

# Repair Operation Manual

**LAND-  
ROVER**

SERIES  
III

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By Appointment to  
Her Majesty  
Queen Elizabeth II

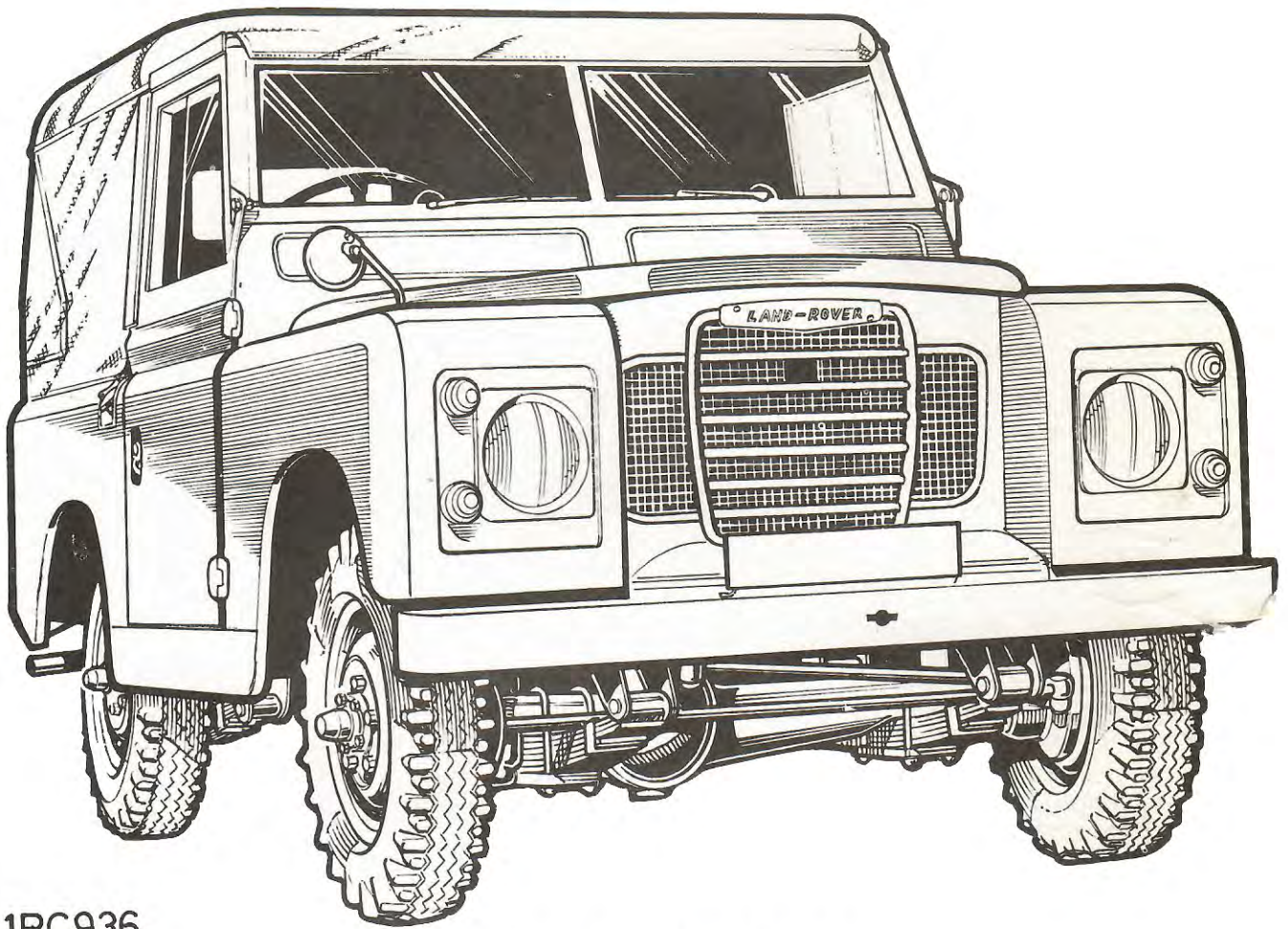


Manufacturers  
of Motor Cars and  
Land-Rovers

By Appointment to  
Her Majesty  
Queen Elizabeth  
the Queen Mother

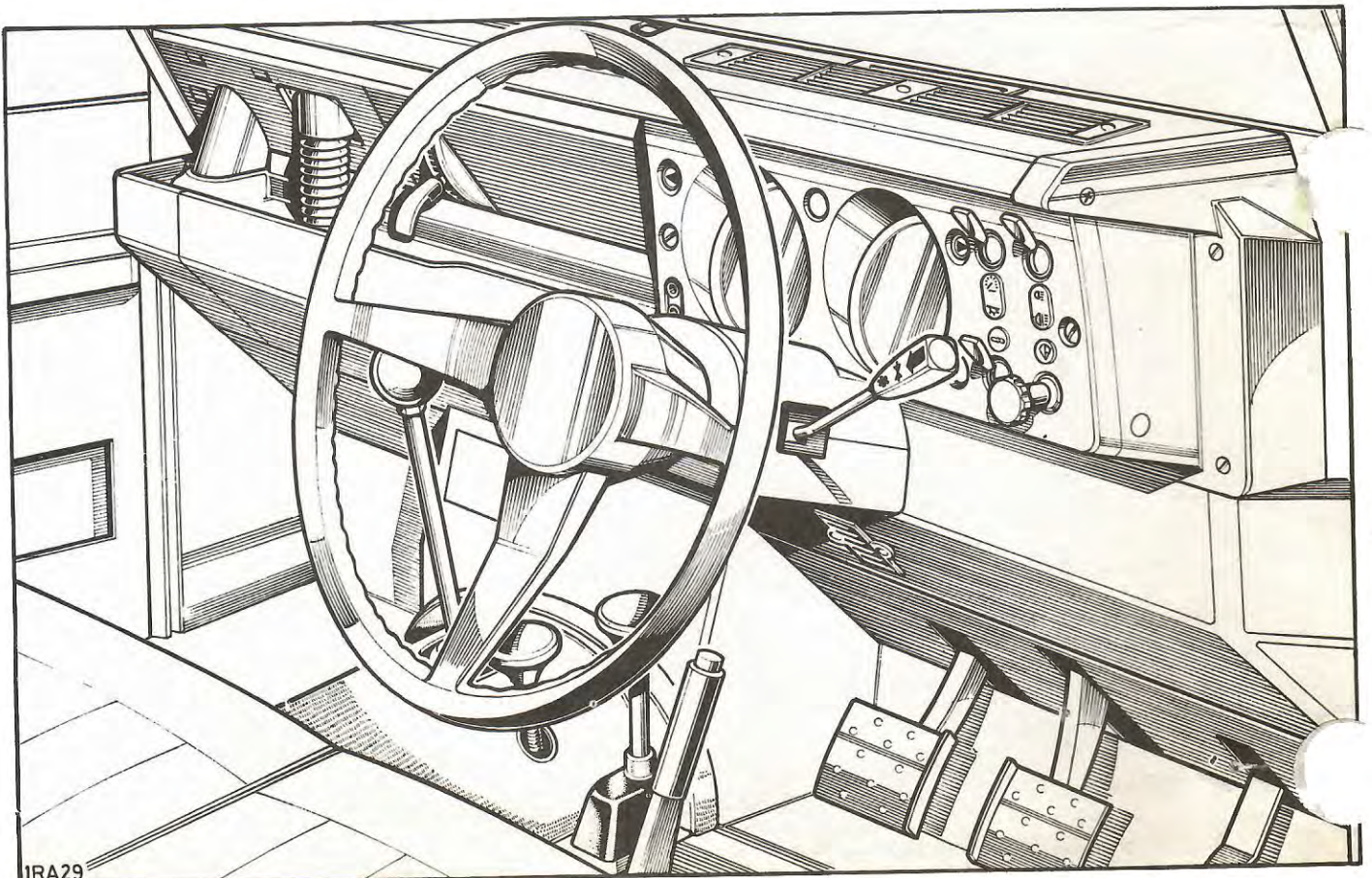


Suppliers  
of  
Motor Cars and  
Land-Rovers



1RC936

Exterior view of Land-Rover Series III



1RA29

Interior view of Land-Rover Series III

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

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

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 circumstances be held liable for any in-accuracy or the consequences thereof.

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## INTRODUCTION

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The purpose of this Manual is to assist skilled mechanics in the efficient repair and maintenance of Land-Rover Series III vehicles. The procedures detailed, carried out in the sequence given and using the appropriate service tools, will enable the operations to be completed in the time stated in the Repair Operation Times.

### **Indexing**

For convenience, this Manual is divided into a number of divisions. A contents page listing the titles and reference numbers of the various divisions is provided.

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

To assist in locating information on particular components or operations an alphabetical index is also provided.

### **Operation Numbering**

Each operation is followed by the number allocated to it in a master index. The number consists of six digits arranged in three pairs.

The master index of operations has been compiled for universal application to vehicles manufactured by British Leyland Motor Corporation and therefore continuity of the numbering sequence is not maintained throughout the Manual. To assist with locating information, each division of the Manual is preceded by a contents page listing the operations in alphabetical order.

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

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 service tools necessary to complete the operations described in the Manual is also included.

### **References**

References to the left or right hand in the Manual are made when viewing the vehicle from the rear. With the engine and gear-box assembly removed, the water pump end of the engine is referred to as the front.

### **Amendments**

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

The circulation of amendments will be confined to Distributors and Dealers of Rover vehicles.

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## Repairs and replacements

When service parts are required it is essential that only genuine Rover 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 manufacturers' 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 existing in their county of origin.

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

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





## AMENDMENTS

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

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

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

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

Amendment No. 1, August 1972

Issue Code	Filing Instructions		Issue Code	Filing Instructions	
	Discard	Insert		Discard	Insert
2	01-7	01-7	1		Division 47
2	01-10	01-10	1		Division 54
2	02-1 to 02-6	02-1 to 02-6	1		Division 57
1		02-7 to 02-11	1		Division 60
1	04-1	04-1	1		Division 64
2	04-2 to 04-17	04-2 to 04-17	1		70.00.00
2	05-1	05-1			Sheets 1 and 2
2	05-3	05-3	2	70.15.41	70.15.41
2	06-2	06-2		Sheets 1 and 2	Sheets 1 and 2
2	09-1	09-1	2	70.60.03/11	70.60.03/11
2	09-3	09-3	1		Division 74
2	12.29.18	12.29.18			
	Sheet 1. 2¼ Petrol	Sheet 1. 2¼ Petrol	2	76-1	76-1
2	12.29.18	12.29.18	2	76.46.05	76.46.05
	Sheet 1. 2¼ Diesel	Sheet 1. 2¼ Diesel	1		Remainder of
2	12.29.55	12.29.55			Division 76
	Sheet 1. 2¼	Sheet 1. 2¼	1		78.00.00
2	12.65.01/05	12.65.01/05			Sheets 1 and 2
	Sheet 3. 2¼	Sheet 3. 2¼	2	80.10.16/22	80.10.16/22
2	12.29.21	12.29.21	2	80.15.03/09	80.15.03/09
	Sheets 2 and 4.	Sheets 2 and 4.			
	2.6 litre	2.6 litre	2	86.40.02	86.40.02
2	12.29.55	12.29.55	2	86.55.53/55	86.55.53/55
	2.6 litre	2.6 litre			
2	17.20.00	17.20.00			
	Sheet 1	Sheet 1			
1		Division 19			
1		Division 26			
1		Division 30			
2	33.35.01	33.35.01			
2	37.12.07	37.12.07			
	Sheet 2	Sheet 2			
2	37.16.10	37.16.10			
2	37.20.19	37.20.19			
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2	37.20.31	37.20.31			
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\*\* ABBREVIATIONS AND SYMBOLS USED THROUGHOUT THIS MANUAL \*\*

Term	Abbreviation or symbol	Term	Abbreviation or symbol
Across flats (bolt size) .. .. .	AF	Midget edison screw .. .. .	MES
After bottom dead centre .. .. .	ABDC	Millimetre .. .. .	mm
After top dead centre .. .. .	ATDC	Miles per gallon .. .. .	mpg
Alternating current .. .. .	a.c.	Miles per hour .. .. .	mph
Ampere .. .. .	amp	Minimum .. .. .	min
Ampere-hour .. .. .	amp hr	minute (of angle) .. .. .	'
Atmospheres .. .. .	Atm	Minus (of tolerance) .. .. .	-
Before bottom dead centre .. .. .	BBDC	Negative (electrical) .. .. .	-
Before top dead centre .. .. .	BTDC	Number .. .. .	No.
Bottom dead centre .. .. .	BDC	Ohms .. .. .	ohm
Brake mean effective pressure .. .. .	BMEP	Ounces (force) .. .. .	ozf
Brake horse power .. .. .	bhp	Ounces (mass) .. .. .	oz
British standards .. .. .	BS	Ounce inch (torque) .. .. .	ozf.in.
Carbon monoxide .. .. .	CO	Outside diameter .. .. .	o.dia.
Centimetre .. .. .	cm	Paragraphs .. .. .	para.
Centigrade (Celcius) .. .. .	C	Part number .. .. .	Part No.
Cubic centimetre .. .. .	cm <sup>3</sup>	Percentage .. .. .	%
Cubic inch .. .. .	in <sup>3</sup>	Pints .. .. .	pt
Degree (angle) .. .. .	deg or °	Pints (US) .. .. .	US pt
Degree (temperature) .. .. .	deg or °	Plus (tolerance) .. .. .	+
Diameter .. .. .	dia.	Positive (electrical) .. .. .	+
Direct current .. .. .	d.c.	Pound (force) .. .. .	lbf
Fahrenheit .. .. .	F	Pounds feet (torque) .. .. .	lbf.ft.
Feet .. .. .	ft	Pounds inches (torque) .. .. .	lbf.in.
Feet per minute .. .. .	ft/min	Pound (mass) .. .. .	lb
Fifth .. .. .	5th	Pounds per square inch .. .. .	lb/in <sup>2</sup>
Figure (illustration) .. .. .	Fig.	Radius .. .. .	r
First .. .. .	1st	Rate (frequency) .. .. .	c/min
Fourth .. .. .	4th	Ratio .. .. .	:
Gramme (force) .. .. .	gf	Reference .. .. .	ref.
Gramme (mass) .. .. .	g	Revolution per minute .. .. .	rev/min
Gallons .. .. .	gal	Right-hand .. .. .	RH
Gallons (US) .. .. .	US gal	Right-hand steering .. .. .	RHStg
High compression .. .. .	h.c.	Second (angle) .. .. .	"
High tension (electrical) .. .. .	H.T.	Second (numerical order) .. .. .	2nd
Hundredweight .. .. .	cwt	Single carburetter .. .. .	SC
Independent front suspension .. .. .	i.f.s.	Specific gravity .. .. .	sp.gr.
Internal diameter .. .. .	i.da.	Square centimetres .. .. .	cm <sup>2</sup>
Inches of mercury .. .. .	in.Hg	Square inches .. .. .	in <sup>2</sup>
Inches .. .. .	in	Standard .. .. .	std.
Kilogramme (force) .. .. .	kgf	Standard wire gauge .. .. .	s.w.g.
Kilogramme (mass) .. .. .	kg	Synchroniser/synchromesh .. .. .	synchro.
Kilogramme centimetre (torque) .. .. .	kgf.cm	Third .. .. .	3rd
Kilogramme per square centimetre .. .. .	kg/cm <sup>2</sup>	Top dead centre .. .. .	TDC
Kilogramme metres (torque) .. .. .	kgf.m	Twin carburetters .. .. .	TC
Kilometres .. .. .	km	United Kingdom .. .. .	UK
Kilometres per hour .. .. .	km/h	Volts .. .. .	V
Kilovolts .. .. .	kV	Watts .. .. .	W
King pin inclination .. .. .	k.p.i.		
Left-hand steering .. .. .	LHStg	<b>SCREW THREADS</b>	
Left-hand thread .. .. .	LHThd	American Standard Taper Pipe .. .. .	NPTF
Litres .. .. .	litre	British Association .. .. .	BA
Low compression .. .. .	l.c.	British Standard Fine .. .. .	BSF
Low tension .. .. .	l.t.	British Standard Pipe .. .. .	BSP
Maximum .. .. .	max.	British Standard Whitworth .. .. .	Whit.
Metre .. .. .	m	Unified Coarse .. .. .	UNC
Microfarad .. .. .	mfd	Unified Fine .. .. .	UNF



	Description	Operation Number	
		Remove/Refit	Check/Overhaul
A	Accelerator pump linkage setting .. .. .		17.20.00
	**Accelerator/throttle controls .. .. .		19.00.00
	Adjust brakes .. .. .		70.25.03
	Adjustments, carburetter .. .. .		17.20.00
	Adjustment, clutch .. .. .		33.30.02
	Adjustment steering box .. .. .		57.35.01
	Adjustment, tappets (2¼) .. .. .		12.29.10
	Adjustment, tappets (2.6) .. .. .		12.29.10/36
	Air cleaner .. .. .	19.10.04	19.10.16
	Air distribution flaps .. .. .	80.15.09	
	Air filter, charcoal container .. .. .	17.15.07	
	Air intake (fresh air) .. .. .	80.15.29	
	Alignment check, chassis frame .. .. .		76.10.02
	Alternator .. .. .	86.10.02	86.10.08
	Axle assembly, rear .. .. .	51.25.01	
	Axle case oil seal .. .. .	54.15.04	
	Axle, front .. .. .	54.15.01	
	Axle shafts, rear .. .. .	51.10.01	
B	Backlight, cab .. .. .	76.81.33	
	Ball-joints, drag link .. .. .	57.55.16	
	Ball-joints, longitudinal steering tube .. .. .	57.55.12	
	Ball-joints, steering .. .. .		57.55.24
	Ball-joints, track rod .. .. .	57.55.08	
	Battery .. .. .	86.15.01	
	Bearings, camshaft .. .. .	12.13.13	
	Bearings, connecting rods .. .. .	12.17.01	12.17.10
	Bearings, crankshaft .. .. .	12.21.33	12.21.46
	Bearing, crankshaft spigot .. .. .	12.53.20	
	Bearing end-float, front hub .. .. .		60.25.13
	Bearing end-float, rear hub .. .. .		64.15.13
	Bearing, top, steering column .. .. .	57.40.19	
	Bell housing .. .. .	37.12.07	37.12.08
	Big-end bearings .. .. .	12.17.01	12.17.10
	Brakes bleed .. .. .		70.25.02
	Bleeding, clutch system .. .. .		33.15.01
	Body, rear .. .. .	76.10.11	
	Body repairs, general information .. .. .		76.00.00
	Body side assembly .. .. .	76.10.08/09	
	Bonnet .. .. .	76.16.01	
	Box, heater .. .. .	80.20.01	
	Brakes, adjust .. .. .		70.25.03
	Bleed brakes .. .. .		70.25.02
	Brake drums, front .. .. .	70.10.02	
	Brake drums, rear .. .. .	70.10.03	
	Brake failure switch .. .. .	70.15.36	70.15.41
	Brake fluid reservoir .. .. .	70.30.15	
	Brake hoses .. .. .	70.15.02/04	
	Brake linings .. .. .	70.40.10	
	Brake master cylinder—single .. .. .	70.30.01	70.30.02
	Brake master cylinder—tandem .. .. .	70.30.08	70.30.09
	Brake pedal .. .. .	70.35.01	
	Brake pipes .. .. .	70.20.01/47	
	Brake servo .. .. .	70.50.01	70.50.06

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	Description	Remove/Refit	Check/Overhaul
B	Brake shoes, front .. .. .	70.40.02	
	Brake shoes, rear .. .. .	70.40.03	
	Brake shoes, transmission .. .. .	70.45.18	
	Brake, transmission .. .. .	70.45.16	70.45.09
	Bush, primary pinion .. .. .	12.53.20	
C	Cab .. .. .	76.10.10	
	Cab backlight .. .. .	76.81.33	
	Cab tropical roof .. .. .	76.61.03	
	Cable, cold start control .. .. .	19.20.26	
	Cable, engine stop control .. .. .	19.20.32	
	Cable, heater/ventilator flap .. .. .	80.10.06	
	Cable, heater water valve .. .. .	80.10.07	
	Cable, inner, speedometer .. .. .	88.30.07	
	Cable, speedometer .. .. .	88.30.06	
	Camshaft .. .. .	12.13.01	
	Camshaft bearings (2¼) .. .. .	12.13.13	
	Camshaft bearings (2.6) .. .. .	12.13.01	
	Carburetter .. .. .	19.15.09	19.15.17
	Carburetter adjustments .. .. .		17.20.00
	Carburetter throttle-prop .. .. .	17.20.35	
	Casing, main, gearbox .. .. .	37.12.40	37.12.43
	Contents gauge, fuel .. .. .	88.25.26	
	Coolant .. .. .		26.10.01
	Coolant expansion tank .. .. .	26.15.01	
	Coolant temperature gauge .. .. .	88.25.14	
	Coolant temperature transmitter .. .. .	88.25.20	
	Cold start control cable .. .. .	19.20.26	
	Cold start thermostat switch .. .. .	19.15.50	
	Charcoal container .. .. .	17.15.13	
	Charcoal container air filter .. .. .	17.15.07	
	Chassis frame, alignment <b>check</b> .. .. .	76.10.02	
	Choke warning light switch .. .. .	86.65.53	
	Clutch adjustment .. .. .	33.30.02	
	Clutch assembly .. .. .	33.10.01	33.10.08
	Clutch hydraulic system, bleed .. .. .	33.15.01	
	Clutch master cylinder .. .. .	33.20.01	33.20.07
	Clutch pedal .. .. .	33.30.02	
	Clutch release assembly .. .. .	33.25.12	
	Clutch slave cylinder .. .. .	33.35.01	33.35.07
	Coil, ignition .. .. .	86.35.32	
	Compression pressures .. .. .		12.25.01
	Connecting rods and pistons .. .. .	12.17.01	12.17.10
	Connector, four way .. .. .	70.15.35	
	Container, charcoal .. .. .	17.15.13	
	Controls, heater .. .. .	80.10.02	
	Covers, cylinder side (2¼) .. .. .	12.25.14/16	
	Cover cylinder side (2.6) .. .. .	12.29.36	
	Cover, timing gear .. .. .	12.65.01	
	Crankcase emission valve .. .. .	17.10.09	17.10.15
	Crankshaft .. .. .	12.21.33	12.21.46
	Crankshaft front oil seal .. .. .	12.65.05	
	Crankshaft rear oil seal .. .. .	12.21.20	
Cylinder head (2¼) .. .. .	12.29.10	12.29.18	



	Description	Operation Number	
		Remove/Refit	Check/Overhaul
<b>C</b>	Cylinder head (2.6) .. .. .	12.29.10	12.29.21
	Cylinder pressures .. .. .		12.25.01
	Cylinder side covers (2¼) .. .. .	12.25.14/16	
	Cylinder side cover (2.6) .. .. .	12.29.36	
	Cylinders, wheel, front .. .. .	70.60.03	70.60.11
	Cylinders, wheel, rear .. .. .	70.60.18	70.60.26
<b>D</b>	Dash panel .. .. .	76.10.36	
	De-mister hose .. .. .	80.15.01	
	De-mister nozzle .. .. .	80.15.03	
	Diesel fuel system .. .. .		19.00.00
	Diesel heater plugs .. .. .	86.35.08	
	Differential assembly, front .. .. .	54.10.01	54.10.07
	Differential assembly, rear .. .. .	51.15.01	51.15.07
	Direction indicator switch .. .. .	86.65.55	
	Distribution flaps, air .. .. .	80.15.09	
	Distributor .. .. .	86.35.20	86.35.26
	Distributor and oil pump drive shaft (2.6) .. .. .	12.10.22	
	Distributor drive shaft (2.6) .. .. .	12.10.22	
	Distributor/injection pump, fuel .. .. .	19.30.07	
	Door glass, side .. .. .	76.31.01/02	
	Door glass, tail .. .. .	76.31.21	
	Door locks .. .. .	76.37.12/16	
	Doors .. .. .	76.28.01/21	
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	Drag link ball-joints .. .. .	57.55.16	
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Drums, brake, rear .. .. .	70.10.03		
<b>E</b>	Emission valve, crankcase .. .. .	17.10.09	17.10.15
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	End float, rear hub bearing .. .. .		64.15.13
	Engine assembly .. .. .	12.41.01	
	Engine speed hand control .. .. .	19.20.29	
	Engine stop control cable .. .. .	19.20.32	
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	Exhaust system .. .. .	30.10.09/19	
	Exhaust valve (2¼) .. .. .		12.29.18
	Exhaust valve (2.6) .. .. .		12.29.21
	Expansion tank, coolant .. .. .	26.15.01	
	External oil filter assembly .. .. .	12.60.01	
	<b>F</b>	Facia, lower .. .. .	76.46.05
Facia support panel .. .. .		76.46.06	
Facia top rail .. .. .		76.46.04	
Failure switch, brakes .. .. .		70.15.36	70.15.41
Fan blades and pulley .. .. .		26.25.01	
Fan motor, heater/blower .. .. .		80.20.15	
Fan switch, heater .. .. .		80.10.22	
Filter, air, charcoal container .. .. .		17.15.07	
Filter, engine oil .. .. .		12.60.01	
Filter, engine sump (2¼) .. .. .		12.60.32	
Filter, engine sump (2.6) .. .. .		12.60.20	
Filter, fuel .. .. .		17.20.38	

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	Description	Operation Number	
		Remove/Refit	Check/Overhaul
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	Flaps, air distribution .. .. .	80.15.09	
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	Flasher lamp, rear .. .. .	86.40.45	
	Flasher switch .. .. .	86.65.55	
	Flasher unit .. .. .	86.55.11	
	Floor, front .. .. .	76.10.12	
	Fluid reservoir, brake .. .. .	70.30.15	
	Flywheel .. .. .	12.53.07	12.53.10
	Flywheel ring gear .. .. .	12.53.19	
	Folding step, tail door .. .. .	76.10.41	
	Four way connector .. .. .	70.15.35	
	Frame and windscreen .. .. .	76.81.02	
	Fresh air intake .. .. .	80.15.29	
	Front axle .. .. .	54.15.01	
	Front brake drums .. .. .	70.10.02	
	Front differential assembly .. .. .	54.10.01	54.10.07
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	Front floor .. .. .	76.10.12	
	Front half-shaft assembly .. .. .	54.20.07	54.20.09
	Front hub .. .. .	60.25.01	60.25.07
	Front hub bearing end-float .. .. .		60.25.13
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	Front output shaft housing .. .. .	37.10.05	37.10.06
	Front pinion oil seal .. .. .	54.10.20	
	Front propeller shaft .. .. .	47.15.02	47.15.11
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	Fuel lift pump .. .. .	19.45.09	19.45.16
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	Fuel tank .. .. .	19.55.01	
	Fuel tank gauge unit .. .. .	88.25.32	
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	Gearbox main casing .. .. .	37.12.40	37.12.43
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	Gearchange selectors, main .. .. .	37.16.31	37.16.34
	Gears, intermediate .. .. .	37.29.28	
	Geometry, steering .. .. .		57.65.02
	Glass, door, side .. .. .	76.31.01/02	
	Glass, tail door .. .. .	76.31.21	
	Glass, windscreen .. .. .	76.81.03	



	Description	Operation Number	
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## GENERAL SPECIFICATION DATA

### ENGINE – 2¼ LITRE PETROL

Type	4 cylinder
Bore	90,47 mm (3.562 in)
Stroke	88,9 mm (3.500 in)
Capacity	2286 cm <sup>3</sup> (139.500 in <sup>3</sup> )
Valve operation	Overhead by pushrod
<b>Crankshaft</b>	
Main journal diameter	63,487 mm to 63,500 mm (2.4995 in to 2.500 in)
Minimum regrind diameter	62,48 mm (2.460 in)
Crankpin journal diameter	58,72 mm to 58,733 mm (2.312 in to 2.31275 in)
Minimum regrind diameter	57,70 mm (2.272 in)
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end float	0,05 mm to 0,15 mm (0.002 in to 0.006 in)
<b>Main bearings</b>	
Number and type	3 halved shells
Material	Steel shell, tin-aluminium lined
Diametrical clearance	0,020 mm to 0,055 mm (0.0008 in to 0.0022 in)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in, 0.020 in, 0.030 in, 0.040 in)
<b>Connecting rods</b>	
Type	Horizontally split big end, plain small end
Length between centres	175,36 mm to 175,46 mm (6.904 in to 6.908 in)
<b>Big end bearings</b>	
Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,019 mm to 0,063 mm (0.0007 in to 0.0025 in)
End float on crankpin	0,20 mm to 0,30 mm (0.007 in to 0.012 in)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in., 0.020 in., 0.030 in., 0.040 in.)
<b>Gudgeon pins</b>	
Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,007 mm to 0,015 mm (0.0003 in to 0.0006 in)
<b>Pistons</b>	
Type	Aluminium alloy, flat top
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin	
Standard size pistons	0,058 mm to 0,068 mm (0.0023 in to 0.0027 in)
Oversize pistons	0,043 mm to 0,055 mm (0.0017 in to 0.0022 in)





ENGINE – 2¼ LITRE PETROL

Piston rings

Compression	2
Gap in bore	0,38 mm to 0,50 mm (0.015 in to 0.020 in)
Clearance in groove	0,046 mm to 0,097 mm (0.0018 in to 0.0038 in)
Oil control	1
Gap in bore	0,38 mm to 0,50 mm (0.015 in to 0.020 in)
Clearance in groove	0,038 mm to 0,089 mm (0.0015 in to 0.0035 in)

Camshaft

Location	Right-hand side (thrust side) of engine
End float	0,06 mm to 0,13 mm (0.0025 in to 0.0055 in)
Number of bearings	4
Material	Steel shell, white metal lined

Valves

Length	
Inlet	111,25 mm to 111,60 mm (4.380 in to 4.394 in)
Exhaust	111,22 mm to 111,58 mm (4.379 in to 4.393 in)
Seat angle	
Inlet	30°
Exhaust	45°
Head diameter	
Inlet	44,45 mm to 44,57 mm (1.750 in to 1.755 in)
Exhaust	35,02 mm to 35,05 mm (1.375 in to 1.380 in)
Stem diameter	
Inlet	7,891 mm to 7,904 mm (0.3107 in to 0.3112 in)
Exhaust	8,661 mm to 8,674 mm (0.3410 in to 0.3145 in)
Stem to guide clearance	
Inlet	0,033 mm to 0,048 mm (0.0013 in to 0.0019 in)
Exhaust	0,058 mm to 0,073 mm (0.0023 in to 0.0029 in)
Valve lift	
Inlet	9,49 mm (0.374 in)
Exhaust	9,85 mm (0.388 in)

Valve springs

Type	Duplex interference coil
Inner	
Length, free	42,67 mm (1.680 in)
Length, under 8,0 kg (17.7 lb) load	37,13 mm (1.462 in)
Outer	
Length, free	46,28 mm (1.822 in)
Length, under 21 kg (46 lb) load	40,30 mm (1.587 in)



## GENERAL SPECIFICATION DATA

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### ENGINE – 2¼ LITRE PETROL

#### Valve timing

Inlet opens	6° BTDC
Inlet closes	52° ABDC
Inlet peak	113° ATDC
Exhaust opens	34° BBDC
Exhaust closes	24° ATDC
Exhaust peak	85° ABDC

#### Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rev/min	3,16 to 4,57 kgf/cm <sup>2</sup> (45 to 65 lbf/in <sup>2</sup> )
Oil pump	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End float of gears	
Steel gear	0,05 mm to 0,12 mm (0.002 in to 0.005 in)
Aluminium gear	0,07 mm to 0,15 mm (0.003 in to 0.006 in)
Radial clearance of gears	0,02 mm to 0,10 mm (0.001 in to 0.004 in)
Backlash of gears	0,15 mm to 0,28 mm (0.006 in to 0.012 in)

#### Oil pressure relief valve

Type	Non-adjustable
Relief valve spring	
Full length	67,82 mm (2.670 in)
Compressed length at 2,58 kg (5.7 lb) load	61,23 mm (2.450 in)



**ENGINE – 2¼ LITRE DIESEL**

Type	4 cylinder
Bore	90,47 mm (3.562 in)
Stroke	88,9 mm (3.500 in)
Capacity	2286 cm <sup>3</sup> (139 in <sup>3</sup> )
Valve operation	Overhead by push rod

**Crankshaft**

Main bearing journal diameter	63,487 mm to 63,500 mm (2.4995 in to 2.5000 in) Regrinding NOT permitted.
Crankpin journal diameter	58,72 mm to 58,733 mm (2.312 in to 2.31275 in) Regrinding NOT permitted.
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end float	0,05 mm to 0,15 mm (0.002 in to 0.006 in)

**Main bearings**

Number and type	3 halved shells
Material	Steel shell, copper-lead lined, tin plated
Diametrical clearance	0,020 mm to 0,055 mm (0.0008 in to 0.0017 in)

**Connecting rods**

Type	Horizontally split big end, plain small end
Length between centres	175,38 mm to 175,43 mm (6.905 in to 6.907 in)

**Big end bearings**

Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,019 mm to 0,063 mm (0.0007 in to 0.0025 in)
End float on crankpin	0,20 mm to 0,30 mm (0.007 in to 0.012 in)

**Gudgeon pins**

Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,002 mm to 0,02 mm (0.0001 in. to 0.0008 in.)

**Pistons**

Type	Aluminium alloy, with V shape recess in crown
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin	
Standard size pistons	0,111 mm to 0,134 mm (0.0044 in to 0.0053 in)
Oversize pistons	0,111 mm to 0,157 mm (0.0044 in to 0.0062 in)



## GENERAL SPECIFICATION DATA

### ENGINE – 2¼ LITRE DIESEL

#### Piston rings

Compression No. 1 (top)	
Type	Square friction edge, chrome plated
Gap in bore	0,35 mm to 0,50 mm (0.014 in to 0.019 in.)
Clearance in groove	0,06 mm to 0,11 mm (0.0025 in to 0.0045 in)
Compression Nos. 2 and 3	
Type	Bevelled friction edge. Marked 'T' or 'TOP' on upper side
Gap in bore	0,25 mm to 0,38 mm (0.010 in to 0.015 in)
Clearance in groove	0,06 mm to 0,11 mm (0.0025 in to 0.0045 in)
Oil control No. 4	
Type	Expander and rails
Gap in bore	0,38 mm to 1,14 mm (0.015 in to 0.045 in)
Clearance in groove	0,038 mm to 0,064 mm (0.0015 in to 0.0025 in)

#### Camshaft

Location	Right hand side (thrust side) of engine
End float	0,06 mm to 0,13 mm (0.0025 in to 0.0055 in)
Number of bearings	4
Material	Steel shell, white metal lined

#### Valves

Length	
Inlet	116,38 mm to 116,58 mm (4.582 in to 4.590 in)
Exhaust	116,89 mm to 117,09 mm (4.602 in to 4.610 in)
Seat angle	
Inlet	45°
Exhaust	45°
Head diameter	
Inlet	39,16 mm to 39,26 mm (1.542 in to 1.546 in)
Exhaust	33,32 mm to 33,42 mm (1.312 in to 1.316 in)
Stem diameter	
Inlet	7,891 mm to 7,904 mm (0.3107 in to 0.3112 in)
Exhaust	8,661 mm to 8,674 mm (0.3410 in to 0.3415 in)
Stem to guide clearance	
Inlet	0,033 mm to 0,048 mm (0.0013 in to 0.0019 in)
Exhaust	0,058 mm to 0,073 mm (0.0023 in to 0.0029 in)
Valve lift	
Inlet	9,85 mm (0.388 in)
Exhaust	10,26 mm (0.404 in)

#### Valve springs

Type	Duplex Interference coil
Inner	
Length, free	42,67 mm (1.680 in)
Length, under 8,0 kg (17.7 lb) load	40,30 mm (1.587 in)
Outer	
Length, free	46,28 mm (1.822 in)
Length, under 21 kg (46 lb) load	40,30 mm (1.587 in)



**ENGINE – 2¼ LITRE DIESEL**

**Valve timing**

Inlet opens	16° BTDC
Inlet closes	42° ABDC
Inlet peak	103° ATDC
Exhaust opens	51° BBDC
Exhaust closes	13° ATDC
Exhaust peak	109° BTDC

**Lubrication**

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rev/min	3,16 to 4,57 kgf/cm <sup>2</sup> (45 to 65 lbf/in <sup>2</sup> )
Oil pump	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End float of gears	
Steel gear	0,05 mm to 0,12 mm (0.002 in to 0.005 in)
Aluminium gear	0,07 mm to 0,15 mm (0.003 in to 0.006 in)
Radial clearance of gears	0,02 mm to 0,10 mm (0.001 in to 0.004 in)
Backlash of gears	0,15 mm to 0,28 mm (0.006 in to 0.012 in)

**Oil pressure relief valve**

Type	Non-adjustable
Relief valve spring	
Free length	67,82 mm (2,670 in)
Compressed length at 2.58 kg (5.7 lb) load	61,23 mm (2.450 in)



## GENERAL SPECIFICATION DATA

### ENGINE – 2.6 LITRE PETROL

Type	6 cylinder
Bore	77,8 mm (3.063 in)
Stroke	92,075 mm (3.625 in)
Capacity	2625 cm <sup>3</sup> (160.3 in <sup>3</sup> )
Valve operation	Inlet – overhead by push rod Exhaust – side by cam follower
<b>Crankshaft</b>	
Main journal diameter	66,64 mm to 66,66 mm (2.624 in to 2.6245 in)
Minimum regrind diameter	65,63 mm (2.584 in)
Crankpin journal diameter	47,62 mm to 47,64 mm (1.875 in to 1.87575 in)
Minimum regrind diameter	46,60 (1.835 in)
Crankshaft end thrust	Taken on thrust washers at rear main bearing
Crankshaft end float	0,05 mm to 0,15 mm (0.002 in to 0.006 in)
<b>Main bearings</b>	
Number and type	7 halved shells
Material	Steel shell, copper-lead lined, tin plated
Diametrical clearance	0,015 mm to 0,050 mm (0.0006 in to 0.002 in)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in, 0.020 in, 0.030 in, 0.040 in)
<b>Connecting rods</b>	
Type	Horizontally split big end, plain small end
Length between centres	206,463 mm (8.1285 in.)
<b>Big end bearings</b>	
Type and material	Steel shell, copper-lead, tin plated
Diametrical clearance	0,0114 mm to 0,043 mm (0.00045 in to 0.0017 in)
End float on crankpin	0,15 mm to 0,38 mm (0.006 in to 0.015 in)
Undersizes	0,25 mm, 0,50mm, 0,76 mm, 1,01 mm (0.010 in, 0.020 in, 0.030 in, 0.040 in)
<b>Gudgeon pins</b>	
Type	Fully floating
Fit in piston	Push fit by hand
Clearance in connecting rod	Zero to 0,0241 mm (0.00095 in)
<b>Pistons</b>	
Type	Aluminium alloy, ridged top
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin. Standard size and oversize pistons.	0,048 mm to 0,060 mm (0.0019 in to 0.0024 in)



ENGINE – 2.6 LITRE PETROL

Piston rings

Compression	2
Gap in bore	0,38 mm to 0,50 mm (0.015 in to 0.020 in)
Clearance in groove	0,046 mm to 0,097 mm (0.0018 in to 0.0038 in)
Oil control	1
Gap in bore	0,38 mm to 0,80 mm (0.015 in to 0.033 in)
Clearance in groove	0,05 mm to 0,10 mm (0.002 in to 0.004 in)

Camshaft

Location	Left hand side of engine
End float	0,11 mm to 0,16 mm (0.0045 in to 0.0065 in)
Number of bearings	6
Material	Split 'Mazak' castings

Valves

Length	
Inlet	96,57 mm to 96,77 mm (3.802 in to 3.810 in)
Exhaust	116,07 mm to 116,28 mm (4.570 in to 4.578 in)
Seat angle	
Inlet	30°
Exhaust	45°
Head diameter	
Inlet	45,54 mm to 45,64 mm (1,793 in. to 1.797 in.)
Exhaust	32,02 mm to 32,13 mm (1.261 in. to 1,265 in.)
Stem diameter	
Inlet	8,68 mm to 8,69 mm (0.342 in to 0.3425 in)
Exhaust	8,66 mm to 8,67 mm (0.341 in to 0.3415 in)
Stem to guide clearance	
Inlet	0,033 mm to 0,048 mm (0.0013 in to 0.0019 in)
Exhaust	0,058 mm to 0,073 mm (0.0023 in to 0.0029 in)
Valve lift	
Inlet	9,49 mm (0.374 in)
Exhaust	10,23 mm (0.403 in)

Valve springs

Type	Duplex. Interference coil
Inlet	
Inner	
Length, free	43,26 mm (1.703 in)
Length under 9,7 kg (21.5 lb) load	36,49 mm (1.437 in)
Outer	
Length, free	49,80 mm (1.960 in)
Length under 31,5 kg (69.5 lb) load	41,27 mm (1.625 in)
Exhaust	
Inner	
Length, free	43,26 mm (1.703 in)
Length under 9,1 kg (16.4 lb.) load	38,10 mm (1.500 in)
Outer	
Length, free	47,26 mm (1,861 in)
Length under 18,9 kg (41.8 lb) load	41,27 mm (1.625 in)



## GENERAL SPECIFICATION DATA

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### ENGINE – 2.6 LITRE PETROL

#### Valve timing

Inlet opens	12° BTDC
Inlet closes	46° ABDC
Inlet peak	107° ATDC
Exhaust opens	47° BBDC
Exhaust closes	17° ATDC
Exhaust peak	75° ABDC

#### Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rev/min	2,81 to 3,51 kgf/cm <sup>2</sup> (40 to 50 lbf in <sup>2</sup> )

#### Oil pump

Type	Spur gear
Drive	Splined shaft from camshaft skew gear
End float of gears	
Steel gear	0,05 mm to 0,12 mm (0.002 in to 0.005 in)
Aluminium gear	0,07 mm to 0,15 mm (0.003 in to 0.006 in)
Radial clearance of gears	0,02 mm to 0,102 mm (0.001 in to 0.004 in)
Backlash of gears	0,20 mm to 0,28 mm (0.008 in to 0.012 in)

#### Oil pressure relief valve

Type	non-adjustable
Relief valve spring	
Free length	87,0 mm (3.425 in)
Compressed length at 7,9 kg (17.5 lb) load	50,55 (1.990 in)





**Clutch**

Make	Borg and Beck
Type	Diaphragm spring
Drive plate diameter	241,3 mm (9.500 in)
Damper spring colour	Dark green
Facing material	Raybestos WR7

**TRANSMISSION**

**Main gearbox**

Type	Single helical constant mesh with synchro-mesh on all forward speeds
Ratios: Top	Direct
Third	1.50:1
Second	2.22:1
First	3.68:1
Reverse	4.02:1

**Transfer gearbox**

Type	Two speed reduction on main gearbox output	
Front wheel drive	Two/four wheel drive control on transfer, box output	
Ratios:	High transfer	Low transfer
Helical and spur gear transfer gearbox	1.15:1	2.35:1
All helical transfer gearbox	1.53:1	3.27:1
Overall ratios (final drive) with helical and spur gear transfer gearbox.		
Top	5.4:1	11.1:1
Third	8.05:1	16.5:1
Second	12.0:1	24.6:1
First	19.88:1	40.7:1
Reverse	21.6:1	44.3:1
Overall ratios (final drive) with all helical transfer gearbox		
Top	7.19:1	15.4:1
Third	10.81:1	23.1:1
Second	15.96:1	34.1:1
First	26.46:1	56.56:1
Reverse	28.91:1	61.78:1

**REAR AXLE**

Type	Spiral bevel	floating shafts
Ratio	4.7:1	

**FRONT AXLE**

Differential	Spiral bevel
Front wheel drive	Enclosed universal joints
Ratio	4.7:1



## GENERAL SPECIFICATION DATA

### PROPELLER SHAFTS

Type	Hardy-Spicer, needle bearing
Diameter of tubular shaft	50,8 mm (2.000 in)
Overall length (face to face in midway position)	
**Front shaft – 4 cylinder models	604,8 mm(23.812 in)**
**Front shaft – 6 cylinder models	693,7 mm(27.312 in)**
Rear shaft – 88 models	554,00mm(21.812 in)
Rear shaft – 109 4-cylinder models	1042,9 mm (41.062 in)
Rear shaft – 109 6 cylinder models	940,6 mm (37.625 in)

### COOLING SYSTEM

Type	Pressurized spill return system with thermostat control, pump and fan assisted
Thermostat	72°C (162°F)
Pressure cap	0,6.kgf cm <sup>2</sup> (9 lbf in <sup>2</sup> )
Type of pump	Centrifugal

### FUEL SYSTEM

Carburetter	see 'ENGINE TUNING DATA'
Air cleaner	Oil bath with built in centrifugal pre-cleaner
<b>Fuel pump</b>	
2¼ litre 4-cylinder Petrol	
Type	Mechanical
Pressure range	0,10 to 0,17 kgf cm <sup>2</sup> (1.5 to 2.5 lbf in <sup>2</sup> )
2¼ litre 4-cylinder Diesel	
Type	Mechanical
Pressure range	0,35 to 0,56 kgf cm <sup>2</sup> (5 to 8 lbf in <sup>2</sup> )
2.6 litre 6-cylinder Petrol	
Type	Electrical – Dual inlet
Pressure range	0,15 to 0,26 kgf cm <sup>2</sup> (2.25 to 3.75 lbf in <sup>2</sup> )
Injection system 2¼ litre Diesel	
Injection pump	CAV mechanically-governed distributor
Injectors	CAV Pintaux
Nozzle size	BDNO/SPC 6209
Operating pressure of nozzle valve	135 atm
Back leakage rate 150 to 100 atm	
New nozzle	7 seconds
Original nozzle	5 seconds
Start of injection	15° BTDC



**SUSPENSION**

Type Springs	Rigid axles, semi-elliptic springs			
	88-Petrol	88-Diesel	109-Petrol	109-Diesel
<b>Front (Driver)</b>				
Length	920,7 mm (36.25 in)	920,7 mm (36.25 in)	920,7 mm (36.25 in)	920,7 mm (36.25 in)
Width	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)
No. of leaves	9	11	11	11
Thickness				
1 at	5,15 mm (0.203 in)	5,15 mm (0.203 in)	5,15 mm (0.203 in)	5,15 mm (0.203 in)
8 at	4,19 mm (0.165 in)			
10 at		4,36 mm (0.172 in)	4,36 mm (0.172 in)	4,36 mm (0.172 in)
Rate	233 kg cm (203 lb in)	314 kg cm (273 lb in)	314 kg cm (273 lb in)	314 kg cm (273 lb in)
Free camber	154,4 mm (6.080 in)	142,8 mm (5.625 in)	142,8 mm (5.625 in)	155,5 mm (6.125 in)
<b>Front (Passenger)</b>				
Length	920,7 mm (36.25 in)	920,7 mm (36.25 in)	920,7 mm (36.25 in)	920,7 mm (36.25 in)
Width	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)
No. of leaves	9	11	11	11
Thickness				
1 at	5,15 mm (0.203 in)	5,15 mm (0.203 in)	5,15 mm (0.203 in)	5,15 mm (0.203 in)
8 at	4,19 mm (0.165 in)			
10 at		4,36 mm (0.172 in)	4,36 mm (0.172 in)	4,36 mm (0.172 in)
Rate	233 kg cm (203 lb in)	314 kg cm (273 lb in)	314 kg cm (273 lb in)	314 kg cm (273 lb in)
Free camber	135,3 mm (5.330 in)	130,1 mm (5.125 in)	130,1 mm (5.125 in)	142,8 mm (5.625 in)
<b>Rear (Driver)</b>				
Length	1219 mm (48 in)	1219 mm (48 in)	1219 mm (48 in)	1219 mm (48 in)
Width	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)
No. of leaves	11	11	10	10
Thickness				
1 at	6,3 mm (0.250 in)	6,3 mm (0.250 in)	6,3 mm (0.250 in)	6,3 mm (0.250 in)
2 at			9,5 mm (0.375 in)	9,5 mm (0.375 in)
7 at			3,9 mm (0.156 in)	3,9 mm (0.156 in)
10 at	4,7 mm (0.187 in)	4,7 mm (0.187 in)		
Rate	191 kg cm (166 lb in)	191 kg cm (166 lb in)	310 kg cm (270 lb in)	310 kg cm (270 lb in)
Free camber	188,4 mm (7.420 in)	188,4 mm (7.420 in)	134,9 mm (9.250 in)	134,9 mm (9.250 in)
<b>Rear (Passenger)</b>				
Length	1219 mm (48 in)	1219 mm (48 in)	1219 mm (48 in)	1219 mm (48 in)
Width	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)	63,5 mm (2.5 in)
No. of leaves	11	11	10	10
Thickness				
1 at	6,3 mm (0.250 in)	6,3 mm (0.250 in)	6,3 mm (0.250 in)	6,3 mm (0.250 in)
2 at			9,5 mm (0.375 in)	9,5 mm (0.375 in)
7 at			3,9 mm (0.156 in)	3,9 mm (0.156 in)
10 at	4,7 mm (0.187 in)	4,7 mm (0.187 in)		
Rate	191 kg cm (166 lb in)	191 kg cm (166 lb in)	310 kg cm (270 lb in)	310 kg cm (270 lb in)
Free camber	171,4 mm (6.750 in)	171,4 mm (6.750 in)	208,2 mm (8.200 in)	208,2 mm (8.200 in)



## GENERAL SPECIFICATION DATA

### Hydraulic dampers

Piston diameter  
88 models  
109 models

Telescopic: non-adjustable

25,4 mm (1.000 in)  
34,6 mm (1.375 in)

### STEERING

Type  
Ratio: Straight ahead  
Full lock  
Front wheel toe-in  
Camber angle  
Castor angle  
Swivel pin inclination

Recirculating ball  
15.6:1  
23.8:1  
1,2 mm to 2,4 mm (0.046 in to 0.093 in)  
1½°  
3°  
7°

### BRAKES

System

Single line, none servo  
Single line with servo  
Dual line  
According to requirements

#### Front

Drum diameter  
88 models  
109 models  
Reclamation limit  
Wheel cylinder bore diameter  
88 models  
109 models  
Lining dimensions  
88 models  
109 models  
Lining material

254 mm (10 in)  
279,4 mm (11 in)  
0,75 mm (0.030 in) oversize  
31,75 mm (1.250 in) Single leading shoe  
27,57 mm (1.125 in.) Twin leading shoe  
220,98 mm x 38,1 mm x 4,75 mm (8.700 in x 1.500 in x 0.187 in)  
264,66 mm x 57,15 mm x 4,74 mm (10.42 in x 2.25 in x 0.187 in)  
Mintex M22

#### Rear

Drum diameter  
88 models  
109 models  
Reclamation limit  
Wheel cylinder bore diameter  
Lining dimensions  
88 models  
109 models  
Lining material

254 mm (10 in)  
279,4 mm (11 in)  
0,75 mm (0.030 in) oversize  
31,75 mm (1.250 in) single leading shoe  
220,98 mm x 38,1 mm x 4,74 mm (8.700 in x 1.500 in x 0.187 in)  
264,66 mm x 57,15 mm x 4,74 mm (10.42 in x 2.25 in x 0.187 in)  
Mintex M22

Total swept area, foot brakes

88 models  
109 models

1212,9 cm<sup>2</sup> (188.0 in<sup>2</sup>)  
2000,0 cm<sup>2</sup> (310.0 in<sup>2</sup>)



**Hand brake**

Drum diameter	228,6 mm (9.000 ins)
Lining dimensions	209,55 mm x 44,45 mm x 4,74 mm (8.250 in x 1.750 in x 0.187 in)
Master cylinder bore diameter	
88 models, non servo	19,05 mm (0.750 in)
88 models, with servo	22,2 mm (0.875 in)
109 models, all	25,4 mm (1.000 in.)

**WHEELS**

Size	
88 models	5.00F x 16
109 models	5.50F x 16
109 One ton models	6.50L x 16

**TYRES**

Type/Size	
88 models: Standard	Cross Ply 6.00-16
Optional	Cross Ply 6.50-16
	Cross Ply 7.00-16
	Cross Ply 7.50-16 with 5.50F x 16 wheel.
109 models	Cross Ply 7.50-16
109 One Ton model	Cross Ply 9.00-16

**Tyre pressures**

		Normal				Emergency soft			
		Load under 250 kg (550 lb.)		Load over 250 kg (550 lb.)		Load under 250 kg (550 lb.)		Load over 250 kg (550 lb.)	
		Front	Rear	Front	Rear	Front	Rear	Front	Rear
88 models 6.00 6.50 and 7.00 - 16	kg/cm <sup>2</sup>	1,8	1,8	1,8	2,1	1,1	1,1	1,1	1,4
	lb/in. <sup>2</sup>	25	25	25	30	15	15	15	20
	bars	1.72	1.72	1.72	2.07	1.03	1.03	1.03	1.38
7.50 - 16	kg/cm <sup>2</sup>	1,8	1,8	1,8	2,1	0,8	0,8	0,8	1,4
	lb/in. <sup>2</sup>	25	25	25	30	12	12	12	20
	bars	1.72	1.72	1.72	2.07	0.83	0.83	0.83	1.38
109 models 7.50 - 16	kg/cm <sup>2</sup>	1,8	1,8	* 1,8	2,5	1,1	1,1	1,1	1,8
	lb/in. <sup>2</sup>	25	25	25	36	15	15	15	26
	bars	1.72	1.72	1.72	2.48	1.03	1.03	1.03	1.79
Michelin 7.50 - 16 XY	kg/cm <sup>2</sup>	1,8	1,8	1,8	2,8	1,1	1,1	1,1	2,5
	lb/in. <sup>2</sup>	25	25	25	40	15	15	15	35
	bars	1.72	1.72	1.72	2.81	1.03	1.03	1.03	2.41
109 One Ton Models 9.00 - 16	kg/cm <sup>2</sup>	1,4	1,4	1,4	2,1	0,7	0,7	0,7	1,4
	lb/in. <sup>2</sup>	20	20	20	30	10	10	10	20
	bars	1.38	1.38	1.38	2.07	0.7	0.7	0.7	1.38



## GENERAL SPECIFICATION DATA

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### ELECTRICAL EQUIPMENT

System	12 volt, negative earth
<b>Battery</b>	
Petrol models	
Make/type	Lucas CZ9 or Exide 6-XNM9R
Capacity	58 A H at 20 hour rate
Diesel models	
Make/type	Exide 6TXMZ-15L
Capacity	95 AH at 20 hour rate
<b>Alternator</b>	
Type	16 ACR
Nominal output	34 amps at 6000 Alternator rev/min
Field resistance	4.33 ohms $\pm$ 5%
Brush spring pressure	255 to 368g (9 to 13 oz)
Brush minimum length	5,0 mm (0.2 in) protruding beyond the brush box
<b>Starter Motor</b>	
Petrol models	
Make/type	Lucas M418G
Brush spring tension	850 to 1134g (30 to 40 oz)
Brush minimum length	8,0 mm (0.312 in)
Diesel models	
Make/type	Lucas M45G Pre-engaged, oil and waterproof
Brush spring tension	1,2 kg (42 oz)
Brush minimum length	8,0 mm (0.312 in)
<b>Wiper motor</b>	
Make/type	Lucas 14W single speed
Armature end float	0,1 to 0,2 mm (0.004 in to 0.008 in)
Brush minimum length	4,8 mm (0.190 in)
Brush spring tension	140 to 200g (5 to 7 oz)
Resistance of armature winding at 16°C (60°F) measured between adjacent commutator segments	0.23 to 0.35 ohms
Light running, rack disconnected	
Current at 13.5 V	2.0 amps
Speed, 60 seconds from cold	60 to 70 rev/min



**GENERAL SPECIFICATION DATA**

**GENERAL DIMENSIONS**

Dimensions and Weights	88		88 Station Wagon		109		109 Station Wagon	
	Metric	British	Metric	British	Metric	British	Metric	British
	Overall length	3,62 m	142.562 in.	3,62 m	142.562 in.	4,44 m	175 in.	4,44 m
Overall width	1,68 m	66 in.	1,68 m	66 in.	1,68 m	66 in.	1,68 m	66 in.
Overall unladen height, hood up	1,97 m	77.5 in.	-	-	-	-	-	-
Overall unladen height, hood down, screen up	1,73 m	68 in.	-	-	-	-	-	-
Overall unladen height, hood down, screen down	1,46 m	57.5 in.	-	-	-	-	-	-
Overall unladen height, with cab or hard top	1,95 m	76.875 in.	1,98 m	77.875 in.	2,06 m	81 in.	2,07 m	81.375 in.
Wheelbase	2,23 m	88 in.	2,23 m	88 in.	2,77 m	109 in.	2,77 m	109 in.
Track	1,31 m	51.5 in.	1,31 m	51.5 in.	1,33 m	52.5 in.	1,33 m	52.5 in.
Turning circle	11,6 m	38 ft.	11,6 m	38 ft.	14,3 m	47 ft.	14,3 m	47 ft.
Unladen ground clearance under differentials, 6.00 x 16 tyres	177 mm	7 in.	177 mm	7 in.	-	-	-	-
Unladen ground clearance under differentials, 7.00 x 16 tyres	197 mm	7.75 in.	197 mm	7.75 in.	-	-	-	-
Unladen ground clearance under differentials, 7.50 x 16 tyres	-	-	-	-	209 mm	8.25 in.	209 mm	8.25 in.
<b>Internal body dimensions:</b>								
Length (between cappings)	1,206 m	47.5 in.	-	-	1,85 m	72.75 in.	-	-
Width (between cappings)	1,448 m	57 in.	-	-	1,44 m	56.875 in.	-	-
Height of body sides	508 mm	20 in.	-	-	495 mm	19.5 in.	-	-
Height of wheel arch	216 mm	8.5 in.	-	-	229 mm	9 in.	-	-
Width of wheel arch (to body side)	292 mm	11.5 in.	-	-	349 mm	13.75 in.	-	-
Width of floor (between wheel arches)	921 mm	36.25 in.	-	-	921 mm	36.25 in.	-	-
Height, floor to roof (maximum)	1,23 m	48.5 in.	-	-	1,22 m	48 in.	-	-

**WEIGHTS**

Dimensions and Weights	88		88 Station Wagon		109		109 Station Wagon	
	Metric	British	Metric	British	Metric	British	Metric	British
Maximum approved payload, normal roads	*Driver, two passengers and: 454 kg 1,000 lb.		*7 persons and: 45 kg 100lb.		Driver, two passengers and: 908 kg 2,000 lb.		10 persons and: 181 kg 400 lb.	
Maximum approved payload, cross-country	Driver, two passengers and: 363 kg 800 lb.		6 persons and: 23 kg 50 lb.		Driver, two passengers and: 816 kg 1,800 lb.		10 persons and: 91 kg 200 lb.	
<b>Maximum drawbar pull, dependent upon surface conditions:</b>								
Petrol models	1,000 kg 4,000 lb.		1800 kg 4,000 lb.		1600 kg 3,500 lb.		1600 kg 3,500 lb.	
Diesel models	1497 kg 3,300 lb.		1497 kg 3,300 lb.		1315 kg 2,900 lb.		1315 kg 2,900 lb.	
Maximum roof rack load	50 kg 112 lb.		50 kg 112 lb.		50 kg 112 lb.		50 kg 112 lb.	
<b>Weight running, with water, oil, 5 gallons fuel:</b>								
Petrol models	1339 kg 2,953 lb.		1488 kg 3,281 lb.		1497 kg 3,301 lb.		1702 kg 3,752 lb.	
Diesel models	1405 kg 3,097 lb.		1554 kg 3,425 lb.		1574 kg 3,471 lb.		1779 kg 3,922 lb.	

\* Maximum loads for cross-country when heavy duty springs are fitted.









<b>ENGINE</b>	<b>2¼ litre 4-cylinder Petrol models <sup>**</sup>(Refer to Division 17 for emission controlled engines)<sup>**</sup></b>	
Type	In line four cylinder four stroke, overhead valves	
Capacity	2286 cm <sup>3</sup> (139,5 in. <sup>3</sup> ).	
Compression ratio		
Standard	8.0:1 <sup>**</sup> (Engine number commencing 901.....) <sup>**</sup>	
Optional	7.0:1 <sup>**</sup> (Engine number commencing 904.....) <sup>**</sup>	
Firing Order	1-3-4-2	
Compression pressure		
8.0:1 compression ratio	11,2 kgf.cm <sup>2</sup> (160 lbf. in <sup>2</sup> ).	
7.0:1 compression ratio	10,2 kgf.cm <sup>2</sup> (145 lbf. in <sup>2</sup> ).	
Idling speed	500 rev/min.	
Fast idle setting	1,40 mm (0.055 in.) Throttle butterfly clearance	
Ignition timing, static		
8.0:1 compression ratio	TDC when using 90 octane fuel 3° ATDC when using 85 octane fuel 6° BTDC when using 90 octane fuel 3° BTDC when using 83 octane fuel TDC when using 75 octane fuel	
7.0:1 compression ratio	On crankshaft pulley 0,25 mm (0.010 in.).	
Timing marks		
Valve clearance, inlet and exhaust		
<b>DISTRIBUTOR</b>		
Make/type	Lucas 25D4	
Rotation of rotor	Anti-clockwise	
Contact breaker gap	0,36 mm to 0,40 mm (0.014 in. to 0.016 in.).	
Condenser capacity	0.2 microfarad	
Serial number	5069	
<b>Centrifugal advance with TDC ignition timing</b>		
<b>Decelerating check with vacuum unit disconnected</b>		
Crankshaft angle	Engine rev/min.	
38° to 42°	4500	
30° to 34°	3500	
22° to 26°	2500	
12° to 16°	1200	
4° to 12°	900	
0° to 4°	600	
No advance below	450	
<b>Vacuum advance</b>		
Starts	89 mm (3.5 in.) Hg.	
Finishes	635 mm (25.0 in.) Hg.	
<b>SPARKING PLUGS</b>		
Make/type		
8.0:1 compression ratio	Champion UN12Y	
7.0:1 compression ratio	Champion N8	
Gap	0,75 to 0,80 mm (0.029 to 0.032 in.).	
<b>IGNITION COIL</b>		
Make/type	HA12	
Primary resistance at 20°C (68°F)	3.0 to 3.5 ohms	
Consumption—ignition on at engine idle speed	1.5 amps	
<b>CARBURETTER</b>		
Make/type	Zenith 36IV	
Choke diameter	27 mm	
Main jet	125	
Compensating (enrichment) jet	150	
Pump jet	65 (short stroke, outer hole)	
Needle valve	1.75	



## ENGINE TUNING DATA

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### 2¼ litre 4-cylinder Diesel models

#### ENGINE

Type	In line four cylinder four stroke, overhead valves.
Capacity	2286 cm <sup>3</sup> (139,5 in <sup>3</sup> ).
Compression ratio	23.0:1
Firing order	1-3-4-2
Idling speed	590 ± 20 rev/min.
Injection timing	15° BTDC
Timing marks	
Valve timing inlet and exhaust	On engine flywheel and timing gears.
Injection timing	On engine flywheel and pump flange.

#### INJECTORS

Make/type	CAV Pintaux
Nozzle size	BDNO/SPC 6209
Opening pressure	135 Atm

#### HEATER PLUGS

Make/type	KLG GF 210/T or Champion AG45
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#### DISTRIBUTOR PUMP

Make/type	C.A.V. type DPA
Direction of rotation	Clockwise, viewed from drive end
Maximum speed setting (sealed)	4,200 engine rev/min



## 2.6 litre 6-cylinder Petrol models

<b>ENGINE</b>	
Type	In line six cylinder four stroke, inlet—overhead valves exhaust—side valves
Capacity	2625 cm <sup>3</sup> (160.3 in <sup>3</sup> )
Compression ratio	
Standard	7.8:1 *(Engine number commencing 941.....)**
Optional	7.0:1 *(Engine number commencing 944.....)**
Firing order	1-5-3-6-2-4
Compression pressure	
7.8:1 compression ratio	11,95 to 12,3 kgf.cm <sup>2</sup> (170 to 175 lbf. in <sup>2</sup> ).
7.0:1 compression ratio	9,84 kgf.cm <sup>2</sup> (140 lbf. in <sup>2</sup> ).
Idling speed	500 rev/min
Fast idle setting	1000 to 1200 rev/min.
Ignition timing, static and dynamic	
7.8:1 compression ratio	2° ATDC when using 90 octane fuel 6° ATDC when using 85 octane fuel
7.0:1 compression ratio	2° BTDC when using 83 octane fuel TDC when using 80 octane fuel
Timing marks	On crankshaft pulley
Valve clearance	
Inlet	0,15 mm (0.006 in.) engine hot
Exhaust	0,25 mm (0.010 in.) engine hot or cold
<b>DISTRIBUTOR</b>	
Make/type	Lucas 25D6
Rotation of rotor	Anti-clockwise
<b>Centrifugal advance</b>	
Decelerating check with vacuum unit disconnected.	
Crankshaft angle	Engine rev/min
30° to 34°	4000
26° to 28°	3000
18° to 24°	1800
10° to 16°	1400
4° to 8°	800
0° to 4°	600
No advance below	400
<b>Vacuum advance</b>	
Starts	165 mm (6.5 in.) Hg.
Finishes	635 mm (25.0 in.) Hg.
<b>SPARKING PLUGS</b>	
Make/type	Champion N5 (7.8:1 and 7.0:1 compression ratio)
Gap	0,75 to 0,80 mm (0.029 to 0.032 in.).
<b>IGNITION COIL</b>	
Make/type	Lucas HA12
Primary resistance at 20°C (68°F)	3.0 to 3.5 ohms
Consumption—ignition on at engine idle speed	1.5 amps
<b>CARBURETTER</b>	
Choke diameter	Zenith-Stromberg 175CD-SE 41,275 mm (1.625 in.).
Metering needle	B18362.Z/4J
Air valve return spring	B18277.Z
Needle valve	B18353.Z 1,75 mm
Fast idle interconnection setting	1,1 mm or No. 57 drill at edge of throttle.
Float height	16 mm to 17 mm (0.629 in. to 0.669 in.).





	kgf.m	lbf.ft.
<b>Engine—2¼ litre 4-cylinder</b>		
Connecting rod cap nuts	3,5	25
Main bearing cap bolts:		
Petrol engines	11,5	85
Diesel engines	13,8	100
Cylinder head bolts:		
Petrol engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	8,9	65
Diesel engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	12,5	90
Rocker shaft bolts		
Petrol engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	8,9	65
Diesel engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	12,5	90
Starter dog:		
Petrol engines	20,5	150
Diesel engines	27,6	200
Flywheel bolts	8,5 to 9,0	60 to 65
<b>Engine—2.6 litre 6-cylinder Petrol</b>		
Connecting rod cap nuts	2,8	20
Main bearing cap bolts	10,4	75
Cylinder head bolts		
3/8 in. (9,5 mm approximately) diameter	4,0	30
7/16 in. (11 mm approximately) diameter	7,0	50
Starter dog:	27,65	200
Flywheel bolts	8,5 to 9,0	60 to 65
<b>Fuel system</b>		
2¼ litre 4-cylinder Diesel		
Injector nuts	0,8 to 1,0	6 to 8
<b>Manifold and exhaust system</b>		
2¼ litre 4-cylinder Petrol		
Induction manifold to exhaust manifold nuts	2,3	17
<b>Clutch</b>		
Clutch cover bolts	3,0 to 3,5	22 to 25
<b>Gearbox</b>		
Output drive flange nut	11,75	85
Layshaft bolt	8,5	60
<b>Rear axle and final drive</b>		
Hub driving flange bolts	3,9	28
Salisbury type axles:		
Differential case bolts	9,1 to 10,4	66 to 75
**Crownwheel bolts	13 to 14,5	95 to 105**
Differential bearing cap bolts	12,9 to 14,5	93 to 105
Differential cover bolts	2,8 to 3,5	20 to 25

continued



## TORQUE WRENCH SETTINGS

	Kgf.m	lbf.ft.
<b>Rover type axles</b>		
Bevel pinion driving flange nut	11,75	85
Crownwheel bolts		
** 0.390 in (10 mm approximately) diameter )	4,8	35**
0.375 in (9.5 mm approximately) diameter )		
Differential bearing cap bolts	8,3	60
Hub driving flange nut	1,4 to 2,0	10 to 15
<b>Front axle and final drive</b>		
Hub driving flange bolts	3,9	28
Hub driving flange nut	1,4 to 2,0	10 to 15
Bevel pinion driving flange nut	11,75	85
Crownwheel bolts		
0.390 in. (10 mm approximately) diameter	6,2	45
0.375 in. (9.5 mm approximately) diameter	4,8	35
Differential bearing cap bolts	8,3	60
<b>Steering</b>		
Steering wheel nut	5,4	40
Ball joint nuts	4,0	30
Relay lever pinch bolts	7,6	55
** Steering box to support bracket bolts	7,0 to 8,5	50 to 60
Steering box support bracket to chassis bolts	2,0	15
Steering box drop arm nut	8,5 to 11,0	60 to 80
<b>Brakes</b>		
Wheel cylinder bleed nipple	0,5 to 0,8	4 to 6
Master cylinder to servo nuts	2,2 to 2,6	16 to 19
Tipping valve retainer (Dual system master cylinder)	4,9 to 6,2	35 to 45
Brake failure switch end pipe union	2,2	16
Brake failure switch unit to housing	2,2	16
Brake failure switch unit to housing	17,28 kgf.cm	15 lbf.in.
Fluid reservoir to master cylinder bolt (single line servo)	2,8 to 3,5	20 to 25
Fluid reservoir to master cylinder screws (dual line servo models)	0,3 to 0,4	2 to 3
Servo assembly securing nuts	1,2	9
<b>Windscreen wipers and washers</b>		
Wiper blade drive adaptor bolts	0,34 (34 kgf.cm)	2.5 (30 lbf.in.)
<b>Electrical equipment</b>		
Alternator shaft nut	3,5 to 4,2	25 to 30
Heater plugs (diesel)	3,4	25
Starter motor		
Petrol models		
Starter through bolts	1,0	8
Diesel models		
Solenoid to starter nuts	0,62	4.5
Solenoid outer terminal nuts	0,41	3
Starter yoke terminal outer nut	0,2	1.5
Starter through bolts	1,1	8
Starter earth stud nut	0,82	6
Eccentric pivot pin locknut	2,2	16



## RECOMMENDED LUBRICANTS, FLUIDS AND FUEL – CAPACITIES

### CAPACITIES

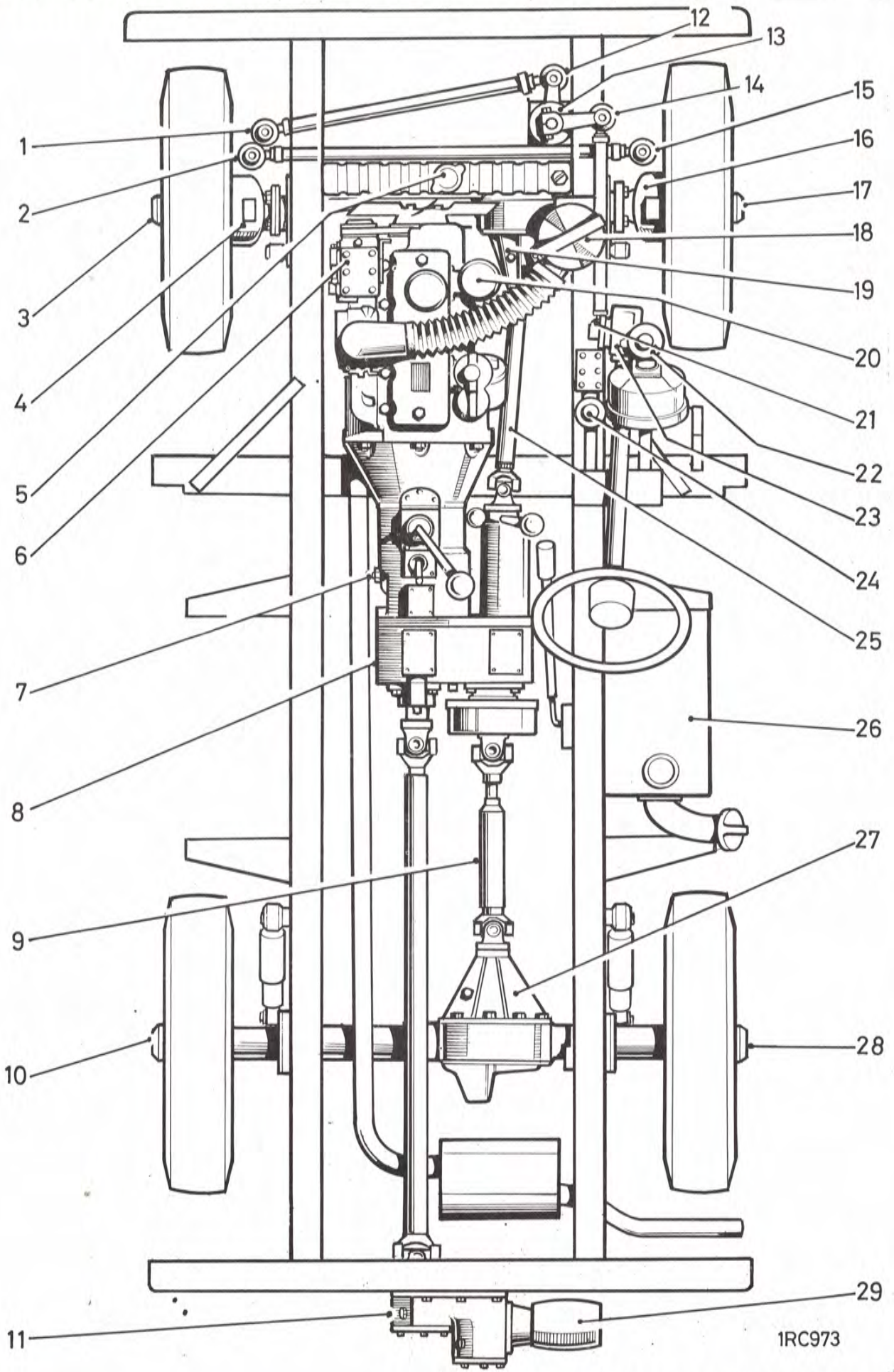
The following capacity figures are approximate and are provided as a guide only. All oil levels must be set using the dipstick or level plug, as applicable.

