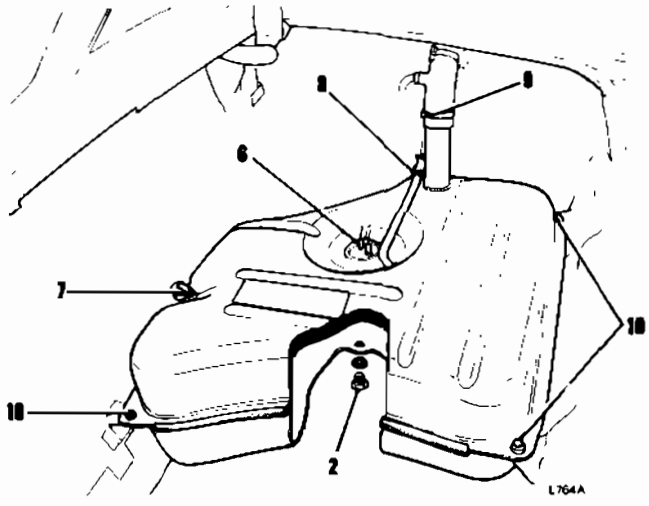


L524


L525

FUEL TANK

—Remove and refit **19.55.01**



WARNING: The fuel tank, even when drained of fuel, contains a highly explosive gas. A naked light or cigarette must not be allowed near the tank. When storing a used tank, plug the breather and feed holes to prevent dirt entering the tank and cover the filler hole with gauze cloth (stocking, etc.) which will prevent dirt entering but allow gas to escape. Store in cool place with good ventilation.

Removing

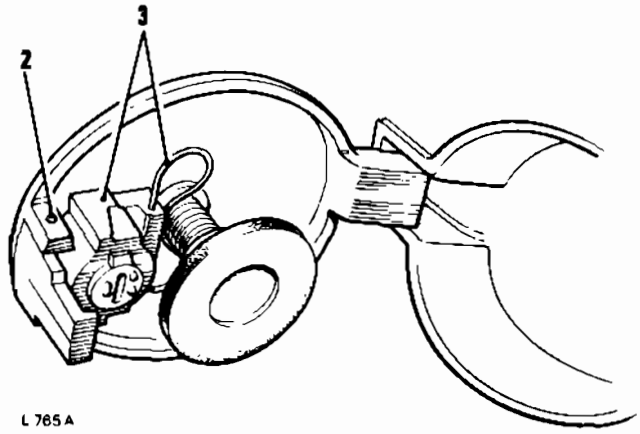
1. Lift luggage compartment lid; remove carpet.
2. Drain fuel.
3. Remove luggage compartment floor boards.
4. Remove spare wheel.
5. Remove R.H. side trim panel.
6. Disconnect three cables to fuel gauge transmitter.
7. Disconnect main fuel feed pipe at tank union.
8. Disconnect tank breather pipe at rubber hose.
9. Disconnect fuel filler pipe at lower clip.
10. Remove four bolts securing tank to mountings.
11. Move tank away to disengage filler pipe.
12. Remove tank.

Refitting

13.**Reverse 1 to 12—check that all joints are leak-free, and that tank edge finisher (when fitted) is correctly located.**

FUEL FILLER LOCK

—Remove and refit **19.55.09**



Removing

1. Open locking cap.
2. Knock out lock retaining pin.
3. Remove lock and spring.

Refitting

4.**Reverse 1 to 3, ensuring that the filler cap seal (when fitted) is in good condition.**

FUEL FILLER CAP

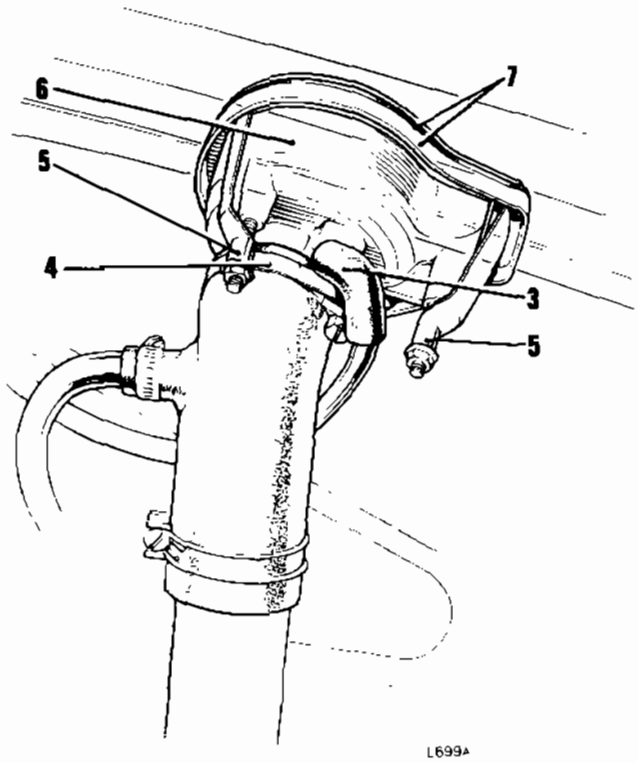
—Remove and refit **19.55.08**

Removing

1. Open luggage compartment.
2. Remove R.H. trim panel (three screws).
3. Disconnect breather pipes and union from filler cap assembly.
4. Slacken upper clip on filler tube.
5. Remove three filler cap retaining posts (secured by nuts).
6. Withdraw filler cap assembly.
7. Remove gaskets.

Refitting

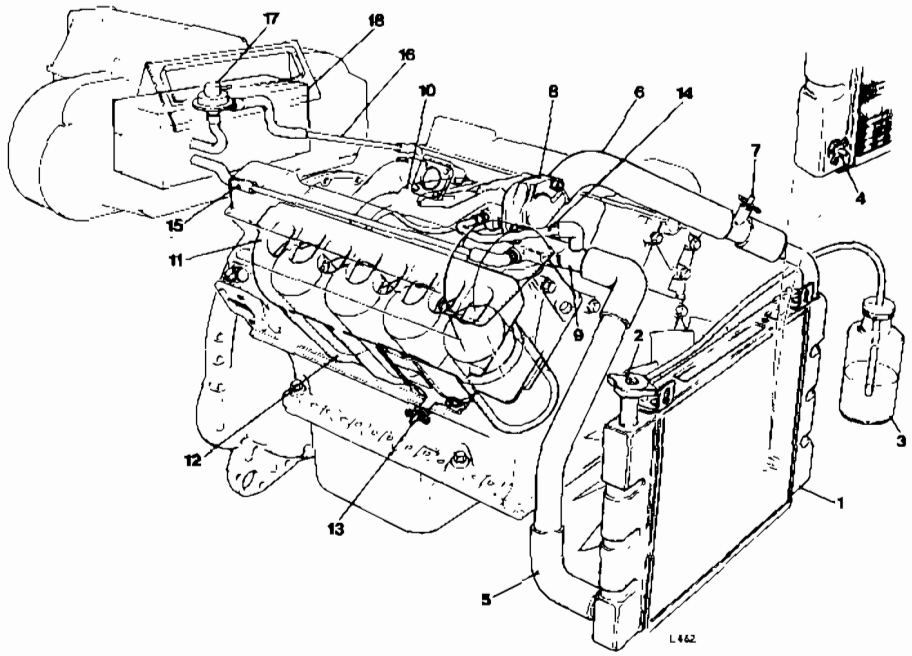
8. Reverse 1 to 7, ensuring that clips are tight and providing leak-tight joints.



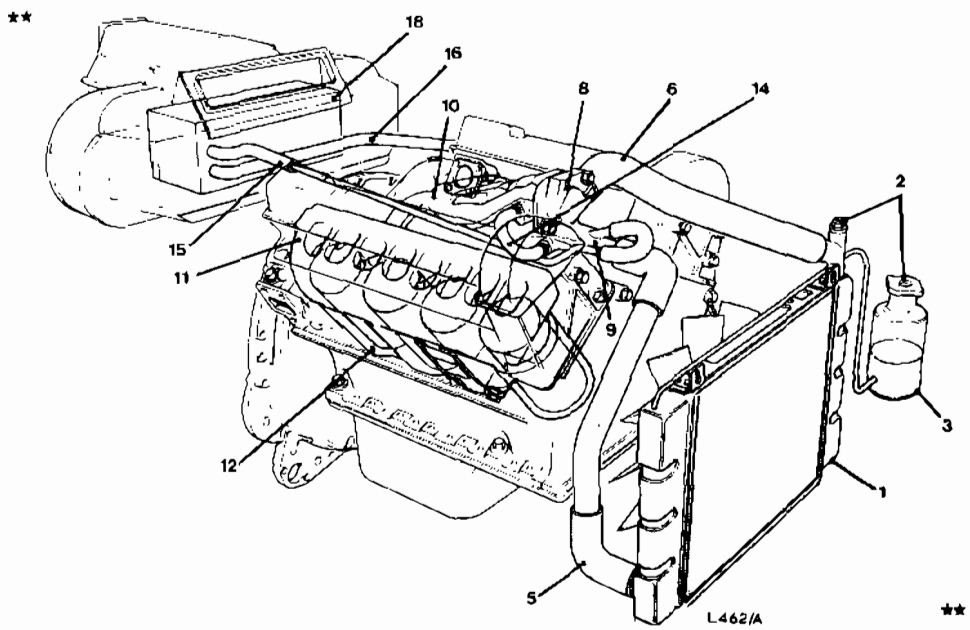
COOLING SYSTEM OPERATIONS

Coolant—drain and refill	26.10.01
Expansion tank—remove and refit	26.15.01
Fan	
—and Torquatrol unit—remove and refit	26.25.21*
—belts	26.25.00
—blades—remove and refit	26.25.06*
—cowl—remove and refit	26.25.11
Hose	
—by-pass—remove and refit	26.30.46*
—radiator to expansion tank—remove and refit	26.30.37
Plugs	
—cylinder block—one	26.35.13*
—cylinder block—rear	26.35.15
—cylinder block—set	26.35.14*
—cylinder head—one—L.H.	26.35.01*
—cylinder head—one—R.H.	26.35.05*
—cylinder head—set—L.H.	26.35.03*
—cylinder head—set—R.H.	26.35.07*
Radiator	
—assembly—remove and refit	26.40.01*
—bottom hose—remove and refit	26.30.07
—drain tap—remove and refit	26.40.10
—top hose—remove and refit	26.30.01
System—pressure test	26.10.07
Thermostat	
—housing—remove and refit	26.45.10*
—remove and refit	26.45.01*
—test	26.45.09*
Water pump	
—cover—remove and refit	26.50.03*
—overhaul	26.50.06*
—remove and refit	26.50.01*

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.



1. Radiator
2. **Cooling system filler cap/plug**
3. Expansion tank
4. **Radiator drain tap (when fitted)**
5. Bottom hose assembly
6. Top hose assembly
7. **Air vent tap (earlier models only)**
8. Thermostat
9. Water pump
10. Induction manifold flow
11. Cylinder head flow
12. Cylinder block flow
13. **Cylinder block drain tap (when fitted)**
14. By-pass hose
15. Heater inlet hose
16. Heater outlet hose
17. **Heater water valve (earlier models only)**
18. Heater unit



**Two types of cooling system layout used on the Stag model are illustrated on page 26.00.01.

The top illustration shows the layout of the cooling system on earlier models. This system operates at 13 lbf/in² (0·91 kgf/cm²) and is distinguishable by the pressure cap being positioned on top of the radiator.

The lower illustration shows the layout of the cooling system on models from Commission Number LD 10195 (or LE 10001—U.S.A. Market) onwards.

This system operates at 20 lbf/in² (1·41 kgf/cm²) and is distinguishable by the pressure cap being positioned on top of the expansion tank situated at the left side of the radiator.**

COOLANT

—Drain and refill 26.10.01

** **WARNING: A hot system under pressure will pump out steam or boiling water when the pressure is released. It is therefore vital to exercise extreme care when opening taps or releasing the pressure cap on warm engines.**

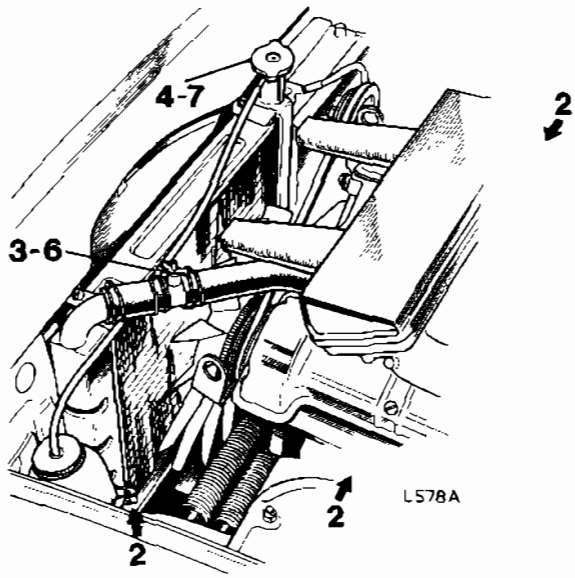
Earlier models:**

Drain

1. Open the coolant taps, two on the cylinder block, one on the radiator, one on the top hose.

Refill

2. Ensure that the two taps on the cylinder block and one on the radiator are closed.
3. Ensure that the tap on the top hose is open.
4. Remove the radiator filler cap.
5. Fill the system with coolant (see Section 09.12)
6. Close the tap on the top hose.
7. Fit the filler cap.



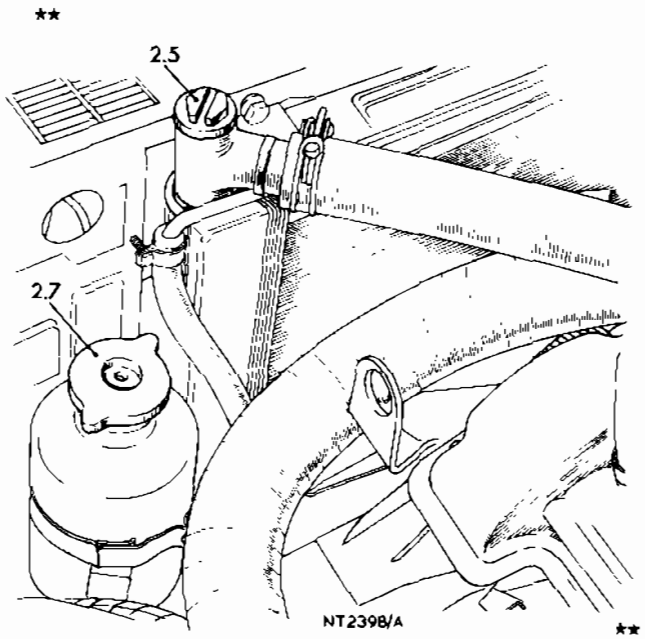
** **Later models:**

Drain

1. Disconnect the bottom radiator hose from the radiator.
2. Remove the radiator filler plug and the pressure bottle pressure cap.

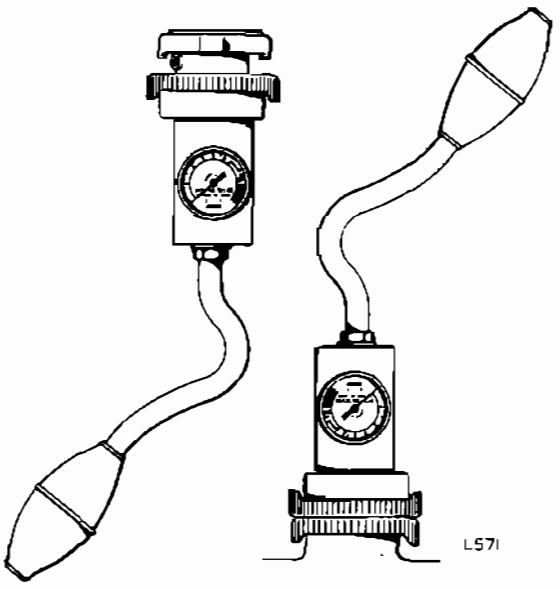
Refill

3. Refit the bottom radiator hose.
4. Fill the radiator, via the filler plug, with coolant (see Section 09.).
5. Fit the filler plug.
6. Half fill the pressure bottle with coolant.
7. Fit the pressure cap.
8. Run the engine until normal operating temperature is reached, stop the engine, allow the engine to cool and top up the expansion tank until half full.**



SYSTEM

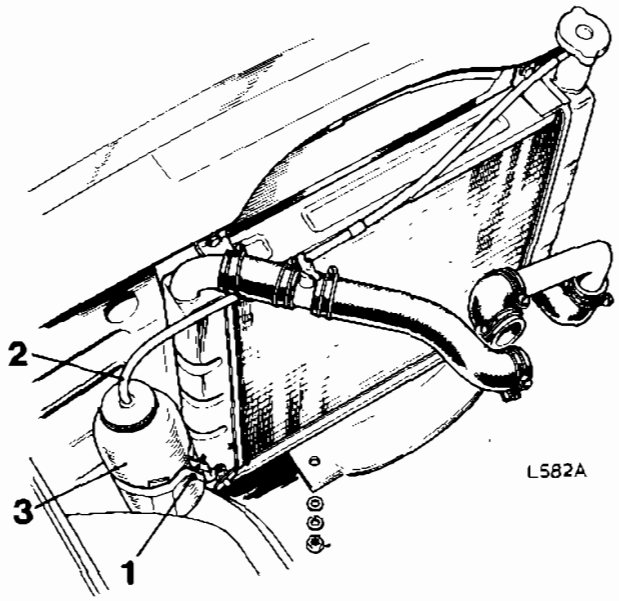
—Pressure test **26.10.07**



1. **Check/top up cooling system level.
2. Run the engine until warm.
3. Remove the cooling system pressure cap **very carefully** (see **WARNING**, 26.10.01).
4. Fit the pressure tester to the pressure cap filler neck.
5. Pump the pressure tester to the pressure shown on the pressure cap:
   13 lbf/in² (0·91 kgf/cm²) earlier models
   20 lbf/in² (1·41 kgf/cm²) later models.
6. Check that pressure is held for 10 seconds.
7. Check for leaks whilst the system is under pressure.
8. If the pressure drops and no leaks are visible, internal leaking is indicated.

EXPANSION TANK

—Remove and refit **26.15.01**



Removing

1. Slacken the support bracket bolt.
2. *a.* Earlier models: Pull out the pipe.
   b. Later models: Slacken the clip and disconnect the rubber pipe from the bottle to the radiator at the radiator connection.
   NOTE: To prevent coolant leakage, hold the end of the pipe at a level above coolant.
3. Remove the bottle—drain the coolant from the bottle.

Refitting

4. Reverse 1 to 3

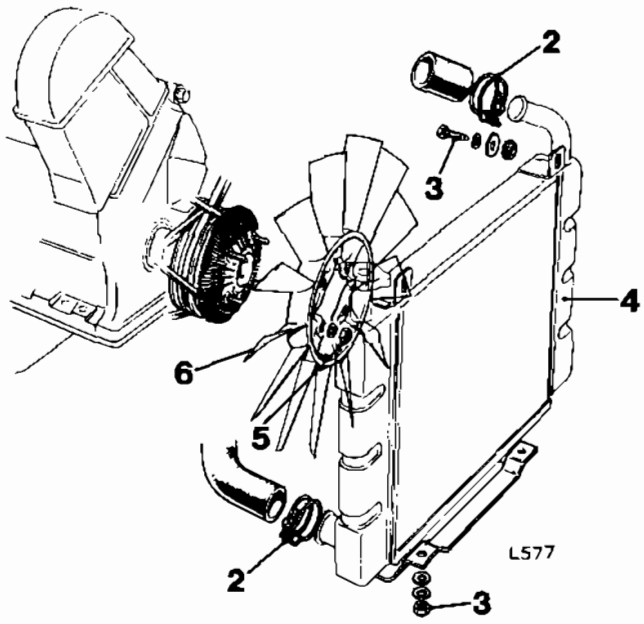
FAN BELTS **26.20.00**

NOTE: The drive belts are dealt with under their respective functions, i.e.

a. Alternator drive. 86.10.05.
b. Power steering pump drive. 57.20.01.
c. Air conditioning compressor drive. **

FAN BLADES

—Remove and refit **26.25.06**



Removing

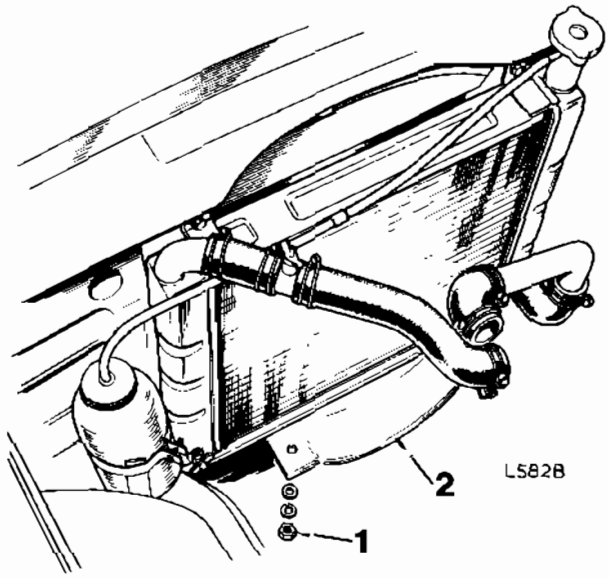
1. Drain coolant.
2. Disconnect radiator hoses at radiator connections.
3. Remove radiator fasteners (bolts top, nuts bottom).
   NOTE: Fan cowl will come away with bottom nuts.
4. Remove radiator.
5. Remove nuts securing fan to hub unit.
6. Remove fan.

Refitting

7. Reverse 1 to 6.

FAN COWL

—Remove and refit **26.25.11**



Removing

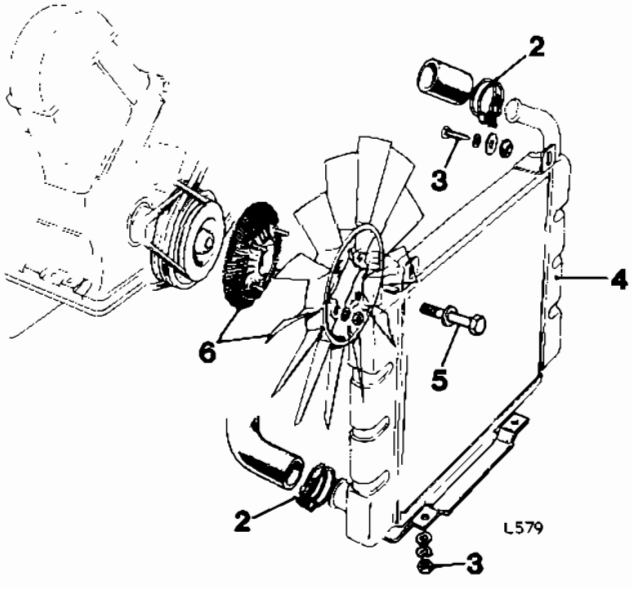
1. Remove two bottom radiator and cowl securing nuts.
2. Remove cowl.

Refitting

3. Position cowl; fit radiator securing nuts and washers.

FAN AND TORQUATROL UNIT

—Remove and refit **26.25.21**



Removing

1. Drain coolant.
2. Disconnect radiator hoses at radiator connections.
3. Remove radiator fasteners (bolts top, nuts bottom).
   NOTE: Fan cowl will come away with bottom nuts.
4. Remove radiator.
5. Remove centre bolt securing fan, Torquatrol unit and pulleys to crankshaft.
6. Withdraw fan and Torquatrol unit.
7. Separate fan from Torquatrol by removing securing nuts.

Refitting

8. Reverse 1 to 7.

RADIATOR TOP HOSE

—Remove and refit **26.30.01**

(Two hoses with interconnections and tap—early models only)

Removing

1. Drain part of coolant.
2. Slacken clips at outer ends of assembly.
3. Remove hose assembly.
4. Slacken clips and separate as required.

Refitting

5. Reverse 1 to 4—when fitted, tap must be at the top.

RADIATOR BOTTOM HOSE

—Remove and refit **26.30.07**

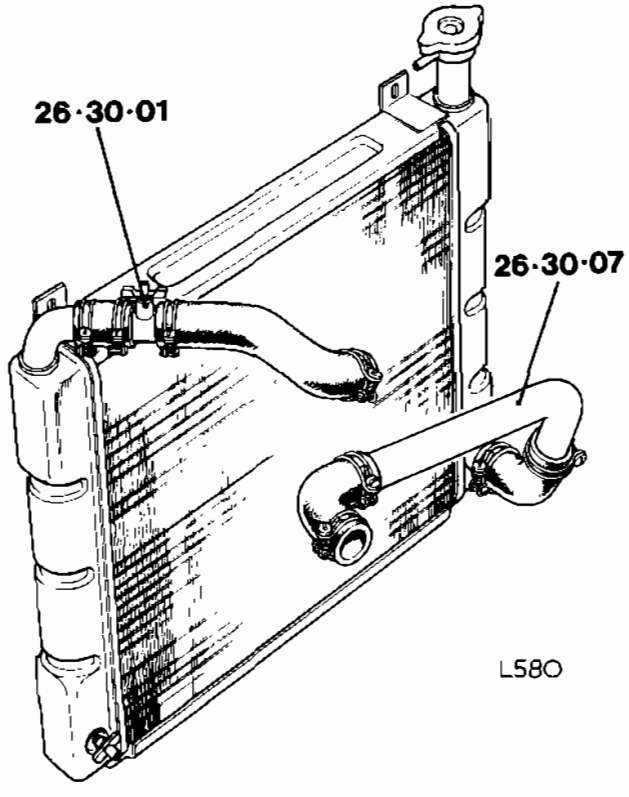
(Two hoses with interconnecting pipe)

Removing

1. **Drain coolant from radiator (early models only).
2. Slacken clips to radiator (bottom) and water pump. On models not fitted with radiator drain tap place a suitable receptacle below the radiator connection to collect the coolant.**
3. Remove hose assembly.
4. Slacken clips and separate as required.

Refitting

5. Reverse 1 to 4. Line up assembly before tightening clips.



HOSE—RADIATOR TO EXPANSION TANK

—Remove and refit **26.30.37**

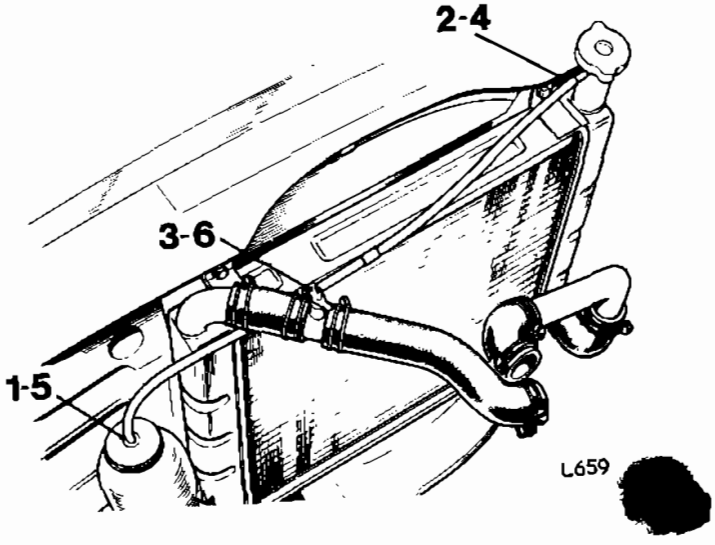
****Removing (early models)****

1. Pull pipe from bottle.
2. Cut pipe from radiator filler neck.
3. Withdraw pipe from retaining clip.

****Refitting (early models)****

4. Feed pipe onto filler neck connection.
5. Push pipe into bottle through grommet.
6. Clip pipe to radiator.

****NOTE:** On later models the hose is secured to a metal pipe from the radiator and the expansion tank by screw clips.**



HOSE—BY-PASS

—Remove and refit **26.30.46**

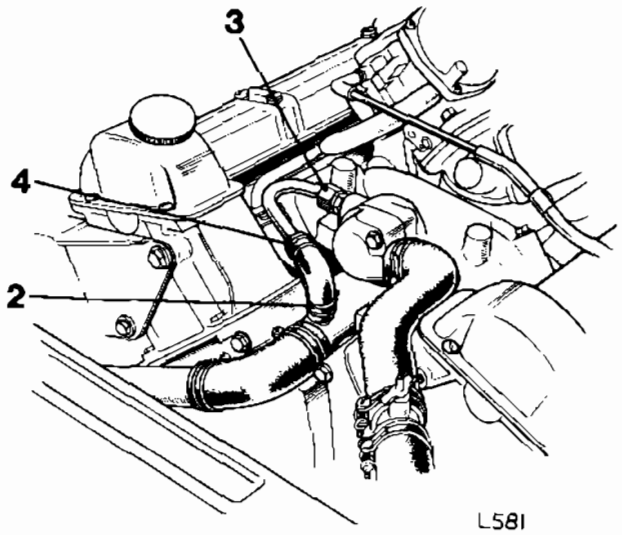
** (Hose and metal pipe with union, early models; hose only, later models)

Removing (early models)**

1. Drain part coolant.
2. Slacken clip—hose to water pump.
3. Unscrew union—pipe to thermostat housing.
4. Remove assembly.
5. Slacken clip and separate.

**** Refitting (early models)**

6. Reverse 1 to 5. Top up coolant.



Removing (later models)

1. Drain part coolant.
2. Slacken the two hose clips.
3. Remove the by-pass pipe.

Refitting (later models)

4. Reverse 1 to 3. Top up coolant.**

PLUGS 26.35.00

The following bucket-type core plugs are fitted. When leaking occurs gain access as outlined below, remove plug by piercing and prising out. Clean seating, coat the rim of plug with sealing compound and drift plug squarely into position.

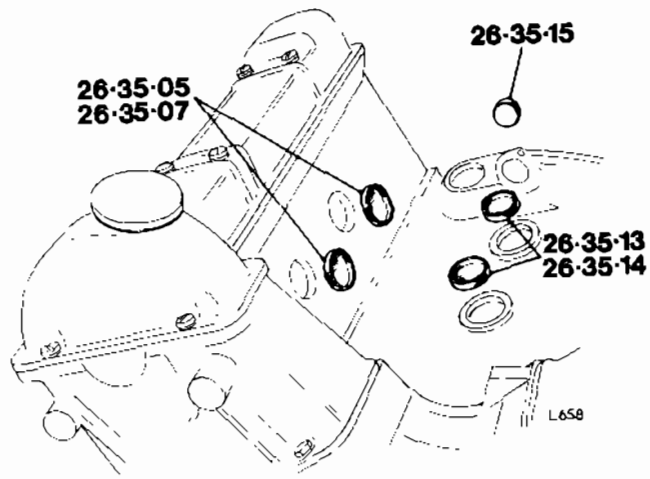
CYLINDER HEAD PLUG (ONE ONLY) —L.H. **26.35.01**

CYLINDER HEAD PLUGS (SET)—L.H. **26.35.03**

CYLINDER HEAD PLUG (ONE ONLY) —R.H. **26.35.05**

CYLINDER HEAD PLUG (SET)—R.H. **26.35.07**

1. To gain access to rear plugs (either head), remove carburetters. 19.15.11.
2. To gain access to front plugs (either head), remove carburetters (19.15.11) and move heater/water pipe.



CYLINDER BLOCK PLUG (ONE ONLY) **26.35.13**

CYLINDER BLOCK PLUG (SET) **26.35.14**

1. To gain access, remove induction manifold. 30.15.02.

CYLINDER BLOCK PLUG—REAR **26.35.15**

1. To gain access, remove flywheel cover. 12.53.01.

RADIATOR ASSEMBLY

—Remove and refit **26.40.01**

Removing

1. Drain coolant.
2. Disconnect radiator hoses at radiator connections.
3. Disconnect overflow hose to bottle.
4. Remove radiator fasteners (bolts top, nuts bottom).
   NOTE: Fan cowl will come away with bottom nuts.
5. Remove radiator.

Refitting

6. Reverse 1 to 5.

RADIATOR DRAIN TAP (when fitted)**

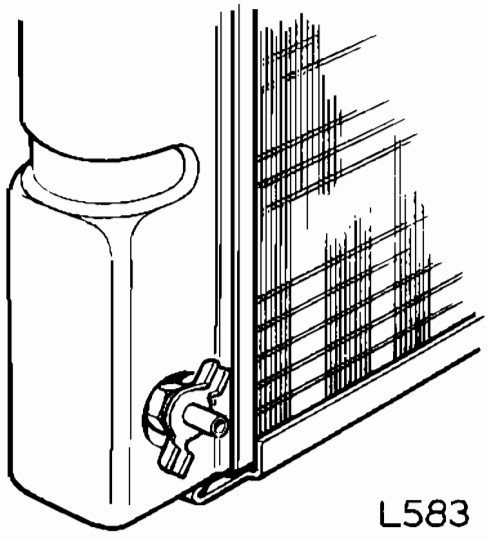
—Remove and refit **26.40.10**

Removing

1. Drain coolant.
2. Unscrew tap assembly from radiator.

Refitting

3. Fit and tighten tap assembly.
4. Fill cooling system.



THERMOSTAT

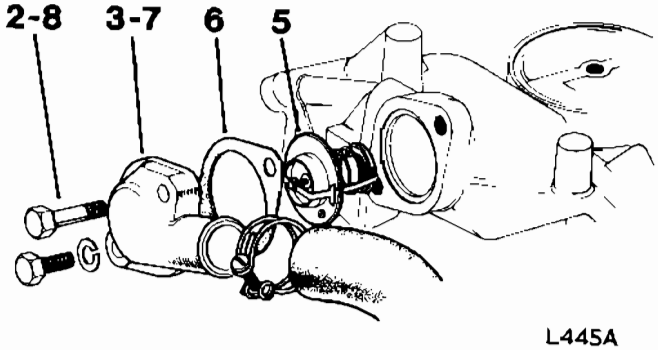
—Remove and refit **26.45.01**

Removing

1. Drain off part of the coolant.
2. **Remove the air cleaner top cover—see 19.10.01 (later models only).
3. Remove the two bolts securing the thermostat housing to the inlet manifold.
4. Pull the housing aside and withdraw the thermostat.

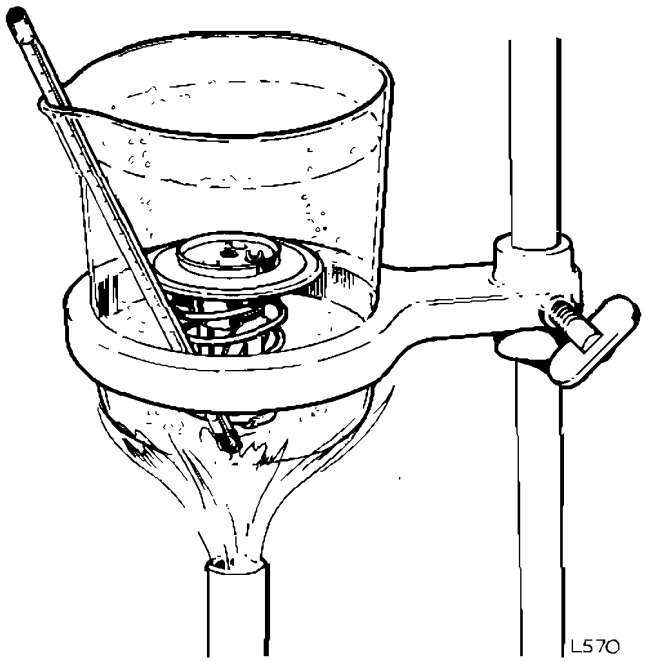
Refitting

5. Clean the gasket faces on the housing and manifold.
6. Insert the thermostat.
7. Fit a new gasket coated with jointing compound.
8. Position the housing.
9. Fit and tighten the securing bolts.
10. Refit the air cleaner top cover—see 19.10.01.
11. Top up the coolant.**



THERMOSTAT

—Test 26.45.09



1. Remove thermostat. 26.45.01.
2. Place the thermostat and a thermometer in water.
3. Heat the water and observe the temperature at which the thermostat valve starts to open and at which it is fully open.
4. Compare the temperature figures noted with those of the table below to ascertain the serviceability of the unit.

Temperature marked on thermostat	Commence to open	Fully open
74°C	71 to 76·5°C	85 to 88°C
82°C	79·5 to 83·5°C	93·5 to 96°C
88°C	85 to 89°C	99 to 102°C

5. Fit thermostat. 26.45.01.

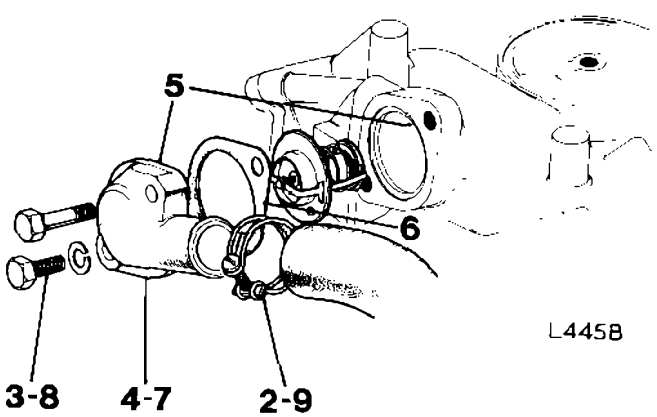
NOTE: For a simplified function test, put the thermostat in an electric kettle full of water. Boil water for at least a minute. The valve should be opened sufficiently for a pencil to be inserted between valve face and flange.

THERMOSTAT HOUSING

—Remove and refit 26.45.10

Removing

1. Drain off part of the coolant.
1*a*. Remove the air cleaner top cover—see 19.10.01 (later models only).
2. Slacken the top hose clip at the thermostat.
3. Remove the two bolts securing the housing to the inlet manifold.
4. Remove the housing.



Refitting

5. Clean the gasket faces.
6. Fit a new gasket coated with jointing compound.
7. Fit the housing.
8. Fit and tighten the housing bolts.
9. Connect the top hose and tighten the clip.
9*a*. Refit the air cleaner top cover—see 19.10.01.
10. Top up with coolant.

WATER PUMP

—Remove and refit **26.50.01**

Water pump cover 1 to 6, 9, 12 to 20 **26.50.03**

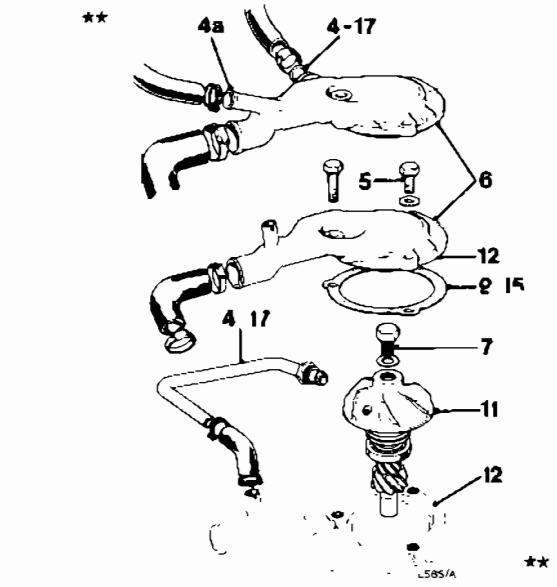
Service tools: S4235A/10, 4235A

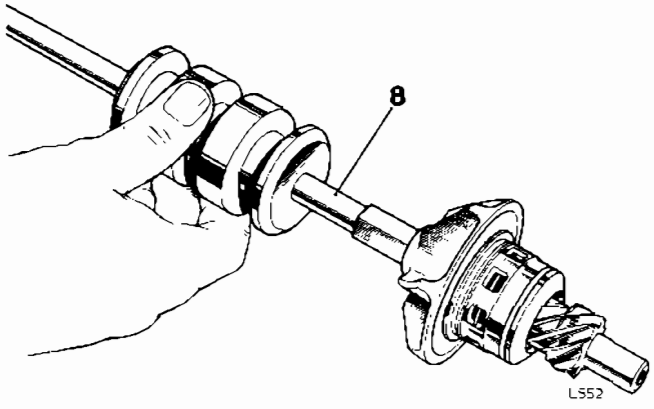
Removing

1. Drain coolant.
2. Remove induction manifold. 30.15.02.
3. **Disconnect bottom hose connection at water pump.
4. Disconnect by-pass hose at water pump.

4*a*. Later models only—Slacken clip and disconnect heater pipe.**

5. Remove three bolts securing water pump to cylinder block.
6. Lift off water pump cover.
7. Apply a spanner to the water pump centre bolt, turn clockwise (L.H. thread) until either:
   a. The water pump is released from the jackshaft gear and can be withdrawn, or
   b. The centre bolt is removed.
8. If 7*b*, fit S4235A-10 and 4235A (impact tool and adaptor) to water pump—remove pump.
9. Remove gasket(s).



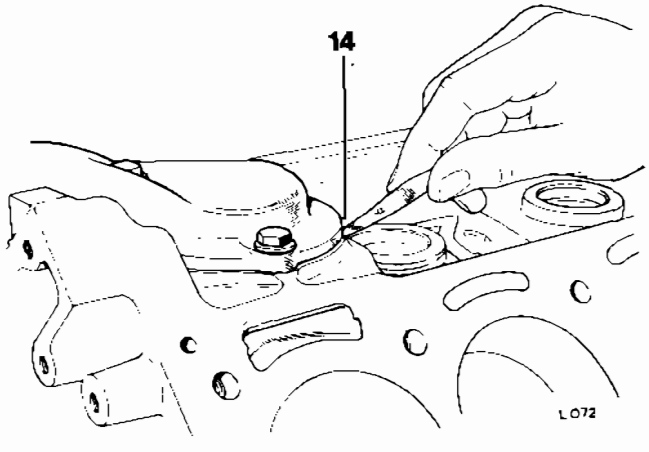


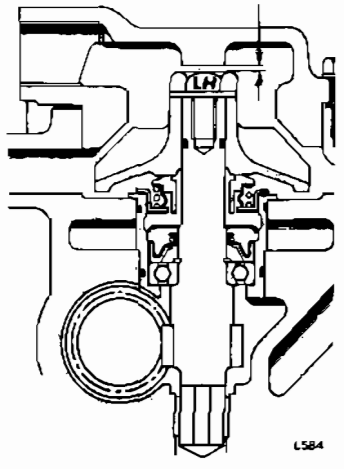
Refitting

10. Check spigot bush in cylinder block; renew if unserviceable.
11. Fit pump into cylinder block, ensuring that the gears of pump and jackshaft mesh correctly and that the pump is fully seated.
    NOTE: By turning the centre bolt anti-clockwise the pump will normally seat correctly.
    CAUTION: The use of impact to seat the pump will damage the graphite seal.
12. Ensure that the mating gasket faces are clean.
13. Fit housing without gaskets; fit the three securing bolts and tighten evenly—finger-tight.
14. Using feeler gauges, check that the gap between housing and cylinder block faces is equal all round gasket face. Adjust the three bolts to equalize the gap.
15. Select water pump gaskets to equal the gap noted in 14 plus 0·25 to 0·5 mm (0·010 to 0·025 in), which is the correct running clearance.
    NOTE: Water pump gaskets are available in the following thicknesses: 0·010, 0·020, 0·030 in.
16. Remove housing, fit selected gasket(s), fit housing, fit and tighten securing bolts.
17. Connect by-pass hose to water pump.

*17*a*. Later models only—Connect the heater pipe and tighten clip.**

18. Connect bottom hose to water pump.
19. Fit induction manifold. 30.15.02.
20. Refill cooling system.



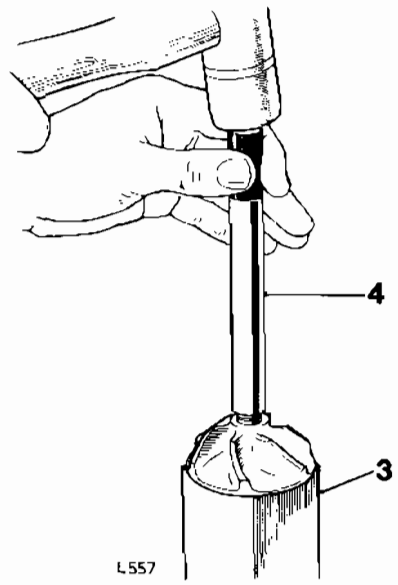


WATER PUMP

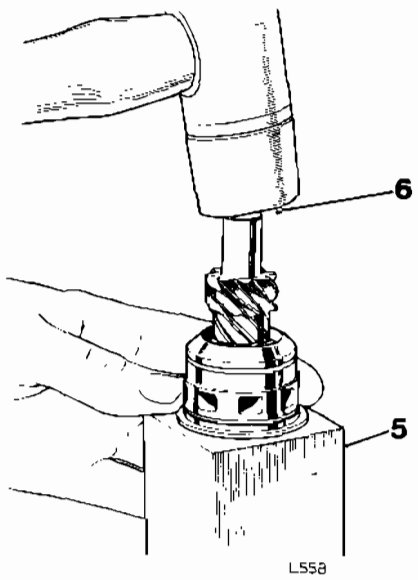
—Overhaul **26.50.06**

Service tools: S348

1. Remove water pump. 26.50.01.
2. Remove centre bolt (L.H.Thd.).
3. Insert assembly in large hole of 348/1.
4. Drift unit from impeller using 348/6.

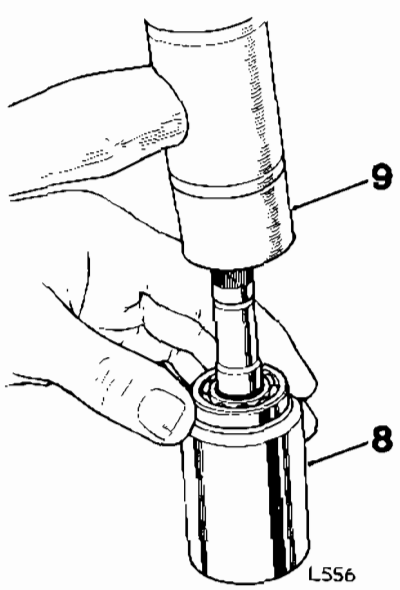


5. Insert assembly, gear uppermost into small hole of 348/1.
6. Drift unit from housing.
7. Remove from shaft (*a*) 'O' ring, (*b*) graphite seal, (*c*) water flinger, (*d*) oil seal, and (*e*) circlip, in that order.

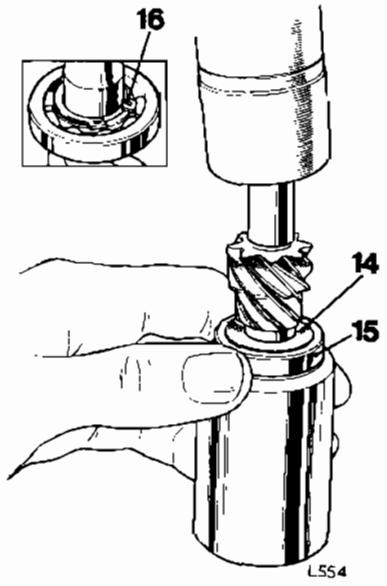


8. Insert shaft, gear down, into 348/7.
9. Drift shaft from bearing.
10. Remove oil flinger.
11. Remove 'O' rings from housing.
12. Discard 'O' rings, seals and bearing.

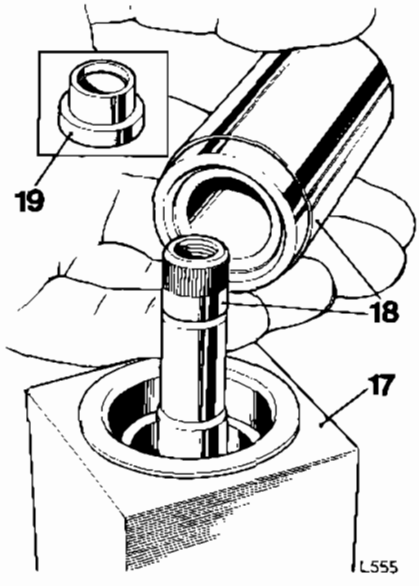
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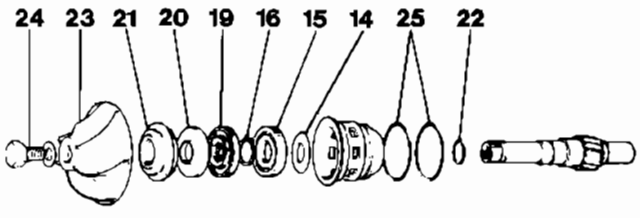
13. Examine shaft housing and impeller for serviceability, renew as necessary.
14. Fit oil flinger to shaft, dish to gear.
15. Fit bearing to shaft, using 348/7 and soft hammer.
16. Fit circlip, ensuring correct seating.



17. Fit water pump body in small hole of 348/1.
18. Fit shaft unit, gear down, into housing; drift gently into position using tool 348/2.
19. Fit oil seal, flat face to bearing.



20. Fit water flinger dish towards bearing, using tool 348/2.
    CAUTION: Water flinger will seat on shoulder of shaft; excessive force, applied when fitting, will cause distortion and fouling of water pump body.
21. Fit graphite seal, flat face down, over shaft and seating in housing.
22. Fit 'O' ring to shaft.
23. Press impeller onto shaft.
24. **Fit centre bolt and washer (L.H. Thd.). Torque: 10 to 14 lbf ft (1·4 to 1·9 kgf m).**
25. Fit two 'O' rings to water pump housing (smaller one nearest gear).
26. Refit water pump. 26.50.01.



MANIFOLD AND EXHAUST SYSTEM OPERATIONS

Down-pipe flange packing—remove and refit 30.10.26

Exhaust manifold—remove and refit—L.H. 30.15.10*
—R.H. 30.15.11

Exhaust system
—alignment check 30.10.30
—complete—remove and refit 30.10.01*
—front pipe—remove and refit—L.H. 30.10.09*
—R.H. 30.10.10
—rear intermediate pipe—remove and refit—L.H. 30.10.24
—R.H. 30.10.25
—silencer assembly—remove and refit—L.H. 30.10.15
—R.H. 30.10.16
—Set 30.10.14
—tail pipes—remove and refit 30.10.19

Induction manifold—remove and refit 30.15.02*

Mounting rubbers—remove and refit 30.20.01

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.

EXHAUST SYSTEM COMPLETE

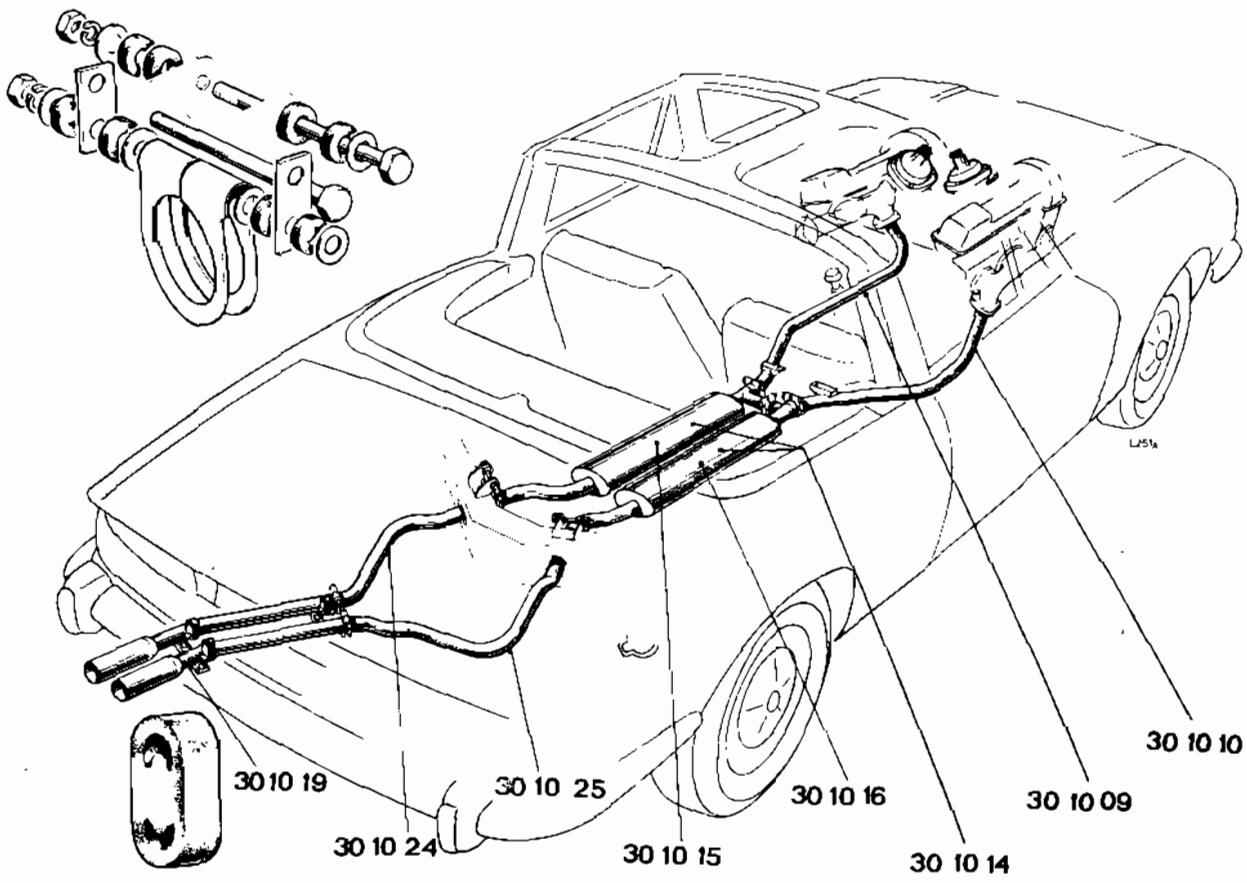
—Remove and refit	**30.10.01**
Front pipe—L.H., 1 to 5, and 15	**30.10.09**
Front pipe—R.H., 1, 6, and 15	**30.10.10**
Silencer assembly(s), 1 to 6, 7, 8, and 15	**30.10.14**
	L.H. 30.10.15
	R.H. 30.10.16
Tail pipes, 1, 10 to 12, and 15	**30.10.19**
Rear intermediate pipe—L.H. 1, 7, 10, 11, 12, 13, and 15	**30.10.24**
Rear intermediate pipe—R.H. 1, 7, 10, 11, 12, 14, and 15	**30.10.25**

Removing

1. Position vehicle on ramp or over inspection pit.
   On L.H. front pipe:
2. Remove three nuts securing front pipe to manifold flange.
3. Remove one nut and bolt securing pipe to gearbox mounting.
4. Slacken clamp bracket nut.
5. Remove L.H. front pipe.
6. Repeat 2 to 5 on R.H. front pipe.
7. Slacken two clamp nuts securing silencer pipes to rear intermediate pipes.
8. Remove silencers.
9. Slacken clamp nut and separate silencers.
10. Slacken clamp nuts securing tail pipes to rear intermediate pipes.
11. Unhook tail pipes from hanger rubbers (3).
12. Remove tail pipe unit.
13. Remove L.H. rear intermediate pipe.
14. Remove R.H. rear intermediate pipe.

Refitting

15. Reverse 1 to 14, noting:
    a. Mating pipes must be overlapped sufficient to ensure gas-proof joints.
    b. Clamp nuts must not be tightened until the system is complete and aligned so that no parts touch the chassis.
    c. Manifold to front pipe flange packings must not be damaged.



DOWN-PIPE FLANGE PACKING

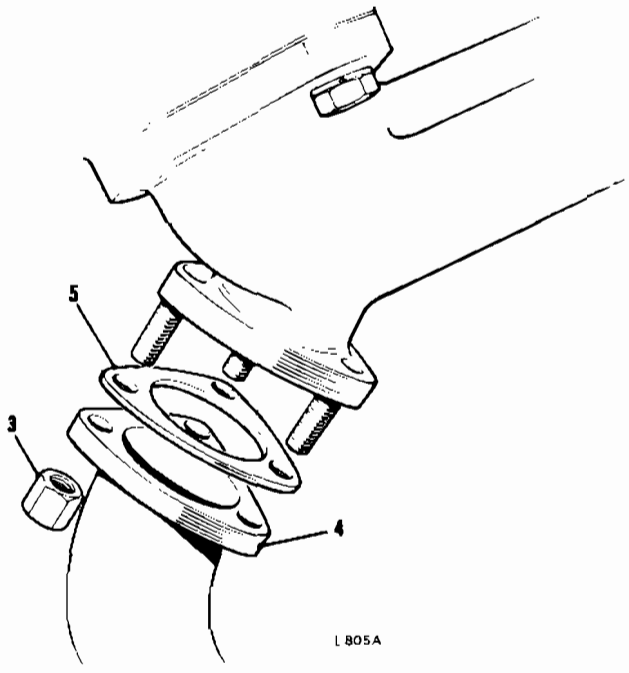
—Remove and refit **30.10.26**

Removing

1. Position vehicle on ramp or over inspection pit.
2. Slacken clamp nuts on front pipe to silencer clips.
3. Remove three nuts securing each front pipe to manifold flange.
4. Ease front pipe clear of manifold studs.
5. Remove gasket.

Refitting

6. Clean gasket faces on manifold and front pipe.
7. Reverse 1 to 5.



EXHAUST SYSTEM ALIGNMENT

—Check **30.10.30**

1. Check all pipes and silencers for chassis clearance. **NOTE:** Where it is necessary to re-align exhaust System, slacken all clamp nuts, re-align and tighten nuts.

EXHAUST MANIFOLD

—Remove and refit—L.H. **30.15.10**

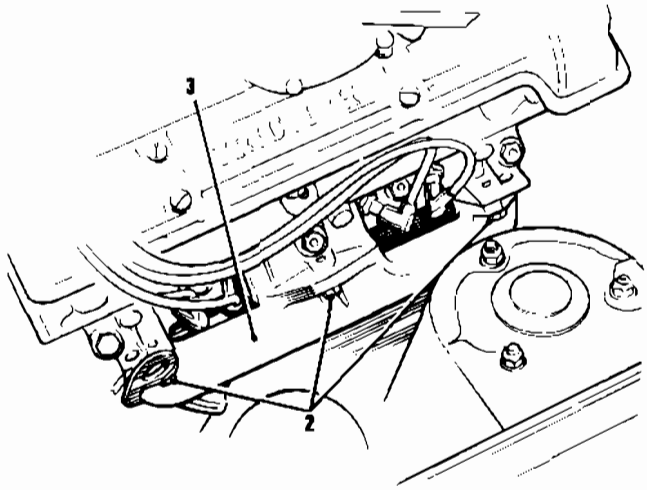
—R.H. **30.15.11**

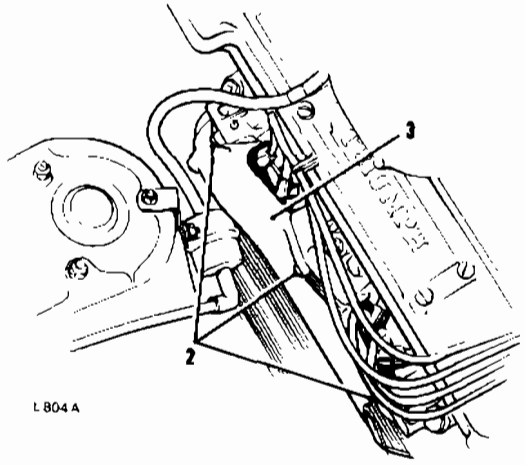
Removing

1. Remove three nuts securing the exhaust down-pipe to manifold flange.
2. Remove seven bolts securing manifold to cylinder head.
3. Remove exhaust manifold.

Refitting

4. Reverse 1 to 3, noting:
   - *a.* On L.H. manifold short bolt is fitted to front lower flange.
   - *b.* No gaskets are fitted between manifold and head.
   - *c.* Lifting eyes are fitted to two rear bolts.
   - ***d.* Tighten four outer bolts to 16 to 22 lbf ft (2·2 to 3·0 kgf m).
   - *e.* Tighten three inner bolts to 26 to 34 lbf ft (3·6 to 4·7 kgf m).**
   - *f.* Manifold to down-pipe gasket must be undamaged.





INDUCTION MANIFOLD

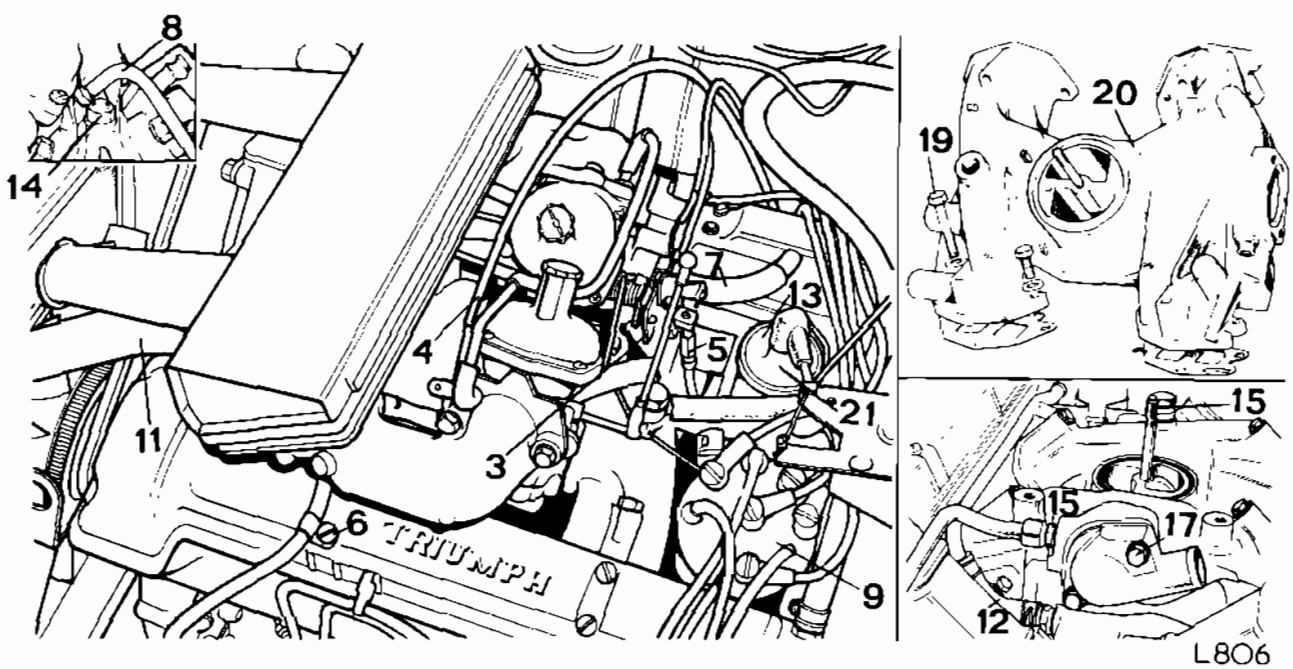
—Remove and refit **30.15.02**

Removing

1. Open bonnet; fit wing covers.
2. Drain coolant.
3. Disconnect throttle cable.
4. Disconnect choke cables (2).
5. Disconnect kick-down cable (automatic transmission only).
6. Disconnect fuel feed pipe from filter (plus clip L.H. cam cover).
7. Disconnect engine breather pipe from R.H. cam cover.
8. Disconnect vacuum advance pipe and union from carburetter.
9. Disconnect h.t. leads and distributor cap—remove cap.
10. Disconnect brake servo pipe from manifold.
11. Disconnect top hose at thermostat housing.
12. Disconnect by-pass pipe.
13. Disconnect coil leads.
14. Remove centre nut and plain washer retaining carburetter pedestal, lift off assembly complete with air cleaner.
15. Remove brake servo and by-pass adaptors from inlet manifold (if required).
16. Remove R.H. (outboard) bolt securing coil to manifold, slacken inner bolt and move coil to provide access to manifold bolt.
17. Remove two bolts securing thermostat housing to manifold.
18. Remove thermostat and housing.
19. Remove bolts securing inlet manifold to cylinder heads.
20. Lift off inlet manifold.
21. Remove coil and ballast resister.

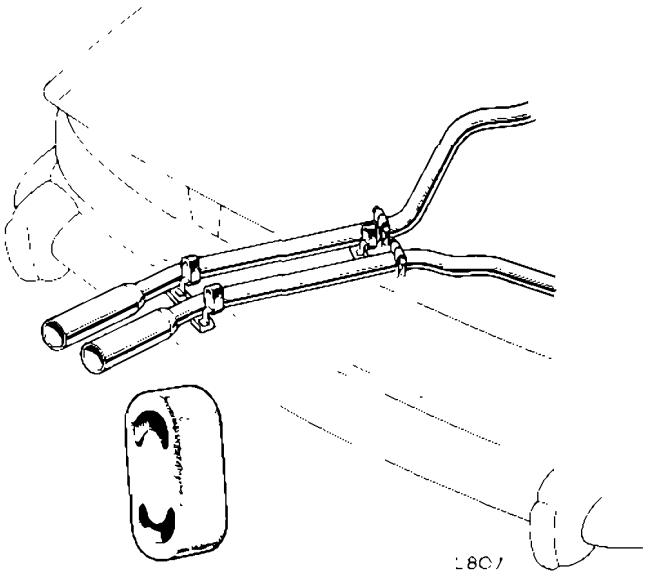
Refitting

22. Slacken the securing nuts and bolts on one cylinder head.
    CAUTION: One cylinder head must be slackened before fitting inlet manifold.
23. Clean gasket faces on cylinder heads and inlet manifold.
24. Fit coil and ballast resister (inboard bolt only to allow movement of coil).
25. Fit gasket to manifold using approved gasket cement.
26. Position manifold; fit bolts to both heads.
27. **Tighten bolts evenly to tightened head, then to head slackened at 22; tighten progressively, taking care to avoid distortion. Torque: 15 to 20 lbf ft (2·0 to 2·8 kgf m).**
28. Retighten cylinder head nuts and bolts slackened at 22.
29. Reposition coil; fit and tighten bolts.
30. Reverse 3 to 18.
31. Refill cooling system; run engine; check for leaks; check coolant level; remove wing cover; close bonnet.



MOUNTING RUBBERS

—Remove and refit **30.20.01**



Removing

1. Unhook rubbers (3) from tail pipes and chassis hooks.

Refitting

2. Hook rubbers into position on tail pipes and chassis clips, ensuring that rubbers are not overstretched.

NOTE: Where rubbers are overstretched or distorted, slacken clamp nuts on rear intermediate pipe and re-align tail pipes. Tighten clamp nuts and check alignment of system.

CLUTCH OPERATIONS

Clutch and brake pedal assembly
—overhaul 33.30.06
—remove and refit 33.30.01

Clutch assembly
—overhaul 33.10.08
—remove and refit 33.10.01

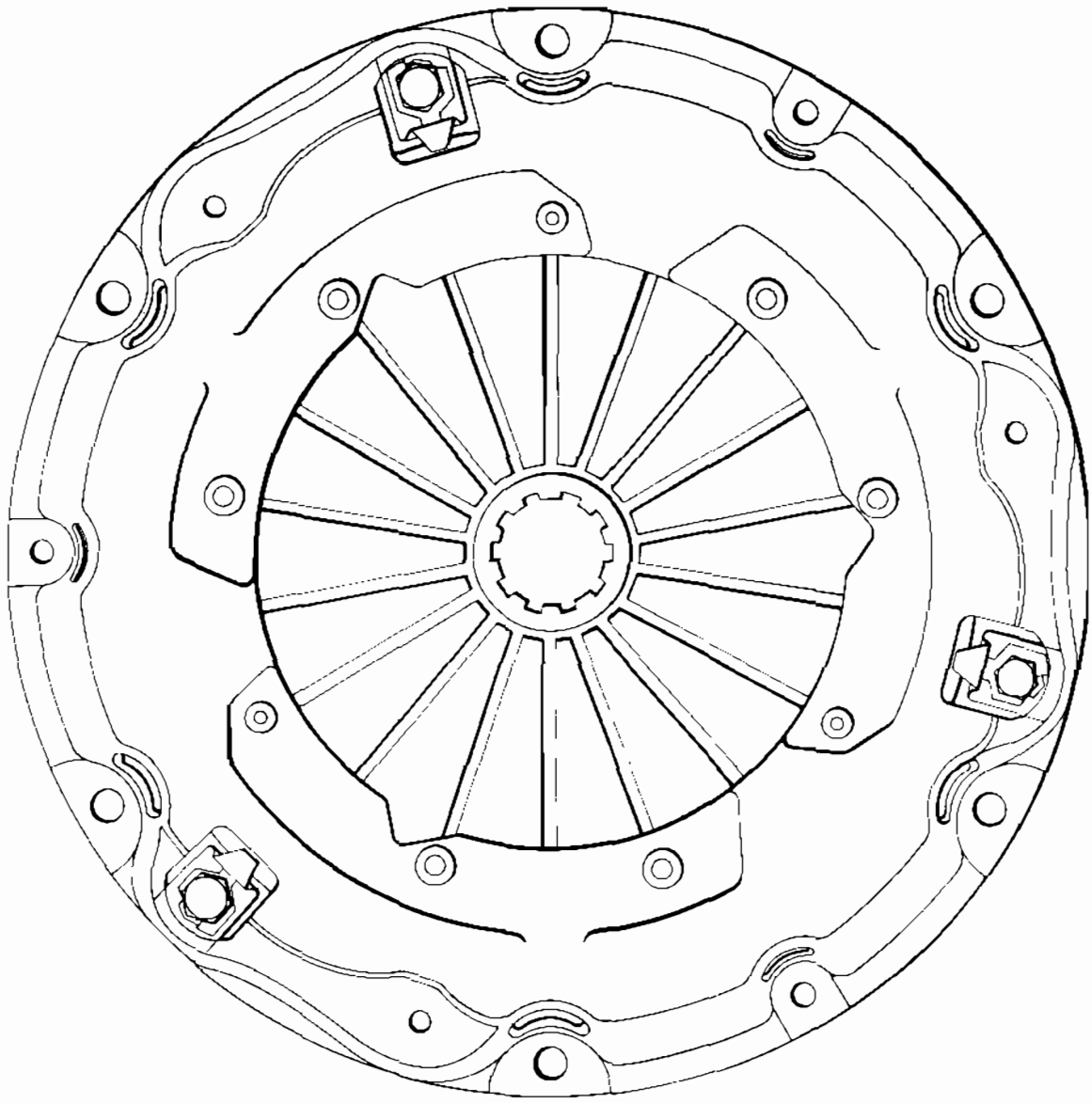
Clutch pedal
—remove and refit 33.30.02
—return spring—remove and refit 33.30.03

Clutch release mechanism—remove and refit 33.25.12

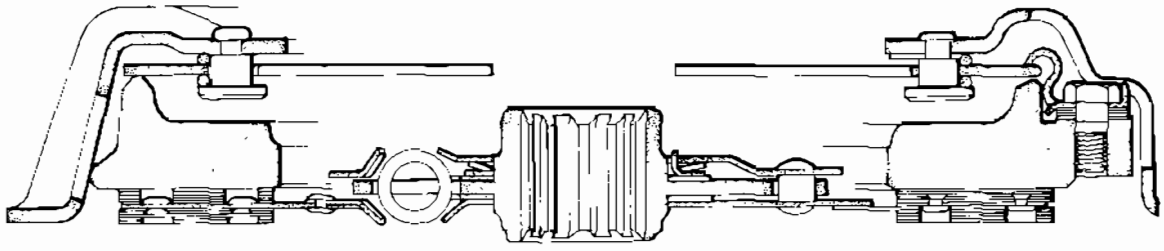
Hydraulic system—bleed 33.15.01

Master cylinder
—overhaul 33.20.07
—remove and refit 33.20.01

Slave cylinder
—overhaul 33.35.07
—remove and refit 33.35.01



M065



CLUTCH DATA

Type	Spring diaphragm
Plate size	9 in (228·6 mm)
**Facing material	H-26**
Operation	Hydraulic
Adjustment	Self-adjusting

CLUTCH ASSEMBLY

—Remove and refit **33.10.01**

Removing

1. Remove gearbox. 37.20.01.
   NOTE: Where a clutch is to be refitted, mark the position on clutch and flywheel to enable original balance to be maintained.
2. Progressively slacken the bolts securing clutch cover to flywheel.
3. Remove cover and driven plate from flywheel dowels.

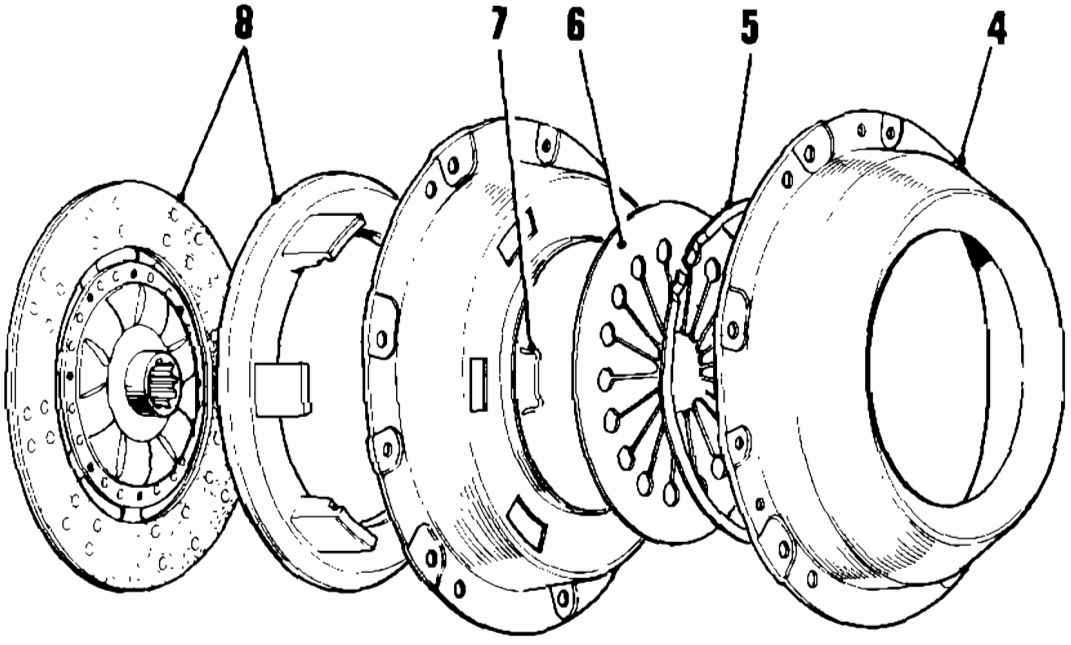
Refitting

4. Using a dummy input shaft, fit clutch driven plate with longer boss of hub facing flywheel.
5. Locate cover assembly on flywheel dowels, fit and tighten retaining bolts.
6. Remove dummy input shaft.
7. Fit gearbox. 37.20.01.

CLUTCH ASSEMBLY

—Overhaul **33.10.08**

1. Remove clutch assembly. 33.10.01.
2. Place clutch, face down, on bench.
3. Mark all parts to ensure assembly in same relative positions.
4. Lift off cover pressing.
5. Take out retaining ring.
6. Remove diaphragm spring.
7. Remove two spring clips.
8. Lift driving plate from pressure plate.
9. Check all components for wear; renew as necessary.
10. Apply a trace of zinc-based grease to the sides of the pressure plate lugs, fulcrum points for diaphragm spring on pressure plate, driving plate and cover.
11. Rebuild clutch by reversing 2 to 8, ensuring that when fitting the retaining ring, the six flat portions fit into the grooves in the pressure plate lugs, and the five crowns of the undulations are fitted so as to press on the spring.



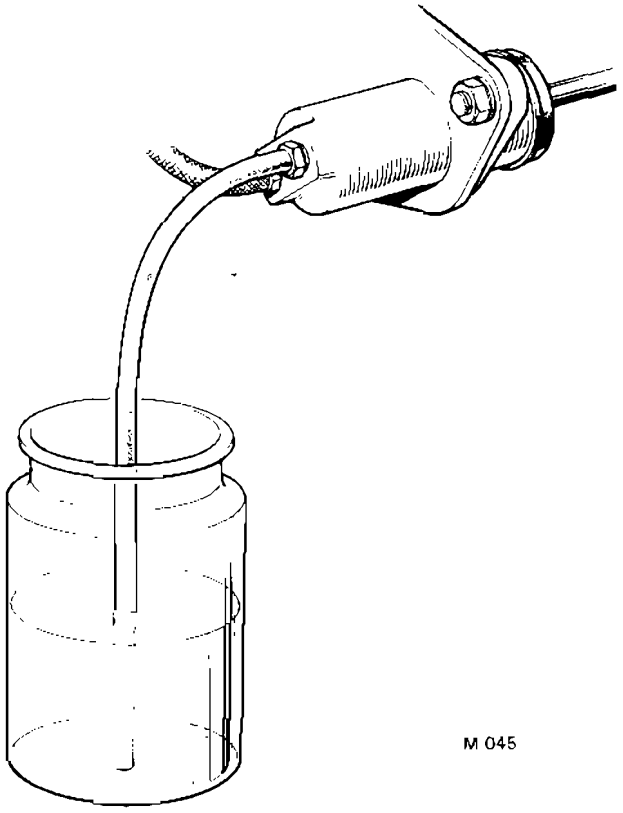
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HYDRAULIC SYSTEM

—Bleed **33.15.01**

Working below the vehicle:

1. Remove the cap from the clutch master cylinder fluid reservoir, top up with new fluid and ensure that during the subsequent operations the fluid level does not drop below half full.
2. Clean the bleed nipple on the slave cylinder.
3. Attach a length of rubber tube to the nipple and allow the other end to be immersed in a quantity of clean hydraulic fluid in a jar.
4. Unscrew the bleed nipple half a turn and have the clutch pedal depressed slowly. Tighten the bleed nipple before the pedal has made a full stroke.
   NOTE: This operation will cause fluid or fluid and air to be pumped into the jar.
5. Repeat 4 until fluid only is pumped into jar.
6. Remove rubber tube and jar, top up reservoir and replace cap.



M 045

MASTER CYLINDER

—Remove and refit **33.20.01**

Removing

Engine compartment:

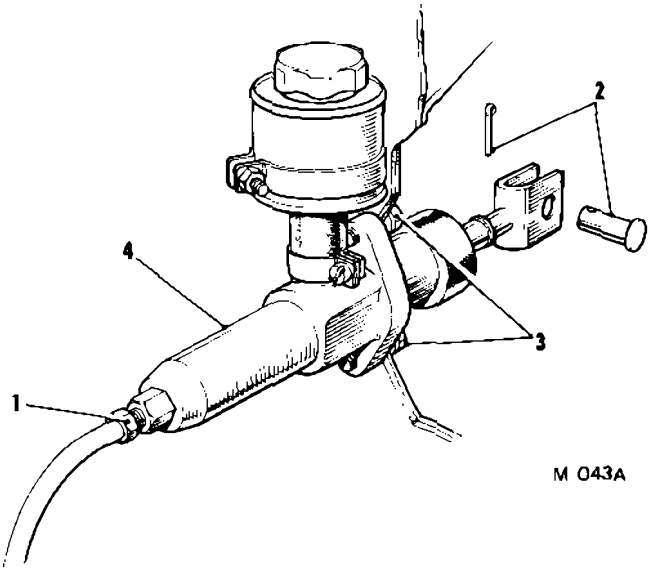
1. Disconnect pressure pipe from master cylinder.

Driving compartment:

2. Remove split pin and withdraw clevis pin securing push-rod to pedal lever.
3. Remove two bolts securing master cylinder to bulkhead.

Engine compartment:

4. Withdraw master cylinder and reservoir.



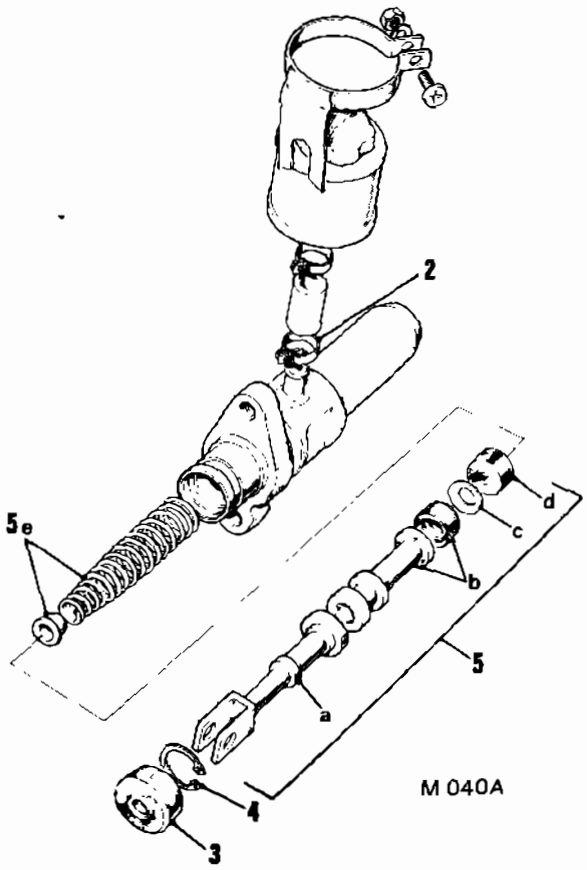
M 043A

Refitting

5. Reverse 1 to 4.

MASTER CYLINDER

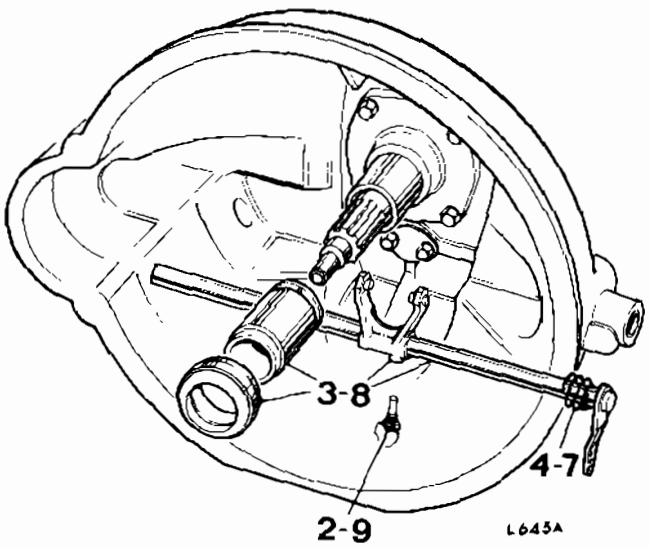
—Overhaul **33.20.07**



1. Remove master cylinder. 33.20.01.
2. Slacken hose clip and detach reservoir from master cylinder.
3. Peel back push-rod dust cover.
4. Depress push-rod and remove circlip.
5. Withdraw (*a*) push-rod with dust cover, (*b*) piston with seal, (*c*) dished washer, (*d*) primary seal, (*e*) spring retainer and spring.
   NOTE: A low pressure air jet applied to the outlet port will assist with the ejection of internal components.
6. Remove dust cover from push-rod and secondary seal from piston.
7. Discard dust cover, seals and dished washer.
8. Clean all components and examine for excess wear or scoring of master cylinder bore; renew as necessary.
9. Lubricate internal components with clean hydraulic fluid.
10. Fit dust cover to push-rod and secondary seal to piston.
11. Assemble master cylinder in reverse order of dismantling, ensuring that the small side of the dished washer is towards the piston.
12. Refit master cylinder. 33.20.01.

CLUTCH RELEASE MECHANISM

—Remove and refit **33.25.12**



Removing

1. Remove gearbox. 37.20.01.
2. Remove pin-bolt from release fork.
3. Withdraw cross-shaft and collect release fork, and release sleeve and bearing.
4. Remove spring from cross-shaft.

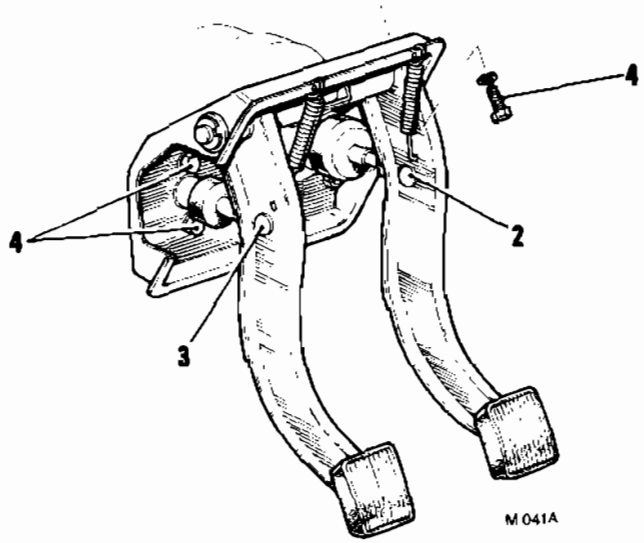
NOTE: Clutch release bearing is an interference fit on release sleeve, with a limit on run-out, and should not be disturbed unless one part requires renewal.

Refitting

5. Protect bearing with a flat block of wood and carefully press bearing onto sleeve, using a hand press.
6. Measure the run-out of the bearing clutch contact (or front) face relative to sleeve lid. Run-out should not exceed 0·152 mm (0·006 in) total dial test indicator reading.
7. Fit spring to cross-shaft.
8. Fit cross-shaft, release fork and sleeve, engaging one with another.
9. Fit pin-bolt to fork. Wire lock pin-bolt.
10. Refit gearbox. 37.20.01.

CLUTCH AND BRAKE PEDAL ASSEMBLY

—Remove and refit **33.30.01**



Removing

1. Disconnect wires from brake switch.
2. Remove split pin and withdraw clevis pin securing brake pedal to push-rod.
3. Remove split pin and withdraw clevis pin securing clutch pedal to push-rod.
4. Remove nuts and bolts securing box to scuttle.
5. Withdraw pedal box assembly.

Refitting

6. Reverse 1 to 5.

CLUTCH PEDAL

—Remove and refit **33.30.02**

Removing

1. Remove pedal assembly. 33.30.01.
2. Release clutch pedal return spring.
3. Remove a circlip and withdraw pedal cross-shaft.

Refitting

4. Reverse 1 to 3.

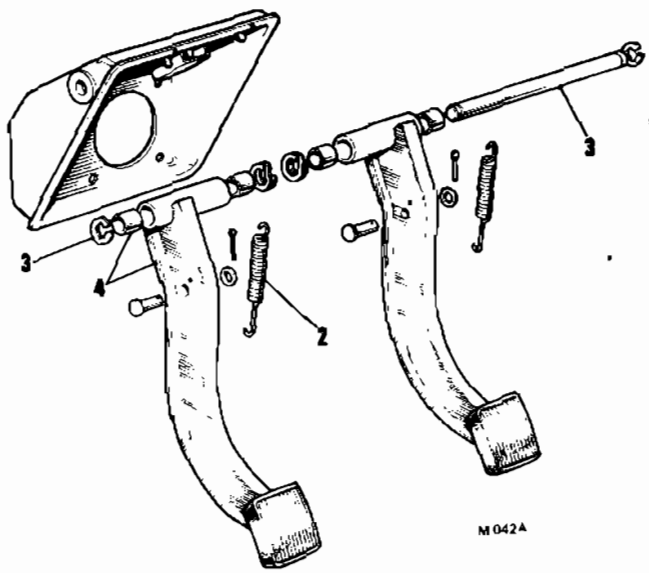
CLUTCH PEDAL RETURN SPRING

—Remove and refit **33.30.03**

Working inside driving compartment: Spring is hooked between pedal lever and box.

CLUTCH AND BRAKE PEDAL ASSEMBLY

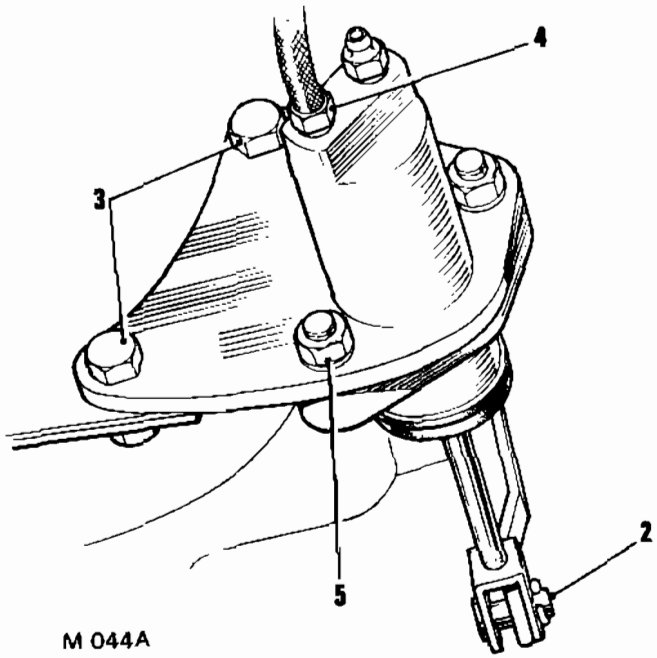
—Overhaul **33.30.06**



1. Remove pedal assembly. 33.30.01.
2. Release clutch pedal return spring.
3. Remove a circlip and withdraw pedal cross-shaft.
4. Withdraw pedals and bushes.
5. Inspect, and renew components as necessary.
6. Assemble and refit assembly by reversing 1 to 5.

SLAVE CYLINDER

—Remove and refit **33.35.01**



Removing

1. Raise the vehicle.
2. Remove split pin and withdraw clevis pin securing operating lever to push-rod.
3. Remove two bolts and nuts securing slave cylinder mounting bracket to ball housing.
4. Hold the pressure hose union with a spanner and turn the slave cylinder to unscrew hose. Avoid twisting the hose.
5. Remove the mounting bracket if required.

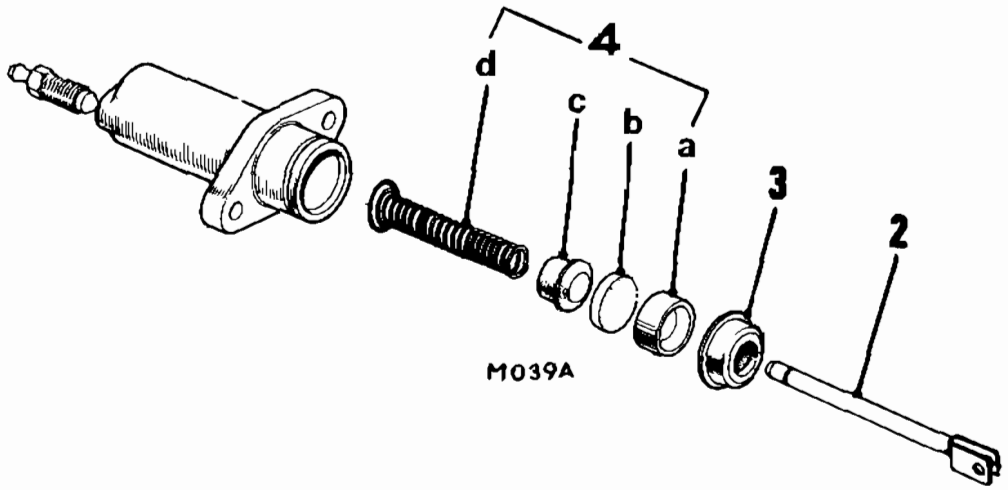
Refitting

6. Refit by reversing 1 to 5.
7. Bleed hydraulic system. 33.15.01.

SLAVE CYLINDER

—Overhaul **33.35.07**

1. Remove slave cylinder. 33.35.01.
2. Remove push-rod.
3. Release dust cover from body.
4. Remove (*a*) piston, (*b*) seal, (*c*) filler block and (*d*) spring.
   NOTE: A low pressure air-line may be used to eject internal components.
5. Discard seal and dust cover, clean remaining components in clean hydraulic fluid or methylated spirits.
6. Check components for excess wear or scoring.
7. Lubricate internal components with new hydraulic fluid, including new seal and dust cover.
8. Reassemble cylinder by reversing 2 to 4.
9. Refit slave cylinder. 33.35.01.



GEARBOX OPERATIONS

Constant pinion shaft—remove and refit 37.20.16

Countershaft—remove and refit 37.20.19

Countershaft bearing—remove and refit 37.20.22

Drive flange—remove and refit 37.10.01

Front bearing plate—remove and refit 37.12.22

Front oil seal—remove and refit 37.23.06

Gearbox assembly
- —overhaul 37.20.04
- —remove and refit 37.20.01

Gear-change lever
- —check and adjust 37.16.01
- —draught excluder—remove and refit 37.16.05
- —remove and refit 37.16.04

Mainshaft—remove and refit 37.20.25

Rear extension—remove and refit 37.12.01

Rear oil seal—remove and refit 37.23.01

Reverse gear shaft—remove and refit 37.20.13

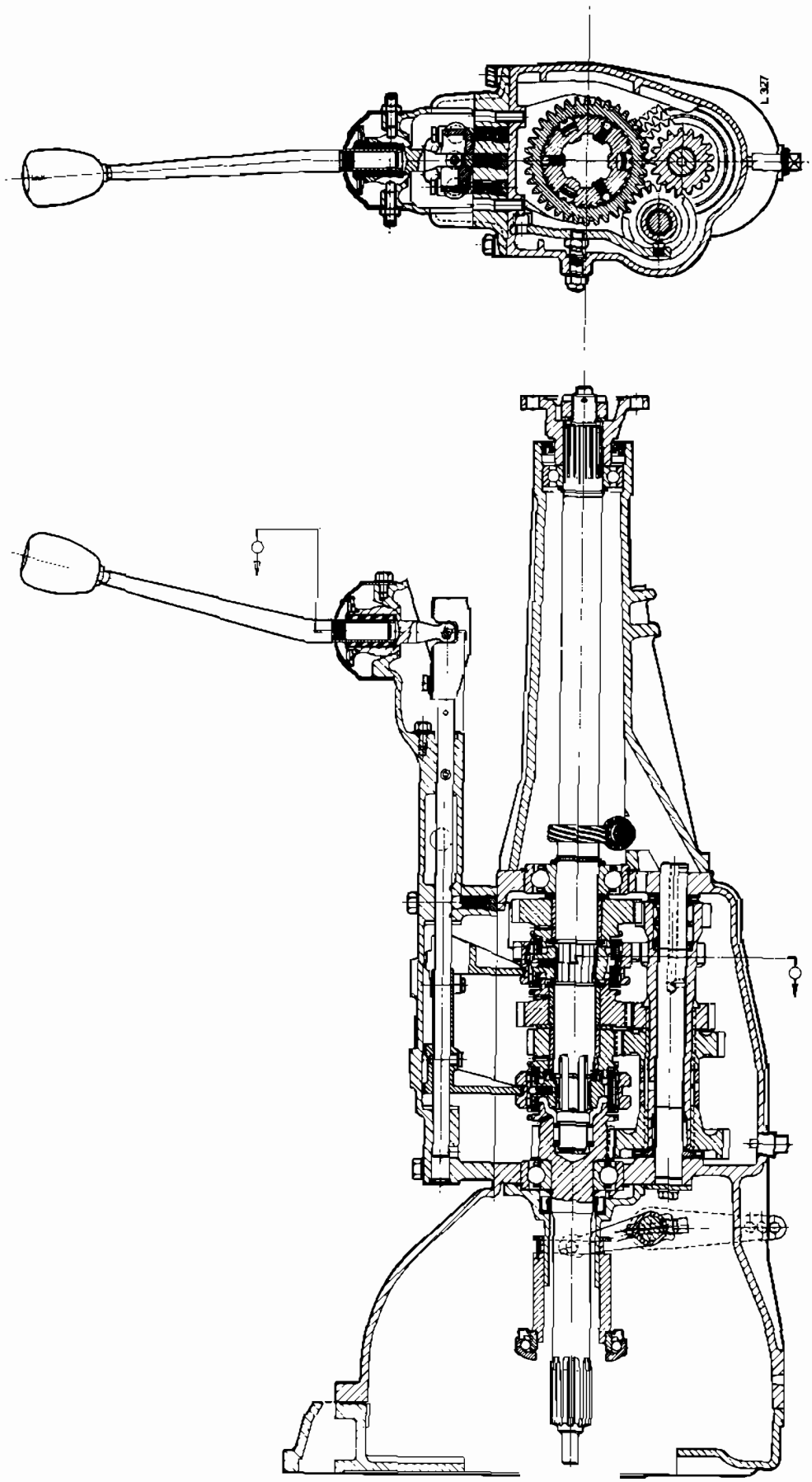
Reverse light switch—remove and refit 37.27.01

Speedometer drive gear—remove and refit 37.25.01

Speedometer drive gear housing and pinion
- —overhaul 37.25.13
- —remove and refit 37.25.09

Synchronizer assemblies
- —overhaul 37.20.08
- —remove and refit 37.20.07

Top cover
- —overhaul 37.12.19
- —remove and refit 37.12.16


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DRIVE FLANGE

—Remove and refit **37.10.01**

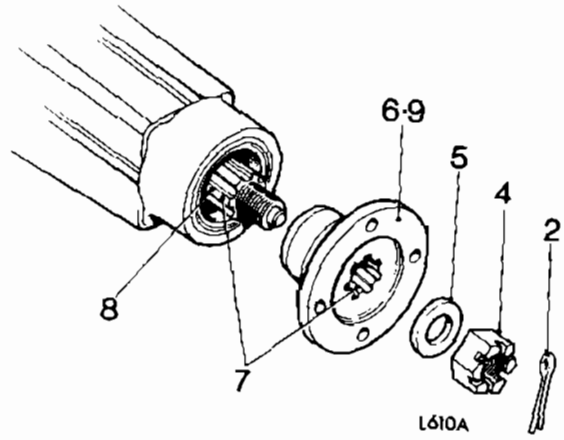
Service tools: 20.SM.90

Removing

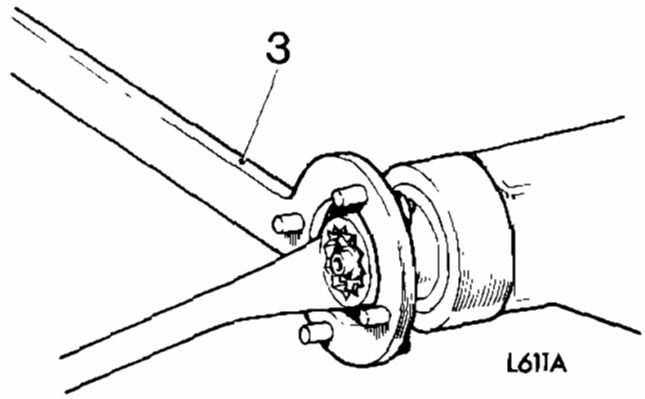
1. Disconnect propeller shaft. 47.15.01.
2. **Where slotted nut and cotter pin are used, remove cotter pin from slotted nut.**
3. Fit tool 20.SM.90 to drive flange.
4. **Remove slotted nut (early models) *or* Nyloc nut.**
5. Collect washer.
6. Withdraw drive flange.

Refitting

7. Thoroughly clean mainshaft and drive flange splines.
8. Apply grease to drive flange splines.
9. Fit drive flange.
10. **Fit washer and slotted nut *or* new Nyloc nut.
11. Fit tool 20.SM.90 to drive flange and, using a torque wrench, tighten nut to 12·4 to 16·6 kgf m (90 to 120 lbf ft).
12. Where a slotted nut and cotter pin are fitted, release nut to nearest slot aligning with mainshaft pin hole, then fit cotter pin.**
13. Re-connect propeller shaft. 47.15.01.



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REAR EXTENSION

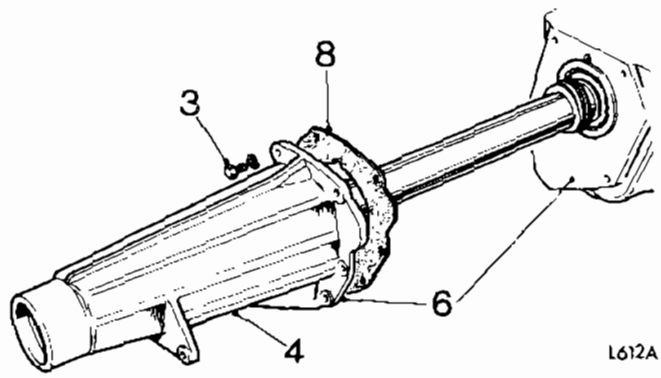
—Remove and refit **37.12.01**

Removing

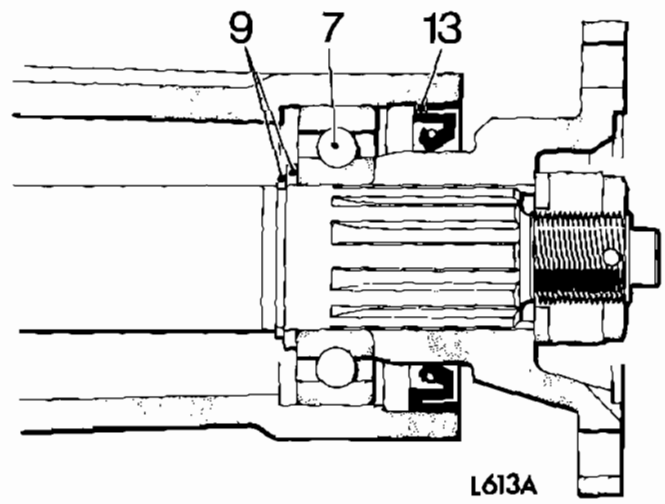
1. Remove gearbox. 37.20.01.
2. Remove drive flange. 37.10.01.
3. Remove six setscrews.
4. Carefully tap off rear extension, using a hide-faced mallet.
5. If it is required to remove ball bearing, drift out with sleeve 54 mm (2·125 in) old × 32 mm (1·250 in) i.dia. of suitable length (oil seal will come away first).

Refitting

6. Clean up gearbox extension abutment faces.
7. If removed, refit ball bearings to extension using suitable sleeve (refer to 5).
8. Fit gasket to extension abutment face, retaining with smear of grease.
9. Check that circlip and washer are in position on rear of mainshaft.
10. Position rear extension over mainshaft and drive home with mallet.
11. Check seating of ball bearing against mainshaft washer.
12. Secure rear extension—six setscrews and lock washers.



L612A



L613A

13. Fit oil seal—spring innermost—to extension so that seal wall is flush with extension wall.
14. Refit drive flange. 37.10.01.
15. Refit gearbox. 37.20.01.

TOP COVER

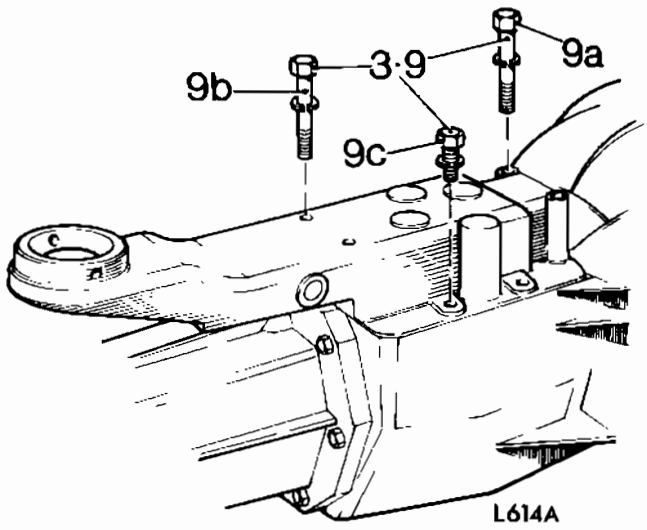
—Remove and refit **37.12.16**

Removing

1. Remove gearbox. 37.20.01.
2. Put all selector shafts to neutral position.
3. Remove eight bolts.
4. Lift off top cover.

Refitting

5. Clean up abutment faces of gearbox and top cover.
6. Apply grease to cover abutment face, then fit gasket to it.
7. Put selector shafts in neutral position.
8. Position top cover on gearbox, engaging gearbox reverse gear lever.
9. Secure top cover with the following bolts each fitted with a lock washer.
   a. Two bolts—67 mm (2·625 in) long—to front.
   b. Two bolts—73 mm (2·875 in) long—to rear.
   c. Four bolts to sides.
10. Refit gearbox. 37.20.01.

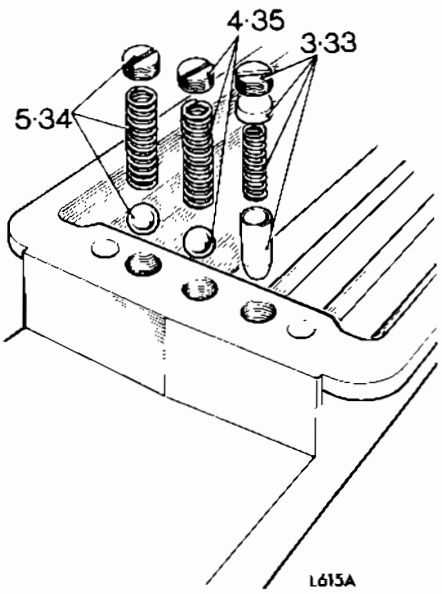


TOP COVER

—Overhaul **37.12.19**

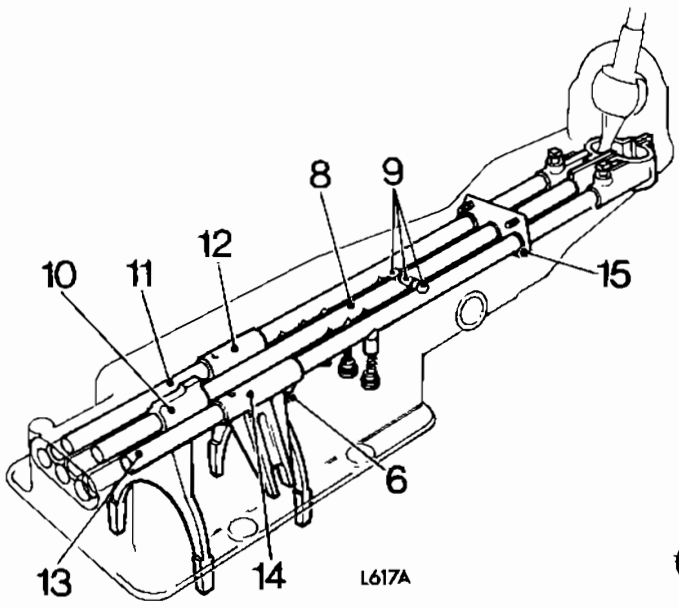
Dismantling

1. Remove top cover. 37.12.16.
2. Remove reverse lamp switch. 37.27.01.
3. Remove screwed plug, distance piece, spring and plunger reverse detent.
4. Remove screwed plug, spring and steel ball—3rd/4th detent.
5. Remove screwed plug, spring and steel ball—1st/2nd detent.
6. Remove three setscrews—one from each selector fork.
7. Put three selector shafts in their neutral positions.
8. Withdraw 3rd/4th (central) selector shaft.
9. Collect interlock plungers and two steel balls.
10. Collect selector fork and distance tube.
11. Withdraw 1st/2nd selector shaft.
12. Collect selector fork and distance tube.
13. Withdraw reverse selector shaft.
14. Collect reverse actuator and distance tube.
15. Remove cover-plate—two setscrews.
16. Remove three exposed sealing rings.



Cleaning

17. *a*. Clean all components in a kerosene wash or, with the exception of the oil seals if for re-use, lead-free gasoline.
    b. Dry the components with a jet of clean, dry, compressed air.

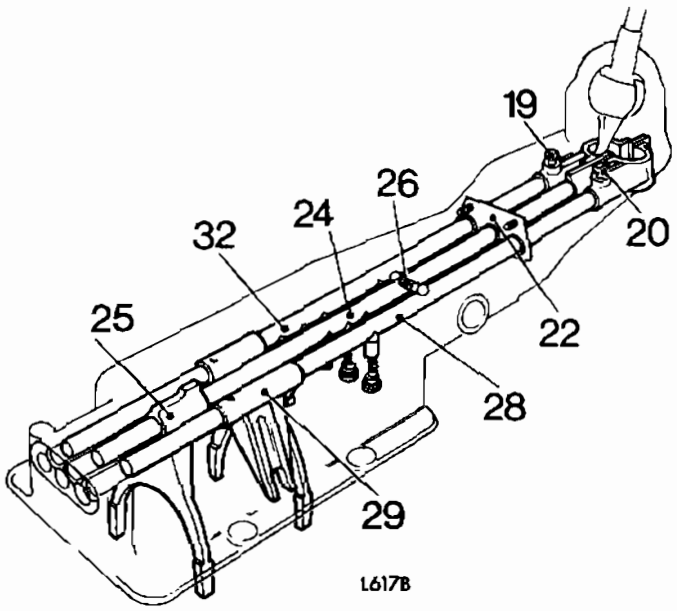


Inspection

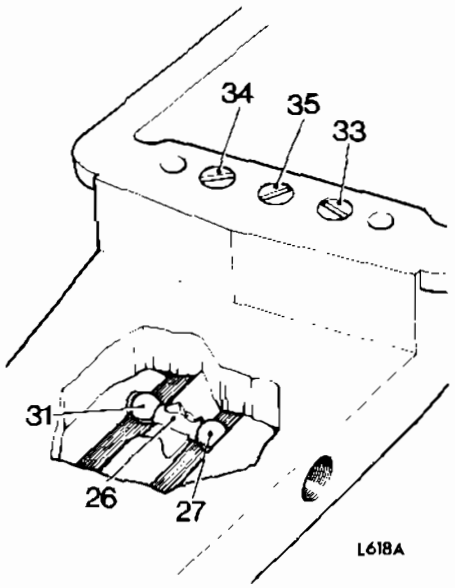
18. *a.* Examine the components for soundness and for excessive wear. Stone-dress minor defects, but if excessive wear is evident, renew the component.
    b. It is recommended to renew the oil seals.
    c. Examine the springs for flats and their housings for signs of spring ridging. If evident, clean up the housings with a smooth file; renew the springs.
    d. Examine the detent plunger and steel balls for roundness; renew as necessary.

Reassembling

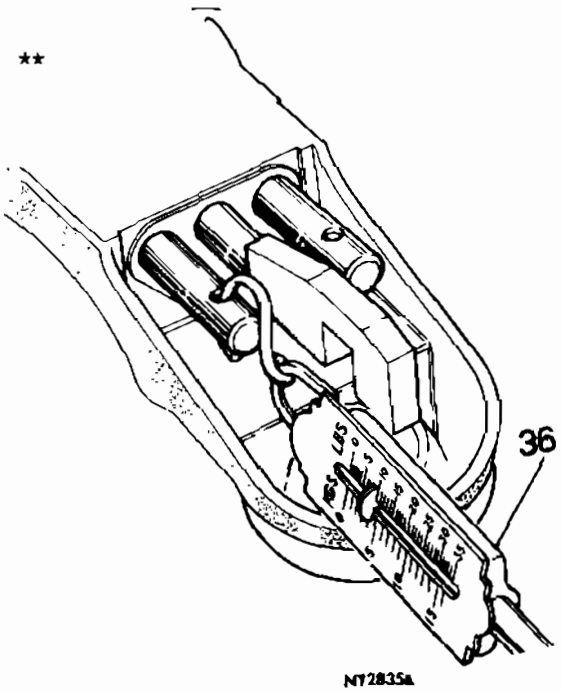
19. If removed, fit 1st/2nd selector to shaft—one setscrew.
20. If removed, fit reverse selector to shaft—one setscrew.
21. Fit a sealing ring to each of three counterbores.
22. Fit cover-plate (far sealing rings)—two screws and lock washers.
23. Lubricate selector shaft bores.
24. Enter 3rd/4th selector shaft into cover central bore and push half-way into cover.
25. Fit distance tube and selector fork to shaft—one setscrew.
26. Fit interlock plunger to (3rd/4th) shaft, then push home shaft into neutral position.
27. Position one interlock ball between 3rd/4th and reverse selector shaft bores with grease and screwdriver.
28. Enter reverse selector shaft into cover bore and push half-way into cover.
29. Fit reverse actuator and distance tube—one setscrew.
30. Push home (reverse) shaft into its neutral position.
31. Ensure that two fitted selector shafts are both in their neutral positions, then fit second interlock ball between 3rd/4th and 1st/2nd selector shaft bores with grease and screwdriver.
32. Fit 1st/2nd selector shaft selector fork and distance tube—one setscrew.
33. Bore for reverse detent—fit plunger, spring, distance piece and screwed plug (fit flush).
34. Bore for 1st/2nd detent—fit steel ball, spring and screwed plug (fit flush).
35. Bore for 3rd/4th detent—fit steel ball, spring and screwed plug (fit flush).
36. Use a spring balance to check pull-off loads on selector shafts.
    1st/2nd/3rd/top 26 to 30 lb (11·8 to 13·6 kg)
    Reverse 26 to 28 lb (11·8 to 12·7 kg)**
    Insert shims or grind springs to adjust.
37. Refit reverse lamp switch. 37.27.01.
38. Refit top cover. 37.12.16.



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L618A



NT2835A

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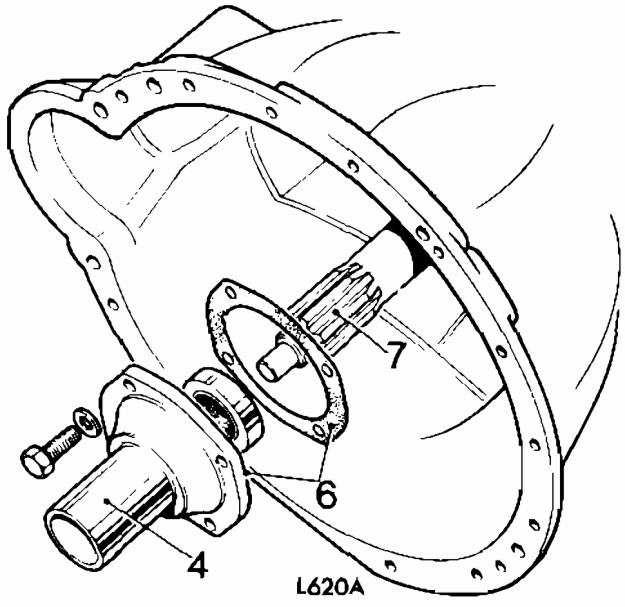
**

FRONT BEARING PLATE

—Remove and refit **37.12.22**

Removing

1. Remove gearbox. 37.20.01.
2. Remove clutch release mechanism. 33.25.12.
3. *a.* Fit, if available, a suitable sheet-metal protective sheath (31·75 mm (1·250 in) i.dia. × 165 mm (6·5 in) long) for oil seal, to constant pinion shaft.
   b. If unavailable, suitably mask constant pinion shaft splines.
4. Remove front bearing plate—four setscrews.



Refitting

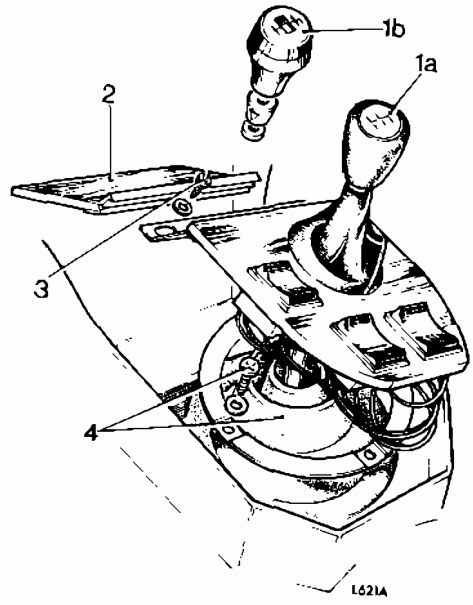
5. Clean up front end cover and gearbox abutment faces.
6. Apply grease to cover abutment face, then fit gasket to it.
7. With constant pinion shaft splines covered (see 3), fit front end cover (oil hole lowermost)—four setscrews and plain washers.
8. Remove cover from constant pinion shaft splines.
9. Refit clutch release mechanism. 33.25.12.
10. Refit gearbox. 37.20.01.

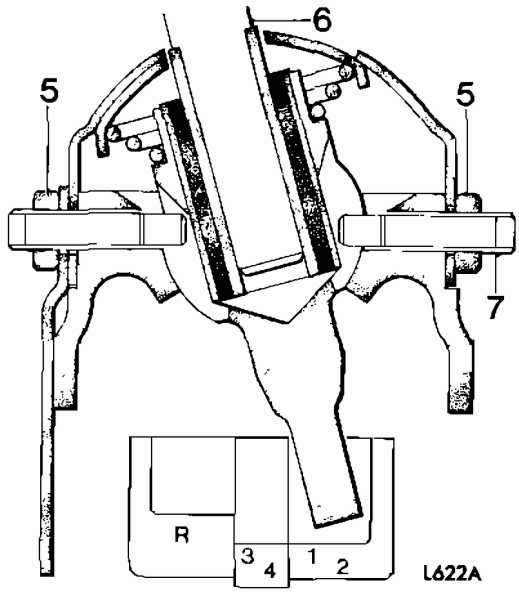
GEAR-CHANGE LEVER

—Check and adjust **37.16.01**

Working inside the vehicle:

1. *a.* Slacken locknut and unscrew gearbox knob.
1. *b.* i. (Overdrive) Prise off gearbox knob cap.
   ii. Disconnect switch.
   iii. Slacken locknut.
   iv. Unscrew retaining nut.
   v. Remove gear-lever knob.
2. Lift the rear edge and remove front section of console tray.
3. Remove two screws and lift out rear section of console tray.
4. Remove four screws and lift off draught excluder.
5. Slacken locknuts on adjuster pins.
6. Position gear lever in first/second gate position.
7. Tighten R.H. pin until it just moves gear lever, slacken pin back half a turn, tighten locknut.
8. Position gear lever in reverse gate position.
9. Tighten L.H. pin until it just moves gear lever, slacken pin back half a turn, tighten locknut.
10. Check operation of lever on all gears.
11. Reverse 1 to 4, testing overdrive switch where applicable.





GEAR-CHANGE LEVER

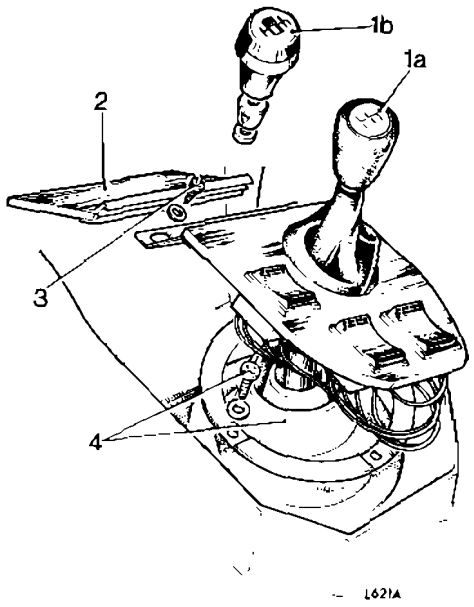
—Remove and refit **37.16.04**

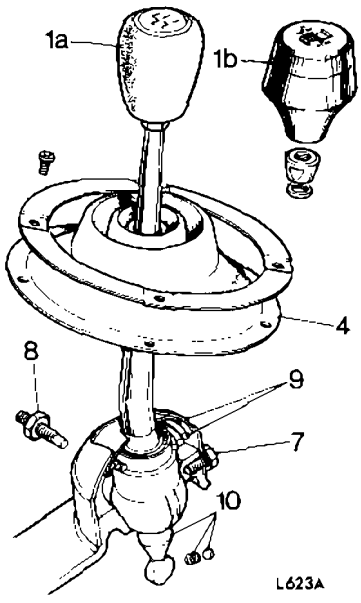
Draught excluder 1 to 4 and 11 **37.16.05**

Removing

Working inside the vehicle:

1. *a.* Slacken locknut and unscrew gear lever knob.
1. *b.* i. (Overdrive) Prise off gear lever knob cap.
   ii. Disconnect switch.
   iii. Slacken locknut.
   iv. Unscrew retaining nut.
   v. Remove gear-lever knob.
2. Lift the rear edge and remove front section of console tray.
3. Remove two screws and remove rear section of console tray.
4. Remove four screws and lift off rubber gaiter.
5. (Overdrive) Withdraw leads through gear lever.
6. Position gear lever in neutral.
7. Remove bolt at rear of gear lever cover.
8. Slacken adjuster pin locknuts.
9. Depress and turn gear lever cover, withdraw cover, plate and spring.
10. Carefully withdraw gear lever, ensuring that the plunger and spring do not fall out.





Refitting

11. Reverse 1 to 10, noting:
   a. Use heavy grease to retain plunger and spring in gear lever.
   b. Carefully feed overdrive cables through lever and check operation of overdrive switch on completion of operation.
   c. Adjust gear lever position as described in 37.16.01 5 to 10.

GEARBOX ASSEMBLY

—Remove and refit **37.20.01**

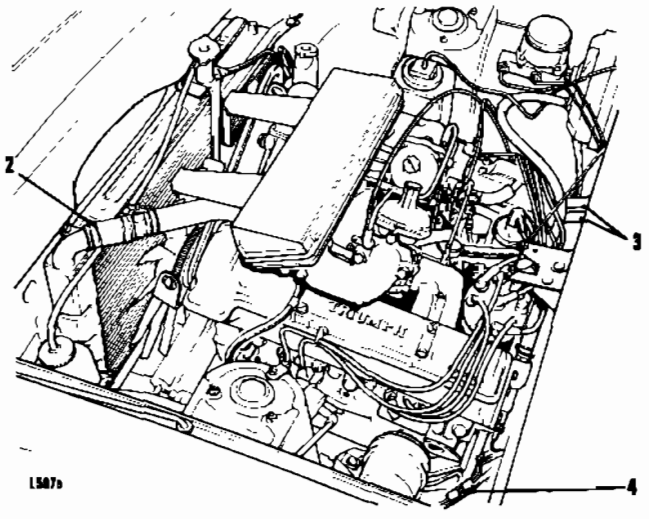
Removing

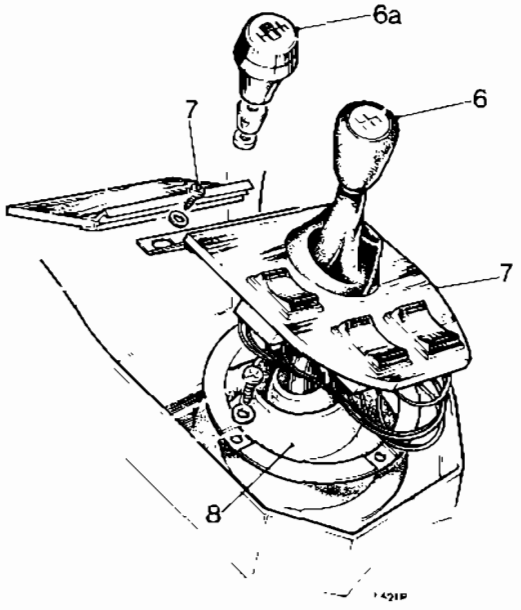
1. Drive the vehicle onto a ramp, chock the wheels and raise the bonnet. Disconnect the battery and drain the cooling system.
2. Release the top hose from the radiator.
3. Release both heater hoses from the heater.
4. Disconnect the gearbox/overdrive harness at the block connector situated adjacent to the starter motor.
5. Slacken the five bell-housing bolts accessible from the engine compartment.
6. Working inside the vehicle, slacken the locknut and unscrew the gear lever knob.

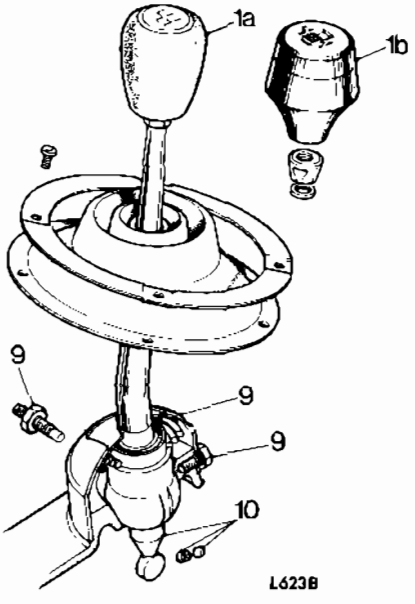
6. *a.* For vehicles with overdrive, prise off the gear lever knob cap/overdrive switch and disconnect the leads from the switch. Slacken the locknut, unscrew the retaining nut and remove the gear lever knob.

7. Lift the rear edge and remove the front section of the console tray. Take out the two screws and remove the rear section of the tray.
8. Pull the overdrive switch lead through the gear lever (where applicable), take out four screws and remove the gear lever grommet.
9. Slacken the gear lever adjuster pin locknuts and take out the gear lever cap attachment bolt. Depress and twist the gear lever cap and remove the cap, plate and spring.
10. Select the neutral gear position and carefully withdraw the gear lever, ensuring that the plunger and spring located in the end of the lever are not lost.
11. Check that the wheels are securely chocked, release the hand brake, close the bonnet and raise the ramp.
12. Remove both exhaust front pipes. 30.10.09–10.
13. Detach the propeller shaft from the gearbox coupling flange, rolling the vehicle as necessary to gain access to the attachment bolts. Chock the wheels securely.
14. Place a stand under the silencers and, using a suitable piece of wood interposed between the stand and silencer bodies, raise the stand or lower the ramp slightly to lift the silencers and propeller shaft clear of the gearbox coupling flange.
15. Using a ramp jack to support the gearbox, remove the mounting plate/body attachments.
16. Unclip the brake pipe from the rear face of the front cross-member. Lower the ramp jack ensuring that the engine sump does not trap the brake pipe against the cross-member. Continue to lower the jack fully until the weight of the engine/gearbox is taken by the cross-member. Move the ramp jack clear of the working area.

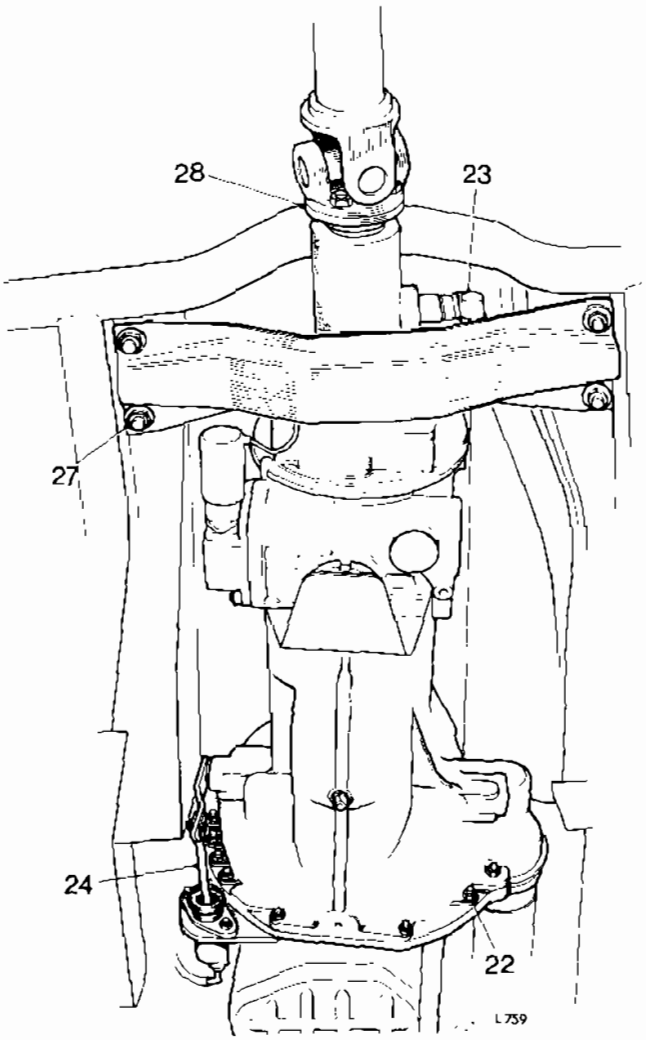
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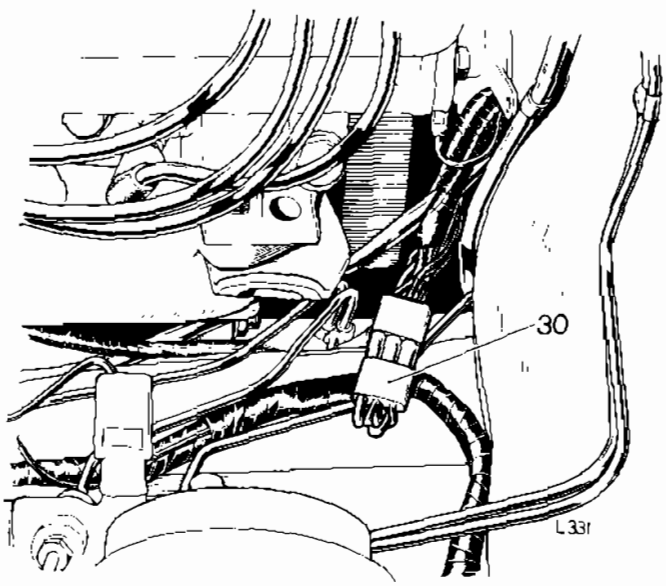


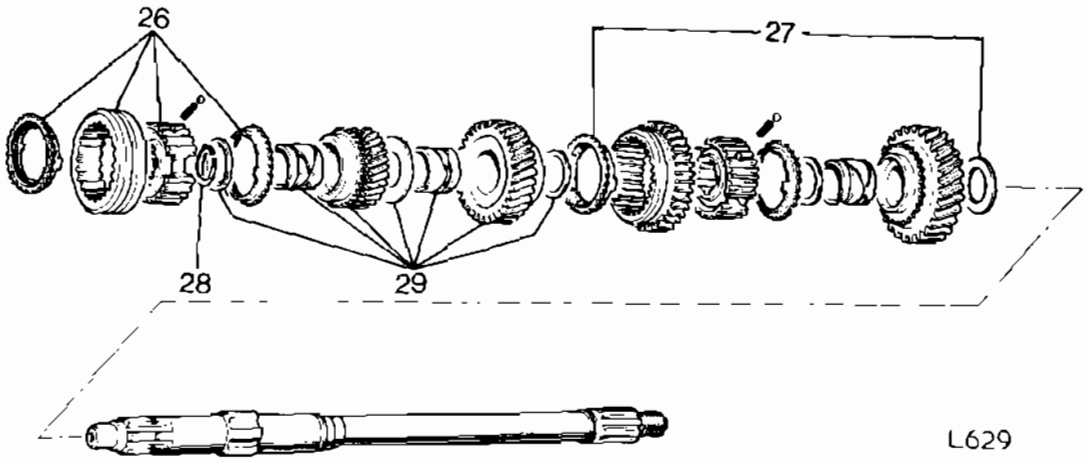
17. Disconnect the speedometer cable from the gearbox (note the spacer used on overdrive models).
18. Detach the clutch slave cylinder push-rod from the cross-shaft arm. Retain the piston in the slave cylinder using string or a suitable clamp.
19. Remove the bell-housing bolts starting with those slackened previously. Withdraw the gearbox rearward and lower to the ground.



Refitting

20. If necessary, align the clutch splines, move the throw-out bearing to the rear extent of its travel and engage top gear.
21. Raise the gearbox up to the engine and, rotating the mainshaft flange, engage the input shaft splines with those of the clutch.
22. Fit two bell-housing bolts and tighten the nuts fingertight only. Locate the remaining bell-housing bolts and attach the nuts. Tighten all the accessible bolts.
23. Refit the speedometer cable.
24. Refit clutch slave cylinder push-rod.
25. Place the ramp jack under the gearbox and raise it until the mounting platform is just clear of the studs.
26. With the aid of an assistant working under the bonnet, tighten the remaining bell-housing bolts and select the neutral gear position.
27. Raise the gearbox and locate the mounting platform over the studs. Fit and tighten the securing nuts.
28. Remove the stand supporting the silencers and connect the propeller shaft to the gearbox coupling flange.
29. Locate the gearbox/overdrive harness block connector adjacent to the starter motor and refit the exhaust front pipes and the front cross-member brake pipe.
30. Lower the ramp and refit the harness block connector.
31. Replace the radiator top hose and the heater hoses. Refill the cooling system.
32. Working inside the vehicle, locate the spring and plunger in the end of the gear lever and retain in position with heavy grease. Replace the gear lever assembly and fit the spring, plate and cap. Secure the cap with the setscrew and tighten the adjuster pin locknuts.
33. Replace the gear lever grommet, and if applicable, feed the overdrive switch lead through the gear lever.
34. Refit the console tray rear section, secure with two screws and replace the front section. Fit the gear lever knob/overdrive switch.
35. Run the engine, top up the cooling system and check for leaks.



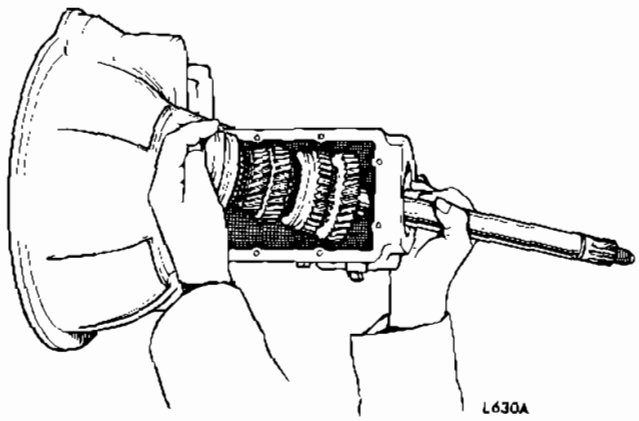


L629

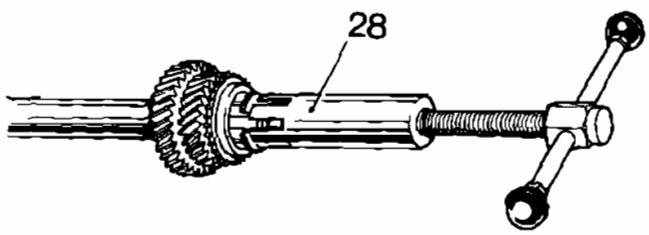
Mainshaft and gears

21. Remove circlip and spacer to rear of shaft bearing.
22. Remove circlip from bearing o.dia.
23. Remove bearing. Tool S4221A–15A.
24. Support mainshaft by hand, remove tool S314.
25. Withdraw mainshaft and gears through top aperture of gearbox.
26. Remove 3rd/4th synchro. hub and cups.
27. Remove washer, 1st gear and bush, washer, 1st/2nd synchro. hub and cups and washers. Tag and identify components for future reference.
28. Remove circlip from mainshaft. Tool S67A.

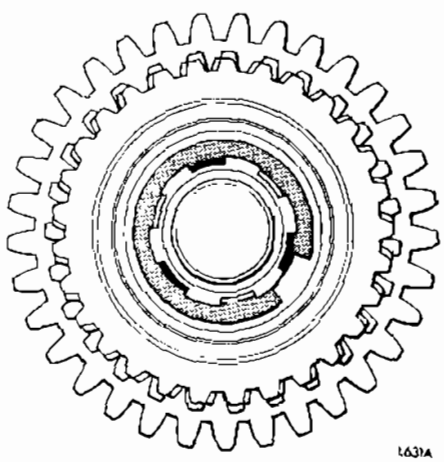
NOTE: On earlier models the sectioned washer behind the circlip has three lugs that fit in alternate splines (later models have a six-lug washer); the longer prongs on tool S69A fit in the splines between the lugs. Rotate circlip to ascertain position of lugs. Position circlip with ends on adjacent prongs of tool. With tool in position, gently prise between 2nd and 3rd gears to push circlip away from slot.



L630A



L632A

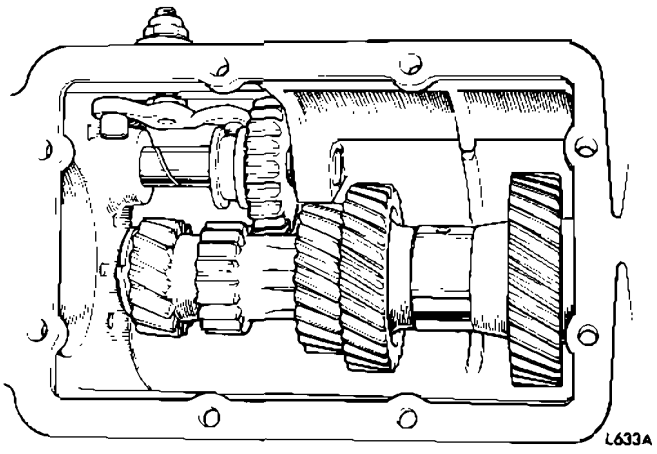


L631A

29. Remove sectioned washer, 3rd gear and bush, washer, 2nd gear and bush, and washer. Tag and identify components for future reference.
30. Remove reverse gear, lever and pivot.

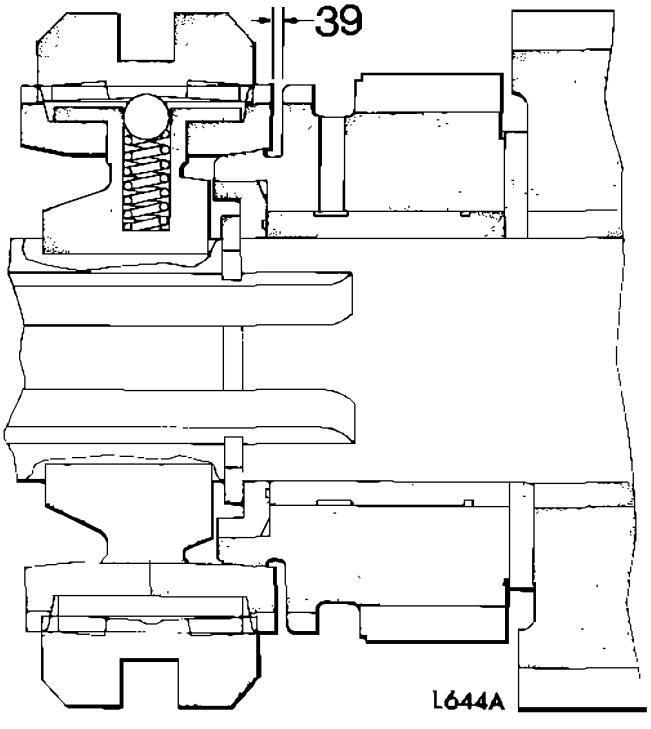
Countershaft gears

31. **Remove rear end thrust bearing (3 parts earlier models—2 parts later models).**
32. Remove countershaft from gearbox sump.
33. Collect front end thrust bearing from sump (3 parts plus spacer).
34. Separate needle bearing and backing washer from front bore, two needle bearings and backing washer from rear bore, 2nd gear, 3rd gear, spacer and constant gear from countershaft hub.



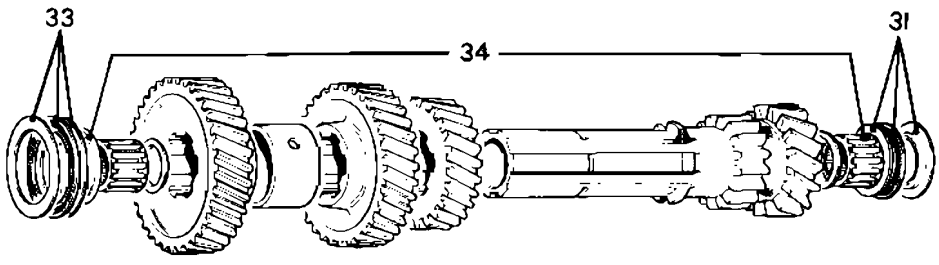
Cleaning

35. *a.* Clean all components in paraffin.
b. Dry with clean, dry, compressed air. **DO NOT** spin bearings.



Inspection

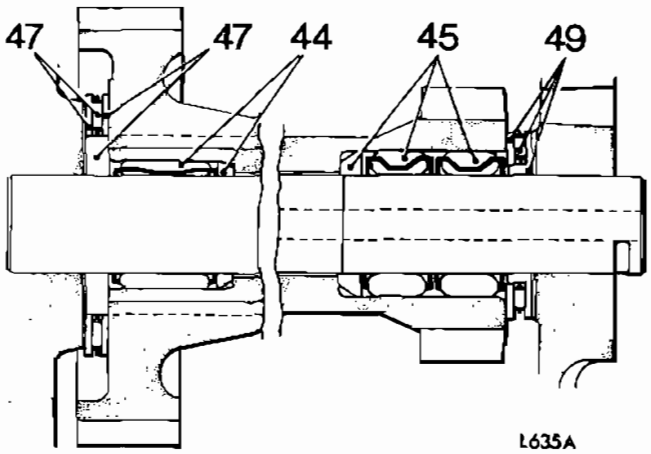
36. Generally examine all the components for serviceability, then carry out the following more detailed examination. Where doubt exists, refer to Data to determine serviceability of parts.
37. Gears, shafts and bushes: Examine the components for evidence of burrs, cracks, excessive wear or discolouration due to overheating. Stone-dress minor defects. Where discoloured, particular attention should be paid to the cleanliness and unobstruction of oilways, and that bushes and gears have been correctly fitted i.e. with oilways in alignment.
38. Constant pinion and gear: These are paired gears and should it be necessary to renew either one the replacement part should be carefully stone-dressed to mate.
39. Synchro. cups: Assemble in turn each synchro. cup on its gear and measure with feeler gauges the clearance between gear and cup. Should the clearance be less than 0·030 in (0·762 mm), renew the cup.
40. Oil seals: It is recommended that all oil seals be renewed.
41. Ball and needle bearings: Lightly lubricate the bearings and spin by hand. Examine for evidence of flats and rough running.



Reassembling

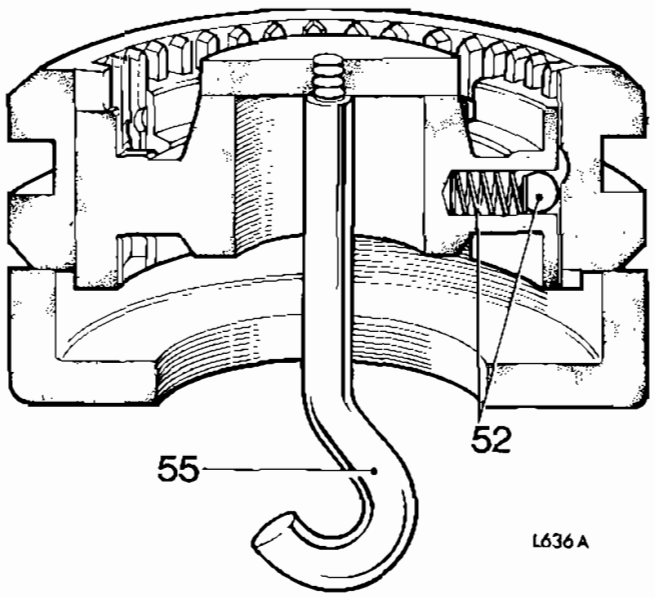
NOTE: Lubricate all moving parts as assembled.

42. Fit reverse gear lever with fulcrum pin, washer and nut to gearbox.
    NOTE: Position lever on pin so that two screw threads (approx.) are visible between gearbox and lever.
43. Fit reverse gear and spindle and engage with lever. Check that lever pin does not bottom in gear groove—adjust if required.



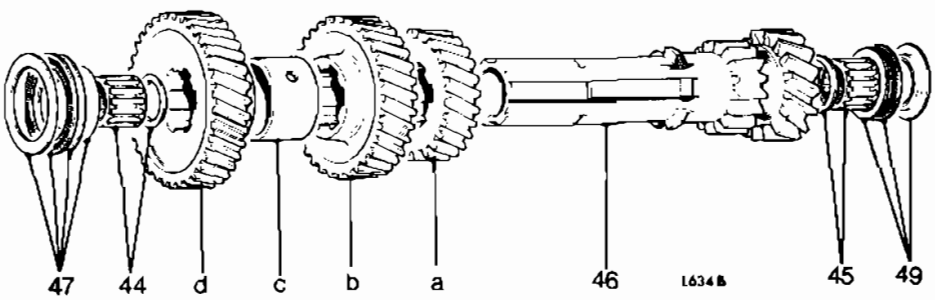
Countershaft gears and bearings

44. Fit backing washer (chamfer innermost) and needle-roller bearing to front bore of countershaft gear hub.
45. Fit backing washer (chamfer innermost) and two needle-roller bearings to rear bore.
46. Fit in order to countershaft gear hub:
    a. 2nd speed gear
    b. 3rd speed gear
    c. Spacer
    d. Constant gear.
47. Apply grease to front thrust bearing (three parts) and collar; assemble and place in position on front face of gear hub; retain with grease.
48. Carefully lower countershaft gear assembly into the gearbox and allow it to rest on sump.
    NOTE: Ensure that bearings are not dislodged during 48.
49. **Assemble rear thrust bearing (three parts earlier models—2 parts later models) and, using grease to retain place in position, supporting washer to gearbox.**
50. Insert countershaft sufficient only to support rear thrust bearing.



Synchro. units

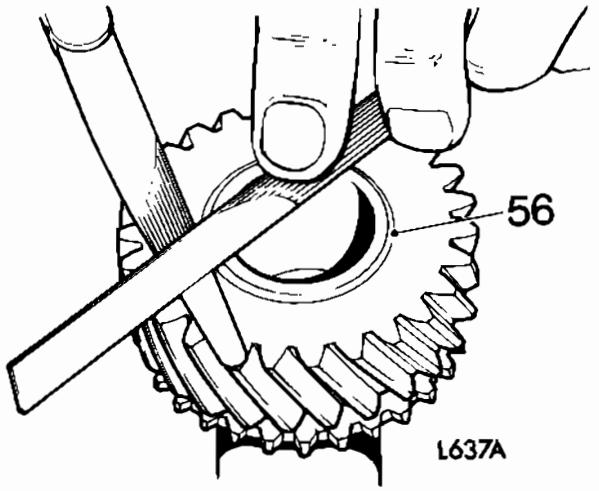
51. Trial fit reverse gear (synchro. sleeve) to 1st/2nd synchro. hub. The fit should be free sliding.
52. Assemble three springs and steel balls to hub.
53. Press hub into sleeve.
54. Repeat 51 to 53 on 3rd/4th synchro. hub.
55. Test, by using spring scale, the axial release loads of the units which should be:
    1st/2nd 21 to 26 lb. (10·1 to 12·5 kg)
    3rd/4th 14 to 19 lb (6·7 to 9·1 kg).
    If release load below limits, renew springs; if above, check both for flats and sleeves for defects.



Gear end-float on bushes

56. Check end-float of 1st, 2nd and 3rd speed mainshaft gears on their bushes.
   a. Assemble gears on their respective bushes.
   b. Using preferably a dial test indicator, or alternatively feeler gauges, measure the end-float of each gear on its bush.
   c. End-float is to be within 0·004 to 0·008 in (0·1 to 0·2 mm).

NOTE: (i) Interchange of 1st and 3rd speed gear bushes is permissible to obtain these figures.
(ii) Other adjustment will entail reducing the bush length to reduce end-float, and fitting a new bush to increase end-float.

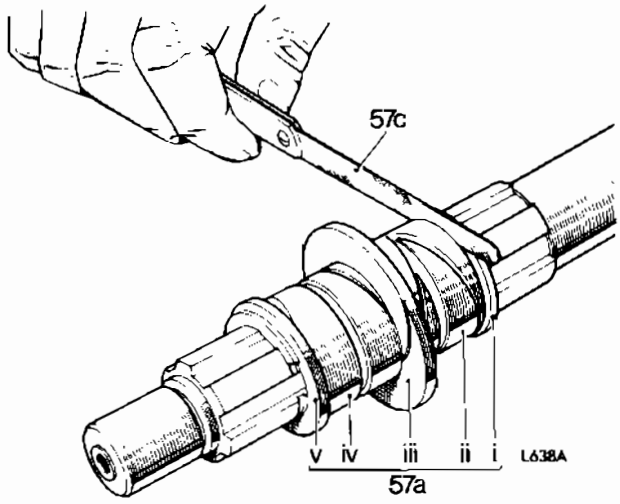


Bush end-floats on mainshaft

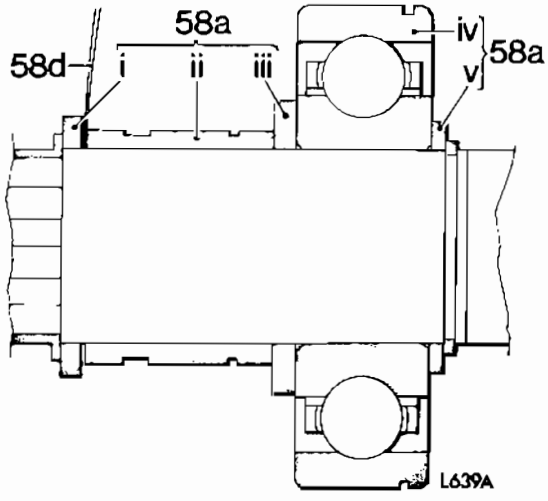
57. Check total end-float of 2nd and 3rd speed gear bushes on mainshaft.
   a. Temporarily fit to front end of mainshaft in order:
      i. Adjustment washer.
      ii. Bush—2nd speed gear.
      iii. Thrust washer.
      iv. Bush—3rd speed gear.
      v. Sectioned washer—fit reversed.
   b. Insert deeper portion of circlip in its groove in mainshaft to retain items and hold by hand.
   c. Measure bush end-float on mainshaft using feeler gauges.
   d. End-float is to be within 0·003 to 0·009 in (0·08 to 0·23 mm).
   e. Adjustment of end-float is to be made by interchange of adjustment washer (*a* i) washer of appropriate thickness listed as follows.

Part No.	Colour	Thickness	
		in +0·001	mm ±0·25
129941	Metal	0·119	3·02
129942	Green	0·122	3·10
129943	Blue	0·125	3·17
129944	Orange	0·128	3·25
134670	Yellow	0·133	3·38

   f. Remove items from mainshaft but suitably identify selected adjustment washer for association with 2nd speed gear.



58. Check end-float of 1st speed gear bush on mainshaft.
   a. Temporarily fit to rear of mainshaft in order:
      i. Adjustment washer
      ii. Bush—1st speed gear
      iii. Thrust washer
      iv. Ball bearing. Tool S314
      v. Washer.
   b. Insert deeper portion of circlip in its groove in mainshaft to retain items and hold by hand.
   c. Drift bearing into close abutment with washer and circlip.
   d. Measure bush end-float on mainshaft using feeler gauges.



   e. End-float is to be 0·003 to 0·009 in (0·08 to 0·23 mm).
   f. Adjustment to end-float is to be made by interchange of adjustment washer (*a* i) with washer of appropriate thickness given in preceding list (57*e*).
   g. Remove items from mainshaft but suitably identify selected adjustment washer for association with 1st speed gear. Bearing extractor tool S4221A–15A.

Mainshaft and gears

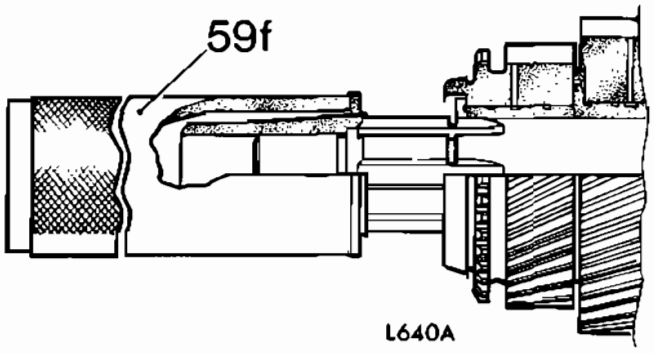
59. Assemble to front of mainshaft in order:
    a. Adjustment washer
    b. Assembled 2nd speed gear and bush
    c. Thrust washer
    d. Assembled 3rd speed gear and bush
    e. Sectioned washer
    f. Circlip. Tool S167
    g. 3rd/4th synchro. unit fitted with inner synchro. cup (short boss innermost).

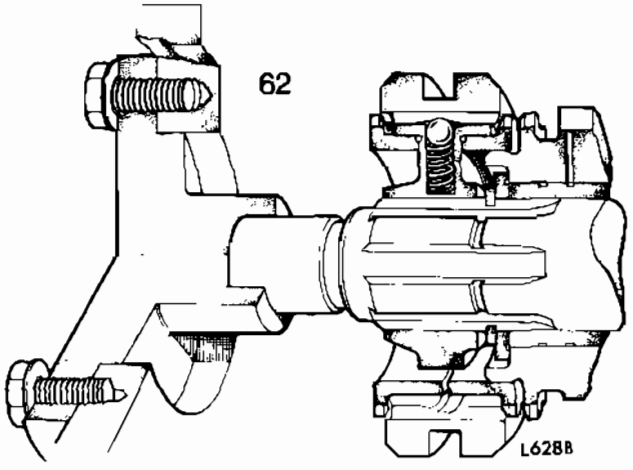
NOTE: Ensure correct assemblage of bush and gear (*b* and *d*) in that bush and gear oilways align.

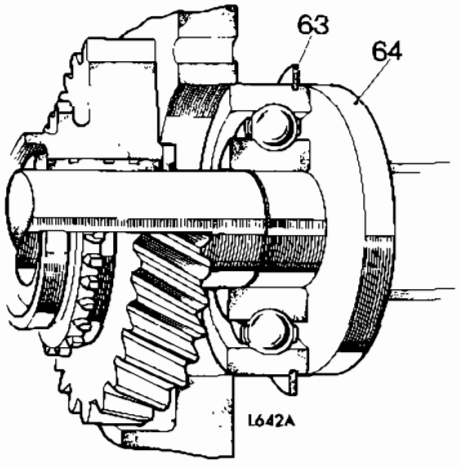
60. Assemble to rear of mainshaft in order:
    a. 1st/2nd synchro. unit fitted with synchro. cups
    b. Adjustment washer
    c. Assembled 1st speed gear and bush (see 59 Note)
    d. Thrust washer.

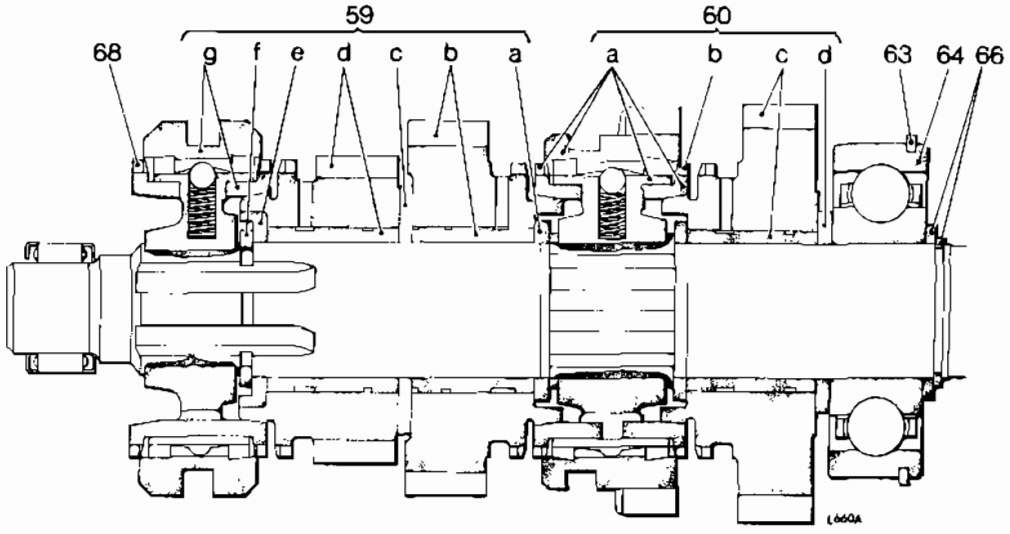
WARNING: It is recommended that several windings of card are lashed around mainshaft to rear of 1st speed gear to prevent its movement, thereby avoiding any possibility of personal damage when fitting mainshaft.

61. Enter rear of mainshaft through top cover and rear apertures of gearbox, respectively, and manœuvre mainshaft assemblies into position.
62. Fit tool S314 to gearbox and engage mainshaft front in tool.
63. Fit circlip to ball bearing o.dia.
64. Fit ball bearing to mainshaft and gearbox. Tool S314.
65. Remove tool S314 (fitted at 62).
66. Fit washer and circlip to mainshaft.
67. Protect rear end of mainshaft (hard brass block), then tap on rear end until inner face of mainshaft ball bearing is in close abutment with washer and circlip.
68. Fit outer synchro. cup to 3rd/4th synchro. unit.



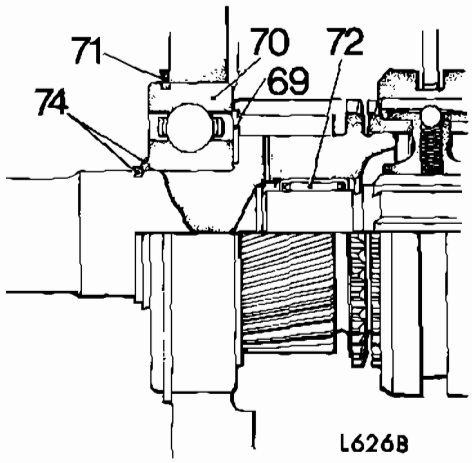






Constant pinion shaft

69. Apply grease to oil thrower and fit to constant pinion shaft.
70. Fit ball bearing (circlip groove outermost) to shaft. Tool S4221A–15A.
71. Fit circlip to ball bearing o.dia.
72. Fit and retain with grease, needle bearing into shaft bore.
73. Fit ball bearing and shaft to gearbox. Tool S314.
74. Fit washer and circlip to shaft.

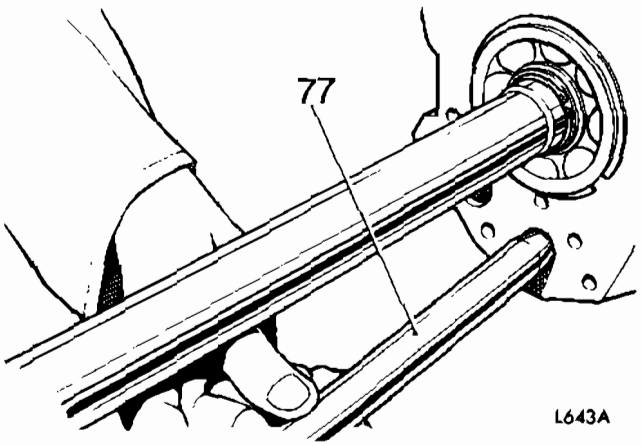


Synchro. cups

75. Prior to engaging countershaft gears, free synchro. cups with screwdriver.

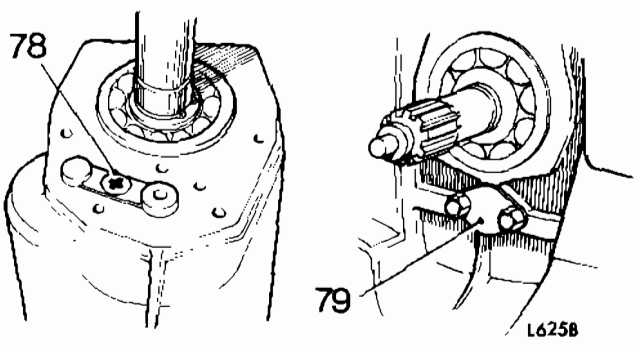
Countershaft

76. Carefully turn gearbox to sump uppermost position to engage countershaft gears—rotate by hand mainshaft and constant pinion shaft as necessary.
77. Align with the fingers, countershaft gears, front thrust bearing, then press home countershaft.
78. Retain spindles with retaining plate—one cross-recessed screw.
79. **Fit paper washer with sealing compound to cover-plate, then fit cover-plate—two screws and plain washers.**



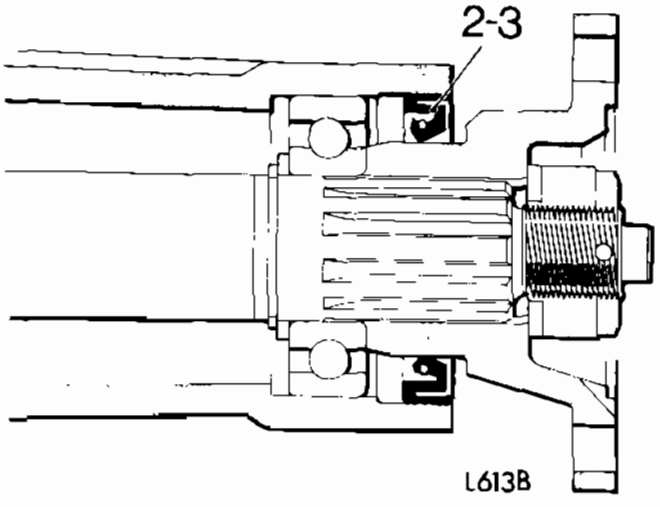
Complete gearbox build

80. Refit overdrive unit 40.20.07 (where applicable; *if not*, 81 to 84).
81. Refit speedometer drive gear. 37.25.01.
82. Refit rear extension. 37.12.01.
83. Refit drive flange. 37.10.01.
84. Refit speedometer drive gear housing and pinion. 37.25.09.
85. Refit front bearing plate. 37.12.22.
86. Refit clutch release mechanism. 33.25.12.
87. Refit top cover. 37.12.16.
88. Refit gearbox. 37.20.01.



REAR OIL SEAL

—Remove and refit **37.23.01**



Removing

1. Remove drive flange. 37.10.01.
2. Hook out oil seal from rear extension.

Refitting

3. Carefully tap oil seal—spring innermost—into rear extension until back wall of seal is flush with extension walls.
4. Refit drive flange. 37.10.01.

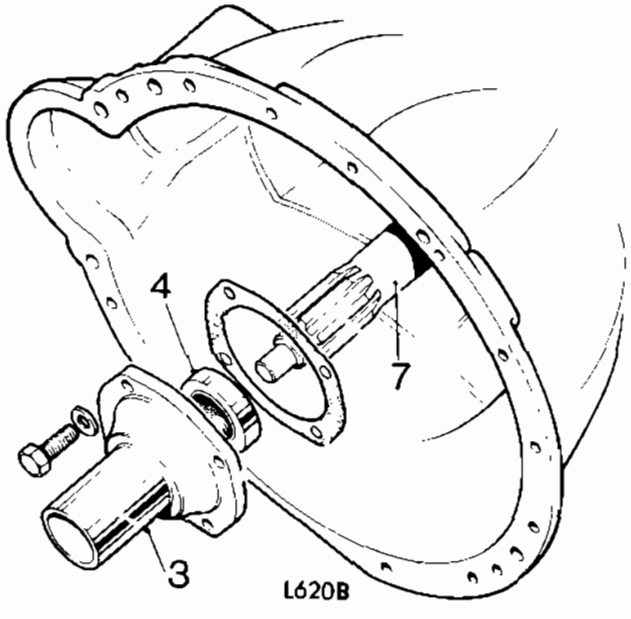
FRONT OIL SEAL

—Remove and refit **37.23.06**

Removing

1. Remove gearbox. 37.20.01.
2. Remove clutch release mechanism. 33.25.12.
3. Remove front bearing plate. 37.12.22.
4. Drift out oil seal from front bearing plate.

NOTE: If difficulty is experienced, machine out oil seal to 50·77 mm (1·999 in) i.dia. max. from front end cover.



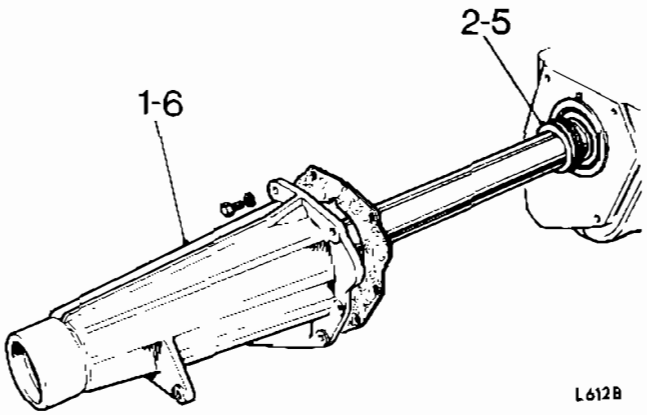
Refitting

5. Clean up front end cover seating diameter for oil seal.
6. Press oil seal into cover using a suitable sleeve (50·4 mm (1·984 in) old) and a hand press.
7. Clean up constant pinion shaft land for oil seal, using rouge paper.
8. Refit front bearing plate. 37.12.22.
9. Refit clutch and release mechanism.
10. Refit gearbox. 37.20.01.

SPEEDOMETER DRIVE GEAR

—Remove and refit **37.25.01**

Service tools: S314



Removing

1. Remove rear extension. 37.12.01.
2. Remove drive gear using suitable extractor.

Refitting

3. Ensure that mating surfaces on gear and mainshaft are unblemished.
4. Fit drive gear with four spots on the edge facing gearbox.
5. Drive home gear using tool S314.
6. Refit rear extension. 37.12.01.

SPEEDOMETER DRIVE GEAR HOUSING AND PINION

—Remove and refit **37.25.09**

Removing

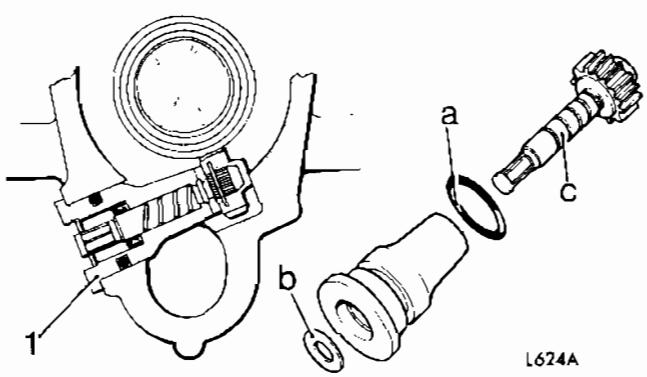
1. Disconnect speedometer drive cable.
2. Remove bolt, plain and spring washer retaining housing.
3. Carefully lever out speedometer pinion and housing.

