BY APPOINTMENT
TO H.M. QUEEN ELIZABETH
THE QUEEN MOTHER
BRITISH LEYLAND UK LIMITED
LEYLAND CARS
MANUFACTURERS OF DAIMLER JAGUAR,
ROVER CARS AND LAND ROVERS

REPAIR OPERATION MANUAL

For

JAGUAR SERIES III V.12 'E' TYPE

Published by
Jaguar Cars
Publication Part No. E 165 3

FOREWORD

(i) 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.

(ii) Whilst every effort is made to ensure the accuracy of the particulars contained in this Manual, neither the Manufacturer nor the Distributor or Dealer, by whom this Manual is supplied, shall in any circumstance be held liable for any inaccuracy or the consequences thereof.

CONTENTS

INTRODUCTION

The purpose of this manual is to assist skilled mechanics in the efficient repair and maintenance of Jaguar 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 sections. Page 01–3 lists the titles and reference numbers of the various sections.

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

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.

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 pages 01–5 and 01–6.

Amendments

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

The circulation of amendments will be confined to Distributors and Dealers of Jaguar Cars Limited.

REPAIRS AND REPLACEMENTS

When service parts are required it is essential that only genuine Jaguar 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 Jaguar parts. All Jaguar or Unipart replacements have the full backing of the factory warranty.

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

AGREED ABBREVIATIONS AND SYMBOLS

Term	Abbreviation or Symbol
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.
Ampere	Amp
Ampere-hour	Amp hr
Before bottom dead centre	B.B.D.C.
Before top dead centre	B.T.D.C.
Bottom dead centre	B.D.C.
Brake mean effective pressure	B.M.E.P.
Brake horse power	b.h.p.
British standards	BS
Carbon monoxide	CO
Centimetre	cm
Centigrade	C
Cubic centimetre	cm^3
Cubic inches	in^3
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
Gramme	g
Gallons (Imperial)	gal
Gallons (U.S.)	U.S. gal
High compression	h.c.
High tension (electrical)	h.t.
Hundredweight	cwt
Independent front suspension	i.f.s
Internal diameter	i.dia
Inches of mercury	in Hg
Inches	in
Kilogramme	kg
Kilogramme centimeter (torque)	kg.cm
Kilogramme per square centimetre	kg/cm^2
Kilogramme metres (torque)	kg.m
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.
Litres	litre
Low compression	l.c.
Low tension	l.t.
Maximum	max.
Metre	m
Microfarad	mfd
Midget edison screw	MES
Millimetre	mm

AGREED ABBREVIATIONS AND SYMBOLS

Term	Abbreviation or Symbol
Miles per gallon	m.p.g.
Miles per hour	m.p.h.
Minimum	min
Minute (of angle)	'
Minus (of tolerance)	– or ±
Negative (electrical)	–
Number	No.
Ohms	ohm
Ounces	oz
Ounce inch	oz. in
Outside diameter	o.dia
Paragraphs	para
Part number	Part No.
Percentage	%
Pints (Imperial)	pt
Pints (U.S.)	U.S. pt
Plus (tolerance)	+ or ±
Positive (electrical)	+
Pound (Force)	lbf
Pounds feet	lb.ft
Pounds inches	lb.in
Pound (mass)	lb
Pounds per square inch	lb/in^2
Radius	r
Rate (Frequency)	c/min
Ratio	:
Reference	ref
Reverse	reverse
Revolutions per minute	rev/min
Right-hand	R.H.
Right-hand steering	R.H. Stg
Second (angle)	"
Second (numerical order)	2nd
Single carburetter	SC
Specific gravity	sp.gr.
Square centimetres	cm^2
Square inches	in^2
Standard	std.
Standard wire gauge	s.w.g.
Synchroniser/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	Whit.
Unified Coarse	U.N.C.
Unified Fine	U.N.F.

AMENDMENTS

To ensure that a record of amendments to this manual is available, this page will be re-issued with each revised page or 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 the existing pages carrying the same number and the old pages discarded.
Additional pages may also be issued. In such cases, the new pages will carry suffix letters and must be inserted immediately following the existing page carrying the original number. To assist in identifying amendments on revised pages, two asterisks (**) will be inserted at the beginning and end of the amended paragraph, instruction or illustration.

Issue Code	Filing Instructions	
	Discard	Insert
1.	Title Page 01-7 Issue 1 01-8 Issue 1 04-1 Issue 1 04-2 Issue 1 05-1 Issue 1 05-2 Issue 1 06-1 Issue 1 06-2 Issue 1 09-1 Issue 1 09-2 Issue 1 GROUP 10 10-04 Issue 1 10-05 Issue 1 10.10.06 Issue 1 10.10.06 Issue 1 10.10.06 Issue 1 10.10.12 Issue 1 10.10.12 Issue 1 10.10.12 Issue 1 10.10.24 Issue 1 GROUP 12 12.21.01 Issue 1 12.25.25 Issue 1 12.29.48 Issue 1 12.37.01 Issue 1 12.37.01 Issue 1 12.37.01 Issue 1 12.37.01 Issue 1 12.41.05 Issue 1 12.41.05 Issue 1 21.41.05 Issue 1 12.41.05 Issue 1 12.41.05 Issue 1 12.65.01 Issue 1 GROUP 17 17.20.07 Issue 1 17.20.07 Issue 1 17.20.07 Issue 1 17.20.07 Issue 1 GROUP 19 19.15.02 Issue 1 19.15.02 Issue 1 19.45.16 Issue 1 19.45.16 Issue 1 19.45.16 Issue 1 19.45.16 Issue 1 19.55.01 Issue 1 GROUP 26 26.10.01 Issue 1 26.50.05 Issue 1	Title Page 01-7 Issue 2 01-8 Issue 2 01-1 Issue 2 04-2 Issue 2 05-1 Issue 2 05-2 Issue 2 06-1 Issue 2 06-2 Issue 2 09-1 Issue 2 09-2 Issue 2 GROUP 10 10-04 Issue 2 10-05 Issue 2 10.10.06 Issue 2 Page 1 10.10.06 Issue 2 Page 2 10.10.06 Issue 2 Page 3 10.10.12 Issue 2 Page 1 10.10.12 Issue 2 Page 2 10.10.12 Issue 2 Page 3 10.10.24 Issue 2 GROUP 12 12.21.01 Issue 2 12.25.25 Issue 2 12.29.48 Issue 2 12.37.01 Issue 2 Page 1 12.37.01 Issue 2 Page 2 12.37.01 Issue 2 Page 3 12.37.01 Issue 2 Page 4 12.41.05 Issue 2 Page 1 12.41.05 Issue 2 Page 2 12.41.05 Issue 2 Page 3 12.41.05 Issue 2 Page 4 12.41.05 Issue 2 Page 5 12.65.01 Issue 2 GROUP 17 17.20.07 Issue 2 Page 1 17.20.07 Issue 2 Page 2 17.20.07 Issue 2 Page 3 17.20.07 Issue 2 Page 4 GROUP 19 19.15.02 Issue 2 Page 1 19.15.02 Issue 2 Page 2 19.45.16 Issue 2 Page 1 19.45.16 Issue 2 Page 2 19.45.16 Issue 2 Page 3 19.45.16 Issue 2 Page 4 19.55.01 Issue 2 GROUP 26 26.10.01 Issue 2 26.50.05 Issue 2
1.	GROUP 33 33.10.03 Issue 1 GROUP 37 37.01 Issue 1 37.10.01 Issue 1 37.12.19 Issue 1 37.12.19 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 37.20.04 Issue 1 GROUP 44 44.01 Issue 1 44.00.10 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 44.20.06 Issue 1 GROUP 51 51.25.13 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 51.25.19 Issue 1 GROUP 57 57.01 Issue 1 57.10.07 Issue 1 57.10.07 Issue 1 57.10.07 Issue 1 57.10.07 Issue 1	GROUP 33 33.10.03 Issue 2 GROUP 37 37.01 Issue 2 37.10.01 Issue 2 37.12.19 Issue 2 Page 1 37.12.19 Issue 2 Page 2 37.20.04 Issue 2 Page 1 37.20.04 Issue 2 Page 2 37.20.04 Issue 2 Page 3 37.20.04 Issue 2 Page 4 37.20.04 Issue 2 Page 5 37.20.04 Issue 2 Page 6 37.20.04 Issue 2 Page 7 GROUP 44 44.01 Issue 2 44.00.10 Issue 2 44.20.06 Issue 2 Page 1 44.20.06 Issue 2 Page 2 44.20.06 Issue 2 Page 3 44.20.06 Issue 2 Page 4 44.20.06 Issue 2 Page 5 44.20.06 Issue 2 Page 6 44.20.06 Issue 2 Page 7 44.20.06 Issue 2 Page 8 44.20.06 Issue 2 Page 9 44.20.06 Issue 2 Page 10 44.20.06 Issue 2 GROUP 51 51.25.13 Issue 2 51.25.19 Issue 2 Page 1 51.25.19 Issue 2 Page 2 51.25.19 Issue 2 Page 3 51.25.19 Issue 2 Page 4 51.25.19 Issue 2 Page 5 51.25.19 Issue 2 Page 6 51.15.19 Issue 2 Page 7 51.25.19 Issue 2 Page 8 51.25.19 Issue 2 Page 9 GROUP 57 57.01 Issue 2 57.10.07 Issue 2 Page 1 57.10.07 Issue 2 Page 2 57.10.07 Issue 2 Page 3 57.10.07 Issue 2 Page 4

Issue Code	Filing Instructions	
	Discard	Insert
1.	GROUP 57 cont. 57.10.27 Issue 1 57.15.02 Issue 1 57.20.20 Issue 1 57.20.20 Issue 1 57.20.20 Issue 1 57.20.20 Issue 1 57.20.20 Issue 1 GROUP 60 60.15.03 Issue 1 60.20.42 Issue 1 60.20.42 Issue 1 60.20.42 Issue 1 60.25.01 Issue 1 60.25.22 Issue 1 60.25.22 Issue 1 60.35.02 Issue 1 60.35.02 Issue 1 60.35.08 Issue 1 GROUP 64 64.15.01 Issue 1 64.15.01 Issue 1 64.15.07 Issue 1 64.15.07 Issue 1 64.15.07 Issue 1 64.15.07 Issue 1 64.20.01 Issue 1 64.35.15 Issue 1 64.35.15 Issue 1 64.35.15 Issue 1 64.35.17 Issue 1 GROUP 70 70.01 Issue 1 70.00.01 Issue 1 70.10.10 Issue 1 70.10.18 Issue 1 70.15.34 Issue 1 70.25.02 Issue 1 70.25.17 Issue 1 70.30.02 Issue 1 70.30.02 Issue 1 70.30.02 Issue 1 70.50.06 Issue 1 70.55.02 Issue 1 GROUP 76 76.10.01 Issue 1 76.10.01 Issue 1 76.10.29 Issue 1 76.19.01/1 Issue 1 76.81.10 Issue 1 76.81.10 Issue 1 GROUP 80 80.01 Issue 1	GROUP 57 cont. 57.10.27 Issue 2 57.15.02 Issue 2 57.20.20 Issue 2 Page 1 57.20.20 Issue 2 Page 2 57.20.20 Issue 2 Page 3 57.20.20 Issue 2 Page 4 57.20.20 Issue 2 Page 5 GROUP 60 60.15.03 Issue 2 60.20.42 Issue 2 Page 1 60.20.42 Issue 2 Page 2 60.20.42 Issue 2 Page 3 60.25.01 Issue 2 60.25.22 Issue 2 Page 1 60.25.22 Issue 2 Page 2 60.35.02 Issue 2 Page 1 60.35.02 Issue 2 Page 2 60.35.08 Issue 2 GROUP 64 64.15.01 Issue 2 Page 1 64.15.01 Issue 2 Page 2 64.15.07 Issue 2 Page 1 64.15.07 Issue 2 Page 2 64.15.07 Issue 2 Page 3 64.15.07 Issue 2 Page 4 64.20.01 Issue 2 64.35.15 Issue 2 Page 1 64.35.15 Issue 2 Page 2 64.35.15 Issue 2 Page 3 64.35.17 Issue 2 GROUP 70 70.01 Issue 2 70.00.01 Issue 2 70.10.10 Issue 2 70.10.18 Issue 2 70.15.34 Issue 2 70.25.02 Issue 2 Insert new Page 70.25.08 70.25.17 Issue 2 70.30.02 Issue 2 Page 1 70.30.02 Issue 2 Page 2 70.30.02 Issue 2 Page 3 70.50.06 Issue 2 70.55.02 Issue 2 GROUP 76 76.10.01 Issue 2 Page 1 76.10.01 Issue 2 Page 2 76.10.29 Issue 2 76.19.01/1 Issue 2 76.81.10 Issue 2 Page 1 76.81.10 Issue 2 Page 2 GROUP 80 80.01 Issue 2

Issue Code	Filing Instructions	
	Discard	Insert
1.	GROUP 82 82.00.06 Issue 1 82.10.01 Issue 1 82.10.14 Issue 1 82.15.07 Issue 1 82.15.07 Issue 1 82.17.01 Issue 1 82.20.26 Issue 1 82.25.17 Issue 1 82.25.20 Issue 1 82.25.30 Issue 1 82.30.08 Issue 1 82.30.13 Issue 1 82.30.16 Issue 1 GROUP 84 84.01 Issue 1 84.10.21 Issue 1 84.15.13 Issue 1 GROUP 86 86.01 Issue 1 86.02 Issue 1 86.03 Issue 1 86.10.02 Issue 1 86.10.04 Issue 1 86.10.05 Issue 1 86.40.69 Issue 1 86.45.71 Issue 1 86.55.12 Issue 1 86.60.00/2 Issue 1 86.60.13 Issue 1 86.60.13 Issue 1 86.60.13 Issue 1 86.60.14 Issue 1 86.65.11 Issue 1 86.65.30 Issue 1 86.65.51 Issue 1 86.70.02 Issue 1 86.70.09 Issue 1 86.70.11 Issue 1 86.70.12 Issue 1 86.70.17 Issue 1 Wiring Diagram Issue 1 GROUP 88 88.30.02 Issue 1 GROUP 99 99.02 Issue 1 99.09 Issue 1 99.11 Issue 1	GROUP 82 82.00.06 Issue 2 82.10.01 Issue 2 82.10.14 Issue 2 82.15.07 Issue 2 Page 1 82.15.07 Issue 2 Page 2 82.17.01 Issue 2 82.20.26 Issue 2 82.25.17 Issue 2 82.25.20 Issue 2 82.25.30 Issue 2 82.30.08 Issue 2 82.30.13 Issue 2 82.30.16 Issue 2 GROUP 84 84.01 Issue 2 84.10.21 Issue 2 84.15.13 Issue 2 GROUP 86 86.01 Issue 2 86.02 Issue 2 86.03 Issue 2 86.10.02 Issue 2 86.10.04 Issue 2 86.10.05 Issue 2 86.40.69 Issue 2 86.45.71 Issue 2 86.55.12 Issue 2 86.60.00/2 Issue 2 86.60.13 Issue 2 Page 1 86.60.13 Issue 2 Page 2 86.60.13 Issue 2 Page 3 86.65.00 Issue 2 86.65.15 Issue 2 86.65.31 Issue 2 86.65.51 Issue 2 86.70.02 Issue 2 86.70.09 Issue 2 86.70.11 Issue 2 86.70.12 Issue 2 86.70.17 Issue 2 Wiring Diagram Issue 2 GROUP 88 88.30.02 Issue 2 GROUP 99 99.02 Issue 2 99.09 Issue 2 99.11 Issue 2

GENERAL SPECIFICATION DATA

Clutch	
Make	Borg and Beck
Type	Diaphragm spring
Clutch release bearing material	Graphite
Clutch adjustment	Push rod adjustable for length
Operation	Hydraulic
Hydraulic fluid	Castrol/Girling Brake fluid GREEN – exceeding Specification S.A.E. **J.1703/C**
Gearbox	
Speeds	Four forward, one reverse
Synchromesh	All forward gears
Ratios – First	2.933:1
– Second	1.905:1
– Third	1.389:1
– Fourth	1.000:1
– Reverse	3.378:1
Final Drive Unit	
Type	Hypoid
Ratio: Cars fitted with:–	
Manual transmission U.S.A./Canada Only	3.54:1
Automatic transmission U.S.A./Canada Only	3.31:1
Manual transmission Other Countries	3.31:1
Automatic transmission Other Countries	3.07:1
Automatic Gearbox	
Make and Type	Borg Warner Model 12
Cooling System	
Water pump – Type	Centrifugal
– Drive	Belt
Number of cooling fans	2
Type of fans	Electrically driven, thermostatically controlled
Cooling system control	Thermostats, one to each cylinder head
Operating temperature	82°C
Fully open temperature	93.5°C to 96°C
Header tank pressure cap rating	,91 kg/sq. cm (13 lb/sq. in.)
Cap – Make	A. C. Delco
Fuel System	
Carburetters – Make and Type	Zenith Stromberg 175 CD2SE
– Size	44,45 mm (1.750 in.)
Jet Needle – Type	B1.BH
– Size	2,54 mm (.1 in.) NOMINAL, flowed jet
Fuel pump – Operation	Electrical
– Type	S. U. AUF.406

Braking System	
Front brakes – Make and Type	Girling; ventilated disc, bridge type calipers
Rear brakes – Make and Type	Girling; disc, bridge type calipers incorporating handbrake friction pads
Handbrake – Type	Mechanical, operating on rear discs
Disc diameter – Front	**284 mm** (11.18 in.)
– Rear	263,5 mm (10.375 in.)
Disc thickness – Front	24,13 mm (.950 in.)
– Rear	12,7 mm (.500 in.)
Master cylinder bore diameter	22,22 mm (.875 in.)
Brake operation	Hydraulic
Hydraulic fluid	Castrol/Girling Brake fluid GREEN – exceeding specification S.A.E. **J.1703/C**
Main brake friction pad material	Ferodo 2430
Hand brake friction pad material	Mintex M.34
Servo unit type	Girling type 8 remote servo unit
Front Suspension	
Type	Fully independent
Castor angle	2½° ± ½° positive
Camber angle	0° ± ¼° positive
Front wheel alignment	1.6 mm to 3.2 mm (.062 in. to .125 in.) Toe in
Dampers	Telescopic, gas filled
Rear Suspension	
Camber angle	¾° ± ¼° negative
Dampers	Telescopic, gas filled
Power Assisted Steering	
Steering gear – Type	Rack and pinion
Number of turns – Lock to lock	3½
Turning circle – Pressed wheels	R.H. Lock 10,8 m (35ft. 7in.) L.H. Lock 11,07 m (36ft. 4in.)
Turning circle – Wire wheels	R.H. Lock 10,6 m (34ft. 10in.) L.H. Lock 11,07 m (36ft. 4in.)
Oil pump – location	Front left hand side of engine
– Operating pressure	77,3 kg/sq. cm to 84,4 kg/sq. cm (1100 lb/sq. in. to 1200 lb/sq. in.)
Tyre Pressures	
Tyres – Make and Type	Dunlop. E.70 VR 15 SP Sports

	Front	**Rear**
For normal use with speeds up to 192 km/h (120 m.p.h.)	1,7 kg/sq. cm (1,65 Bars) (24 lb/sq.in.)	2,0 kg/sq. cm (1.9 Bars) (28 lb/sq.in.)
For sustained speeds in excess of 192 km/h (120 m.p.h.)	2,67 kg/sq. cm (2.62 Bars) (38 lb/sq.in.)	2,8 kg/sq. cm (2.75 Bars) (40 lb/sq.in.)

Snow Tyres

Dunlop S.P.44 Weathermaster tyres (185 x 15) may be fitted to rear wheels only. With these tyres, speeds should be restricted to 137 km/h (85 m.p.h.) for normal use with an absolute maximum of 160 km/h (100 m.p.h.). Recommended tyre pressures are 2,25 kg/sq.cm. (2,2 Bars) (32 lb/sq.in.).

Special inner tubes marked with the tyre size and carrying the lettering WEATHERMASTER ONLY are available and MUST be fitted with these tyres.

	Early cars	Later cars
Electrical Equipment		
Battery – Make and Type	Lucas XCA 55/8	Lucas CP 13/11/8
Voltage	12	12
Number of plates per cell	11	11
Capacity at ten hour rate	53	60
Capacity at twenty hour rate	60	70

Alternator	
Make	Butec
Nominal voltage	12 volts
Maximum output	60 amperes
Maximum operating speed	10,000 alternator revs/min.
Resistance of rotor coil	3.6 to 4.0 Ohms.
Starter Motor	
Make and Type	Lucas M45G Pre-engaged drive
Lock torque	4,007 kg/m (29 lb.ft.) at 940 Amps.
Torque at 1,000 rev/min	1,8 kg/m (13 lb.ft.) at 535 Amps.
Light running current	100 Amps at 5,000 to 6,000 revs/min
Starter Motor Solenoid Switch	
Closing coil resistance (measured between terminal 'STA', copper link removed and Lucar terminal)	0.36 to 0.42 Ohms.
Hold on coil resistance (measured between Lucar terminal and solenoid outer case)	1.49 to 1.71 Ohms.
Distributor	
Make and Type	Lucas 36 DE 12
Service Number	41321
Windscreen Wiper Motor	
Light running speed – rack disconnected (after 60 seconds from cold) – Normal	40 revs/min.
– High	60 revs/min.
Light running current (after 60 seconds from cold) – Normal	1.0 Amps.
– High	1.5 Amps.
Pressure of blades against windscreen	425g to 481g (15 to 17 ozs.)

ROAD SPEED/R.P.M. DATA

The following tables give the relationship between engine revolutions per minute and road speed in miles and kilometers per hour.
The safe maximum speed is **6,500 revolutions per minute.**
Engines must not, under ANY CIRCUMSTANCES, be allowed to exceed this figure.
It is recommended that engine revolution **in excess of 6,000 per minute** should not be exceeded for long periods.
Therefore, if travelling at sustained high speed on motorways, the accelerator should be released occasionally to allow the car to overrun for a few seconds.

Road Speed		Final Drive Ratio 3.31:1 Engine Revolutions Per Min.			
K.p.h.	M.p.h.	First Gear 9.71:1	Second Gear 6.31:1	Third Gear 4.6:1	Top Gear 3.31:1
32	20	2551	1658	1209	869
64	40	5100	3314	2416	1739
96	60		4972	3624	2608
128	80			4833	3477
160	100				4345

Road Speed		Final Drive Ratio 3.54:1 Engine Revolutions Per Min.			
K.p.m.	M.p.h.	First Gear 10.39:1	Second Gear 6.74:1	Third Gear 4.92:1	Top Gear 3.54:1
32	20	2729	1770	1292	930
64	40	5456	3541	2584	1860
96	60		5311	3877	2789
128	80			5169	3718
160	100				4647

Note: The figures in these tables are theoretical and actual figures may vary slightly from those quoted due to such factors as tyre wear, pressures etc.

AUTOMATIC TRANSMISSION DATA

Maximum ratio of torque convertor	2.00:1
1st gear reduction	2.40:1
2nd gear reduction	1.46:1
3rd gear reduction	1.00:1
Reverse gear reduction	2.00:1

Automatic Shift Speeds
(All Axle Ratios)

	M.P.H.	K.P.H.
Light Throttle Upshifts		
1 – 2	8–16	12–25
2 – 3	20–31	32–49
Shut Throttle Downshifts		
2 – 1	3–7	4–11
3 – 2	16–21	25–33
Full Throttle Upshifts		
1 – 2	45–59	72–95
2 – 3	80–95	128–152
Manual Shut Throttle Downshift		
3 – 1	22–31	35–49
Part Throttle Downshift		
Obtainable up to	30–41	48–66

Dimensions and Weights

Wheel base	2,66 m (8 ft. 9 in.)
Track – Front	1,38 m (4 ft. 6.375 in.)
– Rear – wire wheels	1.35 m (4 ft. 5.375 in.)
– Rear – pressed wheels	1,33 m (4 ft. 4.750 in.)
Overall length	4,67 m (15 ft. 4.375 in.)
Overall height (2 + 2)	1,30 m (4 ft. 3.125 in.)
(Open sports)	1,25 m (4 ft. 0.125 in.)
Kerb weight – approximately	1558 kg. (3435 lb.)
– with air conditioning	1587,5 kg. (3500 lb.)
Ground clearance	140 mm (5.500 in.)

Capacities

	Litre	Imp. Pints	U.S. Pints
Engine – Refill including filter	10,7	19.0	23
Gearbox	2,4	3.0	3.25
Automatic transmission unit (from dry)	9,0	16.0	19.0
Final drive unit	1,54	2.75	3.05
Cooling system	20,5	36.0	43
Petrol tank	81,0	18.0 gallons	20.25 gallons

Luggage compartment – Open two seater	0,135 m^3 (4.75 cu.ft.)
– 2 + 2 seat back lowered	0,354 m^3 (12.5 cu.ft.)
– 2 + 2 seat back raised	0,27 m^3 (9.5 cu.ft.)

LAMP BULBS				
LAMP	LUCAS BULB NO.	VOLTS	WATTS	APPLICATION
Head	Sealed Beam Unit 411	12	75/50 50/40 60/50 45/40 (Yellow)	Home and R.H. drive export U.S.A./CANADA L.H. drive (Not U.S.A./CANADA) FRANCE
Side/flasher	380	12	6/21	U.S.A./CANADA – ITALY ONLY
Front flasher	382	12	21	All countries (Not U.S.A./ CANADA – ITALY)
Sidelamp	501	12	5	All countries (not U.S.A./ CANADA – ITALY)
Rear Flashing Indicators Reversing Light	382 273	12 12	21 21	
Rear/Brake	380	12	21/6	
Number Plate Illumination	989	12	5	
Interior Lights	382 989	12 12	21 6	Open 2 Seater 2 + 2
Map Light	989	12	6	
Instrument Illumination Headlamp warning light Ignition warning light Fuel level warning light Handbrake/Brake Fluid warning light Mixture control warning light Traffic warning device indicator light	987	12	2	
Switch indicator strip Flashing indicator warning light	281	12	2	
Automatic transmission selector quadrant	281	12	2	

General Data

Number of cylinders	12
Bore	90 mm (3.543 in)
Stroke	70 mm (2.756 in)
Cubic capacity	5343 c.c. (326.0 cu. in.)
Compression ratio	9:1
Ignition timing	12° B.T.D.C. (Static) 4° A.T.D.C. (Idling)
Firing order 'A' Bank – Right hand 'B' Bank – Left hand Number one cylinders at front of engine	1A, 6B, 5A, 2B, 3A, 4B, 6A, 1B, 2A, 5B, 4A, 3B,

Cylinder Block

Material (Cylinder Block)	Aluminium alloy
Angle of cylinders	60° Vee
Type of cylinder liner	Slip fit, wet liner
Material (Liners)	Cast iron
Nominal size of bore after honing	
GRADE 'A' – RED	89.98 mm (3.543 in)
GRADE 'B' – GREEN	90.01 mm (3.544 in)
Outside diameter of liner – Both grades	97.99 mm +.02 mm –.00 mm (3.858 in +.001 in –.00 in)
Main line bore for main bearings	80.41 mm to 80.49 mm (3.1665 to 3.1667 in)

Cylinder Heads

Material	Aluminium alloy
Valve seat angle – Inlet	44½°
– Exhaust	44½°

Crankshaft

Material	Manganese molybdenum steel
Number of main bearings	7
Main bearing type	Vandervell V.P.3
Journal diameter	76.201 mm to 76.203 mm (3.0007 in to 3.0012 in)
Journal length – Front	29.72 mm to 29.97 mm (1.170 in to 1.180 in)
– Centre	36.21 mm to 36.22 mm (1.425 in to 1.426 in)
– Intermediate	30.43 mm to 30.53 mm (1.198 in to 1.202 in)
– Rear	36.21 mm to 36.22 mm (1.425 in to 1.426 in)
Thrust taken	Centre bearing thrust washers
Thrust washer thickness – T48 + .010 in = .25 mm (.010 in) – T48 + .014 in = .35 mm (.020 in)	
Permissible end float	.10 mm to .15 mm (.004 in to .006 in)
Width of main bearing – Front	24.45 mm to 24.7 mm (.963 in to .973 in)
– Centre	30.2 mm to 30.5 mm (1.190 in to 1.200 in)
– Intermediate	24.45 mm to 24.7 mm (.963 in to .973 in)
– Rear	30.2 mm to 30.5 mm (1.190 in to 1.200 in)
Diametrical clearance – All bearings	.04 mm to .07 mm (.0015 in to .003 in)
Crankpin diameter	58.40 mm to 58.42 mm (2.2994 in to 2.3000 in)
Crankpin length	42.92 mm to 43.20 mm (1.699 in to 1.701 in)
Regrind undersize	.25 mm (.010 in); .51 mm (.020 in); .76 mm (.030 in); 1.02 mm (.040 in)

Connecting Rods

Length between centres	151.4 mm +.12 mm –.00 mm (5.96 in +.005 in –.000 in)
Big end bearing material	Lead indium
Bore for big end bearing	70.0 mm +.15 mm –.00 mm (2.441 in +.006 in –.000 in)
Width of big end bearing	18.3 mm to 18.5 mm (.720 in to .730 in)
Big end diametrical clearance	.04 mm to .07 mm (.0015 in to .0034 in)
Big end side clearance	.17 mm to .33 mm (.007 in to .013 in)
Small end bush material	Clevite 10
Bore for small end bush	27.0 mm +.02 mm –.00 mm (1.062 in +.001 in –.000in)
Width of small end bush	26.2 mm to 26.7 mm (1.03 in to 1.05 in)
Bore diameter of small end bush	23.8 mm to 23.9 mm (.9375 in to .9377 in)

Pistons

Type	Solid skirt
Skirt clearance (measured midway down bore across bottom of piston skirt	.03 mm to .04 mm (.0012 in to .0017 in)

Piston Rings	
Number of compression rings	2
Number of oil control rings	1
Top compression ring width	3.81 mm to 4.06 mm (.150 in to .160 in)
Second compression ring width	3.81 mm to 4.06 mm (.150 in to .160 in)
Oil control ring width	Self expanding
Width of oil control ring rails	3.37 mm ±.07 mm (.103 in ±.003 in)
Top compression ring thickness	1.56 mm to 1.58 mm (.062 in to .063 in)
Second compression ring thickness	1.95 mm to 1.98 mm (.077 in to .078 in)
Side clearance of top compression ring in groove	.07 mm (.0029 in)
Side clearance of second compression ring in groove	.08 mm (.0034 in)
Side clearance of oil control rings in groove	.14 mm to .17 mm (.0055 in to .0065 in)
Top compression ring gap in bore	.35 mm to .48 mm (.014 in to .020 in)
Second compression ring gap in bore	.25 mm to .38 mm (.010 in to .015 in)
Gap of oil control ring rails in bore	.38 mm to 1.14 mm (.015 in to .045 in)
Gudgeon Pins	
Type	Fully floating
Length	79.24 mm to 79.40 mm (3.120 in to 3.125 in)
Outside diameter – Grade 'A' Red	23.80 mm (.9375 in)
– Grade 'B' Green.	23.75 mm (.9373 in)
Camshafts	
Number of journals	Seven per shaft
Number of bearings	Seven per shaft (fourteen half bearings)
Type of bearings	Aluminium alloy – Camshafts run direct in caps
Journal diameter – All journals	27.11 mm +.015 mm –.000 mm (1.0615 in +.0005 in –.000 in)
Diametrical clearance	.03 mm to .07 mm (.001 in to .003 in)
Thrust taken	Front end of shafts
Jackshaft	
Number of bearings	3
Diametrical clearance in block	.015 mm to .076 mm (.0005 in to .003 in)
Thrust taken	Front end of shaft
Permissible end float	.13 mm (.005 in)
Line bore of front bearing	31.77 mm to 32.00 mm (1.251 in to 1.252 in)
Line bore of centre and rear bearing	30.22 mm to 30.24 mm (1.190 in to 1.191 in)
Valve Timing	
Inlet valve opens	17° B.T.D.C.
Inlet valve closes	59° A.B.D.C.
Exhaust valve opens	59° B.B.D.C.
Exhaust valve closes	17° A.T.D.C.
Valves and Valve Springs	
Inlet valve material	Silico chrome steel
Exhaust valve material	Austenitic steel
Inlet valve head diameter	41.22 mm to 41.32 mm (1.623 in to 1.627 in)
Exhaust valve head diameter	34.5 mm to 34.6 mm (1.358 in to 1.362 in)
Valve stem diameter – Inlet and Exhaust	**7.84 mm to 7.87 mm (.3092 in to .3097 in)**
Valve lift	9.5 mm (.375 in)
Inlet valve clearance	.304 mm to .355 mm (.012 in to .014 in)
Exhaust valve clearance	.304 mm to .355 mm (.012 in to .014 in)
Outer valve spring free length	53.4 mm (2.103 in)
Inner valve spring free length	44.0 mm (1.734 in)
Valve Guides and Seats	
Valve guide material	Cast iron
Inlet valve guide length	48.5 mm (1.910 in)
Exhaust valve guide length	54.0 mm (2.125 in)
Inlet valve guide outside diameter	As exhaust valve guide

Valve Guides and Seats – Continued	
Exhaust valve guide outside diameter	Standard:– 12.75 mm to 12.72 mm (.502 in to .501 in) Diameter First oversize (2 grooves) 12.92 mm to 12.85 mm (.507 in to .506 in) Diameter Second oversize (3 grooves) 15.29 mm to 15.26 mm (.512 in to .511 in) Diameter
Inlet valve guide finished bore	7.87 mm to 7.88 mm (.311 in to .312 in)
Exhaust valve guide finished bore	7.87 mm to 7.88 mm (.311 in to .312 in)
Maximum clearance between valve stem and guide	.05 mm to .06 mm (.0020 in to .0023 in)
Interference fit in cylinder head	.05 mm to .15 mm (.002 in to .006 in)
Valve seat insert material	Sintered iron
Inlet valve seat insert diameter	43.9 mm $^{+.01\text{ mm}}_{-.000\text{ mm}}$ (1.7282 in $^{+.0005\text{ in}}_{-.0000\text{ in}}$)
Exhaust valve seat insert diameter	37.8 mm $^{+.01\text{ mm}}_{-.000\text{ mm}}$ (1.4882 in $^{+.0005\text{ in}}_{-.0000\text{ in}}$)
Inlet valve seat inside diameter	33.4 mm $^{+.25\text{ mm}}_{-.00\text{ mm}}$ (1.350 in $^{+.010\text{ in}}_{-.000\text{ in}}$) to to 37.84 mm $^{+.25\text{ mm}}_{-.00\text{ mm}}$ (1.490 in $^{+.010\text{ in}}_{-.000\text{ in}}$)
Exhaust valve seat inside diameter	29.4 mm $^{+.20\text{ mm}}_{-.00\text{ mm}}$ (1.160 in $^{+.008\text{ in}}_{-.000\text{ in}}$) to to 33.5 mm $^{+.25\text{ mm}}_{-.00\text{ mm}}$ (1.325 in $^{+.010\text{ in}}_{-.000\text{ in}}$)
Service replacements	
Inlet valve seat insert diameter	44.26 mm $^{+.01\text{ mm}}_{-.00\text{ mm}}$ (1.744 in $^{+.0005\text{ in}}_{-.0000\text{ in}}$)
Exhaust valve seat insert diameter	38.17 mm $^{+.01\text{ mm}}_{-.00\text{ mm}}$ (1.503 in $^{+.0005\text{ in}}_{-.0000\text{ in}}$)
Inlet valve seat inside diameter	35.56 mm $^{+.07\text{ mm}}_{-.00\text{ mm}}$ (1.400 in $^{+.003\text{ in}}_{-.000\text{ in}}$) to to 39.74 mm $^{+.25\text{ mm}}_{-.00\text{ mm}}$ (1.565 in $^{+.010\text{ in}}_{-.000\text{ in}}$)
Exhaust valve seat inside diameter	30.1 mm $^{+.07\text{ mm}}_{-.00\text{ mm}}$ (1.185 in $^{+.003\text{ in}}_{-.000\text{ in}}$) to to 33.4 mm $^{+.12\text{ mm}}_{-.00\text{ mm}}$ (1.315 in $^{+.005\text{ in}}_{-.000\text{ in}}$)
Tappets and Tappet Guides	
Tappet Material	Cast Iron (Chilled)
Outside diameter of tappet	34.89 mm to 34.90 mm (1.373 in to 1.374 in)
Diametrical clearance	.02 mm to .04 mm (.001 in to .002 in)
Lubricating System	
Oil pump	Epicyclic gear type
Oil pump gears	Diametrical Clearance / Radial Clearance.
Driving gear O/D	.127 mm to .304 mm (.005 in to .012 in) / .07 mm to .152 mm (.0025 in to .006 in)
Driven gear O/D	.178 mm to .254 mm (.007 in to .010 in) / .09 mm to .13 mm (.0035 in to .005 in)
Driven gear I/D	.28 mm to .46 mm (.011 in to .018 in) / .14 mm to .23 mm (.0055 in to .009 in)
Side clearance – Driving and Driven Gear	.12 mm to .17 mm. (.0045 in to .0065 in)
Oil filter type	Full flow, renewable element
Timing Chains and Sprockets	
Type of chain	Duplex endless
Pitch	9.5 mm (.375 in)
Number of pitches	180
Camshaft sprockets – number of teeth (each)	42
Crankshaft sprocket – number of teeth	21
Jackshaft sprocket – number of teeth	21
Sparking Plugs	
Make	Champion
Type	N9Y
Gap	.63 mm (.025 in)

TORQUE WRENCH SETTINGS

ENGINE

	Kg.m	lb.ft.
Cylinder head nuts 7/16 in U.N.F.	7.2	52
3/8 in U.N.F.	**3.7	27.5**
Main bearing nuts 3/8 in U.N.F.	3.7	27.5
1/2 in U.N.F.	8.6	62.5
Big end nuts	5.1	37.5
Flywheel bolts	9.1	66.5
Crankshaft bolt	17,3 to 20,7	125 to 150
Camshaft bearing cap nuts	1.2	9
Camshaft cover nuts and bolts	1.1	8
Torque converter bolts	4.8	35
Main bearing studs 3/8 in.	0.7	5
1/2 in.	2.7	20
Cylinder head studs 3/8 in.	0.7	5
1/2 in.	2.1	15
Engine mounting bracket to frame	2.1 to 2.5	15 to 18
Mounting rubber to frame bracket	3.8 to 4.4	28 to 32
Mounting rubber to engine bracket	3.8 to 4.4	28 to 32
Rear engine mounting bolt	9.6 to 10.4	70 to 75
Rear engine mounting to body	2.1 to 2.5	15 to 18
Fuel System		
Sump to petrol tank	3.5	25
Petrol tank drain plug	3.5	25
Petrol tank mounting bolts	1.6	12
Fuel pump mounting to bracket	1.0	7
Fuel pump bracket to body	1.0	7
Fuel filter to mounting bracket	2.5	18
Mounting bracket to body	2.5	18
1. Petrol pipe to torsion bar reaction bracket	3.8 to 4.4	28 to 32
Carbon canister to body	2.5	18
Banjo bolts and unions with exception of 1 above	3.0 to 3.5	21 to 25
Cooling System		
Support bracket to radiator	2.5	18
Support bracket to sub-frame	3.5	25
Thermostatic switch to tee-piece	0.5	4
Fan cowl to radiator	0.8	6
Manifold and Exhaust System		
Exhaust manifolds to down pipes	3.5	25
Exhaust pipe coupling flange nuts	1.5 to 1.8	11 to 13
Clutch		
Pedal box to body	1.8	13
Pedal shaft retaining nut	2.5 to 3.0	18 to 22
Master cylinder to pedal box	1.8	13
Automatic Transmission		
Pump to gear case bolt	2.35 to 3.04	17 to 22
Front servo to gear case bolt	4.15 to 4.84	30 to 35
Rear servo to gear case bolt	5.53 to 6.91	40 to 50
Centre support to gear case bolt	2.76 to 3.46	20 to 25
Valve body to gear case bolts 1/4 in.	0.69 to 1.11	5 to 8
Valve body to gear case bolts 5/16 in.	2.35 to 2.76	17 to 20
Extension housing to gear case bolts	3.87 to 4.56	28 to 33
Oil pan to gear case bolts	1.38 to 1.80	10 to 13

Automatic Transmission (Cont.)	Kg.m	lb.ft.
Pressure check point plug	1.80 to 2.35	13 to 17
Filler tube nut	2.76 to 3.46	20 to 25
Rear band adjusting screw locknut	5.53 to 6.08	40 to 44
Gear case to bell housing bolts	8.02 to 8.98	58 to 65
Manual lever attaching nut	4.84 to 5.53	35 to 40
Front pump cover attaching screw	0.28 to 0.42	2 to 3
Governor inspection cover attaching screws	0.69 to 0.83	5 to 6
Governor valve body to counter-weight bolts	0.55 to 0.69	4 to 5
Governor valve body cover screws	0.28 to 0.35	2 to 2.5
Valve body and strainer screws	0.28 to 0.35	2 to 2.5
Vacuum control unit	1.80 to 2.35	13 to 17
Rear seal cover to extension housing bolt	4.15 to 4.84	30 to 35
Selector lever return spring locknut	0.5 to 0.6	4 to 4.5
Reverse switch	2.7	20
Ball end to gearbox lever	0.8 to 0.9	6 to 7
Cable to ball end	1.5 to 1.8	11 to 13
Propeller Shaft		
Driving flange nuts	3.8 to 4.3	28 to 32
Final Drive Unit		
Final drive unit to cross beam	9.7 to 10.6	70 to 77
Fulcrum pin (inner) securing nut	6.2 to 6.9	45 to 50
Fulcrum pin (outer) securing nut	13.1 to 14.5	95 to 105
Final drive unit to drive shafts	6.9 to 7.6	50 to 55
Half shaft to hub carrier	19.3	140
Companion flange nut	16.6 to 19.3	120 to 140
Output shaft oil seal housing bolts	7.6 to 9.7	55 to 70
Drive gear bolts	9.7 to 11.1	70 to 80
Differential bearing cap bolts	**8.3 to 9.0**	60 to 65
Power Assisted Steering		
Track rod ball joint nut	6.2 to 6.9	45 to 50
Steering rack to track rod	8.3 to 11.1	60 to 80
Steering column to body	2.1 to 2.5	15 to 18
Steering wheel to inner column	7.0 to 7.6	50 to 55
Universal joint to steering pinion	1.1	8
Universal joints to upper and lower columns	2.1 to 2.5	15 to 18
Front Suspension		
Stub axle to vertical link	**13.4 to 14.8	97 to 107**
Tie rod lever to vertical link	7.0 to 7.6	50 to 55
Ball joint cap to vertical link	2.1 to 2.7	15 to 20
Upper fulcrum shaft nut	8.3 to 9.7	60 to 70
Lower fulcrum shaft nut	11.1 to 13.1	80 to 95
Upper wishbone pinch bolt	2.1 to 2.5	15 to 18
Fulcrum mounting brackets to frame	3.8 to 4.4	28 to 32
Anti-roll bar to frame	2.5	18
Link to anti-roll bar	7.0 to 7.6	50 to 55
Link to lower wishbone	7.0 to 7.6	50 to 55
Torsion bar cam adjuster nut	7.0 to 7.6	50 to 55
Torsion bar mounting bracket to body	7.0 to 7.6	50 to 55
Damper to frame	6.2 to 6.9	45 to 50
Damper to wishbone	6.2 to 6.9	45 to 50

	K.gm	lb.ft.
Rear Suspension		
Radius rod to wishbone	6.2 to 6.9	45 to 50
Radius rod and safety strap to body	5.5 to 6.2	40 to 45
Safety strap to body	2.1 to 2.5	15 to 18
Vee mounting fixings	2.1 to 2.5	15 to 18
Damper fixings	4.1 to 5.0	30 to 36
Front Brakes		
Brake disc to hub	4.1 to 5.0	30 to 36
Brake caliper to vertical link	7.0 to 8.3	50 to 60
Disc shield to vertical link	1.0	7
Rear Brakes		
Brake caliper to drive flange	7.0 to 7.6	50 to 55
Handbrake assembly to body	2.1 to 2.5	15 to 18
Fork end locknut	1.0	7
Compensator to cross beam	2.1 to 2.5	15 to 18
Brake Controls		
Pedal box to body	1.5 to 1.8	11 to 13
Pedal shaft nut	2.5 to 3.0	18 to 22
Vacuum tank to body	0.8 to 1.0	6 to 7
Fluid container clamp	0.45 to 0.61	3.5 to 4.5
Banjo bolt on master cylinder	3.8 to 4.4	28 to 32
1. Three way connections	1.0	7
2. Flexible hoses to body	3.8 to 4.4	28 to 32
3. Brake pipe to torsion bar reaction bracket	3.8 to 4.4	28 to 32
Hydraulic connections with exception of 1, 2 and 3 above	0.9 to 1.0	6.5 to 7
Road Wheels		
Wheel nuts	6.9 to 8.3	50 to 60
Body		
Accelerator mounting bracket to floor	1.0	7
Accelerator pedal to mounting bracket	1.0	7
Sub-frame to body	2.1 to 2.5	15 to 18
Sub-frame to body channels	3.8 to 4.4	28 to 32
Upper cross member to sub-frame	3.8 to 4.4	28 to 32
Lower cross member to sub-frame	2.1 to 2.5	15 to 18
Brake air duct to body	0.5	4
Heating System		
Heater box to bulkhead	1.0	7
Air Conditioning		
Condenser to radiator	1.0	7
Hose to evaporator	3.0 to 3.7	21 to 27
Evaporator hose to compressor	4.2 to 4.8	30 to 35
Condenser hose to compressor	4.2 to 4.8	30 to 35
Compressor hose to condenser	3.0 to 3.7	21 to 27
Drier bottle hose to condenser	2.0 to 2.7	15 to 20
Hoses to drier bottle – Aluminium tank	1.5 to 2.1	11 to 13
– Steel tank	4.2 to 4.8	30 to 35
Drier bottle hose to evaporator	1.5 to 2.1	11 to 13
Expansion valve to evaporator joint – expansion valve	2.1 to 2.8	15 to 20

RECOMMENDED LUBRICANTS, FLUID AND FUEL

Component	MOBIL	CASTROL	SHELL	ESSO	B.P.	DUCKHAM	TEXACO
Engine	Mobiloil Super or Mobiloil Special 20/50	Castrol GTX	Shell Super Oil	Uniflo	B.P. Super Visco-Static 20-50	Q20-50	Havoline 20W/40 or 10W/30
Upper cylinder lubrication	Mobil Upperlube	Castrollo	Shell U.C.L. or Donax U	Esso U.C.L.	B.P. U.C.L.	Adcoid Liquid	Texaco U.C.L.
Distributor oil can points Oil can lubrication	Mobiloil Super	Castrol GTX	Shell Super Oil	Uniflo	B.P. Super Visco-Static 20-50	Q20-50	Havoline 30
Gearbox Final Drive Unit ("Powr-Lok") top up only	Mobilube GX 90	Castrol Hypoy	Spirax 90 E P	Esso Gear Oil GX 90/140	B.P. Gear Oil SAE 90 EP	Hypoid 90	Multigear Lubricant EP.90
Final Drive Unit ("Powr-Lok") refill	Mobilube 46	Hypoy LS	Shell S.7143	Esso Gear oil GP 90/140	B.P. Limslip Gear oil 90/1	Hypoid 90 DL	3450 Gear Oil
Front wheel bearings Rear wheel bearings Final drive halfshafts Steering tie-rods Wheel swivels Door Hinges Steering housing	Mobil-grease MP or Mobil grease Super	Castrol LM Grease	Retinax A	Esso Multi-purpose Grease H	B.P. Energrease L. 2	LB.10	Marfak All Purpose
Automatic transmission unit Power steering system	Mobil ATF 210	Castrol T.Q.F.	Shell Donax 17	Esso Glide	B.P. Autran B	Q-matic	Texamatic Type F

RECOMMENDED HYDRAULIC FLUID

Braking System and Clutch Operation

Castrol-Girling Brake Fluid (Green). This fluid exceeds S.A.E. **J.1703/C** specification.

FUEL REQUIREMENTS FOR V12 ENGINES

The engine of this car is fitted with high compression ratio pistons (indicated by H after the engine number) use only Super grade fuel with a minimum octane rating of 98.
(Research method)

In the United Kingdom use '4 STAR' FUEL

If, of necessity, the car has to be operated on lower octane fuel do not use full throttle otherwise detonation may occur with resultant piston trouble.

CAPACITIES AND VEHICLE DIMENSIONS

Capacities	Litres	Imp. Pints	U.S. Pints
Engine (refill including filter)	10,7	19.0	23
Gearbox	2,4	3.0	3.25
Automatic transmission unit (from dry)	9,0	16.0	19
Final drive unit	1,54	2.75	3.25
Cooling system	20,5	**36.0**	43
Petrol tank	81,0	18 Galls:	20.25 Galls:

Luggage Compartment (Open sports)	.135 m^3 (4.75 cu.ft)
(2+2 – seat back lowered)	.354 m^3 (12.5 cu.ft)
(2+2 – seat back raised)	.27 m^3 (9.5 cu.ft)

Dimensions and Weights

Wheel base	2.66m (8ft 9ins)
Track (front)	1.38m (4ft 6 3/8ins)
(rear – wire wheels)	1.35m (4ft 5 3/8ins)
(rear – ventilated disc wheels)	1.33m (4ft 4¾ins)
Overall length	4.67 m (15ft 4 3/8ins)
Overall height (2+2)	1.30m (4ft 3 1/8ins)
(open sports)	1.25m (4ft 0 1/8ins)
Kerb weight (approximately)	1558kg (3435lb)
(with air-conditioning)	1587.5kg (3500lb)
Turning circle – (approximately)	
Wire wheels – Left lock	11.07m (36ft 4ins)
– Right lock	10.6m (34ft 10ins)
Ventilated disc wheels – Left lock	11.07m (36ft 4ins)
– Right lock	10.8m (35ft 7ins)
Ground clearance	140mm (5½ins)

CONTENTS

LUBRICATION CHART

Daily

1. Engine – Check oil level and top up if necessary.
2. Cooling system – Check coolant level and top up if necessary.

Weekly

3. Battery – Check electrolyte level and top up if necessary.
4. Tyres – Check for damage; adjust pressures including spare.

Every 5,000 Km. (3,000 miles)

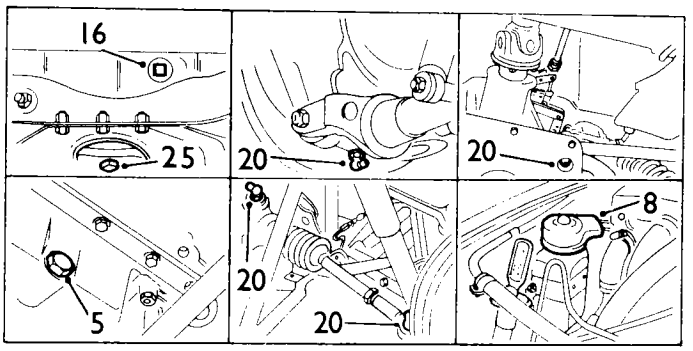
5. Engine – Change oil.
6. Cooling system – Check coolant level and top up if necessary.
7. Clutch fluid reservoir – Check fluid level and top up if necessary.
8. Brake fluid reservoirs – Check fluid level and top up if necessary.
9. Power assisted steering – Check fluid level in reservoir and top up if necessary.
10. Carburetters – Top up carburetter piston dampers.

Every 10,000 Km. (6,000 miles)

11. Carry out operations 5 to 10.
12. Engine – Renew oil filter element.
13. Clutch – Lubricate linkage – Manual transmission cars only.
14. Distributor – Lubricate.
15. Gearbox – Check oil level and top up if necessary.
16. Final drive unit – Check oil level and top up if necessary.
17. Lubricate gearbox selector linkage – Cars fitted with automatic transmission only.
18. Handbrake – Lubricate mechanical linkage and cables.
19. Lubricate accelerator linkage.
20. Grease all points excluding wheel hubs.
21. Fuel filter – Renew element.
22. Battery – Check electrolyte level and top up if necessary.
23. Lubricate – Bonnet, boot and door locks; boot and door hinges.

Every 20,000 Km. (12,000 miles)

24. Carry out operations 11 to 13, 17 to 19 and 21 to 23.
25. Final drive unit – Drain oil and refill.
26. Grease all points including wheel hubs.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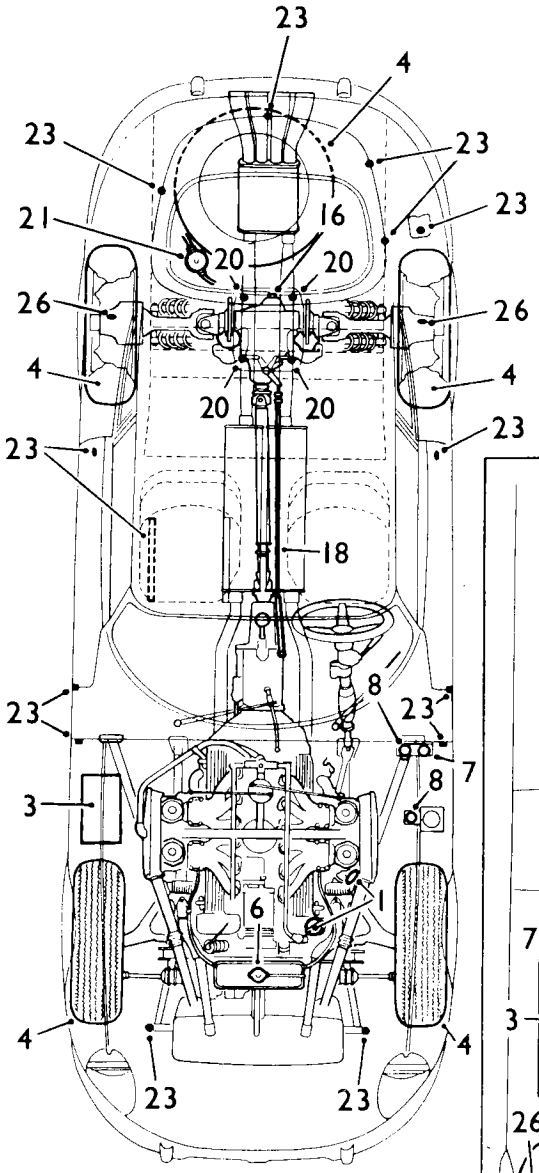
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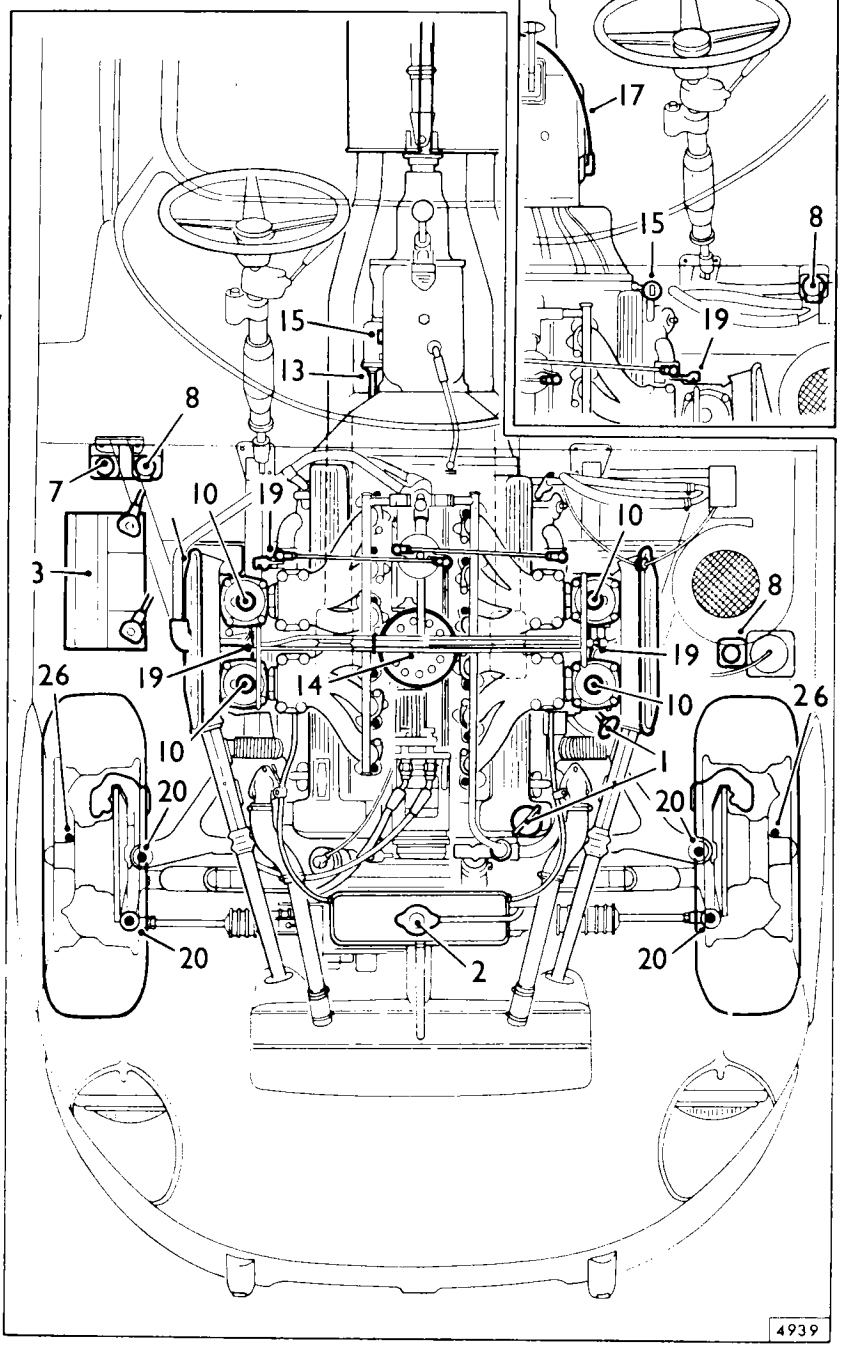
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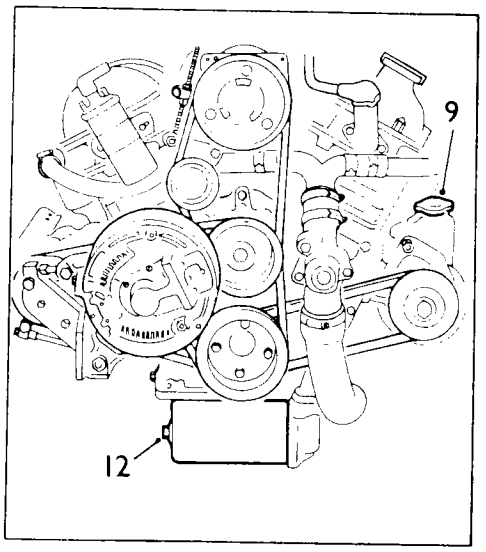
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RECOMMENDED LUBRICANTS, FLUID AND FUEL

Component	MOBIL	CASTROL	SHELL	ESSO	B.P.	DUCKHAM	TEXACO
Engine	Mobiloil Super or Mobiloil Special 20/50	Castrol GTX	Shell Super Oil	Uniflo	B.P. Super Visco-Static 20-50	Q20-50	Havoline 20W/40 or 10W/30
Upper cylinder lubrication	Mobil Upperlube	Castrollo	Shell U.C.L. or Donax U	Esso U.C.L.	B.P. U.C.L.	Adcoid Liquid	Texaco U.C.L.
Distributor oil can points Oil can lubrication	Mobiloil Super	Castrol GTX	Shell Super Oil	Uniflo	B.P. Super Visco-Static 20-50	Q20-50	Havoline 30
Gearbox Final Drive Unit ("Powr-Lok") top up only	Mobilube GX 90	Castrol Hypoy	Spirax 90 E.P.	Esso Gear Oil GX 90/140	B.P. Gear Oil SAE 90 E P	Hypoid 90	Multigear Lubricant EP.90
Final Drive Unit ("Powr-Lok") refill	Mobilube 46	Hypoy LS	Shell S.7143	Esso Gear Oil GP 90/140	B.P. Limslip Gear oil 90/1	Hypoid 90 DL	3450 Gear Oil
Front wheel bearings Rear wheel bearings Final drive half shafts Steering tie-rods Wheel swivels Door Hinges Steering housing	Mobil-grease MP or Mobil grease Super	Castrol LM Grease	Retinax A	Esso Multi-purpose Grease H	B.P. Energrease L.2	LB.10	Marfak All Purpose
Automatic transmission unit Power steering system	Mobil ATF 210	Castrol T.Q.F.	Shell Donax T7	Esso Glide	B.P. Autran B	Q-matic	Texamatic Type F

RECOMMENDED HYDRAULIC FLUID

Braking System and Clutch Operation

Castrol-Girling Brake Fluid (Green). This fluid exceeds S.A.E. **J.1703/C** specification.

FUEL REQUIREMENTS FOR V12 ENGINES

The engine of this car is fitted with high compression ratio pistons (indicated by H after the engine number) use only Super grade fuel with a minimum octane rating of 98. (Research method)

In the United Kingdom use '4 STAR' Fuel

If, of necessity, the car has to be operated on lower octane fuel do not use full throttle otherwise detonation may occur with resultant piston trouble.

Operation number / Description	10.10.06 EVERY 5,000 Km. (3,000 mls.)	10.10.12 EVERY 10,000 Km. (6,000 mls.)	10.10.24 EVERY 20,000 Km. (12,000 mls.)
ENGINE			
Oil – Drain and refill		X	X
**Oil – Check/top up	X**		
Oil filter – Renew element	X	X	X
Check engine for oil leaks and report	X	X	X
Check engine timing using stroboscope		X	X
Clean/adjust spark plugs		X	
Renew spark plugs			X
Lubricate distributor		X	X
Check tightness of manifold nuts and bolts			X
Clean crankcase breather filter			X
COOLING SYSTEM			
Check/top up coolant	X	X	X
Check cooling and heating system for leaks and report		X	X
FUEL SYSTEM			
Check/top up carburetter piston dampers	X	X	X
Check/adjust carburetter settings		X	X
Lubricate throttle linkage		X	X
Air cleaners – Renew filter element and seal			X
Fit red emission pack (Cars fitted with exhaust emission control)			40,000 Km. (24,000 mls.)
Renew charcoal canister (Cars fitted with exhaust emission control)			40,000 Km. (24,000 mls.)
Check fuel pipes and unions for leaks, chafing and corrosion; report findings	X	X	X
Fit new fuel filter element		X	X
CLUTCH – Cars fitted with manual transmission only			
Check/top up fluid level in reservoir	X	X	X
Check/adjust push rod free travel		X	X
Check clutch pipes and unions for leaks, chafing and corrosion; report findings	X	X	X
Lubricate linkage		X	X
MANUAL GEARBOX (if fitted)			
Check/top up oil level		X	X
Check for oil leaks and report	X	X	X
AUTOMATIC GEARBOX (if fitted)			
Check/top up oil level		X	X
Lubricate exposed selector linkage		X	X
Check for oil leaks and report	X	X	X
FINAL DRIVE UNIT			
Check/top up oil level		X	
Drain oil and refill with correct grade of hypoid oil			X
Check for oil leaks and report	X	X	X

Operation number Description	10.10.06 EVERY 5,000 Km. (3,000 mls.)	10.10.12 EVERY 10,000 Km. (6,000 mls.)	10.10.24 EVERY 20,000 Km. (12,000 mls.)
BRAKING SYSTEM			
Check/top up fluid level in reservoirs	X	X	X
Check brake pads for wear, condition of discs and report	X	X	X
Lubricate hand brake mechanical linkage and cable		X	X
Check brake pedal travel, handbrake operation and report	X	X	X
Drain system, refill with fresh fluid			40,000 Km. (24,000 mls.)
Overhaul complete braking system			80,000 Km. (48,000 mls.)
Check brake pipes and unions for chafing, leaks and corrosion; report findings	X	X	X
POWER ASSISTED STEERING			
Check/top up oil in reservoir	X	X	X
Check condition of steering joints and report	X	X	X
Check condition of gaiters and report	X	X	X
Check steering system for oil leaks and report	X	X	X
Check security of suspension fixings			X
DRIVING BELTS			
Check/adjust driving belts and report condition	X	X	X
EXHAUST SYSTEM			
Check exhaust system for security and signs of leaks; report findings	X	X	X
Check exhaust manifold nuts for tightness			X
ELECTRICAL SYSTEM			
Check/top up battery	X	X	X
Check battery condition, if necessary, clean and grease terminals		X	X
Check/adjust headlight alignment	X	X	X
Check operation of electrical systems and report	X	X	X
WINDSCREEN WIPERS AND WASHERS			
Check/top up windscreen washer reservoir	X	X	X
Check condition of windscreen wiper blades, renew if necessary	X	X	X

Operation number Description	10.10.06 EVERY 5,000 Km. (3,000 mls.)	10.10.12 EVERY 10,000 Km. (6,000 mls.)	10.10.24 EVERY 20,000 Km. (12,000 mls.)
WHEELS AND TYRES			
Check tightness of road wheel nuts	X	X	X
Check/adjust tyre pressures including spare	X	X	X
Check that tyres fitted are in accordance with manufacturer's specification	X	X	X
Check and report depth of tread, cuts in fabric, exposure of fabric, lumps or bulges	X	X	X
Check front wheel alignment and report		X	X
LUBRICATION			
Lubricate all grease nipples excluding wheel bearings		X	
Lubricate all grease nipples including wheel bearings			X
Lubricate all door bonnet and boot locks and hinges		X	X
GENERAL			
Check and report security and condition of safety belts	X	X	X
Check and report security of seats	X	X	X
Check and report rear view mirrors for looseness, cracks or crazing	X	X	X
Check operation of door locks and window controls	X	X	X
Carry out road/roller test and report any additional work required		X	X
Ensure cleanliness of seats, controls, door handles, steering wheel etc.	X	X	X

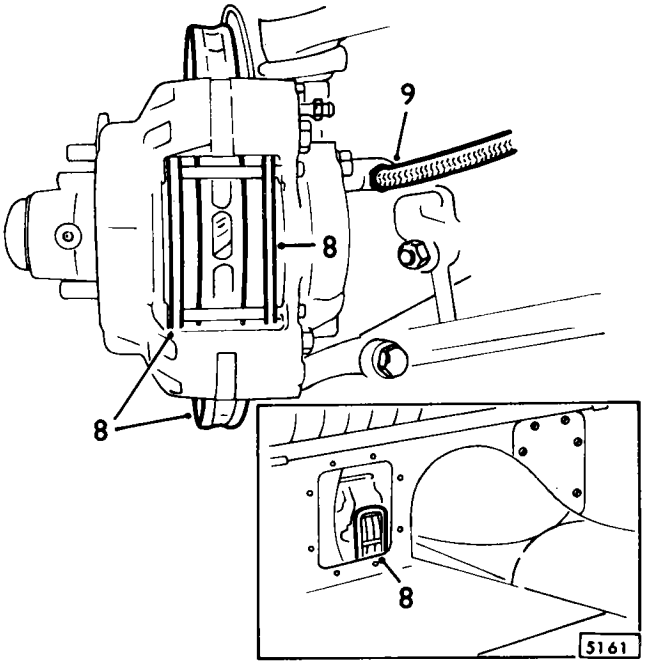
5,000 Km. (3,000 MILES) SERVICE 10.10.06

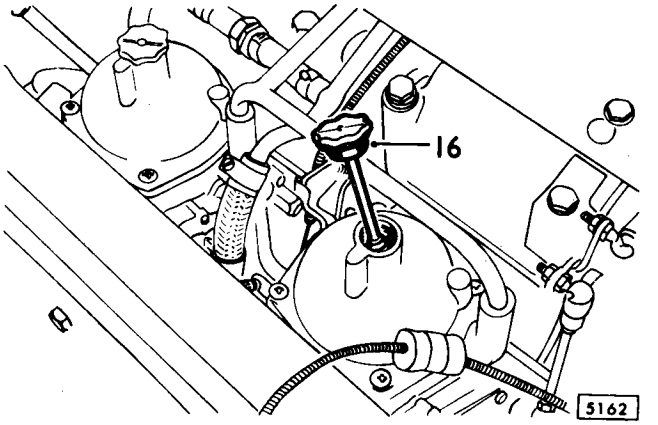
**1. With engine cold, check engine oil level.
2. If necessary, remove oil filler cap and top up oil level.**
3. Refill engine with recommended grade of oil to top of knurled patch on dipstick.
4. Run engine at fast idle, switch off ignition, wait one minute, recheck oil level and top up if necessary.
5. Check engine for oil leaks and report findings.
6. Check fuel pipes and unions for leaks, chafing and corrosion; report findings.
7. Check clutch pipes and unions for leaks, chafing and corrosion; report findings.
8. Check brake pads for wear and that discs are not damaged or scored; report findings.
9. Check brake pipes and unions for leaks, chafing and corrosion; report findings.
10. Check gearbox for oil leaks and report findings.
11. Check final drive unit for oil leaks and report findings.
12. Check exhaust system for security and signs of leaks; report findings.
13. Check condition of steering joints and report findings.
14. Check power assisted steering system for oil leaks and report findings.
15. Check condition of gaiters and report findings.
16. Unscrew piston damper from piston cover.
17. Top up guide rod of piston with Zenith Lube pack or S.A.E. 20 engine oil to within 6 mm. (.250 in.) of top of rod.
18. Refit piston damper, do not overtighten.
19. Carry out operations 16 to 18 on remaining carburetters.
20. Remove header tank filler cap.
21. Check coolant level; if necessary, add coolant until level is at bottom of filler neck.
22. Refit filler cap.

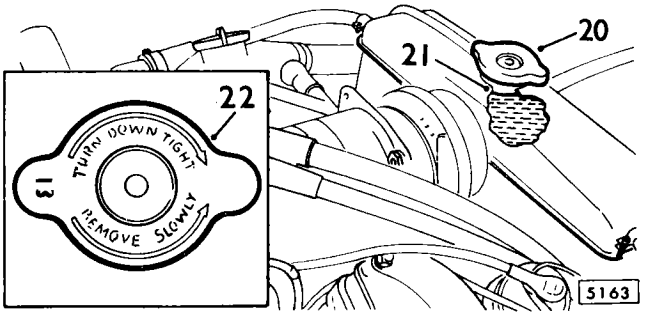
CAUTION: **During winter months Bluecol 'U' antifreeze must be used, this is a specially formulated antifreeze which is designed to afford maximum corrosion protection to all metals normally found in engine cooling systems as well as having the normal frost protection properties necessary during winter months. It should not, therefore, be mixed with other antifreezes. In places where Bluecol 'U' is not available for top-up or replenishment, drain the system, flush and fill with antifreeze which complies with specification B.S.3150 for aluminium or B.S.3152 for other engines.

A 40% solution by volume (55% U.S.A./Canada) of all antifreeze must be used at all times, either when topping up or replenishing the cooling system. For maximum corrosion protection, the concentration should never be allowed to fall below 25%. Always top-up with recommended strength of antifreeze, **NEVER WITH WATER ONLY.**

In countries where it is unnecessary to use antifreeze, Marston SQ.36 Corrosion Inhibitor must be used in the cooling system in the proportion of 3 fluid ounces to one gallon of water. CHANGE COOLANT ANNUALLY.**

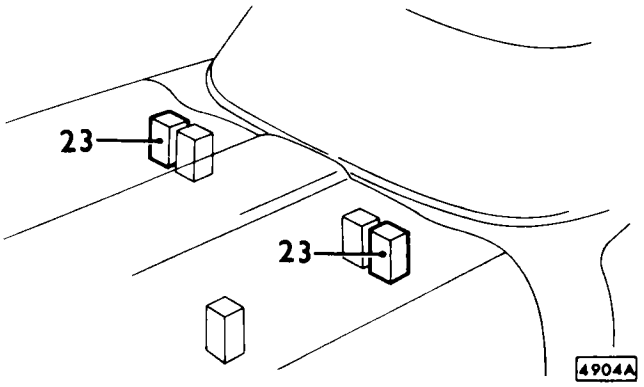


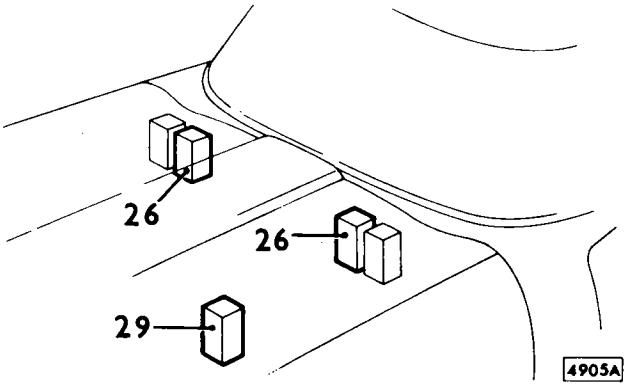


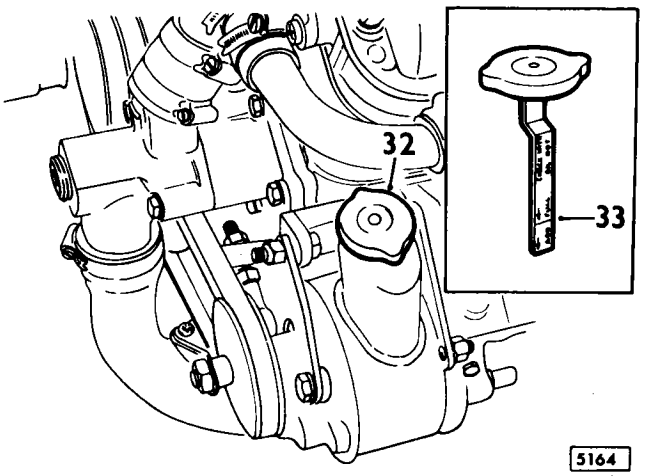


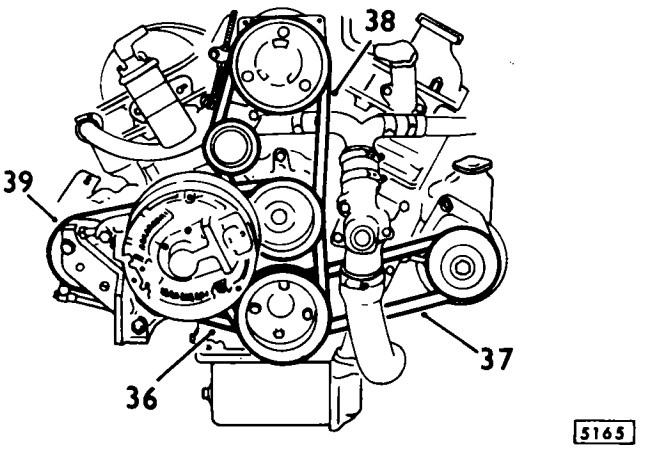
NOTE: Items 23 to 25 apply only to cars fitted with manual transmission.

23. Clean any dirt from around clutch fluid reservoir filler cap; remove cap.
24. Check fluid level; if necessary, add fluid to bring level up to mark on reservoir. Use only recommended grade of hydraulic fluid.
25. Refit filler cap.
26. Clean any dirt from around brake fluid reservoir filler cap; remove cap.
27. Check fluid level; if necessary, add fluid to bring level up to mark on reservoir. Use only recommended grade of hydraulic fluid.
28. Refit filler cap.
29. Carry out items 26 to 28 on remaining brake fluid reservoir.
30. Check brake pedal travel, handbrake operation and report findings.
31. Run engine until it reaches normal operating temperature.
32. Remove combined filler cap and dipstick from power assisted steering pump reservoir.
33. Check oil level on dipstick; if necessary, add oil to bring level to 'full' mark on dipstick.
34. Turn steering from lock to lock several times.
35. Re-check oil level and top up if necessary.
36. Check alternator driving belt tension and adjust if necessary. See operation **86.10.05.**
37. Check power assisted steering pump drive belt tension and adjust if necessary. See operation 57.20.01.
38. **Cars fitted with air conditioning only**. Check compressor drive belt tension and adjust if necessary – See operation 82.10.01.
39. **Cars fitted with exhaust emission control only**. Check air pump drive belt tension and adjust if necessary – See operation 17.25.13.
40. Check condition of all driving belts and report.









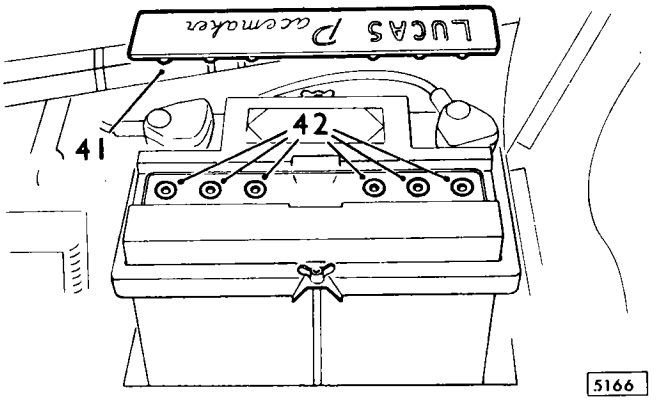
41. Remove manifold cover and check battery electrolyte level.
42. If necessary, top up with distilled water to bottom of filler tubes.
43. Refit manifold cover.
44. Check headlight alignment and adjust if necessary – See operation 86.40.17.
45. Check function of all electrical systems and report.
46. Remove filler cap from windscreen washer reservoir.
47. Top up level if necessary with clean water to bottom of filler neck.
48. Refit filler cap.

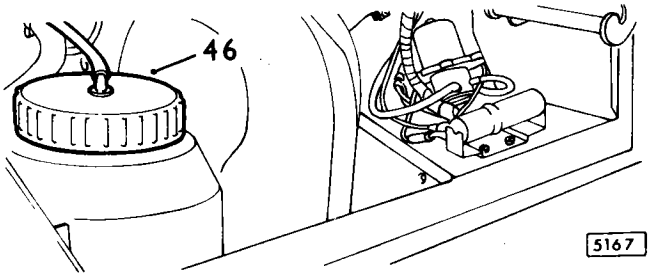
NOTE: In cold weather the water container can be given a safe degree of protection from frost damage down to −28 deg. F (−33 deg C) by the use of proprietary anti-freeze solvents as marketed by 'TRICO' or 'HOLTS'. Instructions regarding the use of the solvent will be found on the container. Denatured alcohol (methylated spirits) must NOT be used. The use of this chemical will discolour the paintwork.

49. Check condition of windscreen wiper blades and report.
50. Check tightness of road wheel nuts.
51. Check that tyres fitted are as specified.
52. Check tyre pressures and adjust if necessary.

CAUTION: Tyres must be cold when checking and adjusting pressures.

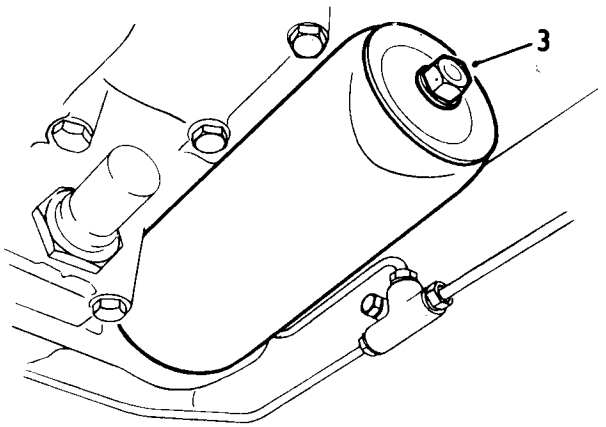
53. Check depth of tyre tread, general condition of tyres e.g. cuts or lumps in fabric or exposure of fabric; report findings.
54. Check and report condition and security of seat belts.
55. Check and report security of seats.
56. Check and report rear view mirrors for looseness, cracks or crazing.
57. Ensure cleanliness of seats, controls, door handles, steering wheel etc.

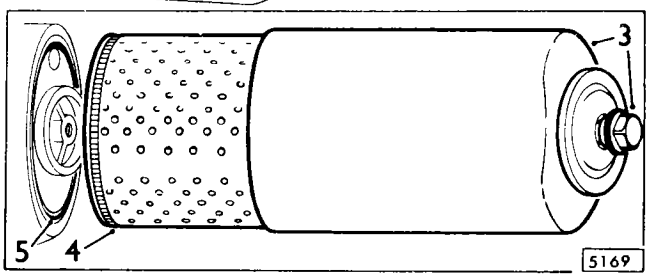


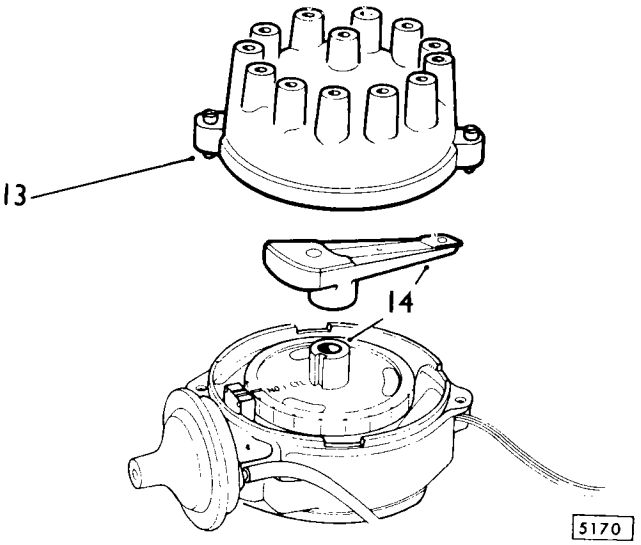


10,000 Km. (6,000 MILES) SERVICE 10.10.12

1. Remove drain plug from sump, allow oil to drain into suitable container; discard sealing washer.
2. Refit drain plug, use new sealing washer; do not overtighten plug.
3. Slacken central bolt securing oil filter canister; withdraw canister together with bolt and filter element.
4. Remove element and discard.
5. Remove canister seal from filter head; discard seal.
6. Wash canister in clean petrol and allow to dry.
7. Fit new canister seal in filter head.
8. Position new filter element in canister; refit canister; do not overtighten central bolt.
9. Refill engine with recommended grade of oil to top of knurled patch on dipstick.
10. Run engine at fast idle. Switch off ignition, wait one minute, recheck oil level and top up if necessary.
11. Remove spark plugs, clean by sand blasting and adjust gap. Correct gap is .64 mm. (.025 in).
12. Refit spark plugs.
13. Remove screws securing distributor cap; lift off cap.
14. Lubricate distributor.
15. Wipe cap clean and refit.
16. Check engine timing by means of a stroboscope.
17. Carry out items 5 to 15 – detailed in operation 10.10.06.

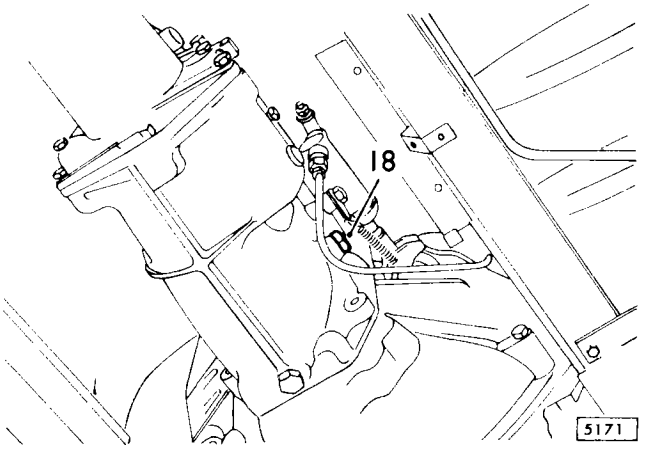






NOTE Items 18 to 20 apply only to cars fitted with manual transmission.

18. Remove filler/level plug.
19. Check oil level and if necessary, top up level to bottom of filler plug hole.
20. Refit filler/level plug.



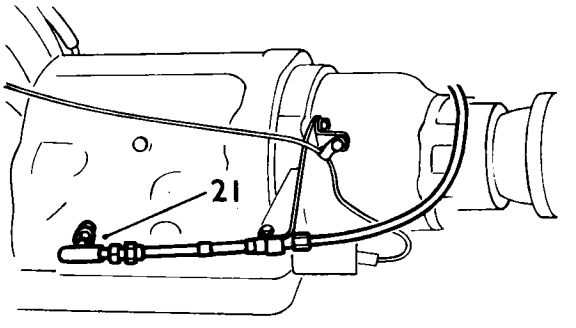
21. **Cars fitted with automatic transmission.**
Lubricate exposed selector linkage.
22. Remove filler/level plug from final drive unit.
23. Check oil level and if necessary, top up level to bottom of filler/level plug hole.
24. Refit filler/level plug.

****Cars fitted with manual transmission****

25. Check and if necessary adjust slave cylinder push rod free travel – See operation 33.10.03.

****Cars fitted with manual transmission****

26. Lubricate slave cylinder push rod.
27. Lubricate hand brake mechanical linkage and cable.
28. Lubricate all grease nipples excluding wheel bearings.



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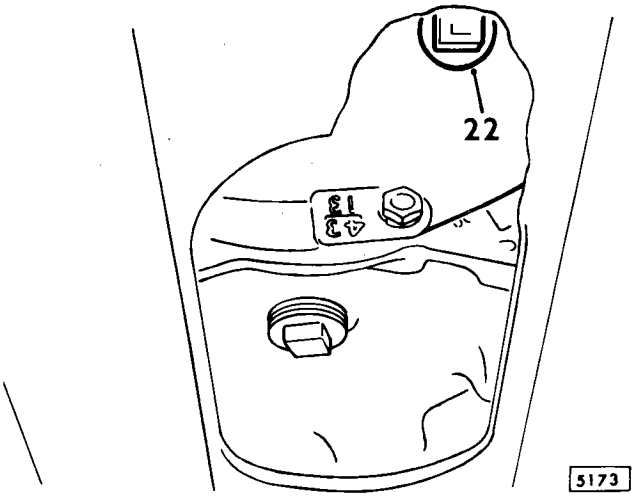

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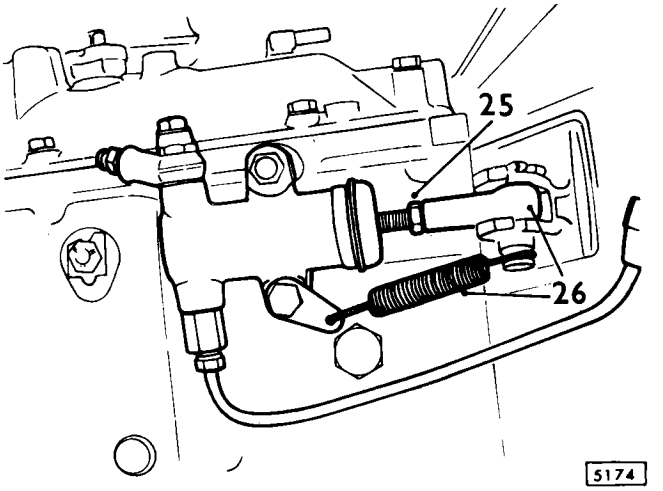

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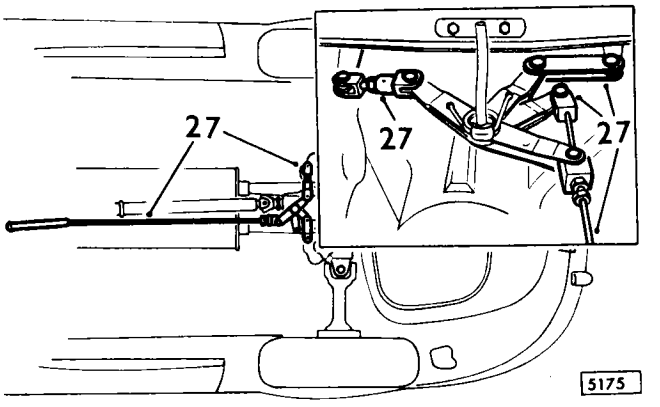

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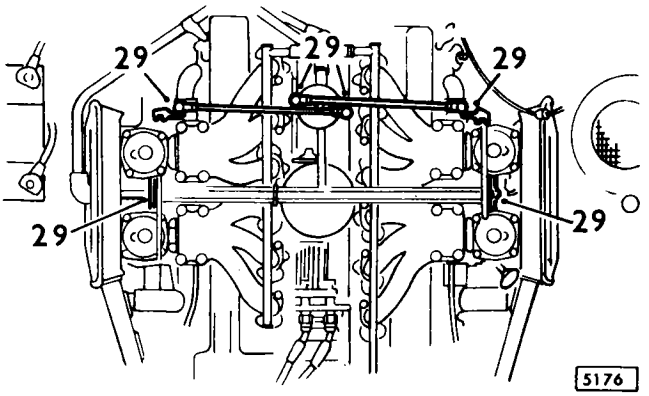
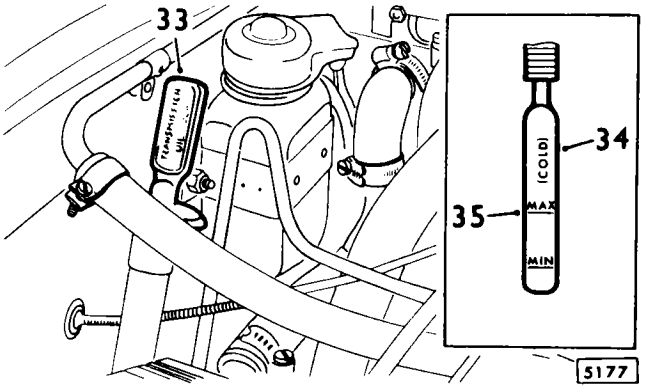
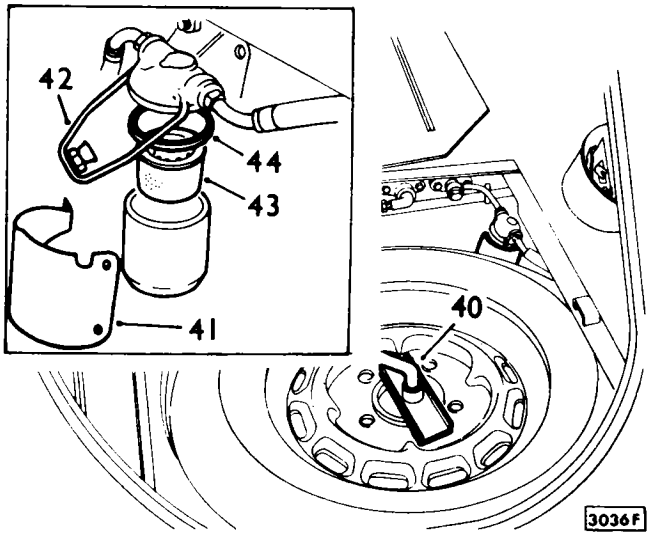
29. Lubricate throttle linkage.
30. Check and if necessary adjust carburetters – See operation 19.15.02.

NOTE Items 31 to 35 apply only to cars fitted with automatic transmission.

31. Place transmission selector lever in 'P' position, apply handbrake.
32. Run engine until it reaches normal operating temperature.
33. With engine running at idling speed, withdraw dipstick.
34. Wipe dipstick clean and replace. Withdraw dipstick immediately and check oil reading.
35. If necessary, top up oil to bring level to 'FULL' mark on dipstick.
36. Carry out items 20 to 56 detailed in operation 10.10.06.
37. Check cooling and heating system for leaks; report findings.
38. Disconnect battery earth lead – 86.15.19.
39. Remove boot/luggage compartment floor.
40. Lift out spare wheel.
41. Remove bolts securing fuel filter guard to mounting bracket; swing guard away from fuel filter.
42. Slacken knurled ring, swing retaining strap away from filter bowl; lower filter bowl.
43. Remove filter element and discard.
44. Examine filter bowl seal and renew if damaged.
45. Reverse items 39 to 44, run engine and check for leaks.
46. Clean any corrosion from battery terminals; smear terminals with petroleum jelly.
47. Check condition of battery and report.
48. Check front wheel alignment and report – See operation 57.65.01.
49. Lubricate all door, bonnet and boot locks and hinges and check operation.
50. Carry out road/roller test and report any additional work required.

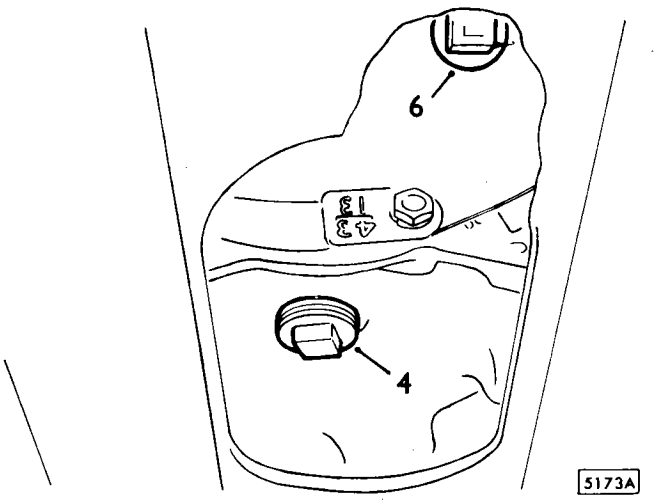






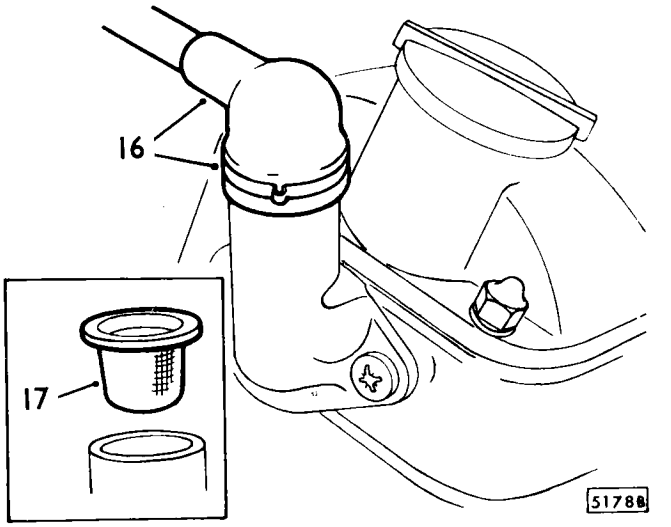
20,000 Km. (12,000 MILES) SERVICE 10.10.24

1. Carry out items 1 to 10 – See operation 10.10.12.
2. Remove spark plugs and discard; fit new spark plugs.
3. Carry out items 13 to 21 – See operation 10.10.12.
4. Remove drain plug from final drive unit and allow oil to drain into suitable container.
5. Refit drain plug.
6. Remove filler/level plug.
7. Refill unit with recommended grade of hypoid oil to bottom of filler/level plug hole.
8. Refit filler/level plug.
9. Carry out items 25 to 27 – See operation 10.10.12.
10. Lubricate all grease nipples including wheel bearings.
11. Check tightness of inlet manifold nuts and bolts.
12. Renew air pump filter element – See operation 17.25.03 – Cars fitted with exhaust emission control.
13. Carry out items 31 to 50 – See operation 10.10.12.
14. Check suspension fixings for security.
15. Check tightness of exhaust manifold nuts.
16. Remove rubber boot together with clip from crankcase breather housing.
17. Lift out gauze, wash in petrol and dry.
18. Refit gauze.
19. Refit rubber boot.



40,000 Km (24,000 MILES) SERVICE 10.10.48

1. Carry out items 1 to 11 – See operation 10.10.24.
2. Fit red emission packs – See operation 17.20.07 – Cars fitted with exhaust emission control.
3. Fit new air cleaner elements – See operation 19.10.08.
4. Fit new charcoal absorption canister – See operation 17.15.13. Cars fitted with exhaust emission control.
5. Flush braking system – See operation 70.25.17.
6. Carry out items 12 to 19 – See operation 10.10.24.



80,000 Km. (48,000 MILES) SERVICE 10.10.96

1. Carry out items 1 to 4 – See operation 10.10.48
2. Overhaul braking system – See operations 70.30.02 70.30.04, 70.55.13, 70.55.14
   Also renew any pipes or hoses showing signs of corrosion, splits, chafing etc.
3. Carry out item 6 – See operation 10.10.48.

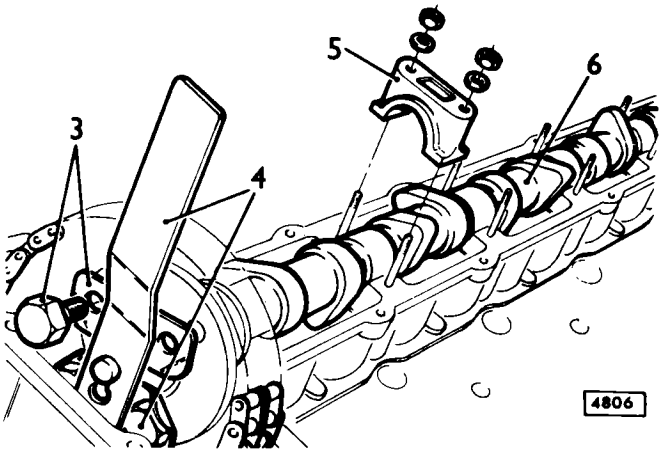
CONTENTS

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in) long, 25.4 cm (10 in) wide and 15 cm (6 in) high. Ensure bonnet is adequately supported after disconnecting stay.

CAMSHAFT

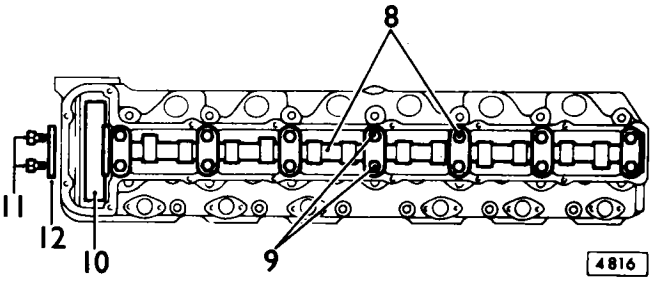
Remove and Refit 12.13.01

Service tools: Sprocket retaining tool JD.40. Valve timing gauge C.3993.



Removing

1. Disconnect carburetter linkage.
2. Remove camshaft cover – 12.29.42.
3. Bend back locking tabs and remove two camshaft sprocket retaining bolts.
4. Rotate engine until valve timing gauge can be fitted to slot in camshaft; bend back locking tabs, mark relative position of camshaft to sprocket, remove bolts. Fit sprocket retaining tool JD.40. DO NOT rotate engine with camshaft disconnected.
5. Progressively slacken camshaft bearing cap nuts starting with centre cap and working outwards; lift off bearing caps.
6. Lift camshaft out of tappet block.



Refitting

7. Smear camshaft journals and tappets with clean engine oil.
8. Position camshaft in tappet block, refit bearing caps, washers and nuts.
9. Progressively tighten bearing cap nuts working from the centre outwards to a torque of 1.2 kg.m (9.0 lb.ft)
10. Engage camshaft sprocket with carrier and fit two retaining bolts.
11. Rotate engine, fit remaining bolts.
12. Secure bolts with tabwashers.
13. Refit camshaft cover 12.29.42.

CAMSHAFT

Overhaul 12.13.26

1. Check that journal diameters are within limits – See Engine data 05.
2. Ensure all oil passages are unobstructed, blow through with dry, clean compressed air.

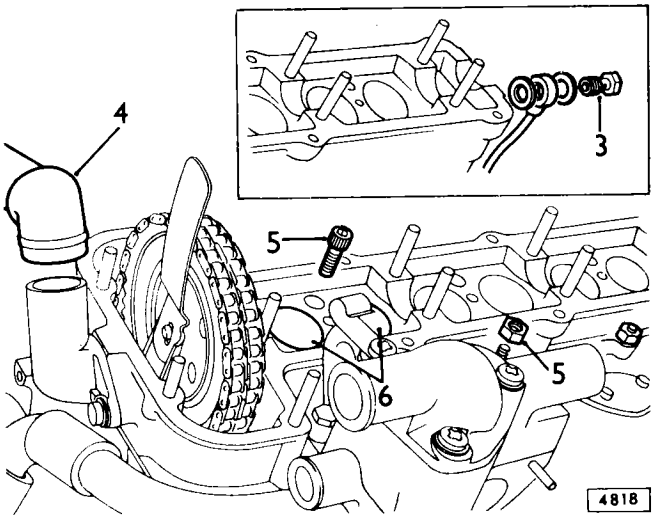
TAPPET BLOCK – Left Hand

Remove and refit 12.13.29

Removing

1. Disconnect carburetter linkage.
2. Remove camshaft – 12.13.01.
3. Remove banjo bolt securing oil feed pipe to tappet block.
4. Disconnect breather pipe.
5. Progressively slacken retaining nuts and capscrews, working from centre outwards.
6. Lift off tappet block carefully, retrieve tappets and valve adjusting pads.

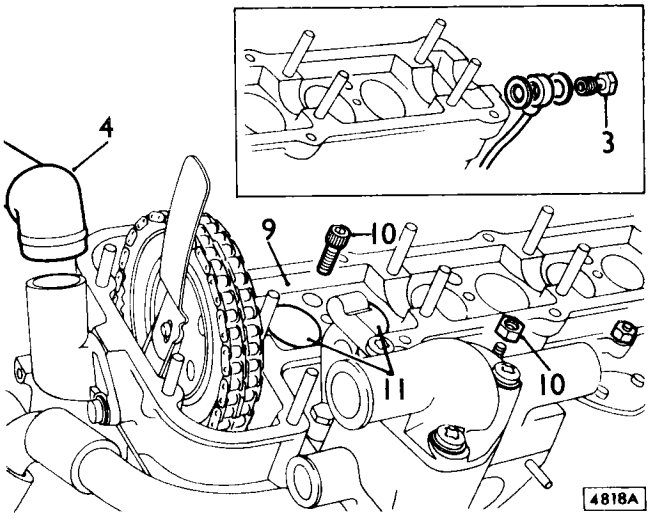
NOTE:– Record which valve each tappet and pads are removed from. Failure to do this will result in incorrect valve adjustment upon reassembly.



Refitting

7. Ensure that mating surfaces of tappet block and cylinder head are clean.
8. Smear mating surfaces of tappet block and cylinder head with Hylomar.
9. Fit tappet block ensuring that dowels are correctly located.
10. Tighten retaining nuts and capscrews by diagonal selection working from centre outwards.
11. Lubricate tappets and adjusting pads with clean engine oil, fit to their respective valves.
12. Reverse operations 1 to 4 inclusive.

NOTE: If tappet block has been renewed, it will be necessary to check valve clearances; see operation 12.29.48.



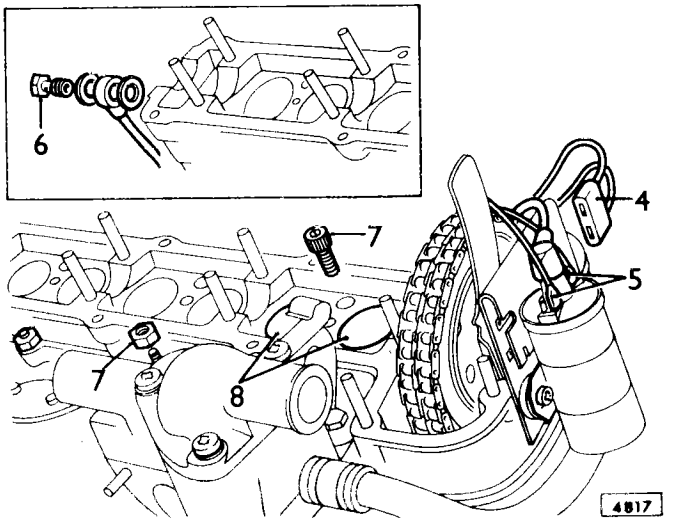
TAPPET BLOCK – Right Hand

Remove and refit 12.13.30

Removing

1. Disconnect battery – 86.15.19 (Negative lead only).
2. Disconnect carburetter linkage.
3. Remove camshaft – 12.13.01.
4. Disconnect wires from ballast resistor unit.
5. Disconnect wires and H.T. Lead from coil.
6. Remove banjo bolt securing oil feed pipe to tappet block.
7. Progressively slacken retaining nuts and capscrews, working from centre outwards.
8. Lift off tappet block carefully, retrieve tappets and valve adjusting pads.

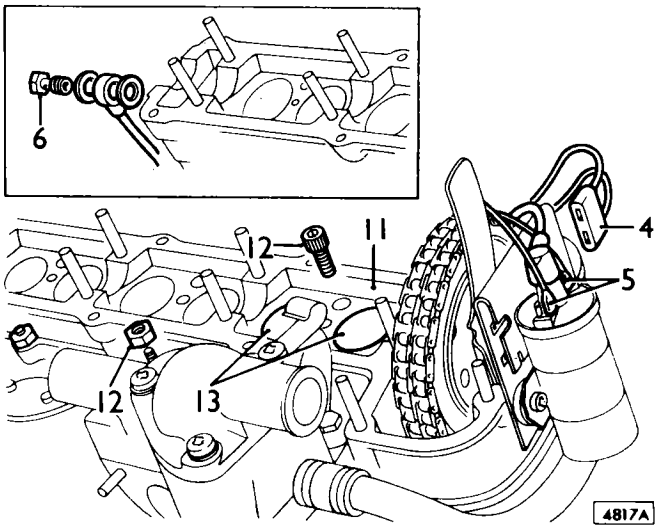
NOTE:– Record which valve each tappet and pads are removed from. Failure to do so will result in incorrect valve adjustment upon reassembly.



Refitting

9. Ensure that mating surfaces of tappet block and cylinder head are clean.
10. Smear mating surfaces of tappet block and cylinder head with Hylomar.
11. Fit tappet block ensuring that dowels are correctly located.
12. Tighten retaining nuts and capscrews by diagonal selection working from centre outwards.
13. Lubricate tappets and adjusting pads with clean engine oil, fit to their respective valves.
14. Reverse operations 1 to 6 inclusive.

NOTE:– If tappet block has been renewed, it will be necessary to check valve clearances, see operation 12.29.48.



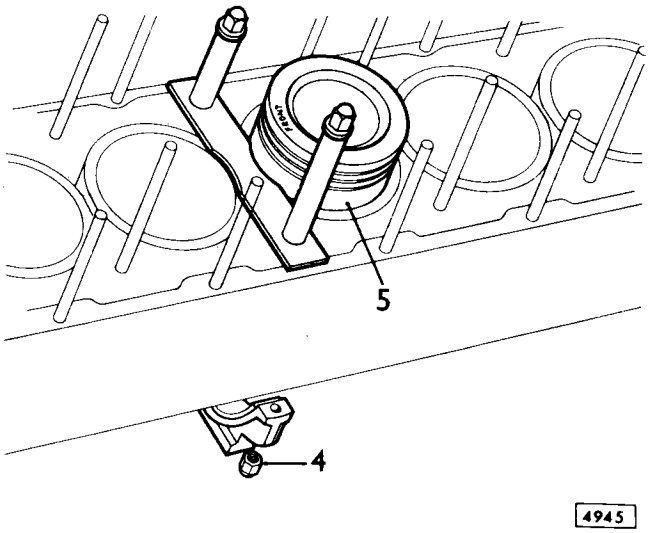
PISTON AND CONNECTING ROD

Remove and refit (Engine in situ) **12.17.01**

Service tool: Piston ring clamp 38U.3.

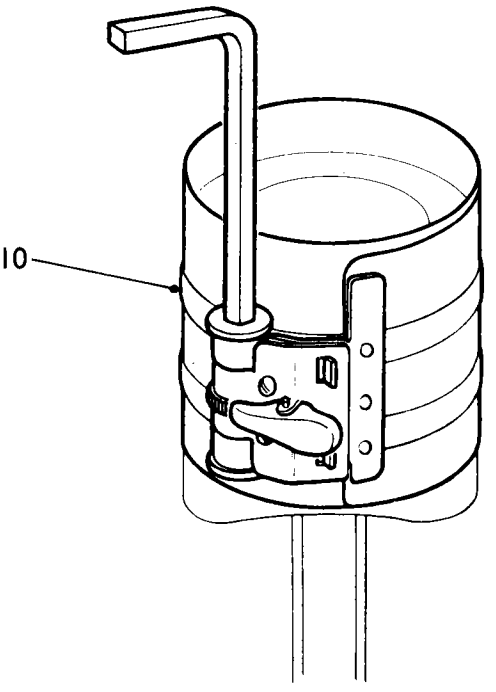
Removing

1. Remove cylinder head – 'A' right hand – 12.29.12 'B' left hand –12.29.11
2. Remove engine sump – 12.60.44
3. Rotate crankshaft until bearing cap to be removed is accessible.
4. Remove nuts, bearing cap and shell.
5. Remove any carbon deposit from top of cylinder bore. Push connecting rod up cylinder bore, withdraw piston together with connecting rod.
6. Retrieve remaining bearing shell.

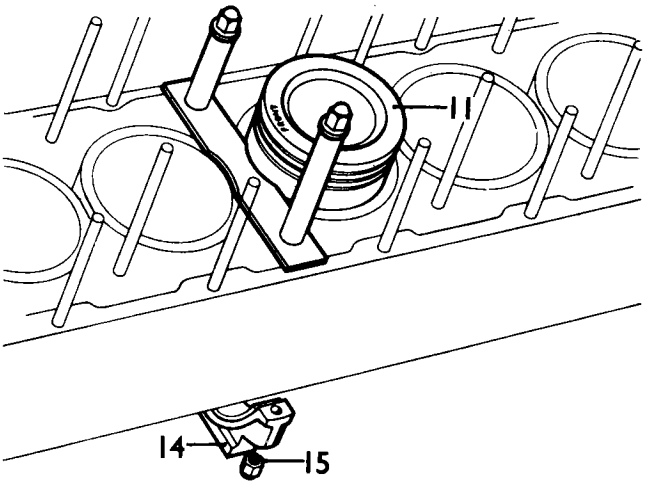


Refitting

7. Ensure that cylinder bore, piston and all bearing surfaces are scrupulously clean.
8. Coat piston rings, gudgeon pin, big end bearing shell and cylinder bore liberally with clean engine oil.
9. Ensure that piston ring gaps are spaced evenly around circumference of piston.
10. Compress piston rings with Service Tool 38U.3



11. Enter piston and connecting rod into bore ensuring that word stamped 'FRONT' on piston faces front of engine.
12. Push piston and connecting rod down bore, do not use undue force.
13. Check that big end shell bearing tab is correctly located in connecting rod.
14. Fit other half of big end bearing shell to cap; oil shell and crankshaft journal.
15. **Refit bearing cap and nuts; tighten nuts to torque of 5.1 kg.m. (37.5 lb.ft.).**
16. **Refit engine sump – 12.60.44.**
17. **Refit cylinder head – 'A' right hand – 12.29.12 'B' left hand – 12.29.11.**



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PISTON AND CONNECTING ROD

Overhaul **12.17.10**

NOTE: Pistons are supplied complete with gudgeon pin. As pins and pistons are matched assemblies, it is not permissible to interchange component parts.

1. **Remove circlips.**
2. **Push gudgeon pin out of piston.**
3. **Withdraw connecting rod.**

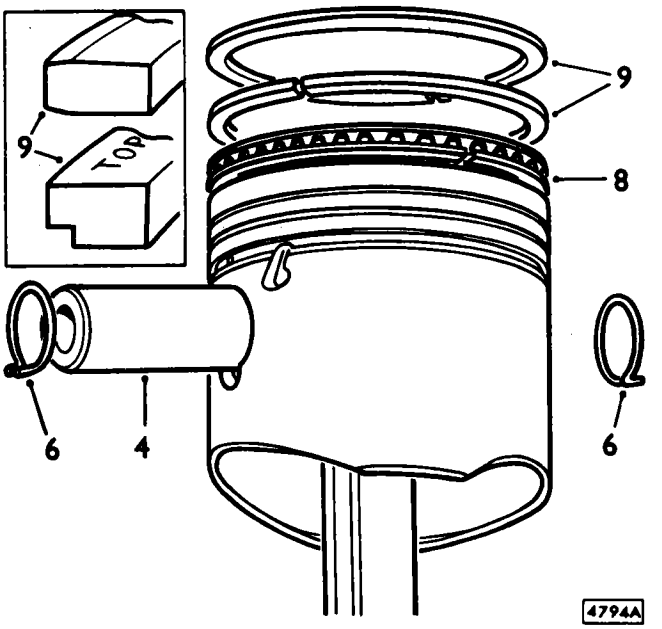
Refitting

4. Fit gudgeon pin in piston.

CAUTION: Connecting rods must be refitted to pistons in such a way that when installed in engine, word 'FRONT' on piston crown faces front of engine and chamfer on big end eye faces crank pin radius.

5. Align small end with end of gudgeon pin and push pin home.
6. Use new circlips to retain gudgeon pin.

NOTE: Gudgeon pin is a push fit in piston at 20 deg. C (60 deg. F)
Three piston rings are fitted, they are as follows:–
a. Top ring – Compression.
b. Second ring – Compression.
c. Bottom ring – Oil control
Both top and second rings have tapered peripheries and second rings are marked 'TOP' to ensure correct fitting. In addition, the top ring has a chrome plated periphery and is also cargraph coated. This coating is coloured RED and must not be removed.
The bottom ring consists of an expander sandwiched between two rails, the assembly being held together by an adhesive.



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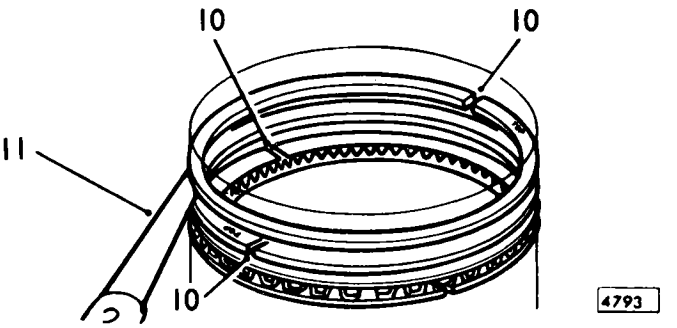
7. **Check piston ring gap in bore. Push ring to a point midway down bore, check that ring is square and measure gap – See Engine data 05.**
8. Fit bottom ring ensuring that expander ends are not overlapping.
9. Fit second and top rings ensuring that they are fitted the correct way up.

10. Position rings so that gaps are in positions shown.
11. Check side clearance of rings in piston groove. See Engine data 05.
12. Check connecting rods for alignment on a suitable jig.
13. Check bore of small end bush – See Engine data 05.

CAUTION: If small end bush is worn beyond acceptable limits; a service exchange connecting rod must be fitted. It is NOT possible to renew bushes as specialised equipment is needed to hone bushes to finished size.



CRANKSHAFT DAMPER AND PULLEY

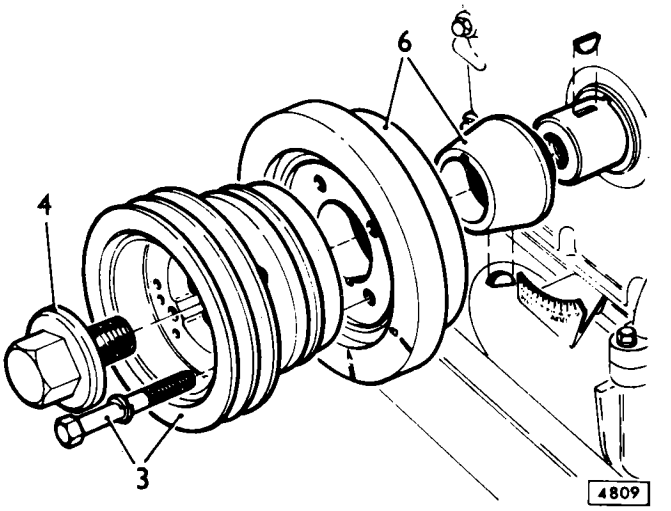
Remove and refit (Engine in situ) 12.21.01

Removing

1. Remove alternator drive belt – 86.10.03.
2. Remove air pump and steering pump drive belts see operations 17.25.15 and 57.20.02.
3. Remove bolts securing pulley to damper, withdraw pulley.
4. Remove crankshaft damper bolt.
5. Strike damper sharply with hide mallet to loosen.
6. Withdraw damper and cone.

Refitting

Reverse operations 1 to 6; tighten damper bolt to 17.3 kg.m to 20.7 kg.m (125 lb.ft to 150 lb.ft)



CRANKSHAFT FRONT OIL SEAL

Remove and refit 12.21.14

Removing

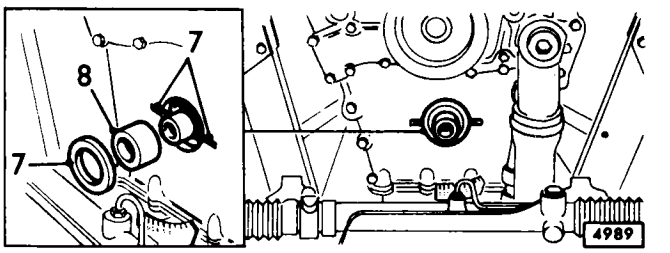
1. Remove radiator – 26.40.01.
2. Remove alternator drive belts – 86.10.03.

WARNING: ON NO ACCOUNT MUST ANY PORTION OF THE AIR CONDITIONING SYSTEM BE DISCONNECTED BY ANYONE OTHER THAN A QUALIFIED REFRIGERATION ENGINEER. BLINDNESS CAN RESULT IF THE GAS CONTAINED WITHIN THE SYSTEM COMES INTO CONTACT WITH THE EYES.

3. Remove compressor drive belt – 82.10.02 Cars fitted with air conditioning only.
4. Remove air pump drive belt – 17.25.15. – Cars fitted with exhaust emission control only.
5. Remove power assisted steering pump drive belt – 57.20.02.
6. Remove crankshaft damper and pulley – 12.21.01.
7. Prise seal out of timing cover and discard.
8. Withdraw spacer.

Refitting

9. Ensure that seal recess in timing cover is thoroughly clean.
10. Smear new oil seal with clean engine oil.
11. Position oil seal squarely in recess and tap gently home using a hide mallet.
12. Refit spacer.
13. Reverse operations 1 to 6.



CYLINDER LINERS

Checking 12.25.25

1. Check bore of liner and compare dimension obtained with dimensions quoted in Engine data 05.
2. Bore grade of liner e.g. 'A' or 'B' is stamped on top of liner. When liners are to be renewed; the new liner must be of the same grade as the old one.

Cylinder Block – General

1. Following engine dismantling or honing operations crankcase must be thoroughly cleaned.
2. Check all Welch washers and renew any showing signs of corrosion.
3. Ensure that all galleries are unobstructed. Blow through with dry, clean compressed air.
4. Check condition of studs, renew any showing signs of corrosion.

CYLINDER HEAD

Remove and refit

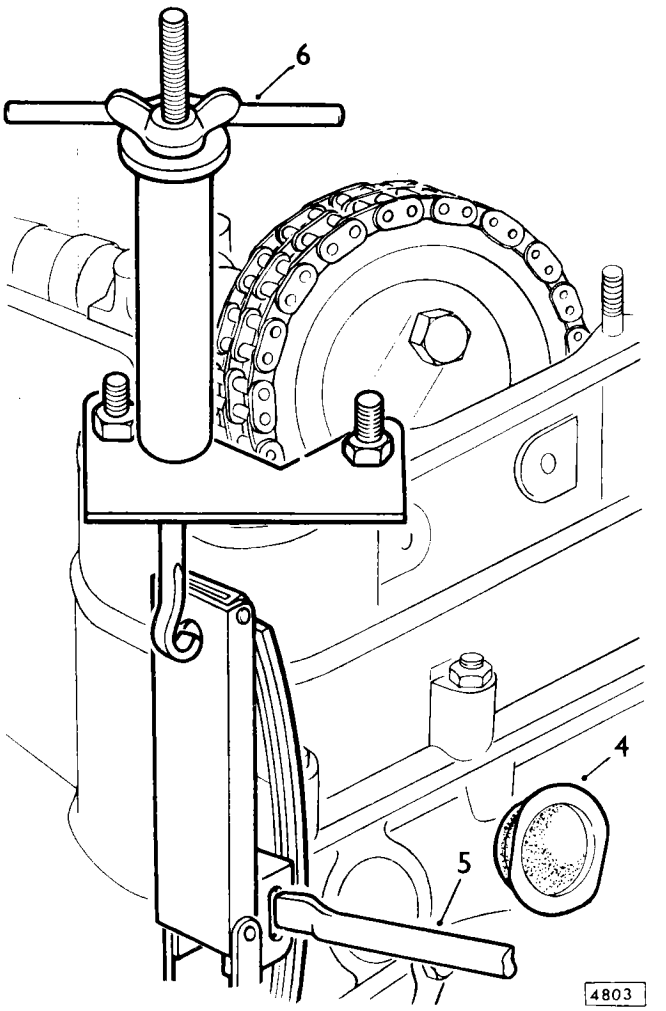
Right hand 'A' Bank 12.29.12
Left hand 'B' Bank 12.29.11

Service tools: Timing chain tensioner retractor tool JD.42; Support plate JD.42-1; Special screwdriver JD.42-2; Camshaft sprocket retaining tool JD.40; Cylinder liner retaining tool JD.41; Valve timing gauge C.3993

Removing

1. Disconnect battery – 86.15.01
2. Drain cooling system – 26.10.01.
3. Remove right hand camshaft cover – 12.29.42.
4. Remove rubber grommet from timing cover.
5. Insert blade of screwdriver JD.42-2 through hole and release locking catch on timing chain tensioner.
6. Using Special tool JD.42 and support plate JD.42-1, retract timing chain tensioner.
7. Remove left hand camshaft cover – left hand cylinder head only – 12.29.42.
8. Disconnect camshaft sprocket from camshaft, fit sprocket retaining tool JD.40.
9. Disconnect exhaust down pipe(s) from exhaust manifolds – 30.10.05.
10. Remove three nuts securing front of cylinder head to timing cover.
11. Progressively slacken cylinder head nuts working from centre outwards.
12. Lift off cylinder head and place on blocks of wood to prevent damage to valves which, when open, protrude below cylinder head face. Remove and discard old gasket.

CAUTION: Do not rotate engine until cylinder liner retaining tools JD.41 have been fitted to cylinder head studs.



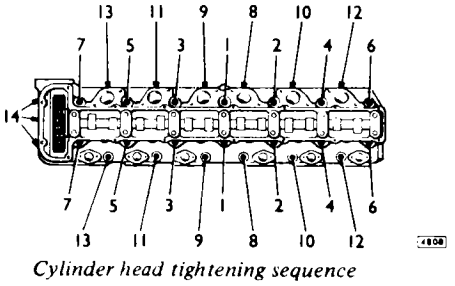
Refitting
Right hand 'A' Bank or both Banks.

13. Ensure mating surfaces of cylinder head and block are clean.
14. Attach a suitable clock gauge to a cylinder head stud.
15. Rotate engine and by means of clock gauge, set number one piston 'A' Bank at T.D.C.
16. Turn camshaft until valve timing gauge C.3993 can be fitted to slot in camshaft front flange.
17. Repeat operation 16 on left hand cylinder head.
18. Remove cylinder liner retaining tools JD.41.

CAUTION: Do not rotate engine until cylinder head(s) are fitted.

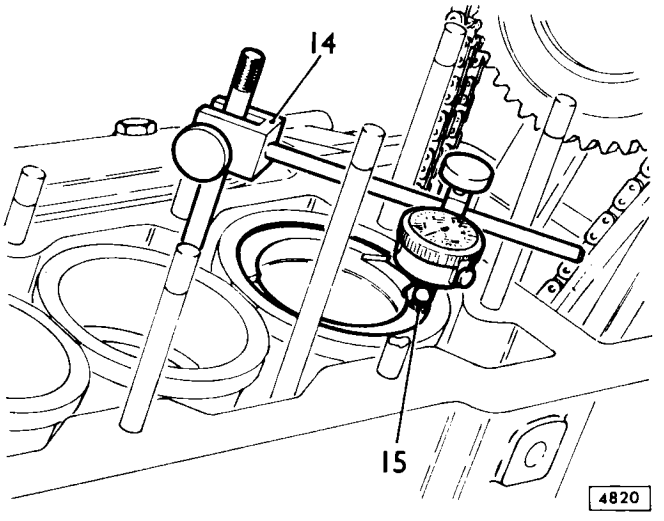
19. Ensure mating surfaces of cylinder block and head are clean.
20. Fit gasket ensuring side marked 'TOP' is uppermost. Do not use jointing compound or grease.
21. Fit right hand cylinder head and retaining nuts.
22. Tighten retaining nuts in order shown to a torque of:–

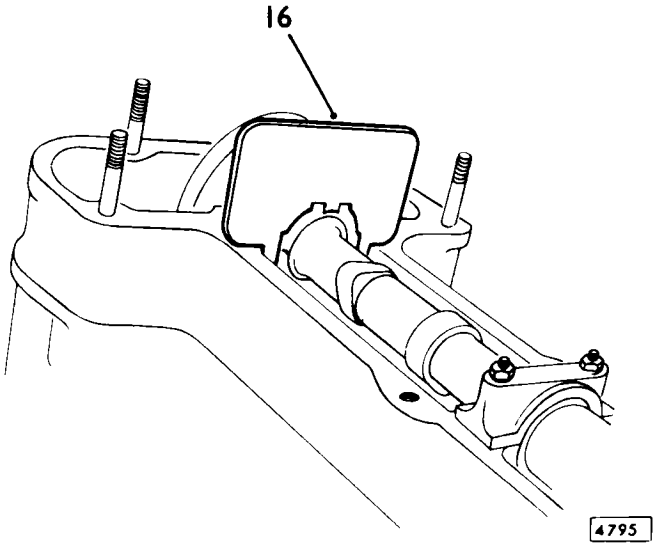
    7.2 kg.m (52 lb.ft) for 7/16 in nuts.
    3.7 kg.m (27.5 lb.ft) for 3/8 in nuts.

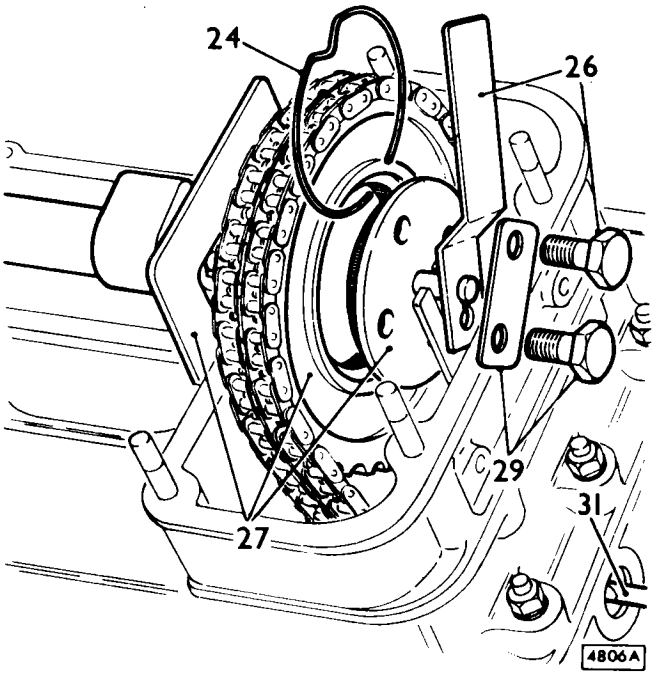


Cylinder head tightening sequence

23. Tighten cylinder head to timing cover nuts to a torque of 1.2 kg.m (9 lb.ft)
24. If camshaft and sprocket holes are not in alignment, remove circlip retaining camshaft coupling to sprocket and disengage coupling from splines.
25. Rotate coupling until access to retaining bolt holes is obtained.
26. Remove sprocket retaining tool JD.40, bolt coupling to camshaft.
27. Engage sprocket with coupling, refit circlip and remove gauge C.3993.
28. If left hand 'B' bank cylinder head has been removed, repeat operations 18 to 27 on this head
29. Rotate engine until remaining camshaft sprocket retaining bolts can be fitted; secure bolts with tab washers.
30. Remove timing chain tensioner retracting tool JD.42 and support plate JD.42-1.
31. Insert screwdriver JD.42-2 through hole in timing cover and trip locking catch, refit rubber grommet.
32. Refit exhaust down pipes – 30.10.05
33. Refit camshaft cover(s) – 12.29.42
34. Refill cooling system – 26.10.01
35. Reconnect battery – 86.15.01







15. Heat cylinder head for half an hour from cold at a temperature of 150 deg. C (300 deg. F).
16. Fit insert ensuring that it beds evenly in the recess.
17. Renew or reface valves as necessary.
    Correct valve seat angles are

Inlet	Exhaust
44½ deg.	44½ deg.

18. Check valve stems for distortion or wear, renew valves with stems worn in excess of .08 mm (.003 in) see section 05.
19. Using a suitable suction tool, grind the valves into their respective seats.
20. If new valve inserts have been fitted, the clearance between valve stem and cam must be checked; this should be 8.13 mm (.320 in) plus the valve clearance. The dimension must be taken between valve stem and back of cam. Should this dimension not be obtained, metal must be ground from valve seat of insert.

    NOTE: Only suitable grinding equipment should be used.

21. Fit valves and place cylinder head on wooden blocks.
22. Fit valve spring seats, inlet valve guide oil seals, springs and collars.
23. Compress springs using Service Tool No. J.6118B and adaptor J.6118C-2, insert split cotters.

CAMSHAFT COVER

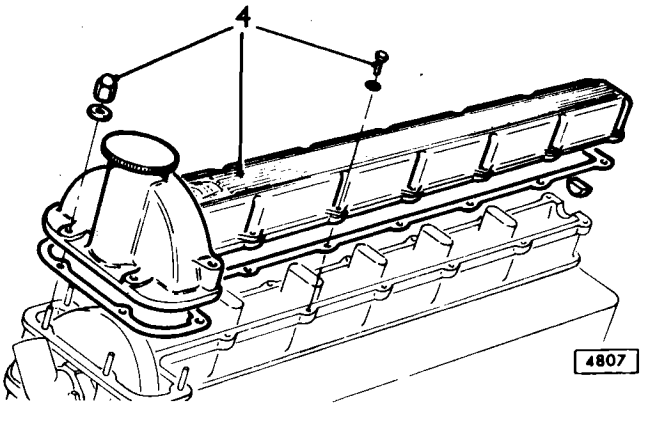
Remove and refit **12.29.42**

Removing

1. Disconnect carburetter linkage.
2. Remove front inlet manifold – 30.15.02.
3. Remove rear inlet manifold – 30.15.03.
4. Remove setscrews, domed head nuts and washers securing camshaft cover to tappet block, lift off cover.

Refitting

Reverse operations 1 to 4, use a new gasket and neoprene sealing plug. Tighten nuts and bolts by diagonal selection to a torque of 1.1 kg.m (8.0 lb.ft)

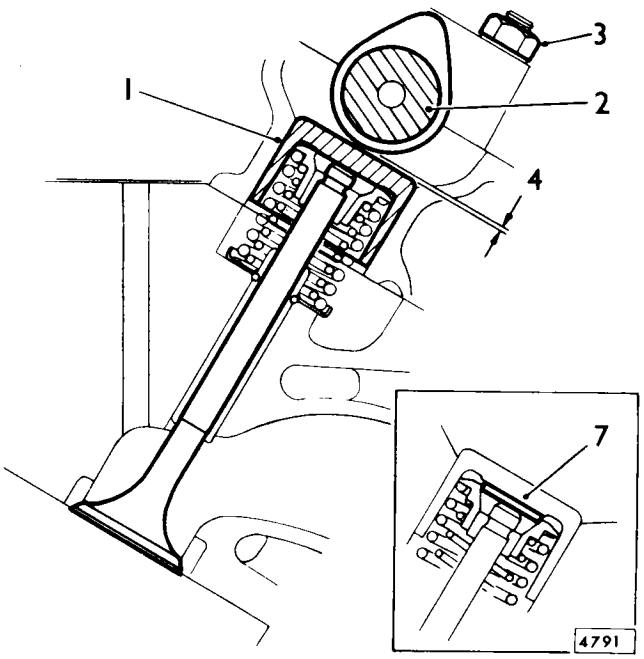


TAPPETS

Adjust 12.29.48

1. Ensure valve adjusting pad is fitted; fit tappets to their respective valves.
2. Fit camshaft, bearing caps, washers and nuts.
3. Tighten bearing cap nuts evenly to a torque of 1.2 kg.m (9 lb.ft)
4. Check and record clearance between each tappet and heel of each cam.
   Valve clearance .304 mm to .355 mm (.012 in to .014 in).
5. Subtract appropriate valve clearance from dimension obtained and select suitable adjusting pads which equal this new dimension. Adjusting pads are available rising in .03 mm (.001 in) sizes from 2.16 mm to 2.79 mm (.085 in to .110 in) and are etched on the surface with letter 'A' to 'Z' each letter indicating an increase in size of .03 mm (.001 in).
6. Remove camshaft and tappets.
7. Fit adjusting pads.

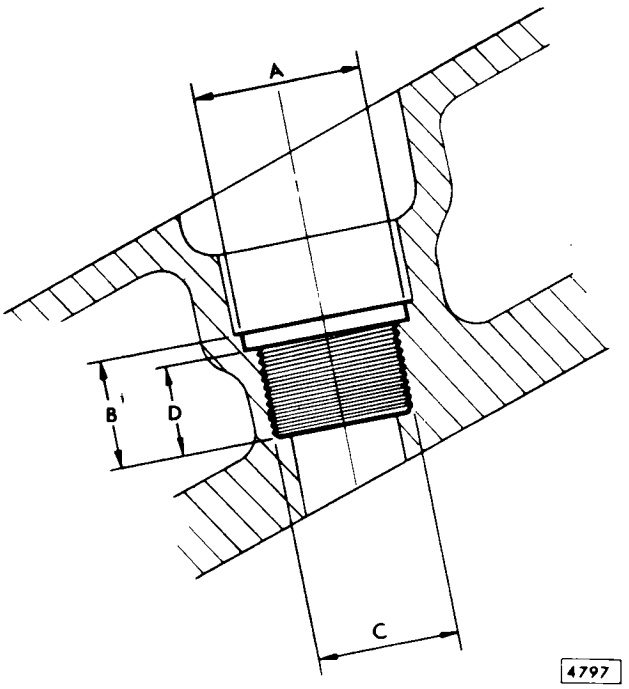
8. Repeat operations 1 to 3.



SPARKING PLUG INSERTS

Fitting 12.29.78

1. Remove cylinder head – 12.29.10.
2. Remove inlet and exhaust valves – 12.29.62.
3. Bore out stripped thread to 19.05 mm (.750 in) diameter and tap out to .5 in B.S.P.
4. Counterbore to 22.62 mm (.890 in).
   Dimension 'A' = 22.62 mm (.890 in).
   Dimension 'B' = 14.28 mm (.562 in).
   Dimension 'C' = 12.7 mm (.50 in) B.S.P.
   Dimension 'D' = 11.1 mm – .13 mm – .15 mm
   (.437 in – .005 in – .010 in).
5. Fit screwed insert ensuring that it sits firmly at bottom of thread.
6. Drill and ream a 3.17 mm (.125 in) diameter hole between side of insert and head.
7. Drive in locking pin and secure by peening edge of insert and locking pin.
   Dimension 'A' = 11.1 mm (.437 in).



ENGINE AND GEARBOX ASSEMBLY

Remove and refit 12.37.01

Removing

1. Remove bonnet – 76.16.01
2. Remove battery – 86.15.01
3. Drain cooling system – 26.10.01
4. Remove air cleaners – 19.10.01
5. Remove bolt and washer securing earth lead to bell housing.
6. Disconnect wires from oil pressure sender unit.
7. Disconnect radiator harness at snap and lucar connectors.
8. Remove radiator securing nuts.
9. Disconnect oil cooler hoses from radiator – Cars fitted with Automatic Transmission only.
10. Disconnect top water pipes from hoses (Engine end and Radiator end).
11. Disconnect hose from underside of header tank.
12. Disconnect header tank hose from radiator.
13. Disconnect bottom hose.

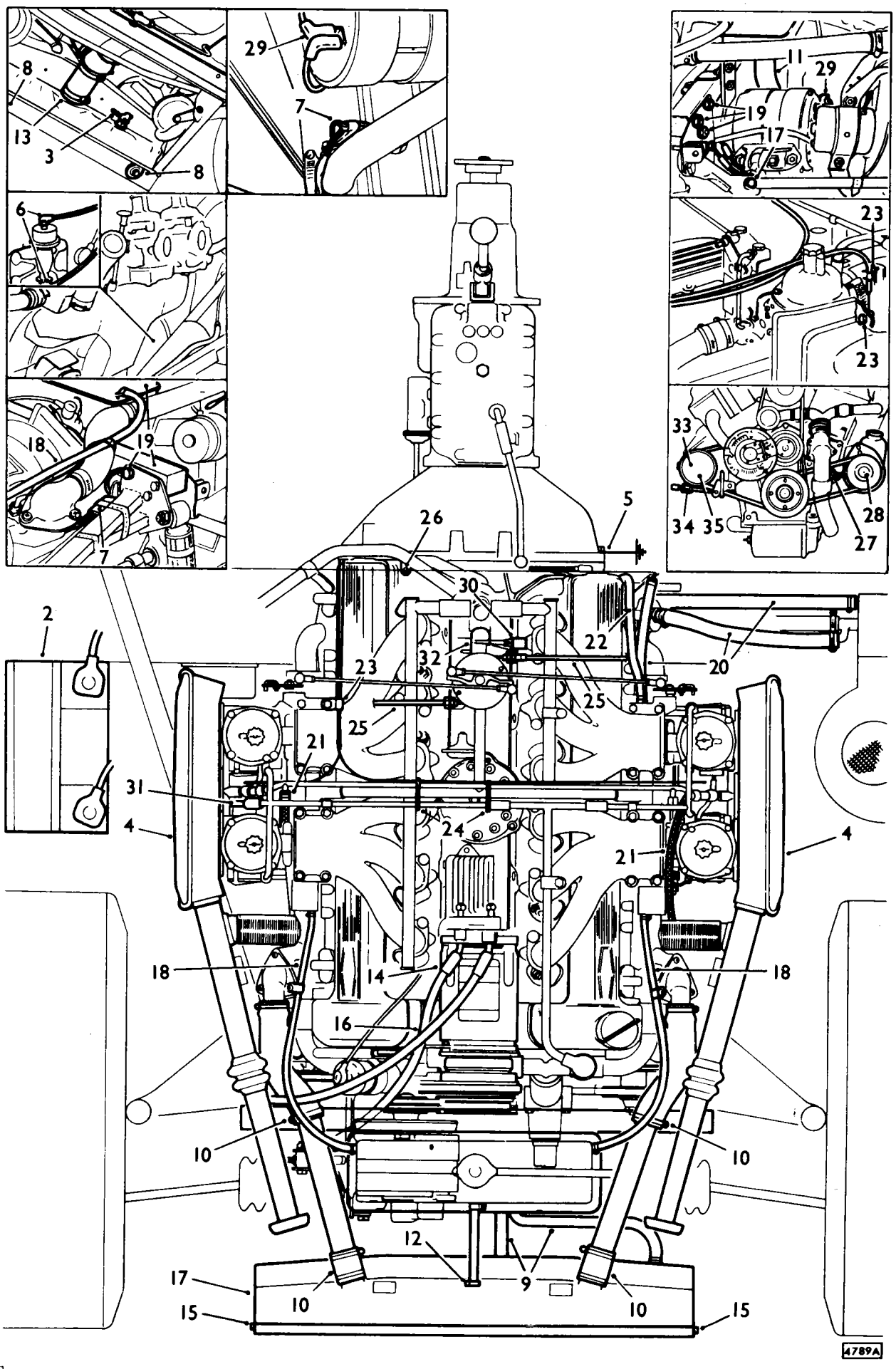
Operations 14, 15, and 16 are only applicable to cars fitted with air conditioning.

WARNING: No attempt should be made to disconnect any portion of the air conditioning system. Blindness can result if the gas contained within the system comes into contact with the eyes.

14. Remove nuts and bolts securing compressor to mounting bracket.
15. Remove bolts securing condenser to radiator assembly.
16. Place compressor and condenser on the floor to the right-hand side of sub-frame, ensuring that hoses are not damaged by excessive twisting.
17. Remove nuts and bolts securing radiator stays to sub-frame. Lift out radiator complete with fans and cowls.
18. Disconnect hoses from left and right-hand induction housings.
19. Remove six nuts and bolts, securing front cross member to sub-frame, detach earth lead and lift off cross member complete with header tank.
20. Disconnect hoses from heater.
21. Disconnect inlet and left and right hand petrol pipes from cross over pipe.
22. Disconnect breather pipe from rear left hand inlet manifold.
23. Slacken pinch bolts and release clips securing choke cables to left and right hand carburetters.
24. Release clips securing choke cables to cross over pipe.
25. Disconnect throttle cable from pedestal.
26. Disconnect clutch pipe at bulkhead union bracket; plug or tape all broken connections to prevent ingress of dirt.
27. Remove power assisted steering pump trunnion securing bolt.
28. Remove power assisted steering pump mounting bolts, swing pump clear of engine.
29. Disconnect wires from alternator paying particular attention regarding relationship of wires to terminals.
30. Disconnect wires from kickdown switch – Cars fitted with automatic transmission only.

The following operations are only applicable to cars fitted with exhaust emission control.

31. Disconnect carbon canister pipe from balance pipe.
32. Disconnect balance pipe from hose.
33. Disconnect flexible and rubber pipes from rear of air pump.
34. Remove air pump trunnion securing bolt.
35. Remove air pump securing bolts, lift air pump off mounting bracket.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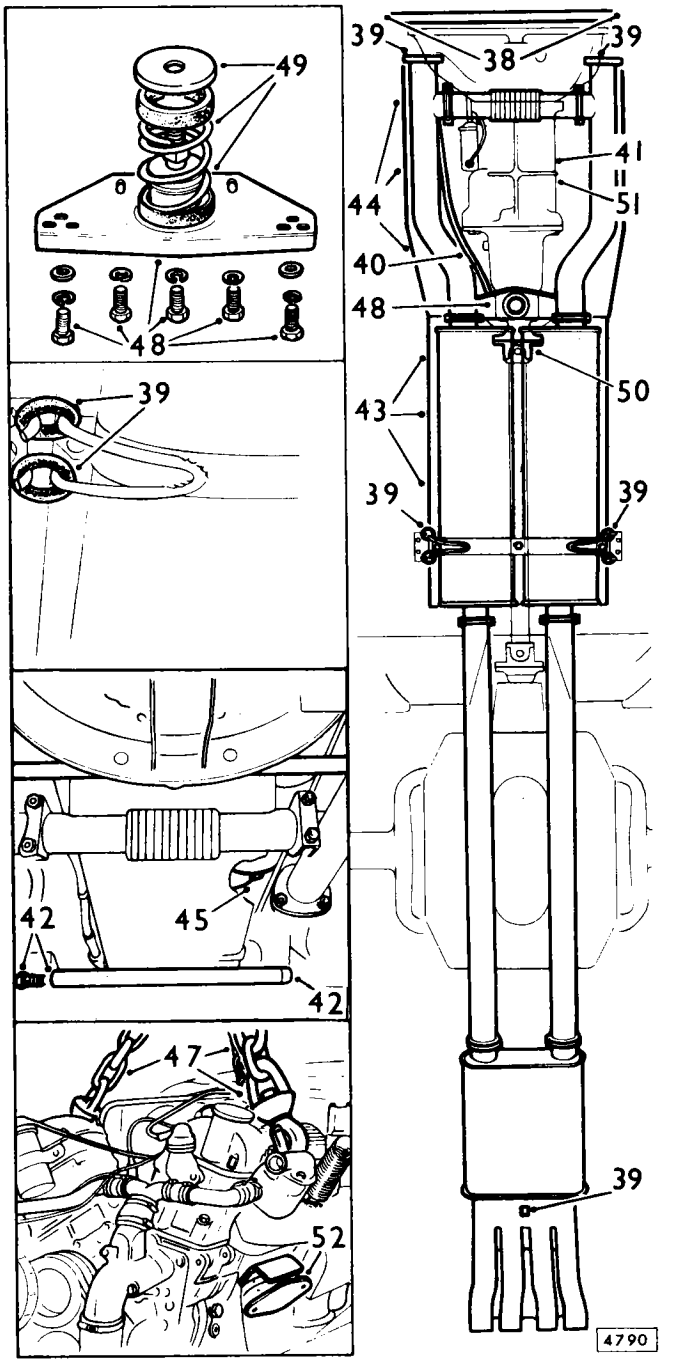
36. Remove oddments tray and gearbox console – 76.25.01.
37. Fold carpet away from lower edge of gearbox cover.
38. Remove two bolts, one on either side of gearbox cover, securing rear cross member; retrieve cross member from under car.
39. Remove exhaust system – 30.10.01.
40. Disconnect speedometer cable from gearbox.
41. Disconnect reverse light at snap connectors.
42. Remove two bolts securing front lower cross member, disengage cross member from mounting brackets.
43. Remove six screws securing rear heat shield to floor pan, remove heat shield.
44. Remove three screws from each front heat shield, remove shields.
45. Disconnect starter motor and solenoid leads.
46. Position a trolley jack under gearbox tail shaft housing.
47. Attach chains to engine lifting eyes.

WARNING: Chains must be of sufficient length to ensure that the distance between lifting eyes and hook of hoist is as follows:–
Front lifting eyes to hook 876 mm (34.5 in)
Rear lifting eyes to hook 1041 mm (41 in)

48. Remove five bolts, washers and spacers securing rear engine mounting bracket support plate to floor pan.
49. Remove centre nut from rear engine mounting followed by washer, support plate, spring, spring seat, spacers and washers.
50. Lower rear of engine slightly, remove nuts and bolts securing propeller shaft to gearbox output flange.
51. Disconnect gear change linkage – Automatic transmission cars only.
52. Remove nuts and bolts securing engine mounting feet to bearers.
53. Lift engine slightly and withdraw through front of sub-frame.

WARNING: Care should be taken at all times to ensure that engine or gearbox does not foul anything, particular attention being paid to the gear-lever and pipe connections on power assisted steering rack.

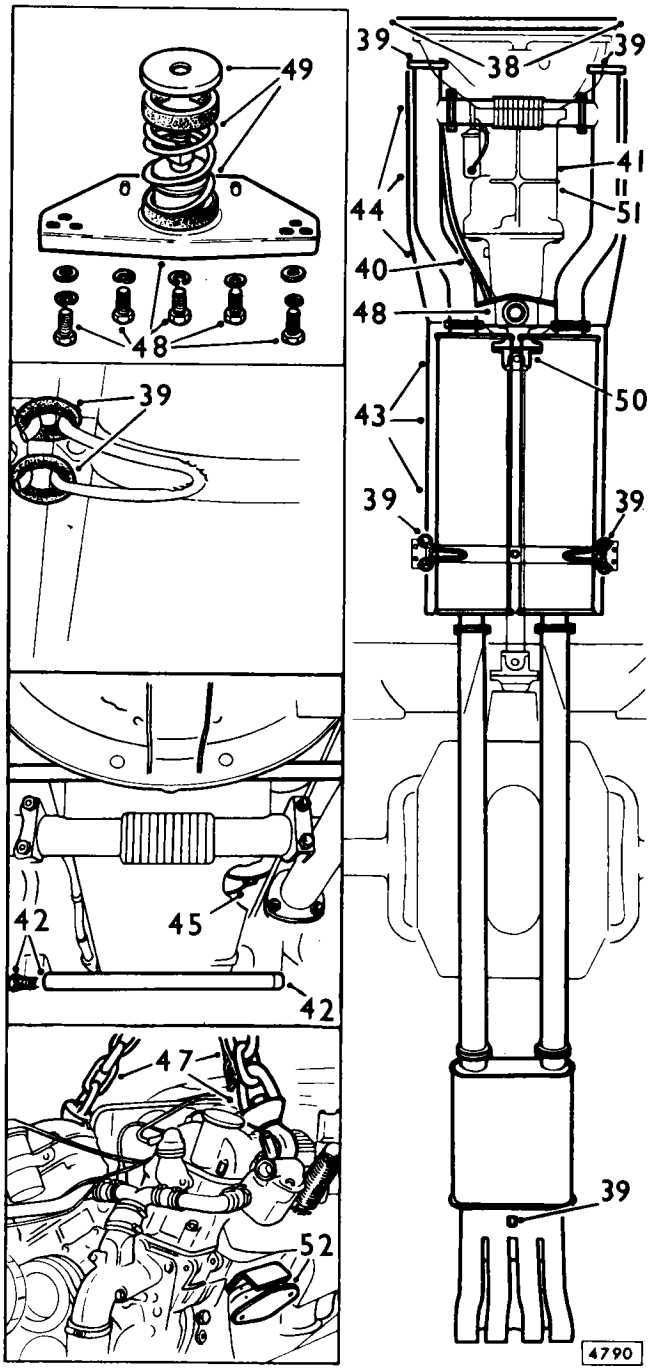


Refitting

54. Lower engine and gearbox into sub-frame, position trolley jack under tail shaft housing and continue lowering engine until engine mounting feet rest on engine bearers.
55. Raise trolley jack until engine mounting bolts and nuts can be fitted; do not tighten at this stage.
56. Connect propeller shaft to output flange, use new self-locking nuts.
57. Reconnect gear change linkage – Automatic transmission cars only.
58. Fit plain washer, shaped washer, spacers, spring, spring seat and support plate to rear engine mounting stud; ensure that spring seats properly.

    NOTE: Two plain washers are used on cars fitted with automatic transmission.

59. Push support plate upwards to compress spring, fit plain washer and self-locking nut; do not tighten nut at this stage.
60. Fit five bolts, plain washers and spacers to secure support plate to floor pan, tighten bolts progressively, tighten self locking nut.
61. Tighten engine mounting nuts.
62. Reverse operations 1 to 47.
63. Bleed clutch – Cars fitted with manual transmission only – 33.15.01.
64. Adjust air pump drive belt – Cars fitted with exhaust emission control only – 17.25.13.
65. Adjust compressor drive belt – Cars fitted with air conditioning only – 82.10.01.



ENGINE

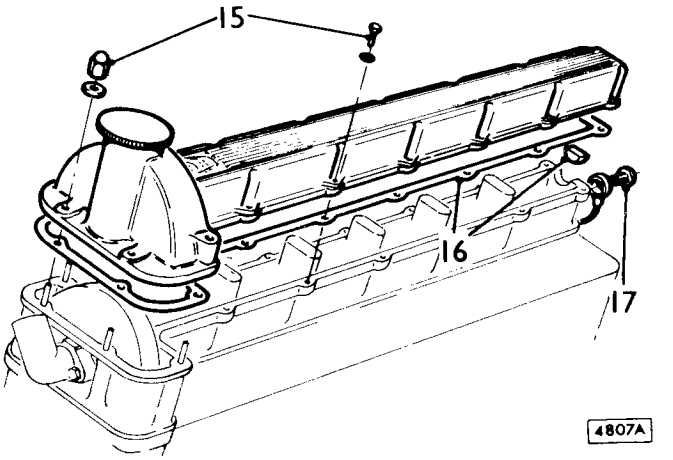
Dismantle and reassemble 12.41.05

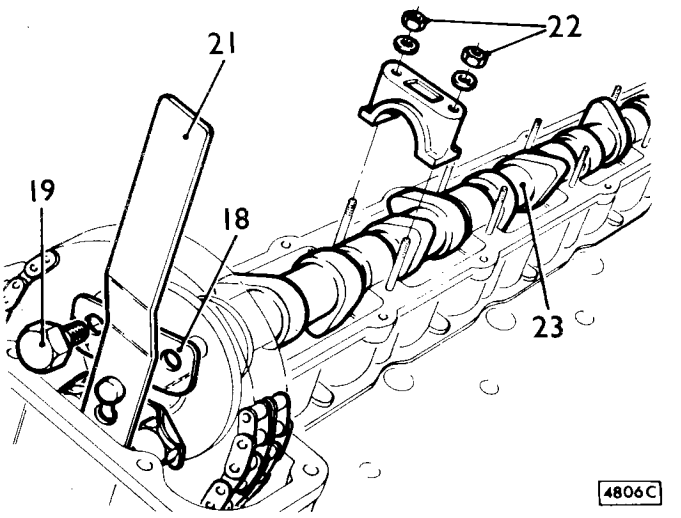
NOTE: All instructions unless otherwise stated, apply to both 'A' bank right hand and 'B' bank left hand cylinder head assemblies.

Service tools: Camshaft sprocket retaining tools JD.40; Cylinder liner retaining tools JD.41; Jackshaft retaining tool JD.39; Oil seal pre-sizing tool JD.17B and adaptor JD.17B-1; Piston ring clamp 38U.3; Valve timing gauge C.3993; Special screwdriver JD.42-2.

Dismantle

1. Remove engine and gearbox – 12.37.01
2. Remove inlet manifolds – front 30.15.02
   – rear 30.15.03
3. Remove exhaust manifolds – front 30.15.10
   – rear 30.15.11
4. Remove gearbox – 37.20.01 – Manual transmission cars only.
5. Remove clutch – 33.10.01 – Manual transmission cars only.
6. Remove gearbox – 44.20.01 – Automatic transmission cars only.
7. Remove torque converter – 44.17.07 – Automatic transmission cars only.
8. Remove alternator – 86.10.02.
9. Remove air pump – 17.25.07 – Cars fitted with exhaust emission control only.
10. Remove water pump – 26.50.01.
11. Remove bolts, washers and spacers securing alternator and air pump mounting bracket.
12. Remove starter motor – 86.60.01.
13. Remove distributor – 86.35.20.
14. Remove amplifier unit – **86.35.30.**
15. Remove domed head nuts, copper washers and setscrews securing camshaft covers to cylinder head; lift off covers.
16. Remove and discard gaskets and neoprene plugs.
17. Remove banjo bolts securing camshaft oil feed pipes to rear of tappet blocks.
18. Bend back locking tabs securing camshaft sprocket retaining bolts.
19. Remove two bolts from each sprocket.
20. Rotate engine until remaining bolts are accessible and remove.
21. Fit retaining tool JD.40 to each sprocket.
22. Slacken off camshaft bearing cap nuts working from centre outwards.
23. Remove camshafts.
24. Remove nuts and capscrews securing tappet block to cylinder head; remove tappet block together with tappets.
25. Retrieve valve adjusting pads.
26. Progressively slacken cylinder head nuts, working from centre outwards.
27. Lift off cylinder head and place on blocks of wood to prevent damaging valves which when open, protrude below cylinder head face.
28. Fit cylinder liner retainers JD.41.
29. Remove four bolts securing crankshaft pulley to damper, withdraw pulley.
30. Remove damper bolt, strike damper sharply with hide mallet, withdraw damper.
31. Remove damper cone and Woodruff key.

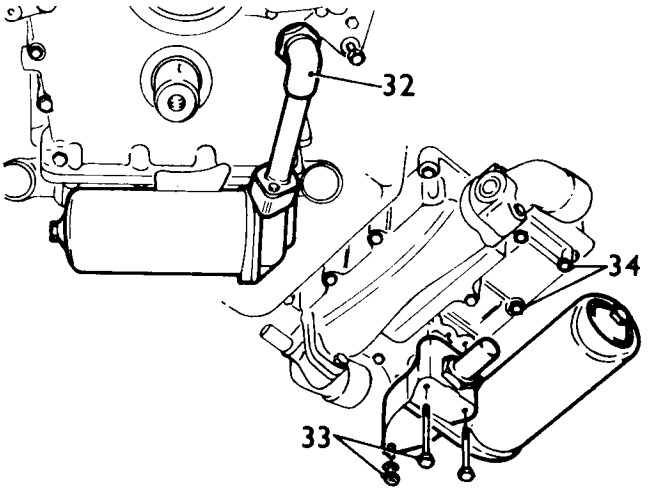




32. Unscrew oil pipe union nut from timing cover.
33. Remove bolts and nut securing oil filter head to oil cooler; remove filter bowl and head.
34. Remove bolts securing timing cover to oil sump.
35. Remove bolts securing timing cover to cylinder block noting relative positions of long, short and dowelled bolts.
36. Remove timing cover, lift off gaskets and discard.
37. Remove oil seal from cover and discard.
38. Withdraw spacer and Woodruff key from crankshaft.
39. Move chain tensioner clear of locating bracket and slide off dowel pin.
40. Disengage timing chain from sprockets and remove.
41. Remove bolts securing oil cooler to engine sump.
42. Remove oil cooler, retrieve and discard 'O' rings from suction and delivery pipes.
43. Withdraw crankshaft sprocket and Woodruff key.
44. Remove bolts securing oil pump to cylinder block, withdraw pump, drive gear and Woodruff key.
45. Remove bolts securing jackshaft cover to cylinder block, lift off cover.
46. Remove setscrews and tabwasher securing sprocket to jackshaft; withdraw sprocket, discard tabwasher.
47. Remove bolts securing jackshaft locking plate to cylinder block; lift plate out of groove in jackshaft flange.
48. Withdraw jackshaft.
49. Remove bolts securing sump to cylinder block, lift off sump; remove and discard gasket.
50. Remove and discard gasket.

NOTE: Care must be taken to identify pistons with their respective bores, big end caps should be fitted to connecting rods immediately after removal.

51. Remove nuts securing connecting rod bearing cap; lift off cap together with shell bearing.
52. Remove carbon deposit from top of bore; push connecting rod and piston up cylinder bore and withdraw.



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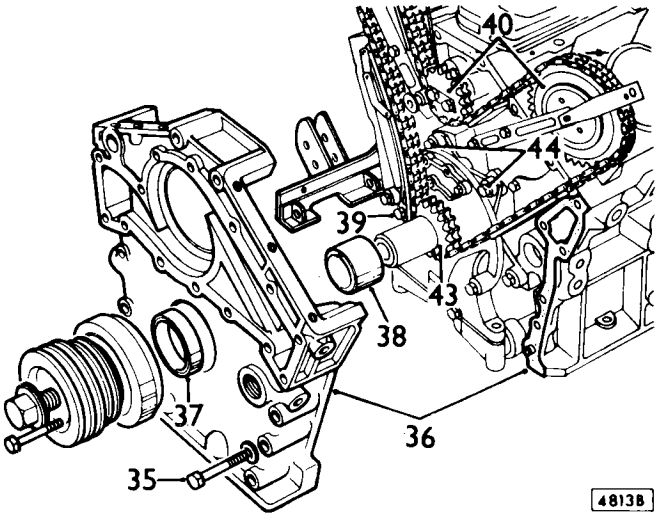

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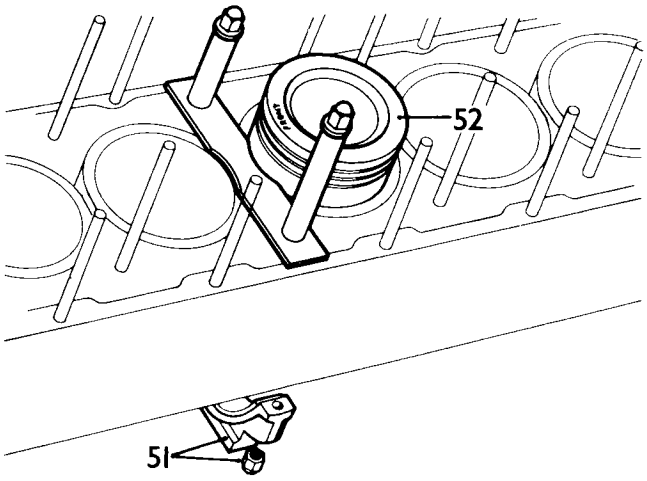

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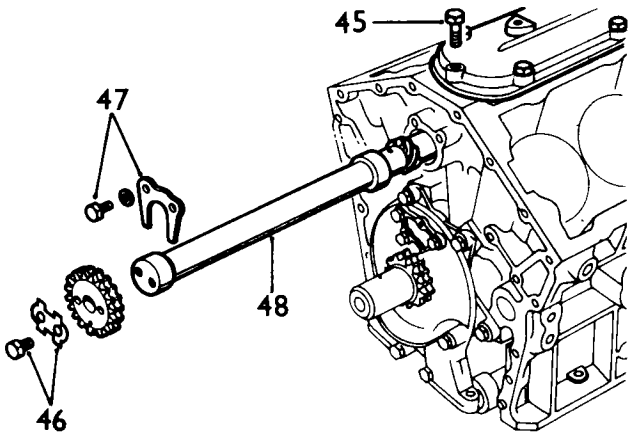


4823

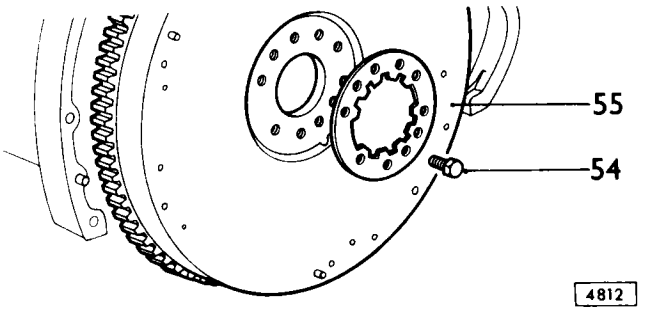
53. Repeat operations 51 and 52 on remaining pistons.

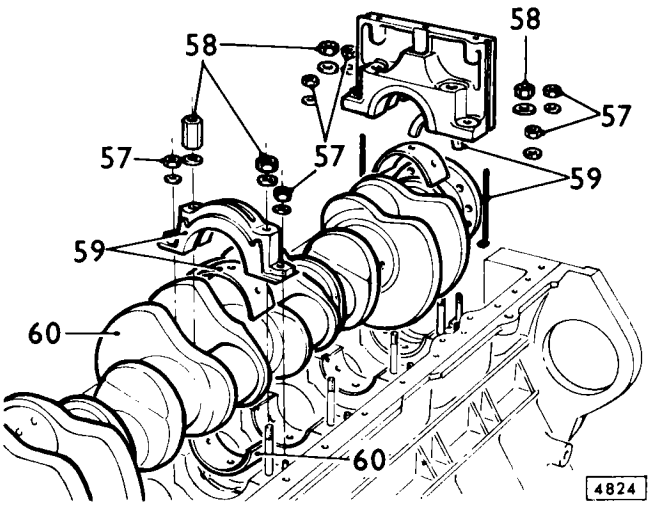
NOTE: Care must be taken to identify pistons with their respective bores, big end caps should be refitted to connecting rods immediately after removal.

54. Remove bolts and locking plate securing flywheel (manual transmission cars) or drive plate (automatic transmission cars) to crankshaft.
55. Lift off flywheel or drive plate.
56. Remove nut and bolt securing oil suction pipe clamp to bracket; remove suction pipe.
57. Remove small nuts securing main bearing caps, starting from centre bearing.
58. Remove pillar nuts and large nuts securing main bearing caps starting from centre bearing.
59. Lift off bearing caps and shell, slide rear main bearing casting out of cylinder block, remove and discard seals.
60. Lift crankshaft out of cylinder block, retrieve upper half of main bearing shells.

NOTE: If for any reason cylinder liners are to be removed and re-used, they should be marked 'front' and refitted in their original bore.

61. Remove cylinder liner retaining tools JD.41.
62. Position a suitable mandrel between cylinder liner and press arbor.
63. Press out cylinder liners from below.





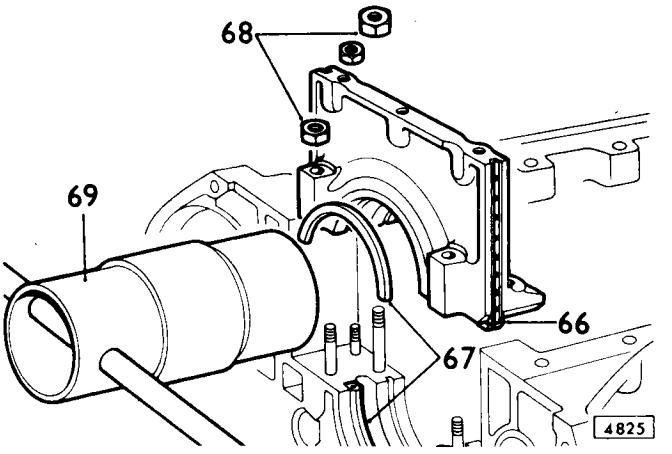
Reassembling

CAUTION: Ensure that all components are scrupulously clean, blow out all oil galleries in crankshaft, camshafts etc., with dry clean compressed air.

64. Smear shoulders of cylinder liners with Hylomar and slip them into cylinder block. Remove excess sealant.

NOTE: Cylinder liners must be fitted dry.

65. Ensure liners are correctly seated and fit retaining tools JD.41.
66. Fit new sealing strips to grooves of rear main bearing casting.
67. Fit new crankshaft rear oil seal.
68. Fit main bearing casting to cylinder block and tighten retaining nuts.
69. Pre-size rear oil seal using Service Tool JD.17B, together with adaptor JD.17B-1.
70. Remove rear main bearing casting.



71. Liberally oil upper main bearing shells and fit in cylinder block. Smear rear oil seal with Dag Colloidal Graphite.

CAUTION: Centre and main bearing shells must not be confused with each other; rear main bearing shell has an oil groove whilst centre main bearing shell is plain.

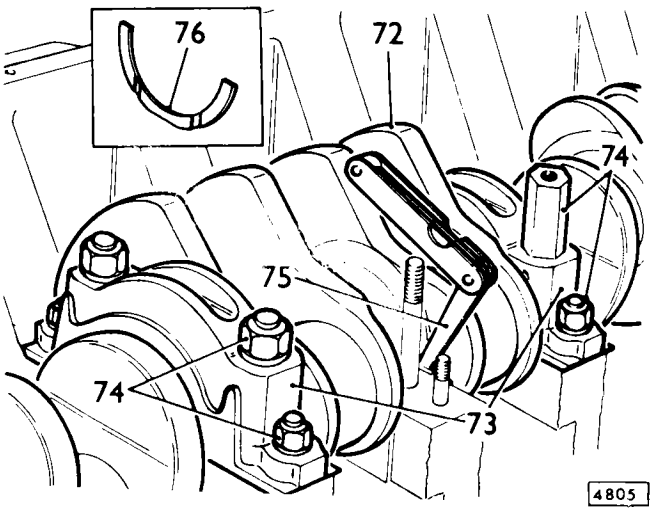
71. Liberally oil upper main bearing shells and fit in cylinder block.
72. Position crankshaft in cylinder block.
73. Fit bearing shells to caps; fit caps.
74. Tighten securing nuts to a torque of:–
    3.7 kg.m (27.5 lb.ft) for: 9.5 mm (⅜in) studs
    8.6 kg.m (62.5 lb.ft) for: 12.7 mm (½in) studs
75. Check crankshaft end float.
76. Select thrust washers which will reduce end float to .10 to .15 mm (.004 in to .006 in). For sizes of thrust washers available see Engine data 05.
77. Remove bearing caps and fit thrust washers selected to groove in block.

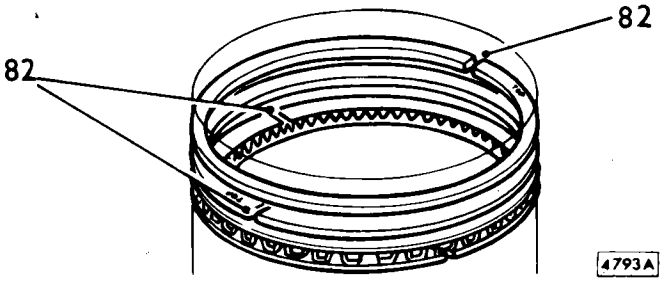
    NOTE: Grooved side of washers must face outwards.

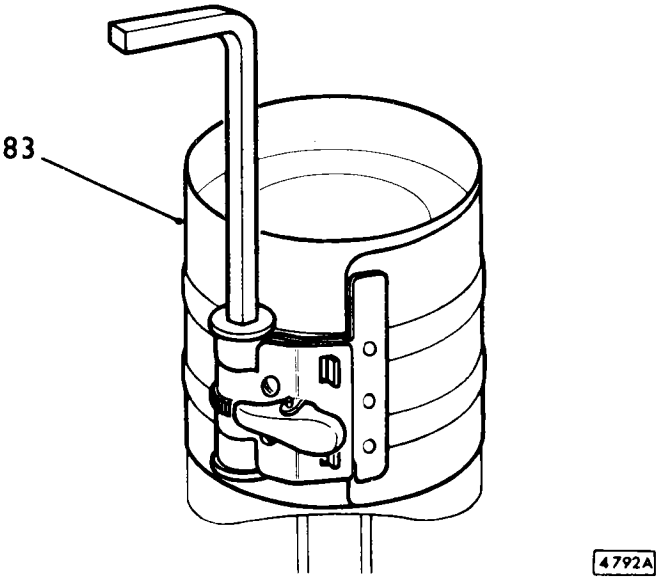
78. Fit bearing shells to caps, oil shells and crankshaft journals.
79. Fit main bearing caps and nuts; smear oil seals in rear main bearing casting with oil before assembly.

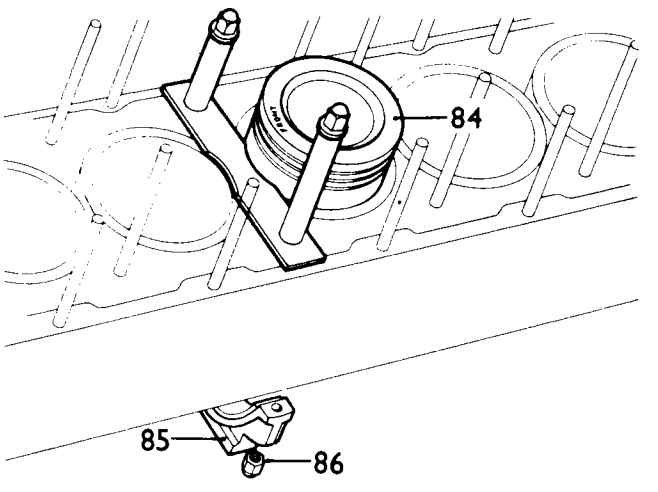
    NOTE: Ensure that reference marks on bearing caps face marks on cylinder block.

80. Tighten bearing caps one at a time working from centre outwards to a torque of:–
    3.7 kg.m (27.5 lb.ft) for: 9.5 mm (⅜in) studs.
    8.6 kg.m (62.5 lb.ft) for: 12.7 mm (½in) studs.
81. Liberally smear bore of number one cylinder with clean engine oil.
82. Ensure that piston ring gaps of number one piston are evenly spaced around circumference of piston.
83. Smear piston rings with oil and compress using Service Tool 38U.3.
84. Enter piston and connecting rod into top of bore ensuring that 'FRONT' stamped on piston faces forward. DO NOT use undue force when fitting piston.
85. Fit big end bearing shell to connecting rod and bearing cap; ensure that locking tabs on shells are correctly located.
86. Oil shells and crankshaft journal, fit bearing cap ensuring that it is correct way round. Tighten connecting rod nuts to 5,1 kg.m (37.5 lb.ft).
87. Repeat operations 81 to 86 on remaining pistons.
88. Check that engine rotates freely.
89. Refit oil suction pipe.





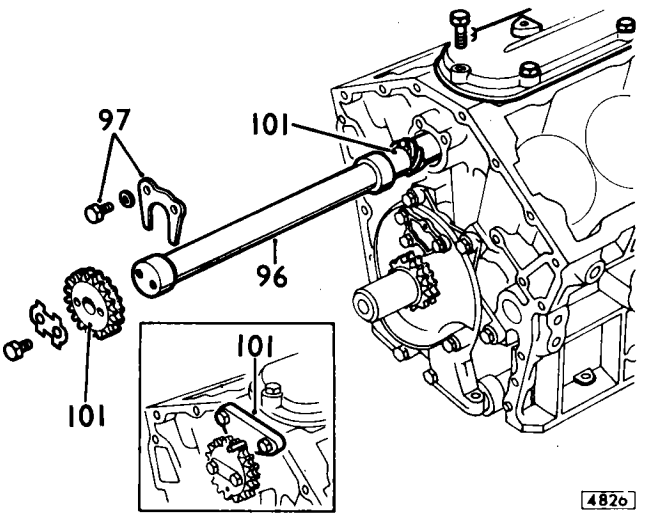


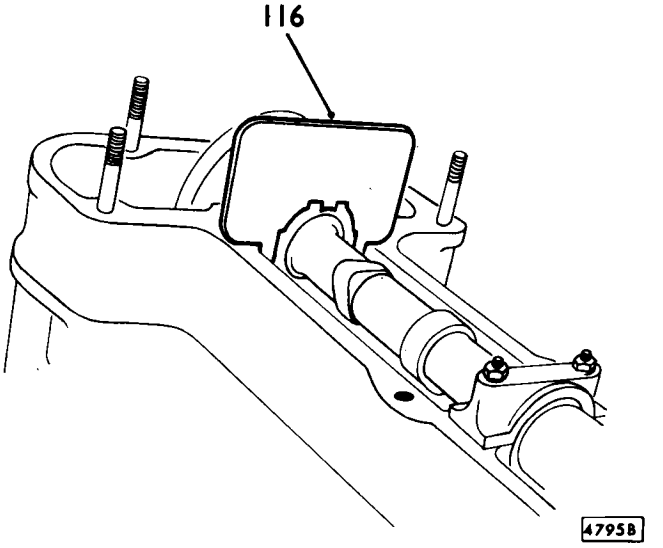


90. Refit flywheel or drive plate; use new locking plate; tighten bolts to 9.1 kg.m (66.5 lb.ft)
91. Refit oil pump to drive gear.
92. Refit oil pump, use new 'O' ring on suction pipe.
93. Refit crankshaft sprocket.
94. Refit timing chain guides – 12.65.50.
95. Refit timing chain tensioner ensuring that it is fully retracted.
96. Smear journals of jackshaft with clean engine oil and fit jackshaft.
97. Refit jackshaft locking plate.
98. Refit camshaft sprockets, use retaining tools JD.40.
99. Attach clock gauge to number one 'A' bank cylinder head stud.
100. Turn engine over and by means of clock gauge set number one 'A' bank piston at T.D.C.
101. Refit jackshaft sprocket ensuring that centre punch marks on sprocket and jackshaft are at 180° and that mark on jackshaft is at top. Fit jackshaft retaining tool JD.39.
102. Refit timing chain. Remove jackshaft retaining tool JD.39.

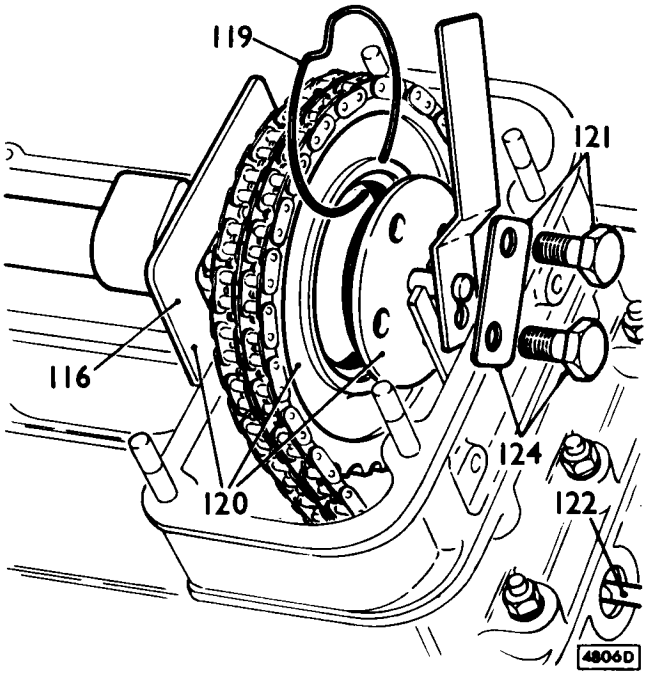
CAUTION: Engine must on no account be rotated until camshaft sprockets are coupled to camshafts.

103. Refit timing cover, use new crankshaft oil seal and gaskets, tighten bolts by diagonal selection.
104. Refit crankshaft distance piece.
105. Refit sump, use new gaskets, tighten bolts by diagonal selection.
106. Refit oil cooler, use new gaskets and 'O' rings.
107. Refit oil filter, do not overtighten union nut.
108. Refit crankshaft damper cone and damper; tighten bolt to 17.3 kg.m to 20.7 kg.m (125 lb.ft to 150 lb.ft).
109. Remove cylinder liner retaining tools JD.41.
110. Smear mating faces of tappet block and cylinder head with Hylomar.
111. Refit tappet block, tighten nuts and capscrews by diagonal selection working from centre outwards.
112. Refit camshaft.
113. Refit bearing caps ensuring that reference marks correspond, tighten nuts by diagonal selection working from centre outwards to a torque of 1.2 kg.m (9.0 lb.ft).
114. Adjust tappets 12.29.48.
115. Fit cylinder head gasket with 'TOP' uppermost. Do not use jointing compound or grease.
116. Turn each camshaft until valve timing gauge C.3993 can be fitted to slot in front flange.
117. Reconnect camshaft oil feed pipe.





118. Refit cylinder head, tighten nuts in order shown to a torque of:–
3.7 kg.m (27.5 lb.ft) for ⅜ in nuts.
7.2 kg.m (52 lb.ft) for ⅞ in nuts.
119. Remove circlip retaining camshaft sprocket coupling, rotate coupling until two bolt holes align with holes in camshaft.
120. Refit coupling to camshaft sprocket, refit circlip, remove gauge C.3993.
121. Remove retaining tool JD.40, bolt coupling to camshaft.
122. Insert screwdriver JD.42-2 through hole in timing cover and release chain tensioner locking catch; refit rubber grommet.
123. Rotate engine until remaining bolt holes in coupling are visible.
124. Fit remaining bolts, secure all bolts with tabwashers.
125. Use new camshaft cover gaskets and neoprene sealing plugs.
126. Refit camshaft cover, tighten bolts to a torque of 1,1 kg.m (8.0 lb.ft).
127. Refit jackshaft cover.
128. Reverse operations 1 to 14.
129. Check engine timing by means of a stroboscope.



CRANKSHAFT – GENERAL

Following crankshaft removal, journals should be checked in accordance with dimensions given in group 05.

> **NOTE:** Due to the extremely hard surface of crankshaft journals, it is not possible to grind crankshafts satisfactorily. Crankshafts are available on an exchange basis and are supplied complete with matching bearing shells.

OIL PUMP

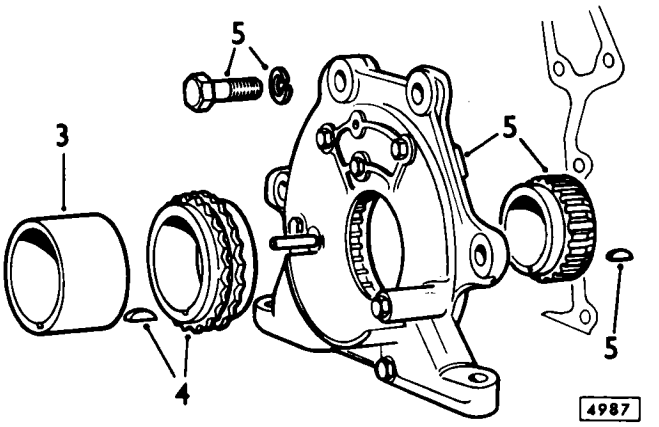
Remove and refit **12.60.26**

Removing

1. Remove timing cover – 12.65.01.
2. Remove the timing chain tensioner – 12.65.28.
3. Remove spacer from crankshaft.
4. Withdraw timing chain and sprocket from crankshaft; collect Woodruff key.
DO NOT ROTATE ENGINE.
5. Remove four bolts and lockwashers and withdraw oil pump and gear; collect Woodruff key.

Refitting

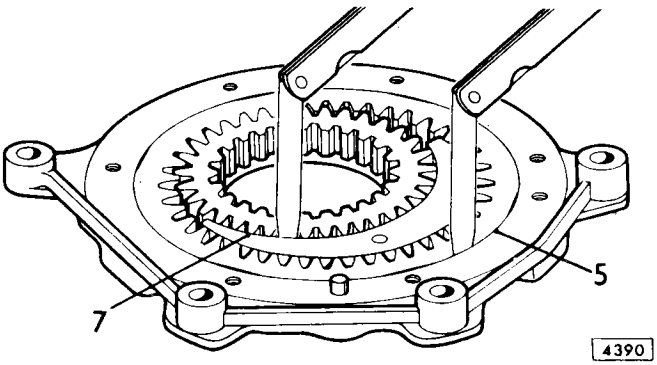
Reverse operations 1 to 5.

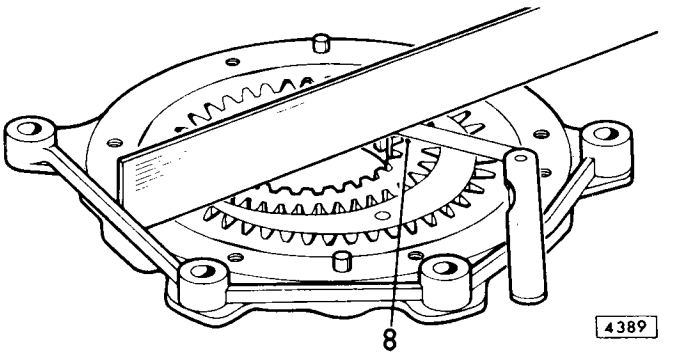


OIL PUMP

Overhaul 12.60.32

1. Remove eight bolts and lockwashers and detach pump cover from gear housing .
2. Mark drive and driven gear faces to ensure that when reassembled the gears are replaced in the same position as prior to removal.
3. Remove both gears, wash all parts in clean petrol and dry with compressed air.
4. Check the condition of all gear teeth and remove any burrs with a fine file.
5. Refit driven gear and check radial clearance between gear and housing. Checks should not be taken at the six radial flats on the gear.
6. Clearance should not exceed .127 mm (0.005 in).
7. Refit drive gear and check radial clearance between gear and crescent. Clearance should not exceed .152 mm (0.006 in).
8. Check gear end float by placing a straight edge across joint face of housing and measuring clearance between straight edge and gears.
9. Figure obtained should not exceed .127 mm (0.005 in).
10. Reassembly is the reverse of items 1 to 3.
11. Lubricate gears with clean engine oil before refitting pump assembly and check that all surfaces are clean.





ENGINE SUMP

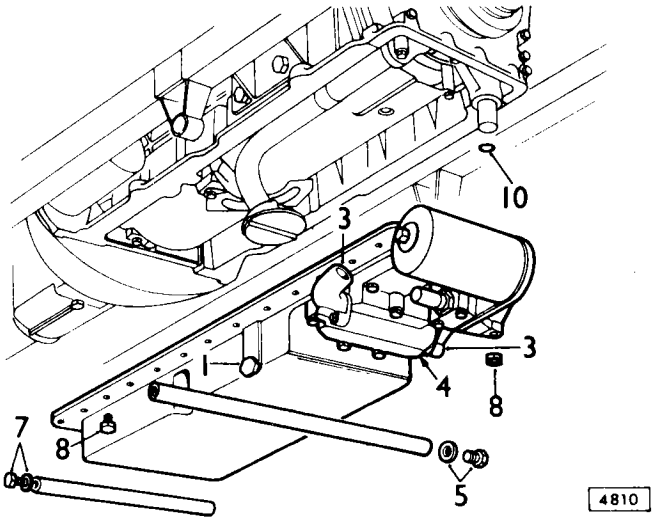
Remove and refit (Engine in situ) 12.60.44

Removing

1. Remove sump plug and drain oil into a suitable container.
2. Drain cooling system – 26.10.01
3. Disconnect water hoses.
4. Disconnect heater pipe hose.
5. Remove bolts securing front cross member to mounting brackets, remove cross member.
6. Fold carpet away from both sides of gearbox cover.
7. Remove rear cross member securing bolts; one from each side of gearbox cover; remove rear cross member.
8. Remove sump securing bolts and serrated washers.
9. Lower sump.
10. Remove and discard 'O' ring from oil delivery elbow.

Refitting

Reverse operations 1 to 10; fit new 'O' ring in oil delivery elbow, use new sump gasket.