Component	Litres	Imperial unit	US unit
Engine sump oil, 4-cylinder .. .. .	6,0	11 pints	13 pints
Engine sump oil, 6-cylinder .. .. .	6,8	12 pints	14 pints
Extra when refilling after fitting new filter, 4-cylinder .. .. .	0,85	1.5 pints	1.8 pints
Extra when refilling after fitting new filter, 6-cylinder .. .. .	0,5	1 pint	1.2 pints
Air cleaner oil, 4-cylinder .. .. .	0,85	1.5 pints	1.8 pints
Air cleaner oil, 6-cylinder .. .. .	0,5	1 pint	1.2 pints
Main gearbox oil .. .. .	1,5	2.5 pints	3 pints
Transfer box oil .. .. .	2,5	4.5 pints	5.5 pints
** Rear differential	1,75	3 pints	3.5 pints
Front differential } Standard	1,75	3 pints	3.5 pints
Rear differential } ENV	1,4	2.5 pints	3.5 pints
Front differential } type **	1,4	2.5 pints	3.5 pints
Rear differential: Salisbury 8HA .. .. .	2,5	4.5 pints	5.5 pints
Swivel pin housing oil (each) .. .. .	0,5	1 pint	1.2 pints
** Fuel tank, 4-cylinder models except Station Wagon** .. .. .	45	10 gallons	12 gallons
Fuel tank, 6-cylinder models except Station Wagon .. .. .	50	11 gallons	13 gallons
** Fuel tank, 4-cylinder and 6-cylinder Station Wagon models** .. .. .	73	16 gallons	19 gallons
Cooling system, 4-cylinder Petrol models .. .. .	8,1	14.25 pints	17.1 pints
Cooling system, 6-cylinder Petrol models .. .. .	11,2	20 pints	24 pints
Cooling system, Diesel models .. .. .	7,8	13.75 pints	16.5 pints
Hydraulic front winch, supply tank .. .. .	20,0	4.5 gallons	7.5 gallons
Hydraulic front winch, gearbox .. .. .	1,0	2 pints	2.4 pints





RECOMMENDED LUBRICANTS, FLUIDS AND FUEL - CAPACITIES



1RC973



## RECOMMENDED LUBRICANTS, FLUIDS AND FUEL – CAPACITIES

### Recommended lubricants and fluids

These recommendations apply to temperate climates where operation temperatures are above  $-10^{\circ}\text{C}$  ( $14^{\circ}\text{F}$ ).

Information on recommended lubricants for use under extreme winter conditions can be obtained from the Rover Company Limited, Technical Service Department, or a Rover Distributor or Dealer.

Lubricants marked with an asterisk (\*) are multi-grade oils suitable for all temperature ranges.

DIAGRAM NUMBER	COMPONENTS	SAE	BP	CASTROL	DUCKHAM'S	ESSO	MOBIL	TEXACO/CALTEX	SHELL
20 18 6	<b>PETROL MODELS</b> Engine Air cleaner Governor	20W	** *BP Super Visco-Static 20-50 **	*Castrol GTX	Duckham's Q20-50 Motor Oil	Uniflo or Esso Motor Oil 20W	Mobiloil Super or Mobiloil Special 20W-50	Havoline 20W-50	*Shell Super Oil
20 18	<b>DIESEL MODELS</b> Engine Air cleaner	20W	EP Vanellus 20W	Castrol CRI.20	Duckham's Fleetol HDX 20 or Q20-50	Essolube HDX 20W	Delvac 1120 or Delvac 1220	Ursa Oil Heavy Duty 20-20W	Shell Rotella S or T 20/20W
7 8 19 27 16 4 23 13 11 29	Main gearbox Transfer box Front differential Rear differential Swivel housing, RH Swivel housing, LH Steering box Steering relay Rear power take-off Pulley unit	90EP	BP Gear Oil SAE 90 EP	Castrol Hypoy	Duckham's Hypoid 90	Esso Gear Oil GP 90/140	Mobilube GX 90	Multigear Lubricant EP 90	Spirax 90 EP
12 1 15 2 14 21 17 3 28 10 25 9	Drag link ball joint, RH Drag link ball joint, LH Track rod ball joint, RH Track rod ball joint, LH Longitudinal arm ball joint, front Longitudinal arm ball joint, rear Front hub, RH Front hub, LH Rear hub, RH Rear hub, LH Front propeller shaft Rear propeller shaft		BP Energlease L2	Castrol LM Grease	Duckham's LB10 Grease	Esso Multi- purpose Grease H	Mobilgrease MP or Mobilgrease Super	Marfak All- purpose	Retinax A or Darina AX
5	Radiator (anti-freeze solution)	Bp Anti-Frost		Castrol Anti- freeze	'Standard' Anti-Freeze	Esso Anti- Freeze	Mobil Permazone	P.I. Anti- Freeze	Shell Anti- Freeze
24 22	Clutch fluid reservoir Brake fluid reservoir	Bluecol and Prestone or any anti-freeze solution conforming to British Standard B.S. 3151 or 3152 Castrol Girling Brake and Clutch Fluid 'Crimson'. Specification J. 1703							
26	Fuel Tank	<p><b>2¼ litre Petrol models</b> 7.0:1 compression ratio: 90 octane with 6° BTDC ignition timing 83 octane with 3° BTDC ignition timing 75 octane with TDC ignition timing</p> <p>8.0:1 compression ratio: 90 octane with TDC ignition timing 85 octane with 3° ATDC ignition timing</p> <hr/> <p><b>2.6 litre Petrol models</b> 7.0:1 compression ratio 83 octane with 2° BTDC ignition timing 80 octane with TDC ignition timing 78 octane with 2° ATDC ignition timing</p> <p>7.8:1 compression ratio: 90 octane with 2° ATDC ignition timing 85 octane with 6° ATDC ignition timing</p> <hr/> <p><b>2¼ litre Diesel models</b> Diesel fuel (D.E.R.V.)</p>							





MAINTENANCE

Summary Chart

Routine Maintenance Operations

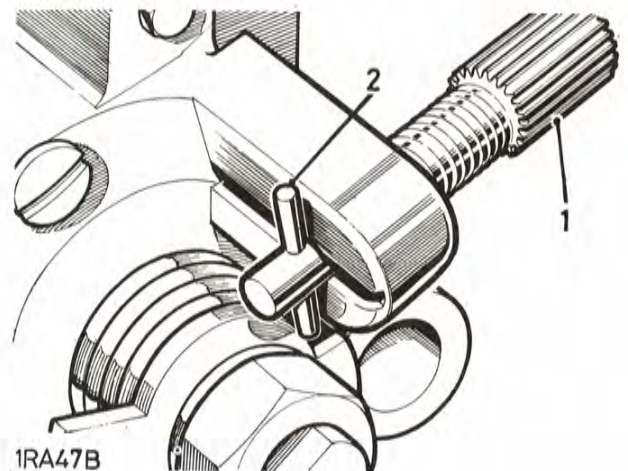
SUMMARY

1. Check engine oil level and water level in radiator daily or weekly depending on operating conditions.
2. Drain and refill engine sump every 10.000 km (6,000 miles) or every six months, whichever comes first.
3. Every month and every maintenance inspection check tyre pressures and inspect tyre treads; under arduous cross-country conditions the tyre pressures should be checked much more frequently, even to the extent of a daily check. If front wheel tread wear is uneven, check wheel alignment.
4. Every month and every maintenance inspection check fluid level in brake fluid reservoir and battery acid level.
5. Brakes. Change brake fluid every 30.000 km (18,000 miles) or eighteen months. The fluid should also be changed before touring in mountainous areas if not done in the previous nine months. Use only Castrol Girling Crimson Brake Fluid, Specification J1703 from sealed tins.  
Renew all rubber seals in the complete brake system and all hydraulic hoses every 60.000 km (36,000 miles) or 3 years. Drain the brake fluid reservoir and flush the system. Refill with the correct fluid.
6. Owners are under a legal obligation to maintain all exterior lights in good working order; this also applies to headlamp beam setting, which should be checked at regular intervals by a Rover Distributor or Dealer.

Cold start unit

1. On the cold start unit fitted to the carburettor on 6 cylinder models there is a spring-loaded pin.
2. For use in ambient temperatures down to  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) the pin should be pushed in and located as illustrated to reduce movement of the starter valve; this avoids over-richness on cold start.
3. Below  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) the pin should be turned so that it is in the slot in the retaining lug.

**NOTE:** The sequence of operations under the headings, Engine compartment, Underbody, Passenger compartment, Exterior and Road test will enable the work to be carried out in the most efficient manner.



# MAINTENANCE

\* Asterisk indicates operation to be carried out at appropriate servicing interval + 1000.

	10.10.03	10.10.06	10.10.12	10.10.24
		3 9 15 21		
1,000 mile (1.500 km)	27 33 39	6 18 30	12 24 36	48 miles/ months
Free Service	5 15 25	10 30 50	20 40 60	80 km
	35 45 50	70 km		
	60 75 km			

LUB Defines operations which may be carried out in a Lubrication Bay.

ENGINE COMPARTMENT Check/report for oil leaks .. .. .	*	*	*	*
Check/top-up oil level in steering box.. .. .	LUB *			*
Check/report condition of steering unit for security and backlash .. .. .			*	*
Check/top-up clutch fluid reservoir: Castrol Girling Brake and Clutch Fluid 'Crimson' Specification J1703	LUB *	*	*	*
Check/top-up brake fluid reservoir: Castrol Girling Brake and Clutch Fluid 'Crimson' Specification J1703	LUB *	*	*	*
Clean fuel pump sediment bowl, 4 cylinder petrol .. .. .	*			*
Change fuel filter element, 6 cylinder petrol .. .. .				*
Replace engine flame trap, 6 cylinder petrol .. .. .				*
Lubricate accelerator linkage and check operation, 6 cylinder petrol .. .. .	*		*	*
Check/top-up carburettor piston damper, 6 cylinder petrol: 12 mm (0.5 in.) from top of tube .. .. .	*		*	*
Check/adjust carburettor mixture and slow running, 6 cylinder petrol .. .. .	*		*	*
Lubricate accelerator linkage and check operation, diesel models .. .. .	*		*	*
Check/adjust injectors, diesel models .. .. .	*		*	*
Empty/clean and refill oil bath air cleaner. Capacity: 0,85 litres (1.5 Imperial pints) .. .. .	LUB *			*
Check/adjust, if necessary report condition of distributor contact points. Gap: 0,35 to 0,40 mm (0.014 to 0.016 in.) .. .. .	*		*	*
Check/adjust, if necessary replace distributor contact points. Gap: 0,35 to 0,40 mm (0.014 to 0.016 in.) .. .. .			*	*
Lubricate distributor and check automatic advance .. .. .	*		*	*
Check/report condition of ignition leads and connections .. .. .			*	*
Clean/adjust sparking plugs. Gap: 0,75 to 0,80 mm (0.029 to 0.032 in.).. .. .			*	*
Replace spark plugs: Gap: 0,70 to 0,80 mm (0.029 to 0.032 in.) 4 cylinder 8.0:1 compression ratio: Champion UN12Y, 7.0:1 compression ratio: Champion N8 6 cylinder 7.8:1 and 7.0:1 compression ratio: Champion N5				*
Clean engine breather filters .. .. .				*
Check/top-up battery .. .. .	*	*	*	*
Check battery condition, grease connections if necessary .. .. .			*	*
Check/top-up cooling system: 12,0 to 19,0 mm (0.5 to 0.75 in.) below bottom of filler neck (engine cold) .. .. .	*	*	*	*
Examine/report cooling and heater system for leaks (renew hoses every 80.000 km (48,000 miles) .. .. .	*	*	*	*
Check/top-up windscreen washer reservoir, when fitted: 25 mm (1 in.) below filler neck .. .. .	*	*	*	*
Check/adjust driving belt: 8 to 11 mm (0.312 to 0.437 in.) free movement .. .. .	*	*	*	*
Check/adjust, report condition of driving belt: 8 to 11 mm (0.312 to 0.437 in.) free movement .. .. .			*	*
Check security of engine mountings .. .. .	*			*
Check/tighten cylinder head bolts, diesel models: Torque: 0.5 in. UNF-12,5 mkg (90 lb ft) 0.312 in. UNF-2,4 mkg (18 lb ft) .. .. .	*			*
Check/adjust tappet clearance: 4 cylinder petrol and diesel: Inlet and exhaust: 0,25 mm (0.010 in.) engine hot .. .. . 6 cylinder petrol: Inlet: 0,15 mm (0.006 in.) engine hot. Exhaust: 0,25 mm (0.010 in.) engine hot or cold				*
Check/adjust ignition timing, using electronic equipment 4 cylinder petrol: 8,0:1 compression ratio: TDC (90 octane fuel) 3° ATDC (85 octane fuel) 7,0:1 compression ratio (optional): 6° BTDC (90 octane fuel) 3° BTDC (83 octane fuel) TDC (75 octane fuel)	*		*	*
6 cylinder petrol: 7,8:1 compression ratio: 2° ATDC (90 octane fuel) 6° ATDC (85 octane fuel) 7,0:1 compression ratio: (optional): 2° BTDC (83 octane fuel) TDC (80 octane fuel) 2° ATDC (78 octane fuel)				*
Check engine oil level .. .. .	LUB *	*	*	*
Lubricate accelerator linkage and check operation, 4 cylinder petrol .. .. .	*		*	*
Check/adjust carburettor mixture and slow running, 4 cylinder petrol .. .. .	*		*	*
Renew fuel filter element, diesel models .. .. .				*



## MAINTENANCE

\* Asterisk indicates operation to be carried out at appropriate servicing interval + 1000.

	10.10.03	10.10.06	10.10.12	10.10.24
	1,000 mile (1,500 km)	3 9 15 21 27 33 39 45 miles/ months	6 18 30 42 miles/ months	12 24 36 48 miles/ months
	Free Service	5 15 25 35 45 50 60 75 km	10 30 50 70 km	20 40 60 80 km
<i>LUB</i> Defines operations which may be carried out in a Lubrication Bay.				
<b>UNDER BODY</b> Check/report for oil leaks .. .. .	*	*	*	*
Check/report steering joints for securing backlash and gaiter condition .. .. .	*	*	*	*
Check/top-up oil level of front differential .. .. .			*	*
Drain front differential oil and refill, also every 40,000 km (24,000 miles) Capacity: Standard: 1,75 litres (3 Imperial pints). ENV: 1,4 litres (2,5 Imperial pints) .. .. .	<i>LUB</i> *			Every 40km(24m)
Check/top-up oil level of swivel pin housings .. .. .			*	*
Drain swivel pin housings and refill, also every 40,000 km (24,000 miles). Capacity: 0,5 litre (1 Imperial pint) <i>LUB</i> .. .. .	<i>LUB</i> *			Every 40km(24m)
Drain engine oil and refill. Capacity: 4 cyl: 6,0 litres (11 Imperial pints). 6 cyl: 6,8 litres (12 Imperial pints) <i>LUB</i> .. .. .	<i>LUB</i> *		*	*
Renew oil filter element .. .. .			*	*
Drain flywheel housing when drain plug is fitted .. .. .		*	*	*
Drain/dismantle and clean fuel sedimenter, diesel models .. .. .				*
Check/top-up oil level of main and transfer gearbox .. .. .			*	*
Drain main and transfer gearbox oils and refill, also every 40,000 km (24,000 miles) Capacities: Main gearbox: 1,5 litres (2,5 Imperial pints). Transfer gearbox: 2,5 litres (4,5 Imperial pints) <i>LUB</i> .. .. .	<i>LUB</i> *			Every 40km(24m)
Lubricate handbrake linkage .. .. .			*	*
Lubricate propeller shafts .. .. .	<i>LUB</i> *		*	*
Lubricate front propeller shaft sealed sliding joint every 40,000 km (24,000 miles) .. .. .				Every 40km(24m)
Check/top-up oil level of rear differential .. .. .			*	*
Drain rear differential oil and refill, also every 40,000 km (24,000 miles). Capacity: 2,5 litres (4,5 Imperial pints) <i>LUB</i> .. .. .	<i>LUB</i> *			Every 40km(24m)
Check security of transmission fixings .. .. .	*			
Check/report exhaust for leakage and security .. .. .		*	*	*
Check visually/report fuel, clutch and brake pipes, unions and hoses for leakage, chafing, corrosion or damage .. .. .	*	*	*	*
<b>PASSENGER COMPARTMENT</b> Check operation of foot and handbrake .. .. .		*	*	*
Check operation of all lamps, direction indicators, warning lights, horns, instruments and other equipment .. .. .	*	*	*	*
Check/report condition and security of seats and safety belts .. .. .		*	*	*
Check/report rear view mirrors for looseness, cracks or crazing .. .. .		*	*	*
Check operation of door locks, window controls, safety catches, bonnet catch etc. and lubricate .. .. .	*		*	*
<b>EXTERIOR</b> Inspect/report brake linings for wear, drums for condition .. .. .			*	*
Check tightness of road wheel fastenings .. .. .	*	*	*	*
Check the tyres are in accordance with Manufacturer's specification .. .. .		*	*	*
Check visually/report tyres for bulges, cuts or damage, unusual wear and tread depth of at least 1 mm .. .. .	*	*	*	*
Check for correct tyre pressure, including spare .. .. .	*	*	*	*
Check, if necessary adjust headlamp alignment .. .. .	*	*	*	*
Check, if necessary replace windscreen wiper blades .. .. .		*	*	*
Check/top-up oil level in steering relay unit .. .. .				*
Check/adjust front wheel alignment: 1,2 to 2,4 mm (0.046 to 0.093 in.) toe-in .. .. .	*			
Check/report front wheel alignment: 1,2 to 2,4 mm (0.046 to 0.093 in.) toe-in .. .. .			*	*
<b>ROAD TEST</b> Road or roller test/report additional work required .. .. .	*		*	*
Check for oil leaks .. .. .	*	*	*	*
Ensure cleanliness of controls, door handles, steering wheel etc. .. .. .	*	*	*	*



## MAINTENANCE

### Engine Compartment

#### Every Maintenance Inspection

Check for oil leaks in engine compartment; rectify as necessary.

**Steering box oil level**—At free service 1.500 km (1,000 miles) and thereafter every 20.000 km (12,000 miles) or 12 months.

1. Check oil level and top up if necessary to the bottom of the filler-plug hole on the top of the cover plate. Access to the plug is gained by lifting the bonnet panel.
2. If significant topping up is required check for oil leaks at joint faces and rocker shaft oil seal.

**Steering box**—Every 5.000 km (3,000 miles) or 3 months. Check steering box mountings for security and steering box for backlash. Rectify as necessary.

**Clutch fluid reservoir**—Every maintenance Inspection.

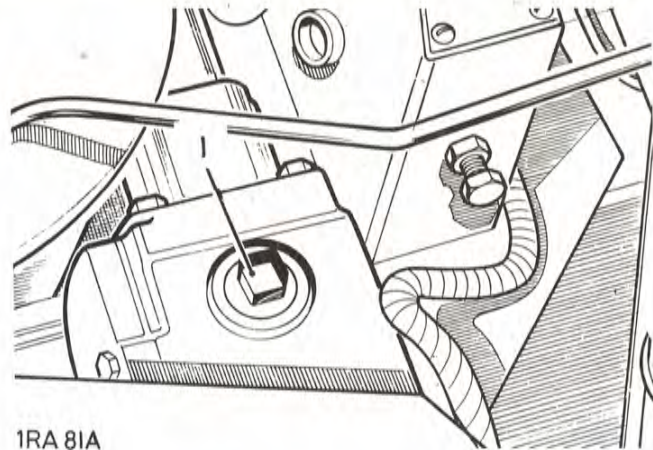
1. Check fluid level in reservoir by removing cap.
2. Top up if necessary to bottom of filler neck. Use Castrol Girling Brake and Clutch Fluid 'Crimson' (Specification J. 1703).

If significant topping-up is required, check for leaks at master cylinder, slave cylinder and connecting pipe

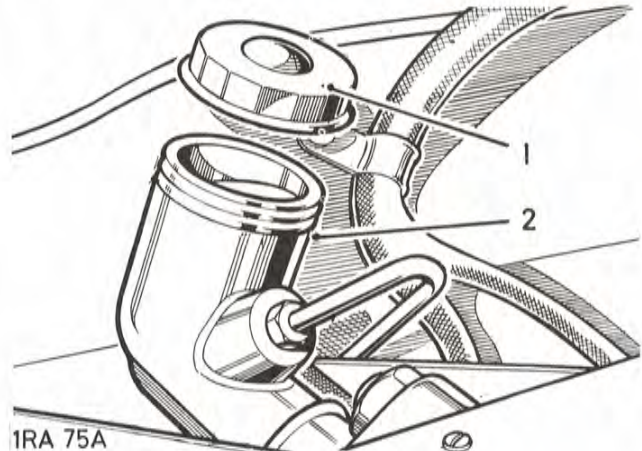
**Brake fluid reservoir**—Every month and at every maintenance inspection.

1. Check fluid level in brake reservoir by removing cap.
2. Top up if necessary to level mark on reservoir. Use Castrol Girling Brake and Clutch Fluid 'Crimson' (Specification J. 1703).

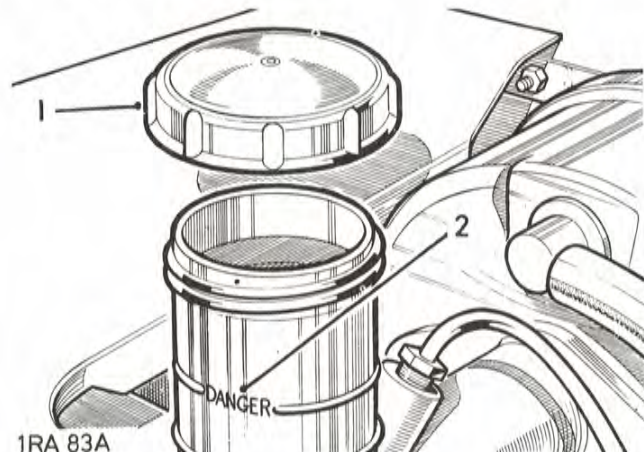
If significant topping-up is required, check master cylinder, wheel cylinders and brake pipes for leakage; any leakage must be rectified immediately.



1RA 81A



1RA 75A



1RA 83A

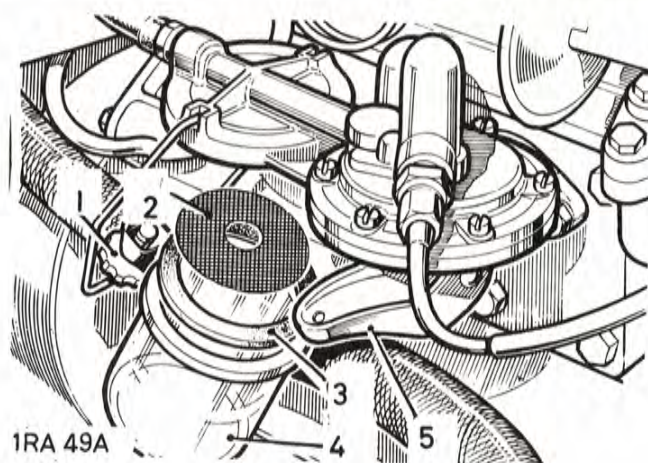
**Engine Compartment**

**Fuel sediment bowl, 4 cylinder petrol models**—At free service 1.500 km (1,000 miles) and thereafter every 20.000 km (12,000 miles) or 12 months.

The fuel sediment bowl, located on the right-hand side of the engine provides additional filtration between the pump and carburetter.

Clean as follows:

1. Remove the bowl by slackening the thumb screw and swinging the retainer to one side.
2. Remove and clean the filter gauze in clean petrol.
3. Ensure that the sealing washer is in good condition.
4. Replace gauze and refit the bowl.
5. Prime the pump by operating the hand lever.

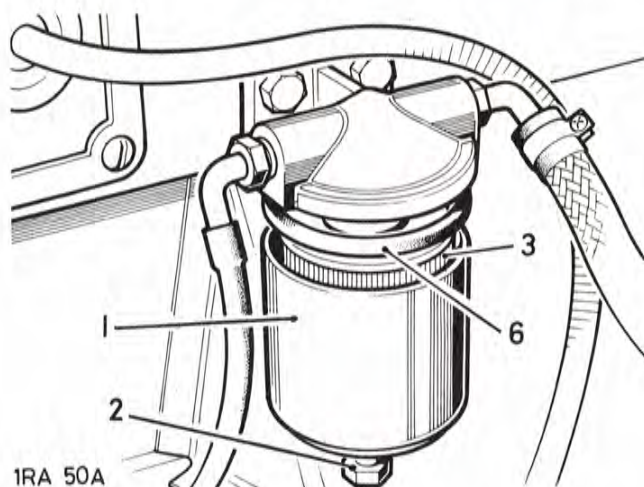


**Fuel filter element, 6 cylinder models**—Every 20.000 km (12,000 miles) or 12 months.

The fuel filter element, located on the dash at the right-hand side of the engine compartment, provides additional filtration between pump and carburetter.

Replace element as follows:

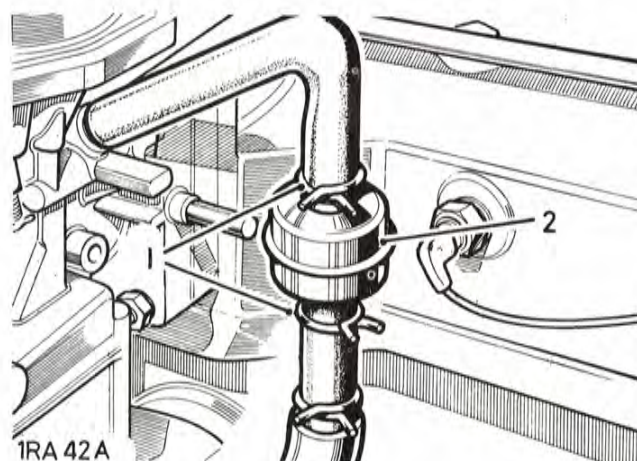
1. Support element holder.
2. Unscrew the special bolt at bottom of filter. The element holder can now be removed.
3. Remove and discard the used element.
4. Thoroughly clean the element holder in petrol.
5. If necessary renew the upper and lower centre seals and also the seal for the centre bolt.
6. Fit the new element, large hole uppermost into the holder using the seal supplied with the element.
7. Place the element holder in position and secure with the special bolt.
8. Start the engine and check for fuel leaks.



**Crankcase emission control, flame-trap type (as applicable)**—Every 20.000 km (12,000 miles) or 12 months.

Replace as follows:

1. Detach the rubber hoses from each side of the flame trap by compressing the clips.
2. Withdraw flame trap.
3. Fit new flame trap by reversing removal procedure.
4. Warm up engine and re-adjust carburetter if necessary.

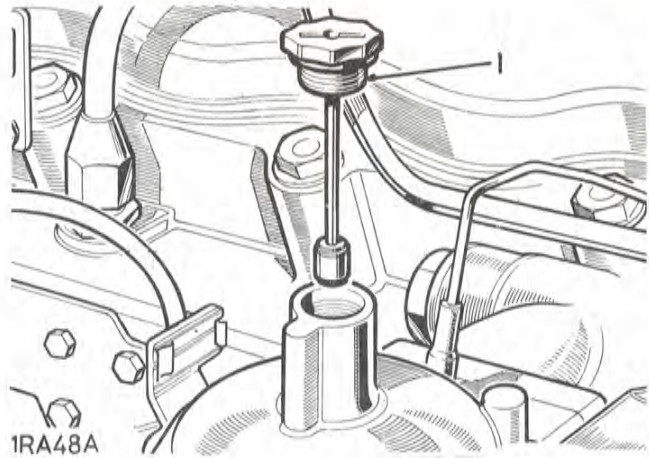




## Engine Compartment

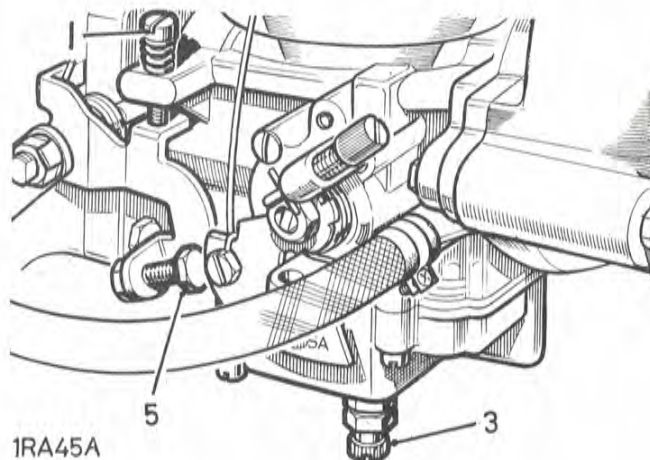
**Accelerator linkage, 6 cylinder models**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

1. Prior to carburettor adjustments, lubricate the accelerator linkage using clean engine oil paying particular attention to accelerator cross shaft bearings and ball joint sockets on the control rods.
2. Check the linkage for correct operation and ensure that there is no tendency to stick.  
Badly worn parts should be replaced as soon as possible.



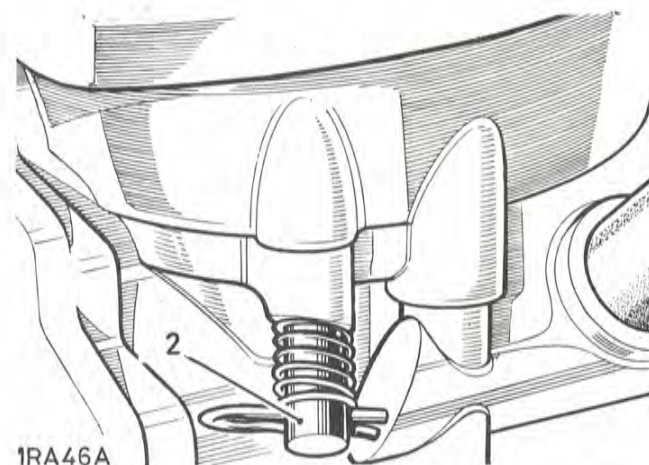
**Carburettor hydraulic damper**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.  
6-cylinder Petrol models.

1. Unscrew the cap on top of the suction chamber, withdraw cap and hydraulic damper, replenish the damper reservoir as necessary with SAE 20 oil to within about 12 mm (0.5 in.) from the top of the tube. Then replace cap and hydraulic damper.



**Carburettor slow-running adjustment**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months. 6 cylinder models.

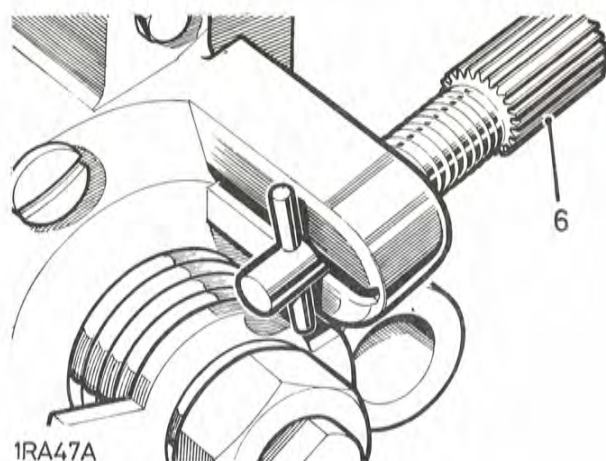
1. Run the engine until normal operating temperature is obtained. If necessary adjust slow-run screw to give the correct idling speed.
2. Lift the carburettor piston approximately 1 mm (0.031 in.) by means of the lift pin situated on the right of the carburettor body. There is approximately 5 mm (0.187 in.) free movement of the lift pin before it contacts the piston.
3. If the engine speeds up immediately the mixture is too rich and the jet adjustment screw must be turned anti-clockwise, thus weakening the mixture; if the engine stops immediately, the mixture is too weak and the jet adjustment screw should be turned clockwise to enrich the mixture.  
If the engine just falters and then continues to run evenly the adjustment is correct.
4. Finally adjust the slow-run screw to get a smooth idling speed.
5. The fast idle screw should not require adjustment.



**Engine Compartment**

6. For starting at temperatures down to  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) push and turn the spring-loaded choke adjustment screw so that the peg is at right-angles to the slot as illustrated. Leave in this position.

When starting at temperatures below  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) turn the screw until peg is recessed in slot.



**Accelerator linkage, diesel models**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

1. Lubricate the accelerator linkage using clean engine oil paying particular attention to accelerator cross shaft brackets, bell crank bushes and ball joint sockets on the control rods.
2. Check the linkage for correct operation and ensure that there is no tendency to stick.  
Badly worn parts should be replaced as soon as possible.

**Fuel and injection system, diesel models**

**Absolute cleanliness is essential when handling any part of the fuel injection system.**

The fuel system comprises the fuel tank, pipe lines, sediment bowl filter, mechanically operated pump, paper element type filter, injectors and injector pump. It is most important that the system be kept clean and free from leaks.

**Fuel injectors**—At free service 1.500 km (1,000 miles) and thereafter check every 20.000 km (12,000 miles) or 12 months.

**Absolute cleanliness is essential when handling fuel injectors**

Nozzle holders and nozzles should not be dismantled unless proper testing and re-setting facilities are available. If a nozzle is found to be faulty, replace the complete unit.

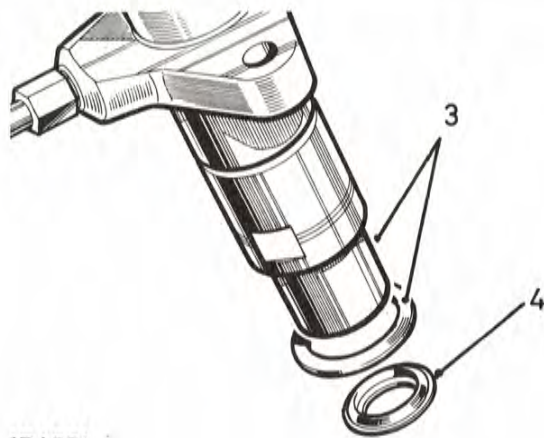
The injectors are located in the top of the cylinder head on the right-hand side. Injectors may be removed for checking and adjustment as follows:

1. Disconnect the spill pipe at T-piece and slacken banjo bolts at nozzles. The feed pipes must be removed from the injectors and the pump, these pipes should be free at both ends; on no account must the pipes be bent to clear the union on the injector.
2. Remove flange securing nuts.



### Engine compartment

3. Lift out the injectors complete with spill pipe and copper washers.
4. Remove the steel washers from inside the injector holes.
5. Fit spill pipe to new injectors, ensuring that no foreign matter is present. Do not fully tighten banjo bolts at this stage.
6. Fit assembly of injectors and spill pipe to cylinder head, taking great care not to damage nozzle and also ensure that both new copper washer and steel washer are fitted. The steel washer must be fitted with the 'u' of the corrugation downwards.
7. Refit flange securing nuts.
8. Tighten each nut alternately an equal amount to ensure that the injector goes into position evenly. The nuts must be tightened only to a torque of 0,8-1,0 mkg (6-8 lb ft). Alternatively, a ½ in. AF open-ended spanner of not more than 100 mm (4 in.) in length can be used. Failure to carry out the above precautions when replacing injectors may result in nozzle distortion, giving rise to rough and uneven running. Finally, tighten spill pipe banjo bolts.



1RA57A

### Checking nozzles in engine, diesel models

The first symptoms of nozzle trouble usually come under one or more of the following headings:

- (a) Cylinder knock
- (b) Engine overheating
- (c) Loss of power
- (d) Smoky exhaust (black)
- (e) Increased fuel consumption.

To check the nozzles, proceed as follows:

1. With the engine running, release the fuel feed pipe union on each nozzle in turn.
2. If the injector being checked has been operating properly, there will be a distinct reduction in engine speed accompanied by obvious roughness, but a faulty injector will make less reduction to engine speed when its fuel pipe is loosened.
3. Do not assume, however, that the nozzles are the only cause of the trouble, as faulty valve timing, leaking valves, incorrect pump timing, dirty filters, etc., may all cause similar trouble.

**Engine compartment**

**Adjusting injectors, diesel models.**

4. The use of a test pump is essential when adjusting injectors; we strongly recommend therefore, that adjustment to injectors be carried out by a Rover Distributor or Dealer or CAV Agent.
5. Great care should be taken to prevent the hands getting into contact with the spray, as the working pressure will cause the fuel to penetrate the skin with ease.

**Heater plugs, diesel models**

6. The heater plugs do not require any maintenance. However, if at any time when the heater plug is used, the warning light glows very brightly, a short circuit in the system is indicated. No light will indicate an open circuit. This should receive attention at a Rover Distributor or Dealer.
7. Great care must be taken not to twist the centre terminal when removing heater plug leads.

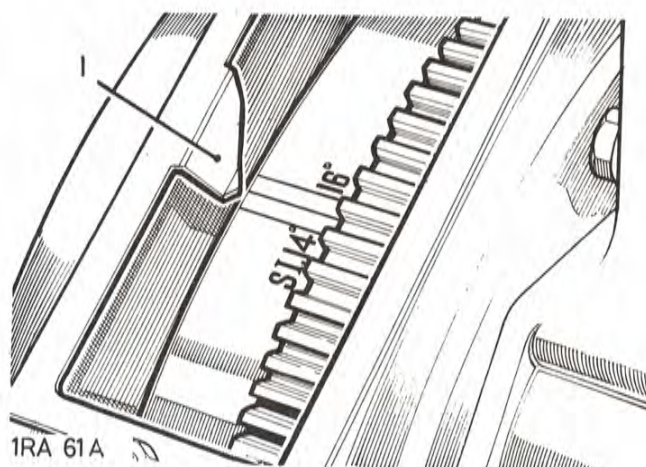
**Distributor pump, diesel models.**

This unit is correctly set on leaving the factory and requires no further adjustment. It is lubricated by the diesel fuel and does not require any maintenance in this respect.

Should any trouble be experienced with the distributor pump, consult a CAV Agent.

If for any reason the distributor pump has been removed, it must be refitted and timed as follows:

1. Turn the crankshaft in the direction of rotation until both valves of number one cylinder are closed and the piston is ascending the bore on the compression stroke. Continue to turn the crankshaft slowly until the pointer is midway between the 14° and 16° marks, that is 15° before top dead centre. This must be done carefully. If the flywheel is inadvertently turned too far and the timing mark goes past the pointer, do not turn the flywheel back, but repeat the above operation. Ensure that a correct line of vision is taken when lining up the timing marks. An incorrect line of vision can result in the timing being 1° to 2° out.
2. The master spline on the driving gear should now be approximately 20° from the centre line of the engine measured from the front end, that is, at the 4 o'clock position.



## MAINTENANCE

### Engine compartment

3. Insert the timing gauge, Part Number 605863, into the driving gear, then twist gauge in a clockwise direction to take up backlash and any wear in the gears.
4. Hold in this position, then, if necessary, slacken off bolts retaining timing pointer on side of cylinder block.
5. Adjust pointer so that it coincides with the line on timing gauge, as illustrated.
6. Remove timing gauge.
7. Rotate driving gear on distributor pump so that master spline lines up with master spline on driving gear.
8. Then offer pump to engine, ensuring that the timing mark on the pump flange coincides with the timing pointer.

When the distributor pump is timed as detailed above, that is, with the timing pointer on the engine altered to take up backlash and wear on the gears, it ensures that optimum distributor pump timing is achieved.

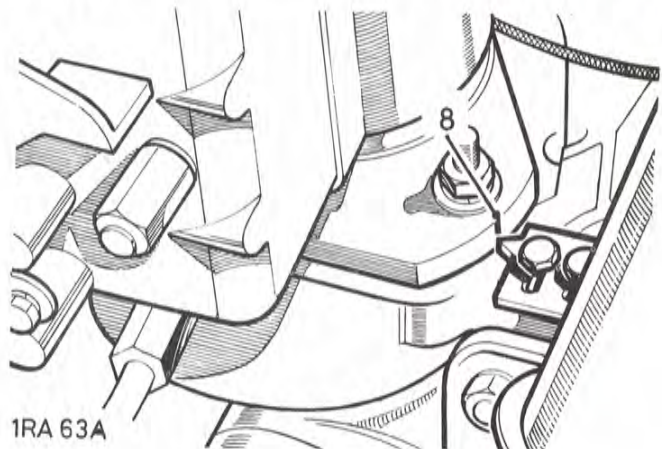
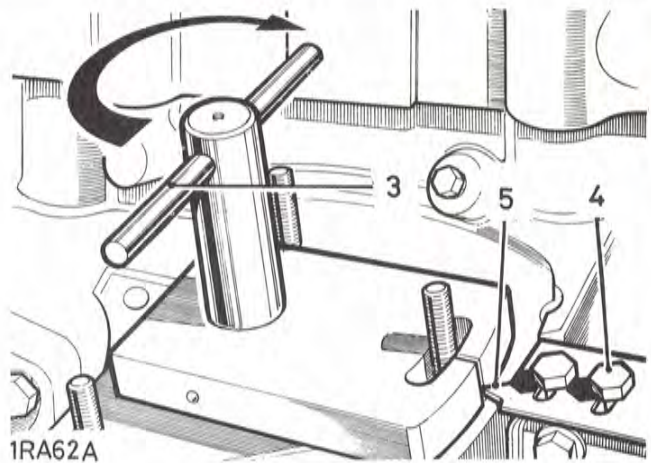
Should there be any fall-off of power during the life of the engine, retiming the distributor pump to take up gear wear could well make a significant improvement to engine performance, providing the engine is generally in good condition.

### Priming the fuel system, diesel models.

- A— When the paper element filter is changed the system must be primed as follows:
1. Do not attempt to start the engine hoping to draw the fuel through in this way, otherwise the full priming procedure will be necessary.
  2. Slacken the bleed pipe on the top of the filter.
  3. Operate the hand priming lever on the mechanical pump until fuel free from bubbles emerges.
  4. Tighten the bleed pipe.
  5. Operate the hand priming lever once or twice to clear the last bubbles of air into the filter bleed pipe.
  6. Start engine in normal way and check for leaks.

### Engine compartment

- B— When fuel system has been completely emptied proceed as follows:
7. Carry out previous operations 1 to 5 inclusive.



**Engine compartment**

8. Release air vent screw on distributor body.
9. Operate the fuel pump hand priming lever until fuel free of air emerges from the aperture.
10. Re-tighten the air vent screw.
11. To ensure that all air is exhausted from the pump it may also be necessary to slacken air vent screw in the distributor control cover and repeat items 9 and 10.
12. Start the engine in the normal way and check for leaks.

C— When distributor pump only has been drained it is only necessary to carry out operations 8 to 12 inclusive.

Always ensure that fuel pump lever is on the bottom of the operating cam when priming the fuel system, otherwise maximum movement of the priming lever will not be obtained.

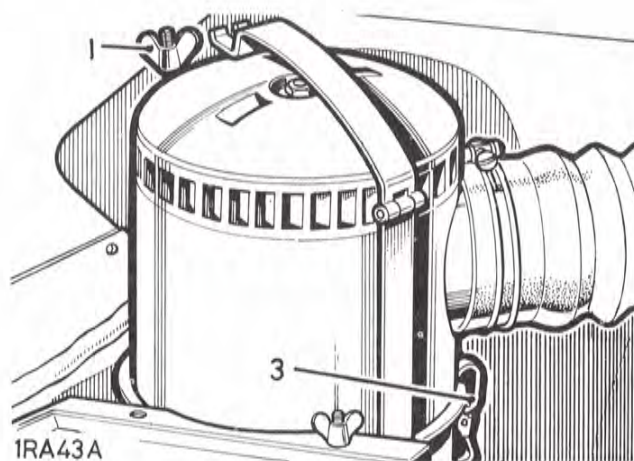
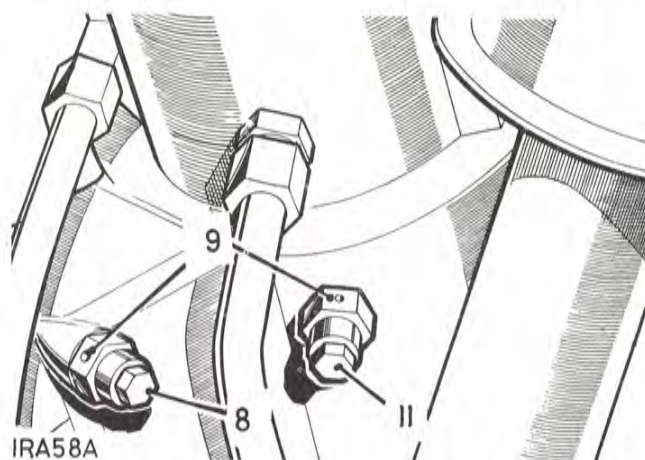
**Air cleaner** All models—At free service 1.500 km (1,000 miles) and thereafter every 20.000 km (12,000 miles) or 12 months.

Attention to the air cleaner is extremely important, especially under dusty conditions, as engine wear generally will be seriously affected if the vehicle is run with an excessive amount of sludge in the cleaner oil bath.

In cases where the vehicle is operated under dusty road or field conditions, attention must be more frequent, even to the extent of a daily oil change; under extremely bad conditions, cleaning twice daily may be called for.

Proceed as follows:

1. Slacken wing nut and release the clamping strap securing the complete air cleaner.
2. Disconnect the outlet elbow from the carburettor intake pipe and remove the cleaner from the vehicle.
3. Remove the oil bowl from the bottom of the cleaner by releasing the three securing clips.
4. Clean all dirty oil and sludge from the bowl and refill with fresh engine oil to the level indicated by a ring formed in the pressing; the capacity is approximately 0,85 litre (1.5 Imperial pints).
5. Clean the filter in the cleaner body by swilling the complete body in petrol or paraffin and shake off the surplus.
6. Replace the bowl and refit the complete unit in the vehicle.

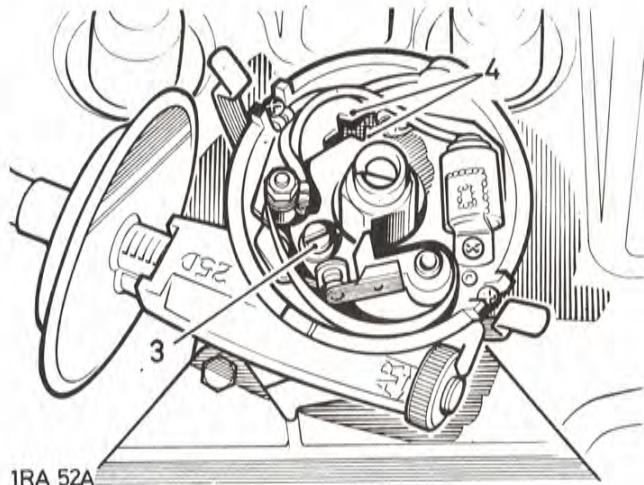


## Engine compartment

**Distributor contact points**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months. Replace every 20.000 km (12,000 miles) or 12 months. Petrol models.

Check and adjust the contact points clearance as follows.

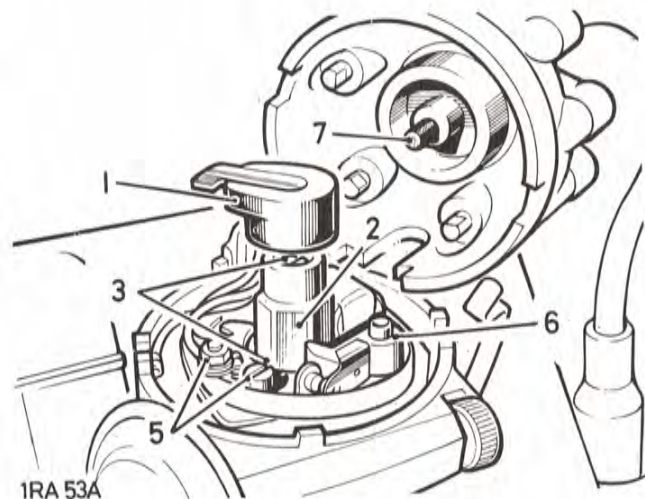
1. Remove the distributor cap and rotor arm; then turn the engine, using the starting handle, until the contacts are fully open.
2. The clearance should be 0,35 to 0,40 mm (0.014 to 0.016 in.) with the feeler gauge a sliding fit between the contacts
3. If necessary, slacken the screw which secures the adjustable contact.
4. Adjust by the adjuster slot until the clearance is correct; re-tighten the retaining screw.
5. Replace the rotor arm and distributor cap.



**Distributor maintenance**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months. Petrol models.

Lubricate as follows:

1. Remove the distributor cap and rotor arm.
2. Lightly smear the cam with clean engine oil.
3. Add a few drops of thin machine oil to lubricate the cam bearing and distributor shaft.
4. Add a few drops of thin machine oil through the side of the contact breaker base plate, to lubricate the automatic timing control.
5. Remove the nut on the terminal block and lift off the spring and moving contact, also remove adjustable contact secured with a screw. Ensure that the contacts are free from grease or oil; if they are burned or blackened, clean with a fine carborundum stone and wipe with a petrol-moistened cloth.
6. Add a smear of grease to contact pivot before replacing the contacts. Then adjust as detailed in previous operation.
7. Wipe the inside and outside of the cap with a soft dry cloth; ensure that the small carbon brush works freely in its holder.
8. Replace rotor arm and distributor cap.



**Engine compartment**

**High tension leads**—Check every 20,000 km (12,000 miles) or 12 months.

1. A careful examination should be carried out on all high tension leads including the coil to distributor lead.
2. Look for any signs of corrosion, insulation cracking or deterioration, particularly of the end contacts.  
Replace any faulty leads.

**Sparking plugs**—Check every 10,000 km (6,000 miles); or 6 months, replace every 20,000 km (12,000 miles) or 12 months. Petrol models.

1. The sparking plugs are fitted with plastic covers.
2. To gain access to the plugs for cleaning and gap-setting, pull up the plug covers without detaching them from the high tension leads.
3. Check or replace the sparking plugs as applicable. If the plugs are in good condition, they should be cleaned, preferably using an approved spark plug cleaning machine.
4. Test the plugs in accordance with the plug cleaning machine manufacturers recommendations.
5. If satisfactory set the electrode gap to 0,75 to 0,80 mm (0.029 to 0.032 in.) and replace.

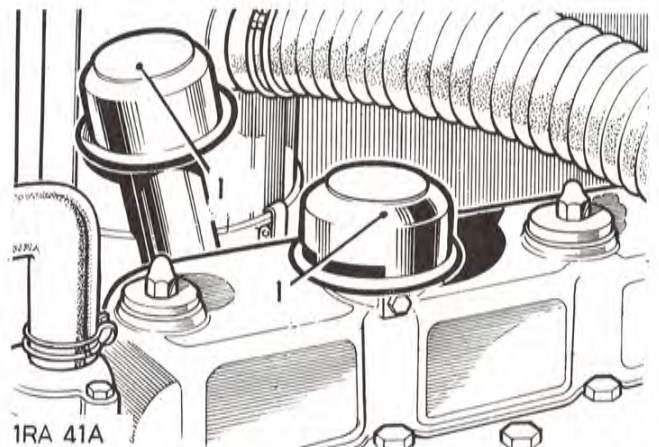
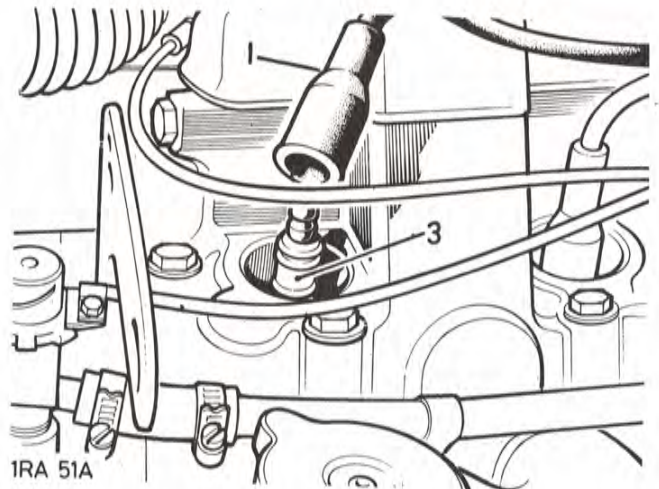
It is important that only the recommended sparking plugs are used for replacements:

- 4-cylinder models 8.0:1, use Champion UN12Y
- 7.0:1, (optional), use Champion N8
- 6-cylinder models, use Champion N5.

**Engine breather filters**—Every 20,000 km (12,000 miles) or 12 months. All models.

Clean as follows:

1. Remove the filters.
2. Wash the gauze thoroughly by swilling the units in petrol.
3. Re-wet the gauzes by dipping in clean engine oil and shake off the surplus; 4-cylinder models, replace the engine breather filter with the slot facing forward and the oil filler filter with the slot facing the rear of the vehicle.
4. Models with sealed engine breather system. Connect hose to top breather.





### Engine compartment

**Battery acid level**—Every month and at every maintenance inspection.

Check weekly when operating under severe conditions. The battery is located under the bonnet at the front right-hand side.

The specific gravity of the electrolyte should be checked at every maintenance inspection. Readings should be:

Temperate climate below 26.5°C (80°F) as commissioned for service, fully charged 1.270 to 1.290 specific gravity.

As expected during normal service, three-quarter charged 1.230 to 1.250 specific gravity.

If the specific gravity should read between 1.190 to 1.210, half-charged, the battery must be bench charged and the electrical equipment in the car should be checked.

Tropical climate above 26.5°C (80°F) as commissioned for service, fully charged 1.210 to 1.230 specific gravity.

As expected during normal service, three-quarter charged 1.170 to 1.190 specific gravity.

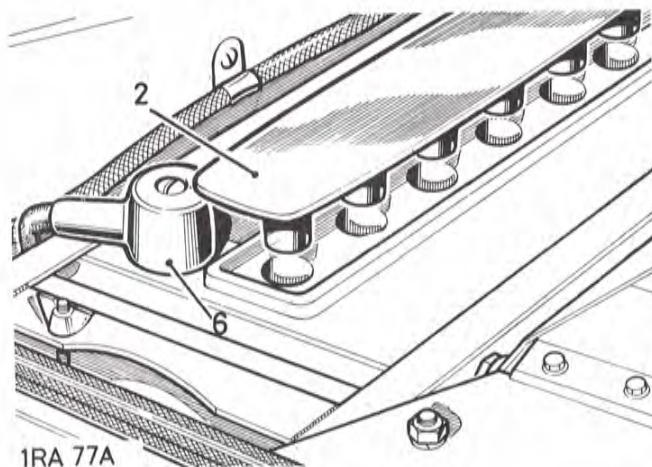
If the specific gravity should read between 1.130 to 1.150, half-charged, the battery must be bench charged and the electrical equipment on the car should be checked.

Check acid level as follows:

1. Wipe all dirt and moisture from the battery top.
2. Remove the filler plugs or manifold lid. If necessary add sufficient distilled water to raise the level to the top of separators. Replace the filler plugs or manifold lid.
3. Avoid the use of a naked light when examining the cells.
4. In hot climates it will be necessary to top up the battery at more frequent intervals.
5. In very cold weather it is essential that the vehicle is used immediately after topping up, to ensure that the distilled water is thoroughly mixed with the electrolyte. Neglect of this precaution may result in the distilled water freezing and causing damage to the battery.

**Battery terminals**—Every 20,000 km (12,000 miles) or 12 months.

6. Remove battery terminals, clean, grease and refit.
7. Replace terminal screw; do not overtighten. Do not use the screw for pulling down the terminal.
8. Do NOT disconnect the battery cables while the engine is running or damage to alternator semiconductor devices may occur. It is also inadvisable to break or make any connection in the alternator charging and control circuits while the engine is running.
9. It is essential to observe the polarity of connections to the battery, alternator and regulator, as any incorrect connections made when reconnecting cables may cause irreparable damage to the semiconductor devices.



1RA 77A

**Engine compartment**

**Radiator water level**—Daily or weekly, depending on operating conditions, and at every maintenance inspection.

1. The radiator filler cap is under the bonnet panel.

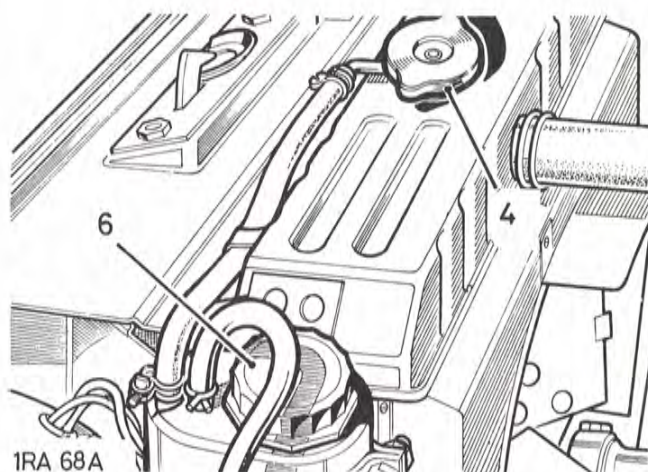
**Diesel models**

2. Never run the engine without water, not even for a very brief period, otherwise the injectors may be seriously damaged. This is due to the very high rate of heat transfer in the region of the injector nozzles.

**All models**

3. The cooling system is pressurised and care must be taken when removing the radiator filler cap, especially when the engine is hot.
4. When removing the filler cap first turn it anti-clockwise to the stop and allow all pressure to escape, before pressing it down and turning further in the same direction to lift it off.
5. When replacing the filler cap, it is important that it is tightened down fully, not just to the first stop. Failure to tighten the filler cap properly may result in water loss, with possible damage to the engine through overheating.
6. All models have a semi-sealed cooling system, that is, an overflow bottle attached to the left-hand side of the radiator.
7. The water level in the cooling system is checked at the radiator only and topping-up is also carried out in the normal manner through the radiator filler. The pipe in the overflow bottle should always be submerged in water.
8. With a cold engine the correct water level is 12 to 19 mm (0.5 to 0.75 in.) below the bottom of the filler neck. For capacities see Division 09.

Use soft water wherever possible; if the local water supply is hard, rainwater should be used.



## Engine compartment

**Cooling system**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

Examine the cooling system for leaks and rectify as necessary. Renew hoses every 80.000 km (48,000 miles).

### Frost precautions

In cold weather, when the temperature may drop to or below freezing point, precautions must be taken to prevent freezing of the water in the cooling system.

As a thermostat is fitted in the system, it is possible for the radiator block to freeze in cold weather even though the engine running temperature is quite high; for this reason, the use of an anti-freezing mixture is essential.

Only anti-freeze solutions conforming to British Standard No. 3151 or 3152 must be used. Prestone, although it does not conform to either Standard, is also suitable.

When the temperature is between 0°C and minus 18°C (32°F and 0°F), use one part of anti-freeze to three parts of water.

Proceed as follows:

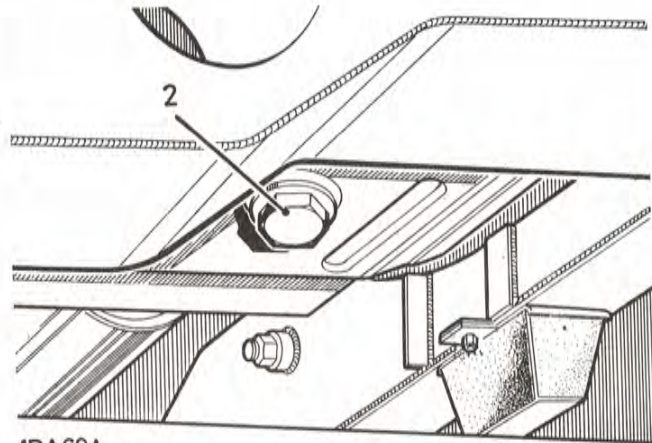
1. Ensure that the cooling system is leak-proof; anti-freeze solutions are far more 'searching' at joints than water.
2. Drain and flush the system. Drain plug under radiator at right-hand side.
3. Drain tap for cylinder block 4-cylinder at left-hand side of engine adjacent to dipstick. 6-cylinder at right-hand side of engine adjacent to engine breather.
4. Pour in approximately 4,5 litres (one gallon) of water, add solution, then top up with water to within 12 to 19 mm (0.5 to 0.75 in.) below bottom of filler neck.
5. Run the engine to ensure a good circulation of the mixture.

During the winter months in Britain Land-Rovers leaving the Rover factory have the cooling system filled with 33% of anti-freeze mixture. This gives protection against frost down to minus 32°C (minus 25°F). Cars so filled can be identified by the blue label affixed to the right-hand side of the windscreen and a blue label tied to the engine.

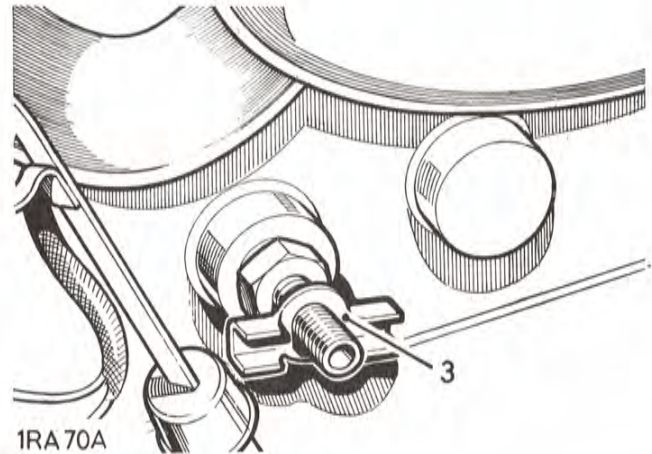
**Water level, windscreen washer as applicable**—Every 1.000 km (750 miles) and at every maintenance inspection.

The windscreen washer reservoir, (optional equipment in some counties), is located on the right-hand bulkhead.

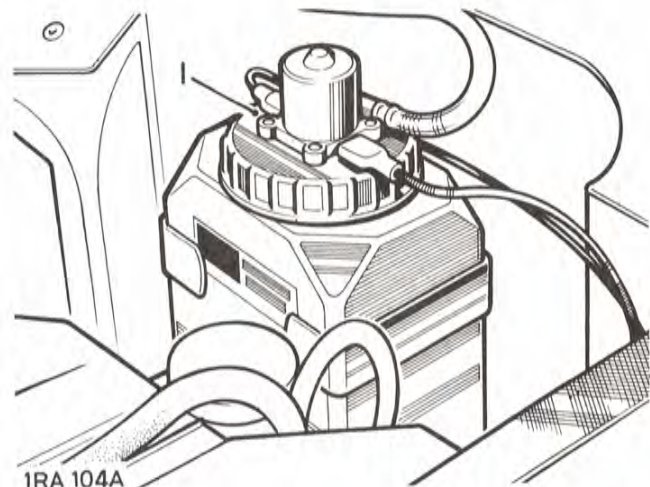
1. Remove reservoir cap by turning anti-clockwise.
2. Top up reservoir to within approximately 25 mm (1 in.) below bottom of filler neck.
3. Use Clearalex windscreen washer powder in the bottle; this will remove mud, flies and road film.
4. In cold weather, to prevent freezing of the water, add 'Isopropyl Alcohol'. Do NOT use methylated spirits, which has a detrimental effect on the screenwasher impeller,



1RA69A



1RA70A



1RA104A

**Engine compartment**

**Fan belt adjustment**—At free service 1.500 km (1,000 miles) and thereafter every 5.000 km (3,000 miles) or 3 months.

*4 cylinder models:*

1. Check by thumb pressure between the fan and crankshaft pulleys. Movement should be 6,3 to 9,5 mm (0.25 to 0.375 in.)

If necessary adjust as follows:

2. Slacken the pivot bolt securing the alternator to the mounting bracket.
3. Slacken the adjusting bolt.
4. Pivot the alternator inwards or outwards as necessary and adjust until the correct belt tension is obtained.
5. Tighten adjusting and pivot bolts.

*6 cylinder models:*

6. Check by thumb pressure between the fan and crankshaft pulleys. Movement should be 8 to 11 mm (0.312 to 0.437 in.) Adjust as above.

**Engine mountings**—At free service 1.500 km (1,000 miles) only.

Check security of engine mountings; rectify as necessary.

**Cylinder head bolts, diesel models**—At free service 1.500 km (1,000 miles) only.

Check, if necessary tighten cylinder head bolts; engine hot.

Torque:

0.5 in. UNF bolts—12,5 mkg (90 lb ft).

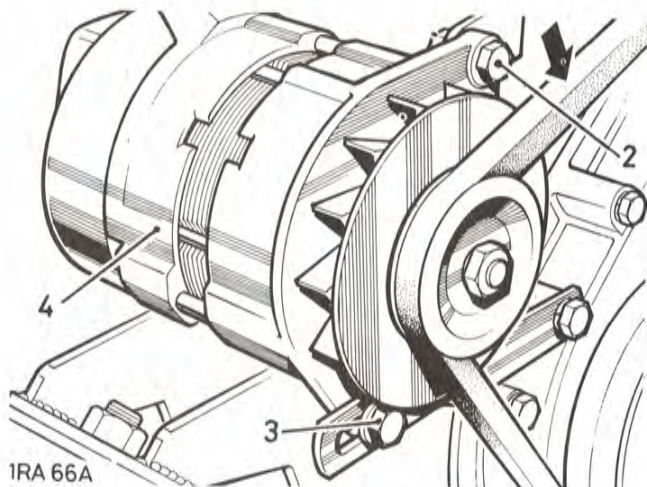
0.312 in. UNF bolts—214 mkg (18 lb ft).

**Tappet adjustment**—Every 20.000 km (12,000 miles) or 12 months.

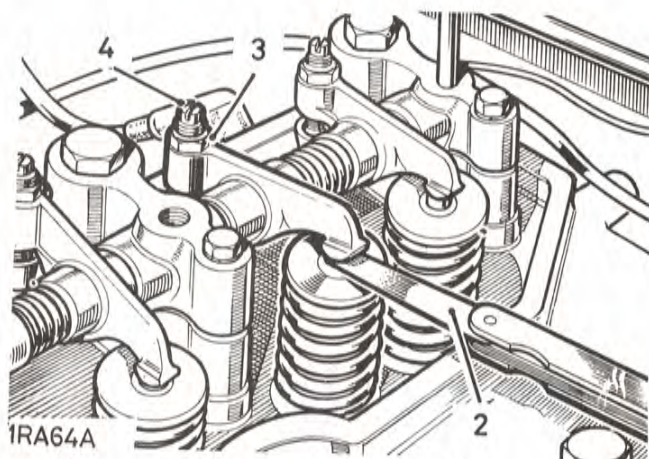
The correct clearance is: 4-cylinder models, inlet and exhaust, 0,25 mm (0.010 in.) engine hot. 6-cylinder models, inlet 0,15 mm (0.006 in.) engine hot and exhaust 0,25 mm (0.010 in.) with the engine hot or cold.

To carry out tappet adjustment, proceed as follows:

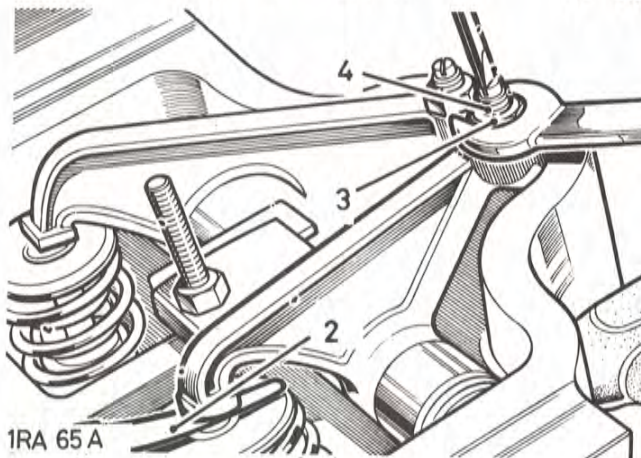
1. Rotate the engine in the running direction until the valve receiving attention is fully open and then rotate the engine one complete turn, to bring the tappet on to the back of the cam.
2. Check the tappet clearance with a feeler gauge.
3. If adjustment is required, slacken the locknut.
4. Rotate the tappet adjusting screw until the clearance is correct; re-tighten the locknut, taking care to ensure that this operation does not upset the clearance.
5. Repeat for the other valves in turn.



1RA 66A



1RA 64A



1RA 65A



## MAINTENANCE

### Engine compartment

**Ignition timing**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.  
Petrol models.

1. In addition to automatic timing advance and retard mechanism, the distributor incorporates an adjuster screw known as the octane selector.
2. This is a vernier adjustment attached to the distributor, fitted with a sliding portion controlled by an adjusting screw. The body of the distributor is marked R (Retard) and A (Advance) to indicate direction of turn.
3. Should pinking develop as a result of the need for decarbonising, the control can be retarded a little by turning the screw in a clockwise direction. Do not forget to return it to the original position after decarbonising.
4. In certain countries very low grade fuel is supplied, in which case it may be necessary to adjust the octane selector to avoid pinking, even with a clean engine.
5. Should the distributor have been disturbed, the ignition timing must be reset as follows:
6. Set the contact breaker point gap to 0,35 to 0,40 mm (0.014 to 0.016 in.) with the points fully open.

#### 2¼ litre petrol models:

7. The timing pointer represent 6° BTDC, 3° BTDC and TDC respectively.
8. Rotate the engine until the mark on the crankshaft pulley is in line with the pointer as follows:

8.0:1 compression ratio

TDC when using 90 octane fuel

3° ATDC\* when using 85 octane fuel

7.0:1 compression ratio (optional)

3° BTDC when using 83 octane fuel

TDC when using 75 octane fuel

\* Estimate this position on pulley

} United  
Kingdom  
use two-star  
grade fuel

#### 2.6 litre 6-cylinder models:

9. Rotate the engine until the appropriate mark on the crankshaft pulley is in line with the pointer as follows:

7.8:1 compression ratio

2° ATDC when using 90 octane fuel

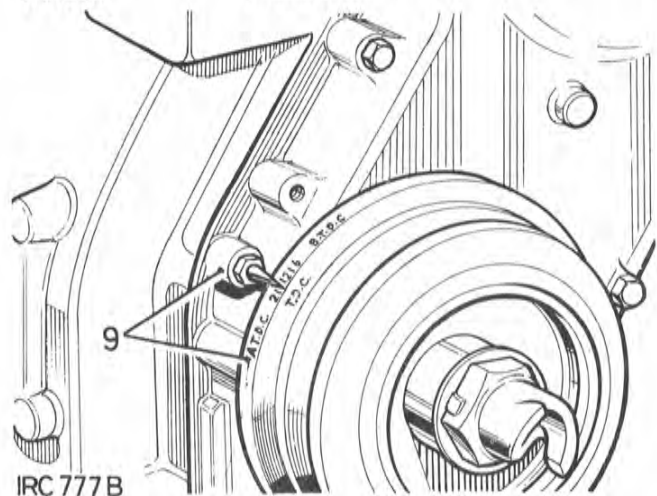
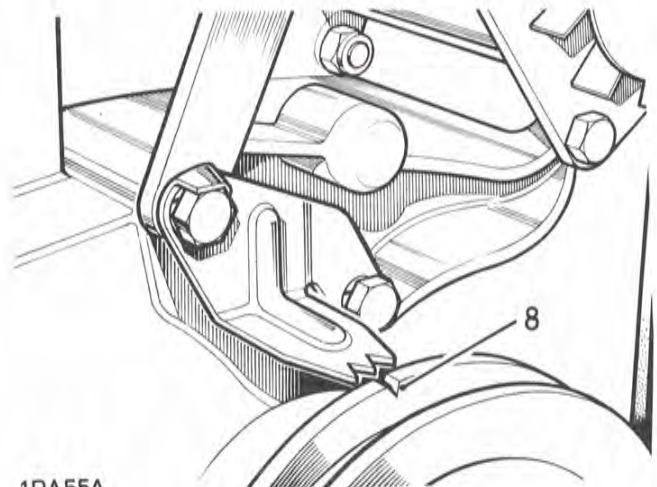
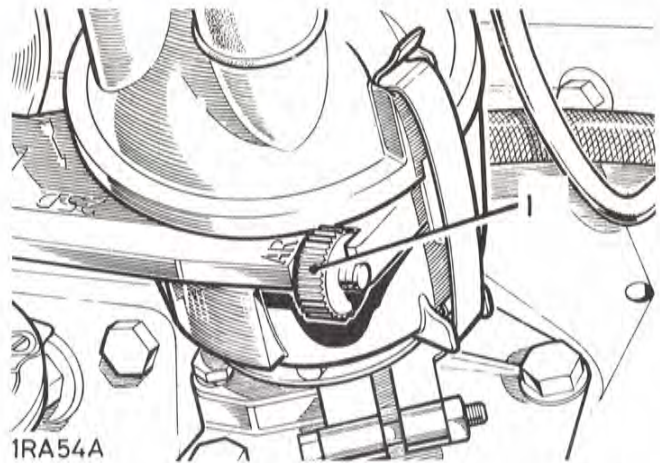
7.0:1 compression ratio (optional)

2° BTDC when using 83 octane fuel

TDC when using 80 octane fuel

2° ATDC when using 78 octane fuel

} United  
Kingdom  
use two-star  
grade fuel



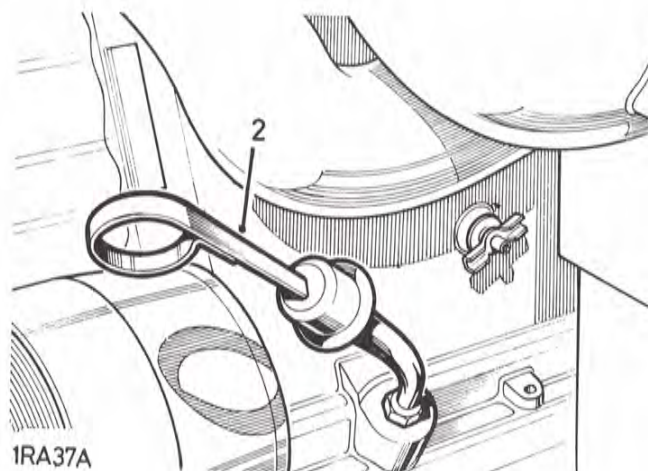
**Engine compartment**

10. The distributor rotor will now correspond with No. 1 cylinder high tension lead terminal.
11. Set the octane selector so that the fourth line from the left-hand side of the calibrated slide is against the face of the distributor body casing.
12. Slacken the pinch bolt at the base of the distributor head, rotate the distributor bodily in the opposite direction to the arrow on the rotor arm until the contact breaker points are just opening with the fibre cam follower on the leading side of the cam; re-tighten the pinch bolt.