Refitting

4. Clean gearbox housing bore.
5. Insert speedometer pinion and housing unit so that recess aligns with hole in rear extension.
6. Fit bolt, plain and spring washer to retain housing.
7. Re-connect speedometer drive cable.

SPEEDOMETER DRIVE GEAR HOUSING AND PINION

—Overhaul **37.25.13**



1. Remove drive gear housing and pinion. 37.25.09.

NOTE: Overhaul is confined to renewal of:

a. Outer 'O' ring
b. Inner oil seal
c. Pinion gear.

2. Renew the above parts as necessary.
3. Refit drive gear housing and pinion. 37.25.09.

REVERSE LIGHT SWITCH

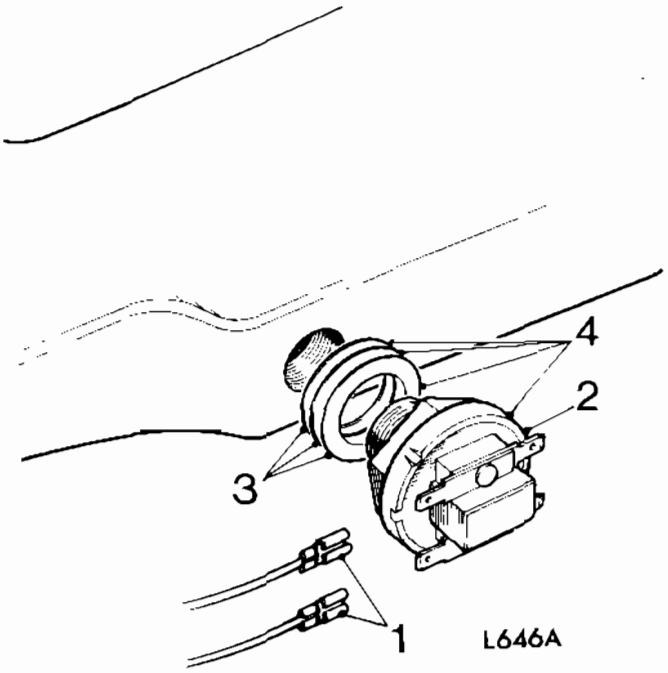
—Remove and refit **37.27.01**

Removing

1. Disconnect leads from switch.
2. Remove switch with open-ended spanner.
3. Collect and tag together shim washers.

Refitting

4. Fit switch together with removed shim washers—open-ended spanner.
5. Connect to switch terminals a simple battery and test lamp circuit.
6. Engage reverse gear—lamp should light. If lamp does not light, remove necessary number of shims until lamp lights.
7. Select reverse gear neutral—lamp should extinguish. If lamp does not extinguish, add shimming.
8. Repeat operations 6 and 7 until stipulated conditions are satisfied.
9. Remove test circuit.
10. Refit car leads to switch.



OVERDRIVE OPERATIONS

Isolator switch—remove and refit 40.24.04

Oil pump—remove and refit 40.18.01

Overdrive assembly
- —hydraulic pressure test 40.20.01
- —overhaul 40.20.10
- —remove and refit 40.20.07

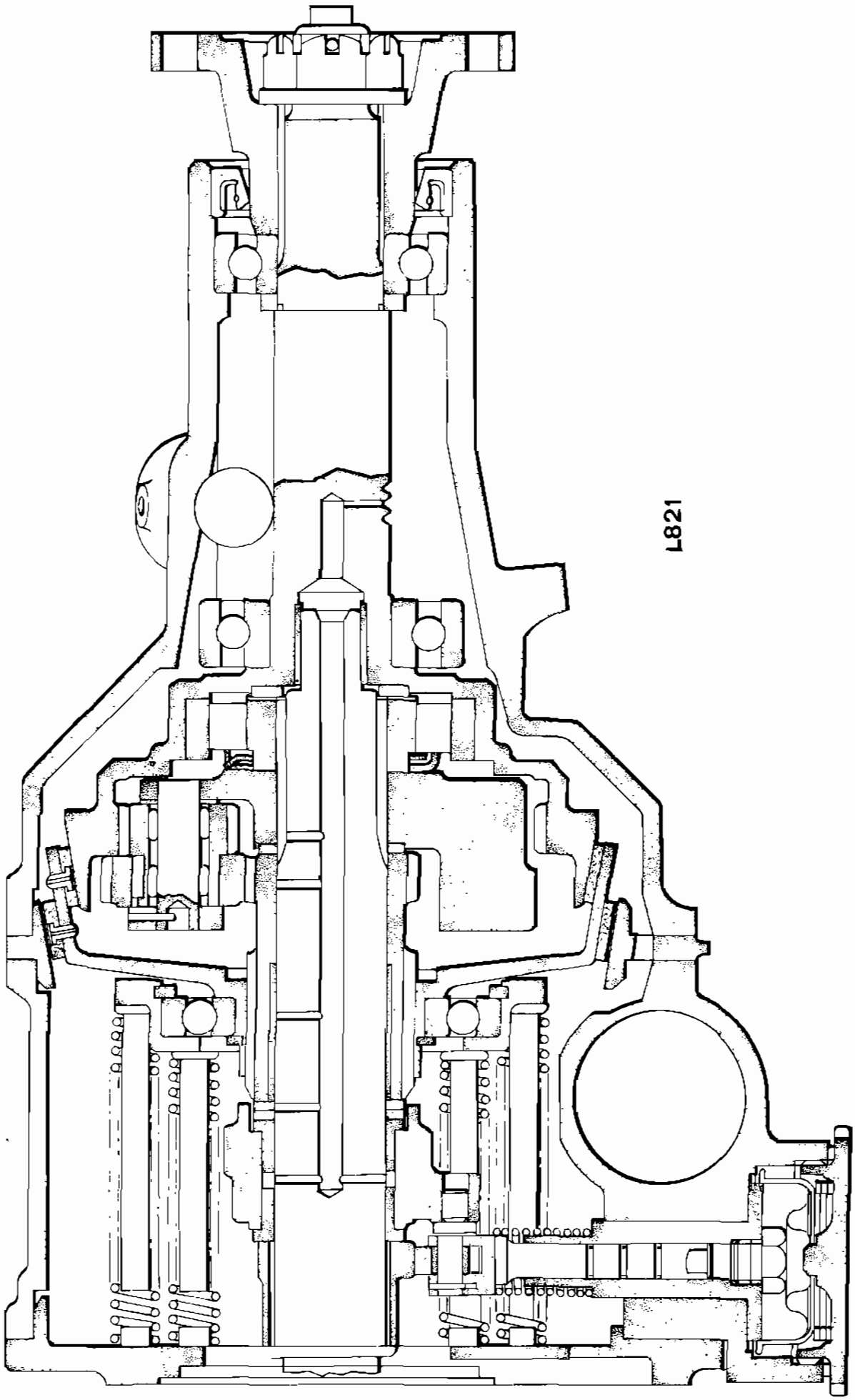
Rear oil seal—remove and refit 40.15.01

Selector switch—remove and refit 40.24.01

Solenoid
- —remove and refit 40.22.04
- —remove, refit and adjust operating valve 40.22.05
- —test and adjust 40.22.01

Sump filter—remove and refit 40.10.01

Valves
- —operating valve, remove, re-seat and refit 40.16.01
- —non-return valve, remove, re-seat and refit 40.16.10


L821

FAULT DIAGNOSIS AND RECTIFICATION

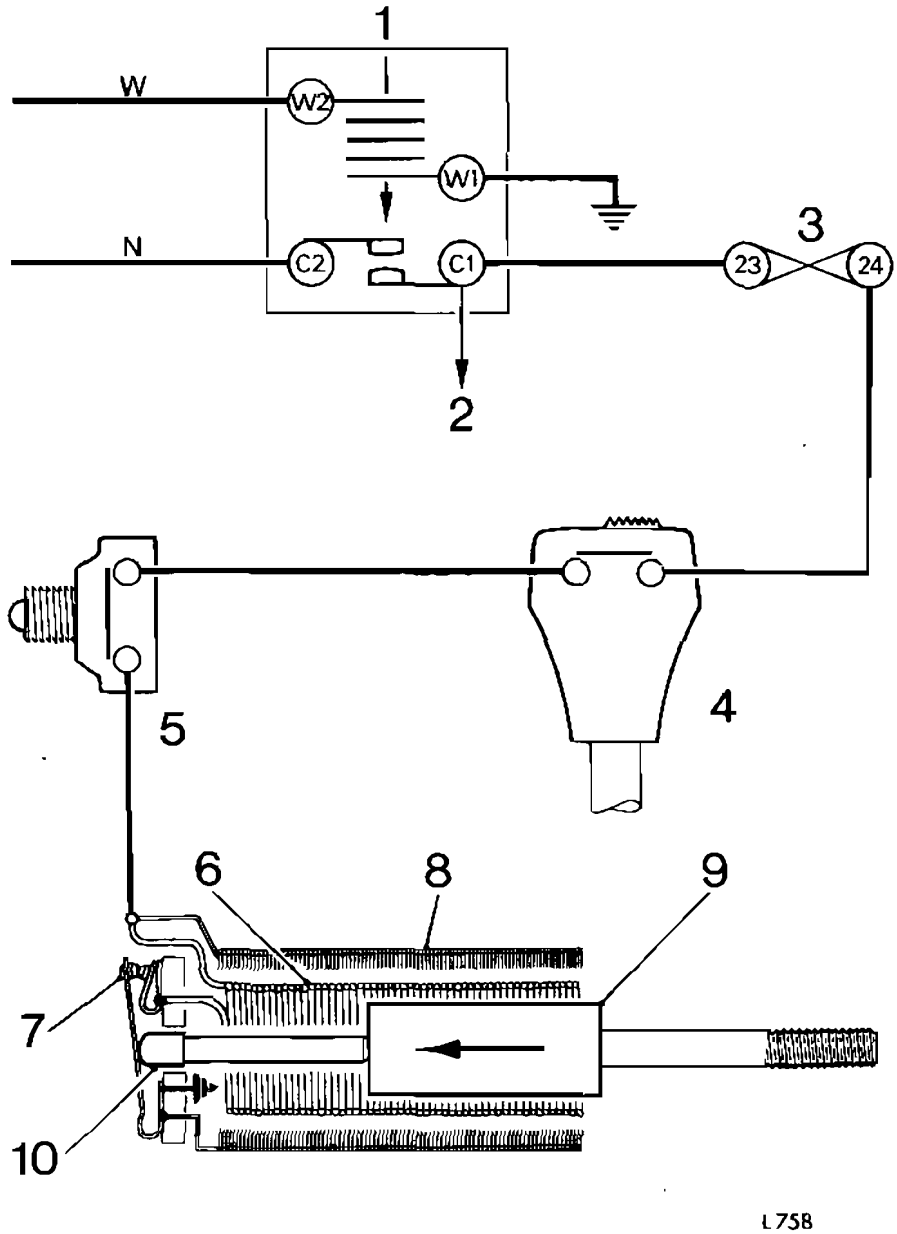
Fault	Possible Cause	Remedy
OVERDRIVE DOES NOT ENGAGE	*a.* Insufficient oil in unit *b.* Solenoid not energizing *c.* Solenoid energized—not operating *d.* Insufficient hydraulic pressure due to pump non-return valve not seating *e.* Insufficient hydraulic pressure due to worn accumulator *f.* Choked filter *g.* Pump damaged *h.* Operating valve leaking *j.* Internal damage	Top up gearbox/overdrive Check circuit Test and adjust. 40.22.01 Re-seat valve. 40.16.10 Overhaul unit. 40.20.10 Clean filter. 40.10.01 Remove and check. 40.18.01 Re-seat valve. 40.16.01 Overhaul unit. 40.20.10
*OVERDRIVE DOES NOT RELEASE	*a.* Fault in electrical control circuit *b.* Choked jet in operating valve *c.* Solenoid/lever incorrect *d.* Sticking clutch *e.* Internal damage	Check circuit Check valve. 40.16.01 Test and adjust. 40.22.01 See note † Overhaul unit. 40.20.10
CLUTCH SLIP IN OVERDRIVE	*a.* Insufficient oil in unit *b.* Solenoid lever out of adjustment *c.* Insufficient oil pressure due to pump non-return valve not seating *d.* Insufficient oil pressure due to worn accumulator	Top up gearbox/overdrive Adjust. 40.22.01 Re-seat valve. 40.16.10 Overhaul unit. 40.20.10
CLUTCH SLIP IN REVERSE AND FREE-WHEEL ON OVER-RUN	*a.* Solenoid lever out of adjustment *b.* Partially choked restrictor jet in operating valve *c.* Solenoid stop incorrectly set	Adjust. 40.22.01 Check valve. 40.16.01 Adjust. 40.22.01

* CAUTION: If, for any reason, the overdrive cannot be released **do not** reverse the vehicle as severe internal damage will result.

† NOTE: When a clutch is sticking on a new vehicle the probable cause is the linings not having bedded in sufficiently to release. Where this occurs the linings may usually be parted by striking the brake ring sharply with a hide mallet.

DATA

Clutch movement from direct to overdrive	0·110 to 0·120 in
Hydraulic operating pressure	480 to 500 lb/in²
Ratio	22%



Key to Overdrive Wiring Diagram

1. Ignition controlled relay*
2. Supply to other circuits
3. Overdrive fuse
4. Gear lever switch
5. Gearbox switch
6. Pull-in winding
7. Contacts
8. Hold-in winding
9. Plunger
10. Rod

* **NOTE:** This relay is not employed as a conventional overdrive relay.

SUMP FILTER

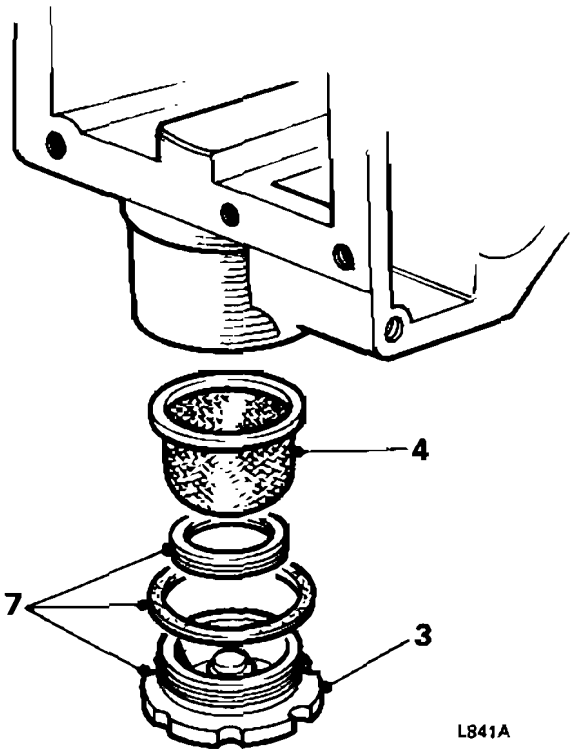
—Remove and refit **40.10.01**

Removing

1. Raise car on ramp.
2. Place a container to receive oil.
3. Remove guard and drain plug.
4. Lift out filter.
5. Clean filter and plug.

Refitting

6. Insert filter.
7. Fit drain plug with magnetic washers and new sealing washer.
8. Fit drain plug guard.
9. Top up gearbox/overdrive oil level.
10. Lower vehicle.



REAR OIL SEAL

—Remove and refit **40.15.01**

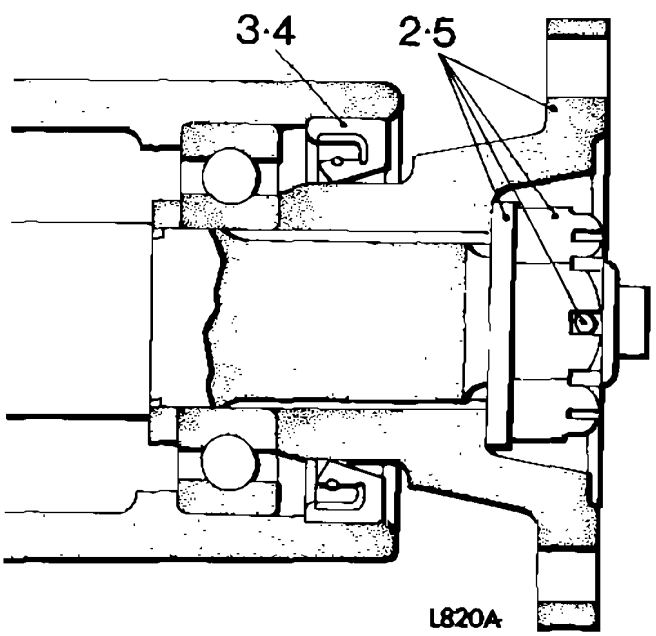
Service tool: L177A

Removing

1. Remove propeller shaft. 47.15.01.
2. Remove split pin, nut, washer and drive flange.
3. Prise out oil seal.

Refitting

4. Fit oil seal squarely into position with lip facing inboard and abutting against shoulder in case tool L177A.
5. **Fit drive flange, washer and nut, tightening to 90 to 120 lbf ft (12·4 to 16·6 kgf m). Secure with split pin.**
6. Fit propeller shaft. 47.15.01.

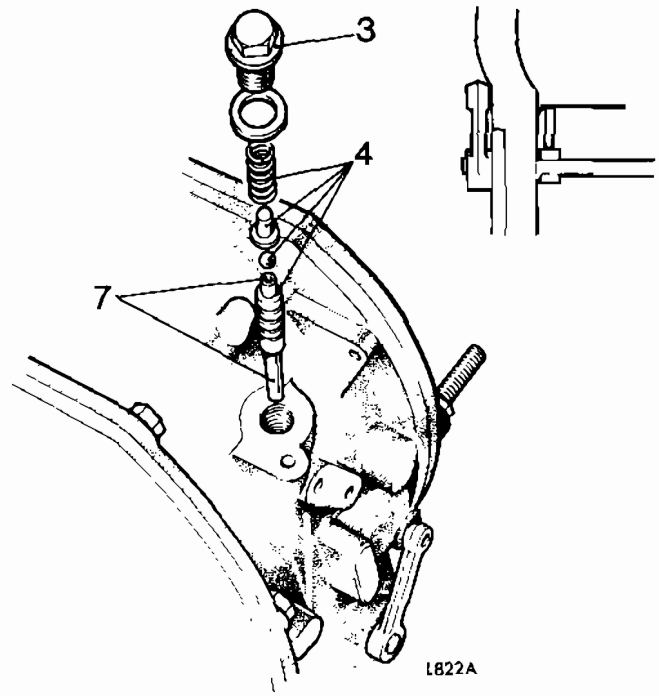


OPERATING VALVE

—Remove and refit **40.16.01**

Removing

1. Switch ignition ON, engage top gear, operate overdrive switch six times, switch off. This operation dissipates pressure in overdrive unit.
2. Lift front console tray, remove rubber grommet.
3. Use extension and socket to remove operating valve plug.
4. Use magnet to withdraw spring, plunger, ball and valve.
5. Insert ball into hole and onto its seat fit valve upside down so that the seat in the casing is facing the seat on the valve with the ball interposed.
6. Give the valve a sharp, gentle tap, remove the valve and ball.
7. Check the valve bore and outlet hole to ensure it is not choked.



Refitting

8. Reverse 1 to 4.

NON-RETURN VALVE

—Remove, re-seat and refit **40.16.10**

Operation 40.18.01, 1 to 10 and 22 to 34.

OIL PUMP

—Remove and refit **40.18.01**

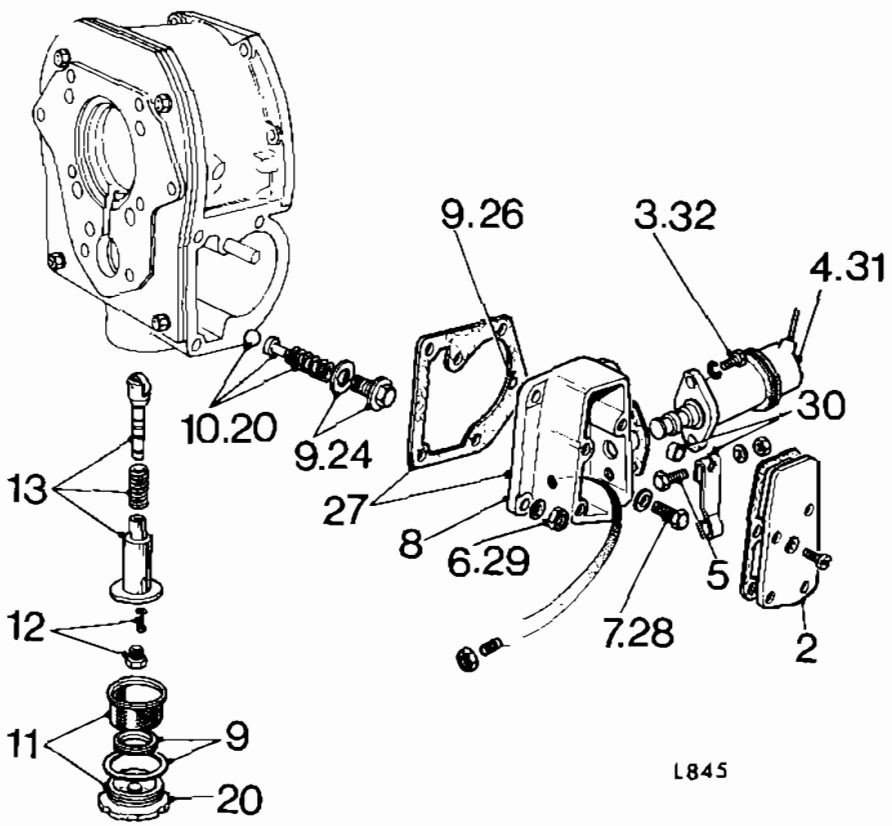
Service tools: L183A, L183A1, L183A2, L184

Removing

1. Raise vehicle, drain oil from overdrive.
2. Remove solenoid bracket cover and gasket, four screws.
3. Remove two screws securing solenoid to bracket.
4. Withdraw solenoid and plunger.
5. Slacken clamp bolt, withdraw operating fork and spacer.
6. Remove two nuts on solenoid bracket studs.
7. Progressively unscrew two bolts, with red painted heads, securing solenoid bracket.
   WARNING: To avoid personal injury remove nuts (6) before bolts (7) to enable the greater length of the bolts to progressively relieve the tension of the accumulator spring.
8. Remove solenoid bracket, collect 'O' ring from bracket recess or operating lever cross-rod.
9. Remove non-return valve plug.
10. Withdraw non-return valve spring, plunger and ball.
11. Remove sump filter.
12. Remove hexagon plug and two screws.
13. Fit tool L183A1 to pump and withdraw pump body, spring and piston.

Refitting

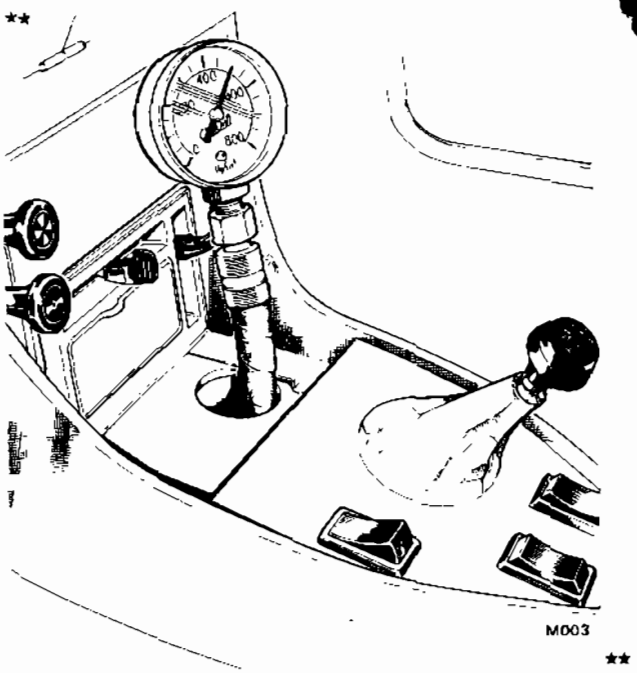
14. Fit guide pegs into bottom pump face holes.
15. Assemble plunger, spring and pump body.
16. Insert pump assembly over guide pegs with:
    a. Flat on plunger facing to the rear.
    b. Hole in pump body flange adjacent to hole in casing.
17. Drift pump into position. Tool L184.
18. Remove guide pegs, fit two screws and hexagon plug.
19. Fit sealing washers, magnetic washers and filter to drain plug.
20. Fit and tighten drain plug.
21. Fit drain plug guard.
22. Fit non-return valve ball on seat and tap with copper drift to seat ball.
23. Fit valve components; ball, plunger and spring.
24. Fit plug and sealing washer.
25. Check that accumulator spring and shims (where fitted) are in position.
26. Fit 'O' ring to solenoid bracket recess.
27. Fit solenoid bracket and gasket.
28. Fit and evenly tighten the two red-headed screws.
29. Fit and tighten two nuts.
30. Fit spacer and solenoid operating lever.
31. Fit solenoid, inserting plunger in yoke of operating lever.
32. Fit and tighten two solenoid retaining screws.
33. Test and adjust solenoid. 40.22.01
34. Top up gearbox and overdrive oil level, run vehicle and re-check oil level.



OVERDRIVE ASSEMBLY

—Hydraulic pressure test 40.20.01

Service tool: L188



1. Lift the front console tray, remove rubber grommet.
2. Switch ignition ON, top gear, overdrive IN and OUT six times.
3. Use socket and extension to remove operating valve plug.
4. Fit hydraulic test guage tool L188 to operating valve orifice.
5. Road-test or jack up vehicle and run engine with and without overdrive.
6. Note the gauge reading which should be 480 to 500 lb/in².
7. Switch engine off, ignition on, top gear, overdrive in and out six times to dissipate oil pressure.
8. Remove gauge, refit operating valve plug.
9. Fit rubber grommet and front console tray.

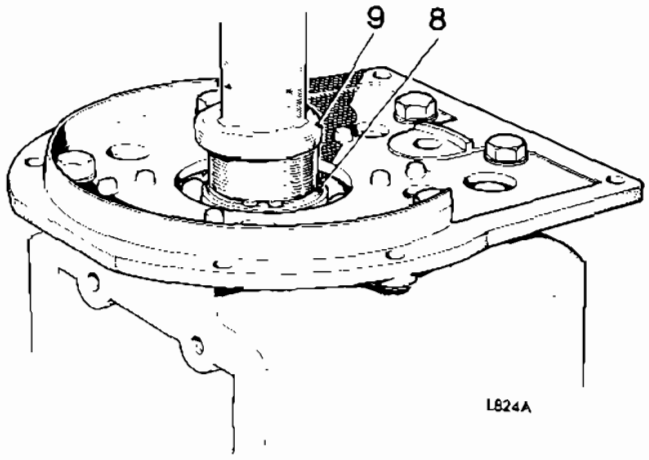
NOTE: Lack of oil pressure when overdrive selected may indicate a fault in the pump non-return valve. 40.16.10. Lack of oil pressure when overdrive not selected may indicate a fault in the operating valve. 40.16.01.

OVERDRIVE ASSEMBLY

—Remove and refit **40.20.07**

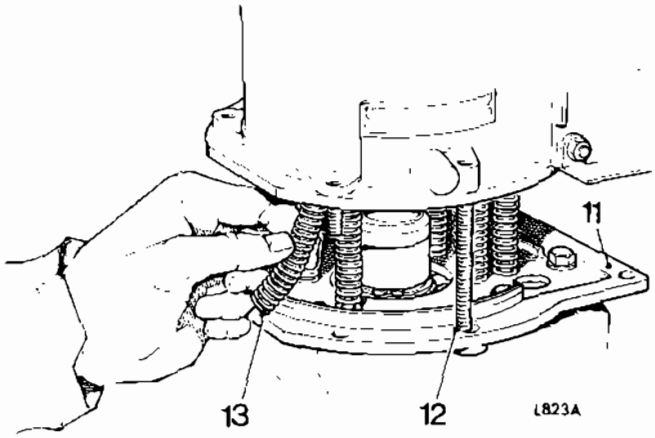
Removing

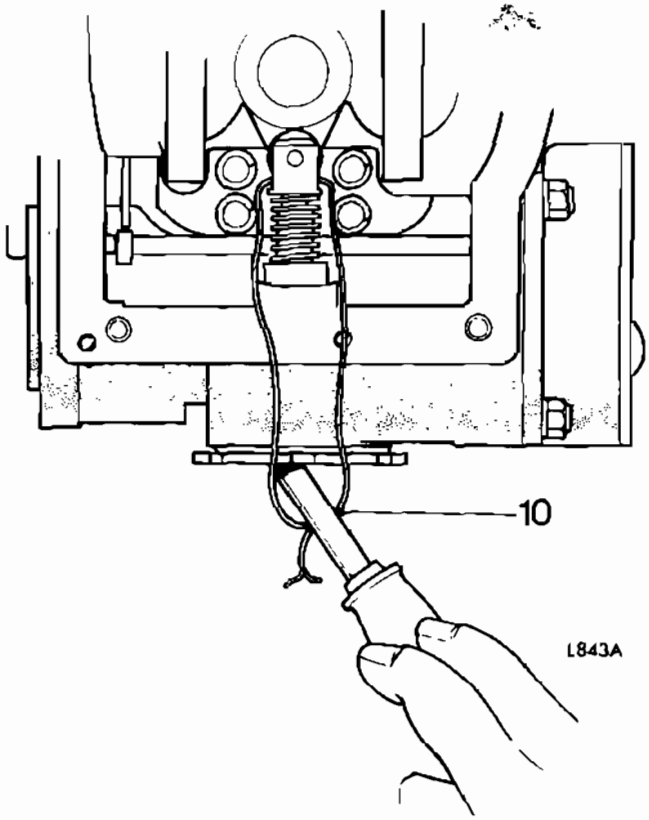
1. Remove gearbox. 37.20.01.
2. Drain gearbox and overdrive units of oil.
3. Place gearbox, bell housing flange down, on bench.
4. Remove four nuts on **short** studs securing overdrive to gearbox.
5. Remove, evenly, the nuts on long studs securing overdrive to gearbox.
6. Lift off overdrive unit, collect eight overdrive clutch return springs.



Refitting

7. Use a dummy mainshaft to ensure that the splines on the uni-directional clutch and the sun wheel are aligned.
8. Check that pump cam is fitted to mainshaft with long, plain end towards the gearbox.
9. Rotate mainshaft until narrowest part of cam is towards bottom of gearbox.
10. Thread a length of soft iron wire through the pump plunger and form it into a continuous loop just below sump level.
    NOTE: The plunger of the oil pump must be depressed whilst fitting the overdrive to allow it to come up below the drive cam when fitted.
11. Fit gasket to adaptor plate.
12. Remove dummy mainshaft and position overdrive over mainshaft with the two long studs slightly misaligned to hold overdrive and gearbox apart.
13. Fit clutch return springs into position with shorter springs on inner posts and locating all springs on their posts and resting over bosses on adaptor plate.
14. Line up long studs and lower overdrive into position, turning drive flange to line up splines of mainshaft and sun wheel/uni-directional clutch.
15. Fit nuts and washers to two long studs and evenly tighten whilst using a screwdriver through the loop of wire to depress pump plunger.
    CAUTION: Locking of the unit before it is tightened down indicates either (*a*) splines not aligned correctly or (*b*) cam and pump fouling. Do not try to force units together but slacken off, investigate cause, rectify and repeat.
16. When the faces are 0·25 in (6 mm) apart cut wire loop and pull out carefully ensuring that all of the wire is removed.
17. Tighten nuts, fit and tighten remaining nuts and washers.
18. Refit gearbox. 37.20.01.





OVERDRIVE ASSEMBLY

—Overhaul **40.20.10**

Service tools: L178, L182, L183A, L183A1, L183A2, L184, L185A, L188, L190A

CAUTION: The internal working parts and oil ways are particularly vulnerable to dirt; for this reason it is most important that a clinical standard of cleanliness is maintained throughout the following operation.

Dismantling

1. Remove the overdrive assembly. 40.20.07.
2. Remove eight clutch return springs.
3. **Unscrew four locknuts and remove the two bridge pieces.**
4. Remove six nuts securing front to rear casings.
5. Separate casings and brake ring.
   CAUTION: The use of a lever or screwdriver to separate the casings will damage the mating faces and result in oil leakage. Use a hide hammer to cases that are tight.

Rear casing

6. Withdraw clutch sliding member.
7. Remove sun wheel and planet carrier.
8. Cover the uni-directional clutch with tool L178 and draw the clutch into the tool with the fingers.
9. Withdraw bronze thrust washer.
10. Remove split pin, nut and washer securing drive flange to tail shaft.
11. Withdraw drive flange,
12. Remove rear oil seal.
13. Remove speedometer drive pinion and housing.
14. Press annulas from rear casing.
15. Remove spacing washer from annulas tail shaft.
16. Remove front bearing from annulas.
17. Drive rear bearing from casing.

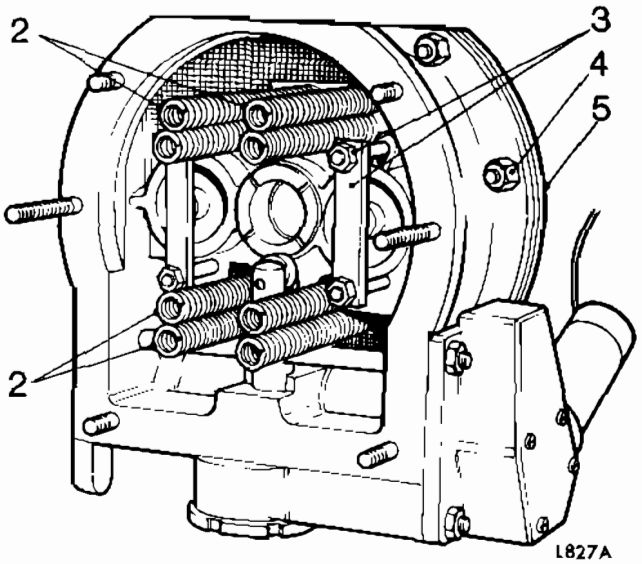
Clutch sliding member

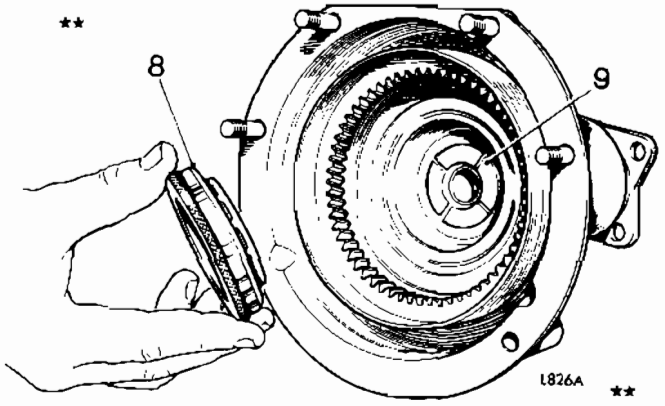
18. Remove circlip and carefully separate clutch member and drive ring assembly.
19. Remove circlip and press bearing from drive ring.

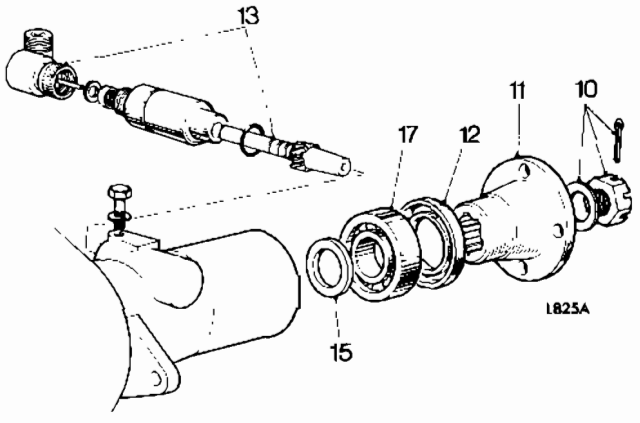
Front casing

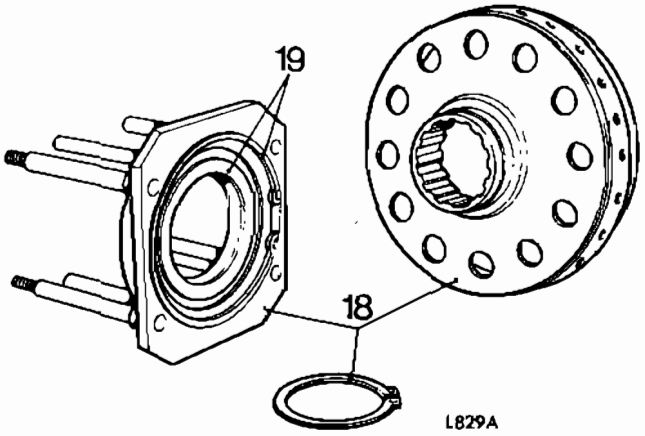
20. Remove bronze and steel thrust washers.

continued









Operating valve

21. Remove operating valve plug a, copper washer b, and withdraw valve components—spring c, plunger d, ball e and valve f.
22. Remove operating pistons using grips and withdrawing with a rotary pull.

Solenoid

23. Remove four screws and lift off solenoid coverplate.
24. Remove two screws securing solenoid.
25. Remove solenoid, easing plunger from yoke of operating lever.
26. Release clamp bolt and remove operating lever and spacer.
27. Remove two nuts from studs securing solenoid bracket.

WARNING: Remove the nuts (27) before slackening setscrews (28) as the accumulator spring, under tension, must be slackened progressively to avoid the risk of personal injury.

28. Progressively slacken the two setscrews with heads painted red securing solenoid bracket to casing.
29. Remove solenoid bracket.
30. Collect 'O' ring from cross-rod or solenoid bracket.

Accumulator

31. Remove accumulator spring, shim washers and tube.
32. Insert tool L182 into bore of accumulator sleeve, turn lower lever to loek in position, withdraw accumulator by turning and pulling upper lever.
33. Separate sleeve and piston.

Non-return valve

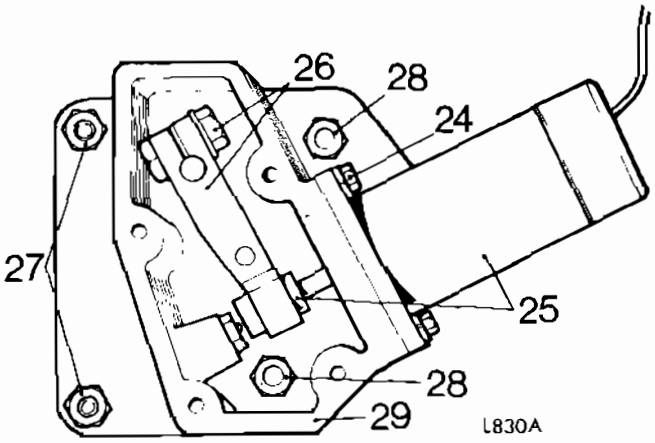
34. Remove hexagon plug a, copper washer b and valve components— spring c, plunger d and ball e.

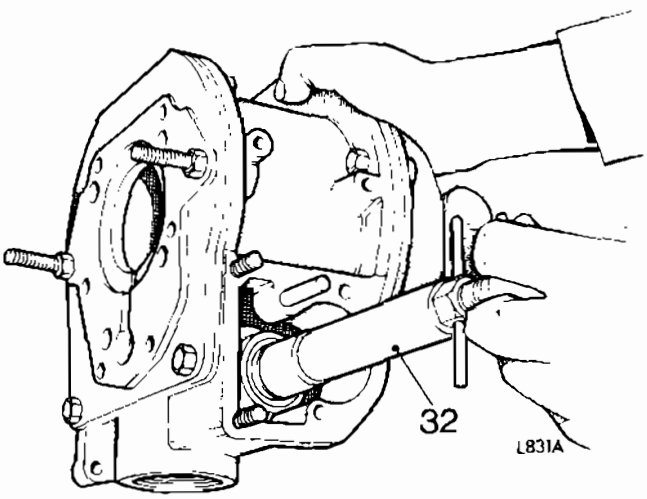
Pump

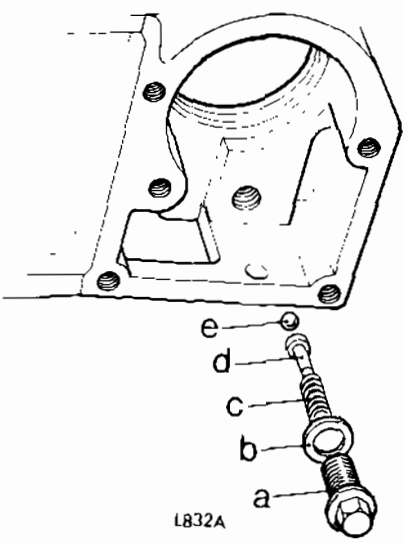
35. Remove sump plug, sealing washer and magnetic washers.
36. Remove filter.
37. Remove hexagon plug and two screws.
38. Fit tool L183A1 to pump and withdraw pump body a, spring b and piston c.

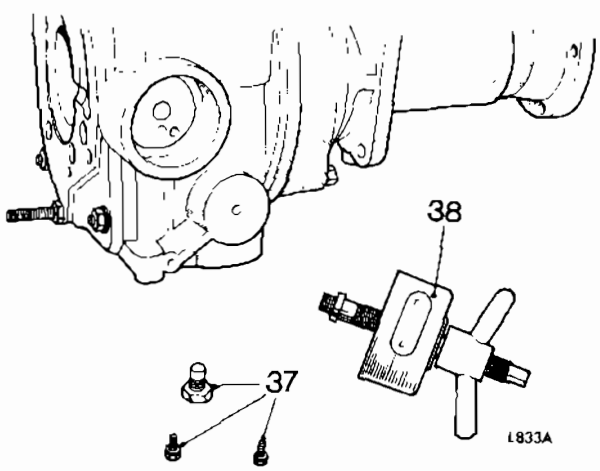
Inspection

39. Clean all components.
40. Inspect all gears, bearings, bushes, working surfaces and oilways for evidence of undue wear and blockage in accordance with good engineering practice. Renew as necessary.
41. Renew all 'O' rings, oil seals and gaskets. Lubricate all 'O' rings with petroleum jelly prior to fitting.







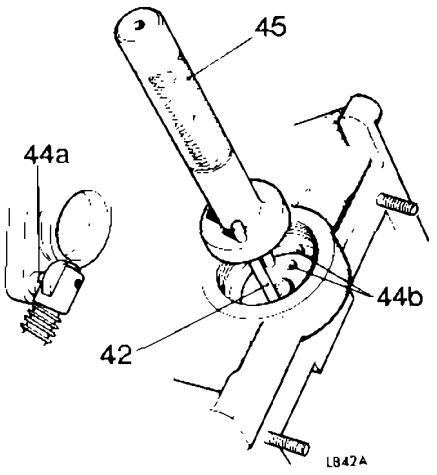


Reassembly

Front casing

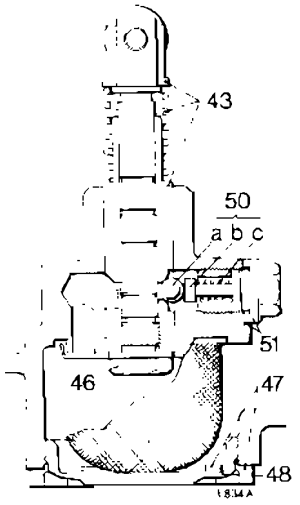
Pump

42. Fit guide pegs into holes in bottom pump face.
43. Assemble plunger, spring and pump body.
44. Insert pump assembly over guide pegs with (*a*) flat on plunger against guide dowel (below centre bronze bush) and (*b*) hole in pump body flange adjacent to hole in casing.
45. Drift pump into position using L.184 (drift).
46. Remove guide pegs, fit two screws and base plug.
47. Fit sealing washer, magnetic washers and filter to drain plug.
48. Fit and tighten drain plug and guard assembly.



Non-return valve

49. Fit ball (0·25 in dia.) on seat and tap with copper drift to seat ball.
50. Fit valve components—(*a*) ball, (*b*) plunger, (*c*) spring.
51. Fit and tighten copper washer and hexagon plug.

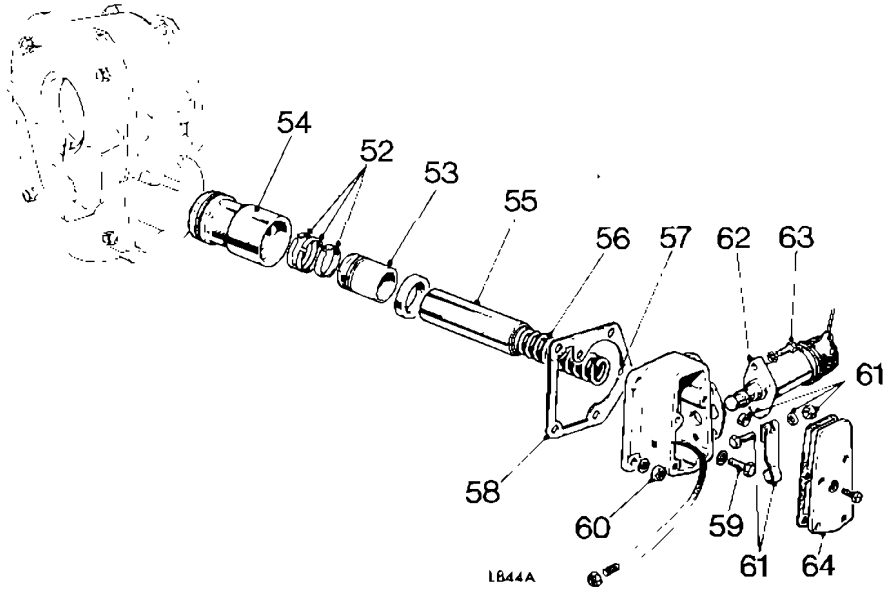


Accumulator

52. Fit rings to piston—two wide inners; four thin outers.
53. Fit piston to sleeve using tool L.179.
54. Fit 'O' ring to sleeve.
55. Ease sleeve into bore and push home using accumulator tube.
56. Fit accumulator spring and shims (where fitted).
    CAUTION: When accumulator spring shims are fitted they must be replaced. Fitting washers of greater thickness can cause a pressure build-up where a spring becomes coil-bound and the blow-off holes are not uncovered by the piston.
57. Fit 'O' ring to solenoid bracket recess.
58. Fit solenoid bracket and gasket.
59. Fit and tighten evenly the two red-headed set screws.
60. Fit and tighten nuts and washers.

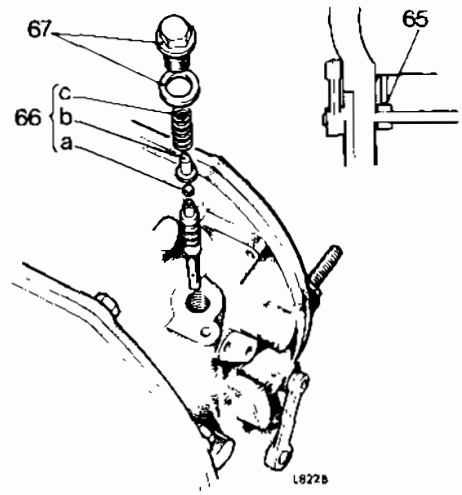
Solenoid

61. Fit spacers and solenoid-operating lever, securing with clamp bolt.
62. Fit solenoid, inserting plunger to yoke of operating lever.
63. Fit and tighten two solenoid retaining screws.
64. Fit solenoid cover.
    NOTE: When the overdrive is rebuilt the solenoid will require adjustment (40.22.01) so fit solenoid cover screws finger tight only.



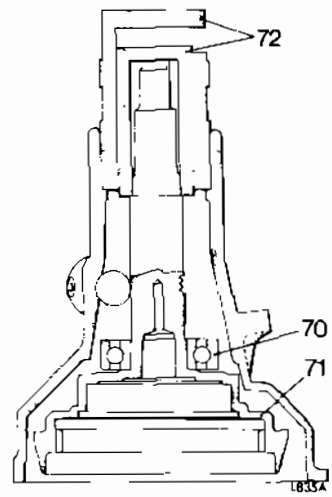
Operating valve

65. Insert valve into casing, ensuring that the hemispherical head engages on the flat of the cam on the operating cross-shaft.
66. Drop the 0·3125 in dia. ball (*a*) on its seat, insert plunger (*b*) and spring (*c*).
67. Fit and tighten plug and copper washer.
68. Fit 'O' rings to operating pistons.
69. Fit pistons to bores.



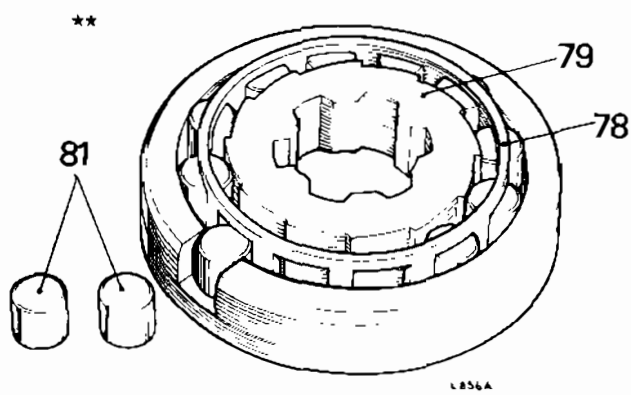
Rear casing

70. Press the front bearing into the rear casing until it abuts against the shoulder in the casing.
71. Press the annulas into the front bearing in casing.
72. Fit gauge L190A over the tailshaft until the outer member contacts the rear bearing shoulder in the casing.
73. Press down the inner member (L190A) and select a spacing washer which will just fit in slot in gauge.
NOTE: Spacing washers are available as follows: Part No. 500623 suffix E 0·146 in; F 0·151 in; G 0·156 in; H 0·161 in; J 0·166 in.
74. Remove gauge, fit selected washer.
75. Drive rear bearing into position.
76. Fit rear oil seal squarely until it abuts on casing shoulder.
77. Fit rear drive flange, washer, nut and split pin.



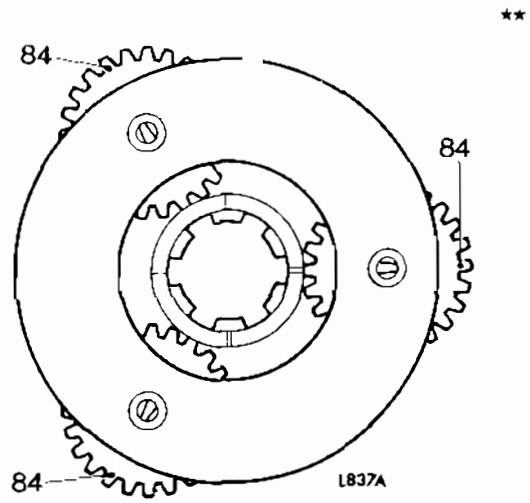
Uni-directional clutch

78. Assembly spring into roller cage.
79. Fit inner member and engage on other end of spring.
80. Engage the slots of the inner member with the tongues of the cage so that the spring rotates the cage and rollers (when fitted) up the inclined face of the inner member.
81. Place assembly, front end down, into tool L178 and insert rollers through slot in tool, turning clutch clockwise until all rollers are in place.
82. Fit thrust washer into annulas recess.
83. Fit uni-directional clutch and tool to annulas, slide clutch from tool into its outer bearing in annulas, remove tool.



Planet carrier

84. Rotate each of the three planet gears until a spot, punched on the outside of each gear, is positioned radially outwards.
85. Insert sun wheel, meshing with planets and keeping dots in position.
86. Insert planet carrier and sun wheel into annulas, meshing gears whilst so doing.



continued

Sun wheel end-float

87. Insert dummy mainshaft tool L185A and turn sun wheel until shaft engages the planet carrier and uni-directional clutch splines.
88. Fit a thrust washer of known thickness plus steel and bronze thrust washers over dummy shaft until they rest on sun wheel.
89. Fit brake ring to front casing, tap fully home.
90. Fit front casing to rear until abutted on washers on dummy shaft.
91. Use feeler gauges to measure gap between cases which should be the thickness of the additional washer fitted at 88 minus the required end-float 0·008 to 0·014 in (0·20 to 0·35 mm).

Example (*a*):

Noted thickness of additional washer	0·125 in
Gap between flanges	0·114 in
End-float	0·011 in

As this end-float is within limits the existing washers are satisfactory.

Example (*b*):

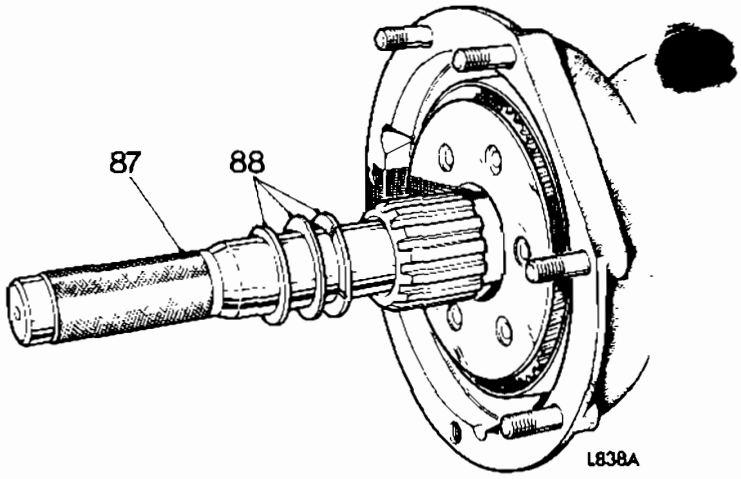
Noted thickness of additional washer	0·125 in
Gap between flanges	0·123 in
End-float	0·002 in

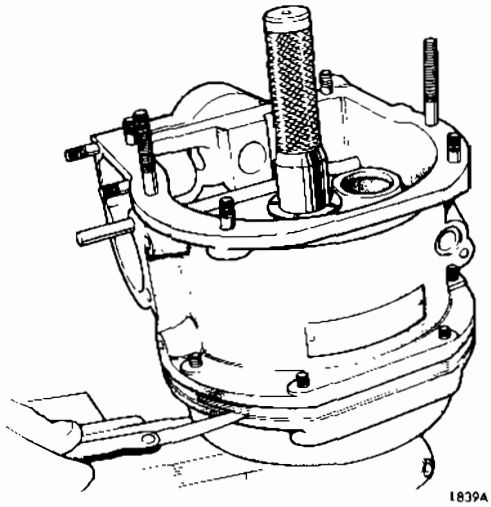
In this example 0·002 in end-float is not sufficient and a steel washer 0·006 to 0·012 in thicker than the existing washer must be fitted.

Washers are available in the following thicknesses in inches:

Part No. 500588 Suffix A. 0·113 to 0·114; B. 0·107 to 0·108; C. 0·101 to 0·102; D. 0·095 to 0·096; E. 0·089 to 0·090; F. 0·083 to 0·084; G. 0·077 to 0·078.

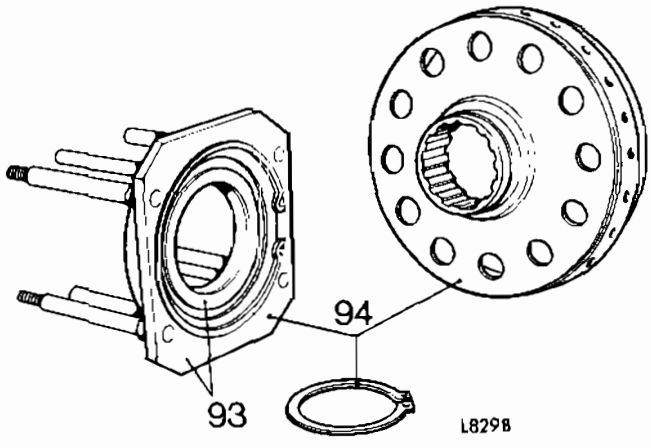
92. On selection of correct washer, separate casings.





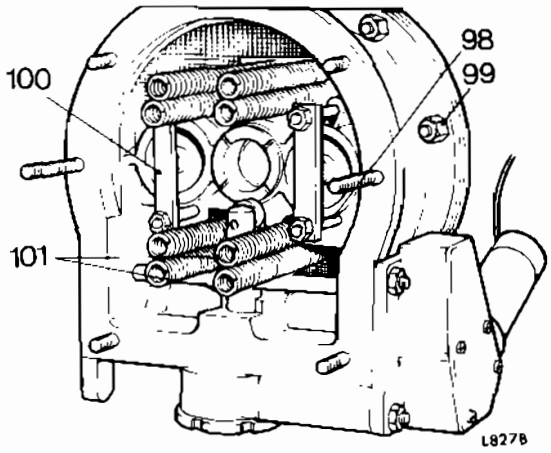
Clutch sliding member

93. Press bearing evenly into thrust ring, secure with circlip.
94. Press thrust ring assembly on the hub of clutch sliding member, secure with circlip.
95. Fit sliding member assembly engaging with splines of sun wheel.



Re-assemble casings

96. Coat flanges of brake ring with jointing compound and fit to front case.
97. Fit steel washer, selected at 91, then bronze washer into recess in front case; use a smear of grease to retain them in position.
98. Join the front to rear case locating thrust ring posts through holes in front case, ensure thrust washers (97) are still located.
99. Fit and tighten nuts securing front to rear case.
100. Fit bridge pieces securing with new locknuts.
101. Fit eight clutch springs, four short ones on inner posts.
102. Fit overdrive assembly to gearbox. 40.20.07.



SOLENOID

—Test and adjust **40.22.01**

Testing

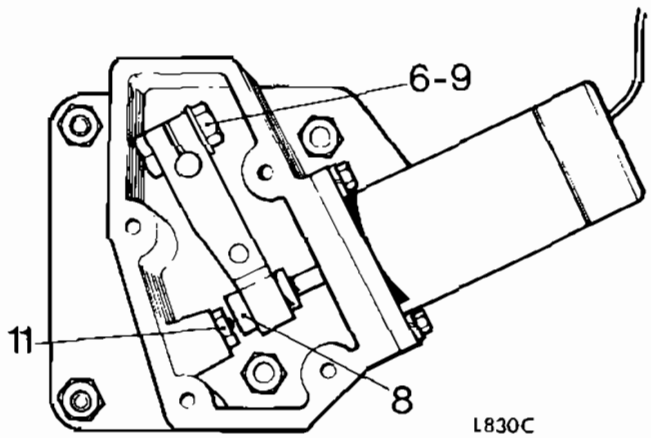
1. Raise vehicle.
2. Connect an ammeter into solenoid feed circuit.
3. Switch ignition ON, top gear, overdrive IN.
4. Note and act on the following accordingly.

***a*. The setting lever will move to a position where its alignment hole is coincident with a hole in the casing (test alignment) by inserting a 0·1875 in (4·5 mm) i.e. $\frac{3}{16}$" drill shank through hole in lever and into casing hole). The ammeter will drop to holding current of 1 to 2 amps immediately after switching on. Test satisfactory.**

b. No current to solenoid check circuit.

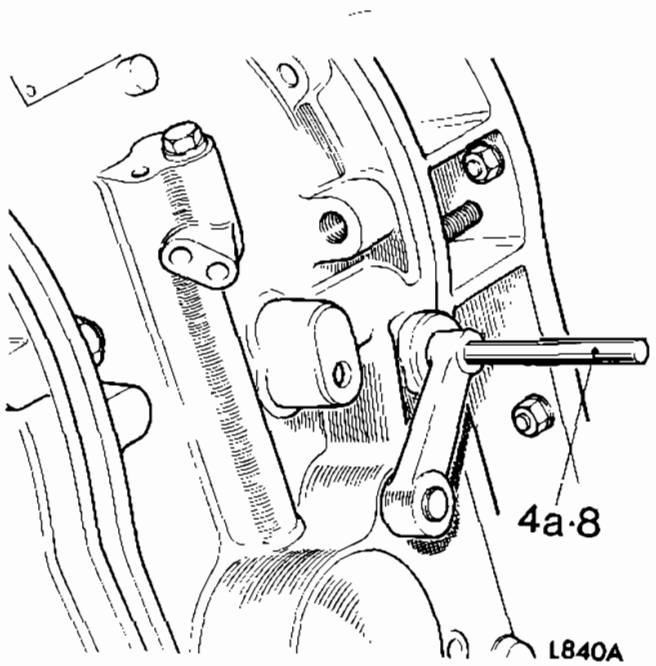
c. Setting lever correctly aligned, ammeter reading high—renew solenoid. 40.22.14.

d. Setting lever incorrectly aligned, ammeter reading correct/incorrect—adjust operating lever.



Adjusting operating lever

5. Remove four screws and lift off solenoid bracket cover.
6. Slacken clamp bolt on operating lever.
7. Check, ignition ON, top gear, overdrive IN.
8. **Position a 0·1875 in (4·5 mm) i.e. $\frac{3}{16}$" drill shank through hole in setting lever and alignment hole in case. Push plunger into solenoid to its limit, holding lever fork against collar of plunger.**
9. Tighten clamp bolt on operating rod.
10. Switch off, re-check 4 till condition 4*a* exists.
11. **Adjust the stop to provide 0·0625 in (1·6 mm) free movement by slackening locknut and turning grub screw with an Allen key. Later units have a non-adjustable rubber stop.**
12. Fit cover and gasket, tighten four screws.



SOLENOID

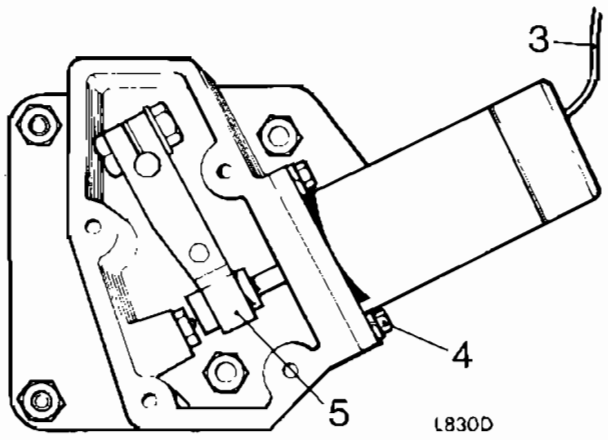
—Remove and refit **40.22.04**

Removing

1. Raise vehicle.
2. Remove solenoid bracket. cover and gasket, four screws.
3. Disconnect solenoid cable.
4. Remove two screws securing solenoid to bracket.
5. Withdraw solenoid and plunger (release plunger from operating lever fork).

Refitting

6. Reverse 1 to 5.



SOLENOID

—Remove, refit and adjust operating lever **40.22.05**

Operation 40.22.04 plus operation 40.22.01, 5 to 12.

SELECTOR SWITCH

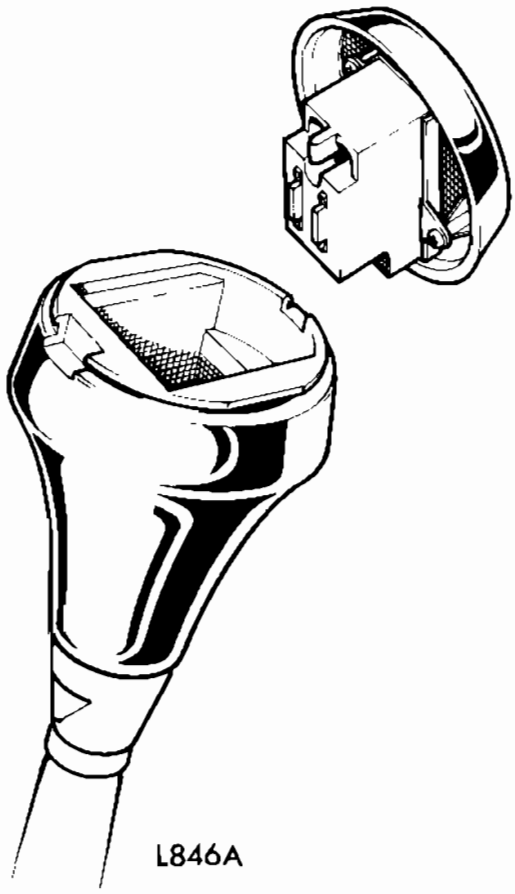
—Remove and refit **40.24.01**

Removing

1. Prise cap from gear lever knob (a slot at the rear of the knob enables a blade to be inserted).
2. Pull two wires from switch connections.

Refitting

3. Connect wires to switch connections.
4. Clip cap to gear knob.



ISOLATOR SWITCH

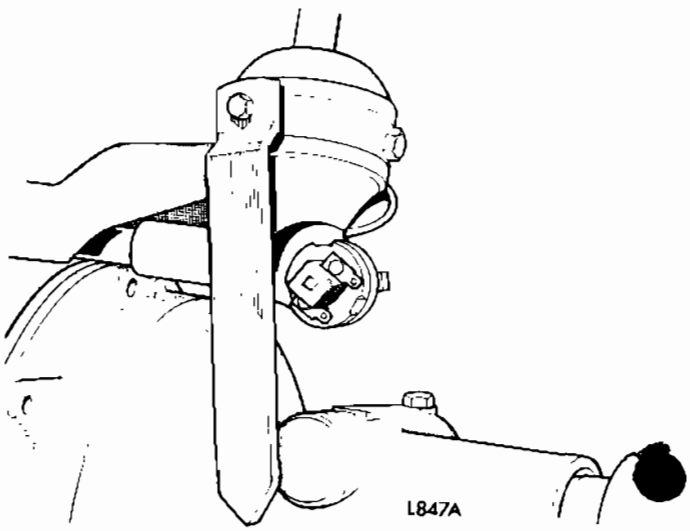
—Remove and refit **40.24.04**

Removing

1. Remove gear lever draught excluder. 37.16.05.
2. Disconnect switch.
3. Remove bolt and nut from switch bracket.
4. Raise vehicle, remove switch and bracket from below vehicle.
5. Separate switch and bracket.

Refitting

6. Reverse 1 to 5.



AUTOMATIC TRANSMISSION OPERATIONS

Air pressure checks	44.30.16
Dipstick/filler tube—remove and refit	44.24.01
Downshift cable—adjust	44.30.02
—initial setting	44.30.01
—pressure check	44.30.03
—remove and refit	44.15.01
Front brake band—adjust	44.30.07
—remove and refit	44.10.01
Front clutch—overhaul	44.12.10
—remove and refit	44.12.04
Front pump—overhaul	44.32.04
—remove and refit	44.32.01
Front servo—overhaul	44.34.10
—remove and refit	44.34.07
Gearbox—overhaul	44.20.06
—remove and refit	44.20.01
—selector lever—remove and refit	44.15.09
Governor—overhaul	44.20.04
—remove and refit	44.20.01
Hand lever turret —overhaul	44.15.05
—remove and refit	44.15.04
Oil cooler—remove and refit	44.24.10
—pipes —gearbox and feed pipe—remove and refit	44.24.20
—pipes —gearbox and return pipe —remove and refit	44.24.21
—pipes —hose and pipe to cooler —remove and refit	44.24.13
Output shaft—remove and refit	44.36.01
Planet gears/rear drum assembly—remove and refit	44.36.04
Rear brake band —adjust	44.30.10
—remove and refit	44.10.09
Rear clutch—overhaul	44.12.13
—remove and refit	44.12.07
Rear extension—remove and refit	44.20.15
Rear oil seal—remove and renew	44.20.18
Rear servo—overhaul	44.34.16
—remove and refit	44.34.13
Restrictor valve	44.24.22
Road test	44.30.17

AUTOMATIC TRANSMISSION OPERATIONS—*continued*

Selector rod—adjust 44.30.04
—remove and refit 44.15.08

Speedometer
drive gear—remove and refit 44.30.07
drive pinion—remove and refit 44.38.04

Starter inhibitor/reverse lamp switch—adjust 44.15.14
– remove and refit 44.15.15

Torque converter– remove and refit 44.17.07
—housing—remove and refit 44.17.01

Transmission
fluid– drain and refill 44.24.02
sump—remove and refit 44.24.04

Uni-directional clutch—remove and refit 44.12.16

Valve block—overhaul 44.40.04
—remove and refit 44.40.01

IMPORTANT

Under agreements existing between Borg-Warner Limited and the car manufacturers, the former does NOT undertake the servicing of automatic transmission units, nor do they supply spare parts or special tools. All matters appertaining to service or spares must therefore be dealt with by Triumph Distributors or Dealers within the organization.

UNIT IDENTIFICATION

A serial number prefix 9EZ appears on a green nameplate on the left-hand side of the transmission case.

TRANSMISSION DATA

	Top (3rd)	Intermediate (2nd)	Low (1st)	Reverse
Gearbox ratios	1 : 1	1·45 : 1	2·39 : 1	2·09 : 1

Converter reduction .. .. .. Infinitely variable between 1—2·3 operating in all gears

AUTOMATIC TRANSMISSION—SHIFT SPEEDS

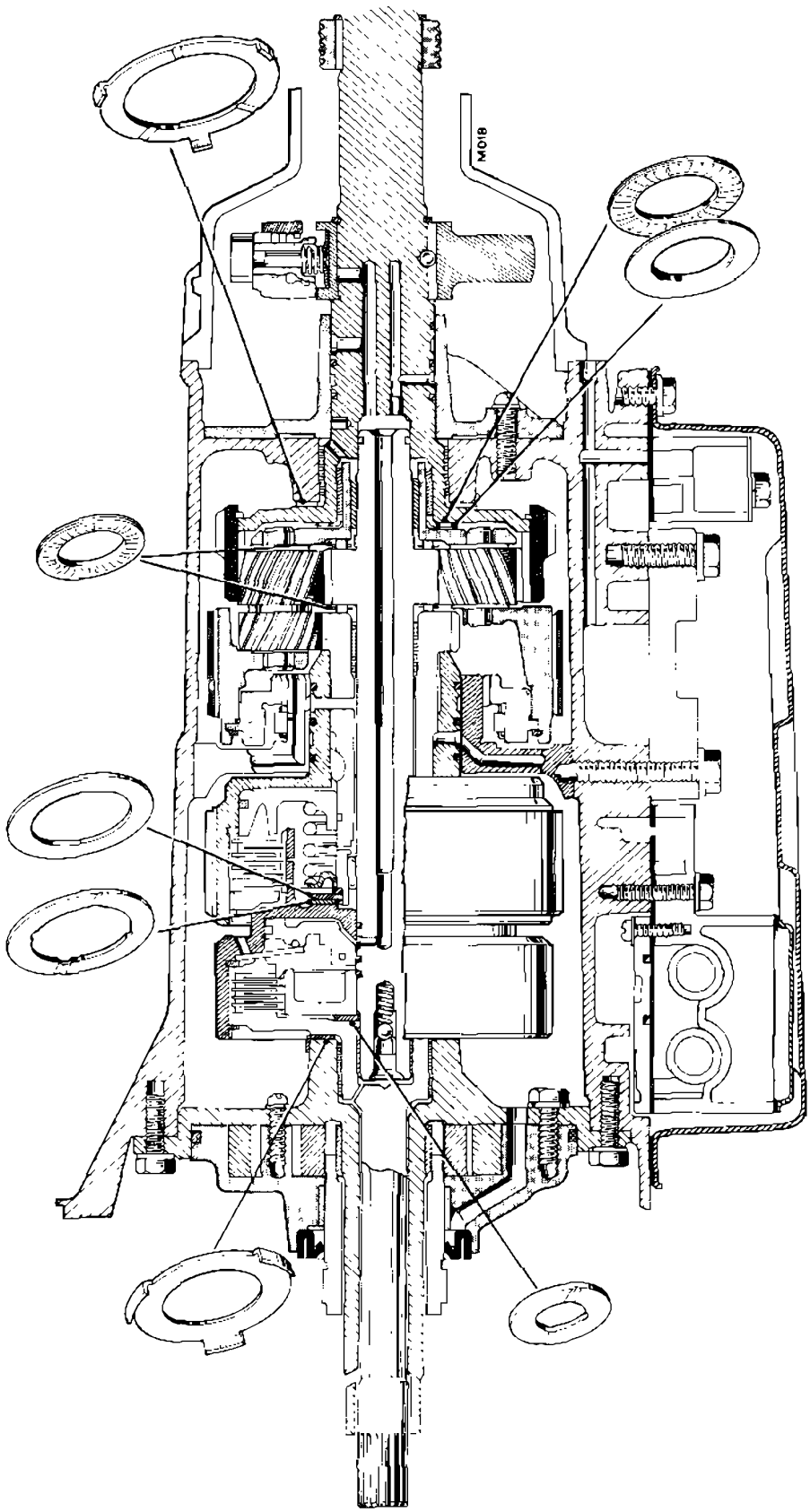
Throttle Position	Zero Throttle	Light Throttle		Part Throttle	Kick-down						
Selector	1	2	D	D	D	D	D	1	D	2	2
Shift	2–1	1–2	2–3	3–2	1–2	2–3	3–2	2–1	3–1	1–2	2–1
Road Speed M.P.H.	8–10	8–12	12–16	22–30	34–42	64–70	56–66	24–30	24–30	38–46	26–34
KmH	13–16	13–19	19–26	35–48	54–68	104–113	90–106	38–48	38–48	61–75	42–54

EXAMINATION OF COMPONENTS

Transmission Case and Servo Castings	Check for cracks and obstructions in passages.
Front and Rear Pump	Check for scoring and excessive wear.
Shafts	Check bearing and thrust faces for scoring.
Clutch Plates	Check for warping, scoring, overheating and excessive wear.
Bands	Check for scoring, overheating and excessive wear.
Drums	Check for overheating and scoring.
Gears	Check teeth for chipping, scoring, wear and condition of thrust faces.
Uni-directional Clutch and Races	Check for scoring, overheating and wear.
Valve Block and Governor	Check for burrs, crossed or stripped threads, and scored sealing faces.
Impeller Hub and Front Pump Drive Gear	Check for pitting and wear. Ensure good contact.
Thrust Washers	Check for burrs, scoring and wear.
White Metal Bushes	Check for scoring and loss of white metal.
Lip Seals	Check for cuts, hardening of rubber, leakage past outer diameter.
Rubber 'O' Rings and Seals	Check for hardening, cracking, cuts or damage.
Cast Iron Sealing Rings	Check fit in groove and wear (evident by lip overhanging the groove).

SERVICING REQUIREMENTS

1. For all operations high standards of cleanliness are essential.
2. Rags and cloths must be clean and free from lint; nylon cloths are preferable.
3. Prior to assembly all components must be cleaned thoroughly with petrol, paraffin or an industrial solvent.
4. All defective items must be renewed.
5. Components should be lubricated with transmission fluid before assembly.
6. New joint washers should be fitted where applicable.
7. Where jointing compound is required, the use of 'Hylomar' SQ32M, 'Hermetite' or 'Wellseal' is approved.
8. All screws, bolts and nuts must be tightened to the recommended torque figure.
9. Thrust washers and bearings should be coated with petroleum jelly to facilitate retaining them in position during assembly operations. Grease should not be used as it may be insoluble in the transmission fluid and could subsequently cause blockage of fluid passages and contamination of brake band and clutch facings.



Sectional view of transmission unit showing location of thrust bearings and washers

FRONT BRAKE BAND

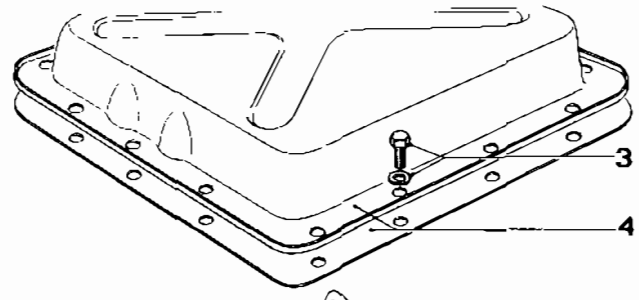
—Remove and refit **44.10.01**

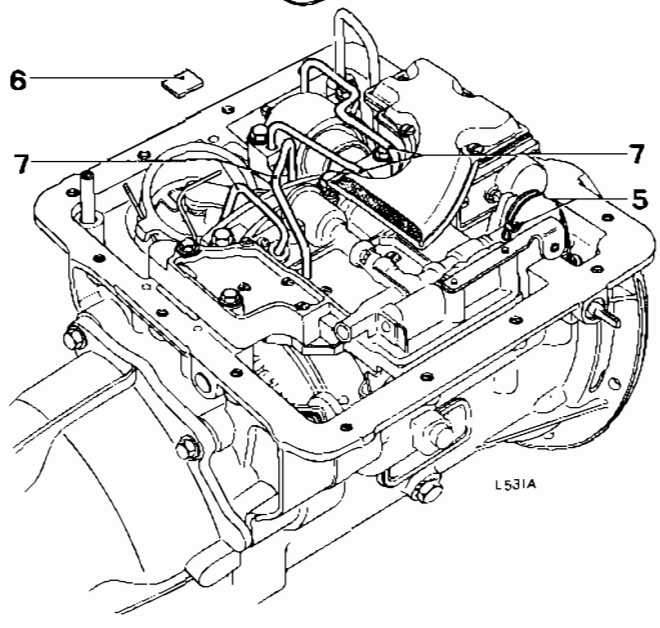
Service tools: BW35 or AT501

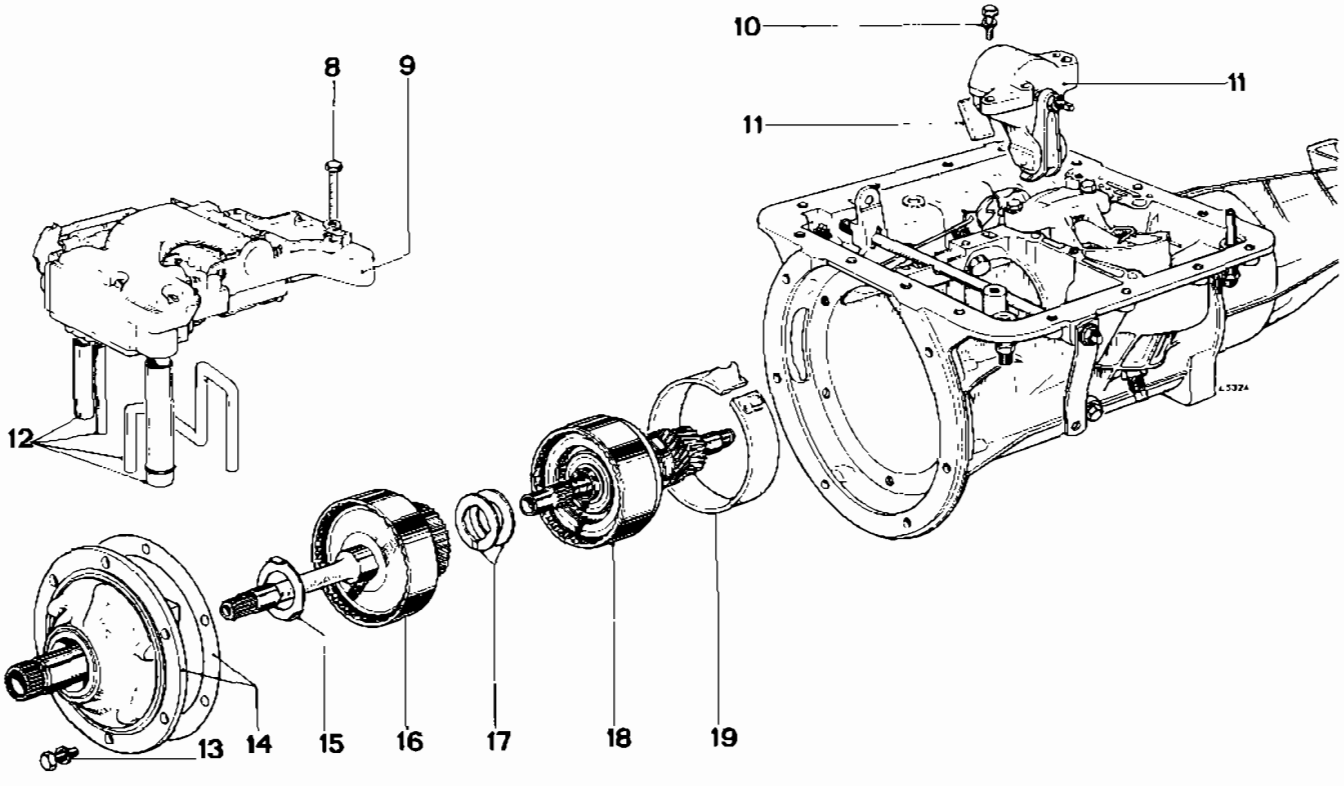
Removing

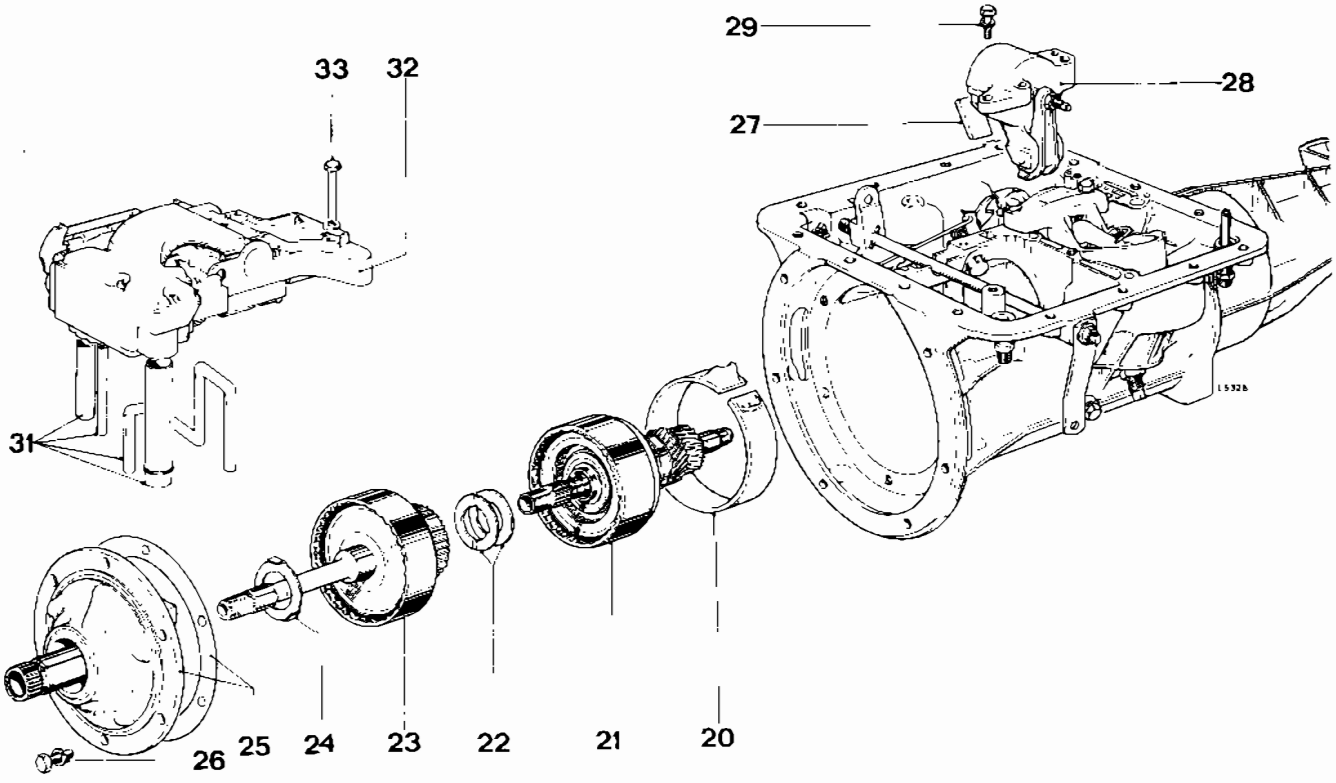
1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Take out two bolts and washers.
11. Remove the front servo and strut.
12. Pull out the oil tubes (note 'O' ring on front pump suction tube).
13. Take out the bolts.
14. Remove the front pump and joint washer.
15. Remove the thrust washer.
16. Withdraw the front clutch.
17. Remove the thrust washers.
18. Withdraw the rear clutch and forward sun gear.
19. Squeeze together the ends of the front brake band and remove it from the casing.

continued



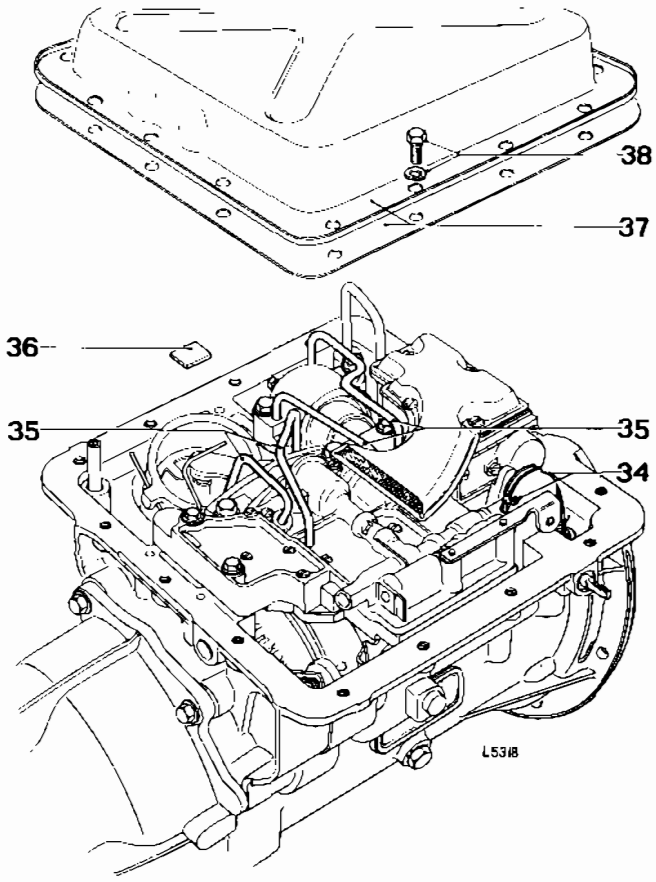






Refitting

20. Squeeze together the ends of the front brake band and fit it into position.
21. Refit the rear clutch and forward sun gear assembly.
22. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
23. Refit the front clutch assembly.
24. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
25. Refit the front pump assembly and new joint washer.
26. Fit and tighten the bolts.
27. Using petroleum jelly, stick the front strut to the front servo lever.
28. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
29. Fit and tighten the two bolts and washers.
30. Adjust the front brake band. 44.30.07.
31. Refit the oil tubes.
32. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
33. Fit and tighten the three bolts and washers.
34. Refit the downshift cable to the cam.
35. Refit the oil pipes.
36. Refit the magnet.
37. Refit the sump and a new joint washer.
38. Fit and tighten the 15 bolts.
39. Refit the gearbox. 44.20.01.



REAR BRAKE BAND

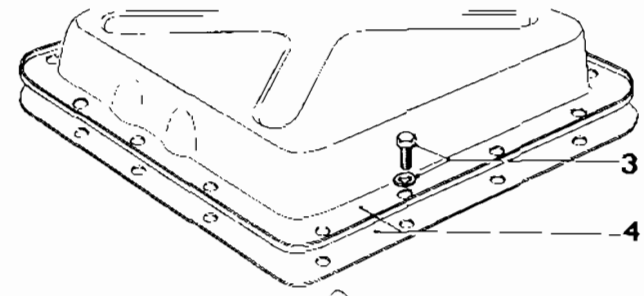
—Remove and refit **44.10.09**

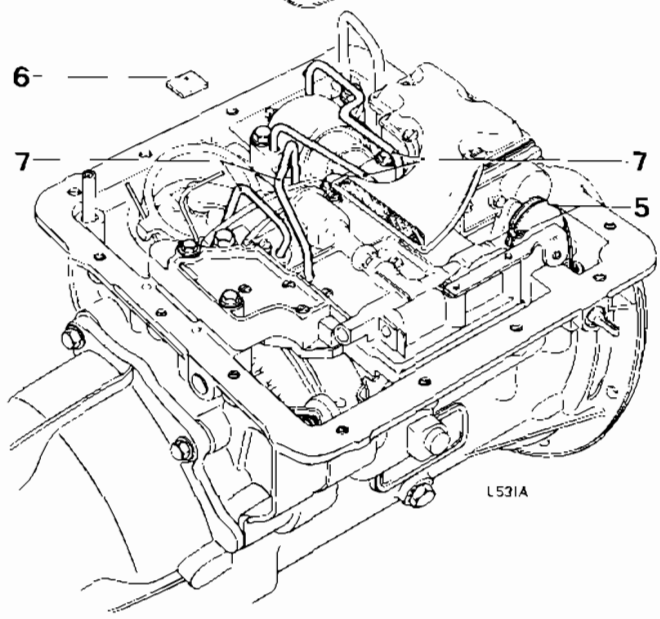
Service tools: BW35 or AT501

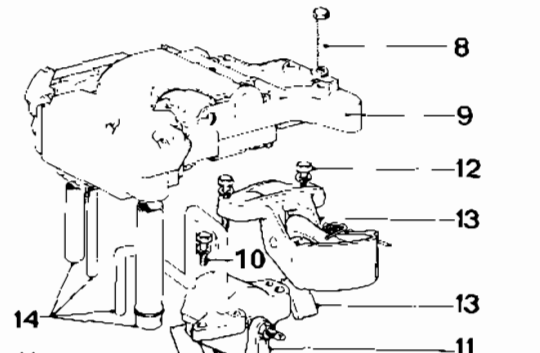
Removing

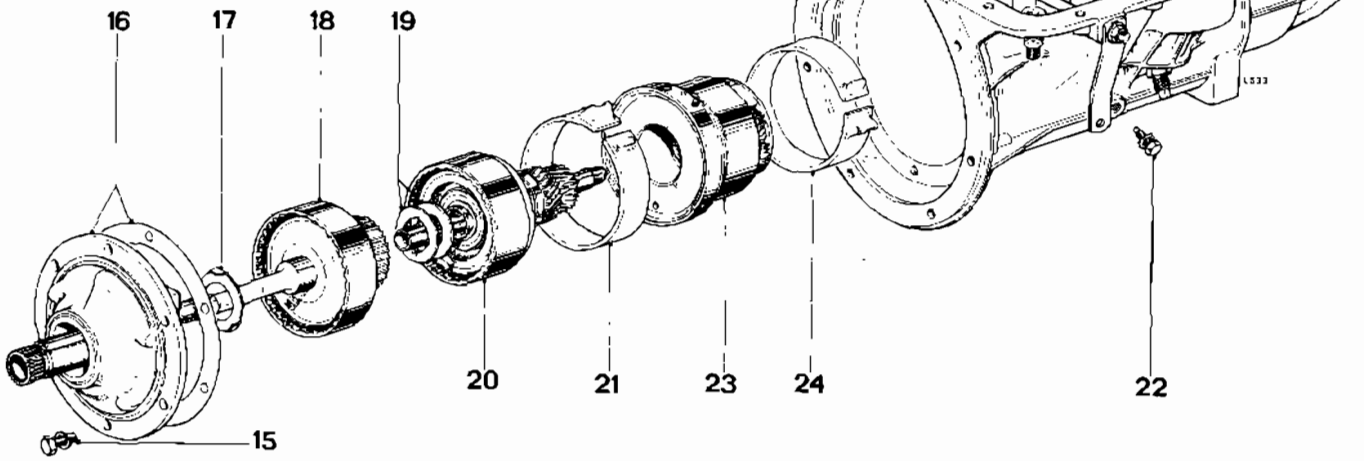
1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Take out two bolts and washers.
11. Remove the front servo and strut.
12. Take out two bolts and washers.
13. Remove the rear servo and strut.
14. Pull out the oil tubes (note 'O' ring on front pump suction tube).
15. Take out the bolts.
16. Remove the front pump and joint washer.
17. Remove the thrust washer.
18. Withdraw the front clutch.
19. Remove the thrust washers.
20. Withdraw the rear clutch and forward sun gear.
21. Squeeze together the ends of the front brake band and remove it from the casing.
22. Take out two bolts and washers.
23. Withdraw the centre support and planet gear assembly.
24. Squeeze the ends of the rear band together, tilt the band and withdraw from the casing.

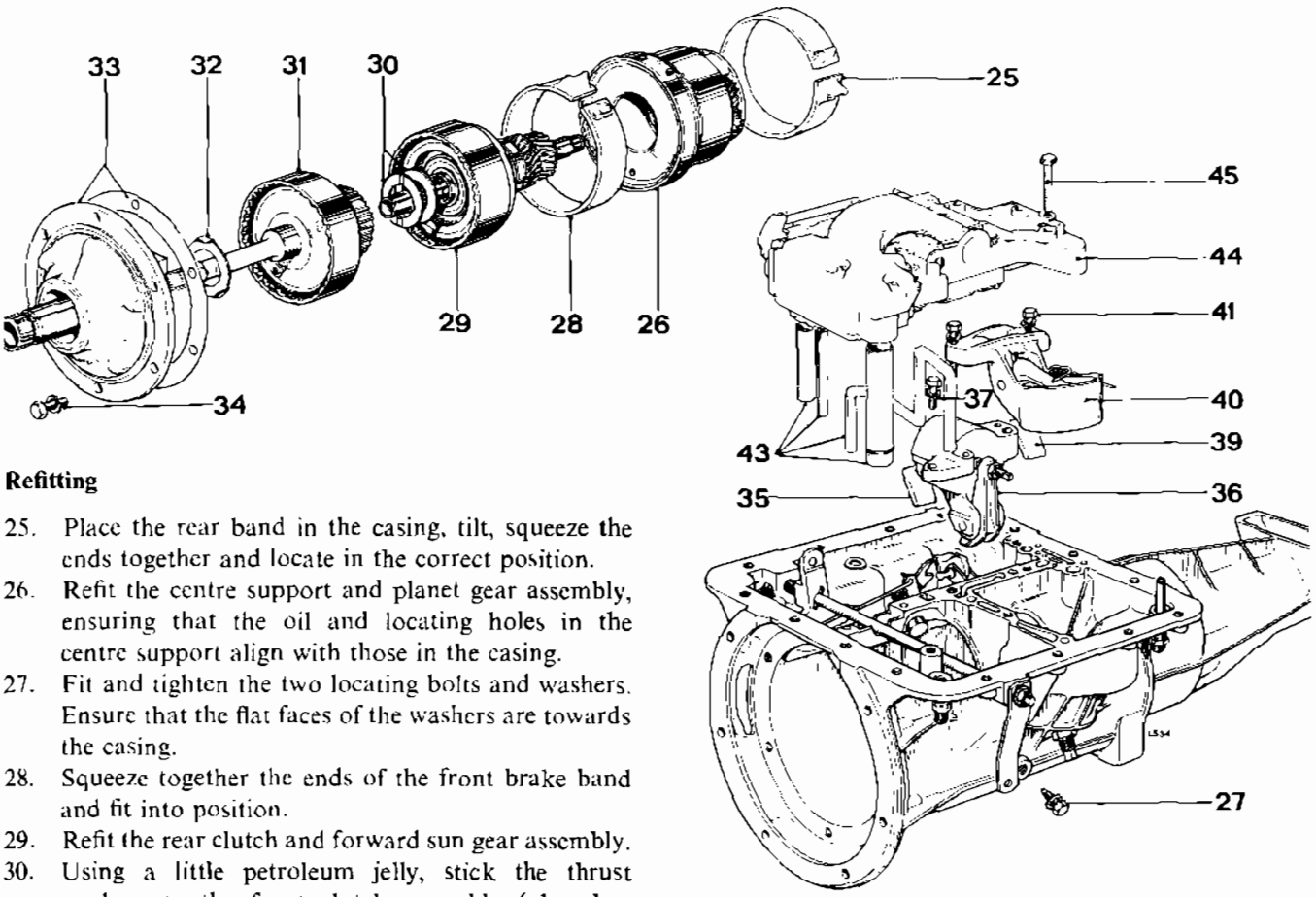
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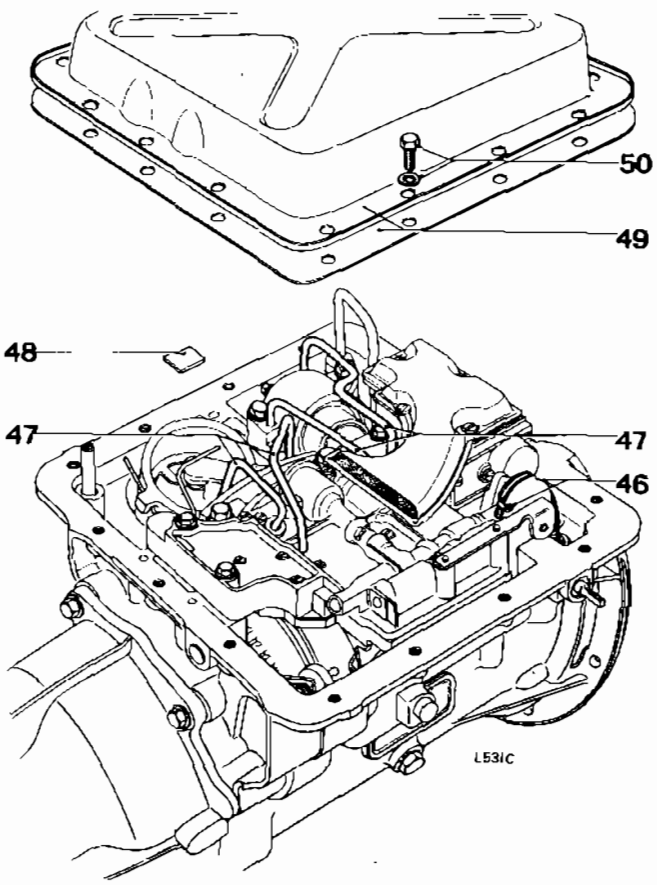






Refitting

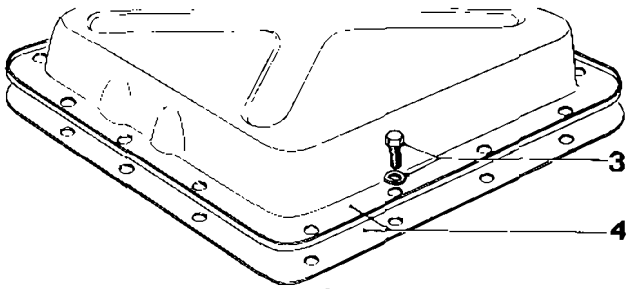
25. Place the rear band in the casing, tilt, squeeze the ends together and locate in the correct position.
26. Refit the centre support and planet gear assembly, ensuring that the oil and locating holes in the centre support align with those in the casing.
27. Fit and tighten the two locating bolts and washers. Ensure that the flat faces of the washers are towards the casing.
28. Squeeze together the ends of the front brake band and fit into position.
29. Refit the rear clutch and forward sun gear assembly.
30. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
31. Refit the front clutch assembly.
32. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
33. Refit the front pump assembly and new joint washer.
34. Fit and tighten the bolts.
35. Using petroleum jelly, stick the front strut to the front servo lever.
36. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
37. Fit and tighten the two bolts and washers.
38. Adjust the front brake band. 44.30.07.
39. Using petroleum jelly, stick the rear strut to the rear brake band.
40. Carefully fit the rear servo in position, ensuring that the rear strut is correctly located in the rear servo lever.
41. Fit and tighten the two bolts and washers.
42. Adjust the rear brake band. 44.30.10.
43. Refit the oil tubes.
44. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
45. Fit and tighten the three bolts and washers.
46. Refit the downshift cable to the cam.
47. Refit the oil pipes.
48. Refit the magnet.
49. Refit the sump and a new joint washer.
50. Fit and tighten the 15 bolts.
51. Refit the gearbox. 44.20.01.

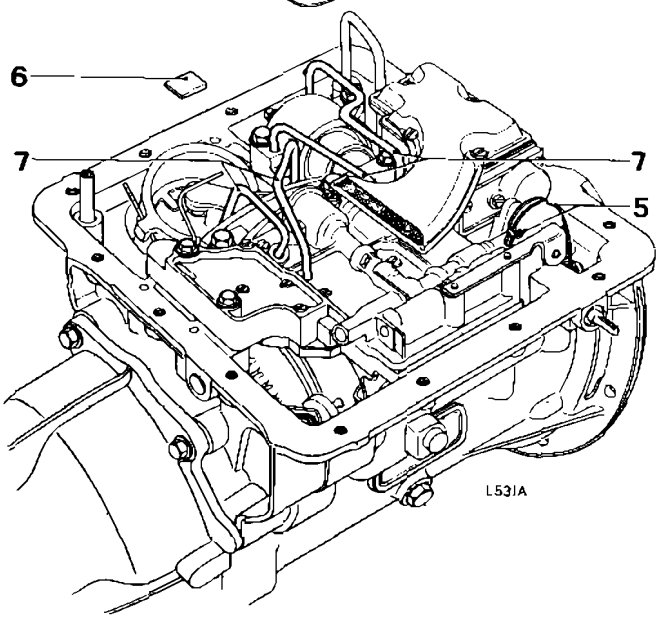


FRONT CLUTCH

—Remove and refit **44.12.04**

Service tools: BW35 or AT501

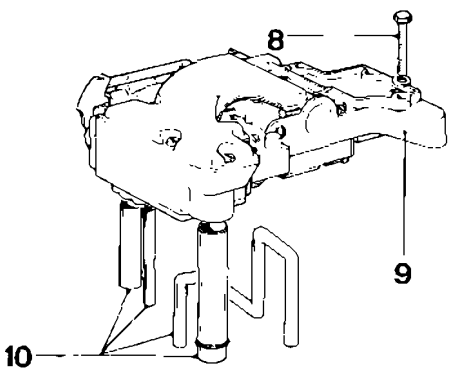


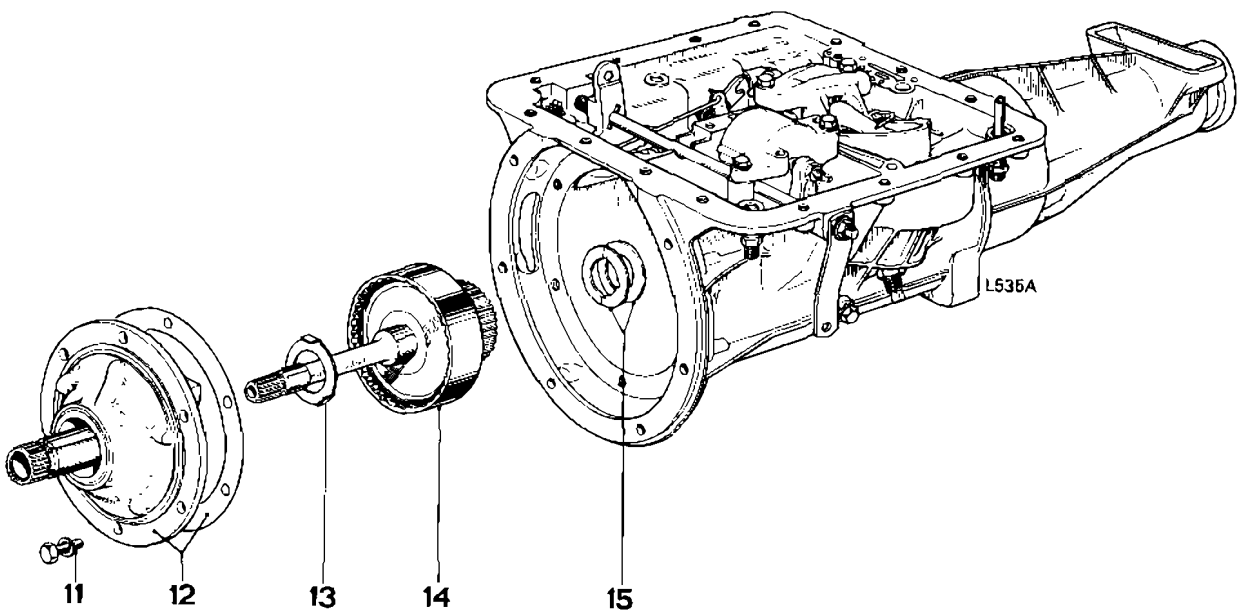


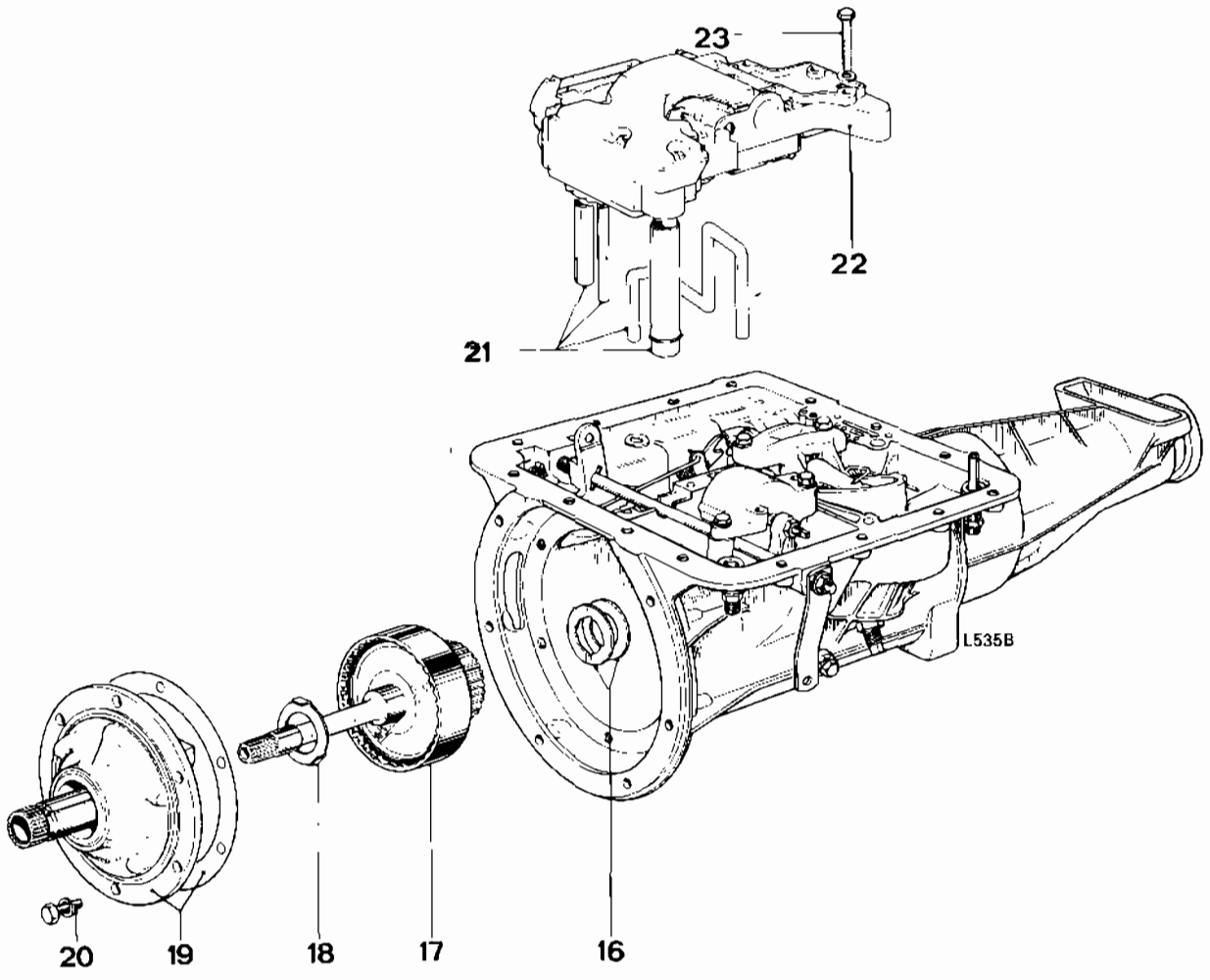
Removing

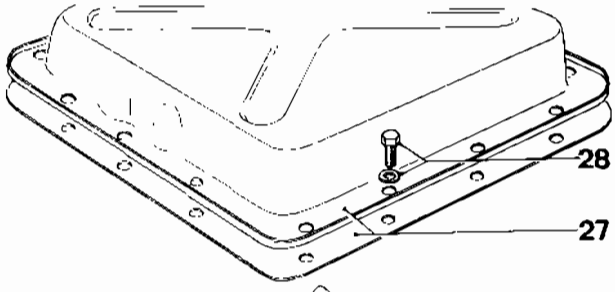
1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Pull out the oil tubes (note 'O' ring on front pump suction tube).
11. Take out the bolts.
12. Remove the front pump and joint washer.
13. Remove the thrust washer.
14. Withdraw the front clutch.
15. Remove the thrust washers.

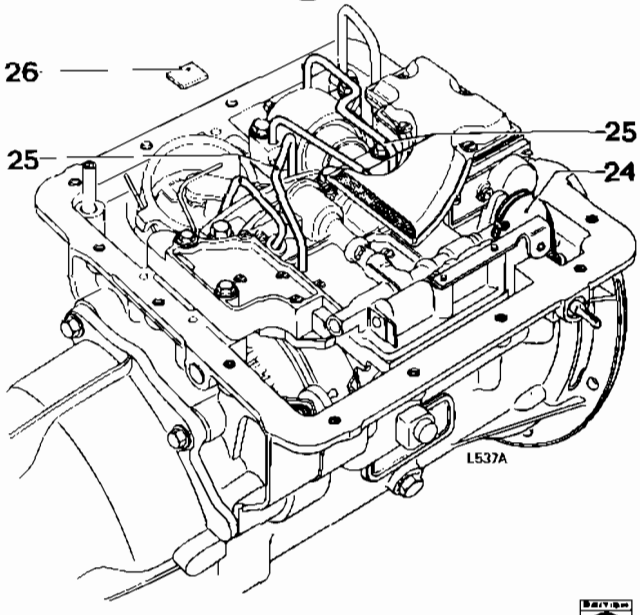
continued











Refitting

16. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
17. Refit the front clutch assembly.
18. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
19. Refit the pump assembly and new joint washer.
20. Fit and tighten the bolts.
21. Refit the oil tubes.
22. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
23. Fit and tighten the three bolts and washers.
24. Refit the downshift inner cable to the cam.
25. Refit the oil pipes.
26. Refit the magnet.
27. Refit the sump and a new joint washer.
28. Fit and tighten the 15 bolts.
29. Refit the gearbox. 44.20.01.

REAR CLUTCH

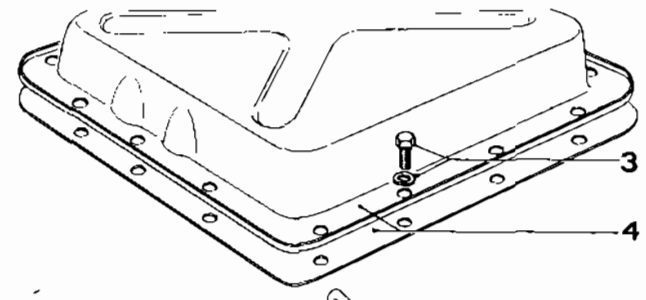
—Remove and refit **44.12.07**

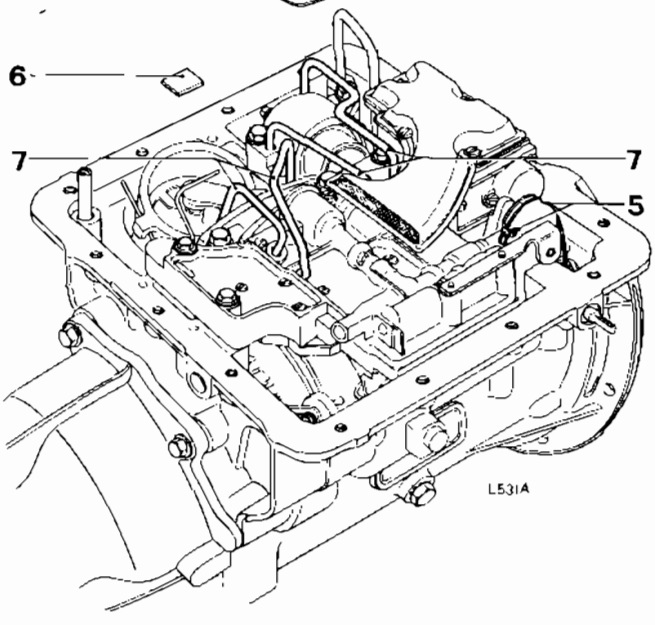
Service tools: BW35 or AT501

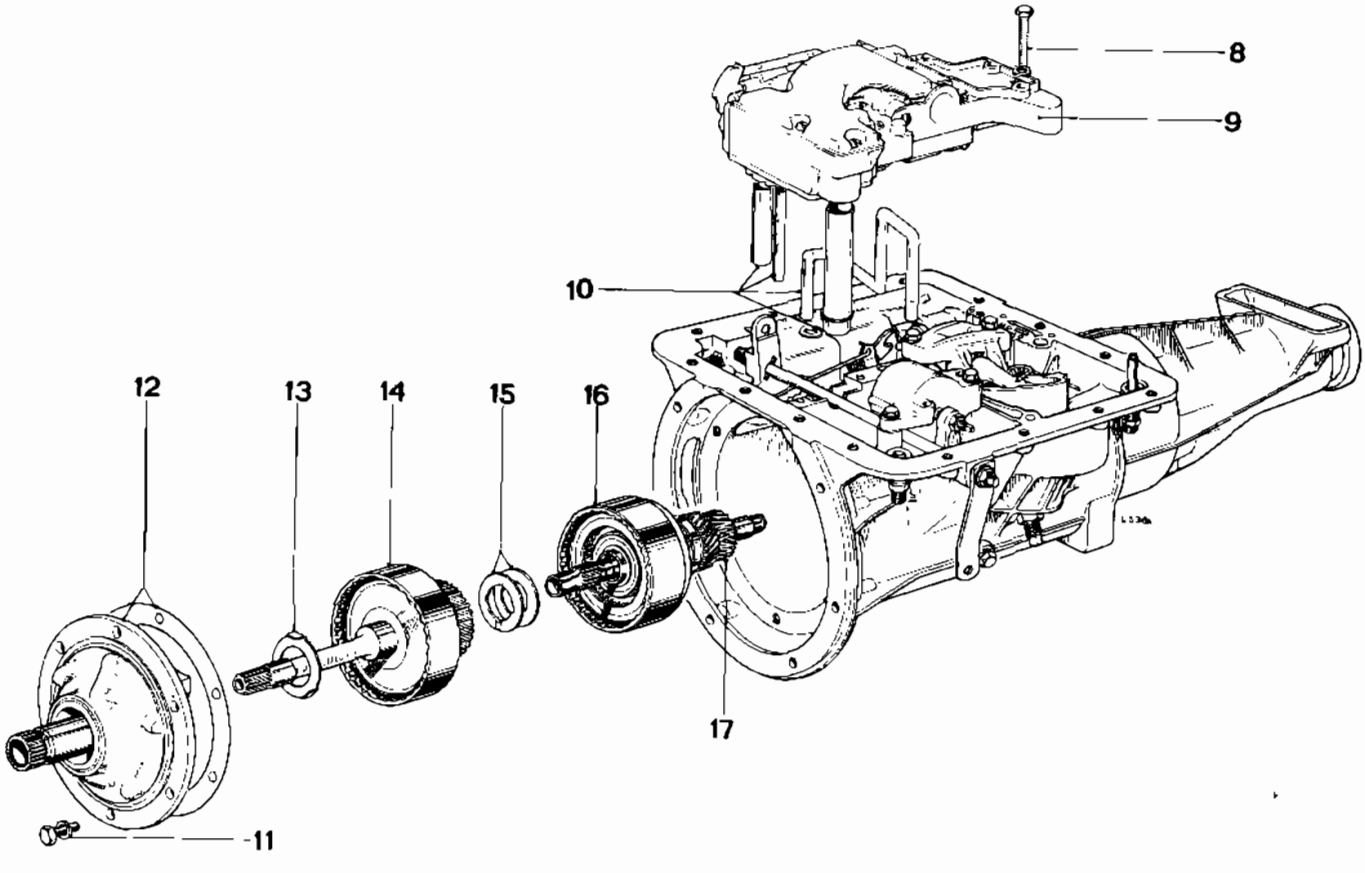
Removing

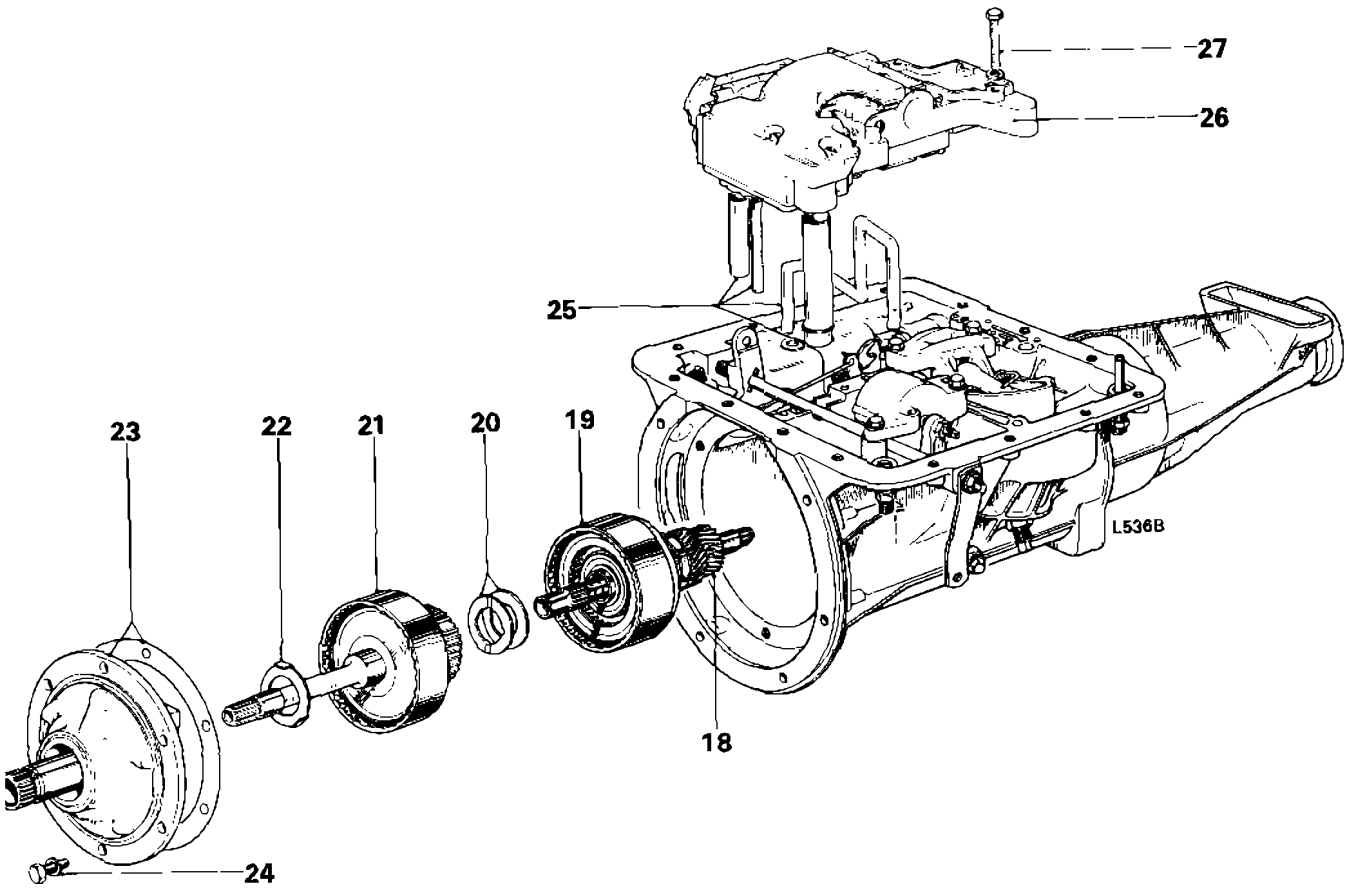
1. Remove the gearbox, 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Pull out the oil tubes (note 'O' ring on front pump suction tube).
11. Take out the bolts.
12. Remove the front pump and joint washer.
13. Remove the thrust washer.
14. Withdraw the front clutch.
15. Remove the thrust washers.
16. Withdraw the rear clutch and forward sun gear.
17. Separate the forward sun gear assembly from the rear clutch.

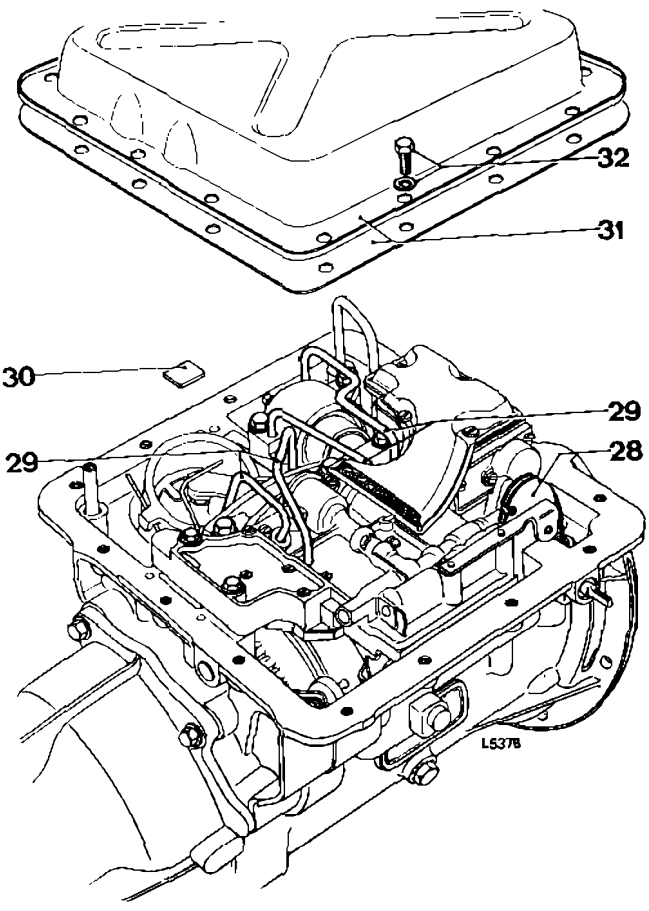
continued











Refitting

8. Assemble the forward sun gear to the rear clutch.
9. Refit the assembly into the casing.
10. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
11. Refit the front clutch assembly.
12. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
13. Refit the front pump assembly and new joint washer.
14. Fit and tighten the bolts.
15. Refit the oil tubes.
16. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
17. Fit and tighten the three bolts and washers.
18. Refit the downshift inner cable to the cam.
19. Refit the oil pipes.
20. Replace the magnet.
21. Refit the sump and a new joint washer.
22. Fit and tighten the 15 bolts.
23. Refit the gearbox. 44.20.01.

FRONT CLUTCH

—Overhaul **44.12.10**

Service tools: BW42

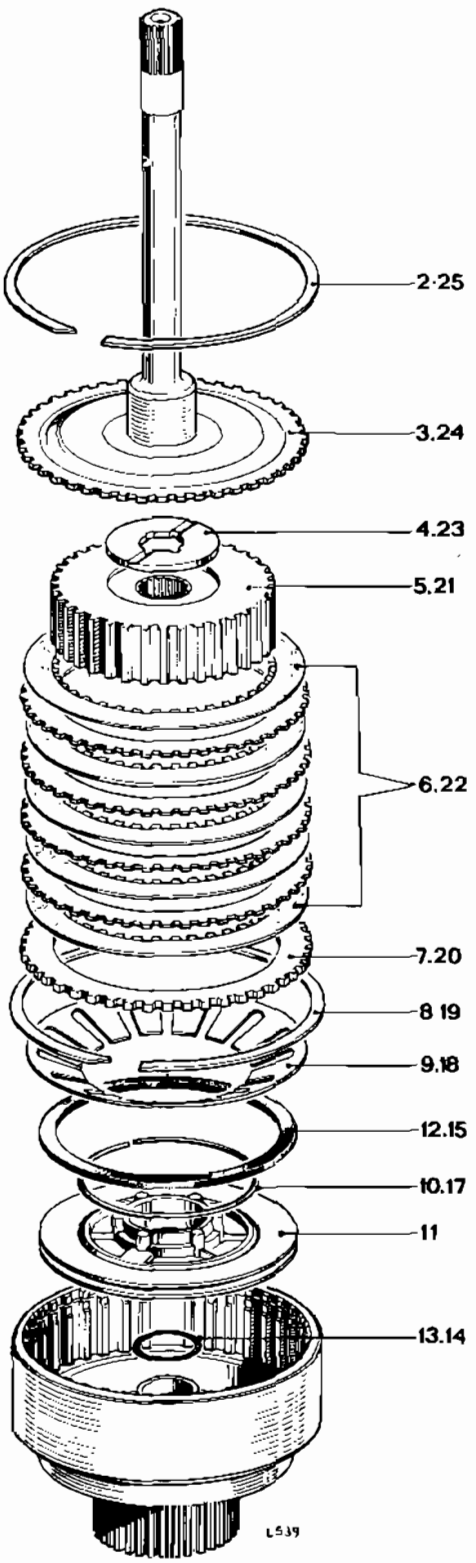
1. Remove the front clutch. 44.12.04.

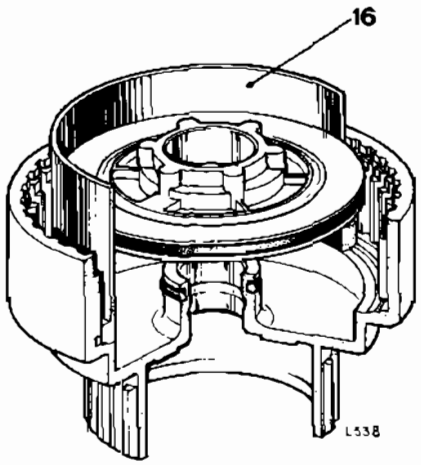
Dismantling

2. Remove the circlip.
3. Withdraw the input shaft.
4. Remove the thrust washer.
5. Remove the hub.
6. Take out the inner and outer friction plates.
7. Remove the pressure plate.
8. Remove the circlip.
9. Take out the spring.
10. Remove the spring bearing.
11. Withdraw the piston. (If necessary, blank off the bores of the clutch drum and apply a compressed air line to the piston valve hole.)
12. Remove the seal from the piston.
13. Remove the 'O' ring from the drum.

Reassembling

14. Refit the 'O' ring to the drum.
15. Refit the seal to the piston.
16. Fit the piston into tool No. BW42 and place the tool in the drum. Push the piston into the drum and remove the tool.
17. Locate the spring bearing in position.
18. Refit the spring.
19. Fit the circlip.
20. Refit the pressure plate.
21. Refit the hub.
22. Fit the inner and outer friction plates in alternate sequence.
23. Using petroleum jelly, stick the thrust washer to the hub.
24. Locate the input shaft in position.
25. Refit the circlip.
26. Refit the front clutch. 44.12.04.





REAR CLUTCH

—Overhaul **44.12.13**

Service tools: BW37A or AT504, BW41 or AT514

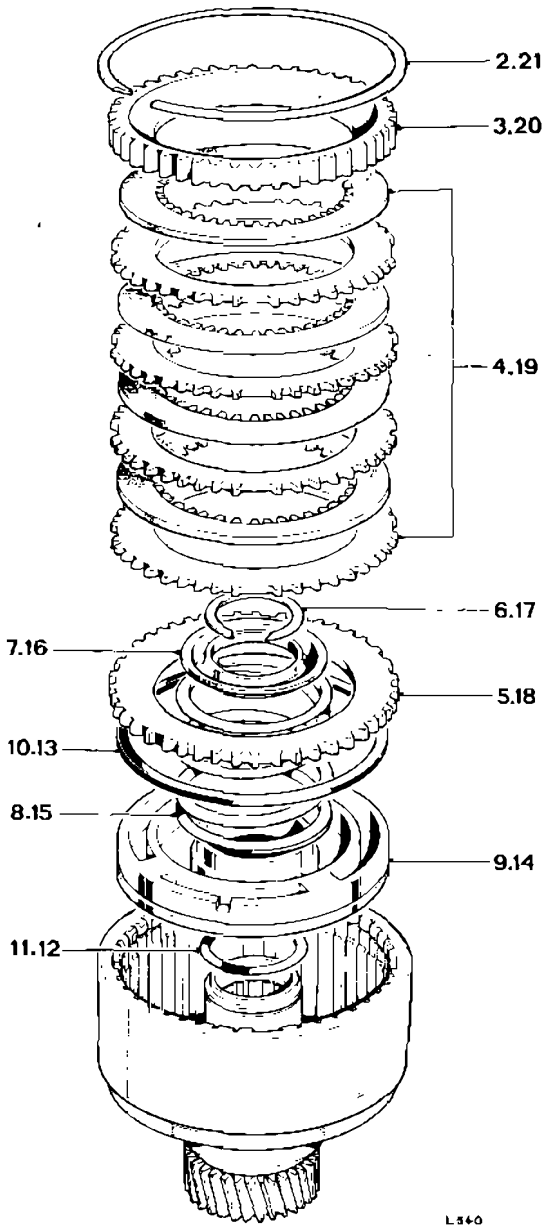
1. Remove the rear clutch. 44.12.07.

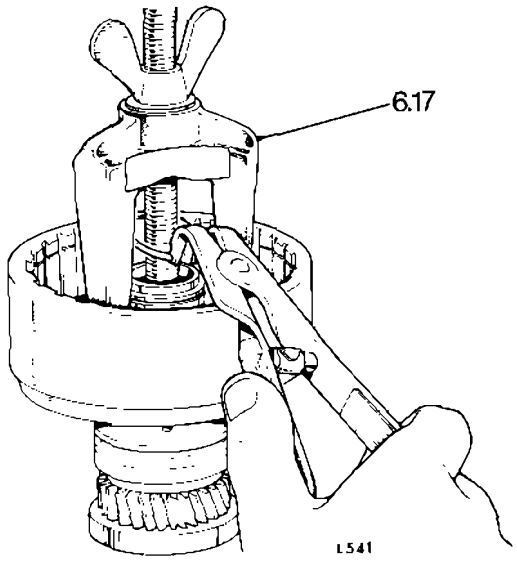
Dismantling

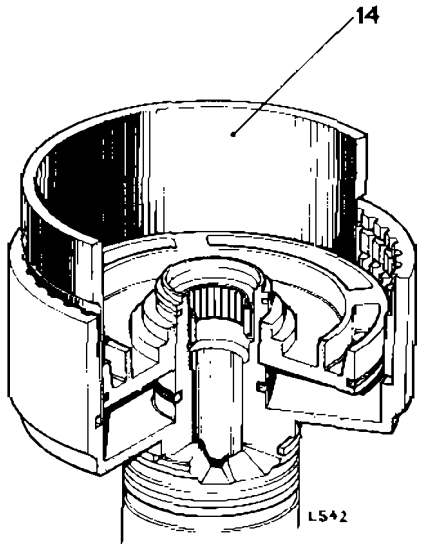
2. Remove the circlip
3. Take out the pressure plate.
4. Remove the inner and outer friction plates.
5. Remove the pressure plate.
6. Using tool BW37A or AT504 a shown, compress the spring and remove the spring seat circlip. Remove the tool.
7. Take out the spring seat.
8. Remove the spring.
9. Withdraw the piston.
0. Remove the rubber sealing ring from the piston.
1. Remove the rubber 'O' ring from the drum.

Reassembling

2. Fit the 'O' ring to the drum.
3. Fit the sealing ring to the piston.
4. Fit the piston assembly into tool BW41 or AT513, and locate the tool in the drum. Push the piston into the drum. Remove the tool.
5. Refit the spring.
6. Refit the spring seat.
7. Using tool BW37A or AT504, compress the spring and fit the circlip. Remove the tool.
8. Refit the pressure plate.
9. Refit the inner and outer clutch plates in alternate sequence.
0. Fit the pressure plate.
1. Refit the circlip.
2. Refit the rear clutch. 44.12.07







UNI-DIRECTIONAL CLUTCH

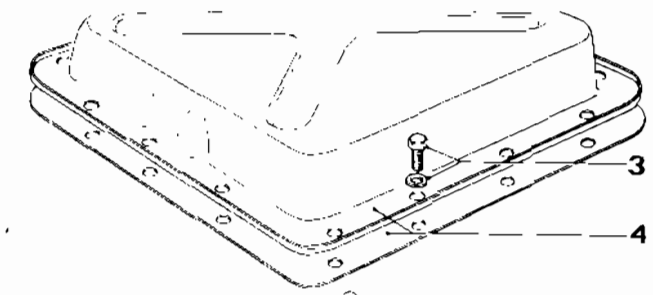
—Remove and refit **44.12.16**

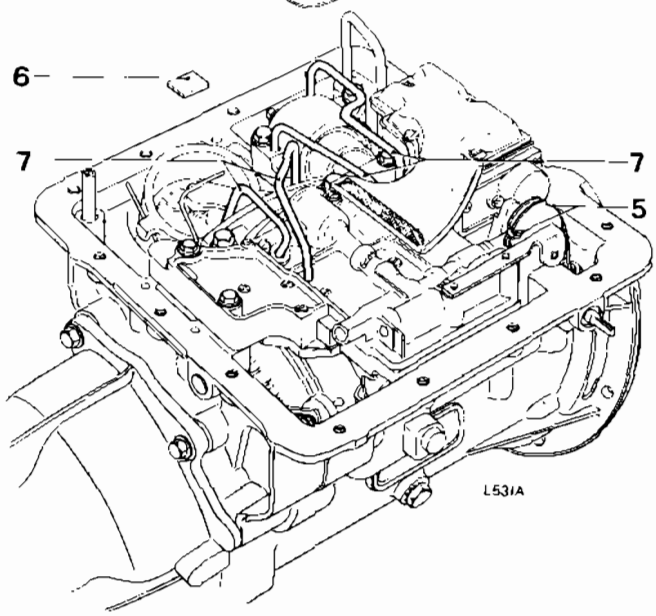
Service tools: BW35 or AT501

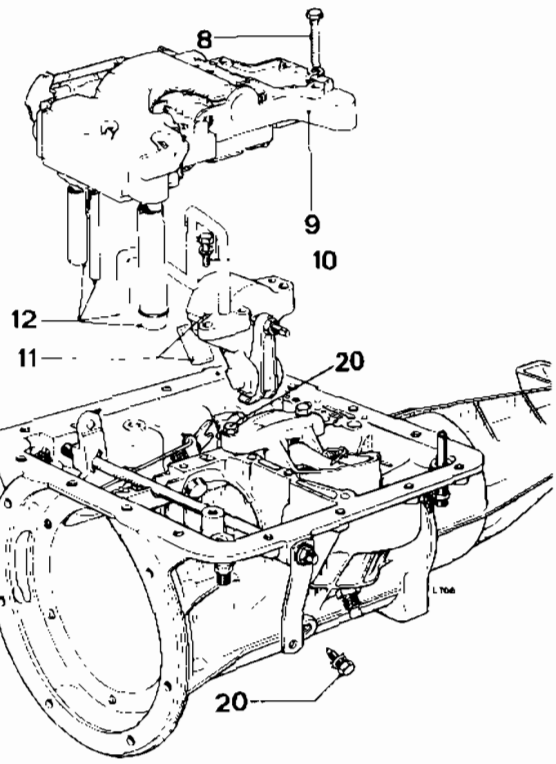
Removing

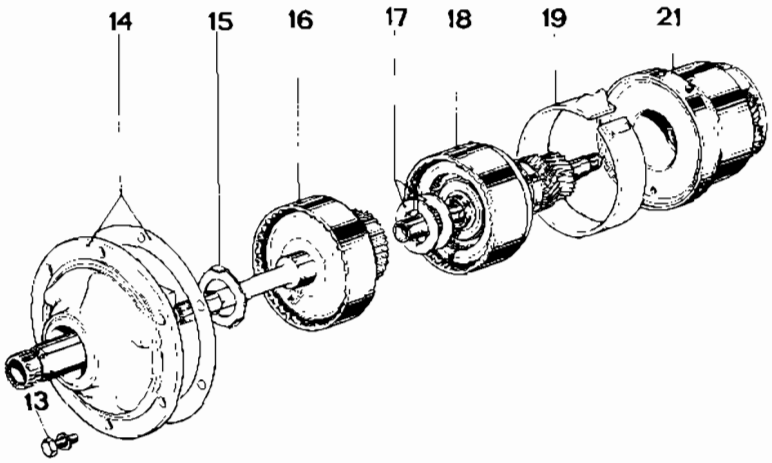
1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Take out two bolts and washers.
11. Remove the front servo and strut.
12. Pull out the oil tubes (note 'O' ring on front pump suction tube).
13. Take out the bolts.
14. Remove the front pump and joint washer.
15. Remove the thrust washer.
16. Withdraw the front clutch.
17. Remove the thrust washers.
18. Withdraw the rear clutch and forward sun gear.
19. Squeeze together the ends of the front brake band and remove it from the casing.
20. Take out three bolts and washers.
21. Withdraw the centre support/planet gear assembly.

continued







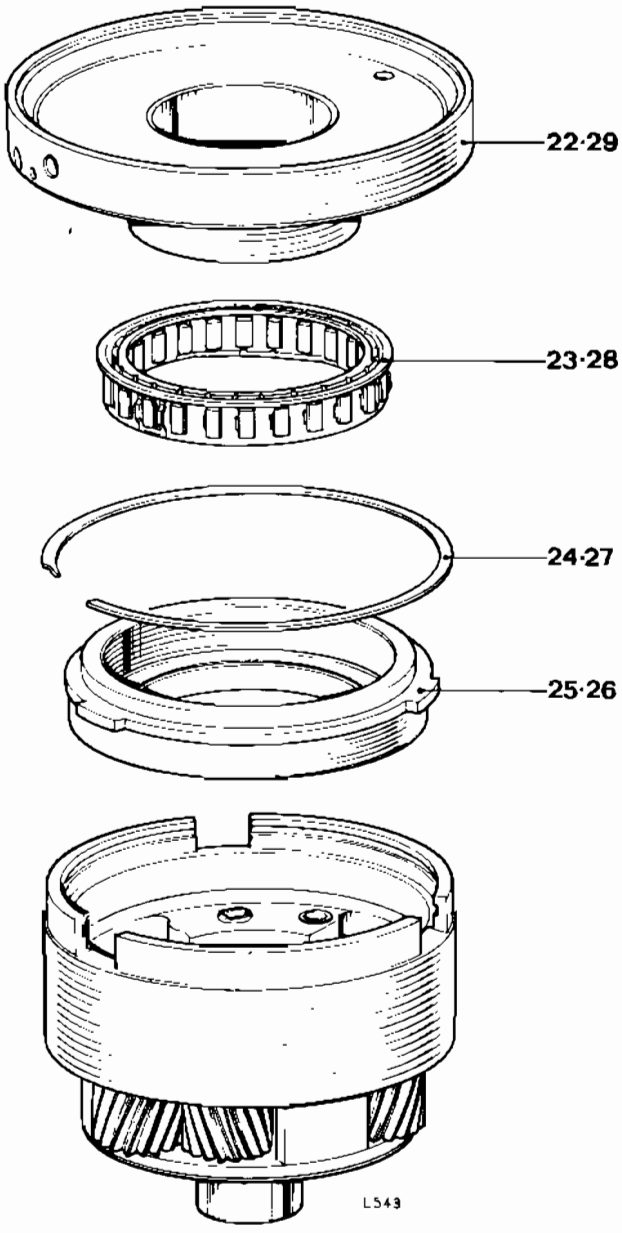


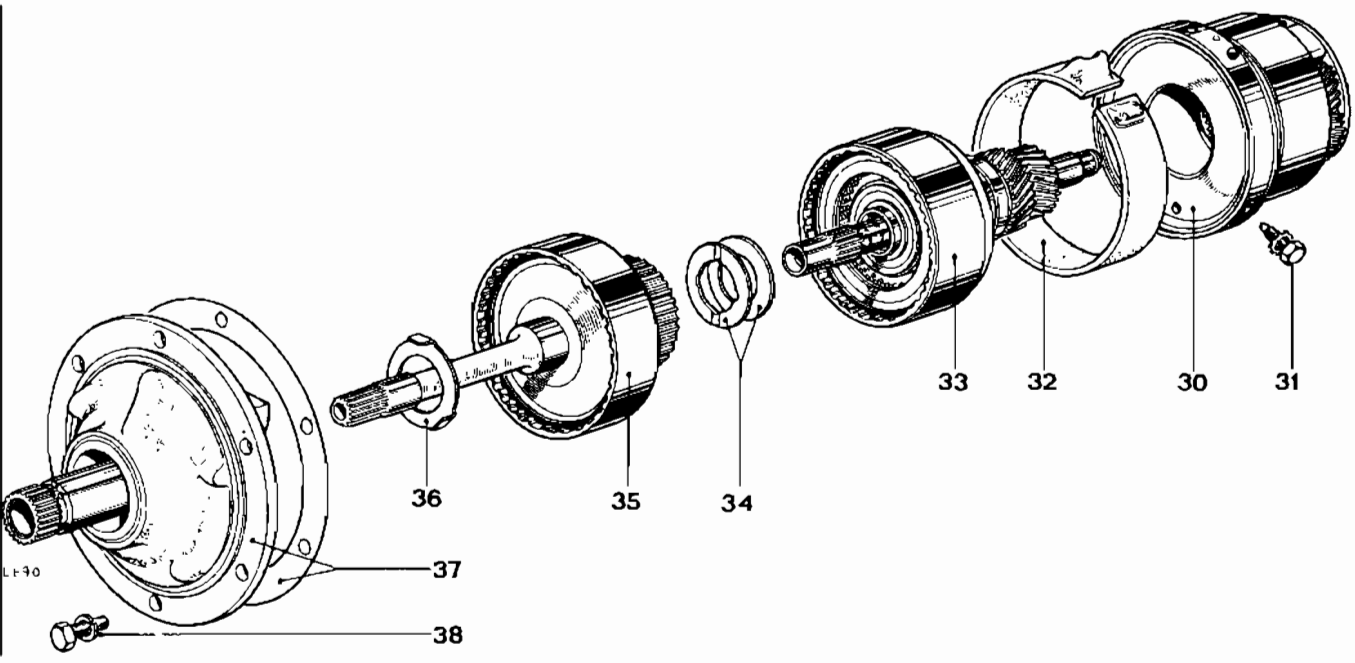
22. Separate the centre support from the planet gear assembly.
23. Withdraw the uni-directional clutch.
24. Remove the circlip.
25. Remove the uni-directional clutch outer race.

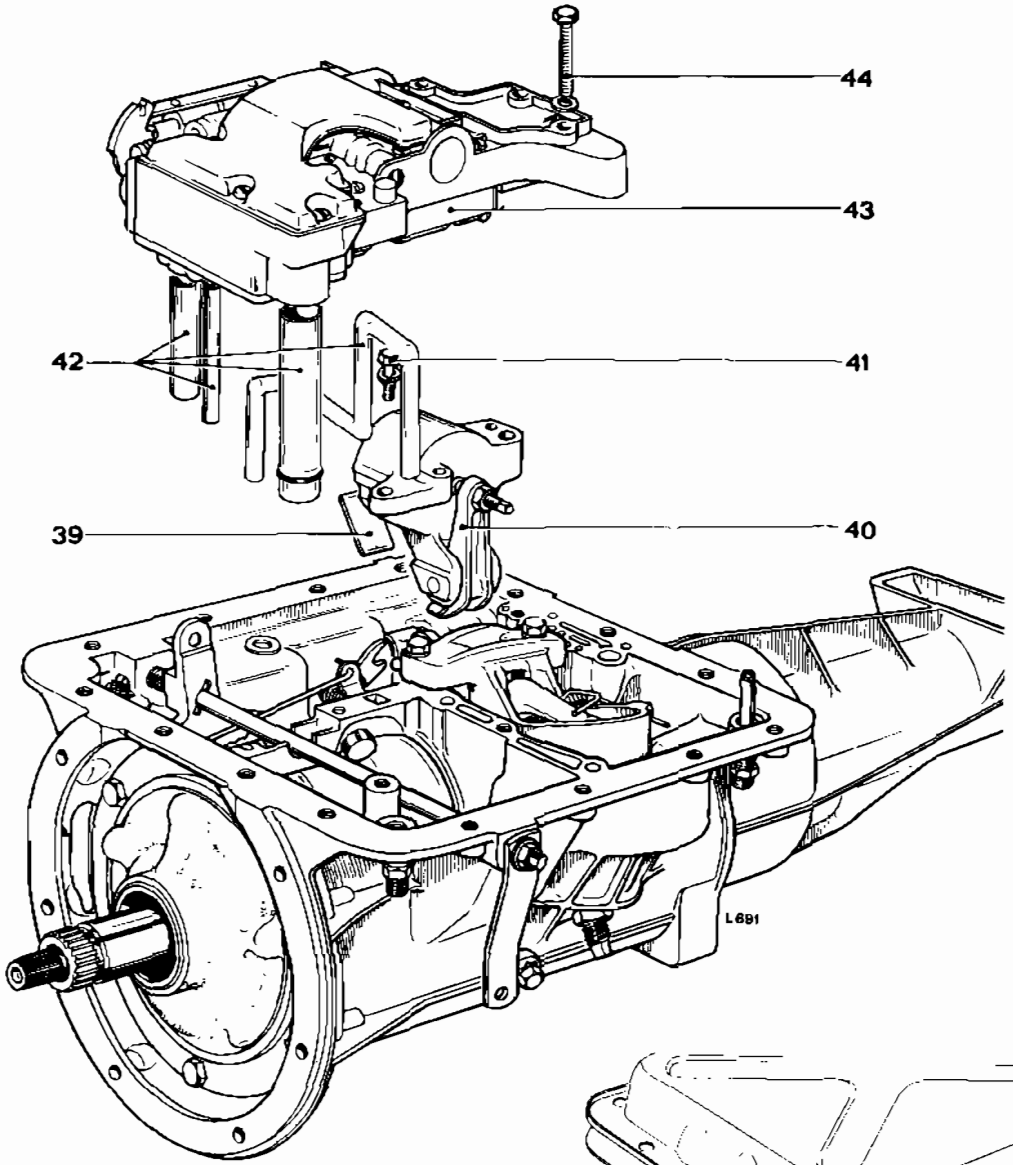
Refitting

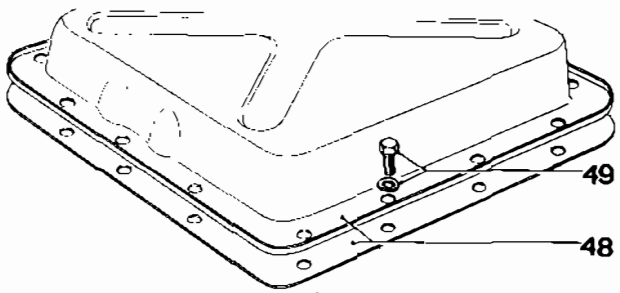
26. Refit the uni-directional clutch outer race to the rear drum.
27. Refit the circlip.
28. Fit the uni-directional clutch into its outer race.
29. Assemble the centre support and planet gear assembly.
30. Refit the assembly, ensuring that the oil and locating holes in the centre support align with those in the casing.
31. Fit and tighten the two locating bolts and washers. Ensure that the flat faces of the washers are towards the casing.
32. Squeeze together the ends of the front brake band and fit it into position.
33. Refit the rear clutch and forward sun gear assembly.
34. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
35. Refit the front clutch assembly.
36. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
37. Refit the front pump assembly and new joint washer.
38. Fit and tighten the bolts.

continued

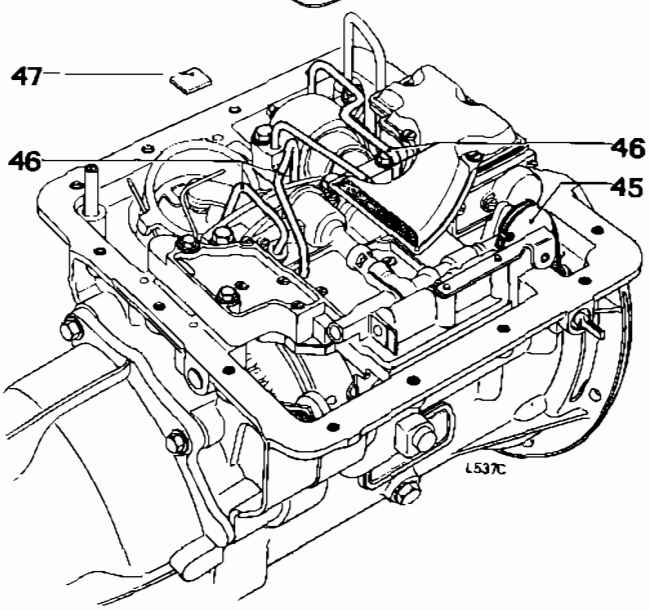








39. Using petroleum jelly, stick the front strut to the front servo lever.
40. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
41. Fit and tighten the two bolts and washers.
42. Refit the oil tubes.
43. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
44. Fit and tighten the three bolts and washers.
45. Refit the downshift inner cable to the cam.
46. Refit the oil pipes.
47. Replace the magnet.
48. Refit the sump and a new joint washer.
49. Fit and tighten the 15 bolts.
50. Refit the gearbox. 44.20.01.

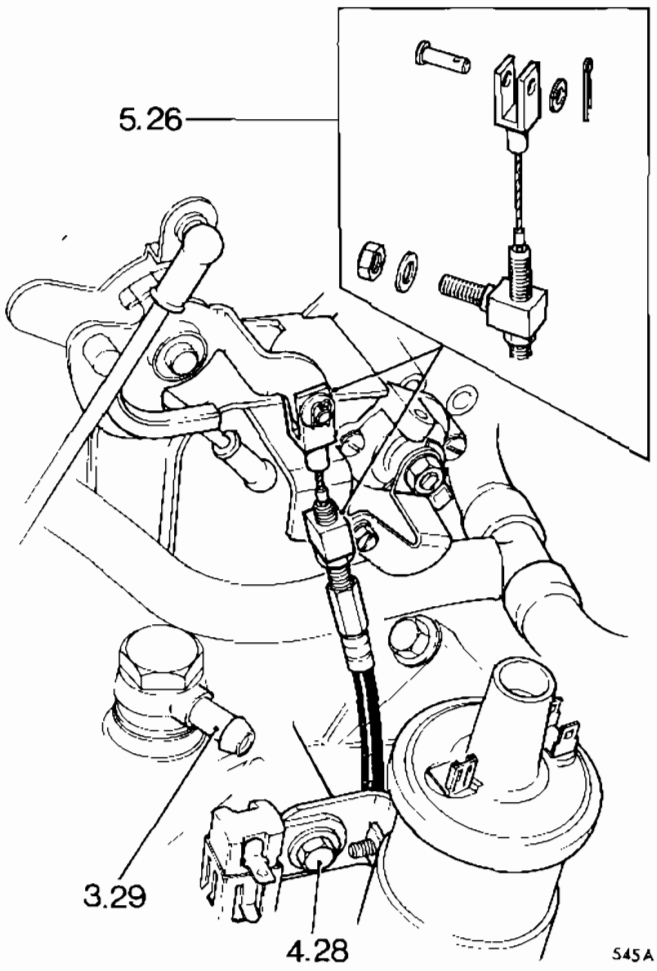


DOWNSHIFT CABLE

-Remove and refit **44.15.01**

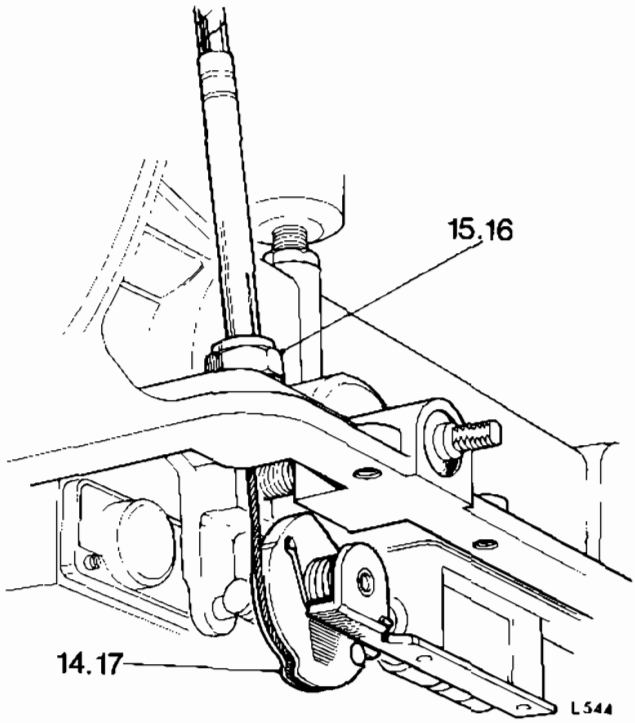
emoving

1. Drive the vehicle onto a ramp, select 'N' and chock the wheels.
2. Drain the cooling system and release the top hose from the radiator.
3. Disconnect the vacuum hose from the inlet manifold.
4. Remove the ignition coil.
5. Disconnect the downshift cable from the throttle linkage.
6. Raise the ramp.
7. Unscrew the union nut and release the filler pipe from the sump pan. Drain the fluid from the transmission unit.
8. Remove the exhaust front pipes and silencers. 30.10.09/10/14.
9. Remove the propeller shaft.
10. Disconnect the selector rod from the hand lever.
11. Using a ramp jack under the rear extension to take the weight of the engine and transmission, release the mounting platform from the body floor.
12. Unclip the brake pipe from the front cross-member and lower the ramp jack until the weight of the engine and transmission is taken by the front edge of the engine sump against the front cross-member. Pull the brake pipe clear of the sump.
13. Remove the transmission sump pan. 44.24.04.
14. Turn the downshift cam and disconnect the inner downshift cable.
15. Unscrew the downshift outer cable from the casing and withdraw the cable.



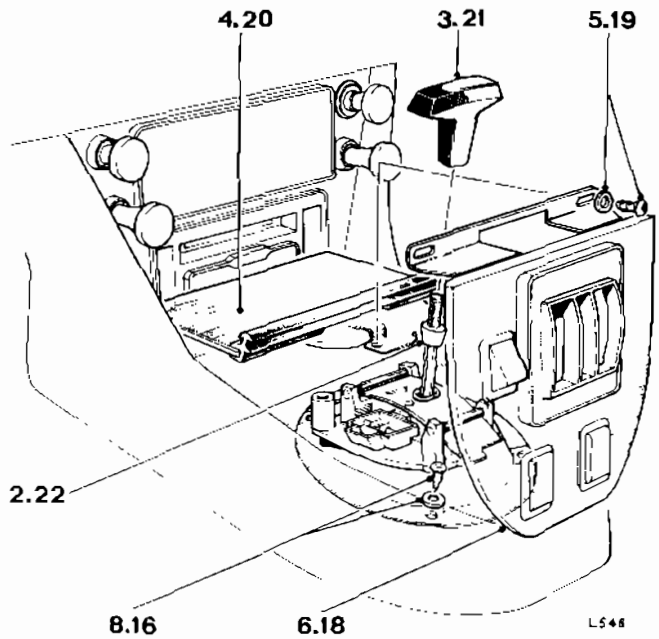
efitting

16. Feed the downshift cable upwards over the torque converter housing and screw the outer cable into the transmission casing.
17. Connect the inner cable to the downshift cam.
18. Refit the sump. 44.24.04.
19. Raise the ramp jack and secure the mounting platform to the body floor.
20. Attach the brake pipe to the front cross-member.
21. Refit the propeller shaft.
22. Refit the exhaust front pipes and silencers. 30.10.09/10/14.
23. Connect the selector rod to the hand lever.
24. Secure the filler pipe to the sump pan.
25. Lower the ramp.
26. Connect the downshift cable to the throttle linkage.
27. Connect the top hose to the radiator and fill the cooling system.
28. Refit the ignition coil.
29. Connect the vacuum hose to the inlet manifold.
30. Adjust the downshift cable. 44.30.01.
31. Road-test the vehicle and check the shift speeds.



HAND LEVER TURRET

—Remove and refit **44.15.04**

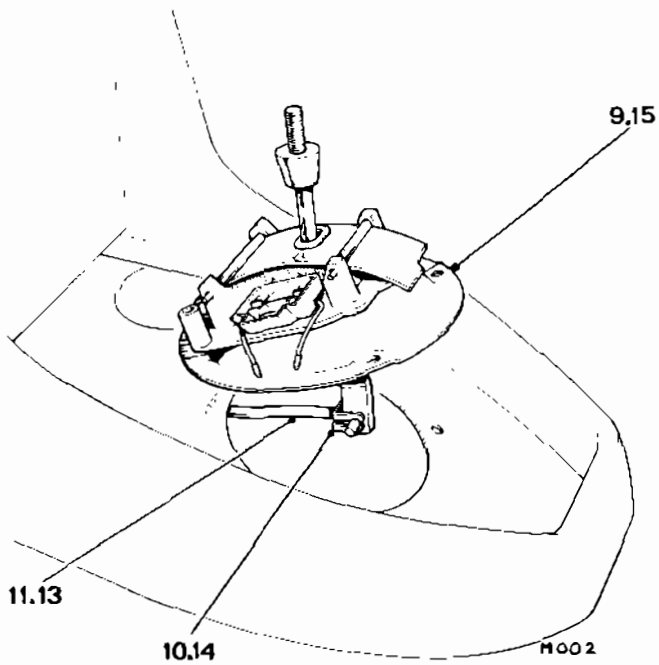


Removing

1. Select position 'I'.
2. Slacken the locking collar.
3. Unscrew the 'T' handle.
4. Remove the console tray front panel.
5. Take out the screws and remove the washers.
6. Lift the console tray rear panel over the hand lever.
7. Disconnect the leads to the selector panel illumination bulb.
8. Take out the screws and remove the washers.
9. Lift the turret assembly clear of the transmission tunnel.
10. Push the clip forward.
11. Disconnect the selector rod from the hand lever.

Refitting

12. Move the hand lever to position 'I'.
13. Locate the selector rod in the hand lever.
14. Pull back the clip to secure the rod to the lever.
15. Locate the turret assembly onto the transmission tunnel.
16. Secure the turret with four screws and washers.
17. Connect the selector panel illumination leads.
18. Fit the console tray rear panel over the hand lever.
19. Secure the panel with two screws and washers.
20. Refit the console tray front panel.
21. Screw the 'T' handle onto the hand lever.
22. Tighten the locking collar.

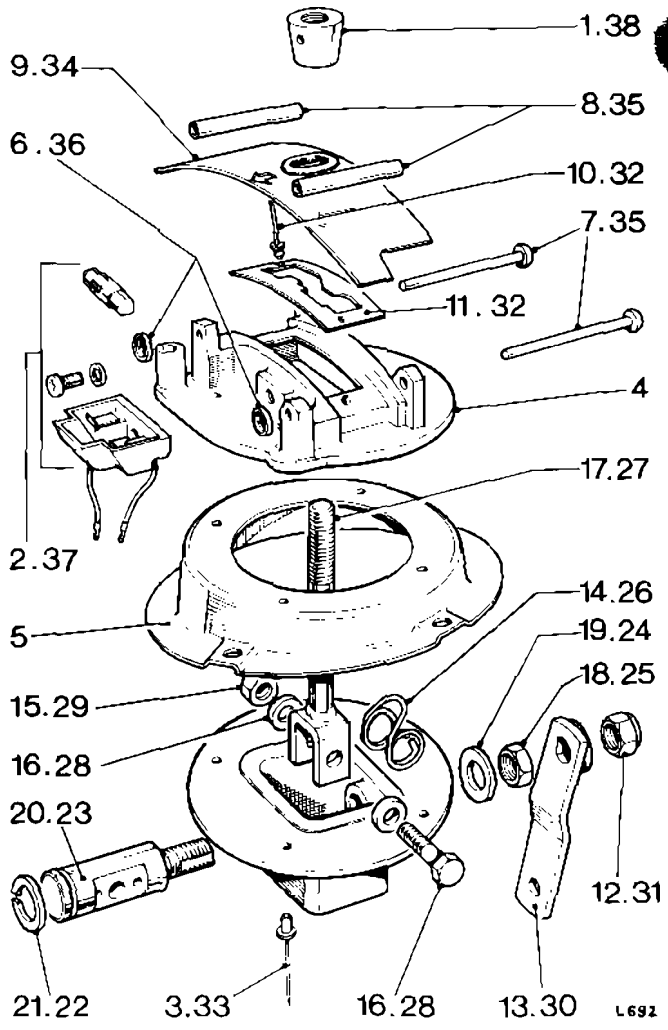


HAND LEVER TURRET

—Overhaul **44.15.05**

Dismantling

1. Unscrew the locking collar.
2. Remove the bulb. Take out the screw and withdraw the bulb holder.
3. Drill out the Pop rivets.
4. Take off the top plate assembly.
5. Take off the base plate.
6. Remove the retaining clips.
7. Take out the pins.
8. Remove the spacer tubes.
9. Lift off the finisher plate.
10. Drill out the Pop rivets.
11. Remove the gate plate.
12. Unscrew the nut.
13. Remove the lower lever.
14. Remove the bias spring.
15. Unscrew the nut.
16. Take out the bolt and washers.
17. Remove the lever.
18. Unscrew the nut.
19. Remove the washer.
20. Withdraw the pivot pin.
21. If necessary, remove the circlip.



Reassembling

22. Fit the circlip to the pivot pin.
23. Lightly grease the pivot pin and insert it in the selector box.
24. Fit the washer.
25. Fit the nut and tighten just sufficiently to eliminate end-float of the pin.
26. Fit the bias spring to the pivot pin.
27. Fit the lever over the pivot pin.
28. Lightly grease the bolt and washers and fit through the lever and pivot pin.
29. Fit and tighten the nut.
30. Assemble the lower lever to the pivot pin.
31. Refit the nut.
32. Using Pop rivets, secure the gate plate to the top plate.
33. Assemble the selector box, base plate and top plate and secure with Pop rivets.
34. Fit the finisher plate over the lever.
35. Refit the pins and spacer tubes.
36. Secure the pins, using new clips.
37. Refit the bulb holder, secure with the screw and refit the bulb.
38. Screw the locking collar onto the lever.

SELECTOR ROD

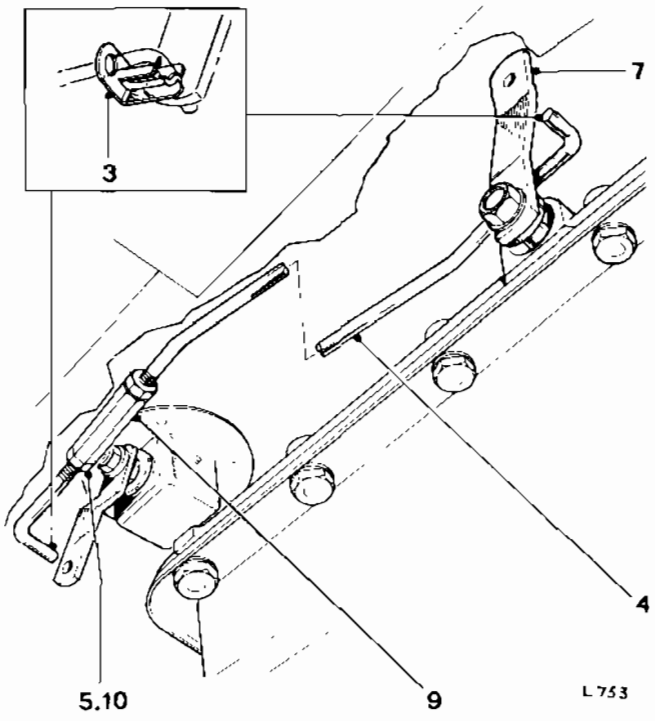
—Remove and refit **44.15.08**

Removing

1. Drive the vehicle onto a ramp, lock the selector lever in 'N' and apply the hand brake.
2. Raise the ramp.
3. Push the clips clear of the levers.
4. Remove the selector rod from the gearbox selector and hand lever.

Refitting

5. Slacken the selector rod locknut.
6. Ensure that the gearbox selector lever and the hand lever are both in position 'N'.
7. Fit the selector rod to the gearbox selector lever.
8. Secure the rod by pushing the clip onto the lever.
9. Alter the length of the rod by adjusting the turnbuckle until the end of the rod can be located in the hand lever.
10. Tighten the locknut.
11. Push the clip onto the lever and secure the rod.