TIMING COVER

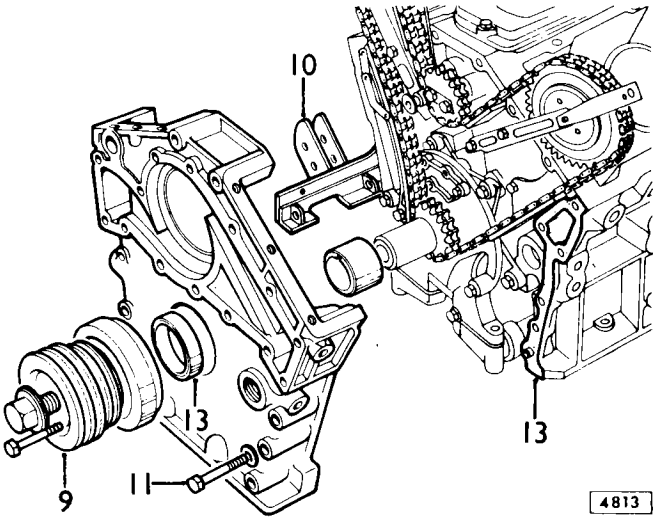
Remove and refit (Engine in situ) **12.65.01**

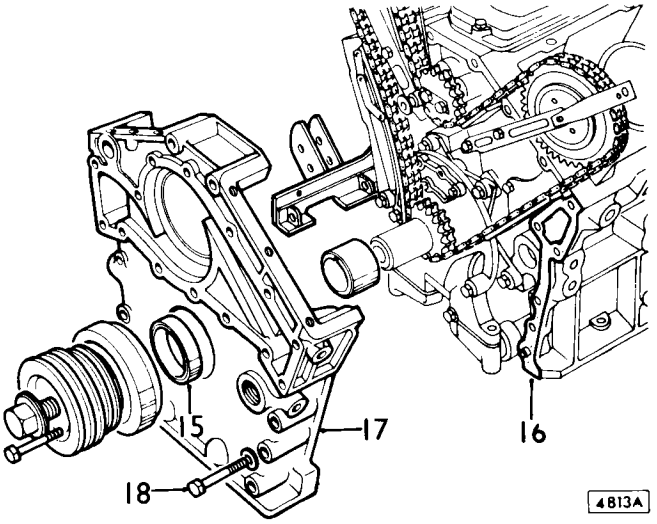
Removing

1. Drain cooling system – 26.10.01.
2. Remove front sub-frame cross member complete with header tank – 12.45.05.
3. Remove cylinder heads – 'A' right hand – 12.29.12 'B' left hand – 12.29.11.
4. Remove engine sump – 12.60.44.
5. Remove alternator – 86.10.02.
6. Remove power assisted steering pump – 57.20.14.
7. Remove emission control air pump – Cars fitted with exhaust emission control only – 17.25.07.
8. Remove water pump – 26.50.01.
9. Remove crankshaft pulley and damper – 12.21.01
10. Remove bolts, washers and spacers securing alternator and air pump mounting bracket.
11. Remove bolts and serrated washers securing timing cover to cylinder block noting relative positions of different length bolts also dowel bolts.
12. Remove timing cover together with oil seal.
13. Remove gaskets and oil seal and discard.

Refitting

14. Ensure mating surfaces of timing cover and cylinder block are scrupulously clean.
15. Immerse new oil seal in clean engine oil and press into timing cover.
16. Smear both sides of each new gasket with suitable jointing compound and position on timing cover.
17. Fit timing cover ensuring that lip on oil seal is not distorted or damaged.
18. Fit bolts and serrated washers, tighten bolts by diagonal selection.
19. Reverse operations 1 to 10.





TIMING CHAIN

Remove and refit (Engine in situ) **12.65.12**

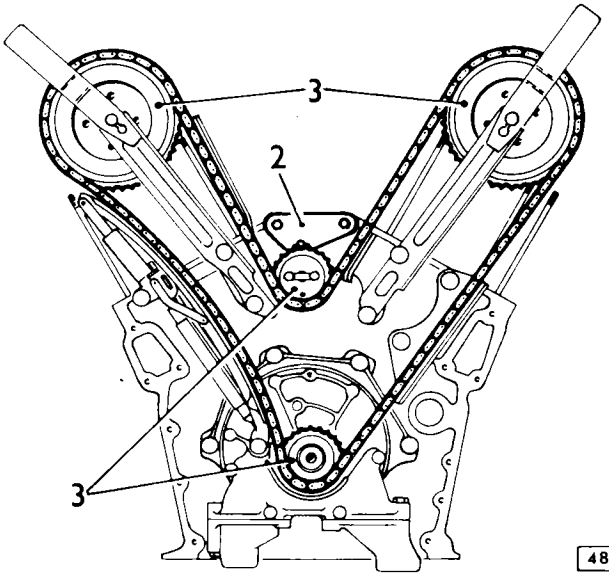
Service tool: Jackshaft retaining tool JD.39.

Removing

1. Remove timing cover – 12.65.01.
2. Fit jackshaft retaining tool JD.39.
3. Disconnect timing chain from camshaft and jackshaft sprockets; withdraw crankshaft sprocket and chain. DO NOT ROTATE ENGINE.

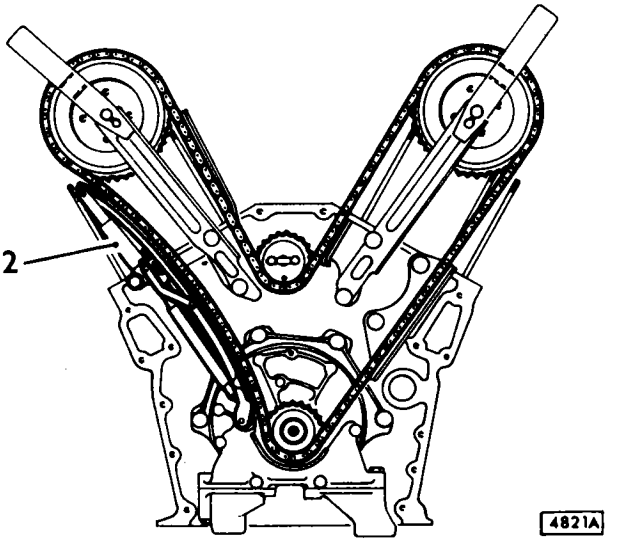
Refitting

Reverse operations 1 to 3; check engine timing by means of a stroboscope.



TIMING CHAIN TENSIONER

Remove and refit (Engine in situ) 12.65.28



Removing

1. Remove timing cover – 12.65.01.
2. Move chain tensioner clear of locating bracket and slide off dowel pin.

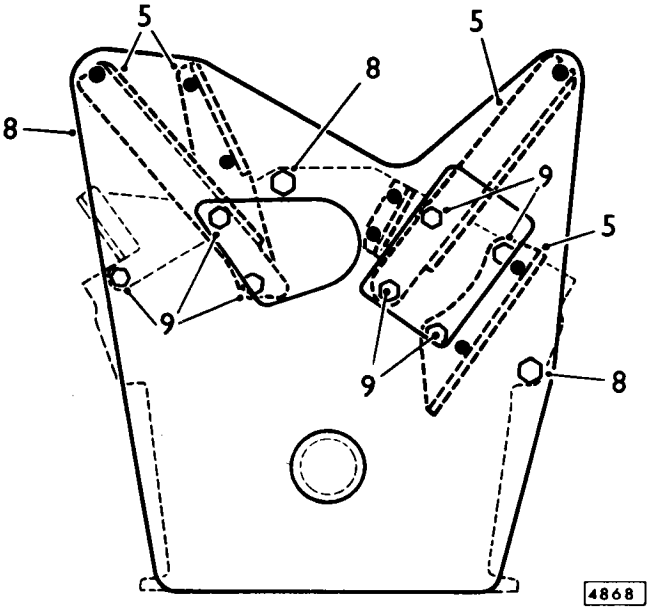
Refitting

Reverse operations 1 and 2.

TIMING CHAIN DAMPERS

Remove and refit 12.65.50

Service tool: Timing chain damper setting jig JD.38.



Removing

1. Remove engine and gearbox assembly – 12.37.01
2. Remove timing chain – 12.65.14.
3. Remove oil pump – 12.60.26.
4. Remove bolts securing camshaft sprocket hangers and timing chain dampers to cylinder block.

Refitting

5. Fit camshaft sprocket hangers and timing chain dampers to cylinder block; do not fully tighten bolts at this stage.
6. Note relative position of jackshaft sprocket to jackshaft sprocket retaining tool (fitted to engine under operation 12.65.14).
7. Remove jackshaft sprocket retaining tool JD.39.
8. Position damper setting jig JD.38 (shown in skeleton form opposite) on front of cylinder block; do not overtighten retaining bolts.
9. Position camshaft sprocket hangers and timing chain dampers so that they are in even contact with locating dowels; tighten securing bolts.
10. Remove damper setting jig JD.38.
11. Refit jackshaft sprocket retaining tool JD.39.
12. Reverse operations 1 to 3.

CONTENTS

17.00.01 FAULT FINDING

CAUTION: The checks and procedures covered in the fault finding chart must be carried out on all four carburetters if satisfactory results are to be obtained.

SYMPTOM	CAUSE	CURE
Erratic or Poor Idling	1. Float height incorrect	1. Check float height; rectify if necessary.
	2. Dirty or worn needle valve	2a. Wash valve in petrol; check filter gauze is clean. 2b. Renew needle valve if sticking or worn.
	3. Piston sticking	3. Clean piston and rod, lubricate with clean engine oil. Top up piston rod to correct level.
	4. Carburetter inlet obstructed	4. Check that air cleaner and case are correctly fitted and that gaskets are not causing obstruction.
	5. Diaphragm damaged	5. Check for splits in diaphragm; renew if necessary.
	6. Temperature compensator not operating correctly	6. Refer to operation 17.20.07 items 22 and 23.
	7. Leakage at induction manifold joints	7. Check all joints for leakage and renew gaskets as necessary.
	8. Leakage from vacuum pipe connections	8. Check all vacuum pipe connections for security and rectify as necessary.
	9. Carburetters not tuned correctly	9. Carry out operation 19.15.02.
Hesitation or Flat Spot	1. Check items 1 to 9 enumerated above	1. If trouble still persists proceed to 2 below. 2. Check that piston return spring is not broken and that spring colour coded RED is fitted.
Air delivery pump inoperative or amount of air pump delivers is low	1. Driving belt tension	1. Carry out operation 17.25.13.
	2. Poor hose connections	2. Check all connections for tightness; rectify as necessary.
	3. Symptoms persist after checking 1 and 2	3. Replace pump.

CAUTION: It is essential that an exhaust emission check is carried out immediately after completing any operation detailed in this section.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in) long, 25.4 cm (10 in) wide and 15 cm (6 in) high. Ensure bonnet is adequately supported after disconnecting stay.

ENGINE BREATHER FILTER

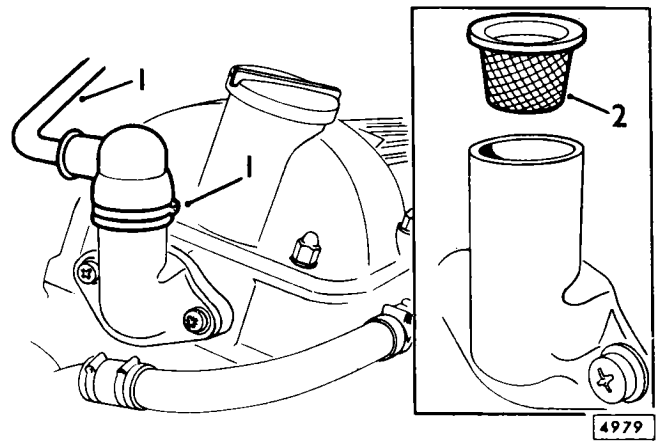
Remove and refit 17.10.02

Removing

1. Remove clip securing rubber elbow to filter housing; lift off elbow.
2. Lift out filter.

Refitting

Reverse operations 1 and 2; use new clip to secure rubber elbow to filter housing.



ABSORPTION CANISTER

Remove and refit 17.15.13

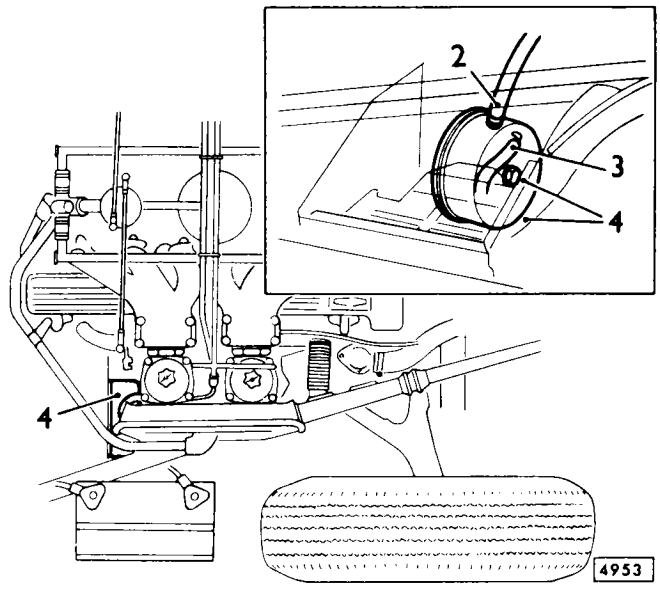
Removing

1. Remove battery – 86.15.01.
2. Slacken clip and disconnect outlet pipe.
3. Disconnect inlet pipe.
4. Remove bolt and lockwasher securing canister to bulkhead; lift out canister.

Refitting

Reverse operations 1 to 4.

NOTE: When a new canister is to be fitted it will be necessary to glue a new mounting pad on to rear of canister. The adhesive used should be petroleum based and should be applied to the **SMOOTH** side of pad.



CARBURETTER EMISSION PACK – RED

Fitting **17.20.07**

NOTE: Four red emission packs, part number 12883 will be required for this operation. As each carburetter has its own individually matched components, it is advisable to deal with one carburetter at a time.

Dismantling

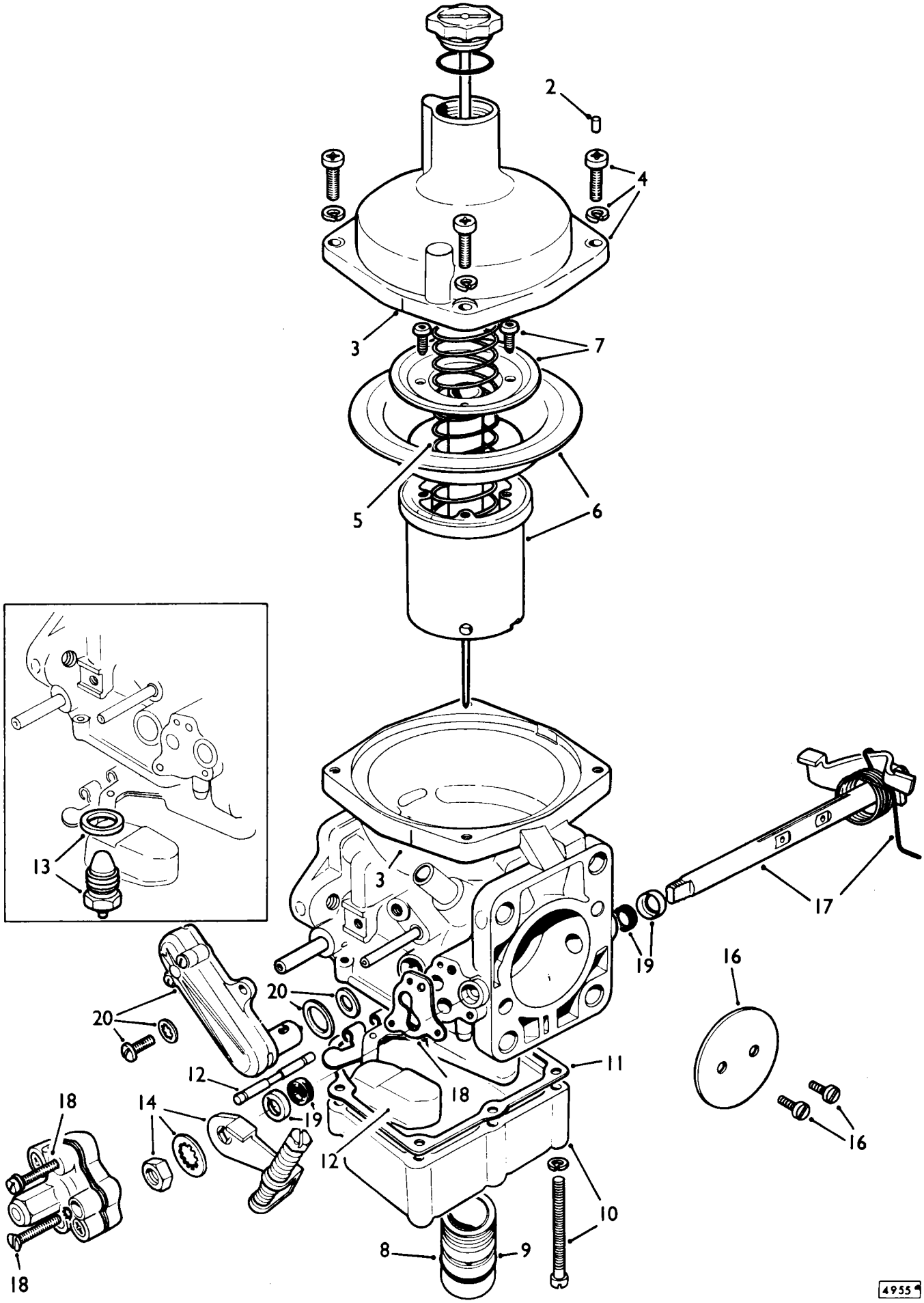
1. Remove carburetters from car – 19.15.11.
2. Remove lead plug from cover securing screw.
3. Mark relative position of cover to carburetter body.
4. Remove cover securing screws; lift off cover.
5. Remove piston return spring.
6. Withdraw piston and diaphragm assembly.
7. Remove screws securing diaphragm retaining ring to piston. Lift off ring; remove and discard diaphragm.

NOTE: Do not attempt to remove needle retaining screw or needle. The position and size of needle is determined during manufacture and on no account may either be altered.

8. Unscrew jet cover from float chamber.
9. Remove and discard 'O' ring.
10. Remove screws and spring washers securing float chamber to carburetter body; lift off float chamber.
11. Remove and discard float chamber gasket.
12. Disengage float hinge pin from spring clip; lift out float.
13. Unscrew needle valve; discard valve and alloy seating washer.
14. Remove nut and serrated washer securing lever to butterfly spindle; withdraw lever.
15. Mark relative position of throttle disc to spindle.
16. Remove screws securing throttle disc; slide disc out of spindle.
17. Note position of spindle return spring; withdraw spindle.
18. Remove screws and lockwashers securing by-pass valve and cover to carburetter body, remove gasket and discard.

CAUTION: The by-pass valve is correctly adjusted during manufacture and this adjustment will be lost if any attempt is made to separate by-pass valve cover from body. If it is suspected that diaphragm is damaged; complete by-pass valve assembly must be replaced.

19. Prise spindle seals out of carburetter body, discard seals.
20. Remove screws securing temperature compensator assembly to carburetter body, withdraw compensator, remove and discard seals.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Reassembling

21. Fit new seals to temperature compensator assembly; fit compensator to carburetter body.
22. Remove screws securing compensator cover; lift off cover.
23. Check that tapered plug is free to move in housing. If plug movement is satisfactory, refit cover. Should plug stick in housing, temperature compensator assembly must be renewed.
24. Press new spindle seals into carburetter body.
25. Position new gasket on carburetter body; fit by-pass valve and secure with screws and lockwashers.
26. Fit spindle ensuring that return spring is located correctly.
27. Fit lever, lockwasher and nut.
28. Slide throttle disc into spindle, fit securing screws but do not tighten at this stage.
29. Adjust position of disc until it closes fully; tighten securing screws.
30. Fit new needle valve, use new alloy seating washer, DO NOT overtighten.
31. Refit float; invert carburetter, ensure needle valve is closed and measure distance from face of carburetter body to highest point on each float. Dimension obtained should be 16.5 mm ± .5 mm. If this dimension is not obtained, bend float arm slightly and recheck.
32. Fit new gasket to float chamber, fit chamber to carburetter body. Tighten retaining screws by diagonal selection to avoid distorting chamber.
33. Fit new 'O' ring on jet cover, smear periphery of 'O' ring with petroleum jelly; screw cover into carburetter.
34. Check by means of a straight edge that needle is not bent or distorted in any way.

    NOTE: Needle is permanently biased to one side and this must not be confused with damage to needle. If needle is found to be damaged, a new piston and needle assembly must be fitted.

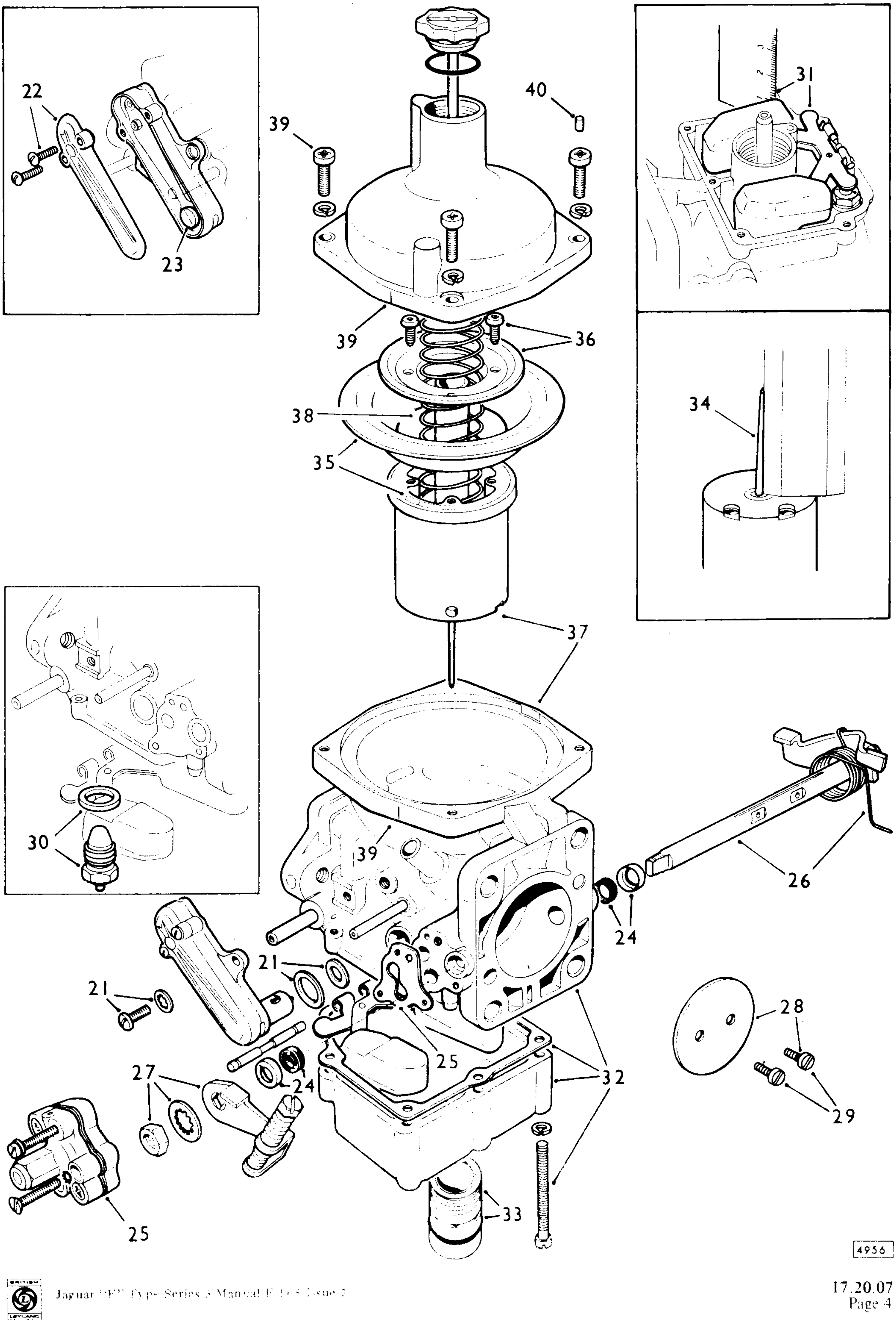
35. Fit new diaphragm to piston ensuring that lip on underside of diaphragm is seated in recess in piston.
36. Fit diaphragm retaining ring, tighten securing screws evenly.
37. Fit piston assembly in carburetter body ensuring that lip on outer periphery of diaphragm is seated in recess in body.
38. Position piston return spring on piston.
39. Fit cover in position marked during dismantling, tighten securing screws by diagonal selection to avoid distorting cover.
40. Drive new lead plug into a cover securing screw.
41. Carry out operations 2 to 40 on remaining carburetters.
42. Refit carburetters to car.
43. Tune carburetters - 19.15.02.

CAUTION: The following items must not be changed in service.

1. The jet assembly.
2. The air valve.
3. The depression chamber cover.
4. The position of the metering needle.

The following items must not be adjusted in service.

5. The temperature compensator.
6. The piston return spring loading. Correct spring is colour coded RED.
7. The by-pass valve spring loading.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4956

AIR CLEANER FILTER ELEMENT

Remove and refit 17.25.03

NOTE: Filter element, A.C. Delco reference number A.224C will be required for this operation.

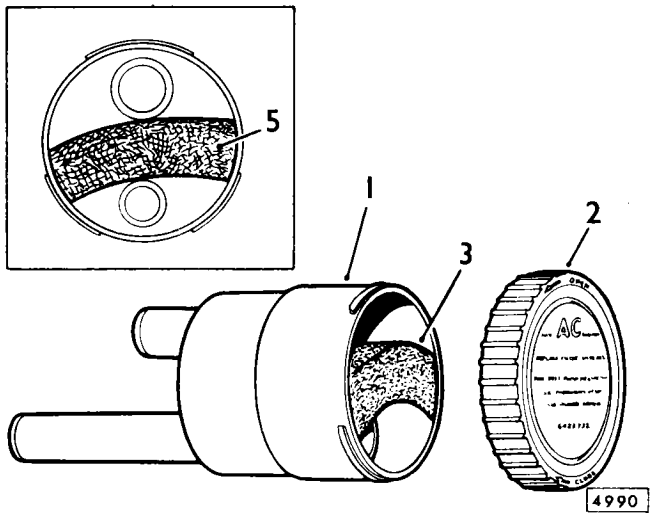
Removing

1. Remove air cleaner – 17.25.05.
2. Unscrew end cover.
3. Remove and discard element.
4. Thoroughly wash filter casing in petrol and dry.

CAUTION: On no account may casing be washed in trichlorethylene.

Refitting

5. Squeeze excess fluid out of filter element and position in cover.
6. Reverse operations 1 and 2.



AIR PUMP AIR CLEANER

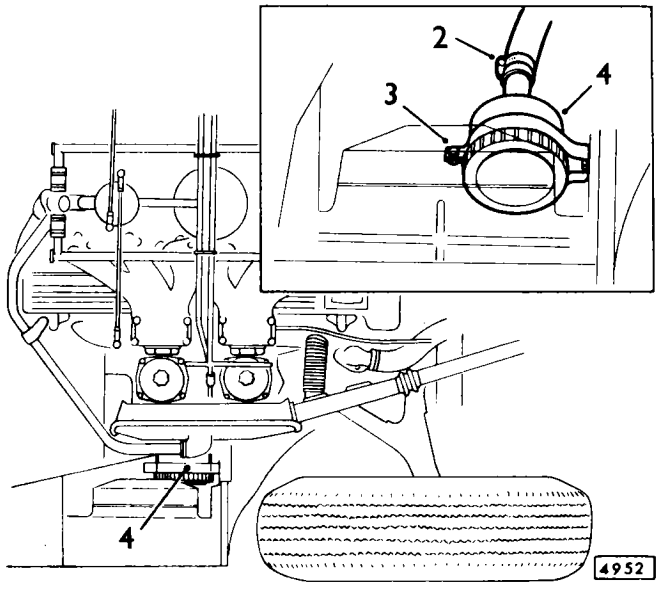
Remove and refit 17.25.05

Removing

1. Remove battery – 86.15.01.
2. Disconnect outlet hose from air cleaner.
3. Slacken off retaining clamp pinch bolt.
4. Withdraw air cleaner.

Refitting

Reverse operations 1 to 4.



AIR DELIVERY PUMP

Remove and refit 17.25.07

Removing

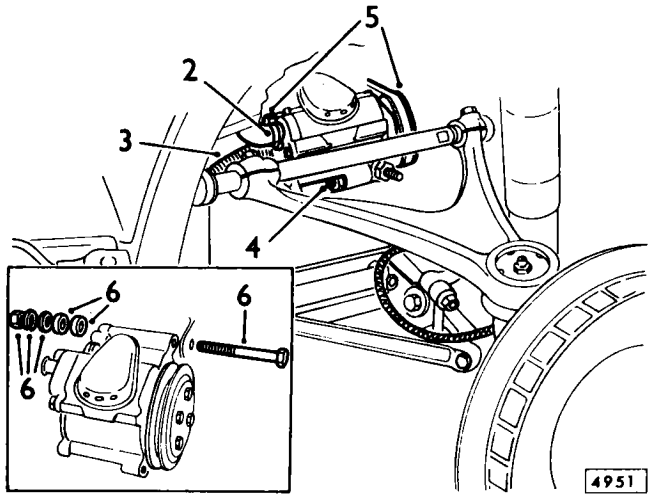
1. Remove front right hand road wheel – 74.20.01.
2. Slacken clip and disconnect rubber outlet pipe.
3. Slacken clip and disconnect flexible inlet pipe.
4. Remove nut and bolt securing trunnion to pump.
5. Slacken nut securing pump mounting bolt, swing pump toward engine and remove driving belt.
6. Remove nut, washers and pump mounting bolt; collect spacers.
7. Lift pump off mounting bracket and withdraw between upper and lower wishbones.

WARNING: Utmost care must be exercised to ensure that pump does not foul brake flexi-pipe when carrying out operation 7.

Refitting

8. Reverse operations 1 to 7.
9. Adjust driving belt tension – 17.25.13.

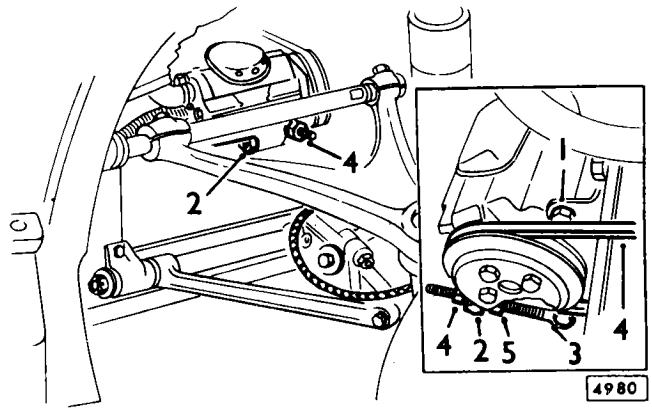
CAUTION: No servicing or overhaul of the air delivery pump is possible. In the event of failure, service exchange unit **MUST** be fitted.



AIR DELIVERY PUMP DRIVING BELT

Tensioning 17.25.13

1. Slacken off mounting bolt securing nut.
2. Slacken off trunnion retaining bolt.
3. Slacken off adjusting link securing bolt.
4. Slacken off locknut.
5. Adjust driving belt tension by screwing adjusting link nut up or down until total belt deflection of 9,5 mm (3/8 in) is obtained. Deflection should be measured at mid point of belt.
6. Reverse operations 1 to 4.



AIR DELIVERY PUMP DRIVING BELT

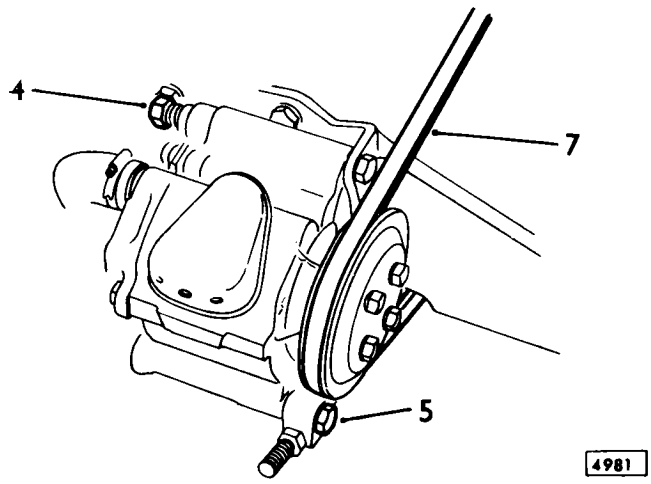
Remove and refit 17.25.15

Removing

1. Remove alternator drive belts – 86.10.03.
2. Remove compressor drive belt – 82.10.02 – Cars fitted with air conditioning only.

WARNING: ON NO ACCOUNT MUST ANY PORTION OF THE AIR CONDITIONING SYSTEM BE DISCONNECTED BY ANYONE OTHER THAN A QUALIFIED REFRIGERATION ENGINEER; BLINDNESS CAN RESULT IF THE GAS CONTAINED WITHIN THE SYSTEM COMES INTO CONTACT WITH THE EYES.

3. Remove power assisted steering pump belt – 57.20.02.
4. Slacken off mounting bolt securing nut.
5. Remove trunnion retaining bolt.
6. Swing air delivery pump towards cylinder block.
7. Disengage driving belt from pulleys.



Refitting

8. Reverse operations 1 to 7.
9. Tension driving belt – 17.25.13.

AIR DELIVERY PIPE

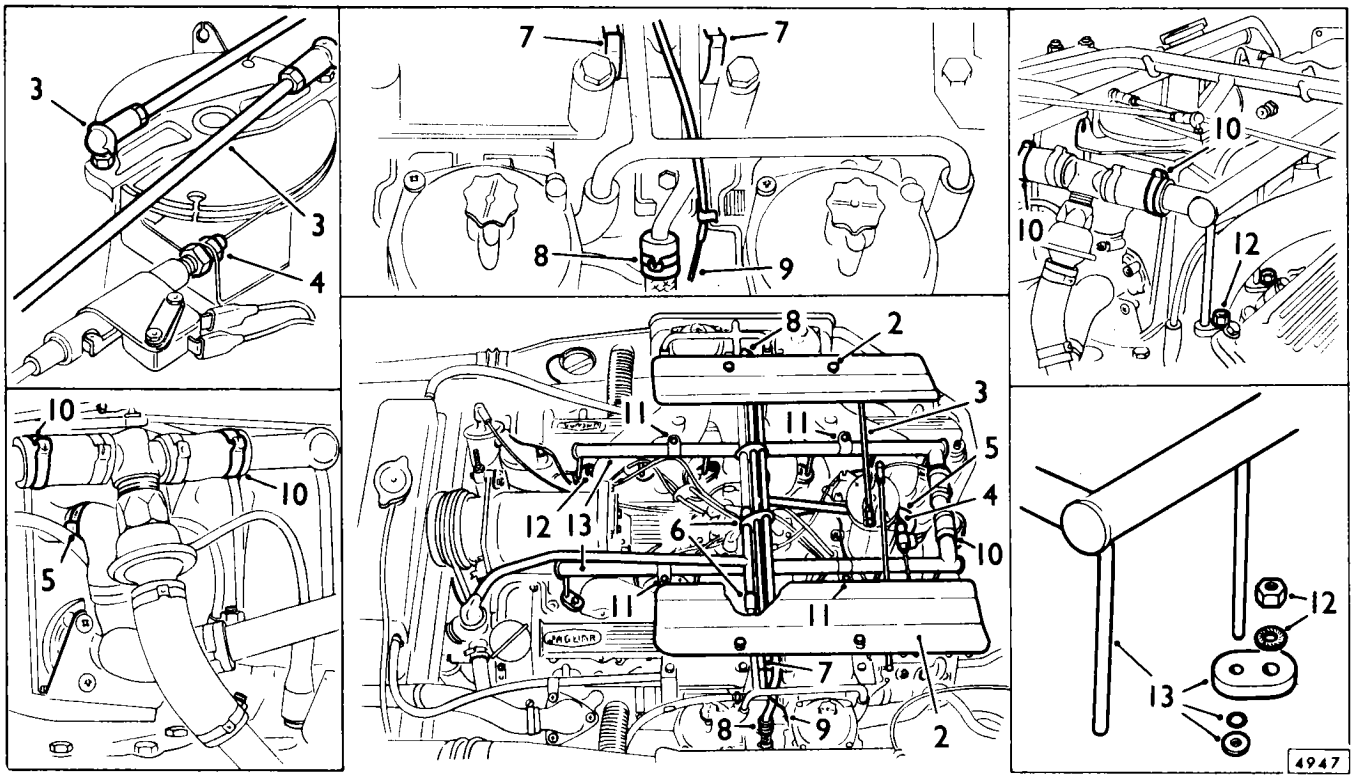
Remove and refit — **Left hand 17.25.17**, **Right hand 17.25.18**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Slacken bolts securing heat shields to inlet manifolds; lift off heat shields.
3. Disconnect throttle linkage.
4. Disconnect accelerator cable – Left hand air delivery pipe only.
5. Slacken clip and disconnect manifold balance pipe from gulp valve hose.
6. Disconnect carburetter balance pipe from hoses.
7. Remove pipe clips securing manifold balance pipe hoses.
8. Remove pipe clips securing hoses to fuel pipe.
9. Disconnect choke cable from rear left hand carburetter.
10. Remove pipe clip securing hose to air delivery pipe.
11. Remove bolts securing delivery pipe clips to inlet manifolds.
12. Remove nuts and serrated washers securing delivery pipe feet to inlet manifolds.
13. Remove pipe followed by securing feet, 'O' rings and steel washers.

Refitting

Reverse operations 1 to 13, use new 'O' rings and pipe clips on delivery pipe, fuel pipe and manifold balance pipe hoses



NON RETURN VALVE

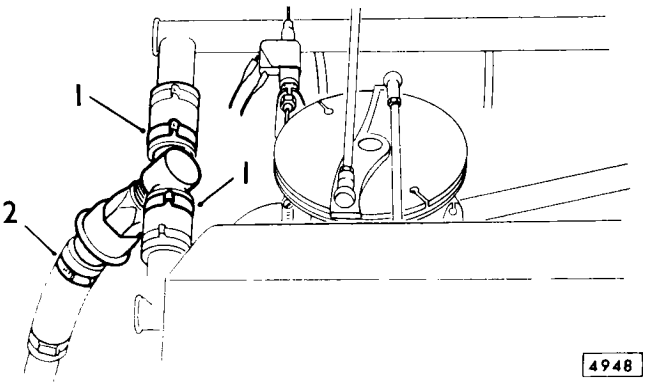
Remove and refit 17.25.21

Removing

1. Remove clips securing air delivery rail hoses to non-return valve outlet.
2. Slacken clip securing air delivery pipe hose to non-return valve inlet; lift off non-return valve.

Refitting

Reverse operations 1 and 2; use new pipe clips on air delivery rail hoses.



OUTLET PIPE

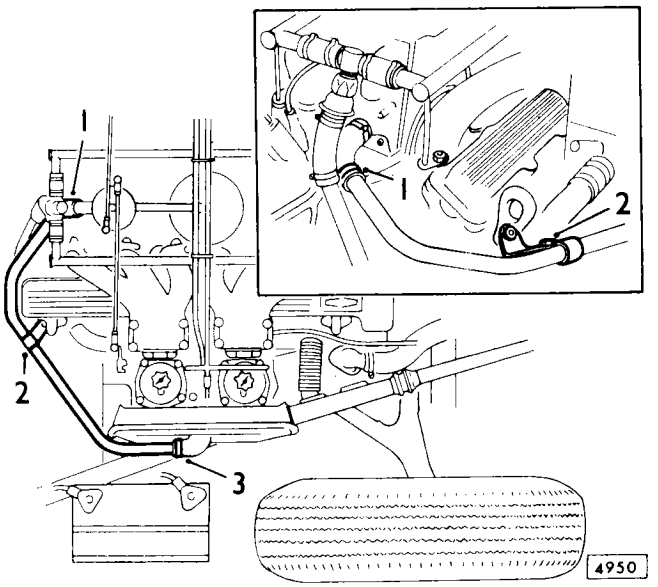
Remove and refit 17.25.24

Removing

1. Remove clip securing outlet pipe hose to gulp valve.
2. Remove nut, bolt and washers securing clip to retaining strap.
3. Remove clip securing air cleaner hose to outlet pipe; withdraw pipe.

Refitting

Reverse operations 1 to 3; use new pipe clips.



GULP VALVE

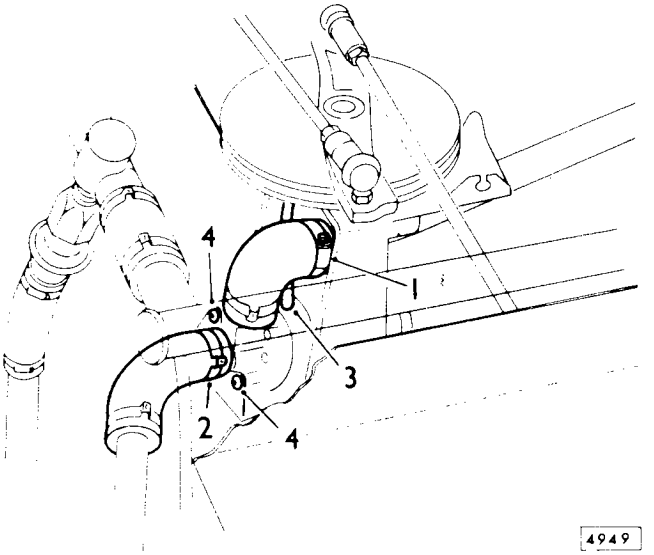
Remove and refit 17.25.30

Removing

1. Slacken clip and disconnect inlet manifold balance pipe from hose.
2. Remove clip securing outlet pipe hose to gulp valve.
3. Disconnect vacuum pipe from gulp valve.
4. Remove screws securing gulp valve to mounting bracket; lift off valve.

Refitting

Reverse operations 1 to 4; use new pipe clip to outlet pipe hose.



TEMPERATURE SENSOR UNIT

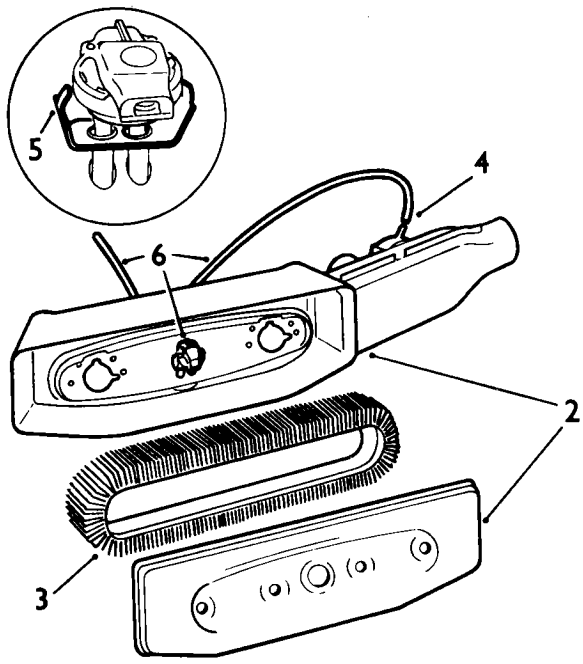
Remove and refit 17.30.10

Removing

1. Remove air cleaner – Left hand – 19.10.01.
   – Right hand – 19.10.01/1.
2. Remove cover from backplate.
3. Lift out filter element.
4. Disconnect vacuum pipe from servo motor.
5. Carefully prise up tabs securing sensor unit to mounting.
6. Withdraw sensor unit together with vacuum pipes.

Refitting

Reverse operations 1 to 6.



4993

CONTENTS

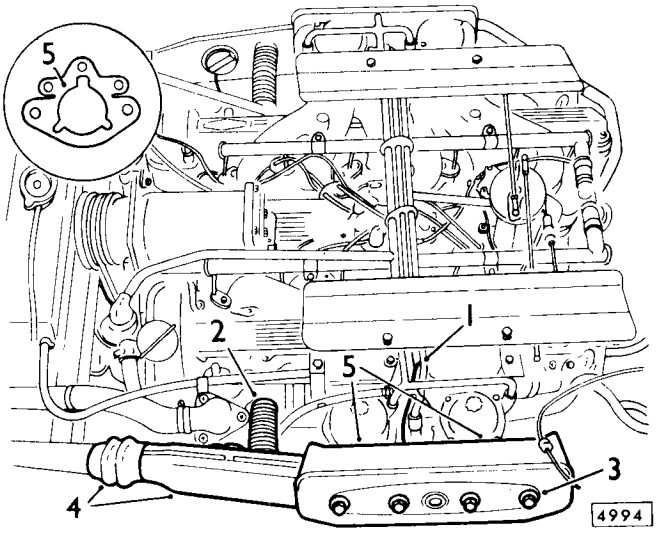
CAUTION: Cars fitted with exhaust emission control. Unless otherwise stated, an exhaust emission check must be carried out upon completing any of the operations contained within this group.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in.) long, 25.4 cm (10 in.) wide and 15 cm (6 in.) high. Ensure bonnet is adequately supported after disconnecting stay.

AIR CLEANER

Remove and refit **19.10.01**

Left or right hand – Cars not fitted with exhaust emission control.
Left hand only – Cars fitted with exhaust emission control.



Removing

1. Disconnect vacuum pipe from inlet manifold.

   CAUTION: Vacuum pipe runs to rear inlet manifold from left hand air cleaner and to front inlet manifold from right hand air cleaner.

2. Disconnect flexible pipe from air cleaner.
3. Remove bolts, plain and rubber washers securing air cleaner to carburetters.
4. Lift off air cleaner assembly and withdraw from flexible rubber pipe.
5. Remove and discard gaskets.

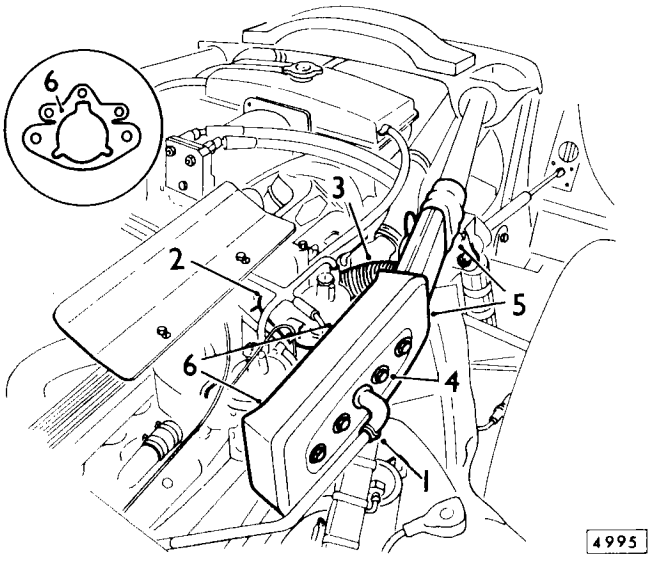
Refitting

Reverse operations 1 to 5; use new gaskets between air cleaner and carburetters.

AIR CLEANER

Remove and refit **19.10.01/1**

Right hand only – Cars fitted with exhaust emission control.



Removing

1. Remove clip securing air pipe to rubber elbow; withdraw pipe.
2. Disconnect vacuum pipe from front inlet manifold.
3. Disconnect flexible pipe from air cleaner.
4. Remove bolts, plain and rubber washers securing air cleaner to carburetters.
5. Lift off air cleaner assembly and withdraw from flexible rubber pipe.
6. Remove and discard gaskets.

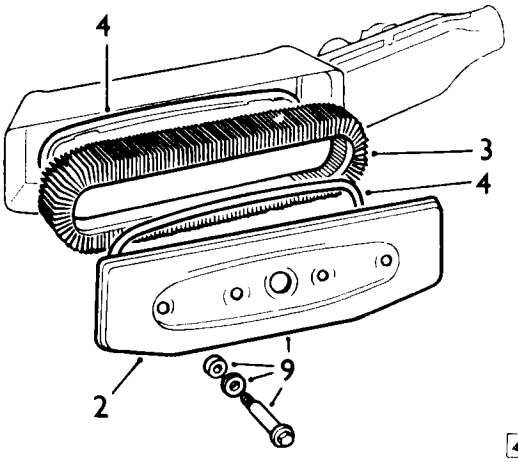
Refitting

Reverse operations 1 to 6; use new gaskets between air cleaner and carburetters; also new clip on air pipe elbow.

AIR CLEANER

Renew element **19.10.08**

1. Remove air cleaner – 19.10.01 or 19.10.01/1.
2. Lift cover off air cleaner.
3. Remove filter element and discard.
4. Remove sealing rings and discard.
5. Remove all traces of adhesive from cover and backplate.
6. Smear sealing rings with a petroleum based adhesive; fit rings to cover and backplate.
7. Position new filter element in air cleaner.
8. Refit cover, ensure that it is correctly seated.
9. Refit air cleaner.



4996

RAM TUBE

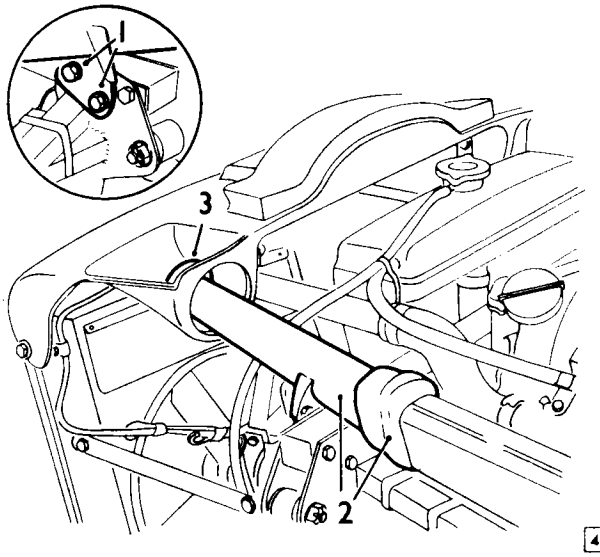
Remove and refit **19.10.21**

Removing

1. Remove bolts and washers securing ram tube to mounting bracket.
2. Disconnect ram tube from flexible pipe.
3. Withdraw ram tube from radiator cowl.

Refitting

Reverse operations 1 to 3.



4997

CARBURETTERS

Tune and adjust **Car set only 19.15.02**

CAUTION: It is impossible to tune carburetters successfully unless engine timing, spark plug gaps and tappet clearances are correctly set.

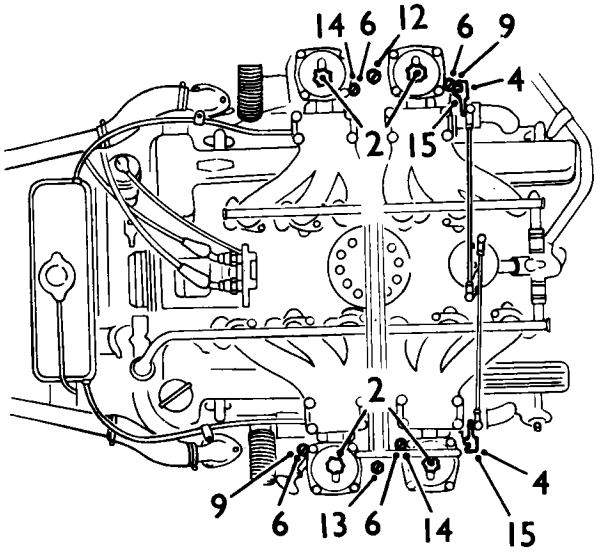
NOTE: Terms left and right hand refer to left and right hand side of engine.

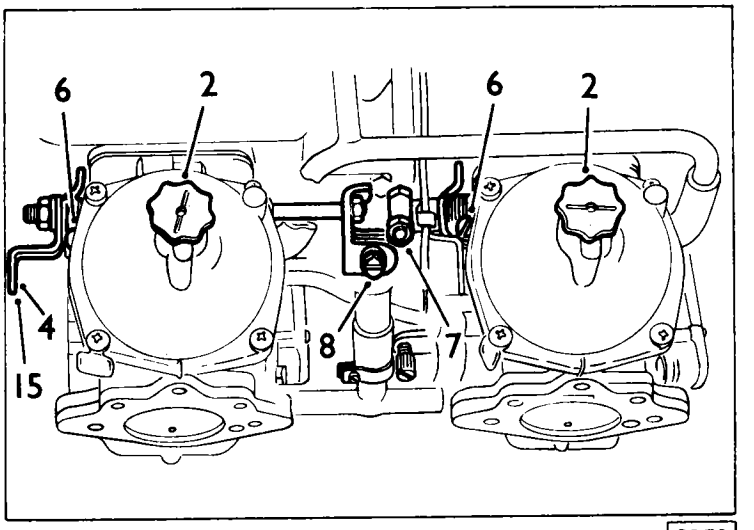
Slow Idle Setting

1. Remove air cleaners – 19.10.01 and 19.10.01/1.
2. Top up carburetter piston dampers with clean engine oil.
3. Run engine until it reaches normal operating temperature.
4. Disconnect throttle linkage.
5. Ensure that choke control is fully closed.
6. Slacken off idle trim screw on each carburetter until it no longer contacts throttle lever.
7. Slacken throttle spindle clamping bolts; ensure throttles are fully closed; tighten clamping bolts.
8. Slacken throttle balancing screws until they no longer contact connecting links.
9. Screw in idle trim screw on rear right hand and front left hand carburetters until contact is made with throttle lever.
10. Start engine and adjust idle trim screw on rear right hand and front left hand carburetters until idling speed is 650 to 750 rev/min.
11. Compare intake hiss on rear right hand and front left hand carburetters and adjust idle trim screws until intake hiss on both carburetters is identical.
12. Screw in right hand throttle balancing screw until intake hiss on front carburetter is identical with that of rear.
13. Screw in left hand throttle balancing screw until intake hiss on rear carburetter is identical with that of front.
14. Screw in idle trim screw on front right hand and rear left hand carburetters until contact is **JUST** made with throttle levers.
15. Reconnect throttle linkage.

    CAUTION: It is essential to ensure that linkage can be reconnected without disturbing throttle settings; if necessary, linkage must be adjusted see operation 19.20.05.

16. Refit air cleaners.





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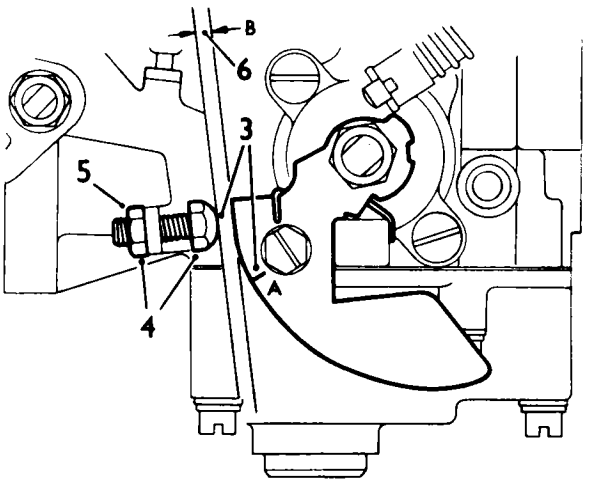
Fast Idle Setting

1. Remove air cleaners – 19.10.01 and 19.10.01/1.
2. Run engine until it reaches normal operating temperature.
3. Operate choke control until mark 'A' on front right hand carburetter choke cam is opposite centre of dome headed screw.
4. Start engine, slacken locknut and adjust screw until idling speed is 1600 to 1700 rev/min.
5. Tighten locknut.
6. Push choke control closed and measure gap 'B' between screw head and cam.
7. Check that gap between screw and cam on rear left hand carburetter is the same as that for right hand and adjust if necessary.
8. Refit air cleaners.



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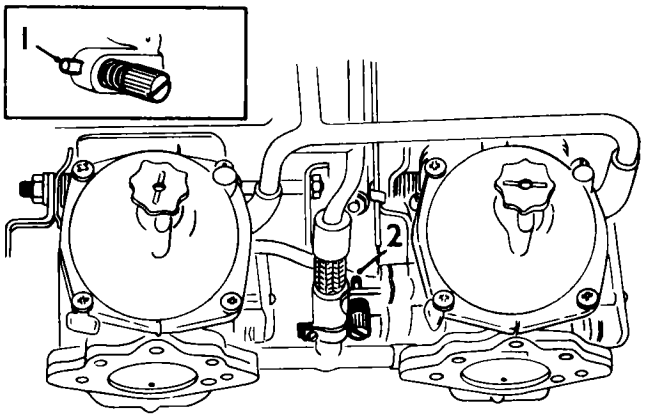
NOTE: A control on the front right hand and rear left hand carburetters enables the choke to be varied for summer and winter operation.

To Adjust for Summer or Winter Operation

1. Note position of pin; if lying in horizontal slot in casting, choke is set for winter setting.
2. Depress plunger and turn through 90° for summer operation.
3. Repeat operations 1 and 2 on other carburetter.



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CARBURETTERS

Remove and refit **Left hand pair 19.15.12**

Removing

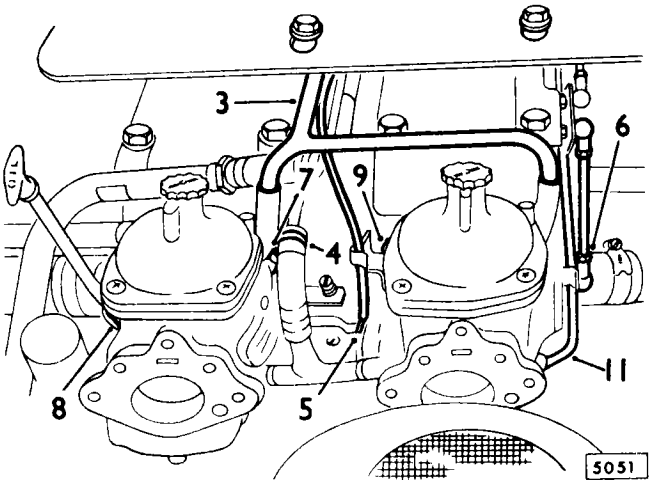
1. Disconnect battery earth lead – 86.15.19
2. Remove air cleaner – 19.10.01.
3. Disconnect balance pipes from carburetters.
4. Remove clip securing fuel inlet pipe to tee-piece.
5. Disconnect choke cable from rear carburetter.
6. Disconnect throttle linkage.
7. Remove nuts and spring washers securing front carburetter to induction housing.
8. Disengage dip stick tube clip from stud.

   CAUTION: Do not slacken nut and bolt securing clip to tube; do not attempt to alter position of tube. False oil level readings will be obtained if the aforementioned points are not observed.

9. Remove nuts and spring washers securing rear carburetter to induction housing.
10. Slide carburetters off mounting studs.
11. Disconnect vacuum pipe from rear carburetter mounting flange.
12. Remove and discard gaskets and insulators.

Refitting

13. Reverse operations 1 to 12; use new gaskets, insulators and pipe clip.
14. Check carburetter tuning – 19.15.02.



CARBURETTERS

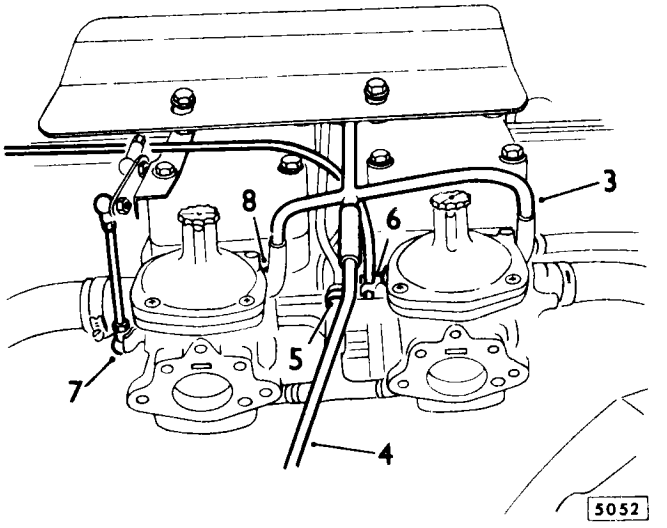
Remove and refit **Right hand pair 19.15.13**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Remove air cleaner – 19.10.01 or 19.10.01/1.
3. Disconnect balance pipes from carburetters.
4. Disconnect carbon canister pipe from breather pipe – Cars fitted with exhaust emission control only.
5. Remove clip securing fuel inlet pipe to tee-piece.
6. Disconnect choke cable from front carburetter.
7. Disconnect throttle linkage.
8. Remove nuts and spring washers securing carburetters to induction housing.
9. Slide carburetters off mounting studs.
10. Remove and discard gaskets and insulators.

Refitting

11. Reverse operations 1 to 10; use new gaskets, insulators and pipe clip.
12. Check carburetter tuning – 19.15.02.



CARBURETTERS

Overhaul and adjust **Car set only 19.15.18**

To overhaul carburetters, proceed as detailed under operation 17.20.07.
To tune and adjust carburetters, proceed as detailed under operation 19.15.02.

CARBURETTER BALANCE PIPE

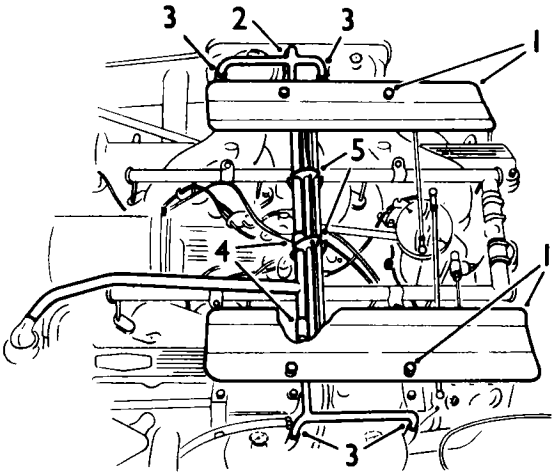
Remove and refit **19.15.22**

Removing

1. Remove bolts and washers securing heat shields to inlet manifolds; lift off heat shields.
2. Disconnect carbon canister pipe from balance pipe – Cars fitted with exhaust emission control only.
3. Disconnect balance pipes from carburetters.
4. Disconnect balance pipes from crankcase breather pipe.
5. Release clips retaining pipes; withdraw pipes.
6. Examine rubber connecting hoses for cracks, splits etc., renew any showing signs of damage.

Refitting

Reverse operations 1 to 5



THROTTLE PEDAL

Remove and refit **19.20.01**

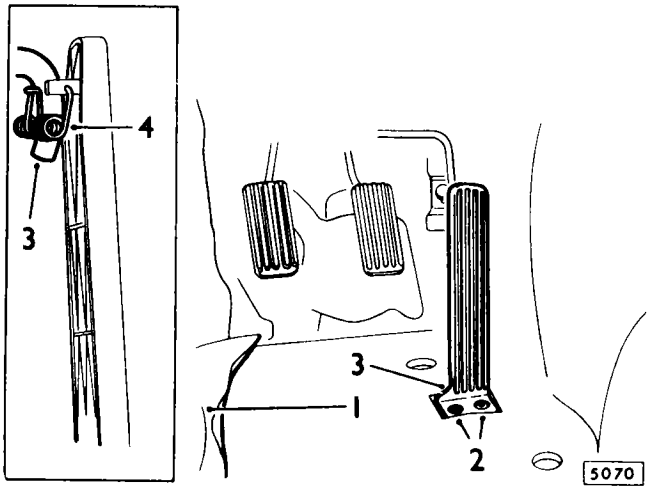
CAUTION: It will not be necessary to carry out an exhaust emission check after completing this operation.

Removing

1. Fold carpet away from base of accelerator pedal.
2. Remove nuts and washers securing base of pedal to mounting plate.
3. Pull base of pedal away from mounting plate; this will disengage rod from spring.
4. Examine spring for wear and renew if necessary.

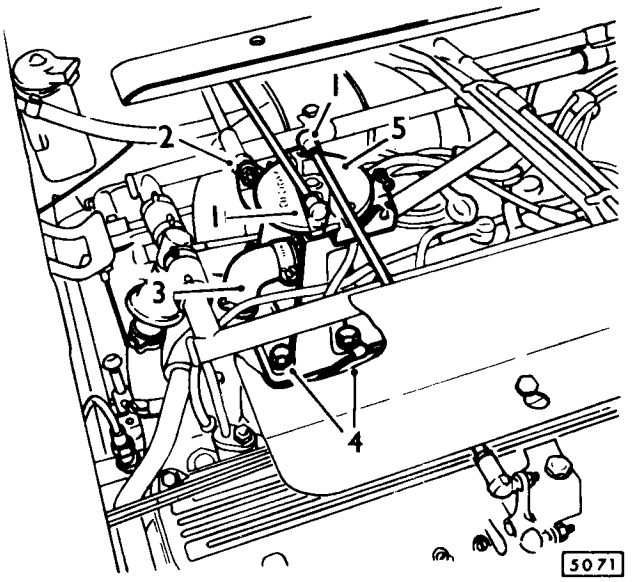
Refitting

5. Position spring on pedal.
6. Engage rod with spring.
7. Push base of pedal towards bulkhead and locate on mounting studs.
8. Reverse operations 1 and 2.



THROTTLE PEDESTAL

Remove and refit 19.20.02



Removing

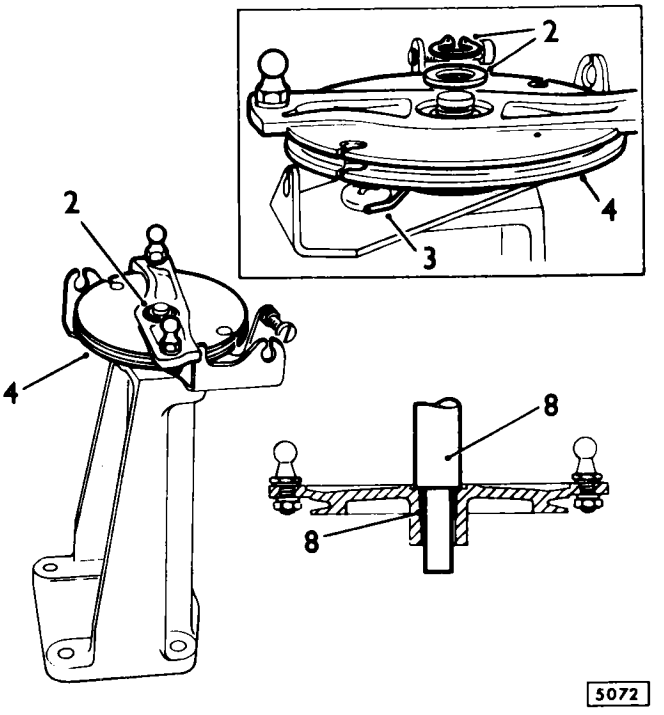
1. Disconnect throttle linkage.
2. Slacken locknut and disconnect throttle cable.
3. Remove gulp valve – 17.25.30 – Cars fitted with exhaust emission control only.
4. Note position of vacuum pipe clip and remove bolts and serrated washers securing throttle pedestal to jackshaft cover.
5. Lift off pedestal; remove and discard gasket.
6. Plug hole in jackshaft cover to prevent ingress of dirt etc.

Refitting

7. Reverse operations 1 to 6; use new gasket between pedestal and jackshaft cover.
8. Check throttle linkage adjustment – 19.20.05.
9. Check kickdown switch adjustment – 44.30.12 – Cars fitted with automatic transmission only.

THROTTLE PEDESTAL

Overhaul 19.20.03



Dismantling

1. Remove throttle pedestal – 19.20.02.
2. Remove circlip and plain washer.
3. Note position of return spring and disengage free end from screw head.
4. Lift off platform together with spring.

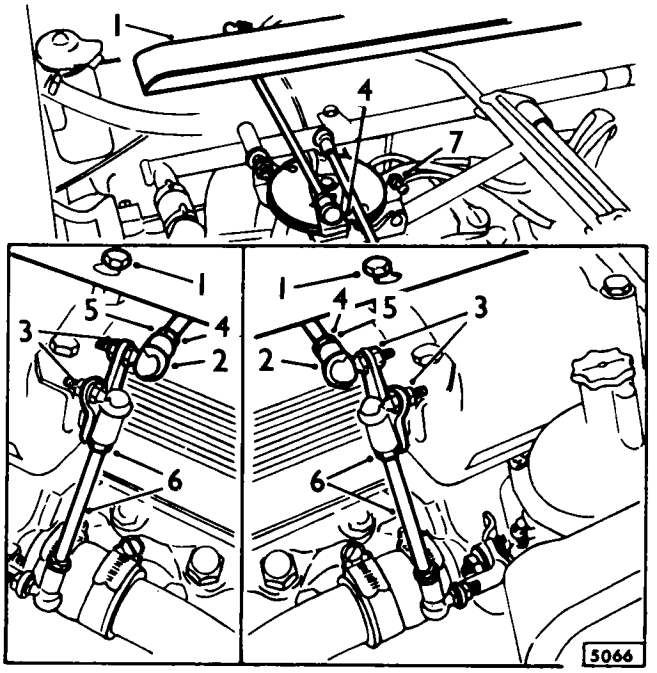
Reassembling

5. Check spindle for wear, or signs of ovality. Should spindle be worn, complete plate and spindle assembly must be replaced.
6. Check bush in platform for wear or signs of ovality. Should bush be worn, carry out operations 7 and 8.
7. Using a suitable drift; drive bush out of platform.
8. Press new bush into platform until end of bush is level with recessed face.
9. Fit spring to platform.
10. Position platform and spring on spindle.
11. Relocate free end of spring behind screw head.
12. Fit plain washer followed by circlip; ensure circlip is correctly located in groove.
13. Refit throttle pedestal.

THROTTLE LINKAGE

Check and adjust **19.20.05**

1. Slacken bolts securing heat shields to inlet manifolds; lift off shields.
2. Disconnect throttle linkage from throttle levers.
3. Check that angle across top of left hand bellcrank equals that of right hand bellcrank; if not, proceed as follows.
4. Slacken locknuts and keeping platform in "throttle closed" position, turn rod clockwise to increase angle, anti-clockwise to decrease.
5. When correct angle is obtained, tighten locknuts.
6. Slacken locknuts and adjust length of vertical links until they can be connected to throttle levers without throttle being disturbed; tighten locknuts.
7. Slacken locknut and unscrew throttle stop.
8. Open throttle fully and screw throttle stop in until contact is made with platform; tighten locknut.
9. Check kickdown switch adjustment – 44.30.12. Cars fitted with automatic transmission only.



CHOKE CABLE ASSEMBLY

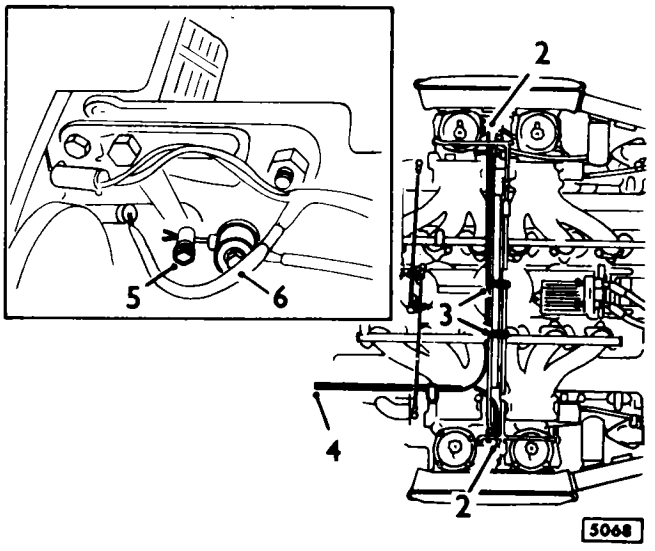
Remove and refit **19.20.13**

Removing

1. Remove facia – 76.46.01.
2. Disconnect choke cable from front right hand and rear left hand carburetters.
3. Withdraw left hand cable assembly from nylon clips.
4. Withdraw both cable assemblies from grommet.
5. Slacken pinch bolt securing inner cables to operating lever.
6. Slacken pinch bolt retaining outer cable ferrule in pivot block.
7. Withdraw cable assemblies rearward through bulkhead.

Refitting

8. Examine grommets for damage and renew if necessary.
9. Reverse operations 1 to 7.
10. Check choke control for smoothness of operation, re-route cable assemblies if control feels stiff.
11. Check fast idle setting see operation – 19.15.02.



CHOKE CABLE – INNER

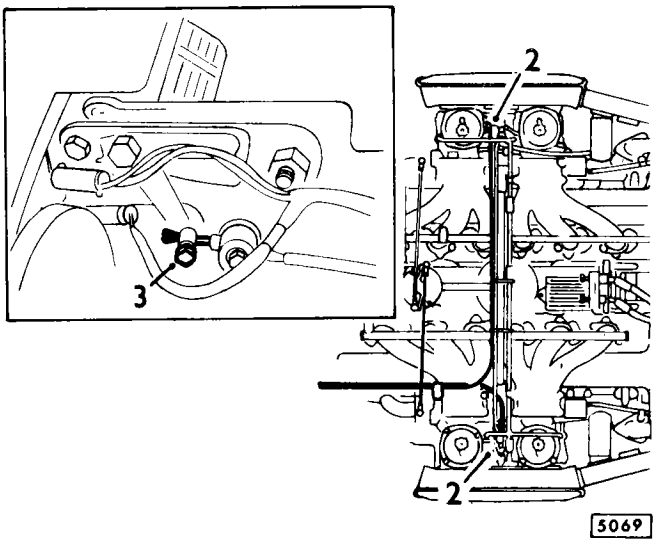
Remove and refit 19.20.14

Removing

1. Remove facia crash roll – 76.46.04.
2. Disconnect choke cable from front right hand and rear left hand carburetters.
3. Slacken pinch bolt securing inner cables to operating lever; withdraw cables.

Refitting

4. Reverse operations 1 to 3.
5. Check fast idle setting see operation – 19.15.02.



FUEL MAIN FILTER

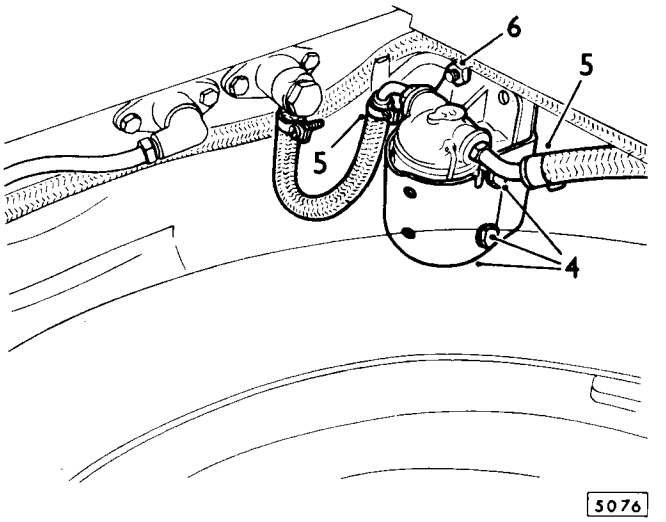
Remove and refit 19.25.02

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Lift out luggage compartment/boot floor.
3. Remove spare wheel.
4. Remove bolts and washers securing filter shield to mounting bracket; lift off shield.
5. Slacken clips and disconnect fuel inlet and outlet pipes; plug pipes to prevent petrol loss and ingress of dirt.
6. Remove nuts and washers securing filter to mounting studs; withdraw filter.

Refitting

7. Reverse operations 1 to 6.
8. Run engine and check pipe connections for leaks.



FUEL MAIN FILTER ELEMENT

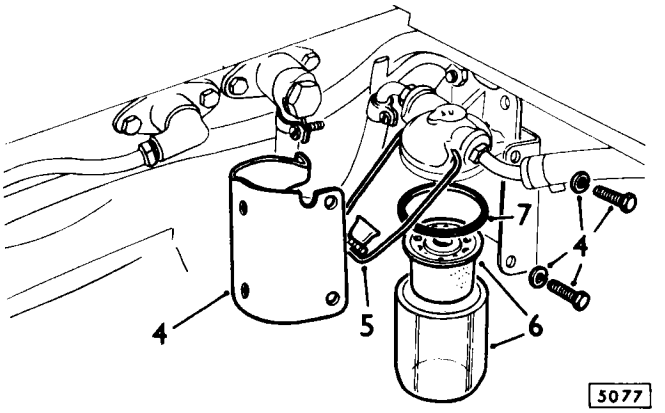
Remove and refit 19.25.07

Removing

1. Disconnect battery earth lead – 86.15.19.
   Lift out luggage compartment/boot floor.
3. Remove spare wheel.
4. Remove bolts and washers securing filter shield to mounting bracket, lift off shield.
5. Unscrew knurled ring, swing securing strap away from filter bowl.
6. Remove filter bowl followed by element.

Refitting

7. Examine filter bowl sealing ring and renew if damaged.
8. Reverse operations 1 to 6; do not overtighten knurled ring.
9. Run engine and check for fuel leaks around filter bowl.



NON-RETURN VALVE

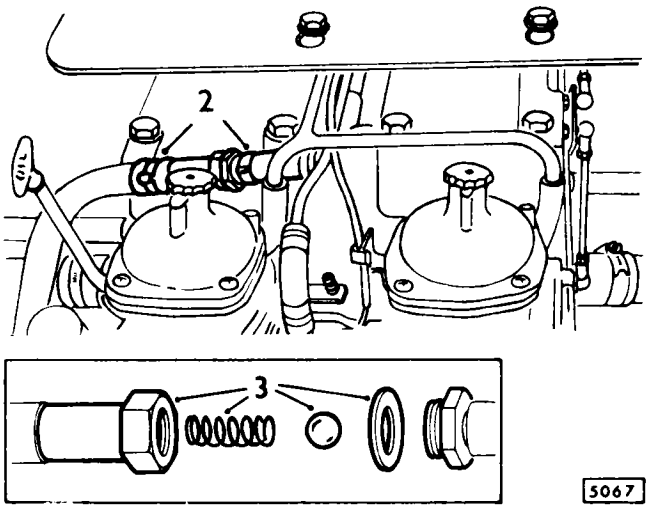
Remove and refit (includes clean) **19.40.28**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Remove clips and withdraw valve from petrol pipes.
3. Separate both halves of valve, withdraw ball and spring.
4. Wash all parts thoroughly in petrol and dry with compressed air.
5. Examine spring and ball for signs of damage or wear and renew if necessary.

Refitting

7. Reverse operations 1 to 3.
8. Run engine and test for leaks.



FUEL LIFT PUMPS

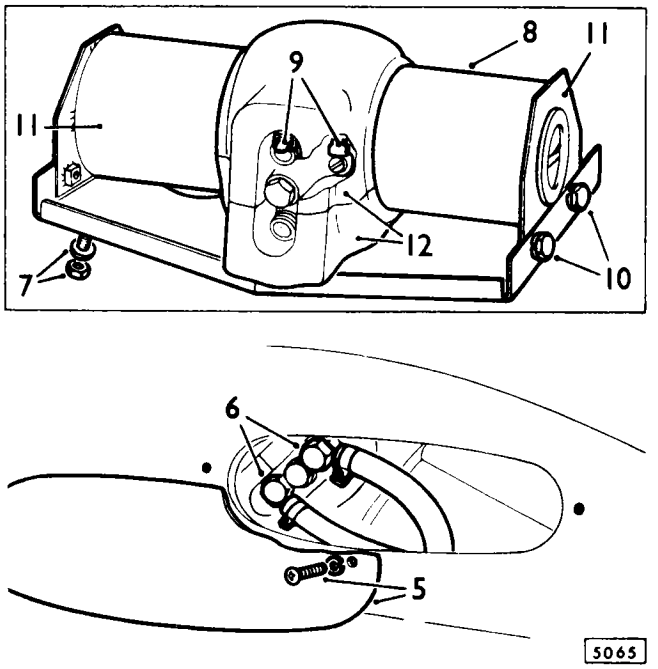
Remove and refit **19.45.09.**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Remove right hand rear road wheel.
3. Remove luggage compartment/boot floor.
4. Remove spare wheel.
5. Remove screws securing trimmed access panel to trim; withdraw panel.
6. Slacken clips and disconnect inlet and outlet pipes; plug pipes to prevent ingress of dirt.
7. Remove three nuts and washers (accessible at rear of wheel arch).
8. Lower pumps together with mounting brackets into well of boot.
9. Disconnect feed and earth wires from pumps; lift pumps out of boot.
10. Remove bolts and washers securing pump cover to mounting bracket.
11. Pull pump covers off foam surround.
12. Separate both halves of surround, lift out pumps.

Refitting

13. Reverse operations 6 to 12.
14. Run engine and check for fuel leaks.
15. Reverse operations 1 to 5.



FUEL LIFT PUMP

Overhaul **pair only 19.45.16**

Dismantling

1. Remove fuel pumps – 19.45.09.
2. Note relative positions of terminals, disconnect harness from pumps.
3. Mark relative positions of coil housing and pump body.
4. Remove screws securing coil housing to pump body; lift off housing, remove and discard gasket.
5. Remove tape and sealing ring from cover.
6. Remove polythene sleeve from terminal stud.
7. Remove nut, terminal tag and lockwasher.
8. Lift off cover.
9. Unscrew diaphragm assembly and withdraw from coil housing.

CAUTION: Diaphragm and spindle are serviced as a complete assembly and no attempt should be made to separate them.

10. Remove armature spring and rubber impact washer from spindle.
11. Remove nylon centralising guide.
12. Remove screw securing terminals and contact blade to pedestal; lift off contact blade.
13. Remove screw securing condenser terminal, earth terminal and pedestal to coil housing.
14. Remove remaining pedestal securing screw and lockwasher.
15. Move pedestal away from coil housing.

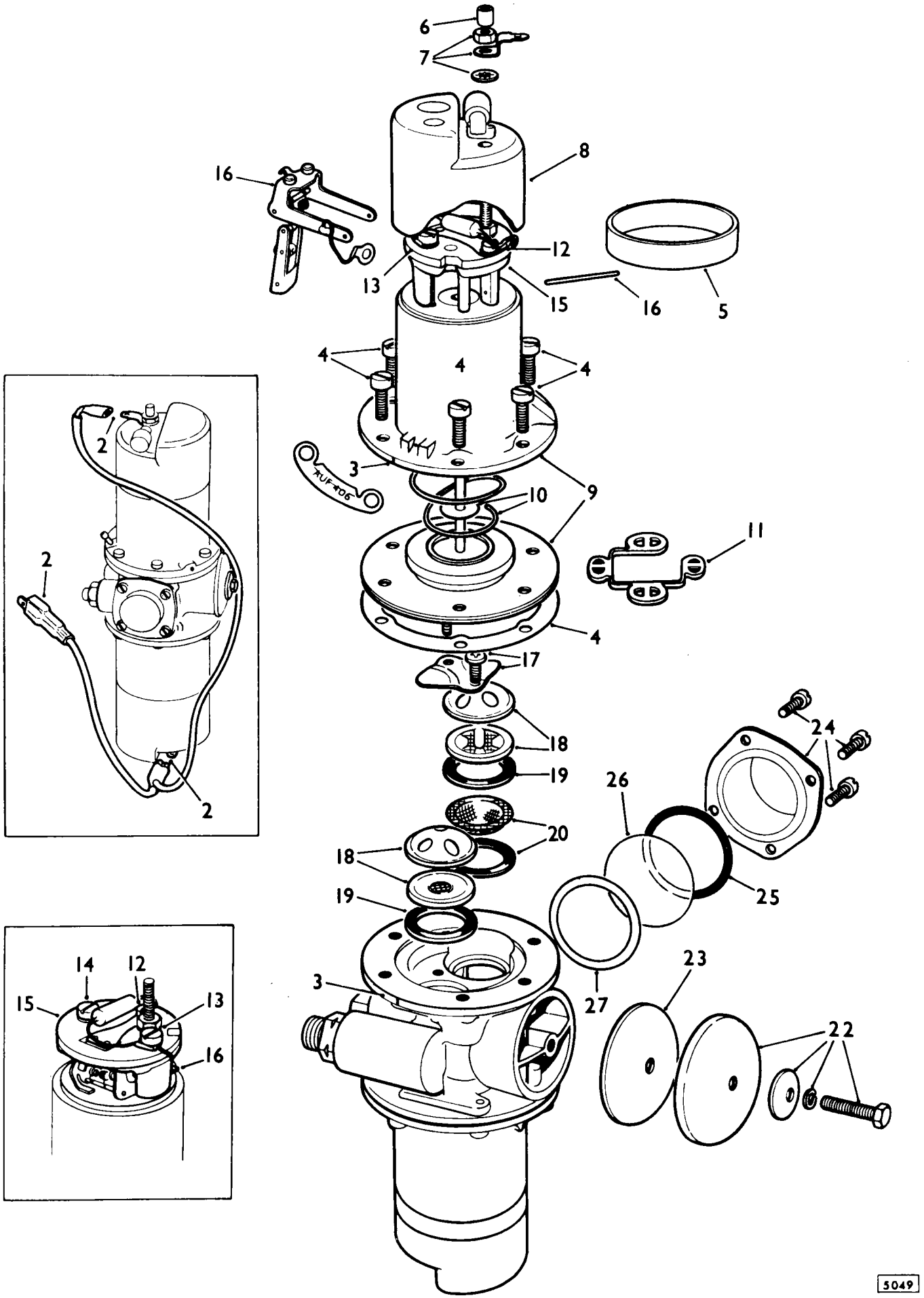
CAUTION: Unless pedestal is to be renewed, it is not advisable to remove terminal from terminal stud.

16. Withdraw rocker assembly pivot pin; remove rocker assembly.
17. Remove screws securing valve clamping plate to body; lift out clamping plate.
18. Note which way valves face, remove valve caps and withdraw valves.
19. Remove and discard neoprene sealing rings.
20. Remove filter gauze from inlet valve seat, remove and discard neoprene sealing ring.
21. Repeat operations 3 to 20 on remaining pump.
22. Remove bolt, spring and plain washers securing air bottle cover to body.
23. Prise cork seal out of cover; discard seal.
24. Remove screws securing flow smoothing valve cover to body; lift off cover.
25. Remove and discard 'O' ring.
26. Remove diaphragm.
27. Remove and discard sealing washer.

Inspecting components

CAUTION: If gum formation has occurred in fuel, pump components which have been in contact with this fuel will have become coated with a varnish like substance. Metal components which have become contaminated can be cleaned by boiling in a 20 per cent solution of caustic soda, dipped in a strong nitric acid solution and finally washed in boiling water. Light alloy components must be cleaned by soaking in denatured alcohol (methylated spirits).

28. Clean pump body and inspect for cracks and damage.
29. Examine valves for damage, check operation by blowing and sucking with the mouth.
30. Check that tongue on each valve cage is not distorted and allows a valve lift of approximately 1.6 mm (0.062 in.). Tongues may be bent slightly to achieve this dimension.
31. Examine flow smoothing valve diaphragm for damage; renew if necessary.
32. Examine valve recesses in body for pitting, corrosion or damage; if excessive, body must be renewed.
33. Examine contact breaker points for signs of burning or pitting, if this is evident, rocker assembly and contact blade must be renewed.
34. Examine pedestal for cracks or damage, particular attention should be paid to the narrow ridge on which contact blade rests. Renew pedestal if damaged.
35. Check that ball in non-return vent is free to move.
36. Examine diaphragm for splits or distortion. If damaged, diaphragm and spindle must be renewed as a complete assembly.
37. Check that nylon centralising guide is not split or distorted, renew if damaged.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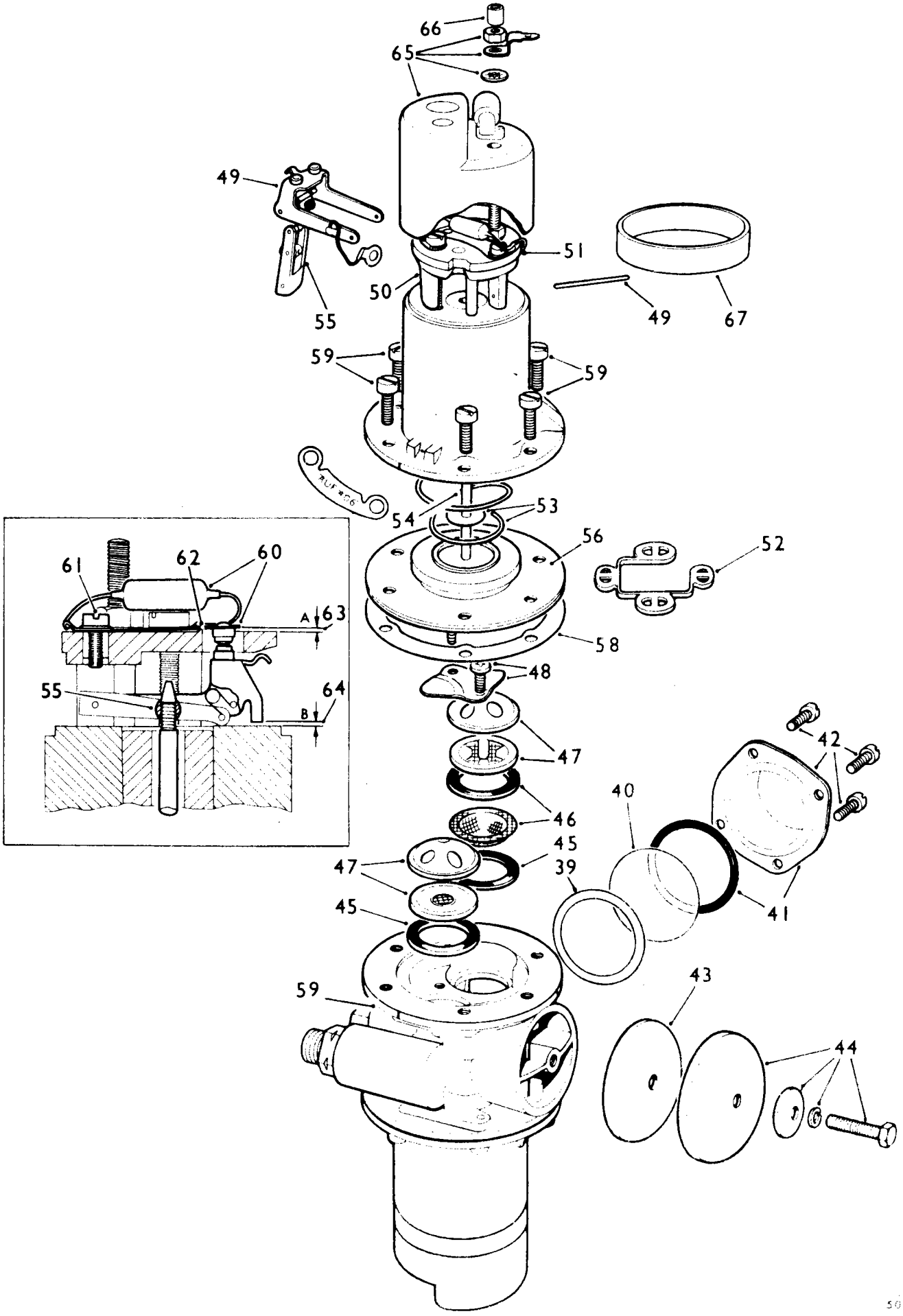
Reassembling

38. Ensure all components are thoroughly clean.
39. Fit new sealing washer in body.
40. Position diaphragm in body; concave side must face inwards.
41. Fit new 'O' ring followed by flow smoothing valve cover.
42. Tighten securing screws by diagonal selection to avoid distorting cover.
43. Position new cork seal in air bottle cover.
44. Fit air bottle cover, do not overtighten securing bolt.
45. Fit new neoprene sealing rings in valve recesses.
46. Fit filter gauze in inlet valve recess.
47. Fit inlet and outlet valves followed by valve caps.
48. Fit valve clamp plate; do not overtighten securing screws.
49. Position rocker assembly in pedestal, insert pivot pin.
50. Position pedestal on coil housing, fit pedestal retaining screw and lockwasher; do not tighten screw at this stage.
51. Position condenser and earth terminals on remaining pedestal retaining screw; tighten both retaining screws.
52. Fit nylon centralising guide to diaphragm assembly.
53. Fit rubber impact washer followed by spring.
54. Insert spindle in coil housing.
55. Screw threaded end of spindle into rocker assembly trunnion.
56. Screw in diaphragm until rocker no longer "throws over".
57. Unscrew diaphragm until rocker just "throws over", continue unscrewing until holes are in alignment then unscrew a further two thirds of a turn (four holes).
58. Position new gasket on body.

    CAUTION: Gasket must be fitted dry; do not use jointing compound or grease.

59. Fit coil housing to body ensuring reference marks made during dismantling are in alignment. Tighten securing screws by diagonal selection to avoid distorting flange.
60. Fit contact blade, condenser and coil leads to screw; do not fully tighten screws at this stage.
61. Manoeuvre contact blade until contact points on blade and rocker assembly are in alignment; tighten securing screw.
62. Check that with points in open position, contact blade rests on narrow ridge on pedestal; contact blade may be bent slightly to achieve this.
63. Hold points in closed position and check that gap 'A' = .9 mm (.035 in.). If necessary, bend stop finger on rocker assembly until correct dimension is obtained.
64. With rocker assembly stop finger resting on coil housing check that gap 'B' = 1.8 mm. (.070 in.). If necessary bend stop finger until correct dimension is obtained.
65. Fit end cover, lockwashers, terminal tag and nut.
66. Fit polythene sleeve to stud.
67. Fit sealing ring and tape.
68. Carry out operations 45 to 67 on remaining pump.
69. Reverse operations 1 and 2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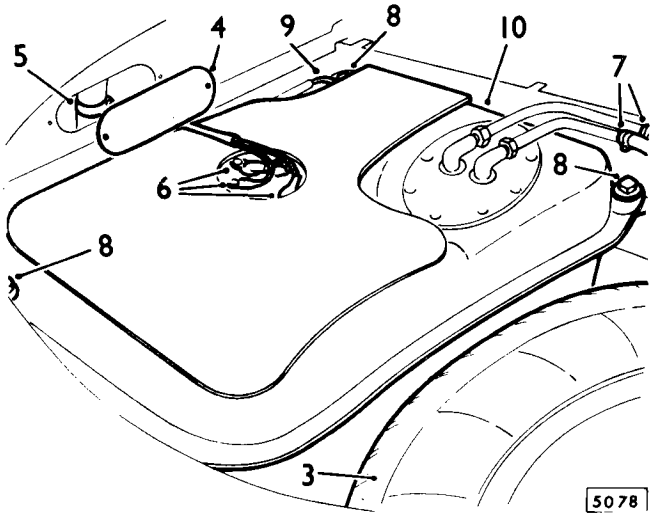
FUEL TANK

Remove and refit **19.55.01**



Removing

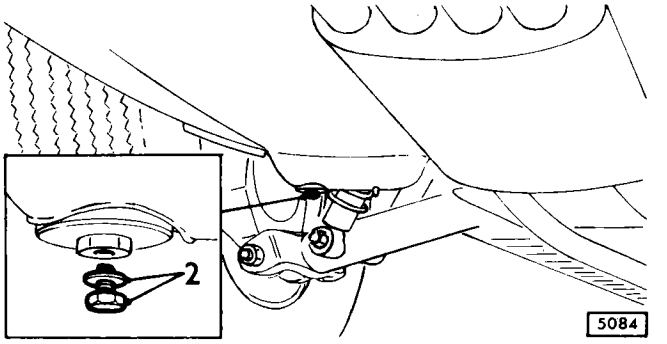
1. Drain fuel tank – 19.55.02.
2. Remove luggage compartment/boot floor.
3. Remove spare wheel.
4. Remove screws securing trimmed access panel to trim.
5. Slacken off clip securing hose to filler neck.
6. Note relative positions of harness terminals and disconnect from tank sender unit.
7. Slacken clips and disconnect hoses from outlet and return pipes.
8. Remove bolts and washers securing fuel tank to mountings.
9. Slide fuel tank towards centre of boot well and disconnect breather pipes.
10. Lift fuel tank out of boot well.

Refitting

11. Reverse operations 1 to 10.
12. Run engine and check pipe connections for leaks.

FUEL TANK

Drain **19.55.02**



Draining

1. Disconnect battery earth lead – 86.15.19.
2. Remove drain plug and drain petrol into suitable container.

Refitting

3. Refit drain plug; do not overtighten.
4. Open fuel filler flap; remove filler cap.
5. Refill tank, refit cap; close filler flap.
6. Reconnect battery.
7. Check for leaks from drain plug.

CONTENTS

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in) long, 25.4 cm (10 in) wide and 15 cm (6 in) high. Ensure bonnet is adequately supported after disconnecting stay.

COOLANT

Drain and refill 26.10.01

Draining

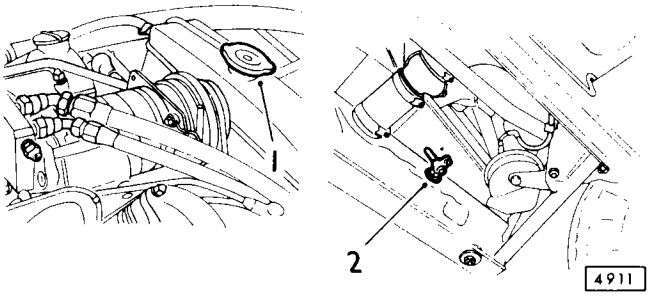
1. Remove header tank cap.
2. Open drain tap and allow coolant to drain. In countries where anti-freeze is in use, coolant may be conserved providing anti-freeze has not been in use for more than 12 months.

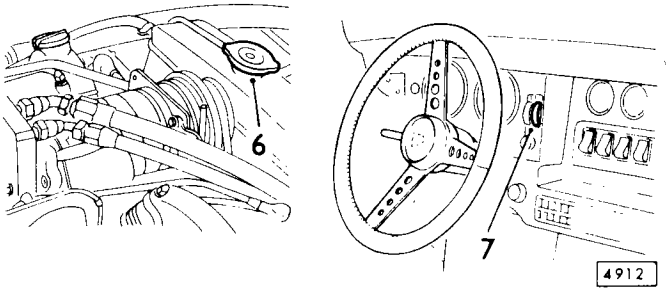
Refilling

3. Close drain tap.
4. Pour contents of two sachets of Bar's Leaks into header tank.

CAUTION: **A 40% solution by volume (55% U.S.A./Canada) of all antifreeze must be used at all times, either when topping up or replenishing the cooling system. For maximum corrosion protection, the concentration should never be allowed to fall below 25%. Always top-up with recommended strength of antifreeze, NEVER WITH WATER ONLY.
In countries where it is unnecessary to use antifreeze, Marston SQ.36 Corrosion Inhibitor must be used in the cooling system in the proportion of 3 fluid ounces to one gallon of water. CHANGE COOLANT ANNUALLY.**

5. Fill cooling system to bottom of header tank filler neck.
6. Refit header tank cap.
7. Place heater control in 'hot' position and run engine at a fast idle speed for approximately five minutes.
8. Remove header tank filler cap and if necessary, top up coolant to correct level.





HEADER TANK

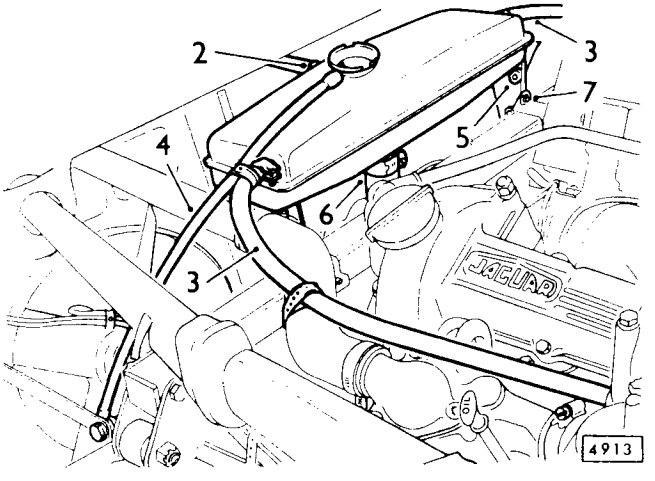
Remove and refit 26.15.01

Removing

1. Drain cooling system – 26.10.01.
2. Disconnect header tank to radiator hose.
3. Disconnect header tank to induction housing hoses.
4. Disconnect overflow hose from neck of header tank.
5. Remove nuts and bolts securing each water rail strap to header tank stays.
6. Disconnect hose from underside of header tank.
7. Remove set screws securing header tank stays to fixing brackets; lift off header tank.

Refitting

Reverse operations 1 to 7.



COOLING FAN AND MOTOR

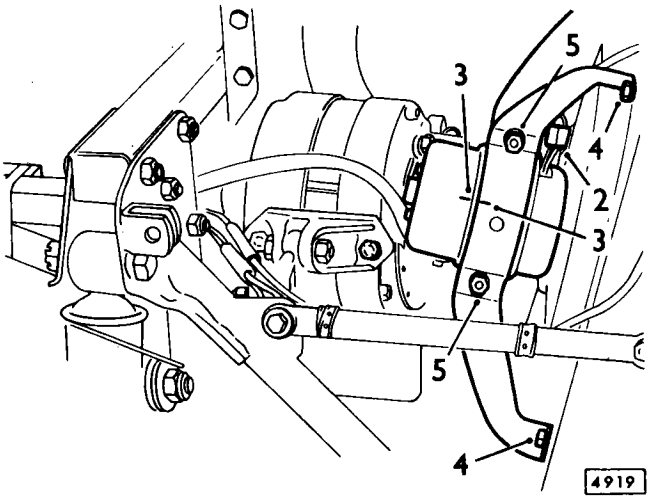
Remove and refit **Left or right hand – 26.25.23**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Disconnect fan harness at snap connectors.
3. Mark relative position of fan motor body to mounting strap.
4. Remove bolts securing outer half of mounting strap to radiator.
5. Remove nuts and bolts securing outer and inner halves of mounting strap; lift out fan and motor.

Refitting

Reverse operations 1 and 2; 4 and 5; ensure locating marks on fan motor body and mounting strap are in alignment.



FAN MOTOR RELAY

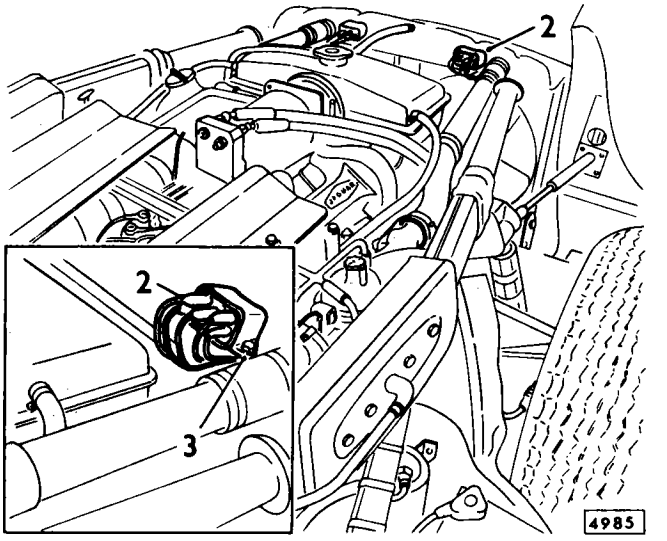
Remove and refit **26.25.31**

Removing

1. Remove radiator cowl – 26.40.07.
2. Note relative location of wires and terminals; disconnect wires.
3. Remove nuts and bolts retaining relay to radiator surround.

Refitting

Reverse operations 1 to 3.



THERMOSTATIC SWITCH

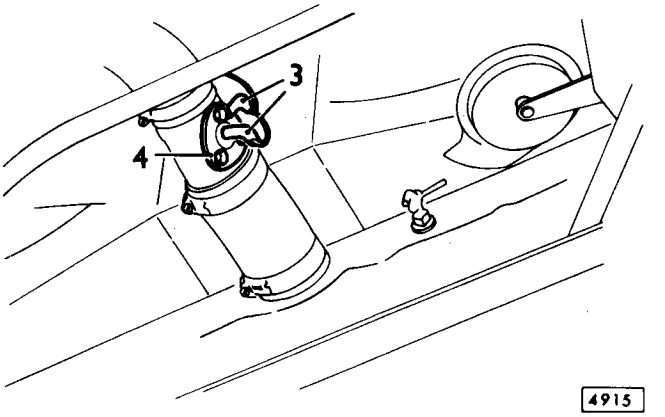
Remove and refit **26.25.35**

Removing

1. Drain cooling system – 26.10.01.
2. Disconnect battery earth lead – 86.15.19.
3. Disconnect Lucar connectors.
4. Remove bolts, lift out switch.

Refitting

Reverse operations 1 to 4; use a new gasket.



RADIATOR

Remove and refit **26.40.01**

Removing

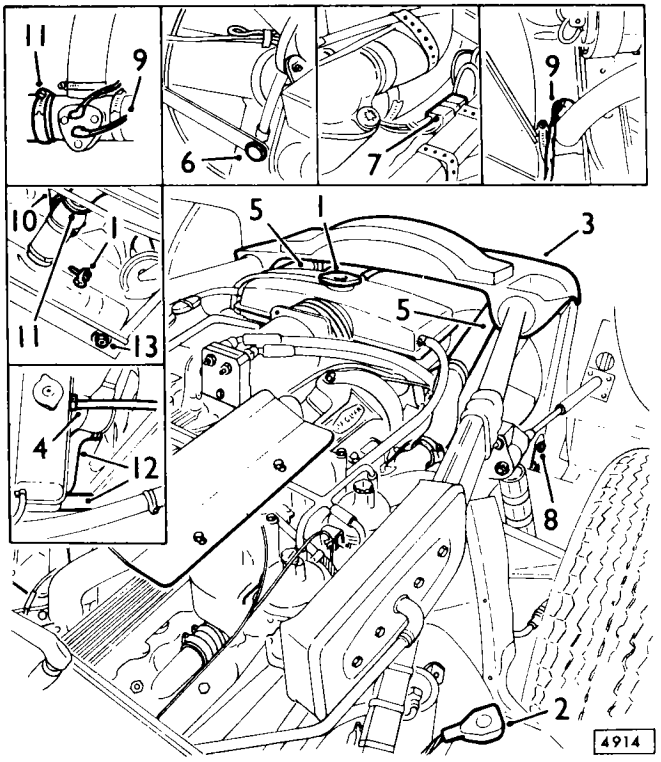
1. Drain cooling system – 26.10.01.
2. Disconnect battery earth lead – 86.15.19.
3. Remove radiator cowl – 26.40.07.
4. Disconnect header tank hose.
5. Disconnect top hoses from radiator.
6. Remove bolt securing each radiator stay to radiator.
7. Disconnect radiator harness at plug.
8. Cars fitted with air conditioning only: Remove bolts securing condenser to radiator: support condenser in frame to avoid possible damage.

   WARNING: ON NO ACCOUNT MUST ANY PORTION OF THE AIR CONDITIONING SYSTEM BE DISCONNECTED BY ANYONE OTHER THAN A QUALIFIED REFRIGERATION ENGINEER; BLINDNESS CAN RESULT IF THE GAS CONTAINED WITHIN THE SYSTEM COMES INTO CONTACT WITH THE EYES.

9. Disconnect Lucar connectors from thermostatic switch.
10. Disconnect header tank hose from thermostatic switch housing.
11. Disconnect bottom hose from thermostatic switch housing.
12. Cars fitted with automatic transmission only: Disconnect oil cooler hoses from radiator.
13. Remove radiator securing nuts, rubbers and spacers; lift radiator out of frame.

Refitting

Reverse operations 1 to 13.



RADIATOR COWL

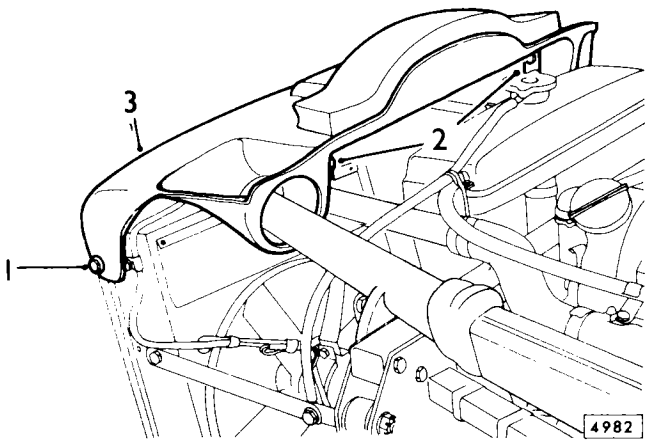
Remove and refit **26.40.07**

Removing

1. Remove bolts and washers securing cowl to either side of radiator.
2. Remove self-tapping screws and washers securing top of cowl to support brackets.
3. Manoeuvre cowl clear of air intake trumpets and withdraw.

Refitting

Reverse operations 1 to 3.



THERMOSTAT

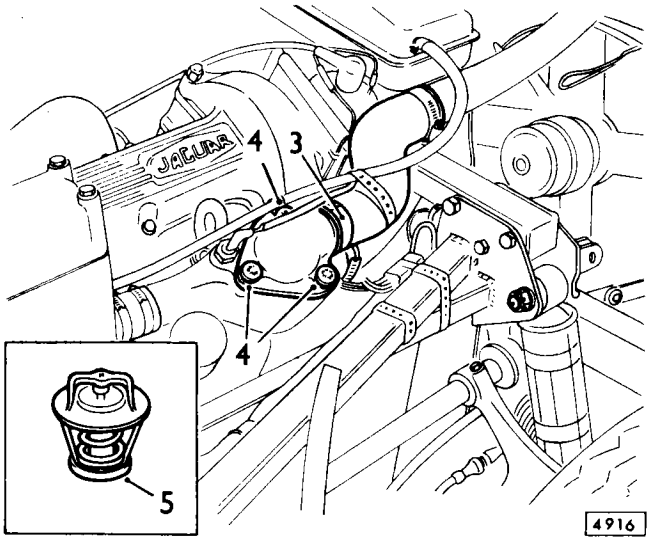
Remove and refit — **Left hand – 26.45.01**
Right hand – 26.45.04

Removing

1. Drain cooling system – 26.10.01.
2. Remove air cleaner – 19.10.01.
3. Disconnect hose from thermostat cover.
4. Remove thermostat cover retaining screws, lift off cover.
5. Lift out thermostat.

Refitting

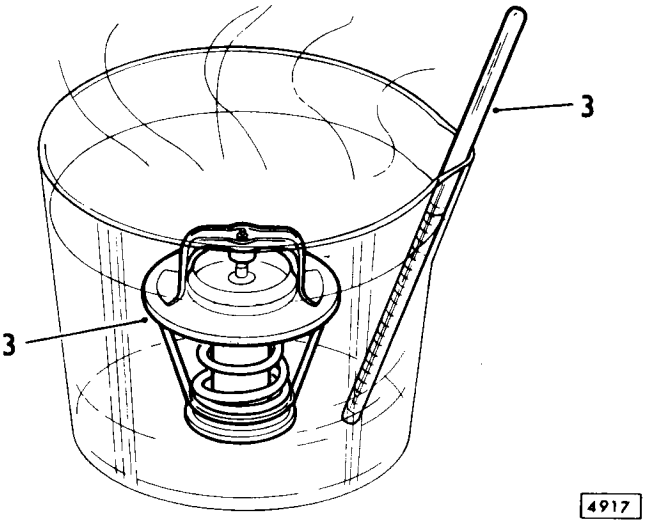
Reverse operations 1 to 5; use a new gasket; tighten screws by diagonal selection to avoid distorting cover.



THERMOSTAT

Test — **26.45.09**

1. Remove thermostat – Left hand 26.45.01.
   – Right hand 26.45.04.
2. Thoroughly clean thermostat.
3. Place thermostat in a container of water together with a thermometer.
4. Heat water and observe if thermostat operates in accordance with data given in Group 04.



THERMOSTAT HOUSING

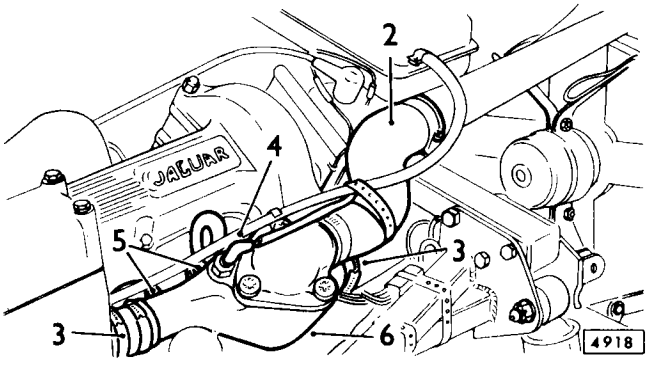
Remove and refit — **Left or right hand – 26.45.10**

Removing

1. Drain cooling system – 26.10.01.
2. Disconnect radiator hose from cover.
3. Disconnect hoses from front and rear of housing.
4. Disconnect wire from water temperature transmitter – Right hand housing only.
5. Remove bolts securing housing to cylinder head.
6. Lift off housing together with engine lifting eye.
7. Remove and discard gaskets.

Refitting

Reverse operations 1 to 7; use new gaskets.



WATER PUMP

Remove and refit **26.50.01**

Removing

1. Drain cooling system – 26.10.01.
2. Remove radiator cowl – 26.40.07.
3. Disconnect hose from underside of header tank.
4. Disconnect bottom hose from elbow.
5. Remove bolts securing elbow to water pump cover; swing elbow away from pump.
6. Remove alternator drive belts – 86.10.03.
   Operations 7 and 8 are only applicable to cars fitted with air conditioning.

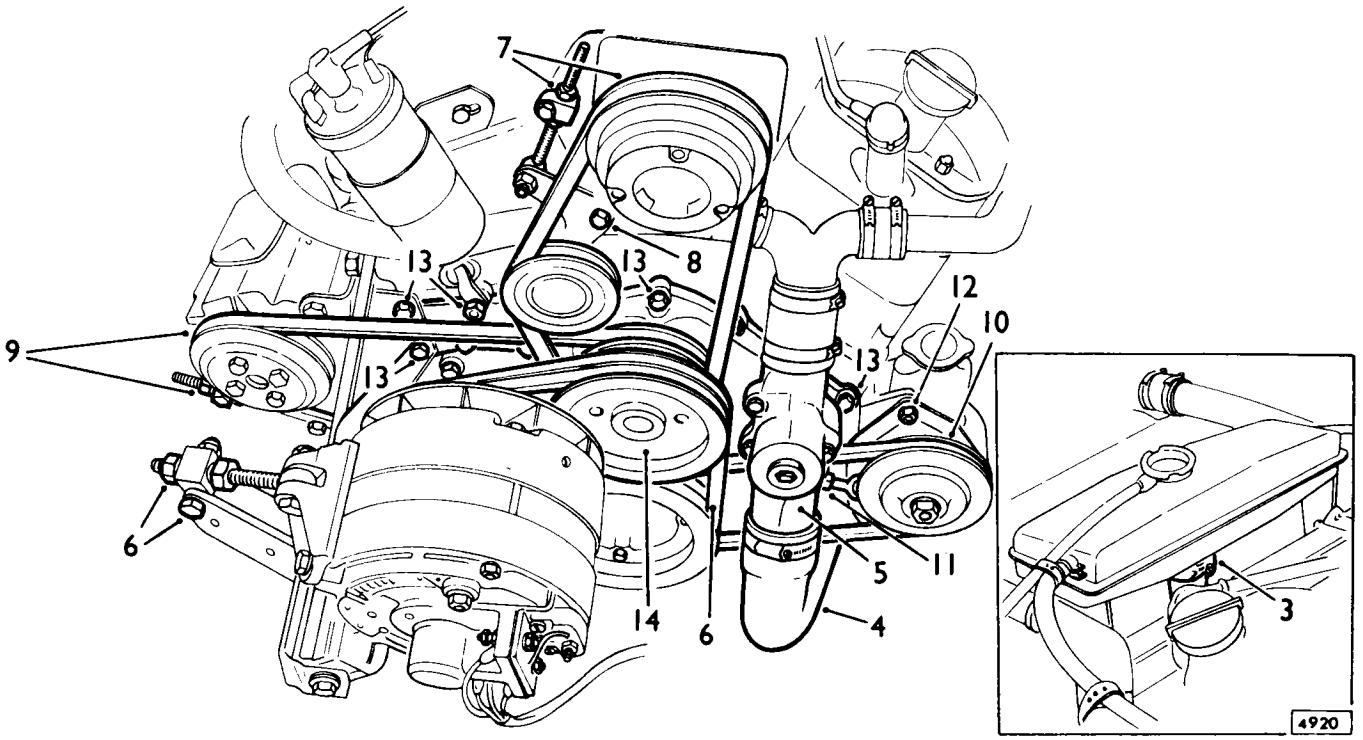
   WARNING: ON NO ACCOUNT MUST ANY PORTION OF THE AIR CONDITIONING SYSTEM BE DISCONNECTED BY ANY ONE OTHER THAN A QUALIFIED REFRIGERATION ENGINEER; BLINDNESS CAN RESULT IF THE GAS CONTAINED WITHIN THE SYSTEM COMES INTO CONTACT WITH THE EYES.

7. Remove compressor drive belt – 82.10.02.
8. Remove bolt securing jockey pulley arm to compressor mounting bracket.
9. Remove air pump drive belt – 17.25.15 – Cars fitted with exhaust emission control only.
10. Remove power assisted steering pump drive belt – 57.20.02.
11. Remove bolt securing power assisted steering pump trunnion to mounting bracket.
12. Slacken power assisted steering pump mounting bolts and swing pump away from engine.
13. Remove bolts securing water pump to timing cover noting relative positions of long and short bolts.
14. Withdraw water pump assembly.

Refitting

Reverse operations 1 to 14, use new gaskets between water pump and timing cover; also between elbow and water pump.

NOTE: The water pump assembly is a sealed unit and no overhaul is possible. Replacement pumps are available on an exchange basis but before returning the defective pump, it will be necessary to remove the pulley, see operation 26.50.05. The pulley must then be pressed on to the replacement pump **before** it is fitted to the engine.



WATER PUMP PULLEY

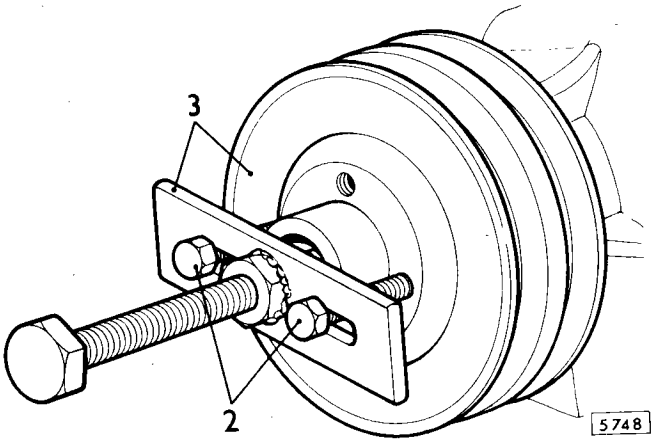
Remove and refit **26.50.05**

Removing

CAUTION: Irreparable damage to the impeller and water pump body will result if an attempt is made to carry out this operation without removing water pump from engine.

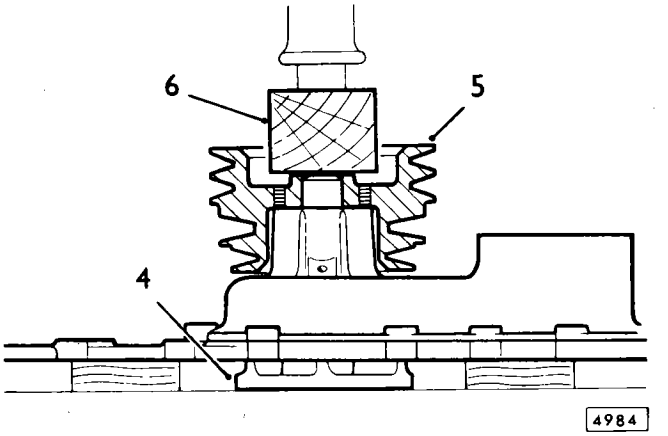
1. Remove water pump – 26.50.01.
2. Screw two **5/16 in.** U.N.F. x 2 in. long bolts into tapped holes in pulley.

3. Using a puller acting between bolts and end of shaft, draw off pulley.



Refitting

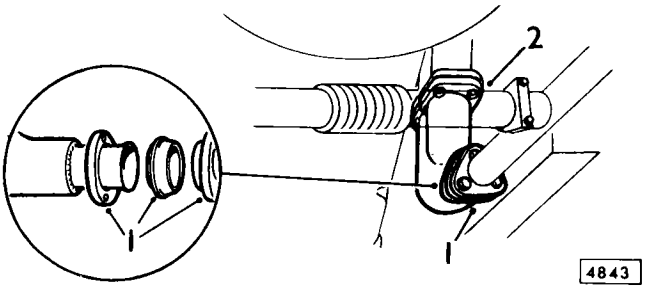
4. Position pump on bed of hand press.
5. Locate pulley on impeller shaft.
6. Position block of wood between press mandrel and pulley.
7. Press pulley on shaft until recessed face of pulley is flush with end of shaft.
8. Refit water pump to engine.



CONTENTS

FRONT PIPE

Remove and refit — **Left hand – 30.10.09**
Right hand – 30.10.10



Removing

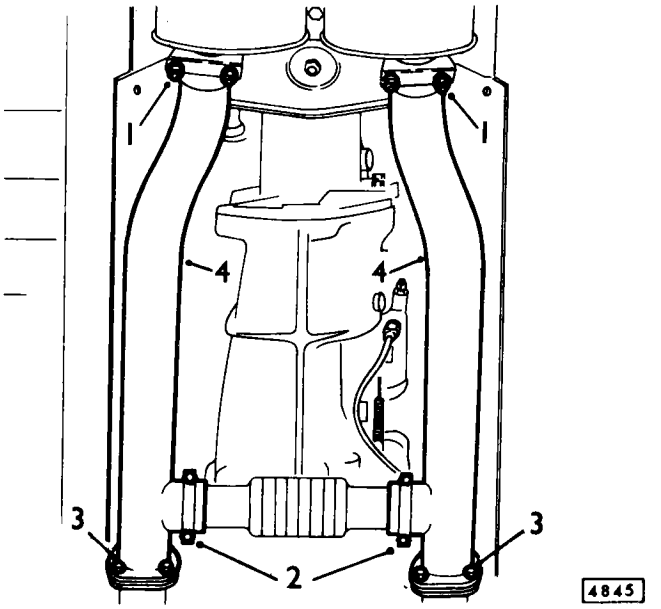
1. Remove nuts and bolts securing both halves of pipe clamp.
2. Remove nuts securing front pipe to exhaust manifolds, withdraw pipe.

Refitting

Reverse operations 1 and 2, use new sealing rings; **DO NOT** overtighten pipe clamp bolts.

INTERMEDIATE PIPE

Remove and refit — **Left hand – 30.10.11**
Right hand – 30.10.12



Removing

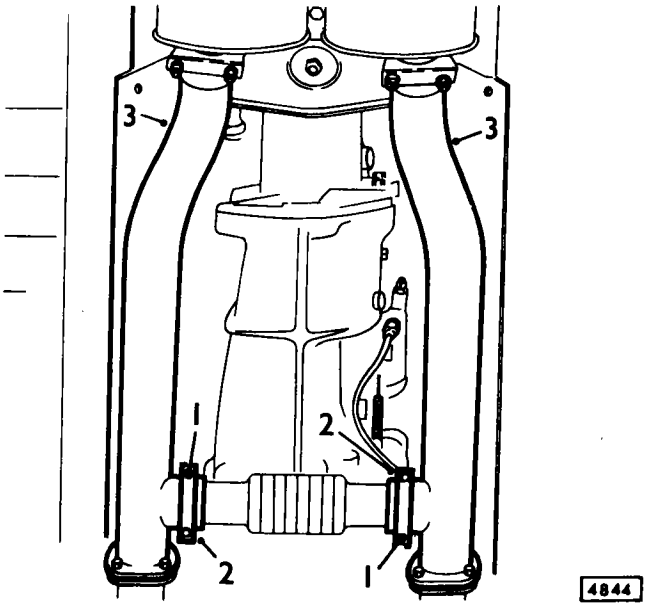
1. Remove intermediate pipe 'D' clamp securing nuts.
2. Remove balance pipe 'D' clamp securing nuts.
3. Remove nuts and bolts securing both halves of pipe clamp.
4. Withdraw intermediate pipe from balance pipe and silencer.

Refitting

Reverse operations 1 to 4, use a new sealing ring; **DO NOT** overtighten pipe clamp bolts.

BALANCE PIPE

Remove and refit — **30.10.13**



Removing

1. Remove 'D' clamp securing nuts.
2. Remove nuts and bolts securing both halves of each pipe clamp.
3. Withdraw intermediate pipes from balance pipe.

Refitting

Reverse operations 1 to 3, use new sealing rings; **DO NOT** overtighten pipe clamp bolts.

SILENCER

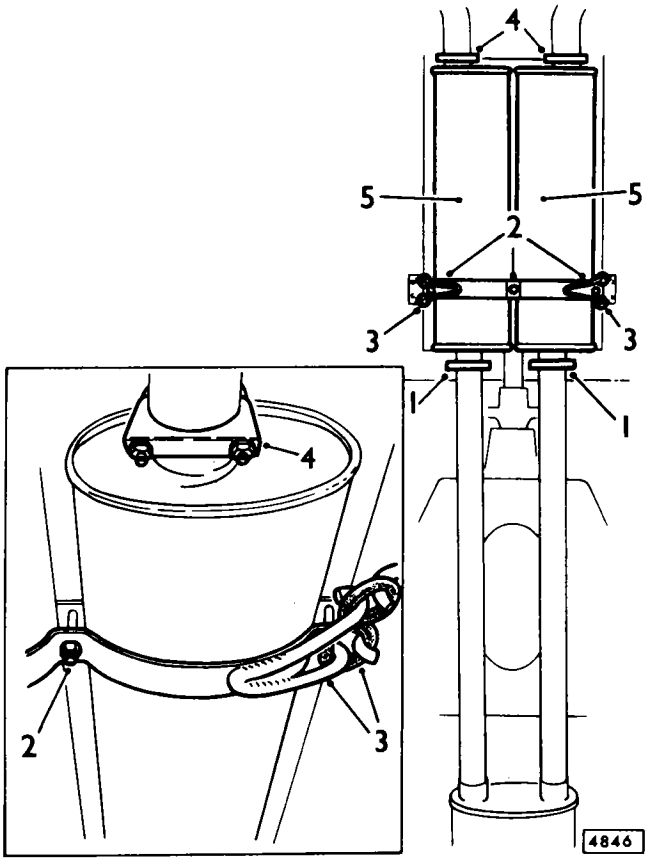
Remove and refit — **Left hand – 30.10.15**
Right hand – 30.10.16

Removing

1. Remove tail pipes and rear silencer – 30.10.22.
2. Remove nuts and bolts securing lower half of silencer clamp to upper half.
3. Detach silencer clamp from rubber rings.
4. Remove 'D' clamp securing nuts.
5. Withdraw silencer from intermediate pipe.

Refitting

Reverse operations 1 to 5.



REAR SILENCER AND TAIL PIPES

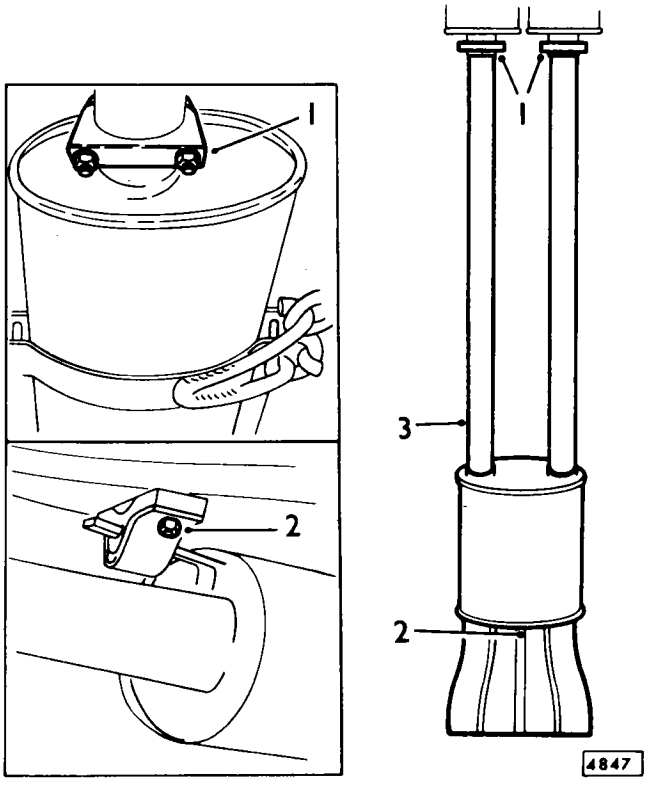
Remove and refit — **30.10.22**

Removing

1. Remove 'D' clamp securing nuts.
2. Remove nuts securing rear mounting to lower rear panel.
3. Withdraw silencer and tail pipes.

Refitting

Reverse operations 1 to 3.



EXHAUST TRIM

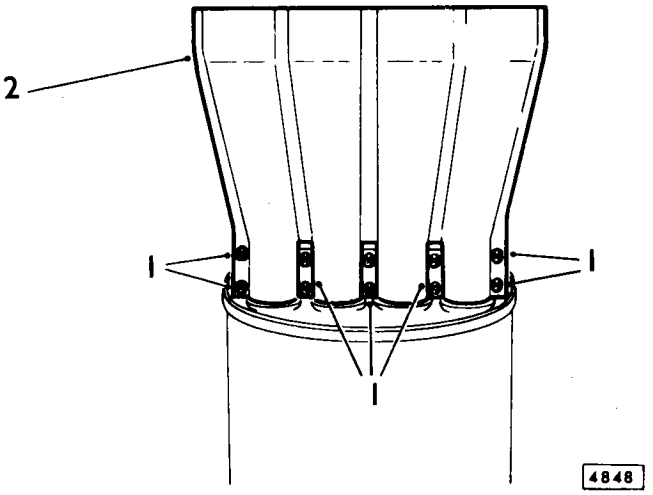
Remove and refit 30.10.23

Removing

1. Remove nuts, bolts and distance pieces securing trim to silencer extension pipes.
2. Withdraw exhaust trim.

Refitting

Reverse operations 1 and 2.



SIDE HEAT SHIELD

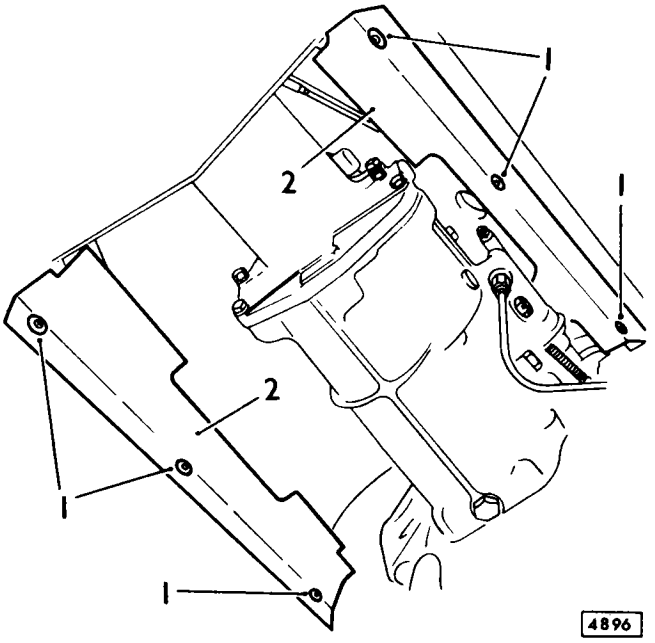
Remove and refit Left hand – 30.10.31
Right hand – 30.10.32

Removing

1. Remove screws and washers securing heat shield to floor pan.
2. Withdraw heat shield.

Refitting

Reverse operations 1 and 2.



SILENCER HEAT SHIELD

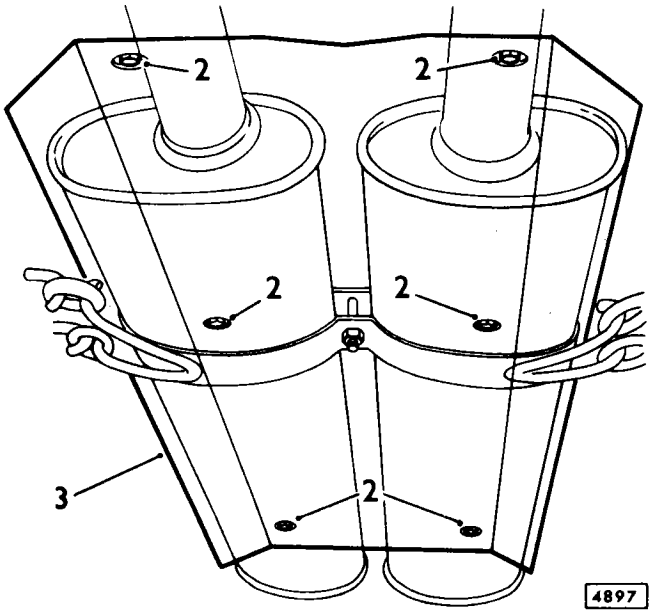
Remove and refit 30.10.34

Removing

1. Remove exhaust system – 30.10.01.
2. Remove screws and washers securing heat shield to underside of floor pan.
3. Lower heat shield

Refitting

Reverse operations 1 to 3.

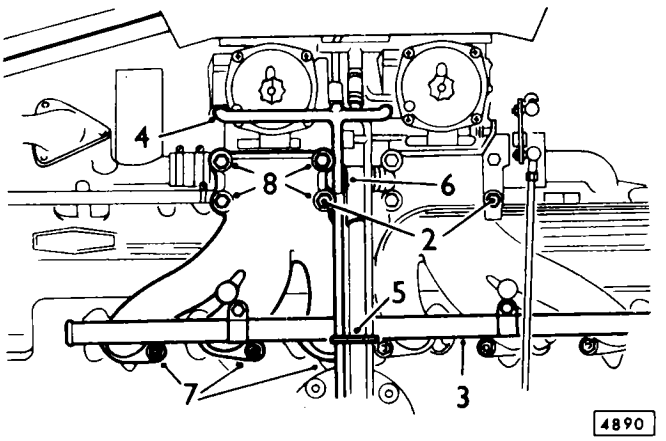


INDUCTION MANIFOLD

Remove and refit **Front – Left hand – 30.15.02**
Front – Right hand – 30.15.03

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Slacken off bolts securing heat shield to induction manifolds, lift off heat shield.
3. Remove air rail – Cars fitted with exhaust emission control only – Left hand – 17.25.17.
   Right hand – 17.25.18.
4. Disconnect balance pipe from carburetters.
5. Release nylon clip retaining carburetter balance pipe.
6. Release clip securing manifold pipe hose to manifold.
7. Remove nuts and washers securing manifold to cylinder head.
8. Remove bolts and washers securing manifold to induction housing; lift off manifold.
9. Remove gaskets and discard.
10. Plug holes in cylinder head to prevent ingress of dirt, etc.



Refitting

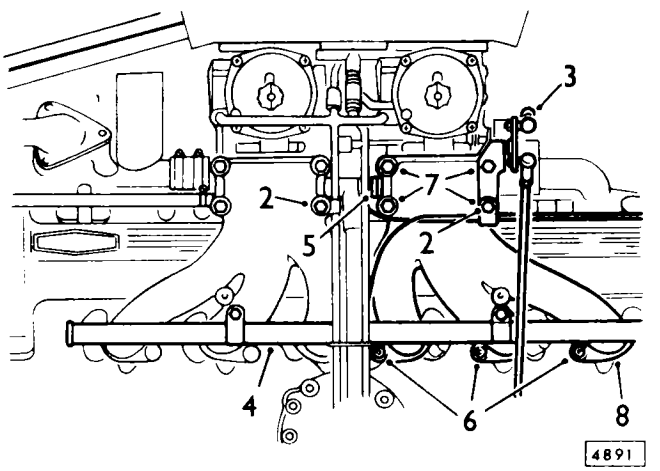
Reverse operations 1 to 10; use new gaskets and balance pipe hose clip.

INDUCTION MANIFOLD

Remove and refit **Rear – Right hand – 30.15.03/1**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Slacken off bolts securing heat shield to induction manifolds; lift off heat shield
3. Disconnect carburetter linkage.
4. Remove air rail – Cars fitted with exhaust emission control only – 17.25.18.
5. Release clip securing manifold balance pipe hose to induction manifold.
6. Remove nuts and washers securing manifold to cylinder head.
7. Remove bolts and washers securing manifold to induction housing, noting position of choke cable clip.
8. Lift off manifold.
9. Remove gaskets and discard.
10. Plug holes in cylinder head to prevent ingress of dirt, etc.

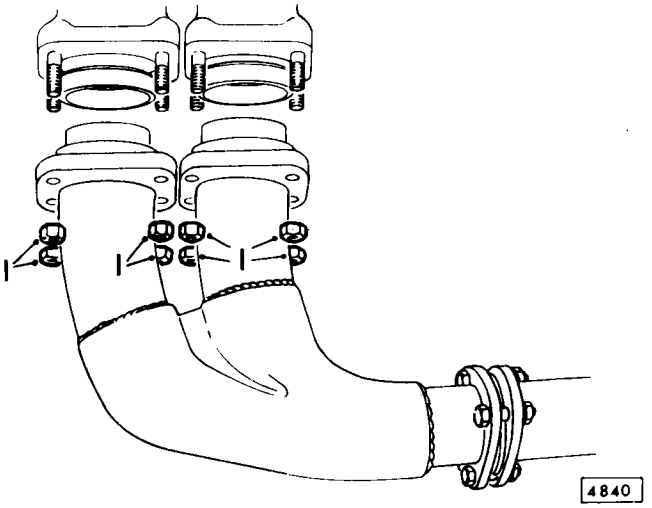


Refitting

Reverse operations 1 to 10; use new gaskets and balance pipe hose clip.

CAUTION: Whenever any of the operations contained within this group are carried out on cars fitted with exhaust emission control; it is essential that an exhaust emission check is carried out upon completion.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect the bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximatley 30.5 cm (12 in) long, 25.4 cm (10 in) wide and 15 cm (6 in) high. Ensure bonnet is adequately supported after disconnecting stay.



EXHAUST SYSTEM

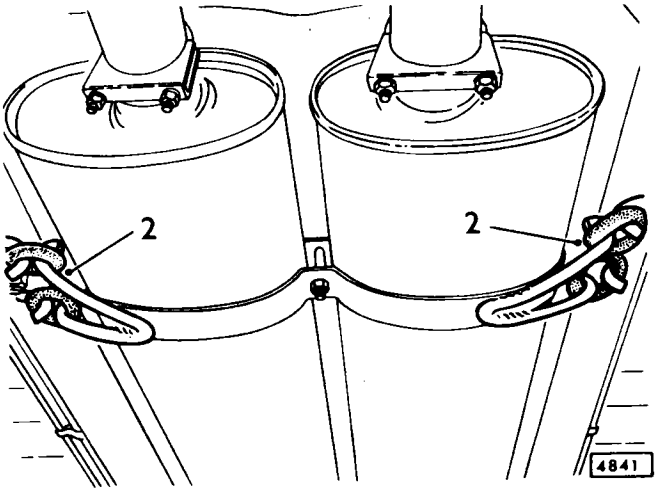
Remove and refit **30.10.01**

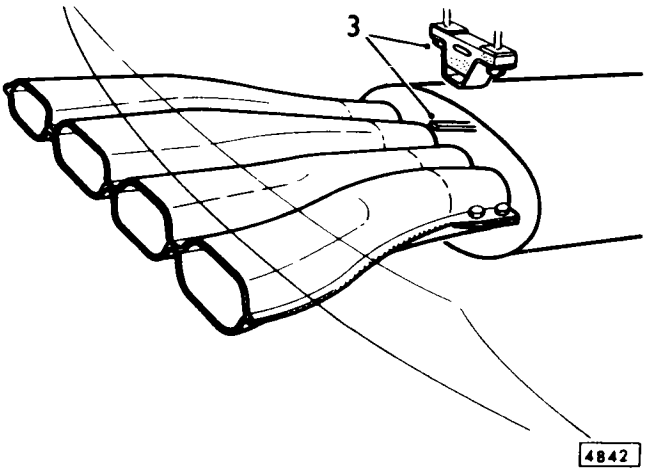
Removing

1. Remove nuts securing front pipes to exhaust manifolds.
2. Release rubber rings attaching silencer clamp to floor pan.
3. Lower system slightly and pull forward to disengage tongue from rear mounting bracket.

Refitting

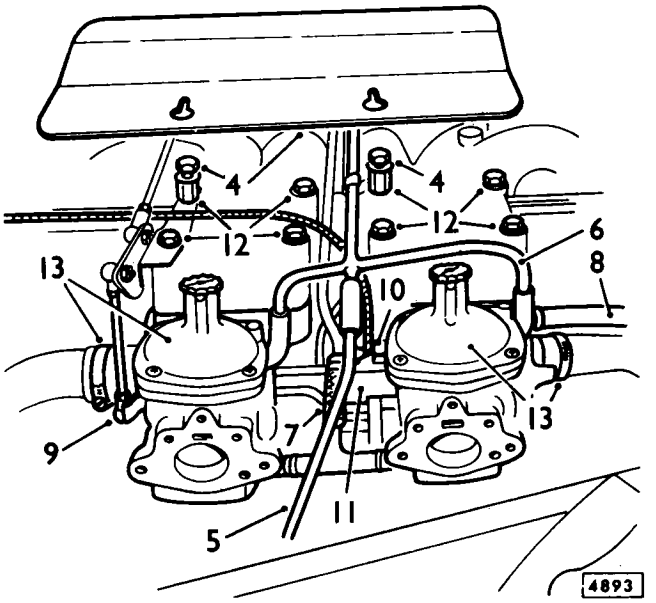
Reverse operations 1 to 3; always use new rubber rings.





INDUCTION HOUSING

Remove and refit **Right hand – 30.15.07**



Removing

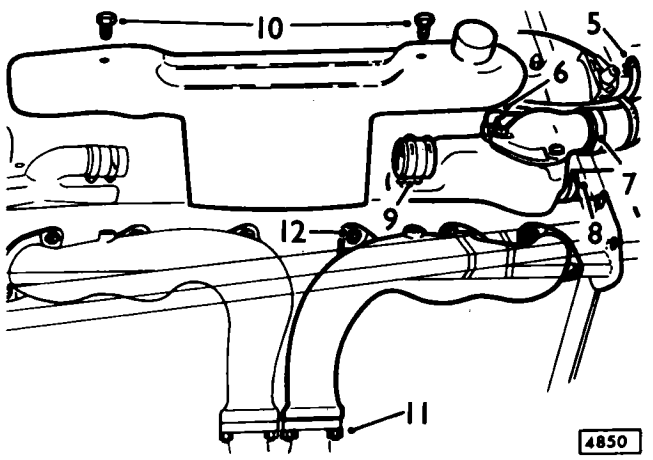
1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Slacken off bolts securing heat shield to induction manifolds; lift off heat shield.
5. Disconnect carbon canister pipe from balance pipe.
6. Disconnect balance pipe from carburetters.
7. Remove clip securing fuel feed pipe to tee-piece.
8. Disconnect header tank hose from front of induction housing.
9. Disconnect carburetter linkage.
10. Release clip securing choke cable to bracket.
11. Disconnect choke cable from front carburetter.
12. Remove bolts and washers securing induction manifold to induction housing.
13. Disconnect pipes connecting water rails to induction housing; withdraw housing together with carburetters.
14. Remove gaskets and discard.

Refitting

Reverse operations 1 to 14; use new gaskets and fuel pipe clip.

EXHAUST MANIFOLD

Remove and refit **Front – Right hand – 30.15.11**



Removing

1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Remove right hand induction housing – 30.15.07.
5. Release clip securing header tank hose.
6. Disconnect wire from water temperature transmitter.
7. Slacken clip and remove top radiator hose from thermostat housing.
8. Slacken clip and remove water pump hose from thermostat housing.
9. Remove bolts securing thermostat housing to cylinder head.
10. Remove bolts securing heat shield to exhaust manifolds.
11. Remove nuts securing front pipe to exhaust manifold.
12. Remove nuts securing exhaust manifold to cylinder head, lift manifold off studs.

Refitting

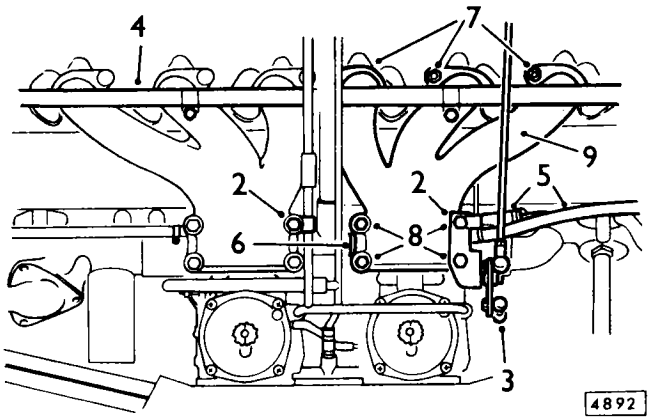
Reverse operations 1 to 12; use new manifold and thermostat housing gaskets.

INDUCTION MANIFOLD

Remove and refit **Rear – Left hand – 30.15.03/2**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Slacken off bolts securing heat shield to induction manifolds; lift off heat shield.
3. Disconnect carburetter linkage.
4. Remove air rail – Cars fitted with exhaust emission control only – 17.25.17.
5. Disconnect vacuum hose from induction manifold; two hoses are fitted on cars having exhaust emission control.
6. Release clip securing manifold balance pipe hose to induction manifold.
7. Remove nuts and washers securing manifold to cylinder head.
8. Remove bolts and washers securing manifold to induction housing, noting position of vacuum pipe clip.
9. Lift off manifold.
10. Remove gaskets and discard.
11. Plug holes in cylinder head to prevent ingress of dirt; etc.



Refitting

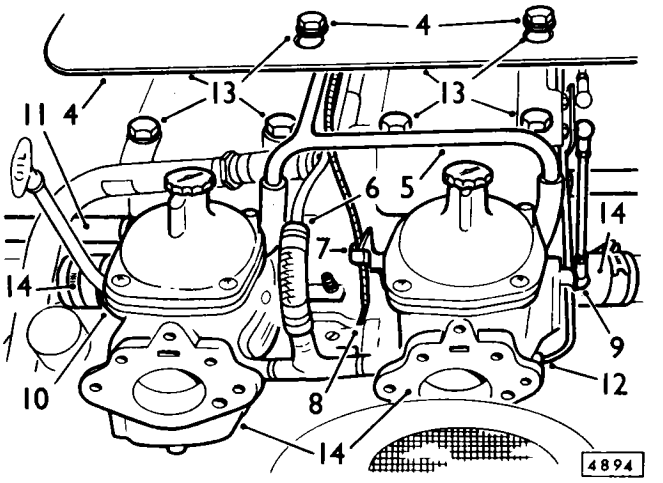
Reverse operations 1 to 11; use new gaskets and balance pipe hose clip.

INDUCTION HOUSING

Remove and refit **Left hand – 30.15.06**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Slacken off bolts securing heat shield to induction manifolds; lift off heat shield.
5. Disconnect balance pipe from carburetters.
6. Remove clip securing fuel feed pipe to tee-piece.
7. Release clip securing choke cable to bracket.
8. Disconnect choke cable from rear carburetter.
9. Disconnect carburetter linkage.
10. Remove nut and bolt retaining dipstick tube clip.
11. Disconnect header tank hose from front of induction housing.
12. Disconnect vacuum pipe from bottom of rear carburetter flange.
13. Remove bolts and washers securing induction manifolds to induction housing.
14. Disconnect pipes joining water rails to induction housing; withdraw housing together with carburetters.
15. Remove gaskets and discard.



Refitting

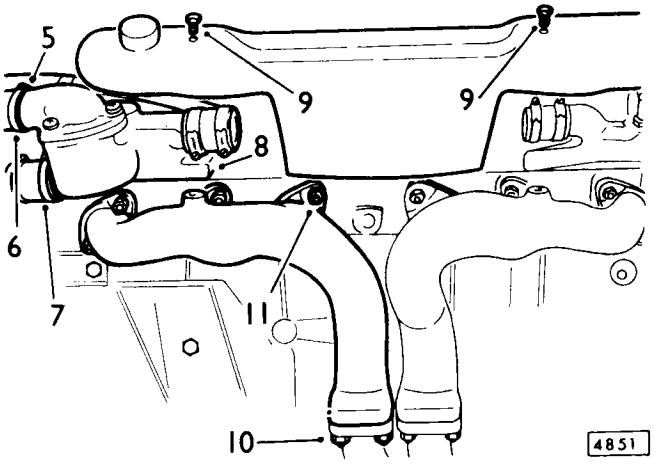
Reverse operations 1 to 15; use new gaskets and fuel feed pipe clip.

EXHAUST MANIFOLD

Remove and refit **Front – Left hand – 30.15.10**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Remove left hand induction housing – 30.15.06.
5. Release clip securing header tank hose.
6. Slacken clip and remove top radiator hose from thermostat housing.
7. Slacken clip and remove water pump hose from thermostat housing.
8. Remove bolts securing thermostat housing to cylinder head.
9. Remove bolts securing heat shield to exhaust manifolds.
10. Remove nuts securing front pipe to exhaust manifold.
11. Remove nuts securing exhaust manifold to cylinder head, lift manifold off studs.



Refitting

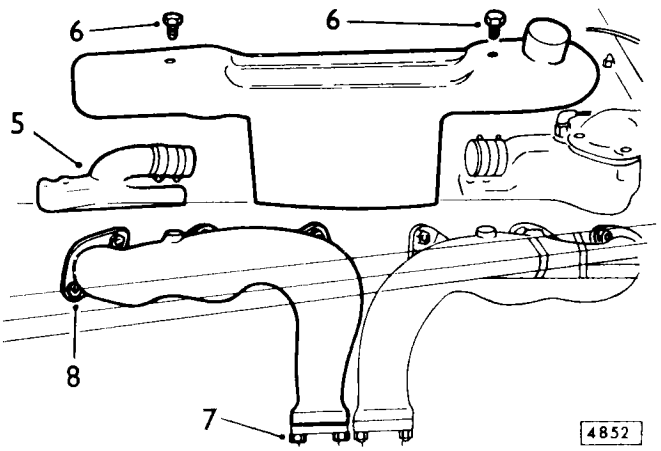
Reverse operations 1 to 11; use new manifold and thermostat housing gaskets.

EXHAUST MANIFOLD

Remove and refit **Rear – Right hand – 30.15.11/1**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Remove right hand induction housing – 30.15.07.
5. Remove bolts securing water rail to cylinder head.
6. Remove bolts securing heat shield to exhaust manifolds.
7. Remove nuts securing front pipe to exhaust manifold.
8. Remove nuts securing exhaust manifold to cylinder head, lift manifold off studs.



Refitting

Reverse operations 1 to 8; use new manifold and water rail gaskets.

EXHAUST MANIFOLD

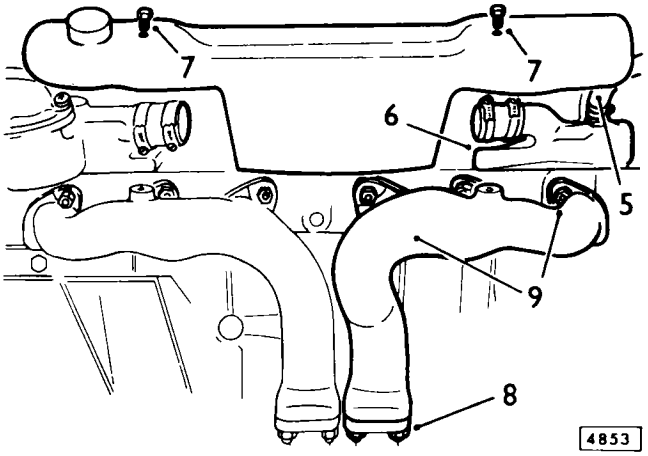
Remove and refit **Rear – Left hand – 30.15.10/1**

Removing

1. Disconnect battery earth lead – 86.15.19.
2. Drain cooling system – 26.10.01.
3. Remove air cleaner – 19.10.01.
4. Remove left hand induction housing – 30.15.06.
5. Disconnect heater pipe from water rail.
6. Remove bolts securing water rail to cylinder head.
7. Remove bolts securing heat shield to exhaust manifolds.
8. Remove nuts securing front pipe to exhaust manifold.
9. Remove nuts securing exhaust manifold to cylinder head, lift manifold off studs.

Refitting

Reverse operations 1 to 8; use new manifold and water rail gaskets.



CONTENTS

CAUTION: The hydraulic fluid used in the clutch hydraulic system is injurious to car paintwork. Utmost precautions MUST at all times be taken to prevent spillage of fluid. Should fluid be accidentally spilled on paintwork, wipe fluid off immediately with a cloth moistened with denatured alcohol (methylated spirits).

CLUTCH ASSEMBLY

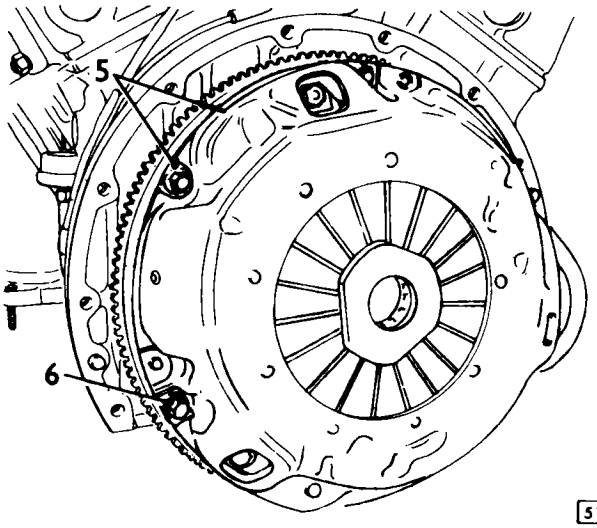
Remove and refit 33.10.01

Removing

1. Remove engine and gearbox assembly from car – 12.37.01.
2. Remove bolts and spring washers securing flywheel cover to bell housing.
3. Remove bolts and spring washers securing starter motor, withdraw motor from bell housing.
4. Remove remaining bolts securing bell housing to cylinder block, noting positions of long bolts; withdraw bell housing and gearbox.
5. Mark relative positions of clutch cover to flywheel and balance weights to clutch cover.
6. Remove bolts and spring washers securing clutch cover to flywheel; withdraw cover together with clutch plates.
7. Examine flywheel face for scoring. If scoring is excessive, flywheel must be renewed.
8. Examine clutch plates for oil contamination or evidence of slipping. If oil contamination is evident, crankshaft rear oil seal should be examined and, if necessary, replaced.

   CAUTION: It is always advisable when removing clutch to fit a new release bearing. To do this, proceed as follows.

9. Release spring clips securing release bearing to withdrawal lever.
10. Disengage lugs from withdrawal lever.



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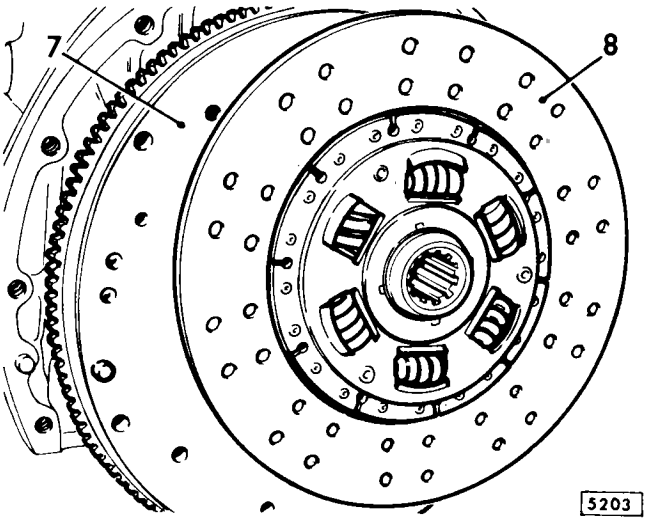

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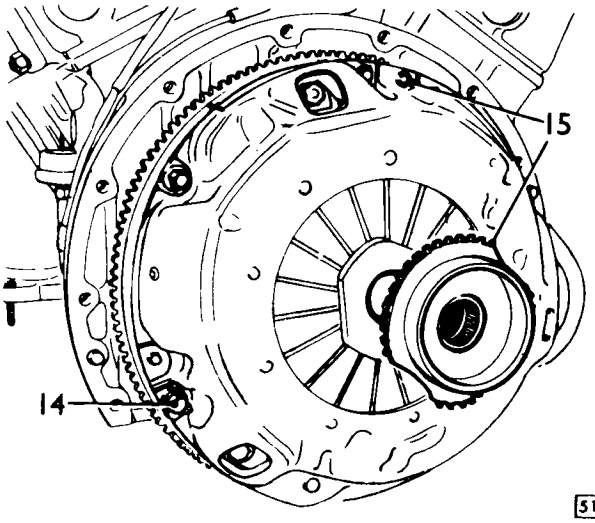
Refitting

11. Position lugs of release bearing in withdrawal lever.
12. Fit spring clips; ensure that lips are correctly seated in recesses.
13. Position clutch plates and cover on flywheel, ensure reference marks made during dismantling are in alignment.
14. Fit balance weights, bolts and washers; do not tighten bolts at this stage.
15. Using dummy shaft, align clutch plates, ensure clutch cover is correctly located on dowels.
16. Tighten bolts by diagonal selection.
17. Reverse operations 1 to 4.
18. Check slave cylinder push rod adjustment – 33.10.03.



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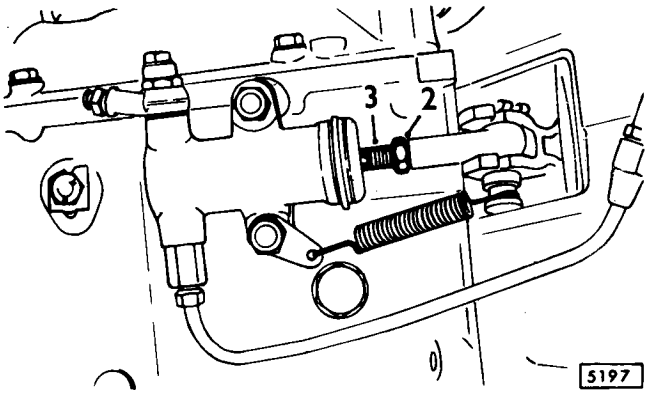
CLUTCH SLAVE CYLINDER PUSH ROD

Check and adjust **33.10.03**



Checking

1. Move push rod backwards and forwards, measure total free movement of rod which, when correctly adjusted, is 3,2 mm (.125 in.).

Adjusting

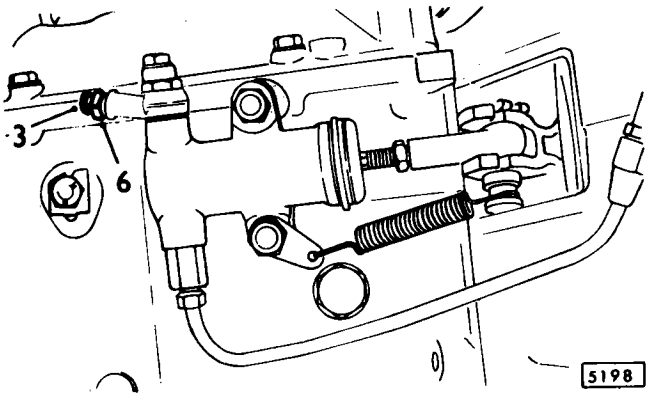
2. Slacken locknut.
3. Screw push rod in or out of trunnion until correct free amount of movement is obtained.

   NOTE: Flats are machined on shank of push rod to enable spanner to be used.

4. Tighten locknut.
5. Operate clutch pedal several times and recheck amount of free travel.

CLUTCH HYDRAULIC SYSTEM

Bleed **33.15.01**



CAUTION: Only Castrol-Girling brake fluid (GREEN) may be used in the hydraulic system.

Bleeding

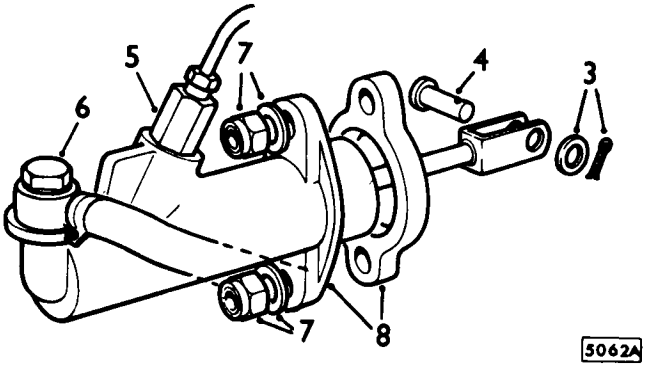
1. Remove reservoir filler cap.
2. Top up reservoir to correct level with hydraulic fluid.
3. Attach one end of a bleed tube to slave cylinder bleed nipple.
4. Partially fill a clean container with hydraulic fluid.
5. Immerse other end of bleed tube in fluid.
6. Slacken slave cylinder bleed nipple.
7. Pump clutch pedal slowly up and down, pausing between each stroke.
8. Top up reservoir with fresh hydraulic fluid after every three pedal strokes.

   CAUTION: Do not use fluid bled from system for topping up purposes as this will contain air. If fluid has been in use for some time it should be discarded. Fresh fluid bled from system may be used after allowing it to stand for a few hours to allow air bubbles to disperse.

9. Pump clutch pedal until pedal becomes firm, tighten bleed nipple.
10. Top up reservoir.
11. Refit filler cap.
12. Apply working pressure to clutch pedal for two to three minutes and examine system for leaks.

CLUTCH MASTER CYLINDER

Remove and refit **33.20.01**



Removing

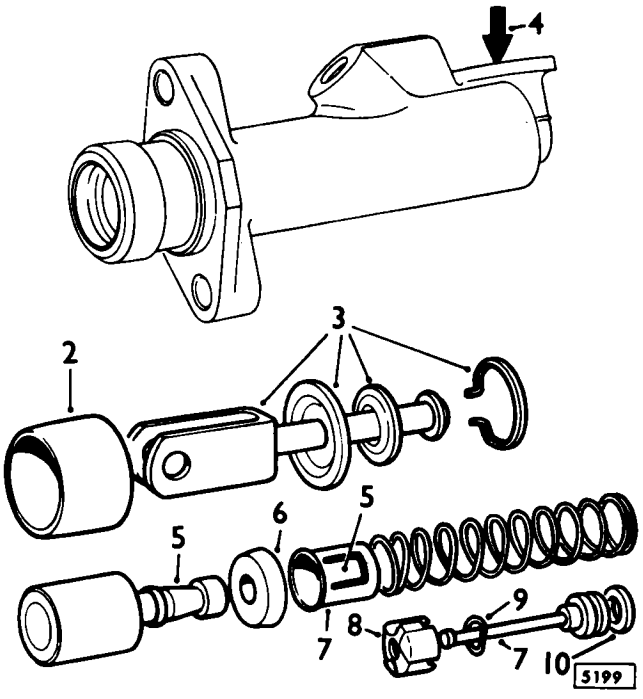
1. Remove air cleaner – Right hand 19.10.01/1 – Left hand 19.10.01.
2. Remove battery – 86.15.01 – Right hand drive cars only.
3. Remove split pin retaining clevis pin in clutch pedal.
4. Withdraw clevis pin.
5. Disconnect outlet pipe from master cylinder; plug or tape end of pipe to prevent ingress of dirt.
6. Disconnect inlet pipe from banjo; plug end of pipe to prevent fluid loss and ingress of dirt.
7. Remove self-locking nuts and washers securing master cylinder to pedal box.
8. Withdraw master cylinder through sub-frame; remove spacer from mounting studs.

Refitting

9. Reverse operations 1 to 8; use new split pin to secure clevis pin.
10. Bleed clutch 33.15.01.

CLUTCH MASTER CYLINDER

Overhaul **33.20.07**



Dismantling

1. Remove master cylinder – 33.20.01.
2. Carefully prise metal boot off body.
3. Remove circlip, withdraw push rod together with rubber dust cover and washer.
4. Apply low air pressure to inlet port and expel piston assembly.
5. Lift tab on spring support and withdraw piston.
6. Remove cup seal from piston; discard seal.
7. Move valve stem sideways in spring support; withdraw valve and spring.
8. Slide nylon spring support off valve stem.
9. Remove wave washer.
10. Remove valve seal; discard seal.

Inspecting components

11. Wash all components in denatured alcohol (methylated spirits) and dry using clean, lint free cloth.
12. Examine piston and master cylinder bore for signs of scoring. Should scoring be evident, components must be renewed.
13. Examine spring for signs of distortion, renew if necessary.

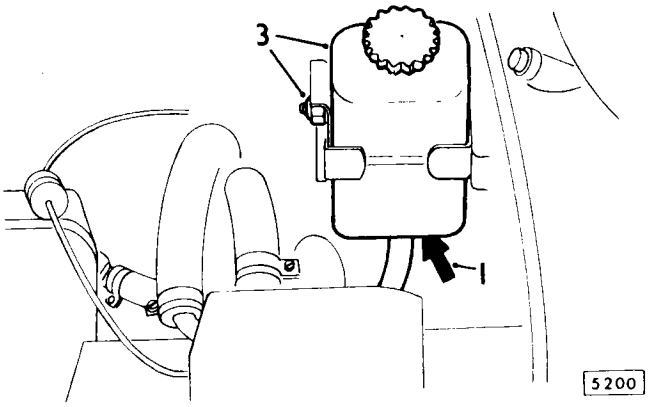
Reassembling

CAUTION: All components must be liberally coated with Girling rubber grease. Always assemble neoprene components using fingers only.

14. Reverse operations 1 to 10, use new cup seal and valve seal.
15. Check slave cylinder push rod adjustment – 33.10.03.

CLUTCH FLUID RESERVOIR

Remove and refit 33.20.08



Removing

1. Slacken clip securing delivery hose to underside of reservoir.
2. Disconnect pipe and drain fluid into suitable clean container; plug pipe to prevent ingress of dirt.
3. Slacken clamp bolt, lift reservoir out of mounting bracket.

Refitting

4. Reverse operations 1 to 3
5. Bleed clutch – 33.15.01.

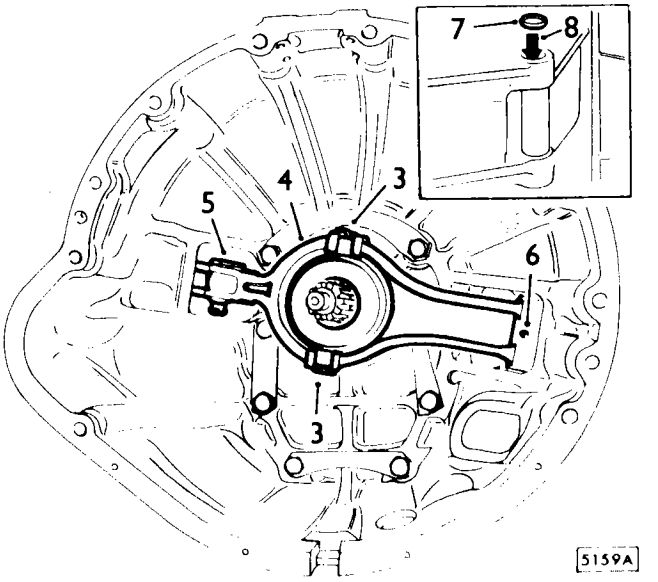
WITHDRAWAL ASSEMBLY

Remove and refit 33.25.12

Removing

1. Remove engine and gearbox assembly from car – 12.37.01.
2. Remove clutch assembly – 33.10.01.
3. Release spring clips securing release bearing to withdrawal fork.
4. Disengage lugs from withdrawal fork.
5. Remove clip and pivot pin at clutch slave cylinder push rod.
6. Drift roll pin from withdrawal fork fulcrum shaft.
7. Drill out upper seal plug from fulcrum boss.
8. Drift shaft downwards through withdrawal fork.
9. Remove withdrawal fork from bell housing.

NOTE: Examine withdrawal fork shaft bushes for wear and renew if necessary. Lightly ream new bushes to size using shaft as guide.

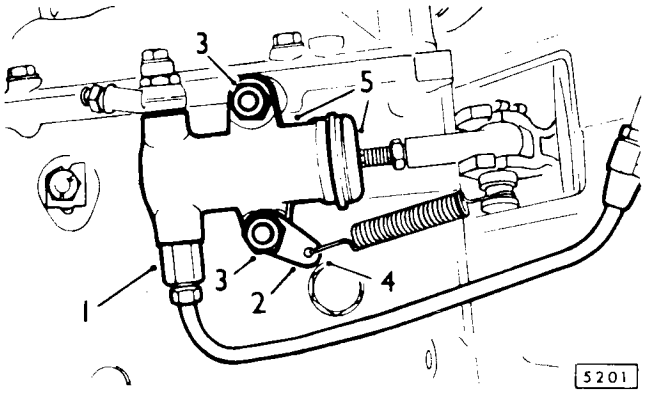


Refitting

10. Position withdrawal fork between bosses on bell housing.
11. Tap pivot shaft into position, locate roll pin holes and fit new roll pin.
12. Fit new seal plugs top and bottom of shaft.
13. Refit slave cylinder push rod pivot pin and retain with spring clip.
14. Position lugs of release bearing in withdrawal fork.
15. Fit spring clips; ensure that lips are correctly seated in recesses.
16. Refit clutch assembly.
17. Refit engine and gearbox to car.

CLUTCH SLAVE CYLINDER

Remove and refit 33.35.01



Removing

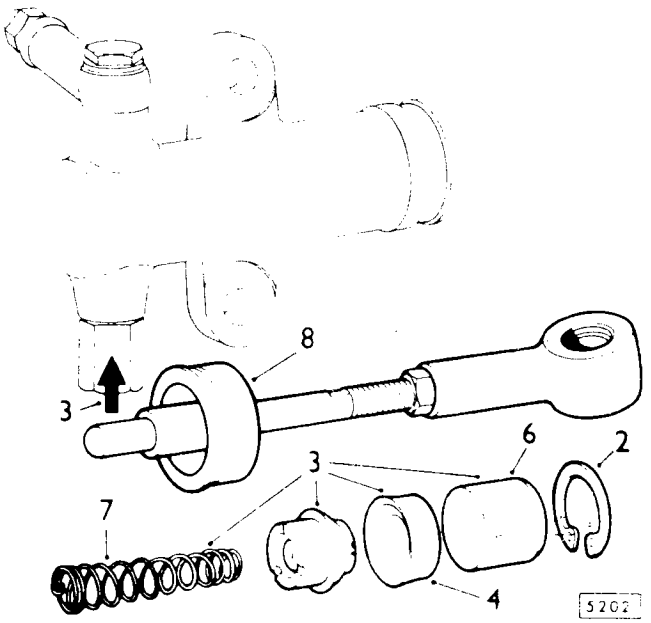
1. Disconnect pipe from slave cylinder; plug or tape pipe to prevent ingress of dirt.
2. Note relative position of spring anchor plate to gearbox.
3. Remove nuts and spring washers securing slave cylinder to gearbox.
4. Slide spring anchor plate off mounting stud.
5. Slide slave cylinder off mounting studs; slide rubber boot along push rod, withdraw cylinder from push rod.

Refitting

6. Reverse operations 1 to 5.
7. Bleed clutch – 33.15.01.
8. Check slave cylinder push rod adjustment – 33.10.03.

CLUTCH SLAVE CYLINDER

Overhaul 33.35.07



Dismantling

1. Remove slave cylinder – 33.35.01.
2. Remove circlip.
3. Apply low air pressure to inlet port and expel piston, cup, cup filler and spring.
4. Discard cup.

Inspecting components

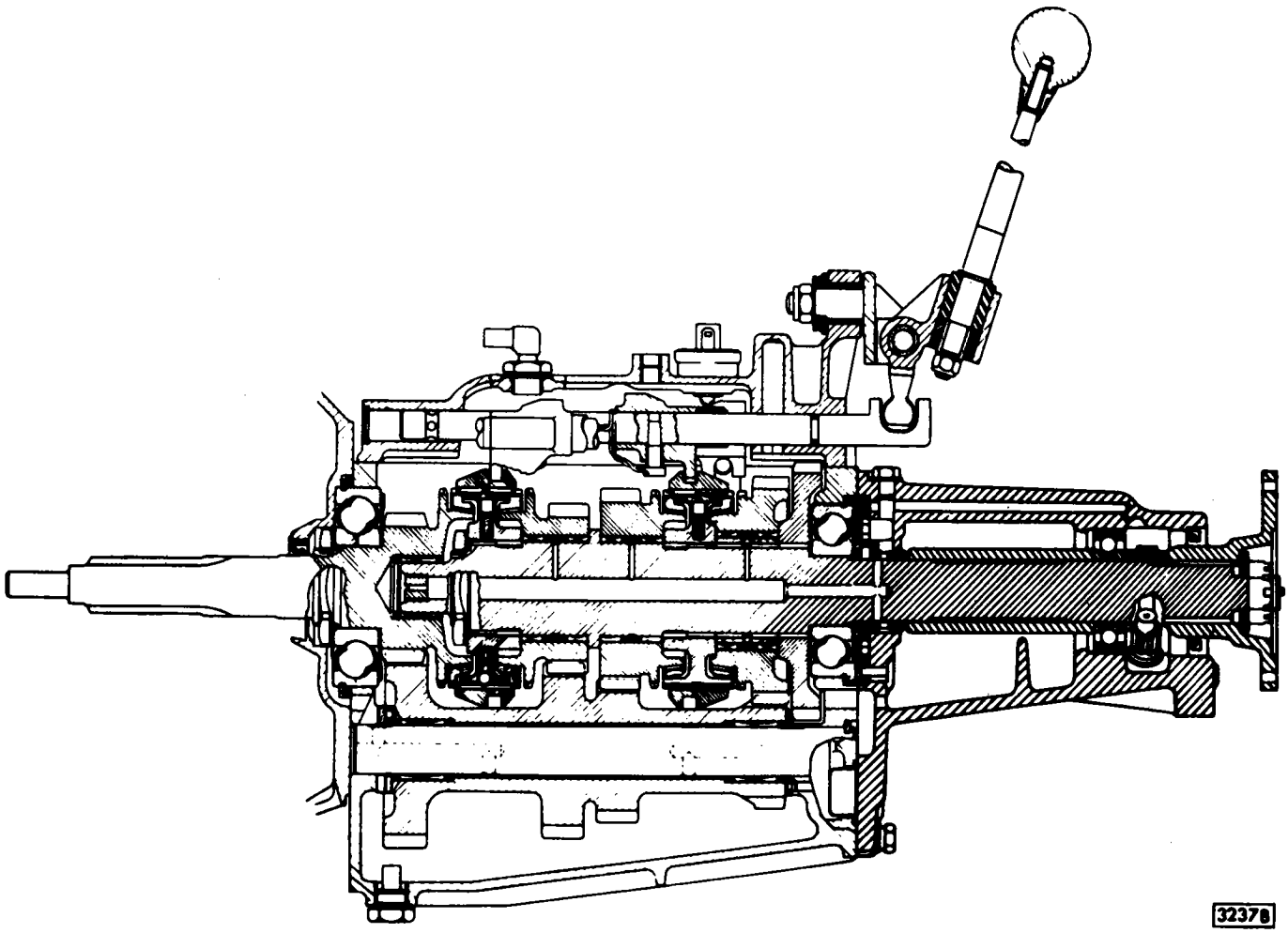
5. Wash all components in denatured alcohol (methylated spirits) and dry using clean, lint free cloth.
6. Examine piston and slave cylinder bore for signs of scoring. Should scoring be evident, components must be renewed.
7. Examine spring for signs of distortion, renew if necessary.
8. Check condition of rubber boot on push rod. If distorted or perished in any way, boot must be renewed.

Reassembling

CAUTION: All components must be liberally coated with Girling rubber grease. Always assemble cup and cup filler using fingers only.

9. Reverse operations 1 to 4, use new cup.

CONTENTS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DRIVE FLANGE

Remove and refit **37.10.01**

Removing

1. Remove engine and gearbox – 12.37.01.
2. Remove clutch assembly – 33.10.01.
3. Remove split pin.
4. Remove castellated nut.
5. Draw drive flange from shaft.

Refitting

Reverse operations 1 to 5, using new split pin.

NOTE: Fit four bolts before tapping drive flange home on splines.

REAR EXTENSION

Remove and refit **37.12.01**

Removing

1. Remove drive flange – 37.10.01.
2. Remove setscrew and spring washer and withdraw speedometer drive assembly.
3. Remove seven setscrews and spring washers retaining rear extension.
4. Draw rear extension from third motion shaft. Remove all traces of old gasket from rear face of gearbox.
5. On front face of rear extension break staking and remove three countersunk head screws securing oil pump gear housing.
6. Enter two screws in tapped holes and evenly tighten down to withdraw gear housing.
7. Mark gears with ink to ensure correct refitting.
8. Recover oil pump drive sleeve and distance tube.
9. Drift rear oil seal from rear extension.
10. Recover speedometer drive gear.
11. Remove ball bearing race, examine, and replace if necessary.

****Refitting****

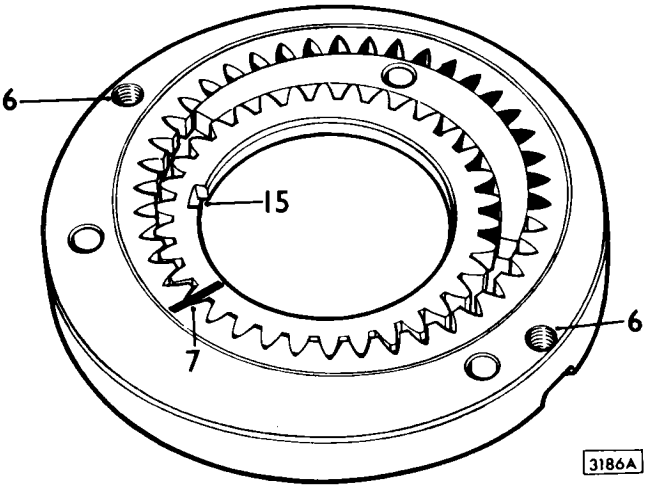
12. Assemble gears to oil pump housing, as marked in operation number 7, and secure housing to gearbox extension using three countersunk head screws.
13. Stake screw heads.
14. Fit oil pump drive sleeve to oil pump gear, long shoulder first.
15. Using new paper gasket, fit rear extension to gearbox.

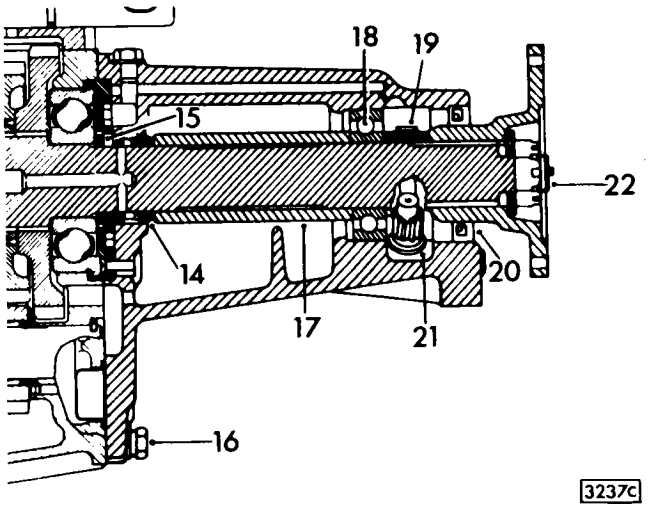
    NOTE: Ensure oil pump drive sleeve pin engages with gear.

16. Retain rear extension with seven setscrews and spring washers.
17. Place distance tube into rear extension on shaft.
18. Place ball bearing race on third motion shaft and gently drift home into rear extension.
19. Fit speedometer drive to third motion shaft.
20. Place rear oil seal in position, and tap into position.

    NOTE: Ensure oil seal seats square.

21. Fit speedometer drive assembly and secure using one setscrew and spring washer.
22. Refit drive flange.





BELL HOUSING

Remove and refit 37.12.07

Removing

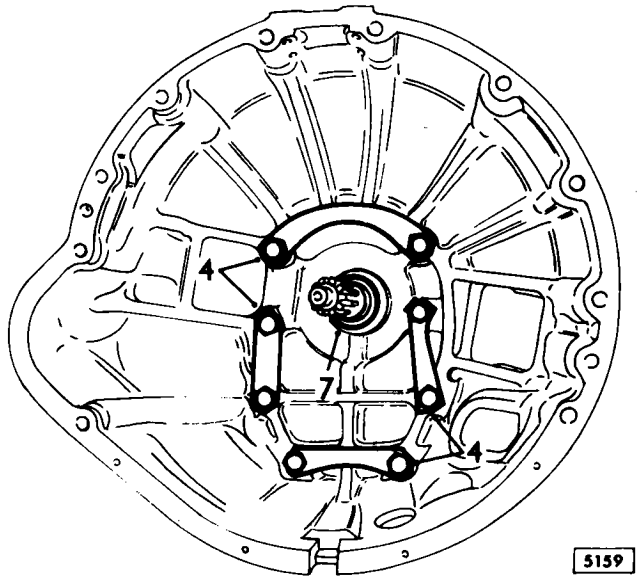
1. Remove engine and gearbox – 12.37.01.
2. Remove clutch assembly – 33.10.01.
3. Remove withdrawal assembly – 33.25.12.
4. Tap back locking tabs and remove eight setscrews.
5. Remove bell housing.
6. Remove all traces of gasket from front face of gearbox.
7. Remove oil seal from bell housing.

Refitting

8. Fit new oil seal to bell housing, lip towards gear box.
9. Cover first motion shaft splines with adhesive tape to protect oil seal.
10. Using new gasket, slide bell housing over first motion shaft.
11. Secure bell housing to gearbox using eight setscrews.

NOTE: Fit lock plates beneath screws and turn up tabs.

12. Refit withdrawal assembly.
13. Replace clutch assembly.
14. Refit engine and gearbox.



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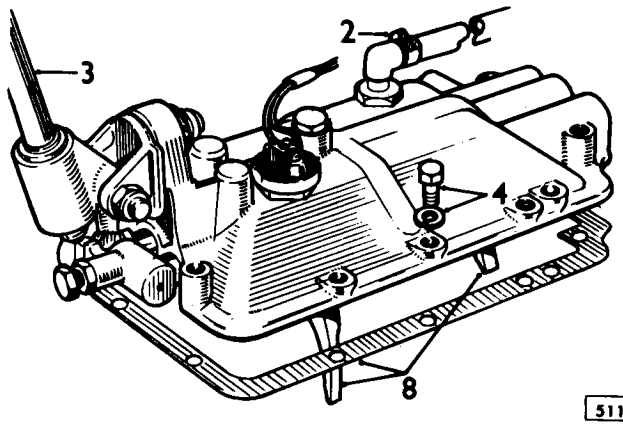


5118

TOP COVER

Remove and refit 37.12.16

Removing (gearbox in situ)

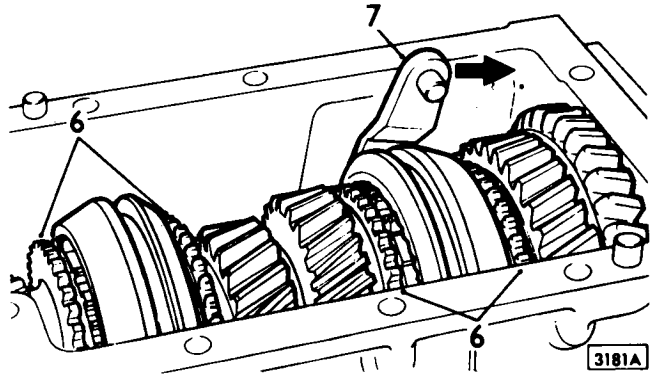
1. Remove gearbox tunnel cover – 76.25.07.
2. Slacken pipe clip on gearbox top cover breather hose; disconnect reverse light cable.
3. Place gear lever in neutral position.
4. Remove ten setscrews and spring washers securing top cover, and lift cover from gearbox.