**Engine oil level**—Daily or weekly depending on operating conditions. All models.

Proceed as follows:

1. Stand the vehicle on level ground and allow the oil to drain back into the sump.
2. Withdraw the dipstick wipe it clean, re-insert to its full depth and remove a second time to take the reading. Add oil as necessary; never fill above the 'H' mark.
3. The oil level dipstick on 4-cylinder models carries three marks: 'H', 'L' and 'MIN L'. Under normal circumstances the oil level should not be allowed to fall below the minimum level mark 'MIN L'.
4. However, when the Land-Rover is being used at steep angles, the oil should not be allowed to fall below the intermediate mark 'L'. This will obviate any danger of oil pump starvation when the vehicle is facing downhill at a steep angle.



**Accelerator linkage, 4-cylinder petrol models**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

1. Lubricate the accelerator linkage using clean engine oil paying particular attention to accelerator cross shaft brackets, bell crank bushes and ball joint sockets on the control rods.
2. Check the linkage for correct operation and ensure that there is no tendency to stick.  
Badly worn parts should be replaced as soon as possible.

## MAINTENANCE

### Engine compartment

**Carburettor slow-running adjustment**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months. 4-cylinder Petrol models.

The only adjustments provided at the carburettor are a throttle stop screw and a volume control screw.

Should the carburettor require adjustment for any reason, proceed as follows:

1. Run the engine until normal operating temperature is obtained. If necessary adjust the throttle stop screw to give the correct idling speed.
2. Adjust the volume control screw so that the engine will idle evenly with no tendency to stall on snap closure of the throttle.
3. Check that, as the throttle is opened slowly, there is a clear positive acceleration of the engine speed.
4. Finally, it may be necessary to readjust the throttle stop screw to give a satisfactory idle speed.

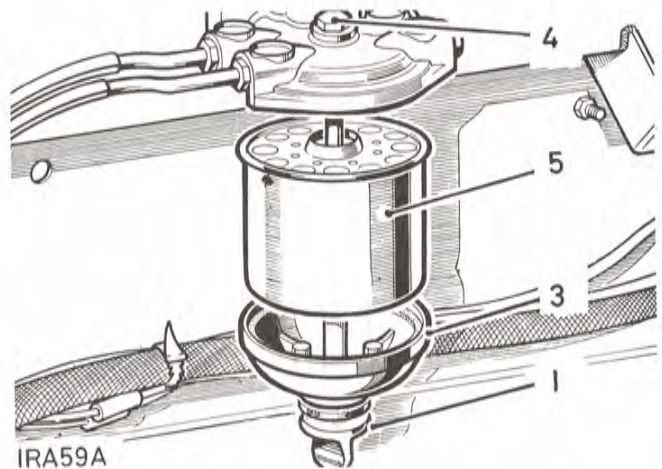
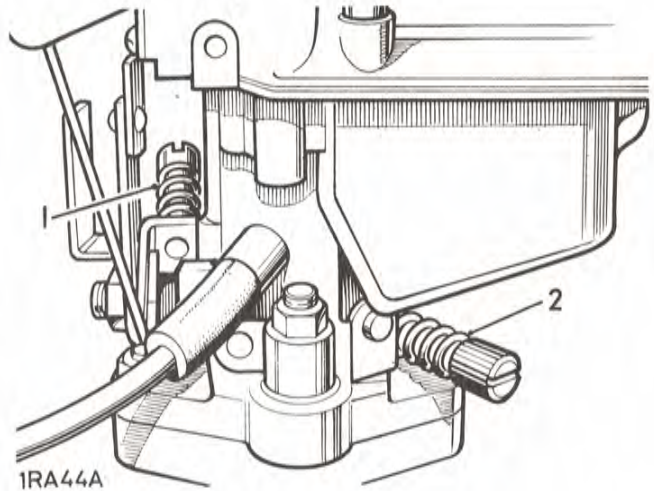
**Fuel filter, paper element type, Diesel models**— Every month, drain off water; Every 20.000 km (12,000 miles) or 12 months, change filter element.

Drain off water as follows:

1. Slacken off drain plug to allow water to run out.
2. When pure diesel fuel is emitted, tighten drain plug.

Change filter element as follows: In some instances it may be advantageous to remove the complete unit before attempting to change the filter element.

3. Support element holder.
4. Unscrew the special bolt on the top of the filter, the element holder can now be removed.
5. Remove and discard the used element.
6. Wash the element holder in petrol or fuel oil.
7. If necessary renew both the large rubber washer and the small rubber washer in the filter top, also renew the large rubber washer in the element holder.
8. Push the new element on to the filter top spigot with the perforated holes in the element to the top.
9. Fit the element holder to the bottom of the element, and secure with the special bolt.
10. Prime the system and check for fuel leaks.



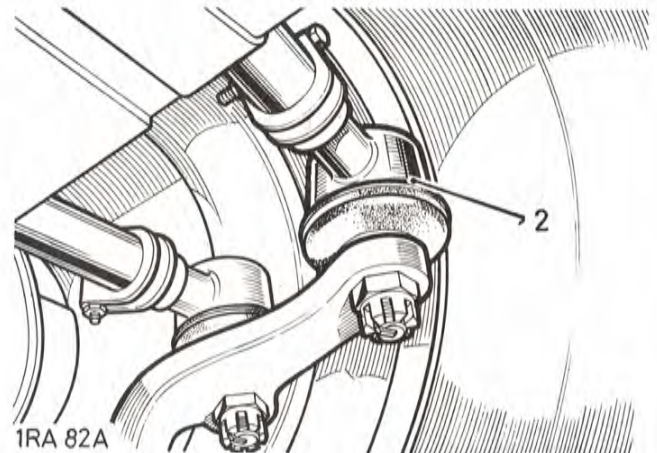
**Underbody**

**Every maintenance inspection**

Check for oil leaks; rectify as necessary.

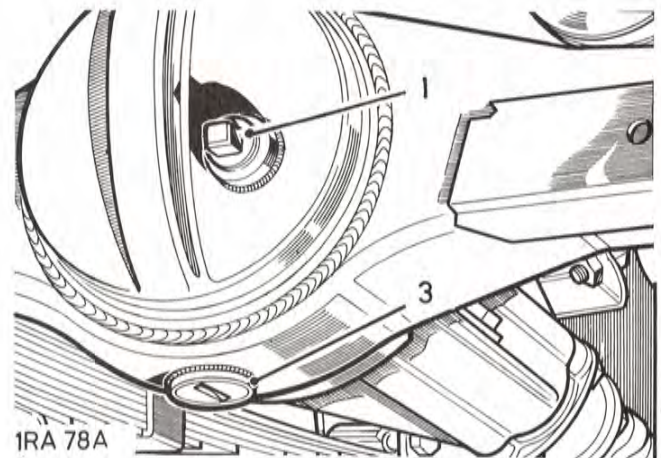
**Steering ball joints—Every maintenance inspection.**

1. Check rubber boots daily when operating under arduous conditions.
2. The steering joints have been designed to retain the initial filling of grease for the normal life of the ball joints; however, this applies only if the rubber boot remains in the correct position. Check to ensure that the rubber boots have not become dislodged or damaged, and check for wear in the joint.
3. This can be done by moving the ball joint vigorously up and down. Should there be any appreciable free movement the complete joint must be replaced.



**Front differential oil level—Every 10,000 km (6,000 miles) or 6 months.**

1. Check oil level and top up if necessary to the bottom of the filler plug hole located at the front of the axle casing. A second plug fitted at the rear of the axle casing can be disregarded.
2. If significant topping up is required check for oil leaks at plugs, joint faces and oil seals adjacent to axle shaft flanges and propeller shaft driving flange.



**Front differential oil changes—At free service 1,500 km (1,000 miles) and thereafter every 40,000 km (24,000 miles) or 24 months.**

To change the differential oil, proceed as follows:

3. Immediately after a run, when the oil is warm, drain off the oil by removing the drain plug in the bottom of the axle casing.
4. Replace the drain plug, remove filler-level plug and refill with oil of the correct grade; the capacity is approximately:  
 Rover type axles—1,75 litres (3 Imperial pints) 3.5 US pints.  
 ENV type axles—1,4 litres (2,5 Imperial pints) 3 US pints.  
 The drain plug has a slotted head and can be removed with the aid of the single-ended spanner in the tool kit.





Underbody

**Swivel pin housing oil level**—Every 10.000 km (6,000 miles) or 6 months.

1. The front wheel drive universal joints, swivel pins and front hubs receive their lubrication from the swivel pin housings. Check oil level and top up if necessary to the bottom of the filler-level plug holes at the rear of the housings.
2. If significant topping up is required check for oil leaks at plugs, joint faces and oil seals.

**Swivel pin housing oil changes**—At free service 1.500 km (1,000 miles) and thereafter every 40.000 km (24,000 miles) or 24 months.

To change the swivel pin housing oil, proceed as follows:

3. Immediately after a run, when the oil is warm, remove the drain plug from the bottom of each housing; allow the oil to drain away completely and replace the plugs. Refill with oil of the correct grade through the filler-level plug holes; the capacity of each housing is approximately 0,5 litre (1 Imperial pint) 1.2 US pints.

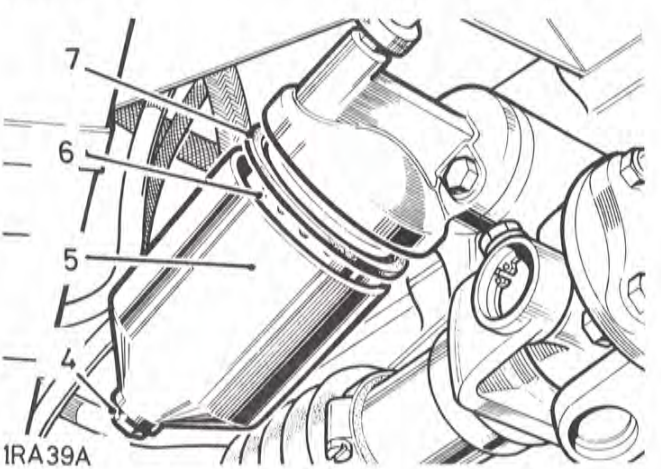
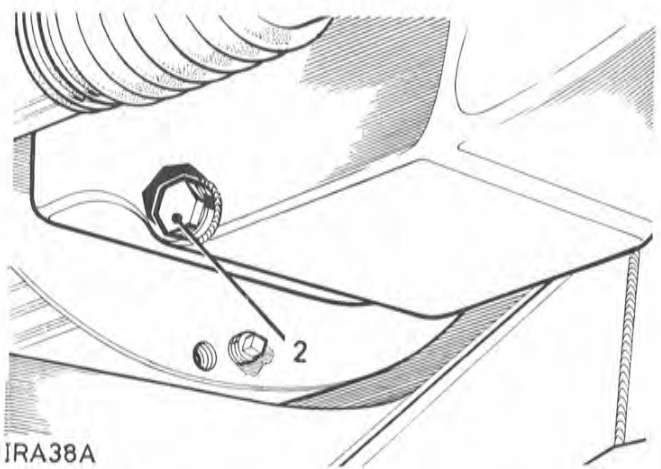
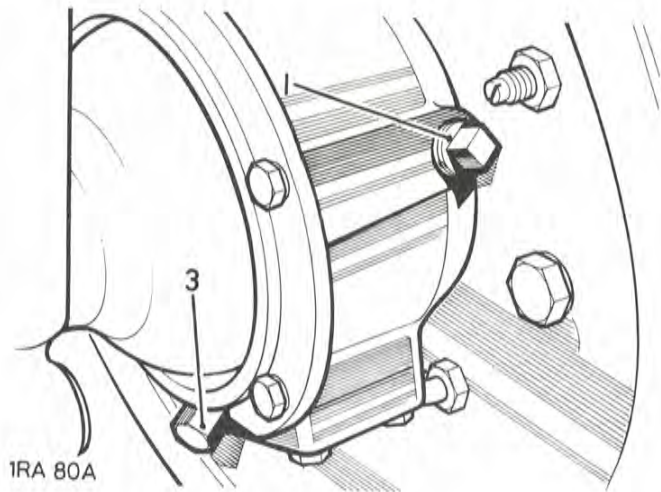
**Engine oil changes and filter replacement.** Oil changes—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months. **Filter replacment** — Every 10.000 km (6,000 miles) or 6 months.

To change the engine oil:

1. Run the engine to warm up the oil, then stop.
2. Remove the drain plug in the right-hand side of the sump. Allow oil to drain away completely and replace the plug.

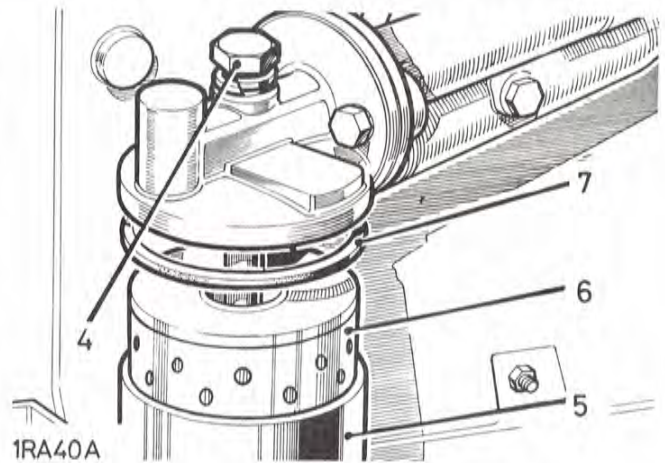
To change filter located at right-hand side of engine on 4-cylinder models, left-hand side on 6-cylinder models.

3. Place oil tray under engine.
4. Unscrew the bolt from the filter adaptor.
5. Remove the container.
6. Remove the element.
7. Discard the used filter element and large rubber washer.
8. Wash the container in petrol.



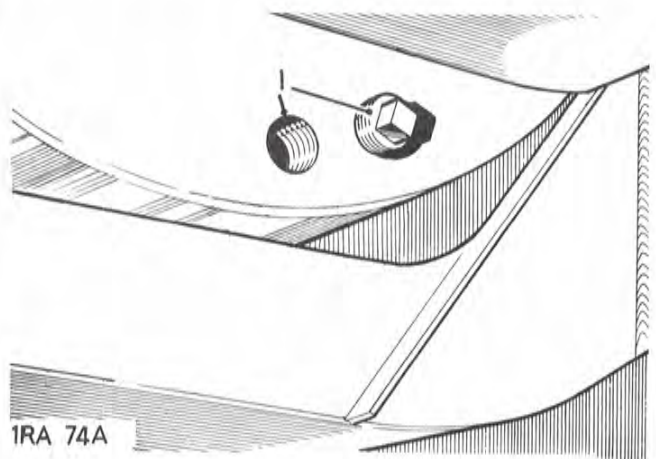
**Underbody**

9. Place the new filter element in the container and reassemble the unit, using the new large rubber washer supplied with the element.
10. Ensure that all the sealing washers are in position and intact, and that the container is correctly located in the adaptor.
11. Refill with oil of the correct grade through the filler at the front of the engine; the total capacity including filter is: 4-cylinder models: 6,0 litres (11 Imperial pints) 12 US pints; 6-cylinder models: 5,5 litres (10 Imperial pints) 11 US pints.
12. Run engine and check for oil leaks at filter and drain plug.



**Flywheel housing drain plug**—Every 5,000 km (3,000 miles) or 3 months. When in use for wading.

1. The flywheel housing can be completely sealed to exclude mud and water under severe wading conditions, by means of a plug fitted in the bottom of the housing.
2. The plug is screwed into a hole adjacent to the drain hole and should only be fitted when the vehicle is expected to do wading or very muddy work.
3. When the plug is in use it must be removed periodically and all oil allowed to drain off before the plug is replaced.

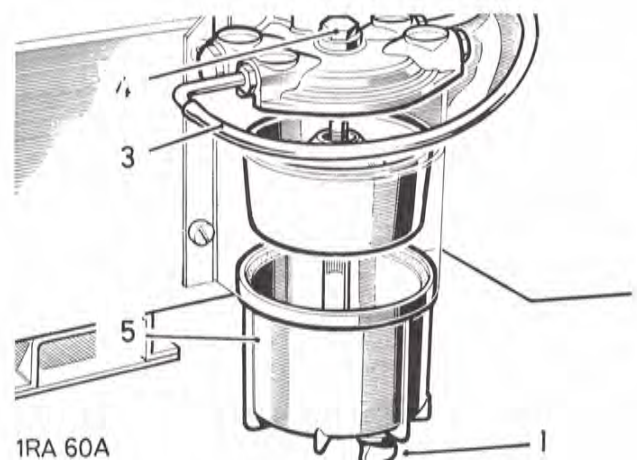


**Fuel sedimenter. Diesel models**—Every month, drain off water. At free service 1,500 km (1,000 miles) and thereafter every 20,000 km (12,000 miles) or 12 months, dismantle and clean.

The sedimenter increases the working life of the fuel filter by removing the larger droplets of water and larger particles of foreign matter from the fuel.

Drain off water as follows:

1. Slacken off drain plug to allow water to run out.
2. When pure diesel fuel is emitted, tighten drain plug. Dismantle and clean as detailed below:
3. Disconnect fuel inlet pipe at sedimenter and raise pipe above level of fuel tank to prevent draining from tank. Support in this position.
4. Support sedimenter bowl and unscrew bolt on top of unit.
5. The lower bowl and element can now be removed.
6. Clean all parts in petrol.
7. Fit new oil seals and reverse removal procedure.
8. Slacken off the drain plug, when pure diesel fuel runs out tighten plug. Start engine and check for air leaks.



## Underbody

### Fuel pump 6-cylinder petrol models.

A dual fuel pump is fitted at the right-hand chassis side member.

On vehicles with one fuel tank both pumps will operate immediately the ignition is switched on, so filling the carburettor for easy starting.

With twin tank installations the pump connections are such that the primary and secondary pumps draw on the main and additional fuel tank respectively.

The secondary pump should be used once a week for a few miles driving to ensure that it is kept in good condition.

The change-over switch is situated on the heelboard.

### Main gearbox oil level—Every 10,000 km (6,000 miles) or 6 months.

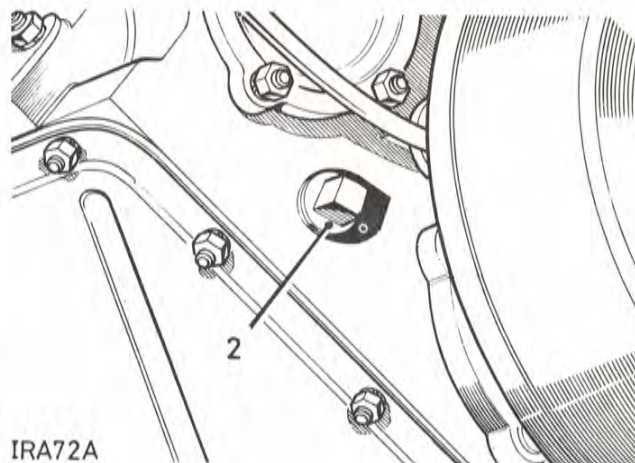
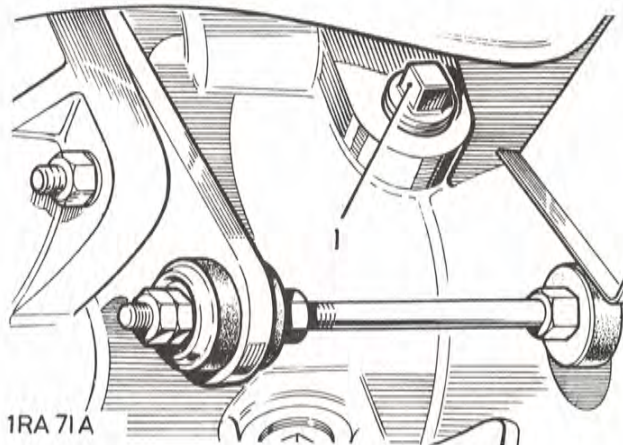
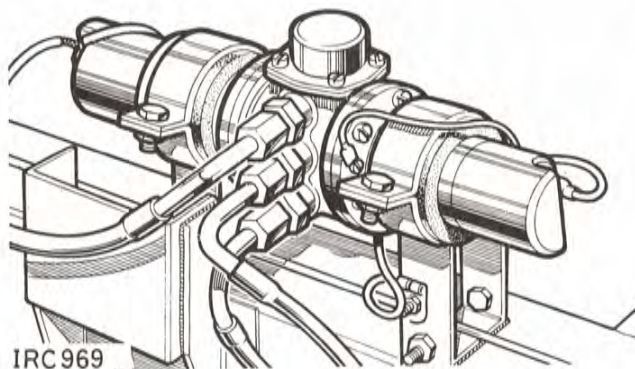
Check oil level daily or weekly when operating under severe wading conditions.

1. The main gearbox and clutch withdrawal mechanism are lubricated as one unit. Check oil level and top up if necessary to the bottom of the filler-level plug hole.
2. If significant topping up is required check for oil leaks at drain and filler plugs, all joint faces and through drain hole in bell housing.

### Transfer box oil level—Every 10,000 km (6,000 miles) or 6 months.

Check oil level daily or weekly when operating under severe wading conditions.

1. The transfer box and front wheel drive housing are lubricated as one unit.
2. Check oil level and top up if necessary to the bottom of the filler-level plug hole. The filler-level plug is in the rear face of the transfer box.
3. If significant topping up is required check for oil leaks at drain and filler plugs, all joint faces and through drain hole in bell housing.



**Underbody**

**Main gearbox oil changes**—At free service 1.500 km (1,000 miles) and thereafter every 40.000 km (24,000 miles) or 24 months.

Drain and refill monthly when operating under severe wading conditions.

To change the gearbox oil, proceed as follows:

1. Immediately after a run, when the oil is warm, drain off the oil by removing the drain plug in the bottom of the gearbox casing.
2. Replace the drain plug and refill gearbox with the correct grade of oil through the filler-level plug. The capacity is: 1,5 litres (2.5 Imperial pints) 3 US pints.

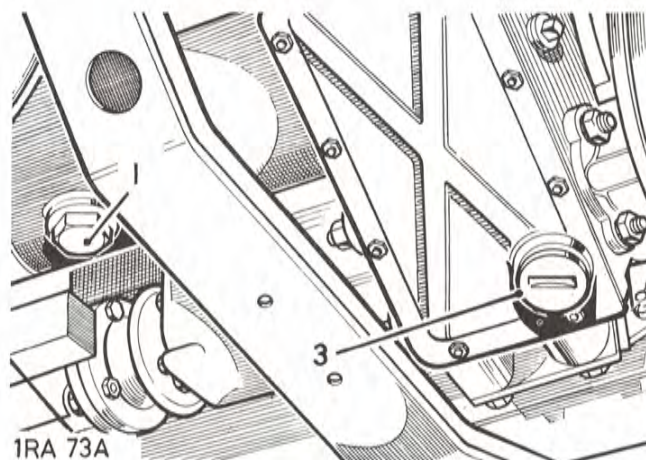
**Transfer box oil changes**—At free service 1.500 km (1,000 miles) and thereafter every 40.000 km (24,000 miles) or 24 months.

Drain and refill monthly when operating under severe wading conditions.

To change the transfer box oil proceed as follows:

3. Immediately after a run, when the oil is warm, drain off the oil by removing the drain plug in the bottom of the transfer box.
4. Replace the drain plug and refill transfer box with the correct grade of oil.

The capacity is: 2,5 litres (4.5 Imperial pints) 5.4 US pints.



**Handbrake linkage**—Every 10.000 km (6,000 miles) or 6 months.

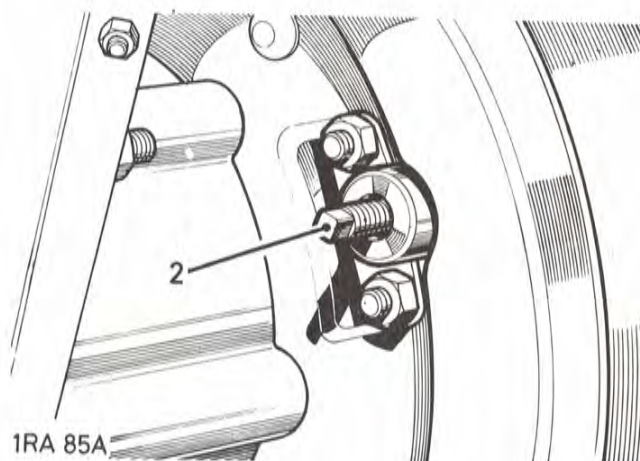
The handbrake operates a mechanical brake unit mounted on the output shaft from the transfer box.

Lubricate the handbrake linkage and check for worn parts. Take care not to contaminate the handbrake linings with oil.

**Transmission brake adjustment**—Every 20.000 km (12,000 miles) or 12 months.

If handbrake movement is excessive, adjust as follows:

1. Release the hand brake. The adjuster protrudes from the front of the brake backplate.
2. During rotation of the adjuster a click will be felt and heard at each quarter revolution. Rotate adjuster in a clockwise direction until the brake shoes contact the drum. Then unscrew the adjuster two clicks and give the hand brake a firm application to centralise the shoes.



## MAINTENANCE

### Underbody

**Propeller shaft lubrication**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

1. Apply one of the recommended greases at the lubrication nipple on the sliding portion of the rear propeller shaft.
2. To the lubrication nipples fitted to the universal joints of both front and rear shafts.

**Front propeller shaft sliding portion**—Every 40.000 km (24,000 miles) or 24 months.

Lubricate the sliding spline on the front propeller shaft, with one of the recommended greases, as follows:

1. Disconnect one end of the propeller shaft.
2. Remove plug in sliding spline and fit a suitable grease nipple.
3. *Important.* Compress propeller shaft at sliding joint to avoid overfilling, then apply grease.
4. Replace grease nipple with plug and reconnect propeller shaft.

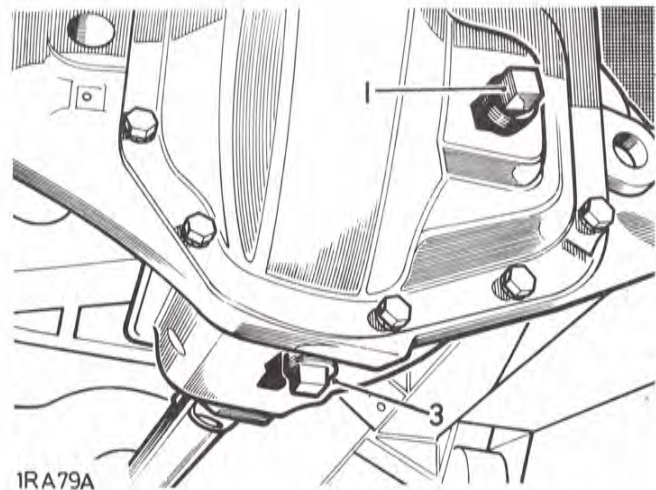
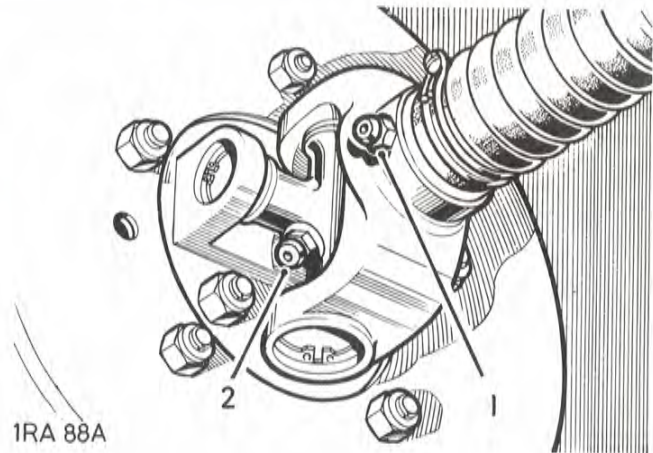
**Rear differential oil level**—Every 10.000 km (6,000 miles) or 6 months.

1. Check oil level and top up if necessary to the bottom of the filler plug hole.
2. If significant topping up is required check for oil leaks at plugs, joint faces and oil seals adjacent to axle flanges and propeller shaft driving flange.

**Rear differential oil changes**—At free service 1.500 km (1,000 miles) and thereafter every 40.000 km (24,000 miles) or 24 months.

To change the differential oil, proceed as follows:

3. Immediately after a run, when the oil is warm, drain off the oil by removing the drain plug in the bottom of the axle casing.
4. Replace the drain plug, remove filler-level plug and refill with oil of the correct grade; the capacity is approximately: 2,5 litres (4.5 Imperial pints) 5.4 US pints.



### Underbody

**Transmission fixings**—At free service 1.500 km (1,000 miles) only. Check security of transmission fixings, rectify as necessary.

**Exhaust system, fuel, clutch and brake pipes**—Every 5.000 km (3,000 miles) or 3 months.

1. Check exhaust system fixings for security, paying particular attention to heat shields, flexible mounting plates and clamps.
2. Examine the system for signs of leakage and blowing. Any silencers or pipes found to be leaking or badly corroded should be replaced.
3. At the same time check all fuel, clutch and brake pipes, unions and hoses for signs of leakage, corrosion, chafing or damage.

### Passenger compartment

**Foot and handbrake**—Every 5.000 km (3,000 miles) or 3 months.

1. Check operation of foot and handbrake, ensure that the brake pedal travel is not excessive and maintains a satisfactory pressure under normal working load.
2. Excessive pedal travel indicates worn brake linings or the necessity for adjustment.
3. If the brakes feel spongy this may be caused by air in the hydraulic system and must be removed by bleeding the system at each wheel cylinder.
4. Prior to this operation, all hydraulic hoses, pipes and connections should be checked for leaks and any leaks rectified.
5. Check operation of handbrake and ensure that it holds the vehicle satisfactorily.

**Electrical and interior equipment**—Every maintenance inspection.

6. Check operation of all lamps, direction indicators, warning lights, horn, instruments and other equipment.

**Seats, safety belts and rear view mirrors**—Every 5.000 km (3,000 miles) or 3 months.

7. Check all seat fixings for security and examine condition of safety harness. Safety harness which have been used in an accident or are frayed or cut, must be replaced.
8. Check rear view mirror(s) for security and examine mirror face for signs of cracks or crazing.

**Door locks and mechanisms**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

9. Check operation of all door locks and mechanisms, window controls, safety catches, bonnet catch etc; apply a few spots of oil as necessary.



## MAINTENANCE

### Exterior

**Wheel brake adjustment**—Every 5,000 km (3,000 miles) or 3 months.

When the vehicle is used in deep muddy conditions the brake drums must be periodically removed and cleaned, at the same time the brake shoes and anchor plate should be thoroughly cleaned.

When used continuously under exceptionally wet and muddy conditions this operation may be advisable once, or even twice a week, to prevent the abrasive action of packed mud rapidly wearing out brake linings and drums.

When lining wear has reached the point where the pedal travel becomes excessive, it is necessary to adjust the brake shoes in closer relation to the drum.

Proceed as follows:

#### 88 Models

1. Jack up each wheel in turn.
2. On the back face of the brake anchor plate will be found a hexagon adjustment bolt which operates a snail cam bearing on the leading shoe. Only one of these is fitted to each wheel brake unit, thereby providing single-point adjustment.
3. Spin the wheel and rotate the adjuster bolt until the brake shoe contacts the drum, then ease the adjuster until the wheel again rotates freely.
4. Repeat for the other three wheels.

#### 109 Models

5. Each shoe is independently set by means of a hexagon adjustment bolt operating through a serrated snail cam.
6. Apply the brakes and set the snail cam adjusters so that the brake shoes are in firm contact with the drums.
7. Slacken off each adjuster just sufficiently for the drum to rotate freely.
8. Repeat for the other wheels in turn.

**Note:** The rear brake shoes should be adjusted individually to obtain the best results.

**Changing wheel positions**—Every 10,000 km (6,000 miles) or 6 months.

The road wheels should be changed round as illustrated to equalise tyre wear.

When cross-country tyres are used, the 'V' tread should be directed to the front at the top.

**Warning:** Do not touch the outer ring of nuts on divided type wheels, (optional equipment) unless the wheel is removed and the tyre fully deflated, or severe personal injury may result.

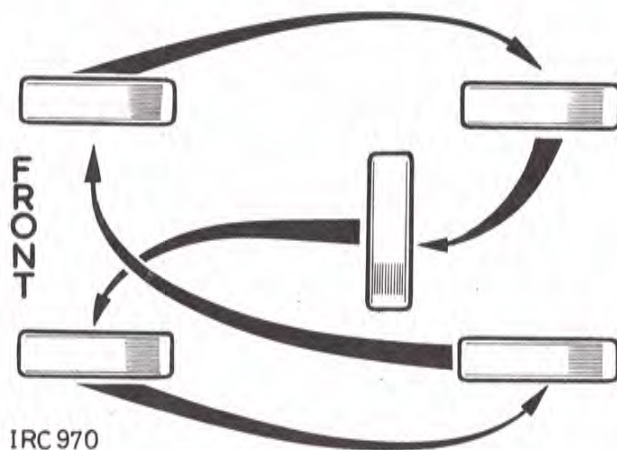
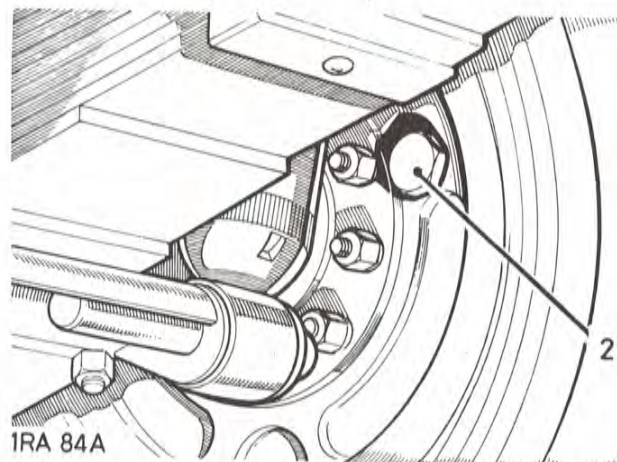
**IMPORTANT.** As the Land-Rover is fitted with a transmission brake, it is necessary before removing a road wheel to apply the hand brake and engage four-wheel drive.

This will ensure that the hand brake is operative on all four wheels.

Remember to engage two-wheel drive when the road wheel has been replaced.

**Road wheel nuts**—Every maintenance inspection.

Check road wheel nuts, tighten as necessary.



Exterior

Tyre pressures—Every month and at every maintenance inspection.

Maximum tyre life and performance will only be obtained if the tyres are maintained at the correct pressures.

Model		Normal				Emergency soft			
		Load under 250 kg (550 lb.)		Load over 250 kg (550 lb.)		Load under 250 kg (550 lb.)		Load over 250 kg (550 lb.)	
		Front	Rear	Front	Rear	Front	Rear	Front	Rear
88 models 6.00 6.50 and 7.00 x 16.00	kg/cm <sup>2</sup>	1.8	1.8	1.8	2.1	1.1	1.1	1.1	1.4
	lb/sq in.	25	25	25	30	15	15	15	20
	bars	1.72	1.72	1.72	2.07	1.03	1.03	1.03	1.38
7.50 x 16.00	kg/cm <sup>2</sup>	1.8	1.8	1.8	2.1	0.8	0.8	0.8	1.4
	lb/sq in.	25	25	25	30	12	12	12	20
	bars	1.72	1.72	1.72	2.07	0.83	0.83	0.83	1.38
109 models	kg/cm <sup>2</sup>	1.8	1.8	1.8	2.5	1.1	1.1	1.1	1.8
	lb/sq in.	25	25	25	36	15	15	15	26
	bars	1.72	1.72	1.72	2.48	1.03	1.03	1.03	1.79
Michelin 7.50 x 16.00 XY	kg/cm <sup>2</sup>	1.8	1.8	1.8	3.0	1.1	1.1	1.1	2.5
	lb/sq in.	25	25	25	42	15	15	15	35
	bars	1.72	1.72	1.72	2.89	1.03	1.03	1.03	2.41
9.00 x 16.00	kg/cm <sup>2</sup>	1.4	1.4	1.4	2.1	0.7	0.7	0.7	1.4
	lb/sq in.	20	20	20	30	10	10	10	20
	bars	1.38	1.38	1.38	2.07	0.7	0.7	0.7	1.38

1. Whenever possible check with the tyres cold as the pressure is about 0,1 kg/cm<sup>2</sup> (2 lb/sq in.) 0,14 bars higher at-running temperature.
2. Always replace the valve caps as they form a positive seal on the valves.
3. Any unusual pressure loss in excess of 0,05 to 0,20 kg/cm<sup>2</sup> (1 to 3 lb/sq in.) 0,07 to 0,21 bars per week should be investigated and corrected.
4. Always check the spare wheel so that it is ready for use at any time.
5. At the same time remove embedded flints etc. from the tyre treads with the aid of a penknife or similar tool and check that the tyres have no breaks in the fabric or cuts to sidewalls etc. Clean off any oil or grease on the tyres using white spirit sparingly.
6. Check that there are no lumps or bulges in the tyres or exposure of the ply or cord structure.
7. 'Butyl' synthetic innertubes are fitted and all repairs must be vulcanised.
8. It is an offence to run tyres when the tread pattern of the tyre does not have a depth of at least 1 mm throughout at least threequarters of the breadth of of the tread and round the entire outer circumference of the tyre.
9. It is advisable to run-in new tyres by driving at reasonable speeds for the first 400 km (250 miles) or so before driving at higher speeds.





## MAINTENANCE

### Exterior

#### Headlamp beam setting—Every maintenance inspection.

1. This operation requires special equipment and should be carried out by a Rover Distributor or Dealer.
2. In an emergency each headlamp can be adjusted by means of a headlamp horizontal adjusting screw.
3. The headlamp vertical adjusting screw.  
The adjusting screws are accessible through slots in the headlamp bezel.

#### Windscreen wiper blades—Check, if necessary replace every 5.000 km (3,000 miles) or 3 months.

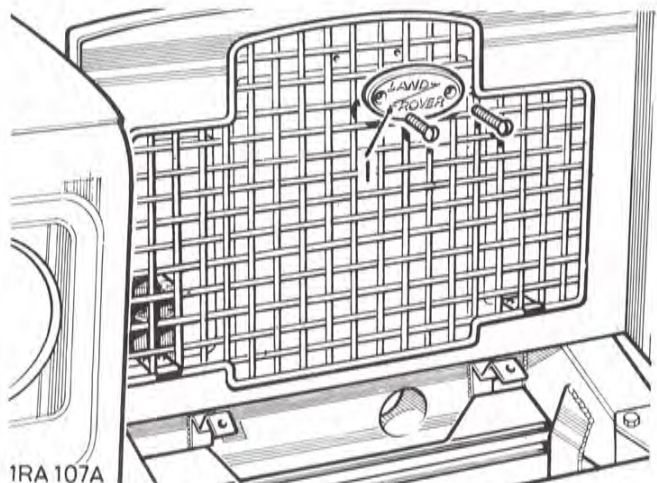
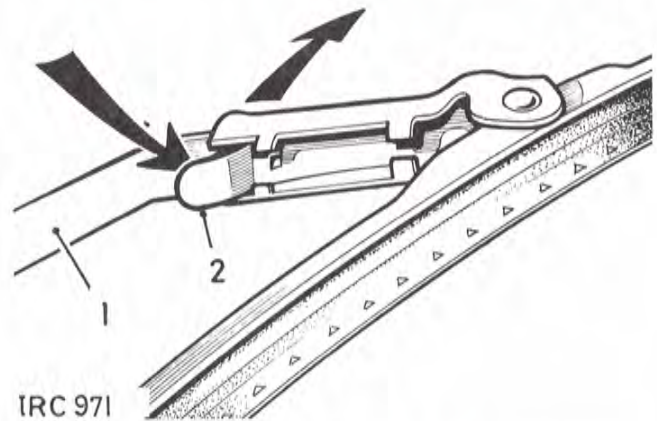
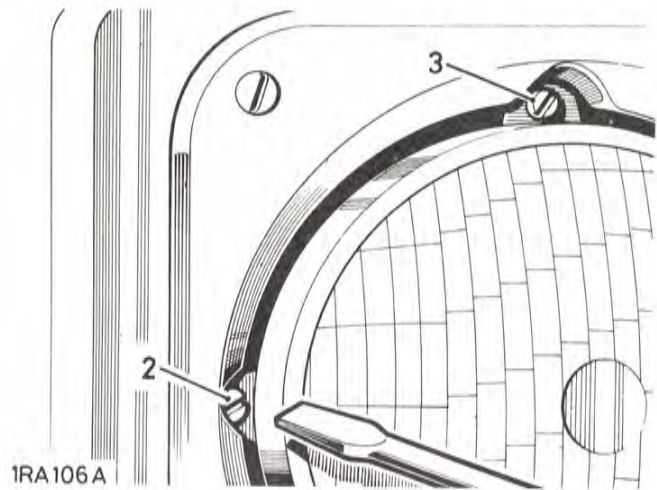
Examine condition of wiper blades, replace as necessary:

1. Full wiper arm forward.
2. Lift spring clip and withdraw blade from wiper arm.
3. To fit new blade reverse removal procedure.

#### Steering relay unit—Every 20.000 km (12,000 miles) or 12 months.

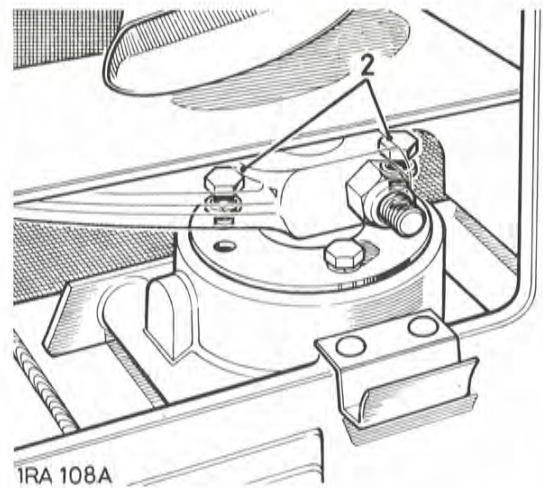
Check oil level and top-up if necessary until the oil is visible at the base of the filler and breather holes. If significant topping-up is required, check joints for leakage and fit new joint washers as necessary. To check oil level and top up, proceed as follows:

1. Remove the name plate and withdraw radiator grille.
2. Remove two of the bolts securing the relay top cover.
3. Using one of the holes as an oil filler (the other acting as a breather hole) fill the relay unit with the correct grade of lubricating oil to the bottom of the filler hole.



**Exterior**

4. Whilst filling, it is probable that oil will eject through the breather hole. If this occurs *do not* assume that the relay unit is full. Time must be given to allow the oil to find its way to the main chamber. Wait a few moments until the breather hole is clear of oil, then continue filling.
5. As the unit fills up, air is forced out usually in the form of an oil bubble, escaping through the breather hole, again giving the impression that the unit is full. Wait for the bubble to subside, then continue filling in this manner until the oil is clearly visible at the base of the filler and breather holes.
6. Replace the two top cover bolts.  
Refit the radiator grille and name plate.



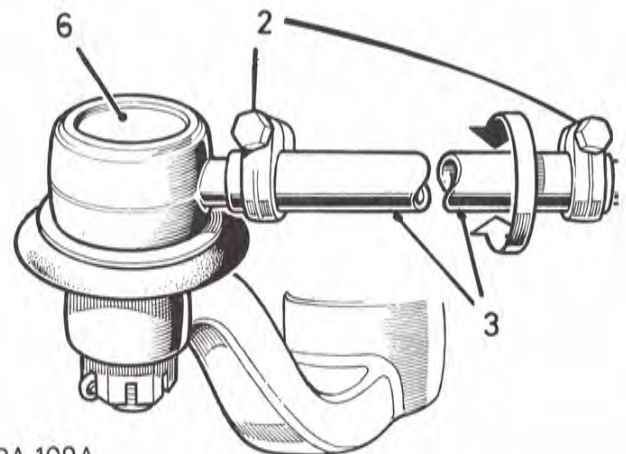
**Wheel alignment**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

Special equipment is required to check wheel alignment and this work should be carried out by a Rover Distributor or Dealer.

For those owners who have suitable equipment, the alignment should be 1,2 to 2,4 mm (0.046 to 0.093 in.) toe-in.

**To adjust**

1. Set the vehicle on level ground with the road wheels in the straight ahead position and push it forward a short distance.
2. Slacken the clamps securing the ball joints at each end of the track rod.
3. Turn the track rod to decrease or increase its effective length as necessary until the toe-in is correct.
4. Push the vehicle rearwards turning the steering wheel from side to side to settle the ball joints, then with the road wheels in the straight ahead position, push the vehicle forward a short distance.
5. Recheck the toe-in, if necessary carry out further adjustment.
6. When the toe-in is correct, lightly tap the track rod ball joints towards the rear of the vehicle to the maximum of their travel. This ensures full unrestricted movement of the track rod. Then secure the ball joint clamps.



### Road Test

**Road test**—At free service 1.500 km (1,000 miles) and thereafter every 10.000 km (6,000 miles) or 6 months.

Give the vehicle a thorough road test and carry out any further adjustments required including brakes, clutch, throttle linkage etc.

Check steering and all gears in high and low range including the high range four-wheel drive control.

Check operation of all lights and instruments. After test check for oil, fuel and fluid leaks at all plugs, flanges, joints and unions.

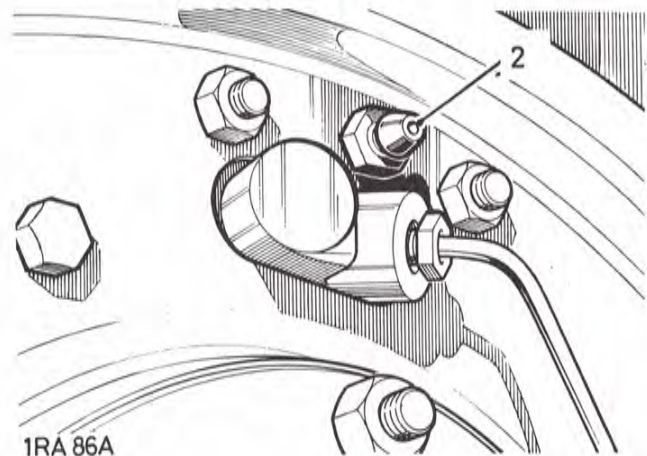
### Preventive Maintenance

#### Bleeding the brake system.

When the fluid in the hydraulic system has been changed or any components replaced it will be necessary to remove the air by bleeding the hydraulic system at each wheel cylinder. Bleeding must always be carried out at all wheels.

Proceed as follows:

1. Slacken the adjusters off on all brake shoes.
2. Attach a length of rubber tubing to the bleed screw on the wheel cylinder furthest from the brake pedal and place the lower end of the tube in a glass jar containing brake fluid.
3. Slacken the bleed screw and depress the brake pedal and release slowly. Pause at each end of the return stroke to allow the master cylinder to recuperate. Continue pumping in this manner until the fluid issuing from the tube shows no signs of air bubbles when the tube is held below the surface of the fluid in the jar.
4. Hold the tube under the fluid surface and, with the foot brake fully depressed, tighten the bleed screw. Do not overtighten.
5. Repeat for the other three wheels in turn, finishing at the one nearest the brake pedal.
6. Pump brake pedal until rear shoes are in firm contact with the brake drums.
7. While holding pedal depressed, adjust rear adjusters up to the shoes.
8. Release pedal and slacken rear adjusters until shoes are just clear of the drums.
9. Adjust front shoes in the normal manner.



**Preventive Maintenance**

The fluid in the reservoir should be replenished throughout the operation, to prevent another air lock being formed, using only new fluid. Castrol Girling Brake and Clutch Fluid 'Crimson' (Specification J. 1703).

It will be obvious that the above operation requires two people.

**Fluid changing, brake system**—Every 30.000 km (18,000 miles) or 18 months.

All brake fluid absorbs moisture from the air and as a result its boiling point is lowered with a consequent deterioration in performance. In a sealed brake system, water absorption takes place over a period and can, if not remedied reduce brake performance to a dangerous level.

All the fluid in the brake system should be changed every 30.000 km (18,000 miles) or eighteen months. It should also be changed before touring in mountainous areas, if not done in the previous nine months. Use only Castrol Girling Brake and Clutch Fluid 'Crimson' (Specification J. 1703) from sealed tins.

**Rubber seals in brake system**—Every 60.000 km (36,000 miles) or 36 months.

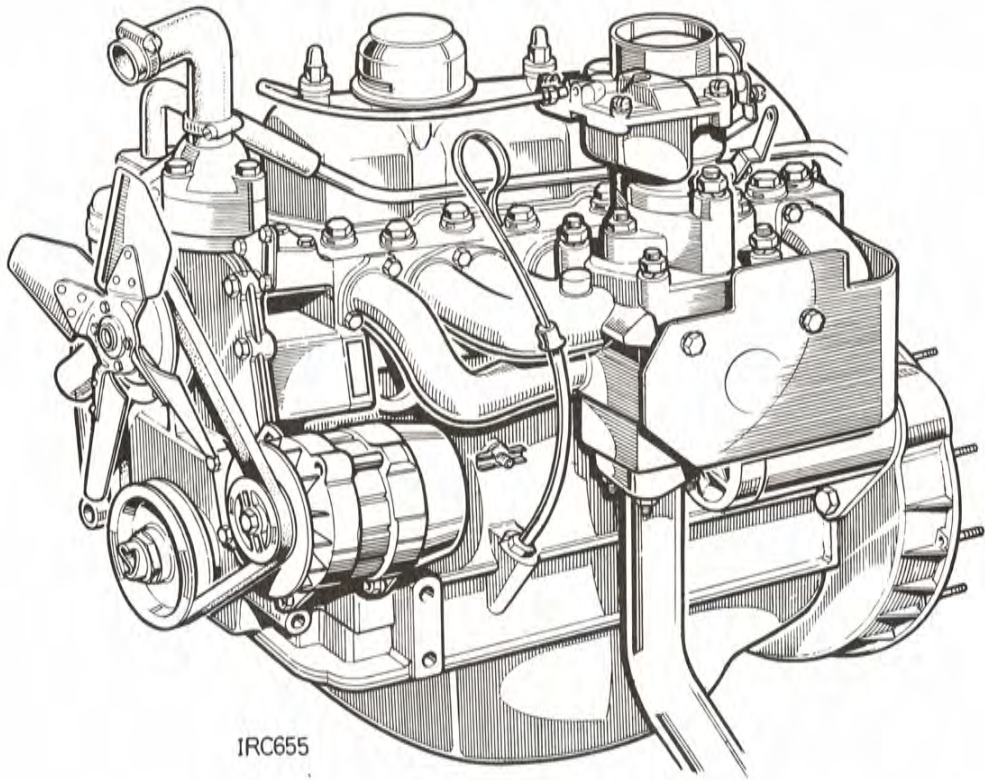
Renew all rubber seals in master cylinder, wheel cylinders and servo unit where applicable. This should be done every three years if mileage travelled is less than 60.000 km (36,000 miles). Refill with correct fluid, that is, Castrol Girling Brake and Clutch Fluid 'Crimson' (Specification J. 1703).





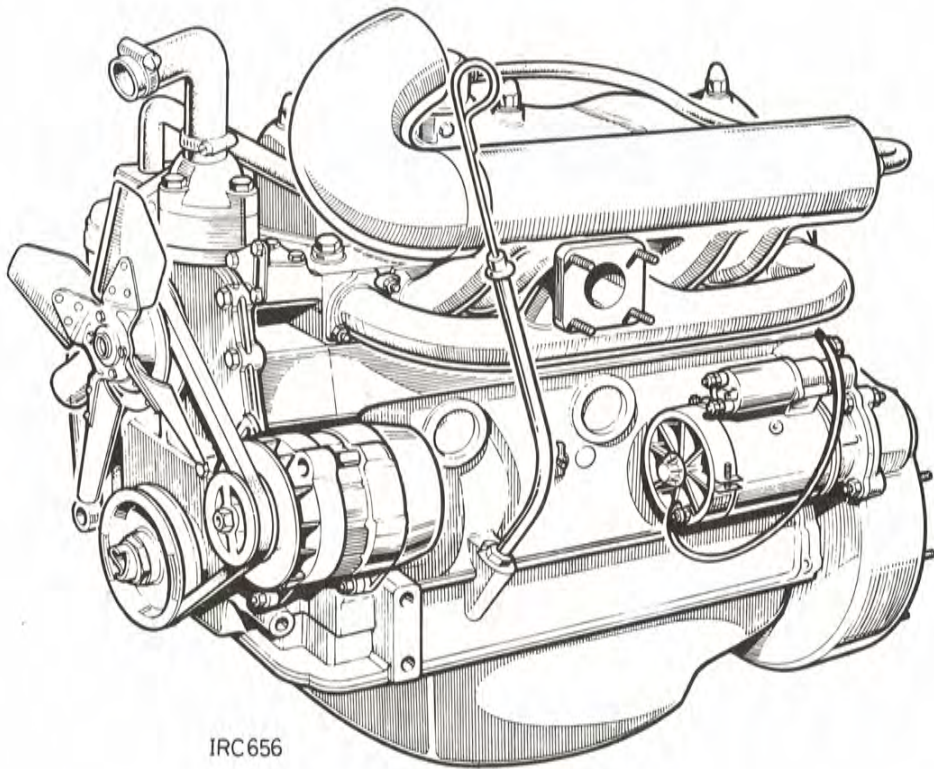
## ENGINE OPERATIONS

Camshaft																
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.13.01
—bearings—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.13.13
Connecting rods and pistons																
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.17.01
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.17.10
Crankshaft																
—rear oil seal—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.21.20
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.21.33
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.21.46
Cylinder																
—head—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.29.10
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.29.18
—pressure check	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.25.01
—side cover, front—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.25.14
—side cover, rear—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.25.16
Engine assembly—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.41.01
Flywheel																
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.53.07
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.53.10
—starter ring gear—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.53.19
—spigot bearing—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.53.20
Oil																
—filter assembly, external—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.60.01
—pump—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.60.26
—pump—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.60.32
—sump—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.60.44
Tappets—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.29.57
Timing																
—gear cover—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.65.01
—gear cover oil seal—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.65.05
—gears—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.65.22
—chain tensioner	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.65.28
Valve gear																
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.29.34
—rocker shaft assembly—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..12.29.55



IRC655

2¼ litre 4-cylinder Petrol engine



IRC656

2¼ litre 4-cylinder Diesel engine



**CAMSHAFT**

-Remove and refit

12.13.01

Service tools: 507231 Chainwheel extractor  
530101 Camshaft extractor

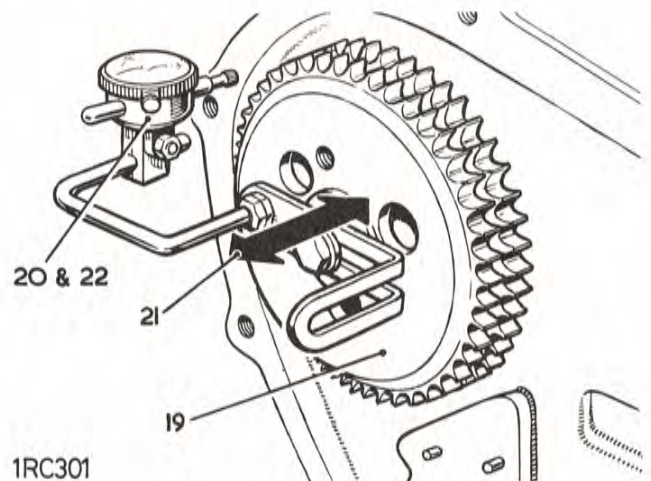
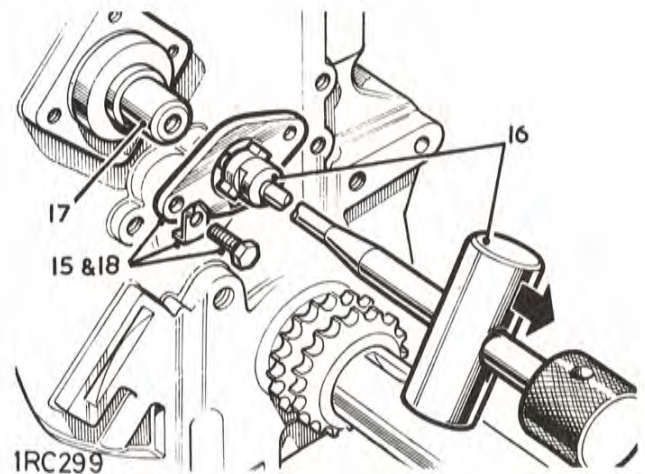
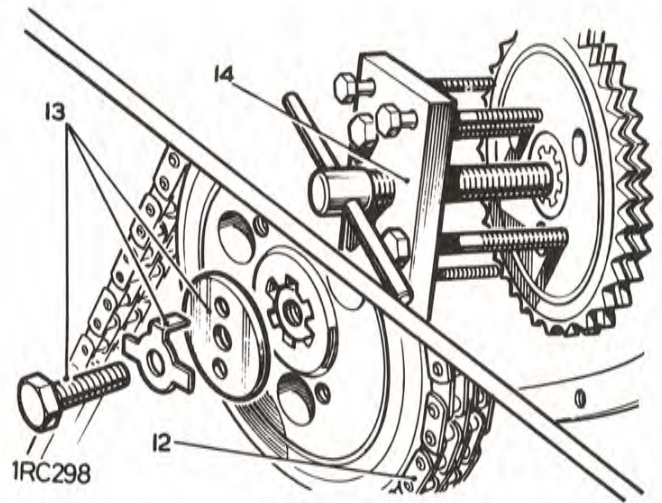
**Removing**

1. Remove the bonnet. 76.16.01
2. Remove the air cleaner. 19.10.01
3. Remove the radiator assembly. 26.40.01
4. Remove the external oil filter assembly. 12.60.01
5. **Petrol engines:** Remove the distributor and drive gear. 86.35.20
6. **Diesel engines:** Remove the fuel injection pump. 19.30.07
7. Remove the valve gear. 12.29.34
8. Remove the cylinder head. 12.29.10
9. Remove the tappets. 12.29.57
10. Remove the timing gear cover. 12.65.01.
11. Remove the timing chain tensioner. 12.65.28
12. Withdraw the timing chain.
13. Remove the fixings from the camshaft chainwheel.
14. Extract the chainwheel from the camshaft. 507231
15. Remove the thrust plate from the camshaft.
16. Extract the camshaft. 530101

**NOTE:** For details of camshaft bearings, refer to 12.13.13.

**Refitting**

17. Insert the camshaft into the cylinder block.
18. Fit the thrust plate.
19. Fit the chainwheel to the camshaft but do not engage the lockwasher at this stage.
20. Mount a dial test indicator to read off the end of the camshaft.
21. Check the camshaft end float. The correct end float limits are 0.06 mm to 0.13 mm (0.0025 in. to 0.0055 in.). If the end float is excessive, fit a new thrust plate and/or camshaft.
22. Remove the dial test indicator.
23. Reset the valve timing. 12.65.22
24. Reverse 1 to 11.

**DATA****Camshaft end float**

0,06 mm to 0,13 mm (0.0025 in. to 0.0055 in.).





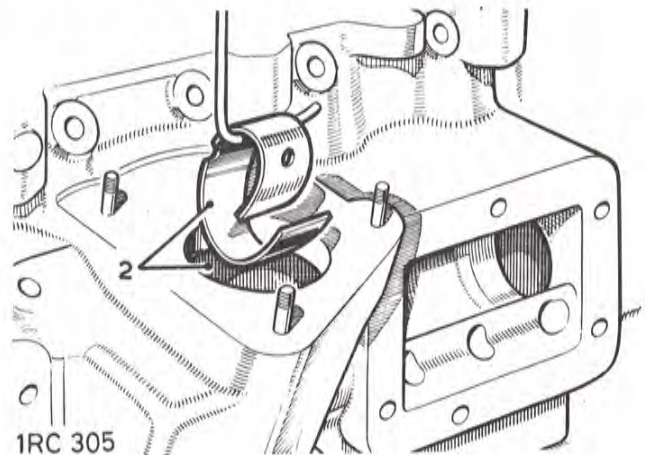
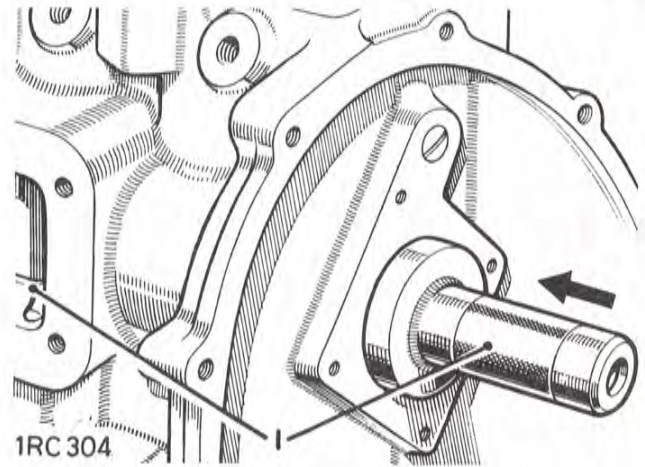
## CAMSHAFT BEARINGS

-Remove and refit

12.13.13

Service tools: 605975 Bearing drift and adaptor assembly comprising:  
 274388 Bearing drift  
 531760 Adaptor  
 274389 Reamer for bearings includes:  
 274394 Guide plug

**NOTE:** Prior to removing the camshaft bearings, the engine must be removed from the vehicle and be completely dismantled until only the camshaft bearings remain in the cylinder block.



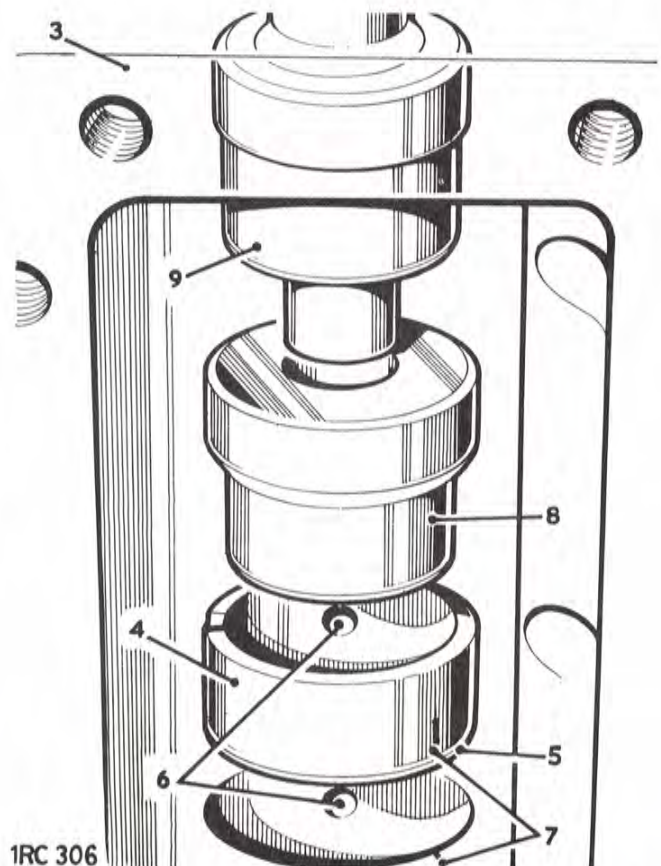
## Removing

1. Drift out the front and rear bearings and withdraw them through the side cover apertures. 274388.
2. Drift the two centre bearings into the distributor drive chamber and collapse them to enable withdrawal. 274388.

## Refitting

**NOTE:** The two centre and rear bearings are of the same width, whereas the front bearing is wider and has an additional oil feed hole.

3. Position the cylinder block vertical, rear face down.
4. Place a new bearing into the front camshaft chamber and position it so that it is above the second bearing housing, counting from the front of the block.
5. The chamfer on the bearing edge must be towards the housing bore.
6. Align the oil hole in the bearing with the innermost oil feed drilling in the housing bore. Accuracy is essential otherwise misalignment of the oil holes may result and once the bearing is in place it cannot be rotated to correct any error.
7. Add pencil marks to the bearing outer diameter and the cylinder block adjacent to the housing to assist in checking alignment.
8. Having visually aligned the bearing, place inside it the adaptor. 531760.
9. Maintain the bearing in a level position. Pass the drift through the front bearing housing into the camshaft chamber so that it rests on top of the adaptor. Commence drifting the bearing into the block. Ensure that the bearing is not drifted in too far, and that the oil feed holes are correctly aligned.

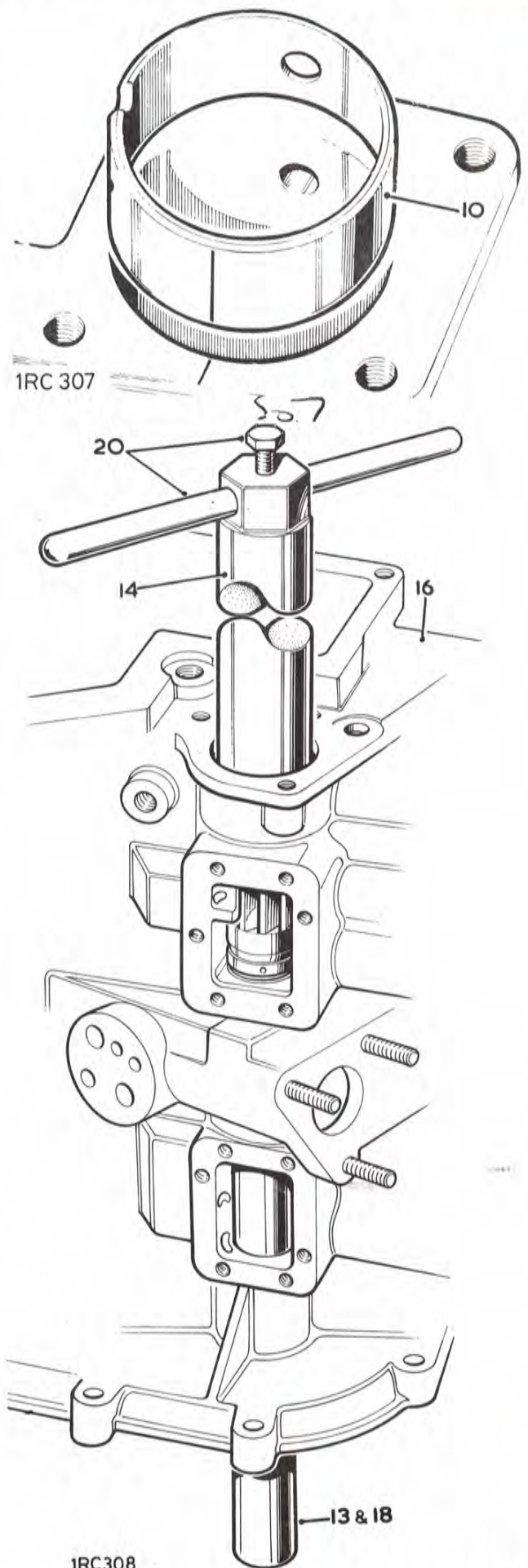
*continued*

10. Repeat 5 to 9 for the front bearing. Note that the front bearing is wider and has a small hole in addition to the large oil feed hole. This small hole aligns with a vertical drilling in the block, which in turn feeds a horizontal drilling for the tappet mechanism. Drift this bearing in so that the outer edge is just below the machined surface of the front face. This is to ensure that when the camshaft thrust plate is fitted it will not stand proud on the bearing edge.
11. Turn the cylinder block over so that the rear face is uppermost.
12. Repeat the foregoing procedures for the two remaining camshaft bearings.

#### Reamering the camshaft bearings

**NOTE:** No lubricant is necessary for the reamering operation, best results are obtained when the bearings are cut dry.

13. Locate the guide plug 274394, into the front camshaft bearing and retain using the thrust plate screws, but do not tighten the screws at this stage.
14. Insert the reamer 274389 from the rear of the cylinder block, locating it through the guide plug at the front.
15. Locate the guide collar immediately in front of the reamer cutter into the rearmost bearing, then secure the screws retaining the guide plug at the front.
16. Position the cylinder block vertical, rear face uppermost.
17. Reamer the rear and two centre bearings. As each bearing is cut the reamer should be held steady by the operator whilst an assistant, using a high pressure airline, blows away the white metal cuttings, before allowing the reamer to enter the next bearing.
18. Remove the guide plug 274394, before reamering the front bearing.
19. Reamer the front bearing.
20. Remove the reamer handle and bolt.
21. Remove the reamer, turning it in the same direction as for cutting.
22. Remove the plugs from the ends of oil gallery passage and clean the gallery and oil feed passages to camshaft and crankshaft bearings, using compressed air. Refit the plugs and lock in position.
23. The hexagon-headed plugs at the rear of the block should have new washers fitted, and their threads coated with a suitable jointing compound.
24. Clean the cylinder block ready for engine reassembly.



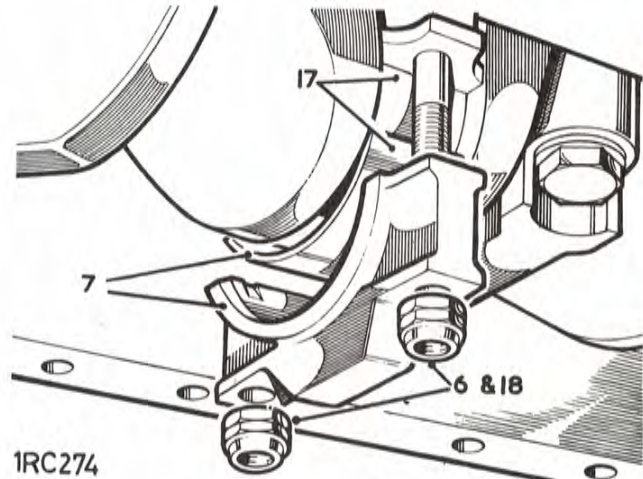
## CONNECTING RODS AND PISTONS

-Remove and refit

12.17.01

## Removing

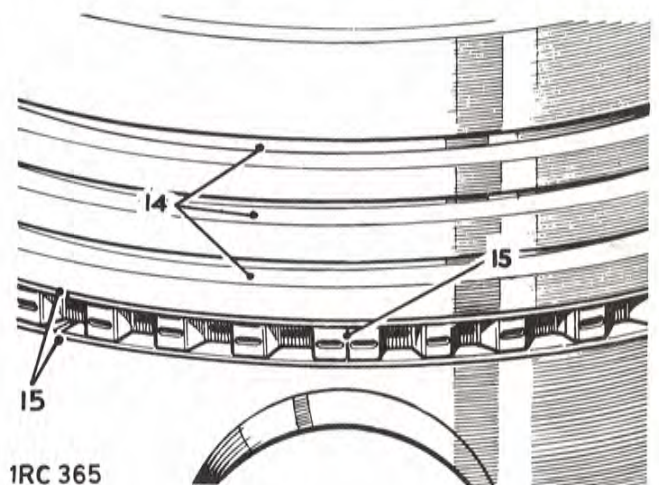
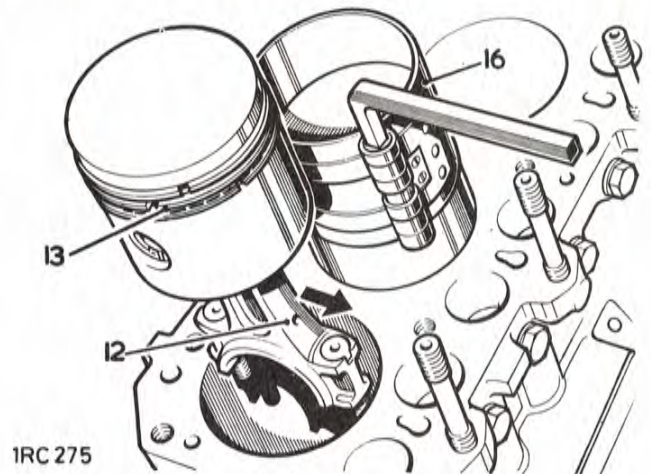
1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Remove the valve gear. 12.29.34.
4. Remove the cylinder head. 12.29.10.
5. Remove the oil sump. 12.60.44.
6. With two pistons at bottom dead centre (BDC) remove the connecting rod cap fixings.
7. Remove the caps and withdraw the connecting rod bearing halves. Retain the caps and bearings in related sets.
8. Withdraw the pistons and attached connecting rods from the top of the bore.
9. Position the remaining pistons at BDC and repeat the removal procedure.
10. Retain the removed components in related sets. The correct cap for each connecting rod is denoted by the number stamped near the joint faces. This number also indicates the crankshaft journal to which it must be fitted.