GEARBOX SELECTOR LEVER

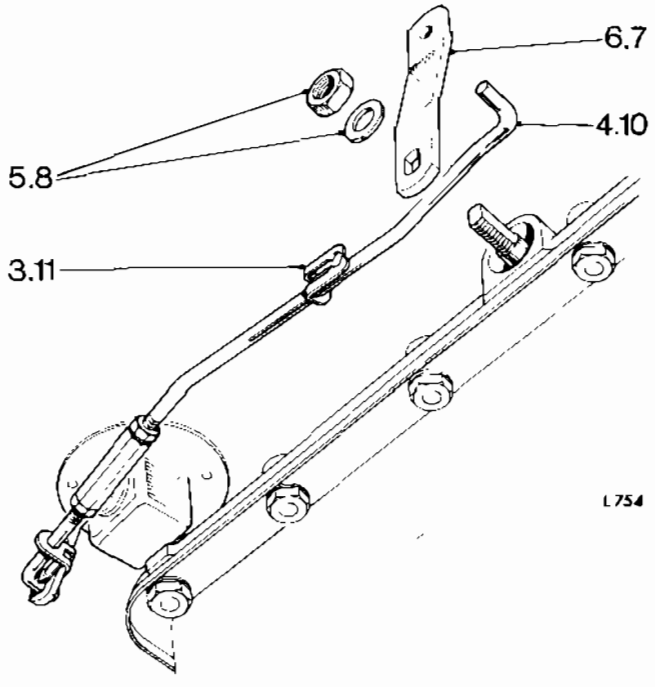
—Remove and refit **44.15.09**

Removing

1. Drive the vehicle onto a ramp, select 'N' and apply the hand brake.
2. Raise the ramp.
3. Push the clip rearward.
4. Disconnect the selector rod from the lever.
5. Unscrew the nut and washer.
6. Remove the lever.

Refitting

7. Fit the lever to the shaft.
8. Fit and tighten the nut and washer.
9. Move the selector into the neutral position.
10. Connect the selector rod to the lever.
11. Push the clip onto the lever and secure the rod.

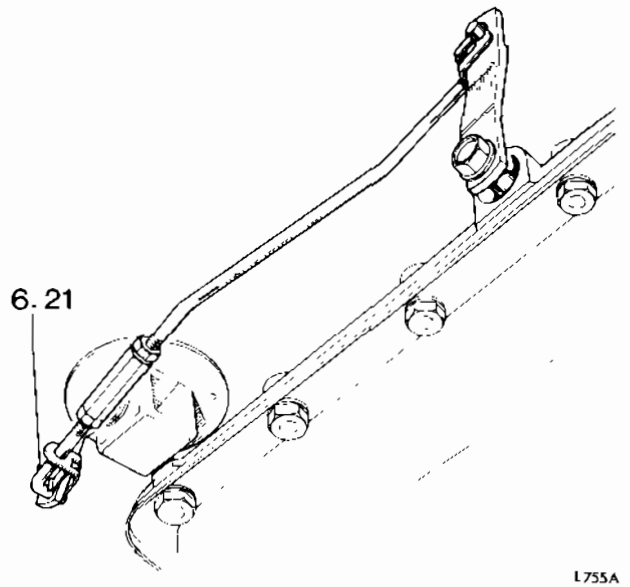


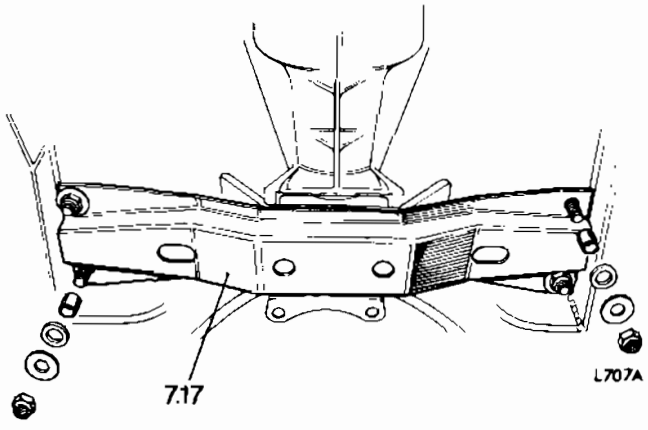
STARTER INHIBITOR/REVERSE LAMP SWITCH

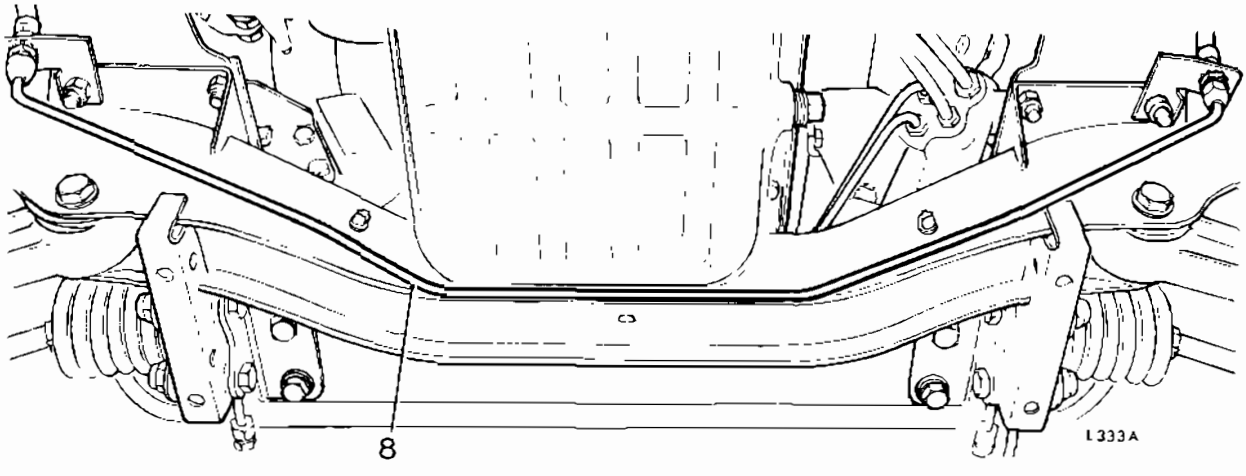
—Adjustment **44.15.14**

1. Drive the vehicle onto a ramp, select 'N', chock the wheels and open the bonnet.
2. Drain the cooling system and release the top hose from the radiator.
3. Raise the ramp.
4. Remove the exhaust front pipes and silencers 30.10.09/10/14.
5. Remove the propeller shaft.
6. Disconnect the selector rod from the hand lever.
7. Using a ramp jack under the rear extension to take the weight of the engine and transmission, release the mounting platform from the body floor.
8. Unclip the brake pipe from the front cross-member and lower the ramp jack until the weight of the engine and transmission is taken by the front edge of the engine sump against the front cross-member. Pull the brake pipe clear of the sump.
9. Disconnect the leads from the switch.
10. Slacken the locknut.
11. Select position '1'.

continued



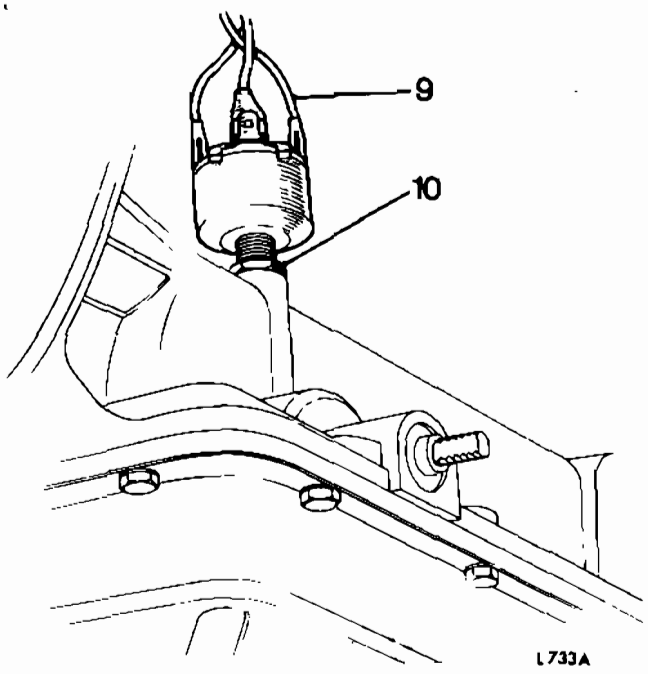


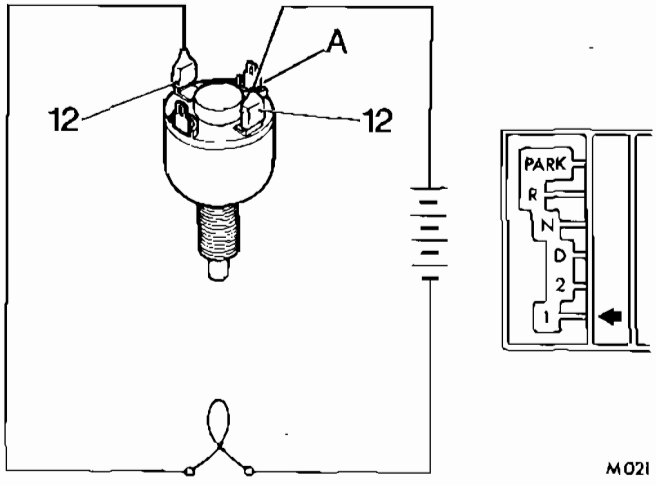


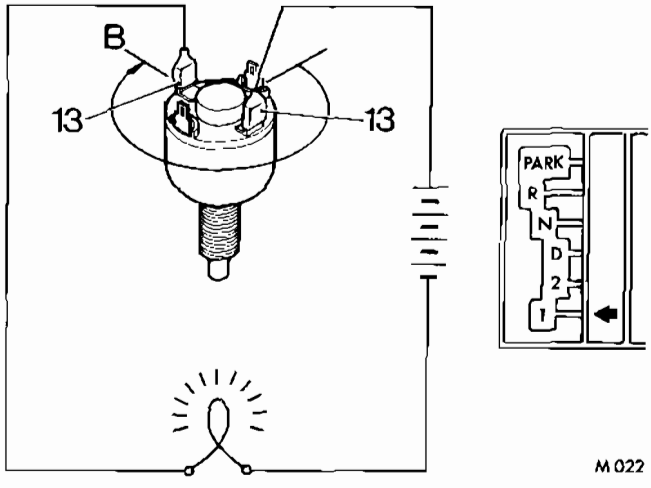
12. Connect a test lamp circuit across the reverse lamp terminals (B) and unscrew the switch until the lamp is on. Screw in the switch until the lamp just goes out. Mark the position of the switch relative to the casing.
13. Connect the test lamp circuit across the starter terminals (B). The lamp should be off. Screw in the switch approximately three-quarters of a turn until the lamp comes on, and mark the position of the switch. Remove the test lamp circuit.
14. Turn the switch until it is mid-way between the two marks, and tighten the locknut.
15. Check the operation of the switch as follows:

    Connect the test lamp circuit across the reverse lamp terminals and select '1', '2', 'D', 'N', 'R', 'P', in sequence. The lamp should come on only in position 'R'.

    Connect the test lamp circuit across the starter terminals and select 'P', 'R', 'N', 'D', '2', '1', in sequence; the lamp should come on only in positions 'P' and 'N'. Remove the test lamp circuit and select 'N'.
16. Connect the harness leads to the switch terminals white/red to the starter terminals; green and green/brown to the reverse lamp terminals.
17. Raise the ramp jack and secure the mounting platform to the body floor.
18. Refit the front brake pipe to the cross-member.
19. Refit the propeller shaft.
20. Refit the exhaust front pipes and silencers. 30.10.09/10/14.
21. Connect the selector rod to the hand lever.
22. Remove the ramp jack and lower the ramp.
23. Refit the top hose and fill the cooling system.





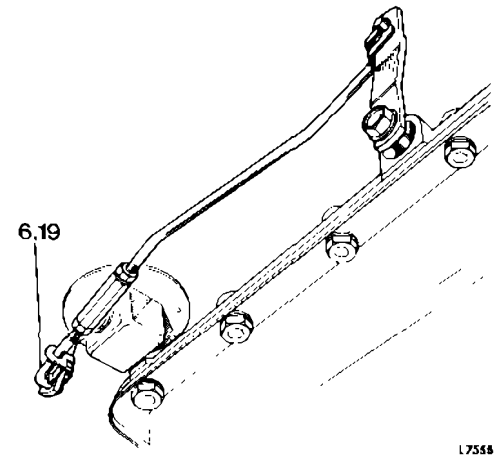


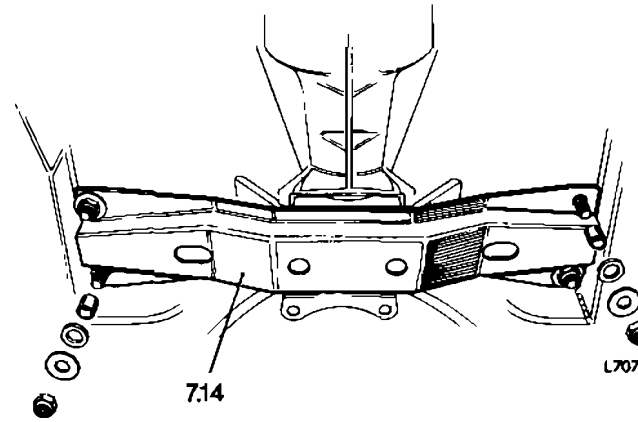
STARTER INHIBITOR/REVERSE LAMP SWITCH

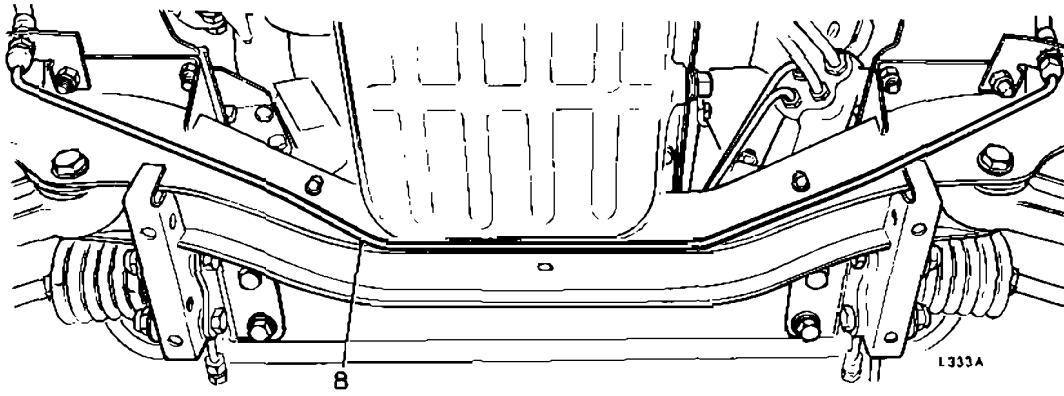
—Remove and refit **44.15.15**

Removing

1. Drive the vehicle onto a ramp, select 'N', chock the wheels and open the bonnet.
2. Drain the cooling system and release the top hose from the radiator.
3. Raise the ramp.
4. Remove the exhaust front pipes and silencers. 30.10.09/10/14.
5. Remove the propeller shaft.
6. Disconnect the selector rod from the hand lever.
7. Using a ramp jack under the rear extension to take the weight of the engine and transmission, release the mounting platform from the body floor.
8. Unclip the brake pipe from the front cross-member and lower the ramp jack until the weight of the engine and transmission is taken by the front edge of the engine sump against the front cross-member. Pull the brake pipe clear of the sump.
9. Disconnect the leads from the switch terminals.
10. Slacken the locknut and unscrew the switch.

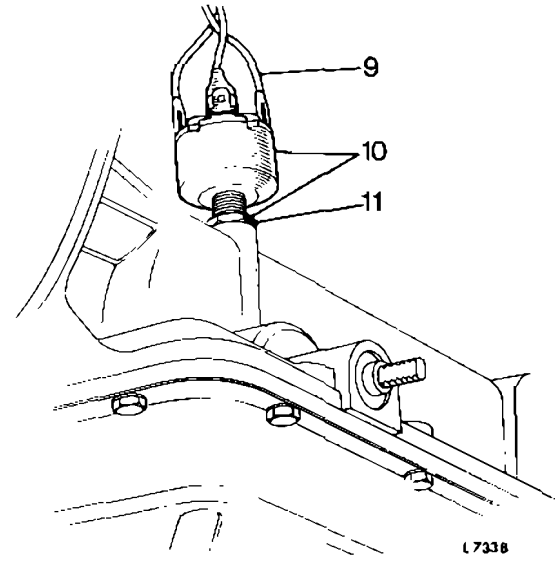






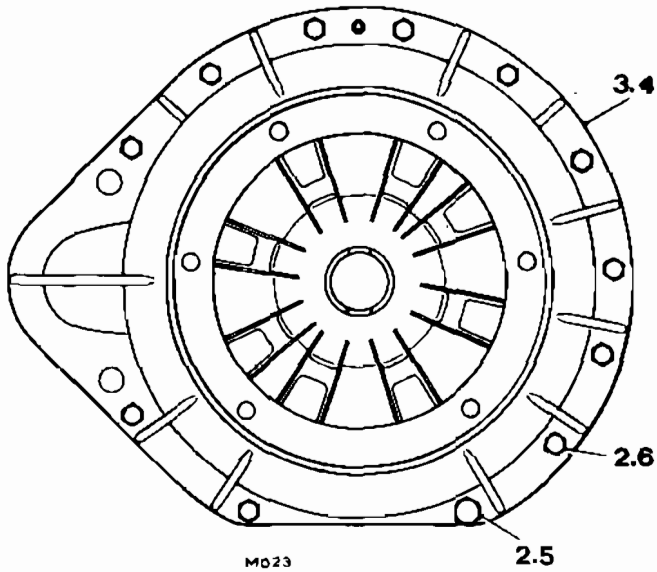
Refitting

11. Fit the locknut onto the switch.
12. Apply a thin coat of sealing compound to the switch threads.
13. Fit the switch into the transmission casing, connect the leads and adjust as described under operation 44.15.14.
14. Raise the ramp jack and secure the mounting platform to the body floor.
15. Fit the brake pipe to the front cross-member.
16. Remove the ramp jack.
17. Refit the propeller shaft.
18. Refit the exhaust front pipes and silencers. 30.10.09/10/14.
19. Connect the selector rod to the hand lever.
20. Lower the ramp.
21. Connect the top hose to the radiator and fill the cooling system.



TORQUE CONVERTER HOUSING

—Remove and refit **44.17.01**



Removing

1. Remove the gearbox. 44.20.01.
2. Unscrew the bolts securing the torque converter to the engine.
3. Remove the housing.

Refitting

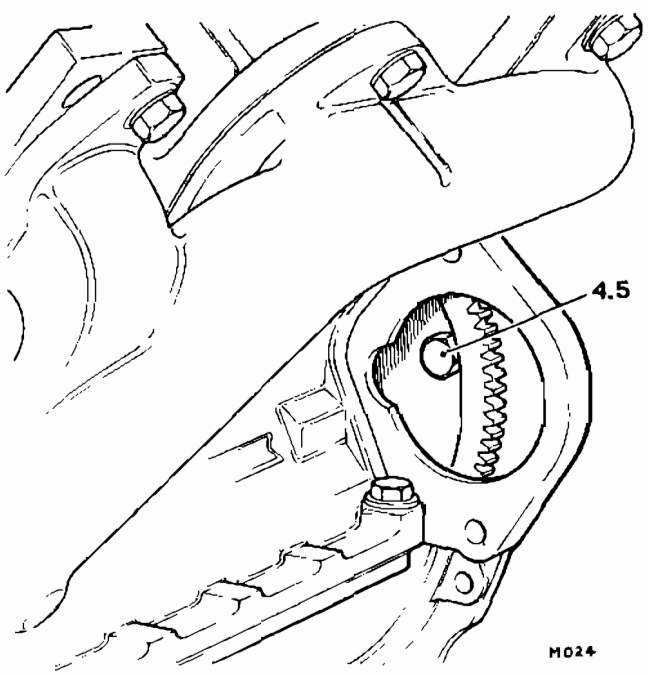
4. Place the torque converter housing in position.
5. Fit and tighten the dowel bolt and nut.
6. Fit and tighten the remaining bolts and nuts.
7. Refit the gearbox. 44.20.01.

TORQUE CONVERTER

—Remove and refit **44.17.07**

Removing

1. Remove the gearbox. 44.20.01.
2. Remove the starter motor. 86.60.01.
3. Unscrew the bolts securing the torque converter housing to the engine and remove the housing.
4. Turn over the engine to bring the torque converter attachment bolts within the starter motor aperture, and progressively slacken each bolt.
   Remove the bolts and take off the torque converter.



Refitting

5. Place the torque converter on the drive plate and fit the four bolts. Tighten the bolts to the recommended torque.
6. Ensure that the dowel is in position and locate the torque housing onto the engine.
7. Fit and tighten the dowel bolt and nut.
8. Fit and tighten the remaining bolts and nuts.
9. Refit the starter motor. 86.60.01.
10. Refit the gearbox. 44.20.01.

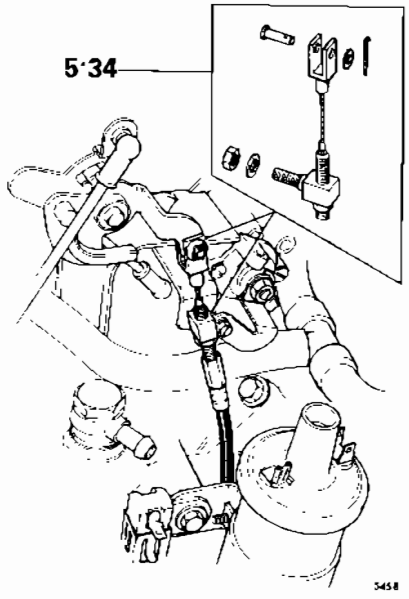
GEARBOX

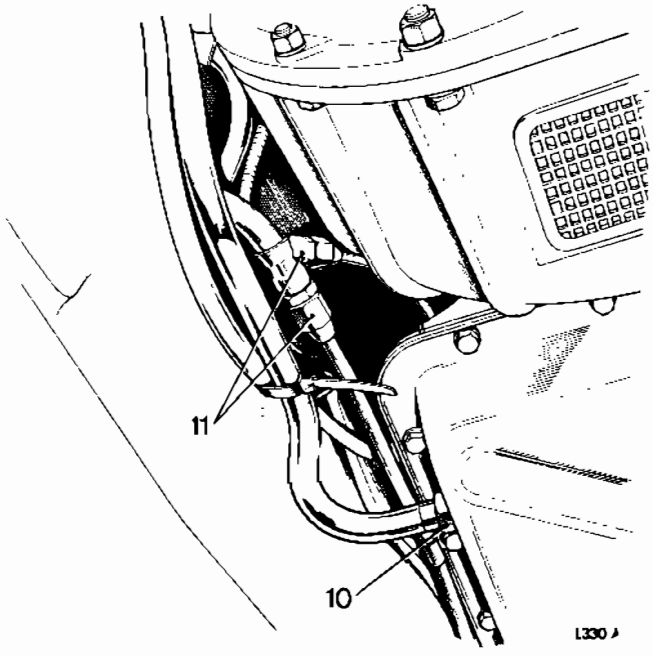
—Remove and refit **44.20.01**

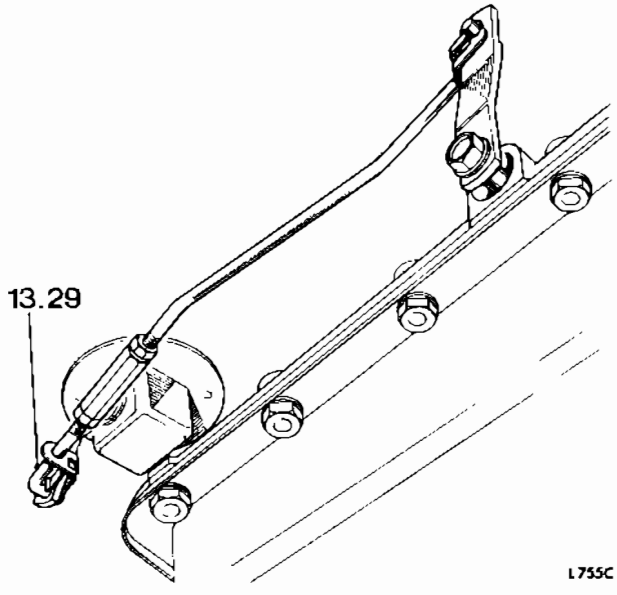
Removing

1. Drive the vehicle onto a ramp, select 'N' and chock the wheels.
2. Open the bonnet, disconnect the battery and drain the cooling system.
3. Disconnect the top hose from the radiator.
4. Disconnect the heater hoses from the heater.
5. Disconnect the downshift cable from the throttle linkage.
6. Disconnect the gearbox harness at the block connector situated adjacent to the starter motor.
7. Close the bonnet and raise the ramp.
8. Remove the exhaust front pipes and silencers. 30.10.09/10/14.
9. Detach the propeller shaft from the rear axle coupling flange, rolling the vehicle as necessary to gain access to the attachment bolts.
   Chock the wheels securely.
10. Unscrew the filler pipe union and drain the fluid from the transmission unit and move the pipe away from the oil pan.
11. Disconnect the oil cooler pipes at the points shown.
12. Remove the straps securing the breather pipe to the filler tube.
13. Disconnect the selector rod from the hand lever.
14. Using a ramp jack under the torque converter housing to take the weight of the engine and transmission, release the mounting platform from the body floor.
15. Unclip the brake pipe from the front cross-member. Pull the pipe clear of the sump and lower the ramp jack until the weight of the engine and transmission is taken by the front edge of the engine sump against the front cross-member.
16. Remove the six bolts securing the gearbox to the torque converter housing and manœuvre the gearbox clear of the torque converter. Lower the gearbox to the floor.
17. Detach the breather pipe from the gearbox and the harness from the switch.
18. Remove the mounting platform assembly from the gearbox.

continued

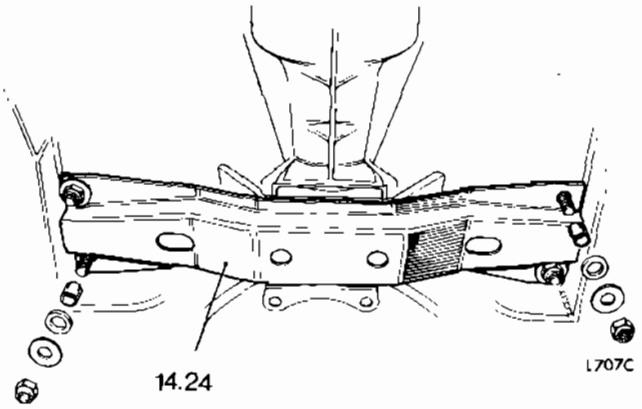




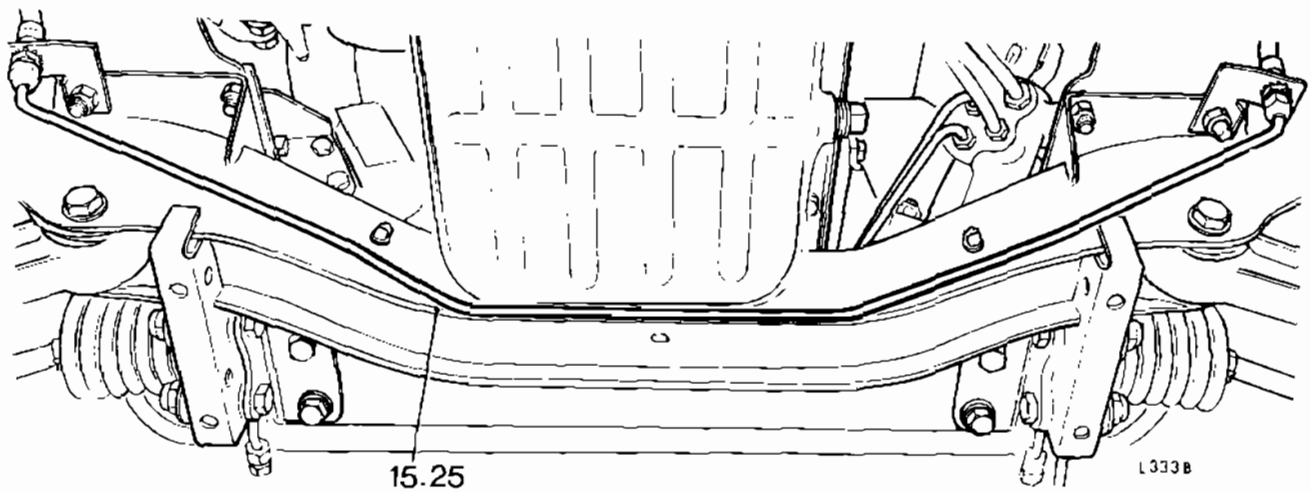


Refitting

19. Fit the mounting platform assembly to the gearbox.
20. Fit the breather pipe to the gearbox and the harness to the switch.
21. Align the slots in the front pump driving gear with the drive fingers of the converter hub.
22. Lift the gearbox and insert the input shaft into the torque converter, employing an assistant to turn the crankshaft thus permitting alignment of the input shaft splines.
23. Secure the gearbox to the torque converter housing with six bolts.
24. Raise the ramp jack and locate the gearbox mounting platform over the studs. Fit and tighten the securing nuts.
25. Clip the brake pipe in position on the front cross-member.
26. Connect the oil cooler pipes.
27. Fit the dipstick/filler pipe.
28. Secure the breather pipe to the filler tube.

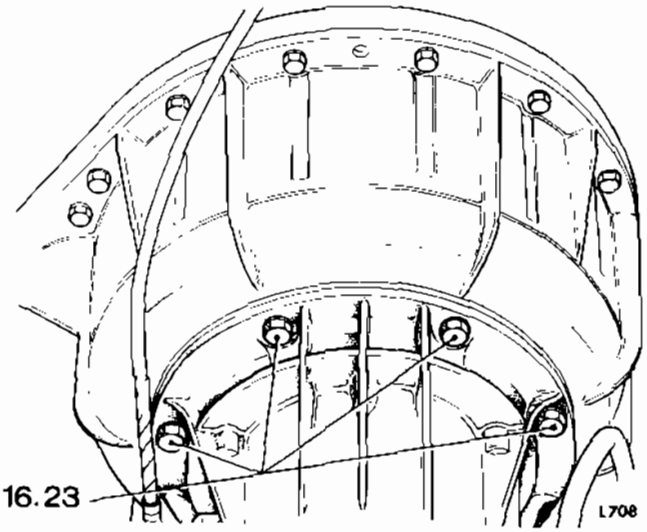


14.24



15.25

29. Connect the selector rod to the hand lever.
30. Refit the propeller shaft.
31. Refit the exhaust front pipes and silencers. 30.10.09/10/14.
32. Remove the ramp jack, lower the ramp and open the bonnet.
33. Connect the gearbox harness at the block connector.
34. Connect the downshift cable to the throttle linkage.
35. Fit the heater hoses to the heater.
36. Fit the top hose to the radiator and fill the cooling system.
37. Fill the transmission unit with fluid. 44.24.02.



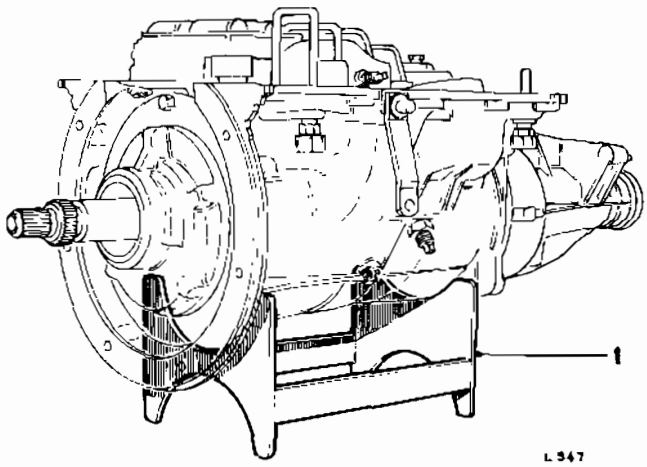
16.23

GEARBOX

—Overhaul 44.20.06

Service tools: BW35 or AT501, BW33 or AT502, 548-1 or AT507, BW34 or AT508

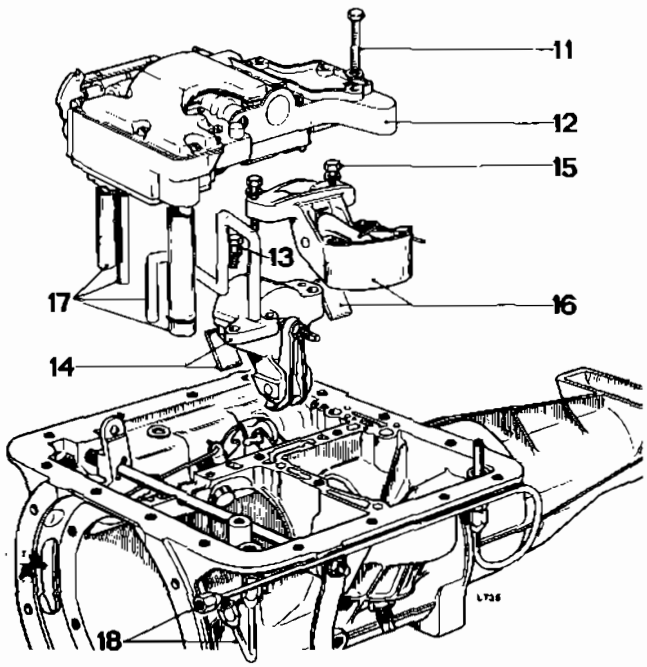
1. Remove the gearbox. 44.20.01.

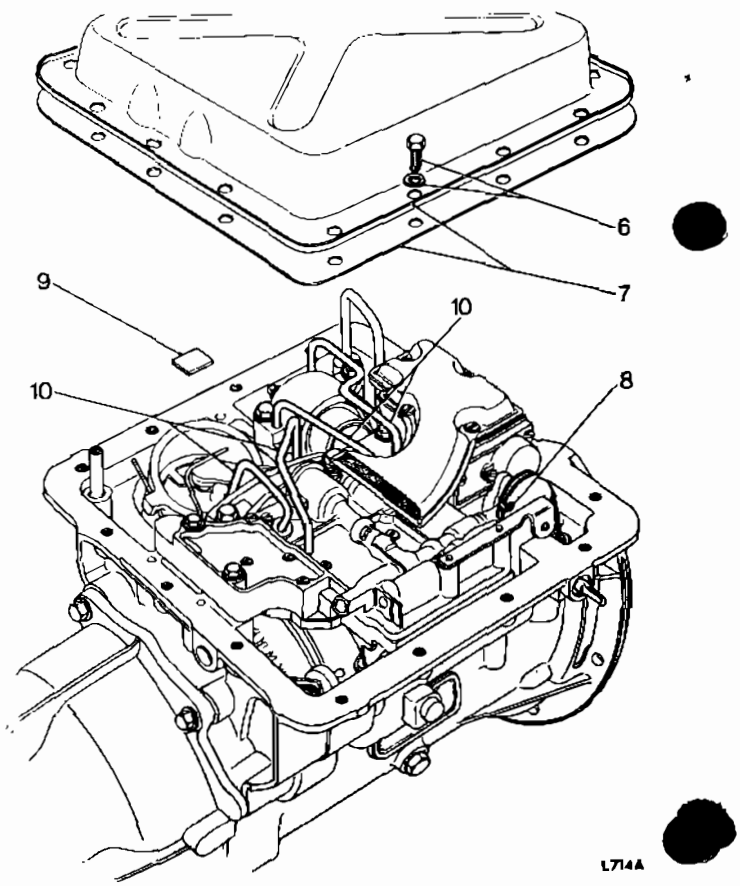


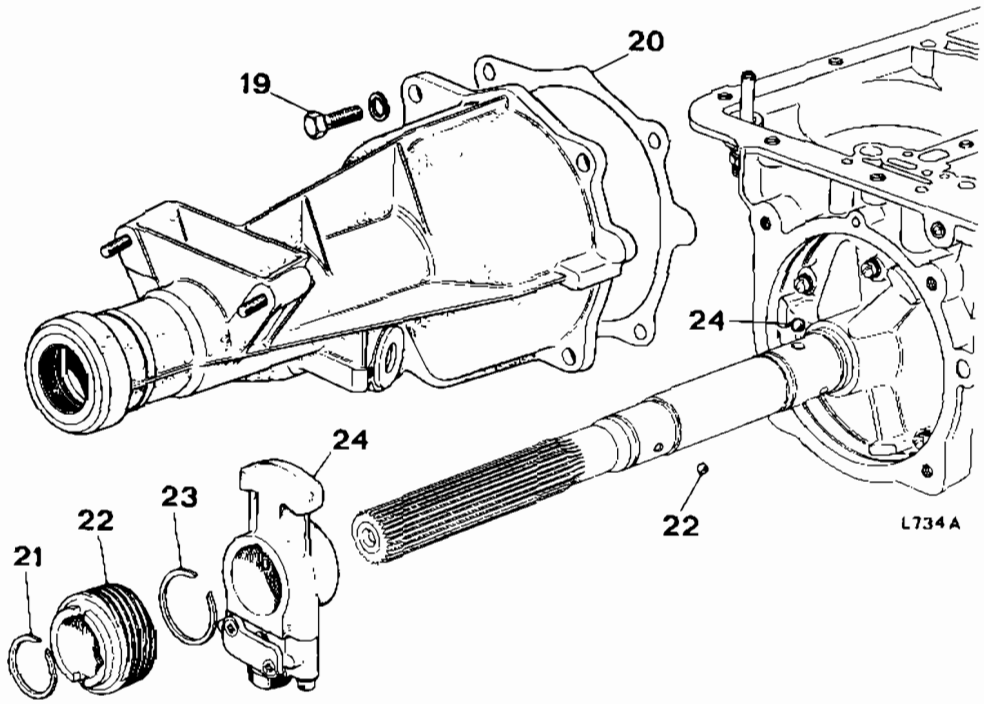
Dismantling

2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. If fitted, withdraw the converter assembly from the input shaft and place a container under the transmission unit to collect fluid which will emerge as the converter is withdrawn.
4. Remove the six bolts securing the torque converter housing to the gearbox.
5. Take off the torque converter housing (if fitted).
6. Take out 15 bolts and washers.
7. Remove the sump and joint washer.
8. Release the downshift inner cable from the downshift cam and unscrew the outer cable from the transmission casing. Remove the cable assembly.
9. Remove the magnet.
10. Pull out the oil tubes.
11. Take out three bolts and washers.
12. Lift off the valve block.
13. Take out two bolts and washers.
14. Remove the front servo and strut.
15. Take out two bolts and washers.
16. Remove the rear servo and strut.
17. Pull out the oil tubes (note 'O' ring on front pump suction tube).
18. Remove the oil pipes from the casing.

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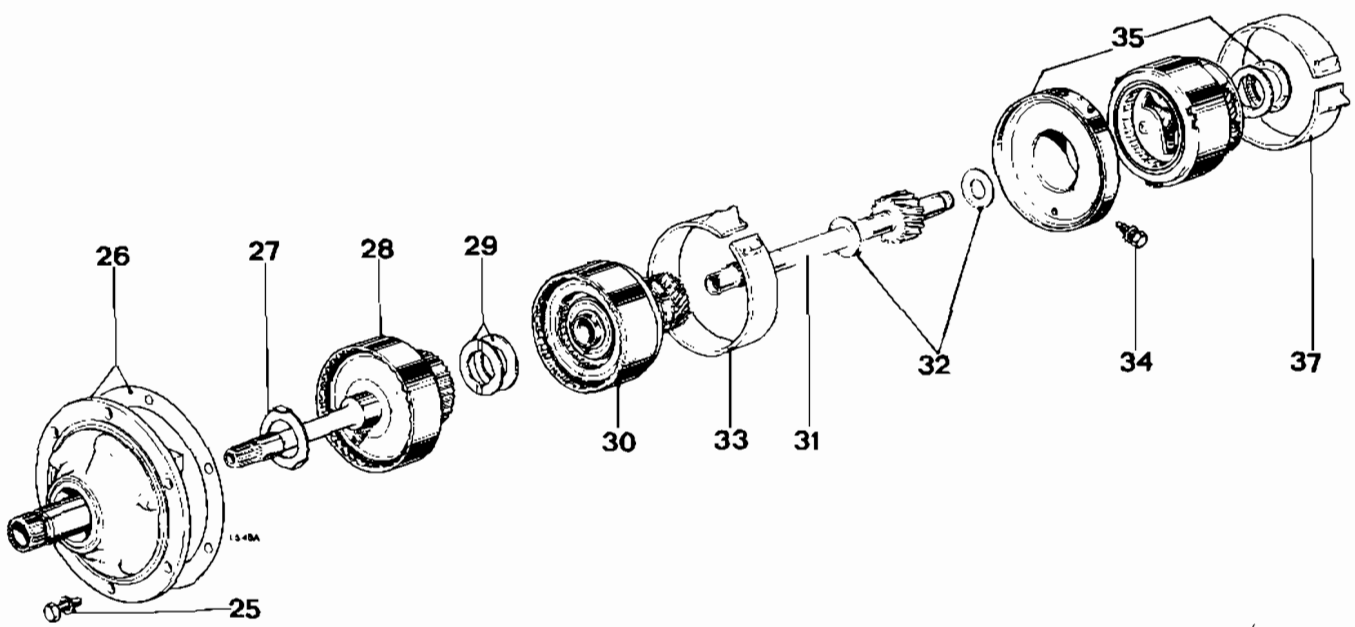




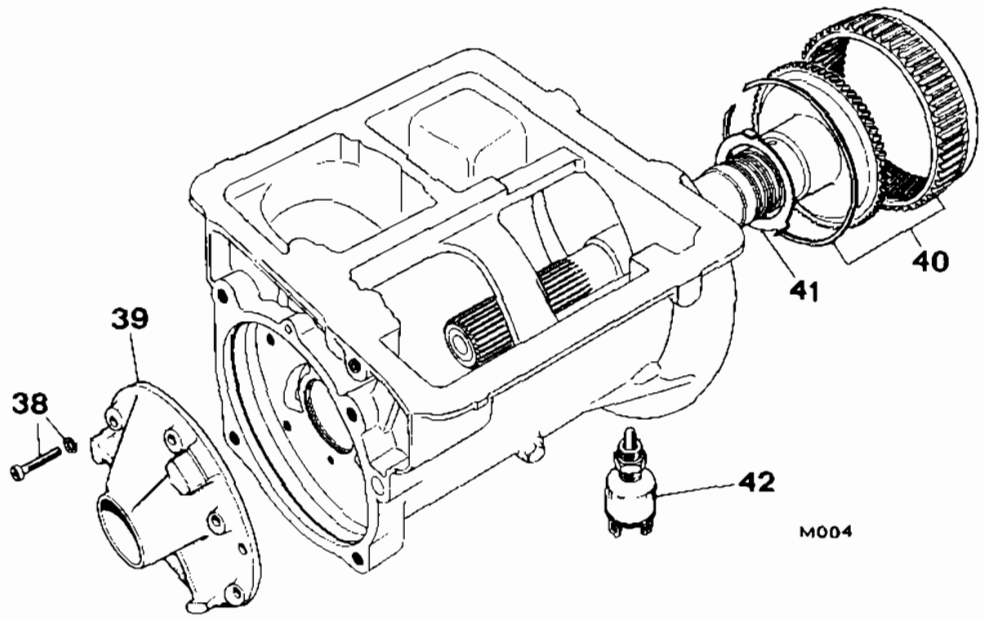


19. Take out four bolts and washers.
20. Withdraw the rear extension housing and joint washer.
21. Remove the circlip.
22. Withdraw the speedometer drive gear and ball.
23. Remove the circlip.
24. Withdraw the governor assembly and drive ball.
25. Take out the bolts.
26. Remove the front pump and joint washer.
27. Remove the thrust washer.
28. Withdraw the front clutch.
29. Remove the thrust washers.
30. Withdraw the rear clutch and forward sun gear.
31. Separate the forward sun gear assembly from the rear clutch.
32. Remove the two needle thrust bearings from the forward sun gear.
33. Squeeze together the ends of the front brake band and remove it from the casing.
34. Take out two bolts and washers.
35. Withdraw the centre support and planet gear assembly and thrust bearing.
36. Separate the planet gear assembly from the centre support.
37. Squeeze the ends of the rear band together, tilt the band and withdraw from the casing.

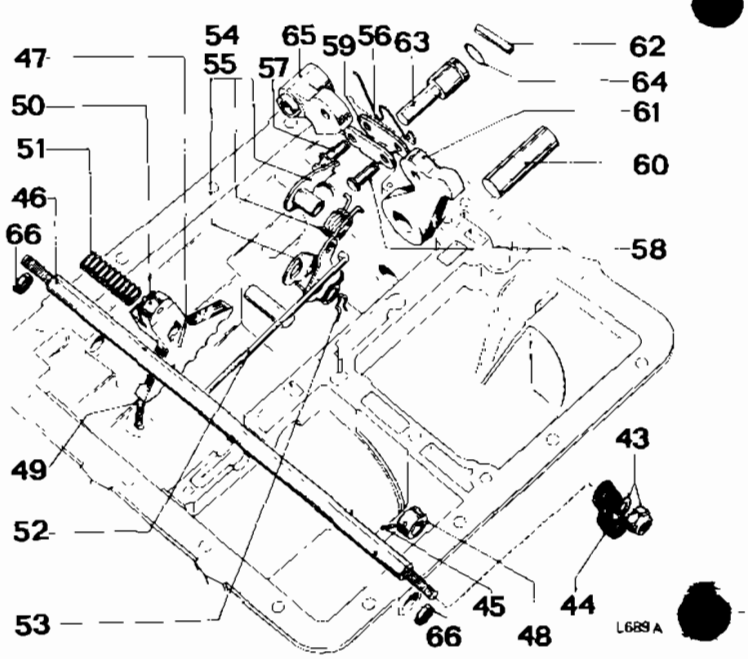
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38. Take out five screws and washers.
39. Remove the adaptor plate.
40. Withdraw the output shaft.
41. Remove the thrust washer.
42. Unscrew and remove the switch and locknut.



43. Unscrew the nut.
44. Remove the selector lever.
45. Drive out the Mills pin.
46. Carefully tap the cross-shaft through the casting and detent lever: do not remove.
47. Extract the pin from the cross-shaft.
48. Holding the detent lever, remove the cross-shaft and collar.
49. Remove the detent ball and spring.
50. Remove the detent lever.
51. Remove the bias spring.
52. Remove the link rod.
53. Pull off the spring clip and remove the washer.
54. Remove the lever assembly from the torsion lever shaft.
55. Separate the torsion lever, toggle lift lever and spring.
56. Detach the release spring.
57. Withdraw the toggle pin.
58. Withdraw the link pin.
59. Remove the toggle link.
60. Shake out the anchor pin.
61. Remove the parking pawl.
62. Drive out the Mills pin.
63. Remove the anchor pin.
64. Detach the 'O' ring.
65. Remove the toggle lever.
66. Prise out the seals.



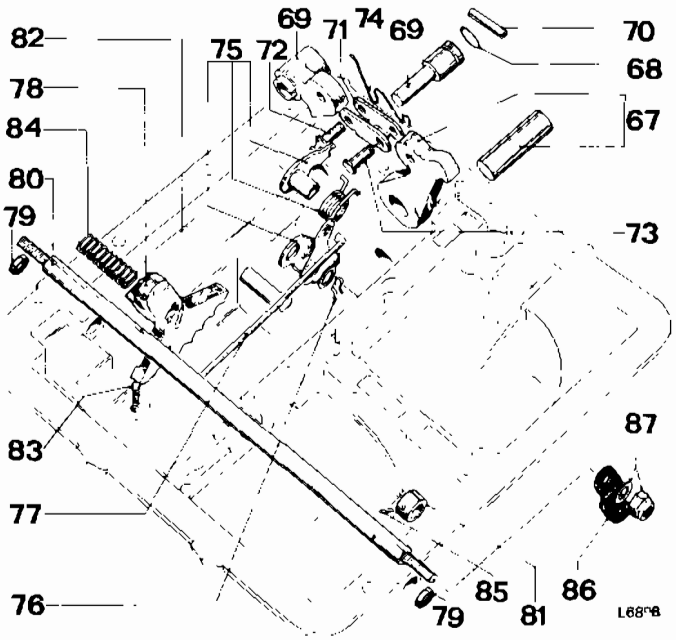
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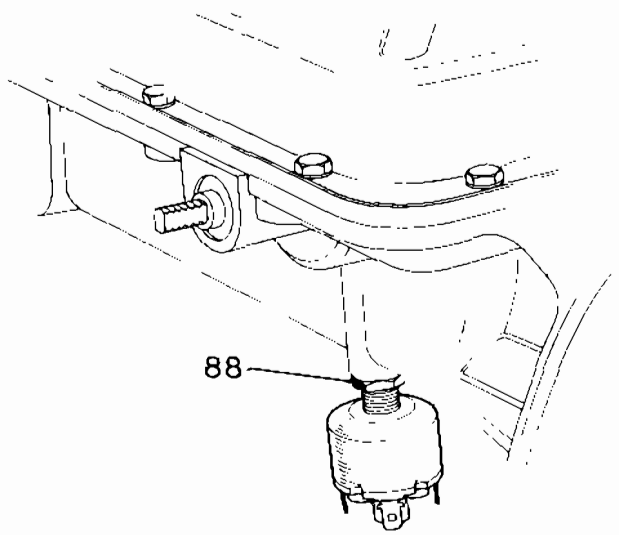
Reassembling

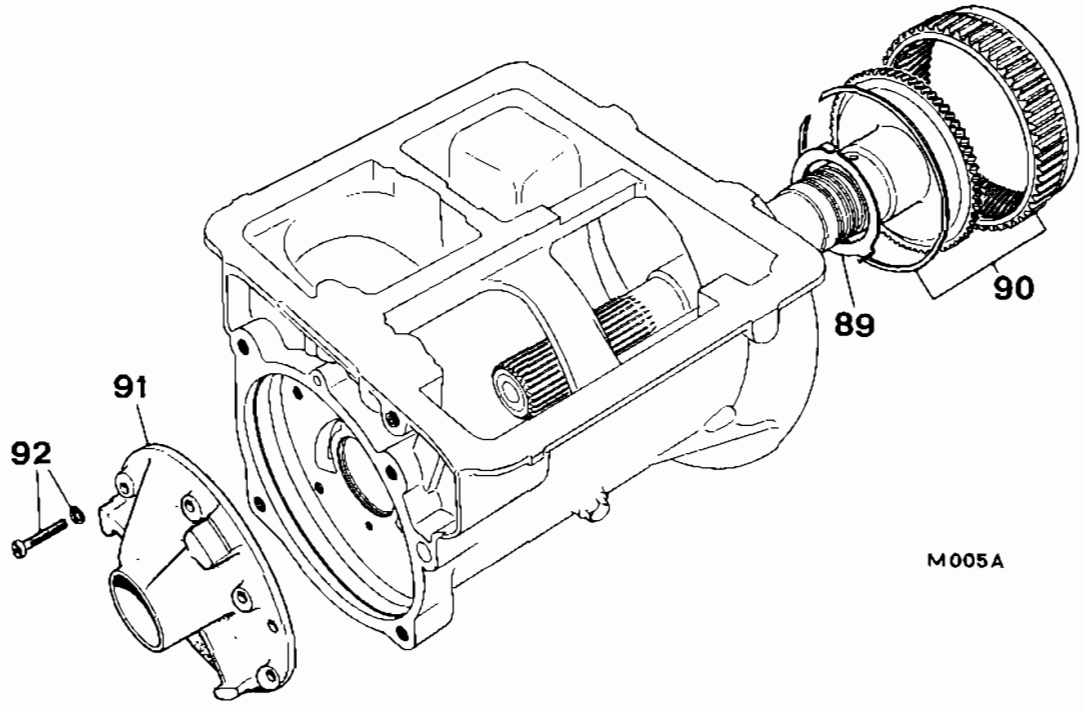
67. Refit the anchor pin and parking pawl.
68. If necessary, fit a new 'O' ring to the toggle lever anchor pin.
69. Refit the toggle lever and anchor pin.
70. Fit the Mills pin.
71. Refit the toggle link.
72. Insert the toggle pin.
73. Insert the link pin.
74. Refit the release spring.
75. Reassemble the toggle link lever, torsion lever and spring, and fit the assembly onto the torsion lever shaft.
76. Secure the assembly with the washer and spring clip.
77. Fit the link rod into the torsion lever.
78. Fit the detent lever to the link rod.
79. Press new seals into the casing.
80. Insert the cross-shaft into the casing from the opposite side to the detent lever.
81. Slide the collar onto the shaft.
82. Fit the pin through the shaft.
83. Locate the detent spring and ball into the casing and hold the detent lever to retain them in position, whilst sliding the cross-shaft through the detent lever.
84. Locate the bias spring to position and slide the cross-shaft fully home.
85. Refit the Mills pin and secure the collar to the shaft.
86. Fit the selector lever.
87. Fit and tighten the nut and washer.
88. Apply a little sealing compound to the threads of the inhibitor/reverse lamp switch and screw the switch and locknut into the casing.

    Adjust the switch. 44.15.14.

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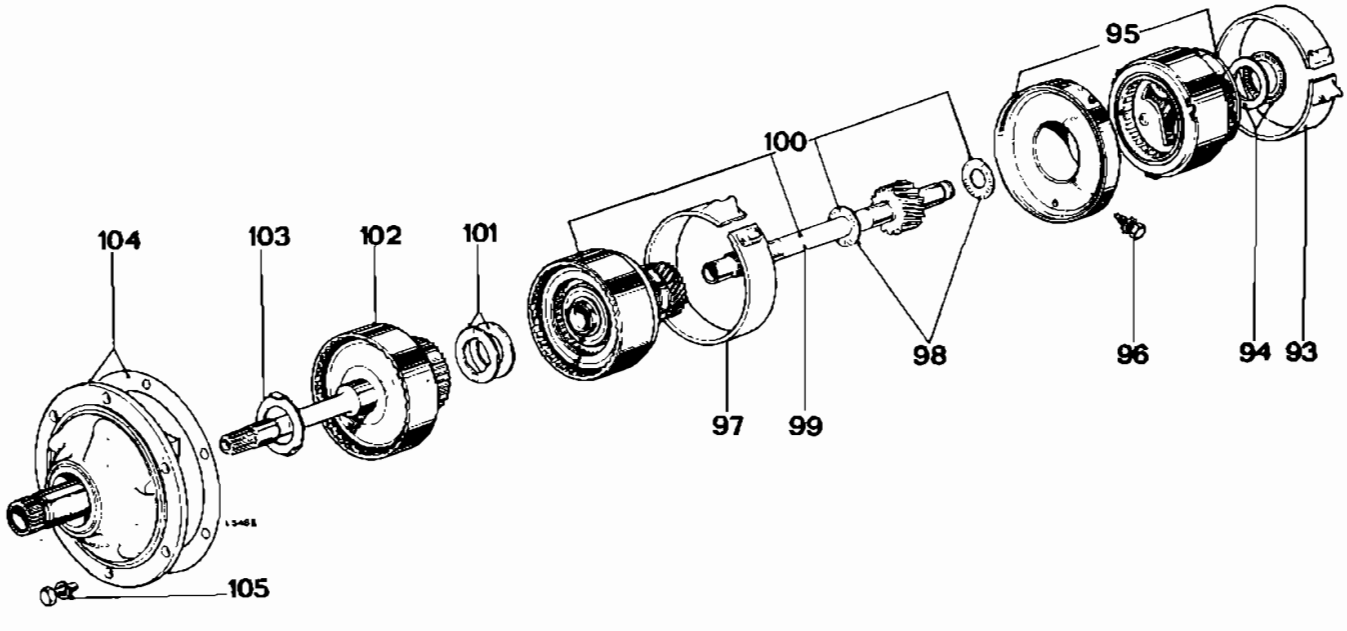




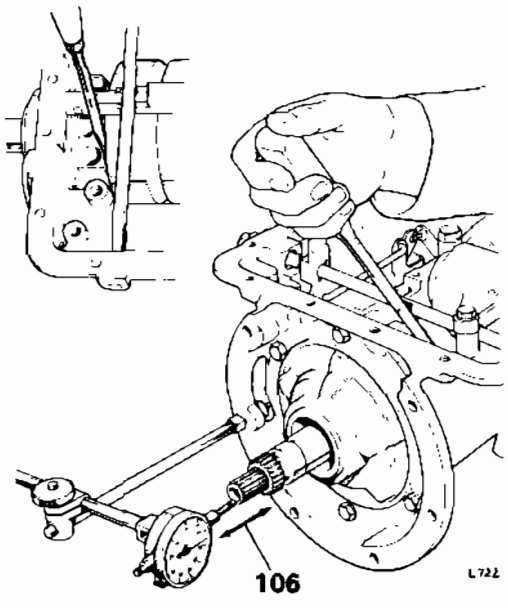


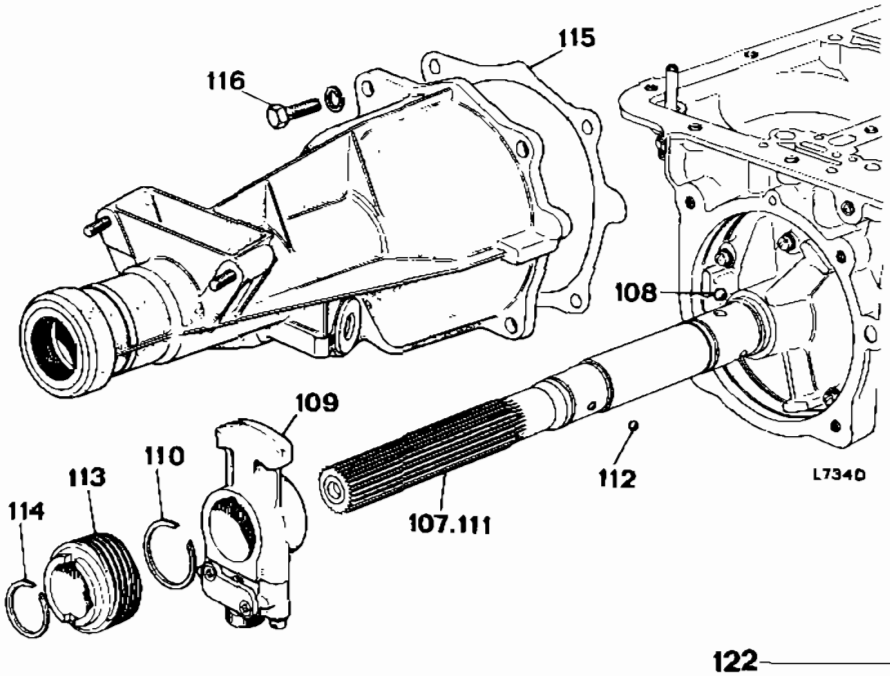
89. Using a little petroleum jelly, stick the thrust washer in position.
90. Refit the output shaft assembly.
91. Locate the adaptor plate on the rear face of the unit.
92. Fit and tighten the five screws and washers.
93. Place the rear band in the casing, tilt, squeeze the ends together and locate in the correct position.
94. Using a little petroleum jelly, stick the thrust bearing and plate in position on the output shaft.
95. Assemble the centre support and planet gear assembly and refit the assembly, ensuring that the oil and locating holes in the centre support align with those in the casing.
96. Fit and tighten the two locating bolts and washers. Ensure that the flat faces of the washers are toward the casing.
97. Squeeze together the ends of the front brake band and fit it into position.
98. Refit the needle thrust bearings to the forward sun gear.
99. Assemble the forward sun gear to the rear clutch.
100. Refit the assembly.
101. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze side against the clutch).
102. Refit the front clutch assembly.
103. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
104. Refit the front pump assembly and new joint washer.
105. Fit and tighten the bolts.

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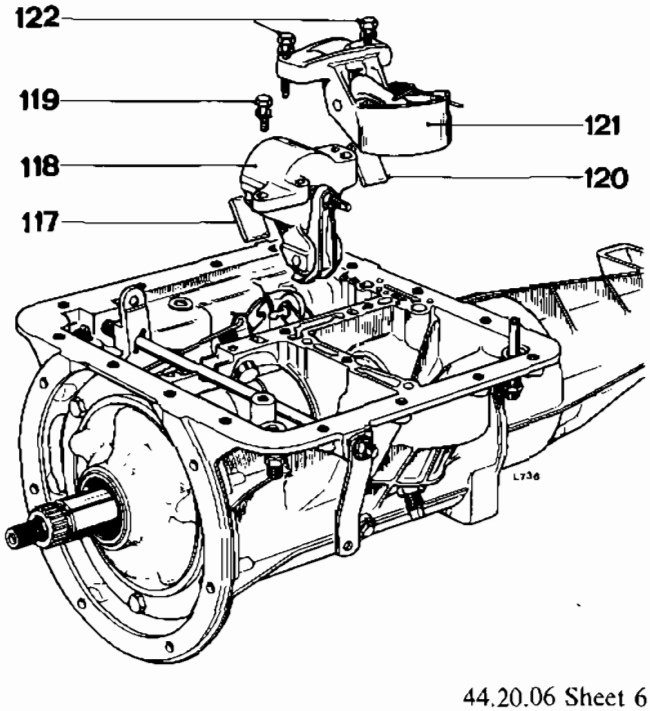
106. Check the gear train end-float and, if necessary, adjust by selective use of the thrust washer fitted between the pump and front clutch. Recommended end-float 0·25 to 0·75 mm (0·010 to 0·030 in).
107. Turn the output shaft until the governor drive ball detent is uppermost.
108. Locate the ball bearing in the detent.
109. Fit the governor assembly.
110. Secure the governor with the circlip.
111. Turn the output shaft until the speedometer drive ball detent is uppermost.
112. Locate the ball bearing in the detent.
113. Fit the speedometer drive gear.
114. Secure the gear with the circlip.
115. Refit the rear extension and a new joint washer.
116. Fit and tighten the bolts and washers.



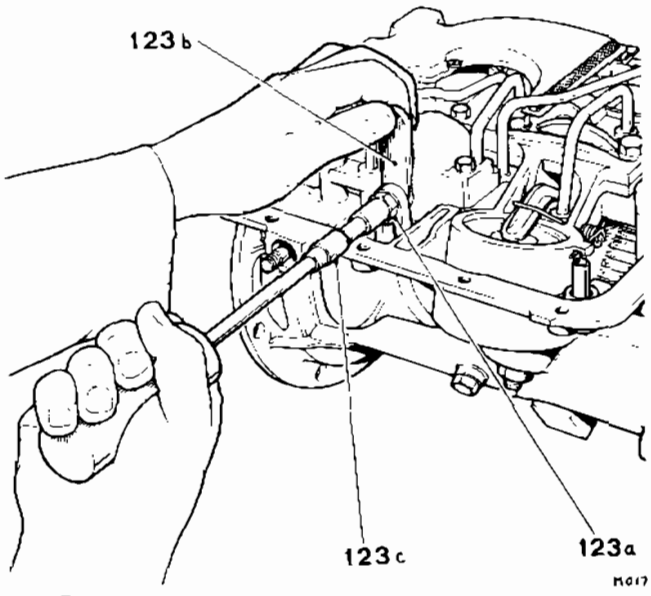


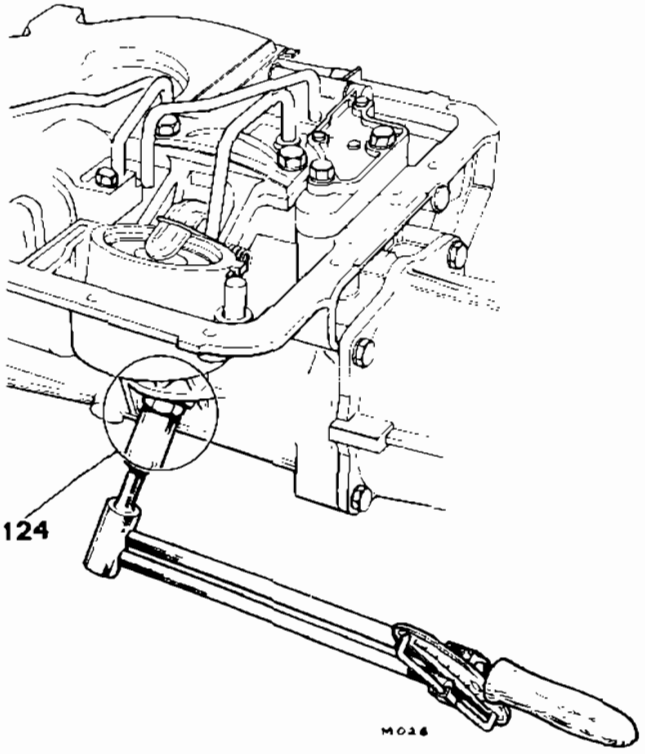
117. Using petroleum jelly, stick the front strut to the front servo lever.
118. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
119. Fit and tighten the two bolts and washers.
120. Using petroleum jelly, stick the rear strut to the rear brake band.
121. Carefully fit the rear servo in position, ensuring that the rear strut is correctly located in the rear servo lever.
122. Fit and tighten the two bolts and washers.

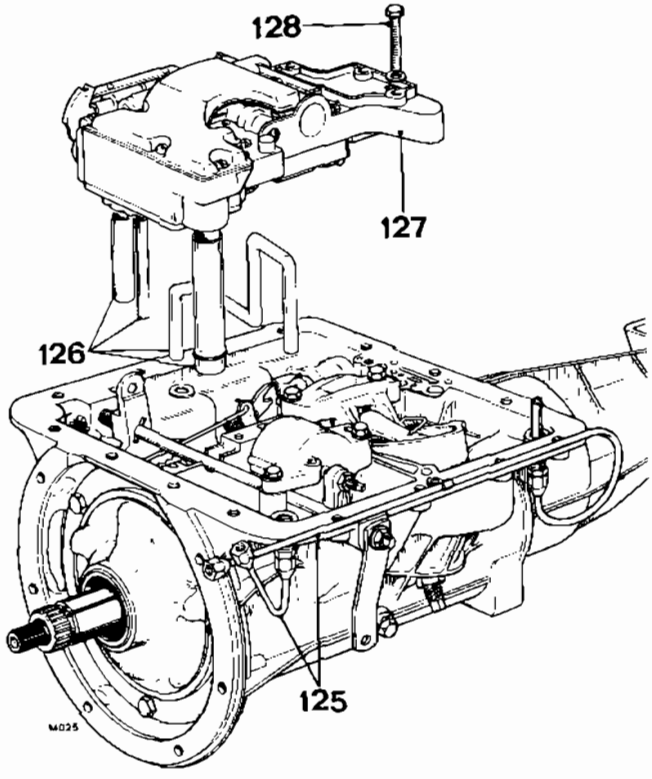
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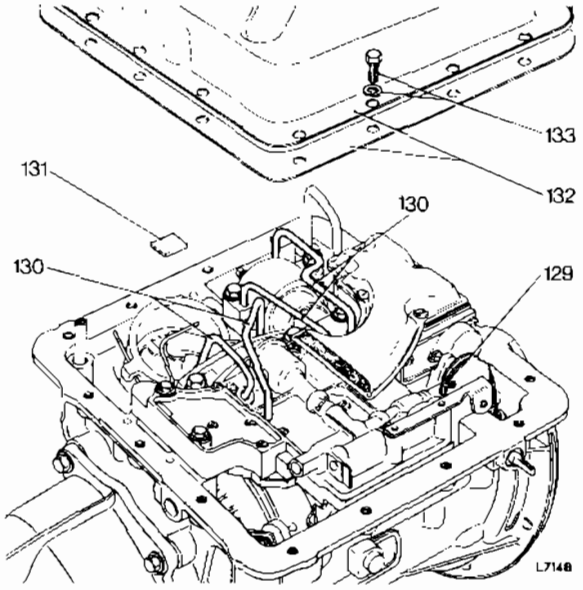


123. Adjust the front band as follows:
   a. Slacken the adjusting screw and locknut.
   b. Move the servo lever outward and place a 6·5 mm (0·250 in) gauge block between the adjusting screw and the piston pin.
   c. Using a 'Spintorq' screwdriver, tighten the adjusting screw to 0·14 kgf m (10 lbf in) and tighten the locknut.
   d. Remove the gauge block.
124. Adjust the rear brake band as follows:
   a. Slacken the locknut and tighten the adjusting screw to 1·38 kgf m (10 lbf ft).
   b. Slacken the adjusting screw one complete turn and tighten the locknut.
125. Refit the oil cooler pipe unions.
126. Refit the oil tubes.
127. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
128. Fit and tighten the three bolts and washers.
129. Refit the downshift cable.
130. Refit the oil tubes.
131. Refit the magnet.
132. Refit the sump and a new joint washer.
133. Fit and tighten the 15 bolts.
134. Refit the torque converter housing (if necessary).
135. Fit and tighten the six bolts and washers.
136. Refit the torque converter (if necessary).
137. Refit the gearbox. 44.20.01.







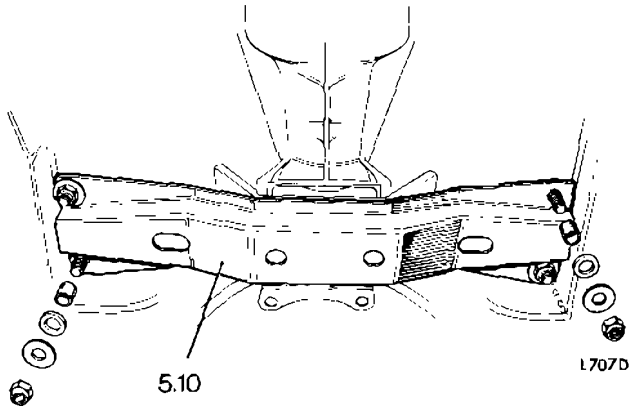


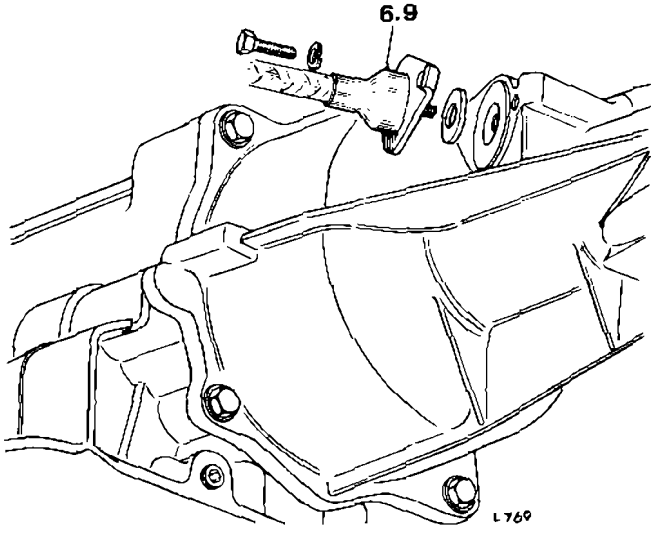
REAR EXTENSION

—Remove and refit **44.20.15**

Removing

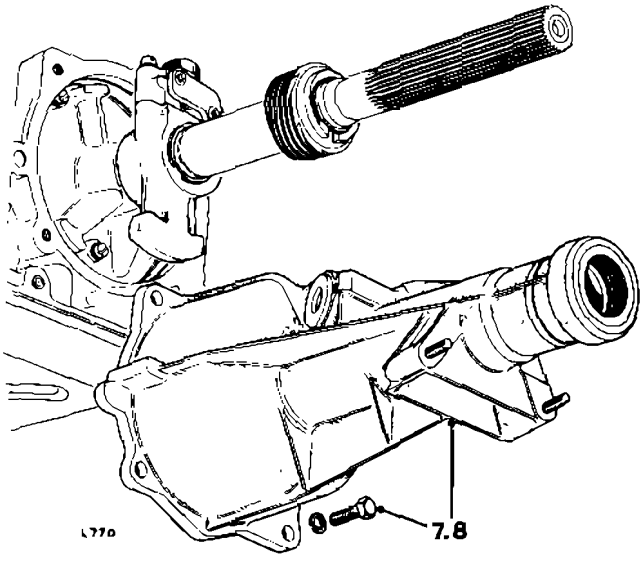
1. Drive the vehicle onto a ramp, select 'N' and chock the wheels.
2. Remove the exhaust front pipes and silencers. 30.10.09/10/14.
3. Remove the propeller shaft.
4. Place a ramp jack under the torque converter housing to support the engine/transmission.
5. Release the mounting platform from the floor and the rear extension push the studs up through the floor.
6. Disconnect the speedometer drive cable from the gearbox extension.
7. Take out the bolts securing the rear extension to the gearbox and withdraw the extension.





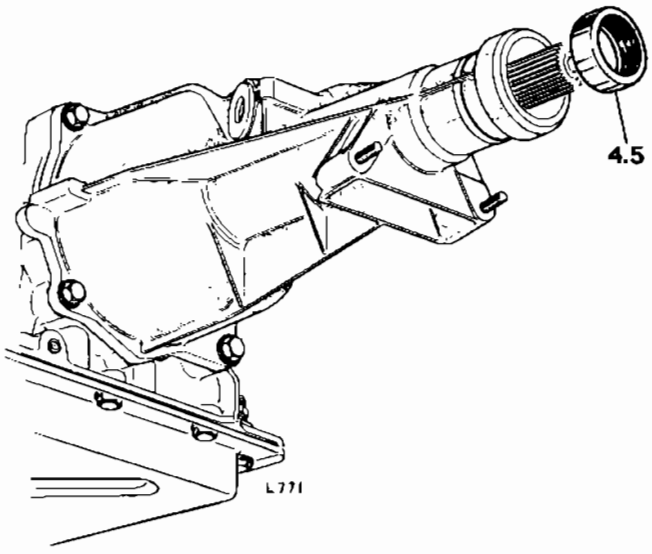
Refitting

8. Refit the rear extension to the gearbox and secure with bolts.
9. Connect the speedometer cable.
10. Refit the mounting platform to the gearbox and the floor.
11. Refit the propeller shaft.
12. Replace the exhaust front pipes and silencers. 30.10.09/10/14.



REAR OIL SEAL

—Remove and replace **44.20.18**



Removing

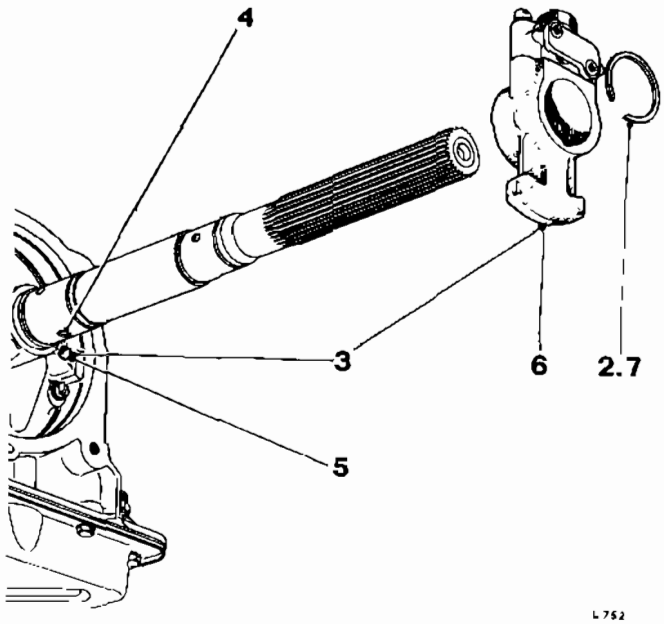
1. Drive the vehicle onto a ramp, select 'N' and chock the wheels.
2. Remove the exhaust front pipes and silencers. 30.10.09/10/14.
3. Remove the propeller shaft.
4. Prise the seal out of the rear extension.

Replacing

5. Using a suitable drift, carefully drive a new seal into the rear extension.
6. Refit the propeller shaft.
7. Refit the exhaust front pipes and silencers. 30.10.09/10/14.

GOVERNOR

—Remove and refit **44.22.01**



Removing

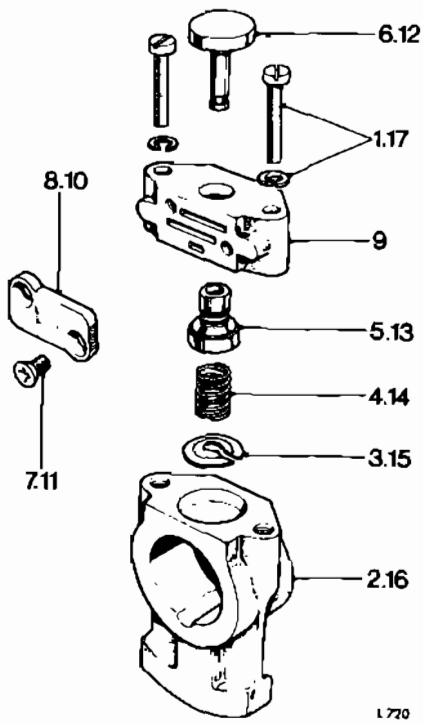
1. Remove the rear extension and speedometer drive gear. 44.38.07.
2. Remove the circlip.
3. Holding one hand to catch the ball, withdraw the governor assembly.

Refitting

4. Turn the output shaft until the drive ball detent is uppermost.
5. Locate the ball in the detent.
6. Slide the governor assembly into position.
7. Fit and secure the circlip.
8. Refit the speedometer drive gear and rear extension 44.38.07.

GOVERNOR

—Overhaul **44.22.04**



Dismantling

1. Take out two screws and washers.
2. Remove the governor counterweight.
3. Pull off the retainer.
4. Remove the spring.
5. Withdraw the valve.
6. Withdraw the weight.
7. Take out two screws.
8. Remove the cover-plate.
9. Remove the valve body.

Reassembling

10. Fit the cover-plate on the valve body.
11. Fit and tighten the two screws.
12. Insert the weight.
13. Invert the assembly and insert the valve.
14. Refit the spring.
15. Slide the retainer onto the stem of the weight.
16. Place the counterweight on the governor assembly.
17. Insert the screws and washers and tighten.

DIPSTICK FILLER TUBE

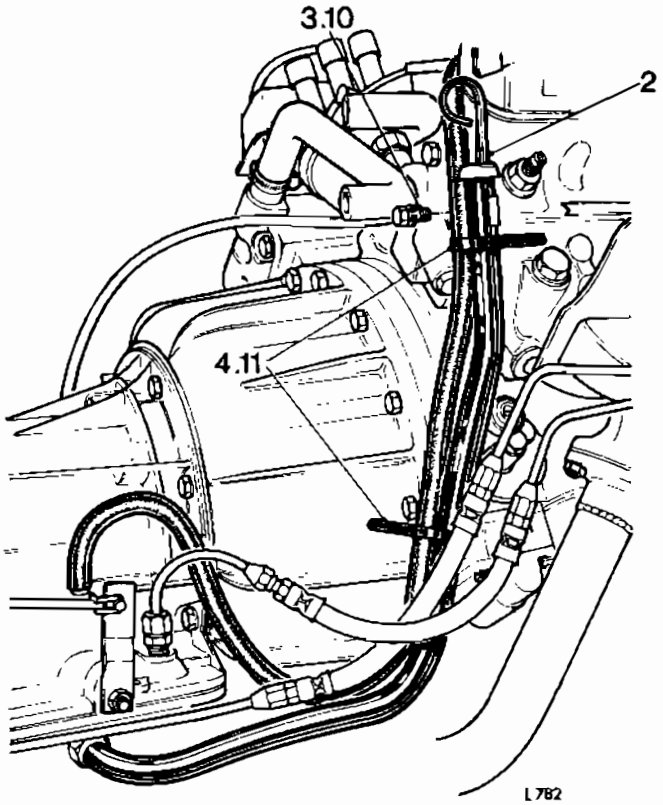
—Remove and refit **44.24.01**

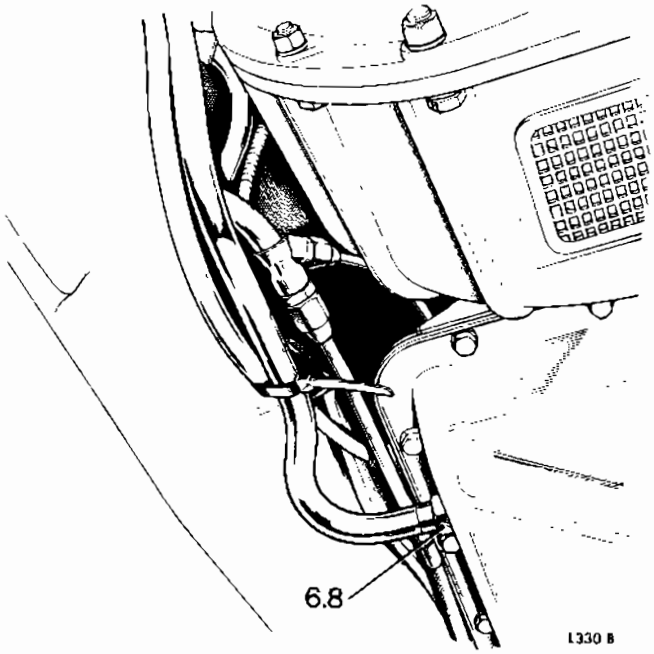
Removing

1. Drive the vehicle onto a ramp, select 'P', apply the hand brake and open the bonnet.
2. Withdraw the dipstick.
3. Release the filler tube from the engine.
4. Detach the straps securing the breather pipe to the filler pipe.
5. Raise the ramp.
6. Unscrew the union nut from the sump pan, and release the filler pipe from the sump.
   Drain the fluid from the transmission unit.
7. Withdraw the filler tube from below the vehicle.

Refitting

8. Manœuvre the filler tube into position and secure to the sump pan with the union nut.
9. Lower the ramp.
10. Secure the filler tube to the engine.
11. Attach the breather pipe to the filler pipe.
12. Refill the unit with fluid. 44.24.02.





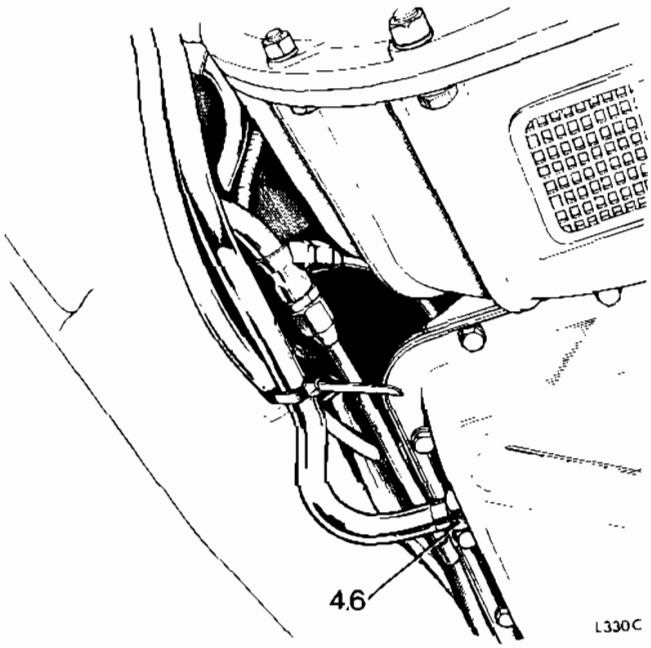
TRANSMISSION FLUID

—Drain and refill 44.24.02

Draining

1. Drive the vehicle onto a ramp, select 'P' and apply the hand brake.
2. Raise the ramp.
3. Place the drain tray under the filler pipe/sump union.
4. Unscrew the union and pull the pipe away from the sump.
5. Drain the fluid into the tray.
6. Refit the pipe to the sump.

NOTE: It is not possible to drain the torque converter or the oil cooler.

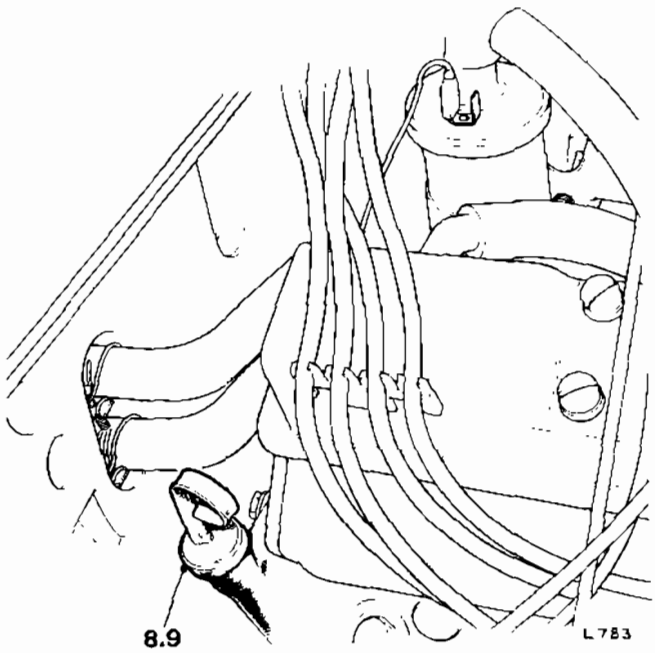


Filling

If the sump has been drained it will be necessary to replenish the transmission unit with approximately 3 litres (5 imp. pints, 6·5 U.S. pints), of one of the recommended fluids.

Check the level as follows:

7. Run the engine until the transmission unit has reached its normal operating temperature. Park the vehicle on level ground, apply the hand brake and select 'P'.
8. Raise the bonnet and wipe clean around the dipstick/filler orifice.
9. While the engine is idling, withdraw the dipstick and wipe it clean, using clean paper or a non-fluffy cloth.
10. Push the dipstick home and again withdraw it for reading. Should the reading be at the lower mark, 0·57 litre (1 imp. pint, 1·2 U.S. pints) of fluid will be required.
    DO NOT OVERFILL THE TRANSMISSION.
11. When the oil level is correct, lower the bonnet and stop the engine.



TRANSMISSION SUMP

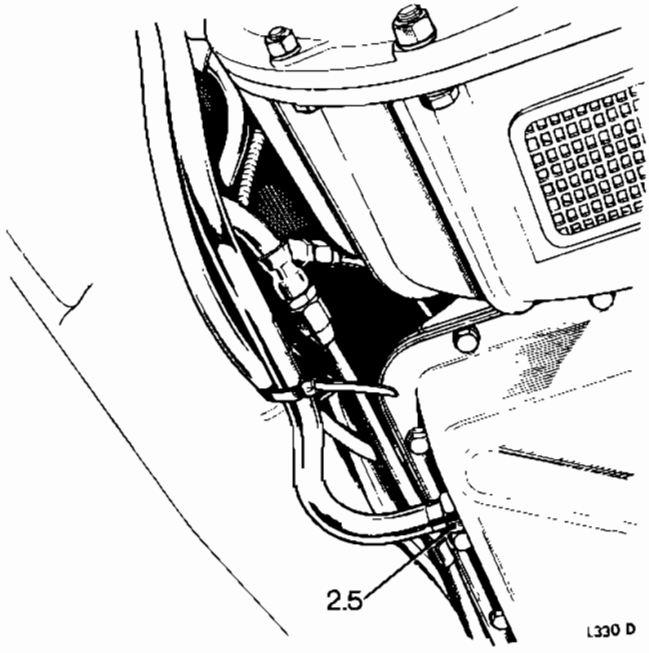
—Remove and refit **44.24.04**

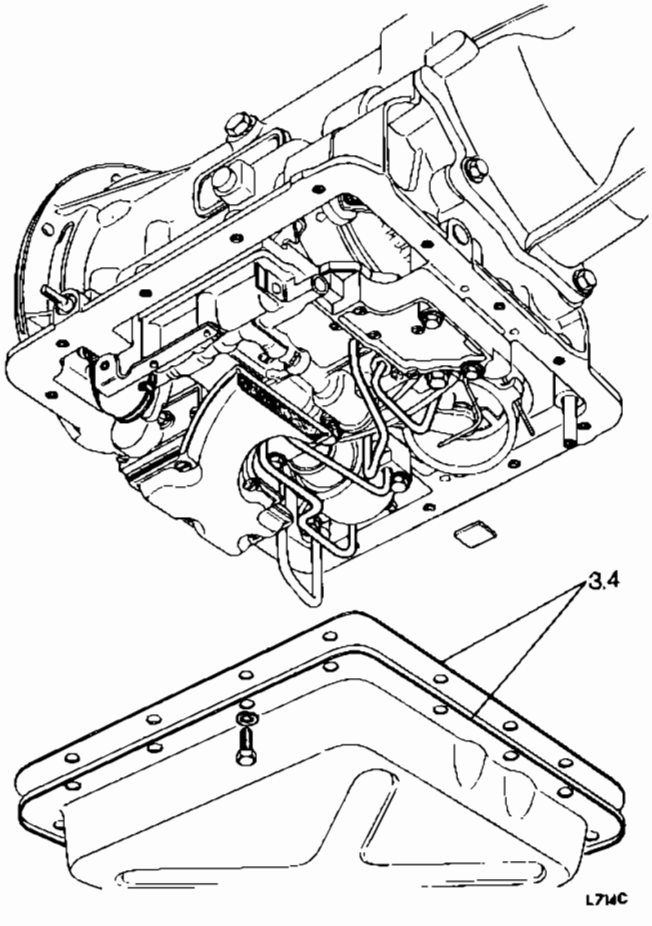
Removing

1. Drive the vehicle onto a ramp and apply the hand brake.
2. Unscrew the union nut, detach the filler pipe from the sump and drain the fluid from the unit.
3. Remove the bolts and detach the sump from the unit.

Refitting

4. Replace the sump, using a new gasket if necessary, and secure with the bolts.
5. Refit the filler pipe.
6. Fill the transmission unit with fluid. 44.24.02.





OIL COOLER

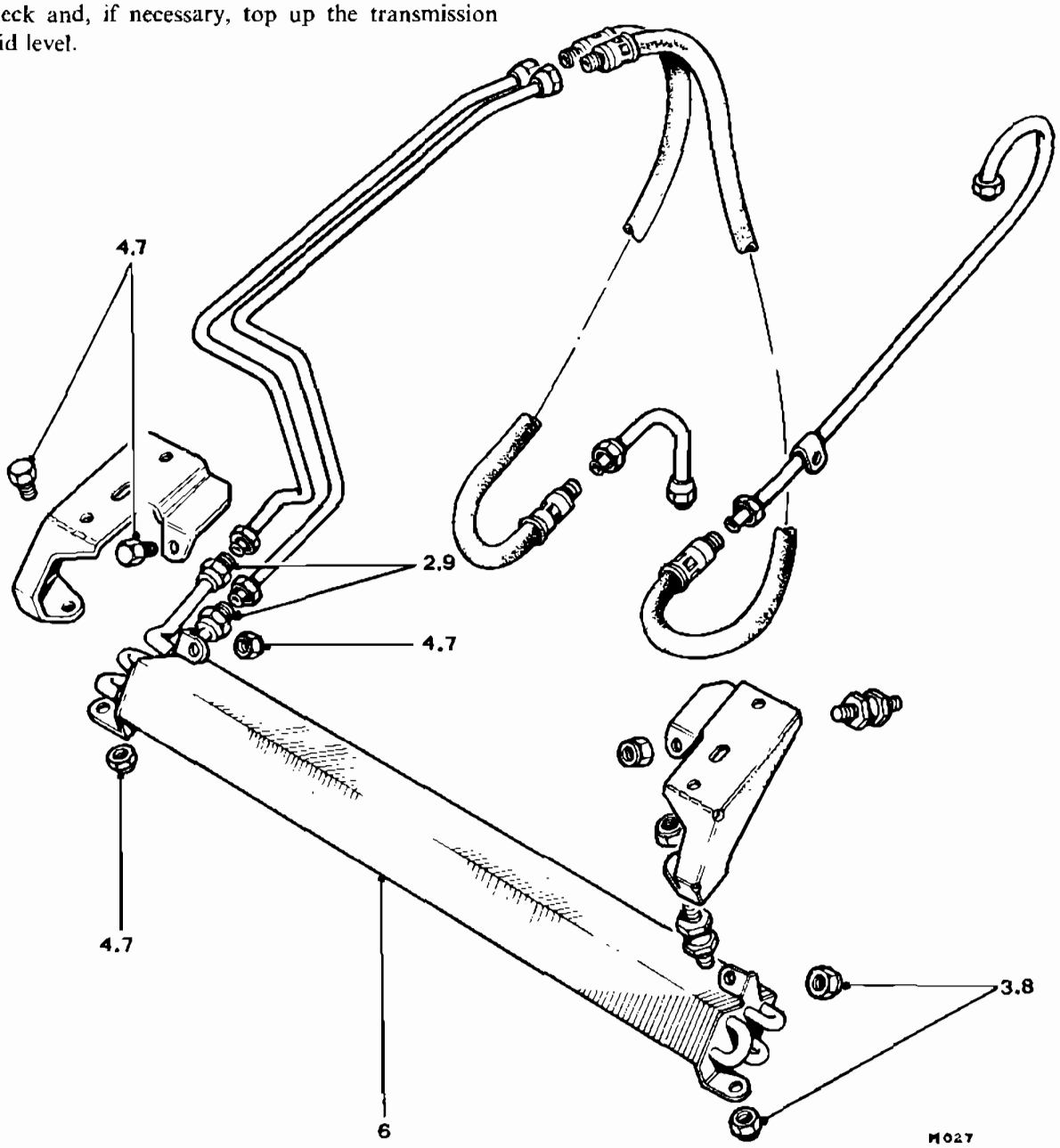
—Remove and refit **44.24.10**

Removing

1. Drive the vehicle onto a ramp, select 'P' and apply the hand brake. Raise the ramp.
2. Disconnect the pipe unions.
3. Unscrew the nuts.
4. Unscrew the nuts and remove the bolts and washers.
5. Withdraw the oil cooler.

Refitting

6. Place the oil cooler in position.
7. Assemble the bolts through the mounting brackets, fit the washers and secure with the nuts.
8. Fit and tighten the nuts.
9. Connect the pipe unions.
10. Check and, if necessary, top up the transmission fluid level.



OIL COOLER PIPES—Hose and Pipe to Cooler (Feed or Return Pipe)

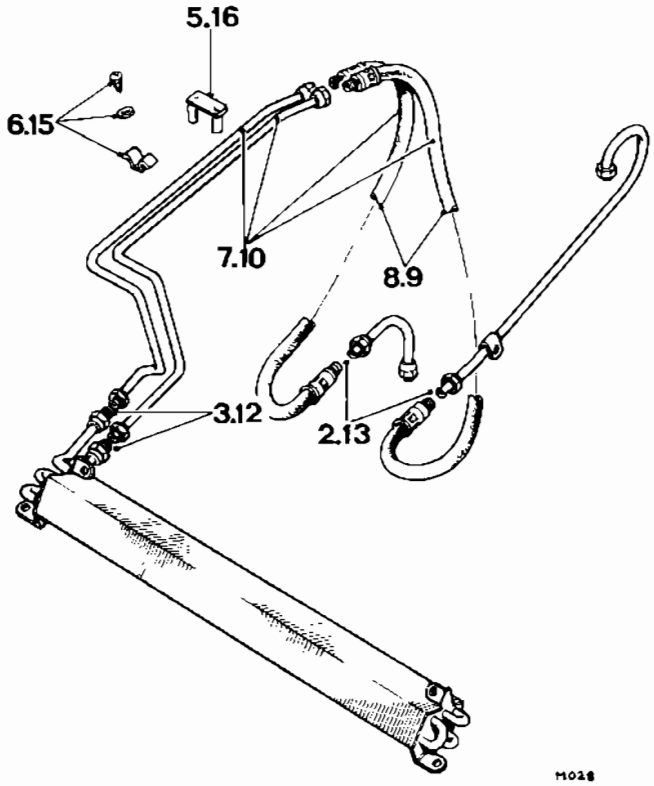
—Remove and refit **44.24.16**

Removing

1. Drive the vehicle onto a ramp, select 'P' and apply the hand brake. Raise the ramp.
2. Disconnect the hose from the gearbox pipe at the union.
3. Disconnect the pipe from the oil cooler at the union.
4. Lower the ramp.
5. Remove the nylon pipe clip.
6. Remove the double 'P' clip.
7. Withdraw the hose and pipe to cooler assembly.
8. Separate the hose from the pipe.

Refitting

9. Connect the hose to the pipe.
10. Fit the hose and pipe assembly in position.
11. Raise the ramp.
12. Connect the pipe to the cooler.
13. Connect the hose to the gearbox pipe.
14. Lower the ramp.
15. Refit the double 'P' clip.
16. Refit the nylon pipe clip.
17. Check the transmission fluid level and check for leakage.



OIL COOLER PIPES—Gearbox End Feed Pipe

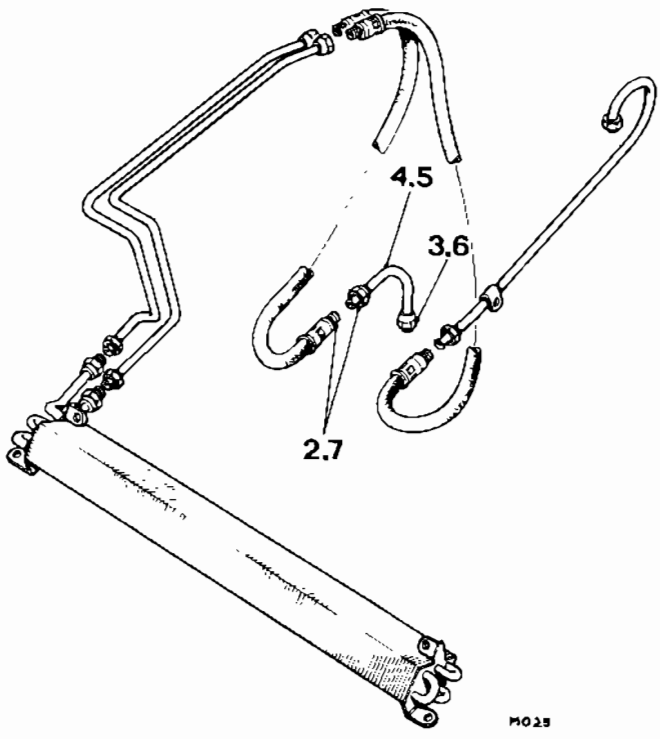
—Remove and refit **44.24.19**

Removing

1. Remove the gearbox oil cooler return pipe. 44.24.21
2. Disconnect the hose from the supply pipe at the union.
3. Disconnect the pipe from the gearbox union.
4. Remove the pipe.

Refitting

5. Place the pipe in position.
6. Connect the pipe to the gearbox.
7. Connect the pipe to the hose.
8. Refit the gearbox return pipe. 44.24.21



OIL COOLER PIPES—Gearbox End Return Pipe

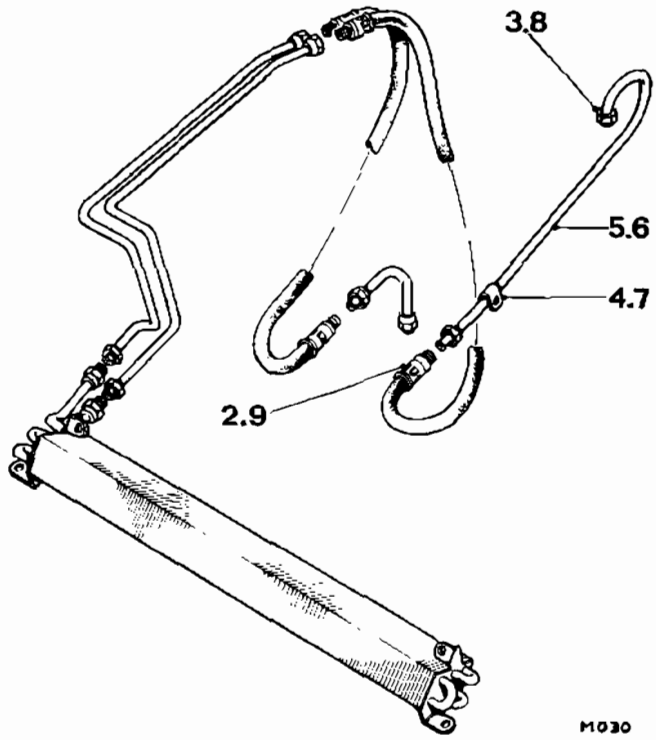
—Remove and refit **44.24.21**

Removing

1. Drive the vehicle onto a ramp, select 'P' and apply the hand brake. Raise the ramp.
2. Disconnect the hose from the return pipe at the union.
3. Unscrew the return pipe union from the restrictor valve.
4. Take out the sump bolt retaining the 'P' clip.
5. Remove the return pipe.

Refitting

6. Place the pipe in position.
7. Secure the 'P' clip to the sump.
8. Connect the pipe to the restrictor valve.
9. Connect the pipe to the hose.
10. Check the transmission fluid level.



RESTRICTOR VALVE—Oil Cooler Return

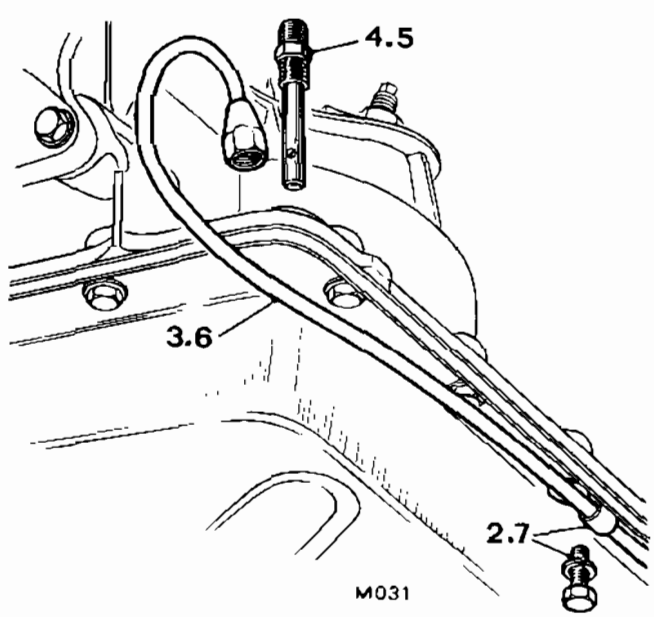
—Remove and refit **44.24.22**

Removing

1. Drive the vehicle onto a ramp, select 'P' and apply the hand brake.
2. Unscrew the bolt and release the 'P' clip from the sump.
3. Unscrew the union and disconnect the return pipe from the restrictor valve.
4. Unscrew the restrictor valve.

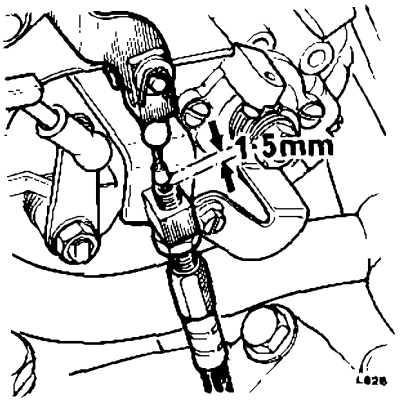
Refitting

5. Screw the restrictor valve into the gearbox casing.
6. Connect the return pipe to the restrictor valve.
7. Fit the bolt and secure the 'P' clip to the sump.
8. Check the transmission fluid level.



DOWNSHIFT CABLE

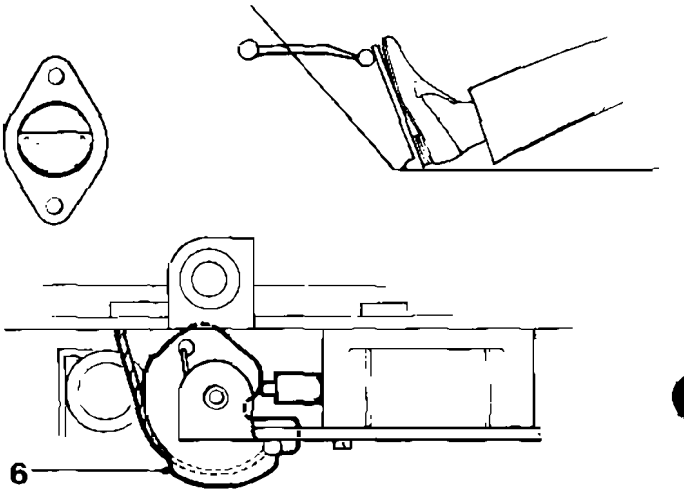
—Initial setting 44.30.01



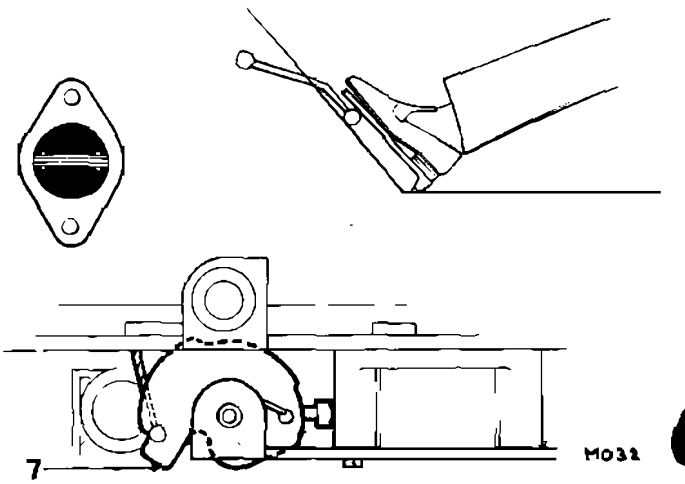
1. Check that the carburetter slow running and fast idle settings are satisfactory.
2. Slacken the locknut.
3. Adjust the outer cable collar in the trunnion block until the crimped stop is 1·5 mm ($\frac{1}{16}$ in) from the end of the cable collar.
4. Tighten the locknut.
5. Road-test the vehicle and check the gear-shift speeds.

DOWNSHIFT CABLE

—Adjustment 44.30.02



1. Drive the vehicle onto a ramp, apply the hand brake and chock the wheels.
2. Start the engine, select 'D' and adjust the idling speed to 750 rev/min. Stop the engine.
3. Slacken the locknut.
4. Adjust the outer cable to 1·5 mm ($\frac{1}{16}$ in) from the stop. 44.30.01 (para. 3).
5. Remove the sump pan. 44.24.04.
6. Check that the downshift cam is in the idling position.
7. With the aid of an assistant in the driving seat, open fully the throttle and check that the downshift cam is in the kick-down position.
8. If necessary, adjust the outer cable until the idling and kick-down positions can be correctly obtained on the downshift cam. Tighten the locknut.
9. Refit the sump. 44.24.04.

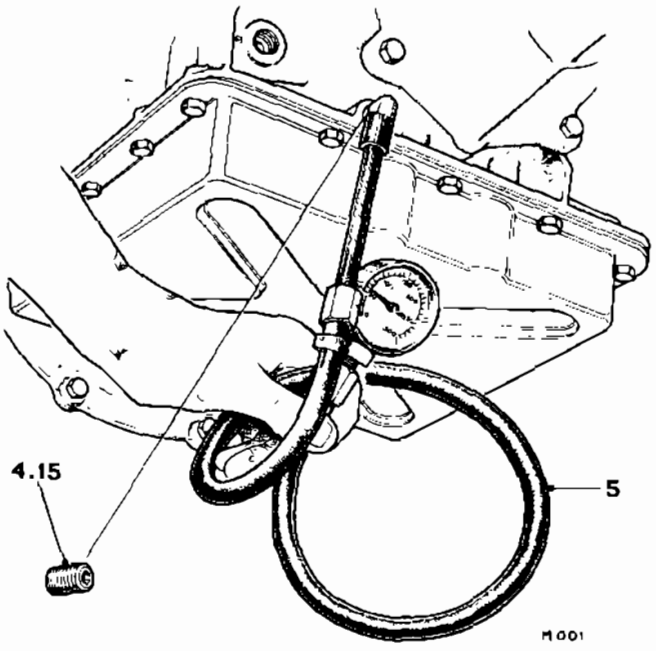


DOWNSHIFT CABLE

—Pressure check 44.30.03

Service tools: BW1A and BW38

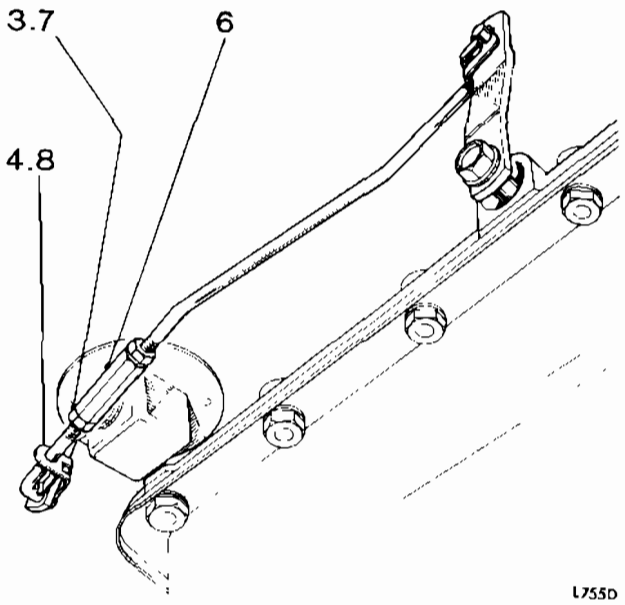
1. Start and run the engine until the transmission reaches its normal operating temperature.
2. Drive the vehicle onto a ramp and check that the engine idling speed is approximately 750 rev/min. Stop the engine.
3. Raise the ramp.
4. Remove the plug.
5. Connect the pressure gauge to the transmission unit.
6. Lower the ramp, chock the wheels and apply the hand brake and foot brake.
7. Start the engine and select 'D'.
8. With the engine idling at 750 rev/min, note the pressure gauge reading which should be 3·5 to 4·2 kg/cm² (50 to 60 lb/in²).
9. Increase the engine speed to 1,000 rev/min and note the pressure increase which should be 1·4 kg/cm² (20 lb/in²).
10. Stop the engine.
11. If the pressure increase is less than 1·4 kg/cm² (20 lb/in²), increase the effective length of the outer cable. If the pressure increase is more than 1·4 kg/cm² (20 lb/in²), decrease the effective length of the outer cable.
12. Repeat operations 7 to 11 until the pressure increase is correct.
13. Raise the ramp.
14. Disconnect the pressure gauge.
15. Refit the plug.
16. Lower the ramp.



SELECTOR ROD

—Adjustment **44.30.04**

1. Drive the vehicle onto a ramp, lock the selector lever in 'N' and apply the hand brake.
2. Raise the ramp.
3. Slacken the locknut.
4. Push the clip off the hand lever.
5. Disconnect the selector rod and check that the gearbox selector lever is in the neutral position.
6. Alter the length of the selector rod by adjusting the turnbuckle until the end of the rod can be located in the hand lever.
7. Tighten the locknut.
8. Push the clip onto the lever and secure the rod.

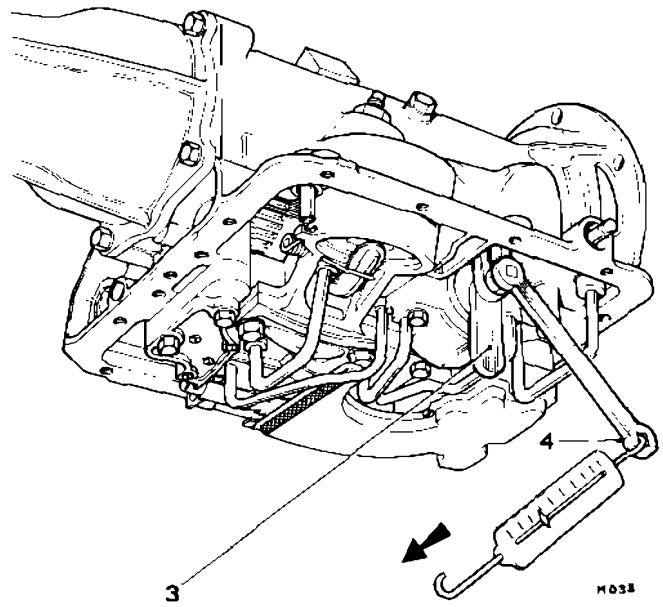


FRONT BRAKE BAND

—Adjustment **44.30.07**

Service tools: BW34 or AT508, spring balance, 6 mm (0·25 in) square key ring spanner

1. Remove the transmission sump pan. 44.24.04.
2. Slacken the adjuster locknut.
3. Move the servo lever outward and fit the 6·3 mm (0·250 in) gauge block between the adjuster screw and servo body.
4. Using the spring balance and square key ring spanner, tighten the adjuster screw to a torque of 1·38 kgf m (10 lbf in).
5. Replace the sump pan. 44.24.04.

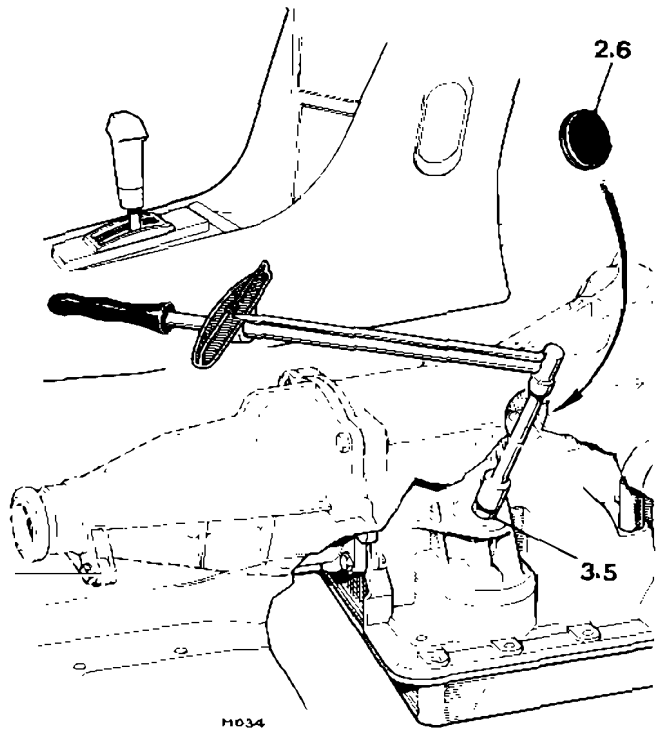


REAR BRAKE BAND

—Adjustment **44.30.10**

PRIOR TO THIS OPERATION IT MAY BE NECESSARY TO CUT AN APERTURE IN THE SIDE OF THE TRANSMISSION COVER PANEL TO PROVIDE ACCESS TO THE ADJUSTER SCREW. FULL INSTRUCTIONS ARE GIVEN ON S.I.S. 2/44/1.

1. Pull back the right-hand side transmission cover carpet.
2. Remove the rubber blanking plug.
3. Slacken the locknut.
4. Tighten the adjuster screw to 1·38 kgf m (10 lbf ft) and slacken one complete turn.
5. Tighten the locknut.
6. Refit the blanking plug.
7. Refit the carpet.

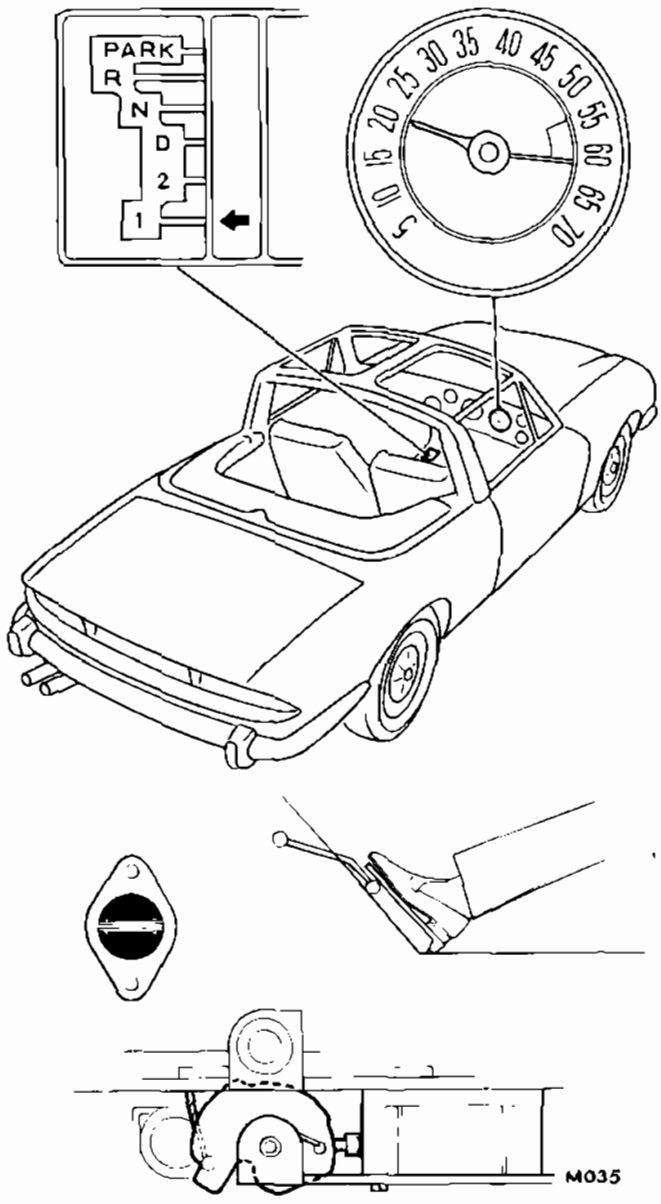


STALL TEST 44.30.13

The function of a stall test is to determine that the torque converter and gearbox are operating satisfactorily.

1. Check the condition of the engine. An engine which is not developing full power will affect the stall test readings.
2. Allow the engine and transmission to reach correct working temperatures.
3. Connect the tachometer to the vehicle.
4. Chock the wheels and apply the hand brake and foot brake.
5. Select '1' or 'R' and depress the throttle to the 'kick-down' position. Note the reading on the tachometer which should be 2,100 rev/min. If the reading is below 1,300 rev/min, suspect the converter for stator slip. If the reading is down to 1,500 rev/min, the engine is not developing full power. If the reading is in excess of 2,300 rev/min, suspect the gearbox for brake band or clutch slip.

NOTE: Do not carry out a stall test for a longer period than 10 seconds, otherwise the transmission will become overheated.



AIR PRESSURE CHECKS 44.30.16

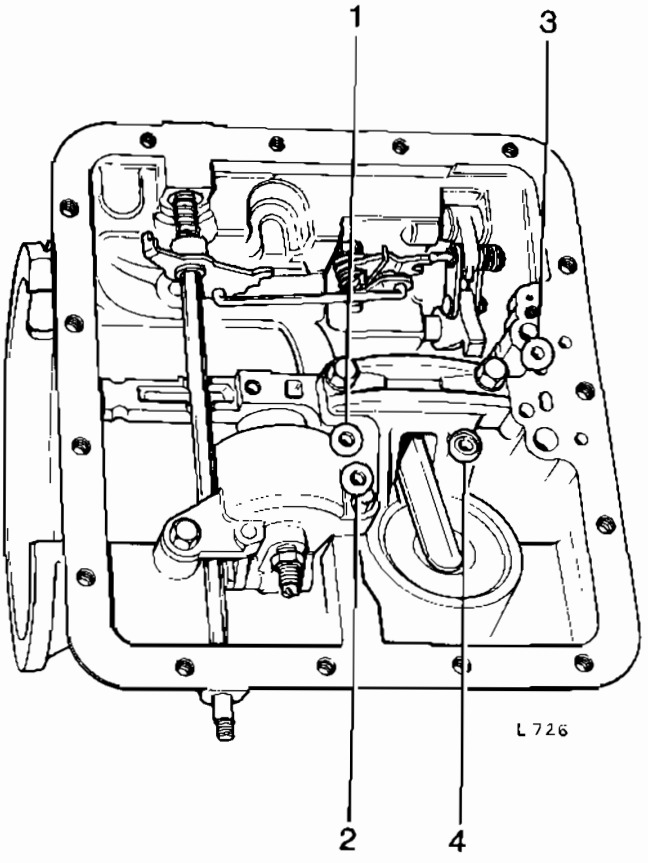
Air pressure checks can be made on the gearbox assembly to determine whether the clutches and brake bands are operating. These checks can be made with the transmission in the car or on the bench, using a high pressure air-line. Remove the oil pan, the valve body, and oil tubes.

1. **Front Clutch and Governor Feed**
   Apply air pressure to the passage (1). Listen for a thump, indicating that the clutch is functioning. With the unit on a bench, verify by rotating the input shaft with air pressure applied. Keep air pressure applied for several seconds to check for leaks in the circuit.
   If the extension housing has been removed, rotate the output shaft so that the governor weight will be at the bottom of the assembly. Verify that the weight moves inwards with air pressure applied.

2. **Rear Clutch**
   Apply air pressure to the passage (2). With the unit on the bench, verify that the clutch is functioning by turning the input shaft. Keep air pressure applied for several seconds to check for leaks; then listen for a thump indicating that the clutch is releasing.

3. **Front Servo**
   Apply air pressure to the apply tube location (3) immediately adjacent to the rear retaining bolt. Observe the movement of the piston pin.

4. **Rear Servo**
   Apply air pressure to the tube location (4). Observe the movement of the servo lever.



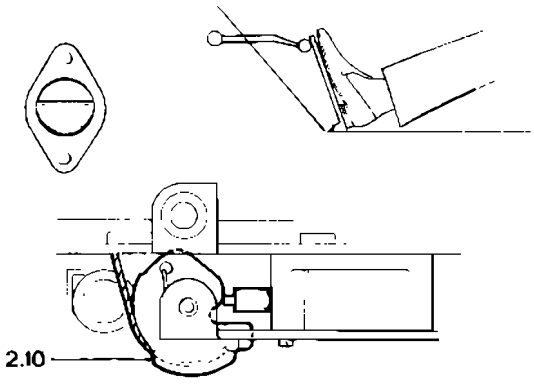
ROAD TEST 44.30.17

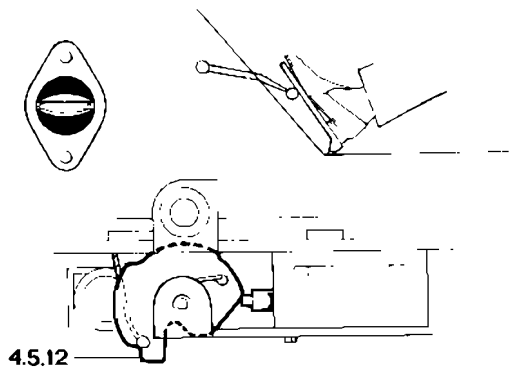
Throughout the road test procedure the term 'full throttle' is equivalent to approximately seven-eighths of the available pedal movement and 'kick-down' is equivalent to the full movement.

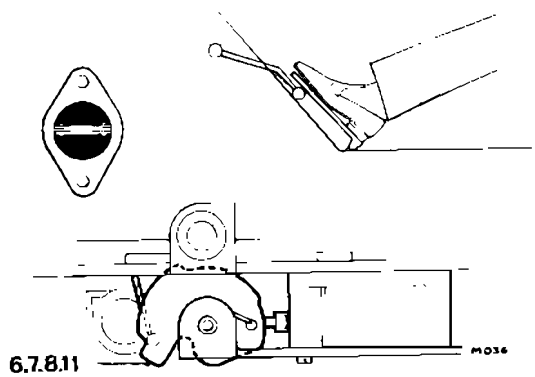
Procedure

1. Check that the starter motor will operate only with the selector level in 'P' or 'N' and that the reverse lights operate only in 'R'.
2. Apply the hand brake and with the engine idling select 'N–D', 'N–2', 'N–1' and 'N–R'. Engagement should be positive. A cushioned 'thump' under fast idling conditions is normal.
3. With the transmission at normal running temperature, select 'D', release the brakes and accelerate with minimum throttle. Check the 1–2 and 2–3 shift speeds and the quality of change.
4. Stop the vehicle, select 'D' and re-start using 'full throttle'. Check 1–2 and 2–3 shift speeds and the quality of change.
5. At 55 km/h (40 m.p.h.) apply 'full throttle'. The vehicle should accelerate in third gear and should not downshift to second.
6. At a maximum speed of 100 km/h (62 m.p.h.) 'kick-down' fully. The transmission should downshift to second gear.
7. At a maximum speed of 38 km/h (24 m.p.h.) 'kick-down' fully. The transmission should downshift to first gear.
8. Stop the vehicle, select 'D' and re-start using 'kick-down'. Check the 1–2 and 2–3 shift speeds.
9. At 95 km/h (60 m.p.h.) select 2 and release the throttle. Check the 2–3 downshift.
10. At 50 km/h (30 m.p.h.) select 1 and release the throttle. Check the 2–1 downshift.
11. With 1 still engaged, stop the vehicle and using 'kick-down' accelerate to over 40 km/h (25 m.p.h.). Check for 'slip', 'squawk', and the absence of upshifts.
12. Stop the vehicle and select 'R'. Reverse using 'full throttle' if possible. Check for 'slip' and 'squawk'.
13. Stop the vehicle on a gradient. Apply the hand brake and select 'P'. Release the hand brake and check the parking pawl hold. Check that the selector lever is held firmly in the gate in 'P'.

continued







CONVERTER DIAGNOSIS

Inability to start on steep gradients, combined with poor acceleration from the rest and low stall speed (1,300 rev/min) indicates that the converter stator unidirectional clutch is slipping. This condition permits the stator to rotate in an opposite direction to the impeller and turbine, and torque multiplication cannot occur.

Poor acceleration in third gear above 30 m.p.h. and reduced maximum speed, indicates that the stator unidirectional clutch has seized. The stator will not rotate with the turbine and impeller and the 'fluid flywheel' phase cannot occur. This condition will also be indicated by excessive overheating of the transmission although the stall speed will be correct.

ROAD TEST—FAULT DIAGNOSIS CHART

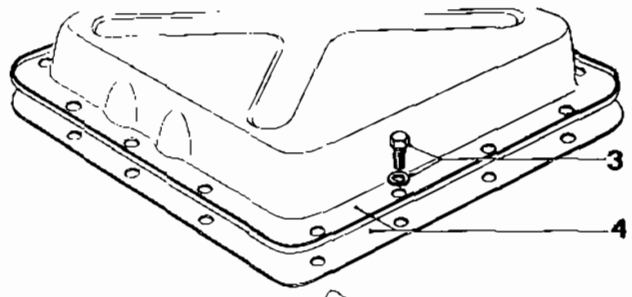
NOTE: The numbers indicate the recommended sequence of investigation

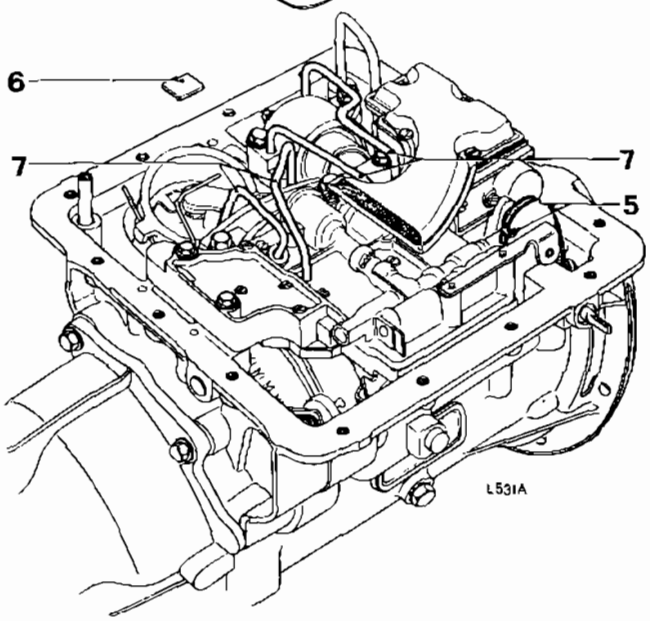
Diagnosis		Engagement of 1, 2, D or R			Take off						Upshifts				Upshift Quality						Downshifts					Downshift Quality			
SYMPTOM		Bumpy	Delayed	None	None forward	None reverse	Seizure reverse	No neutral	Squawk	Slip	No 1–2	No 2–3	Above normal speed	Below normal speed	Slip 1–2	Slip 2–3	Rough 1–2	Rough 2–3	Seizure 1–2	Seizure 2–3	No 2–1	No 3–2	Involuntary 3–2	Above normal speed	Below normal speed	Slip 2–1	Slip 3–2	Rough 2–1	Rough 3–2
ADJUSTMENT FAULTS	Fluid level insufficient		1	1					1						1	1							1						
	Downshift cable incorrectly assembled or adjusted	2							2				1	1	2	2	1	1			1	1		1	1				
	Manual linkage incorrectly assembled or adjusted		2	2	1	1		1	3	1	1	1			3	3													
	Incorrect engine idling speed	1	3																							1		1	
	Incorrect front band adjustment						1				2				4	4	2	2		1									
	Incorrect rear band adjustment					2													1											
HYDRAULIC CONTROL FAULTS	Oil tubes incorrectly installed, missing or leaking		4	3		7			7		8	8			8	9				2			2			6			
	Sealing ring missing or broken		7	4	3	6			5		9	9	8	5	9	10			5	3				5	5	7	3		
	Valve block screws missing or loose	5	6	5	2	5		3			10	10	9	6	10	11	10	6	6	4				6	6	8			5
	Primary regulator valve sticking	3	5	6									10		6	7	3	3								4			3
	Secondary regulator valve sticking																												
	Throttle valve sticking	4									6	6	2	2	7	8	4	4						4	4	5			4
	Modulator valve sticking										7	7	7				5												
	Governor valve sticking, leaking or incorrectly assembled										3	2	3	3			6				3	3		2	2				
	Orifice control valve sticking																									3		2	
	1–2 shift valve sticking					3					4		4								2	2			7				
	2–3 shift valve sticking					4						3	5												8				
	2–3 shift valve plunger sticking											4	6	4										3	3				
	Converter 'out' check valve sticking or missing		13																										
	Check valve sticking or missing		8																										
MECHANICAL FAULTS	Front clutch slipping		9		4				4								9										2		
	Front clutch seized or plates distorted	6					2	2																					
	Rear clutch slipping		10			9			6			5				5							3			9		6	
	Rear clutch seized or plates distorted	7																5	2			4							7
	Front band slipping due to faulty servo or worn band										5				5	6						5				2			8
	Rear band slipping due to faulty servo or worn band		11			8															4								
	Uni-directional clutch slipping or incorrectly installed				5												7		3							1		1	
	Uni-directional clutch seized																8		4										
	Input shaft broken			7																									
	Front pump drive tangs on converter hub broken			8																									
	Front pump worn		12	9																									
	Converter blading and/or uni-directional clutch failed			10																									

FRONT PUMP

—Remove and refit **44.32.01**

Service tools: BW35 or AT501



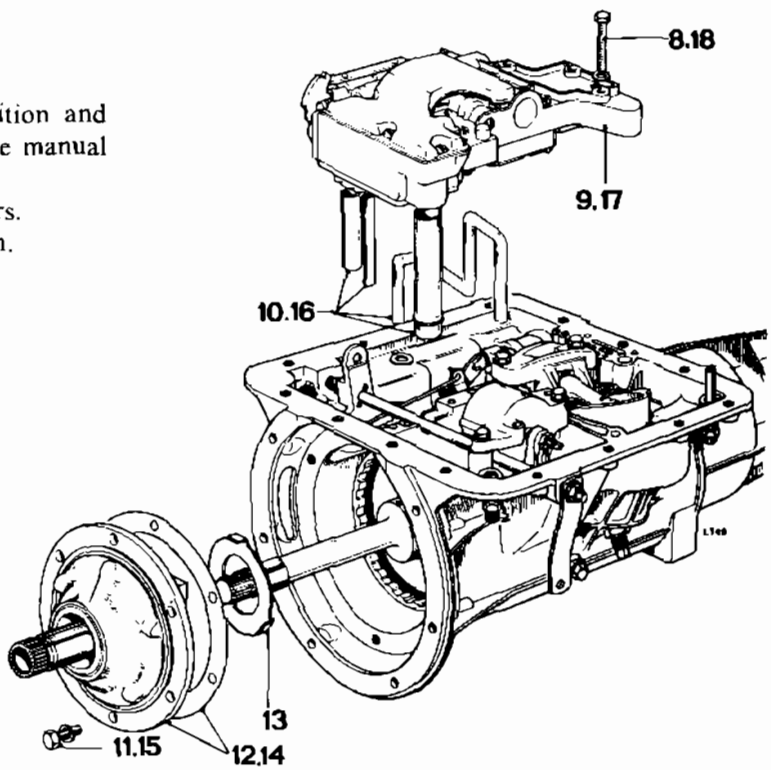


Removing

1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the sump and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out the three bolts and washers.
9. Lift off the valve block.
10. Pull out the oil tubes (note 'O' ring on front pump suction tube).
11. Take out the bolts.
12. Remove the front pump, joint washer and thrust washer.

Refitting

13. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
14. Refit the front pump assembly and a new joint washer.
15. Fit and tighten the bolts.
16. Refit the oil tubes.
17. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
18. Fit and tighten the three bolts and washers.
19. Refit the downshift inner cable to the cam.
20. Refit the sump and a new joint washer.
21. Fit and tighten the 15 bolts.
22. Refit the gearbox. 44.20.01.



FRONT PUMP

—Overhaul **44.32.04**

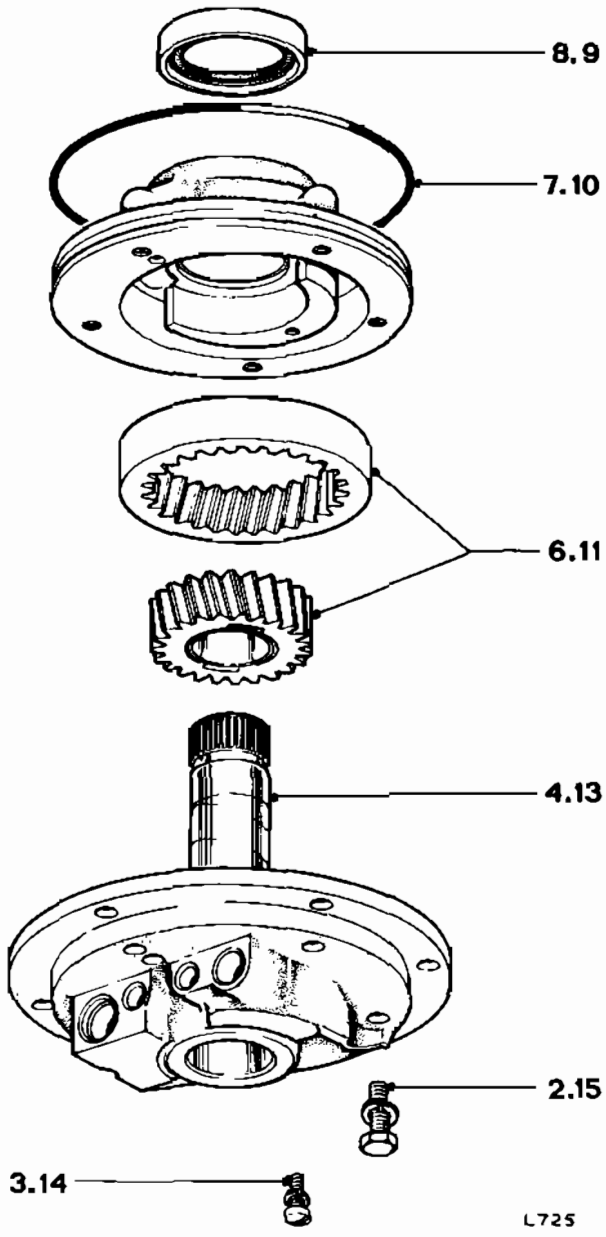
1. Remove the front pump. 44.32.01.

Dismantling

2. Unscrew the bolts.
3. Take out the locating screw.
4. Separate the stator support from the pump body assembly.
5. Mark the outside faces of the gears to facilitate correct assembly.
6. Remove the gears.
7. Remove the 'O' ring.
8. Extract the seal.

Reassembling

9. Renew the seal.
10. Refit the 'O' ring.
11. Fit the gears into the pump body.
12. Lightly lubricate the gears and the 'O' ring.
13. Refit the stator support.
14. Fit and tighten the locating screw and lock washer.
15. Fit and tighten the bolts and lock washers.
16. Refit the front pump. 44.32.01.



FRONT SERVO

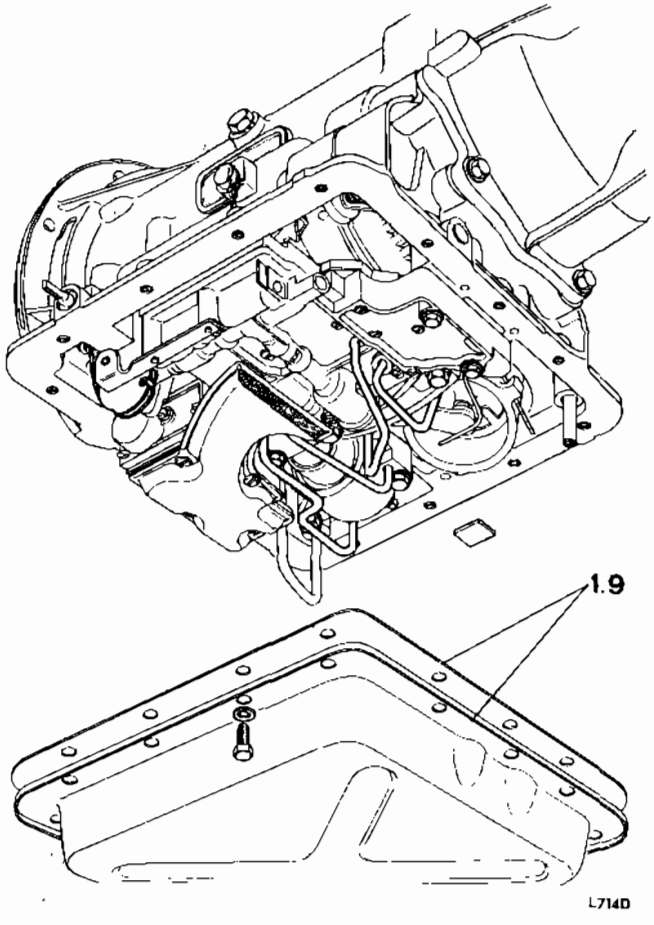
—Remove and refit **44.34.07**

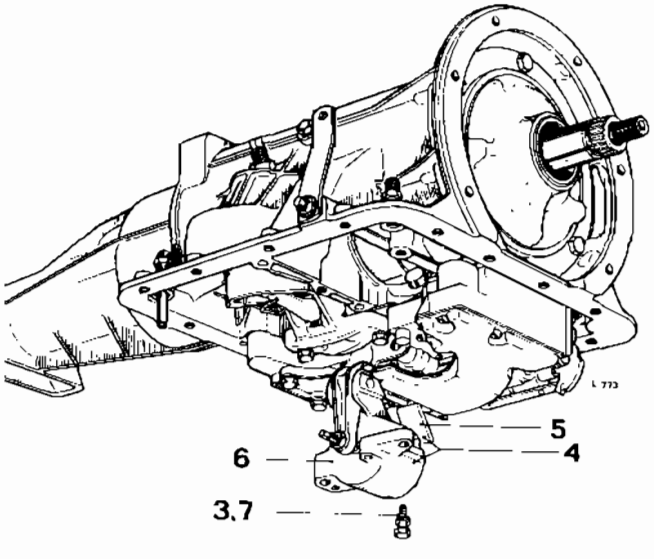
Removing

1. Remove the transmission sump pan. 44.24.04.
2. Pull out the oil pipes.
3. Take out two bolts.
4. Remove the servo assembly and strut.

Refitting

5. Locate the strut on the front brake band.
6. Place the servo in position, locating the servo lever onto the strut.
7. Secure the servo with the two bolts.
8. Refit the oil tubes.
9. Replace the transmission sump pan. 44.24.04.





FRONT SERVO

—Overhaul **44.34.10**

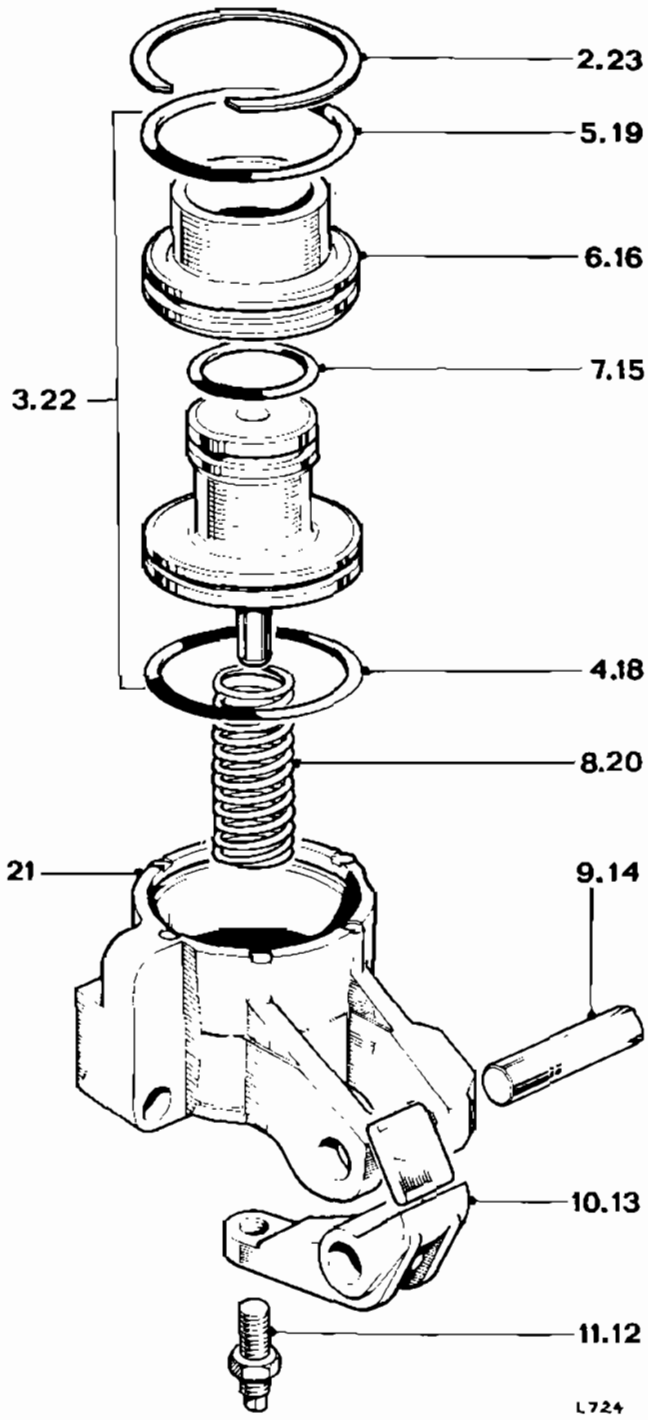
1. Remove the front servo. 44.34.07.

Dismantling

2. Remove the circlip.
3. Withdraw the piston assembly.
4. Take off the 'O' ring from the piston.
5. Take off the 'O' ring from the sleeve.
6. Withdraw the sleeve.
7. Remove the seal.
8. Take out the spring.
9. Drive out the pivot pin.
10. Remove the lever.
11. Unscrew the adjuster screw and locknut.

Reassembling

12. Fit the adjuster screw and locknut to the servo lever.
13. Locate the lever in position on the servo body.
14. Fit the pivot pin.
15. Fit the seal to the piston.
16. Lubricate the bore of the sleeve and slide onto the piston.
17. Lubricate the groove in the piston and sleeve.
18. Fit the 'O' ring to the piston.
19. Fit the 'O' ring to the sleeve.
20. Fit the spring over the piston pin.
21. Lubricate the bore of the servo body.
22. Fit the piston assembly into the body.
23. Refit the circlip.
24. Refit the front servo. 44.34.07.



REAR SERVO

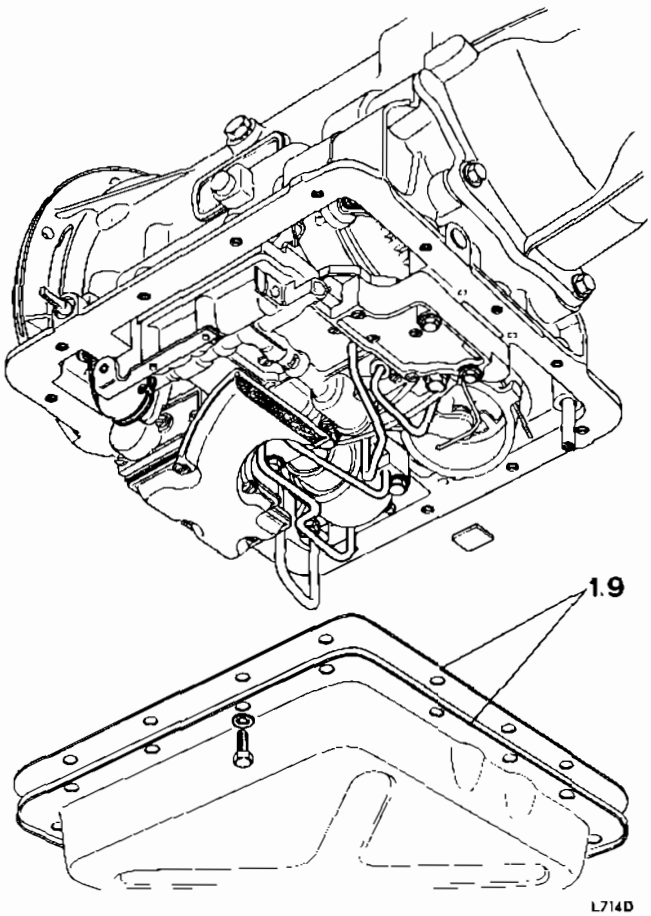
—Remove and refit **44.34.13**

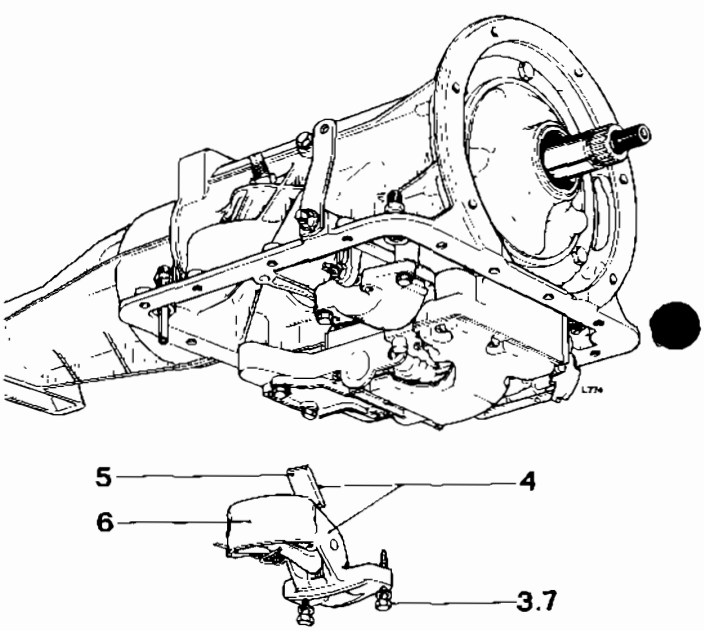
Removing

1. Remove the transmission sump pan. 44.24.04.
2. Pull out the oil pipes.
3. Take out two bolts.
4. Remove the servo assembly and strut.

Refitting

5. Locate the strut on the rear servo lever.
6. Place the servo in position, locating the strut onto the rear band.
7. Secure the servo with the two bolts.
8. Refit the oil tubes.
9. Replace the transmission sump pan. 44.24.04.





REAR SERVO

—Overhaul **44.34.16**

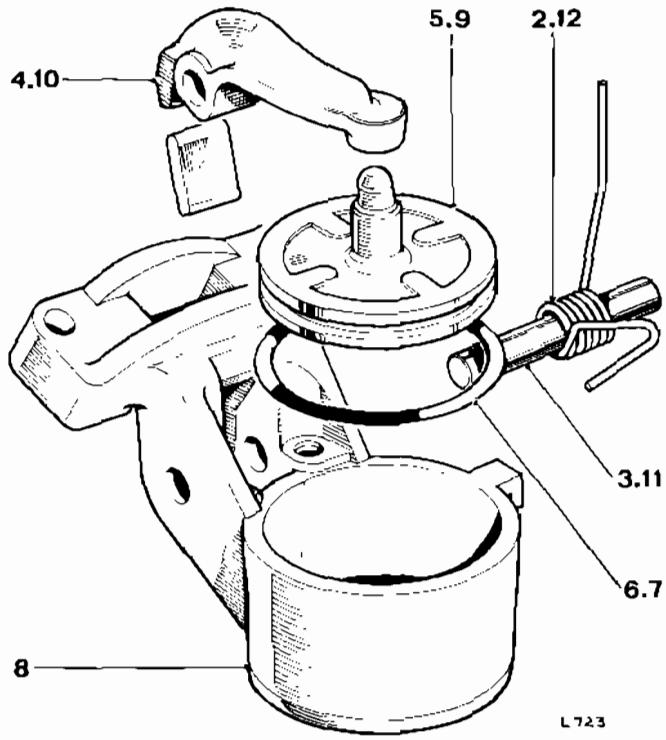
1. Remove the rear servo. 44.34.13.

Dismantling

2. Remove the spring.
3. Drive out the fulcrum pin.
4. Remove the lever.
5. Withdraw the piston.
6. Remove the 'O' ring.

Reassembling

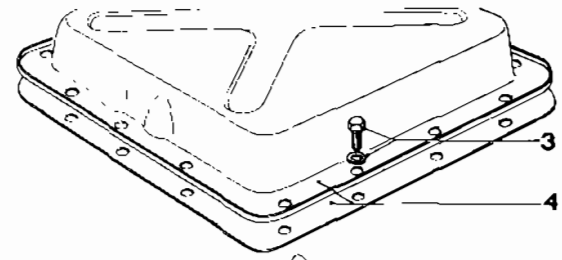
7. Refit the 'O' ring.
8. Lightly lubricate the bore of the servo body.
9. Insert the piston into the bore of the servo body.
10. Refit the lever.
11. Drive the fulcrum pin into position.
12. Refit the spring.
13. Refit the rear servo. 44.34.13.

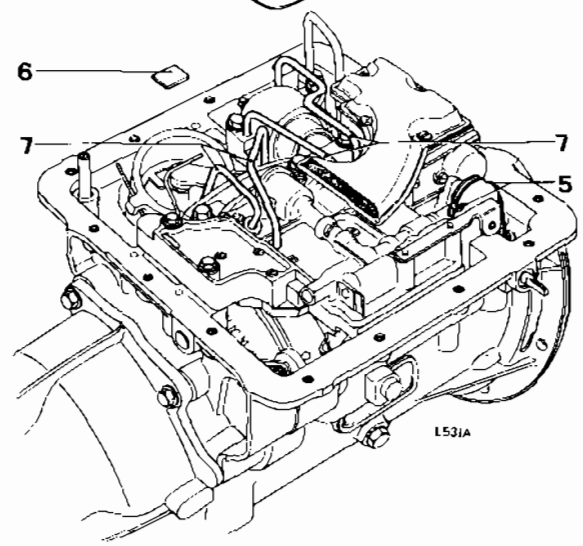


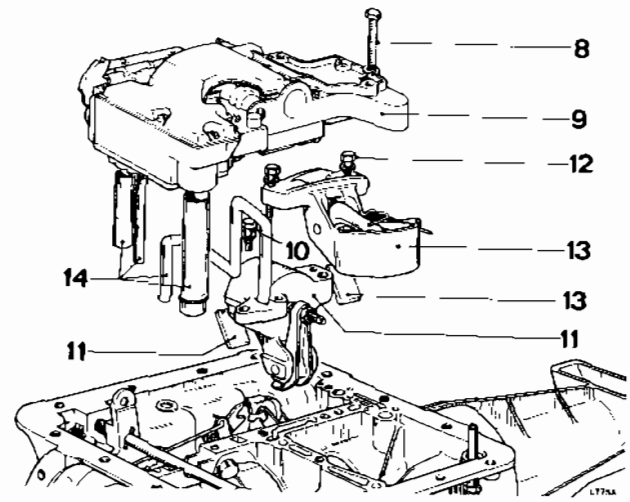
OUTPUT SHAFT

—Remove and refit **44.36.01**

Service tools: BW35 or AT501



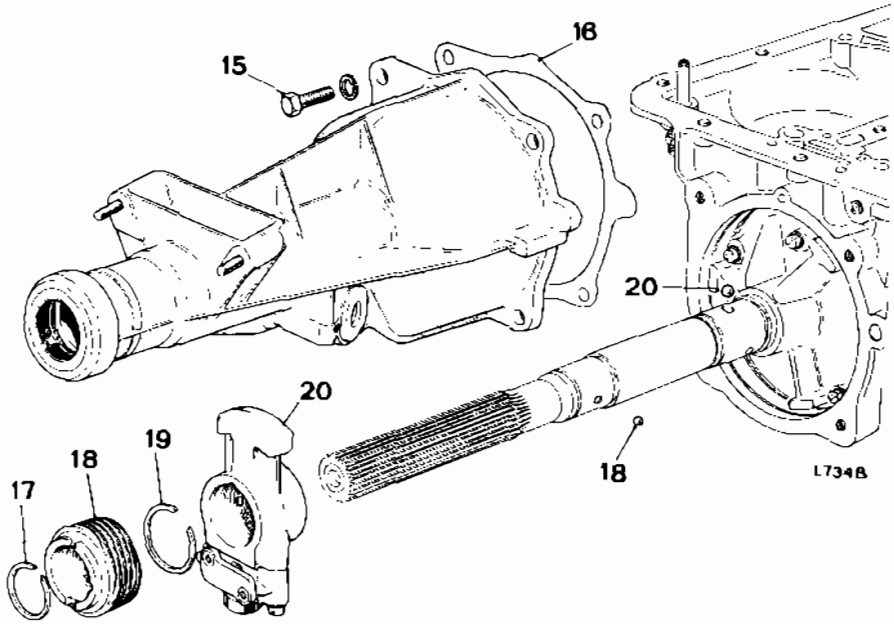


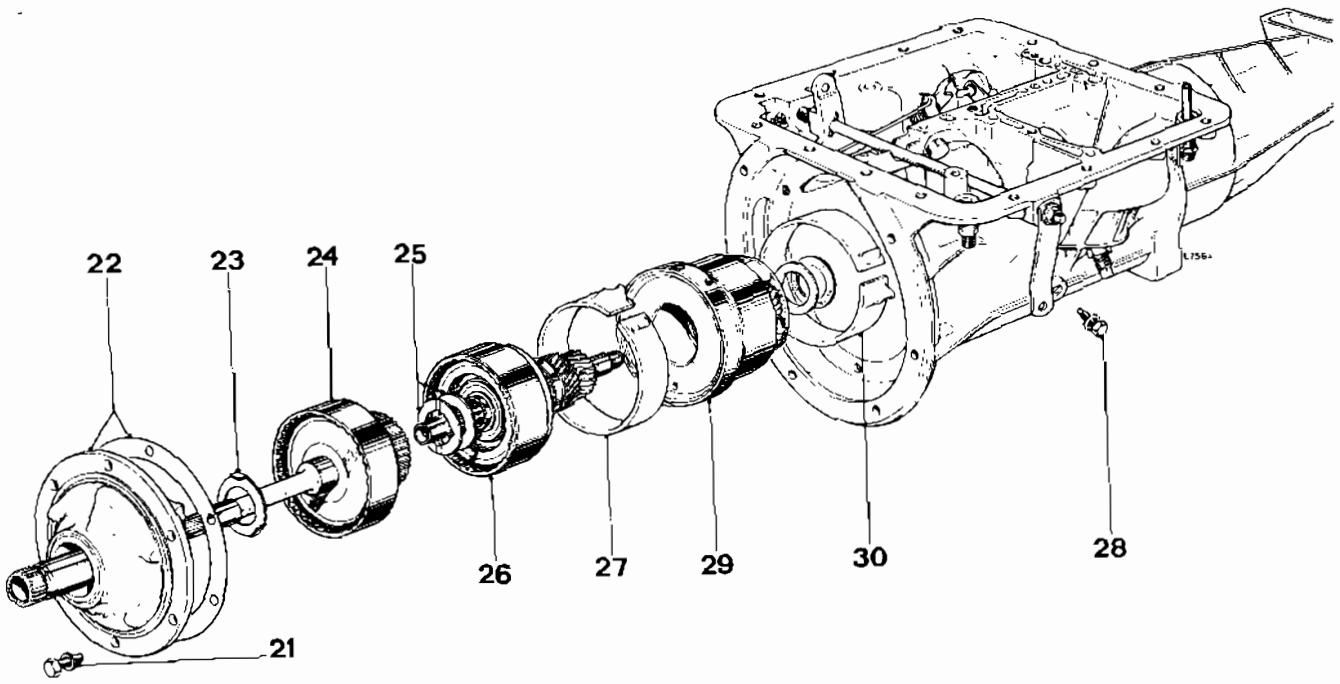


Removing

1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve block.
10. Take out two bolts and washers.
11. Remove the front servo and strut.
12. Take out two bolts and washers.
13. Remove the rear servo and strut.
14. Pull out the oil tubes (note 'O' ring on front pump suction tube).
15. Take out four bolts and washers.
16. Withdraw the rear extension housing and joint washer.
17. Remove the circlip.
18. Withdraw the speedometer drive gear and ball.
19. Remove the circlip.
20. Withdraw the governor assembly and drive ball.

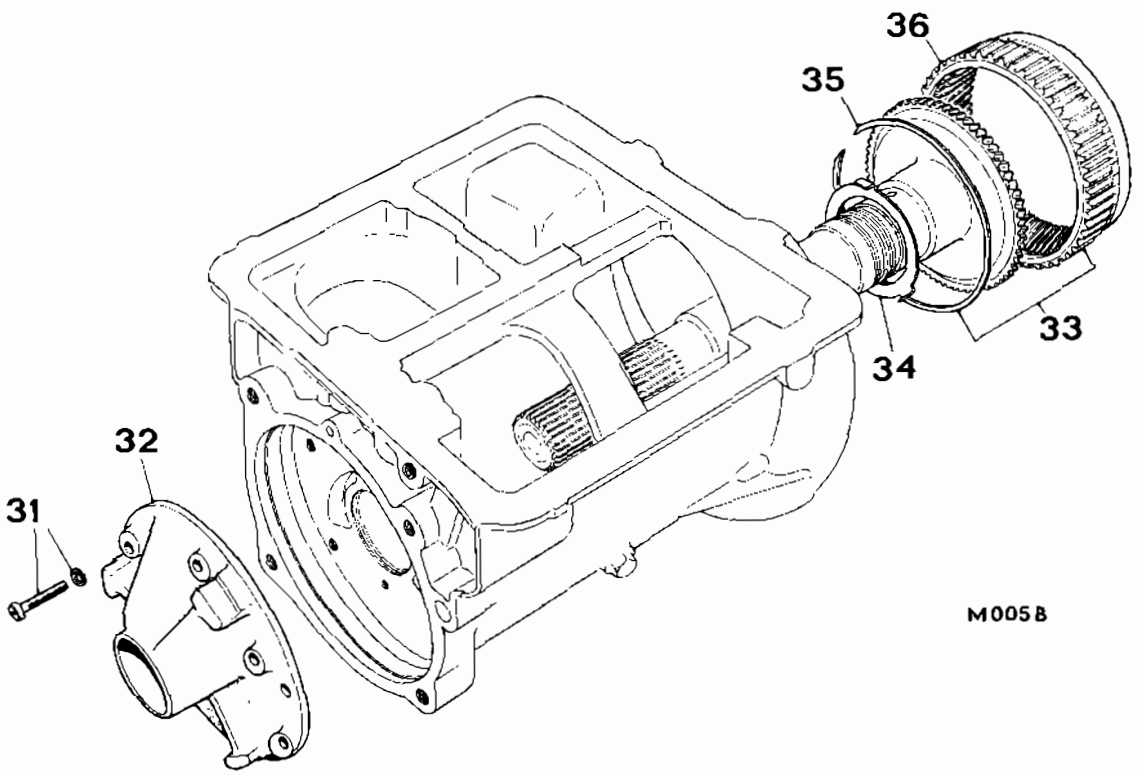
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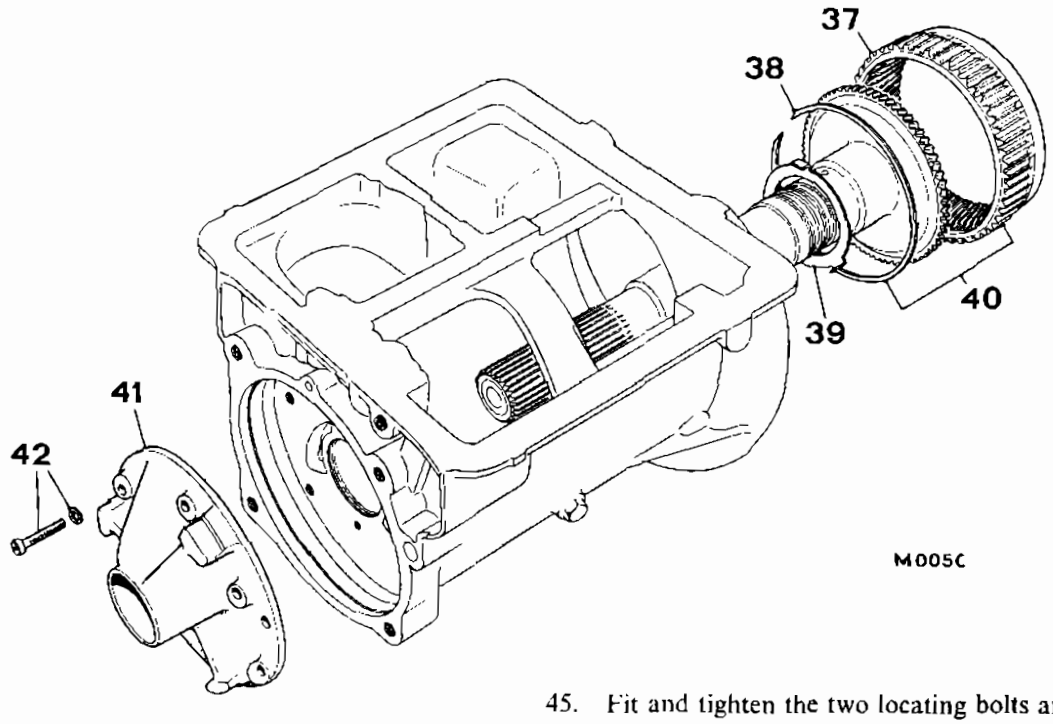




21. Take out the bolts.
22. Remove the front pump and joint washer.
23. Remove the thrust washer.
24. Withdraw the front clutch.
25. Remove the thrust washers.
26. Withdraw the rear clutch and forward sun gear.
27. Squeeze together the ends of the front brake band and remove it from the casing.
28. Take out two bolts and washers.
29. Withdraw the centre support and planet gear assembly.
30. Squeeze the ends of the rear band together, tilt the band and withdraw from the casing.
31. Take out five screws and washers.
32. Remove the adaptor plate.
33. Withdraw the output shaft.
34. Remove the thrust washer.
35. Remove the circlip.
36. Detach the annulus from the output shaft.

continued

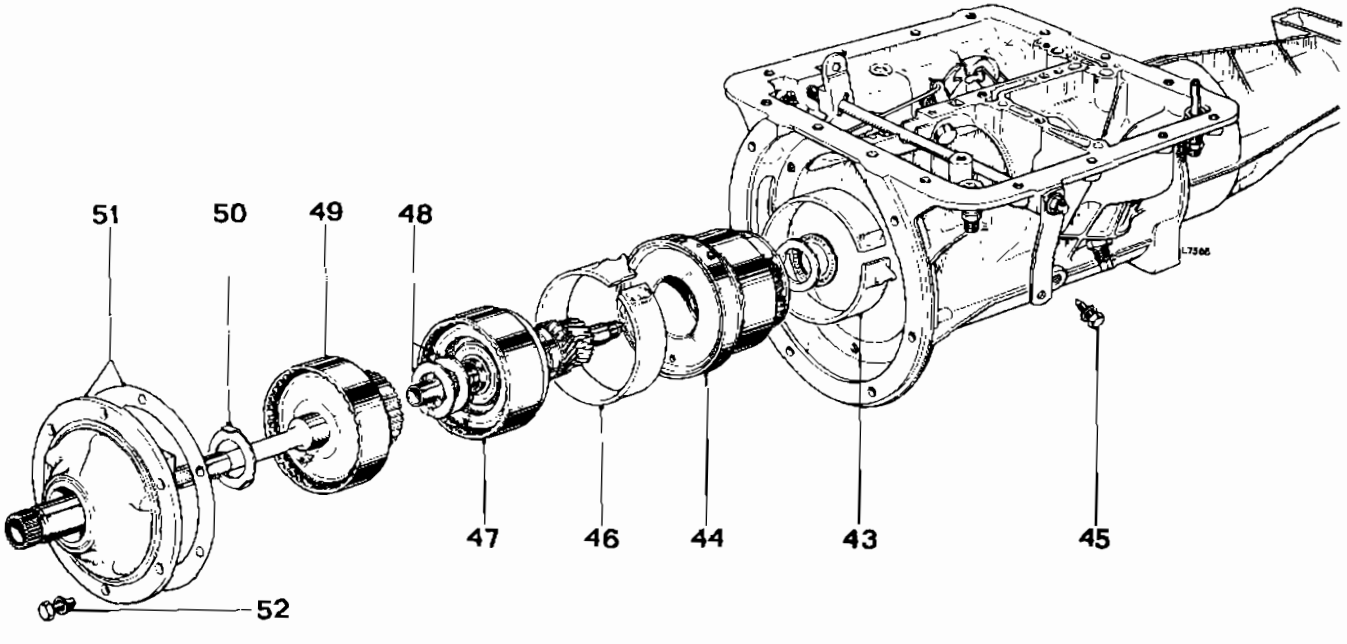


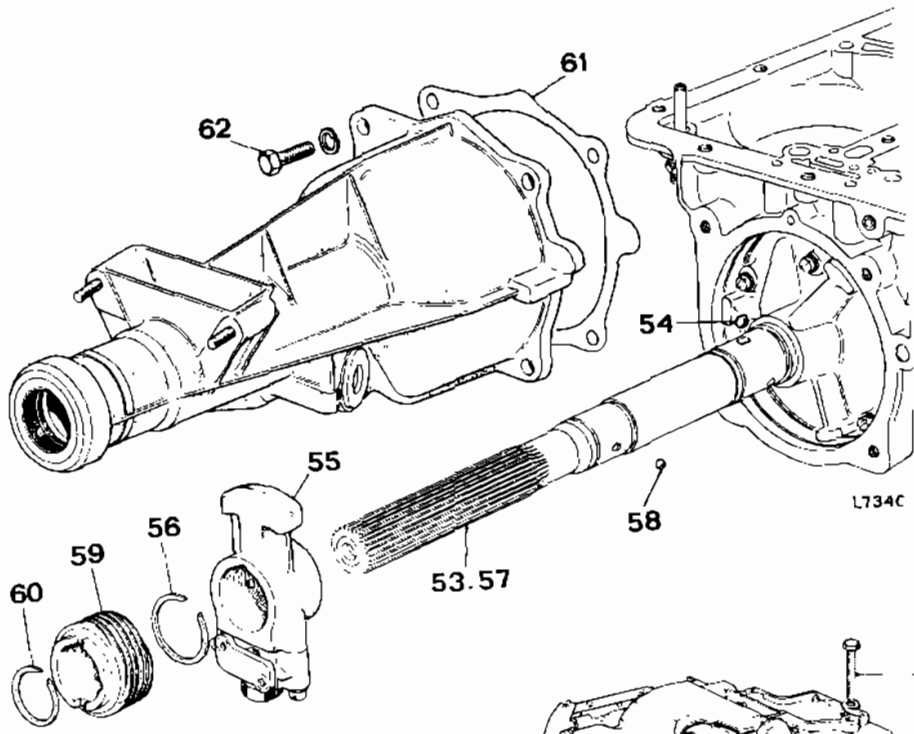


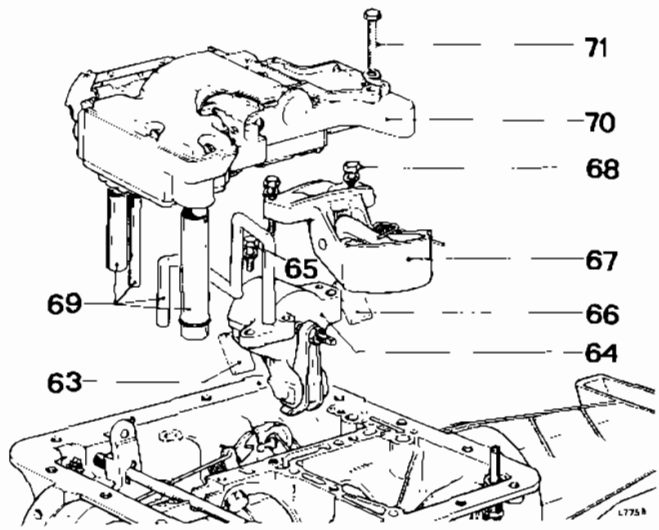
Refitting

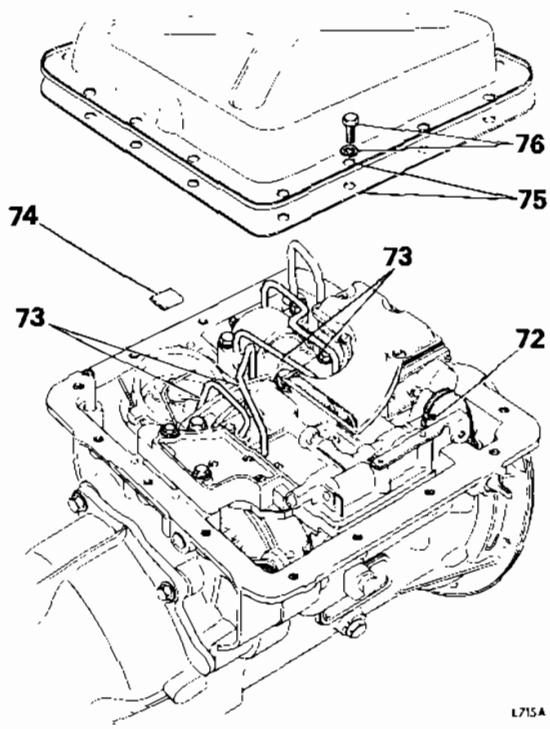
37. Fit the output shaft to the annulus.
38. Refit the circlip.
39. Using a little petroleum jelly, stick the thrust washer in position.
40. Refit the output shaft assembly.
41. Locate the adaptor plate on the rear face of the unit.
42. Fit and tighten the five screws and washers.
43. Place the rear band in the casing, tilt, squeeze the ends together and locate in the correct position.
44. Refit the centre support and planet gear assembly, ensuring that the oil and locating holes in the centre support align with those on the casing.
45. Fit and tighten the two locating bolts and washers. Ensure that the flat faces of the washers are towards the casing.
46. Squeeze together the ends of the front brake band and fit it into position.
47. Refit the rear clutch and forward sun gear assembly.
48. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
49. Refit the front clutch assembly.
50. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
51. Refit the front pump assembly and new joint washer.
52. Fit and tighten the bolts.

continued









53. Turn the output shaft until the governor drive ball detent is uppermost.
54. Locate the ball bearing in the detent.
55. Fit the governor assembly.
56. Secure the governor with the circlip.
57. Turn the output shaft until the speedometer drive ball detent is uppermost.
58. Locate the ball bearing in the detent.
59. Fit the speedometer drive gear.
60. Secure the gear with the circlip.
61. Refit the rear extension and a new joint washer.
62. Fit and tighten the bolts and washers.
63. Using petroleum jelly, stick the front strut to the front servo lever.
64. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
65. Fit and tighten the two bolts and washers.
66. Using petroleum jelly, stick the rear strut to the rear brake band.
67. Carefully fit the rear servo in position, ensuring that the rear strut is correctly located in the rear servo lever.
68. Fit and tighten the two bolts and washers.
69. Refit the oil tubes.
70. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
71. Fit and tighten the three bolts and washers.
72. Refit the downshift cable to the cam.
73. Refit the oil pipes.
74. Refit the magnet.
75. Refit the sump and a new joint washer.
76. Fit and tighten the 15 bolts.
77. Refit the gearbox. 44.20.01.