NOTE: Setscrews are of different lengths.

5. Clean all traces of gasket from cover and gearbox.

Refitting

6. Ensure gearbox and selectors are in neutral position.
7. Ensure reverse idler gear out of mesh by pushing lever towards rear of gearbox.
8. Using new paper gasket place top cover in position on gearbox. Ensure selector forks engage synchro assemblies.
9. Secure using ten setscrews, noting varying lengths.
10. Refit top cover breather hose and secure pipe clip; reconnect reverse light cable.
11. Refit gearbox tunnel cover.



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TOP COVER

Overhaul 37.12.19

Dismantling

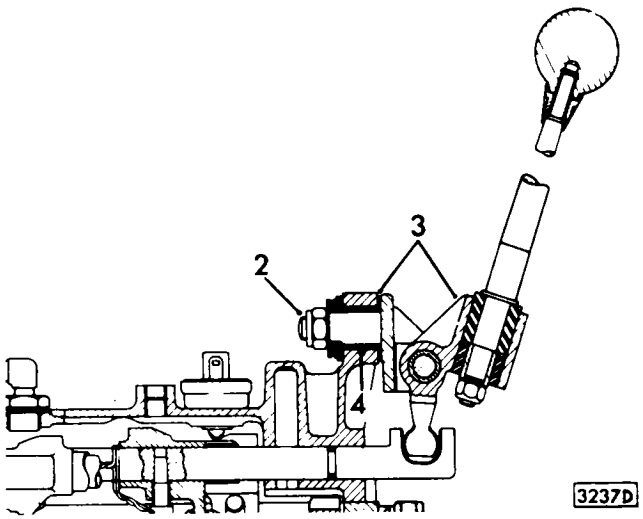
1. Remove top cover – 37.12.16.
2. Remove self locking nut and recover coil spring, flat washer and fibre washer securing gear lever assembly to top cover.
3. Withdraw gear lever and recover remaining fibre washer.
4. Press bush from pivot jaw housing.
5. Remove locking wire and remove retaining screws from selector forks and locating arm.
6. Withdraw 3rd/top selector rod and collect selector fork, spacing tube and interlock ball.
7. Withdraw 1st/2nd selector rod and collect selector fork, spacing tube and loose interlock pin in rod.
8. Withdraw reverse selector rod, fork and locating arm.

NOTE: Collect reverse rod detent plunger, ball and spring. Collect interlock ball.

9. Release locknut on reverse selector, and slacken setscrew.
10. Recover detent plunger, stop spring, detent ball and spring.

Inspection

11. Examine all components for scores and undue wear. Examine ball bearings for pitting. Check springs for length against new items.
12. Remove 'O' ring seals from selector rods, and fit new.



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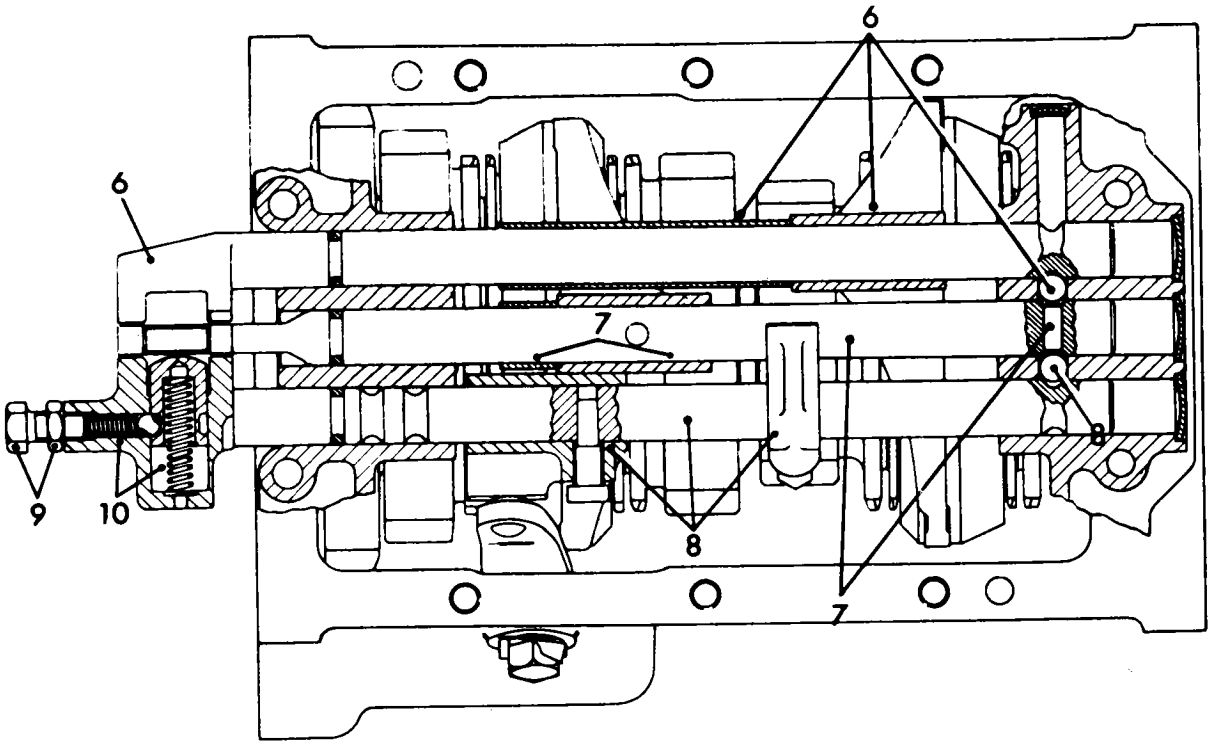

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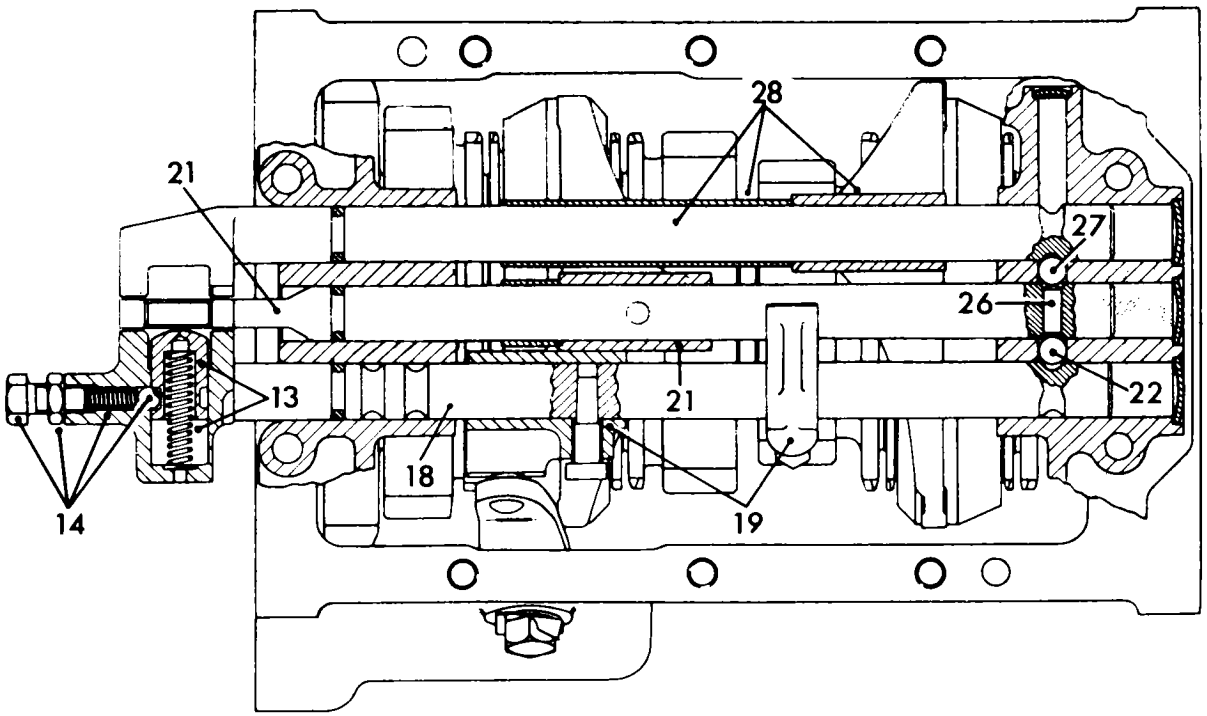
Assembling

13. Fit detent plunger and spring to reverse selector rod.
14. Fit detent ball, spring setscrew and lock-nut.
15. Press detent plunger fully home, and tighten setscrew to lock plunger.
16. Slowly slacken setscrew until plunger is released and detent ball engages in groove.
17. Restrain setscrew and tighten locknut.
18. Place reverse selector rod detent spring, plunger and ball in its housing. Depress plunger and fit selector rod.
19. Fit selector fork and locating arm to reverse selector rod.
20. Fit retaining screws.
21. Fit 1st/2nd selector rod into cover far enough to collect selector fork and spacing tube.
22. Place top cover on its side, reverse selector rod downwards, and carefully push an interlock ball through 1st/2nd selector rod hole at front of top cover. Locate ball in hole in casting, against groove in reverse selector rod.
23. Push 1st/2nd selector rod into hole to retain ball in groove.

NOTE: Take care not to push ball ahead of rod.

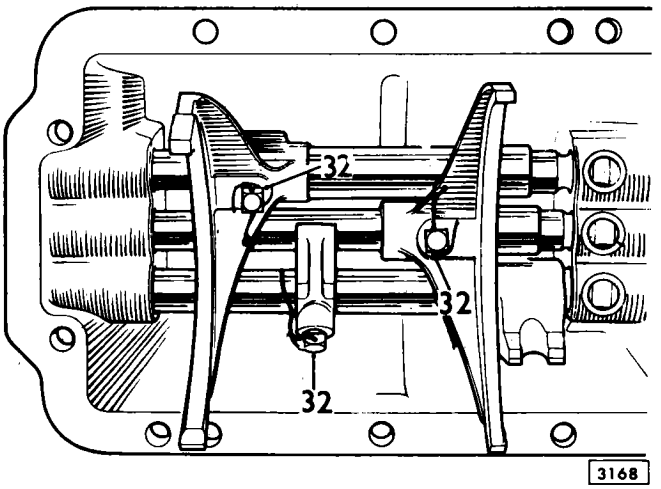
24. Fit retaining screw to 1st/2nd selector fork.
25. Check interlock by ensuring selector rods will not move together, and that moving one locks the other.
26. Carefully place interlock plunger through 3rd/top selector rod hole at front of top cover. Gently manipulate 1st/2nd rod until plunger drops through.
27. Ensure reverse and 1st/2nd selector rods level and carefully push second interlock ball through 3rd/top hole to rest in hole in casting.
28. Pass 3rd/top selector rod through hole in top cover and fit selector fork and spacing tube.
29. Push 3rd/top selector rod into hole to retain ball in groove.

NOTE: Take care not to push ball ahead of rod.



32398

30. Fit locating screw.
31. Check interlock by ensuring selector rods will not move together, and that moving one locks both the others.
32. Check tighten four locating screws and wirelock each to its fork.
33. Fit new bush to pivot jaw housing. Lightly ream to size, using jaw pivot pin as a gauge.
34. Fit fibre washer to gear selector pivot jaw pin.
35. Push pin through bush in top cover and secure with fibre washer, flat washer, coil spring and self locking nut.
36. Refit top cover.



GEAR CHANGE LEVER ASSEMBLY

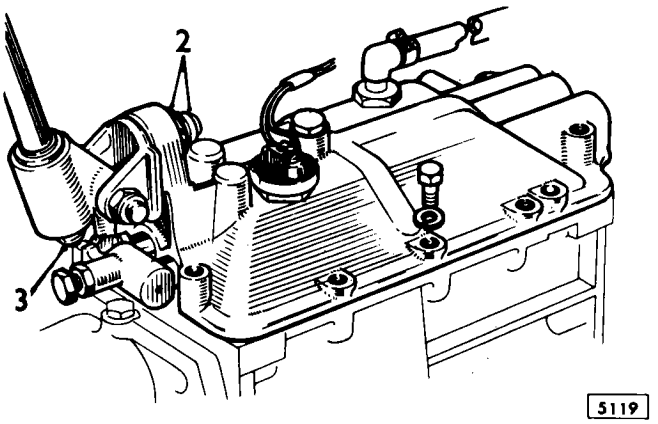
Remove and refit **37.16.04**

Removing

1. Remove gearbox tunnel cover – 76.25.07..
2. Remove self locking nut and recover coil spring, flat washer and fibre washer securing gear lever assembly to top cover.
3. Remove self locking nut and special washer securing gear change lever to gear selector lever.
4. Taking care not to damage threads, tap gear lever up through bush.
5. Recover one plain washer.

Refitting

Reverse operations 1 to 5.



GEAR CHANGE LEVER DRAUGHT EXCLUDER

Remove and refit **37.16.05**

Removing

1. Disconnect battery – 86.15.19.
2. Remove console assembly – 76.25.01.
3. Remove six drive screws securing draught excluder ring.
4. Remove draught excluder.

Refitting

Reverse operations 1 to 4.

GEAR CHANGE LEVER ASSEMBLY

Overhaul 37.16.10

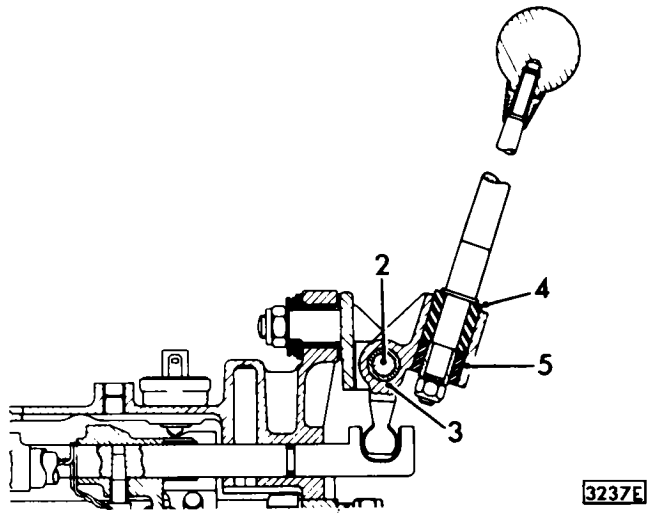
NOTE: Remove gear change lever assembly – 37.16.04. Bush in gearbox top cover for gear selector pivot jaw pin is normally included in top cover overhaul and if replacement is necessary top cover may have to be removed.

Dismantling

1. Remove self locking nut securing pivot pin in pivot jaw.
2. Tap pivot pin from pivot jaw and recover two fibre washers and one spring washer.
3. Using a suitably sized mandrel, tap, or press pivot pin bush from selector lever.
4. Prise upper bush from selector lever.
5. Using a suitably sized mandrel, tap, or press lower bush from selector lever.

Reassembling

6. Fit new lower bush to selector lever, pressing in from underside, until rubber is flush with selector lever.
7. Press new upper bush into selector lever.
8. Fit new pivot pin bush to selector lever. Lightly ream to size, using pivot pin as gauge.
9. Locate selector lever between pivot jaws and retain using pivot pin, spring washer, tufnol washer, selector lever and tufnol washer.
10. Secure pivot pin using self locking nut.
11. Refit gearchange lever assembly.



GEARCHANGE SELECTORS

Remove and refit 37.16.31

NOTE: Follow procedure given under 37.12.19, top cover overhaul, as necessary to change selectors.

GEARBOX ASSEMBLY

Overhaul **37.20.04**

NOTE: Remove engine and gearbox – 12.37.01.
Remove clutch assembly – 33.10.01.
Remove bell housing – 37.12.07.
Remove rear extension – 37.12.01.
Remove top cover – 37.12.16.

Dismantling

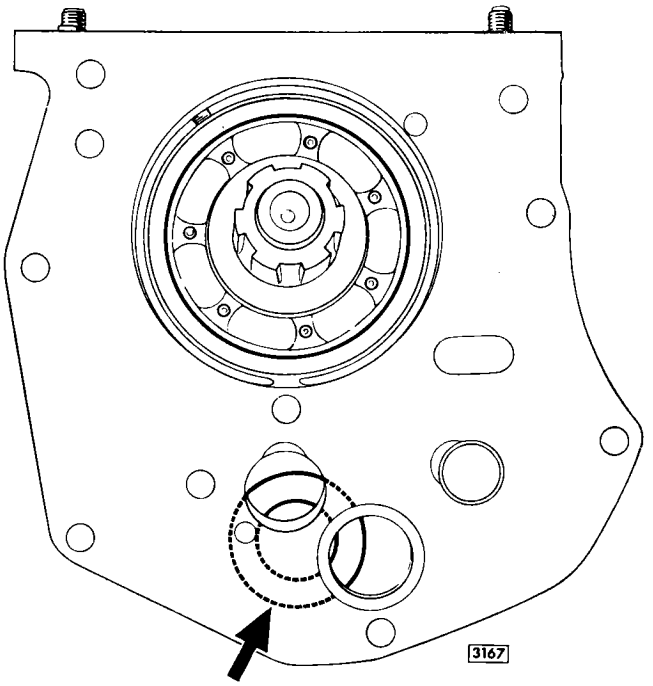
1. Remove fibre plug at front end of countershaft.
2. Drive out countershaft from front of gearbox casing.

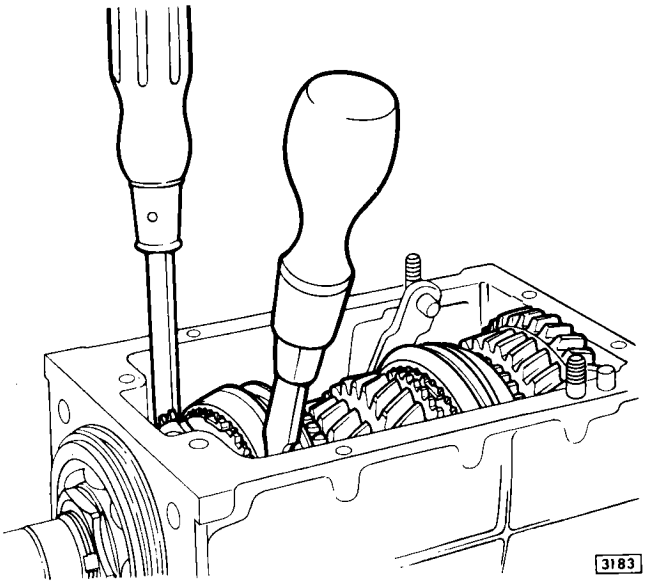
CAUTION: Ensure rear thrust washer (pegged to casing) drops down in clockwise direction, viewed from rear of casing, as countershaft is withdrawn. This is to avoid trapping the washer with reverse gear when driving mainshaft forward.

3. Rotate first motion shaft until cutaway portions of driving gear are facing top and bottom of casing.

NOTE: Check endfloat of 1st, 2nd and 3rd gears on mainshaft to be within limits given. Endfloat limits can only be restored by fitting new parts.

1st gear – end float on mainshaft .13 – .18 mm (.005 in – .007 in.).
2nd gear – end float on mainshaft .13 – .20 mm (.005 in. to .008 in.).
3rd gear – end float on mainshaft .13 – .20 mm (.005 in. to .008 in.).

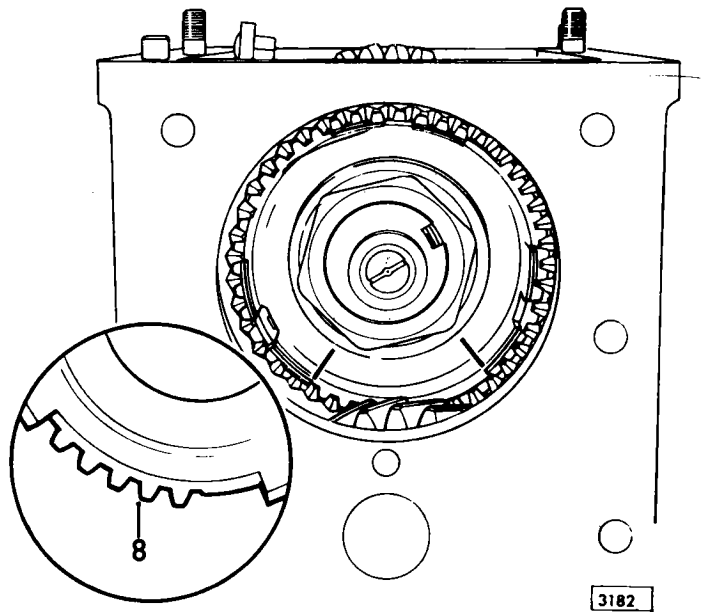


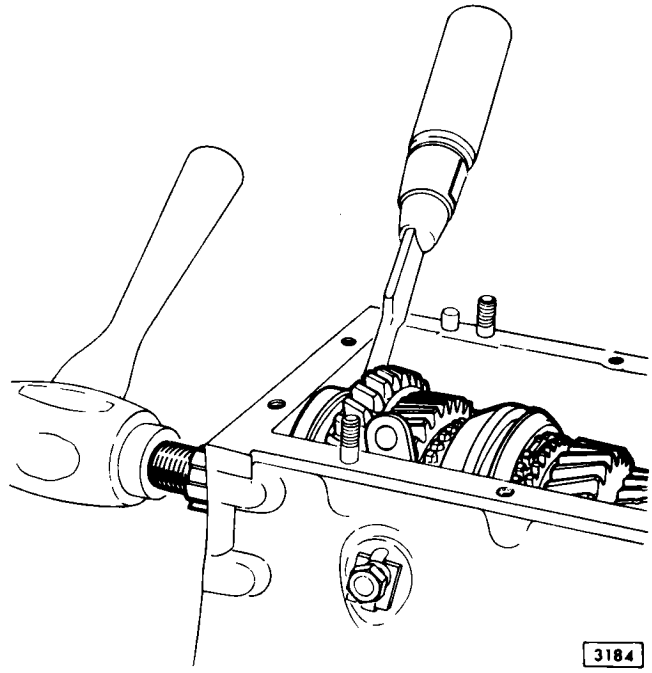


4. With the aid of two levers, ease first motion shaft and front bearing assembly forward until it can be withdrawn. Recover top gear synchro gear.
5. Remove spigot bearing from inside first motion shaft.
6. Tap back tab washer and remove large nut, tab washer and oil thrower.
7. Tap shaft sharply against a metal plate to dislodge bearing.
8. Rotate mainshaft until one of the cutaway portions of 3rd/top synchro hub is in line with countershaft.

   NOTE: Otherwise hub will foul countershaft.

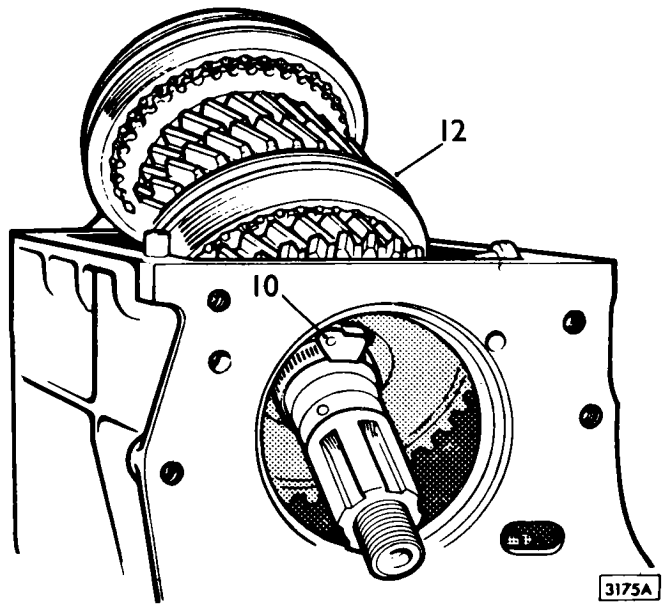
9. Tap or press mainshaft forward through rear bearing ensuring that reverse gear is kept tight against first gear.
10. Remove rear bearing from casing and fit hose clip to mainshaft to prevent reverse gear from sliding off.
11. Slacken reverse lever bolt until lever can be moved to rear.





12. Lift out mainshaft forward and upward.
13. Lift out countershaft cluster gear and collect needle bearings, inner and outer thrust washers, and retaining rings.
14. Withdraw reverse idler shaft and lift out gear.

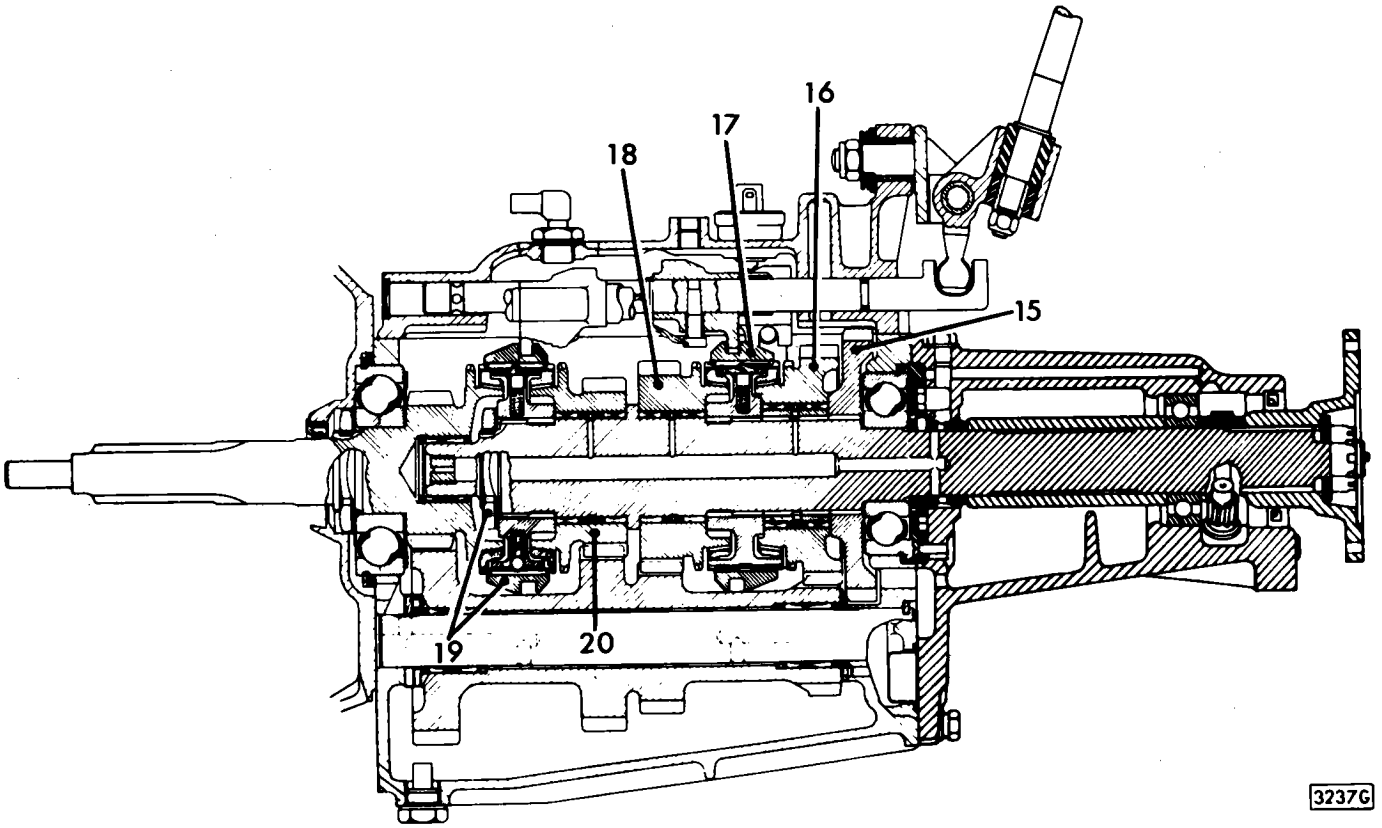
    CAUTION: Needle roller bearings are graded by size, and, if re-used, must be kept together as sets, and replaced in the location from which they were removed.



15. Remove hose clip retaining reverse gear and withdraw gear.
16. Withdraw 1st gear and collect 120 needle rollers, spacer and sleeve.
17. Withdraw 1st/2nd synchro assembly and collect two loose synchro rings.
18. Withdraw 2nd speed gear and collect 106 needle rollers. Leave spacer on mainshaft.
19. Tap back tab washer and remove large nut retaining 3rd/top synchro assembly from mainshaft. Collect loose synchro ring.
20. Withdraw 3rd speed gear and collect 106 needle rollers and spacer.
21. Wrap synchro assemblies, in turn, with cloth and push synchro hub from operating sleeve. Collect synchro detent balls and springs, thrust members, plungers and springs.

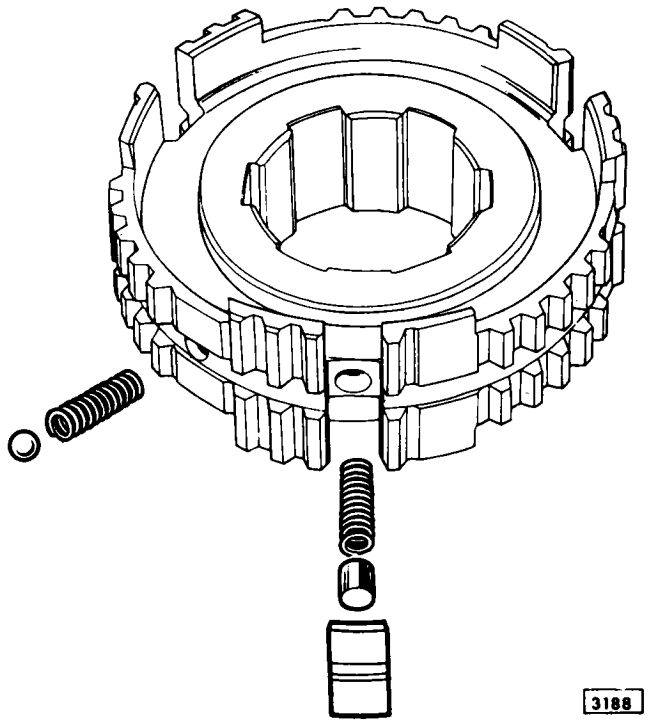
Inspection

Check all components for undue wear, signs of overheating, scores, or excessive clearances. Thoroughly clean out gearbox casing.
Ensure oil-ways in mainshaft unobstructed by blowing out with shop airline, and thoroughly washing in solvent. Dry carefully.
If needle rollers are to be replaced owing to damage, rollers of one grade only must be used at each location.

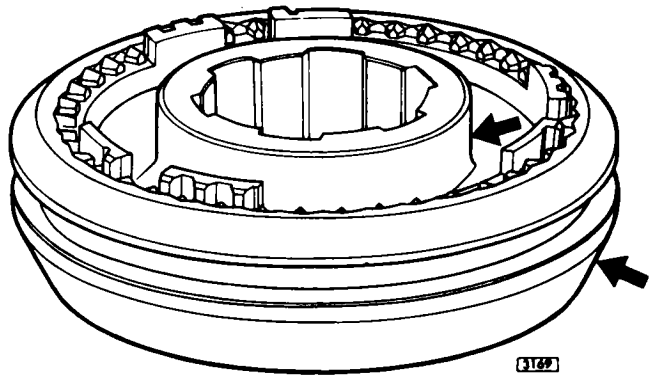


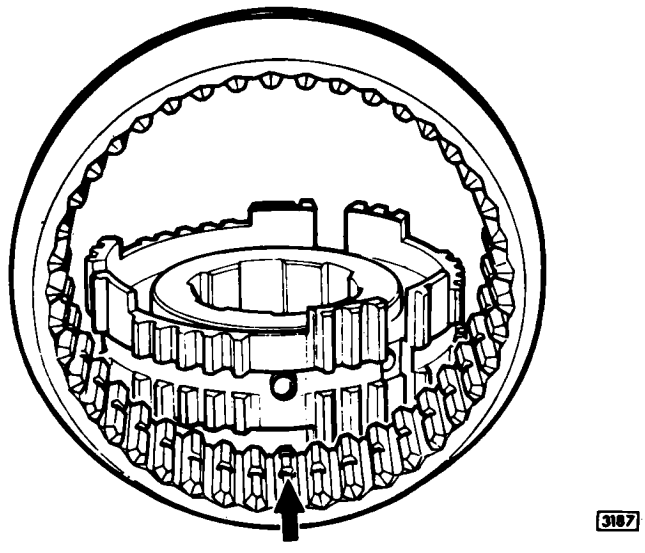
Reassembling

22. Assembly procedure for both synchro assemblies is the same as synchro assemblies are identical.
23. Assemble synchro hub to operating sleeve with wide boss of hub on opposite side to wide chamfer end of sleeve.

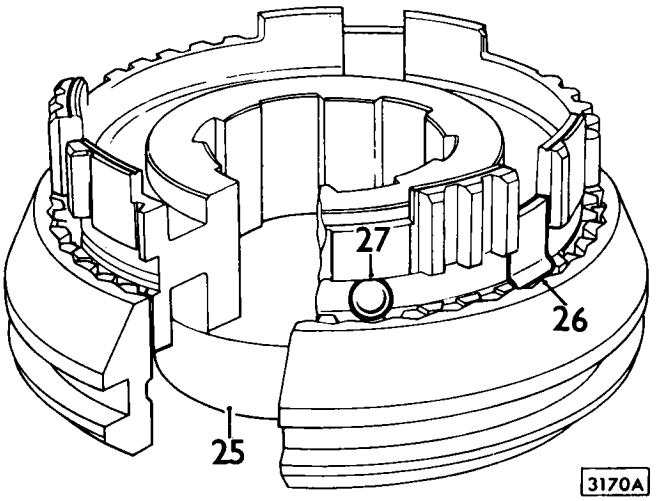


24. Assemble three balls and springs in line with operating sleeve teeth having three detent grooves.
25. Pack up synchro hub so that holes for balls and springs are exactly level with top of operating sleeve.

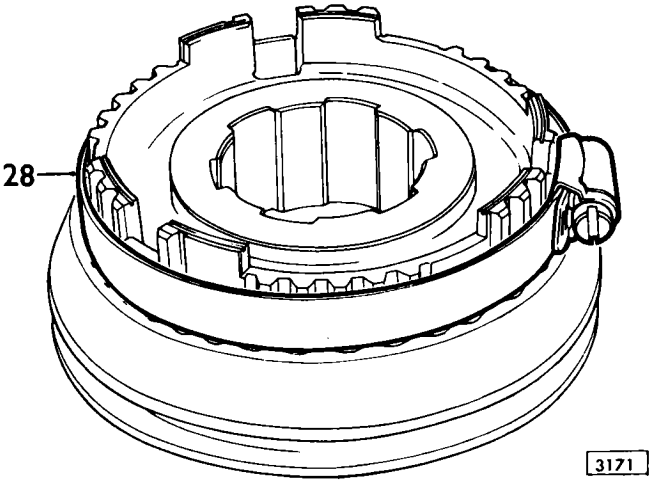


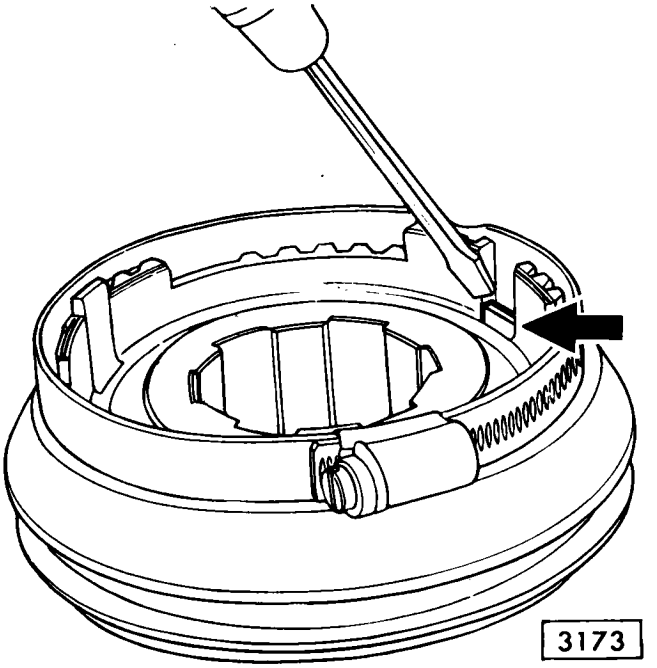


26. Fit three springs, plungers and thrust members to their correct positions with grease. Press thrust members down as far as possible.
27. Fit three springs and balls to remaining holes.



28. Compress springs with large hose clip or piston ring clamp and carefully lift synchro assembly from packing piece.
29. Depress hub slightly and push down thrust members with a screwdriver until they engage neutral groove in operating sleeve.
30. Tap hub down using hide or lead hammer until balls can be heard and felt to engage with **neutral** groove (second click).

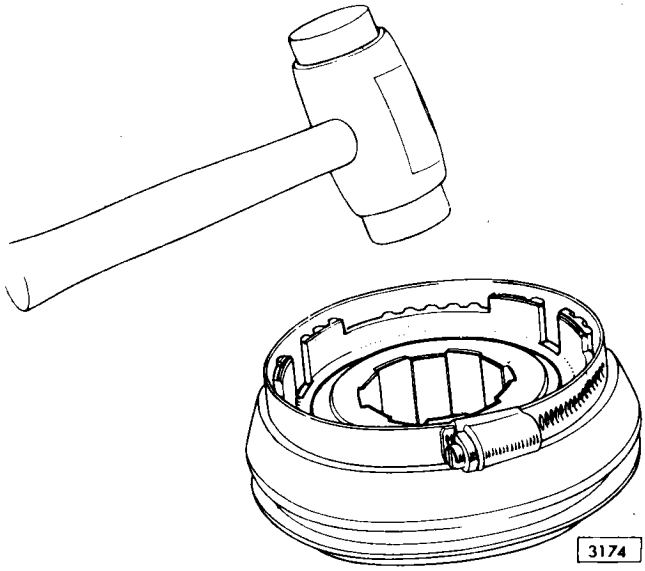


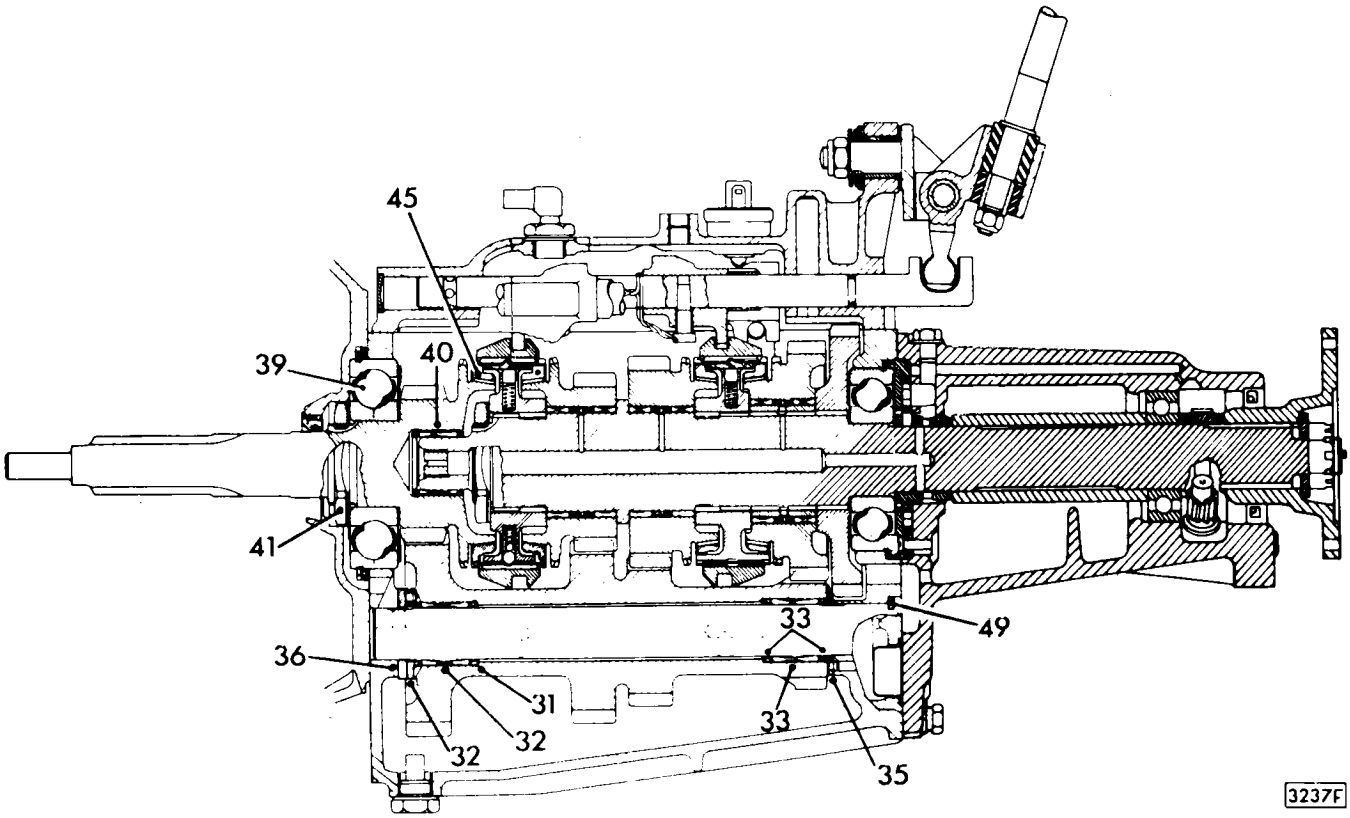


31. Fit one retaining ring in front (large gear) end of cluster gear.
32. Locate 29 needle rollers with grease and fit inner thrust washer.

    CAUTION: Ensure peg on washer locates in groove in cluster gear.

33. Fit a retaining ring, 29 needle rollers, and second retaining ring in rear of cluster gear.
34. Fit reverse idler gear, lever and idler shaft to casing.
35. Locate pegged rear washer on its boss with grease.
36. Locate outer thrust washer to front of cluster gear with grease.





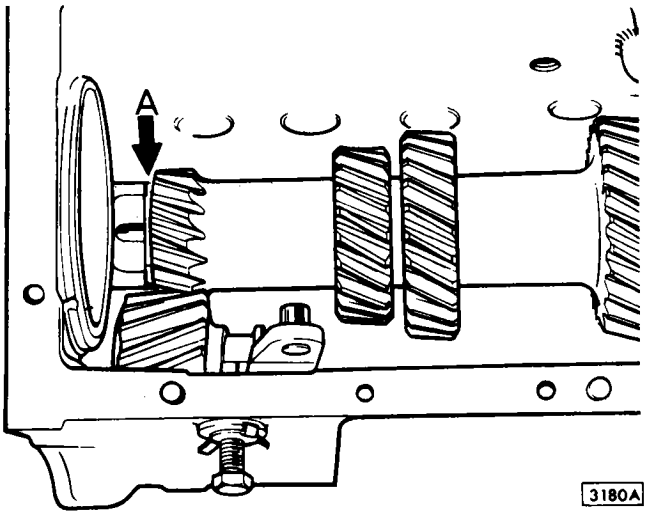
37. Carefully lower cluster gear into position, large gear to front of casing.
38. Insert a dummy countershaft and check clearance between rear thrust washer and cluster gear. Dimension A; 0.10 mm to .15 mm (0.004 in. to 0.006 in.).

    NOTE: If necessary obtain selective outer thrust washers to adjust to these limits. (Large gear end of cluster gear).

39. Fit front ball bearing to 1st motion shaft and press square to shoulder of gear.
40. Fit bearing race in rear of 1st motion shaft.
41. Retain ball bearing with new tab washer and nut. Turn down tab washer.

Using new parts as required by operation 3 or Inspection assemble mainshaft by reversing operations 15 to 20 inclusive.

42. Withdraw dummy countershaft and simultaneously substitute a thin rod. Keep rod in contact with dummy shaft until shaft is clear of casing.
43. Enter mainshaft through top of casing and pass rear of shaft through bearing hole.
44. Enter 1st motion shaft through front of casing with cutaway portions of driving gear at top and bottom.
45. Position synchro ring to locate on front face of 3rd/top synchro hub.
46. Tap 1st motion shaft into position entering front end of mainshaft into spigot bearing.
47. Hold 1st motion shaft in position, and, with a hollow drift, tap rear bearing into position.
48. Enter countershaft from rear to collect cluster gear. Withdraw thin rod and lever cluster gear up into mesh.
49. Tap countershaft, through from rear, fitting key before driving home.
50. Fit new fibre plug at front of countershaft bore.
51. Fit top cover.
52. Fit rear extension.
53. Fit bell housing.
54. Fit clutch assembly.
55. Fit engine and gearbox to car.



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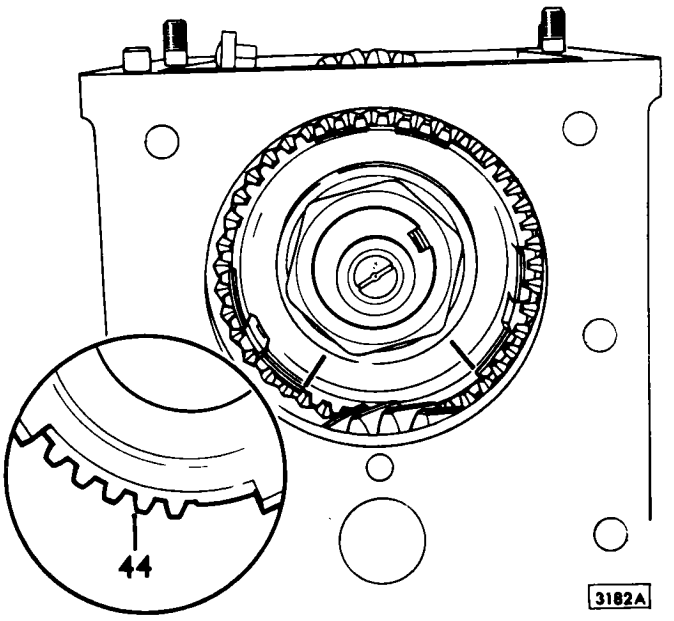


3182A

REAR OIL SEAL

Remove and refit **37.23.01**

Removing

1. Remove engine and gearbox – 12.37.01.
2. Remove drive flange – 37.10.01.
3. Remove oil seal.

NOTE: While removing oil seal, take care not to damage oil seal seat in rear extension.

Refitting

4. Fit new oil seal lip inwards.
5. Fit drive flange.
6. Fit engine and gearbox.

FRONT OIL SEAL

Remove and refit **37.23.06**

Removing

1. Remove engine and gearbox – 12.37.01.
2. Remove clutch assembly – 33.10.01.
3. Remove bell housing – 37.12.07.
4. Remove oil seal.

NOTE: While removing oil seal take care not to damage oil seal seat in bell housing.

Refitting

5. Fit new oil seal, lip towards gearbox.
6. Fit bell housing.
7. Fit clutch assembly.
8. Fit engine and gearbox to car.

SPEEDOMETER DRIVE GEAR

Remove and refit **37.25.01**

Removing

1. Remove engine and gearbox – 12.37.01.
2. Remove drive flange – 37.10.01.
3. Remove rear oil seal.

NOTE: While removing oil seal take care not to damage oil seal seat in rear extension.

4. Screw speedometer drive gear from pinion and withdraw from rear extension.

Refitting

Reverse operations 1 to 4.
Use new oil seal.

SPEEDOMETER DRIVE PINION

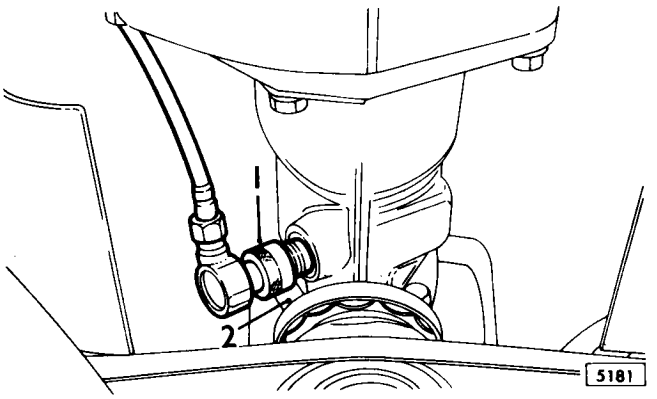
Remove and refit 37.25.05

Removing

1. Beneath car, release sleeve securing right angle drive to pinion housing.
2. Remove setscrew and plain washer and draw pinion and housing from gearbox.

Refitting

Reverse operations 1 and 2.



REVERSE LIGHT SWITCH

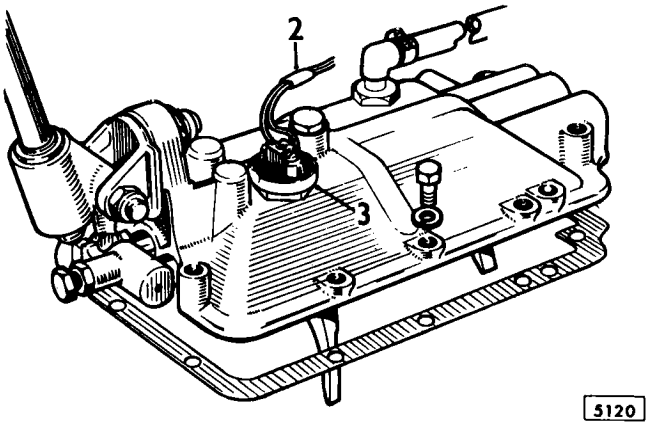
Remove and refit 37.27.01

Removing

1. Remove gearbox tunnel cover – 76.25.07.
2. Detach cables from cable connector.
3. Unscrew reverse light switch.

Refitting

Reverse operations 1 to 4 using new gasket.

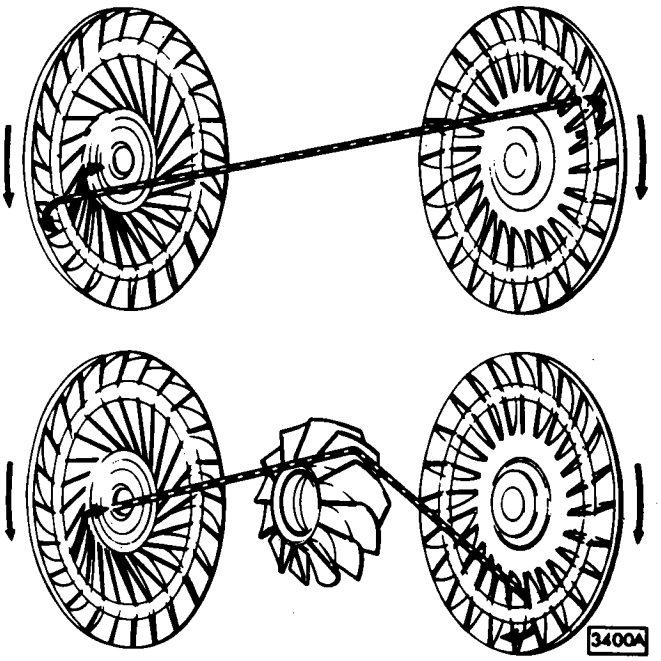


CONTENTS

DESCRIPTION

TORQUE CONVERTER

The torque converter is of the three element, single phase type. The three elements are: Impeller, connected to the engine crankshaft; Turbine, connected to the gearbox input shaft, and Stator, mounted on a one-way clutch on the stator support projecting from the gearbox case. The converter provides torque multiplication of from 1:1 to 2:1 and the speed range during which this multiplication is obtained varies with the accelerator position.



Torque converter – principle of operation

GEAR SET

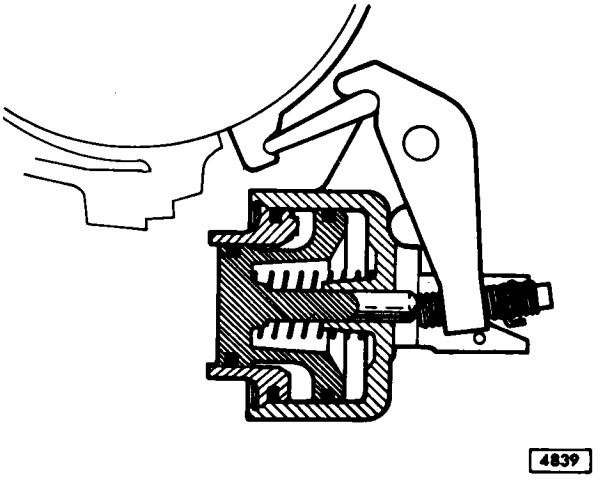
The planetary gear set consists of two sun gears, two sets of pinions, a pinion carrier and a ring gear.

Power enters the gear set via the two sun gears, the forward sun gear driving in forward gears, the reverse sun gear driving in reverse gear. The ring gear, attached to the output shaft, is the driven gear. The planet wheels connect driving and driven gears, two sets of planet wheels being used in forward gears and one set in reverse.

The planet carrier locates the planet wheels relative to sun and ring gears, also serving as a reaction member.

CLUTCHES

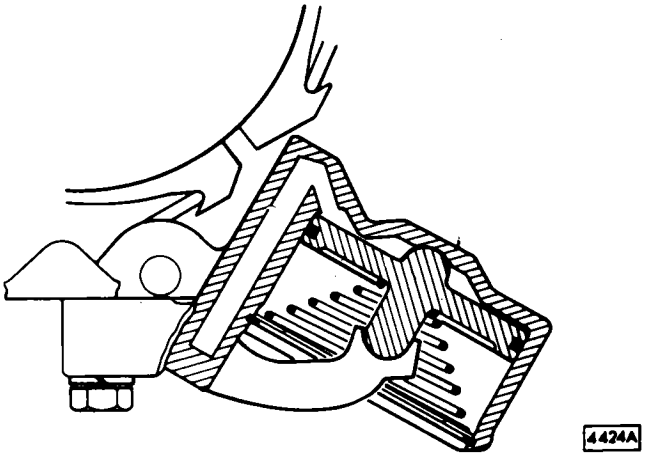
The gearbox input shaft is connected to the torque converter turbine at the front end and is therefore known as the turbine shaft. The rear end of the shaft is connected to the front and rear clutches, (the clutches are of the multi disc type operated by hydraulic pressure). Engagement of the front clutch connects the turbine shaft to the forward sun gear. Engagement of the rear clutch connects the turbine shaft to the reverse sun gear.



Front servo operation

BRAKE BANDS

The brake bands operated by hydraulic servos, are used to hold drive train components stationary in order to obtain low, intermediate and reverse gears. The front band is clamped around the rear clutch outer drum to hold the reverse sun gear stationary. The rear band is clamped around the planet carrier to hold the planet carrier stationary.



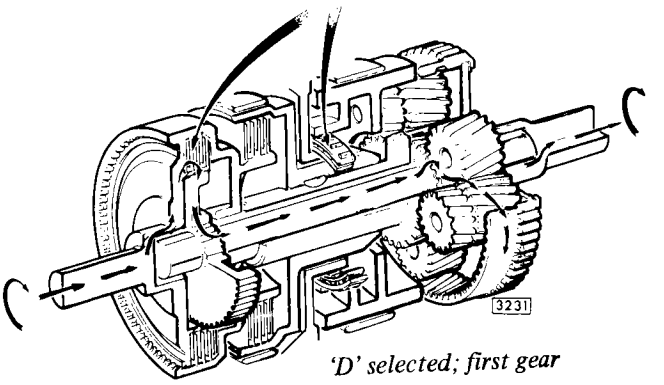
Rear servo operation

ONE WAY CLUTCH

The "one-way" clutch is situated between the planet carrier and the gearbox case. Rotation of the planet carrier against engine direction is prevented so providing the reaction member for low gear (drive). Rotation of the planet carrier in engine direction is allowed (free-wheeling) providing smooth changes from low to intermediate and intermediate to low gears.

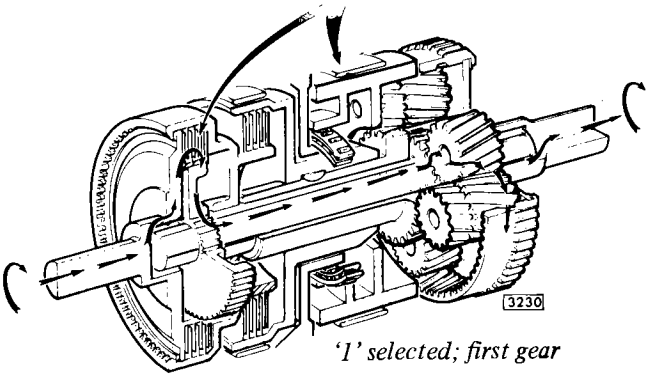
MECHANICAL POWER FLOWS

Neutral and Park
In neutral the front and rear clutches are off, and no power is transmitted from the converter to the gear set. The front and rear bands are also released. In 'P' the Rear Servo circuit is pressurised while the engine is running, so that the rear band is applied.



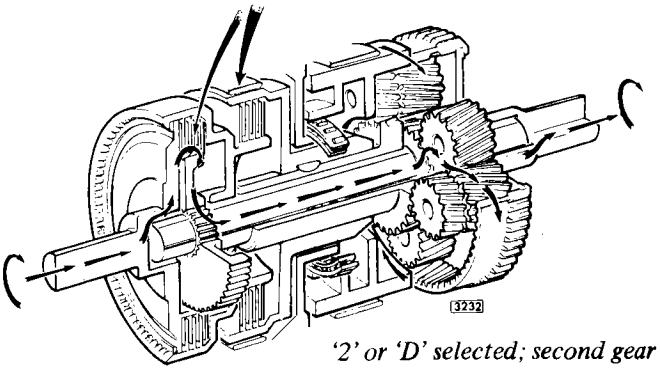
'D' selected; first gear

First Gear ('D' selected)
The front clutch is applied, connecting the converter to the forward sun gear. The one-way clutch is in operation, preventing the planet carrier from rotating anti-clockwise. When the vehicle is coasting the one-way clutch over-runs and the gear set freewheels.



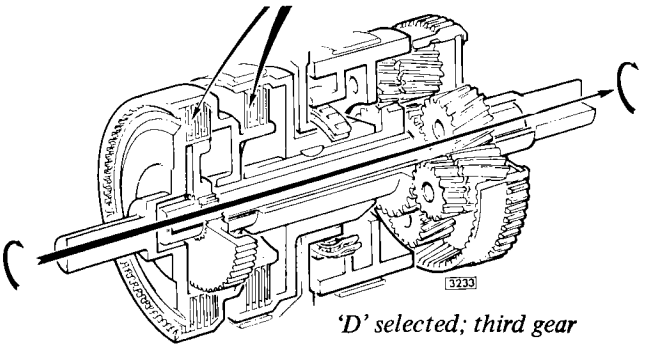
'1' selected; first gear

First Gear ('1' selected)
The front clutch is applied, connecting the converter to the forward sun gear. The rear band is applied, holding the planet carrier stationary. The reverse sun gear rotates freely in the opposite direction to the forward sun gear.



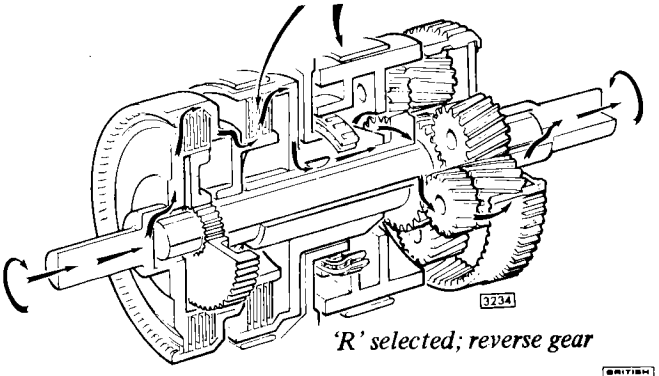
'2' or 'D' selected; second gear

Second Gear ('2' or 'D' selected)
Again the front clutch is applied, connecting the converter to the forward sun gear. The front band is applied, holding the reverse sun gear stationary.



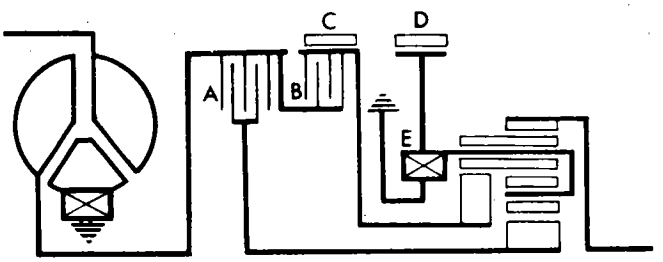
'D' selected; third gear

Third Gear ('D' selected)
Again the front clutch is applied, connecting the converter to the forward sun gear. The rear clutch is applied, connecting the converter also to the reverse sun gear; thus both sun gears are locked together and the gear set rotates as a unit, providing a ratio of 1:1.



'R' selected; reverse gear

Reverse Gear ('R' selected)
The rear clutch is applied, connecting the converter to the reverse sun gear. The rear band is applied, holding the planet carrier stationary.



	A	B	C	D	E
1 (first gear)	●			●	
D (first gear)	●				●
2&D (sec. gr.)	●		●		
D (third gear)	●	●			
R (rev. gear)		●		●	

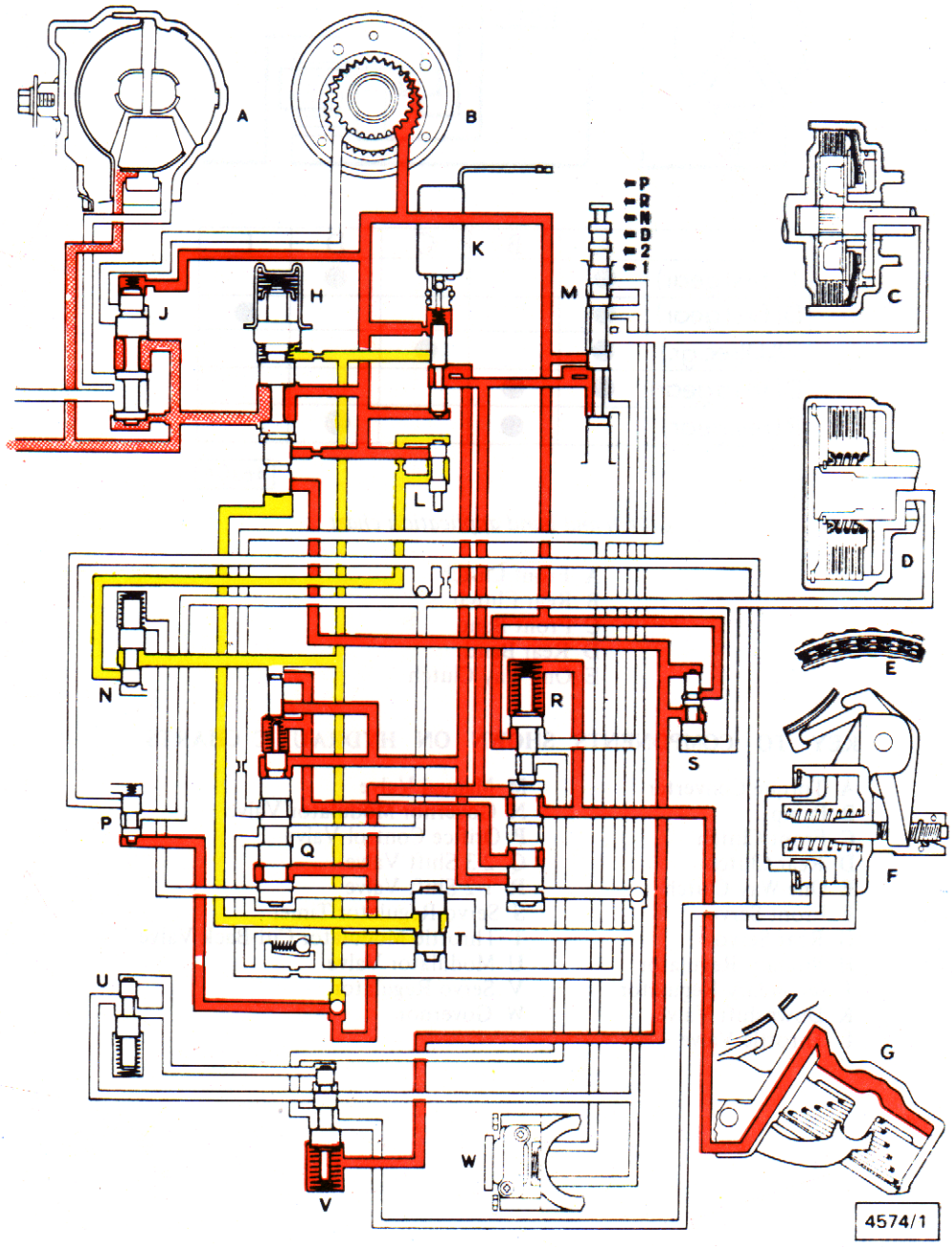
4610A

Clutch and band application chart

A Front Clutch
B Rear Clutch
C Front Band
D Rear Band
E One Way Clutch

KEY TO COMPONENTS SHOWN ON HYDRAULIC CHARTS

A Torque Converter
B Pump
C Front Clutch
D Rear Clutch
E One-Way Clutch
F Front Servo
G Rear Servo
H Primary Regulator
J Secondary Regulator
K Downshift Valve
L Throttle Valve
M Manual Valve
N Governor Modulator Valve
P Orifice Control Valve
Q 2-3 Shift Valve
R 1-2 Shift Valve
S Servo Regulator Timer
T Throttle Modulator Cut-Back Valve
U Modulator Valve
V Servo Regulator
W Governor



HYDRAULIC OPERATION IN 'N' (NEUTRAL)

With the engine running, the pump supplies fluid to the primary regulator which regulates line pressure.

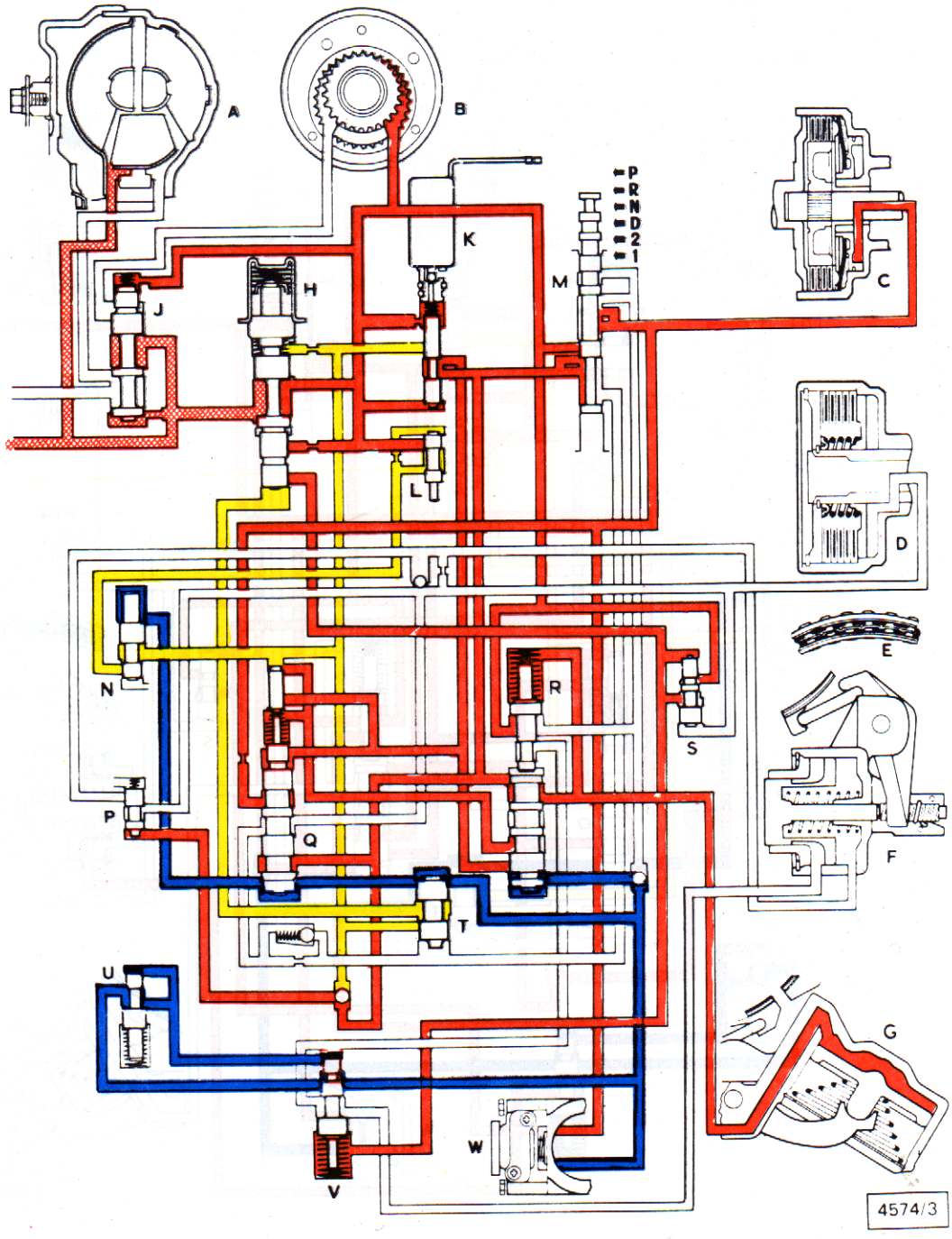
Spill from the primary regulator supplies the torque converter and lubrication requirements. This supply is regulated by the secondary regulator.

The line pressure supplied to the manual valve is blocked by a land on the valve so that neither governor, clutches or servos are energised.

Line pressure at the throttle valve is converted to throttle pressure, dependant on manifold depression, i.e. throttle pedal position.

HYDRAULIC OPERATION IN 'P' (PARK)

Coupled to the manual valve operating lever is a linkage incorporating a pawl; movement of this lever to the 'Park' position engages the pawl with the toothed outer surface of the ring gear, so locking the output shaft to the transmission case. The rear servo is energised in 'P' selection but, as both the front and rear clutches are not energised, drive is impossible and the transmission remains inoperative.



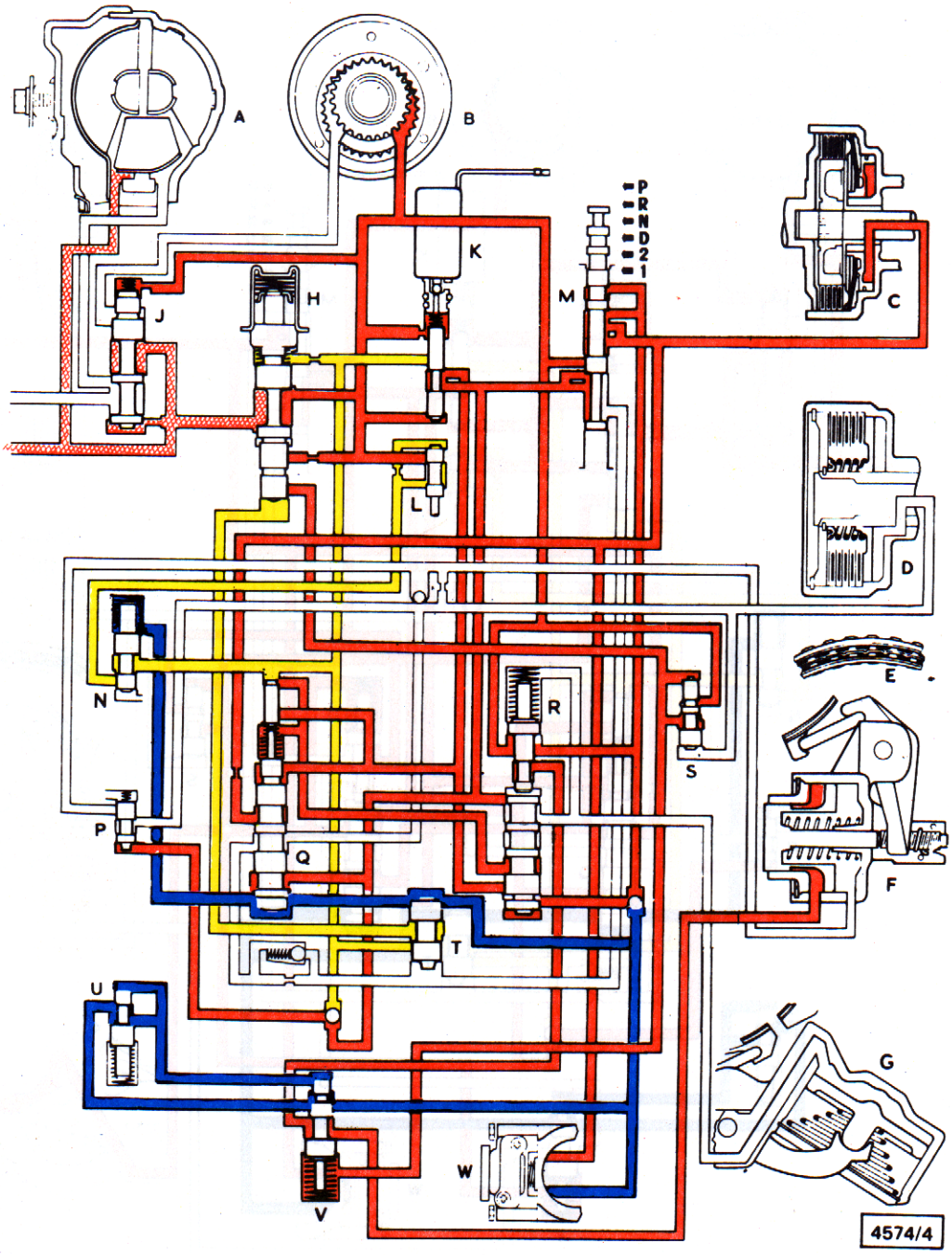
HYDRAULIC OPERATION IN 'D' (FIRST GEAR)

Movement of the manual valve to the 'D' position opens the front clutch and governor to line pressure. No other component is required to engage first gear.

Line pressure is supplied to the top of the secondary regulator to control converter pressure. Throttle pressure is applied to the top and bottom of the primary regulator to modulate line pressure in the interests of shift quality.

HYDRAULIC OPERATION IN '1' (FIRST GEAR)

Application of the front clutch and rear servo are required in '1' (Manual) selection. The rear band is applied to provide engine braking. Line pressure applied to the lands of the 1-2 shift valve opposes governor pressure. There is, therefore, no upshift and the transmission remains in '1' (Low) ratio.



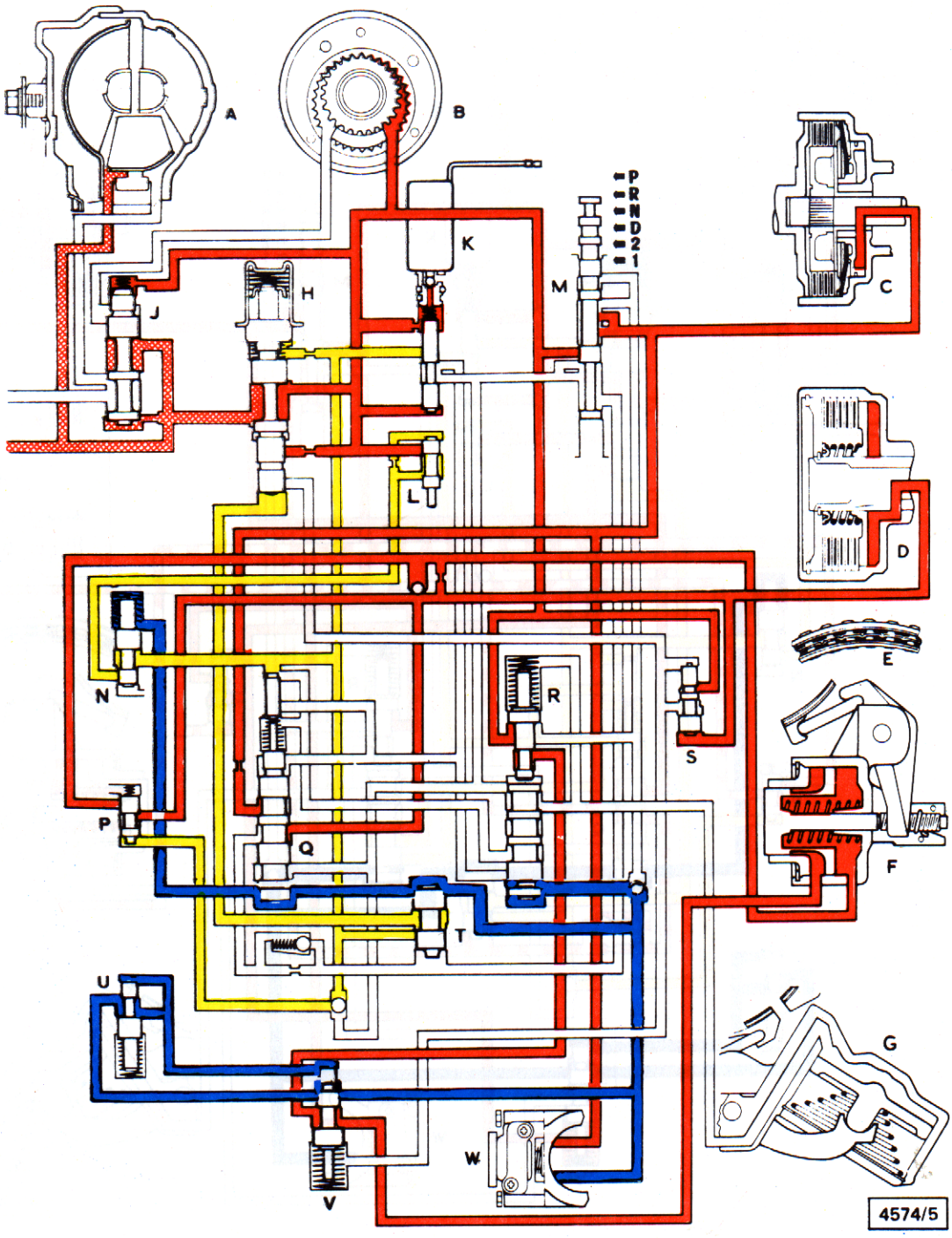
HYDRAULIC OPERATION IN 'D' (SECOND GEAR)

Increasing road speed results in a corresponding increase in governor pressure which will move the 1-2 shift valve to the 2nd gear position. The exact speed at which this change takes place is dependent upon the throttle pressure opposing governor pressure at the 1-2 shift valve.

With the 1-2 shift valve in the 2nd gear position, the line to the front servo apply side, through the servo regulator, is open to line pressure and the front band is applied.

HYDRAULIC OPERATION IN '2' (SECOND GEAR)

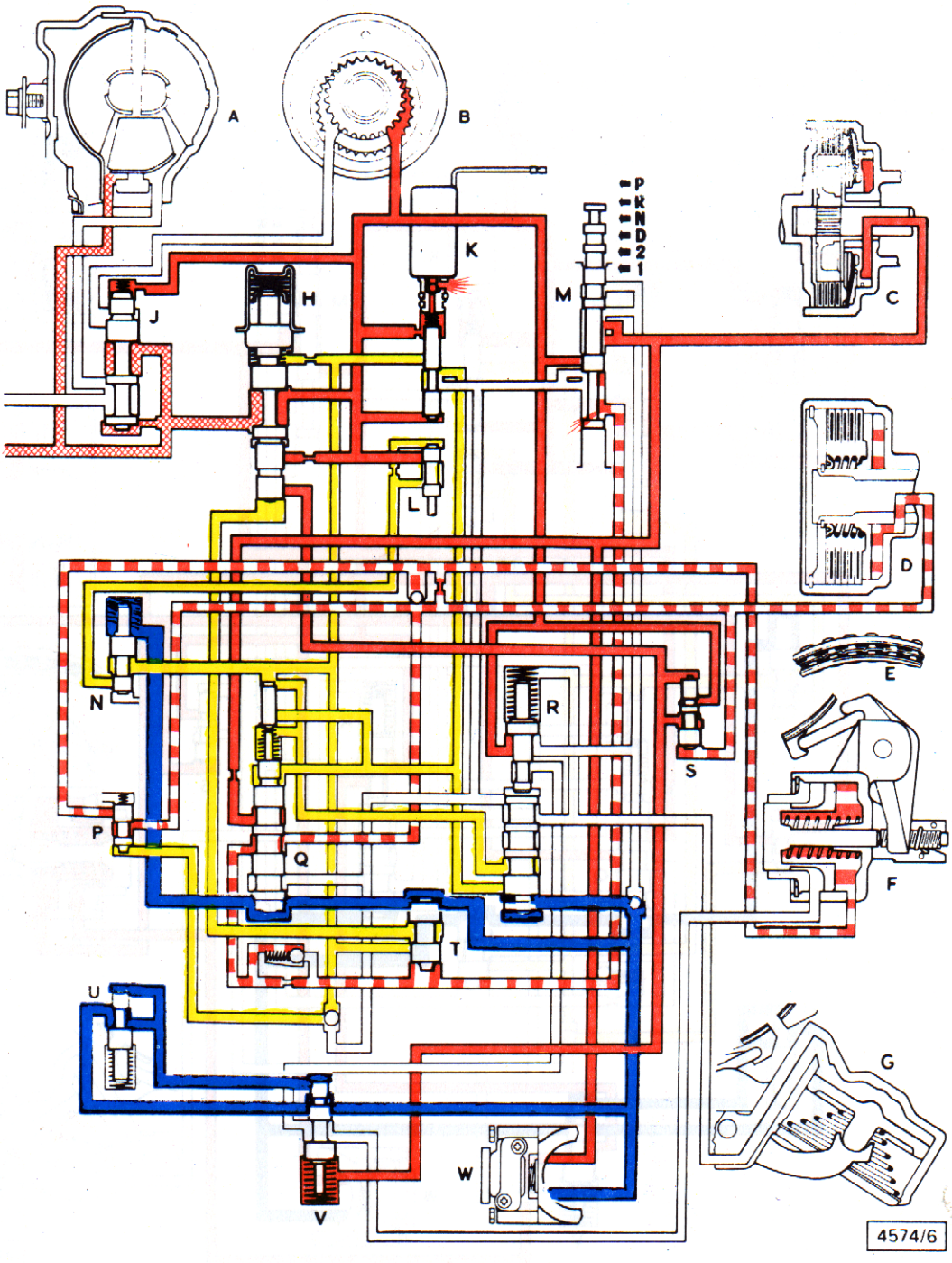
Once '2' (Manual) is engaged, there are no upshifts or downshifts. If either are required, a change to '1' (Manual) or 'D' must be made. Movement of the manual valve to the '2' (Manual) position allows line pressure to flow to a ball valve where it closes the governor line and introduces line pressure to the base of the 1-2 shift valve to retain it in the '2' (Intermediate) ratio.



HYDRAULIC OPERATION IN 'D' (THIRD GEAR)

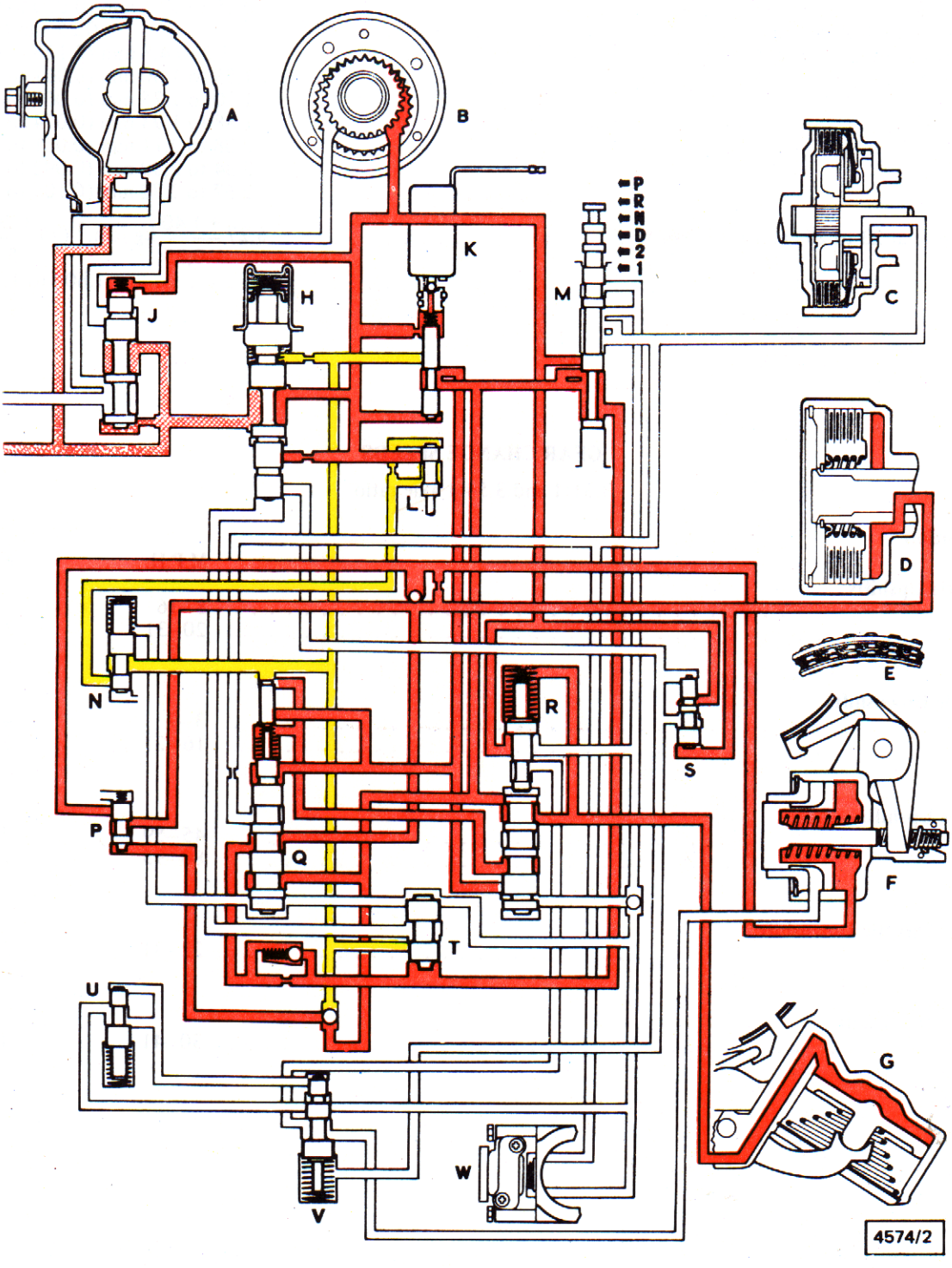
In order to change to third gear, the front band must be released and the rear clutch applied. With the movement of the 2-3 shift valve to the third gear position the line to the front servo release and the rear clutch are open to line pressure.

The lines now supplied with line pressure are the front clutch, rear clutch, front servo apply and front servo release. As the front servo release has a greater area than the apply side, the front band is released, therefore the front and rear clutches remain applied.



HYDRAULIC OPERATION IN 'D' (THIRD GEAR TO SECOND GEAR) KICKDOWN

Depression of the accelerator to the kickdown position actuates the kickdown switch to energise the kickdown solenoid at the valve block. With the solenoid energised. the plunger is lifted, allowing line pressure to escape past the ball valve. This sudden pressure drop allows the line pressure at the base of the downshift valve to move the valve upwards so introducing extra modulated throttle pressure to the 2-3 shift valve. This extra pressure opposing governor pressure at the 2-3 shift valve assists in overcoming governor pressure so returning the shift valve to the 2nd gear position.



HYDRAULIC OPERATION IN 'R

Movement of the manual valve to the reverse position closes the lines to the front clutch and governor. The rear clutch and rear servo are energised so reversing the direction of rotation of the output shaft. As the front servo release and rear clutch are interconnected, the front servo release will also be energised. This has no effect on the operation of reverse gear.

GENERAL DATA

Gear Train End Float	0,20 to 1,12 mm (0.008 to 0.044 in.)
Pinion End Float	0,25 to 0,51 mm (0.010 to 0.020 in.)
Minimum Rear Clutch Plate Coning	0,25 mm (0.010 in.)
One Way Clutch Spring to Lever Clearance	3,2 to 4,8 mm (0.125 to 0.188 in.)
Thrust Washer Sizes	1,55 to 1,60 mm (0.061 to 0.063 in.)
	1,70 to 1,75 mm (0.067 to 0.069 in.)
	1,88 to 1,93 mm (0.074 to 0.076 in.)
	2,08 to 2,11 mm (0.081 to 0.083 in.)
	2,34 to 2,39 mm (0.092 to 0.094 in.)
	2,67 to 2,72 mm (0.105 to 0.107 in.)
Control Pressure at 23 to 25 cm (9 to 10 in.) Hg	$5{,}27\ ^{+1{,}40}_{-0{,}35}$ kg./cm.^{2} ($75\ ^{+20}_{-5}$ lb./in.^{2})
Stall speed	1,600 to 1,700 r.p.m.

GEAR CHANGE SPEEDS

3.31:1 and 3.54:1 axle ratio

Throttle position	M.P.H.	K.P.H.
Light Throttle Upshifts		
1 – 2	8–16	12–25
2 – 3	20–31	32–49
Shut Throttle Downshifts		
2 – 1	3–7	4–11
3 – 2	16–21	25–33
Full Throttle Upshifts		
1 – 2	45–59	72–95
2 – 3	80–95	128–152
Manual Shut Throttle Downshift		
3 – 1	22–31	35–49
Part Throttle Downshift		
Obtainable up to	30–41	48–66**

ROAD TEST AND FAULT DIAGNOSIS 44.00.00

The following points should be checked before proceeding with the road test.

1. Fluid level.
2. Engine idle speed.
3. Manual lever adjustment.
4. Manifold vacuum of 23 to 25 cm. (9 to 10 in.) Hg.

ROAD TEST

The road speed figures for the tests listed below are to be found under "GENERAL DATA – GEAR CHANGE SPEEDS".

Road testing should follow the complete sequence detailed below. Transmission should be at normal working temperature, i.e. after being driven on road or rollers.

1. With brakes applied and engine idling, move selector from:–

   'N' to 'R'
   'N' to 'D'
   'N' to '2'
   'N' to '1'

   Engagement should be felt with each selection.
2. Check stall speed.
3. Select 'D', accelerate with minimum throttle opening and check speed of first gear to second gear shift.
4. Continue with minimum throttle and check speed of second gear to third gear shift.
5. Select 'D', accelerate with maximum throttle opening (kickdown) and check speed of first gear to second gear shift.
6. Continue with maximum throttle and check speed of second gear to third gear shift.
7. Check for kickdown shift third gear to second gear.
8. Check for kickdown shift second gear to first gear.
9. Check for kickdown shift third gear to first gear.
10. Check for "roll-out" downshift with minimum throttle, second gear to first gear.
11. Check for part throttle downshift, third gear to second gear

Should a fault be apparent during road test, first identify the problem from the list printed in the Fault Diagnosis Chart. The reference numbers shown opposite each fault may be translated by reference to the page headed "Transmission Fault Key".

FAULT DIAGNOSIS

Problem	Checks in Vehicle	Checks on Bench
Engagements		
Harsh	A1, A3, A4, A5, M2, V1, V2, V3, V4	T4 (in reverse only)
Soft or delayed	M1, A2, A3, A4, A5, V1, V2, V3, V9	T14
None in all Positions	V16, M1, A2, V2, C3	T9, T10, C2
No forward		
in 1 position	V16, M1, A2, V1, V2	T1, T4, T7, T14
in 2 position	V16, M1, A2, T16, T13, V1, V2, V10	T1, T4, T14
in D position	V16, M1, A2, V1, V2, A5	T1, T4, T7, T14
in all positions	V16, M1, A2, V1, V2	C2, T9, T10, T14
No reverse	V16, M1, A2, A5, T15, T6, V1, V5, V6	T2, T3, T14
Jumps in forward	A2, A3, A4, A5	T4, T7
Jumps in reverse	A2, A3, A4, A5	T2, T3
No neutral	A2, V1, V16	T2
Upshifts		
No 1-2	M1, A2, A4, G1, T5, T13, T16, V1, V2, V4, V5	T14
No 2-3	M1, A2, G1, T13, V1, V2, V4, V5, V6	T3, T14
Shift points too high	A1, A2, M2, G1, V1, V2, V4, V5, V8, V12, V14	T14
Shift points too low	A1, M3, G1, M4, V1, V5, V6, V12, V14	T14
Upshift Quality		
1-2 slips or runs-up	M1, A1, A2, M3, G1, T13, V1, V2, V4, V9, V10, V5	T10, T5, T14
2-3 slips or runs-up	M1, A1, A2, A4, M3, G1, T13, V1, V2, V4, V5, V6, V9, V10, V12	T10, T5, T14
1-2 harsh	A1, A2, A4, A5, M2, V1, V2, V3, V4, V5, V9	T1, T7, T8
2-3 harsh	A1, A2, A4, M2, V1, V2, V4, V9	T4
1-2 ties-up or grabs	A4, A5, V1, V5, T16	T4, T7, T8
2-3 ties-up or grabs	A2, A4, T13, V17, T15	

FAULT DIAGNOSIS—*continued*

Problem	Checks in Vehicle	Checks on Bench
Downshifts		
No 2-1	A1, A2, A6, M3, M4, G1, V1, V5, V14	T7
No 3-2	A1, A2, A6, M4, G1, V1, V6, V14, T13	T4
Shift points too high	A1, A2, M2, G1, V1, V4, V5, V6, V12	T14
Shift points too low	A1, A2, M3, G1, V1, V4, V5, V6, V12	T14
Downshift Quality		
2-1 slides	T5, A1, A2, A4, T13, G1, V1, V2, V4, V9, V11	T7
3-2 slides	A1, A2, A4, T13, G1, V1, V2, V4, V9, V11, T5	
2-1 harsh	A1, A2, A4, A5, M2, V1, V2, V3, V4, V9	T1, T7, T14
3-2 harsh	A1, A2, A4, G1, V1, V2, V3, V4, V9	T3, T4
Reverse		
Slips or chatters	M1, A1, A2, A5, T6, V1, V2, V4, V10	T14, T2, T3
Line Pressure		
Low idle	M1, A1, A2, A3, T13, V1, V2, G1	T10, T14
High idle	A1, M2, V1, V2, V3, V4	
Low stall	M1, A1, M3, M4, T13, G1, V1, V2, V4, V14	T10
High stall	A1, V1, V2, V3	
Stall speed		
Too low (200 R.P.M. or more below)		C1
Too high (200 R.P.M. or more above)	M1, A1, A2, A4, T13, V1, V4	T14, T1, T3, T6, T7, T9, T10
Others		
Transmission overheats	M1, A4, A5, V2, V3, M5, T13, V1	T1, T2, T3, T4, T5, T6, T7, T10, T14
Drag in neutral	A2, A3	T2, T4
Poor Acceleration	M1, V2, V3	C1
Noisy in neutral	V13	T2, T4, V15
Noisy in park	V13, V15	T10
Noisy in all gears	V13, C3, V15	T10, C1, C2
Noisy during coast (30-20 M.P.H.)		T12
Park brake does not hold	A2, T11	
Ties up in 1 or low	A4, T15, T13, V1	T4, T14
Ties up in 2 or intermediate ratio D or 2 selected	A5, T16, A2, V1	T4, T14, T8
Ties up in direct drive	A5, T16, A2, V1, A4, T15, T12	T17, T14, T8
Poor acceleration	M6, A1, A2, A4, M1, T15, T16, V1, V2	C1, T10, T14
Oil out breather	T18, M1, G1, T13, V1	T14
Oil out fill tube	T18, M1, G1, T13, M7	T14

TRANSMISSION FAULT KEY

Adjustments
A1 Vacuum control adjustment.
A2 Manual control adjustment.
A3 Engine idle speed.
A4 Front band adjustment.
A5 Rear band adjustment.
A6 Kickdown switch adjustment.

Miscellaneous
M1 Fluid level.
M2 Vacuum leak.
M3 Vacuum line restricted.
M4 Broken kickdown wire or blown fuse.
M5 Oil cooler, lines and connections.
M6 Engine tune-up.
M7 Breather plugged.

Converter
C1 Converter blading or one-way clutch failed.
C2 Pump drive tangs on converter hub broken.
C3 Broken converter drive plate.

Governor
G1 Governor, sticking, leaking or incorrectly assembled.

Transmission
T1 Front clutch slipping due to worn or faulty parts.
T2 Front clutch seized or plates distorted.
T3 Rear clutch slipping due to worn plates or faulty parts.
T4 Rear clutch seized or plates distorted.
T5 Front band slipping due to a faulty servo, broken or worn band.
T6 Rear band slipping due to a faulty servo, broken or worn band.
T7 One-way clutch slipping or incorrectly installed.
T8 One-way clutch seized.
T9 Broken input shaft.
T10 Front pump worn or defective.
T11 Parking linkage.
T12 Planetary assembly.
T13 Oil tubes missing or broken.
T14 Sealing rings missing or broken and other oil leaks.
T15 Front bank locked in the applied condition.
T16 Rear band locked in the applied condition.
T17 Rear clutch piston ball check leaking.
T18 Dipstick length.

Valve Body
V1 Valve body improperly assembled or screws missing.
V2 Primary valve sticking.
V3 Secondary valve sticking.
V4 Throttle valve sticking.
V5 1-2 shift valve sticking.
V6 2-3 shift valve sticking.
V7 Governor modulator valve sticking.
V8 Throttle modulator valve sticking.
V9 Cutback valve sticking.
V10 Servo regulator valve sticking.
V11 Orifice control valve sticking.
V12 2-3 shift valve plug sticking.
V13 Regulator valve buzz.
V14 Defective solenoid.
V15 Dirty oil Screen.
V16 Manual valve not connected to shift control.
V17 Ball check valve stuck.

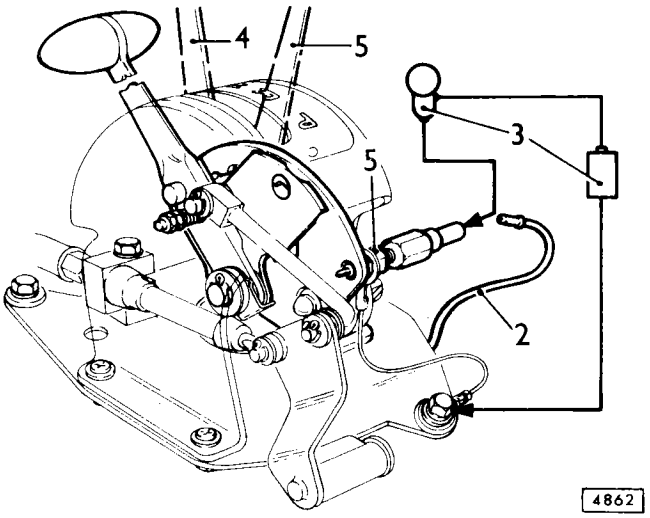
STARTER INHIBITOR SWITCH

Check and adjust **44.15.18**

1. Remove console – 76.25.01.
2. Detach cable from switch.
3. Connect a test lamp and battery in series with switch.

NOTE: Switch is in earthed circuit.

4. Place selector lever in 'N' position.
5. Release switch locknuts and adjust switch until lamp lights. Tighten locknuts, check that lamp remains on with lever in 'P' position and is switched off in the drive positions.
6. Remove battery and test lamp, reconnect feed cable to switch.
7. Refit selector cover, knob and console.



4862

STARTER INHIBITOR SWITCH

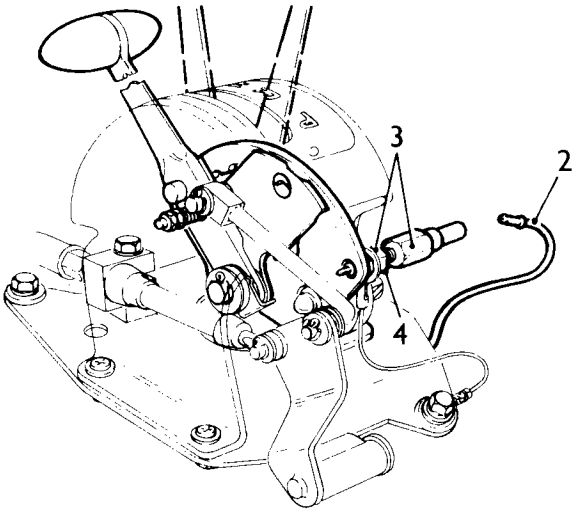
Remove and refit **44.15.19**

Removing

1. Remove console 76.25.01.
2. Detach cable from switch.
3. Release locknut and remove switch.

Refitting

4. Fit locknut to new switch.
5. Fit switch to bracket and adjust 44.15.18.
6. Refit console.



5046

CONVERTOR HOUSING

Remove and refit **44.17.01**

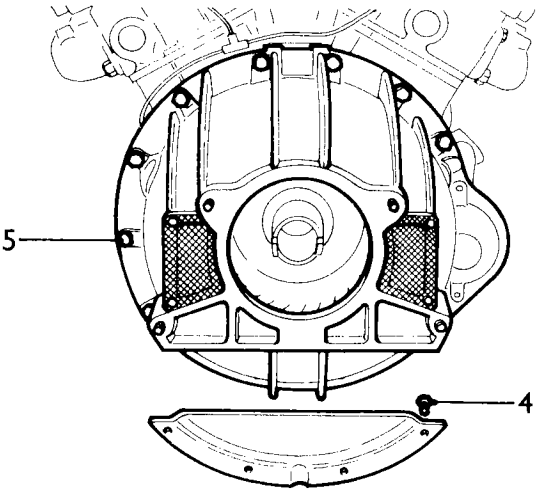
Removing

1. Remove engine 12.37.01.
2. Remove transmission unit – 44.20.01.
3. Remove starter motor.
4. Remove four setscrews and washers and detach front cover from housing.
5. Withdraw eight bolts and washers and remove housing.

NOTE: Two bolts are shorter than remaining six, check location for reference when refitting.

Refitting

Reverse operations 1 to 5.



5055

CONVERTOR

Remove and refit **44.17.07**

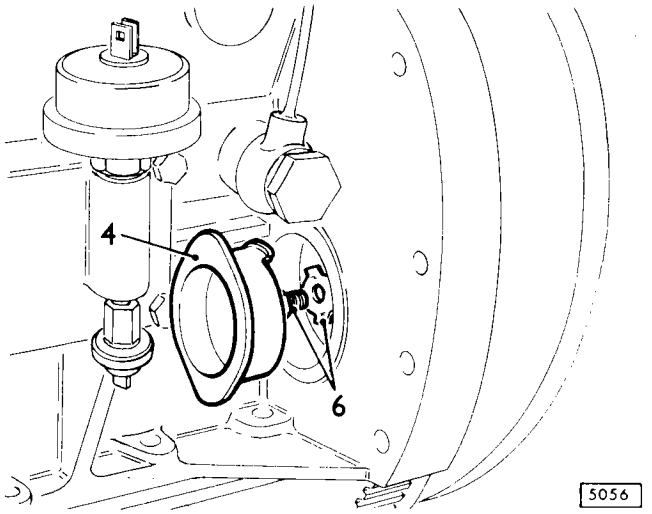
Removing

1. Remove engine 12.37.01.
2. Remove transmission unit 44.20.01.
3. Remove convertor housing 44.17.01.
4. Remove rubber plug from left hand rear of cylinder block.
5. Rotate engine until one of the four setscrews securing the convertor to the flywheel is opposite the aperture.
6. Knock back the tab washer and remove the setscrew.
7. Rotate engine until the remaining three setscrews are in turn accessible. Remove setscrews.
8. Remove convertor.

Refitting

Reverse operations 1 to 8.

CAUTION: The convertor is a sealed unit and if faulty must be renewed.



TRANSMISSION UNIT

Remove and refit **44.20.01**

Removing

1. Remove engine 12.37.01.
2. Disconnect oil filler tube at oil pan union and drain oil.
3. Remove four nuts and lock washers securing unit to convertor housing.
4. Withdraw unit.

Refitting

Reverse operations 1 to 3. Check that convertor and unit shaft splines are in alignment, force must not be used to engage units.

TRANSMISSION ASSEMBLY

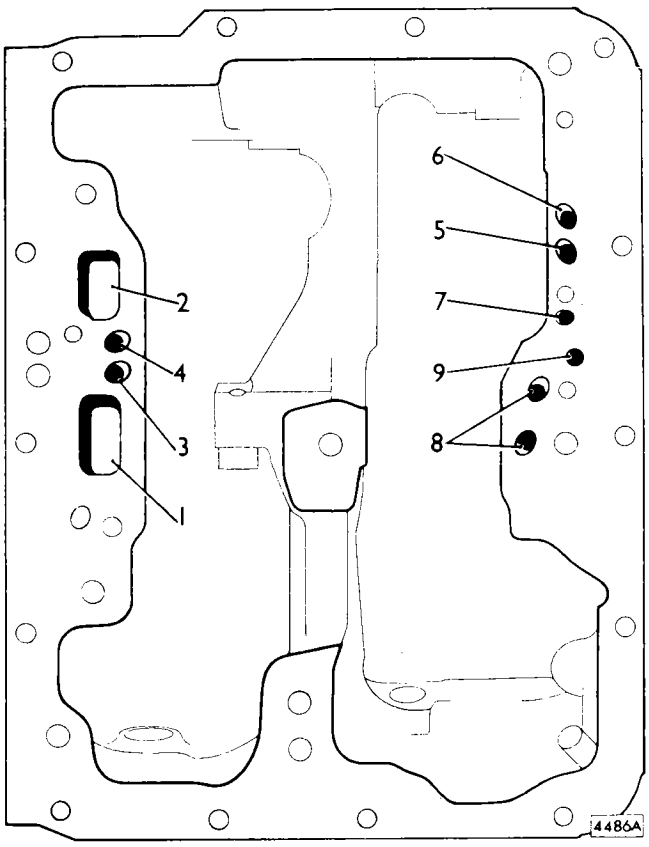
Overhaul **44.20.06**

Service Tools
CBW.34, CBW.548, CBW.548-2, CBW.548-2A, CBW.33, CWG.35, CBW.547A-50, CBW.37A, CWG.37, 7066, CWG.41, CWG.42, CBW.548, CBW.548-1.

General

Air Checks
In order to ascertain the condition of piston and shaft seals the front (7) and rear (5) clutches may be tested with air pressure before dismantling. The same test may be carried out after assembly.

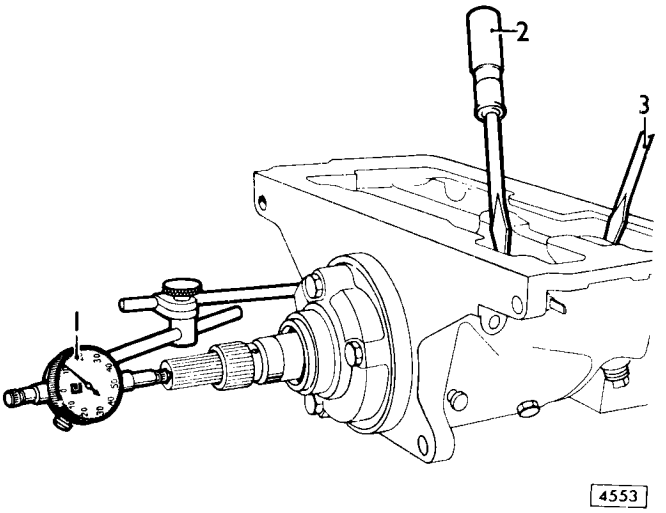
1. Pump inlet.
2. Pump outlet.
3. Convertor feed.
4. Convertor outlet.
5. Rear clutch feed.
6. Governor outlet.
7. Front clutch and governor feed.
8. Rear servo feed.
9. Lubrication.



Checking the transmission end-float before dismantling is essential to ascertain the condition of the worn parts.

1. Assemble a dial gauge (Tool No. CBW.33) to the gearbox case with the stylus touching the end of the turbine shaft.
2. Insert a lever between the front clutch and the front wall of the gear case. Ease the gear train to the rear and zero the gauge.
3. Insert the lever between the ring gear, and rear clutch housing and ease the gear train forward noting the final gauge reading.
4. End-float limits are:-
   ,20 mm (.008 in.) to 1,01 mm (.040 in.)
5. End-float adjustment is by a selective washer, indicated below, when rebuilding.

   CAUTION: Failure to obtain specified end-float by replacing thrust washer (6) will necessitate replacing all washers (6-11).



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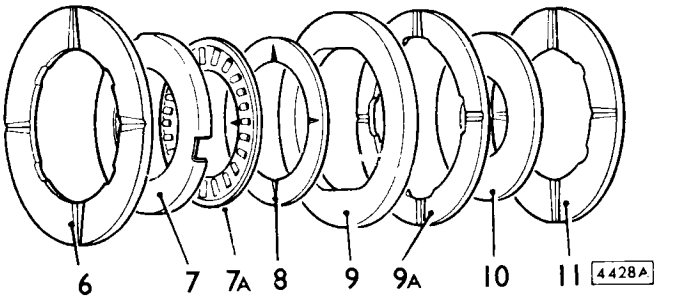
6. Bronze faced – thrust washer – selective – situated between output shaft and planet carrier.
7. Steel backing washer.
7A. Needle thrust washer, situated between planet carrier, backing washer (7) and forward sun gear.
8. Bronze faced thrust washer, situated between forward and reverse sun gears.
9. Steel support washer.
9A. Bronze faced thrust washer. Internal flats on steel washer. Located on rear clutch centre pillar. Situated between rear and front clutches.
10. Non-metallic thrust washer. Situated between front clutch hub and turbine shaft flange.
11. Bronze faced thrust washer. Situated between turbine shaft flange and inner face of gear case.



4428A

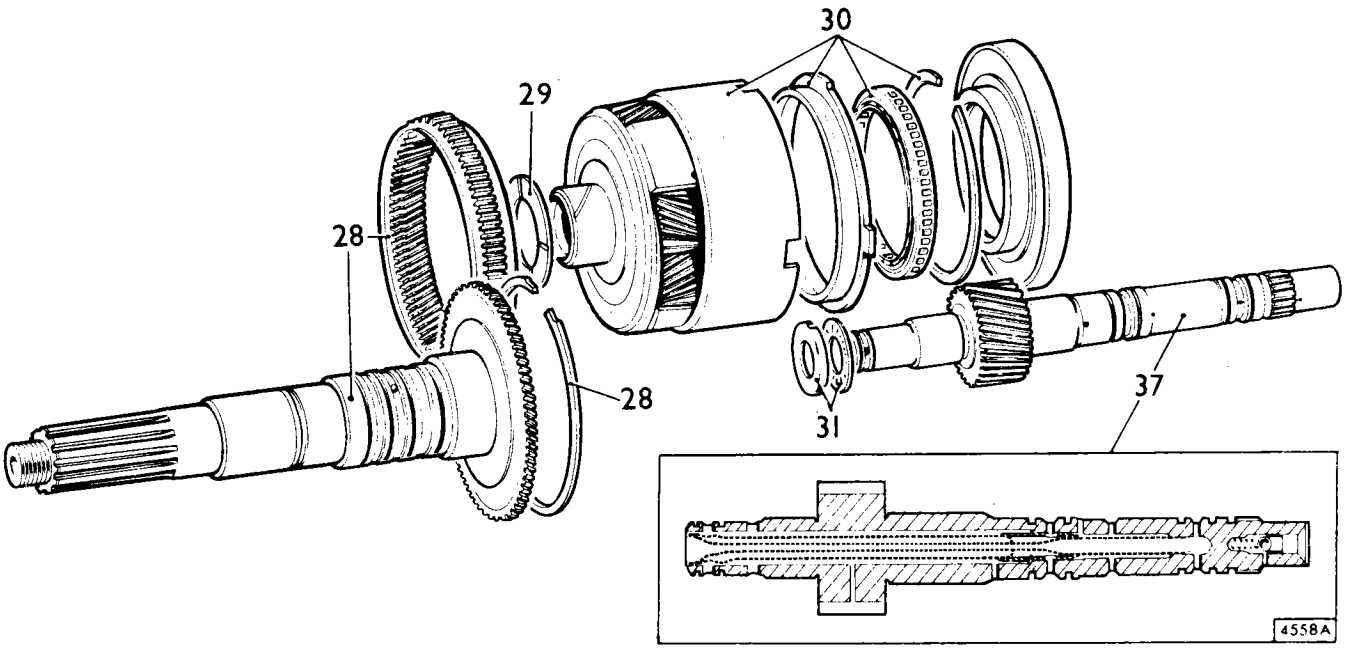
AVAILABLE SELECTIVE WASHER SIZES

MM.	IN.
1,55 – 1,60	.061 – .063
1,70 – 1,75	.067 – .069
1,88 – 1,93	.074 – .076
2,06 – 2,11	.081 – .083
2,34 – 2,39	.092 – .094
2,67 – 2,72	.105 – .107

Dismantling

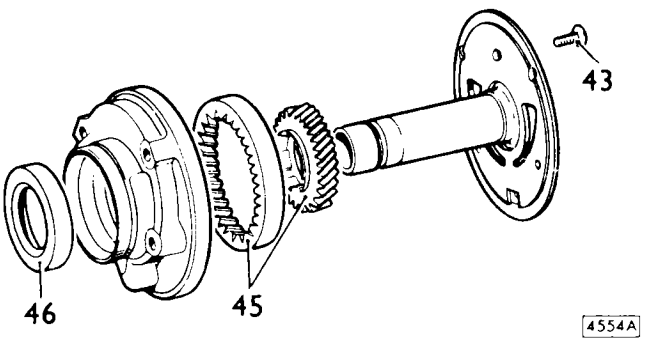
12. Thoroughly clean transmission exterior.
13. Invert transmission and place in suitable stand (Service tool No. CWG.35).
14. Remove sump and discard gasket.
15. Remove magnet from rear servo mounting bolt.
16. Unscrew vacuum control unit from gear case and remove push-rod, discard 'O' ring.
17. Disconnect solenoid cable from connector, compress lugs and push out connector, discard 'O' ring.
18. Slacken off front and rear band adjustments.
19. Loosen front servo mounting bolts to permit the valve body to be removed from the servo tubes.
20. Remove the six valve body retaining bolts and withdraw the valve body.
21. Remove front servo mounting bolts, lift out front servo and strut.
22. Remove rear servo mounting bolts, lift out rear servo and struts.

23. Remove coupling, remove cover, discard gasket and oil seal.
24. Remove speedometer drive gear.
25. Remove securing bolts and tap extension housing with a soft hammer to withdraw complete with bearing.
26. Remove governor retaining circlip, slide governor off output shaft and remove drive ball.
27. Withdraw rear adaptor and discard gasket.
28. Hold rear clutch drum steady and withdraw output shaft and ring gear assembly.
29. Remove selective thrust washer.
30. Holding forward sun gear shaft forward, withdraw planet carrier with sprag clutch, taking care to clear sealing rings.
31. Remove needle thrust bearing and backing washer.
32. Withdraw front pump mounting bolts and remove pump. Tap lightly with a soft hammer to free if necessary.
33. Note position of rear band for reassembly, i.e. depression in boss to adjusting screw. Compress band, pull to rear and withdraw it from case.
34. Remove both centre support bolts. Holding forward sun gear shaft and pushing turbine shaft to the rear, remove front clutch, rear clutch and centre support as a unit. Do not allow units to separate at this stage.
35. Remove centre support from clutch units.
36. Remove front band, noting position fitted.
37. Check fluid passages in forward sun gear shaft for obstructions or leakage.



The clutch units as removed from the gear case are assembled together with the forward sun gear shaft. To facilitate removal and replacement of the clutches without damage to the sealing rings, a suitable stand is required, e.g. the planet carrier may be used for this purpose. If the forward sun gear shaft is to be held in a vice, **soft jaws must be used.**

38. Insert rear end of forward sun gear shaft in stand.
39. Holding input shaft, carefully lift front clutch assembly clear of forward sun gear shaft.
40. Remove both steel and bronze thrust washers from rear clutch pedestal.
41. Lift rear clutch off forward sun gear shaft.
42. Remove bronze thrust washer.
43. Remove locking screw, separate pump halves.
44. Mark mating faces with die-marker.
45. Remove gears.
46. Remove oil seal and discard.



VALVE BLOCK

Overhaul

CAUTION: The working area for the following operations should be cleaned thoroughly. Use only lint free cloth.
If valves or assemblies are to be stored after cleaning and servicing they should be liberally lubricated.
Dismantled valve blocks should be stored in transmission fluid if possible.

Dismantling

47. Remove three pan headed screws and three ¼ UNC x 2.25 in (57 mm) bolts and detach filter screen.
48. Remove five ¼ UNC x 2.25 in. (57 mm) and one ¼ UNC x 2.125 in. (54 mm) bolts.
49. Invert assembly and remove upper valve body and separator plate.
50. Remove 2-3 shift ball-valve and spring.
51. Invert valve body and retrieve three ball valves.
52. Remove retaining pin and extract plug, secondary regulator valve and spring.
53. Remove spring retainer, seat and spring. Extract plug sleeve, primary regulator valve and spring.
54. Remove retaining pin, and extract plug, governor modulator valve and spring.
55. Remove retaining pin, extract plug, spring and servo regulator.
56. Remove retaining pin, extract plug and spring and 1-2 shift valve.
57. Remove retaining pin, extract plug, 2-3 shift valve and spring.
58. Remove four No.10 UNC x .375 in. (9,5 mm) cheese headed screws and detach lower valve body end plate.
59. Extract modulator valve and spring.
60. Extract throttle modulator cut back valve.
61. Extract 1-2 shift valve.
62. Extract 2-3 shift valve and spring.
63. Remove solenoid from upper valve body by rotating **180°.** Extract spring and downshift valve.
64. Extract manual valve.
65. Remove three No.10 UNF x .375 in. (9,5 mm) cheese headed screws and upper valve body end plate.
66. Extract orifice control valve and spring.
67. Extract servo regulator timer.
68. Extract throttle valve.

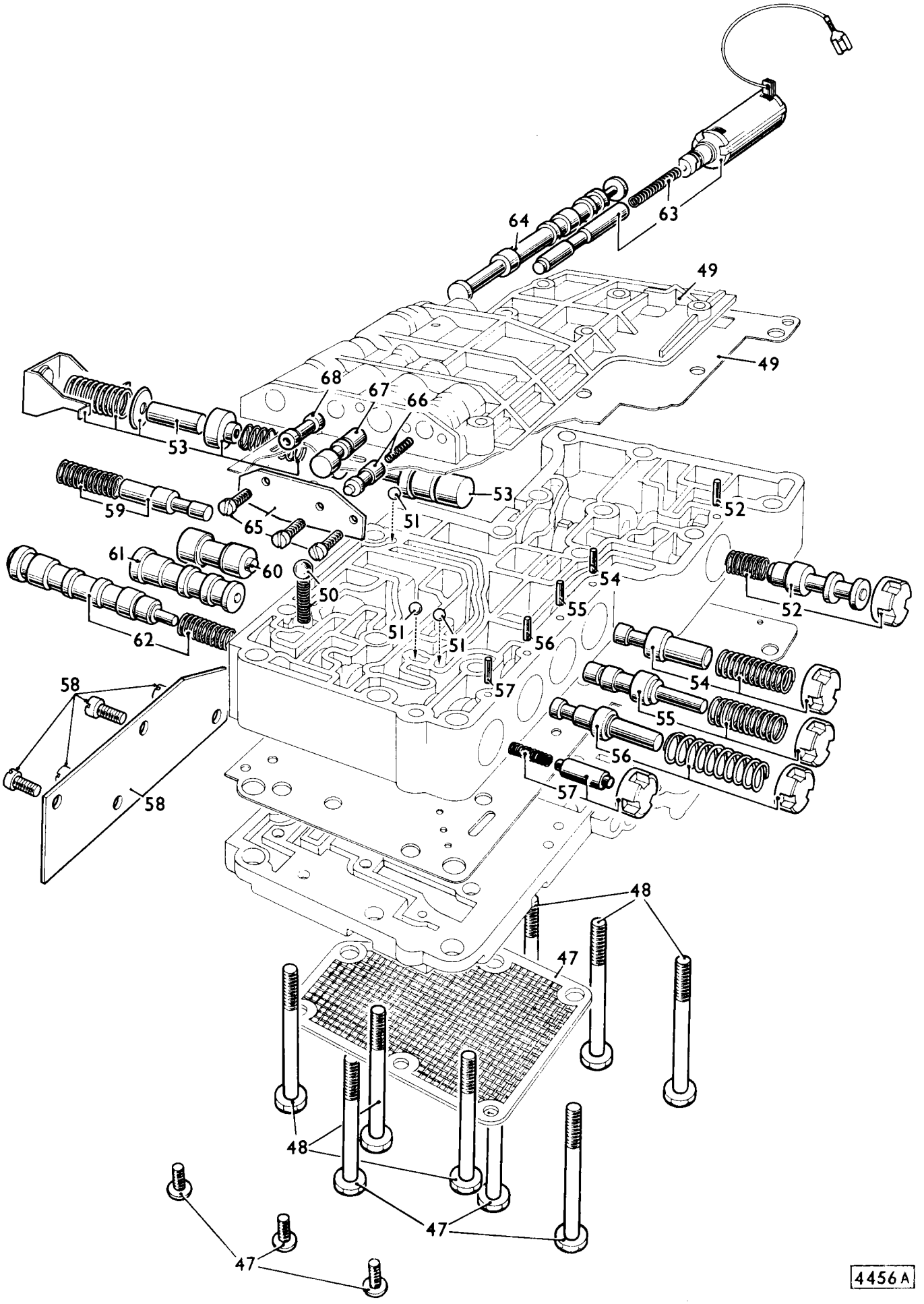
Inspection

Clean all parts thoroughly in a solvent. Do not use paraffin. Always lubricate valves with transmission fluid after cleaning. Scores and burrs may be removed from valves with a fine abrasive; do not round-off sharp edges. Check all valves for free movement in their bores.

Reassembling

Reverse operations 47 to 68.

NOTE: Tightening torque figures must be adhered to when assembling valve block. Commence tightening at centre and work outwards.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4456A

REAR CLUTCH

Overhaul

Dismantling

69. Place rear clutch assembly over central spindle of compression. Tool No. CWG.37, reverse sun gear down.
70. Fit compressor sleeve over spindle, locating on spring retainer.

NOTE: Alternative method may be used with only compressor sleeve CBW.37A under hand or power press.

71. Compress spring and remove spring ring.
72. Gradually release pressure and remove tool.
73. Remove retainer and spring.
74. Remove spring ring retaining pressure plate.
75. Remove pressure plate and clutch plates.
76. Remove piston by applying air pressure to the supply hole situated in the centre bore.
77. Discard piston ring and 'O' ring.

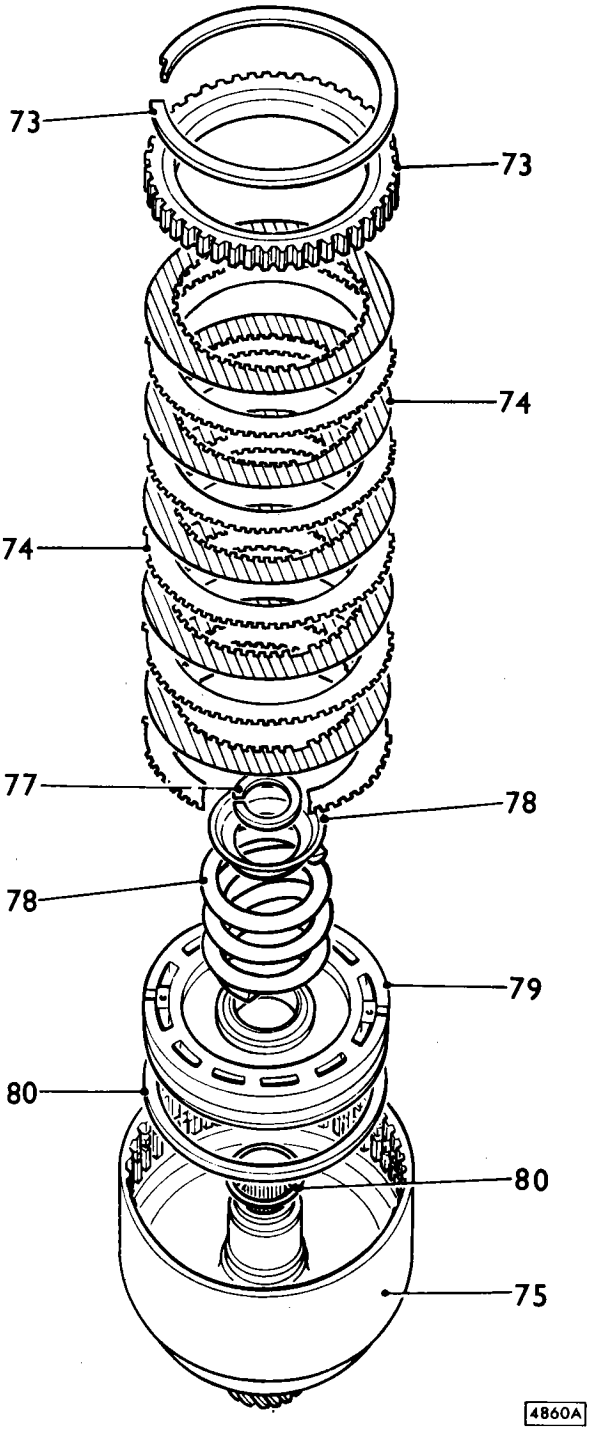
Inspection

78. Check clutch drum, clutch hub thrust and bearing surfaces for scores and burrs. Replace if damaged.
79. Check fluid passages and clean if necessary.
80. Inspect piston check valve for free operation.
81. Check clutch release spring for distortion. Discard if damaged.
82. Check clutch inner plates for flatness and facing damage.
83. Check clutch outer plates for coning of ,25 mm (.010 in.) on surface plate. Discard if not at least ,25 mm (.010 in.).
84. Check clutch outer plate surface for scoring. Replace if damaged. Minor scores or burrs may be removed with a very fine abrasive.

CAUTION: On rear clutch outer plates, two pairs of teeth at 180° have been omitted, for identification purposes.

Reassembling

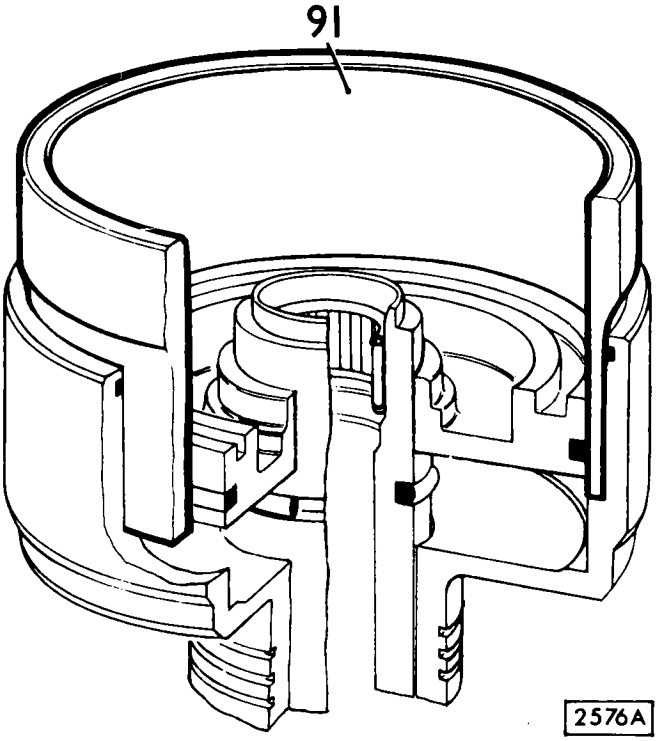
85. Place forward sun gear shaft in stand.
86. Fit new sealing rings.
87. Fit bronze thrust washer.
88. Lubricate rings and washer with petroleum jelly.
89. Fit new 'O' ring to clutch drum pedestal and lubricate.
90. Fit new piston ring.



91. Lubricate and install piston using rear clutch piston assembly sleeve, Tool No. CWG.41.
92. Using compressor Tool No. CWG.37 fit release spring retainer and circlip.
93. Fit clutch plates in alternate order, 4 external (steel) and 4 internal (friction face).

    CAUTION: Check with feeler gauge that outer plates have ,25 mm (.010 in.) cone. Plates must be assembled with cones facing same direction.

94. Fit pressure plate and spring ring.



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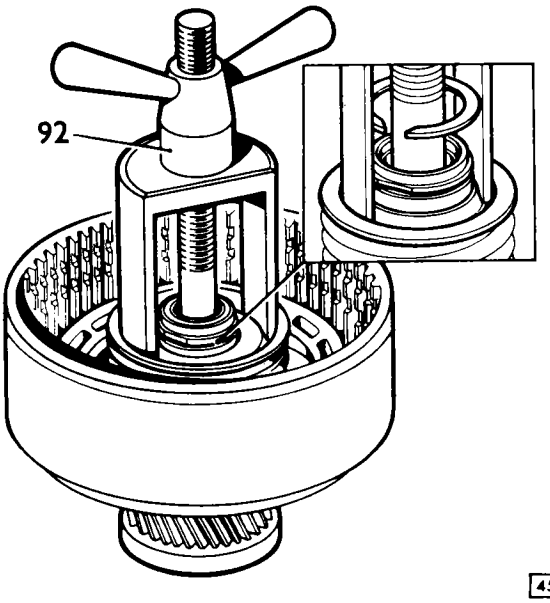

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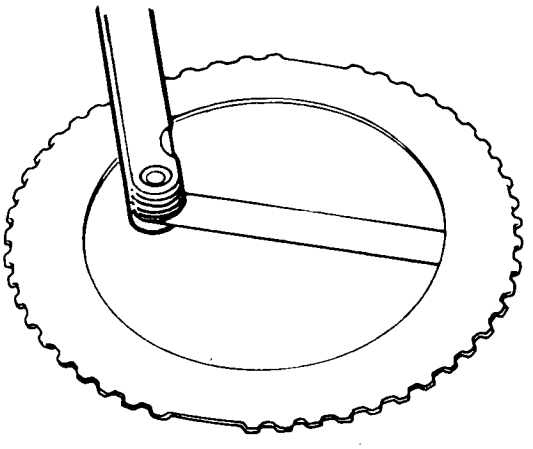
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FRONT CLUTCH

Overhaul

Dismantling

95. Remove circlip and turbine shaft.
96. Remove clutch hub and thrust washer.
97. Remove clutch plates.
98. Remove circlip and clutch release spring.
99. Apply air pressure to piston via oil supply hole and remove piston.
100. Remove 'O' ring from clutch housing pedestal and discard.
101. Remove piston ring and discard.

Inspection

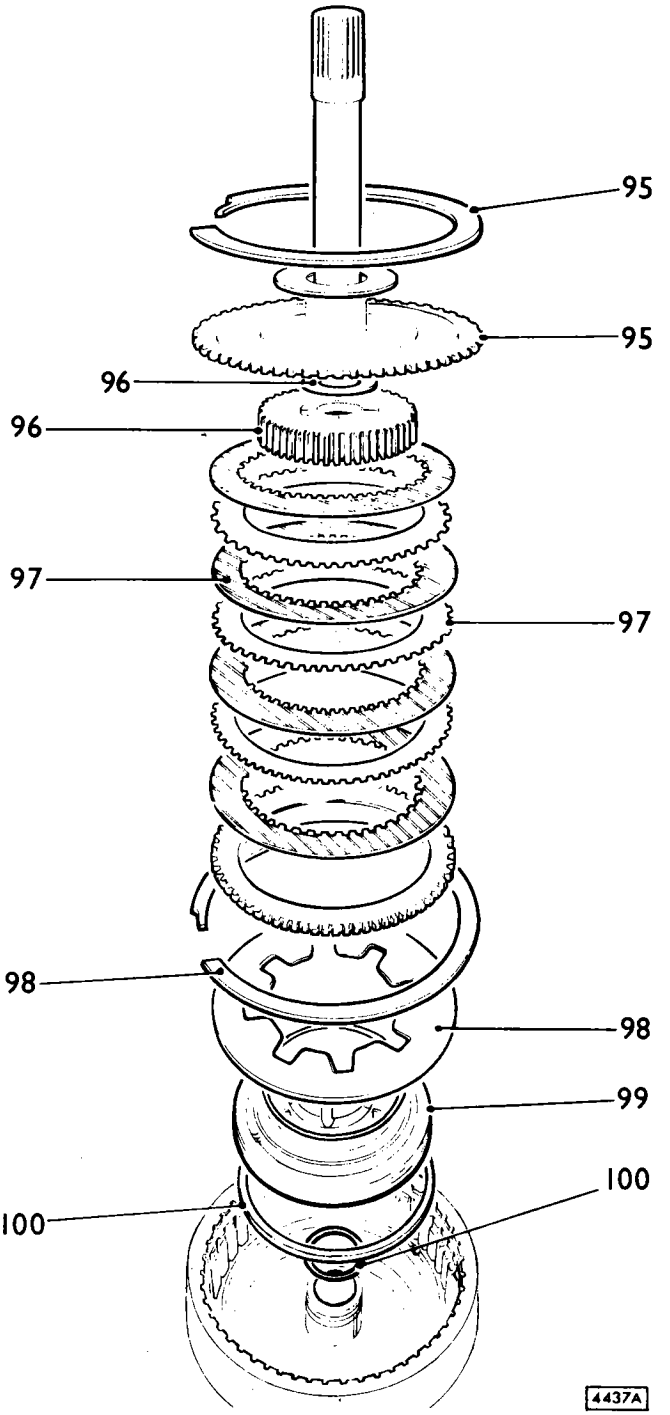
102. Check clutch drum, clutch hub, thrust and bearing surfaces for scores and burrs. Replace if damaged.
103. Check fluid passages and clean if necessary.
104. Inspect piston check valve for free operation.
105. Check clutch release spring for distortion and cracks. Discard if damaged.
106. Check clutch inner plates for flatness, facing depth and scoring.
107. Check clutch outer plates for flatness and scoring. Minor scores may be removed with a fine abrasive.

CAUTION: For identification purposes there are no teeth missing on front clutch outer plates.

Reassembling

108. Fit new 'O' ring to clutch housing pedestal and lubricate.
109. Fit new piston ring.
110. Using front clutch piston assembly sleeve Tool No. CWG.42 install piston. Lubricate sleeve and piston ring with specified transmission fluid.
111. Fit release spring and spring ring, checking that spring ring is fully seated in groove.
112. Place forward sun gear shaft and rear clutch in holder or vice (using soft jaws only).
113. Fit new sealing rings to sun gear shaft. Lubricate with petroleum jelly.
114. Carefully lower front clutch drum over shaft and sealing rings. Oscillate drum to enter into rear clutch plate splines.
115. Fit front clutch hub and pressure plate, flat sides up.
116. Fit 4 internal (friction face) and 3 external (flat steel) plates alternately.
117. Place composition washer in recess in clutch hub with petroleum jelly.
118. Fit turbine shaft and spring ring.

CAUTION: Care must be taken when removing the assembly from vice or stand not to allow the units to separate, otherwise damage to the sealing rings may result if an attempt is made to re-unite the units.



PUMP

Overhaul

Inspection

119. Check mating surfaces, bearing surfaces, gear teeth and splines for scores, burrs and wear.
120. Check fluid passages and clean if necessary.

FRONT SERVO

Overhaul

Dismantling

121. Depress piston and sleeve, remove circlip, collect spring.
122. Remove setscrew and washers.
123. Drift piston out of stop plate.
124. Withdraw stop plate from piston sleeve.
125. Remove and discard sealing rings.
126. Drift out hinge pin by tapping at opposite end to splined grooves.
127. Remove lever and adjusting screw.

NOTE: Adjusting screw has left hand thread.

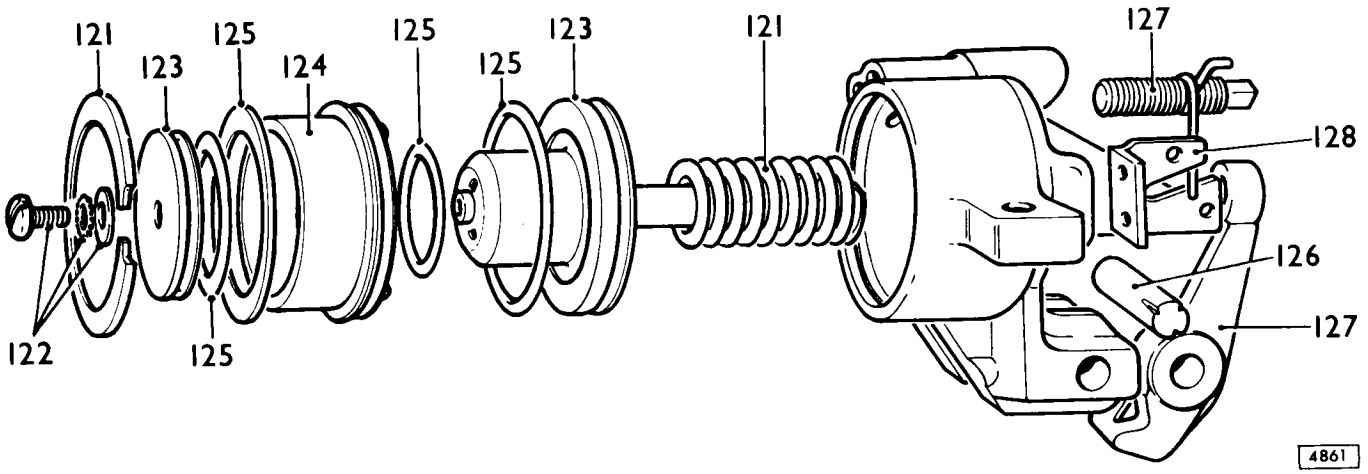
128. If removal of cam plate is required, unscrew both 15/16 in. AF ,8 mm. (5/16 in.) long bolts.

Inspection

129. Check hinge pin for tight fit in body.
130. Check piston pin for tight fit in the piston.
131. Check lever for free movement.
132. Check servo body for crack and scores.
133. Check for free movement of adjusting screw in lever.
134. Check fluid passages and clean if necessary.

Reassembling

Reverse operations 121 to 128.



REAR SERVO

Overhaul

Dismantling

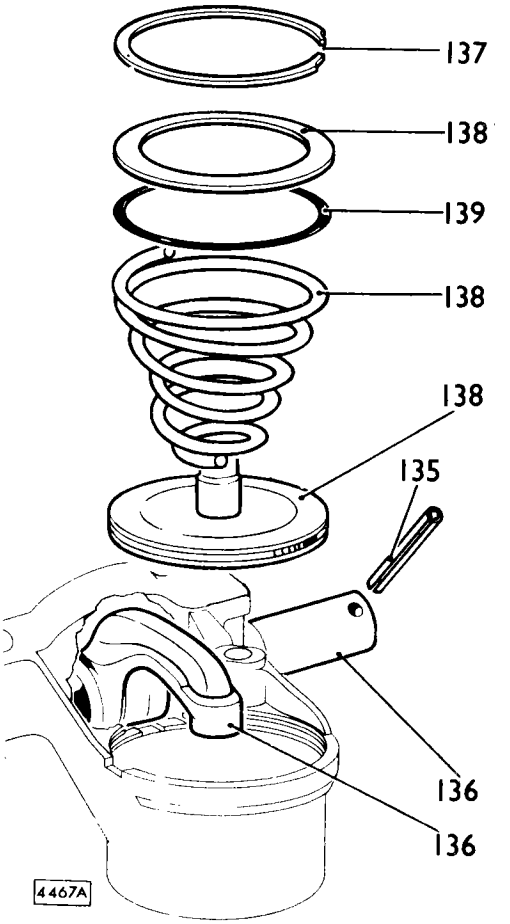
135. Drive out roll pin with 3 mm. (.125 in.) punch.
136. Remove shaft and lever.
137. Compress return spring and remove spring ring.
138. Remove steel ring return spring and piston.
139. Discard sealing ring.

Inspection

140. Check servo body for cracks and cylinder bore for scores.
141. Check fluid passages and clean if necessary.
142. Check fluid passage plug for tightness.
143. Check for spring distortion.
144. Check shaft wear.

Reassembling

Reverse operations 135 to 139; use new sealing rings.



GOVERNOR

Overhaul

Dismantling

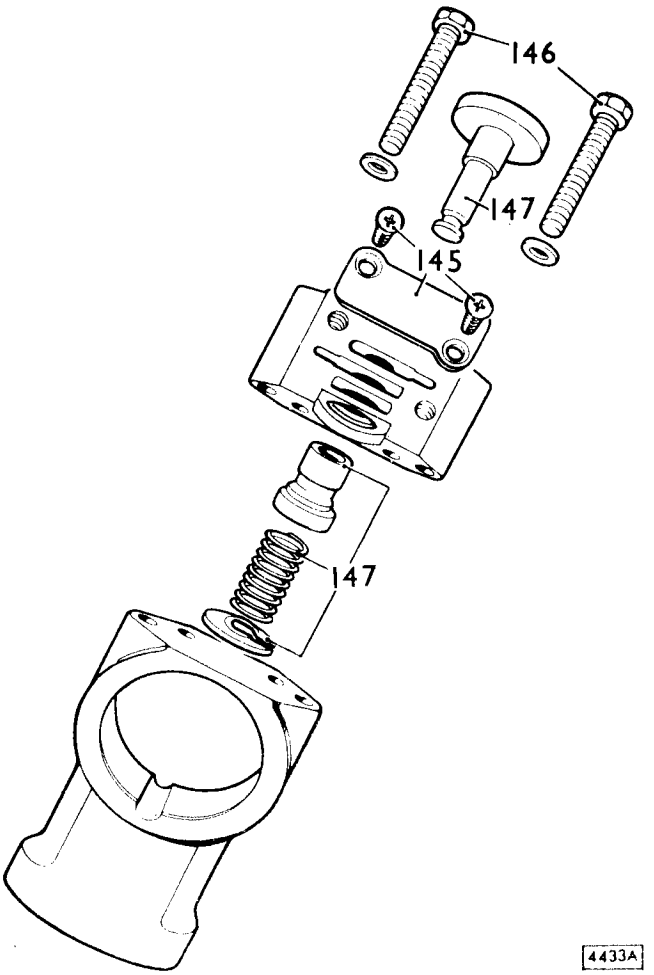
145. Remove screws and cover plate.
146. Remove governor body attaching bolts.
147. Remove retainer, spring, valve and weight.

Inspection

148. Minor scores and burrs may be removed with a very fine abrasive.
149. Replace components deeply scored or warped. Mating surfaces must be smooth and flat.
150. Check fluid passages for obstruction.
151. Check for smooth movement of the weight and valve in the assembled condition.

Reassembling

Reverse operations 145 to 147.



PARKING BRAKE PAWL ASSEMBLY

Overhaul

Dismantling

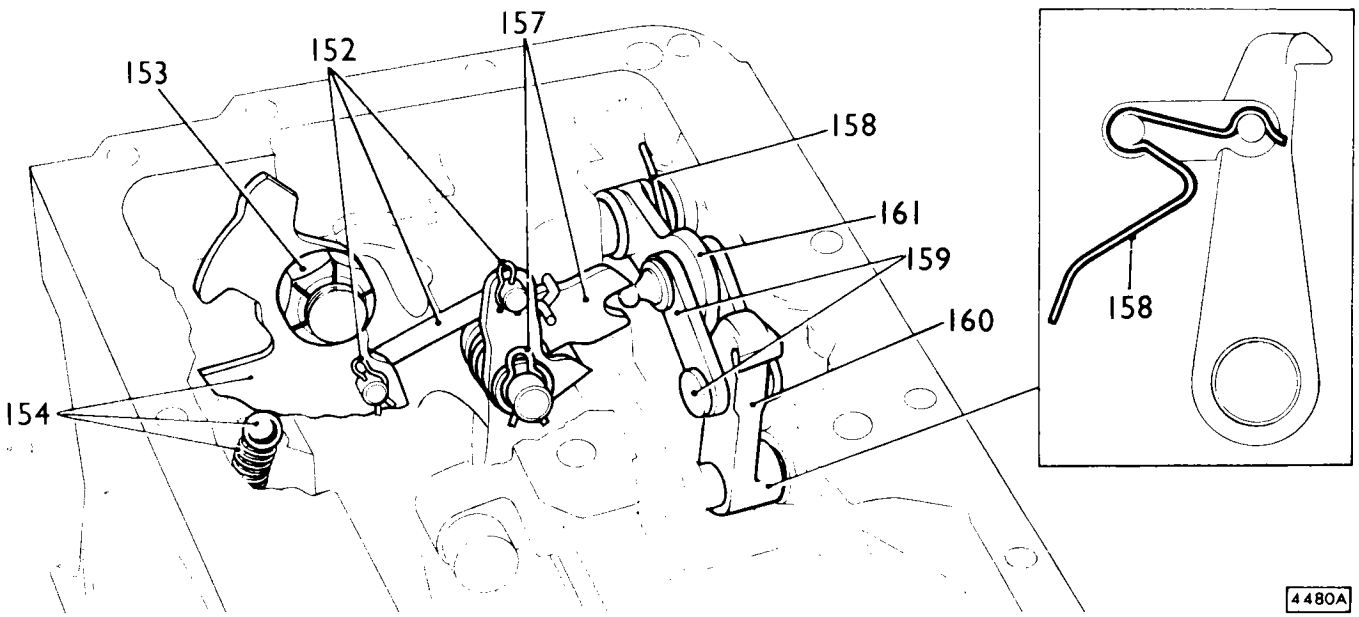
152. Withdraw retaining clips from both ends and remove link rod.
153. Remove manual lever shaft nut.
154. Remove lever detent ball and spring.
155. Remove manual lever shaft assembly.
156. Withdraw and discard seal.
157. Remove the retaining clip and torsion lever assembly.
158. Remove the combined pawl return spring and retainer clip.
159. Remove toggle link and pins.
160. Move pawl back and forth until pin protrudes, then withdraw pin and pawl.
161. Drive toggle lever towards rear case wall so driving out the plug, leaving pin free and withdraw toggle lever pivot pin and toggle lever.

Inspection

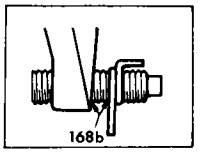
162. Check all components for wear.
163. Check springs for distortion.
164. Check pawl tooth for damage.

Reassembling

Reverse operations 152 to 161.

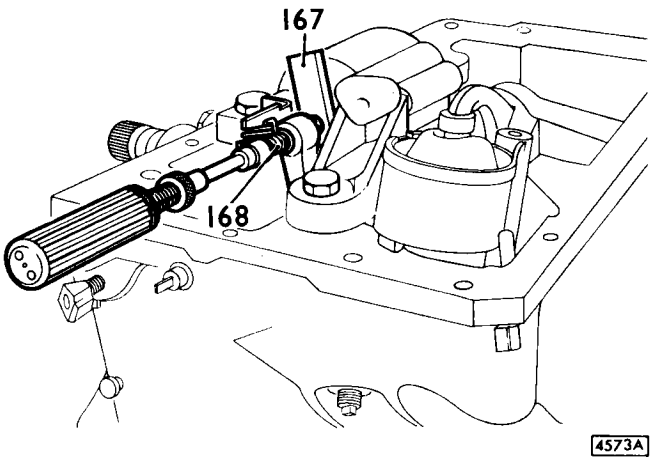


TRANSMISSION ASSEMBLY



Reassembling

165. Reverse operations 15 to 36 **and 43 to 46.**
166. Pull back on the actuating lever.
167. Insert gauge block Churchill CBW.34 between the servo piston pin and adjusting screw.
168. Tighten screw to torque setting ,12 kg.m (10 lb. ins.) noting:-
    a) The adjusting screw has a left-hand thread.
    b) The non-return adjusting spring is spaced 3,13 to 4,76 mm (.125 to .188 in.) from lever.
169. Refit oil pan, use new gasket.
170. Adjust rear brake band 44.30.10.
171. Refill unit with transmission fluid after refitting in car.



OIL PAN

Remove and refit **44.24.04**

Removing

1. Remove exhaust system 30.10.01.
2. Withdraw dipstick.
3. Unscrew union securing dipstick tube to oil pan.
4. Drain off oil and discard.
5. Remove bolts securing oil pan to transmission case.
6. Lower oil pan, remove and discard gasket.

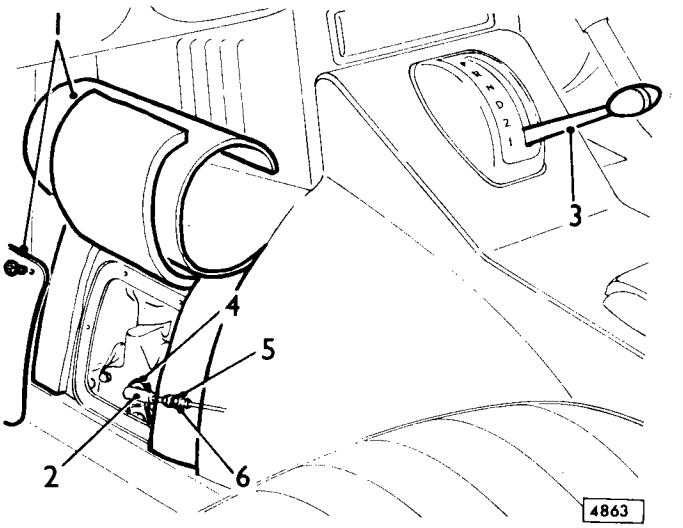
Refitting

Reverse operations 1 to 6; use new oil pan gasket.

MANUAL SELECTION

Adjustment **44.30.04**

1. Remove carpet and access cover on transmission tunnel.
2. Disconnect ball joint at lower end of cable.
3. Place selector lever in position '1'.
4. Operate transmission lever to full extent and allow to spring back to position '1'.
5. Adjust cable until lower ball joint will enter lever freely.
6. Tighten locknuts.



VACUUM CONTROL UNIT

Line pressure check and adjustment 44.30.05

Special tools – CBW.1A – 642

1. Check engine tune i.e. cylinder compressions, spark plugs, ignition timing.
2. Disconnect pipe from vacuum control unit. Insert 'T' piece union and reconnect pipe. Connect a vacuuum gauge to centre junction.
3. Lift carpet from left hand side of gearbox housing.
4. Remove access plate.
5. Remove the 3,2 mm (.125 in.) plug at the gear case front left-hand side and connect the pressure gauge.
6. With the engine and transmission at normal running temperature select D, apply hand and foot brakes.
7. Accelerate engine until vacuum gauge reads 23-25 cm. (9-10 in.) Hg. at 1,200 r.p.m.
8. Check reading of line pressure on pressure gauge which should be:

   $5{,}27 \frac{+1{,}40}{-0{,}35}$ kg/cm^2 $\quad (75 \frac{+20}{-5}$ lb./in.^{2})

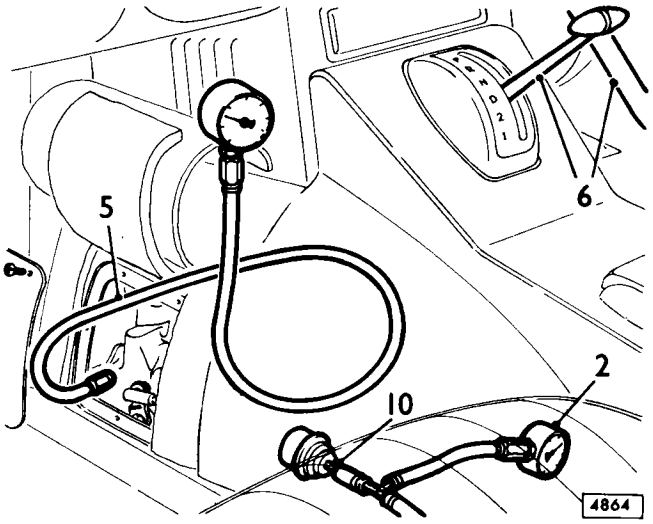
   NOTE: Pressure reading below 4,9 kg/cm^2 (70 p.s.i.) at 1,200 r.p.m. will result in possible clutch slip and damage to the transmission.
9. To gain access to the vacuum control unit control screw, remove the vacuum hose.
10. Insert screwdriver and turn clockwise to increase line pressure and anti-clockwise to decrease line pressure.

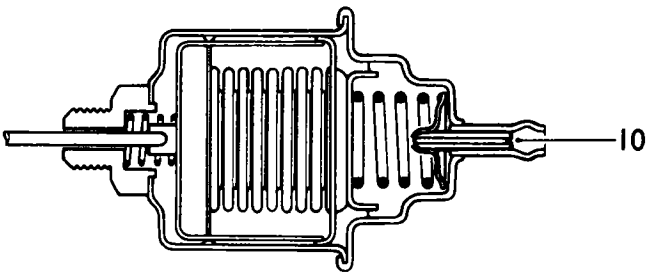
    CAUTION: Approximately two full turns on the screw will vary pressure about 0,7 kg/cm^2 (10 lb./in.^{2}). **THERE IS NO LOCKNUT ON THE SCREW**. Therefore, when all feel of loading on the screw has been removed, it MUST be turned clockwise half-a-turn to ensure contact with the servo actuating rod. If contact is not maintained, a rapid knocking noise will be evident between 600 to 800 r.p.m.

11. After each adjustment replace the vacuum hose and re-check line pressure as before.

    CAUTION: To avoid over-heating of the transmission do not stall for more than 10 seconds at a time for a total of one minute in any half hour period.

12. Remove vacuum gauge, refit hose.
13. Remove pressure gauge, refit plug.
14. Refit access plate.
15. Refit carpet.

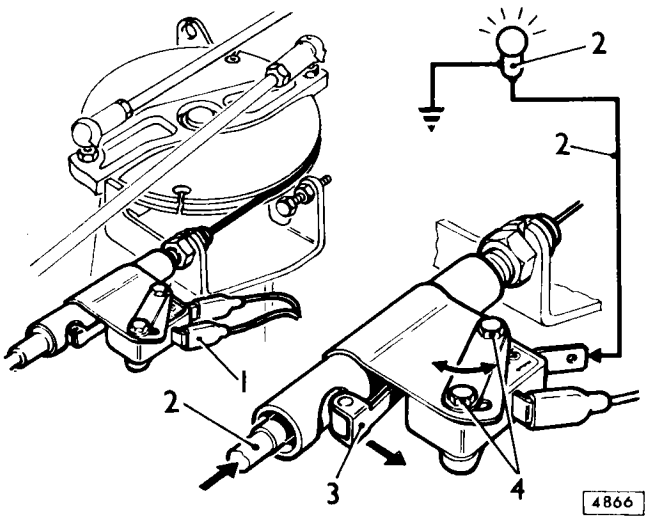




KICKDOWN SWITCH

Circuit test 44.30.09

1. Switch on ignition, check that current is available at input terminal (cable colour – green).
2. Connect earthed test lamp to output terminal. Operate switch control and observe test lamp.
3. If lamp does not illuminate, gently lift switch arm to operate switch.
   Renew switch if faulty.
4. If test confirms that switch is not faulty, adjust by releasing clamping screws and moving switch towards cable abutment.
5. Lock screws and recheck.



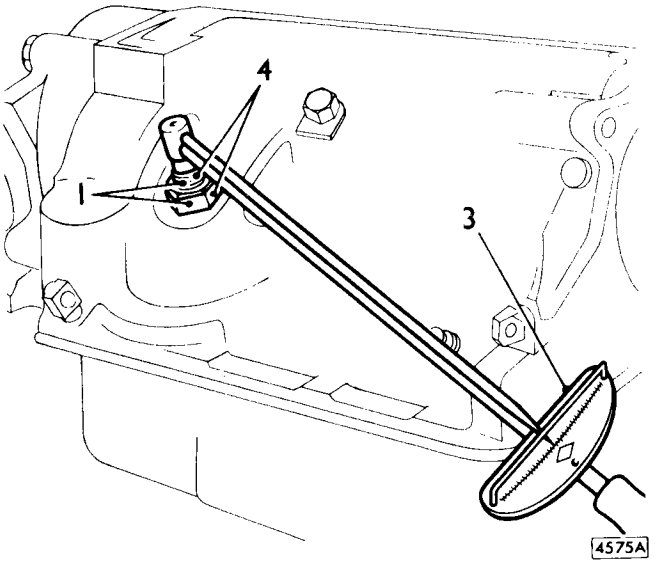
REAR BRAKE BAND

Adjustment 44.30.10

Service tools No. CBW.547A-50
CBW.547A-50-2A

1. Slacken locknut and loosen adjusting screw approximately two turns.
2. Remove dirt from threads and lubricate screw.
3. Tighten screw to 1,4 kg.m (10 lb.ft.).
4. Loosen screw 1.25 turns and tighten locknut.

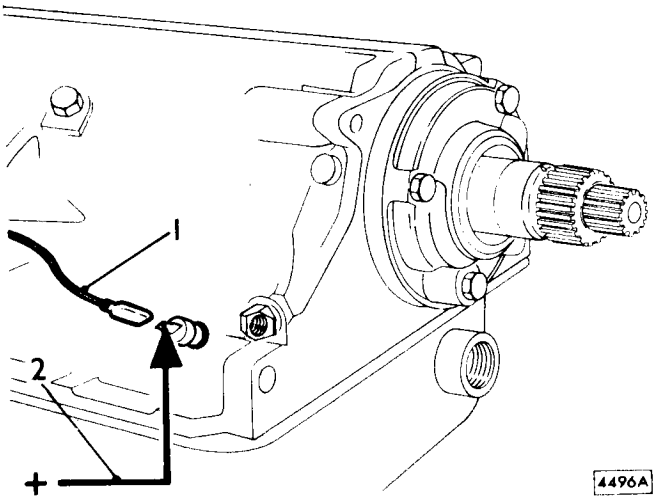
CAUTION: Severe damage may result if adjusting screw is not backed off exactly 1.25 turns.



KICKDOWN SOLENOID

Test 44.30.11

1. Disconnect solenoid wire at connector.
2. With jumper lead connect battery positive to connector, momentarily.
3. Solenoid should operate with an audible click if functioning correctly.
4. Refit wire to connector.



STALL SPEED

Test 44.30.13

The results of this test indicate condition of gearbox and converter.
Stall speed is maximum engine revolutions recorded whilst driving impeller against stationary turbine. Stall speed will vary with both engine and transmission conditions so before attempting a stall speed check, engine condition must be determined. Engine and transmission must be at normal operating temperature before commencing check.

1. Apply handbrake.
2. Apply footbrake.
3. Start engine.
4. Select 'D'.
5. Fully depress accelerator.
6. Note tachometer reading.

CAUTION: To avoid overheating of transmission do not stall for more than 10 seconds at a time or for a total of one minute in any half hour period.

R.P.M.	CONDITION INDICATED
Under 1,000	Stator free wheel slip
1,600 to 1,700	Normal
Over 2,100	Clutch slip

KICKDOWN SOLENOID

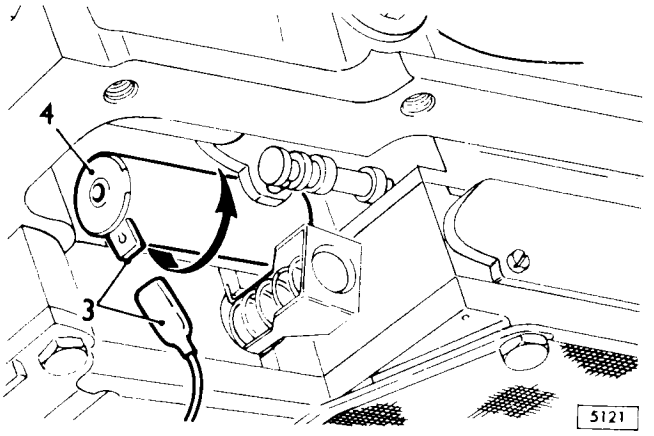
Remove and refit 44.30.14

Removing

1. Engage 'P' at gearshift selector.
2. Remove oil pan – 44.24.04.
3. Disconnect wire from connector.
4. Rotate solenoid through 180° and withdraw.

Refitting

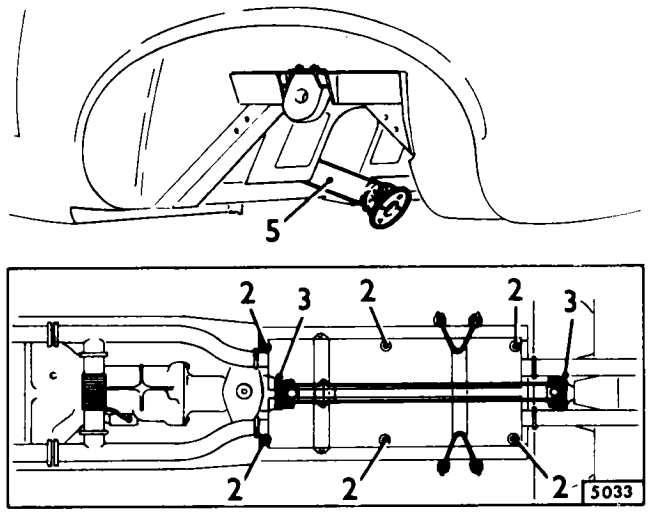
Reverse operations 1 to 4.



CONTENTS

PROPELLER SHAFT

Remove and refit 47.15.01



Removing

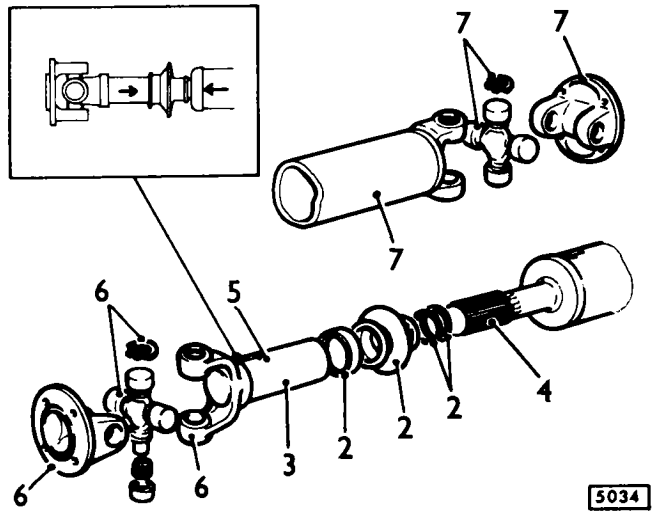
1. Remove silencer assembly – 30.10.01.
2. Remove six setscrews and washers securing heat shield.
3. Remove nuts and bolts from front and rear flanges of propeller shaft.
4. Remove rear suspension unit – 64.25.01.
5. Withdraw propeller shaft rearwards from transmission tunnel.

Refitting

6. Reverse operations 1 to 5 using new self locking nuts on propeller shaft flanges.

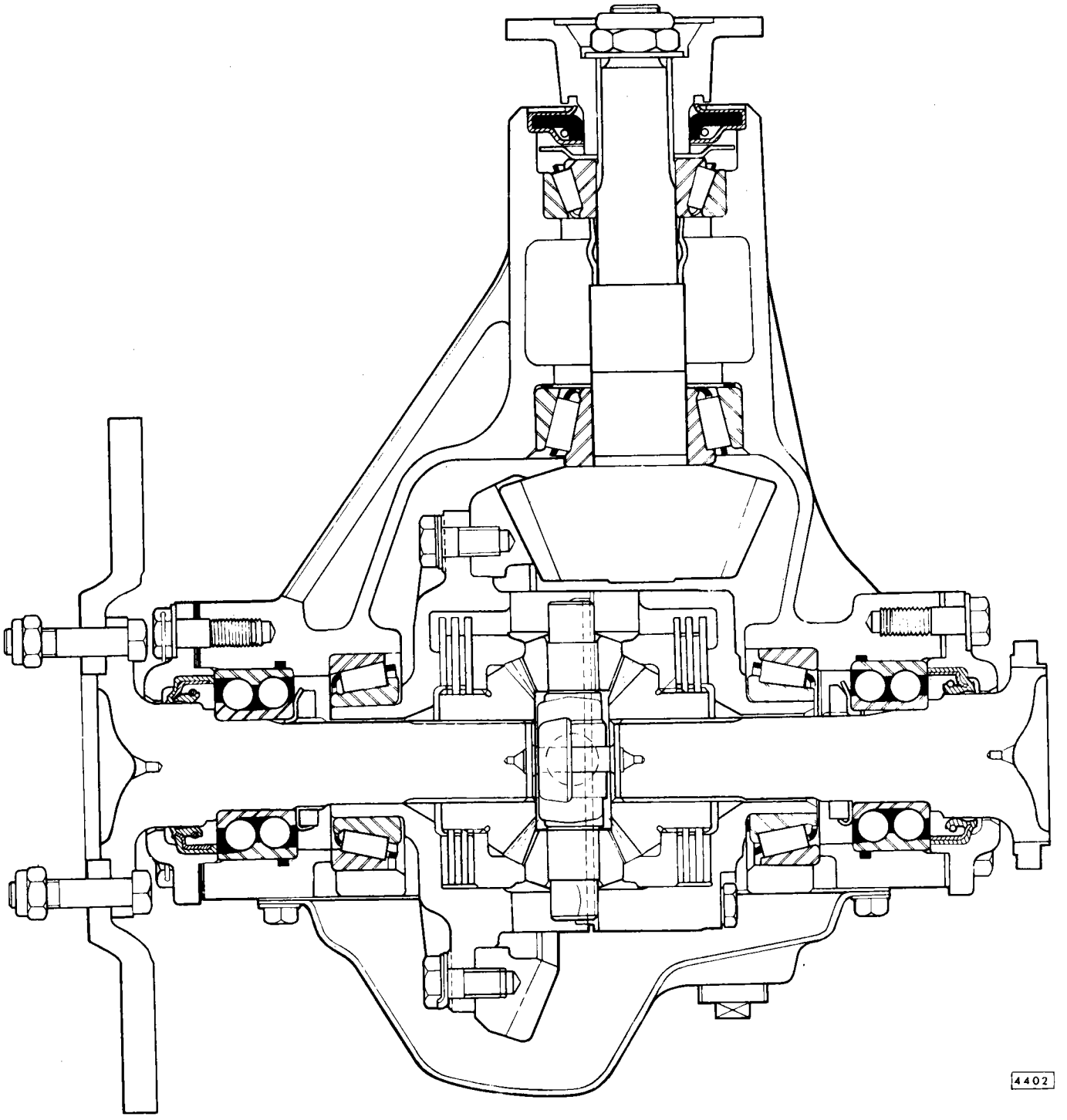
PROPELLER SHAFT

Overhaul 47.15.10



1. Remove propeller shaft 47.15.01.
2. Remove metal and plastic clips from gaiter and withdraw gaiter along shaft.
3. Partially withdraw sleeve yoke from splined shaft.
4. Examine splines for wear. If there is more than .1 mm (.004 ins.) circumferential movement measured on the outside diameter of spline, renew complete propeller shaft.
5. Withdraw sleeve yoke from splined shaft.
6. Remove circlips retaining journal assembly, withdraw bearings and journal from flange yoke and sleeve yoke.
7. Remove circlips retaining journal assembly, withdraw bearings and journal from flange yoke and propeller shaft yoke.
8. Examine all parts and renew as necessary.
9. Reverse operations 5 to 7 and 1 to 3.

CONTENTS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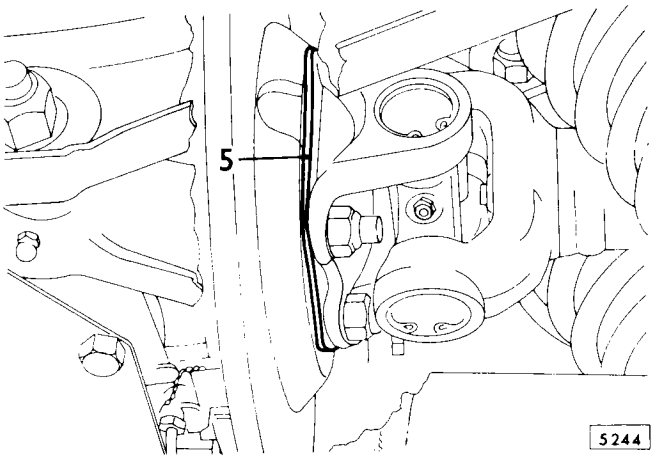
HALF SHAFT

Remove and refit 51.10.03



Removing

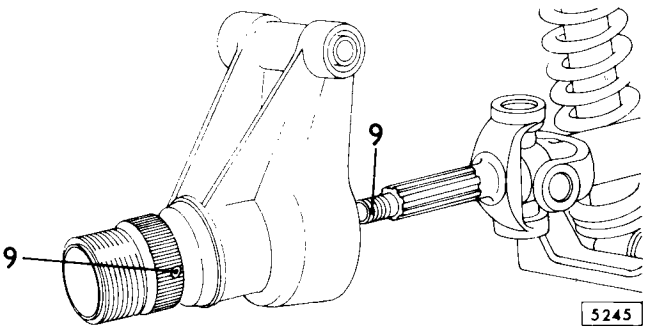
1. Remove rear suspension unit – 64.25.01.
2. Remove hub – 64.15.01.
3. Remove forward damper and spring unit – 64.20.02.
4. Remove four steel self locking nuts securing half shaft flange to drive shaft flange and brake disc.
5. Draw half shaft from suspension unit noting number of camber shims fitted between half shaft flange and brake disc.

Refitting

6. Replace camber shims removed in operation 5.
7. Fit half shaft inner universal joint over four bolts and fit steel locknuts. Torque to 6,9 to 7,6 kg.m. (50 to 55 lb.ft.).
8. Refit forward damper and spring unit.
9. Refit hub.

NOTE: If car fitted with wire wheels and associated splined hub, rotate half shaft to align split pin hole with access hole in hub.

10. Refit rear suspension.
11. Check rear wheel camber – 64.25.18.



HALF SHAFT

Overhaul 51.10.14

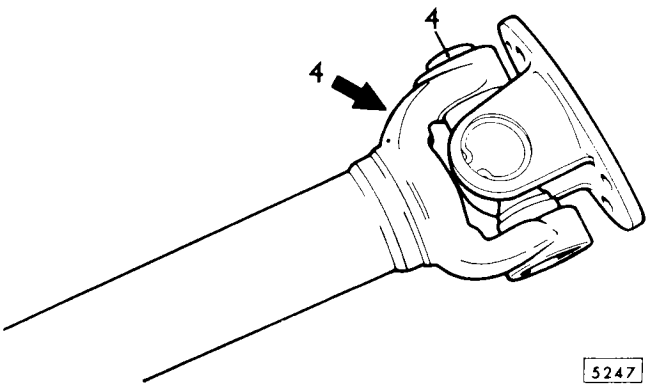
1. Remove half shaft from car – 51.10.03.

Dismantling

2. Clean paint and dirt from splines and both universal joints.
3. Remove snap rings from grooves.

NOTE: If snap ring difficult to remove, tap bearing inwards to relieve pressure on ring.

4. Hold flanged yoke in hand and tap lug with soft faced hammer. Bearing will gradually emerge and can finally be removed with the fingers.
5. Repeat operation for opposite bearing and remove flanged yoke.
6. Rest exposed trunnions on wood or lead blocks, and tap yoke to remove remaining two bearings.
7. Repeat operations 4 to 6 inclusive on splined yoke end of shaft.
8. If it is required to remove outer universal joint cover, release jubilee clip and drill out rivets.



Inspection

9. Wash all parts in petrol.
10. Check splined yoke for wear of splines.
11. Examine bearing races and spider journals for signs of looseness, load markings, scoring or distortion.
12. Spider or bearings should not be renewed separately, as this will cause premature failure of the replacement.
13. It is essential that bearing races are a light drive fit in yoke trunnion.

Reassembling

14. Fit new cork gaskets and gasket retainers to spiders.
15. Fit needle rollers in bearing housings.
    Retain, if necessary, with petroleum jelly during assembly.
16. Insert two spider journals in a yoke, and using a soft round drift ,8 mm. (.031 in.) smaller in diameter than hole in yoke, tap bearings into position.
17. Fit two spider journals to shaft yoke and assemble bearings as in operations 14, 15 and 16.
18. When four bearings are assembled to joint, fit new snap rings to retain bearing housings.
19. If joint appears to bind, tap it lightly with soft faced hammer and exercise it until free.
20. Complete assembly of opposite end of half shaft.
21. If outer universal joint cover has been removed pop rivet two halves of replacement together with open end of cup towards splined yoke joint.
22. Open jubilee clip and fit around half shaft to secure collar of joint cover.

DRIVE FLANGE

Remove and refit **51.15.36**

CAUTION: The drive flange securing nut must not be loosened for any reason other than carrying out a procedure detailed in this workshop manual.
If the nut is moved in error, the complete procedure, Final drive unit, overhaul – 51.25.19, must be used to ensure subsequent satisfactory operation of the final drive.

DRIVE PINION SHAFT OIL SEAL

Remove and refit **51.20.01**

As the collapsible spacer preloading the pinion shaft taper roller bearings must be replaced each time the pinion flange securing nut is released, it is impossible to change the pinion shaft oil seal without removing final drive unit from car, see operation 51.25.13. Further, to ensure that tolerance build up does not disturb backlash, pinion settings and tooth meshing, it is adviseable to carry out full overhaul procedure, operation 51.25.19., when renewing the oil seal.

DRIVE SHAFT OIL SEAL

Remove and refit **51.20.19**

The drive shaft oil seal is integral with the caliper mounting bracket.

Removing

1. Remove half shaft – 51.10.03.
2. Remove locking wire and withdraw two bolts and lockwashers securing brake caliper to final drive unit.
3. Remove discs, noting number of shims removed between brake disc and drive shaft flange.
4. Remove locking wire and remove five bolts securing caliper mounting bracket.
5. Withdraw drive shaft, together with caliper mounting bracket shims, ball bearing and square section oil seal from housing.
6. Turn down tab washer and remove nut from drive shaft.
7. Remove ball bearing and caliper mounting bracket from drive shaft.

Refitting

8. Lightly oil new square section seal, position carefully, and press squarely to fully seat in drive shaft ball bearing housing.

   CAUTION: Under no circumstances must the portion of oil seal protruding above the housing be removed. This induces a metal to metal contact between housing and bearing, and completely destroys the seal properties.

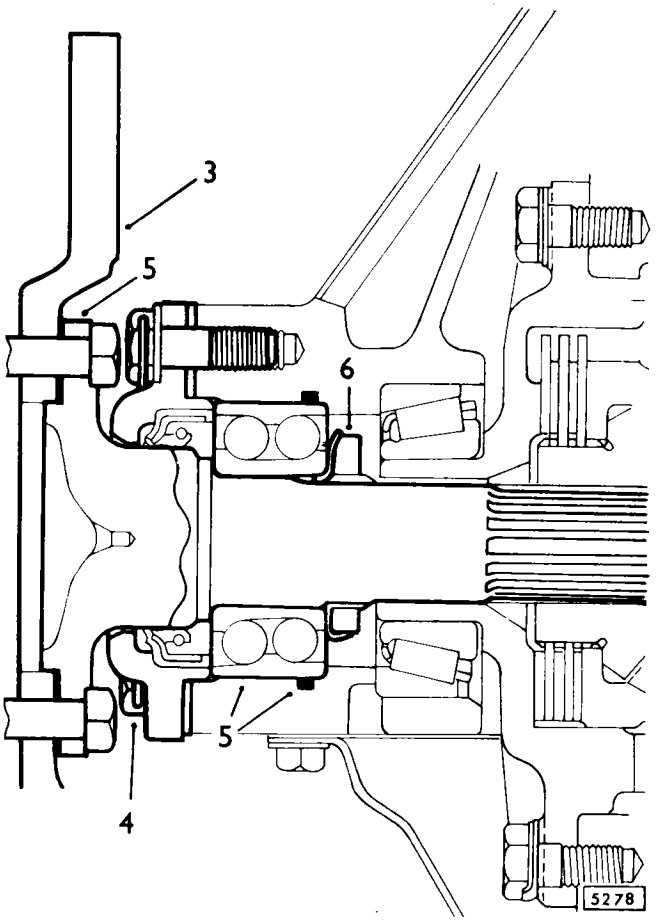
9. Coat oil seal with hypoid gear oil, fit four special flange bolts and position caliper mounting bracket and oil seal assembly over drive shaft.

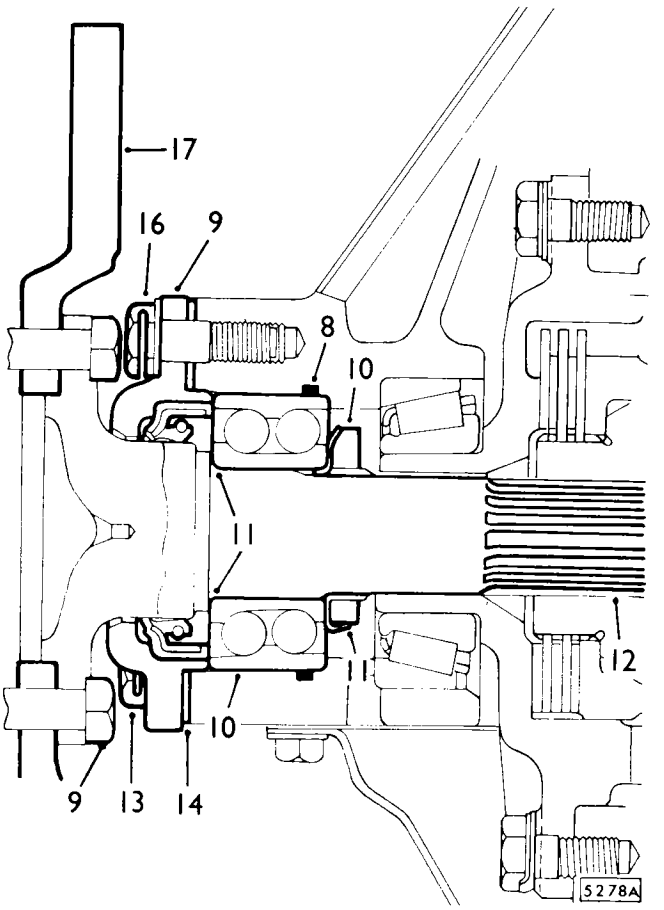
   NOTE: Brackets are handed.

10. Slide a ball bearing on to drive shaft followed by a new tab washer and nut.
11. Ensure bearing seats square to drive shaft shoulder. Tighten nut to 12,4 to 14,2 kg.m. (90 to 110 lb.ft.) and turn up tab washer.
12. Lightly oil drive shaft splines and fit shaft into differential casing.
13. Fit five bolts and spring washers to retain mounting bracket. Screw up until finger tight.

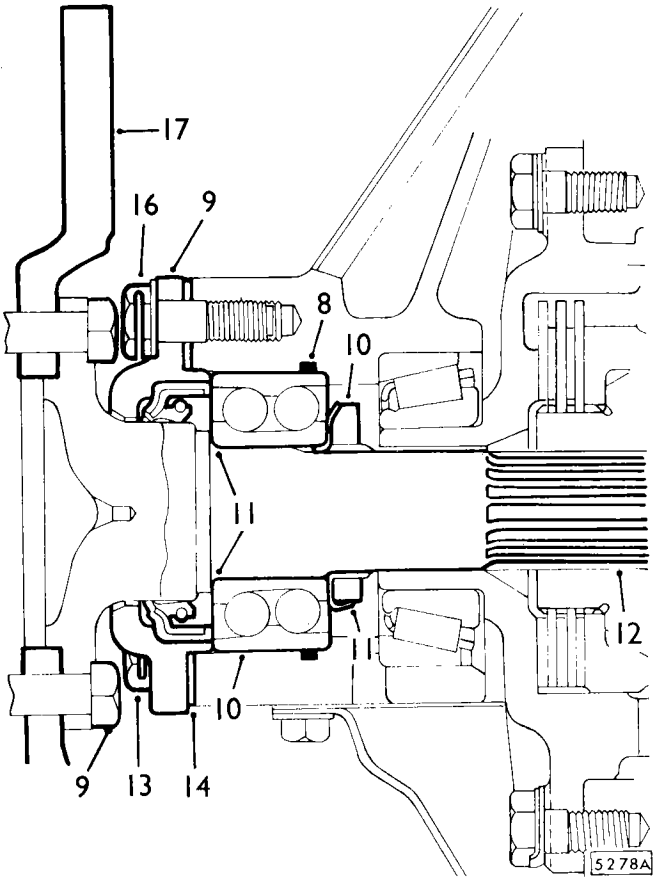
    NOTE: Allowance has been made when calculating shimming required for ,076 mm. (.003 in.) squash of the oil seal when fully tightened.

14. Using feeler gauges, measure dimension between inside face of caliper mounting bracket and differential housing. The measurement obtained determines shimming required to give correct degree of nip on outer ball bearing race and oil seal flange. Shims are available in the following thicknesses: ,076 mm., ,127 mm., ,254 mm., and ,762 mm. (.003 in., .005 in., .010 in. and .030 in.).





15. Remove drive shaft, select shims of required thickness, thinly coat mating faces and shims with Hylomar (NOT grease). Tighten bolts to 7,6 to 9,7 kg.m. (55 to 70 lb.ft.) by diagonal selection.
16. Wire lock five securing bolts to tension bolt in clockwise direction.
17. Fit discs to drive shaft flanges, using shims removed in operation 3 between disc and flange.
18. Fit caliper to mounting bracket using two bolts and lockwashers.
19. Fit distance tubes (oversize nuts) to disc studs and secure using four nuts. Use feeler gauges to ensure disc central between jaws of caliper. If necessary add to or remove from shim pack between drive flange and disc.
20. Wire lock caliper bolts.
21. Refit half shaft.

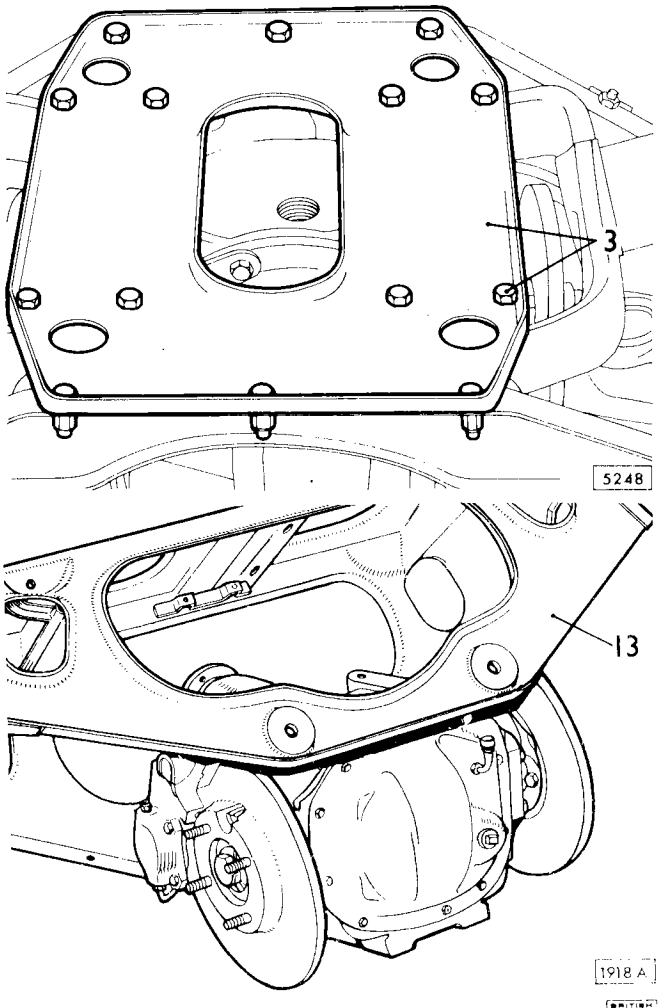


FINAL DRIVE UNIT

Remove and refit 51.25.13

Removing

1. Remove rear suspension unit – 64.25.01.
2. Remove final drive drain plug and allow oil to drain.
3. Invert suspension assembly on bench and remove bolts and lock nuts securing tie plate.
4. Remove hydraulic dampers and road springs – 64.20.02.
5. Remove four self locking nuts securing half-shaft inner universal joint to brake disc and final drive output flange.
6. Withdraw half-shaft from bolts on flange noting the number of camber shims.
7. Remove one nut from inner wishbone fulcrum shaft and drift out shaft.
8. Withdraw hub, half-shaft, wishbone and radius arm assembly
9. Repeat operations 5 to 8 on opposite side of suspension.
10. Disconnect hydraulic brake pipes from calipers. Plug holes to prevent ingress of dirt.
11. Remove split pins, clevis pins and washers securing handbrake levers to compensator.
12. Remove locking wire from differential carrier bolts.
13. Turn assembly over, unscrew carrier bolts and remove crossbeam from carriers by tilting forward over the nose of the pinion.
14. Remove locking wire, and withdraw two bolts and lock washers securing each caliper to the final drive unit.
15. Remove discs noting number of shims removed between brake disc and drive shaft flange.