*continued*

## Refitting

**NOTE:** If replacement components are to be fitted, the checks detailed in 12.17.10 must be carried out.

11. Position the crankshaft with two crankpins at BDC.
12. Insert the appropriate connecting rod and piston assemblies into their respective bores, noting that the oil hole in the connecting rods must be towards the camshaft.
13. **Petrol engines:** Position the piston rings so that their gaps are staggered around the piston thrust face (camshaft side of the engine).
14. **Diesel engines:** Position the piston compression rings so that their gaps are staggered around the piston thrust face) camshaft side of the engine).
15. **Diesel engines:** Position the oil control ring so that the ends of the expander butt but do not overlap and are in line with the gudgeon pin. Position the gap in each rail 25 mm (1 in.) to the left of the butted ends of the expander.
16. Using a piston ring compressor, locate the pistons into the cylinder bores.
17. Lubricate the journals and bearing halves and fit the appropriate bearing halves to the connecting rods and caps.
18. Fit the connecting rod caps using NEW securing nuts. Torque 3.5 kgf.m (25 lbf. ft.).
19. Repeat 11 to 19 for the remaining connecting rod and piston assemblies.
20. Reverse 1 to 5.



## CONNECTING RODS AND PISTONS—Petrol

—Overhaul

12.17.10

## Dismantling

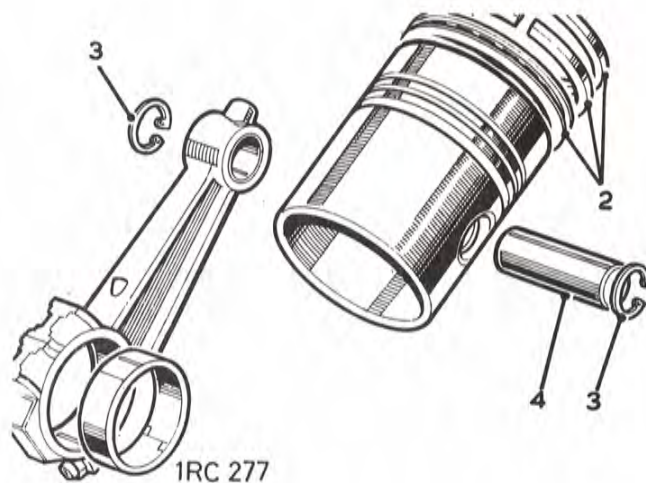
**NOTE:** During the following procedures retain all components in related sets to facilitate subsequent assembly. If the same pistons are to be refitted, add location marks to ensure reassembling in the same relative position.

1. Remove the connecting rods and pistons. 12.17.01.
2. Remove the piston rings.
3. Remove the circlips from the gudgeon pin bosses.
4. Withdraw the gudgeon pins from the pistons.

## Overhauling pistons

## Original pistons

5. Remove the carbon and deposits, particularly from the ring grooves.
6. Examine the pistons for damage or excessive wear—see under “New pistons” for clearance dimensions—fit new replacements as necessary.



## New Pistons

Pistons are available in graded standard size and in ungraded oversizes of 0,25 mm, 0,50 mm, 0,76 mm and 1,01 mm (0.010 in., 0.020 in., 0.030 in. and 0.040 in.).

Standard pistons are graded in diameter, and the grade letter is stamped on the crown of the piston and on the cylinder block.

Grade letter	Cylinder bore diameter
Z	Nominal to plus 0,005 mm (0.0002 in.) above nominal.
A	0,005 mm to 0,010 mm (0.0002 in. to 0.0004 in.) above nominal.
B	0,010 mm to 0,015 mm (0.0004 to 0.0006 in.) above nominal.
C	0,015 mm to 0,020 mm (0.0006 in. to 0.0008 in.) above nominal.
D	0,020 mm to 0,025 mm (0.0008 to 0.0010 in.) above nominal.

*continued*



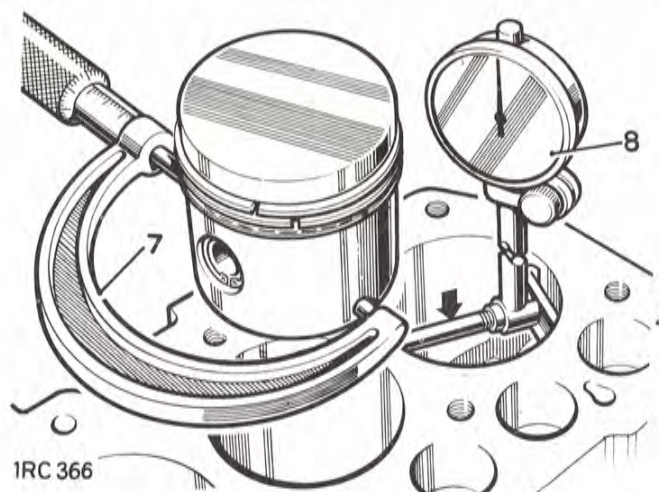
The clearance limits with new standard size pistons and a new cylinder block are 0,058 mm to 0,068 mm (0.0023 in. to 0.0027 in.).

The clearance limits with new oversize pistons and a newly rebored cylinder block are 0,043 mm to 0,055 mm (0.0017 in. to 0.0022 in.).

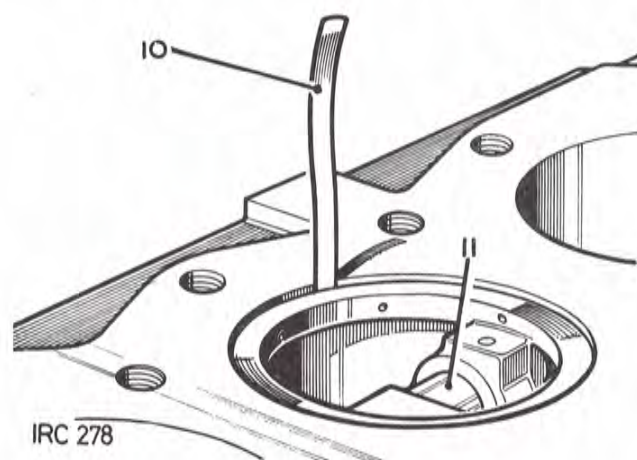
The temperature of the piston and cylinder block must be the same to ensure accurate measurements.

7. Check the piston diameter at the bottom of the skirt at right angles to the gudgeon pin.
8. Check the bore diameter at approximately half way down.
9. If gauge equipment is not available, the piston clearance can be assessed using long feeler gauges. 10 to 12.
10. Insert a long suitably sized feeler gauge down the right hand side of the cylinder bore.
11. Insert the correct piston, inverted, into the cylinder bore and position it with the gudgeon pin parallel with the axis of the crankshaft.
12. Push the piston down the cylinder until the piston reaches its tightest point in the bore, at this point withdraw the feeler gauge—a steady resistance should be felt.
13. If standard size pistons are being fitted, select pistons from the range available until the clearance is satisfactory.
14. If new piston rings are to be fitted without reboring, deglaze the cylinder walls with a hone, without increasing the bore diameter. A deglazed bore must have a cross-hatch finish.
15. Check the compression and oil control ring gaps in the applicable cylinder, held square to the bore with the piston. Gap limits: 0,38 mm to 0,5 mm (0.015 in. to 0.020 in.). Use a fine cut flat file to increase the gap if required. Select a new piston ring if the gap exceeds the limit.

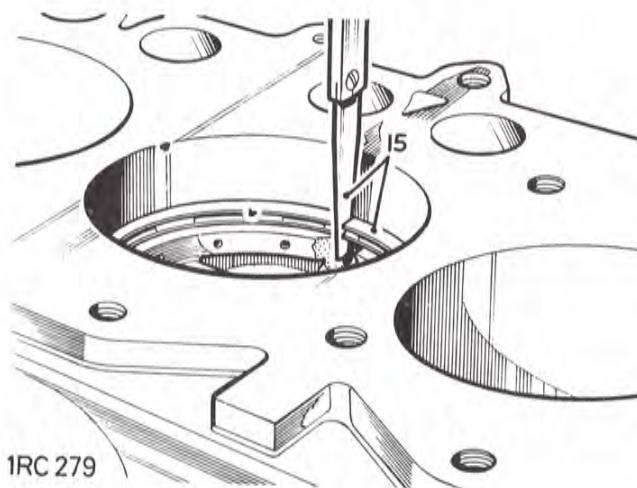
*continued*



1RC 366



1RC 278



1RC 279

16. Fit the oil control ring to the piston.
17. Check the oil control ring clearance in the piston groove. Clearance limits: 0,038 mm to 0,089 mm (0.0015 in. to 0.0035 in.).
18. Fit the two compression rings to the piston with the sides marked 'T' or 'Top' uppermost.
19. Check the compression ring clearance in the piston grooves. Clearance limits: 0,046 mm to 0,097 mm (0.0018 in. to 0.0038 in.).

Where maximum permitted boring tolerance is not sufficient to reclaim the bores, cylinder liners may be fitted.

Fitting the cylinder liners conforms to normal practice. Machine the cylinder block bores to 94,425 mm + 0,012 mm (3.7175 in. + 0.0005 in.) diameter. This will provide the liner with 0,076 mm to 0,114 mm (0.003 in. to 0.0045 in.) interference fit.

Press the liners into the cylinder block. The liners must not be proud of, or more than 0,254 mm (0.010 in.) below, the top face of the cylinder block.

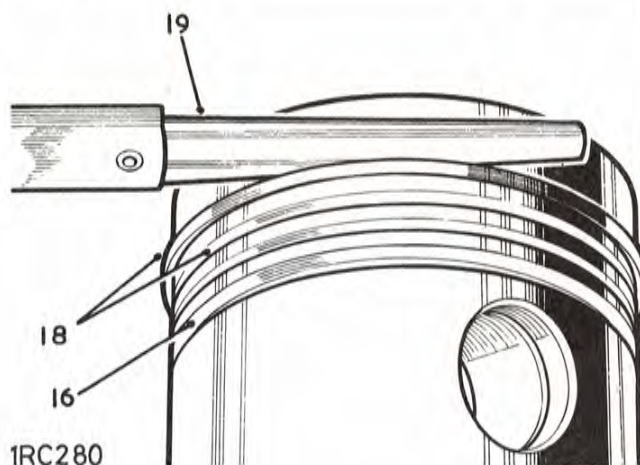
Cylinder liners should be bored to standard size of 90,47 mm (3.562 in.) diameter.

Liners may be rebored 0,254 mm (0.010 in.) oversize.

#### Connecting rods

20. Check the alignment of the connecting rod.
21. Check the gudgeon pin clearance in the connecting rod. Clearance limits: 0,007 mm to 0,015 mm (0.0003 in. to 0.0006 in.).
22. If a new connecting rod small end bush is required, ensure that the oil holes are aligned when pressing in the replacement, then reamer the bush to obtain the correct clearance, as above.
23. Check the fit of the gudgeon pin in the piston, the pin must not fall through either boss but be capable of being fitted by hand at normal room temperature 20°C (68°F.).

*continued*



24. Select the correct cap for each connecting rod as denoted by the number stamped near the joint faces. This number also indicates the crankshaft journal to which it must be fitted.
25. Assemble the caps, less bearing halves, to the respective connecting rods. Torque 3.5 kgf.m (25 lbf. ft.).
26. Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a new assembly must be fitted.

#### Connecting rod bearing nip and clearance

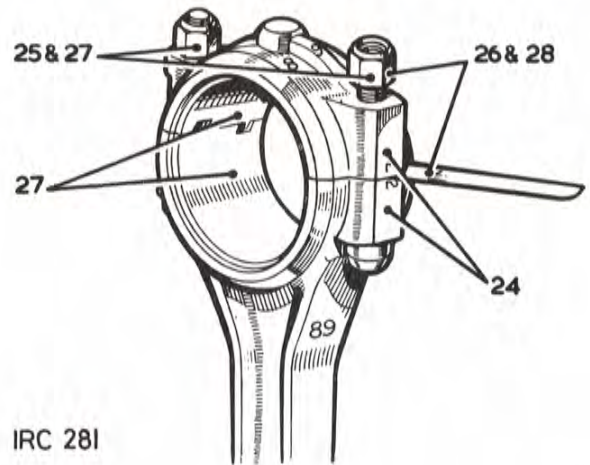
**NOTE:** New bearing halves are supplied with a protective coating and must be degreased, prior to fitting, to remove the coating.

27. Fit the bearing halves to the connecting rod and cap, and secure the assembly. Torque 3.5 kgf.m (25 lbf. ft.).
28. Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.). The bearing nip can be corrected by selective assembly of the bearing shells; these are available in slightly varying thicknesses. Do not file or machine the caps or connecting rods to vary the bearing nip.
29. Make a final check to prove the bearing clearance, using a 0,063 mm (0.0025 in.) shim paper. The connecting rod should resist rotation when fitted to the crankshaft with the shim paper fitted between the journal and one half of the bearing shell, and move freely by hand with the shim paper removed.

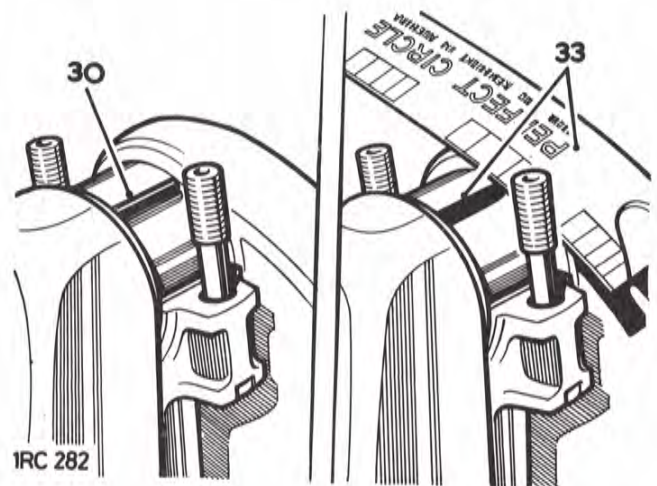
**NOTE:** As an alternative, Plastigauge may be used to check the connecting rod bearing clearance. 30 to 36.

Do not rotate the connecting rod or crankshaft while the Plastigauge is fitted, or the reading will be impaired.

30. Place a piece of Plastigauge across the centre of the lower half of the crankshaft journal. 605238.
31. Fit the connecting rod complete with bearings to the applicable journal. Torque 3.5 kgf.m (25 lbf. ft.).
32. Remove the connecting rod cap and lower half bearing.
33. Using the scale printed on the Plastigauge packet, measure the flattened Plastigauge at its widest point. The graduation that most closely corresponds to the width of the Plastigauge indicates the bearing clearance.



IRC 281



IRC 282

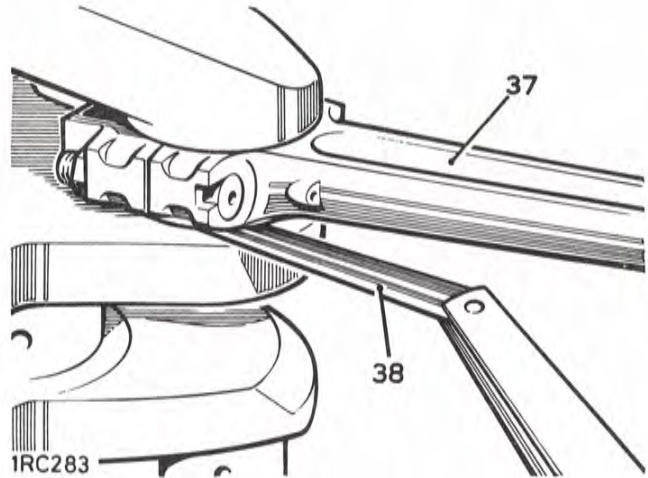
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34. The correct clearance with new or overhauled components is 0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).
35. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
36. Wipe off the Plastigauge with an oily rag. DO NOT scrape it off.

#### Connecting rod end float

37. Fit the connecting rods complete with bearings to their applicable journals. Torque 3.5 kgf.m (25 lbf.ft.).
38. Check the end float between the end face of the connecting rod and the journal shoulder. End float limits: 0,20 mm to 0,30 mm (0.007 in. to 0.012 in.)
39. Remove the connecting rods from the crankshaft and retain all parts in related sets.



#### Assembling

40. Assemble the pistons to their respective connecting rods.
41. Fit new circlips to retain the piston gudgeon pins.
42. Refit the connecting rods and pistons 12.17.01.

*continued*

**DATA****Pistons**

Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin.

Standard size pistons

0,058 mm to 0,068 mm (0.0023 in. to 0.0027 in.).

Oversize pistons

0,043 mm to 0,055 mm (0.0017 in. to 0.0022 in.).

**Piston Rings****Compression (2)**

Gap in bore

0,38 mm to 0,50 mm (0.015 in. to 0.020 in.).

Clearance in groove

0,046 mm to 0,097 mm (0.0018 in. to 0.0038 in.).

Oil control

Gap in bore

0,38 mm to 0,50 mm (0.015 in. to 0.020 in.).

Clearance in groove

0,038 mm to 0,089 mm (0.0015 in. to 0.0035 in.).

**Gudgeon pin**

Clearance in connecting rod

0,007 mm to 0,015 mm (0.0003 in. to 0.0006 in.).

Fit in piston

Push fit by hand.

**Connecting rods**

Clearance, bearing to crankpin

0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).

End float on crankpin

0,20 mm to 0,30 mm (0.007 in. to 0.012 in.).



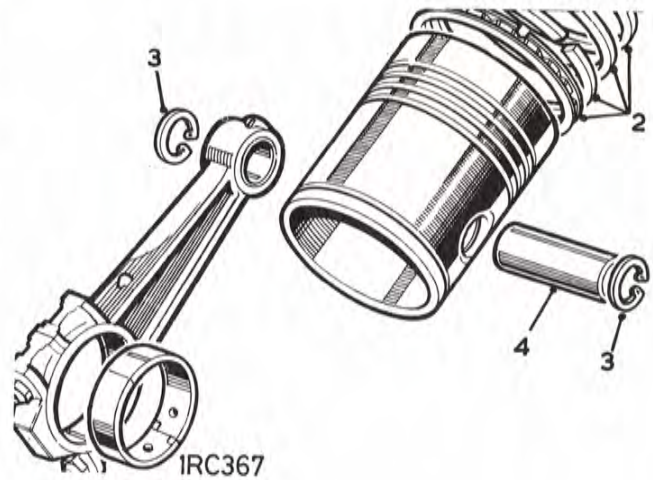
## CONNECTING RODS AND PISTONS—Diesel

—Overhaul 12.17.10

## Dismantling

**NOTE:** During the following procedures retain all components in related sets to facilitate subsequent assembly. If the same pistons are to be refitted, add location marks to ensure reassembling in the same relative position.

1. Remove the connecting rods and pistons. 12.17.01.
2. Remove the piston rings.
3. Remove the circlips from the gudgeon pin bosses.
4. Withdraw the gudgeon pins from the pistons.



## Overhauling Pistons

## Original Pistons

5. Remove the carbon and deposits, particularly from the ring grooves.
6. Examine the pistons for damage or excessive wear—see under 'New pistons' for clearance dimensions—fit new replacements as necessary.

## New Pistons

Pistons are available in graded standard size, and in ungraded oversizes of 0,25 mm, 0,50 mm, 0,76 mm and 1,01 mm (0.010 in., 0.200 in., 0.030 in. and 0.040 in.).

Standard pistons are graded in diameter, and the grade letter is stamped on the crown of the piston and on the cylinder block.

Grade letters	Cylinder bore diameter
ZAB	Nominal to plus 0,015 mm (0.0006 in.).
BCD	0,010 mm to 0,025 mm (0.0004 in. to 0.001 in.) above nominal.

**NOTE:** The suffix letter H or L which follows the piston grade letters, is not important.

*continued*



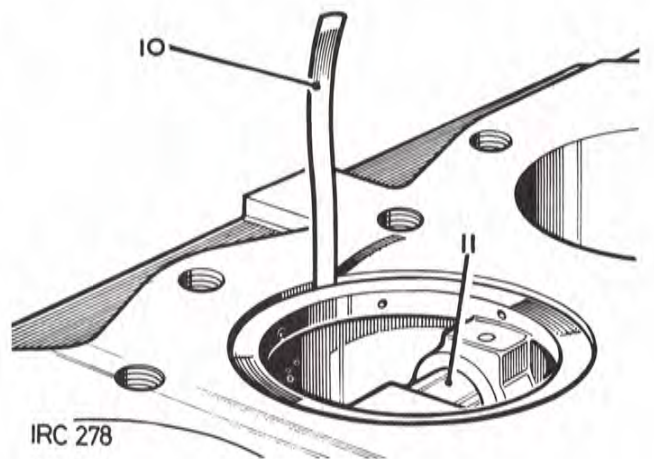
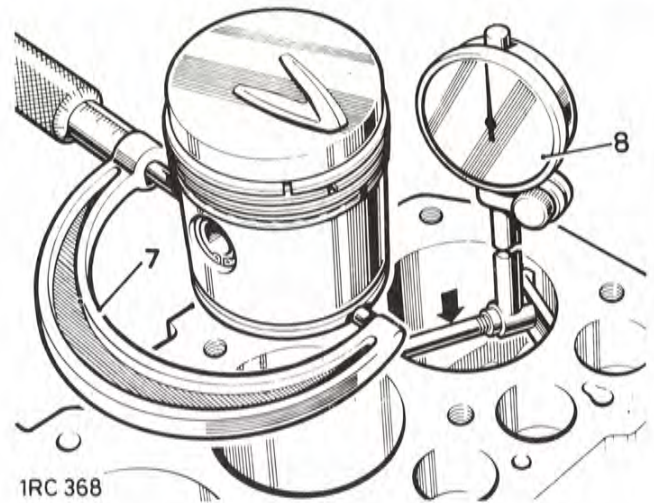
The clearance limits with new standard size pistons and a new cylinder block are 0,111 mm to 0,134 mm (0.0044 in. to 0.0053 in.).

The clearance limits with new oversize pistons and a newly rebored cylinder block are 0,111 mm to 0,157 mm (0.0044 in. to 0.0062 in.).

The temperature of the piston and cylinder block must be the same to ensure accurate measurements.

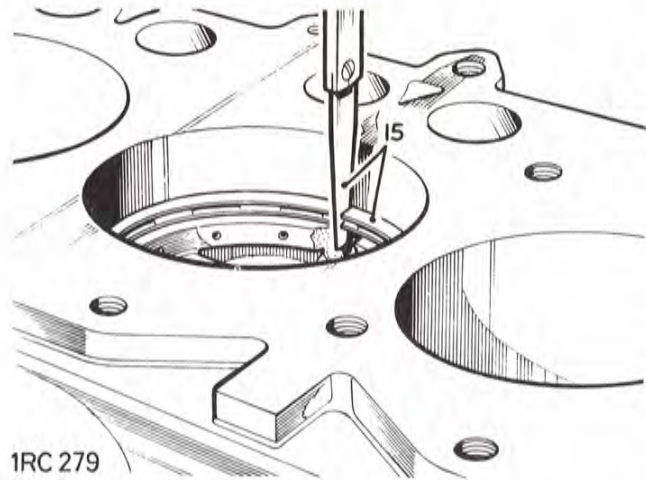
7. Check the piston diameter at the extreme bottom land at right angles to the gudgeon pin.
8. Check the bore diameter at approximately half way down, at right angles to the gudgeon pin.
9. If gauge equipment is not available, the piston clearance can be assessed using long feeler gauges. 10 to 12.
10. Insert a long, suitably sized feeler gauge down the right hand side of the cylinder bore.
11. Insert the correct piston, inverted, into the cylinder bore and position it with the gudgeon pin parallel with the axis of the crankshaft.
12. Push the piston down the cylinder until the piston reaches its tightest point in the bore, at this point withdraw the feeler gauge—a steady resistance should be felt.
13. If standard size pistons are being fitted, use pistons with the same grade markings as the cylinder block.
14. If new pistons rings are to be fitted without reboring, deglaze the cylinder with a hone, without increasing the bore diameter. A deglazed bore must have a cross-hatch finish.

*continued*

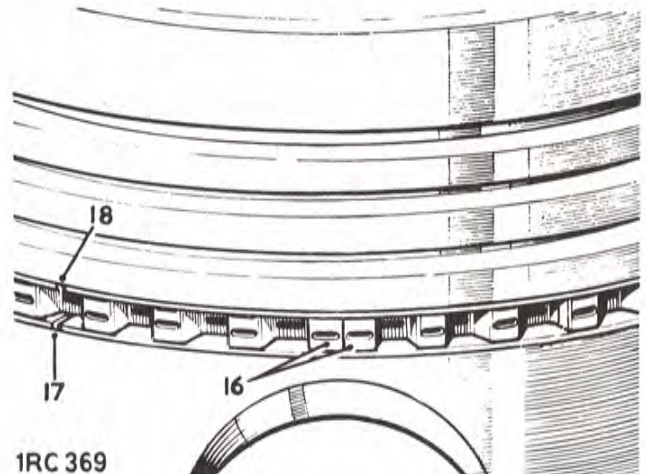


15. Check the compression and oil control ring gaps in the applicable cylinder, held square to the bore with the piston. Gap limits:  
Upper compression ring (chromed):  
0,35 mm to 0,50 mm (0.014 in. to 0.019 in.).  
Middle and lower compression rings:  
0,25 mm to 0,38 mm (0.010 in. to 0.015 in.).  
Oil control ring, upper and lower rail:  
0,38 mm to 1,14 mm (0.015 in. to 0.045 in.).
16. Fit the expander for the oil control ring into the groove immediately above the gudgeon pin. The ends of the expander must butt but not overlap and be in line with the gudgeon pin.
17. Fit the lower rail from the bottom of the piston and locate it into the groove, beneath the expander. Position the ring gap 25 mm (1 in.) to the left of the butted ends of the expander.
18. Fit the upper rail from the top of the piston and locate it into the groove, above the expander. Position the ring gap 25 mm (1 in.) to the left of the butted ends of the expander.
19. Check the oil control ring clearance in the piston groove. Clearance limits: 0,038 mm to 0,064 mm (0.0015 in. to 0.0025 in.).
20. Fit the compression rings marked 'T' or 'TOP' with the marking uppermost, to the two middle grooves.
21. Fit the chrome edged compression ring to the top groove.
22. Check the compression ring clearance in the piston grooves. Clearance limits: 0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.).

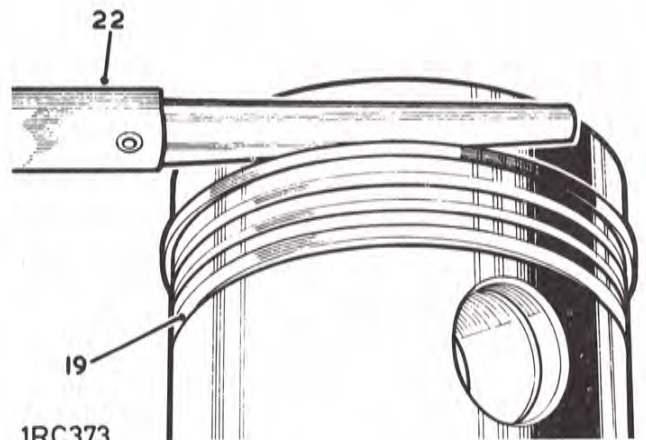
*continued*



1RC 279



1RC 369



1RC 373

Where the maximum permitted boring tolerance is not sufficient to reclaim the bores, cylinder liners may be fitted. Fitting the cylinder liners conforms to normal practice. Machine the cylinder block bores to 94,425 mm + 0,012 mm (3.7175 in. + 0.0005 in.) diameter. This will provide the liner with 0,076 mm to 0,114 mm (0.003 in. to 0.0045 in.) interference fit.

Press the liners into the cylinder block. The liners must not be proud of, or more than 0,05 mm (0.002 in.) below, the top face of the cylinder block.

Cylinder liners should be bored to standard size of 90,47 mm (3.562 in.) diameter.

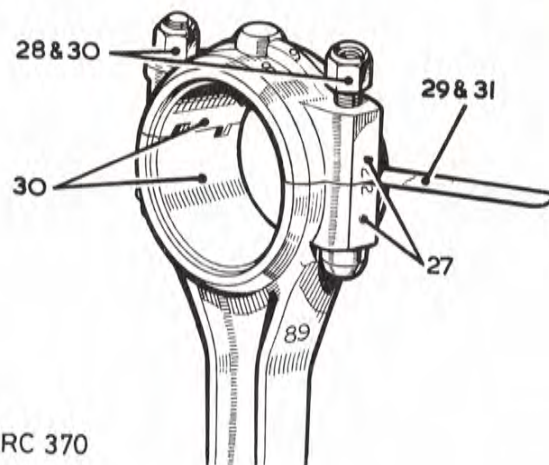
Liners may be rebored 0,254 mm (0.010 in.) oversize.

#### Connecting rods

23. Check the alignment of the connecting rod.
24. Check the gudgeon pin clearance in the connecting rod. Clearance limits: 0,002 mm to 0,02 mm (0.0001 in. to 0.0008 in.).
25. If a new connecting rod small end bush is required, ensure that the oil holes are aligned when pressing in the replacement, then reamer the bush to obtain the correct clearance, as above.
26. Check the fit of the gudgeon pin in the piston, the pin must not fall through either boss but be capable of being fitted by hand at normal room temperature 20°C (68°F).

*continued*

27. Select the correct cap for each connecting rod as denoted by the number stamped near the joint faces. This number also indicates the crankshaft journal to which it must be fitted.
28. Assemble the caps, less bearing halves, to the respective connecting rods. Torque 3.5 kgf.m (25 lbf.ft.).
29. Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a new assembly must be fitted.



IRC 370

#### Connecting rod bearing nip and clearance

**NOTE:** New bearing halves are supplied with a protective coating and must be degreased prior to fitting, to remove the coating.

30. Fit the bearing halves to the connecting rod and cap and secure the assembly. Torque 3.5 kgf.m (25 lbf.ft.).
31. Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.). The bearing nip can be corrected by selective assembly of the bearing shells; these are available in slightly varying thicknesses. Do not file or machine the caps or connecting rods to vary the bearing nip.
32. Make a final check to prove the bearing clearance, using a 0,063 mm (0.0025 in.) shim paper. The connecting rod should resist rotation when fitted to the crankshaft with the shim paper fitted between the journal and one half of the bearing shell, and move freely by hand with the shim paper removed.

*continued*

**NOTE:** As an alternative, Plastigauge may be used to check the connecting rod bearing clearance. Do not rotate the connecting rod or crankshaft while the Plastigauge is fitted, or the reading will be impaired.

33. Place a piece of Plastigauge across the centre of the lower half of the crankshaft journal. 605238.
34. Fit the connecting rod complete with bearings to the applicable journal. Torque 3.5 kgf.m (25 lbf.ft.).
35. Remove the connecting rod cap and lower half bearing.
36. Using the scale printed on the Plastigauge packet, measure the flattened Plastigauge at its widest point. The graduation that most closely corresponds to the width of the Plastigauge indicates the bearing clearance.
37. The correct clearance with new or overhauled components is 0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).
38. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
39. Wipe off the Plastigauge with an oily rag. DO NOT scrape it off.

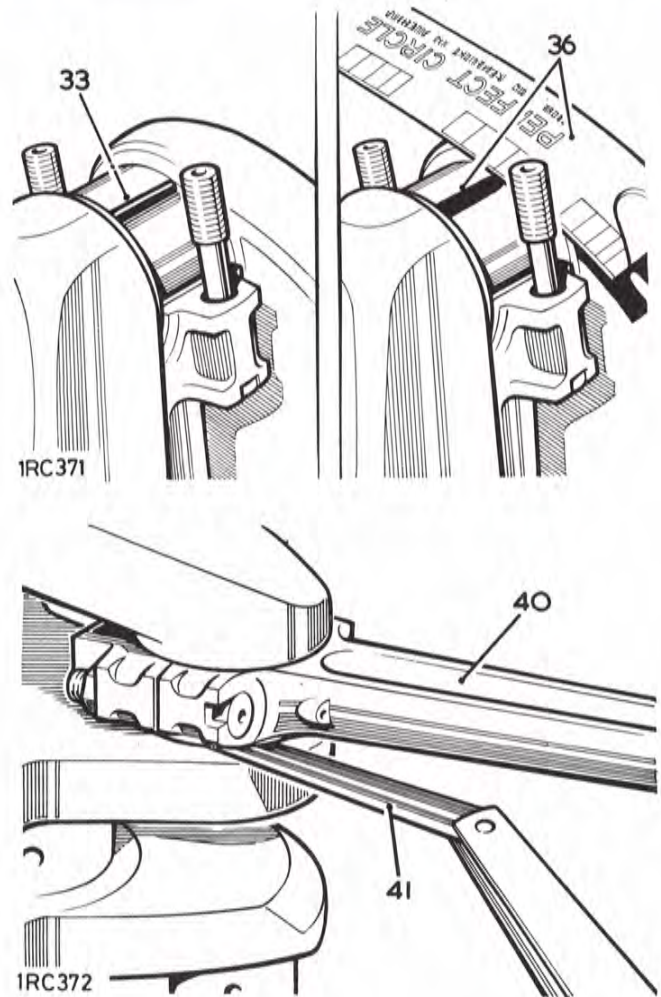
#### Connecting rod end float

40. Fit the connecting rods complete with bearings to their applicable journals. Torque 3.5 kgf.m (25 lbf.ft.).
41. Check the end float between the end face of the connecting rod and the journal shoulder. End float limits' 0,20 mm to 0,30 mm (0.007 in. to 0.012 in.).
42. Remove the connecting rods from the crankshaft and retain all parts in related sets.

#### Assembling

43. Assemble the pistons to their respective connecting rods.
44. Fit new circlips to retain the piston gudgeon pins.
45. Refit the connecting rods and pistons. 12.17.01.

*continued*





## DATA

**Pistons**

Clearance in bore measured at bottom of skirt at right angles to gudgeon pin.

Standard size pistons

0,111 mm to 0,134 mm (0.0044 in. to 0.0053 in.).

Oversize pistons

0,111 mm to 0,157 mm (0.0044 in. to 0.0062 in.).

**Piston rings**

Compression No. 1

Type

Square friction edge—chromium plated.

Gap in bore

0,35 mm to 0,50 mm (0.014 in. to 0.019 in.).

Clearance in groove

0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.).

Compression Nos. 2 and 3

Type

Bevelled friction edge. Marked 'T' or 'TOP' on upper side.

Gap in bore

0,25 mm to 0,38 mm (0.010 in. to 0.015 in.).

Clearance in groove

0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.).

Oil control No. 4

Type

Expander and rails

Gap in bore

0,38 mm to 1,14 mm (0.015 in. to 0.045 in.).

Clearance in groove

0,038 mm to 0,064 mm (0.0015 in. to 0.0025 in.).

**Gudgeon pin**

Clearance in connecting rod

0,002 mm to 0,012 mm (0.0001 in. to 0.0008 in.).

Fit in piston

Push fit by hand

**Connecting rods**

Clearance, bearing to crankpin

0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).

End float on crankpin

0,20 mm to 0,30 mm (0.007 in. to 0.012 in.).



## DATA

## Pistons

Clearance in bore measured at bottom of skirt at right angles to gudgeon pin.

Standard size pistons

0,111 mm to 0,134 mm (0.0044 in. to 0.0053 in.).

Oversize pistons

0,111 mm to 0,157 mm (0.0044 in. to 0.0062 in.).

## Piston rings

Compression No. 1

Type

Square friction edge—chromium plated.

Gap in bore

0,35 mm to 0,50 mm (0.014 in. to 0.019 in.).

Clearance in groove

0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.).

Compression Nos. 2 and 3

Type

Bevelled friction edge. Marked 'T' or 'TOP' on upper side.

Gap in bore

0,25 mm to 0,38 mm (0.010 in. to 0.015 in.).

Clearance in groove

0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.).

Oil control No. 4

Type

Expander and rails

Gap in bore

0,38 mm to 1,14 mm (0.015 in. to 0.045 in.).

Clearance in groove

0,038 mm to 0,064 mm (0.0015 in. to 0.0025 in.).

## Gudgeon pin

Clearance in connecting rod

0,002 mm to 0,012 mm (0.0001 in. to 0.0008 in.).

Fit in piston

Push fit by hand

## Connecting rods

Clearance, bearing to crankpin

0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).

End float on crankpin

0,20 mm to 0,30 mm (0.007 in. to 0.012 in.).

**CRANKSHAFT REAR OIL SEAL**

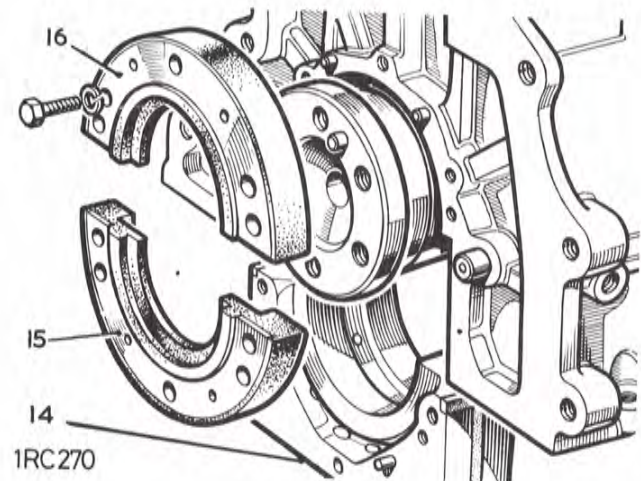
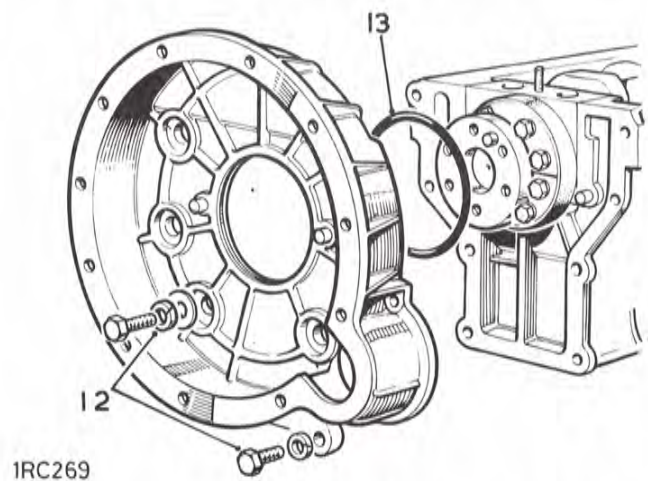
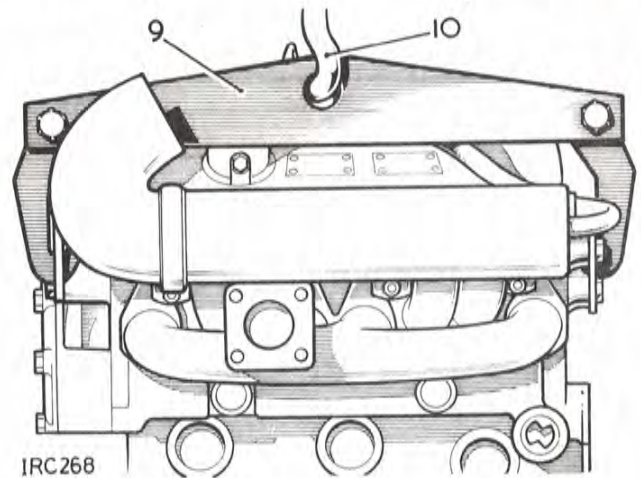
—Remove and refit

12.21.20

Service Tool: 270304 Guides for oil seal  
600963 Engine lifting sling

**Removing**

1. Remove the bonnet. 76.16.01
2. Remove the front ffoot. 76.10.12.
3. Remove the seat base. 76.70.06.
4. Remove the gearbox assembly. 37.20.01.
5. Remove the starter motor. 86.60.01.
6. Remove the oil sump. 12.60.44.
7. Remove the clutch assembly. 33.10.01.
8. Remove the flywheel. 12.53.07.
9. Attach a suitable lifting sling and hoist to the engine-lifting hooks. 600963.
10. Tension the hoist sufficient to support the engine weight.
11. Withdraw the packing piece from between the flywheel housing and the chassis cross-member, previously fitted during gearbox removal.
12. Remove the flywheel housing.
13. Remove the oil seal ring.
14. Remove the rear main bearing cap.
15. Remove the lower half of the oil seal retainer from the rear main bearing cap.
16. Remove the upper half of the oil seal retainer from the cylinder block, by rotating the crankshaft to align the cut-out with the fixings.
17. Remove the oil seal from the crankshaft.

*continued*

## Refitting

18. Assemble the garter spring on the crankshaft journal by engaging the hook and eye. Do not stretch the spring.
19. Move the assembled spring along the journal until it is against the thrower flange.
20. Apply Silocone Grease MS4 to the crankshaft oil seal journal and to both end faces of the split oil seal.
21. Open the split seal sufficiently to allow it to be fitted over the crankshaft oil seal journal. The recess in the oil seal must be towards the thrower flange and the garter spring.

**NOTE:** The oil seal must not be repeatedly fitted and removed from the crankshaft, as this can damage the sealing lip.

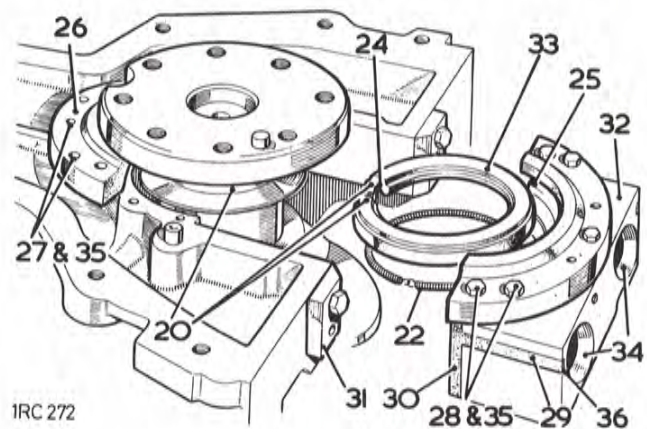
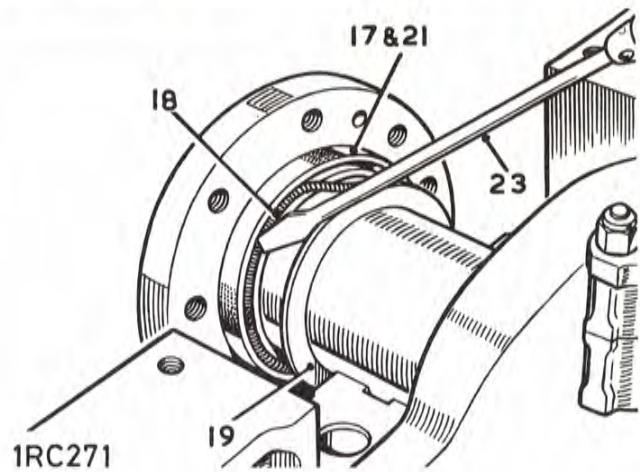
22. Position the garter spring so that the hook and eye is located mid-way between the split and hinge of the oil seal.
23. Using a small screwdriver, ease the spring into the recess in the oil seal.
24. Rotate the oil seal until the split is on the vertical axis pointing towards the cylinder head and in its approximate running position on the journal; this position is important.

**NOTE:** Do not degrease the seal retainer halves with trichlorethylene, but wipe clean with a dry cloth prior to applying Hylomar.

25. Apply Hylomar PL 32/M jointing compound, Rover Part No. 534244, to the seal location diameter of both retainer halves.
26. Locate one half of the oil seal retainer onto the cylinder block dowels. The oil seal should be compressed to assist assembly, also ensure that it is correctly located in the retainer recess.

**CAUTION:** The seal must be held so that it does not rotate when the crankshaft is being rotated to fit the retainer securing bolts.

*continued*



27. Secure the upper half of the oil seal retainer with the three inner bolts, leaving the outer bolt at each end finger tight at this stage.
28. Secure the lower half of the oil seal retainer to the rear main bearing cap in the same manner as described for the upper half.
29. Apply Silicone Grease MS4 to the 'T' seals and fit them to the rear main bearing cap.
30. Trim the top edges of the 'T' seals to prevent them from fouling the cylinder block when being fitted.
31. Fit the seal guides to the crankcase. 270304.
32. Fit the rear main bearing cap complete with the seal retainer, 'T' seals and bearing shell to the crankcase until there is an 0,8 mm (0.030 in.) gap between the cap and the crankcase.
33. Check that the seal is correctly located in the retainer recess.
34. Tighten the bearing cap bolts ensuring that there is no buckling of the split seal or misalignment of the butt joint. Torque: Petrol engines: 11.5 kgf.m (85 lbf.ft.). Diesel engines: 13.8 kgf.m (100 lbf.ft.).
35. Fully tighten all the bolts securing the retainer halves. Turn the bolt heads so that the hexagon corners will not foul the flywheel housing seal when fitting.
36. Trim the ends of the 'T' seals to leave 0,8 mm (0.030 in.) protruding from the bearing cap.
37. Reverse 1 to 13.

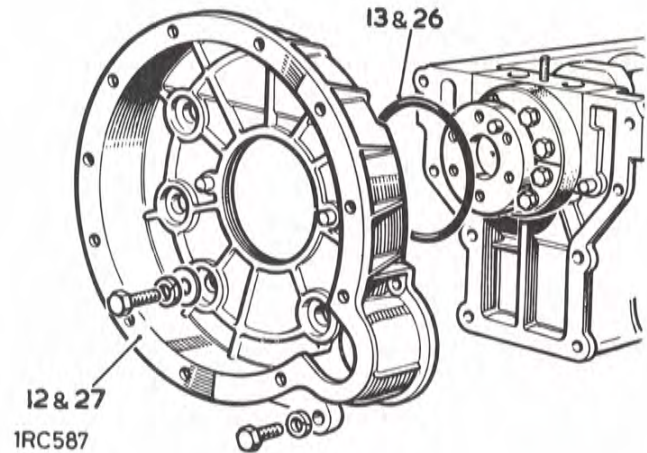
## CRANKSHAFT

-Remove and refit

12.21.33

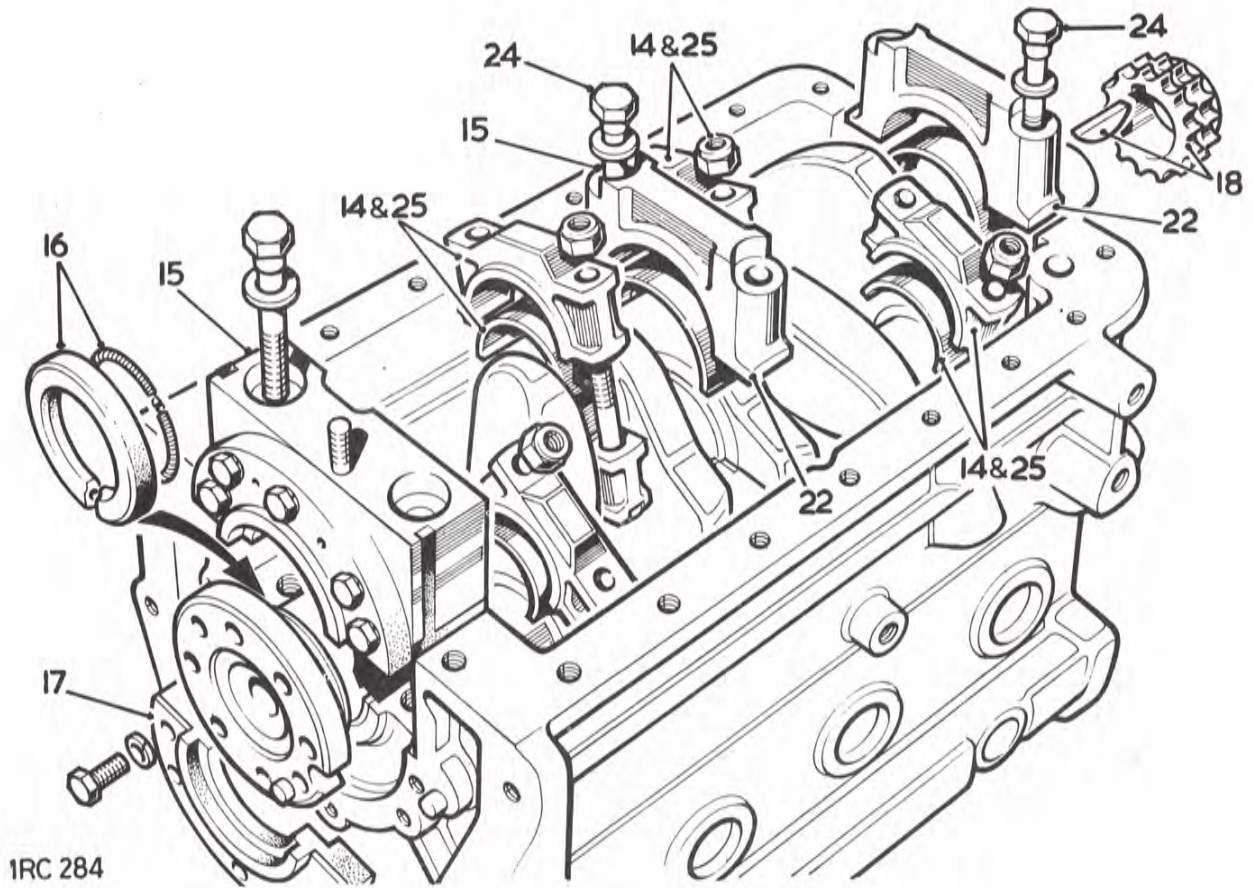
## Removing

1. Remove the bonnet, 76.16.01
2. Remove the air cleaner, 19.10.01.
3. Remove the radiator assembly, 26.40.01.
4. Remove the front floor, 76.10.12.
5. Remove the engine assembly, 12.41.01.
6. Remove the oil sump, 12.60.44.
7. Remove the oil pump, 12.60.26.
8. Remove the timing gear cover, 12.65.01.
9. Remove the timing chain and tensioner, 12.65.28.
10. Remove the clutch assembly, 33.10.01.
11. Remove the flywheel, 12.53.07
12. Remove the flywheel housing.
13. Remove the oil seal ring.

*continued*

14. Remove the connecting rod caps and bearing lower halves. Retain in related sets.
15. Remove the main bearing caps and lift the crankshaft clear. Retain the bearing halves and caps in related sets.
16. Remove the oil seal from the crankshaft.
17. Remove the upper half of the oil seal retainer from the cylinder block.
18. If required, remove the chainwheel and key from the crankshaft.

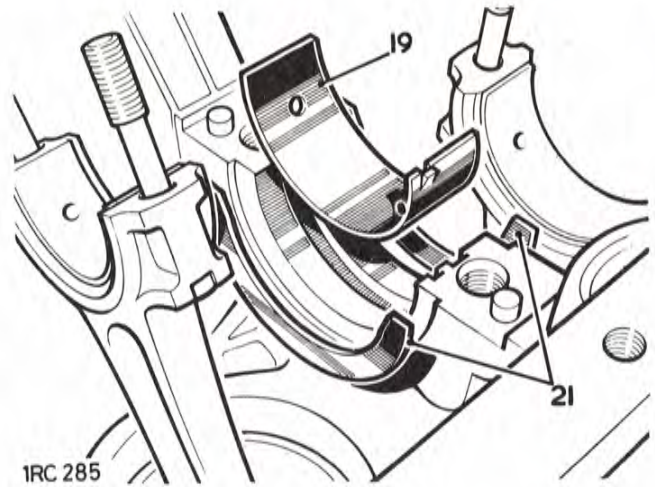
*continued*



## Refitting

**NOTE:** If replacement components are to be fitted, the checks detailed in 12.21.46 must be carried out.

19. Locate the upper main bearing halves into the cylinder block.
20. Lubricate the bearings and crankshaft journals with clean engine oil, and place the crankshaft in position.
21. Insert a thrust washer at each side of the centre main bearing shell with the unplated faces towards the cylinder block.
22. Locate the bearing lower halves into the front and centre main bearing caps. Fit the caps but do not fully tighten the fixings at this stage.
23. Fit the crankshaft rear oil seal. 12.21.20.
24. Tighten the front and centre main bearing cap fixings. Torque: Petrol engines: 11.5 kgf.m (85 lbf.ft.). Diesel engines: 13.8 kgf. m (100 lbf. ft.).
25. Fit the appropriate bearing halves and caps to the connecting rods, using NEW securing nuts. Torque: 3.5 kgf.m (25 lbf.ft.).
26. Fit the oil seal ring to the flywheel housing.
27. Refit the flywheel housing.
28. Refit the flywheel. 12.53.07.
29. Refit the clutch assembly. 33.10.01.
30. Reset the valve timing. 12.65.22.
31. Reverse 1 to 9.



*continued*



**CRANKSHAFT**

-Overhaul

12.21.46

**CAUTION:** DO NOT fit an undersize crankshaft to a Diesel engine. When a Diesel engine crankshaft is worn, a new standard size replacement must be fitted, carrying out the following checks (except item 3).

1. Remove the crankshaft. 12.21.33.

**Inspecting**

2. Check each crankshaft journal for ovality. If ovality exceeds 0,040 mm (0.0015 in.), a reground or new crankshaft should be fitted.
3. **Petrol engines:** Bearings for the crankshaft main journals and the connecting rod journals are available in the following undersizes:  
0,25 mm (0.010 in.).  
0,50 mm (0.020 in.).  
0,76 mm (0.030 in.).  
0,01 mm (0.040 in.).
4. Thrust washers for the crankshaft centre main journal, to control the crankshaft end float, are available in the following oversizes:  
0,06 mm (0.0025 in.).  
0,12 mm (0.005 in.).  
0,18 mm (0.0075 in.).  
0,25 mm (0.010 in.).

*continued*

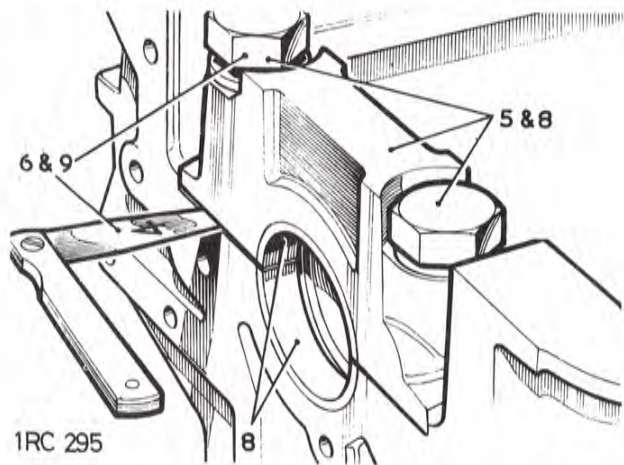


5. Fit the front main bearing cap, less bearing halves, to the cylinder block. Torque: Petrol engines: 11.75 kgf.m (85 lbf.ft.). Diesel engines: 13.8 kgf.m (100 lbf.ft.).
6. Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a complete new cylinder block must be fitted.
7. Repeat 5 and 6 for the centre and rear main bearing caps.

#### Main bearing nip and clearance

**NOTE:** New bearing halves are supplied with a protective coating and must be degreased prior to fitting, to remove the coating.

8. Locate the bearing halves into the front main bearing cap and the cylinder block, and fit the cap to the block. Torque: Petrol engines: 11.75kgf.m(85 lbf.ft.). Diesel engines: 13.8 kgf.m (100 lbf.ft.).
9. Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,10 mm to 0,15 mm (0.004 in. to 0.006 in.).
10. The bearing nip can be corrected by selective assembly of the bearing halves; these are available in slightly varying thicknesses. Do not file or machine the caps or cylinder block to vary the bearing nip.
11. Repeat 8 to 10 for the centre and rear main bearings.
12. When the bearing nip has been checked, remove the caps and bearing shell bottom halves.

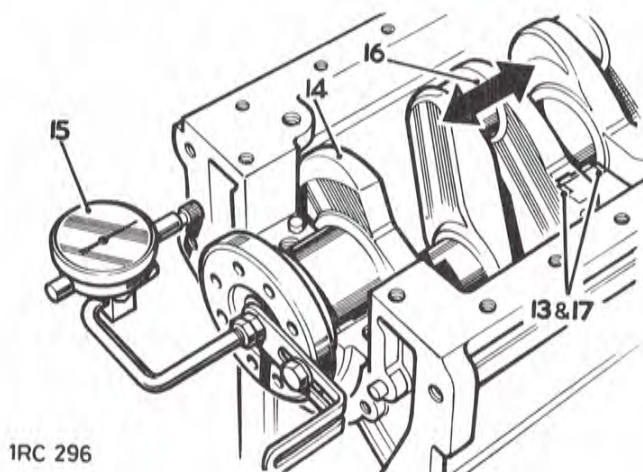


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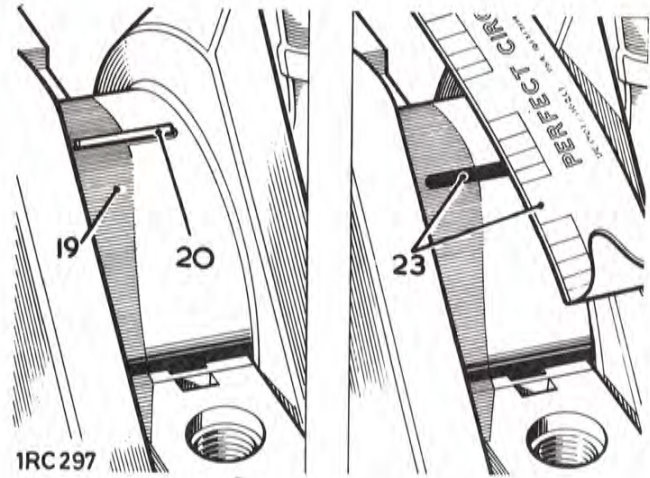
13. Position a standard size thrust washer each side of the centre main bearing shell, top half, with the unplated faces towards the cylinder block. The thrust washer thickness must agree within 0,08 mm (0.003 in.).
14. Place the crankshaft in position on the cylinder block.
15. Mount a dial test indicator to read off the end of the crankshaft.
16. Check the crankshaft end float limits are 0,05 mm to 0,15 mm (0.002 in. to 0.006 in.).
17. The crankshaft end float can be adjusted by fitting oversize thrust washers. The variation of thrust washer thickness at each side must not exceed 0,08 mm (0.003 in.) to ensure that the crankshaft remains centralised.
18. Make a final check to prove the main bearing clearance, using a 0,063 mm (0.0025 in.) shim paper. Check each bearing in turn by fitting both bearing halves and the bearing cap, with the shim paper between the crankshaft and one half of the bearing. The crankshaft should resist rotation with the shim paper fitted, and move freely by hand with the shim paper removed.

**NOTE:** As an alternative, Plastigauge may be used to check the main bearing clearance 19 to 26. Do not rotate the crankshaft while the Plastigauge is fitted, or the reading will be impaired.

*continued* ,



19. Locate the crankshaft in position on the upper bearing halves in the cylinder block.
20. Place a piece of Plastigauge across the centre of the lower half of the crankshaft journal. 605238.
21. Fit the bearing cap complete with the lower bearing half. Torque: Petrol engines: 11.75 kgf.m (85 lbf.ft.). Diesel engines: 13.8 kgf.m (100 lbf.ft.).
22. Remove the bearing cap and lower half bearing.
23. Using the scale printed on the Plastigauge packet, measure the flattened Plastigauge at its widest point. The graduation that most closely corresponds to the width of the Plastigauge indicates the bearing clearance.
24. The correct clearance with new or overhauled components is 0,020 mm to 0,055 mm (0.0008 in. to 0.0022 in.).
25. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
26. Wipe off the Plastigauge with an oily rag. Do not scrape it off.
27. Retain all components in related sets.
28. Refit the crankshaft. 12.21.33.



*continued*

## DATA

## Crankshaft

Journal diameter	63,5 mm—0,012 mm (2.5.in.—0.0005 in.).		
Crankpin diameter	58,7 mm (2.312 in.).		
End-float (controlled by thrust washers at centre bearing).	0,05 mm to 0,15 mm (0.002 to 0.006 in.).		
Regrind sizes:— Petrol Engines only:	Undersize	Journal dia.	Crankpin Dia.
	0,25 mm	63,24 mm	58,47 mm
	(0.010 in.)	(2.490 in.)	(2.302 in.)
	0,50 mm	62,99 mm	58,22 mm
	(0.020 in.)	(2.480 in.)	(2.292 in.)
	0,76 mm	62,73 mm	57,96 mm
	(0.300 in.)	(2.470 in.)	(2.282 in.)
	1,01 mm	62,48 mm	57,70 mm
	(0.040 in.)	(2.460 in.)	(2.272 in.)
Main bearing running clearance.	0,019 mm to 0,063 mm (0.0007 in. to 0.0025 in.).		
Connecting rod bearing running clearance.	0,020 mm to 0,055 mm (0.0008 in. to 0.0022 in.).		



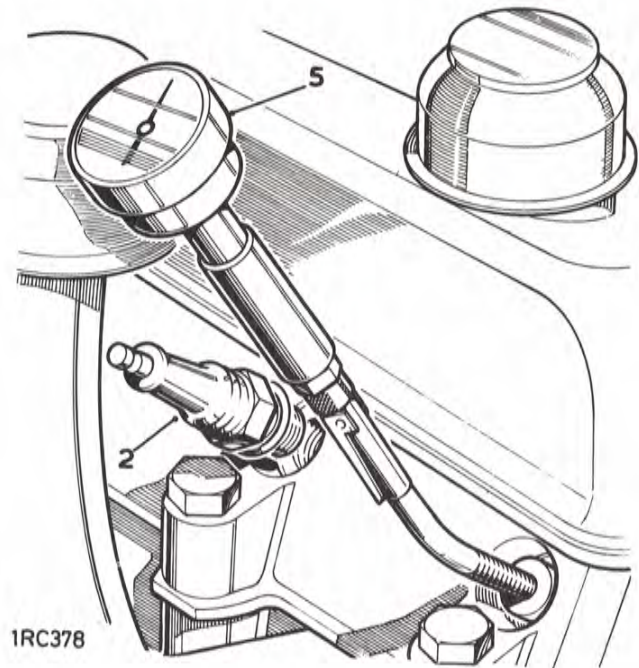
## CYLINDER PRESSURES—Petrol

—Check

12.25.01

## Checking

1. Run the engine until it attains normal operating temperature.
2. Remove the sparking plugs.
3. Secure the throttle in the fully open position.
4. Check each cylinder in turn as follows:
5. Insert a suitable pressure gauge into the sparking plug hole.
6. Crank the engine with the starter motor for several revolutions and note the highest pressure reading obtainable.
7. If the pressure is appreciably less than the correct figure, the piston rings or valves may be faulty.
8. Low pressure in adjoining cylinders may be due to a faulty cylinder head gasket.



Compression ratio

7.0 : 1

8.0 : 1

Compression pressure

10.2 kgf.cm<sup>2</sup> (145 lbf/in<sup>2</sup>)11.2 kgf.cm<sup>2</sup> (160 lbf/in<sup>2</sup>)

Cranking speed

300 rev/min

300 rev/min

**CYLINDER SIDE COVERS—Petrol****—Remove and refit**

Front side cover 1 to 6, 10 and 11. 12.25.14

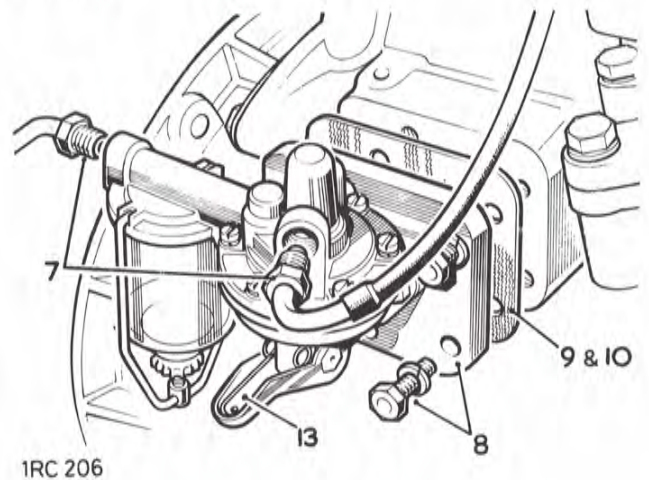
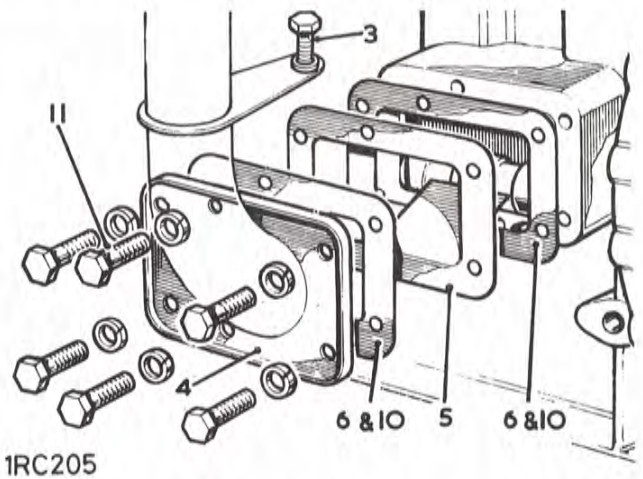
Rear side cover 1, 2, 7 to 10 and 12 to 14. 12.25.16

**Removing**

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01
3. Release the oil filler pipe bracket from the cylinder block.
4. Remove the front side cover complete with oil filler pipe.
5. Withdraw the baffle.
6. Withdraw the joint washers.
7. Disconnect the fuel pipes at the fuel pump.
8. Remove the rear side cover complete with fuel pump.
9. Withdraw the joint washer.

**Refitting**

10. Smear both sides of a new joint washer with general purpose grease.
11. Reverse 1 to 6. When fitting front the side cover bolts, first engage the tapping nearest to the oil filter pipe.
12. Reverse 7 to 9
13. Prime the fuel pump by operating the hand prime lever until no resistance is felt.
14. Reverse 1 and 2.



## CYLINDER SIDE COVERS—Diesel

—Remove and refit

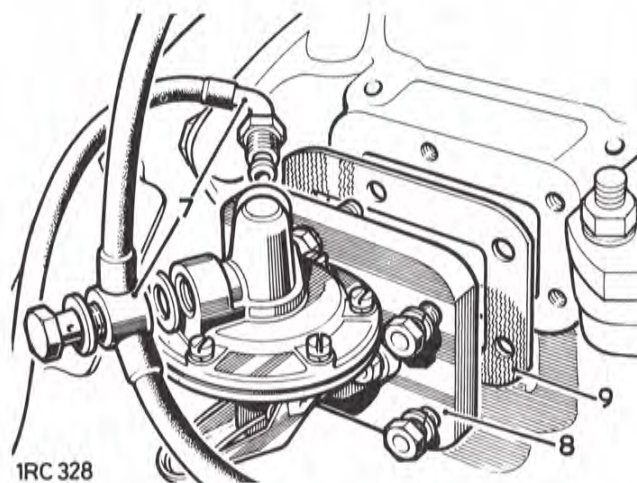
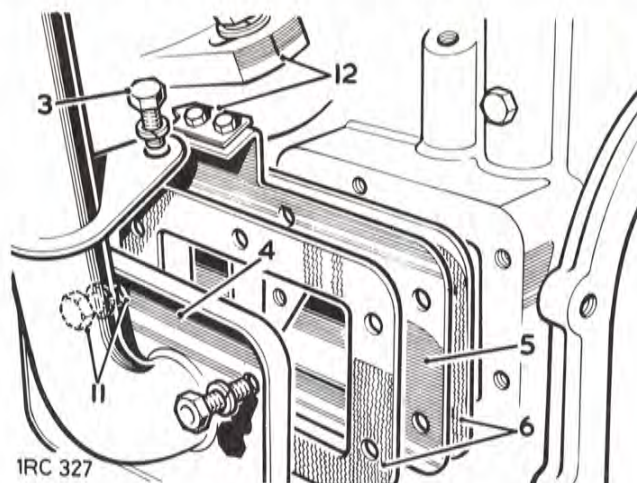
Front side cover 1 to 6 and 10 to 12 12.25.14  
 Rear side cover 1, 2, 7 to 10 and 13 to 15 12.25.16

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Release the oil filter pipe bracket from the cylinder block.
4. Remove the front side cover complete with oil filler pipe.
5. Withdraw the baffle.
6. Withdraw the joint washers.
7. Disconnect the fuel pipes at the fuel pump.
8. Remove the rear side cover complete with the fuel pump.
9. Withdraw the joint washer.

## Refitting

10. Smear both sides of a new joint washer with general purpose grease.
11. Reverse 1 to 6. When fitting the side cover bolts, first engage the tapping nearest to the oil filler pipe.
12. Align the timing pointer with the timing mark scribed on the flange of the fuel distributor pump.
13. Reverse 7 to 9.
14. Prime the fuel system. 19.50.01.
15. Reverse 1 and 2.





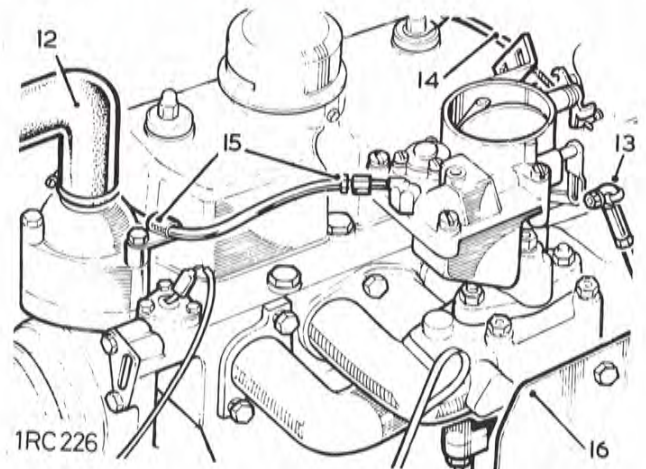
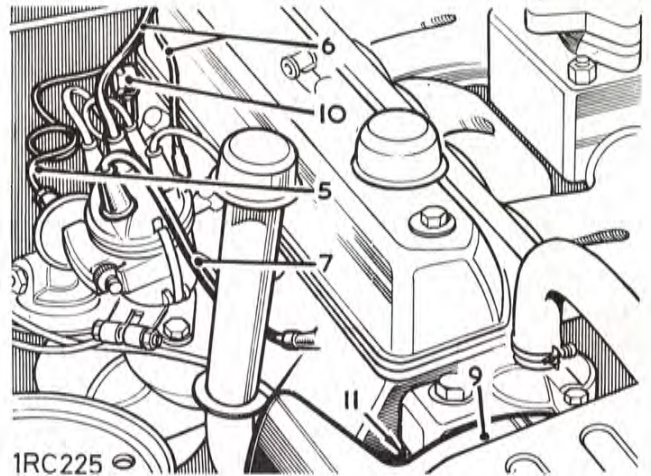
## CYLINDER HEAD—Petrol

—Remove and refit

12.29.10

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Disconnect the battery earth lead.
4. Drain the cooling system.
5. Disconnect the vacuum pipe at the distributor.
6. Disconnect the distributor leads at the ignition coil.
7. Disconnect the distributor leads from the sparking plugs.
8. Remove the sparking plugs.
9. Remove the fan cowl shroud.
10. Disconnect the oil gallery pipe.
11. Disconnect the coolant by-pass hose.
12. Disconnect the coolant hoses from the thermostat housing.
13. Disconnect the carburetter linkage at the ball joint.
14. Disconnect the cold start cable at the carburetter.
15. Disconnect the fuel inlet pipe at the carburetter and release the pipe clip at the cylinder head.
16. Remove the heat shield from the manifold.
17. Disconnect the exhaust pipe at the manifold.
18. Remove the valve gear. 12.29.34.

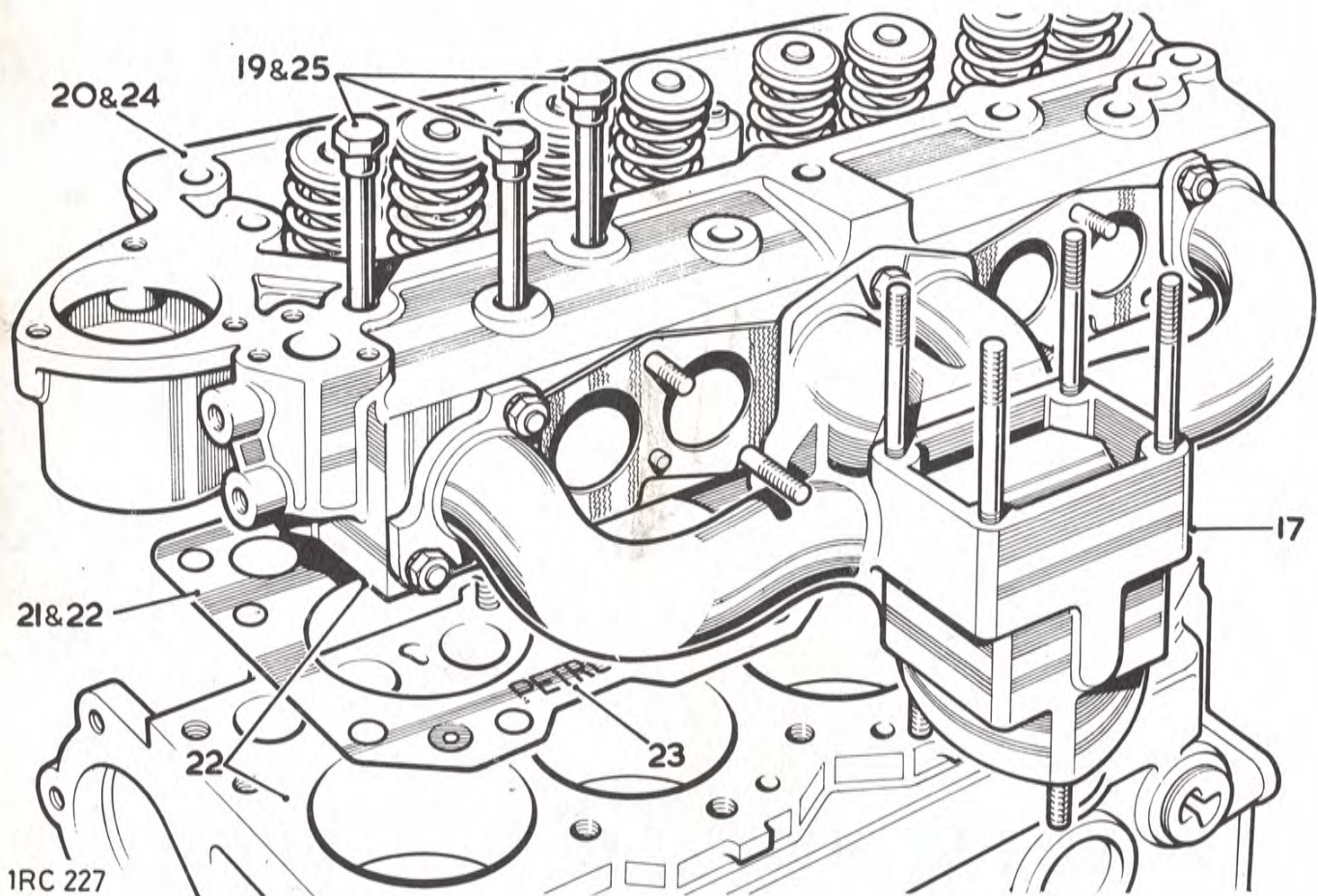
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19. Slacken evenly and remove the remaining cylinder head fixings.
20. Lift off the cylinder head.
21. Withdraw the gasket.