PLANET GEARS AND REAR DRUM ASSEMBLY

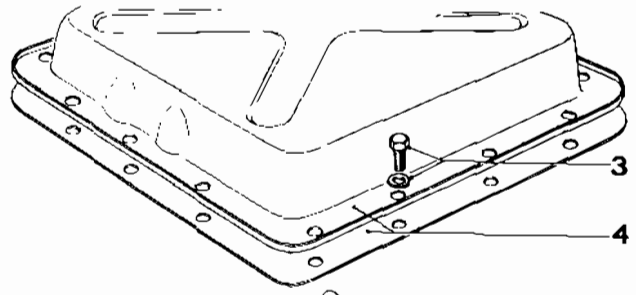
—Remove and refit **44.36.04**

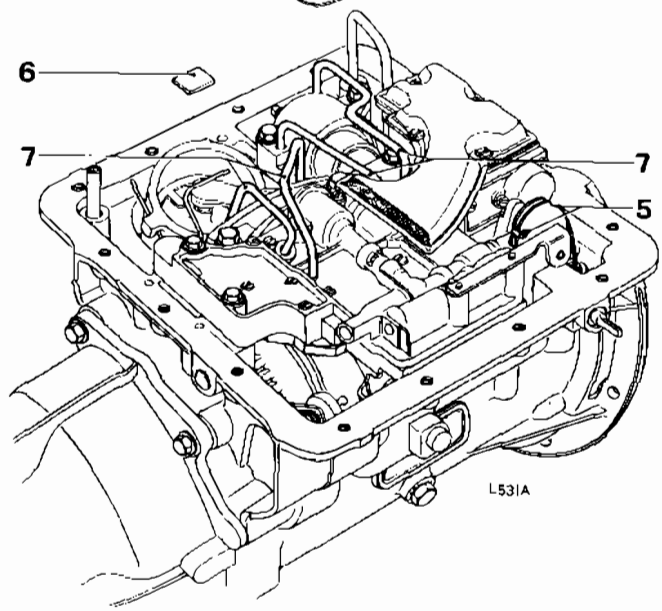
Service tools: BW35 or AT501

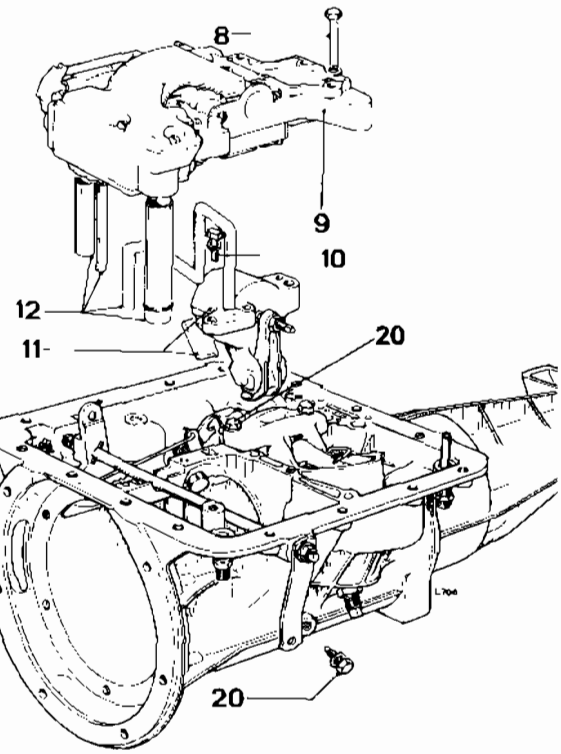
Removing

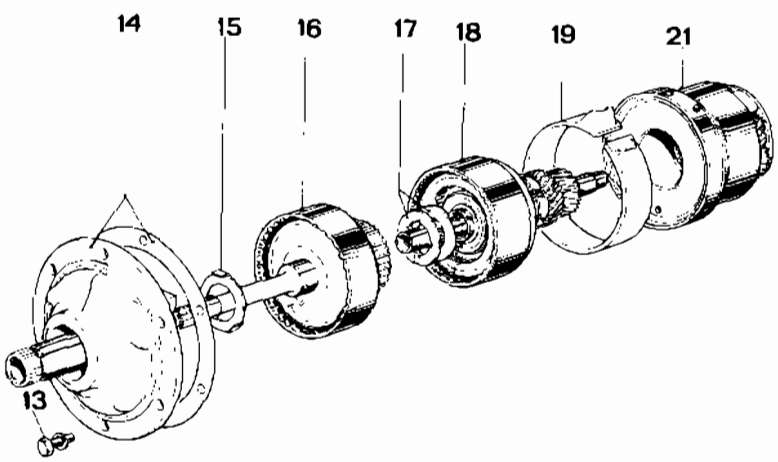
1. Remove the gearbox. 44.20.01.
2. Wash the exterior of the unit in clean petrol or paraffin, invert it and place on a bench cradle BW35 or AT501.
3. Take out 15 bolts and washers.
4. Remove the oil pan and joint washer.
5. Release the downshift inner cable from the downshift cam.
6. Remove the magnet.
7. Pull out the oil tubes.
8. Take out three bolts and washers.
9. Lift off the valve body.
10. Take out two bolts and washers.
11. Remove the front servo and strut.
12. Pull out the oil tubes (note 'O' ring on front pump suction tube).
13. Take out the bolts.
14. Remove the front pump and joint washer.
15. Remove the thrust washer.
16. Withdraw the front clutch.
17. Remove the thrust washers.
18. Withdraw the rear clutch and forward sun gear.
19. Squeeze together the ends of the front brake band and remove it from the casing.
20. Take out three bolts and washers.
21. Withdraw the centre support and planet gear assembly.

continued







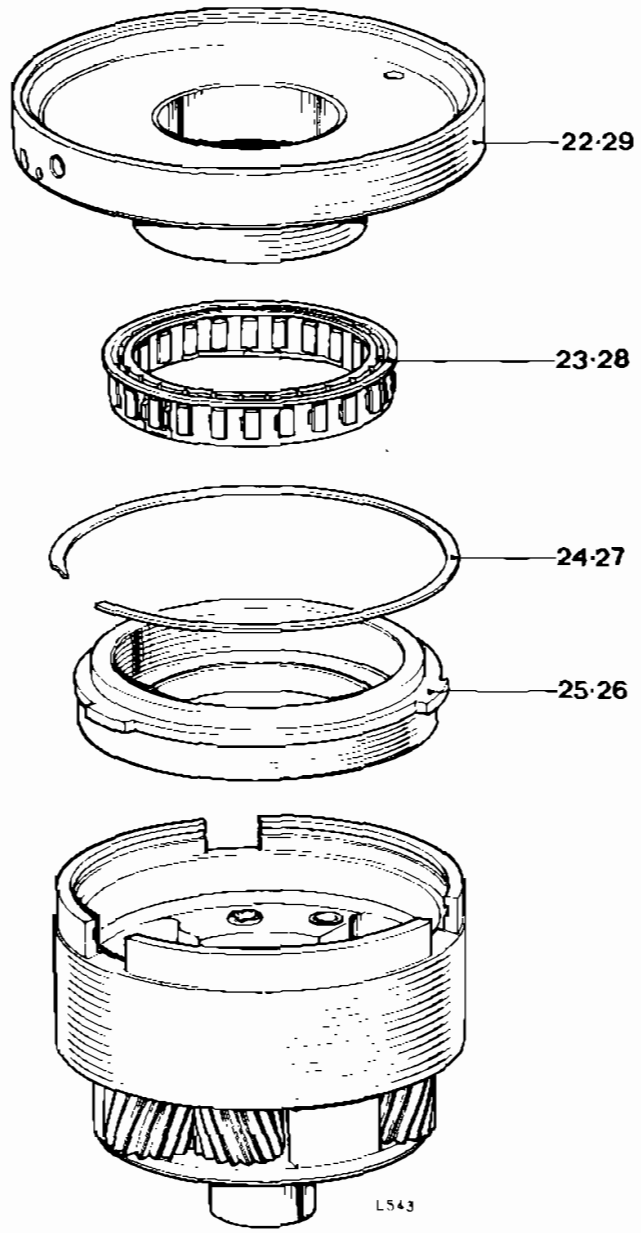


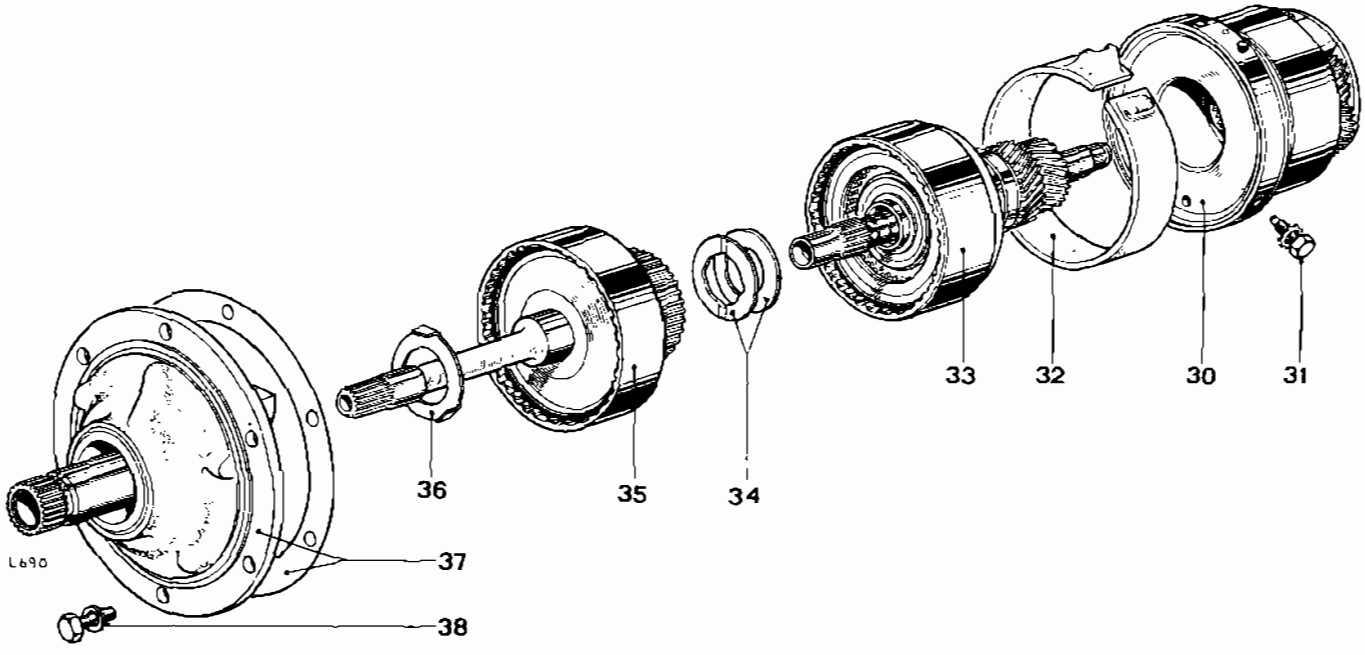
22. Separate the centre support from the planet gear assembly.
23. Withdraw the uni-directional clutch.
24. Remove the circlip.
25. Detach the uni-directional clutch outer race.

Refitting

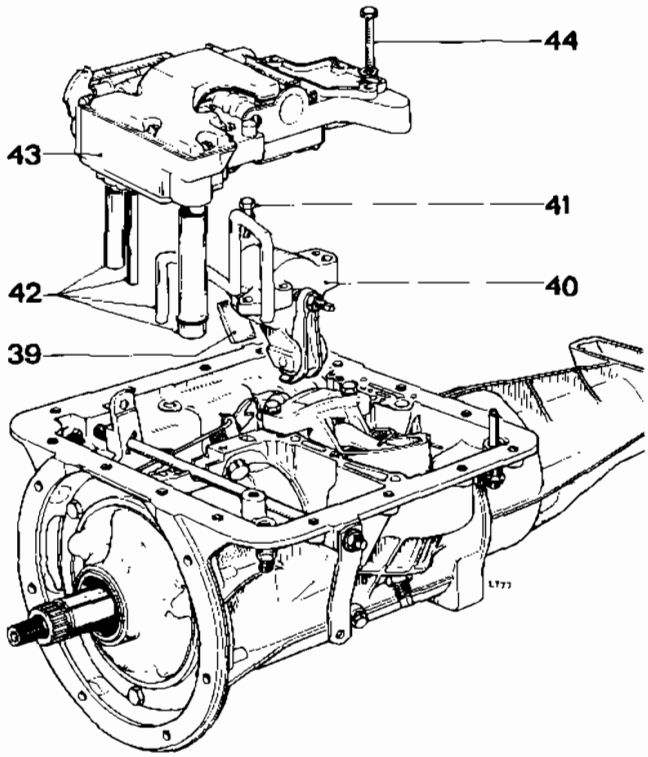
26. Fit the uni-directional clutch outer race to the rear drum assembly.
27. Refit the circlip.
28. Refit the uni-directional clutch.
29. Assemble the centre support and planet gear assembly.
30. Refit the assembly, ensuring that the oil and locating holes in the centre support align with those in the casing.
31. Fit and tighten the three locating bolts and washers. Ensure that the flat faces of the washers are towards the casing.
32. Squeeze together the ends of the front brake band and fit it into position.
33. Refit the rear clutch and forward sun gear assembly.
34. Using a little petroleum jelly, stick the thrust washers to the front clutch assembly (phosphor bronze against the clutch).
35. Refit the front clutch assembly.
36. Using a little petroleum jelly, stick the thrust washer to the front pump assembly.
37. Refit the front pump assembly and new joint washer.
38. Fit and tighten the bolts.

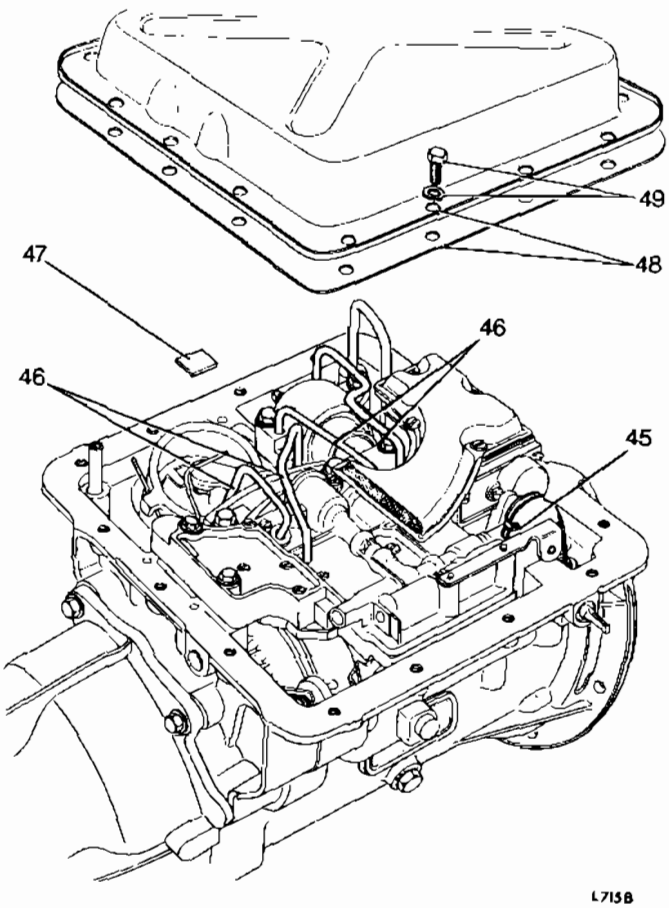
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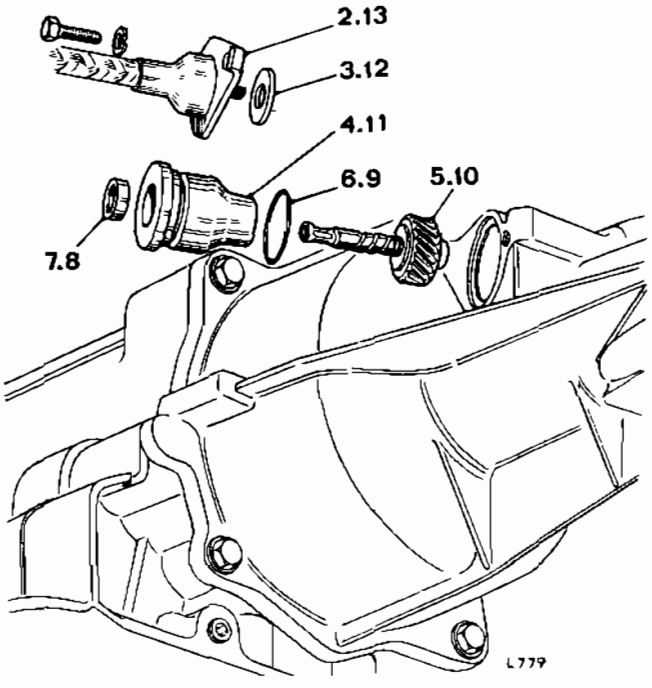
39. Using petroleum jelly, stick the front strut to the front servo lever.
40. Carefully fit the front servo in position, ensuring that the front strut is correctly located on the front band.
41. Fit and tighten the two bolts and washers.
42. Refit the oil tubes.
43. Carefully locate the valve block in position and ensure that the detent lever locates in the manual valve.
44. Fit and tighten the three bolts and washers.
45. Refit the downshift cable to the cam.
46. Refit the oil pipes.
47. Refit the magnet.
48. Refit the sump and a new joint washer.
49. Fit and tighten the 15 bolts.
50. Refit the gearbox. 44.20.01.





SPEEDOMETER DRIVE PINION

—Remove and refit **44.38.04**



Removing

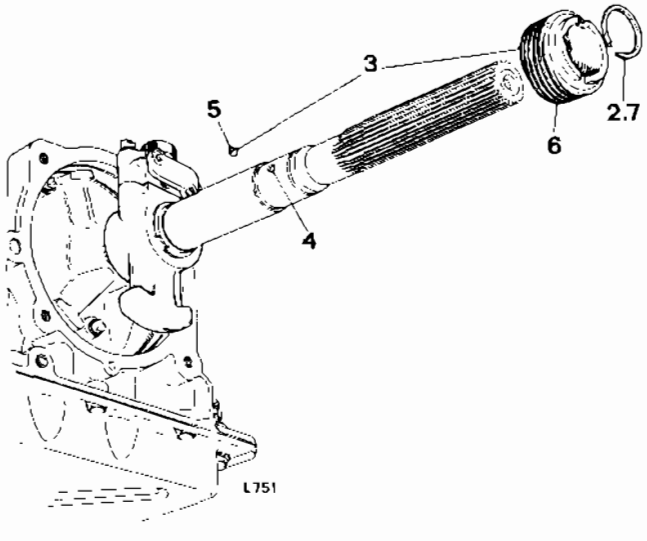
1. Drive the vehicle onto a ramp and apply the hand brake.
2. Disconnect the speedometer cable from the gearbox.
3. Remove the washer.
4. Carefully prise the speedometer pinion housing out of the extension.
5. Withdraw the pinion from the housing.
6. Remove the 'O' ring.
7. Extract the seal.

Refitting

8. Press a new seal into the housing.
9. Fit a new 'O' ring to the housing.
10. Fit the drive pinion into the housing.
11. Press the housing into the rear extension.
12. Replace the washer.
13. Refit the speedometer cable.

SPEEDOMETER DRIVE GEAR

—Remove and refit **44.38.07**



Removing

1. Remove the rear extension. 44.20.15.
2. Remove the circlip.
3. Holding one hand to catch the ball, withdraw the speedometer drive gear.

Refitting

4. Turn the output shaft until the drive ball detent is uppermost.
5. Locate the ball in the detent.
6. Slide the speedometer drive gear into position.
7. Fit and secure the circlip.
8. Refit the rear extension. 44.20.15.

VALVE BLOCK

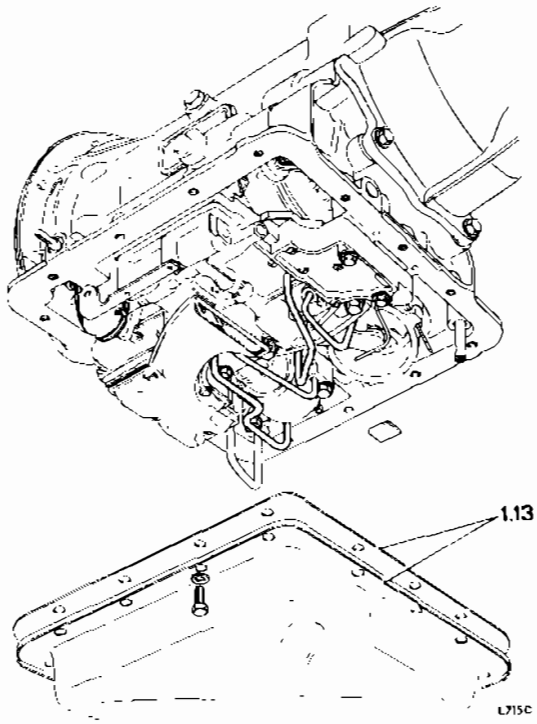
—Remove and refit **44.40.01**

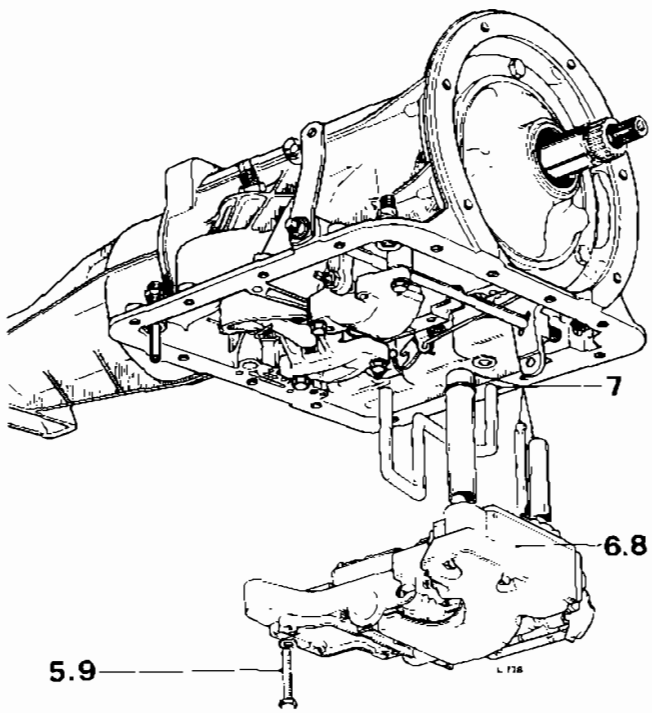
Removing

1. Remove the sump pan. 44.24.04.
2. Remove the magnet.
3. Pull out the oil connector pipes.
4. Disconnect the downshift cable from the cam.
5. Take out three bolts.
6. Release the valve block.

Refitting

7. Ensure that the pipes are correctly located.
8. Fit the valve block to the unit.
9. Secure with three bolts.
10. Attach the downshift cable to the cam, ensuring that the cam is correctly located on the manual valve.
11. Refit the oil connector pipes.
12. Attach the magnet to one end of the bolt heads.
13. Replace the sump pan. 44.24.04.





VALVE BLOCK

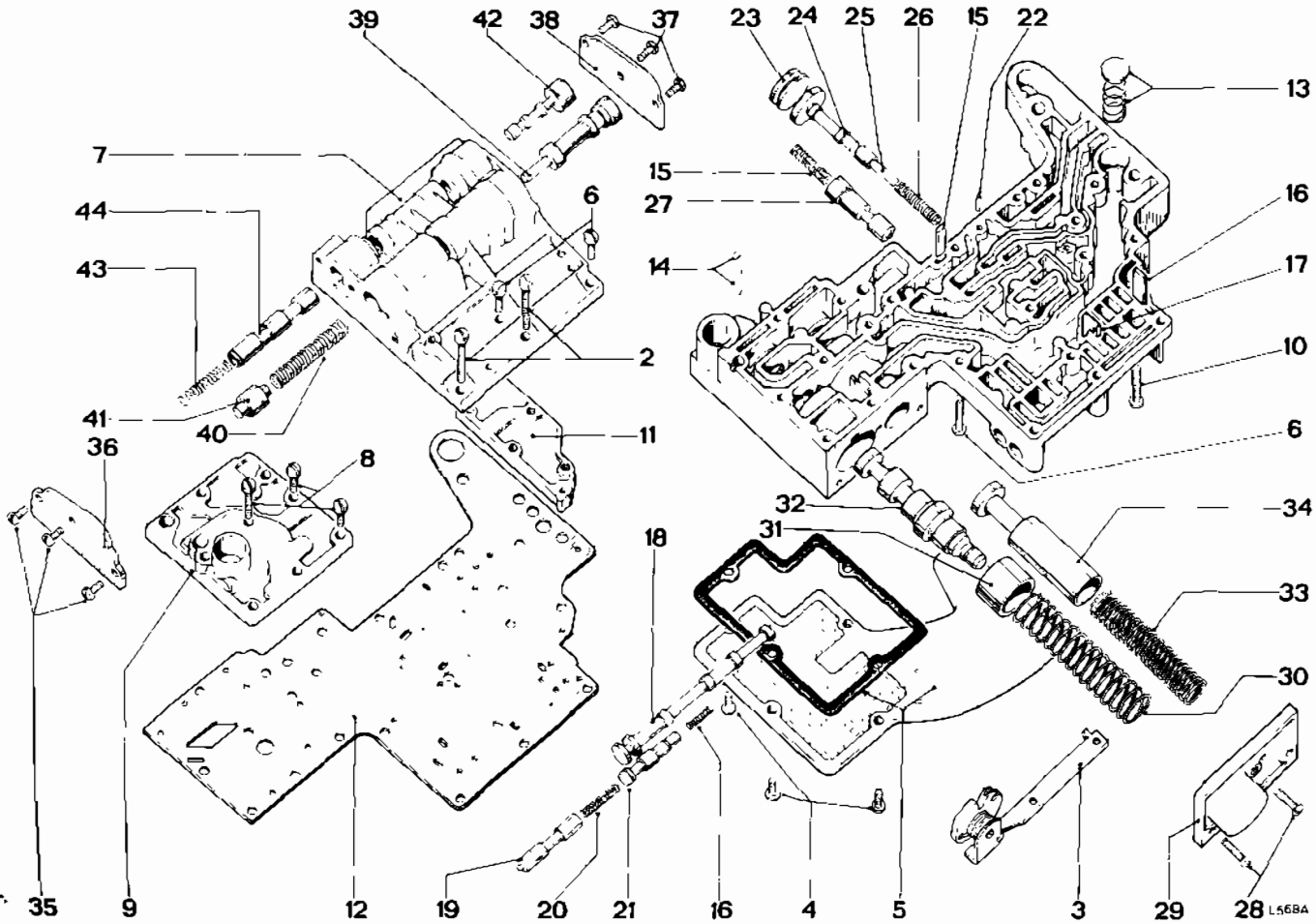
—Overhaul 44.40.04

1. Remove the valve block. 44.40.01.

Dismantling

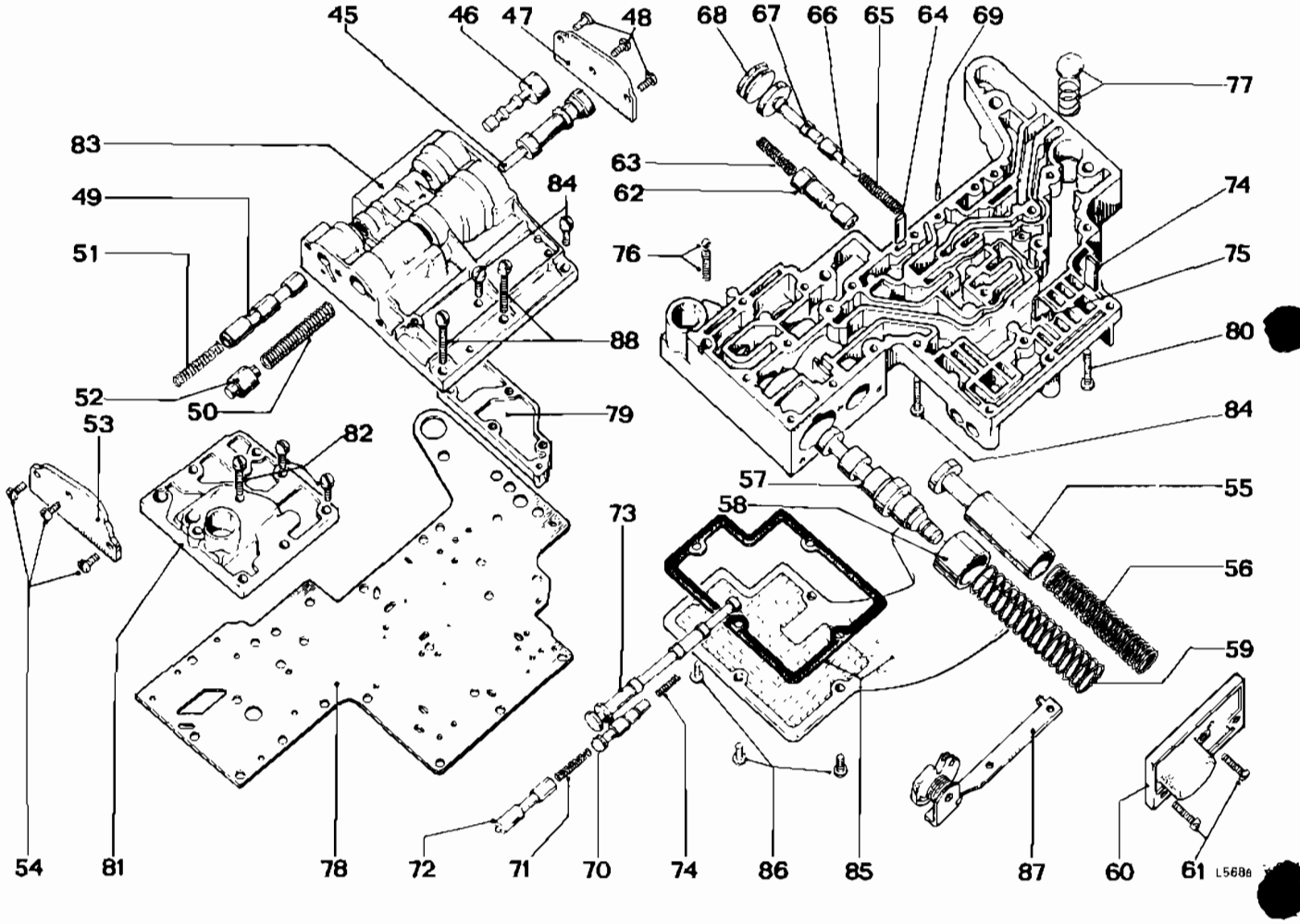
2. Take out two screws.
3. Remove the downshift cam assembly.
4. Take out four screws.
5. Remove the oil strainer and gasket.
6. Take out eight screws.
7. Remove upper valve body.
8. Take out eight screws.
9. Remove the oil tube collector.
10. Take out four screws.
11. Remove the governor line plate.
12. Remove the separating plate.
13. Remove the check valve and spring.
14. Remove the converter check valve ball and spring.
15. Remove the servo orifice control valve spring and stop.
16. Remove the throttle valve stop and return spring.
17. Remove the throttle valve plate.
18. Withdraw the manual control valve.
19. Withdraw the downshift valve.
20. Remove the throttle valve spring.
21. Withdraw the throttle valve.
22. Tap out the dowel pin, applying light pressure to the plug.
23. Withdraw the modulator plug.
24. Withdraw the modulator valve.
25. Withdraw the modulator valve spacer.
26. Withdraw the modulator valve spring.
27. Withdraw the servo orifice control valve.
28. Slacken progressively the three screws.
29. Carefully remove the end plate.
30. Remove the spring.
31. Withdraw the sleeve.
32. Take out the primary regulator valve.
33. Remove the spring.
34. Withdraw the secondary regulator valve.
35. Remove three screws from the upper valve body.
36. Remove the front end plate.
37. Take out three screws.
38. Remove the rear end plate.
39. Withdraw the 2–3 shift valve from the rear.
40. Remove the spring.
41. Withdraw the plunger.
42. Withdraw the 1–2 shift valve from the rear.
43. Remove the spring.
44. Withdraw the plunger.

continued



Reassembling

45. Insert the 1–2 shift valve.
46. Insert the 2–3 shift valve.
47. Replace the rear end plate.
48. Fit and tighten the three screws.
49. Insert the 1–2 shift valve plunger.
50. Insert the 2–3 shift valve spring.
51. Insert the 1–2 shift valve spring.
52. Insert the 2–3 shift valve plunger.
53. Locate the front end plate in position.
54. Fit and tighten three screws.
55. Insert the secondary regulator valve into the lower valve body.
56. Refit the spring.
57. Insert the primary regulator valve.
58. Insert the sleeve.
59. Insert the spring.
60. Hold the end plate in position.
61. Fit and tighten the three screws.
62. Insert the servo orifice control valve.
63. Insert the spring.
64. Depress the spring and fit the stop.
65. Insert the modulator control valve spring.
66. Insert the spacer.
67. Insert the modulator control valve.
68. Insert the plug.
69. Fit the dowel pin.
70. Insert the throttle valve.
71. Insert the spring.
72. Insert the down shift valve.
73. Insert the manual control valve.
74. Insert the throttle valve return spring and stop.
75. Refit the throttle valve plate.
76. Refit the converter check valve ball and spring.
77. Refit the check valve and spring.
78. Place the separating plate in position.
79. Hold the governor line plate in position.
80. Fit and loosely tighten the four screws.
81. Replace the oil tube collector.
82. Fit and loosely tighten eight screws.
83. Replace the upper valve body.
84. Fit and tighten the eight screws.
85. Refit the oil strainer and gasket.
86. Fit and tighten four screws.
87. Tension the downshift cam and refit the assembly.
88. Fit and tighten two screws.
89. Refit the valve block. 44.40.01.



PROPELLER AND DRIVE SHAFT OPERATIONS

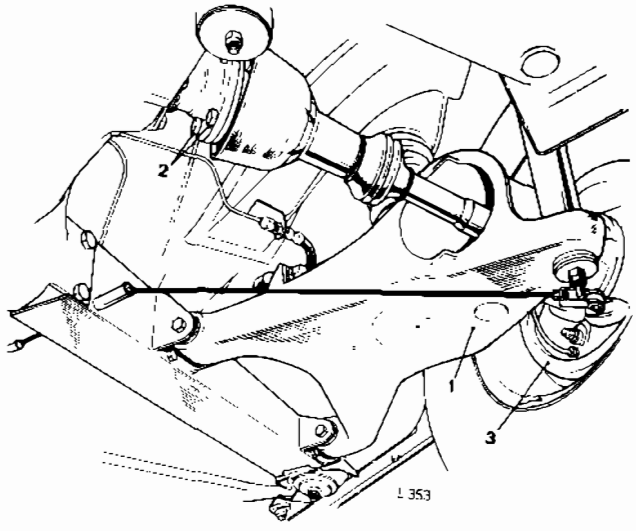
Propeller shaft—remove and refit 47.15.01

Rear drive shaft—remove and refit 47.10.01

Universal joint—remove and refit 47.15.18

REAR DRIVE SHAFT

—Remove and refit 47.10.01

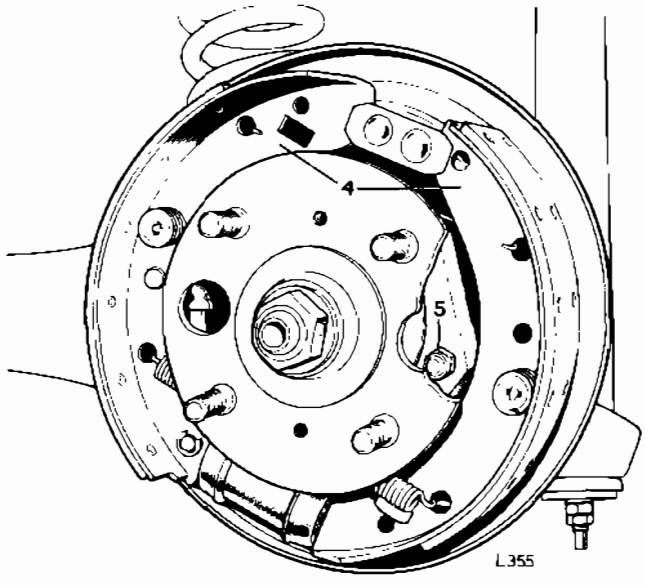


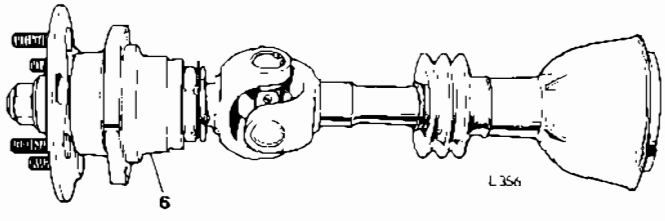
Removing

1. Jack up car and support trailing arm.
2. Disconnect drive shaft flange from rear axle.
3. Remove road wheel and brake-drum.
4. Remove brake-shoes. 70.40.03.
5. Remove six nuts securing hub bearing housing flange to trailing arm. Holes are provided in the hub to permit spanner access.
6. Withdraw drive shaft, taking care to avoid damaging the rubber boot enclosing the drive shaft splines.

Refitting

7. Reverse instructions 1 to 6.

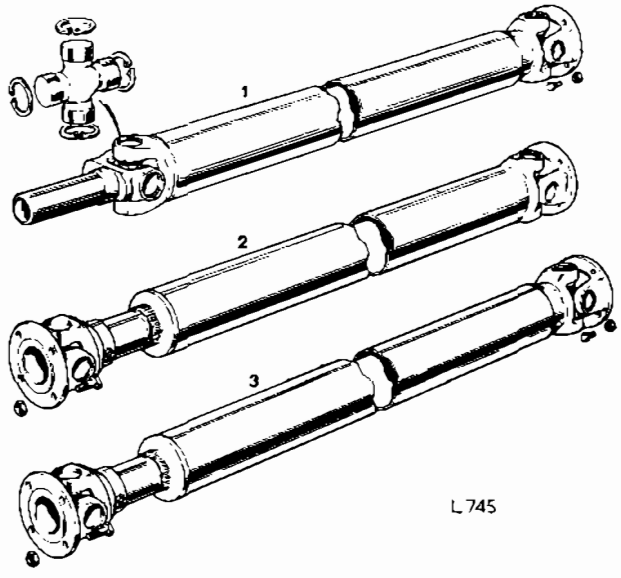




PROPELLER SHAFT 47.15.00

Three variations of propeller shaft are fitted to accommodate the use of automatic, manual, and overdrive gearboxes. These propeller shafts can be identified as follows:

1. Automatic gearbox: forward sliding member provided with internal splines, rear end of shaft employs built-in rubber coupling.
2. Manual gearbox: conventional propeller shaft, sliding yoke fitted to front.
3. Manual gearbox and overdrive: sliding yoke fitted to front, built-in rubber coupling at rear.

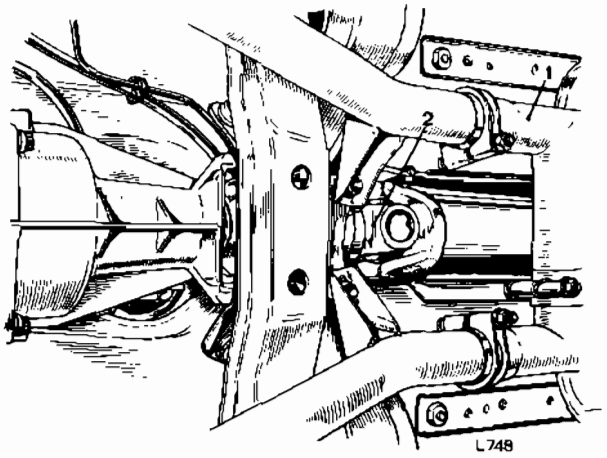


ROPELLER SHAFT

-Remove and refit **47.15.01**

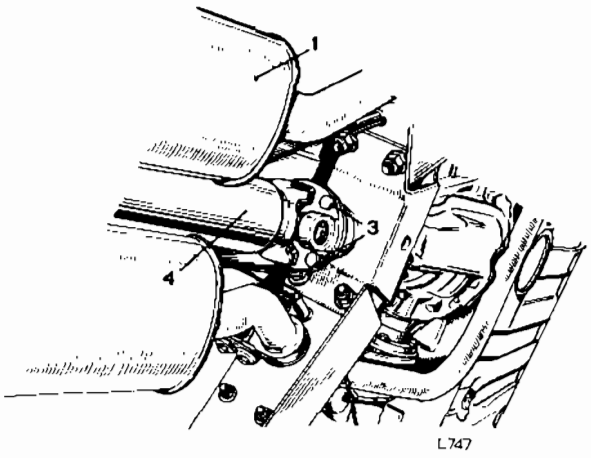
emoving

1. Remove front exhaust pipes and silencers. 30.10.09, 30.10.10, 30.10.14.
2. Disconnect front end of propeller shaft from gearbox flange (overdrive and manual gearbox models only).
3. Disconnect rear end of propeller shaft from hypoid casing extension.
4. Withdraw propeller shaft from gearbox. Seal gearbox to prevent entry of grit and to minimise oil leakage (automatic only).



tefitting

5. Ensure arrows on sliding yoke and shaft are aligned, and connect flange to gearbox (overdrive and normal gearbox models only).
6. Engage propeller shaft splines in gearbox (automatic only).
7. Connect rear of shaft to hypoid extension.
8. Fit silencers and front exhaust pipes. 30.10.09, 30.10.10, 30.10.14.

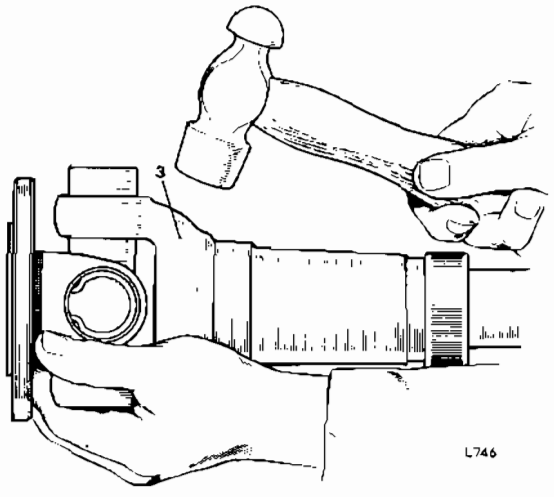


JNIVERSAL JOINT

-Remove and refit **47.15.18**

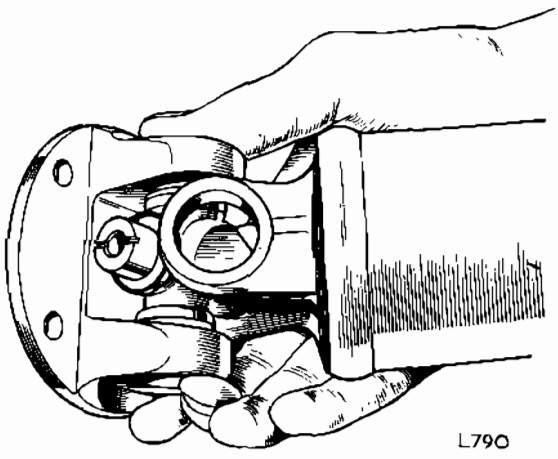
temoving

1. Remove paint, rust, etc., in vicinity of bearing cups and circlips.
2. Remove circlips.
3. Tap yokes to eject bearing cups.
4. Withdraw bearing cups and spider.



tefitting

5. Remove bearing cups from new spider.
6. Ensure cups contain approved lubricant (one-third full) and that needle bearings are complete and in position.
7. Fit spider to propeller shaft yoke.
8. Engage spider trunnion in bearing cup and insert cup into yoke.
9. Fit opposite bearing cup to yoke and carefully press both cups into position, ensuring spider trunnion engages cups and that needle bearings are not displaced.
10. Using two flat-faced adaptors of slightly smaller diameter than the bearing cups, press cups into yokes until they reach the lower land of the circlip grooves. Do not press bearing cups below this point or damage may be caused to cups and seals.
11. Fit circlips.



REAR AXLE OPERATIONS

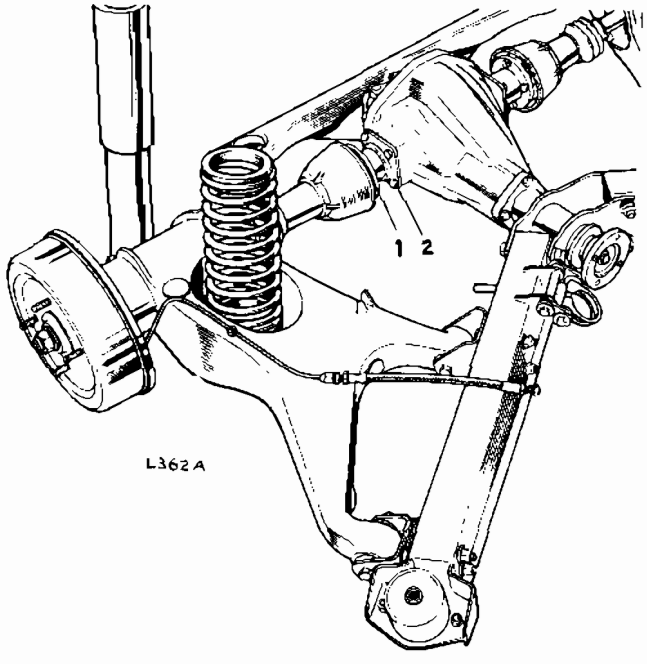
Differential—remove and refit	51.15.01
Final drive unit mountings—remove and refit	51.25.31
Final drive unit—overhaul	51.25.19
Hypoid casing—remove and refit	51.25.25
Hypoid casing rear cover gasket—remove and refit	51.20.07
Inner shaft, bearing, and oil seal—remove and refit	51.10.02
Pinion extension housing—overhaul	51.25.49
Pinion extension housing—remove and refit	51.25.37
Pinion oil seal—remove and refit	51.20.01

INNER SHAFT, BEARING, AND OIL SEAL

—Remove and refit **51.10.02**

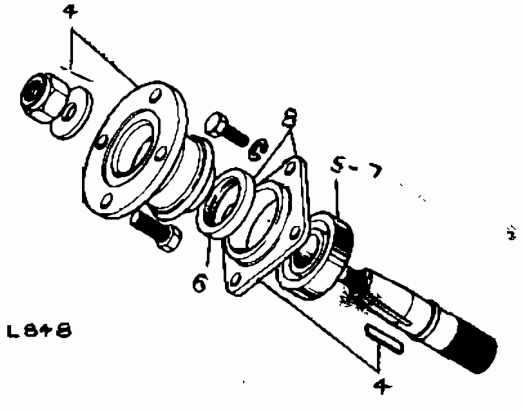
Removing

1. Disconnect drive shaft from inner shaft.
2. Remove four bolts and spring washers securing inner shaft oil seal housing to hypoid casing.
3. Withdraw inner shaft complete with driving flange, oil seal housing and ballrace.
4. Remove Nyloc nut and plain washer from shaft. Withdraw driving flange, key, and oil seal housing.
5. Remove ballrace from shaft.
6. Extract oil seal from housing.



Refitting

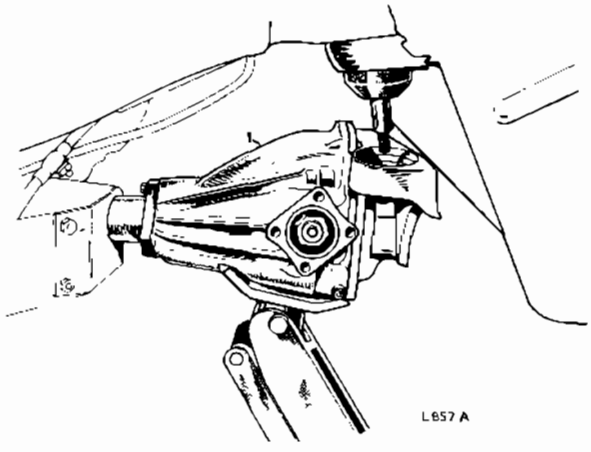
7. Fit ballrace to shaft until outer face of ball race is approximately aligned with end of shaft taper.
8. Lay oil seal housing flat on bench with the smaller diameter uppermost. Insert oil seal (lip leading) into housing until plain face of seal is flush with housing.
9. Lubricate seal lip and slide seal over driving flange (plain face of seal leading). Ensure driving flange deflector shield is undamaged and will not foul oil seal housing.
10. Fit key, driving flange, and oil seal housing to shaft.
11. Fit plain washer and Nyloc nut to shaft. Tighten nut.
12. Enter shaft into hypoid casing, engaging splines in sun gear.
13. Fit and tighten four spring washers and bolts securing oil seal housing to hypoid casing.
14. Connect drive shaft.



DIFFERENTIAL

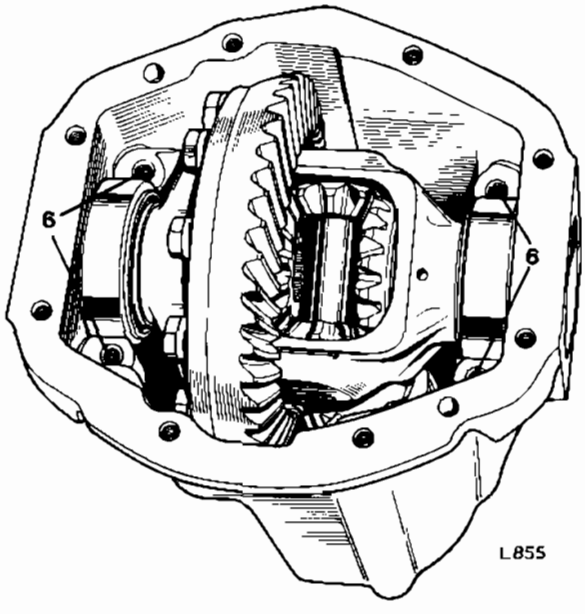
—Remove and refit **51.15.01**

Service tools: S101



Removing

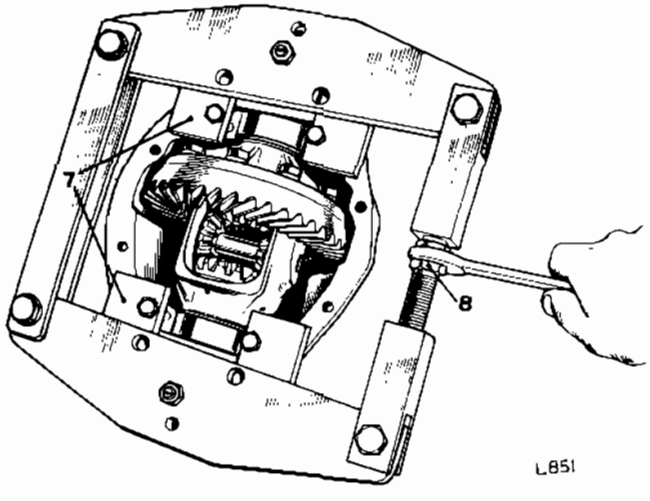
1. Remove hypoid casing from car. 51.25.25.
2. Slacken eight bolts and spring washers securing rear cover to hypoid casing and allow oil to drain.
3. Remove rear cover. If required, the rear mounting plate can be removed by releasing the lock plate tabs and removing the four securing nuts.
4. Remove eight bolts (four either side) securing inner shaft housing to hypoid casing.
5. Withdraw inner shafts complete with ballrace, oil seal, and flanges.
6. Note location identity markings on carrier bearing caps. Remove four bolts and spring washers securing bearing caps to casing and withdraw bearing caps. Do not intermix bearing caps.
7. Fit spreader tool (S101) adaptor plates to hypoid casing.
8. Mount spreader tool on adaptor and turn jacking screw **by hand** to expand spreader. A further **half-turn** with a spanner will spread the casing sufficiently to release the differential unit.
   DO NOT over-expand, or damage will be caused to the hypoid casing.
9. Lift out crown wheel and differential unit.

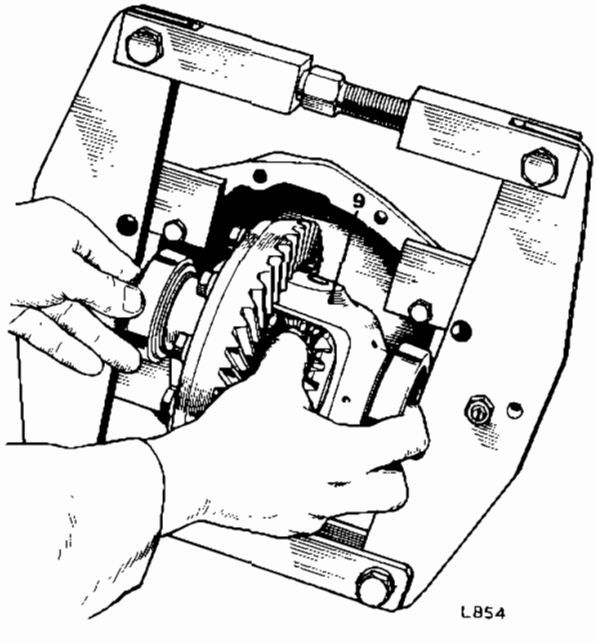


Refitting

10. Reverse instructions 1 to 10.

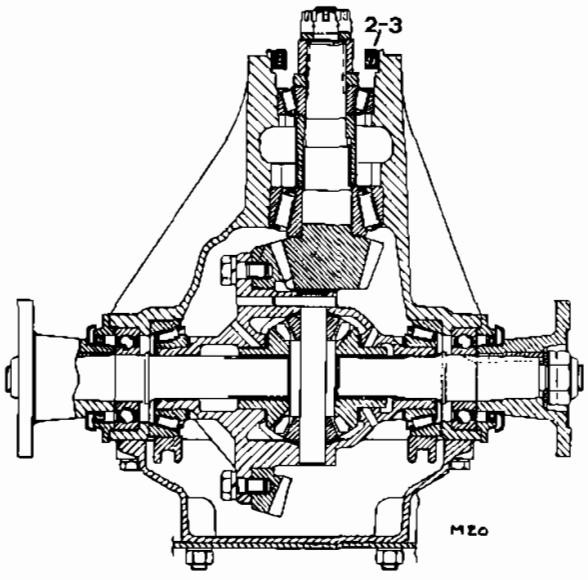
NOTE: Where carrier bearing(s) and/or crown wheel are renewed it is necessary to check carrier bearing tolerances and crown wheel/pinion backlash as detailed under 51.15.13.





PINION OIL SEAL

—Remove and refit **51.20.01**



Removing

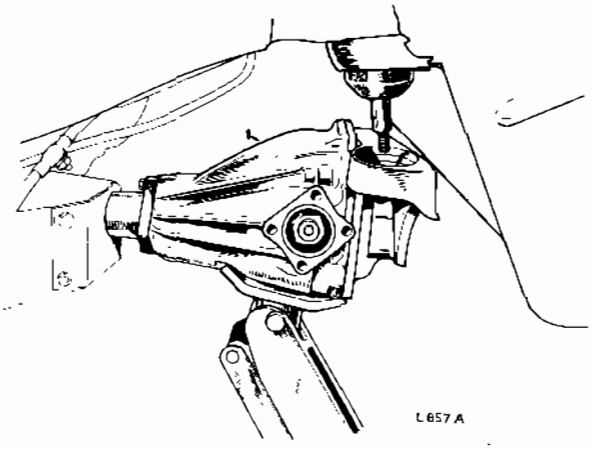
1. Remove hypoid casing. 51.25.25.
2. Withdraw oil seal.

Refitting

3. Fit new oil seal (lip towards pinion).
4. Install hypoid casing. 51.25.25.

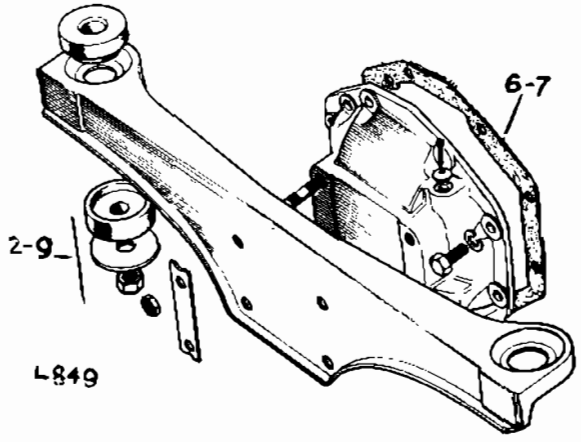
HYPOID CASING REAR COVER GASKET

—Remove and refit **51.20.07**



Removing

1. Jack up car and support body on stands.
2. Support hypoid casing on jack and remove Nyloc nuts, washers and the lower rubbers from casing rear bracket.
3. Carefully lower jack until bracket is clear of body studs.
4. Slacken bolts securing rear cover to hypoid casing. Ease cover from casing and allow oil to drain.
5. Remove bolts and cover.
6. Remove gasket, and clean mating faces.



Refitting

7. Fit new gasket and assemble cover and bracket to hypoid casing.
8. Raise jack and engage bracket in body studs ensuring upper rubber mounting pads are in position.
9. Fit lower rubber mounting pads, plain washers, and Nyloc nuts.
10. Remove stands and jack.
11. Refill hypoid casing with fresh oil.

FINAL DRIVE UNIT

—Overhaul 51.25.19

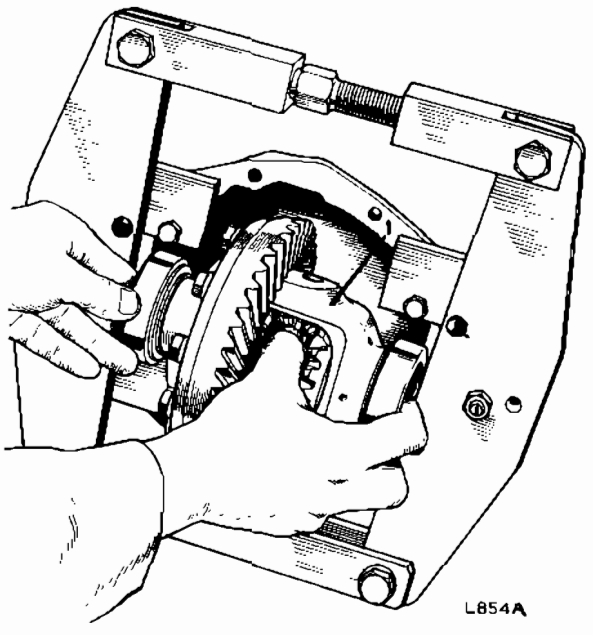
Service tools: S4221A-10-16, S316, S123A, M84B

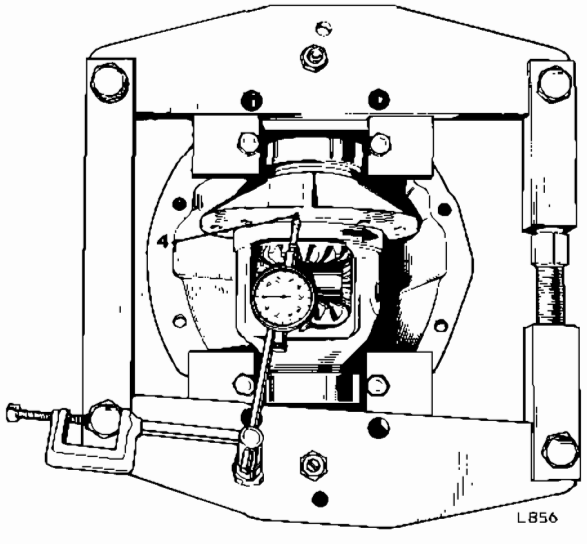
Dismantling

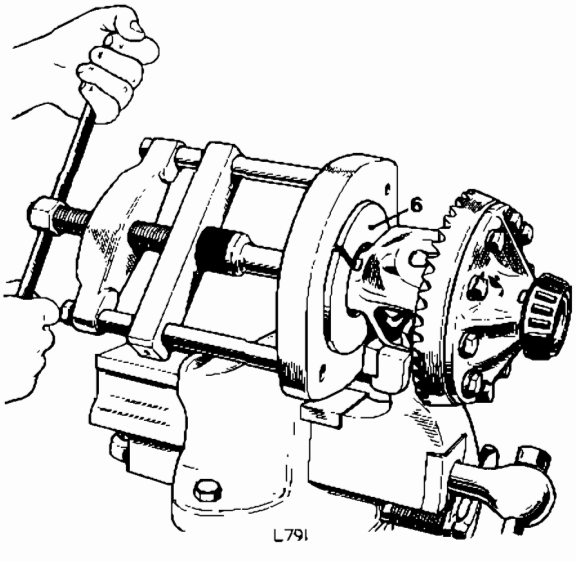
Crown wheel and differential unit

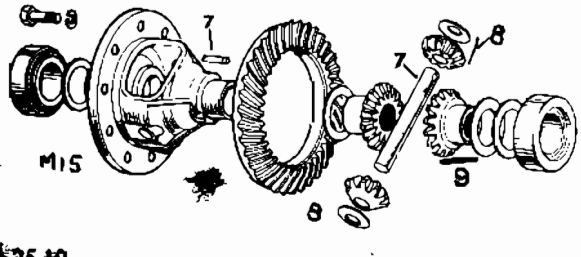
1. Withdraw crown wheel and differential unit from hypoid casing. 51.15.01.
2. Remove the bolts and spring washers securing crown wheel to differential flange. Withdraw crown wheel.
3. With crown wheel removed, install differential unit in hypoid casing and release all tension from spreading tool.
4. Using a dial gauge, check crown wheel flange. Run-out should not exceed 0·003 in (0·08 mm). Excessive run-out is indicative of a distorted crown wheel flange or differential cage, or defective bearings.
5. Remove differential unit from hypoid casing.
6. Using tools S4221A-10, withdraw differential carrier bearings.
7. Drift out cross-shaft locking pin and cross-shaft.
8. Rotate both sun gears 90° and extract planet gears and thrust washers.
9. Withdraw sun gears and thrust washers.

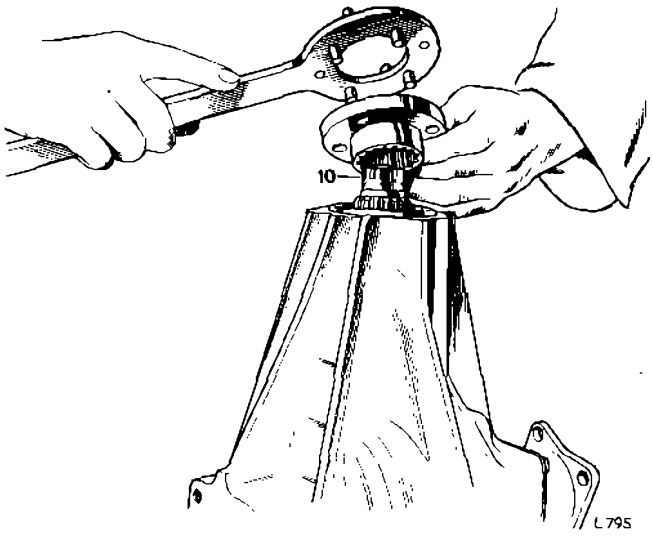
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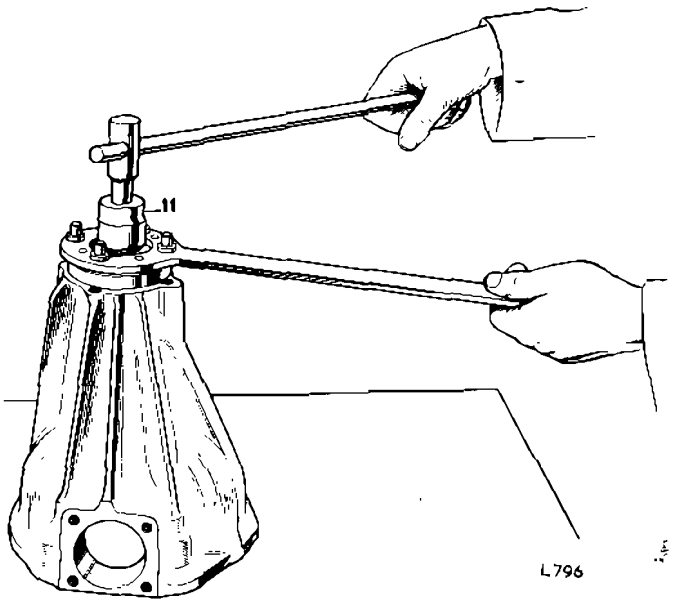


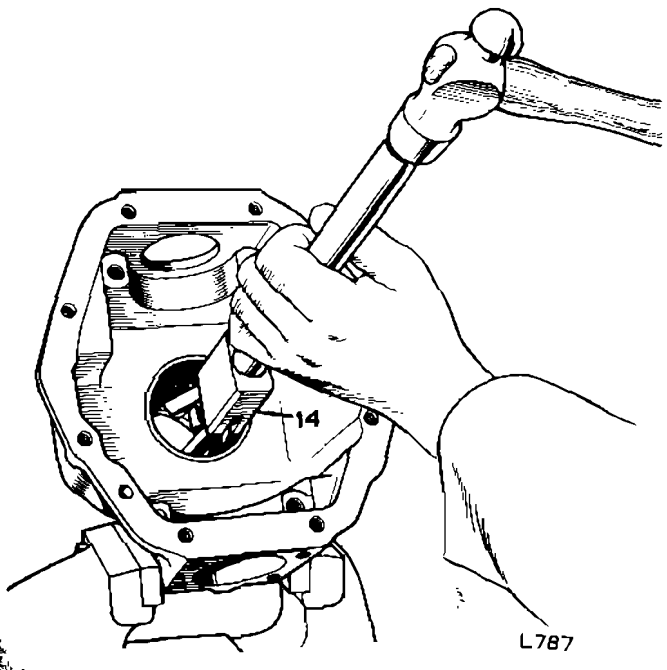


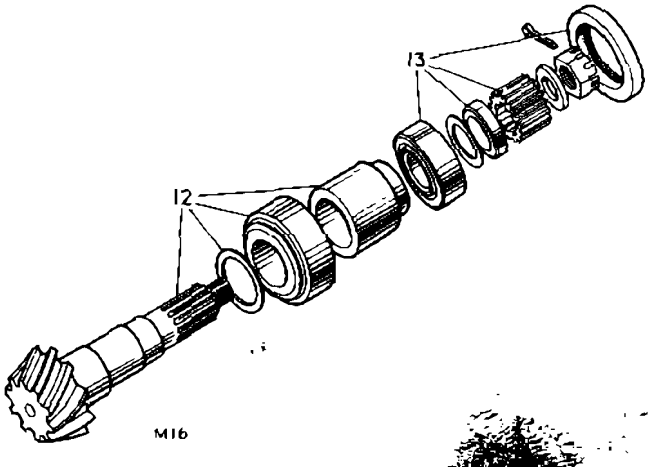
Pinion and bearings

10. Remove cotter pin from pinion shaft.
11. Using tool S316, remove slotted nut and washer.
12. Carefully drive out pinion shaft complete with inner bearing, bearing spacer, and shim pack.
13. Extract oil seal, coupling muff, centralizing collar, and outer bearing.
14. Remove pinion shaft bearing outer tracks from hypoid casing. (Tool S123A.)

continued





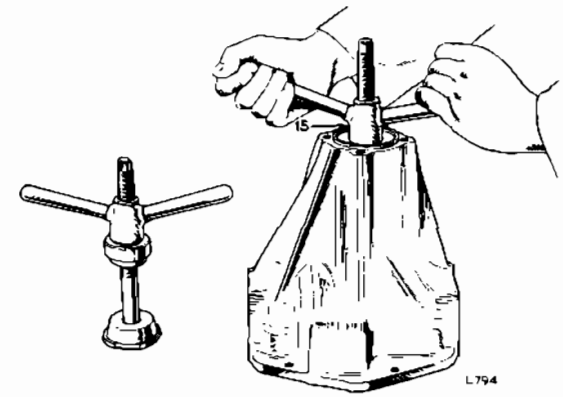


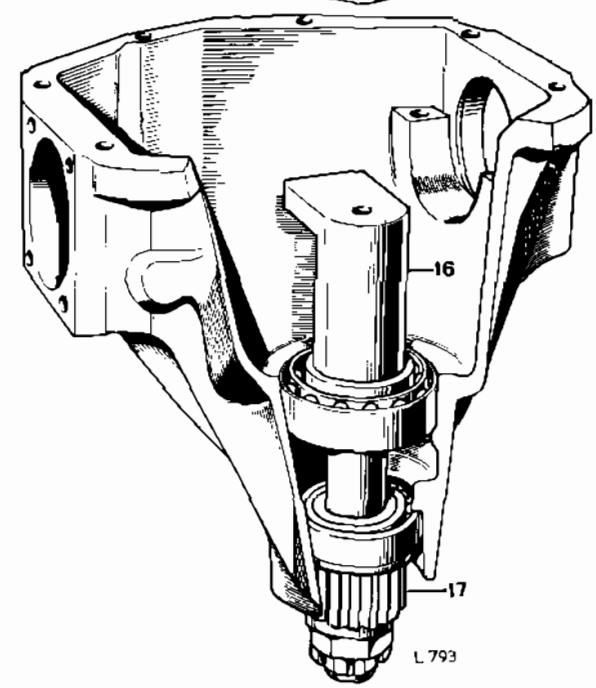
Assembling

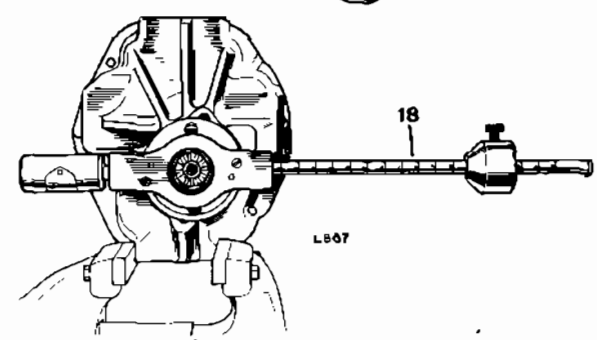
Pinion and bearings

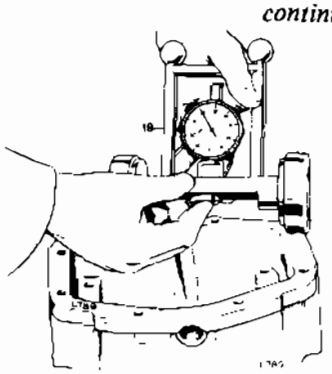
15. Using Tool S4221A-16, install pinion bearing outer tracks in hypoid casing.
16. Install pinion head bearing on dummy pinion (Tool M84B-1), and assemble to hypoid casing.
17. Fit pinion tail shaft bearing, centralizing collar, coupling muff, plain washer, and slotted nut. The bearing spacer is not fitted at this stage.
18. Tighten the slotted nut until a torque of 15 to 18 lbf in (0·17 to 0·21 kgf m) will just turn the pinion.
19. Set pinion gauge (Tool 84B) to zero.
20. Install gauge and dummy bearing in hypoid casing.
21. Maintaining slight pressure on gauge body, rock stylus across dummy pinion.
    Observe gauge readings. The minimum value is recorded when the stylus is parallel to the axis of the dummy pinion. This value is the thickness of the shim(s) to be fitted between the pinion and the pinion head bearing.
22. Remove gauge and dummy pinion from hypoid casing.
23. Fit required shim(s) to pinion shaft and fit pinion head bearing.
24. Install pinion in hypoid casing.
25. Fit bearing spacer, tail shaft bearing, centralizing collar, coupling muff, plain washer, and slotted nut.
    NOTE: Ensure tapered face of bearing spacer is fitted adjacent to tailshaft bearing.
26. Carefully tighten slotted nut checking pinion bearing pre-load. Shim the bearing spacer as necessary to obtain a pinion torque of 15 to 18 lbf in (0·17 to 0·21 kgf m) when the slotted nut is tightened to 90 to 120 lbf ft (12·4 to 16·6 kgf m).**
27. Fit cotter pin to slotted nut.
28. Fit oil seal (lip towards pinion).

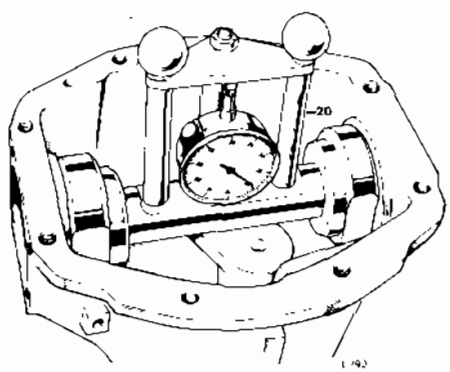
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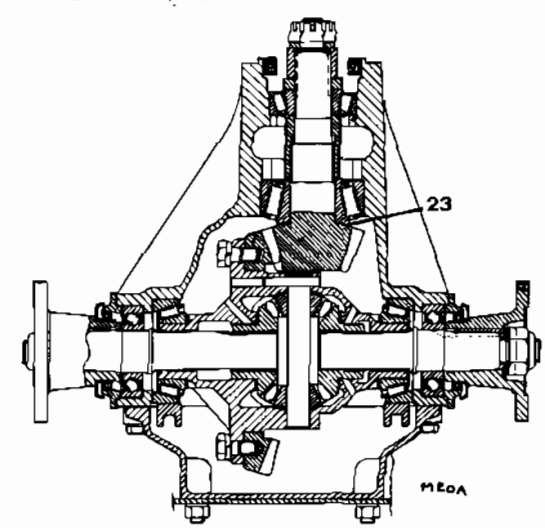












Crown wheel and differential unit

29. Fit thrust washers to sun gears and install gears in differential unit.
30. Assemble thrust washers to planet gears and mesh planet gears with sun gears (planet gears opposite each other).
31. Rotate sun gears and slide both planet gears into position in differential unit.
32. Insert planet gear cross-shaft.
33. Select and fit planet gear thrust washers and/or sun gear shims as required to obtain zero backlash.
34. Fit locking pin to cross-shaft and lightly peen to secure.
35. Fit carrier bearing inner cones to differential unit. Do not install shims at this stage.
36. Fit bearing outer tracks to cones and install differential unit in hypoid casing. Do not fit bearing caps.
37. Using a dial gauge, check total axial movement of crown wheel flange. To the measurement obtained must be added 0·003 in (0·0762 mm) carrier bearing pre-load.

    Thus the total amount of shims to be fitted to the carrier bearings is: free movement + 0·003 in (0·0762 mm).
38. Remove differential unit and fit crown wheel.

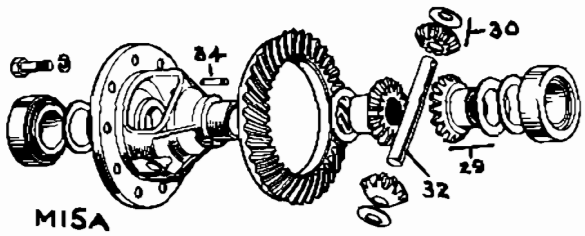
    NOTE: Crown wheel nuts should be treated with Loctite compounds before assembly to ensure retention.**
39. Again install differential unit in hypoid housing.
40. Using dial gauge, check total axial movement. This represents crown wheel movement, zero backlash to maximum backlash. Subtract an operational backlash requirement of 0·004 to 0·006 in (0·1016 to 0·1524 mm) from gauge reading. From these two dimensions:

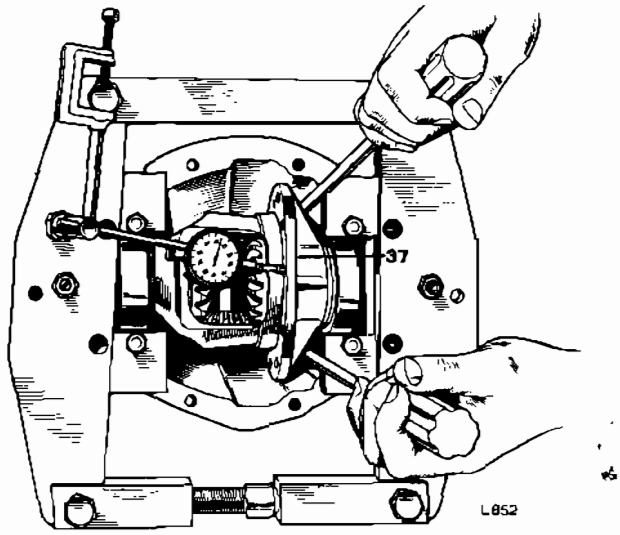
    Instruction 37. Total float **without** crown wheel **plus** 0·003 in (0·0762 mm) bearing preload

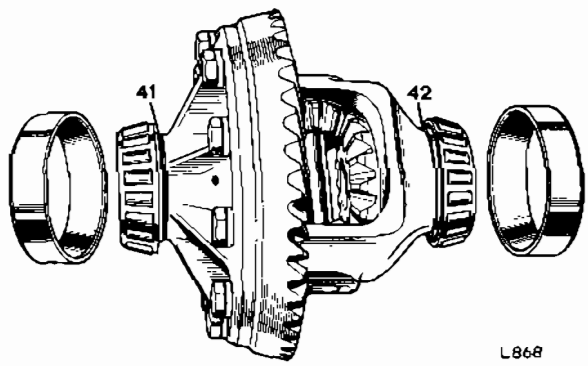
    and

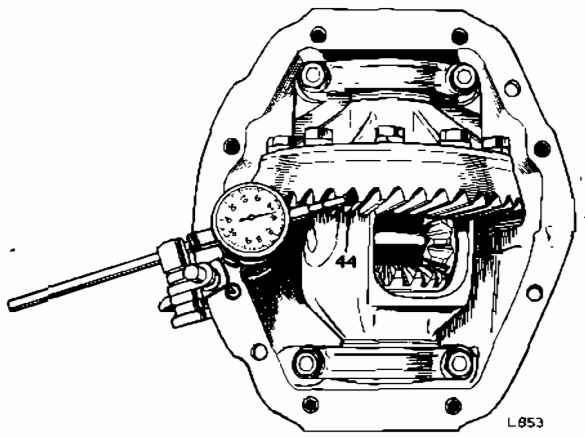
    Instruction 40. Total float **with** crown wheel **minus** required backlash 0·004 to 0·006 in (0·1016 to 0·1524 mm) can be found bearing shim thickness and location.
41. Remove carrier bearing adjacent to crown wheel from differential unit and select shim pack to value of instruction 40 (total float **with** crown wheel **minus** 0·004 to 0·006 in (0·1016 to 0·1524 mm). Fit shim pack and bearing.
42. Remove carrier bearing farthest from crown wheel. Subtract dimension instruction 40 from instruction 37.

    Select shim pack and fit shims and bearing to differential unit.
43. Using spreading tool, insert differential unit in hypoid casing. Release spreading tool and fit and tighten carrier bearing caps.









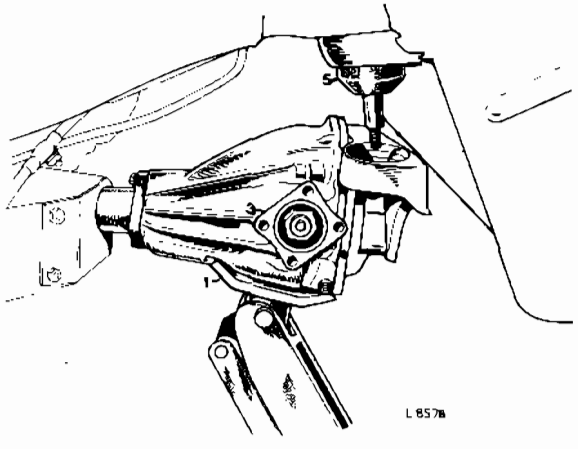
44. Using dial gauge, check backlash at several points on crown wheel. If a mean reading outwith 0·004 to 0·006 in (0·1016 to 0·1524 mm) is obtained, transfer shims from one carrier bearing to the other as required.

HYPOID CASING

—Remove and refit **51.25.25**

Removing

1. Raise car on ramp, support body on stands and locate jack under hypoid casing
2. Remove exhaust tail, and rear intermediate pipes. 30.10.19.
3. Disconnect drive shaft flanges from inner axle shafts.
4. Supporting hypoid casing on jack, remove Nyloc nuts, heavy plain washers, and rubber pads from hypoid casing rear mounting bracket.
5. Carefully lower jack until the rear mounting bracket is clear of body studs. Withdraw upper rubber pads from body studs.
6. Ensuring hypoid casing is firmly supported on jack, remove four bolts and spring washers securing hypoid casing to pinion extension housing.
7. Carefully withdraw hypoid casing to rear of car.



Refitting

8. Reverse instructions 1 to 7.
9. Fill hypoid casing to oil level plug.

FINAL DRIVE UNIT MOUNTINGS

—Remove and refit **51.25.31**

Front

Removing

1. Remove rear seat to expose sub-frame front mounting bolts.
2. Remove Nyloc nut below front mounting and withdraw bolt from inside car.
3. Remove the large flat washer from inside car and the small and large flat washers from below the rubber mounting block.
4. Raise body of car and withdraw the two flat washers installed between mounting rubber and car body.
5. Remove two nuts and bolts securing mounting block to sub-frame member.
6. Withdraw rubber block downwards.

Refitting

7. Insert rubber block into sub-frame and secure with two nuts and bolts.
8. Select the two washers fitted between mounting block and body. Smear the top face of the washers with 'Plastiseal' and insert both washers into position ensuring they are aligned with hole in mounting block.
9. Lower the car.
10. Smear area around mounting hole with 'Plastiseal'. Slide large washer to head of bolt and enter bolt from inside car into rubber block.
11. Fit large washer, anti-vibration strap, small washer and Nyloc nut to bolt.
12. Tighten Nyloc nut and install rear seat.

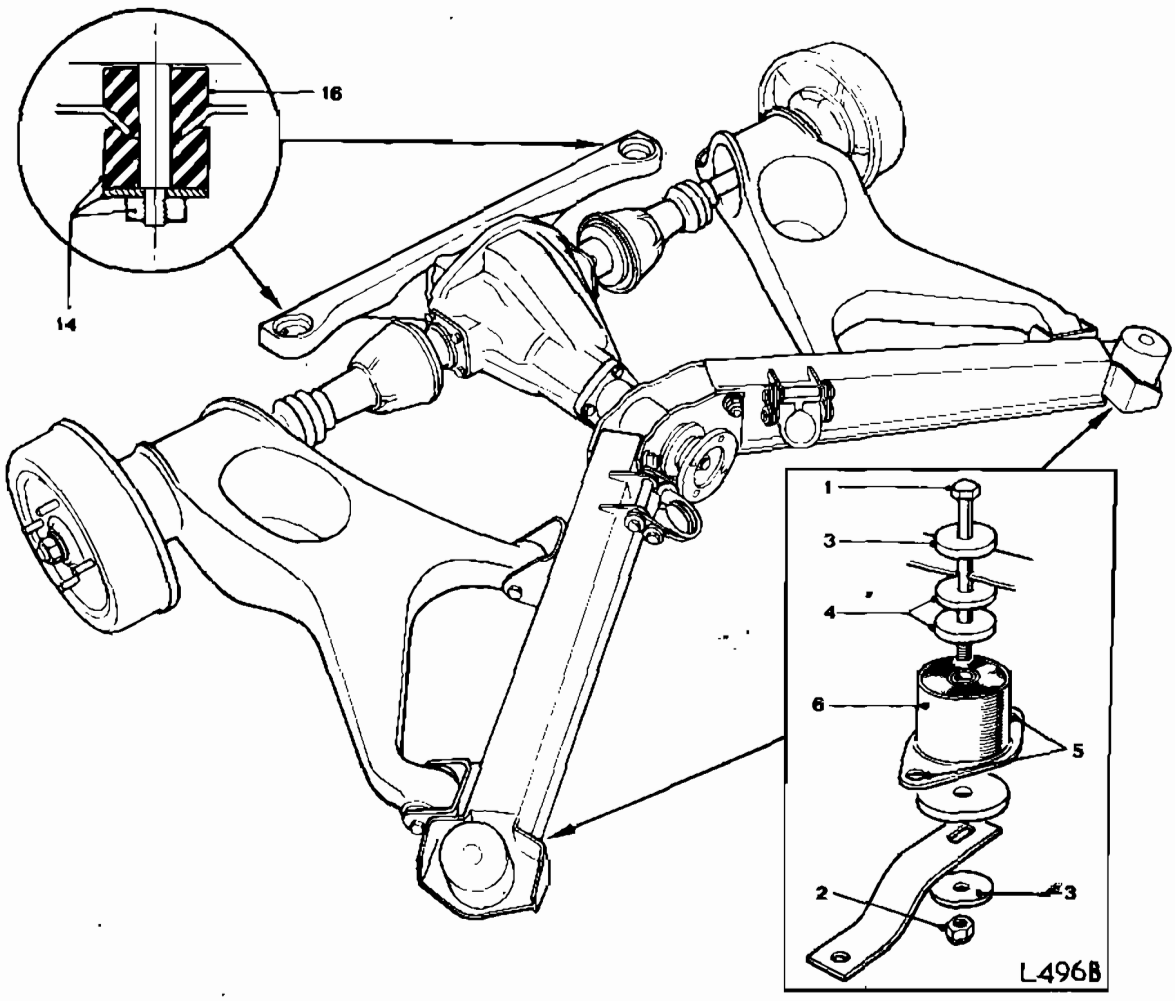
Rear

Removing

13. Raise car and support body on stands.
14. With hypoid casing supported by jack, remove two Nyloc nuts, large washers and the lower rubbers from hypoid rear cover bracket.
15. Lower jack to release hypoid bracket from body studs.
16. Remove upper rubbers from body studs.

Refitting

17. Reverse instructions 1 to 4.

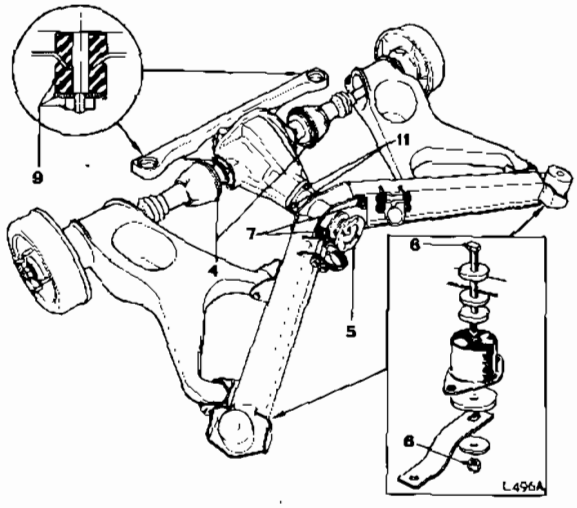


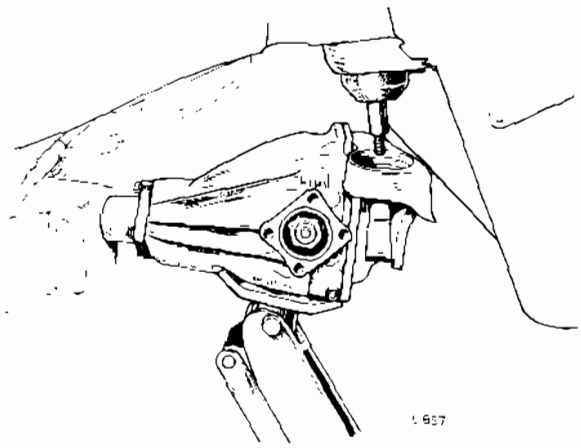
INION EXTENSION HOUSING

-Remove and refit **51.25.37**

emoving

1. Raise rear of car and support body on stands.
2. Remove rear intermediate exhaust pipes and tail pipes.
3. Disconnect hand brake cable at rear backplate.
4. Disconnect drive shafts at inner flanges.
5. Disconnect propeller shaft rear flange and slide propeller shaft fully forward on its splines.
6. With jack supporting hypoid casing, slacken the nuts and long bolts securing sub-frame front mountings to body.
7. Remove the nuts and bolts securing sub-frame front members to pinion extension housing.
8. Detach sub-frame front members from pinion extension housing.
9. Remove nuts and washers and the lower mountings from hypoid casing rear bracket.
10. Carefully lower hypoid casing.
11. Remove four bolts and washers securing pinion extension housing to hypoid casing.
12. Withdraw pinion extension housing.





Refitting

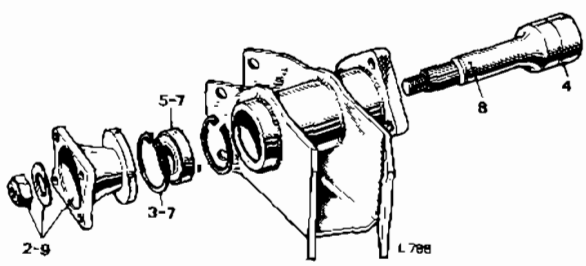
13. Reverse instructions 1 to 12.

PINION EXTENSION HOUSING

—Overhaul **51.25.49**

Dismantling

1. Remove extension housing. 51.25.37.
2. Remove nut and washer from quill shaft flange and withdraw flange.
3. Remove outer circlip from bearing.
4. Insert a drift into hollow end of quill shaft and tap out bearing and quill shaft.
5. Extract bearing from quill shaft and withdraw quill shaft rearwards.
6. Examine all components and renew as necessary.



Reassembling

7. Fit bearing to extension housing and install outer circlip.
8. Fit quill shaft to bearing.
9. Fit flange, plain washer, and Nyloc nut.
10. Tighten nut.

STEERING OPERATIONS

**General description
—Power steering system 57.00.01
—Hydraulic pump 57.00.02
—Control valve/pinion assembly 57.00.03
—Adwest unit 57.00.04
—Alford and Alder unit 57.00.05
—Identification and interchangeability 57.00.06**

Control valve and pinion
—port inserts—remove and refit 57.10.24
—remove and refit 57.10.19
—top seal—remove and refit 57.10.23

Hydraulic pump
—drive belt—adjust 57.20.01
—drive belt—remove and refit 57.20.02
—overhaul 57.20.20
—remove and refit 57.20.14
—reservoir—remove and refit 57.15.08

Steering-column
—adjustment clamp—remove and refit 57.40.07
—intermediate shaft—remove and refit 57.40.15
—lock and ignition switch—remove and refit 57.40.31
—mast—remove and refit 57.40.06
—nacelle—remove and refit 57.60.04
—remove and refit 57.40.01
—support tubes—remove and refit 57.40.16

Steering rack
—adjust 57.10.13
—feed hose—remove and refit 57.15.20
—overhaul 57.10.07
—remove and refit 57.10.01
—return hose—remove and refit 57.15.22

Steering rack and control valve
—bleeding 57.15.02
—testing 57.15.01

Steering-wheel
—hub—remove and refit 57.60.02
—remove and refit 57.60.01

Tie-rod
—ball joint—inner—remove and refit 57.55.03
—ball joint—outer—remove and refit 57.55.02
—remove and refit 57.55.01

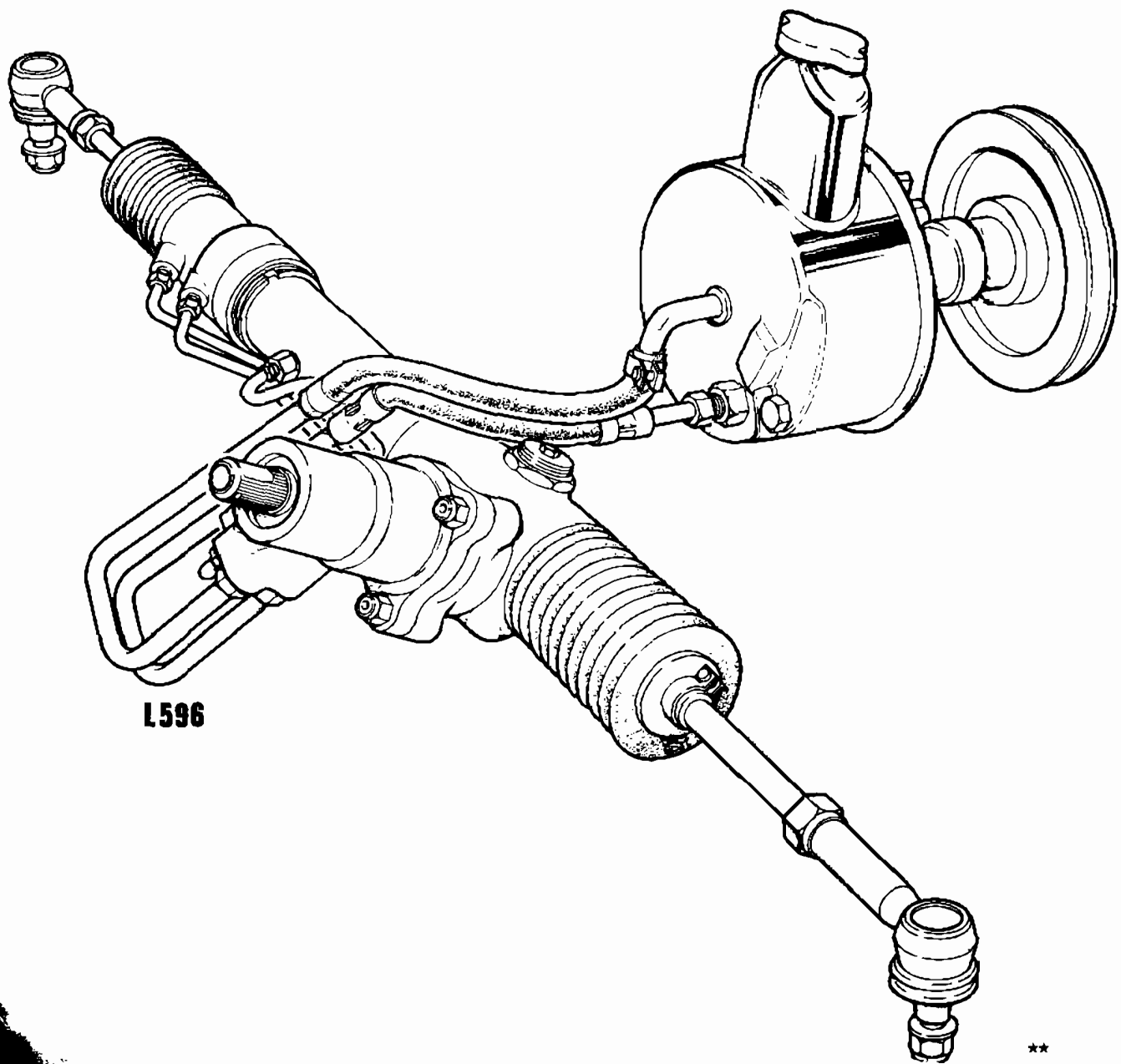
**THE POWER STEERING SYSTEM 57.00.01

The power steering system provides hydraulic assistance to reduce driver effort to a minimum. Since the energy needed to marginally deflect the front road wheels at speed is considerably less than is necessary to apply full lock to a stationary car, the degree of assistance must be variable and related to the frictional resistance between tyre and road surface. In addition it is necessary to ensure that the effort of turning the steering-wheel is not reduced to such negligible limits that the 'feel' of the car is lost, i.e. the effort required to steer the car must not be entirely removed. The power steering system therefore provides variable, sensitive assistance to deflect the front road wheels as required.

The power steering system comprises a rack-type steering mechanism which incorporates a double-acting hydraulic ram, a control/valve pinion assembly, a combined hydraulic pump and fluid reservoir, and connecting supply and return hoses.

The vane-type hydraulic pump which is belt-driven from the engine crankshaft pulley delivers a continuous supply of oil to the steering rack control valve. The control valve is the intermediate link between the steering-wheel and the rack pinion. As its name suggests, the control valve is the instrument through which the circulating oil is directed to change either side of the steering race ram chamber or to permit free return to the reservoir.

Power assistance is provided only when the engine and therefore the hydraulic pump is running. When the engine is stationary, or if for any reason the hydraulic system is inoperative, steering is performed by direct mechanical means.



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57.00.02

THE HYDRAULIC PUMP

Description

A combined hydraulic pump and fluid reservoir unit is secured to the engine by two brackets and is belt-driven from the engine crankshaft pulley. Two flexible hoses—one delivery, one return—connect it to a control valve on the steering rack. A rotor with 10 floating vanes is fitted to the pump shaft and is enclosed by an elliptical ring which provides two diametrically opposed pumping chambers. Fitted front and rear of the rotor are, respectively, a thrust plate and a pressure plate. These plates employ dowel pins to align them with the elliptical ring and pump body. A tapered compression spring assisted by pump output pressure, maintains controlled loading of the pressure plate. An end plate located by a circlip and sealed by an 'O' ring provides a division between pump and reservoir. Below the rotor, from which it is supplied, is a combined flow valve/relief valve, and the pump delivery union. Oil, returned from the rack control valve is fed directly to the reservoir.

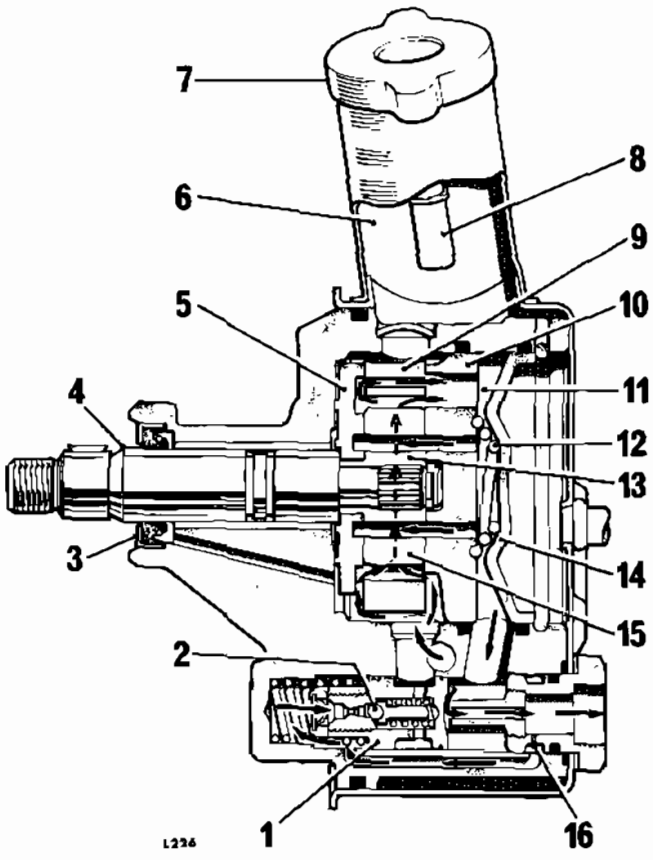
Operation

Oil, from the reservoir, is admitted via a drilling in the pump body to the underside of the pump rotor, from whence, through portings between the rotor and thrust plate and also the rotor and pressure plate, it is admitted to the pumping chambers. From the pumping chambers the oil is expelled to the discharge chamber, and, via a drilling in the pump body, to the pump outlet union. Pressurized oil in the discharge chamber is also admitted to the vane roots, thus ensuring that the vane tips follow the contours of the elliptical ring.

At the pump outlet union the oil passes via a slot on the piston crown of the flow/relief valve and is delivered to the rack control valve.

The flow/relief valve serves a dual function, namely to provide escape for pressurized oil when steering demands require limitation (for example, when the road wheels are on full lock and excessive pressure would overload the rack seals), and also to ensure that oil flow is adequate to pressurize the rack chamber as required.

continued



1. Flow valve
2. Pressure relief valve
3. Shaft seal
4. Shaft
5. Thrust plate
6. Reservoir housing
7. Filler cap
8. Dipstick
9. Elliptical ring
10. Pressure plate
11. Discharge cavity
12. Spring
13. Rotor hub
14. End plate
15. Rotor vane
16. Orifice

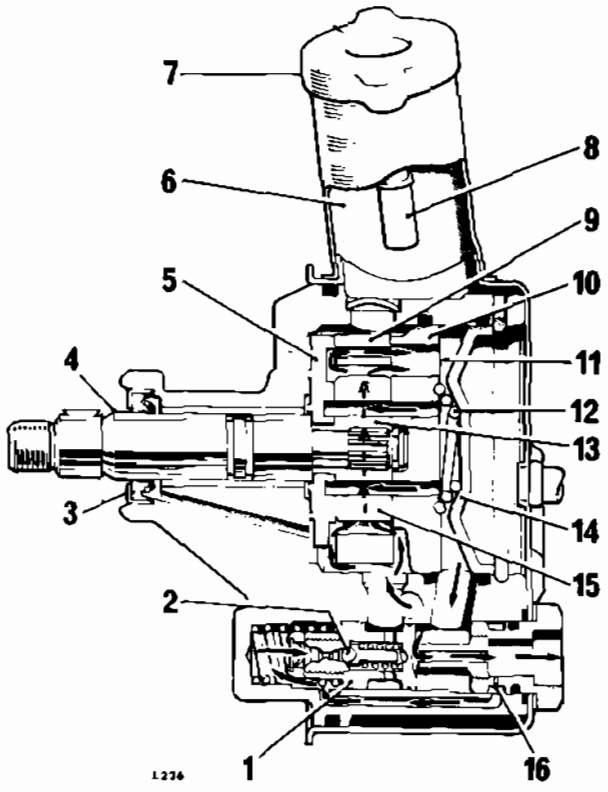
The flow/relief valve comprises a piston, the crown of which is exposed to pump pressure, the other end bears against a compression spring. Within the piston is a spring-loaded ball type relief valve. The need for high rack chamber pressure is greatest when manœuvring or parking and usually coincides with reduced pump speeds and high frictional resistance between tyre and road due to zero or low rolling speed. The flow/relief valve therefore has to cater for a range of flow and pressure variations ranging from high volume flow and no steering demands (vehicle travelling in straight line at high speed), and low volume flow and maximum steering demands (vehicle stationary, engine idling, full lock).

Pump discharge pressure, acting on the piston of the flow valve, tends to displace the piston against the action of its compression spring, thereby increasing oil flow through the outlet union, to the rack control valve, or, when the piston is displaced sufficiently, to uncover the escape port, allowing oil to return to the reservoir. This latter position is the normal working position of the piston, as discharge from the pump is always in excess of power steering requirements and oil is constantly being circulated externally. However, oil admitted to the outlet union also has access, via an orifice and transfer passage, to the spring chamber of the flow piston where it is further assisted by the spring.

Since piston area, front and rear, are equal, given hydraulic balance, the spring will oppose pump pressure and resist piston displacement, but since movement of the piston towards the outlet union must create restriction in oil flow and consequent pressure increase, the piston adjusts bleed-off or escape to the reservoir to match the pressure and flow requirements of the rack control valve.

Piston displacement is also influenced by the orifice in the transfer passage to the spring chamber, as its presence introduces a delay factor in pressure balance between spring chamber and piston crown.

The interaction of these forces causes the flow piston to be hydraulically self-compensating to match pump pressure with steering power requirements, and by means of the relief valve, to control pressure delivery within 52·73 to 59·76 kgf/cm² (750 to 850 lbf/in²).



1. Flow valve
2. Pressure relief valve
3. Shaft seal
4. Shaft
5. Thrust plate
6. Reservoir housing
7. Filler cap
8. Dipstick
9. Elliptical ring
10. Pressure plate
11. Discharge cavity
12. Spring
13. Rotor hub
14. End plate
15. Rotor vane
16. Orifice

THE CONTROL VALVE/PINION ASSEMBLY 57.00.03

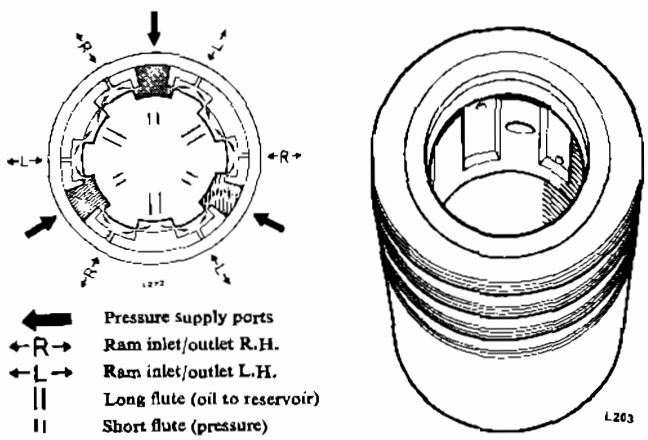
There are two types of control valve/pinion assembly. Models up to commission number LD 319 (Right-hand steering) and LD 410 (Left-hand steering) were fitted with an Adwest unit; subsequent models are fitted with an Alford and Alder unit.

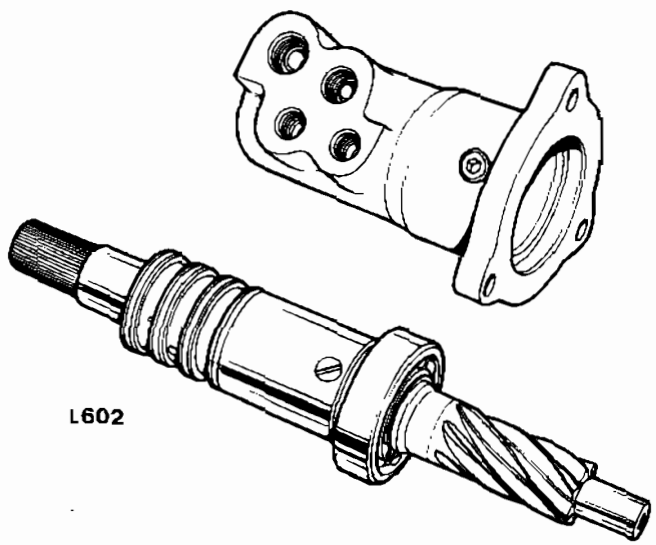
ADWEST UNIT 57.00.04

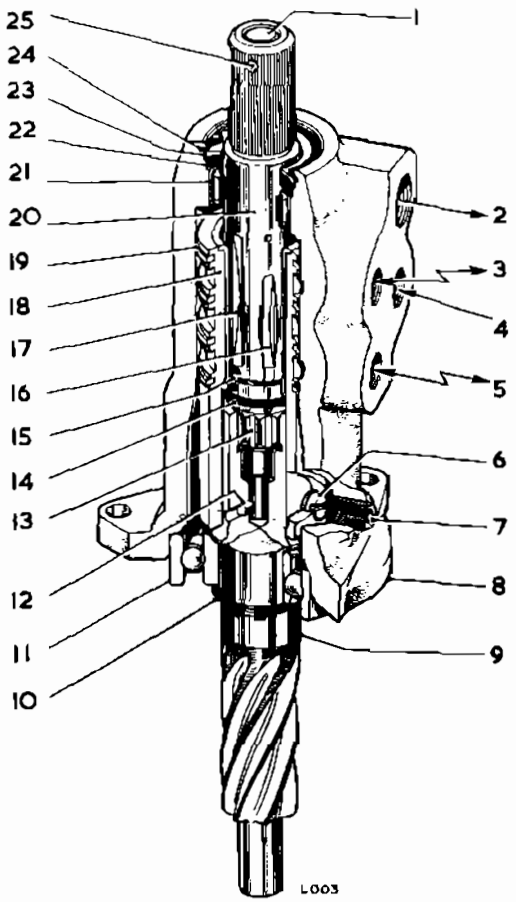
The cut-away illustration shows the construction and component parts. The spool shaft (20) and the pinion shaft (9) are connected by a torsion bar (1) and also by splines (13). The splines (13) have sufficient tolerance or backlash to enable slight (approx. 7°) rotation of the spool shaft (20) before the splines transmit direct mechanical torque to the pinion shaft (9). The spool shaft and pinion shaft are also connected by a torsion bar (1) which is pinned at its ends to each shaft.

The spool sleeve (18) is located by an eccentric screw (6) which is screwed to the pinion shaft. Thus, while movement imparted to the steering-wheel results in rotation of the spool shaft (20), spool sleeve (18) and the pinion shaft (9), the spool shaft, due to the backlash provided in the splines and to the action of the torsion bar always leads in relation to the other two components. The significance of this pre-movement becomes apparent on examination of the spool cylinder and spool shaft.

The spool sleeve (18) has three external annular grooves and four sealing rings; internally there are six vertical channels at 60°. Three 120° drillings in the upper annular groove connect the upper extremity of the three vertical channels, and three 120° drillings in the lower annular groove connect with the lower extremities of three alternate vertical channels. The centre annular groove has three drillings at 120° which penetrate the sleeve between each pair of vertical channels. The spool shaft (20) has six machined flutes, three long and three short, alternately spaced at 60°. The relationship of the spool shaft flutes and the vertical channels of the spool sleeve controls the flow of oil from the pump to the rack as indicated in the oil flow diagram.







1. Torsion bar
2. Fluid outlet—to pump
3. Fluid outlet/inlet—to and from rack
4. Fluid inlet—from pump
5. Fluid outlet/inlet—to and from rack
6. Eccentric screw (must not be disturbed)
7. Plug
8. Housing—control valve
9. Pinion shaft
10. Circlip
11. Ball race
12. Pin—torsion bar to pinion shaft
13. Splines (mechanical drive —no power assistance)
14. Circlip
15. Damper seal
16. Short flute
17. Long flute
18. Spool sleeve
19. Sealing ring—spool sleeve
20. Spool shaft
21. Roller bearing
22. Top seal
23. Washer—top seal
24. Circlip
25. Pin—torsion bar to spool shaft

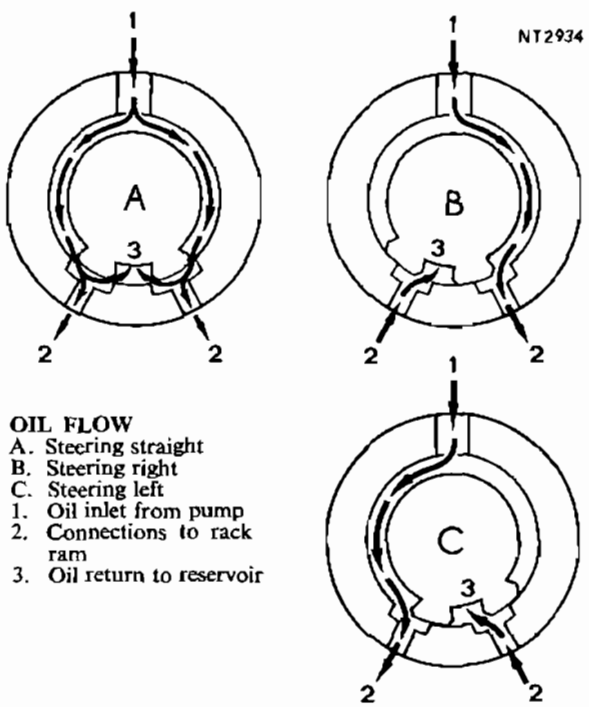
ALFORD AND ALDER UNIT 57.00.05

The cut-away illustration shows the construction and component parts. The spool shaft (12), spool sleeve (11) and the pinion shaft (7) are connected by dogs (inset). The dogs (inset) positively locate the spool sleeve to the pinion shaft but provide sufficient tolerance or backlash to permit slight (approximately 11°) rotation of the spool shaft in relation to the spool sleeve before they transmit direct mechanical torque to the pinion shaft. The spool shaft and pinion shaft are also connected by a torsion bar (14) which is pinned at its ends to each shaft. Thus, while movement imparted to the steering-wheel results in rotation of the spool shaft, spool sleeve and pinion shaft, the spool shaft, due to the backlash provided in the dogs and to the action of the torsion bar, always leads in relation to the other two components. The significance of this pre-movement becomes apparent on examination of the spool sleeve and spool shaft.

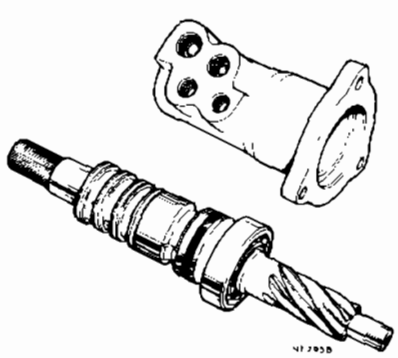
The spool sleeve (11) has three external annular grooves and four sealing rings; internally there are two adjacent vertical channels. A drilling in the upper annular groove connects the upper extremity of one vertical channel. The lower annular groove is drilled to connect the other vertical channel at its lower extremity. A drilling in the external annular groove penetrates the spool at a point opposite the two vertical channels.

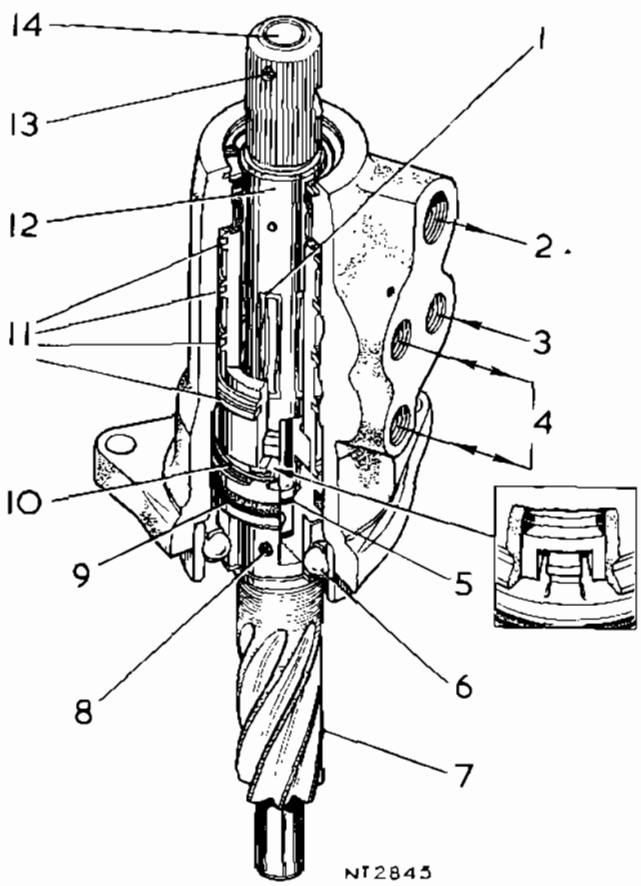
The spool shaft has three machined flutes of equal length. The two outer flutes are connected by a machined groove. The central flute is drilled to connect through the hollow shaft with six equally spaced radial drillings above the vertical flutes.

The relationship of the spool shaft flutes and the vertical channels of the spool sleeve controls the flow of oil from the pump to the rack as indicated in the oil flow diagram.



OIL FLOW
A. Steering straight
B. Steering right
C. Steering left
1. Oil inlet from pump
2. Connections to rack ram
3. Oil return to reservoir



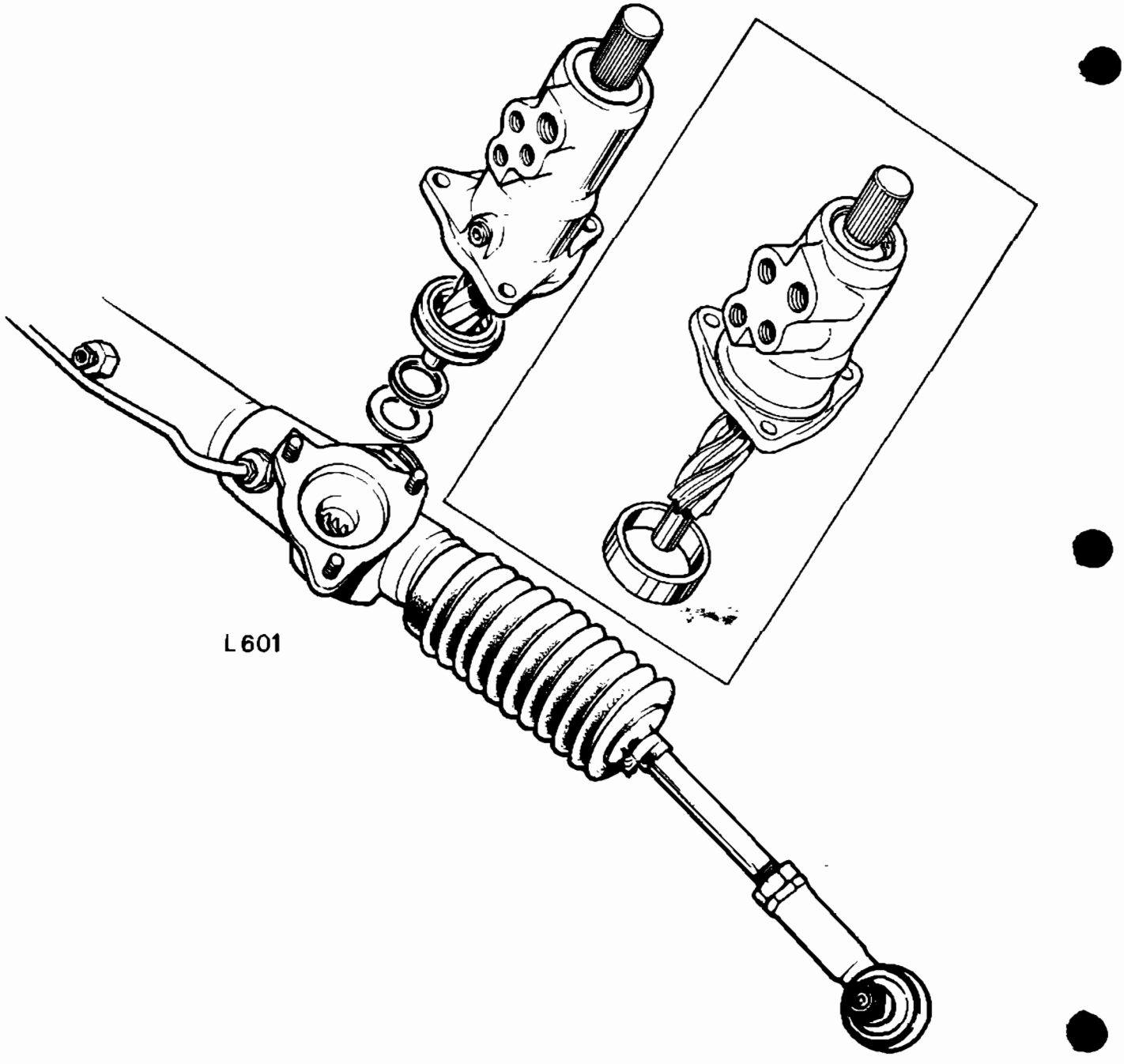


1. Flutes—spool shaft
2. Fluid outlet—to pump reservoir
3. Fluid inlet—from pump
4. Outlet/inlet ports—to and from rack
5. 'O' ring
6. Ball race
7. Pinion
8. Pin—torsion bar
9. 'O' ring
10. Circlip
11. Sealing rings—spool sleeve
12. Spool shaft
13. Pin—torsion bar
14. Torsion bar

IDENTIFICATION AND INTERCHANGEABILITY
57.00.06

The Alford and Alder control valve/pinion assembly is distinguishable from its Adwest counterpart in that the housing body is shorter, there is no plug fitted at the base of the body above the mounting flange and a plastic dust cover encloses the top of the housing.

Both types are interchangeable, but it is important to note that in the Adwest unit a seal assembly is fitted in the rack below the pinion shaft roller bearing: in the Alford and Alder unit a spacer ring is fitted below the roller bearing.



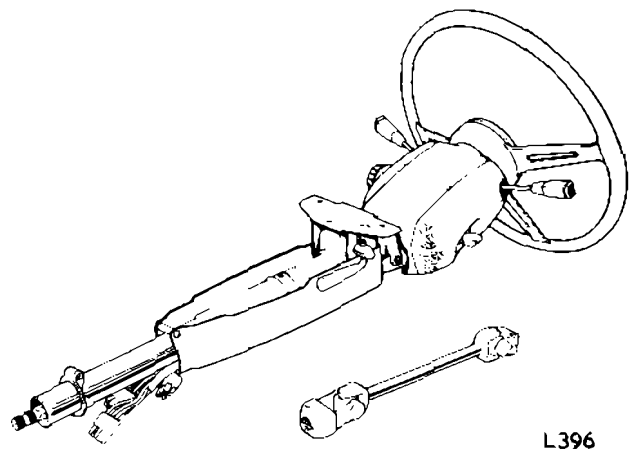
STEERING-WHEEL AND COLUMN 57.00.07

The steering-column comprises an upper shaft and a lower shaft connected by a needle-bearing universal joint. The upper shaft is supported by a housing to which the trafficator, windscreen wiper control stalks, and a steering lock are fitted. The lower shaft is telescopic and is enclosed and supported by a two-piece tubular housing. In the event of impact due to collision, both the lower shaft and its housing will collapse and prevent the steering-wheel being thrust towards the driver.

An intermediate shaft connects the steering-column lower shaft and the rack pinion shaft via splined universal joints. Both universal joints are lubricated on assembly and require no attention in service.

Steering-column adjustment for both axial movement (102 mm, 4 in), and rake (51 mm, 2 in), is provided by a single lever clamp located in front of the nacelle.

The 407 mm (16 in) three-spoke steering-wheel incorporates a padded rim and boss. Four turns are required from lock to lock.



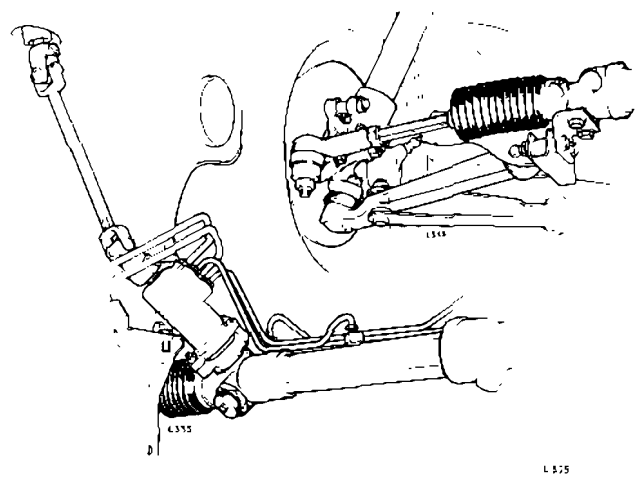
L396

POWER STEERING RACK

—Remove and refit 57.10.01

Removing

1. Disconnect the tie-rod ball joints from the steering-arms.
2. Remove the pinch bolt connecting the intermediate shaft lower universal joint to the control valve pinion shaft.
3. Disconnect the flexible hydraulic pipes at the control valve.
4. Remove four bolts securing the rack to the front cross-member.
5. Withdraw the rack.



L575

Refitting

6. Reverse the operations in 1 to 5.
7. Bleed the steering system. 57.15.01.

POWER STEERING RACK

—Overhaul **57.10.07**

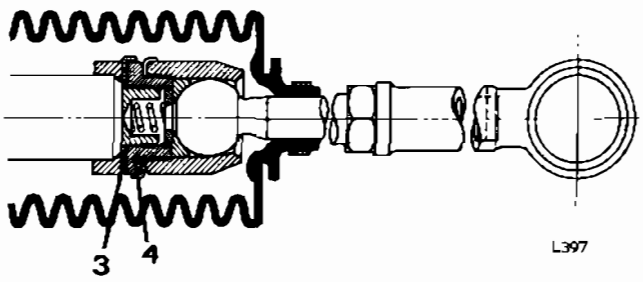
Service tools: S355

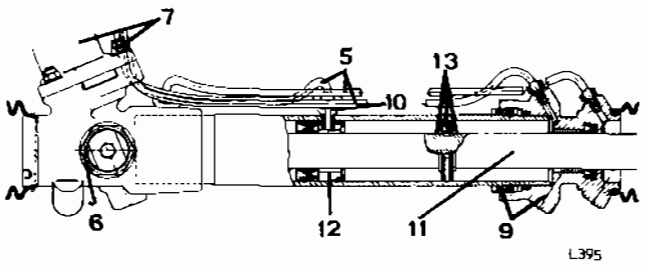
Dismantling

1. Remove the rack complete from vehicle. 57.10.01.
2. Slacken the clips securing bellows seals and slide bellows seals along the tie-rods to expose the rack shaft ends.
3. Wipe rack shaft ends clear of grease and straighten tab ends of innermost lock washers.
4. Unscrew tie-rod seats from rack shaft.
5. Disconnect unions connecting rack pipes to control valve and rack chambers and remove pipes.
6. Slacken locknut on rack plunger adjusting screw and withdraw adjusting screw, spring, and plunger.
7. Remove the three Nyloc nuts and washers securing control valve flange to rack and withdraw control valve and gasket.
8. Withdraw pinion seal housing and washer from rack.
9. Using Tool No. S355, release screwed ring securing end-housing to rack cylinder and withdraw end-housing.
10. Remove union from centre of rack cylinder.
11. Withdraw rack shaft complete with piston in direction of end-housing.

NOTE: This operation invariably results in the rack teeth being drawn through the lip-type seal in the cylinder sleeve. Renew all seals and 'O' rings.

12. Withdraw cylinder sleeve from bore of cylinder.
13. Remove circlips and extract piston from rack shaft. Take care not to score or scratch rack shaft.





Reassembling

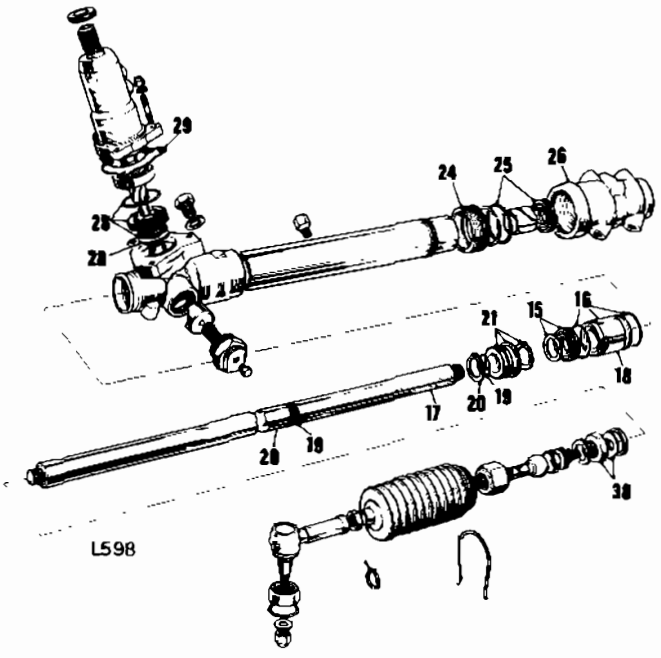
14. Thoroughly clean all components.
15. Fit new seal and nylon backing ring to cylinder sleeve.

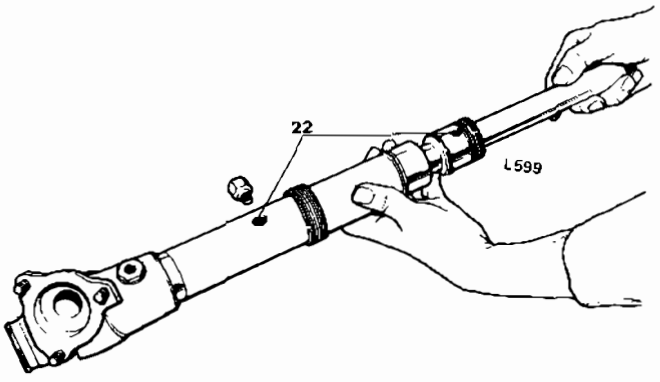
NOTE: Seal lip must be fitted adjacent to tapped locating hole and square edge of nylon ring must butt against seal.

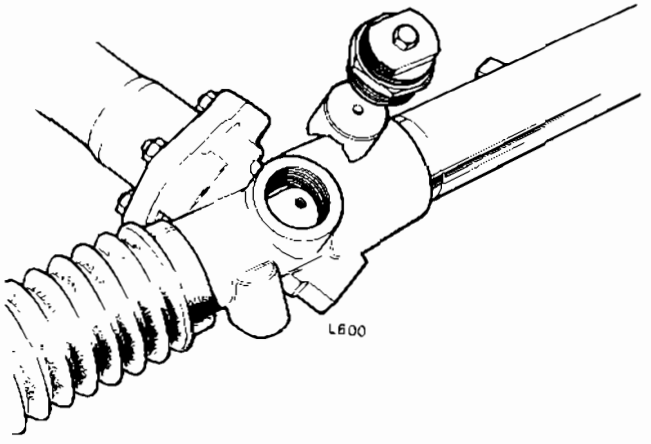
16. Fit new 'O' rings to cylinder sleeve and lubricate cylinder bore with hydraulic oil.
17. Lubricate seal lip and enter cylinder sleeve (seal leading) over rack shaft at opposite end to rack teeth.
18. Carefully slide cylinder sleeve (seal end first) along plain end of rack shaft beyond location of piston. **Do not** slide cylinder sleeve over rack teeth.
19. Fit piston inner circlip to rack shaft, taking care not to score rack shaft.
20. Fit piston inner 'O' ring to rack shaft.

continued

21. Fit piston ring to piston, slide piston into position on rack shaft and secure with circlip, taking care not to score shaft.
22. Align tapped hole in cylinder sleeve with countersunk hole in cylinder and carefully slide sleeve and rack shaft into cylinder.
23. Through countersunk hole in cylinder, locate tapped hole in cylinder sleeve.
24. Ensuring end-cover securing ring is at open end of cylinder, smear conical seat of union with hydraulic sealing compound, and fit and tighten union.
25. Fit a new lip-type seal (lip of seal towards cylinder bore), and 'O' ring, to end-cover.
26. Lubricate seal lip and slide end-cover into position.
27. Align mounting feet and secure end-cover by tightening screwed retaining ring (Tool No. S355).
28. Fit lip seal and 'O' ring to retainer. Fit washer into recess in pinion housing and fit retainer (lip seal downwards).
29. Fit new gasket to control valve flange.
30. Locate rack shaft in cylinder so that rack teeth are visible through control valve flange and are aligned to permit engagement of pinion.
31. Carefully enter pinion through seal and engage rack teeth, locating control valve over studs. Fit and tighten the three Nyloc nuts.
32. Rotate pinion until rack is centralized, i.e. the dimple on rack shaft is visible through the thrust plunger aperture.
33. Fit thrust plunger, spring, screwed plug, and locknut to rack housing.
34. Remove the small hexagonal plug from the screwed plug, and using a dial gauge tighten screwed plug until plunger end-float (i.e. side movement of the rack shaft) does not exceed 0·178 mm (0·007 in). This measurement must not be confused with backlash or axial movement.
    Tighten locknut.
35. Fit grease nipple to screwed plug, and grease rack.
36. Remove grease nipple and replace hexagonal plug.
37. Fit new end washer complete with 'D' plates to rack (recessed side of washer towards rack).
38. Fit and tighten tie-rod inner ends to correct torque. Both tie-rod inner ends should be tightened simultaneously to prevent stress to pinion. Secure by bending over lock tabs on 'D' plates, care being taken not to disturb ball housing tabs. Check ball joints for free articulation after assembly to rack.
39. Grease rack ends and inner ball ends, slide bellows into position, and secure with clips.
40. Fit Bundy tubing to control valve and rack housing.







POWER STEERING RACK

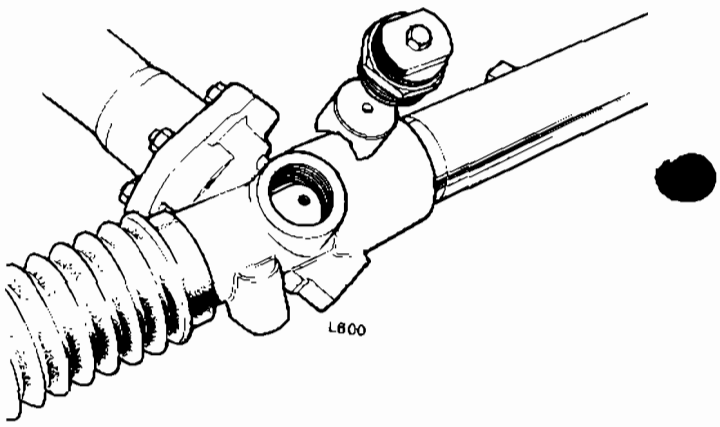
—Adjust **57.10.13**

Adjustment to the power steering rack is confined to ensuring that fore and aft movement (not to be confused with axial movement), of the rack shaft is within the limits 0·0762 to 0·178 mm (0·003 to 0·007 in) over seven central teeth of the rack shaft.

Adjusting

Check and adjust rack plunger movement as follows:

1. Remove the small hexagonal plug from plunger adjusting screw.
2. Ensure that rack shaft is approximately in a central position, but do not align central dimple in rack shaft with drilling in plunger adjusting screw.
3. Using a dial gauge and a long stylus, insert stylus through drilling in adjusting screw, allowing stylus to contact rack shaft. Zero the dial gauge.
4. Gently rock rack shaft towards front and rear of car observing readings on gauge. To increase plunger movement slacken locknut and rotate adjusting screw anti-clockwise; to decrease plunger movement rotate adjusting screw clockwise.
5. When required adjustment is obtained tighten locknut, while at the same time preventing the adjusting screw from turning.
6. Re-check rack shaft movement before removing dial gauge and replacing hexagonal plug.

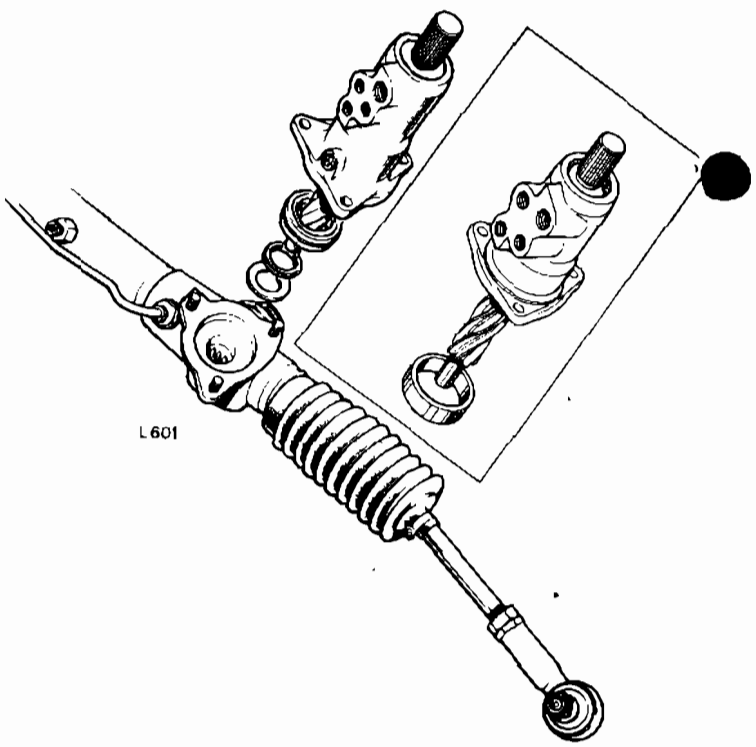


*CONTROL VALVE/PINION ASSEMBLY

—Remove and refit **57.10.19**

Removing

1. Remove the rack from the car. 57.10.01.
2. Disconnect the rack pipes from the control valve.
3. Slacken the rack plunger locknut and slacken the plunger adjusting screw.
4. Remove the three nuts and washers securing the control valve housing to the rack.
5. Withdraw the control valve/pinion assembly.



Refitting

6. Fit the control valve/pinion assembly to the rack using a new gasket. (When inserting the pinion into the rack care must be taken to avoid damaging the pinion seal—Adwest unit only.)
7. Fit and evenly tighten the three securing nuts.
8. Connect the rack pipes to the control valve housing.
9. Adjust the rack plunger. 70.10.13.
10. Fit the rack to the car. 57.10.01.
11. Bleed the system. 57.15.02.**

** CONTROL VALVE TOP SEAL

—Remove and refit **57.10.23**

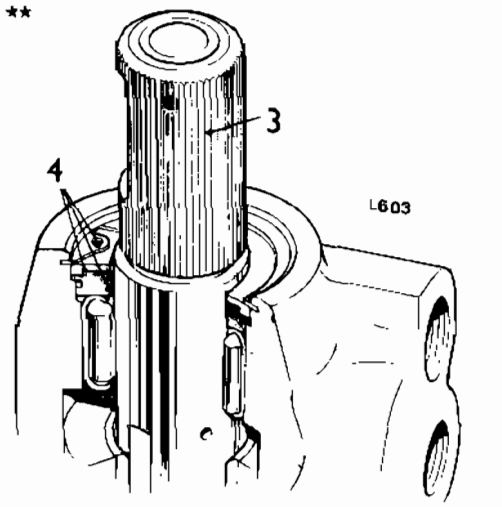
Removing

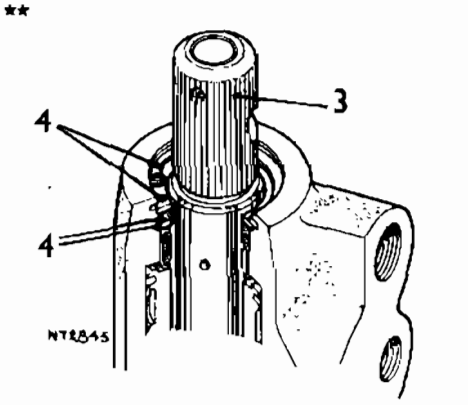
1. Remove the rack from the car. 57.10.01.
2. Remove the control valve from the rack. 57.10.19.
3. Carefully press or tap out the pinion shaft and withdraw the spool sleeve and pinion assembly from the housing.
   NOTE: Pressure must not be applied to the torsion bar. Do not handle or disturb the special sealing rings on the spool sleeve. The eccentric screw which locates the spool sleeve in relation to the spool shaft on the Adwest unit must not be disturbed. Disregard of these instructions may result in a requirement for a new control valve assembly.
4. Remove the circlip, plastic washer and the oil seal from the top of the control valve housing. On Alford and Alder units a plastic washer is fitted below the oil seal.

Refitting

5. Renew and fit the oil seal, plastic washer(s) and circlip.
6. Fit the spool sleeve and shaft to the housing.
7. Fit the control valve assembly to the rack. 57.10.19.
8. Adjust the rack plunger. 57.10.13.
9. Fit the rack to the car. 57.10.01.
10. Bleed the system and top up the reservoir. 57.15.01.

**





CONTROL VALVE PORT INSERTS

—Remove and refit **57.10.24**

Inserts are fitted to the inlet and return ports of the control valve housing. These inserts can be damaged due to overtightening of the flexible hose unions.

Removing

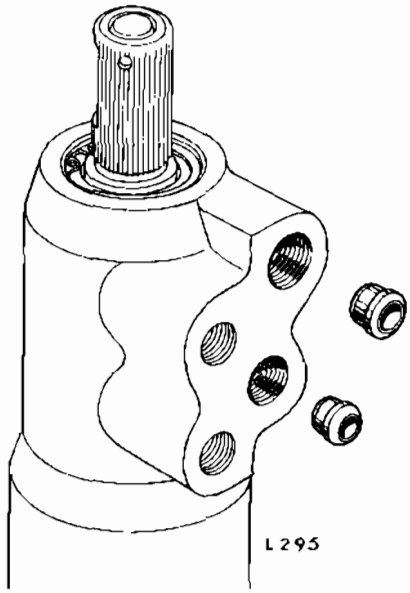
1. Using an 'Easi-Out' extractor, withdraw old inserts from control valve housing.

Refitting

2. Carefully press new insert into position in control valve housing.

NOTE: Scrupulous cleanliness must be observed as the entry of swarf or grit can render the control valve inoperative.

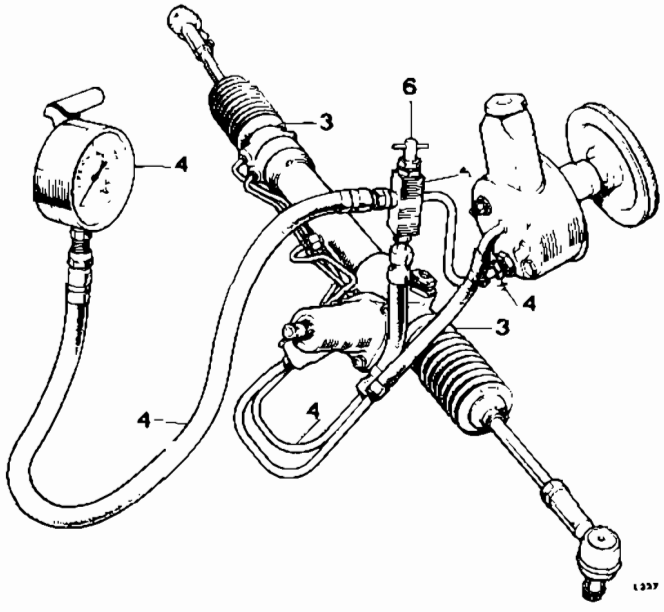
IMPORTANT: The insert in the control valve pressure inlet port is also a restrictor. This insert must be chosen to suit the hydraulic pump (refer Parts List).



POWER STEERING SYSTEM

—Testing 57.15.01

Service tools: Tool No. JD10 and adaptor 10-2



Should steering defects arise in service, examination is advised before attributing blame to the power steering equipment. Heavy steering and pull to one side may be caused by mechanical faults; wheel track, tyre treads, tyre pressures, wheel bearings, steering geometry, and wear and stiffness in linkage must first be checked.

Testing

1. Check reservoir level and examine power steering units and connections for leaks. All leaks must be rectified before attempting to test system.
2. Check pump drive belt for condition and tension.
3. Release rubber bellows from rack-ends and examine for fluid leakage.
4. Fit test gauge (JD10 and adaptor 10-2) to pump outlet line.
5. Ensure all air is exhausted from the circuit, the oil level in the reservoir is correct, and oil is at working temperature.
6. With test-cock open and engine running, gently turn steering-wheel to left and right lock whilst observing gauge. A pressure of 52·73 to 59·76 kg/cm² (750 to 850 lb/in²) should be recorded in both cases. If pressure within this range is not obtained, or pressure imbalance is recorded, a fault exists in the system.
7. To determine if the fault is in the rack circuit or in the pump, close the test-cock for a period not exceeding five seconds. If the gauge fails to register 52·73 to 59·76 kg/cm² (750 to 850 lb/in²) the pump is inefficient and the pump relief valve/flow valve should be examined/renewed as necessary.
8. Repeat above test after renewing relief/flow valve and bleeding the system. If the pump still fails to achieve 52·73 to 59·76 kg/cm² (750 to 850 lb/in²), attention to the pump, or a new exchange unit is required.
9. If pump delivery is satisfactory and low pressure or marked imbalance exists, the fault must be in the rack control valve, or be caused by internal leakage in the rack cylinder.
10. Remove rack cylinder pipe unions from rack control valve body. Using suitable plugs, seal rack cylinder ports in control valve body.

continued

11. With engine idling, turn steering-wheel gently to left and right, observing gauge reading. **DO NOT** hold wheel in either direction for periods exceeding five seconds. Check that pressures of 52·73 to 59·76 km/cm² (750 to 850 lb/in²) are obtained in both directions.

NOTE: Since fluid is now not being supplied to the rack, the steering will naturally be heavier. It is quite unnecessary to attempt to impart movement to the road wheels since the object of this test is merely to record pressure obtained at maximum torsion bar deflection.

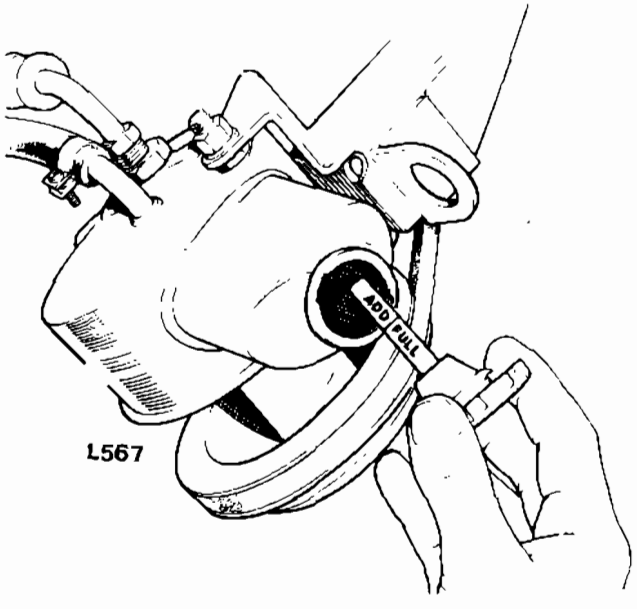
12. If the control valve is found satisfactory, the fault must be within the rack.

POWER STEERING SYSTEM

—Bleeding 57.15.02

The hydraulic steering system is self-bleeding, but care must be taken to ensure that at no time is the pump reservoir allowed to empty or become dangerously low. This is especially important where both the pump and the rack have been newly installed.

When the hydraulic system has been disturbed, proceed as follows:



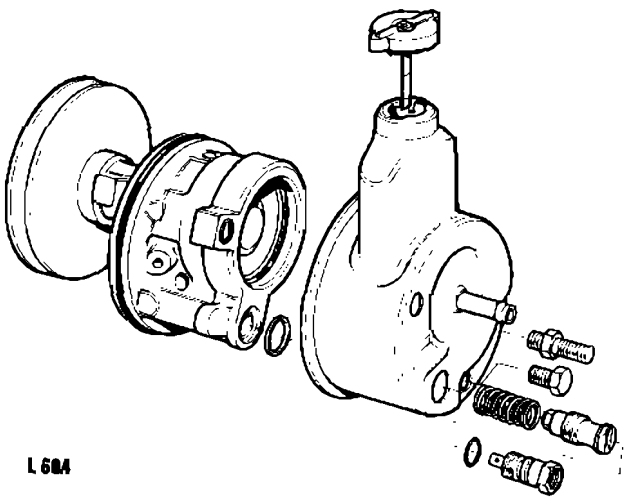
Testing

1. Ensure all hydraulic connections are tight.
2. Fill hydraulic reservoir to high level mark on the dipstick.
3. Place road wheels in straight-ahead position, and with drive belt slackened or removed, rotate pulley by hand to prime system.
4. Fit and adjust drive belt.
5. Check and top up hydraulic reservoir as necessary.
6. Start engine and allow to idle.
7. Turn driving wheel to full lock and return wheel to straight-ahead position.
8. Check, and top up reservoir.
9. Turn driving wheel to opposite lock and return to straight-ahead position.
10. Again check reservoir level.
11. Turn wheels from lock to lock several times to permit air to be fully exhausted from system.
12. Return wheel to straight-ahead position and give final check to reservoir level.

NOTE: While repeated turning of the steering-wheel when the car is stationary will do the steering mechanism and hydraulic units no harm, the effect on tyre treads is not so favourable. When testing or bleeding the power steering, the road wheels should be rotating slowly to minimize tyre scrub.

STEERING OIL RESERVOIR

—Remove and refit **57.15.08**


L 604

Removing

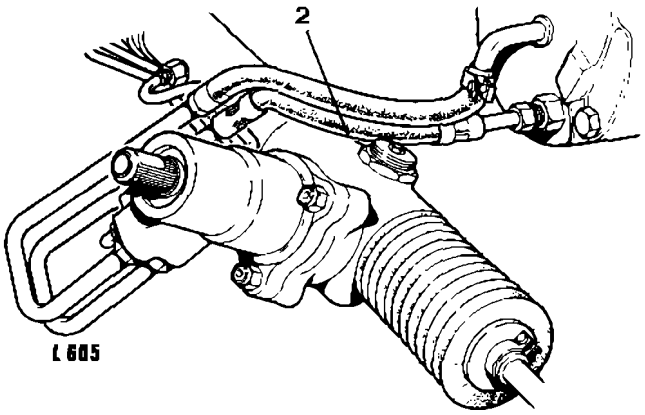
1. Remove hydraulic pump complete with mounting bracket from engine. 57.20.14.
2. Remove the nut and spring washer securing bracket rear half to pump reservoir and lift off bracket rear half.
3. Remove the bracket mounting stud from reservoir.
4. Remove the pressure outlet union from reservoir.
5. Remove bolt securing reservoir to pump body.
6. Withdraw reservoir.

Refitting

7. Renew 'O' ring on pump body and the three rubber insert rings between pump body and reservoir.
8. Offer reservoir to pump body and press into position, ensuring mounting holes are aligned and insert rings are not disturbed.
9. Fit top pivot stud, pressure outlet union, and bolt.
10. Fit mounting bracket rear half to mounting stud and fit spring washer and nut.
11. Fit pump and bracket to engine.
12. Engage drive belt on pump pulley, adjust tension and tighten bracket bolts and nuts.
13. Fit flexible hose to pump.
14. Top up reservoir and bleed system.

STEERING-RACK FEED HOSE

—Remove and refit **57.15.20**



L 605

Removing

1. Thoroughly clean surrounding flexible hose unions at pump and control valve.
2. Disconnect unions at pump and control valve.

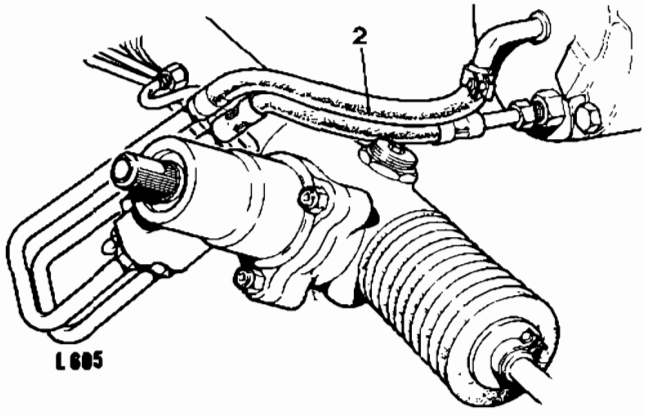
NOTE: To minimize fluid spillage the reservoir may first be partially drained by siphon but care must be taken not to introduce grit or dust to the reservoir.

Refitting

3. Reverse instructions 1 and 2.
4. Top up reservoir and bleed system.

STEERING-RACK RETURN HOSE

—Remove and refit **57.15.22**



Removing

1. Thoroughly clean area surrounding flexible hose unions at pump and control valve.
2. Disconnect unions at pump and control valve.

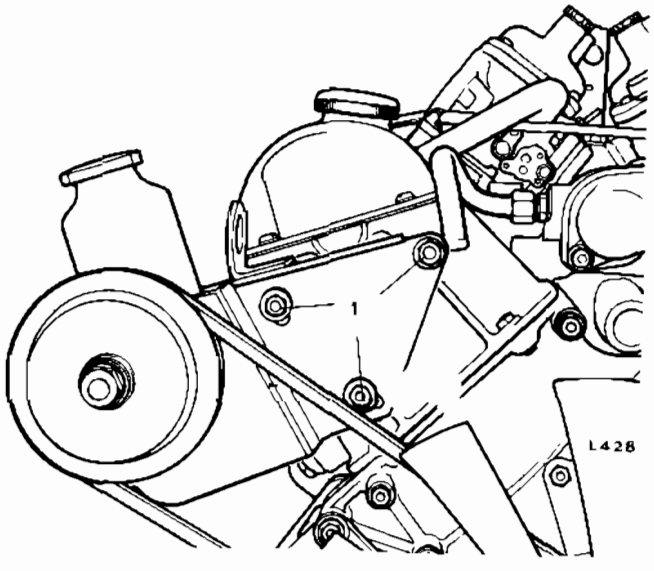
NOTE: To minimize fluid spillage the reservoir may first be partially drained by siphon but care must be taken not to introduce grit or dust to the reservoir.

Refitting

3. Reverse instructions 1 and 2.
4. Top up reservoir and bleed system.

STEERING PUMP DRIVE BELT

—Adjust **57.20.01**



Adjusting

1. Slacken the three bolts securing pump bracket to engine timing case.
2. Pivot pump and bracket to obtain required belt tension.

NOTE: Excessive belt tension will shorten belt life and overload the pump shaft bearing.

STEERING PUMP DRIVE BELT

—Remove and refit **57.20.02**

Removing

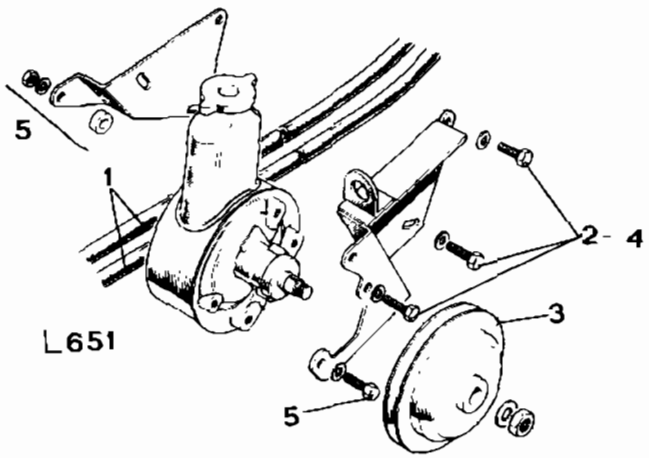
1. Slacken the pump bracket mounting bolts. Pivot pump and bracket to release belt tension.
2. Detach belt from pump pulley and pass belt through Torquatrol fan blades.

Refitting

3. Pass belt through Torquatrol fan blades and fit belt to fan pulley and hydraulic pump pulley.
4. Pivot hydraulic pump and mounting bracket to adjust belt tension.
5. Tighten mounting bracket bolts.

STEERING PUMP

—Remove and refit **57.20.14**



Removing

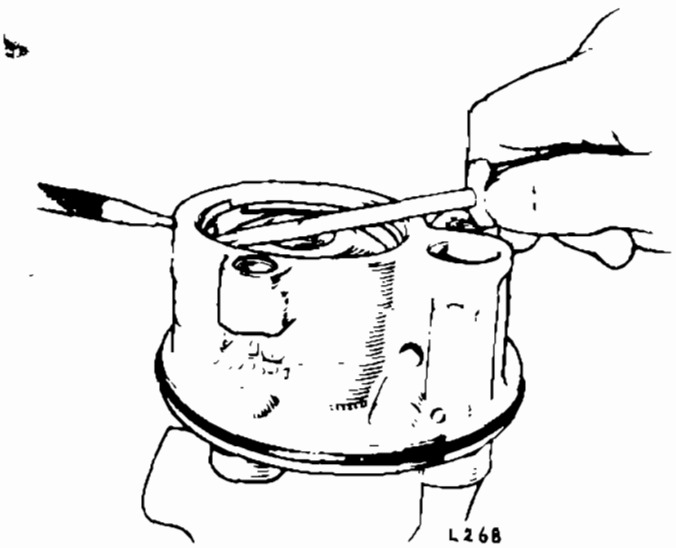
1. Disconnect flexible hoses from pump.
2. Slacken the three bolts securing pump mounting bracket to engine and relieve belt tension.
3. Release drive belt from pump pulley.
4. Remove the three bolts securing pump mounting bracket to engine and lift out pump complete with mounting bracket.
5. Remove mounting bracket from pump.

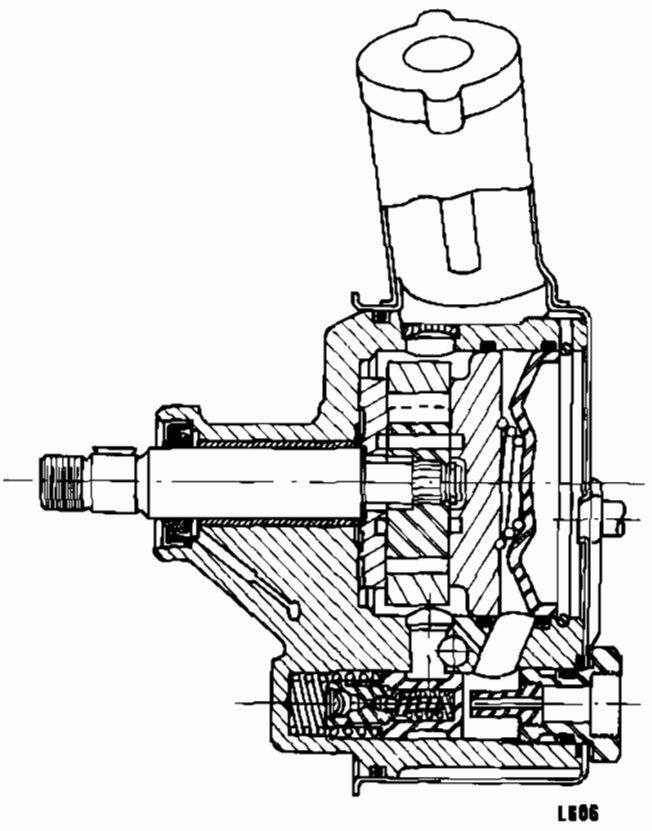
Refitting

6. Reverse instructions 1 to 5.
7. Top up reservoir and bleed system.

STEERING PUMP

—Overhaul **57.20.20**





Dismantling

Where 'front' and 'rear' are mentioned, interpret 'front' to indicate pulley end of pump.

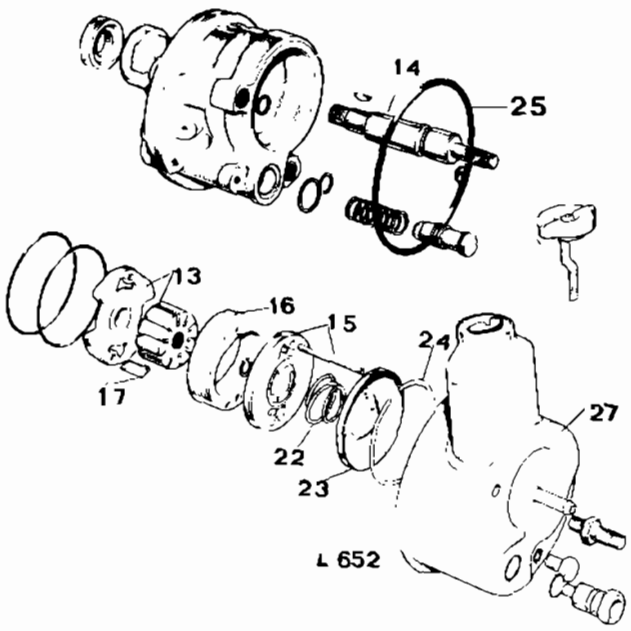
1. Drain oil from reservoir and clean exterior of pump.
2. Remove nut and washer securing pulley to shaft.
3. Using a suitable puller, withdraw pulley. Do not attempt to tap the shaft from pulley, or to lever the pulley from shaft as this may cause internal damage to pump.
4. Withdraw Woodruff key from pump shaft.
5. Remove mounting stud from rear of pump body.
6. Remove pressure outlet complete with 'O' ring and withdraw relief/flow valve and spring.
7. Separate reservoir from pump body.
8. Remove circlip securing end-plate. To facilitate the removal of this circlip a small hole is drilled in the body casing to permit the insertion of a pin punch or stiff wire.
9. Withdraw end-plate and spring, and extract end-plate 'O' ring from pump body.
10. Carefully slide pump shaft to rear of body and withdraw shaft complete with pressure plate, thrust plate and rotor assembly.
11. Remove thrust plate, dowel pins, eccentric ring and rotor vanes, and examine all components.
12. The thrust plate and rotor hub may be separated from the pump shaft by removing the circlip from the shaft.