Refitting

16. Fit discs to drive shaft flanges, using shims removed in operation 15 between disc and flange.
17. Fit caliper to mounting bracket using two bolts and lockwashers.
18. Temporarily position half shaft inner universal joint at disc and secure using four nuts. Use feeler gauges to ensure disc central between jaws of caliper. If necessary add to or remove from shim pack between drive flange and disc.
    Remove four nuts securing half shaft.
19. Wire lock caliper bolts.
20. Reverse operations 1 to 13 inclusive, wire locking to tension bolts in a clockwise direction.
21. Check rear wheel camber – 64.25.18.

FINAL DRIVE UNIT

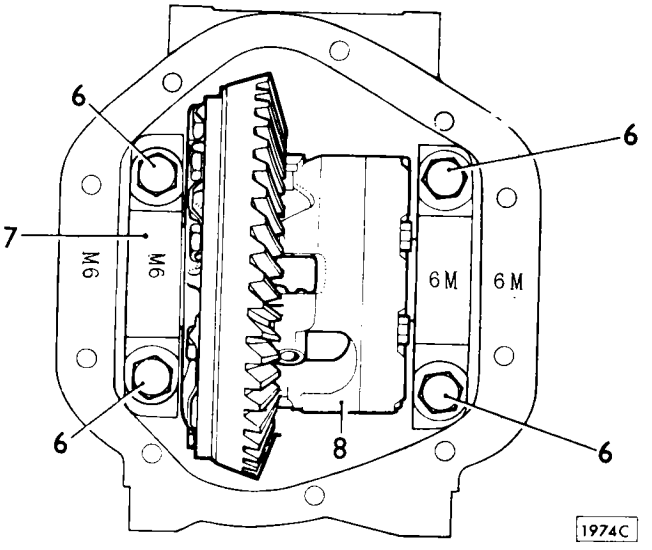
Overhaul **51.25.19**

Service tools

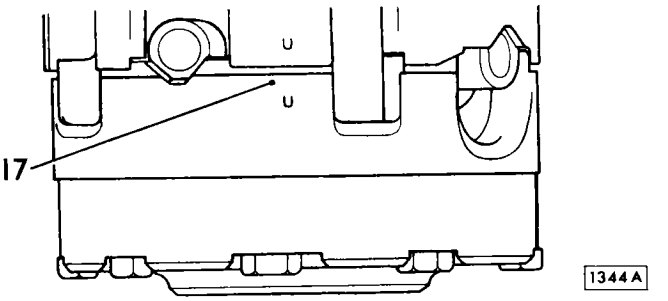
Puller SL.14
SL.14/1
SL.14/3
Gauge mount SL.3
Pinion oil seal replacer SL.4
Gauge block 4 HA
Press tool SL.550/4
Handle 550

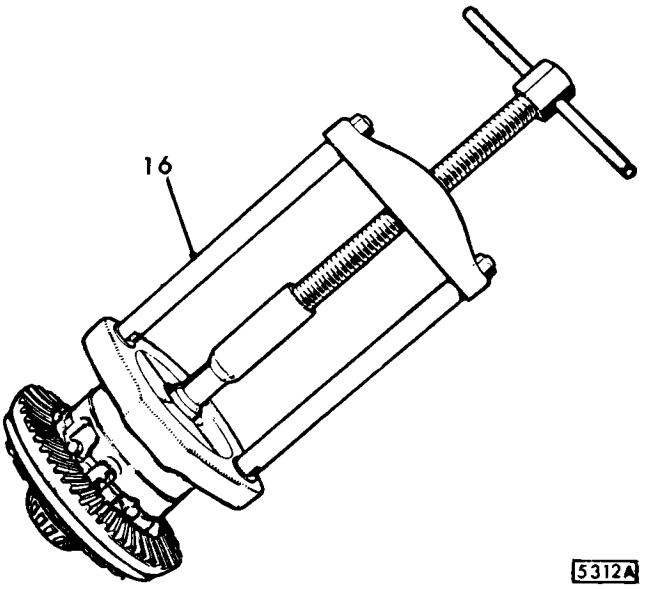
Dismantling

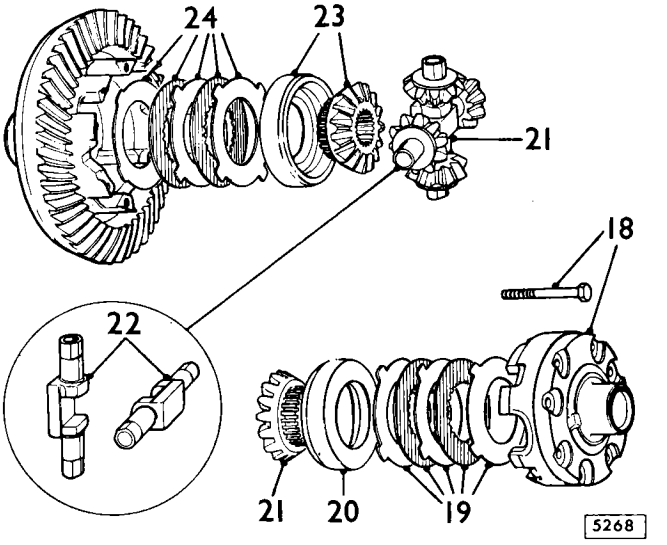
1. Support unit in vice.
2. Remove rear cover.
3. Remove locking wire and remove five bolts securing caliper mounting bracket.
4. Withdraw drive shaft, together with caliper mounting bracket shims, ball bearings and square section oil seal. Turn down tab washer, remove nut and withdraw ball bearing and caliper mounting bracket from drive shaft.
5. Carry out operations 3 and 4 on second drive shaft.
6. Remove two bolts holding each differential bearing cap.
7. Lift caps out of differential housing.
8. Using two levers, suitably padded to prevent damage to differential carrier, prise out differential unit, crownwheel and bearing assembly.
9. Remove drive pinion nut.
10. Remove 'D' washer.
11. Suitably mark relative positions of companion flange to pinion shaft.
12. Withdraw companion flange.
13. Using a suitable press, extract pinion from differential housing.
14. Remove oil seal, oil thrower and outer bearing cone.
**15. Examine inner and outer bearing cups for wear. If replacement is required extract cups using tools No. SL.14 and SL.14/1.
16. Remove differential side bearings using Tools SL.14 and SL.14/3.**



17. In the absence of any alignment marks, scribe a line across both halves of differential casing to facilitate reassembly.
18. Remove eight bolts securing both halves of differential casing.
19. Split casing and remove clutch discs and plates from one side.
20. Remove differential side ring.
21. Remove pinion side gear and pinion cross shafts complete with gears.
22. Separate cross shafts.
23. Remove remaining side gear and ring.
24. Extract remaining clutch discs and plates.

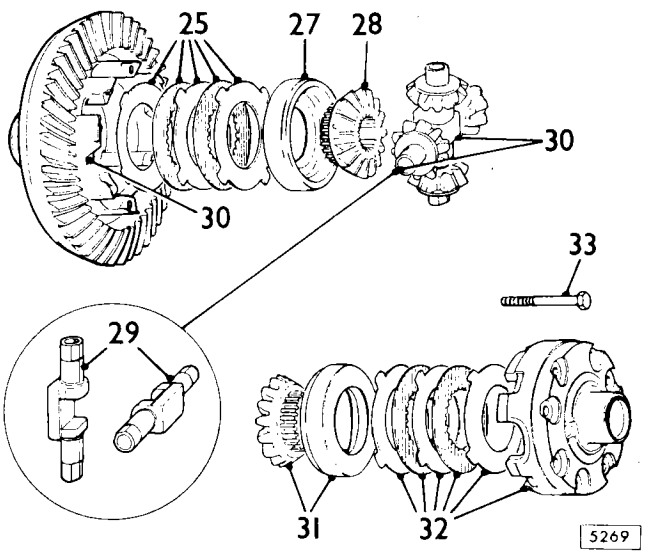






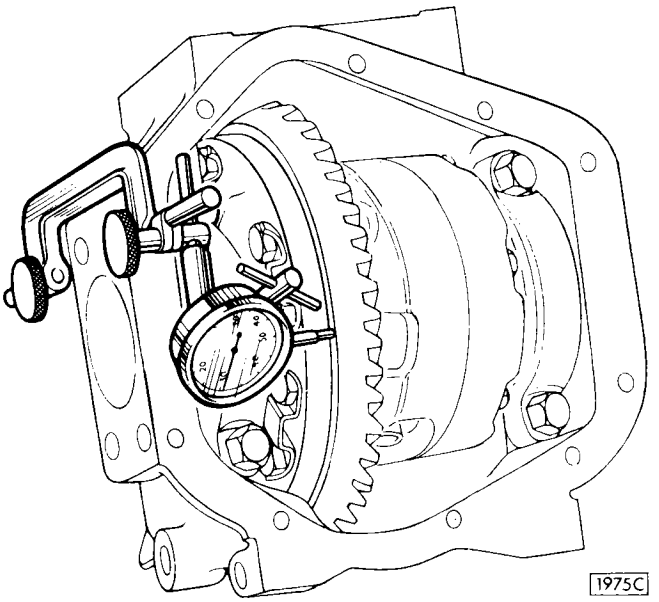
Reassembling

25. Refit clutch plates and discs alternately into flange half of the casing.
26. Fit two belleville clutch plates so that convex sides are against differential casing.
27. Fit side ring.
28. Position one side gear into ring recess.
29. Fit cross shafts.
30. Refit pinion mating cross shafts complete with pinion gears ensuring that ramps on the shafts coincide with the mating ramps in the differential case.
31. Assemble remaining side gear and ring.
32. Offer up bottom half of differential case to flange half in accordance with identification marks and position clutch friction plate tongues so that they align with grooves in differential case.
33. Assemble bottom half to flange half of differential case using eight bolts, but do not tighten at this stage.
34. Check alignment of splines by inserting two drive shafts.
35. Tighten eight bolts to a torque of 4,8 to 6,2 kg.m. (35 to 46 lb.ft.) while drive shafts are in position.
36. With one drive shaft locked, the other drive shaft must not turn radially more than 19 mm. (.75 in.) measured on a 152 mm. (6 in.) radius.



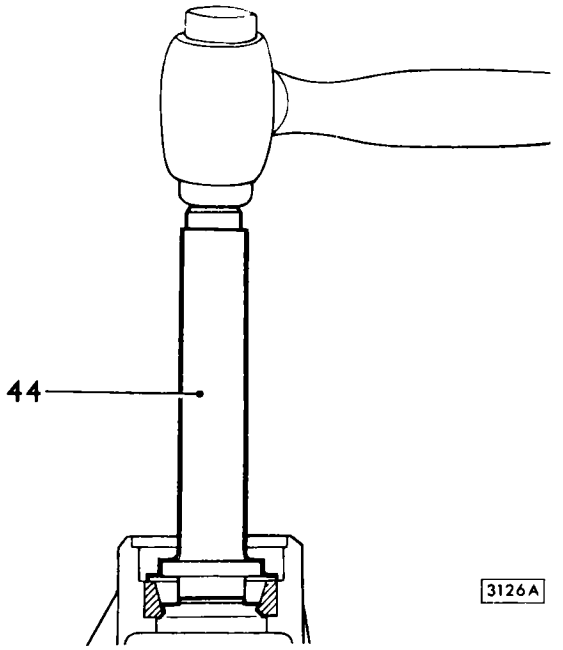
Thickness of shims required in the installation of the differential side bearings is determined as follows:-

37. Fit differential side bearings, without shims, on the differential case, making sure that bearings and housing are perfectly clean.
38. Place the differential assembly, with the bearings in their housing, within the gear carrier, the pinion not being assembled.
39. Install dial indicator gauge (tool No. SL.3), setting the button against back face of drive gear.
40. Inserting two levers between housing and the bearing cups, move the differential assembly to one side of the carrier.
41. Set the dial indicator to zero.
42. Move the assembly to the other side and record indicator reading, giving total clearance between bearings, as now assembled, and abutment faces of the gear carrier housing.

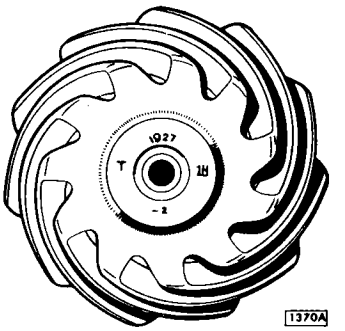


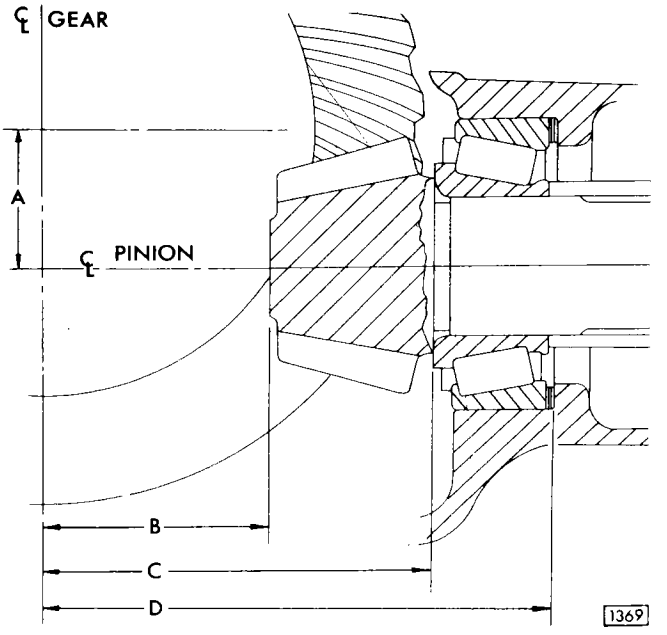
NOTE: Add ,13 mm. (.005 in.) more to the clearance reading to give preload: This thickness of shims to be used in the installation of the differential bearings, the shims being divided to give the gear position with correct backlash.

43. Remove differential assembly from the gear carrier.
44. Re-install the pinion outer bearing cup using tool No. SL.550/4 with 550 Handle.
45. Fit inner bearing cup adjusting shims and install inner bearing cup.
46. Press inner bearing cone on to pinion using an arbor press and length of tube contacting the inner race only. Do not press on roller retainer.



NOTE: The hypoid drive pinion must be correctly adjusted before attempting further assembly, the greatest care being taken to ensure accuracy.
The correct pinion setting is marked on the ground end of the pinion. The matched assembly serial number at the top is also marked on the drive gear, and care should be taken to keep similarly marked gears and pinions in their matched sets as each pair is lapped together before despatch from the factory. The letter on the left is a production code letter and has no significance relative to assembly or servicing of any axle. The letter and figure on the right refer to the tolerance on offset or pinion drop dimension, which is stamped on the cover facing of the gear carrier housing. The number at the bottom gives the cone setting distance of the pinion and may be Zero (0), Plus (+) or Minus (–).
When correctly adjusted a pinion marked Zero will be at the zero cone setting distance dimension which is 66,67 mm. (2.625 in.) (i.e from the centre line of the gear to the face on the small end of the pinion). A pinion marked Plus two (+2) should be adjusted to the nominal (or Zero) cone setting plus ,0508 mm. (.002 in.) and a pinion marked Minus two (–2) to the cone setting distance minus .002 in. Thus for a pinion marked Minus two (–2) the distance from the centre of the drive gear to the face of the pinion should be 66,619 mm. i.e. 66,67 – ,0508 mm. (2.623 in. i.e. 2.625 – .002) and for a pinion marked Plus three (+3) the cone setting distance should be 66,746 mm. (2.628 in.).

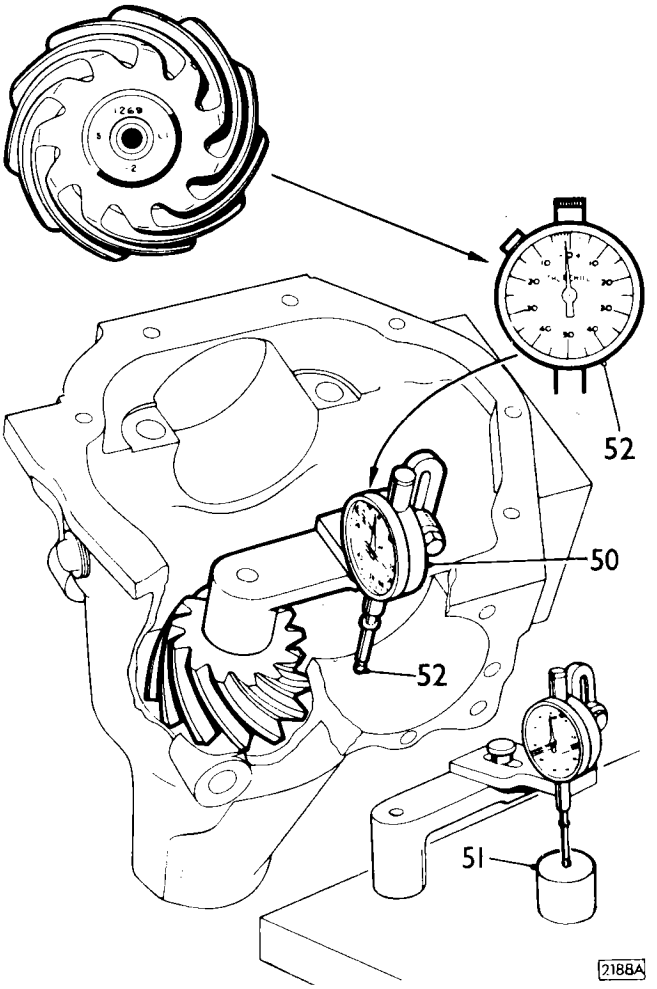


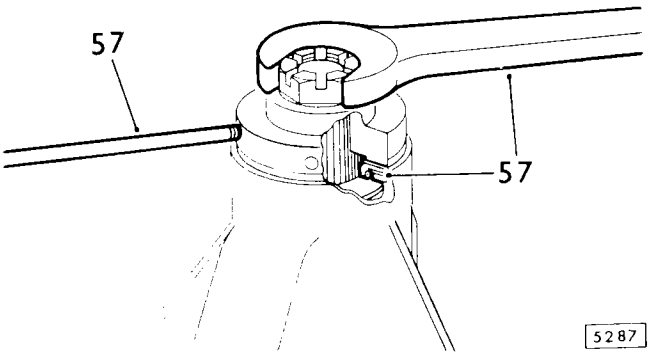


A	Pinion drop 1.5 in. (38.1 mm)
B	Zero cone setting 2.625 in. (66.67 mm)
C	Mounting distance 4.312 in. (108.52 mm)
D	Centre line to bearing housing 5.495 in. (139.57 mm) to 5.505 in. (139.83 mm)

47. Place pinion, together with inner bearing cone, into gear carrier.
48. Turn carrier over and support pinion with a suitable block of wood for convenience before attempting further assembly.
49. Fit pinion outer bearing cone, companion flange, washer and nut only, omitting the collapsible spacer, oil thrower and oil seal, and tighten nut.
50. Check pinion setting distance by means of gauge, tool No. SL.3.
51. Adjust bracket carrying dial indicator using 4 H.A. setting block and set dial face to zero.
52. Check pinion setting by taking a dial indicator reading on the differential bearing bore with the assembly firmly seated on the ground face of the pinion. The correct reading will be the minimum obtained; that is, when the indicator spindle is at the bottom of the bore. Slight movement of the assembly will enable the correct reading to be easily ascertained. The dial indicator shows the deviation of the pinion setting from the zero cone setting and it is important to note the direction of any such deviation as well as the magnitude.
53. If pinion setting is incorrect it is necessary to dismantle the pinion assembly and remove pinion inner bearing cup. Add or remove shims as required from the pack locating the bearing cup and re-install the shim pack and bearing cup. Adjusting shims are available in thicknesses of ,076 mm., ,127 mm. and ,254 mm. (.003 in., .005 in. and .010 in.). Repeat operations 52 and 53 until satisfactory result is obtained.
54. Extract pinion shaft from gear carrier sufficiently far to enable the outer bearing cone to be removed from the pinion.
55. Fit the collapsible spacer to the pinion ensuring that it seats firmly on the machined shoulder on the pinion shaft.
56. Insert pinion into gear carrier.
57. Refit outer-bearing cone, oil thrower and oil seal.
58. Lightly grease splines of pinion shaft and fit companion flange.

NOTE: Ensure reference marks made during dismantling are in alignment.



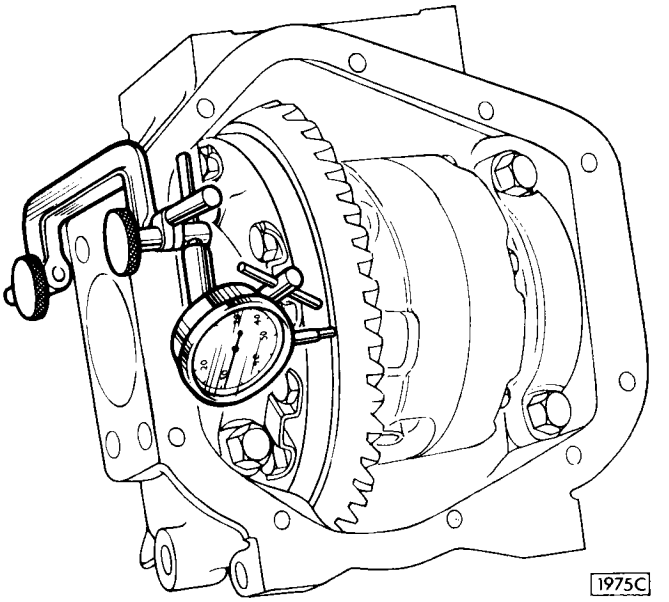


59. Fit new 'D' washer, convex side facing towards the end of the shaft.
60. Fit the nut but DO NOT tighten at this stage.
61. Place differential assembly complete with side bearings but less shims, in the housing. Ensure that bearings and housing are perfectly clean.
62. Install a dial indicator on the housing with button on back face of drive gear.
63. Insert two small levers between housing and side bearing. Move differential case and drive gear assembly away from pinion until opposite side bearing is seated against housing.
64. Set dial indicator to zero, then move differential assembly towards pinion until drive gear is in metal to metal contact, and deeply in mesh with pinion.

    NOTE: The indicator reading now obtained (i.e. clearance between drive gear and pinion) minus the backlash allowance etched on the drive gear (e.g. B/L .007) denotes the thickness of shims (in inches) to be placed between the differential case and the side bearing on the drive gear side of the differential.

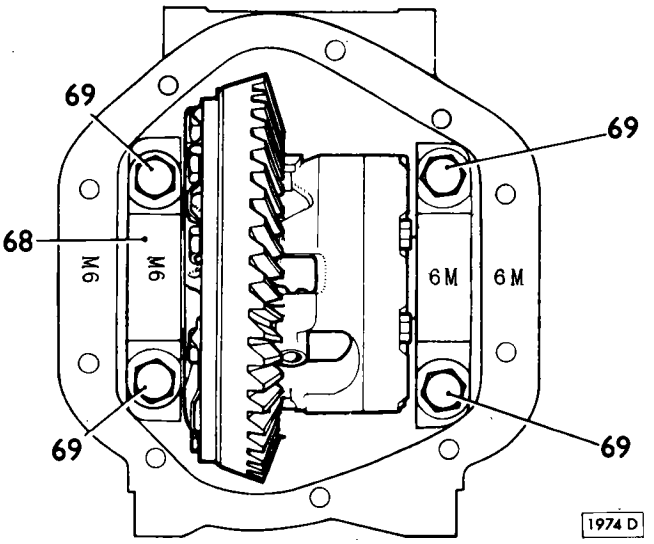
65. Install thickness of shims, determined in operation 64, on drive gear side of differential, taking shims from pack determined previously in operation 42.
66. Install balance of total shims required on opposite side of differential case.

    NOTE: As an example of differential and drive gear adjustment, assume that the total indicator reading obtained in operation 42 is 2,032 mm. (.080 in.). This figure plus ,127 mm. (.005 in.) for the recommended preload, equals 2,159 mm. (.085 in.) which denotes the total thickness of shims to be used. Also assuming the clearance between drive gear and pinion to be 1,067 mm. (.042 in.) determined as in operations 61 to 64, subtract the backlash as etched on the gear, say ,178 mm. (.007 in.) from the 1,067 mm. (.042 in.) clearance. The ,889 mm. (.035 in.) difference denotes the thickness of shims to be placed between the differential case and side bearing on the drive gear side of the differential. Then subtract the thickness of shims ,889 mm. (.035 in.) inserted on the drive gear side of the differential case from 2,159 mm. **(.085 in.)** and the 1,270 mm. (.050 in.) difference denotes the thickness of shims to be installed on the opposite side of the case.



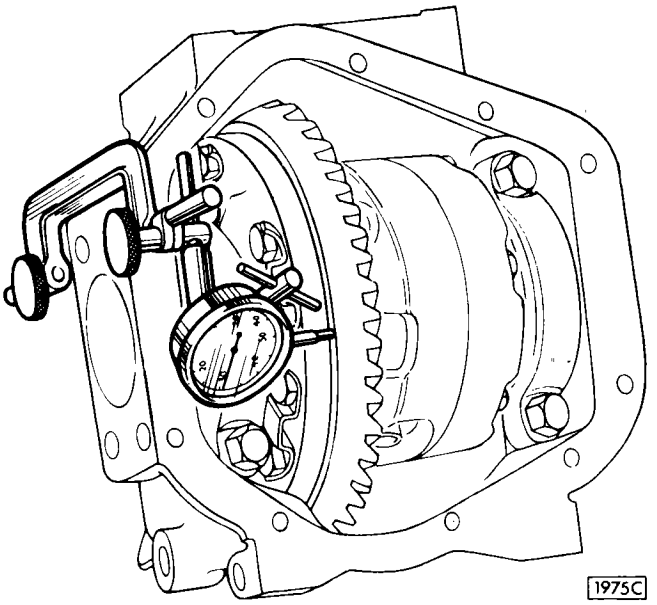
67. Lower differential assembly into position lightly tapping the bearings home with a hide hammer.

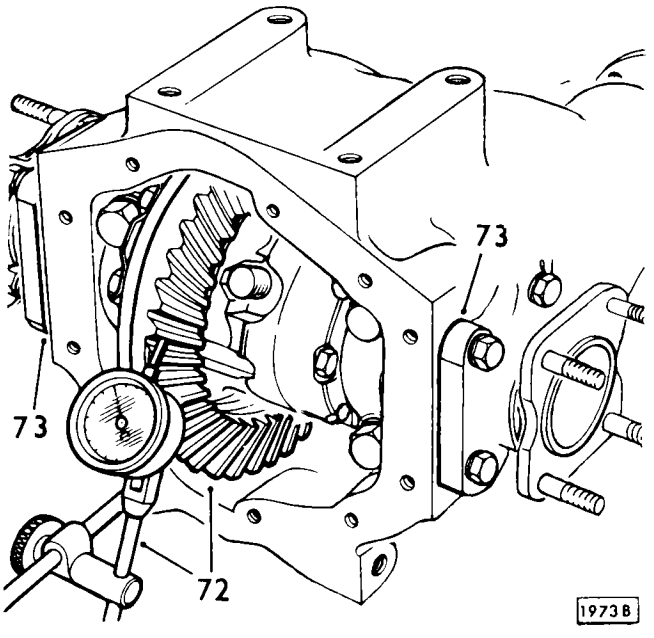
    NOTE: Ensure that gear teeth are led into mesh with those of the pinion. Careless handling at this stage may result in bruising the gear teeth. Removal of the consequent damage can only be partially successful and will result in inferior performance.



68. When refitting side bearing caps, ensure that position of the numerals marked on gear carrier housing face and side bearing cap coincide.
69. Tighten caps to a torque of 8,3 to 9,0 kg.m. (60 to 65 lb.ft.).
70. Mount a dial indicator on gear carrier housing with the button against back face of gear as for operation 62.
71. Turn pinion by hand and check run out on back face of gear. Run out should not exceed ,13 mm. (.005 in.). If run out excessive, strip the assembly and rectify by cleaning the surfaces locating the drive gear. Any burrs on these surfaces must be removed.
72. Remount dial indicator on gear carrier housing with button tangentially against one of drive gear teeth.
73. Move drive gear by hand to check backlash which should be as etched on the gear. If backlash is not to specification, transfer the necessary shims from one side of the differential case to the other to obtain the desired setting.

    NOTE: To increase backlash remove shims from the drive gear side of the differential and install on the opposite side. To decrease backlash transfer shims to the drive gear side from the opposite side of the differential case.

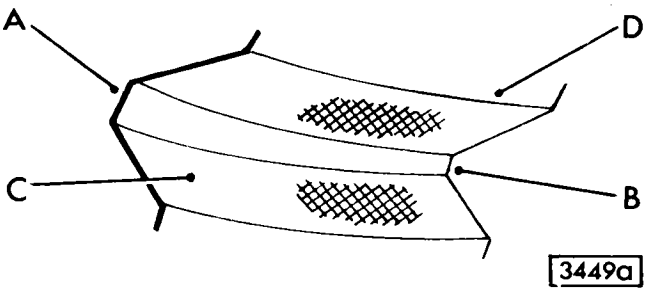




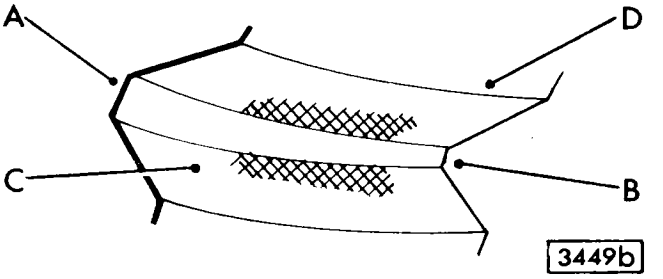
74. After setting backlash to required figure use a small brush to sparingly paint eight or ten of the drive gear teeth with a stiff mixture of marking raddle or with engineers blue. Move painted gear teeth in mesh with pinion until a good impression of the total contact is obtained. The result should conform with ideal impression given. Correction procedure of poor meshing is also given.
75. The ideal tooth bearing impression on the drive and coast sides of the gear teeth is evenly distributed over the working depth of the tooth profile and is located nearer to the toe (small end) than the heel (large end). This type of contact permits the tooth bearing to spread towards the heel under operating conditions when allowance must be made for deflection.

NOTE: If 'ideal' impression obtained, proceed with operation 80, otherwise continue with operation 76, 77, 78 or 79 as applicable.
Nomenclature referring to gear teeth is as follows:-

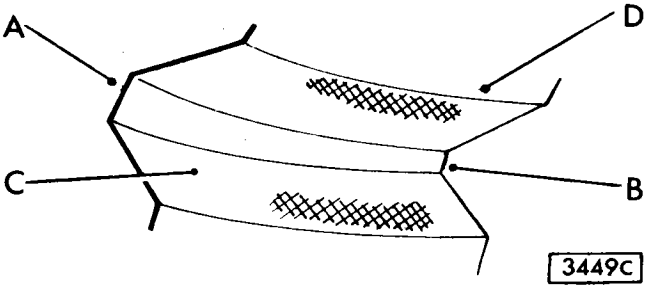
The HEEL is the large or outer end of the tooth (see 'A')
The TOE is the small or inner end of the tooth (see 'B')
The DRIVE side of the drive gear tooth is CONVEX (see 'C')
The COAST side of the drive gear tooth is CONCAVE (see 'D')



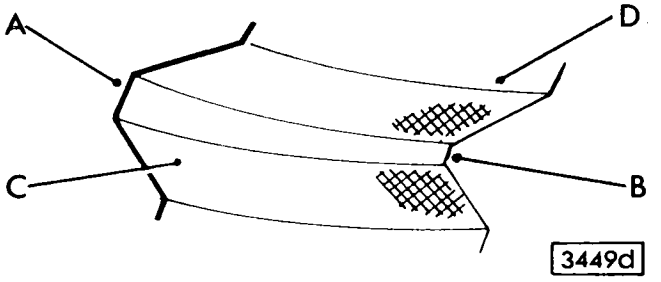
76. In High Tooth Contact it will be observed that the tooth contact is heavy on the drive gear face or addendum. To rectify this condition, move the pinion deeper into mesh, that is, reduce the pinion cone setting distance, by adding shims between the pinion inner bearing cup and the housing and fitting a new collapsible spacer.
This correction has a tendency to move the tooth bearing towards the toe on drive and heel on coast, and it may therefore be necessary after making this change to adjust the drive gear as described in operations 78 and 79.



77. In Low Tooth Contact it will be observed that the tooth contact is heavy on the drive gear flank or dedendum. This is the opposite condition from that shown in 76 and is therefore corrected by moving the pinion out of mesh, that is, increase the pinion cone setting distance by removing shims from between the pinion inner bearing cup and housing and fitting a new collapsible spacer.
This correction has a tendency to move the tooth bearing towards the heel on drive and toe on coast, and it may therefore be necessary after making this change to adjust the drive gear as described in operations 78 and 79.

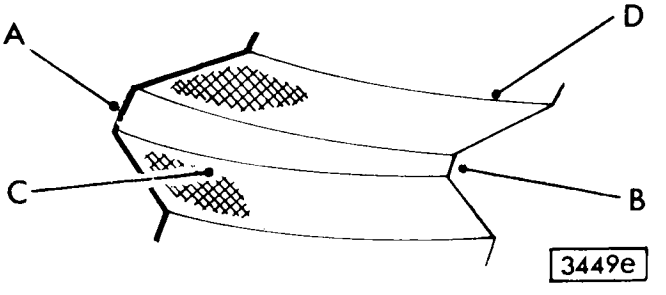


78. Toe Contact occurs when the bearing is concentrated at the small end of the tooth. To rectify this condition, move the drive gear out of mesh, that is, increase backlash, by transferring shims from the drive gear side of the differential to the opposite side.

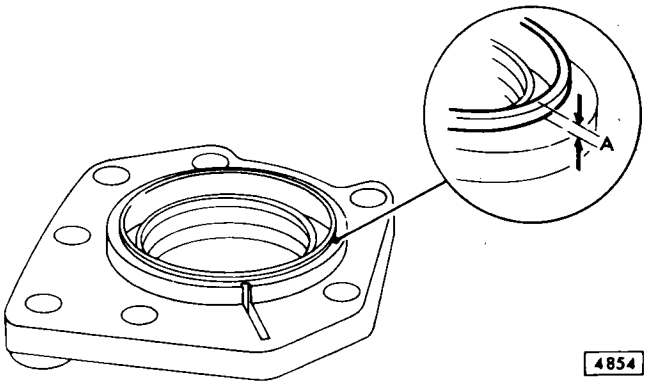


79. Heel Contact is indicated by the concentration of the bearing at the large end of the tooth. To rectify this condition move the drive gear closer into mesh, that is, reduce backlash, by adding shims to the drive gear side of the differential and removing an equal thickness of shims from the opposite side.

NOTE: It is most important to remember when making this adjustment to correct a heel contact that sufficient backlash for satisfactory operation must be maintained. If there is insufficient backlash the gears will at least be noisy and have a greatly reduced life, whilst scoring of the tooth profile and breakage may result. Therefore, always maintain a minimum backlash requirement of ,10 mm. (.004 in.).



80. Lightly oil new square section seal, position carefully, and press squarely to fully seat in drive shaft ball bearing housing.

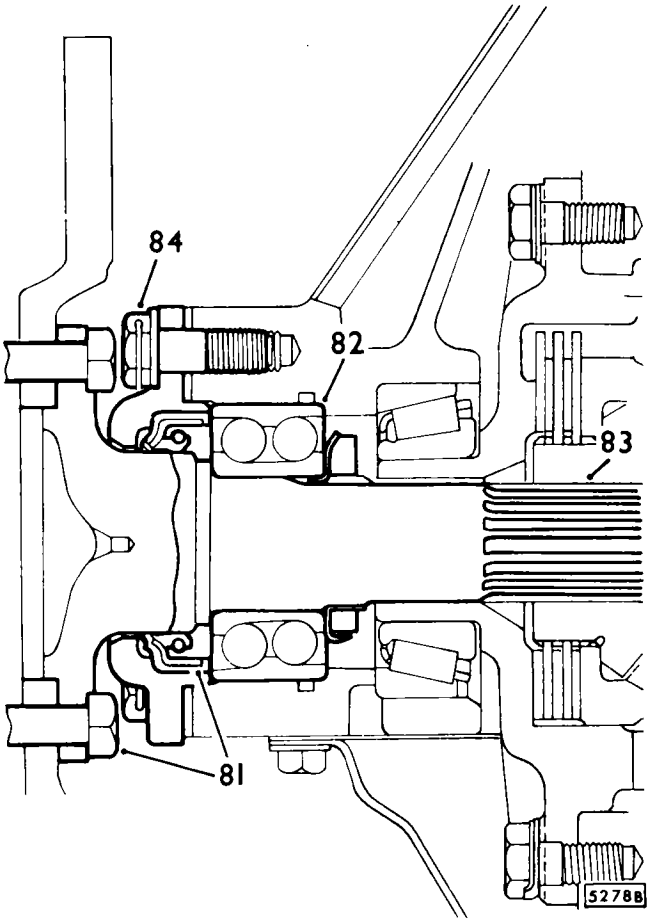


81. Coat oil seal with hypoid gear oil, fit four special flange bolts and position caliper mounting bracket and oil seal assembly over drive shaft.

CAUTION: Under no circumstances must the portion of caliper mounting bracket oil seal 'A' protruding above the housing be removed. This induces a metal to metal contact between housing and bearing and completely destroys the seal properties.

82. Slide a ball bearing on to drive shaft followed by new tab washer and nut. Ensure bearing seats square to drive shaft shoulder. Tighten nut to 12,4 to 14,2 kg.m. (90 to 110 lb.ft.) and turn up tab washer.
83. Lightly oil drive shaft splines and fit shaft into differential casing.
84. Fit five bolts and spring washers to retain mounting bracket. Screw up until finger tight.

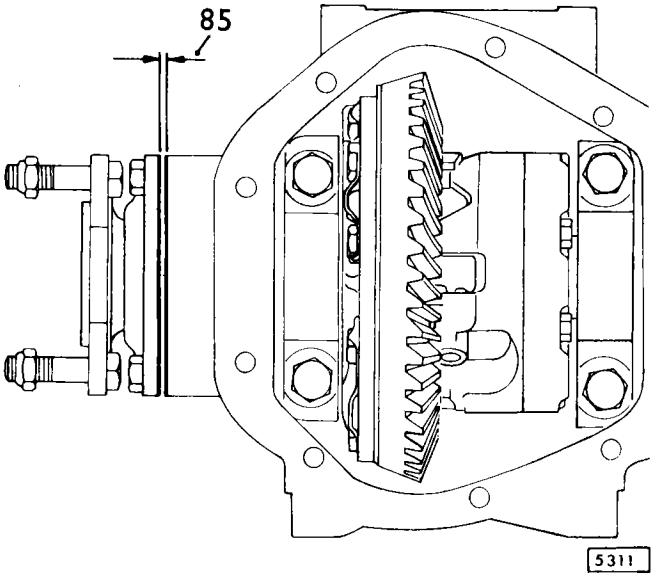
NOTE: Allowance has been made when calculating shimming required for ,076 mm. (.003 in.) squash of the oil seal when fully tightened.



85. Using feeler gauges, measure dimension between inside face of caliper mounting bracket and differential housing. The measurement obtained determines shimming required to give correct degree of nip on outer ball bearing race and oil seal flange.
Shims are available in the following thicknesses: ,076 mm., ,127 mm., ,254 mm. and ,762 mm. (.003 in., .005 in., .010 in. and .030 in.).
86. Remove drive shaft, select shims of required thickness. Thinly coat mating faces and shims with Hylomar (NOT grease), Fit four special flange bolts and refit drive shaft. Tighten bolts to 7,6 to 9,7 kg.m. (55 to 70 lb.ft.) by diagonal selection.
87. Wire lock five securing bolts to tension bolt in clockwise direction.

CAUTION: Exercise the greatest care when torquing companion flange nut as overtightening will necessitate almost complete dismantling of final drive unit to replace collapsible spacer.

88. Tighten companion flange securing nut to 16,6 to 19,34 kg.m. (120 to 140 lb.ft.). During tightening operation, the companion flange should be rotated periodically to ensure correct seating of the taper roller bearings.
Should the nut be inadvertently overtightened, the flange must be removed and a new collapsible spacer fitted. On no account must the nut be slackened off and re-torqued, as this will result in incorrect preloading of drive pinion bearings.
89. Using new gasket coated with Hylomar fit rear cover. Fit axle ratio tab beneath one of securing bolts.
90. Refit final drive unit to rear suspension unit.



CONTENTS

POWER STEERING FAULT FINDING

SYMPTOM	CAUSE	CURE
External oil leaks from steering rack unit.	Damaged or worn seals. Loose unions. Damaged union sealing washers.	Replace seals. Tighten unions to recommended torque. Replace sealing washers.
Oil leak at pump shaft	Damaged shaft seal.	Replace shaft seal.
Oil leak at high pressure outlet union.	Loose or damaged union. Damaged pipe end.	Tighten union to recommended torque. Replace pipe.
Oil leak at low pressure inlet connection.	Loose or damaged hose connection.	Remove and refit or renew hose and clip.
Oil overflowing reservoir cap.	Reservoir overfull. Sticking flow control valve (closed).	Reduce level in reservoir. Remove valve and clean or renew and refit.
Oil leak at reservoir edge.	Damaged 'O' ring.	Replace 'O' ring.
Noise from hydraulic system.	Air in system.	Bleed system, 57.15.02.
Noise from pump.	Slack drive belt (squealing). Internal wear and damage.	Adjust drive belt tension, 57.20.01. Overhaul pump, 57.20.20.
Noise from rack (rattling).	Worn rack and pinion gears. Worn inner ball joints.	Adjust rack damper, 57.35.09. Replace inner ball joints.
Steering veering to left or right.	Unbalanced tyre pressures. Incorrect tyres fitted. Incorrect geometry. Steering unit out of trim.	Inflate to correct pressure. Fit tyres of correct specification. Reset geometry to correct specification. Replace valve and pinion assembly.
Heavy steering when driving.	Low tyre pressures. Tightness in steering column. Tightness in steering joints.	Inflate to correct specification. Grease or replace. Grease and adjust or replace.
Heavy steering when parking.	Low tyre pressures. Tightness in steering column. Tightness in steering joints. Slack drive belt (squealing). Restricted hose. Sticking flow control valve (open). Internal leaks in steering unit.	Inflate to correct specification. Grease or replace. Grease and adjust or replace. Adjust drive belt tension, 57.20.01. Replace hose. Remove and clean or replace. Replace seals.
Steering effort too light.	Valve torsion bar dowel pins worn. Valve torsion bar broken.	Replace valve assembly. Replace valve assembly.

POWER STEERING UNIT

Remove and refit **57.10.01**

Service tool. Ball joint separator JD24.

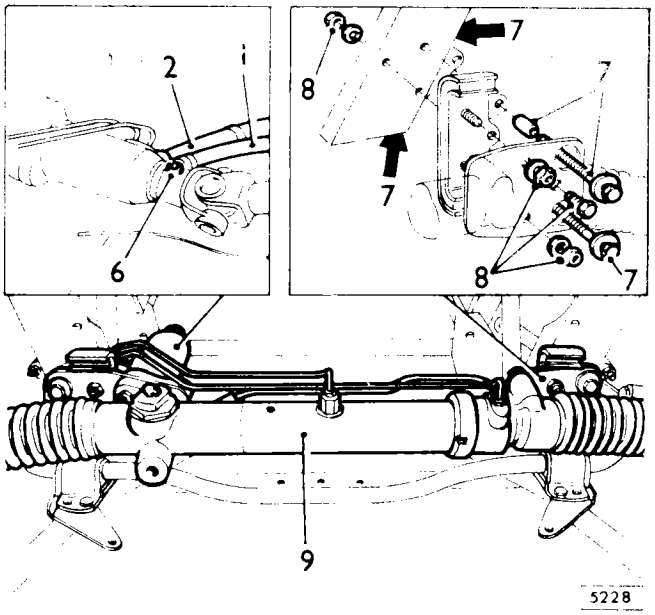
Removing

1. Disconnect low pressure union from pinion housing. Drain oil into container.
2. Disconnect high pressure union from pinion housing.
3. Blank off ports and pipes to prevent ingress of dirt.
4. Remove nuts and washer from track rod ball pins.
5. Extract ball pins using Service tool JD24.
6. Remove pinch bolt and washer.
7. Remove four self-locking nuts, withdraw safety bolts and washers. Collect spacers.
8. Remove six nuts and two bolts securing rack mounting plates and mounting rubbers.
9. Withdraw rack and mounting rubbers

Refitting

10. Reverse operations 1 to 9. Centralize rack unit and steering column before connecting to lower column.
11. Refill system with recommended fluid and bleed. 57.15.02.

NOTE If a replacement rack unit is to be fitted it will be necessary to detach the lower column from the upper column at the universal joint to ensure correct centralization.



OVERHAUL 57.10.07

Service tools. Seal protector – JD 35
Centralising tool – 12297

Dismantling

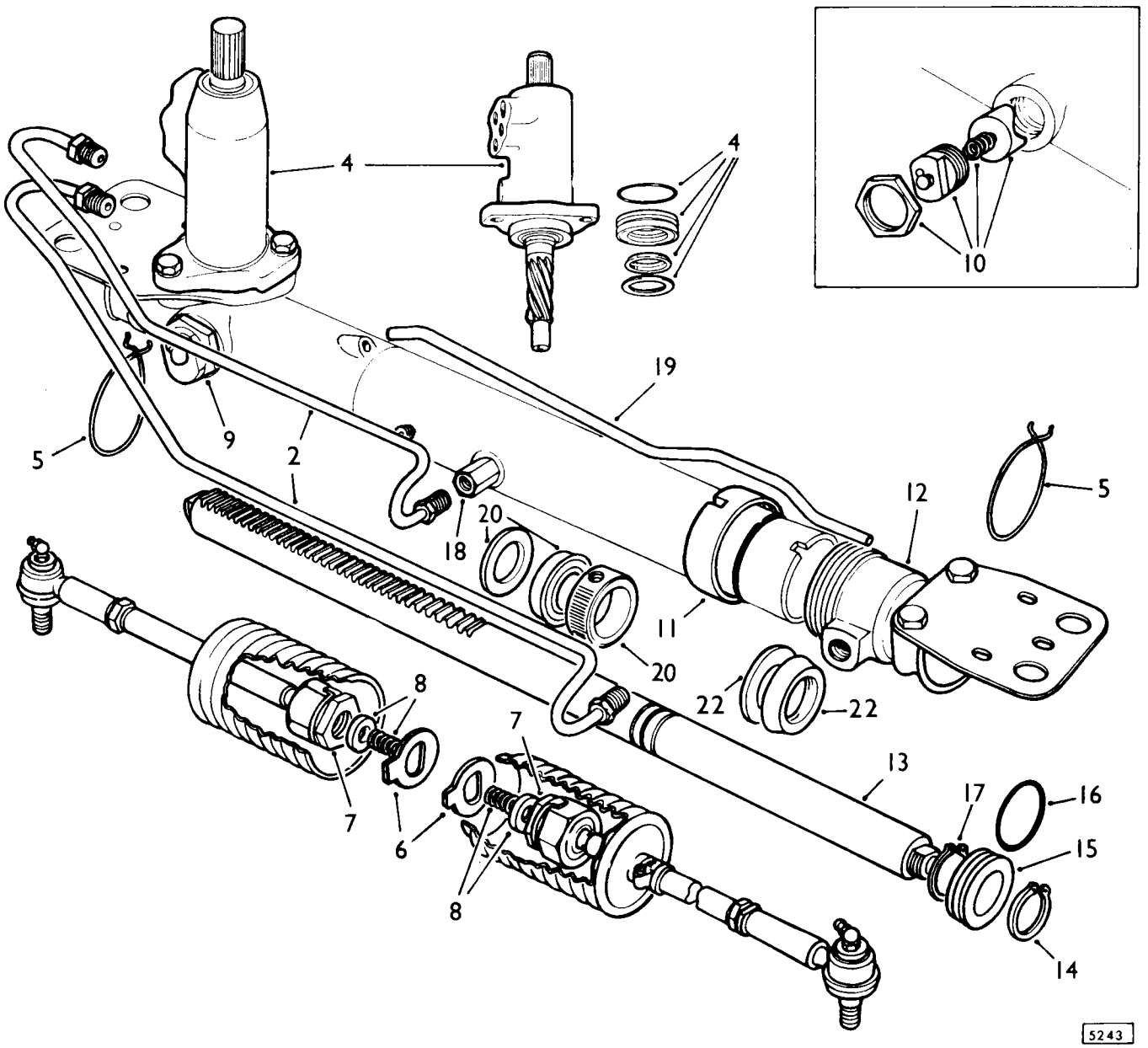
1. Remove rack assembly – 57.10.01.
2. Remove external pipes.
3. Clean rack exterior.
4. Remove valve and pinion assembly – 57.10.19.
5. Remove wire retaining clips and fold back bellows to expose inner ball joints.

   NOTE: Do not disturb outer ball joints unless replacement is necessary. If these are to be renewed check total length of tie-rods before releasing locknuts.

6. Knock back tab washers situated inboard of locknuts.

   CAUTION: Do not disturb lockwashers between locknut and ball pin housing.

7. Release locknut and unscrew tie-rod assemblies from rack.
8. Collect thrust springs and spacers.
9. Release locknut securing rack damper.
10. Remove nut, screwed plug, spring and rack damper pad.
11. Unscrew ring nut.
12. Remove end cap.
13. Withdraw rack.
14. Remove outer circlip.
15. Remove piston.
16. Remove piston 'O' ring.
17. Remove inner circlip.
18. Remove pipe union adaptor from housing assembly.
19. Extract centre pipe fitting from bore of rack housing.
20. Withdraw piston stop, seal and retaining washer. Discard seal.
21. Renew cracked or damaged pipe union seats. 57.10.24.
22. Remove seal and retaining washer from end cap. Discard seal.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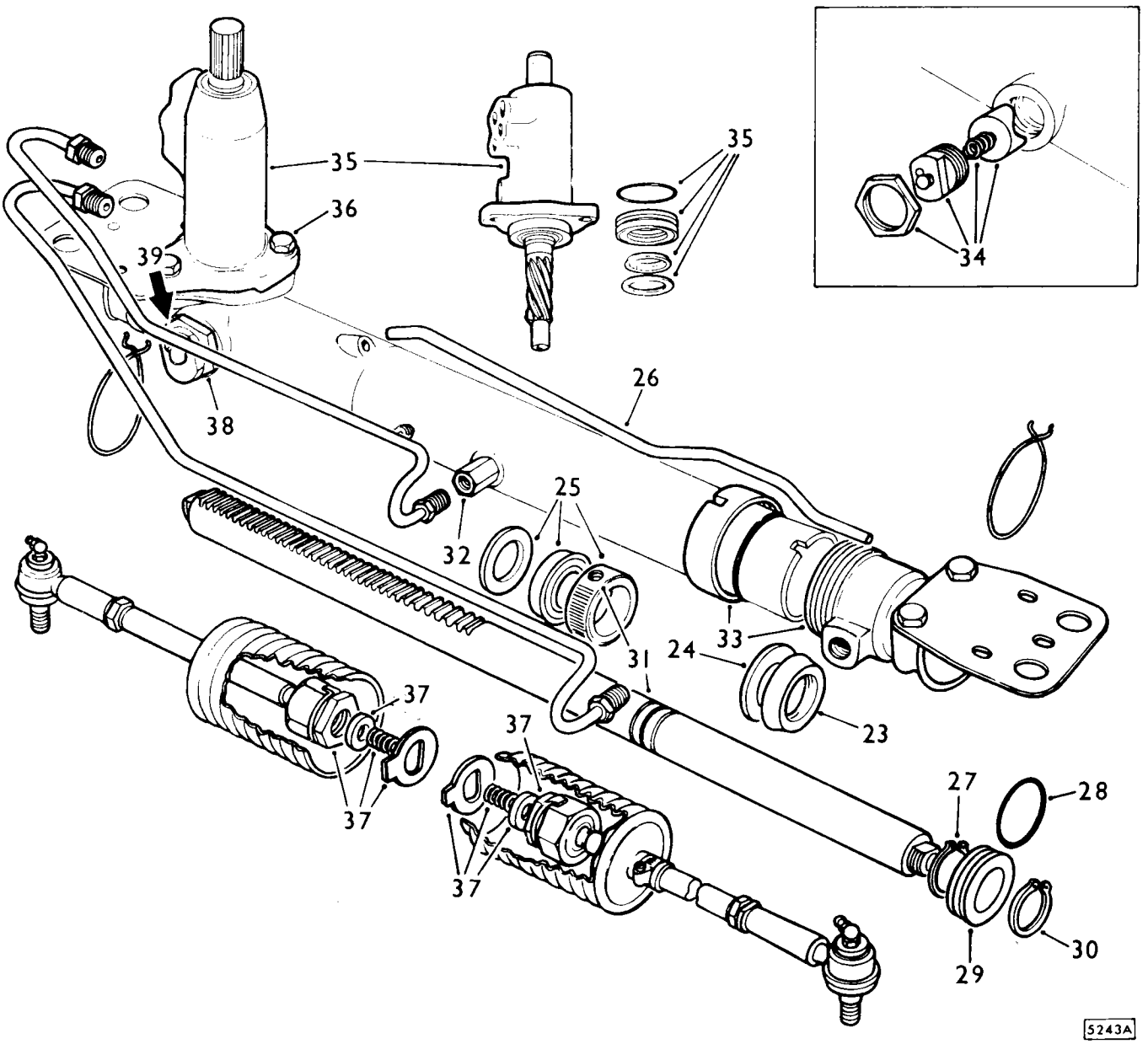
5243

Reassembling

23. Insert new seal, contained in seal kit, into end cap with lips towards external thread. Fit seal retaining washer.
24. Fit seal retaining washer to rack shaft.
25. Fit retaining washer, seal, contained in seal kit, to rack shaft from plain end of shaft. Lips of seal to face circlip grooves.
26. Fit centre pipe.
*27. Fit inner circlip.**
28. Fit new piston 'O' ring contained in seal kit.
29. Fit piston. Renew piston ring if scored or damaged.
30. Fit outer circlip.
31. Enter rack into housing. Check that threaded hole in piston stop registers with hole in housing.
32. Insert union adaptor and tighten fully.
33. Complete housing assembly by reversing operations 11 and 12.
34. Refit damper pad assembly by reversing operation 10. Do not adjust at this stage.
35. Overhaul valve and pinion assembly. 57.10.22.
36. Refit assembly to rack housing 57.40.19.
37. Reverse operations 5 to 8. Tighten nut fully and secure with tab washer. Renew bellows if damaged, refer to 57.10.27. Coat both rack ball housings with 57 grammes (2 oz.) of the recommended grade of grease before fitting bellows.
38. Adjust rack damper 57.10.13.
39. Apply grease gun to the nipple in damper and inject 28 grammes (1 oz.) of the recommended grade of grease. Do not over lubricate the housing to the extent where the bellows become distended.
40. Refit rack assembly. Operation 57.10.01.
41. Refill with recommended fluid and bleed system. Operation 57.15.02.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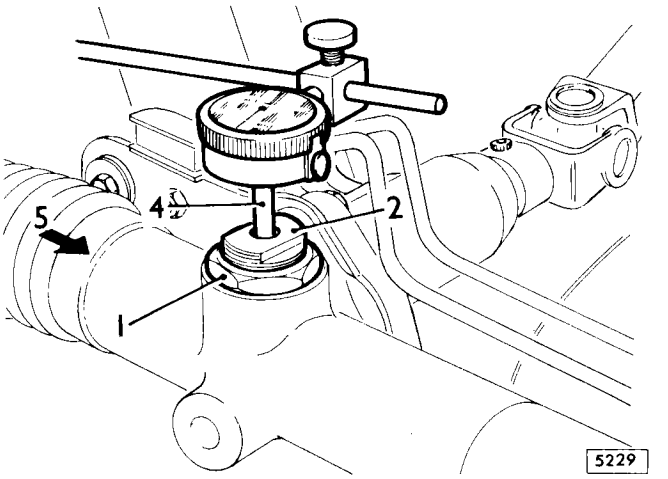
POWER STEERING RACK

Adjust 57.10.13

NOTE: the following adjustment for rack rattle usually apparent when travelling on rough surfaces, can be carried out on the car.

1. Release the locknut retaining the rack damper plug.
2. Screw in the damper plug until a firm resistance is felt and back off 22.5° (1/16 of a turn).
3. Remove nut and washer and detach tie-rod ball pin from the steering arm on steering wheel side, using suitable extractor.
4. Remove the grease nipple from the adjuster and insert a dial gauge ensuring that the stem passes through the plug and adjuster pad to contact the back of the rack.
5. Grip the tie-rod firmly and push towards the adjuster until the adjuster spring resistance is felt. By pulling the rack against the spring the total of play at the rack can be measured. Total play should not exceed .254 mm (.010 in.). Correct minimum clearance should allow smooth operation of unit without binding at any point throughout full travel.
6. Finalize adjustment by screwing the adjuster plug in or out as required and tightening the locknut.
7. Remove dial gauge and refit grease nipple.
8. Refit ball pin.



CONTROL VALVE AND PINION

Remove and refit 57.10.19

NOTE: The control valve and pinion assembly may be removed with the steering rack unit in situ if this part only is to be serviced as indicated following test procedure. Operation 57.10.20.

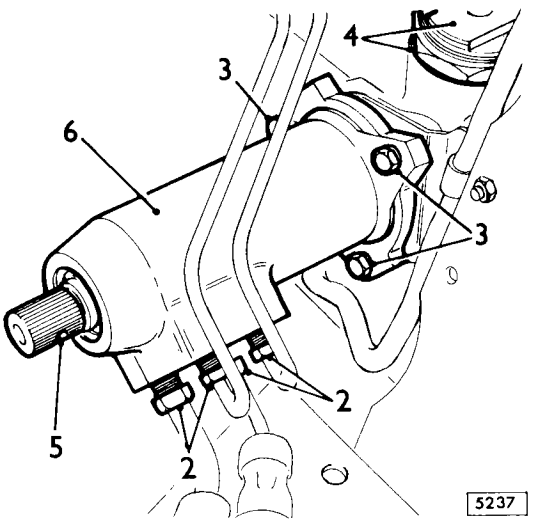
Removing

1. Remove lower steering column 57.40.05.
2. Disconnect two feed and two return pipes from pinion housing.
3. Remove three setscrews and washers securing pinion housing to steering rack unit.
4. Release rack adjuster locknut and back off adjuster plug.
5. Note location of pinch bolt slot in pinion shaft in relation to housing for reference when refitting.
6. Withdraw pinion housing. Discard joint.

CAUTION: Do not move road wheels or turn steering column after pinion housing has been removed.

Refitting

7. Reverse operations 1 to 6. Ensure that the pinch bolt slot is in exactly the position relative to the housing as noted on removal.
8. Adjust rack adjuster plug as detailed in operation 57.10.13.



CONTROL VALVE AND PINION

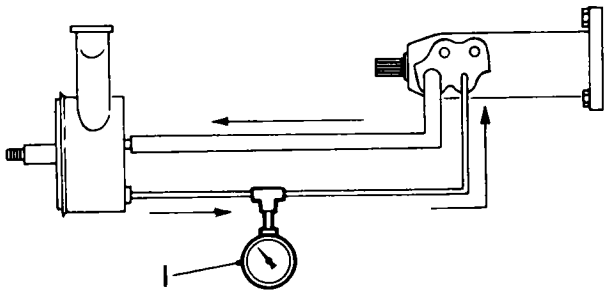
Test **57.10.20**

Faults developing in the control valve and pinion assembly as indicated in the following test as shown under "Fault Finding" will necessitate renewing the control valve and pinion
No adjustment or repair is permissible.
Check tyres, tyre pressures and steering geometry before testing.

1. Install a 7 kg/cm^2 (100 lb. per sq. in.) pressure gauge in the feed line, start engine and allow to idle. Gauge should register 2,8 kg/cm^2 (40 lb. per sq. in.) approximately.
2. Turn the steering wheel slightly to the right or left.

CAUTION: Do not turn steering excessively as this will produce high pressure resulting in irreparable damage to the gauge.

Pressure should increase by an equal amount irrespective of the direction. Any un-balance will be indicated by a slight fall in pressure on either side before rising.
3. Stop and restart engine and check that steering does not kick to one side.



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PINION SEAL

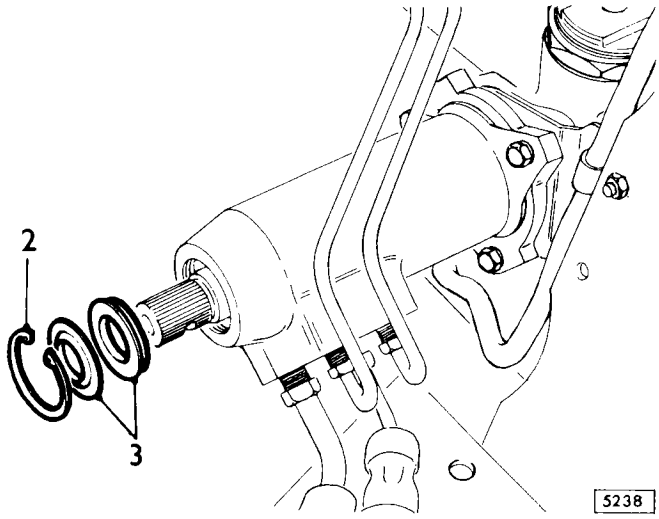
Remove and refit **57.10.23**

Removing

1. Remove lower steering column 57.40.05.
2. Remove circlip.
3. Withdraw seal and retainer.

Refitting

Reverse operations 1 to 3.



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PORT INSERTS

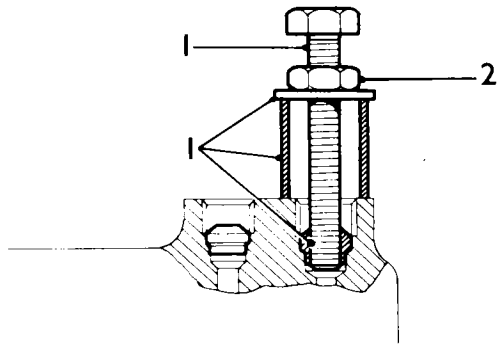
Remove and refit **57.10.24**

Removing

1. Tap a suitable thread in the bore of the seat, and insert a setscrew with attached nut, washer and distance piece.
2. Tighten the nut and withdraw the seat.

Refitting

3. Insert seat and tap home squarely with a soft mandrel.



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POWER STEERING RACK BELLOWS

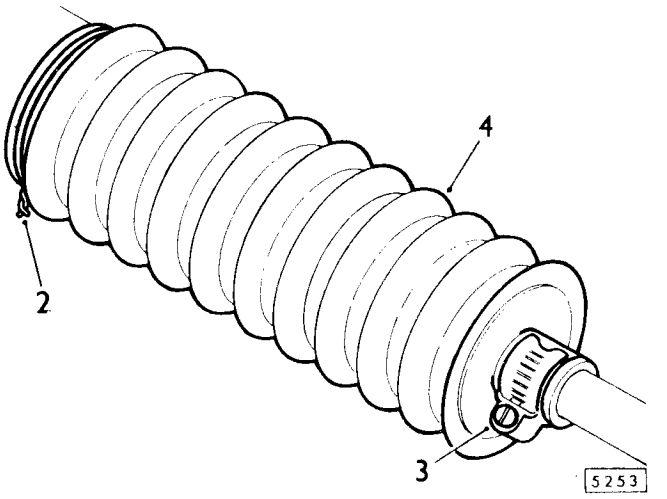
Remove and refit 57.10.27

Removing

1. Remove outer ball joint 57.55.02.
2. Remove wire clip.
3. Slacken clip securing bellows to tie rod.
4. Withdraw bellows; clean grease from inner joints.

Refitting

Reverse operations 1 to 4. Coat each inner ball joint with 57 grammes (2 oz.) of the recommended grade of grease before attaching bellows to rack housing.



SYSTEM TESTING 57.15.01

Faults in the system can be caused by inefficiencies in the hydraulic system, see "Fault Finding Chart". The following tests can be carried out without removing any components from the car. Check fluid level before carrying out tests.

PUMP BLOW-OFF PRESSURE

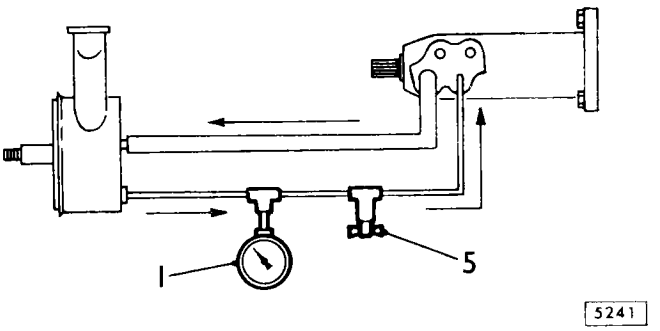
1. Fit pressure gauge in pressure line.
2. Start engine and allow to run at idling speed.
3. Turn steering to full lock and continue to increase steering effort until pressure recorded on gauge ceases to rise.
4. Check that recorded pressure lies between 77 and **84 kg/cm^2 (1,100 and 1,200 lb. sq. in.)** Pressure should not increase with higher engine R.P.M.

NOTE: If pressure is below 77 kg/cm^2 (1,100 lb./sq. in.) at tickover, but rises to correct figure with increased engine speed, the fault is caused by a faulty control valve in the pump, or by excessive internal leakage in the rack and pinion unit. Carry out following test to establish location.

5. Fit an 'ON-OFF' tap in series between gauge and steering unit, ensuring that TAP IS OPEN.
6. Start engine and allow to run at idling speed.
7. Turn steering to full lock.
8. Check gauge reading 84 kg/cm^2 (1,200 lb/sq. in.).
9. If pressure does not reach 84 kg/cm^2 (1,200 lb/sq. in.) CLOSE TAP AT ONCE, noting gauge reading as tap reaches "OFF" position (84 kg/cm^2 or 1,200 lb/sq. in.).

CAUTION: Tap must not be closed more than 5 seconds when engine is running.

NOTE: If above reading is obtained leaks are confined to steering unit which must be overhauled see 57.10.07.



POWER STEERING SYSTEM

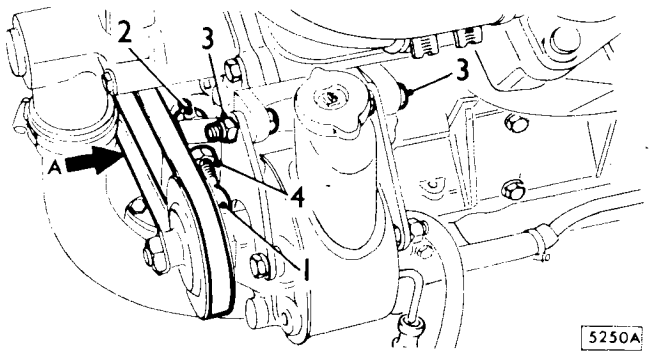
Bleed **57.15.02**

1. Fill reservoir to the full mark on dipstick with recommended grade of fluid.
2. Start engine and turn steering from lock to lock a few times to expel any air which may be present in system. Indicated when all lumpiness has disappeared.
3. Check fluid level. Top up with correct fluid only.

**STEERING PUMP DRIVE BELT

Adjust **57.20.01**

1. Slacken bolt securing adjusting bolt to power assisted steering pump.
2. Slacken adjusting bolt locknut.
3. Slacken nuts securing mounting bracket retaining bolts.
4. Adjust drive belt tension by screwing adjusting bolt locknut up or down to achieve total belt tension at point 'A' in illustration of 9,5 mm (.375 in.).**



STEERING PUMP DRIVE BELT

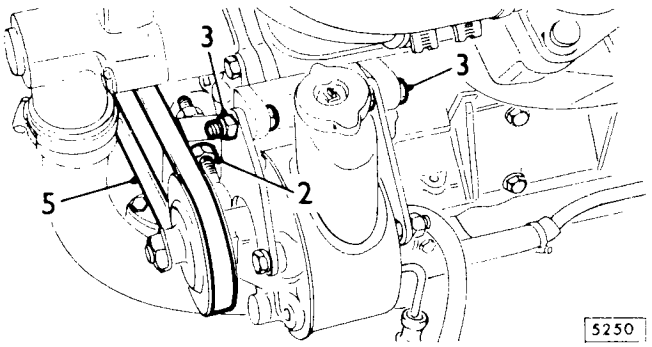
Remove and refit **57.20.02**

Removing

1. Remove alternator belt 86.10.03.
2. Release inner nut locking pump belt adjuster bolt to trunnion block.
3. Slacken off pump mounting bolts.
4. Swing pump in towards engine.
5. Remove belt.

Refitting

6. Reverse operations 1 to 5.
7. Adjust alternator and pump belts to correct tension **86.10.05 and 57.20.01.**



STEERING PUMP

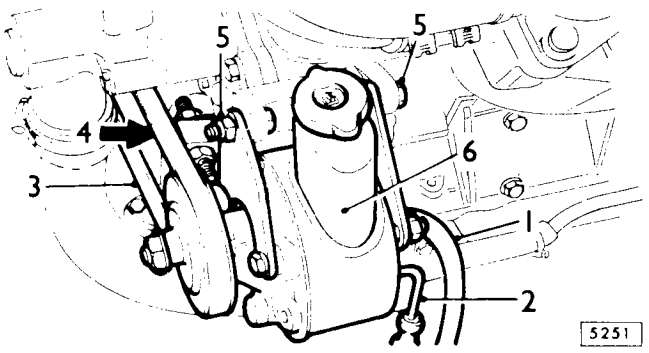
Remove and refit **57.20.14**

Removing

1. Remove hose clip and withdraw low pressure hose from outlet at rear of pump reservoir casing. Drain oil into container.
2. Detach high pressure hose from union on reservoir casing.
3. Remove belt 57.20.02.
4. Withdraw adjuster trunnion securing bolt and lockwasher.
5. Remove two bolts, nuts and lockwashers securing support brackets to pivot mounting.
6. Remove pump/reservoir assembly.

Refitting

7. Reverse operations 1 to 6.
8. Adjust belt to correct tension.
9. Refill system with recommended fluid and bleed 57.15.02.



STEERING PUMP OVERHAUL 57.20.20

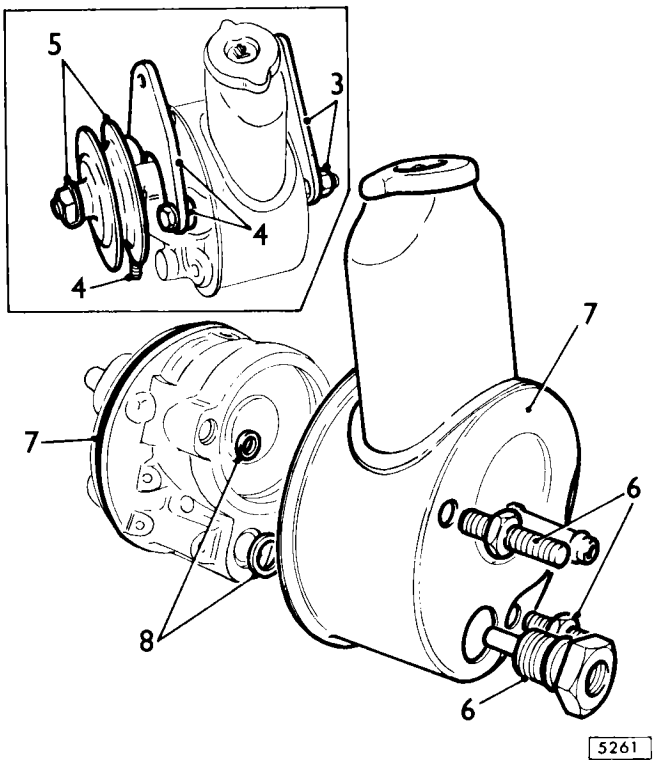
Dismantling and reassembling

Dismantling

1. Remove belt. 57.20.02.
2. Remove pump. 57.20.14.
3. Remove two nuts and lockwashers and detach rear mounting bracket.
4. Note relative size of each spacer, withdraw two setscrews and lockwashers and detach trunnion front mounting bracket and spacers.

   NOTE: Before dismantling further thoroughly clean exterior.

5. Remove tabwasher and nut, withdraw pulley.
6. Remove high pressure outlet union and two mounting studs.
7. Detach reservoir from pump body. Remove 'O' ring from body.
8. Remove three 'O' rings from recesses in pump body.
9. Insert suitable pin punch in hole in pump body. Push retaining ring away from groove.
10. Lever out ring with screwdriver.



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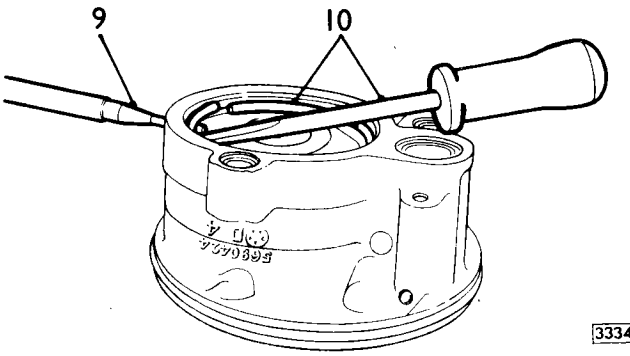

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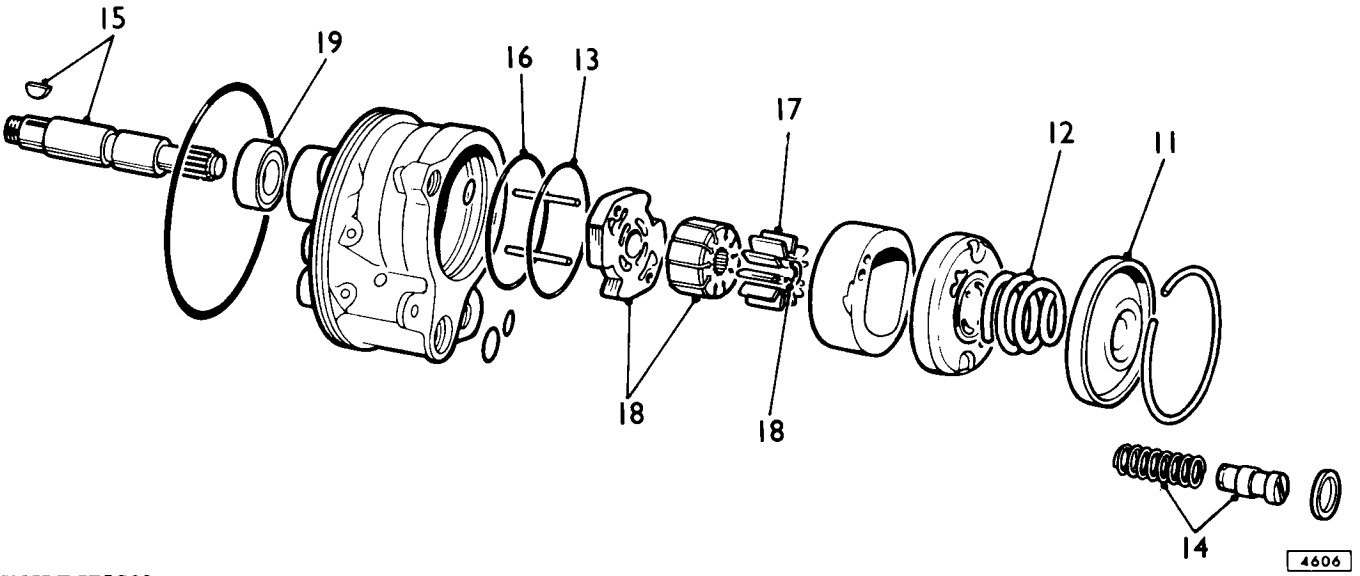
11. Remove end plate.

    NOTE: If end plate sticks in pump body a light tap will free it.

12. Remove spring.
13. Remove end plate 'O' ring from internal recess in pump body.
14. Withdraw flow control valve and spring.
15. Remove drive key and top shaft and rotor assembly rearwards through pump body.
16. Remove pressure plate 'O' ring from pump body.
17. Separate rotor assembly components taking care not to damage pump rotor vanes.
18. Remove circlip and withdraw rotor and thrust plate.
19. Remove drive shaft oil seal.

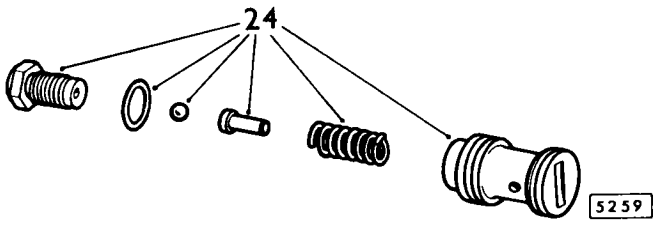


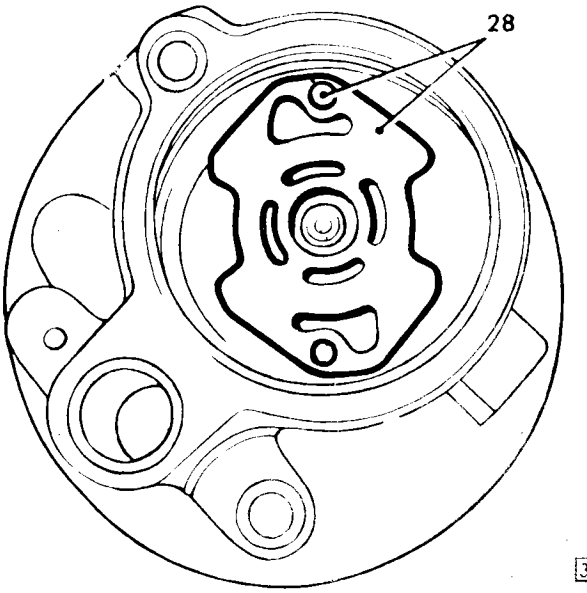
INSPECTION

20. Clean all parts in solvent. Renew all 'O' rings and shaft seal. Seal kit No. 10992.

    NOTE: Do not immerse new seals in solvent.

21. Check pressure plate, thrust plate and rotor. Light scoring can be removed by lapping.
22. Check contour surface for extreme wear. Scuff marks and uniform wear are not detrimental. Renew pump ring and vanes if chatter marks and grooves exist. Repair kit No. 11653.
23. Check shaft and bushing. The bush is not replaceable as a separate item.
24. Check flow control valve for free movement in bore. Remove burrs or foreign matter if sticking. Renew if faulty.

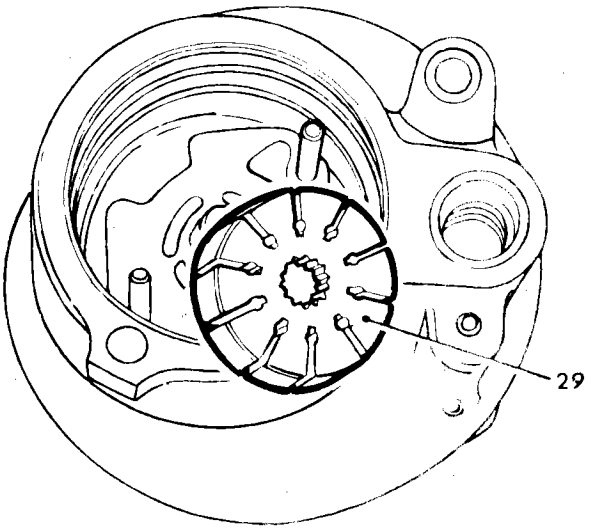




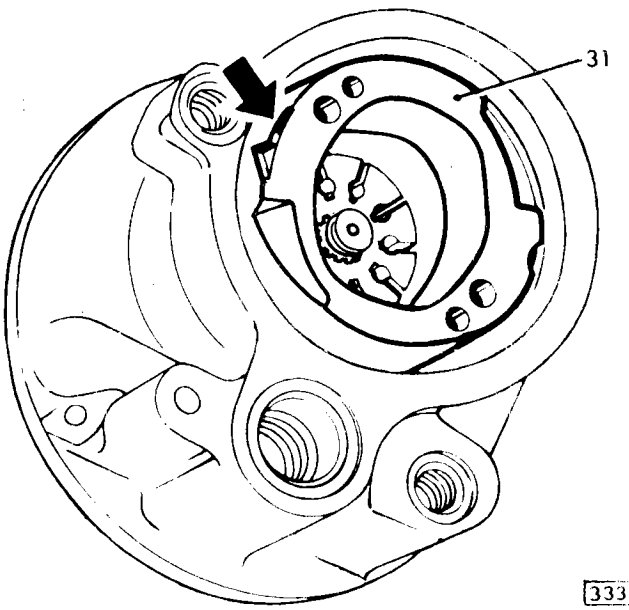
3338A

Reassembling

25. Lubricate shaft seal with petroleum jelly and fit to pump body.
26. Insert drive shaft, splined end first.
27. Insert dowel pins in pump body.
28. Fit thrust plate over dowel pins, ported face uppermost.
29. Fit rotor on splines with counterbored side towards thrust plate.
30. Fit retaining clip.
31. Fit pump ring over dowel pins, rotation arrow uppermost.



3336A



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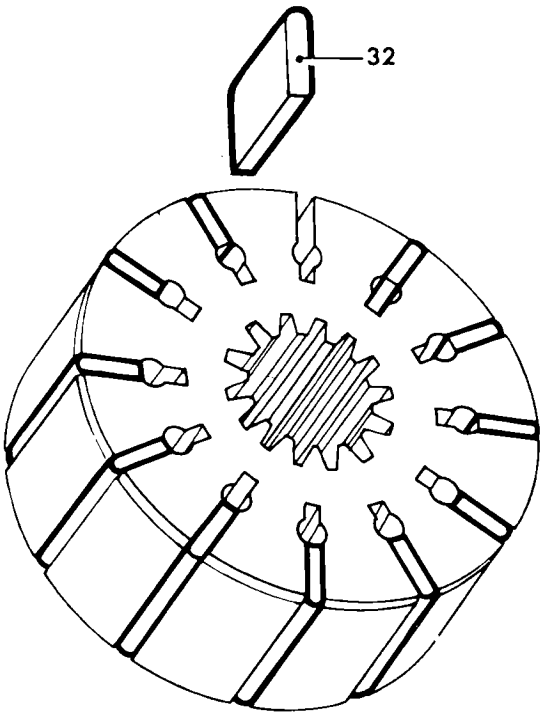

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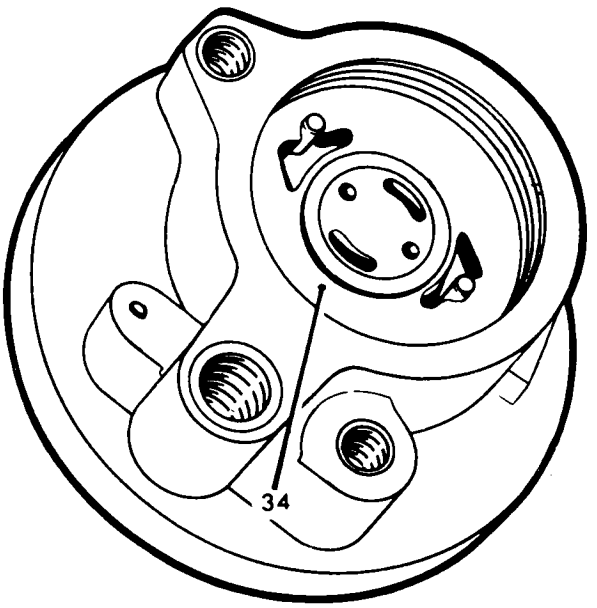
32. Insert vanes in rotor slots, radiused edges outwards.
33. Lubricate pressure plate 'O' ring and insert in lower groove.
34. Lubricate periphery of pressure plate and fit over dowel pins with recess for spring uppermost.
35. Push the plate down firmly and squarely to engage 'O' ring.

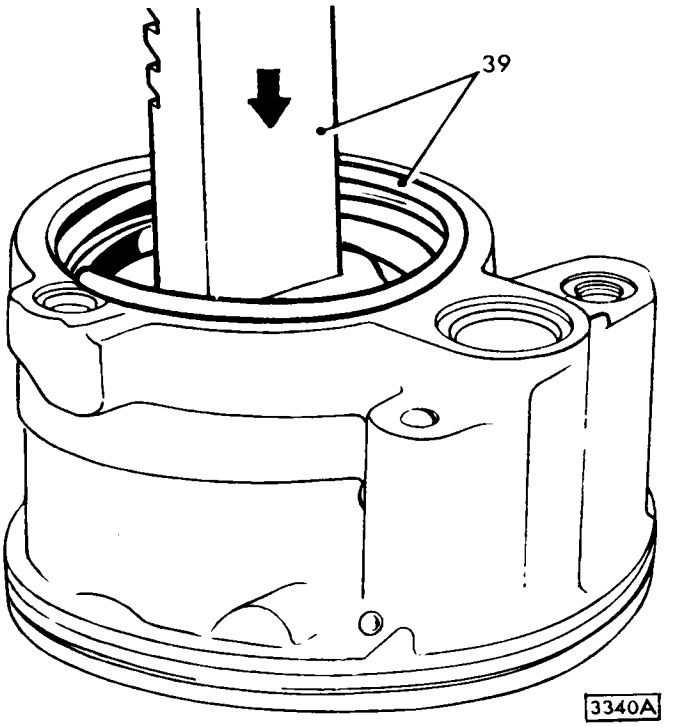
NOTE: Do not tap into position.

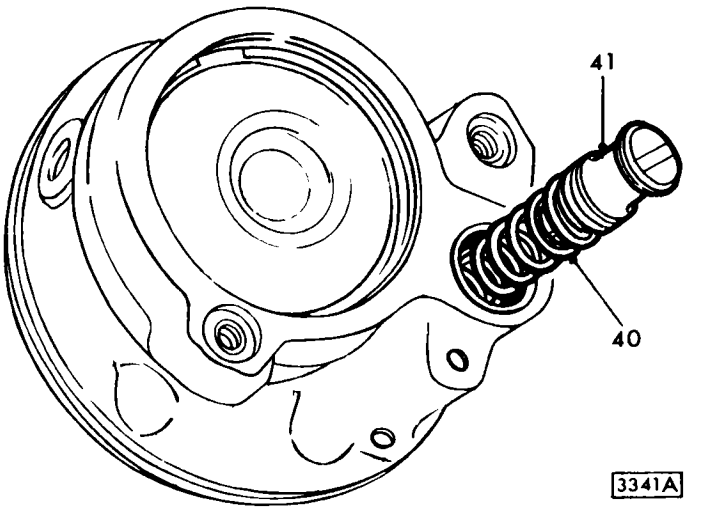
36. Lubricate end plate 'O' ring and insert in groove in pump body.
37. Fit spring in circular recess in pressure plate.
38. Lubricate periphery of end plate. Place in position with retaining ring. Ensure that gap in ring is not opposite removal hole in pump body.



3339A

39. Place assembly under a press. Apply pressure until retaining ring can be sprung into the groove.
40. Place control valve spring in bore.
41. Insert control valve.
42. Fit new 'O' rings for retaining studs and outlet union in position.
43. Lubricate reservoir sealing ring and fit to pump body.
44. Fit reservoir, secure with retaining studs and outlet union.
45. Fit drive key, pulley, tab washer and nut.
46. Refit pump.
47. Refit belt.
48. Refill system with recommended fluid and bleed 57.15.02.





UPPER STEERING COLUMN

Remove and refit **57.40.02**

Removing

1. Disconnect battery 86.15.01.
2. Remove parcel tray on driver's side. 76.67.04.
3. Remove scuttle casing on driver's side. 76.46.11.
4. Remove nut and bolt securing upper universal joint to upper column.
5. Disconnect leads to turn indicator switch and column lock/starter switch at plug and socket connection.
6. Disconnect lead to key alarm buzzer if fitted.
7. Remove ignition key and lock steering in straight ahead position.
8. Withdraw upper column lower mounting setscrews. Collect packing piece(s).
9. Remove column top mounting bolts and nuts.
10. Withdraw upper column from universal joint splines.

NOTE: Do not alter the position of the road wheels when the column has been removed.

Refitting

No repair or adjustment, of any description, is permissible. Damaged or worn units must be renewed.

Reverse operations 1 to 10. Check that upper column and road wheels are centralised before reconnecting splines.

CAUTION: Excessive force, which may damage the nylon shear plugs in the inner column and mounting, must not be used when withdrawing or refitting the column. Burrs on splines should be removed with a fine file.

LOWER STEERING COLUMN

Remove and refit **57.40.05**

Removing

1. Remove pinch bolts securing upper and lower column universal joints.
2. Remove ignition key and lock steering in straight ahead position.
3. Withdraw upper column lower mounting set screws. Collect packing piece(s).
4. Release upper column top mounting bolts and nuts.
5. Withdraw upper column to limit of travel in upper mounting.
6. Push lower column down to limit of splines in lower universal joint until upper joint is clear of upper column.
7. Withdraw lower column from lower universal joint and remove from the interior of car.

NOTE: Do not alter position of road wheels when lower column has been removed.

Refitting.

No repairs are permissible. Damaged columns must be renewed.

Reverse operations 1 to 7. Check that upper column and road wheels are centralized before reconnecting splines.

CAUTION: Excessive force, which may damage the shear plugs, must not be used when withdrawing and refitting the columns. Burrs on splines should be removed with a fine file.

STEERING COLUMN UNIVERSAL JOINTS

Remove and refit **57.40.25**

1. Carry out operations 1 to 6 57.40.05 when removing upper joint.
2. Complete operations 1 to 7 to remove lower joint.

STEERING COLUMN LOCK

Remove and refit **57.40.31**

Removing

1. Remove upper column. 57.40.02
2. Remove horn slip ring contact and insulation piece.
3. Drill through the centre of the sheared retaining bolt and withdraw with an "Easi-out" extractor.
4. Withdraw lock.

Refitting

5. Refit lock to column.
6. Insert new shear bolt and tighten until the head is sheared away.
7. Reverse operations 1 and 2.

OUTER TIE-ROD BALL JOINT

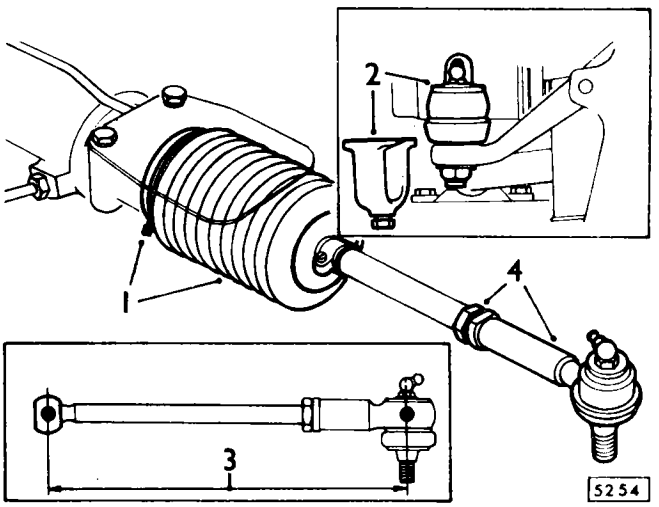
Remove and refit **57.55.02**

Removing

1. Remove wire clip and detach bellows from rack housing.
2. Remove outer ball joint from steering arm with tool JD24.
3. Check exact length of the tie-rod between ball centres.
4. Release locknut, remove ball joint.

Refitting.

Reverse operations 1 to 4. Ensure that the tie-rod when assembled is to the exact length as noted on removal.



INNER TIE-ROD BALL JOINT

Remove and refit **57.55.03**

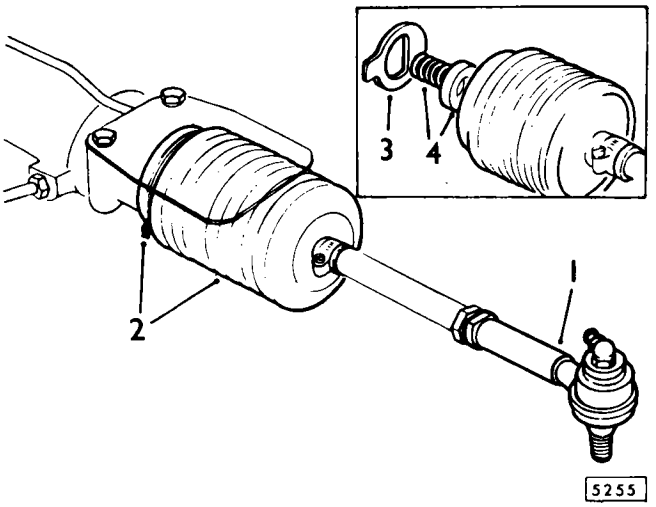
Removing

Replacement inner ball joints will only be supplied complete with the tie-rods, less outer ball joint as an assembly. No adjustment or repair is permissible.

1. Remove outer ball joint 57.55.02.
2. Remove wire clip and detach bellows.
3. Knock back tab washer and release locknut securing ball joint to rack shaft.
4. Remove tie-rod assembly. Collect thrust spring and spacer.

Refitting

5. Reverse operations 1 to 4. Secure nut with new tab washer.
6. Coat inner ball joint with 57 grammes (2 oz.) of the recommended grade of grease before attaching bellows to rack housing.



STEERING WHEEL

Remove and refit **57.60.01**

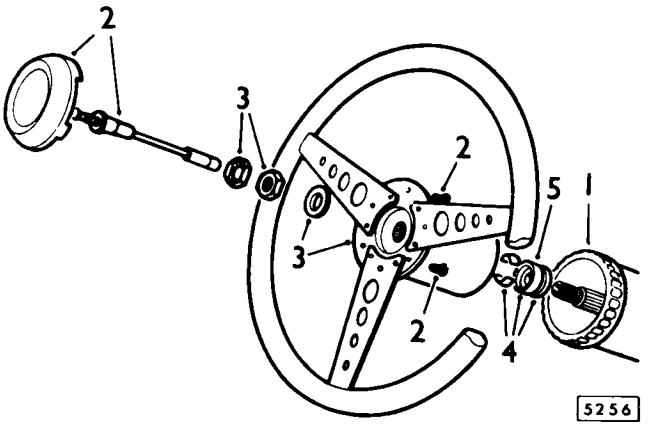
CAUTION: On no account should undue force be used to remove/refit steering wheel as this will cause nylon pegs in steering column to shear.

Removing

1. Slacken steering wheel locknut and pull steering wheel to the full extent of its adjustment.
2. Remove the screws from rear of steering wheel hub and withdraw horn push button.
3. Remove pal nut, hexagon nut and flat washer. Withdraw steering wheel from splines of inner column.
4. Remove split collet, impact rubber and impact washer.
5. Examine impact rubber and renew if necessary.

Refitting

Reverse operations 1 to 4.



FRONT WHEEL ALIGNMENT

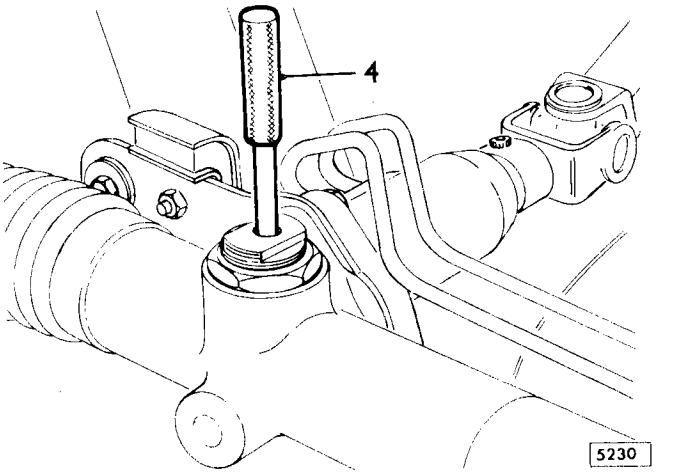
Service Tool: Rack Centralising Tool Jaguar Part No. 12297.

Check and adjust **57.65.01**

1. Inflate tyres to correct pressures.
2. Set front wheels in straight ahead position.
3. Remove grease nipple from rack adjuster pad.
4. Insert centralizing tool and adjust the position of the rack until the reduced tip of the tool registers with the locating hole in the rack.
5. Check the alignment by using light beam equipment or an approved track setting gauge.

   Adjust if necessary as follows:

6. Slacken the locknuts at the outer end of each tie-rod. Release the outer clips securing the rack bellows.
7. Turn the tie-rods by an equal amount until the alignment is correct. Refer to "DATA" Section 04.
8. Tighten locknuts and re-check.
9. Ensure that the bellows are not twisted and tighten the clips.
10. Remove centralizing tool and refit grease nipple.



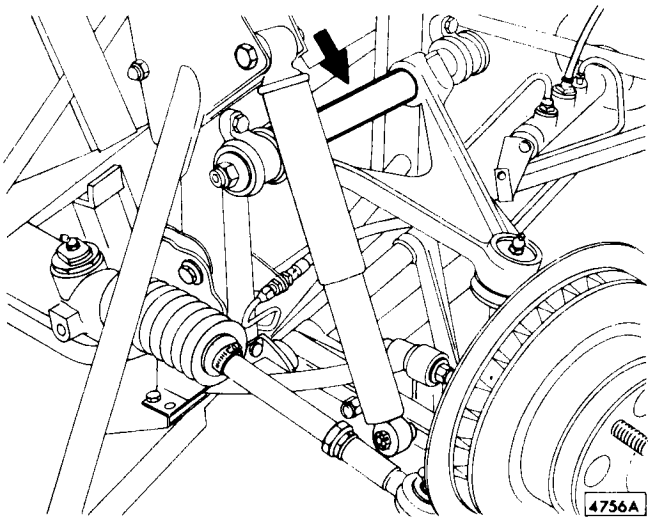
CASTOR ANGLE

Check and adjust **57.65.04**

1. Ensure that car is standing on level ground and inflate tyres to correct pressures.
2. Set rear suspension in mid-laden position. 64.25.12.
3. Obtain a wooden block 15,56 cm (6.125 in.) high and place under the centre of the front sub-frame lower cross member.
4. Load car until cross member is in contact with test block.
5. Check castor angle using an approved gauge. Refer to "DATA" Section 04.
6. Adjust by rotating the round threaded shaft on the upper wishbone bracket. Release the locknuts at the front and rear of the fulcrum shaft and also the wishbone clamping bolts. Rotate the fulcrum shaft by means of a spanner placed on the two flats provided, anti-clockwise. Rotate the shaft, viewed from front of car, to increase positive castor angle and clockwise to decrease.
7. Re-tighten wishbone clamp bolts.
8. Remove load and test block and allow the full weight of car to rest on the front suspension. Re-tighten shaft locknuts.

   NOTE: Omitting to carry out this procedure will result in undue torsional loading of the rubber bushes.

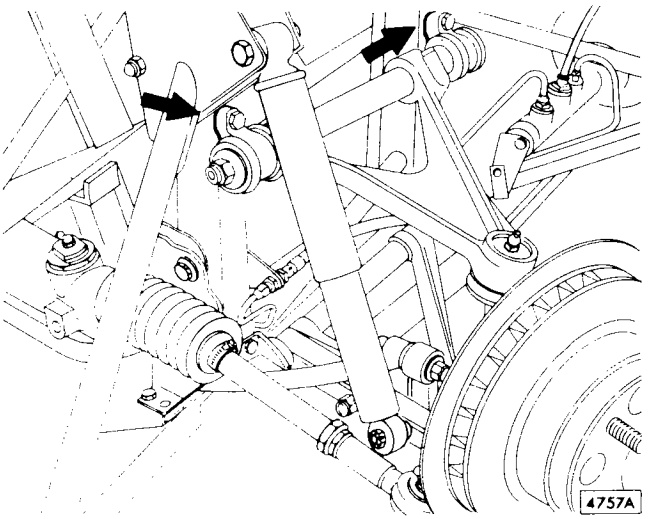
9. Check front wheel alignment. 57.65.01.



CAMBER ANGLE

Check and adjust 57.65.05

1. Ensure that car is standing on level ground and inflate tyres to correct pressures.
2. Set rear suspension in mid-laden position. 64.25.12.
3. Fit test block and load car as detailed in 57.65.04.
4. Line up wheel to be checked parallel to centre line of car. Check camber angle with an approved gauge. Refer to "DATA" Section 04.
5. Rotate wheel through 180° and re-check.
6. Adjust by removing or adding shims between the fulcrum shaft front and rear mounting brackets and the sub-frame. Remove or add an equal thickness of shims from each position otherwise the castor angle will be affected. Inserting shims will increase positive camber angle, removing shims will decrease angle. 1,6 mm (.063 in.) of shimming will alter camber by approximately ¼°.
7. Check opposite wheel.
8. Check front wheel alignment 57.65.01.



CONTENTS

WARNING: THE FRONT SUSPENSION SPRINGING MEDIUM IS A PRE-STRESSED TORSION BAR. FOR THIS REASON IT IS MOST IMPORTANT THAT PROCEDURES ARE EXACTLY FOLLOWED IF PERSONAL INJURY IS TO BE AVOIDED.

ANTI-ROLL BAR

Remove and refit — 60.10.01

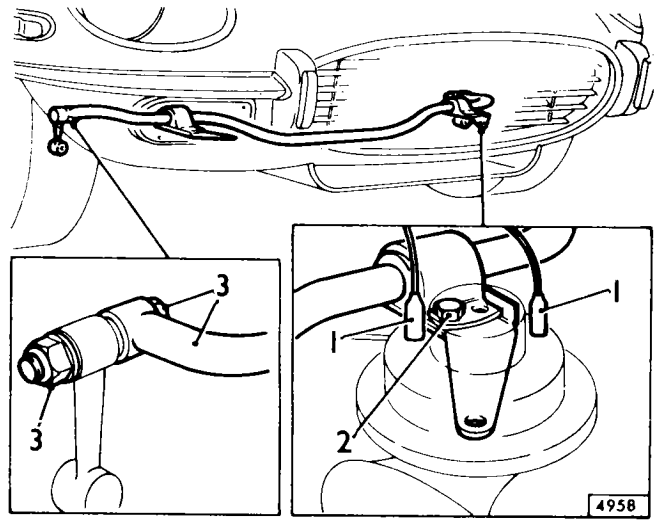
Removing

1. Disconnect leads from left and right horns leaving horns attached to anti-roll bar brackets.
2. Remove four nuts and setscrews securing anti-roll bar brackets to chassis member and remove brackets and keeper plates.
3. Remove self-locking nuts and washers and withdraw two bolts securing anti-roll bar link arms; detach anti-roll bar.

Refitting

4. Reverse operations 1 to 3.

CAUTION: All nuts and setscrews must be tightened with full weight of car on the suspension; premature failure of rubber bushes may occur if this precaution is not taken.



ANTI-ROLL BAR LINK

Remove and refit — 60.10.02

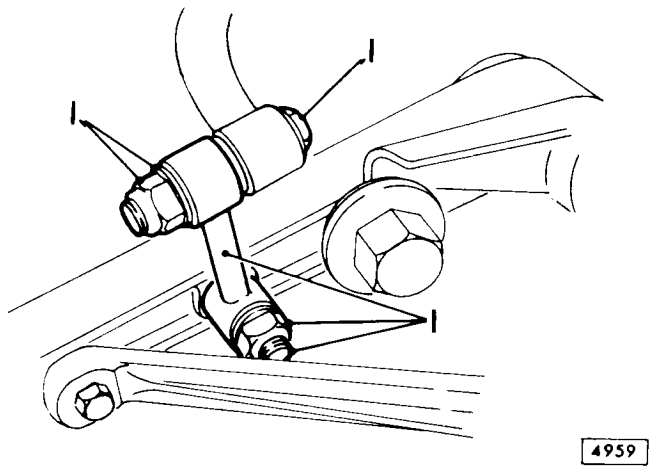
Removing

1. Remove nuts and washers and withdraw bolts retaining link to anti-roll bar and lower wishbone. Note location of bevel on washers for reference when refitting.

Refitting

2. Check conditions of bushes in link. Replace if damaged – 60.10.03.
3. Reverse operation 1 to refit.

CAUTION: Nuts must only be tightened with full weight of car on suspension; premature failure of bushes may occur if this precaution is not taken.



ANTI-ROLL BAR LINK BUSHES

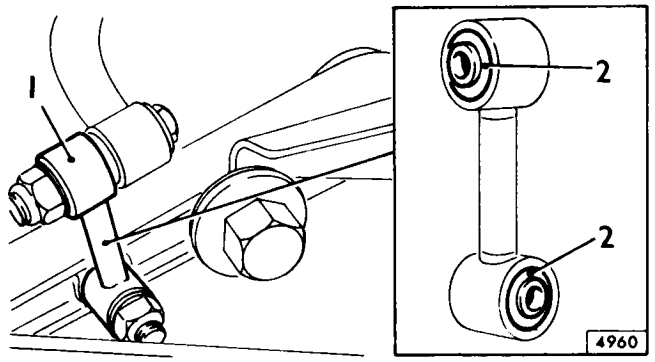
Remove and refit **60.10.03**

Removing

1. Remove anti-roll bar link – 60.10.02.
2. Press out bushes from link arm upper and lower eyes.

Refitting

3. Reverse operations 1 and 2 ensuring that each bush protrudes an equal amount from each side of eye. A lubricant made from one part liquid soap to twelve parts water will aid the fitting of bushes.



ANTI-ROLL BAR RUBBERS

Remove and refit **60.10.04**

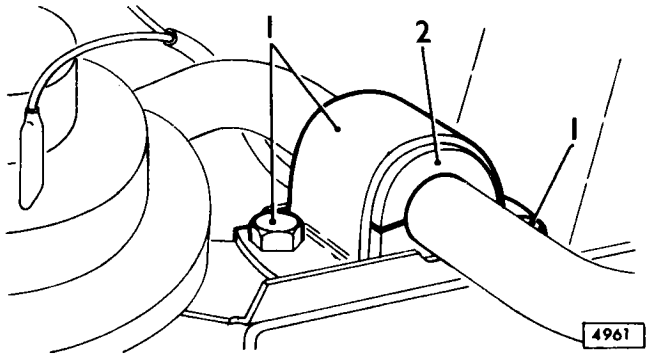
Removing

1. Remove nuts and setscrews securing anti-roll bar brackets to chassis member and remove keeper plates.
2. Remove rubbers from around anti-roll bar.

Refitting

3. Reverse operations 1 and 2 ensuring that each rubber protrudes an equal amount each side of its respective keeper plate. The split in rubbers should face forward.

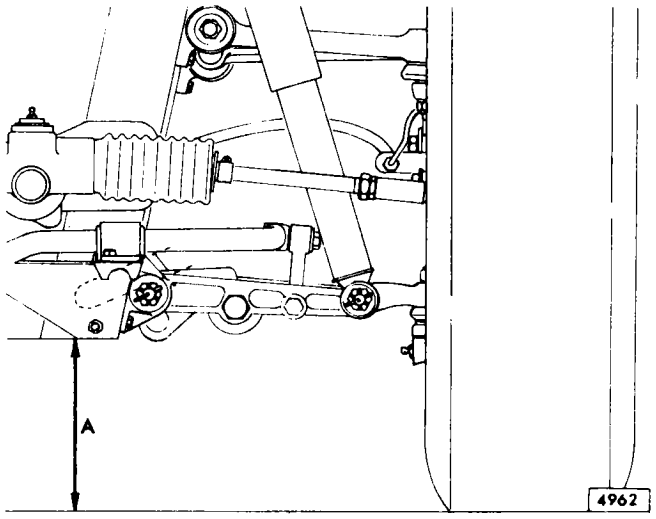
CAUTION: All nuts and setscrews must be tightened with full weight of car on the suspension; premature failure of rubber bushes may occur if this precaution is not taken.



FRONT SUSPENSION RIDING HEIGHT

Check **60.10.18**

1. Check that car is full of petrol, oil and water and that tyre pressures are correctly adjusted.
2. Roll car forward three lengths on a perfectly level surface.
3. Measure distance of lower surface of front sub-frame lower cross member to ground at right hand side and left hand side of car. The measurement 'A' should be 15.9 cm. ± .64 cm. (6¼ in. ± ¼ in.). Should adjustment be required operation number 60.20.36 is to be carried out.



BALL JOINT UPPER

Remove and refit **60.15.02**

Removing

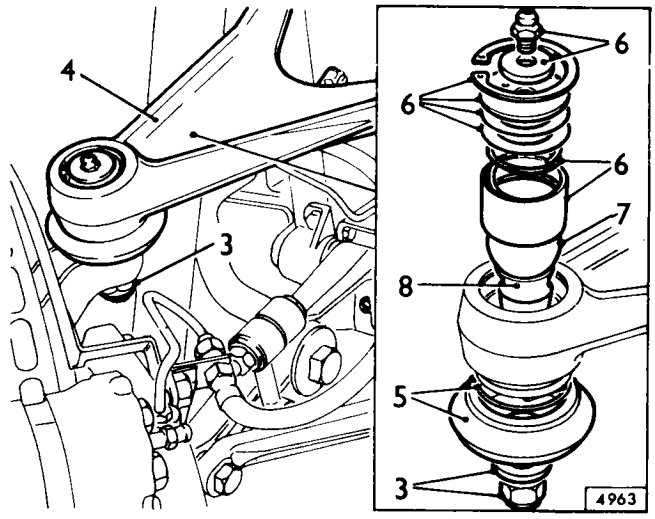
1. Remove road wheel – 70.20.01.
2. Support hub on stand.
3. Remove ball pin nut and tap sharply with hammer adjacent to the ball joint to free taper.
4. Withdraw wishbone from carrier.
5. Remove gaiter from ball joint.
6. Remove circlip and top cover. Collect shims, spring, and top socket, nylon washer and grease nipple.
7. Withdraw ball pin.
8. Remove rubber sleeve.
9. Clean and examine all metal parts. Ball pins and sockets **must** be renewed if worn or scored.

Refitting

10. Renew gaiter and rubber sleeve over ball pin.
11. Lightly grease ball pin and insert into wishbone seat.
12. Fit top socket, shims, spring cover and circlip.
13. Check ball pin clearance and adjust as necessary.
14. Add shims until ball pin is tight in socket. Remove one shim and re-check.

CAUTION: Excessive wear must not be compensated for by shimming. **New parts must be fitted.**

15. Repeat operation until pin moves readily under pressure.
16. Refit wishbone and pin assembly to carrier.
17. Charge the ball joint with the recommended grade of lubricant.



BALL JOINT LOWER

Remove and refit **60.15.03**

Removing

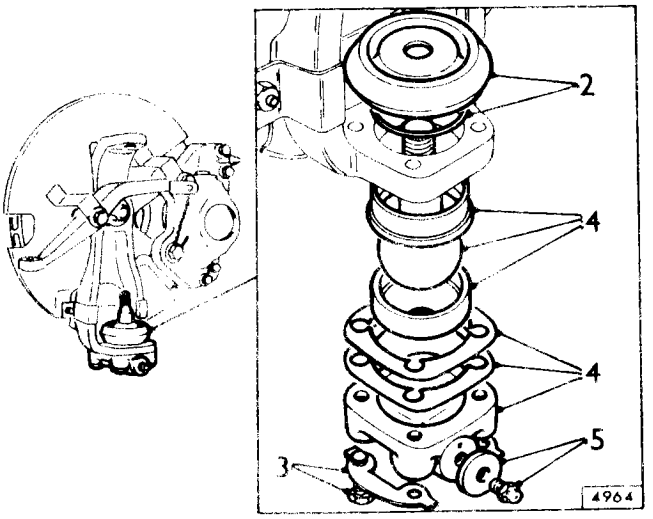
1. Remove stub axle carrier – 60.25.23.
2. Remove ring and clip retaining gaiter and remove gaiter.
3. Bend back tab washers, remove four screws securing ball pin cap to stub axle carrier.
4. Detach ball pin cap, shims, socket, ball pin and spigot from stub axle carrier.
5. Remove grease nipple and washer from ball pin cap.
6. Clean and examine all parts. Renew where necessary.

Refitting

7. Fit grease nipple and washer to ball pin cap.

CAUTION: In order to obtain correct adjustment of the ball joint it is necessary to shim to the correct clearance. Excessive wear on ball pin and sockets must not be adjusted by shims. **Worn parts must be renewed.**

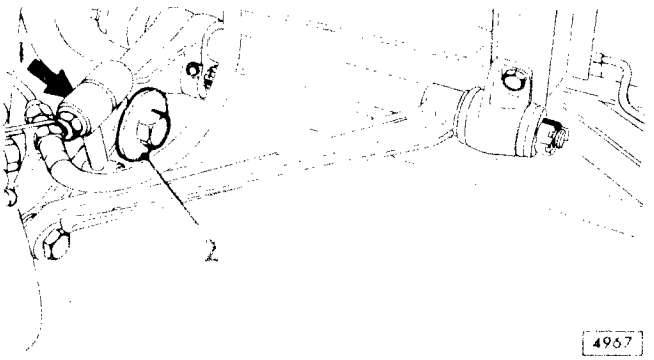
8. Fit spigot, ball pin, socket, shims, ball pin cap and screws. Remove shims one by one until the ball pin is tight in its socket with screws fully tightened.
9. Remove screws, ball pin cap, shims and socket. Add shims to the value of .10 mm. to .15 mm. (.004 in. to .006 in.).
10. Lightly grease ball pin and socket. Refit socket, ball pin cap and new tab washers. Refit and tighten screws. Ball pins should now move readily in socket.
11. Reverse operations 1 and 2.
12. Charge ball joint with recommended lubricant.



TORSION BAR

Adjust **60.20.36**

1. Slacken locknut on cam adjuster on lower wishbone front.
2. Rotate cam adjuster to give correct riding height - 60.10.18.
3. Tighten locknut to a torque of **7.6 kg.m. (55 lb.ins.).**
4. Check front suspension riding height - 60.10.18.



TORSION BAR

Remove and refit 60.20.42

Up to chassis number 1S50064 R.H.D. 1S70412 L.H.D.

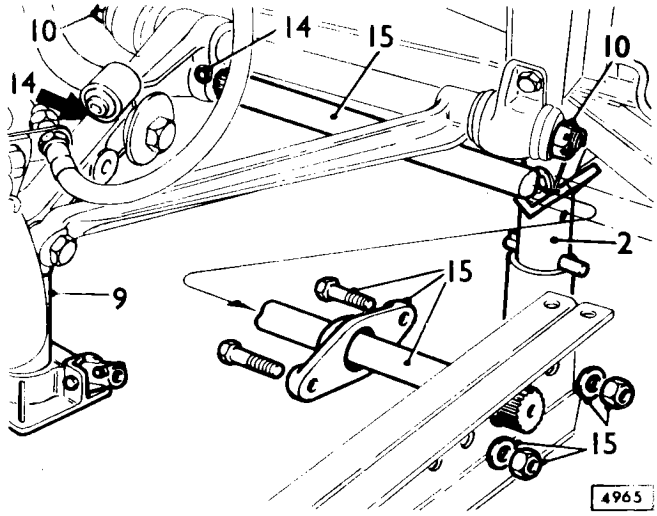
BLUE coding on Torsion Bar for L.H. fitting
RED coding on Torsion Bar for R.H. fitting

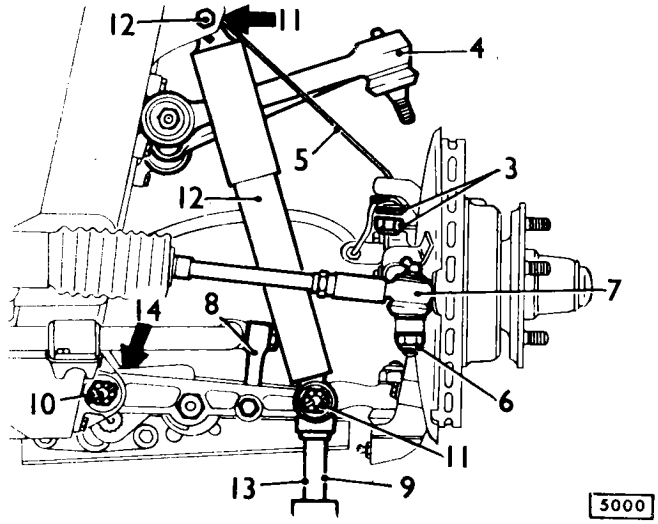
Removing

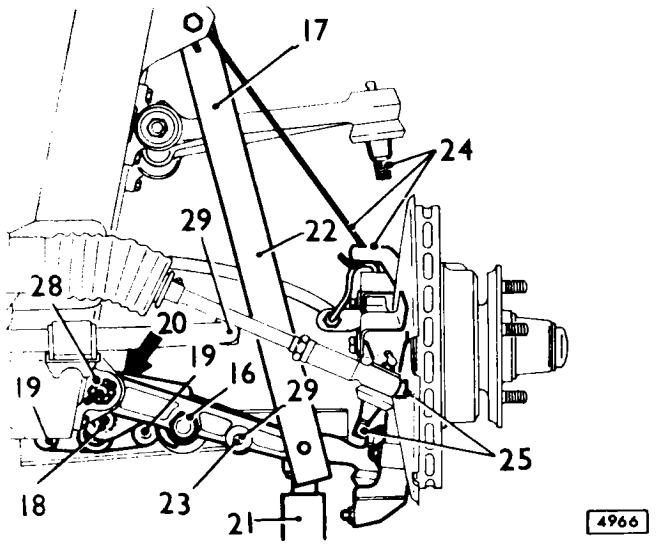
1. Remove road wheel 70.20.01.
2. Place stand under cross tube bracket beneath rear lower wishbone fulcrum support bracket.
3. Remove ball pin nut and tap sharply with light hammer adjacent to ball joint to free seat.
4. Withdraw joint and wishbone from carrier.
5. Tie stub axle carrier to sub frame to hold axle carrier in vertical position.
6. Remove self locking nut from steering tie rod end.
7. Lift tie rod to pull ball pin out of taper seat in stub axle carrier.
8. Remove anti-roll bar link 60.10.02.
9. Jack up lower wishbone at a point adjacent to damper lower mounting but do not lift car off stands.
10. Remove split pins and slacken nuts retaining lower wishbone rubber mountings.
11. Remove split pin and nut from damper top and bottom mounting bolts.
12. Withdraw top mounting bolt and detach damper from car.
13. Lower jack.
14. Remove locknut and torsion bar locating bolt from lower wishbone adjusting lever and withdraw torsion bar from splines in lower wishbone and reaction bracket.
15. Remove bolts, washers and locknuts securing torsion bar reaction bracket and remove reaction bracket and torsion bar.

Refitting

16. Slacken locknut on cam adjuster of lower wishbone front, set cam at its lowest point and tighten locknut to a torque of **7.6 kg.m. (55 lb.ins.).**
17. Fit setting gauge with two holes drilled at 49.69 cm. (19.563 in.) centres to damper mounting points to position lower wishbone.
18. The torsion bar has 24 splines front and 25 splines rear for micro-adjustment. Fit torsion bar into lower wishbone and reaction bracket so that fixing holes of reaction bracket coincide with holes in mounting bracket; the torsion bar is rotated spline by spline in wishbone and reaction bracket to achieve this position.
19. Fit bolts, washers and locknuts securing reaction bracket.
20. Secure torsion bar with locating bolt and locknut.
21. Jack up lower wishbone at a position adjacent to the lower mountings.
22. Remove setting gauge and fit damper, replace bolts and nuts but do not fully tighten nuts.
23. Loosely fit anti-roll bar link 60.10.02.
24. Untie stub axle carrier and replace upper ball pin taper into seat in stub axle carrier and secure with washer and locknut.
25. Replace tie rod end ball pin in taper seat in stub axle. Replace and tighten nut.
26. Remove stands and jack. Refit road wheel.
27. Tighten nuts securing damper and insert split pins.
28. Tighten lower wishbone fulcrum shaft nuts and insert split pins.
29. Tighten nuts securing anti-roll bar link.
30. Check front suspension riding height – 60.10.18.







TORSION BAR

Remove and refit **60.20.42**
(From cars numbered 1S50065 R.H.D.
1S70413 L.H.D.)

Service Tool — JD.43 Torsion bar tensioning rack

WARNING: Torsion bar colour coded BLUE Fit to left hand side.
Torsion bar colour coded RED Fit to right hand side.

Removing

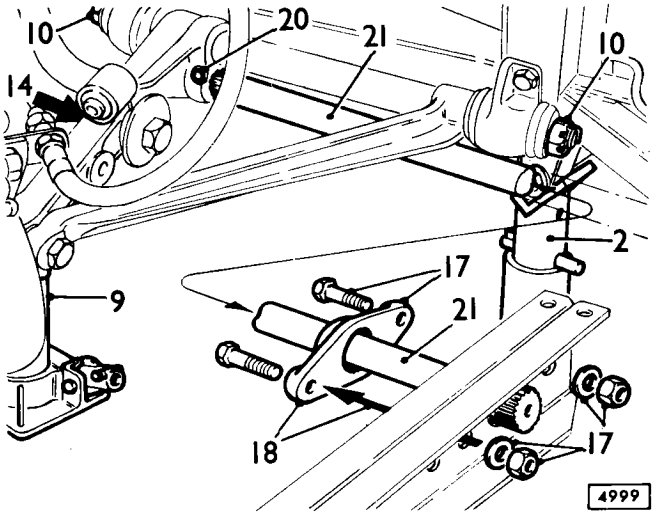
1. Remove road wheel – 70.20.01.
2. Place stand under lower wishbone fulcrum support bracket.
3. Remove ball pin nut and tap sharply with light hammer to ball joint to free seat.
4. Withdraw joint and wishbone from carrier.
5. Tie stub axle carrier to sub frame to hold carrier in vertical position.
6. Remove self-locking nut from steering tie rod end.
7. Lift tie rod to pull ball pin out of taper seat in stub axle carrier.
8. Remove nut, bolt and washers from top of anti roll bar link.
9. Jack up lower wishbone at a point adjacent to the damper lower mounting but do not lift car off stands.
10. Remove split pins and slacken nuts retaining lower wishbone rubber mountings.
11. Remove split pin and nut from damper top and bottom mounting bolts.
12. Withdraw top mounting bolt and detach damper from car.
13. Lower jack to fit setting gauge with holes drilled at 48.89 cm. (19.25 in.) centres between damper securing points.
14. Slacken locknut on cam adjuster of lower wishbone and set cam to lowest point.

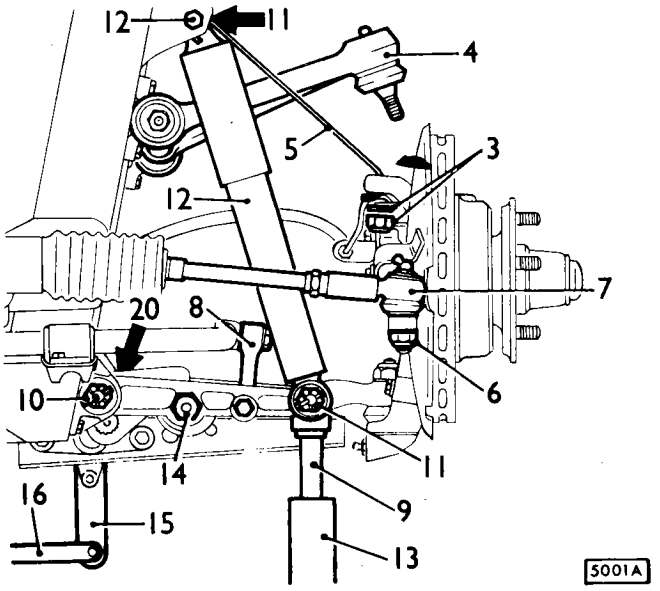
WARNING: BEFORE REMOVING TORSION BAR, SET BARREL NUT OF TORSION BAR TENSIONING RACK SO THAT APPROXIMATELY 25.4 mm. (1.0 in.) OF THREAD IS SHOWING AT RACK END OF NUT.
WHEN REFITTING, SET RACK TO SHOW 63.5 mm. (2.5 in.) OF THREAD. UNDER NO CIRCUMSTANCES MUST THE RACK BE USED WITH MORE THAN 63.5 mm. (2.5 in.) OF THREAD SHOWING.

15. Fit tool to rear of torsion bars.
16. Slightly turn barrel nut to shorten link and take bar torsion.
17. Remove setscrews and nuts securing torsion bar reaction bracket.
18. Slide bracket forward along torsion bar.

NOTE: It may be necessary to slowly ease tension of bar to half cover bolt holes in reaction bracket, then tap through to free.

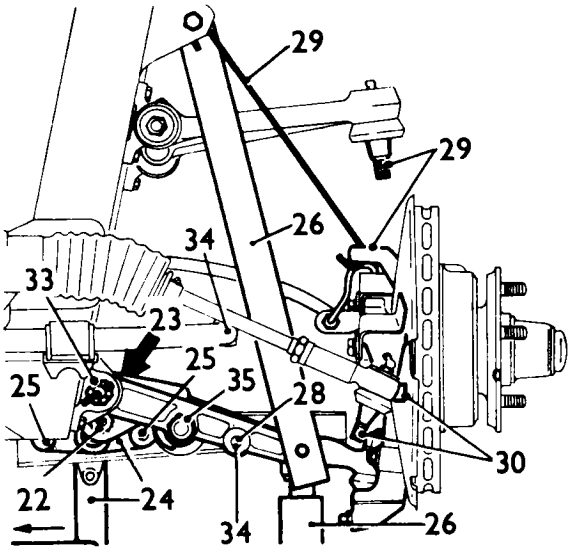
19. Turn barrel nut to completely release torsion; remove tool.
20. Remove locknut and torsion bar locating bolt from lower wishbone adjusting lever.
21. Tap torsion bar rearwards through lower wishbone and remove.





Refitting

22. The torsion bar has 24 splines front and 25 splines rear for micro-adjustment. Fit torsion bar into lower wishbone and reaction bracket so that the fixing holes of reaction bracket coincide with holes in mounting bracket; the torsion bar is rotated spline by spline to achieve this position.
23. Secure torsion bar into lower wishbone with locating bolt and locknut.
24. Scribe reference mark between spline on reaction bracket and torsion bar; fit tool onto rear of torsion bars, slide reaction bracket along torsion bar clear of splines, wind on torsion bar one spline by shortening tool link using barrel nut; re-engage reaction bracket and torsion bar splines in new position.
25. Fit bolts, washer and locknuts securing reaction bracket, remove setting tool from rear of torsion bars, tighten nuts on bolts.
26. Use jack beneath lower wishbone at a point adjacent to the lower mountings, until setting gauge is not under tension. Remove setting gauge.
27. Fit damper, replace bolts and nuts but do not fully tighten nuts.
28. Loosely fit anti roll bar link.
29. Untie stub axle carrier; replace upper ball pin taper into seat in stub axle carrier and secure with washer and locknut.
30. Replace tie rod end ball pin in taper seat in stub axle assembly. Replace and tighten locknut.
31. Remove stands and jack. Refit road wheel.
32. Tighten nuts securing damper and insert split pins.
33. Tighten lower wishbone fulcrum shaft nuts and insert split pins.
34. Tighten nuts securing anti roll bar.
35. Check front suspension riding height – 60.10.18.



FRONT HUB ASSEMBLY

Remove and refit **60.25.01**

Removing

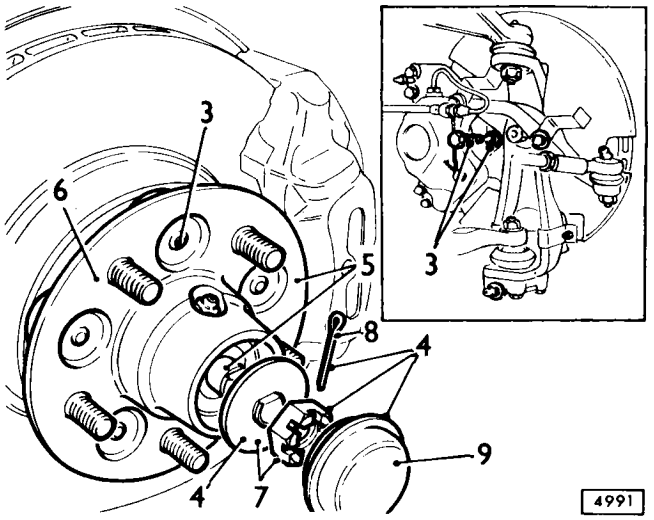
1. Remove road wheel.
2. Place stand under lower wishbone support bracket.
3. Remove bolts holding hub assembly to brake disc through aperture in disc shield.
4. Remove hub grease cap, extract split pin, remove nut and washer from stub axle.
5. Remove hub assembly from stub axle with a suitable extractor.

Refitting

6. Pack hub with suitable grease and refit to stub axle.
7. Fit nut and washer to stub axle and tighten nut to give .05 to .15 mm (.002 in. to .006 in.) endfloat.

NOTE: End float is measured by fitting a dial test indicator with the button against the hub.

8. Refit split pin.
9. Refit grease cap.



STUB AXLE

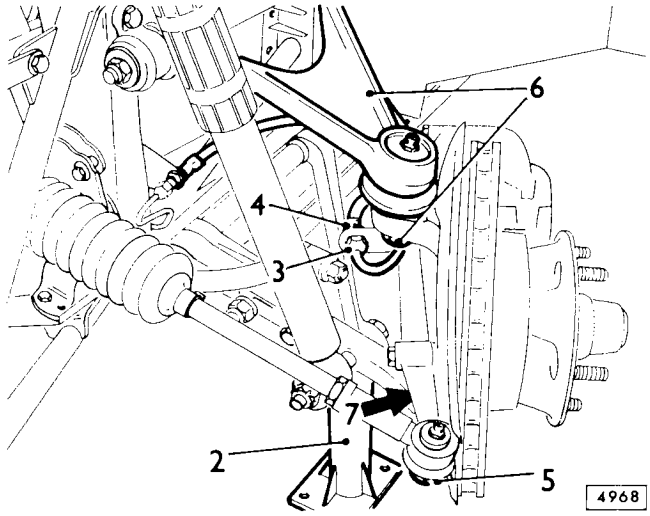
Remove and refit 60.25.22

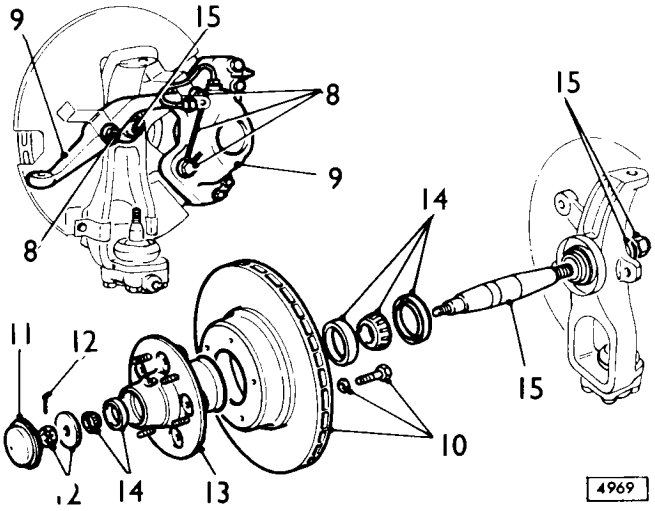
Removing

1. Remove road wheel – 70.20.01.
2. Place stand under lower wishbone at a point adjacent to the damper.
3. Disconnect brake pipe from flexible hose at bracket on stub axle and blank off unions to prevent loss of fluid and ingress of dirt.
4. Remove nut and lockwasher from flexible brake pipe, detach pipe from bracket and blank off unions to prevent loss of fluid and ingress of dirt.
5. Remove self-locking nut securing steering ball pin and remove ball pin from taper seat in steering arm.

   CAUTION: It is advisable to support the stub axle assembly before carrying out the next two operations. This is to protect the operator and prevent damage to ball pins.

6. Remove self-locking nut and washer securing upper ball pin to stub axle carrier and remove upper wishbone ball pin out of taper seat in carrier.
7. Remove self-locking nut and washer securing lower ball pin in lower wishbone, drift ball pin from taper seat in lower wishbone and remove stub axle assembly from car.
8. Remove locking wire, two bolts and washers securing caliper to stub axle carrier. Remove bolt securing steering arm to stub axle carrier.
9. Remove steering arm, shims, clip and caliper from stub axle carrier.
10. Remove bolts and washers securing disc to hub and separate disc from hub. (Nuts are also removed when wire spoked road wheels are fitted to vehicle).
11. Remove hub sealing cap (not fitted with wire spoked road wheels).
12. Remove split pin, nut and washer securing hub to stub axle.
13. Remove hub from stub axle.
14. Remove oil seal and bearings and examine for wear. Should new bearings be required extract taper seats from hub.
15. Remove self-locking nut and washer securing stub axle to carrier and detach stub axle.



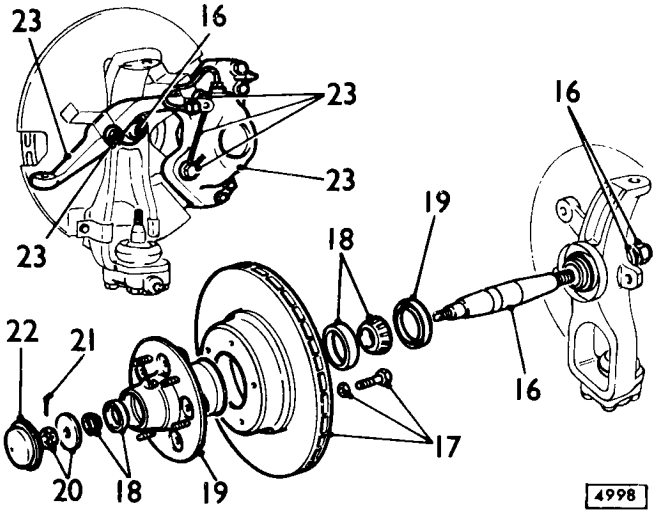


Refitting

16. Fit stub axle into taper seat in axle carrier, replace washer and nut. Tighten nut to a torque of 13.4 to 14.8 kg.m. (97 to 107 lbs.ft.).
17. Fit disc to hub and tighten bolts to a torque of 4.1 to 5.0 kg.m. (30 to 36 lbs.ft.).
18. Refit taper bearings into hub, grease and replace bearings.
19. Replace oil seal and fit hub to stub axle.
20. Replace washer and nut to stub axle and tighten nut to give end float .05 to .15 mm (.002 in. to .006 in.).

    NOTE: End float is measured by fitting a dial test indicator with the button against the hub.

21. Refit split pin.
22. Fit grease cap to hub, (not fitted with wire road wheels).
23. Fit caliper, shim, steering arm and clip to axle carrier and insert bolts. Tighten bolts securing caliper to a torque of 6.9 to 8.2 kg.m. (50 to 60 lbs.ft.) and fit locking wire on bolts. Tighten bolt securing steering arm to a torque of 6.8 to 7.6 kg.m. (49 to 55 lbs.ft.).
24. Reverse operations 1 to 7.
25. Bleed brakes – 70.25.02.



STUB AXLE CARRIER

Remove and refit **60.25.23**

Removing

1. Remove road wheel – 70.20.01.
2. Place stand under lower wishbone at a point adjacent to the damper.
3. Disconnect brake pipe from flexible hose at bracket on stub axle and blank off unions to prevent loss of fluid and ingress of dirt.
4. Remove nut and lockwasher from flexible brake pipe, detach pipe from bracket and blank off unions to prevent loss of fluid and ingress of dirt.
5. Remove self-locking nut securing steering ball pin and remove ball pin from taper seat in steering arm.

   CAUTION: It is advisable to support the stub axle assembly before carrying out the next two operations. This is to protect the operator and prevent damage to the ball pins.

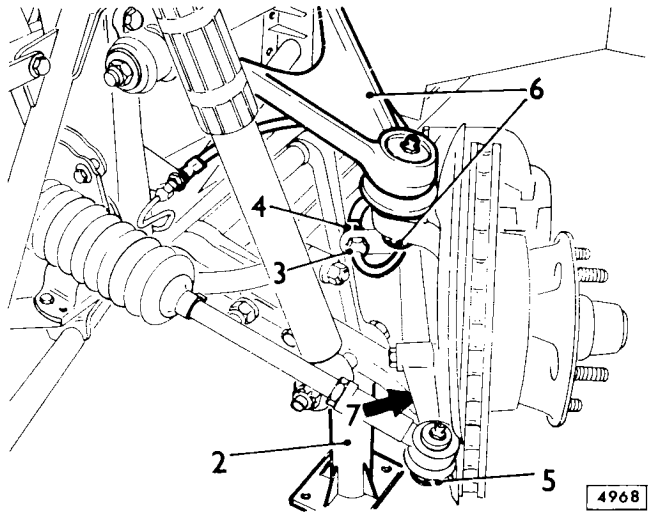
6. Remove self-locking nut and washer securing upper ball pin to stub axle carrier and remove upper wishbone ball pin out of taper seat in carrier.
7. Remove self-locking nut and washer securing lower ball pin in lower wishbone, drift ball pin from taper seat in lower wishbone and remove stub axle assembly from car.
8. Remove locking wire, two bolts and washers securing caliper to stub axle carrier. Remove brake pipe bracket, shims and caliper from stub axle carrier.
9. Remove bolt securing steering arm to stub axle carrier. Remove steering arm.

   CAUTION: Support hub and disc assembly before breaking taper.

10. Remove self-locking nut and washer securing stub axle to carrier and detach stub axle and hub assembly from carrier.
11. Remove lower ball joint – 60.15.03.
12. Remove two self-locking nuts securing brake disc shield brackets and remove shields.

Refitting

13. Reverse operations 1 to 12. Tighten all securing bolts and nuts to correct torque figures.
14. Bleed brakes – 70.25.02.



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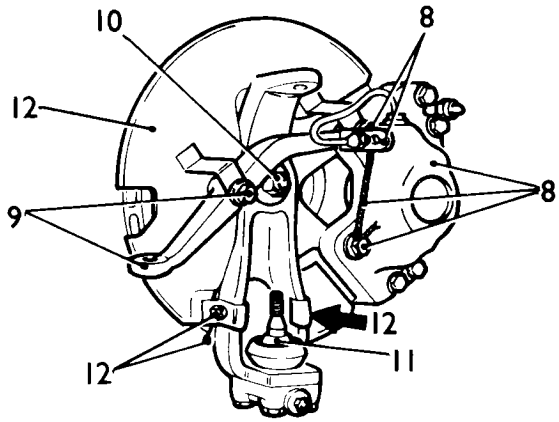


4970

FRONT HUB STUDS

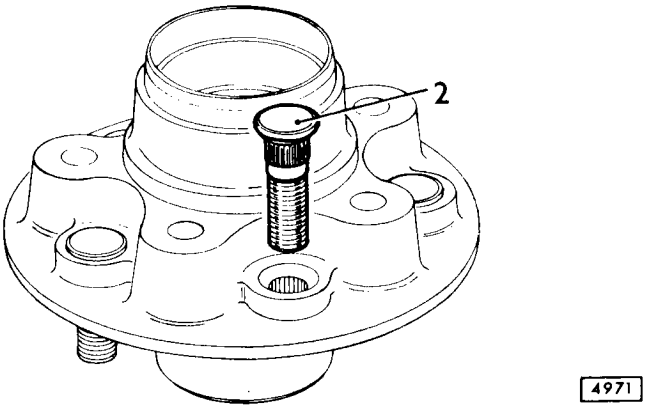
Remove and refit **60.25.29**

Removing

1. Remove front hub – 60.25.01.
2. Using power press and suitable mandrel, press stud/s from hub.

Refitting

3. Use power press and suitable mandrel to press stud/s into hub.
4. Refit front hub – 60.25.01.



FRONT DAMPER

Remove and refit **60.30.02**

WARNING: The jack must be left in position while the damper is not in place in order to control the torsion bar pre-load.

Removing

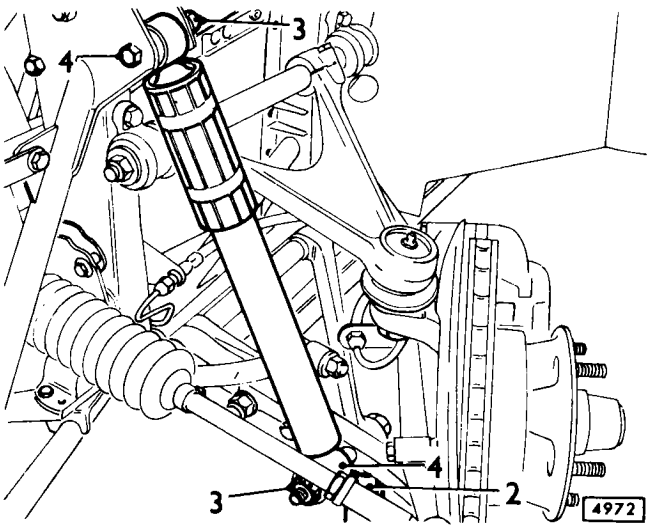
1. Remove road wheel – 70.20.01.
2. Jack up car at a point adjacent to the damper lower mounting.
3. Remove split pin and nut from the damper top and bottom mounting bolts.
4. Remove top mounting bolt, withdraw damper from bottom mounting and remove from car.

NOTE: Before fitting a new damper it is advisable to 'bleed' the damper. Hold damper in vertical position and make several short strokes (not more than half way) until there is no lost motion. Extend the damper to its full extent once or twice. Keep damper in vertical position after 'bleeding' until it is fitted to car.

Refitting

5. Reverse operations 1 to 4.

CAUTION: The slotted nuts should not be tightened until full weight of car is on the suspension. Early failure of rubber bushes may occur due to undue torsional load if nuts are not tightened with full weight of car on suspension.



FRONT DAMPER BUSHES

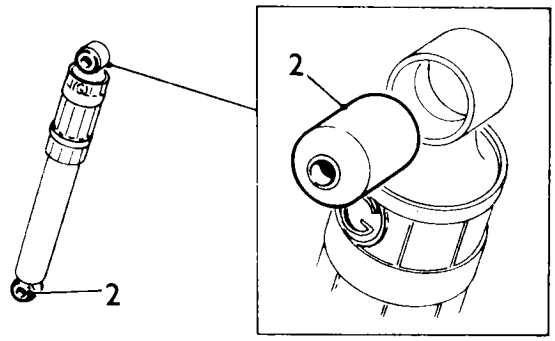
Remove and refit **60.30.07**

Removing

1. Remove front damper – 60.30.02.
2. Remove rubber bushes from top and bottom of damper, examine and renew as necessary.

Refitting

3. Reverse operations 1 and 2.



4973

WISHBONE UPPER

Remove and refit **60.35.01**

Removing

1. Remove road wheel – 70.20.01.
2. Support lower wishbone at a point adjacent to damper.
3. Remove ball pin nut and tap sharply with light hammer adjacent to the pin to free taper seat.
4. Support hub assembly on stand and withdraw wishbone from carrier.
5. Remove nuts, washers and set screws securing fulcrum shaft housings to frame. Lift wishbone clear and recover shims.

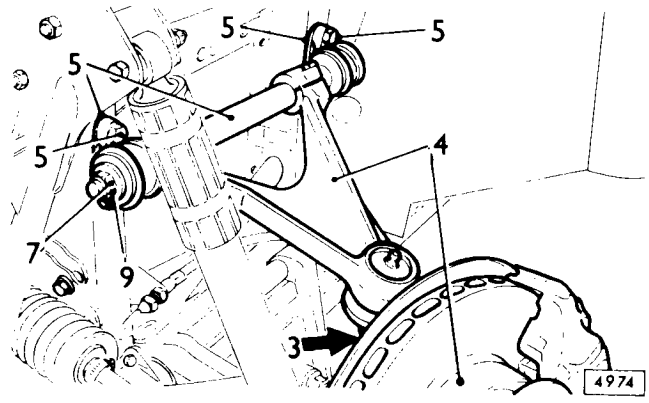
CAUTION: Note number and location of shims for reference when refitting.

Refitting

6. Reverse operations 3 to 5, fitting shims in the location from which they were removed.
7. Slacken nuts at ends of fulcrum shaft.
8. Remove stand from lower wishbone. Refit road wheel.

CAUTION: The nuts at each end of fulcrum shaft must be tightened with full weight of car on suspension; premature failure of rubber bushes may occur if this precaution is not taken.

9. Tighten nuts at each end of fulcrum shaft. Torque to 8.3 to 9.7 kg.m. (60 to 70 lbs.ft.).
10. Check castor angle – 57.65.04.
11. Check camber angle – 57.65.05.



4974

WISHBONE LOWER

Remove and refit **60.35.02**

Service Tool — JD.43 Torsion bar tensioning rack

Removing

1. Remove road wheel – 70.20.01.
2. Place stand under cross tube bracket beneath lower wishbone rear fulcrum support.
3. Support lower wishbone on a suitable jack at a point adjacent to damper.
4. Disconnect brake pipe from frame connection, disconnect flexible hose and blank off pipe and hose to prevent loss of fluid and ingress of dirt.
5. Remove self-locking nut securing steering ball pin and remove ball pin from taper seat in steering arm.

   WARNING: It is advisable to support the hub assembly before carrying out the next two operations. This is to protect operator and prevent damage to ball pins.

6. Remove self-locking nut and washer securing upper ball pin in stub axle carrier, remove upper wishbone ball pin from taper seat in carrier and tie upper wishbone to frame.
7. Remove self-locking nut and washer securing lower ball pin in lower wishbone drift ball pin from taper seat in lower wishbone and remove stub axle assembly from car.
8. Remove anti roll bar link – 60.10.02.
9. Remove front damper – 60.30.02.

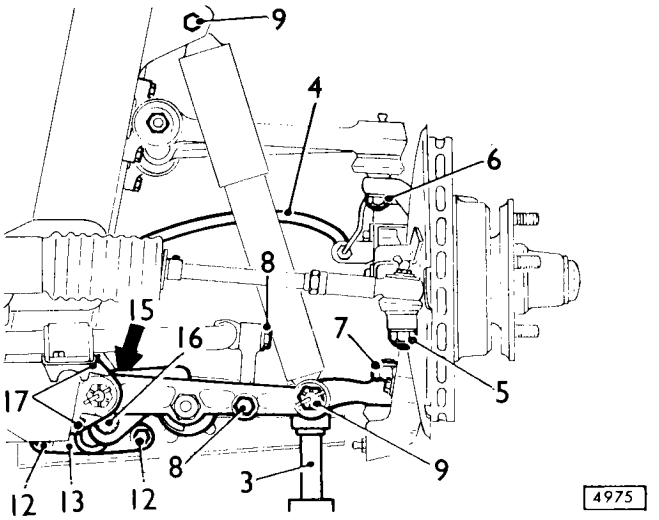
   WARNING: The car is still to be supported on stand beneath cross member whilst carrying out the next operation.

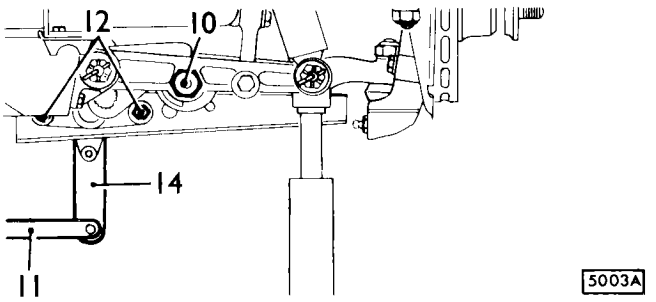
   NOTE: On cars up to 1S 50064 R.H.D. and 1S 70412 L.H.D. it is sufficient to lower jack and proceed with operation 12. If car chassis number is 1S 50065 R.H.D. or 1S 70413 L.H.D. or greater, it is necessary to continue with operation 10.

10. Slacken locknut on cam adjuster of lower wishbone and set cam to lowest point.

    WARNING: BEFORE REMOVING TORSION BAR, SET BARREL NUT OF TORSION BAR TENSIONING RACK SO THAT APPROXIMATELY 25.4 mm (1.0 in.) OF THREAD IS SHOWING AT EACH END OF NUT. WHEN REFITTING, SET RACK TO SHOW 63.5 mm (2.5 in.) OF THREAD. UNDER NO CIRCUMSTANCES MUST THE RACK BE USED WITH MORE THAN 63.5 mm. (2.5 in.) OF THREAD SHOWING.

11. Fit tool to rear of torsion bars. Slightly turn barrel nut to shorten link and take bar torsion.
12. Remove setscrews and nuts securing torsion bar reaction bracket.





13. Slide bracket forward along torsion bar.

    NOTE: It may be necessary to slowly ease tension of bar to half cover bolt holes in reaction bracket, then tap through to free.

14. If setting tool used turn barrel nut to completely release torsion; remove tool.
15. Remove locknut and torsion bar locating bolt from lower wishbone adjusting lever.
16. Tap torsion bar rearwards through lower wishbone and remove.
17. Remove bolts, setscrews, nuts and washers securing fulcrum shaft housing to frame and withdraw wishbone assembly from car.

Refitting

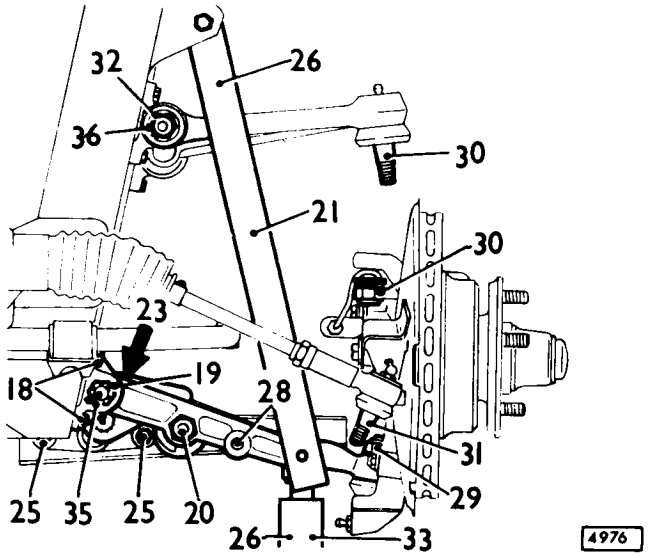
18. Fit wishbone assembly to car and secure fulcrum shaft housing to frame with bolts, setscrews, nuts and washers.
19. Remove split pins and slacken nuts at ends of fulcrum shaft.
20. Slacken locknut on cam adjuster of lower wishbone front, set cam at its lowest point.
21. Fit setting gauge at damper mounting points to position lower wishbone.
22. The torsion bar has 24 splines front and 25 splines rear for micro-adjustment. Fit torsion bar into lower wishbone and reaction bracket so that fixing holes of reaction bracket coincide with holes in mounting bracket: the torsion bar is rotated spline by spline in wishbone and reaction bracket to achieve this position.
23. Secure torsion bar in lower wishbone with locating bolt and locknut.

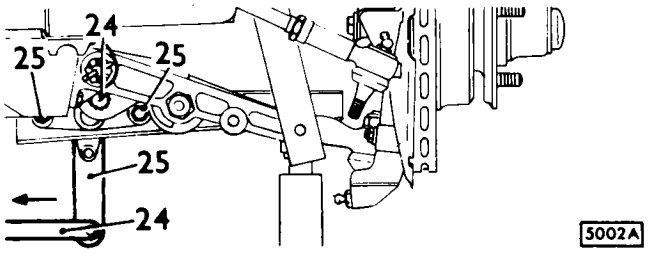
NOTE: On cars up to 1S 50064 R.H.D. and 1S 70412 L.H.D. it is sufficient to proceed with operation 25. If car chassis number is 1S 50065 R.H.D. or 1S 70413 L.H.D. or greater, it is necessary to continue with operation 24.

24. Scribe reference mark between spline on reaction bracket and torsion bar; fit tool onto rear of torsion bars, slide reaction bracket along torsion bar clear of splines, wind on torsion bar one spline by shortening tool link using barrel nut, re-engage reaction bracket and torsion bar splines in new position.
25. Fit bolts, washers and locknuts securing reaction bracket, remove setting tool from rear of torsion bars. Tighten nuts on bolts.
26. Use jack beneath lower wishbone at a point adjacent to the lower mountings, until setting gauge is not under tension. Remove setting gauge.
27. Fit damper, replace bolts and nuts but do not fully tighten nuts.
28. Loosely fit anti roll bar link – 60.10.02.
29. Fit lower ball pin in lower wishbone and secure with self-locking nut and washer.
30. Untie upper wishbone and fit ball pin in stub axle carrier, secure with self-locking nut and washer.
31. Replace tie rod end ball pin in taper seat in stub axle assembly. Replace and tighten locknut.
32. Slacken nuts at the ends of upper wishbone fulcrum shaft.

CAUTION: The nuts at the ends of fulcrum shafts must be tightened with full weight of car on the suspension; premature failure of rubber bushes may occur if this precaution is not taken.

33. Remove stand and jack. Refit road wheel.
34. Tighten nuts securing damper and insert split pins.





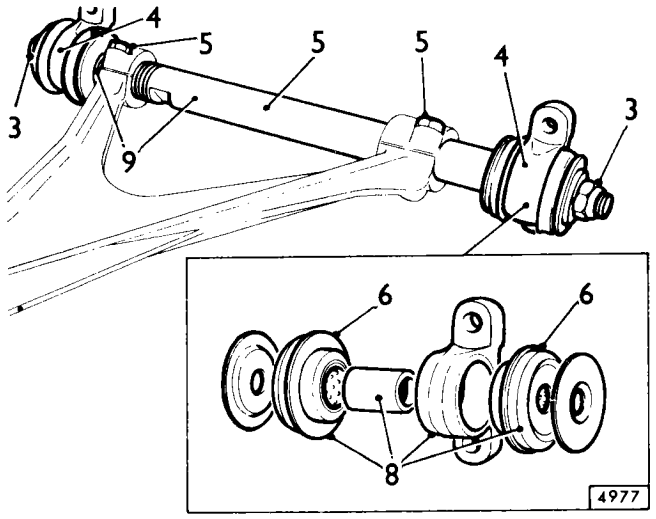
WISHBONE UPPER

Overhaul **60.35.08**

1. Remove upper wishbone – 60.35.01.
2. Remove upper ball joint – 60.15.02.
3. Remove self-locking nuts at each end of fulcrum shaft.
4. Withdraw washer, thrust washers and housings complete with bushes from each end of the shaft.
5. Slacken pinch bolts locking upper wishbone to fulcrum shaft and unscrew from wishbone.
6. Extract bush assembly from each housing.

NOTE: Check wishbone dimensions if damaged.

7. Examine all parts and renew as necessary.
8. Separate bush assembly. Lubricate rubber with Esso process oil 'L'. Press rubber bush into housing. Insert metal bush and press rubber bush into opposite side of housing. Repeat operation for other housing.
9. Screw fulcrum shaft into wishbone until thread protrudes 7.1 mm. (.28 ins.) from outer edge of wishbone.
10. Reverse operations 1 to 5.



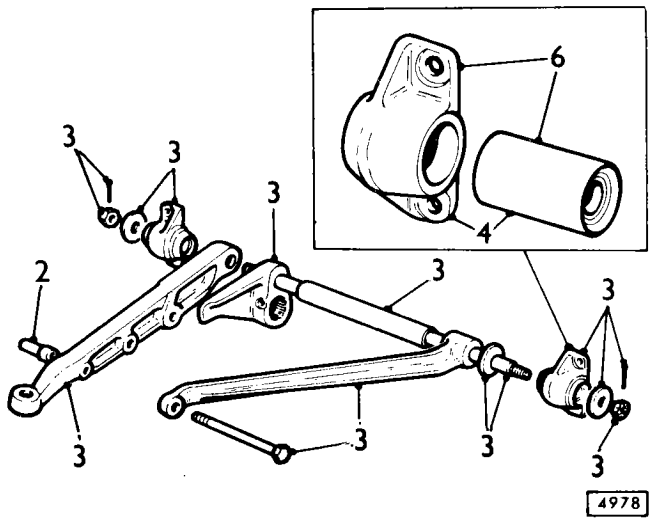
WISHBONE LOWER

Overhaul **60.35.09**

1. Remove lower wishbone – 60.35.02.
2. Remove spacer from bolt which secures front and rear wishbones.
3. Remove split pins, nuts and washers from each end of fulcrum shaft. Remove housings, washer, front wishbone, cam lever, rear wishbone and spacer from fulcrum shaft; withdraw bolt from front and rear wishbone.
4. Press rubber/steel bushes from each housing.

NOTE: Check wishbone dimensions if damaged.

5. Examine all parts and renew as necessary.
6. Press rubber bushes into housings so that an equal amount protrudes from each side of each housing. A solution on one part liquid soap to twelve parts water used as a lubricant will facilitate the fitting of bushes.
7. Reverse operations 1 to 3.



CONTENTS

WARNING

THIS CAR IS FITTED WITH A THORNTON POWR-LOK DIFFERENTIAL AND UNDER NO CIRCUMSTANCES MUST THE ENGINE BE RUN WITH THE CAR IN GEAR AND ONE WHEEL OFF THE GROUND. IF IT IS FOUND NECESSARY TO TURN THE TRANSMISSION WITH THE CAR IN GEAR BOTH WHEELS MUST BE RAISED.

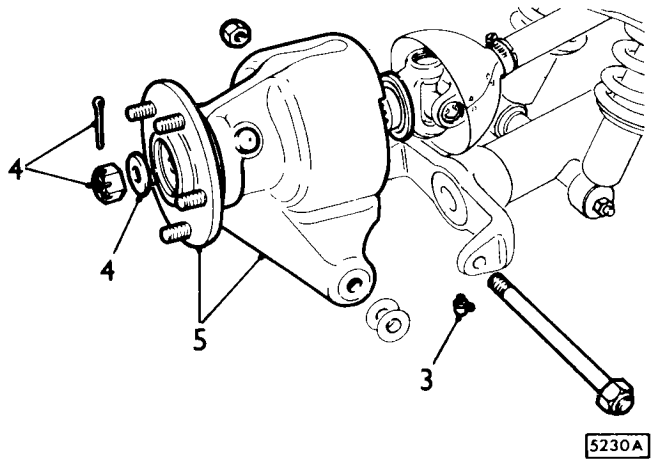
REAR HUB AND CARRIER ASSEMBLY

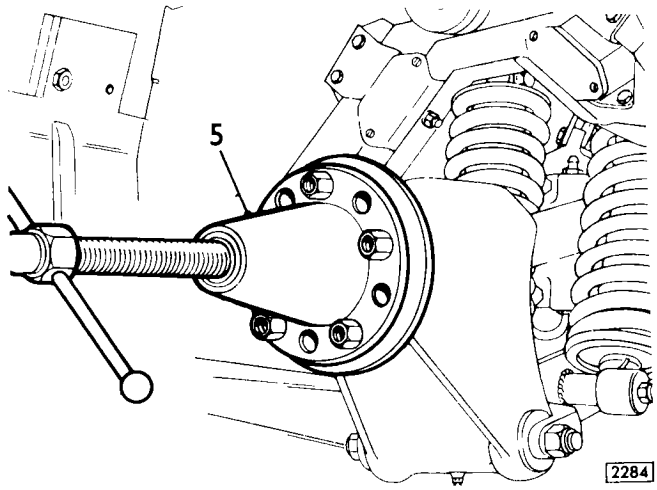
Remove and refit 64.15.01

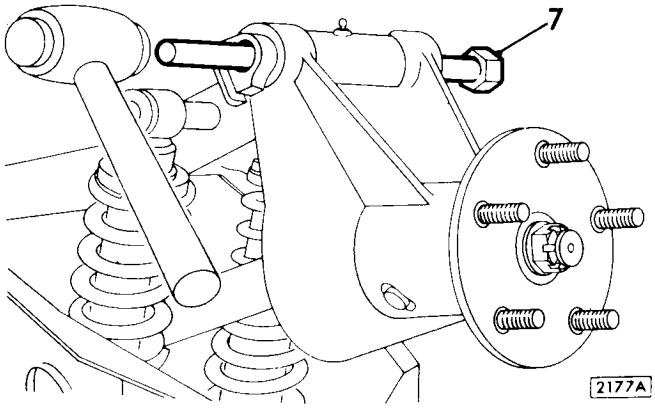
Service tools Hub puller JD.1D
JD.7A
Dummy shaft JD.14

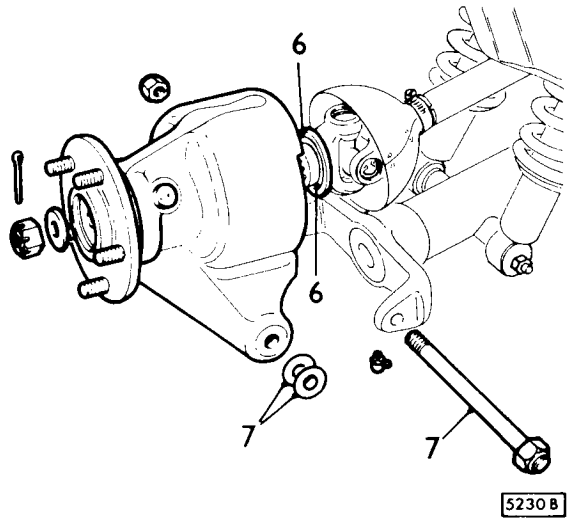
Removing

1. Remove rear road wheel – 74.20.01.
2. Place stand under rear of car.
3. Remove fulcrum shaft grease nipple.
4. Withdraw split pin, remove castellated nut and plain washer from splined end of half shaft.
5. Fit hub puller, JD.1D or JD.7A, to rear hub and secure. Withdraw hub and carrier from half shaft. Remove hub puller from hub and carrier.
6. Recover spacer from half shaft. Examine inner oil seal track and renew if necessary.
7. Remove one nut from outer wishbone fulcrum shaft, drift out shaft, remove hub and carrier assembly from car. Temporarily secure retaining washers and shims using adhesive tape.







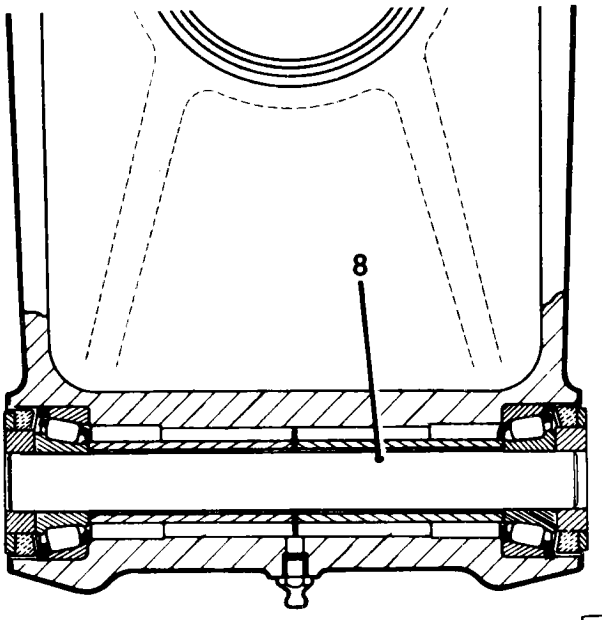


Refitting

8. Fit dummy shaft tool number JD.14 to hub carrier fulcrum.
9. Fit hub carrier to wishbone, positioning shims removed between carrier and wishbone.
10. Replace outer wishbone fulcrum shaft, displacing dummy shaft.
11. Secure shaft with nut. Torque to 7.6 kg.m. (55 lb.ft.). Refit grease nipple.
12. If necessary fit oil seal track to half shaft splined flange. Refit spacer.
13. Thoroughly clean and de-grease splines of half shaft and bore of hub.
14. Using a small brush sparingly apply Loctite 'Stud Lock' to outer two thirds of half shaft splines.
15. Assemble hub carrier to half shaft.

NOTE: If car fitted with wire wheels and associated splined hubs, rotate hub to align access hole with split pin hole in half shaft.

16. Fit washer and secure hub carrier assembly with castellated nut. Torque to 19.3 kg.m. (140 lb.ft.). Lock using new split pin.
17. Check, and if necessary, adjust hub bearing end float – 64.15.13.
18. Remove stands.
19. Refit road wheel.



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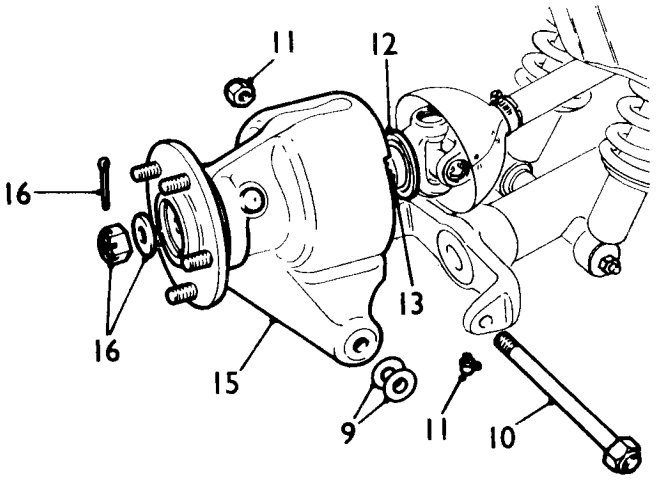

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REAR HUB AND CARRIER ASSEMBLY

Overhaul 64.15.07

Service tools

Special collar JD.14
Dummy shaft JD.14
Press tool JD.16C
Hand press SL.14
Press tool JD.20A
Tool JD.20A-1

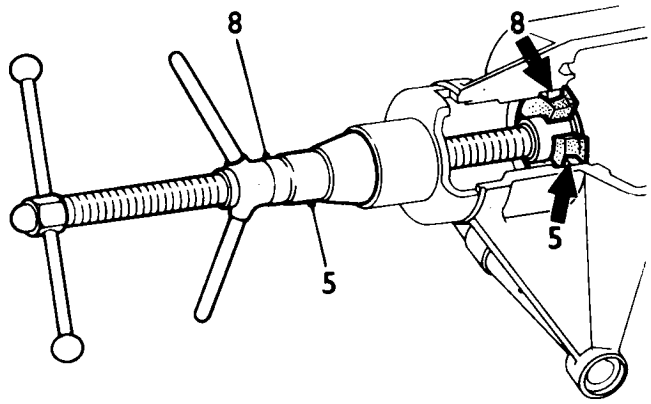
1. Remove rear hub and carrier assembly – 64.15.01.

Dismantling

2. Recover shims and retaining washers from fulcrum. Prise out oil seals and oil seal holders, remove spacer ring taper roller bearings, spacers and shims.
3. Support hub carrier and press out hub using handpress and suitable mandrel.
4. Remove oil seals from carrier.
5. Remove inner and outer bearing cups from carrier.
6. Extract outer bearing from hub.

Inspection

7. Examine all components for signs of wear or damage and renew if necessary. Pay particular attention to oil seal tracks on hub and half shaft, as scores on these items will considerably shorten oil seal life.



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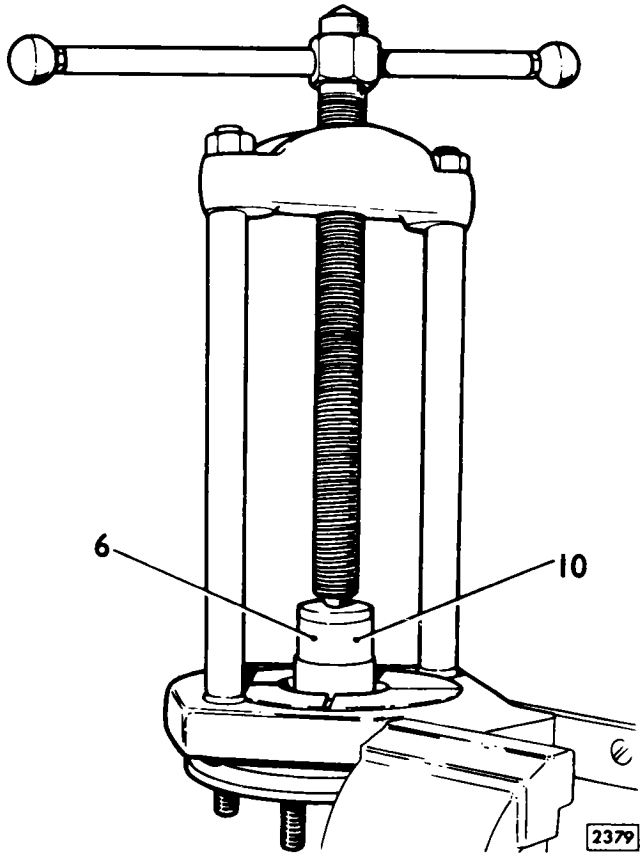

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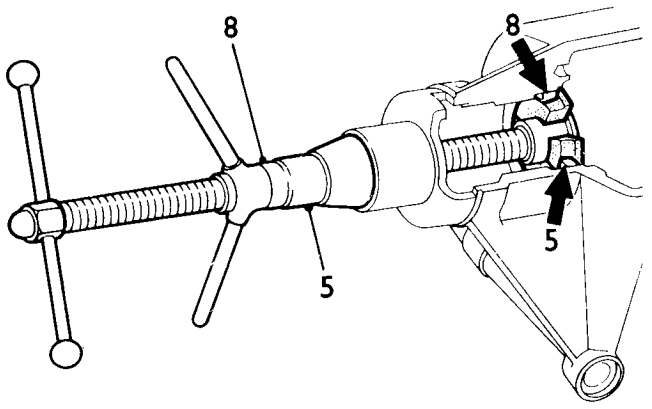
Reassembling

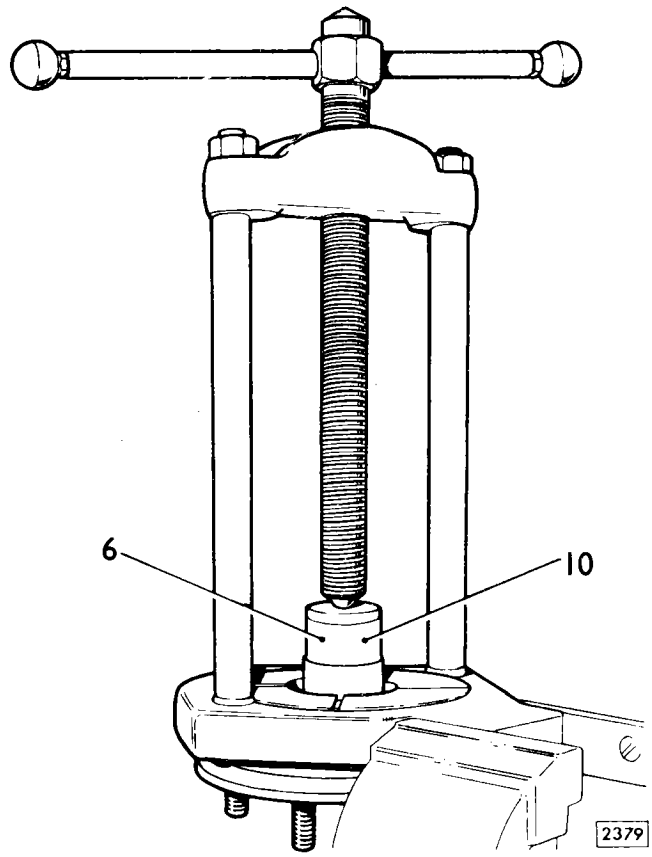
8. Press cups of inner and outer bearing into hub carrier.
9. If outer oil seal track is to be changed press new item on to hub.
10. Press outer bearing on to hub.
11. Press new outer seal into recess in hub carrier.
12. Place hub into carrier and position beneath press, inner end uppermost. Pack with specified grease.
13. Place inner bearing inner race on hub.
14. Place special collar JD.15 over bearing and press bearing on to hub.
15. Using dial indicator measure end float of carrier on hub.

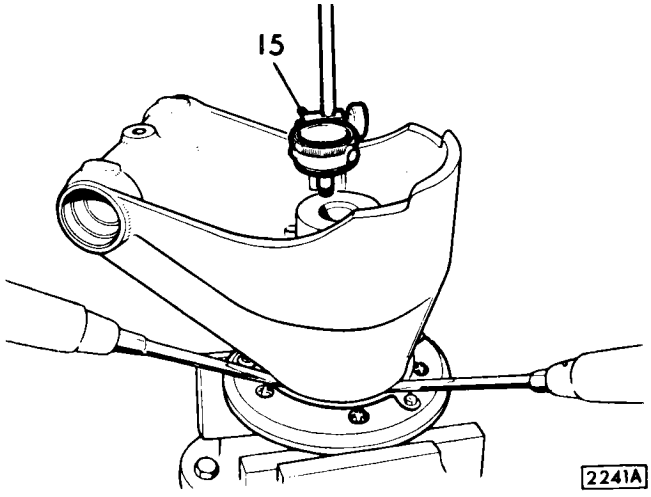
NOTE: Special collar is equivalent to spacer of 3.81 mm. (.15 in.)
Using this knowledge, calculate the spacer required to give endfloat of .025 to .076 mm. (.001 to .003 in.) Spacers are supplied in thickness of 2.77 to 4.84 mm. (.109 to .151 in) in steps of .076 mm (.003 in.) and are lettered A to R (less letters I, N and O)

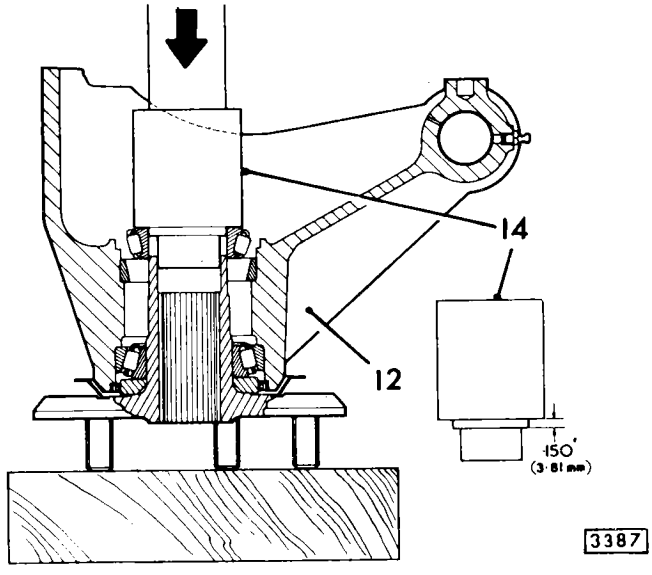
SPACER LETTER	THICKNESS mm	inches
A	2.77	.109
B	2.85	.112
C	2.92	.115
D	3.00	.118
E	3.07	.121
F	3.15	.124
H	3.23	.127
G	3.30	.130
J	3.38	.133
K	3.45	.136
L	3.53	.139
M	3.61	.142
P	3.68	.145
Q	3.75	.148
R	3.87	.151

For example, assume endfloat measured to be .64 mm. (.025 in.). Subtract required nominal end float of .050 mm. (.002 in.) from measured end float giving .59 mm. (.023 in.). Since special collar is 3.81 mm. (.150 in.) thick, the thickness of the spacer to be fitted will be 3.81 mm. – .59 mm. i.e. 3.22 mm (.126 in.).
The nearest spacer is 3.30 mm. (.130 in.) so letter H spacer should be fitted in place of special collar.





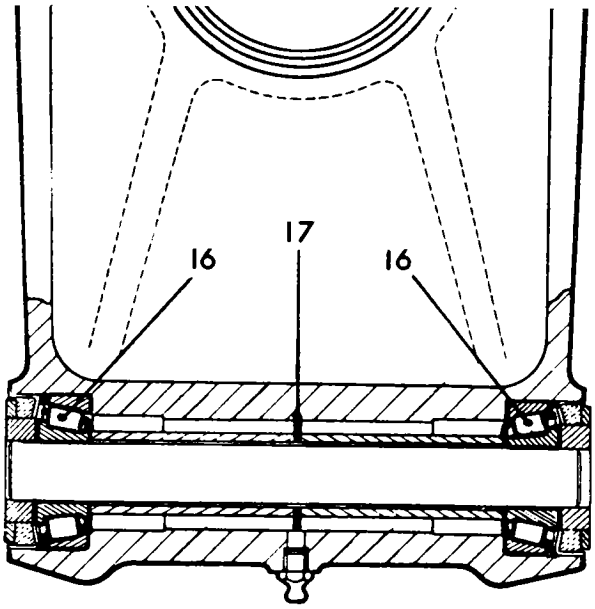




16. Before assembling hub carrier to wishbone, shimming of fulcrum taper bearings must be checked and adjusted to establish bearing pre-load.
17. Bearing pre-load adjustment is effected by shims fitted between the two fulcrum spacer tubes. The correct bearing adjustment is .02 mm. (.001 in.) pre-load.

    NOTE: Shims are available in sizes of 0.76 mm (.003 in.) and .178 mm. (.007 in.) thick and 28.67 mm. (1.125 in.) diameter. A simple jig should be made consisting of a piece of plate steel approximately 17.7 cm x 10.1 cm x 9.5 mm. (7 in. x 4 in. x .375 in.). Drill and tap a hole suitable to receive the outer fulcrum shaft.

18. Place steel plate in a vice, screw fulcrum shaft into plate and slide oil seal track on to shaft.
19. Place hub carrier assembly on to the shaft, less oil seals, but with a known excess of shims between two fulcrum spacer tubes.
20. Place an inner wishbone fork outer thrust washer into fulcrum shaft, so that it abuts oil seal track and retaining washer.
21. Fill remaining space on shaft with washers and secure with nut.
    Torque to 7.6 kg.m. (55 lb.ft.).
22. Press hub carrier assembly towards steel plate, twisting it to settle taper rollers. Maintain pressure on carrier and use feeler gauges to measure clearance between large diameter washer and hub carrier. Note clearance.
23. Pull hub carrier towards large diameter washer, twisting it to settle taper rollers. Maintain pressure on carrier and use feeler gauges to measure clearance between washer and hub carrier. Note clearance.



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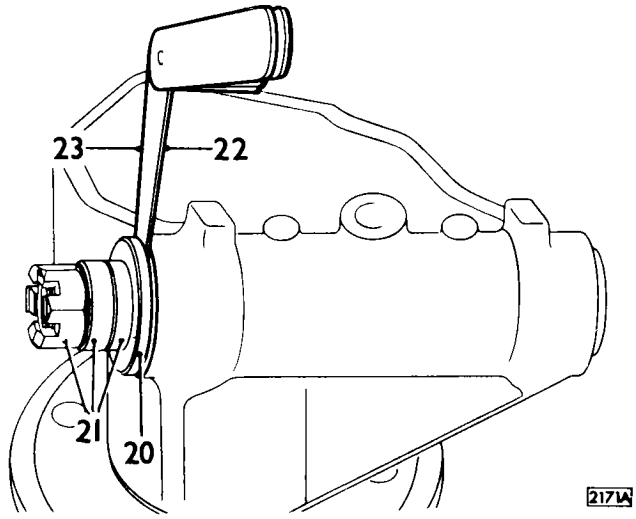

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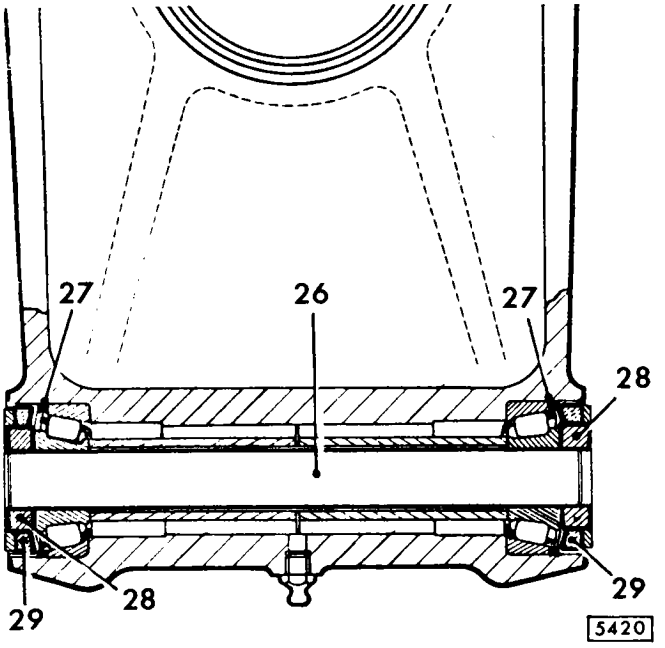
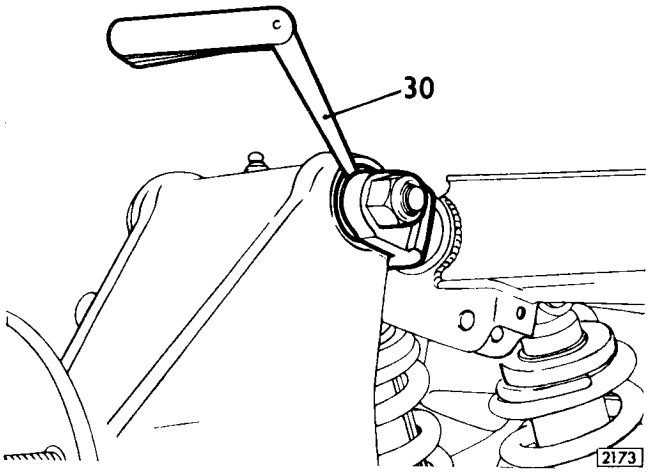
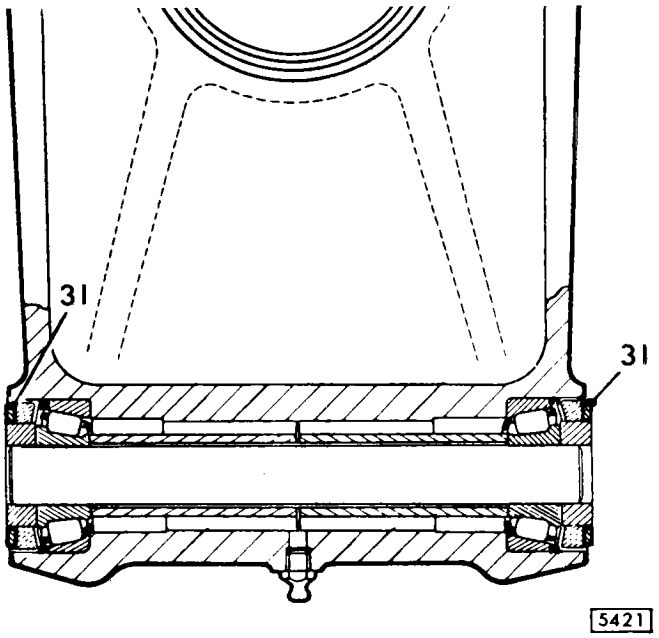
24. Subtract clearance noted in operation 23 from that noted in operation 22. This gives an endfloat measurement for bearing assembly.
25. Dismantle assembly from jig plate and remove sufficient shims to obtain a reading of .02 mm. (.002 in.) pre-load.
    For example:–
    Assume endfloat found in operation 24 to be .25 mm. (.010 in.).
    Therefore
    .25 + .02 mm = .27 mm.
    (.010 + .002 in. = .011 in.)
    to be removed to give correct pre-load.
26. Pack fulcrum bearing housing with specified grease, and fit dummy shaft, tool number JD.14.
27. Ensure spacing ring is fitted between taper roller bearing track and oil seal shell.
28. Fit oil seal tracks on dummy shaft.
29. Fit new oil seals.
30. Locate outer fulcrum boss between jaws of wishbone. Press against one jaw and use feeler gauges to measure clearance between opposite jaw and boss. Select shims to this value. Divide pack into two equal parts to centralize hub carrier between jaws of wishbone and prevent jaws nipping in. Shims are available of .076 mm. (.003 in.) and .179 mm (.007 in.) thickness, and 22,2 mm. (.875 in.) diameter.
31. Fit a seal retainer ring at each side of fulcrum bearing assembly.
32. Fit shims selected in operation 30 at each side of fulcrum bearing assembly.
33. Chase dummy shaft through wishbone with fulcrum shaft.
34. Fit nut and tighten to 7.6 kg.m. (55 lb.ft.).
35. Thoroughly clean and de-grease splines of half shaft and bore of hub.
36. Using a small brush sparingly apply Loctite 'Stud lock' to outer two thirds of half shaft splines.
37. Assemble hub carrier to half shaft.