#### Refitting

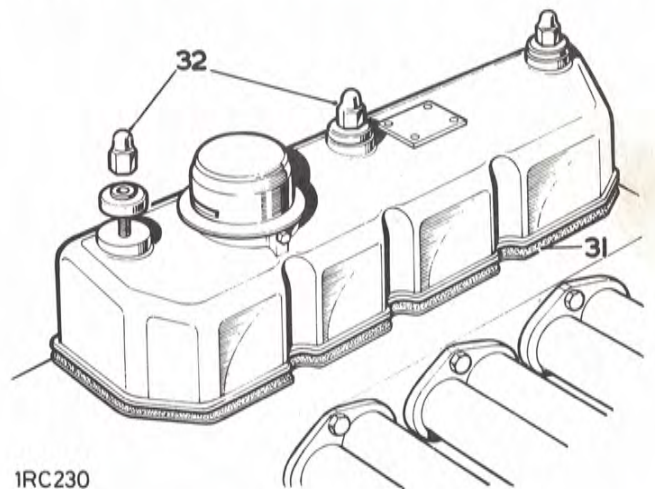
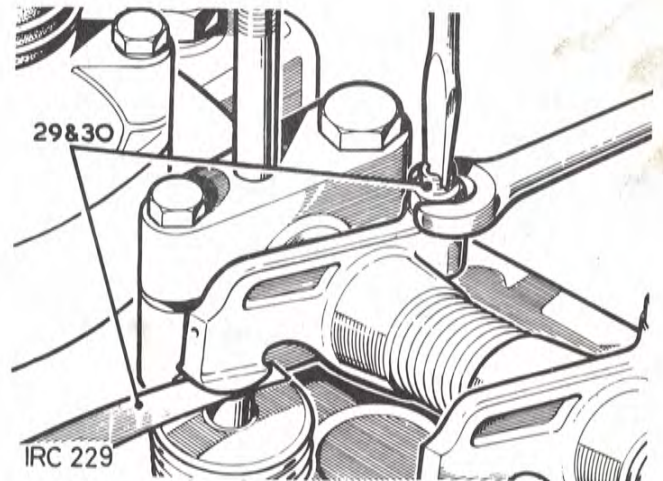
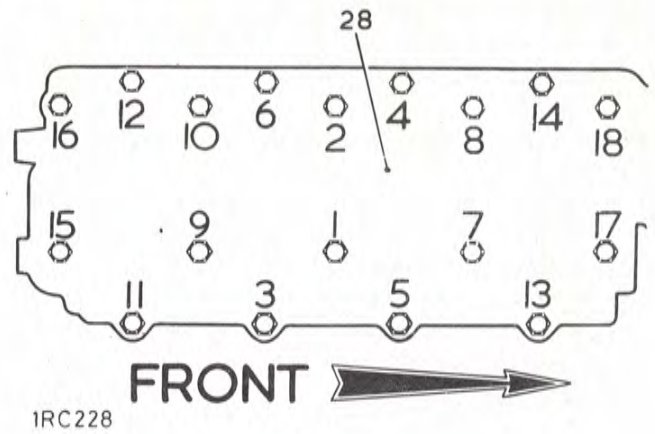
22. Smear clean engine oil on the cylinder block and cylinder head gasket joint faces.
23. Position the gasket on the cylinder block with the lettering 'PETROL' uppermost.
24. Place the cylinder head in position.
25. Engage all the cylinder head fixing bolts except those also used to secure the rocker shaft assembly.

*continued*



1RC 227

26. Place the push rods into position and ensure that they bottom correctly into the spherical seats in the tappet slides.
27. Fit the rocker shaft assembly and engage the fixings.
28. Secure the cylinder head and rocker shaft fixings in the sequence illustrated. Torque: 1/2 in. UNF bolts 8.9 kgf.m (65 lbf.ft.), 5/16 in. UNF bolts 2.4 kgf.m (18 lbf.ft.).
29. Set the tappet clearances to 0,25 mm (0.010 in.) for all valves, as follows:  
Set No. 1 tappet with No. 8 valve fully open.  
Set No. 3 tappet with No. 6 valve fully open.  
Set No. 5 tappet with No. 4 valve fully open.  
Set No. 2 tappet with No. 7 valve fully open.  
Set No. 8 tappet with No. 1 valve fully open.  
Set No. 6 tappet with No. 3 valve fully open.  
Set No. 4 tappet with No. 5 valve fully open.  
Set No. 7 tappet with No. 2 valve fully open.
30. Recheck the tappet clearances with the locknuts tightened, and readjust if necessary.
31. Place the joint washer for the engine top cover in position.
32. Fit the engine top cover.
33. Reverse 1 to 17.
34. After the initial engine run, that is with the engine at normal running temperature, check the cylinder head fixings to the correct torque load with the sparking plugs removed.



## CYLINDER HEAD—Diesel

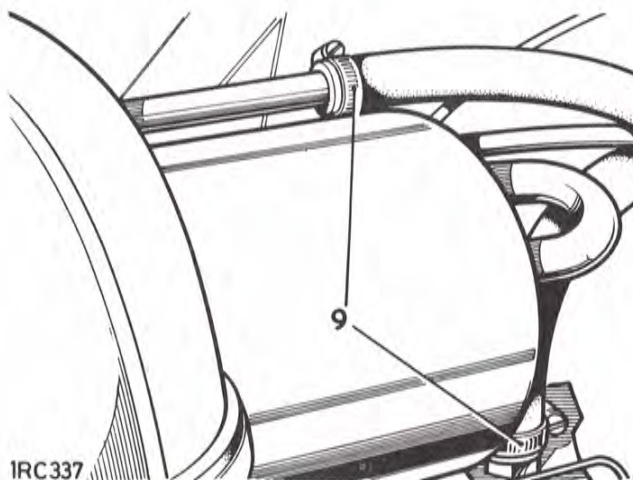
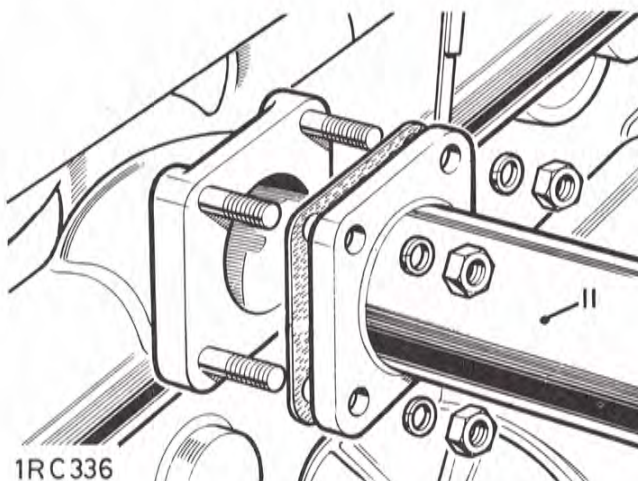
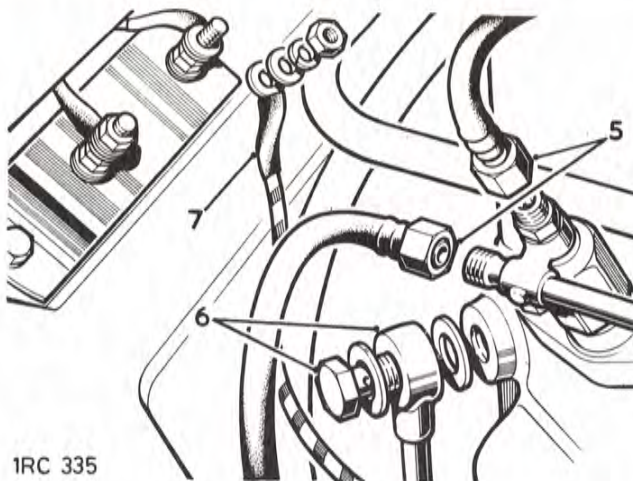
—Remove and refit

12.29.10

Service tool 606445 Spanner for cylinder head bolts.

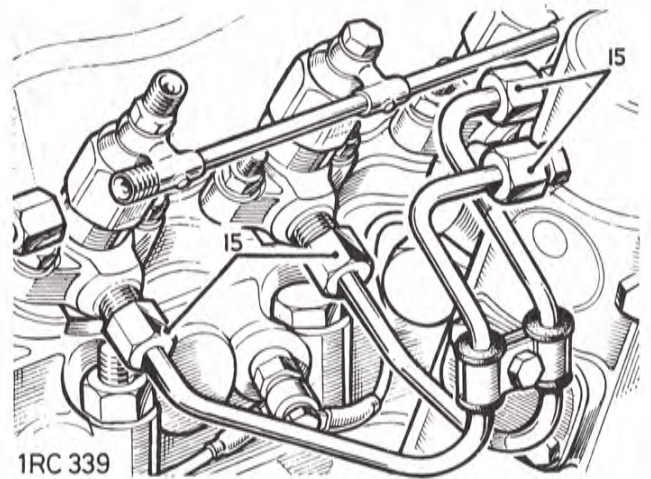
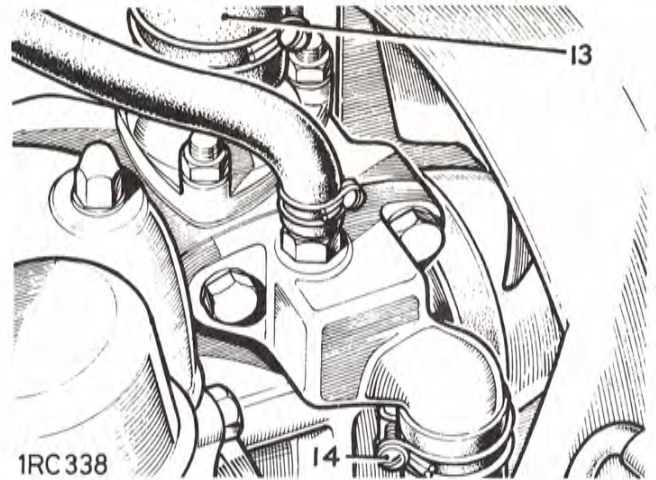
## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Disconnect the battery earth lead.
4. Drain the cooling system.
5. Disconnect the fuel spill pipes at the injector end.
6. Disconnect the oil gallery pipe.
7. Disconnect the electrical feed to the heater plugs.
8. Disconnect the electrical lead from the water temperature transmitter.
9. Disconnect the breather hose from the engine top cover.
10. If a brake servo unit is fitted, disconnect the vacuum pipe and the butterfly control rod from the induction manifold.
11. Disconnect the exhaust pipe at the manifold.
12. Disconnect the heater hoses if fitted.

*continued*

13. Disconnect the coolant hose from the thermostat housing.
14. Disconnect the coolant by-pass hose.
15. Slacken the fuel injector feed pipes at the distributor pump and disconnect them from the injectors.
16. Remove the valve gear. 12.29.34.

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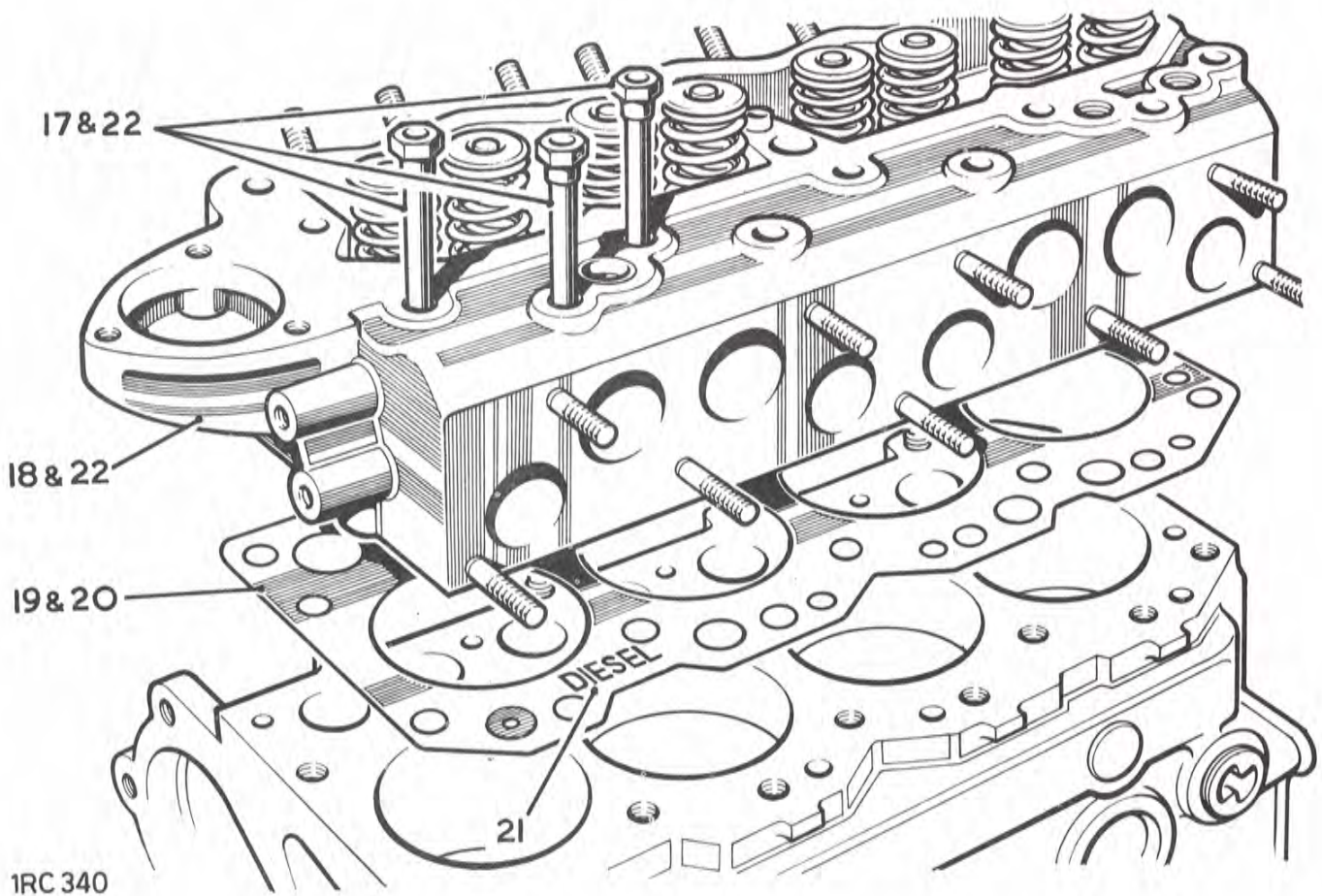


17. Slacken evenly and remove the remaining cylinder head fixings.
18. Lift off the cylinder head.
19. Withdraw the gasket.

#### Refitting

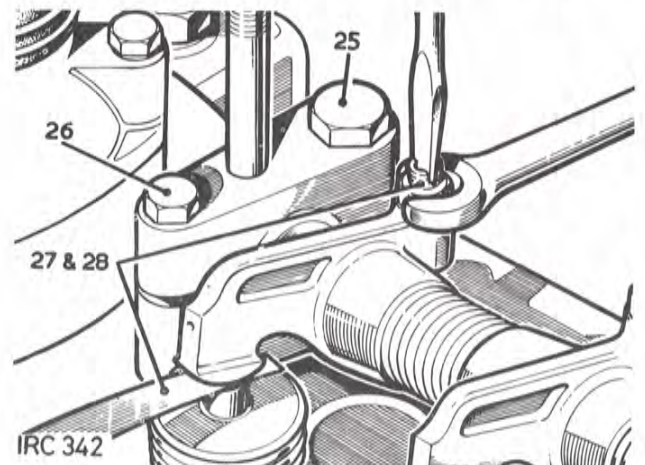
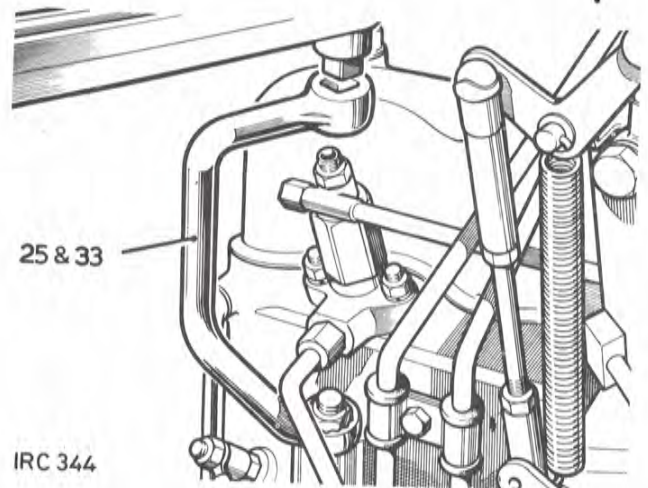
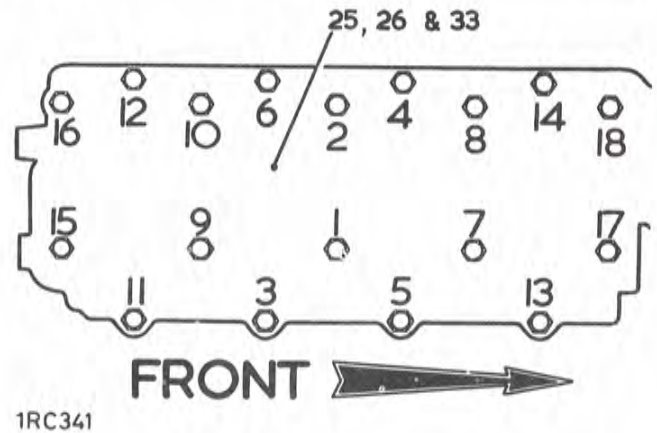
20. Thinly coat both sides of the cylinder head gasket with Hylomar PL 32/M jointing compound, Rover Part No. 534244.
21. Position the gasket on the cylinder block with the lettering 'DIESEL' uppermost.
22. Place the cylinder head in position. Engage all the cylinder head fixings except those that also secure the rocker shaft assembly.
23. Place the push rods into their original bores and ensure that they bottom correctly into the spherical seats in the tapped slides
24. Fit the rocker shaft assembly and engage the fixings.

*continued*

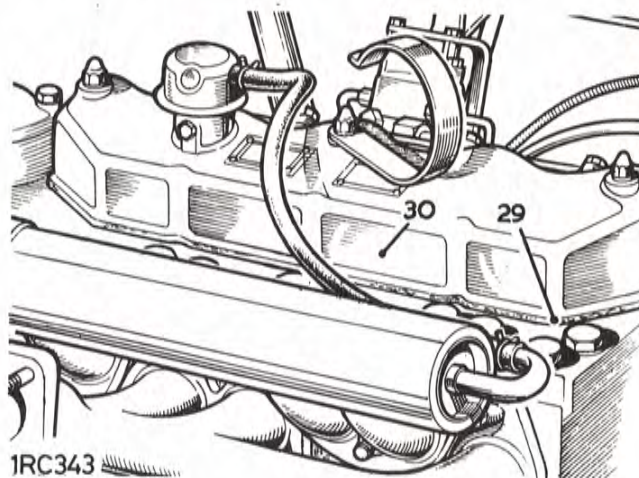


25. Secure to 1/2 in. UNF cylinder head fixings, 606445. Torque 12.5 kgf.m (90 lbf.ft.).
26. Secure the 5/16 in. UNF rocker shaft fixings. Torque 2.4 kgf.m (18 lbf.ft.).
27. Set the tappet clearances to 0,25 mm (0.010 in.) for all valves, as follows:
  - Set No. 1 tappet with No. 8 valve fully open.
  - Set No. 3 tappet with No. 6 valve fully open.
  - Set No. 5 tappet with No. 4 valve fully open.
  - Set No. 2 tappet with No. 7 valve fully open.
  - Set No. 8 tappet with No. 1 valve fully open.
  - Set No. 6 tappet with No. 3 valve fully open.
  - Set No. 4 tappet with No. 5 valve fully open.
  - Set No. 7 tappet with No. 2 valve fully open.
28. Recheck the tappet clearances with the locknuts tightened, and readjust if necessary.

*continued*



29. Place the joint washer for the engine top cover in position.
30. Fit the engine top cover.
31. Reverse 1 to 15.
32. Start and run the engine until it attains normal operating temperature.
33. Remove the engine top cover, and while the engine is hot, check tighten all the 1/2 in. UNF cylinder head fixings in the order shown. 606445. Torque 12.5 kgf. m (90 lbf. ft.).



1RC343





CYLINDER HEAD—Petrol

—Overhaul

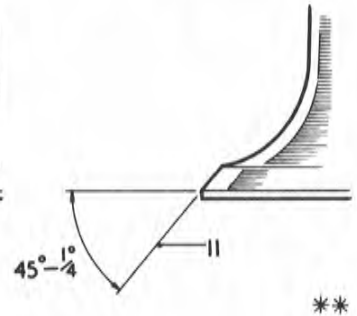
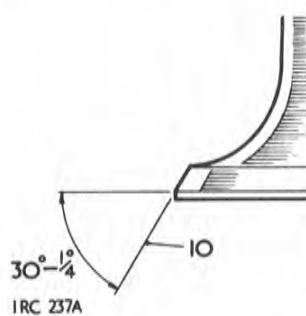
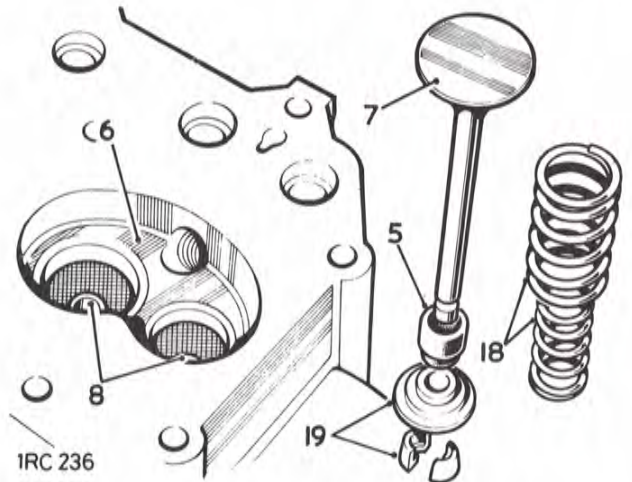
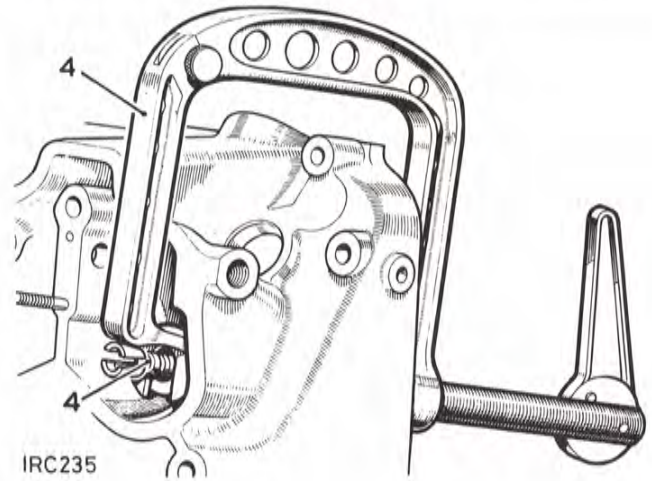
12.29.18

- Service tools: 276102 Valve spring compressor  
 274400 Inlet valve guide remover  
 274401 Exhaust valve guide remover  
 600959 Exhaust valve guide replacer  
 601508 Inlet valve guide replacer

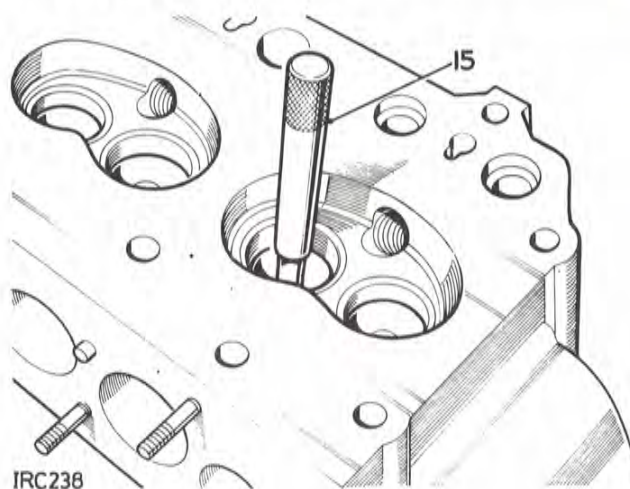
Dismantling

1. Remove the cylinder head. 12.29.10.
2. Remove the induction and exhaust manifold assembly. 30.15.01.
3. Remove the thermostat housing complete.
4. Remove the valve assemblies and retain the components in related sets. Compressor 276102.
5. Withdraw the oil seals from the valve guides.
6. Clean the combustion chambers and piston crowns with a soft wire brush.
7. Clean the valves.
8. Clean the valve guide bores.
9. Regrind or fit new valves as necessary.
10. The correct angle for the inlet valve face is  $30^{\circ} - \frac{1}{4}^{\circ}$ .
11. The correct angle for the exhaust valve face is  $45^{\circ} - \frac{1}{4}^{\circ}$ .
12. The correct angle for the inlet valve seat is  $30^{\circ} + \frac{1}{4}^{\circ}$ .
13. The correct angle for the exhaust valve seat is  $45^{\circ} + \frac{1}{4}^{\circ}$ .

continued

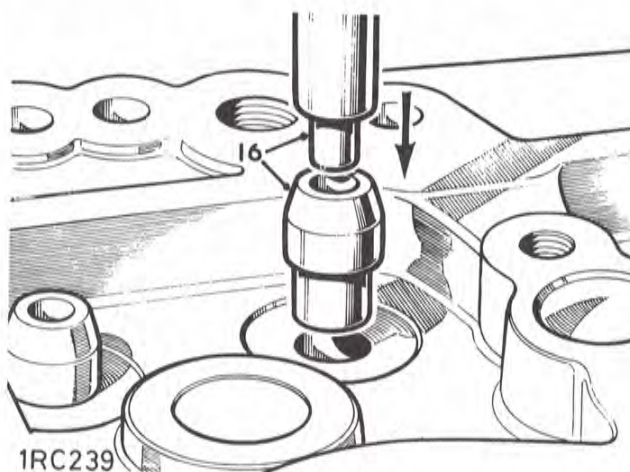


14. Check the valve guides and fit replacements as necessary. 15 to 17.
15. Drive out the old guides from the combustion chamber side. 274400 and 274401.
16. Lubricate the new valve guides and drive them into position. 600959 and 601508.
17. Check and if necessary, reface the valves and seats, as previously described.
18. Inspect the valve springs which are provided as paired assemblies. The springs must be an interference fit with each other.
19. Inspect the valve split cones and valve spring caps for general condition.
20. Inspect the cylinder head for general condition and for damage to threads.

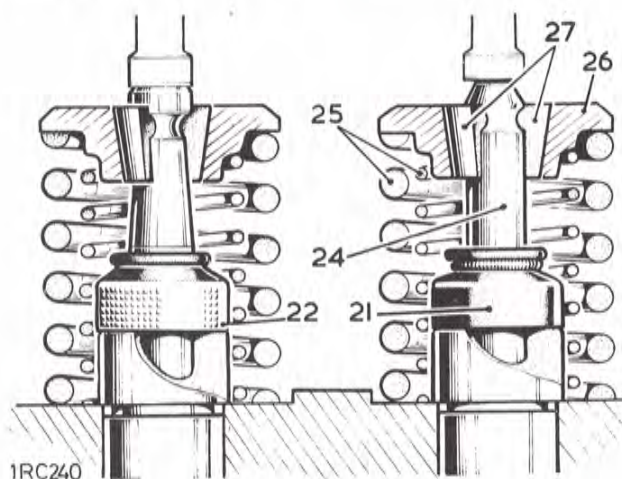


### Assembling

21. Fit the oil seals, fitted with springs, to the inlet valve guides.
22. Fit the oil seals, with external projections, to the exhaust valve guides.
23. Lubricate the valve stems and guides with engine oil and fit each valve as follows:
  24. Insert the valve into its respective guide.
  25. Place the valve springs in position.
  26. Locate the cap on the springs.
  27. Compress the springs and fit the valve collets. 276102.
  28. Reverse 1 to 3.
  29. After the initial engine run, that is with the engine at normal running temperature, check the cylinder head fixings to the correct torque load with the sparking plugs removed. Torque: 1/2 UNF bolts 8.9 kgf.m (65 lbf.ft.). 5/16 UNF bolts 2.4 kgf.m (18 lbf.ft.).



*continued*



**DATA****Cylinder head**

Inlet valve seat angle	$30^{\circ} + \frac{1}{4}^{\circ}$ .
Exhaust valve seat angle	$45^{\circ} + \frac{1}{4}^{\circ}$ .

**Valves**

Inlet valve	
Diameter of stem	7,88 mm to 7,90 mm (0.3107 in. to 0.3112 in.).
Face angle	$30^{\circ} - \frac{1}{4}^{\circ}$ .
Exhaust valve	
Diameter of stem	8,65 mm to 8,67 mm (0.3410 in. to 0.3415 in.).
Face angle	$45^{\circ} - \frac{1}{4}^{\circ}$ .

**Valve guides**

Inlet bore size, after fitting	7,93 mm to 7,97 mm (0.3125 in. to 0.3140 in.).
Exhaust bore size after fitting	8,73 mm to 8,77 mm (0.3435 in. to 0.3450 in.).

**Valve Springs**

Inner	
Length, free	42,67 mm (1.680 in.).
Length, under 8.0 kg. (17.7 lb.) load	37,13 mm (1.462 in.).
Outer	
Length, free	46,28 mm (1.822 in.).
Length, under 21 kg. (46 lb.) load	40,30 mm (1.587 in.).

## CYLINDER HEAD—Diesel

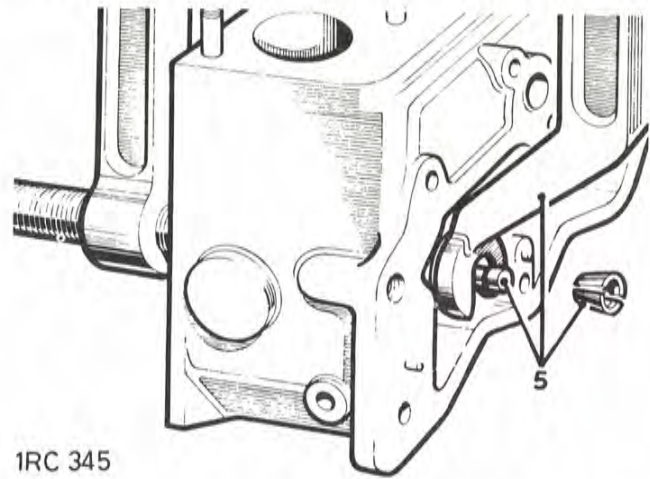
—Overhaul

12.29.18

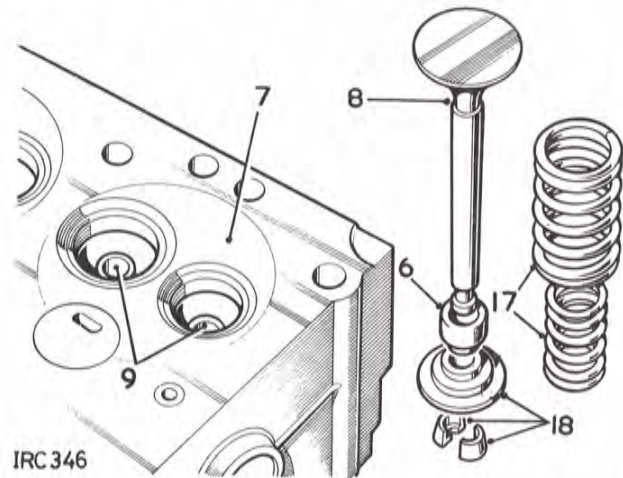
Service tools: 276102 Valve spring compressor  
 274400 Inlet valve guide remover.  
 274401 Exhaust valve guide remover  
 600959 Exhaust valve guide replacer  
 601508 Inlet valve guide replacer  
 530625 Exhaust seat insert replacer.  
 274399 Push rod tube replacer

## Dismantling

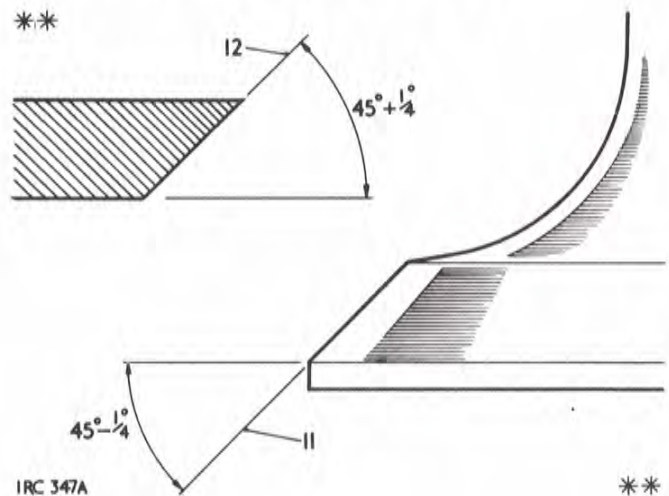
1. Remove the cylinder head. 12.29.10.
2. Remove the induction and exhaust manifold assembly. 30.15.01.
3. Remove the injectors. 19.60.01.
4. Remove the thermostat housing complete.
5. Remove the valve assemblies and retain the components in related sets. Compressor 276102.
6. Withdraw the oil seals from the valve guides.
7. Clean the combustion chambers and piston crowns with a soft wire brush.
8. Clean the valves.
9. Clean the valve guide bores.
10. Regrind or fit new valves as necessary.
11. The correct angle for inlet and exhaust valve faces is  $45^\circ - \frac{1}{4}^\circ$ .
12. The correct angle for the inlet and exhaust valve seats is  $45^\circ + \frac{1}{4}^\circ$ .

*continued*

IRC 345



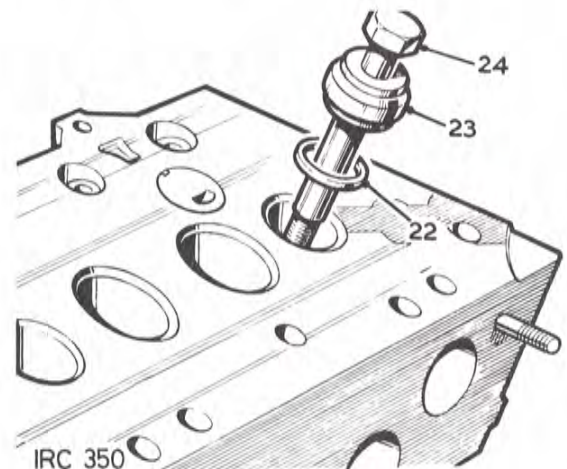
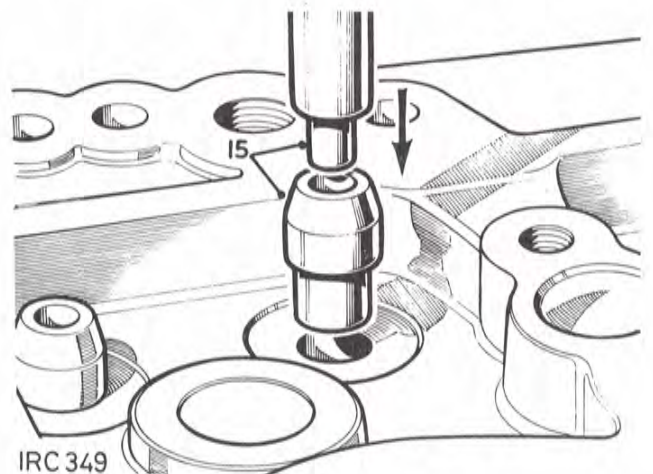
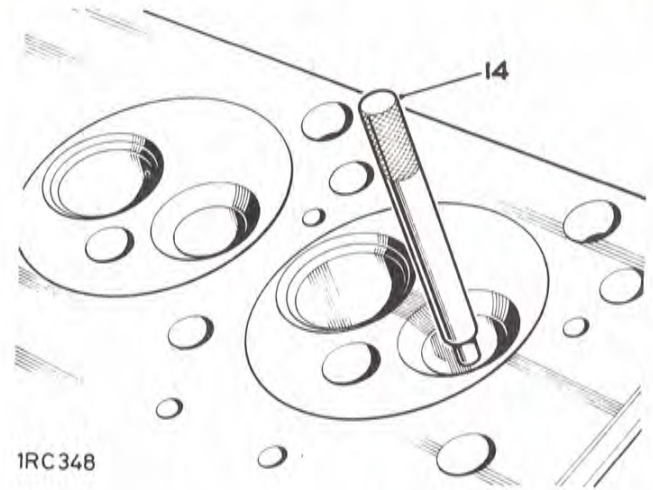
IRC 346



IRC 347A

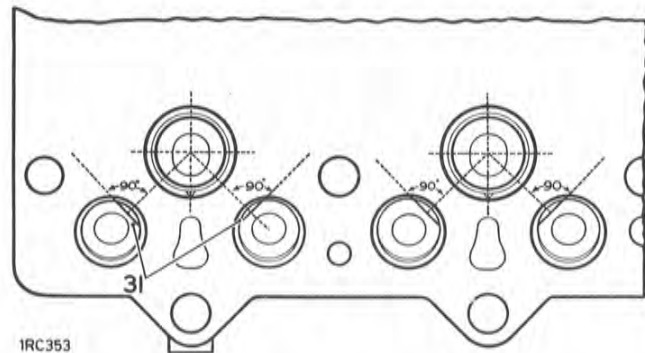
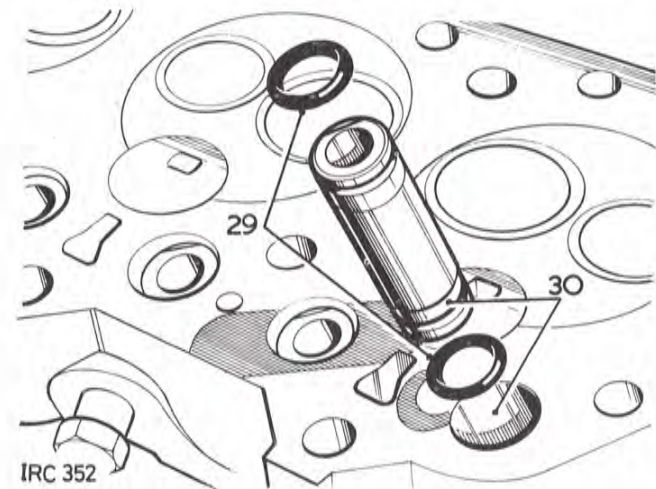
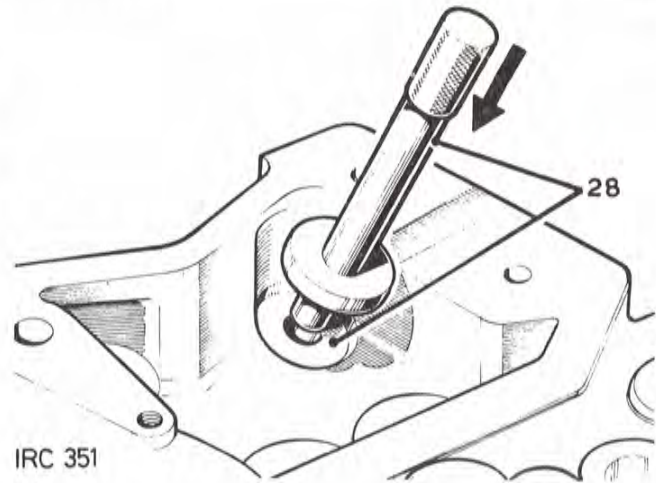
13. Check the valve guides and fit replacements as necessary. 14 to 16.
14. Drive out the old guides from the combustion chamber side. 274400 and 274401.
15. Lubricate the new valve guides and drive them into position. 600959 and 601508.
16. Check and if necessary, **reface** the valves and seats, as previously described.
17. Inspect the valve springs which are provided as paired assemblies. The springs must be an interference fit with each other.
18. Inspect the valve collets and valve springs caps for general condition.
19. Check the exhaust valve seats and fit replacements as necessary.
20. Remove the valve guides from the applicable exhaust ports.
21. Remove the old seat inserts by grinding them away until they are thin enough to be cracked and prised out.
22. Place the new seat insert in position.
23. Locate the replacer tool 530625, onto the seat insert.
24. Using a suitable nut and bolt, pull the insert into the recess in the cylinder head.
25. Fit the valve guides as previously detailed.
26. Cut the valve seats to  $45^\circ + \frac{1}{4}^\circ$ .

*continued*



27. Check the push rod tubes and seals and fit replacements as necessary. 28 to 32.
28. Drive out the old push rod tubes from valve gear side. 274399.
29. Fit new sealing rings to new push rod tubes and smear them with MS4 silicone grease.
30. Insert the new tubes, chamfered end first, from the combustion chamber side.
31. Align the flat on the push rod tube at right angles to an imaginary line between the centre of the push rod tube and the centre of the hot plug.
32. Press the push rod tubes into position ensuring that the alignment is maintained and that the chamfers on the tubes and in the cylinder head are fully engaged.

*continued*



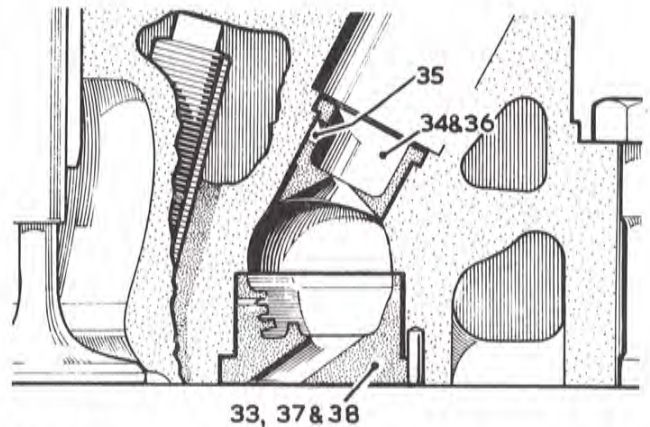
**Hot plugs (combustion chamber) and injector shrouds**

When carrying out normal top overhaul work on the cylinder it is not necessary to remove either the injector shrouds or the hot plugs.

Small surface cracks in the hot plug, extending from the opening to approximately 8,0 mm (0.312 in.) in length can be ignored. However if any severe cracks appear on the face of the hot plug, before attempting to remove it, closely inspect the cylinder head for signs of cracks, particularly between the inlet and exhaust valve seats. Such cracking indicates that the engine has overheated, usually through lack of coolant, and the cylinder head should be scrapped.

33. To remove a hot plug, insert a thin soft metal drift through the injector shroud throat and tap the hot plug from the inside. Once removed the hot plug is scrap.
34. If an injector shroud is damaged, drift the shroud out towards the injector bore.
35. Thoroughly clean out the combustion chamber. The hole in the side of the injector shroud is for manufacturing purposes only, but at the same time can be used as a guide when refitting the shroud.
36. Smear a little oil on the shroud and insert into the cylinder head with the hole pointing towards the centre of the cylinder head, and drift into position. 274399.
37. Fit the hot plugs by tapping with a hide faced mallet.
38. When fitted, the hot plugs must be checked with a dial test indicator to ensure that they do not protrude above the level of the cylinder head face more than 0,025 mm (0.001 in.) and are not recessed below the level of the cylinder head face more than 0,05 mm (0.002 in.).

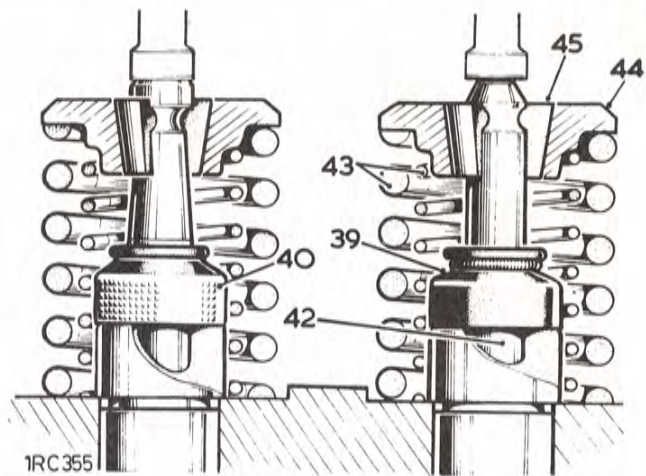
**NOTE:** If the hot plugs are loose in the cylinder head they may be retained with a little grease.



1RC354

## Assembling

39. Fit the oil seals, fitted with springs, to the inlet valve guides.
40. Fit the oil seals, with external projectors, to the exhaust valve guides.
41. Lubricate the valve stems and guides with engine oil and fit each valve as follows:
  42. Insert the valve into its respective guide.
  43. Place the valve springs in position.
  44. Locate the cap on the springs.
  45. Compress the springs and fit the valve collets. 276102.
46. Reverse 1 to 4.
47. After the initial engine run, that is with the engine at normal running temperature, check the cylinder head fixings to the correct torque load. 606445. Torque: 1/2 in. UNF fixings 12.5 kgf.m (90 lbf.ft.), 5/16 in. UNF fixings 2.4 kgf.m (18 lbf.ft.).



*continued*



**DATA****Cylinder head**

Inlet valve seat angle	$45^{\circ} + \frac{1}{4}^{\circ}$ .
Exhaust valve seat angle	$45^{\circ} + \frac{1}{4}^{\circ}$ .

**Valves**

Inlet valve	
Diameter of stem	7,88 mm to 7,90 mm (0.3107 in. to 0.3112 in.).
Face angle	$45^{\circ} - \frac{1}{4}^{\circ}$ .
Exhaust valve	
Diameter of stem	8,65 mm to 8,67 mm (0.3410 in. to 0.3415 in.).
Face angle	$45^{\circ} - \frac{1}{4}^{\circ}$ .

**Valve guides**

Inlet guide bore size, after fitting	7,93 mm to 7,97 mm (0.3125 in. to 0.3140 in.).
Exhaust guide bore size, after fitting	8,73 mm to 8,77 mm (0.3435 in. to 0.3450 in.).

**Valve springs**

Inner	
Length, free	42,67 mm (1.680 in.).
Length, under 8.0 kg. (17.7 lb.) load	37,13 mm (1.462 in.).
Outer	
Length, free	46,28 mm (1.822 in.).
Length, under 21 kg. (46 lb. load).	40,30 mm (1.587 in.).

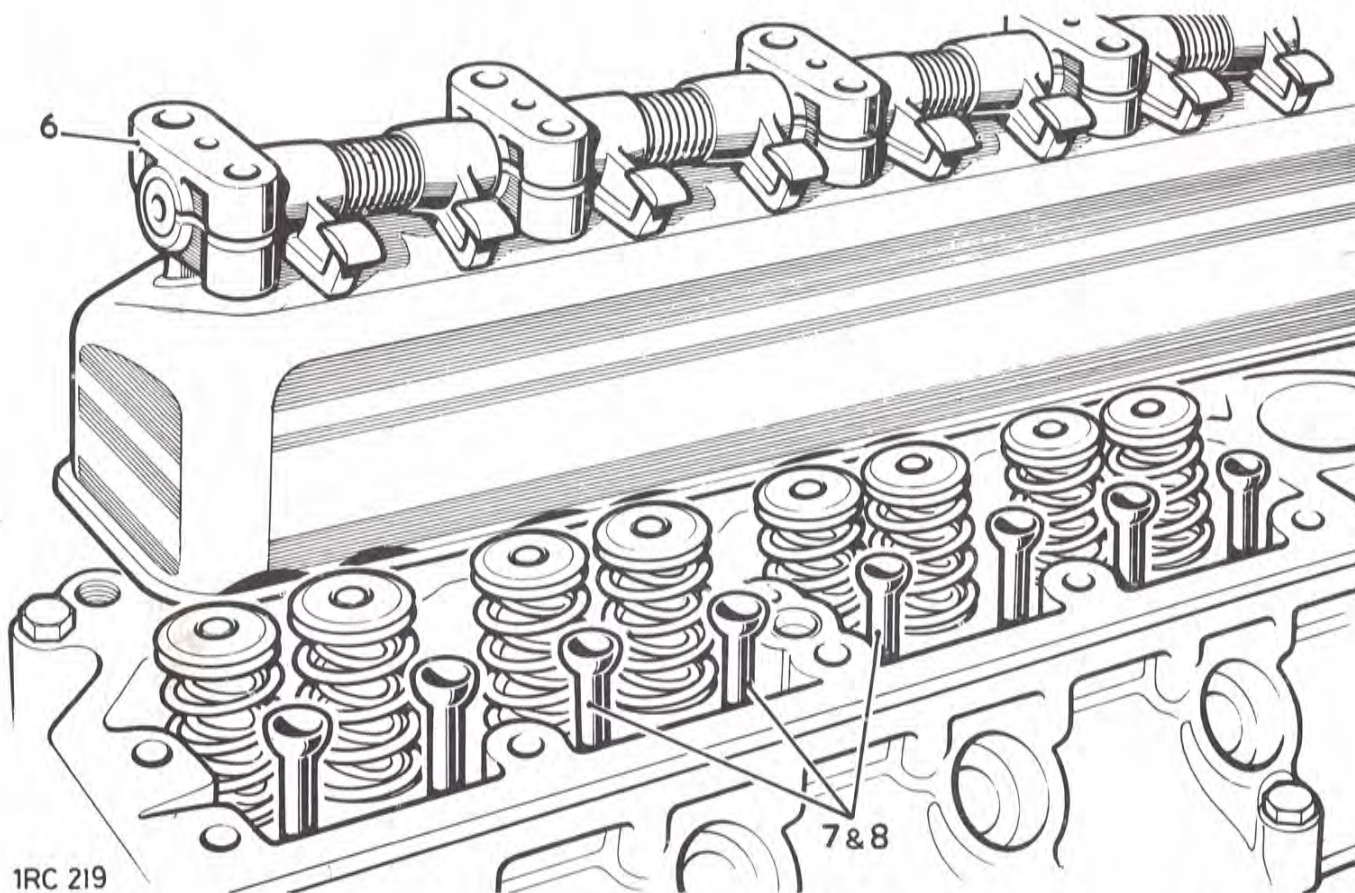
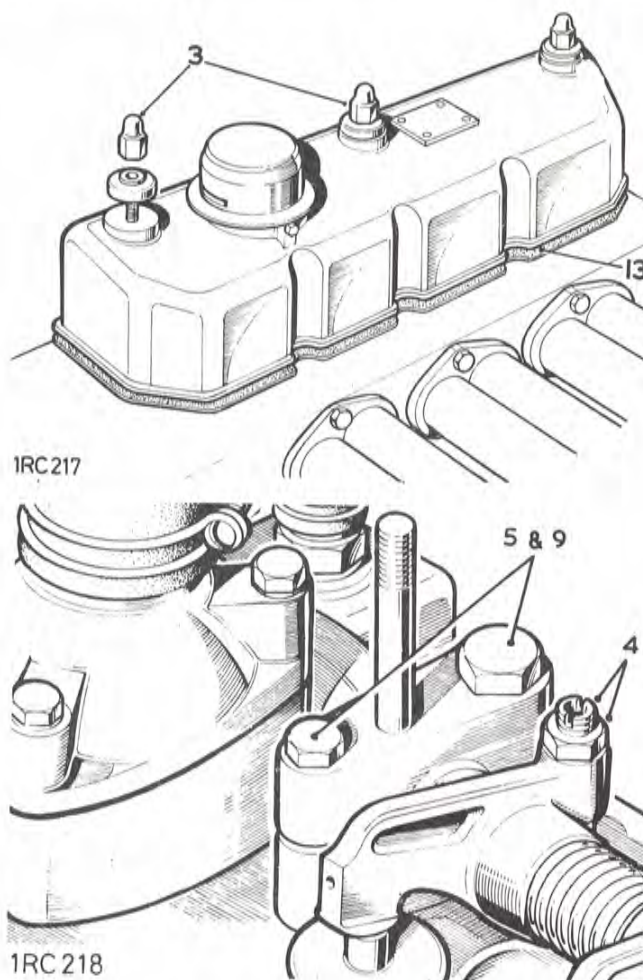
## VALVE GEAR—Petrol

—Remove and refit

12.29.34

## Removing

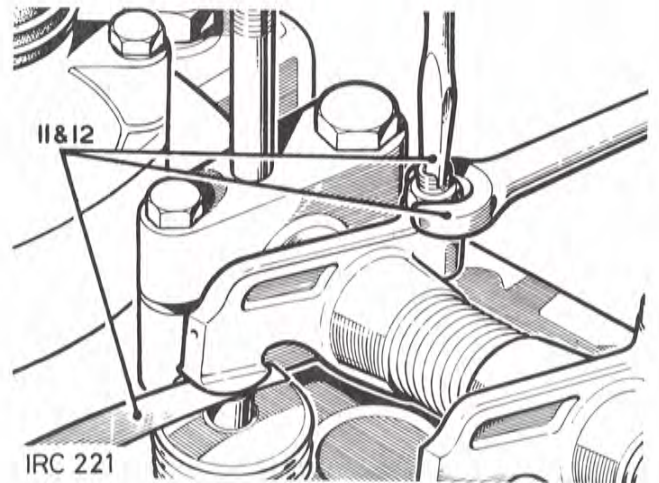
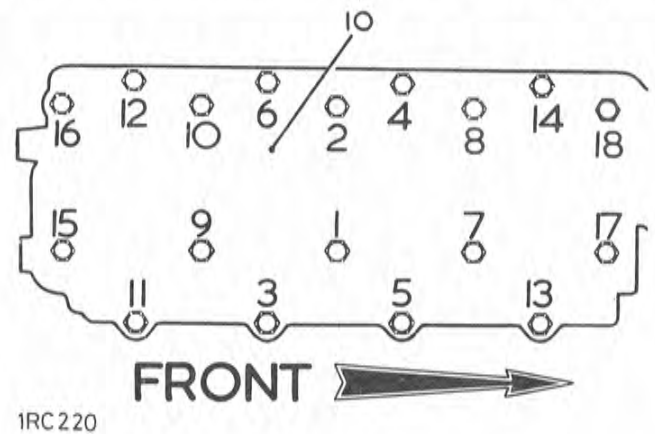
1. Remove the bonnet. 76.16.01
2. Remove the air cleaner. 19.10.01.
3. Remove the engine top cover.
4. Slacken locknuts and turn tappet adjusting screws to disengage from push rods.
5. Remove fixings from rocker shaft support brackets. Do not remove shaft assembly at this stage.
6. Withdraw the rocker shaft assembly complete, using the engine top cover secured inverted to the rocker bracket studs to retain the assembly.
7. Withdraw the tappet push rods and retain them in numbered sequence related to the tappet served.

*continued*

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## Refitting

8. Fit the tappet push rods to their original borés. Ensure that the bottom end of the push rods locate in the spherical tappet seats.
9. Refit the rocker shaft assembly, located by spigots. Torque: 1/2 in. UNF bolts: 8.9 kgf.m (65 lbf.ft.). 5/16 in. UNF bolts: 2.4 kgf.m (18 lbf.ft.).
10. Check tighten all 1/2 in. UNF cylinder head fixings in the order shown. Torque: 8.9 kgf.m (, lbf.ft.).
11. Set the tappet clearances to 0,25 mm (0.010 in.) for all valves, as follows:  
Set No. 1 tappet with No. 8 valve fully open.  
Set No. 3 tappet with No. 6 valve fully open.  
Set No. 5 tappet with No. 4 valve fully open.  
Set No. 2 tappet with No. 7 valve fully open.  
Set No. 8 tappet with No. 1 valve fully open.  
Set No. 6 tappet with No. 3 valve fully open.  
Set No. 4 tappet with No. 5 valve fully open.  
Set No. 7 tappet with No. 2 valve fully open.
12. Recheck the tappet clearances with the locknuts tightened, and readjust if necessary.
13. Place the joint washer for the engine top cover in position.
14. Reverse 1 to 3.



## DATA

## Tappet clearance

0,25 mm (0.010 in.) inlet and exhaust.

## VALVE GEAR—Diesel

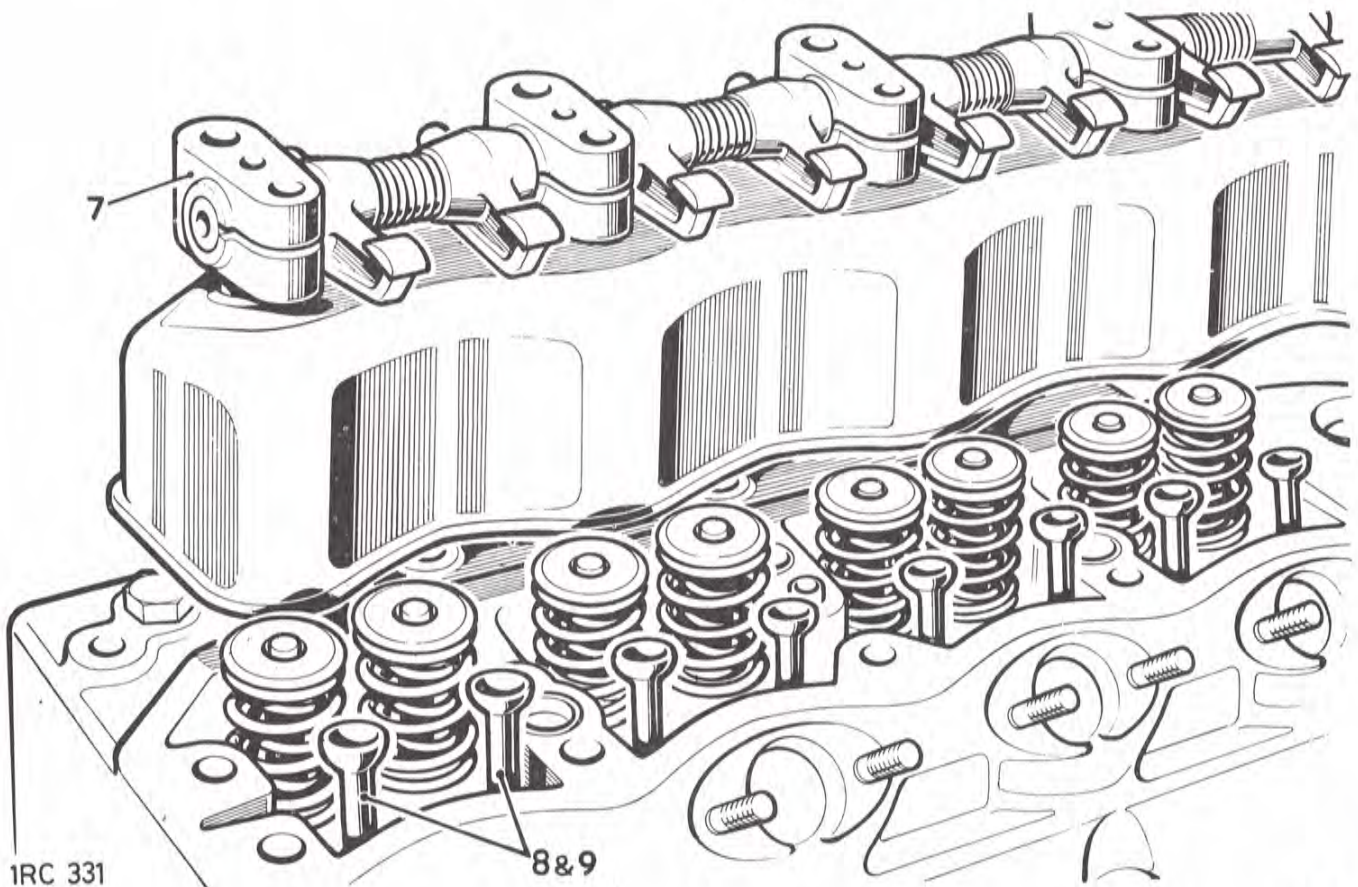
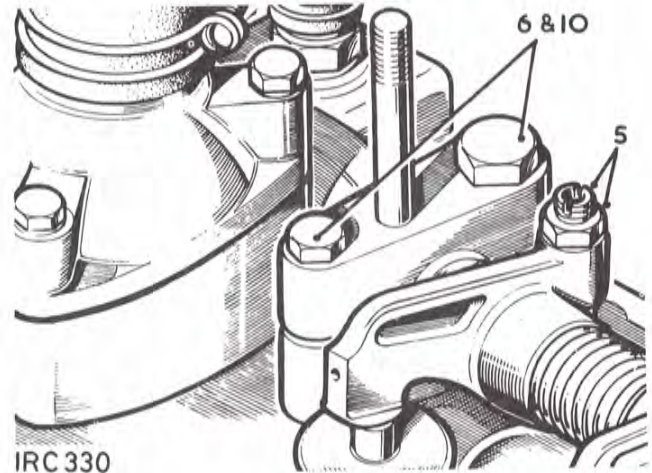
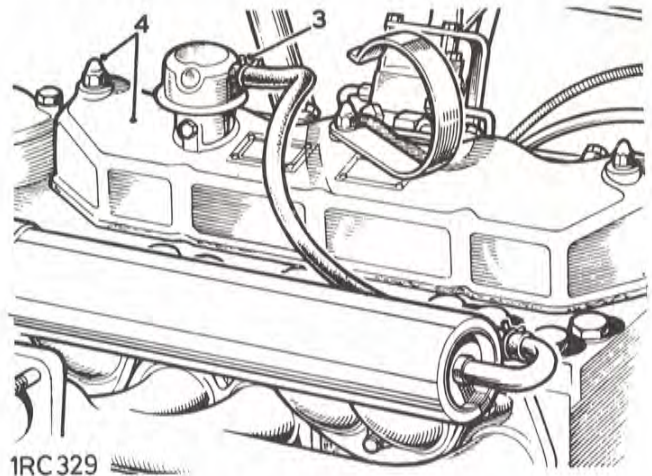
—Remove and refit

12.29.34

Service tool: 606445 Spanner for cylinder head bolts.

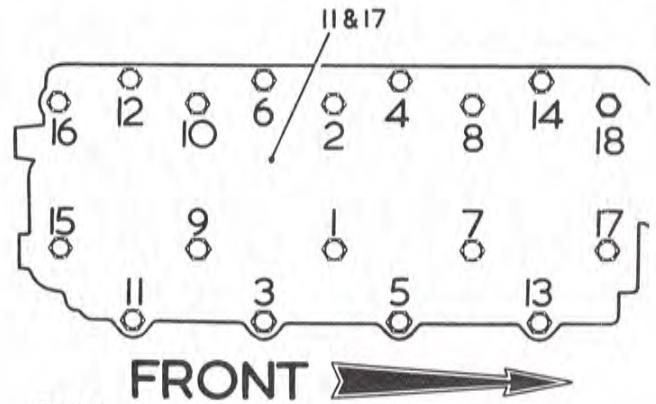
## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Disconnect the breather hose from the engine top cover.
4. Remove the engine top cover.
5. Slacken locknuts and turn tappet adjusting screws to disengage from push rods.
6. Remove fixings from rocker shaft support brackets. Do not remove shaft assembly at this stage.
7. Invert the engine top cover and secure it to the studs on the rocker brackets. Withdraw the rocker shaft assembly complete, using the engine top cover to retain the assembly.
8. Withdraw the tappet pushrods and retain them in numbered sequence related to the tappet served.

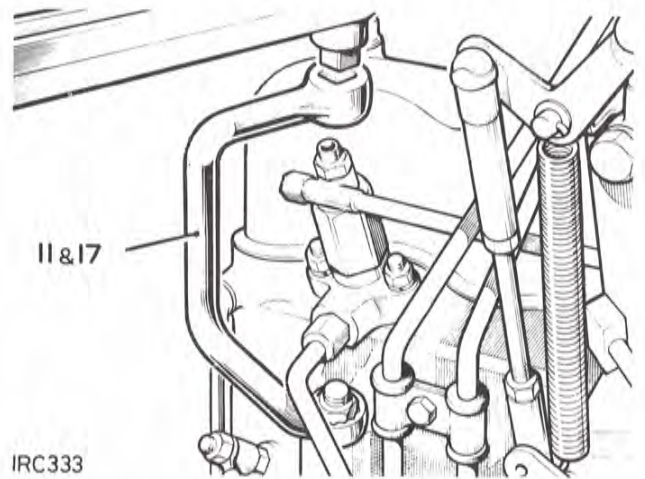
*continued*

## Refitting

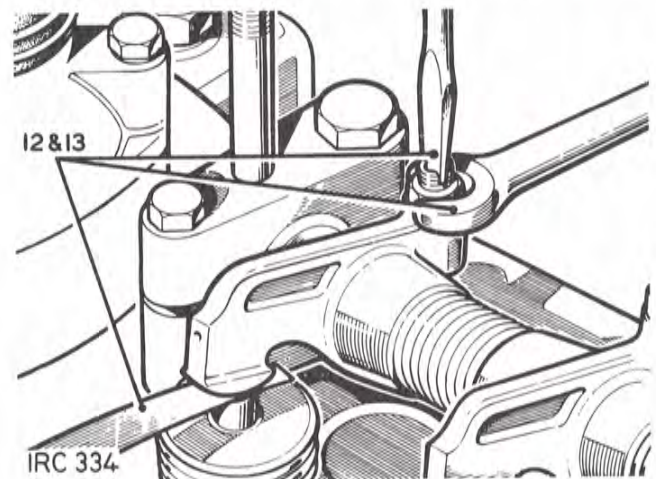
9. Fit the tappet pushrods to their original bores. Ensure that the bottom end of the push rods locate in the spherical tappet seats.
10. Fit the rocker shaft assembly, located by spigots. Torque: 1/2 in. UNF bolts: 12.5 kgf.m (90 lbf.ft.), 5/16 in. UNF bolts: 2.4 kgf.m (19. lbf.ft.).
11. Check thighten all the 1/2 in. UNF cylinder head fixings in the order shown. 606445. Torque: 12.5 kgf.m (90 lbf.ft.).
12. Set the tappet clearance to 0,25 mm (0.010 in.) for all valves, as follows.  
Set No. 1 tappet with No. 8 valve fully open.  
Set No. 3 tappet with No. 6 valve fully open.  
Set No. 5 tappet with No. 4 valve fully open.  
Set No. 2 tappet with No. 7 valve fully open.  
Set No. 8 tappet with No. 1 valve fully open.  
Set No. 6 tappet with No. 3 valve fully open.  
Set No. 4 tappet with No. 5 valve fully open.  
Set No. 7 tappet with No. 2 valve fully open.
13. Recheck the tappet clearances with the locknuts tightened, and readjust if necessary.
14. Place the joint washer for the engine top cover in position.
15. Reverse 1 to 4.
16. Start and run the engine until it is hot.
17. Remove the engine top cover, and while the engine is hot, check tighten all the 1/2 in. UNF cylinder head fixings in the order shown. 606445. Torque: 12.5 kgf.m (90 lbf.ft.).
18. Refit the engine top cover.



IRC332



IRC333



IRC 334

## DATA

## Tappet clearance

0,25 mm (0.010 in.) inlet and exhaust.

## ROCKER SHAFT ASSEMBLY

-Overhaul

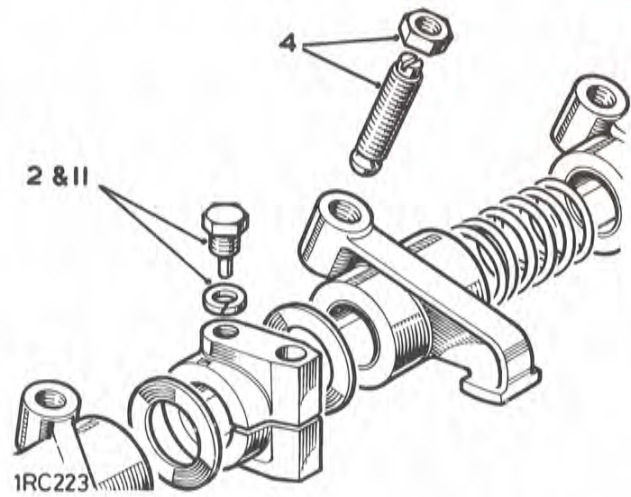
12.29.55

## Dismantling

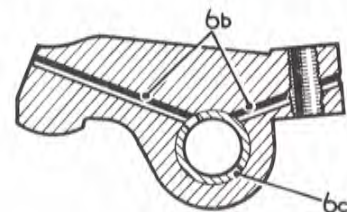
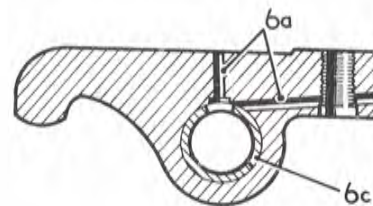
1. Remove the valve gear. 12.29.34
2. Remove the locating screw and washer from the intermediate rocker bracket.
3. Withdraw all the components from the rocker shaft.
4. Remove the tappet adjustment screws.

## Inspecting

5. Rocker brackets. Ensure the oil feed holes are clear. Inspect the locating dowel spigots; the spigots must be undamaged to ensure a correct fit on the locating dowels in the cylinder head.
- 6.\*\* Valve rockers:
  - a. Valve rocker for 2¼ litre Petrol engines.
  - b. Valve rocker for 2¼ litre Diesel engines.
  - c. Visually inspect the rocker bushes for wear. If necessary, press replacement bushes into the rockers and ream to 13,5 mm + 0,02 mm (0.530 in. + 0.001 in.). The oil holes in the rocker bushes are pre-drilled and must be aligned with the oil holes in the valve rocker when assembled.\*\*
7. Check that all oil passage drillings are clear.
8. Tappet adjusting screws and locknuts. Examine threads for damage. Check that the oil relief drilling is clear.
9. Inspect the rocker shaft for wear and scores; check that the oil feed holes are clear.
10. Examine the rocker shaft springs, spacing washers and the locating screw for soundness and general condition.

*continued*

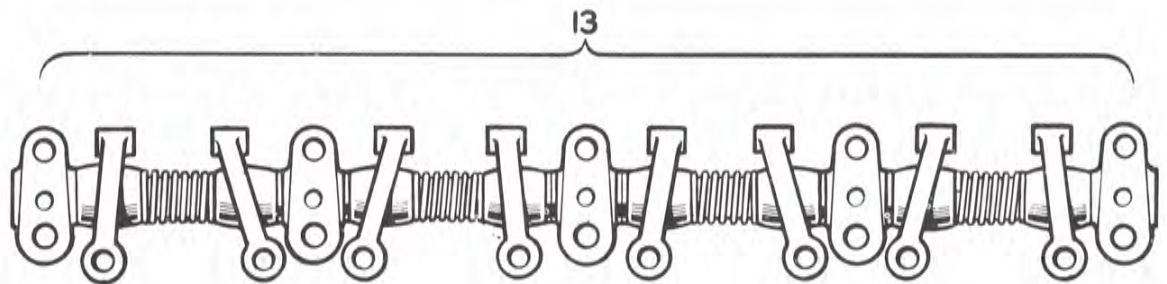
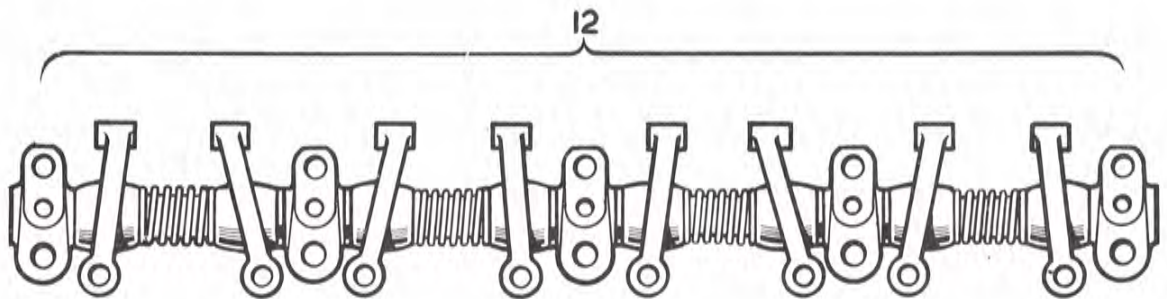
\*\*



2 RC 172

\*\*

11. Fit an intermediate rocker bracket to the rocker shaft and engage the locating screw through the bracket and into the larger hole in the shaft.
12. **Petrol engines**—Assemble the components to the rocker shaft as illustrated and note the assembled position of the spacing washers and the handed valve rockers.
13. **Diesel engines**—Assemble the components to the rocker shaft as illustrated and note the assembled position of the spacing washers and the handed valve rockers.
14. Refit the tappet adjustment screws.
15. Refit the valve gear. 12.29.34.