Reassembling

Where 'front' and 'rear' are mentioned, interpret 'front' to be pulley end of pump.

Ensure all components are thoroughly clean. The oil seal, and all 'O' rings, should be renewed.

13. If the thrust plate and rotor hub have been disturbed, fit them to shaft and secure with new circlip. Ensure ported face of thrust plate is adjacent to rotor hub.
14. Lubricate shaft bush and lips of oil seal and carefully enter shaft in pump body.
15. Align pressure plate dowel holes with pump body and insert the two dowel pins.
16. Locate eccentric ring on dowel pins, making sure rotation arrow is to rear of pump.
17. Fit vanes to rotor hub slots (curved edges of vanes towards eccentric ring).
18. Using hydraulic fluid, lubricate eccentric ring, vanes and rotor hub.
19. Install pressure plate 'O' ring in pump body and smear with hydraulic fluid.
20. Enter pressure plate evenly in body (ported face towards rotor hub), and engage dowel pins. Press gently into position (hand only).
21. Fit end-plate 'O' ring to pump body.
22. Locate tapered coil spring in pump body, engaging larger diameter coil in recessed seat in pressure plate.
23. Smear perimeter of end-plate with hydraulic fluid and evenly insert end-plate into pump body until it is slightly below groove of retaining circlip.
24. Fit circlip to pump body and release end-plate.
25. Fit reservoir 'O' ring to pump body.
26. Fit rubber seals into recess in rear face of pump body.
27. Carefully and evenly slide reservoir over pump body, ensuring that mounting holes are aligned and mounting bolt sealing rings are not dislodged.
28. Fit reservoir mounting bolts and studs.
29. Insert relief valve spring, relief valve/flow valve.
30. Fit new 'O' ring to outlet union and screw union into position.
31. Install key to drive shaft and fit pulley and securing nut.

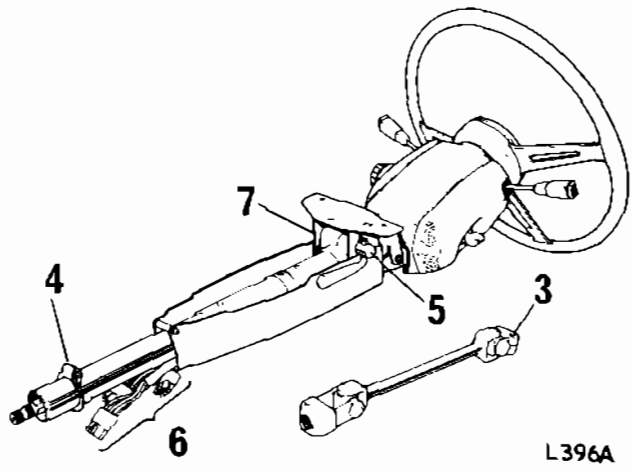


STEERING-COLUMN

—Remove and refit **57.40.01**

Removing

1. Disconnect battery.
2. Set road wheels to straight-ahead position.
3. Remove pinch-bolt securing intermediate shaft upper universal joint to bottom of steering-column.
4. From within car, remove nut and bolt securing column lower support tube to scuttle bracket.
5. Slacken steering-column clamp, and lower the column in adjustment slots.
6. Release the four push-in cable connectors (*a*) ignition/starter switch, (*b*) wiper/washer, (*c*) trafficator/flasher/horn, (*d*) lights.
7. Remove Nyloc nut and plain washer from steering-column clamp and, supporting weight of column, withdraw clamp bolt complete with lever.
8. Lower steering-column clear of bracket.
9. Withdraw steering-column from intermediate shaft.



Refitting

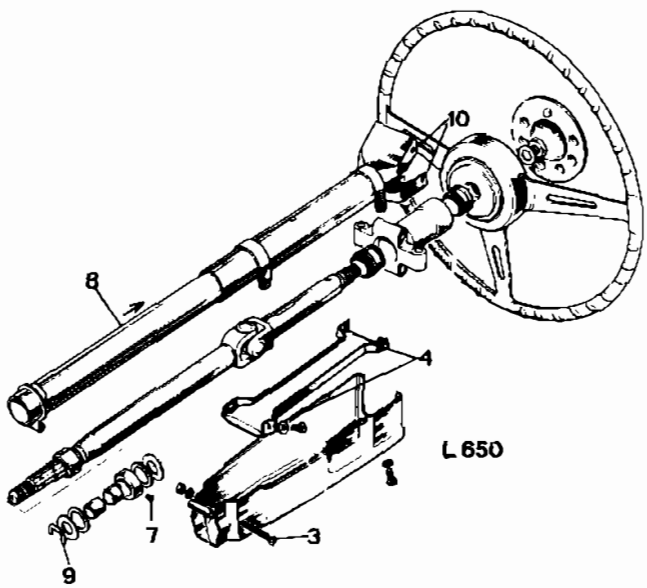
10. Reverse instructions 1 to 9.

STEERING MAST

—Remove and refit **57.40.06**

Removing

1. Remove steering-column. 57.40.01.
2. Remove the three screws clamping nacelle halves to column and lift off nacelle.
3. Remove the single bolt, nut and distance piece securing lower cover to column.
4. Remove the four screws securing cable channel guide to column.
5. Remove the two screws holding wiper/washer stalk to column and lift off stalk.
6. Remove the two screws holding trafficator/horn stalk to column and lift off stalk.
7. Remove the countersunk screw, locating steering-column mast lower bearing housing.
8. Slide lower tube towards steering lock to expose circlip locating lower bearing to mast.
9. Withdraw circlip and slide lower bearing from mast.
10. Remove the two bolts and nuts securing upper tube to mast housing and slide upper and lower tubes from mast.



Refitting

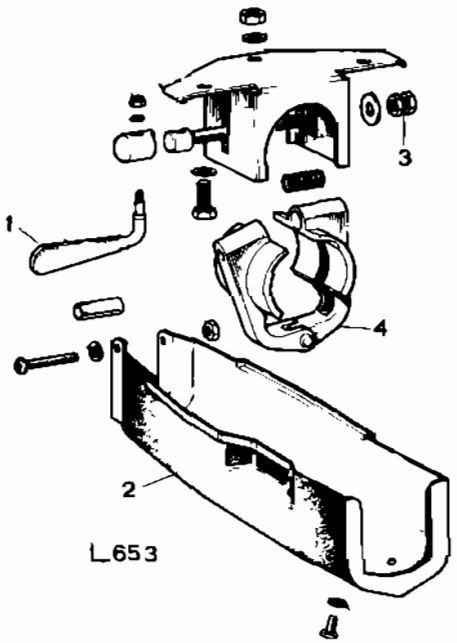
11. Reverse instructions 1 to 10.

STEERING-COLUMN ADJUSTMENT CLAMP

—Remove and refit **57.40.07**

Removing

1. Slacken adjusting lever on steering-column adjustment clamp and allow steering-column to drop to limit of adjustment slots.
2. Remove lower cover from column.
3. Slacken and remove Nyloc nut and plain washer from column clamp lever, and withdraw adjusting lever.
4. Lower column and clamp clear of support bracket noting that plain washers are fitted either side of clamp between clamp and bracket.
5. Swing clamp open, withdraw clamp spring and remove clamp from column.



Refitting

6. Reverse instructions 1 to 5.

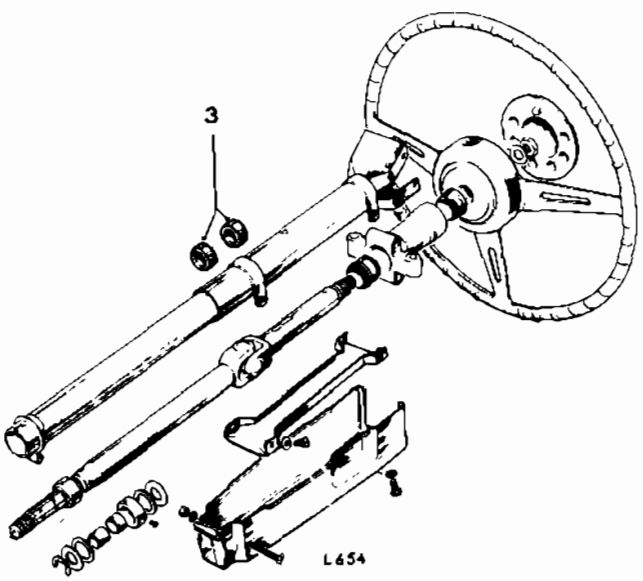
NOTE: When refitting the clamp lever and bolt, the Nyloc nut should be tightened to enable the adjusting lever to travel **fully** forward without excessive force. The tightness of the nut is a compromise to provide positive clamping with minimum effort to lock the adjusting lever.

STEERING-COLUMN SUPPORT TUBES INNER/OUTER AND/OR BUSHES

—Remove and refit **57.40.16**

Removing

1. Separate column inner and outer tubes from steering mast. 57.40.06.
2. Withdraw inner tube from outer tube.
3. Extract the two rubber bushes from outer tube by depressing locating dowel and drawing bushes through tube.



Refitting

4. Reverse instructions 1 to 3.

INTERMEDIATE SHAFT

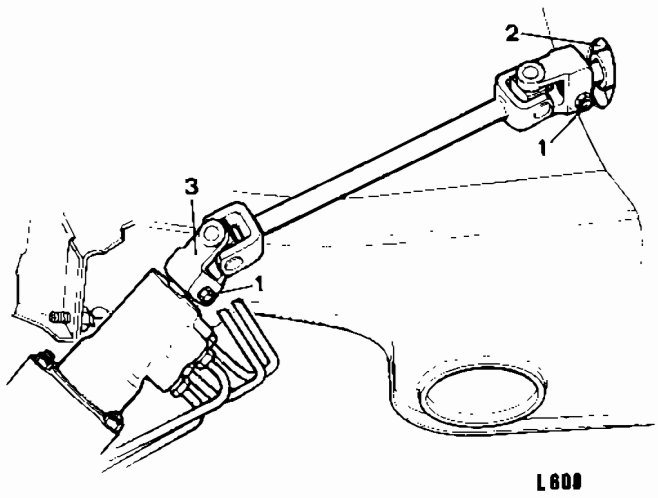
—Remove and refit **57.40.15**

Removing

1. Remove two pinch-bolts and nuts clamping upper universal joint to steering mast and the lower universal joint to the control valve.
2. Remove the bolt and nut securing steering-column to scuttle (accessible from inside car).
3. Withdraw lower end of steering-column from intermediate shaft.
4. Withdraw intermediate shaft from control valve.

Refitting

5. Reverse instructions 1 to 4.



STEERING-COLUMN LOCK AND IGNITION/STARTER SWITCH

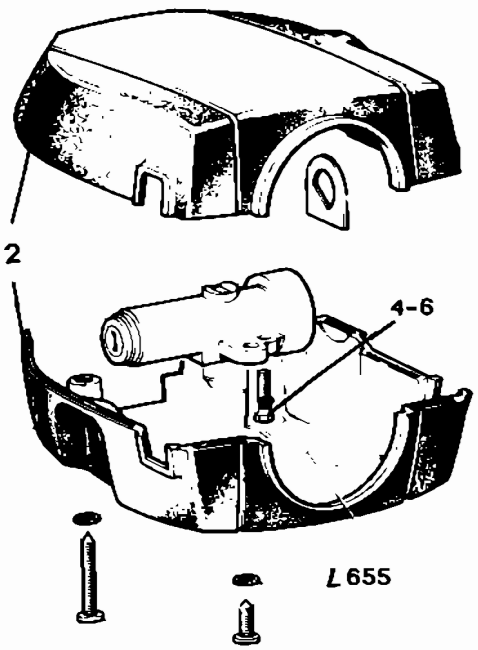
—Remove and refit **57.40.31**

Removing

1. Disconnect battery.
2. Remove the three screws (located on underside of nacelle) and lift nacelle halves clear of column.
3. Disconnect multi-socket at ignition switch.
4. Using a centre punch or small 'cape' chisel, carefully unscrew the sheared heads of the steering-lock securing bolts. Should it be found that the bolts will not unscrew using this method, a drill and an 'Easi-out' type extractor can be employed.

Refitting

5. Offer up steering lock to steering-column. Insert and evenly tighten two new securing bolts.
6. Tighten securing bolts until heads are sheared.
7. Connect multi-socket at ignition switch.
8. Refit nacelle halves.
9. Connect battery.

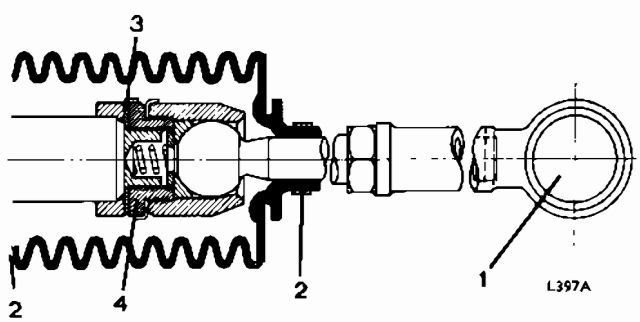


TIE-ROD

—Remove and refit **57.55.01**

Removing

1. Remove front wheel and disconnect tie-rod outer ball joint from steering-arm.
2. Slacken clips securing bellows seals and slide bellows along tie-rod to expose inner ball joint.
3. Wipe grease from ball joint and straighten tabs on lock washer securing ball joint housing to rack shaft.
4. Unscrew tie-rod complete with inner ball housing from rack shaft.



Refitting

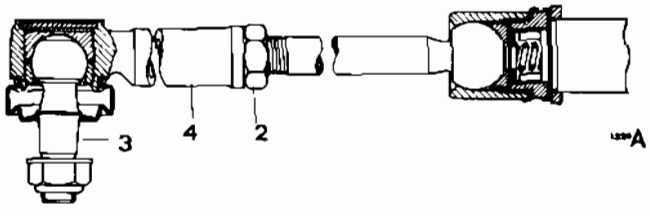
5. Reverse instructions 1 to 4, ensuring inner lock plates are renewed and are subsequently bent over to secure ball end to rack shaft. When tightening inner ball and adaptor to rack shaft it is advised that the opposite ball end adaptor is held to prevent stress being applied to the rack pinion.
6. Check front wheel track and adjust as required.

TIE-ROD BALL JOINT—Outer

—Remove and refit **57.55.02**

Removing

1. Remove road wheel.
2. Slacken tie-rod outer end locknut.
3. Release tie-rod outer end from steering-arm.
4. Unscrew outer end from tie-rod.



Refitting

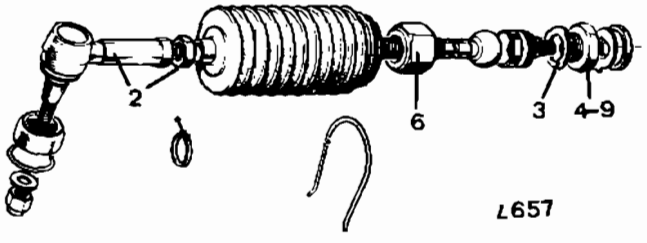
5. Reverse instructions 1 to 4.
6. Check and adjust front wheel track as required.

TIE-ROD BALL JOINT—Inner

—Remove and refit **57.55.03**

Removing

1. Remove tie-rod from steering-rack. 57.55.01.
2. Remove outer ball joint and locknut from tie-rod.
3. Straighten tab washer locking adaptor and ball housing.
4. Unscrew adaptor from ball housing and withdraw shims and ball seat.
6. Slide ball housing from tie-rod.



Refitting

7. Lubricate tie-rod ball end and fit ball housing to tie-rod.
8. Assemble ball seat, shims, tab washer and adaptor to ball housing.
9. Tighten adaptor and check ball end for end-float and articulation. End-float should be within 0·0127 to 0·0762 mm (0·0005 to 0·003 in). There must be no tight spots in articulation.
10. Ensure adaptor is tightened to 11·1 to 12·4 kgf m (80 to 90 lbf ft).
11. Re-check ball joint for end-float and articulation. If satisfactory, bend over tabs on washer.
12. Fit tie-rod to rack 57.55.01.

STEERING-WHEEL

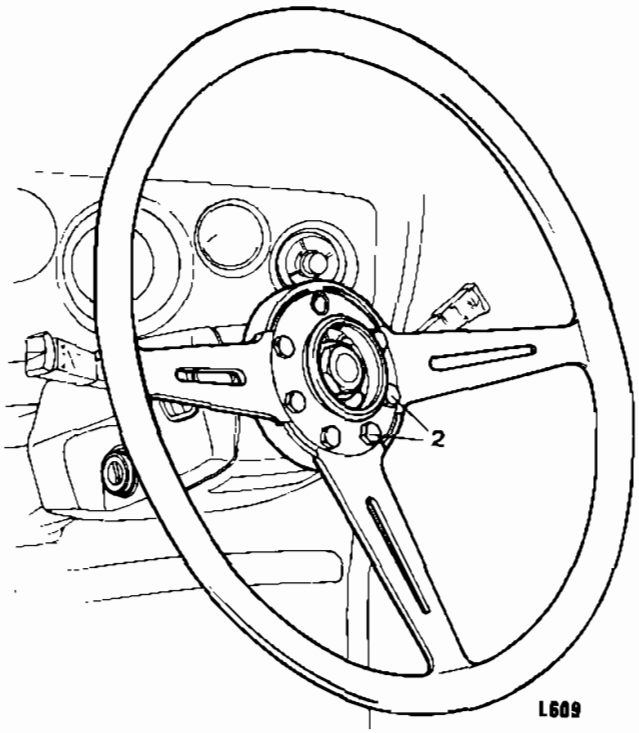
—Remove and refit **57.60.01**

Removing

1. Pull off steering-wheel pad from hub centre.
2. Remove the six bolts securing wheel spokes to hub, and lift off wheel.

Refitting

3. Reverse instructions 1 and 2.



STEERING-WHEEL HUB

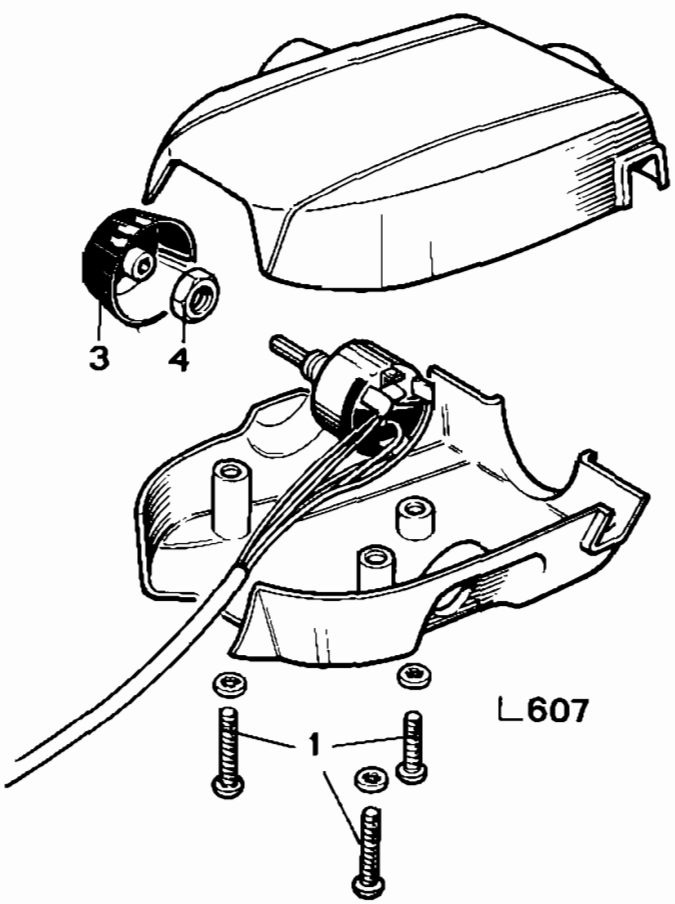
—Remove and refit **57.60.02**

Removing

1. Locate front road wheels in straight-ahead position.
2. Lift off steering-wheel pad.
3. Slacken and remove the exposed centre nut and plain washer.
4. To ensure that the steering-wheel hub will be replaced in its original steering mast splines scribe a line on both hub and steering mast.
5. Using a suitable extractor, withdraw steering-wheel.

Refitting

6. Reverse instructions 1 to 4, ensuring scribed markings are aligned. If the wheel was withdrawn without spline location being marked, set road wheels to straight-ahead position and install steering-wheel with two of its spokes horizontal and the third spoke pointing towards driver's seat.



STEERING-COLUMN NACELLE

—Remove and refit **57.60.04**

Removing

1. Remove three screws located on underside of nacelle.
2. Withdraw upper and lower nacelle halves from steering-column.
3. To remove light switch from nacelle slacken the Allen screw, accessible through drilling in rim of switch knob, and withdraw knob.
4. Slacken exposed nut on shaft and withdraw switch from nacelle half.

Refitting

5. Fit switch to nacelle, ensuring that markings on knob are visible from driver's seat.
6. Fit nacelle halves to steering-column, ensuring apertures for control stalks and light switch are properly positioned. Do not over-tighten screws.

FRONT SUSPENSION OPERATIONS

Anti-roll bar
—link—remove and refit 60.10.02
—remove and refit 60.10.01
—rubbers—remove and refit 60.10.04

Ball joint
—wishbone—remove and refit 60.15.03

Bump stop
—remove and refit 60.30.10

Dampers
—remove and refit 60.30.02

Hub
—bearing end-float—check and adjust 60.25.13
—bearings—remove and refit 60.25.14
—oil seal—remove and refit 60.25.15
—remove and refit 60.25.01

Radius rod
—remove and refit 60.10.16

Road springs
—remove and refit 60.20.01

Stub axle
—remove and refit 60.25.22

Upper swivel
—remove and refit 60.30.04

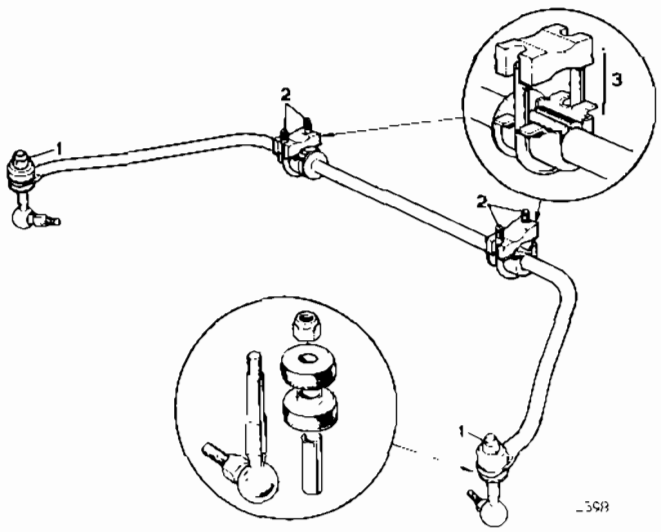
Vertical link
—remove and refit 60.25.23

Wheel studs
—remove and refit 60.25.29

Wishbone
—overhaul 60.35.09
—remove and refit 60.35.02

ANTI-ROLL BAR

—Remove and refit **60.10.01**



Removing

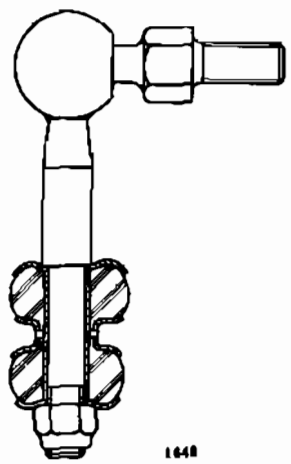
1. Disconnect links from anti-roll bar.
2. Remove nuts, washers, 'U' bolts, clamp brackets, and distance pieces.
3. Withdraw anti-roll bar.

Refitting

4. Reverse instructions 1 to 4, renewing rubber bushes as necessary.

ANTI-ROLL BAR LINK

—Remove and refit **60.10.02**



Removing

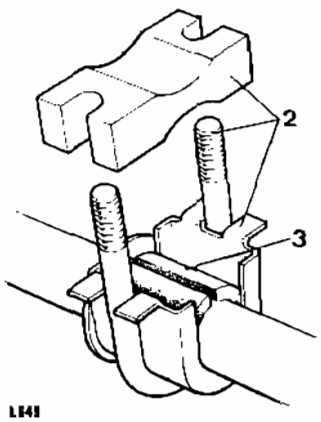
1. Disconnect link from anti-roll bar and radius rod.
2. Withdraw anti-roll bar link.

Refitting

3. Reverse instructions 1 and 2.

ANTI-ROLL BAR RUBBERS

—Remove and refit **60.10.04**



Removing

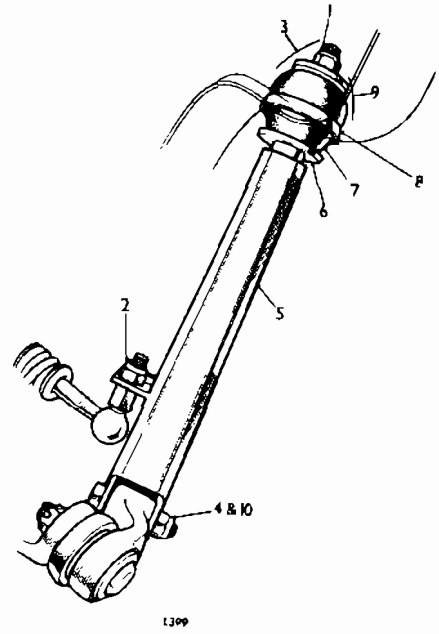
1. Remove nuts and washers from 'U' bolts.
2. Withdraw 'U' bolts, clamp brackets, and distance pieces.
3. Remove rubbers from anti-roll bar.

Refitting

4. Reverse instructions 1 to 3.

RADIUS ROD

—Remove and refit **60.10.16**



Removing

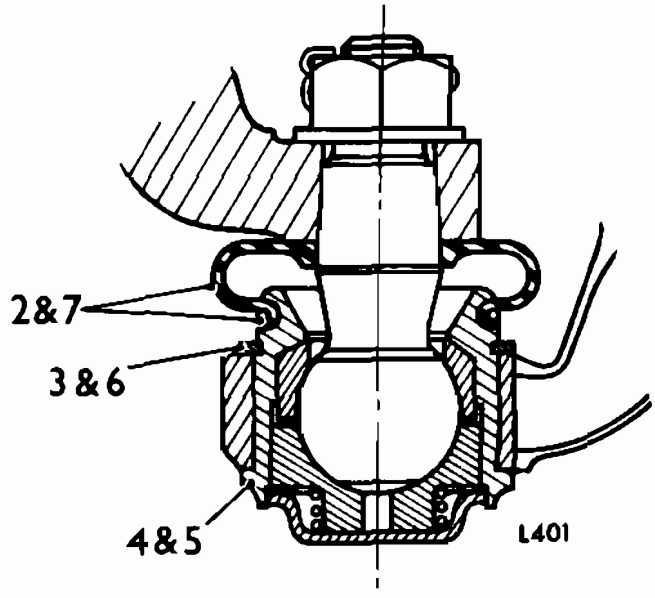
1. Raise the vehicle and support body on stands.
2. Disconnect the anti-roll bar link from radius rod.
3. Remove nut, washer and rubber block from radius rod rear mounting.
4. Disconnect radius rod from wishbone.
5. Detach radius rod.

Refitting

6. Fit dished washer (dished edge leading) to radius rod.
7. Fit rubber block (curved face leading) to radius rod.
8. Locate radius rod in body.
9. Fit rubber block (flat face leading), dished washer (dished edge trailing), and nut. Do not tighten nut at this stage.
10. Connect radius rod to wishbone.
11. Tighten nut at rear end of radius rod.
12. Remove body stands.

BALL JOINT

—Remove and refit **60.15.03**



Removing

1. Remove the wishbone. 60.35.02.
2. Remove the plastic boot from the ball joint.
3. Remove the circlip.
4. Press out the ball joint housing.

Refitting

5. Using a short length of suitable bore steel tubing, press a new ball joint and housing squarely into the wishbone. Do not apply pressure to the centre of the housing end cap.
6. Fit circlip and plastic boot.
7. Fit wishbone. 60.35.02.

FRONT ROAD SPRING

—Remove and refit **60.20.01**

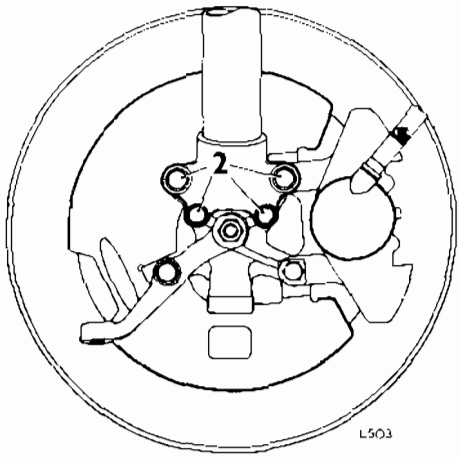
Service tools: 4221A; 4221A-5; S320

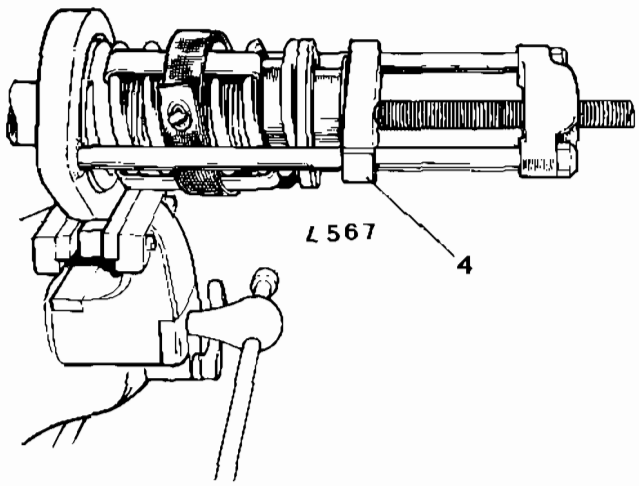
Removing

1. Raise the car and support body on stands.
2. Remove four bolts and spring washers from the damper flange, noting that a spacer, and shims as appropriate are fitted to the top front bolt.
3. Remove three nuts and washers from wing valance and withdraw damper and spring.
4. Using hand press 4221A and adaptor 4221A-5, carefully compress the road spring until the spring hooks, S320, can be fitted over five coils. Centre the safety straps on the hooks and fasten the strap.

WARNING: Hooks, fitted to less than five coils, will not provide sufficient constraint to permit safe release of the damper upper swivel bearing.

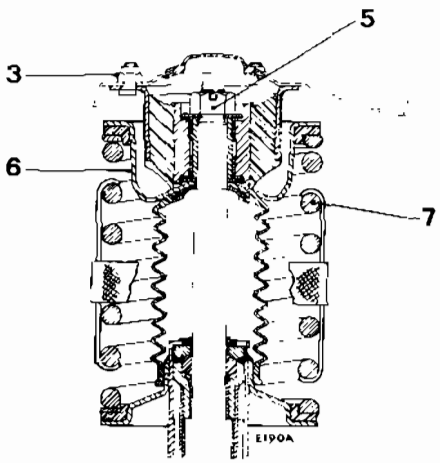
5. Remove cotter pin and slotted nut from damper.
6. Lift off the spring pan complete with the top mounting and the swivel bearing assembly.
7. Withdraw the road spring from the damper strut.
8. Use the hand press to release the spring hooks.

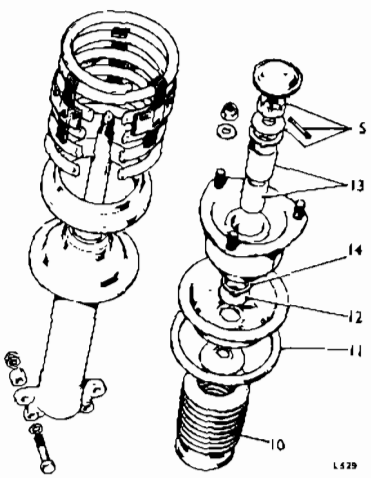




Refitting

9. Using S4221A and adaptor 4221A-5, compress the road spring and fit the spring hooks, S320, over **five** coils. Centre the safety strap on the hooks, fasten the strap and release the spring from the hand press.
10. Ensure gaiter is intact and is correctly fitted to damper.
11. Fully extend damper rod and fit lower insulating ring, road spring, upper insulating ring and spring pan.
12. Fit the 'D' washer to the damper rod.
13. Assemble the swivel bearing and sleeve to rubber mounting.
14. Locate the thrust washers on top and bottom of swivel bearing ensuring tabs are engaged and that plain faces of thrust washers are adjacent to swivel bearing.
15. Fit rubber mounting to damper.
16. Fit washer and slotted nut. Tighten nut and insert a new cotter pin.
17. Using hand press release clips from road spring.
18. Thoroughly clean spring turret and apply 'Plastiseal' to damper upper mounting flange.
19. Offer up damper to spring turret and engage the three studs. Fit the plain washers, nuts, and tighten.
20. Fit the damper to the vertical link. Tighten the four securing bolts.
21. Fit the road wheel and lower the vehicle.





FRONT HUB

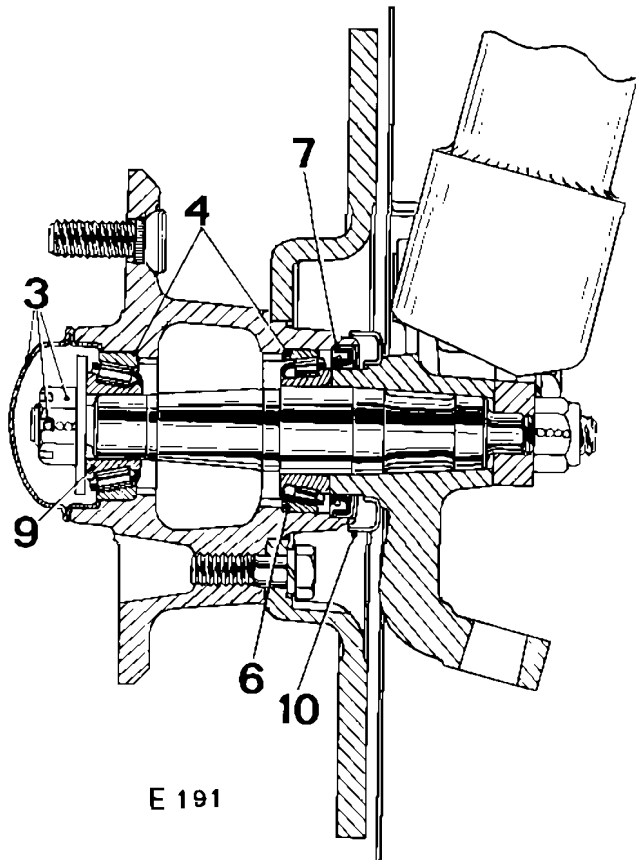
—Remove and refit **60.25.01**

Removing

1. Remove the front wheel.
2. Detach brake calliper from disc. 70.55.02.
3. Prise off hub cap and remove cotter pin, slotted nut, and washer.
4. Withdraw hub and bearings from stub shaft.

Refitting

5. Half fill hub with clean grease.
6. Lubricate inner bearing and insert bearing in hub.
7. Fit new inner oil seal to hub (lip of seal towards hub).
8. Lubricate seal lip, and outer bearing track.
9. Insert outer bearing.
10. Ensure seal deflector ring fitted to vertical link is undamaged and will not foul hub.
11. Fit hub and bearings to stub axle.
12. Fit plain washer, and slotted nut to stub axle.
13. Gently tighten slotted nut, at the same time rotating hub clockwise and checking hub end-float. Cease tightening immediately hub end-float is eliminated. Slacken nut to first slot to admit entry of cotter pin. The slotted nut must never be overtightened as this can damage the bearings. Maximum torque load before slackening off must not exceed 5 lb ft (0·691 kgf m).
14. Fit and secure cotter pin. Half fill the hub cap with grease and press into position.
15. Fit brake calliper, and road wheels and lower vehicle to ground.

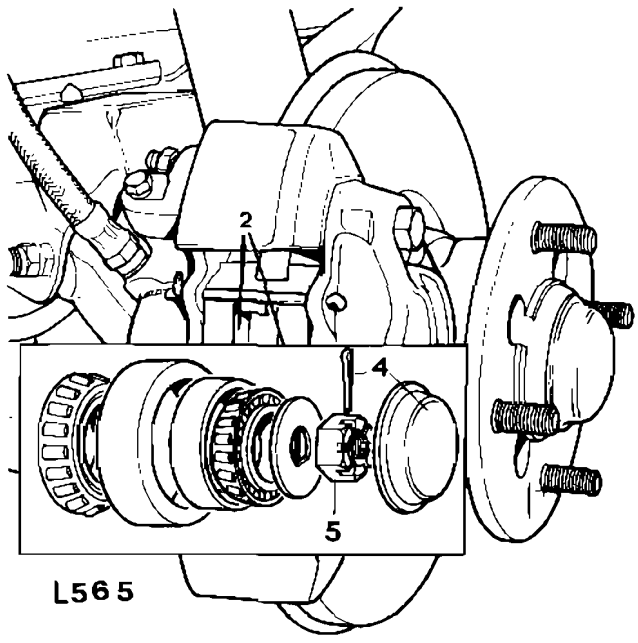


E 191

FRONT HUB BEARING END-FLOAT

—Check and adjust **60.25.13**

1. Remove road wheel.
2. Remove spring pins retaining brake pads to calliper and withdraw pad spring plates and pads.
3. Check hub for end-float.
4. If adjustment is required remove hub cap and cotter pin.
5. Tighten slotted nut as required to eliminate end-float. A torque of 5 lbf ft (0·691 kg m) must not be exceeded or damage may be caused to bearings and bearing tracks.
   Slacken nut to permit entry of cotter pin.
6. Insert and lock cotter pin.
7. Clean hub cap, half fill with fresh grease and refit.
8. Replace brake pads, spring plates and spring pins.
9. Fit road wheels.



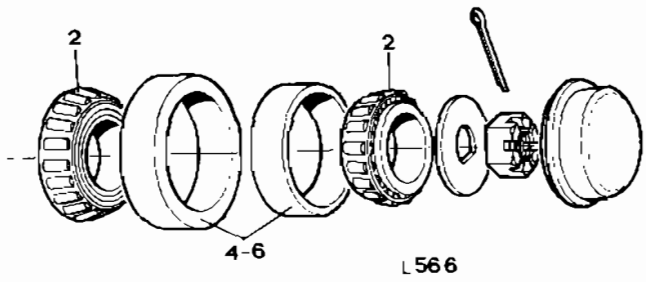
L565

FRONT HUB BEARINGS

—Remove and refit **60.25.14**

Removing

1. Remove front hub. 60.25.01.
2. Remove outer bearing, inner oil seal, and inner bearing.
3. Thoroughly clean hub.
4. Evenly drift outer and inner bearing tracks from hub.



Refitting

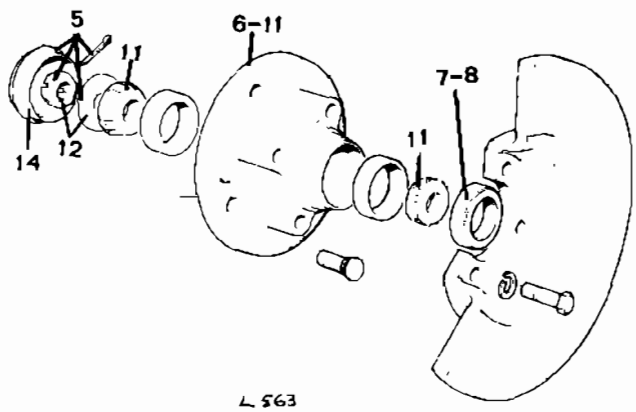
5. Clean bearing track recesses in hub.
6. Evenly install new tracks in hub, ensuring they abut against the machined lip.
7. Fit new oil seal. 60.25.15.
8. Fit hub to car. 60.25.01.

FRONT HUB OIL SEAL

—Remove and refit **60.25.15**

Removing

1. Remove front wheel.
2. Remove the top rear bolt securing vertical strut flange to vertical link and slacken the remaining three bolts on flange.
3. Remove lower bolt securing brake calliper to vertical link.
4. Detach brake calliper from disc and support weight of calliper using wire or string. Do not allow calliper to hang suspended by brake hose.
5. Prise off hub cap and remove cotter pin, slotted nut and washer.
6. Withdraw hub from stub shaft.
7. Extract oil seal from hub.

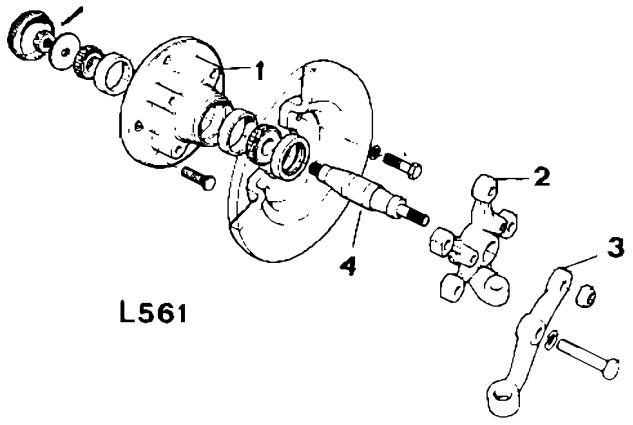


Refitting

8. Insert new oil seal (lip towards bearing) in hub, and press or drift evenly into position. Properly installed, the oil seal casing will project approximately $\frac{1}{16}$ in (1·59 mm) from hub.
9. Lubricate seal lip.
10. Ensure seal deflector ring fitted to the vertical link is undamaged and will not foul hub.
11. Fit hub and bearings to stub axle.
12. Fit plain washer and slotted nut to stub axle.
13. Adjust hub bearings and secure adjusting nut with a new cotter pin. 60.25.13.
14. Half fill hub cap with fresh grease and press into position in hub.
15. Fit brake calliper and road wheel.
16. Lower vehicle to ground.

FRONT HUB STUB AXLE

—Remove and refit **60.25.22**



L561

Removing

1. Remove front hub. 60.25.01.
2. Remove vertical link. 60.25.23.
3. Remove steering-arm.
4. Press out stub axle from vertical link.

Refitting

5. Install stub axle in vertical link.
6. Fit vertical link. 60.25.23.
7. Fit front hub. 60.25.01.

VERTICAL LINK

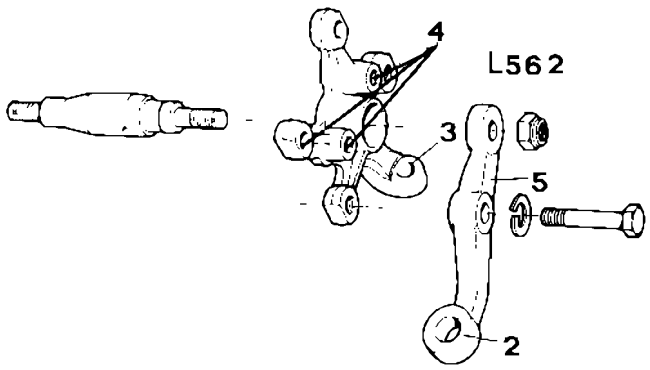
—Remove and refit **60.25.23**

Removing

1. Remove front hub. 60.25.01.
2. Disconnect tie-rod ball joint from steering-arm.
3. Disconnect wishbone from vertical link.
4. Remove the remaining three bolts from damper flange and withdraw vertical link.

NOTE: A spacer and shims are fitted between the top, front lug and vertical link. Care must be taken not to lose shim packs.

5. Remove steering-arm from vertical link.



L562

Refitting

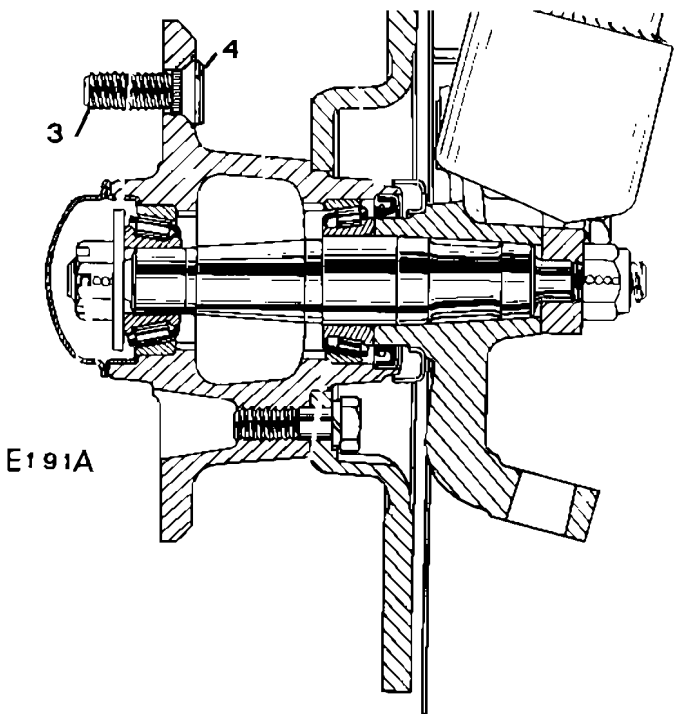
6. Reverse instructions 1 to 5.

FRONT HUB WHEEL STUDS

—Remove and refit **60.25.29**

Removing

1. Remove front wheel.
2. Apply foot brake. This serves to prevent the transmission of shock load to the inner hub bearing when wheel studs are extracted.
3. Tap out wheel studs towards brake disc.
   The removal of wheel studs is not recommended unless for purposes of renewal.



E191A

Refitting

4. Enter stud squarely in hub flange ensuring that the countersunk faces on both stud and rear of hub flange are clean.
5. Using suitable packing (e.g. a short length of conduit tubing and washers) inserted over wheel stud and with wheel nut reversed (plain face towards hub flange) draw the stud into hub flange. Should new studs be found to be a loose fit in the hub flange, a new hub should be fitted.
6. Fit road wheel.

FRONT DAMPER

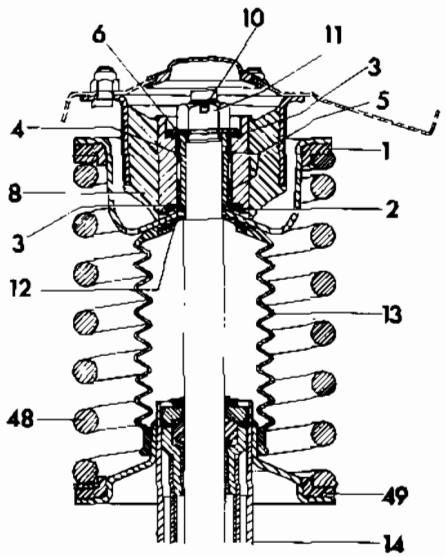
—Remove and refit **60.30.02**

As operation 60.20.01.

FRONT DAMPER UPPER SWIVEL ASSEMBLY

—Remove and refit **60.30.04**

As operation 60.20.01.



1. Insulating ring—upper
2. 'D' washer
3. Thrust washer
4. Sleeve
5. Bush
6. Washer
8. Mounting block
10. Cotter pin
11. Slotted nut
12. Spring pan
13. Gaiter
14. Damper
48. Spring
49. Insulating ring—lower

BUMP STOP

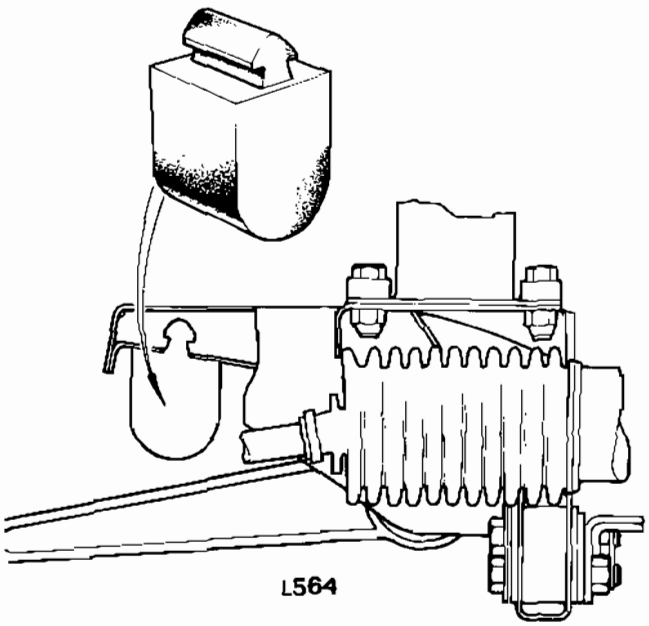
—Remove and refit **60.30.10**

Removing

1. Tear bump stop from front cross-member.

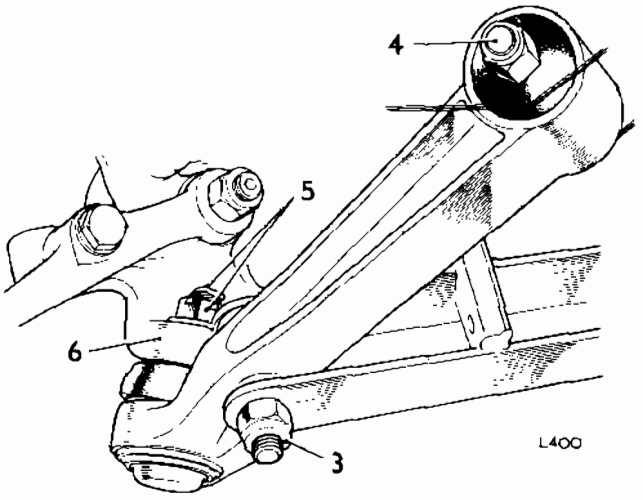
Refitting

2. Press new bump stop into position.



WISHBONE

—Remove and refit **60.35.02**



Removing

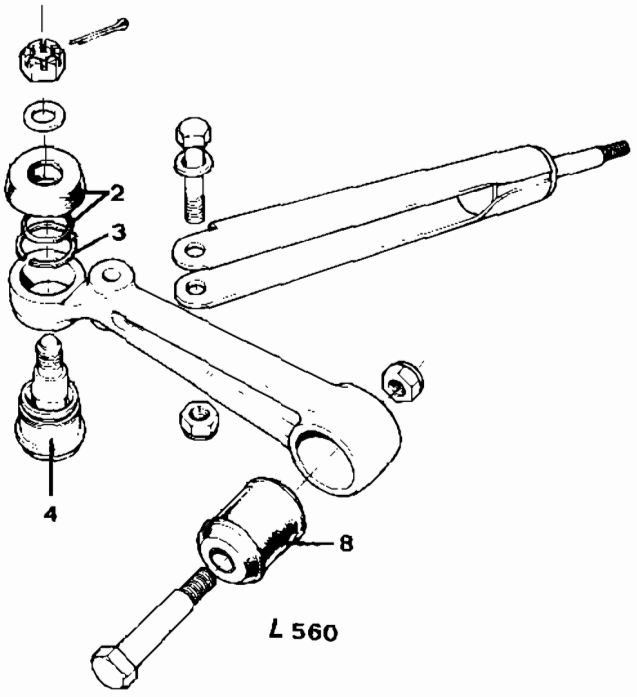
1. Jack up car.
2. Release anti-roll bar lower link from radius rod.
3. Remove the bolt and nut securing radius rod to wishbone.
4. Remove the bolt and nut securing wishbone to front cross-member.
5. Remove cotter pin and slotted nut securing wishbone ball joint to vertical link.
6. Release ball joint from vertical link and withdraw wishbone.

Refitting

7. Reverse instructions 1 to 6. Do not finally tighten the bolt securing wishbone to front cross-member until car is resting on its wheels.

WISHBONE

—Overhaul **60.35.09**



1. Remove wishbone. 60.35.02.
2. Remove plastic gaiter and rubber ring from ball joint.
3. Remove circlip retaining ball joint housing to wishbone.
4. Press or drive out ball joint and housing.
5. Enter new ball joint and housing from underside of wishbone ensuring housing is squarely located.
6. Press housing into wishbone taking care not to damage bottom of housing. A short length of suitable diameter tube is recommended.
7. Fit circlip, new plastic gaiter, and gaiter retaining ring.
8. Press out rubber bush and sleeve from fulcrum end of wishbone.
9. Press new bush and sleeve into position.

REAR SUSPENSION OPERATIONS

Rear hub
- —bearing end-float—check and adjust 64.15.13
- —bearings—remove and refit 64.15.14
- —hub—remove and refit 64.15.01
- —oil seals—remove and refit 64.15.15
- —wheel studs—remove and refit 64.15.26

Rear road springs
- —insulating rings—remove and refit 64.20.17
- —springs—remove and refit 64.20.01

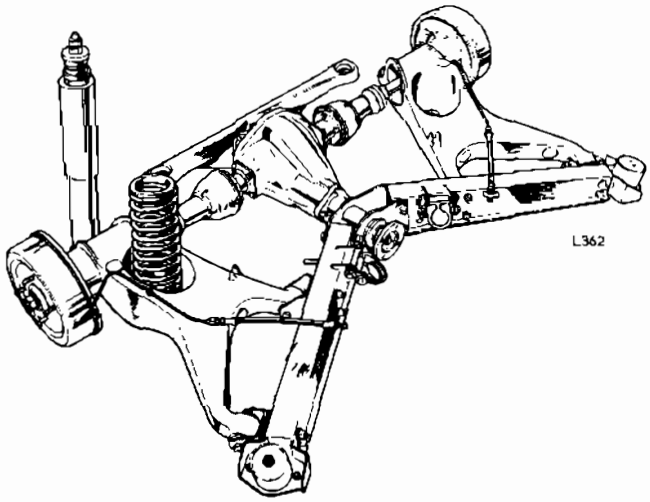
Rear suspension unit
- —remove and refit 64.25.01

Rear wheel alignment
- —check and adjust 64.25.17

Trailing arms
- —bushes—remove and refit 64.35.05
- —mounting bracket—remove and refit 64.35.20
- —remove and refit 64.35.02

REAR SUSPENSION UNIT

A rear sub-frame which employs the differential casing as a stiffening member is rubber mounted to the body at four points. Trailing arms pivoted on rubber bushes accommodate attachment points for the coil road springs, rear dampers, and wheel hubs. Two universal joints fitted to each drive shaft provide for articulation of the trailing arms.

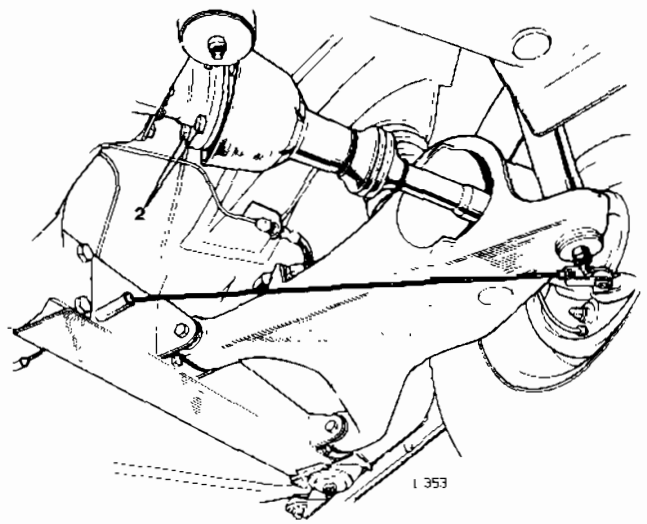


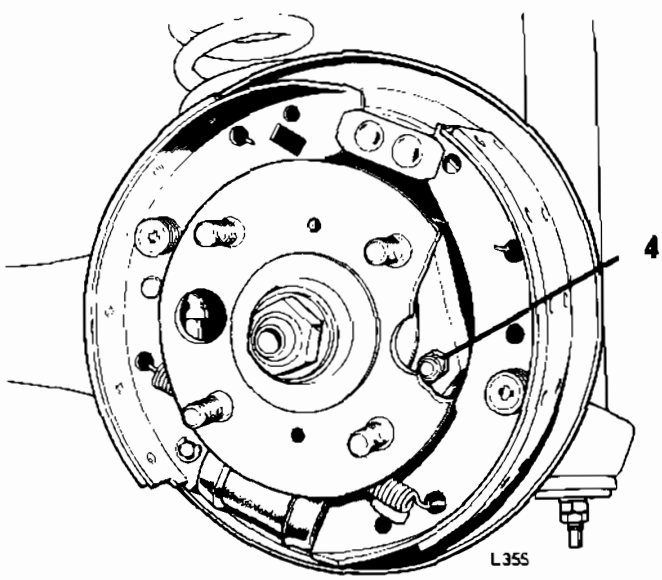
REAR HUB 64.15.01

—Remove and refit

Removing

1. Jack up the car and remove the rear wheel.
2. Remove four bolts and nuts securing the drive shaft inner flange to the differential. (A length of thin cord passed between the outer yoke of the drive shaft universal joint and the inner driving flange will facilitate handling when the drive shaft is withdrawn and will also prevent stress being applied to the rubber boots.)
3. Release the hand brake, remove the countersunk screws securing the brake-drum to hub flange and withdraw the brake-drum and brake-shoes.
4. Remove six nuts securing the hub bearing housing and brake backplate to the trailing arm, and withdraw the hub and drive shaft from the vehicle.





Refitting

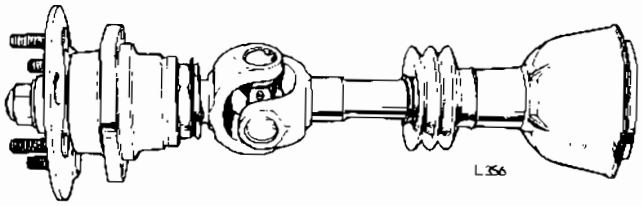
Reverse operations 1 to 4.
Remove the cord retaining the drive shaft yokes.

REAR HUB BEARING END-FLOAT

—Check and adjust **64.15.13**

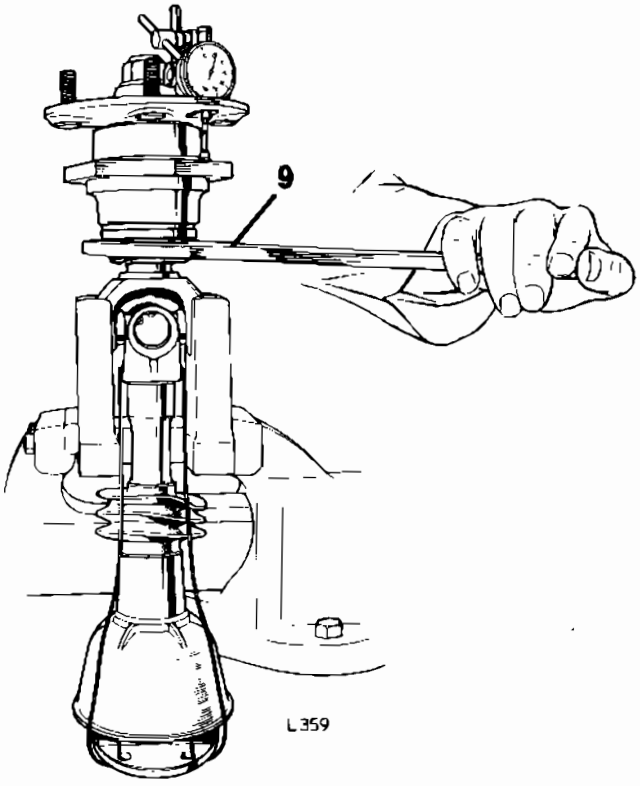
Service tools: S318, S317

Rear hub bearing end-float should be within 0·0508 to 0·127 mm (0·002 to 0·005 in). Excessive end-float out with the above limits can be reduced. Too little end-float, however, cannot be increased without dismantling the hub and renewing the collapsible spacer fitted between the hub bearings.



Checking

1. Jack up the car and remove road wheel.
2. Release the hand brake and remove brake-drum.
3. Using a dial indicator, place dial stylus in contact with hub flange, and zero gauge.
4. Carefully check end-float of hub, observing gauge needle.



Adjusting

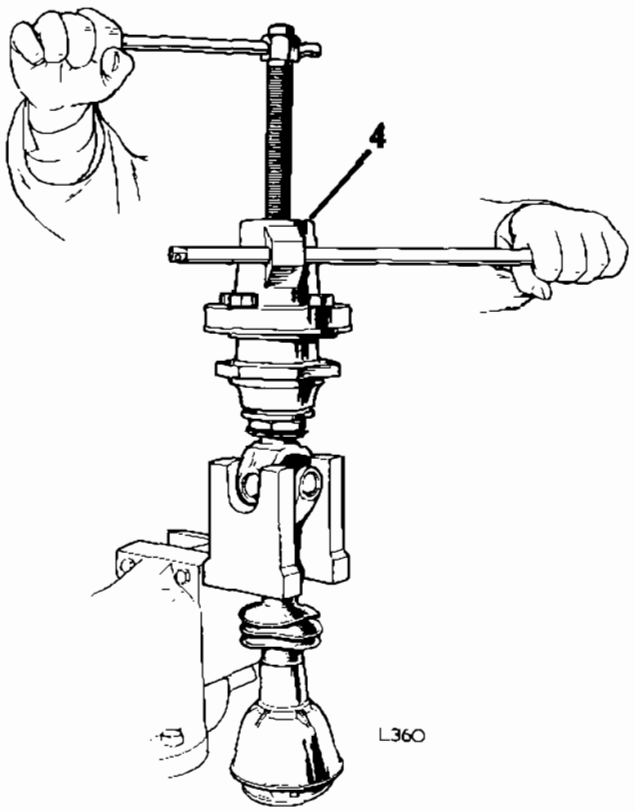
If hub end-float is found to be excessive, proceed as follows:

5. Remove drive shaft and hub. 64.15.01.
6. Locate drive shaft in holding jig S318.
7. Straighten lock tabs on hub bearing adjusting nuts.
8. Using a dial gauge, check hub end-float.
9. Using wrench S317, carefully tighten inner nut to reduce end-float, at the same time checking end-float reduction by means of dial gauge.
10. When end-float is within the limits specified, 0·0508 to 0·127 mm (0·002 to 0·005 in), hold inner adjusting nut and tighten outer locknut taking care not to alter position of adjusting nut.
11. Again check end-float. If satisfactory, remove dial gauge and bend over lock tabs on bearing adjusting and locknuts. If hub end-float is less than 0·0508 mm (0·002 in) it will be necessary to dismantle the hub and fit a new collapsible spacer. 64.15.15.
12. Fit drive shaft and hub to vehicle.
13. Fit brake-drum and road wheel and lower vehicle from jack.

REAR HUB BEARING(S)

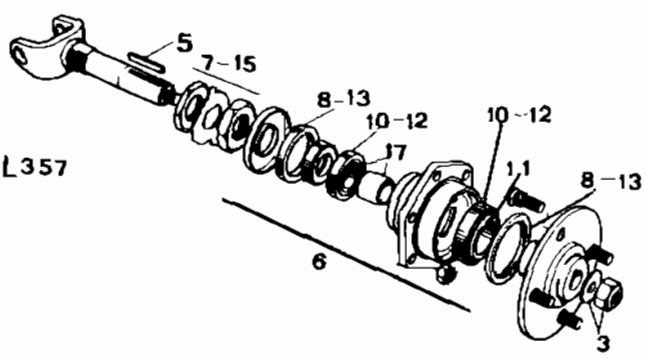
—Remove and refit **64.15.14**

Service tools: S318, S317, M86C



Removing

1. Remove rear hub and drive shaft. 64.15.01.
2. Mount stub shaft in jig (Tool No. S318), straighten tabs on hub adjusting nuts and slacken hub locknut and adjusting nut.
3. Remove Nyloc nut and washer securing hub to stub shaft.
4. Using Tool No. M86C, withdraw rear hub from stub shaft.
5. Remove key from stub shaft.
6. Withdraw hub bearing housing, bearings, collapsible spacer, bearing inner sleeve and inner oil seal stone shield.
7. Remove bearing adjusting nut, tab washer, and locknut.
8. Evenly drift out inner and outer oil seals.
9. Thoroughly clean all components.
10. Bearing outer tracks can be removed by evenly drifting them from the bearing housing. Bearing tracks should not be disturbed unless renewal is intended.
11. The outer bearing can be removed using Main Tool S4221A and adaptor 16.

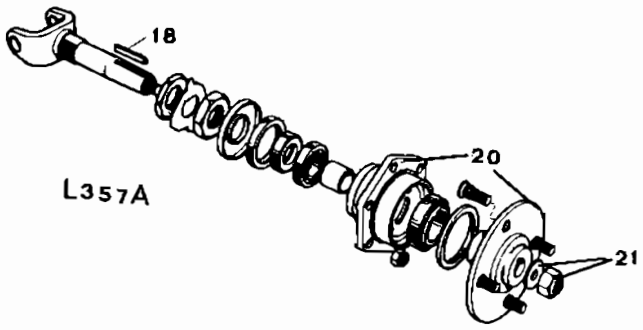


Refitting

12. Evenly press or drift bearing outer tracks (tapered face outwards) into position in bearing housing.
13. Evenly press or drift new inner and outer oil seals into position in bearing housing. (Lips of seals towards bearing outer tracks.)
14. Press inner track of new bearing into position on hub.
15. Install locknut, new lock washer, and bearing adjusting nut on stub shaft ensuring both nuts are screwed as close as possible to stub shaft yoke.
16. Fit stone shield and bearing inner sleeve to stub shaft.
17. Slide inner bearing and collapsible spacer on stub shaft.

continued

18. Fit key to stub shaft. If a new key is being installed ensure hub seats properly on stub shaft taper.
19. Half fill bearing housing with grease and lubricate lips of both seals.
20. Install bearing housing and hub.
21. Fit plain washer and nut to stub shaft. Tighten to correct torque.
22. Using a dial gauge adjust bearing clearance, instructions 8 to 11. 64.15.13.
23. Fit hub and drive shaft to car.



REAR HUB OIL SEALS

—Remove and refit **64.15.15**

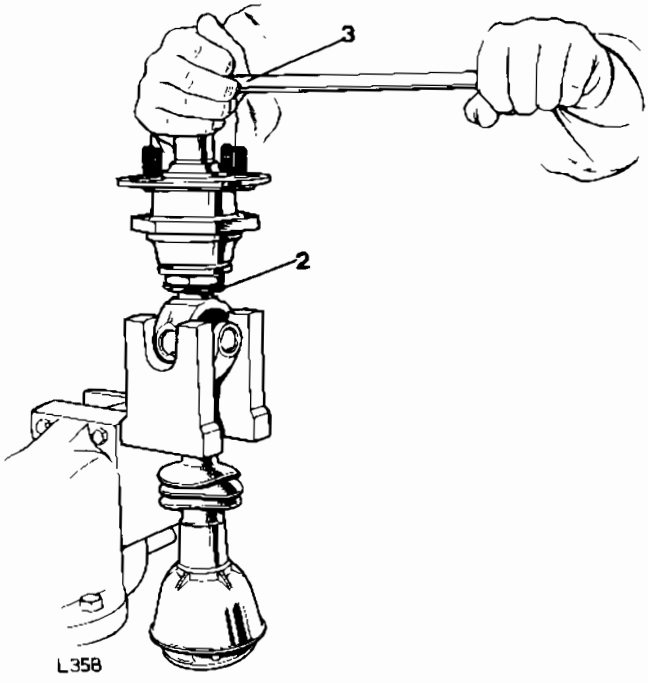
Service tools: S318, S317, M86C

Removing

1. Remove rear hub and drive shaft. 64.15.01.
2. Install drive shaft in jig (Tool No. S318), straighten tabs on hub adjusting and locknut and fully slacken both nuts.
3. Remove Nyloc nut and plain washer securing hub to stub shaft.
4. Using Tool No. M86C, withdraw rear hub from stub shaft.
5. Remove key from stub shaft.
6. Withdraw hub bearing housing, bearing collapsible spacer, inner bearing, sleeve, stoneguard, adjusting nut and lock washer.
7. Evenly drift out inner and outer oil seals.
8. Thoroughly clean all components.

Refitting

9. Follow instructions 2 to 23 inclusive, operation 64.15.14.



REAR HUB WHEEL STUDS

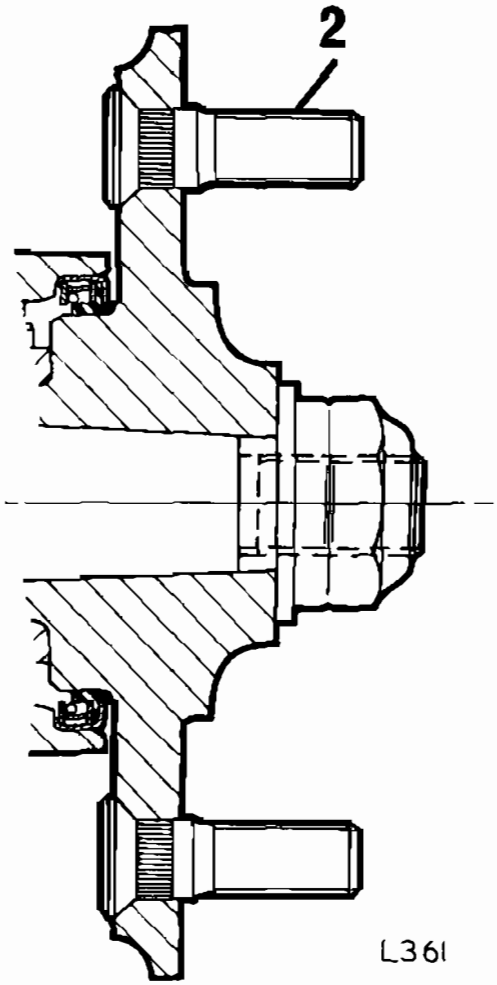
—Remove and refit **64.15.26**

Removing

1. Remove rear wheel and brake-drum.
2. Tap wheel stud towards back-plate until stud splines are released from hub flange.
3. Manœuvre stud clear of hub flange.

Refitting

4. Enter stud squarely in hub flange, ensuring countersunk faces are clean.
5. Using suitable packing (e.g. a short length of steel tubing and washers) inserted over wheel stud, draw the stud into position.
6. Remove packing and fit brake-drum and road wheel.



REAR ROAD SPRING

—Remove and refit **64.20.01**

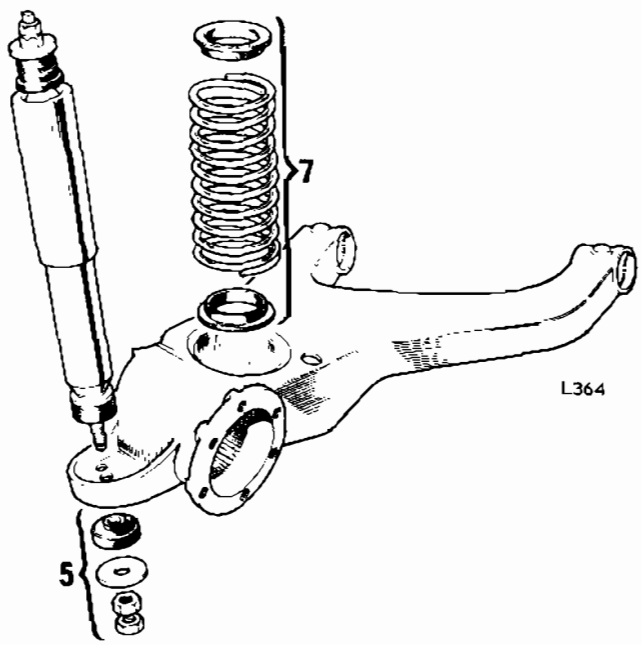
—Insulating Rings **64.20.17**

Removing

1. Jack up rear of vehicle and support body on stands.
2. Transfer jack to support trailing arm and partially compress road spring taking care not to relieve weight on stands.
3. Remove road wheel.
4. Remove the locknut, nut, plain washer, and rubber securing lower end of shock absorber to rear underside of trailing arm.
5. Carefully lower jack, allowing trailing arm to release tension on road spring.
6. Withdraw road spring and its upper and lower rubber insulating rings.

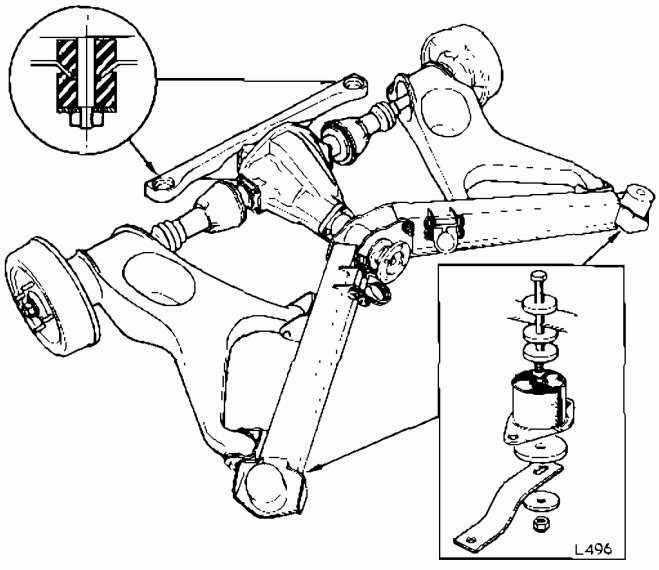
Refitting

7. Reverse instructions 1 to 6.



REAR SUB-FRAME

—Remove and refit **64.25.01**



Removing

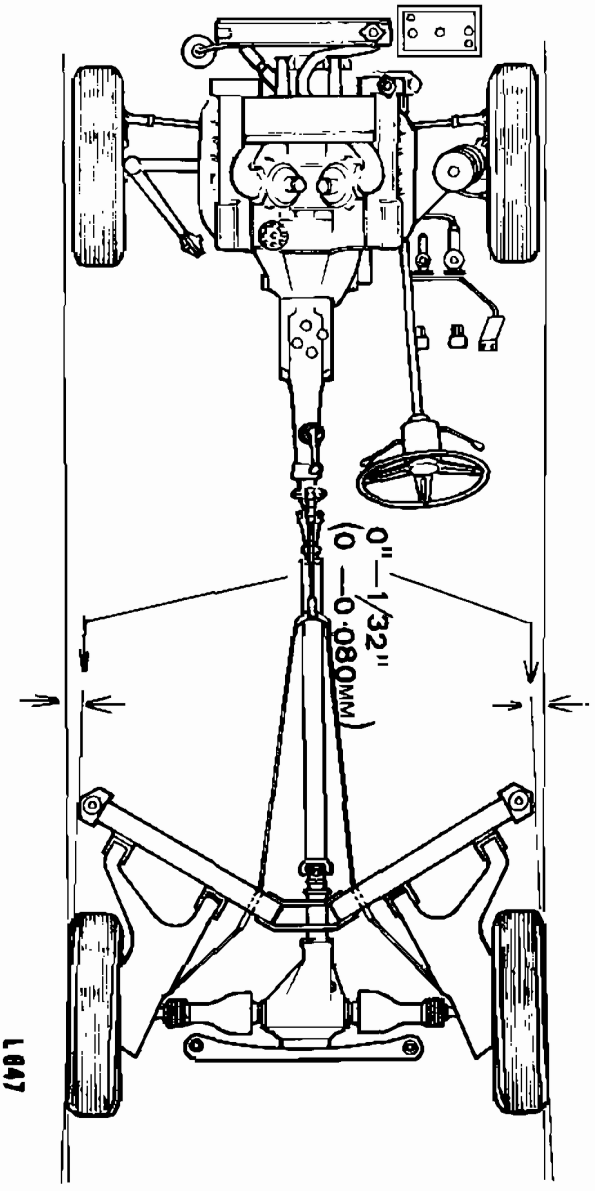
1. Raise rear of car and support body on stands.
2. Remove road wheels.
3. Remove exhaust tail pipes and rear intermediate pipes. 30.10.09.
4. Disconnect hand brake cable at rear backplates, remove yokes from cable and withdraw cable ends through sub-frame guides.
5. Remove road springs.
6. Disconnect brake flexible hoses at trailing arms.
7. Disconnect propeller shaft at hypoid extension flange.
8. With hypoid casing supported on jack, disconnect sub-frame mountings. Note order of washers and rubbers removed.
9. Carefully lower sub-frame from car.

Refitting

10. Reverse instructions 1 to 9.
11. Bleed brakes.

REAR WHEEL ALIGNMENT

—Adjust **64.25.17**



Rear wheel toe-in should be within the dimensions 0 to 1·58 mm (0 to $\frac{1}{16}$ in).

Adjustment to toe-in is made by removing shims from, or adding shims to, the outer brackets of the trailing arms.

Where examination confirms a condition outside the above limits the vehicle should be checked for accident damage, loose or worn sub-frame mountings, defective trailing arm bushes, loose trailing arm brackets, worn hub bearings and slack road wheels.

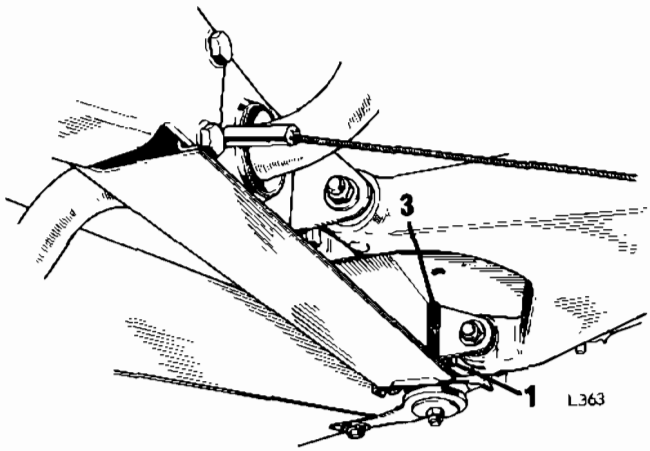
Only when the above items are checked and found to be satisfactory should alteration to shim adjustment be made.

In contrast to front wheel track adjustment where alteration is made equally to both tie-rods to maintain balanced steering lock angles, adjustment to rear wheel track is individual to either wheel and is determined by alignment with its respective front wheel to which it has a tolerance of 0 to 0·313 mm (0 to $\frac{1}{32}$ in) toe-in.

continued

Adjusting

1. Slacken the two bolts and nuts securing trailing arm **outer** bracket(s) to sub-frame front cross-member.
2. Using a tyre lever, prise trailing arm bracket away from cross-member.
3. Withdraw shim pack towards centre of vehicle.
4. Add or remove shim(s) as required.
5. Install shim pack and tighten bolts.
6. Drive vehicle or bounce rear suspension before re-checking toe-in wheel alignment.

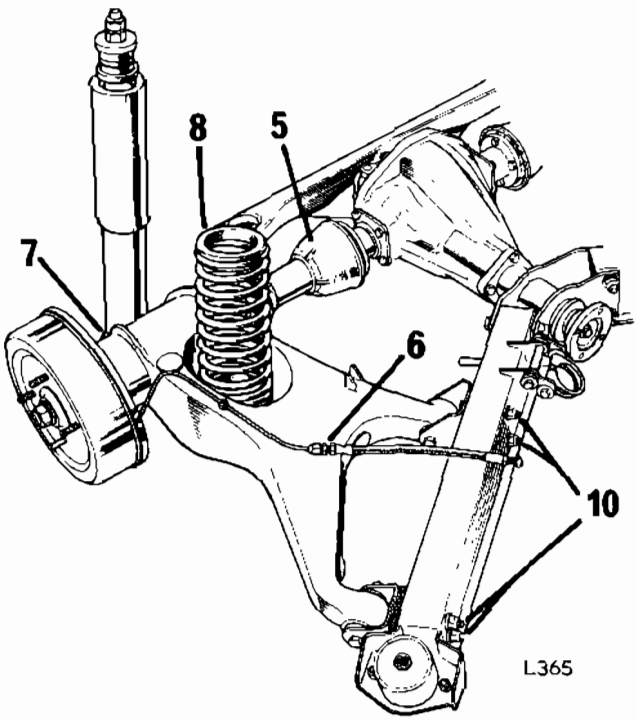


TRAILING ARMS

—Remove and refit **64.35.02**

Removing

1. Jack up rear of car and support body on stands.
2. Remove road wheels.
3. Position jack under trailing arm and partially compress road spring, taking care not to relieve weight on body stands.
4. Release hand brake and disconnect hand brake cable from brake backplate lever.
5. Disconnect drive shaft inner flange from differential.
6. Disconnect brake pipe to rear brake cylinder.
7. Disconnect lower end of rear damper from trailing arm.
8. Carefully lower jack and withdraw road spring and spring upper and lower insulating rings.
9. Remove jack.
10. Remove the two nuts and bolts securing trailing arm to sub-frame/trailing arm brackets.
11. Withdraw trailing arm complete with hub, brake, and drive shaft.
12. If required remove hub, brake, and drive shaft from trailing arm by withdrawing brake-drum and removing the six bolts securing hub and backplate to trailing arm flange.



Refitting

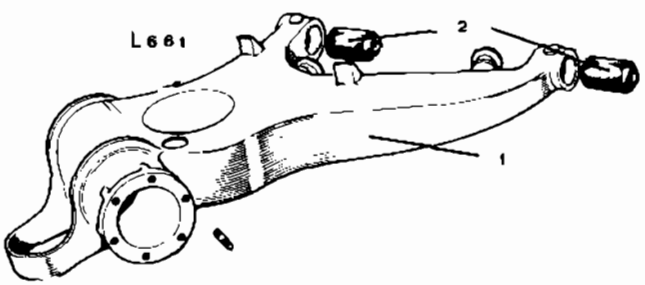
13. Reverse instructions 1 to 11. Do not tighten trailing arm pivot bolts until car is on its wheels.
14. Bleed brakes.

TRAILING ARM BUSHES

—Remove and refit **64.35.05**

Removing

1.**Remove trailing arm. 64.35.02.**
2. Press out trailing arm bushes.



Refitting

3. Press in new bushes.
4.**Fit trailing arm. 64.35.02.**
5. Bleed brakes.

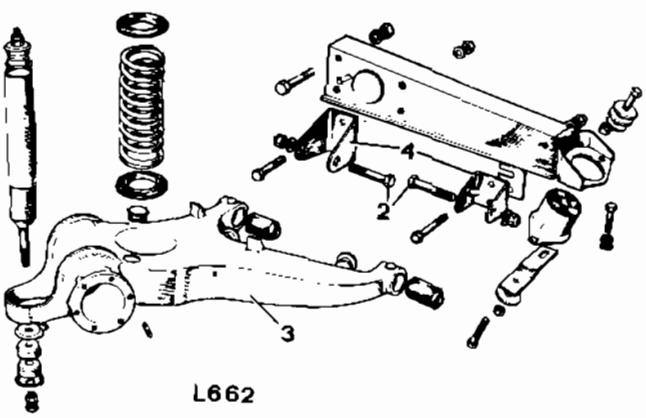
TRAILING ARM MOUNTING BRACKET(S)

—Remove and refit **64.35.20**

Removing

1. Remove rear road spring.
2. Remove the two pivot bolts securing trailing arm to sub-frame cross-member brackets.
3. Withdraw trailing arm from mounting brackets.
4. Remove the two bolts and nuts securing bracket to cross-member and withdraw bracket.

NOTE: A shim pack is fitted between the **outer** bracket and cross-member. If both trailing arm outer brackets are removed care must be taken not to intermix shim packs.



L662

Refitting

5. Reverse instructions 1 to 4.
   Do not finally tighten trailing arm pivot bolts until vehicle is resting on its wheels.

BRAKE OPERATIONS

Brakes—bleed	70.25.02
—pedal—remove and refit	70.35.01
Connector—3-way—remove and refit	70.15.34
Front calliper	70.00.04
—calliper—remove and refit	70.55.02
—disc—remove and refit	70.10.10
—disc shield—remove and refit	70.10.18
Hand brake cable	
—adjust	70.35.10
—remove and refit	70.35.16
—lever—remove and refit	70.35.08
—pawl and ratchet—remove and refit	70.35.09
Hoses—remove and refit	
—front left	70.15.02
—front right	70.15.03
—rear left	70.15.17
—rear right	70.15.18
Master cylinder	70.00.03
—remove and refit	70.30.08
P.D.W.A. switch	70.00.03
—overhaul	70.15.41
—remove and refit	70.15.36
Pipes—remove and refit	70.20.00
—to L.H. front hose	70.20.02
—to L.H. rear hose	70.20.17
—to P.D.W.A.—front brakes	70.20.46
—to P.D.W.A.—rear brakes	70.20.47
—to R.H. front hose	70.20.03
—to R.H. rear cylinder	70.20.18
—to R.H. rear hose	70.20.16
—to 3-way connector	70.20.14
Rear brakes	70.00.04
—backplate—remove and refit	70.10.26
—brake-shoes—remove and refit	70.40.03
—cylinder—overhaul	70.60.26
—cylinder—remove and refit	70.60.18
—drum—remove and refit	70.10.03

HYDRAULIC SYSTEM

A Lockheed combined vacuum servo and tandem master cylinder unit operates the front disc callipers and rear brake cylinders. Also fitted is a pressure differential warning actuator (P.D.W.A.) switch which operates a warning light on the fascia should pressure imbalance exist between the front and rear brake circuits.

Whenever any component in the hydraulic system is disturbed it is necessary to ensure that all air is removed from the brake circuits before the vehicle is returned to service. This evacuation of air from the system is known as 'bleeding'. Once bled, the system remains airtight until again disturbed, or until a fault develops.

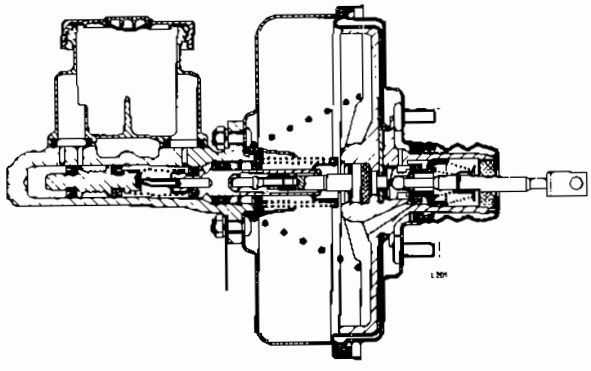
Air can be introduced to the hydraulic system by slack bleed nipples, slack or defective unions, damaged flexible hoses, worn piston seals or because the level of fluid in the brake reservoir is insufficient.

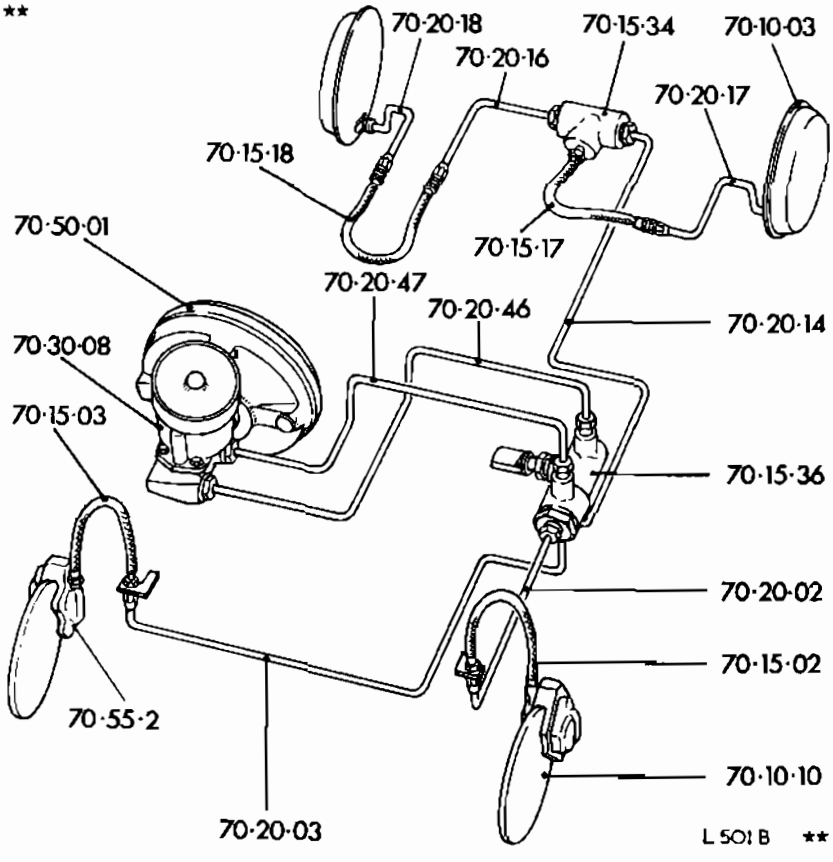
Brake fluid is not generally subject to loss by evaporation, therefore a falling level of fluid is usually indicative of a leak in the system and in such instances is almost invariably accompanied by a reduction in braking efficiency. To this statement, however, qualification is necessary. Where a vehicle is fitted with self-adjusting brakes and compensation for liner/pad wear occurs, fluid is drawn from the reservoir. This reduction in reservoir fluid level is slight, periodically consistent, and can rarely be confused with the resulting constant loss associated with leakage. Sudden abnormal consumption of brake fluid necessitates immediate examination of the hydraulic system to locate the point of leakage.

The tandem master cylinder

In contrast to single-type master cylinders, which use one pressure outlet point to provide hydraulic force for both axles of a vehicle, the tandem-type master cylinder has two pressure outlets, each serving an individual axle; thus front and rear axles are served by separate and independent circuits.

Two, in-line pistons share a common bore and are supplied with fluid from a single, but partitioned, reservoir. The partition ensures, in the event of total failure of a brake circuit, e.g. a burst front or rear brake pipe, that adequate fluid is retained in the reservoir to maintain operation of the undamaged circuit.





Front calliper units

The front 270 mm (10·625 in) dia. discs are straddled by a calliper unit which houses two pistons and brake pad assemblies. The pistons share a common fluid supply from the master cylinder and are self-adjusting to compensate for brake pad wear.

Rear brakes (drum)

The rear brakes are 229 × 57 mm (9 × 2·25 in) and have leading and trailing characteristics in both directions. A self-adjusting mechanism which maintains a fixed brake liner/drum running clearance is incorporated in the brake-shoe hand brake linkage. Self-adjustment occurs on application of the foot brake.

Operation of self-adjusting mechanism

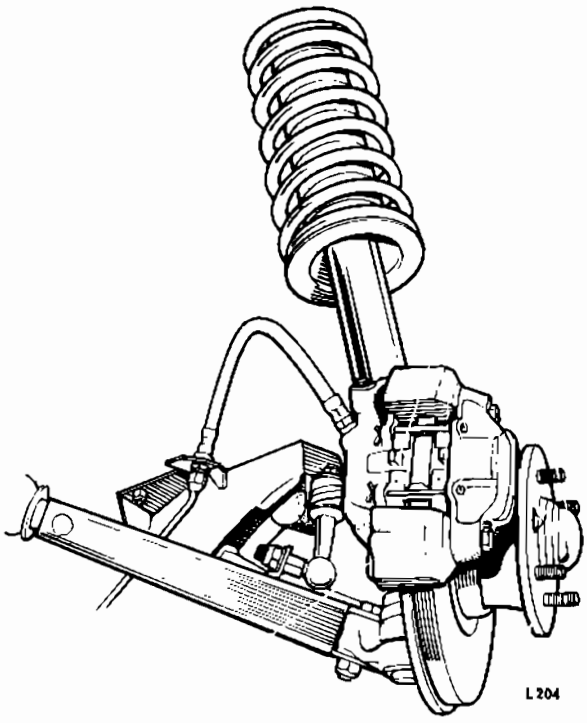
Fluid delivered from the master cylinder expands the wheel cylinder pistons, forcing the brake liners into contact with the drum. Centralization of the brake-shoes is ensured by the ability of each brake-shoe to slide in its locating slots in wheel cylinder pistons and anchor block.

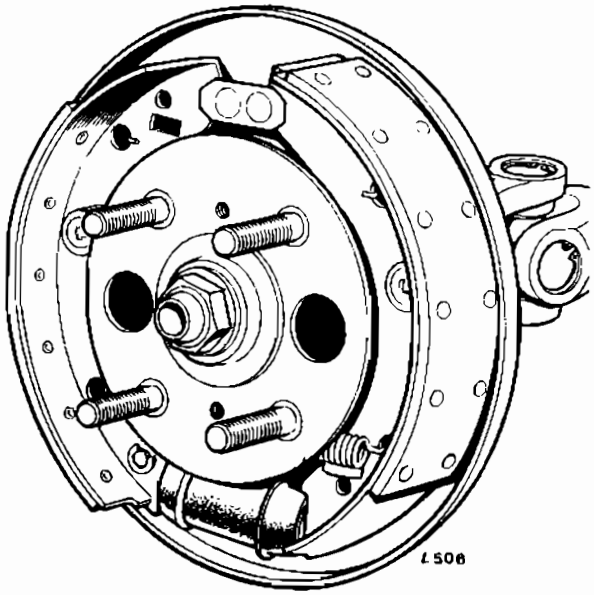
On release of pressure in the wheel cylinder the brake-shoe pull-off springs force the wheel cylinder pistons to retract, thus withdrawing the brake liners from contact with the drums.

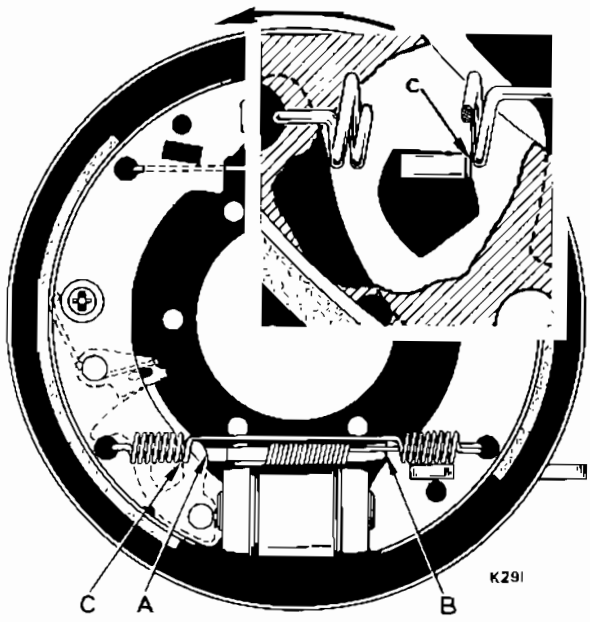
When brake liners and drum are unworn the adjuster plate and ratchet are as shown. The inner edges of the adjuster plate and the leading shoe web butt against the shoulders of the cross-lever at A and B. Running clearance is controlled by the gap C between the projection in the cross-lever and the inner edge of the slot in the adjuster plate.

When significant lining wear occurs the combined movement of the shoes to contact the drum exceeds gap C. The cross-lever, which is spring-loaded to bear on the shoe web at B, is carried with the leading shoe to close gap C, thereby rotating the lower adjuster plate inwards against the upper spring-loaded adjuster plate or pawl. The ratchet serrations prevent loss of the new relationship until further liner wear causes adjustment to take place.

On release of fluid pressure the shoes retract to butt against the shoulders of the cross-lever at A and B, thus maintaining running clearance proportionate to gap C.







Pressure differential warning actuator (P.D.W.A.) switch

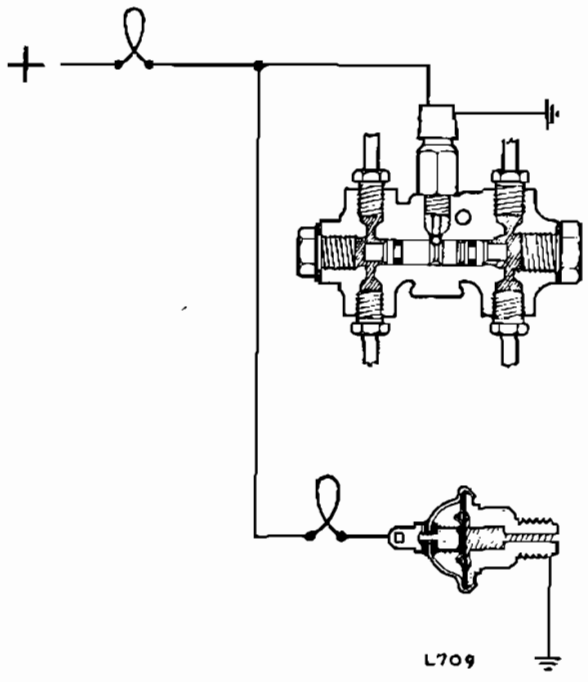
A pressure differential warning actuator (P.D.W.A.) switch located on the inside front wing valance opposite the master cylinder provides a sensing junction through which the fluid supply to both front and rear brakes is routed. A defect occurring in either front or rear brake circuit causes a shuttle to be displaced which operates a red warning light on the fascia.

Once displaced, the shuttle will remain out-of-centre until the system defect is rectified and action is taken to re-centralize the shuttle.

The P.D.W.A. switch is wired to employ a single brake warning light which provides:

a. A bulb/wiring check circuit—ignition 'ON'—engine stationary.
In this condition (normal—no brake defect—the shuttle is centred, and the P.D.W.A. switch is open circuit), both the oil warning light and the brake warning light are operated via the earth connection across the oil pressure switch. The resistance of the oil light causes the brake light to glow dimly.

b. Brake defect circuit—ignition 'ON'—engine running.
With the engine running, oil pressure actuates the oil switch, breaking the earth connection and thus extinguishing both oil and brake warning lights.
Should a brake defect occur (for example, a front hose burst), when the brake pedal is depressed, hydraulic pressure will operate the rear brakes, but due to the burst front hose will spill brake fluid from the front circuit.
With hydraulic pressure on one side of the P.D.W.A. shuttle and zero resistance on the other the shuttle will be displaced, i.e. moved out-of-centre.
Displacement of the shuttle causes the P.D.W.A. switch to operate placing an earth on either side on the brake warning light circuit and inhibiting the oil light circuit. The brake warning light, thus freed of the resistance of the oil light, will shine brightly.



REAR DRUM

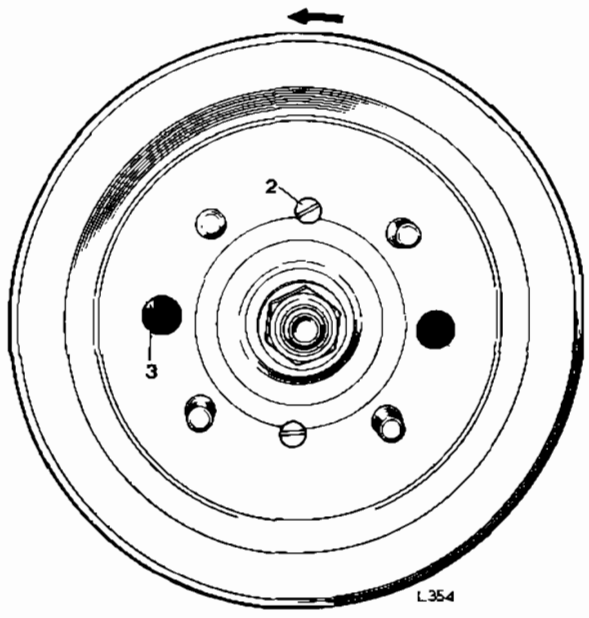
—Remove and refit **70.10.03**

Removing

1. Remove the road wheel and release the hand brake.
2. Remove two countersunk screws securing the brake-drum to the hub flange.
3. Withdraw the brake-drum. Where difficulty is experienced due to worn brake-drums, release the self-adjusting mechanism by lifting the ratchet pawl. A hole is provided in the brake-drum for this purpose.

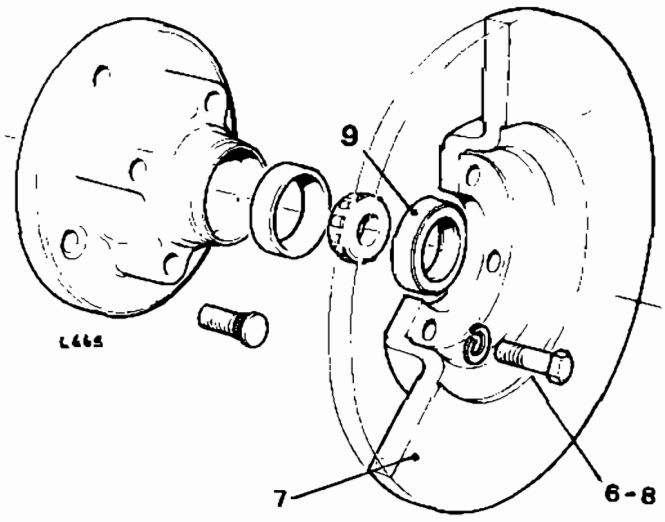
Refitting

4. Reverse operations 1 to 3.
5. Operate the brake pedal several times to adjust the brakes.



FRONT DISC

—Remove and refit **70.10.10**



Removing

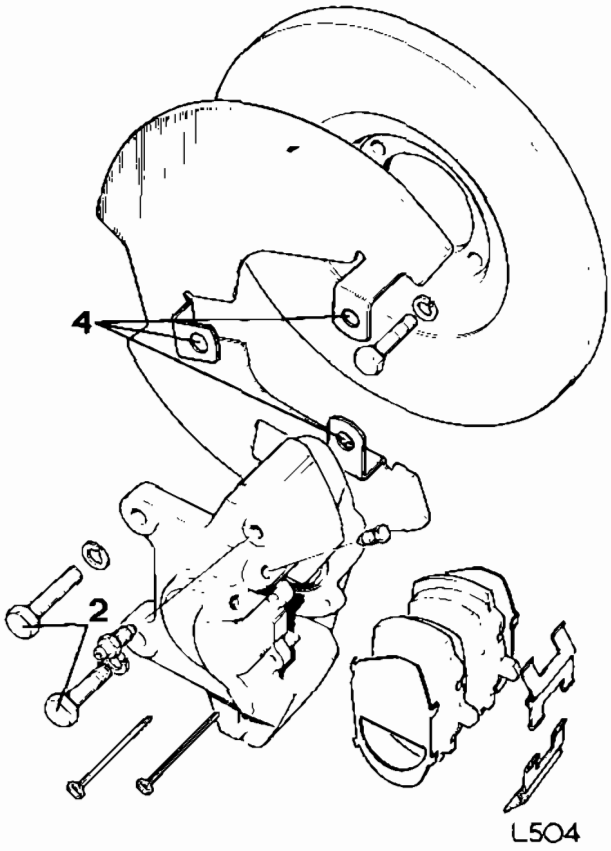
1. Remove front wheel.
2. Remove two bolts and spring washers securing the brake calliper lugs to vertical link.
3. Withdraw calliper. Avoid straining the brake hose.
4. Prise off hub cap and remove cotter pin, slotted nut, and washer.
5. Withdraw hub and brake disc.
6. Remove four bolts and spring washers to release brake disc from hub.

Refitting

7. Assemble disc to hub with dished base of disc adjacent to hub.
8. **Fit and tighten four bolts and spring washers to a torque of 26 to 34 lbf ft (3·6 to 4·7 kgf m).**
9. Renew the hub oil seal and fit hub and bearings to the stub axle. 60.25.01.
10. Using a dial gauge, check disc run-out. This should not exceed 0·1524 mm (0·006 in) total indicator reading measured 12·7 mm (0·50 in) from periphery.
11. Fit the brake calliper and brake pads.
12. Fit the road wheel.

FRONT DISC SHIELD

—Remove and refit **70.10.18**



Removing

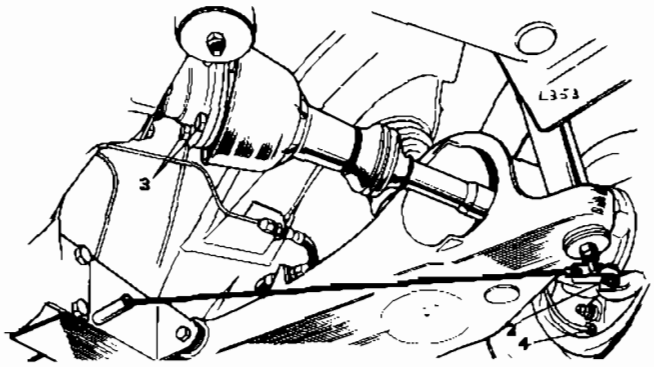
1. Remove front wheel.
2. Remove two bolts securing the calliper lugs to the vertical link and slacken the remaining three bolts securing the damper flange to vertical link.
3. Remove the bolt securing steering-arm to vertical link and slacken the Nyloc nut securing steering-arm to the inner end of the stub axle.
4. Ease disc shield supporting lugs clear of vertical link and withdraw the disc shield.

Refitting

5. Reverse instructions 1 to 4.

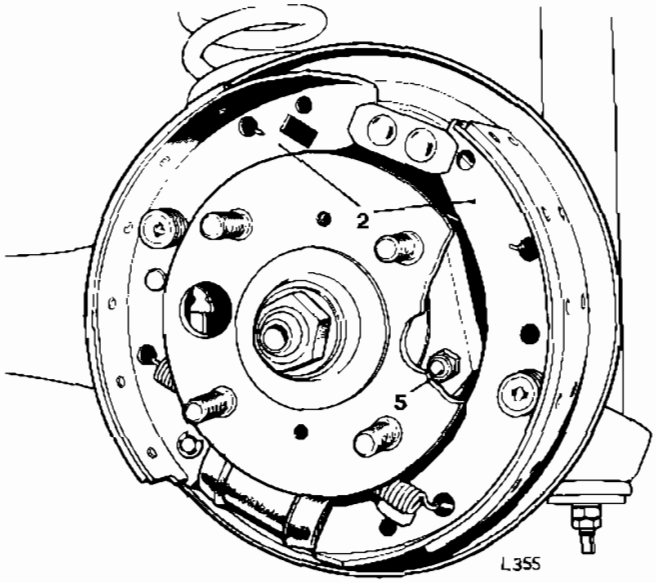
REAR BRAKE BACKPLATE

—Remove and refit **70.10.26**



Removing

1. Remove the rear road wheel and brake-drum.
2. Remove brake-shoes and disconnect the hand brake cable at backplate.
3. Disconnect the drive shaft inner flange at differential.
4. Disconnect brake pipe union at rear brake cylinder.
5. Remove six nuts securing the rear hub bearing housing and backplate to the trailing arm.
6. Withdraw the hub complete with drive shaft.
7. Withdraw brake backplate.



Refitting

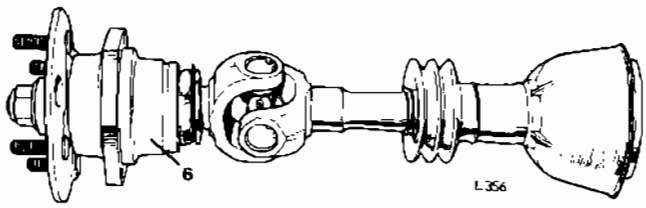
8. Reverse instructions 1 to 7.
9. Bleed brakes.

HOSE—FRONT—LEFT-HAND **70.15.02**

HOSE—FRONT—RIGHT-HAND **70.15.03**

—Remove and refit

To aid identification of individual components, operation numbers are included in the illustration showing brake general arrangement (see next page).



Removing

1. Disconnect pipe from flexible hose.
2. Using two spanners remove locknut and washer securing flexible hose to support bracket on front cross-member.
3. Unscrew hose from brake calliper.

Refitting

4. Reverse instructions 1 to 3. Ensure hose is neither kinked nor twisted when installed.
5. Bleed brakes.

HOSE—REAR—L.H. (R.H. STEER) 70.15.17

—R.H. (L.H. STEER)

—Remove and refit

Removing

1. Using two spanners, disconnect pipe union from flexible hose.
2. Unscrew flexible hose from 3-way connector.

Refitting

3. Reverse instructions 1 and 2. The hose must not be kinked or twisted when installed.
4. Bleed brakes.

HOSE—REAR—R.H. (R.H. STEER) 70.15.18

—L.H. (L.H. STEER)

—Remove and refit

Removing

1. Using two spanners, disconnect pipe unions from flexible hose.

Refitting

2. Connect flexible hose to pipe unions. The hose must not be twisted or kinked when installed.
3. Bleed brakes.

CONNECTOR—REAR—3-WAY

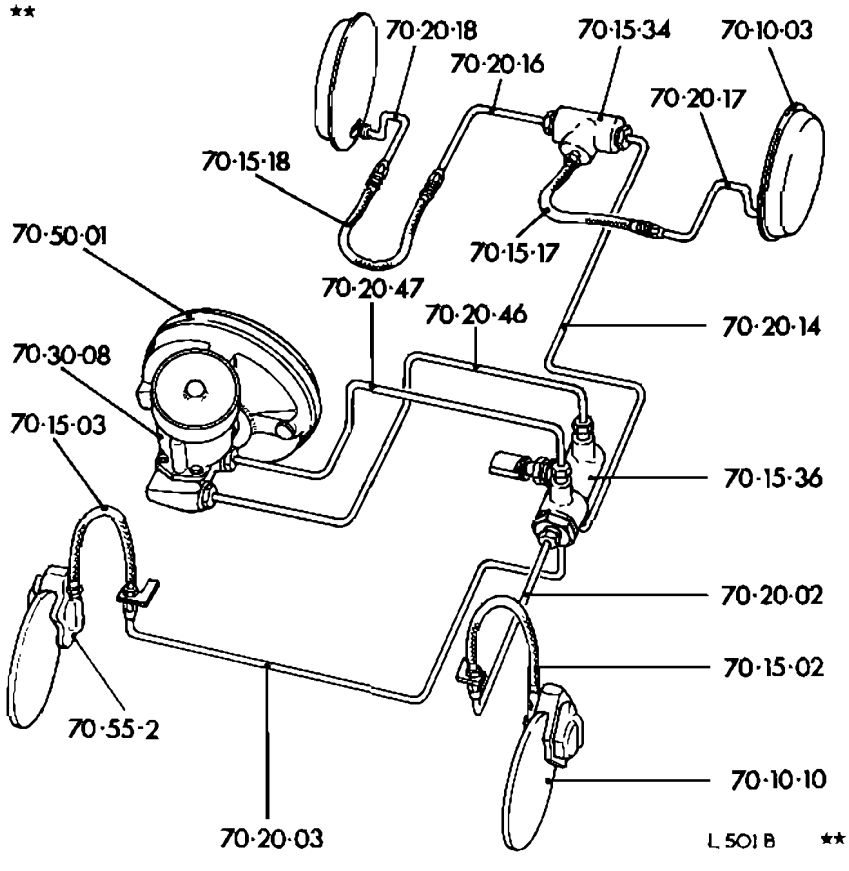
—Remove and refit 70.15.34

Removing

1. Disconnect hydraulic pipe unions.
2. Disconnect flexible hose. 70.15.18.
3. Remove bolt securing 3-way connector.

Refitting

4. Reverse instructions 1 to 3.
5. Bleed brakes.



P.D.W.A. SWITCH

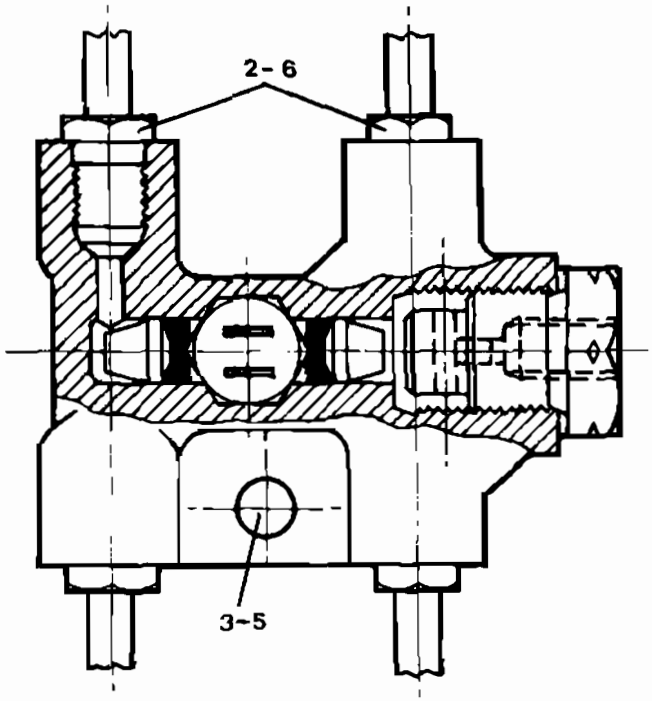
—Remove and refit **70.15.36**

Removing

1. Release the snap connector from P.D.W.A. unit located on inside wing valance on opposite side of car to master cylinder.
2. Disconnect the four brake pipe unions at P.D.W.A. unit.
3. Remove the single bolt and nut securing P.D.W.A. unit to wing valance.
4. Withdraw P.D.W.A. unit.

Refitting

5. Install and tighten the single bolt and nut securing P.D.W.A. unit to wing valance.
6. Connect and tighten four brake-pipe unions.
7. Fit snap connector to P.D.W.A. terminal.
8. Top up master cylinder reservoir and bleed brakes.
9. Check operation of brake warning light to ensure P.D.W.A. shuttle is centralized.



P.D.W.A. SWITCH

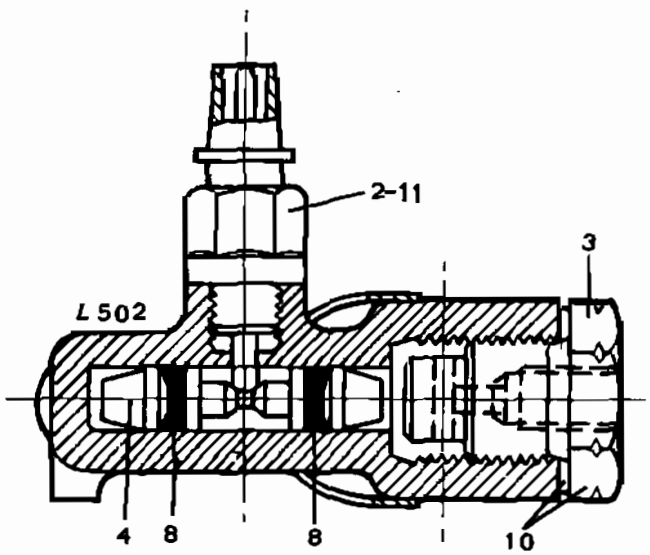
—Overhaul **70.15.41**

Dismantling

1. Remove P.D.W.A. switch from vehicle. 70.15.36.
2. Unscrew and remove switch unit from shuttle housing.
3. Unscrew and remove end-plug from shuttle housing.
4. Gently tap out shuttle from housing. It may be found advantageous to use a low pressure air-line for this purpose.
5. Thoroughly clean all components. Do not immerse electrical switch in cleaning fluid.
   Examine shuttle bore for wear or damage. A defective bore will necessitate renewal of the complete assembly.
6. Remove rubber seals from shuttle.

Reassembling

7. Lubricate housing bore, shuttle and new rubber seals with brake fluid or equivalent silicone grease.
8. Install new rubber seals on shuttle, ensuring seal lips are fitted adjacent to brake circuit unions.
9. Insert shuttle into housing.
10. Fit new copper washer and end-plug to housing. Tighten plug to 2·30 to 2·53 kgf m (200 to 220 lbf in).
11. Fit switch to housing. Tighten to 0·17 kgf m (15 lbf in).
12. Ensure a good earth connection exists between housing and vehicle.



HYDRAULIC PIPES

To aid identification of individual components operation numbers are included in the illustration showing brake general arrangement.

Pipe to L.H. front hose—Remove and refit 70.20.02

Pipe to R.H. front hose—Remove and refit 70.20.03

Pipe to rear 3-way connector—Remove and refit 70.20.14

Pipe to rear R.H. hose (R.H. Steer) —Remove and refit 70.20.16

Pipe to rear L.H. hose (L.H. Steer) —Remove and refit

Pipe to rear L.H. wheel cylinder —Remove and refit 70.20.17

Pipe to rear R.H. wheel cylinder— —Remove and refit 70.20.18

Pipe to P.D.W.A. switch—front brakes —Remove and refit 70.20.46

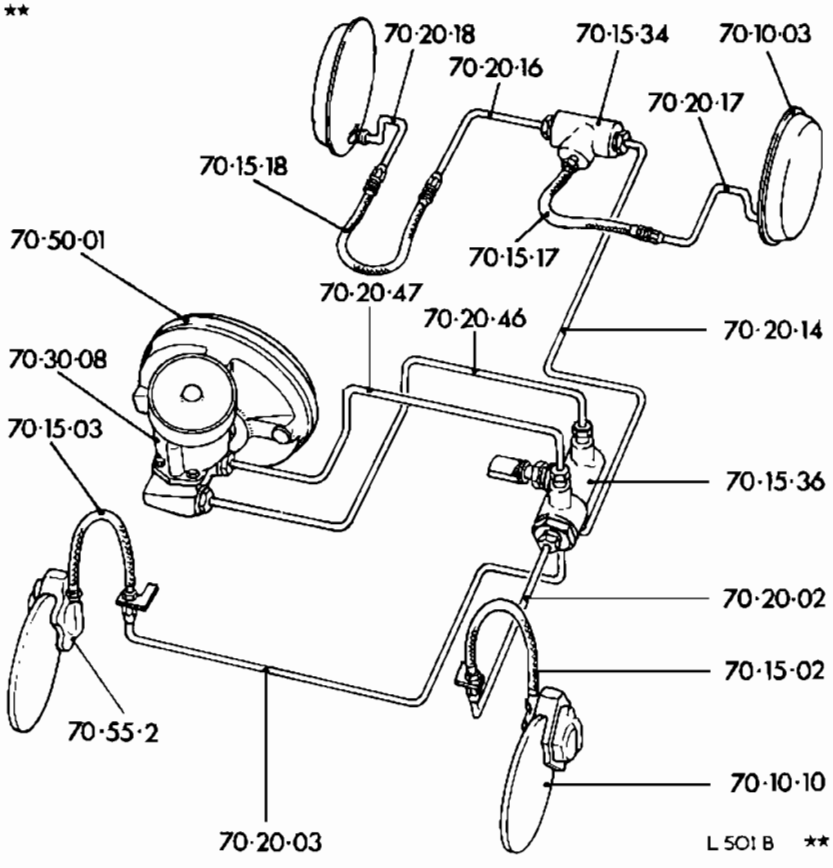
Pipe to P.D.W.A. switch—rear brakes —Remove and refit 70.20.47

Removing

1. Disconnect unions at both ends of pipe.
2. Release pipe from securing clips.

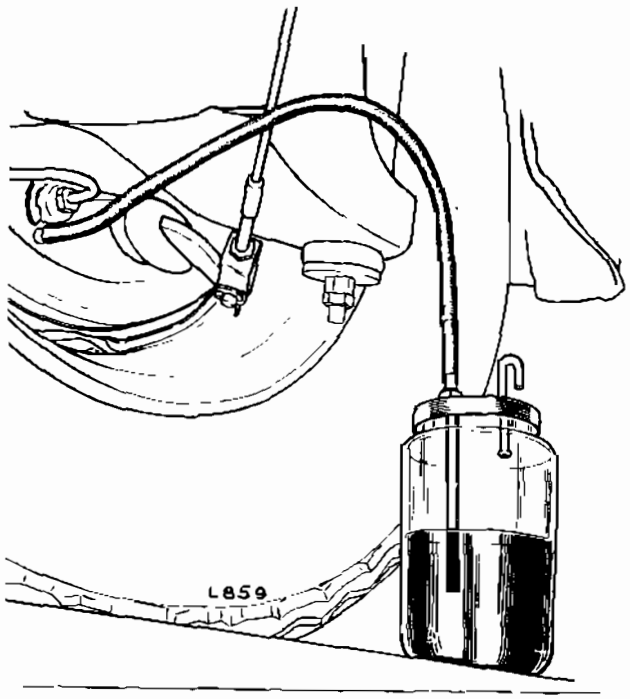
Refitting

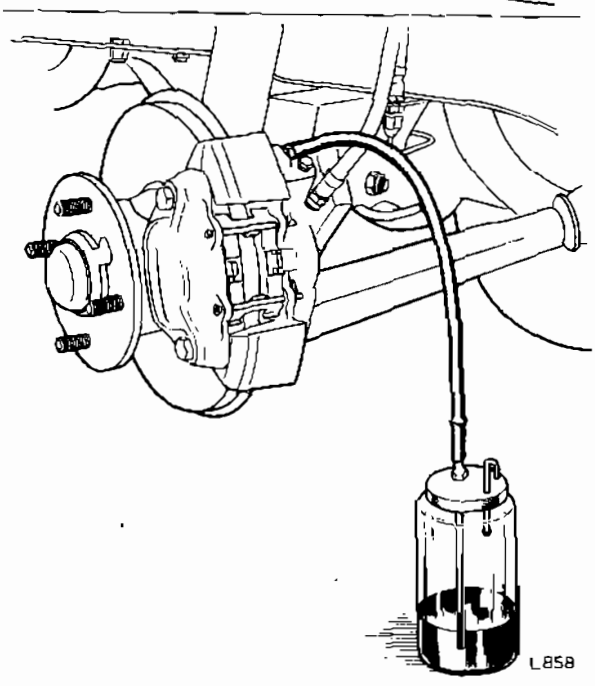
3. Reverse instructions 1 and 2.
4. Bleed brakes.



BRAKES—BLEED 70.25.02

1. Ensure reservoir is fully topped up.
2. Attach bleed tube to nipple of rear wheel cylinder farthest from master cylinder, allowing free end of tube to hang submerged in brake fluid in a transparent container.
3. Slacken bleed nipple (90 to 180° is usually adequate) and depress brake pedal using light pedal pressure. Do not use the full travel of the brake pedal as this may cause the shuttle of the P.D.W.A. switch (70.15.00) to be decentralized.
   Allow pedal to return to its idle position and again depress lightly. Continue until discharge from the bleed tube is free of air.
4. Hold pedal depressed, tighten bleed nipple, and release pedal.
5. Repeat above procedure on wheel cylinder on opposite rear backplate.
6. Attach bleed tube to front disc calliper farthest from master cylinder.
7. Again, using light pressure on pedal, depress and release until air bubbles cease to issue from bleed tube.
8. Hold pedal depressed and tighten bleed nipple. Release pedal.
9. Repeat operations 6 to 8 on opposite front calliper.
10. Check level of fluid in reservoir and top up if required.
    Do not use the aerated, and possibly contaminated, fluid discharged from the wheel/calliper cylinders for this purpose.
11. Check centralization of P.D.W.A. switch. Re-centre shuttle if necessary by opening bleed nipple on axle opposite to which the P.D.W.A. shuttle is displaced and depressing brake pedal until shuttle is felt to click to centre. If the ignition is switched 'ON', the brake warning light will be seen to dim when the shuttle moves to centre. When this occurs further pressure must not be applied to the brake pedal. Close bleed nipple and release brake pedal.
12. Check and top up reservoir as necessary.





MASTER CYLINDER

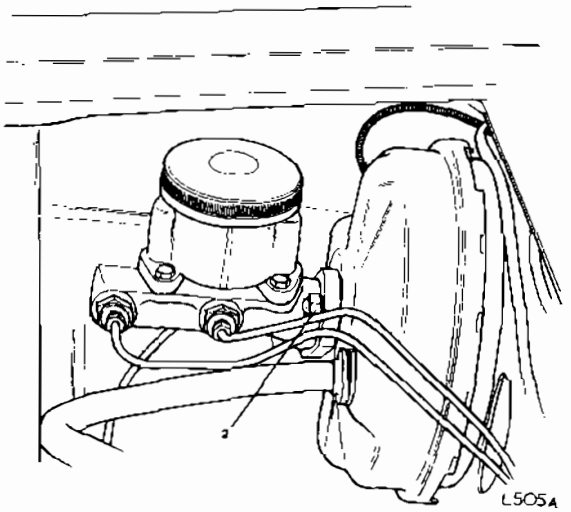
—Remove and refit 70.30.08

Removing

1. Remove servo and master cylinder complete from car. 70.50.01.
2. Remove the two nuts and spring washers securing master cylinder mounting flange to servo.
3. Withdraw master cylinder from servo.

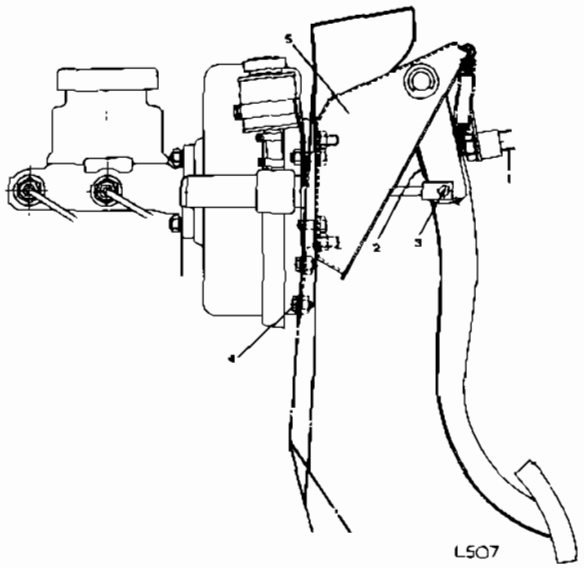
Refitting

4. Reverse instructions 1 to 3.



PEDAL ASSEMBLY

—Remove and refit **70.35.01**



Removing

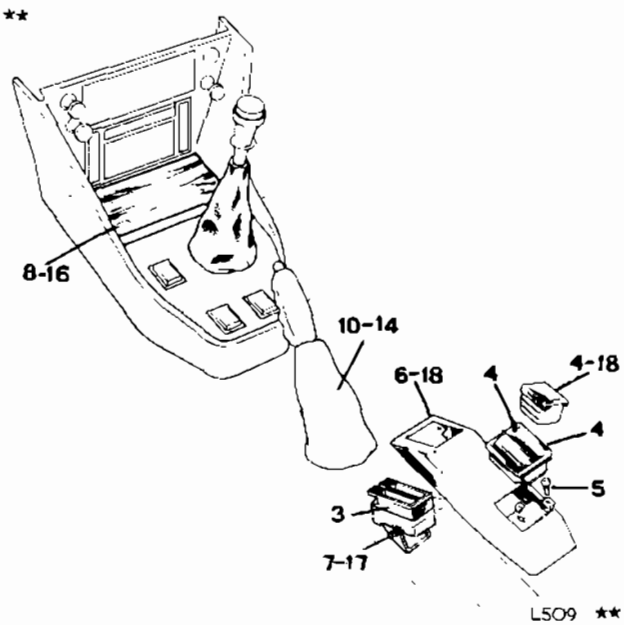
1. Disconnect wires from brake switch.
2. Remove cotter pin and clevis pin linking brake pedal to master cylinder push-rod.
3. Remove cotter pin and clevis pin linking clutch pedal to clutch cylinder push-rod (manual gearbox only).
4. Remove the 10 bolts, nuts and spring washers securing pedal assembly to scuttle.
5. Withdraw pedal assembly.

Refitting

6. Reverse instructions 1 to 5.

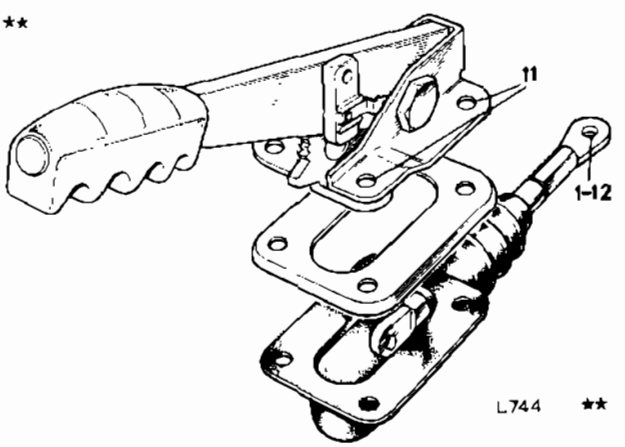
HAND BRAKE LEVER

—Remove and refit **70.35.08**



Removing

1. Disconnect hand brake cable at brake backplate and compensator link.
2. Remove both front seats. 76.70.04 and 76.70.05.
3. Release safety belts from buckle clamp.
4. Lift out container from rear ashtray, remove two screws from ashtray casing and lift out casing.
5. Remove the screw below ashtray casing.
6. Remove ashtray console from transmission tunnel and expose safety belt buckle clamp.
7. Remove two bolts securing buckle clamp.
8. Prise off console panel in front of gear lever and remove the two screws revealed.
9. Lift carpet to obtain access to hand brake bracket.
10. Open hand brake glove and disconnect hand brake switch.
11. Remove four bolts securing hand brake bracket to floor and withdraw hand brake assembly.



Refitting

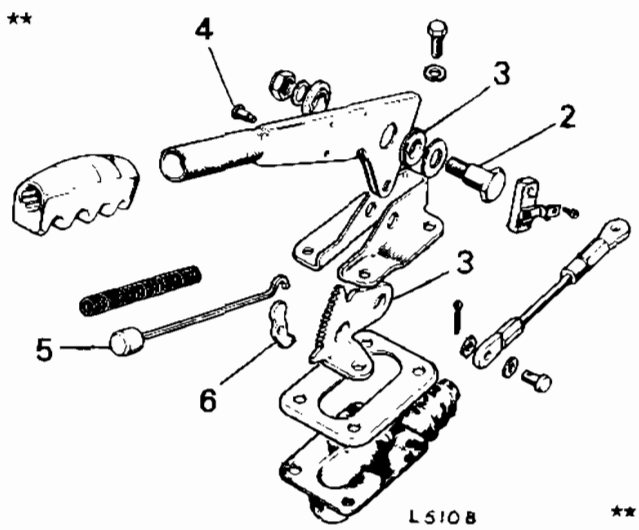
12. Connect hand brake-rod to cable compensator. and secure with clevis pin and new cotter pin.
13. Fit hand brake lever to floor of car.
14. Slide glove over hand brake lever, attach warning light connectors and close glove.
15. Fit carpet.
16. Fit console panel in front of gear lever.
17. Fit buckle clamp.
18. Fit ashtray console and ashtray.
19. Attach safety belts to buckle unit.
20. Fit both front seats. 76.70.04 and 76.70.05.
21. Connect hand brake cable to brake backplate lever.

HAND BRAKE LEVER, PAWL AND RATCHET

—Remove and refit **70.35.09**

Removing

1. Remove hand brake lever assembly. 70.35.08.
2. Remove Nyloc nut and fulcrum pin from hand brake mounting bracket.
3. Withdraw ratchet and bushes from hand brake lever.
4. Drill or file riveted end of pawl fulcrum pin until end of pin is flush with hand brake lever.
5. Depress hand brake button and retain in this position with tape.
6. Remove pawl fulcrum pin and withdraw pawl.



Refitting

7. Enter new pawl in hand brake lever ensuring curved end of pawl engages lever release rod, and teeth of pawl are towards base of hand brake lever.
8. Fit new fulcrum pin to pawl and hand brake lever, and secure by riveting.
9. Fit ratchet and bushes to hand brake lever.
10. Fit hand brake bracket, and fulcrum pin.
11. Remove tape from release button.
12. Refit hand brake lever to car. 70.35.08.

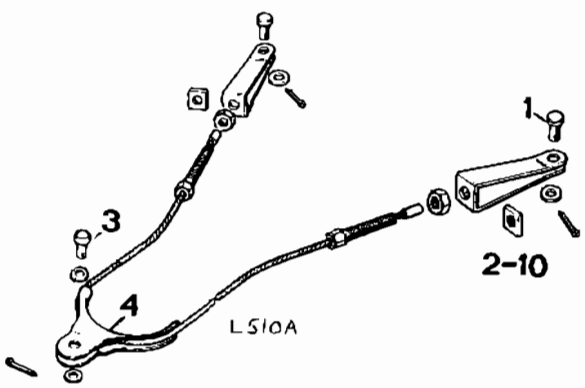
HAND BRAKE CABLE

—Adjust **70.35.10**

—Remove and refit **70.35.16**

Removing

1. Remove clevis pins securing hand brake cable ends to operating levers on brake backplates.
2. Unscrew cable yokes and locknuts from cable ends.
3. Remove cotter pin and clevis pin securing compensator to hand brake lever cable.
4. Release compensator from cable.
5. Withdraw cable from car.



Refitting

6. Reverse instructions 1 to 5.
7. Adjust hand brake cable.

Adjusting

8. With hand brake released and car static laden, examine slack in hand brake cable.
9. Disconnect hand brake cable at rear brake backplate.
10. Adjust cable ends so that clevis pins connecting cable to brake operating levers on backplate can be inserted without difficulty while slack in cable is lightly drawn by hand.

EAR BRAKE-SHOES

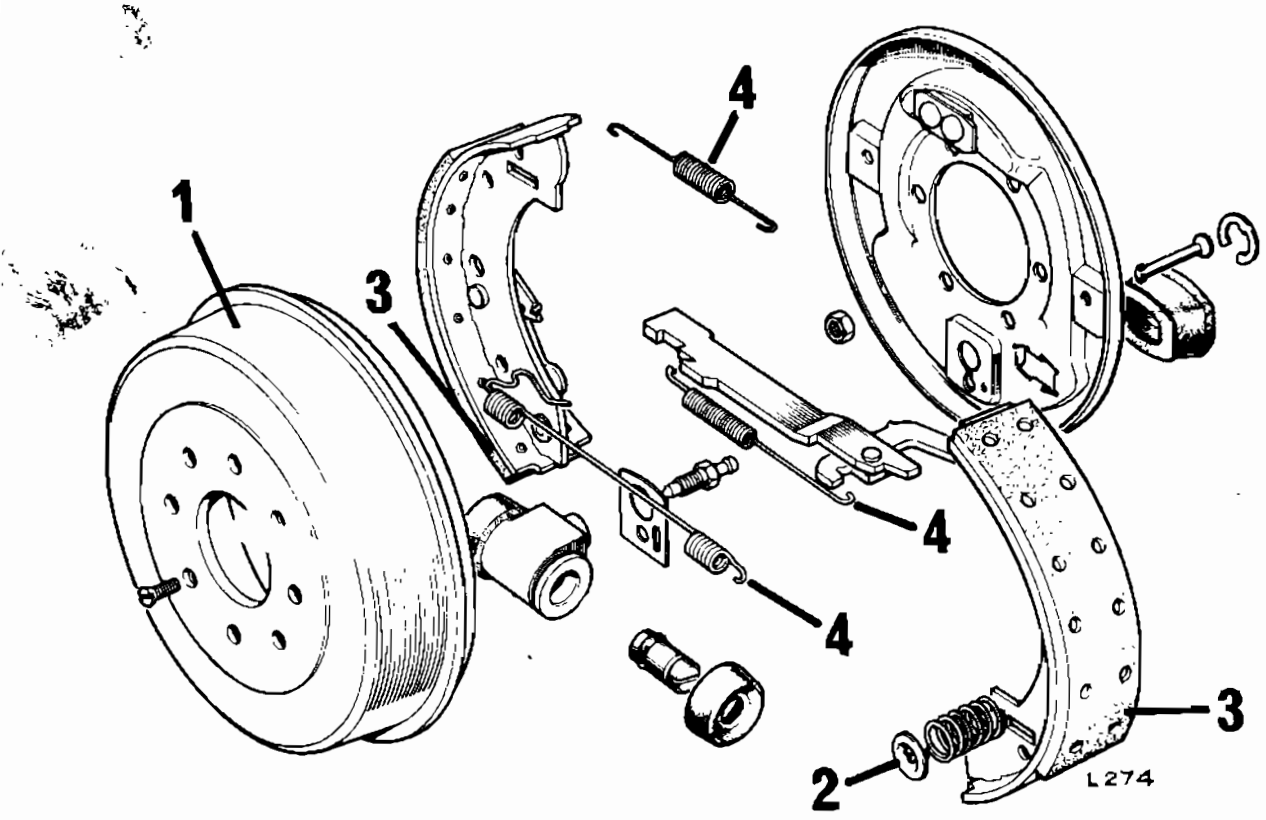
—Remove and refit **70.40.03**

Removing

1. Release hand brake, remove two countersunk screws securing brake-drum and withdraw brake-drum. When brake-drum removal is found to be difficult due to wear or ridging, rotate drum until self-adjusting ratchet mechanism is visible through hole in drum flange, and lever the adjuster plate upwards to release ratchet.
2. Remove shoe steady pin cups and springs and extract shoe steady pins from rear of backplate.
3. Ease toe of leading shoe and heel of trailing shoe clear of wheel cylinder.
4. Unhook the pull-off springs, the cross-lever tension spring, and withdraw brake-shoes.
   To avoid possible ejection of wheel cylinder pistons restrain them in position with a twist of wire or a suitable clamp.

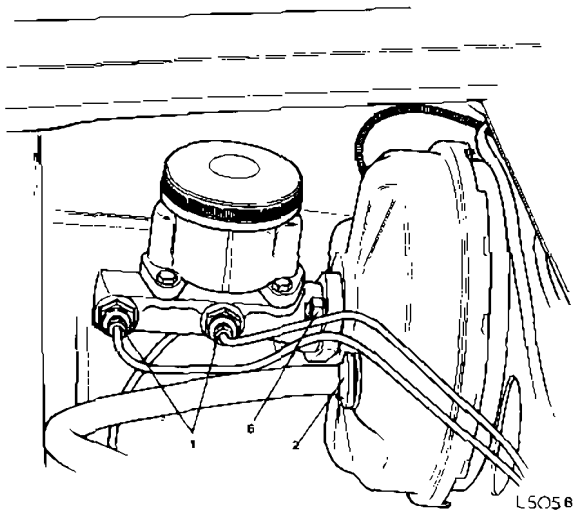
Refitting

5. Reverse instructions 1 to 4, ensuring that the upper pull-off spring is fitted inboard.
   Do not lubricate ratchet teeth on adjuster plates.
   The functioning of the adjuster can be checked by gently operating the foot brake with the drum removed. Following expansion of the brake-shoes the ratchet will be seen to operate. Brake-shoes expansion can be cancelled by raising the ratchet plate to separate the ratchet teeth and allowing the pull-off springs to retract the shoes.
6. Operate foot brake several times to adjust rear brakes.



BRAKE SERVO

—Remove and refit **70.50.01**



Removing

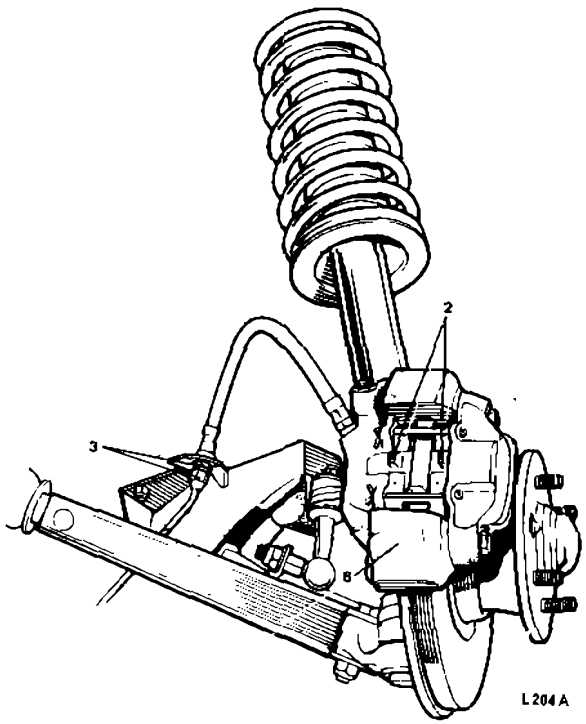
1. Disconnect master cylinder pressure outlet unions.
2. Detach vacuum pipe from servo.
3. Remove clevis pin linking servo push-rod to brake pedal.
4. Remove the four nuts and spring washers securing servo to brake pedal bracket.
5. Withdraw servo complete with master cylinder.
6. Separate master cylinder from servo. 70.30.08.

Refitting

7. Reverse instructions 1 to 6.
8. Bleed brakes. 70.25.02.

FRONT CALLIPER

—Remove and refit **70.55.02**



Removing

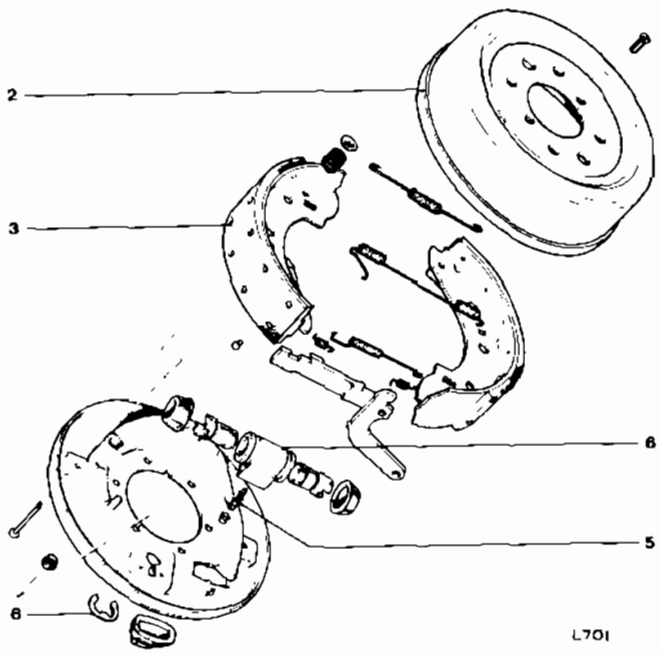
1. Remove road wheel.
2. Remove brake pads from calliper.
3. Disconnect calliper flexible hose at 'Bundy' tubing and release hose from locating bracket.
4. Remove two bolts securing calliper lugs to vertical link.
5. Slacken the remaining three bolts securing damper flange to vertical link.
6. Withdraw brake calliper.

Refitting

7. Reverse instructions 1 to 6.
8. Bleed brakes. 70.25.02.

REAR BRAKE CYLINDER

—Remove and refit **70.60.18**



Removing

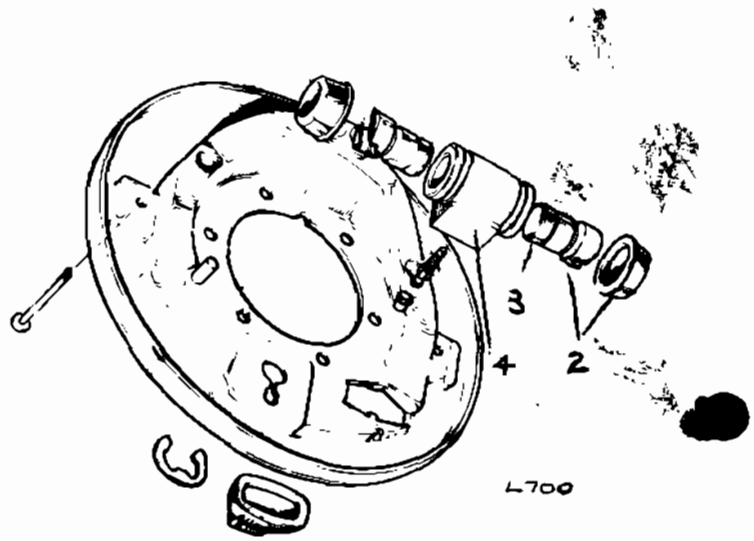
1. Remove road wheel.
2. Remove brake-drum. 70.10.03.
3. Remove brake-shoes. 70.40.03.
4. Disconnet fluid supply at wheel cylinder.
5. Remove bleed nipple from wheel cylinder.
6. Detach spring clip (at rear of backplate) from wheel cylinder and withdraw cylinder and gasket.

Refitting

7. Reverse instructions 1 to 6.
8. Bleed brakes. 70.25.02.

REAR BRAKE CYLINDER

—Overhaul **70.60.26**



Dismantling

1. Remove brake-shoes. 70.10.03.
2. Withdraw pistons and rubber boots from wheel cylinder.
3. Remove boot, and seal from pistons.

Reassembling

4. Thoroughly clean cylinder and pistons and examine for wear, scoring and corrosion. Renew the complete wheel cylinder assembly if components are found unsuitable for further service.
5. If pistons and cylinder bore are undamaged, fit new seals to piston (seal lip facing away from slot on piston).
6. Lubricate cylinder bore and pistons with clean brake fluid and fit rubber boot to piston.
7. Partially fill interior of boots with approved lubricant and insert pistons into cylinder.
8. Fit boots to cylinder.
9. Fit brake-shoes, brake-drum and road wheel.
10. Bleed brakes. 70.25.02.

WHEEL AND TYRE OPERATIONS

General 74.00.00

Road wheel—remove and refit 74.20.01

WHEELS AND TYRES 74.00.00

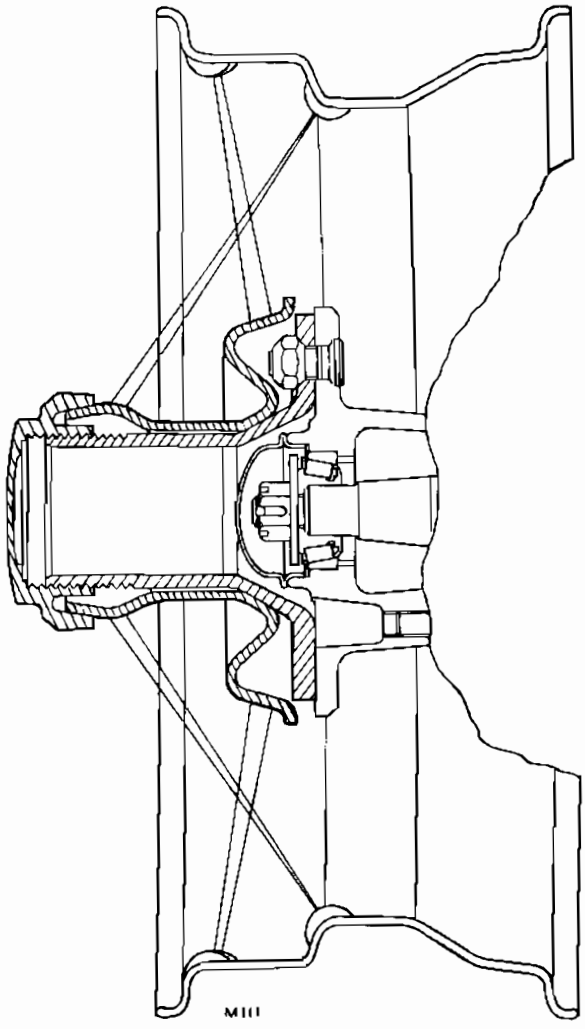
Original equipment 74.00.01

Original wheel and tyre equipment is as follows:

Pressed steel wheels. Wide base 5 in (127 mm) J rims incorporating a flat humped rim and fitted with 185 HR—14 tubeless, radial tyres.

Wire wheels. Wide base 5·½ in (139·7 mm) J rims, 72 (inner 24, outer 48) spokes, incorporating a flat safety ledge and fitted with a rubber rim band and 185 HR—14 tubed tyres.

If hub extensions are removed and intermixed, it is essential that left-hand-threaded members are fitted to right-hand side of car, and right-hand-threaded members to left-hand side of car.



Wire wheels—servicing 74.00.02

It is recommended that the servicing and reconditioning of wire wheels is entrusted to those who are equipped to fulfil this specialist function. It is pointed out that the renewal of a single broken spoke may necessitate extensive re-adjustment to spoke tension throughout the wheel.

Outer and inner nipples must not protrude more than 0·040 in (1·02 mm) and 0·060 in (1·524 mm) respectively above the tyre seat face. All nipple heads must be free of burrs before refitting tyres.

Front, or outer spokes must have an average torque of not less than 42 lbf in (0·48 kgf m).

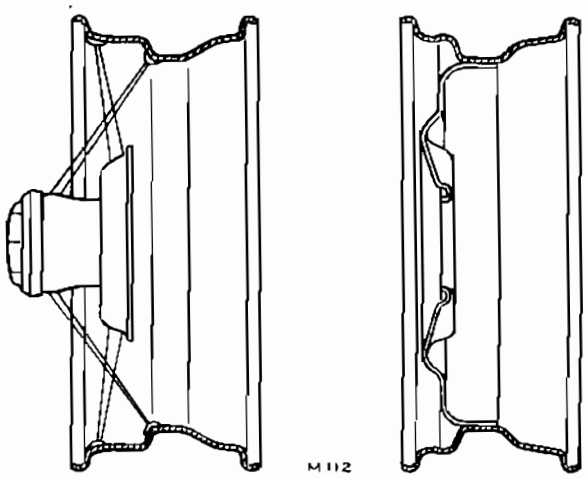
Rear, or inner spokes must have an average torque of not less than 54 lbf in (0·62 kgf m).

When correctly tightened and conforming to concentric and lateral tolerances nipples must not 'bottom' on spoke threads.

Wheel tolerance and balance 74.00.03

Tyres and wheels should be balanced to within 4 oz in. Balance weights are available in ½ oz steps from ½ to 3 oz.

Wheel eccentricity and wobble should not exceed 0·050 in (1·27 mm) for wire wheels, and 0·045 in (1·143 mm) for pressed steel wheels.



Tyres 74.00.04

Radial-ply tyres are fitted to both pressed steel and wire wheels. The fitting of cross-ply tyres or the mixing of cross-ply and radial are not recommended.

Snow chains must not be fitted to the car unless tyre sizes are changed to 175 HR—14.

To avoid damage to tyre beads, removal and refitting must be carried out as follows:

Wire wheels—narrow ledge inboard, remove and refit tyre over inboard ledge.

Pressed steel wheels—flat humped rim type—narrow ledge outboard, remove and refit tyre over outboard ledge.

ROAD WHEEL

—Remove and refit **74.20.01**

Pressed steel wheel

Removing

1. Apply hand brake and jack up car.
2. Remove wheel trim.
3. Remove four nuts securing wheel to hub and withdraw wheel from studs.

Refitting

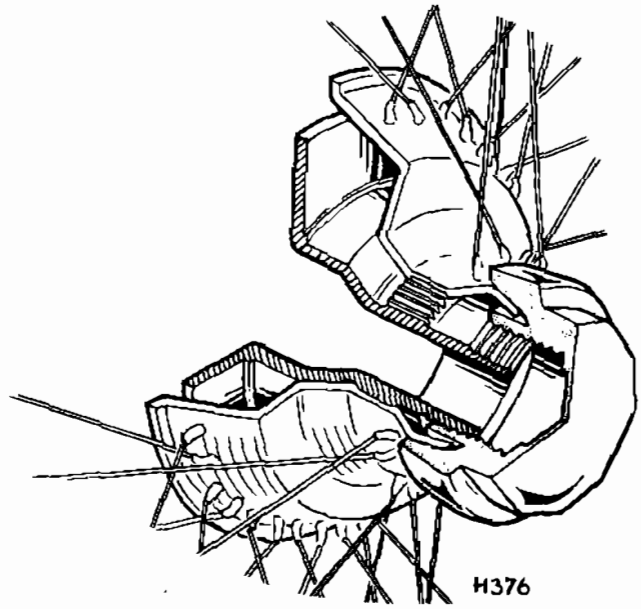
4. Ensure mating faces of hub and wheel are clean.
5. Align wheel mounting holes and hub studs and fit wheel to car.
6. Fit wheel nuts, ensuring tapered face of nut is adjacent to wheel.
7. Evenly tighten wheel nuts.
8. Fit wheel trim and remove jack.

Wire wheels

—Remove and refit

Removing

1. Apply hand brake and jack up car.
2. Fit spanner to hub nut and slacken nut by tapping spanner in direction wheel rotates when car is travelling in forward direction. This instruction remains true regardless of whether the wheel concerned is fitted left- or right-hand side.
3. Remove hub nut and withdraw wheel from splined hub extension.



Refitting

4. Ensure splines and conical mating faces of hub extension wheel and hub nut are clean and smeared with Poly Butyl Cuprasyl (PBC) grease.
5. Offer up wheel to hub extension, engage splines and slide into contact with hub.
6. Fit hub nut and tighten with spanner and soft-headed hammer **against** direction in which wheel rotates when travelling in forward direction.
7. Remove jack.

BODY OPERATIONS

Ashtray—rear—remove and refit	76.67.14
'B' post capping—remove and refit	76.43.34
'B' post trim—remove and refit	76.13.08
Body side trim panel—remove and refit	76.13.03
**Body unit—alignment check	76.10.01**
Bonnet—remove and refit	76.16.01
**Bonnet catch—adjust	76.16.20**
Bonnet catch control cable—remove and refit	76.16.29
**Bonnet catch—remove and refit	76.16.34**
Bonnet insulation pad—remove and refit	76.16.06
**Bonnet lock—remove and refit	76.16.21**
**Bonnet stay—remove and refit	76.16.14**
Bumper—front—remove and refit	76.22.08
Bumper—rear—remove and refit	76.22.15
Carpet—gearbox cover—remove and refit	76.49.01
**Carpet—rear floor—remove and refit	76.49.03**
Console assembly—remove and refit	76.25.01
Door—remove and refit	76.28.01
Door check wire—remove and refit	76.40.27
Door glass and glass frame—remove and refit	76.31.01
Door glass regulator—remove and refit	76.31.45
Door hinges—remove and refit	76.28.42
Door lock remote control and linkage—remove and refit	76.37.31
Door lock—remove and refit	76.37.12
**Door lock striker—remove and refit	76.37.23**
**Door mirror—remove and refit	76.10.52**
Door outside handle—remove and refit	76.58.01
Door trim panel—remove and refit	76.34.01
Exterior mouldings—remove and refit	76.43.06
Fascia—remove and refit	76.46.01
Front cross-member—remove and refit	76.10.05
Glovebox and lid assembly—remove and refit	76.52.01
Glovebox lock—remove and refit	76.52.08
**Hard top—remove and refit	76.61.01**
Heated back-light glass and/or sealing rubber—remove and refit	76.81.11
Hood release catch cable—inner—remove and refit	76.61.21

continued

BODY OPERATIONS—*continued*

Luggage compartment lid—remove and refit	76.19.01
Luggage compartment lid lock—remove and refit	76.19.11
Luggage compartment lid lock striker—remove and refit	76.19.12
Luggage compartment lid push-button assembly—remove and refit	76.19.18
Luggage compartment lid springs—remove and refit	76.19.08
Luggage compartment lid/tonneau cover hinges—remove and refit	76.19.07
Over-riders—front—remove and refit	76.22.01
Over-riders—rear—remove and refit	76.22.02
Over-rider buffers—front—remove and refit	76.22.07
Over-rider buffers—rear—remove and refit	76.22.14
Parcel tray—remove and refit	76.67.01
Private lock—remove and refit	76.37.39
Quarter vent—remove and refit	76.31.28
Quarter vent wheelbox—remove and refit	76.31.37
Radiator front grille—remove and refit	76.55.03
Roll-over bar—remove and refit	76.10.44
Roll-over bar trim—remove and refit	76.13.09
Safety harness console—remove and refit	76.25.10
Seat belt—front—automatic—fitting	76.73.09
Seat belt(s)—front—buckle unit—remove and refit	76.73.05
Seat cushion—front—remove and refit	76.70.02
Seat cushion—rear—remove and refit	76.70.37
Seat—front—driver—remove and refit	76.70.04
Seat—front—passenger—remove and refit	76.70.05
Seat runners and adjuster assembly—front—remove and refit	76.70.24
Seat squab—rear—remove and refit	76.70.38
Seat squab catch—remove and refit	76.70.27
Seat squab catch release cable—front—remove and refit	76.70.26
**Sill finisher—remove and refit	76.76.05**
Soft top—remove and refit	76.61.08
Sub-frame—rear—remove and refit	76.10.06
Tonneau cover—remove and refit	76.61.14
Tonneau cover springs—remove and refit	76.61.15
Tonneau cover trim—remove and refit	76.61.16
Tonneau release catch cable—inner—remove and refit	76.61.20
Windscreen glass and/or sealing rubber—remove and refit	76.81.01

** BODY UNIT

—Alignment check 76.10.01

(Using Churchill 700 or 707 system)

Whilst severe underframe damage is readily detected, less serious damage may cause distortion that is not visually apparent.

If steering or suspension checks indicate a fault which cannot be attributed to anything other than underframe distortion, initial checking should be carried out to determine the area and extent of the distortion.

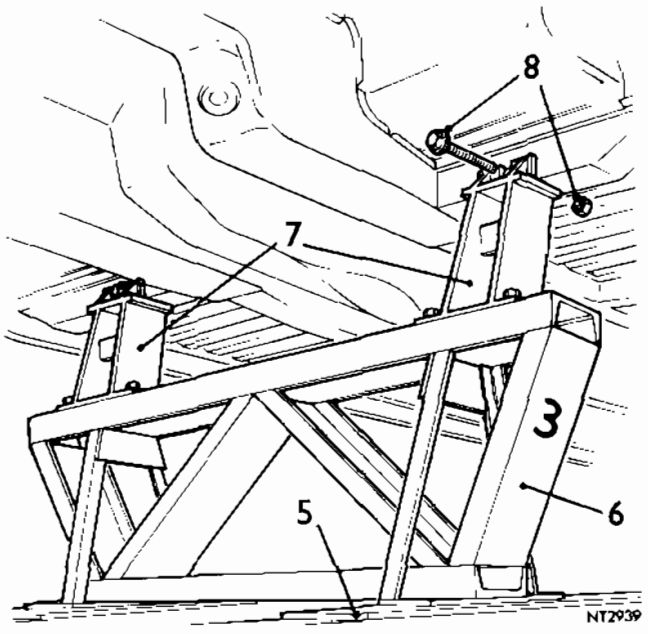
Initial check

1. Clip the location tape on the right-hand side of the jig and make a chalk mark on the floor at each required location for initial checking.
2. Remove the tape to avoid damage.
3. Position the vehicle centrally over the jig with the front wheel centres approximately 30 in (76 cm) from the front of the jig.
4. Raise the front of the vehicle.
5. Fit adaptor plates S.1111/1 to the jig.
6. Fit transverse member No. 3.
7. Fit brackets S.700–35 (L.H.) and S.700–35 (R.H.) to the transverse member, locating the outer bolts in holes 'H'.
8. Fit bolts S.700–35/3 to the body outriggers and lower the body onto the brackets. Do not tighten the nuts.
9. Raise the rear of the vehicle by jacking under the differential housing.
10. Fit adaptor plates S.1111/2 to the jig.
11. Fit transverse member No. 2.
12. Fit brackets S.700–24 (L.H.) and S.700–24 (R.H.) to the transverse member, locating the outer bolts in holes 'C'.
13. Remove the rear outer pivot bolts from the trailing arms. Lower the vehicle onto the brackets and fit pins S[illegible].7313.
14. Remove the pivot bolts from the lower radius arms.
15. Fit transverse member No. 4.
16. Fit brackets S.700–45 (L.H.) and S.700–45 (R.H.) to the transverse member, locating the outer bolts in holes 'G'.
17. Locate the brackets into the cross-member channels and fit pins STN.7313.
18. Tighten the nuts securing the body outriggers to the brackets on transverse member No. 3.

Distortion, if any, of the underframe will now be apparent if the brackets do not engage with the body locations at any point.

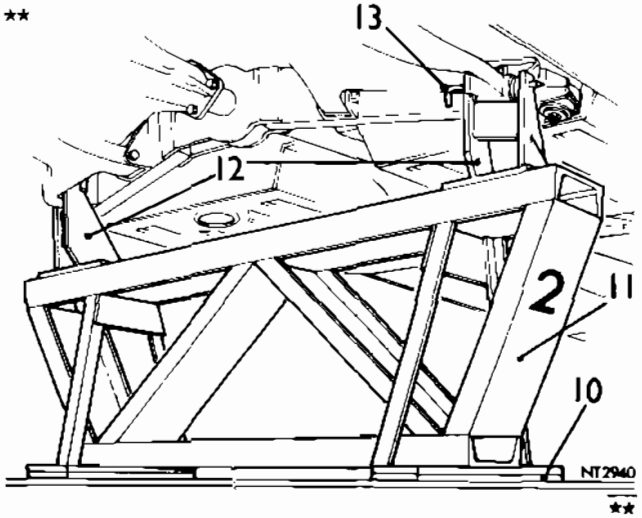
The following operations are only necessary if repairs are required.

continued



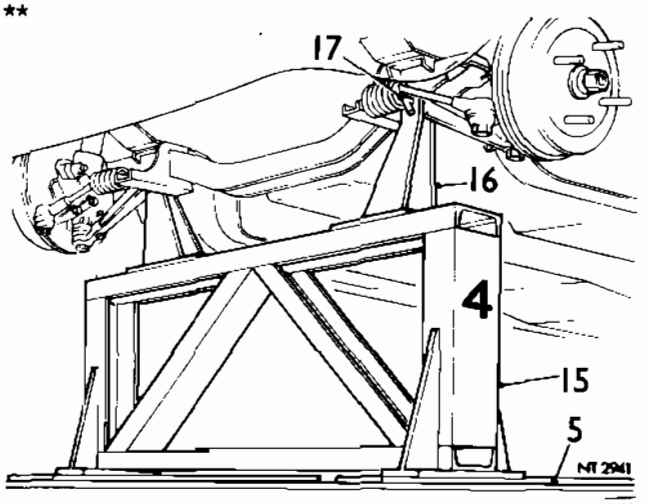
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Repair stage

It may not be necessary to fit the full set of repair brackets. If damage is confined to one end of the car, the repair brackets can be fitted at that end only and the initial check brackets retained at the other end.

Where it is necessary to remove sub-assemblies before fitting repair brackets, reference should be made to the appropriate repair operation manual section.

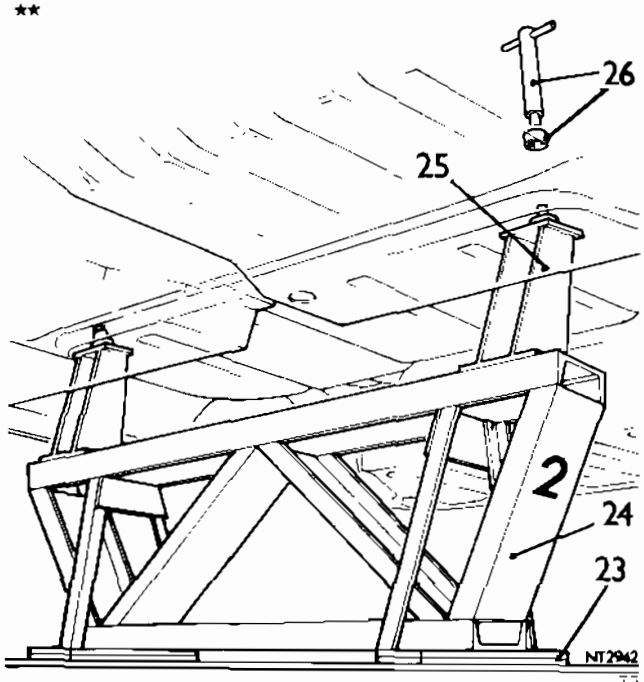
For rear-end repairs, the transverse members Nos. 3 and 4 and their brackets used for initial checking are used again in their original positions with the following additions:

19. Slacken the bolts on the body outriggers.
20. Remove the pins from the cross-member channels.
21. Support the rear of the vehicle and remove transverse member No. 2 and brackets.
22. Remove the rear sub-frame. 64.25.01.
23. Re-position the adaptor plates S.700–1111/2 with the rear mounting bolts at tape position 5.
24. Fit transverse member No. 2.
25. Fit brackets S.700–23 (L.H.) and S.700–23 (R.H.) locating the outer bolts in holes 'E'.
26. From inside the vehicle, locate collars S.700–23/3 and fit pins S.700–1111/3.
27. Fit two more adaptor plates S.700–1111/2 with the mounting bolts at tape position 4/11.
28. Fit transverse member No. 1.
29. Fit brackets S.700–12 (L.H.) and S.700–12 (R.H.).
30. Fit distance pieces STN.7710 between brackets and rear sub-frame studs.
31. Remove the jack and re-tighten the bolts on the body outriggers.
32. Refit the pins through the cross-member channels.