    NOTE: If car fitted with wire wheels and associated splined hub, rotate hub to align access hole with split pin hole in half shaft.

38. Fit washer and castellated nut to half shaft. Torque to 19.3 kg.m. (140 lb.ft.).
39. Refit rear hub and carrier assembly to car.







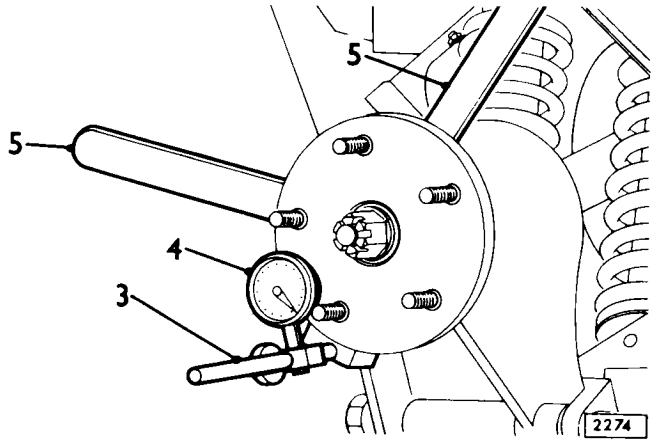
REAR HUB BEARING END FLOAT

Check and adjust 64.15.13

Service tool Bracket JD.13

Checking

1. Remove rear road wheel – 74.20.01.
2. Place stands under rear of car.
3. Clamp tool JD.13 to hub carrier web so that button of dial indicator bears on end of hub.
4. Tap hub fully inward and set dial indicator to zero.
5. Using two levers between hub and hub carrier boss press hub outwards. Take care not to damage water thrower. Maintain steady pressure and note dial indicator reading. Endfloat should be .025 to .076 mm. (.001 to .003 in.).
   A maximum endfloat of .127 mm (.005 in.) can be tolerated; a larger endfloat reading necessitates investigation and rectification according to procedures laid down in Rear hub and carrier assembly – overhaul 64.15.07.
6. Refit road wheels.
7. Remove stands.



REAR HUB OIL SEALS

Remove and refit 64.15.15

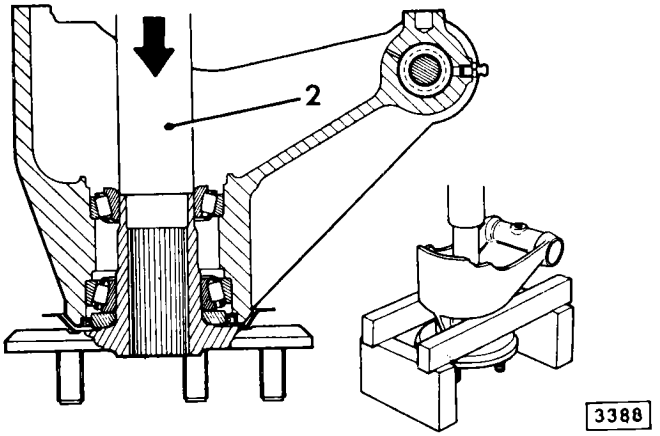
The degree of dismantling required to change rear hub oil seals is extensive; full rear hub overhaul procedure should therefore be carried out – 64.15.07 and all oil seals, including outer wishbone fulcrum oil seals changed. Renew grease content of both hub and fulcrum bearing assemblies.

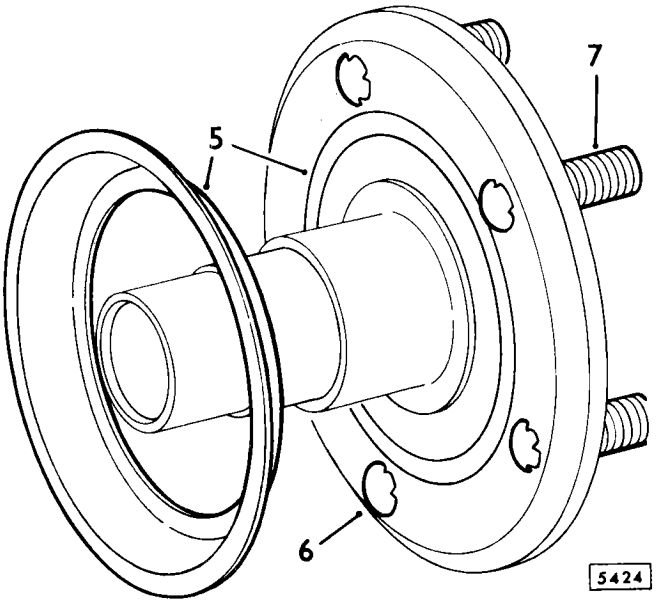
REAR HUB WHEEL STUDS

Remove and refit 64.15.26

Removing

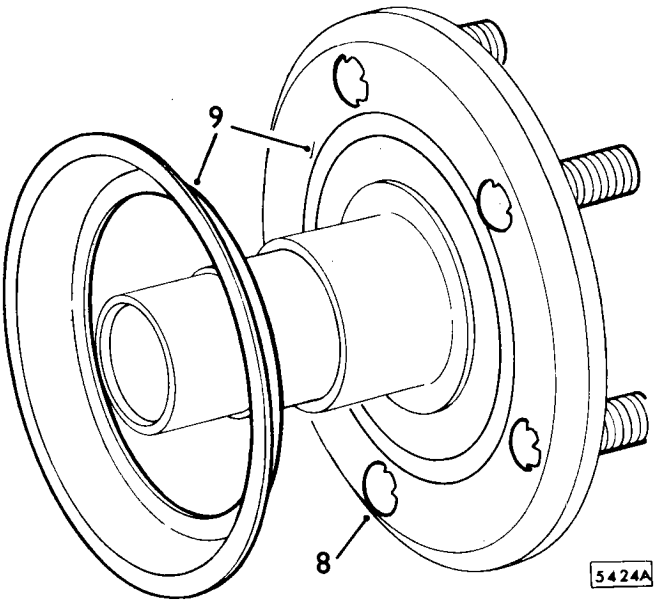
1. Remove rear hub and carrier assembly – 64.15.01.
2. Support hub carrier and press out hub using handpress and suitable mandrel.
3. Prise old oil seals from hub.
4. Draw outer bearing and oil seal track from hub.
5. Use a narrow, sharp cold chisel to open peening securing water thrower. Remove thrower.
6. Support hub, and file or grind staking from faulty stud/s.
7. Unscrew stud/s from hub flange.





Refitting

8. Screw new stud/s into hub and stake in four places to back of flange.
9. Fit water thrower to hub and use blunt cold chisel to peen over flange in three or four places.
10. Press oil seal track and outer bearing race on to hub.
11. Press new outer and inner oil seals into hub.
12. Fit hub into hub carrier and pack with suitable grease.
13. Locate inner bearing over hub and press into position.
14. Refit rear hub and carrier assembly.



REAR ROAD SPRINGS

Remove and refit **64.20.01**

Service tools Handpress SL.14
Adaptor JD.11B

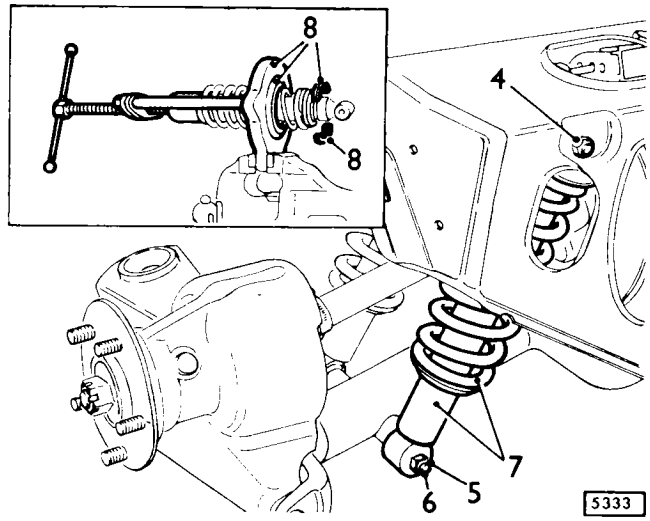
Removing

NOTE: Rear springs can be removed with rear suspension unit fitted to car.

1. Remove rear road wheel – 74.20.01.
2. Support rear of car on stand.
3. Place jack to support wishbone.
4. Remove self-locking nut and bolt securing top of hydraulic damper to suspension unit cross beam.
5. Remove washers and nuts securing hydraulic dampers to wishbone.
6. Drift out damper mounting pin. Recover spacer at forward end of mounting pin tube.
7. Withdraw hydraulic damper and road spring assembly.
8. Using tools SL.14 and JD.11B compress road spring until collets and spring seat can be removed.
9. Release spring pressure and withdraw hydraulic damper from road spring.

Refitting

Reverse operations 1 to 9 inclusive.

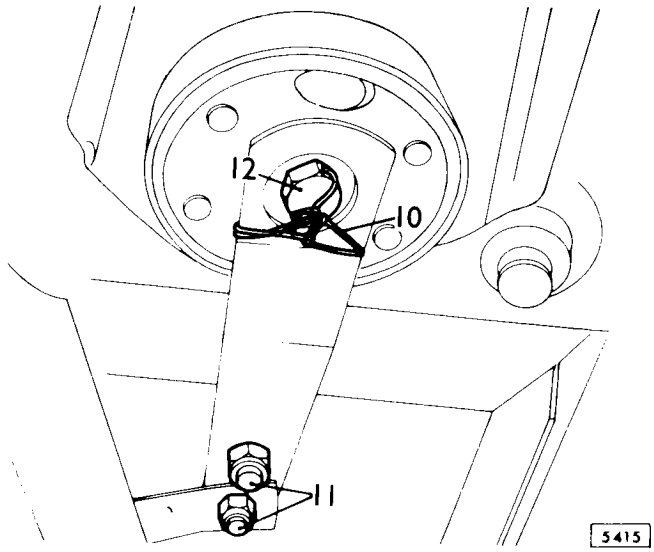


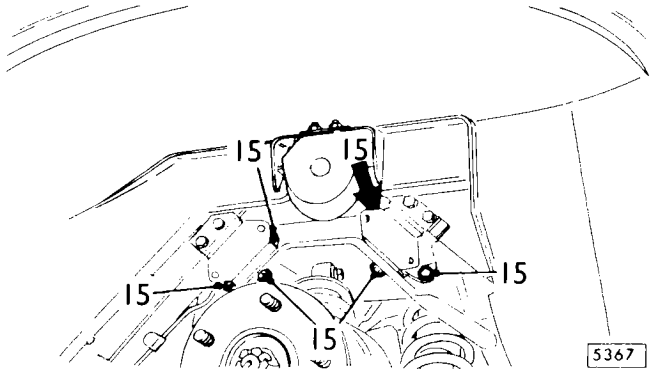
REAR SUSPENSION UNIT

Remove and refit **64.25.01**

Removing

1. Open luggage compartment and remove spare wheel.
2. Remove rear road wheels – 74.20.01.
3. Place stands under car, forward of radius arm anchor points.
4. Remove rear silencer and tailpipes, on later cars restrain bracket set screws from inside luggage compartment – 30.10.22.
5. Disconnect centre brake pipe hose – 70.15.04.
6. Remove two drive screws from right hand rear brake air scoop and swing it to one side.
7. Set handbrake fully off.
8. Remove split pin, washer and clevis pin securing handbrake cable to compensator.
9. Slacken locknut and screw adjuster from compensator.
10. Remove safety wire from radius arm bolts and safety straps.
11. Remove nuts from bolts securing safety straps.
12. Remove bolts securing radius arms and disconnect radius arms and safety straps from body.
13. Place jack beneath tie plate of rear suspension unit.
14. Remove nuts from rear flange of propeller shaft.
15. Remove two locknuts and two bolts, and one locknut and plain washer securing each rubber mounting to suspension unit.
16. Lower jack to remove suspension unit.





Refitting

17. Reverse operations 1 to 16 inclusive.

    NOTE: Before refitting radius arms to body, it is adviseable to wire brush spigot mounting and lightly smear it with waterproof grease. Wire lock radius arm bolt to safety strap.
    Tighten following fixings to stated torque levels:
    Radius arm and safety strap to body.
    5.5 to 6.2 kg.m. (40 to 45 lb.ft.)
    Safety strap to body.
    2.1 to 2.5 kg.m. (15 to 18 lb.ft.)
    Vee mounting fixings.
    2.1 to 2.5 kg.m. (15 to 18 lb.ft.)
18. Bleed brakes – 70.25.02.
19. Adjust handbrake – 70.35.10.

REAR SUSPENSION UNIT

Overhaul **64.25.06**

The rear suspension unit is an assembly comprising individual units, the removal, refitting and overhaul of each being covered elsewhere in this Manual.
For this reason, an overhaul procedure is not given for the rear suspension unit assembly proper, although it is adviseable to check all bushes, fulcrum bearings and oil seals for leakage whenever the unit is removed from the car.

REAR SUSPENSION HEIGHT

Check **64.25.12**

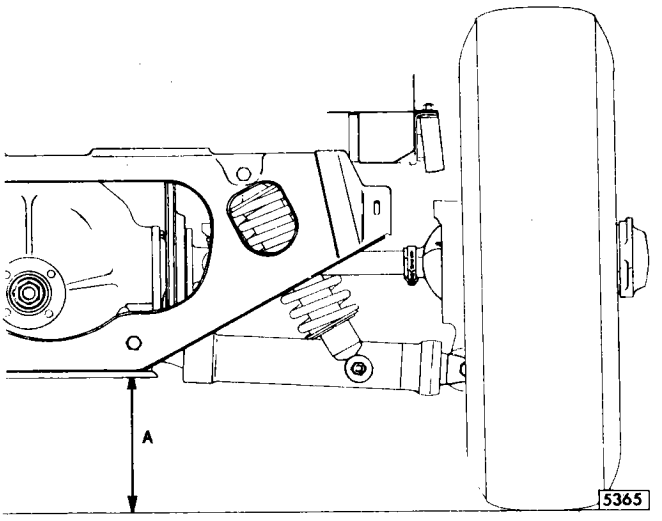
1. Ensure radiator topped up with coolant.
2. Ensure engine sump filled to correct level with specified lubricant.
3. Ensure tyre pressures correct.
4. Note contents of fuel tank.

   NOTE: Fuel tank holds 81 litres (18 Imperial gallons or 20 U.S. gallons).

5. Calculate ballast weights required to represent difference between weight of fuel tank contents and weight of full tank.

   NOTE: 5 litres weighs 3.8 kg.
   1 Imp. gallon weighs 8.0 lb.
   1 U.S. gallon weighs 7.2 lb.
   Full fuel tank weighs 61 kg. (135 lb.)

6. Place weights on floor of luggage compartment immediately above fuel tank.
7. Roll car forward three lengths on perfectly level surface.
8. Measure distance between lower surface of rear cross member and ground at both sides of car.
   Dimension A must be 20.08 cm ± .64 cm. (7.90 in. ± .25 in.).
   If dimension is not correct, check all bushes and bearing points of rear suspension. If no cause discovered, rear road springs must be changed.
   Remove all four springs and change as complete set.



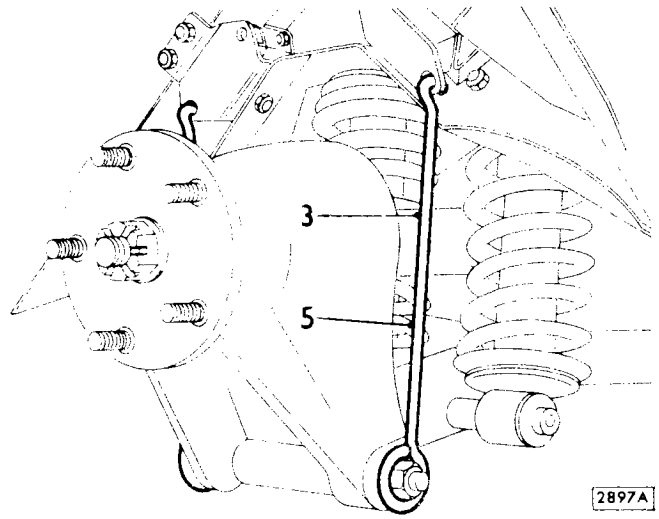
REAR SUSPENSION CAMBER ANGLE

Check and adjust 64.25.18

Service tool Setting links JD.25

Checking

1. Set car on level surface.
2. Ensure tyre pressures correct.
3. Hook one end of setting link, tool JD.25, in lower hole of rear mounting, depress body until other end of setting link can be slid over outer wishbone fulcrum nut. Repeat on other side of car.
4. Set camber gauge against each rear tyre and read off camber angle. The correct reading should be $-\frac{3}{4}^{\circ} \pm \frac{1}{4}^{\circ}$. If these limits are not met, note deviation and adjust camber angle, see operation 6 to 14 inclusive. If result satisfactory, continue with operation 5.
5. Remove setting links.



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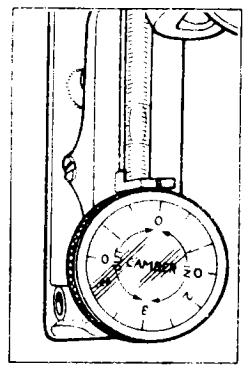

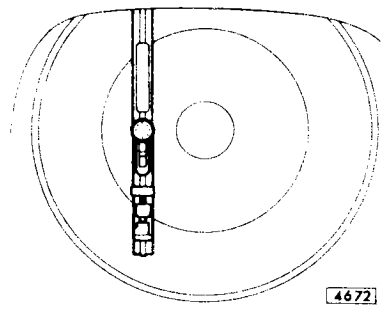
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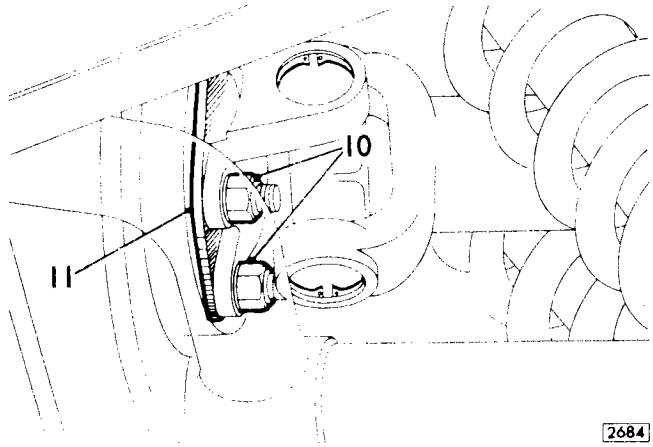
Adjust

6. Remove setting links.
7. Jack up rear of car and place stands to support body.
8. Remove road wheel – 74.20.01.
9. Remove lower wishbone outer fulcrum grease nipple.
10. Remove four steel locknuts securing half shaft flange to brake disc.
11. Separate half shaft from disc to enable shims to be fitted.

NOTE: Addition of one shim .5 mm (.020 in.) will alter camber position $\frac{1}{4}^{\circ}$.

12. Add or remove shims as required.
13. Reverse operations 6 to 10 inclusive.
14. Recheck camber angle, operation 4.



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REAR HYDRAULIC DAMPERS

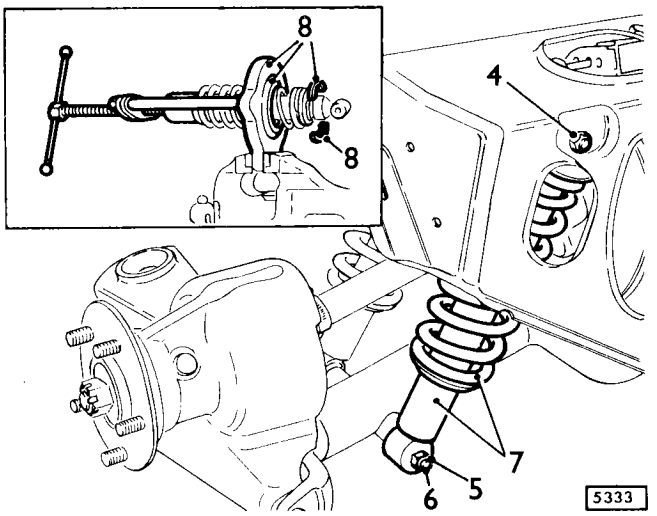
Remove and refit **64.30.01**

Service tools Handpress SL.14
Adaptor JD.11B

Removing

NOTE: Rear hydraulic dampers can be removed with rear suspension unit fitted to car.

1. Remove rear road wheel – 74.20.01.
2. Support rear of car on stand.
3. Place jack to support wishbone.
4. Remove self-locking nut and bolt securing top of hydraulic damper to suspension unit cross beam.
5. Remove washers and nuts securing hydraulic dampers to wishbone.
6. Drift out damper mounting pin. Recover spacer at forward end of mounting pin tube.
7. Withdraw hydraulic damper and road spring assembly.
8. Using tools SL.14 and JD.11B compress road spring until collets and spring seat can be removed.
9. Release spring pressure and withdraw hydraulic damper from road spring.



Refitting

NOTE: Hydraulic dampers fitted to this car are of the gas pressurized type and therefore need not be exercised before installation.

Reverse operations 1 to 9 inclusive.

BUMP STOP

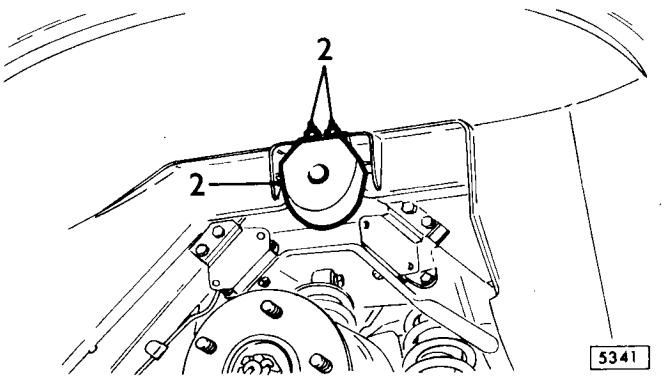
Remove and refit **64.30.15**

Removing

1. Remove rear road wheel – 74.20.01.
2. Remove two self-locking nuts and washers and detach bump stop.

Refitting

Reverse operations 1 and 2.



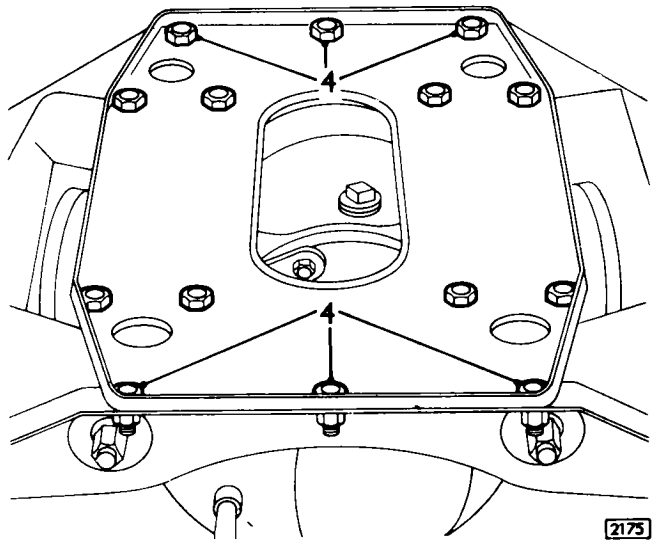
WISHBONE

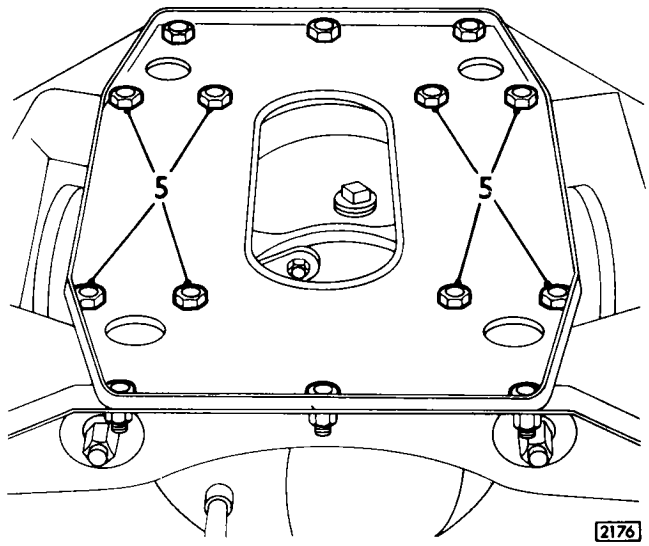
Remove and refit 64.35.15

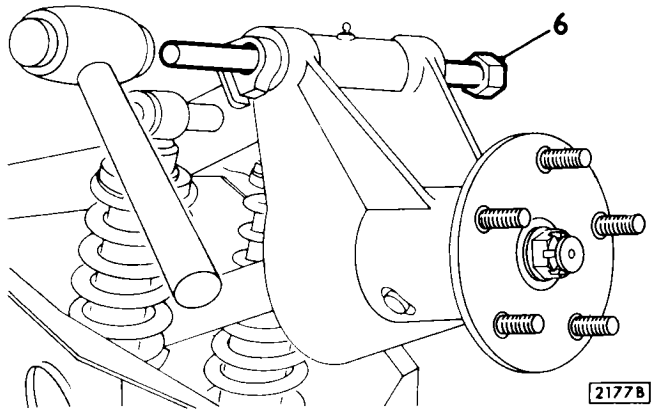
Service tool Dummy shaft JD.14

Removing

1. Drain oil from final drive unit.
2. Remove rear suspension unit – 64.25.01.
3. Invert rear suspension unit on bench.
4. Remove six self locking nuts and setscrews securing tie plate to cross member flange.
5. Remove eight bolts and spring washers securing tie plate to wishbone inner fulcrum mounting brackets.
6. Remove one self locking nut from outer fulcrum shaft, drift out shaft and remove.

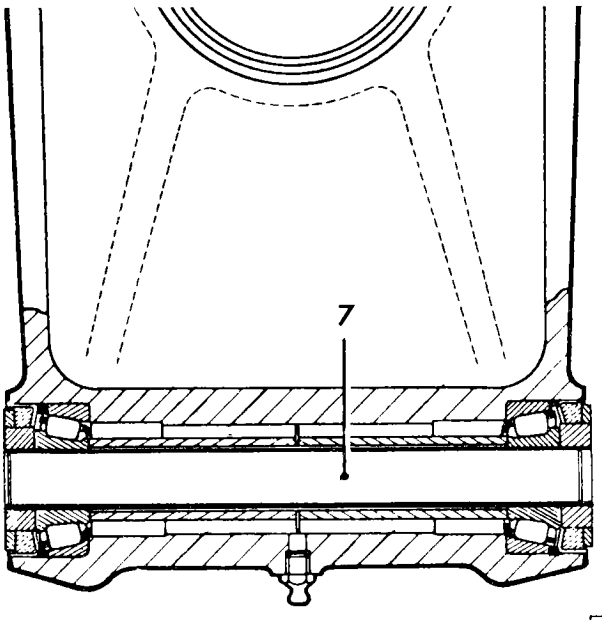






7. Fit dummy shaft tool JD.14 to hub carrier assembly. Retain shims and oil seal retaining washers at each side of fulcrum with adhesive tape.
8. Remove forward self locking nut and plain washer at wishbone road spring assembly pivot.
9. Tap pivot rearwards through wishbone to clear forward damper and spacer. Recover spacer and move damper towards centre of suspension assembly.
10. Turn down tab washer and remove special bolt securing radius arm to wishbone. Remove radius arm.
11. Withdraw road spring assembly pivot.
12. Remove one self locking nut and plain washer on wishbone inner fulcrum shaft.
13. Drift inner fulcrum shaft from cross member and fulcrum mounting bracket.
14. Withdraw wishbone assembly.
15. Recover thrust washers, seal retainers, seals, bearing tube, needle bearing cages and spacer from each inner boss of wishbone.

NOTE: It is not necessary to remove spacing tube fitted to inner fulcrum mounting bracket unless mounting bracket is to be removed.



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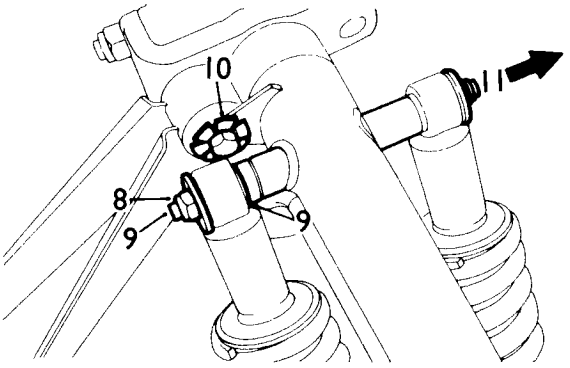

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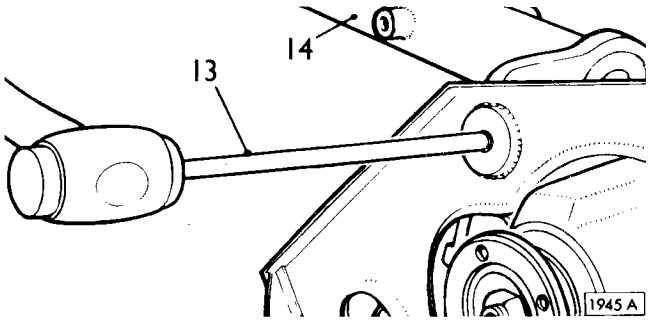


1945 A

Refitting

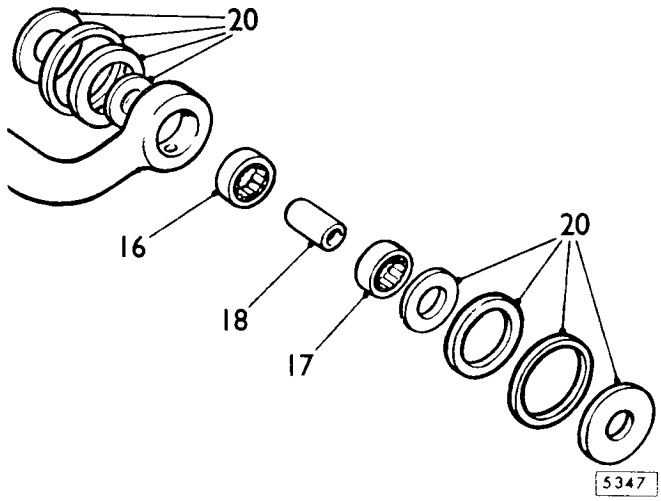
16. Smear needle bearing cage with grease and press into wishbone inner fulcrum boss, engraving facing outwards.
17. From opposite end of boss, press in second needle bearing cage, again with engraved face outwards.
18. Insert bearing tube.
19. Repeat for other boss.
20. Smear four outer thrust washers, inner thrust washers, new oil seals and oil seal retainers with grease and place into position on wishbone.
21. Offer up wishbone to inner fulcrum mounting bracket with radius arm bracket towards front of suspension unit.

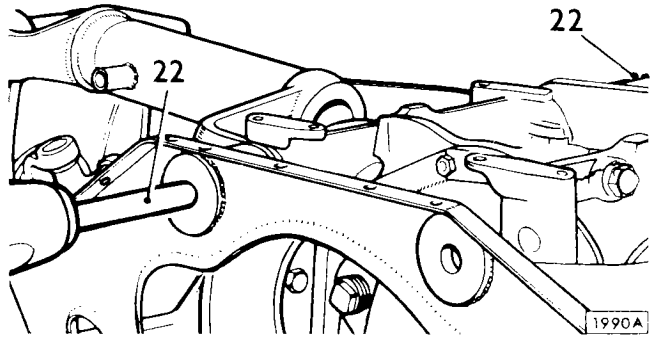
NOTE: Take great care not to displace any of the fulcrum bearing components.

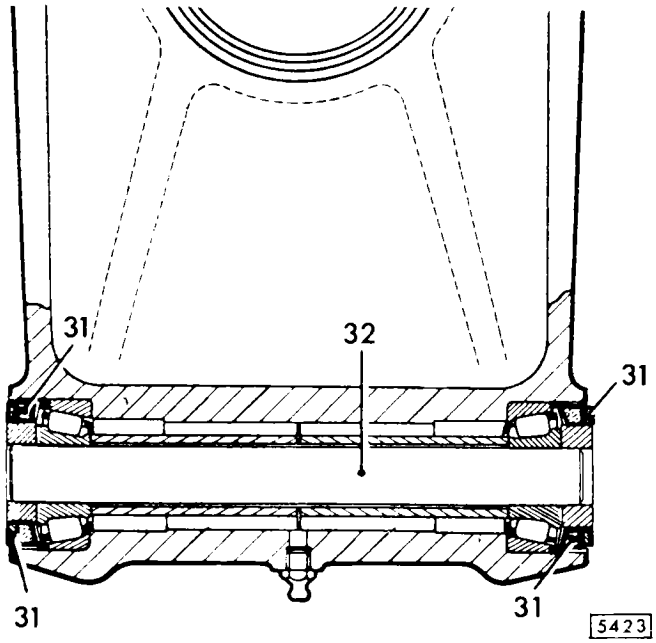
22. Carefully enter dummy shaft, tool JD.14, from each end to retain bearing assemblies and locate wishbone with mounting bracket.
23. Smear fulcrum shaft with grease and gently drift it through fulcrum to chase out dummy shafts.

NOTE: It is adviseable to maintain a slight reaction pressure on dummy shafts as they emerge from fulcrum. This ensures that thrust washers are not knocked out of position. Should this happen, the fulcrum shaft, dummy shaft and wishbone must be removed, and the installation operations 16 to 23 repeated.

24. Fit self locking nut to fulcrum shaft. Tighten to torque of 6.2 to 6.9 kg.m. (45 to 50 lb.ft.).
25. Refit eight bolts and spring washers securing tie plate to fulcrum mounting bracket. Tighten.
26. Refit six setscrews and self locking nuts securing tie plate to cross member. Tighten.
27. Refit radius arm to wishbone using special bolt and tab washer.
28. Refit road spring assembly pivot pin, replacing spacer adjacent to radius arm securing bolt.
29. Fit self locking nut and plain washer and tighten to 4.1 to 5.0 kg.m. (30 to 36 lb.ft.).
30. Remove adhesive tape securing shims and oil seal retainers at wishbone outer fulcrum in hub carrier assembly.
31. Remove shims and oil seal retainers, prise out old oil seals and fit new. Replace oil seal retainers and shims.
32. Fit dummy shaft JD.14 to retain components of bearing in hub carrier.
33. Locate hub carrier assembly between jaws of wishbone and chase dummy shaft out with fulcrum shaft.
34. Fit self locking nut to fulcrum shaft. Tighten to torque of 13.1 to 14.5 kg.m. (95 to 105 lb.ft.).
35. Refit rear suspension unit.
36. Refill final drive unit with specified lubricant.
37. Check rear suspension camber angle – 64.25.18.
38. Re-lubricate wishbone fulcrum shafts as detailed in Routine Maintenance group 10.







WISHBONE OIL SEALS

Remove and refit 64.35.17

Follow procedure given under wishbone – remove and refit – **64.35.15.**

MOUNTING BRACKET

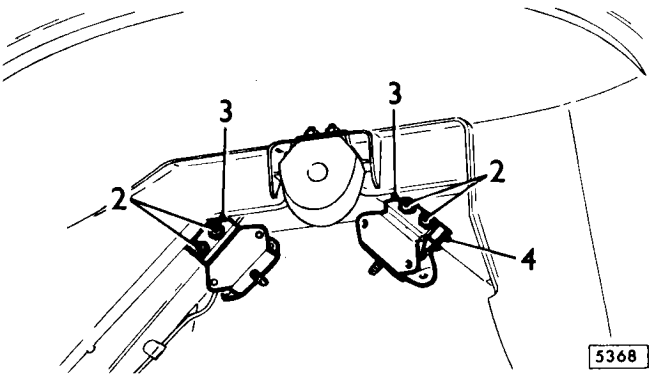
Remove and refit 64.35.20

Removing

1. Remove rear suspension unit – 64.25.01.
2. Remove two self locking nuts and bolts securing each mounting bracket to body. Recover two packing pieces from beneath each rear bracket.

Refitting

3. Fit new rear suspension rubber mountings to body with cut-away end of flange upwards.
4. Position a packing piece on either side of body channel beneath both rear brackets.
5. Secure bracket using bolts and self locking nuts. Tighten to torque of 2.1 to 2.5 kg.m. (15 to 18 lb.ft.).
6. Refit rear suspension unit.



WISHBONE BEARINGS

Remove and refit 64.35.16

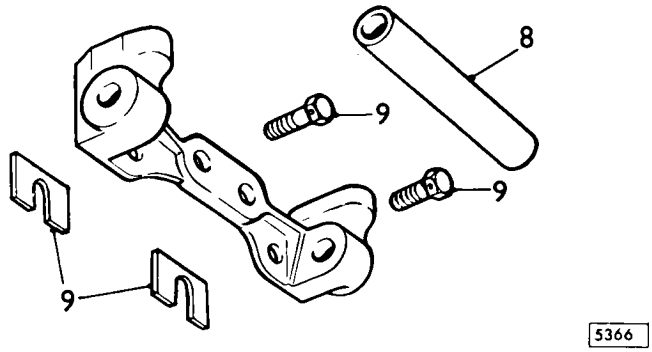
Procedures for removal and refitting the wishbone outer fulcrum bearings are given in Rear hub and carrier assembly – remove and refit – 67.15.01, and overhaul – 67.15.07. The wishbone inner fulcrum bearings are covered in Wishbone – remove and refit – 64.35.15.

INNER FULCRUM MOUNTING BRACKET

Remove and refit 64.35.21

Removing

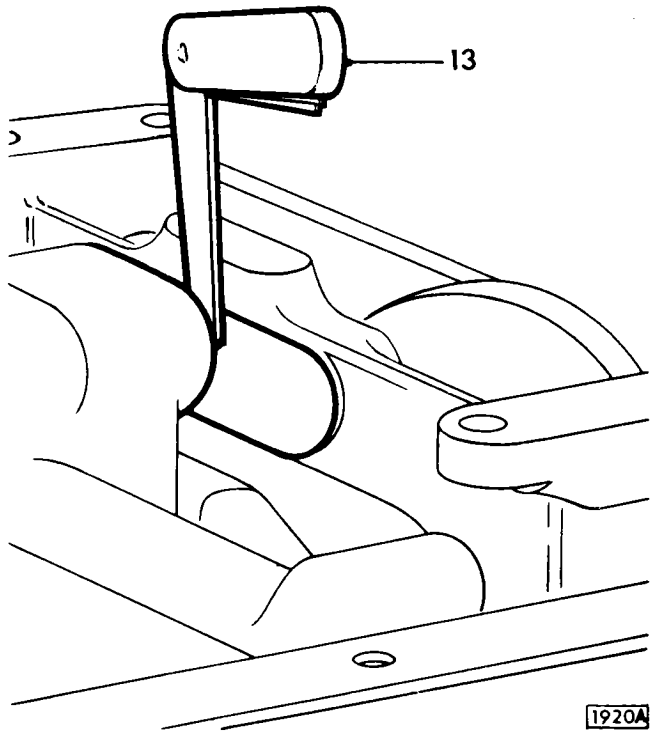
1. Drain oil from final drive unit.
2. Remove rear suspension unit – 64.25.01.
3. Remove eight bolts and locking washers securing tie plate to inner fulcrum mounting bracket.
4. Remove six bolts and self locking nuts securing tie plate to crossmember.
5. Remove one self locking nut and drift out inner fulcrum shaft.
6. Withdraw wishbone fork from fulcrum bracket.
7. Recover thrust washers, seal retainers etc. temporarily position them correctly and secure to wishbone with adhesive tape.
8. Tap spacer tube from between lugs of mounting bracket.
9. Remove locking wire from two setscrews securing mounting bracket to final drive unit. Remove setscrews. Note position and number of shims beneath each setscrew.



5366

Refitting

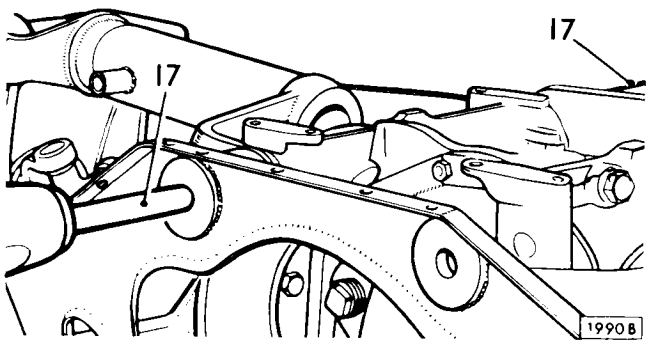
10. Position mounting bracket against final drive unit and loosely locate with two setscrews.
11. Pass fulcrum shaft through crossmember and mounting bracket.
12. Position shims, removed in operation 9, between final drive unit and mounting bracket.
13. Use feeler gauges to determine whether shimming is sufficient to remove clearance, and adjust shim pack beneath each setscrew as necessary.
    Shims are available in thicknesses of .127 mm (.005 in.) and .178 mm. (.007 in.).
14. Remove fulcrum shaft, position selected shims and tighten setscrews to torque of 8.3 to 9.1 kg.m. (60 to 65 lb.ft.).
    Wire lock setscrews to tension in a clockwise direction.
15. Tap spacing tube into position between mounting bracket lugs.
16. Remove adhesive tape from wishbone bearings, fit new oil seals and relocate seal retainers and thrust washers with grease.
17. Carefully position wishbone arms between mounting bracket lugs and locate with dummy shafts, tool number JD.14. Take great care not to displace any component during this operation.
18. Drift dummy shafts from fulcrum using fulcrum shaft.



1920A

NOTE: It is adviseable to restrain dummy shafts as they emerge to prevent spacers or thrust washers being knocked out of position.

19. Fit self locking nut to fulcrum shaft and tighten to torque of 6.2 to 6.9 kg.m. (45 to 50 lb.ft.).
20. Fit six bolts and self locking nuts securing tie plate to crossmember.
21. Fit eight bolts and lockwashers securing tie plate to inner fulcrum mounting bracket.
22. Refit rear suspension unit.
23. Refill final drive unit with specified lubricant.



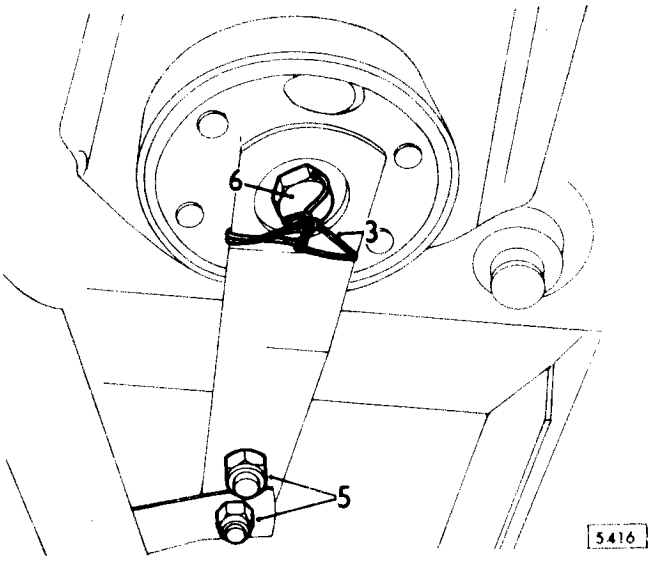
19908

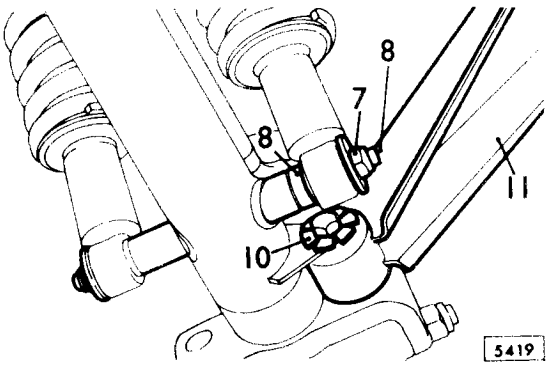
RADIUS ARM

Remove and refit 64.35.28

Removing

1. Jack up rear of car and support on stands just forward of radius arm anchor point.
2. Remove road wheel – 74.20.01.
3. Remove safety wire from radius arm bolt and safety strap.
4. Remove two drive screws securing rear brake air scoop.
5. Remove nuts securing safety strap to body move air scoop bracket and remove safety strap.
6. Remove bolt securing radius arm to body and disconnect arm from body.
7. Remove self locking nut and plain washer at forward road spring assembly lower mounting pivot.
8. Drift mounting pin from front to rear sufficiently far to clear forward road spring assembly and spacer.
9. Remove drift, recover spacer and move road spring assembly towards centre line of car.
10. Turn down tab washer and remove special bolt securing bush of radius arm to wishbone.
11. Lever radius arm from spigot anchor point.
12. Examine radius arm bushes and replace if necessary.





Refitting

NOTE: Before fitting radius arm to body spigot location, wirebrush spigot and smear with waterproof grease.

13. Reverse operations 1 to 12 inclusive. Tighten following fixings to stated torque level.
    Radius arm to wishbone 6.2 to 6.9 kg.m. (45 to 50 lb.ft.).
    Radius arm front fixing bolt 5.5 to 6.2 kg.m. (40 to 45 lb.ft.).
    Safety strap to body 2.1 to 2.5 kg.m. (15 to 18 lb.ft.).
    Road spring assembly 4.1 to 5.0 kg.m. (30 to 36 lb.ft.).
14. Wire lock radius arm front fixing bolt to safety strap.

RADIUS ARM BUSHES

Remove and refit 64.35.29

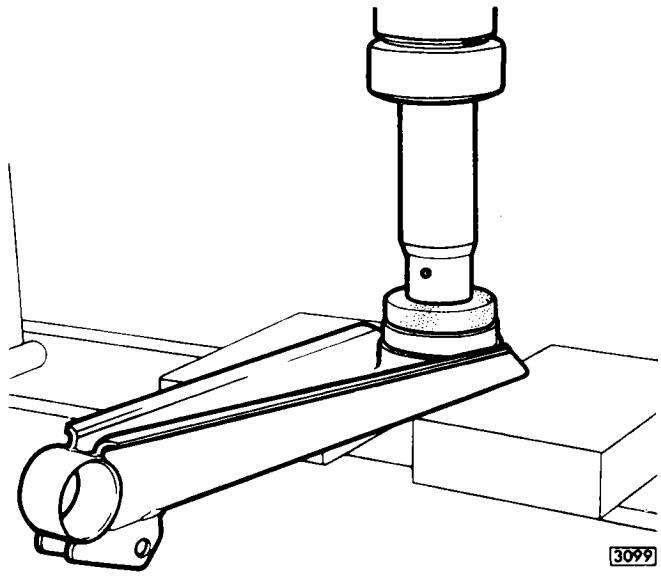
Service tool Mandrel JD.21

Removing

1. Remove radius arm – 64.35.28.
2. Use mandrel tool JD.21 and press front bush from housing.
3. Use mandrel tool JD.21 and press rear bush from housing.

Refitting

4. Press new bush into rear bush housing so that bush is central in radius arm.
5. Use mandrel and press new bush into front bush housing so that holes in bush rubber are in line with centre line of radius arm. Press bush into radius arm until bush ring is flush with bush housing. When pressing bush, have open channel of radius arm and small hole in bush core upwards.



ACCIDENTAL DAMAGE

The dimensional drawings below are provided to assist in assessing accidental damage. A component suspected of being damaged should be removed from the car and cleaned off, the dimensions should then be checked and compared with those given in the appropriate illustration.

DIMENSION

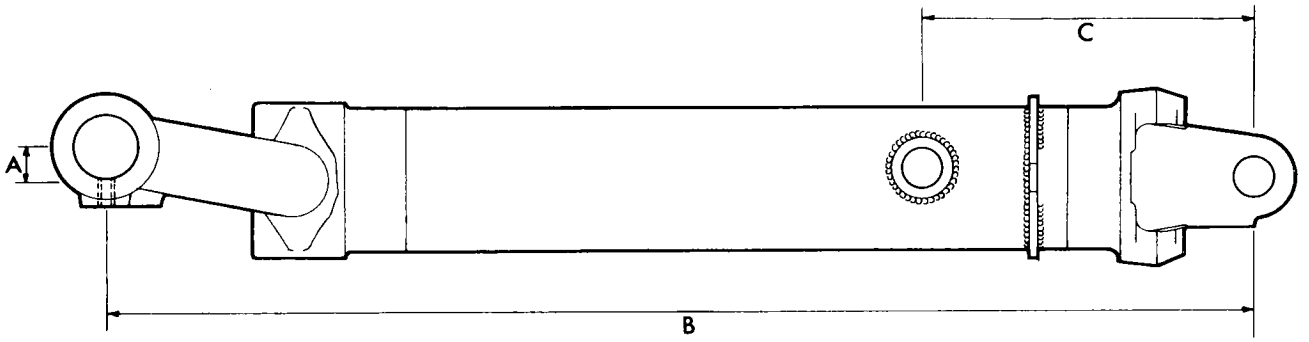
A 15.6 mm. (.625 in.)

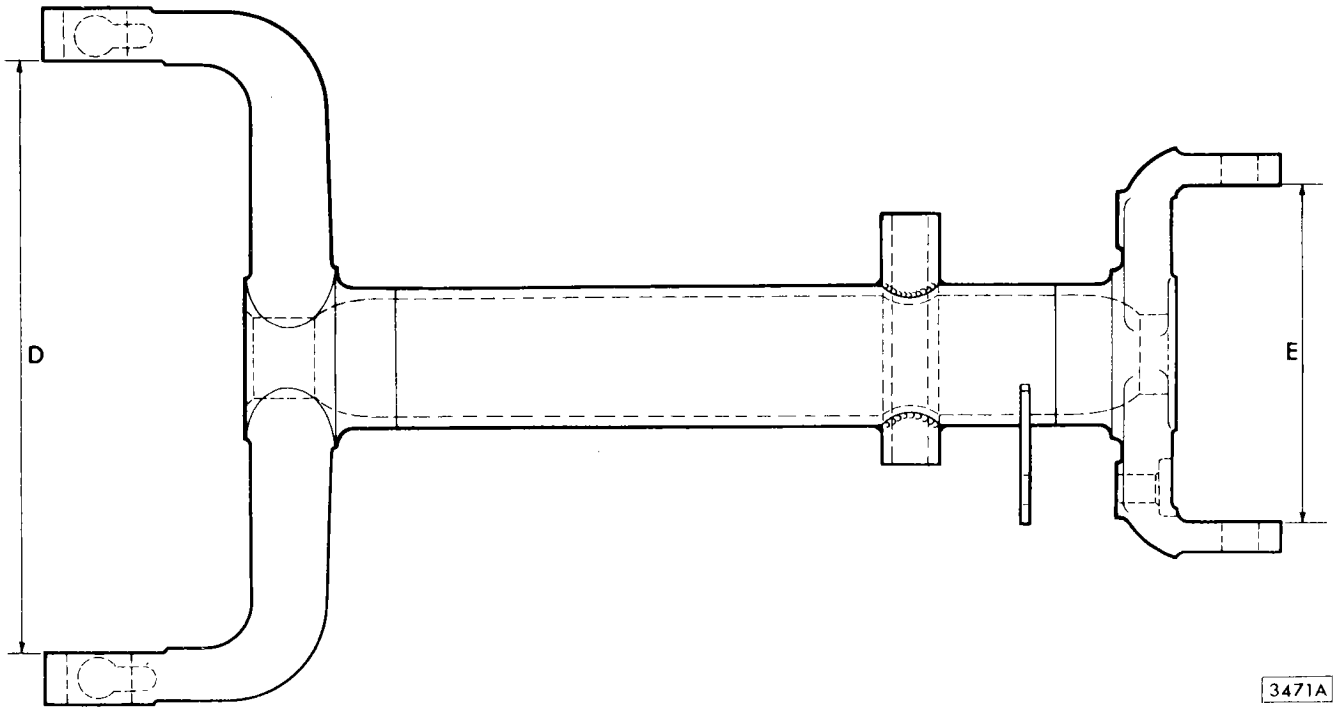
B 51.99 cm. (20.469 in.)

C 15.08 cm. (5.937 in.)

D 27.0 – 27.02 cm. (10.642 – 10.632 in.)

E 15.5 cm. (6.125 in.)



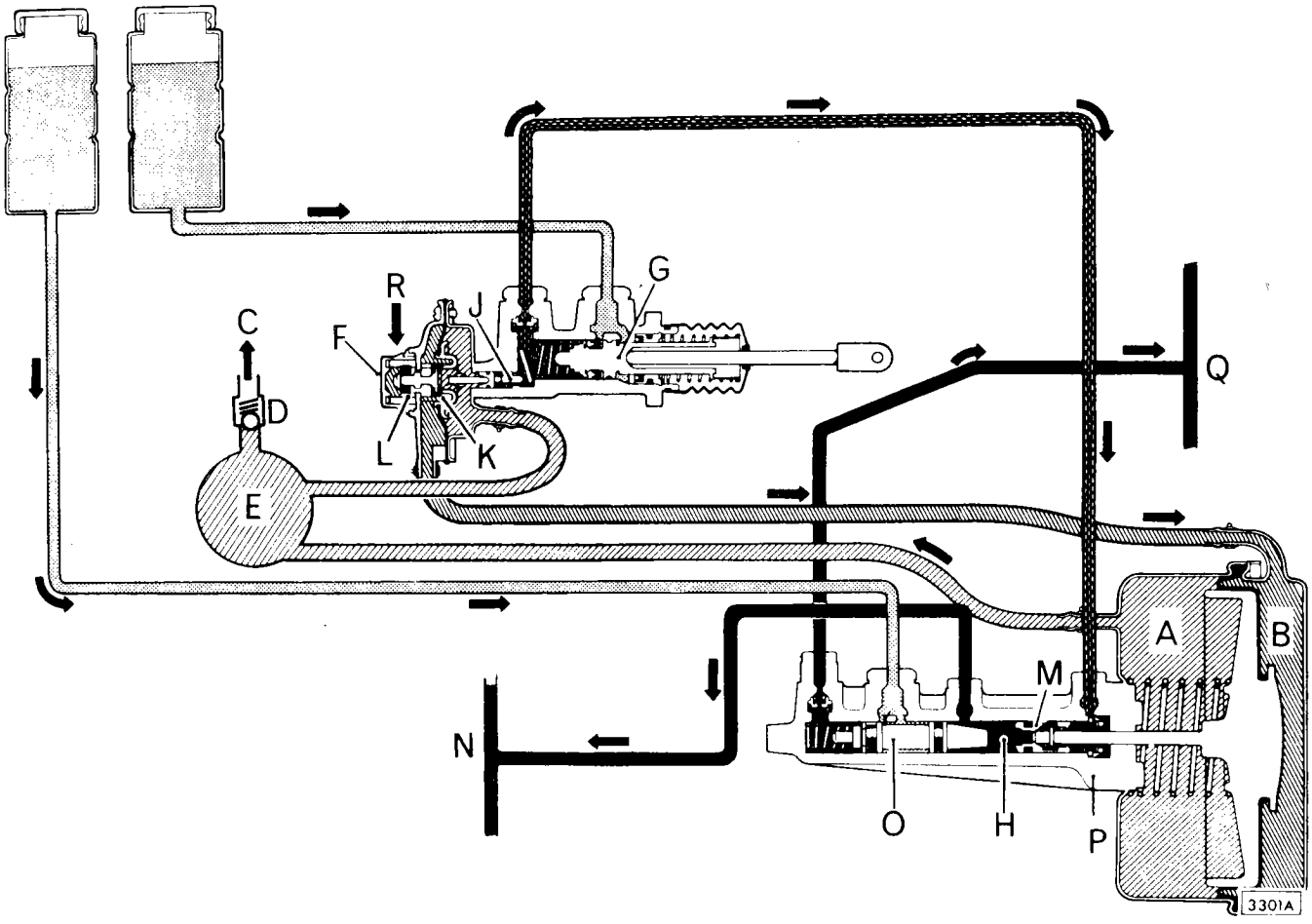


CONTENTS

BRAKE SYSTEM

Description

The hydraulic servo assisted braking system fitted to this vehicle is of the dual-line type.
The complete system is given schematically below.



Operation

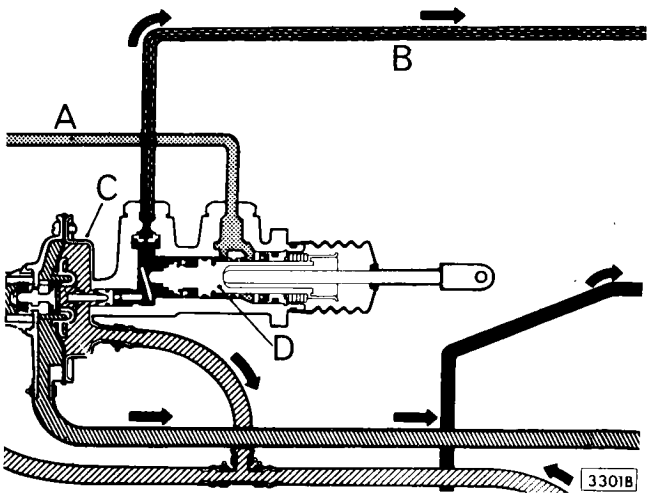
When the system is at rest, both sides of the servo diaphragm 'A' and 'B' are continuously exhausted by the engine manifold depression 'C' via a check valve 'D' reservac tank 'E' and reaction valve 'F'. As the brake pedal is depressed, the master cylinder piston 'G' moves along the cylinder building up pressure and forcing fluid to the primary chamber 'H' of the servo slave cylinder 'P'. Simultaneously, the intermediate piston 'J' in the end of the master cylinder, closes the diaphragm valve 'K' in the reaction valve. This isolates the reservac and front side of the servo diaphragm from the rear.
Further progress of the intermediate piston along its bore will crack the air control spool 'L' in the reaction valve and admit air at atmospheric pressure to the rear of the servo diaphragm 'B'. Atmospheric pressure applied to the rear of the diaphragm provides the servo assistance to hydraulic braking operation; the primary piston 'M' attached to the servo push rod directly providing braking on the front wheels 'N'. The movement of the primary piston, and the consequent front brake operating pressure, forces the secondary piston 'O' forward to provide braking on the rear wheels 'Q'.

Safety Factors

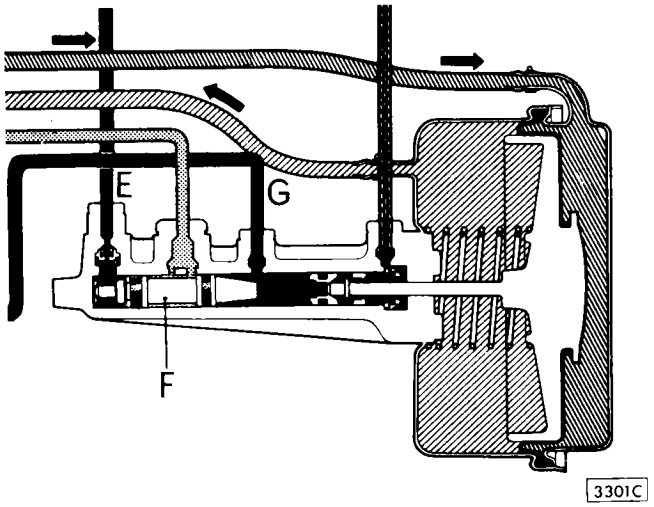
WARNING: ALTHOUGH THESE SAFEGUARDS PREVENT COMPLETE FAILURE OF THE BRAKING SYSTEM ANY CHANGE IN BRAKING EFFICIENCY OR SUDDEN LOSS OF HYDRAULIC FLUID MUST BE INVESTIGATED AND RECTIFIED IMMEDIATELY'
IF A FAILURE IN THE BRAKE SYSTEM IS SUSPECTED THE CAR MUST NOT UNDER ANY CIRCUMSTANCES BE MOVED WITH THE ENGINE SWITCHED OFF.'
UNDER CERTAIN CONDITIONS THIS WILL RESULT IN TOTAL LOSS OF BRAKING.

NOTE: Later cars are fitted with a pressure differential warning actuator. Failure of hydraulic pressure in either front or rear brake systems operates a pressure differential warning actuator (P.D.W.A.), and switches on a warning lamp in the car.

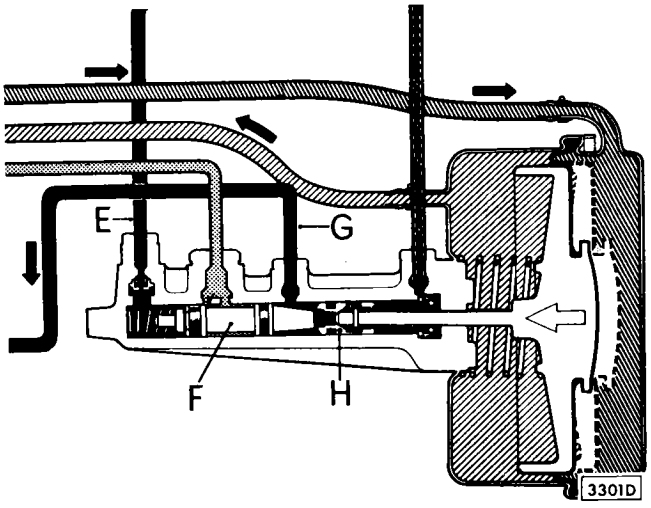
The system has four built in safeguards; 'engine off' complications are also given.



1. In the event of a fluid line failure in the pipe linking the master cylinder to the fluid supply tank 'A' or the pipe linking master cylinder and slave cylinder 'B', the reaction valve 'C' is operated mechanically by the master cylinder piston 'D'. This operates the slave cylinder by air pressure differential alone. This fault will result in rapid draining of the master cylinder reservoir.
   If the engine is switched off. TOTAL LOSS OF BRAKING.

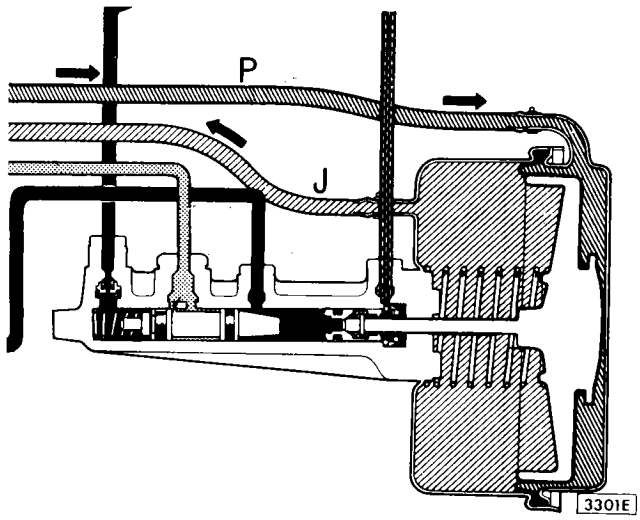


2. A failure in the fluid line coupling the slave cylinder to the rear brakes 'E' will result in the slave cylinder secondary piston 'F' travelling the full length of the bore. This has the effect of isolating the rear brake line from the rest of the system and allowing fluid pressure to build up in the front brake line 'G'. This fault will result in rapid draining of the servo slave cylinder reservoir.
   If the engine is switched off. LOSS OF SERVO ASSISTANCE.



3. If a fault exists in the front brake line 'G', the slave cylinder primary piston 'H' will travel along the bore until it contacts the secondary piston; the two pistons together will then apply the rear brakes. This fault will result in rapid draining of the master cylinder reservoir, and eventually, to operation as for fault 1.
   If the engine is switched off. TOTAL LOSS OF BRAKING.

4. In the case of leaks in either the air **pipe** 'P' or vacuum pipe 'J' both front and rear brakes may still be applied by master cylinder pressure only. In this event, the primary piston is inoperative. The master cylinder pressure therefore operates front brakes direct, and rear brakes via the slave secondary piston. If the engine is switched off. NO ADDITIONAL EFFECT.



FRONT DISCS

Remove and refit 70.10.10

Removing

**1. Remove front hub – 60.25.01.
2. Remove brake pads – 70.40.02.

CAUTION: Do not operate brake pedal while disc is not in place.

3. Draw disc from between jaws of caliper.

Refitting

CAUTION: Use new self-locking nuts (knock on wheels).

4. Reverse operations 1 to 3 (bolts fit from outside to in-knock on wheels).

NOTE: Do not fit road wheel at this stage.

5. Check brake disc for 'run-out' by clamping a dial test indicator to stub axle carrier. Clamp indicator so that button bears on face of disc. 'Run-out' must not exceed .15 mm. (.006 in.).
6. Fit road wheel.**

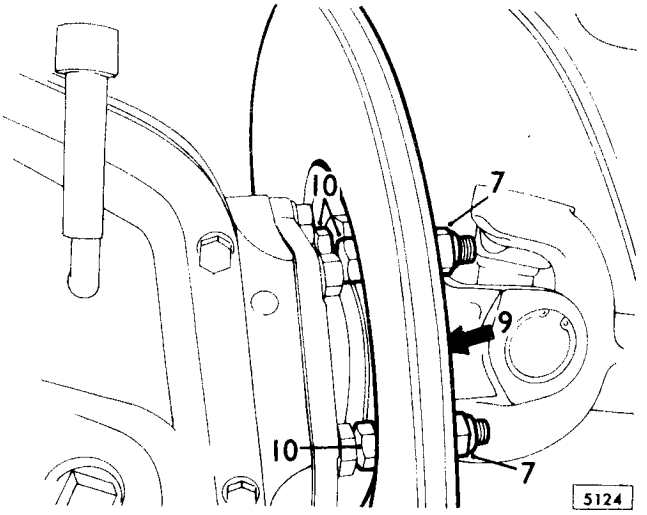
REAR DISCS

Remove and refit – each **70.10.11**

Removing

1. Remove rear suspension unit – 64.25.01.
2. Remove brake caliper – 70.55.03.
3. Invert suspension unit.
4. Remove hydraulic damper – 64.30.01.
5. Remove road spring – 64.20.01.
6. Release jubilee clip(s) and slide back half shaft inner universal joint shield (if fitted).
7. Remove four steel self locking nuts securing half shaft inner universal joint and brake disc to axle output shaft flange.
8. Withdraw half shaft from bolts.
9. Note number of camber shims between universal joint and brake disc.
10. Tap brake disc securing bolts back as far as possible.
11. Lift lower wishbone, hub carrier and half shaft assembly upwards until brake disc can be withdrawn from securing bolts.

NOTE: Do not disturb shims on axle flange.



Refitting

12. Position new disc against axle output shaft flange and tap securing bolts through.
13. Place camber shims removed in operation 9 on securing bolts.
14. Secure half shaft inner universal joint flange to axle output shaft flange using four new steel self locking nuts.
15. Check brake discs for 'run-out' by clamping a dial test indicator to suspension unit cross member. Clamp indicator so that button bears on face of disc. 'Run-out' must not exceed .15 mm. (.006 in.).
16. Reverse operations 2 to 6.
17. Use feeler gauges to check centralization of disc between caliper jaws. If necessary determine shims required. Remove caliper and disc, and fit shims between axle drive shaft and disc.
18. Replace brake caliper.
19. Refit rear suspension.
20. Check and, if necessary, adjust rear wheel camber – 64.25.18.

DISC SHIELDS – FRONT

Remove and refit **70.10.18**

Removing

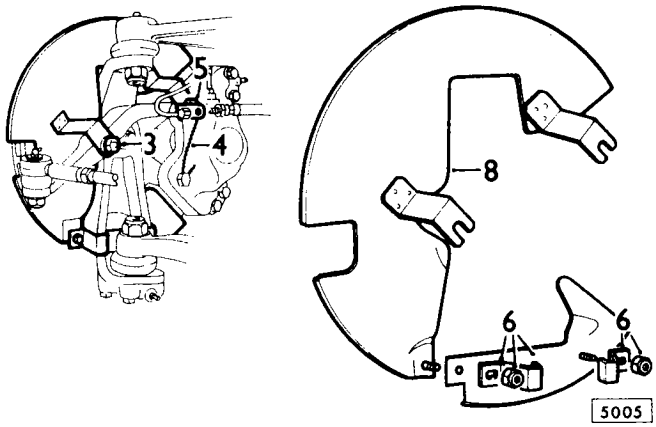
1. Remove road wheel – 74.20.01.
2. Place a stand beneath the lower wishbone at a point adjacent to the damper.
3. Slacken bolt securing steering arm to stub axle carrier.
4. Break and remove caliper securing bolt locking wire.
5. Slacken upper securing bolt.

   CAUTION: Take care not to strain brake pipe bracket.

6. Remove self-locking nuts and clips securing lower shield assembly to stub axle carrier. Remove lower shield assembly.
7. Pull slotted brackets on upper shield assembly from beneath large washers.
8. Manoeuvre upper shield assembly clear of disc.

Refitting

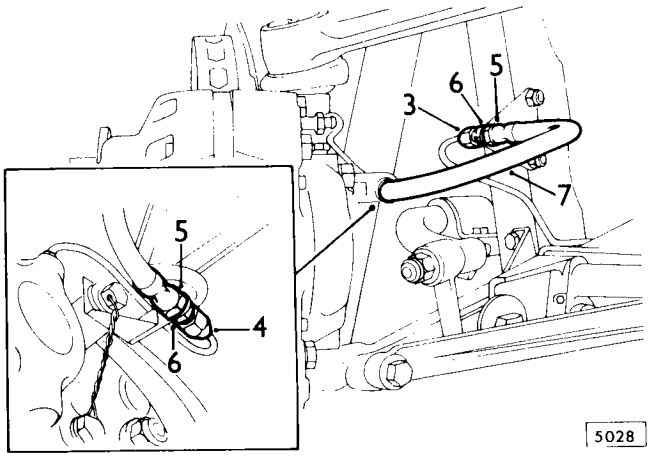
9. Offer disc shield into position so that slotted brackets locate beneath large washers on steering arm securing bolt and upper caliper securing bolt.
10. Fit lower shield assembly and securing brackets using self-locking nuts.
11. Tighten steering arm and caliper securing bolts. Torque 6.91 – 8.30 kg.m (50 – 60 lb.ft.).
12. Wire lock together both caliper securing bolts.
13. Remove stand.
14. Refit road wheel.



WARNING: Throughout the following operations absolute cleanliness must be observed to prevent grit or other foreign matter contaminating the brake system. If the system is to be flushed or cleaned through, ONLY Girling Brake Cleaner or methylated spirit must be used. Brake system components must be washed in methylated spirit and all traces of spirit removed before reassembly.
All brake system components must be dipped in clean brake fluid and assembled using the fingers only.

BRAKE HOSES

Remove and refit – each **Left hand – 70.15.02**
Right hand – 70.15.03



Removing

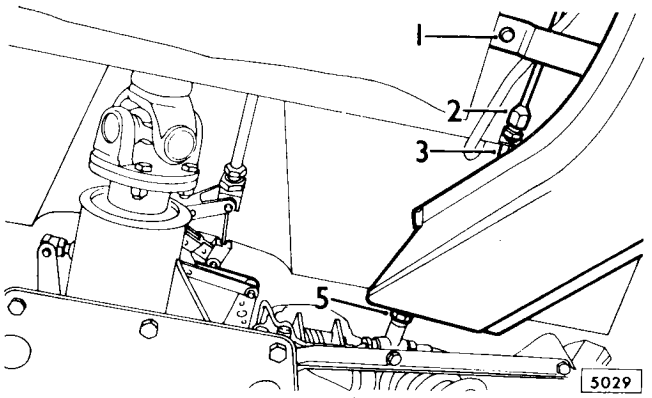
1. Remove road wheel – 74.20.01.
2. Place stand under wishbone at a point adjacent to damper.
3. Remove vehicle pipe connector at sub-frame bracket. Immediately plug pipe to prevent fluid loss.
4. Remove pipe connector to caliper.
5. Restrain hexagonal ends of hose.
6. Remove lock nuts.
7. Pull hose from brackets.

Refitting

8. Reverse operations 1 to 7, using a new shake proof washer beneath lock nuts.
9. Bleed brakes – 70.25.02.

CENTRE HOSE

Remove and refit **70.15.04**



Removing

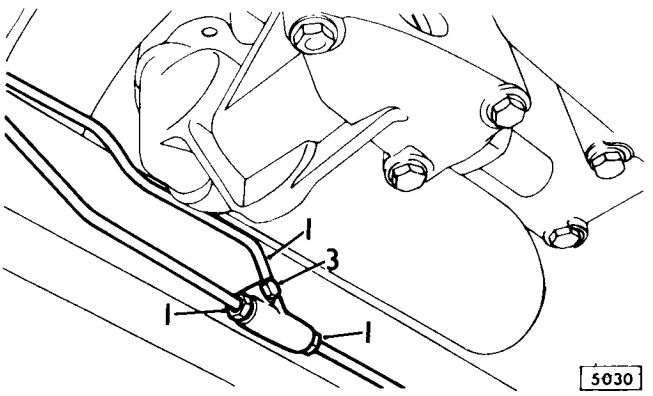
1. Remove two setscrews and one locknut securing left hand rear brake air scoop.
2. Remove vehicle pipe connector at brackets. Immediately plug pipe to prevent fluid loss.
3. Restrain hexagonal end of hose at bracket.
4. Remove lock nut and pull hose from bracket.
5. Remove hose from three way union on rear suspension unit cross member. Immediately plug three way union to prevent fluid loss.

Refitting

6. Reverse operations 1 to 5, using a new copper gasket at three way union, and a new shake proof washer beneath lock nut.
7. Bleed brakes – 70.25.02.

BRAKE UNIONS

Front three way union – remove and refit **70.15.33**



Removing

1. Remove pipe connectors from three way union.
2. Plug each pipe as it is freed to prevent fluid loss.
3. Remove nyloc nut, two plain washers and setscrew securing three way union to cross member.

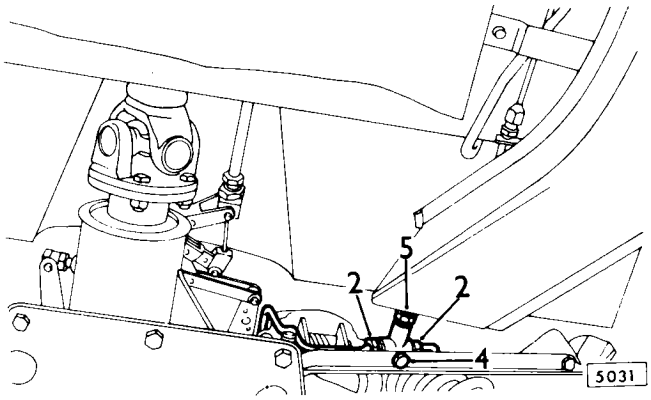
Refitting

4. Reverse operations 1 to 3.
5. Bleed brakes – 70.25.02.

Rear three way union – remove and refit **70.15.34**

Removing

1. Remove two setscrews and one locknut securing left hand rear brake air scoop.
2. Remove pipe connectors from ends of three way union.
3. Plug each pipe as it is freed to prevent fluid loss.
4. Remove setscrew, nut, spring and plain washers securing three way union to cross member.
5. Restrain hexagon end of flexible hose and screw off three way union.



Refitting

6. Reverse operations 1 to 5, using a new copper gasket between flexible hose and three way union.
7. Settle lay of flexible hose to remove as much twist as possible.
8. Bleed brakes – 70.25.02.

****PRESSURE DIFFERENTIAL WARNING ACTUATOR (P.D.W.A.)**

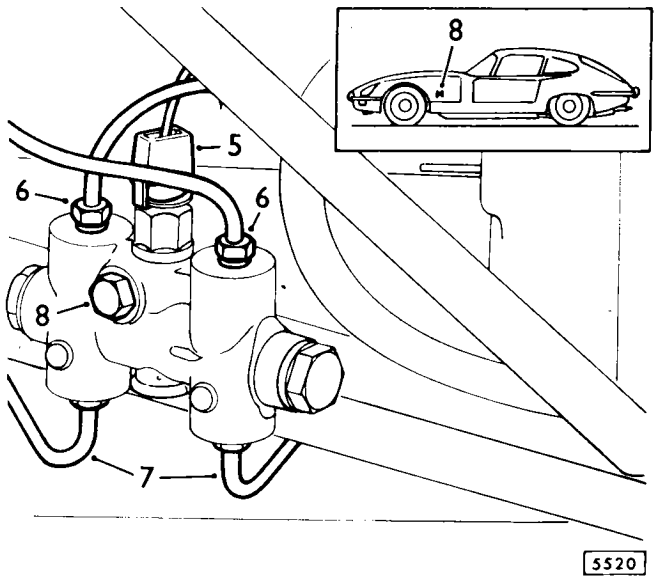
Remove and refit **70.15.36**

Removing

1. Disconnect battery – 86.15.17.
2. Remove reservac tank – 70.50.04.
3. Remove windscreen washer reservoir – 84.10.01.
4. Remove brake servo fluid reservoir – 70.30.17.
5. Disconnect electrical connector from P.D.W.A. switch.
6. Disconnect input pipes to P.D.W.A. plug pipes to prevent loss of fluid and ingress of dirt.

   NOTE: Slacken input pipe connectors at servo slave cylinder swing pipes clear of P.D.W.A.

7. Disconnect output pipes from P.D.W.A. plug pipes.
8. Remove nut, spacer and bolt securing P.D.W.A. to bracket.



Refitting

9. Reverse operations 1 to 8.
10. Bleed brakes – 70.25.02.**

BRAKE PIPES

Feed pipe – brake servo to adaptor

Remove and refit **70.20.14**

Removing

1. Remove left hand undershield – 76.10.42.
2. At torsion bar reaction bracket disconnect out board pipe connectors from front of adaptor. Plug pipe and adaptor.
3. Remove windscreen washer reservoir – 84.10.01.
4. Remove pipe from front connector of brake slave cylinder. Plug connector outlet **or pressure differential warning actuator (P.D.W.A.) if fitted;** to prevent fluid loss.

Refitting

5. Reverse operations 1 to 4.
6. Bleed brakes – 70.25.02.

BRAKES

Bleed 70.25.02

Bleeding the brake system is not a routine maintenance operation and should only be necessary if the fluid level has been allowed to fall or a portion of the system has been disconnected. During the bleeding operation it is important that the level in the reservoir is kept topped up to avoid drawing air into the system. It is recommended that new fluid be used for this purpose, as fluid bled from the system may be aerated.

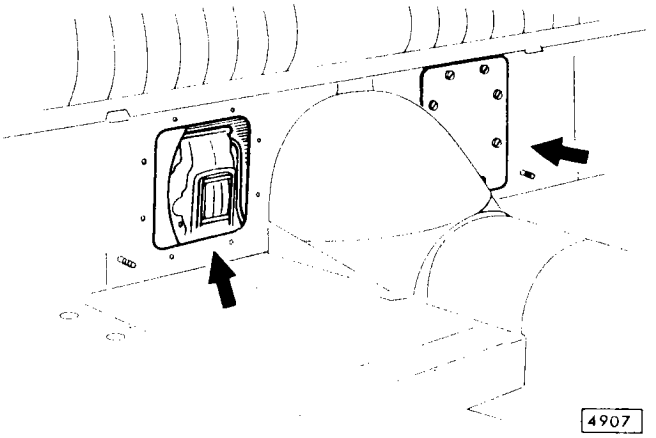
NOTE: If car is fitted with a pressure differential warning actuator (P.D.W.A.), items 20 to 24 must also be carried out.

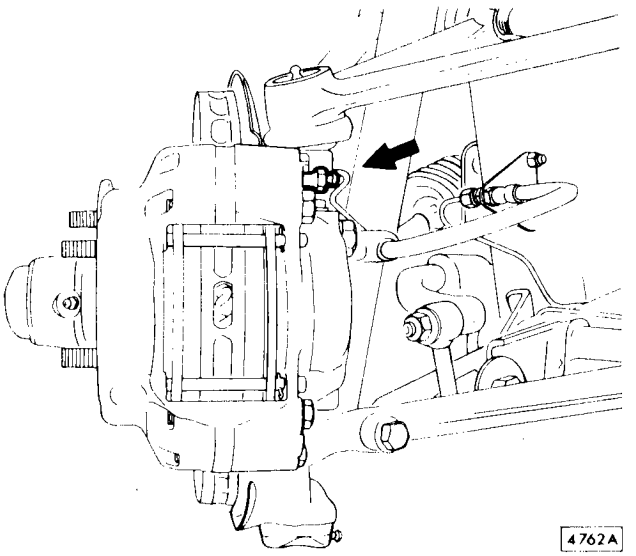
1. Check that all connections are tightened and both front bleed screws closed.
2. Ensure both fluid reservoirs are filled with fluid of correct specification.
3. Remove rear seat lower squab – 76.70.40.
4. Remove eight drive screws securing each inspection plate and remove plates. Remove all sealer.
5. Check left hand bleed screw closed.
6. Attach bleeder tube to bleed screw on right hand brake caliper and immerse open end of tube in clean glass jar containing a little clean brake fluid.
7. Slacken bleed screw.
8. Operate brake pedal slowly backwards and forwards through full stroke until fluid pumped into jar is reasonably free of bubbles.

   NOTE: Check fluid level in both reservoirs at regular intervals and replenish as necessary.

9. Keep pedal fully depressed and close bleed screw.
10. Repeat operations 6 to 9 inclusive to bleed left hand rear brake then continue with operation 11.
11. Repeat for each front brake in turn.
12. Repeat complete sequence for bleeding brakes until brake fluid pumped into jar is completely free from air bubbles.
13. Finally check tighten all bleed screws. Fit caps.
14. Regulate fluid level in both reservoirs.
15. Apply normal working load to brake pedal for two or three minutes to ensure pedal position does not change. If pedal moves, the system is not sufficiently bled or has a leak or faulty seal. The cause must be ascertained and rectified, and the brakes re-bled.
16. Check complete system for evidence of fluid leakage.
17. Apply suitable waterproof sealing compound around inspection plates. Use new gaskets.
18. Secure each inspection plate in position using eight drive screws.
19. Replace rear seat lower squab.
*20. Run engine when bleeding brakes.
21. Only light pedal pressure is required.
22. Pedal must not be pushed through at end of stroke.
23. Never check feel of pedal until system is fully bled.
24. On completion of bleeding operation carry out P.D.W.A. operation check and reset if necessary see operation 70.25.08.

    NOTE: Any of operations 20 to 24, if not carried out correctly can cause the P.D.W.A. to operate.**





BRAKE SYSTEM – FLUSH

Drain, flush and bleed 70.25.17

Draining

1. Loosen front road wheel fastenings.
2. Jack up front of car.
3. Place stands under cross tube brackets beneath lower wishbone rear fulcrum supports.
4. Remove front road wheels.
5. Remove rear seat lower squab - 76.70.40.
6. Remove eight drive screws securing each inspection plate and remove plates. Remove all sealer.
7. Attach bleeder tube to left hand rear caliper bleed screw and place end in suitable container.

NOTE: It is imperative that the rear brakes are drained before the front. Once the front brake system is drained, it is impossible to operate the rear brakes from the master cylinder unless the engine is running.

8. Loosen bleed screw.
9. Operate brake pedal slowly backwards and forwards through full stroke until slave cylinder reservoir is empty.
10. Attach another bleeder tube to right hand rear caliper bleed screw.
11. Place end of tube in suitable container, loosen bleed screw and again operate brake pedal until no fluid is expelled.
12. Remove clips and pins retaining both sets of rear brake pads.

WARNING: DO NOT OPERATE BRAKE PEDAL WHILE PADS ARE REMOVED.

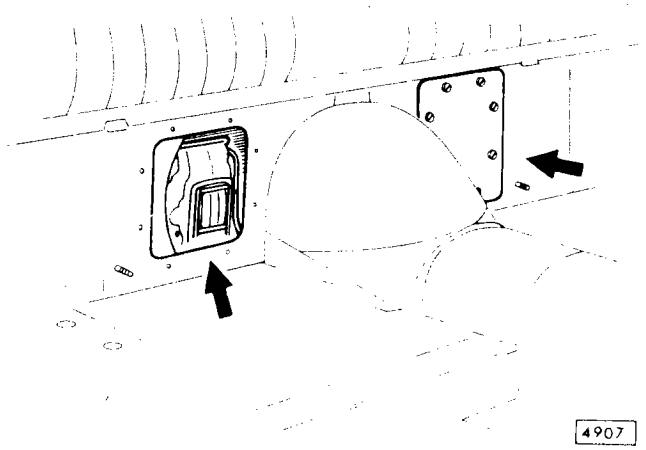
13. Remove pads from rear calipers and lever pistons back into bores to expel trapped fluid.
14. REPLACE REAR BRAKE PADS.

NOTE: It is not necessary to replace retaining pins and clips at this time.

15. Repeat above procedures 7 to 14 inclusive on front calipers to drain front brake system. Operate pedal until master cylinder fluid reservoir is empty, then continue as detailed. Remove containers of expelled fluid, DISCARD FLUID, and replace containers. Continue with operation 16 on completion.
16. Close both front caliper bleed screws.

Flushing

17. Fill both fluid reservoirs with Castrol Girling Brake Flushing Fluid.
18. Operate brake pedal slowly through full stroke until clean flushing fluid is expelled from both rear bleed screws.



**PRESSURE DIFFERENTIAL WARNING ACTUATOR

Check and reset 70.25.08

1. Switch on ignition. 'Brakes' warning light illuminates.
2. Release handbrake if warning light remains illuminated, proceed with item 3.
3. Check brake reservoir fluid level, top up as necessary. If warning light is still illuminated, proceed with item 4.
4. Disconnect electrical connector from P.D.W.A. switch.

If warning light goes out P.D.W.A. has operated, if warning light remains illuminated check for a short in electrical circuit of the brake warning switches.

WARNING: IF WARNING LIGHT GOES OUT IN OPERATIONS 1 to 3 P.D.W.A. HAS NOT OPERATED.

Reset

1. Switch on ignition and run engine, release handbrake, ensure that brake reservoir is full and brake warning light illuminated.
2. Using suitable container and bleed tube attached to FRONT right-hand bleed nipple apply gentle pressure to brake pedal. Slacken bleedscrew and slowly increase brake pedal pressure until P.D.W.A. resets and warning light goes out.

WARNING: AS P.D.W.A. RESETS, IMMEDIATELY REFRAIN FROM INCREASING BRAKE PEDAL PRESSURE AS ADDITIONAL PRESSURE MAY TRIP P.D.W.A. IN OPPOSITE DIRECTION.

3. Hold pedal stationary and close bleed screw.
4. If warning light goes out and immediately illuminates, P.D.W.A. has tripped in opposite direction and operations 2 and 3 must be carried out on left-hand REAR bleed nipple.
5. Continue operations 2 to 4 alternately until warning light is permanently out.
6. Apply operating pressure to brake pedal, check 'Brake' warning light does not illuminate.
7. Switch off ignition, apply handbrake, refit bleedscrew covers and check system for any fluid leakage.**

NOTE: Keep both reservoirs topped up with flushing fluid.

19. Close both rear brake bleed screws and operate pedal two or three times.
20. Open both front bleed screws, and operate pedal until clean flushing fluid is expelled from both front bleed screws.
21. Close both bleed screws and operate pedal two or three times.
22. Open both rear bleed screws and operate pedal until no fluid is expelled.

WARNING: DO NOT OPERATE BRAKE PEDAL WHILE PADS ARE REMOVED.

23. Remove pads from rear calipers and lever pistons back into bores to expel trapped fluid.
24. REPLACE REAR BRAKE PADS.
25. Secure rear pads with retaining pins and clips.
26. Loosen both front bleed screws.
27. Operate brake pedal slowly through full stroke until no fluid is expelled.

WARNING: DO NOT OPERATE BRAKE PEDAL WHILE PADS ARE REMOVED.

28. Remove pads from front calipers and lever pistons back into bores to expel trapped fluid.
29. REPLACE FRONT BRAKE PADS.
30. Secure front pads with retaining pins and clips.
31. Fit anti-chatter springs.
32. Close bleed screws on front and rear calipers.
33. Remove fluid containers, discard fluid, and replace containers.

Refilling

34. Fill both brake reservoirs with new brake fluid of correct specification.
35. Loosen left hand rear bleed screw.

NOTE: Throughout the following operations, check fluid levels at regular intervals and replenish as necessary.

36. Operate brake pedal slowly backwards and forwards through full stroke until fluid pumped into jar is absolutely clean and reasonably free from bubbles.
37. Keep pedal depressed and close bleed screw.
38. Repeat operations 36 and 37 on right hand rear caliper, and right and left hand front calipers in turn. Continue with these operations in turn on all calipers until fluid is completely free from bubbles.
39. Regulate fluid level in both reservoirs.
40. Apply normal working load to brake pedal for two to three minutes to ensure pedal position does not change. If pedal moves, the system is not sufficiently bled or has a leak or faulty seal. The cause must be ascertained and rectified, and the brakes re-bled.
41. Check complete system for signs of fluid leakage.
42. Check tightness of all bleed screws. Fit caps.
43. Apply suitable waterproof sealing compound around inspection plates. Use new gaskets.
44. Secure each inspection plate in position using eight drive screws.
45. Replace rear seat lower squab.
46. Remove stands.
47. Fit front road wheels.

MASTER CYLINDER

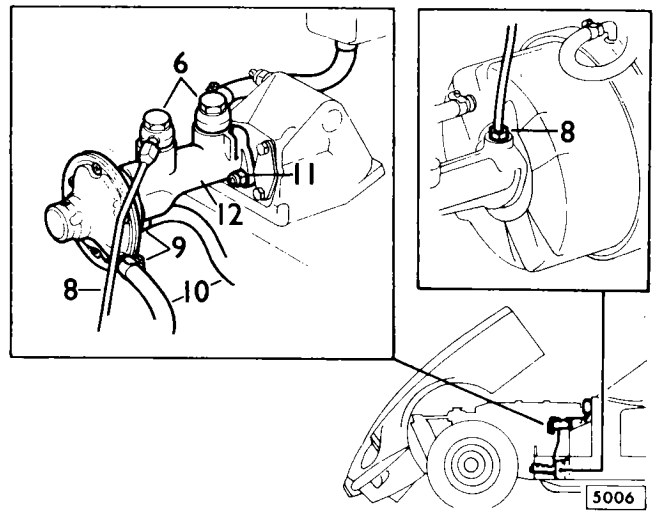
Left hand drive – remove and refit **70.30.01**

Removing

1. Disconnect battery – 86.15.17.
2. Remove left hand air cleaner – 19.10.01.
3. **Cars fitted with manual transmission**
   Release nyloc nut securing brake master cylinder and clutch reservoirs. Re-secure clutch reservoir.
4. **Cars fitted with automatic transmission**
   Remove nyloc nut and bolt retaining reservoir.
5. Taking great care to avoid spilling hydraulic fluid on paintwork, empty brake reservoir into a suitable container.
6. Release two banjo connectors on top of master cylinder.

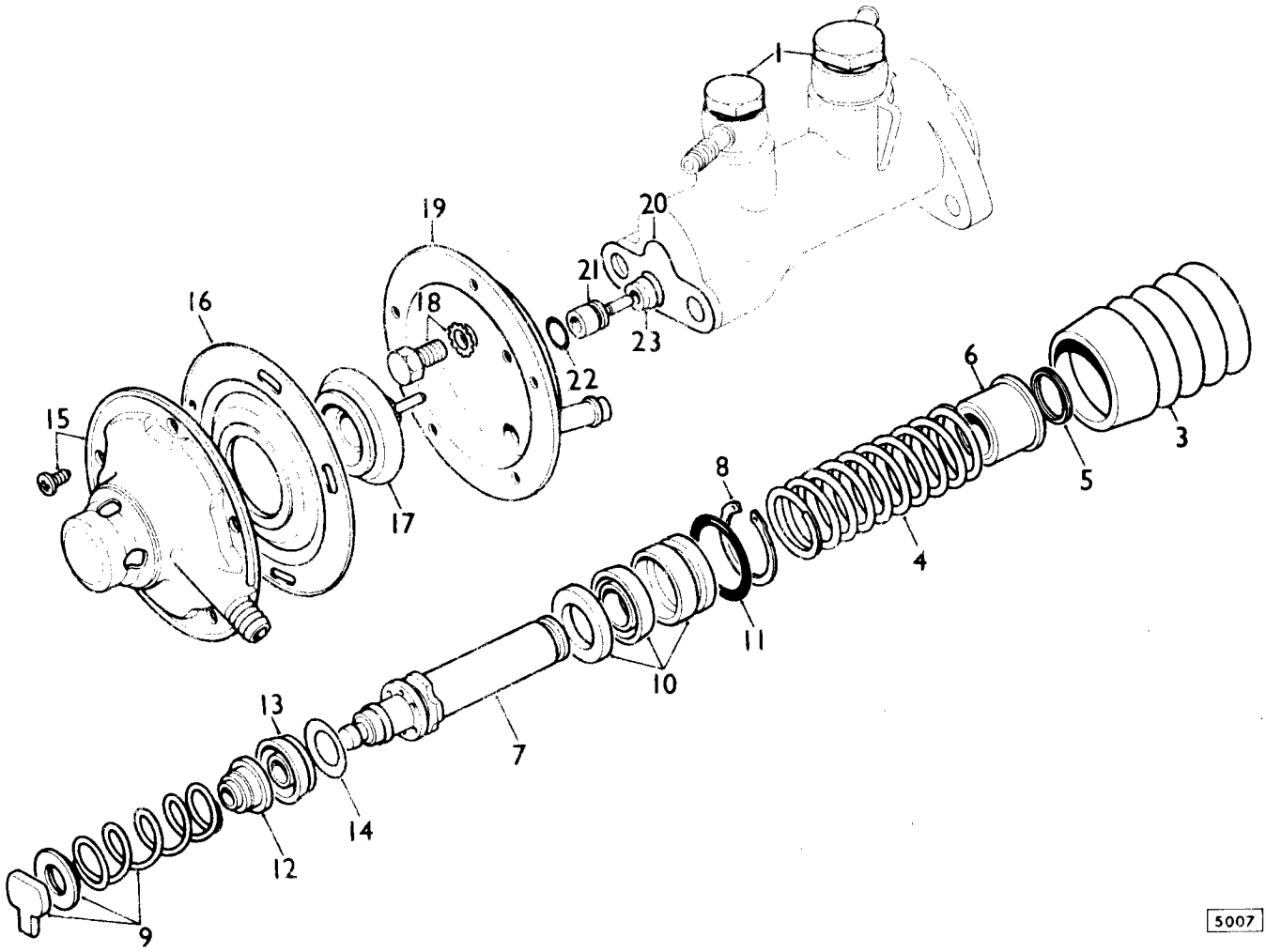
   NOTE: Temporarily refit banjo bolt to retain valve trap assembly in outlet port.

7. Remove windscreen washer reservoir – 84.10.01.
8. Slacken connector nearest to servo vacuum shell and move pipe clear of brake master cylinder.
9. Loosen pipe clips securing air pipes to reaction valve.
10. Pull air pipes from reaction valve.
11. Remove two nyloc nuts securing brake master cylinder to pedal box studs.
12. Draw master cylinder from studs, leaving push rod attached to pedal.



Refitting

13. Locate replacement master cylinder rubber boot over brake pedal push rod.
14. Reverse operations 6 to 11 using new copper gaskets on banjo fittings.
15. Secure brake fluid and clutch reservoirs in position. Ensure neither feed pipe is kinked or twisted.
16. Fill reservoir with hydraulic fluid of the correct type.
17. Fit left hand air cleaner.
18. Bleed brakes – 70.25.02.
19. Connect battery.
20. Check that brake pedal has approximately 3.17 mm (.125 in.) free movement before resistance of master cylinder is felt.
21. If necessary release lock nut and adjust to achieve this result.
22. Ensure brake light switch still functions correctly. Reset if necessary – 86.65.51.



MASTER CYLINDER AND REACTION VALVE ASSEMBLY

Overhaul — **Left hand – 70.30.02**
Right hand – 70.30.04

Service tool — circlip pliers – 7066

Differences between master cylinders fitted to right and left hand drive vehicles are minimal. The deviation is given in text.

Before dismantling the master cylinder and reaction valve assembly, it is advisable to obtain the repair kits containing all parts necessary during overhaul. The kits are:–

(a) Reaction valve repair kit.
(b) Master cylinder repair kit.

Dismantling

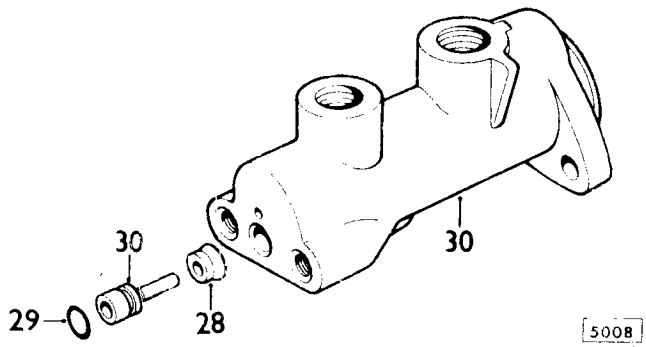
1. Remove banjo connector bolts.
2. Recover trap valve assembly from outlet port.
3. Remove rubber boot.
4. Compress return spring.
5. Remove spiral circlip.
6. Recover spring retainer and return spring.
7. Press piston down bore and hold.
8. Use special circlip pliers (Tool number 7066) to remove circlip.

CAUTION: Do not damage the surface finish of the piston.

9. Withdraw piston assembly followed by spring, spring retainer and lever.
   'O' ring seal may enter circlip groove and make withdrawal difficult. **Thickly pad** jaws of a pair of pliers to extract piston assembly if this happens.
10. Withdraw bearing and secondary cup assembly from piston.
11. Withdraw 'O' ring from bearing.
12. Due to the plastic spring retainer being an interference fit on the piston, it will probably be damaged during dismantling. To remove the spring retainer hold the piston head **downwards** on a bench and apply a downward force to the back of the spring retainer using a slim open end spanner.
13. Remove main cup.
14. Remove piston washer.
15. Remove five screws retaining reaction valve cover. Prise clear.
16. Remove diaphragm.
17. Peel diaphragm from diaphragm support.
18. Remove two screws and shakeproof washers.
19. Remove valve housing.
20. Remove and discard gasket.
21. Remove valve piston by inserting a blunt screwdriver into master cylinder output port. Ease valve along its bore until it can be removed by hand.
22. Remove 'O' ring from piston.
23. Remove seal from piston.

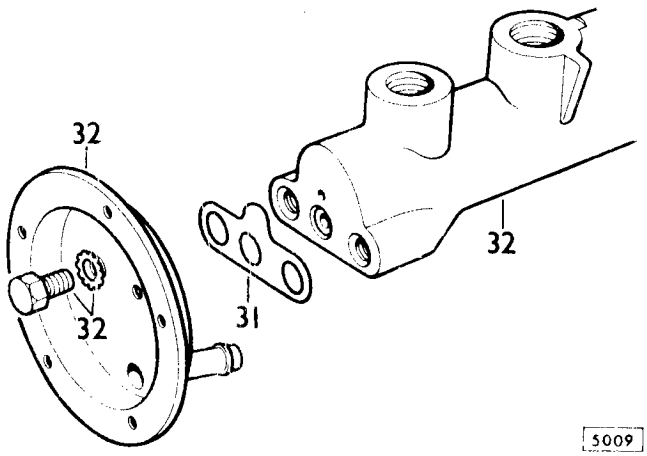
Inspection

24. Check bores and pistons for scoring or pitting.
25. Wash all components in methylated spirit or Girling Brake Cleaner.
26. Thoroughly dry with lint free cloth.
27. Liberally smear 'O' ring seals and plastic bearings with disc brake lubricant.



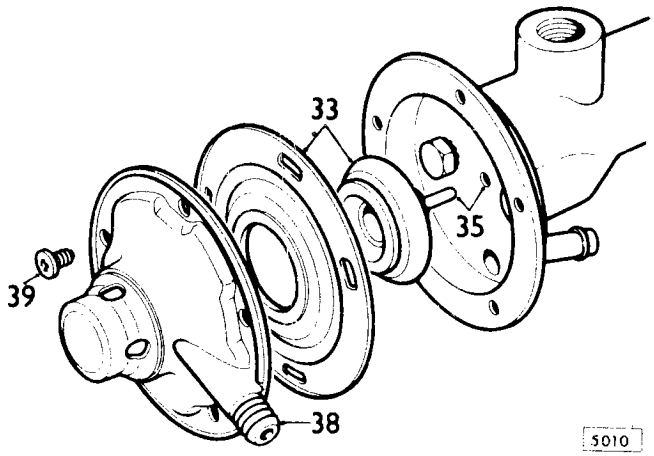
Reassembling

28. Using fingers only, fit seal.
29. Fit 'O' ring.
30. Moisten piston with clean brake fluid and insert assembly into master cylinder body.
31. Place new gasket in position.
32. Secure valve housing to master cylinder body using two screws and shakeproof washers. Torque screws to 1.8 – 2 kg/m (13.3 – 15 lbs.ft.).
33. Stretch diaphragm on to diaphragm support.
34. Ensure that flex of diaphragm is correct way round.
35. Place diaphragm support through hole in master cylinder body to engage depression in valve piston. Locate slots in diaphragm centrally over screw holes.



Right hand drive vehicle

36. Locate replacement valve cover with air hose connection in line with valve housing air hose connection. Ensure moulded bosses on valve cover locate with slots in diaphragm.
37. Secure with five screws.

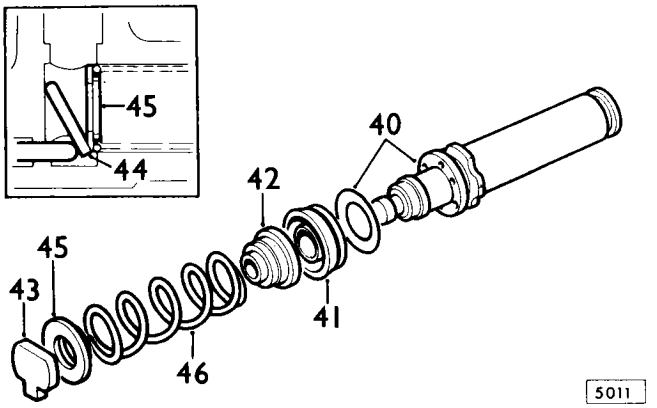


Left hand drive vehicle

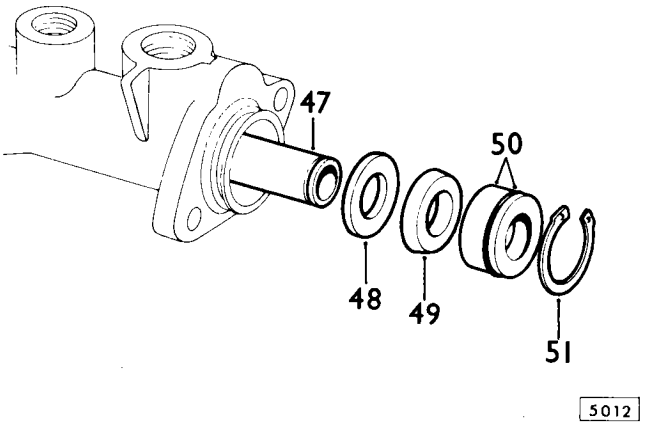
38. Locate replacement valve cover with air hose connection to right hand side viewed from filter end. Ensure moulded bosses on valve cover locate with slots in diaphragm.
39. Secure with five screws.

All vehicles

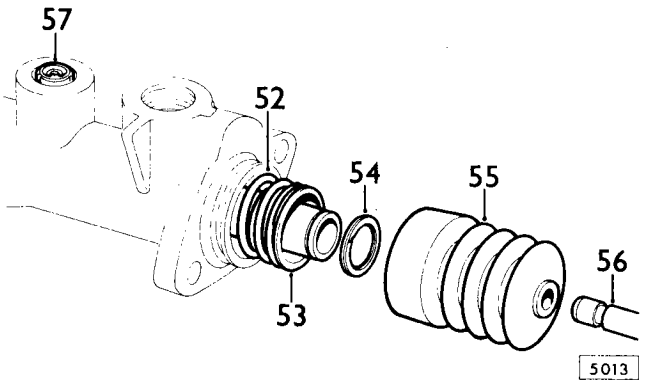
40. Fit replacement piston washer to main piston, convex face towards piston flange.
41. Fit replacement main cup to piston.
42. Press new plastic spring retainer into position.
43. Hold master cylinder body at an angle of 25 degrees to horizontal and insert lever, tab foremost into bore.
44. Ensure that when lever reaches bottom of bore tab drops into recess. If necessary press the reaction valve piston forward with a blunt screwdriver fed through fluid outlet port.
45. Drop pressed steel spring retainer into bore. Ensure it locates square, and right way up.
46. Drop piston return spring into bore.



47. Lubricate main cup with clean brake fluid and place piston in bore.
48. Slide rectangular section plastic bearing on to piston.
49. Slide secondary cup on to piston and lubricate with clean brake fluid.
50. Fit 'O' ring seal to plastic bearing and slide on to piston over secondary cup.
51. Press bearing assembly down as far as possible and, using special tool 7066 with K points, fit circlip to retain internal parts.



52. Locate larger piston return spring over piston.
53. Place pressed steel spring retainer in position and compress spring to fullest extent.
54. Secure spring and spring retainer with spiral circlip.
55. Fit replacement rubber boot to groove.
56. Enter round ended rod through rubber boot to engage in piston. Check piston for freedom of operation.
57. Place trap valve in outlet port.
58. Temporarily replace banjo connector bolts.



MASTER CYLINDER

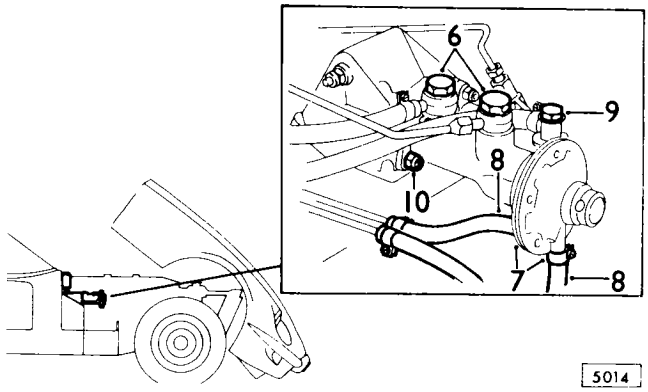
Right hand drive – remove and refit 70.30.03

Removing

1. Disconnect and remove battery – 86.15.01.
2. Remove right hand air cleaner – 19.10.01.
3. **Cars fitted with manual transmission**
   Release nyloc nut securing brake master cylinder and clutch reservoirs.
4. **Cars fitted with automatic transmission**
   Remove nyloc nut and bolt retaining reservoir.
5. Taking great care to avoid spilling hydraulic fluid on paintwork, empty both reservoirs into a suitable container.
6. Release two banjo connectors on top of master cylinder.

NOTE: Temporarily refit banjo connector bolts to retain valve trap assembly in outlet port.

7. Loosen pipe clips securing air pipes to reaction valve.
8. Pull air pipes from reaction valve.
9. On cars fitted with manual transmission, release feed pipe banjo at front connector of clutch master cylinder.
10. Remove two nyloc nuts securing brake master cylinder to pedal box studs.
11. Draw master cylinder from studs, leaving push rod attached to pedal.

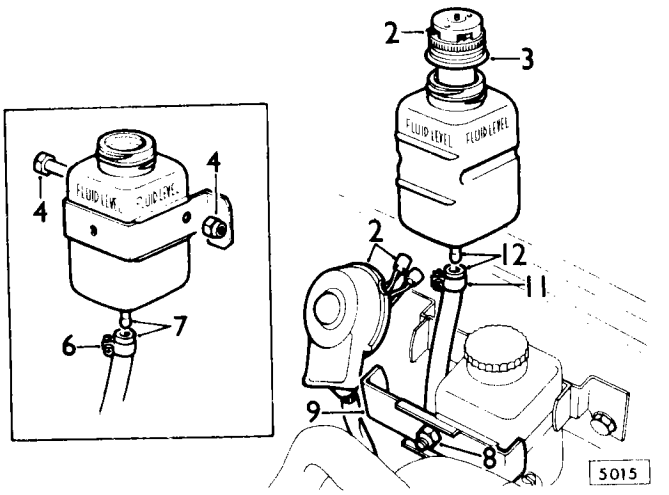


Refitting

12. Locate replacement master cylinder rubber boot over brake pedal push rod.
13. Reverse operations 6 to 10, using new copper gaskets on banjo fittings.
14. Secure brake fluid and clutch reservoirs in position. Ensure neither feed pipe is kinked or twisted.
15. Fill reservoir with hydraulic fluid of the correct type.
16. Fit right hand air cleaner.
17. Bleed brakes – 70.25.02.
18. On cars fitted with manual transmission bleed clutch hydraulic system – 33.15.01.
19. Fit and connect battery.
20. Check that brake pedal has approximately 3.17 mm (.125 in.) free movement before resistance of master cylinder is felt.
21. If necessary release locknut and adjust to achieve this result.
22. Ensure brake light switch still functions correctly. Reset if necessary – 86.65.51.

FLUID RESERVOIR – MASTER CYLINDER

Remove and refit **70.30.16**



Removing

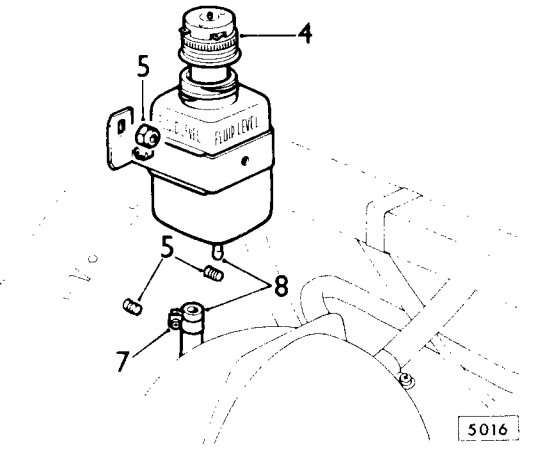
1. Disconnect battery – 86.15.19.
2. Remove reservoir cap/cover and disconnect cables.
3. Remove reservoir cap and filter assembly.
4. **Cars fitted with automatic transmission**
   Remove nyloc nut and bolt securing reservoir.
5. Drain reservoir into suitable container.
6. Release pipe clip.
7. Pull pipe from spigot at base of reservoir.
8. **Cars fitted with manual transmission**
   Remove one nyloc nut securing reservoir clip.
9. Temporarily replace clip to secure clutch reservoir.
10. Drain reservoir into suitable container.
11. Release pipe clip.
12. Pull pipe from spigot at base of container.

Refitting

13. **Cars fitted with automatic transmission**
    Reverse operations 1 to 4. Continue with operation 12.
14. **Cars fitted with manual transmission**
    Reverse operations 5 to 9. Continue with operation 12.
15. Bleed brakes – 70.25.02.
16. Fit reservoir cap and electrical connectors.

FLUID RESERVOIR – SLAVE CYLINDER

Remove and refit **70.30.17**



Removing

1. Disconnect battery – 86.15.19.
2. Remove windscreen washer bottle – 84.10.01.
3. Remove reservoir cap cover and disconnect cables.
4. Remove reservoir cap and switch assembly.
5. Remove two set screws and nyloc nuts securing reservoir bracket.
6. Drain reservoir into suitable container.
7. Release pipe clip.
8. Pull pipe from spigot at base of reservoir.

Refitting

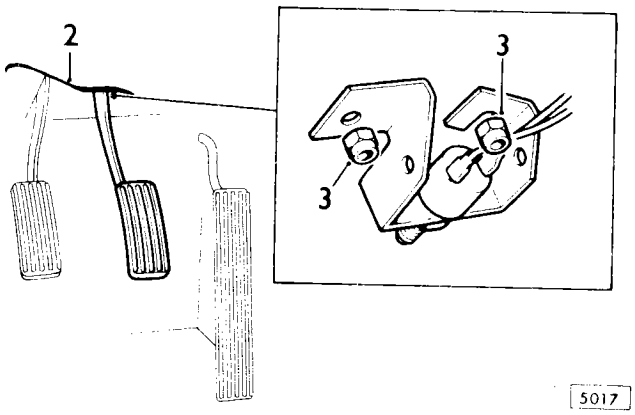
9. Reverse operations 1 to 8.
10. Bleed brakes – 70.25.02.

PEDAL ASSEMBLY

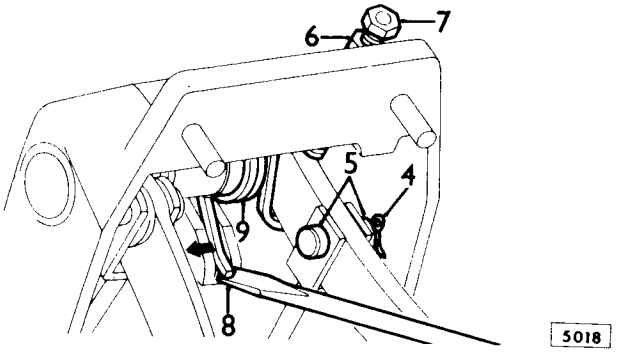
Remove and refit 70.35.01

Removing

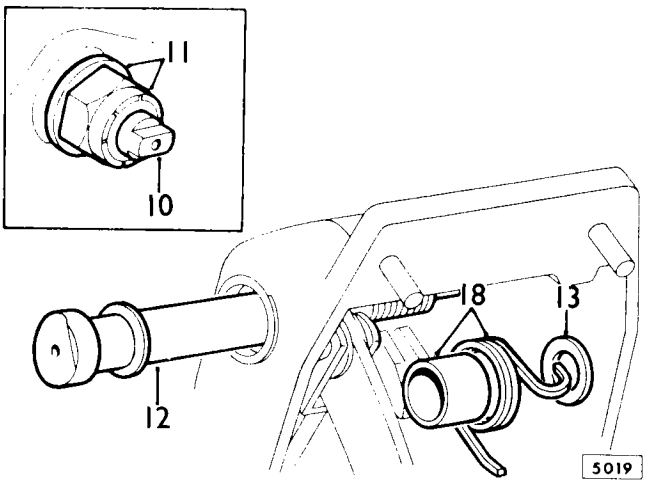
1. Disconnect battery – 86.15.19.
2. Inside car pull back trim at top of drivers footwell.
3. Remove two nyloc nuts securing brake light switch.



4. Remove split pin from brake push rod yoke.
5. Remove plain washer and clevis pin.
6. Loosen brake pedal stop locknut.
7. Remove setscrew from pedal box.
8. Using a large screwdriver prise brake pedal return spring from high, narrow abutment on opposite side to pedal.
9. Push spring sideways on to spacer.
10. Hold flats on end of pedal shaft in suitable spanner.

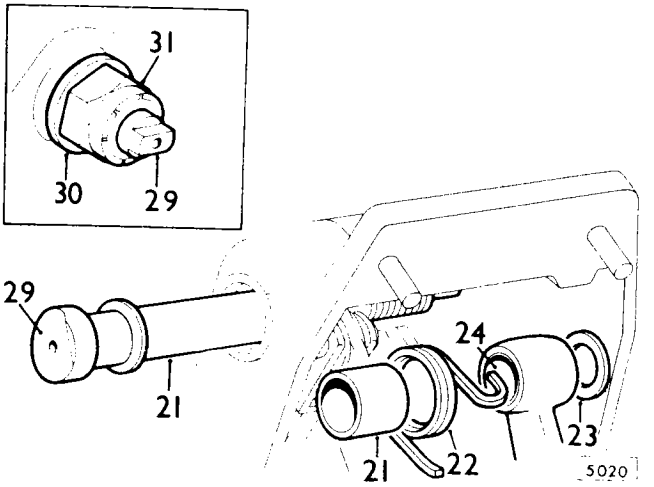


11. Remove nyloc nut and recover plain washer.
12. Carefully tap shaft into housing sufficiently far to free brake pedal. Use a soft drift small enough to pass through brake pedal bush.
13. Remove fibre washer from recess in pedal box.
14. Remove nut securing pedal pad to brake pedal.
15. Check plastic coating of pedal boss bearing bushes. If the coating has picked up or is badly scored the bushes must be replaced as follows:-
16. Remove worn bearing bushes by gently tapping right through pedal boss with suitably sized drift.
17. Fit new bushes, one from each side, using a suitably sized stepped drift. Bush must be square to pedal boss when insertion commences.
18. Remove spacer and brake pedal spring from pedal shaft.
19. Check shaft for scoring or burrs.
20. Check ends of spacer for signs of undue wear.

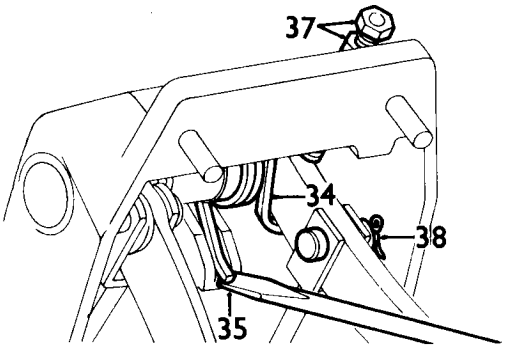


Refitting

21. Lightly oil pedal shaft and place spacer in position.
22. Place return spring on spacer so that long straight leg of spring is alongside narrow spring abutment.
23. Place new fibre washer in recess.
24. Oil bushes in pedal boss.
25. Hold pedal in position next to spacer so that stepped flat on foot of pedal is towards front of car.
26. Carefully tap pedal shaft into box to collect pedal boss.
27. Ensure pedal moves freely.
28. Ensure fibre washer sits squarely in recess.
29. Using flats on shaft end, rotate shaft until the chamfers on pedal box and shaft end line up.
30. Fit plain washer to shaft.
31. Lightly secure with nyloc nut.



32. Ensure fibre washer still in recess, then fully tighten nut. Torque 2.5 to 3.0 kg.m (18 to 22 lb.ft.).
33. Check pedal moves freely.
34. Hook return spring around pedal arm.
35. Using a large screwdriver, lever straight arm of return spring on to spring abutment.
36. Use screwdriver to tap spring on to pedal boss.
37. Fit pedal stop and locknut.
38. Using clevis pin, plain washer and new split pin, secure pedal arm to brake push rod yoke.
39. Set pedal stop so that brake pedal pad has approximately 3.17 mm. (1.25 in.) free movement before resistance of master cylinder is felt.
40. Tighten lock nut.
41. Fit brake light switch and secure with two nyloc nuts.
42. Connect battery.
43. Adjust stop light switch as necessary – 86.65.56.
44. Replace trim.
45. Fit pedal pad and secure with nut.



5021

PEDAL BOX

Remove and refit **70.35.03**

Removing

1. Remove brake master cylinder – Left hand drive cars – 70.30.01 – Right hand drive cars – 70.30.03.
2. Remove nut securing brake pedal pad.

Cars with manual transmission only

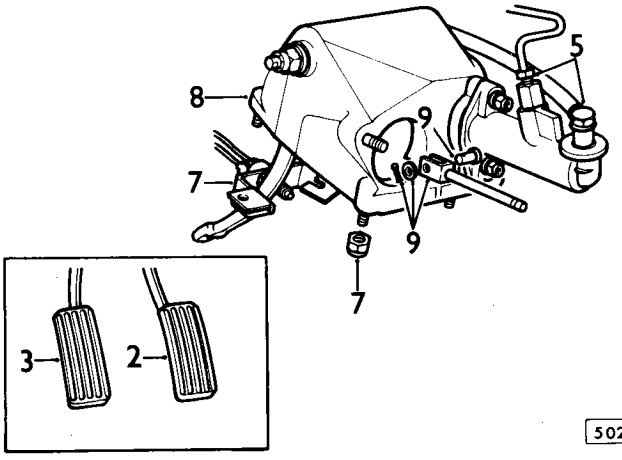
3. Remove nut securing clutch pedal pad.
4. Drain clutch hydraulic fluid reservoir.
5. Disconnect pipes to clutch master cylinder.

Left hand drive only

6. Remove heater unit – 80.20.01.

All cars

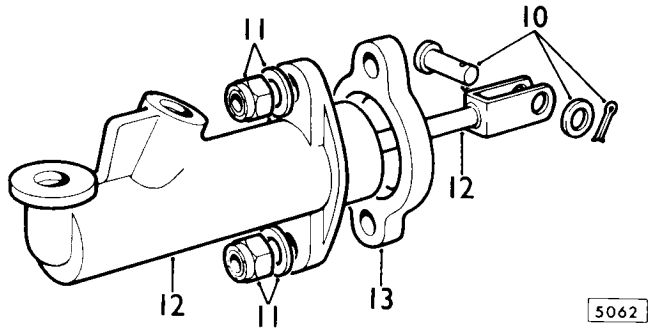
7. Move footwell trim as necessary, and remove five self-locking nuts and washers securing pedal box; recover brake light switch.
8. Lift pedal box from scuttle. Remove all traces of gasket.
9. Remove split pin securing clevis pin at brake pedal push rod. Withdraw rod.



5023

Cars with manual transmission only

10. Remove split pin securing clevis pin at clutch pedal push rod.
11. Remove self-locking nuts and washers securing clutch master cylinder to pedal box.
12. Withdraw master cylinder and push rod.
13. Recover spacer.



Refitting

14. Reverse operations 1 to 13, using new split pins where appropriate.
15. Adjust stop light switch – 86.65.56.

Cars with manual transmission only

16. Bleed clutch hydraulic system 33.15.01.

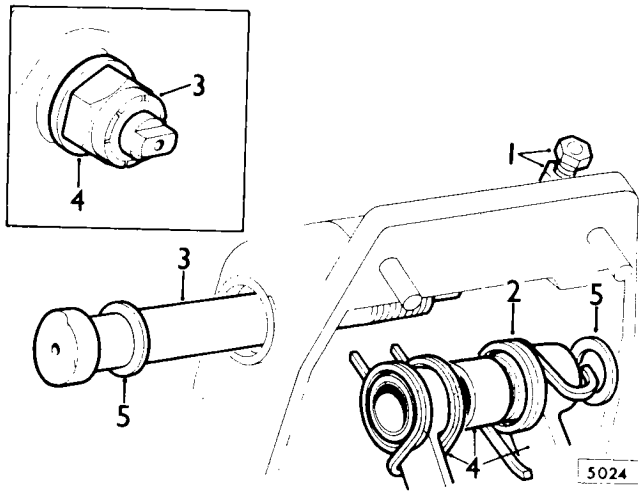
PEDAL BOX

Overhaul **70.35.04**

Dismantling

1. Release brake pedal adjustment setscrew and locknut.
2. Prise brake pedal spring from abutment.
3. Release locknut from pedal shaft and carefully drift shaft from box.
4. Recover one plain washer, clutch pedal (when fitted) brake pedal and spacer.
5. Remove and discard fibre washer from recess in pedal box. Remove and discard fibre washer from pedal shaft.

NOTE: One fibre washer only is fitted to automatic transmission cars.

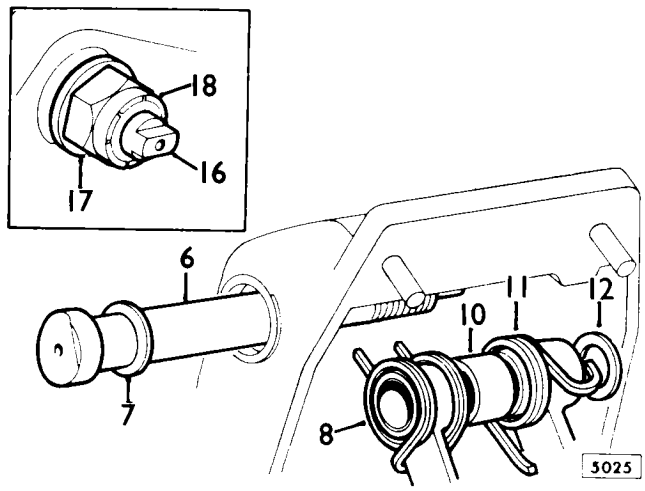


Reassembling

6. Enter pedal shaft into box from clutch master cylinder side.

Cars with manual transmission only

7. Place new fibre washer on shaft.
8. If clutch pedal return spring has been removed, fit to pedal boss.
9. Fit clutch pedal on to shaft so that legs of spring rest on abutment when pedal installed, and stepped flat on pedal arm is towards master cylinder mountings.



All cars

10. Fit spacer to shaft.
11. Place brake pedal return spring on spacer so that long straight leg of spring is alongside narrow spring abutment.
12. Place new fibre washer in recess.
13. Hold brake pedal in position so that stepped flat on foot of pedal is towards master cylinder mountings
14. Carefully tap pedal shaft into box. Ensure pedal/s move freely.
15. Ensure fibre washer sits squarely in recess.
16. Using flats on shaft end, rotate shaft until the chamfers on pedal box and shaft end line up.
17. Fit plain washer to shaft.
18. Lightly secure with self-locking nut.

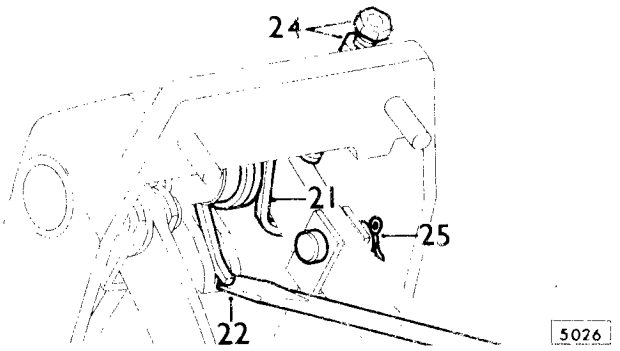
19. Ensure fibre washer still in recess, and fully tighten nut. Torque 2.5 to 3.0 kg.m. (18 to 22 lb.ft.).
20. Ensure pedal/s move freely.
21. Hook brake return spring round pedal arm.
22. Using a large screwdriver, lever straight arm of return spring on to spring abutment.
23. Use screwdriver to tap spring on to pedal boss.
24. Fit brake pedal stop screw and locknut.
25. Fit brake master cylinder push rod and secure with clevis pin, plain washer and new split pin.

Cars with manual transmission only

26. Fit spacer to clutch master cylinder mounting studs.
27. Fit clutch master cylinder and secure with two plain washers and self-locking nuts. Torque 1.8 kg.m (13 lb.ft.).
28. Secure clutch master cylinder push rod to pedal arm using clevis pin, plain washer and new split pin.

All cars

29. Refit pedal box to vehicle loosely securing brake light switch until refitting is complete.
30. Adjust brake light switch and tighten two nuts.



HANDBRAKE LEVER ASSEMBLY

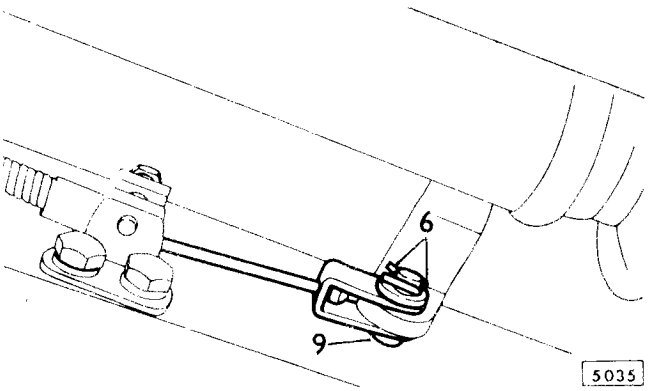
Remove and refit **70.35.08**

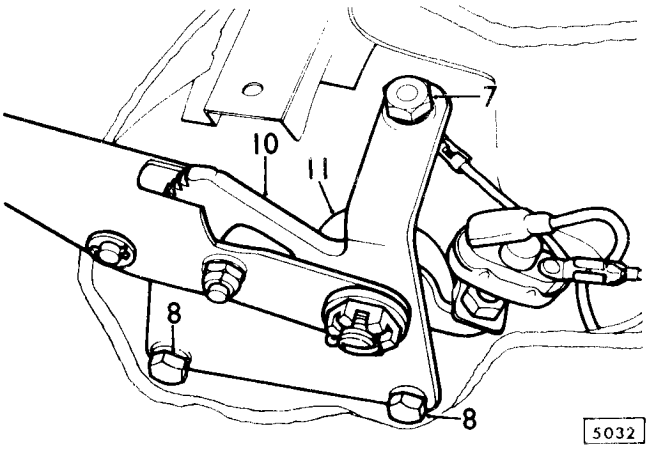
Removing

1. Disconnect battery – 86.15.19.
2. Remove left hand front seat – 76.70.01.
3. Remove console assembly – 76.25.01.
4. Remove exhaust system complete – 30.10.01.
5. Remove six setscrews, plain washer and shakeproof washers securing main heatshield.
6. Remove split pin and plain washer retaining clevis pin in cable yoke.

   NOTE: It will probably not be possible to withdraw clevis pin.

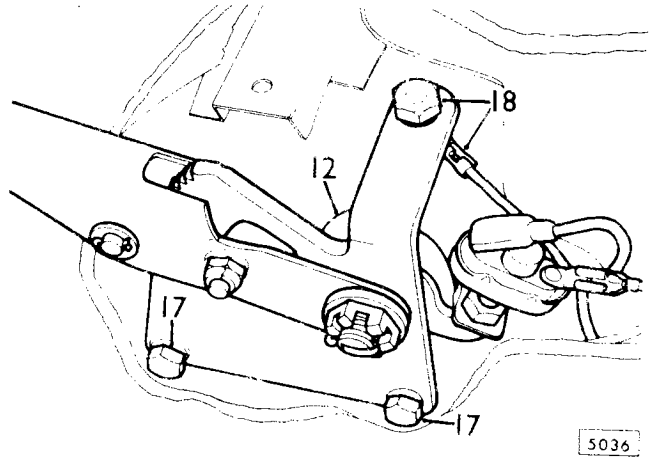
7. Remove one setscrew, lock washer, and spacer securing top of handbrake plate to tunnel.
8. Remove two setscrews and shakeproof washers securing bottom of handbrake plate to tunnel.
9. Beneath car, free clevis pin from cable yoke.
10. Remove handbrake lever assembly from tunnel.
11. Recover one rubber seal.

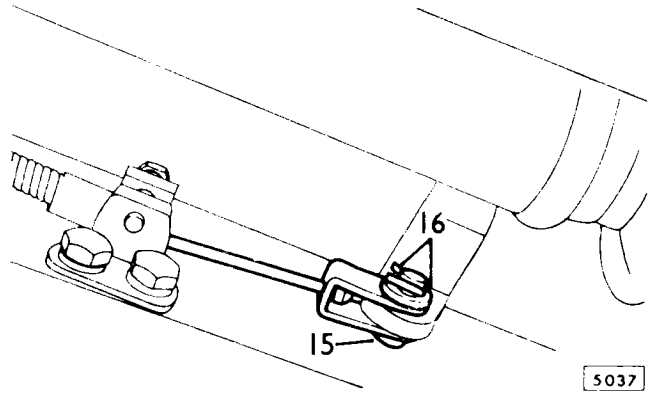




Refitting

12. Lightly grease new rubber seal and slide over hand brake lever arm.
13. Pass lever arm through hole in tunnel.
14. Strike hand brake assembly sharply with a hammer to finally locate in tunnel.
15. Secure cable yoke to lever with clevis pin fitted in direction shown.
16. Retain with plain washer and new split pin.
17. Smear threads of two set screws in suitable waterproof sealing compound and, using shakeproof washers, secure bottom of plate to tunnel.
18. Smear thread of one setscrew with waterproof sealing compound and secure top of plate to tunnel. Use one shakeproof washer beneath set screw head, and spacer beneath plate. Fit electrical terminal between plate and spacer.
19. Set handbrake fully off.
20. Use large screwdriver as lever to obtain correct clearance.
21. Check handbrake cable adjustment – 70.35.10.
22. Fit main heatshield and secure using six setscrews, plain washers and shakeproof washers.
23. Fit exhaust system complete.
24. Connect battery.
25. Check adjustment of handbrake warning switch, operation 4 to 10 – 86.65.46.
26. Refit console assembly.
27. Refit left hand front seat.



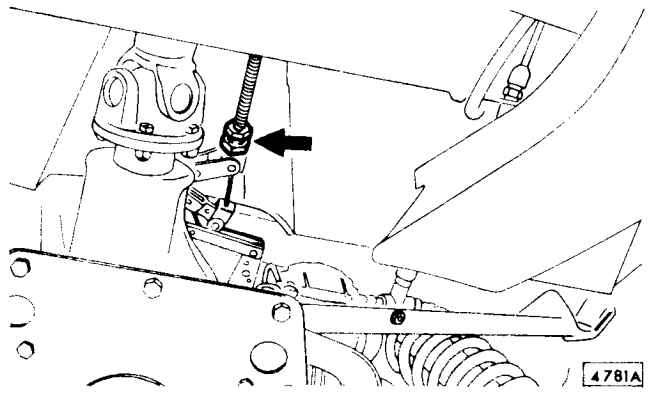


HANDBRAKE CABLE

Adjust **70.35.10**

1. Set handbrake to fully off position.
2. Slacken locknut at rear end of handbrake cable.
3. Screw out threaded adaptor until handbrake operating levers at caliper just start to move.
4. Slacken off one half turn of adaptor and secure locknut.

NOTE: When correctly adjusted a certain amount of slack will be apparent in the cable. No attempt should be made to place the cable under tension, or the handbrake may bind.



CABLE ASSEMBLY

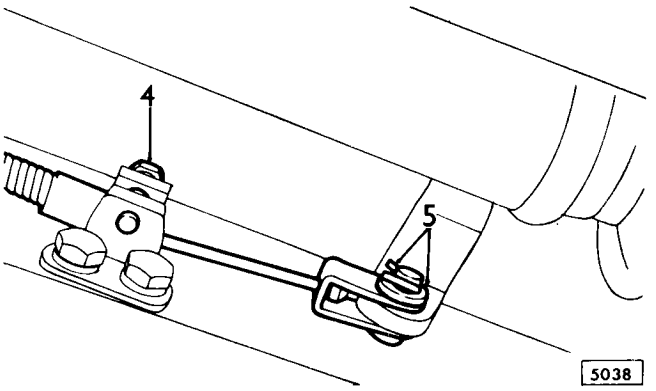
Remove and refit **70.35.16**

Removing

1. Set handbrake fully off.
2. Remove exhaust system complete – 30.10.01.
3. Remove six setscrews, plain washers and shakeproof washers securing main heatshield.
4. Remove pinch bolt and spring washer securing cable in cable abutment. Pull cable clear.
5. Remove split pin and plain washer from front yoke. Remove clevis pin.

NOTE: It may be necessary to spring lever slightly to remove clevis pin.

6. Release locknut at handbrake cable adjuster.
7. Screw cable adaptor out of compensator lever.
8. Remove split pin and plain washer securing clevis pin at compensator lever.
9. Remove handbrake cable from car by pulling towards rear through bracket.

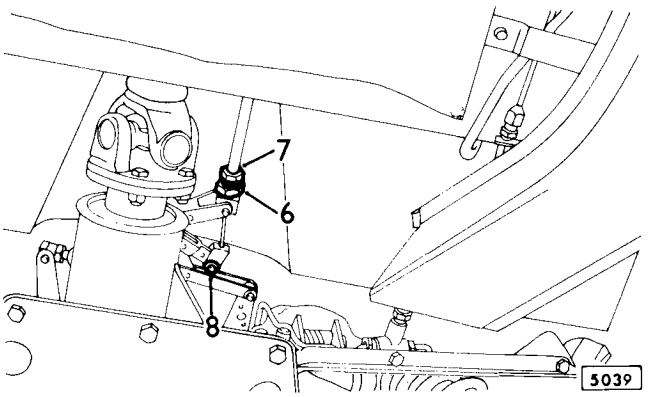


Refitting

10. If necessary fit new grommet in cable bracket.
11. Feed cable through grommet to rest in position, adjustment adaptor to rear.
12. Fit rear cable yoke to compensator arm and secure with a clevis pin, plain washer and new split pin.
13. Screw locknut along thread and screw adaptor well into compensator arm.
14. At forward end of cable secure yoke to handbrake lever arm.

NOTE: The clevis pin must be passed through yoke towards centre-line of vehicle. It will be necessary to spring lever slightly.

15. Secure clevis pin with one plain washer and new split pin.
16. Position cable sheath in cable abutment and secure with one setscrew and spring washer.
17. Adjust handbrake cable – 70.35.10.
18. Fit main heatshield and secure with six setscrews, plain washers and shakeproof washers.
19. Refit exhaust system complete.

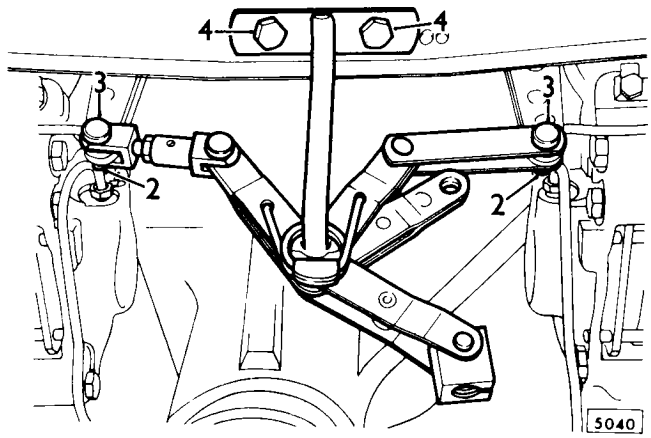


HANDBRAKE COMPENSATOR COMPLETE

Remove and refit **70.35.21**

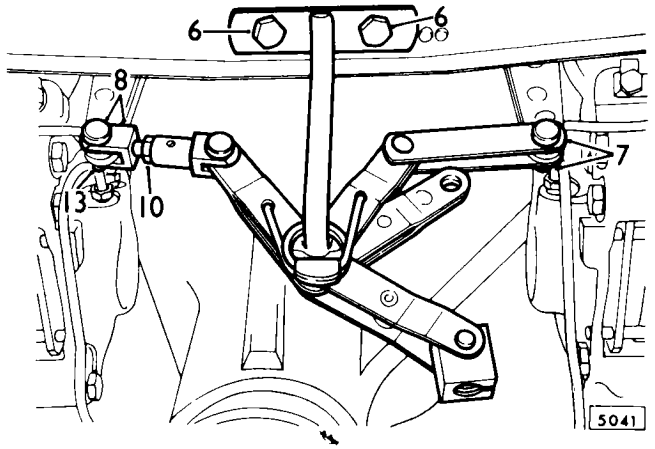
Removing

1. Remove rear suspension – 64.25.01.
2. Remove split pins securing clevis pin at each handbrake operating lever.
3. Remove clevis pins and plain washers.
4. Remove setscrews and spring washers securing compensator to crossmember.
5. While suspension unit is out of car it is advisable to check handbrake pads for wear and replace if necessary – 70.40.04.



Refitting

6. Secure compensator to crossmember using two setscrews and spring washers.
7. Secure left hand link to left hand handbrake operating lever using clevis pin (from top), plain washer and new split pin.
8. Position outer fork of right hand link over right hand handbrake operating lever. Clevis pin should drop through to secure without drawing handbrake lever towards centre-line of car.
9. If necessary, adjust link as follows:
10. Slacken locknut.
11. Screw outer fork end in or out.
12. Secure locknut.
13. Secure clevis pin with plain washer and new split pin.
14. Refit rear suspension.

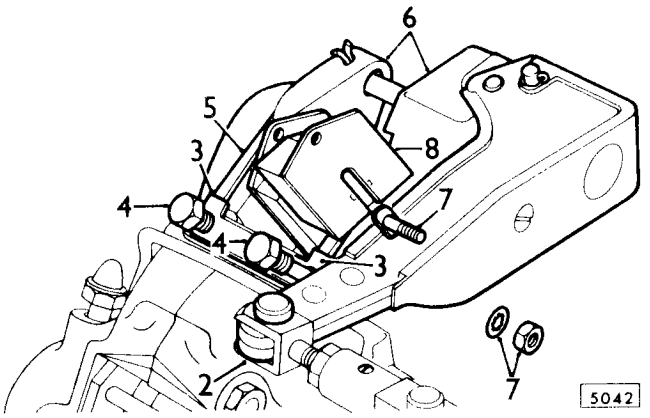


HANDBRAKE PADS

Remove and refit 70.40.04

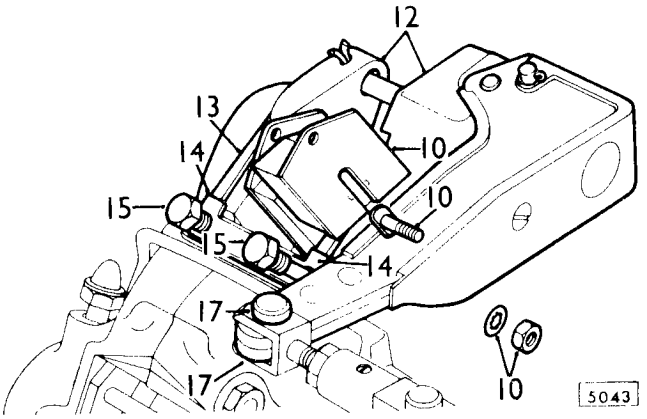
Removing

1. Remove rear suspension unit – 64.25.01.
2. Remove split pin securing clevis pin at handbrake operating lever.
3. Lift locking tabs.
4. Remove pivot bolts.
5. Remove retraction plate.
6. Withdraw handbrake pad carriers through top of suspension unit crossmember.
7. Remove nut and spring washer securing pad clamp bolts.
8. Remove worn pads.



Refitting

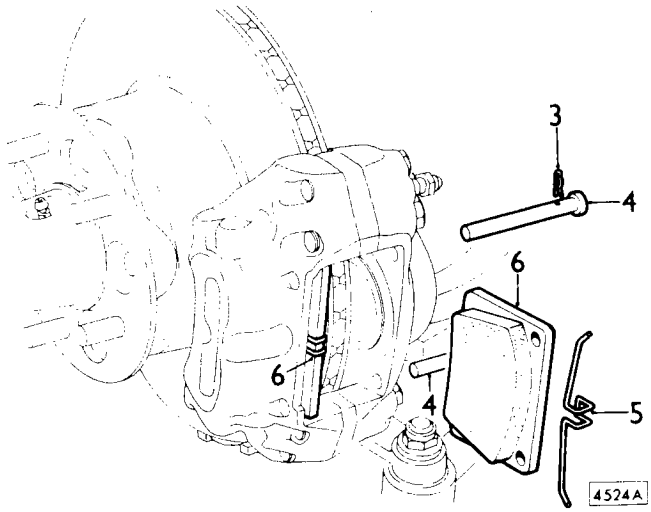
9. Wind pad carrier out along adjuster bolt two to three turns.
10. Use new clamp bolts, nuts and spring washers to secure new brake pads.
11. Wind carrier along adjuster bolt to give dimension of 19.05 mm. (.750 in.) between pad faces.
12. Place handbrake pad carriers in position on caliper.
13. Fit retraction plate ensuring tips engage with pad carriers.
14. Fit tab washer.
15. Secure pad carriers with two bolts. Turn up tab washer.
16. Move operating lever backwards and forwards until adjuster ratchet does not click. This sets pads to correct clearance.
17. Fit clevis pin and secure with plain washer and new split pin.
18. Refit rear suspension unit.



BRAKE PADS – FRONT

Special Tool – 64932392

Remove and refit **70.40.02**



Removing

1. Remove road wheel – 74.20.01.
2. Place a stand beneath the lower wishbone at a point adjacent to the damper.
3. Remove clips.
4. Remove retaining pins.
5. Recover anti-chatter springs.
6. Withdraw worn pads.

Refitting

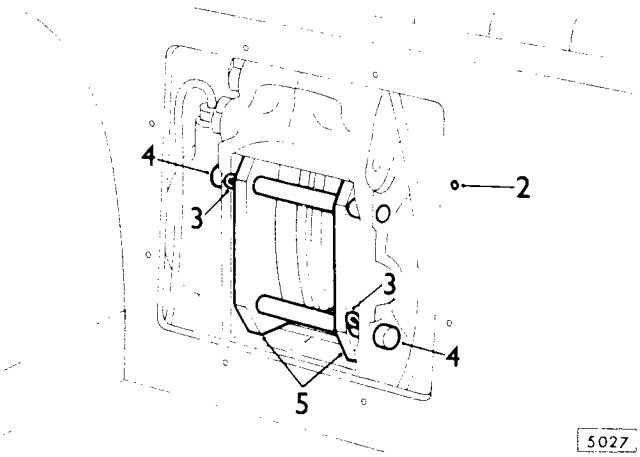
It is advisable to half empty servo reservoir and master cylinder reservoir before fitting new pads.

7. Lever pistons back into bores using Girling Piston Retraction Tool Number 64932392.
8. Fit new brake pads.
9. Fit retaining pins.
10. Secure with clips.
11. Fit anti-chatter springs.
12. Top up reservoirs to correct level.
13. Apply brake several times until pedal feels solid.
14. Refit road wheel.

BRAKE PADS – REAR

Remove and refit **70.40.03**

Special Tool 64932392



Removing

1. Remove rear seat lower squab – 76.70.40.
2. Remove eight drive screws securing each inspection plate and remove panels. Clean off all sealer.
3. Remove clips.
4. Remove retaining pins.

NOTE: Upper pins are removed towards centre line of car. Lower pins are removed away from centre line of car.

5. Withdraw worn pads.

Refitting

It is advisable to half empty the servo reservoir before fitting new pads.

6. Lever pistons back into bores using Girling Piston Retraction Tool Number 64932392.
7. Fit new brake pads.
8. Fit retaining pins.

NOTE: Upper pins are fitted away from centre line of car. Lower pins are fitted towards centre line of car.

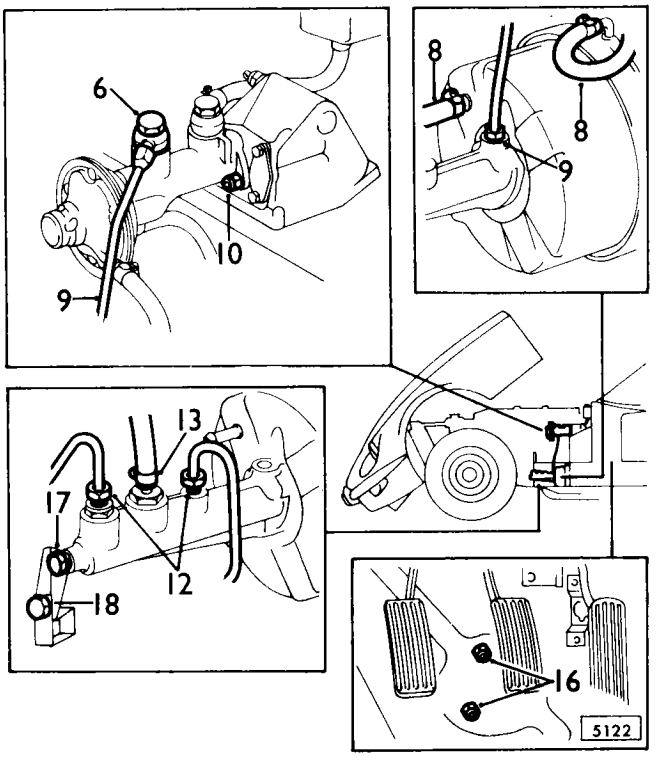
9. Secure with clips.
10. Apply suitable waterproof sealing compound around inspection plates. Fit new gaskets.
11. Secure each inspection plate in position using eight drive screws.
12. Replace rear seat lower squab.
13. Top up servo reservoir to correct level.

SERVO ASSEMBLY

Left hand steering – remove and refit 70.50.01

Removing

1. Disconnect battery – 86.15.19.
2. Remove reservac tank – 70.50.04.
3. Remove windscreen washer reservoir and bracket – 84.10.01 – 84.10.02.
4. Remove servo fluid reservoir – 70.30.17.
5. Remove left hand air cleaner – 19.10.01.
6. Remove banjo bolt from master cylinder outlet. Temporarily replace bolt to retain trap valve assembly
7. Remove petrol pipe clip and pull off flexible hose.
8. Disconnect air hoses at servo.
9. Release connector and remove pipe.
10. Remove two nyloc nuts securing brake master cylinder to pedal box studs.
11. Draw master cylinder from studs. Disengage push rod, and suspend master cylinder beneath rear carburetter using soft wire loops.
12. Release two connectors on slave cylinder. Plug each pipe to prevent fluid loss.
13. Remove fluid feed hose from top of slave cylinder.
14. Inside vehicle, pull carpet from left hand front toeboard.
15. Remove insulation material.
16. Remove three nyloc nuts and plain washers.
17. Under bonnet, release setscrew and shakeproof washer at bracket on front of slave cylinder.
18. Loosen setscrew, nut and plain washer securing bracket to clip.
19. Draw servo from bulkhead and manoeuvre clear.

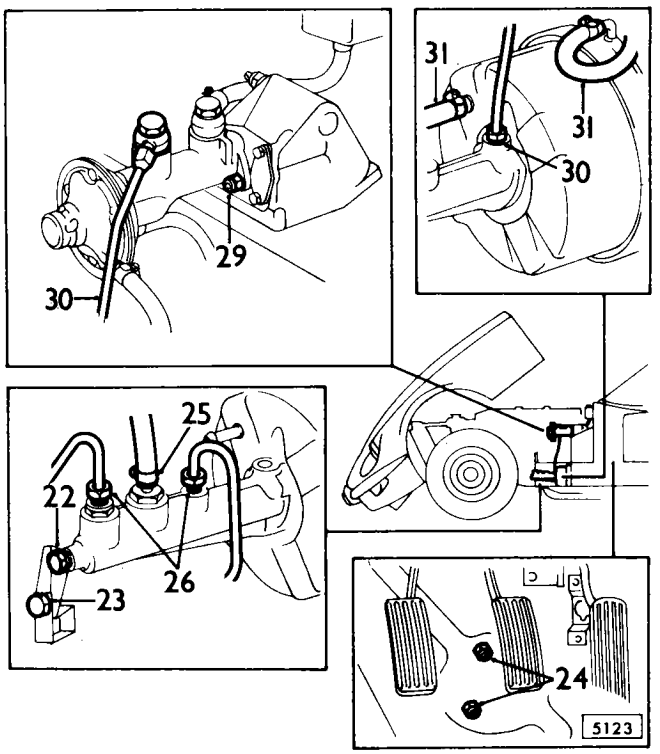


Refitting

20. Fit polyurethane washers to servo studs.
21. Manoeuvre servo into position, and pass studs through bulkhead.
22. Secure bracket to front of slave cylinder with one setscrew and shakeproof washer.
23. Tighten setscrew, nut and plain washer.
24. Fit plain washer and nyloc nut to each servo stud.
25. Fit fluid feed hose to top of slave cylinder.
26. Fit front two connectors to slave cylinder.
27. Release master cylinder.
28. Pass push rod through rubber boot and engage flange with two studs on pedal box.
29. Secure with two nyloc nuts.
30. Fit master cylinder output pipe between banjo connector and rear connector on slave cylinder.
31. Fit air hoses to servo.

CAUTION: Ensure correct connections made.

32. Fit flexible petrol hose to pipe at bulkhead and make new connection.
33. Fit servo fluid reservoir.
34. Fit windscreen washer reservoir and bracket.
35. Fit reservac tank.
36. Fill servo fluid reservoir to correct level.
37. Bleed brakes – 70.25.02.
38. Connect battery.
39. Fit insulation material at toeboard.
40. Fit carpet.



SERVO ASSEMBLY

Right hand steering – remove and refit **70.50.02**

Removing

1. Disconnect battery – 86.15.07.
2. Remove reservac tank – 70.50.04.
3. Remove windscreen washer reservoir and bracket – 84.10.01 – 84.10.02.
4. Remove servo fluid reservoir – 70.30.17.
5. Release pipe clips and pull off air hoses at bulkhead.

NOTE: Make note of connections.

6. Remove petrol pipe clip and pull off flexible hose.
7. Disconnect air hoses at servo.
8. Release three connectors at top of slave cylinder. Plug each pipe to prevent fluid loss.
9. Remove fluid feed hose from top of slave cylinder.
10. Inside vehicle pull carpet from left hand front toeboard.
11. Remove insulation material.
12. Remove three nyloc nuts and plain washers.
13. Under bonnet release setscrew and shakeproof washer at bracket on front of slave cylinder.
14. Loosen setscrew, nut and plain washer securing bracket to clip.
15. Draw servo from bulkhead and manoeuvre clear.

Refitting

16. Fit polyurethane washers to servo studs.
17. Manoeuvre servo into position, and pass studs through bulkhead.
18. Secure bracket to front of slave cylinder with one setscrew and shakeproof washer.
19. Tighten setscrew, nut and plain washer.
20. Fit plain washer and nyloc nut to each servo stud.
21. Fit fluid feed hose to top of slave cylinder.
22. Fit three connectors to top of slave cylinder.
23. Fit air hoses to servo.
24. Fit air hose to pipe at bulkhead.

CAUTION: Ensure correct connections made.

25. Fit flexible petrol hose to pipe at bulkhead and make new connection.
26. Fit servo fluid reservoir.
27. Fit windscreen washer reservoir and bracket.
28. Fit reservac tank.
29. Fill servo fluid reservoir to correct level.
30. Bleed brakes – 70.25.02.
31. Connect battery.
32. Fit insulation material at toeboard.
33. Fit carpet.

RESERVOIR TANK

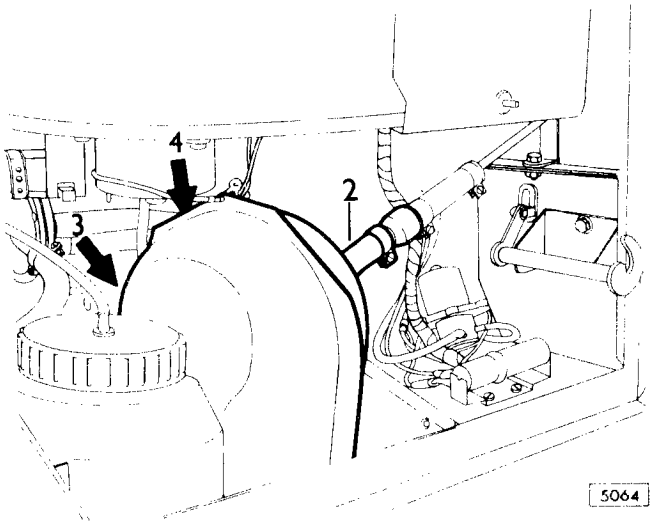
Remove and refit **70.50.04**

Removing

1. Remove windscreen washer reservoir – 84.10.01.
2. Disconnect hose at check valve.
3. Disconnect hose to front of servo.
4. Disconnect hose to rear of reaction valve.
5. Remove setscrew and shakeproof washer securing tank to body.
6. Remove nyloc nut and plain washer securing tank to sill.
7. Manoeuvre tank from car.

Refitting

8. Reverse operations 1 to 7.



SERVO ASSEMBLY

Overhaul **70.50.06**

General

Before dismantling the vacuum servo assembly and slave cylinder it is adviseable to obtain the repair kit containing all parts necessary during overhaul. The kit is:-

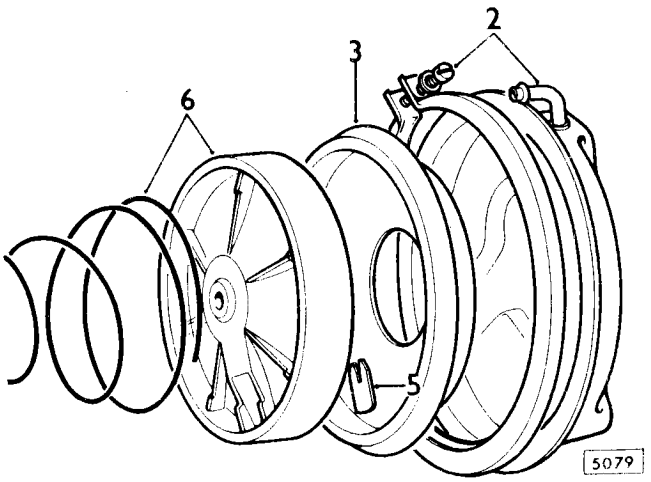
(a) Vacuum servo repair kit.

Dismantling

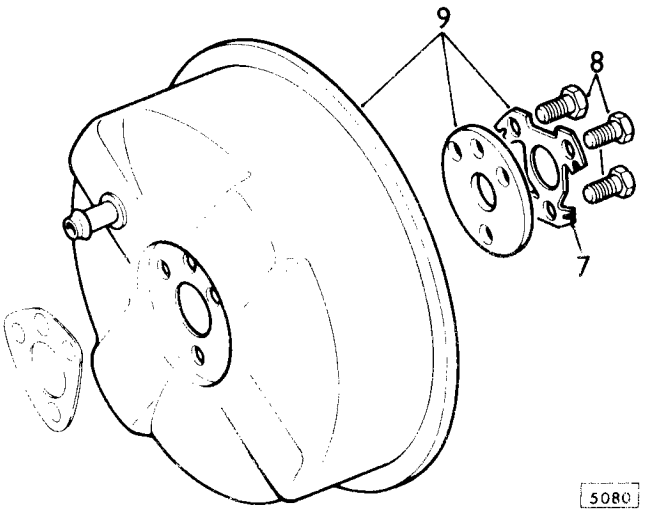
1. Support servo slave cylinder in the padded jaws of a vice.
2. Loosen clamping ring screw to release end cover assembly.

NOTE: Hold end cover against spring pressure while releasing screw.

3. Remove diaphragm from diaphragm support.
4. Remove servo from vice.
5. Press and gently shake diaphragm support until key drops out.
6. Remove diaphragm support and return spring.



7. Bend down tabs on locking plate.
8. Remove three setscrews.
9. Withdraw locking plate, abutment plate and shell assembly.

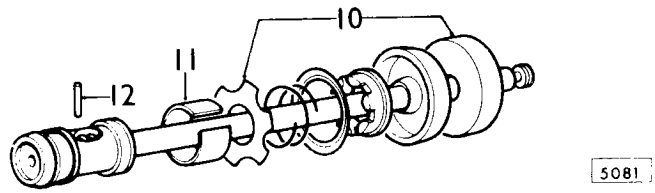


10. Gently pull servo push rod and withdraw primary piston, seal and bearing assembly.
11. Slide back spring steel clip on piston.
12. Press out pin and remove push rod.

NOTE: It is not necessary to remove cup from primary piston, as repair kit contains replacement primary piston with cup assembled.

13. Remove fluid inlet connector and extract stop pin.

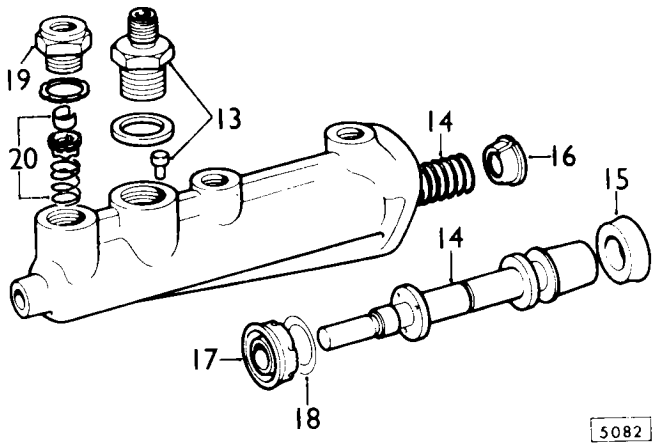
NOTE: Apply gentle pressure to secondary piston down bore to release pin.



14. Tap mouth of slave cylinder with soft hammer to extract secondary piston and spring.
15. Remove rubber seal.
16. Remove plastic spring retainer.

NOTE: This will probably be damaged during removal, but a replacement is provided in repair kit.

17. Remove seal.
18. Remove piston washer.
19. Remove adaptor from outlet port.
20. Remove trap valve assembly.



Inspection

21. Check bores and pistons for scoring or pitting.
22. Wash all components in Girling Brake Cleaner.
23. Thoroughly dry with lint free cloth.
24. Liberally smear seal and bearing assembly with disc brake lubricant.

Reassembling

25. Assemble trap valve and outlet adaptor to servo slave cylinder body. Use new copper gasket. Torque to 4.01 – 4.98 kg.m (29 – 36 lb.ft.).
26. Fit piston washer to secondary piston.
27. Moisten secondary piston front seal with clean brake fluid.
28. Press seal on to piston.
29. Fit retainer.
30. Moisten secondary piston cup with clean brake fluid.
31. Press cup on to piston.
32. Press return spring on to secondary piston and slide assembly into bore of slave cylinder.

NOTE: Ensure front seal is not damaged or turned back.

33. Press piston down bore and retain with piston stop pin through inlet port.
34. Retain stop pin by fitting inlet adaptor on new copper gasket.
35. Insert push rod through rear of primary piston assembly.
36. Use a small screwdriver to press coil spring to heel of piston and insert pin.

    NOTE: Ensure spring presses push rod towards crown of piston, and that pin is not through coils.

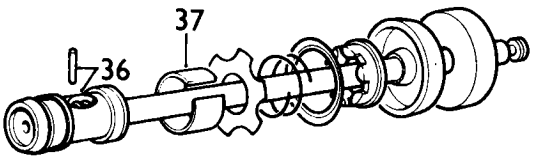
37. Fit spring retaining clip. Ensure it does not stand proud of largest piston diameter.
38. Moisten piston cup with clean brake fluid and assemble primary piston to slave cylinder bore.

    NOTE: Ensure cup is not damaged or turned back.

39. Assemble spacer to push rod.
40. Lubricate seal with Lockheed Disc Brake Lubricant and assemble to push rod, concave side first.
41. Lubricate bearing with Lockheed Disc Brake Lubricant and assemble to push rod, plain face first.
42. Fit gasket to end face of slave cylinder.
43. Assemble shell assembly, abutment plate and **new** locking plate to plastic bearing spigot.
44. Secure with three setscrews. Torque to 1.70 – 1.94 kg.m (12.2 – 14 lb.ft.). Turn up locking tabs.
45. Locate spring over abutment plate, and slide diaphragm support over push rod.
46. Secure by dropping key into slot.
47. Fit bead around inside diameter of diaphragm into groove in diaphragm support.

    NOTE: Diaphragm must be completely dry.

48. Fit bead around outside diameter of diaphragm into lip round shell assembly.
49. Place end cover assembly in position, pipe connector in line with connectors on slave cylinder, and secure with clamping ring.



5083

CHECK VALVE

Remove and refit **70.50.15**

Removing

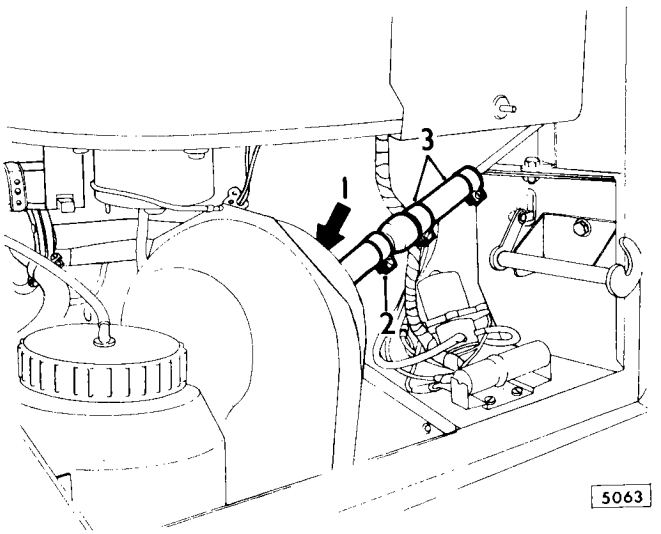
1. Release pipe clip and pull pipe from reservac tank.
2. Release pipe clip and pull check valve from hose.
3. Release pipe clip and pull hose from check valve.

Refitting

4. Fit hose to check valve and secure clip.

   NOTE: Fit check valve with head of arrow towards reservac tank.

5. Push check valve into rubber hose and secure.
6. Push hose on to reservac tank and secure.



5063

FRONT CALIPER

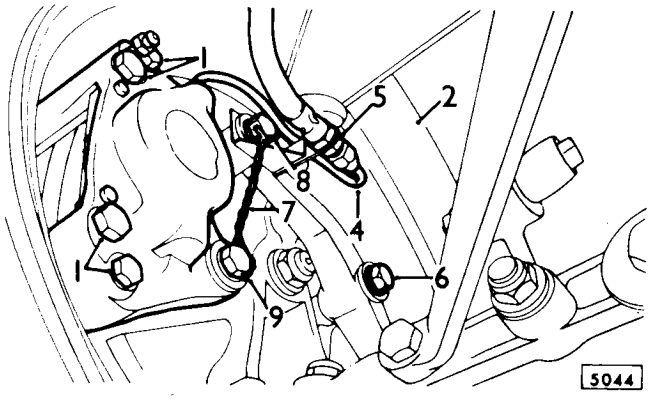
Remove and refit **70.55.02**

Removing

1. Do not, under any circumstances, remove four setscrews securing two halves of caliper and distance pieces. If a weep of fluid appears at the joints, the caliper MUST be replaced.
2. Remove road wheel – 74.20.01.
3. Place a stand beneath the lower wishbone at a point adjacent to the damper.
4. Remove pipe between caliper port and bracket. Immediately plug hose to prevent fluid loss.
5. Release locknut and pull flexible hose from bracket.
6. Loosen bolt securing steering arm to stub axle carrier.
7. Remove locking wire from caliper bolts.
8. Remove bolt through steering arm and caliper.

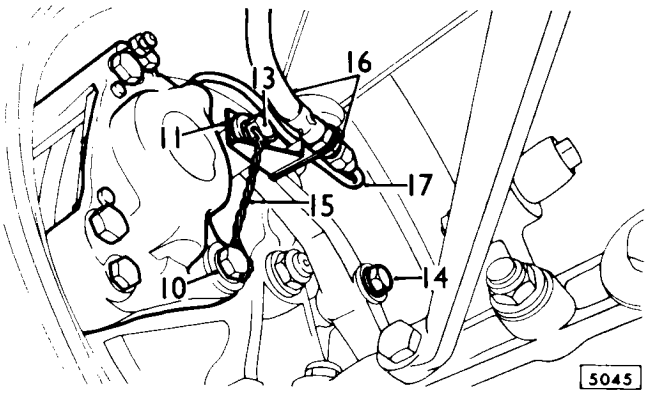
   NOTE: Note position and number of shims between steering arm and caliper.

9. Remove lower caliper bolt and withdraw caliper from disc.



Refitting

10. Offer caliper into position and loosely secure with lower bolt, plain washer and spring washer.
11. Place spring washer, plain washer and brake pipe bracket on upper bolt.
12. Position shims, removed in operation 8, between steering arm boss and caliper.
13. Fit upper bolt to trap disc shield bracket beneath brake pipe bracket.
14. Tighten both caliper and steering arm bolt to torque of 6.91 – 8.30 kg.m. (50 – 60 lb.ft.).
15. Wire lock caliper bolts.
16. Fit flexible hose to bracket and secure locknut.
17. Fit pipe between caliper port and bracket.
18. Fit road wheel.
19. Bleed brakes – 70.25.02.

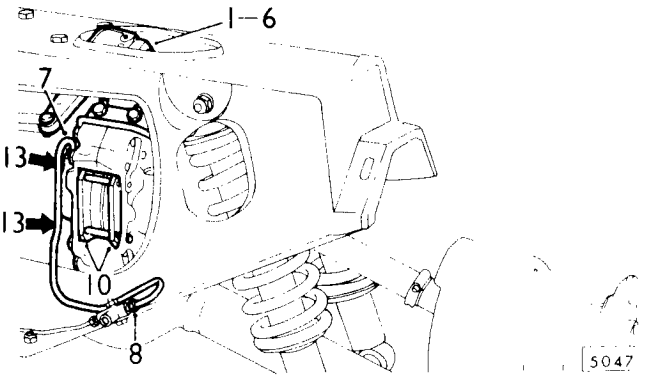


REAR CALIPER

Remove and refit 70.55.03

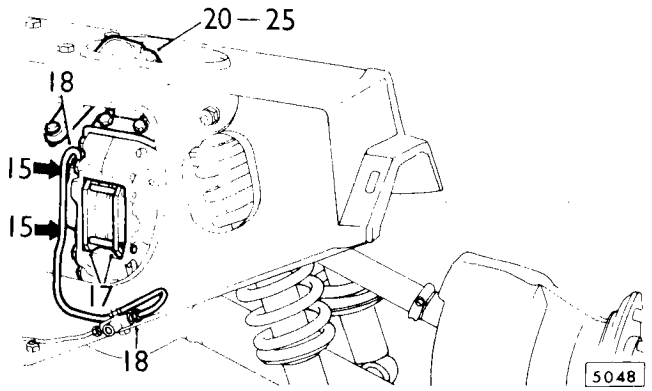
Removing

1. Remove rear suspension unit – 64.25.01.
2. Remove split pin securing clevis pin at handbrake operating lever.
3. Lift pivot bolt locking tabs.
4. Remove pivot bolts.
5. Remove retraction plate.
6. Withdraw handbrake mechanism through top of suspension unit.
7. Release brake pipe feed connector at caliper.
8. Loosen pipe connector at three way union.
9. If right hand caliper being removed, also release clip on centre bolt of suspension unit bottom plate.
10. Remove friction pads – 70.40.03.
11. Remove locking wire from caliper bolts.
12. Do not, under any circumstances, remove four setscrews securing two halves of caliper.
13. Remove two securing bolts and spring washers.
14. Withdraw caliper through front of suspension unit.



Refitting

15. Offer caliper into position and secure with two bolts and spring washers. Torque 6.77 – 7.60 kg.m. (49 – 55 lb.ft.). Check disc is central between jaws of caliper. If necessary, adjust shims between drive flange and disc. If adjustment is made rear wheel camber must be checked as final operation.
16. Wire lock caliper bolts.
17. Fit friction pads.
18. Fit brake feed pipe to caliper. Tighten connector at three way union.
19. If necessary, resecure clip.
20. Place handbrake pad carriers in position on caliper.
21. Fit retraction plate, ensuring tips engage with pad carriers.
22. Fit tab washer.
23. Secure pad carriers with two bolts. Turn up tab washer.
24. Move operating lever backwards and forwards until adjuster ratchet does not click. This sets pads to correct clearance.
25. Fit clevis pin and secure with plain washer and new split pin.
26. Refit rear suspension.
27. Bleed brakes – 70.25.02.



HANDBRAKE CALIPER PAD CARRIERS

Remove and refit 70.55.04

Removing

1. Follow procedure given for renewing handbrake pads – 70.40.04.

Refitting

2. Follow procedure given for renewing handbrake pads – 70.40.04.

NOTE: If pad carriers or retraction plate are new it is advisable to ensure that fingers of retraction plate will fit into pad carrier holes before assembly.
If necessary, lightly dress retraction plate fingers with a fine file.

BRAKE CALIPER – FRONT

Overhaul 70.55.13

Service Tool 18G672 Piston Clamp

1. Remove front brake caliper – 70.55.02.
2. Thoroughly clean caliper using methylated spirit only.

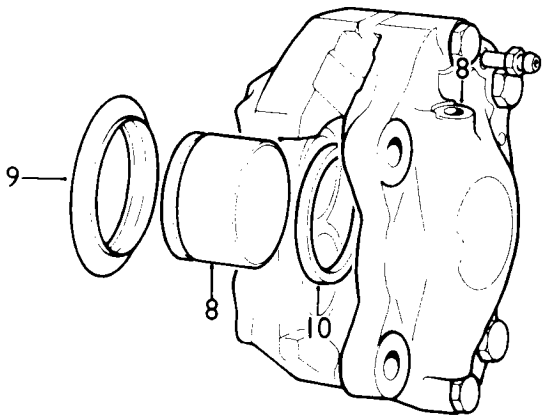
Dismantling

CAUTION: Under no circumstances must the two caliper halves be separated. Piston seals can be changed without splitting the caliper.

3. Remove clips.
4. Remove retaining pins.
5. Recover anti-chatter springs.
6. Withdraw friction pads.
7. Fit piston clamp to retain two outboard pistons.
8. Carefully use a compressed air jet through feed port to expel large inboard piston.
9. Pull dust seal from piston and cylinder bore groove.

CAUTION: Do not scratch pistons or cylinder bores. Use extreme care when removing seals.

10. Carefully prise seal from groove in cylinder wall.



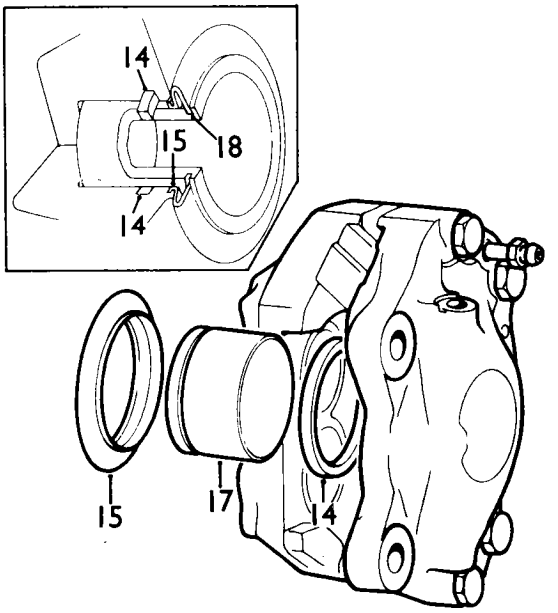
5054

Inspection

11. Using Girling Brake Cleaner or methylated spirit only, thoroughly clean piston, cylinder bore and seal groove.
12. Examine cylinder bore and piston for scratches or signs of corrosion. Defective components must be changed.

Assembling

13. Coat new seal with Lockheed Disc Brake Lubricant.
14. Ease seal into its groove using fingers only.
15. Fit dust seal into outer groove in cylinder bore.
16. Coat piston with Lockheed Disc Brake Lubricant.
17. Carefully enter piston into bore through dust seal.
18. Fit dust seal lip into groove in piston.
19. Release piston clamp, and refit to press inboard piston fully into cylinder.
20. Overhaul pistons, seals and dust seals in outboard half of caliper as detailed in operations 8 to 18. Continue with operation 21.
21. Fit piston clamp to outboard pistons and press fully home.
22. Locate friction pads in position.
23. Fit retaining pins.
24. Fit clips.
25. Fit anti-chatter springs.
26. Fit front brake caliper to vehicle.



5061

BRAKE CALIPER – REAR

Overhaul **70.55.14**

Service Tool 18G672 Piston Clamp

1. Remove rear brake caliper – 70.55.03.
2. Thoroughly clean caliper using methylated spirit only.

Dismantling

CAUTION: Under no circumstances must the two caliper halves be separated. Piston seals can be changed without splitting the caliper.

3. Fit piston clamp to retain one piston.
4. Carefully use a compressed air jet through feed port to expel one piston.
5. Pull dust seal from piston and cylinder bore groove.

CAUTION: Do not scratch pistons or cylinder bores. Use extreme care when removing seals.

6. Carefully prise seal from groove in cylinder wall.

Inspection

7. Using Girling Brake Cleaner or methylated spirit only, thoroughly clean piston, cylinder bore and seal groove.
8. Examine cylinder bore and piston for scratches or signs of corrosion. Defective components must be changed.

Assembling

9. Coat new seal with Lockheed Disc Brake Lubricant.
10. Ease seal into its groove using fingers only.
11. Fit dust seal into outer groove in cylinder bore.
12. Coat piston with Lockheed Disc Brake Lubricant.
13. Carefully enter piston into bore through dust seal.
14. Fit dust seal lip into groove in piston.
15. Release piston clamp and use it to press piston fully into bore.
16. Overhaul piston, seal and dust seal in other half of caliper as described in operations 4 to 15. Continue with operation 17.
17. Remove piston clamp.
18. Fit rear brake caliper to vehicle.

CONTENTS

CONTENTS—continued

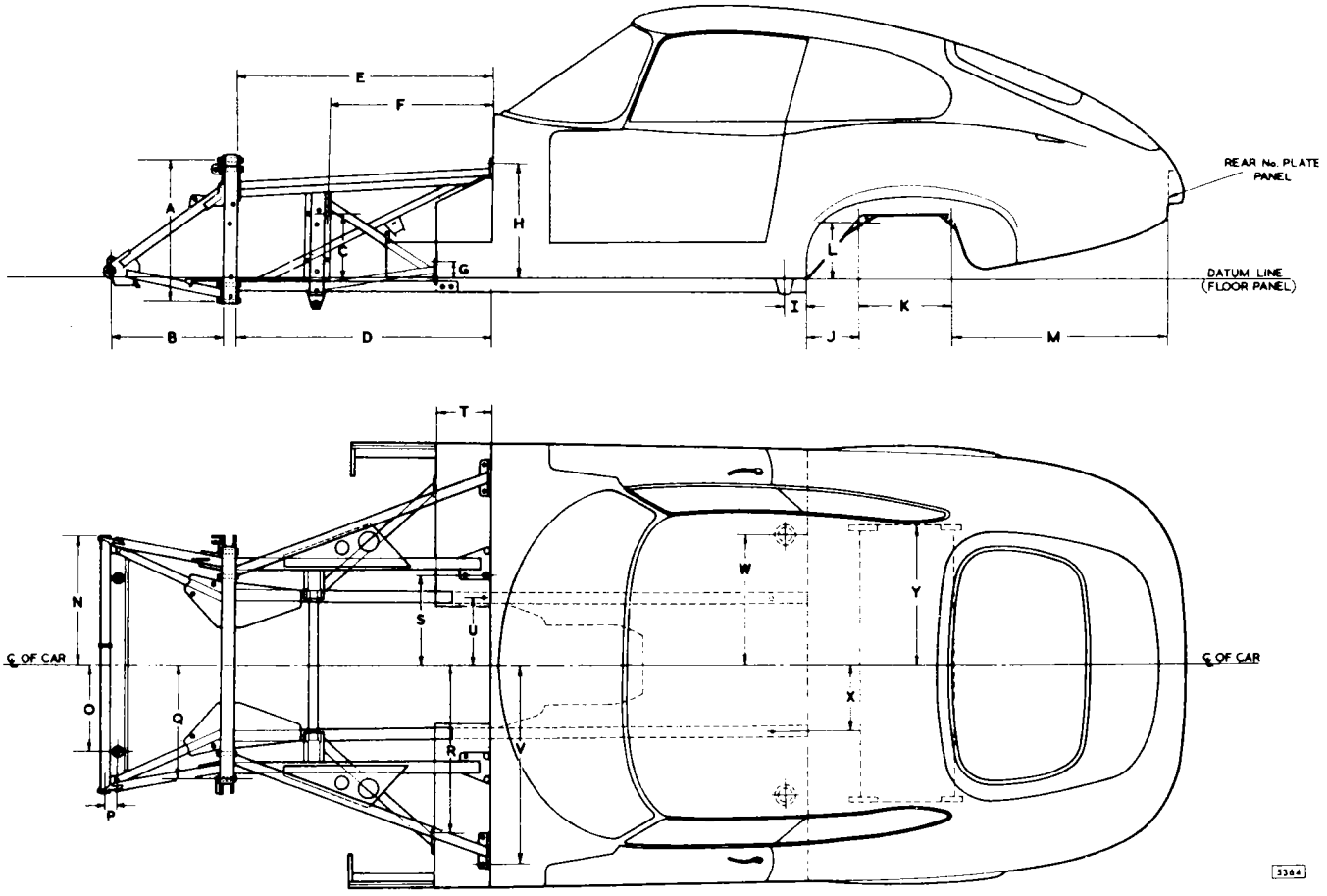
CONTENTS – continued

ALIGNMENT CHECK 76.10.01

Symbol	Measurement taken from	centimetres	inches
A	Upper hole of top mounting flange to lower hole of lower mounting flange on front sub frame	45,7	18.00
B	Centre line front tube to rear mounting flange front sub frame	34,6	13.62
C	Centre line top rear hole engine mounting post to datum line	23,4	9.20
D	Lower rear face of front crossmember to front bulkhead face	92,4	36.38
E	Upper rear face of front crossmember to front bulkhead face	92,4	36.38
F	Centre line top rear hole engine mounting post to front bulkhead face	60,6	23.88
G	Top hole in outer side member to datum line	4,4	1.75
H	Top hole in upper outrigger flange to datum line	38,4	15.13
I	Centre of radius arm mounting post to front face of rear wheel aperture	9,7	3.81
J	Centre line of front lower mounting hole to front face of rear wheel aperture	22,2	8.73
K	Centre line of front lower mounting hole to centre line of rear lower mounting hole	26,8	10.57
L	Centre line of front lower mounting hole to datum line	20,5	8.08
M	Centre line of rear lower mounting hole to rear number plate panel	80,5	31.68
N	Outer face of front sub frame front tube to centre line of car	43,0	16.94
O	Centre line of radiator mounting hole to centre line of car	30,9	12.18
P	Centre line of front frame front tube to centre line of radiator mounting hole	4,4	1.74
Q	Top outer hole of front sub frame upper mounting flange to centre line of car	38,7	15.25
R	Inner hole of outer side member mounting flange to centre line of car	57,6	22.69
S	Inner hole of top side member mounting flange to centre line of car	32,2	12.68
T	Rear mounting flange face of outer side member of front bulkhead face	20,32	8.00

Alignment check–continued

Symbol	Measurement taken from	centimetres	inches
U	Centre line of hole in front of body underframe side members to centre line of car	24,8	9.78
V	Outer hole of outrigger mounting bracket to centre line of car	67,6	26.62
W	Centre line of radius arm mounting post to centre line of car	48,3	19.00
X	Centre line of hole in rear of body underframe side members to centre line of car	23,2	9.12
Y	Outside face of rear suspension mounting points to centre line of car	47,1	18.56



REAR CROSS MEMBER

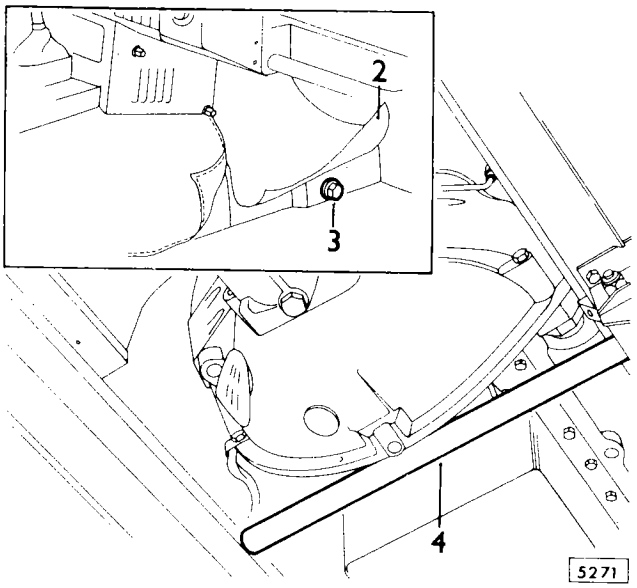
Remove and refit 76.10.06

Removing

1. Remove side heatshields – 30.10.33.
2. Lift carpets away from lower edge of each side of gearbox cover.
3. Remove bolts and washers securing rear cross member to gearbox cover.
4. Recover cross member from under car.