1RC 224

**DATA****Rockers**

Bush internal diameter, reamed in position.

Shaft clearance in rocker bush:

Petrol engines

Diesel engines

13,40 mm to 13,42 mm (0.530 in. to 0.531 in.).

0,013 mm to 0,038 mm (0.0005 in. to 0.0015 in.).

0,013 mm to 0,062 mm (0.0005 in. to 0.0025 in.).

## TAPPETS

-Remove and refit

12.29.57

Service tool: 530101 Tappet guide remover

## Removing

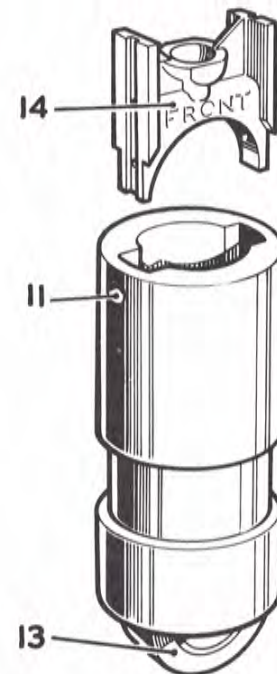
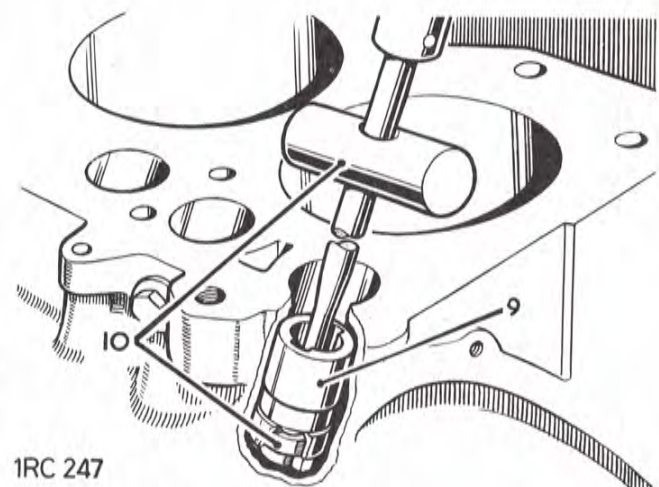
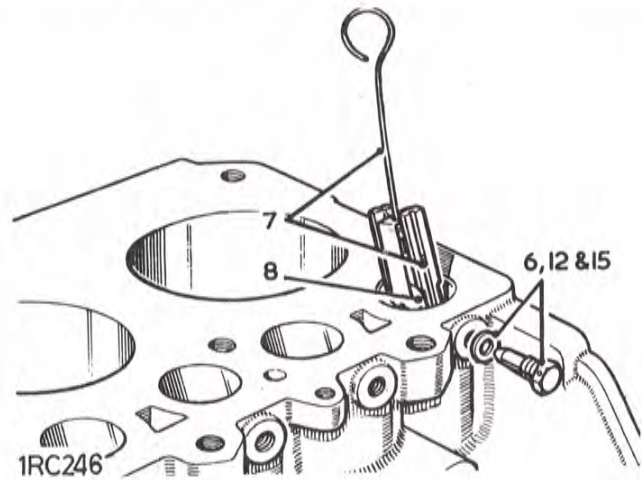
1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Disconnect the battery earth lead.
4. Remove the valve gear. 12.29.34.
5. Remove the cylinder head. 12.29.10.
6. Remove the tappet guide locating bolts from the R.H. side of the cylinder block.

**CAUTION:** Do not remove the tappet guides before the rollers have been withdrawn, otherwise the rollers may fall behind the camshaft.

7. Using a long nose pliers or a suitably made wire clip, withdraw the tappet slides and retain in sequence.
8. Withdraw the tappet rollers and retain with the related slides.
9. Withdraw the tappet guides and retain in sequence with the other related parts.
10. If the guides are difficult to withdraw, use Service Tool 530101.

## Refitting

11. Fit the tappet guides in the sequence removed, aligning the locating holes.
12. Engage the locating bolts sufficient to retain the guides.
13. Fit the tappet rollers with the larger chamfer towards the front of the engine.
14. Fit the tappet slides with the marking 'FRONT' towards the front of the engine.
15. Tighten the tappet guide locating bolts and secure in pairs by wire-locking.
16. Reverse 1 to 5.





## ENGINE ASSEMBLY—Petrol

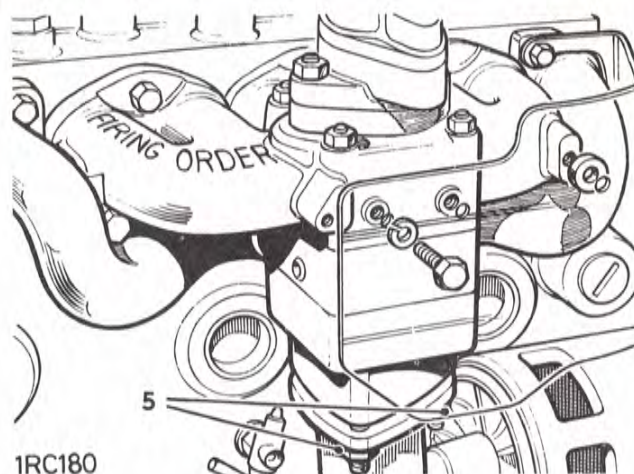
## —Remove and refit

12.41.01.

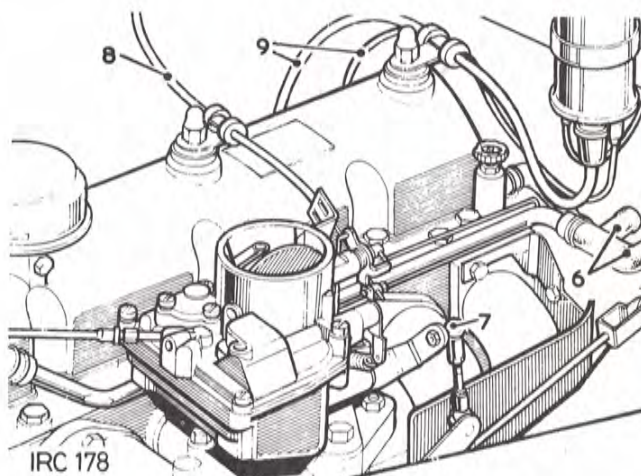
Service tool: 600963 Engine sling

## Removing

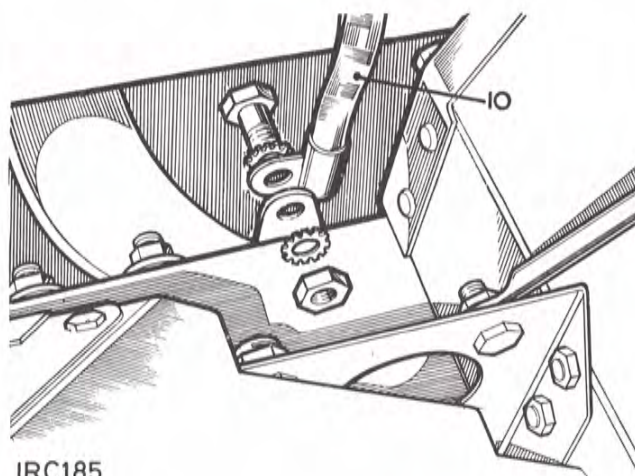
1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Remove the radiator assembly. 26.40.01.
4. Remove the front floor. 76.10.12.
5. Disconnect the exhaust pipe at the manifold.
6. Disconnect the heater hoses, if fitted.
7. Disconnect the carburettor linkage at the ball joint.
8. Disconnect the cold start cable at the carburettor.
9. Disconnect the distributor leads from the coil.
10. Disconnect the engine earth cable.

*continued*

IRC180



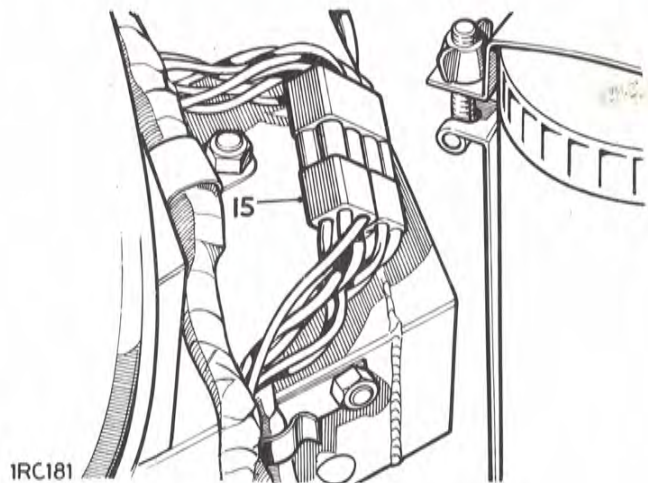
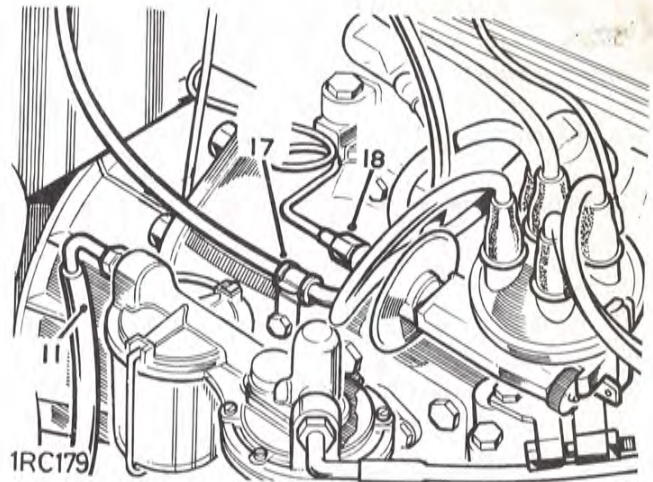
IRC 178



IRC185

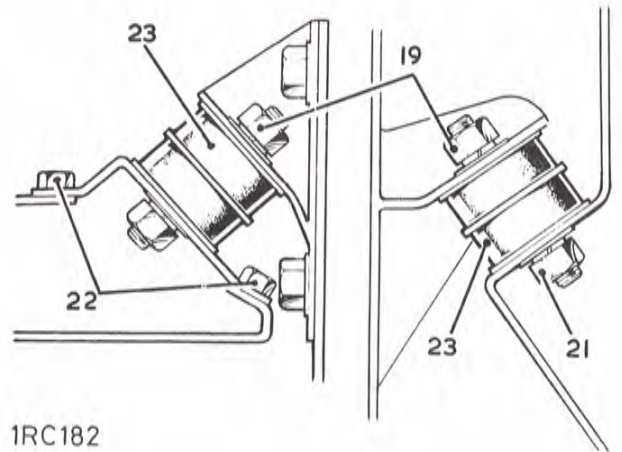
11. Disconnect the fuel inlet pipe at the fuel pump.
12. Release the clutch fluid pipe from the clips at the rear of the engine.
13. Disconnect the starter motor leads at the solenoid.
14. Disconnect the electrical leads from the alternator.
15. Disconnect the engine electrical leads at the snap connectors adjacent to the dash.
16. Release the disconnected electrical leads from the retaining clips at the dash panel.
17. Release the speedometer drive cable from the clip at the engine.
18. Disconnect the vacuum pipe from the distributor.

*continued*

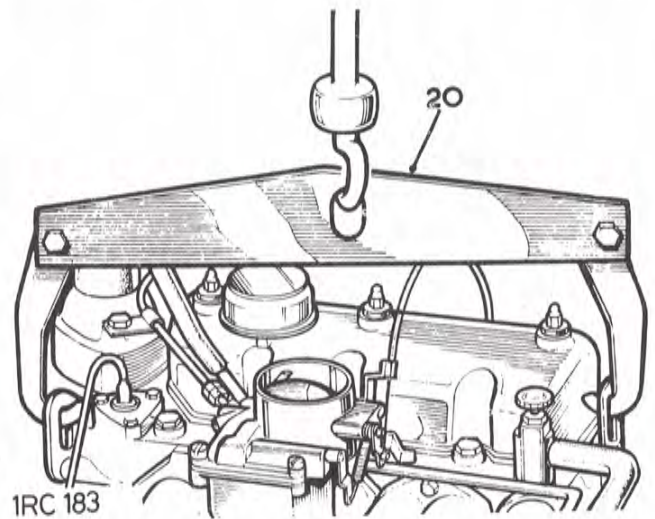


19. Remove the upper fixings from the engine mounting rubbers.
20. Attach a suitable lifting sling and hoist to the engine lifting hooks. 600963.
21. Remove the bottom fixing from the left hand engine mounting rubber.
22. Remove the support bracket fixings from the right hand engine mounting rubber.
23. Tension the hoist sufficient to withdraw the engine mounting rubbers, then lower the engine to its original position to maintain alignment with the gearbox.
24. Remove the fixings securing the bell housing to the flywheel housing.
25. Move the clutch slave cylinder aside without disconnecting the fluid pipe.
26. Support the gearbox assembly using a suitable packing block or jack.
27. Draw the engine forward to release it from the dowelled location to the bell housing, and to clear the primary pinion from the clutch.
28. Lift the engine clear.

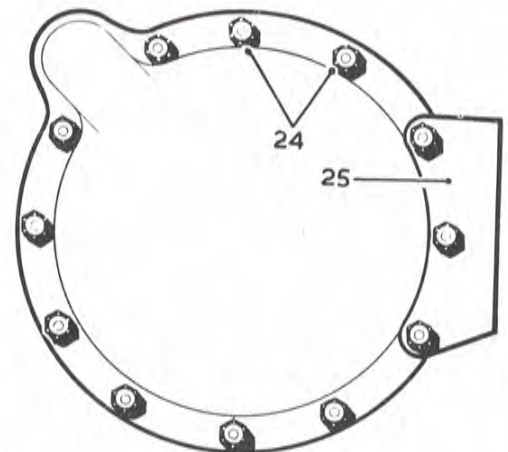
*continued*



1RC182



1RC183



1RC184

**Refitting**

29. Attach a suitable lifting sling and hoist to the engine lifting hooks. 600963.
30. Lower the engine into position, locating the primary pinion into the clutch and engage the bell housing dowels.
31. Secure the bell housing to the flywheel housing.
32. Tension the hoist sufficient to remove the support from the gearbox and insert the engine front mounting rubbers.
33. Lower the engine and secure the engine mounting upper and lower fixings.
34. Remove the engine lifting sling.
35. Reverse 1 to 18.
36. Check, and if necessary replenish the engine lubricating oil.
37. Check, and if necessary replenish, the gearbox lubricating oil.
38. Start the engine. Check that the oil pressure warning light goes out, and check the cooling system for leaks.
39. Check, and if necessary adjust, the engine idle speed.
40. Check, and if necessary adjust, the ignition timing.
41. When the engine is cold, check the coolant level in the radiator and top up if necessary.



## ENGINE ASSEMBLY—Diesel

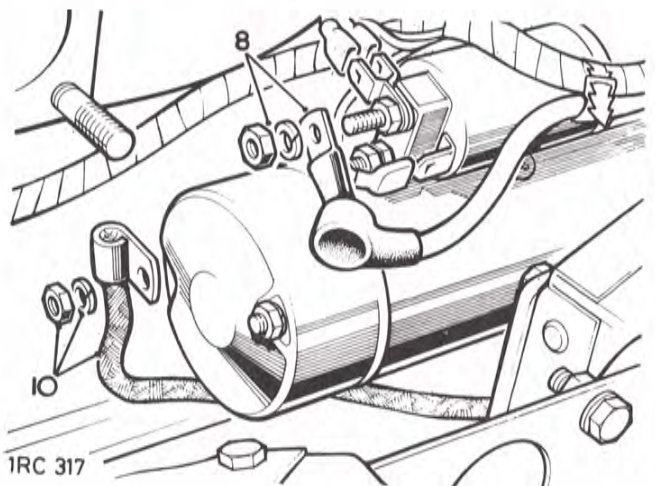
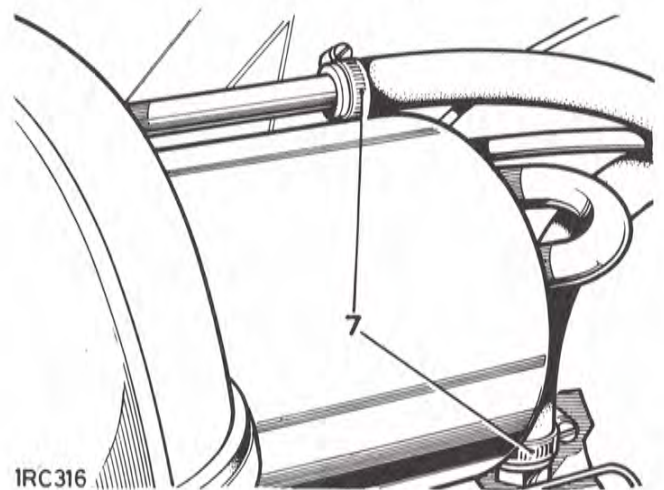
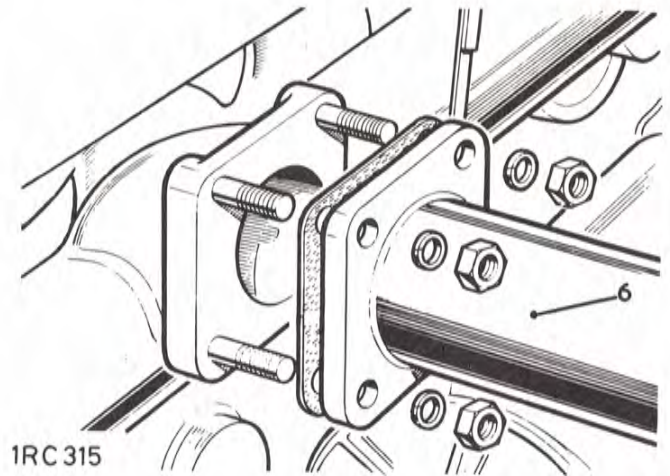
## —Remove and refit

12.41.01.

Service tool: 600963 Engine sling

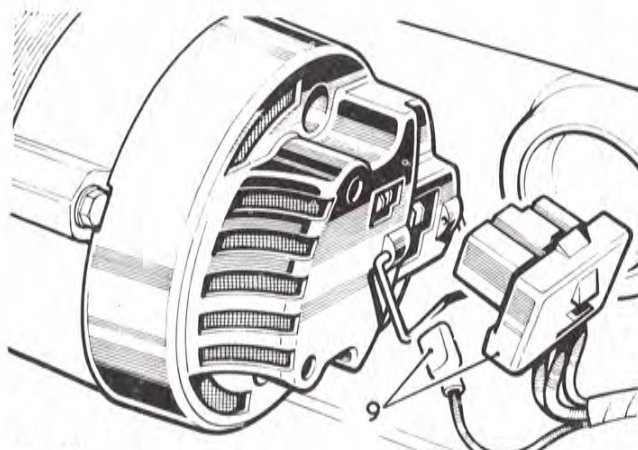
## Removing

1. Remove the bonnet. 76.16.01.
2. Disconnect the battery earth lead.
3. Remove the air cleaner. 19.10.01.
4. Remove the radiator assembly. 26.40.01.
5. Remove the front floor. 76.10.12.
6. Disconnect the exhaust pipe at the manifold.
7. Disconnect the heater hoses, if fitted.
8. Disconnect the starter motor leads.

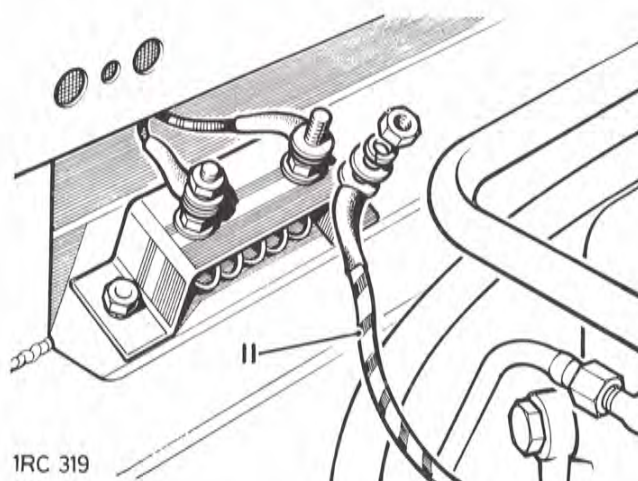
*continued*

9. Disconnect the alternator leads.
10. Disconnect the engine earth cable.
11. Disconnect the electrical feed to the heater plugs.
12. Disconnect the fuel pipe to the fuel pump.

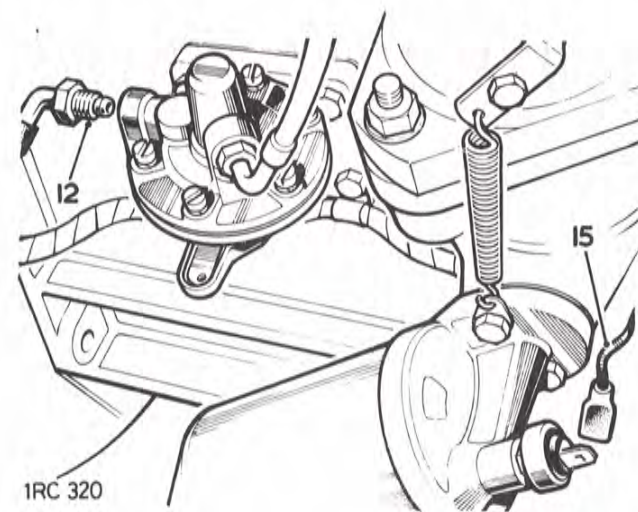
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1RC 318



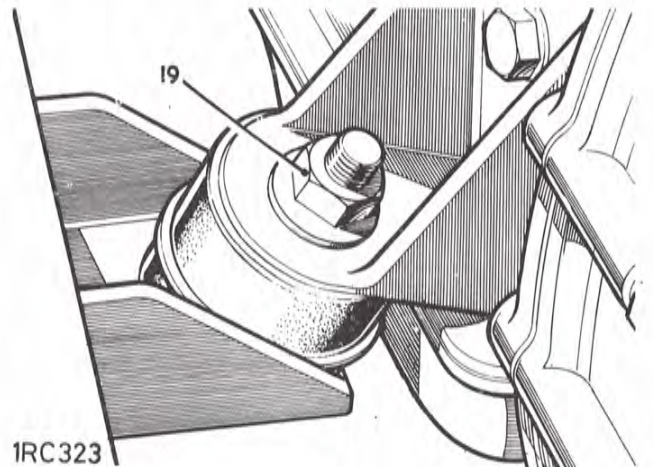
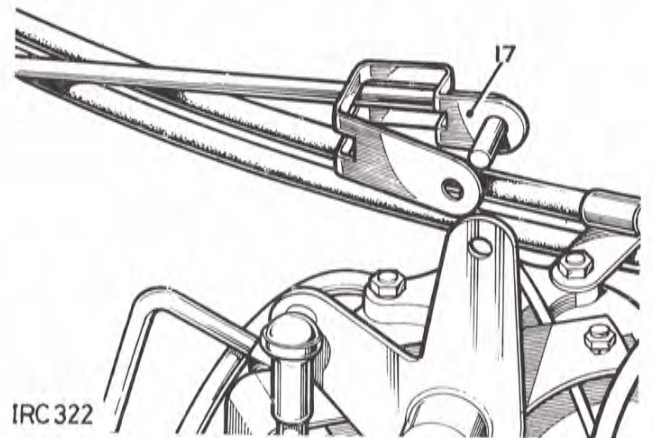
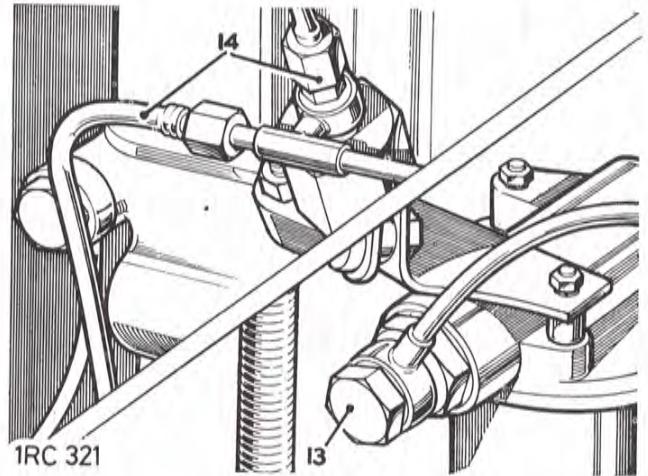
1RC 319



1RC 320

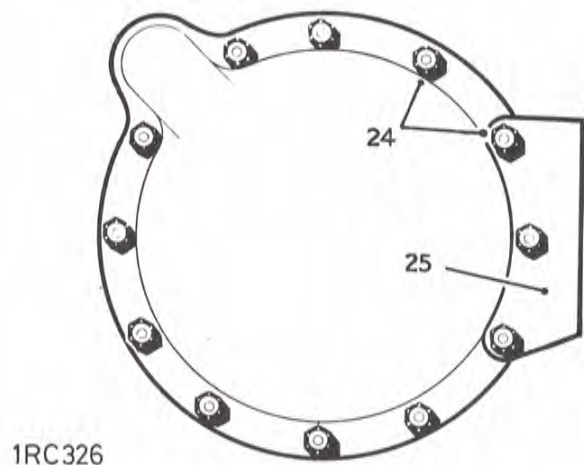
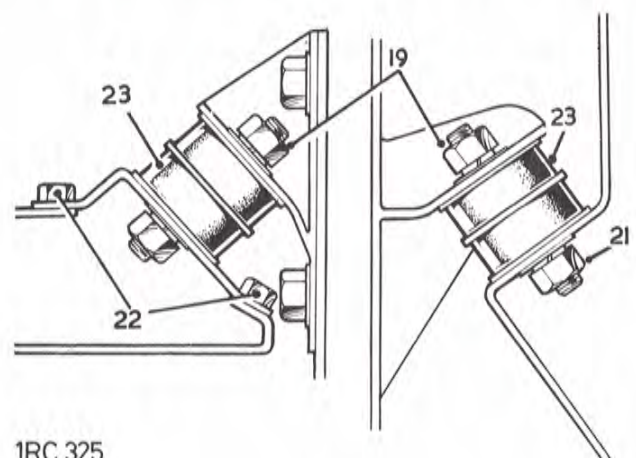
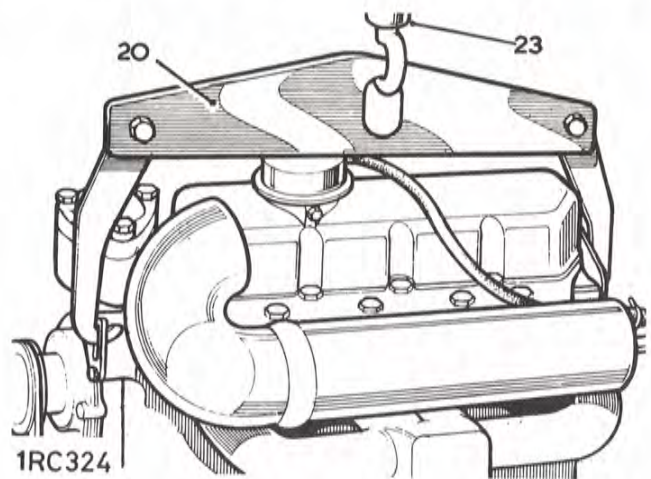
13. Disconnect the fuel inlet pipe from the distributor pump.
14. Disconnect the fuel spill pipes.
15. Disconnect the electrical lead from the oil pressure switch.
16. Disconnect the electrical lead from the water temperature transmitter.
17. Disconnect the accelerator linkage at the fuel distributor pump.
18. If a brake servo unit is fitted, disconnect the vacuum pipe and the butterfly control rod from the induction manifold.
19. Remove the upper fixings from the engine mounting rubbers.

*continued*



20. Attach a suitable lifting sling and hoist to the engine lifting hooks. 600963.
21. Remove the bottom fixing from the left hand engine mounting rubber.
22. Remove the support bracket fixings from the right hand engine mounting rubber.
23. Tension the hoist sufficient to withdraw the engine mounting rubbers, then lower the engine to its original position to maintain alignment with the gearbox.
24. Remove the fixings securing the bell housing to the flywheel housing.
25. Move the clutch slave cylinder aside without disconnecting the fluid pipe.
26. Support the gearbox assembly using a suitable packing block or jack.
27. Draw the engine forward to release it from the dowelled location to the bell housing, and to clear the primary pinion from the clutch.
28. Lift the engine clear.

*continued*





**Refitting**

29. Attach a suitable lifting sling and hoist to the engine lifting hooks. 600963.
30. Lower the engine into position, locating the primary pinion into the clutch and engage the bell housing dowels.
31. Secure the bell housing to the flywheel housing.
32. Tension the hoist sufficient to remove the support from the gearbox and insert the engine mounting rubbers.
33. Lower the engine and secure the engine mounting upper and lower fixing.
34. Remove the engine lifting sling.
35. Reverse 1 to 18.
36. Check, and if necessary replenish, the engine lubricating oil.
37. Check, and if necessary replenish, the gearbox lubricating oil.
38. Start the engine. Check that the oil pressure warning light goes out, and check the cooling system for leaks.
39. Check, and if necessary adjust, the engine speed settings.
40. When the engine is cold, check the coolant level in the radiator and top up if necessary.

## FLYWHEEL

-Remove and refit

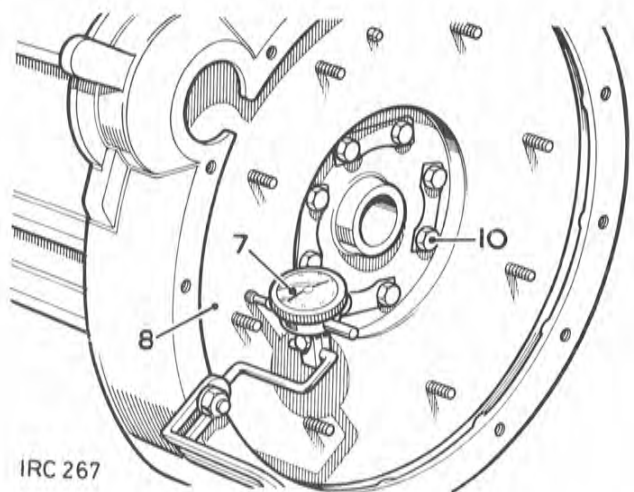
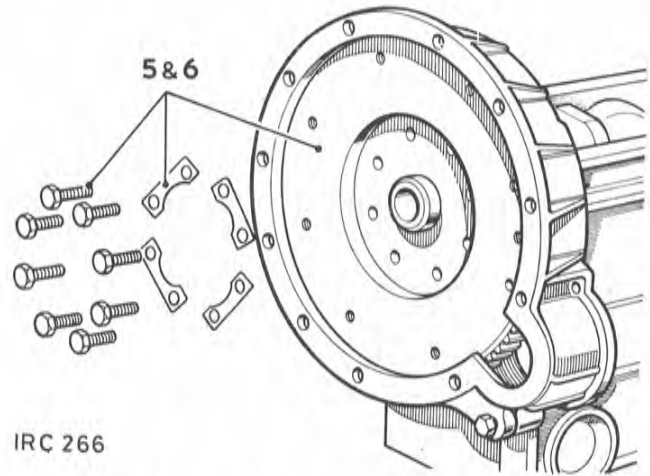
12.53.07

## Removing

1. Remove the front float. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Remove the gearbox assembly. 37.20.01.
4. Remove the clutch assembly. 33.10.01.
5. Remove the flywheel.

## Refitting

6. Fit the flywheel to the crankshaft and tighten the securing bolts. Torque: 8.5 to 9.0 kgf.m (60 to 65 lbf. ft.). Do not engage the lockplates at this stage.
7. Mount a dial test indicator to read off the flywheel face.
8. Check the run-out on the flywheel face, this must not exceed 0,05 mm (0.002 in.).
9. If the run-out is excessive, remove the flywheel and investigate the cause.
10. When the flywheel run-out is within the limits, engage the lockplates over the securing bolts.
11. Reverse 1 to 4.



**FLYWHEEL**

-Overhaul

12.53.10

**Procedure**

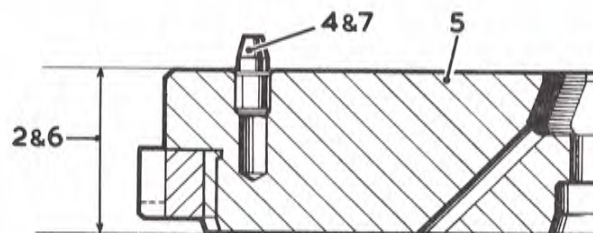
1. Remove the flywheel. 12.53.07.

Wear or scoring on the flywheel pressure face may be corrected by machining, providing that the overall thickness of the flywheel is not reduced below the following applicable dimension:

Petrol engines 34,72 mm (1.375 in.).

Diesel engines 36,957 mm (1.455 in.).

2. Check the overall thickness of the flywheel, as it may have been previously machined.
3. If the flywheel is above the minimum thickness, the clutch face can be replaced as follows:
4. Remove the dowels.
5. Replace the flywheel over the complete surface.
6. Check the overall thickness of the flywheel to ensure that it is still above the minimum thickness.
7. Fit the dowels.
8. Refit the flywheel. 12.53.07.



IRC 310

## STARTER RING GEAR

-Remove and refit

12.53.19

## Removing

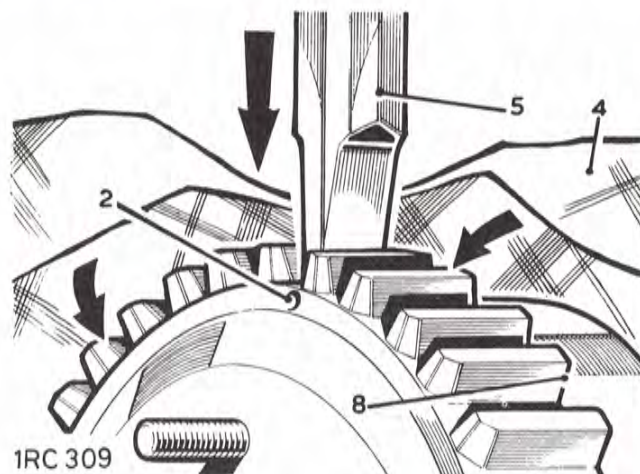
1. Remove the flywheel. 12.53.07.
2. Drill an 8,0 mm (0.312 in.) diameter hole axially between the root of any tooth and the inner diameter of the starter ring sufficiently deep to weaken the ring DO NOT allow the drill to enter the flywheel.
3. Secure the flywheel in a vice fitted with soft jaws.
4. Place a cloth over the flywheel to protect the operator from flying fragments.

**WARNING:** Take adequate precautions against flying fragments as the starter ring may fly asunder when being split.

5. Place a chisel immediately above the drilled hole and strike it sharply to split the starter ring.

## Refitting

6. Heat the starter ring gear uniformly to between 225°C and 250°C (437°F and 482°F) but do not exceed the higher temperature.
7. Place the flywheel, flanged side down, on a flat surface.
8. Locate the headed starter ring gear in position on the flywheel with the square edge of the teeth against the flywheel flange.
9. Press the starter ring gear firmly against the flange until the ring contracts sufficiently to grip the flywheel.
10. Allow the flywheel to cool gradually DO NOT hasten cooling in any way.
11. Refit the flywheel. 12.53.07.



**SPIGOT BEARING**

—Remove and refit

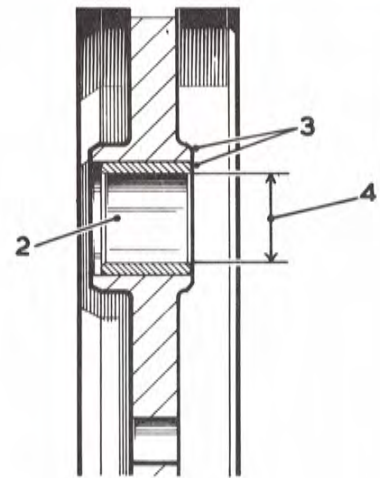
12.53.20

**Removing**

1. Remove the flywheel. 12.53.07.
2. Press the spigot bearing from the flywheel.

**Refitting**

3. Press in the new spigot bearing flush with the clutch side of the flywheel.
4. Reamer the spigot bearing to 22,237 mm to 22,242 mm (0.8755 in. to 0.8757 in.).
5. Refit the flywheel. 12.53.07



IRC 311

## OIL FILTER ASSEMBLY—EXTERNAL

—Remove and refit

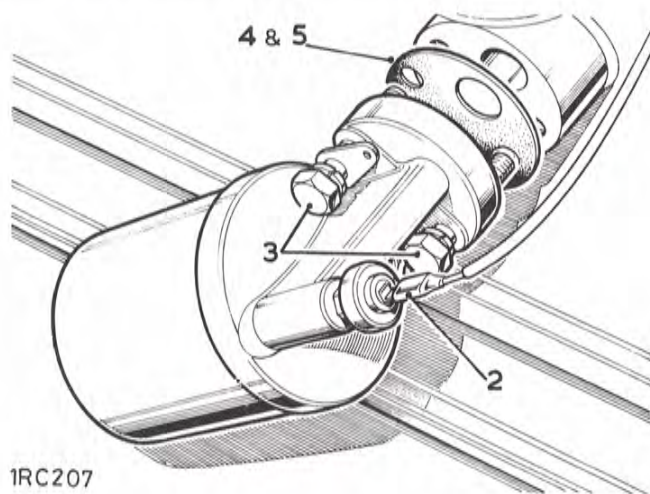
12.60.01

## Removing

1. Prop open the bonnet.
2. Disconnect the electrical lead from the oil pressure switch.
3. Remove the oil filter.
4. Withdraw the joint washer

## Refitting

5. Smear both sides of the joint washer with general purpose grease.
6. Reverse 2 to 4.
7. Check the sump oil level after a short engine run and top up as necessary to the 'high' mark on the oil level dipstick.



1RC207

**OIL PUMP**

-Remove and refit

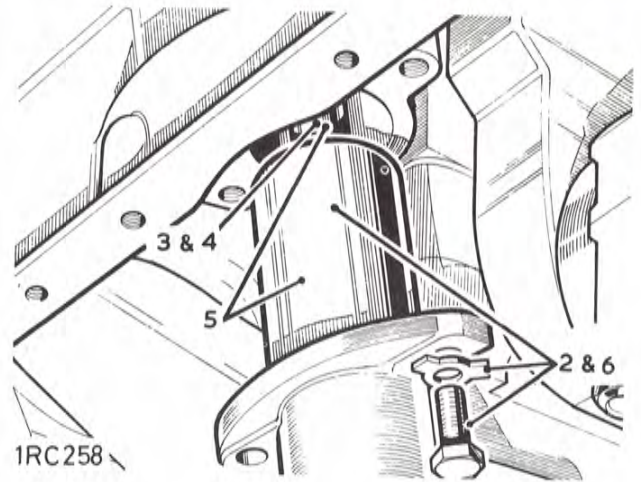
12.60.26

**Removing**

1. Remove the oil sump. 12.60.44
2. Remove the oil pump.
3. Withdraw the oil pump drive shaft.

**Refitting**

4. Locate the longer splined end of the drive shaft into the oil pump.
5. Offer up the pump and drive shaft and engage the drive splines at the engine.
6. Secure the oil pump.
7. Fit the oil sump. 12.60.44.
8. Replenish the engine lubricating oil to the 'high' mark on the oil level dipstick.
10. Check the sump oil level after a short engine run and top up as necessary to the 'high' mark on the oil level dipstick.



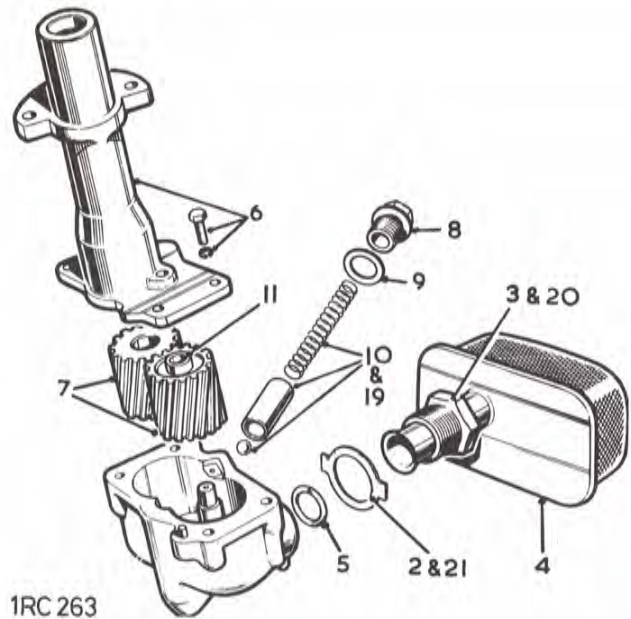
## OIL PUMP

—Overhaul

12.60.32

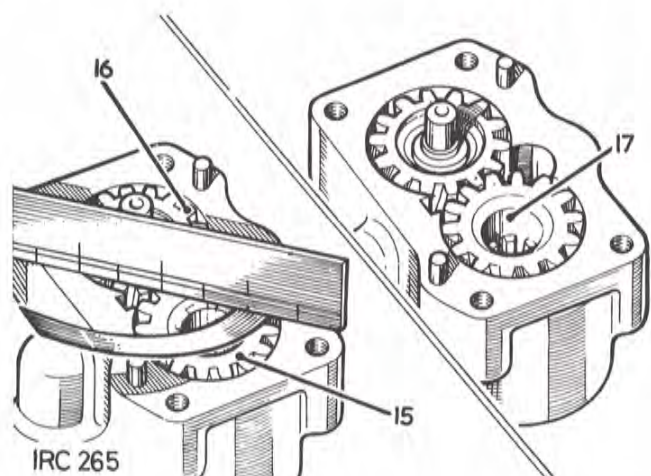
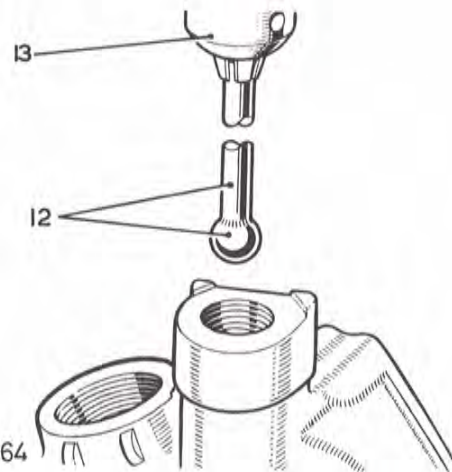
## Dismantling

1. Remove the oil pump. 12.60.26
2. Straighten the lockwasher for the oil filter union nut.
3. Unscrew the oil filter union nut.
4. Withdraw the oil filter.
5. Withdraw the sealing ring.
6. Remove the oil pump cover.
7. Withdraw the pump gears.
8. Remove the plug for the oil pressure relief valve.
9. Withdraw the sealing washer.
10. Withdraw oil pressure relief valve spring, plunger and ball.



## Inspecting

11. If necessary the idler gear bush may be renewed. Press the new bush into the gear, drill the lubrication hole 3,175 mm (0.125 in.) diameter and ream the bush to 12,7 mm (0.500 in.) diameter
12. Inspect the pressure relief valve ball seating and renovate, if necessary, using a locally manufactured lapping tool consisting of a steel ball, Rover Part No. 3748, soldered to suitable tubing.
13. The lapping tool may be installed in a drilling machine or hand brace and the ball seating refaced, using coarse grinding paste. The tool may then be removed and used to 'hand lap' the ball seating with fine grinding paste to a good finish. The seat must then be thoroughly cleaned.
14. Check the end float of the oil pump gears, as follows 15 and 16, and fit new parts as necessary.
15. Steel gear: 0,05 mm to 0,12 mm (0.002 in. to 0.005 in.).
16. Aluminium gear: 0,07 mm to 0,15 mm (0.003 in. to 0.006 in.).

*continued*



**Assembling**

17. Fit the pump gears to the body, with the plain portion of the drive gear bore uppermost.
18. Smear the joint faces with suitable jointing compound and fit the pump cover to the pump body, locating on the dowels.
19. Assemble the pressure relief valve components to the housing bore. When fitting the plunger, insert the end with the integral ball seating first.
20. Fit the oil filter to the pump.
21. Position the filter such that it will be square to the sump baffle plate when fitted and secure with the lock-washer.
22. Fit the oil pump to the engine. 12.60.26.

**DATA**

Pump gear end float

Steel gear

Aluminium gear

0,05 mm to 0,12 mm (0.002 in. to 0.005 in.).

0,07 mm to 0,15 mm (0.003 in. to 0.006 in.).

Relief valve spring free length

67,82 mm (2.670 in.).



## OIL SUMP

—Remove and refit

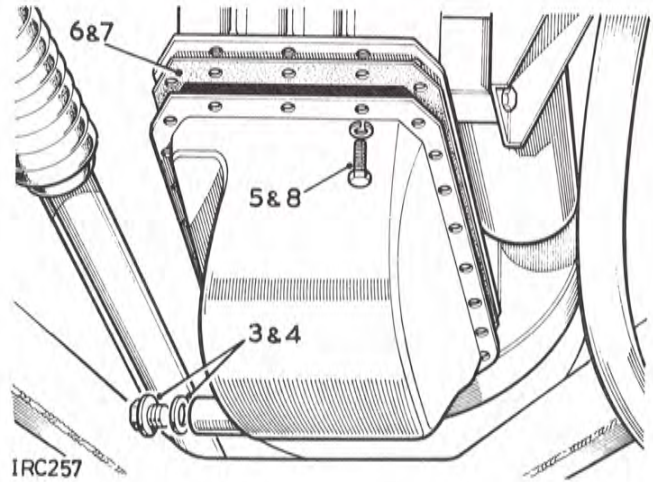
12.60.44

## Removing

1. Prop open the bonnet.
2. Remove the oil filler cap.
3. Remove the sump drain plug.
4. Allow the oil to drain, then refit the drain plug and sealing washer.
5. Remove the sump.
6. Withdraw the joint washer

## Refitting

7. Place a new joint washer in position.
8. Fit the sump.
9. Replenish the engine lubricating oil to the 'high' mark on the oil level dipstick.
10. Reverse 1 and 2.
11. Check the sump oil level after a short engine run and top up as necessary to the 'high' mark on the oil level dipstick.



## TIMING GEAR COVER AND OIL SEAL

—Remove and refit

Gear cover 1 to 14 and 18 to 24

12.65.01

Oil seal 1 to 24

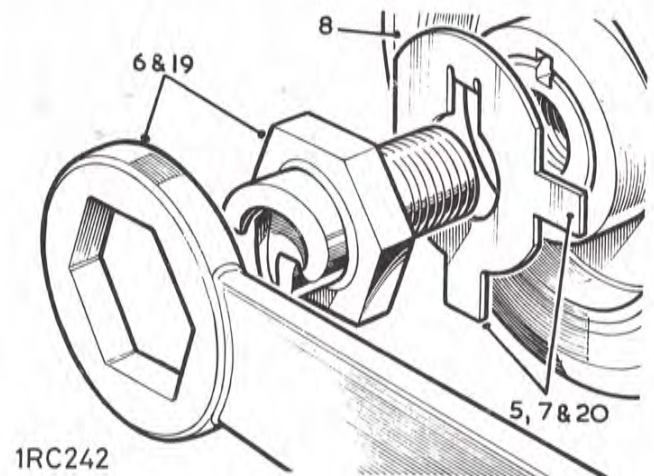
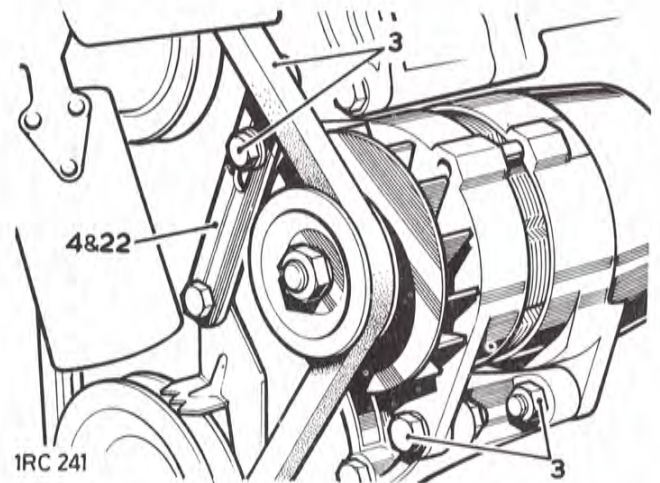
12.65.05

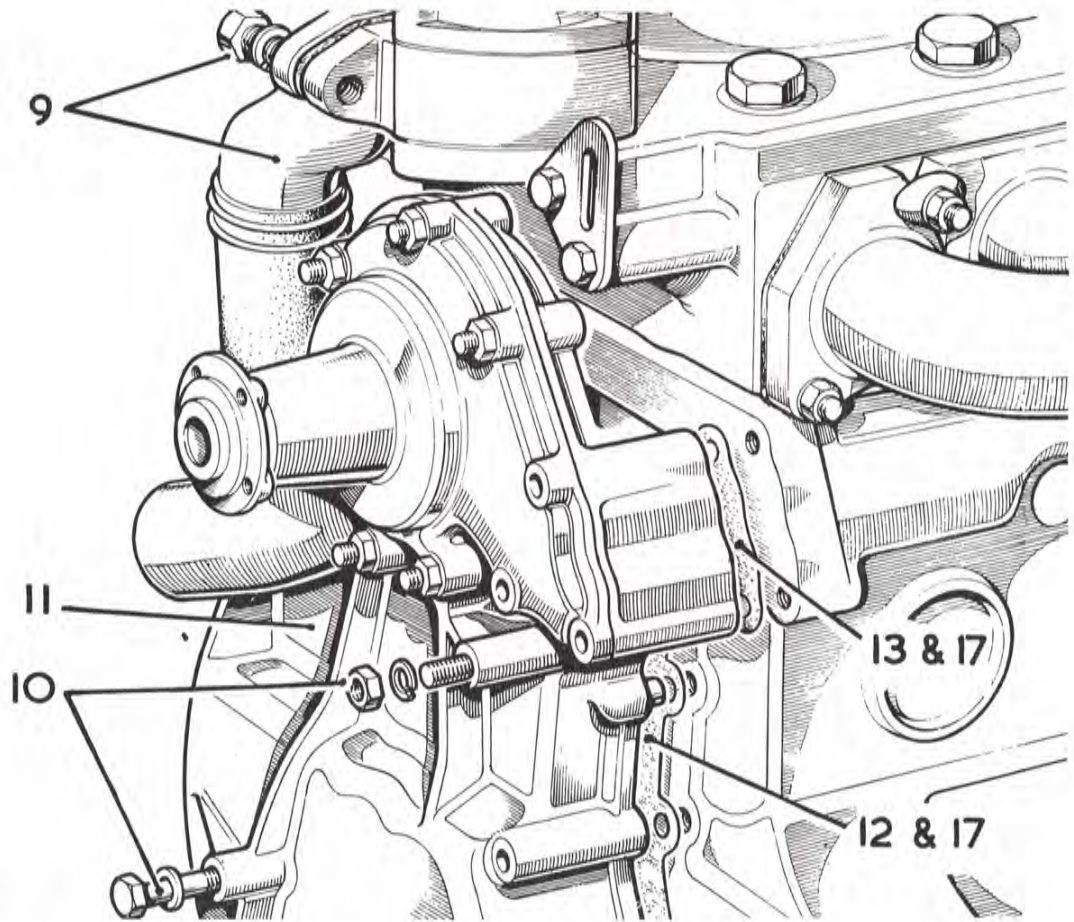
Service tool: 530102 Spanner for starter dog.

## Removing

1. Remove the bonnet. 76.16.01.
2. Slacken the alternator fixings and remove the fan belt.
3. Remove the radiator assembly. 26.40.01.
4. Remove the alternator adjusting link.
5. Disengage the lockplate from the starter dog.
6. Remove the starter dog. 530102.
7. Withdraw the lockplate.
8. Withdraw the crankshaft pulley.

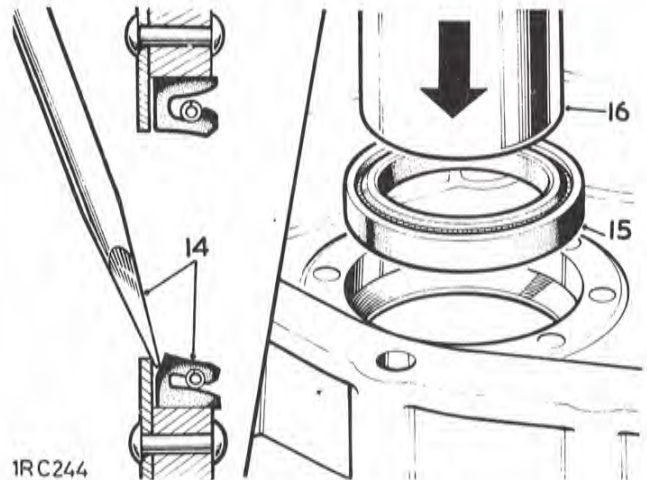
*continued*





1RC243

9. Disconnect the by-pass pipe from the thermostat housing.
10. Remove the timing cover fixings, including those at the sump front flange.
11. Withdraw the timing cover.
12. Withdraw the joint washer from the timing cover.
13. Withdraw the joint washer from the water inlet.
14. Drive the oil seal from the timing cover.
15. Smear the outside diameter of a new oil seal with Hylomar PL32/M jointing compound, Rover Part No. 534244.
16. Press the oil seal into the timing cover.

*continued*

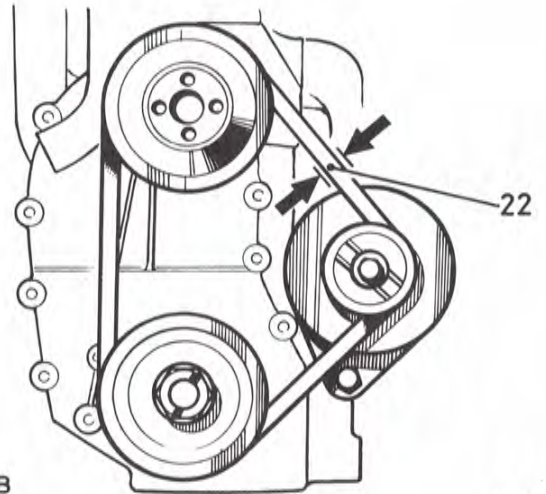
1RC244

**Refitting**

**NOTE:** It is of advantage temporarily to remove the fixing stud from the cylinder block front face. This will enable the front cover to be lifted sufficient to clear the edge of the sump gasket when offering the front cover to the engine.

17. Smear general purpose grease on both sides of the front cover and water inlet joint washers.
18. Reverse 7 to 13.
19. Fit the starter dog. Torque: Petrol engines: 20.5 kgf.m (150 lbf.ft.) Diesel engines: 27.65 kgf.m (200 lbf.ft.).
20. Engage the lockplate over the starter dog.
21. Fit the alternator adjusting link.
22. Adjust the fan belt to give 6,5 to 9,5 mm (0.250 to 0.375 in.) free movement when checked midway between the fan and alternator pulleys.
23. Reverse 1 to 3.

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1RC245B

\* \*



## TIMING GEARS—Petrol

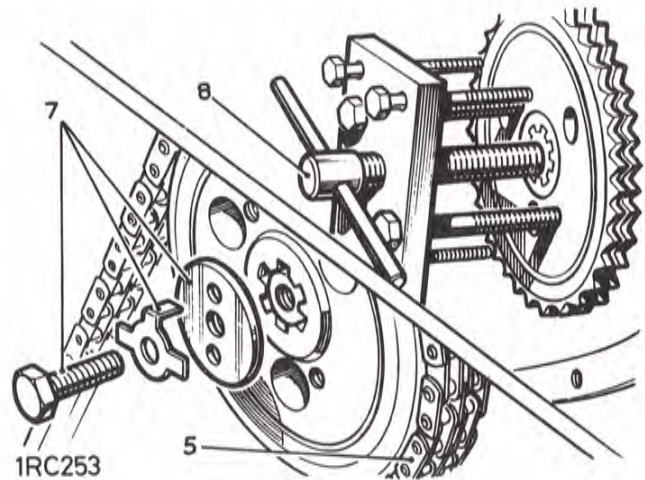
—Remove and refit

12.65.22

Service tool: 507231 Chainwheel extractor.

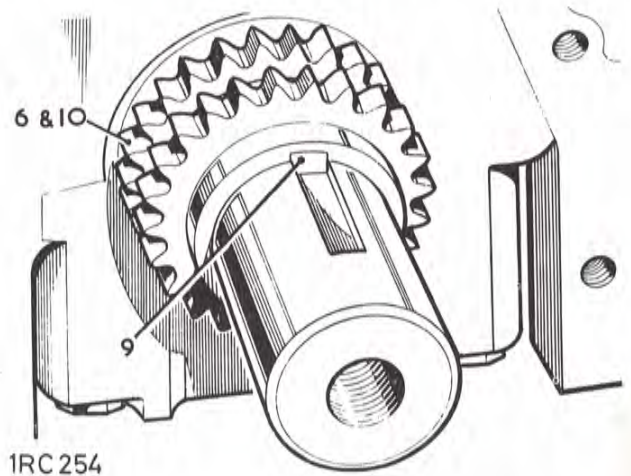
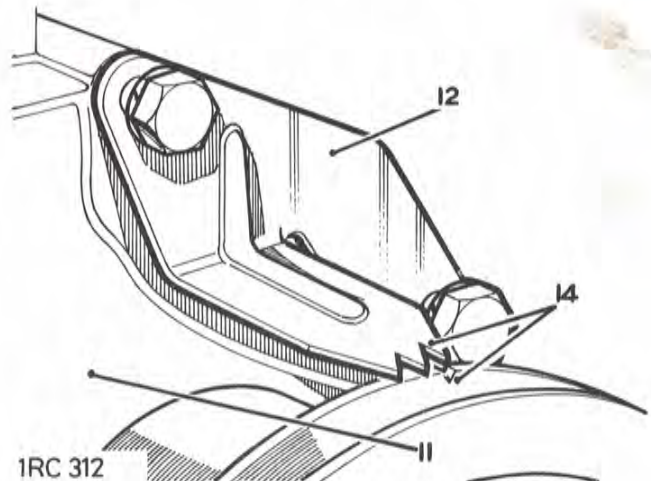
## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the radiator assembly. 26.40.01.
3. Remove the timing gear cover. 12.65.01.
4. Remove the timing chain tensioner. 12.65.28.
5. Withdraw the timing chain.
6. Withdraw the chainwheel from the crankshaft.
7. Remove the fixings from the camshaft chainwheel.
8. Extract the chainwheel from the camshaft. 507231.

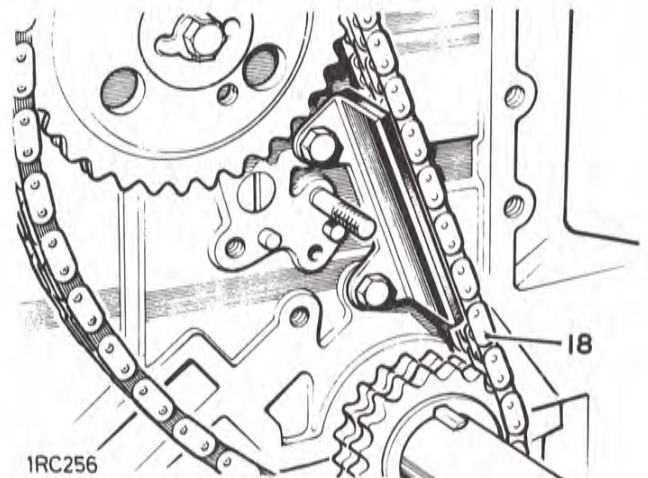
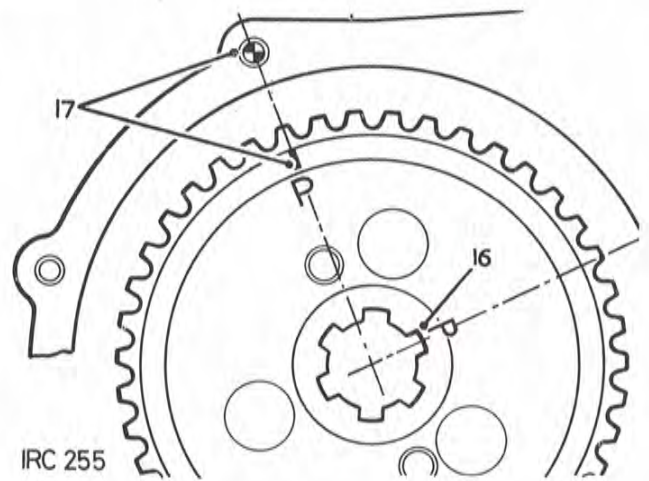


## Refitting

9. Check that the key for the chainwheel is correctly located in the crankshaft slot.
10. Fit the chainwheel, large shoulder first, to the crankshaft.
11. Locate the timing gear cover in position.
12. Fit the timing pointer.
13. Locate the crankshaft pulley in position.
14. Rotate the crankshaft until the timing mark in the crankshaft pulley is aligned with the longest tongue on the timing pointer (No. 1 piston at TDC).
15. Without disturbing the crankshaft, remove the pulley, timing pointer and gear cover.

*continued*

16. Fit the camshaft chainwheel, using keway marked 'P'.
17. Rotate the camshaft chainwheel until the groove marked 'P' is in line with the centre of the tapped hole, as illustrated.
18. Retaining the chainwheels in the set positions, fit the timing chain ensuring that there is no slack chain on the driving side.
19. If it is not possible to obtain a taught fit on the driving side of the chain with the chainwheels in the set positions, withdraw the camshaft chainwheel without disturbing the set position of the camshaft, and re-fit the chainwheel using one of the alternative keyways. This procedure may be repeated until a taught chain is obtained on the driving side with the camshaft and crankshaft in their previously set positions.
20. Reverse 1 to 4.



## TIMING GEARS—Diesel

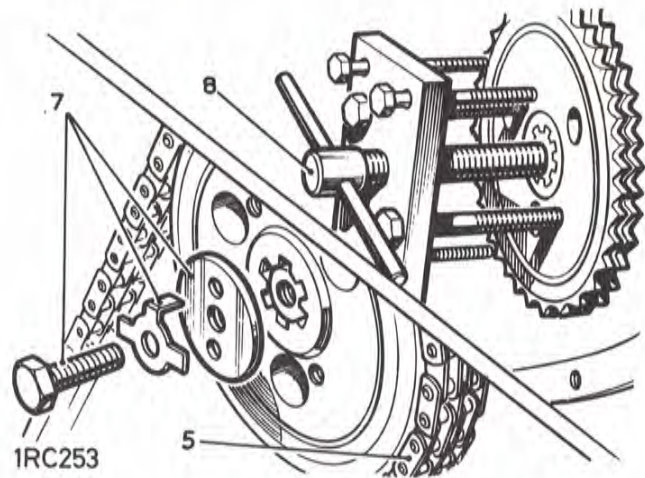
—Remove and refit

12.65.22

Service tool: 507231 Chainwheel extractor.

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the radiator assembly. 26.40.01.
3. Remove the timing gear cover. 12.65.01.
4. Remove the timing chain tensioner. 12.65.28.
5. Withdraw the timing chain.
6. Withdraw the chainwheel from the crankshaft.
7. Remove the fixings from the camshaft chainwheel.
8. Extract the chainwheel from the camshaft. 507231.

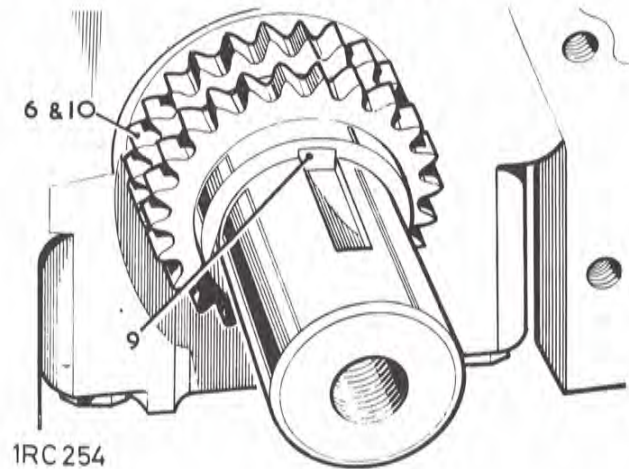
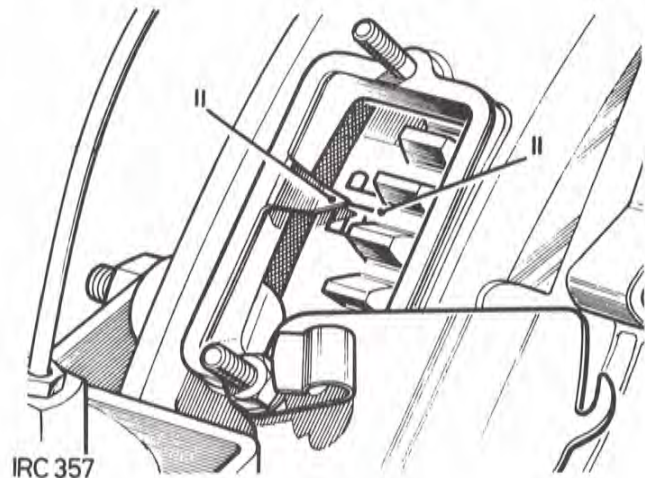


## Refitting

9. Check that the key for the chainwheel is correctly located in the crankshaft slot.
10. Fit the chainwheel to the crankshaft.

**CAUTION:** When turning the crankshaft do not allow the pistons to foul the valves. If necessary, turn the camshaft to enable the crankshaft setting to be obtained.

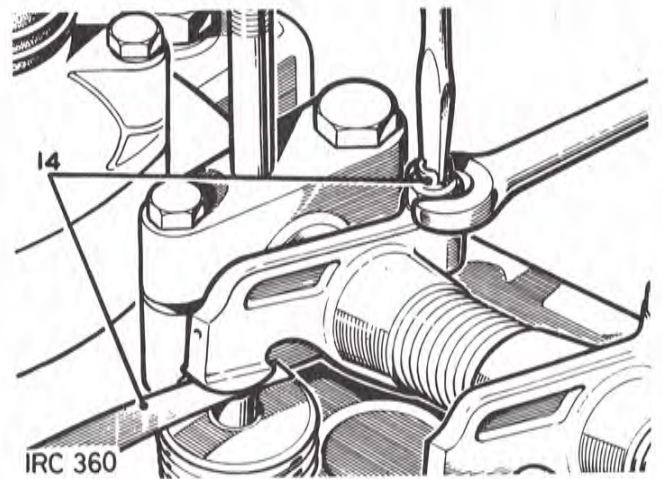
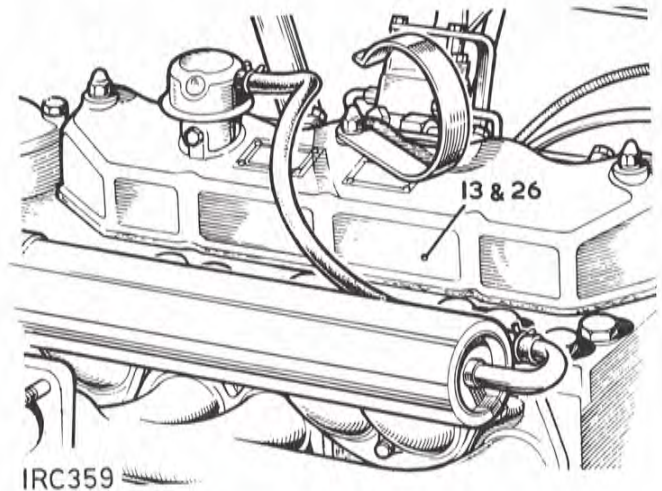
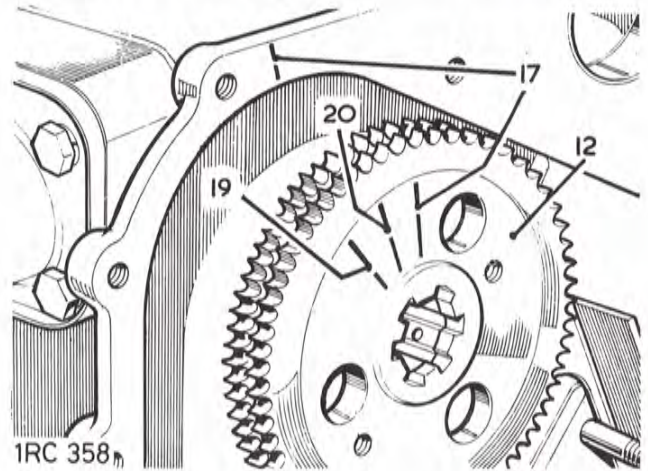
11. Turn the crankshaft in the direction of rotation until the EP mark on the flywheel is aligned with the timing pointer.

*continued*

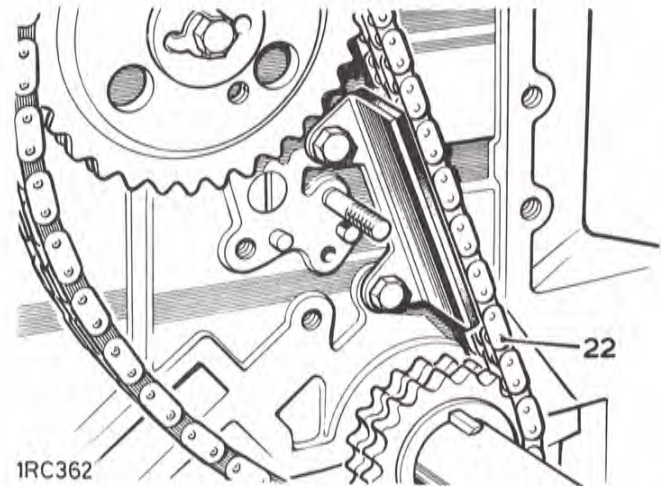
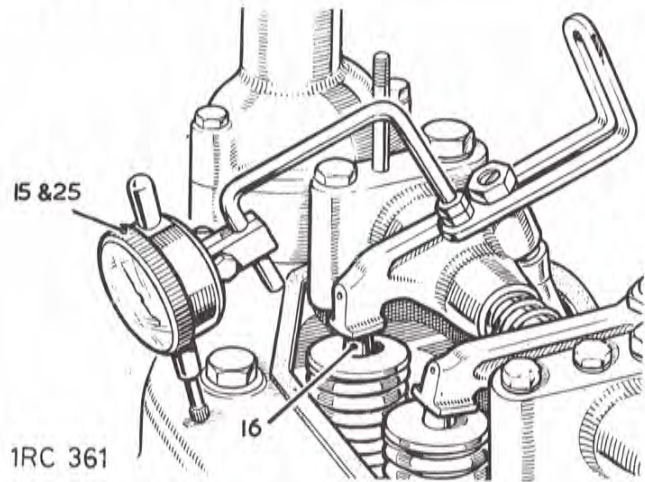


12. Fit the chainwheel to the camshaft using any keyway.
13. Remove the engine top cover.
14. Turn the camshaft until No. 1 cylinder exhaust valve is fully closed and set the tappet clearance to 0,25 mm (0.010 in.).

*continued*



15. Mount a dial test indicator to enable the "fully open" position of the valve to be ascertained.
16. Turn the camshaft in the direction of rotation until the rocker pad has nearly opened the valve fully. Stop camshaft rotation.
17. Suitably mark the chainwheel and rear casing relative to each other.
18. Note the reading on the dial test indicator, then continue turning the camshaft in the direction of rotation until the dial test indicator needle has reached the same position as previously noted. Stop camshaft rotation.
19. Suitably mark the chainwheel adjacent to the mark previously made on the rear casing.
20. Make a third mark on the chainwheel to bisect the angle between the two previously made marks.
21. Turn the camshaft against the direction of rotation and align the middle mark on the chainwheel with the mark on the rear casing. No. 1 exhaust valve is now fully open.
22. Retaining the chainwheels in the set positions, fir the timing chain ensuring that there is no slack chain on the driving side.
23. If it is not possible to obtain a taught fit on the driving side of the chain with the chainwheels in the set positions, withdraw the camshaft chainwheel without disturbing the set position of the camshaft, and refit the chainwheel using one of the alternative keyways. This procedure may be repeated until a taught chain is obtained on the driving side with the camshaft and crankshaft in their previously set positions.
24. Secure the fixings for the camshaft chainwheel and engage the lockwasher.
25. Remove the dial test indicator.
26. Refit the engine top cover.
27. Reverse 1 to 4.