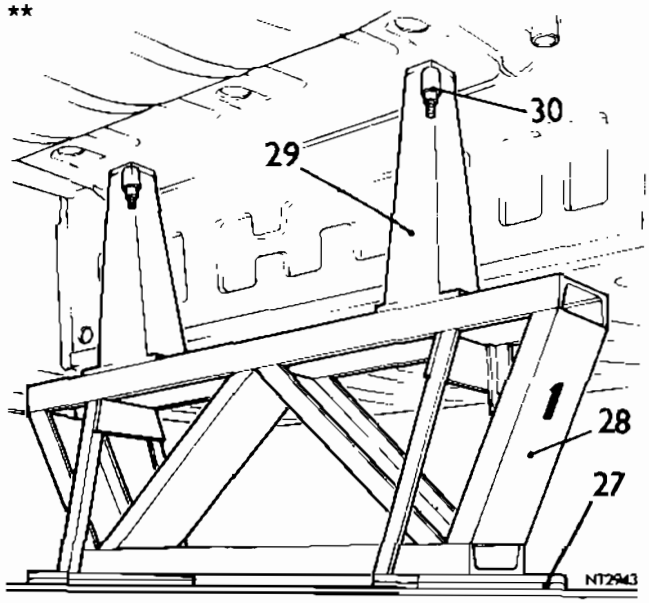
For front-end repairs, transverse members Nos. 2 and 3 and their brackets used for initial checking are retained in their original positions with the following additions:

33. Remove the front cross-member together with brakes, steering and suspension.
34. Fit transverse member No. 4
35. Fit brackets S.700–43 (L.H.) and S.700–43 (R.H.) locating the outer bolts in holes 'E'.
36. Locate brackets S.700–46 (L.H.) and S.700–46 (R.H.) in the upper spring mounting points beneath the front wings and fit nuts.
37. Fit adaptor plates S.700–44/3 between the brackets and fit bolts.**

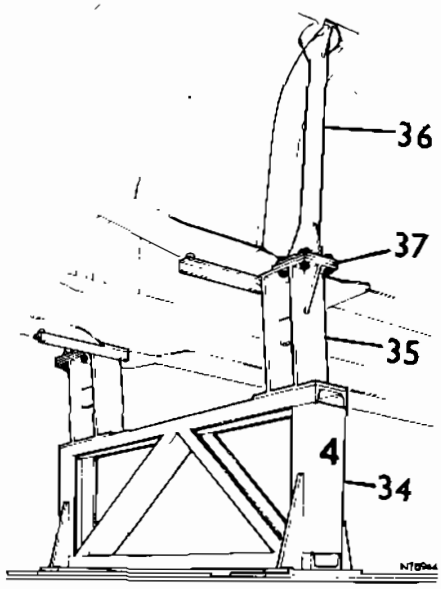
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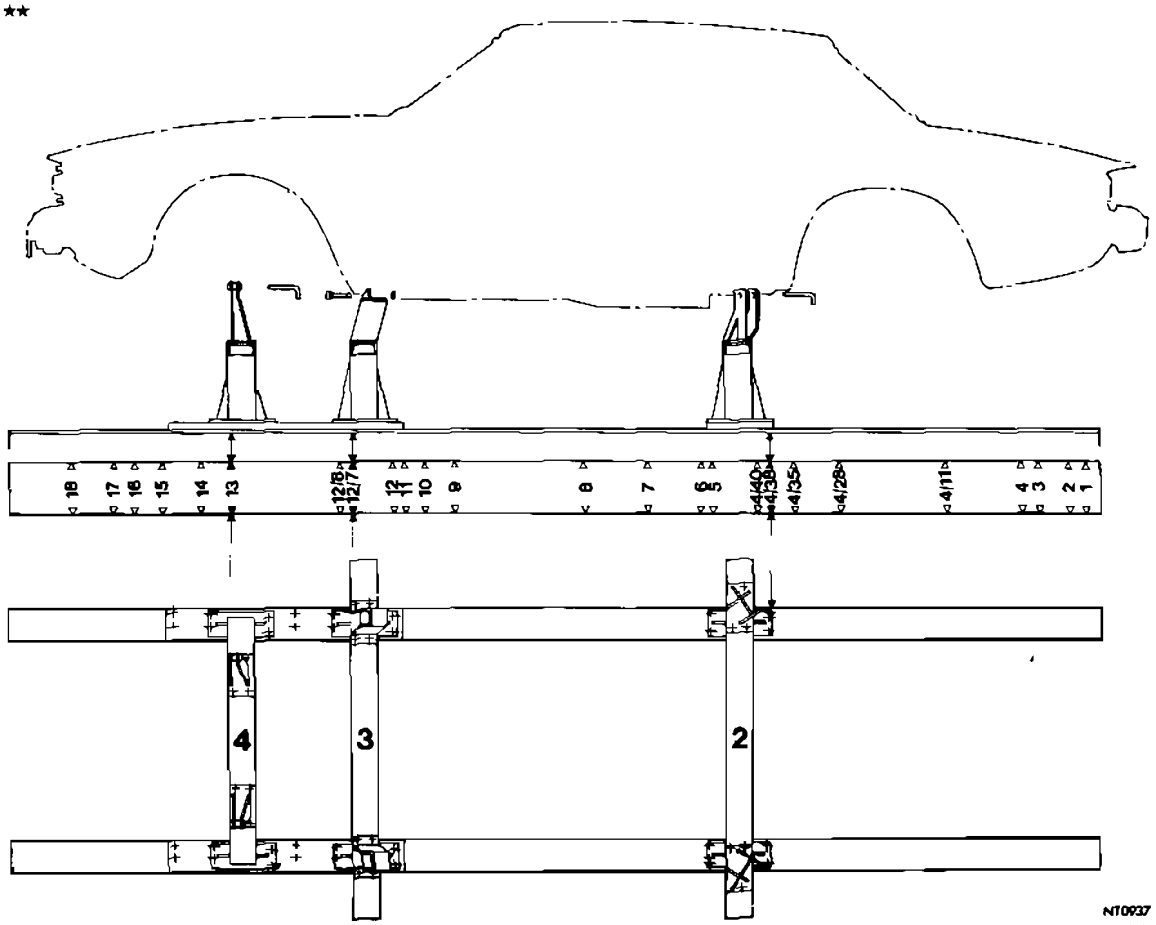
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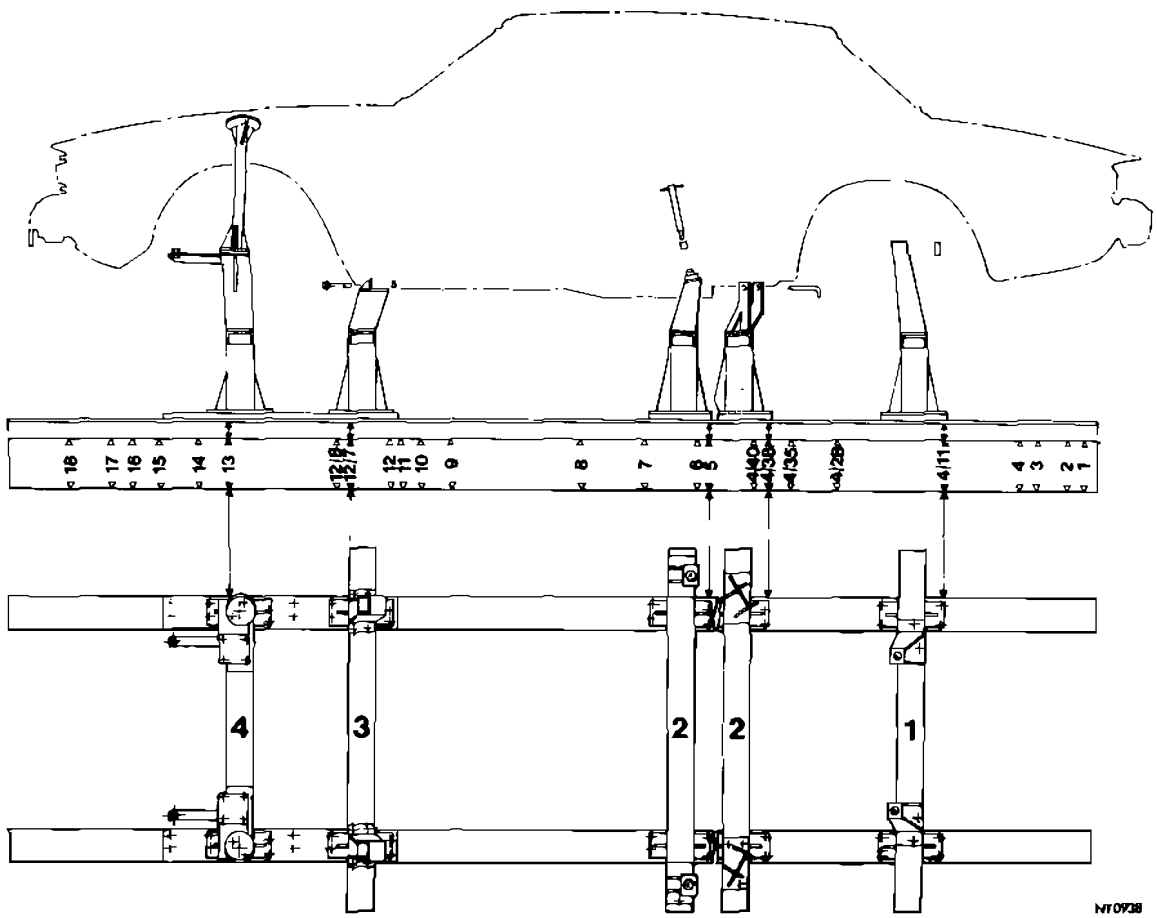
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Transverse member locations for initial check



Transverse member locations for repair

FRONT CROSS-MEMBER

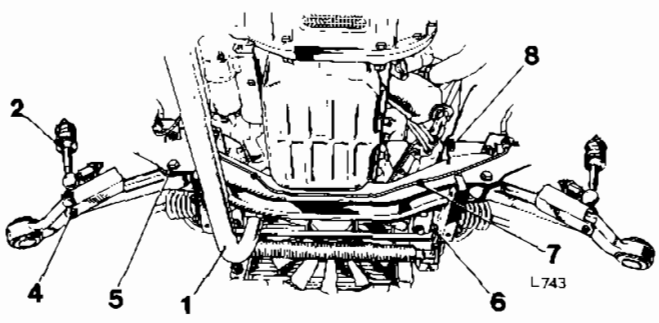
—Remove and refit **76.10.05**

Removing

1. Remove L.H. front exhaust pipe. 30.10.09.
2. Disconnect anti-roll bar links from anti-roll bar.
3. Jack up front of vehicle and place stands under front outriggers.
4. Disconnect radius rods from wishbones.
5. Disconnect wishbones from cross-member and pull down clear of their pivot points.
6. Disconnect steering rack from cross-member (remove lower bolts), and allow it to drop slightly.
7. Pull brake pipe clear of nylon clips on cross-member.
8. Remove four bolts on each side which secure cross-member, and reinforcement plates on top of chassis-members.

Refitting

9. Fit cross-member (fit plates behind bolt heads; the two chamfered plates are positioned inboard to accommodate chassis radii. Brake pipe brackets attach to the rear outer bolts).
10. Attach brake pipe to nylon clips on cross-member.
11. Position wishbone in cross-member hangers.
12. Attach radius rods to wishbones; do not tighten.
13. Fit wishbone pivot bolts, from rear. Fit nuts but do not tighten.
14. Lower vehicle.
15. Fit steering rack to cross-member.
16. Tighten nuts and bolts on radius rods, wishbones and steering rack.
17. Fit anti-roll bar links.
18. Fit exhaust pipe. 30.10.09.



REAR SUB-FRAME

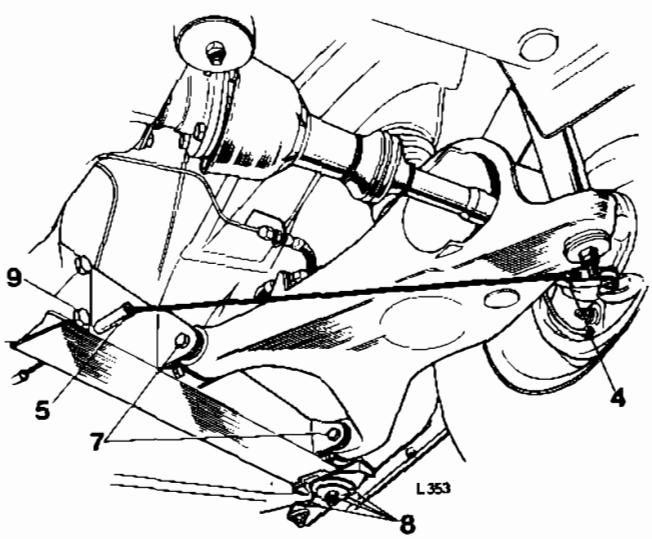
—Remove and refit **76.10.06**

Removing

1. Remove tailpipe unit. 30.10.19.
2. Remove L.H. and R.H. rear intermediate exhaust pipes.
3. Remove from sub-frame the two exhaust pipe attachment clips.
4. Release threaded ends of hand brake cable from jaw ends.
5. Pull the hand brake cable through the guide tubes and clear of the sub-frame.
6. Jack up rear of body until the road wheels are just clear of the ground.
7. Remove two bolts securing each trailing arm to its support brackets.
8. Remove nut, strap, and plain washers from each outer mounting rubber.
9. Remove two bolts securing inner end of each sub-frame member to pinion extension housing.
10. Pull sub-frame members down clear of the housing.
11. If necessary, remove from each sub-frame member, the rubber mounting and the two trailing arm support brackets, noting the number and position of adjustment shims.

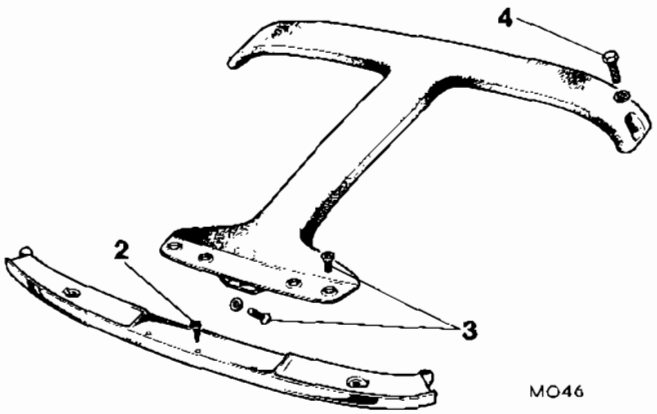
Refitting

12. Fit rubber mountings and trailing arm support brackets to sub-frame members.
13. Secure trailing arms to their support brackets.
14. Reverse 1 to 6 and 8 to 10.



ROLL-OVER BAR

—Remove and refit **76.10.44**



Removing

1. Pull the sun visors from their inner pivot points on the rollover bar.
2. Remove the capping from the windscreen header rail (nine screws).
3. Remove the five screws (four upper, one lower) securing the front of the roll bar to the windscreen header rail.
4. Remove the two bolts securing the roll bar to the 'B' posts.
5. **Raise the rear right-hand side of the roll bar from the 'B' post and disconnect the three lamp leads (vehicles fitted with roof lamp only).
6. Lift the roll bar clear.

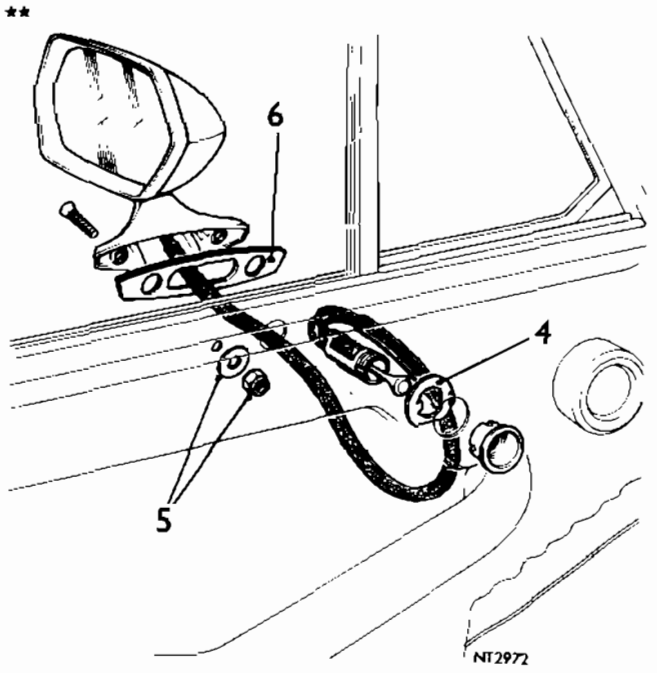
Refitting

7. Reverse instructions 1 to 6, applying fresh sealing compound under the windscreen header rail capping.**

**

DOOR MIRROR (U.S.A. vehicles only)

—Remove and refit **76.10.52**



**

Removing

1. Isolate the battery.
2. Ensure that the door glass is in the fully raised position.
3. Remove the door trim panel. 76.34.01.
4. Remove the locating washer from the control unit.
5. Remove the two Nyloc nuts and plain washers securing the mirror to the door and withdraw the mirror and control assembly.
6. Remove the gasket if necessary.

Refitting

7. Apply Seelastik S.R.51 to the inner face of the gasket and position it on the door.
8. Reverse instructions 1 to 5.**

BODY SIDE TRIM PANEL

—Remove and refit **76.13.03**

Removing

1. Loosen the two nuts securing the 'B' post cover.
2. Remove the clips securing the trim to the seat/trim support rail.
3. Push the trim attachment pegs from their locations in the seat/trim support rail.
4. **Remove two screws and washers securing the trim panel to the brackets. Lift the trim panel clear.

Refitting

5. Reverse instructions 1 to 4.**

'B' POST TRIM

—Remove and refit **76.13.08**

Removing

1. **Lower the soft top or, if fitted, remove the hard top 76.61.01.
2. Remove the bolt securing the side of the roll-over bar.
3. Isolate the battery (vehicles fitted with 'B' post lamps only).
4. Remove the 'B' post lamp (if fitted).**
5. Remove the seat belt from its 'B' post anchorage.
6. Remove the body side trim panel. 76.13.03.
7. Remove the screw securing the lower edge of the trim to the 'B' post.
8. Pull the trim carefully from the 'B' post to disengage the attachment clips.

Refitting

9. Reverse instructions 1 to 8.

ROLL-OVER BAR TRIM

—Remove and refit **76.13.09**

Removing

1. Remove roll-over bar. 76.10.44.
2. Open zip fastener.
3. Peel back the extremities of the trim and pull the trim sleeve from the roll-over bar.

Refitting

4. Reverse the removal procedure, gluing the trim where previously glued.

BONNET

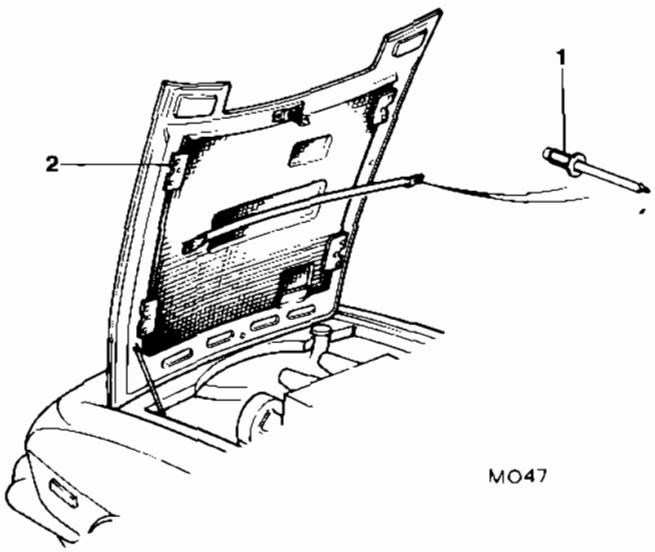
—Remove and refit **76.16.01**

Removing

1. Remove split pin from bonnet stay, and disconnect stay from bonnet.
2. Remove six bolts securing hinges to body, and lift bonnet clear.

Refitting

3. Reverse removal procedure, adjusting the bonnet for alignment in the bonnet aperture (the captive nuts for the six attachment bolts have limited 'float' to allow for this). The bonnet catch is adjustable by means of its threaded striker pin with locknut, and the elongated holes in the striker pin attachment bracket.



BONNET INSULATION PAD (If fitted)

—Remove and refit **76.16.06**

Removing

1. Drill out two rivets securing insulation pad retaining bar to bonnet.
2. Taking care not to split the insulation pad by excessive bending, pull it from under the retaining plates.

Refitting

3. Reverse the removal procedure.

**

BONNET STAY

—Remove and refit **76.16.14**

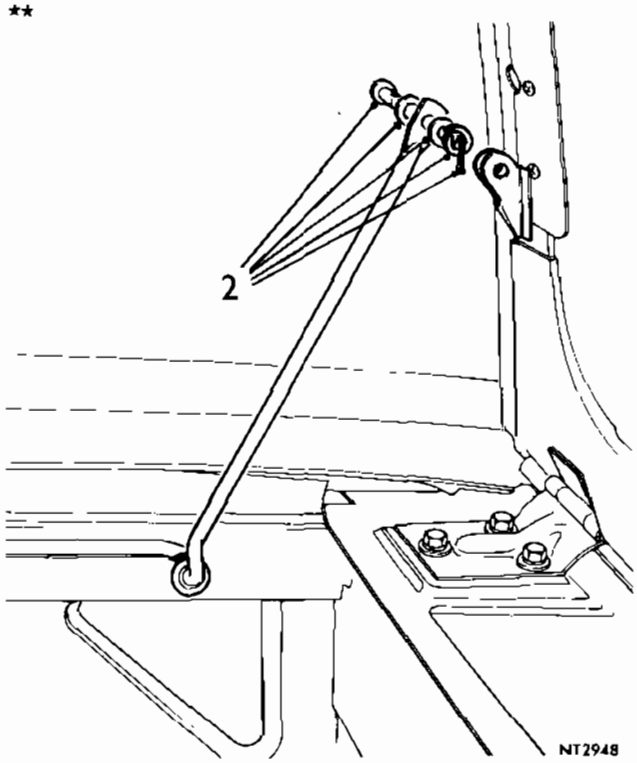
Removing

1. Raise and support the bonnet.
2. Remove the split pin, washers and clevis pin.
3. Detach the bonnet stay.

Refitting

4. Reverse instructions 1 to 3.**

**



**

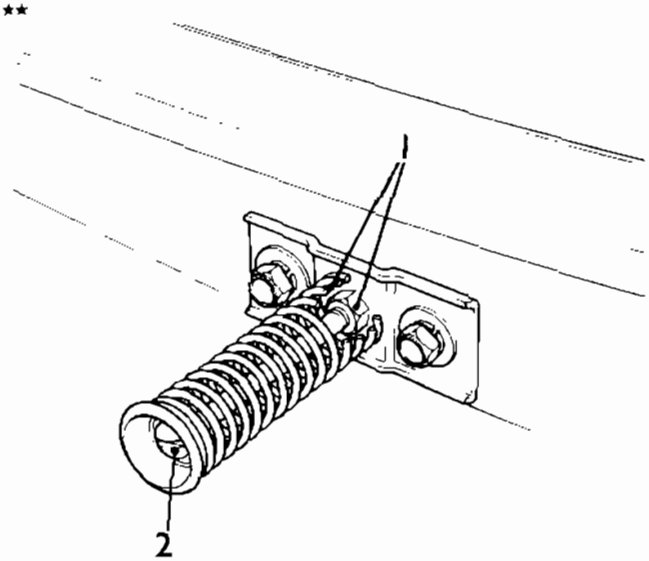
**
BONNET CATCH

—Adjust **76.16.20**

To ensure positive locking and eliminate free movement at the closing face, adjust the bonnet catch as follows:

1. Pull back the spring and slacken the locknut at the base of the shaft.
2. Using a screwdriver, adjust the shaft length as required.
3. Retighten the locknut.
4. Check the bonnet closing action, and repeat instructions 1 to 3 if necessary.**

**



NT2945
**

**
BONNET LOCK

—Remove and refit **76.16.21**

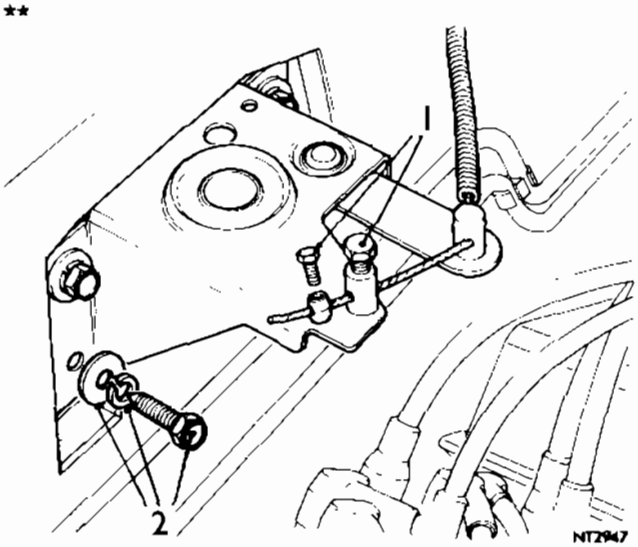
Removing

1. Slacken the trunnion bolts and detach the release cable.
2. Remove the four bolts and washers securing the lock to the bulkhead.

Refitting

3. Reverse instructions 1 and 2.**

**



NT2947
**

BONNET CATCH CONTROL CABLE

—Remove and refit **76.16.29**

Removing

1. Release solderless nipple and screw securing cable to bonnet catch.
2. Release two clips securing cable to bulkhead.
3. Pull cable from its anchorage clip on bonnet catch.
4. Release nut securing cable to anchorage bracket beneath fascia and pull cable clear.

Refitting

5. Reverse the removal procedure, ensuring that the catch closes fully when the control knob is released.

** BONNET CATCH

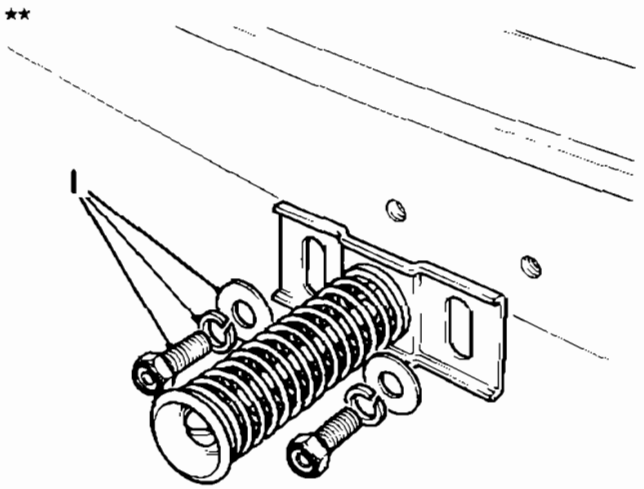
—Remove and refit **76.16.34**

Removing

1. Remove the two bolts and washers securing the catch to the bonnet.

Refitting

2. Refit in reverse order, and adjust if necessary. 76.16.20.**



** LUGGAGE COMPARTMENT LID

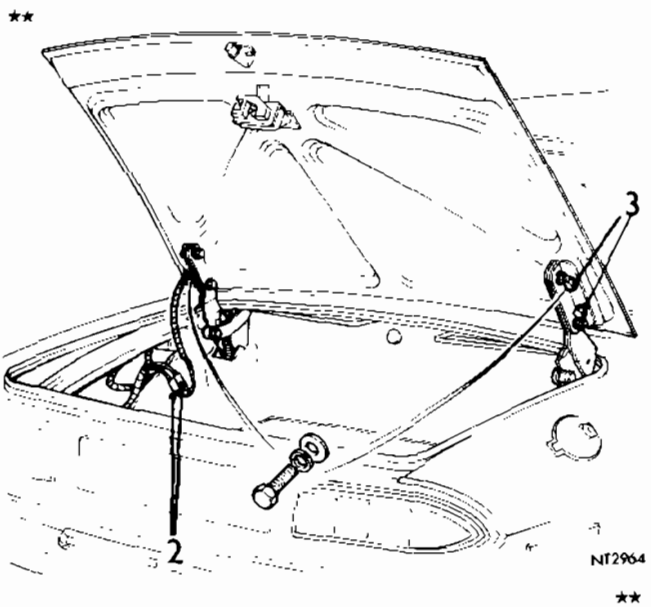
—Remove and refit **76.19.01**

Removing

1. Remove the L.H. luggage compartment trim pad (post-1972 vehicles only).
2. Disconnect the two number-plate lamp leads (post-1972 vehicles only).
3. Support the lid and remove the four bolts securing it to the hinges.

Refitting

4. Reverse instructions 1 to 3.**



LUGGAGE COMPARTMENT LID/TONNEAU COVER HINGES

—Remove and refit **76.19.07**

Removing

1. Remove hard top (76.61.01) and/or raise hood from its stowage compartment.
2. Remove luggage compartment lid. 76.19.01.
3. Remove tonneau cover. 76.61.09.
4. Remove luggage compartment right-hand trim panel and trim covering each hinge assembly .
5. Isolate battery and disconnect luggage compartment lamp lead.
6. Remove two bolts securing each hinge assembly and lift hinges clear.

Refitting

7. Reverse the removal procedure.

LUGGAGE COMPARTMENT LID SPRINGS

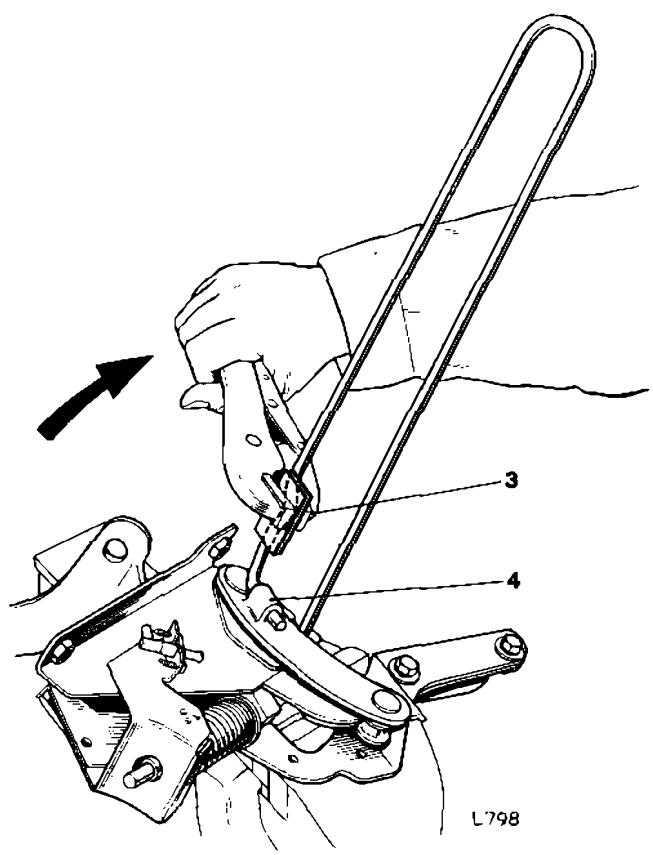
—Remove and refit **76.19.08**

Removing

1. Remove luggage compartment lid/tonneau cover hinges. 76.19.07.
2. Holding hinge assembly firmly in a vice, position the hinges such that the boot hinge spring is in its least loaded condition.
3. Using a suitable tool, grip the spring at the position shown.
4. Twist the spring and withdraw its foot from the anchorage point.
5. Release the spring and lift clear of hinge assembly.

Refitting

6. Reverse the removal procedure.



BOOT/LUGGAGE COMPARTMENT LID LOCK

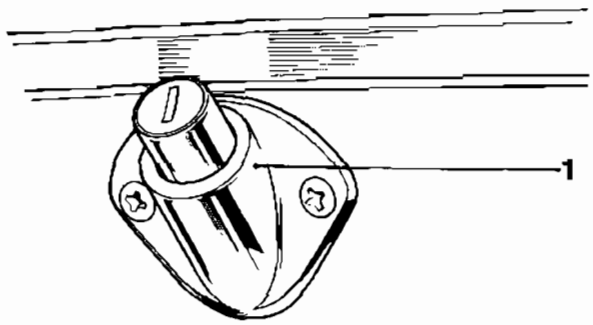
—Remove and refit **76.19.11**

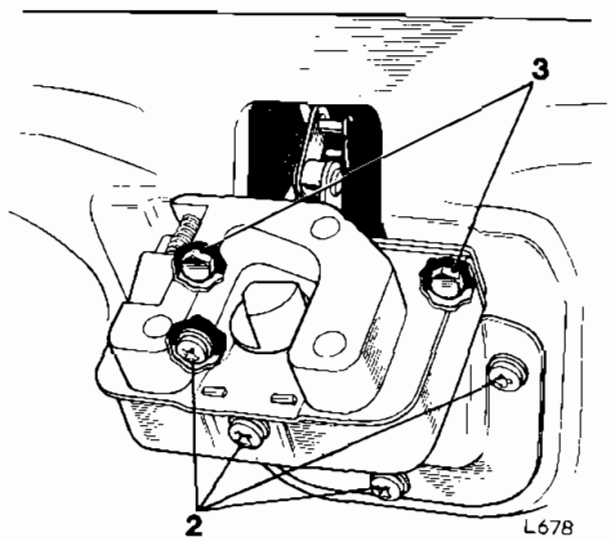
Removing

1. Remove push-button assembly. 76.19.18.
2. Remove four screws and panel.
3. Remove two bolts.

Refitting

4. Reverse the removal procedure.





BOOT/LUGGAGE COMPARTMENT LID LOCK STRIKER

—Remove and refit **76.19.12**

Removing

1. Remove three screws securing striker plate to boot panel.

Refitting

2. Tighten three screws. Check the closing action of the luggage compartment lid and adjust position of the lock striker as necessary.

BOOT/LUGGAGE COMPARTMENT LID PUSH-BUTTON ASSEMBLY

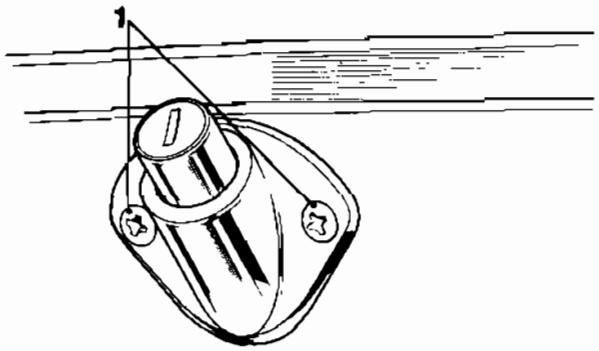
—Remove and refit **76.19.18**

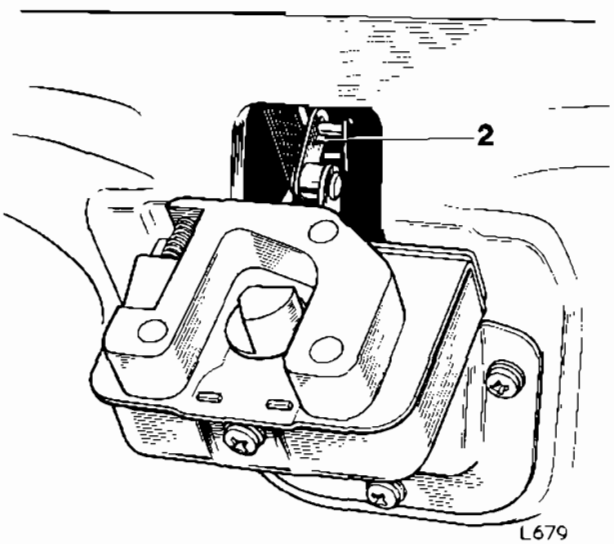
Removing

1. Remove two screws.
2. Release push-rod from bell-crank. Remove push-button assembly.

Refitting

3. Reverse the removal procedure.





OVER-RIDERS

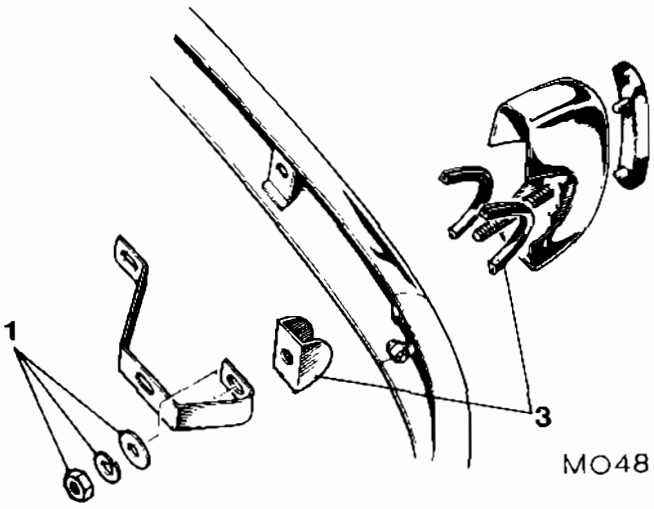
—Remove and refit **Front** **76.22.01**
Rear **76.22.02**

Removing

1. Remove nut, spring washer and large plain washer from over-rider attachment bolt.
2. Withdraw over-rider, and remove spacer from between bumper and bumper mounting bracket.

Refitting

3. Reverse the removal procedure, ensuring that the spacer and the over-rider mouldings are correctly positioned.



OVER-RIDER BUFFERS

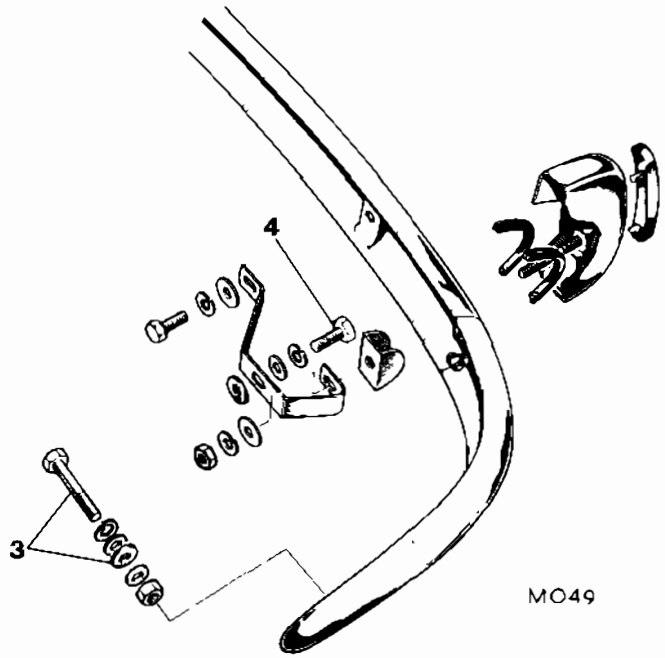
—Remove and refit **Front** **76.22.07**
Rear **76.22.14**

Removing

1. Remove over-rider. 76.22.01.
2. Remove nut securing buffer to over-rider.
3. Pull buffer stud clear of bumper, and turn the buffer through 90° to release the securing tag.

Refitting

4. Reverse the removal procedure.



BUMPERS—FRONT

—Remove and refit **76.22.08**

Removing

1. Remove two bolts securing bumper to wing mounting brackets.
2. Remove four bolts securing bumper mounting brackets to front of sub-frame, and lift bumper assembly clear.

Refitting

3. Reverse the removal procedure, setting the bumper level and with uniform clearance from the wing on either side.

BUMPERS—REAR

—Remove and refit **76.22.15**

Removing

1. Remove the luggage compartment carpet, floor boards and right-hand trim panel.
2. **Disconnect the number-plate lamp leads at the snap connectors (vehicles with bumper-mounted number-plate lamps only).**
3. Remove the two bolts securing the outer sections of the bumper to the wing. Remove the rubber pads from between the bumper and the wing.
4. Remove the two bolts securing the bumper mounting brackets to the rear valance and lift the bumper assembly clear.

Refitting

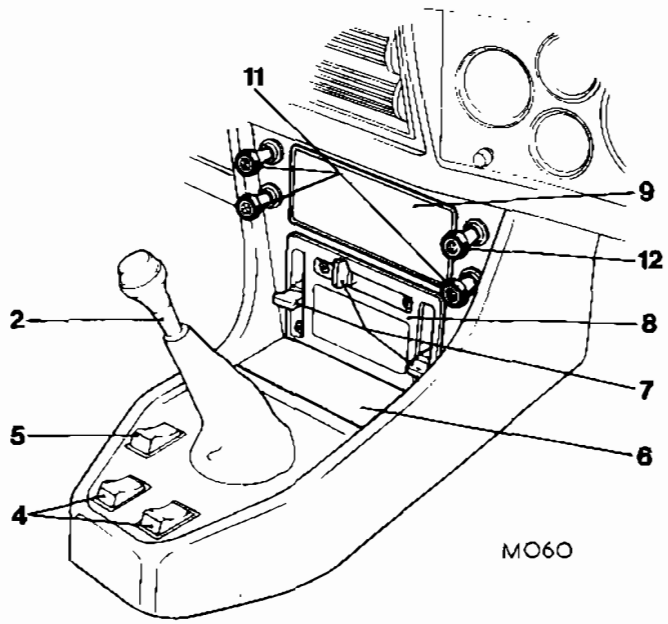
5. Reverse instructions 1 to 4.

CONSOLE ASSEMBLY

—Remove and refit **76.25.01**

Removing

1. Isolate battery.
2. Loosen gear selector knob locking collar. Remove knob and collar (where overdrive is fitted, first prise off gear selector knob cap, and disconnect overdrive switch leads).
3. Prise out gear selector lever gate panel (automatic transmission only).
4. Prise out door glass regulator switches, and disconnect the wiring plugs from their sockets.
5. Prise out interior light switch and disconnect the electrical leads.
6. Prise out the console front panel.
7. Pull off three heater control knobs.
8. Remove heater control panel.
9. Remove radio aperture cover, or if fitted, the radio.
10. Remove two screws securing console to transmission tunnel, and lift rear panel clear of the gear selector lever.
11. Remove knobs and bezels from the heater blower switch, back-light heater switch and choke control.
12. Disconnect the purple lead from the cigar lighter, and remove lighter by unscrewing the centre section from the outer sleeve.
13. Disconnect the electrical leads to the lamp on either side of the console.
14. Remove bulb holder from back-light heater indicator light.
15. Pull wiring harness from the clips securing it to console.
16. Pull console back from fascia and lift clear.



Refitting

17. Reverse the removal procedure.

SAFETY HARNESS CONSOLE

—Remove and refit **76.25.10**

Removing

1. Remove ashtray. 76.67.14.
2. Remove screw securing console to transmission tunnel.
3. Push console forward to disengage retaining lugs and lift clear.

Refitting

4. Reverse the removal procedure.

DOOR

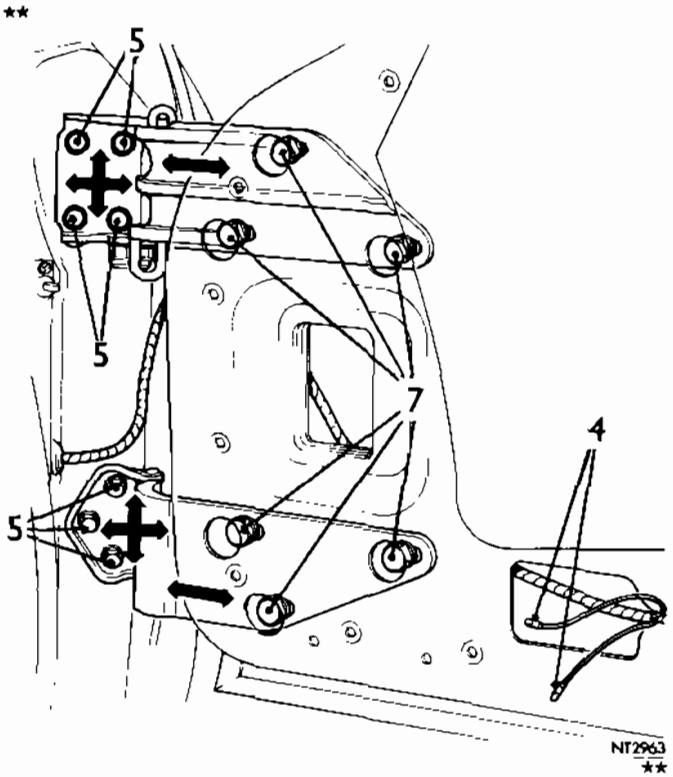
—Remove and refit **76.28.01**

Removing

1. Isolate the battery.
2. Remove the door trim panel. 76.34.01.
3. Remove the weather curtain.
4. Disconnect the door glass regulator motor leads. Free the harness from the retaining clips and remove it from the door.
5. Support the door and remove the seven bolts securing the hinges to the 'A' post.

Refitting

6.**Refit the door and check closing action. Adjust vertical and/or lateral alignment if necessary before fully tightening bolts 5.
7. If fore-and-aft adjustment is required, slacken the six bolts securing the hinges to the door and adjust to obtain parallel gaps between door, wing, and 'B' post. Retighten the bolts.
   NOTE: Slight adjustment in a vertical plane may also be obtained if necessary at this stage.
8. Reverse instructions 1 to 4.**



DOOR HINGES

—Remove and refit **76.28.42**

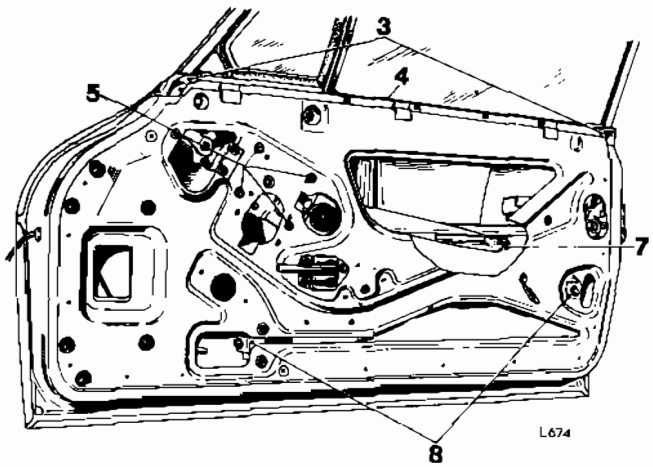
Removing

1. Remove door. 76.28.01.
2. Remove six bolts securing hinges to door, and withdraw hinges.

Refitting

3. Reverse the removal procedure.

DOOR GLASS AND GLASS FRAME



—Remove and refit 76.31.01

Removing

1. Remove door trim panel. 76.34.01.
2. Remove weather curtain.
3. Drill out the two rivets securing each of the door finishers. Remove the finishers.
4. Remove inner weatherstrip.
5. Remove four bolts securing door glass regulator to door.
6. Disconnect regulator motor leads.
7. Disengage regulator from glass channel and place at the bottom of the door.

WARNING: Do not attempt to separate motor from regulator whilst these components are in situ in the door. Failure to observe this instruction may result in severe personal injury.

8. Remove brackets securing door glass frame to door, and lift glass and frame as a unit from the door.

NOTE: The door glasses and frames are handed and therefore are not interchangeable.

Refitting

9. Place the door glass regulator in position, attaching loosely with one bolt.
10. Place glass and glass frame as a unit loosely in position. Push glass fully to the bottom of the door.
11. Fit outer weatherstrip.
12. Fit glass frame securing bolts and brackets loosely, and adjust frame to suit the door aperture and the aperture sealing rubber (the bolt holes in the door and in the brackets are elongated to allow both 'fore and aft' and 'in and out' adjustment of frame). Tighten bolts.
13. Locate glass regulator arm in its channel. Fit and tighten regulator securing bolts (move glass up or down to align bolt holes).
14. Connect wiring harness and battery. Check glass for correct operation.
15. Check all nuts and bolts for tightness and fit weather curtain, ensuring that the puddle light leads protrude through it.
16. Rivet door finishers in position.
17. Fit inner weatherstrip.
18. Connect puddle light leads and fit door trim panel. 76.34.01.

QUARTER VENT

—Remove and refit **76.31.28**

Removing

1. Remove trim panel. 76.34.01.
2. Remove quarter vent wheelbox. 76.31.37.
3. Loosen bolt securing quarter vent spindle clip.
4. Remove two screws securing quarter vent top hinge to door glass frame.
5. Pull quarter vent upwards, disengaging the spindle from its clip and from the rubber seal.

Refitting

6. Reverse the removal procedure.

QUARTER VENT WHEELBOX

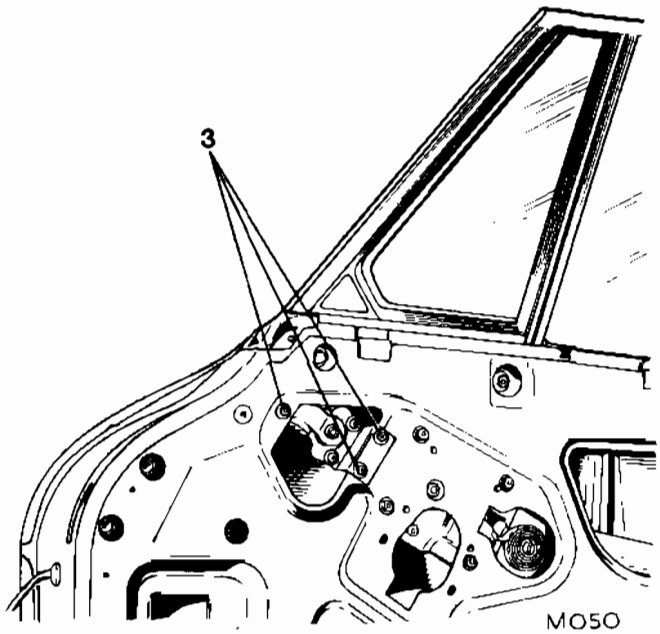
—Remove and refit **76.31.37**

Removing

1. Remove door trim panel. 76 34.01.
2. Remove weather curtain.
3. Release three bolts securing quarter vent wheelbox to the door, and pull wheelbox clear of quarter vent spindle.

Refitting

4. Reverse the removal procedure.



DOOR GLASS REGULATOR

—Remove and refit **76.31.45**

Removing

1. Remove door glass and glass frame. 76.31.01.
2. Lift regulator clear of the door through the aperture in the door inner panel.

Refitting

3. Reverse the removal procedure, ensuring that the correct **short** set screws are used for regulator attachment.

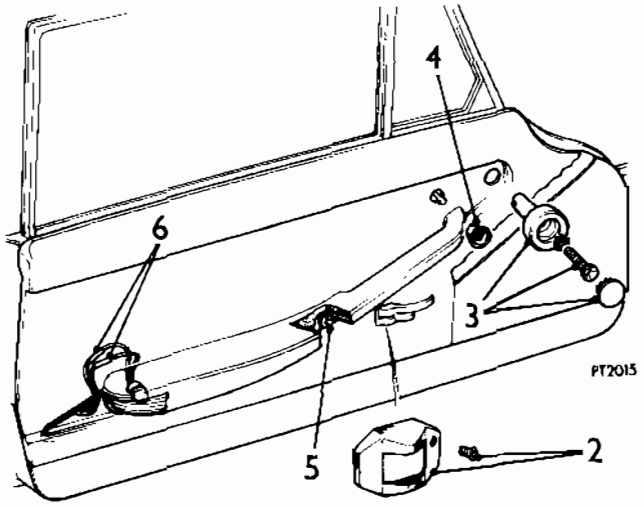
DOOR TRIM PANEL

—Remove and refit **76.34.01**

Removing

1. Isolate the battery.
2. Raise the door interior handle and remove the screw securing the escutcheon. Push the escutcheon towards the trailing edge of the door to disengage the retaining lugs, and lift it clear of the handle.
3. Prise out the button from the centre of the quarter vent control knob, release the set screw and pull the knob from the wheelbox.
4. **Unscrew the door mirror control bezel (U.S.A. post-1972 vehicles only).
5. Remove the screw securing the centre of the trim panel.
6. Starting at the bottom, release the panel by pulling the clips from their locations and lifting the panel clear of the three top retaining lugs. Disconnect the puddle light leads at the snap connectors.

**



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Refitting

7. Reverse instructions 1 to 6.**

DOOR LOCK

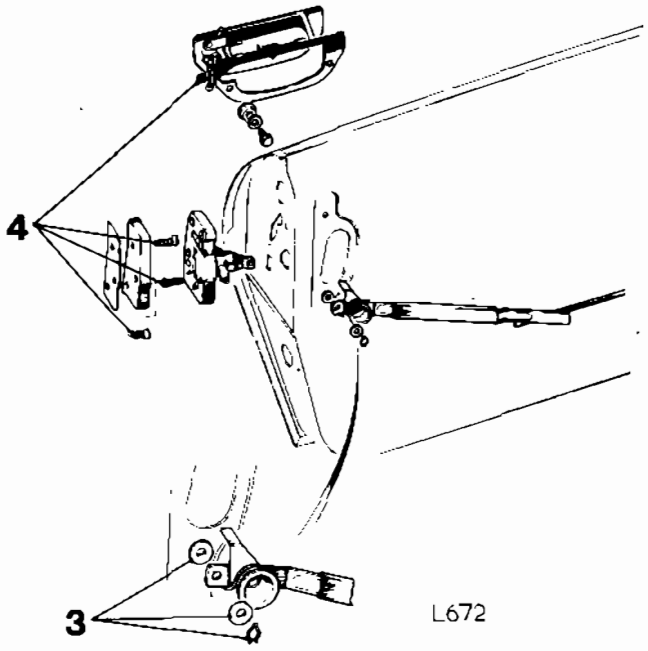
—Remove and refit **76.37.12**

Removing

1. Remove door trim panel. 76.34.01.
2. Remove weather curtain.
3. Remove clip and plain washer. Disconnect remote control linkage from door lock. Remove waved washer.
4. Remove clip and three set screws. Remove lock from door.

Refitting

5. Reverse the removal procedure.



**

DOOR LOCK STRIKER

—Remove and refit **76.37.23**

Removing

1. Remove the three screws and lift off the striker.

Refitting

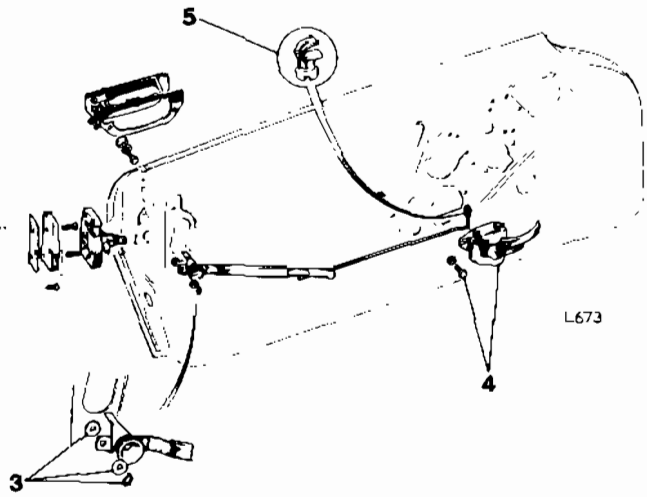
2. Reverse instruction 1, adjusting if necessary to ensure correct door locking action.**

DOOR LOCK REMOTE CONTROL AND LINKAGE

—Remove and refit **76.37.31**

Removing

1. Remove door trim panel. 76.34.01.
2. Remove weather curtain.
3. Remove clip and plain washer. Disconnect remote control linkage from door lock. Remove waved washer.
4. Release three set screws and remove remote control assembly complete with linkage.
5. Release linkage from remote control by springing open the securing clip and pulling linkage from its nylon bush.



Refitting

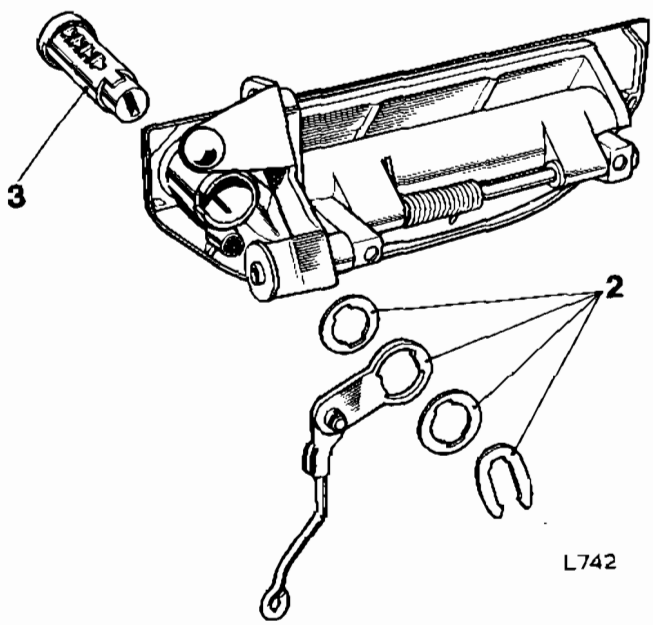
6. Reverse the removal procedure.

PRIVATE LOCK

—Remove and refit **76.37.39**

Removing

1. Remove door outside handle. 76.58.01.
2. Remove spring clip, linkage and washers from locking barrel.
3. Withdraw locking barrel from handle.



Refitting

4. Reverse the removal procedure.

DOOR CHECK WIRE

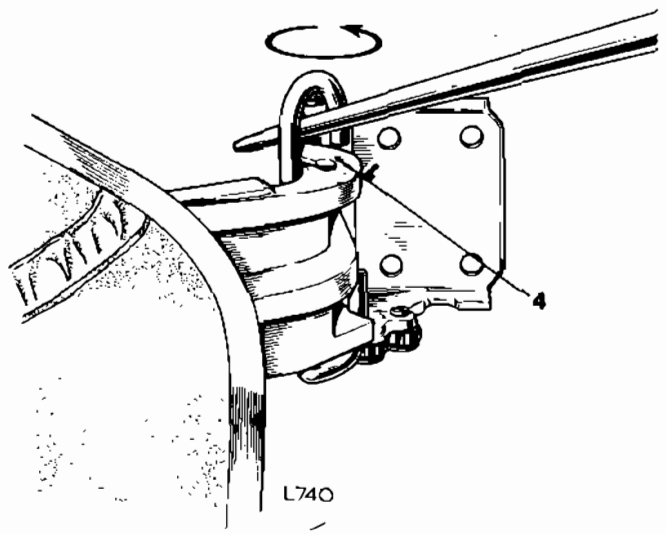
—Remove and refit **76.40.27**

Removing

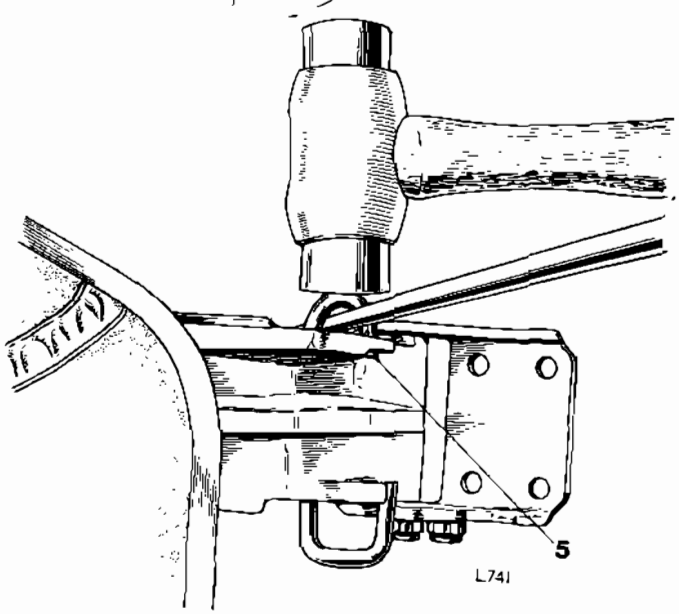
1. Remove door. 76.28.01.
2. Using a hide-faced hammer, drive the door check wire upwards to release it from the door hinge.

Refitting

3. Place the stay wire on the hinge, with the lower end in position and the upper end standing clear of the hinge.
4. With an assistant supporting the door, rotate the upper part of the check wire, using a suitable bar, until it aligns with its location hole.
5. Holding the check wire in this position, drive it downwards until the notch registers in the location hole.
6. Refit door. 76.28.01.



L740



L741

EXTERIOR MOULDINGS

—Remove and refit **76.43.06**

The exterior mouldings, i.e. front end upper and lower mouldings, sidelamp mouldings, trunk lid moulding, rear valance moulding and tail lamp mouldings are secured to the panel edges by barbed clips.

Removing

1. Starting at one end, pull the moulding firmly and progressively from the panel.

Refitting

2. Replace any damaged or weakened clips, and reverse the removal procedure.

'B' POST CAPPING

—Remove and refit **76.43.34**

Removing

1. Lower soft top or, if fitted, remove the hard top.
2. Remove bolt securing side of roll-over bar.
3. Remove two screws securing 'B' post top capping. Lift top capping from beneath roll-over bar.
4. Pull draught excluder from the 'B' post.
5. Remove 'B' post trim. 76.13.08.
6. Drill out rivets securing capping. Lift capping clear.

Refitting

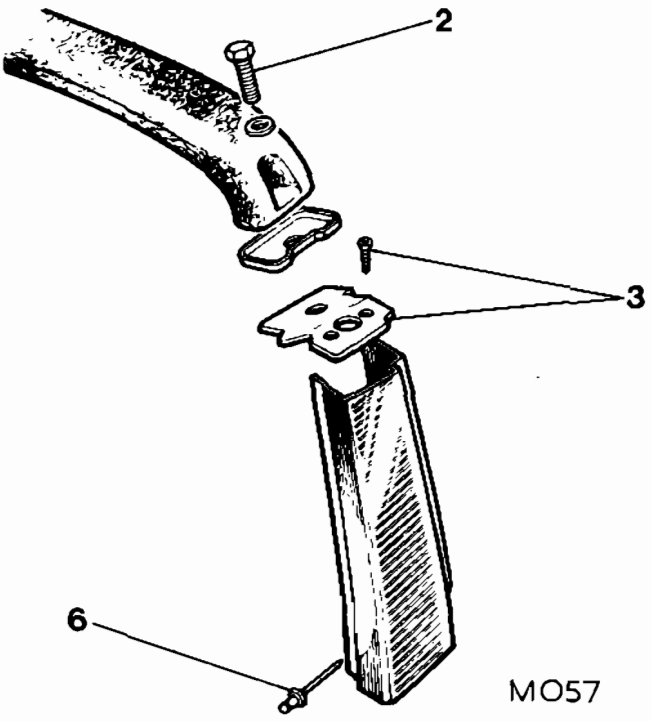
7. Reverse the removal procedure.

FASCIA

—Remove and refit **76.46.01**

Removing

1. Remove instrument panel. 88.20.01.
2. Remove glovebox and lid. 76.52.01.
3. Remove screen demister hoses. 80.15.01.
4. Remove bonnet release cable anchorage bracket from fascia.
5. Remove three bolts securing steering-column to fascia.
6. Remove radio aperture cover or, if fitted, the radio.
7. Remove heater control knobs and panel.
8. Prise out console front panel and release two screws securing console to transmission tunnel. Pull console back from fascia.
9. Remove four bolts securing fascia to 'A' posts; loosen two nuts securing fascia to top mounting brackets; remove two bolts securing lower edge of fascia to support bracket (take care not to drop these two bolts during removal or refitting).
10. Pull fascia clear.
11. If necessary, remove from fascia, screen demister ducts, clock reset cable, panel illumination rheostat, glovebox light switch, demister outlet finisher, swivelling vent surround.



Refitting

12. Reverse the removal procedure.

**
CARPET—GEARBOX COVER

—Remove and refit **76.49.01**

Removing

1. Remove the seats. 76.70.04/05.
2. Remove the front seat belts buckle unit. 76.73.05.
3. Remove the heater control knobs and control panel.
4. Remove the console front panel and the two screws securing the console to the transmission tunnel.
5. Lifting the rear of the console, pull back the carpet and lift it clear of the hand brake lever.

Refitting

6. Reverse instructions 1 to 5.**

**
CARPET—REAR FLOOR

—Remove and refit **76.49.03**

Removing

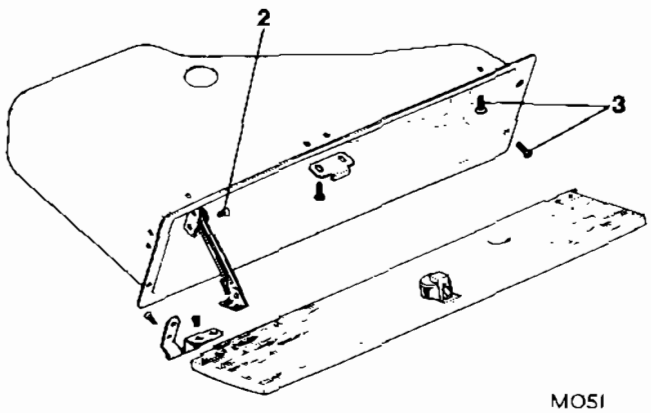
1. Remove the seat. 76.70.04/05.
2. Lift off the carpet.

Refitting

3. Reverse instructions 1 and 2.**

GLOVEBOX AND LID ASSEMBLY

—Remove and refit **76.52.01**



MO51

Removing

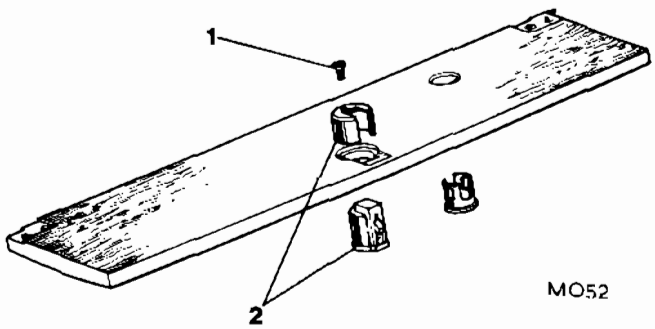
1.**Isolate the battery (vehicles with combined glovebox/map-reading lamp only).**
2. Remove the two screws securing the glovebox lid check link to the fascia.
3. Supporting the lid, remove the remaining six screws from the periphery of the glovebox aperture. Remove the glovebox.
4.**Disconnect the glovebox/map-reading lamp leads (if fitted) at their snap connectors.**

Refitting

5. Reverse instructions 1 to 4.

GLOVEBOX LOCK

—Remove and refit **76.52.08**



Removing

1. Release screw securing lock retaining sleeve to lock.
2. Remove sleeve and withdraw lock from glovebox lid.

Refitting

3. Reverse the removal procedure.

RADIATOR FRONT GRILLE

—Remove and refit **76.55.03**

Removing

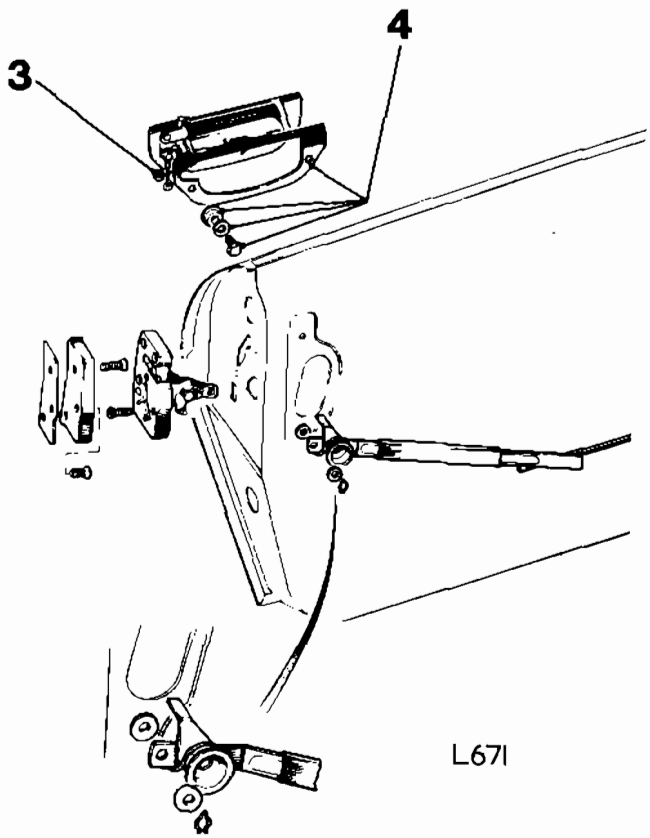
1. Remove six screws securing the centre section and two screws securing each of the two inner and two outer sections.

Refitting

2. Reverse the removal procedure.

DOOR OUTSIDE HANDLE

—Remove and refit **76.58.01**



Removing

1. Remove door trim panel. 76.34.01.
2. Remove weather curtain.
3. Remove clip securing door lock linkage to outside handle.
4. Remove two set screws, two lock washers and two 'top-hat' washers. Lift handle with its seating gasket from the door.

Refitting

5. Reverse the removal procedure.

DOOR INSIDE HANDLE

—Remove and refit **76.58.18**

The door inside handle and the door lock remote control form an integral unit.

Removing

1. Proceed as for removal of door lock remote control and linkage. 76.37.31.

Refitting

2. Reverse the removal procedure.

**

HARD TOP

—Remove and refit **76.61.01**

Removing

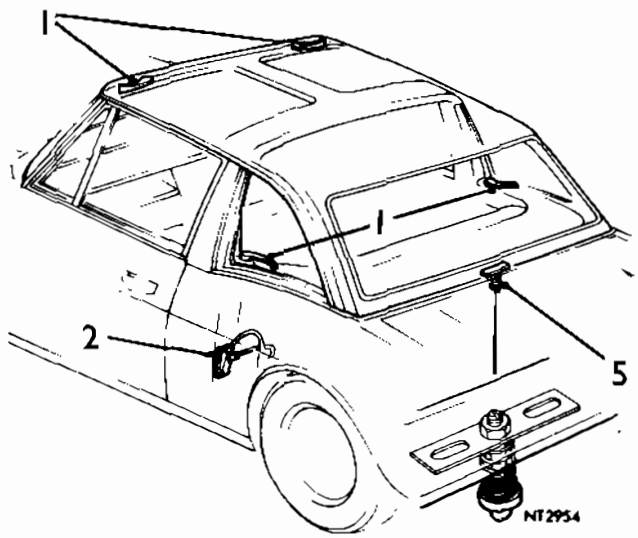
1. Release the header rail and door pillar catches by pulling the levers inwards.
2. Release the tonneau catch.
3. With the aid of an assistant, carefully lift the hard top from the vehicle.

Refitting

4. With the aid of an assistant, carefully locate the hard top in position, ensuring that all the catch levers are pointing inwards.
5. Depress the rear edge of the hard top to engage the tonneau catch.
6. Lock the door pillar catches.
7. Lock the header rail catches.

NOTE: Electrical connections to the heated back-light are made automatically.**

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** SOFT TOP

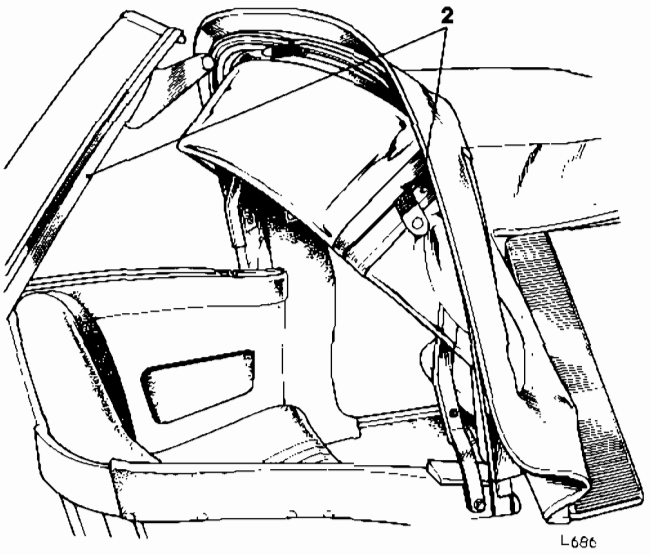
—Remove and refit **76.61.08**

Removing

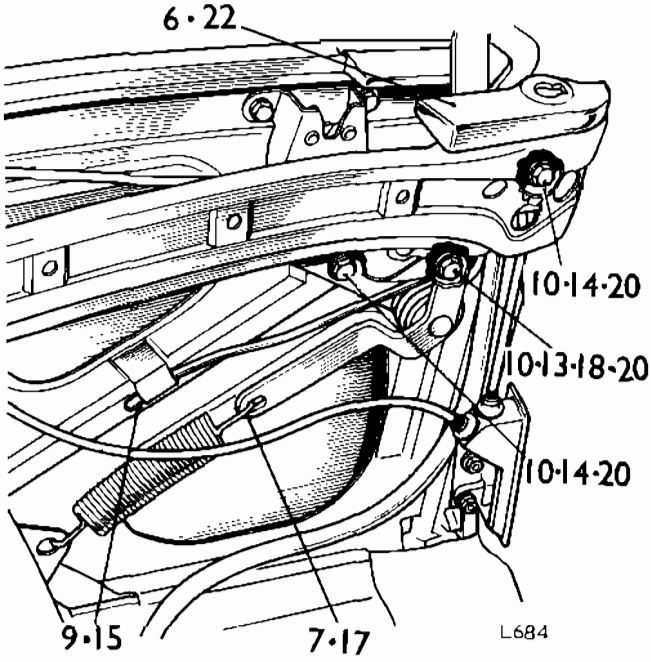
1. Release the tonneau catch.
2. Raise the rear of the soft top and lift the tonneau to the raised position.
3. Remove the rear seat cushion. 76.70.37.
4. Remove the rear seat squab. 76.70.38.
5. Remove the side trim panels. 76.13.03.
6. Remove the two 'B' post covers (two nuts on each cover).
7. Disengage the ends of the tension springs.
8. Release the front of the soft top by turning the catch levers.
9. Lower the soft top to the folded position and disengage the torsion springs.
10. Remove the six set screws securing the hood-stick assembly to the body, moving the soft top as necessary to obtain access.
11. Lift the soft top from the vehicle.

Refitting

12. Fully open the front section of the soft top.
13. Install one jig bolt on each side of the frame and locate the soft top in position, securing the front catches.
    NOTE: Jig bolts should be machined to dimensions shown from $\frac{3}{8}$ in U.N.F. × 1 in (25·4 mm) set screws.
14. Loosely fit four of the set screws.
15. With the soft top in the folded position, locate the torsion springs at their anchorage points.
16. Raise the soft top and lock in position with front and rear catches, adjusting the striker pin if necessary.
17. Fit the tension springs.
18. Replace the two jig bolts by the two remaining set screws.
19. Adjust the soft top for tension by levering the hood-stick assembly up or down (the holes for the securing bolts are elongated for this purpose).
20. Tighten the six hood-stick assembly securing set screws to 15 to 20 lbf ft (2·1 to 2·8 kgf m).
21. Check stowage operation and fit of soft top. Re-adjust if necessary.
22. Fit the 'B' post covers.
23. Fit the side trim panels. 76.13.03.
24. Fit the rear seat squab. 76.70.38.
25. Fit the rear seat cushion. 76.70.37.**

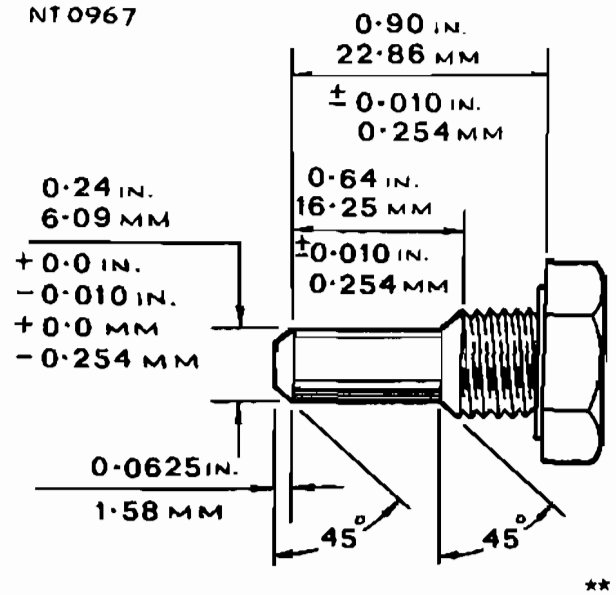


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TONNEAU COVER

—Remove and refit **76.61.14**

Removing

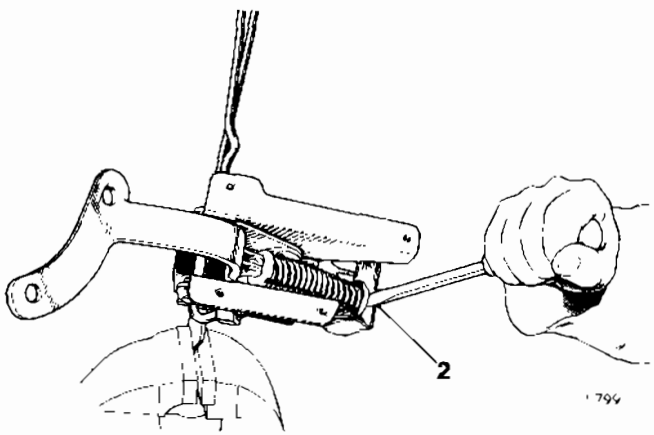
1. Remove two bolts securing catch assembly to tonneau cover.
2. Remove four bolts securing tonneau cover to its hinges, and lift tonneau cover clear.

Refitting

3. Reverse the removal procedure, adjusting the tonneau cover to the front catches.

TONNEAU COVER SPRINGS

—Remove and refit **76.61.15**



Removing

1. Remove luggage compartment lid/tonneau cover hinges. 76.19.07.
2. Holding hinge assembly firmly in a vice, position the hinges such that the tonneau hinge coil spring is in its least compressed condition. Carefully prise the spring collar from its location hole and release the spring, restraining it from flying free, with a heavy pad of waste rag.

Refitting

3. Reverse the removal procedure.

TONNEAU COVER TRIM

—Remove and refit **76.61.16**

Removing

1. Prise off two upper mouldings.
2. Drill out rivets securing top and front finishers. Remove finishers.
3. Pull off inner moulding.
4. Remove trim panel.

Refitting

5. Reverse the removal procedure.

TONNEAU RELEASE CATCH CABLE—Inner

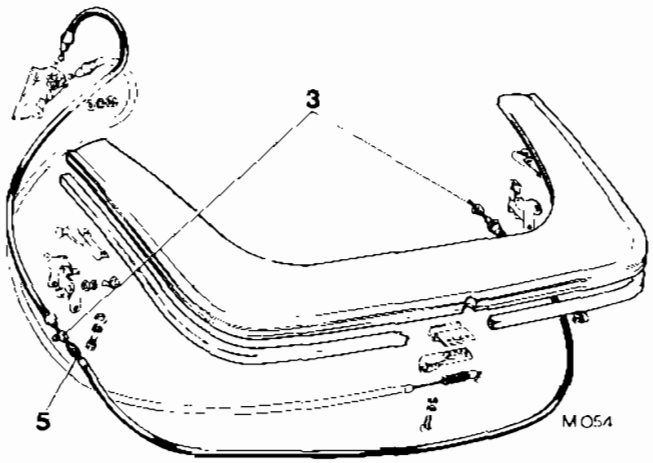
—Remove and refit **76.61.20**

Removing

1. Remove rear seat cushion. 76.70.37.
2. Remove left-hand-side trim panel. 76.13.03.
3. Release the solderless nipple at each tonneau catch, free the inner cable from the control lever and pull clear of the outer cable.

Refitting

4. Feed inner cable into the outer cable, fitting one solderless nipple loosely to the cable as it passes through the left-hand tonneau catch. Fit second nipple loosely to the end of the cable at the right-hand tonneau catch.
5. One end of outer cable is threaded for adjustment. Set the outer cable and the two solderless nipples for correct operation of the two catches.
6. Fit trim panel. 76.13.03.
7. Fit rear seat cushion. 76.70.37.

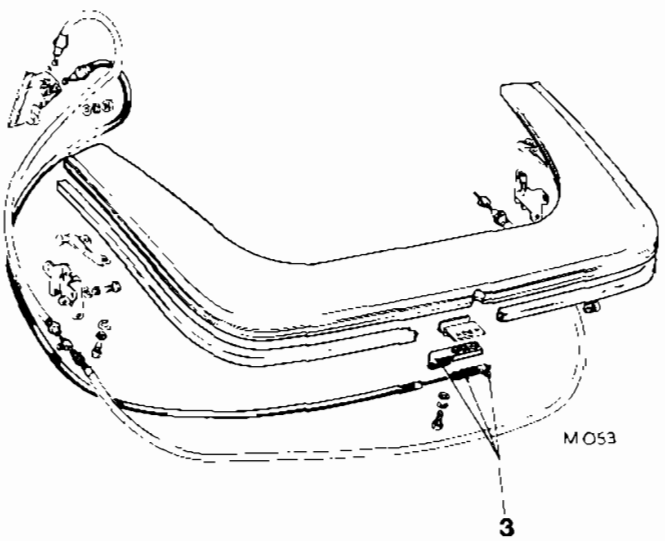


HOOD RELEASE CATCH CABLE—Inner

—Remove and refit **76.61.21**

Removing

1. Remove rear seat cushion. 76.70.37.
2. Remove left-hand-side trim panel. 76.13.03.
3. Remove solderless nipple, anti-rattle spring and catch return spring from the inner cable.
4. Free the inner cable from the control lever and pull clear of the outer cable. (To release inner cable from control lever it may be necessary to remove the control lever from its housing by drilling out the pivot pin.)



Refitting

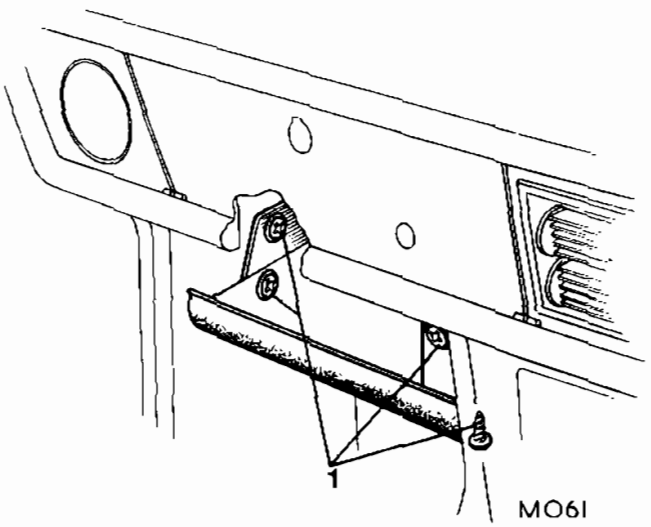
5. Reverse the removal procedure, setting the solderless nipple for correct catch operation.

PARCEL TRAY

—Remove and refit **76.67.01**

Removing

1. Remove four screws.



Refitting

2. Reverse the removal procedure.

ASHTRAY—REAR

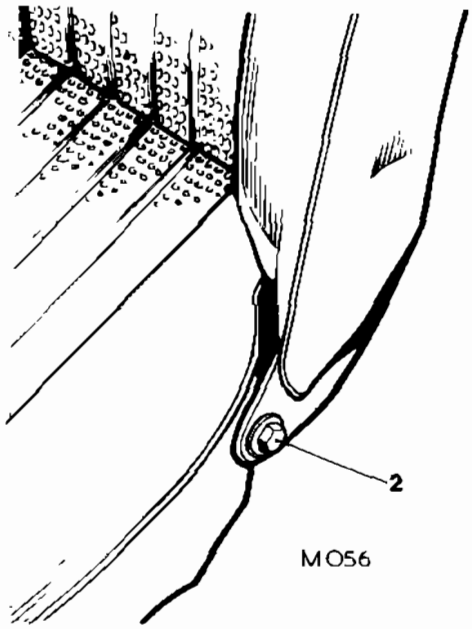
—Remove and refit **76.67.14**

Removing

1. Remove ashtray bowl.
2. Remove two screws securing ashtray container. Withdraw container from console.

Refitting

3. Reverse the removal procedure.



FRONT SEAT CUSHION

—Remove and refit **76.70.02**

Removing

1. Remove seat. 76.70.01.
2. Remove the two plated pivot bolts securing the squab to the cushion.

Refitting

3. Reverse the removal procedure.

FRONT SEATS

—Remove and refit

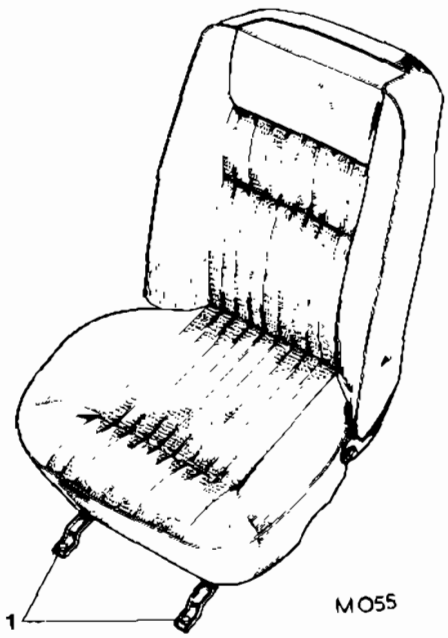
Driver	**76.70.04**
Passenger	**76.70.05**

Removing

1. Remove the four bolts securing the seat runners to the floor. The bolts will be exposed by sliding the seat to the limit of adjustment, fore and aft.
2. **Disconnect the seat belt warning harness plug (passenger seat only—if fitted).**

Refitting

3. Reverse instructions 1 and 2.



FRONT SEAT RUNNERS AND ADJUSTER ASSEMBLY

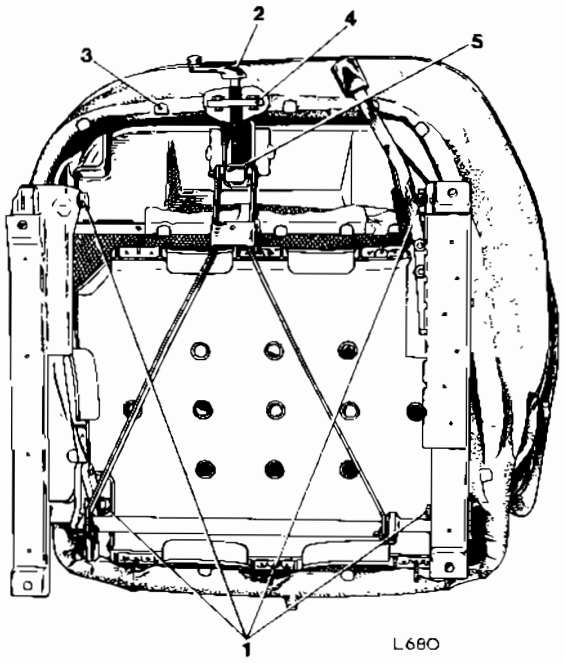
—Remove and refit **76.70.24**

Removing

1. Remove four bolts with thrust washers securing assembly to the seat frame.
2. Remove height adjuster handle.
3. Pull off trim clips securing trim to front of seat cushion frame.
4. Remove two screws securing threaded adjuster screw to cushion frame.
5. Remove threaded adjuster screw from brass nut.
6. Lift assembly clear of seat.

Refitting

7. Reverse the removal procedure, ensuring that the **shorter** slide assembly attachment bolts are fitted at the **front** of the assembly.



FRONT SEAT SQUAB CATCH RELEASE CABLE

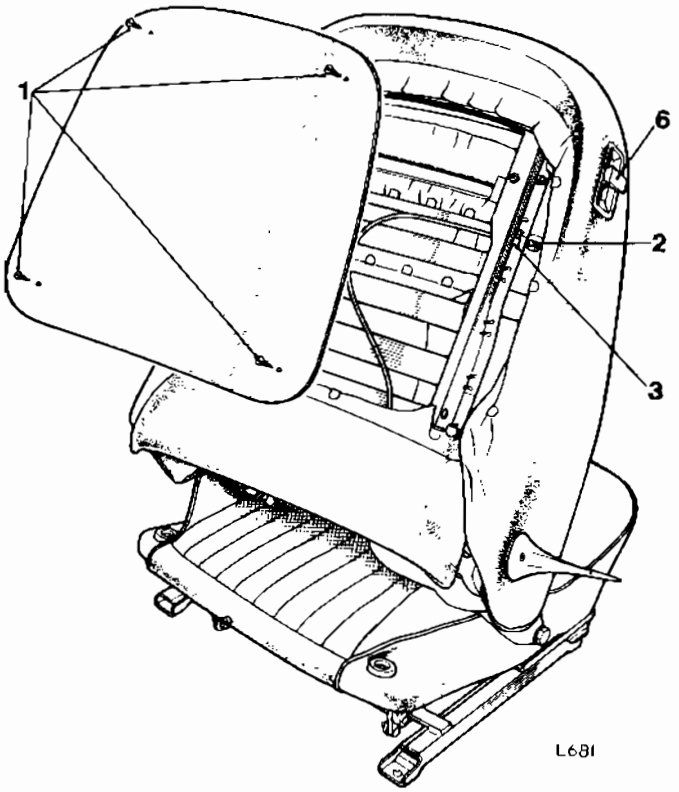
—Remove and refit **76.70.26**

Removing

1. Remove four screws securing seat squab trim panel and pull panel downwards to free the two clips securing panel to seat frame.
2. Remove solderless nipple.
3. Release outer cable stop from the seat frame, and pull stop from cable.
4. Draw inner cable out of the outer, through the catch, and pull the outer cable clear of the seat.

Refitting

5. Reverse the removal procedure and adjust the cable as follows:
6. Set the catch to the locked position.
7. Holding the control knob fully down, and pulling the inner cable tight, tighten the solderless nipple against the stop of the control lever.



SEAT SQUAB CATCH

—Remove and refit **76.70.27**

Removing

1. Remove release cable. 76.70.26.
2. Remove two screws securing catch to squab frame.

Refitting

3. Reverse the removal procedure, adjusting the catch to its pin on the seat cushion frame.

REAR SEAT CUSHION

—Remove and refit **76.70.37**

Removing

1. Pull the front edge of the seat cushion upwards to free it from its location between the seat pan flange and the seat squab.

Refitting

2. Push the cushion firmly under the bottom of the squab and locate the steel wire of the cushion frame behind the seat pan flange.

REAR SEAT SQUAB

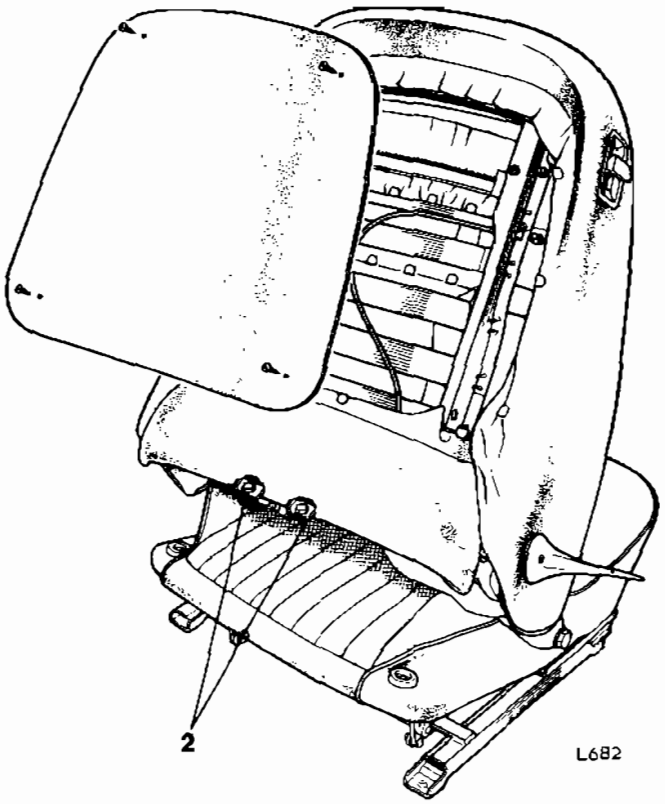
—Remove and refit **76.70.38**

Removing

1. Remove two bolts securing squab to support rail and lift squab clear of its two retaining lugs.

Refitting

2. Reverse the removal procedure.



FRONT SEAT BELT(S) BUCKLE UNIT

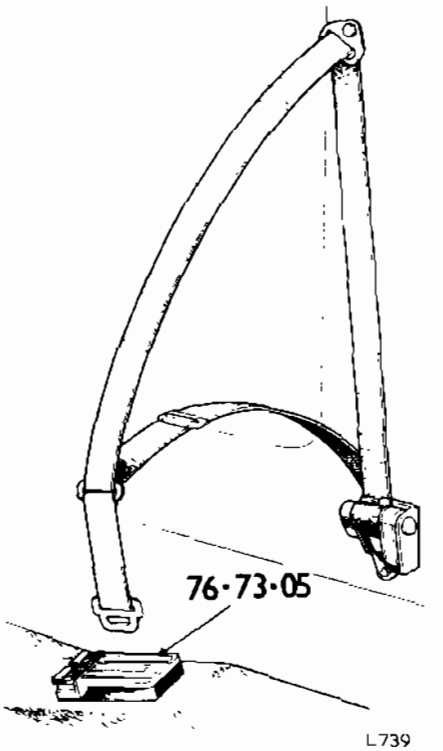
—Remove and refit **76.73.05**

Removing

1. Remove the safety harness console 76.25.10.
2. **Disconnect the two seat belt warning leads (if fitted).**
3. Remove the two buckle unit pivot bolts.
4. Remove the two bolts securing the anchorage bracket to the transmission tunnel.

Refitting

5. Reverse instructions 1 to 4.

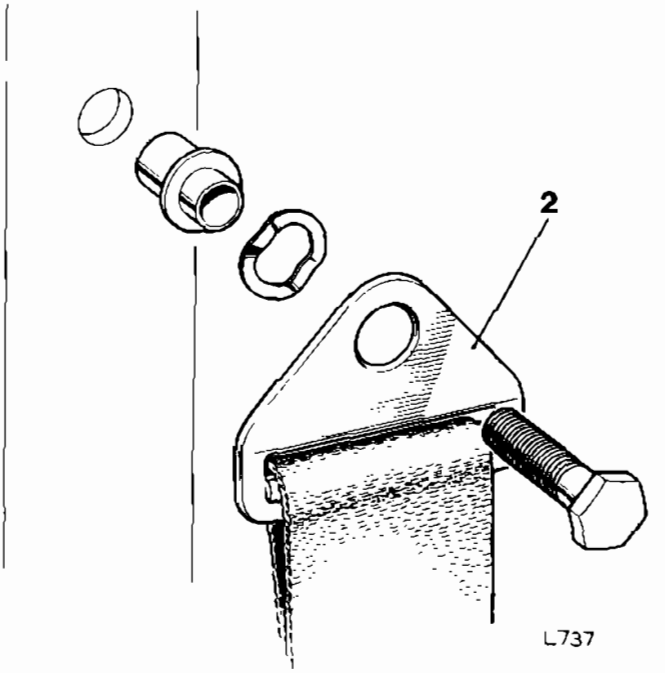


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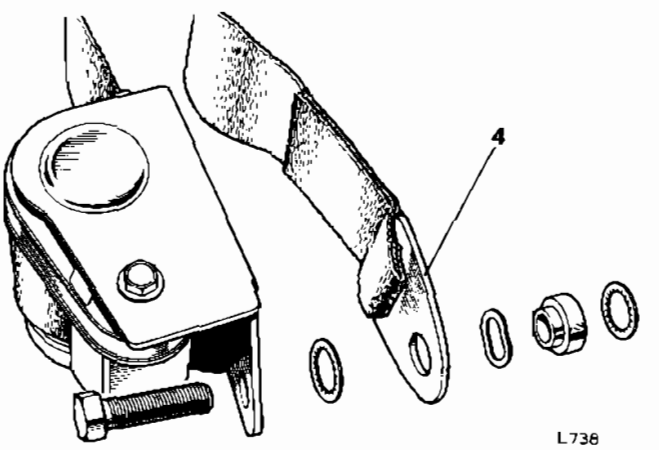
FRONT SEAT BELT—AUTOMATIC

—Fitting **76.73.09**

1. Remove the blanking plug from the tapped hole in the door pillar.
2. Attach the shoulder strap bracket to the door pillar with the chromium-plated dome-headed bolt, fitting the wavy washer and the double-shouldered spacer (the longer side of which locates in the anchorage hole). Tighten the bolt, ensuring that the bracket is free to swivel.
3. Remove the blanking plug from the tapped hole in the sill at the base of the door pillar.
4. Attach the lap strap bracket and reel with the remaining bolt, fitting two shakeproof washers, wavy washer and single-shouldered spacer. Tighten the bolt ensuring that the webbing spindle of the reel is horizontal.
5. The centre buckle unit is already fitted at the safety harness console.
   No adjustment of the harness is required as the automatic action of the reel retains the webbing at the correct position and tension across the body.



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**

SILL FINISHER (U.S.A. vehicles only)

—Remove and refit **76.76.05**

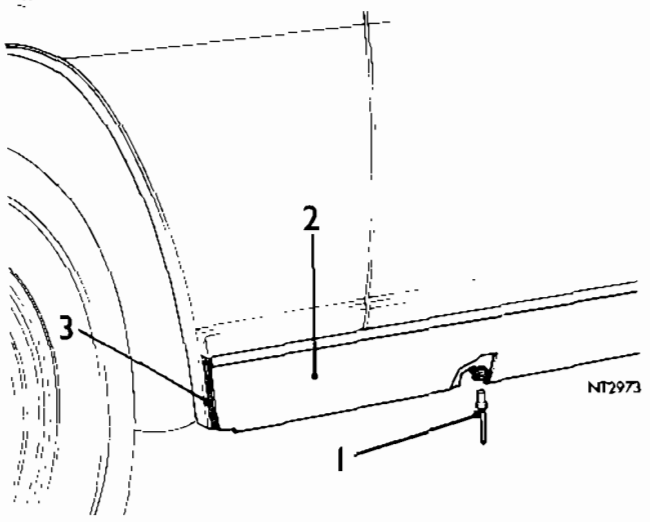
Removing

1. Drill out the 11 rivets securing the finisher to the body.
2. Remove the finisher by pulling it downwards.

Refitting

3. Apply Sealastrip to both ends of the finisher.
4. Position the finisher, locating the upper edge beneath the retainer.
5. Rivet the underside of the finisher to the body in 11 places.**

**



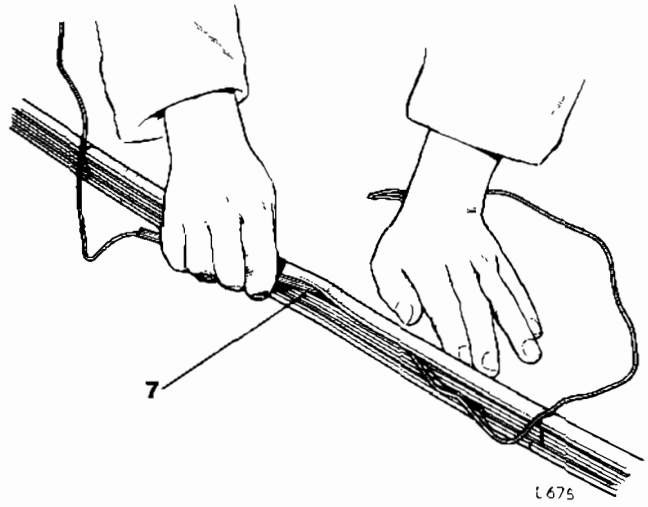
**

WINDSCREEN GLASS AND/OR SEALING RUBBER

—Remove and refit **76.81.01**

Removing

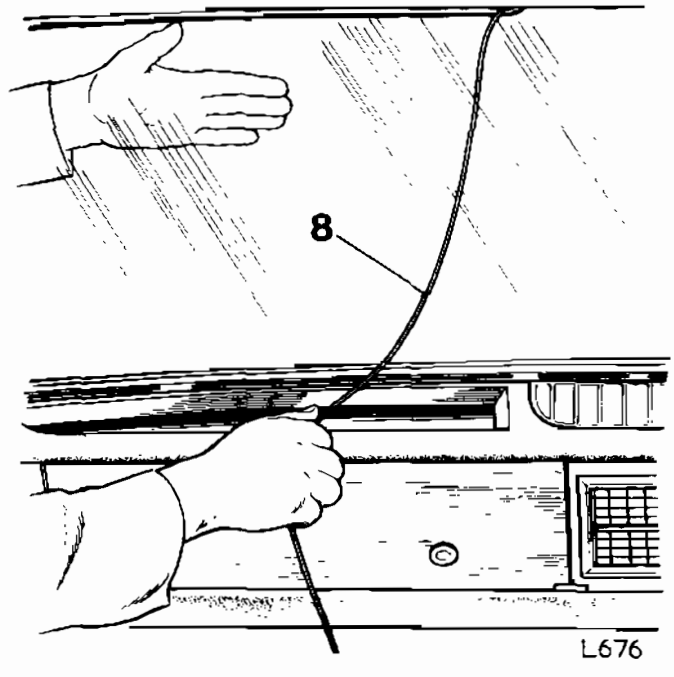
1. Remove windscreen wiper arms and the interior mirror.
2. Cover the bonnet, wings, heater air-intake grille, screen demisting ducts and carpets in case of accidental shattering of the windscreen.
3. Using a suitable piece of wood, push the joint finishers of the stainless finisher strip to one side to expose the joints. Taking care not to distort it, ease the finisher strip from the rubber weatherstrip.
4. With a tapered, rounded, smooth piece of wood, break the seal between the rubber weatherstrip and the panel. With the aid of a second operator (one working inside and one outside the vehicle), apply hand pressure to the inside of the screen and whilst easing the lip of the rubber weatherstrip over the edge of the screen aperture, push the screen clear.



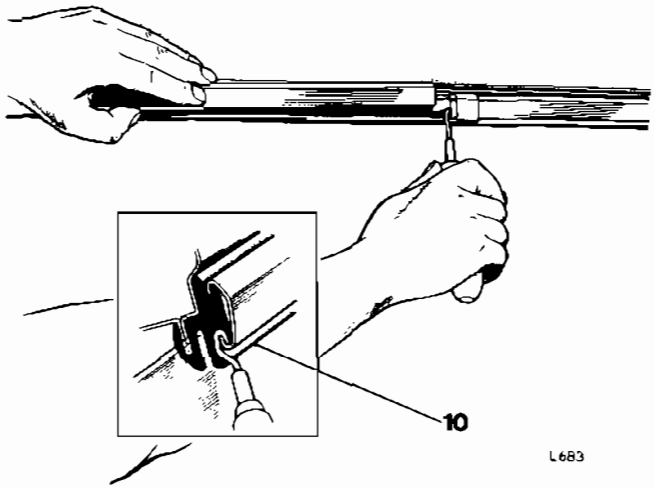
Refitting

5. Use petrol or white spirit to remove all old sealing compound from the windscreen aperture flange.
6. Fit the weatherstrip to the windscreen, with the vulcanized joint central on the lower edge.
7. Insert a thick cord, of greater length than the periphery of the glass, into the rear channel of the weatherstrip, with the loose ends of the cord crossed over at the top centre. Fitting of the cord is greatly facilitated if a short piece (approx. 4 in.) of bundy fuel piping is used as a locating sleeve over the cord.
8. Apply a soap/water solution to the flange of the windscreen aperture. Position the windscreen centrally in the aperture, with the cord ends inside the car.
   With a second operator maintaining steady pressure on the outside of the screen, pull the ends of the cord, drawing the flange of the weatherseal over the lip of the aperture. It may be necessary to strike the glass with a rubber-faced hammer **(around the edges only)** in order to seat the screen in the aperture. However, if the screen is of laminated construction, a hammer must **not** be used.

continued



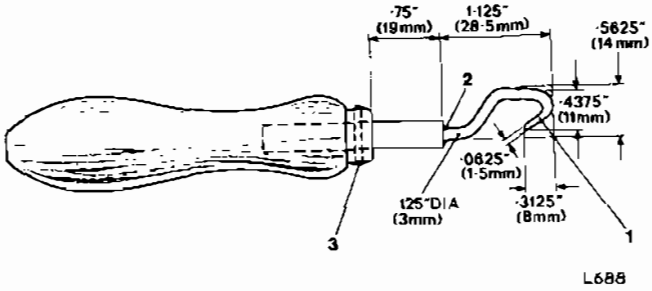
9. Apply sealing compound between weatherstrip and edge of aperture, and between weatherstrip and windscreen. On completion, remove surplus compound with a petrol-moistened rag.
10. Sparingly apply rubber grease or soap/water solution to the weatherstrip inner recess, and offer one of the stainless finisher strips into position. Locate the hook of the special tool in the recess, with open end uppermost and in a vertical position. Keeping the hook firmly engaged in the recess, draw the tool along, to engage the inner flange of the weatherstrip with the finisher strip. Ensuring that the two join finishers are fitted, repeat the procedure with the other finisher strip. Push the join finishers centrally over the joins.
11. Fit interior mirror and windscreen wiper arms.



FINISHER STRIP INSERTION TOOL

To fabricate finisher strip insertion tool

1. Shape a piece of $\frac{1}{8}$" mild steel rod as shown, paying particular attention to the form of the tip. Ensure that the tip is fully rounded and free from burrs.
2. Braze the hook into a metal stock.
3. Fit stock into a file handle and secure with a rivet.



HEATED BACK-LIGHT GLASS AND/OR SEALING RUBBER

—Remove and refit **76.81.11**

Removing

1. Disconnect electrical leads from back-light terminals.
2. Remove retainer screws from lower corners of back-light finisher strip.
3. Continue as for removal of windscreen glass. 76.81.01, 2 to 4.

Refitting

4. Proceed as for windscreen refitting, 5 to 9.
5. Fit back-light finisher strips. Sparingly apply rubber grease to the finisher strip recess of the weatherstrip. Offer the lower finisher strip into position. Using a windscreen finisher insertion tool, locate the hook of the tool in the recess. Holding the tool at 90° to the weatherstrip and with the hook firmly engaged in the recess, draw the tool along to engage the inner flange of the weatherstrip with the finisher strip.
   Repeat the procedure with the two remaining finisher strips, placing the join finisher on one of these strips prior to fitting.
   Slide the join finisher over the join.
6. Fit retainer screws at lower corners of finisher strip.
7. Connect electrical leads to back-light terminals.

HEATING AND VENTILATION OPERATIONS

Cold air hoses—heater to swivelling vents—remove and refit	80.25.01
Cold air outlet assembly—remove and refit	80.15.16
Demister ducts—remove and refit	80.15.03
Demister hoses—remove and refit	80.15.01
Heater air distribution control cables—remove and refit	80.10.06
Heater fan switch—remove and refit	80.10.22
Heater temperature control cable—remove and refit	80.10.05
Heater unit—remove and refit	80.20.01
Heater water valve—remove and refit	80.10.16
Pipe—feed to heater—remove and refit	80.25.15
Swivelling cold air vents L.H.—remove and refit	80.15.22
Swivelling cold air vents R.H.—remove and refit	80.15.23

HEATING AND VENTILATING SYSTEM

An air intake in front of the windscreen draws fresh air into a plenum chamber from which the heater draws its supply of air. The air is heated and delivered to the passengers and/or windscreen. In warm weather the system can be used to supply unheated fresh air. The air supply can be increased by the use of the two-speed blower.

HEATER TEMPERATURE CONTROL CABLE

—Remove and refit **80.10.05**

Removing

1. Remove the outer cable stop from its retention slot.
2. Release the inner cable from the flap lever set screw, and from the pivot pin on the control segment.

Refitting

3. Reverse the removal procedure, and adjust the cable as follows:
   a. Set the temperature control to 'cold'. The water valve control lever should now be in its fullest anti-clockwise position (resting against its stop) and the two ingress to matrix flaps should be fully closed, i.e. fully lowered against the heater matrix.
   b. To check the position of these flaps remove the parcel tray and pull the windscreen demister hose clear of the heater. The flaps will now be visible through the hose orifice. Should the water valve or flaps be incorrectly set, slacken the appropriate flap lever set screw and reset the lever.
   c. Retighten the set screw.

HEATER AIR DISTRIBUTION CONTROL CABLES

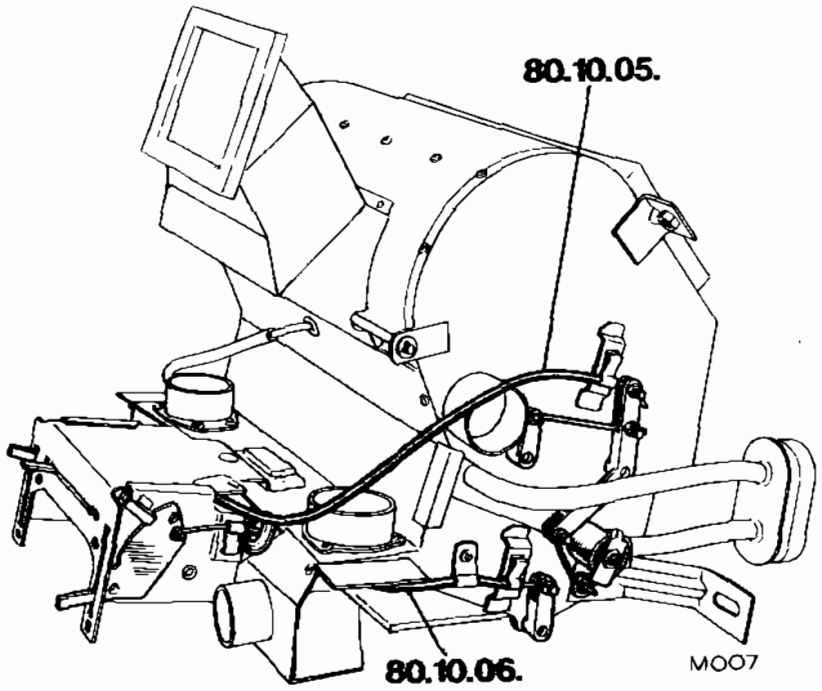
—Remove and refit **80.10.06**

Removing

1. Remove the outer cable stop from its retention slot.
2. Release the inner cable from the flap lever set screw, and from the pivot pin on the control segment.

Refitting

3. Reverse the removal procedure and adjust the cable as follows:
   a. *Air distribution control cable:* Move the air distribution control to the 'car' position. The distribution flap, which is visible at the base of the heater, should now be in the fully open position.
   b. If it is not fully open, slacken the control cable set screw on the flap operating lever, and set the flap in the fully open position. Retighten the set screw.
   c. *Fascia centre air louvre control cable:* Move the control lever to the 'off' position. If the cold air flap (visible between the rotatable air louvres) is not fully closed, remove the parcel tray. 76.67.01. The flap operating lever is now accessible.
   d. Slacken the control cable set screw and close the flap. Re-tighten the set screw and replace the parcel tray.



HEATER WATER VALVE

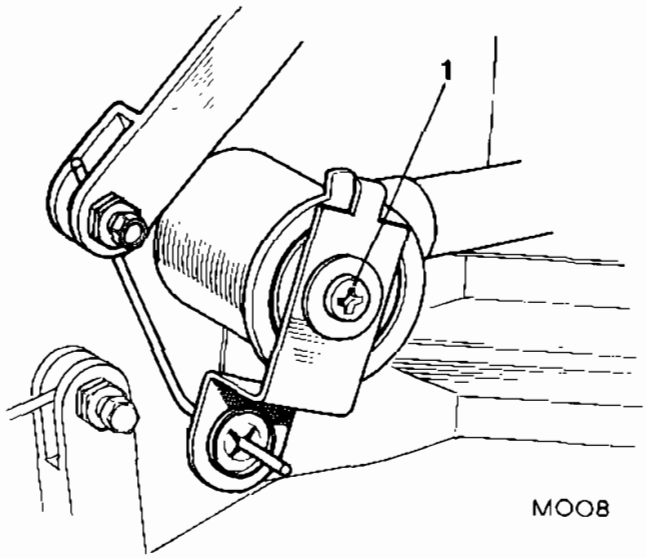
—Remove and refit **80.10.16**

Removing

1. Remove screw securing actuating lever to valve. Detach lever from valve.
2. Refit screw with its head protruding sufficiently to be gripped with pliers. Withdraw valve from its outer sleeve.

Refitting

3. Reverse the removal procedure.



HEATER FAN SWITCH

—Remove and refit **80.10.22**

Removing

1. Prise out radio aperture cover or, if fitted, the radio.
2. Disengage electrical leads.
3. Remove knob and bezel. Withdraw switch from fascia.

Refitting

4. Reverse the removal procedure.

DEMISTER HOSES

—Remove and refit **80.15.01**

Removing (passenger side)

1. Remove glovebox. 76.52.01.
2. Pull hose from demister duct and from heater.

Refitting

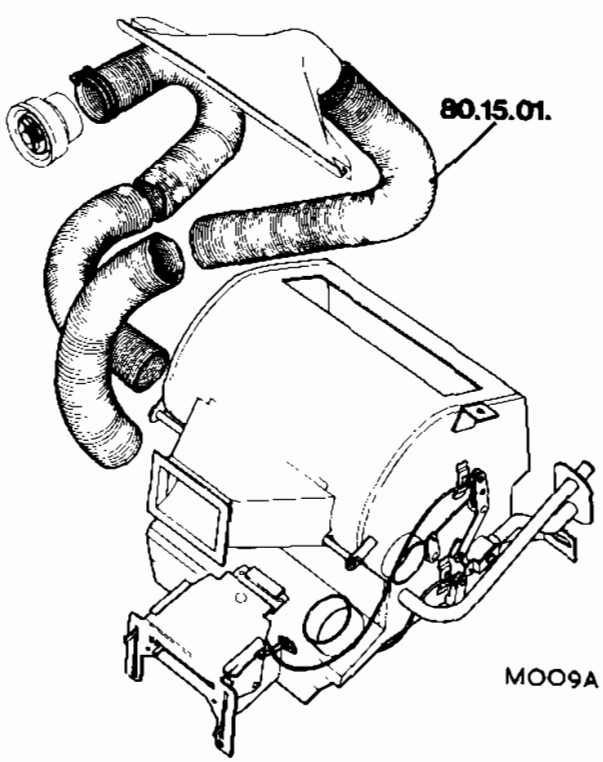
3. Reverse the removal procedure.

Removing (driver side)

1. Remove panel illumination rheostat knob.
2. Remove four screws and pull instrument panel back from fascia.
3. Pull hose from demister duct and from heater.

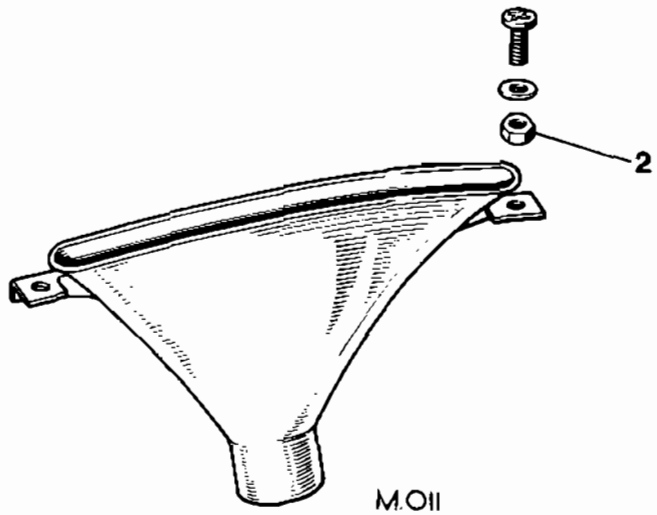
Refitting

4. Reverse the removal procedure.



DEMISTER DUCTS

—Remove and refit **80.15.03**



Removing

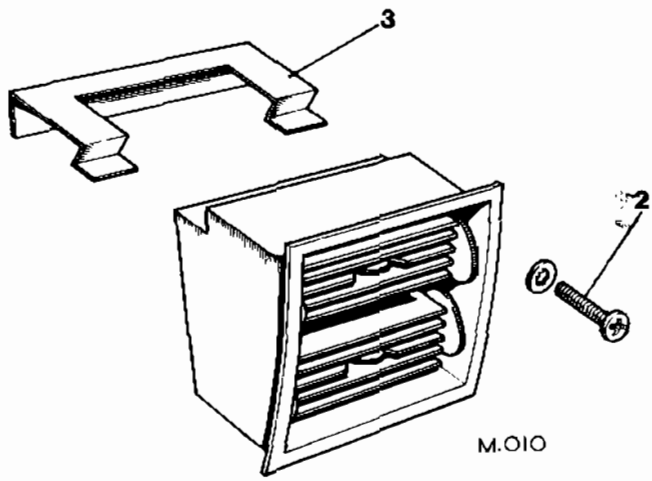
1. Remove demister hoses. 80.15.01.
2. Remove two nuts securing each duct to fascia and pull ducts clear.

Refitting

3. Reverse the removal procedure.

COLD AIR OUTLET ASSEMBLY

—Remove and refit **80.15.16**



Removing

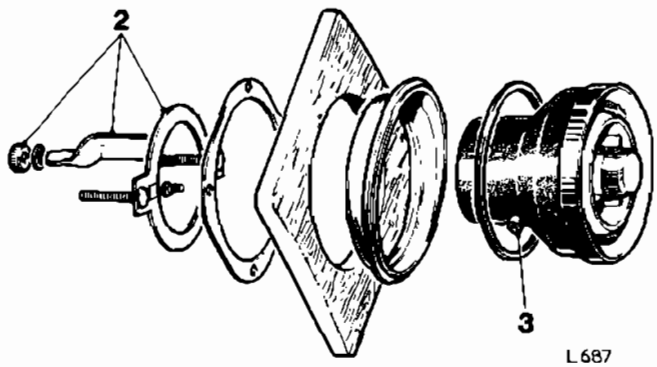
1. Remove radio loudspeaker grille and, if fitted, the loudspeaker.
2. Rotate the upper multi-directional airstream unit to expose two retaining screws. Loosen, but do not remove the screws.
3. Reach through loudspeaker grille aperture and push assembly retaining clamp down clear of edge of aperture. Withdraw air outlet assembly from its aperture and disengage it from the glovebox lid.

Refitting

4. Reverse the removal procedure.

SWIVELLING COLD AIR VENTS

—Remove and refit **L.H. 80.15.22**
R.H. 80.15.23



Removing

1. Remove cold air hoses. 80.25.01.
2. **Loosen two knurled nuts securing clamp legs to retaining clamp (early models only).**
3. Rotate the clamp clockwise until it can be released from the retaining pins.
4. Pull the vent clear of the fascia.

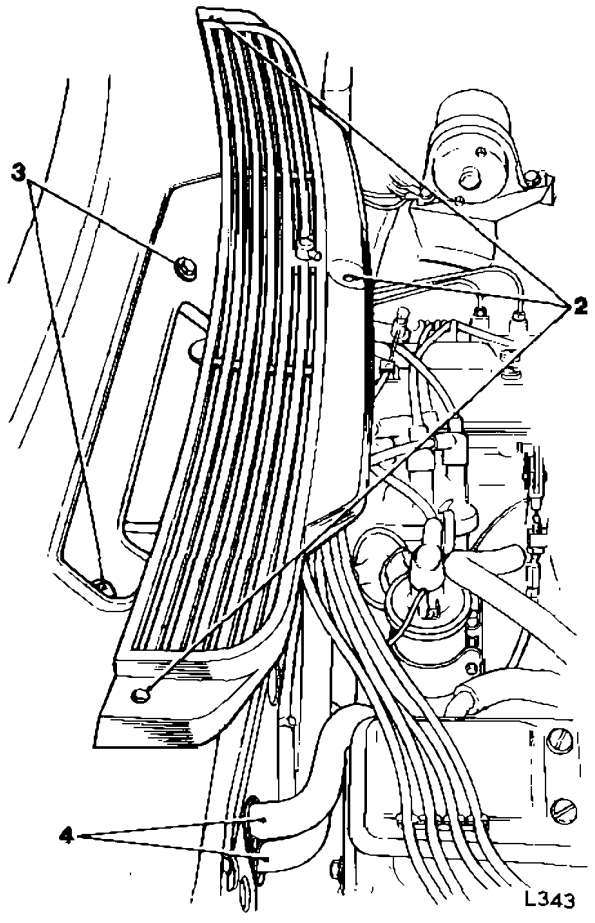
Refitting

5. Reverse the removal procedure.

** **NOTE:** On later models a push-in type vent is fitted and on the driver's side two sealing rings are used.**

HEATER UNIT

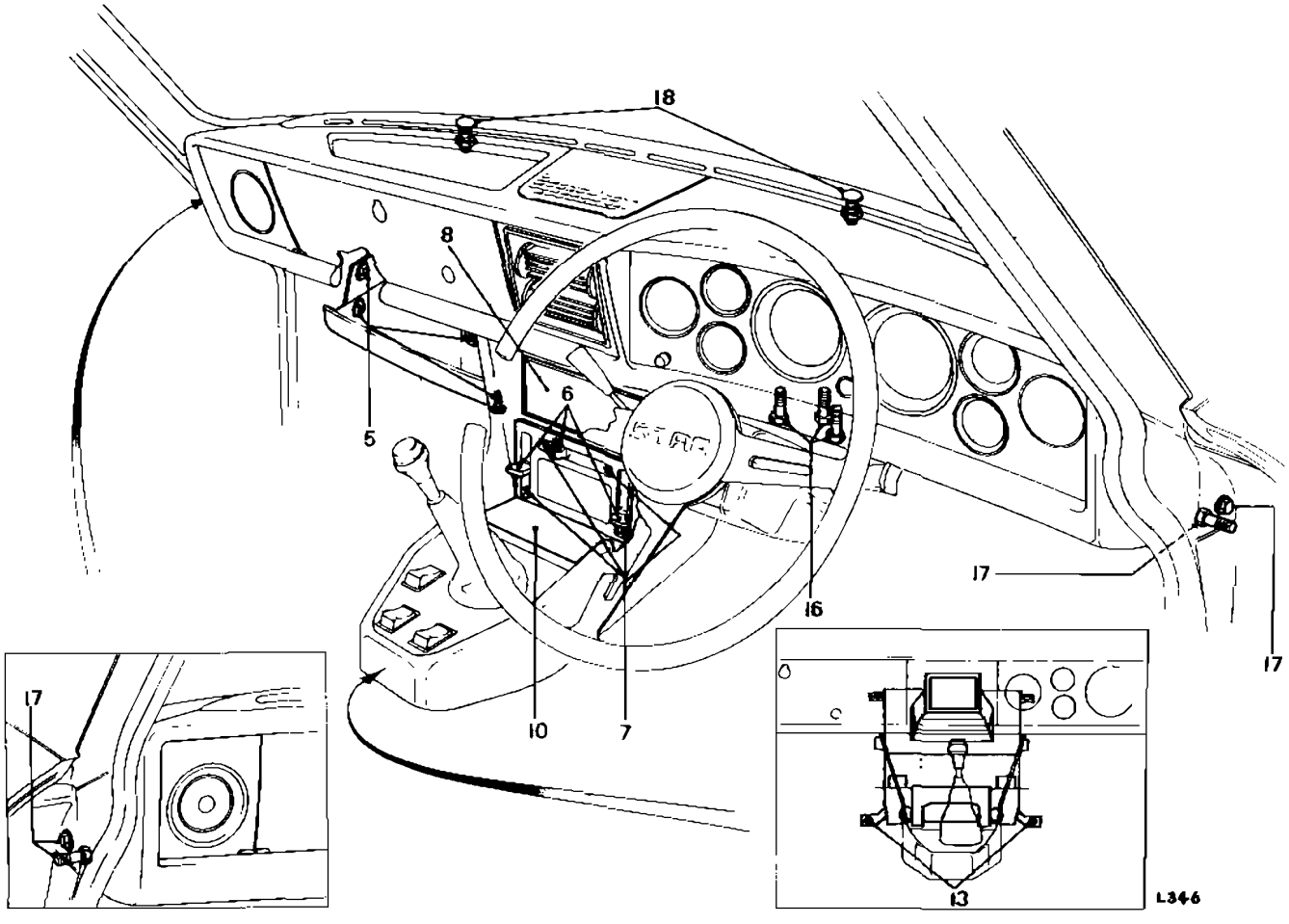
—Remove and refit **80.20.01**



Removing

1. Isolate battery, and drain cooling system.
2. Remove three screws securing air intake grille. Lift grille clear.
3. Remove two set screws securing heater to scuttle.
4. Disconnect rubber hoses from the heater entry and exit pipes.
5. Remove four screws securing parcel tray. Lift tray clear.
6. Pull off the three heater control knobs.
7. Remove four screws securing heater control panel. Withdraw control panel.
8. Prise out the radio aperture cover or, if fitted, the radio.
9. If automatic transmission is fitted, prise out the gear selector lever gate panel.
10. Remove console front cover.
11. Remove two screws securing console to transmission tunnel. Pull console back from heater.
12. Pull air vent hoses clear of the heater, and remove screen demister hoses.

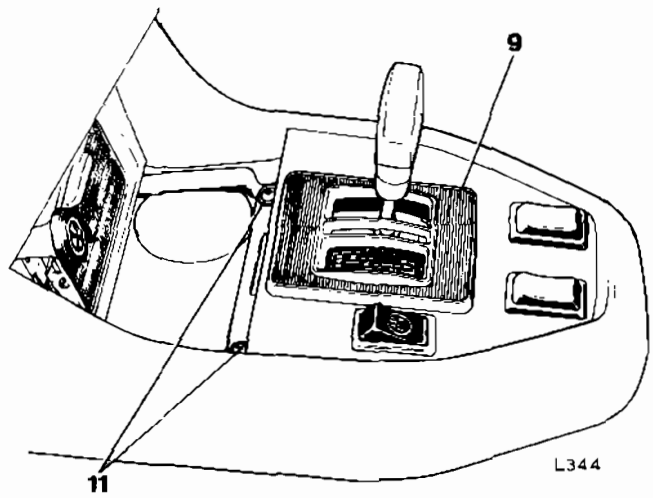
continued



13. Remove two lower bolts securing heater to scuttle.
14. Remove four bolts securing fascia support bracket to fascia and tunnel. Remove the bracket.
15. Disconnect blower motor leads.
16. Remove three bolts securing steering-column to fascia, and lower the column from the fascia.
17. Remove the outer four fascia attachment bolts.
18. Remove the two nuts securing upper edge of fascia. Access to the fixing on the passenger side is gained through an aperture in the top of the glovebox. Pull the fascia back from the heater.
19. Remove the heater through the passenger side of vehicle.

Refitting

20. Reverse the removal procedure, re-sealing with fresh compound those joints and bolts previously sealed.



COLD AIR HOSES—HEATER TO SWIVELLING VENTS

—Remove and refit **80.25.01**

Removing (passenger side)

1. Remove glovebox. 76.52.01.
2. Loosen clip, and pull hose from swivelling vent and from heater.

Refitting

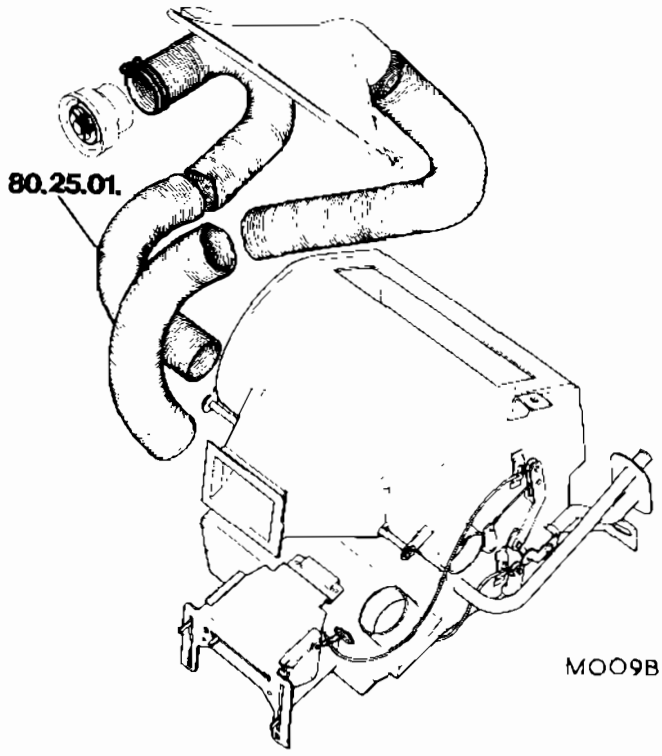
3. Reverse the removal procedure.

Removing (driver side)

1. Remove panel illumination rheostat knob.
2. Remove four screws and pull instrument panel clear of the fascia.
3. Remove the clip and pull hose from swivelling vent and from heater.

Refitting

4. Reverse the removal procedure.



PIPE—FEED TO HEATER

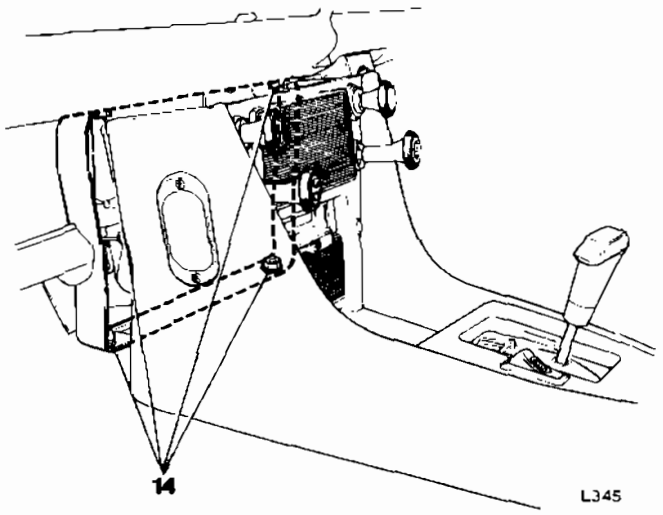
—Remove and refit **80.25.15**

Removing

1. Drain cooling system.
2. Release clips securing rubber feed hoses to steel feed pipe.
3. Remove bolt securing steel feed pipe to induction manifold. Withdraw pipe.

Refitting

4. Reverse the removal procedure.



AIR CONDITIONING OPERATIONS

Air conditioner unit
—blower motor—left-hand—remove and refit 82.25.13
—blower motor—right-hand—remove and refit 82.25.14
—control box—remove and refit 82.25.16
—description 82.25.00
—expansion valve—remove and refit 82.25.01
—remove and refit 82.25.07

Cold temperature system
—cold refrigerant circuit 82.00.02
—refrigerant 82.30.00
—warnings 82.30.00

Compressor
—clutch—remove and refit 82.10.08
—drive belt—adjust 82.10.01
—oil level 82.10.14
—remove and refit 82.10.20
—service valves 82.30.00

Condenser
—fan motor—remove and refit 82.15.01
—remove and refit 82.15.07

Controls—automatic
—cold temperature control system 82.20.00
—flap actuation system 82.20.00
—high pressure cut-out—description 82.20.00
—high pressure cut-out—remove and refit 82.20.20
—hot temperature control system 82.20.00
—master switch —remove and refit 82.20.07
—modulator valve—remove and refit 82.20.30
—on/off valve—remove and refit 82.20.15
—temperature sensing valve—remove and refit 82.20.31
—thermostat—remove and refit 82.20.18
—relays .. .. Section 86
—vacuum tank—description 82.20.00
—vacuum tank—remove and refit 82.20.13
—water flow valve—remove and refit 82.20.33

Controls—manual
—blower switch 82.20.00
—levers 82.20.00

continued

Electrical circuit
—relays .. .. Section 86
—wiring diagram—left-hand steer—air conditioning .. .. .. Appendix 01
—wiring diagram—right-hand steer—air conditioning .. .. .. Appendix 03
—wiring diagram—U.S.A. market—air conditioning .. .. .. Appendix 05

High pressure cut-out
—description 82.20.00
—remove and refit 82.20.20

Hot temperature system
—hot water circuit 82.00.03

Receiver drier
—remove and refit 82.17.01

Servicing
—charge 82.30.08
—depressurize 82.30.05
—evacuate 82.30.06
—functional check 82.30.16
—gauge set—connect and disconnet 82.30.01
—general instructions 82.30.00
—leak test 82.30.09
—refrigerant 82.30.00
—service valves 82.30.00
—warnings 82.30.00

Introduction

The air conditioning system is designed to provide both heated air as available in a conventional heater-equipped vehicle or cool, dry, clean air for increased comfort in hot climates.

The principal component of the system is the air conditioner unit. It governs all airflows and contains two separate matrixes: a hot matrix heated by the hot water circuit and a cold matrix cooled by the cold refrigerant circuit.

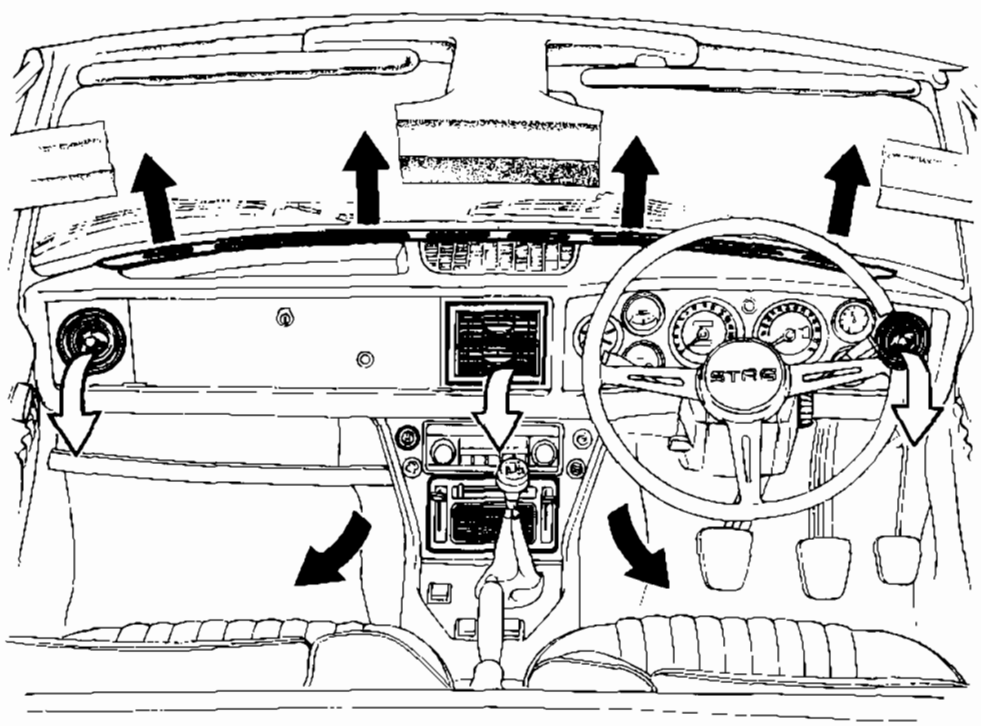
Hot air is delivered from the footwell outlets and screen outlets at a temperature controlled by the hot temperature control system.

Cold air is delivered from the central fascia vent and the two fascia louvres at a temperature controlled by the cold temperature control system.

The refrigeration circuit consists of a compressor at the front of the engine driven via a belt and electro-magnetic clutch, a condenser in the nose of the vehicle, a receiver drier cylinder on the left-hand valance and the cold matrix in the air conditioner unit. Hoses join the components.

The system is filled with refrigerant which must be subject to special precautions. It exists in the circuit both as a liquid and as a vapour.

Service personnel who are not familiar with air-conditioned vehicles must study Servicing—General instructions 82.30.00. A full understanding of this section must be obtained before breaking into the system. Failure to observe this instruction may result in severe personal injury.



M121

Cold refrigerant circuit

Introduction

The function of the refrigeration circuit is to cool the cold matrix. The circuit comprises the following main components:

Compressor
Condenser
Receiver drier
Expansion valve and cold matrix

Hoses are employed to transport the refrigerant between components.

Compressor

The compressor draws vaporized refrigerant from the cold matrix. It is compressed, and thus heated, and passed on to the condenser as a hot, high pressure vapour.

Condenser

The condenser is mounted at the front of the car. Its function is to remove heat from the refrigerant and disperse it into the atmosphere. It is delivered with hot, high pressure vapour. Air flow across the tubes, induced by vehicle movement and assisted by two electric fans, cools the vapour, causing it to condense into a high pressure liquid. As this change of state occurs a large amount of latent heat is released.

Receiver drier

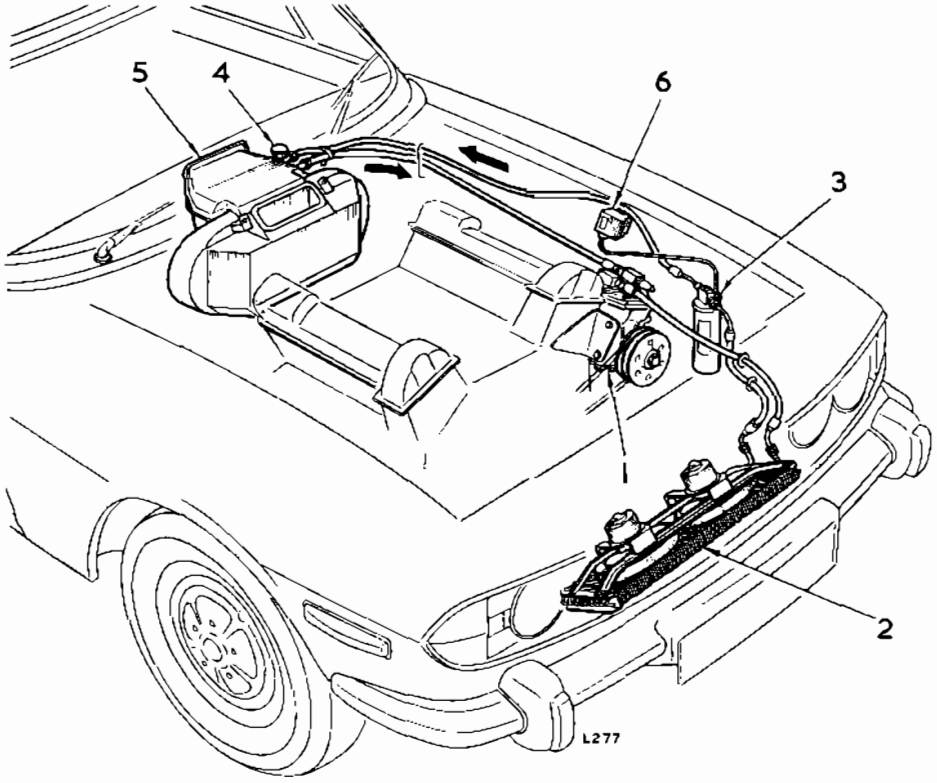
This unit filters, removes moisture, and acts as a reservoir for the liquid. To prevent icing inside the system, extreme precautions are taken during servicing to exclude moisture. The receiver drier should be considered as a second stage insurance to prevent the serious consequences of ice obstructing the flow. A sight glass provided in the unit top enables a visual check to be made of the high pressure liquid flow.

Expansion valve and cold matrix

High pressure liquid refrigerant is delivered to the expansion valve. A severe pressure drop occurs across the valve and as the refrigerant enters the cold matrix space at a temperature of approximately −6°C it boils and vaporizes. As this change of state occurs, a large amount of latent heat is absorbed. The cold matrix is therefore cooled and as a result heat is extracted from the air flowing across the matrix.

Second cycle

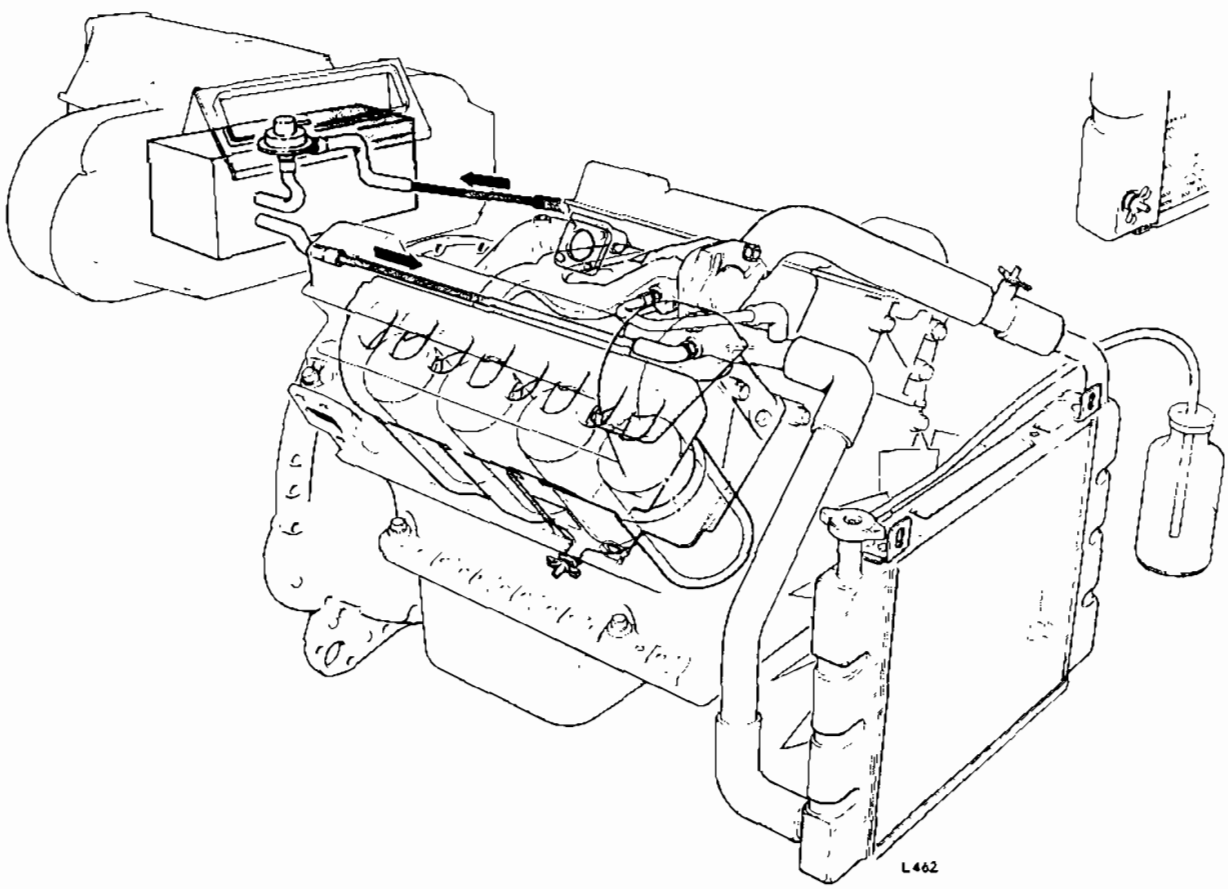
Vaporized refrigerant is then drawn from the cold matrix by the compressor and a second cycle commences.



1. Compressor
2. Condenser
3. Receiver drier
4. Expansion valve
5. Cold matrix
6. High pressure cut-out

Hot water circuit

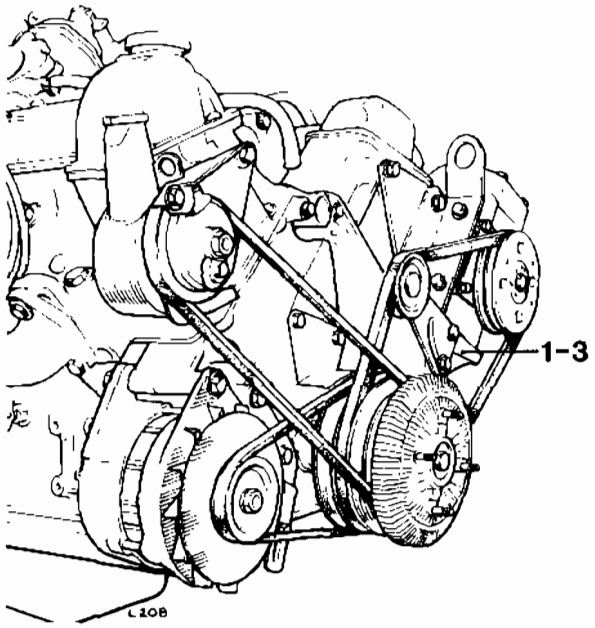
The function of the hot water circuit is to heat the hot matrix. The hot water flow is induced by the engine water pump. Hot water is drawn from the water transfer housing at the rear of the left-hand bank and passes through the water flow valve to the hot matrix. From the hot matrix outlet the flow is forward between the two banks to enter the water pump housing. This entry is on the suction side of the water pump.



COMPRESSOR

Drive belt—adjust **82.10.01**

1. Slacken two jockey pulley bolts
2. Carefully lever jockey pulley mounting to tension belt.
3. Tighten two bolts.
4. Check belt tension. This should be 0·75 to 1·00 in (19 to 25 mm) at the mid-point between jockey pulley and compressor pulley.

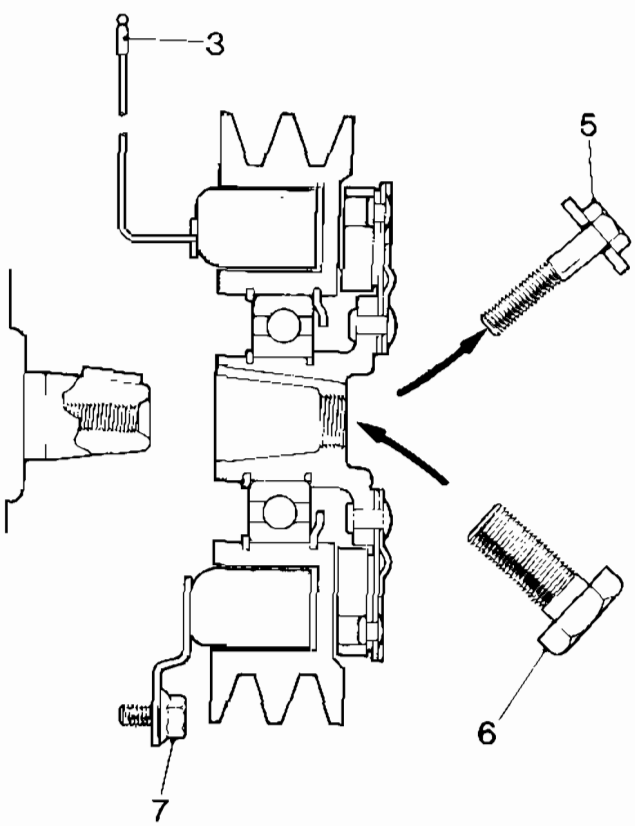


COMPRESSOR

Clutch—remove and refit **82.10.08**

Removing

1. Remove radiator. 26.40.01.
2. Slacken top bolt and remove bottom bolt. Push jockey pulley downwards and remove drive belt from compressor pulley.
3. Disconnect electrical connection to compressor clutch.
4. Energize clutch by using a slave wire between battery positive terminal and clutch electrical connection.
5. With compressor crankshaft locked to pulley, retain pulley and remove centre bolt.
6. Screw a 0·625 in U.N.C. bolt into the thread provided to withdraw pulley assembly from tapered shaft.
7. Remove four bolts and withdraw clutch coil assembly.



Refitting

8. Reverse 1 to 7. With clutch energized, torque-load centre bolt to 16 lb ft (2·2 kgf m).

COMPRESSOR

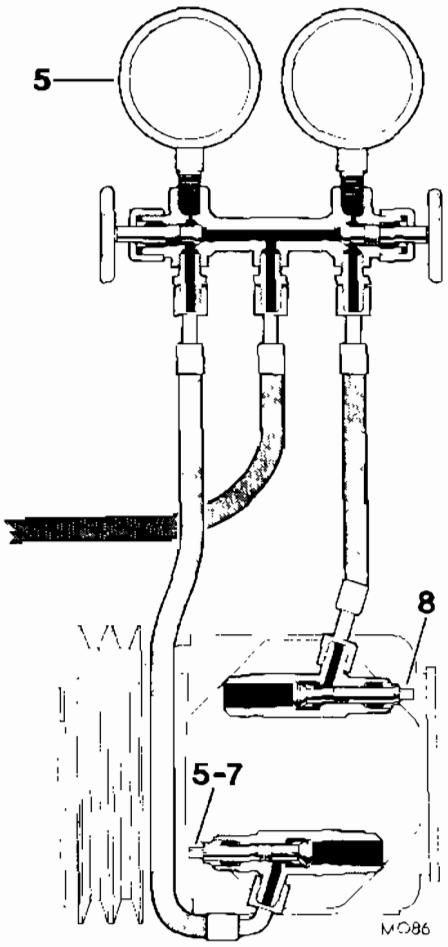
Oil level 82.10.14

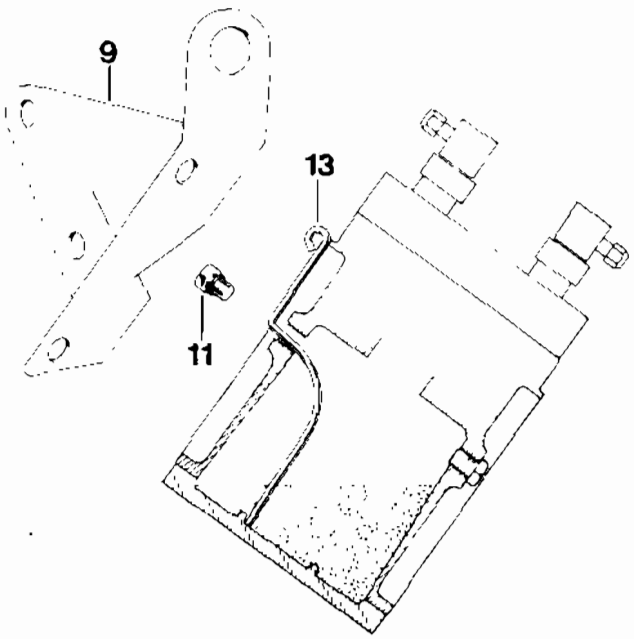
During system operation some refrigerant compressor oil from the compressor crankcase circulates throughout the circuit. When the system is stopped the oil remains in the components and hoses. If a component is changed some oil will therefore be lost. Perform an oil level check after renewing a compressor, condenser, receiver drier, air conditioner unit or hose.

CAUTION: Fill only with refrigerant compressor oil of approved trade names:

BP	Energol LPT 100
Texaco	Capella E
Shell	Clavus 33.

1. Connect gauge set to service valves. 82.30.05.
2. Select lever 'B' to full 'COLD'.
3. Run engine at 1,200 to 1,500 rev/min for five minutes.
4. Reduce engine speed to idle.
5. Slowly turn suction service valve towards front seat position—turn clockwise. Continue until gauge reads zero or a little below.
6. Use a second operator in vehicle to control ignition switch to speed operations 7 and 8.
7. Stop engine. Quickly close suction service valve to front seat position—turn clockwise.
8. Quickly close discharge service valve to front seat position—turn clockwise.
9. Remove five bolts and lift out stabilizer bracket.
10. Protect eyes with safety goggles and wear gloves during operation 11.
11. Carefully remove bolt, allowing crankcase pressure which may be up to 5 lb/in² to dissipate slowly.
12. Locate oil level dipstick in vehicle tool kit.
13. Insert clean dipstick to position shown. It may be necessary to turn compressor crank to provide clearance.
14. Withdraw dipstick. Observe oil level with care as lubricant is of a transparent nature.
15. If oil level is near minimum mark, top up with approved oil to bring level near maximum mark. Do not overfill.
16. If available, use new rubber 'O' ring. Lubricate 'O' ring with refrigerant compressor oil before fitting to bolt. Fit bolt.
17. Position stabilizer bracket and secure with five bolts.
18. Disconnect gauge set from service valves. 82.30.05.



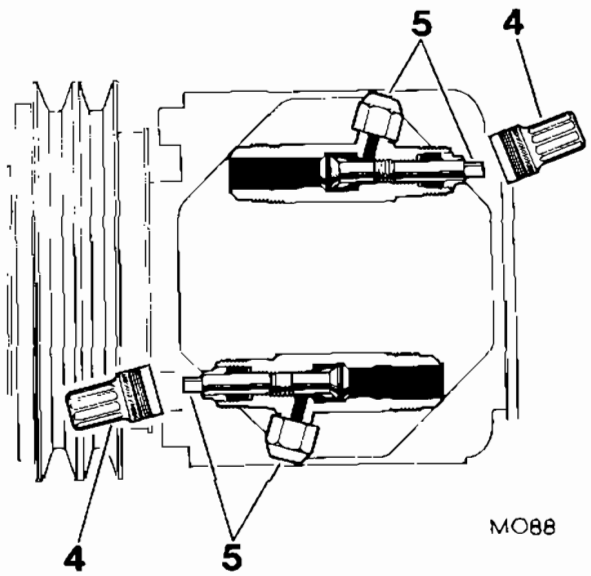


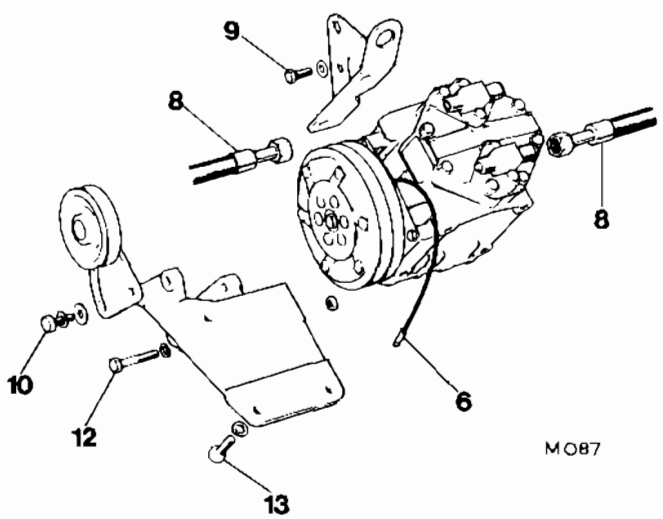
COMPRESSOR

—Remove and refit **82.10.20**

Removing

1. Place vehicle on ramp. Operations 2 to 10 may be performed with ramp lowered.
2. Depressurize. 82.30.05
3. Disconnect gauge set from service valves. 82.30.01.
4. Remove two protective caps from service valves.
5. To seal compressor interior ensure two hexagon caps are fitted and close both service valves to front seat position—turn clockwise.
6. Ensure electrical connection to compressor clutch is disconnected.
7. Protect eyes with safety goggles and wear gloves during operation 8.
8. Carefully disconnect two hose connections. Blank exposed connections immediately.
9. Remove five bolts and lift out stabilizer bracket.
10. Slacken top bolt and remove bottom bolt. Push jockey pulley downwards and remove drive belt from compressor pulley.
11. Raise vehicle on ramp.
12. Support weight of compressor. Remove three bolts and one bolt and nut. Lift compressor complete with mounting bracket from vehicle.
13. Hold mounting bracket in vice. Remove four bolts and separate compressor from mounting bracket.



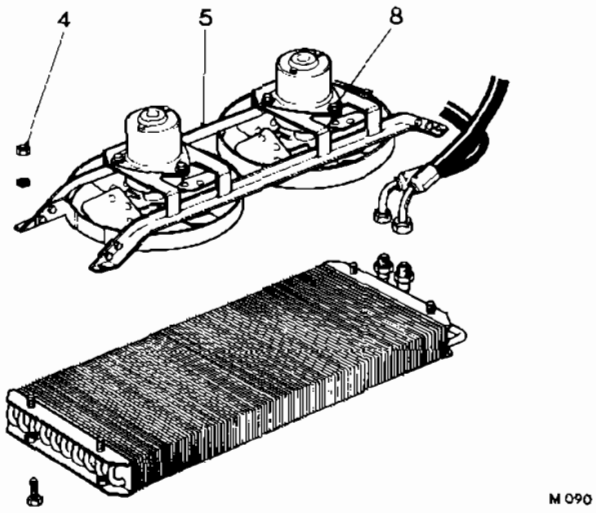


Refitting

14. Reverse 9 to 13.
15. Adjust compressor drive belt. 82.10.01.
16. Connect two hose connections. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
17. Connect gauge set. 82.30.01.
18. Evacuate. 82.30.06.
19. Change. 82.30.08.

CONDENSER FAN MOTOR

—Remove and refit **82.15.01**



Removing

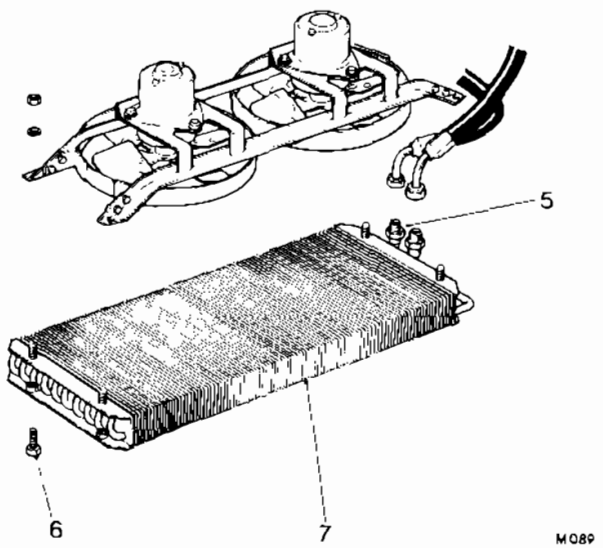
1. Remove four screws and withdraw centre grille section.
2. Remove radiator. 26.40.01.
3. Disconnect four electrical connections to isolate both fan motors.
4. Remove four nuts from studs. If right-hand rear nut proves difficult to remove with tools available, remove battery 86.15.01. Access hole in battery tray will facilitate nut removal.
5. Manœuvre fan motor mounting assembly upwards and lift from vehicle.
6. Note appropriate motor shaft projection from fan boss.
7. Slacken Allen screw and withdraw fan from shaft.
8. Remove three nuts, washers and screws and withdraw motor.

Refitting

9. Reverse 1 to 8.

CONDENSER

—Remove and refit **82.15.07**



Removing

1. Depressurize. 82.30.05.
2. Remove condenser fan motor. 82.15.01 operations 1 to 5.
3. Remove three screws and withdraw left-hand inner headlamp assembly complete to provide space for condenser removal
4. Protect eyes with safety goggles and wear gloves during operation 5.
5. Carefully disconnect two hose connections. Use two spanners at each joint to protect delicate condenser pipe joints. Blank exposed connections immediately.
6. Remove four bolts.
7. Carefully manœuvre condenser upwards and lift from vehicle. Handle with care as fins are easily damaged.

Refitting

8. Reverse 5 to 7. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
9. Reverse 2 to 3.
10. Evacuate. 82.30.06.
11. Change. 82.30.08.

RECEIVER DRIER

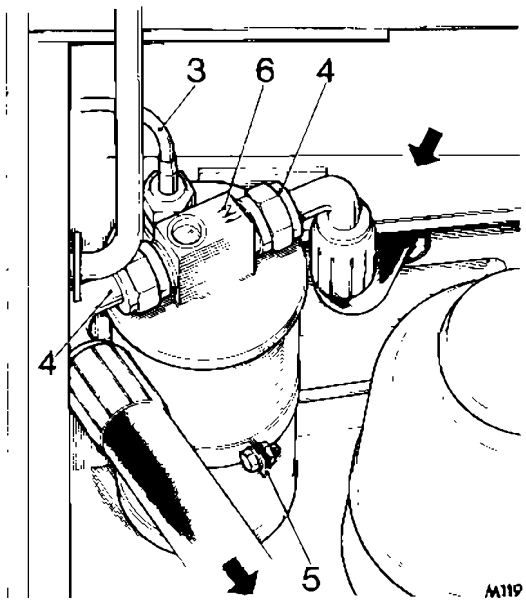
—Remove and refit **82.17.01**

Removing

1. Depressurize. 82.30.05.
2. Protect eyes with safety goggles and wear gloves during operations 3 and 4.

   CAUTION: Immediate blanking is especially important with receiver drier. Exposed life of unit is only 15 minutes.

3. Carefully disconnect capillary tube from receiver drier. Blank exposed connections immediately.
4. Carefully disconnect two hose connections. Blank exposed connections immediately.
5. Slacken mounting bracket clamp and withdraw unit.



Refitting

6. Insert unit into mounting bracket with 'IN' and 'OUT' connections correct to refrigerant circuit flow. Tighten mounting bracket clamp.
7. Reverse 3 to 4. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
8. Evacuate. 82.30.06.
9. Change. 82.30.08.

CONTROLS—AUTOMATIC

—Description 82.20.00

Cold temperature control system

This control system is electrically powered. It comprises a circuit with various control inputs which switch on and off the air conditioner unit blower motors, the condenser fan motors and the electro-magnetic clutch fitted to the compressor.

Moving lever 'B' to the left of its central 'OFF' position will energize the cold temperature control system by tripping the master switch in the control box. This will automatically bring into operation the two blower motors at low speed.

The thermostat located in the control box is the temperature controlling component. The position of lever 'B' between 'OFF' and 'COLD' determines the initial manual setting of the thermostat. The thermostat also recognizes the temperature of the cold matrix by a vapour-charged capillary inserted into the cold block. These two signals together govern the exact on/off switching of the unit.

The thermostat controls a relay which directs an electrical supply to either the heated back-light circuit or the refrigeration circuit.

Energizing the refrigeration circuit brings into operation the two condenser fan motors and, subject to the safety feature of the high pressure cut-out, engages the electro-magnetic clutch of the compressor.

The electro-magnetic clutch is the means of cutting the compressor in and out to achieve on—off control of the refrigeration circuit. The cold matrix temperature is therefore automatically adjusted to maintain an approximately constant temperature within the vehicle.

High pressure cut-out

This unit is a safety feature to protect the refrigeration circuit from excessive pressure. It is not subject to continuous cycling during normal system operation.

Refrigerant pressure is sensed at the receiver drier and governs an electrical switch. The switch is included in the cold temperature control system so that it may control the electro-magnetic clutch.

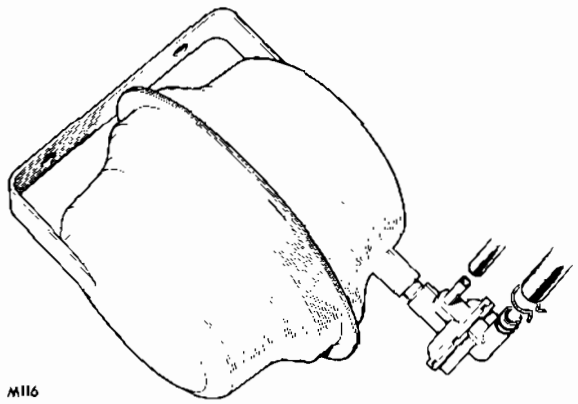
The electro-magnetic clutch is the means of cutting the compressor in and out to achieve on–off control of the refrigeration circuit. The refrigerant pressure is therefore automatically adjusted to maintain a pressure below the high limit.

continued

Vacuum tank

The vacuum tank provides the power supply for both the flap actuation system and the hot temperature control system.

The unit is mounted on the engine side of the bulkhead and consists of a storage tank and a non-return valve with integral pipe connections. The tank is evacuated by manifold suction.



Flap actuation system

This system comprises three main components: a vacuum tank exhausted by engine suction, a manually controlled on/off valve, and a diaphragm-operated actuator. The actuator positions two flaps 'B' to closed/hot or open/cold. No intermediate positions are used.

The on/off valve is located in the control box. Moving lever 'B' to the left of its central 'OFF' position will cause the vacuum supply to be connected to the actuator. Moving lever 'B' to the right of its central 'OFF' position will cause the actuator to be connected to the valve atmospheric vent.

The valve selection directly affects the pressure on the diaphragm which determines the position of the actuator. The actuator drives a simple rod and lever system to position the two flaps 'B' to closed/hot or open/cold. No intermediate positions are used.

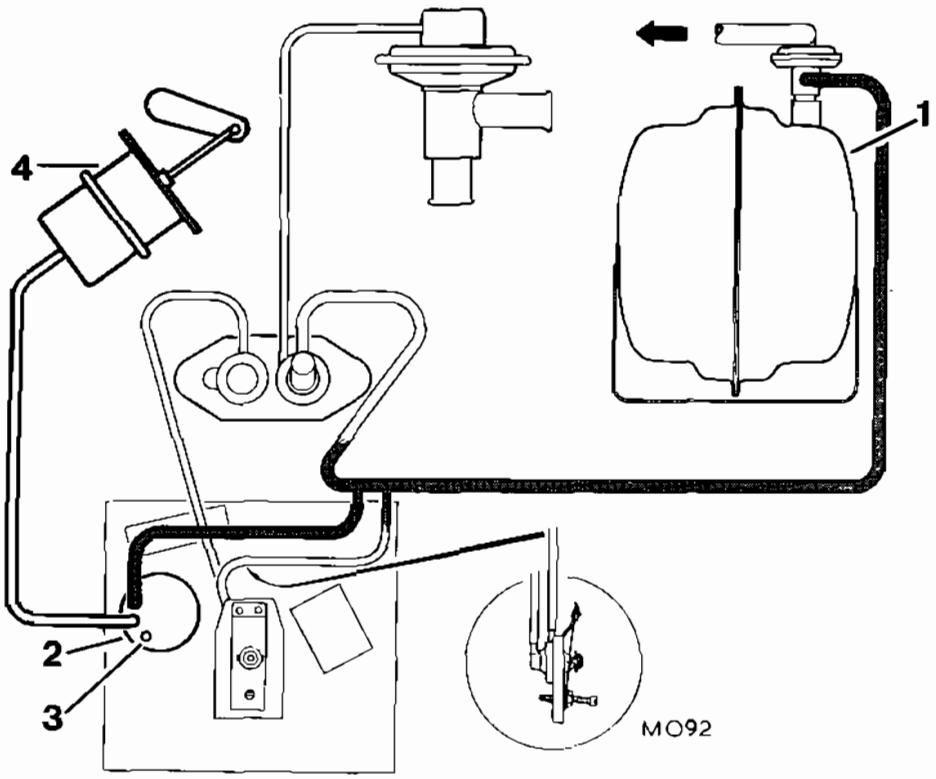
Hot temperature control system

This system comprises four main components: a vacuum tank exhausted by engine suction, a manually set modulator valve, a temperature sensing valve, and a diaphragm-operated water flow valve.