Refitting

5. Reverse operations 1 to 4.
6. Secure carpets to gearbox cover with petroleum based adhesive.



FUEL FILLER FLAP

Remove and refit 76.10.25

Removing

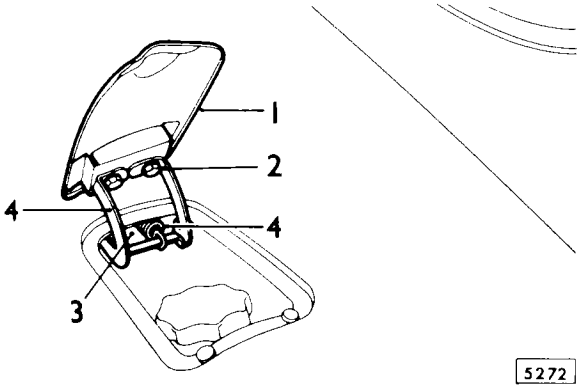
1. Raise fuel filler flap.
2. Remove bolts and washers securing flap to hinge.

To remove hinge, carry out operations 3 and 4

3. Remove bolts and washers securing hinge assembly to body.
4. Withdraw hinge assembly together with tensioning spring.

Refitting

5. Fuel filler flap only – reverse operations 1 and 2.
6. Hinge assembly – reverse operations 3 and 4.



SUB FRAME

Remove and refit **76.10.29**

Removing

1. Remove engine and gearbox assembly – 12.37.01
2. Remove heater assembly – 80.20.01.
3. Remove reservac tank – 70.50.04.
   Carry out operations 4 to 6 on cars fitted with exhaust emission control.
4. Remove air pump air cleaner – 17.25.05.
5. Remove absorption canister – 17.15.13.
6. Remove right hand engine valance – 76.79.08.
7. Remove right hand undershield – 76.10.43.
8. Remove left hand engine valance – 76.79.07.
9. Remove left hand undershield – 76.10.42.
10. Support car securely beneath body shell.
11. Remove front shock absorbers – 60.30.02.
12. Remove stub axle carriers – 60.25.23.
13. Remove upper suspension arms – 60.35.01.
14. Remove lower suspension arms – 60.35.02.
15. Remove anti-roll bar – 60.10.01.
16. Remove torsion bars – 60.20.42.
17. Remove power assisted steering rack – 57.10.01.
18. Remove lower steering column – 57.40.05.
19. Remove brake pipes – 70.20.02 and 70.20.03.
20. Remove forward wiring harness – 86.70.08.
21. Remove bracket supporting end of brake servo to sub-frame.
22. Remove bolts and washers securing sub-frame to body.

Refitting

23. Reverse operation 22.
24. Check items A, B, C, D, E, F, G, H, N, O, P, Q, R, S, T and U covered by operation 76.10.01.
25. Reverse operations 1 to 21.

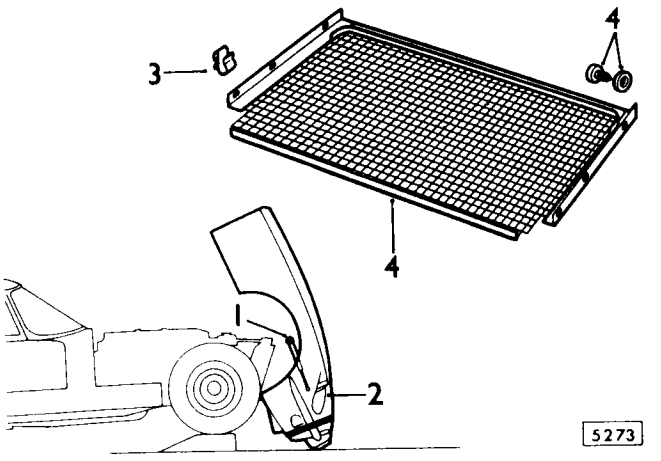
RADIATOR STONEGUARD

Remove and refit **76.10.38**

Removing

1. Ensure bonnet is adequately supported, remove spring clip and withdraw clevis pin securing bonnet stay.
2. Hinge bonnet fully forward.
3. Release clips securing windscreen washer pipe to edge of stoneguard.
4. Remove self-tapping screws and washers securing stoneguard to bonnet; lift out stoneguard.

CAUTION: Ensure stoneguard does not foul radiator matrix or, if air conditioning is fitted, condenser unit matrix.



Refitting

Reverse operations 1 to 4.

LEFT HAND UNDERSHIELD

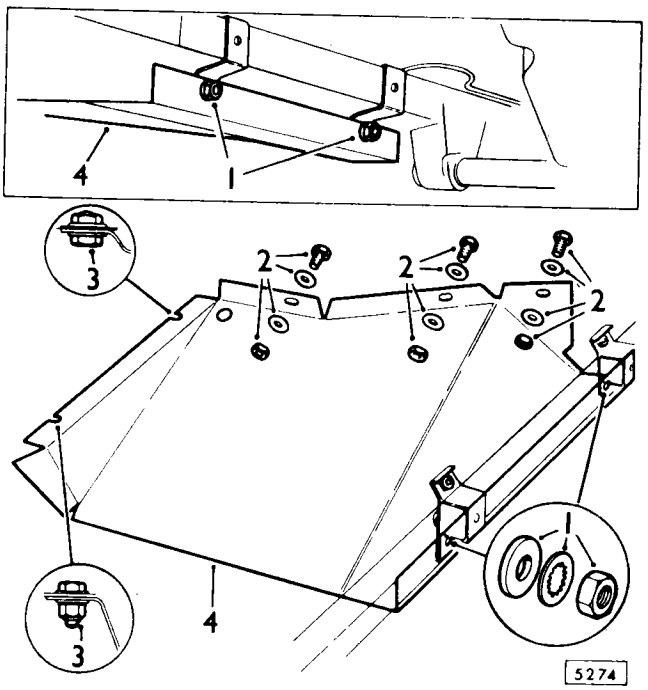
Remove and refit **76.10.42**

Removing

1. Remove nuts and washers securing undershield to retaining clips.
2. Remove nuts, bolts and washers securing undershield to engine valance.
3. Slacken bolt and self-locking nut securing undershield to body sill panel.
4. Withdraw undershield.

Refitting

Reverse operations 1 to 4.



RIGHT HAND UNDERSHIELD

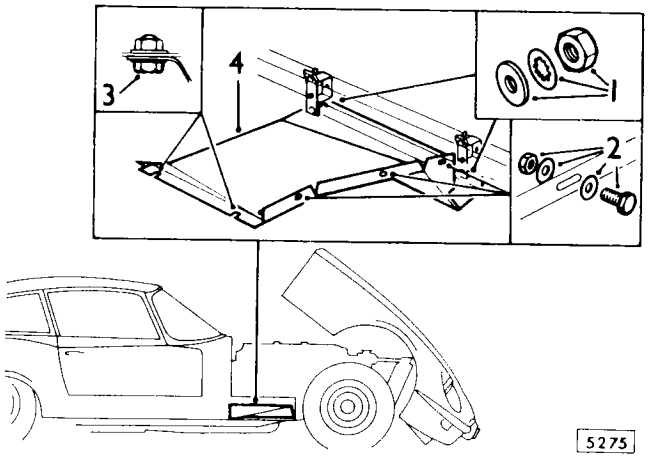
Remove and refit **76.10.43**

Removing

1. Remove nuts and washers securing undershield to retaining clips.
2. Remove nuts, bolts and washers securing undershield to engine valance.
3. Slacken bolts securing undershield to body sill panel.
4. Withdraw undershield.

Refitting

Reverse operations 1 to 4.



SUN VISOR

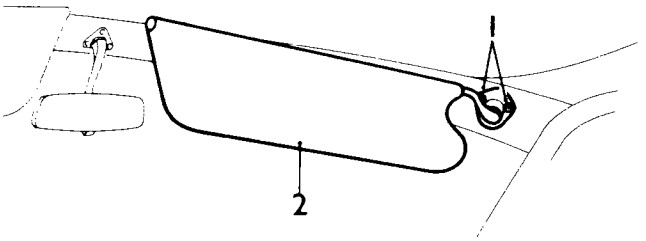
Remove and refit **2 + 2 cars 76.10.47**

Removing

1. Remove screws securing sun visor mounting bracket to screen rail.
2. Withdraw visor assembly.

Refitting

Reverse operations 1 and 2.



SUN VISOR

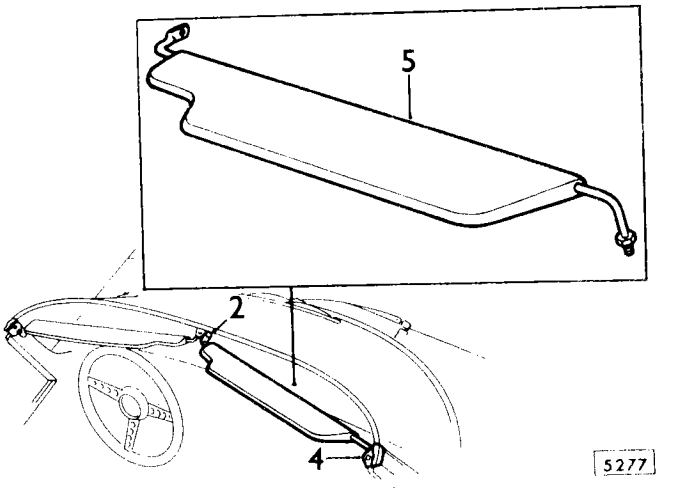
Remove and refit **Open two seater 76.10.47/1**

Removing

1. Fold back hood or remove hard top, whichever is applicable – 76.61.01.
2. Remove screws securing inner pivot rod to windscreen centre support.
3. Rotate sun visor until access to dome headed nut securing outer pivot rod is obtained.
4. Remove dome headed nut and washer.
5. Withdraw sun visor.

Refitting

Reverse operations 1 to 5.



BODY SIDE FRONT TRIM PAD

Remove and refit **Left or right hand 76.13.01**

Removing

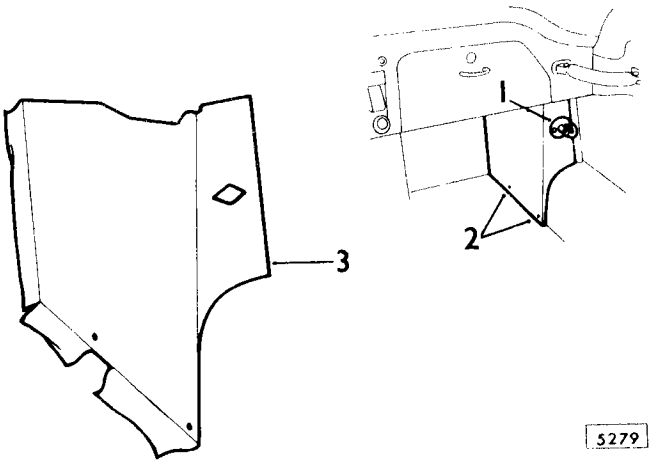
1. Remove bonnet lock control rod – 76.16.29.
2. Remove screws retaining trim to body.

CAUTION: Trim pad is also secured by adhesive.

3. Carefully pull trim away from body.

Refitting

4. Clean off all traces of old trim solution.
5. Smear trim pad with petroleum based trim solution.
6. Reverse operations 1 and 2.



'B' POST TRIM PAD

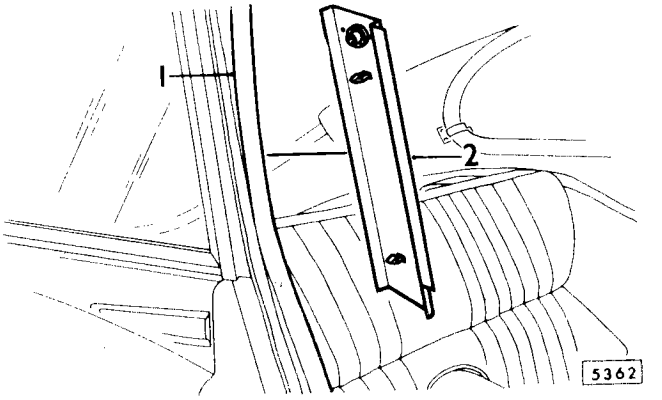
Remove and refit **76.13.08**

Removing

1. Prise draught welt away from edge of 'B' post.
2. Carefully prise off trim pad.

Refitting

Reverse operations 1 and 2.



CANT RAIL CRASH ROLL

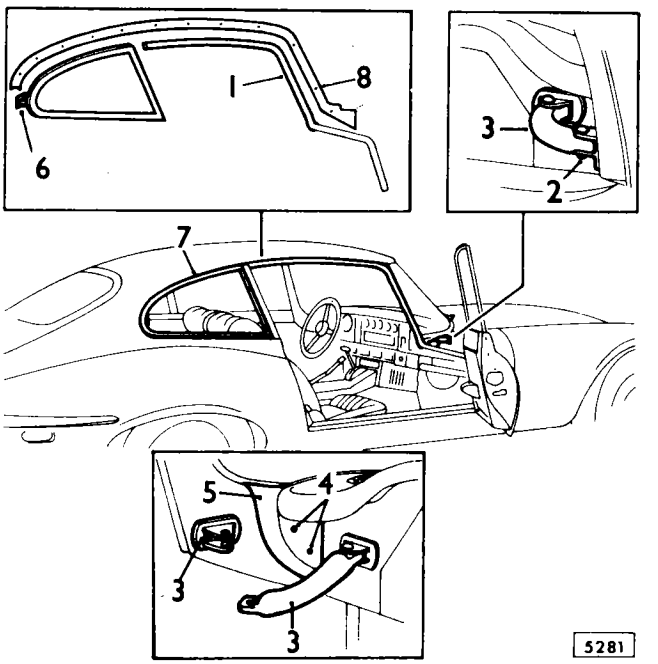
Remove and refit **Left or right hand 76.13.10**

Removing

1. Carefully remove rubber seal from 'A' post and cant rail
   Passenger side only carry out operations 2 and 3.
2. Remove dome headed nut, washer and bolt securing grab handle.
3. Swing grab handle away from mounting bracket, remove screws securing bracket to 'A' post.
4. Remove screws securing capping over chrome finisher.
5. Remove screw securing chrome finisher to body; withdraw finisher.
6. Remove screws securing quarter vent catch to trim pad.
7. Carefully remove top half of rubber seal from quarter vent aperture.
8. Remove screws securing cant rail crash roll to body; withdraw crash roll.

Refitting

Reverse operations 1 to 8.



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LUGGAGE COMPARTMENT TRIM CASING

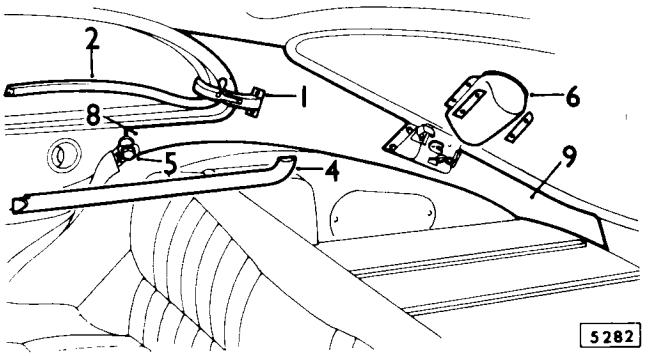
Remove and refit **Left or right hand 76.13.17**

Removing

1. Remove screws securing quarter vent catch to trim pad.
2. Carefully remove rubber seal from quarter vent aperture.
3. Remove screws securing cant rail crash roll to quarter vent aperture.
4. Remove screws securing lower crash roll to quarter vent aperture; withdraw crash roll.
5. Remove safety belt anchorage bolt; withdraw safety belt.
6. **Right hand trim casing only** – Remove screws securing door lock cover to trim casing; withdraw cover.
7. **Left hand trim casing only** – Remove screws securing hinge cover to trim casing.
8. Pull trim from around safety belt anchorage point.
9. Carefully pull trim casing which is retained by trim clips away from the body.
10. Withdraw trim casing.

Refitting

Reverse operations 1 to 10.



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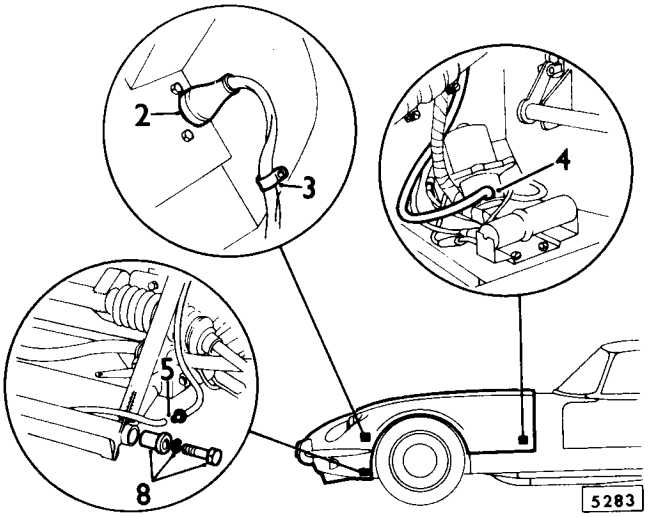
BONNET

Remove and refit **76.16.01**



Removing

1. Disconnect battery lead – 86.15.19.
2. Disconnect wiring plug from socket.
3. Remove wiring harness clip.
4. **Early cars** Disconnect windscreen washer tubing from pump unit, release retaining straps and withdraw through sub-frame.
5. **Later cars** Disconnect tubing at connector.
6. Ensure bonnet is adequately supported.
7. Remove clip, clevis pin and detach bonnet stay.
8. Remove pivot bolts, washers and locating tubes.
9. Lift off bonnet.

Refitting

10. Reverse operations 1 to 9.
11. If new bonnet has been fitted, check alignment see Operation 76.16.02.

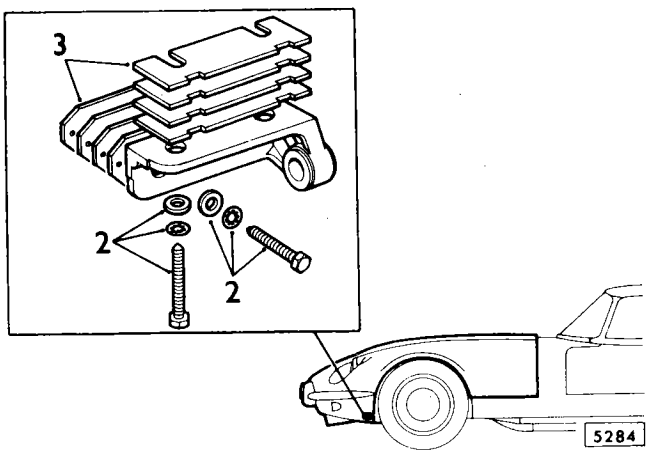
BONNET ALIGNMENT

Adjust **76.16.02**

1. Slacken bolts securing hinge brackets.
2. Close bonnet but do not lock.
3. Align bonnet with body contours if necessary, add or remove shims.
4. Working from underneath car, tighten one bolt on each hinge bracket.
5. Lock bonnet and recheck alignment; readjust if necessary.
6. Tighten remaining hinge securing bolts.

BONNET HINGES

Remove and refit **76.16.12**



Removing

1. Remove bonnet – 76.16.01.
2. Remove bolts and washers securing hinge brackets to bonnet.
3. Lift off hinge brackets, collect and record number of shims fitted.

Refitting

4. Reverse operations 1 to 3.
5. If new bonnet has been fitted, check alignment and lock adjustment see Operations 76.16.02 and 76.16.20.

BONNET STAY

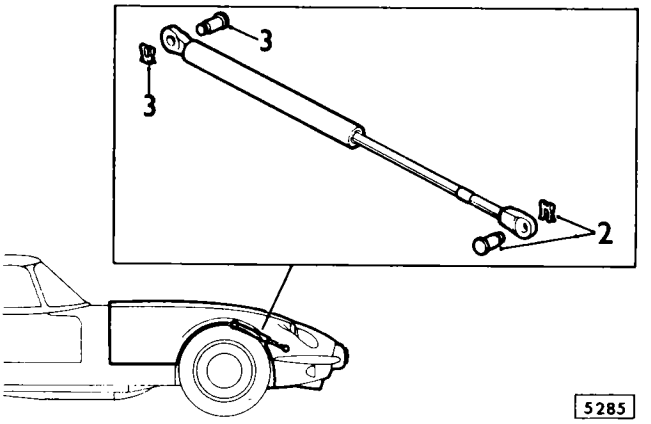
Remove and refit 76.16.14

Removing

1. Ensure bonnet is adequately supported.
2. Remove spring clip and clevis pin; detach stay from bonnet.
3. Remove spring clip and clevis pin; detach stay from sub-frame.

Refitting

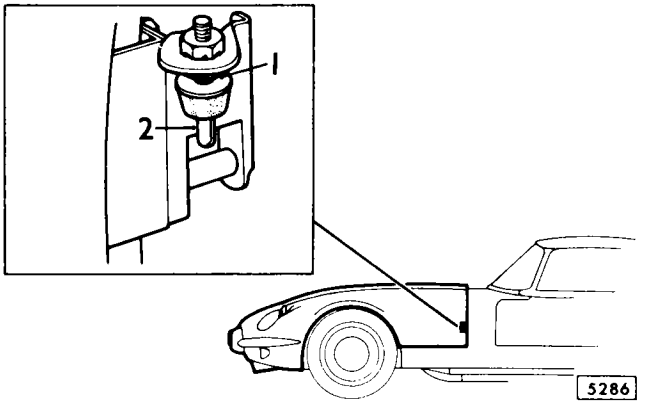
Reverse operations 1 to 3, ensure spring clips are correctly located in clevis pin grooves.



BONNET LOCK

Adjust 76.16.20

1. Slacken locknut on locating peg.
2. Screw peg in or out to lower or raise bonnet line.
3. Close and lock bonnet; check alignment.
4. Adjust position of peg until alignment is satisfactory, tighten locknut.
5. Carry out operations 1 to 4 on remaining bonnet lock.

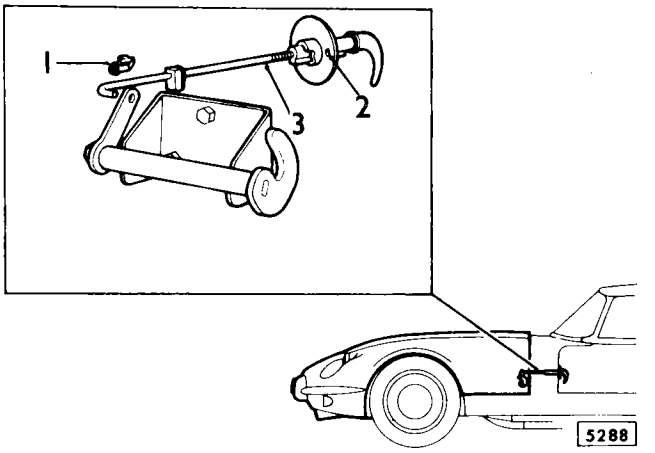


BONNET LOCK CONTROL ROD

Remove and refit **Left or right hand 76.16.29**

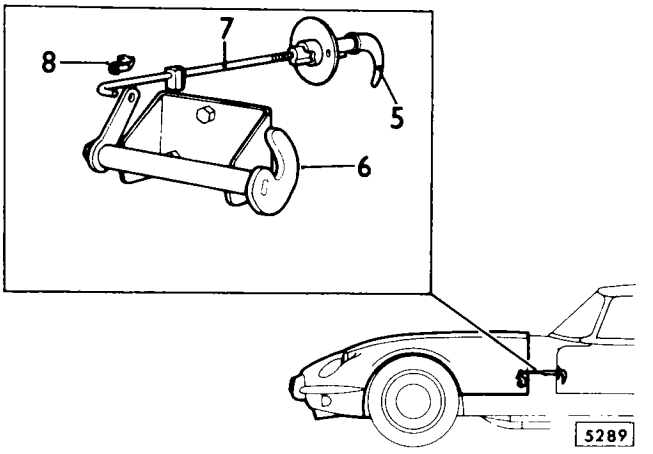
Removing

1. Remove spring clip securing control rod to lock.
2. Remove screws securing plate to trim pad.
3. Withdraw control rod.



Refitting

4. Reverse operations 2 and 3.
5. Place operating lever in "Bonnet unlocked" position.
6. Place catch in position shown.
7. Screw control rod in or out of operating lever until end of rod can be fitted in lock.
8. Fit spring clip.
9. Close bonnet and check operation of lock.
10. Readjust control rod if necessary to ensure complete engagement of catch.



BONNET SAFI TY CATCH AND PLATE

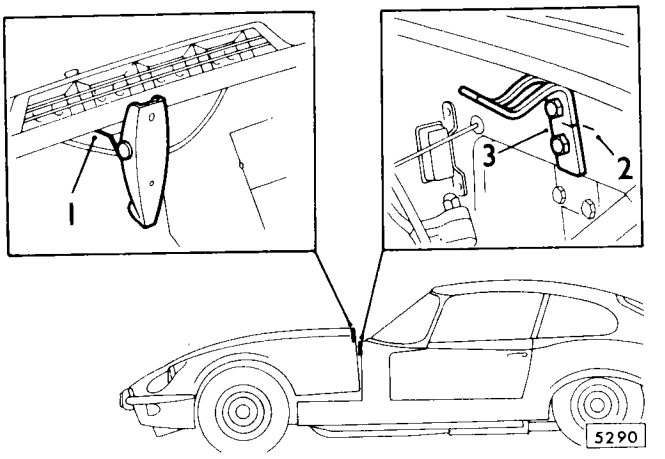
Remove and refit **76.16.34**

Removing

1. Remove screws, lockwashers and plain washers securing safety catch to bonnet.
2. Mark reference line between catch plate and bulkhead to facilitate realignment.
3. Remove bolts and washers securing catch plate to bulkhead.

Refitting

Reverse operations 1 and 3.



BONNET LOCK

Remove and refit **Left or right hand 76.16.21**

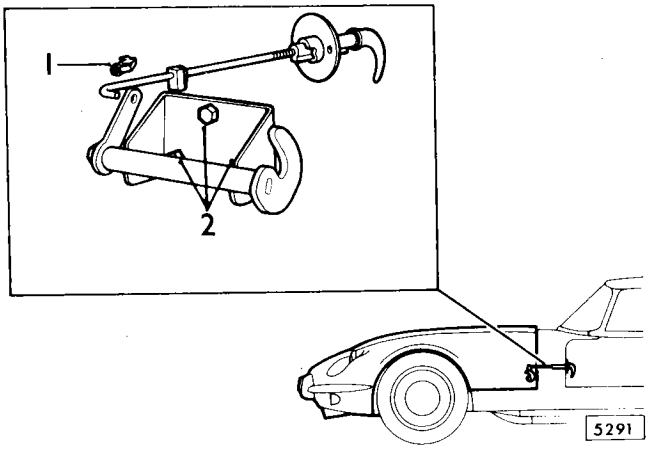
Removing

1. Remove spring clip securing operating rod to lock.

   CAUTION: Take care to ensure that length of operating rod is not altered.
2. Remove bolts and spring washers securing lock to bulkhead; withdraw lock.

Refitting

3. Reverse operations 1 and 2.
4. If new lock has been fitted, check adjustment; see Operation 76.16.20 and items 5 to 10 Operation 76.16.29.



LUGGAGE COMPARTMENT DOOR

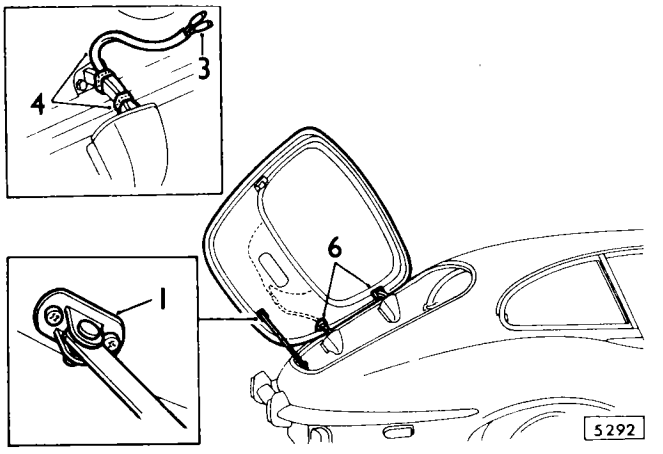
Remove and refit **2 + 2 Cars 76.19.01**

Removing

1. Remove self-tapping screws and washers securing stay to door panel.
   Cars fitted with heated rear window, carry out operations 2 to 4.
2. Carefully prise trim pad away from bottom of door.
3. Disconnect wiring harness at snap connectors.
4. Release straps securing wiring harness to hinge.
5. Mark relative positions of hinge to door casing to facilitate realignment.
6. Support door, remove bolts securing hinge brackets to door casing; lift off door.

Refitting

7. Reverse operations 1 to 6.
8. Check that door sits squarely in aperture. If necessary slacken hinge bracket bolts and realign door.



BOOT LID

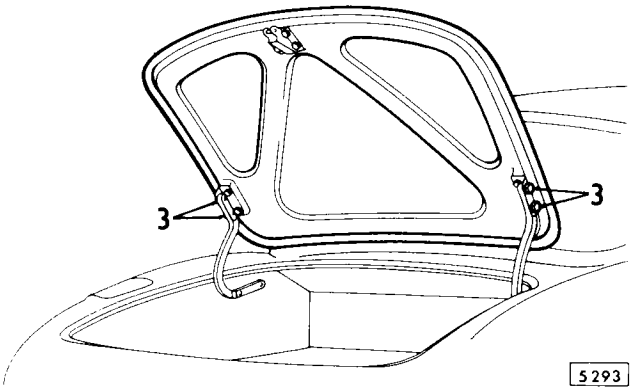
Remove and refit — **Open 2 seater 76.19.01/1**

Removing

1. Mark relative positions of hinges and boot lid to facilitate realignment.
2. Place cloth beneath front edge of boot lid to prevent accidental damage to bodywork.
3. Support boot lid and remove bolts, spring and plain washers securing hinges to lid.
4. Lift off boot lid.

Refitting

5. Reverse operations 3 and 4.
6. Check that gap between edge of lid and body is equal on each side if necessary, slacken bolts and realign.



LUGGAGE COMPARTMENT DOOR SEAL

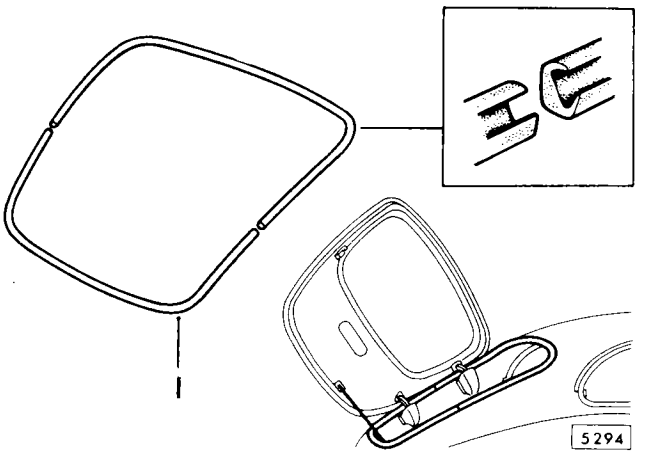
Remove and refit — **2 + 2 Cars 76.19.06**

Removing

1. Remove both halves of seal and discard.
2. Thoroughly clean all dirt and traces of adhesive from body channel.

Refitting

3. Coat both halves of new seal and body channel with petroleum based adhesive.
4. Press seal into channel ensure that joint is adjacent to door lock.



LUGGAGE COMPARTMENT DOOR HINGE

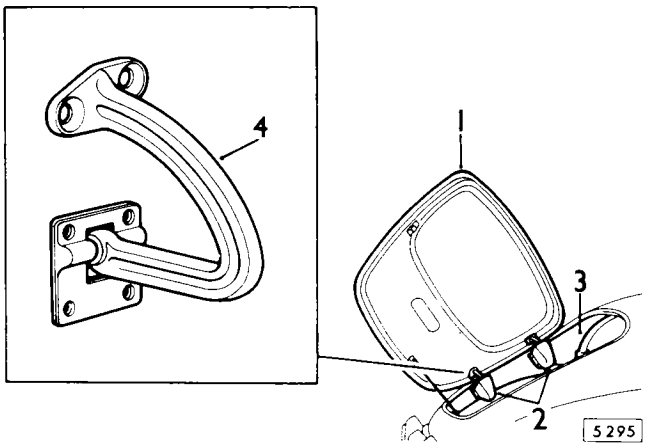
Remove and refit — **2 + 2 Cars 76.19.07**

Removing

1. Remove luggage compartment door – 76.19.01.
2. Remove screws securing hinge cover to trim pad.
3. Remove luggage compartment trim pad – 76.13.17.
4. Remove nuts and washers securing hinge mounting plate to body.

Refitting

Reverse operations 1 to 4.



BOOT LID HINGE

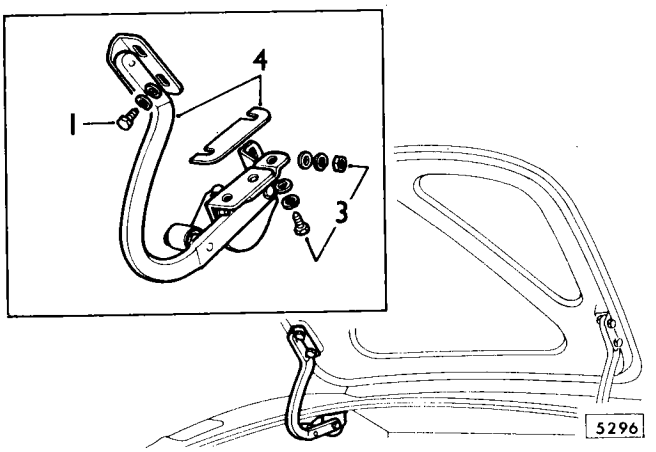
Remove and refit **Open 2 seater 76.19.07/1**

Removing

1. Remove boot lid – 76.19.01/1.
2. Mark relative position of hinge to body.
3. Remove nuts, bolts and washers securing hinge to body.
4. Withdraw hinge noting position and thickness of shims.

Refitting

Reverse operations 1, 3 and 4.



BOOT LID LOCK

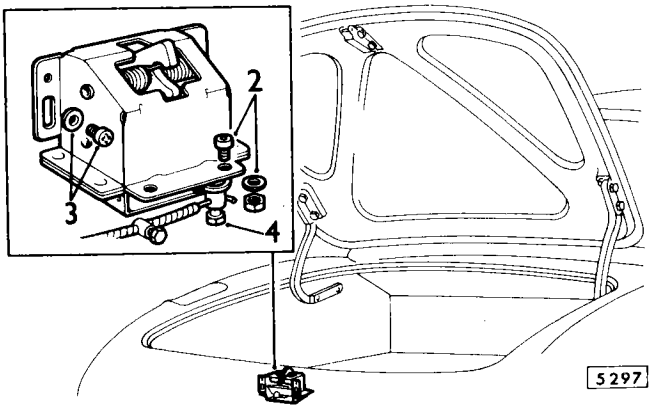
Remove and refit **Open 2 seater 76.19.11**

Removing

1. Remove boot floor – 76.19.24/1.
2. Remove screws, nuts and washers securing lock to mounting bracket.
3. Remove screws and washers securing lock to body.
4. Slacken pinch bolt and withdraw lock from operating cable.

Refitting

5. Fit operating cable to lock but do not tighten pinch bolt at this stage.
6. Position lock on mounting bracket.
7. Reverse operations 2 and 3.
8. Ensure that lock control is fully closed.
9. Tighten operating cable pinch bolt and check operation of lock.
10. Close boot lid and check that lock is fully engaged. If necessary, reset by slackening lock securing screws and repositioning lock.



BOOT LID LOCK STRIKER

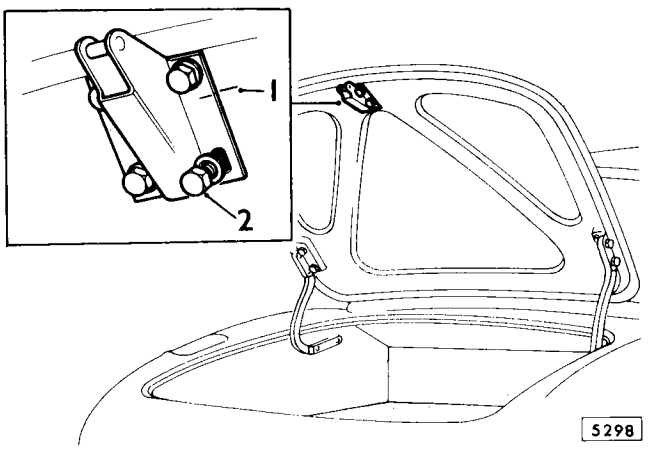
Remove and refit **Open 2 seater 76.19.12**

Removing

1. Mark relative positions of striker and boot lid to facilitate realignment.
2. Remove bolts, lock washers and plain washers securing striker to boot lid.

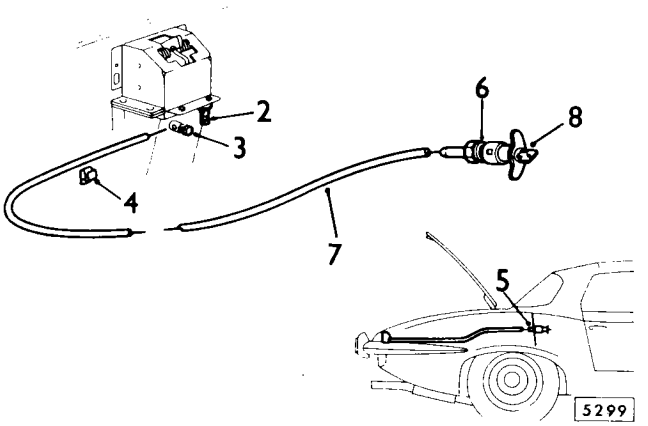
Refitting

3. Reverse operations 1 and 2.
4. Close boot lid and check that it closes firmly.
5. If necessary, slacken striker securing bolts and realign striker.



BOOT REMOTE CONTROL

Remove and refit **Open 2 seater 76.19.13**



Removing

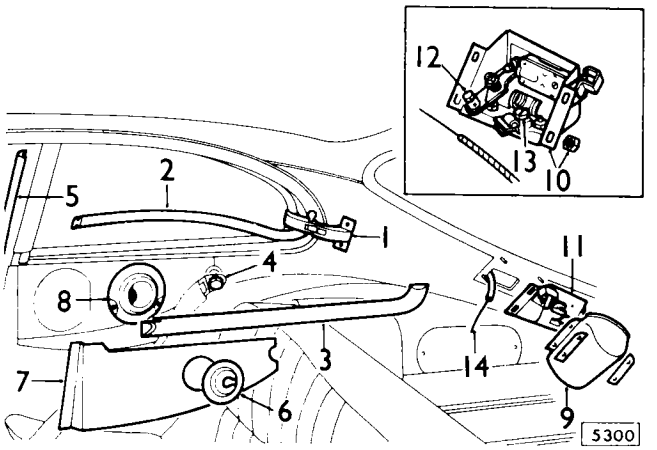
1. Remove boot floor – 76.19.24/1.
2. Slacken pinch bolt securing inner cable.
3. Slacken pinch bolt and withdraw outer and inner cables.
4. Release clip securing outer cable to boot floor support.
5. Carefully fold back trim from vicinity of lock barrel retaining nut.
6. Remove retaining nut and washer.
7. Note run of control cable.
8. Withdraw lock barrel and cable assembly.

Refitting

9. Reverse operations 1 to 8.
10. Check operation of control.

LUGGAGE COMPARTMENT LOCK RELEASE CABLE

Remove and refit **76.19.16**



Removing

1. Remove screws securing quarter vent catch to trim pad.
2. Carefully prise rubber seal out of lower portion of aperture.
3. Remove screws securing lower crash roll to body; withdraw crash roll.
4. Remove safety belt securing bolt and wave washer; withdraw safety belt from mounting.
5. Prise draught welt off edge of 'B' post.
6. Remove screws securing operating lever escutcheon; remove escutcheon.
7. Carefully remove edge of trim from 'B' post; prise off panel.
8. Remove screws securing backplate to body.
9. Remove screws securing lock cover to trim pad; lift off cover.
10. Remove nuts and washers securing lock assembly to mounting studs.
11. Withdraw lock from studs noting position of any shims which may be fitted.
12. Slacken screw securing outer cable clamp.
13. Slacken inner cable pinch bolt.
14. Attach length of stout cord to cable.
15. Withdraw backplate, control lever and cable.

Refitting

16. Reverse operations 12 to 15.
17. Ensure inner cable does not foul any part of lock.
18. Check lock for correct operation.
19. Reverse operations 1 to 11; secure trim to 'B' post with suitable petroleum based adhesive.

LUGGAGE COMPARTMENT FLOOR

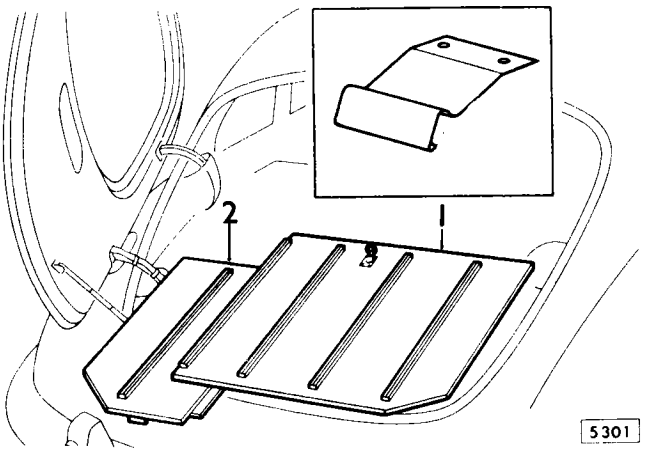
Remove and refit **2 + 2 cars 76.19.24**

Removing

1. Lift out floor panel covering spare wheel.
2. Lift out floor panel covering fuel tank.

Refitting

Reverse operations 1 and 2; ensure panels are correctly located in retaining clips.



BOOT FLOOR

Remove and refit **Open 2 seater 76.19.24/1**

Removing

1. Release press studs securing cover to boot floor.
2. Lift out panel covering spare wheel.
3. Remove screws and plate securing panel covering petrol tank; lift out panel.

Refitting

Reverse operations 1 to 3.

REAR BUMPER

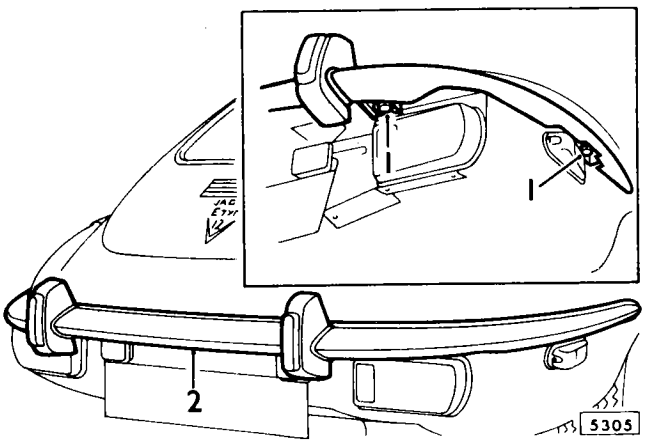
Remove and refit **76.22.15**

Removing

1. Support bumper and remove nuts, bolts and washers securing bumper to body.
2. Carefully withdraw bumper

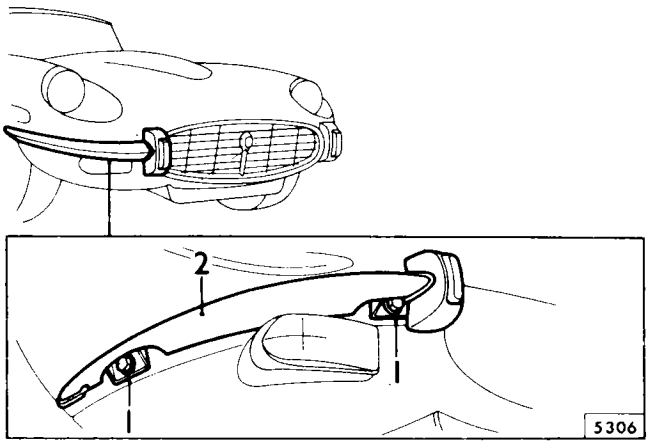
Refitting

3. Examine rubber beading and renew if perished or damaged. Secure beading with petroleum based adhesive.
4. Reverse operations 1 and 2.



FRONT BUMPER

Remove and refit **Left or right hand 76.22.16**



Removing

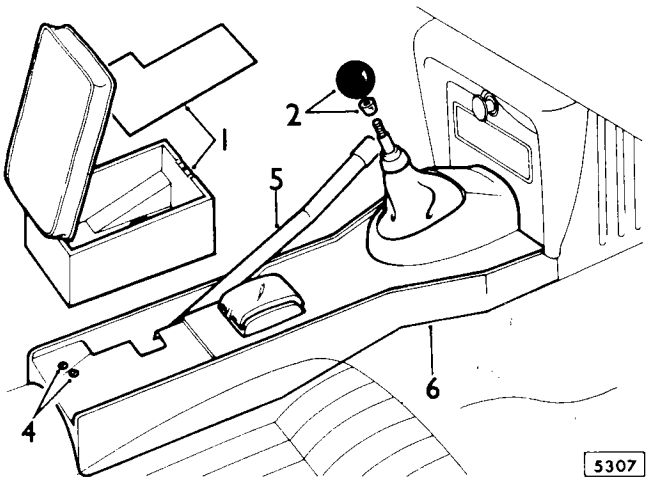
1. Support bumper and remove bolts and washers securing bumper to body.
2. Carefully withdraw bumper.

Refitting

3. Examine rubber beading and renew if perished or damaged. Secure beading with petroleum based adhesive.
4. Reverse operations 1 and 2.

CONSOLE

Remove and refit **76.25.01**



Removing

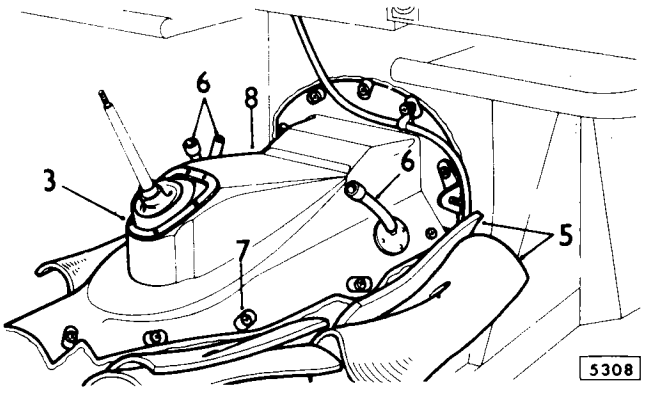
1. Remove armrest – 76.70.13.
2. **Cars fitted with Manual Transmission.** Remove gear lever knob and cone.
3. **Cars fitted with Automatic Transmission** Remove selector lever knob.
4. Remove screws securing console to transmission tunnel.
5. Apply handbrake.
6. Lift off console.

Refitting

Reverse operations 1 to 6.

TRANSMISSION TUNNEL COVER

Remove and refit **76.25.07**



Removing

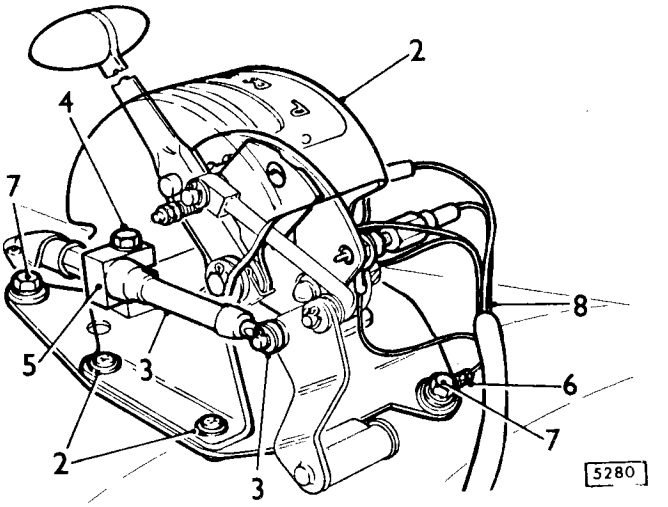
1. Remove radio panel – 86.50.04.
2. Remove console – 76.25.01.
3. **Cars fitted with Manual Transmission** Remove screws securing draught excluder retainer; lift off retainer and draught excluder.
4. **Cars fitted with Automatic Transmission** Remove selector quadrant – 76.25.08.
5. Carefully lift carpet and remove insulation material from front and sides of tunnel cover.
6. **Cars fitted with Air Conditioning** Detach rubber pipes from drain tubes.
7. Remove screws securing tunnel cover noting position of speedometer cable clip.
8. Lift off tunnel cover

Refitting

9. Remove all traces of sealing compound.
10. Apply a suitable waterproof sealing compound to aperture in transmission tunnel.
11. Reverse operations 1 to 8; secure insulation material with suitable petroleum based adhesive.

AUTOMATIC TRANSMISSION SELECTOR QUADRANT

Remove and refit 76.25.08



Removing

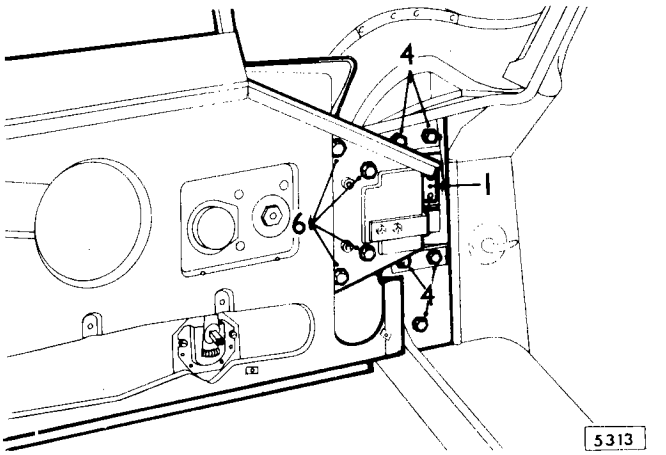
1. Remove console – 76.25.01.
2. Remove screws securing cover; lift off cover.
3. Remove split pin and washer securing selector cable to pivot arm; disengage cable from arm.
4. Remove bolt and lockwasher securing clamp block to base plate.
5. If tunnel cover is to be removed, slide clamp block off selector cable.
6. Note fitted position of each lead terminal tag.
7. Remove bolts and lockwashers securing quadrant assembly.
8. Note relative position of wires and disconnect.

Refitting

Reverse operations 1 to 8.

DOOR HINGE

Remove and refit **Left or right hand 76.28.42**



Removing

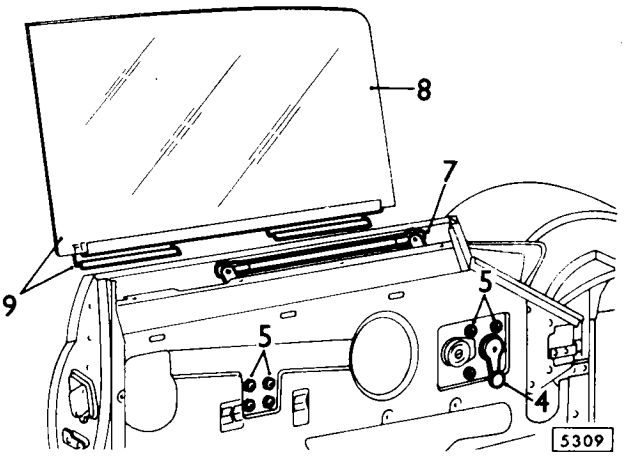
1. Remove courtesy light/buzzer alarm switch – 86.65.14.
2. Remove door casing – 76.34.01.
3. Mark relative position of hinge to door pillar to facilitate realignment.
4. Support door, remove bolts and washers securing hinge to door pillar; lift off door.
5. Mark relative position of hinge to door.
6. Remove bolts, screws and washers securing hinge to door.

Refitting

7. Reverse operations 1 to 6.
8. Check that door closes correctly. If necessary, slacken bolts securing hinge to door pillar and realign door.

DOOR GLASS

Remove and refit **Left or right hand 76.31.01**



Removing

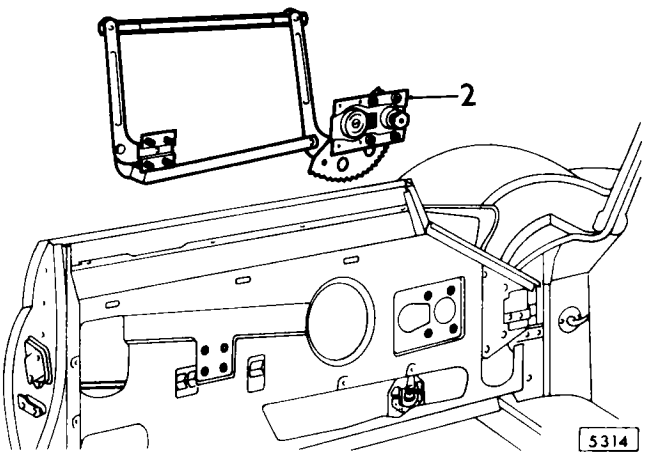
1. Remove door casing – 76.34.01.
2. Remove crash roll – 76.34.17.
3. Remove door glass frame 2 + 2 Cars only – 76.31.51.
4. Carefully wind up glass to fully closed position.
5. Remove screws and nuts securing regulator control and pivot support.
6. Push pivot support in until studs are through door panel.
7. Raise regulator until mechanism can be withdrawn from channel.
8. Withdraw glass and channel
9. Withdraw glass from channel.

Refitting

10. Reverse operations 1 to 9. Do not overtighten nuts and screws securing regulator.
11. Check window operation for smoothness.

DOOR GLASS REGULATOR

Remove and refit **Left or right hand 76.31.45**



Removing

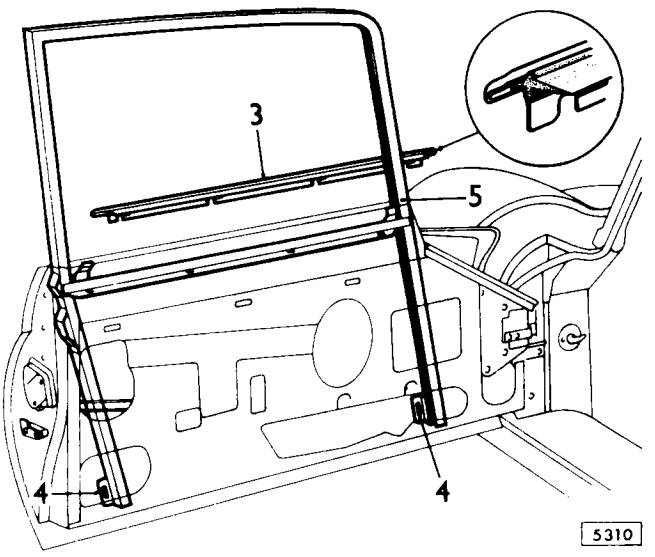
1. Remove door glass – 76.31.01.
2. Collapse frame, withdraw regulator through aperture in top of door panel.

Refitting

Reverse operations 1 and 2. Ensure polythene sheeting is between regulator and inner door panel.

DOOR GLASS FRAME

Remove and refit **76.31.51**



Removing

1. Remove door casing – 76.34.01.
2. Remove crash roll – 76.34.17.
3. Carefully tap chrome bead towards front of car; prise bead upwards and withdraw together with rubber sealing strip.
4. Remove nuts, bolts and washers securing glass frame to door.
5. Withdraw glass frame from door.

Refitting

Reverse operations 1 to 5.

DOOR TRIM CASING

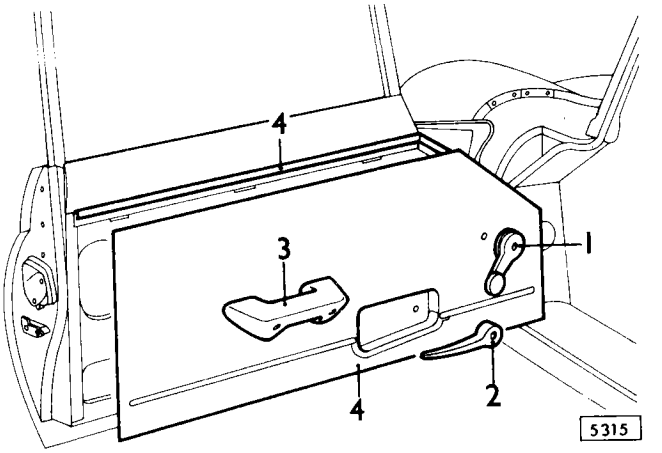
Remove and refit **Left or right hand 76.34.01**

Removing

1. Remove screw securing window regulator.
2. Remove screw securing lock remote control lever.
3. Remove armrest – 76.34.23.
4. Carefully prise bottom of casing away from door; lower casing and withdraw from chrome finisher.

Refitting

Reverse operations 1 to 4.



LUGGAGE COMPARTMENT DOOR TRIM CASING

Remove and refit **2 + 2 Cars 76.34.09**

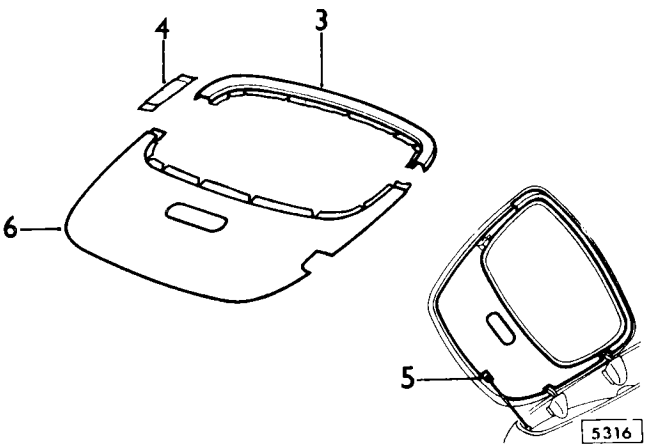
Removing

CAUTION: Trim casings are retained by clips and adhesive.

1. Remove door striker – 76.37.25.
2. Remove rear window and sealing rubber – 76.81.10 or on cars fitted with heated rear window – 76.81.11.
3. Carefully prise upper trim casing from door.
4. Carefully prise side trim casing from door.
5. Remove screws and washers securing door stay bracket to door.
6. Carefully prise lower trim casing from door.

Refitting

7. Clean off all traces of old adhesive.
8. Reverse operations 1 to 6; use suitable petroleum based adhesive.



DOOR CRASH ROLL

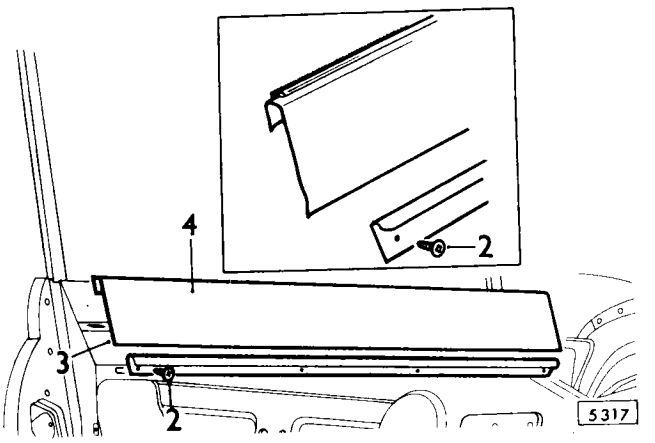
Remove and refit **Left or right hand 76.34.17**

Removing

1. Remove door casing 76.34.01.
2. Remove screws securing chrome finisher to door.
3. Carefully prise bottom edge of trim away from door.
4. Carefully tap crash roll upwards to remove.

Refitting

5. Clean off all traces of old adhesive.
6. Reverse operations 1 to 4; use suitable petroleum based adhesive.



DOOR ARMREST

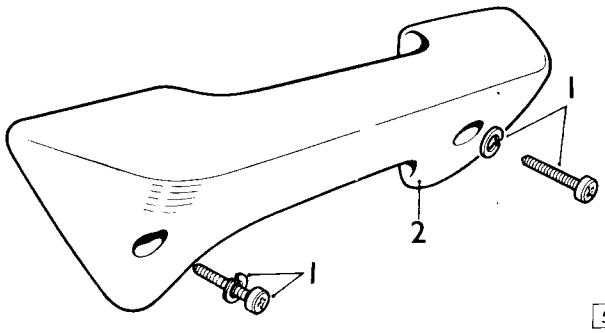
Remove and refit **Left or right hand 76.34.23**

Removing

1. Remove screws and lockwashers securing armrest to door.
2. Lift off armrest.

Refitting

Reverse operations 1 and 2



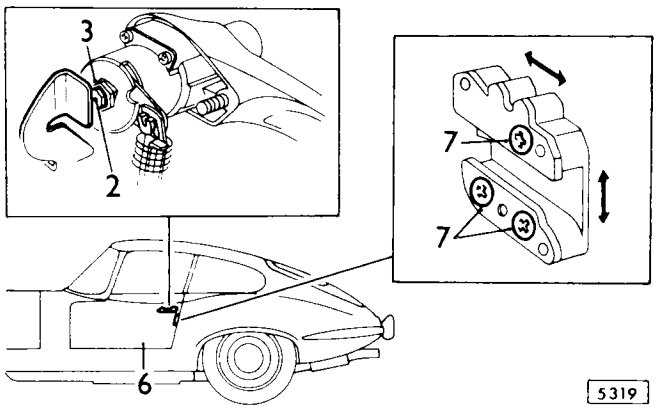
5318

DOOR LOCK

Check and adjust **Left or right hand 76.37.01**

CAUTION: Operations 1 to 5 apply to push button adjustment whilst numbers 6 to 9 apply to striker plate setting.

1. Remove door casing – 76.34.01.
2. Check that push button plunger just touches lock contactor.
3. To adjust, slacken locknut and screw bolt in or out until it just touches contactor.
4. Tighten locknut.
5. Reverse operation 1.
6. Check that door closes firmly and easily but that when closed, does not rattle.
7. To adjust, slacken three screws securing striker plate to B' post.
8. Close door firmly.
9. Carefully open door and tighten securing screws.



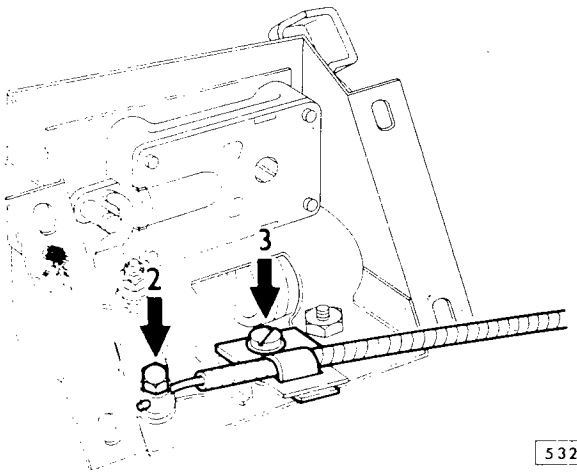
5319

LUGGAGE COMPARTMENT DOOR LOCK

Check and adjust **76.37.05**

NOTE: Elongated holes in lock mounting bracket allow for a limited amount of lock adjustment; this being effected by slackening retaining nuts and re-positioning lock. Further adjustment is obtained by carrying out operations 1 to 5.

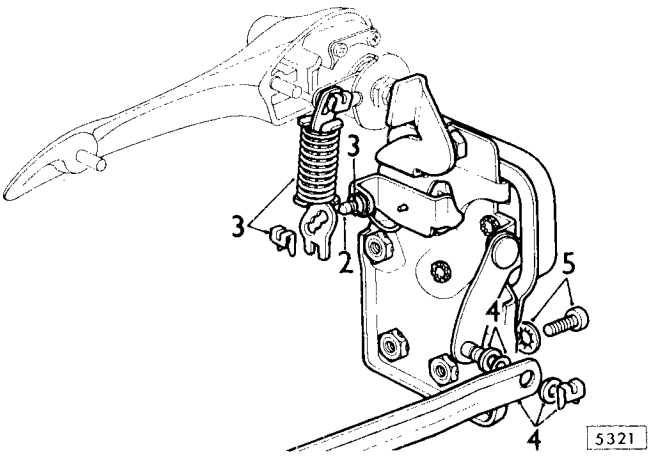
1. Carry out operations 1 and 2 see 76.37.16.
2. Slacken clamp bolt securing inner cable.
3. Slacken bolt securing outer cable clamp.
4. Adjust inner cable until lock mechanism can be operated through full range of travel.
5. Reverse operations 1 to 3; check operation of lock.



5320

DOOR LOCK

Remove and refit **Left or right hand 76.37.12**



Removing

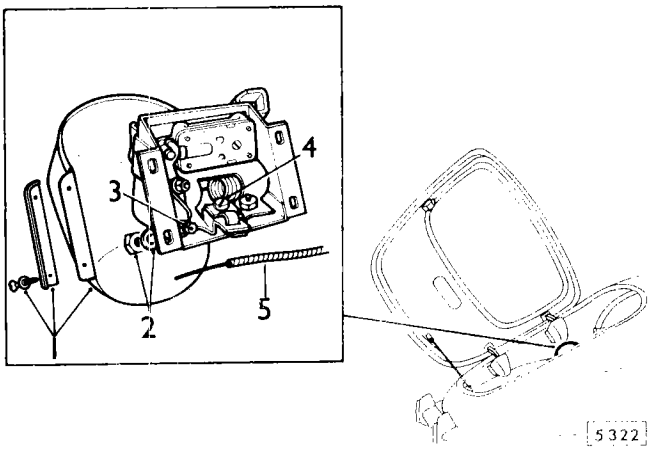
1. Remove door casing – 76.34.01.
2. Note position of peg in control link coupling door handle to lock.
3. Remove spring clip, control link and double spring washer.
4. Remove spring clip securing remote control link; withdraw plain washer, control link, wave washer and plain washer.
5. Remove screws and lockwashers securing door lock to door panel; withdraw lock.

Refitting

Reverse operations 1 to 5.

LUGGAGE COMPARTMENT DOOR LOCK

Remove and refit **76.37.16**



Removing

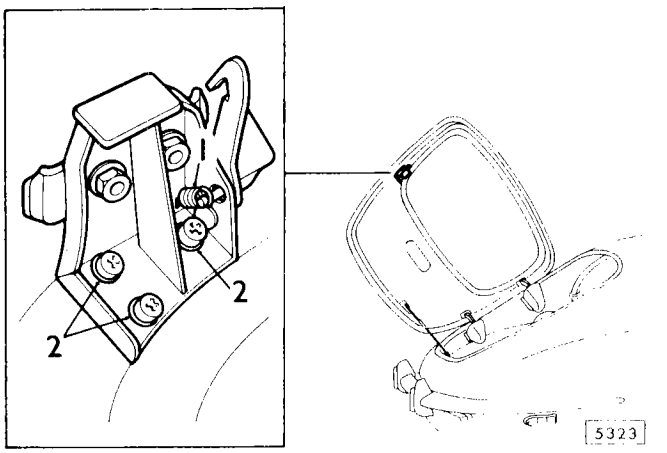
1. Remove screws securing lock cover to trim casing; withdraw cover.
2. Remove nuts and washers securing lock to mounting studs.
3. Slacken pinch bolt securing inner cable.
4. Slacken bolt securing outer cable clamp.
5. Withdraw inner and outer cable.

Refitting

6. Reverse operations 3 to 5.
7. Check lock adjustment – 76.37.05.

LUGGAGE COMPARTMENT DOOR CATCH AND STRIKER PLATE

Remove and refit **76.37.25**



Removing

1. Release catch return spring.
2. Remove screws and lockwashers securing striker plate to door.

Refitting

3. Reverse operations 1 and 2.
4. Check that door shuts correctly. If necessary, slacken securing screws and realign striker plate.

DOOR LOCK REMOTE CONTROL

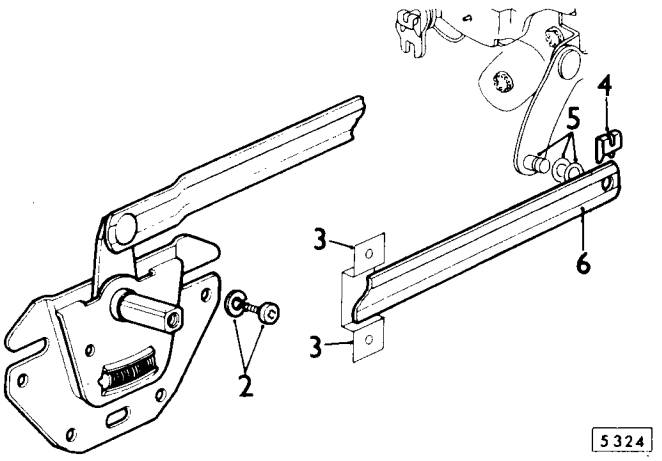
Remove and refit **76.37.31**

Removing

1. Remove door casing – 76.34.01.
2. Remove screws and lockwashers securing control to mounting bracket.
3. Drill out two pop rivets securing remote control link bracket to door.
4. Remove clip securing control link to door lock.
5. Withdraw control link followed by shim washer and wave washer.
6. Withdraw remote control.

Refitting

Reverse operations 1 to 6; ensure polythene sheet is behind remote control assembly.



5324

DOOR SEALING RUBBER

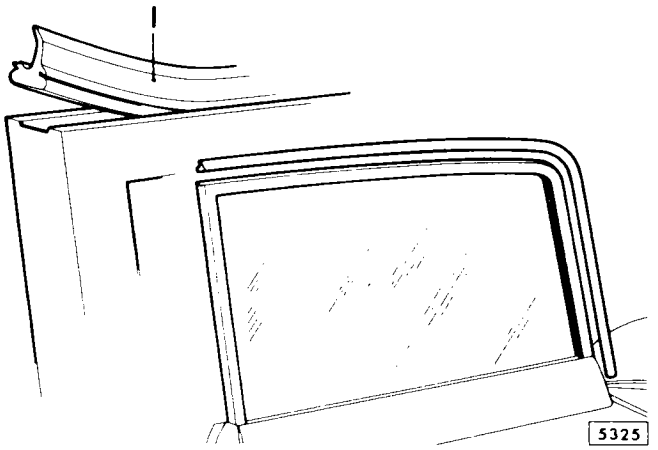
Remove and refit **Left or right hand 76.40.01**

Removing

1. Carefully prise sealing rubber out of channel.

Refitting

2. Ensure that door channel is clean.
3. Reverse operation 1.


5325

DRIP MOULDING

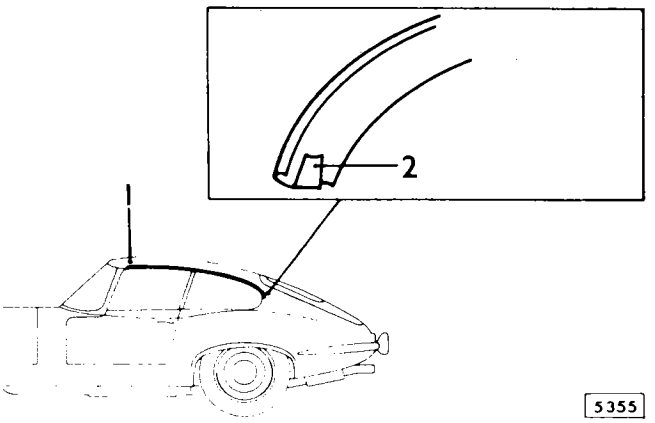
Remove and refit **Left or right hand 76.43.11**

Removing

1. Carefully prise moulding off drip rail; commencing at the front.
2. Push rear of moulding down to disengage locking tab from drip rail.
3. Remove all traces of sealing compound.

Refitting

4. Coat inside of moulding with suitable sealing compound.
5. Locate tab under rear edge of drip rail; bend tab over to retain end of moulding.
6. Carefully press moulding on to drip rail.



5355

BONNET FINISHER

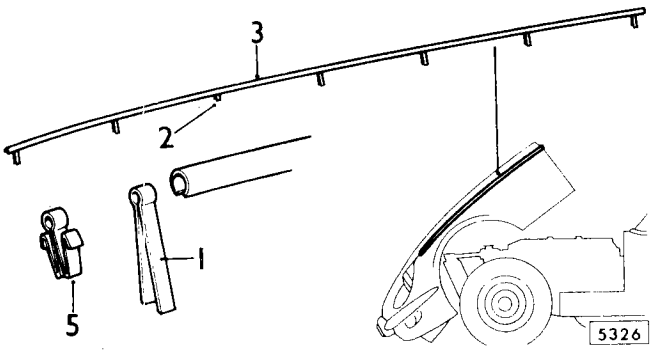
Remove and refit **Left or right hand 76.43.27**

Removing

1. Straighten prongs of finisher retaining clips.
2. Cut off prongs of retaining clips as close to bonnet as possible.
3. Carefully lift off bonnet finisher.

Refitting

4. Position new retaining clips in finisher; fit finisher to bonnet.
5. Bend retaining clips as shown.



WINDSCREEN PILLAR FINISHER

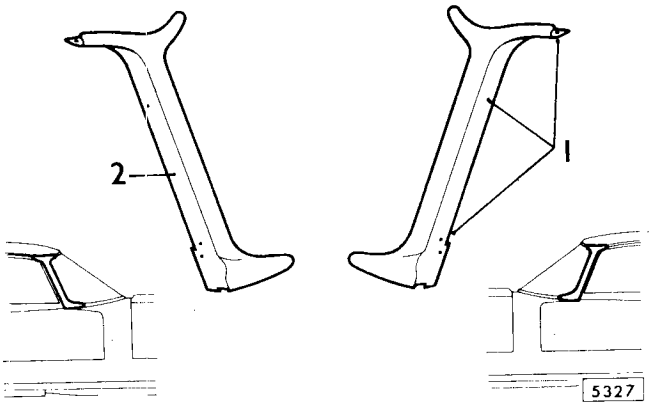
Remove and refit **Left or right hand 76.43.39**

Removing

1. Remove screws securing finisher to 'A' post.
2. Move top of finisher away from 'A' post and carefully lift to withdraw from windscreen rubber.

Refitting

Reverse operations 1 and 2.



FACIA CRASH ROLL

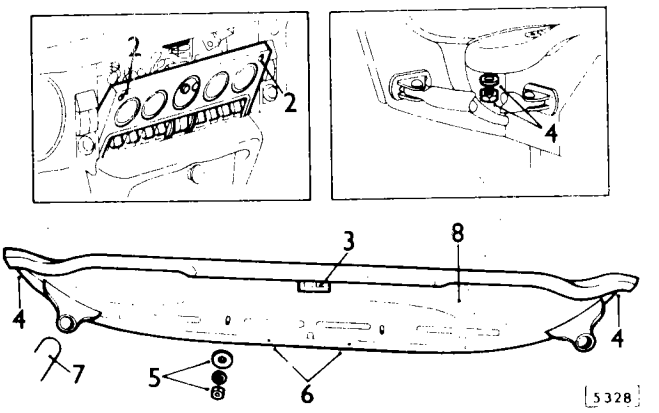
Remove and refit **76.46.04**

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled head screws and lower centre instrument panel.
3. Note position of wires and disconnect from map light.
4. Remove nuts and washers securing each end of crash roll.
5. Remove nuts and washers securing crash roll to brackets.
6. Remove self-tapping screws securing front edge of crash roll to front facia.
7. Carefully raise crash roll and disconnect demister tubes from ducts.
8. Lift out crash roll.

Refitting

Reverse operations 1 to 8; ensure crash roll is positioned correctly before tightening fixings.

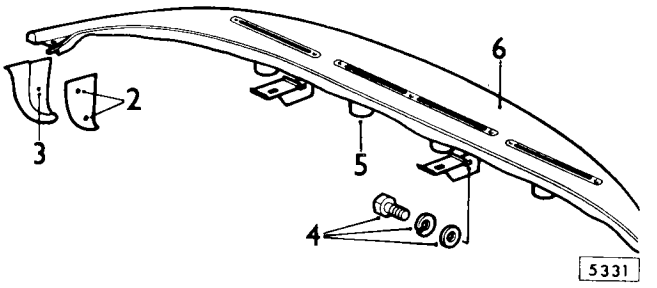


FRONT FACIA

Remove and refit **76.46.07**

Removing

1. Remove crash roll – 76.46.04.
2. Remove screws securing chrome strip capping.
3. Remove screw securing chrome strip to body.
4. Remove bolts and washers securing mounting brackets to body.
5. Carefully lift front facia and disconnect demister tubes from vents.
6. Withdraw front facia.



Refitting

Reverse operations 1 to 6.

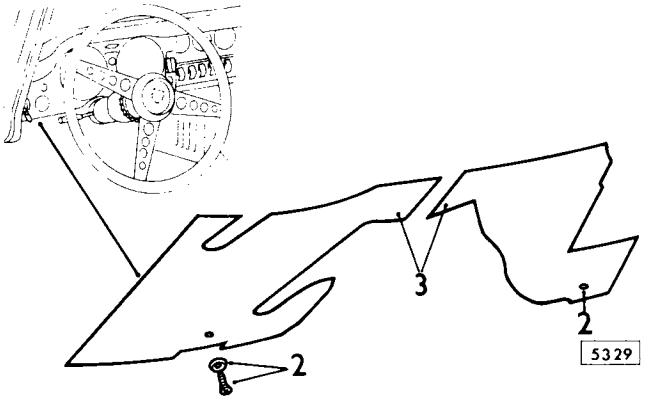
DASH LINER

Remove and refit **76.46.11**

Removing

1. Remove parcel tray – Driver's side 76.67.04.
   – Passenger's side 76.67.05
2. Remove screws and cup washers securing dash liner.
3. Lower dash liner and withdraw.

NOTE: On driver's side, dash liner is in two pieces.

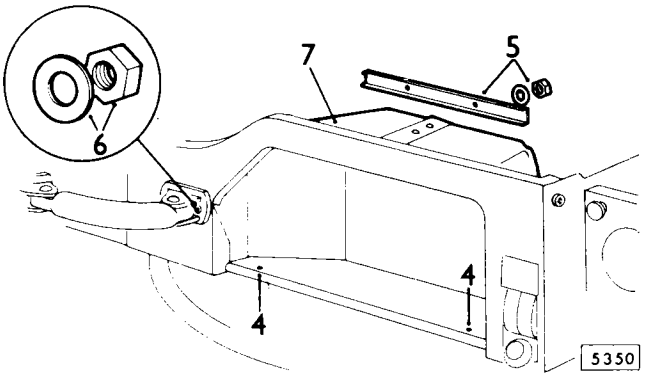


GLOVE BOX

Remove and refit **76.52.01**

Removing

1. Remove crash roll – 76.46.04.
2. Remove front facia – 76.46.07.
3. Remove glove box lid – 76.52.02.
4. Remove bifurcated rivets securing lower edge of glove box.
5. Remove nuts, washers and retaining strip securing top of glove box.
6. Remove nut and plain washer securing edge of glove box.
7. Lift out glove box.

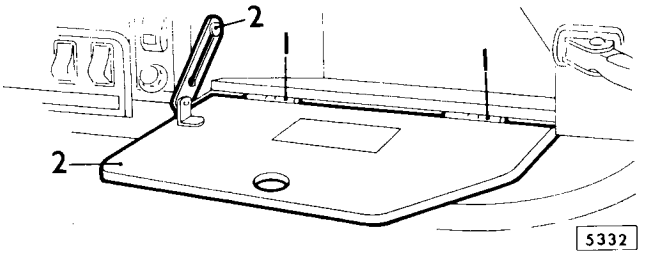


Refitting

Reverse operations 1 to 7.

GLOVE BOX LID

Remove and refit 76.52.02



Removing

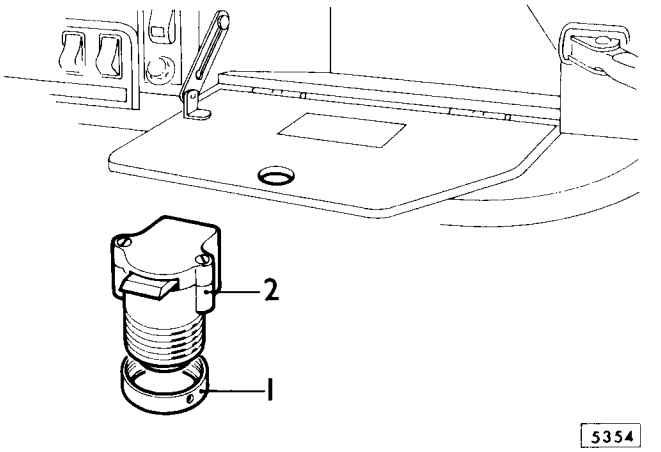
1. Remove screws securing lid hinges.
2. Disengage stay; withdraw lid.

Refitting

Reverse operations 1 and 2.

GLOVE BOX LID LOCK

Remove and refit 76.52 08



Removing

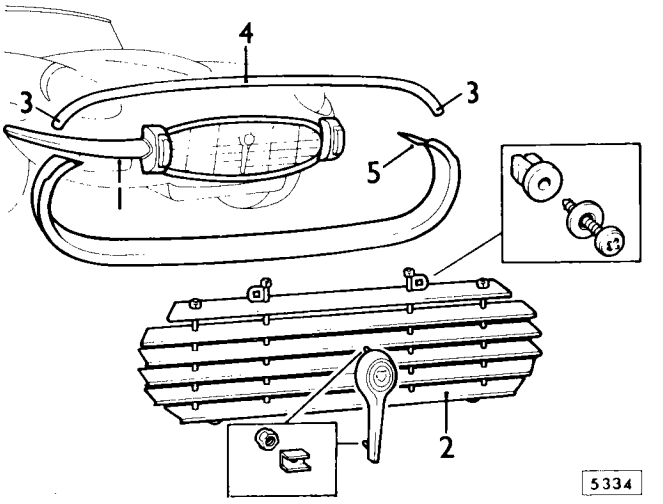
1. Unscrew ring securing lock assembly to lid.
2. Withdraw lock assembly.

Refitting

Reverse operations 1 and 2.

RADIATOR GRILLE SURROUND

Remove and refit 76.55.02



Removing

1. Remove front bumpers – 76.22.16.
2. Remove radiator grille – 76.55.03.
3. Remove screws securing top half of surround to bonnet.
4. Carefully prise top half of surround off retaining clips.
5. Remove screws securing bottom half of surround to bonnet; withdraw surround.

Refitting

Reverse operations 1 to 5; take care not to distort top half of surround.

RADIATOR GRILLE

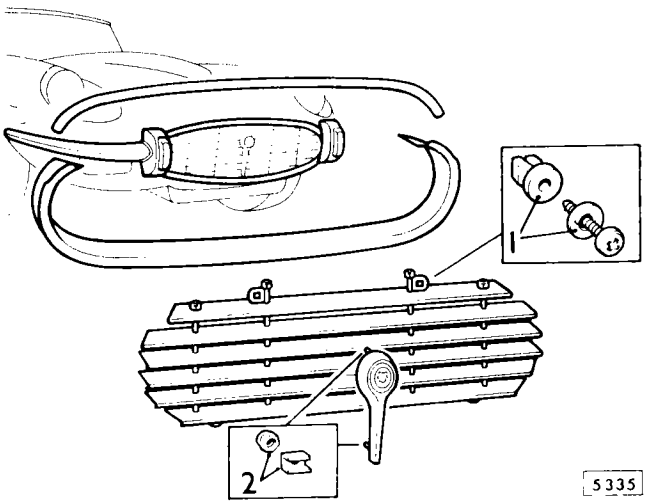
Remove and refit 76.55.03

Removing

1. Remove screws, plain washers and nylon nuts securing grille to mounting brackets.
   If motif is to be removed, carry out operation 2.
2. Remove self-locking nuts, spacer and washers securing motif to grille; withdraw motif.

Refitting

Reverse operations 1 and 2.



AIR VENT GRILLE

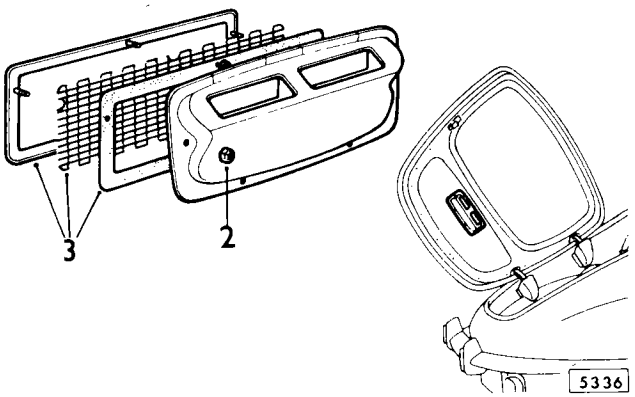
Remove and refit 76.55.17

Removing

1. Carry out items 1, 2, 5 and 6 see Operation 76.34.09.
2. Remove nuts securing outlet duct; lift off duct.
3. Withdraw chrome surround, grille and gasket from outside of door.

Refitting

Reverse operations 1 to 3; always use a new gasket.



DOOR HANDLE

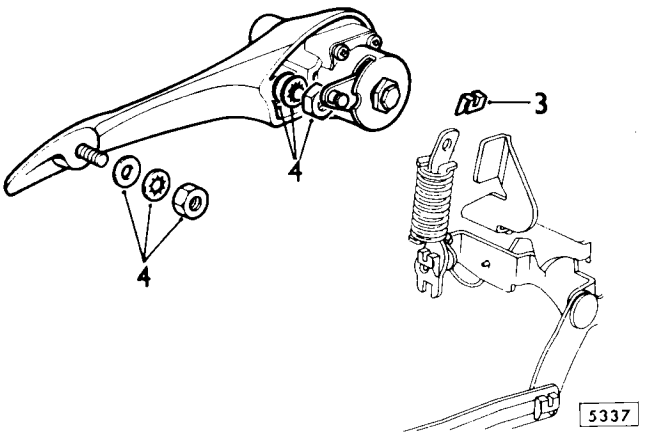
Remove and refit **Left or right hand 76.58.01**

Removing

1. Fully close window.
2. Remove crash roll – 76.34.17.
3. Remove spring clip securing connecting link to peg.
4. Remove nuts, plain and shakeproof washers securing handle to door; withdraw handle.

Refitting

5. Reverse operations 1 to 4.
6. Carry out items 2 to 5 see Operation 76.37.01.



GRAB HANDLE

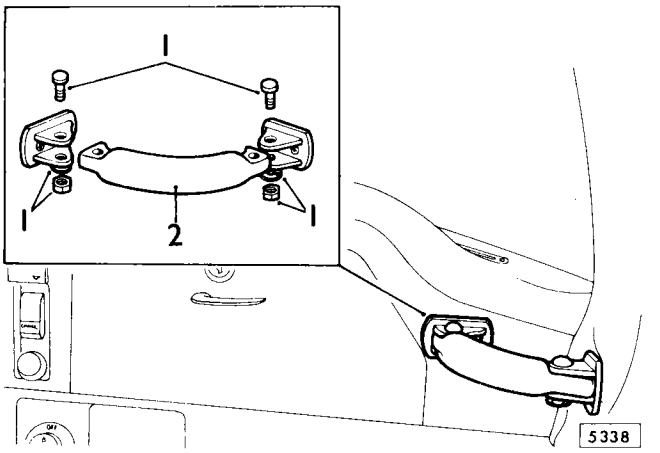
Remove and refit **76.58.30**

Removing

1. Remove dome head nuts, lockwashers and bolts securing grab handle to mounting brackets.
2. Withdraw grab handle.

Refitting

Reverse operations 1 and 2.



HARD TOP

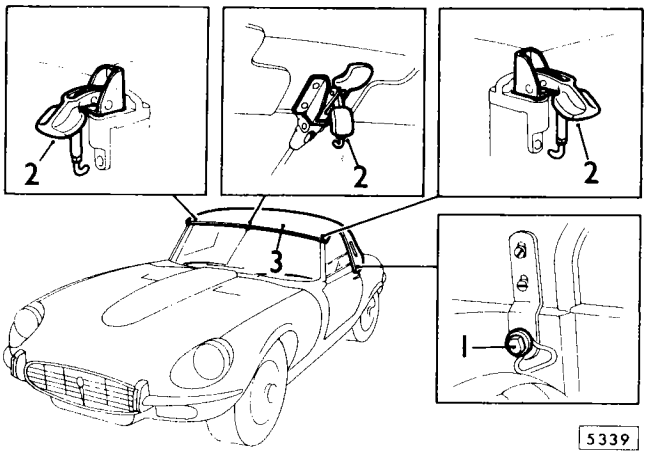
Remove and refit **76.61.01**

Removing

1. Remove bolts securing locating brackets to body trim.
2. Release toggles securing front edge of hard-top to windscreen rail.
3. Lift off hardtop.
4. Secure sides of tonneau cover to Velcro strips.
5. Refit securing bolts.

Refitting

Reverse operations 1 to 5.



HEADLINING

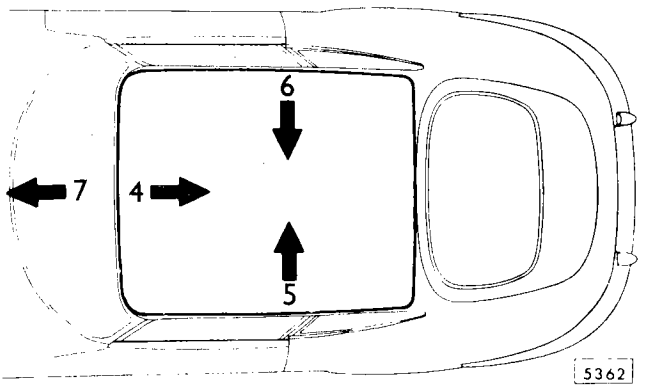
Remove and refit **76.64.01**

WARNING: THIS OPERATION SHOULD NOT BE ATTEMPTED BY PERSONS KNOWN TO BE ALLERGIC TO GLASS FIBRE (FIBREGLASS). SHOULD SKIN AREAS DEVELOP A RASH OR IF ITCHING OCCURS, WASH AFFECTED AREA WITH WATER AND SEEK MEDICAL ADVICE IMMEDIATELY. ALWAYS WEAR GLOVES, FACE MASK AND GOGGLES WHEN HANDLING HEADLINING.

NOTE: A strip of "Velcro" approximately 30,4 cm. (12 in.) long and 5 cm. (2 in.) wide should be used for removing and refitting headlining.

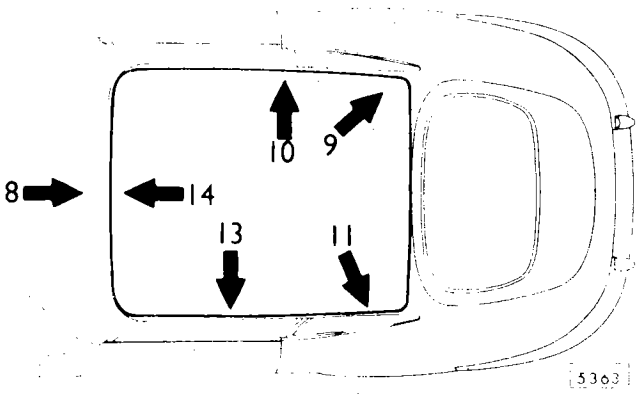
Removing

1. Remove windscreen – 76.81.01.
2. Tilt seats fully back.
3. Attach "Velcro" strip to headlining.
4. Move headlining to the rear and carefully lever down front of headlining.
5. Move headlining to the right and carefully lever down left hand side of headlining.
6. Move headlining to the left and carefully lever down right hand side of headlining.
7. Withdraw headlining through windscreen aperture.



Refitting

8. Enter headlining into car through windscreen aperture.
9. Locate rear right hand corner of headlining in recess.
10. Position right hand side of headlining in recess.
11. Locate rear left hand side of headlining in recess.
12. Attach "Velcro" strip to headlining.
13. Press headlining up into roof at the same time slide it sideways until left hand side is located in recess.
14. Pull headlining forward until located above screen rail.
15. Refit windscreen.
16. Remove any stains from headlining with a cloth moistened with white spirit.
17. Thoroughly vacuum clean interior of car.



PARCEL SHELF

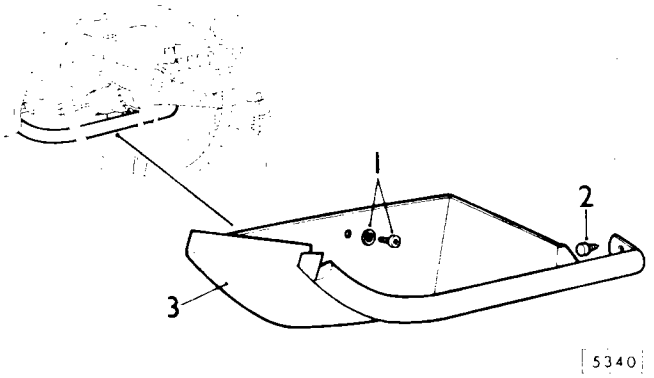
Remove and refit — **Driver's side 76.67.04**
Passenger's side 76.67.05

Removing

1. Remove setscrews, lockwashers and nut securing parcel shelf.
2. Remove knurled headed screw securing parcel shelf to radio mounting panel.
3. Withdraw parcel shelf.

Refitting

Reverse operations 1 to 3.



FRONT SEAT

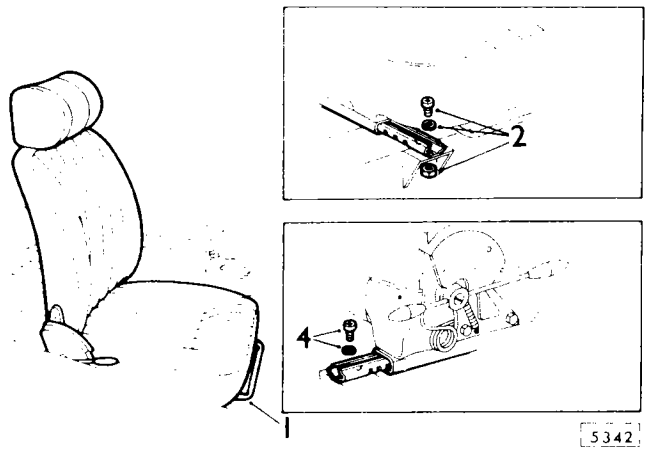
Remove and refit — **Left or right hand 76.70.01**

Removing

1. Raise adjuster bar and slide seat fully back.
2. Remove nuts, bolts and washers securing seat slides to front mounting.
3. Slide seat forwards.
4. Remove screws and lockwashers securing rear of seat slide to floor pan.
5. Lift out seat.

Refitting

6. Reverse operations 1 to 5.
7. Check fore and aft seat movement for ease of operation if necessary; apply light smear of grease to slides.



SEAT ARMREST AND CUBBY BOX

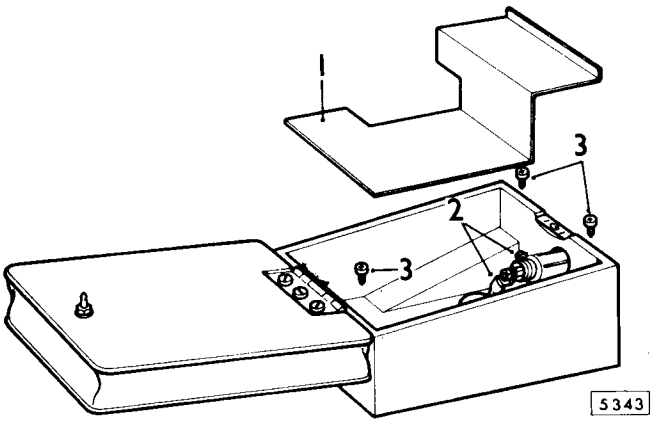
Remove and refit 76.70.13

Removing

1. Lift out bottom of cubby box.
2. **Cars fitted with air conditioning.** Note position of leads and detach from cigar lighter.
3. Remove screws and washers securing cubby box to transmission tunnel; lift off cubby box.

Refitting

Reverse operations 1 to 3.



FRONT SEAT SLIDES

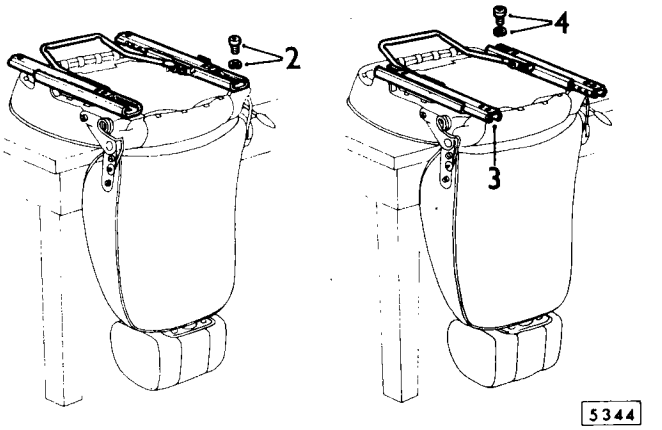
Remove and refit **Left or right hand seats 76.70.21**

Removing

1. Remove seat – 76.70.01.
2. Remove screws and washers securing rear of seat runners to seat.
3. Slide runners back until access to remaining securing screws is obtained.
4. Remove screws and washers securing front of seat runners to seat; lift off runners.

Refitting.

Reverse operations 1 to 4.



REAR SEAT UPPER SQUAB

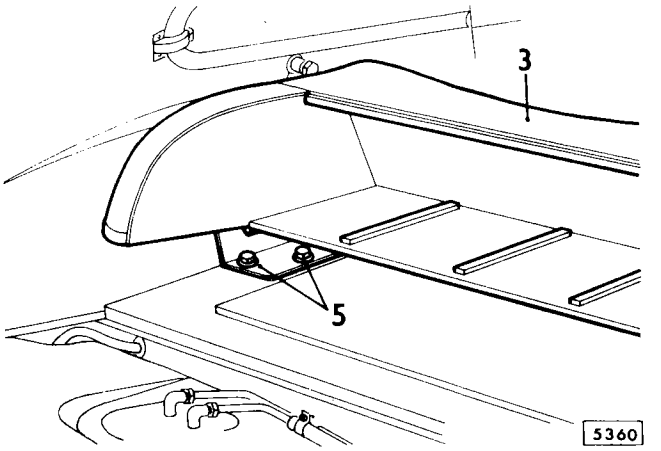
Remove and refit 76.70.38

Removing

1. Tilt front seats forward.
2. Remove luggage compartment floor – 76.19.24.
3. Pull upper squab forward.
4. Remove screws securing front portion of floor to body; lift out floor.
5. Remove bolts, lockwashers and plain washers securing seat mounting brackets to body; lift out upper squab.

Refitting

Reverse operations 1 to 5.



REAR SEAT LOWER SQUAB

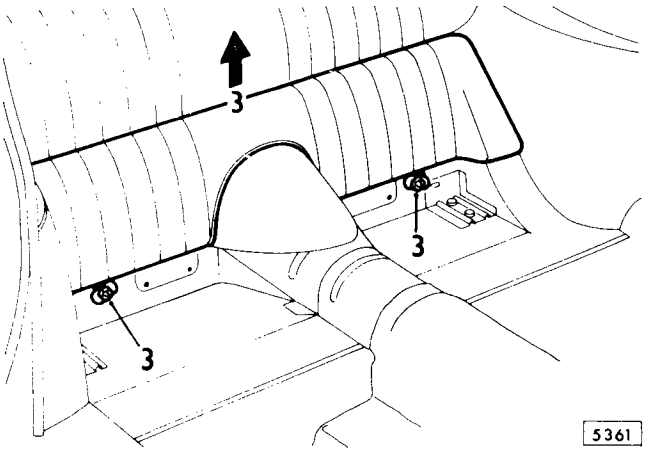
Remove and refit **76.70.40**

Removing

1. Tilt front seats forward.
2. Lift out seat cushion.
3. Remove nuts, lockwashers and plate securing lower squab to body; lift and withdraw lower squab.

Refitting

Reverse operations 1 to 3.



ENGINE VALANCE

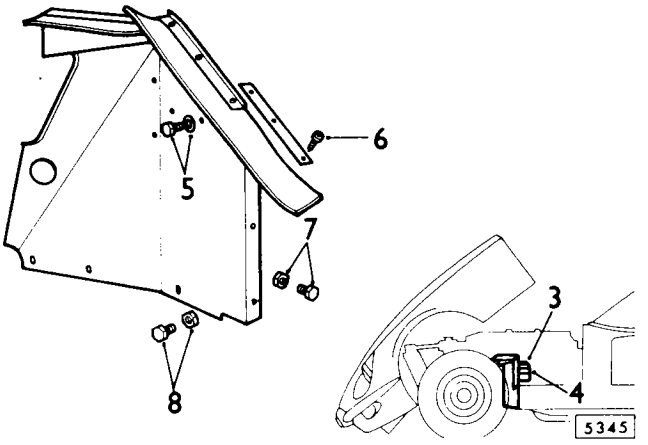
Remove and refit **Left hand 76.79.07**

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove windscreen washer reservoir bracket – 84.10.02.
3. Slacken clamp bolt until brake fluid reservoir can be withdrawn from mounting bracket; ensure reservoir is kept in an upright position.
4. Remove bolts and washers securing mounting bracket to valance; withdraw bracket.
5. **Cars fitted with air conditioning.**
   Remove nuts, bolts and washers securing relay to valance.
6. Remove screws and fixing strip securing rubber seal.
7. Remove nuts, bolts and washers securing valance to sill.
8. Remove bolts, nuts and washers securing valance to undershield; withdraw valance.

Refitting

Reverse operations 1 to 8.



ENGINE VALANCE

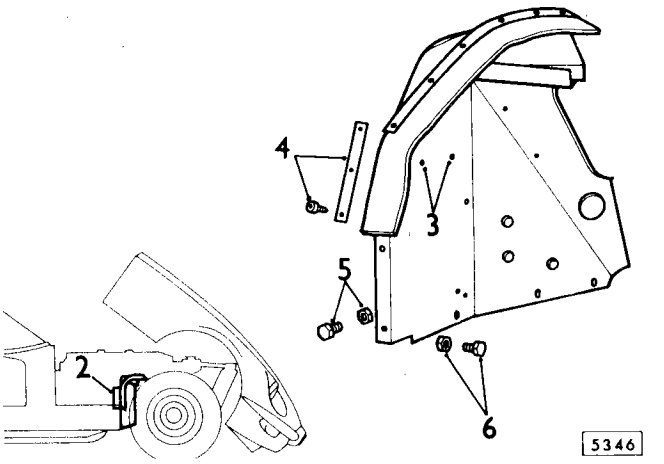
Remove and refit **76.79.08**

Removing

1. Remove battery – 86.15.01.
2. **Cars fitted with air conditioning only**
   Remove bolts and washers securing receiver/drier unit to valance. Support receiver/drier unit in frame.

   WARNING: ON NO ACCOUNT MUST ANY PORTION OF THE AIR CONDITIONING SYSTEM BE DISCONNECTED BY ANYONE OTHER THAN A QUALIFIED REFRIGERATION ENGINEER. BLINDNESS CAN RESULT IF THE GAS CONTAINED WITHIN THE SYSTEM COMES INTO CONTACT WITH THE EYES.

3. Remove nuts, bolts and washers securing relay to valance.
4. Remove screws and fixing strip securing rubber seal.
5. Remove nuts, bolts and washers securing valance to sill.
6. Remove bolts, nuts and washers securing valance to undershield.



Refitting

Reverse operations 1 to 6.

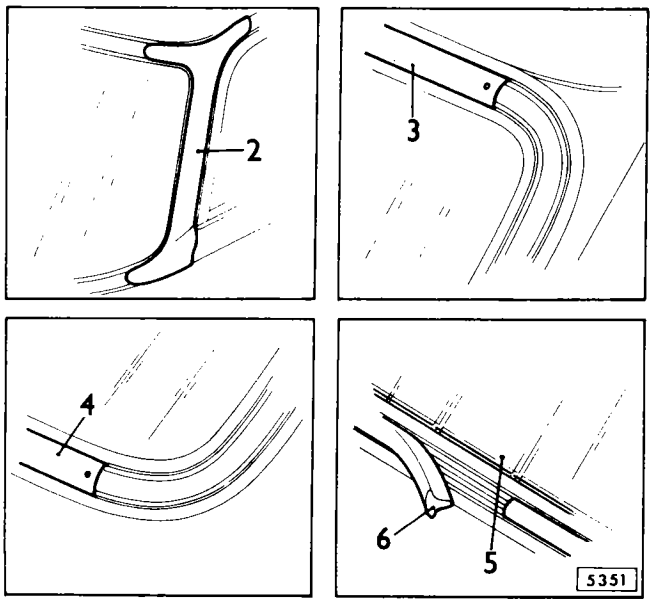
WINDSCREEN

Remove and refit 2 + 2 Cars 76.81.01

Service Tool JD.23

Removing

1. Remove front facia – 76.46.07.
2. Remove pillar finishers – 76.43.39.
3. Carefully prise top finisher from sealing rubber.
4. Carefully prise bottom finisher from sealing rubber.
5. If windscreen is not broken, press out by exerting pressure against centre of windscreen from inside of car.
6. Withdraw sealing rubber and discard.
7. Clean all traces of sealing compound from windscreen aperture.

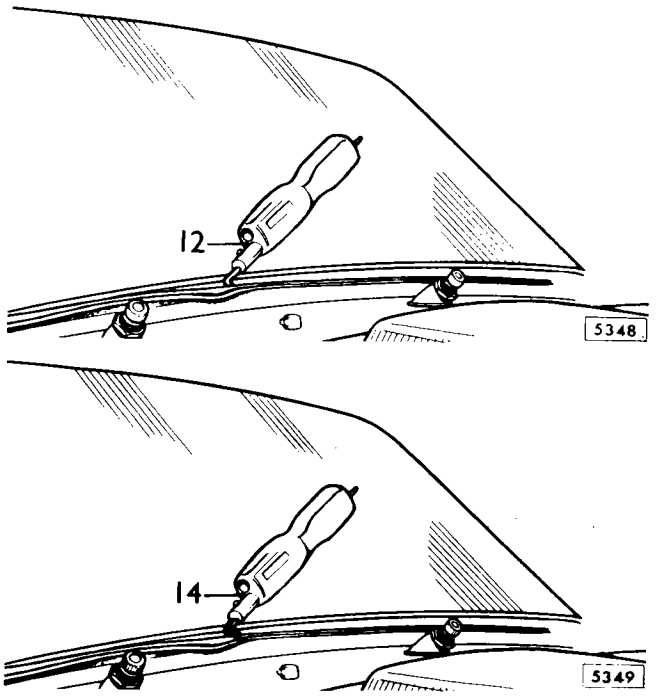


Refitting

8. Apply suitable sealing compound to outside of windscreen aperture.
9. Fit new sealing rubber, working from centre of aperture outwards.
10. Apply soft soap solution to windscreen edge of sealing rubber.
11. Insert lower right hand edge of windscreen in sealing rubber.
12. Using service tool JD.23 fitted with right angled adaptor, prise outside edge of sealing rubber away from windscreen whilst at the same time pushing windscreen into position.
13. Inject suitable sealing compound between outside face of windscreen and sealing rubber.
14. Using service tool JD.23 fitted with square ended adaptor, fit sealing strip commencing at bottom of screen.

    NOTE: Rounded edge of sealing strip **MUST** face outwards.

15. Reverse operations 1 to 4.



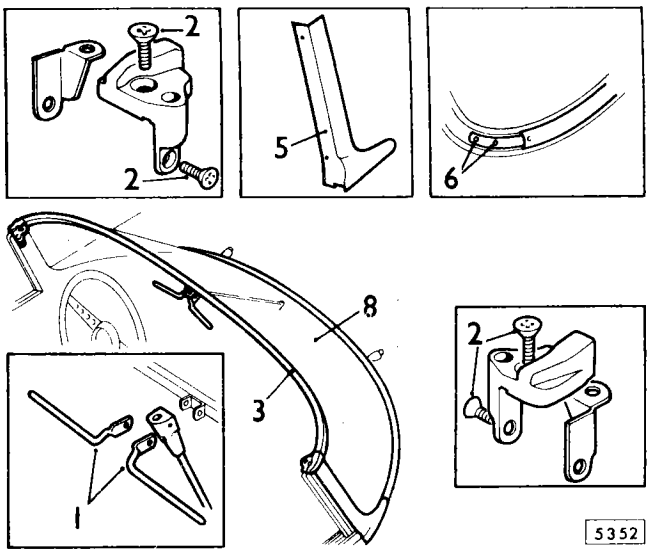
WINDSCREEN

Remove and refit — Open 2 seater 76.81.01/1

Service Tool — JD.23

Removing

1. Remove sun visors – 76.10.47/1.
2. Remove screws securing chrome cappings to 'A' post; lift off cappings.
3. Lift off windscreen top rail, remove and discard sealing strip.
4. Remove front facia – 76.46.07.
5. Remove pillar finishers – 76.43.39.
6. Remove screws securing bottom finisher to body; carefully prise finisher from sealing rubber.
7. If windscreen is not broken, exert pressure against top centre portion of screen until is is clear of sealing rubber.
8. Lift windscreen clear.
9. Remove and discard sealing rubber.
10. Clean all traces of sealing strip from windscreen aperture.



Refitting

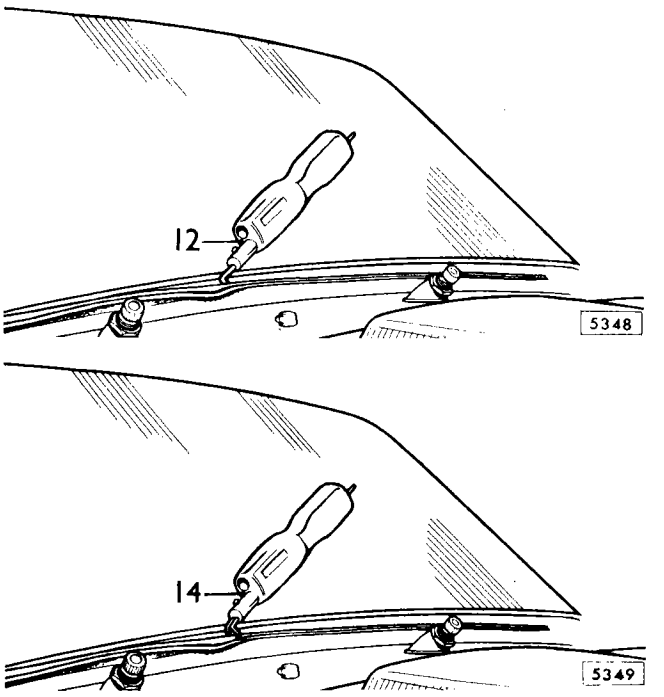
11. Apply 12,7mm. (.5 in.) wide sealing strip to aperture.

    NOTE: Strip must finish at base of each 'A' post.

12. Fit new sealing rubber, working from centre of aperture outwards.
13. Trim off excess sealing rubber flush with top of 'A' posts.
14. Apply soft soap solution to windscreen edge of sealing rubber.
15. Insert lower right hand edge of windscreen in sealing rubber.
16. Using Service tool JD.23 fitted with right angled adaptor, prise outside edge of sealing rubber away from windscreen whilst at the same time pushing windscreen into position.
17. Inject suitable sealing compound between outside face of windscreen and sealing rubber.
18. Using service tool JD.23 fitted with square ended adaptor, fit sealing strip commencing at top of 'A' post.

    NOTE: Rounded edge of sealing strip **MUST** face outwards.

19. Reverse operations 1 to 6; use new sealing strip under windscreen top rail.



BACKLIGHT

Remove and refit 76.81.10

Service tool Handle JD.23

Removing

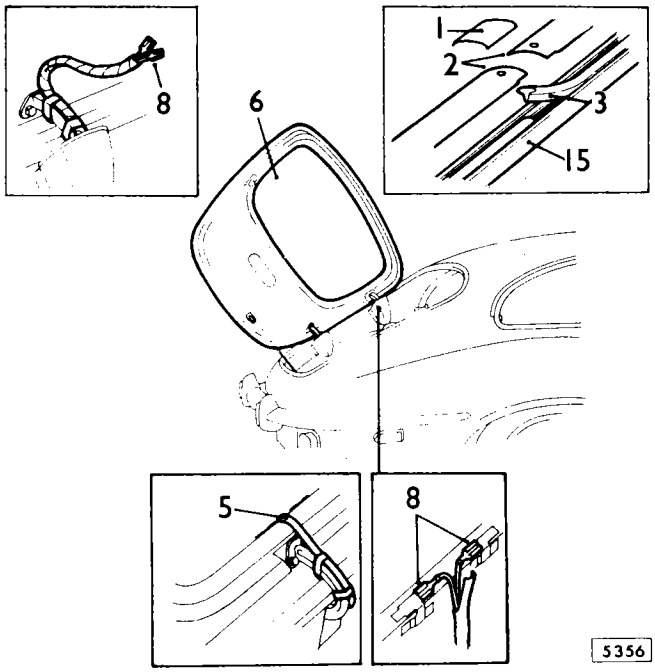
1. Carefully slide chrome finisher joint pieces to clear gaps between finisher strip.
2. Carefully prise chrome finisher from backlight seal.
3. At centre top of backlight seal hook end of insert from seal and draw from groove.

Cars fitted with heated backlight

4. Disconnect battery – 86.15.19.

   NOTE: Two types of heated backlight are fitted. These differ in the method of electrical connection and are identified by whether the supply cables are strapped to the upper or lower door hinge.

5. Open luggage compartment door and check whether cable strapped to upper or lower hinge. If cable strapped to upper hinge, release strap, and proceed with operations 6 to 8. If cable strapped to lower hinge proceed with operations 9 to 11.
6. Prise right hand side of glass from seal and free at top and bottom.
7. Carefully draw glass to right, out of left hand edge seal.
8. Detach two Lucar connectors from glass. Lift glass from aperture and continue with operation 15.
9. Remove two screws securing stay to door.
10. Prise up lower edge of door trim casing.
11. Reach up underneath casing and release two snap connectors.



5356

All cars

12. Prise right hand side of glass from seal and free at top and left hand side.
13. Pull out top of glass, and lift bottom edge from seal.

Cars fitted with heated backlight

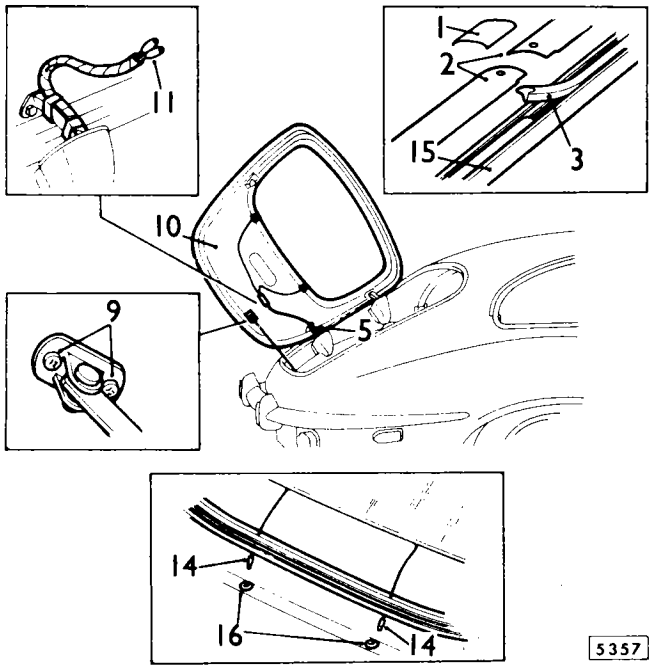
14. Draw cables from holes in lower flange.

All cars

15. Pull seal from flange around aperture.
16. If cable grommets fitted in lower flange, check condition and renew if necessary.
17. Taking care not to damage trim, clean old sealing compound from door flange.

Refitting

18. Using sealing compound gun, sparingly apply sealant in a continuous strip to door flange.
19. Commencing at one bottom corner fit new seal to door and press home around flange. Settle well.
20. Apply soap solution to glass groove in seal.



5357

Cars fitted with heated backlight. Cables at bottom hinge.

21. Using sharp pointed spike, pierce sealing rubber through glass groove in line with grommet holes in bottom flange.

    NOTE: Ensure hole pierced to inside of door flange.

22. Rest lower edge of glass along seal and pass cables through holes. Press lower edge of glass well home in seal.
23. Use handle JD.23 fitted with right angled adaptor to prise seal into position all around glass. Ensure glass beds well.
24. Pass cables through grommet holes in door.
25. Reach up under trim casing and make cable snap connections.
26. Refit door trim casing and re-secure door stay. Continue with operations 35 to 41.

Cables at top hinge

27. Rest glass on aperture with left hand edge just clear of seal.
28. Fit Lucar sockets to two inward facing connectors on glass.
29. Pull sleeve to protect cables from edge of glass.
30. Press glass to left to engage in seal groove.
31. Use handle JD.23 fitted with right angled adaptor to prise seal into position all around glass. Ensure glass beds well.
32. Refit strapping at top hinge and continue with operations 35 to 41.

All cars

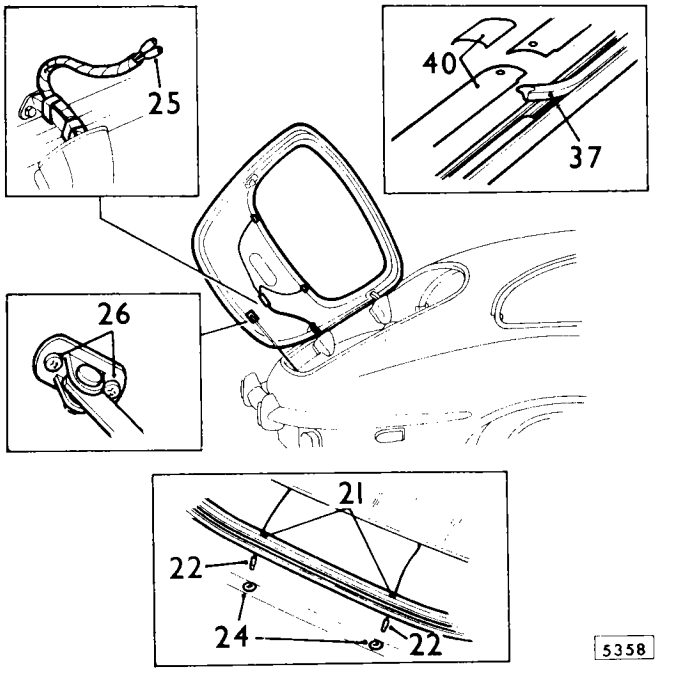
33. Rest lower edge of glass along seal. Press well home.
34. Use handle JD.23 fitted with right angle adaptor to prise seal into position all around glass. Ensure glass beds well.
35. Use sealing compound gun to apply sealant between outside of seal and glass.
36. Thread seal insert through handle JD.23, fitted with square ended adaptor. Pass seal insert through adaptor.
37. Commencing at top centre of seal, run insert into groove.

    NOTE: Rounded edge of sealing strip **MUST** face outwards.

38. Cut seal insert to leave gap of ,635 mm. (.25 in.) between ends. Press in ends of insert.
39. Clean excess sealing compound from glass.
40. Fit chrome finishers and slide joint pieces across gaps.

Cars fitted with heated backlight.

41. Reconnect battery.



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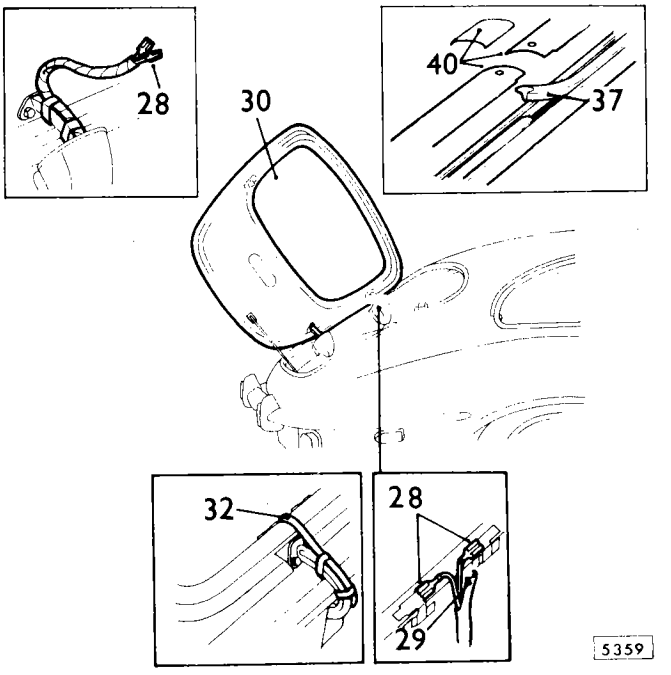


5359

QUARTER VENT

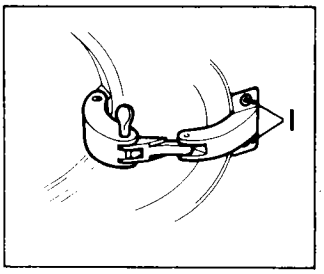
Remove and refit **Left or right hand 76.81.19**

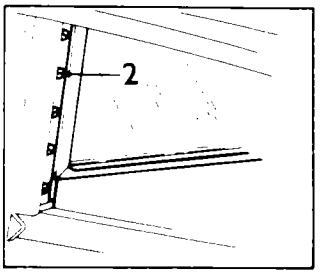
Removing

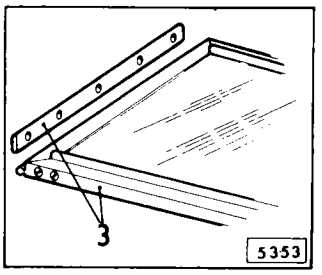
1. Remove screws securing vent control to trim pad.
2. Support quarter vent and remove screws securing retainer to 'B' post.
3. Withdraw retainer strip together with quarter vent.

Refitting

Reverse operations 1 to 3.







CONTENTS

HEATING AND VENTILATION

DESCRIPTION

Hot coolant from the engine pumped through the matrix of the heater, passes through a thermostatically operated water valve. The valve has a manual setting control to provide regulation between hot and cold airflow positions.

An electrically driven fan, having fast and slow speeds, boosts the airflow through the heater. The heater unit is mounted on the engine side of the bulkhead. A system of shutters and deflectors directs the air stream inside the car as required.

The 'AIR' control operates a flap that routes air from the fan either through the heater matrix and into the car, or out through a dump aperture in the base of the heater unit. Cold air flow is therefore achieved by setting the 'AIR' control to 'ON' and the temperature control to 'COLD'.

HEATER AIR FLOW CONTROL CABLE

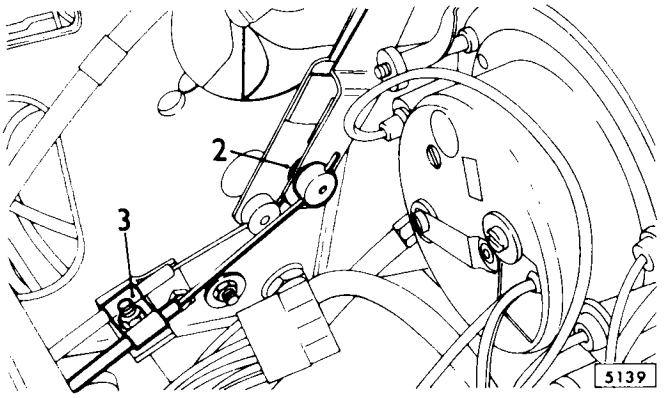
Remove and refit **80.10.06**

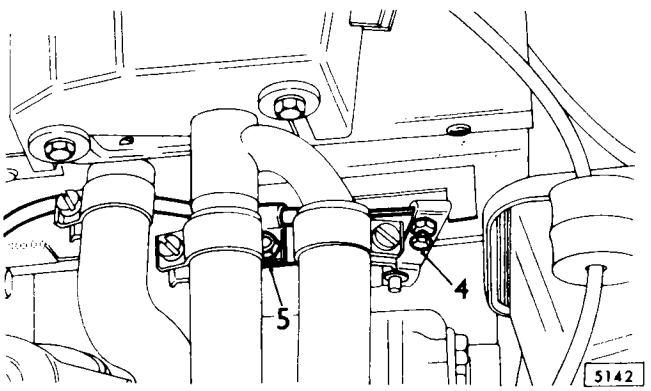
Removing

1. Remove screen rail crash roll assembly – 76.46.04.
2. Slacken setscrew on control lever securing inner control wire.
3. Slacken setscrew on clamp securing outer casings of control cables to bracket.
4. Under bonnet slacken lock bolt at air flap lever.
5. Slacken setscrew on clamp securing outer casing.
6. Withdraw cable through grommet into car.

Refitting

Reverse operations 1 to 6.





HEATER WATER VALVE CONTROL CABLE

Remove and refit **80.10.07.**

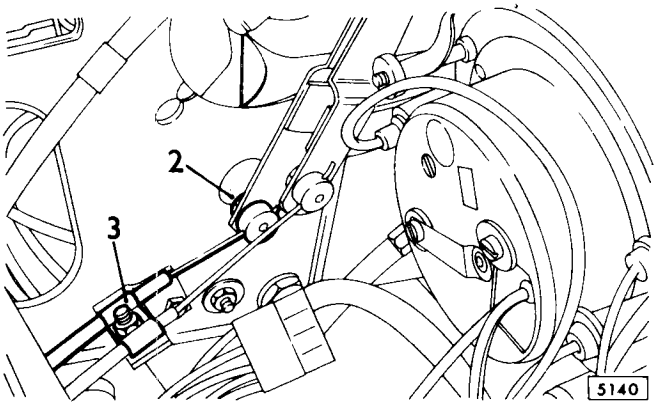
Removing

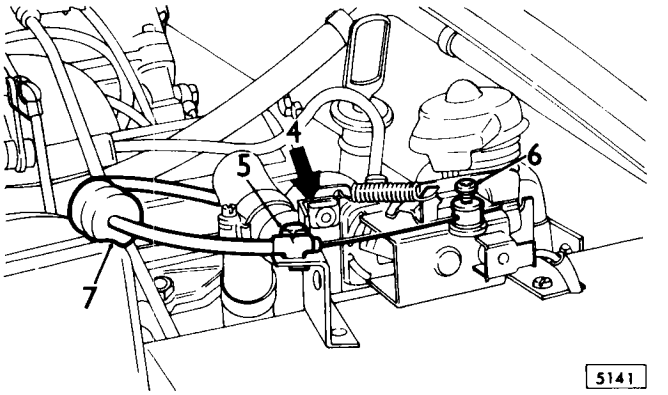
1. Remove screen rail crash roll assembly – 76.46.04.
2. Slacken setscrew on control lever securing inner control wire.
3. Slacken nut on clamp securing outer casings of control cables to bracket.
4. Under bonnet, slacken two setscrews and remove heater valve cover.
5. Slacken nut securing outer cable clamp.
6. Slacken setscrew securing inner cable to control lever.
7. Pull insulating material from cable.
8. Draw cable into engine compartment.

Refitting

Reverse operations 1 to 8.

NOTE: Ensure insulation material fitted to cable sheath before connecting to control valve. Position insulation above left hand air cleaner.





HEATER TEMPERATURE CONTROL VALVE

The heater temperature control valve comprises a capillary sensing element positioned in the hot air flow from the heater radiator matrix. The associated bulb operates linkage in the water control valve to maintain the air temperature as selected by the driver.

The temperature control is an integral part of the heater water control valve and, should the automatic facility fail, the control valve assembly complete must be changed.

Remove and refit **80.10.08**

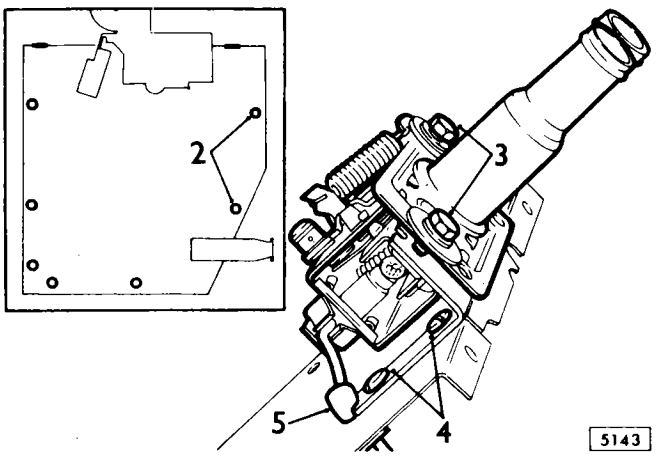
Removing

1. Remove heater unit – 80.20.01.
2. Remove nine self-tapping screws securing top plate of heater unit: remove plate.

   NOTE: Take care not to bend temperature control capillary. It will be used as a model in preforming the replacement.

3. Remove two setscrews securing control valve to brackets.
4. Remove two self-tapping screws securing control valve bracket to top plate.
5. Slide rubber sleeve insulation from capillary.

   NOTE: Replace sleeve if perished.

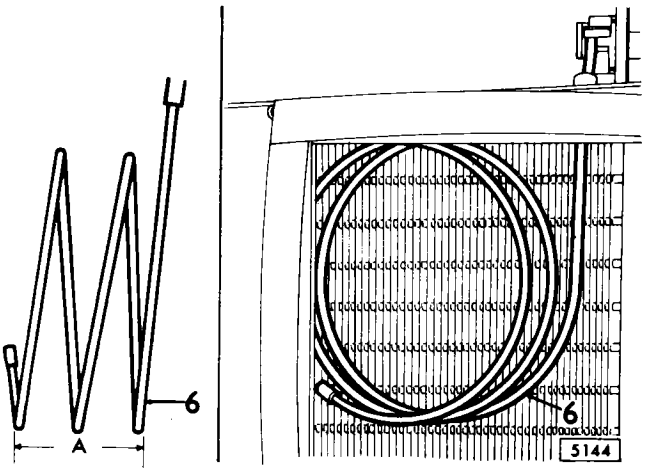


Refitting

The capillary of the replacement control valve must be preformed before fitting. This is important for correct operation of the automatic control.

CAUTION: The capillary tube must be carefully bent in any direction only once. It must not, under any circumstances, be kinked or worked back and fore.

6. Form capillary – dimension A – 19 mm (0.75 in.).
7. Fit short piece of rubber insulation sleeve to capillary, positioned correctly.
8. Position control valve against fixed bracket and loosely secure.
9. Fit bracket to top plate using two self-tapping screws.
10. Carefully locate top plate on heater box and secure using nine self-tapping screws.
11. Refit heater unit.



HEATER AIR FLOW AND HEAT CONTROLS

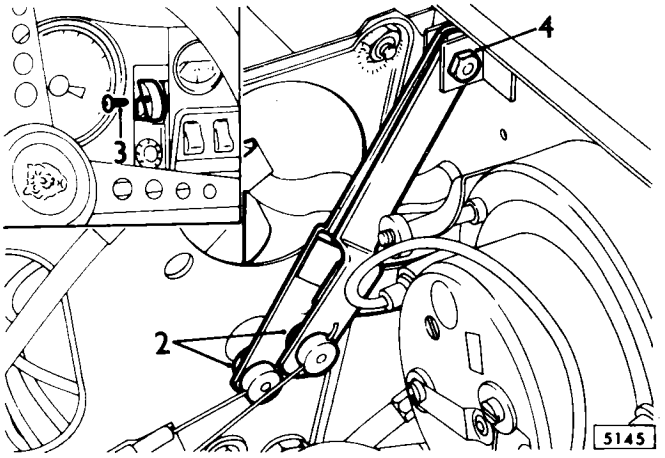
Remove and refit — **Air flow control – 80.10.09**
Water flow control – 80.10.10

Removing

1. Remove screen rail crash roll assembly – 76.46.04.
2. Slacken setscrew on control lever securing inner control wire.
3. Pull control lever to OFF position and remove drive screw securing knob. Press lever in through facia.
4. Remove setscrew, spacing washer and self-locking nut from pivot of levers, and lift lever clear. Temporarily replace setscrew to retain remaining lever.

Refitting

Reverse operations 1 to 4.



HEATER WATER CONTROL VALVE

Remove and refit — **80.10.16**

See procedure given for heater temperature control valve – 80.10.08.

HEATER FAN SWITCH

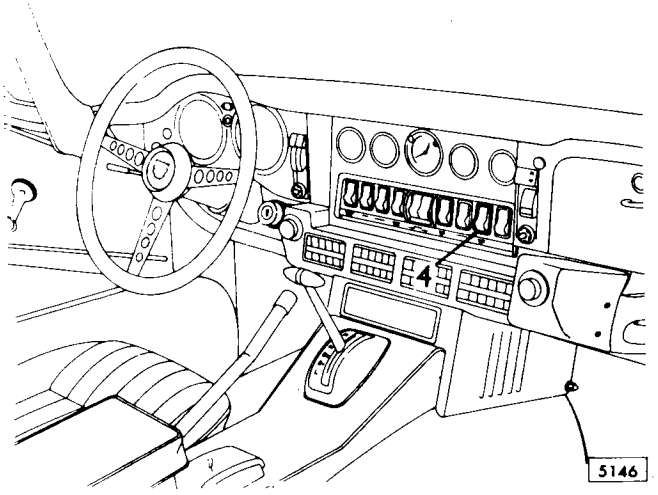
Remove and refit — **80.10.22**

Removing

1. Disconnect battery – 86.15.19.
2. Remove two knurled finger nuts and hinge facia centre panel down.
3. Note connections on heater fan switch. Remove connectors.
4. Use two screwdrivers to depress plastic locking tabs on switch body, and press out through front of panel.

Refitting

5. Ensure switch right way up and square to aperture. Press into panel until locking tabs engage.
6. Fit connectors.
7. Refit facia centre panel.
8. Reconnect battery.



AIR DIRECTION BOX

Remote control

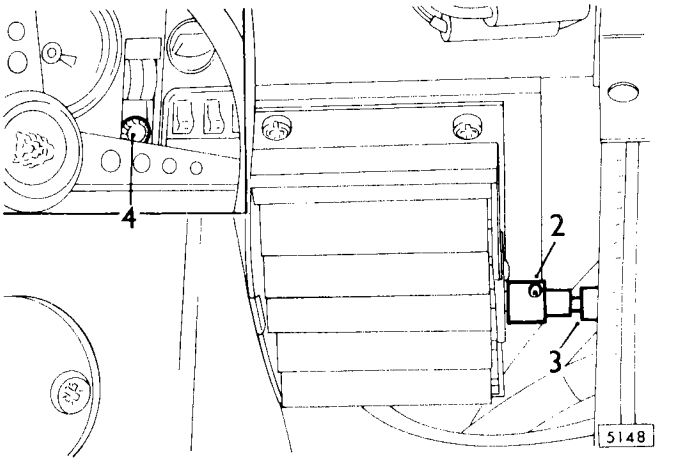
Remove and refit **80.10.31**

Removing

1. Disconnect battery – 86.15.19.
2. Beneath left hand parcel tray, remove split pin securing remote control cable to air direction box; detach cable.
3. Rotate outer cable end clockwise to unscrew it from facia.

NOTE: Attach a piece of strong cord to inner cable before withdrawing it from facia. This will facilitate fitting of replacement cable.

4. Draw cable from facia; detach cord and leave it in position.



Refitting

5. Attach cord to replacement cable inner, and draw cable into position.
6. Rotate outer cable end anti-clockwise to screw it into facia.

NOTE: Ensure threads do not cross.

7. Close louvres of air direction box and turn control knob at facia fully anti-clockwise
8. Locate inner cable at air direction box, and secure with a new split pin.
9. Reconnect battery.

AIR DIRECTION BOX

Remove and refit **Left hand/right hand 80.10.33**

Removing

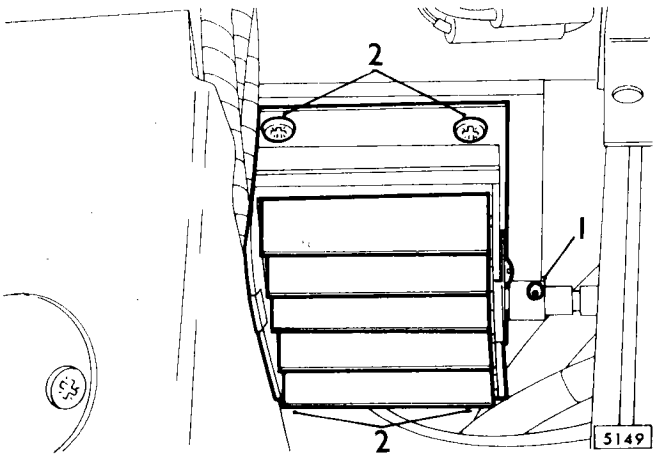
Left hand only

1. Detach split pin securing remote control cable inner to air box.

Both boxes

2. Remove four self-tapping screws securing box.

NOTE: Move footwell trim as necessary.



Refitting

Reverse operations 1 and 2 using new seal if necessary.

WINDSCREEN DEMIST FLAP

Remote control and cable

Remove and refit **80.10.36**

Removing

If vehicle fitted with air conditioning

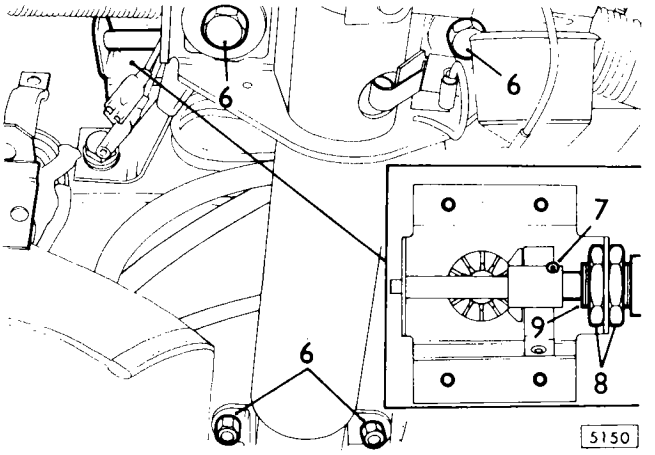
1. Remove evaporator unit, operations 1 to 21 – 82.25.20.

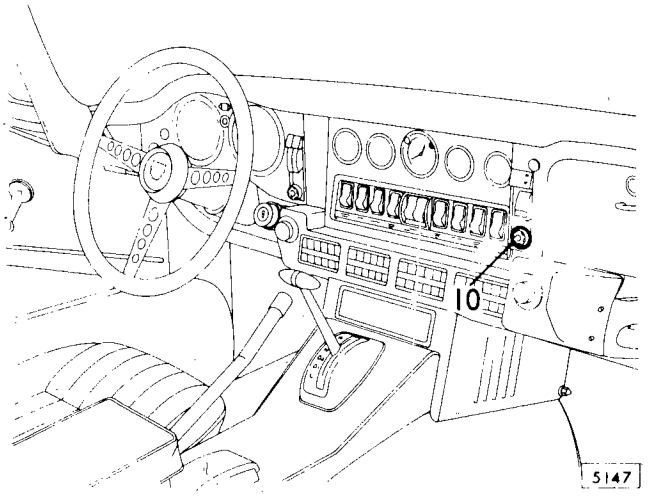
If vehicle not fitted with air conditioning

2. Remove radio panel and radio (if fitted) – 82.50.03 – 86.50.04.
3. Remove left hand parcel tray and dash liner – 76.67.04 – 76.46.11.
4. Set left hand seat fully to rear.

If vehicle left hand steering continue with operations 6 and 7. If not, continue with operation 8.

5. Fully collapse steering column adjustment.
6. Remove two bolts securing steering column to bracket, and two setscrews securing clip. Lower steering wheel in front of seat.
7. Remove split pin securing remote control inner cable to control gears.
8. Remove locknuts securing outer cable.
9. Rotate outer cable clockwise to unscrew it from facia.
10. Draw control cable from facia.





Refitting

11. Feed cable into position.

    NOTE: Ensure cable passes behind electrical connectors.

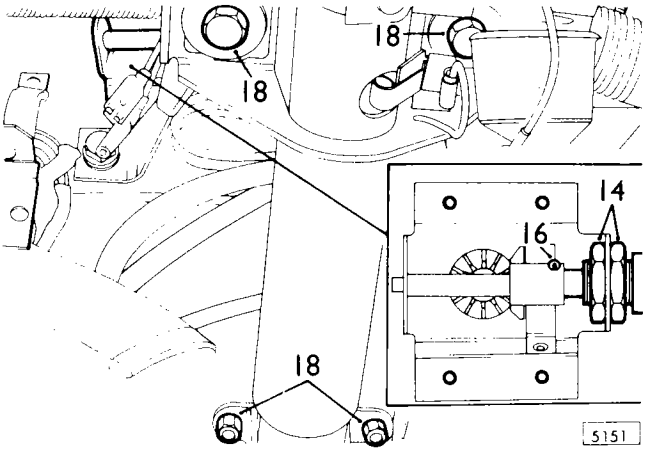
12. Lightly grease threads at both ends of outer cable.
13. Rotate outer cable end anti-clockwise to screw it into facia.

    NOTE: Ensure threads do not cross.

14. Fit one locknut to end of cable outer sheath, locate sheath in bracket, and fit second locknut.
15. Adjust locknuts so that input gear is firmly located by inner cable.
16. Rotate remote control knob and secure gear to cable using a new split pin.

    NOTE: If necessary adjust locknuts to get correct depth of engagement of cable.

17. Tighten locknuts.
18. Reposition and secure steering column to bracket. Replace clip and secure.
19. Refit left hand parcel tray and dash liner.
20. Refit radio panel and evaporator unit as appropriate.
21. Reconnect battery.



WINDSCREEN DEMIST FLAP

Control Gears and Flap

Remove and refit **80.10.37**

Removing

If vehicle fitted with air conditioning

1. Remove evaporator unit, operations 1 to 21 – 82.25.20.

If vehicle not fitted with air conditioning

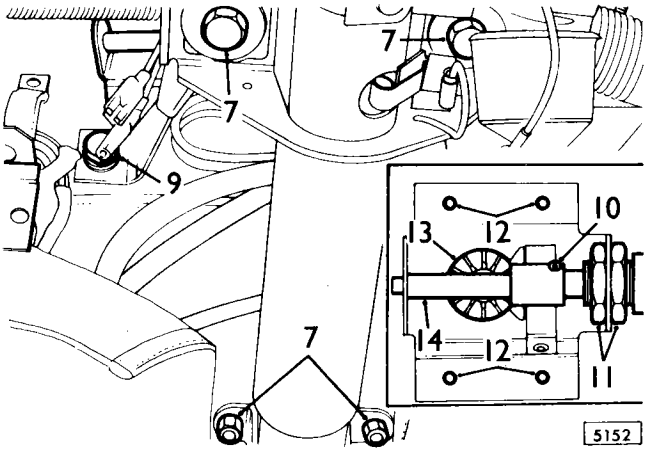
2. Remove radio panel and radio (if fitted) – 86.50.03 – 86.50.04.
3. Remove left hand parcel tray and dash liner – 76.67.04 – 76.46.11.
4. Set left hand seat fully to rear.
5. Remove screen rail facia assembly – 76.46.04.

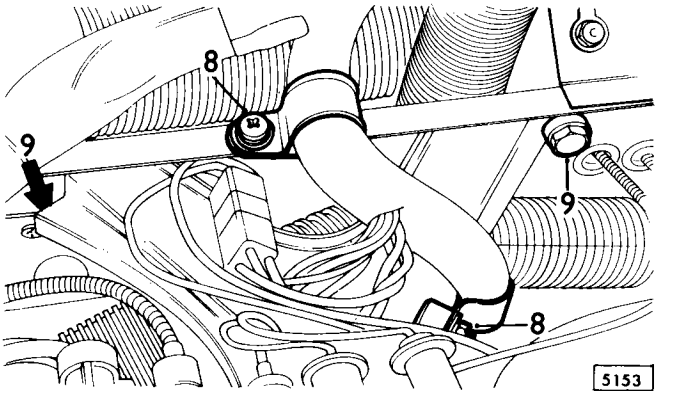
If vehicle left hand steering continue with operations 6 to 9. If not, continue with operation 10.

6. Fully collapse steering wheel adjustment.
7. Remove two bolts securing steering column to bracket, and two setscrews securing clip. Lower steering wheel in front of seat.
8. Release cable clip on steering column bracket.
9. Remove four setscrews and withdraw steering column bracket.
10. Remove split pin securing remote control inner cable to control gears.
11. Remove locknut securing outer cable; disengage cable from bracket.
12. Slacken four self-tapping screws securing control gear bracket to duct.
13. Move bracket to right, disengage and remove input gear.
14. Use a thin blade to lever pinion from spindle.

If control gears only are to be changed, continue with 'Refitting' operation 22. If flap and/or shaft are to be changed continue with operation 15.

15. Remove self-tapping screws and recover bracket and bush.
16. Remove heater unit – 80.20.01.
17. Reach through heater inlet hole to duct and grip flap.
18. Draw spindle from duct into car; withdraw flap from heater inlet hole.





Refitting

19. Place flap into heater inlet hole with straight edge of flap towards front of car. Position flap at pivot hole and locate by passing spindle through from inside car, pivot point first. Ensure point locates at front of duct.
20. Place bush on end of shaft.
21. Fit bracket over end of shaft, large hole to right hand side, and loosely secure with four self-tapping screws.
22. Locate pinion over end of spindle and secure with a pressed on new spring clip.
23. Reach down through facia top rail and locate pointed end of spindle. Press a suitable hard implement against the point, and press spring clip fully home to retain gear.
24. Press bracket to right, and fit input gear, teeth towards duct and with lower detent flap against spring.

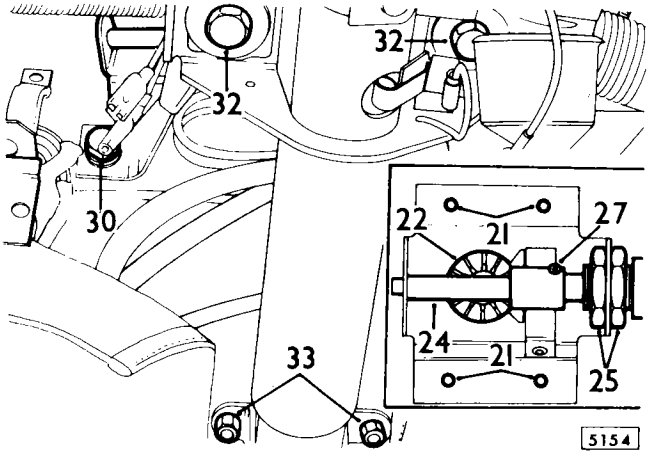
    NOTE: Split pin hole will be angled upwards and out towards operator.

25. Fit remote control cable to bracket and loosely secure with locknut.
26. Turn remote control knob fully anti-clockwise.
27. Manipulate control knob about fully anti-clockwise position to permit fitting of split pin. Secure.
28. Tighten locknut.
29. Slide bracket to left to engage gears to best advantage and tighten four self-tapping screws.

    NOTE: Check operation, and lightly oil gears.

If vehicle right hand steering, continue with operation 34.

30. Fit steering column bracket and secure with four setscrews, spring and plain washers.
31. Secure cable harness clip to bracket.
32. Raise steering column into position, and secure to bracket with bolt, plain washer and locknut.
33. Fit clip and spacer at lower end of upper column using two setscrews, plain and spring washers.
34. Fit screen rail facia assembly.
35. Fit left hand parcel tray and dash liner.
36. Fit radio panel and evaporator unit as appropriate.
37. Fit heater unit.



FRESH AIR INTAKE

Remove and refit 80.15.29

Removing

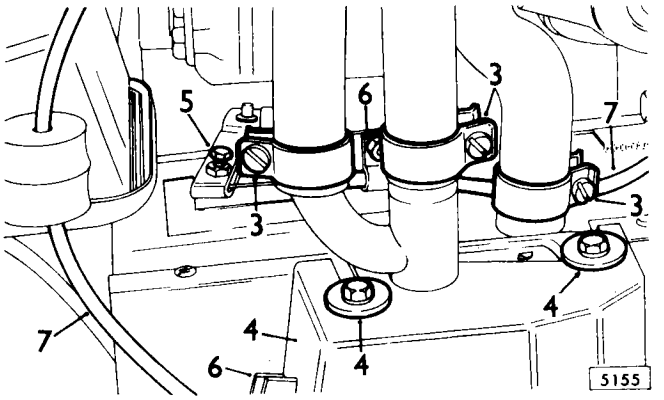
1. Raise bonnet.
2. Remove air intake assembly fixings.
3. Withdraw fresh air intake from bonnet duct.

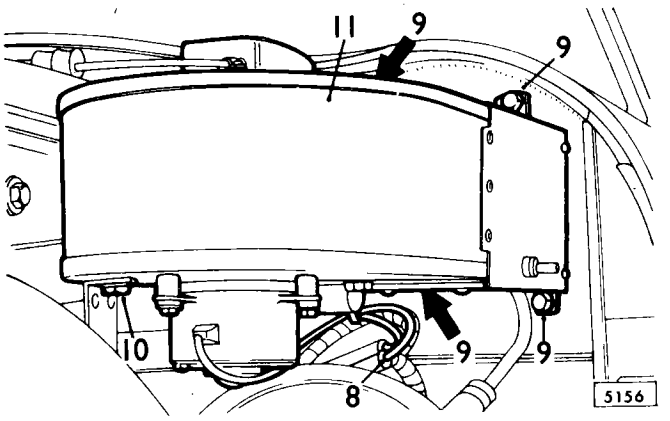
Refitting

4. Apply a suitable sealing compound to the flanges of the intake assembly.
5. Reverse operations 1 to 3.

HEATER UNIT

Remove and refit **80.20.01**





Removing

1. Drain cooling system – 26.10.01.
2. Disconnect battery – 86.15.19.
3. Slacken hose clips at input and output water hoses on heater unit. Pull hoses from connections.
4. Slacken two setscrews securing heater control valve cover; remove cover.
5. Slacken clamp screws securing inner cables of AIR and TEMPERATURE control cables.
6. Slacken clamp setscrews securing outer casings of control cables to brackets.
7. Disconnect both control cables.
8. Disconnect electrical leads to heater fan.
9. Remove four setscrews, plain and spring washers securing heater to bulkhead.
10. Remove setscrew securing heater unit to support bracket on sub frame.
11. Lift out heater unit.

Refitting

Reverse operations 1 to 11 using a new seal between heater unit and bulkhead, and checking controls when connected.

HEATER UNIT

Overhaul **80.20.08**

Dismantling

1. Remove heater radiator – 80.20.29.
2. Remove heater motor/fan assembly 80.20.15.

Inspection

3. Clean out heater case.
4. Check condition of foam pad on air flap, and replace if necessary. Use a non-inflammable foam material, and a non-petrol based adhesive.
5. Clear all debris from heater radiator, and blow out with shop air line.

NOTE: Take great care not to damage radiator matrix fins by mishandling. Any distortion must be made good with a fin comb.

6. Thoroughly clean out heater fan.

Reassembly

7. Refit heater motor/fan assembly.
8. Refit heater radiator.
9. Lightly oil flap spindle at bushes.

HEATER MOTOR/FAN ASSEMBLY

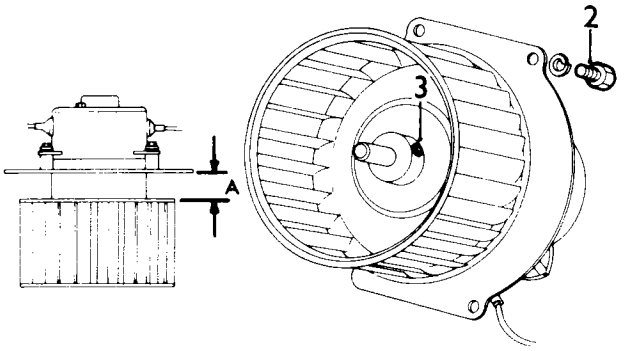
Remove and refit **80.20.15**

Removing

1. Remove heater unit – 80.20.01.
2. Remove two setscrews securing motor mounting plate to heater unit, lift out heater motor and fan assembly.
3. Using an Allen key, slacken the clamping grub screw; pull fan from motor shaft.

Refitting

4. Fit fan to motor shaft to obtain dimension A of 18,26 mm (23/32 in.) between bottom edge of fan and motor mounting plate. Check at three stations.
5. Use Allen key to tighten clamping grub screw.
6. Enter heater motor and fan assembly into case, and secure with two setscrews and spring washers.
7. Refit heater unit.



5157

HEATER RADIATOR

Remove and refit **80.20.29**

Removing

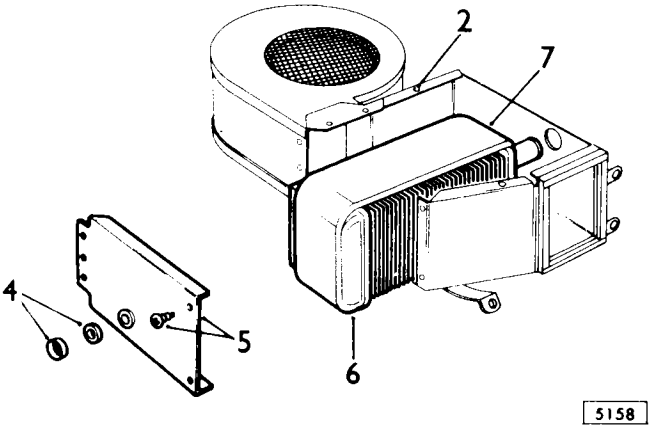
1. Remove heater unit – 80.20.01.
2. Remove nine self-tapping screws and lift off top cover and control valve complete.

CAUTION: Take care not to damage control valve capillary.

3. Set air flap down.
4. Prise spring clip from air flap spindle. Recover one plain washer.
5. Remove seven self-tapping screws retaining side plate; draw side plate from heater box.
6. Carefully draw heater radiator matrix from heater box.
7. Remove self adhesive packing material from old matrix, and fit, positioned identically, to new.

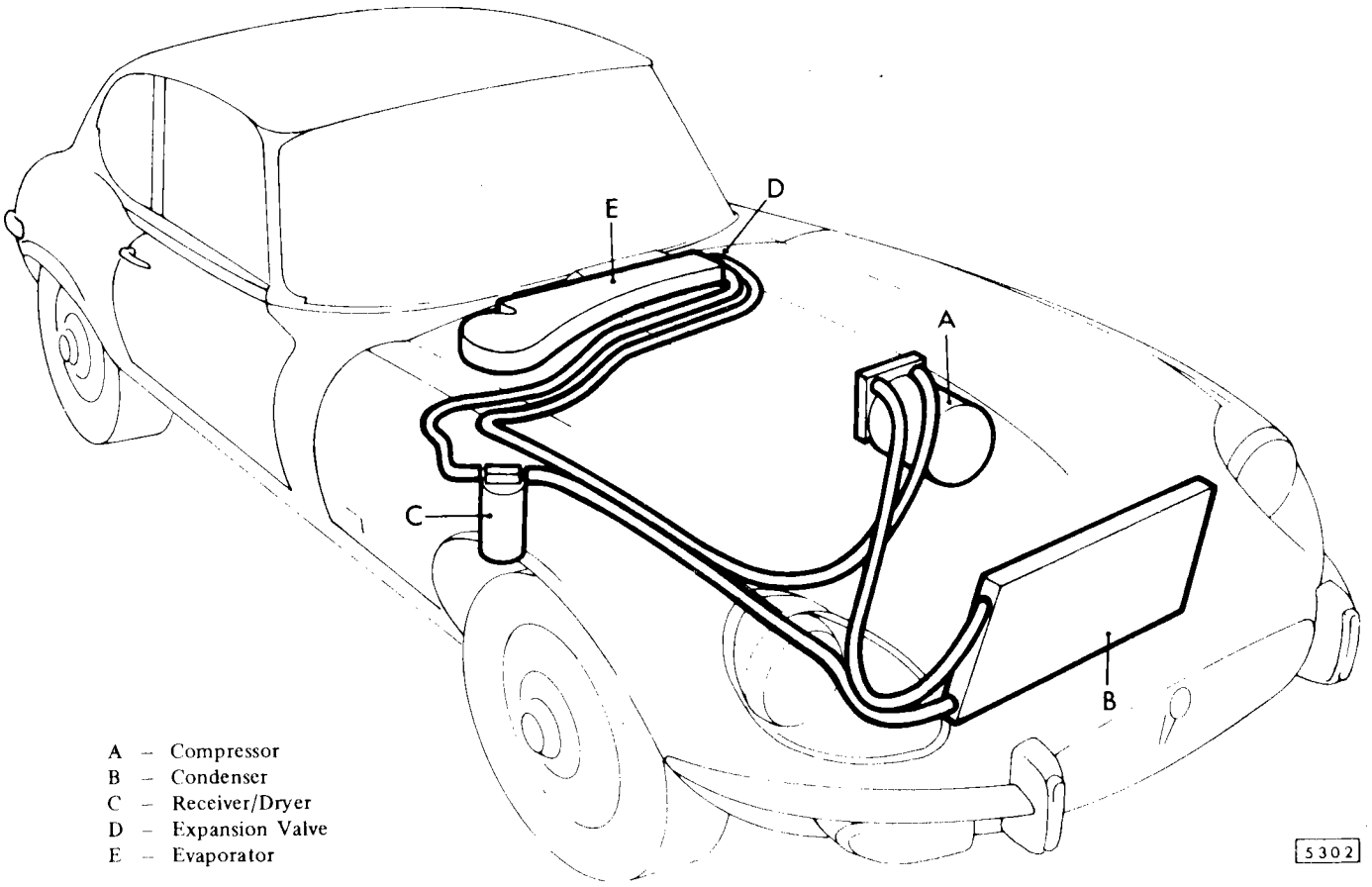
Refitting

8. Install replacement radiator matrix in heater box, taking great care not to damage fins.
9. Fit side plate into position and secure using seven self-tapping screws.
10. Fit plain washer to air flap spindle and retain with spring clip.
11. Fit top cover and secure using nine self-tapping screws.
12. Refit heater unit.



5158

CONTENTS



A – Compressor
B – Condenser
C – Receiver/Dryer
D – Expansion Valve
E – Evaporator

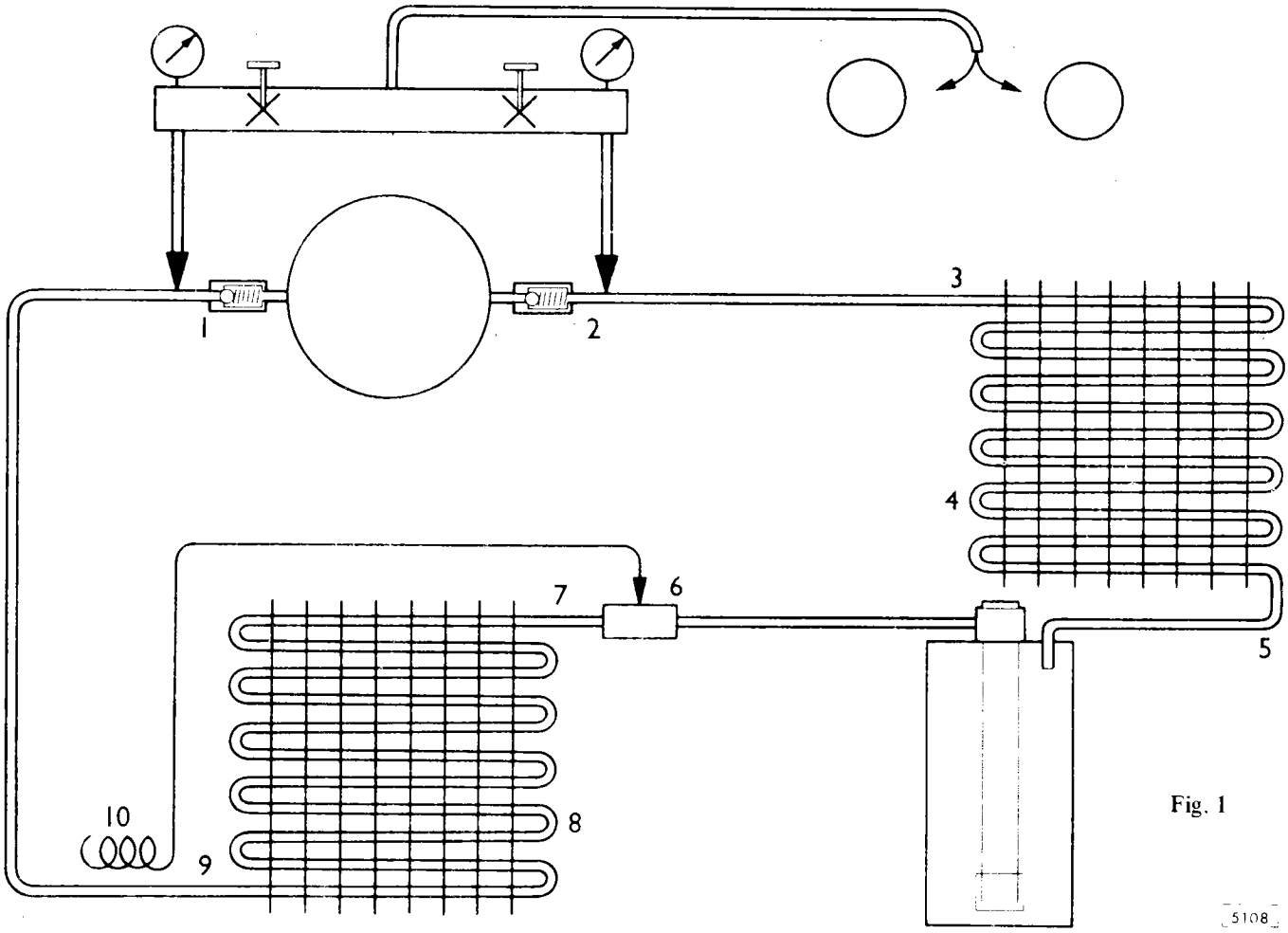


Fig. 1

AIR CONDITIONING SYSTEM

System description 82.00.00

The Jaguar air conditioning refrigeration system is comprised of the following components; a compressor, a magnetic clutch, a condenser, a combined receiver/drier, an evaporator coil with attached expansion valve, a blower fan, a thermostat and interconnecting hoses. It is fitted with two electric relays, one supplying current while the ignition is switched on, and the other by-passing the engine cooling system radiator thermostat. The cooling fans therefore run continually while the air conditioning system is switched on.

The refrigeration cycle is best described with reference to figures 1 and 2. The refrigerant used is to specification R.12 (refrigerant 12) which is a halogenated hydrocarbon (dichlorodifluoromethane).

The heart of the automobile refrigerant system is the compressor. Its purpose is two fold; to raise the pressure of the refrigerant vapour and correspondingly raise its temperature.

The suction side of the compressor, point 1, pulls in superheated refrigerant vapour. The compression cycle occurs between points 1 and 2 of figure 1, work being done on the vapour to raise its pressure and add heat. The fact that heat is added is shown by point 2 on figure 2 being to the right of point 1. The pressure difference is given by the vertical axis of figure 2. The high pressure, high temperature vapour is delivered to a fin and tube

construction condenser located in front of the engine coolant radiator where heat flow takes place from the high temperature vapour to the surrounding air. As the refrigerant passes through the condenser, heat transfer and a reduction in temperature takes place, the gas giving up its latent heat and condensing to a cooi liquid. However, the length of the condenser is selected so that further heat loss takes place, sub-cooling the refrigerant liquid to ensure complete condensation. In figure 2 these conditions are shown between points 3 and 5. At point 3 condensation commences, passes through a wet vapour state, and is complete at point 4. The sub-cooling is shown taking place between points 4 and 5.

The high pressure liquid now passes to the receiver/drier, a reservoir for the liquid content of the system. The receiver/drier incorporates a filter and a limited capacity dehydrating element to remove traces of moisture from the refrigerant.

From the receiver/drier, liquid refrigerant passes to the expansion valve and evaporator unit point 6 of figure 1.

The expansion valve is the dividing point in the system, a step change from a high pressure area into a low through a small metering orifice. The metering orifice is protected by a gauze filter in the inlet union of the expansion valve. The orifice size is controlled by the temperature at the outlet from the evaporator unit and by the inlet pressure to the expansion valve. A quantity of liquid refrigerant passes the expansion valve orifice and expands suddenly as it enters the low pressure area. As the liquid passes through the coils of the evaporator unit heat transfer takes place from the car interior air to the liquid causing it to boil.

The length of the evaporator coil is so chosen that the liquid refrigerant has completely vapourised at approximately three quarters through, the remaining length serving to absorb more heat and super-heat the vapour. This ensures that no liquid refrigerant reaches the compressor, and that as much heat as possible is absorbed from the car interior. The temperature sensing capillary of the expansion valve is fitted at the outlet of the evaporator. The capillary senses the outlet gas temperature and sets the expansion valve to meter the supply of cold liquid to the input of the evaporator.

For example, should the outlet pipe temperature fall, the expansion valve closes, cutting off the flow of liquid refrigerant until the temperature rises to the preset level. The super-heated vapour is then drawn to the suction side of the compressor, point 1 of figure 1, and the cycle continues.

Moisture from air passing over the matrix of the evaporator unit condenses on to the cool fins and drains from the evaporator via three rubber tubes. Use of the air conditioning system can therefore result in a pool of water beneath the vehicle after parking. This is completely normal and does not indicate malfunction of the system.

It can be seen that ice formation is possible upon the fins of the evaporator unit. Anti-icing of the coil, and control of the vehicle interior temperature is provided by the thermostat. The capillary senses the temperature of the evaporator coil and, via a switch, de-energises the compressor clutch when the temperature falls to the preset level. This stops the flow of refrigerant and allows the coil to heat up until the thermostat switch re-closes. The compressor clutch then engages to re-start the cycle.

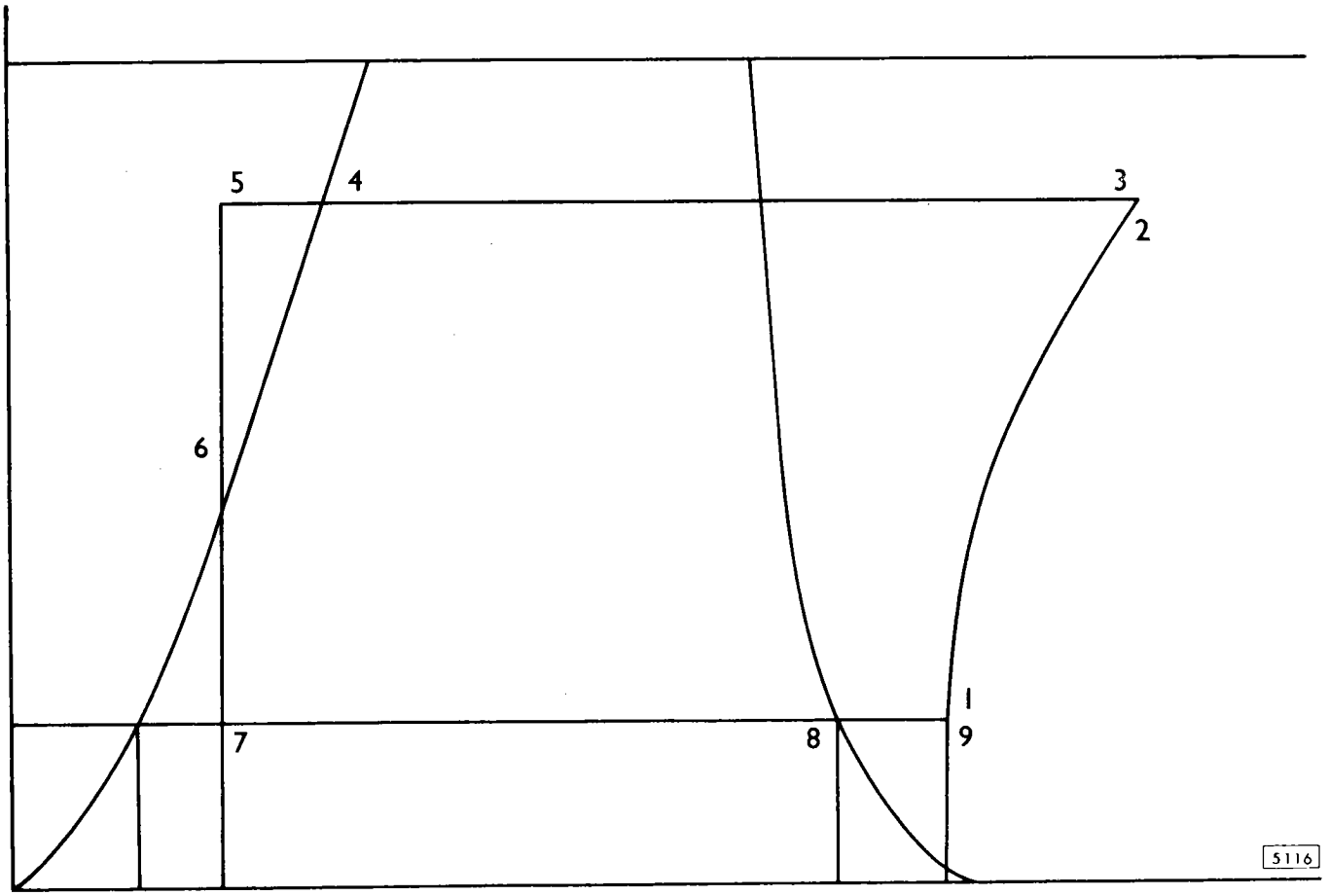


Figure 2.

Component description

Compressor

The compressor utilizes three double acting pistons disposed axially around the compressor drive shaft. The pistons are actuated by a swash plate pressed on to the shaft. A magnetic clutch is used to drive the compressor shaft. When current passes through the clutch coil, the armature clutch plate assembly, keyed to the compressor shaft, is drawn rearwards against the belt driven pulley that is free wheeling upon the same shaft. This locks pulley and armature plate together to drive the compressor. When current ceases to flow, springs in the armature plate draw the clutch face from the pulley. The compressor comes to rest and the pulley continues to free wheel.

Condenser

The condenser is a copper tube and aluminium fin heat transfer unit fitted forward of the engine coolant radiator. The condenser transfers heat from the refrigerant flowing through it to the airstream drawn through it by the engine cooling fans.

Receiver/Drier

The receiver/drier is a cylindrical tank that serves as a reservoir for the refrigerant. The liquid refrigerant is fed in at the top, and is drawn out, via a screen and filter, through a tube extending to the bottom. The outlet tube has a sight glass fitted through which it can be determined by observing the refrigerant condition, whether there is adequate refrigerant in the system. A cloth sac filled with moisture absorbing granules is located inside the tank. This retains any traces of moisture that may be present in the refrigerant.

Expansion Valve

The expansion valve controls the flow of refrigerant through the evaporator coil to achieve optimum cooling efficiency. To do this, the valve senses the outlet pipe temperature and inlet pipe pressure and increases or decreases the flow of refrigerant liquid to maintain the outlet temperature constant.

Evaporator

The evaporator is a tube and fin heat exchanger into which the liquid refrigerant is metered. The air content of the vehicle, when forced over the fins by the recirculating blower fan, gives up its heat to boil the refrigerant.

GENERAL SECTION 82.00.00

This section contains safety precautions, general information, good practice and standards that must be followed when working upon the air conditioning system. A fault finding and rectification section is included.

SAFETY PRECAUTIONS

The air conditioning equipment is manufactured for use only with Refrigerant 12 (dichlorodifluoromethane) and **extreme care** must be taken **NEVER** to use a methylchloride refrigerant.

The chemical reaction between methylchloride and the aluminium parts of the compressor will result in the formation of products which burn spontaneously on exposure to air, or decompose with violence in the presence of moisture. The suitable refrigerant is supplied under the following trade names:

FREON 12
ARCTON12
ISCEON 12

or any refrigerant to specification 12.

Goggles and gloves must be worn while working with the refrigerant.

WARNING: EXTREME CARE SHOULD BE EXERCISED IN HANDLING THE REFRIGERANT. LIQUID REFRIGERANT AT ATMOSPHERIC PRESSURE BOILS AT −29°C (−20°F) SERIOUS DAMAGE OR BLINDNESS MAY OCCUR IF REFRIGERANT IS ALLOWED TO CONTACT THE EYES.

FIRST AID: IF REFRIGERANT SHOULD CONTACT THE EYES OR SKIN, SPLASH THE EYES, OR AFFECTED AREA WITH COLD WATER FOR SEVERAL MINUTES. DO NOT RUB. AS SOON AS POSSIBLE THEREAFTER, OBTAIN TREATMENT FROM A DOCTOR OR EYE SPECIALIST.

FAULT FINDING CHART

Procedures to resolve the causes given are included in the following section.

CAUSE		SYMPTOM: Unusually low reading of compound gauge	SYMPTOM: Unusually high reading of compound gauge	SYMPTOM: Unusually low reading of high pressure gauge	SYMPTOM: Unusually high reading of high pressure gauge
Air or non condensable gases in system	(m)				X
Unusually hot running engine	(l)				X
Insufficient air over condenser	(k)				X
Restriction in high pressure side	(j)				X
Loose capillary tube connection at evaporator coil outlet	(i)		X		
Very high heat load	(h)		X		X
Excessive refrigerant charge	(g)		X		X
Evaporator coil blocked with ice	(f)	X		X	
Defective expansion valve	(e)	X	X	X	
Low capillary charge in expansion valve	(d)	X		X	
Partial restriction in expansion valve	(c)	X		X	
Very light heat load	(b)	X		X	
Low refrigerant charge	(a)	X		X	

FAULT FINDING AND RECTIFICATION

Carry out preliminary tests – 82.30.16, before continuing with relevant check.

Low refrigerant charge

1. Run engine at 1000 – 1200 r.p.m.
2. Switch on air conditioning system to high delivery setting.
3. Set thermostat control to mid range position.
4. Fit charging manifold as described in 82.30.06, first ensuring both charging manifold valves closed.
5. With the following ambient air temperatures, the corresponding delivery pressure gauge readings should be as given.

Ambient Temp.	Pressure gauge kg/cm²	lb/sq.in.
16°C (60°F)	7,03 – **10,54**	100 – 150
27°C (80°F)	9,84 – 13,36	140 – 190
38°C (100°F)	**12,65** – 15,8	180 – 225
43.5°C (110°F)	15,1 – 17,56	215 – 250

NOTE: The higher pressure gauge readings for each temperature reading would only occur if very little air is flowing over condenser.
Readings will decrease as the vehicle cools down from extended air conditioning system use.

Check

Check receiver/drier sight glass for excessive foaming.
Check expansion valve for intermittent hissing.

Correction

Test for leaks – 82.30.09, and rectify as necessary.

IMPORTANT: The system **MUST** be depressurised before any brazing repair is attempted.

Recharge the system – 82.30.08 on completion of repair.

Very light heat load

Check

Low outside ambient.
Evaporator blower intake for obstruction.
Outlet louvres for obstruction.
Remove blower motor assembly and check fan for damage.
Evaporator coils for ice formation.

Correction

Clear or remove any obstruction.
Renew or repair fan blades.
If ice formation present, set thermostat control to higher position.

Partial restriction of expansion valve

Check

Reach up beside evaporator unit and feel expansion valve and connecting hoses.
If a restriction is present ice can form on the valve body and on the pipe from valve to matrix.
If the valve is functioning correctly, the intake hose will feel warm.

Correction

Remove valve – 82.25.01. Clean filter in inlet connection. If this filter is not obstructed fit replacement valve.

Low capillary charge in expansion valve

Check

Follow procedure to remove evaporator unit, operations 1 to 21 – 82.25.20.
Remove three self tapping screws securing expansion valve cover.
Remove filler pads.
Observe suction side pressure gauge, and enclose capillary sensing coil in the hand. The unusual heat should cause the expansion valve to flood and show sudden rise in suction side pressure. If the pressure does not rise, it can be assumed that capillary charge is weak.

Correction

Replace expansion valve – 82.25.01.

Defective expansion valve

Check

Carry out checks as for partial restriction of expansion valve.

Correction

As for partial restriction of expansion valve.

Evaporator coil blocked with ice

Check

Thermostat sensor not in contact with fins of evaporator.
Thermostat setting.
Expansion valve.

Correction

Reposition sensor to touch fins.
Reposition thermostat to lower level.
Renew expansion valve.

GENERAL INFORMATION

Torque levels to be used when tightening all connections are as follows:

		Torque loading		
		kg.m	ft.lb.	
1.	Compressor/Condenser	4,15 to 4,84	30 to 35	
2.	Condenser/Compressor	2,90 to 3,73	21 to 27	
3.	Condenser/Receiver/Drier	2,10 to 2,76	15 to 20	
4.	Receiver/Drier/Condenser	1,52 to 1,80	11 to 13	(Aluminium tank)
		4,15 to 4,84	30 to 35	(Steel tank)
5.	Receiver/Drier/Evaporator	1,52 to 1,80	11 to 13	(Aluminium tank)
		4,15 to 4,84	30 to 35	(Steel tank)
6.	Evaporator/Receiver/Drier	1,52 to 1,80	11 to 13	
7.	Expansion valve/Evaporator	2,10 to 2,76	15 to 20	
8.	Evaporator/Compressor	2,90 to 3,73	21 to 27	
9.	Compressor/Evaporator	4,15 to 4,84	30 to 35	

GOOD PRACTICE

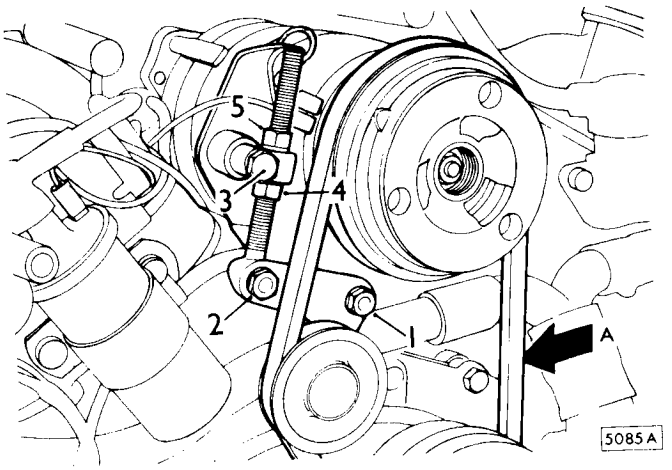
1. The protective sealing plugs must remain in position on all replacement components and hoses until immediately before assembly.
2. Any part arriving for assembly without sealing plugs in position must be returned to the supplier as defective.
3. It is essential that a second backing spanner is always used when tightening all joints. This minimises distortion and strain on components or connecting pipes.
4. Components must not be lifted by connecting pipes, hoses or capillary tubes.
5. Care must be taken not to damage fins on condenser or evaporator matrices. Any damage must be rectified by the use of fin combs.
6. Before assembly of tube and hose joints, use a small amount of clean new refrigerant oil on the sealing seat.
7. Refrigerant oil for any purpose must be kept very clean and capped at all times. This will prevent the oil absorbing moisture.
8. Before assembly the condition of joints and flares must be examined. Dirt and even minor damage can cause leaks at the high pressures encountered in the system.
9. Dirty end fittings can only be cleaned using a clean cloth wetted with alcohol.
10. After removing sealing plugs and immediately before assembly, visually check the bore of pipes and components. Where ANY dirt or moisture is discovered, the part must be rejected.
11. All components must be allowed to reach room temperature before sealing plugs are removed. This prevents condensation should the component be cold initially.
12. Before finally tightening hose connections ensure that the hose lies in the correct position, is not kinked or twisted, and will not be trapped by subsequent operations e.g. closing bonnet, refitting battery.
13. Check hose is correctly fitted in clips or strapped to subframe members.
14. The Frigidaire compressor must be stored horizontally and sump down. It must not be rotated before fitting and charging. Do not remove the shipping plate until immediately before assembly. Always use new 'O' ring seals beneath union housing plate.
15. Components or hoses removed must be sealed immediately after removal.
16. AFTER A SYSTEM HAS BEEN OPENED TWICE THE RECEIVER/DRIER MUST BE RENEWED.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect the bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30,5 cm (12 in.) long, 25,4 cm (10 in.) wide and 15 cm (6 in.) high. Ensure bonnet is adequately supported after disconnecting stay.

COMPRESSOR DRIVE BELT

Adjust 82.10.01

CAUTION: It is extemely important that the drive belt tension is **exactly** as stated. Excessive slack or tension will lead to premature failure either of the belt, the idler pulley or of the compressor pulley ball bearing races. The drive belt is specifically designed for this application and must not be used elsewhere.



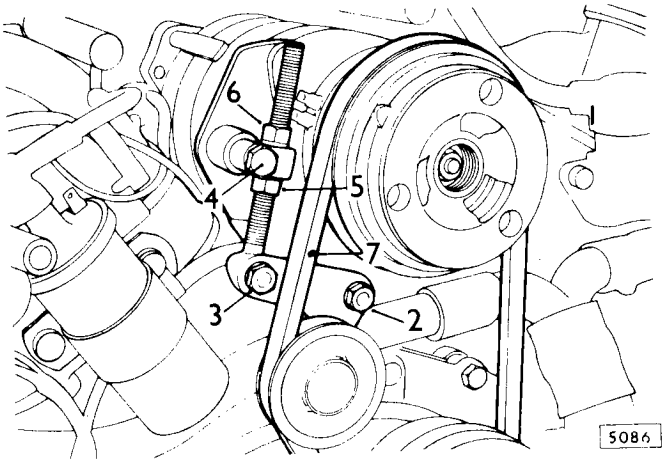
1. Slacken setscrew at angle of idler pulley arm.
2. Slacken locknut and bolt at adjustment bolt boss.
3. Slacken setscrew at adjustment sleeve.
4. Slacken locknut beneath adjustment sleeve.
5. Use locknut above adjustment sleeve to set belt tension as follows:–
   A load of 2,1 kg (4.6 lb) applied at point A, in the direction shown, shall deflect the belt 3,2 mm (0.125 in.)
6. Retighten setscrews and nuts loosened at operations 1, 2, and 3.
7. Tighten locknut beneath adjustment sleeve.

COMPRESSOR DRIVE BELT

Remove and refit 82.10.02

CAUTION: The drive belt is specifically designed for this application and must not be used elsewhere.

Removing



1. Remove alternator drive belts – 86.10.03.
2. Slacken setscrew at angle of idler pulley arm.
3. Slacken locknut and bolt at adjustment bolt boss.
4. Slacken setscrew at adjustment sleeve.
5. Slacken locknut beneath adjustment sleeve and wind down.
6. Screw top locknut up adjustment bolt sufficiently far to free drive belt.
7. Remove belt and manoeuvre clear.

Refitting

NOTE: It is possible that some early vehicles will have the adjustment sleeve rotated through 180 degrees. This is not critical, but means that the adjustment bolt is not operating with the best possible advantage. While fitting the replacement belt, therefore, ensure sleeve is fitted as shown in diagram.

8. Manoeuvre replacement belt into position.
9. Set drive belt tension, operations 5, 6 and 7 of – 82.10.01.
10. Refit alternator drive belts.

Excessive refrigerant charge

Check

Observe charging manifold gauge readings. If both suction and discharge pressure readings are unusually high for the prevailing ambient this indicates the possibility of the system being overfilled. Ensure centre hose of charging manifold pointing in safe direction, and **slowly** open pressure side valve to bleed off some refrigerant.
If the gauge pressures fall, this confirms excessive refrigerant charge.

Correction

Continue to **slowly** bleed off refrigerant until both gauge readings are approximately normal.

IMPORTANT: Keep close watch on receiver/drier sight glass during this operation. Any bubbles appearing will indicate that too much refrigerant has been removed.

Very high heat load

Check

Very hot or very humid day.
Vehicle heater is switched off.
All windows and doors are closed.

Correction

Ensure heater is switched off and that all air vents, windows, and doors are closed.