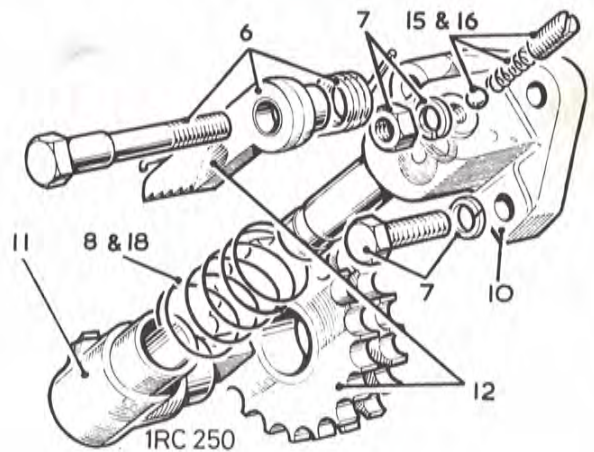
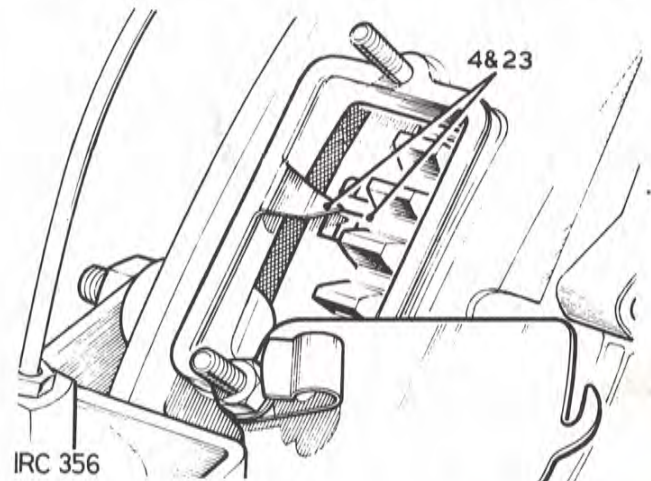
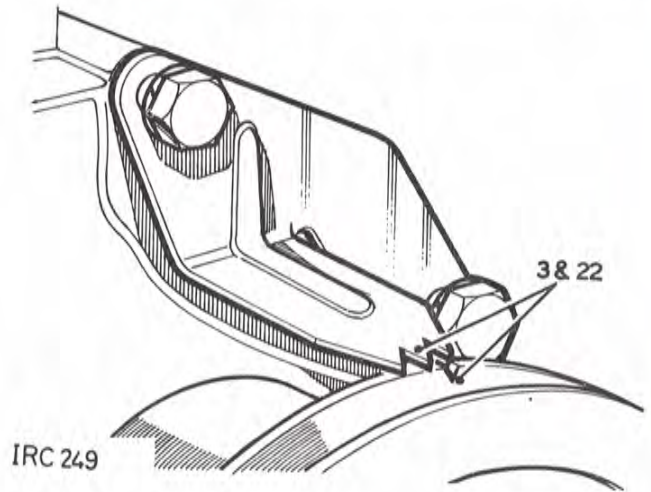
## TIMING CHAIN TENSIONER

-Remove and refit

12.65.28

## Removing

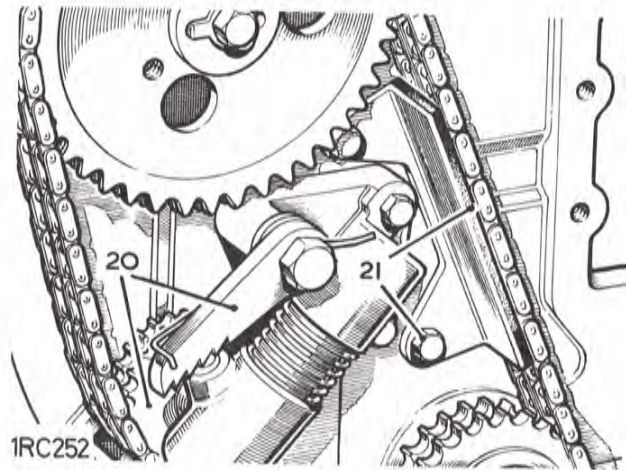
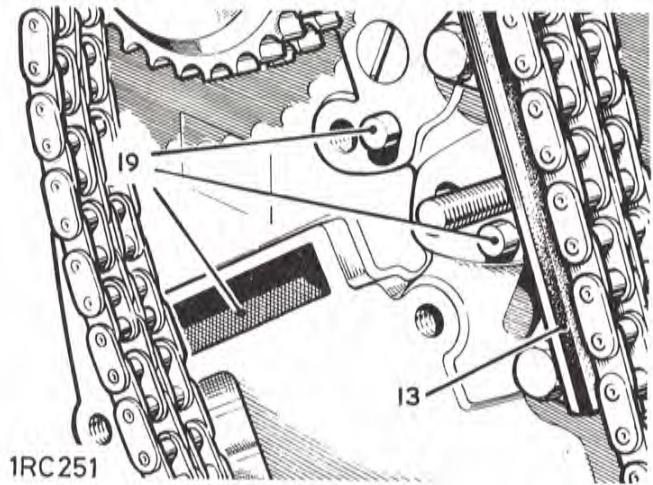
1. Remove the bonnet. 76.16.01.
2. Remove the radiator assembly. 26.40.01.
3. **Petrol engines:** Turn the crankshaft in the direction of rotation until the timing mark on the crankshaft pulley is aligned with the centre tongue of the timing pointer.
4. **Diesel engines:** Turn the crankshaft in the direction of rotation until the EP mark on the flywheel is aligned with the timing pointer.
5. Remove the timing gear cover. 12.65.01.
6. Remove the tensioner ratchet and spring.
7. Remove the fixings from the piston housing.
8. Compress the tensioner spring by hand and withdraw the tensioner assembly complete.
9. Clean the tensioner components in clean fuel.
10. Fit a new piston and housing if unduly worn.
11. If the tensioner cylinder bush is unduly worn, fit a new cylinder and bush complete.
12. Fit a new idler wheel and ratchet arm if the bushes are unduly worn.

*continued*

13. Fit a new chain vibration damper if the rubber pad is grooved.
14. Ensure that all oil passage drillings are clear.
15. **Petrol engines:** If required, remove the non-return valve plug, spring and ball.

#### Refitting

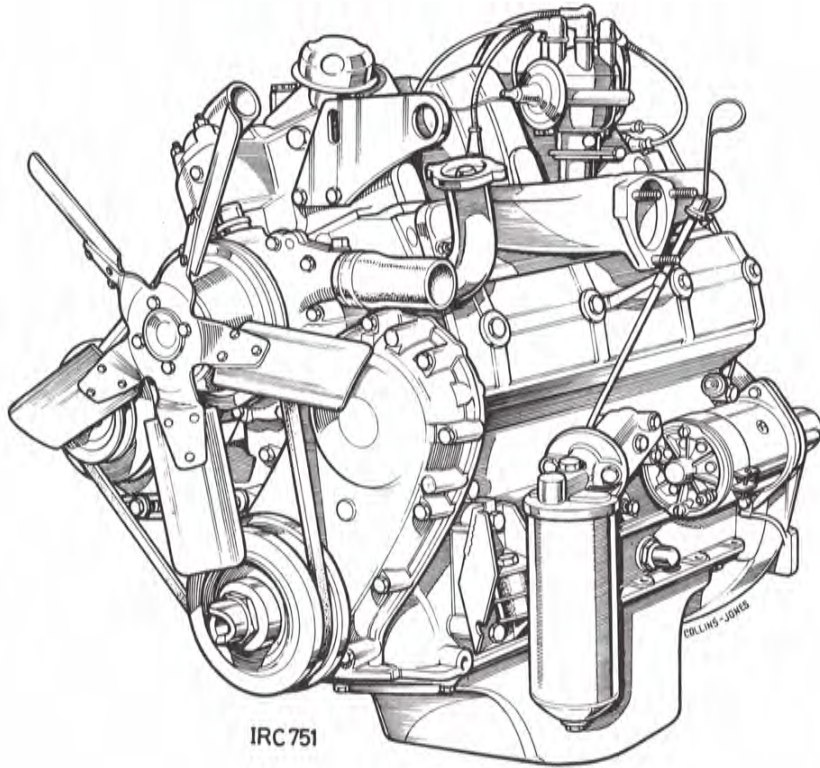
16. **Petrol engines:** If removed, refit the non-return valve ball, spring and plug.
17. Assemble together, the piston housing, tensioner spring, cylinder and idler wheel.
18. Compress the assembly against the tensioner spring.
19. Fit the assembly to the engine, locating the piston housing onto the dowels and the cylinder spigot into the slot.
20. Fit the ratchet and spring and allow the idler wheel to take up the timing chain slack.
21. If necessary, adjust the position of the chain vibration damper to allow 0,25 mm (0.010 in.) maximum clearance between the timing chain and the vibration pad.
22. **Petrol engines:** Temporarily, refit the timing gear cover, timing pointer and crankshaft pulley, and ensure that the timing marks are still correctly aligned. Then providing that the camshaft has not been rotated, the engine valve timing should be correct. If there is any doubt, check the valve timing. 12.65.22.
23. **Diesel engines:** Check that the EP mark on the flywheel is still aligned with the timing pointer. Then providing that the camshaft has not been rotated, the engine valve timing should be correct. If there is any doubt, check the valve timing. 12.65.22.
24. Fit the timing gear cover. 12.65.01.
25. Reverse 1 and 2.







Inlet valve rockers and shafts																
* -remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.29.35
-overhaul (replacing bushes)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.29.55
Oil filter, external																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.60.01
Oil pump																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.60.26
-overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.60.32
Oil strainer																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.60.20
Oil sump																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.60.44
Spigot bearing																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.53.20
Starter ring gear																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.53.19
Timing chain and gears																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.65.12
Timing chain tensioner																
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.65.28
-overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.65.36
Timing gear cover and oil seal																
-remove and refit cover	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.65.01
-remove and refit oil seal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	12.65.05



General view of engine



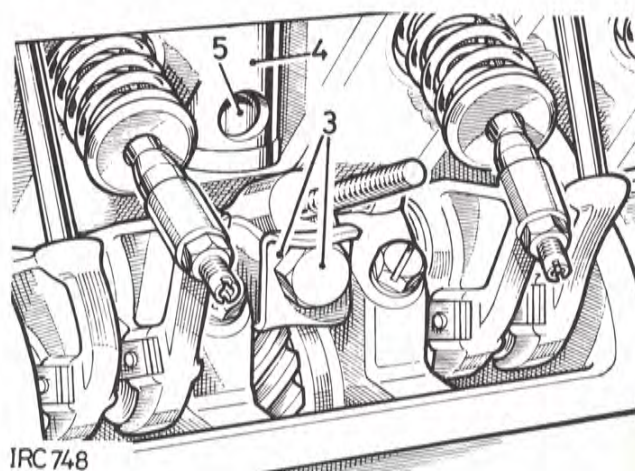
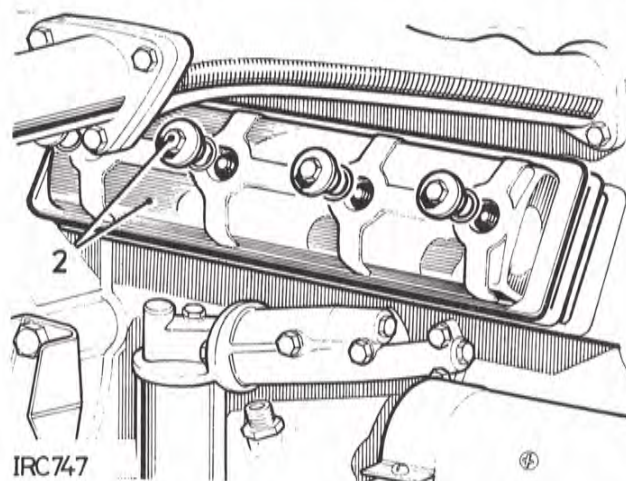
**DISTRIBUTOR AND OIL PUMP DRIVE SHAFT**

-Remove and refit

12.10.22

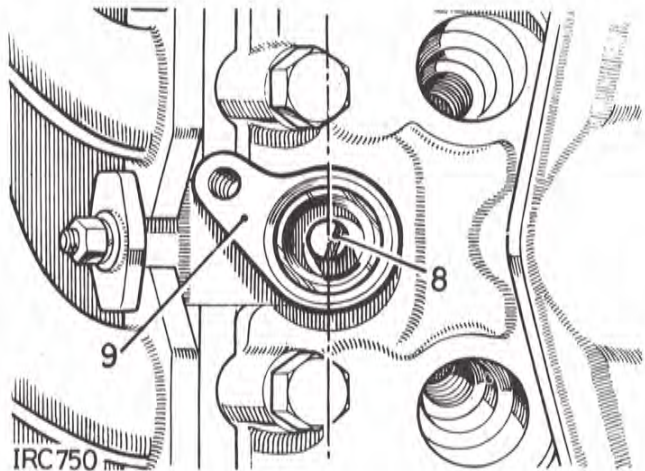
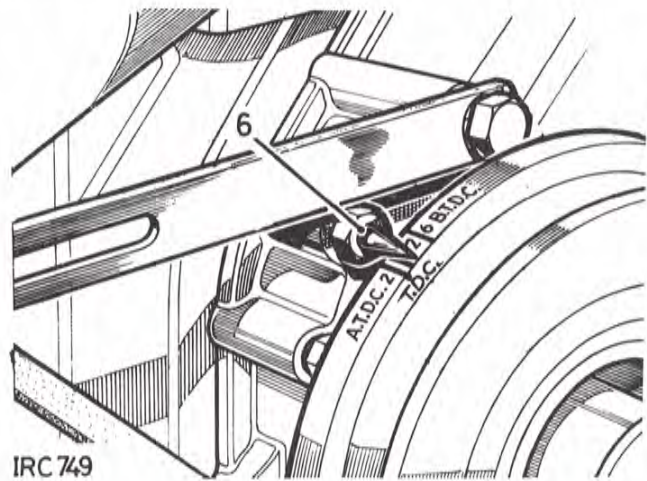
**Removing**

1. Remove the distributor and short drive shaft. 86.35.20.
2. Remove the side rocker cover
3. Remove the oil feed bolt and lock washer locating the distributor housing inside the rocker chamber.
4. Lift out the distributor housing.
5. Withdraw the drive shaft.

*continued*

## Refitting

6. Rotate the engine in direction of rotation until the TDC mark on the crankshaft pulley, aligns with the timing pointer with both valves on No. 1 cylinder fully closed (i.e. No. 1 cylinder commencing firing stroke).
7. Fit the oil pump and distributor gear drive shaft to the engine with the lower splines engaged in the oil pump, and the skew gear engaged with the camshaft.
8. Turn the drive shaft using a suitable screwdriver, until the offset drive slot in the end of the shaft is positioned as illustrated.
9. Fit the distributor housing to the engine and locate and secure with the oil feed bolt and lock washer.
10. Reverse 1 and 2.



## CAMSHAFT

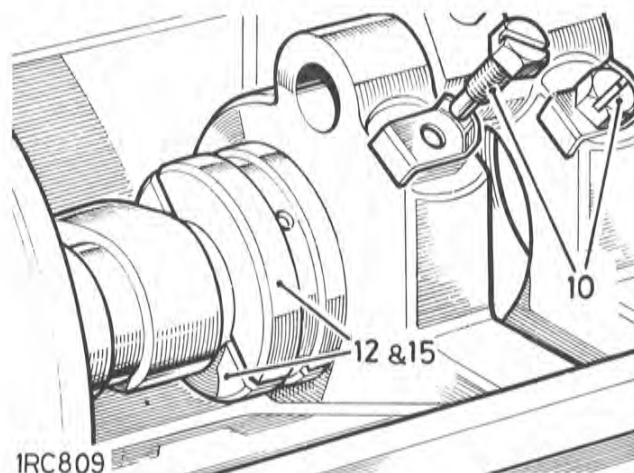
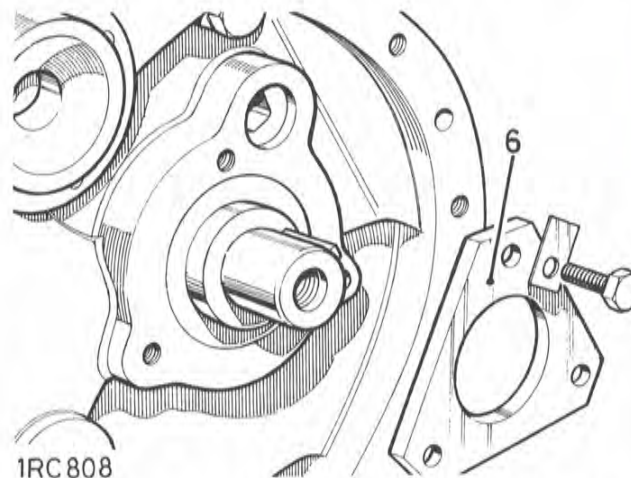
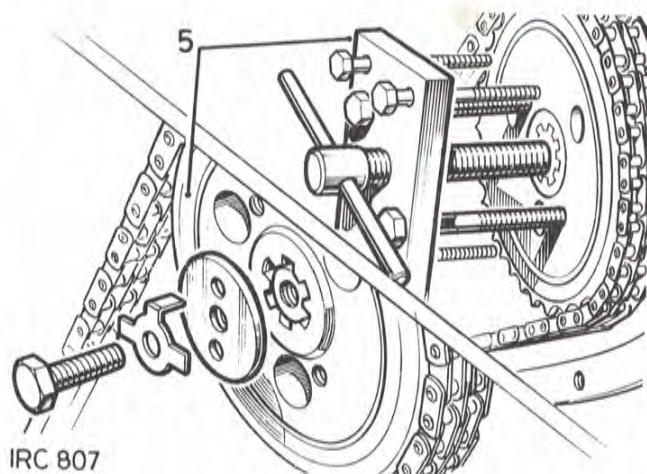
—Remove and refit

12.13.01

Service tools    530101 Extractor for camshaft  
                      507231 Extractor for chainwheel

## Removing

1. Remove the radiator and grille panel. 26.40.01.
2. Remove the exhaust manifold. 30.15.10.
3. Remove the timing gear cover. 12.65.01.
4. Remove the timing chain tensioner. 12.65.28.
5. Remove the camshaft chainwheel and timing chain, Extractor 507231.
6. Remove the camshaft thrust plate.
7. Remove the side rockers and shafts. 12.29.36.
8. Remove the distributor and short drive shaft. 86.35.20.
9. Remove the oil pump and distributor gear drive shaft. 12.10.22.
10. Remove the six camshaft bearings locating screws.
11. Withdraw the camshaft until the bearings are clear of the housings. Extractor 530101.
12. Remove the bearings by separating the bearing halves. Keep the halves in related pairs as indicated by the figures marked on the end faces.

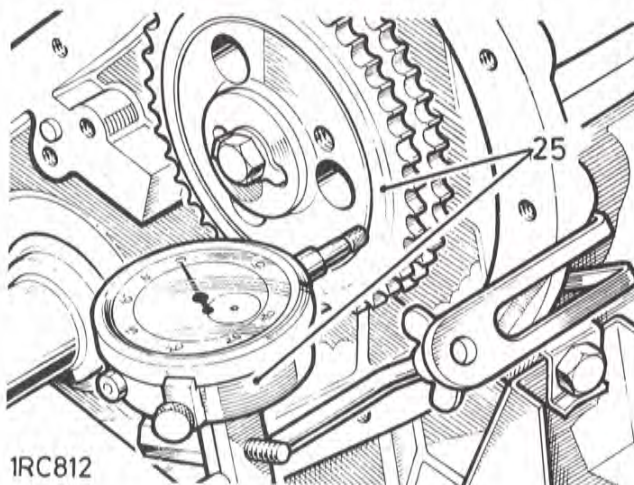
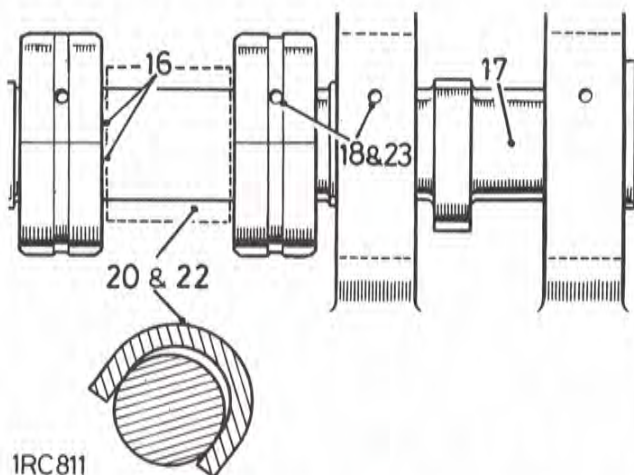
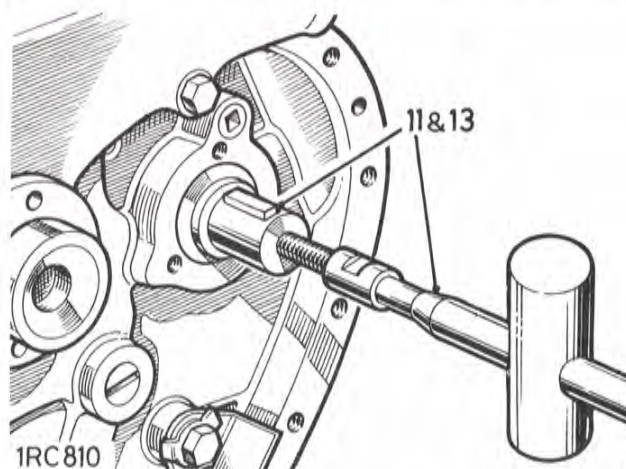
*continued*

13. Withdraw the camshaft clear of the engine.
14. Withdraw the remaining bearing from the rear housing, utilising the oil relief holes for extraction purposes if required.

### Refitting

15. Before attempting to fit the camshaft bearings to the cylinder block, ensure that the bearing halves fit together correctly on the dowels by checking that no light is visible between the joint faces.
16. The bearings must be fitted dry and should be a hand push fit in the cylinder block; they must always be renewed in paired halves and the numbers stamped on one of the end faces of the bearing halves must be adjacent.
17. Insert the camshaft partly into the cylinder block, allowing the distributor and oil pump drive gear to pass through the first and second intermediate housing webs.
18. Assemble the front and intermediate bearings on to their respective journals on the camshaft. Ensure that the dowelled joint faces are tightly fitted together and the locating holes in the bearings are in line with the holes in the housing webs.
19. Fit the rear bearing into the housing.
20. Place a suitable distance piece between the first and second intermediate bearings. The width of the distance piece to be approximately the distance between the bearing housings but allowing sufficient clearance for withdrawal.
21. Tap the camshaft rearwards until the bearings are fully home in their respective housings and the locating holes are aligned.
22. Remove the distance piece.
23. Lubricate the bearings through the locating bolt holes then fit the bearing fixings.
24. Fit the camshaft thrust plate.
25. Temporarily fit the camshaft chainwheel and check the camshaft end-float which must be 0,11 to 0,16 mm (0.0045 to 0.0065 in.). Replace the thrust plate if the end-float is excessive.
26. Temporarily remove the camshaft chainwheel and fit the side rocker shafts. 12.29.36.

*continued*



27. Fit the camshaft chainwheel and timing chain and set the valve timing. 12.65.12.
28. Fit the oil pump and distributor gear. 12.10.22.
29. Fit the distributor and short drive shaft. 86.35.20.
30. Reverse 1 to 4.

**DATA**

Camshaft end float 0,11 to 0,16 mm (0.0045 to 0.0065 in.).



## CONNECTING RODS AND PISTONS

—Remove and refit

12.17.01

## Removing

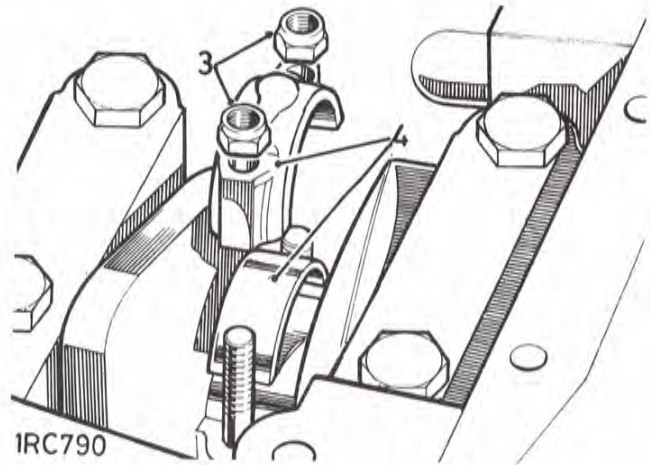
**NOTE:** During the following procedures retain all components in related sets to facilitate re-assembly. If the pistons are not to be replaced, add location marks to ensure re-assembling in the same relative positions.

1. Remove the cylinder head. 12.29.10
2. Remove the oil sump. 12.60.44.
3. With two pistons at bottom dead centre (BDC) remove the connecting rod cap fixings.
4. Remove the caps and withdraw the connecting rod bearing halves. Retain the caps and bearings in related sets.
5. Withdraw the pistons and attached connecting rods from the top of the bore.
6. Position the remaining pistons at BDC and repeat the removal procedure.

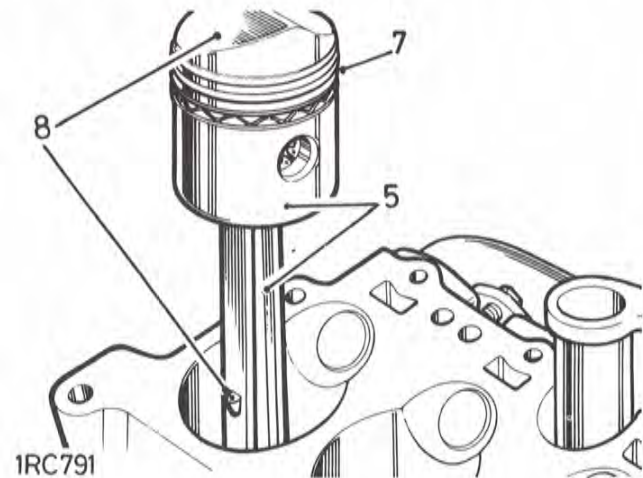
## Refitting

**NOTE:** If replacement components are to be fitted, the checks detailed in 'Overhaul' 12.17.10 must be carried out as necessary.

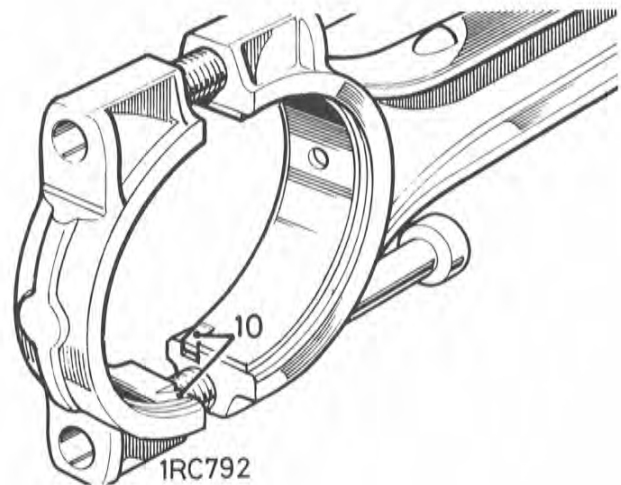
7. Position the piston rings so that the end gaps do not align with each other or with the gudgeon pin bore in the piston.
8. Enter the connecting rods into the appropriate cylinders and position the oil hole in the connecting rod and the flat on the piston crown away from the camshaft side of the engine.
9. Insert the pistons into the cylinders.
10. Lubricate the journals and bearing halves and fit the appropriate halves to the connecting rods and caps. The bearing halves are located by tongues, these to be positioned at the same side of the connecting rod in the grooves provided.
11. Fit new bearing cap nuts and tighten to 2,8kgf.m(20 lbf. ft.).
12. Reverse 1 and 2.



1RC790



1RC791



1RC792

## CONNECTING RODS AND PISTONS

—Overhaul

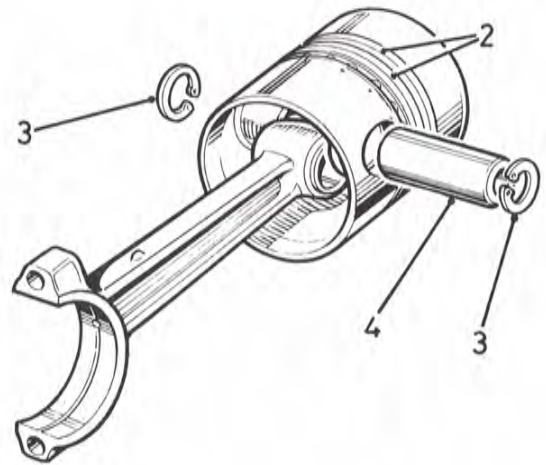
12.17.10

## Dismantling

**NOTE:** During the following procedures retail all components in related sets to facilitate subsequent assembly. If the same pistons are to be refitted, add location marks to ensure reassembling in the same relative position.

1. Remove the connecting rods and pistons. 12.17.01
2. Remove the piston rings.
3. Remove the circlips from the gudgeon pin bosses.
4. Withdraw the gudgeon pins from the pistons.

IRC 793



## Overhauling pistons

## Original pistons

5. Remove the carbon and deposits, particularly from the ring grooves.
6. Examine the pistons for damage or excessive wear—see under 'New pistons' for clearance dimensions—fit new replacements as necessary.

## New Pistons

Pistons are available in graded standard size and in ungraded oversizes of 0,25 mm, 0,50 mm, 0,76 mm and 1,01 mm (0.010 in., 0.020 in., 0.030 in. and 0.040 in.).

Standard pistons are graded in diameter, and the grade letter is stamped on the crown of the piston and on the cylinder block.

Grade Letter	Cylinder bore diameter
Z	Nominal to plus 0,005 mm (0.0002 in.) above nominal.
A	0,005 mm to 0,010 mm (0.0002 in. to 0.0004 in.) above nominal.
B	0,010 mm to 0,015 mm (0.0004 in. to 0.0006 in.) above nominal.
C	0,015 mm to 0,020 mm (0.0006 in. to 0.0008 in.) above nominal.
D	0,020 mm to 0,025 mm (0.0008 in. to 0.0010 in.) above nominal.

The clearance limits between the pistons and cylinder bores are 0,048 mm to 0,060 mm (0.0019 in. to 0.0024 in.), measured as described subsequently.

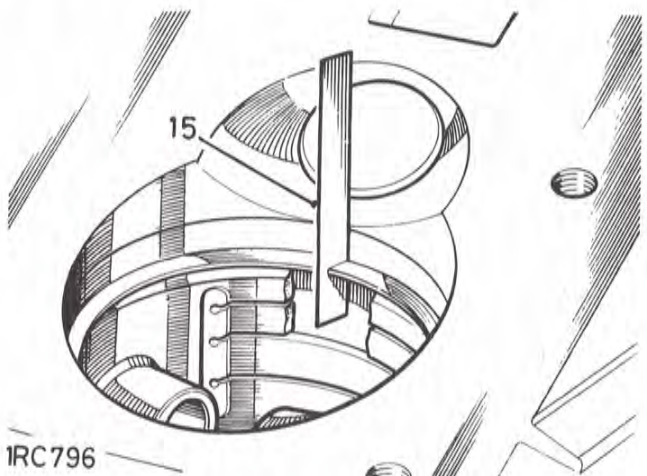
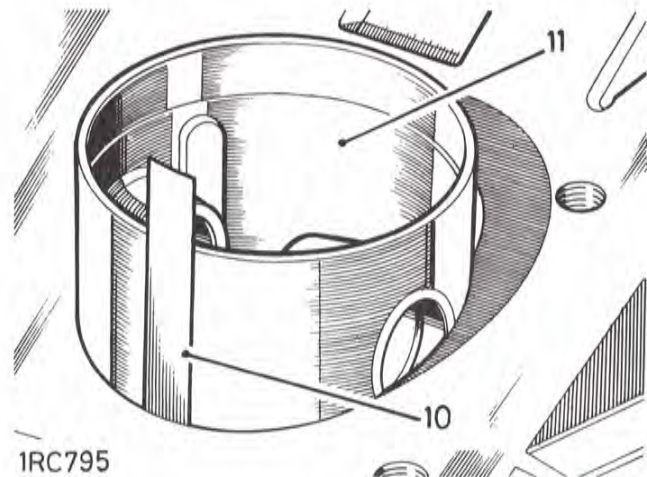
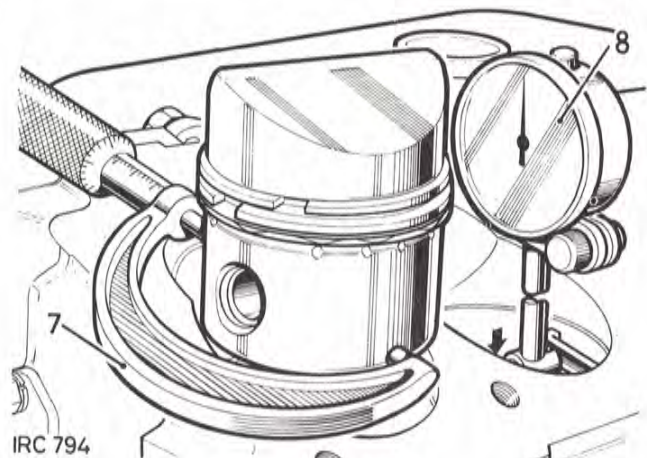
The temperature of the piston and cylinder block must be the same to ensure accurate measurements.

*continued*



7. Check the piston diameter at the bottom of the skirt at right angles to the gudgeon pin.
8. Check the bore diameter at approximately half way down.
9. If gauge equipment is not available, the piston clearance can be assessed using long feeler gauges. 10 to 12.
10. Insert a long, suitably sized feeler gauge down the thrust side of the cylinder bore.
11. Insert the correct piston, inverted, into the cylinder bore and position it with the gudgeon pin parallel with the axis of the crankshaft.
12. Push the piston down the cylinder until the piston reaches its tightest point in the bore, at this point withdraw the feeler gauge—a steady resistance should be felt.
13. If standard size pistons are being fitted, select pistons from the range available until the clearance is satisfactory.
14. If new piston rings are to be fitted without reboring, deglaze the cylinder walls with a hone, without increasing the bore diameter. A deglazed bore must have a cross-hatch finish.
15. Check the compression and oil control ring gaps in the applicable cylinder, held square to the bore with the piston.  
 Compression rings gap: 0,38 mm to 0,50 mm (0.015 in. to 0.020 in.).  
 Oil control ring gap: 0,40 mm to 0,80 mm (0.015 in. to 0.033 in.).  
 Use a fine cut flat file to increase the gap if required.  
 Select a new piston ring if the gap exceeds the limit.

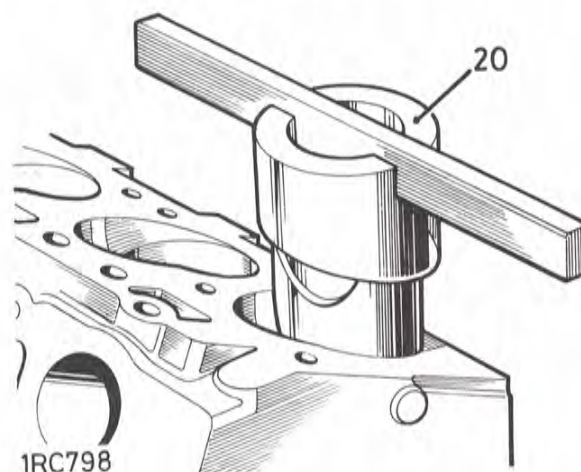
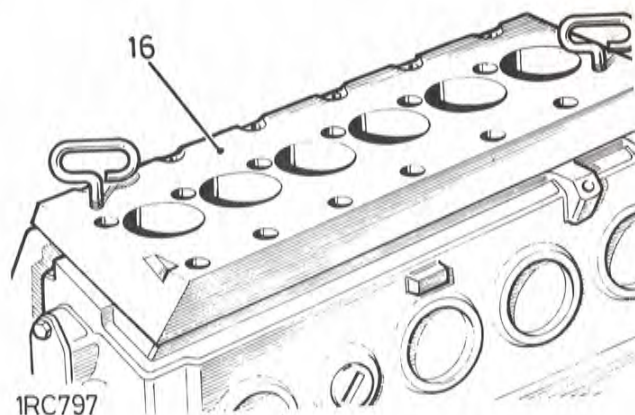
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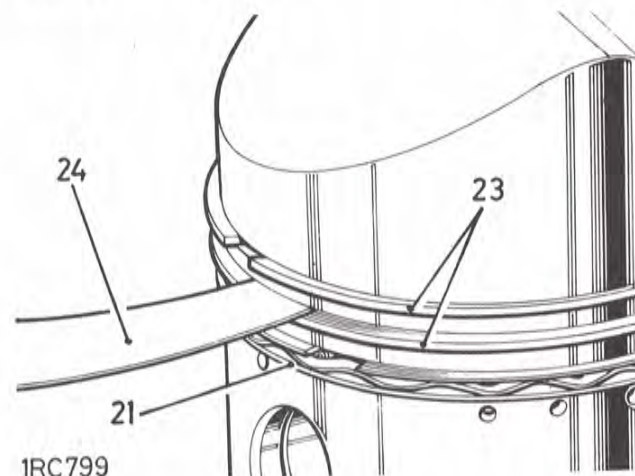


**Reboring**

16. The cylinder head is inclined at an angle of  $22^{\circ}$ ; standard boring equipment can be used in conjunction with a special jig block 261288.
17. Where the maximum permitted boring tolerance is not sufficient to reclaim the bores, cylinder liners may be fitted.
18. Fitting the cylinder liners conforms to normal practice. Machine the cylinder block bores to 81,28 mm + 0,025 mm (3.200 in. +0.001 in.) which will provide the liner with 0,07 mm to 0,10 mm (0.003 in. to 0.004 in.) interference fit.
19. Prior to pressing in the liner, allowance must be made for unavoidable rotation of up to 5 mm (0.187 in.) clockwise. To facilitate realignment should the liner not be positioned correctly at the first attempt, scribe lines down the sides of the liner from the two peaks, and make corresponding marks on the cylinder block.
20. Press in the liner, using a special press block 246650, until the top edge is level with the bottom of the exhaust valve pocket. Blend to the shape of the cylinder block.  
Bore to the selected diameter to suit pistons. Liners may only be bored to suit standard or 0,25 mm (.010 in.) oversize pistons.

**Assembling**

21. Fit the oil control ring to the piston.
22. Check the oil control ring clearance in the piston groove. Clearance limits: 0,05 mm to 0,10 mm (0.002 in. to 0.004 in.).
23. Fit the two compression rings to the piston with the sides marked 'T' or 'Top' uppermost.
24. Check the compression ring clearance in the piston grooves. Clearance limits: 0,046 mm to 0,097 mm (0.0018 in. to 0.0038 in.).

*continued*

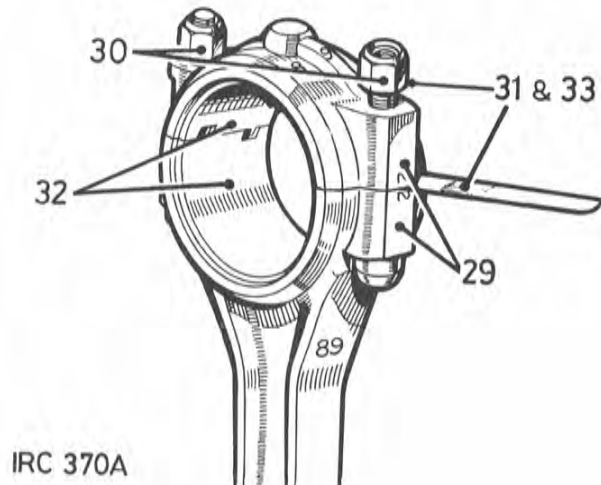
**Connecting rods**

25. Check the alignment of the connecting rod.
26. Check the gudgeon pin clearance in the connecting rod bush. Clearance limits: zero to 0,0241 mm (0.00095 in.).
27. If a new connecting rod small end bush is required, ensure that the oil holes are aligned when pressing in the replacement, then reamer the bush to obtain the correct clearance, as above.
28. Check the fit of the gudgeon pin in the piston, the pin must not fall through either boss but be capable of being fitted by hand at normal room temperature 20°C (68°F).  
Gudgeon pins of 0,025 mm and 0,076 mm (0.001 in. and 0.003 in.) oversizes are available.
29. Select the correct cap for each connecting rod as denoted by the number stamped near the joint faces. This number also indicates the crankshaft journal to which it must be fitted.
30. Assemble the caps, less bearing halves, to the respective connecting rods. Torque 2,8 kgf.m (20 lbf. ft.).
31. Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a new assembly must be fitted.

**Connecting rod bearing nip and clearance**

**NOTE:** New bearing halves are supplied with a protective coating and must be degreased, prior to fitting, to remove the coating.

32. Fit the bearing halves to the connecting rod and cap, and secure the assembly. Torque 2,8 kgf.m (20 lbf. ft.)
33. Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,05 mm to 0,10 mm (0.002 in. to 0.004 in.). The bearing nip can be corrected by selective assembly of the bearing shells; these are available in slightly varying thicknesses. Do not file or machine the caps or connecting rods to vary the bearing nip.

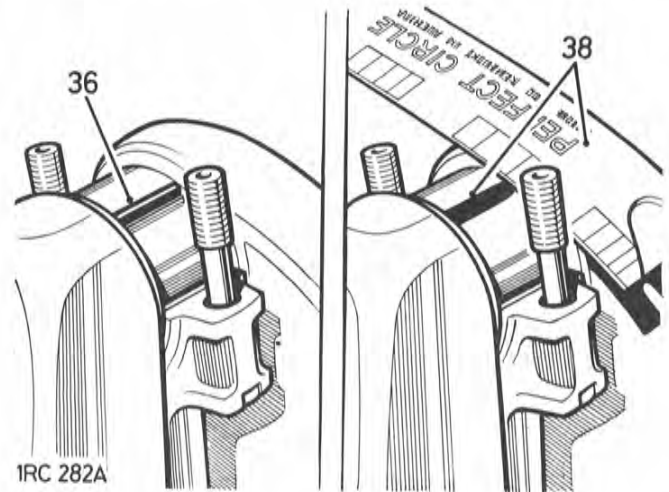


*continued*

34. Make a final check to prove the bearing clearance, using selected shim papers fitted between the journal and one half of the bearing shell. As the bearing clearance is taken up, the connecting rod will become stiff to rotate about the journal. The correct bearing clearance is 0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.).

**NOTE:** As an alternative, 'Plastigauge' may be used to check the connecting rod bearing clearance. 35 to 41. Do not rotate the connecting rod or crankshaft while the Plastigauge is fitted, or the reading will be impaired.

35. Place a piece of 'Plastigauge' across the centre of the lower half of the crankshaft journal. 605238.
36. Fit the connecting rod complete with bearings to the applicable journal. Torque 2,8 kgf.m(20 lbf. ft.).
37. Remove the connecting rod cap and lower half bearing.
38. Using the scale printed on the 'Plastigauge' packet, measure the flattened 'Plastigauge' at its widest point. The graduation that most closely corresponds to the width of the 'Plastigauge' indicates the bearing clearance.
39. The correct clearance with new or overhauled components is 0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.).
40. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
41. Wipe off the 'Plastigauge' with an oily rag. DO NOT scrape it off.

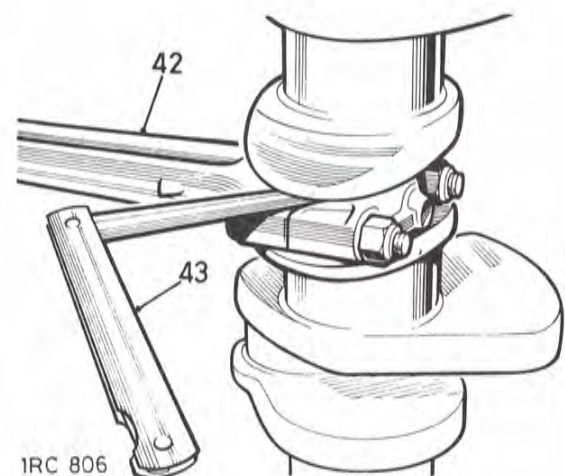


#### Connecting rod end-float

42. Fit the connecting rods complete with bearings to their applicable journals. Torque 2,8 kgf.m(20 lbf. ft.).
43. Check the end float between the end face of the connecting rod and the journal shoulder. End float limits: 0,15 mm to 0,38 mm (0.006 in. to 0.015 in.).
44. Remove the connecting rods from the crankshaft and retain all parts in related sets.

#### Assembling

45. Assemble the pistons to their respective connecting rods.
46. Fit new circlips to retain the piston gudgeon pins.
47. Refit the connecting rods and pistons 12.17.01.



*continued*

## DATA

**Pistons**

Clearance in cylinder bore, measured at bottom of skirt at right angles to gudgeon pin. Standard size and oversize pistons

0,048 mm to 0,060 mm (0.0019 in. to 0.0024 in.).

**Piston rings**

## Compression (2)

Type

Cast iron. Marked 'T' or 'TOP' on upper side.

Gap in bore

0,38 mm to 0,50 mm (0.015 in. to 0.020 in.).

Clearance in groove

0,046 mm to 0,097 mm (0.0018 in. to 0.0038 in.).

## Oil control

Type

Slotted, square friction edge.

Gap in bore

0,38 mm to 0,80 mm (0.015 in. to 0.033 in.).

Clearance in groove

0,05 mm to 0,10 mm (0.002 in. to 0.004 in.).

**Gudgeon pin**

Clearance in connecting rod

Zero to 0,0241 mm (0.00095 in.).

Fit in piston

Push fit by hand.

**Connecting rods**

Clearance, bearing to crankpin

0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.).

End float on crankpin

0,15 mm to 0,38 mm (0.006 in. to 0.015 in.).

## CRANKSHAFT REAR OIL SEAL

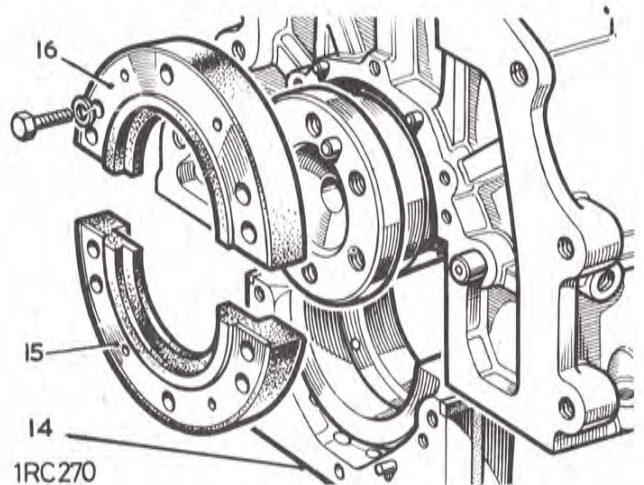
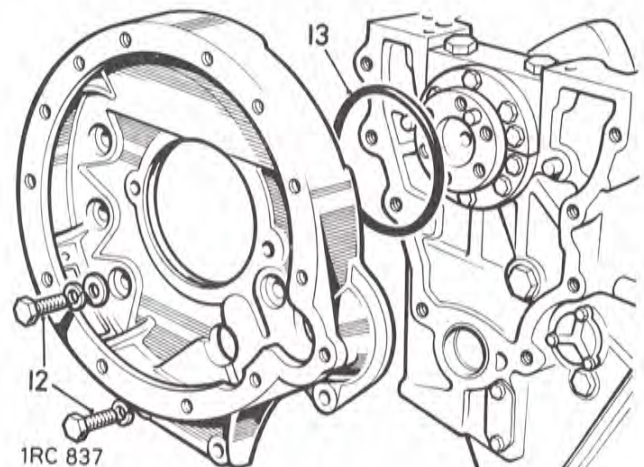
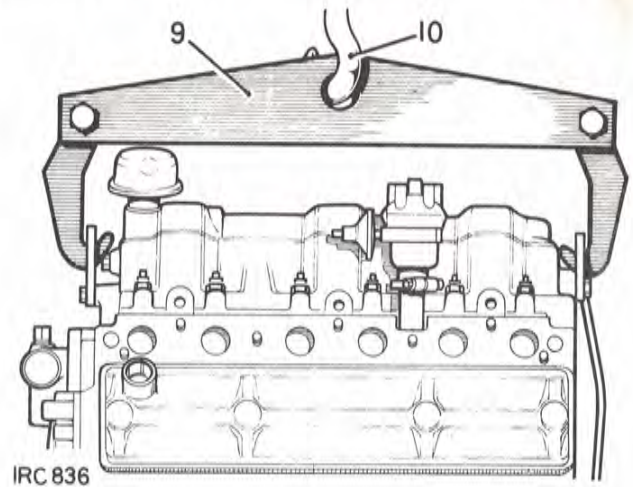
—Remove and refit

12.21.20

Service Tool: 270304 Guides for oil seal  
600963 Engine lifting sling

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the front floor. 76.10.12.
3. Remove the seat base. 76.70.06.
4. Remove the gearbox assembly. 37.20.01.
5. Remove the starter motor. 86.60.01.
6. Remove the oil sump. 12.60.44.
7. Remove the clutch assembly. 33.10.01.
8. Remove the flywheel. 12.53.07.
9. Attach a suitable lifting sling and hoist to the engine lifting hooks. 600963.
10. Tension the hoist sufficient to support the engine weight.
11. Withdraw the packing piece from between the flywheel housing and the chassis cross-member, previously fitted during gearbox removal.
12. Remove the flywheel housing.
13. Remove the oil seal ring.
14. Remove the rear main bearing cap.
15. Remove the dowel located lower half of the oil seal retainer from the rear main bearing cap.
16. Remove the dowel located upper half of the oil seal retainer from the cylinder block.
17. Remove the oil seal from the crankshaft.

*continued*

## Refitting

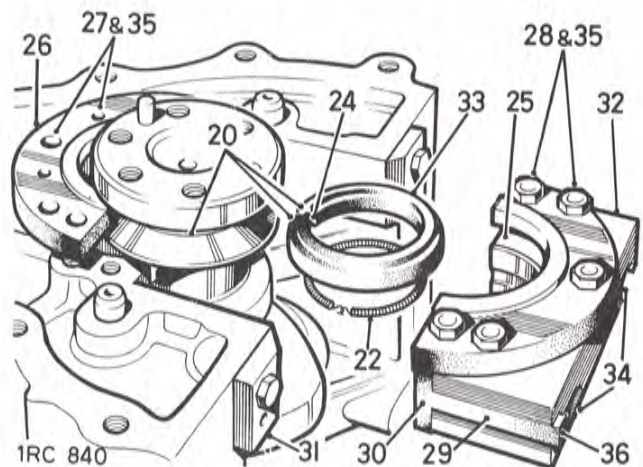
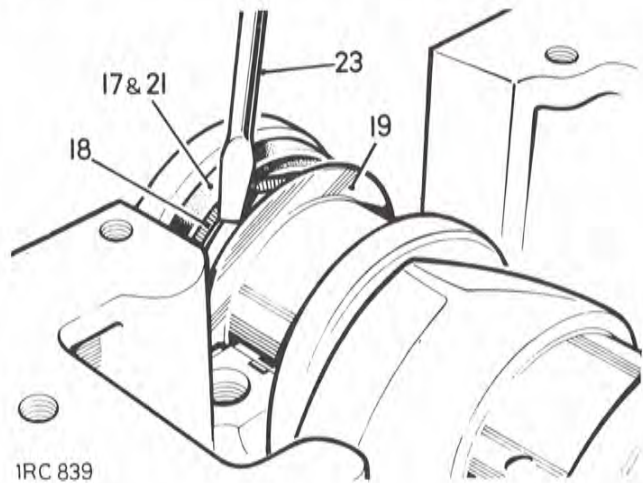
18. Assemble the garter spring on the crankshaft journal by engaging the hook and eye. Do not stretch the spring.
19. Move the assembled spring along the journal until it is against the thrower flange.
20. Apply Silicone Grease MS4 to the crankshaft oil seal journal and to both end faces of the split oil seal.
21. Open the split seal sufficiently to allow it to be fitted over the crankshaft oil seal journal. The recess in the oil seal must be towards the thrower flange and the garter spring.

**NOTE:** The oil seal must not be repeatedly fitted and removed from the crankshaft, as this can damage the sealing lip.

22. Position the garter spring so that the hook and eye is located mid-way between the split and hinge of the oil seal.
23. Using a small screwdriver, ease the spring into the recess in the oil seal.
24. Rotate the oil seal until the split is on the vertical axis pointing towards the cylinder head and in its approximate running position on the journal; this position is important.

**NOTE:** Do not degrease the seal retainer halves with trichlorethylene, but wipe clean with a dry cloth prior to applying Hylomar.

25. Apply Hylomar PL 32/M jointing compound, Rover Part No. 534244, to the seal location diameter of both retainer halves.
26. Locate one half of the oil seal retainer onto the cylinder block dowels. The oil seal should be compressed to assist assembly, also ensure that it is correctly located in the retainer recess.



*continued*

## CRANKSHAFT REAR OIL SEAL

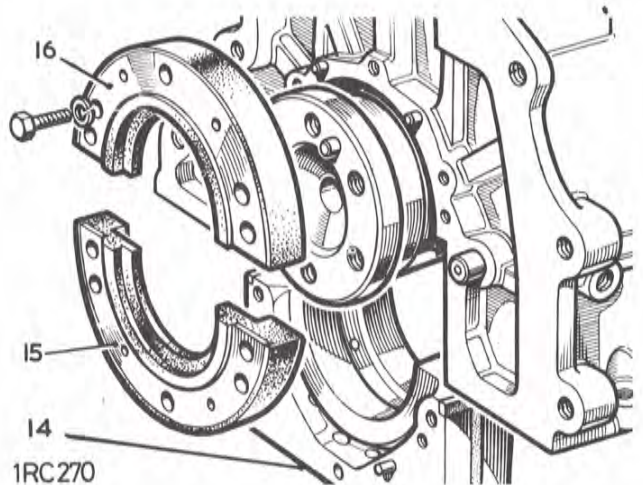
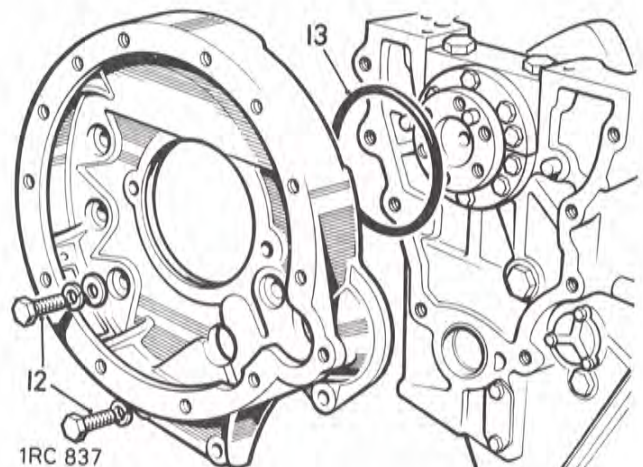
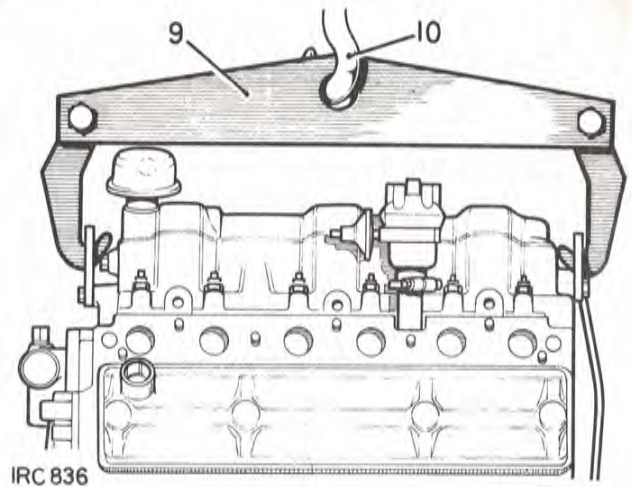
—Remove and refit

12.21.20

Service Tool: 270304 Guides for oil seal  
600963 Engine lifting sling

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the front floor. 76.10.12.
3. Remove the seat base. 76.70.06.
4. Remove the gearbox assembly. 37.20.01.
5. Remove the starter motor. 86.60.01.
6. Remove the oil sump. 12.60.44.
7. Remove the clutch assembly. 33.10.01.
8. Remove the flywheel. 12.53.07.
9. Attach a suitable lifting sling and hoist to the engine lifting hooks, 600963.
10. Tension the hoist sufficient to support the engine weight.
11. Withdraw the packing piece from between the flywheel housing and the chassis cross-member, previously fitted during gearbox removal.
12. Remove the flywheel housing.
13. Remove the oil seal ring.
14. Remove the rear main bearing cap.
15. Remove the dowel located lower half of the oil seal retainer from the rear main bearing cap.
16. Remove the dowel located upper half of the oil seal retainer from the cylinder block.
17. Remove the oil seal from the crankshaft.

*continued*

27. Secure the upper half of the oil seal retainer with the three inner bolts, leaving the outer bolt at each end finger tight at this stage.
28. Secure the lower half of the oil seal retainer to the rear main bearing cap in the same manner as described for the upper half.
29. Apply Silicon Grease MS4 to the 'T' seals and fit them to the rear main bearing cap.
30. Trim the top edges of the 'T' seals to prevent them from fouling the cylinder block when being fitted.
31. Fit the seal guides to the crankcase. 270304.
32. Fit the rear main bearing cap complete with the seal retainer, 'T' seals and bearing shell to the crankcase until there is an 0,8 mm (0.030 in.) gap between the cap and the crankcase.
33. Check that the seal is correctly located in the retainer recess.
34. Tighten the bearing cap bolts ensuring that there is no buckling of the split seal or misalignment of the butt joint; Torque: 10 kgf.m (75 lbf. ft.).
35. Fully tighten all the bolts securing the retainer halves. Turn the bolt heads so that the hexagon corners will not foul the flywheel housing seal when fitting.
36. Trim the ends of the 'T' seals to leave 0,8 mm (0.030 in.) protruding from the bearing cap.
37. Reverse 1 to 13.



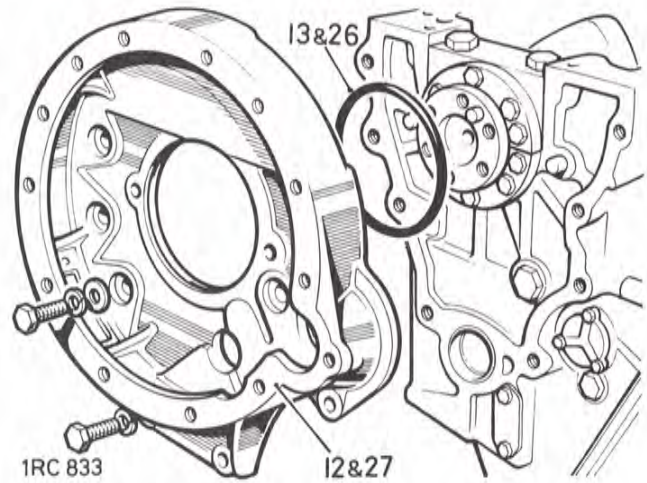
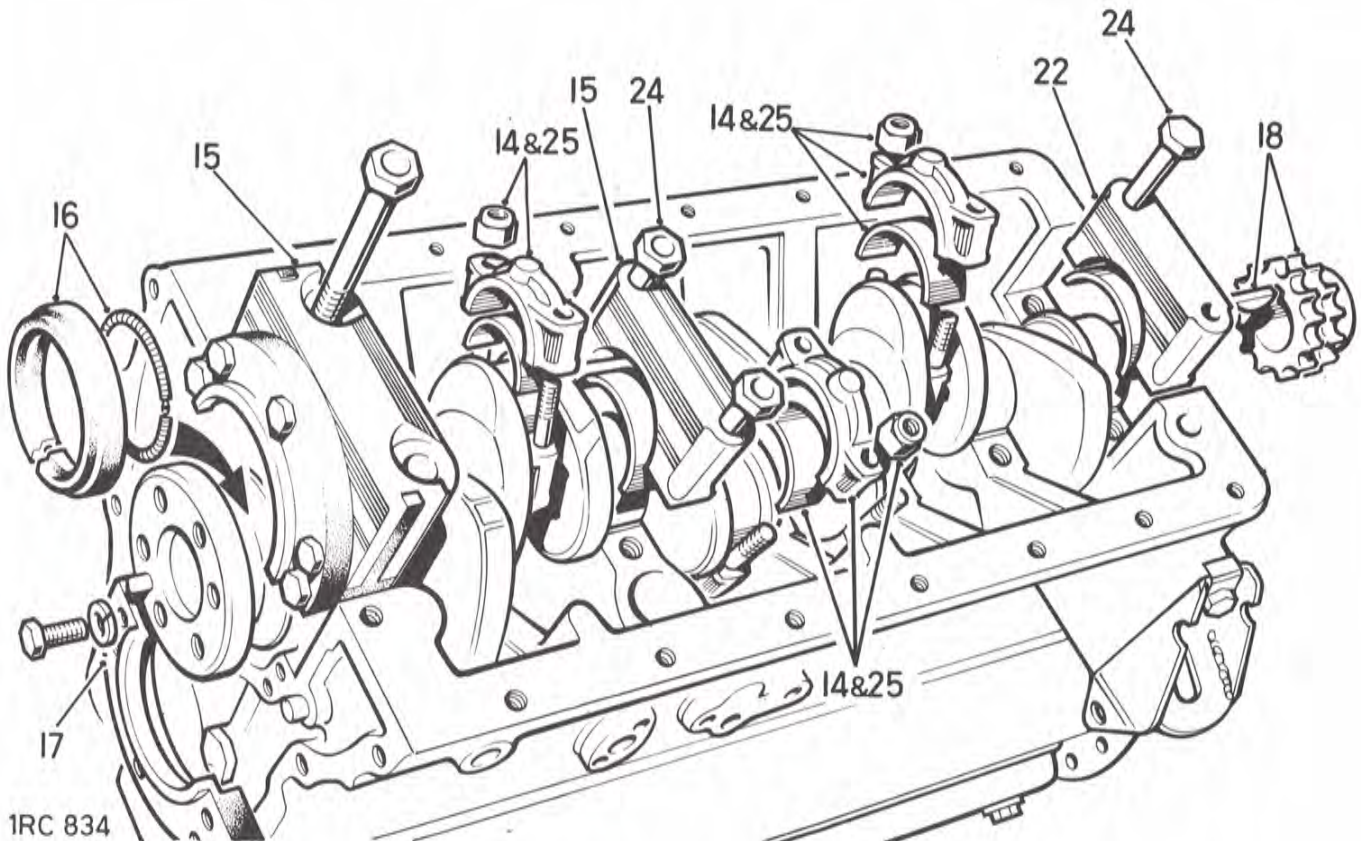
## CRANKSHAFT

—Remove and refit

12.21.33

## Removing

1. Remove the bonnet. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Remove the radiator assembly. 26.40.01.
4. Remove the front floor. 76.10.12.
5. Remove the engine assembly. 12.41.01.
6. Remove the oil sump. 12.60.44.
7. Remove the oil pump. 12.60.26.
8. Remove the timing gear cover. 12.65.01.
9. Remove the timing chain and tensioner 12.65.28.
10. Remove the clutch assembly. 33.10.01.
11. Remove the flywheel. 12.53.07.
12. Remove the flywheel housing.
13. Remove the oil seal.

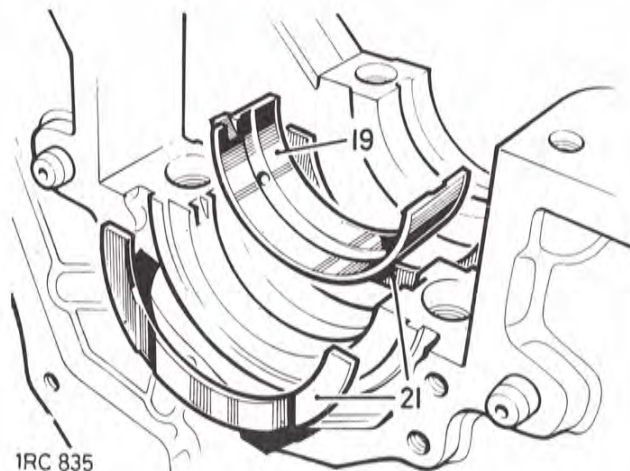
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14. Remove the connecting rod caps and bearing lower halves. Retain in related sets.
15. Remove the main bearing caps and lift the crankshaft clear. Retain the bearing halves and caps in related sets.
16. Remove the oil seal from the crankshaft.
17. Remove the upper half of the oil seal retainer from the cylinder block.
18. If required, remove the chainwheel and key from the crankshaft.

### Refitting

**NOTE:** If replacement components are to be fitted, the checks detailed in 12.21.46 must be carried out.

19. Locate the upper main bearing halves into the cylinder block.
20. Lubricate the bearings and crankshaft journals with clean engine oil, and place the crankshaft in position.
21. Insert a thrust washer at each side of the rear upper main bearing shell with the grooved faces towards the crankshaft webs.
22. Locate the bearing lower halves into numbers 1 to 6 main bearing caps. Fit the caps but do not fully tighten the fixings at this stage.
23. Fit the crankshaft rear oil seal and number 7 rear main bearing shell. 12.21.20.
24. Tighten the main bearing cap fixings. Torque: 10,0 kgf.m (75 lbf. ft.).
25. Fit the appropriate bearing halves and caps to the connecting rods, using NEW securing nuts. Torque: 2,8 kgf.m (20 lbf. ft.).
26. Fit the oil seal ring to the flywheel housing.
27. Refit the flywheel housing.
28. Refit the flywheel. 12.53.07.
29. Refit the clutch assembly. 33.10.01.
30. Reset the valve timing. 12.65.22.
31. Reverse 1 to 9.



## CRANKSHAFT

—Overhaul

12.21.46

## Inspecting

1. Remove the crankshaft. 12.21.33
2. Check each crankshaft journal for ovality. If ovality exceeds 0,040 mm (0.0015 in.), a reground or new crankshaft should be fitted.
3. Bearings for the crankshaft main journals and the connecting rod journals are available in the following undersizes:
  - 0,25 mm (0.010 in.).
  - 0,50 mm (0.020 in.).
  - 0,76 mm (0.030 in.).
  - 1,01 mm (0.040 in.).
4. Thrust washers for the crankshaft rear main journal, to control the crankshaft end float, are available in the following oversizes:
  - 0,06 mm (0.0025 in.).
  - 0,12 mm (0.005 in.).
  - 0,18 mm (0.0075 in.).
  - 0,25 mm (0.010 in.).
  - 0,31 mm (0.0125 in.).

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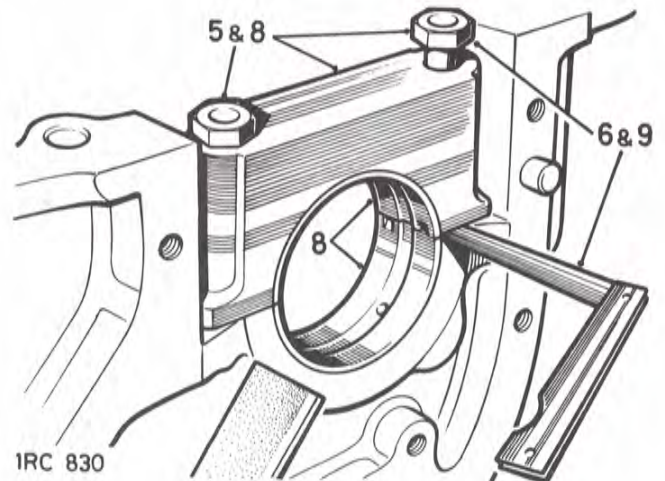


5. Fit the front main bearing cap, less bearing halves, to the cylinder block. Torque: 10,4 kgf.m (75 lbf. ft.).
6. Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a complete new cylinder block must be fitted.
7. Repeat 5 and 6 for the remaining main bearing caps.

#### Main bearing nip and clearance

**NOTE:** New bearing halves are supplied with a protective coating and must be degreased prior to fitting, to remove the coating.

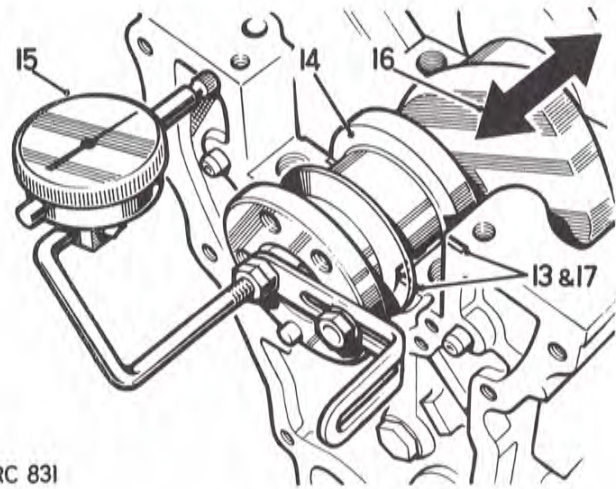
8. Locate the bearing halves into the front main bearing cap and the cylinder block, and fit the cap to the block. Torque: 10,4 kgf.m (75 lbf. ft.).
9. Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,10 mm to 0,15 mm (0.004 in. to 0.006 in.).
10. The bearing nip can be corrected by selective assembly of the bearing halves; these are available in slightly varying thicknesses. Do not file or machine the caps or cylinder block to vary the bearing nip.
11. Repeat 8 to 10 for the remaining main bearings.
12. When the bearing nip has been checked, remove the caps and bearing shell bottom halves.



*continued*

13. Position a standard size thrust washer each side of the rear main bearing shell, top half, with the grooved faces away from the cylinder block. The thrust washer thicknesses must agree within 0,08 mm (0.003 in.).
14. Place the crankshaft in position on the cylinder block.
15. Mount a dial test indicator to read off the end of the crankshaft.
16. Check the crankshaft end float. The correct end float limits are 0,05 mm to 0,15 mm (0.002 in. to 0.006 in.).
17. The crankshaft end float can be adjusted by fitting oversize thrust washers. The variation of thrust washer thickness at each side must not exceed 0,08 mm (0.003 in.) to ensure that the crankshaft remains centralised.
18. Make a final check to prove the main bearing clearance, using a 0,063 mm (0.0025 in.) shim paper. Check each bearing in turn by fitting both bearing halves and the bearing cap, with the shim paper between the crankshaft and one half of the bearing. The crankshaft should resist rotation with the shim paper fitted, and move freely by hand with the shim paper removed.

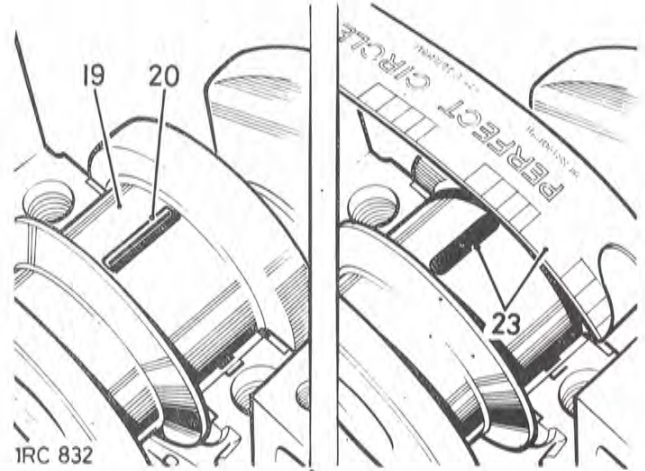
1RC 831



**NOTE:** As an alternative, Plastigauge may be used to check the main bearing clearance, 19 to 26. Do not rotate the crankshaft while the Plastigauge is fitted, or the reading will be impaired.

*continued*

19. Locate the crankshaft in position on the upper bearing halves in the cylinder block.
20. Place a piece of Plastigauge across the centre of the lower half of the crankshaft journal. 605238.
21. Fit the bearing cap complete with the lower bearing half. Torque: 10,5 kgf.m (75 lbf. ft.).
22. Remove the bearing cap and lower half bearing.
23. Using the scale printed on the 'Plastigauge' packet, measure the flattened 'Plastigauge' at its widest point. The graduation that most closely corresponds to the width of the 'Plastigauge' indicates the bearing clearance.
24. The correct clearance with new or overhauled components is 0,015 mm to 0,050 mm (0.0006 in. to 0,002 in.).
25. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
26. Wipe off the 'Plastigauge' with an oily rag. DO NOT scrape it off.
27. Retain all components in related sets.
28. Refit the crankshaft. 12.21.33.



IRC 832

## DATA

### Crankshaft

Journal diameter

Crankpin diameter:

End-float (controlled by thrust washers at rear bearing).

Regrind permissible by 0,25 mm (0.010 in.) stages to:

Main bearing running clearance

Connecting rod bearing running clearance

67,0 mm – 0,0127 mm (2.6245 in. – 0.0005 in.).

47,63 mm + 0,018 mm (1.875 in + 0.00075 in.).

0,05 mm to 0,15 mm (.002 in. to .006 in.)

Undersize	Journal dia.	Crankpin dia.
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1,01 mm	65,63 mm	46,6 mm
---------	----------	---------

(0.040 in.)	(2.584 in.)	(1.835 in.)
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0,015 mm to 0,050 mm (0.0006 in. to 0.002 in.).

0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.).