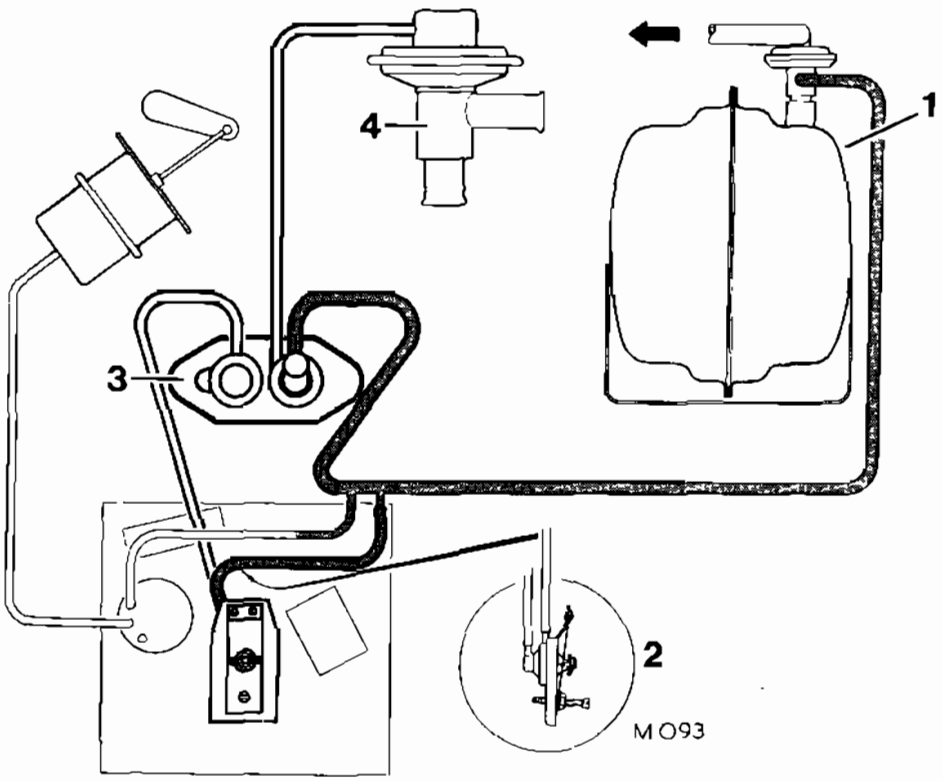
The modulator valve is located in the control box. It has a supply of vacuum direct from the vacuum tank. The position of lever 'B' between 'OFF' and 'HOT' determines the setting of the valve to direct the degree of air bleeding and thus the vacuum signal felt at the temperature sensing valve.

The temperature sensing valve is positioned forward of the control box, adjacent to the hot matrix air outlet so its bi-metal strip is directly affected by the heater output air temperature. The valve has a supply of vacuum direct from the vacuum tank. The combined effect of the vacuum signal from the modulator valve and the position of the bi-metal strip governs the degree of air bleeding into this supply and establishes a second vacuum value.

This second vacuum value is felt by the water flow valve diaphragm which determines the water flow volume. The hot matrix temperature is therefore automatically adjusted to maintain an approximately constant temperature within the vehicle.



1. Vacuum tank
2. On/off valve
3. Atmosphere vent
4. Actuator



1. Vacuum tank
2. Modulator valve
3. Temperature sensing valve
4. Water flow valve

CONTROLS—MANUAL

—Description 82.20.00

Blower switch

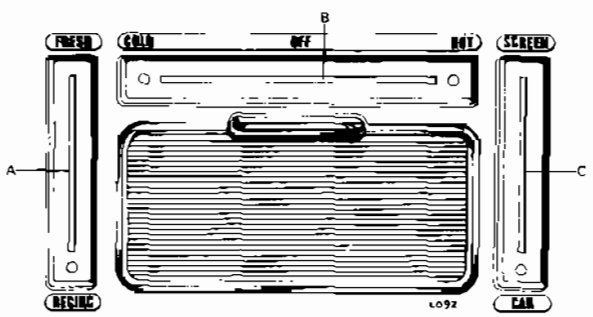
Two blower units may be used to increase the fresh air flow when the car is operating in extremes of temperature or at low road speeds. When the recirculating system is employed the blower units must be used to induce the flow. To operate, pull the knob to the first position for low speed and fully out for high speed. It may be noted that selecting the cooling system will automatically bring into operation the blower units at low speed. From this condition high speed may be obtained by pulling the switch knob fully out.

Levers

Lever 'A'

The system draws either fresh air at ambient temperature through the bulkhead aperture or recirculated air from the vehicle interior. The choice is a driver function by selection at lever 'A'. To obtain maximum heating and particularly maximum benefit from the cooling system in hot climates select 'RECIRC'.

Lever 'B'



Moving lever 'B' to the right of its central 'OFF' position will select the heating system. Air flowing from the footwell outlets or screen outlets will be heated. The position of lever 'B' between 'OFF' and 'HOT' directs the degree of heat required. The hot temperature control system will maintain an approximately constant interior temperature.

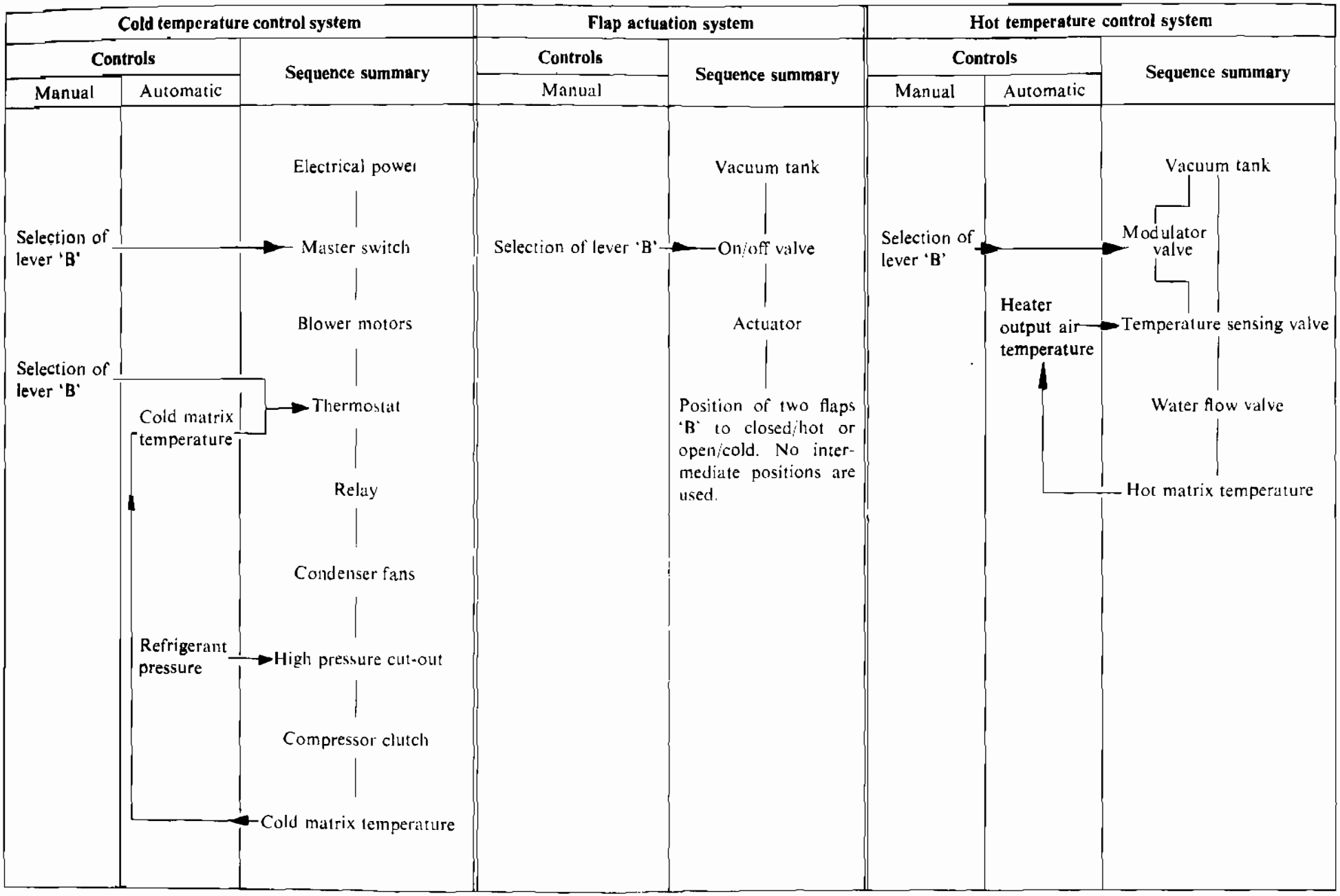
Moving lever 'B' to the left of its central 'OFF' position will select the cooling system. The total cold air volume will be split from the central fascia vent and the two fascia louvres. The position of lever 'B' between 'OFF' and 'COLD' directs the degree of cooling required. The cold temperature control system will maintain an approximately constant interior temperature.

Lever 'C'

NOTE: When the cooling system is selected the position of lever 'C' has no relevance.

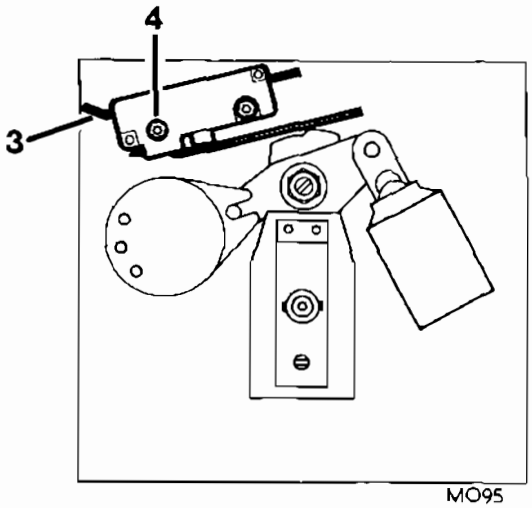
Lever 'C' is effective when heated or ambient air is being delivered. When selected to 'SCREEN' the total air volume is directed to the screen vents. Moving the lever down progressively decreases the flow to the screen and increases the flow to the footwells. A selection to 'CAR' will cause the total air volume to be delivered to the footwells.

CONTROL SUMMARY



CONTROLS—AUTOMATIC

Master switch—remove and refit **82.20.07**



Removing

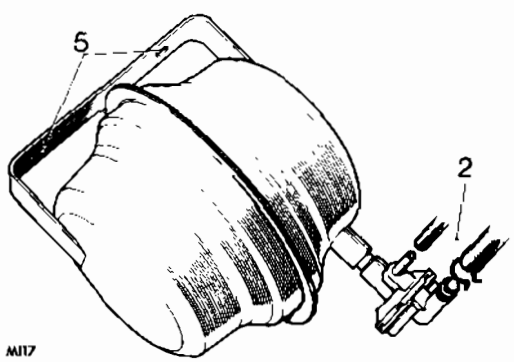
1. Withdraw control box to limited access position. 82.25.16 operations 1 to 4.
2. Remove two screws to release mounting plate from control box top.
3. Disconnect two Lucar connectors.
4. Remove two nuts and washers. Lift out master switch. Retain two thick washers and two screws.

Refitting

5. Fit master switch.
6. Slacken two screws to allow movement in elongated holes. Adjust microswitch position to acheive the following:
   a. Lever 'B' selected 'OFF'—switch contacts open.
   b. Lever 'B' selected 3 to 5 degrees towards 'COLD' —switch contacts close.
   c. Lever 'B' selected full 'COLD'—switch contacts remain closed.
   d. from full 'COLD' return lever 'B' towards 'OFF'—switch contacts must open at the 'OFF' position.
   e. If switch position cannot be adjusted to comply with conditions *b* and *d*, ignore condition *b* and adjust for condition *d*.
7. Connect two Lucar connectors.
8. Position mounting plate to control box top and secure with two screws.
9. Reverse operation 1.

CONTROLS—AUTOMATIC

Vacuum tank—remove and refit **82.20.13**



Removing

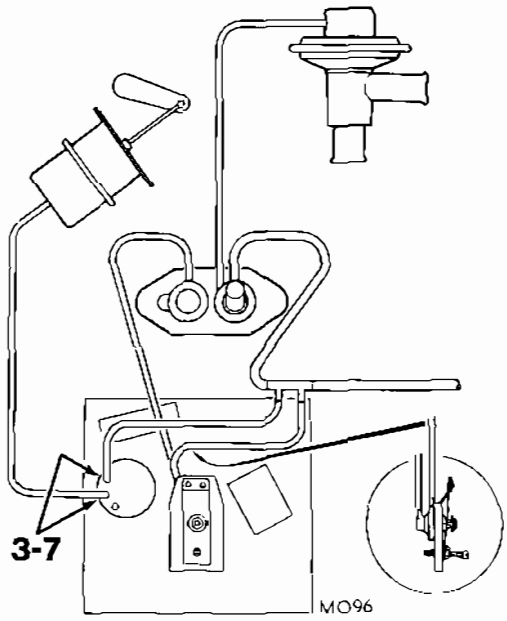
1. Isolate battery.
2. Pull off two vacuum hoses at non-return valve.
3. Remove parcel tray. 76.67.01.
4. Remove three self-tapping screws and lift aside component mounting plate complete.
5. Support vacuum tank. Remove two bolts and lift out tank.

Refitting

6. Reverse 1 to 5.

CONTROLS—AUTOMATIC

On/off valve—remove and refit 82.20.15



Removing

1. Withdraw control box to limited access position. 82.25.16 operations 1 to 4.
2. Remove two screws to release mounting plate from control box top.
3. Pull off two vacuum pipes at on/off valve.
4. Remove two screws and lift out on/off valve.

Refitting

5. Position on/off valve and secure with two screws.
6. Provide vacuum supply of 18 inHg to vacuum switch input. Connect vacuum switch output to manometer representing actuator.

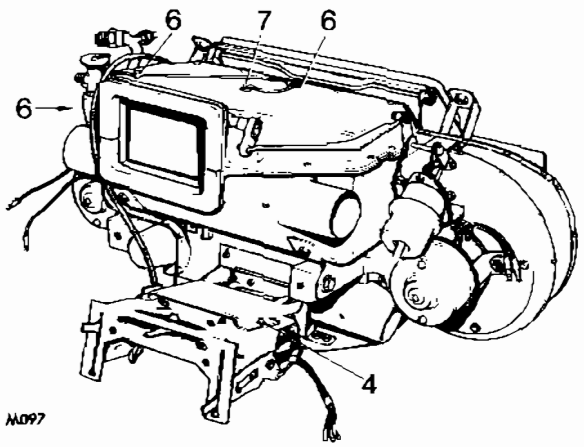
   Slacken two screws to allow movement in elongated holes. Adjust vacuum switch position to achieve the following:

   a. Lever 'B' selected 'OFF'—vacuum zero.
   b. Lever 'B' selected 3 to 5 degrees towards 'COLD' —vacuum 12 inHg minimum.
   c. Lever 'B' selected full 'COLD'—vacuum 12 inHg minimum.
   d. From full 'COLD' return lever 'B' towards 'OFF'—vacuum must be zero at the 'OFF' position.
   e. Ensure vacuum switch position does not cause any tightness when the control geometry is at T.D.C.

7. Connect two vacuum pipes as shown.
8. Position mounting plate to control box top and secure with two screws.
9. Reverse operation 1.

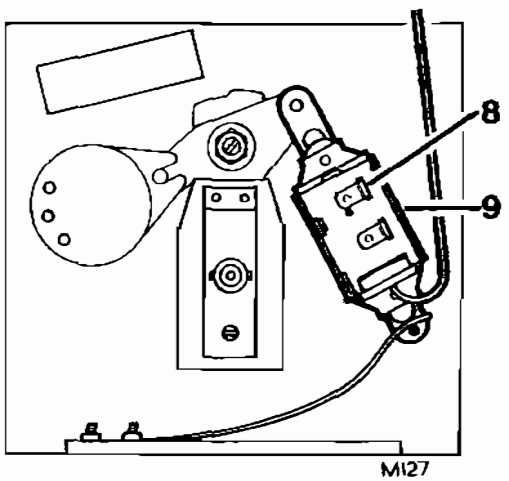
CONTROLS—AUTOMATIC

Thermostat—remove and refit **82.20.18**



Removing

1. Right-hand steer vehicles only: Remove glovebox. 76.52.01.
2. Left-hand steer vehicles only: Lower instrument panel to service position. 88.20.01 operations 1 to 7.
3. Withdraw control box to limited access position. 82.25.16 operations 1 to 4.
4. Remove two screws to release mounting plate from control box top.
5. Using screwdriver, prise up speaker grille. If fitted, remove radio speaker.
6. Using short length Pozidriv screwdriver, remove three self-tapping screws and clips to release thermostat capillary.
7. Carefully withdraw grommet and capillary sensor from cold matrix.
8. Disconnect two Lucar connectors.
9. Remove two screws and carefully lift out thermostat and withdraw capillary.



Refitting

10. Reverse 5 to 9.
11. Slacken two screws to allow movement in elongated holes.

    Operating link, post and thermostat trigger are visible through aperture in control box top panel.

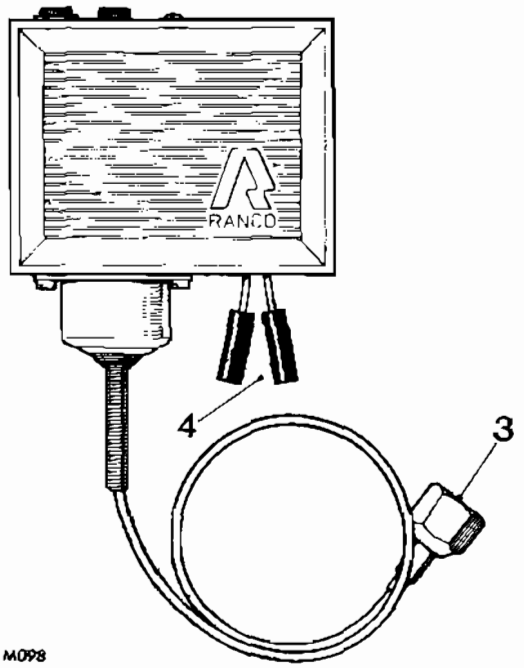
    Adjust thermostat position to achieve the following:

    a. Lever 'B' selected 'OFF'—operating link just in contact with post.
    b. Lever 'B' selected full 'COLD'—thermostat trigger at full travel.

12. Reverse 1 to 4.

CONTROLS—AUTOMATIC

High pressure cut-out—remove and refit 82.20.20



Removing

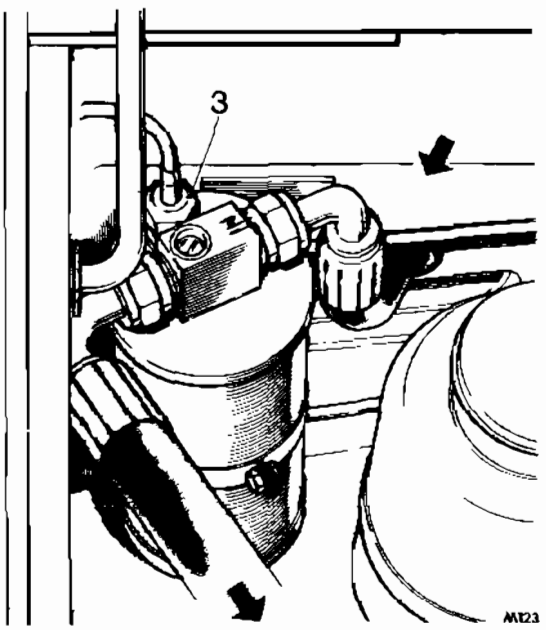
1. Depressurize. 82.30.05.
2. Protect eyes with safety goggles and wear gloves during operation 3.

   CAUTION: Immediate blanking is especially important with receiver drier. Exposed life of unit is only 15 minutes.

3. Carefully disconnect capillary tube from receiver drier. Blank exposed connections immediately.
4. Disconnect two electrical connections.
5. Working from under front wing panel, support unit and remove two screws. Lift out unit.

Refitting

6. Reverse 3 to 5. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
7. Evacuate. 82.30.06.
8. Change. 82.30.08.



CONTROLS—AUTOMATIC

Modulator valve—remove and refit **82.20.30**

Removing

1. Withdraw control box to limited access position. 82.25.16 operations 1 to 4.
2. Pull off two vacuum pipes at modulator valve.
3. Slacken locknut and screw out nylon valve operating screw until screw end is clear of mounting plate.
4. Remove two small Pozidriv screws and withdraw valve from mounting.

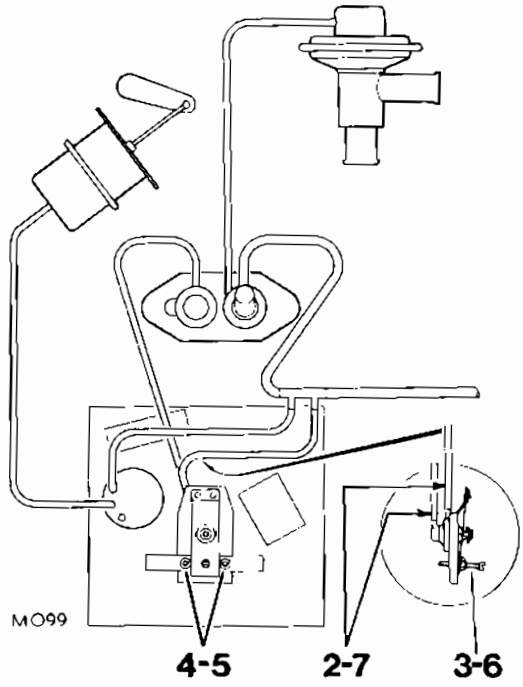
Refitting

5. With nylon valve operating screw suitably positioned, insert valve into mounting. Secure with two small Pozidriv screws.
6. Provide vacuum supply of 18 inHg to modulator valve input. Connect output to manometer representing temperature sensing valve.

   Slacken locknut. Adjust nylon screw to achieve the following:

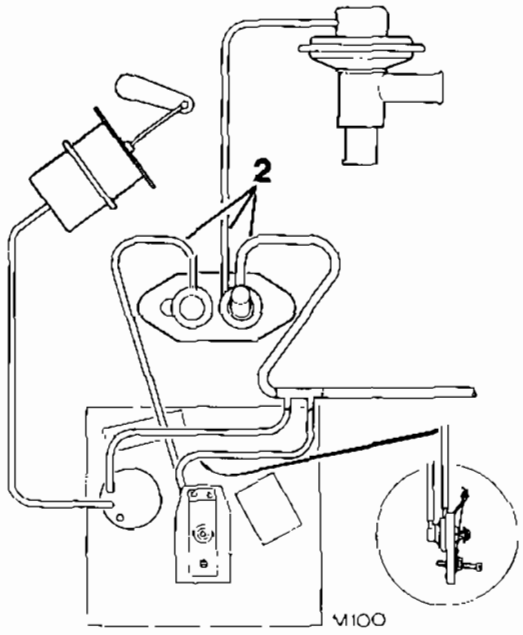
   a. Lever 'B' selected 'OFF'—vacuum 4 inHg maximum.
   b. Lever 'B' selected 10 degrees towards 'HOT'—vacuum 8·1 to 9·1 inHg.
   c. Lever 'B' selected full 'HOT'—vacuum 12 inHg minimum.
   d. From full 'HOT' return lever 'B' towards 'OFF'—vacuum 4 inHg maximum at the 'OFF' position.

7. Connect two vacuum pipes as shown.
8. Reverse operation 1.



CONTROLS—AUTOMATIC

Temperature sensing valve—remove and refit **82.20.31**



Removing

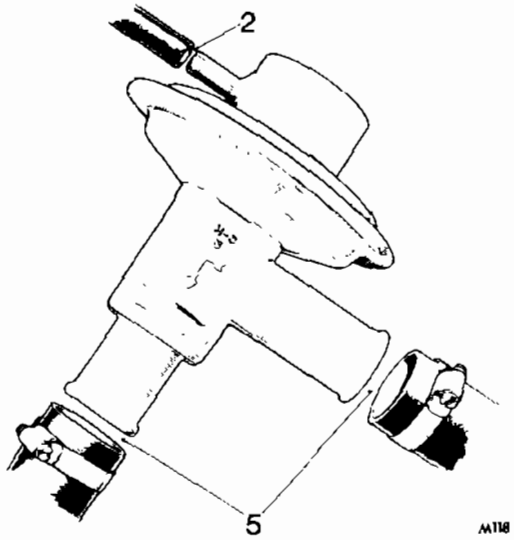
1. Withdraw control box to limited access position. 82.25.16 operations 1 to 4.
2. Pull off three vacuum pipes at temperature sensing valve.
3. Remove two self-tapping screws and withdraw temperature sensing valve.

Refitting

4. Reverse 1 to 3. Connect vacuum pipes as shown.

CONTROLS—AUTOMATIC

Water flow valve—remove and refit **82.20.33**



Removing

1. Drain part coolant, 26.10.01.
2. Pull off vacuum pipe.
3. Slacken water hose clips.
4. Slacken mounting bracket clamp screw.
5. Slide out water flow valve and pull off water hoses.

Refitting

6. Reverse 1 to 5.

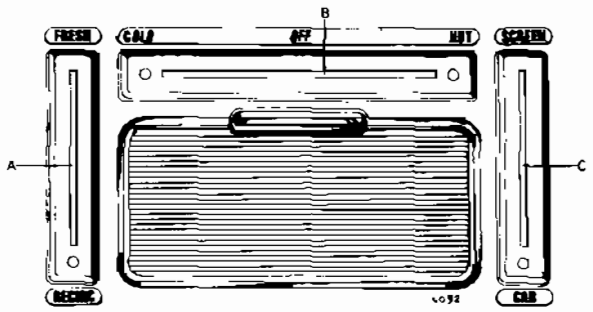
AIR CONDITIONER UNIT

—Description 82.25.00

Introduction

The air conditioner unit is positioned on the centre line of the vehicle between the bulkhead and the fascia/console panels. The function of the unit is to receive air, process and deliver it to the outlets as directed by the control positions.

To comprehend the following system descriptions it should be appreciated that control lever 'A' positions flap 'A' in the air conditioner unit, Similarly lever 'B' positions the two flaps 'B'—this time by vacuum actuator—and lever 'C' positions the two flaps 'C'.



Intakes

The system draws fresh air at ambient temperature through the bulkhead aperture, or recirculated air from the vehicle interior, into the air conditioner unit plenum chamber, The choice is directed by the cable-controlled flap 'A'.

Blowers

Two blower units transfer air from the plenum chamber to the distribution area.

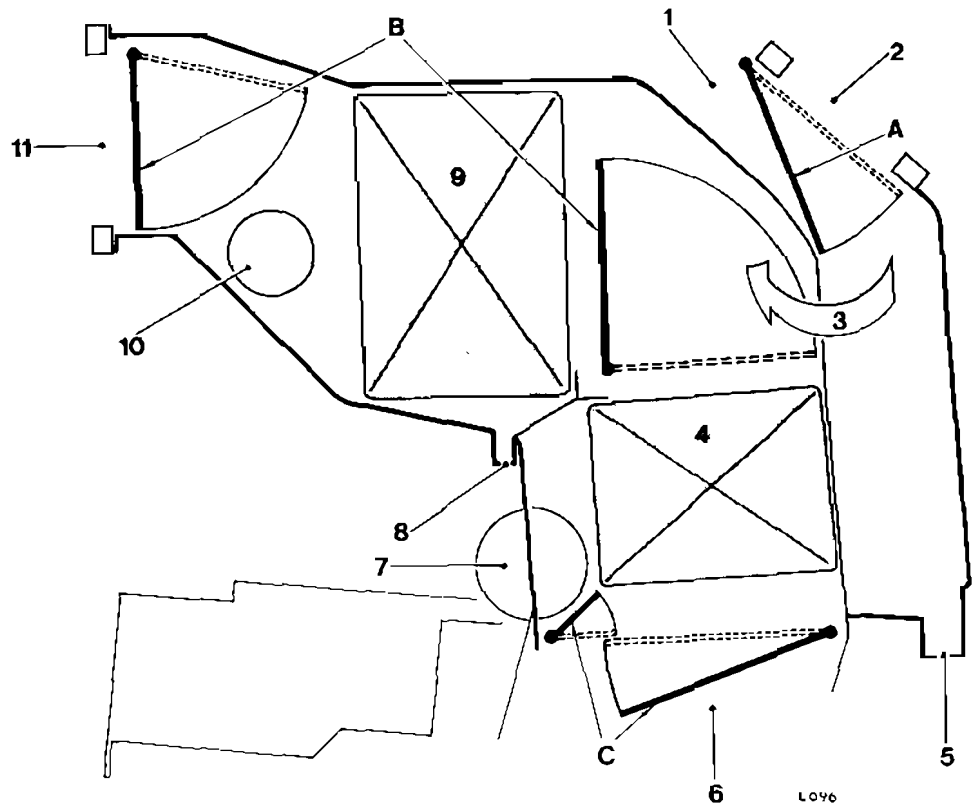
Matrixes

Two separate matrixes are employed. A hot matrix which may be supplied with hot water from the engine cooling system and a cold matrix which may be cooled by the refrigeration circuit.

Hot air

When hot air is demanded the two flaps 'B' are positioned by an unenergized vacuum actuator to the closed/hot position. Air from the distribution area flows down across the hot matrix to the hot distribution area. The heated air then flows to the screen outlets and the footwell outlet in the proportions directed by the two interconnected cable-controlled flaps 'C'.

continued



A. Flap 'A' controlled by lever 'A'.

B. Two flaps 'B'. Controlled by lever 'B' but positioned by the flap actuation system. Positioned to closed/hot or open/cold. No intermediate positions are used.

C. Two flaps 'C'. Controlled by lever 'C'.

1. Recirculated air inlet
2. Fresh air inlet
3. Air transfer at each side via two blower units from plenum chamber to distribution area
4. Hot matrix
5. Plenum chamber water drain
6. Footwell outlet
7. Screen outlets
8. Water and dust drain
9. Cold matrix
10. Fascia louvre outlets
11. Central fascia vent outlet

Cold air

When cold air is selected the two flaps 'B' are positioned by an energized vacuum actuator to the open/cold position. Air from the distribution area flows across the cold matrix and the total cold air volume is split into the vehicle interior from the central fascia vent and the two fascia louvres.

Cooled, dried, and cleaned air

The air conditioner unit is capable of supplying cooled, dried, and cleaned air when cold air is selected. Air of the above description is obtained by passing air across the cold matrix. Heat is extracted from the air and absorbed by the refrigerant. Moisture carried in the air condenses on the exterior surfaces of the cold matrix and is removed by draining off into a tray below the matrix. Dust suspended in the air tends to be retained by the moisture and also collects in the tray. Twin drain pipes lead down from the tray to beneath the vehicle.

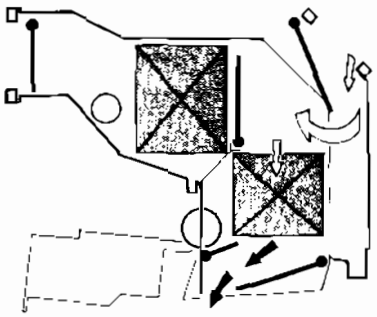
Outlets

The screen outlets can provide a flow of heated or ambient air to demist or defrost the windscreen.

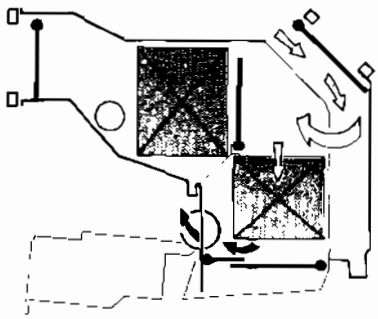
The footwell outlets can provide a flow of heated or ambient air to heat or ventilate the vehicle interior.

The central fascia vent can provide a flow of refrigerated air to be split into the vehicle interior. It may be noted that unless 'COLD' is selected no flow will occur.

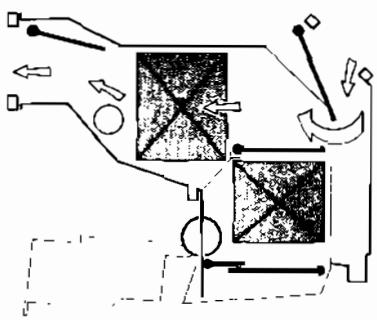
The fascia louvres can provide a flow of ambient or refrigerated air. The ambient flow to the fascia louvres may be considered as a variation on the two main airflow patterns of the air conditioner unit. These are downward through the hot matrix for heated or ambient air and horizontal through the cold matrix for refrigerated air. When lever 'B' is selected to 'OFF' or 'HOT' a flow at ambient temperature is available as follows. The two flaps 'B' are positioned by an unenergized vacuum actuator to the closed/hot position and the cold matrix is blanked off. However, a limited flow is permitted from the distribution area over the upper edge of the flap and across the cold matrix to the fascia louvres. It may be noted that in this selection the air is not cooled below ambient. The flow direction and volume is adjustable at each fascia louvre. When lever 'B' is selected to 'COLD' a flow of refrigerated air is available as detailed above. The flow direction and volume is adjustable at each fascia louvre.



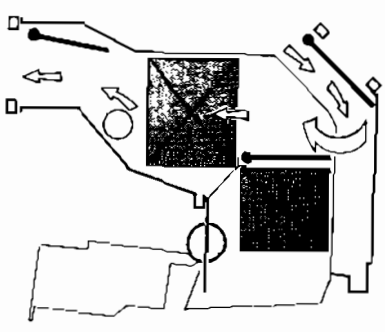
Fresh hot air to footwells



Recirculated hot air to screen

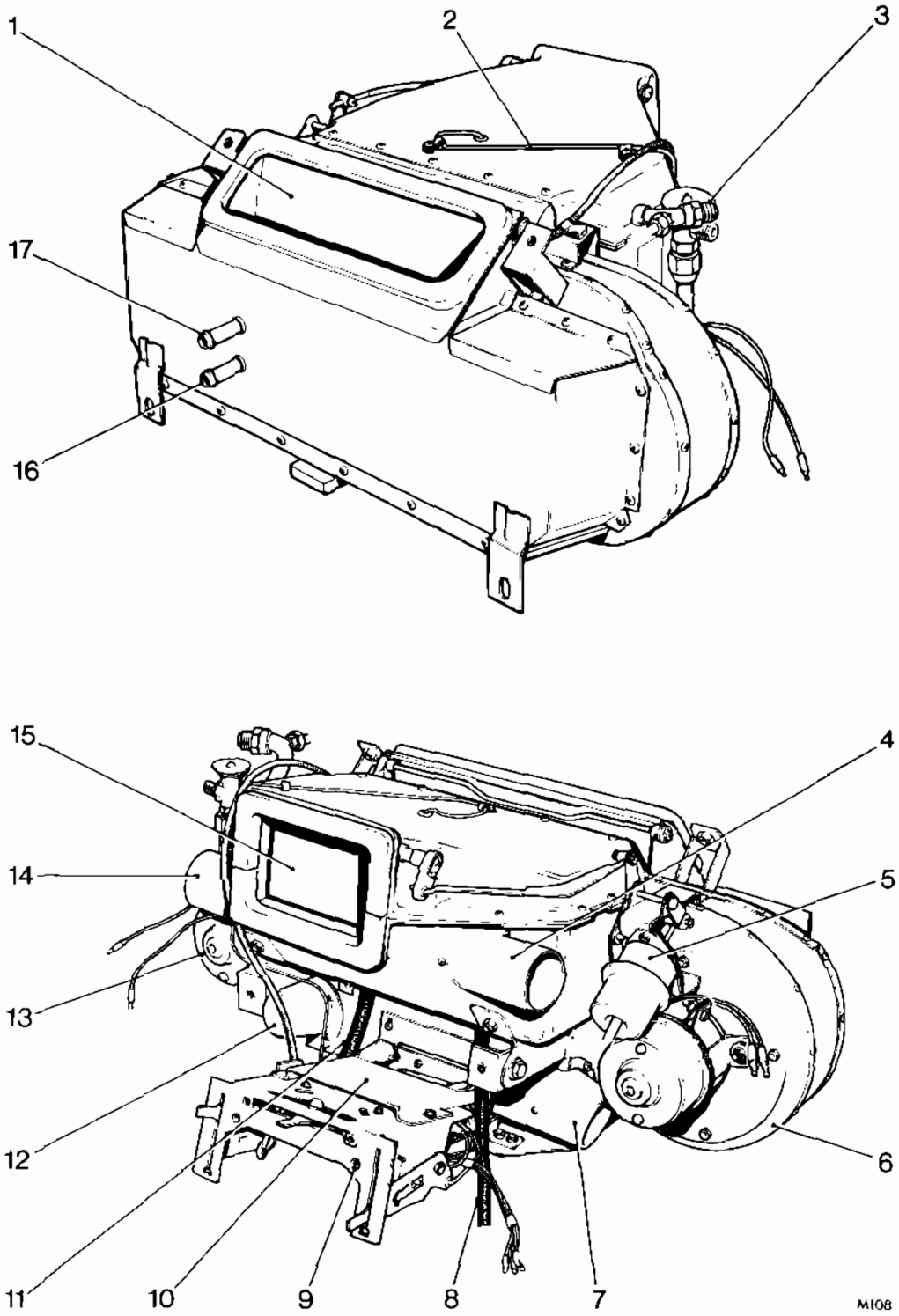


Fresh cold air to fascia



L097

Recirculated cold air to fascia



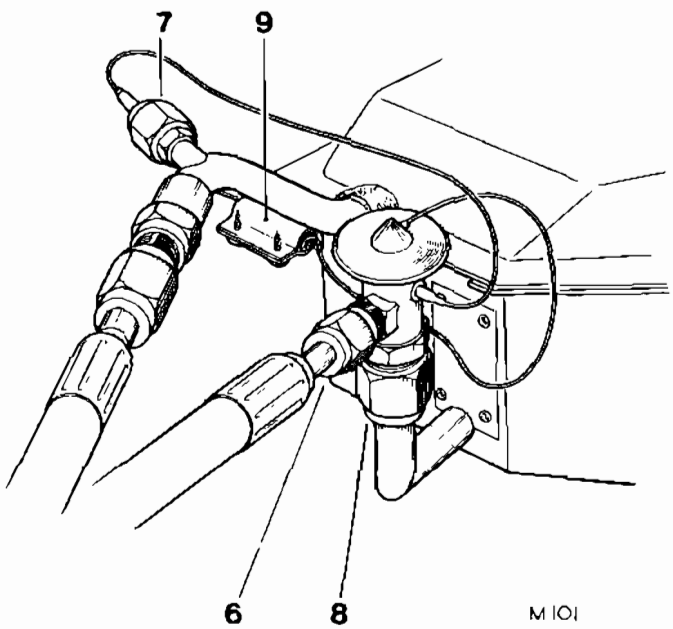
1. Fresh air inlet
2. Thermostat capillary
3. Expansion valve
4. Fascia louvre outlet
5. Actuator
6. Blower motor
7. Screen outlet
8. Tray drain pipe
9. Control box
10. Control box mounting plate
11. Tray drain pipe
12. Screen outlet
13. Blower motor
14. Fascia louvre outlet
15. Central fascia vent outlet
16. Water outlet
17. Water inlet

AIR CONDITIONER UNIT

Expansion valve—remove and refit 82.25.01

Removing

1. Depressurize. 82.30.05.
2. Right-hand steer vehicles only: Remove parcel tray 76.67.01 and glovebox. 76.52.01.
3. Left-hand steer vehicles only: Lower instrument panel to service position. 88.20.01 operations 1 to 7.
4. Remove insulating material from around expansion valve and adjacent pipes.
5. Protect eyes with safety goggles and wear gloves during operations 6, 7 and 8.
6. Carefully disconnect hose connection. Blank exposed connections immediately.
7. Carefully disconnect pressure sensing connection. Blank exposed connections immediately.
8. Carefully disconnect expansion valve mounting connection. Use two spanners at joint to protect delicate air conditioner unit pipe joint. Note that the larger lower hexagon is the union to be rotated. Blank exposed connections immediately.
9. Remove two small nuts, washers and screws. Carefully withdraw temperature sensing capillary from clip.



Refitting

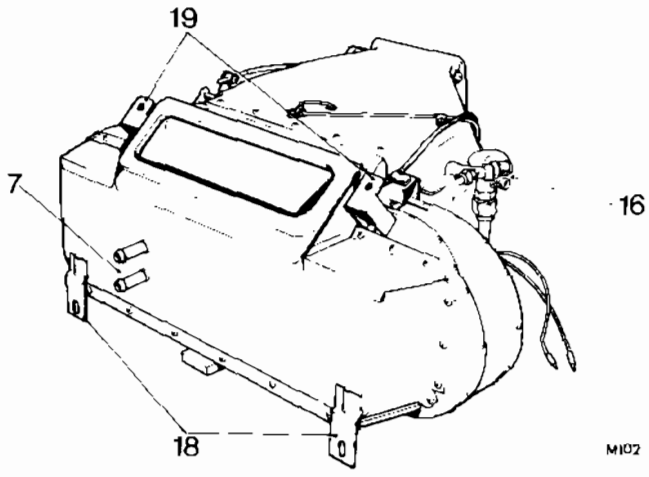
10. Position temperature sensing capillary in clip. Secure with two small screws, washers and nuts. Ensure sensing capillary makes good contact with clip.
11. Reverse 6 to 8. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
12. Evacuate. 82.30.06.
13. Change. 82.30.08.
14. Reverse 2 to 4.

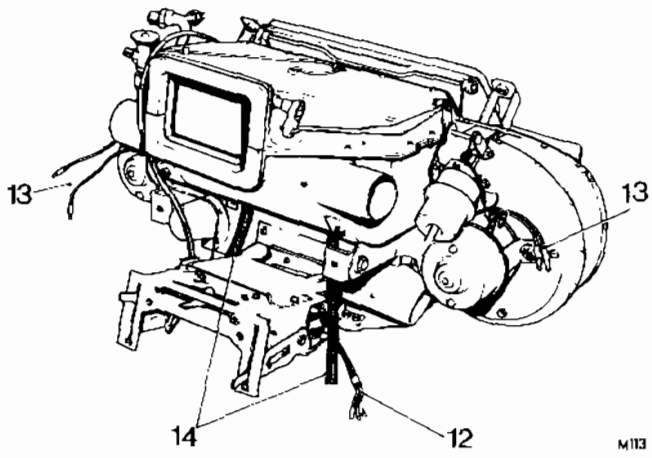
AIR CONDITIONER UNIT

—Remove and refit 82.25.07

Removing

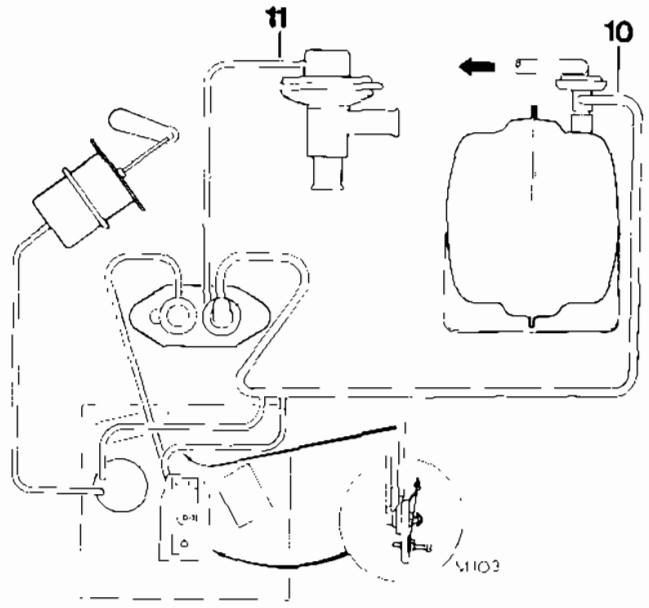
1. Depressurize. 82.30.05.
2. Isolate battery.
3. Remove parcel tray. 76.67.01.
4. Remove console. 76.25.01.
5. Remove fascia. 76.46.01.
6. Drain part coolant. 26.10.01.
7. Disconnect two water hoses.
8. To drain hot matrix attach two slave hoses to inlet and outlet pipes. Place one slave hose end in suitable collection tank. Apply low air pressure to other slave hose end to move water from matrix.
9. Remove interior carpets from vehicle to prevent damage from water spillage.
10. Pull off one vacuum pipe at vacuum tank and manœuvre through bulkhead.
11. Pull off vacuum pipe at water flow valve and manœuvre through bulkhead.
12. Disconnect four electrical connections to isolate control box.
13. Disconnect four electrical connections to isolate both blower motors.
14. Carefully withdraw cold matrix tray twin drain pipes from body apertures.
15. Protect eyes with safety goggles and wear gloves during operation 16.
16. Carefully disconnect two hose connections. Blank exposed connections immediately.
17. Remove three screws and lift off intake grille.
18. Remove two mounting bolts from vehicle interior.
19. Remove two mounting bolts from plenum chamber.
20. Manœuvre air conditioner unit from vehicle.





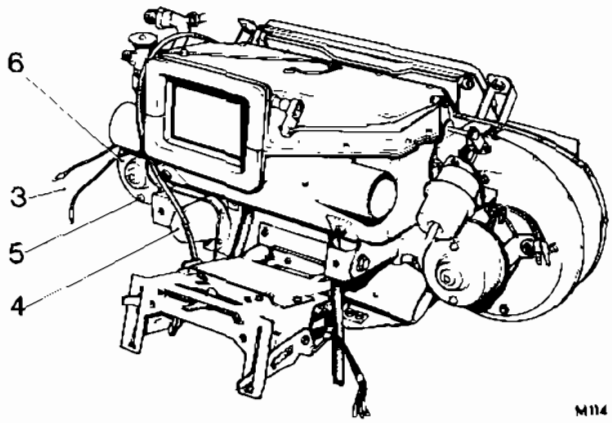
Refitting

21. Reverse 17 to 20.
22. Connect two hose connections. Use refrigerant compressor oil on all mating surfaces to assist leakage prevention.
23. Reverse 9 to 14.
24. Reverse 2 to 7.
25. Evacuate. 82.30.06.
26. Change. 82.30.08.



AIR CONDITIONER UNIT

Blower motor—left-hand—remove and refit **82.25.13**

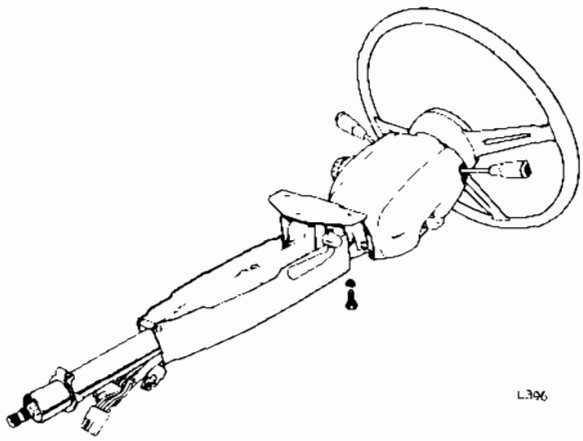


Removing

1. Right-hand steer vehicle only: Remove parcel tray. 76.67.01.
2. Left-hand steer vehicle only: Remove three bolts and drop steering-column.
3. Disconnect two electrical connections.
4. Remove three self-tapping screws and detach screen outlet vent moulding.
5. Remove four self-tapping screws to release circular mounting plate.
6. Position small flat on plate adjacent to expansion valve. Manœuvre with patience to withdraw assembly.
7. Note motor shaft projection from impeller clip.
8. Remove clip and withdraw impeller.
9. Slacken mounting clamp and withdraw motor.

Refitting

10. Reverse 1 to 9.

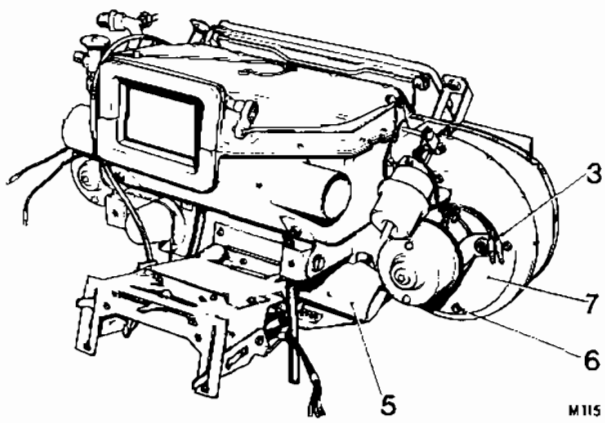


AIR CONDITIONER UNIT

Blower motor—right-hand—remove and refit **82.25.14**

Removing

1. Right-hand steer vehicle only: Remove three bolts and drop steering-column.
2. Left-hand steer vehicle only: Remove parcel tray, 76.67.01.
3. Disconnect two electrical connections.
4. Lever control rod away from hot/cold flap lever.
5. Remove three self-tapping screws and detach screen outlet vent moulding.
6. Remove four self-tapping screws to release circular mounting plate.
7. Manœuvre with patience to withdraw assembly.
8. Note motor shaft projection from impeller clip.
9. Remove clip and withdraw impeller.
10. Slacken mounting clamp and withdraw motor.



Refitting

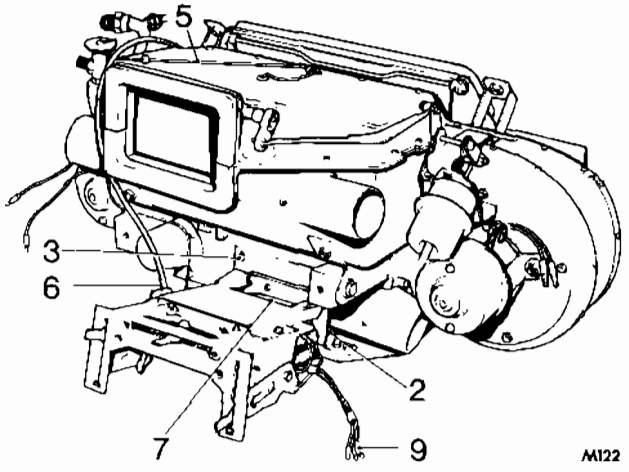
11. Reverse 1 to 10.

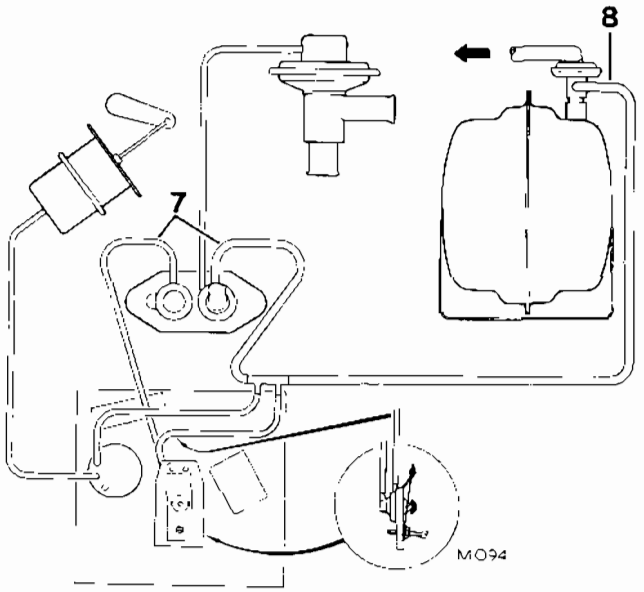
AIR CONDITIONER UNIT

Control box—remove and refit 82.25.16

Removing

1. Remove console. 76.25.01.
2. Slacken screw to release SCREEN/CAR control rod.
3. Remove two screws to release control box mounting plate from main body of air conditioner unit.
4. Taking care not to damage thermostat capillary, partially withdraw control box to limited access position.
5. Remove thermostat capillary from cold matrix 82.20.18 operations 1 to 2 and 5 to 7.
6. Slacken screw and spring off clip to release 'FRESH/RECIRC' control cable.
7. Pull off two vacuum pipes at temperature sensing valve.
8. Pull off one vacuum pipe at vacuum tank.
9. Disconnect four electrical connections.
10. Withdraw control box.





Refitting

11. Reverse 7 to 10.
12. Attach 'FRESH/RECIRC' control cable. Ensure it is fitted to give full travel of single flap 'A'.
13. Reverse 3 to 5.
14. Attach 'SCREEN/CAR' control rod. Ensure it is fitted to give full travel of two flaps 'B'.
15. Refit console. 76.25.01.

SERVICING

—General instructions **82.30.00**

WARNING: The refrigeration circuit must only be disturbed by a qualified refrigeration engineer possessing the required special servicing equipment. Failure to observe this instruction may result in severe personal injury.

When depressurizing the system or subsequently breaking open any pipe connections, protect the eyes with safety goggles and wear gloves.

If any liquid refrigerant should contact the eyes, splash with cold water to slowly raise the temperature. Mineral or cod liver oil on the area will reduce the chance of infection. Consult an eye specialist as soon as possible.

Ensure that no refrigerant vapour comes into contact with an open flame. Should this occur a poisonous, corrosive gas may be produced. This vapour may attack metal.

Refrigerant in containers must be protected from heat. Do not expose to radiant heat from the sun. Do not place in water above 50°C (122°F). Do not heat with any flame. Do not carry a container in the vehicle interior.

When it is necessary to remove and refit any component of the refrigeration circuit the system must first be depressurized as detailed 82.30.05.

To prevent icing or corrosion inside the refrigeration system extreme precautions must be observed during servicing to exclude moisture. Component connections and hose ends must only be open to atmosphere for a brief period. Blanking caps must be fitted immediately to any exposed connections. Replacement components will be supplied sealed and must only be opened immediately prior to making the connections.

After reassembling, the system must be evacuated as detailed in 82.30.06. This should remove air, moisture and old refrigerant from the system so it may be fully charged with fresh refrigerant.

Immediately after evacuation the system should be charged with refrigerant as detailed in 82.30.08.

Refrigerant

Type	Refrigerant 12
Approved trade-names	Arcton 12 Freon 12 Isceon 12
Properties at normal atmospheric pressure and temperature	Vapour Odourless Colourless Heavier than air Non-corrosive Non-explosive Non-inflammable Non-poisonous
Dangerous at normal atmospheric pressure and temperature	
Contact with the skin—	Liquid refrigerant will freeze anything it contacts. Severe burns may result. Especially dangerous to the eyes. Always protect with safety goggles. See 82.30.00 for eye burn treatment.
Contact with an open flame—	A poisonous, corrosive gas may be produced. This vapour may attack metal

Service valves

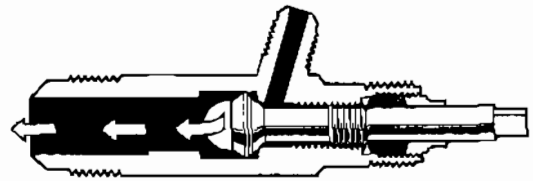
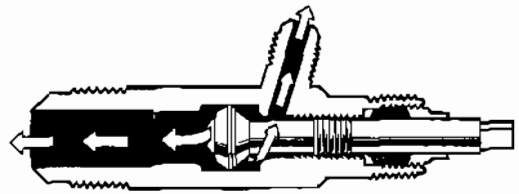
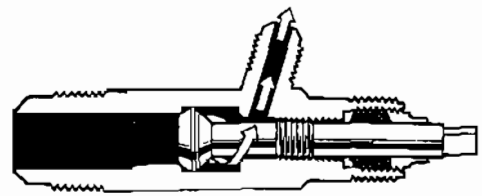
Refrigerant is introduced and removed from the refrigeration circuit by way of two service valves located on the compressor top plate.

One service valve communicates with the input side of the compressor and is designated the 'SUCTION' or low side service valve. The other service valve is associated with the compressor output side and is designated the 'DISCHARGE' or high side service valve.

The service valves are controlled by square-ended shafts normally covered by protective caps.

Each service valve has three basic positions summarized as follows:

SERVICE VALVE POSITIONS

Back seat position	Turn full anti-clockwise	Normal system operating position Compressor communicating with refrigeration circuit Service port sealed	
Mid position	From back seat position turn clockwise 3 turns.	Compressor and refrigeration circuit communicating with service port	
Front seat position	Turn full clockwise	Compressor communicating with service port Refrigeration circuit sealed	

MO84

SERVICING

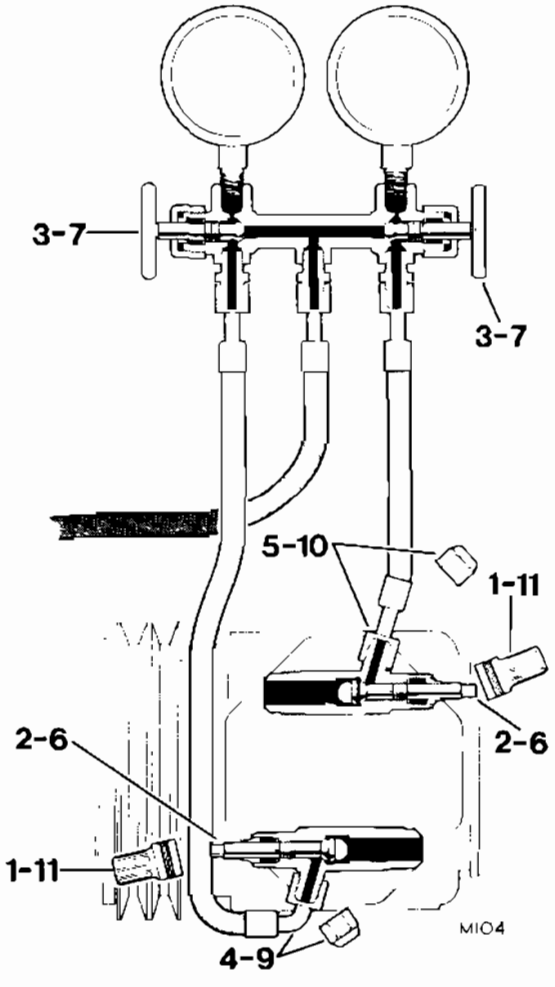
—Gauge set—connect and disconnect **82.30.01**

Connecting

1. Remove two protective caps from service valves.
2. Ensure both service valves are in back seat position —turn anti-clockwise.
3. Ensure both gauge set valves are closed.
4. Remove hexagon cap from suction service valve and connect gauge set low side hose.
5. Remove hexagon cap from discharge service valve and connect gauge set high side hose.

Disconnecting

6. Ensure both service valves are in back seat position —turn anti-clockwise.
7. Ensure both gauge set valves are closed.
8. Protect eyes with safety goggles and wear gloves during operations 9 and 10.
9. Carefully disconnect gauge set low side hose from suction service valve. Allow any pressure to dissipate slowly. Fit hexagon cap.
10. Carefully disconnect gauge set high side hose from discharge service valve. Allow any pressure to dissipate slowly. Fit hexagon cap.
11. Fit two protective caps to service valves.



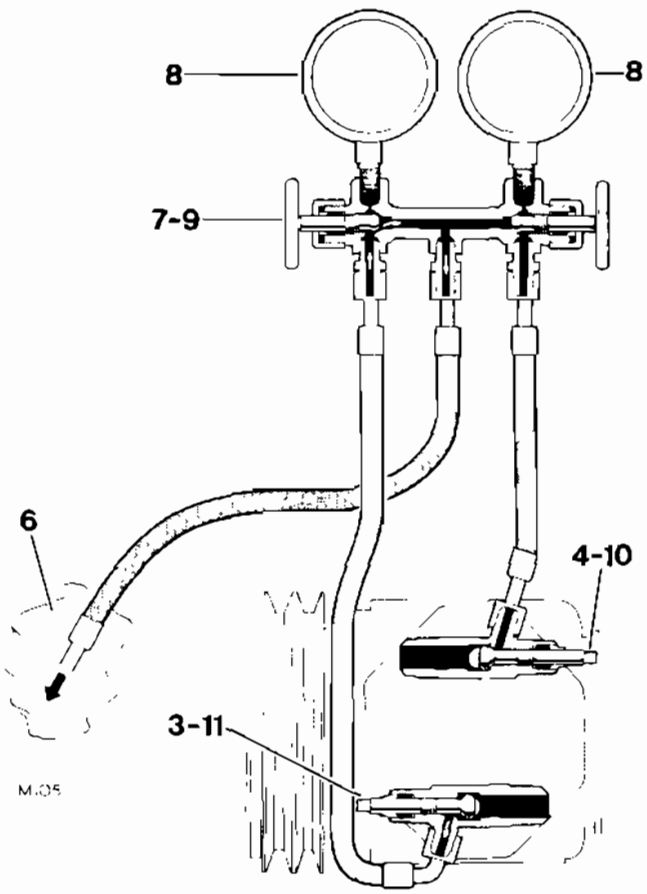
SERVICING

Depressurize 82.30.05

WARNING: Depressurize the system with the vehicle in a well-ventilated area.

Ensure that no refrigerant vapour comes into contact with an open flame. Should this occur a poisonous gas may be produced. This vapour may attack metal.

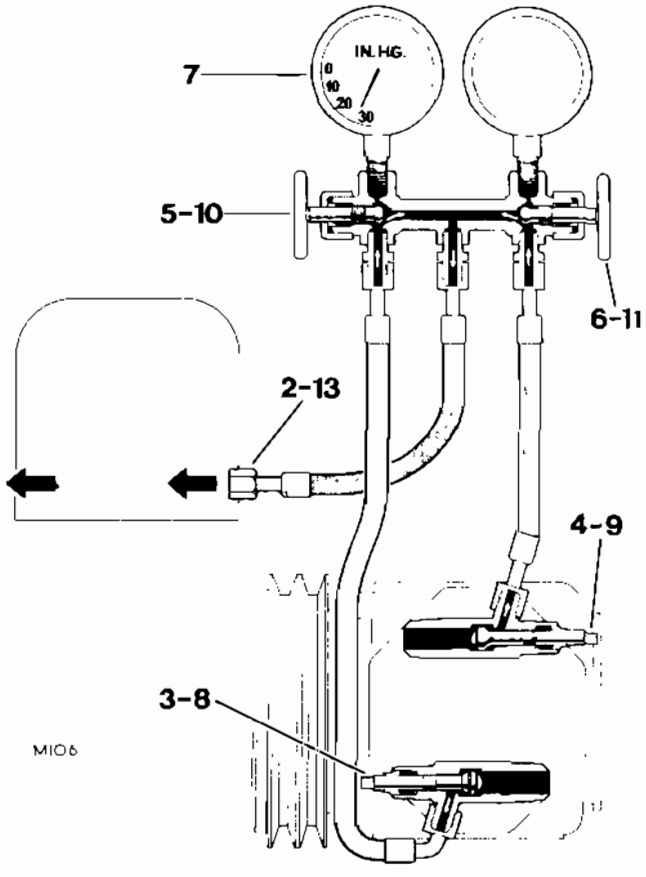
1. Immobilize refrigerant circuit by disconnecting electrical connection to compressor clutch.
2. Connect gauge set. 82.30.01.
3. Open suction service valve to mid position—turn clockwise three turns.
4. Open discharge service valve towards mid position —turn clockwise half a turn.
5. Protect eyes with safety goggles and wear gloves during operations 6 to 7.
6. Hold gauge set centre manifold hose end in a suitable rag.
7. Slightly open gauge set low side valve to allow refrigerant vapour to discharge to atmosphere via hose end. If oil from compressor is discharged, reduce gauge set low side valve opening.
8. When discharge has stopped ensure both gauges read zero.
9. Close gauge set low side valve.
10. Close discharge service valve to backseat position— turn anti-clockwise.
11. Close suction service valve to backseat position— turn anti-clockwise.



SERVICING

—Evacuate 82.30.06

1. Depressurize. 82.30.05.
2. Connect vacuum pump to gauge set centre manifold hose.
3. Open suction service valve to mid position—turn clockwise three turns.
4. Open discharge service valve to mid position—turn clockwise three turns.
5. Open gauge set low side valve fully.
6. Open gauge set high side valve fully.
7. Run vacuum pump for 20 minutes. A vacuum of 28 inHg should be indicated on low side gauge. If this is not achieved, consider the possibility of a system leak.
8. Close suction service valve to back seat position—turn anti-clockwise. Perform this operation with pump running.
9. Close discharge service valve to back seat position—turn anti-clockwise. Perform this operation with pump running.
10. Close gauge set low side valve. Perform this operation with pump running.
11. Close gauge set high side valve. Perform this operation with pump running.
12. Stop vacuum pump.
13. Disconnect vacuum pump from gauge set centre manifold hose.



SERVICING

Charge 82.30.08

CAUTION: Charge with refrigerant 12 of approved trade names:

Arcton 12
Freon 12
Isceon 12

Do not charge with methylchloride refrigerant. This would react undesirably with aluminium parts used in the system.

NOTE: The lower volume of the container contains liquid refrigerant while the upper volume contains vapour.

During the transfer operation a pressure drop occurs allowing the refrigerant to boil at a rate controlled by the amount of heat the container can absorb from its surrounds.

The transfer operation may be speeded in two ways.

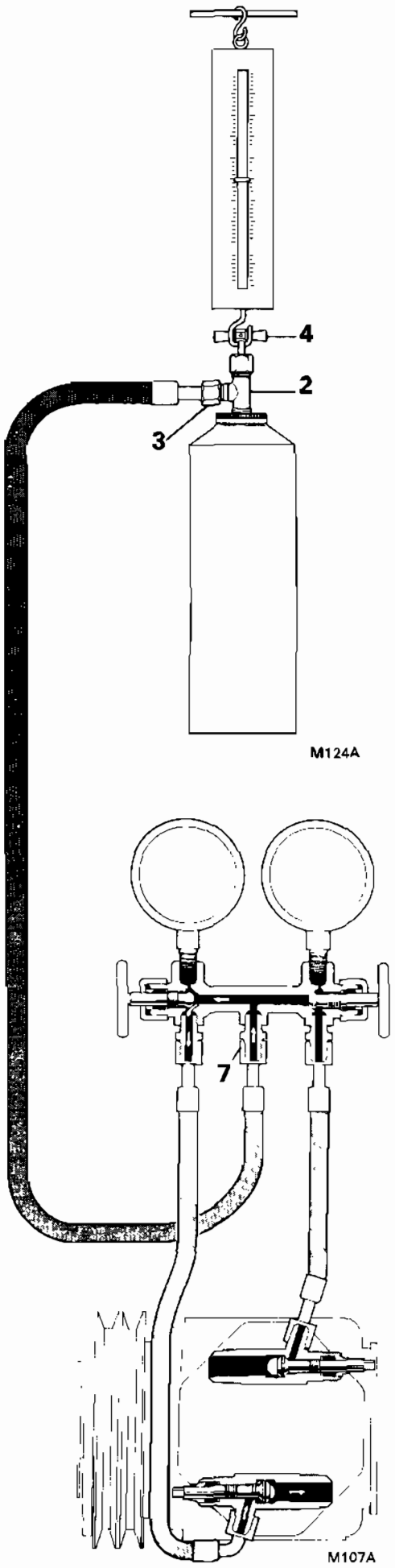
The boil rate may be hastened by warming the container in an attempt to bring it back to ambient temperature. This may be achieved by immersing the container in warm water. Do not place in water above 50°C (122°F). See 82.30.00 Warnings.

The container may be removed from the spring balance and inverted to pour liquid refrigerant down the centre manifold hose. To ensure that the refrigerant vaporizes before reaching a running compressor, invert for short periods at a time to pour a small slug of refrigerant and allow complete vaporization. This is especially important if a short centre manifold hose is employed.

System capacity (sight glass clear plus 0·25 lb (110 g) 2·5 lb (1130 g)

1. Evacuate. 82.30.06.
2. Provide refrigerant container valve. Ensure valve is capped. Fit to refrigerant container as detailed by the manufacturer.
3. Connect gauge set centre manifold hose to container valve.
4. Open container valve.
5. Hang container on spring balance.
6. Protect eyes with safety goggles and wear gloves during operation 7.
7. Slightly loosen hose connector at centre manifold connection to allow refrigerant to purge air from centre manifold hose. Tighten hose connector.

continued



8. Note spring balance reading.
   It should be possible at any time to calculate the weight of refrigerant put into the system.
9. Open suction service valve to mid position—turn clockwise three turns.
10. Open gauge set low side valve.

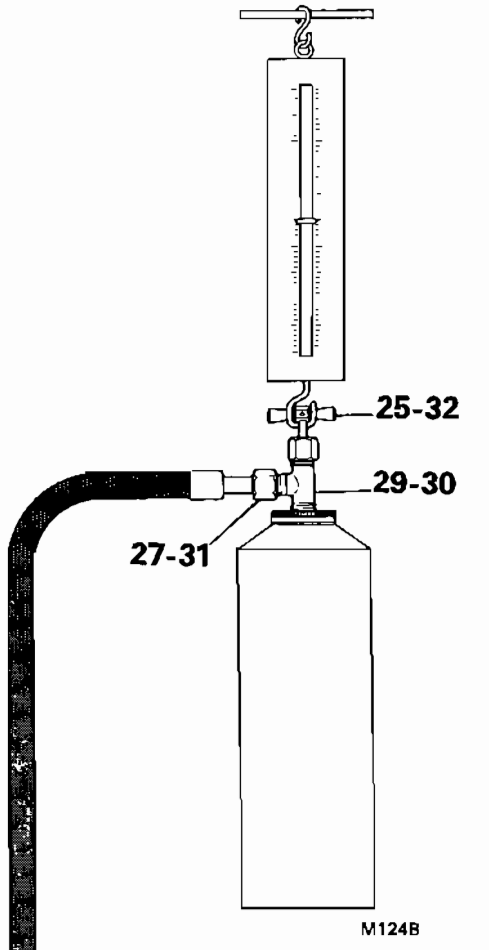
    High pressure liquid refrigerant from the container will vaporize on entering the evacuated low pressure system. Flow will continue until container pressure equals system pressure.

11. Wait until low side gauge reading stabilizes at approximately 40 lb/in². Close gauge set low side valve.
12. Perform first leak test. 82.30.09.
13. Connect electrical connection to compressor clutch.
14. Employ a second operator to sit in driver's seat.
15. Select blower switch to high speed.
16. Select lever 'A' to 'FRESH'.
17. Select lever 'B' to full 'COLD'.
18. Run engine at 1,500 rev/min.
19. Open gauge set low side valve.

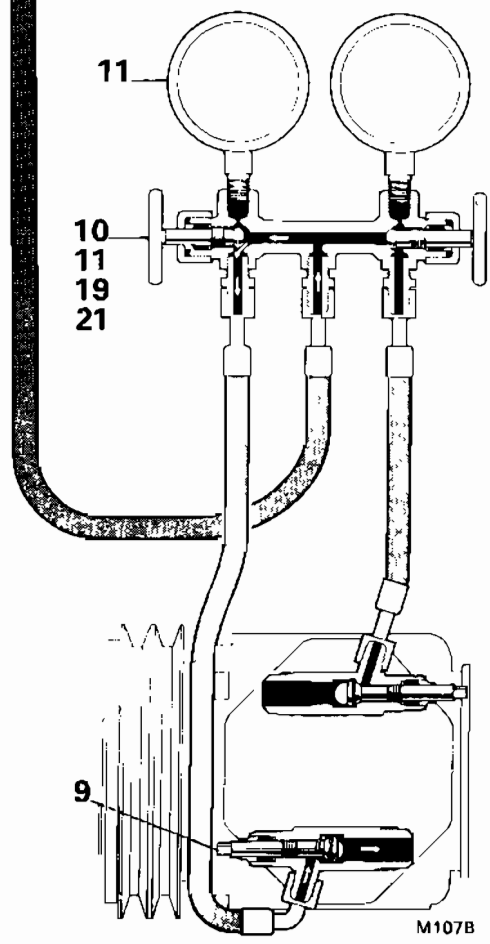
    Compressor suction will draw further vaporized refrigerant into the system. The refrigeration circuit will commence to function and vapour passed into the condenser will accumulate as liquid refrigerant in the receiver drier.

20. Remove container from spring balance. Shake gently until no liquid is heard or felt. Container will now be empty.
21. Close gauge set low side valve.
22. Stop engine.
23. Hang container on spring balance and note reading.
24. Remove container from spring balance.
25. Close container valve.
26. Protect eyes with safety goggles and wear gloves during operation 27.
27. Disconnect gauge set centre manifold hose from container valve.
28. Hold container valve outlet away from personnel. Open container valve to allow container to vent to atmosphere.
29. Remove container valve from container.
30. Ensure container valve is capped. Fit to new refrigerant container as detailed by the manufacturer.
31. Connect gauge set centre manifold hose to container valve.
32. Open container valve.
33. Hang container from spring balance.
34. Protect eyes with safety goggles and wear gloves during operation 35.

continued

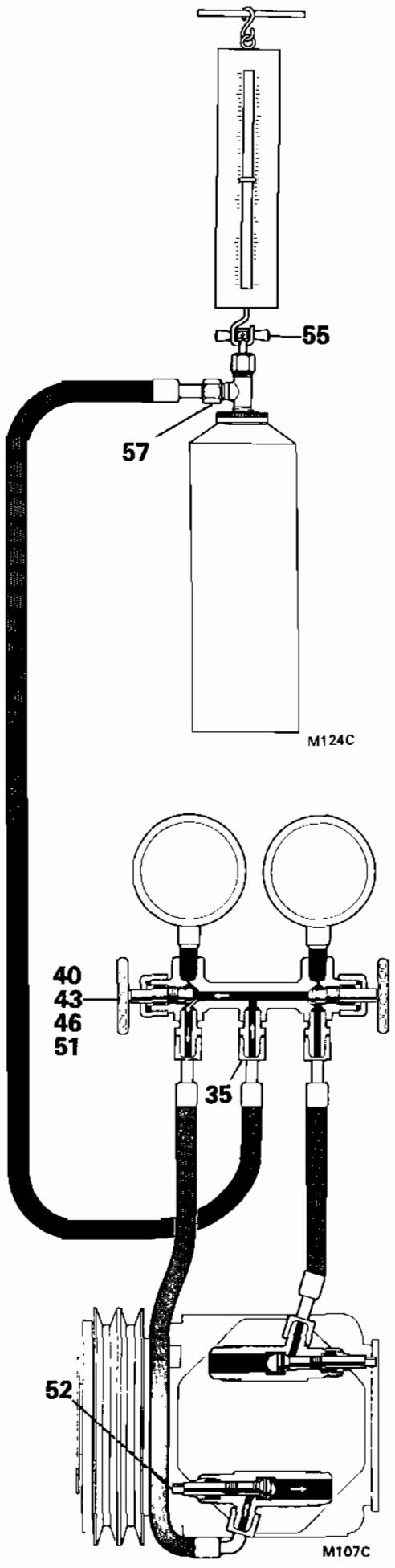


M124B



M107B

35. Slightly loosen hose connector at centre manifold connection to allow refrigerant to purge air from centre manifold hose. Tighten hose connector.
36. Note spring balance reading.
37. Ensure interior controls remain set as detailed in operations 15 to 17.
38. Run engine at 1,500 rev/min.
39. Watch receiver drier sight glass.
40. Open gauge set low side valve.
41. Sight glass will initially show a procession of bubbles or foam when compressor clutch is engaged.
42. Continue until sight glass clears, showing no bubbles or foam when compressor clutch is engaged.
43. Close gauge set low side valve.
44. Note spring balance reading.
45. From this datum reading an additional 0·25 lb (110 g) of refrigerant must be added.
46. Open gauge set low side valve.
47. If required, remove container from spring balance. Shake gently to assist transfer of refrigerant into system.
48. Hang container from spring balance.
49. Note spring balance reading.
50. Continue operations 47 to 49 until additional 0·25 lb (110 g) of refrigerant has been added.
51. Close gauge set low side valve.
52. Close suction service valve to back seat position—turn anti-clockwise.
53. Stop engine.
54. Remove container from spring balance.
55. Close container valve.
56. Protect eyes with safety goggles and wear gloves during operation 57.
57. Disconnect gauge set centre manifold hose from container valve.
58. Perform operations 59 and 60 only if container is thought to be almost empty.
59. Hold container valve outlet away from personnel. Open container valve to allow container to vent to atmosphere.
60. Remove container valve from container.
61. Perform second leak test. 82.30.09.
62. Functional check. 82.30.16.



SERVICING

—Leak test **82.30.09**

A major leak in the system should be shown up during the evacuating operation 82.30.06 prior to charging with fresh refrigerant.

Minor leaks should be searched for as instructed in the charging operation 82.30.08, using one of the two basic types of leak testing equipment in common use.

The burner type has a hand-held burner connected by hose to a cylinder of gas. A second hose attached to the burner is the search hose which draws in air or refrigerant vapour. This hose is of some length so its end may be positioned close to the unions while the burner is held and observed by a second operator a safe distance from the vehicle. A leak is indicated by the flame changing colour to green or purple. The product of burning gas and refrigerant is a poisonous, corrosive gas which should not be inhaled.

The electronic type has a control unit suitable for bench mounting connected to a cylinder of gas and an electrical supply. A gun connected by hoses and wires to the control unit carries the search probe which detects refrigerant vapour. A leak is indicated by audible warning, a light or meter.

Whether a burner type or electronic type unit is used the equipment should be employed as detailed by the manufacturer. The following instructions are provided to assist leak testing.

General

Place the vehicle in a well-ventilated area or refrigerant may persist in the vicinity and give misleading results.

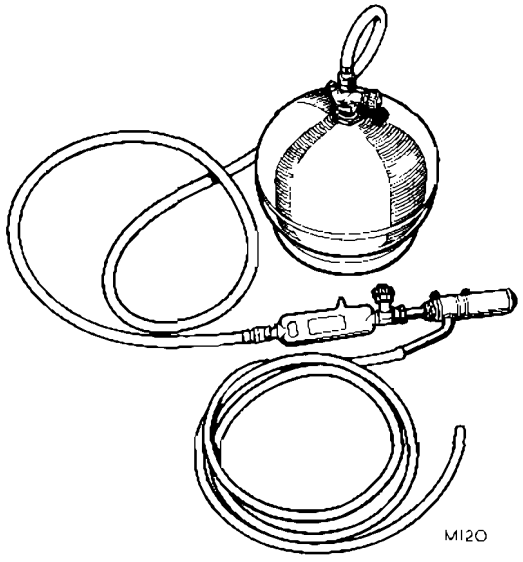
Strong draughts should be avoided as a leak may be dissipated without detection.

Refrigerant is heavier than air. When checking each union pass the detector slowly round each joint with special attention to the underside.

Compressor

Check two hose connections, service valves, head joint, rear bearing plate joint and base joint.

Check the shaft seal by positioning the detector between the clutch and seal plate. As access is poor, leave the detector in the vicinity for one minute.



Condenser

Remove four screws and withdraw centre grille section to obtain access to condenser.

Check two hose connections and delicate condenser pipe joints. Check all soldered joints and pass detector across underside of unit.

Receiver drier

Check two hose connections and high pressure cut-out capillary.

Expansion valve and cold matrix

Right-hand steer vehicles only: Remove parcel tray 76.67.01 and glovebox 76.52.01 to obtain access to expansion valve.

Left-hand steer vehicles only: Lower instrument panel to service position (88.20.01, operations 1 to 7) to obtain access to expansion valve.

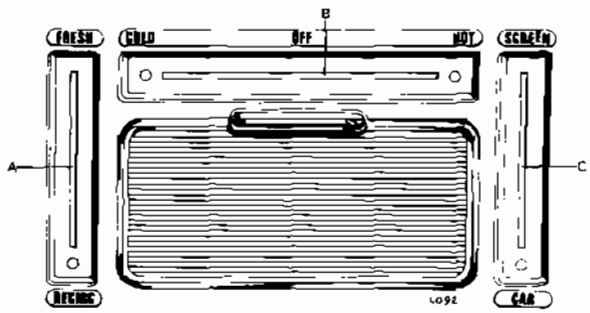
Remove insulating material from around expansion valve and adjacent pipes to permit a thorough leak test.

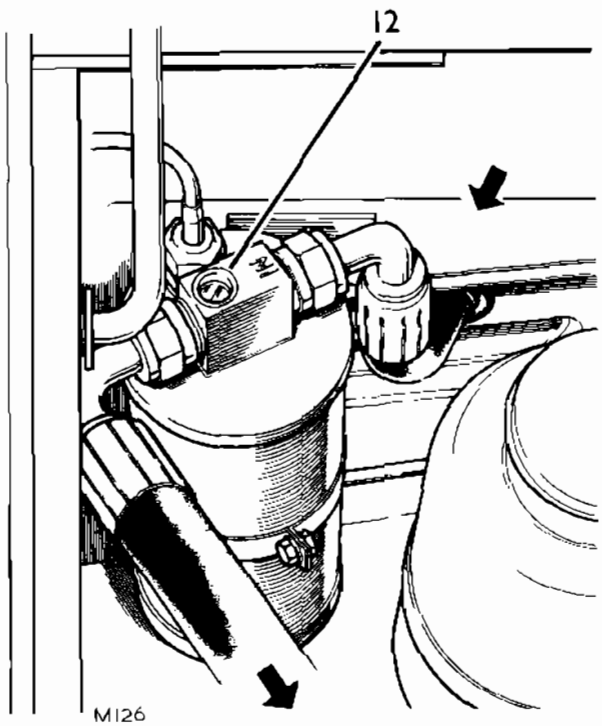
Check cold matrix. Select lever 'B' to full 'COLD'. Run engine. Insert detector into central fascia vent outlet. Stop engine and immediately insert detector into one tray drain pipe. Refrigerant is heavier than air and a leak from the cold matrix may sink down the tray drain pipes.

SERVICING

—Functional check 82.30.16

1. Place vehicle in a well-ventilated area.
2. Ensure compressor drive belt is correctly adjusted. 82.10.01.
3. Connect gauge set. 82.30.01.
4. If the gauge set high and low side hoses contain air, purge the hoses as follows:
   a. Provide refrigerant container valve. Ensure valve is capped. Fit to refrigerant container as detailed by the manufacturer.
   b. Connect gauge set centre manifold hose to container valve.
   c. Open container valve.
   d. Protect eyes with safety goggles and wear gloves during operations *e* to *g*.
   e. Slightly loosen hose connector at centre manifold connection to allow refrigerant to purge air from centre manifold hose. Tighten hose connector.
   f. Open both gauge set valves.
   g. In turn, slightly loosen each hose connector at service valve to allow refrigerant to purge air from hoses. Tighten hose connectors.
   h. Close both gauge set valves.
5. Note ambient air temperature.
6. Open suction service valve towards mid position—turn clockwise half a turn.
7. Open discharge service valve towards mid position —turn clockwise half a turn.
8. Select blower switch to high speed.
9. Select lever 'A' to 'RECIRC'.
10. Select lever 'B' to full 'COLD'.
    In humid conditions it may be necessary to reduce lever 'B' setting from full 'COLD' towards 'OFF' to prevent icing of the cold matrix. Slightly higher central fascia vent outlet air temperatures should then be expected.
11. Run engine at 1,000 to 1,200 rev/min for 10 minutes to warm engine and stabilize system.
12. Check receiver drier sight glass is clear, showing no bubbles or foam.
13. Note low-side gauge and high-side gauge readings.
14. Insert thermometer into central fascia vent outlet and note air temperature.
15. Compare all readings obtained with values given in table for appropriate ambient air temperature.
16. Disconnect gauge set. 82.30.01.





Ambient air temperature		Low side gauge		High side gauge		Central fascia vent outlet air temperature	
°F	°C	lb/in²	kN/m²	lb/in²	kN/m²	°F	°C
60	16	12 to 20	83 to 138	80 to 130	552 to 897	32 to 40	0 to 4
80	27	16 to 25	110 to 172	130 to 180	897 to 1242	35 to 44	2 to 7
100	38	18 to 28	124 to 193	200 to 240	1380 to 1656	38 to 47	3 to 8
110	43	19 to 29	131 to 200	240 to 275	1656 to 1897	39 to 48	4 to 9

WINDSCREEN WIPERS AND WASHERS OPERATIONS

Windscreen washer pump
—remove and refit 84.10.21

Windscreen wiper system
—data and description 84.15.00
—motor—overhaul 84.15.18
—motor—remove and refit 84.15.12
—rack—remove and refit 84.15.24
—wheelbox—driver's—remove and refit 84.15.28
—wheelbox—passenger's—remove and refit 84.15.29
—wiper arm—driver's—remove and refit 84.15.02
—wiper arm—passenger's—remove and refit 84.15.03
—wiper blade—driver's—remove and refit 84.15.06
—wiper blade—passenger's—remove and refit 84.15.07

WINDSCREEN WASHER PUMP

—Remove and refit **84.10.21**

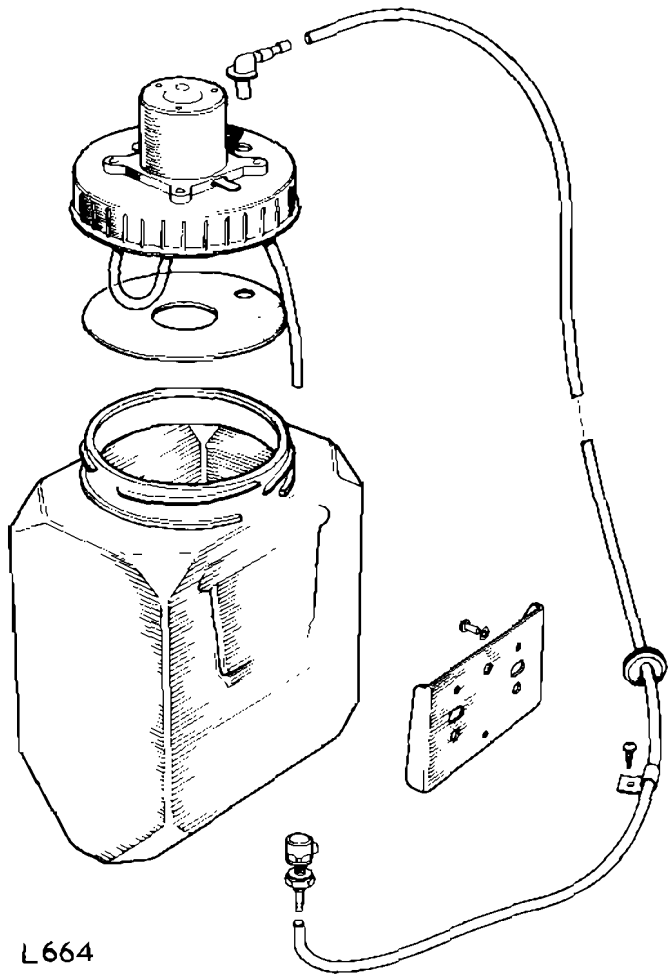
Removing

1. Disconnect Lucar connectors.
2. Pull off outlet pipe.
3. Lift pump from bracket.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   Green wire to positive terminal marked 12V DC + with red spot.
   Light green/black wire to negative terminal.



WINDSCREEN WIPER SYSTEM

Data and description **84.15.00**

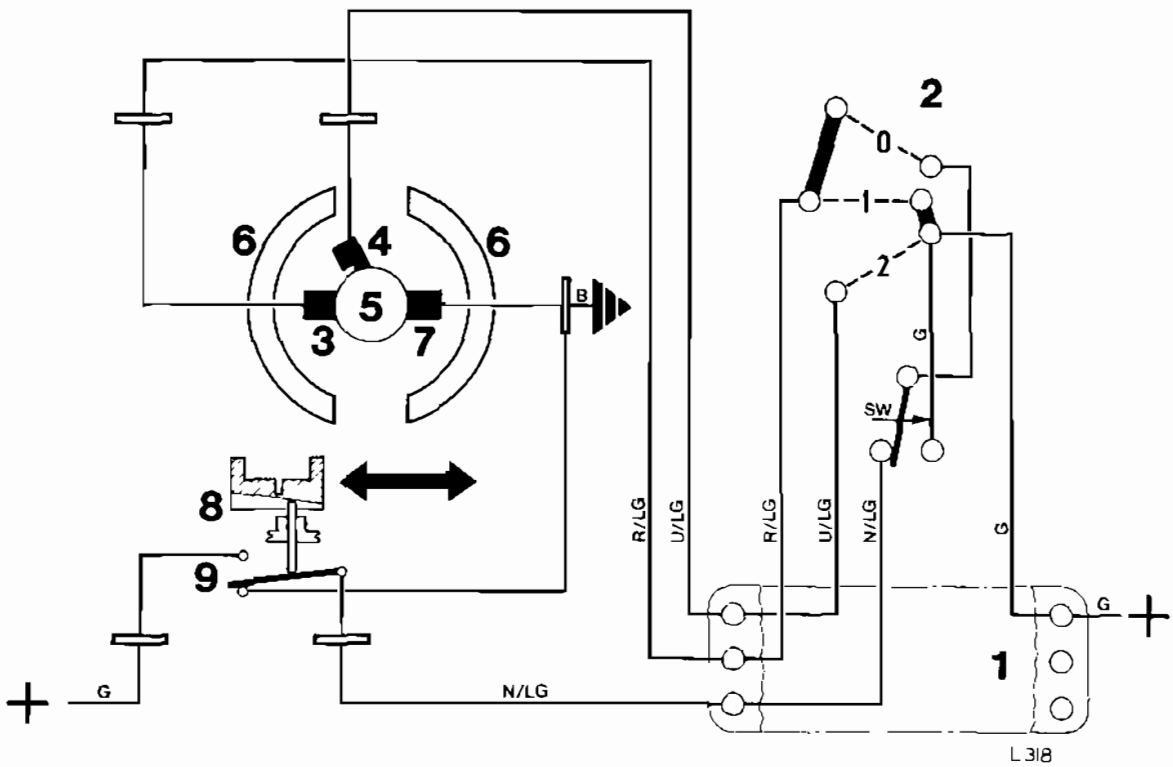
Motor:	
Manufacturer	Lucas
Type	16W
Lucas Part No.: motor minus gear assembly	75721
gear assembly	54705366
Stanpart No.: motor minus gear assembly	519909
gear assembly	519532
Running current—after 60 seconds from cold with connecting rod removed:	
Normal speed	1·5 amp
High speed	2·0 amp
Running speed—final gear after 60 seconds from cold with connecting rod removed:	
Normal speed	46 to 52 rev/min
High speed	60 to 70 rev/min
Armature end-float	0·002 to 0·008 in (0·05 to 0·20 mm)
Brush length—normal speed: new	0·380 in (9·65 mm)
renew if less than	0·180 in (4·76 mm)
high speed: new	0·380 in (9·65 mm)
renew if less than	0·280 in (7·11 mm) (i.e. when narrow section is worn to step into full-width section)
earth: new	0·380 in (9·65 mm)
renew if less than	0·180 in (4·76 mm)
Brush spring pressure—when compressed so brush bottom is aligned with brushbox slot end	5 to 7 oz. (140 to 200 g)
Maximum permissible force to move cable rack in tubing—arms and blades removed	6 lb (3 kg)

The unit consists of a two-speed permanent-magnet motor and a gearbox unit which drives a cable rack mechanism. Rotation of the motor armature is converted to a reciprocating motion of the cable rack by a single-stage worm and gear, a connecting rod and a cross-head contained in a guide channel.

Two-speed operation is provided by a third brush. When high speed is selected the positive supply is transferred from the normal speed brush to the high speed brush.

A switching feature stops the blades in the park position irrespective of their position when the steering-column switch is selected OFF. This is effected by a two-stage limit switch unit attached to the gearbox. The contacts are actuated by a straight cam slope on a slider block which is traversed by a projection from the cross-head.

When the steering-column switch is selected OFF, the motor will continue to run until the limit switch first stage contacts open. A momentary period follows during which no contact is made. The second stage contacts then close causing regenerative braking of the armature which maintains consistent parking of the blades.

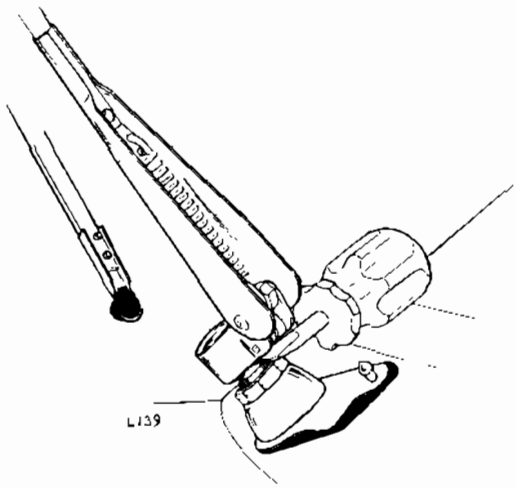


+ Supply

1. Steering-column in line plug and socket
2. Steering-column switch
   - 0 OFF
   - 1 NORMAL SPEED
   - 2 HIGH SPEED
   - SW SWEEP WIPE FACILITY
3. Normal speed brush
4. High speed brush
5. Commutator
6. Permanent magnet
7. Earth brush
8. Slider block
9. Limit switch unit

WINDSCREEN WIPER SYSTEM

Wiper arm—driver's—remove and refit **84.15.02**



Removing

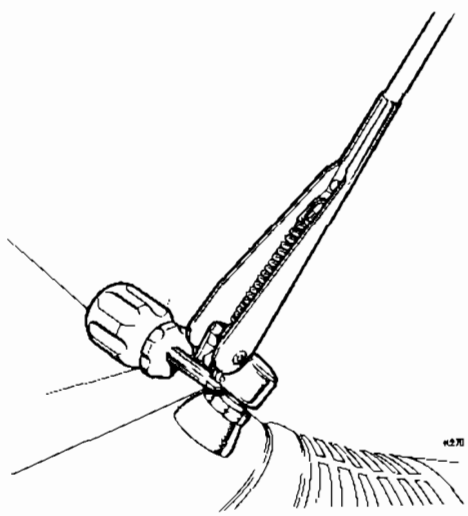
1. Simultaneously lift wiper arm from screen and pull out lower end of pantograph arm to release ball socket. Allow assembly to fall into its service position.
2. Position screwdriver as shown and impart a twisting action to lift clip from spindle groove.
3. Assembly may now be removed by hand.

Refitting

4. Ensure wheelbox spindles are in the park position.
5. Hinge wiper arm against spring to adopt its service position.
6. Locate splines for suitable park position. Push on to engage clip to spindle groove.
7. Simultaneously lower wiper arm to screen and guide lower end of pantograph arm to ball end.
8. Push ball socket firmly onto ball end.

WINDSCREEN WIPER SYSTEM

Wiper arm—passenger's—remove and refit **84.15.03**



Removing

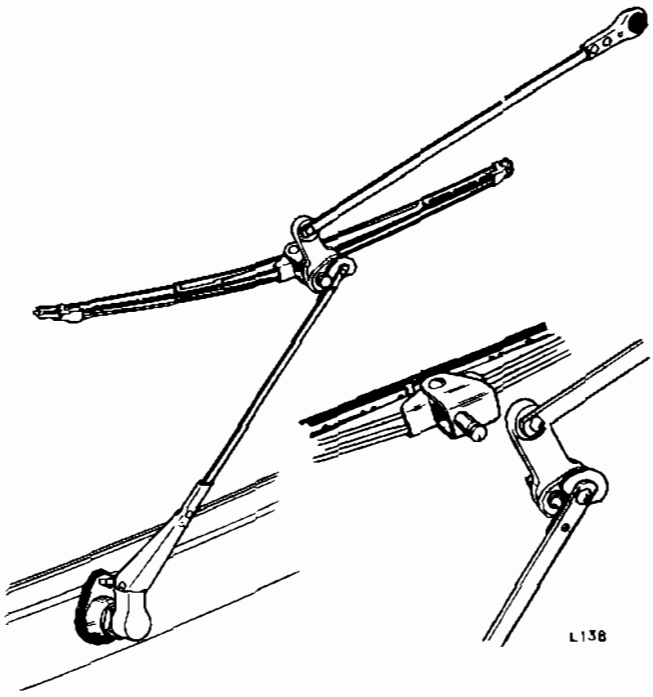
1. Lift wiper arm and blade from screen so it falls into its service position.
2. Position screwdriver as shown and impart a twisting action to lift clip from spindle groove.
3. Assembly may now be removed by hand.

Refitting

4. Ensure wheelbox spindles are in the park position.
5. Hinge wiper arm against spring to adopt its service position.
6. Locate splines for suitable park position. Push on to engage clip to spindle groove.
7. Lower wiper arm to screen.

WINDSCREEN WIPER SYSTEM

Wiper blade—driver's—remove and refit **84.15.06**



Removing

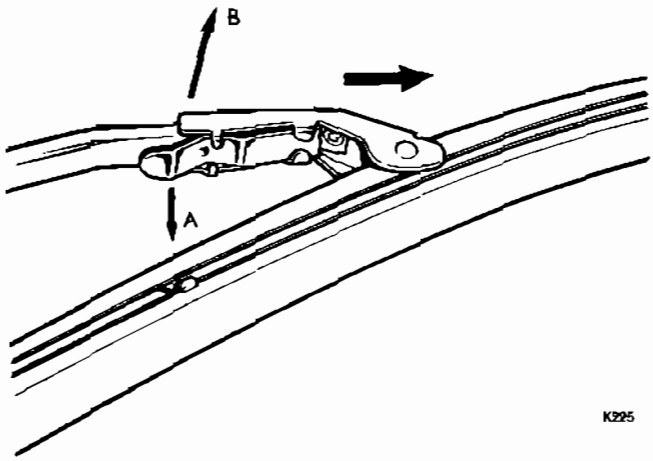
1. Wet windscreen.
2. Switch on ignition and wipers. Stop wiper assembly in a vertical position by switching off ignition at an appropriate moment.
3. Simultaneously lift wiper arm from screen and pull out lower end of pantograph arm to release ball socket. Allow assembly to fall into its service position.
4. Rotate blade and pantograph arm to position shown to free blade pin from retaining plate.
5. Withdraw blade from pivot block.

Refitting

6. With pantograph arm in position shown and blade correct way up to obtain full pivot block contact, insert blade pin into pivot block.
7. Rotate blade and pantograph arm to normal position to trap blade pin with retaining plate.
8. Simultaneously lower wiper arm to screen and guide lower end of pantograph arm to ball end.
9. Push ball socket firmly onto ball end.

WINDSCREEN WIPER SYSTEM

Wiper blade—passenger's—remove and refit **84.15.07**



Removing

1. Lift wiper arm and blade from screen so it falls into its service position.
2. Simultaneously lift clip 'A', tilt cage 'B' and gently pull wiper blade from arm.

Refitting

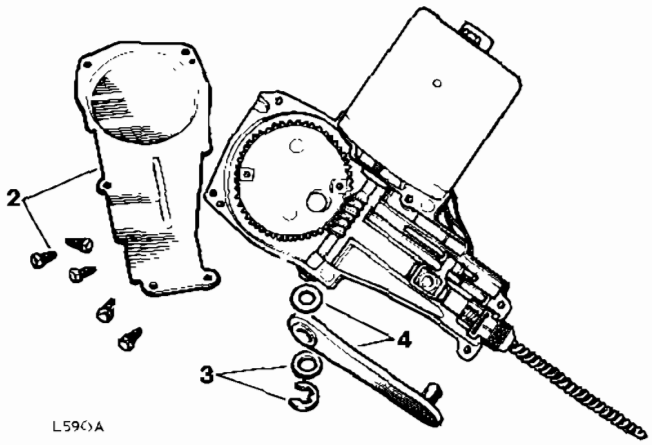
3. Locate cage and clip assembly to wiper arm. Push on to engage 'pip'.
4. Lower wiper arm to screen.

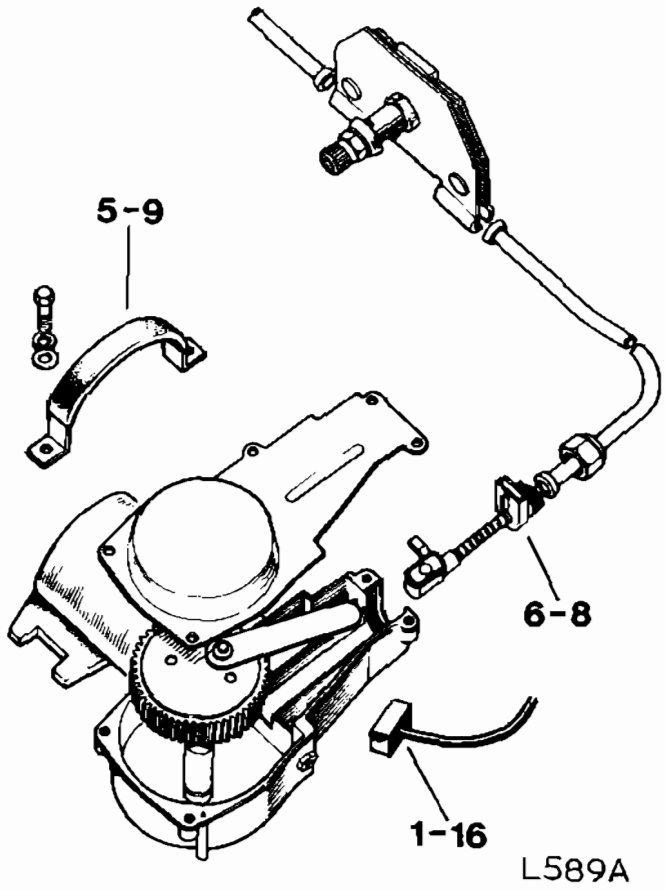
WINDSCREEN WIPER SYSTEM

Motor—remove and refit **84.15.12**

Removing

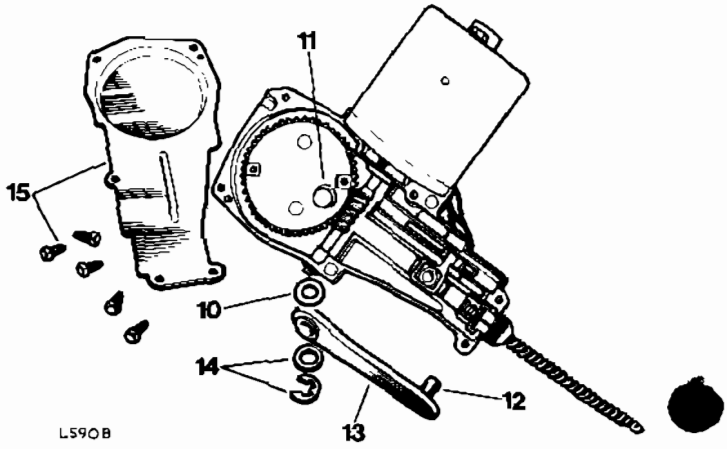
1. Remove harness plug from limit switch.
2. Remove five screws. Lift off gearbox cover.
3. Remove crankpin spring clip by withdrawing sideways. Remove washer.
4. Carefully withdraw connecting rod. Remove washer.
5. Remove two bolts, spring washers and washers. Remove strap.
6. Manœuvre motor to allow cross-head, rack and tube assembly to be released. Remove motor from vehicle.





Refitting

7. Ensure connecting rod is removed as detailed above.
8. Position motor so that cross-head, rack and tube assembly are correctly located to guide channel.
9. Fit strap and secure with two bolts, spring washers and washers. Ensure to secure two harness earth tags with rear bolt.
10. Fit washer.
11. Lubricate final gear crankpin with Shell Turbo 41 oil.
12. Lubricate cross-head end of connecting rod, including pin, with Ragosine Listate grease.
13. Carefully insert connecting rod.
14. Fit washer. Fit spring clip by inserting sideways.
15. Position gearbox cover. Secure with five screws.
16. Fit harness plug to limit switch.



WINDSCREEN WIPER SYSTEM

Motor overhaul **84.15.18**

General

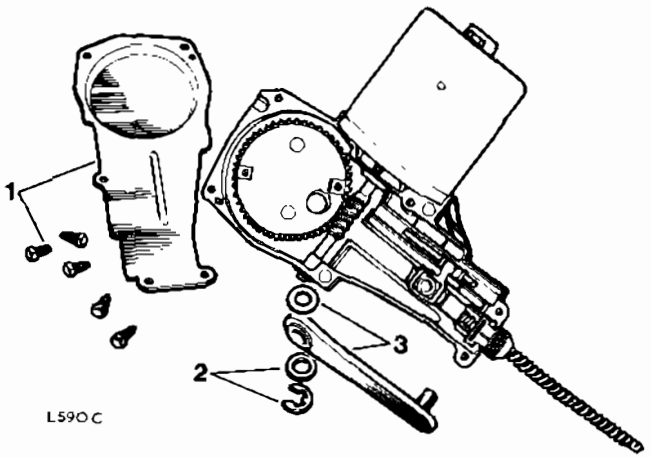
If the motor is not operating correctly, first check electrical supply of 12 volts on terminal 5 with normal speed selected and terminal 3 with high speed selected.

If electrical supply is satisfactory, perform the following operations to determine if the fault is in the motor or in the rack, tube and wheelbox assembly, resulting in the motor being required to drive an excessive load.

Running current

1. Remove five screws. Lift off gearbox cover.
2. Remove crankpin spring clip by withdrawing sideways. Remove washer.
3. Carefully withdraw connecting rod. Remove washer.
4. Connect ammeter suitable for running current (see Data) in supply circuit.
5. Allow motor to run for 60 seconds. Ammeter reading should then be as given in Data for normal speed and high speed respectively.

   If the reading is not as stated, a fault in the motor is indicated.



Running speed

1. Remove five screws. Lift off gearbox cover.
2. Remove crankpin spring clip by withdrawing sideways. Remove washer.
3. Carefully withdraw connecting rod. Remove washer.
4. Allow motor to run for 60 seconds. Speed of final gear should then be as given in Data for normal speed and high speed respectively.

   If the speed is not as stated, a fault in the motor is indicated.

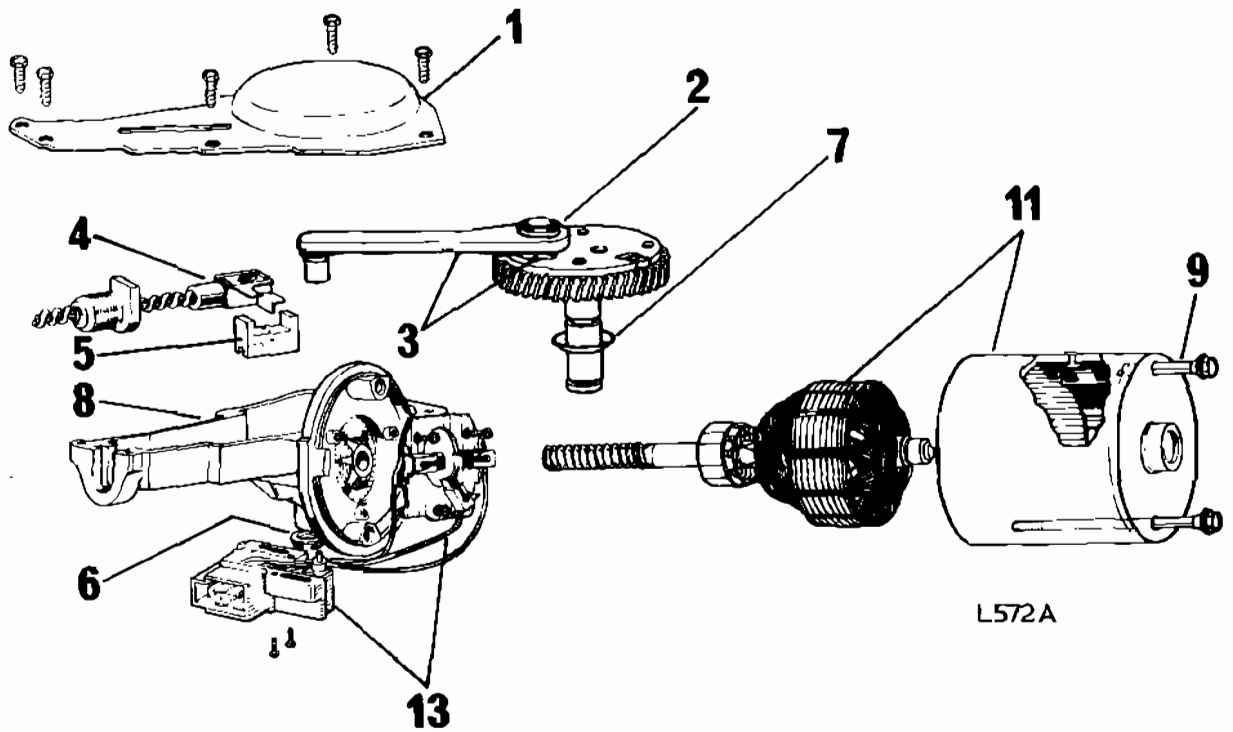
Force to move rack in tube and wheelbox assembly

1. Remove five screws. Lift off gearbox cover.
2. Remove crankpin spring clip by withdrawing sideways. Remove washer.
3. Carefully withdraw connecting rod. Remove washer.
4. Remove wiper arms. 84.15.02 and 84.15.03.
5. Attach a suitable spring scale to hole in cross-head. Maximum permissible force to move rack is given in Data.

   If the required force is greater than stated, a fault in the rack, tube and wheelbox assembly is indicated.

Dismantling

1. Remove five screws. Lift off gearbox cover.
2. Remove crankpin spring clip by withdrawing sideways. Remove washer.
3. Carefully withdraw connecting rod. Remove washer.
4. If necessary, remove cross-head.
5. Remove slider block. Note direction of cam slope.
6. Remove final gearshaft spring clip by withdrawing sideways. Remove washer.
7. Ensure shaft is burr-free and withdraw. Remove dished washer.
8. Remove thrust screw and locknut.
9. Remove through-bolts.
10. Carefully withdraw cover and armature about 0·2 in (5 mm). Continue withdrawal, allowing brushes to drop clear of commutator. Ensure three brushes are not contaminated with grease.
11. Pull armature from cover against action of permanent magnet.
12. Note position of limit switch on gearbox by scribing pencil line.
13. Remove five screws to release brush assembly and limit switch. Remove both units joined together by wires.
14. Remove plate.



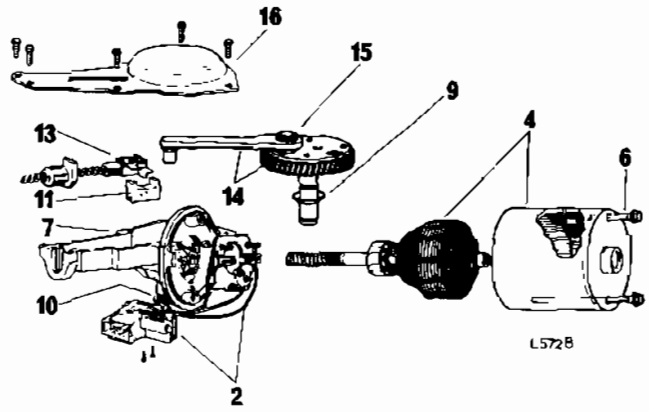
Reassembling

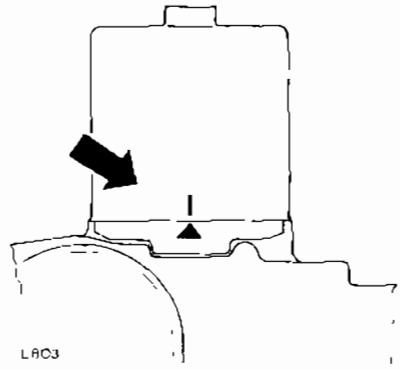
NOTE: The following lubricants are required during assembly: Shell Turbo 41 oil and Ragosine Listate grease.

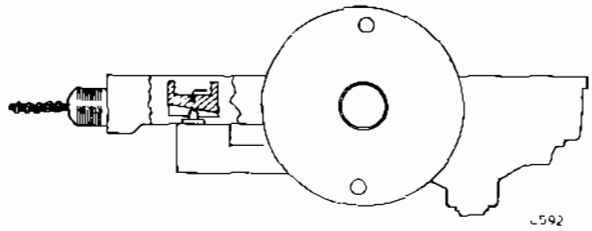
1. Position plate so that round hole will accommodate plunger.
2. Position brush assembly and limit switch joined together by wires. Secure with five screws.
3. Slacken two limit switch screws and align pencil lines. Tighten screws.
4. Lubricate cover bearing and saturate cover bearing felt washer with Shell Turbo 41 oil. Position armature to cover against action of permanent magnet.
5. Lubricate self-aligning bearing with Shell Turbo 41 oil. Carefully insert armature shaft through bearing. Ensure that brushes are not contaminated with lubricant. Push three brushes back to clear commutator.
6. Seat cover against gearbox. Turn cover to align marks shown. Fit through-bolts.

CAUTION: If marks are not aligned, motor will run in reverse direction.

7. Fit thrust screw and locknut.
8. Adjust armature end-float as follows. Slacken locknut. Screw thrust screw in until resistance is felt. Screw thrust screw out a quarter of a turn, maintain in this position and tighten locknut.
9. Lubricate final gear bushes with Shell Turbo 41 oil. Fit dished washer with concave surface facing final gear. Insert shaft.
10. Fit washer. Fit spring clip by inserting sideways.
11. Lubricate slider block cam slope, block sides and guide channel with Ragosine Listate grease. Position slider block with direction of cam slope as shown.
12. Pack Ragosine Listate grease around worm gear, final gear and into cross-head guide channel.
13. If necessary, fit cross-head locating projection in slider block slot.
14. Fit washer. Lubricate final gear crankpin with Shell Turbo 41 oil. Lubricate cross-head end of connecting rod, including pin, with Ragosine Listate grease. Carefully insert connecting rod.
15. Fit washer. Fit spring clip by inserting sideways.
16. Position gearbox cover. Secure with five screws.







WINDSCREEN WIPER SYSTEM

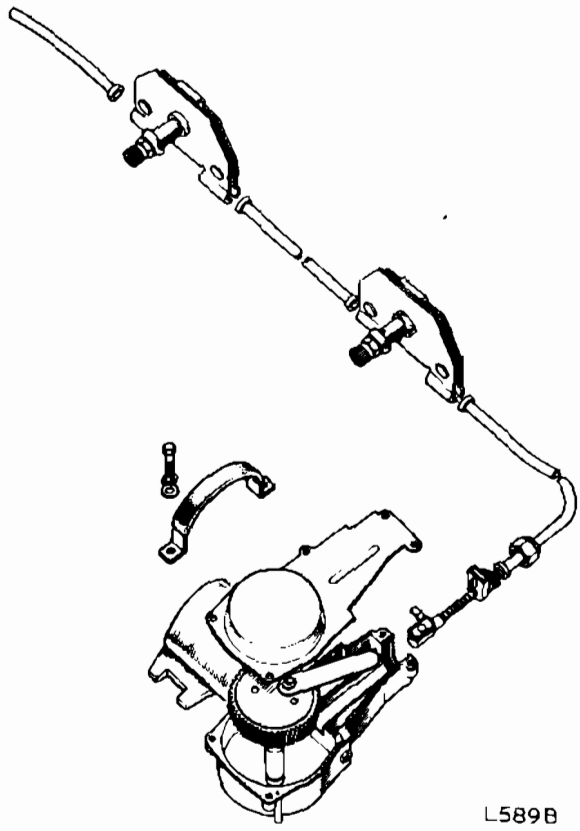
Rack—remove and refit **84.15.24**

Removing

1. Remove driver's wiper arm. 84.15.02.
2. Remove passenger's wiper arm. 84.15.03.
3. Remove motor. 84.15.12.
4. Pull cross-head to withdraw rack.

Refitting

5. Reverse 1 to 4. When inserting rack it may be necessary to slightly rotate each wheelbox spindle by hand to facilitate rack engagement.



WINDSCREEN WIPER SYSTEM

Wheelbox—driver's—remove and refit **84.15.28**

Removing

1. Isolate battery.
2. Remove rack. 84.15.24.
3. Remove instrument panel. 88.20.01.
4. Remove two nuts and remove wheelbox rear plate.
5. Place tube ends aside.
6. Remove spindle nut and withdraw wheelbox.

Refitting

7. Reverse 1 to 6.

WINDSCREEN WIPER SYSTEM

Wheelbox—passenger's—remove and refit **84.15.29**

Removing

1. Isolate battery.
2. Remove rack. 84.15.24.
3. Remove glovebox and lid assembly. 76.52.01.
4. Remove passenger's demister duct. 80.15.03.
5. Remove two nuts and remove wheelbox rear plate.
6. Place tube ends aside.
7. Remove spindle nut and withdraw wheelbox.

Refitting

8. Reverse 1 to 7.

ELECTRICAL OPERATIONS

Alternator
—data and description 86.10.00
—drive belt—adjust 86.10.05
—functional check 86.10.01
—overhaul 86.10.08
—remove and refit 86.10.02

Alternator control system
—control unit—functional check 86.10.25
—control unit—remove and refit 86.10.26
—data and description 86.10.00
—relay—functional check 86.10.18
—relay—remove and refit 86.10.20

Battery
—remove and refit 86.15.01

Bulbs
—bulb chart 86.00.03

Buzzers
—key warning buzzer—description 86.00.05
—key warning buzzer—remove and refit 86.55.13

Component mounting plate
—component chart 86.00.05
—description 86.00.04

Flasher units
—hazard flasher unit—description 86.00.05
—hazard flasher unit—remove and refit 86.55.12
—turn signal flasher unit—description 86.00.05
—turn signal flasher unit—remove and refit 86.55.11

Fuse system
—description 86.70.00
—fuse chart 86.70.00

Ignition coil and ballast resistor
—ballast resistor—remove and refit 86.35.33
—data and description 86.35.00
—ignition coil—remove and refit 86.35.32

Ignition distributor
—contact assembly—remove and refit 86.35.13
—contact gap—adjust 86.35.14
—data and description 86.35.00
—ignition timing—adjust 86.35.16
—lubrication 86.35.18
—overhaul 86.35.26
—remove and refit 86.35.20

Lamps

—flasher repeater lamp—remove and refit 86.40.53
—front marker lamp—remove and refit 86.40.59
—front parking and flasher lamp—remove and refit 86.40.26
—headlamp—beam aiming 86.40.18
—headlamp—inner—remove and refit 86.40.03
—headlamp—outer—remove and refit 86.40.02
—plate illumination lamp—remove and refit 86.40.86
—rear flasher, tail stop and reverse lamp—remove and refit 86.40.70
—rear marker lamp—remove and refit 86.40.64

Relays

—air conditioning master switch controlled relay—description 86.00.05
—air conditioning master switch controlled relay—remove and refit 86.55.10
—alternator control system relay—data and description 86.10.00
—alternator control system relay—functional check 86.10.18
—alternator control system relay—remove and refit 86.10.20
—blower switch controlled relay—description 86.00.05
—blower switch controlled relay—remove and refit 86.55.25
—horn relay—description 86.00.05
—horn relay—remove and refit 86.55.09
—ignition controlled relay (Ref. No. 2A)—description 86.00.05
—ignition controlled relay (Ref. No. 2A)—remove and refit 86.55.26
—ignition controlled relay (Ref. No. 8)— description 86.00.05
—ignition controlled relay (Ref. No. 8)— remove and refit 86.55.27
—ignition and starter controlled relay—description 86.00.05
—ignition and starter controlled relay—remove and refit 86.55.28
—night dimming relay description 86.55.00
—night dimming relay—remove and refit 86.55.03

Staretr motor

—data and description 86.60.00
—overhaul 86.60.13
—remove and refit 86.60.01*

Switches

—data 86.65.00

Window lift motor

—circuit breaker—remove and refit 86.25.31
—description 86.25.00
— overhaul 86.25.05
—remove and refit 86.25.04

Wiring diagram

—left-hand steer—air conditioning .. .. Appendix 01
—left-hand steer—heater .. .. Appendix 02
—right-hand steer—air conditioning .. .. Appendix 03
—right-hand steer—heater .. .. Appendix 04
—U.S.A. market—air conditioning .. .. Appendix 05
—U.S.A. market—heater .. .. Appendix 06

* For operations affected by emission control or air-conditioning equipment, see also sections 17 and 82 as appropriate.

BULB CHART

Lamp	Watts	Lucas Part No.	Stanpart No.	
Headlamps—L.H. dip—Home market—Outer	55	448	519397	
Inner	55	448	519397	
Other L.H. dip markets—Outer	37·5/50	54521806	511603	★
Inner	50	54522973	518815	★
Headlamps—R.H. dip—Normal—Outer	45/40	410	510218	●
Inner	45/40	410	510218	†
France—Outer	45/40	411	510219	●
Inner	45/40	411	510219	†
U.S.A —Outer	37·5/50	54521335	—	★
Inner	37·5	54521334	—	★
Front parking lamps (Not U.S.A.)	6	989	59467	
Front flasher lamps (Not U.S.A.)	21	382	502379	
Flasher repeater lamps (Not U.S.A.)	5	501	514797	
Front parking and flasher lamps (U.S.A. only)	6/21	380	502287	
Front marker lamps (U.S.A. only)	3	504	518414	
Rear marker lamps (U.S.A. only)	3	504	518414	
Rear flasher lamps	21	382	502379	
Tail/stop lamps	6/21	380	502287	
Reverse lamps	21	382	502379	
Plate illumination lamp	5	207	57591	
Luggage boot lamp	5	501	514797	
Console lamps	3	256	57599	
Glovebox/map lamp	6	254	59897	
Puddle lamps	5	501	514797	
'B post' lamps	6	254	59897	
Clock illumination	2	281	513000	
Instrument illumination	2·2	987	59492	
Brake line failure warning light	2·2	987	59492	
Hazard warning light	2·2	987	59492	
Warning light cluster	1·5	280	502288	
Cigarette lighter illumination	2·2	543	516266	
Heated back-light warning light	2·2	987	59492	
Selector panel illumination—Borg-Warner automatic only	3	256	57599	

★—Sealed beam light unit.

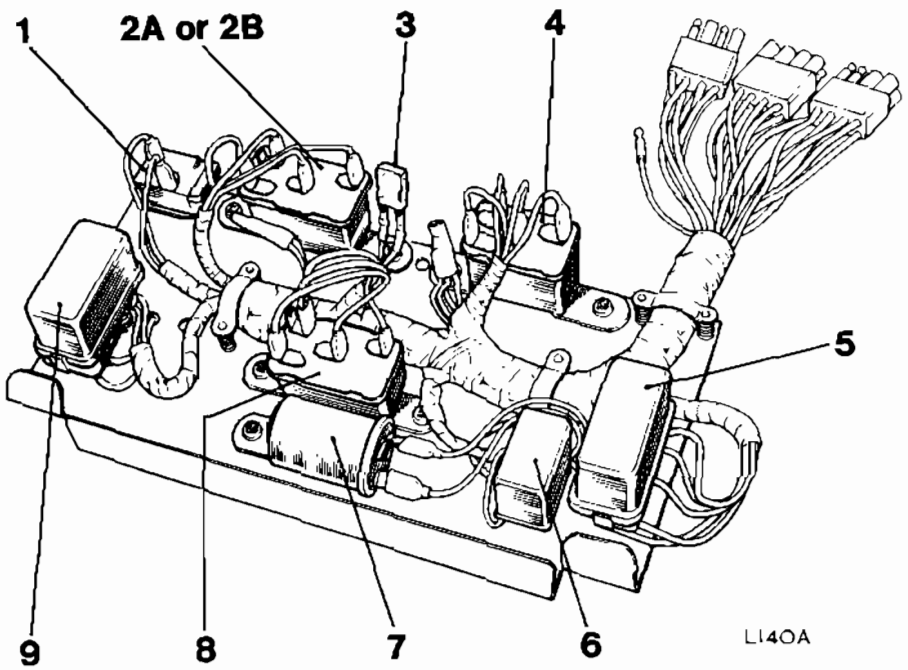
●—The 45-watt filament positioned at the focal point of the reflector provides the dip beam. The 40-watt filament provides part of the main beam.

†— The 45-watt filament positioned at the focal point of the reflector provides part of the main beam. The 40-watt filament is not used.

COMPONENT MOUNTING PLATE

The electrical units listed below are attached to the component mounting plate which is located on the rear side of the bulkhead on the passenger's side of the vehicle.

The right-hand-steer condition is shown. The plate layout for a left-hand-steer vehicle is a mirror image of that shown.



For key refer to 86.00.05

COMPONENT CHART

Illustration Ref. No.	Component	Function	Remove and Refit Operation Number	Wiring Diagram Reference					
				Right-hand steer Heater	Left-hand steer Heater	U.S.A. market Heater	Right-hand steer Air conditioning	Left-hand steer Air conditioning	U.S.A. market Air conditioning
1	Turn signal flasher unit	System flasher unit	86.55.11	65	68	73	65	68	73
2A	Heater vehicles— Ignition controlled relay	Provides power to heated backlight circuit and heater motor circuit when ignition is on	86.55.26	93	96	97	Not fitted		
2B	Air conditioning vehicles— Ignition and starter controlled relay	Provides power to heated back-light circuit, air conditioning circuit and blower motor circuit when ignition is on and starter motor circuit is not energized	86.55.28	Not fitted			93	96	97
3	Window lift circuit breaker	Refer to 86.25.00	86.25.31	88	91	92	88	91	92
4	Horn relay	Provides power to horns when horn-push is depressed	86.55.09	32	32	35	32	32	35
5	Air conditioning master switch controlled relay	Switches power to either heated back-light circuit or air conditioning circuit as directed by air conditioning master switch and cold matrix thermostat	86.55.10	Not fitted			98	101	102
6	Hazard flasher unit	System flasher unit	86.55.12	Not fitted	35	38	Not fitted	35	38
7	Key warning buzzer	Buzzer controlled by left-hand door switch and key switch	86.55.13	Not fitted	Not fitted	53	Not fitted	Not fitted	53
8	Ignition controlled relay	Provides power to window lift circuit and overdrive circuit	86.55.27	84	87	88	84	87	88
9	Blower switch controlled relay	Switches section of blower motor circuit to either supply or earth as directed by blower switch	86.55.25	Not fitted			104	107	108

ALTERNATOR AND ALTERNATOR CONTROL SYSTEM

Data and description **86.10.00**

CAUTION: The alternator and alternator control unit contain polarity-sensitive components that may be irreparably damaged if subjected to incorrect polarity.

To prevent damage to components do not make or break any connections in the charging circuit—including the battery leads—while the engine is running. Run the alternator only with all connections made or with the alternator and alternator control unit disconnected.

High voltages may damage semi-conductor devices. Disconnect alternator and alternator control unit before performing any electric arc welding on the vehicle.

Alternator

Manufacturer	Lucas	
Type	11AC	
	Lucas Part No.	**Stanpart No.**
Part Nos.—Alternator assembly comprising:		
Alternator	23532	215167
Fan	54216148	143775
Pulley	54219467	154334
Polarity	Negative earth	
Brush length: New	0·625 in (15·88 mm)	
Renew if less than	0·200 in (5·00 mm) protrudes from brushbox when free	
Brush spring pressure—face flush with brushbox	8 to 16 oz (230 to 450 g)	
Rectifier pack	6 diodes (3 live side, 3 earth side)	
Stator windings	Three-phase, star connected	
Rotor: Poles	8	
Maximum permissible speed	12,500 rev/min	
Shaft thread	$\frac{7}{16}$ in—20 U.N.F.—R.H.—2A	
Field winding resistance	3·8 ± 5% ohms at 20°C	
Nominal output—hot	43 amps	

Triumph Stag

Crankshaft pulley—effective diameter	5·500 in (139·70 mm)
Alternator pulley—effective diameter	2·375 in (60·33 mm)
Drive ratio—engine rev/min : alternator rev/min	19 : 44

Relay

Manufacturer	Lucas
Type	16RA
Lucas Part No.	33294
Stanpart No.	151363
Resistor	60 ohm
Contacts	Normally open
Cut-in voltage	2·5 to 3·5 volts
Drop-off voltage—after saturation of 7·5 volts	0·5 to 2·0 volts

Alternator control unit

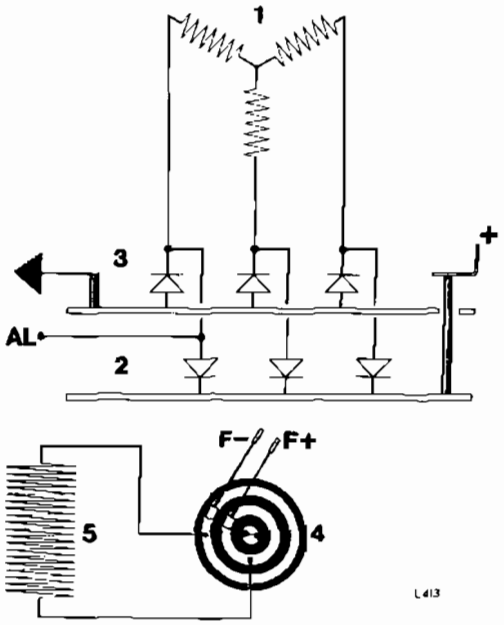
Manufacturer	Lucas
Type	4TR
Lucas Part No.	37423
Stanpart No.	137795

Alternator

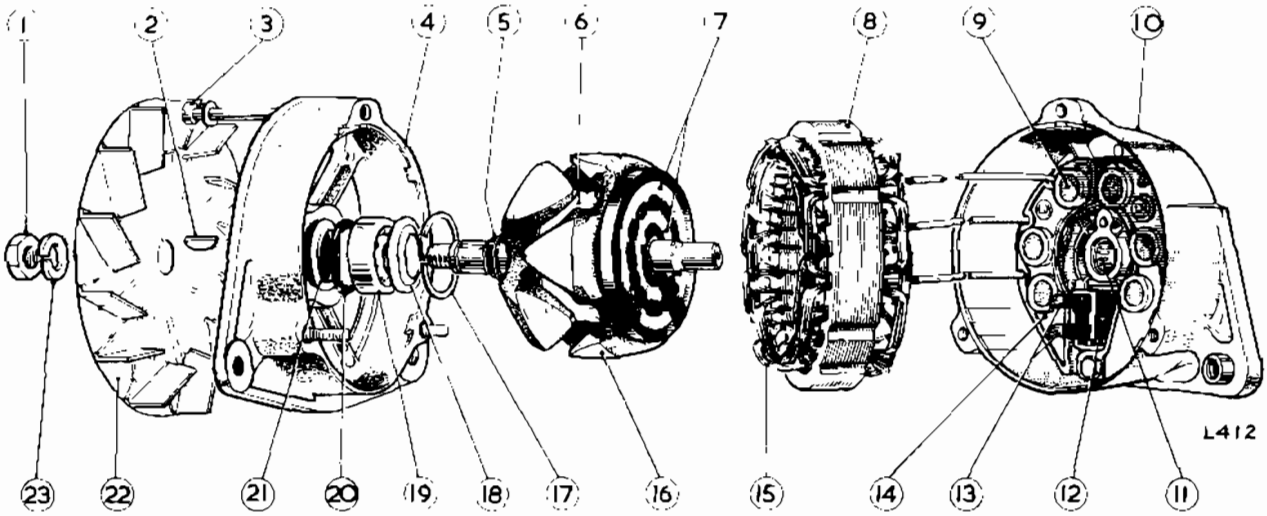
The mechanical features of the alternator are a rotor supported by a ball bearing at the drive-end and a needle-roller bearing at the slip-ring end. No periodic lubrication is required. The field winding carried on the rotor is energized via a pair of brushes and slip-rings. Cooling air is drawn through the unit by a fan mounted at the drive end.

Electrically an alternating current produced in the three-phase, star-connected, stator windings is rectified by six diodes—three on the live side and three on the earth side—to supply direct current to the vehicle electrical circuits and battery.

The field winding circuit is controlled by the alternator control system. A tapping taken from the mid-point of one pair of diodes is connected to terminal 'AL' and provides the low voltage facility required by the alternator control system.



1. Stator windings
2. Live side output diodes
3. Earth side output diodes
4. Brushes and slip-rings
5. Field winding



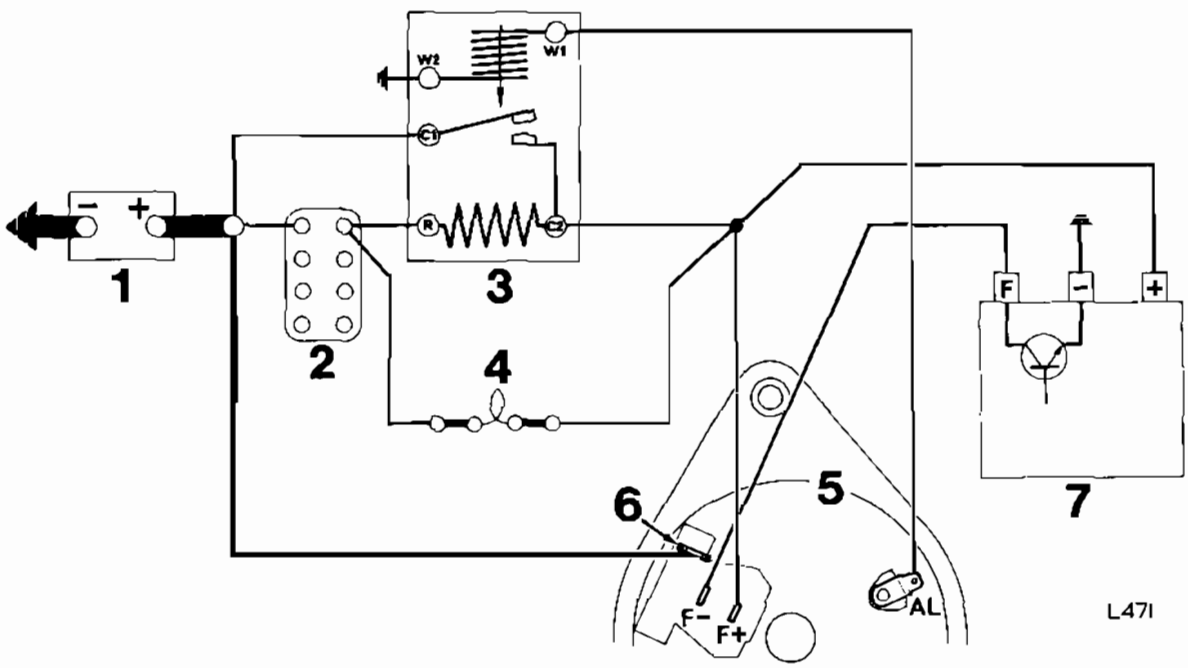
1. Nut
2. Key
3. Through-bolt
4. Drive end bracket
5. Jump ring shroud (early units)
6. Field winding
7. Slip-rings
8. Lamination pack
9. Diode
10. Slip-ring end bracket
11. Needle-roller bearing
12. Brushbox
13. Brushes
14. Heatsink
15. Stator winding
16. Rotor
17. Circlip
18. Retaining plate
19. Ball bearing
20. Rubber 'O' ring
21. Retaining washer
22. Fan
23. Washer

Alternator control system

The alternator control system consists of a relay which controls energization of the alternator field winding and an alternator control unit which finely adjusts the current flow through the alternator field winding.

The relay is a dual-purpose component containing both a resistor and a set of contacts. Switching on the ignition causes current to flow through two parallel paths—via the resistor and via the ignition warning light—to provide a low current for battery excitation of the alternator field winding preparatory to starting the engine. With rising alternator speed terminal 'AL' becomes positive, which provides the low voltage facility to pull in the relay contacts to connect the battery direct to the field winding. This action also extinguishes the ignition warning light.

The alternator control unit is positioned in the field winding earth-return path. Until a measure of control is required terminal 'F' is connected via the output transistor to earth. As alternator output rises the reference voltage felt at terminal '+' increases. When control is required the voltage-sensitive electronic circuit turns the output transistor off. The unit thus finely adjusts the current flow through the alternator field winding to control the alternator output to suit the electrical requirements of the vehicle and the state of charge of the battery.



1. Battery
2. Ignition switch
3. Relay
4. Ignition warning light
5. Alternator
6. Output terminal
7. Alternator control unit

F+ Field winding terminal
F− Field winding terminal
AL Low voltage facility terminal

ALTERNATOR

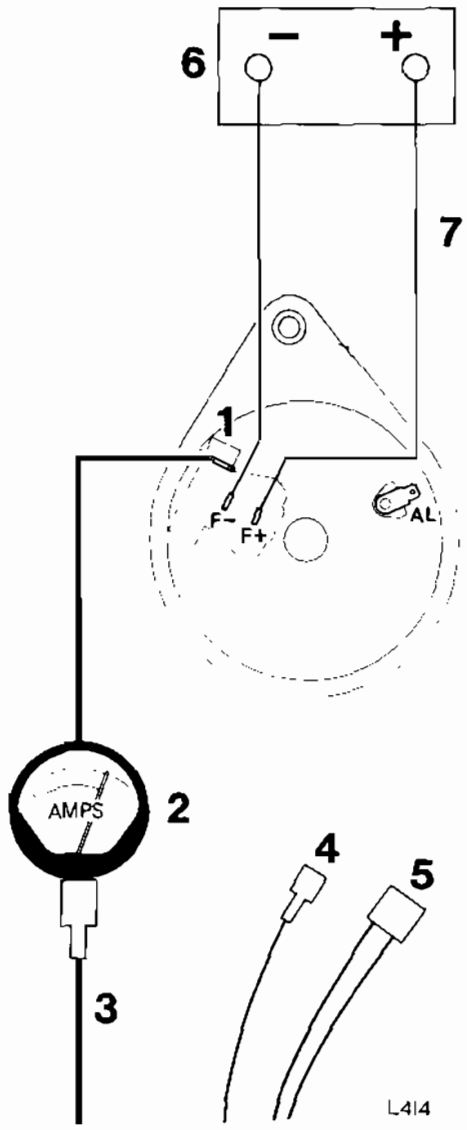
—Functional check **86.10.01**

NOTE: To obtain access to the alternator connections this operation may be facilitated by placing the vehicle on a ramp.

1. Check tension of drive belt. If required, adjust. 86.10.05.
2. Remove two Lucar connections and one multi-socket connector from alternator.
3. Provide test circuit as shown.

CAUTION: The alternator contains polarity-sensitive components that may be irreparably damaged if subjected to incorrect polarity. Observe polarity of alternator and battery terminals.

4. Run engine; gradually increasing speed.
   At 4,000 alternator rev/min (1,700 engine rev/min) ammeter reading should be approximately 40 amps. If the ammeter reading is not approximately 40 amps, the indication is that the alternator requires overhaul or replacement.



1. Output terminal
2. Ammeter 0 to 60 amp
3. Harness brown wire removed from output terminal
4. Harness brown/yellow wire removed from AL terminal
5. Harness multi-socket connector removed from field terminals
6. Vehicle battery 12 volt
7. Slave wires to energize field winding

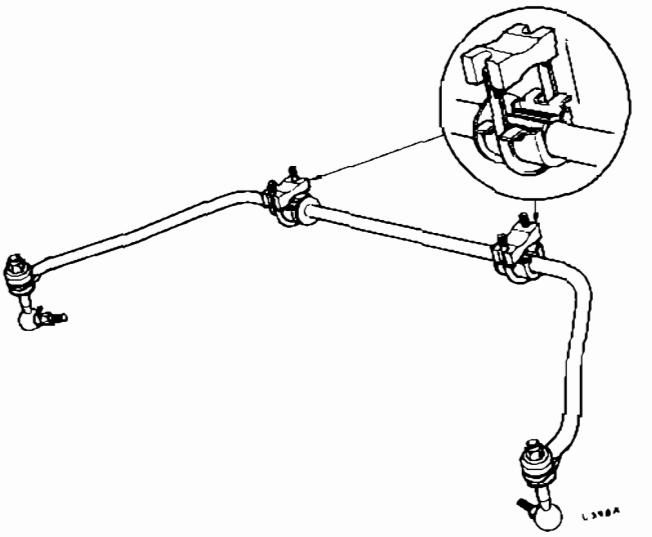
ALTERNATOR

—Remove and refit **86.10.02**

NOTE: This operation may be facilitated by placing the vehicle on a ramp.

Removing

1. Isolate the battery.
2. Remove four nuts securing anti-roll bar 'U' bolts to body. Swing anti-roll bar downwards to provide clearance for alternator removal.
3. Remove two Lucar connections and one multi-socket connector from alternator.
4. Slacken main mounting bolt assembly and three adjustment bracket bolts.
5. Push alternator towards engine and remove drive belt from pulley.
6. Remove lower adjustment bracket bolt.
7. Supporting weight of alternator, withdraw main mounting bolt and lower alternator from vehicle.

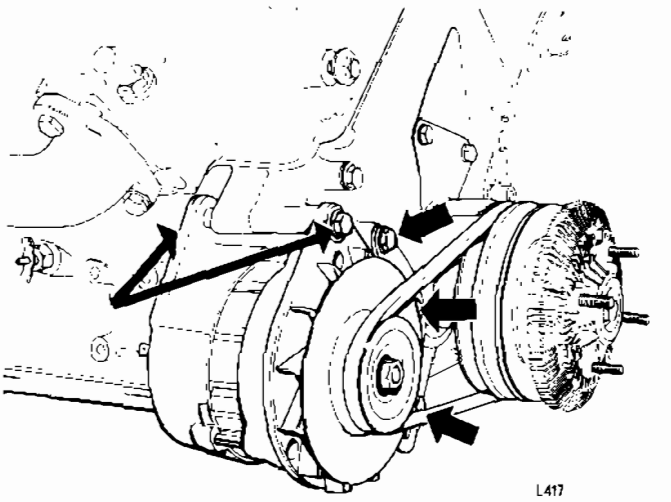


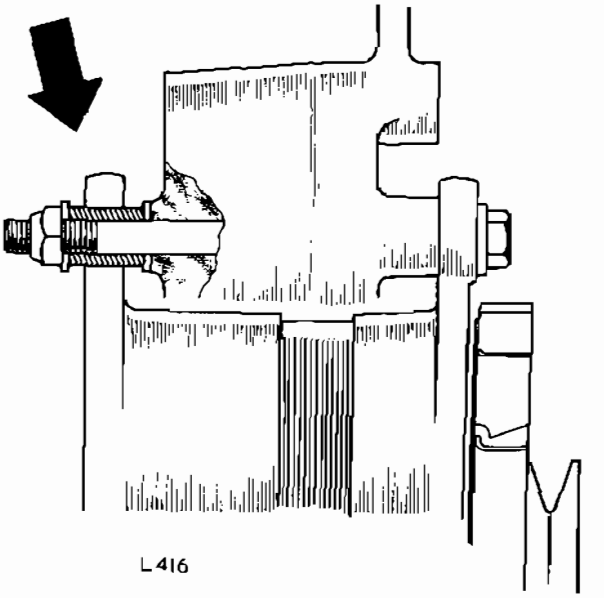
Refitting

8. Position alternator. Fit main mounting bolt assembly.

CAUTION: To prevent a fracture of the alternator rear mounting lug it is important to ensure that the main mounting bolt assembly is fitted as shown. A short mounting lug bush or deletion of washers may produce a compressive load between the two lugs which the alternator is not designed to resist.

9. Fit lower adjustment bracket bolt.
10. Push alternator towards engine and fit drive belt to pulley.
11. Adjust alternator drive belt. 86.10.05.
12. Fit two Lucar connections and one multi-socket connector to alternator.
13. Position anti-roll bar. Secure 'U' bolts with four nuts.





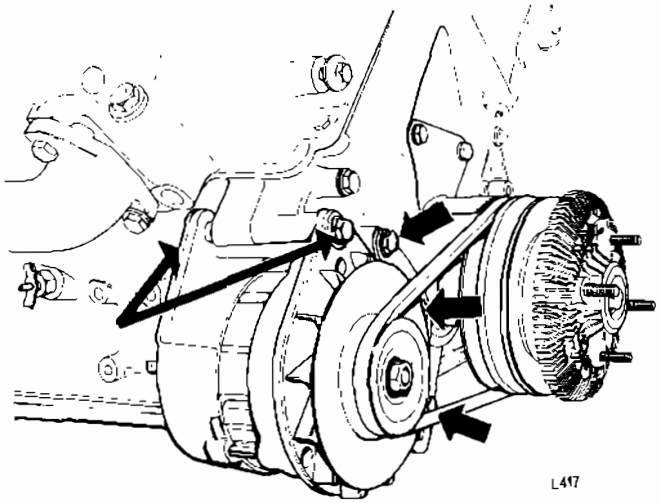
ALTERNATOR

—Drive belt adjust **86.10.05**

1. Slacken main mounting bolt assembly and three adjustment bracket bolts.
2. Carefully lever alternator away from engine to tension belt.

CAUTION: To prevent bearing damage when tensioning the belt use a lever of soft material—preferably wood—applied to the alternator drive end bracket. Do not lever on any other part of the alternator.

3. Tighten four bolts.
4. Check belt tension. This should be 0·50 to 07·5 in (10 to 20 mm) at the mid-point between pulleys.

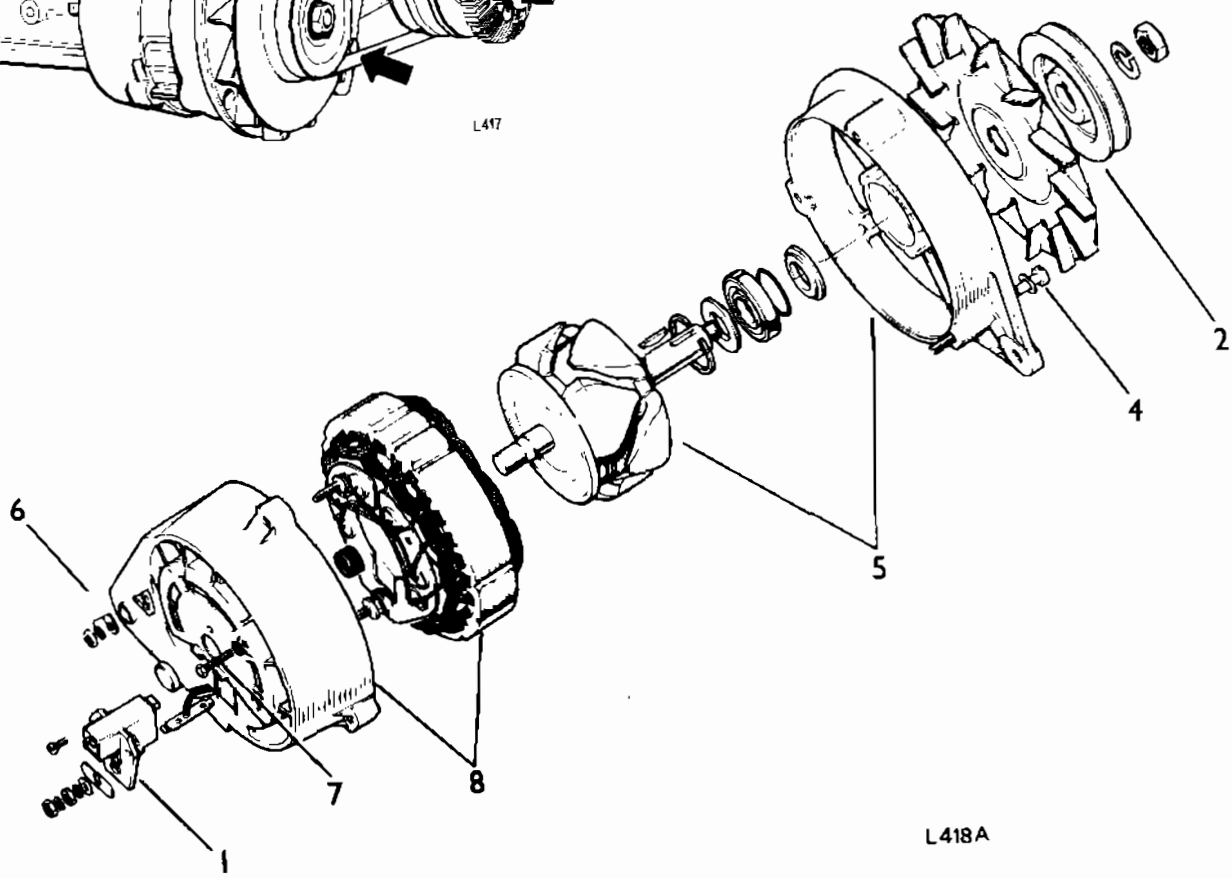


ALTERNATOR

—Overhaul **86.10.08**

Dismantling

1. At output terminal remove nut, washer, nut, washer, Lucar terminal and red plastic strap. Remove two screws and withdraw brush box assembly.
2. Prevent rotor turning by wrapping a scrap fan belt round pulley and retaining by hand or vice. Remove nut, spring washer, pulley and fan. If necessary, use a suitable extractor.
3. Note angular relationship of drive end bracket, lamination pack and slip-ring end bracket by marking a common line.
4. Remove through-bolts.
5. Remove drive-end bracket and rotor assembly.
6. At terminal 'AL' remove nut, washer, Lucar terminal and plastic insulation.
7. On slip-ring end bracket remove nut and washer.
8. Carefully separate slip-ring end bracket from stator winding and diode assembly. Take care to retain two insulation washers and two steel washers now loose on diode assembly.
9. If required, remove rotor from drive-end bracket using a suitable hand press. Ensure that key is removed before performing operation.



Brush box assembly

Clean brushes with petrol-moistened cloth. Ensure that the brushes move freely in the brush box. If necessary, lightly polish brush sides with a fine file.

Check brush length—renew brush box assembly if less than 0·2 in (5 mm) protrudes from brush box when free.

Using a suitable push-type spring scale, check brush spring pressure. Pressure should be 8 to 16 oz (230 to 450 g) with face flush with brush box. If pressure is low, renew brush box assembly.

Diode heatsink assemblies

Check each of the six diodes individually.

Provide test circuit as shown.

Place each diode in circuit with battery positive to diode pin. Repeat check with battery negative to diode pin.

When placing each diode in circuit, wire 'A' must be connected to the heatsink to which the diode is associated.

Light illumination—indicating current flow—should occur in one direction only.

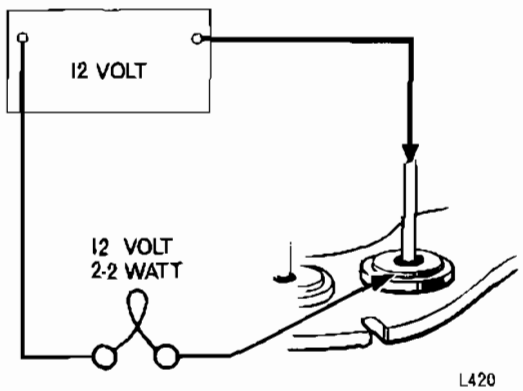
If light illuminates in both directions, or fails to illuminate in either, the diode is unserviceable and a new diode heatsink assembly must be fitted.

Diodes are not individually replaceable but may be replaced as a positive heatsink assembly of three diodes marked red or as a negative heatsink assembly of three diodes marked black.

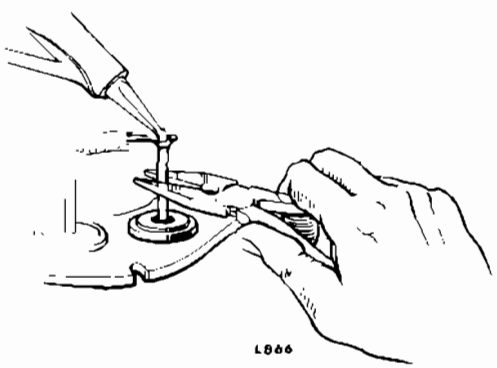
Note position of all wires before unsoldering.

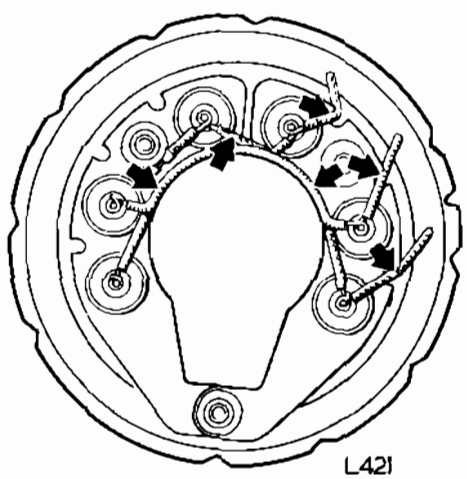
When soldering, take care not to overheat diodes or bend diode pins. Perform soldering operation as quickly as possible and provide a heatsink by lightly gripping diode pin with long-nosed pliers. Use 'M' grade 45–55 tin–lead solder.

Stator wires must pass through notches on negative heatsink and other wires must be neatly arranged around heatsinks to ensure rotor clearance. Tack wires down with 'MMM' EC 1099 adhesive where shown.



L420


L866


L421

Rotor slip-rings

Clean slip-rings with petrol-moistened cloth. If there is evidence of burning use very fine glasspaper. The surfaces should be smooth and uncontaminated by oil or other foreign matter.

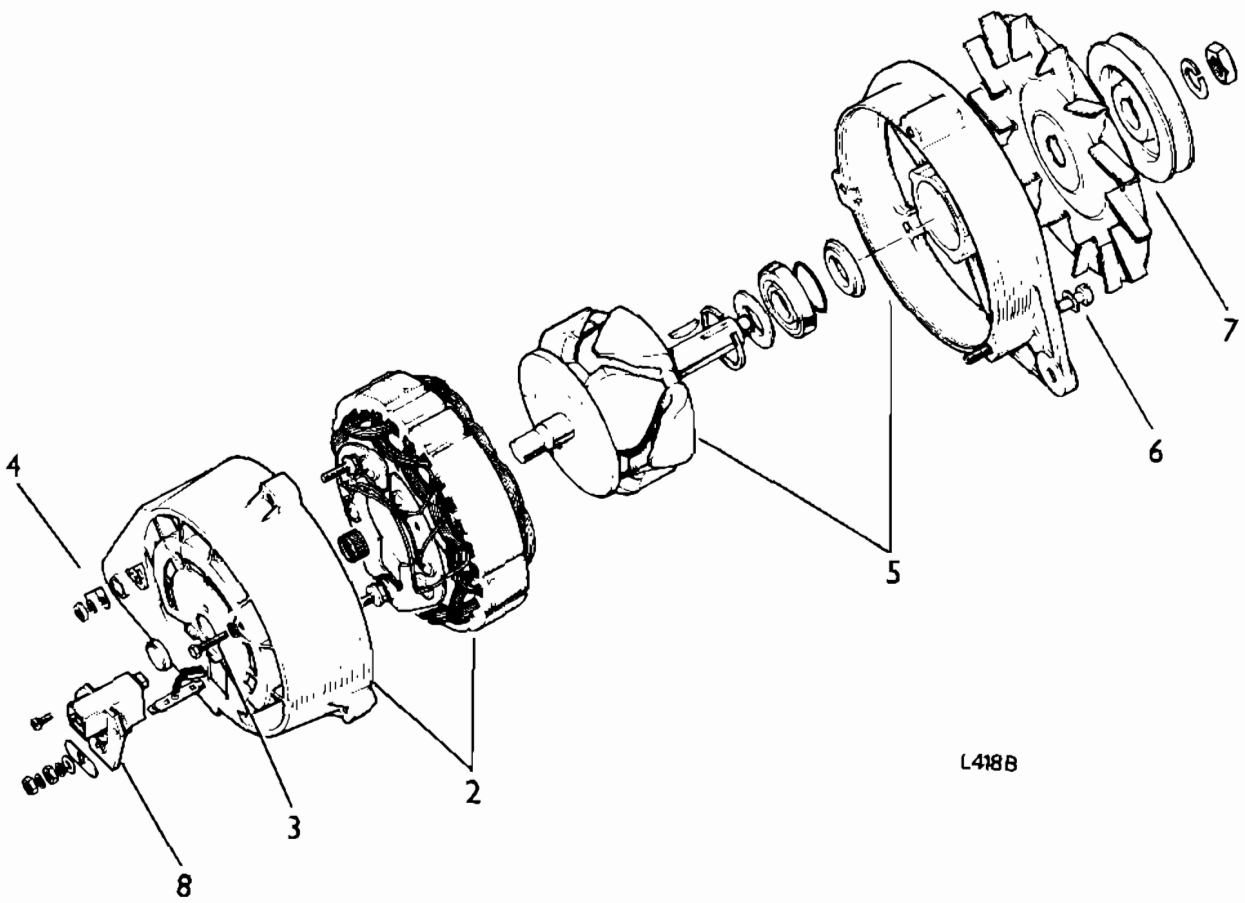
CAUTION: Do not use emery-cloth or similar abrasive. Do not machine skim—any eccentricity in machining will adversely affect the alternator's high speed performance.

Reassembling

1. If required, fit rotor to drive-end bracket. Use hand press and suitable tube to apply pressure to bearing inner journal and rotor.

CAUTION: Do not use drive-end bracket as support while fitting rotor.

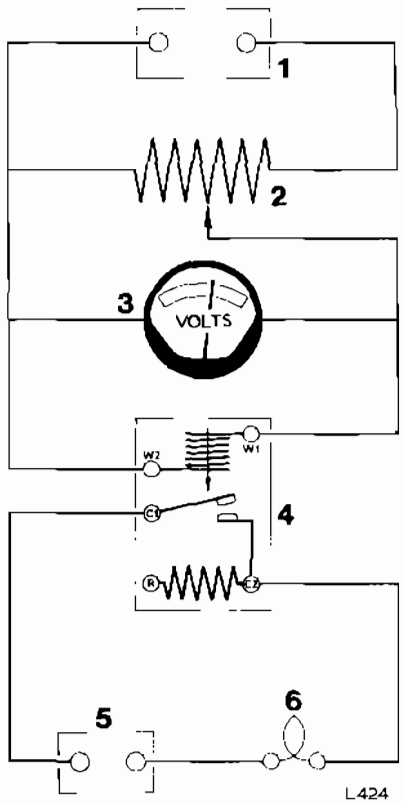
2. Ensure that two steel washers and two insulation washers are fitted on diode assembly. Carefully position slip-ring end bracket to stator winding and diode assembly as indicated by mark line.
3. On slip-ring end bracket fit nut and washer.
4. At terminal 'AL' fit plastic insulation, Lucar terminal, washer and nut.
5. Position drive-end bracket and rotor assembly as indicated by mark line.
6. Fit through-bolts, tightening evenly.
7. Ensure that key is fitted. Fit fan, pulley, spring washer and nut. Prevent rotor turning by wrapping a scrap fan belt round pulley and retaining by hand or vice.
8. Insert brush box assembly and secure with two screws. At output terminal fit red plastic strap, Lucar terminal, washer, nut, washer and nut.



ALTERNATOR CONTROL SYSTEM

—Relay—functional check **86.10.18**

1. Remove multi-socket connector from relay.
2. Provide test circuit as shown.
3. Increase variable voltage applied across terminals 'W1—W2'. At 2·5 to 3·5 volts relay should cut in, indicated by test lamp illumination.
   If relay does not cut in within required limits use suitable probe to carefully push out centre core of each fastener. Retrieve both centre cores. Pull cover from base. Using suitable setting tool, turn adjustment cam to obtain correct cut-in.
4. Raise voltage to 7·5 volts to saturate winding. Decrease voltage. At 0·5 to 2·0 volts relay should drop off, indicated by test lamp extinguishing.
   If relay does not drop off within required limits use suitable probe to carefully push out centre core of each fastener. Retrieve both centre cores. Pull cover from base. Adjust height of fixed contact to obtain correct drop-off.
5. Remove test circuit.
6. Check continuity and value of resistor by applying ohmmeter across terminals 'R—C2'. Resistance should be 60 ohms.



1. Battery—12 volt
2. Variable resistor
3. Voltmeter—0 to 10 volt
4. Relay
5. Battery—suitable for test lamp
6. Test lamp—suitable for battery

ALTERNATOR CONTROL SYSTEM

Relay—remove and refit **86.10.20**

Removing

1. Locate relay mounted at top of right-hand front suspension turret.
2. Remove multi-socket connector from relay.
3. Remove three nuts, spring washers and washers.
4. Remove relay from mounting.

Refitting

5. Reverse 1 to 4.

ALTERNATOR CONTROL SYSTEM

Control unit—functional check **86.10.25**

1. Ensure that the vehicle battery is in a well-charged condition.
   If this cannot be assured the battery must be temporarily replaced by a well-charged nine-plate battery for the duration of the check.
2. At alternator, disconnect Lucar connection to output terminal.
   Connect ammeter suitable for 0 to 50 amp range between output terminal and removed brown wire connector.
3. Connect voltmeter suitable for battery voltage and with accuracy of one per cent or better between battery terminals.
4. Run engine at approximately 3,000 alternator rev/min (1,300 engine rev/min). Allow approximately eight minutes for the system to stabilize.
   Switch on sidelamp circuit (approximately 4 amp) to achieve a condition at which ammeter reads a current flow towards battery of approximately 5 amps.
   Voltmeter reading should now be 13·9 to 14·3 volts.
   If the voltmeter reading is not steady or is outside the limits the indication is that the alternator control unit requires replacement.

NOTE: If the ammeter reading remains above 10 amps, the indication is that the battery is not in a well-charged condition. Refer to operation 1 above.

ALTERNATOR CONTROL SYSTEM

Control unit—remove and refit **86.10.26**

Removing

1. Locate unit mounted at right-hand engine valance adjacent to power steering pump.
2. Remove multi-socket connector from unit.
3. Remove two screws, spring washers and washers and remove unit from panel.

Refitting

4. Reverse 1 to 3.

BATTERY

—Remove and refit **86.15.01**

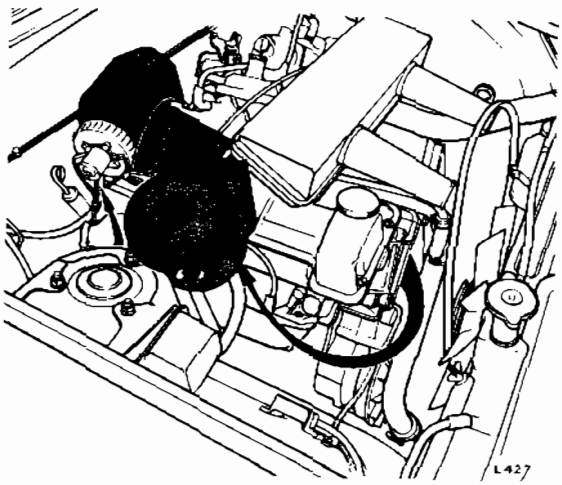
NOTE: To achieve this operation it is not necessary to disturb the power steering hydraulic circuit.

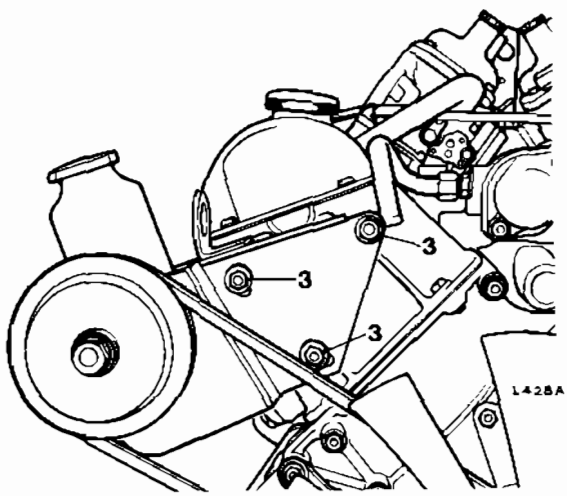
Removing

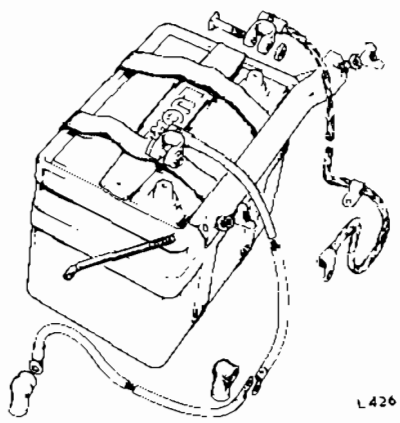
1. Lift windscreen washer bottle from bracket and position as shown. Take care to avoid water spillage from vent hole.
2. *U.S.A. market vehicles only:* Lift absorption canister from bracket.
3. Slacken pivot bolt and adjustment bolts. Swing pump down and remove belt from pulley. Supporting weight of pump, remove three bolts. Lift to position shown.
4. Remove battery leads.
5. Slacken wing-nuts and swing down battery retaining assembly. Using carrier, lift battery from vehicle.

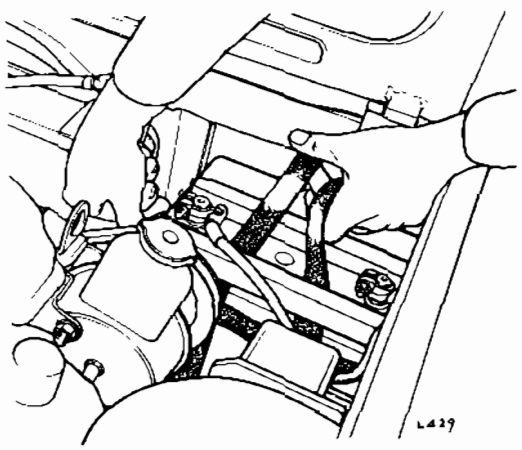
Refitting

6. Fit carrier to new battery.
7. Lift battery into tray. Swing up battery retaining assembly. Pull looseness of carrier to lay on top of battery clear of pulley and belt and tighten wing-nuts as shown.
8. Fit battery leads. Do not hammer terminals to terminal posts; such action may damage battery. Coat terminals with petroleum jelly (Vaseline) to prevent corrosion.
9. Position pump and insert three bolts. Fit belt to pulley.
10. Adjust belt tension. 57.20.01.
11. *U.S.A. market vehicles only:* Fit absorption canister to bracket.
12. Fit windscreen washer bottle to bracket.









WINDOW LIFT MOTOR

Description **86.25.00**

A polarity-sensitive, reversible, permanent magnet motor is located in each door to actuate the window regulator.

Two spring-loaded tilt switches located on the console control the motors on the appropriate sides of the vehicle.