Loose capillary tube connection at evaporator coil outlet

Check

Observe suction side of compressor connector union housing for severe frosting or icing.
Note: A slight degree of frosting is normal.

Correction

If icing is heavy, check that expansion valve capillary coil is in correct contact and clamped to evaporator outlet pipe. Tighten clip as necessary. Do not overtighten to damage capillary coil.
Replace expansion valve – 82.25.01.

Restrictions in high pressure side

Check

For restriction in condenser, receiver/drier, and hoses connecting these units. Any restriction or partial blockage will create a drop in temperature at the point of restriction. This temperature drop will be obvious to the touch, and in some cases frost or sweating may occur at that point.

Correction

Replace component or hose affected.

Insufficient air over condenser

Check

That the condenser matrix is not damaged or obstructed.
Vehicle radiator matrix is not damaged.
Cooling fans run continually while air conditioning system is on.
Direction of rotation of fans.

Correction

Blow out matrices with compressed air. Use hose if necessary to soften caked mud.
Dress deformed finning.
Check wiring to fan and replace fan if wiring correct.

Unusually hot running engine

Check

Engine cooling system as detailed in Group 26.
Ensure radiator blind (if fitted) is not in operation.

Air or non-condensable gas in system

Check

If all other methods fail to reduce head pressure to a satisfactory level, check for air in the system.
Pour cold water over condenser to accelerate condensing action.
If there is excessive refrigerant in system the pressure will momentarily fall.
Air in the system will not condense. The pressure will therefore remain high.

Correction

Sweep (purge) the system – 82.30.07.
Change receiver/drier unit.

COMPRESSOR OIL LEVEL

Check **82.10.14**

There is no way to check oil level while the compressor is installed but the level should not change throughout normal service. However, owing to the fact that oil is normally in suspension and comes to rest whenever the system is shut down, that oil within a component removed is lost to the total quantity.
In order to compensate for this loss, a specific quantity of oil is to be added for each component replaced; the quantity relating to each component will be given in the relevant procedure. If oil has been lost from the system owing to accident damage depressurisation or incorrect depressurisation procedure, the compressor must be removed from the installation to check oil level – 82.10.20.

COMPRESSOR

Remove and refit **82.10.20**

WARNING: Before commencing work on this operation, refer to general section 82.10.00. Do not turn the compressor over until the system is correctly charged.

NOTE: Ensure that suitable clean, dry male and female sealing plugs are to hand.

Removing

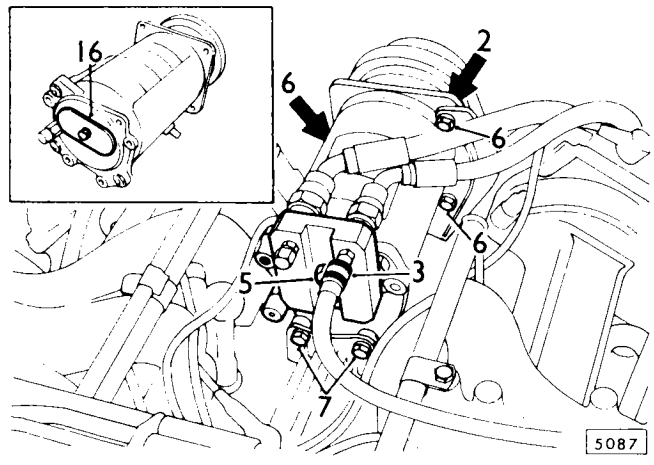
1. Disconnect battery – 86.15.19.
2. Pull electrical connector from compressor clutch coil.
3. Depressurise air conditioning system 82.30.05.
4. Remove compressor drive belt – 82.10.02.
5. Remove one setscrew and spring washer securing valve and union assembly housing to rear of compressor.

   IMMEDIATELY seal all connection orifices using clean dry plugs. Recover 'O' ring seals.
6. Remove three setscrews. Plain and spring washers securing front flange to mounting.
7. Remove two setscrews and spring washers securing back flange to mounting.
8. **Keeping compressor horizontal and sump down**, lift from car.
9. Drain oil from compressor sump into a suitable container and accurately measure quantity.

   CAUTION: If the oil shows any sign of contamination with solids or water, the system must be swept (82.30.07) and the receiver/drier replaced (82.17.01) on completion of this operation.

10. Drain oil, if any, from replacement compressor.

    NOTE: Transfer parts, as necessary, from replaced compressor to new, by following compressor manufacturer's instructions.



11. If oil present, refill replacement compressor with an equal quantity of new clean refrigerant oil to that removed in operation 9.
If oil not present, refill replacement compressor with an equal quantity of new clean refrigerant oil to that removed in operation 9 PLUS 29 g. (1 oz.).

NOTE: This allows for the fact that more oil is retained within a freshly drained unit than in one that has never been filled.

Refitting

12. Place replacement compressor in position, sump downwards.
13. Loosely secure back flange to mounting using two setscrews and spring washers.
14. Loosely secure front flange to mounting using three setscrews, plain and spring washers. Fit earth connection at top right hand setscrew.
15. Tighten all five mounting setscrews.
16. Remove shipping plate from rear of replacement compressor and fit, after removing sealing plugs, to replaced compressor.

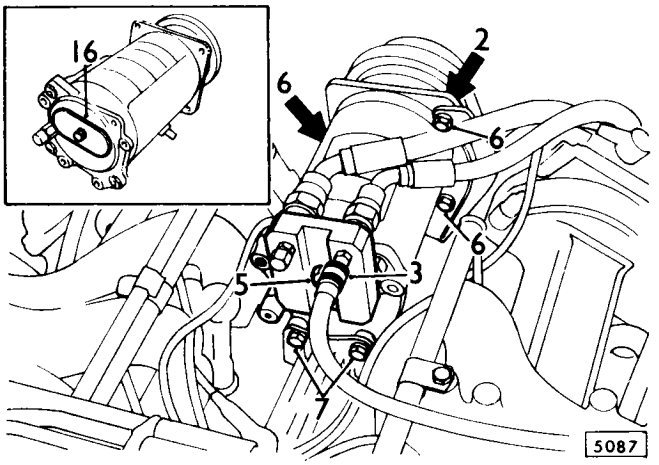
NOTE: Use 'O' ring seals removed in operation 5 beneath shipping plate.

17. Remove sealing plugs from valve and union housing assembly and secure to rear of replacement compressor using one setscrew and spring washer. Torque 4,5 kg.m to 11,3 kg.m (10 lb.ft to 25 lb.ft.).

NOTE: Ensure replacement 'O' ring seals are not displaced.

18. Refit compressor drive belt.
19. Refit electrical connector to clutch coil.
20. Reconnect battery
21. Charge air conditioning system subject to the condition of oil removed in operation 9 – 82.30.08.

CAUTION: After charging, cycle clutch in and out 10 times with blower fan set to low. This ensures that faces of pulley and clutch plate are correctly bedded in before a high demand is made upon them.



CONDENSER

Remove and refit 82.15.07

WARNING: Before commencing work on this operation, refer to general section 82.00.00.

NOTE: Ensure that suitable clean, dry male and female sealing plugs are to hand.

Removing

1. Disconnect battery – 86.15.19.
2. Depressurise air conditioning system – 82.30.05.
3. **Using two spanners**, release the upper union on condenser matrix.

   IMMEDIATELY seal each connector using clean dry plugs.

4. **Using two spanners**, release the lower union on condenser matrix.

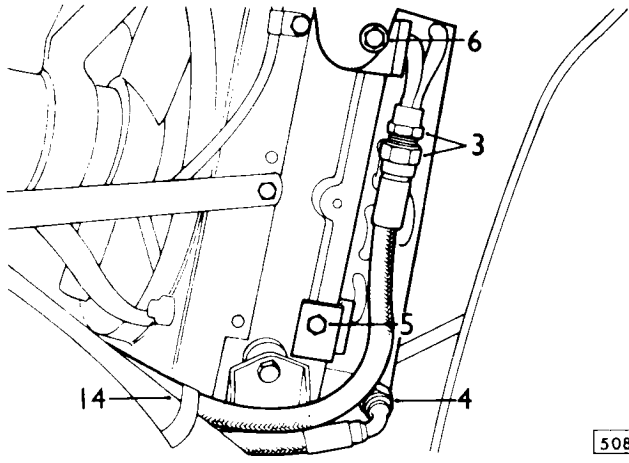
   IMMEDIATELY seal each connector using clean dry plugs.

5. Remove two setscrews and spring washers securing bottom of condenser matrix.
6. Support core, and remove two setscrews, large plain washers and spring washers securing top of condenser matrix.
7. Lift condenser matrix from vehicle.

Refitting

CAUTION: The replacement condenser **MUST** have sealing plugs fitted. If not, the unit must be rejected and another used. The setscrews used to secure the condenser **MUST NOT EXCEED** the stated length. Longer screws will irreparably damage the radiator core.

8. Measure 15 g. (½ oz.) of clean new refrigerant oil, remove plug and pour oil into lower connection of condenser. Replace plug. Rotate condenser to disperse oil.
9. Using two 15,8 mm (.625 in.) long setscrews, two large plain washers, and two spring washers, loosely secure top brackets of condenser beneath cowl.
10. Using two 12,7 mm (.5 in.) long setscrews and two spring washers, loosely secure bottom brackets to radiator.
11. Tighten four setscrews securing condenser.
12. Using two spanners fit lower connector to condenser **immediately** after removing sealing plugs. Securely tighten to torque given in 82.00.00 at angle shown. Ensure hose not kinked or twisted.
13. Using two spanners, fit upper connector to condenser **immediately** after removing sealing plugs. Securely tighten to torque given in 82.00.00. Ensure hose not kinked or twisted.
14. Settle lie of hoses **INSIDE** frame tube.
15. Reconnect battery.
16. Charge air conditioning system – 82.30.08.



5088

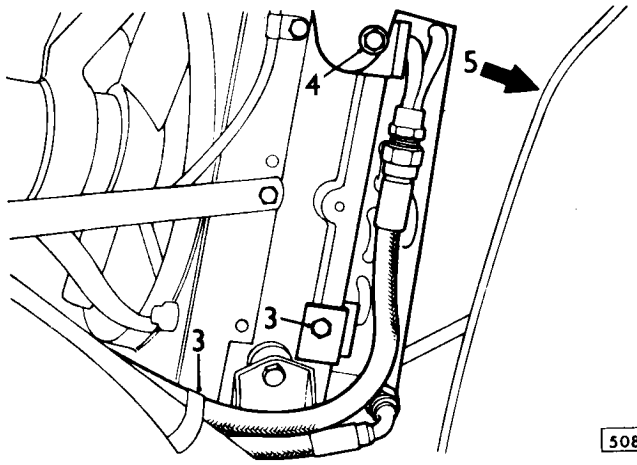
Cleaning matrix

The condenser matrix is mounted in a position that receives maximum flow of air while the vehicle is moving. In addition, while the air conditioning system is in operation, the radiator cooling fans run continuously.
It is therefore advisable to check at regular intervals to ensure that the matrix is not obstructed by an accumulation of insects and other debris. A procedure for cleaning the matrix is given, and if followed whenever necessary will ensure that the air conditioning system and the engine coolant radiator operate at top efficiency.

1. Place front wheels of vehicle on wood blocks. 30,5 cm (12 in.) long, 25,4 cm (10 in.) wide and 15 cm (6 in.) high and disconnect bonnet stay.
2. Place rubber mat or link mat across inside of bonnet to prevent damage to matrix.
3. Remove two setscrews and spring washers from bottom brackets of matrix. Remove hose strapping.
4. Support matrix and remove two setscrews, large plain washers and spring washers from top brackets of matrix.
5. Lay matrix forward into bonnet, supporting and padding as necessary to avoid straining or twisting hoses.
6. Using a shop airline directed from the back surface towards the front, remove all debris. Use hose to disperse caked mud.

   CAUTION: The setscrews **MUST** be replaced in the position from which they were removed.

7. Using two 15,8 mm (.625 in.) long setscrews, two large plain washers, and two spring washers, loosely secure top brackets of condenser beneath air intake deflector cowl.
8. Using two 12,7 mm (.5 in.) long setscrews and two spring washers, loosely secure bottom brackets to radiator.
9. Tighten four setscrews securing condenser. Torque 1,0 kg.m (7.0 lb.ft.).
10. Remove all mats and padding used.
11. Ensure hoses lie **INSIDE** frame tube. Refit strapping.
12. Refit bonnet stay.



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LIQUID RECEIVER/DRIER

Remove and refit 82.17.01

WARNING: Before commencing work on this operation, refer to general section **82.00.00.**

CAUTION: If the replacement receiver/drier is not fitted with sealing plugs, or is left open for longer than 5 minutes, it **MUST NOT** be used. Return to supplier as defective.

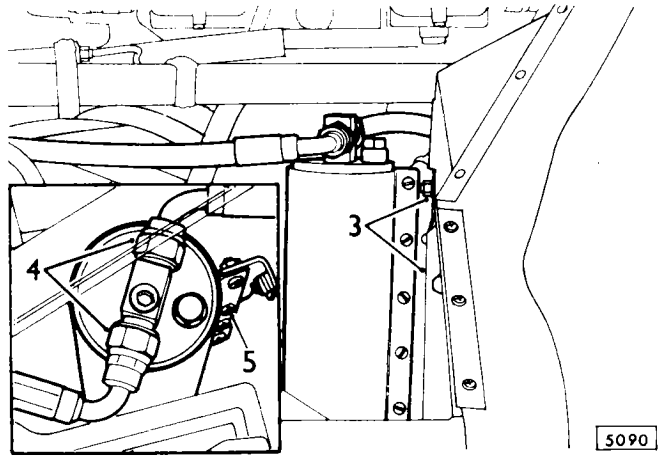
NOTE: Ensure that suitable clean, dry male and female sealing plugs are to hand.

Removing

1. Disconnect and remove battery – 86.15.01.
2. Depressurise air conditioning system – 82.30.05.
3. Remove two setscrews, plain and spring washers securing receiver/drier carrier bracket to right hand mudshield.
4. Remove hose connectors from head of receiver/drier. **Immediately** seal all connections using clean dry plugs.
5. Remove four screws and nuts closing carrier.
6. Remove receiver/drier from carrier.

Refitting

7. Position new filter/drier in carrier, tank top level with top of carrier and angled as shown. Secure carrier and bracket with four screws and nuts.
8. Measure 15 g. (½ oz.) of clean new refrigerant oil, remove plug and pour oil into inlet connector.
9. Remove plug from inlet hose, and make connection. Torque to level given in general – **82.00.04.**
10. Remove plug from outlet connector and outlet hose, and make connection. Torque to level given in general – **82.00.04.**
11. Secure bracket to right-hand mudshield using two setscrews, plain and spring washers. Torque level is given in general – **82.00.04.**
12. Ensure hoses are not kinked or twisted.
13. Charge air conditioning system – 82.30.08.
14. Refit and connect battery.



CONTROLS 82.20.00

The air conditioning system is controlled by the driver through two knobs on the evaporator unit front case. The right hand control is a four position switch. This is used to engage the air conditioning system and set the three speeds of the recirculating blower unit in the evaporator. The left hand control adjusts a thermostatically controlled, variable switch.

The thermostatic probe is positioned within the evaporator matrix, and senses the temperature at this point. The switch breaks the supply of the compressor clutch current when the temperature falls to the desired level, thus stopping the refrigerating cycle. Current is restored to the clutch, when the evaporator coil temperature has risen a set amount, so re-starting the cycle.

Rotating the control clockwise lowers the temperature at which the thermostat operates.

CONTROL SWITCH

Remove and refit 82.20.07

Removing

1. Remove evaporator front case – 82.25.18.
2. Remove knob from control switch.
3. Remove two countersunk head screws from escutcheon plate.
4. Remove one countersunk head screw securing top of switch bracket.
5. Pull off electrical connectors and note terminals.
6. Remove two screws securing switch mounting bracket to switch.

Refitting

7. Fit mounting bracket to replacement switch and retain with two special screws.
8. Make electrical connections to switch.
9. Place switch in position and loosely secure with two countersunk head screws through escutcheon plate.
10. Fit countersunk head screw through top of front cover to locate switch bracket.
11. Tighten all three screws.
12. Fit knob.
13. Fit evaporator front case.

AIR CONDITIONING SYSTEM RELAYS

When the air conditioning system is installed, two additional relays are used. They operate as follows:–
Air Conditioning Relay is fitted upon the left hand mudshield. It supplies current to the control switch while the ignition is on (position II). This powers the compressor clutch via the thermostatic control. The relay coil current is broken while the starter motor is operating, ensuring that the engine does not have to start while loaded by the compressor.

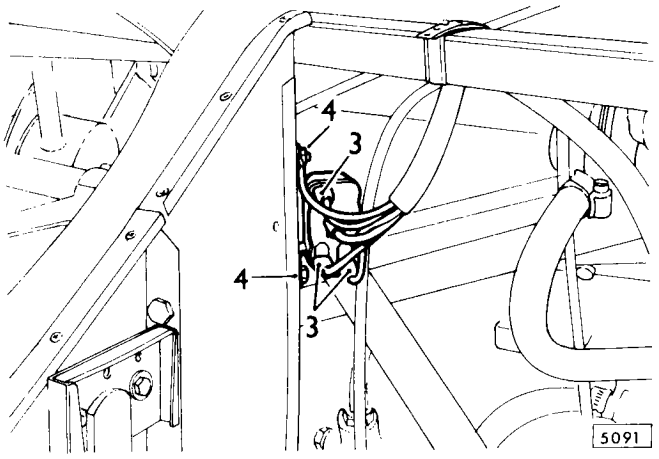
Radiator Cooling Fan Thermostat Relay is mounted on the left hand side on top of the radiator. It provides a short circuit path across the cooling fan thermostat when the air conditioning system is switched on. The cooling fans therefore run continually while the air conditioning is operating.

MAIN RELAY (AIR CONDITIONING)

Remove and refit 82.20.08

Removing

1. Disconnect battery – 85.15.19.
2. Release servo brake fluid reservoir bracket from mudshield and suspend reservoir, up-right beneath heater.
3. Note connections on relay, then release connectors.
4. Remove two setscrews and plain nuts securing relay. Recover earth cable from upper screw and spring washer from lower.



Refitting

5. Fit connectors to relay.
6. Secure relay in position using setscrew and nut at top. Fit earth cable beneath nut.
7. Fit setscrew, spring washer and nut to secure bottom of relay.
8. Refit servo brake fluid reservoir bracket to mudshield.
9. Reconnect battery.

RADIATOR COOLING FAN THERMOSTAT RELAY

Remove and refit

Removing

1. Follow procedure given in 26.25.31.

Refitting

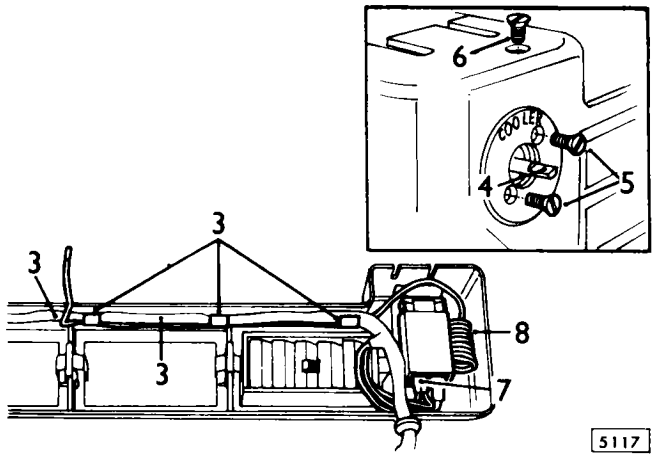
Follow procedure given in 26.25.31.

THERMOSTAT

Remove and refit **82.20.18**

Removing

1. Remove evaporator front case – 82.25.18.
2. Remove knob from thermostat.
3. Pull cable harness from clips that also control thermostat capillary.
4. Remove knob from thermostat control.
5. Remove two countersunk head screws from escutcheon plate.
6. Remove one countersunk head screw securing top of thermostat bracket.
7. Pull off electrical connectors and note terminals.
8. Do not disturb lie of thermostat capillary. This can be used as a pattern to assist in forming replacement.
9. Remove two special screws securing mounting bracket to thermostat.

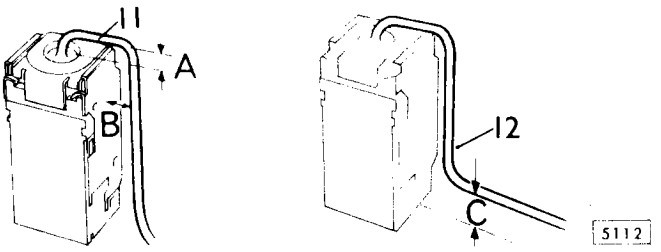


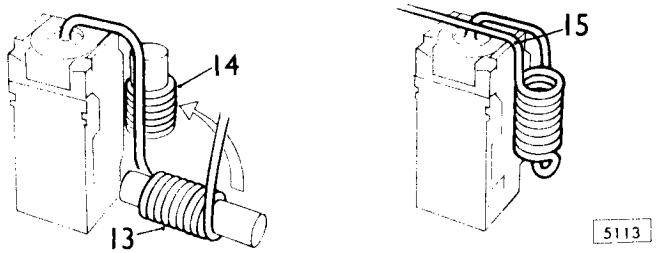
Refitting

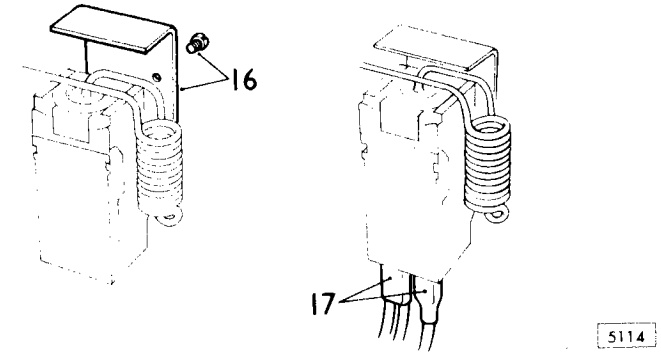
10. The thermostat capillary must be pre-formed before assembly into the front cover.

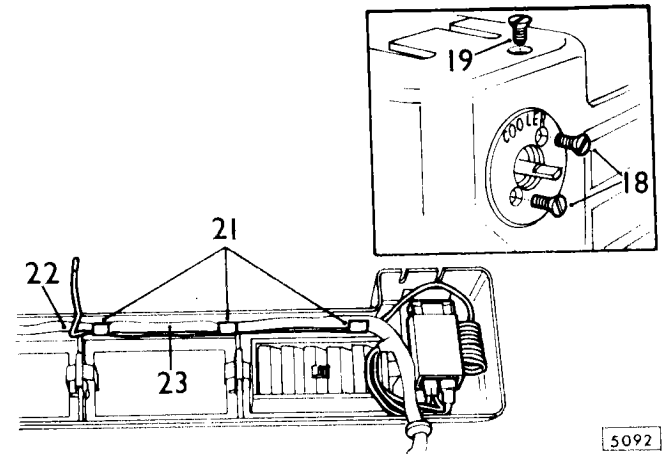
    CAUTION: The capillary tube must be carefully bent in any direction only once. It must not, under any circumstances, be kinked or worked back and fore.

11. Bend capillary over to right hand side of thermostat. Dimensions A and B 7,93 mm (.31 in.).
12. Form second bend. Dimension C 7,93 mm (.31 in.).
13. Commencing at a point 12,7 mm (0.5 in.) along horizontal length of capillary, carefully wind 8½ full close turns upon a length of 9,52 mm (.375 in.) wooden dowel. The greatest care must be taken not to kink the tube during this operation.
14. With dowel still in place carefully move coil through 90 degrees to lie alongside thermostat.
15. Remove dowel, and carefully bend capillary across top of thermostat.
16. Fit thermostat bracket and secure with two special screws.
17. Make electrical connections to thermostat.
18. Place switch in position and loosely secure with two countersunk head screws through escutcheon plate.
19. Fit countersunk head screw through top of front cover to locate switch bracket.
20. Tighten all three screws.
21. Bend capillary to lay in three right hand clips and to pass beneath harness.
22. Immediately past third clip bend capillary away from front cover at 90 degrees.
23. Press harness into right hand three clips to retain capillary.
24. Fit knob.
25. Test offer front case to evaporator unit and ensure capillary sensing end passes into evaporator core and is in contact with core. If necessary, put slight set, in capillary to ensure contact.
26. Fit evaporator front case.





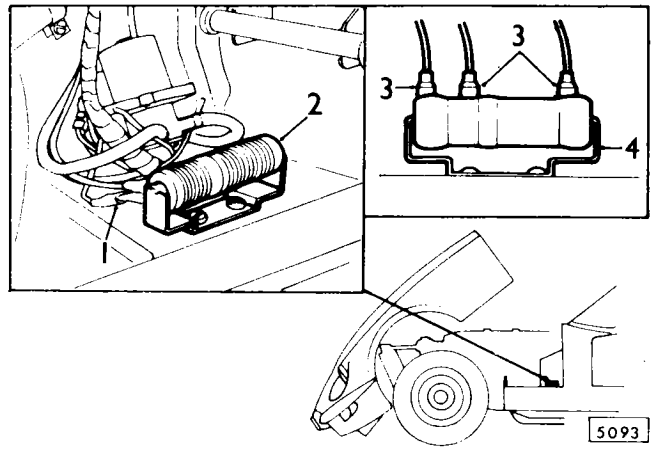




BLOWER MOTOR RESISTANCE UNIT

The resistance unit consists of high dissipation, wirewound resistances switched in series to control blower motor speed.

Remove and refit 82.20.26



Removing

1. Pull electrical connectors from resistance. Note cable locations.
2. Remove resistance from clip.

Refitting

3. Fit electrical connectors to replacement resistor.
4. Fit unit into clips.

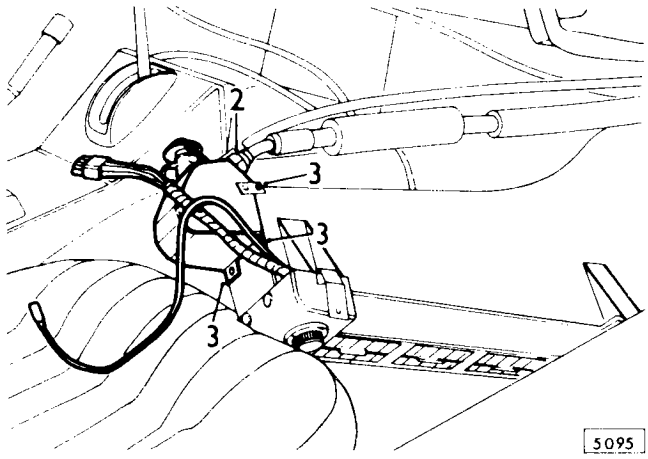
CAUTION: The connectors must be fitted as removed. Incorrect installation will over-load the unit, give incorrect speeds, and lead to premature failure.

EXPANSION VALVE

Remove and refit 82.25.01

WARNING: Before commencing work on this operation, refer to general section **82.00.04.**

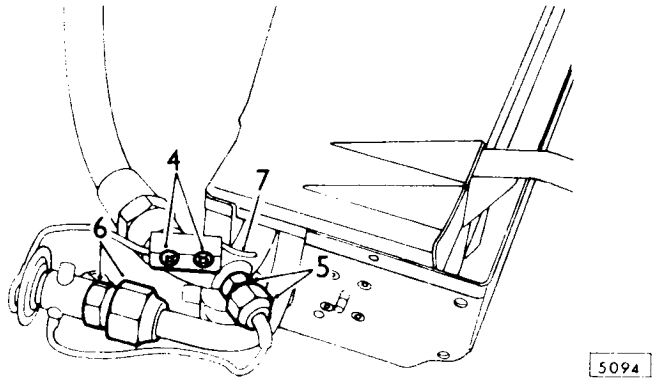
NOTE: Ensure that suitable clean, dry male and female sealing plugs are to hand.



Removing

1. Remove evaporator unit assembly, operations 1 to 21 - 82.25.20.
2. Release inlet hose connection to expansion valve. **IMMEDIATELY** plug both connections.
3. Remove three small self tapping screws securing expansion valve cover. Remove filler pads. Loosen insulating material.
4. Remove two self tapping screws from outlet temperature sensing coil clip.
5. Restrain boss nut and release pressure balancing pipe union (if fitted).
6. Restrain expansion valve body and release pipe union nut. Draw valve clear.

IMMEDIATELY plug evaporator inlet pipe.



Refitting

7. Locate outlet temperature sensing coil in clip and fit screws.
8. Remove sealing plugs and fit expansion valve to evaporator.
9. Set angle of expansion valve and finger tighten pipe union nut.
10. Fit pressure balancing pipe union (if fitted). Restrain boss nut and tighten.
11. Restrain expansion valve body and tighten pipe union nut. Torque 2,1 to 2,8 kg.m (15 to 20 lb.ft.).
12. Remove sealing plugs and fit inlet hose to expansion valve. Torque to level given in general 82.10.00 Wrap insulation around inlet and outlet hose connections.
13. Fit expansion valve cover over filler pads and secure with three small self tapping screws.
14. Refit evaporator unit assembly, operations 25 to 34.

BLOWER ASSEMBLY

Remove and refit 82.25.13

Removing

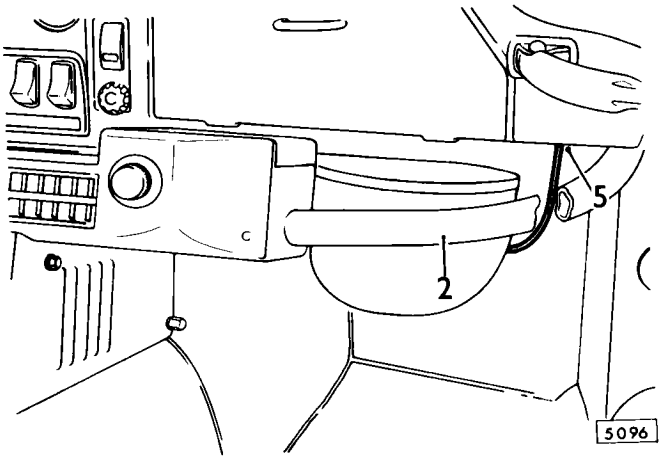
1. Disconnect battery – 86.15.19.
2. Remove right hand parcel tray – 76.67.05.
3. Remove one screw securing dash liner.
4. Manoeuvre dash liner clear.
5. Remove screw securing blower earth cable.
6. In right hand footwell, reach up behind evaporator blower fan duct and pull cable down from clips.
7. Separate blower motor cable connector.
8. Remove two self tapping screws securing blower intake cowl.

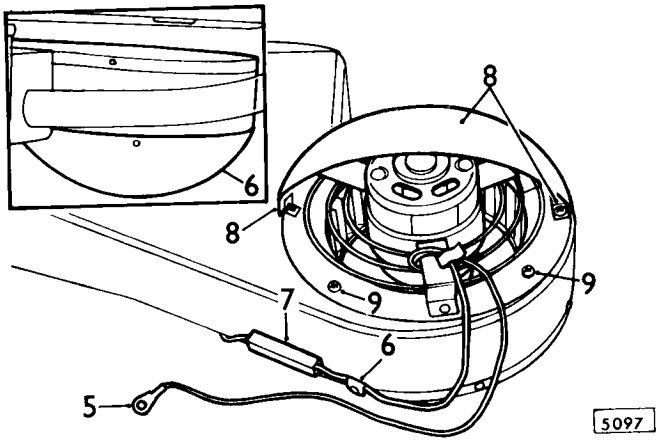
   NOTE: Pull cowl out towards front seats to disengage clip.

9. Support blower assembly while removing four setscrews securing blower assembly in bottom case.

Refitting

10. Reverse operations 1 to 9 inclusive.





LOUVRE ASSEMBLY

Remove and refit 82.25.16

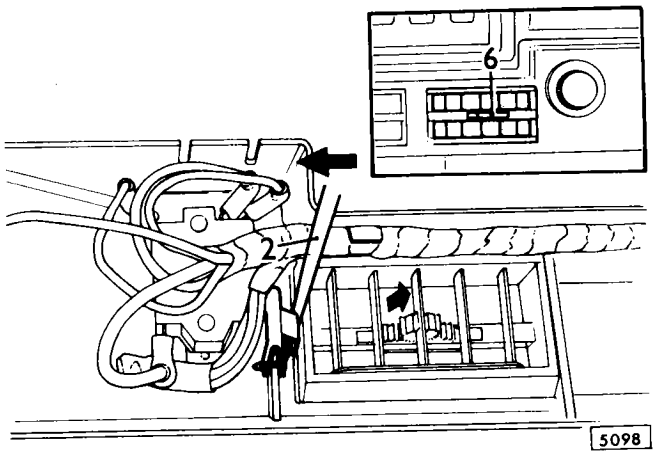
Removing

1. Remove evaporator front case – 82.25.18.
2. Insert knife blade beneath clip at one end of louvre assembly to one side of pivot.
3. Gently lever away from louvre assembly, at the same time pressing upwards from beneath.
4. Remove louvre assembly towards interior of front case.

Refitting

NOTE: The louvre assemblies are handed and only close fully in one direction. In order to distribute air flow to the best advantage they must be fitted as follows.

5. Operate louvre slide button to fully close louvres.
6. Fit louvre into rear of front case such that slide button is away from the centre line of front case.
7. Locate one pivot in a spring clip.
8. Align pivot at other end with hole in spring clip and press down into engagement.
9. Check for free movement. Left hand louvre has limited travel, but others should rotate through 360 degrees.
10. Refit evaporator front case.



LOUVRE ASSEMBLY CLIP

Remove and refit 82.25.17

Removing

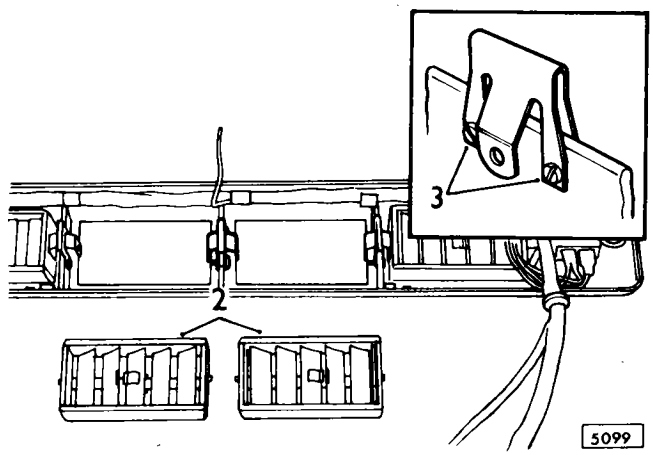
1. Remove evaporator front case – 82.25.18.
2. Remove louvre assembly on either side of damaged clip – 82.25.23.

   NOTE: If clip is at one end, one louvre assembly only need be removed.

3. Slacken two self tapping screws securing clip.

Refitting

4. Fit new clip in position and lightly secure with two self tapping screws.
5. Set position of clip so that a dimension of 13,5 mm (.53 in.) exists between front face of case and centre of pivot hole on both sides of clip.
6. Fully tighten screws.
7. Refit louvre assemblies.
8. Refit evaporator front case.



EVAPORATOR UNIT FRONT CASE

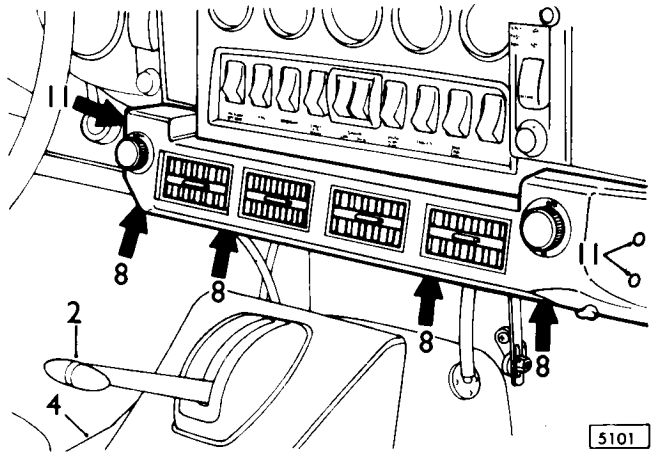
Remove and refit in situ 82.25.18

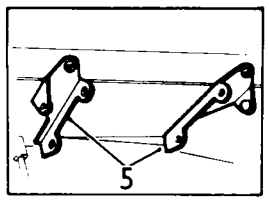
Removing

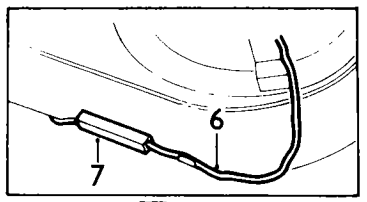
1. Disconnect battery – 86.15.19.
2. Engage 2nd gear (standard car) or 'L' (automatic transmission).
3. Chock wheels.
4. Set handbrake fully off.
5. Remove radio mounting brackets – 86.50.02.
6. In right hand footwell, reach up behind evaporator blower fan duct and pull cable down from clips.
7. Separate blower motor cable connector.
8. Remove four countersunk head screws beneath front case.
9. Release two knurled finger nuts securing instrument panel and hinge down.
10. Release white, sleeved, cable from fuse station 7 at right hand side.
11. Draw front case straight away from evaporator unit assembly until thermostat sensor is clear of core.
12. Disconnect multipin connector at left hand side.
13. Draw blower cable through grommet at right hand side.

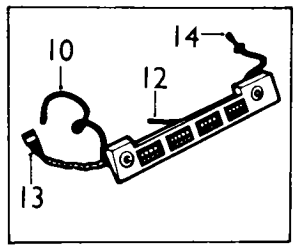
Refitting

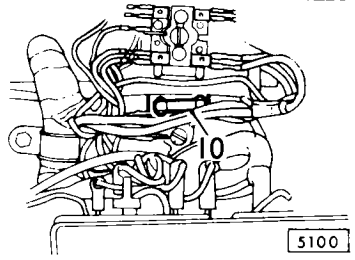
Reverse operations 1 to 13 inclusive.











EVAPORATOR UNIT ASSEMBLY

Remove and refit 82.25.20

WARNING: Before commencing work on this operation refer to general section 82.10.00.

NOTE: Ensure that suitable clean dry male and female blanking plugs are to hand.

Removing

1. Disconnect battery – 86.15.19.
2. Depressurise air conditioning system – 82.30.05.

NOTE: It is only necessary to depressurise the system if it is intended to disconnect hoses.

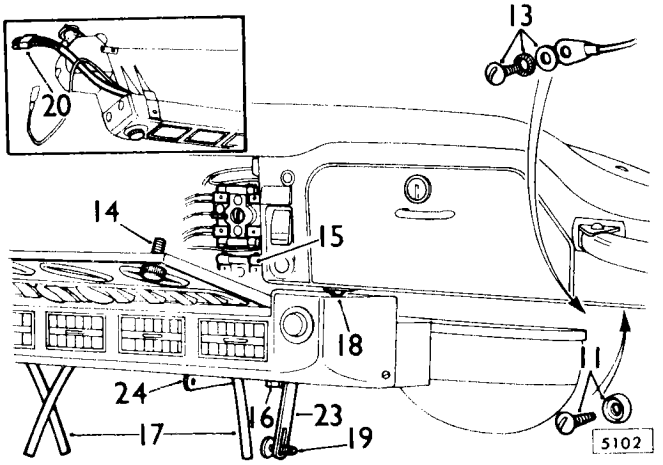
3. Engage 2nd gear (standard car) or 'L' (automatic transmission).
4. Chock wheels.
5. Set handbrake fully off.
6. Slide seats fully to rear.
7. Remove radio panel and radio (if fitted) – 86.50.04 – 86.50.03.
8. Protect gear shift or transmission selector with suitable piece of felt.
9. Remove left hand parcel tray – 76.67.04.
10. Remove right hand parcel tray – 76.67.05.
11. Remove one self tapping screw and cup washer securing under dash liner at right hand side.
12. Manoeuvre dash liner clear.
13. Remove one self tapping screw, plain and shakeproof washer securing blower earthing cable.
14. Release two knurled finger nuts securing instrument panel and hinge down.
15. Remove sleeved white cable from fuse number 7, right hand side.
16. Beneath right hand side of evaporator unit assembly loosen set screw at top of steady stay.
17. Pull three condensate drain tubes from underside of unit.
18. Release two self tapping screws securing evaporator unit assembly.
19. Press evaporator unit inwards far enough to release front brackets from flange. Simultaneously release steady stay from radio panel stud.
20. Pull evaporator unit out into car and release multipin connector at left hand side. Draw sleeved white lead from behind instrument panel.
21. Lower unit to rest in right hand side footwell.
22. Using two spanners, release inlet and outlet hose connections.

IMMEDIATELY plug all connectors.

23. Remove steady stay.
24. Remove radio mouting bracket.

Refitting

25. Fit radio mounting bracket.
26. If replacement evaporator unit assembly drawn from stores, measure 15 g (½ oz.) of clean, new refrigerant oil, remove plug from outlet connector and pour oil into core.
27. Remove plug from outlet hose and fit to connector.
28. Settle lay of hose and tighten connector to torque given in **82.00.04;** using two spanners.
29. Remove plugs from inlet hose and connector and make connection.
30. Settle lay of hose and tighten connector to torque given in **82.00.04;** using two spanners.
31. Loosely fit steady stay using one setscrew and plain washer.
32. Complete reassembly by reversing operations 3 to 20.
33. Connect battery.
34. Charge air conditioning system – 82.30.08.



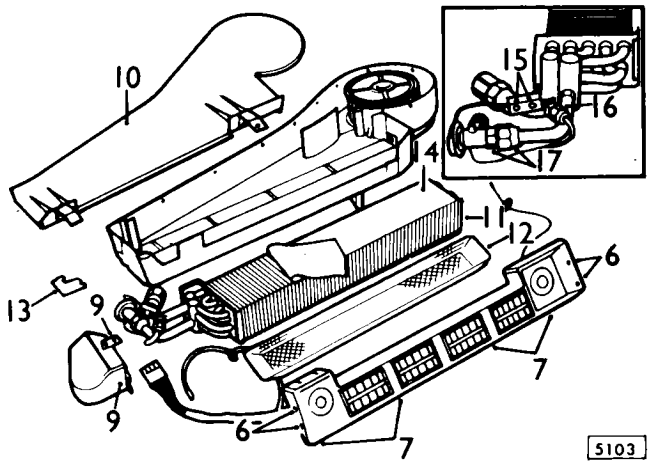
EVAPORATOR MATRIX

Remove and refit 82.25.22

WARNING: Before commencing work on this operation, refer to general section 82.00.00.

Removing

1. Disconnect battery – 86.15.19.
2. Depressurise air conditioning system – 82.30.05.
3. Remove evaporator unit assembly – 82.25.20.
4. Remove radio mounting brackets.
5. Slacken self tapping screws at blower cable clips and release cable connector.
6. Remove two plastic locating pins at either side of front case by carefully levering with a knife blade.
7. Remove four countersunk head self tapping screws along bottom of front case.
8. Draw front case straight away from evaporator unit assembly until thermostat sensor is clear of core.
9. Remove three small self tapping screws securing expansion valve cover.
10. Remove thirteen small self tapping screws securing top cover. Recover two clips.
11. Carefully lift evaporator matrix from bottom case.
12. Recover front grill screen.
13. Recover rubber seal at inlet and outlet pipes.
14. Recover sealing sheet along top of evaporator matrix.
15. Remove two self tapping screws from outlet temperature sensing coil clip.
16. Restrain boss nut and release pressure balancing pipe union (if fitted).
17. Restrain expansion valve body and release pipe union nut. Draw valve clear.
18. Blank off expansion valve.



Refitting

NOTE: Ensure blanking plugs removed immediately before making connections.

19. Locate outlet temperature sensing coil in clip and fit screws.
20. Set angle of expansion valve.
21. Finger tighten expansion valve to pipe union nut.
22. Fit pressure balancing pipe union (if fitted). Restrain boss nut and tighten.
23. Restrain expansion valve body and tighten pipe union nut. Wrap insulation around inlet and outlet pipe connections.
24. Locate small pad at bottom of inlet and outlet pipe headers.
25. Fit sealing sheet.
26. Fit front grill screen.
27. Offer front case to evaporator coil to matrix, ensure hole in front grill locates with thermostat sensor.
28. Use a sharpened piece of 4,76 mm (.187 in.) **wooden dowel** and part evaporator core fins to give interference hole for thermostat sensor.
29. Carefully lower evaporator matrix into bottom case ensuring flanges locate correctly.

NOTE: Before fitting matrix to bottom case, carefully check to ensure case is watertight, and all sealing compound in good condition.

30. Fit rubber seal at inlet and outlet pipes.
31. Place top cover in position and secure with thirteen small self tapping screws. Fit cable clips where shown and do not tighten these screws. Seal joint with suitable, non-hardening sealing compound.
32. Fit front cover and secure with four countersunk head screws.

    NOTE: Ensure thermostat sensor fits straight into evaporator core, and blower motor cable passes through grommet hole in top cover.

33. Fit four plastic locating pins.
34. Connect blower motor cable and pass cable beneath clips.
35. Tighten clip screws.
36. Measure 15 g (½ oz.) of clean new refrigerant oil, remove plug from outlet connector and pour oil into core. Refit plug and position evaporator to ensure oil flows into core.
37. Fit evaporator unit assembly.
38. Refit radio mountings, radio (if fitted) and radio panel.
39. Connect battery.
40. Charge air conditioning system – 82.30.08.

HOSES

Remove and refit **82.25.26**

WARNING: Before commencing work on this operation, refer to general section 82.00.00.

NOTE: Ensure that suitable clean dry male and female sealing plugs are to hand.

1. Before attempting to remove any hoses, the air conditioning system MUST be depressurised – 82.30.05.
2. Hoses used as replacements must have sealing plugs fitted at each end. The plugs must not be removed until immediately before the connection is made.
3. In several cases it is advantageous to remove a component before attempting to remove hoses. This makes the correct reconnection procedure much easier.
4. In all cases two spanners must be used in opposition to avoid straining the component at hose connections.
5. If the suction hose between the evaporator and the compressor is to be changed, the hose may be cut at the outlet plate in right hand pedal board to facilitate removal. When replacing this hose it is advisable to test lay it in position and ensure that it is correct end for end. Check condition of grommet at pedal board and replace if necessary. Fit the hose by feeding the evaporator end along its run from the front of the engine to the pedal board, then through the pedal board and on to the evaporator. The large pieces of insulation material must be stripped from the defective hose, and replaced, positioned identically, on the new.
6. In all cases, settle the lay of a hose to ensure it is not kinked or trapped before torque tightening the end connections and locating clips or strapping.
7. If either of the hoses to condenser are to be changed, ensure, after refitting that both lay **INSIDE** the frame tube.

BLOWER ASSEMBLY

Overhaul 82.25.30

Dismantling

1. Using long slim Allen headed screwdriver, release blower fan locking screw.
2. Pull fan from motor shaft.
3. Release motor cables from clip.
4. Slacken clamp nut and bolt, and withdraw motor.

Assembling

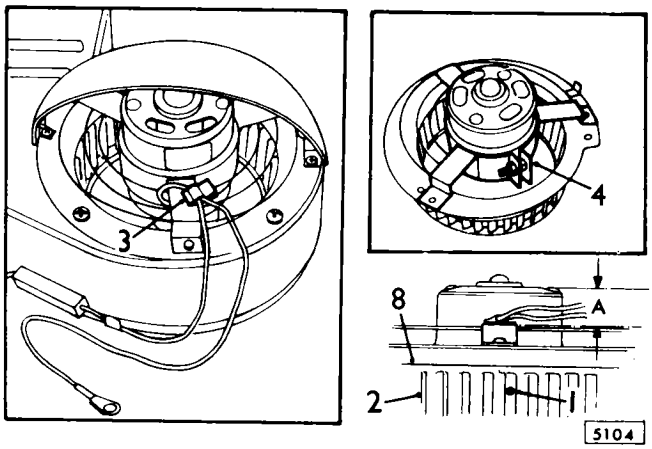
5. Fit motor into clamp and loosely secure.

   NOTE: Position cable outlet hole adjacent to clip on limb of clamp ring.

6. Position motor to obtain a dimension 'A' of 30,16 mm (.812 in.) between bracket and top face of motor casing. Tighten clamp nut and bolt.
7. Fit both cables through clip.
8. Place fan on motor spindle and position so that bottom outside rim of fan is level with top of mounting ring flare.

   NOTE: Some degree of run out is permissible, but the fan must not touch the flare at any point.

9. Tighten locking screw using a long slim Allen headed screwdriver.



CHARGING AND TESTING EQUIPMENT

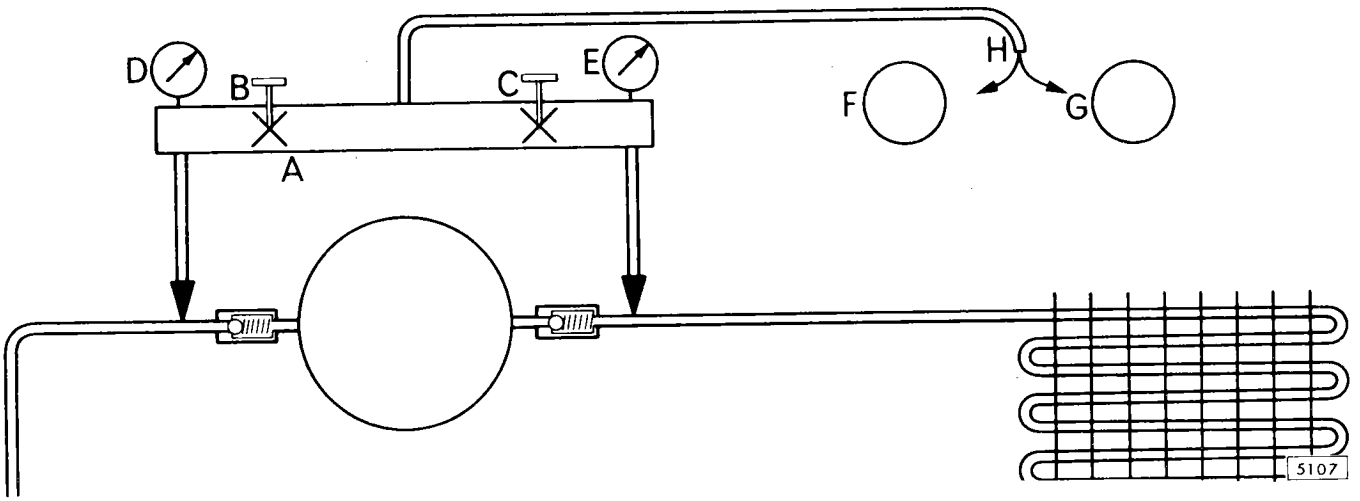
WARNING: Before commencing work on this operation, refer to general – 82.00.00.

Fit and remove **82.30.01**

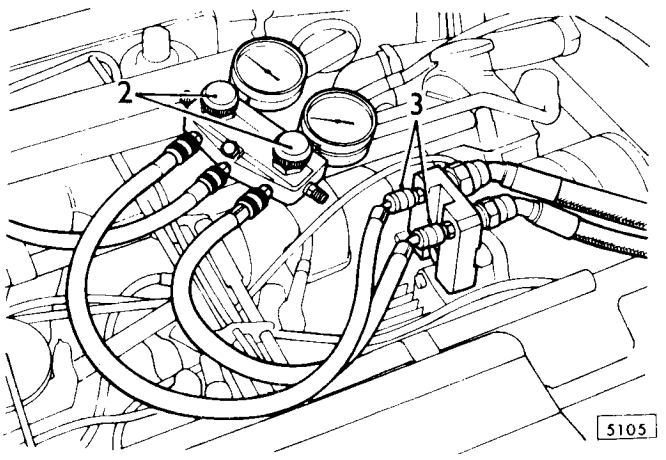
The charging and testing equipment consists of a charging manifold A fitted with two stop valves B and C and two pressure gauges D and E, a vacuum pump F, and a supply of refrigerant gas, G.
One gauge is a compound type, reading both vacuum and positive pressure, and is connected to the suction side of the union housing; the other is a high pressure gauge and is connected to the delivery side.

WARNING: FOR SAFETY REASONS, THE ACCURACY OF BOTH GAUGES MUST BE CHECKED AT FREQUENT INTERVALS

The stop valves enable either suction or delivery hoses, or both, to be connected to the centre port of the manifold. The centre hose H can be connected either to a vacuum pump or to a supply of refrigerant. Two hose connectors to union housing must be fitted with depressers to operate the Schrader valve. The equipment should be fitted with a means of accurately weighing the refrigerant container during the charging process.



1. To fit the charging manifold to the air conditioning system, remove the protective sealing caps over the union housing Schrader valves.
2. Ensure both manifold stop valves are fully closed (screwed in).
3. **Quickly** fit hose connectors to correct Schrader valves. The gauges will display system pressures on suction and delivery sides.
4. To remove the equipment from the vehicle, **quickly** unscrew each connector in turn. This ensures that the Schrader valves are held open for the shortest possible time.
   Refit the valve sealing caps.



AIR CONDITION SYSTEM

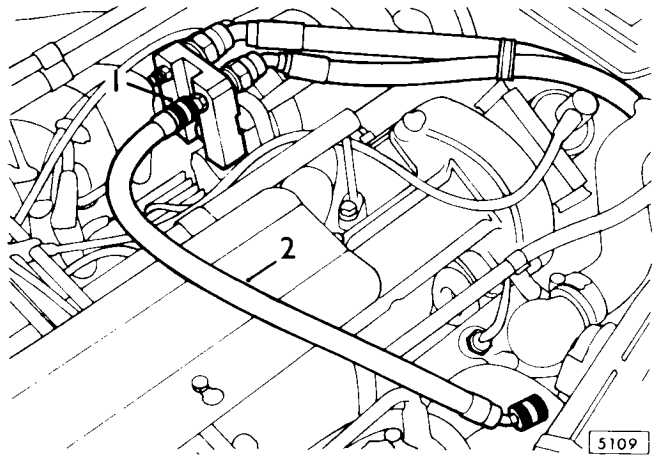
WARNING: Before commencing work on this operation refer to general 82.00.00.

Depressurise 82.30.05

Depressurising the system means that the system is vented until the refrigerant remaining is at atmospheric pressure. The system is then resealed to prevent air contaminating the components.
This procedure **MUST** be carried out before any connection is released.
It is very important that the method used is **EXACTLY** as described. Too rapid venting entrains the compressor lubricating oil and necessitates refilling to the correct level. See 82.10.20.

WARNING: NO SMOKING. POINT THE VENT HOSE IN A SAFE DIRECTION

1. Remove protective cap over the union housing discharge Schrader valve.
2. Using a piece of hose approximately 91 cm (36 in.) long, fitted with a suitable connector, vent the system by **SLOWLY** screwing the hose connector on to the discharge side of the union housing.
3. If oil is seen escaping or if the vented gas becomes dense and white, **IMMEDIATELY** slow the flow rate by unscrewing the hose.
4. As the flow rate falls, the hose connector can be screwed further on to the union.
5. When no further gas escapes, and the hose connector is fully home **IMMEDIATELY** unscrew it as quickly as possible.
6. Refit protective sealing cap.

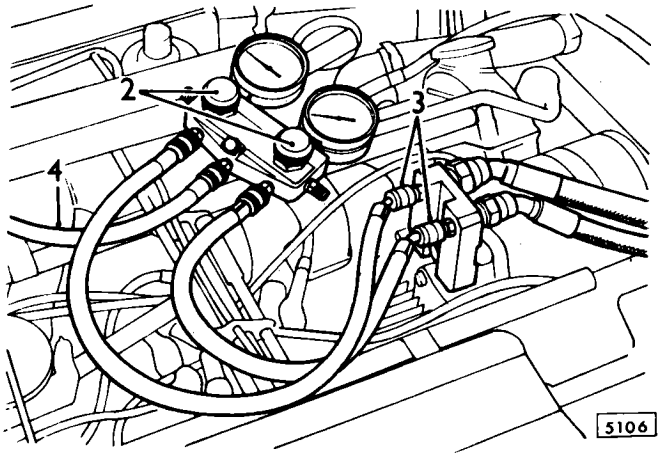


AIR CONDITIONING SYSTEM

Evacuate 82.30.06

The system is evacuated by removing all residual gas or air after depressurisation and/or repair using a vacuum pump.
Evacuation must be carried out before charging, as the ability of the system to hold a high vacuum is a measure of its tightness; the vacuum also assists in drawing in the charge of refrigerant.
The evacuation process serves to boil off any moisture in the system if ambient temperature is high enough. In conditions of low ambient temperature the purging method of system cleansing must be used before charging.
Any sign of a rapid fall in vacuum indicates a serious leak. This must be found and rectified **IMMEDIATELY**, as air is being drawn in through the leak.
Follow the procedure given under leak test – 82.30.09 before proceeding. The procedure given here refers to the evacuation of an old system. The method for a new system is similar, but **no** decrease in vacuum is permitted.

1. Remove both protective caps over union housing Schrader valves.
2. Ensure both manifold stop valves are fully closed (screwed in).
3. **Quickly** fit hose connectors to correct Schrader valves.
4. Fit centre hose of charging manifold to vacuum pump connection.
5. Fully open both valves of charging manifold.
6. Start vacuum pump.
7. Wait until a vacuum of 50.8 Torr (28 in Hg.) has been drawn, or when the maximum that can be achieved with the prevailing barometric conditions is obtained.
8. Close both valves on charging manifold.
9. Switch off vacuum pump and wait 20 minutes.
10. A very slight pressure rise may occur due to the slow evaporation of liquid refrigerant or moisture entrained in the compressor oil.
11. If the vacuum holds satisfactorily, switch on vacuum pump, open both charging manifold valves and allow the pump to pull on the system for a further 20 minutes.
12. Fully close both charging manifold valves.
13. Switch off vacuum pump.
14. Disconnect centre hose from vacuum pump connection.
    The air conditioning system is now ready for charging – 82.30.07.



AIR CONDITIONING SYSTEM

WARNING: Before commencing work on this operation, refer to general – 82.00.00.

Sweep (Purge) 82.30.07

The sweeping, or purging, operaion given below may be used in addition to, and following, evacuation as a method of removing the last traces of moisture if ambient temperature is low.
The operation must be carried out if the system has inadvertently been left open for longer than a few minutes on a humid day. The operation must also be carried out if moisture is suspected in the system following the diagnosis of a fault.
The receiver/drier **MUST** be replaced immediately after the purging operation, and before the final evacuation operation commences.

1. Evacuate system, operations 1 to 8 – 82.30.06.
2. Disconnect vacuum connection from pump and connect to refrigerant supply.
3. Open refrigerant supply valve.
4. To purge length of hose, slightly crack centre connector at charging manifold; retighten connection.
5. Slowly open the suction side valve on charging manifold and allow 0,23 kg. to 0,45 kg. (½ lb. to 1 lb.) of gas to enter system.
6. Close suction side valve on charging manifold.
7. Close refrigerant supply valve.
8. Leave for 10 minutes.
9. Disconnect hose from refrigerant supply.
10. Open both valves on charging manifold to allow refrigerant to escape slowly from system. IMMEDIATELY flow stops, reconnect hose to refrigerant supply.
11. Close suction side valve on charging manifold.
12. Loosen hose connection at suction side of charging manifold.
13. Open refrigerant supply valve slowly and allow gas to pass through entire system and escape at charging manifold for about 5 seconds.
14. Close refrigerant supply valve.
15. Close valve at pressure side of charging manifold.
16. Tighten suction side hose connection while gas still flows.
17. If system is being purged to remove excess moisture, change receiver/drier – 82.17.01 – before proceeding to evacuation and charging. If system is being purged owing to low ambient temperature, evacuate and charge immediately. Operations 4 to 14 – 82.30.06.

AIR CONDITIONING SYSTEM

WARNING: Before commencing work on this operation, refer to general – 82.00.00.

Charge 82.30.08

Charging the air conditioning system is the process of adding a specific quantity of refrigerant to the circuit. Before attempting the charging operation the system **MUST** have been evacuated and, if necessary, swept (purged) immediately beforehand. No delay between evacuation and charging procedures is permissible. Great care must be taken to charge correctly, as under charging will result in very inefficient operation, and over charging will result in very high pressures and possible damage to components.

1. Evacuate the system – 82.30.06.
2. Connect centre hose of charging manifold to supply of refrigerant. The supply available must be at least 3,3 kg. (7.2 lb.) weight.
3. Open refrigerant supply valve.
4. Purge centre hose by momentarily cracking connection at manifold block; retighten connector.
5. Record weight of refrigerant supply source.
6. Open both valves on charging manifold and allow refrigerant source pressure to fill vacuum in system.
7. Between 0,23 kg. and 0,45 kg. (½ lb. to 1 lb.) weight will enter the system.
   Record quantity.

   NOTE: The quantity drawn in will vary with ambient temperature.

8. Close pressure side valve on manifold block.
9. Ensure all clear and start vehicle engine. Run engine at 1500 r.p.m.
10. Set air conditioning system blower speed control to 'H'.

    NOTE: This engages compressor clutch to start system circulation, and runs blower motor at fast speed to heat evaporator coil. Vapour will be turned to liquid in the condenser and stored in the receiver drier.
11. Control flow of refrigerant with suction side valve on charging manifold, and allow a total weight (including operation 7) of 1,14 to 1,36 kg. (2½lb. to 3 lb.) refrigerant to enter system.
12. Close suction side valve.

    NOTE: Alternatively, observe sight glass on receiver/drier until sight glass clears, and no bubbles or foam are visible. Close suction valve.
    Re-open suction valve for 2 to 5 minutes (2 mins. if ambient temperature low, 5 minutes if high).
    This will allow an additional 0,11 kg. (¼ lb.) of refrigerant to enter the system.

13. Run system for 5 minutes, observing sight glass.
14. If foaming very slight, switch off engine.

    NOTE: It is normal for there to be slight foaming if ambient air temperature is 21°C (70°F) or below.

15. Close refrigerant supply valve; disconnect hose.
16. **Quickly** disconnect hoses from Schrader valves on union block.
17. Fit protective sealing caps.
18. Switch on engine and check function of air conditioning system – 82.30.16.
19. Switch off engine; flush engine compartment and interior of vehicle with shop compressed air line.
20. Conduct a leak test on installation – 82.30.09.

AIR CONDITIONING SYSTEM

Leak test 82.30.09

The system shall show no leaks when tested by a detector with high sensitivity ideally of 0,45 kg (1 lb.) in 32 years. Exceptions are the receiver/drier sight glass and uncapped Schrader valves, which must show no leakage when tested by a detector with sensitivity of 0,45 kg. (1 lb.) in 15 years.

Do not smoke while conducting the leak tests.

For safety reasons the discharge pressure gauge on the charging manifold must be checked at frequent intervals.

The testing area must be well ventilated, but free from draughts.

The system must be operated at high pressure before leak testing. As compressor discharge pressures are variable with ambient temperature the following procedure must be used.

Pressurising

1. Remove Schrader valve protective sealing cap from discharge connector at union housing.
2. Ensure both valves on charging manifold closed.
3. **Quickly** screw pressure hose from charging manifold block on to union.
4. If necessary blank off condenser.
5. Set heater control to full hot, fast fan.
6. Set air conditioning controls to full cold, fast blower.
7. Start engine and allow discharge pressure to reach 15,76 bars. (225 lb/sq. in.). Under no circumstances allow the pressure to rise above 17,58 Bars (250 lb/sq. in.).

CAUTION: Do not allow engine to overheat.

8. When pressure reaches 15,76 Bars (225 lb/sq. in.), turn off engine.
9. Continue with Testing.

Testing

1. All joints and fittings shall be free of excess oil to eliminate the possibility of false readings caused by refrigerant absorption in the oil. For this reason any joint tightened to eliminate leakage should be cleared with compressed air to remove refrigerant vapour.
2. Since refrigerant vapour is heavier than air, the detector probe must be moved in the area below the joint tested.

3. The detector probe must be held for at least 3 seconds closer than 6,4 m (.250 in.) to the joint tested.
4. The detector should be cleared with uncontaminated air before each usage.
5. False readings may occur if the detectors are used in atmospheres where solvents or volatile compounds containing halides (Fluorine, Bromine, Chlorine or Iodine) are present e.g. Trichlorethylene.

   Cigarette smoke and exhaust fumes may also cause false readings.

6. If the exact location of a leak is in doubt, liquid soap solution should be brushed on to the area and the position of the bubble observed.
7. The detector probe should be held at the air conditioning outlets with the system off and the fan turned on and off quickly to flow a small quantity of air. This procedure will find any leaks in the evaporator coil. The car body must be cleared of refrigerant before this test.

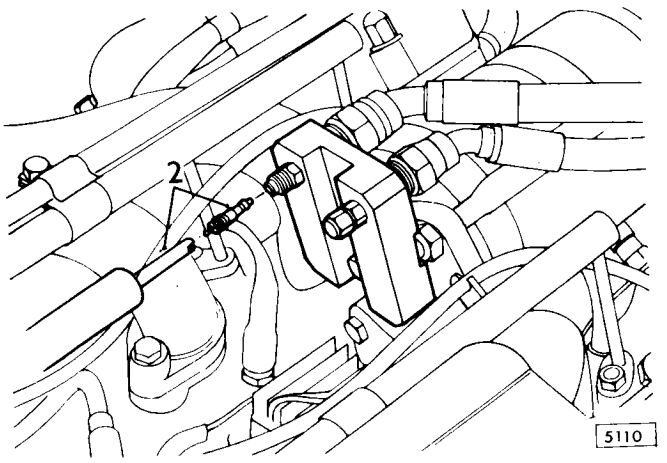
CHARGING VALVE CORE

WARNING: Before commencing work on this operation, refer to general – 82.00.00.

Remove and refit **82.30.12**

A possible reason for very slow charging rates is a bent or damaged Schrader valve depresser. Do not attempt to straighten. The valve core must be replaced.

If excessive leakage is detected from the Schrader valve cores on the connector union housing at the rear of the compressor, use a soap solution to ensure that the valve core itself is at fault. If the valve core is leaking replace it by following this procedure. If the valve union is leaking refer to – 32.30.13.
Ensure replacement clean dry valve core is to hand before commencing operation.



Remove

1. Depressurise the system – 82.30.05.
2. Remove valve core using a Schrader removing tool.

Refitting

3. Insert new valve core into union and ensuring threads not crossed, screw home.

   NOTE: Do not overtighten.

4. Charge the system – 82.30.08.

CONNECTOR UNION HOUSING

WARNING: Before commencing work on this operation, refer to general – 82.00.00

Remove and refit **82.30.13**

If leakage is detected between the Schrader valve union and the housing, or the threads are damaged in any way, the union housing must be replaced. Ensure a replacement housing and 'O' rings are to hand before commencing the operation.

Removing

1. Depressurise the system – 82.30.05.

   NOTE: Ensure suitable clean dry male and female sealing plugs are to hand.

2. Release suction and delivery hose connections from union housing; **IMMEDIATELY** seal hoses.

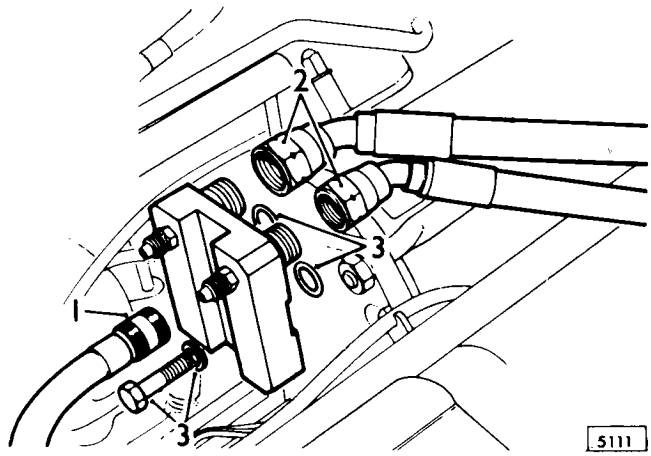
3. Remove one setscrew and spring washer securing housing to rear of compressor; remove 'O' ring seals.

Refitting

4. Fit new clean dry 'O' ring seals at rear of compressor.

   CAUTION: Ensure 'O' ring seal seating area clean, dry, flat and unmarked by scores or burrs.

5. Fit new housing and secure with one setscrew and spring washer. Torque 4,5 kg.m to 11,3 kg.m. (10 lb.ft. to 25 lb.ft.) Ensure 'O' ring seals are correctly positioned before fully tightening setscrew.
6. Remove sealing plugs from hoses and fit to union housing. Torque to level given in general – 82.00.00.
7. Charge system – 82.30.08.



AIR CONDITIONING EQUIPMENT

Preliminary tests 82.30.16

The following checks must be carried out to ensure that the system is basically functional. These checks may also be used to ensure satisfactory operation after any rectification has been done. If the system proves unsatisfactory in any way refer to Fault finding – 82.00.00.

1. Check evaporator blower fan is giving air flow expected in relation to control switch position. Check speed resistor for signs of over heating.
2. Check that compressor clutch is operating correctly, engaging and releasing immediately control switch is set to an 'ON' position.

   NOTE: The engine must be running and the thermostat control set fully cool.

3. Check both radiator cooling fans start operating when compressor clutch engages.

   NOTE: The engine must be running for this check.

4. Check that the compressor drive belt is correctly adjusted and is not slipping at higher engine speeds, at idle speed, or on sudden acceleration of the engine, with the compressor clutch engaged.
5. Observe sight glass on receiver/drier and check for frothing or bubbles with engine running at 1000 r.p.m.
   Slowly increase engine speed and repeat check at 1800 r.p.m.

   NOTE: It is normal for there to be slight foaming if ambient air temperature is below 21°C (70°F).

6. Check for frosting on connector union housing, the region around the suction port is normally cold, and slight frosting is permissible.
7. Check by feel along pipe lines for sudden temperature changes that would indicate blockage at that point.
8. Place a thermometer in the air outlet louvres. Run the vehicle on the road and note drop in temperature with air conditioning system switched on or off.
9. Ensure condenser matrix is free of mud, road dirt, leaves or insects that would prevent free air flow. If necessary clear the matrix following the cleaning procedure given under 82.15.07.
10. If the foregoing checks are not met satisfactorily, refer to rectification and fault finding procedures – 82.00.00.

CONTENTS

WINDSCREEN WASHERS

Washer reservoir

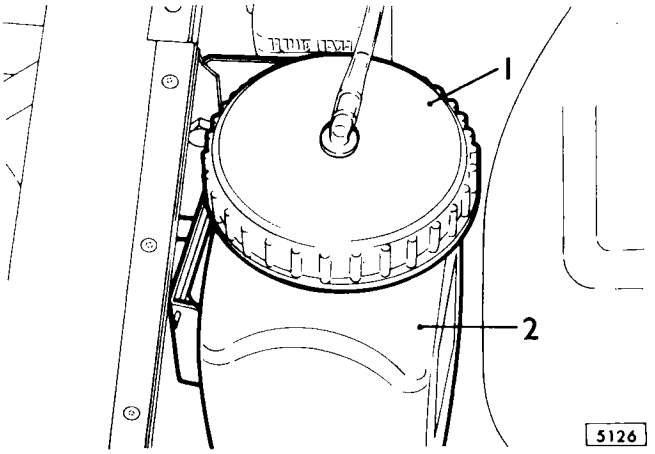
Remove and refit **84.10.01**

Removing

1. Unscrew cap from windscreen washer reservoir.
2. Lift reservoir from bracket.

Refitting

Reverse operations 1 and 2. Use recommended additive.



WASHER RESERVOIR BRACKET

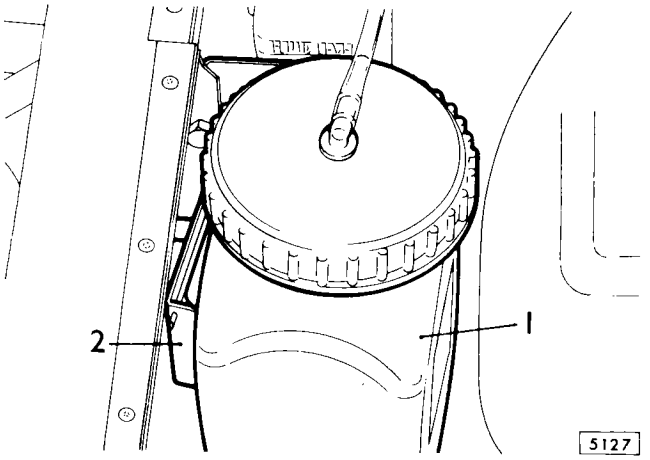
Remove and refit **84.10.02**

Removing

1. Remove washer reservoir – 84.10.01.
2. Remove setscrews and locknuts securing bracket to mudshield.

Refitting

3. Secure washer reservoir bracket to mudshield using two setscrews, four plain washers, two spacers and two locknuts.
4. Refit washer reservoir.



WASHER JETS

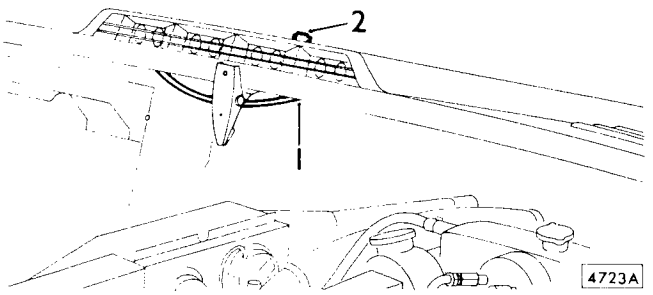
Remove and refit **84.10.09**

Removing

1. Pull plastic tube from washer jet.
2. Unscrew cap nut and remove washer jet from bonnet.

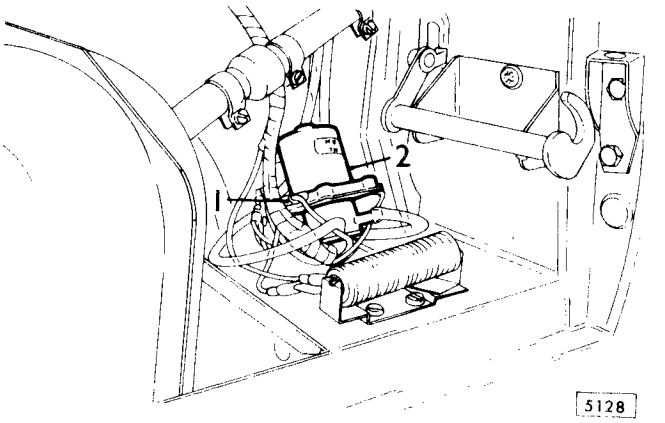
Refitting

3. Use new rubber seal, if necessary, beneath jet, and secure to bonnet with one cap nut.
4. Push on plastic tube.
5. Close bonnet, operate washer, and re-aim jets for optimum performance.



WASHER PUMP

Remove and refit **84.10.21**



Removing

1. Beneath heater unit, pull electrical connectors from washer pump motor.
2. Remove self-tapping screws securing pump bracket to bulkhead.

Refitting

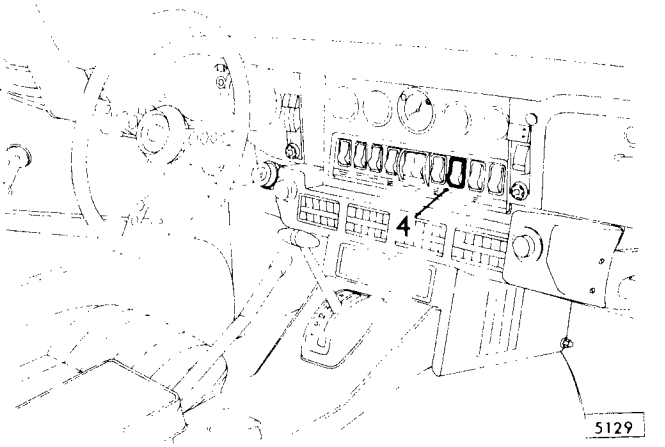
3. Secure pump to bulkhead using two self-tapping screws and shakeproof washers.

   NOTE: Fit earth connector beneath right hand screw between two shakeproof washers.

4. Fit electrical connectors to pump motor.

WASHER CONTROL SWITCH

Remove and refit **84.10.27**



Removing

1. Disconnect battery – 86.15.19.
2. Remove two knurled finger nuts and hinge facia centre panel down.
3. Note connections on windscreen washer switch.
4. Use two screwdrivers to depress plastic locking tabs on switch body, and press out through front of panel.

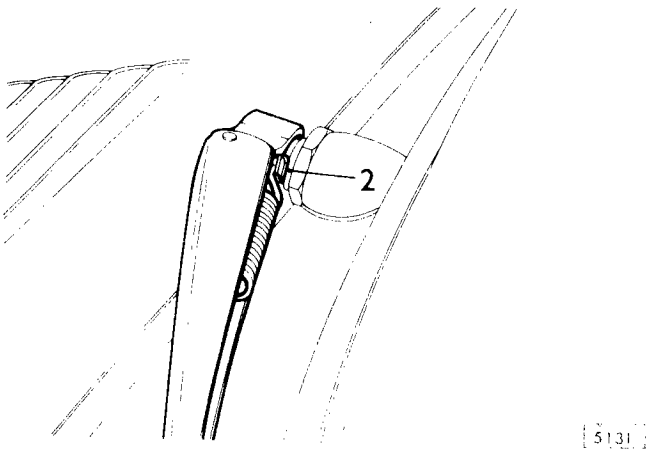
Refitting

5. Ensure switch right way up and square to aperture, and press into panel until locking tabs engage.
6. Fit connectors.
7. Refit facia centre panel.
8. Reconnect battery.

WINDSCREEN WIPERS

Wiper arm/s

Remove and refit **Left hand – 84.15.02**
Right hand – 84.15.03



Removing

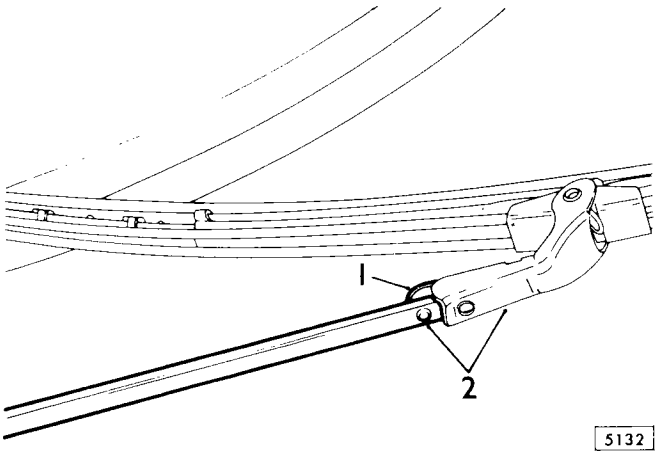
1. Note angle of parked windscreen wiper arm.
2. Lift spring clip and pull wiper arm from spindle.

Refitting

3. Check condition of spindle splines. If very badly worn, wiper backplate and wheelboxes assembly must be changed – **84.15.30.**
4. Thoroughly clean splines, and lightly coat with waterproof grease.
5. Press wiper arm on to spindle at angle noted in operation 1.
6. Test operate windscreen wipers and re-locate arm if necessary.

WIPER BLADES

Remove and refit 84.15.05



Removing

1. Hold blade in left hand, and, with thumb nail of right hand, press spring clip towards windscreen.
2. Press wiper arm towards windscreen to disengage dimple from blade, and slide blade from arm.

Refitting

3. Press blade straight on to wiper arm until dimple engages and spring clip locks.

WIPER MOTOR

Remove and refit 84.15.12

CAUTION: Early windscreen wiper motors are identified by the suffix 'A' following the manufacturers five figure part number. If one of these motors is to be changed, it should be replaced by a motor bearing the suffix 'B'.

Removing

1. Remove wiper motor assembly – 84.15.13.
2. Remove gear assembly – 84.15.14.

Refitting

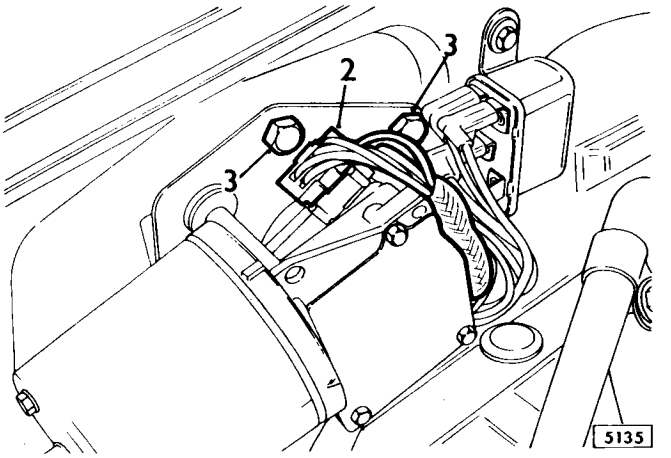
3. Fit gear assembly to replacement motor.
4. Fit wiper motor assembly.

WIPER MOTOR AND GEAR ASSEMBLY

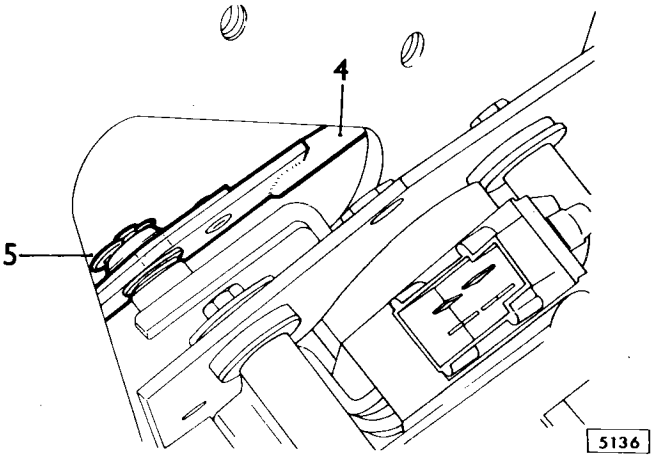
Remove and refit 84.15.13

Removing

1. Disconnect battery – 86.15.19.
2. Disconnect connector plug to windscreen wiper motor.
3. Remove four setscrews and shakeproof washers retaining motor mounting plate at bulkhead.



4. Carefully draw motor and mounting plate from bulkhead until primary link is accessible. Retain link with twist of welding wire or strong cord.
5. Draw 'C' spring clip from rotary link and recover one plain washer and one wave washer. Lift motor assembly clear.



Refitting

6. Examine gasket and renew if necessary.
7. Fit wave washer, primary link and plain washer on motor rotary link pin and retain with 'C' spring clip.
8. Secure motor mounting plate to bulkhead with four setscrews and shakeproof washers.

NOTE: Fit cable clip beneath one setscrew.

9. Fit connector plug.
10. Reconnect battery.
11. Operate wiper switch and check parking position.

NOTE: Reset position of wiper **arms – see operation 84.15.02/03.**

GEAR ASSEMBLY

Remove and refit 84.15.14

NOTE: The gear assembly must be marked and removed from motor assembly to ensure that gear cam/rotary link relationship is retained in replacement assembly.

Removing

1. Remove wiper motor and gear assembly – 84.15.13.
2. Remove motor mounting screws.
3. Remove three drive screws securing top cover of gearbox. Clear grease from face of gear assembly and scribe a mark in line with the rotary link.
4. Place rotary link in a vice and remove nut and washers. Lift gear assembly from gearbox.

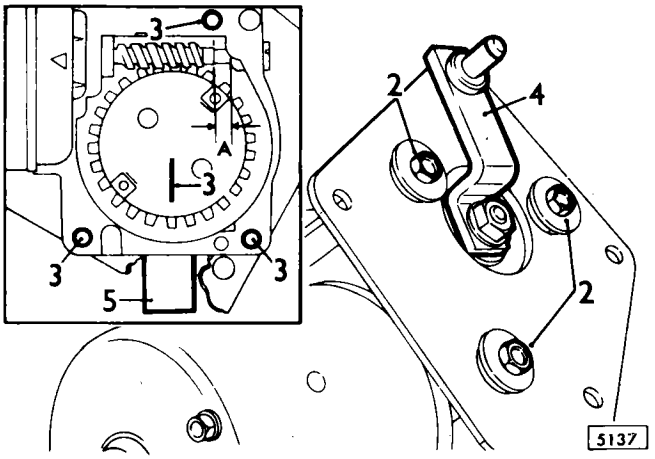
Refitting

Scribe a mark on replacement gear in an identical position, relative to cam ramp, to that made in operation 3.

5. Place gear assembly in gearbox casing and secure by fitting rotary link, washers and nut.

NOTE: Ensure scribed mark is in line with link.

6. Use feeler gauge to ensure gap between end of armature shaft and adjustment screw is 0.05 to 0.2 mm (0.002 in. to 0.008 in.), dimension 'A'.
7. Add suitable grease.
8. Fit gearbox cover and secure.
9. Replace motor mounting screws.
10. Fit wiper motor assembly.



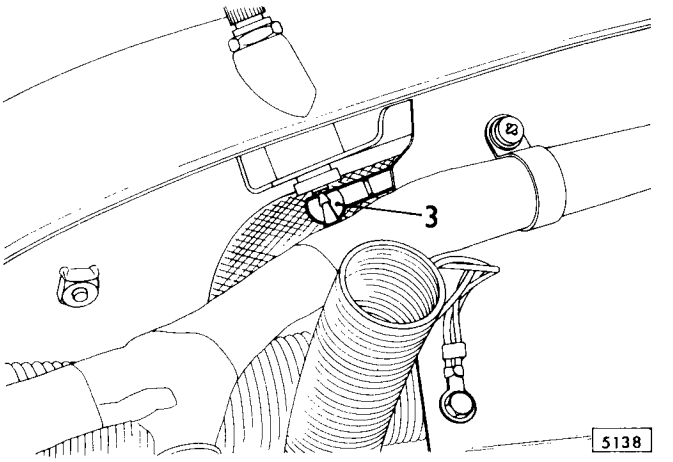
PARKING SWITCH

Remove and refit 84.15.15

Failure of the parking switch necessitates replacement of the complete motor assembly. The motor assembly is supplied with no gear fitted, a replacement gear assembly must be ordered at the same time as the motor.
For procedure see – 84.15.12.

WIPER PRIMARY LINK

Remove and refit 84.15.26



Removing

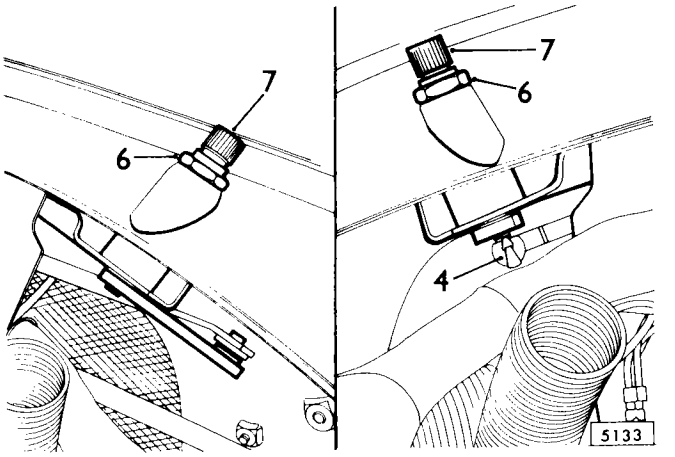
1. Remove wiper motor and gear assembly – 84.15.13.
2. Remove screen rail facia assembly – 76.46.01.
3. On left hand side of vehicle detach ball socket from wheel box lever; draw primary link through motor mounting aperture.

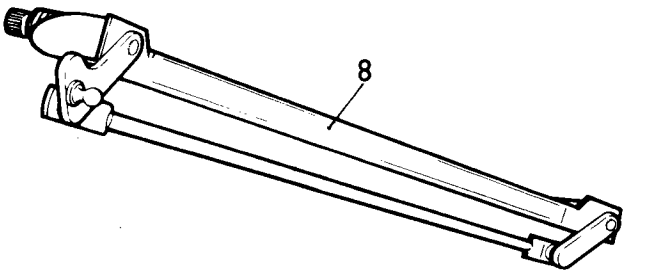
Refitting

4. Before fitting replacement link, ensure that the distance between bearing bush and ball socket centres is identical to that on replaced link. If necessary slacken locknut and adjust ball socket. Ensure that the planar relationship between bearing bush plate and ball socket is identical to that on replaced link. If necessary slacken locknut and adjust ball socket. Tighten locknut.
5. Secure length of welding wire or strong cord to bearing bush end of link.
6. Enter link, ball socket end first, through motor mounting aperture, and fit ball socket to left hand wheelbox lever.
7. Refit wiper motor assembly.
8. Refit screen rail facia assembly.

BACKPLATE AND WHEELBOXES ASSEMBLY

Remove and refit 84.15.30





Removing

1. Disconnect battery – 86.15.19.
2. Remove screen rail facia assembly – 76.46.01.
3. Release two knurled nuts and lower centre facia panel.
4. Tie length of strong cord to ball socket end of primary link; release clip and allow link to fall.
5. Remove windscreen wiper arms – Left hand 84.15.02 – Right hand 84.15.03.
6. Remove large nut from wiper shafts and recover one finisher and rubber seal from each.
7. Press both shafts simultaneously to drop assembly into car.
8. Manoeuvre assembly from facia rail.

CAUTION: Take great care not to damage windscreen.

NOTE: Release cable harness clips as necessary.

Refitting

9. Manoeuvre replacement assembly into position and press wiper shafts out through scuttle.
10. Secure each wiper shaft with new rubber seal, finisher and large nut.
11. Resecure cable harness clips as necessary.
12. Draw up primary link, grease ball socket, and fit to left hand wheelbox lever. Remove cord.
13. Refit facia centre panel.
14. Refit screen rail facia assembly.
15. Lightly oil wiper shafts, and fit wiper arms.
16. Reconnect battery.

WIPER CONTROL SWITCH

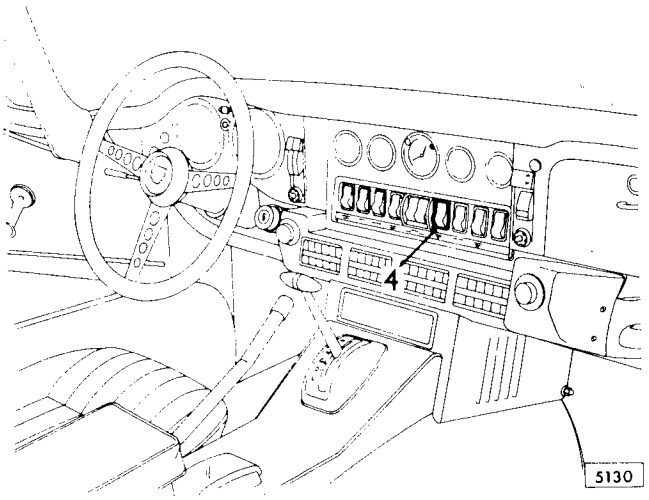
Remove and refit **84.15.33**

Removing

1. Disconnect battery – 86.15.19.
2. Remove two knurled finger nuts and hinge facia centre panel down.
3. Note connections on windscreen wiper switch.
4. Use two screwdrivers to depress plastic locking tabs on switch body, and press out through front panel.

Refitting

5. Ensure switch right way up and square to aperture, and press into panel until locking tabs engage.
6. Fit connectors.
7. Refit facia centre panel.
8. Reconnect battery.



CONTENTS

CONTENTS—continued

CONTENTS—continued

ALTERNATOR 86.10.00

The Butec type A7/1A alternator is a high powered three phase machine which produces current even at idling speed.

Two replaceable heat sinks contained within the alternator, each carry three silicon type rectifying diodes. Individual diodes in a heat sink cannot be replaced. Three sensing diodes, mounted in a replaceable block attached to the A.C. terminals, permit a warning light to be used.

A built-in 0.15 micro-farad capacitor connected between the heat sinks is provided for smoothing transients.

Regulation is provided by a Butec type 2R/1 control box, which is mounted separately. Isolation of the field windings is provided by a relay in the ignition switch circuit

Replacement parts are only obtainable from Butec Service Depots.

CAUTION: When using electric-arc welding equipment in the vicinity of the engine, take the following precautions to avoid damage to the semi-conductor devices used in the alternator and control box and also the ignition system:

Disconnect battery earthed lead.
Disconnect alternator output cables.
Withdraw regulator connector plug.
Disconnect ignition amplifier unit.

NOTE: To improve engine accessibility it is advantageous to place both front wheels on blocks of wood and disconnect the bonnet stay; this allows bonnet to hinge further forward. The blocks should be approximately 30.5 cm (12 in.) long, 25.4 cm (10 in.) wide and 15 cm (6 in.) high. Ensure bonnet is adequately supported after disconnecting stay.

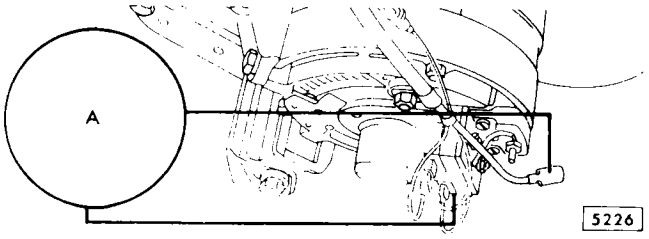
ALTERNATOR

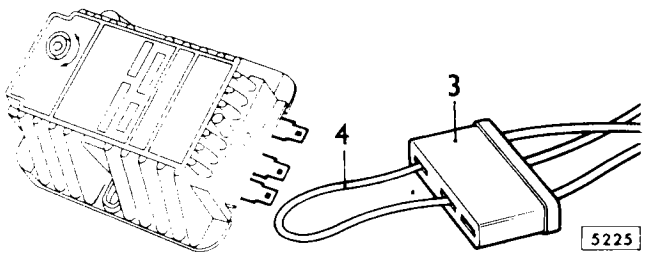
Test – (in situ) 86.10.01

Equipment required:
Moving coil ammeter or multi-range test meter 0–75 amperes.

Complete the following procedure to determine if a fault is due to the alternator, or to the regulator unit.

1. Disconnect cable from alternator main output terminal.
2. Connect ammeter between main output terminal and its cable.
3. Disconnect regulator unit.
4. Bridge field and negative leads of regulator cables with a jumper lead.
5. Start and gradually increase speed of engine. Zero reading on ammeter will indicate faulty alternator, but ammeter reading that increases with rising engine speed indicates faulty regulator unit.



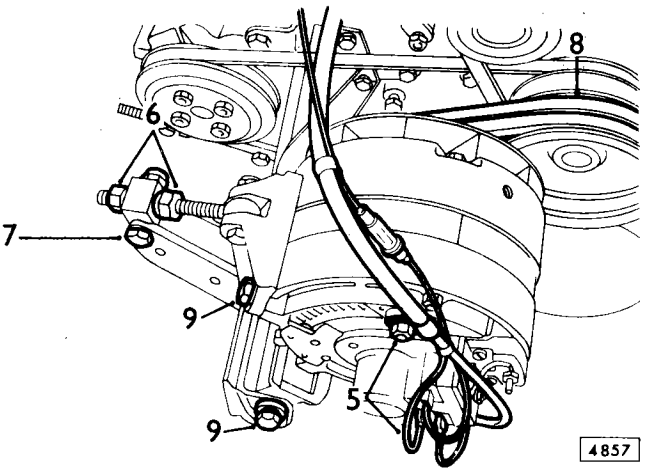


ALTERNATOR

Remove and refit **86.10.02**

Removing

1. Disconnect battery – 86.15.19.
2. Remove **radiator cowl – 26.40.07.**
3. Remove header tank – 26.15.01.
4. Remove ignition coil fixings and move coil to one side to facilitate access to alternator mounting bracket.
5. Disconnect alternator leads and release cable clip on alternator minus terminal.
6. Release locknuts to slacken adjuster.
7. Slacken locknut and setscrew at adjustment sleeve.
8. Remove belts from alternator pulley.
9. Remove fixings securing alternator to its mounting bracket and detach adjuster.
10. Withdraw alternator up between engine and radiator.



Refitting

11. If replacement alternator is being fitted transfer the pulley, spacer and mounting brackets from the old unit to its replacement – 86.10.04.
12. Reverse operations 1 to 10.
13. Adjust drive belts – **86.10.05.**
14. Start engine and check that charging system operates satisfactorily.

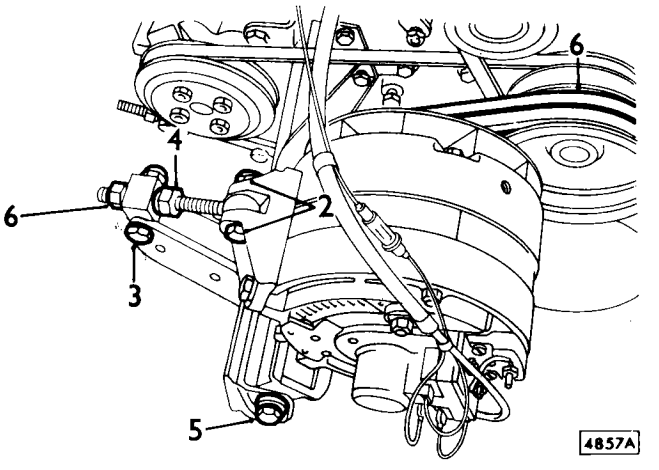
ALTERNATOR DRIVE BELTS

Remove and refit **86.10.03**

Removing

If one alternator drive belt is found to be faulty, both must be changed.

1. Disconnect battery – 86.15.19.
2. Slacken setscrew and locknut at adjustment bolt boss.
3. Slacken setscrew and locknut at adjustment sleeve.
4. Slacken locknuts on adjustment bolt.
5. Slacken two pivot setscrews.
6. Slacken outboard locknut until drive belts can be manoeuvred clear.

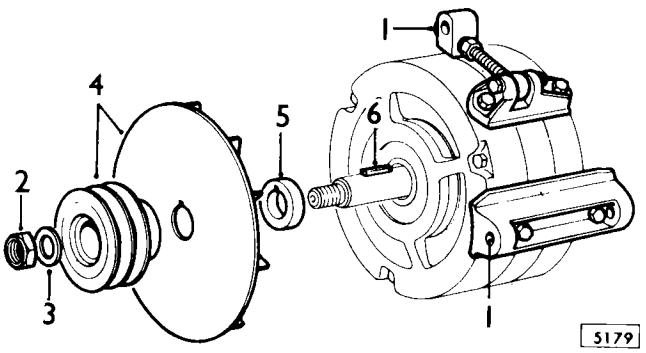


Refitting

7. Manoeuvre replacement belts into position.
8. Set drive belt tension; operations 6 and 7 of **86.10.05.**

ALTERNATOR PULLEY

Remove and refit **86.10.04**



Removing

NOTE: The pulley is normally removed only when replacing an alternator and the alternator is separated from the car.
If it is found necessary to replace the pulley in situ, refer to operation 86.10.04/1.

1. Remove alternator – 86.10.02.
2. Restrain fan and pulley and remove shaft nut.
3. Recover plain washer.
4. Draw pulley and fan from shaft.
5. Recover spacer.
6. Remove drive key.

Refitting

Reverse operations 1 to 6.

ALTERNATOR PULLEY

Remove and refit – in situ **86.10.04/1**

Removing

1. Disconnect battery – 86.15.19.
2. Jam pulley and belt with screwdriver handle and start shaft nut.
3. Slacken setscrew and locknut at adjustment bolt boss.
4. Slacken setscrew and locknut at adjustment sleeve.
5. Slacken locknuts on adjustment bolt.
6. Slacken two pivot setscrews.
7. Slacken outboard locknut until drive belts can be manoeuvred clear.
8. Restrain fan and release shaft nut.
9. Prise fan and pulley from shaft.
10. Recover drive key and spacer.

Refitting

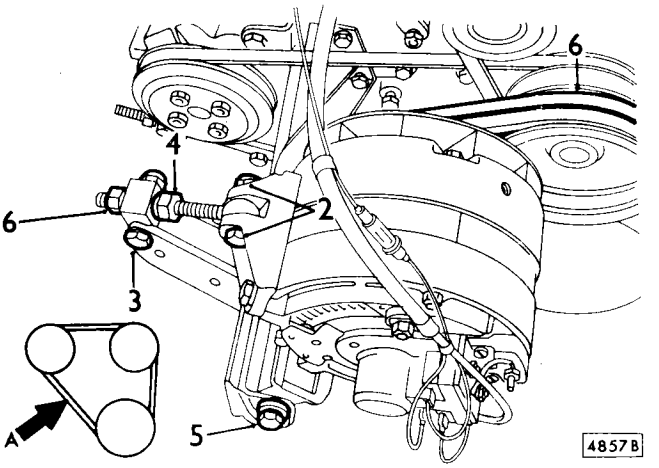
11. Fit drive key and spacer to drive shaft.
12. Fit fan and pulley to shaft.
13. Secure with plain washer and shaft nut.
14. Restrain fan and fully tighten shaft nut.
15. Adjust drive belts – **86.10.05.**

ALTERNATOR DRIVE BELTS

Adjust 86.10.05

CAUTION: It is very important that both drive belts are subject to the same tension. Any slight variation in the figures obtained for each belt may be rectified by vigorously exercising the tighter belt by hand, running the engine for a few seconds, then rechecking. If results are still not satisfactory, both belts must be changed.

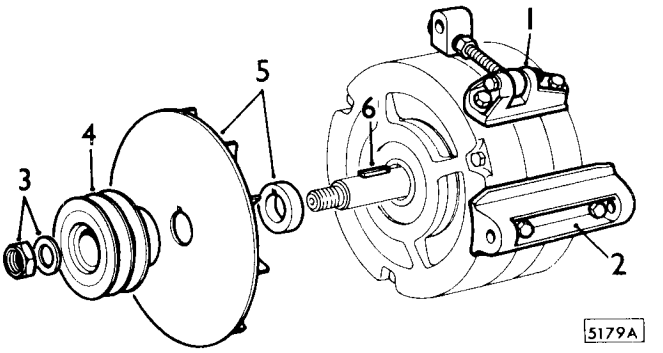
1. Disconnect battery – 86.15.19.
2. Slacken setscrew and locknut at adjustment bolt boss.
3. Slacken setscrew and locknut at adjustment sleeve.
4. Slacken locknuts on adjustment bolt.
5. Slacken two pivot setscrews.
6. Use outboard locknut to set belt tension as follows:– A load of 1,95 kg (4.29 lb.) applied at point A in the direction shown shall deflect the belt 1,5 mm (0.59 in.).
7. Retighten setscrews and locknuts loosened at operations 2, 3, 4 and 5.
8. Reconnect battery.

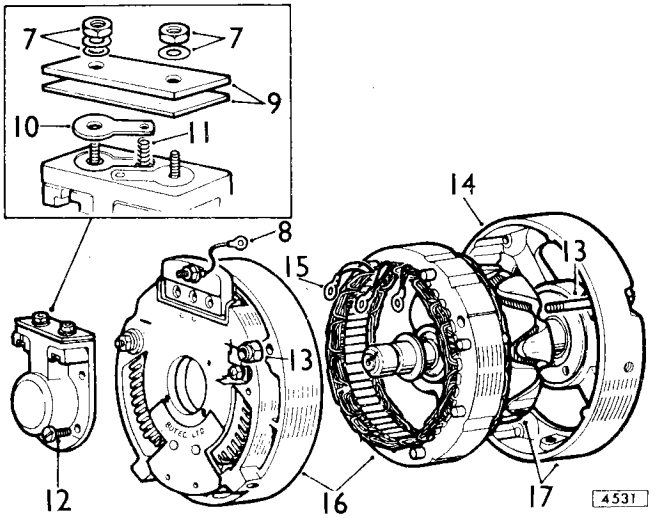


ALTERNATOR

Overhaul 86.10.08

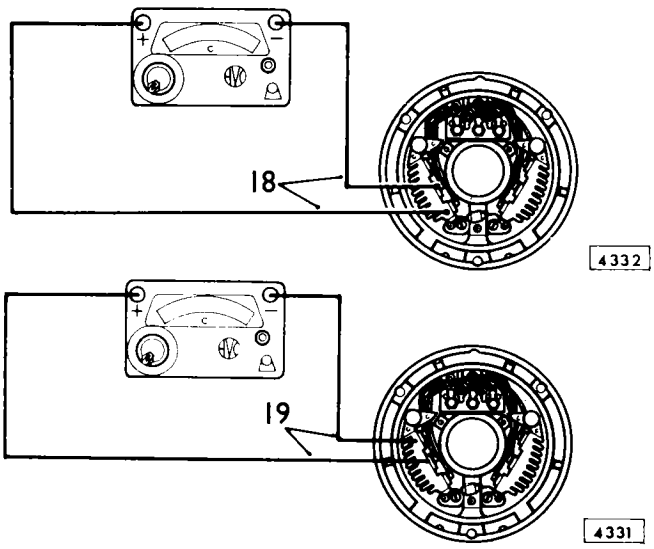
1. Remove adjustment bolt mounting bracket.
2. Remove pivot bracket.
3. Remove nut and washer retaining pulley.
4. Withdraw pulley from shaft.
5. Withdraw fan and spacer.
6. Extract drive key from shaft.
7. Remove field terminal nuts and washers.
8. Detach jumper lead terminal.
9. Withdraw insulator cover and cork gasket from terminal posts.
10. Remove jumper plates from terminal posts.
11. Withdraw brush assemblies, it may be necessary to remove the centre screw from the field diode block terminals to enable inner brush assembly to be withdrawn.
12. Remove brush holder housing.
13. Remove through bolts and nuts.
14. Separate rotor and drive end housing from slip ring housing by tapping the slip ring end of the rotor shaft with a hide faced mallet.
15. Remove the three nuts from the field terminal posts and detach the stator winding terminals.
16. Separate the stator assembly from slip ring end housing, by inserting a medium sized screwdriver between the stator and end housing and carefully prising housing from the eight locating dowels in stator assembly.
17. Remove rotor from end housing by carefully tapping out with a hide faced mallet.





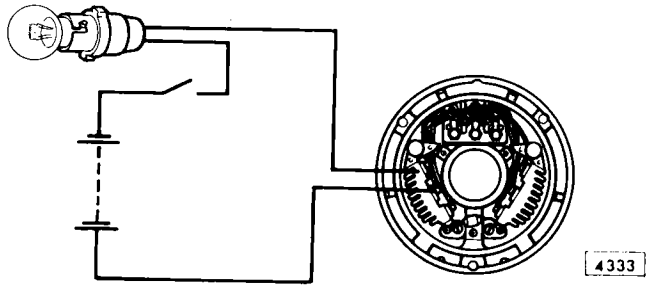
Rectifier testing, using ohmmeter **86/10.08/1**

18. **Positive terminal diodes**
Connect negative lead of ohmmeter to terminal post of a diode and positive lead to the corresponding heat sink. Meter should indicate a low resistance.
19. Reverse polarity of meter connections. Reading should indicate a very high resistance or infinity.
20. Apply tests 18 and 19 to each of the two remaining positive terminal diodes.
21. **Negative terminal diodes**
Connect positive lead of ohmmeter to terminal post of a diode, and negative lead to corresponding heat sink. Meter should indicate a low resistance.
22. Reverse polarity of meter connections. Reading should indicate a very high resistance or infinity.
23. Apply tests 21 and 22 to each of the two negative terminal diodes.
24. Any diode or diodes not operating properly will necessitate heat sink assembly replacement.



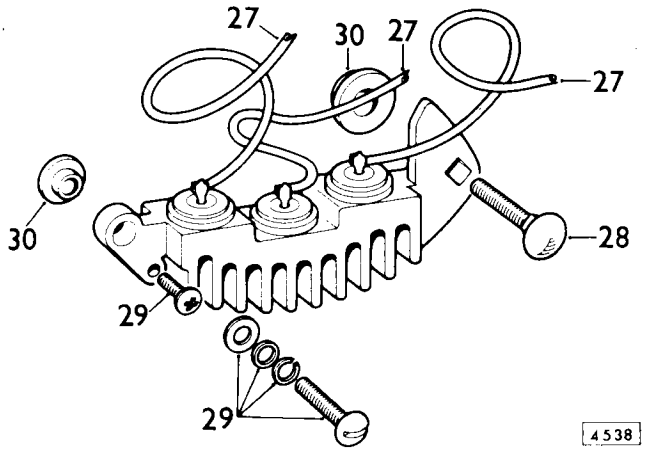
Rectifier testing, using 12 volt battery and test lamp – alternative method **86.10.08/2**

25. If an ohmmeter is unavailable, a 12 volt battery and test lamp may be used to test the diodes. This test is basically the same as those detailed in 86.10.08/1 but with the battery and bulb replacing the ohmmeter. The results of the test procedure can be as follows:- If bulb lights in one direction only, the rectifier diode is good.
If bulb lights in both directions the diode is shorted.
If bulb does not light in either direction, diode is open circuit.



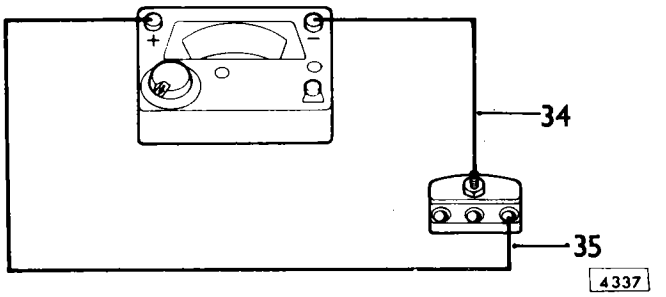
Rectifier assembly replacement **86.10.08/3**

26. Detach capacitor lead from heatsink(s), secured by a screw.
27. Cut the three flexible leads of the diode/heatsink assembly(ies) to be replaced, at the crimped terminals.
28. Remove dome headed terminal bolt and nut from end housing.
29. Remove setscrews and washers retaining opposite end of heatsink to end housing.
30. Fit replacement rectifier assembly (of correct polarity) and ensure that large and small ceramic insulators and fibre washers are in their correct relative positions.
31. Remove the three A.C. terminal nuts.
32. Connect diode leads and refit terminal nuts.
33. Reconnect capacitor lead(s).



Testing field diode block **86.10.08/4**

34. Connect negative lead of ohmmeter to terminal post of diode block.
35. Connect positive lead of ohmmeter in turn to each of the three other terminals. In each instance meter should indicate low resistance.
36. Reverse polarity of ohmmeter leads and again take reading at each of other three terminals. In each instance meter should indicate high resistance.
37. Use meter to check for leakage between each diode. Apply meter leads between any two of the three diodes in turn. No meter reading should be obtained.



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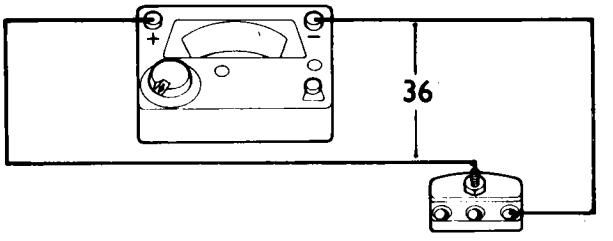

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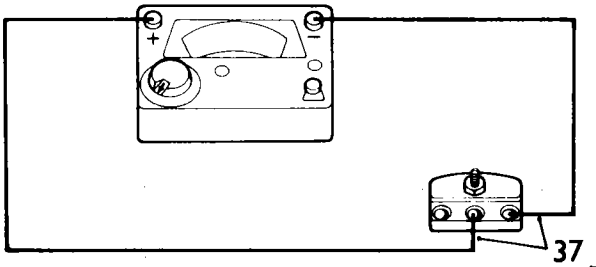
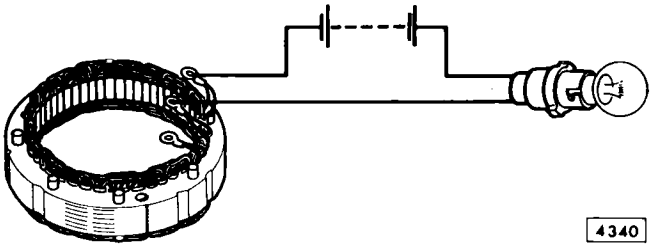


4338

Stator and housing – checking **86.10.08/5**

38. Blow away dust etc., from assembly using compressed air line.
    Avoid damaging the insulation of windings with nozzle of air line.
39. Visually inspect windings for broken wires, burn marks, or evidence of insulation damage.
40. Carefully clean stator housing with a cloth moistened in petrol, but avoid applying petrol to winding insulation.
41. Allow assembly to dry; then continuity test windings by connecting them in series with a test lamp and battery circuit. Connect each terminal to each of the other two in turn. At each test lamp should light.
42. Connect test lamp circuit between stator housing and each of the terminals in turn. If insulation is satisfactory, lamp should NOT light.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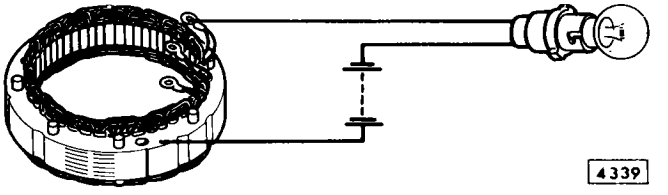
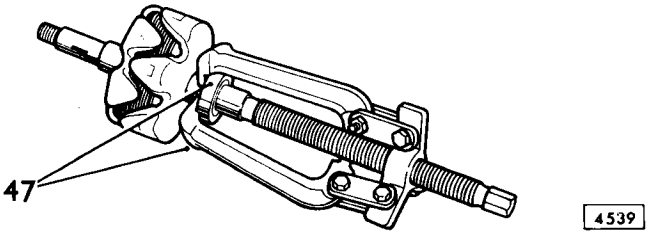

4339

Rotor bearing – replacement **86.10.08/6**

43. Unsolder wire from rotor coil to outer slip ring.
44. Bend wire so that it is parallel to shaft.
45. Unsolder wire from inner slip ring.
46. Use an extractor tool to remove slip ring assembly and insulating washer.
47. Withdraw bearing from rotor shaft using extractor tool.
48. Press on new bearing.



4539

Slip ring – replacement **86.10.08/7**

49. Store slip ring assembly in a warm place for some time prior to fitting; this will help to prevent cracking of the slip ring assembly when fitting.
50. Align slots in slip ring with slot in rotor shaft.
51. Press slip ring on to shaft until it is against the shoulder.
52. Solder coil leads to slip rings.
53. Mount rotor assembly between centres of a lathe and check concentricity of slip rings with a dial test indicator.
54. If necessary make a light smooth cut preferably using a diamond tipped tool. Limit, checked with dial test indicator, to be within 0,050 mm (0.002 in.) total indicator reading.
55. Temporarily fit through bolts into slip ring end housing (wrong way around) to facilitate alignment of stator assembly.
56. Locate stator assembly on through bolts and press down firmly to mate with slip ring end housing.
57. Connect stator windings and replace terminal nuts.
58. Fit rotor into end housing.
59. Align rotor and end housing with through bolts in stator assembly, ensuring that the threaded holes for the mounting brackets align with the corresponding ones in the slip ring end housing.
60. Press the assembly together carefully.
61. Withdraw through bolts and refit them so that their heads are at the driving end of the alternator.
62. Fit and tighten the locknuts.
63. Locate shaft key.
64. Fit fan with blades facing end housing.
65. Fit pulley with boss facing fan.
66. Fit washer and locknut to retain pulley.
67. Fit mounting brackets.

CONTROL BOX

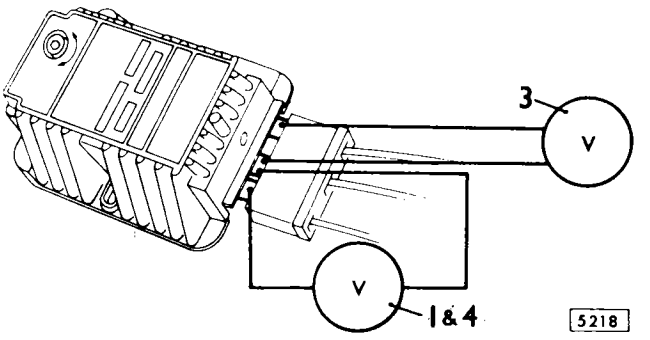
Test – (in situ) **86.10.25**

Special equipment – Moving coil voltmeter 0–30 Volts range or multi-range testmeter.

The Butec R2/1 unit has no moving contacts, the switching operations being performed by transistors. All components are mounted upon a printed circuit base and housed in a sealed aluminium case which also serves as a heat sink. A socket headed plug in the case provides access to the output voltage adjustment screw.

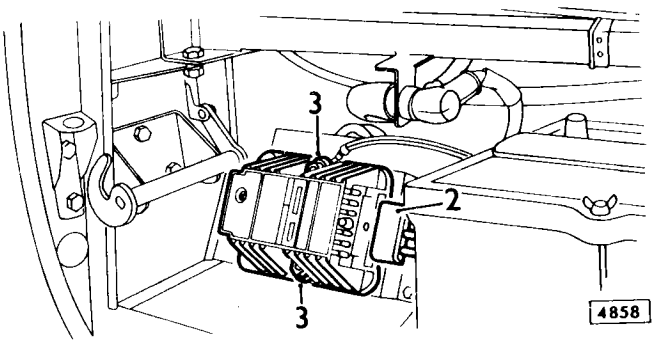
> **CAUTION: DO NOT** disconnect the battery whilst the alternator is running, or reverse the battery connections, otherwise damage will be caused to both regulator box and alternator.

1. With engine speed steady at 1000 r.p.m., and dipped head and side lights switched on, check that a voltage at least equal to battery voltage exists between positive (+) and negative (–) at the regulator terminals.
2. The control potentiometer may be incorrectly set; remove cover plug and adjust to 14 volts.
3. Note setting of control potentiometer; then rotate control fully clockwise and measure voltage between field and negative (–) terminals; this must be less than 1.5 volts. If so, the regulator is operating correctly; reset to original position. If regulator control box is faulty remove it for further testing or unit replacement.
4. Replace voltmeter between positive and negative regulator terminals.
5. Simultaneously switch on heater blower and main headlamp beam. Regulator output voltage must not change by more then 0.2 volts (steady reading).



CONTROL BOX

Remove and refit **86.10.26**



Removing

1. Disconnect battery – 86.15.19.
2. Detach connector plugs from regulator control box.
3. Remove regulator control box, secured by two screws.

Refitting

Reverse operations 1 to 3.

BATTERY

WARNING: THE BATTERIES FITTED TO THIS VEHICLE HAVE A SPECIAL ARRANGEMENT TO FACILITATE TOPPING UP. IT IS IMPERATIVE THAT THE MANIFOLD COVER IS LEFT IN POSITION WHILE THE BATTERY IS BEING RE-CHARGED.

Description **86.15.00**

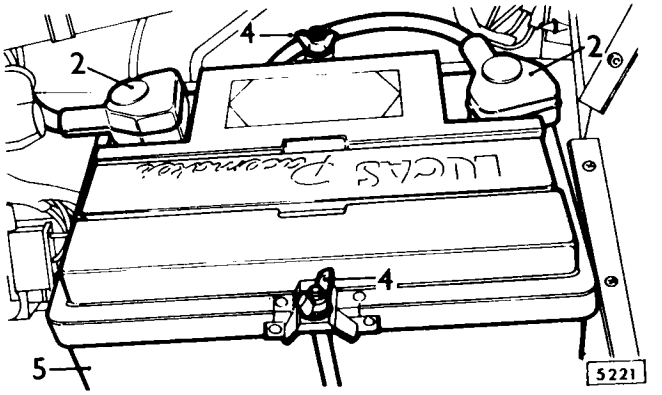
The battery, which is a special high performance type, is located in the engine compartment.

Data

Battery type: Lucas 12 volt XCA55/8
or Lucas 12 volt PACEMAKER CP13/11

BATTERY

Remove and refit **86.15.01**



Removing

1. Raise bonnet.
2. Withdraw plastic covers from battery terminals.
3. Slacken terminal bolts and withdraw terminals.
4. Remove battery clamp, secured by two wing nuts.
5. Remove battery.

Refitting

6. Reverse operations 1 to 5. Smear battery terminal posts with petroleum jelly before fitting cables.
7. Restart electric clock on dashboard.

BATTERY

Test 86.15.02

It is NOT possible to test this battery with a high rate discharge meter, due to the location of the intercell connectors. The battery top must not be drilled in an attempt to locate the connectors. Check the specific gravity of the electrolyte in each cell using an hydrometer. A variation of more than 40 points (0.040) in any cell reading means that the battery is suspect and should be removed for testing by a battery agent. If possible prove the battery by substitution.

State of charge S.G. readings

1. Lift and tilt the battery vent cover to one side.
2. Insert the hydrometer into each cell through the filling tube and note the readings.

STATE OF CHARGE	SPECIFIC GRAVITY READINGS CORRECTED TO 15°C (60°F)	
	CLIMATES NORMALLY Below 25°C (77°F)	CLIMATES NORMALLY Above 25°C (77°F)
FULLY CHARGED	1.270 – 1.290	1.210 – 1.230
70% CHARGED	1.230 – 1.250	1.170 – 1.190
DISCHARGED	1.100 – 1.120	1.050 – 1.070

Electrolyte Temperature Correction
For every 10°C (18°F) below 15°C (60°F), subtract 0.007.
For every 10°C (18°F) above 15°C (60°F), add 0.007.

BATTERY CARRIER

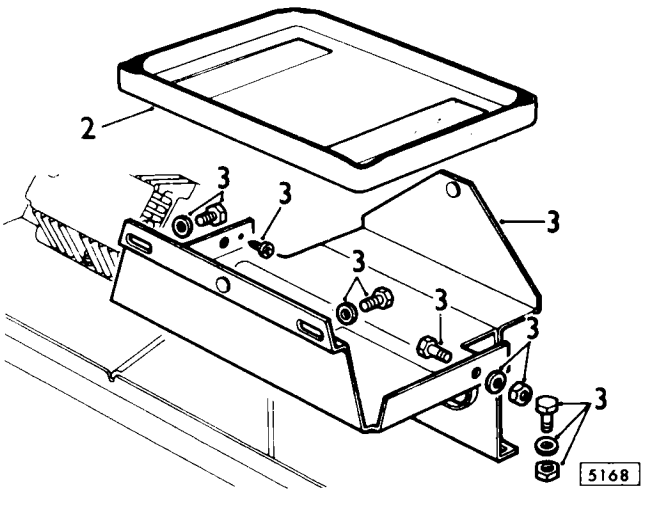
Remove and refit 86.15.11

Removing

1. Remove battery – 86.15.01.
2. Withdraw battery tray.
3. Remove battery carrier secured to the sill panel and valance.

Refitting

Reverse operations 1 to 3.



BATTERY LEAD – POSITIVE

Remove and refit 86.15.17

Removing

1. Raise bonnet.
2. Lift plastic cover from terminal on battery post.
3. Release clamp bolt and remove terminal from battery post.
4. If necessary, remove lead from terminal post located on upper right hand engine sub-frame member.

Refitting

Reverse operations 1 to 4.

NOTE: Ensure that all connections are clean and metal to metal. Protect the battery terminal with a smear of petroleum jelly. Tighten all fixings.

BATTERY LEAD – NEGATIVE

Remove and refit 86.15.19

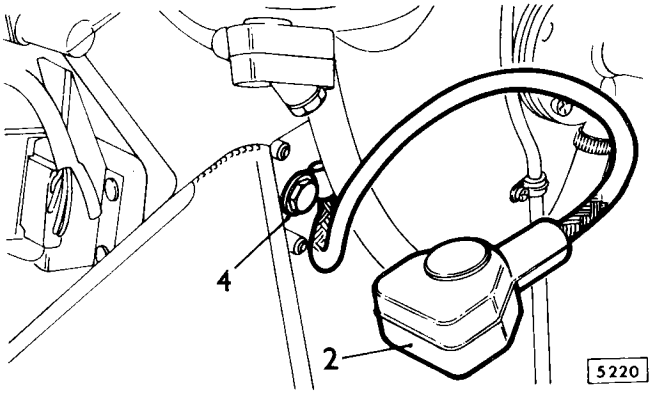
Removing

1. Raise bonnet.
2. Lift plastic cover from terminal on battery post.
3. Release clamp bolt and remove terminal from battery post.
4. If necessary, remove lead from bulkhead, secured by a setscrew and washer.

Refitting

Reverse operations 1 to 4.

NOTE: Ensure that all connections are clean and metal to metal. Protect the battery terminal with a smear of petroleum jelly. Tighten all fixings.



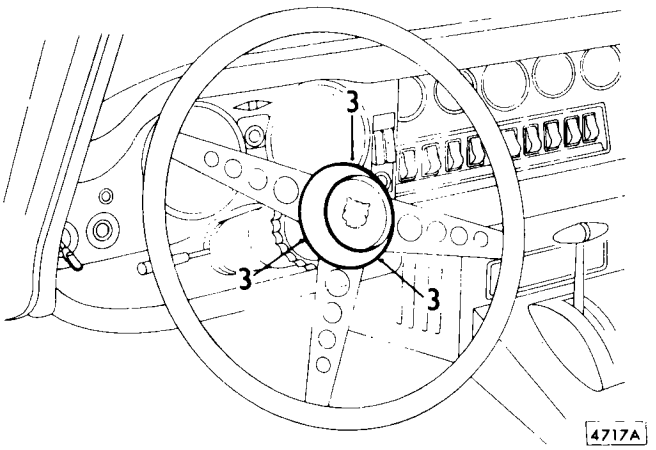
HORNS

Description 86.30.00

Twin horns are fitted, and are mounted on the crossmember below the radiator. Both horns operate simultaneously and are energised by a relay located on the right hand engine valance. The relay terminal W.1 is connected to the battery through the ignition switch, so that the horns will only operate whilst the ignition is switched 'ON'.

HORN SWITCH

Remove and refit **86.30.01**



Removing

1. Disconnect battery – 86.15.19.
2. Set steering wheel in fully raised position.
3. Remove horn push assembly secured by three screws in steering wheel boss.
4. Withdraw switch contact assembly from steering column.

Refitting

Reverse operations 1 to 4.

HORNS

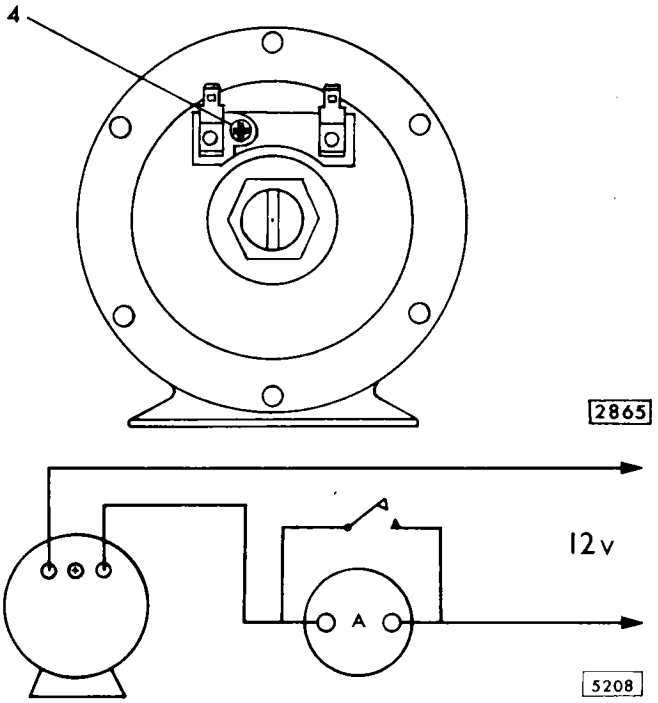
Adjust **86.30.08**

The horn adjustment screw provides for the take up of wear of moving parts, but does not affect the pitch of the note.

1. Raise bonnet.
2. Detach supply lead to horn.
3. Connect an ammeter (0-25A range) or a suitable multi range testmeter, in series with the horn and its supply lead.

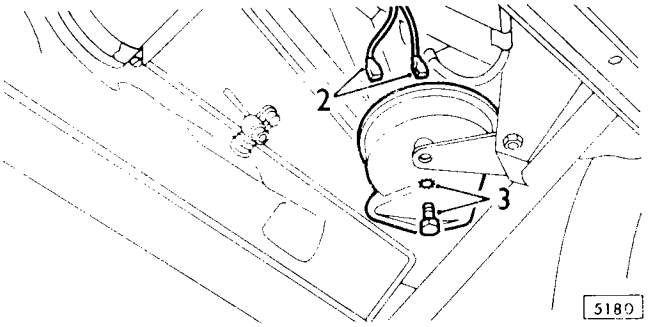
NOTE: To prevent overloading of ammeter whilst making adjustments, connect an ON/OFF switch in parallel with ammeter terminals. Keep switch ON except when taking readings, i.e. when horn is sounding.

4. Turn adjustment screw anti-clockwise until horn just fails to sound.
5. Turn adjustment screw clockwise until horn operates within the limit of 6.5 to 7.0 amperes.
6. Horns not responding to adjustment should be replaced.



HORNS

Remove and refit **86.30.09**



Removing

1. Disconnect battery – 86.15.19.
2. Detach wiring at 'Lucar' connectors on horn body.
3. Remove horn(s).

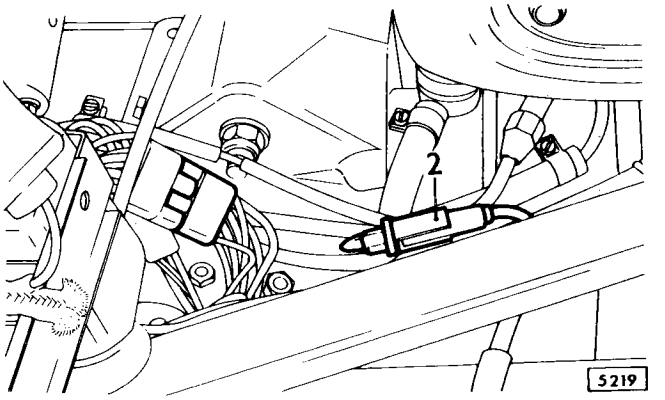
Refitting

Reverse operations 1 to 3.

HORN CIRCUIT

Check (Horns inoperative) **86.30.16**

1. Check fuse No. 7 located on right hand side behind front dash panel.
2. Check in line fuse located on right hand top engine sub-frame member.
3. Check that 'Lucar' connectors at relay have not become detached.
4. Check that 'Lucar' connectors at horns have not become detached.
5. Check wiring at each horn using a 12 volt test lamp connected in place of the horn.
6. Check relay – 86.30.17.
7. Check horn control on steering column.



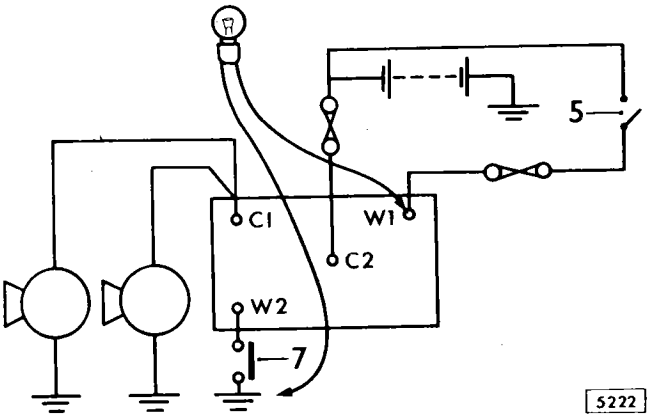
HORN RELAY

Check – (in situ) **86.30.17**

1. Cars equipped with exhaust emission control equipment – remove absorption canister – 17.15.13.
2. Switch ignition 'ON'.

   NOTE: Avoid leaving ignition switched on for long periods when making tests.

3. Connect 12 volt test lamp leads between terminal W.1. (green) of relay and a good earth point. If lamp does not light, check fuse No. 7.
4. Transfer test lamp lead to relay terminal W.2. (purple/black); lamp should light indicating continuity through relay winding.
5. Transfer test lamp lead to relay terminal C.2. (brown), if test lamp does not light check line fuse located on right hand top engine sub-frame member.
6. Transfer test lamp lead to relay terminal C.1. (purple/yellow), short relay terminal W.2. to earth; lamp should light indicating relay contacts are closed and relay is working. Failure of lamp to light means relay replacement.
7. Failure of horns to operate, must now be due to horn control, associated wiring, or defective horns.



HORN RELAY

Remove and refit **86.30.18**

Removing

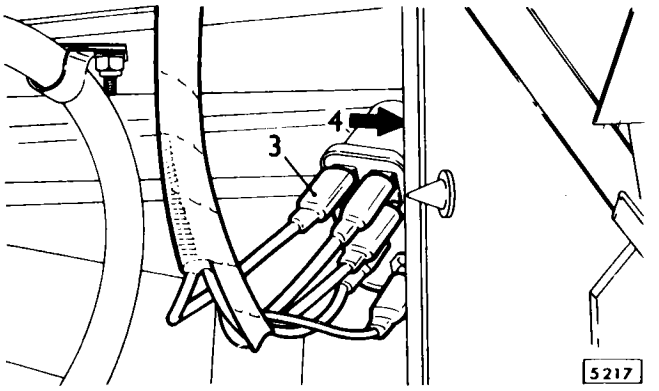
1. Cars equipped with exhaust emission control equipment – remove absorption canister – 17.15.13.
2. Disconnect battery – 86.15.19.
3. Detach leads from relay.
4. Remove relay, secured by two screws.

Refitting

Reverse operations 1 to 4.

NOTE: Wiring identification:

Relay terminal W.1. green lead.
Relay terminal W.2. purple/black lead.
Relay terminal C.1. purple/yellow lead.
Relay terminal C.2. brown lead.



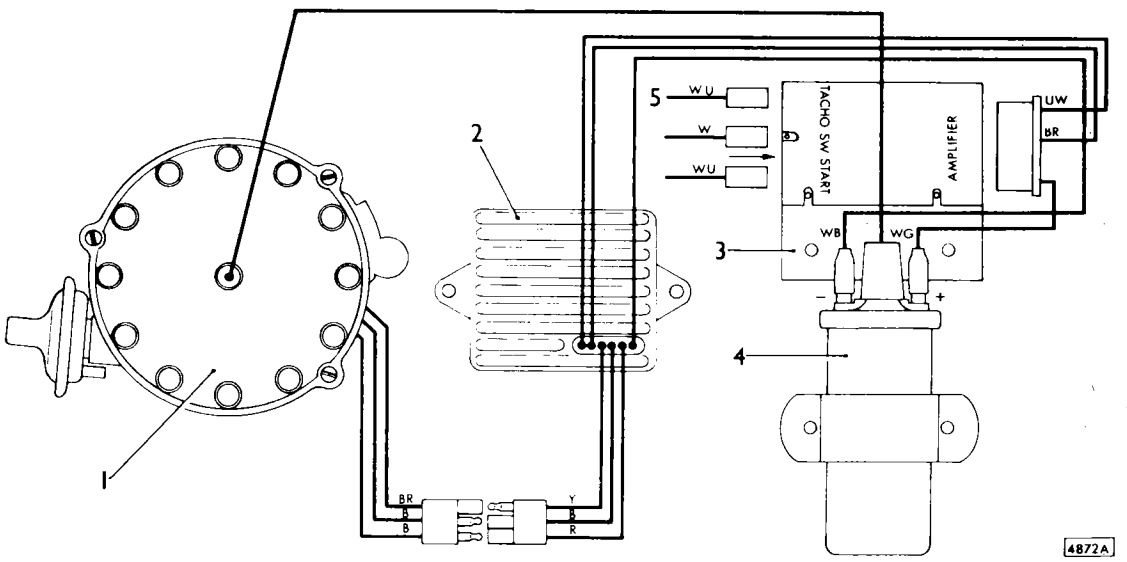
THE IGNITION SYSTEM

Description 86.35.00

'OPUS' Electronic ignition system, which is fitted, comprises the following:–

1. DISTRIBUTOR – Model 36 DE 12.
2. AMPLIFIER UNIT – Model AB3.
3. BALLAST RESISTANCE UNIT – Model 9BR.
4. IGNITION COIL – Model 13C 12.
5. WIRE TO TACHOMETER.

CABLE COLOUR CODE
B Black
R Red
W White
U Blue
Y Yellow
G Green



The Distributor

The 'OPUS' distributor comprises:–

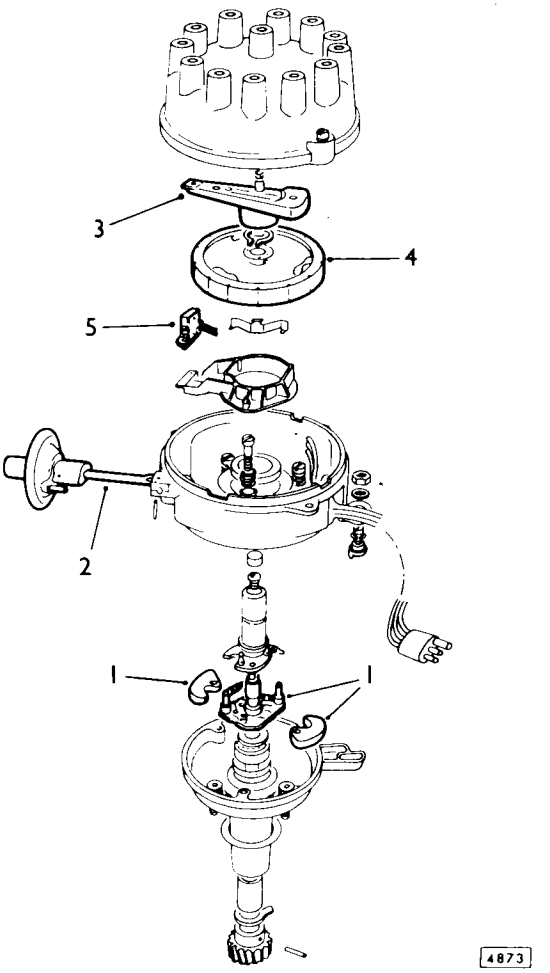
1. A centrifugal auto-advance mechanism.
2. Retard type vacuum unit.
3. High tension rotor.
4. Electronic timing rotor.
5. Pick-up module assembly.

The timing rotor and pick-up module, working in conjunction with a separate amplifier unit, replace the contact breaker and cam of a conventional distributor.
The timing rotor is a glass-filled nylon disc with small ferrite rods embedded into its outer edge, the number and spacing of the rods corresponding with the number of cylinders and firing angles of the engine. An air gap (adjustable to specified limits) exists between the rotor and the ferrite core of the stationary pick-up module. The pick-up module assembly comprises a magnetically-balanced small transformer, with primary (input) and secondary (output) windings.

CAUTION: Magnetic balancing of the pick-up module. This unit is balanced during manufacture and the setting cannot alter in service. The sealed ferrite adjusting screw must not be disturbed.

Automatic control of retard-ignition timing is provided by the vacuum unit which varies the static timing position of the pick-up module in relation to the ferrite rods in timing rotor.
The distributor timing rotor and pick-up module generate an electronic timing signal, which is fed to the amplifier unit via external cables.

CAUTION: The length of this triple-core extruded type cable must not be altered and the cables must not be separated or replaced by loose individual cables.



Amplifier Unit – Item 1

This interprets the timing signals from the distributor. The power transistor incorporated in the printed circuit then functions as an electronic switch in the primary circuit of the ignition coil. The unit is connected to the ignition coil via a ballast resistance unit and external cables.

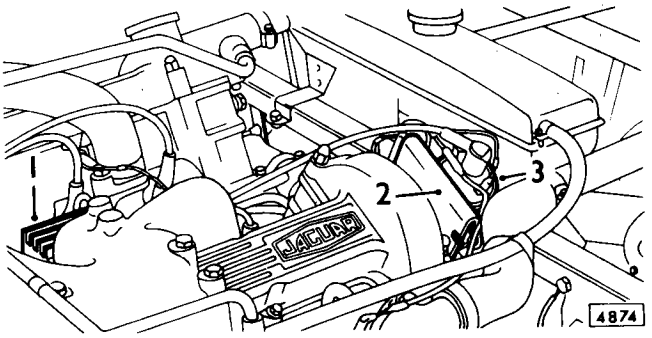
Ballast Resistance Unit – Item 2

An encapsulated assembly comprising three resistors in an aluminium heat sink fixing bracket.
External wiring connects two of the resistors in series with the ignition coil primary winding.
The third resistor unit is associated with the function of one of the transistors in the amplifier unit.

Ignition Coil – Item 3

A specially designed fluid-cooled, high-performance, ballast-ignition ignition coil.
The coil terminals are marked '+' and '–' and have different types of Lucar connector to prevent incorrect cable connection.

CAUTION: The 'OPUS' coil is NOT interchangeable with any other type.



Operation

Normally when the engine is stationary, the distributor timing rotor will be in a position where none of the ferrite rods will be in close proximity with the ferrite core of the pick-up module.
When the ignition is switched on, a power transistor in the amplifier unit is in a conductive state and the ignition coil primary winding circuit is complete via the emitter/collector electrodes of the power transistor.
Simultaneously, a sinusoidal (pulsating a.c.) voltage is applied by the amplifier unit to the distributor pick-up module primary windings and a small residual a.c. voltage is produced at the pick-up secondary windings which at this stage is magnetically balanced.
The voltage at the pick-up module secondary terminals is applied to the amplifier unit, but the residual voltage at this stage is insufficient to have any effect on transistor circuits which control the switching off of the power transistor in the output stage of the amplifier unit.
When the engine is cranked, one of the ferrite rods in the rotor, now brought into close proximity with the ferrite core of the module causes "magnetic unbalancing" of the module core, resulting in an increase in the voltage at the module output terminals.
This "unbalancing" and voltage increases to maximum as the rotor rod traverses the centre and upper limbs of the module 'E' shaped core.
Maximum voltage is then applied to the amplifier unit, where it is rectified, the resulting direct (d.c.) current is then used to operate the transistor circuits which control the switching off of the power transistor in the output stage. With the power transistor switched off, its emitter/collector electrodes cease to conduct and the coil primary winding is disconnected which causes a rapid collapse of the primary winding magnetic field through the secondary windings of the ignition coil, resulting in a high-tension (H.T.) voltage being produced at the H.T. output terminal of the ignition coil.

Data

1.	Nominal voltage	12V (Negative Earth)
2.	Stall current (measured at 'SW' terminal of ballast resistance unit)	5.0 – 6.5A
3.	Ignition coil primary winding resistance (measured between L.T. terminals '+' and '–')	0.8 – 1.0 ohm at 20°C
4.	Distributor Pick-up Module	
	(a) Primary (input) winding resistance (measured between centre terminal and outer terminal with red cable)	2.5 ohms nominal at 20°C
	(b) Secondary (output) winding resistance (measured between centre terminal and outer terminal with black cable)	0.9 ohm nominal at 20°C
	(c) Gap between pick-up-module 'E' core faces and timing rotor-outer edge	0.50 mm – 0.55 mm (0.020 in – 0.022 in)

5. Centrifugal Auto-advance Details
Run up to 100 distributor rev/min. and set gauge to read zero degrees.
Check at following speeds.

Distributor R.P.M.	Distributor advance degrees
350	No advance
550	1.0 – 3.5
750	5.5 – 7.5
950	6.0 – 8.0
1750	8.0 – 10.0
2900	11.0 – 13.0
3500	11.5 – 13.5

6.	Distributor retard	
	(a) With rising vacuum at 17.7 cm (7 in) hg. and up to 25.3 cm (13 in) hg.	7 – 9 degrees
	(b) With falling vacuum at 25.4 mm (1 in) hg.	No retard

DISTRIBUTOR CAP

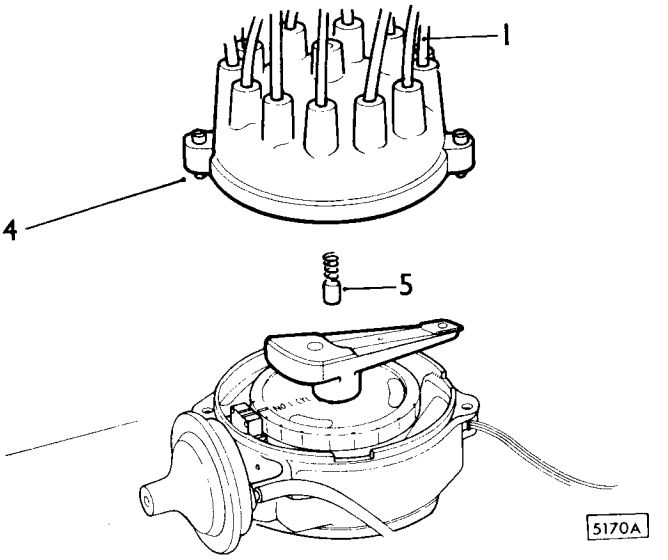
Remove and refit 86.35.10

Removing

1. Check all H.T. sparking plug leads and ensure each is adequately identified.
2. Detach leads from sparking plugs.
3. Detach H.T. lead from ignition coil.
4. Unscrew three captive screws and detach distributor cap.
5. Check carbon contact is in good condition and moving freely on spring.

Refitting

Reverse operations 2 to 4.



DISTRIBUTOR LEADS

Remove and refit 86.35.11

Removing

1. Pull faulty lead from distributor cap and from sparking plug.
2. Cut length of replacement H.T. lead same length as that removed.
3. Transfer identification sleeve or renew.
4. Fit terminations.

Refitting

5. Fit new lead to sparking plug and to distributor cap.

ROTOR ARM

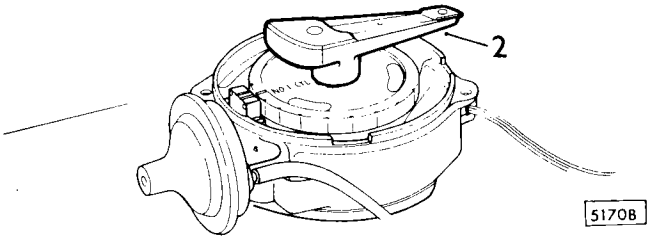
Remove and refit 86.35.16

Removing

1. Remove three captive screws and detach distributor cover.
2. Withdraw H.T. rotor.

Refitting

3. Place two or three drops of clean engine oil on rotor carrier shaft oil pad.
4. Replace H.T. rotor. Ensure keyway engaged, and rotor pushed fully home.
5. Refit distributor cover and tighten three screws.



ELECTRONIC TIMING ROTOR

Remove and refit 86.35.17

Removing

1. Remove rotor arm – 86.35.16.
2. Remove circlip and wave washer.
3. Detach electronic timing rotor.

Refitting

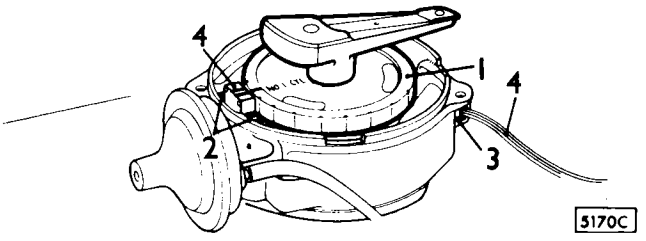
Reverse operations 1 to 3.

PICK UP MODULE

Remove and refit 86.35.18

Removing

1. Remove electronic timing rotor – 86.36.17.
2. Remove two cheese head screws securing pick up module to pick up arm and recover two spring and two plain washers.
3. Prise cable grommet inwards from body of distributor.
4. Feed cable and cable connector in through hole and lift pick up module clear.

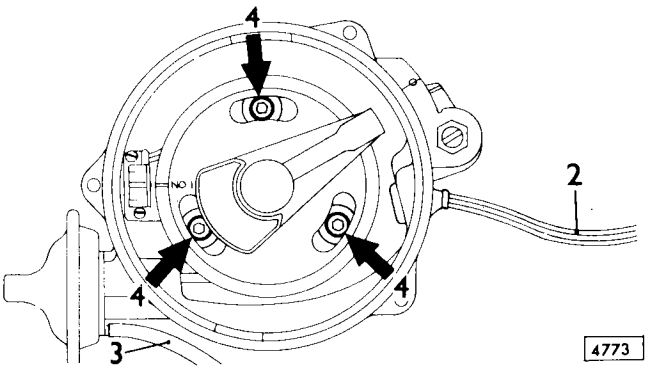


Refitting

5. Feed cable connector out through hole in distributor body. Fit grommet into hole in body, wide end first.
6. Locate pick up module on pick up arm, pick up core towards distributor shaft. Loosely secure using two cheese head screws, plain and spring washers.
7. Fit electronic timing rotor and secure using a wave washer and circlip.
8. Use feeler gauges to set distance between pick up module E core faces and timing rotor outer edge to 0,50 to 0,55 mm (0.021 to 0.022 in.).
9. Tighten both pick up securing screws.
10. Fit rotor arm.

DISTRIBUTOR

Remove and refit – Engine dismantling and reassembling only **86.35.20**



Removing

1. Remove three captive screws and detach distributor cover.
2. Disconnect cable at connecting plug.
3. Disconnect pipe from vacuum retard unit.
4. Release three Allen screws, accessible through slots in micro housing, withdraw distributor.

Refitting

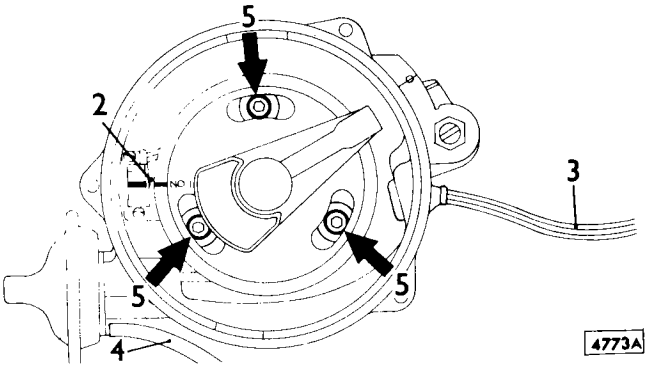
5. Rotate engine until mark 'A' etched on crankshaft damper is in line with 12° B.T.D.C. mark on timing plate.

   CAUTION: No. 1 piston 'A' bank must be on firing stroke. Both inlet and exhaust valves in cylinder will be closed and removal of sparking plug will enable an obervation to be made to ascertain that this is so. DO NOT rotate engine backwards.

6. Rotate distributor until No. 1 cylinder mark on timing rotor is in alignment with mark on pick up module.
7. Reverse operations 1 to 4 ensuring that marks on timing rotor and pick up module do not move out of alignment.
8. Check ignition timing – 86.35.29/7.

DISTRIBUTOR

Remove and refit – Service replacement only **86.35.20/1**



Removing

1. Remove three captive screws and detach distributor cover.
2. Rotate engine until No. 1 cylinder mark on timing rotor is in alignment with mark on pick-up module.
3. Disconnect cable assembly at connector plug.
4. Disconnect pipe from vacuum retard unit.
5. Release three Allen screws, accessible through slots in micro-housing, and withdraw distributor. DO NOT rotate engine.

Refitting

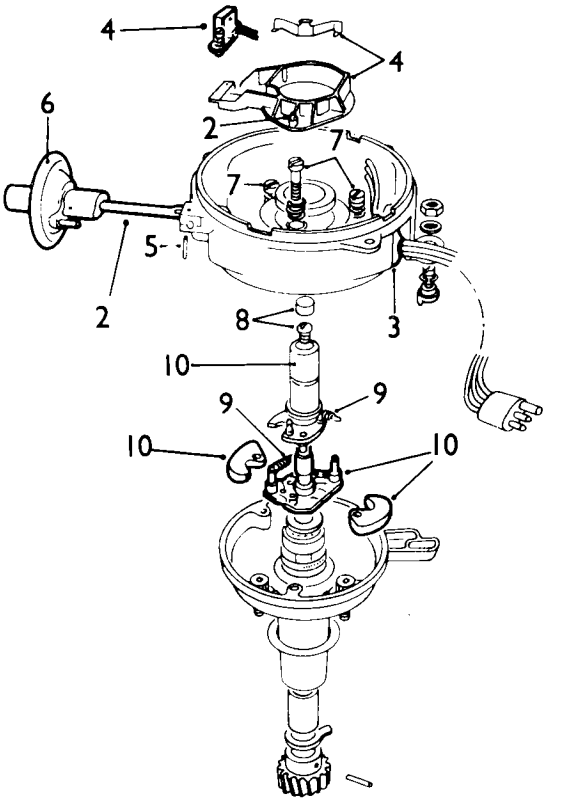
6. Reverse operations 3 to 5.
7. Check that No. 1 cylinder mark on timing rotor is in alignment with mark on pick-up module.
8. Refit distributor cap.
9. Check ignition timing – 86.35.29/7.

DISTRIBUTOR

Overhaul 86.35.26

Dismantling

1. Remove distributor – 86.35.20 and electronic timing rotor – 86.35.17.
2. Lift vacuum operating rod from peg on pick up arm.
3. Prise cable grommet from body of distributor.
4. Remove pick up arm bearing spring.
   Slide pick up arm sideways to disengage it from bearing. Lift from micro housing, drawing cable in through hole. Detach pick-up module.
5. Use a pin punch 1,85 mm (0.073 in.) to tap out roll pin securing vacuum unit in micro housing.
6. Withdraw vacuum unit from micro housing.
7. Remove three spring loaded screws and lift micro housing from distributor body.
8. Extract felt pad from top of rotor carrier shaft and release screw.
9. Release control springs from fixing posts.
10. Lift rotor carrier shaft from distributor shaft. Collect centrifugal weights.



4873A

Inspection

11. Check control springs for correct length.
12. Check pivot holes in centrifugal weights for wear or deformation.
13. Check distributor shaft for undue play.

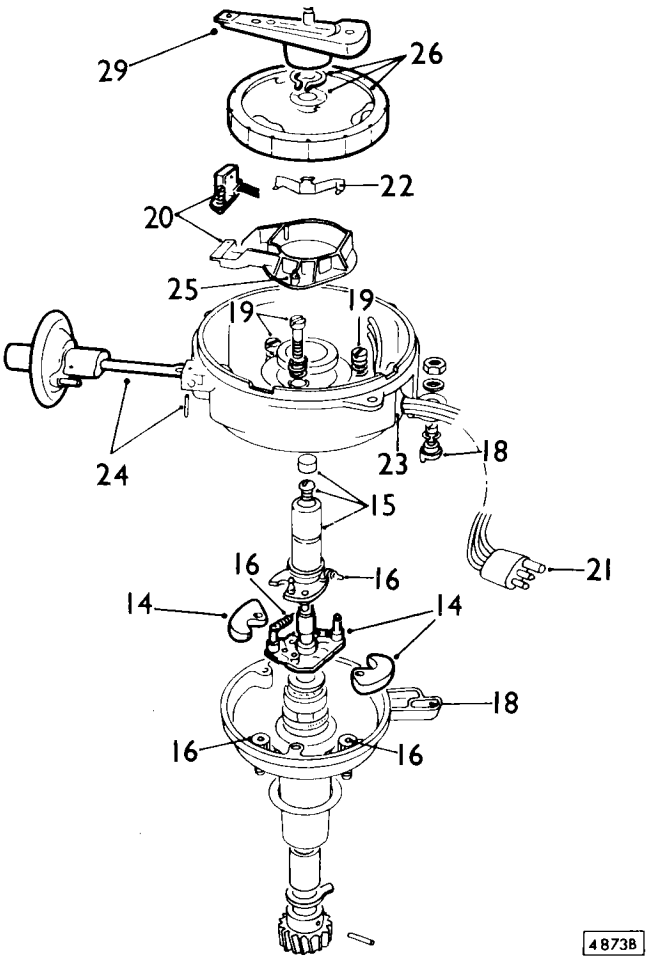
NOTE: If any part of the distributor body assembly is found to be defective, the complete assembly must be renewed.

Assembly

14. Smear centrifugal weights and rotor carrier pivot posts with either Rocol grease No.30863 or Mobilgrease No.2. Assemble weights to pivot posts.
15. Lubricate bore of rotor carrier shaft with clean engine oil and fit to distributor shaft. Retain with round headed screw. Fit oil pad.
16. Fit control springs.

NOTE: Ensure three socket headed screws and plain washers in place through slots in distributor body base.

17. Liberally smear auto advance mechanism with grease previously specified.
18. Fit micro housing to distributor body, ensuring micro adjustment eccentric peg engages in slot.
19. Secure micro housing to body using screws, plain washers and springs. Tighten screws to just short of coil binding.
20. Loosely secure pick up module to pick up arm using two cheese head screws, plain and spring washers.
21. Pass pick up module connector and cable out through hole in micro housing and locate pick up arm on rotor carrier shaft.
22. Fit bearing spring.
23. Engage wide part of cable grommet in hole and prise into position.
24. Place vacuum unit in position and secure with a new roll pin.
25. Fit vacuum operating rod to peg on pick up arm.
26. Fit electronic timing rotor and secure using a wave washer and circlip.
27. Use feeler gauges to set distance between pick up module E core faces and timing rotor outer edge to 0,50 to 0,55 mm (0.020 to 0.022 in.).
28. Tighten both pick up module securing screws.
29. Fit rotor arm.
30. Fit distributor.



'OPUS' IGNITION SYSTEM

Checking 86.35.29

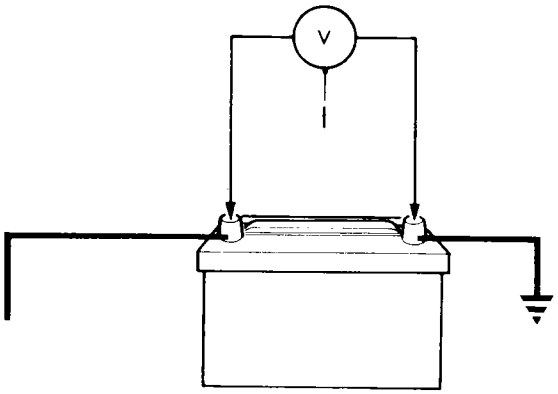
Special Equipment. A Multi-testmeter, or a Voltmeter 0 – 20V range. Ammeter 0 – 20A range and an Ohmmeter 0 – 20 ohms range.

CAUTION: When carrying out the following tests it is essential that they are performed in the order enumerated under each heading.

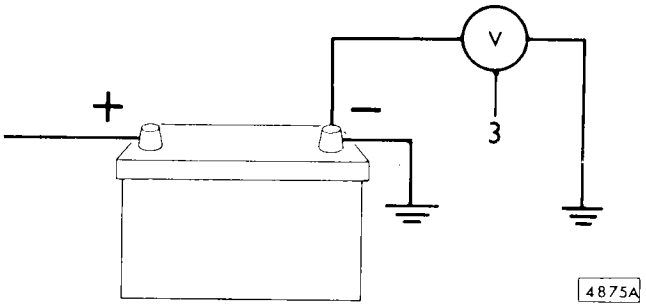
BATTERY

Circuit Test — 86.35.29/1

1. Check battery voltage. Full 12V should be registered.
2. Disconnect cable from coil L.T. terminal marked '–'.
3. Connect voltmeter between battery earth and frame.
4. Operate starter, check voltmeter reading which should not exceed 0.5 Volts. Refit coil cable.
5. If more than 0.5 volts is registered rectify faulty connection between frame and battery.



4837

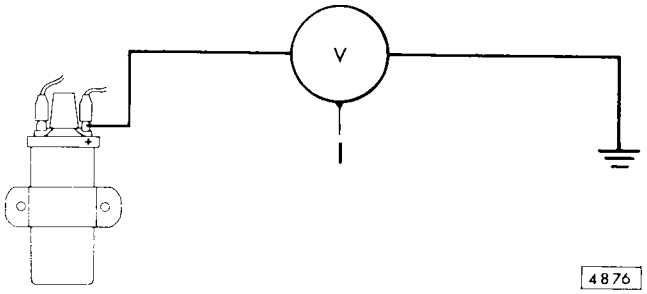


4875A

IGNITION COIL

Applied Voltage Test — 86.35.29/2

1. Connect voltmeter between coil '+' terminal and earth.
   Switch on ignition, check voltmeter reading.
   If 4 – 6 volts registered proceed to operation 86.35.29/3.
2. If below 4 volts is registered, check value of each resistor in ballast unit with ohmmeter.

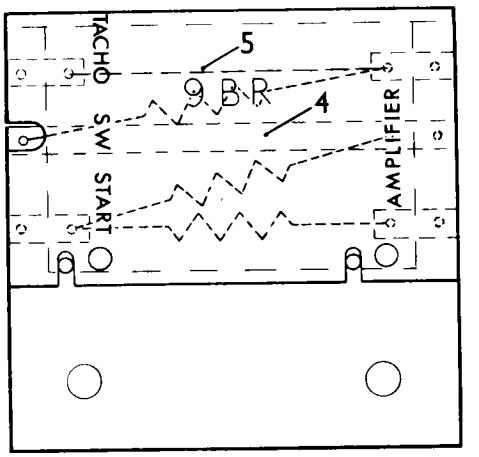


4876

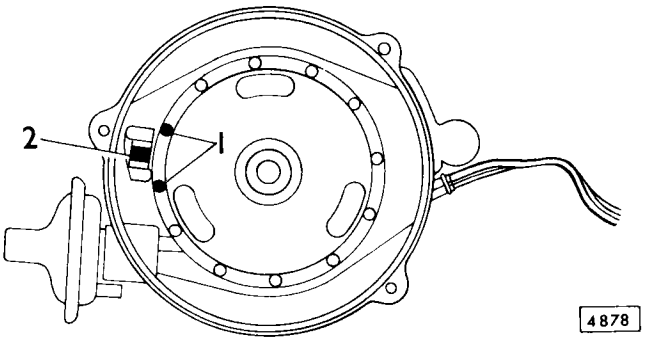
Readings obtained should be:–
Resistor 1 – 7.6 – 9.2 ohms.
Resistor 2 – 0.72 – 0.80 ohms.
Resistor 3 – 0.9 – 1.0 ohms.
Renew resistor unit if outside these limits. Check battery supply voltage to unit.

Connection 4 – Straight through internal connection.
Connection 5 – Tachometer terminal and straight through internal connection (incorporated in later units marked 47227).

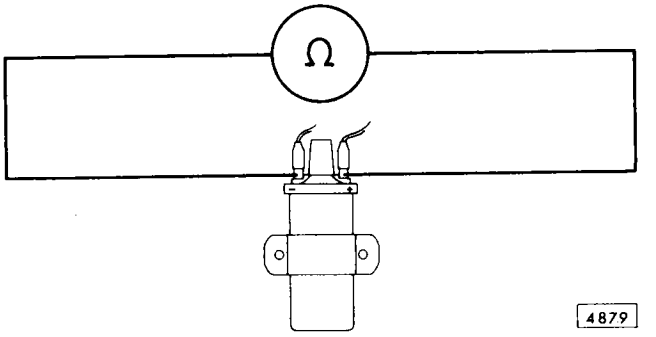
3. If above 6 volts is registered, remove distributor cover, crank engine until two of the timing rotor rods (1) are equi-distant either side of the pick-up module core (2) and re-check.
4. Check ignition coil for continuity and resistance of primary winding between '+' and '–' terminals. Renew coil if outside limits of 0.8 – 1.0 ohms, or open circuited.



4877A



4878

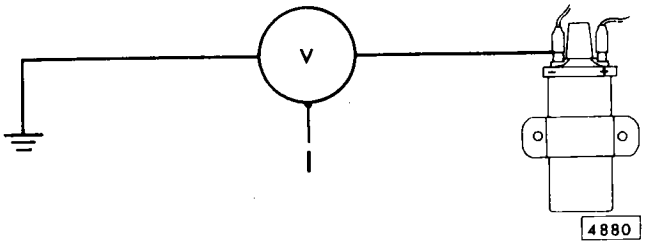


4879

IGNITION COIL

Voltage Drop Test 86.35.29/3

1. Connect voltmeter between '–' (negative) terminal of coil and earth. DO NOT disconnect coil cables.
2. Switch on ignition and note meter-reading. Replace amplifier unit if above 2 volts.

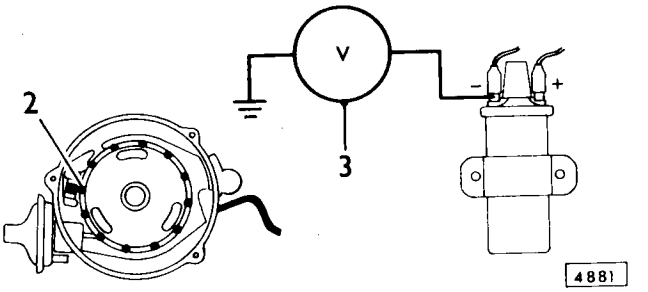


4880

AMPLIFIER UNIT

Switching Action Test 86.35.29/4

1. Remove distributor cover.
2. Rotate engine until one of the ferrite rods is in line with timing mark on module.
3. Connect voltmeter between '–' (negative) terminals of coil and earth. DO NOT disconnect coil cables.
4. Switch on ignition and note meter reading.
5. If below battery voltage (12 volts) carry out operations 86.35.29/5 and 86.35.29/6, in that order.

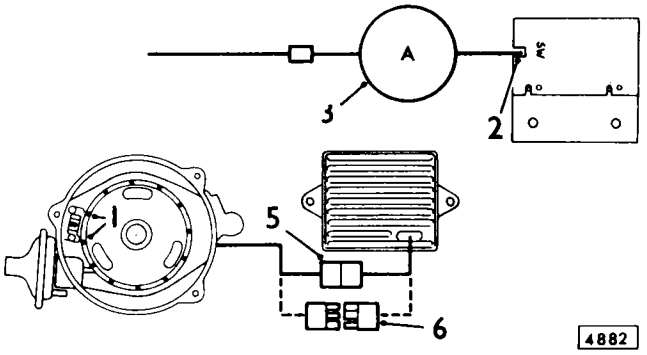


4881

AMPLIFIER UNIT

Test **86.35.29/5**

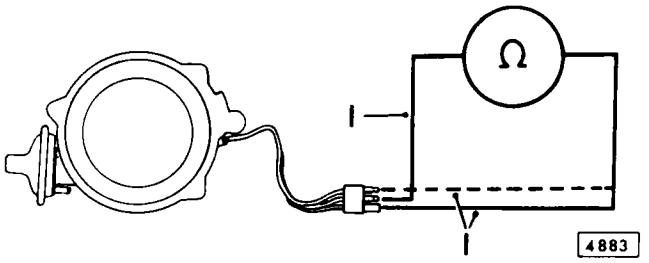
1. Rotate engine until two of the ferrite rods in the timing rotor are equi-distant either side of module core.
2. Disconnect cable from "SW" terminal of ballast unit.
3. Connect a moving coil ammeter (0 – 20A range) in series with cable and terminal.
4. Switch on ignition and check ammeter reading (5 – 6.5 amperes).
5. Separate connector between distributor and amplifier unit.
6. Connect outside terminals of amplifier plug alternately to centre terminal. Ammeter reading should remain unchanged. If reading increases by more than 0.5A, renew amplifier unit.



PICK-UP MODULE

Test **86.35.29/6**

1. Connect one lead of ohmmeter to centre terminal of the pick-up module connector and the other lead alternately to each of the outside terminals.
2. Readings obtained should be as stated under heading 'Distributor Pick-up Module' in DATA section.
3. Renew module if outside these limits.
4. If readings obtained conform to those stated under 'DATA', remove pick-up module and check sealed adjusting screw near bottom limb of 'E' shaped core.
5. Renew module assembly if seal is broken.



IGNITION TIMING

Check **86.35.29/7**

1. Disconnect vacuum pipe from vacuum retard unit.
2. Slacken locknut of micro adjustment control and set vernier at zero.
3. Set engine idling speed at 500 to 600 rev/min.
4. Check timing with a stroboscope and adjust until timing is 12° B.T.D.C.
5. Tighten locknut, refit vacuum pipe.
6. Reset engine idling speed at 650 to 750 rev/min.

AMPLIFIER UNIT

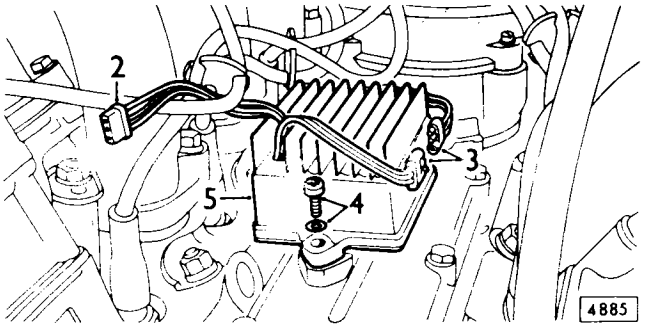
Remove and refit **86.35.30**

Removing

1. Disconnect battery – 86.15.19.
2. Withdraw unit cable plug from ballast resistor assembly.
3. Disconnect plug adaptor between distributor and amplifier unit line.
4. Remove two screws and washers.
5. Remove amplifier unit. Collect spacers.

Refitting

Reverse operations 1 to 5.



COIL

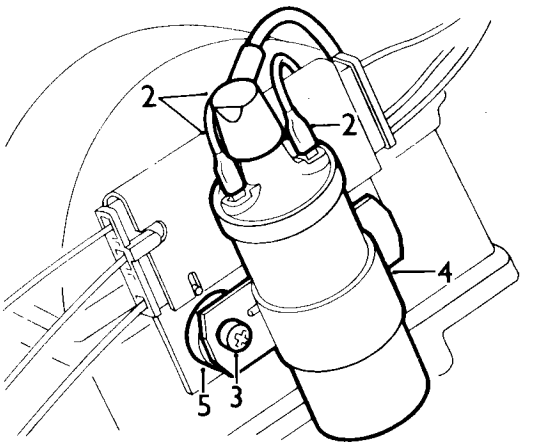
Remove and refit 86.35.32

Removing

1. Disconnect battery – 86.15.19.
2. Disconnect cables.
3. Remove two setscrews and washers.
4. Detach coil.
5. Collect ballast resistor unit distance pieces.

Refitting

Reverse operations 1 to 5.



4888

BALLAST RESISTOR UNIT

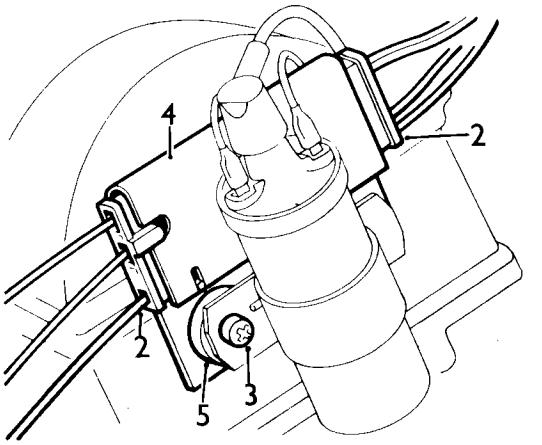
Remove and refit 86.35.33

Removing

1. Disconnect battery – 86.15.19.
2. Withdraw connector plugs.
3. Remove setscrews and washers.
4. Remove unit.
5. Collect distance pieces.

Refitting

Reverse operations 1 to 5.



4889

BALLAST RESISTOR/STARTER RELAY

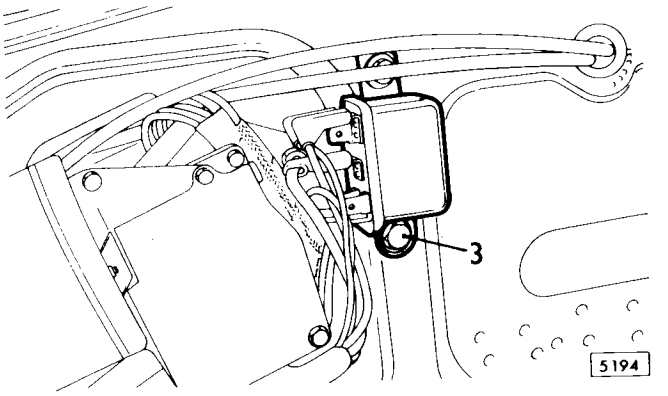
Remove and refit 86.35.34

Removing

1. Disconnect battery – 86.15.19.
2. Note connections and pull connectors from relay.
3. Release two setscrews securing relay and recover plain washers and spring washers.

Refitting

Reverse operations 1 to 3, fitting earth tag beneath lower screw.



5194

BALLAST RESISTOR/STARTER RELAY

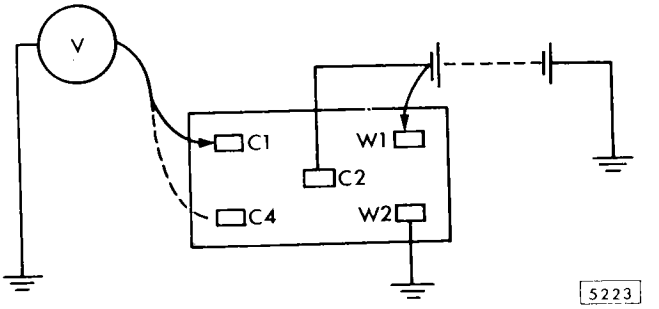
Test – (in situ) 86.35.35

If starter motor does not operate when ignition key turned initially, check as follows.

1. Pull cable from C2 and C4 connectors on relay and short together. Starter motor should operate showing relay at fault. If starter does not operate, either no supply in brown cable or starter motor at fault.

Relay removed

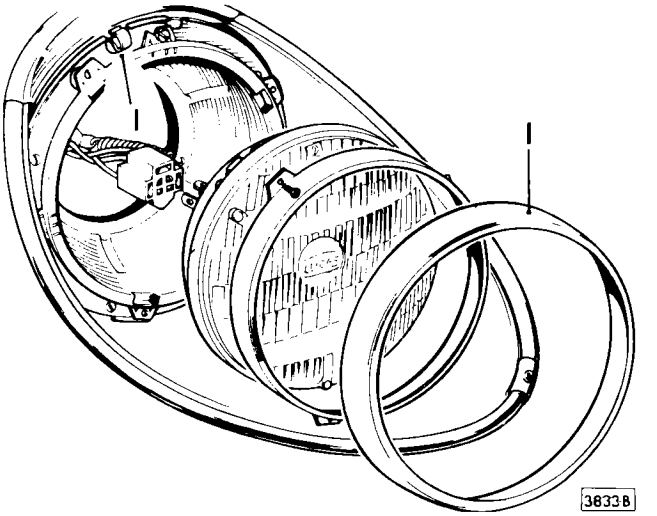
1. Apply 12V as shown, 12V should appear on both C1 and C4.



5223

HEADLAMP RIM

Remove and refit **86.40.01**



Removing

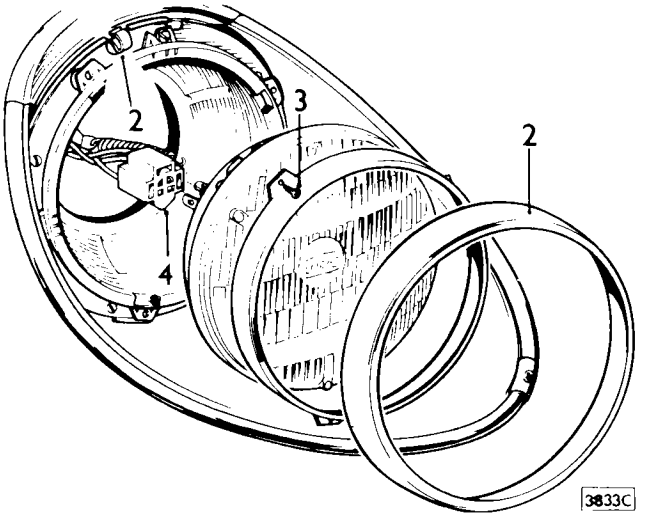
1. The rim is secured by spring clips and should be carefully prised off with a suitable screwdriver inserted behind the rim.

Refitting

2. Locate rim on spring clip and snap into position.

HEADLAMP ASSEMBLY

Remove and refit **86.40.02**



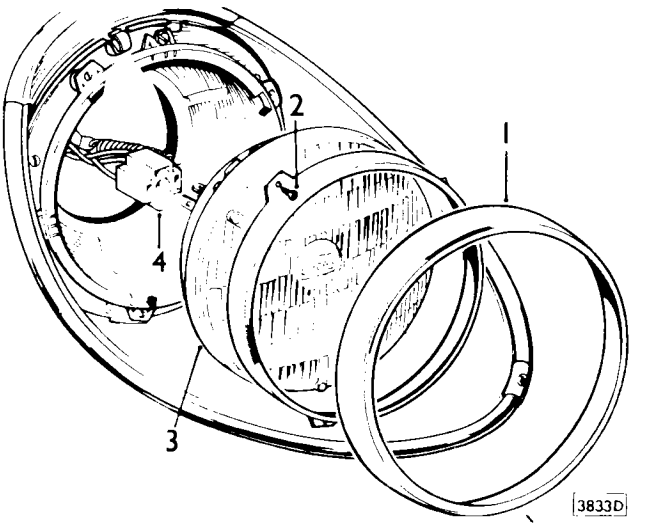
1. Left hand headlamp only – remove flasher lamp assembly 86.40.26 to facilitate access to wiring.
2. Remove rim – 86.40.01.
3. Withdraw lamp assembly, retained by four screws.
4. Disconnect cables at snap connectors.

Refitting

5. Reverse operations 1 to 4.
6. Adjust beam alignment – 86.40.17.

HEADLAMP SEALED BEAM UNIT

Remove and refit **86.40.09**



Removing

1. Remove rim – 86.40.01.
2. Remove retaining ring, secured by three screws. DO NOT disturb adjusting screws.
3. Withdraw light unit.
4. Detach wiring connector.

Cars fitted with separate headlamp bulbs.

5. Withdraw bulb.

Refitting

Reverse operations 1 to 5.

HEADLAMP PILOT BULB

Remove and refit **86.40.11**

Removing

1. Remove light unit – 86.40.09.
2. Withdraw pilot bulb from holder, the bulb is of the capless type and is a push fit into its holder.

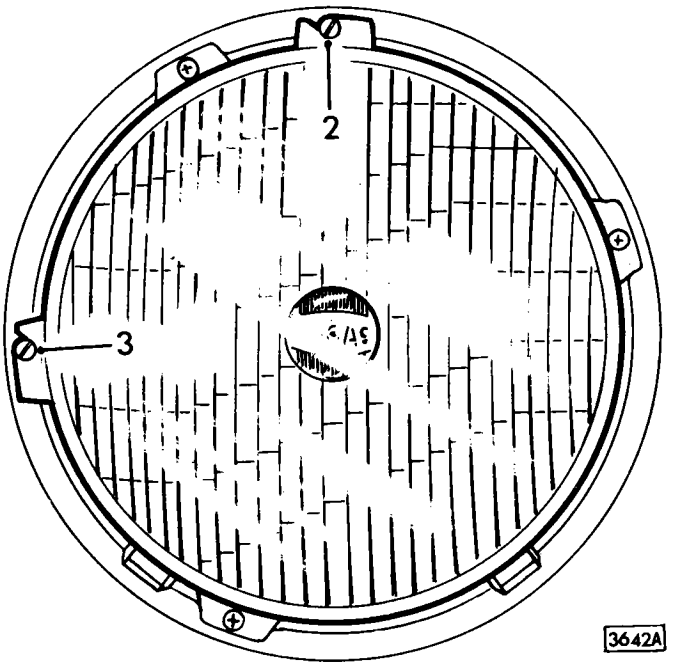
Refitting

3. Insert bulb into its holder, taking care not to misplace or distort the contact wires.
4. Refit light unit.

HEADLAMPS ALIGN BEAM 86.40.17

NOTE: It is recommended that a suitable beam setting instrument should be used.

1. Remove rim – 86.40.01.
2. Adjust vertical alignment.
3. Adjust horizontal alignment.
4. Refit rim.



SIDE/FLASHER LAMP LENS

Remove and refit **86.40.24**

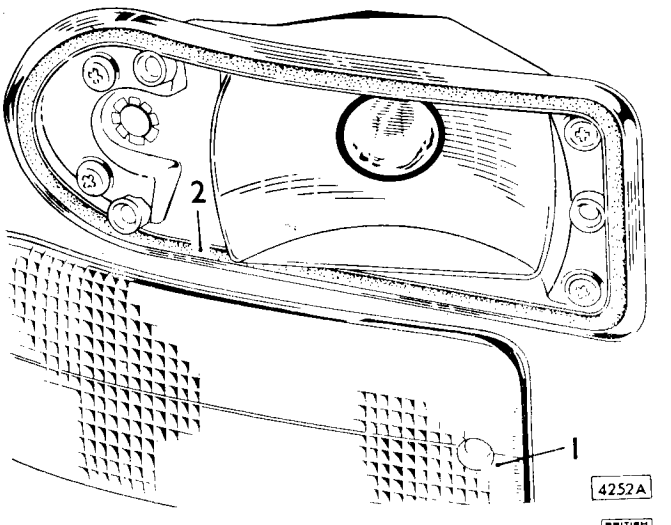
NOTE: Lamps for U.S.A./CANADA and ITALY incorporate double filament bulbs with off-set pins (side/flasher).
Lamps for all other countries have single filament bulbs (flasher only). Pins are not off-set.

Removing

1. Remove three retaining screws and detach lens.

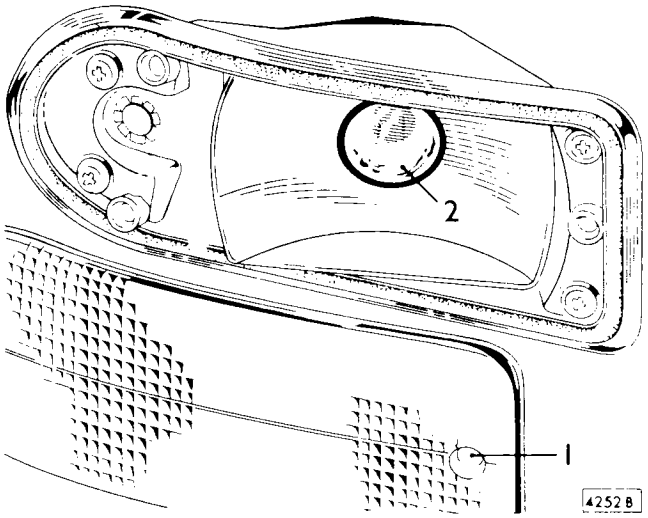
Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens and secure using three screws.



SIDE/FLASHER LAMP BULB

Remove and refit 86.40.25



Removing

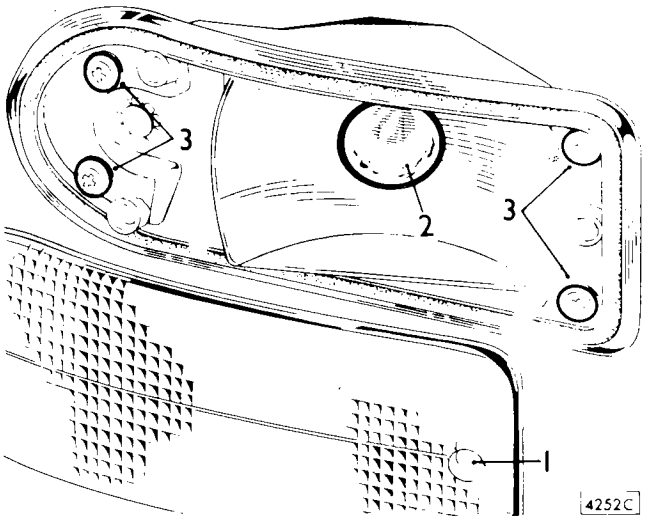
1. Remove three retaining screws and detach lens.
2. Remove bulb.

Refitting

3. Fit bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and secure using three screws.

SIDE/FLASHER LAMP ASSEMBLY

Remove and refit 86.40.26



Removing

1. Remove three retaining screws and detach lens.
2. Remove bulb.
3. Remove four screws, disconnect cables and detach assembly.

Refitting

4. Examine gasket and renew if necessary.
5. Connect cables, fit assembly and retain with four screws.
6. Fit bulb.
7. Examine lens and gasket, renew if necessary.
8. Refit lens and secure using three screws.

FRONT FLASHER LAMP LENS
FRONT FLASHER LAMP BULB
FRONT FLASHER LAMP ASSEMBLY

Remove and refit 86.40.40
86.40.41
86.40.42

Removing

See procedure given under 86.40.24, 86.40.25 or 86.40.26.

Refitting

See procedure given under 86.40.24, 86.40.25 or 86.40.26.

FRONT FLASHER REPEATER LENS

(Flasher repeater lamps are only fitted to cars for certain territories).

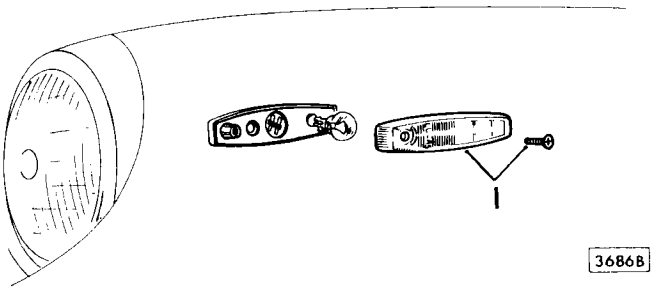
Remove and refit **86.40.51**

Removing

1. Remove screw retaining lens and detach lens from clip.

Refitting

2. Refit lens and retaining screw.



FRONT FLASHER REPEATER BULB

(Flasher repeater lamps are only fitted to cars for certain territories).

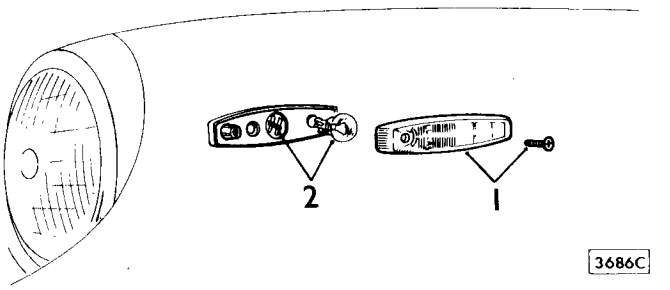
Remove and refit **86.40.52**

Removing

1. Remove screw retaining lens and detach lens from clip.
2. Withdraw bulb, which is of the capless type, and is a push fit into its holder.

Refitting

3. Insert bulb into its holder taking care not to displace or distort the connecting wires.
4. Replace lens and retaining screw.



FRONT FLASHER REPEATER ASSEMBLY

(Flasher repeater lamps are only fitted to cars for certain territories).

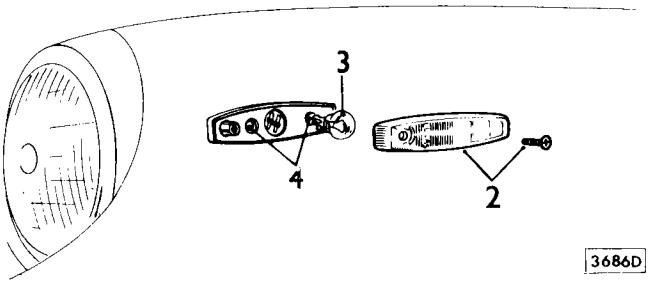
Remove and refit **86.40.53**

Removing

1. Disconnect battery – 86.15.19.
2. Remove screw retaining lens, and detach lens from clip.
3. Withdraw bulb, which is of the capless type and is a push fit into its holder.
4. Withdraw lamp assembly, secured by two screws.
5. Disconnect leads at connector.

Refitting

6. Reverse operations 1 to 5. Renew gasket.
7. When fitting bulbs, take care not to distort or displace the connecting wires.



SIDE MARKER LAMP BULB

(Side marker lamps are only fitted to cars for certain territories)

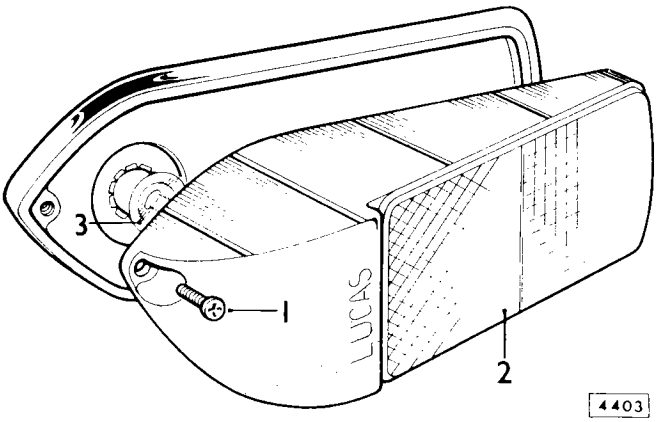
Remove and refit 86.40.62

Removing

1. Remove lens retaining screw.
2. Withdraw lens.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.



4403

SIDE MARKER LAMP LENS

(Side marker lamps are only fitted to cars for certain territories).

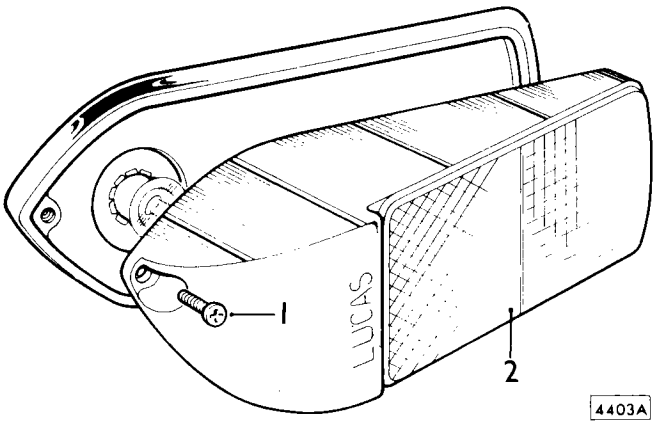
Remove and refit 86.40.63

Removing

1. Remove lens retaining screw.
2. Withdraw lens.

Refitting

Reverse operations 1 and 2.



4403A

SIDE MARKER LAMP ASSEMBLY

(Side marker lamps are only fitted to cars for certain territories).

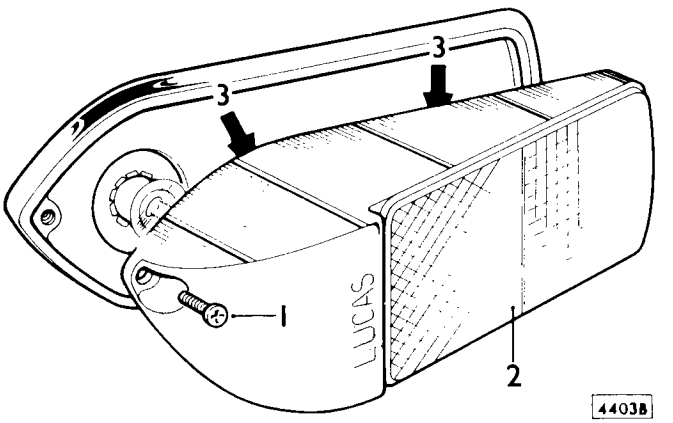
Remove and refit 86.40.64

Removing

1. Remove lens retaining screw.
2. Withdraw lens.
3. Remove screws and withdraw lamp.
4. Disconnect leads.

Refitting

Reverse operations 1 to 4. Renew gasket.



4403B

TAIL, STOP AND FLASHER LAMP LENS

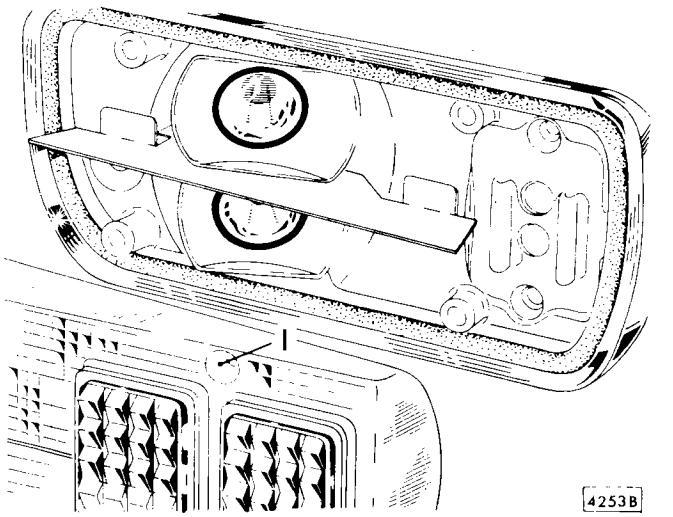
Remove and refit 86.40.68

Removing

1. Remove lens, secured by four screws.

Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens and securing screws.



4253B

TAIL, STOP AND FLASHER LAMP BULB

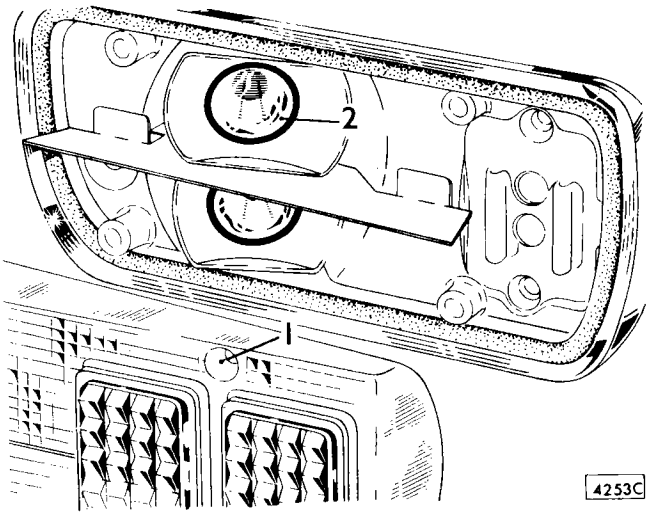
Remove and refit **86.40.69**

Removing

1. Remove lens secured by four screws.
2. Withdraw bulb. Upper bulb flasher, lower bulb stop and tail.

Refitting

3. Fit new bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and securing screws.
6. Check operation of lamps.



TAIL, STOP AND FLASHER LAMP ASSEMBLY

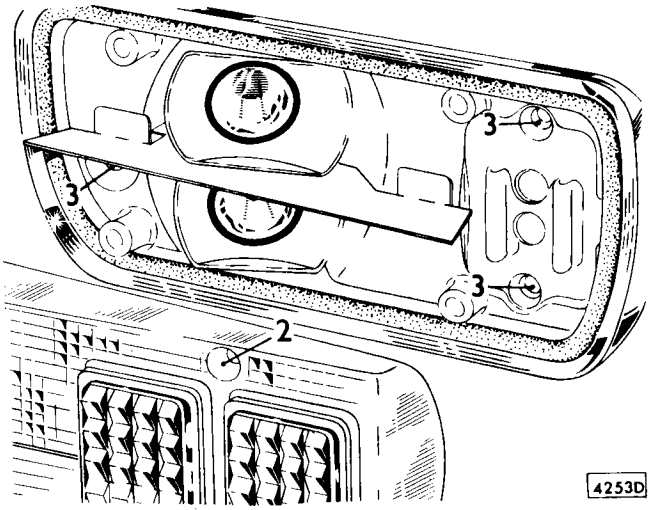
Remove and refit ****Right-hand 86.40.70**
Left-hand 86.40.71**

Removing

1. Disconnect battery – 86.15.19
2. Remove lens, secured by four screws.
3. Withdraw lamp assembly secured by three screws.
4. Disconnect cables and remove lamp assembly.

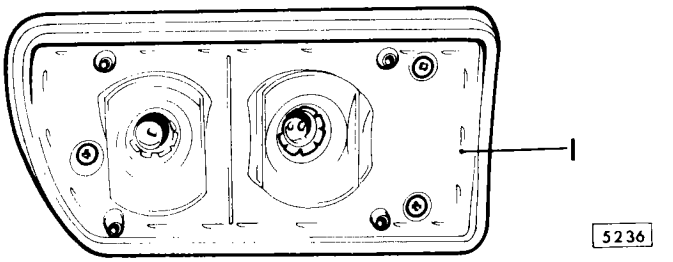
Refitting

5. Reverse operations 1 to 4.
6. Examine lens and gasket, if necessary renew.
7. Check operation of lamp.



TAIL STOP AND FLASHER LAMP

1. Alternative form



NUMBER PLATE LAMP LENS

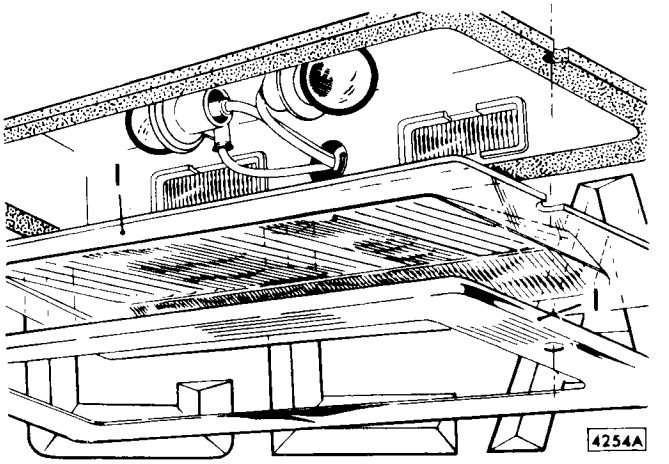
Remove and refit **86.40.84**

Removing

1. Withdraw lens and bezel secured by two screws.

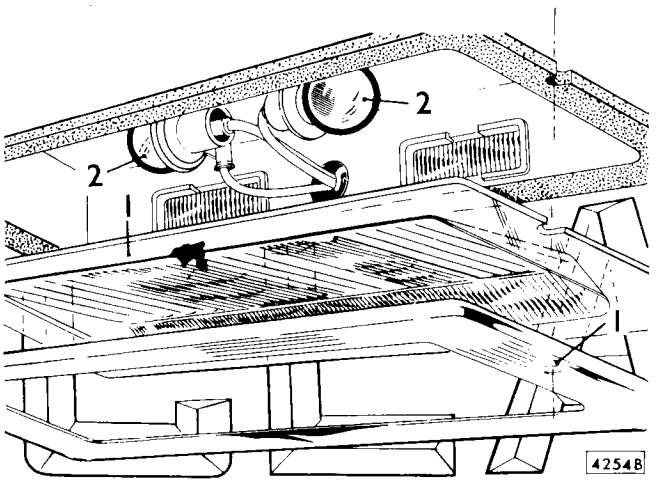
Refitting

2. Examine lens and gasket, if necessary renew.
3. Refit lens, bezel and gasket.



NUMBER PLATE LAMP BULB

Remove and refit **86.40.85**



Removing

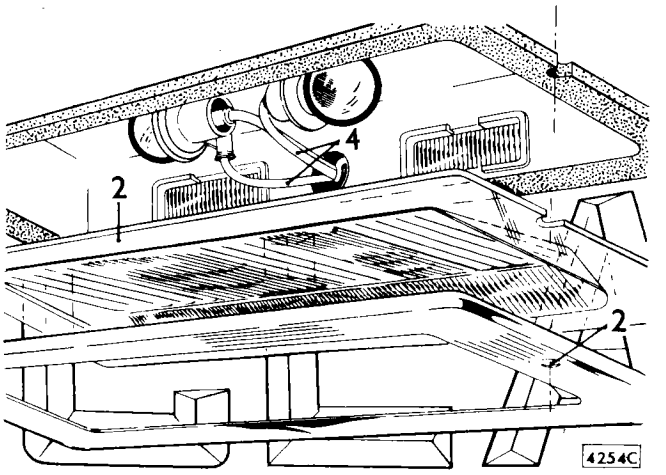
1. Remove lens and bezel, secured by two screws.
2. The lamp contains 2 bulbs which are of the bayonet cap type. Withdraw bulb(s).

Refitting

3. Reverse operations 1 and 2.
4. Check operation of lamp.

NUMBER PLATE LAMP ASSEMBLY

Remove and refit **86.40.86**



Removing

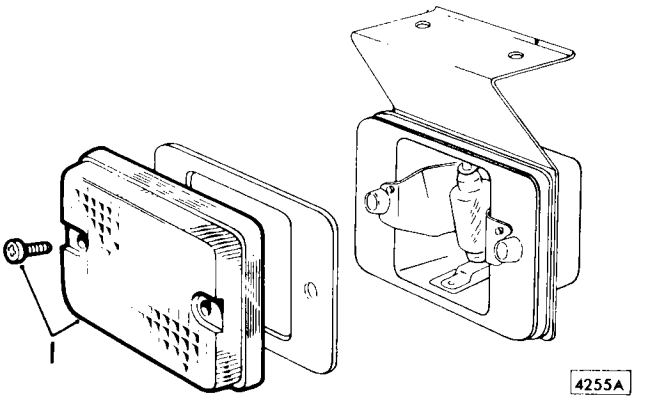
1. Disconnect battery – 86.15.19.
2. Remove lens and bezel, secured by two screws.
3. Withdraw lamp assembly.
4. Disconnect cables.

Refitting

5. Reverse operations 1 to 4.
6. Check operation of lamp.

REVERSE LAMP LENS

Remove and refit **86.40.89**



Removing

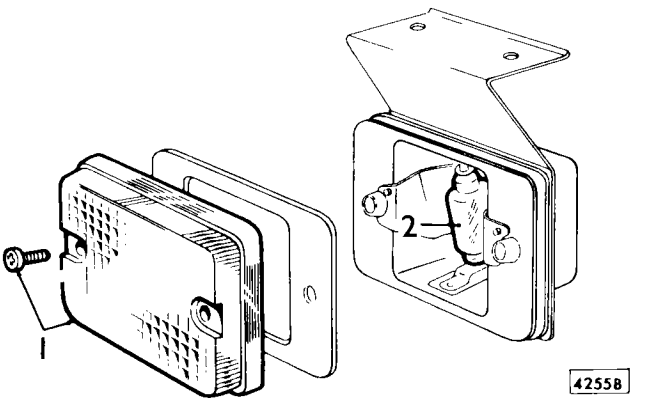
1. Remove lens, secured by two screws.

Refitting

2. Examine lens and gaskets, if necessary renew.
3. Refit lens and secure using two screws.

REVERSE LAMP BULB

Remove and refit **86.40.90**



Removing

1. Remove lens, secured by two screws.
2. Withdraw bulb.

Refitting

3. Fit new bulb.
4. Examine lens and gasket, if necessary renew.
5. Refit lens and secure using two screws.
6. Check operation of lamp.

REVERSE LAMP ASSEMBLY

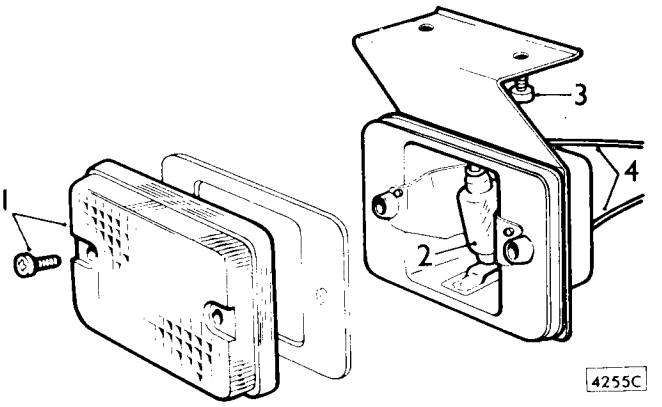
Remove and refit 86.40.91

Removing

1. Remove lens, secured by two screws.
2. Withdraw bulb.
3. Remove two screws securing lamp bracket to body.
4. Disconnect cables.

Refitting

5. Secure lamp bracket to body using two self tapping screws.
6. Make electrical connections.
7. Fit bulb.
8. Examine gasket and renew if necessary.
9. Refit lens and secure, using two screws.
10. Check operation of lamp.



4255C

INTERIOR LAMP BULB/S

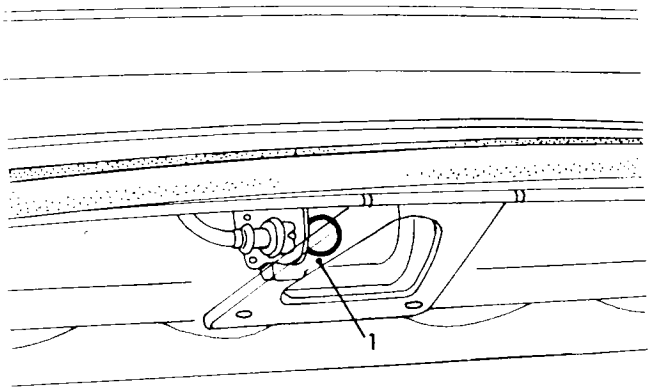
Remove and refit 86.45.01

Removing

1. Detach lens cover and remove bulb(s).

Refitting

2. Fit bulb(s) and refit lens cover.



3002A

Refitting

Reverse operations 1 and 2.

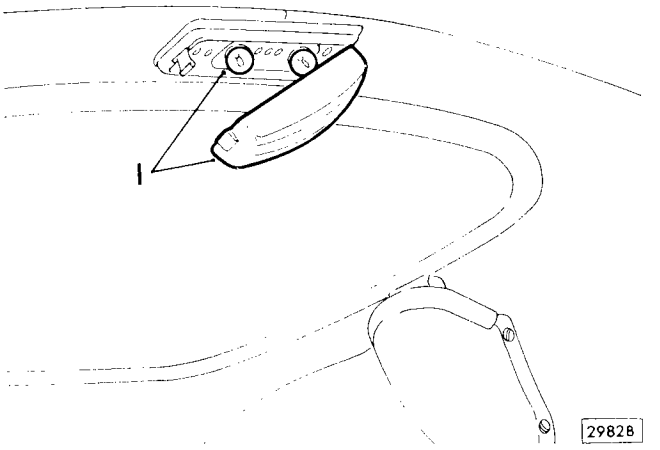
INTERIOR LAMP ASSEMBLY (2 + 2 only)

Remove and refit 86.45.02

Removing

1. Detach lens cover and remove bulb(s).
2. Remove two screws, withdraw assembly and disconnect cables.

NOTE: On open two seater cars the bulb is accessible when the luggage compartment lid is raised.



2982B

MAP LAMP BULB

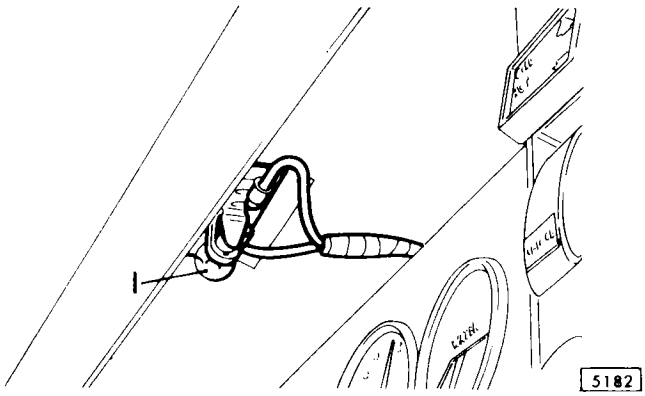
Remove and refit **86.45.09**

Removing

1. Remove bulb from holder located under screen rail facia.

Refitting

Reverse operation 1.



MAP LAMP ASSEMBLY

Remove and refit **86.45.10**

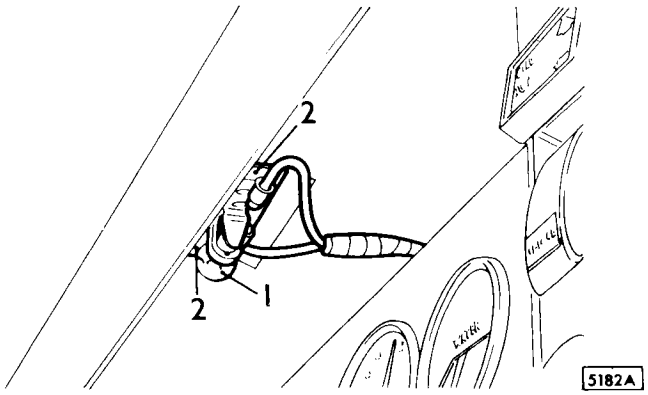
Removing

1. Remove bulb from holder.
2. Carefully drill out pop rivets. DO NOT pierce facia trim.

Refitting

3. Secure replacement holder with new rivets.

NOTE: Refit insulation pad beneath holder.



PANEL ILLUMINATION BULB

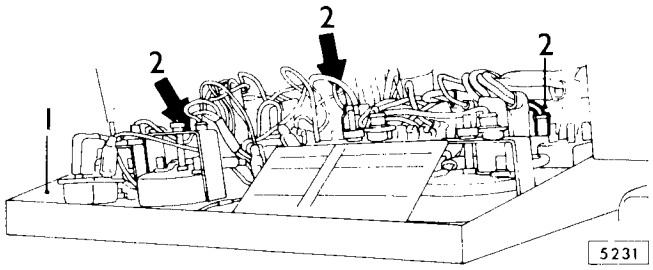
Remove and refit **86.45.31**

Removing

1. Remove two finger nuts and lower centre instrument panel.
2. Remove bulb from holder.

Refitting

Reverse operations 1 and 2.



AUTOMATIC TRANSMISSION INDICATOR BULB

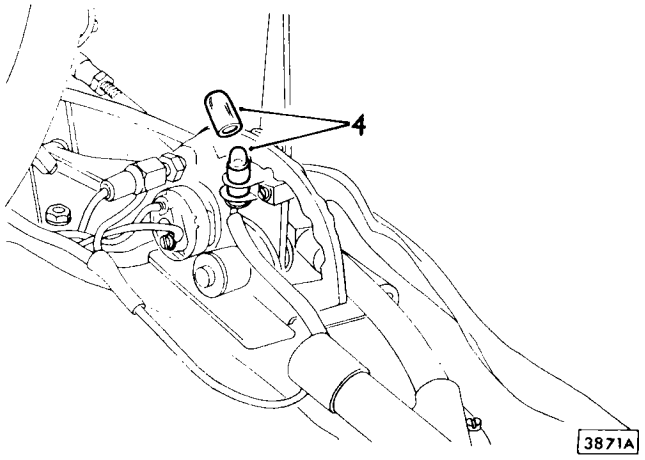
Remove and refit **86.45.40**

Removing

1. Disconnect battery – 86.15.19.
2. Remove console assembly – 76.25.01.
3. Withdraw two screws and detach gear indicator cover.
4. Detach bulb cover and withdraw bulb.

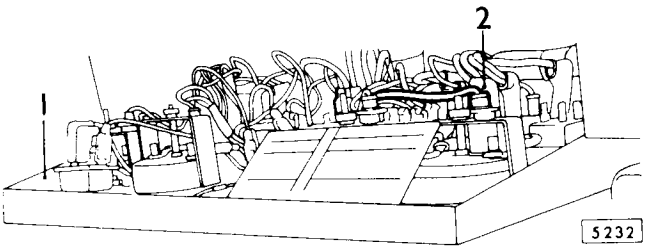
Refitting

Reverse operations 1 to 4.



INSTRUMENT ILLUMINATION BULBS

Remove and refit 86.45.48



Removing

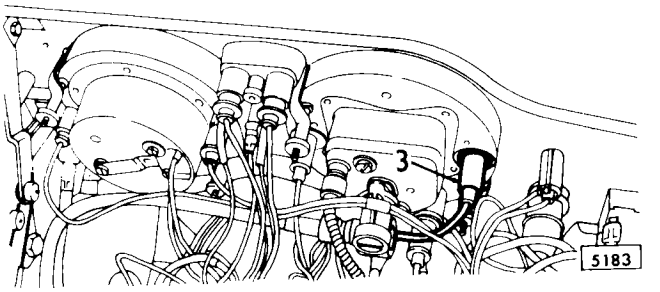
1. Release knurled finger nuts and lower instrument panel.
2. Withdraw bulb holder.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.

SPEEDOMETER ILLUMINATION BULBS
TACHOMETER ILLUMINATION BULBS
FLASHER INDICATOR BULBS
IGNITION WARNING BULB
HEADLAMP FULL BEAM BULB
OIL PRESSURE WARNING BULB
FUEL WARNING BULB

Remove and refit 86.45.49
86.45.53
86.45.63
86.45.64
86.45.65
86.45.66
86.45.70



Removing

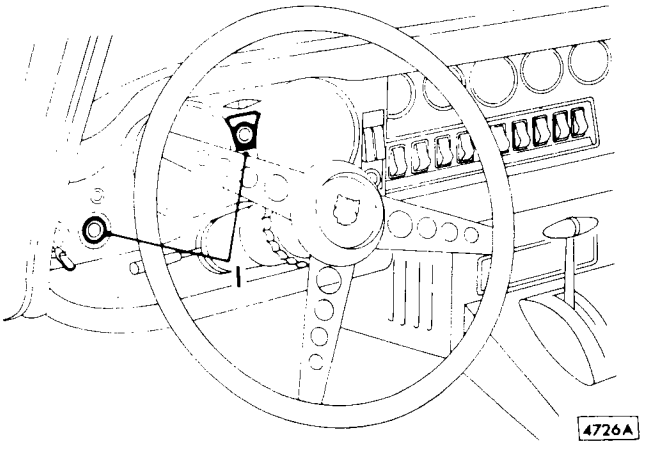
1. Disconnect battery – 86.15.19.
2. Remove screen rail crash roll assembly – 76.46.04.
3. Pull out bulb holder.
4. Remove bulb.

Refitting

Reverse operation 1 to 4.

HANDBRAKE/BRAKE FLUID WARNING BULB
HAZARD WARNING BULB

Remove and refit 86.45.67
86.45.68



Removing

1. Unscrew bezel.
2. Remove bulb.

Refitting

Reverse operations 1 and 2.

CHOKE WARNING LIGHT BULB

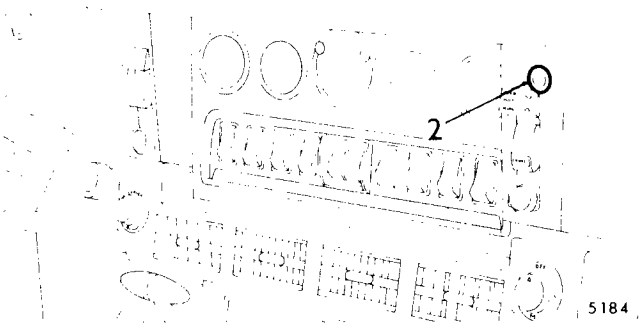
Remove and refit 86.45.71

Removing

1. Remove screen rail crash roll assembly – 76.46.04.
2. Press bulb holder from facia panel.
3. Remove bulb.

Refitting

Reverse operations 1 to 3.



CHOKE INDICATOR LIGHT BULB

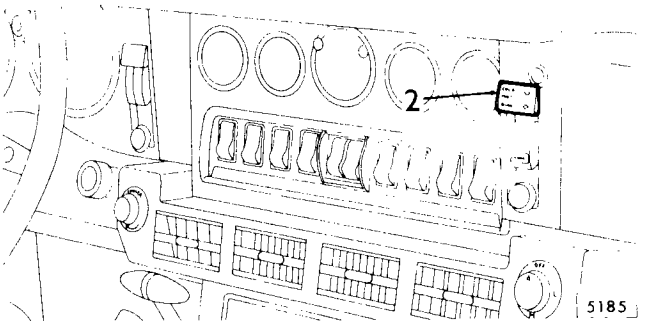
Remove and refit 86.45.72

Removing

1. Remove screen rail crash roll assemlby – 76.46.04
2. Press indicator display from facia panel.
3. Remove bulb.

Refitting

Reverse operations 1 to 3



HEATER INDICATOR LIGHT BULB

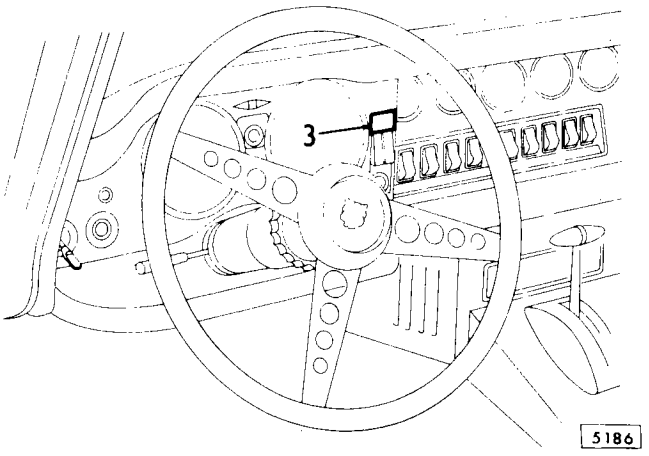
Remove and refit 86.45.73

Removing

1. Remove screen rail crash roll assembly – 76.46.04.
2. Disengage cable from clip.
3. Press indicator display from facia panel.
4. Remove bulb.

Refitting

Reverse operations 1 to 4.



**SEAT BELT WARNING LAMP BULB

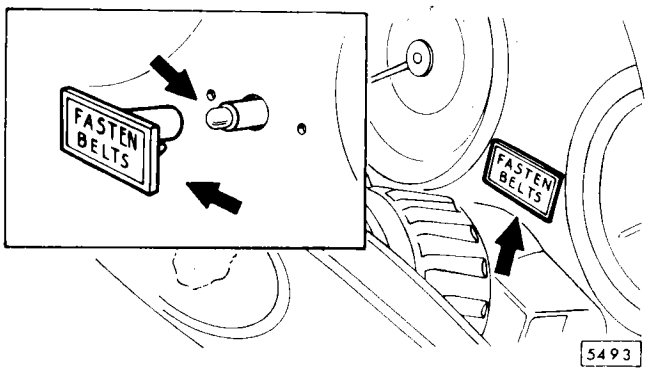
Remove and refit 86.45.75

Removing

1. Disconnect battery.
2. Withdraw lens cover unit from facia, (retained by two nylon friction bushes).
3. Withdraw bulb holder from lamp unit.
4. Remove bulb.

Refitting

Reverse operations 1 to 4.**



RADIO CONTROL UNIT

Remove and refit 86.50.01

Removing

1. Disconnect battery – 86.15.19.
2. Detach radio control knobs.
3. Remove two dome nuts.
4. Remove two screws.
5. Remove two nuts securing control unit.
6. Withdraw radio panel.
7. Remove two setscrews and washers and withdraw control unit.
8. Disconnect fuse holder, collect fuse cartridge.
9. Disconnect speaker leads.
10. Disconnect aerial pick-up lead.
11. Disconnect power lead for rear aerial (if fitted).
12. Disconnect tape recorder lead (if fitted).
13. Withdraw control unit.

Refitting

Reverse operations 1 to 13.

RADIO CONTROL UNIT MOUNTINGS

Remove and refit 86.50.02.

Air conditioned cars only

Removing

1. Remove radio control unit 86.50.01.
2. Remove four setscrews, plain and spring washers securing mounting brackets to evaporator unit.

Refitting

Reverse operations 1 and 2.

RADIO PANEL

Remove and refit 86.50.04

Removing

1. Disconnect battery – 86.15.19.
2. Remove parcel tray – 76.67.04 – driver's side.
3. Remove parcel tray – 76.67.05 – passenger side.
4. Remove fixings at both sides of radio panel.
5. **Non air conditioned cars only**
   Withdraw panel sufficiently to detach 'Lucar' connectors from cigar lighter – 86.65.60.
6. Disconnect radio control unit (if fitted) – 86.50.01.

Refitting

Reverse operations 1 to 6.

RADIO SPEAKER/S

Remove and refit 86.50.12

Removing

1. Extract bolt, remove seat belt inertia reel (if fitted).
2. Lift door draught welt.
3. Remove two screws and detach boot lid lock control escutcheon (right hand side only).
4. Lift trim secured by solution to door shut face. Insert screwdriver under lower edge, prise away from clip fixings, and remove trim panel.
5. Remove four drive screws, withdraw speaker/baffle board assembly. Unsolder cables.

Refitting

Reverse operations 1 to 5.

NOTE: Speakers must be mounted with wide portion of baffle at top.

MANUAL AERIAL

Remove and refit 86.50.20

Removing

1. Remove spare wheel.
2. Remove two drive screws and detach panel at right hand side.
3. Remove nut, bush and seal washer securing aerial mast to wing.
4. Draw aerial from wing and disconnect coaxial cable.

Refitting

Reverse operations 1 to 4.

MOTORISED AERIAL

Remove and refit 86.50.21

Removing

1. Remove spare wheel.
2. Disconnect battery – 86.15.19.
3. Remove two drive screws and detach panel at right hand side.
4. Remove nut, bush and seal washer securing aerial mast to wing.
5. Note connections to relay and disconnect cables.
6. Remove four nuts and washers and detach motor from mounting bracket.
7. Draw assembly from car and disconnect coaxial cable.

Refitting

Reverse operations 1 to 7.

MOTORISED AERIAL RELAY

Remove and refit 86.50.27

Removing

1. Disconnect battery – 86.15.19.
2. Remove two setscrews and detach cover plate from luggage compartment side panel.
3. Remove securing screws and detach relay.
4. Disconnect cables. Note location for reference when refitting.

Refitting

Reverse operations 1 to 4.

MOTORISED AERIAL RELAY

Test 86.50.28

Check by substitution or by the following method.

1. Connect 12V battery supply to contact terminal C.2.
2. Apply 12 volt to terminal W.1 to energise relay coil.
3. Check with battery earthed test lamps that current is available at terminal C.1.
4. Switch off current to W.1 and W.2, check with test lamp that current is available at terminal C.3.
5. Replace unit if faulty.

AIR CONDITIONING MASTER RELAY

Remove and refit 86.55.10

Removing

See 82.20.08.

Refitting

See 82.20.08.

FLASHER AND ALARM UNITS

Flasher unit

The Lucas 8FL flasher unit is a sealed component, no service or repair being possible. Check bulbs and wiring before renewing unit. Care must be taken to fit correct replacement unit. Check current rating marked on unit covers. These MUST correspond.

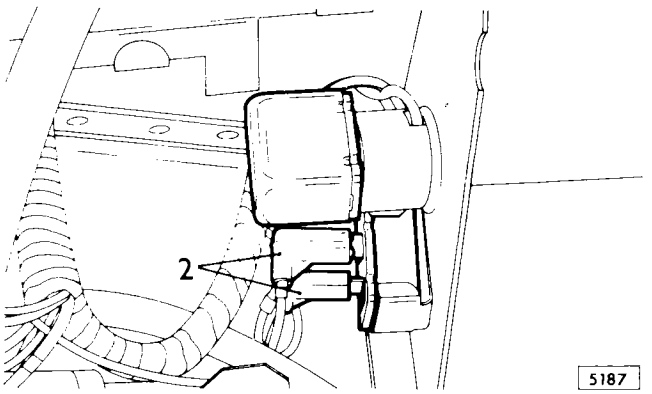
Remove and refit 86.55.11

Removing

1. Remove drive screws and detach right hand under scuttle casing.
2. Disconnect cables. Note location for reference when refitting. Withdraw unit from spring clip bracket.

Refitting

Reverse operations 1 and 2.



Hazard Flasher Unit

The hazard unit is a sealed component, no service or repair being possible. Correct replacement units MUST be fitted.

Remove and refit **86.55.12**

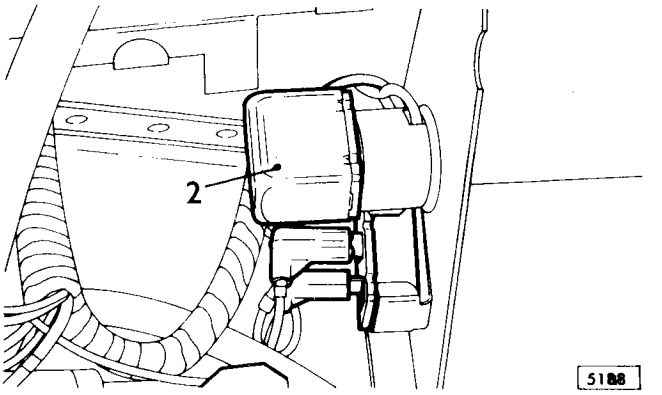
Removing

1. Remove drive screw and detach right hand under scuttle casing.
2. Withdraw unit from base block.

Refitting

Reverse operations 1 and 2.

NOTE: Unit blades are off-set to prevent incorrect assembly.



KEY ALARM BUZZER UNIT **SEAT BELT WARNING**

NOTE: Cars for U.S.A./CANADA only

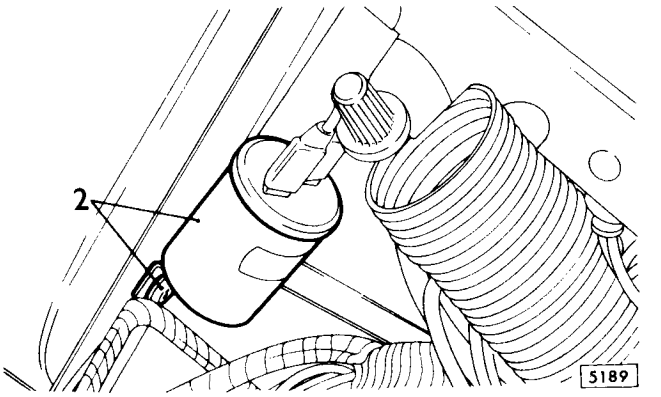
Remove and refit **86.55.13**

Removing

1. Remove drive screw and detach driver's side under scuttle casing.
2. Withdraw drive screw, disconnect cables and remove unit.

Refitting

Reverse operations 1 and 2.



STARTER MOTOR

Description **86.60.00**

Two types of starter motor are fitted, the later incorporating oil seals. The sealed motor is identified by a domed sealing cover fitted at the brush gear end.

Performance Data – Starter Motor and Solenoid

The performance is dependent on the capacity and state of charge of the battery.

Early Starter Motors

Lock Torque
2,5 kgf.m. (18.5 lbf.ft.) with 460 A at 7.2 V

Torque at 1,000 rev./min.
1,08 kgf.m. (7.8 lbf.ft.) with 245 A at 9.4 V

Light Running Current
70 A at 5800 – 6500 r.p.m. with 9.4 V

Later Starter Motors

Lock Torque
4,0 kgf.m. (29 lbf.ft.) with 940 A at 6.5 V.

Torque at 1,000 rev./min.
1,8 kgf.m. (13 lbf.ft.) with 535 A at 8.0 V.

Light Running Current
100 A at 5000 to 7500 rev.&min. with 8.0 V

Early Motor Solenoid

Closing (or series) winding resistance measured between small unmarked Lucar terminal and the main terminal marked 'STA' – 0.27 to 0.33 ohms.
Holding (or shunt) winding resistance measured between the small unmarked Lucar terminal and a good earth point on solenoid body – 1.00 to 1.20 ohms.

Later Motor Solenoid

Specification as for early motors, readings as follows:-

Series winding
0.13 to 0.15 ohms.

Shunt winding
0.63 to 0.75 ohms.

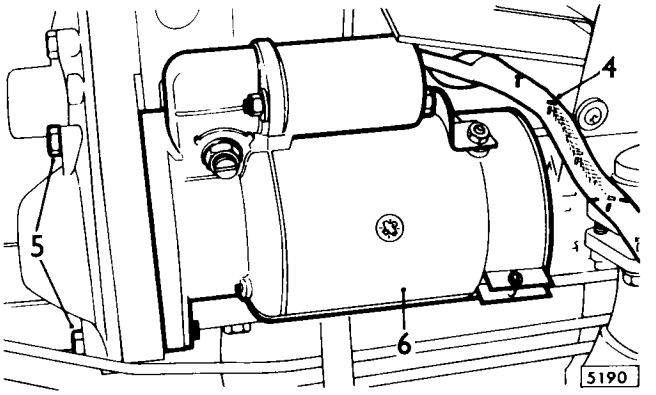
Operation

Turning the ignition key to the start position energises the solenoid, the plunger of which moves the drive assembly along the armature shaft to engage the starter pinion with the flywheel. Full engagement of the pinion with the flywheel normally takes place, in which case the solenoid contacts close to connect the starter motor to the battery and the engine is cranked.

If tooth-to-tooth abutment between pinion and flywheel occurs, the solenoid plunger continues its normal movement by compressing a drive-engagement spring inside the plunger. This plunger movement causes the solenoid contacts to close, connecting the starter motor to the battery. The starter armature now commences to rotate and the pressure of the drive-engagement spring, combined with push-screw assistance from the drive helix, causes the pinion to be fully engaged with the flywheel and the engine is cranked. The solenoid plunger linkage incorporates a lost motion spring, which ensures that the solenoid contacts will open to disconnect the starter motor from the battery prior to disengagement of the pinion from the flywheel.

STARTER MOTOR

Remove and refit **86.60.01**



Removing

1. Remove battery – 86.15.01.
2. Remove left hand under shield – 76.79.07.
3. Disconnect hydraulic pipe from clutch slave cylinder. Blank off unions.
4. Disconnect cables from starter motor.
5. Remove two bolts securing motor to bell housing.
6. Withdraw motor forward to clear pinion and rear wards through battery location.

Refitting

7. Reverse operations 1 to 6.
8. Bleed clutch – 35.15.01

STARTER MOTOR

Test (in situ) **86.60.02**

Failure to crank engine

1. Switch ignition 'ON', and observe Battery Condition Meter reading, (allow a few seconds for the instrument to stabilise). Needle should settle in the 'Normal' band of the dial.
2. If needle settles in the 'Off Charge' (Red) band, there is probably insufficient current in the battery to operate the starter. For satisfactory starter motor performance, the battery must be in good condition and at least 70% charged. Check specific gravity of electrolyte in each cell with a hydrometer. A variation of more than 40 points (0.040) in any cell reading, the battery is suspect and should be removed for testing by a battery agent. If possible, prove the battery by substitution. Ensure that the battery posts are clean and that the terminals also are clean and firmly clamped to the battery terminal posts.

Electrolyte Temperature Correction

For every 10°C (18°F) below 15°C (60°F), subtract 0.007.
For every 10°C (18°F) above 15°C (60°F), add 0.007.

3. If battery is in satisfactory condition switch on headlamps and attempt to start engine, if lamps dim but starter does not crank engine, indication is given that current is flowing to starter solenoid, but an internal fault exists. Remove starter and solenoid assembly for detailed examination.

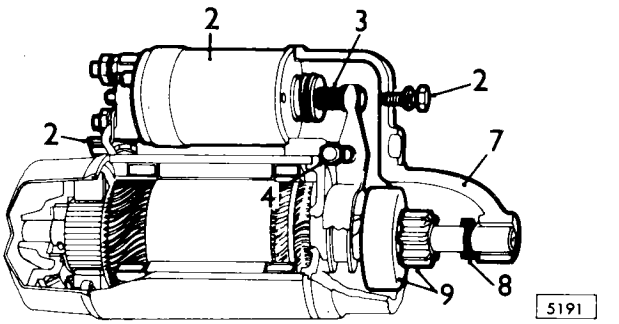
STATE OF CHARGE	BATTERY SPECIFIC GRAVITY READINGS CORRECTED TO 15°C (60°F)	
	CLIMATES NORMALLY Below 25°C (77°F)	CLIMATES NORMALLY Above 25°C (77°F)
FULLY CHARGED	1.270 – 1.290	1.210 – 1.230
70% CHARGED	1.230 – 1.250	1.170 – 1.190
DISCHARGED	1.100 – 1.120	1.050 – 1.070

STARTER MOTOR ROLLER CLUTCH DRIVE UNIT

Remove and refit 86.60.05

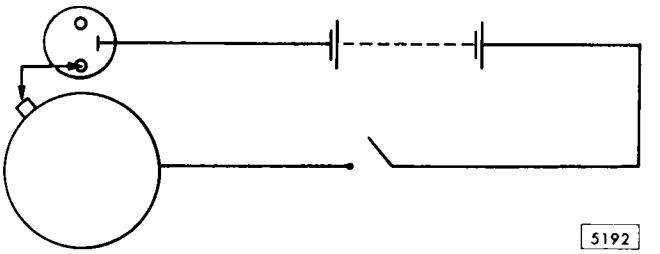
Removing

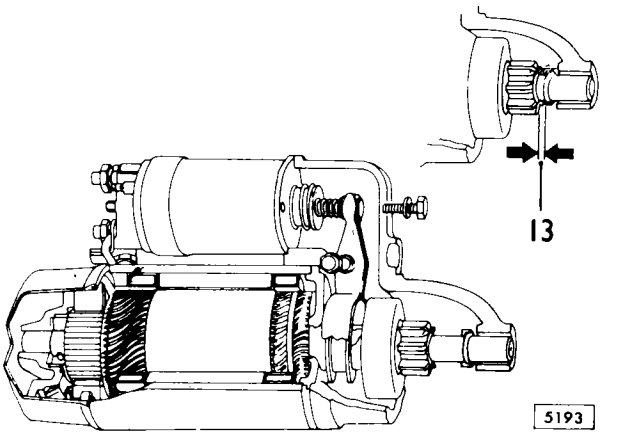
1. Remove starter motor – 86.60.01.
2. Remove solenoid complete with bridge strap (copper link).
3. Remove solenoid unit from drive end fixing bracket.
4. Remove engagement lever pivot pin.
5. Withdraw through bolts, but do not remove end bracket or commutator end cover.
6. Mount starter motor vertically in a vice, (drive end uppermost).
7. Withdraw drive end fixing bracket.
8. Remove jump ring from groove on drive shaft.
9. Remove collar and drive unit from shaft.



Refitting

10. Reverse operations 3 to 9.
    Tightening torques:
    Through bolts 1,1 kg.m. (8.0 lb.ft.).
    Solenoid unit fixing bolts 0,62 kg.m. (4.5 lb.ft.)
    (a) Smear all moving parts of drive unit liberally with grease.
    Shell SB.2628 (Home and cold climate countries).
    Retinax 'A' (Hot climate countries).
11. Connect solenoid terminal 'STA' to starter motor casing.
12. Connect a 6 volt supply between solenoid operating 'Lucar' terminal and starter motor casing.
13. With solenoid energised and drive assembly now in engaged position, press pinion lightly back towards armature to take up any slack in drive operating mechanism and then set position of eccentric pivot pin to obtain 0,127 – 0,381 mm (0.005 – 0.015 in.) clearance between pinion and thrust collar.
14. Apply sealing compound and tighten locknut.
15. Refit bridge strap (copper link).
16. Refit starter motor – 86.60.01.





STARTER MOTOR SOLENOID UNIT

Remove and refit **86.60.08**

Removing

1. Remove starter motor – 86.60.01.
2. Remove link connecting solenoid to yoke terminal.
3. Remove two fixings, withdraw solenoid from bracket. Collect gasket.
4. Release plunger from top of drive engagement lever.

Refitting

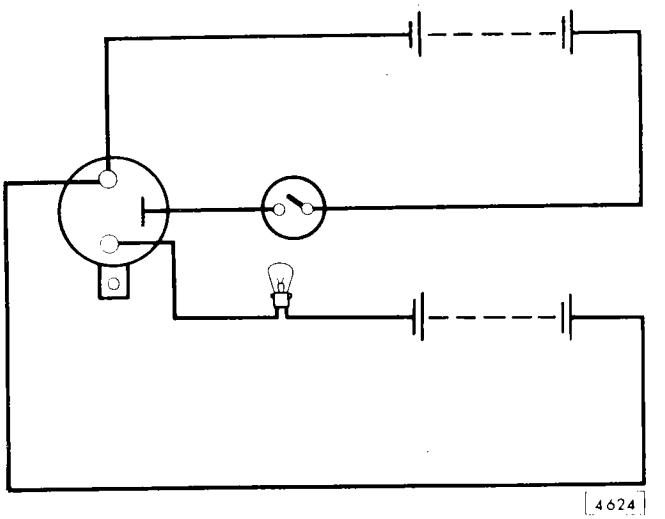
Reverse operations 1 to 4 inclusive.

STARTER MOTOR SOLENOID UNIT

Test **86.60.09**

The following checks assume that the pinion travel has been correctly set.

1. Remove bridge strap connecting solenoid to motor.
2. Connect a 12 volt D.C. supply, with switch between solenoid 'Lucar' and large terminal 'STA'.
   DO NOT CLOSE SWITCH
3. Connect a separately energised 60 watt test lamp across solenoid main terminals.
4. Close switch. Solenoid should be heard to operate, and lamp should light with full brilliance.
5. Open switch. Lamp should go out.



STARTER RELAY

Remove and refit **86.60.10**

See 86.35.34.

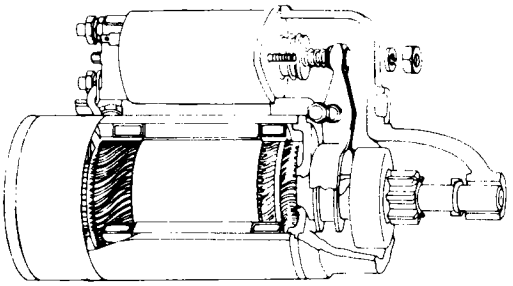
STARTER RELAY

Test **86.60.11**

See 86.35.34.

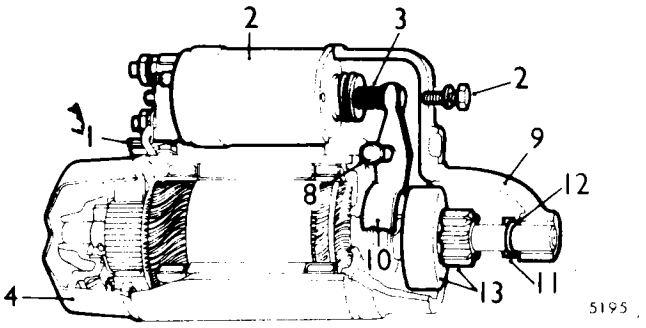
STARTER MOTOR

Overhaul 86.60.13



Dismantling

1. Remove link connecting solenoid to yoke terminal.
2. Remove two fixings, withdraw solenoid from bracket. Collect gasket.
3. Release plunger from top of drive engagement lever.
4. Remove commutator-end sealing cover.
5. Withdraw through bolts.
6. Lift brushes from boxes and detach commutator-end bracket from yoke.
7. Withdraw yoke and field coil assembly from armature and intermediate bracket.
   Collect sealing ring fitted to intermediate bracket.
8. Slacken locknut and remove drive engagement pivot pin from fixing bracket.
9. Remove drive end fixing bracket.
10. Remove drive engagement lever.
11. Using suitable piece of tubing drift the thrust collar away from the jump ring on armature shaft.
12. Remove jump ring.
13. Withdraw roller clutch drive assembly.
14. Remove intermediate bracket.
15. Check individual components as detailed under relevant sub-headings.



Re-assembling

16. Reverse operations 1 to 15. Tighten the through bolts to a torque of 1,1 kg.m. (8.0 lb.ft.).

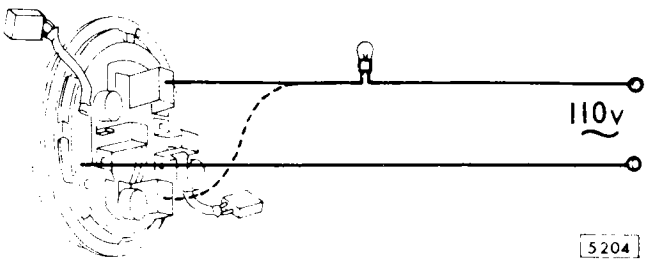
Brush replacement

17. Renew brushes when worn to 8 mm (0.313 in.) in length.

NOTE: The insulated brush connectors are hot pressed to the free ends of the field coils. To replace, cut off the worn brush connectors approximately 3 mm (0.125 in.) from the joint.
Open out and tin the loop of the replacement brush. Place the tinned loop over the stub of the brush connector, squeeze up and solder.

Brush box insulation test

18. Connect a 110V a.c. 15W test lamp between a clean part of the end bracket and each of the two insulated brush boxes.
If the lamp lights, renew the commutator end bracket assembly.



Commutator cleaning

19. Clean the commutator if not scored with a petrol moistened cloth.
Worn commutators should be cleaned with fine glass paper or mounted in a lathe and a fine cut taken with a sharp tool. Finally polish with very fine glass paper.
DO NOT UNDER CUT INSULATORS BETWEEN SEGMENTS.

NOTE: Armatures must not be skimmed below a minimum diameter of 38 mm (1.5 in.). Replace if below this limit.

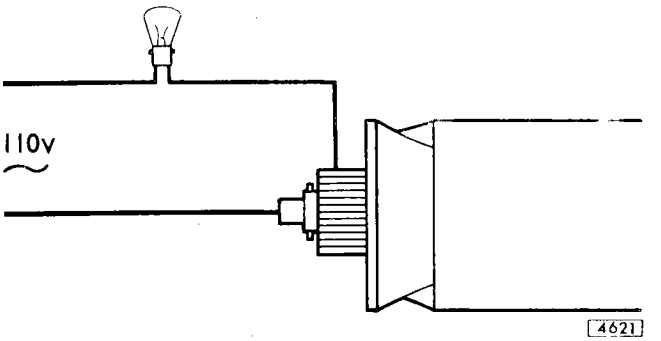
Armature – checking

20. Armature conductors lifted from risers indicate overspeeding. Carefully resolder conductors or replace armature. Check clutch operation.

Armatures showing signs of fouling indicate worn bearings or un-true shaft.
Renew armature or bearings as required.
No attempt should be made to machine an untrue shaft.

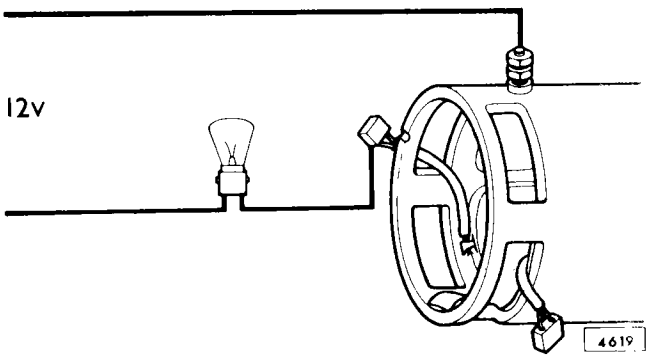
Armature insulation test

21. Connect a 110V a.c. 15W test lamp between any one of the commutator segments and the shaft.
If lamp lights renew armature.

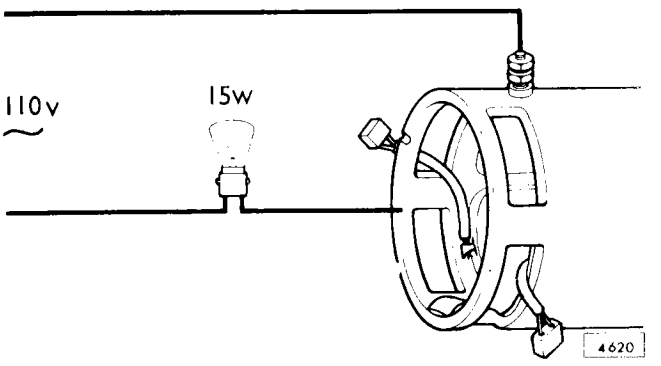


Field coil – Test

22. Check continuity of winding by connecting a 12 volt test lamp and battery between the terminal post and each brush (with the armature removed). An open circuit is indicated if lamp does not light.
Replace faulty coils.



23. Check coil insulation with a 110 volt a.c. 15 watt test lamp connected between the terminal post and a clean part of the yoke.
Renew field coils if bulb is illuminated.



24. To replace field coils, unscrew the four poleshoe retaining screws using a wheel-operated screwdriver. Remove coils, pole shoes and insulation pieces.
Fit new coils over shoes, and replace in yoke, taking care that the taping around the coils is not trapped between the shoes and yoke.
Locate shoes by lightly tightening the screws, fit insulation pieces, and finally tighten screws with wheel-screwdriver.

Bearing - replacement

25. Replace bearings if excessive side play of shaft is evident.
Bushes in intermediate and drive end brackets should be pressed out, commutator end bracket bush must be withdrawn with a withdrawal tool. Soak bushes in clean engine oil for 24 hours before refitting. Refit by using a shouldered polished mandrel, 0,013 mm (0.0005 in.) greater in diameter than shaft.

NOTE: Porous bronze bushes must not be reamed out after fitting.

Roller clutch drive - Checking

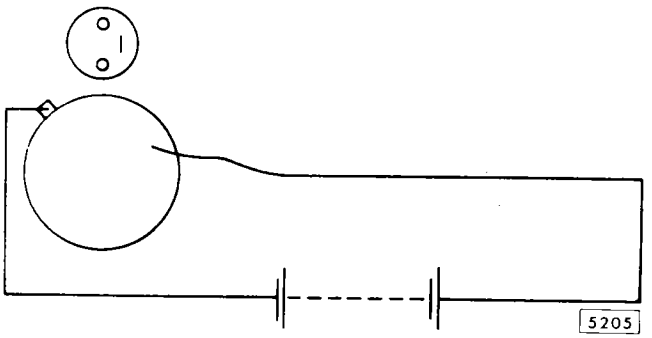
26. Check that pinion is free to move on shaft splines, and clutch assembly operates correctly. Replace faulty or sticking units.

Pinion Movement – Setting

27. After re-assembly of the starter (cranking) motor pinion movement must be reset as follows:
Connect the 'Lucar' solenoid terminal in series with a switch to a 10 volt battery.
Connect other battery terminal to starter yoke.
Close switch. (This throws the drive assembly forward into the engage position). Measure the distance between pinion and thrust washer on armature shaft extension.

NOTE: Pinion should be pressed lightly towards armature to take up any slack in engagement linkage. Correct setting should be 0,127 to 0,381 mm (0.005 to 0.015 in.)
To adjust, slacken the eccentric pin securing nut and turn pin until correct setting is obtained.

NOTE: Arc of adjustment is 180° and the head of the arrow on the pivot pin should be set only between the arrow heads on the drive end casting.
Tighten securing nut to retain pin position after setting.

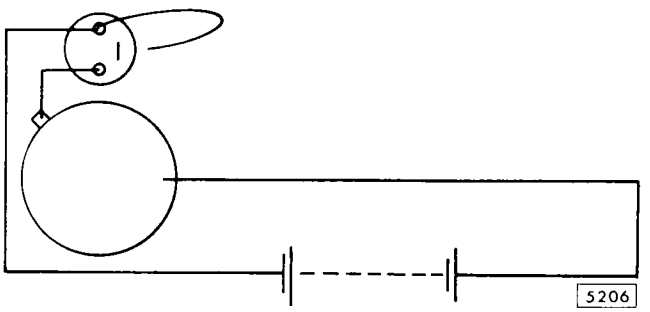


STARTER MOTOR

Bench Testing **86.60.14**

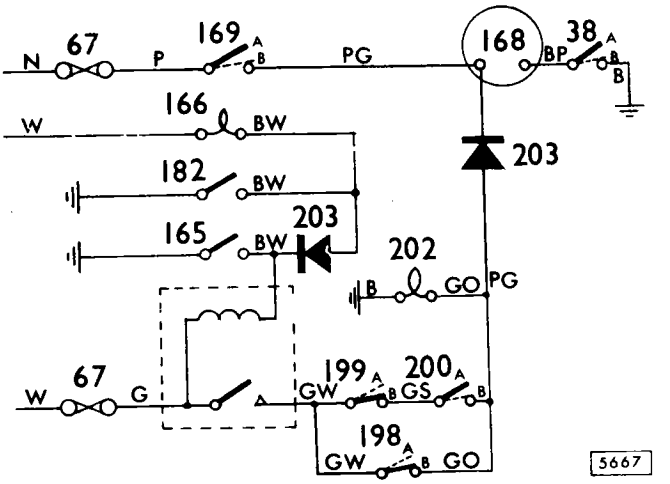
The following bench tests will determine if the fault is with the motor or solenoid unit.

1. Clamp motor in vice.
2. Connect a 12 volt battery, using heavy duty cables, to the motor frame and motor terminal.
3. Check that motor operates under light running conditions. If necessary equipment is available check light running current and speed against figures stated under "Performance Data".
4. If starter motor fails test, dismantle for overhaul.
If starter operates check or replace solenoid unit as follows:-
5. Transfer cable from motor terminal to main solenoid terminal.
6. Fit jumper lead and touch to Lucar solenoid connector.
7. If motor does not operate, solenoid or solenoid contacts are faulty. Check and replace as necessary.



**SEAT BELT WARNING SYSTEM 86.65.00

The system is associated with the ignition key alarm buzzer and gives audio and visual indication that seat belts are not fastened. Warning signals comprise an illuminated sign to 'Fasten belts' and a buzzer alarm. The warning lamp is situated at bottom centre of the facia between the speedometer and revolution counter (tachometer). The alarms are actuated if, with the engine running, the handbrake is released. Occupied front seats must have safety belts fastened to cancel the warnings. The passenger seat section of the system is inhibited if the seat is not occupied.**



IGNITION/STARTER SWITCH

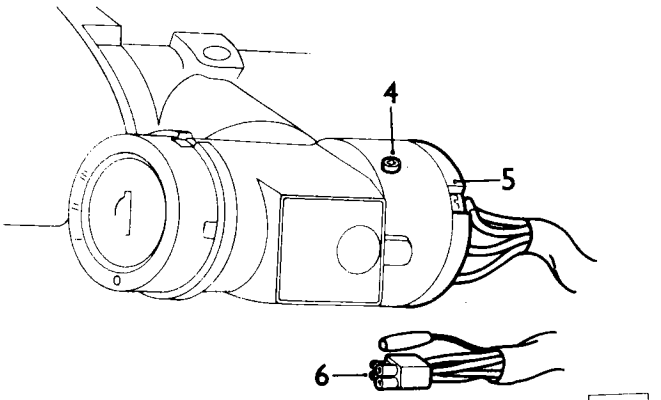
Remove and refit 86.65.03

Removing

1. Disconnect battery – 86.15.19.
2. Remove parcel tray – 76.67.04 – driver's side.
3. Remove four bolts securing upper steering column, and lower column to foot well.
4. Remove the phillips headed screw located in the steering column lock body which retains the switch.
5. Withdraw the switch.
6. Disconnect the switch harness at the plug/socket unit located under the side instrument panel.

Refitting

Reverse operations 1 to 6.



PANEL SWITCHES

Remove and refit 86.65.06

Side lamp switch	**86.65.25**
Head lamp switch	**86.65.26**
Panel light switch	**86.65.12**
Interior light switch	**86.65.13**
Courtesy light switch	**86.65.14**
Heated rear window switch	**86.65.36**
Windscreen wiper switch	**86.65.38**
Windscreen washer switch	**86.65.40**
Hazard warning switch	**86.65.50**

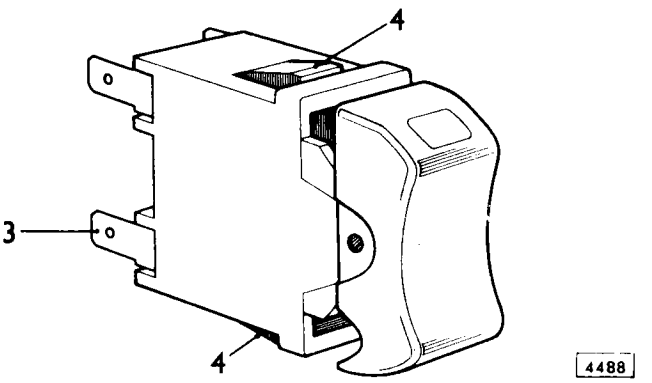
Removing

1. Disconnect battery – 86.15.19.
2. Release two finger nuts and lower instrument panel.
3. Disconnect cables from switch to be removed. Note location of cables for reference when refitting.
4. Press in nylon locking tabs and withdraw switch.

NOTE: Headlight switch must be removed before side light switch can be withdrawn.

Refitting

Reverse operations 1 to 4.



HEADLIGHT DIP SWITCH

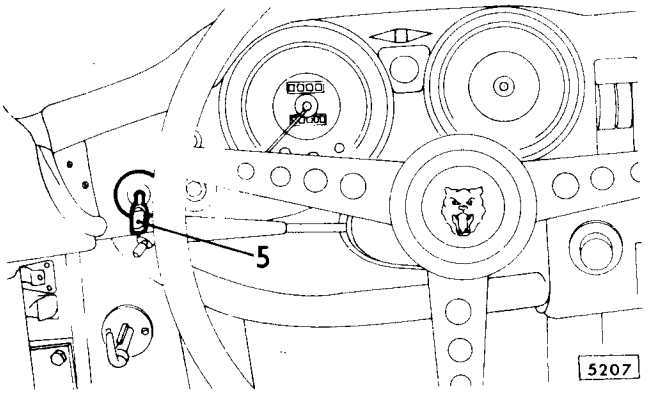
Remove and refit 86.65.11

Removing

1. Disconnect battery – 86.15.19.
2. Remove driver's side parcel tray.
3. Remove drive screw and detach under scuttle casing.
4. Remove ring nut.
5. Withdraw switch and disconnect cables. Note location for reference when refitting.

Refitting

Reverse operations 1 to 4.



DOOR PILLAR SWITCH

Remove and refit **86.65.15**

Removing

1. Unscrew switch and disconnect cable.

Refitting

Reverse operation. Check earth contact between switch and panel.

DOOR PILLAR/KEY ALARM SWITCH

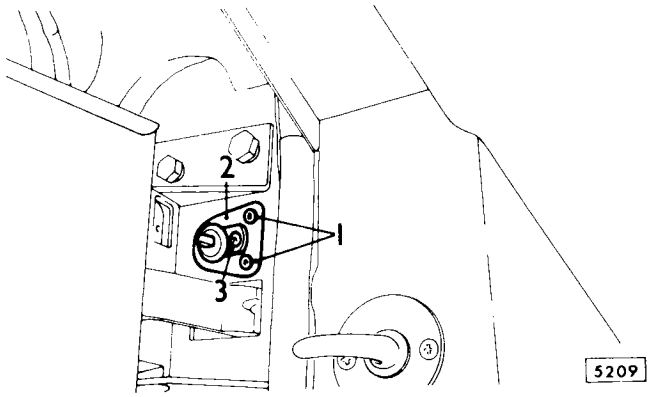
Remove and refit **86.65.27**

Removing

1. Withdraw two screws.
2. Remove switch/plate assembly and disconnect cables.
3. Remove self tapping screw and detach switch from carrier plate.

Refitting

Reverse operations 1 to 3.



**SEAT SWITCH

Remove and refit **Passenger side only 86.65.29**

Removing

1. Disconnect battery.
2. Remove passenger seat cushion.
3. Disconnect cable connector located beneath seat.
4. Release hooks retaining seat diaphragm to frame.
5. Withdraw two switch retaining screws and washers.
6. Remove seat switch.

Refitting

Reverse operations 1 to 6.**

OIL PRESSURE SWITCH

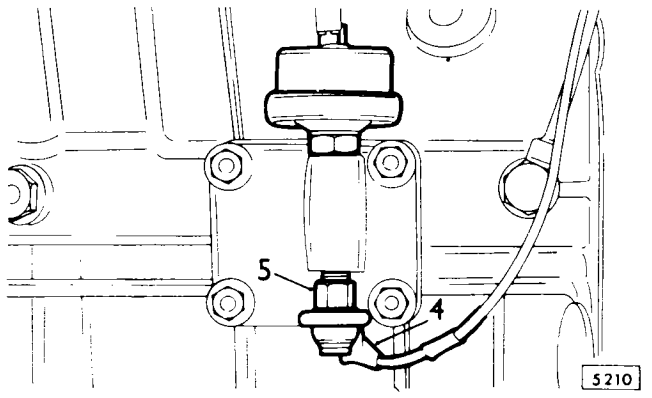
Remove and refit **86.65.30**

Removing

1. Disconnect battery – 86.15.19.
2. Remove windscreen washer reservoir – 84.10.01.
3. Detach servo fluid reservoir and bracket complete from bulkhead.
4. Detach Lucar connector from switch.
5. Unscrew switch from cylinder block.

Refitting

Reverse operations 1 to 5



**BELT SWITCHES

Remove and refit — **Drivers 86.65.31**
Passengers 86.65.32

Removing

1. Disconnect battery.
2. Remove seat cushion.
3. Withdraw seat belt anchorage bolt.
4. Slacken two screws retaining transmission tunnel side trim.
5. Lift side trim slightly and pull seat belt harness and connector clear.
6. Disconnect cable connector and remove belt complete with its harness.

Refitting

Reverse operations 1 to 6.**

HANDBRAKE WARNING SWITCH

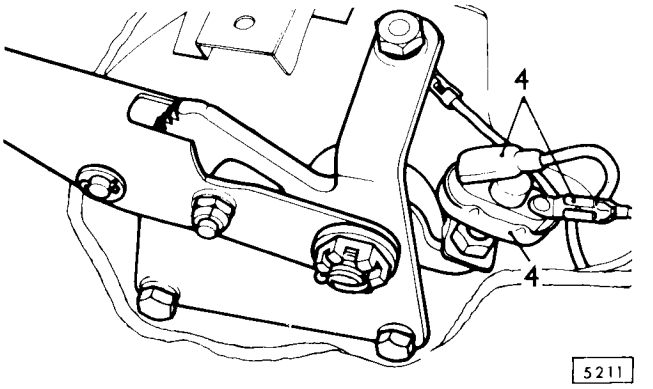
Remove and refit — **86.65.45**

Removing

1. Disconnect battery – 86.15.19.
2. Remove left hand front seat – 76.70.01.
3. Remove console assembly – 76.25.01.
4. Disconnect cables, release lock nuts and remove switch.

Refitting

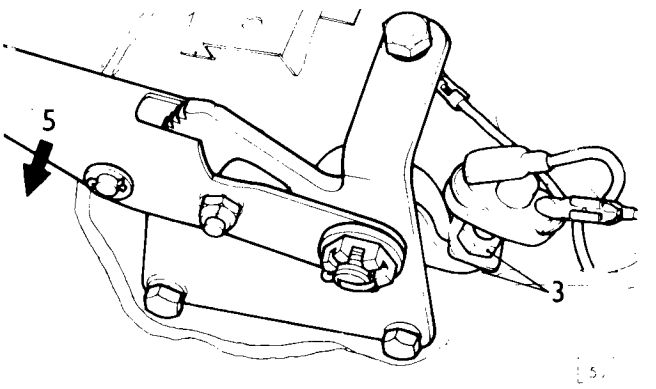
5. Set handbrake fully off.
6. Remove locknut from switch and fit switch to bracket.
7. Loosely refit locknut.
8. Fit connectors to switch.
9. Reconnect battery.
10. Adjust handbrake switch by following operations 4 to 10 – 86.65.46.
11. Refit console assembly.
12. Refit left hand front seat.



HANDBRAKE WARNING SWITCH

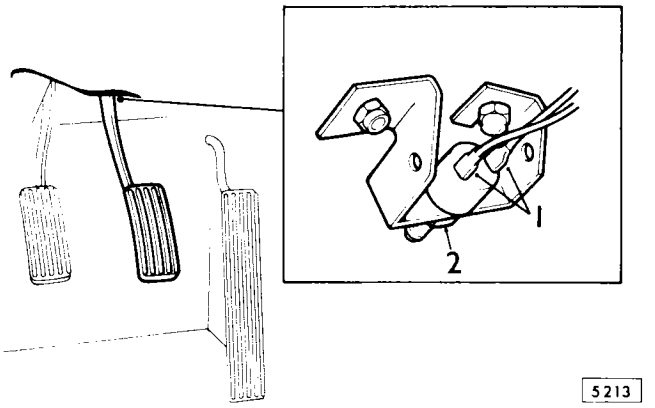
Adjust — **86.65.46**

1. Remove left hand front seat.
2. Remove console assembly – 76.70.01.
3. Slacken warning switch locknuts.
4. Check fluid level in both brake reservoirs. Top up as necessary.
5. Set handbrake fully off.
6. Switch on ignition. DO NOT ROTATE ENGINE.
7. Observe brake warning light. Wind locknut towards switch body, keeping switch pressed tight to bracket, until light goes off.
8. Secure locknut.
9. Check operation of switch by carefully lifting handbrake lever; warning light should come on before third click of ratchet. Adjust locknuts and tighten.
10. Switch off ignition.
11. Refit console assembly.
12. Refit left hand front seat.



STOP LIGHT SWITCH

Remove and refit 86.65.51



Removing

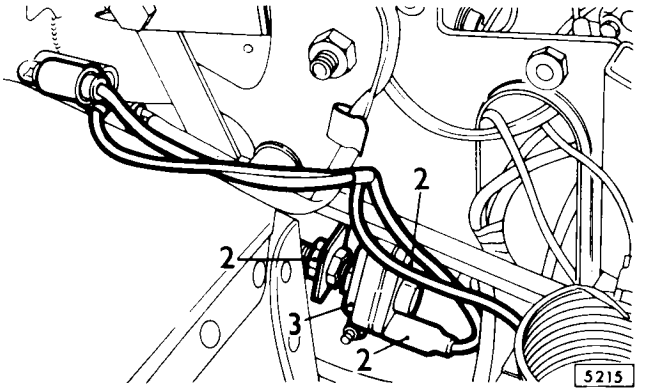
1. Disconnect cables.
2. Remove locknuts, withdraw switch.

Refitting

Reverse operations 1 and 2 to refit. Check that switch is inoperative when brake pedal is released. Adjust if necessary. **See operation – 86.65.56.**

CHOKE WARNING LIGHT SWITCH

Remove and refit 86.65.53



Removing

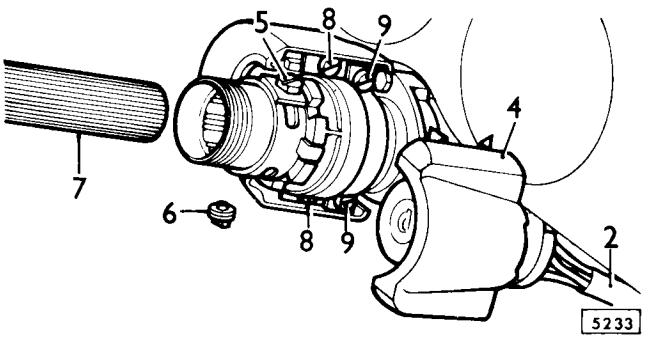
1. Remove screen rail facia assembly – 76.46.04.
2. Disconnect cables, remove locknut.
3. Withdraw switch.

Refitting

Reverse operations 1 to 3. Check that switch is inoperative when choke is off. Adjust if necessary.

DIRECTION INDICATOR/HEADLIGHT FLASHER SWITCH

Remove and refit 86.65.55



Removing

1. Disconnect battery – 86.15.19.
2. Disconnect cables at plug and socket connection.
3. Release locknut and pull steering wheel upwards to full extent.
4. Remove switch inner cover. Retained by spring clips.
5. Remove two hexagonal headed screws, special square washers and release striker.
6. Withdraw stop button.
7. Withdraw steering wheel/inner shaft assembly.
8. Remove two screws and detach switch outer cover.
9. Remove two screws and detach switch clamp.
10. Withdraw switch assembly over column.

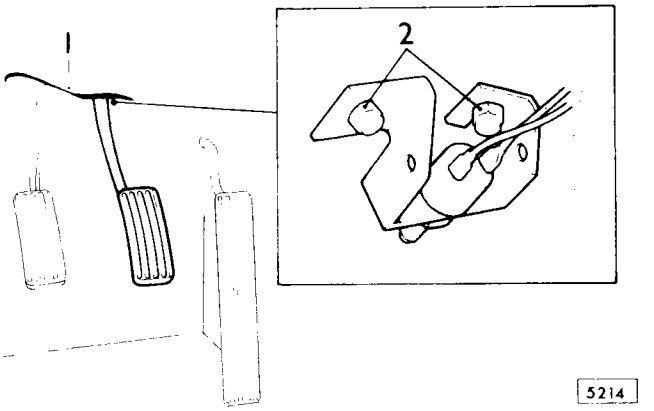
Refitting

11. Ensure peg on switch clamp fits in outer steering column locating hole.
12. Reverse operations 1 to 10. Adjust striker position to centralise switch cancellation.

STOP LIGHT SWITCH

Adjust **86.65.56**

1. Loosen trim as necessary.
2. Slacken two locknuts securing stop light switch bracket.
3. Adjust brake pedal stop so that pedal pad has approximately 3,17 mm (.125 in) free movement before resistance of master cylinder is felt.
4. Switch on ignition and set stop light switch so that stop lights are on when resistance of master cylinder is felt.
5. Secure locknuts.
6. Re-check adjustment.
7. Switch off ignition.
8. Replace trim.



CIGAR LIGHTER

Remove and refit **86.65.60**

Removing

Cars with air conditioning only

1. Disconnect battery – 86.15.19.
2. Remove false bottom from armrest storage compartment.
3. Release connectors from cigar lighter.
4. Unscrew centre contact and sheath of cigar lighter and remove from armrest.

Refitting

Reverse operations 1 to 4.

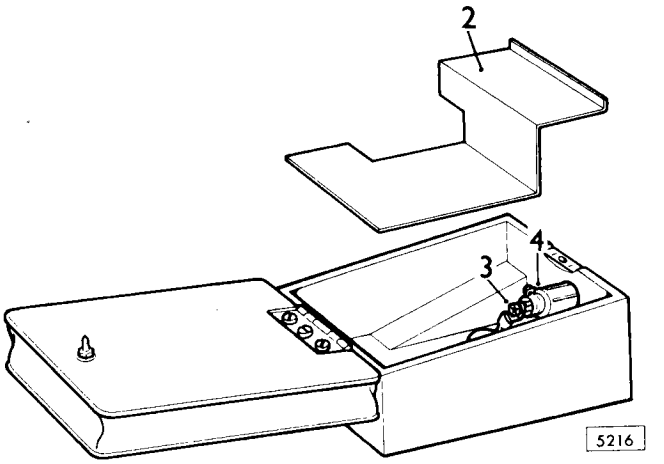
Removing

Cars without air conditioning

5. Remove radio panel – 86.50.04.
6. Detach Lucar connectors from cigar lighter.
7. Unscrew centre contact and sheath of cigar lighter and remove from radio panel.

Refitting

Reverse operations 5 to 7.



FUSE BLOCK

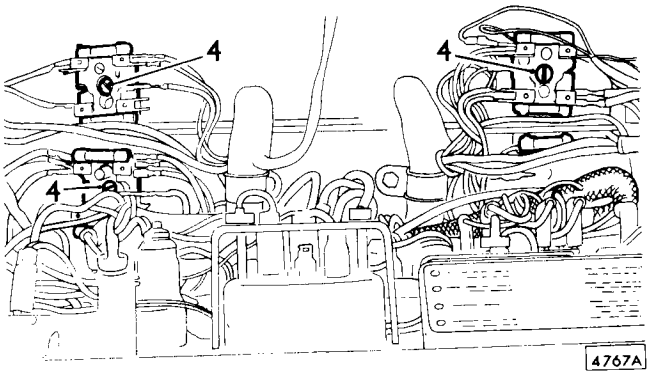
Remove and refit **86.70.01**

Removing

1. Disconnect battery – 86.15.19.
2. Lower instrument panel.
3. Disconnect cables from fuse unit. Note location for reference when refitting.
4. Remove screw(s) and detach fuse block(s).

Refitting

Reverse operations 1 to 4.



****AIR CONDITIONING FUSE****

Remove and refit **86.70.02**

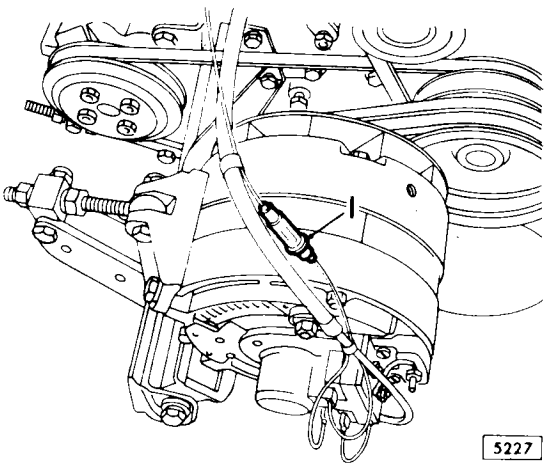
Fuse is in-line type and is installed on wiring harness between alternator and radiator matrix on cars fitted with air conditioning only.

Removing

1. Press fuse holder together, twist it, and remove fuse.

Refitting

2. Fit new fuse, press halves of holder together and twist to lock.



WIRING HARNESSES

NOTE: Removal and refitting of a cable harness is a major operation and should be undertaken only by an authorised dealer.

The wiring harness consists of seven main items, namely right and left hand body, forward, bulkhead, panel, headlamp and engine harness. Connection between various harnesses is by indexed plug and socket to prevent incorrect connection, and colour coding must be followed on all snap connections.
When replacing harnesses all items must be secured in clips provided and all grommets must be replaced if worn or damaged.
Small individual harnesses connect components into the main circuits.
Always refer to wiring diagram when making connections and carefully examine runs before disconnecting any cables.

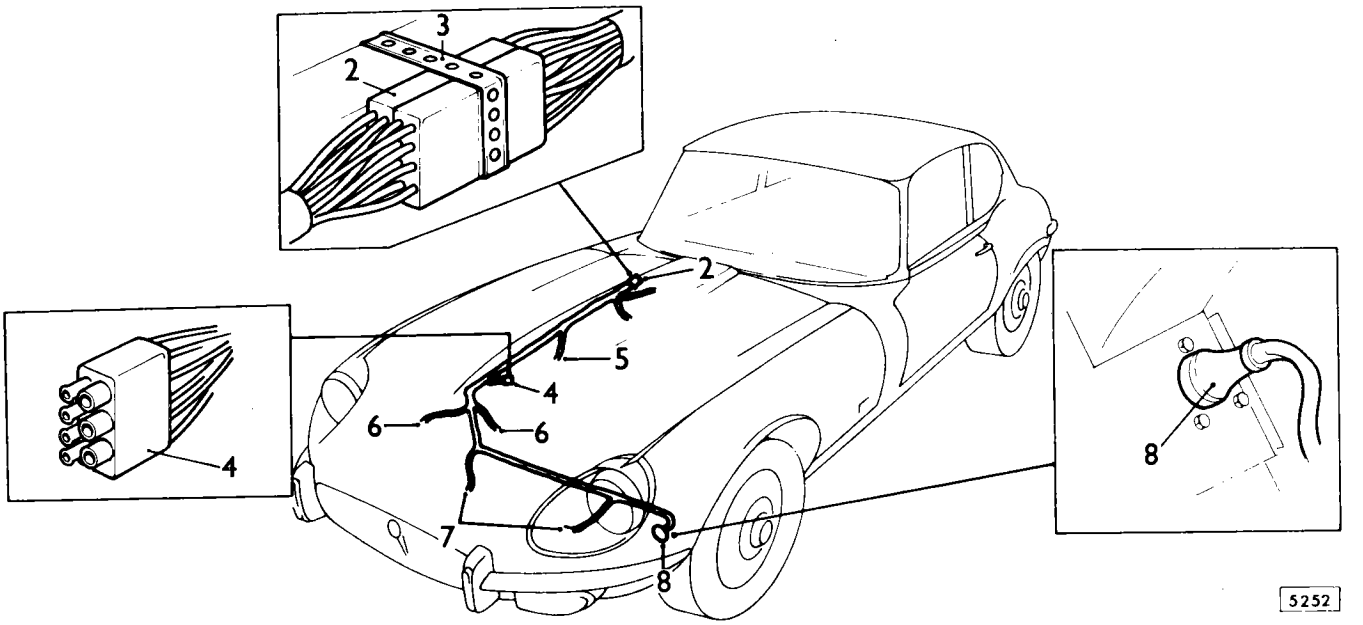
WARNING: IN ALL CASES DISCONNECT THE BATTERY BEFORE REMOVING HARNESS.

WIRING HARNESS – FORWARD

Remove and refit **86.70.08**

Removing

1. Disconnect battery – 86.15.19.
2. Disconnect at bulkhead harness junction.
3. Remove straps securing harness to frame side member.
4. Disconnect plug to engine harness.
5. Disconnect horn relay connection.
6. Disconnect alternator and cooling fan leads.
7. Raise front of vehicle and disconnect horn connectors and all clips on frame cross member.
8. Disconnect harness plug connector to front lamps.
9. Disconnect all earth connections.



Refitting

10. Lay new harness in position.
11. Make all connections and secure all clips and strapping.
12. Ensure frame earth connections are clean and tight.
13. Reconnect battery.

WIRING HARNESS – BULKHEAD

Remove and refit **86.70.09**

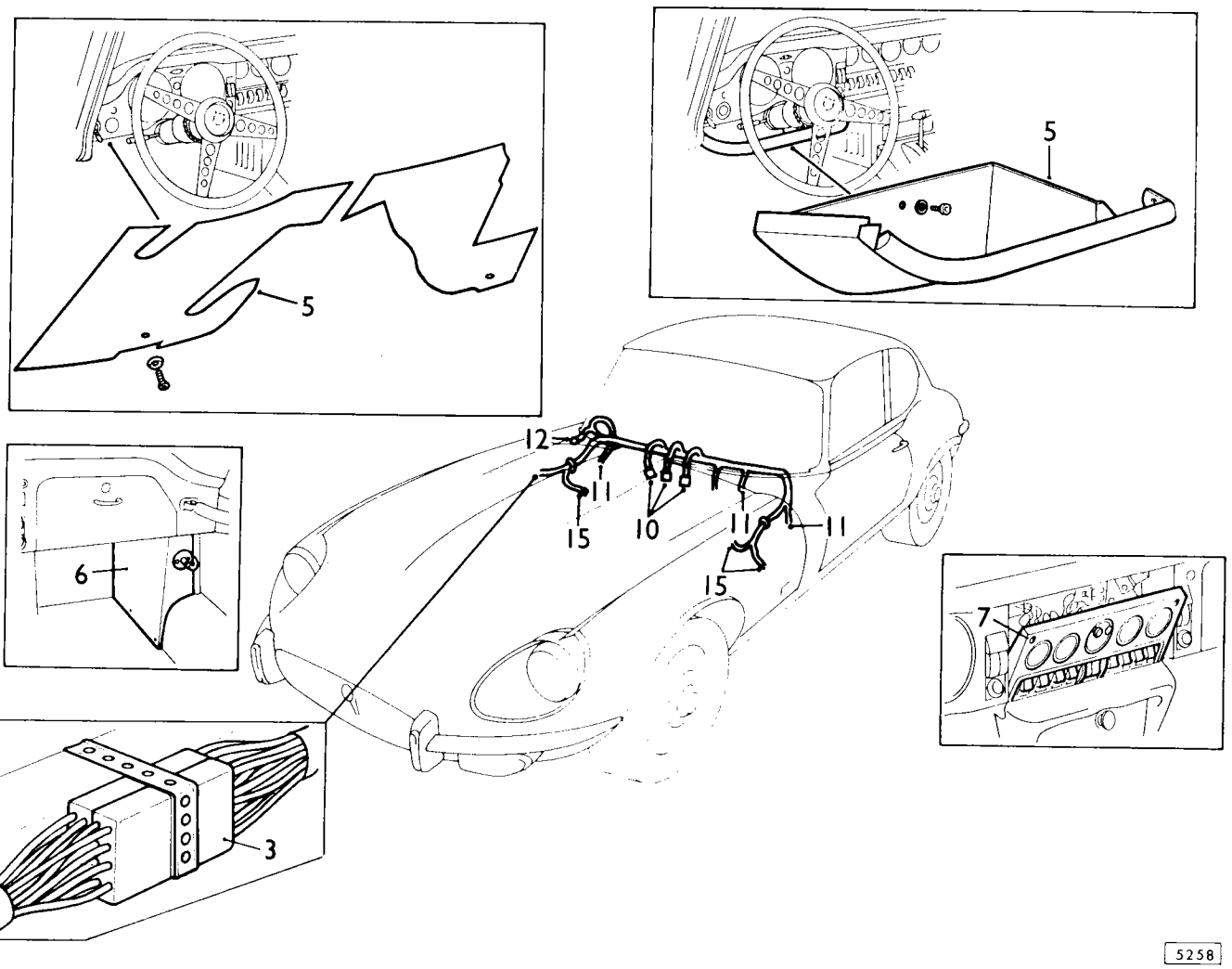
Removing

1. Disconnect battery – 86.15.19.
2. Remove screen rail facia assembly – 76.46.01.
3. Disconnect forward harness plug in engine compartment.
4. Detach earth connections.
5. Remove right and left hand parcel trays and under scuttles **76.67.04/05 and 76.46.11.**
6. Remove right and left hand scuttle side panels **76.13.01.**
7. Remove knurled nut and lower instrument panel.
8. Release all connectors from fuses.
9. Disconnect all connections to instruments, radio (if fitted) and lights at both sides of car facia.

   NOTE: If vehicle air conditioned, remove radio panel and detach cigar lighter cables.
10. Disconnect plug connections to panel harness.
11. Disconnect connectors to right and left hand harnesses and steering column.
12. Pull connectors from door light switches.

    NOTE: Hazard flasher holder is part of harness and must be detached from side panel.
13. Release clips securing harness across car. Remove taping where necessary.

    NOTE: It may be found easier to remove clips and taping if windscreen is removed.
14. Remove grommet retainer.
15. Detach plug from windscreen wiper motor and connectors from starter ballast resistor relay, windscreen washer motor and heater.
16. Withdraw harness rearwards through bulkhead into car.



5258

Refitting

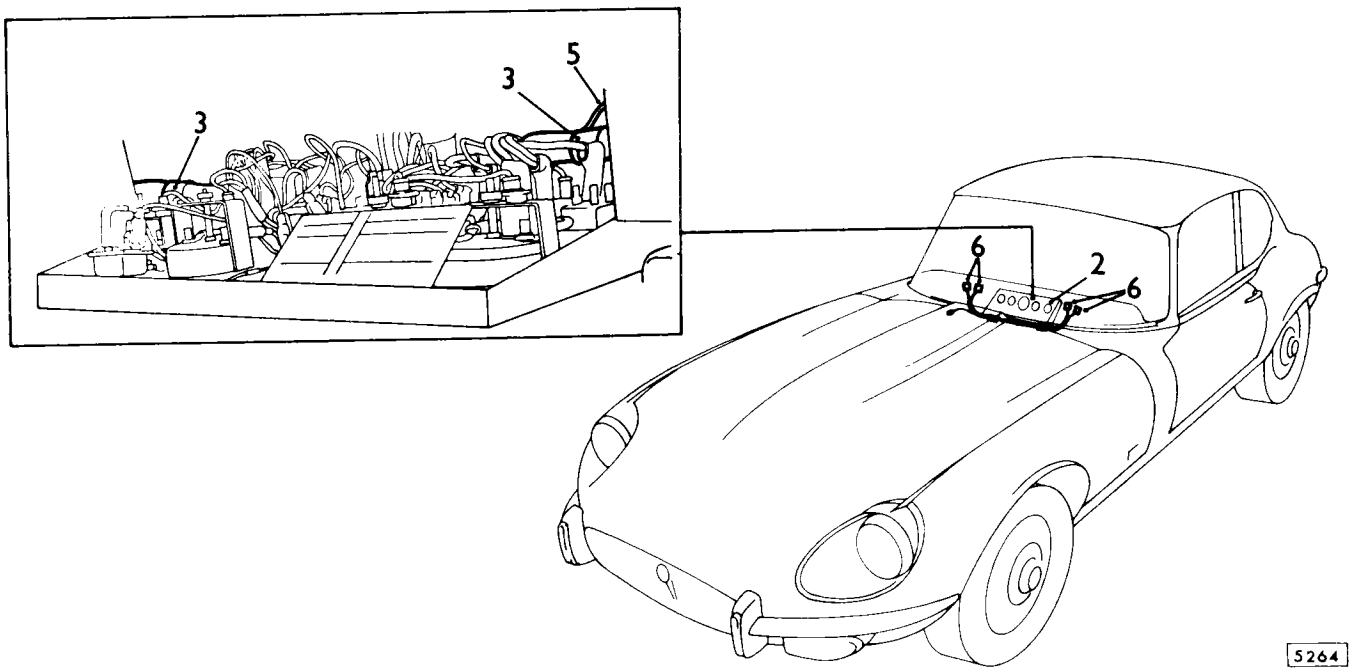
17. Lay new harness in position according to whether car is right or left hand drive.
18. Make all plugs and connectors.
19. Refit strapping and secure clips.
20. Retape upper and lower sections of cable harness.
21. Ensure frame earth connections are clean and tight.
22. Ensure windscreen wiper linkage clear.
23. Replace windscreen and all interior trim removed.
24. Reconnect battery.

WIRING HARNESS – PANEL

Remove and refit **86.70.10**

Removing

1. Disconnect battery – 86.15.19.
2. Remove two knurled finger nuts and lower centre facia panel.
3. Remove two cable clips on rear of panel.
4. Disconnect all instrument connections.
5. At right hand side, reach through aperture to detach wire from choke warning switch.
6. Unplug from bulkhead harness.



Refitting

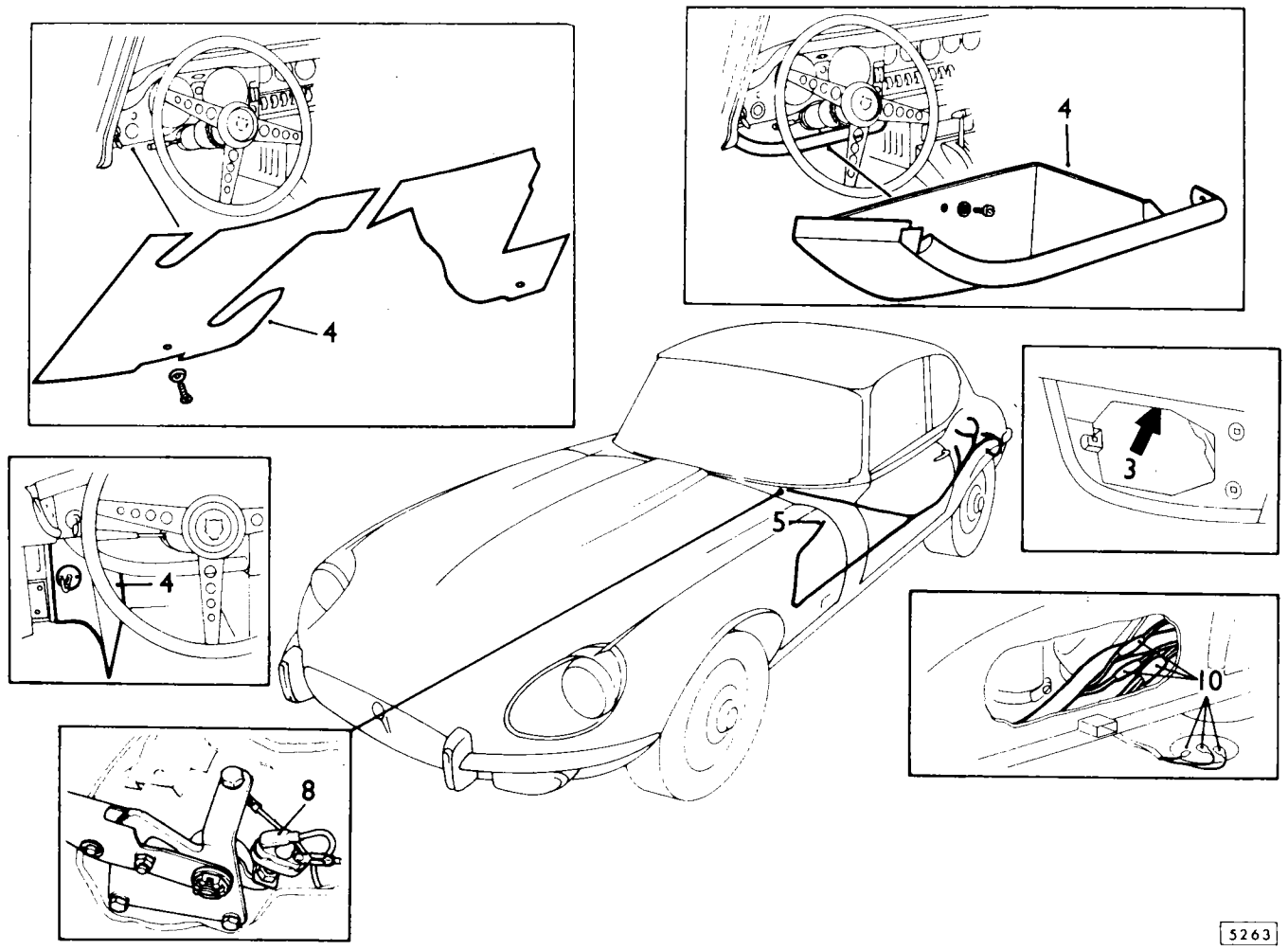
Reverse operations 1 to 6.

WIRING HARNESS – LEFT HAND

Remove and refit **86.70.11**

Removing

1. Disconnect battery – 86.15.19.
2. Remove left hand tail lamp assembly **86.40.70.**
3. Remove bolt, nut and washer, disconnect earth cable accessible through tail lamp aperture.
4. Remove left hand parcel tray, under scuttle and scuttle side panel **76.67.04, 76.67.11 and 76.13.01.**
5. Disconnect at bulkhead harness junction.
6. Carefully lift trim and insulation from lower edge of door sills until harness is exposed.
7. In luggage compartment, remove floor and access panel at left hand side (2 + 2 only).
8. Remove centre console **76.25.01** and disconnect lead to handbrake switch.
9. Remove left hand loud-speaker **86.50.12**, if radio fitted, and detach connectors.
10. Reach through access panel at left hand side of luggage compartment and draw cables down. Separate connectors from interior light and heated rear window if fitted. Disconnect tank unit.
11. Lift tab clips securing harness in door sill.
12. Withdraw harness from front and rear towards centre of car. Renew grommets at rear wheel arch if necessary.



5263

Refitting

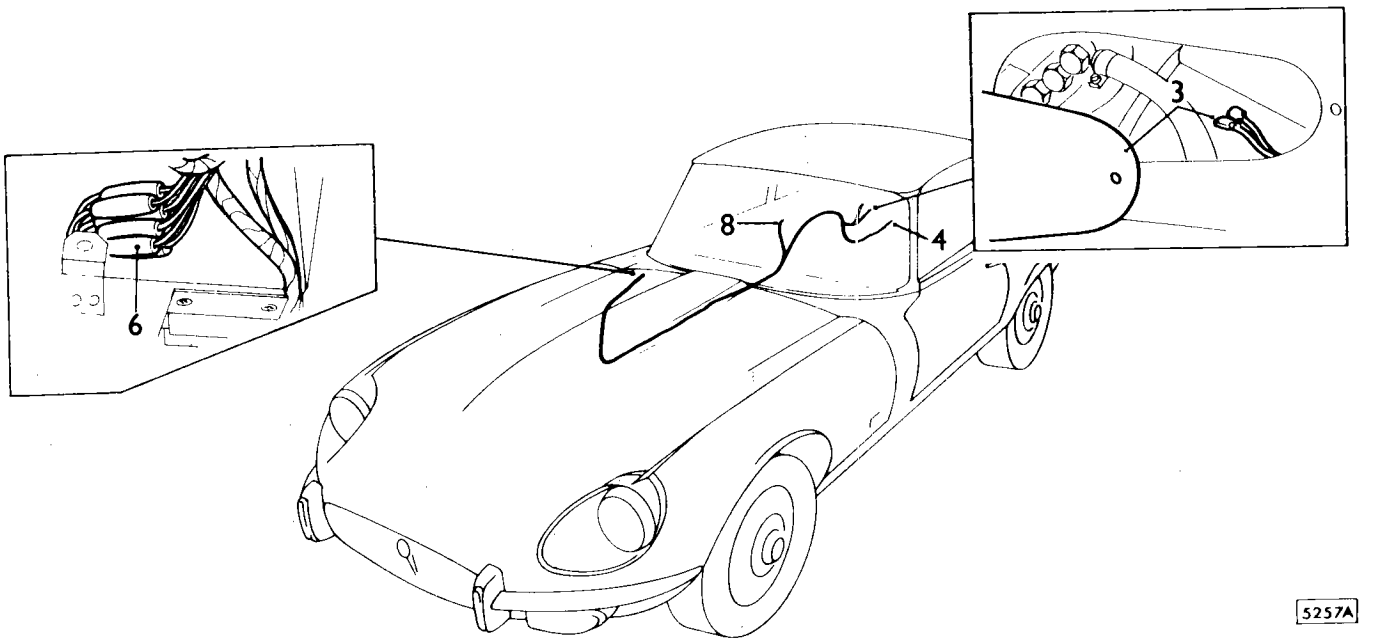
Reverse operations 1 to 12 inclusive.

WIRING HARNESS – RIGHT HAND

Remove and refit **86.70.12**

Removing

1. Remove battery – 86.15.19.
2. Remove spare wheel.
3. Remove access panel at right hand side of luggage compartment. Disconnect petrol pump and electric aerial (if fitted).
4. Separate connectors to right hand tail lamp assembly.
5. Remove right hand parcel tray, under scuttle and scuttle side panel **76.67.05, 76.46.11 and 76.13.01.**
6. Disconnect at bulkhead harness junction.
7. Carefully lift trim and insulation from lower edge of door sills until harness is exposed.
8. Remove right hand loud-speaker **86.50.12**, if radio fitted, and detach connectors.
9. Lift tab clips securing harness in door sill.
10. Withdraw harness from front and rear towards centre of car. Renew grommets at rear wheel arch if necessary.



Refitting

Reverse operations 1 to 10 inclusive.

WIRING HARNESS – ENGINE

Remove and refit **86.70.17**

Removing

1. Disconnect battery – 86.15.19.
2. Disconnect plug to forward harness at front of right hand sub frame side member.
3. Disconnect connectors to ballast resistor, ignition coil, ignition amplifier.

If car fitted with automatic transmission

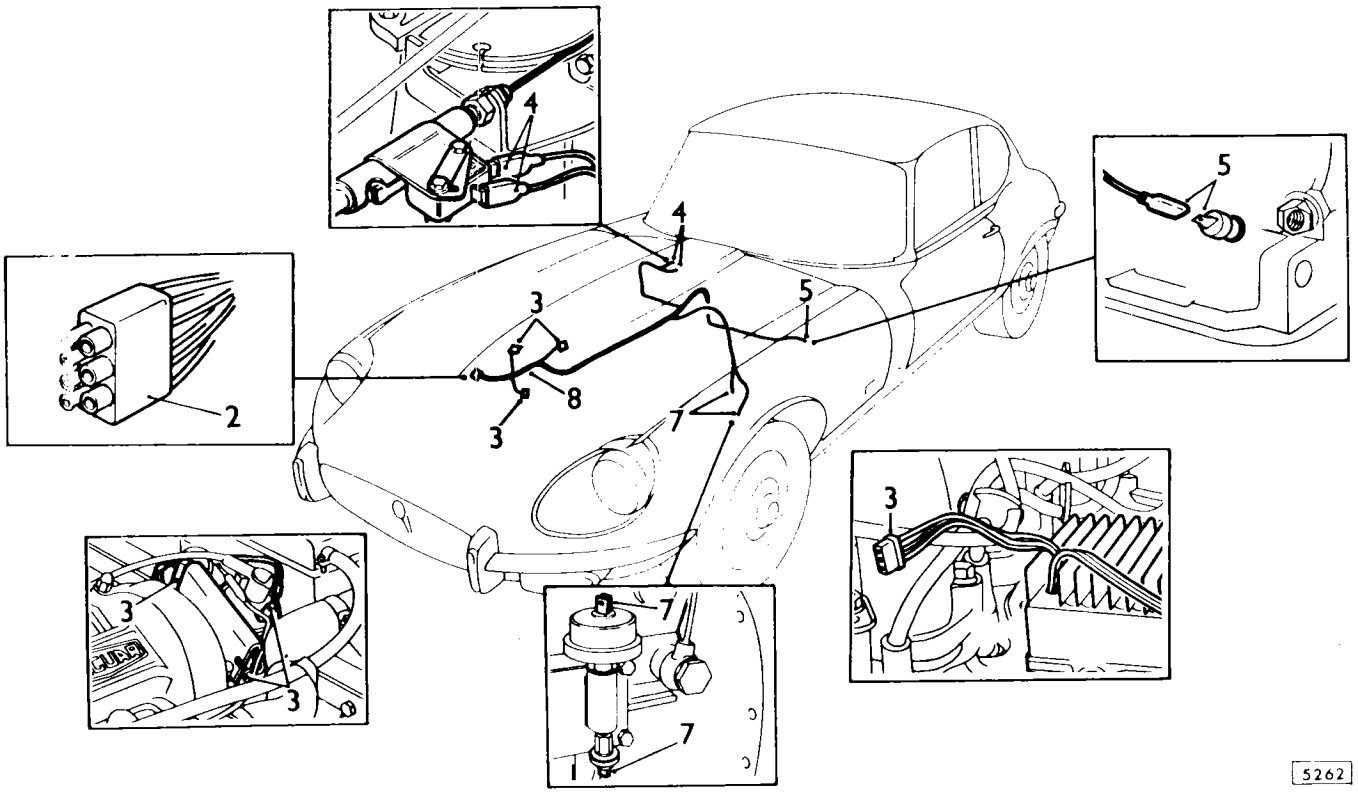
4. Detach connectors from kickdown switch on accelerator cable.
5. Beneath vehicle, detach cable from kickdown operating solenoid at gearbox.

All vehicles

6. Remove windscreen washer reservoir **84.10.01.**
7. Reach in through to engine and detach connectors from oil pressure switch and oil pressure transmitter.
8. Release all cable clips along top of engine block.

NOTE: Recover insulation from forward clip.

9. Draw cable harness from car.



Refitting

Reverse operations 1 to 9 inclusive.

WIRING HARNESS – FRONT LAMPS

Remove and refit **86.70.18**

Removing

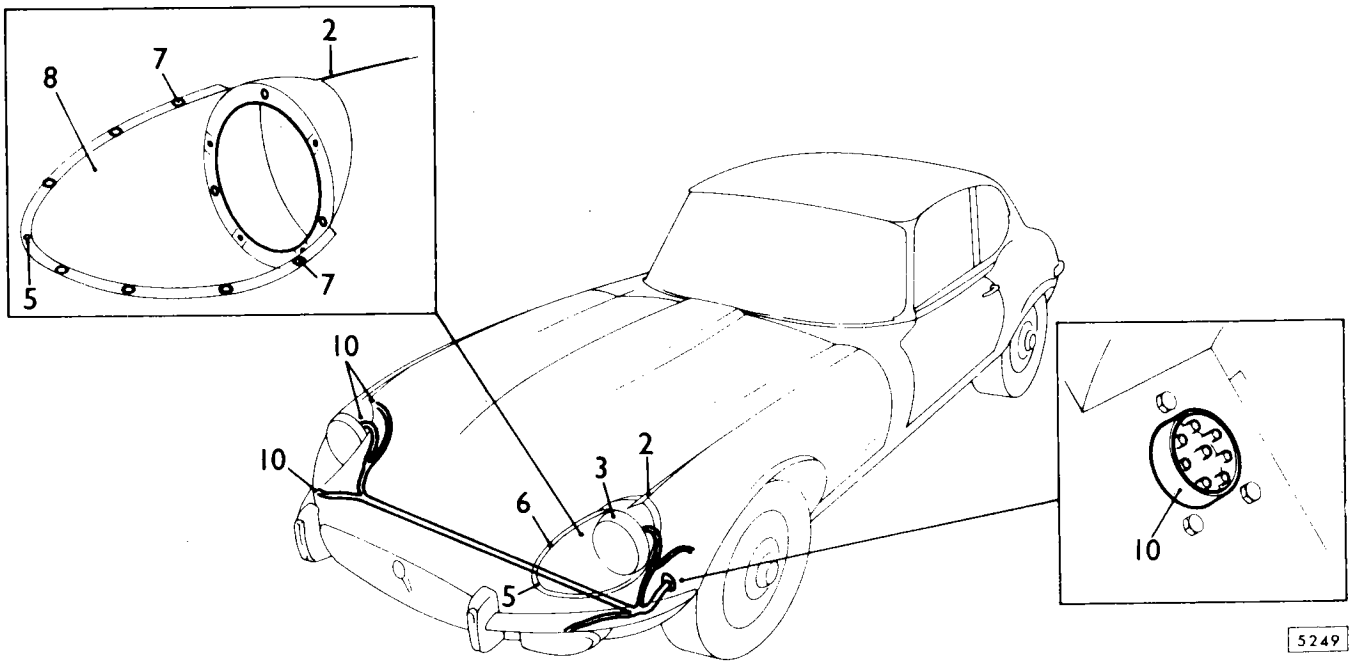
1. Disconnect battery – 86.15.19.
2. Under wheel arch, straighten two foremost limbs of finisher strip clips at both sides of car.
3. Prise off headlamp bezels.
4. Remove two screws securing finisher and lift it clear.
5. Remove one screw at forward end of finisher.
6. Prise off two strips and recover seals.
7. Carefully drill out seven rivets securing each headlamp scoop. Hold rivet head with pliers while drilling.

   CAUTION: Be especially careful, while drilling outer rivets to avoid piercing skin of scoop. Ideally fit a stop to drill.

8. Protect paintwork and lift each scoop, complete with headlamp assembly from bonnet apertures.
9. Remove clips as necessary.
10. Note connections and separate connectors.

    NOTE: It is unnecessary to detach wires from seven pin plug short harness.

11. Attach draw cord to harness at right hand side.
12. Carefully pull harness out through left hand aperture. Detach draw cord and leave in position.

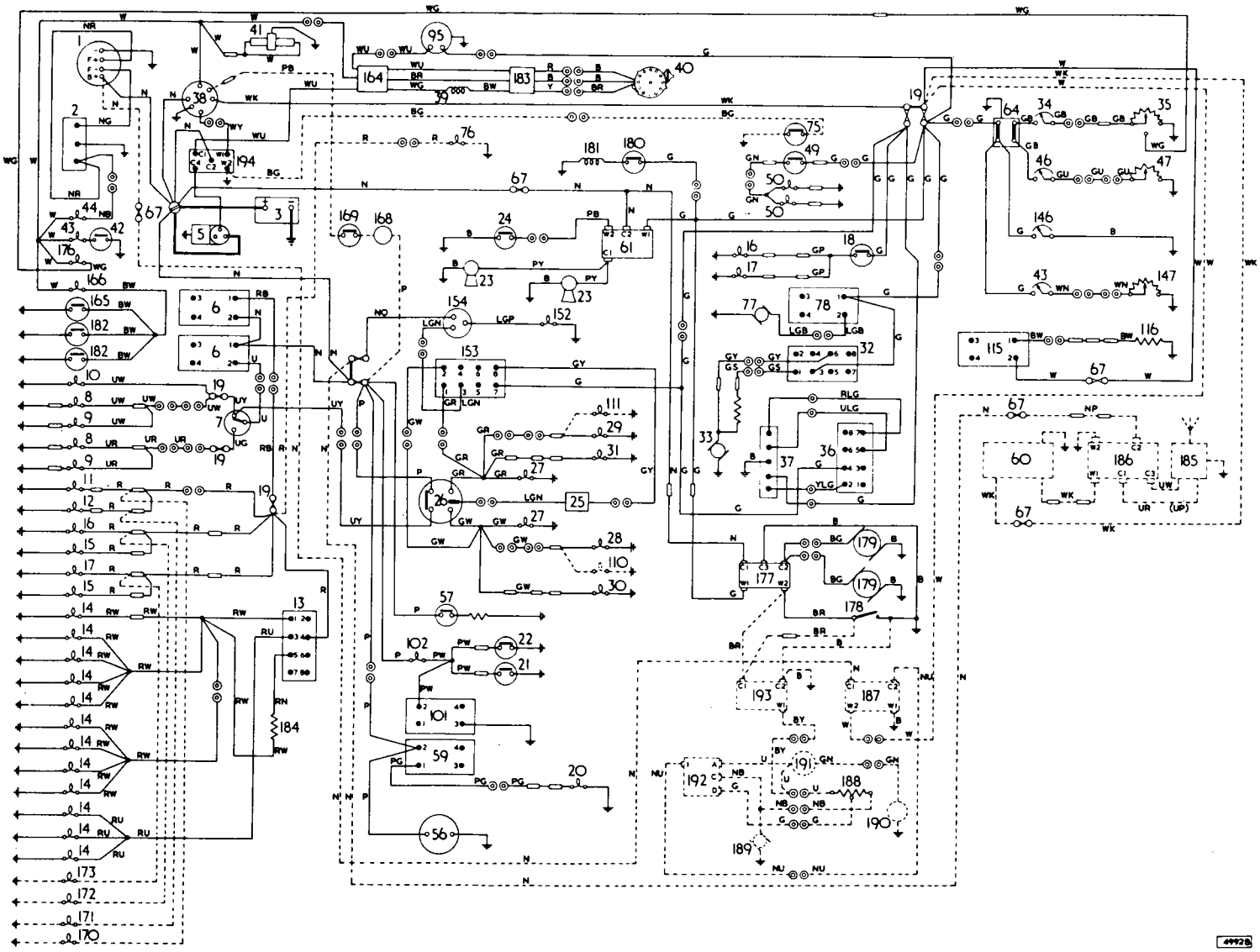


Refitting

13. Reverse operations 8 to 12 to reposition scoops.
14. Re-rivet each scoop, ensuring spacer washers fitted beneath each rivet head.
15. Refit chrome headlamp finishers by reversing operations 1 to 6.

WIRING DIAGRAM

Refer to following pages for cable runs and all circuitry

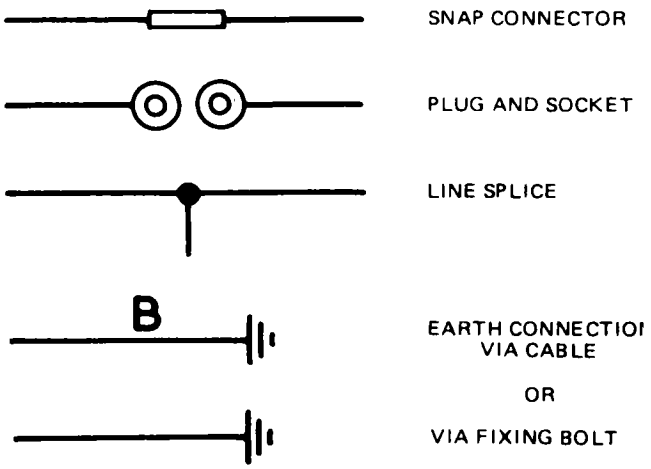


1. Alternator
2. Control Box
3. Battery (12 volt)
5. Starter Motor
6. Lighting Switch
7. Headlamp Dip Switch
8. R.H. Headlamp
9. L.H.Headlamp
10. Main Beam Warning Lamp
11. R.H. Sidelamp
12. L.H. Sidelamp
13. Panel Lamps Switch
14. Panel Lamps
15. Number Plate Illumination Lamp
16. R.H. Stop & Tail Lamp
17. L.H. Stop & Tail Lamp
18. Stop Lamp Switch
19. Fuse Unit 2 Way
20. Interior Lights
21. R.H. Door Switch
22. L.H. Door Switch
23. Horns
24. Horn Push
25. Flasher Unit
26. Direction Indicator Switch
27. Direction Indicator Warning Lamps
28. R.H. Front Flasher Lamp
29. L.H. Front Flasher Lamp
30. R.H. Rear Flasher Lamp
31. L.H. Rear Flasher Lamp
32. Heater Switch
33. Heater Motor(s)
34. Fuel Gauge
35. Fuel Gauge Tank Unit
36. Windscreen Wiper Switch
37. Windscreen Wiper Motor
38. Ignition/Starter/Steering Column Lock Switch
39. Ignition Coil
40. Distributor
41. Fuel Pump
42. Oil Pressure Switch
43. Oil Pressure Gauge
44. Ignition Warning Lamp
46. Water Temperature Gauge
47. Water Temperature Transmitter
49. Reverse Lamp Switch
50. Reverse Lamps
56. Clock
57. Cigar Lighter
59. Interior Light Switch
60. Radio (If Fitted)
61. Horn Relay
64. Bi-metal Instrument Voltage Stabiliser
67. Line Fuse
75. Automatic Gearbox Safety Switch
76. Automatic Gearbox Gear Selector Indicator Lamp.
77. Electric Windscreen Washer
78. Electric Windscreen Washer Switch
95. Revolution Counter
101. Map Light Switch
102. Map Light
110. R.H. Repeater Flasher
111. L.H. Repeater Flasher
115. Rear Window Demist Switch
116. Rear Window Demist Unit
146. Battery Condition Indicator
147. Oil Pressure Transmitter
152. Hazard Warning Lamp
153. Hazard Warning Switch
154. Hazard Warning Flasher Unit
164. Ballast Resistor
165. Handbrake Switch
166. Handbrake Warning Lamp
168. Ignition Key Warning Buzzer
169. Buzzer Door Switch
170. R.H. Front Marker
171. L.H. Front Marker
172. R.H. Rear Marker
173. L.H. Rear Marker
176. Low Fuel Warning Light
177. Radiator Cooling Fan Relay
178. Radiator Cooling Fan Thermostat
179. Radiator Cooling Fan Motor
180. Auto. Trans. Kickdown Switch
181. Auto. Trans. Kickdown Solenoid
182. Brake Fluid Level Switch
183. Opus Ignition Amplifier
184. Panel Light Resistor
185. Aerial Motor (if fitted)
186. Aerial Motor Relay (if fitted)
187. Main relay – air conditioning
188. Air Conditioning Resistor
189. Air Conditioning Motor
190. Air Conditioning Compressor
191. Air Conditioning Thermostat Switch
192. Air Conditioning Control Switch
193. Radiator Cooling Fan Thermostat Relay
194. Starter Solenoid/Ballast Coil Relay

CABLE COLOUR CODE

N. Brown	**P. Purple**	**W. White**
U. Blue	**G. Green**	**Y. Yellow**
R. Red	**L. Light Green**	**B. Black**
K. Pink	**S. Slate**	

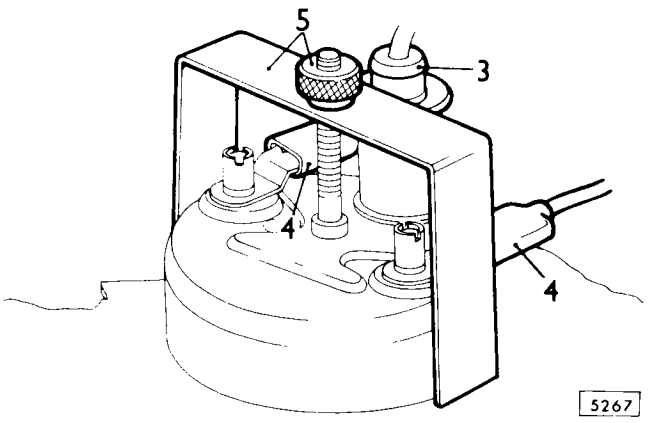
When a cable has two colour code letters, the first denotes the Main Colour and the second the Tracer Colour.



CONTENTS

BATTERY CONDITION INDICATOR

Remove and refit **88.10.07**



Removing

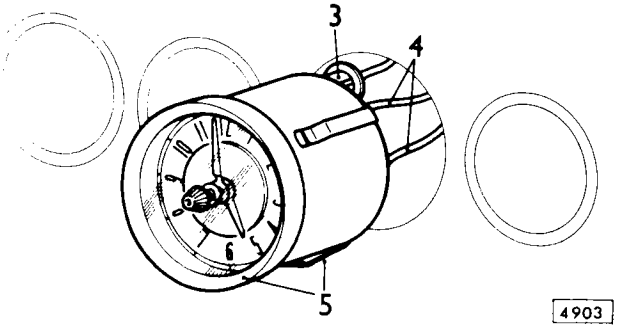
1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts in the centre instrument panel and lower the hinged panel to the horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach the two Lucar connectors from the instrument.
5. Support the instrument from beneath the panel and remove the clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.

CLOCK

Remove and refit **88.15.07**



Removing

1. Disconnect battery lead – 86.15.19.
2. Remove the knurled finger nuts in the centre instrument panel and lower hinged panel to the horizontal position.
3. Detach lead to illumination lampholder.
4. Withdraw the two Lucar connectors from the instrument.
5. Support the clock from beneath the panel and remove clamp retaining clock in panel.
6. Remove clock through panel.

Refitting

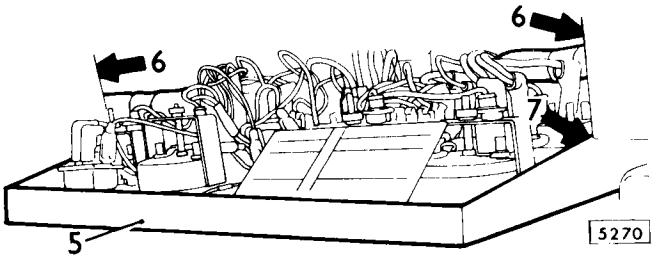
7. Reverse operations 1 to 6.
8. Re-start the clock by setting the hands.

CENTRE INSTRUMENT PANEL

Remove and refit **88.20.01**

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove parcel tray, driver's side – 76.67.04.
3. Remove parcel tray, passenger side – 76.67.05.
4. Remove dash liners – 76.46.11.
5. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
6. Separate wiring harness connectors at plug/socket connectors.
7. Remove pivot screws securing centre instrument panel.
8. Withdraw panel.



Refitting

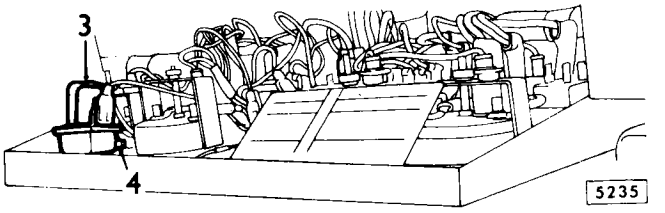
Reverse operations 1 to 8.

VOLTAGE STABILIZER

Remove and refit **88.20.26**

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw Lucar connectors from stabilizer.
4. Remove stabilizer from panel, secured by a nut and washer.



Refitting

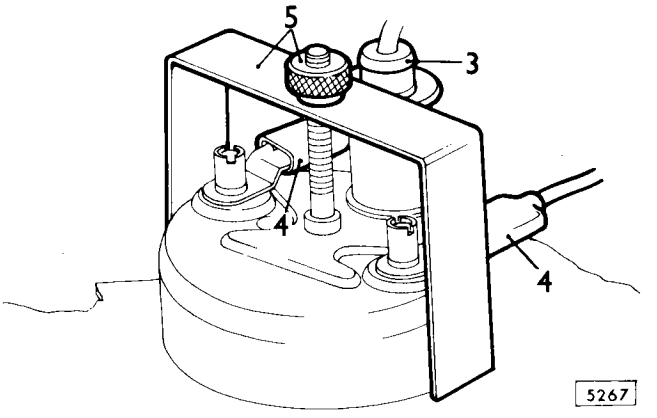
Reverse operations 1 to 4.

OIL GAUGE

Remove and refit **88.25.01**

Removing

1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

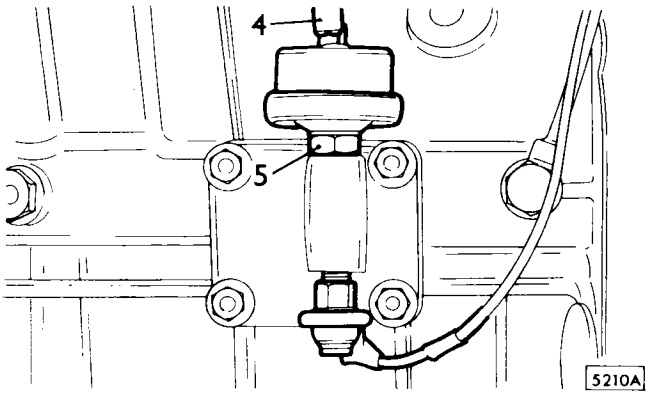


Refitting

Reverse operations 1 to 6.

OIL PRESSURE SENDER UNIT

Remove and refit 88.25.07



Removing

1. Disconnect battery lead – 86.15.19.
2. Remove windscreen washer reservoir – 84.10.01.
3. Detach servo fluid reservoir and bracket complete from bulkhead.
4. Detach Lucar connector from transmitter.
5. Unscrew transmitter from cylinder block.

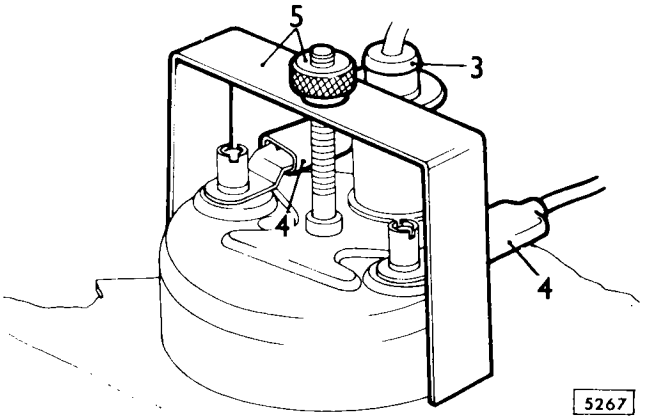
Refitting

Reverse operations 1 to 5.

NOTE: Use a new sealing washer between the transmitter and its housing.

WATER TEMPERATURE GAUGE

Remove and refit 88.25.14



Removing

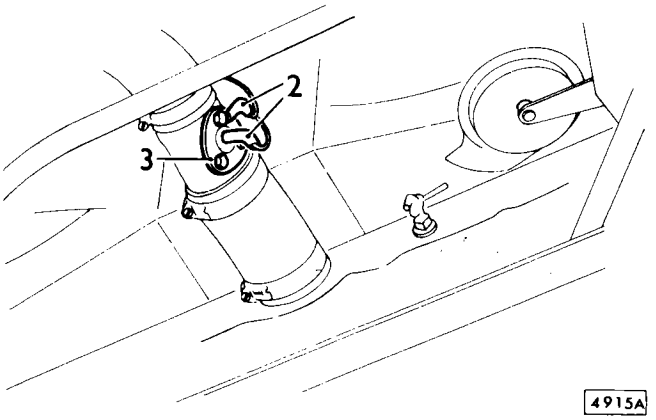
1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre instrument panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.

WATER TEMPERATURE TRANSMITTER

Remove and refit 88.25.20



Removing

1. Disconnect battery lead – 86.15.19.
2. Detach Lucar connector from transmitter.
3. Remove transmitter.

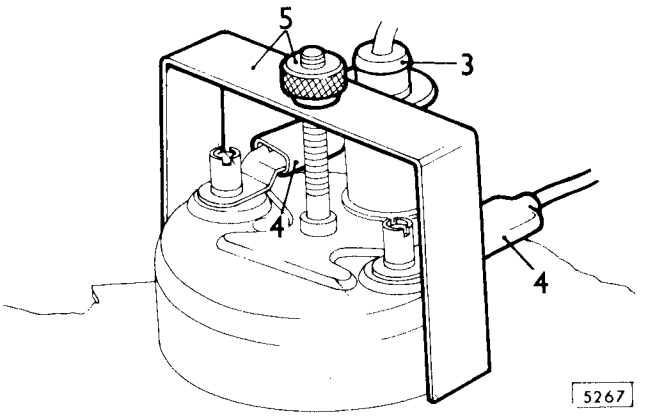
Refitting

Reverse operations 1 to 3.

NOTE: Use a new sealing washer on the transmitter.

FUEL GAUGE

Remove and refit 88.25.26



Removing

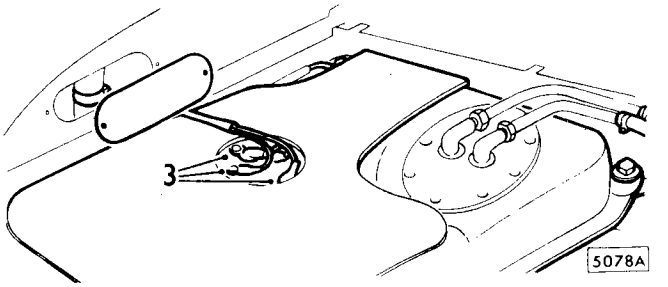
1. Disconnect battery lead – 86.15.19.
2. Remove knurled finger nuts and lower hinged centre panel to horizontal position.
3. Withdraw instrument illumination lampholder.
4. Detach Lucar connectors from instrument.
5. Support instrument from beneath panel and remove clamp, secured by a knurled nut and spring washer.
6. Withdraw instrument through panel.

Refitting

Reverse operations 1 to 6.

FUEL GAUGE TANK UNIT

Remove and refit 88.25.32.



Removing

WARNING: ENSURE ALL DUE PRECAUTIONS ARE TAKEN AGAINST FIRE AND EXPLOSION.

1. Disconnect battery lead – 86.15.19.
2. Remove the L.H. section of the boot floor.
3. Detach leads from tank unit at Lucar connectors.
4. Remove tank unit.

Refitting

Reverse operations 1 to 3.

NOTE: A new gasket must be used between the tank unit flange and tank.

SPEEDOMETER AND TACHOMETER 88.30.00

Speedometer

Performance is dependent on the condition of the flexible drive; apparent faults in the instrument may be due to some failure of the drive. Before returning to speedometer for service check the inner cable.

Inaccuracy of an instrument may be due to incorrect tyre pressure or badly worn tyres. If non-standard tyres are fitted, apply to Smiths for a specially calibrated instrument.

Check that the code number on the face of the instrument is correct for the final drive unit ratio.

Pointer Waver

This complaint may be caused by a defective drive cable.

Over lubrication of the cable may have caused the instrument to become oiled up. If no fault in the cable is found, replace the speedometer.

Noisy installation

Check inner cable for defects if the cable is found to be satisfactory the drive gearing on the transmission may be suspect.

Test the drive with the inner cable withdrawn, but the outer casing connected at the transmission.

Ticking noise

Regular ticking in time with the distance counter usually indicates an internal defect of the instrument. Return speedometer for replacement.

Loud screeching

Usually more prevalent during cold weather. Return instrument for replacement.

Revolution counter (tachometer)

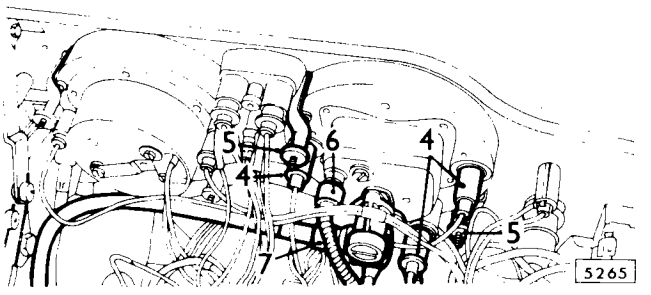
This is an electronic impulse type instrument having a printed circuit. The pulse lead is connected to a terminal on the ballast resistor unit. Connections to the back of the instrument are by means of a blocked plug and socket, the contacts of which are offset to prevent reversed polarity of the connections.

SPEEDOMETER

Remove and refit **88.30.01**

Removing

1. Disconnect battery lead 86.15.19.
2. Remove parcel tray 76.67.04.
3. Remove dash liner 76.46.11.
4. Withdraw speedometer illumination and warning light lampholders (note their positions).
5. Remove speedometer clamps.
6. Disconnect trip recorder control at knurled ferrule on instrument.
7. Disconnect speedometer cable from right-angle drive on instrument.
8. Withdraw instrument through panel.



Refitting

9. Reverse operations 1 to 8.
10. Check that the code number on the face of the instrument is correct for the final drive unit ratio of the vehicle.

SPEEDOMETER TRIP RECORDER CONTROL

Remove and refit **88.30.02**

Removing

1. Remove screen rail crash roll assembly 76.46.04.
2. Disconnect battery lead 86.15.19.
3. Remove parcel tray 76.67.04.
4. Remove dash liner 76.46.11.
5. Withdraw speedometer illumination and warning light lampholders (note their positions).
6. Remove speedometer clamps.
7. Disconnect trip recorder control cable at knurled ferrule on instrument.
8. Remove plastic cap from control knob.
9. Unscrew chrome bezel behind control knob.
10. Withdraw control cable.

Refitting

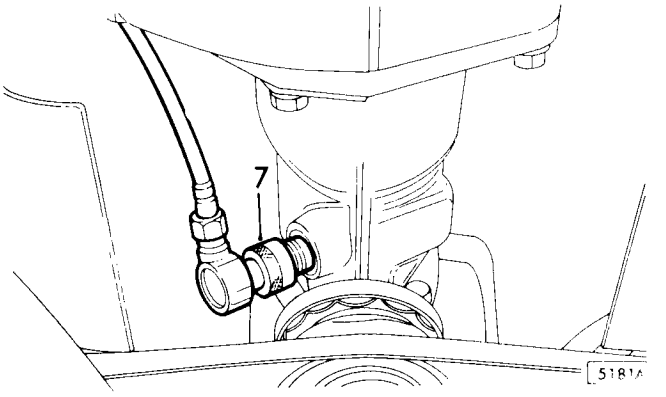
Reverse operations 1 to 10.

SPEEDOMETER CABLE ASSEMBLY

Remove and refit **88.30.06**

Removing

1. Remove parcel tray driver's side 76.67.04.
2. Remove parcel tray, passenger side 76.67.05.
3. Remove dash liner, driver's side 76.46.11.
4. Remove radio panel 86.50.04.
5. Detach speedometer cable at ferrule on right angle drive, behind instrument.
6. Carefully pull away carpet which is adhered to gearbox tunnel.
7. Disconnect drive cable at gearbox or (automatic transmission unit) from beneath car.
8. Release cable from body clipping.
9. Withdraw cable through grommet in side of gearbox tunnel.

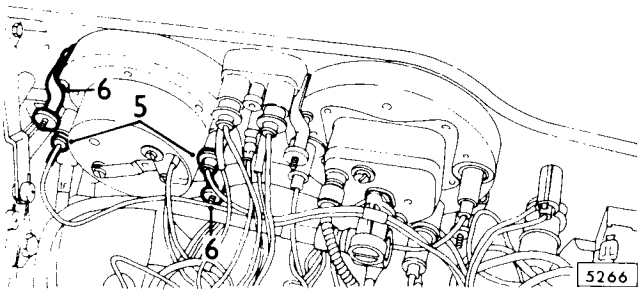


Refitting

Reverse operations 1 to 9.

TACHOMETER (Revolution counter)

Remove and refit 88.30.21



Removing

1. Remove screen rail crash roll assembly 88.30.21.
2. Disconnect battery lead 86.15.19.
3. Remove parcel tray 76.67.04
4. Remove dash liner 76.46.11.
5. Withdraw tachometer illumination lampholder.
6. Remove tachometer clamps.
7. Detach tachometer leads at plug/socket unit.
8. Withdraw instrument through panel.

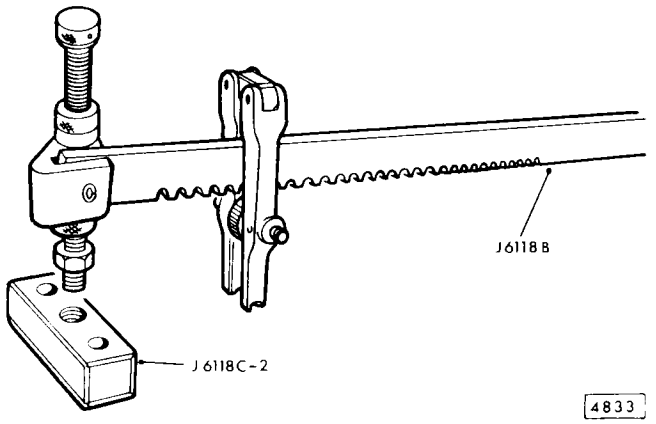
Refitting

Reverse operations 1 to 8.

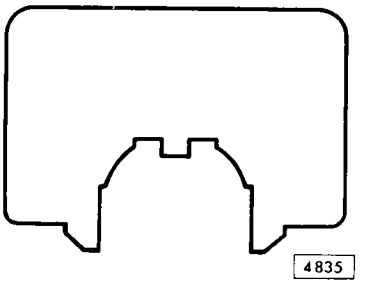
CONTENTS

CONTENTS—continued

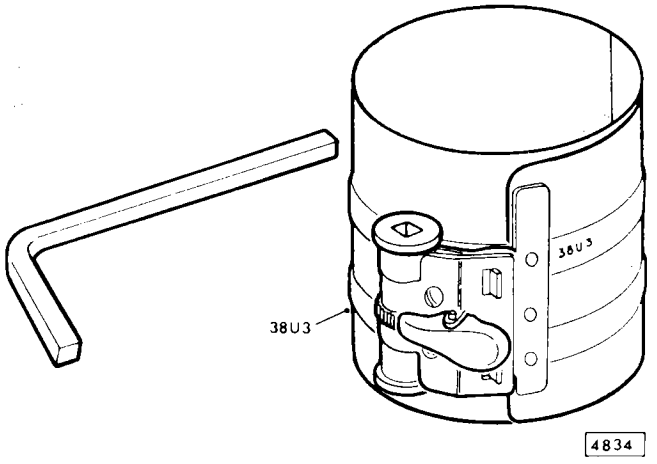
SECTION 12



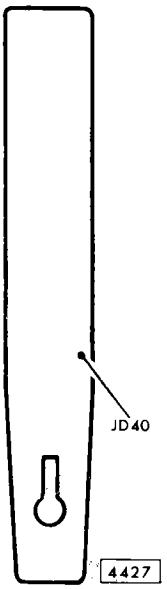
Valve Spring Compressor J.6118B and Adaptor J.6118C-2.



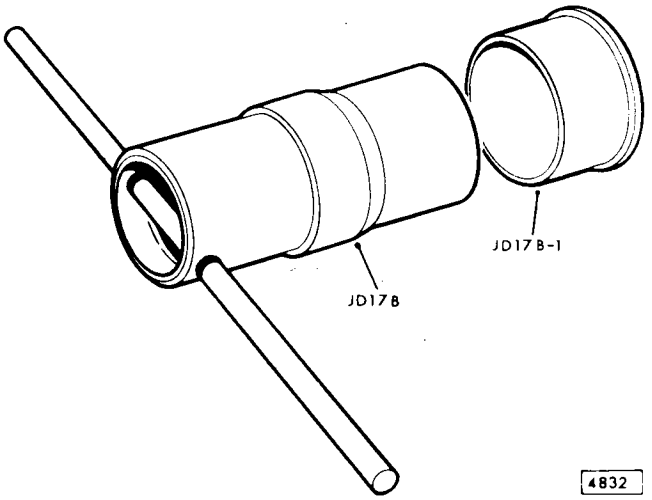
Valve Timing Gauge C.3993.



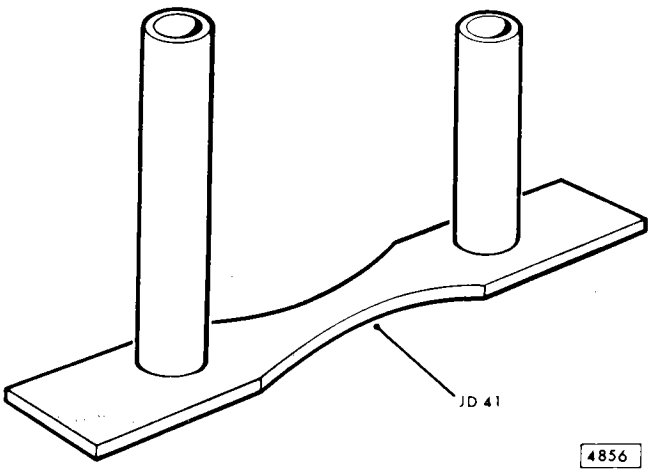
Piston Ring Clamp 38.U.3.



Camshaft Sprocket Retaining Tool JD.40.

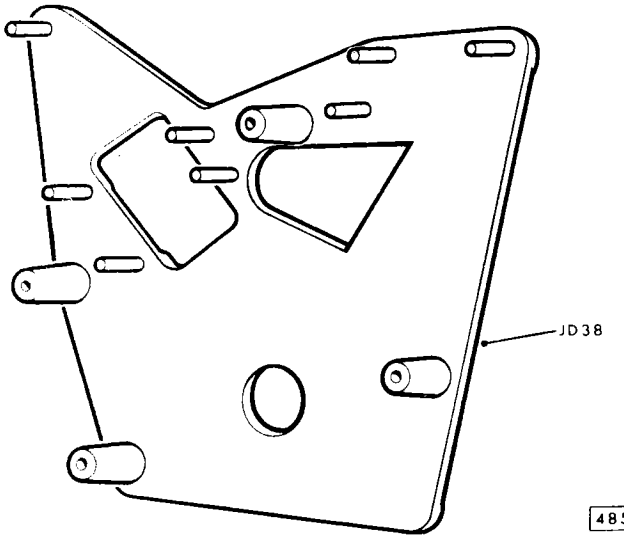


Rear Oil Seal Pre-sizing Tool JD.17B and Adaptor JD.17B-1.

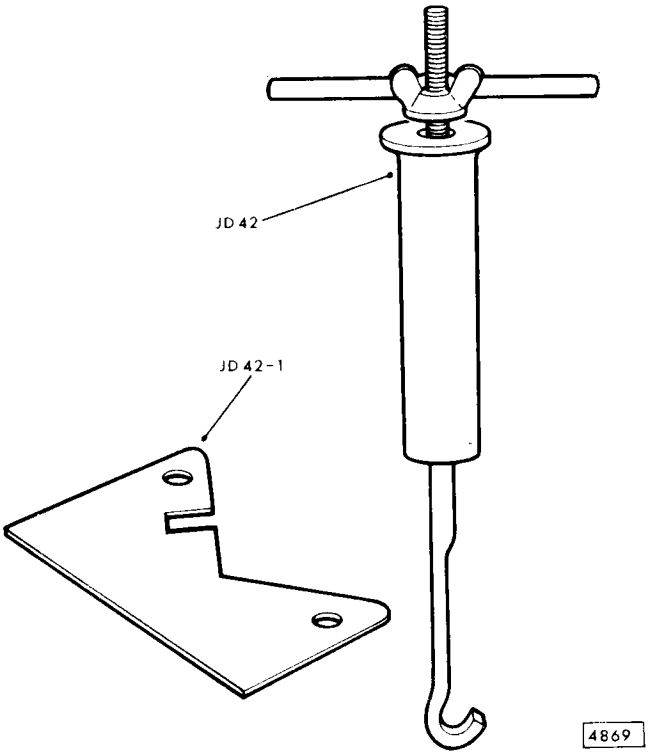


Cylinder Liner Retaining Tool JD.41.

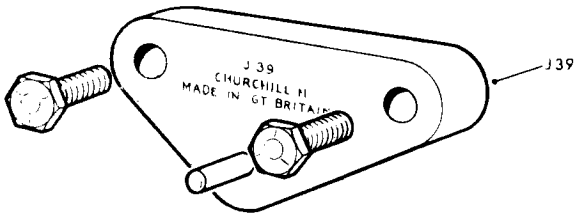
SECTION 12 (continued)



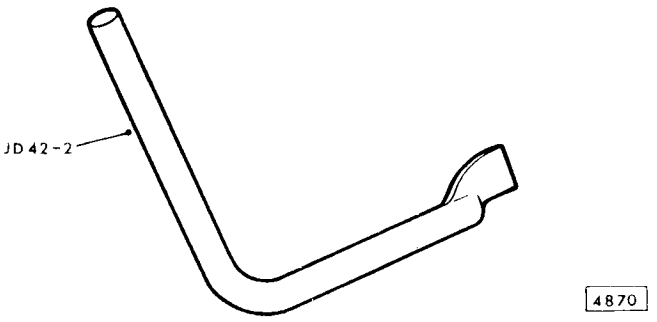
Chain Damper Setting Jig JD.38.



Timing Chain Tensioner Retractor Tool JD.42 and Support Plate JD.42-1.

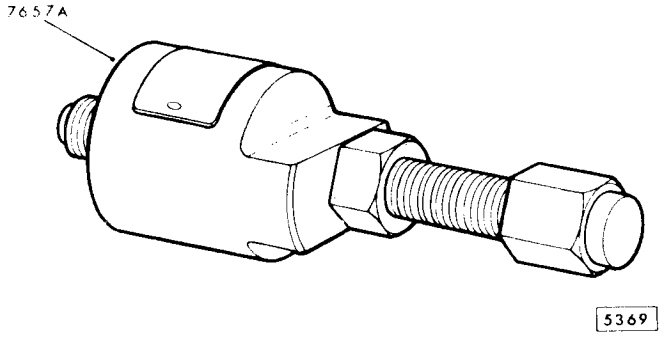


Jackshaft Sprocket Retaining Tool J.39.

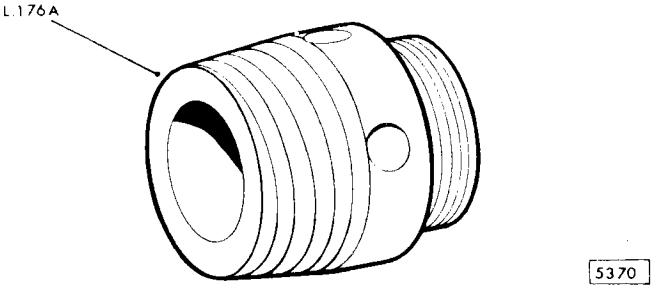


Timing Chain Tensioner Screwdriver JD.42-2.

SECTION 37

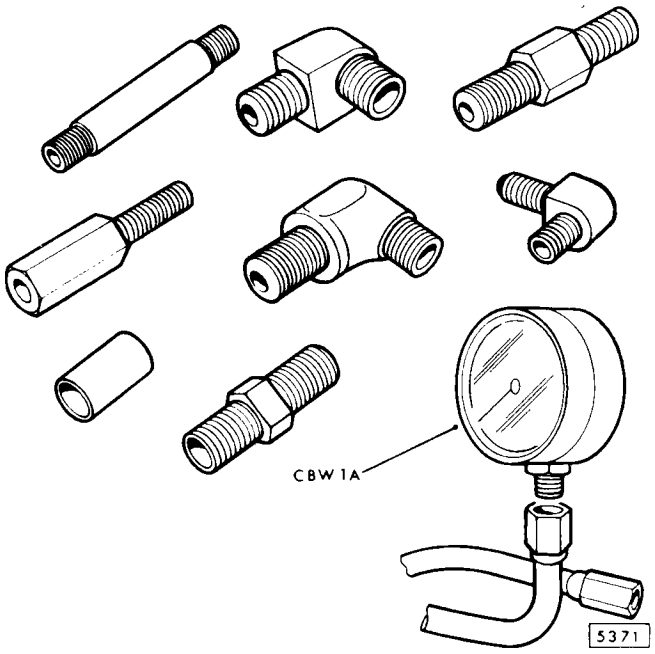


Oil Seal Remover-Main Tool 7657A.

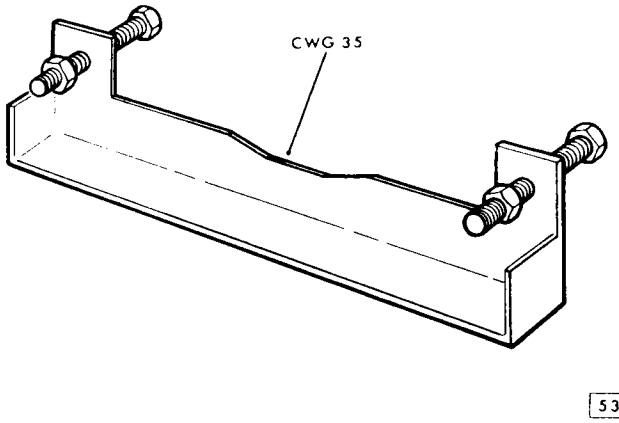


Oil Seal Remover Adaptor L.176A.

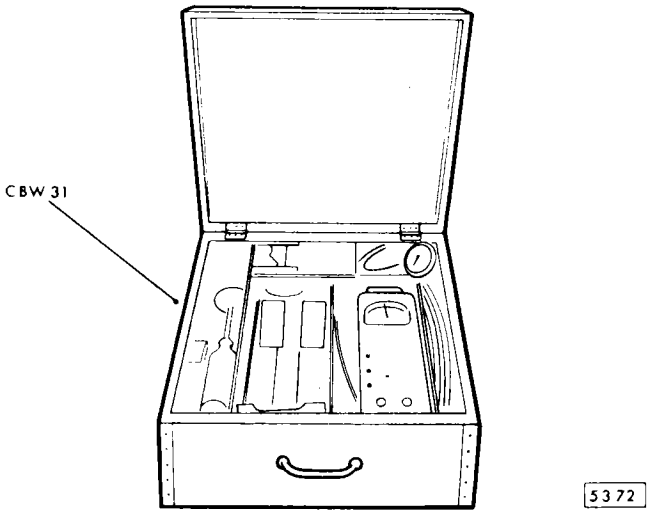
SECTION 44



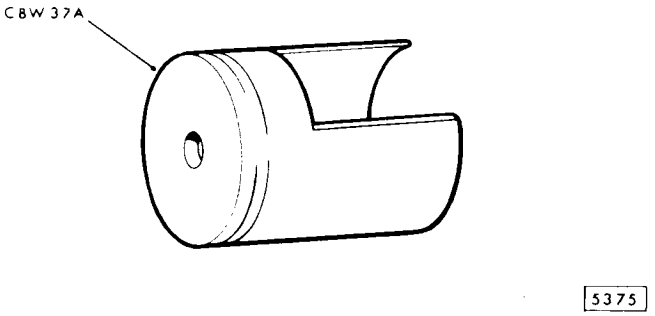
Pressure Test Equipment CBW.1A.



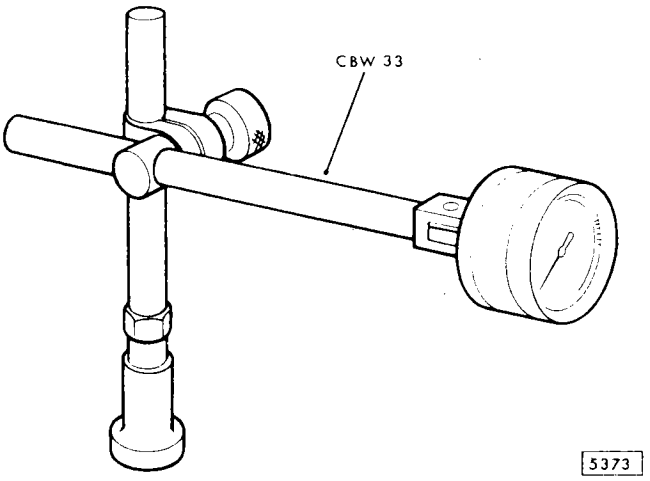
Bench Cradle CWG.35.



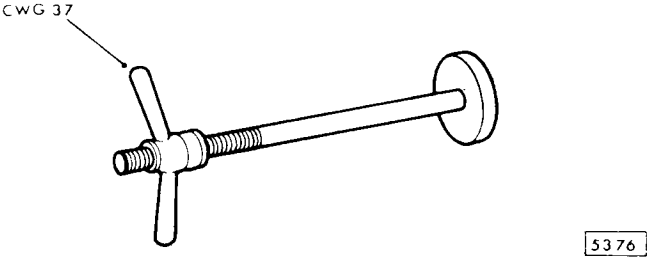
Tool Kit CBW.31.



Clutch Spring Compressor CBW.37A.

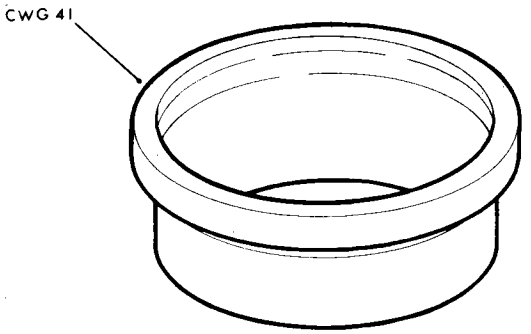


Mainshaft End Float Gauge CBW.33.

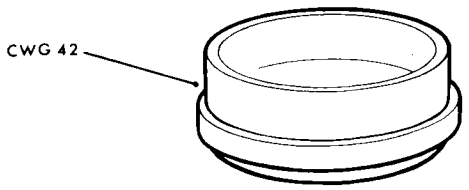


Clutch Spring Compressor CWG.37.

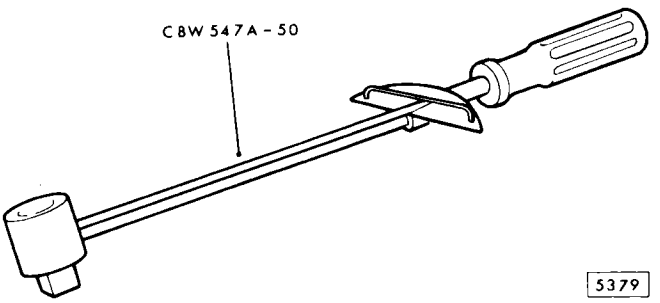
SECTION 44 (continued)



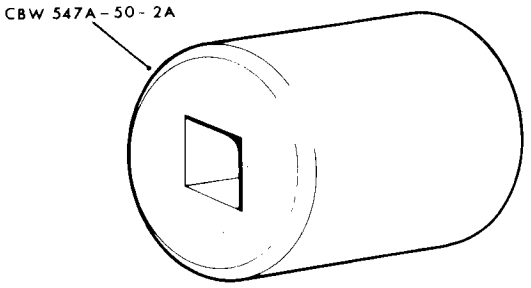
Rear Clutch Piston Replacer CWG.41.



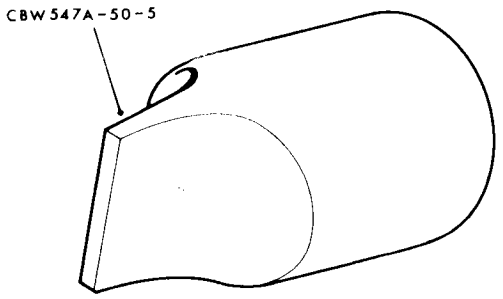
Front Clutch Piston Replacer CWG.42.



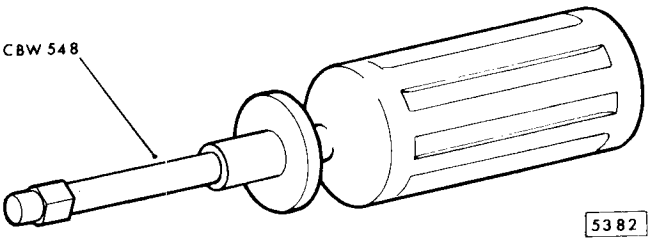
Tension Wrench CBW.547A-50.



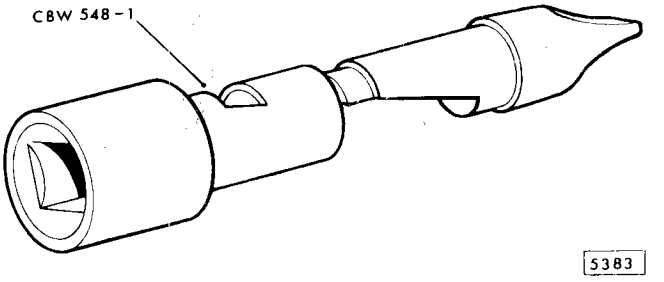
Rear Servo Adjuster Adaptor CBW.547A-50-2A.



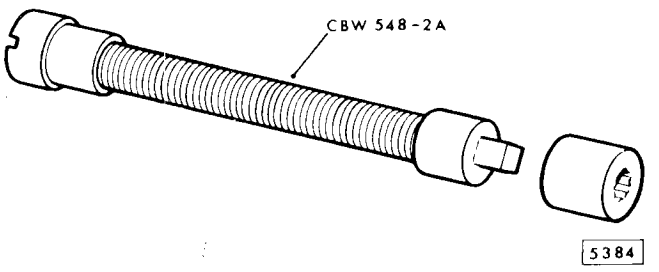
Screwdriver Bit Adaptor CBW.547A-50-5.



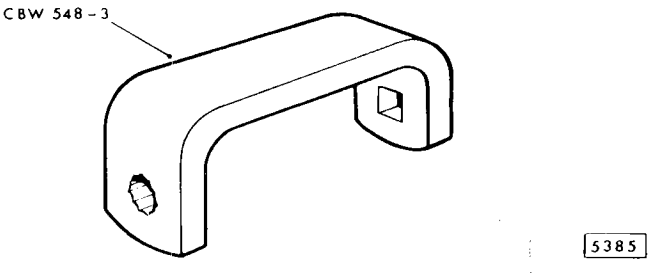
Torque Screwdriver CBW.548.



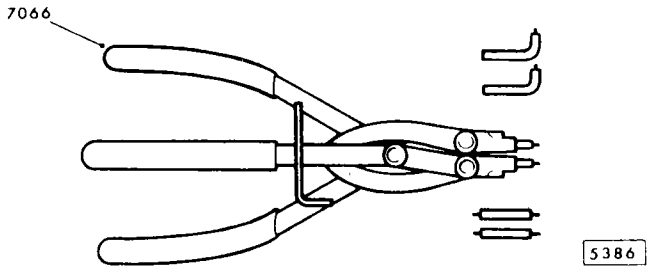
Screwdriver Bit Adaptors CBW.548-1.



Front Servo Adjuster Adaptor CBW.548-2A.

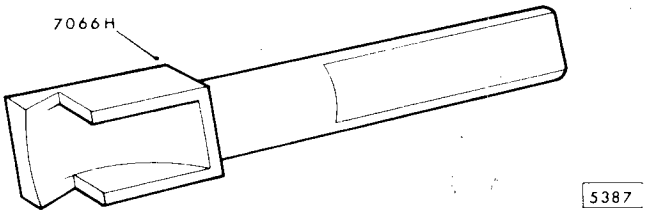


Front Servo Adjuster Adaptor CBW.548-3.

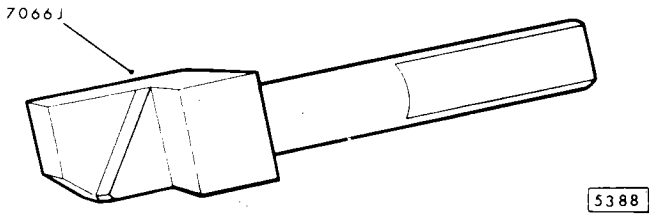


Circlip Pliers 7066.

SECTION 44 (continued)

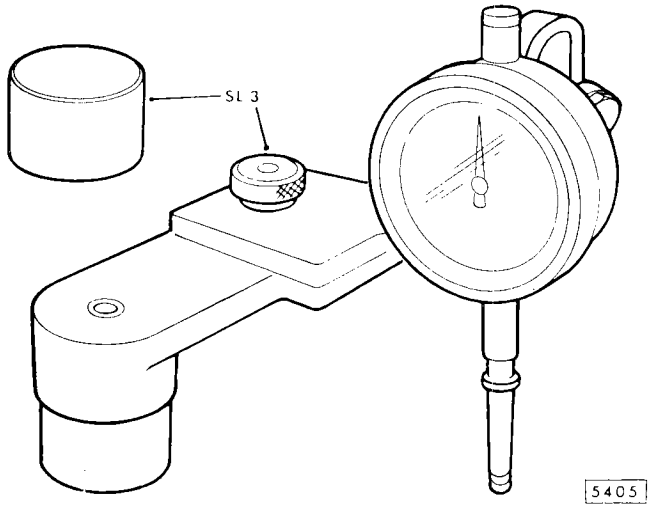


Circlip Pliers – Points 7066H

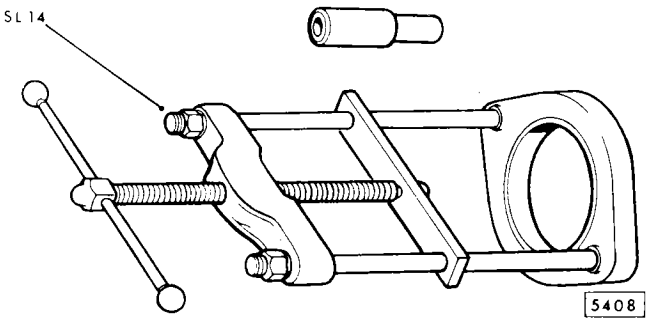


Circlip Pliers – Points 7066J

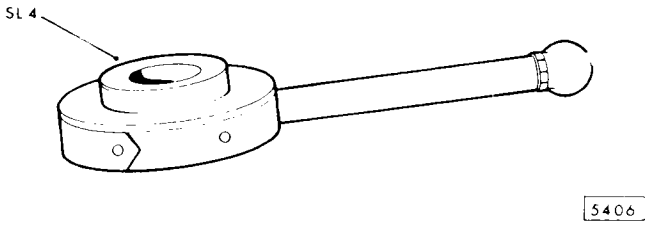
SECTION 51



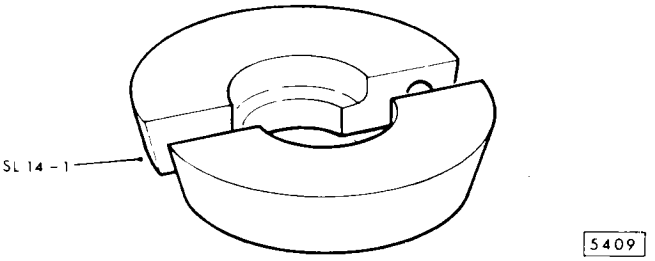
Pinion Setting Gauge SL.3.



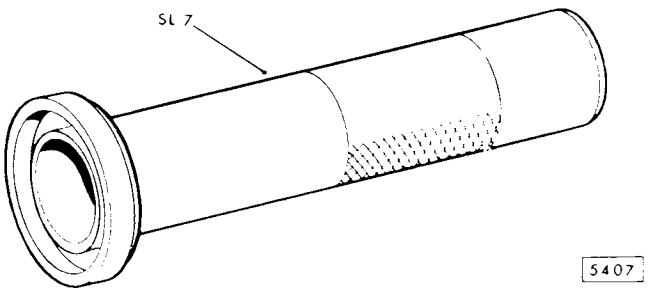
Hand Press SL.14.



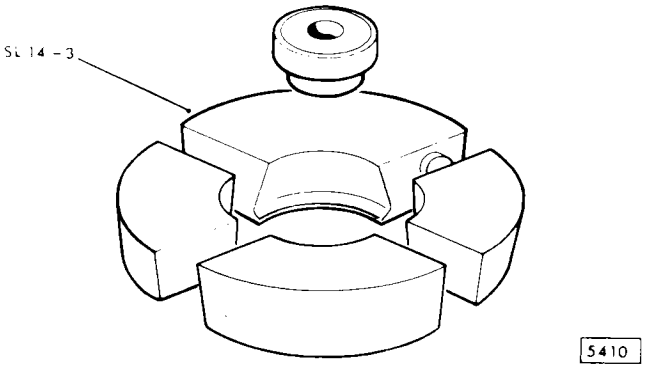
Pinion Oil Seal Replacer SL.4.



Pinion Bearing Cone Remover/Replacer SL.14-1.

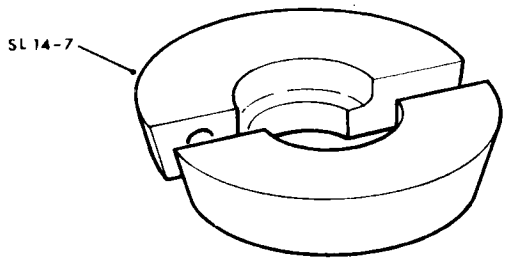


Rear Hub Bearing Cone and Cup Replacer SL.7.

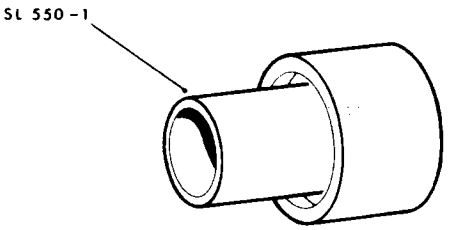


Differential Bearing Cone Remover SL.14-3.

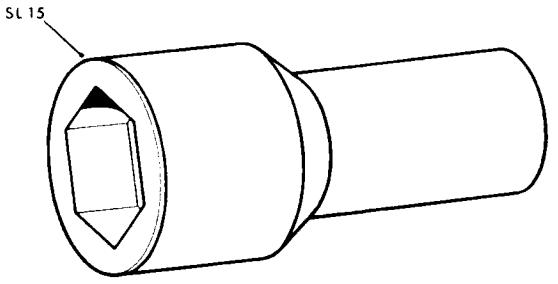
SECTION 51 (continued)



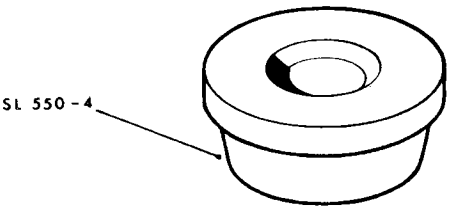
Rear Hub Bearing Cone Remover SL.14-7.



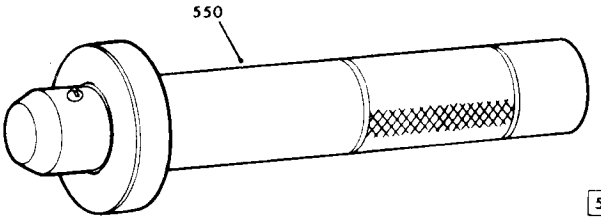
Differential Bearing Cone Replacer SL.550-1.



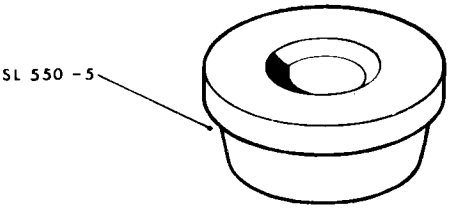
Drive Shaft Bearing Nut Wrench SL.15.



Pinion Outer Bearing Cup Replacer SL.550-4.

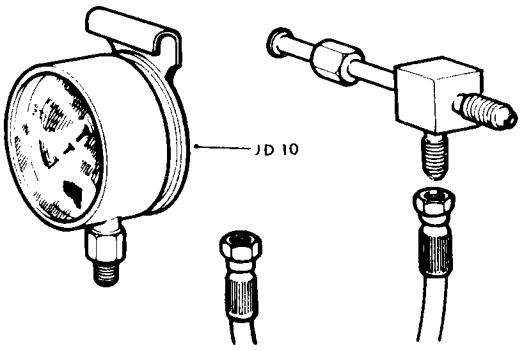


Driver Handle 550.

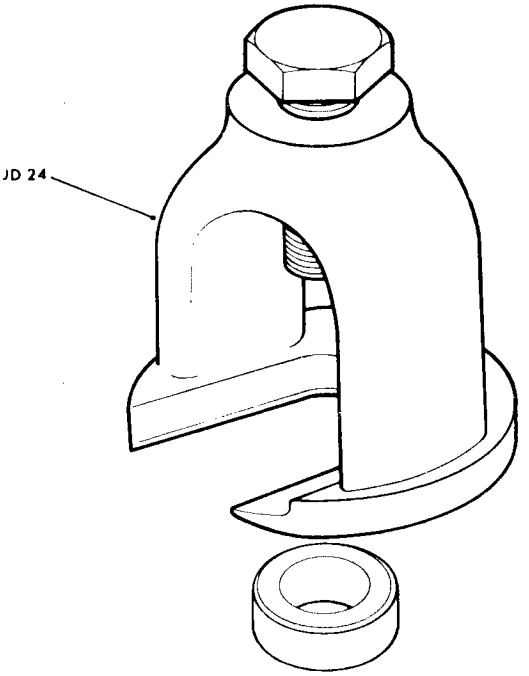


Pinion Inner Bearing Cup Replacer SL.550-5.

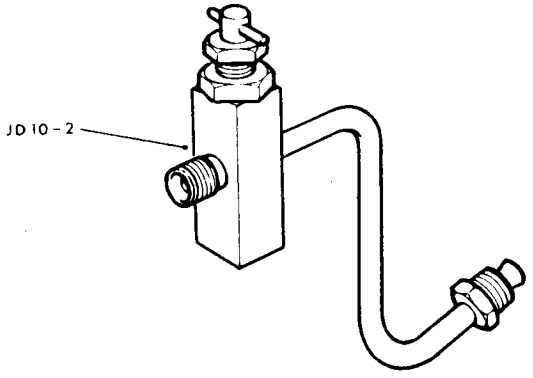
SECTION 57



Power Steering Test Set JD.10.

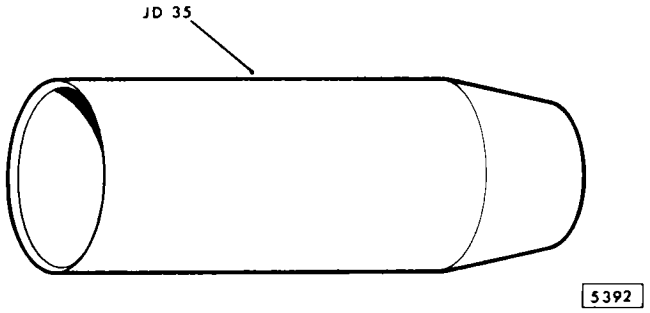


Steering Joint Taper Separator JD.24.



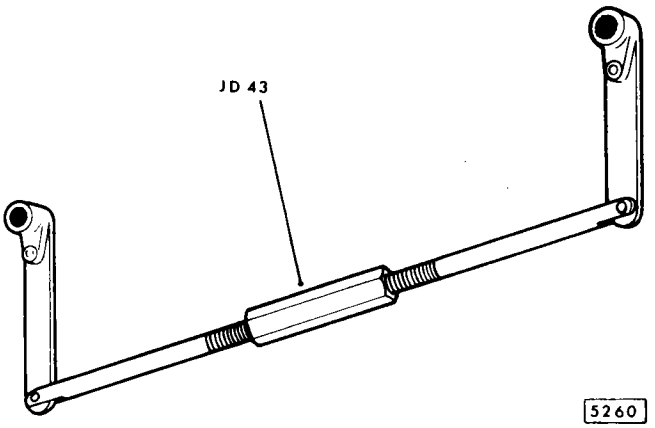
Hydraulic Pressure Test Adaptor JD.10-3.

SECTION 57 (continued)



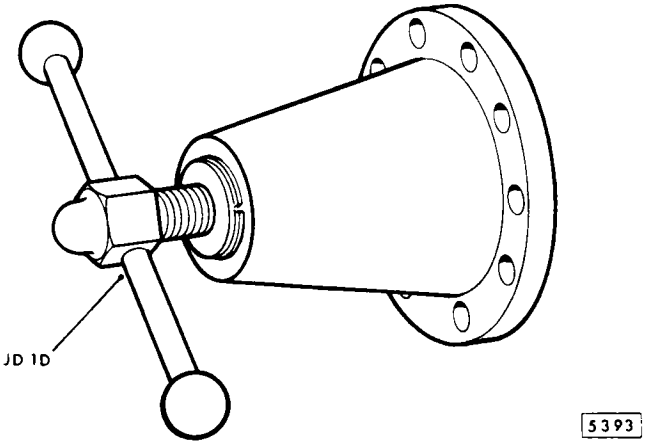
Rotor Spline Seal Protector JD.35.

SECTION 60

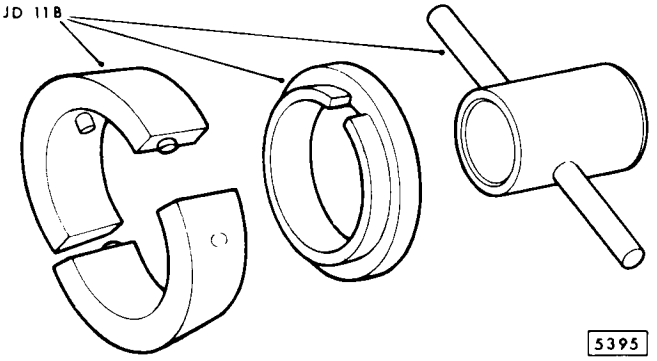


Front Suspension Setting Links JD.43.

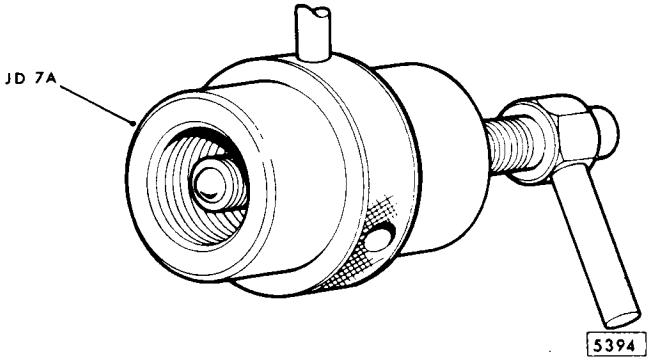
SECTION 64



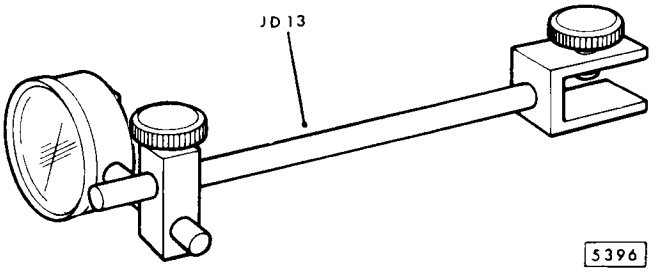
Hub Remover JD.1D.



Hydraulic Damper and Spring Unit Dismantling Adaptor JD.11B.

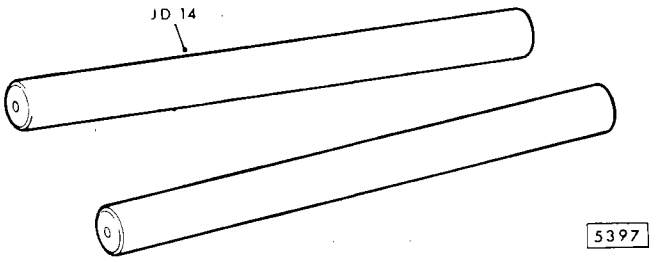


Hub Puller JD.7A.

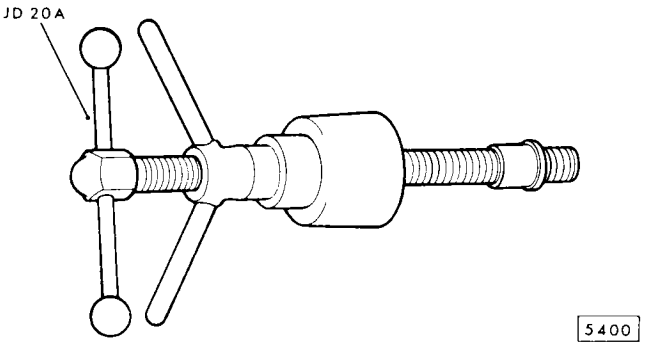


Rear Hub Backlash Gauge JD.13.

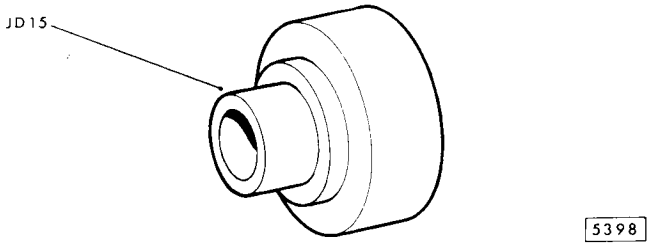
SECTION 64 (continued)



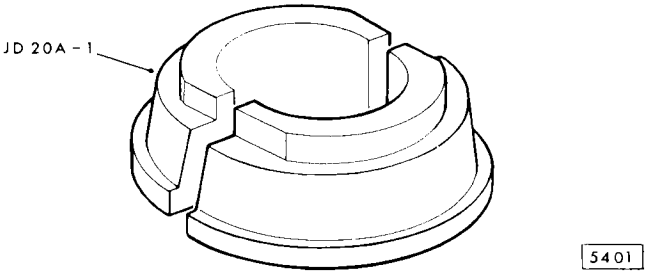
Rear Wishbone Pivot Dummy Shafts JD.14.



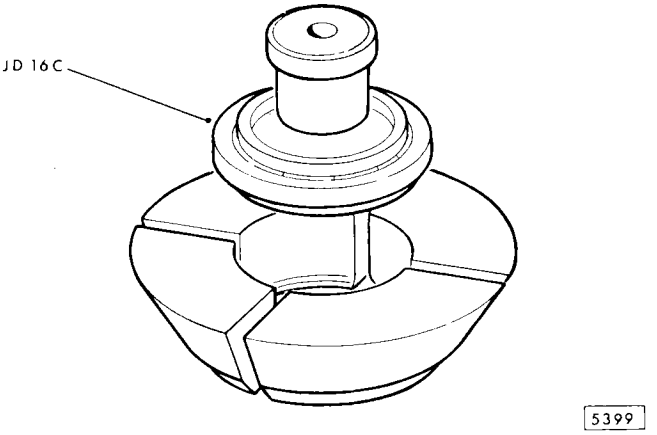
Bearing Remover – Main Tool JD.20A.



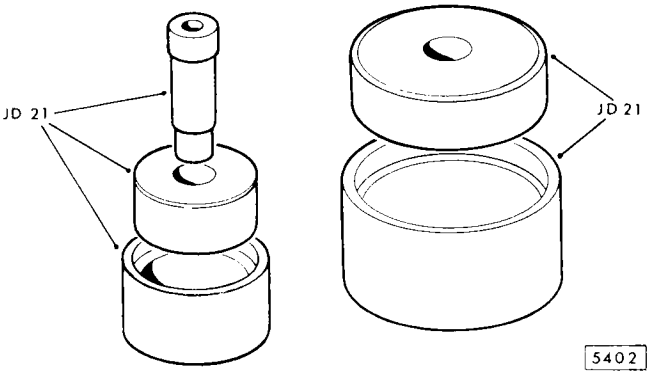
Rear Hub Master Spacer and Bearing Replacer JD.15.



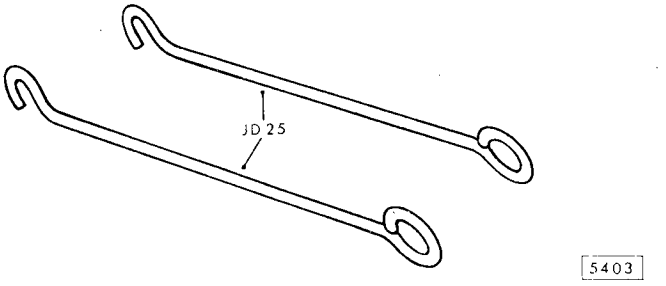
Rear Hub Inner and Outer Cup Remover/Replacer Adaptor JD.20A-1.



Rear Hub Outer Bearing Cone Remover/Replacer JD.16.C.

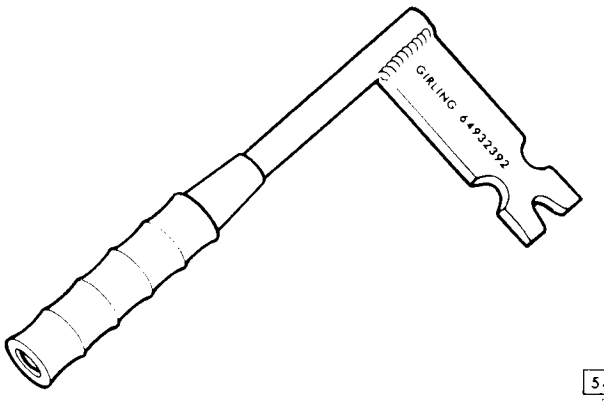


Torque Arm Bush Remover/Replacer JD.21.



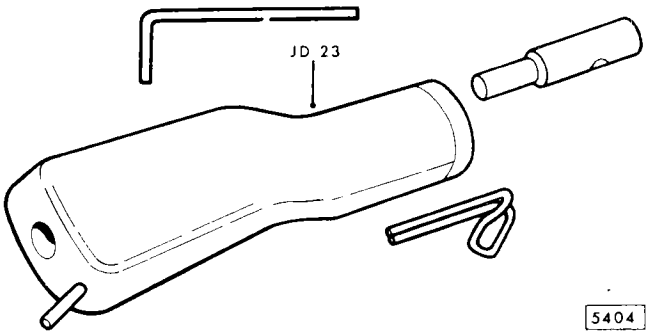
Rear Camber Setting Links JD.25.

SECTION 70



Brake Piston Retraction Tool Girling 64932392.

SECTION 76



Weatherstrip Fitting Tool JD.23.

Printed by Donbro (Printers) Limited, St. Albans Lane, Golders Green, London NW11 7QB