Electrical supply is via an ignition-controlled relay and an Otter current/heat-sensitive circuit breaker. If the motion of the window is obstructed, the motor will draw an excess current and the circuit breaker will actuate. This unit is self-resetting and has a quick recovery time. Both the relay and the circuit breaker are located on the component mounting plate.

To ensure the greatest possible personal safety and minimize the obvious danger to children's fingers, Triumph have chosen to use a relatively low power motor and a sensitive circuit breaker.

WINDOW LIFT MOTOR

—Remove and refit **86.25.04**

WARNING: Do not attempt to separate motor from regulator whilst these components are 'in situ'. **Failure to observe this instruction may result in severe personal injury.**

Removing

1. Remove regulator and motor assembly complete from door. 76.31.45.
2. The lever spring is retained by the motor pinion which is held by the inherent design feature of a worm drive. Without precautions, removal of the motor will free the arm and spring with possible personal injury.
3. Secure assembly in vice. Use slave battery to run motor to align large hole in segment with hole on centre line of regulator plate.
4. Insert slave bolt through holes and secure with slave nut.
5. Remove three bolts and withdraw motor from regulator plate.

Refitting

6. Grease pinion and regulator plate bearing.
7. Position motor to regulator plate and secure with three bolts.
8. Remove slave nut and bolt.
9. Refit regulator and motor assembly complete to door. 76.31.45.

WINDOW LIFT MOTOR

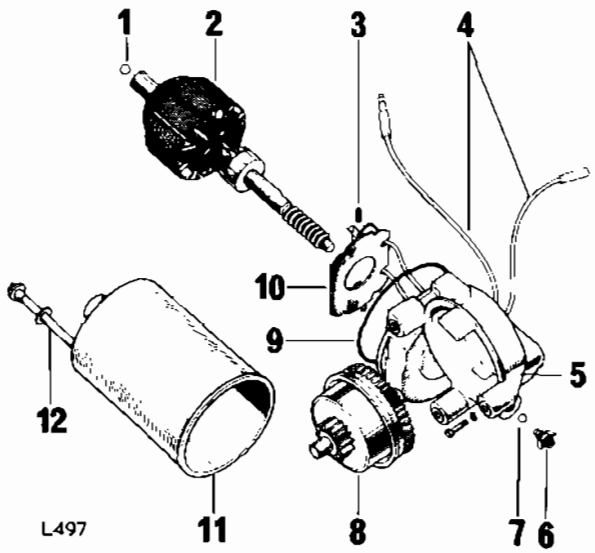
—Overhaul **86.25.05**

Dismantling

1. Note relationship of cover to housing by marking a common line.
2. Remove two through-bolts.
3. Carefully withdraw cover against action of permanent magnet.
4. Remove rubber sealing ring.
5. Using fuse wire, wire each brush into brush box against action of spring.
6. Carefully remove armature by rotating clockwise while withdrawing to release worm from gear. Ensure that brushes are not contaminated with lubricant.
7. Remove gear assembly.

Reassembling

8. Fit gear assembly.
9. Ensure that each brush is wired into brush box.
10. Carefully fit armature by rotating anti-clockwise while inserting to engage worm to gear. Ensure that brushes are not contaminated with lubricant.
11. Release brushes to rest against commutator. Remove slave wires.
12. Position rubber sealing ring.
13. Carefully insert cover against action of permanent magnet. Turn cover as indicated by mark lines to align 'pip' on cover to notch on housing.
14. Fit two through-bolts.



1. Thrust ball
2. Armature
3. Spring
4. Brush and terminal assemblies
5. Housing
6. Thrust screw and locknut
7. Thrust ball
8. Gear assembly
9. Rubber sealing ring
10. Brushplate
11. Cover
12. Through-bolt

WINDOW LIFT MOTOR

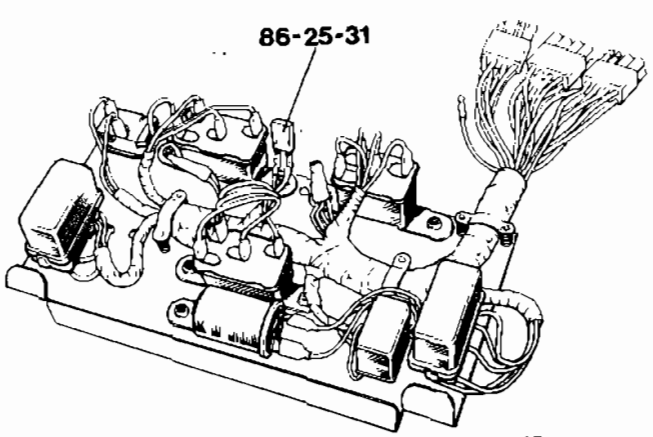
Circuit breaker—remove and refit **86.25.31**

Removing

1. Remove parcel tray. 76.67.01.
2. Locate circuit breaker at component mounting panel.
3. Carefully pull off two miniature Lucar connectors to detach unit.

Refitting

4. Reverse 1 to 3.



IGNITION DISTRIBUTOR— IGNITION COIL AND BALLAST RESISTOR

Data and description **86.35.00**

Ignition distributor

Manufacturer	Lucas
Type	35D8
Lucas part No.	41276
Stanpart No.	213954
Contact gap	0·014 to 0·016 in (0·36 to 0·41 mm)
Rotation—viewed on rotor	Anti-clockwise
Firing angles	45±1 degree
Dwell angle	26 to 28 degrees
Open angle	17 to 19 degrees
Moving contact spring tension	18 to 24 oz (500 to 700g)
Capacitor capacity	0·18 to 0·25 mfd
Engine firing order	1-2-7-8-4-5-6-3

Centrifugal Advance

Check at decelerating speeds

Distributor rev/min	Degs. distributor advance		Crankshaft rev/min	Degs. crankshaft advance	
	Minimum	Maximum		Minimum	Maximum
Below 350	No advance to occur		Below 700	No advance to occur	
600	0	2	1,200	0	4
1,200	5	7	2,400	10	14
1,700	8	10	3,400	16	20
2,650	11	13	5,300	22	26
3,200	12	14	6,400	24	28

Vacuum Advance

Inches of mercury vacuum	Degs. distributor advance		Degs. crankshaft advance	
	Minimum	Maximum	Minimum	Maximum
Below 3·5	No advance to occur			
5	0	0·5	0	1
8	0·5	2·5	1	5
12	3·0	5·0	6	10
16	5·0	7·0	10	14
20	6·0	8·0	12	16
25	6·0	8·0	12	16

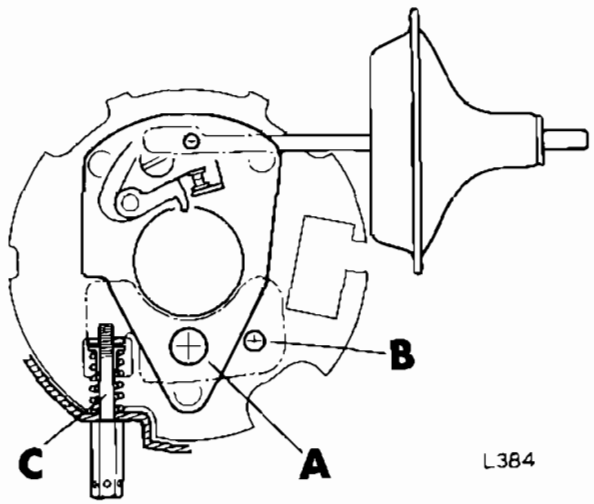
Ignition distributor

Stag is equipped with an eight-cylinder distributor featuring centrifugal timing control to advance the spark under increasing engine speed and vacuum timing control which functions to improve fuel economy by timing the spark earlier at part throttle.

The single, high speed, lightweight contact assembly is located on the moving plate. This assembly can be rotated through a limited angle about pivot post 'A' by the vacuum timing control.

A special feature of this unit is that the dwell angle—i.e. contact gap—may be adjusted externally provided a dwell angle meter is available. The moving plate is mounted to pivot post 'A'. Pivot post 'A' is attached to a lever which may be swung about a fixed pivot 'B'. The lever end is positioned by the adjustment nut and spring assembly 'C'. Rotating the adjustment nut thus moves the contact assembly relative to the cam and amends the contact gap.

Ignition timing can be adjusted by slackening the two distributor mounting bolts using Service tool number S349 and rotating the distributor body. No micrometer adjustment nut is fitted to this unit.



Ignition coil

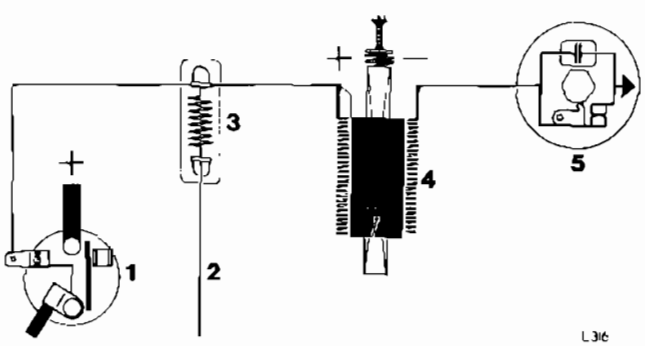
Manufacturer	Lucas
Type	16C6
Lucas Part No.	45232
Stanpart No.	154272
Primary winding resistance	1·43 to 1·58 ohm

Ballast resistor

Manufacturer	Lucas
Type	3BR
Lucas Part No.	47170
Stanpart No.	134176
Resistance	1·3 to 1·4 ohm

Ignition coil and ballast resistor

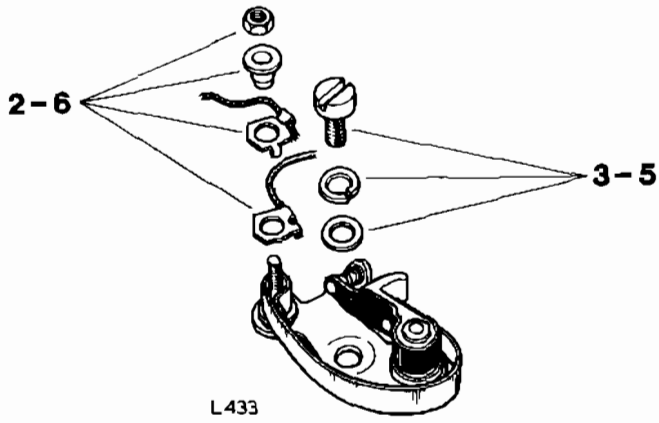
To assist engine starting under adverse conditions the following system is fitted. A ballast resistor is positioned in series in the normal supply to the six volt ignition coil. During engine start the resistor is by-passed and full battery voltage (during engine start) is applied to the coil direct from the starter solenoid.



1. Starter solenoid
2. Normal ignition supply
3. Ballast resistor
4. Ignition coil—6 volt
5. Ignition distributor

IGNITION DISTRIBUTOR

Contact assembly—remove and refit **86.35.13**



Removing

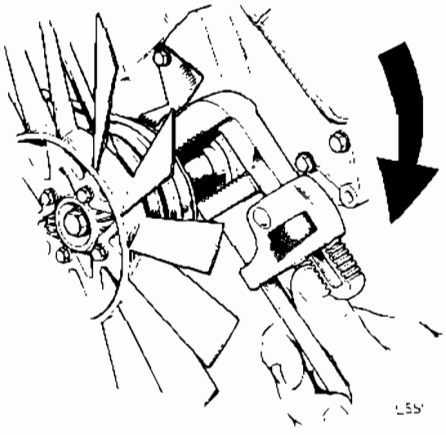
1. Remove cover and rotor.
2. Remove nut, insulation piece, low tension wire eyelet and capacitor wire eyelet.
3. Remove lock screw, spring washer and washer, and lift out contact assembly.

Refitting

4. Wipe preservative from new contact faces.
5. Position contact assembly with post extension located in moving plate hole. Fit washer, spring washer and lock screw.
6. Fit capacitor wire eyelet, low tension wire eyelet, insulation piece (manœuvre spring to fit) and nut.
7. Adjust contact gap. 86.35.14.

IGNITION DISTRIBUTOR

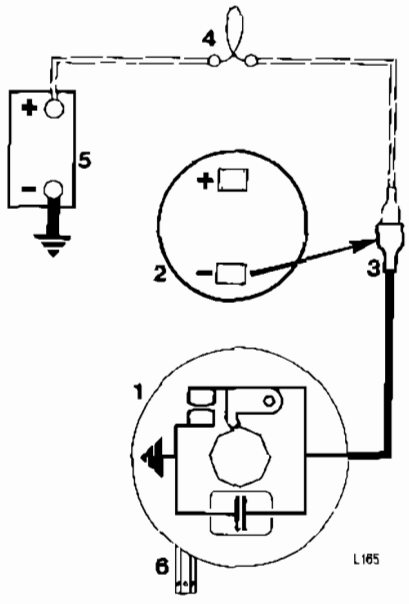
Contact gap—adjust **86.35.14**



Static

If the engine cannot be run or no dwell angle meter is available, adjust statically as follows:

1. Remove cover and rotor.
2. Apply a suitable wrench to the crankshaft pulley as shown to enable the crankshaft to be rotated.
3. Rotate crankshaft to position contact heel on a cam peak.
4. Disconnect distributor fly lead from coil.
5. Provide test lamp circuit as shown.
6. Press adjustment nut inwards and turn anti-clockwise until lamp illuminates. Continue turning anti-clockwise for approximately half a turn more.
7. Carefully turn clockwise until lamp just goes out. This is the datum point. Continue turning clockwise through exactly five hexagonal flats of the adjustment nut. The contact gap should now be correct.



1. Distributor—diagrammatic layout
2. Ignition coil
3. Distributor fly lead removed from coil
4. Test lamp—12 volt
5. Vehicle battery
6. Adjustment nut

Dynamic

If the engine can be run and a dwell angle meter is available, adjust dynamically as follows:

8. Connect dwell angle meter as instructed by the manufacturer.
9. Run engine. Rotate adjustment nut to achieve a dwell angle of 26 to 28 degrees.

IGNITION DISTRIBUTOR

Ignition timing—adjust **86.35.16**

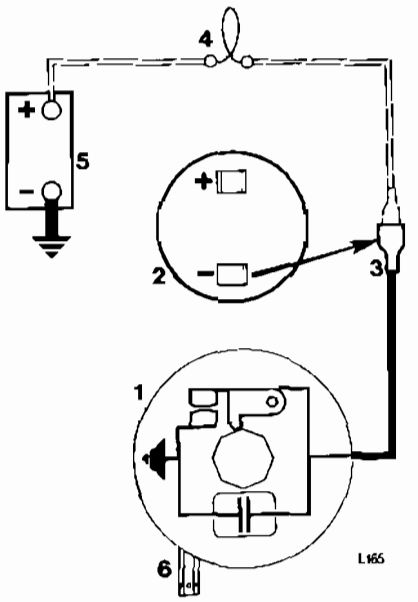
Static

If the engine cannot be run or no strobe timing light is available, adjust statically as follows:

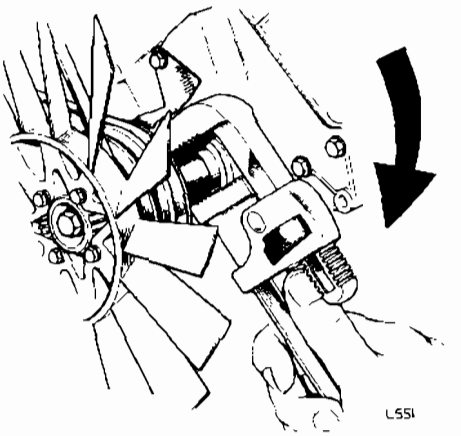
WARNING: To ensure that the engine does not fire during this operation select ignition off.

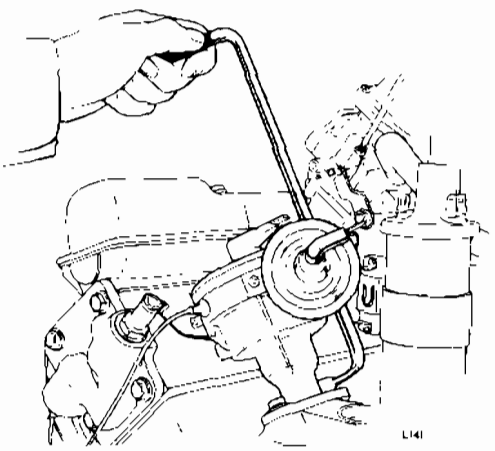
1. Adjust contact gap 86.35.14.
2. Disconnect distributor fly lead from coil.
3. Provide test lamp circuit as shown.
4. Apply a suitable wrench to the crankshaft pulley as shown to enable the crankshaft to be rotated.
5. Rotate crankshaft in direction shown to approximately align mark on pulley with 24 degree BEFORE on scale. Test lamp should now be illuminated.
6. Carefully rotate crankshaft further until lamp just goes out.
7. If timing is correct, mark on pulley will be aligned with 14 degree BEFORE on scale.
8. When timing is correct, operations 9 to 13 may be ignored.
9. If timing is not correct, rotate crankshaft in direction shown to align mark on pulley with 14 degree BEFORE on scale.
10. Use Service tool S349 to slacken two distributor mounting bolts.
11. Rotate distributor body anti-clockwise past test lamp illumination position.
12. Carefully rotate clockwise until lamp just goes out. Tighten two mounting bolts with unit in this position.
13. Repeat operation 5 onwards.

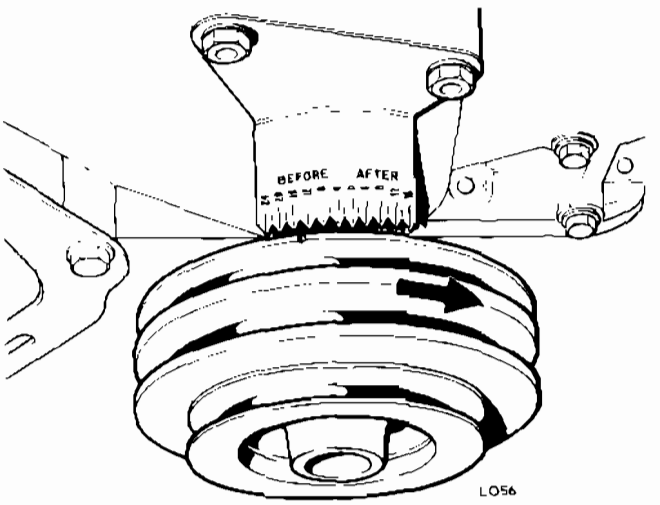
continued



1. Distributor—diagrammatic layout
2. Ignition coil
3. Distributor fly-lead removed from coil
4. Test lamp—12 volt
5. Vehicle battery
6. Adjustment nut







IGNITION DISTRIBUTOR

Ignition timing—adjust **86.35.16**

continued

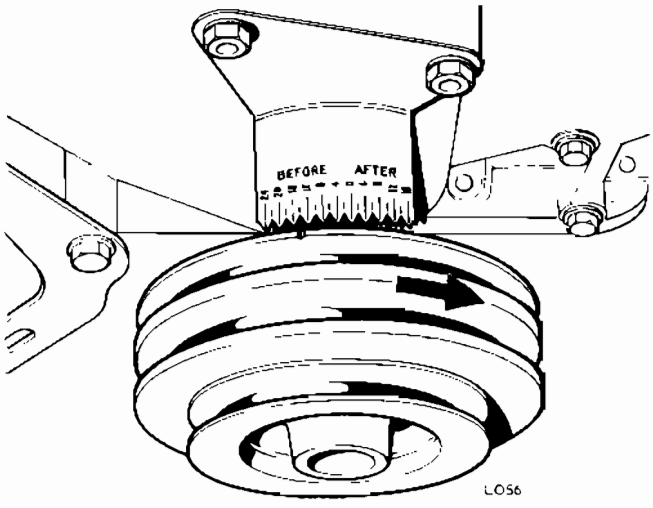
Dynamic

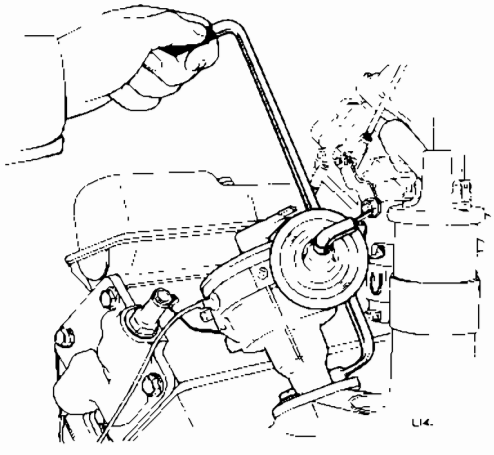
If the engine can be run and a strobe timing light is available, adjust dynamically as follows:

14. Adjust contact gap 86.35.14.
15. Pull off vacuum timing control pipe.
16. Connect timing light as instructed by the manufacturer.

NOTE: This engine is timed on No. 2 cylinder which is located left-hand bank front.

17. Run engine at 3,400 rev/min. Position timing light to illuminate crankshaft pulley and scale.
18. If timing is correct, equipment will show 16 to 20 degrees crankshaft advance above the static figure of 14 degrees B.T.D.C.
19. When timing is correct, operations 20 to 23 may be ignored.
20. If timing is not correct, stop engine.
21. Use Service tool S349 to slacken two distributor mounting bolts.
22. Carefully rotate distributor body as required. Tighten two mounting bolts.
23. Repeat operation 17 onwards.
24. Remember to replace vacuum timing control pipe.





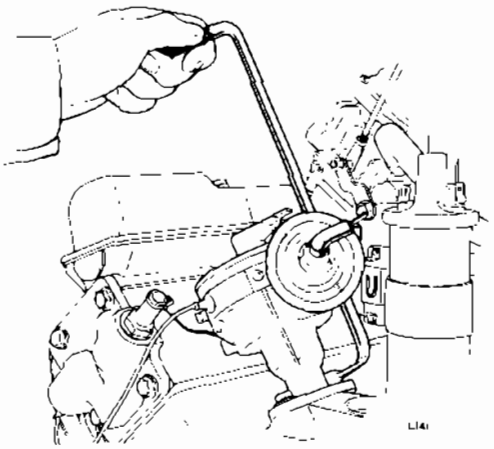
IGNITION DISTRIBUTOR

Lubrication **86.35.18**

1. Remove cover and rotor.
2. Apply a few drops of engine oil to felt pad to lubricate cam spindle bearing.
3. Inject a few drops of engine oil through aperture below cam to lubricate centrifugal timing control.
4. Lightly grease cam with Mobilgrease No. 1 or equivalent.

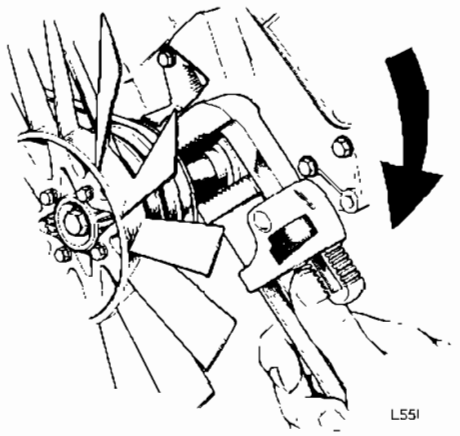
IGNITION DISTRIBUTOR

—Remove and refit **86.35.20**



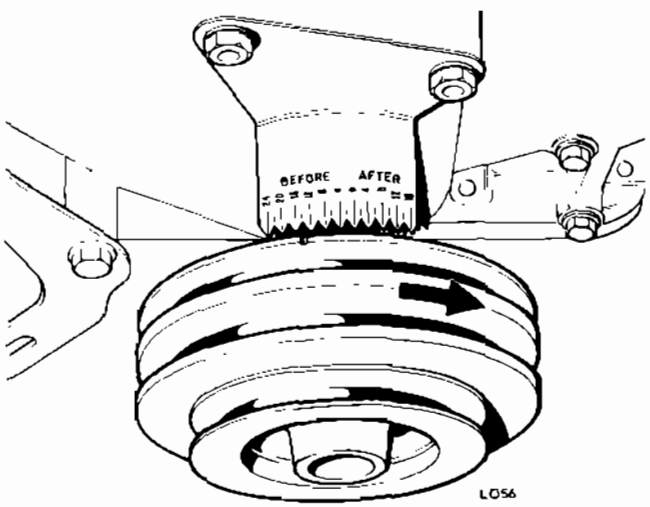
Removing

1. Detach two plastic clips retaining high tension leads to camshaft covers.
2. Pull off high tension connection to ignition coil.
3. Remove distributor cover and swing forward to rest on carburetters.
4. Pull off vacuum timing control pipe.
5. Disconnect distributor fly lead from coil.
6. Using Service tool number S349, withdraw two distributor mounting bolts. Withdraw distributor from block.



Refitting

1. Remove No. 2 cylinder sparking plug which is located left-hand bank front.
2. Insert suitable probe into plug hole to indicate No. 2 piston position.
3. Apply a suitable wrench to the crankshaft pulley as shown to enable the crankshaft to be rotated.
4. Rotate crankshaft in direction shown to align mark on pulley with T.D.C. on scale and bring No. 2 piston to T.D.C.
5. Position mounting bolts and washers to distributor. Insert distributor into block with vacuum unit adjacent to ignition coil. Engage drive gear so that rotor is finally pointing towards outboard ignition coil mounting bolt. Tighten mounting bolts.
6. Connect distributor fly lead to coil.
7. Push on vacuum timing control pipe.
8. Fit distributor cover.
9. Push on high tension connection to ignition coil.
10. Fit two plastic clips retaining high tension leads tc camshaft covers.
11. Remember to replace number 2 cylinder sparking plug.
12. Adjust ignition timing. 86.35.16.

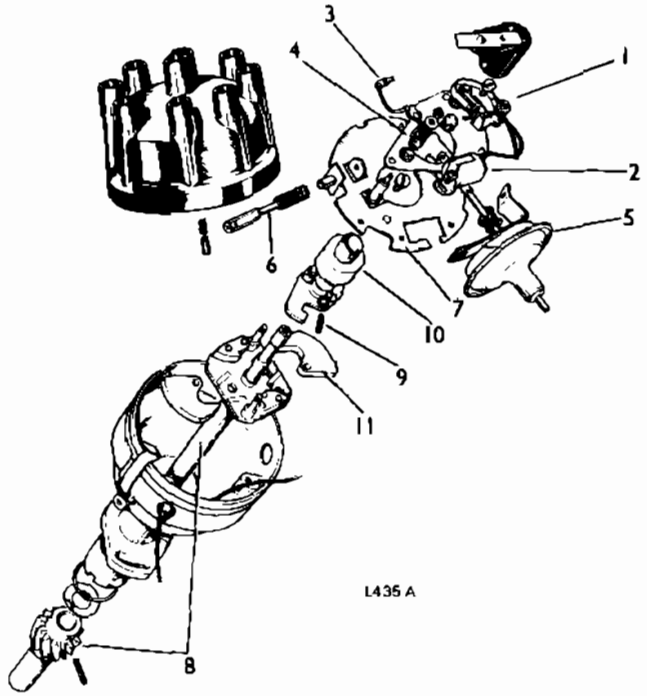


IGNITION DISTRIBUTOR

Overhaul **86.35.26**

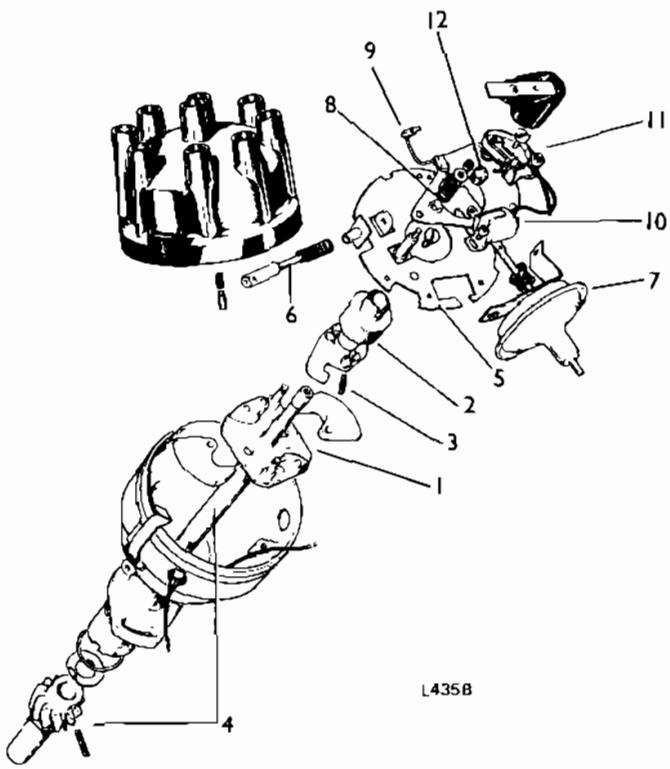
Dismantling

1. Remove contact assembly. 86.35.13.
2. Remove screw and spring washer and lift out capacitor.
3. Remove moving plate earth lead screw and spring washer.
4. Remove locknut, washer and spring. Withdraw moving plate.
5. Remove two side screws, spring washers and washers to release vacuum timing control including rubber grommet.
6. Unscrew adjustment nut. Remove plastic friction strip and spring.
7. Remove two screws and spring washers and withdraw plate.
8. Tap out drive gear pin. Remove drive gear and thrust washer. Ensure shaft is burr-free and withdraw. Remove distance collar.
9. Remove control springs, exercising care not to distort springs.
10. Extract felt pad and remove cam spindle screw. Withdraw cam spindle.
11. Remove weights.



Reassembling

1. Lubricate action plate sliding surfaces and cam surfaces with Rocol 'Moly pad'. Position weights on action plate.
2. Lubricate cam spindle bearing and cam spindle weight pillars with Rocol 'Moly pad'. Fit cam spindle either way round to weights and secure with cam spindle screw.
3. Fit control springs, exercising care not to distort springs.
4. Fit distance collar. Lubricate shaft with Rocol 'Moly pad' and insert into body. Fit thrust washer and drive gear. Secure with drive gear pin.
   If fitting a new undrilled shaft, assemble and drill so end-float is 0·007 to 0·012 in (0·18 to 0·31 mm).
5. Insert plate and secure with two screws and spring washers.
6. Position plastic friction strip and spring. Screw in adjustment nut.
7. Position vacuum timing control including rubber grommet. Secure with two side screws, spring washers and washers.
8. Locate moving plate to pivot post and vacuum timing control. Fit spring, washer and locknut.
9. Attach moving plate earth lead with screw and spring washer.
10. Position capacitor and secure with screw and spring washer.
11. Refit contact assembly. 86.35.13.
12. Insert felt pad.
13. Lubricate distributor. 86.35.18.



IGNITION COIL AND BALLAST RESISTOR

Ignition coil—remove and refit **86.35.32**

Removing

1. Remove low tension and pull off high tension electrical connections.
2. Remove two bolts, spring washers and washers and lift out coil.

Refitting

3. Position coil and secure with two washers, spring washers and bolts. Include in the left-hand bolt assembly the ballast resistor lug and in the right-hand bolt assembly the water pipe bracket.
4. Fit low tension and push on high tension electrical connections.

IGNITION COIL AND BALLAST RESISTOR

Ballast resistor—remove and refit **86.35.33**

Removing

1. Locate ballast resistor on engine adjacent to ignition coil.
2. Remove electrical connections.
3. Remove bolt, spring washer and washer and lift out ballast resistor.

Refitting

4. Position ballast resistor and secure with washer, spring washer and bolt.
5. Fit electrical connections. White/slate wire to lower and white/orange wire to upper.

LAMPS

Headlamp outer—remove and refit **86.40.02**

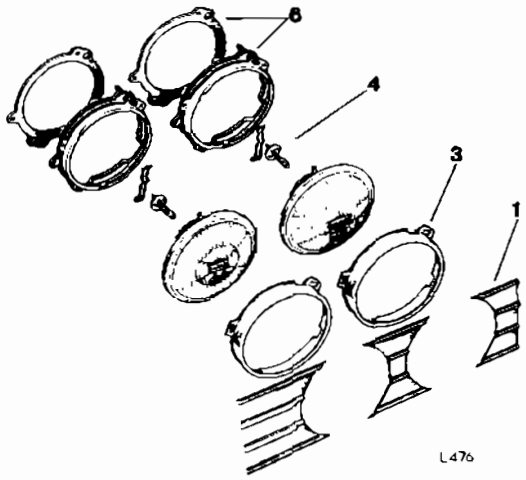
Headlamp inner—remove and refit **86.40.03**

Removing

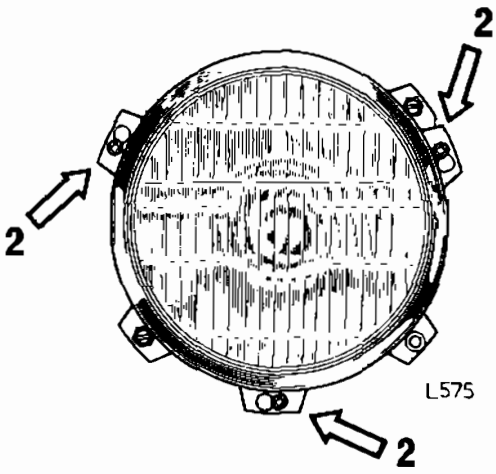
1. Remove two grille sections adjacent to appropriate lamp. Outer and intermediate sections are each retained with two screws. Centre section is retained with four screws.
2. Slacken three screws.
3. Rotate retaining rim anti-clockwise to release retaining rim and light unit.
4. Light unit fitted with bulb only: Pull Lucar connections or connector block from bulb. Disengage clip and withdraw bulb.
5. Sealed beam light unit only: Pull connector block from light unit.
6. Remove three screws and withdraw seating assembly and gasket.

Refitting

7. Reverse 1 to 6.



L476



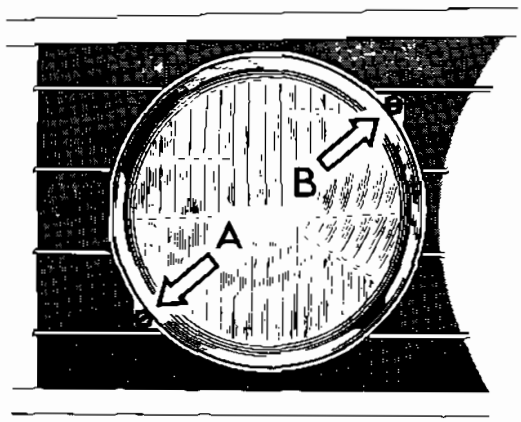
L575

LAMPS

Headlamp beam alignment **86.40.18**

It should be possible to adjust the beams without removing the grille. Screw 'A' positions the beam in the horizontal plane. Screw 'B' controls beam height.

Beam aiming can best be accomplished using equipment such as Lucas 'Beam-setter' or 'Lev-L-Lite'. This service is available at Triumph distributors or dealers and will ensure maximum road illumination with minimum discomfort to other road users.



L574

LAMPS

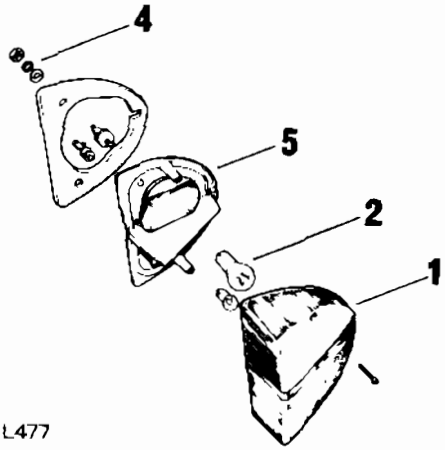
Front parking and flasher lamp—remove and refit 86.40.26

Removing

1. Remove two screws and withdraw lens.
2. Remove two bulbs from bayonet fittings.
3. Remove outer headlamp. 86.40.02.
4. Remove three nuts, spring washers and washers.
5. Withdraw lamp from panel and disconnect Lucar connections.

Refitting

6. Reverse 1 to 5.



L477

LAMPS

Flasher repeater lamp—remove and refit (Not U.S.A.)
86.40.53

Removing

1. Remove two screws to release lens.
2. Pull out bulb.
3. Open bonnet. Obtain access to lamp fixing clamps through engine valance aperture.
4. Holding lamp to panel, remove nuts, washers and fixing clamps.
5. Withdraw lamp from panel and disconnect wires.

Refitting

6. Reverse 1 to 5.

LAMPS

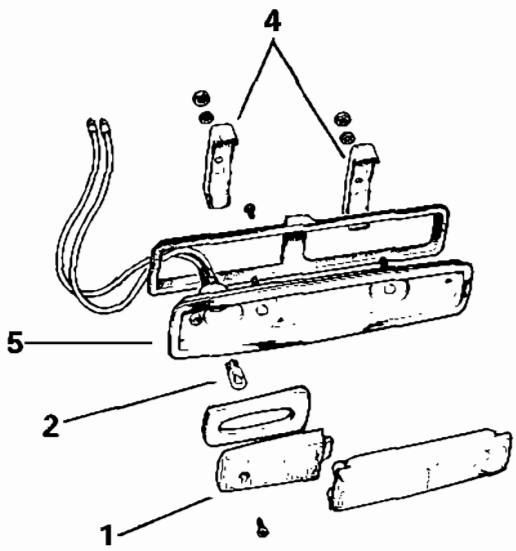
Front marker lamp—remove and refit (U.S.A. only)
86.40.59

Removing

1. Remove single screw. Withdraw forward edge of lens and release rear lug.
2. Pull out bulb.
3. Open bonnet. Obtain access to lamp fixing clamps through engine valance aperture.
4. Holding lamp to panel, remove nuts, washers and fixing clamps.
5. Withdraw lamp from panel and disconnect wires.

Refitting

6. Reverse 1 to 5.



L479

LAMPS

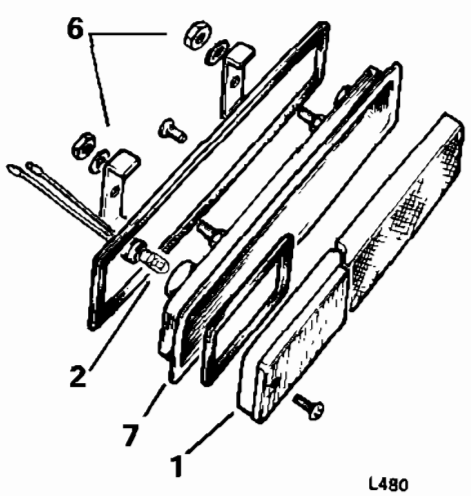
Rear marker lamp—remove and refit (U.S.A. only)
86.40.64

Removing

1. Remove single screw. Withdraw rear edge of lens and release forward lug.
2. Pull out bulb.
3. Open luggage boot lid. Remove floor carpet.
4. Right-hand lamp only: Remove L.H. floor panel and slide out R.H. floor panel.
5. Remove three screws and withdraw side trim panel.
6. Holding lamp to panel, remove nuts, washers and fixing clamps.
7. Withdraw lamp from panel and disconnect wires.

Refitting

8. Reverse 1 to 7.



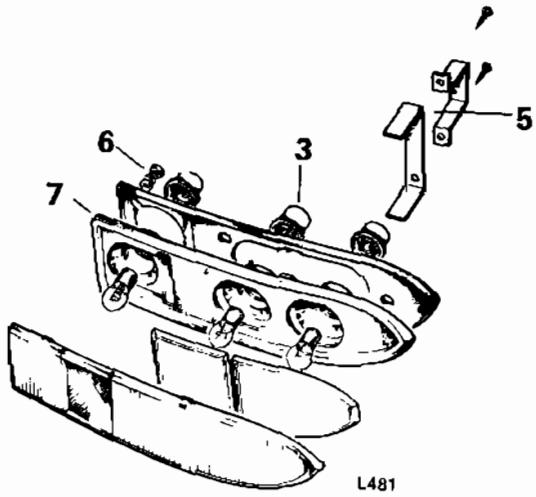
L480

86.40.53

86.40.64

LAMPS

Rear flasher, tail/stop and reverse lamp—remove and refit **86.40.70**



Removing

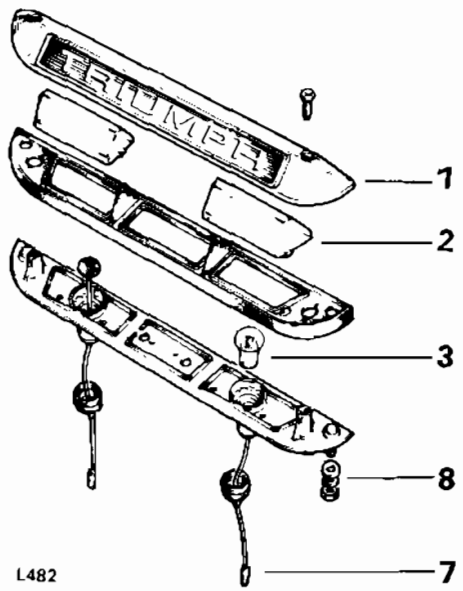
1. Open luggage boot lid. Remove floor carpet.
2. Remove two screws and withdraw appropriate cover.
3. Pull three bulb holders from lamp base. Remove bulbs from bayonet fittings.
4. Remove sufficient screws to enable appropriate half of rear trim panel to be slipped from side trim panel edge and swung forward to allow access to lamp.
5. Remove two screws to release cover bracket and fixing clamp.
6. Remove five nuts, spring washers and washers.
7. Withdraw lamp from panel and disconnect single Lucar earth connection.

Refitting

8. Reverse 1 to 7.

LAMPS

Plate illumination lamp—remove and refit **86.40.86**



Removing

1. Remove two screws and lift off chrome cover.
2. Disengage small lugs of lenses from rubber base.
3. Remove two bulbs from bayonet fittings.
4. Open luggage boot lid. Remove floor carpet.
5. Remove two screws and withdraw left-hand lamp cover.
6. Remove sufficient screws to enable left-hand half of rear trim panel to be slipped from side trim panel edge and swung forward to allow access to harness connection.
7. Disconnect two wires from harness and pull through panel grommet.
8. Remove two nuts, spring washers and washers. Remove lamp from bumper.

Refitting

9. Reverse 1 to 8.

RELAYS

Description **86.55.00**

NOTE: All relays attached to the component mounting plate are described under 'Component mounting plate 86.00.04.'

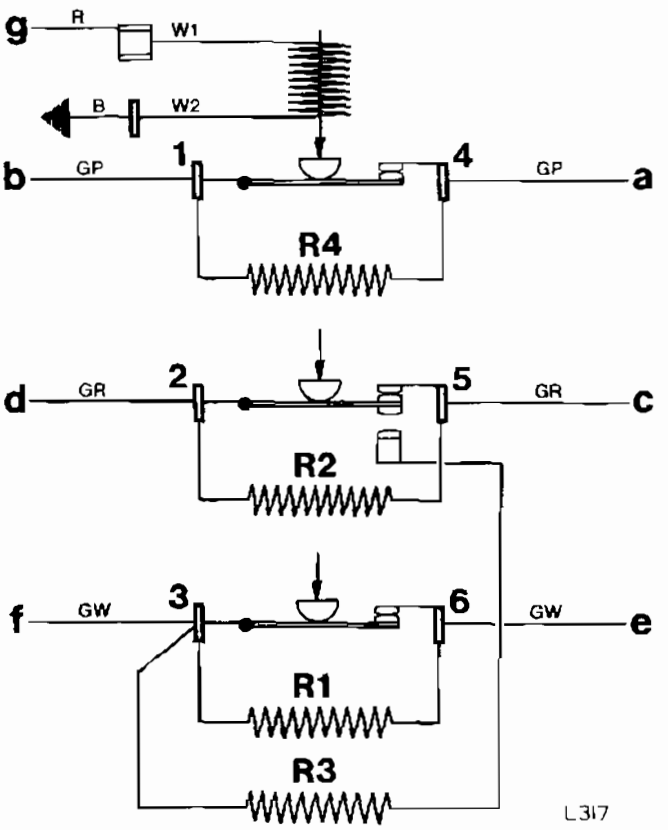
Night dimming relay

This relay dims stop lamps and rear flasher lamps when the parking lamps are illuminated. At night minimum discomfort to other road users is ensured. During daylight the safety of full intensity is provided.

The relay winding is controlled by the parking lamp circuit. Three sets of normally closed contacts with associated resistors permanently connected in parallel are featured. The pair of stop lamps, the left-hand rear flasher lamp and the right-hand rear flasher lamp are each associated with one contact/resistor set.

When the relay is not energized the contacts are closed and the lamps operate at full intensity. When the relay is energized the contacts are open. The resistors are positioned in series with the lamps which then operate at reduced voltage.

To maintain the correct frequency of operation of the turn signal flasher unit the current must be kept constant. To provide current compensation for either flasher circuit a fourth resistor is used. This resistor is brought into circuit by the double contact set between terminals 2 and 5. The switching is such that when either flasher circuit is selected, a parallel path exists through R3, the resistor of the unselected flasher circuit and across the filament of the unselected rear flasher lamp to earth. While providing compensation, this current is not large enough to illuminate the unselected lamp.



a. From stop lamp switch
b. To pair of stop lamps
c. From turn signal switch
d. To L.H. rear flasher lamp
e. From turn signal switch
f. To R.H. rear flasher lamp
g. From master light switch

RELAYS

Night dimming relay—remove and refit 86.55.03

Removing

1. Isolate battery.
2. Open luggage boot lid. Remove floor carpet.
3. Remove left-hand floor panel.
4. Remove three screws and withdraw left-hand-side trim panel.
5. Remove two screws and withdraw relay.
6. Disconnect two Lucar connectors.
7. Disconnect two multi-socket connectors.

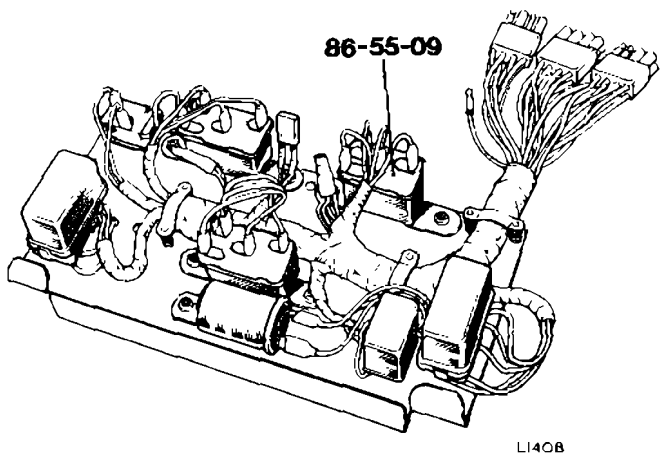
Refitting

8. Reverse 1 to 7. Connect electrical connectors as follows:

   Multi-socket 1–2–3 as indicated.
   Multi-socket 4–5–6 as indicated.
   Red wire to terminal W1.
   Black wire to terminal W2.

RELAYS

Horn relay—remove and refit 86.55.09



Removing

1. Remove parcel tray. 76.67.01.
2. Disconnect Lucar connectors.
3. Remove two screws and remove relay from plate.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   Either purple wire to terminal W2.
   Purple/black wire to terminal W1.
   Either purple wire to terminal C2.
   Purple/yellow wire to terminal C1.

RELAYS

Air conditioning master switch controlled relay—remove and refit **86.55.10**

For Stag model applicability refer to 86.00.05

Removing

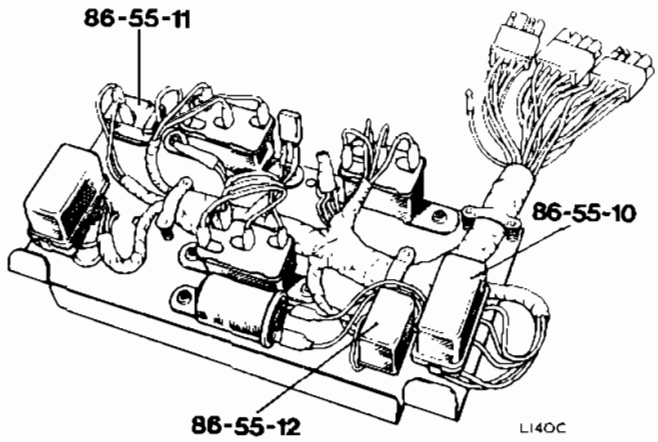
1. Remove parcel tray. 76.67.01.
2. Pull relay from socket.

Refitting

3. Reverse 1 to 2.

FLASHER UNITS

Turn signal flasher unit—remove and refit **86.55.11**



Removing

1. Remove parcel tray. 76.67.01.
2. Pull turn signal flasher unit from clip.
3. Disconnect Lucar connectors.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   Light green/slate wire to terminal B.
   Light green/brown wire to terminal L.

FLASHER UNITS

Hazard flasher unit—remove and refit **86.55.12**

For Stag model applicability refer to 86.00.05

Removing

1. Remove parcel tray. 76.67.01.
2. Pull hazard flasher unit from socket.

Refitting

3. Reverse 1 to 2.

BUZZERS

Key warning buzzer—remove and refit **86.55.13**

For Stag model applicability refer to 86.00.05.

Removing

1. Remove parcel tray. 76.67.01.
2. Remove single screw and remove buzzer from plate.
3. Disconnect Lucar connectors.

Refitting

4. Reverse 1 to 3.

RELAYS

Blower switch controlled relay—remove and refit **86.55.25**

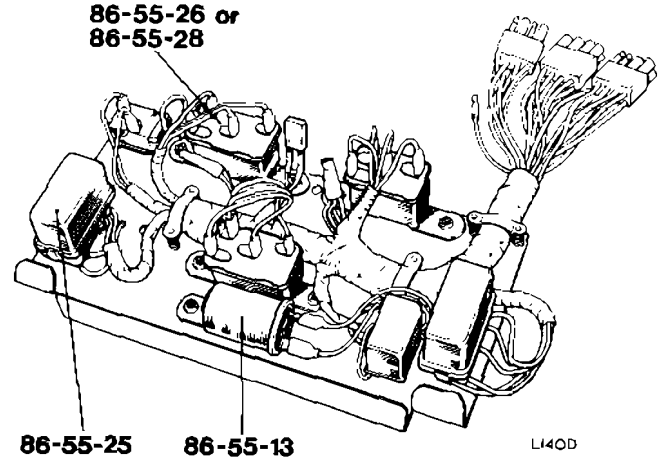
For Stag model applicability refer to 86.00.05.

Removing

1. Remove parcel tray. 76.67.01.
2. Pull relay from socket.

Refitting

3. Reverse 1 to 2.



RELAYS

Ignition controlled relay (Ref. No. 2A) —remove and refit **86.55.26**

For Stag model applicability refer to 86.00.05.

Removing

1. Remove parcel tray. 76.67.01.
2. Disconnect Lucar connectors.
3. Remove two screws and remove relay from plate.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   White wire to terminal W2.
   Black wire to terminal W1.
   Brown wire to terminal C1.
   Purple/brown wire to terminal C2.

RELAYS

Ignition controlled relay (Ref. No. 8)
—remove and refit **86.55.27**

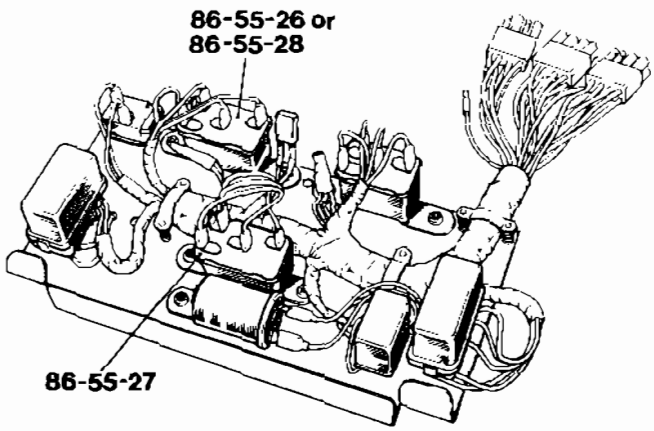
Removing

1. Remove parcel tray. 76.67.01.
2. Disconnect Lucar connectors.
3. Remove two screws and remove relay from plate.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   White wire to terminal W2.
   Black wire to terminal W1.
   Brown wire to terminal C2.
   Slate wire to terminal C1.



LI4OE

RELAYS

Ignition and starter controlled relay
—remove and refit **86.55.28**

For Stag model applicability refer to 86.00.05

Removing

1. Remove parcel tray. 76.67.01.
2. Disconnect Lucar connectors.
3. Remove two screws and remove relay from plate.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   White wire to terminal W2.
   White/red wire to terminal W1.
   Brown wire to terminal C1.
   Purple/brown wire to terminal C2.

STARTER MOTOR

Data and description

86.60.00

Manufacturer	Lucas
Type	M418G pre-engaged
Lucas part No.	25627
Stanpart No.	215111

Motor

Yoke diameter	4·187 to 4·218 in (106·35 to 107.14 mm)
Light running current at 5,500 to 8,000 rev/min	80 amp
Torque at 1,000 rev/min with 280 amp at 9·0 volts	7 lbf ft (10·4 kgf m)
Lock torque with 465 amp at 7·0 volts	15 lbf ft (22·3 kgf m)
Skim commutator—minimum skimming diameter	1·218 in (30·96 mm)
Brush length: renew if less than	0·312 in (7·94 mm)
Brush spring tension	36 oz (1000 g)

Solenoid

Pull-in winding resistance—measured between unmarked 'WR wire' connector and 'STA' terminal with motor lead disconnected	0·13 to 0·15 ohm
Hold-in winding resistance—measured between unmarked 'WR wire' connector and unit body	0·63 to 0·73 ohm

The starter solenoid is integral with the starter motor.

The solenoid contains a heavy pull-in winding and a light hold-in winding. Applying battery voltage to the unmarked 'WR wire' connector initially energizes both windings. The combined action of both windings pulls in the plunger to cause engagement of the pinion and contact of the main terminals. The pull-in winding is now shorted-out leaving the hold-in winding to maintain the plunger position.

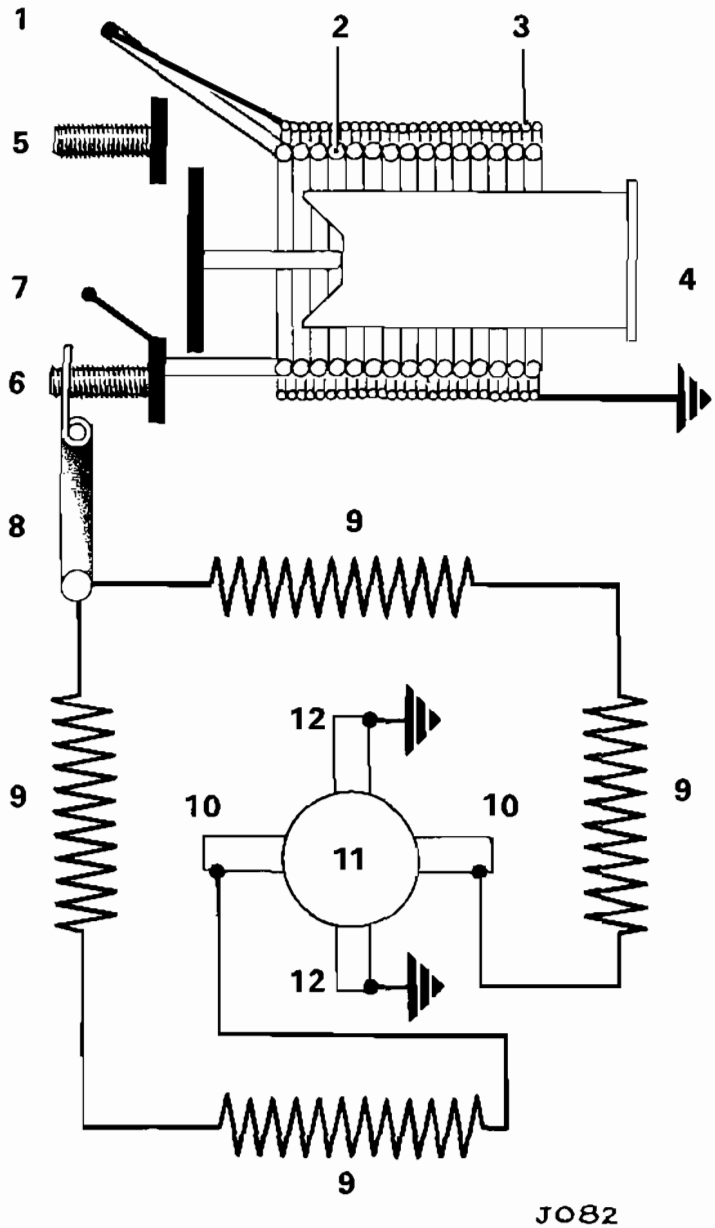
The starter drive consists of two sections. The drive operating plate and distance piece mounted on the internally splined drive sleeve rotate with the armature. The pinion and pinion bearing may—subject to roller clutch action—rotate about the shaft.

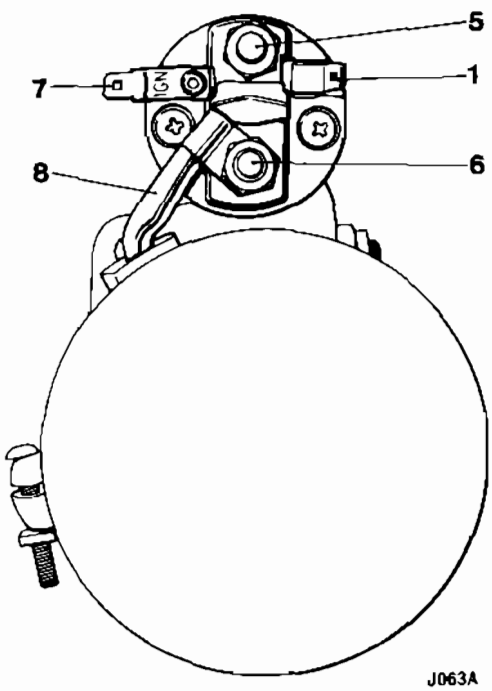
At contact of the main terminals the motor is energized; the roller clutch locks up and the engine is cranked. When the engine has fired, the pinion is driven at high speed. The roller clutch is over-ridden and damaging high speed rotation of the armature does not occur. Driver release of the ignition/starter switch allows the plunger to move out under spring action. Contact of the main terminals is broken and disengagement of the pinion occurs.

Springs built into the solenoid are designed to achieve the following sequences:

Pinion engagement before energization of the motor. Should tooth-to-tooth abutment occur, plunger movement will continue by compression of the outer and inner engaging springs. Contact of the main terminals will rotate the armature and clear the abutment.

Termination of the motor current before disengagement of the pinion.





1. Unmarked 'WR wire' connector
2. Pull-in winding
3. Hold-in winding
4. Plunger
5. Solenoid battery terminal
6. 'STA' terminal
7. 'IGN' connector
8. Motor lead
9. Field windings
10. Field winding brushes
11. Commutator
12. Earth brushes

STARTER MOTOR

—Remove and refit **86.60.01**

Removing

1. Isolate battery.
2. Remove exhaust system left-hand front pipe. 30.10.09.
3. Disconnect battery lead from starter solenoid.
4. Disconnect two Lucar connectors.
5. Remove top mounting bolt, nut and washer. This operation may be achieved working from above engine using socket on forward bolt head with extension build up running forward so rachet spanner may be used adjacent to cooling fan. Rear nut may be held with open-jawed spanner.
6. Working from below engine remove lower mounting bolt. Manœuvre starter motor downwards from vehicle.

Refitting

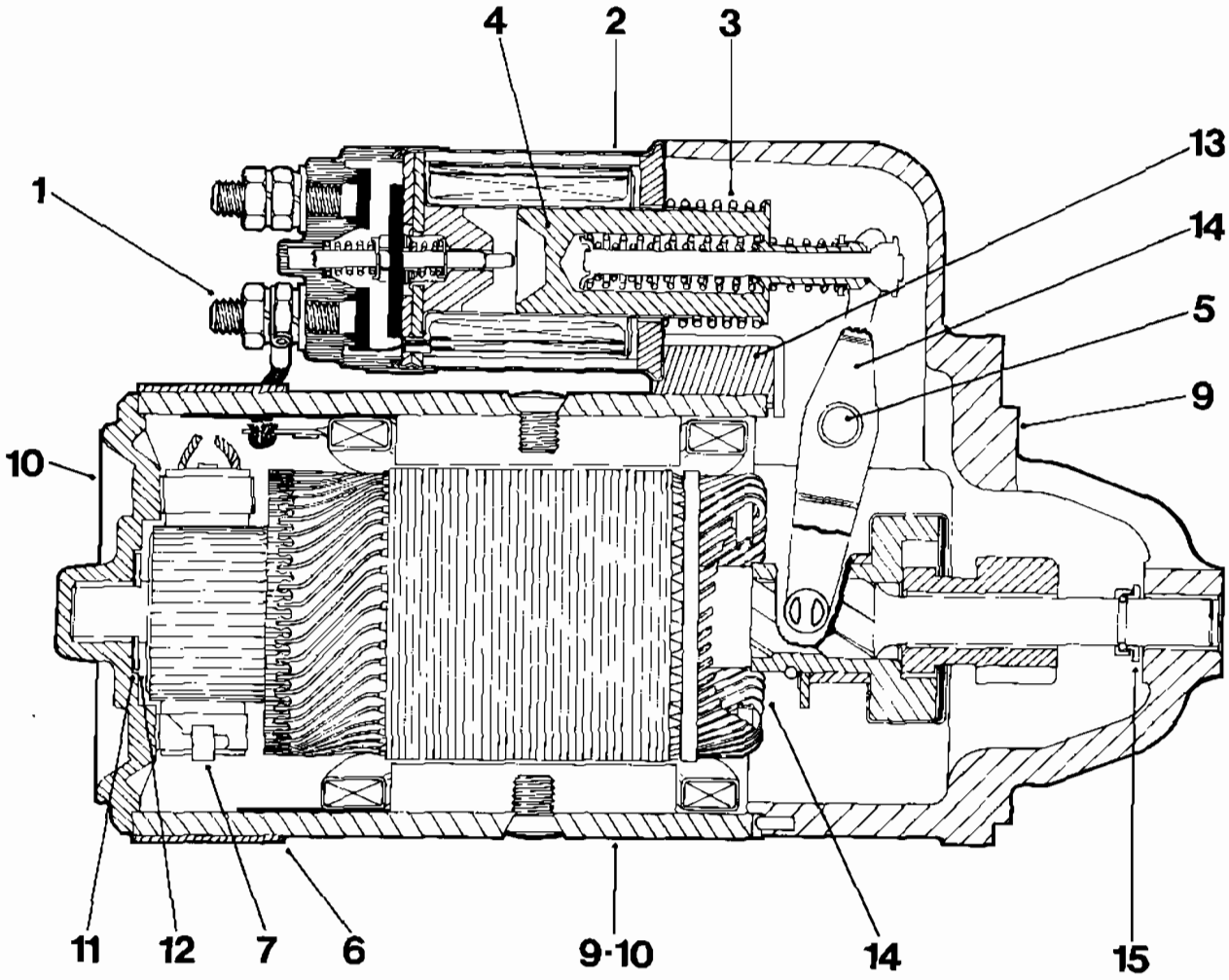
7. Reverse 1 to 6.

STARTER MOTOR

—Overhaul **86.60.13**

Dismantling

1. Disconnect motor lead from 'STA' terminal.
2. Remove two nuts and withdraw solenoid, leaving plunger attached to engaging lever.
3. Remove return spring.
4. Remove plunger from engaging lever.
5. Slacken locknut. Unscrew and withdraw eccentric pin.
6. Remove cover band.
7. Withdraw brushes from holders.
8. Remove through-bolts.
9. Carefully tap fixing bracket mounting lugs to separate yoke from fixing bracket.
10. Separate commutator end bracket from yoke.
11. Remove fabric thrust washer.
12. Remove steel thrust washer.
13. Remove rubber moulding.
14. Withdraw armature and starter drive assembly. Remove engaging lever.
15. Remove thrust washer.



L439A

Armature

Inspect for lifted armature conductors from commutator risers. This defect may result if the armature is over-revved by defective roller clutch action.

Ensure the shaft is not bent. Score marks on the laminations may indicate a bent shaft, worn bearing bushes or a loose pole-shoe on the yoke.

Do not attempt to rectify a defective armature. Repair is by replacement.

Bearing bushes—renew

1. Fixing bracket bearing bush only:
   Remove bearing bush. This operation can be performed by pressing out using suitable bar.
2. Commutator end bracket bearing bush only:
   Remove bearing bush. This operation can be performed using suitable extractor or by screwing a $\frac{9}{16}$ in tap squarely into bush and withdrawing.
3. Prepare porous bronze bearing bushes by immersing in thin engine oil for 24 hours.
   If required, this period may be reduced by immersing in thin engine oil heated to 100°C for two hours. Allow oil to cool before removing bushes.
4. Fixing bracket bearing bush only:
   Using highly polished shouldered mandrel of 0·4729+0·0005 in diameter and suitable press, fit bush.
   Do not ream bush after fitting or porosity may be impaired.
5. Commutator end bracket bearing bush only:
   Using highly polished shouldered mandrel of 0·5000+0·0005 in diameter and suitable press, fit bush.
   Do not ream bush after fitting or porosity may be impaired.

Brushes

Clean brushes and holders with petrol-moistened cloth. Ensure that the brushes move freely in the holders. If necessary, lightly polish holder sides with a fine file.

Using a suitable spring scale, check brush spring tension. If less than tension given in Data, renew brush springs.

Check brush length. If less than length given in Data, renew as follows:

1. Field winding brushes only: Unsolder flexibles from field windings. Position ends of new flexibles. Squeeze up and solder.
2. Earth brushes only: Unsolder flexibles from clips on commutator end bracket. Open clips and position ends of new flexibles. Squeeze up and solder.

Commutator

Clean commutator with petrol-moistened cloth. If the unit is in good condition it will be smooth and free from pits or burned spots. If necessary, polish with fine glass-paper. If excessively worn, the commutator may be skimmed as follows:

1. Remove starter drive as detailed below.
2. Mount armature in lathe.
3. Rotate at high speed. Using a very sharp tool, take a light cut. Do not remove more metal than necessary. Do not cut below minimum skimming diameter given in Data.
4. Polish with fine glasspaper.

CAUTION: The insulators between the segments must not be undercut.

Starter drive

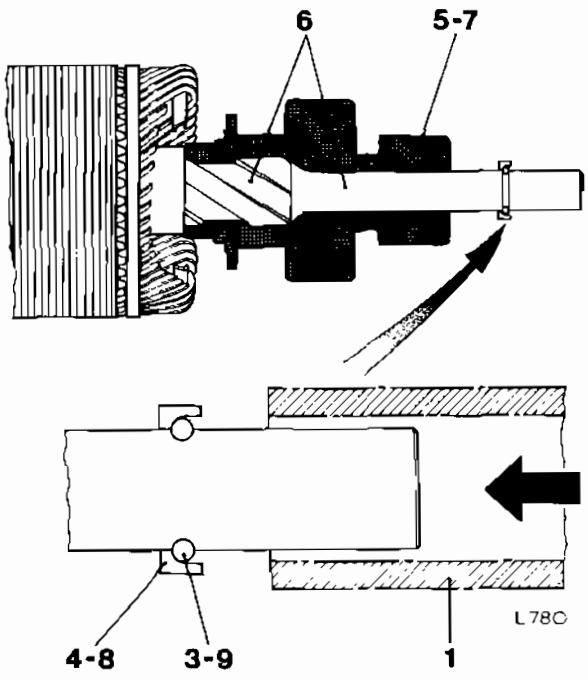
CAUTION: Do not wash starter drive in petrol or paraffin. Such action would remove lubricant from sealed roller clutch.

The starter drive may be cleaned by wiping carefully with a petrol-moistened cloth.

The roller clutch is sealed by a rolled-over steel outer cover. If the roller clutch action is suspect, do not attempt to service the starter drive. Repair by unit replacement.

To remove and refit the starter drive from and to the armature shaft, proceed as follows:

1. Provide tube with internal diameter of 0·625 in. (15 mm).
1. Provide tube with internal diameter of 15·875 mm (0·625 in).
2. Place tube over shaft end and force thrust collar from jump ring towards starter drive.
3. Prise jump ring from shaft groove.
4. Remove thrust collar.
5. Remove starter drive.
6. Lubricate drive sleeve splines and pinion bearing with Shell Retinax A grease or equivalent.
7. Fit starter drive.
8. Fit thrust collar to shaft with open side facing shaft end as shown.
9. Prise jump ring into shaft groove.
10. Force thrust collar over jump ring.



Starter solenoid

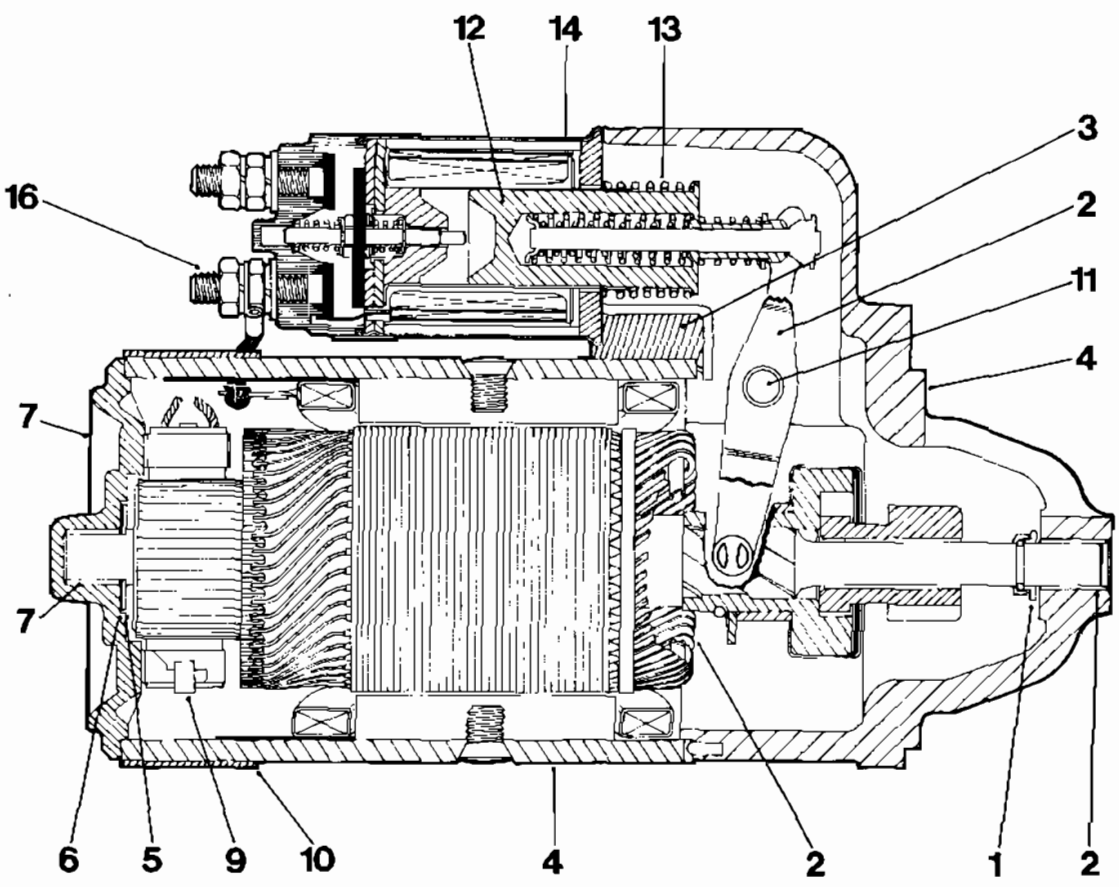
Assembly of the starter solenoid involves soldering and sealing complications. It is therefore not advisable to attempt to service this unit. If the solenoid operation is suspect, repair by unit replacement.

Reassembling

1. Fit thrust washer to shaft with lip facing starter drive as shown.
2. Position engaging lever to drive operating plate.

NOTE: Engaging lever may be fitted either way round. Lightly lubricate fixing bracket bearing bush with engine oil. Insert armature and starter drive assembly with engaging lever into fixing bracket.

3. Position rubber moulding.
4. Position yoke to fixing bracket.
5. Fit steel thrust washer.
6. Fit fabric thrust washer.
7. Lightly lubricate commutator end bracket bearing bush with engine oil. Ensure no brushes are inserted in holders. Position commutator end bracket.
8. Fit through-bolts. Tighten bolts equally.
9. Insert brushes into holders.
10. Fit cover band.
11. Lightly grease eccentric pin bearing surface. Insert eccentric pin. Ensure to align through engaging lever. Screw in to maintain position only.
12. Position plunger to engaging lever.
13. Position return spring to solenoid inner tube.
14. Insert solenoid so 'STA' terminal is positioned adjacent to yoke. Fit two nuts.
15. Adjust pinion movement as detailed below.
16. Connect motor lead to 'STA' terminal

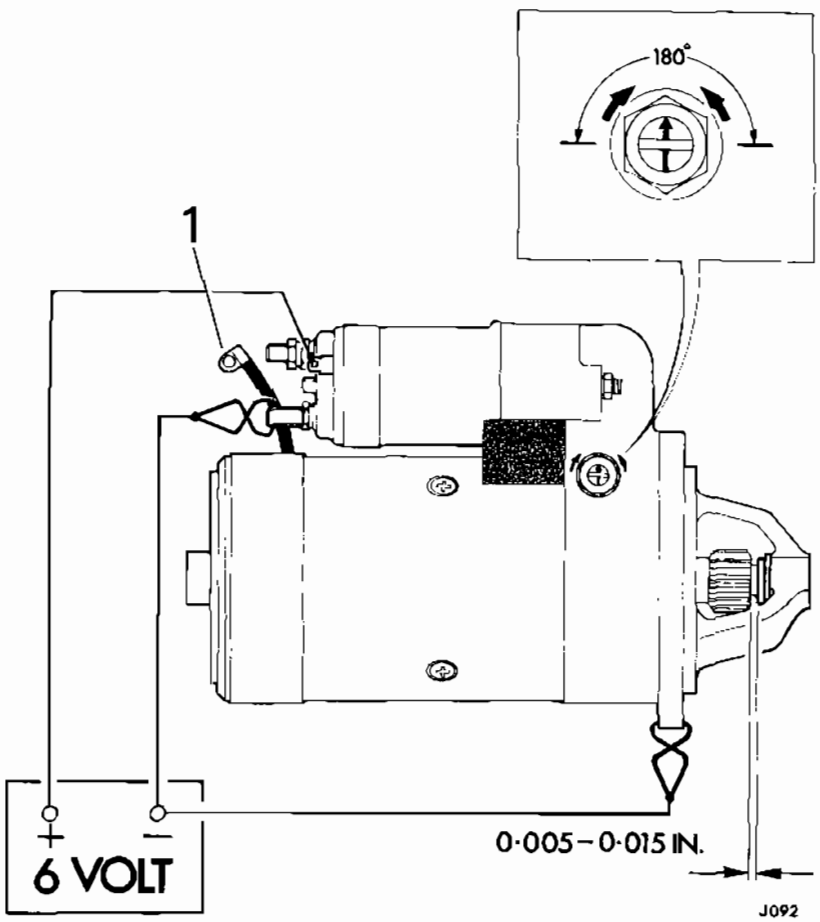


L439B

Adjust pinion movement

After assembly of the starter motor the pinion movement must be adjusted as follows:

1. Disconnect motor lead from 'STA' terminal.
2. Provide six-volt test circuit as shown.
3. Slacken locknut. Screw eccentric pin fully in.
4. Note arc of adjustment is 180 degrees. After adjustment, arrow on eccentric pin must be pointing towards arc indicated by two arrows on fixing bracket.
5. Energize both pull-in winding and hold-in winding to move starter drive to the engage position.
6. Position a feeler gauge between pinion and thrust collar as shown. Press pinion lightly towards motor to take up any 'lost motion' in linkage. Rotate eccentric pin to adjust gap to 0·005 to 0·015 in (0·13 to 0·38 mm). Tighten locknut.
7. Check correct gap has been maintained.



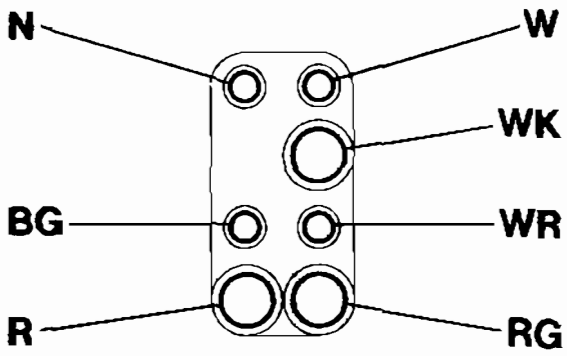
SWITCHES

Data **86.65.00**

Ignition/starter switch

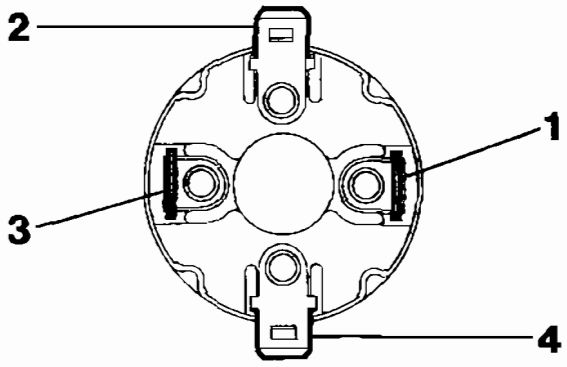
View on switch harness plug:

Position O	Off	No connections
Position 1	Auxiliary	N to WK
Position 2	Ignition	N to WK to W and also R to R6
Position 3	Start	N to W to WR



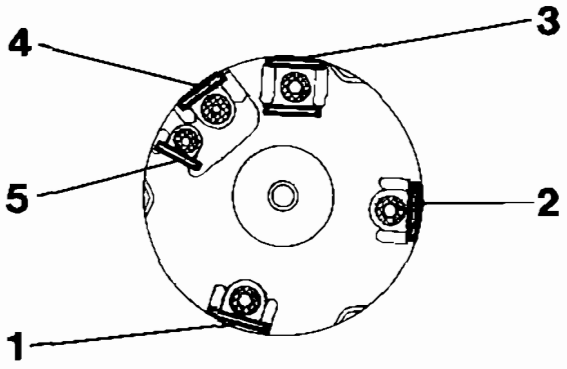
Inhibitor switch—Borg-Warner automatic only

Position P	Park	1 to 3
Position R	Reverse	2 to 4
Position N	Neutral	1 to 3
Position O	Automatic forward drive	No connections
Position 2	1st and 2nd gear hold	No connections
Position 1	1st gear hold	No connections



Master light switch

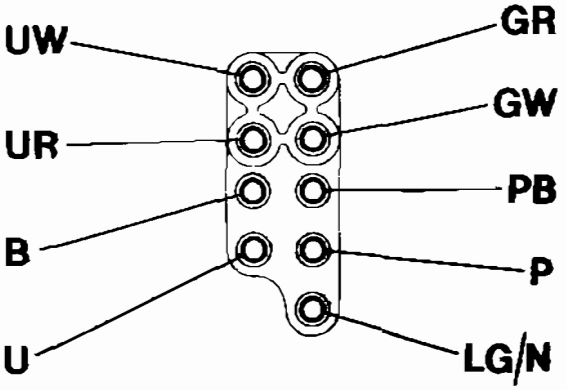
Position P	Park	1 to 2
Position O	Off	No connections
Position S	Side	1 to 2 to 3
Position H	Head	1 to 2 to 3 to 4
Position F	Fog	1 to 2 to 3 to 5



Steering-column combination switch

View on switch harness plug:

Position	Head main	U to UW
Position	Head dip	U to UR
Position	Head flash	P to UW
Position	L.H. turn signal	LG/N to GR
Position	R.H. turn signal	LG/N to GW
Position	Horn	PB to B

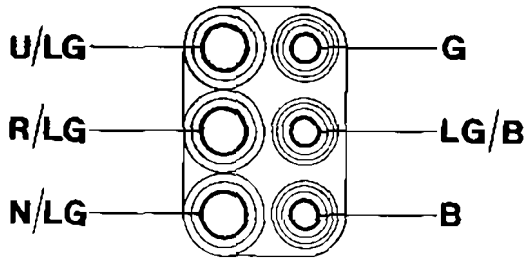


K339

Steering-column wiper/washer switch

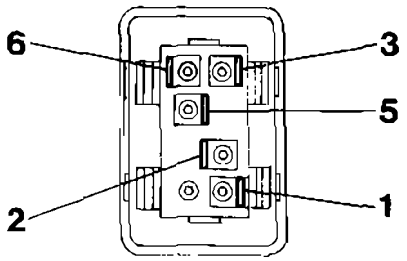
View on switch harness plug:

Position O	Off	N/LG to R/LG
Position 1	Normal speed	G to R/LG
Position 2	High Speed	G to U/LG
Pull	Sweep wipe	G to R/LG
Push knob	Washers	LG/B to B



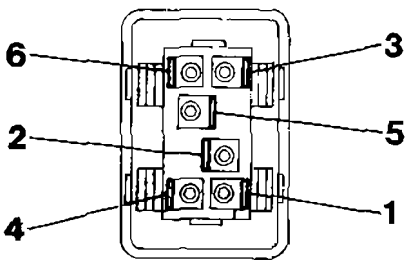
Hazard switch

Position	Off	1 to 2
Position	Hazard	3 to 5 to 6



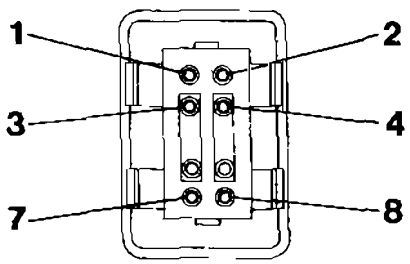
Interior lamp switch

Position	Off	1 to 2 and also 4 to 5
Position	Interior lamp	2 to 3 and also 5 to 6



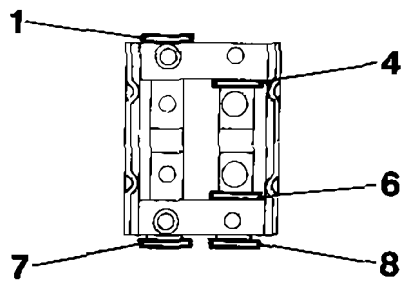
Window lift switch

Position	Up	1 to 3 and also 2 to 4
Position	Off	1 to 3 and also 4 to 8
Position	Down	3 to 7 and also 4 to 8



Heater switch

Position	Off	1 to 6 to 7
Position	Low speed	1 to 4 to 6 to 7
Position	High speed	1 to 4 to 7 to 8



K340

FUSE SYSTEM

Description **86.70.00**

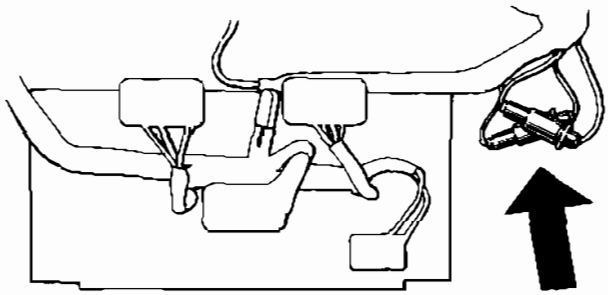
The fusebox is located on the bulkhead. The unit contains 12 fuse positions and has provision to house three spares.

To obtain access to the fuses, lift the bonnet and pull off the fusebox cover. Note that the cover is keyed and may only be replaced the correct way round. Each fuse position relates to circuits that should be protected by a fuse of specific value. It is therefore important to ensure that a replacement fuse is of the correct amperage as detailed in the 'Fuse Chart'.

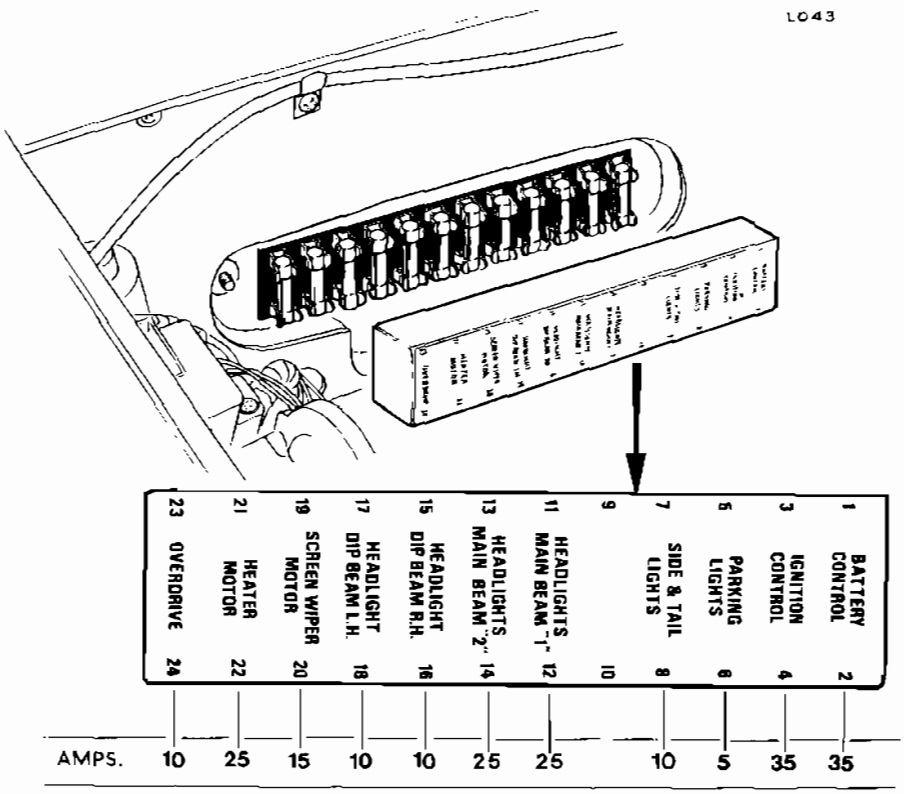
Two line fuses are also employed. They are components of the main harness and are positioned adjacent to the component mounting plate which is located on the rear side of the bulkhead on the passenger's side of the vehicle. Each unit contains one operational fuse.

To obtain access to the line fuses, remove four screws and withdraw the passenger side parcel tray. The two parts of each fuse holder are retained together by a bayonet fitting.

Failure of a particular fuse is indicated when all the circuits protected by it become inoperative. If a new fuse fails, establish the cause and rectify the fault before fitting a second replacement.



L181

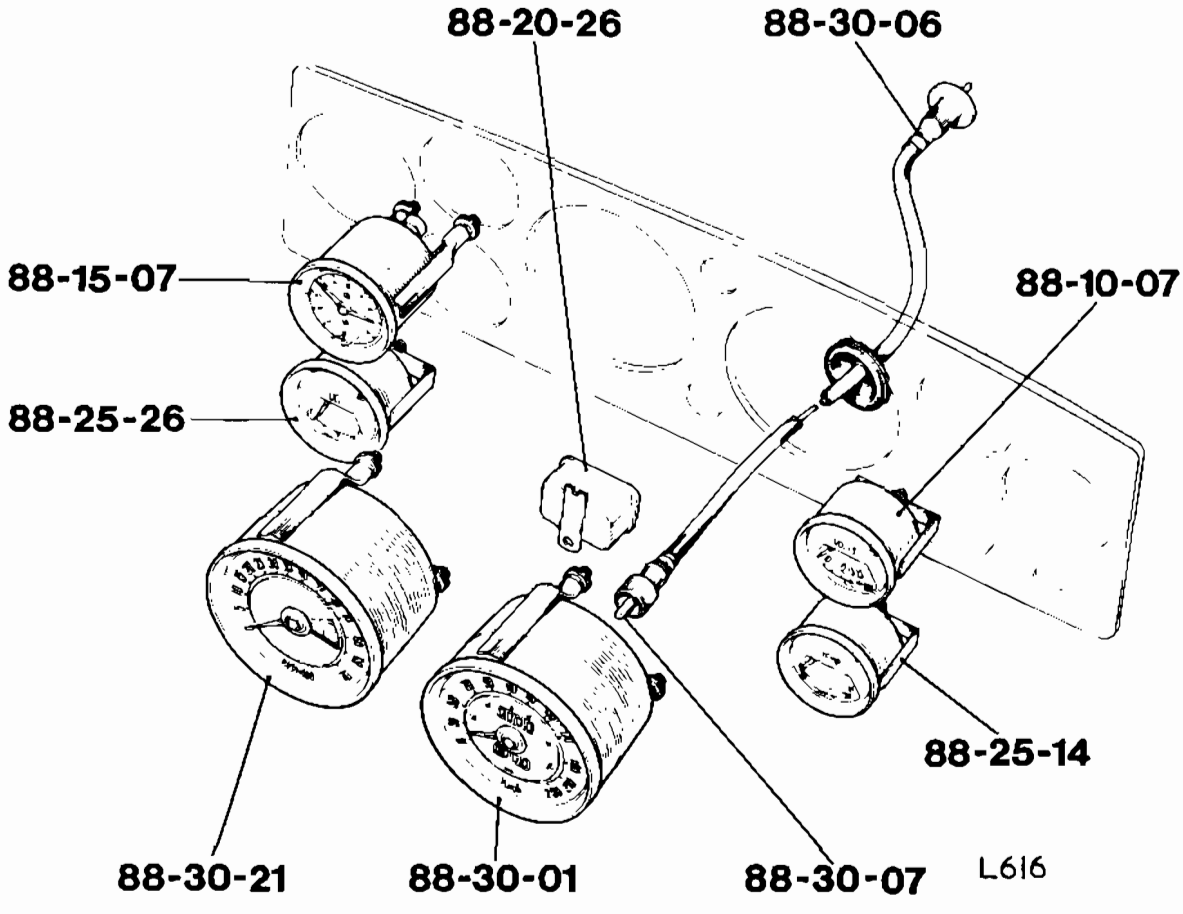


FUSE CHART

Fuse			Circuits	Amps.	Colour Code	Lucas Part No.	Stanpart No.
1	BATTERY CONTROL	2	Horn Cigarette lighter Puddle lamps 'B' post lamps Console lamps Glovebox/map lamp Clock Headlamp flash	35	White	188218	58465
3	IGNITION CONTROL	4	Fuel indication Temperature indication Tachometer Windscreen washer pump Stop lamps Reverse lamps Turn signal	35	White	188218	58465
5	PARKING LIGHTS	6	Tail lamp Front side lamp	5	Yellow	188206	518442
7	SIDE AND TAIL LIGHTS	8	Tail lamp Front side lamp Night dimming relay winding Plate illumination lamp Cigarette lighter illumination Selector panel illumination- -Borg Warner automatic only Instrument illumination	10	Black	188211	518443
9		10					
11	HEADLIGHTS MAIN BEAM '1'	12		25	Pink	188216	503488
13	HEADLIGHTS MAIN BEAM '2'	14		25	Pink	188216	503488
15	HEADLIGHT DIP BEAM R.H.	16		10	Black	188211	518443
17	HEADLIGHT DIP BEAM L.H.	18		10	Black	188211	518443
19	SCREEN WIPER MOTOR	20		15	Light brown	188220	518444
21	HEATER MOTOR	22		25	Pink	188216	503488
23	OVERDRIVE	24		10	Black	188211	518443
	LINE FUSE		Radio (optional extra)	5	Yellow	188206	518442
	LINE FUSE		Fog lamp (optional extra)	10	Black	188211	518443

INSTRUMENTS OPERATIONS

Instruments
—battery condition indicator—remove and refit 88.10.07
—clock—remove and refit 88.15.07
—fuel indicator—remove and refit 88.25.26
—fuel tank unit—remove and refit 88.25.32
—instrument panel—remove and refit 88.20.01
—speedometer—remove and refit 88.30.01
—speedometer cable—complete—remove and refit 88.30.06
—speedometer cable—inner—remove and refit 88.30.07
—tachometer—remove and refit 88.30.21
—temperature indicator—remove and refit 88.25.14
—temperature transmitter—remove and refit 88.25.20
—voltage stabilizer—remove and refit 88.20.26


88-20-26
88-30-06
88-15-07
88-10-07
88-25-26
88-25-14
88-30-21
88-30-01
88-30-07
L616

INSTRUMENTS

Battery condition indicator—remove and refit **88.10.07**

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect two Lucar connectors.
3. Pull out panel light bulb holder.
4. Remove knurled nut, spring washer and clamp bracket.
5. Withdraw indicator from panel.

Refitting

6. Reverse 1 to 5. Connect Lucar connectors either way round.

INSTRUMENTS

Clock—remove and refit **88.15.07**

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Pull out panel light bulb holder.
3. Disconnect clock power lead at in-line snap connector.
4. Remove two knurled nuts, spring washers and clamp legs.
5. Withdraw clock from panel.

Refitting

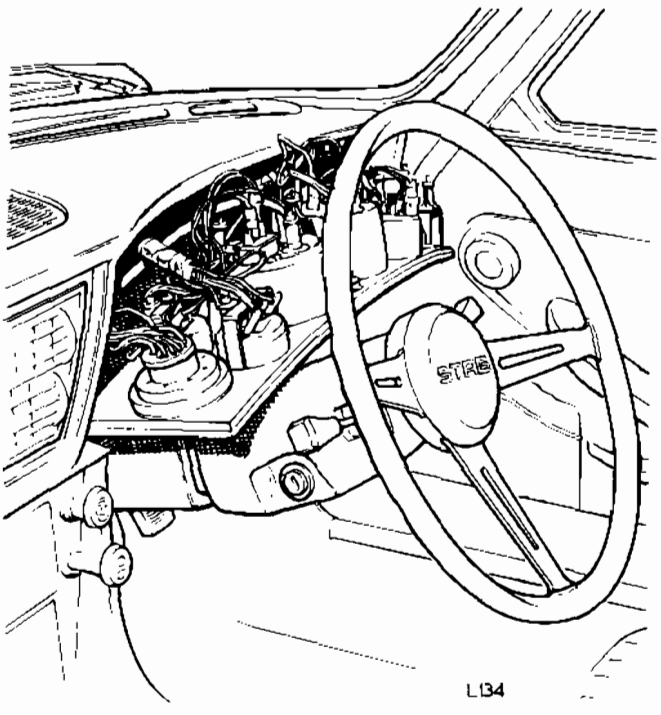
6. Reverse 1 to 5. Connect brown clock power lead to purple wire of fascia harness.

INSTRUMENTS

Instrument panel—remove and refit 88.20.01

Removing

1. Isolate battery.
2. Pull steering-column adjustment lever rearward and move column to its lowest position.
3. Pull driver's swivelling vent hose from heater outlet duct.
4. Pull off panel rheostat knob.
5. Remove four instrument panel screws and countersunk washers.
6. Withdraw panel until it is possible to unscrew speedometer cable knurled nut and clock reset cable knurled nut.
7. Lower instrument panel to service position as shown.
8. Remove glovebox and lid assembly. 76.52.01.
9. Disconnect three harness plugs.
10. Disconnect two Lucar connectors from panel rheostat.
11. Unscrew trip reset knurled nut at attachment to lower edge of fascia.
12. Remove instrument panel from vehicle.



Refitting

13. Reverse 1 to 12.

INSTRUMENTS

Voltage stabilizer—remove and refit 88.20.26

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect two Lucar connectors.
3. Remove single screw and washer. Remove voltage stabilizer.

Refitting

4. Reverse 1 to 3. Connect Lucar connectors as follows:

   Green wire to terminal B
   Light green wire to terminal I.

INSTRUMENTS

Temperature indicator—remove and refit **88.25.14**

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect two Lucar connectors.
3. Pull out panel light bulb holder.
4. Remove knurled nut, spring washer and clamp bracket.
5. Withdraw indicator from panel.

Refitting

6. Reverse 1 to 5. Connect Lucar connectors either way round.

INSTRUMENTS

Temperature transmitter—remove and refit **88.25.20**

Removing

1. Drain part coolant. 26.10.01.
2. Locate transmitter on water transfer housing at rear of left-hand bank.
3. Disconnect Lucar connector.
4. Remove transmitter from housing.

Refitting

5. Reverse 1 to 4. Fit new sealing washer.

INSTRUMENTS

Fuel indicator—remove and refit **88.25.26**

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect two Lucar connectors.
3. Pull out panel light bulb holder.
4. Remove knurled nut, spring washer and clamp bracket.
5. Withdraw indicator from panel.

Refitting

6. Reverse 1 to 5. Connect Lucar connectors either way round.

INSTRUMENTS

Fuel tank unit—remove and refit **88.25.32**

Removing

1. Open luggage boot lid. Remove floor carpet.
2. Remove L.H. floor panel and slide out R.H. floor panel.
3. Remove three screws and withdraw side trim panel.
4. Disconnect three Lucar connectors.
5. Release locking ring by tapping anti-clockwise. Remove locking ring.
6. Carefully withdraw tank unit.
7. Remove sealing washer.

Refitting

8. Reverse 1 to 7. Ensure tank unit location lugs engage correctly. Connect Lucar connectors as follows:

   Green/black wire to terminal T
   Green/orange wire to terminal W
   Black wire to earth terminal.

INSTRUMENTS

Speedometer—remove and refit **88.30.01**

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect three Lucar connectors.
3. Pull out panel light bulb holder.
4. Unscrew trip reset knurled nut at attachment to lower edge of fascia.
5. Remove two knurled nuts, spring washers and clamp legs.
6. Withdraw speedometer from panel.
7. Remove single screw and washer. Remove voltage stabilizer.

Refitting

8. Reverse 1 to 7. Connect Lucar connectors as follows:

   Green wire to voltage stabilizer terminal B
   Light green wire to voltage stabilizer terminal I
   Black wire to speedometer earth terminal.

INSTRUMENTS

Speedometer cable—complete

—Remove and refit **88.30.06**

Removing

1. Place vehicle on ramp.
2. Lower instrument panel to service position. 88.20.01 operation numbers 1 to 7.
3. *Manual gearbox (non-overdrive) and Borg-Warner automatic vehicles only:* Working from below vehicle remove bolt, spring washer and washer to release clamp plate. Withdraw speedometer cable.
4. *Overdrive vehicles only:* Working from below vehicle unscrew speedometer cable knurled nut from right angle drive.
5. Manœuvre speedometer cable downwards through grommet aperture and detach from vehicle.

Refitting

6. Reverse 1 to 5. Seal grommet to body panel with approved sealer to ensure a waterproof joint.

INSTRUMENTS

Speedometer cable—inner

—Remove and refit **88.30.07**

Removing

1. Lower instrument panel to service position. 88.20.01 operation numbers 1 to 7.
2. Withdraw inner cable. Take care not to contaminate upholstery or fittings with grease.

Refitting

3. Sparingly grease inner cable. Do not use oil.
4. Feed inner cable into outer cable. Rotate slightly to assist operation.
5. Withdraw inner cable approximately 8 in. (200 mm.) and wipe off surplus grease. Re-insert inner cable. Rotate slightly to assist engagement of squared end to drive gear.
6. Reverse operation 1.

INSTRUMENTS

Tachometer—remove and refit 88.30.21

CAUTION: A Smiths negative earth eight-cylinder impulse tachometer is fitted. It contains polarity-sensitive components that may be irreparably damaged if subjected to incorrect polarity. For reference the following information is given.

TACHOMETER CONNECTIONS

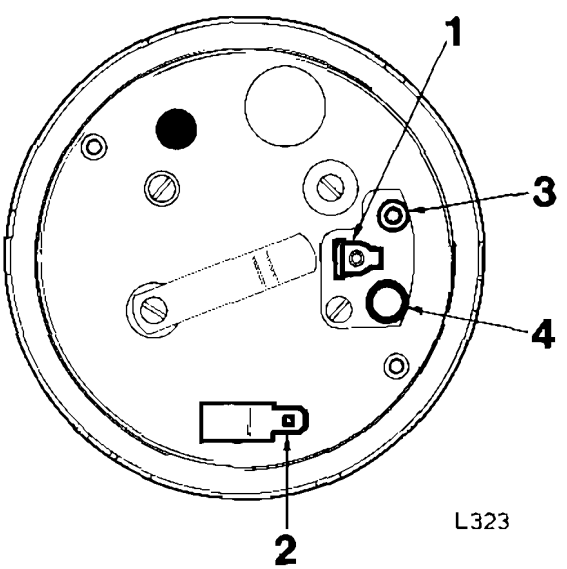
Circuit		Wire Colour Code	Terminal on Tachometer	Illustration Reference No.
Instrument power	Fused ignition-controlled positive supply	Green	17½-amp Lucar blade	1
	Negative earth	Black	10-amp Lucar blade on instrument body	2
Pulse lead	From ignition-controlled positive supply	White	Male bullet-type terminal	3
	To ignition coil via ballast resistor	White/Slate	Female snap connector type terminal	4

Removing

1. Lower instrument panel to service position. 88.20.01, operation numbers 1 to 7.
2. Disconnect two Lucar connectors.
3. Pull out two snap-type connectors.
4. Pull out panel light bulb holder.
5. Remove two knurled nuts, spring washers and clamp legs.
6. Withdraw tachometer from panel.

Refitting

7. Reverse 1 to 6. Connect electrical connections as detailed above.



SERVICE TOOLS

Tool No.	Description
60A	Valve Guide Remover and Replacer
S.60A–2	Adaptor set
S.60A–8	Valve Guide Replacer Adaptor
S.69A	Gearbox Mainshaft Circlip Remover
M.84B	Pinion Bearing Setting Gauge
M.84B–1	Pinion and Dummy Bearing Set
M.84B–4	Dummy Pinion Height Spacer
M.86C	Rear Hub Remover
S.98A	Pre-load Gauge
S.101	Differential Case Spreader
S.101–1	Differential Case Spreader Adaptor
S.123A	Pinion Bearing Outer Cup Remover
S.167	Circlip Installer
S.314	Mainshaft Ball Bearing Replacer
S.316	Pinion Holder Adaptor
S.317	Rear Hub Adjusting Nut Wrench
S.318	Halfshaft Assembly Holding Jig
S.320	Front Suspension Spring Clips
S.348	Water Pump Overhaul Kit
S.349	Distributor Wrench
S.350	Cylinder Head Stud Remover/Replacer
S.352	Valve Spring Compressor Adaptor
S.353	Carburetter Adjusting Tool
S.4221A	Multi-purpose Hand Press
S.4221A–5	I.F.S. Coil Spring Remover and Replacer Adaptor
S.4221A–10	Differential Bearing Remover Adaptor
S.4221A–15A	Gearbox Ball Race Remover/Replacer Adaptor
S.4221A–16	Outer Taper Bearing Remover/Replacer Adaptor
4235A	Impact Remover
S.4235A–2	Constant Pinion Remover Adaptor
S.4235A–10	Water pump Assembly Remover

AUTOMATIC TRANSMISSION TOOLS

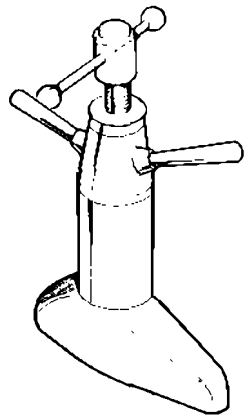
CBW.1A	Pressure Test Equipment
CBW.1A–4	Pressure Take-off Adaptor
CBW.33	Mainshaft End-float Gauge
CBW.34	Front Band Spacer Gauge
CBW.35B	Bench Cradle
CBW.37A	Clutch Spring Compressor
CBW.41	Rear Clutch Piston Replacer
CBW.42	Front Clutch Piston Replacer
CBW.547A–50	Tension Wrench
CBW.547A–50–2	Rear Servo Adjuster Adaptor
CBW.548	Torque Screwdriver
CBW.548–1	Screwdriver Bit Adaptors
CBW.548–2A	Front Servo Adjuster Adaptor

OVERDRIVE TOOLS

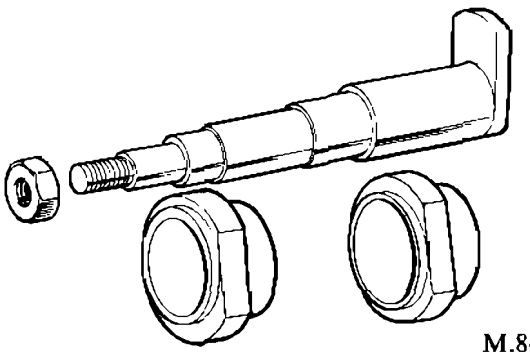
L.178	Free-wheel Assembly Ring
L.182	Accumulator Piston Housing Remover
L.183A	Pump Barrel Remover (Main Tool)
L.183A–1	Adaptor
L.185A	Dummy Drive Shaft
L.187	Tailshaft Bearing Remover/Replacer
L.188	Hydraulic Test Equipment

All Service Tools mentioned in this Manual must be obtained direct from the manufacturers:

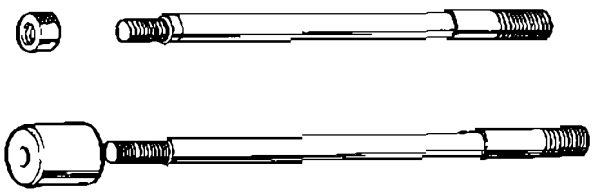
Messrs. V. L. Churchill & Co. Ltd.
P. O. Box No.3
London Road,
Daventry, Northants



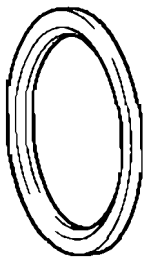
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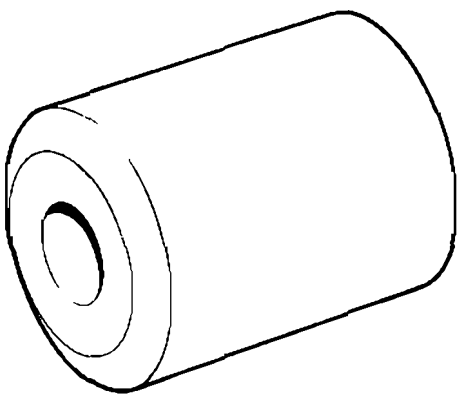
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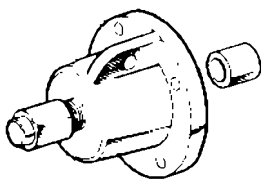
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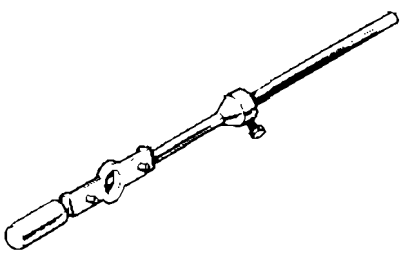
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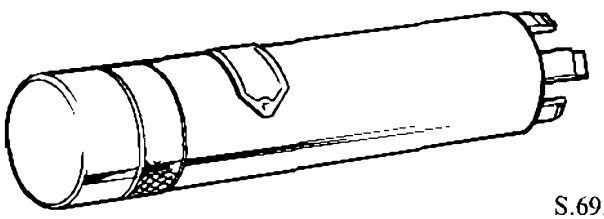
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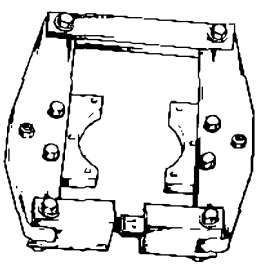
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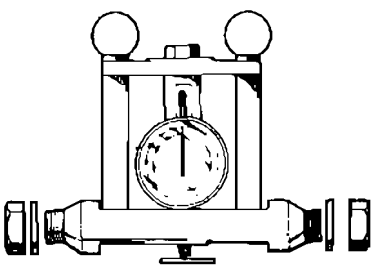
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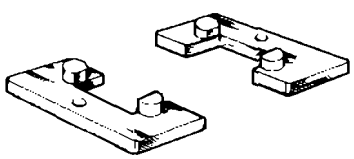
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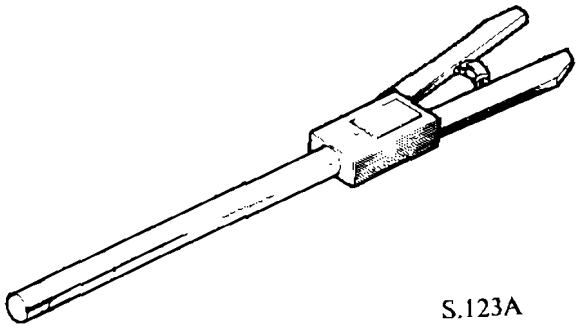


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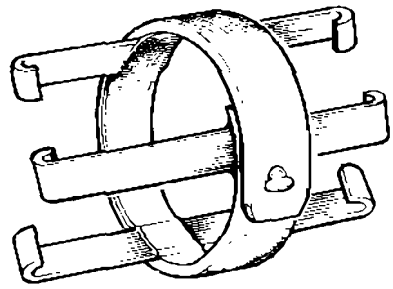


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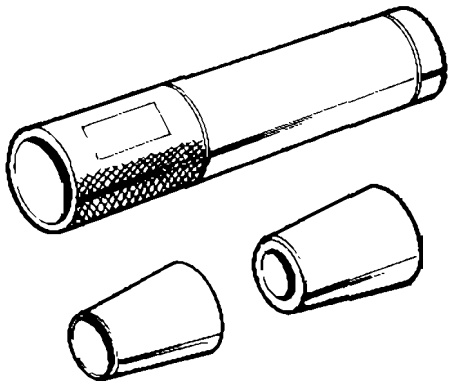
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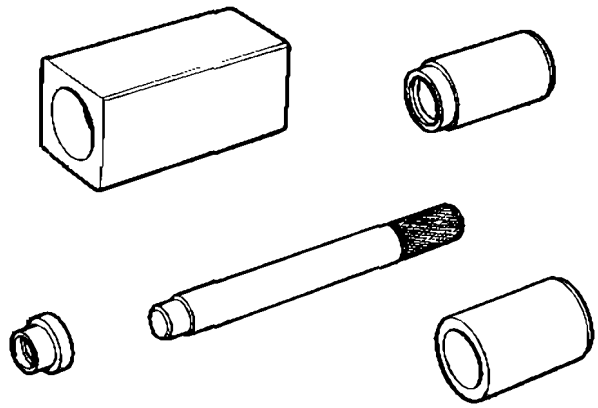
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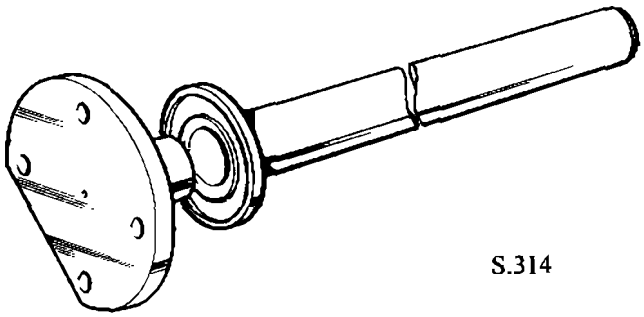
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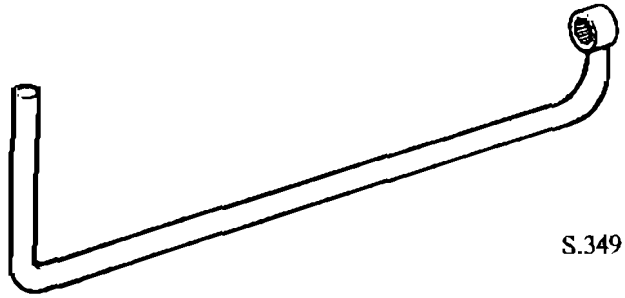
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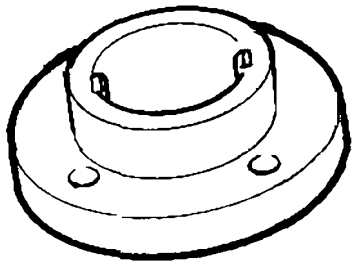
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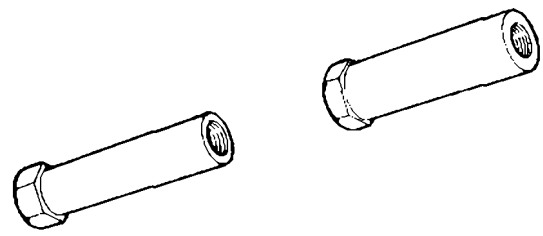
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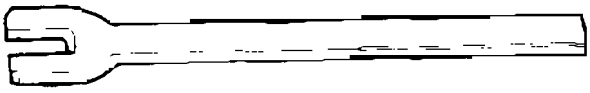
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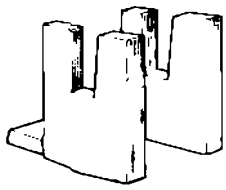
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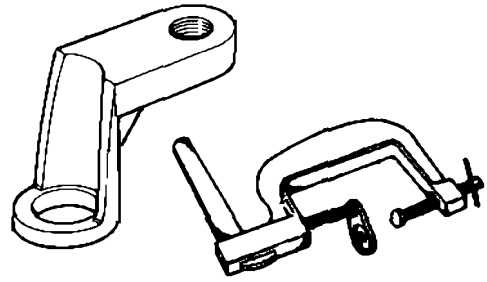
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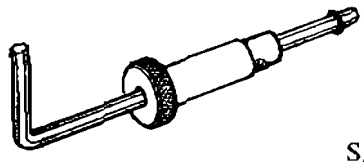
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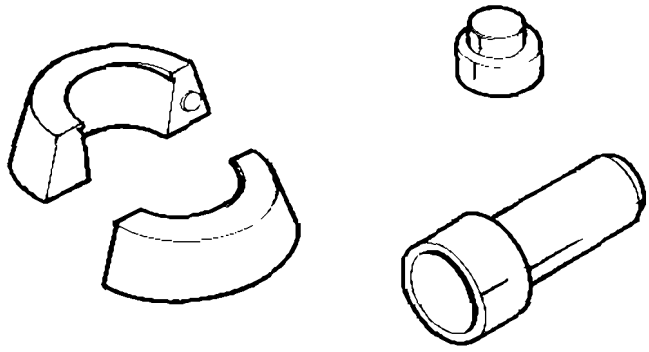
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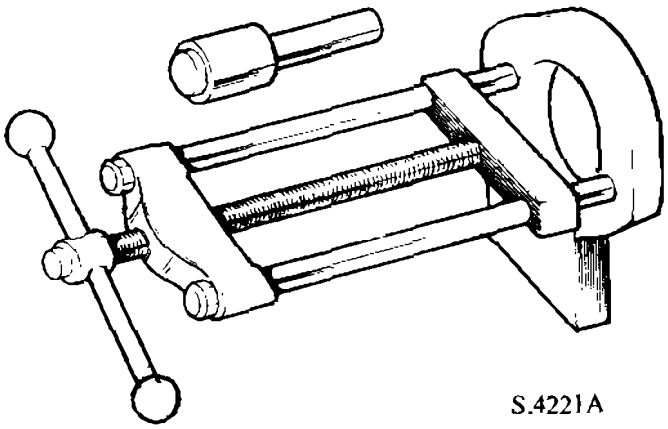
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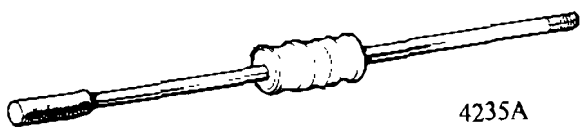
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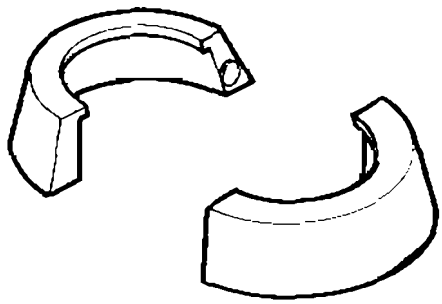
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S.4221A



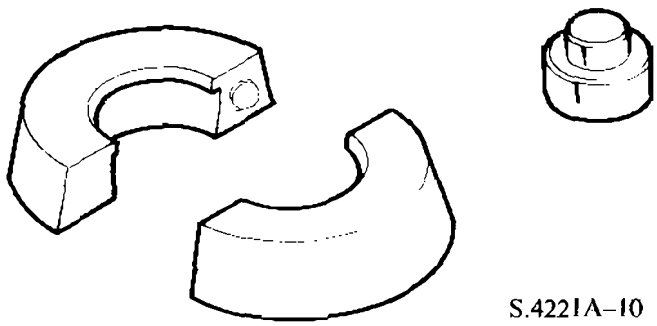
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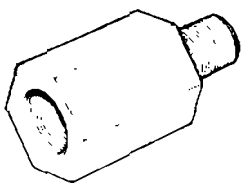
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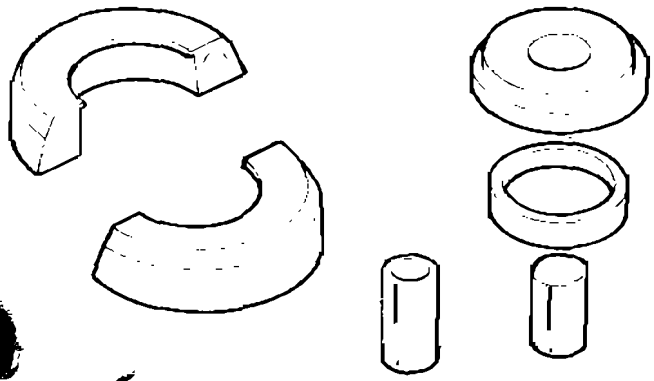
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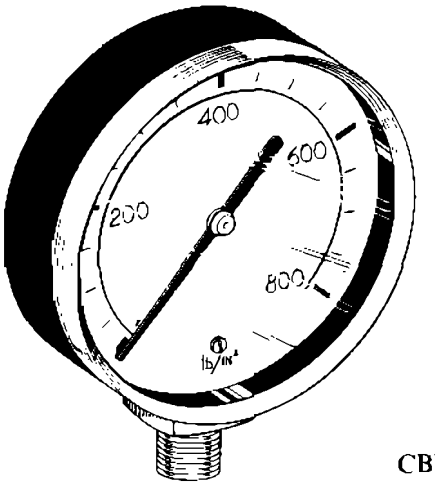
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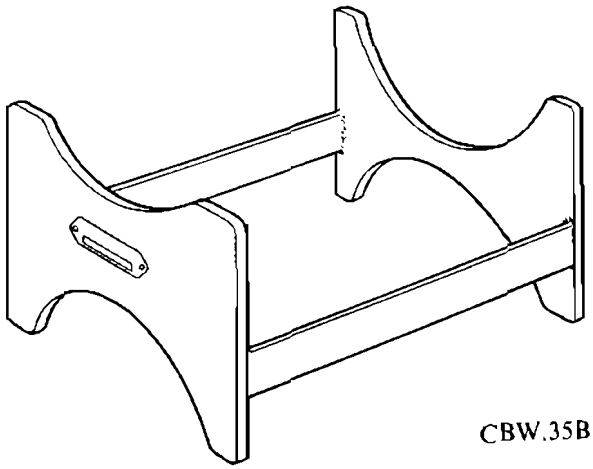
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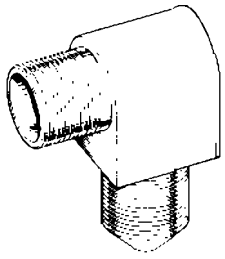
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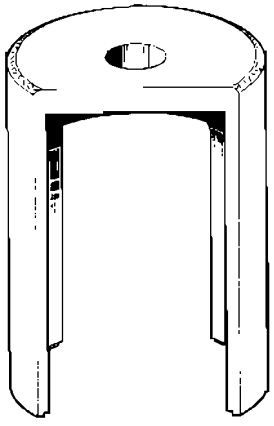
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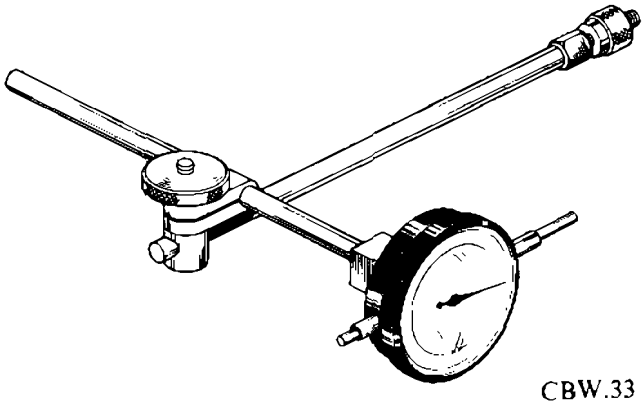
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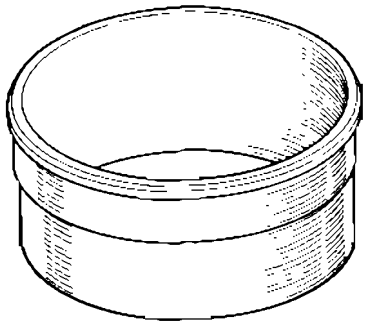
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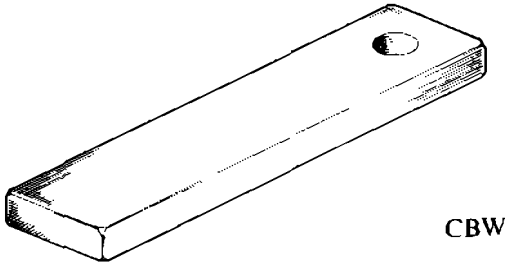
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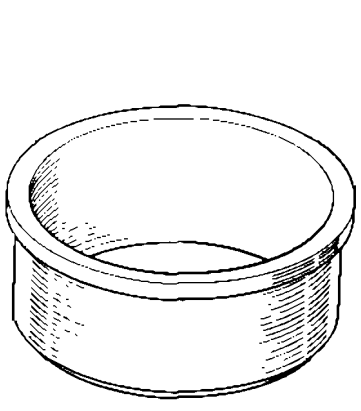
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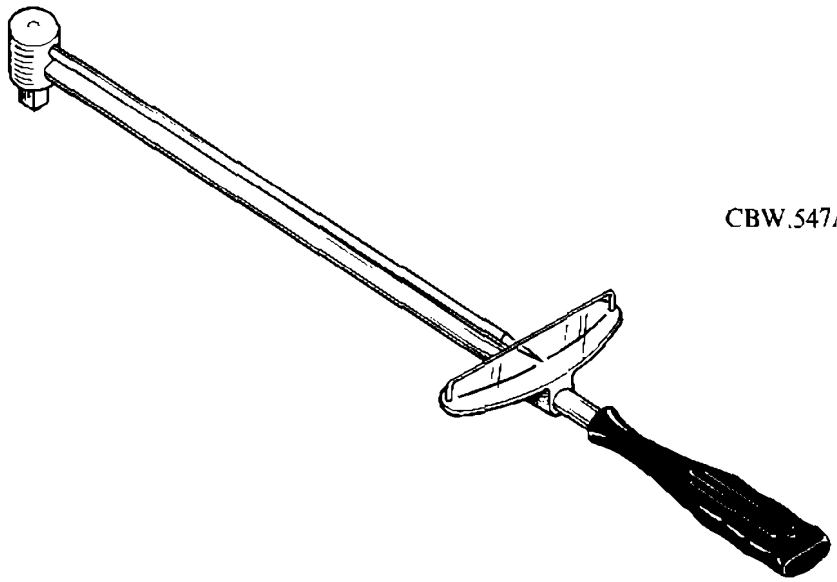
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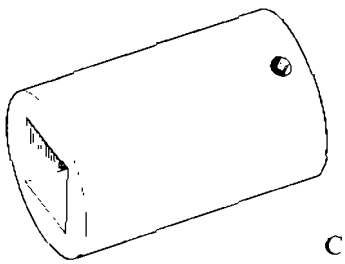
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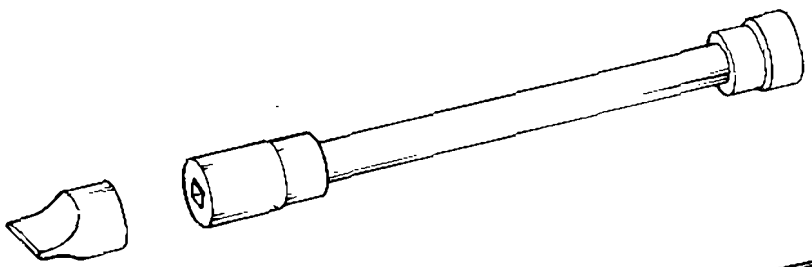
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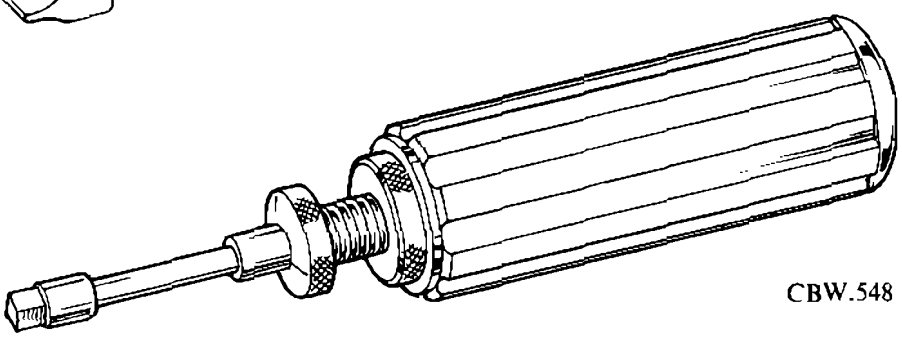


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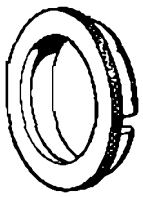


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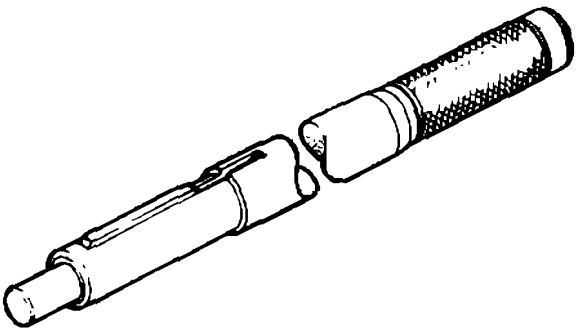
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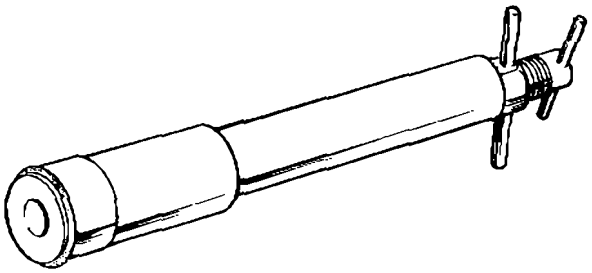
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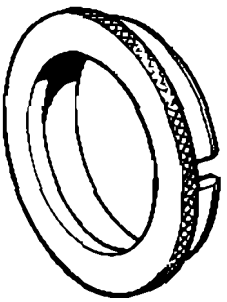
L.178



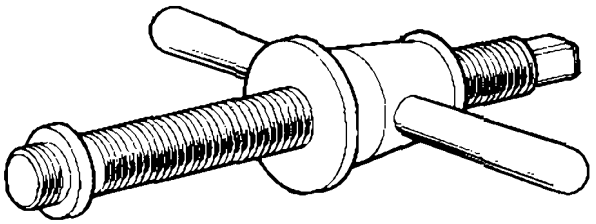
L.185A



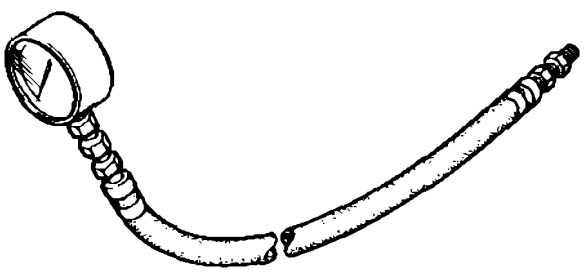
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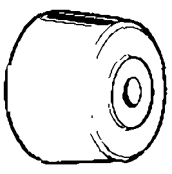
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L.183A



L.188



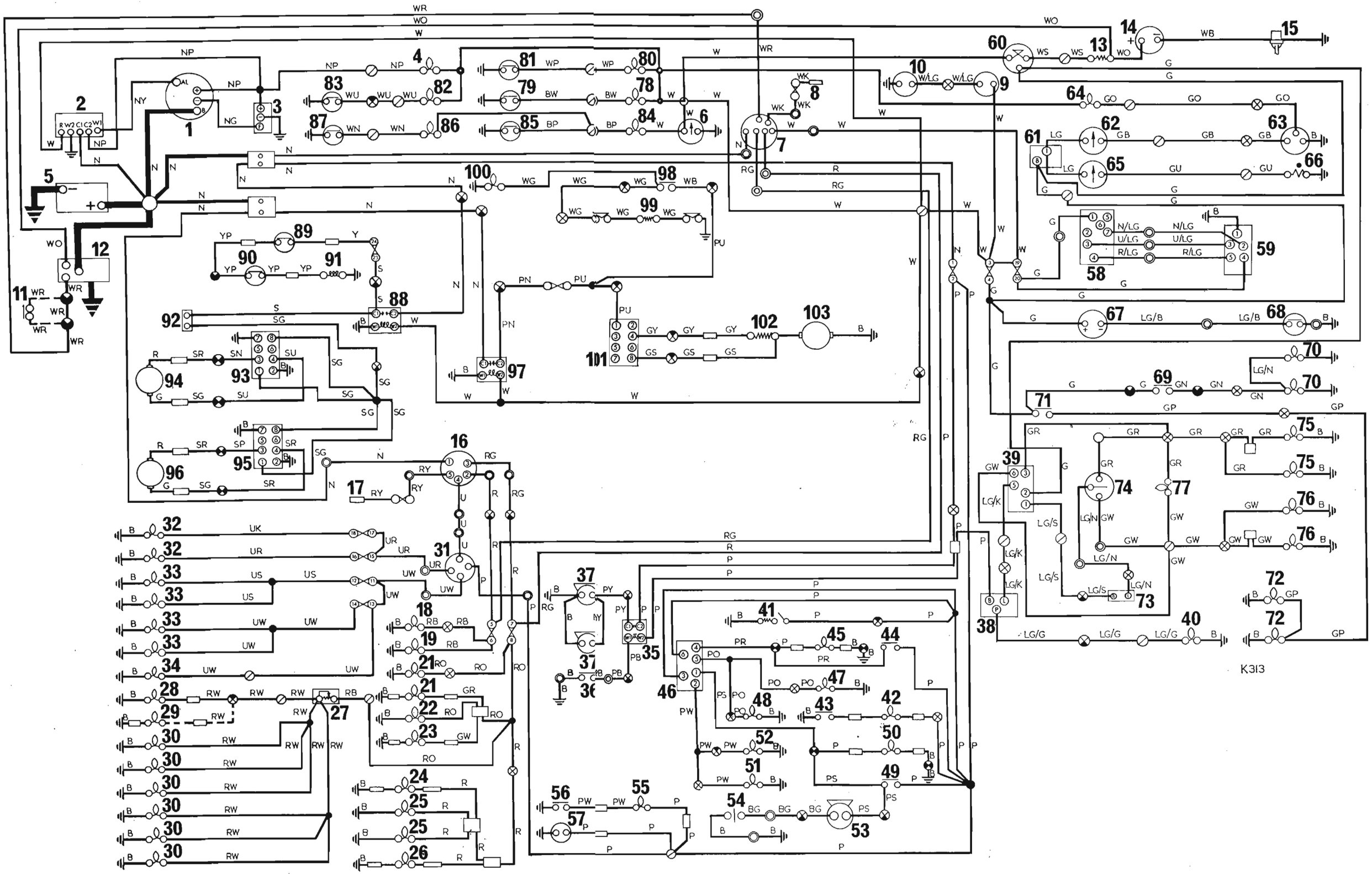
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WIRING DIAGRAM — STAG
U.S.A. MARKET — HEATER

KEY TO WIRING DIAGRAM — STAG

U.S.A. MARKET — HEATER

1 Alternator
2 Charging system relay
3 Alternator control unit
4 Ignition warning light
5 Battery
6 Battery condition indicator
7 Ignition/starter switch
8 Radio supply
9 Inertia cut out
10 Petrol pump
11 Inhibitor switch—Borg Warner automatic only
12 Starter motor
13 Ballast resistor
14 Ignition coil—6 volt
15 Ignition distributor
16 Master light switch
17 Fog lamp supply
18 L.H. tail lamp
19 L.H. front parking lamp
20 R.H. tail lamp
21 L.H. front marker lamp
22 R.H. front parking lamp
23 R.H. front marker lamp
24 R.H. rear marker lamp
25 Plate illumination lamp
26 L.H. rear marker lamp
27 Panel rheostat
28 Cigarette lighter illumination
29 Selector panel illumination—Borg Warner automatic only
30 Instrument illumination
31 Main/dip/flash switch
32 Dip beam
33 Main beam
34 Main beam warning light
35 Horn relay
36 Horn push
37 Horn
38 Hazard flasher unit
39 Hazard switch
40 Hazard warning light
41 Cigarette lighter
42 Luggage boot lamp
43 Luggage boot lamp switch
44 R.H. door switch
45 R.H. puddle lamp
46 Interior lamp switch
47 R.H. 'B post' lamp
48 R.H. console lamp
49 L.H. door switch
50 L.H. puddle lamp
51 L.H. 'B post' lamp
52 L.H. console lamp
53 Key warning buzzer
54 Key switch
55 Glove box/map lamp
56 Glove box/map lamp switch
57 Clock
58 Windscreen wiper switch
59 Windscreen wiper motor
60 Tachometer
61 Voltage stabilizer
62 Fuel indicator
63 Fuel tank unit
64 Fuel warning light
65 Temperature indicator
66 Temperature transmitter
67 Windscreen washer pump
68 Windscreen washer switch
69 Reverse lamp switch
70 Reverse lamp
71 Stop lamp switch
72 Stop lamp
73 Turn signal flasher unit
74 Turn signal switch
75 L.H. flasher lamp
76 R.H. flasher lamp
77 Turn signal warning light
78 Hand brake warning light
79 Hand brake switch
80 Temperature warning light
81 Temperature switch
82 Choke warning light
83 Choke switch
84 Brake line failure warning light
85 Brake line failure switch
86 Oil pressure warning light
87 Oil pressure switch
88 Ignition controlled relay
89 Overdrive gear lever switch—optional extra
90 Overdrive gearbox switch—optional extra
91 Overdrive solenoid—optional extra
92 Window lift circuit breaker
93 L.H. window lift switch
94 L.H. window lift motor
95 R.H. Window lift switch
96 R.H. window lift motor
97 Ignition controlled relay
98 Heated backlight switch
99 Heated backlight
100 Heated backlight warning light
101 Heater switch
102 Heater rheostat
103 Heater motor

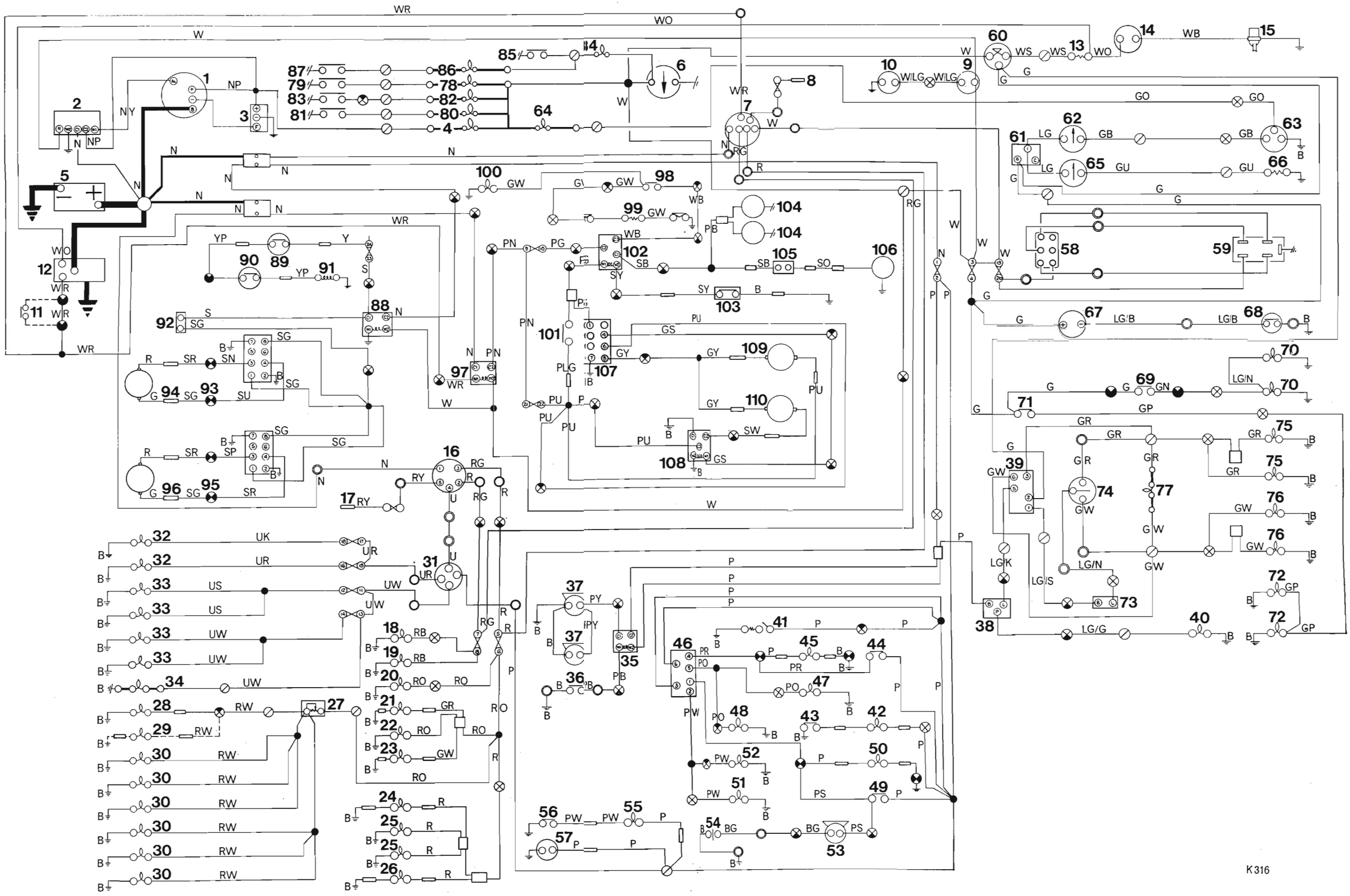

K313

KEY TO WIRING DIAGRAM — STAG

U.S.A. MARKET — AIR CONDITIONING

1 Alternator
2 Charging system relay
3 Alternator control unit
4 Ignition warning light
5 Battery
6 Battery condition indicator
7 Ignition/starter switch
8 Radio supply
9 Inertia cut out
10 Petrol pump
11 Inhibitor switch—Borg Warner automatic only
12 Starter motor
13 Ballast resistor
14 Ignition coil—6 volt
15 Ignition distributor
16 Master light switch
17 Fog lamp supply
18 L.H. tail lamp
19 L.H. front parking lamp
20 R.H. tail lamp
21 L.H. front marker lamp
22 R.H. front parking lamp
23 R.H. front marker lamp
24 R.H. rear marker lamp
25 Plate illumination lamp
26 L.H. rear marker lamp
27 Panel rheostat
28 Cigarette lighter illumination
29 Selector panel illumination—Borg Warner automatic only
30 Instrument illumination
31 Main/dip/flash switch
32 Dip beam
33 Main beam
34 Main beam warning light
35 Horn relay
36 Horn push
37 Horn
38 Hazard flasher unit
39 Hazard switch
40 Hazard warning light
41 Cigarette lighter
42 Luggage boot lamp
43 Luggage boot lamp switch
44 R.H. door switch
45 R.H. puddle lamp
46 Interior lamp switch
47 R.H. 'B post' lamp
48 R.H. console lamp
49 L.H. door switch
50 L.H. puddle lamp
51 L.H. 'B post' lamp
52 L.H. console lamp
53 Key warning buzzer
54 Key switch
55 Glove box/map lamp
56 Glove box/maplamp switch
57 Clock
58 Windscreen wiper switch
59 Windscreen wiper motor
60 Tachometer
61 Voltage stabilizer
62 Fuel indicator
63 Fuel tank unit
64 Fuel warning light
65 Temperature indicator
66 Temperature transmitter
67 Windscreen washer pump
68 Windscreen washer switch
69 Reverse lamp switch
70 Reverse lamp
71 Stop lamp switch
72 Stop lamp
73 Turn signal flasher unit
74 Turn signal switch
75 L.H. flasher lamp
76 R.H. flasher lamp
77 Turn signal warning light
78 Hand brake warning light
79 Hand brake switch
80 Temperature warning light
81 Temperature switch
82 Choke warning light
83 Choke switch
84 Brake line failure warning light
85 Brake line failure switch
86 Oil pressure warning light
87 Oil pressure switch
88 Ignition controlled relay
89 Overdrive gear lever switch—optional extra
90 Overdrive gearbox switch—optional extra
91 Overdrive solenoid—optional extra
92 Window lift circuit breaker
93 L.H. window lift switch
94 L.H. window lift motor
95 R.H. window lift switch
96 R.H. window lift motor
97 Ignition and starter controlled relay
98 Heated back light switch
99 Heated back light
100 Heated back light warning light
101 Air conditioning master switch
102 Master switch controlled relay
103 Cold matrix thermostat
104 Condenser fan motor
105 Refrigeration circuit high pressure cut out
106 Compressor clutch
107 Blower switch
108 Blower switch controlled relay
109 L.H. blower motor
110 R.H. blower motor

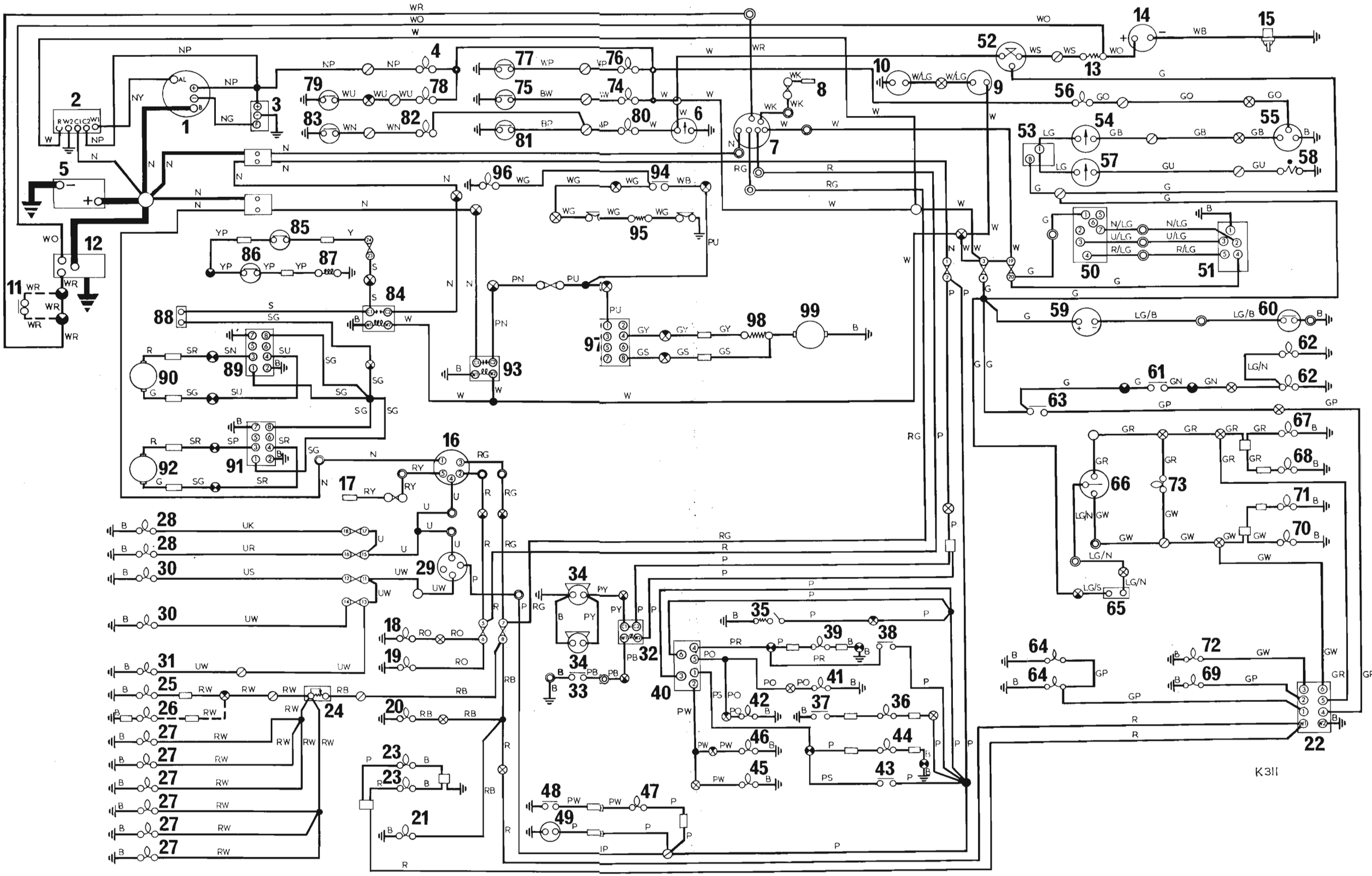



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K316

KEY TO WIRING DIAGRAM — STAG

RIGHT HAND STEER — HEATER

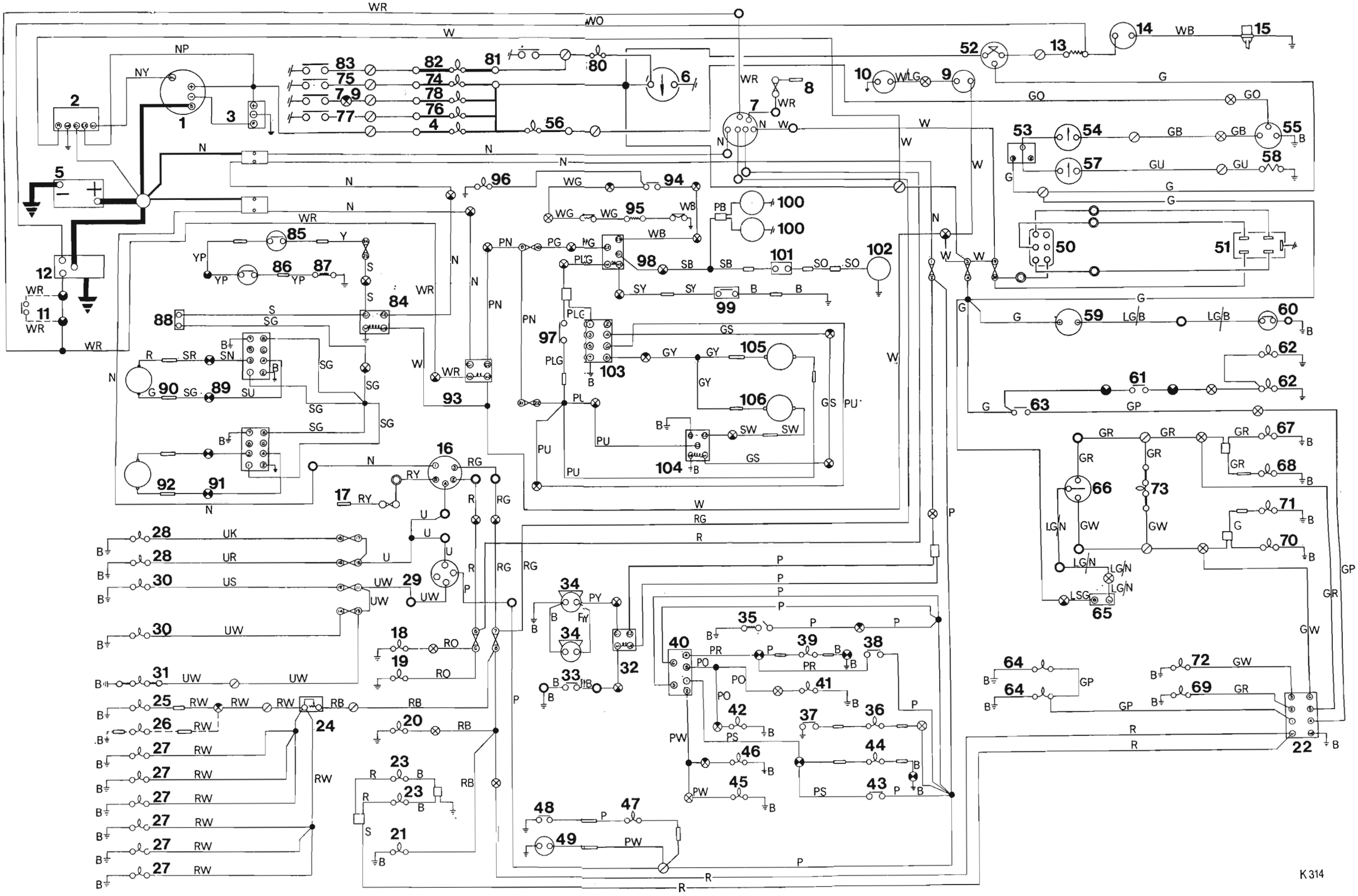
1 Alternator
2 Charging system relay
3 Alternator control unit
4 Ignition warning light
5 Battery
6 Battery condition indicator
7 Ignition/starter switch
8 Radio supply
9 Inertia cut out
10 Petrol pump
11 Inhibitor switch—Borg Warner automatic only
12 Starter motor
13 Ballast resistor
14 Ignition coil—6 volt
15 Ignition distributor
16 Master light switch
17 Fog lamp supply
18 R.H. tail lamp
19 R.H. front parking lamp
20 L.H. tail lamp
21 L.H. front parking lamp
22 Night dimming relay
23 Plate illumination lamp
24 Panel rheostat
25 Cigarette lighter illumination
26 Selector panel illumination—Borg Warner automatic only
27 Instrument illumination
28 Dip and main beam
29 Main/dip/flash switch
30 Main beam
31 Main beam warning light
32 Horn relay
33 Horn push
34 Horn
35 Cigarette lighter
36 Luggage boot lamp
37 Luggage boot lamp switch
38 R.H. door switch
39 R.H. puddle lamp
40 Interior lamp switch
41 R.H. 'B post' lamp
42 R.H. console lamp
43 L.H. door switch
44 L.H. puddle lamp
45 L.H. 'B post' lamp
46 L.H. console lamp
47 Glove box/map lamp
48 Glove box/map lamp switch
49 Clock
50 Windscreen wiper switch
51 Windscreen wiper motor
52 Tachometer
53 Voltage stabilizer
54 Fuel indicator
55 Fuel tank unit
56 Fuel warning light
57 Temperature indicator
58 Temperature transmitter
59 Windscreen washer pump
60 Windscreen washer switch
61 Reverse lamp switch
62 Reverse lamp
63 Stop lamp switch
64 Stop lamp
65 Turn signal flasher unit
66 Turn signal switch
67 L.H. front flasher lamp
68 L.H. flasher repeater lamp
69 L.H. rear flasher lamp
70 R.H. front flasher lamp
71 R.H. flasher repeater lamp
72 R.H. rear flasher lamp
73 Turn signal warning light
74 Hand brake warning light
75 Hand brake switch
76 Temperature warning light
77 Temperature switch
78 Choke warning light
79 Choke switch
80 Brake line failure warning light
81 Brake line failure switch
82 Oil pressure warning light
83 Oil pressure switch
84 Ignition controlled relay
85 Overdrive gear lever switch—optional extra
86 Overdrive gearbox switch—optional extra
87 Overdrive solenoid—optional extra
88 Window lift circuit breaker
89 L.H. window lift switch
90 L.H. window lift motor
91 R.H. window lift switch
92 R.H. window lift motor
93 Ignition controlled relay
94 Heated backlight switch
95 Heated backlight
96 Heated backlight warning light
97 Heater switch
98 Heater rheostat
99 Heater motor


K311

KEY TO WIRING DIAGRAM — STAG

RIGHT HAND STEER — AIR CONDITIONING

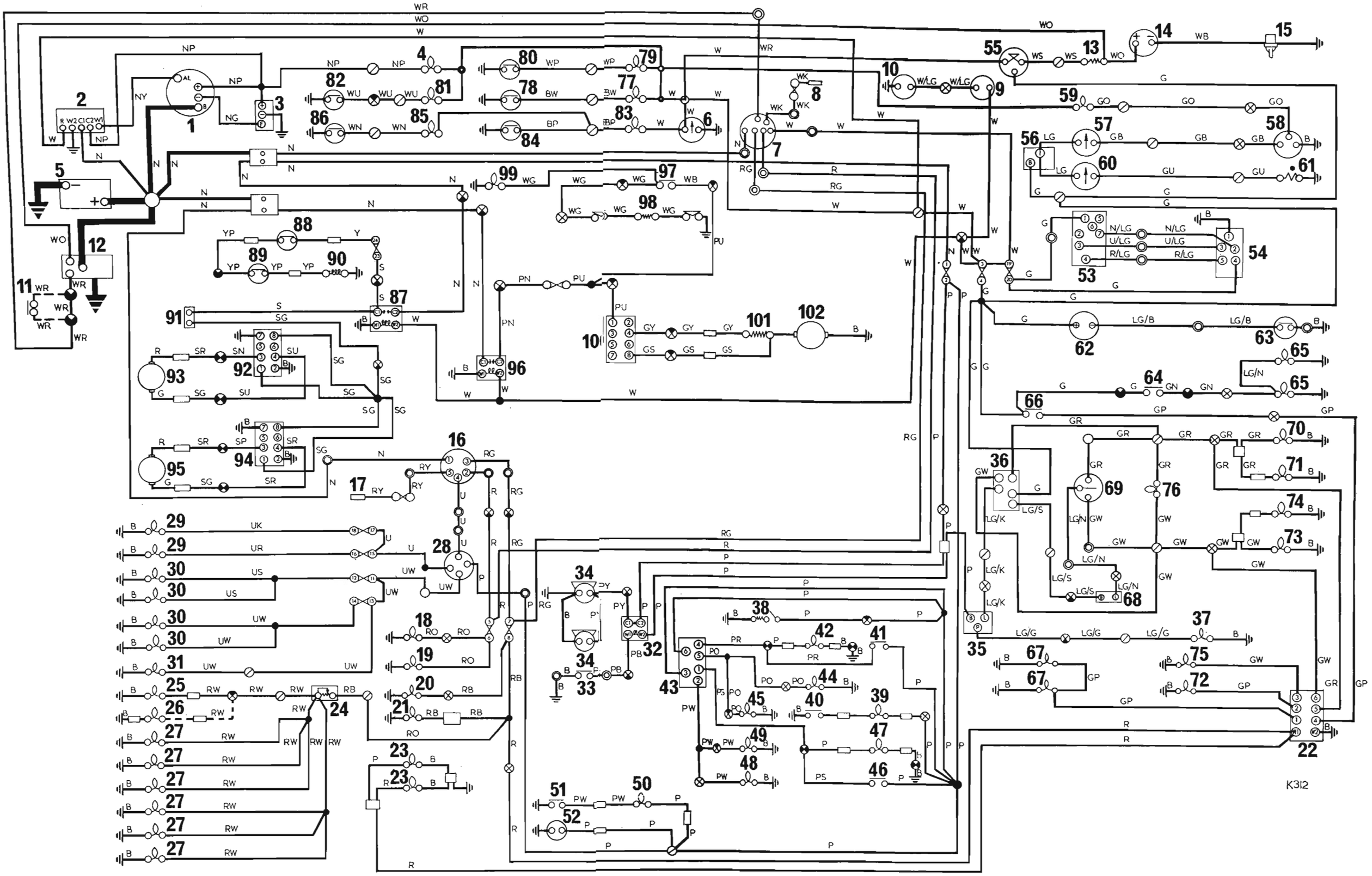
1 Alternator
2 Charging system relay
3 Alternator control unit
4 Ignition warning light
5 Battery
6 Battery condition indicator
7 Ignition/starter switch
8 Radio supply
9 Inertia cut out
10 Petrol pump
11 Inhibitor switch—Borg Warner automatic only
12 Starter motor
13 Ballast resistor
14 Ignition coil—6 volt
15 Ignition distributor
16 Master light switch
17 Fog lamp supply
18 R.H. tail lamp
19 R.H. front parking lamp
20 L.H. tail lamp
21 L.H. front parking lamp
22 Night dimming relay
23 Plate illumination lamp
24 Panel rheostat
25 Cigarette lighter illumination
26 Selector panel illumination—Borg Warner automatic only
27 Instrument illumination
28 Dip and main beam
29 Main/dip/flash switch
30 Main beam
31 Main beam warning light
32 Horn relay
33 Horn push
34 Horn
35 Cigarette lighter
36 Luggage boot lamp
37 Luggage boot lamp switch
38 R.H. door switch
39 R.H. puddle lamp
40 Interior lamp switch
41 R.H. 'B post' lamp
42 R.H. console lamp
43 L.H. door switch
44 L.H. puddle lamp
45 L.H. 'B post' lamp
46 L.H. console lamp
47 Glove box/map lamp
48 Glove box/map lamp switch
49 Clock
50 Windscreen wiper switch
51 Windscreen wiper motor
52 Tachometer
53 Voltage stabilizer
54 Fuel indicator
55 Fuel tank unit
56 Fuel warning light
57 Temperature indicator
58 Temperature transmitter
59 Windscreen washer pump
60 Windscreen washer switch
61 Reverse lamp switch
62 Reverse lamp
63 Stop lamp switch
64 Stop lamp
65 Turn signal flasher unit
66 Turn signal switch
67 L.H. front flasher lamp
68 L.H. flasher repeater lamp
69 L.H. rear flasher lamp
70 R.H. front flasher lamp
71 R.H. flasher repeater lamp
72 R.H. rear flasher lamp
73 Turn signal warning light
74 Hand brake warning light
75 Hand brake switch
76 Temperature warning light
77 Temperature switch
78 Choke warning light
79 Choke switch
80 Brake line failure warning light
81 Brake line failure switch
82 Oil pressure warning light
83 Oil pressure switch
84 Ignition controlled relay
85 Overdrive gear lever switch—optional extra
86 Overdrive gearbox switch—optional extra
87 Overdrive solenoid—optional extra
88 Window lift circuit breaker
89 L.H. window lift switch
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91 R.H. window lift switch
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101 Refrigeration circuit high pressure cut out
102 Compressor clutch
103 Blower switch
104 Blower switch controlled relay
105 L.H. blower motor
106 R.H. blower motor

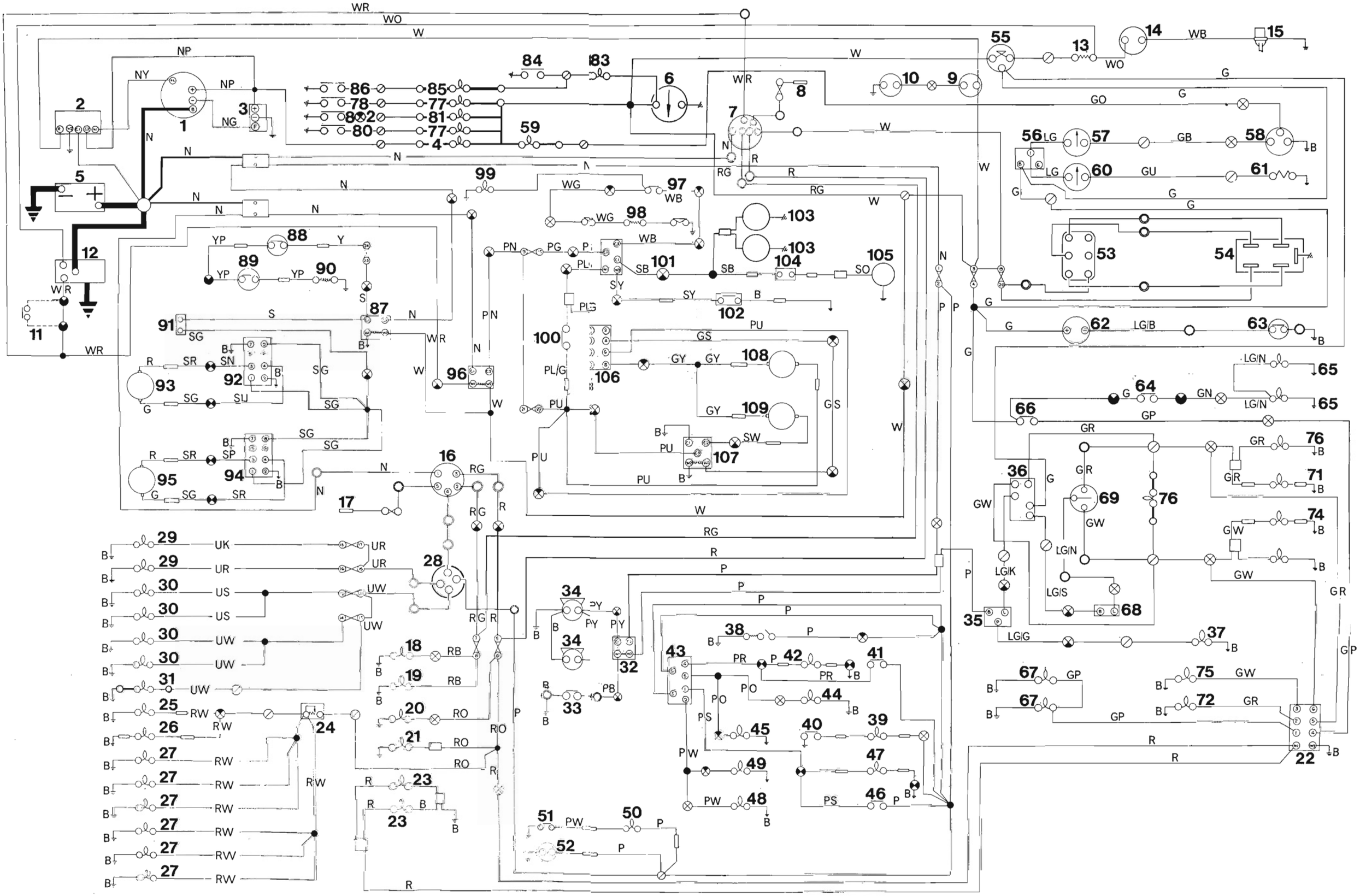

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KEY TO WIRING DIAGRAM — STAG

LEFT HAND STEER — HEATER

1 Alternator
2 Charging system relay
3 Alternator control unit
4 Ignition warning light
5 Battery
6 Battery condition indicator
7 Ignition/starter switch
8 Radio supply
9 Inertia cut out
10 Petrol pump
11 Inhibitor switch—Borg Warner automatic only
12 Starter motor
13 Ballast resistor
14 Ignition coil—6 volt
15 Ignition distributor
16 Master light switch
17 Fog lamp supply
18 L.H. tail lamp
19 L.H. front parking lamp
20 R.H. tail lamp
21 R.H. front parking lamp
22 Night dimming relay
23 Plate illumination lamp
24 Panel rheostat
25 Cigarette lighter illumination
26 Selector panel illumination—Borg Warner automatic only
27 Instrument illumination
28 Main/dip/flash switch
29 Dip beam
30 Main beam
31 Main beam warning light
32 Horn relay
33 Horn push
34 Horn
35 Hazard flasher unit
36 Hazard switch
37 Hazard warning light
38 Cigarette lighter
39 Luggage boot lamp
40 Luggage boot lamp switch
41 R.H. door switch
42 R.H. puddle lamp
43 Interior lamp switch
44 R.H. 'B post' lamp
45 R.H. console lamp
46 L.H. door switch
47 L.H. puddle lamp
48 L.H. 'B post' lamp
49 L.H. console lamp
50 Glove box/map lamp
51 Glove box/map lamp switch
52 Clock
53 Windscreen wiper switch
54 Windscreen wiper motor
55 Tachometer
56 Voltage stabilizer
57 Fuel indicator
58 Fuel tank unit
59 Fuel warning light
60 Temperature indicator
61 Temperature transmitter
62 Windscreen washer pump
63 Windscreen washer switch
64 Reverse lamp switch
65 Reverse lamp
66 Stop lamp switch
67 Stop lamp
68 Turn signal flasher unit
69 Turn signal switch
70 L.H. front flasher lamp
71 L.H. flasher repeater lamp
72 L.H. rear flasher lamp
73 R.H. front flasher lamp
74 R.H. flasher repeater lamp
75 R.H. rear flasher lamp
76 Turn signal warning light
77 Hand brake warning light
78 Hand brake switch
79 Temperature warning light
80 Temperature switch
81 Choke warning light
82 Choke switch
83 Brake line failure warning light
84 Brake line failure switch
85 Oil pressure warning light
86 Oil pressure switch
87 Ignition controlled relay
88 Overdrive gear lever switch—optional extra
89 Overdrive gearbox switch—optional extra
90 Overdrive solenoid—optional extra
91 Window lift circuit breaker
92 L.H. window lift switch
93 L.H. window lift motor
94 R.H. window lift switch
95 R.H. window lift motor
96 Ignition controlled relay
97 Heated back light switch
98 Heated back light
99 Heated back light warning light
100 Heater switch
101 Heater rheostat
102 Heater motor


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