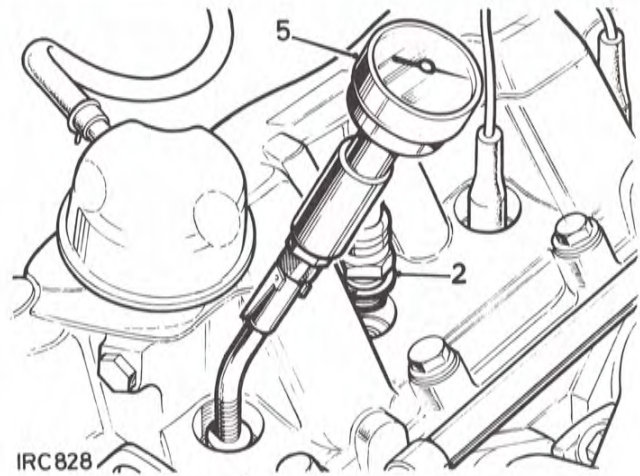
## CYLINDER PRESSURES

—Check

12.25.01

## Checking

1. Run the engine until it attains normal operating temperature.
2. Remove the sparking plugs.
3. Secure the throttle in the fully open position.
4. Check each cylinder in turn as follows:
5. Insert a suitable pressure gauge into the sparking plug hole.
6. Crank the engine with the starter motor for several revolutions and note the highest pressure reading obtainable.
7. If the pressure is appreciably less than the correct figure, the piston rings or valves may be faulty.
8. Low pressure in adjoining cylinders may be due to a faulty cylinder head gasket.



Compression ratio            7.8 : 1            7.0 : 1

Compression pressure    11,95 kgf.cm<sup>2</sup> (170 lbf/in.<sup>2</sup>)

9,84 kgf.cm<sup>2</sup> (140 lbf/in.<sup>2</sup>)

Cranking speed            300 rev/min.

300 rev/min.

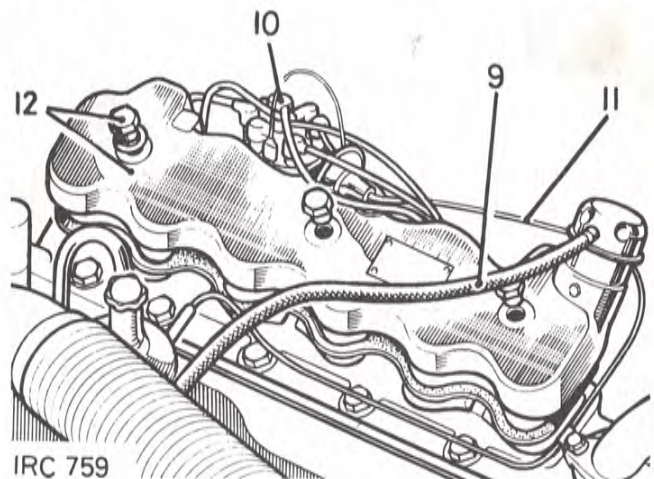
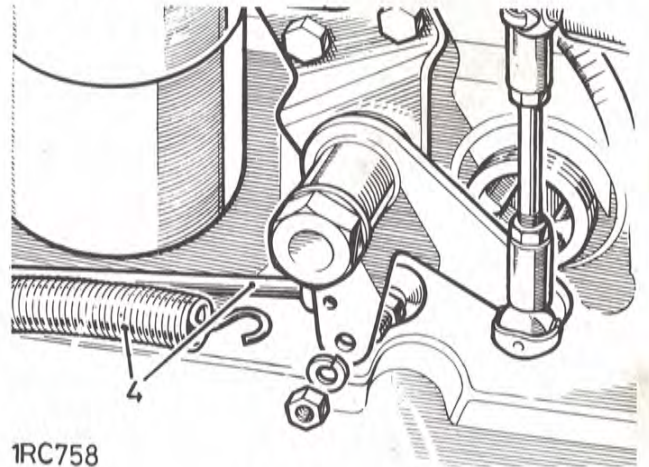
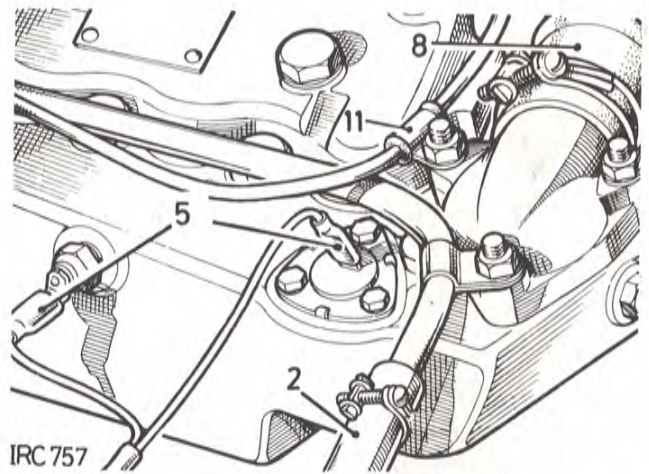
## CYLINDER HEAD

—Remove and refit

12.29.10

## Removing

1. Drain the coolant at the radiator and engine block.
2. Disconnect the brake servo pipe from the inlet manifold.
3. Remove the carburetter. 19.15.09.
4. Disconnect the accelerator control rod and return spring at the bell crank lever.
5. Disconnect the two temperature transmitter leads from the cylinder head.
6. Disconnect the rocker oil feed pipe at the rear of the cylinder head.
7. Remove the sparking plugs.
8. Disconnect the radiator top hose.
9. Disconnect the hose from the engine breather cap.
10. Remove the distributor. 86.35.20
11. Remove the distributor vacuum pipe and retaining clip from the thermostat outlet pipe fixing.
12. Remove the special nuts and sealing washers and lift off the top rocker cover and joint washer.

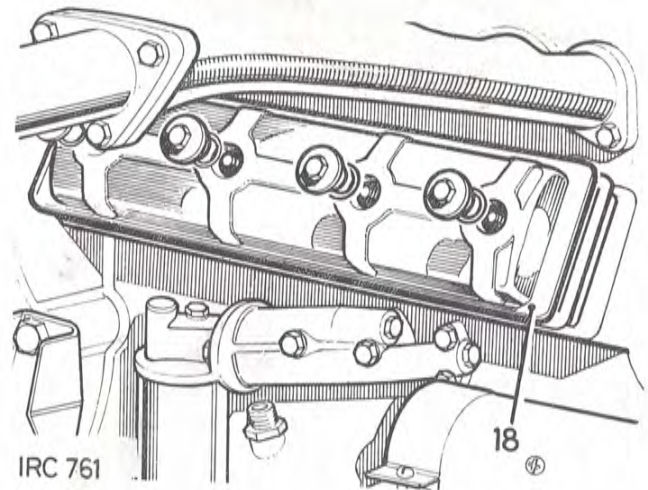
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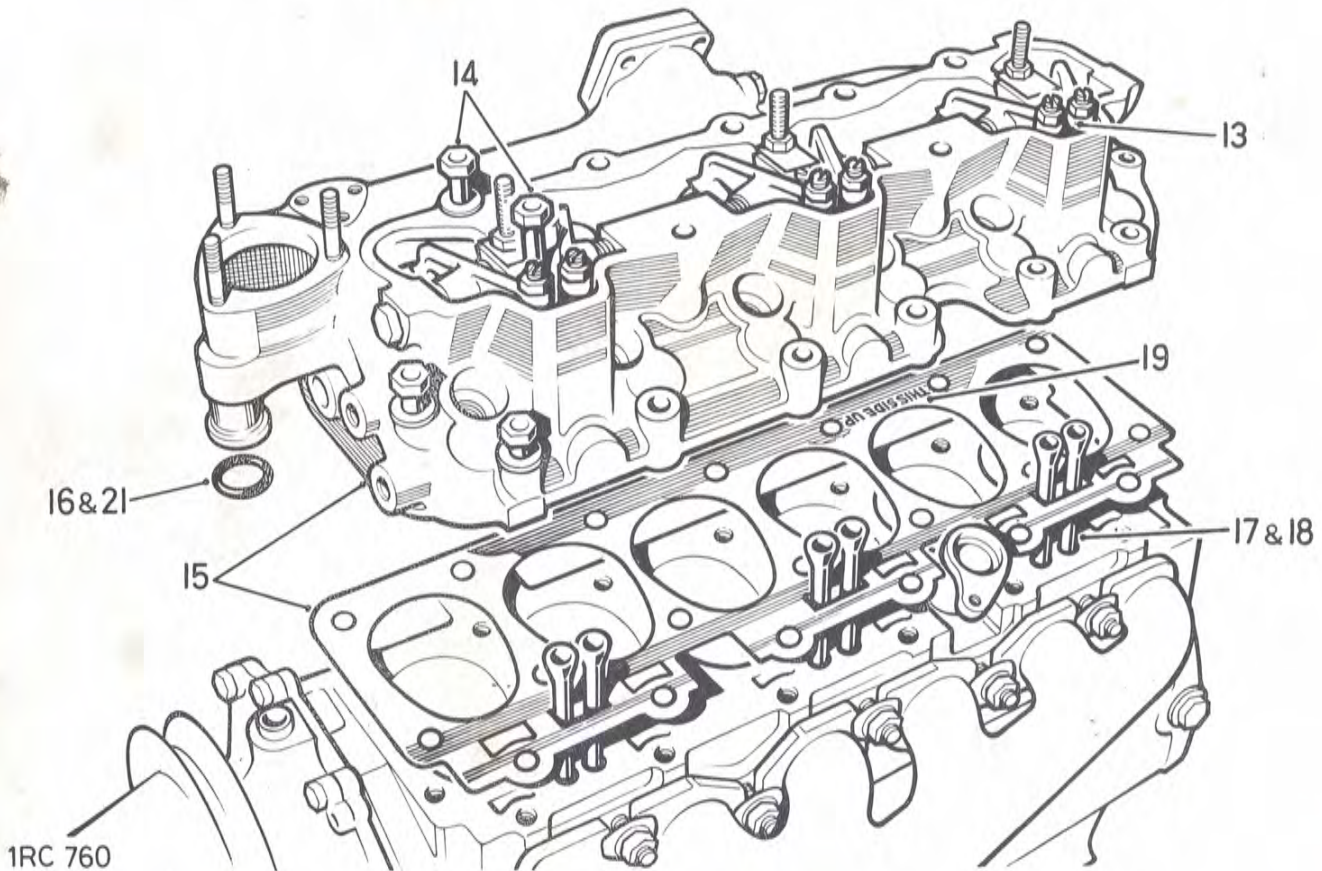
13. Slacken the locknuts and screw back the tappet adjusting screws.
14. Slacken the cylinder head fixings evenly and remove them.
15. Lift off the cylinder head and discard the cylinder head gasket.
16. Remove the 'O' ring seal from the connector, by-pass to water pump.
17. Withdraw the tappet push rods and retain them in their fitted order.

### Refitting

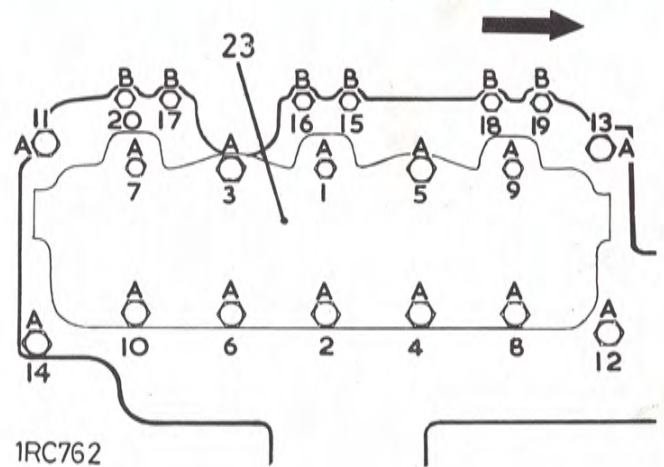
18. Remove the side rocker cover and fit the tappet push rods in their original positions.
19. Smear a new cylinder head gasket with oil and place on the face of the cylinder block, with the side marked 'this side up' uppermost.
20. Use two old cylinder head bolts with their heads sawn-off to locate the gasket and head. Cut a screwdriver slot across the diameter of the bolts to facilitate removal when the cylinder head is in position.
21. Position the cylinder head onto the block, at the same time position the 'O' ring seal onto the by-pass connector.



*continued*



22. Ensure that the tappet push rods remain correctly seated.
23. Tighten the cylinder head bolts in the order shown and to the following torques:
  - a. Bolts 'A' 7 kgf.m (50 lbf. ft.).
  - b. Bolts 'B' 4 kgf.m (30 lbf. ft.).
24. Set the inlet valve tappet clearances to 0,15 mm (0.006 in.) in the following order:
  - Set No. 1 tappet with No. 6 valve fully open.
  - Set No. 2 tappet with No. 5 valve fully open.
  - Set No. 3 tappet with No. 4 valve fully open.
  - Set No. 4 tappet with No. 3 valve fully open.
  - Set No. 5 tappet with No. 2 valve fully open.
  - Set No. 6 tappet with No. 1 valve fully open.
25. Refit the side and top covers.
26. Fit the distributor. 86.35.20.
27. Reverse 1 to 8.
28. With the engine at normal running temperature, check the cylinder head fixings tightness, then the inlet valves tappet clearances, and tighten and reset as necessary.



## CYLINDER HEAD

—Decarbonise and top overhaul

12.29.21

Service tools: 262749 Rocker shaft extractor  
 276102 Valve Spring compressor  
 274401 Exhaust valve guide remover  
 274400 Inlet valve guide remover  
 600959 Exhaust valve guide replacer  
 601508 Inlet valve guide replacer  
 263050 Protection plate, insert removal  
 530625 Exhaust valve seat replacer.

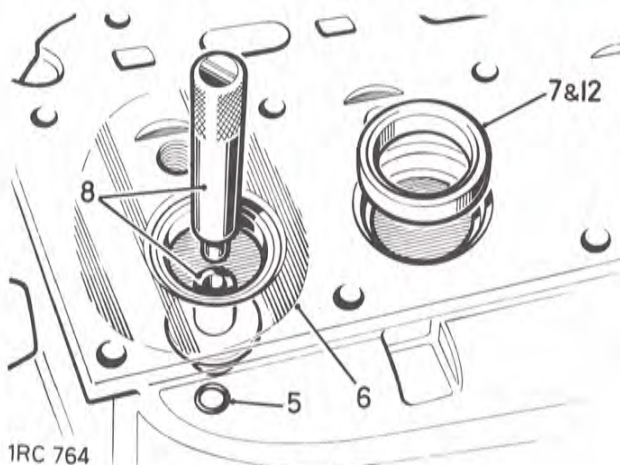
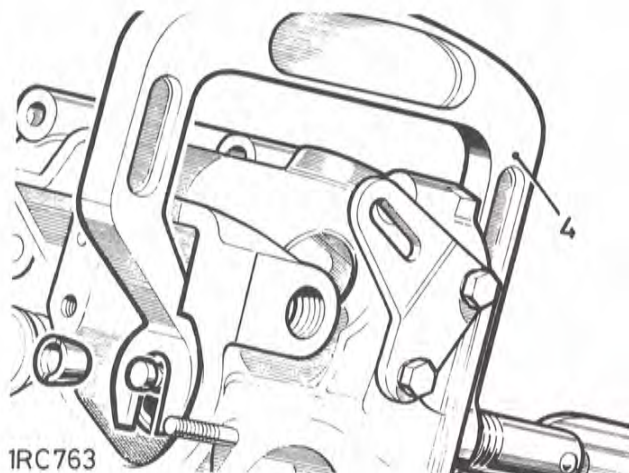
## Cylinder head and inlet valves

## Dismantling

1. Remove the cylinder head. 12.29.10.
2. Remove the thermostat housing and thermostat.
3. Remove the inlet valve rockers and shafts. 12.29.35.
4. Remove the inlet valve assemblies, using spring compressor 276102, and retain the components in sets related to their parent cylinder.
5. Withdraw the oil seals from the valve guides.
6. Remove combustion deposits from the cylinder head, valve ports and piston crowns, using only soft metal tools.
7. If necessary, remove the inlet valve seat inserts by grinding sufficient to weaken the insert, then prising out.
8. Drive out the inlet valve guides from the combustion chamber side, using remover 274400.
9. Inspect the valve spring pairs which must be an interference fit with each other.
10. Inspect the valve split cones and spring caps for general condition.
11. Inspect the cylinder head for general condition and for damage to threads.

## Assembling

12. If replacement inlet valve seat inserts are to be fitted, warm the head evenly for a few minutes at 66°C (150°F) approximately (the normal operating temperature of a degreaser), enter the seat squarely into the cylinder head recess and press into position.

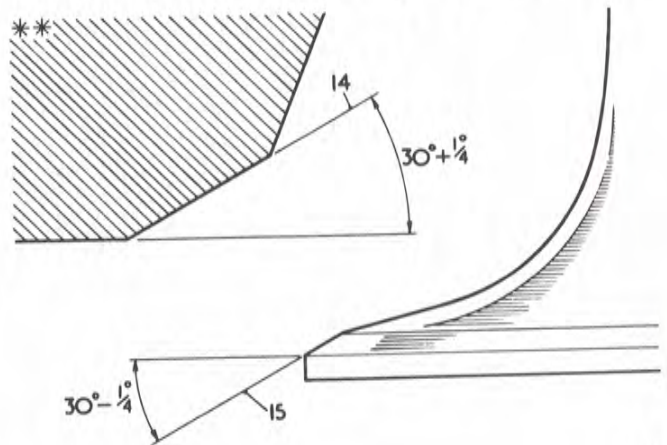
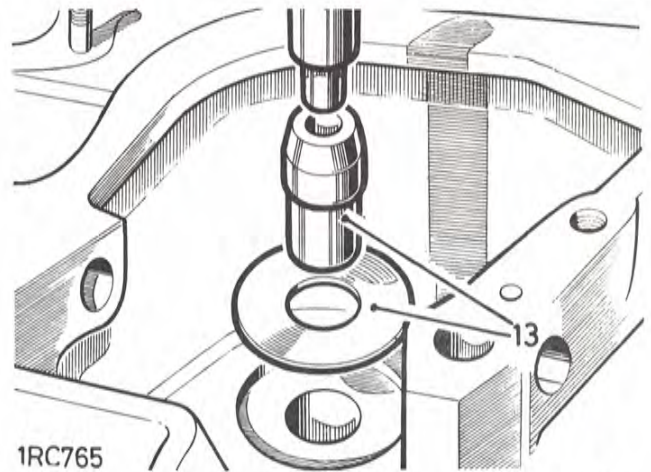
*continued*

13. Lubricate and fit the inlet valve guides, together with the valve spring seating washers, using replacer 601 508.
14. Face the inlet valve seats, both original and replacements, to  $30^{\circ} + \frac{1}{4}^{\circ}$ , using the valve guides as pilots.
15. Check, and if necessary, reface the inlet valve faces to  $30^{\circ} - \frac{1}{4}^{\circ}$ .
16. Lap each valve into its respective seat then thoroughly wash the assembly.
17. Lubricate the valve stems and reverse 4.
18. Reverse 2 and 3.
19. Place the cylinder head assembly aside pending re-fitting.

#### Dismantling the exhaust valves arrangement

20. Remove the exhaust manifold. 30.15.10.
21. Remove the side rocker cover and joint washer.
22. Mark the exhaust valves for refitting in correct sequence.

*continued*

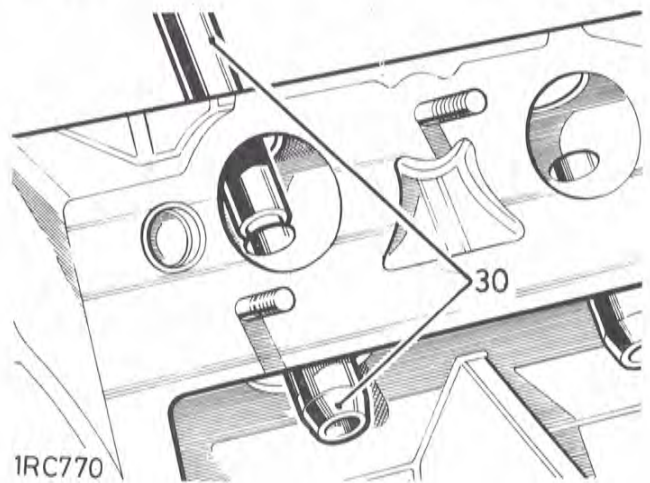
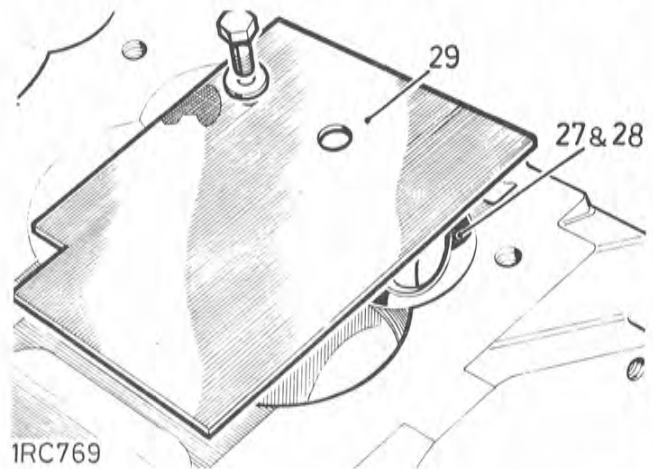
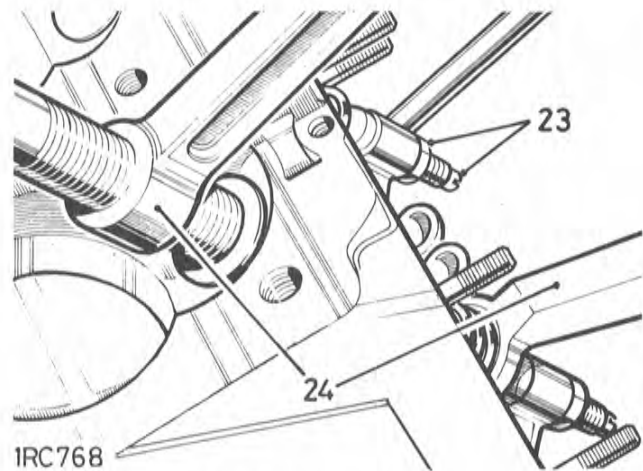


23. Slacken the tappet adjusting screws right off and set each rocker back on its cam.
24. Remove the exhaust valve assemblies, using spring compressor 276102, and retain the components in sets related to their parent cylinder.
25. Remove the combustion deposits from the valves and ports.
26. Examine the valve seat inserts and valve guides. If replacement is necessary, first remove the exhaust valve rockers and shafts. 12.29.36.  
**NOTE:** In installations where access is restricted, to replace valve guides on No. 5 or No. 6 cylinders may first require engine removal.
27. If necessary, remove the valve seat inserts, 28 and 29.

**WARNING:** Due to the extreme hardness of the seat inserts, take great care to avoid possible injury due to fragmentation.

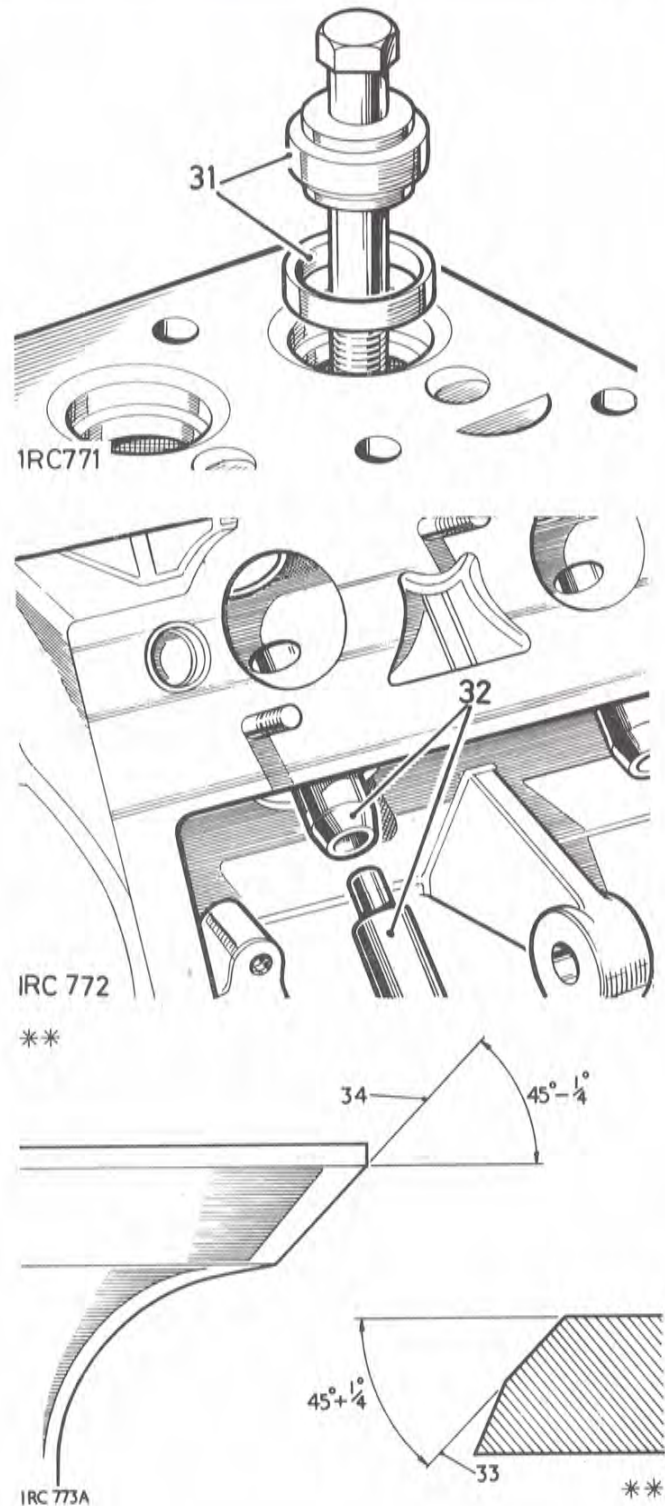
28. Reduce the insert to a minimum thickness by grinding.
29. Secure the protection plate 263050 over the cylinder block face and break the seat insert, using a suitable chisel applied through the hole in the plate.
30. If necessary, drift out the exhaust valve guides, using remover 274401.

*continued*



## Exhaust valves, seats and guides, refitting

31. If new exhaust seat inserts are to be fitted, clean the seat recess and pull the new insert into position, using special tool 530625. It is not necessary to heat the block or freeze the insert, but light taps on the tool may be required to ensure that the insert enters smoothly. Continue precautions against fragmentation by fitting the protection plate 263050 and leaving it in position for a few minutes.
32. Lubricate the exhaust valve guides and carefully drift them into position, using replacer 600959.
33. Use the valve guide as a pilot and cut the valve seat to  $45^\circ + \frac{1}{4}^\circ$ .
34. Face the exhaust valves to  $45^\circ$  and lap each valve into its respective seat, using suitable equipment.
35. Wash each valve, seat, port and guide in clean paraffin.
36. Lightly oil the valve stems and reverse 24.
37. If removed, reverse item 26, during which the valve timing must be re-set as necessary.
38. Reverse 20 and 21.
39. Refit the cylinder head. 12.29.10.



## INLET VALVE ROCKERS AND SHAFTS

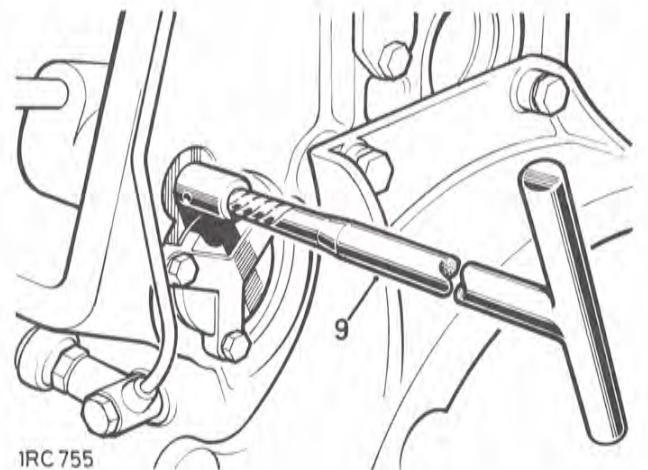
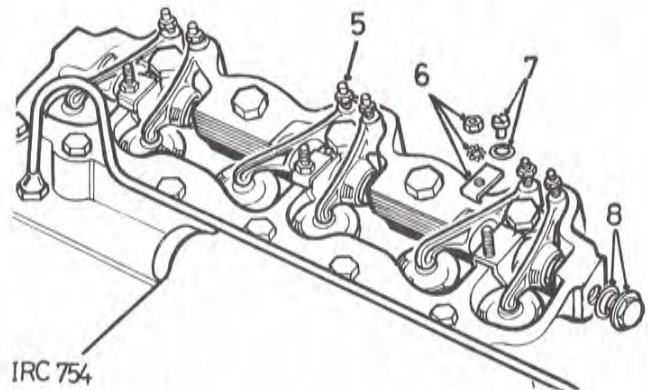
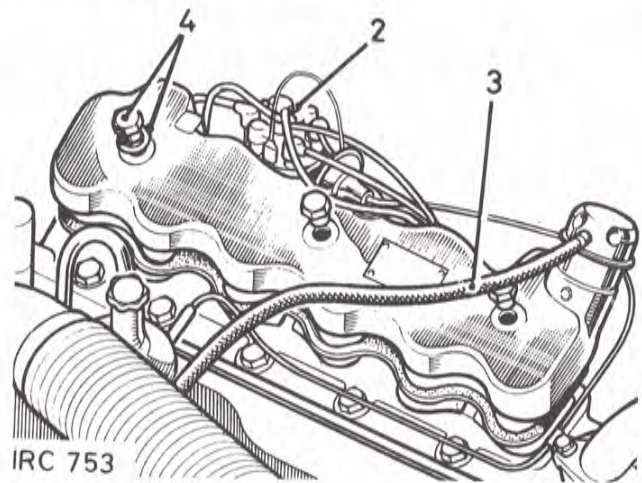
—Remove and refit

12.29.35

Service tool: 262749 Extractor for rocker shafts

## Removing

1. Remove the radiator and grille panel. 26.40.01.
2. Disconnect the sparking plugs leads and remove the distributor cap.
3. Disconnect the hose at the engine breather cap.
4. Remove the special nuts and sealing washers and lift off the top rocker cover and joint washer.
5. Slacken the locknuts and screw back the tappet adjusting screws.
6. Remove the nuts, washers and screw retainer plates from the rocker spacers.
7. Remove the special set screws and washers securing the rocker shafts.
8. Remove the end plug and sealing washer from the front of the cylinder head.
9. Extract the front and rear rocker shafts and withdraw the valve rockers, springs and spacers as they are released. Extractor 262749.

*continued*

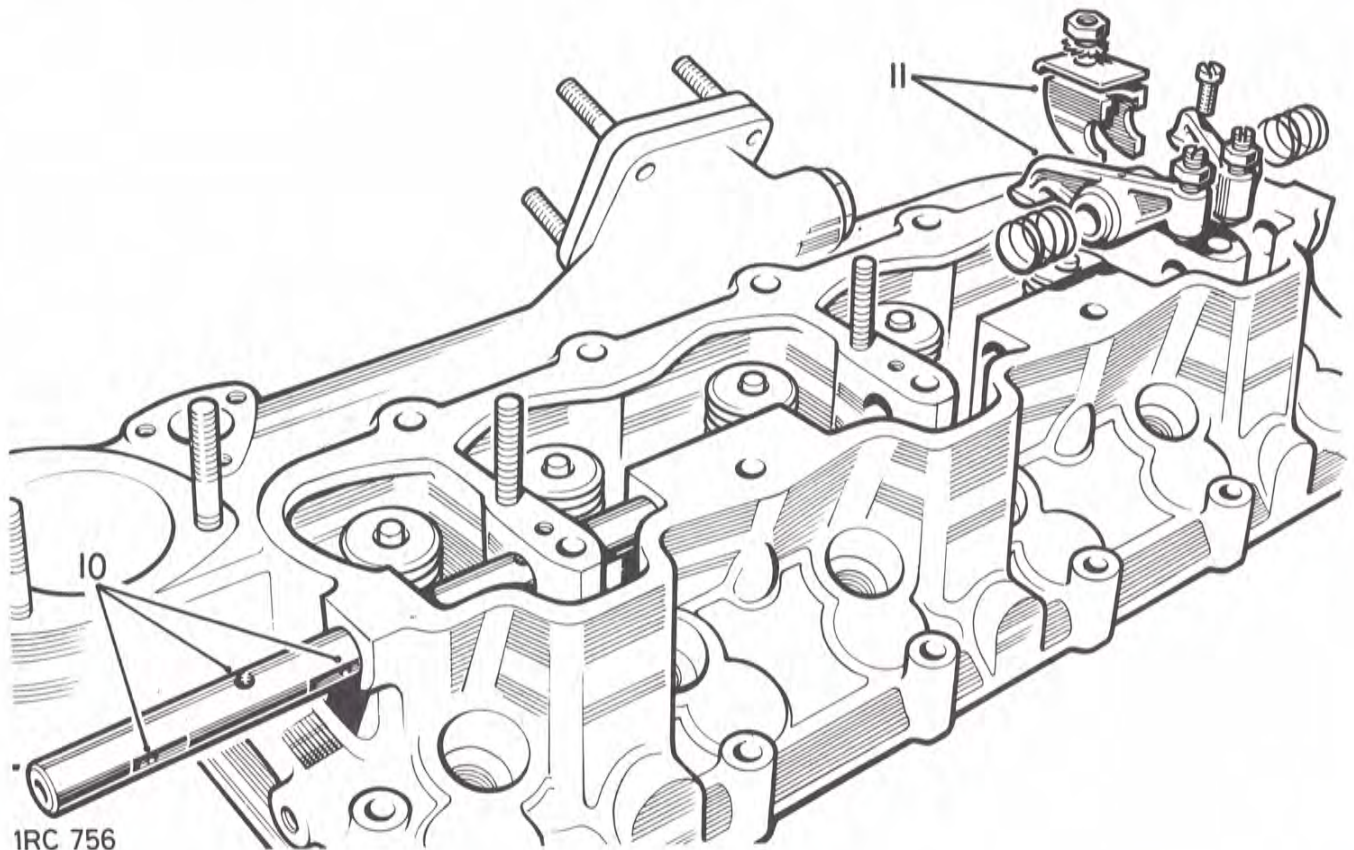
**Refitting**

10. Enter the rear (longer) shaft into the head, with the tapped holes aligned with the set screw holes in the housing webs, and with the oil holes facing away from the valves.
11. Push the shaft rearwards, fitting a spring, valve rocker, spacer, valve rocker and spring for each cylinder.
12. Reverse 6 and 7 for the rear shaft.
13. Repeat 10 and 11 for the front (shorter) shaft.
14. Reverse 6 and 7 for the front shaft.
15. Set the tappet clearances to 0,15 mm (0.006 in.) in the following order:  
 Set No. 1 tappet with No. 6 valve fully open.  
 Set No. 2 tappet with No. 5 valve fully open.  
 Set No. 3 tappet with No. 4 valve fully open.  
 Set No. 4 tappet with No. 3 valve fully open.  
 Set No. 5 tappet with No. 2 valve fully open.  
 Set No. 6 tappet with No. 1 valve fully open.
16. Reverse 1 to 4.
17. Check the inlet valve tappet clearances with the engine at normal running temperature. Reset to 0,15 mm (0.006 in.) as necessary.

**DATA**

Inlet valve tappet clearance

0,15 mm (0.006 in.) with engine at normal running temperature.



IRC 756





## EXHAUST VALVE ROCKERS AND SHAFTS

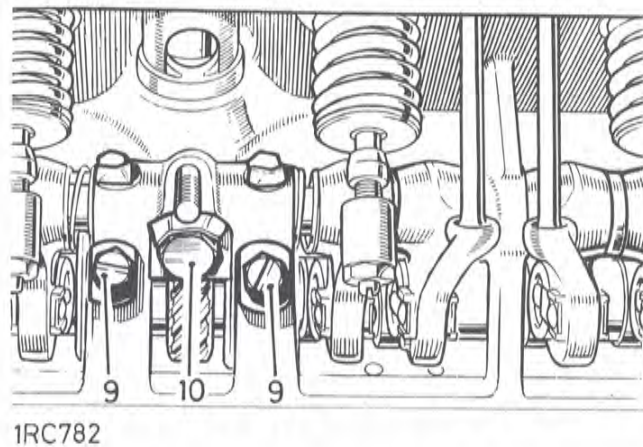
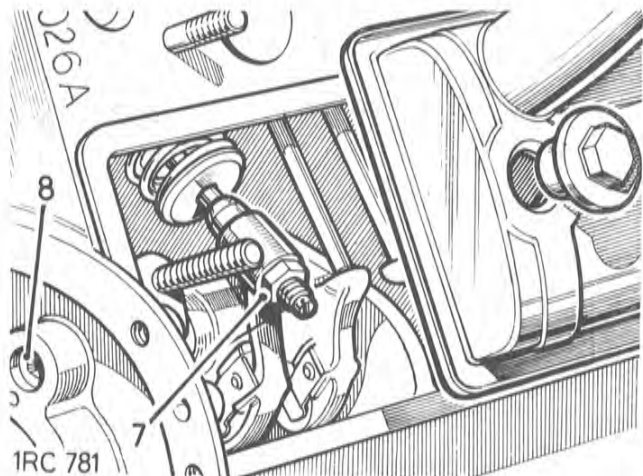
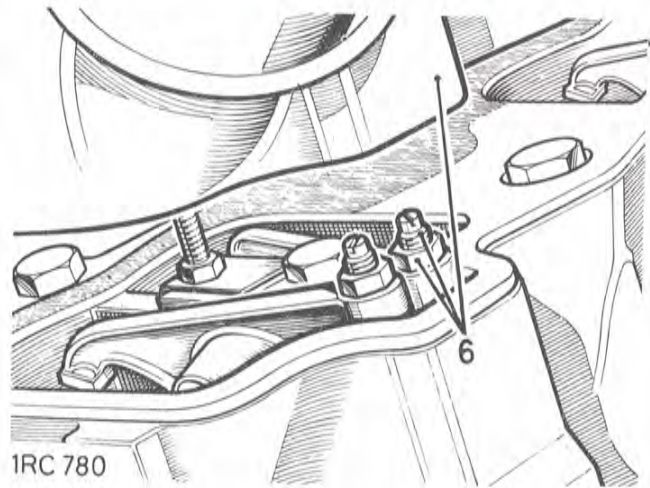
—Remove and refit

12.29.36

Service tool: 262749 Extractor for rocker shafts

## Removing

1. Remove the radiator and grille panel. 26.40.01.
2. Remove the exhaust manifold. 30.15.10.
3. Remove the timing gear cover. 12.65.01.
4. Remove the timing chain tensioner. 12.65.28.
5. Remove the timing chain and gears. 12.65.12.
6. Remove the top rocker cover and slacken the inlet tappet adjusting screws.
7. Remove the side rocker cover and slacken the exhaust tappet adjusting screws.
8. Remove the end plug from the front end of the rocker shaft.
9. Remove the two locating screws securing front and rear rocker shafts.
10. Remove the oil feed bolt locating the distributor housing.

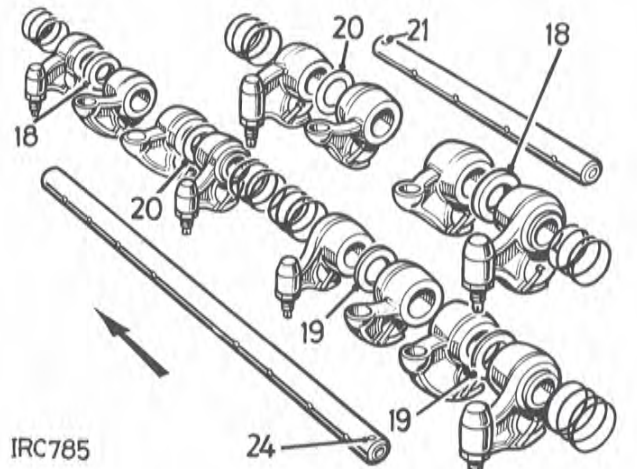
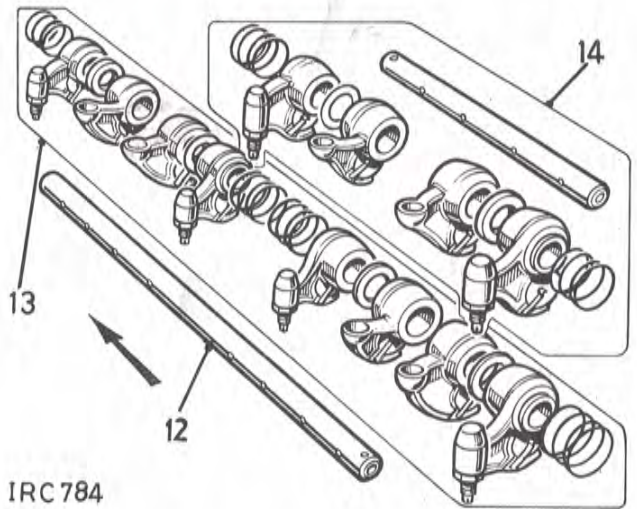
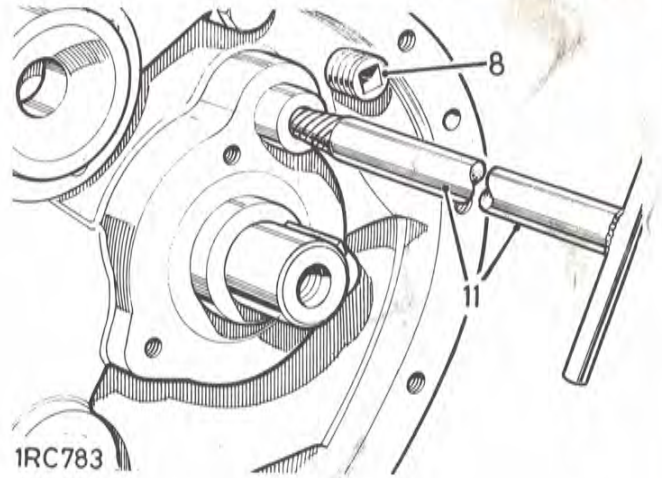
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11. Engage the extractor 262749 into the front rocker shaft.
12. Withdraw the rocker shaft.
13. Lift out the exhaust valve rockers, inlet cam followers, springs and spacers. Note the sequence of assembly.
14. Repeat 11 and 12 on the rear rocker shaft arrangement.

**Refitting**

15. Fit a suitable slave bolt and packing washer into the tapped hole at front end of camshaft. This will enable the camshaft to be rotated as required to position the cam lobes away from the rocker assembly being fitted.
16. To aid reassembly, lay out the six spacer washers to be fitted between the inlet cam followers and exhaust valve rockers as follows:  
thick, thin, medium, medium, thin, thick.
17. Reverse 14 in the order removed, noting the fitted positions of the spacing washers. Items 18 to 20.
18. Thick washers
19. Medium washers.
20. Thin washers.

*continued*



21. Feed in the rear rocker shaft. Ensure that the locating screw hole in the shaft is to the front; use the extractor tool to align the hole with the hole in the block.
22. Secure the shaft with the locating screw and lock washer.
23. Reverse 12 and 13 in the order removed.
24. Feed in the front rocker shaft. Ensure that the locating screw hole in the shaft is to the rear and in line with the hole in the block.
25. Reverse 8 and 9.
26. Reverse, 3, 4 and 5, setting the valve timing as described.
27. Set the tappet clearances to 0,15 mm (0.006 in.) for inlet valves and 0,25 mm (0.010 in.) for exhaust valves in the following order:
  - Set No. 1 tappet with No. 6 valve fully open.
  - Set No. 2 tappet with No. 5 valve fully open.
  - Set No. 3 tappet with No. 4 valve fully open.
  - Set No. 4 tappet with No. 3 valve fully open.
  - Set No. 5 tappet with No. 2 valve fully open.
  - Set No. 6 tappet with No. 1 valve fully open.
28. Reverse 1 and 2 and fit the rocker covers.
29. Check and if necessary reset the inlet valves tappet clearances with the engine at normal running temperature.

**DATA**

Tappet clearances:

Inlet	0,15 mm (0.006 in.).
Exhaust	0,25 mm (0.010 in.).



## INLET VALVE ROCKERS

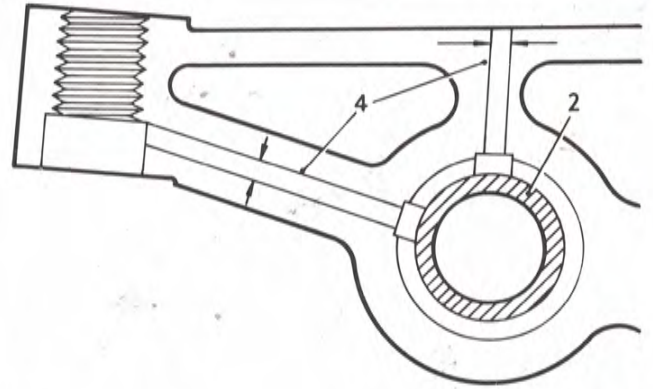
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## -Replace Bush

12.29.55

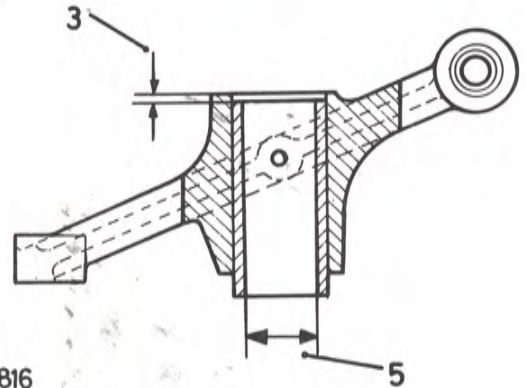
## Replacing bush

1. Remove the rockers and shafts. 12.29.35.
2. Press out the bush from the rocker.
3. Press in the replacement bush to 0,25 mm to 0,50 mm (0.010 in. to 0.020 in.) below the thrust face of the rocker.
4. Using the holes in the rocker as guides, drill oil holes 1,58 mm (0.062 in.) and 2,77 mm (0.109 in.) diameter in the bush.
5. Ream the bush to 12,5 mm + 0,025 mm (0.500 in. + 0.001 in.).
6. Reverse 1.



IRC 222B

\*\*



IRC 816



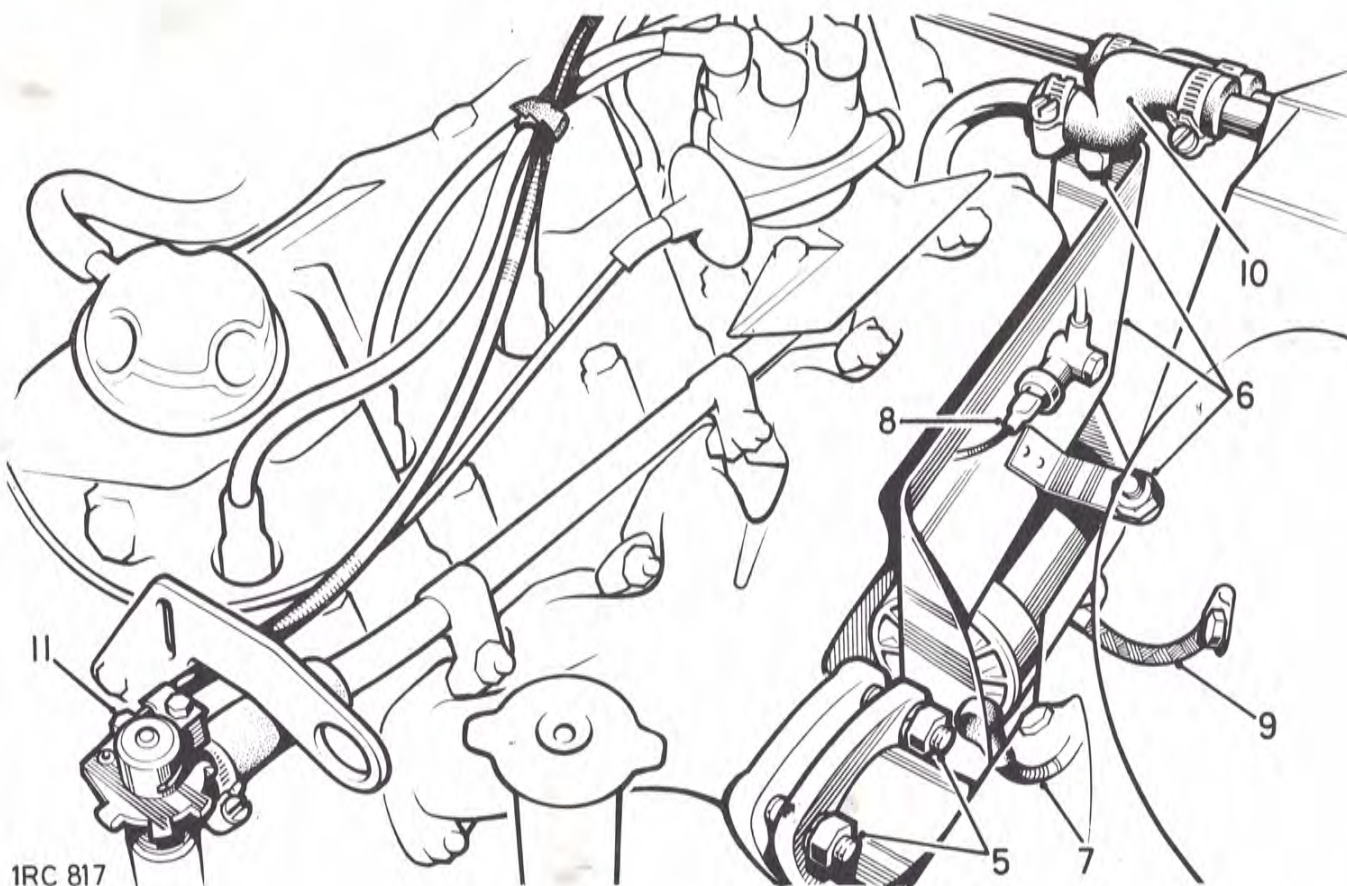
## ENGINE ASSEMBLY

—Remove and refit

12.41.01

## Removing

1. Remove the bonnet. 76.16.01.
2. Disconnect the battery earth lead.
3. Remove the radiator and grille panel. 26.40.01.
4. Remove the gearbox tunnel cover. 76.25.07.
5. Disconnect the front exhaust pipe from the manifold.
6. Remove the exhaust heat shield.
7. Disconnect the electrical leads at the starter motor.
8. Disconnect the oil pressure switch lead.
9. Disconnect the engine earth cable at the chassis side-member.
10. Where fitted, disconnect the heater hoses.
11. Where fitted, disconnect the control cable at the heater water valve.

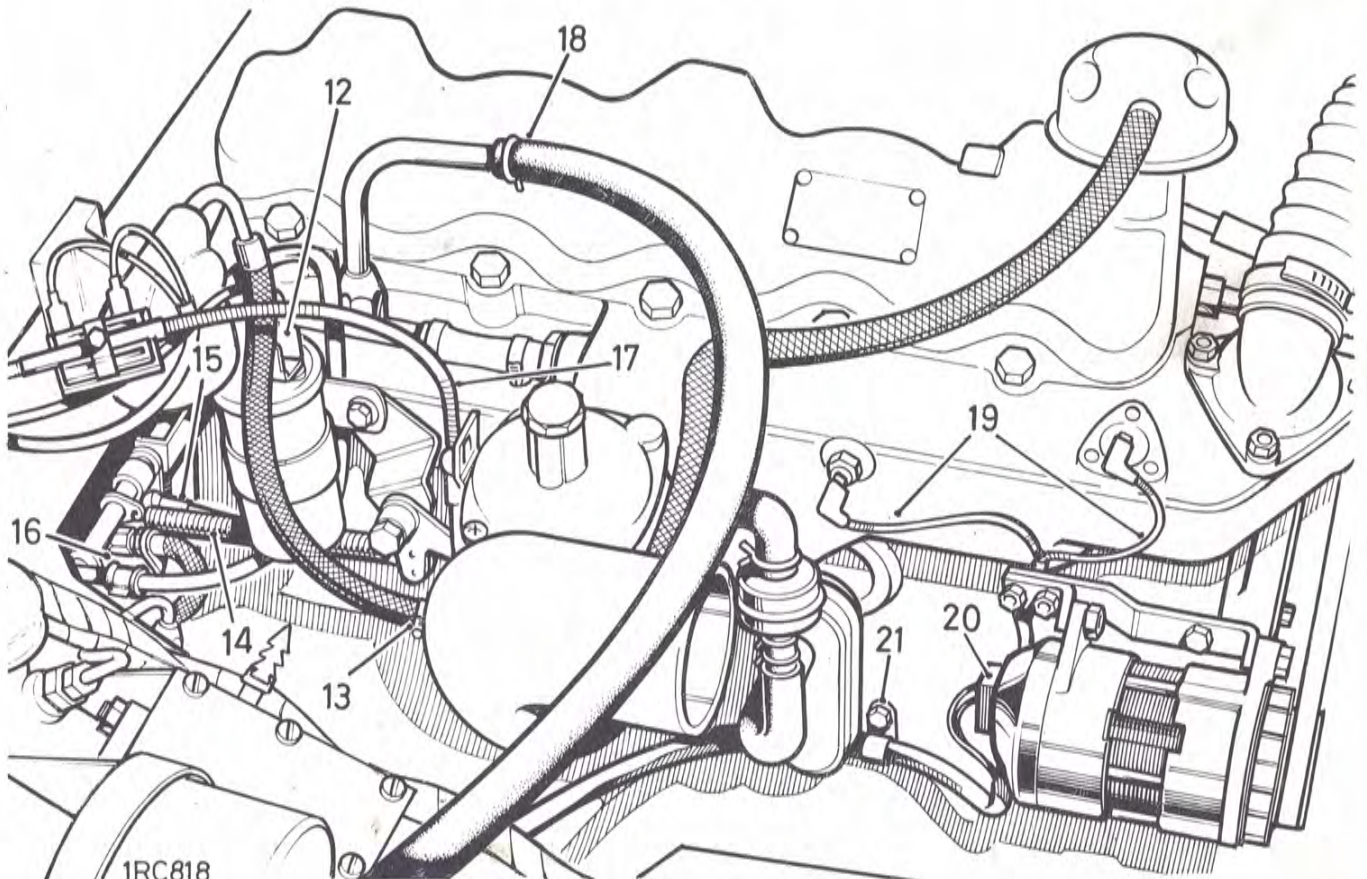
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1RC 817



12. Disconnect the switch lead at the ignition coil.
13. Disconnect the fuel feed at the carburetter.
14. Release the accelerator return spring.
15. Disconnect the accelerator linkage at the bell crank lever.
16. Remove the fixings securing the clutch hose and speedometer cable bracket at the flywheel housing.
17. Disconnect the cold start control cables at the carburetter.
18. Detach the servo hose at the manifold pipe.
19. Disconnect the electrical leads at the cold start and coolant temperature indicators.
20. Disconnect the electrical leads at the alternator.
21. Remove the harness clip fixings at the engine breather box.

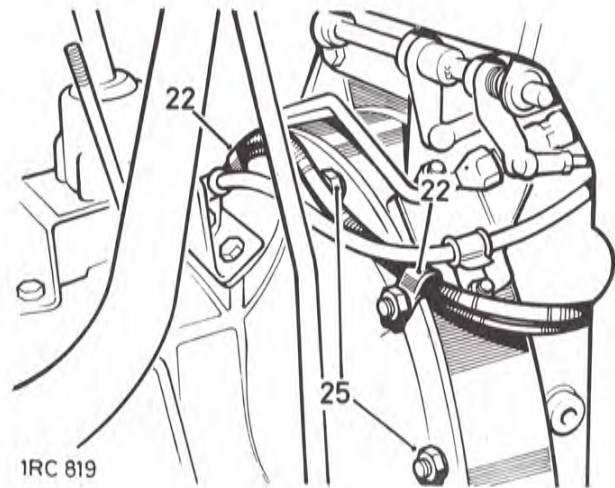
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22. Remove the harness clip fixings at the bell housing.
23. Support the engine weight, using a suitable lifting sling.
24. Remove the engine front mountings upper and lower fixings.
25. Support the gearbox, using suitable packing blocks or a jack, and remove the bell housing to flywheel housing fixings.
26. Pull the engine forward sufficient to disengage the drive from the gearbox.
27. Ensure that all cables, pipes etc. are clear then hoist the engine from the vehicle.

#### Refitting

28. Engage a gear to prevent gearshaft rotation and offer the engine to the gearbox. If necessary, rotate the engine sufficient to align the gearbox primary pinion with the clutch plate splines.
29. When aligned, push the engine fully to the rear and secure the bell housing to the flywheel housing, tightening the fixings evenly.
30. Lift the engine sufficient to remove the packing or jack from beneath the gearbox and insert the engine front mounting rubbers.
31. Reverse 1 to 24.



**FLYWHEEL****—Remove and refit**

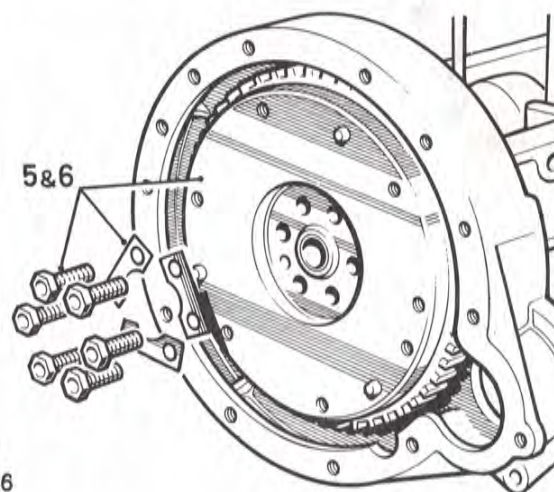
12.53.07

**Removing**

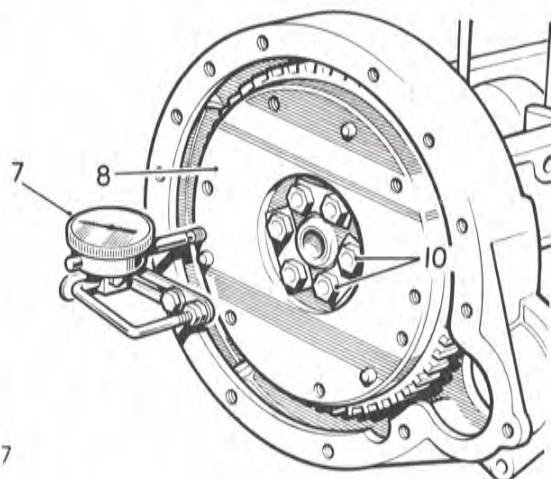
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Remove the gearbox assembly. 37.20.01.
4. Remove the clutch assembly. 33.10.01.
5. Remove the flywheel.

**Refitting**

6. Fit the flywheel to the crankshaft and tighten the securing bolts. Torque 8,5 to 9,0 kgf.m (60 to 65 lbf.ft.). Do not engage the lockplates at this stage.
7. Mount a dial test indicator to read off the flywheel face.
8. Check the run-out on the flywheel face, this must not exceed 0,05 mm (0.002 in.).
9. If the run-out is excessive, remove the flywheel and investigate the cause.
10. When the flywheel run-out is within the limits, engage the lockplates over the securing bolts.
11. Reverse 1 to 4.



1RC 826



1RC 827

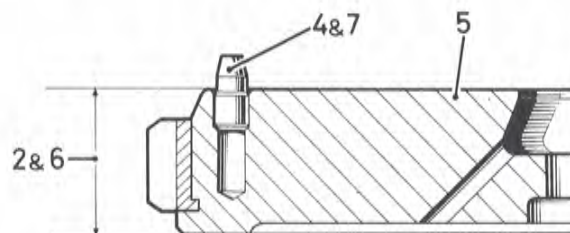
**FLYWHEEL****—Overhaul**

12.53.10

**Procedure**

Wear or scoring on the flywheel pressure face may be corrected by machining, providing that the overall thickness of the flywheel is not reduced below 30,5 mm (1.204 in.).

1. Remove the flywheel. 12.53.07.
2. Check the overall thickness of the flywheel, as it may have been previously machined.
3. If the flywheel is above the minimum thickness, the clutch face can be refaced as follows:
4. Remove the dowels.
5. Reface the flywheel over the complete surface.
6. Check the overall thickness of the flywheel to ensure that it is still above the minimum thickness.
7. Fit the dowels.
8. Refit the flywheel. 12.53.07.



1RC 829





**STARTER RING GEAR**

—Remove and refit

12.53.19

**Removing**

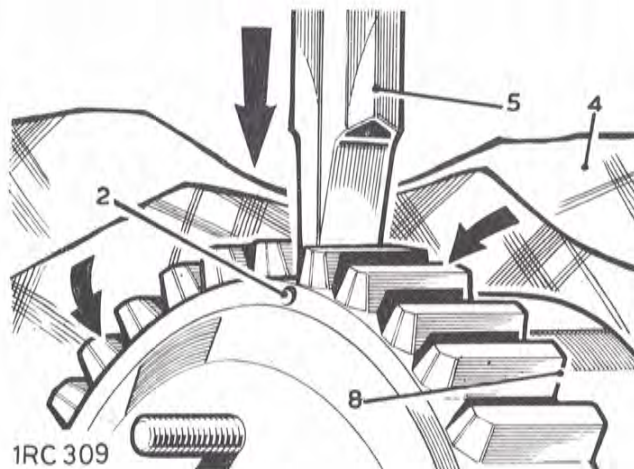
1. Remove the flywheel. 12.53.07.
2. Drill an 8 mm (0.312 in.) diameter hole axially between the root of any tooth and the inner diameter of the starter ring sufficiently deep to weaken the ring. DO NOT allow the drill to enter the flywheel.
3. Secure the flywheel in a vice fitted with soft jaws.
4. Place a cloth over the flywheel to protect the operator from fragments.

**WARNING:** Take adequate precautions against fragments as the starter ring may break asunder when being split.

5. Place a chisel immediately above the drilled hole and strike it sharply to split the starter ring.

**Refitting**

6. Heat the starter ring gear uniformly to between 225°C and 250°C (437°F and 482°F) but do not exceed the higher temperature.
7. Place the flywheel, flanged side down, on a flat surface.
8. Locate the heated starter ring gear in position on the flywheel with the square edge of the teeth against the flywheel flange.
9. Press the starter ring gear firmly against the flange until the ring contracts sufficiently to grip the flywheel.
10. Allow the flywheel to cool gradually. DO NOT hasten cooling in any way.
11. Refit the flywheel. 12.53.07.

**SPIGOT BEARING**

—Remove and refit

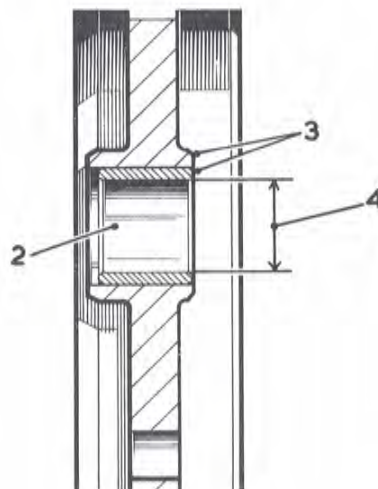
12.53.20

**Removing**

1. Remove the flywheel. 12.53.07.
2. Press the spigot bearing from the flywheel.

**Refitting**

3. Press in the new spigot bearing flush with the clutch side of the flywheel.
4. Reamer the spigot bearing to 22,237 mm to 22,242 mm (0.8755 in. to 0.8757 in.).
5. Refit the flywheel. 12.53.07



**OIL FILTER ASSEMBLY, EXTERNAL**

—Remove and refit

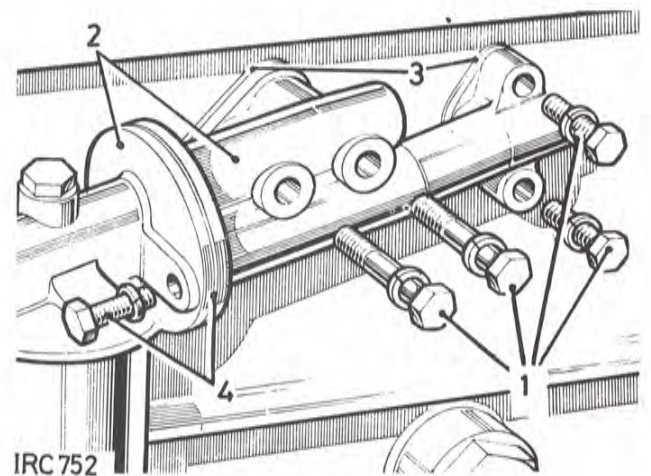
12.60.01

**Removing**

1. Remove the fixings, oil filter adaptor to cylinder block.
2. Withdraw the oil filter assembly complete with adaptor.
3. Withdraw the front and rear joint washers.
4. If required, remove the fixings and detach the filter body from the adaptor; withdraw the joint washer.

**Refitting**

5. Reverse 4 as necessary.
6. Reverse 1 to 3.
7. Replenish the lubricating oil as necessary.

**OIL STRAINER**

—Remove and refit

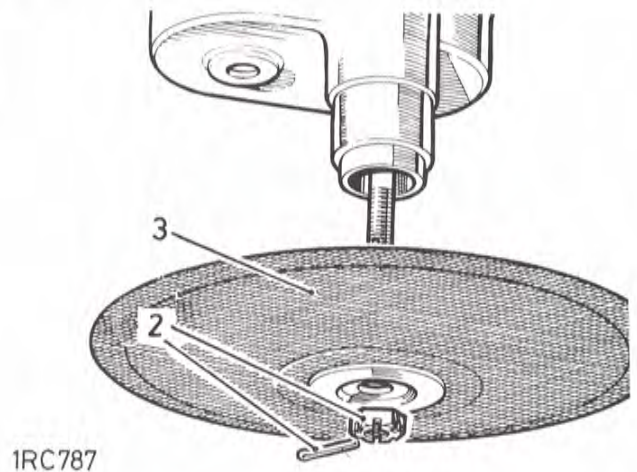
12.60.20

**Removing**

1. Remove the oil sump, 12.60.44.
2. Remove the strainer fixings.
3. Withdraw the strainer from the oil pump.

**Refitting**

4. Wash the strainer, using clean fuel.
5. Reverse 1 to 3.



## OIL PUMP

—Remove and refit

12.60.26

## Removing

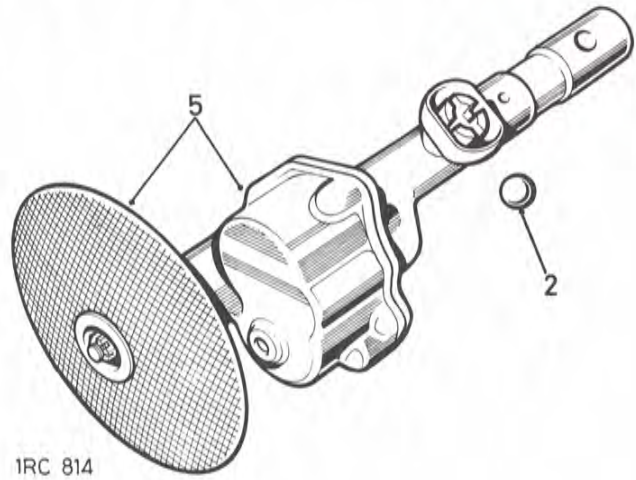
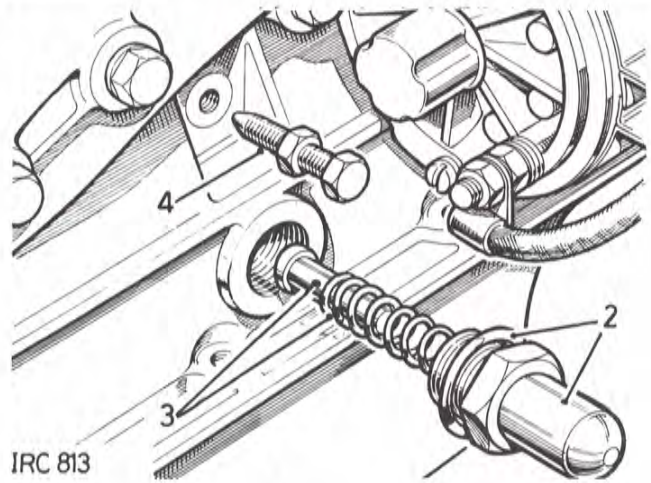
1. Remove the oil sump. 12.60.44.
2. Remove the relief valve retainer and joint washer.

**NOTE:** Take care to retain the steel ball which is freed from the oil pump relief outlet.

3. Withdraw the spring and plunger.
4. Remove the oil pump locating screw.
5. Withdraw the oil pump and strainer assembly from the engine.

## Refitting

6. Offer the oil pump assembly to the engine and align the pressure relief valve housing and the locating screw bore with the respective tappings in the engine block.
7. Reverse 1 to 5.



**OIL PUMP****—Overhaul**

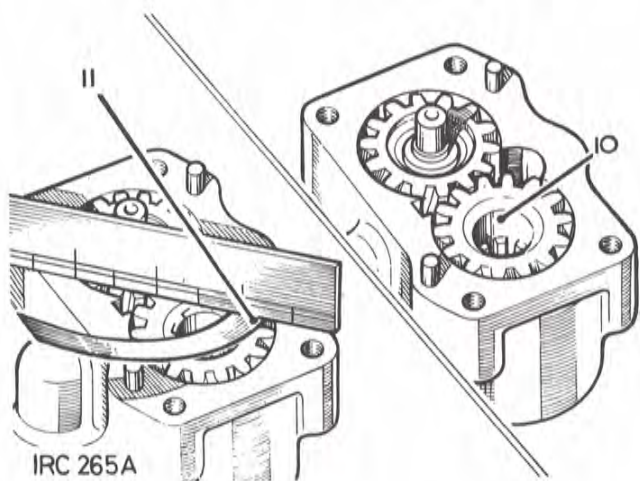
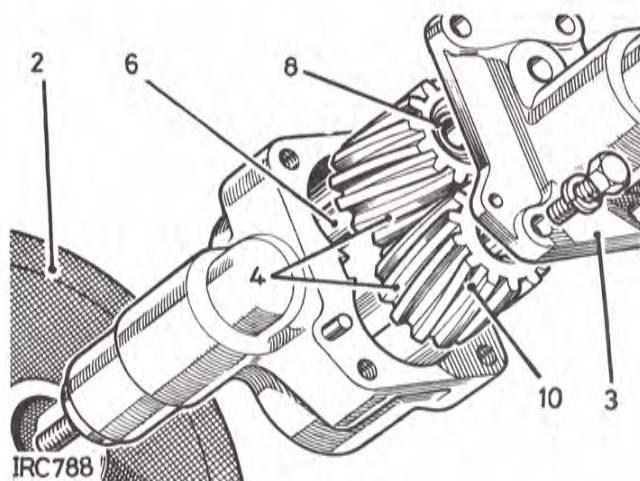
12.60.32

**Dismantling**

1. Remove the oil pump. 12.60.26.
2. Remove the oil pump strainer.
3. Remove the oil pump body.
4. Lift out the pump gears.

**Inspecting and replacement**

5. Clean all parts and examine for wear.
6. If required, unscrew and replace the idler gear spindle in the pump cover.
7. If required, replace the drive shaft bush at the top of the pump body. Press the replacement bush into the body and ream in position to  $14,28 \text{ mm} + 0,02 \text{ mm}$  ( $0.5625 \text{ in.} + 0.001 \text{ in.}$ ). Ensure correct alignment with the bore at the bottom end of the pump body; the bush should be a light drive fit.
8. If required, replace the bush in the idler gear. Drill the oilway  $3,0 \text{ mm}$  ( $0.125 \text{ in.}$ ) diameter then reamer the bush, in position, to  $12,7 \text{ mm} + 0,02 \text{ mm}$  ( $0.500 \text{ in.} + 0.001 \text{ in.}$ ) diameter.
9. Fit the idler gear to the spindle.
10. Fit the driving gear with the plain part of the gear bore uppermost.
11. Using a straight edge and feeler gauges, check the gears end-float which should be:  
Driving gear:  $0,05 \text{ to } 0,12 \text{ mm}$  ( $0.002 \text{ to } 0.005 \text{ in.}$ ).  
Idler gear:  $0,07 \text{ to } 0,15 \text{ mm}$  ( $0.003 \text{ to } 0.006 \text{ in.}$ ).
12. Reverse 1 to 3.



## OIL SUMP

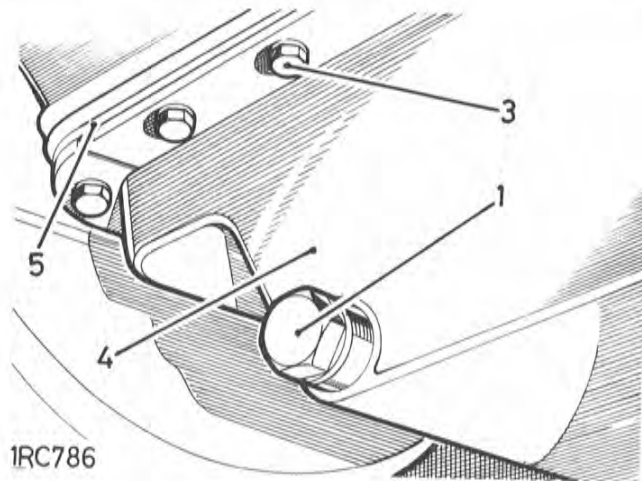
—Remove and refit 12.60.44

## Removing

1. Remove the sump plug and drain off the lubricating oil.
2. Withdraw the dipstick.
3. Remove the fixings at the sump flange.
4. Lower the sump to clear the oil strainer and withdraw.
5. Withdraw the sump joint washer.

## Refitting

6. Reverse 4 and 5, using a new sump joint washer.
7. Reverse 3, fitting the two 5/16 in. UNC bolts into the timing gear cover tappings.
8. Reverse 1 and 2.



## TIMING GEAR COVER AND OIL SEAL

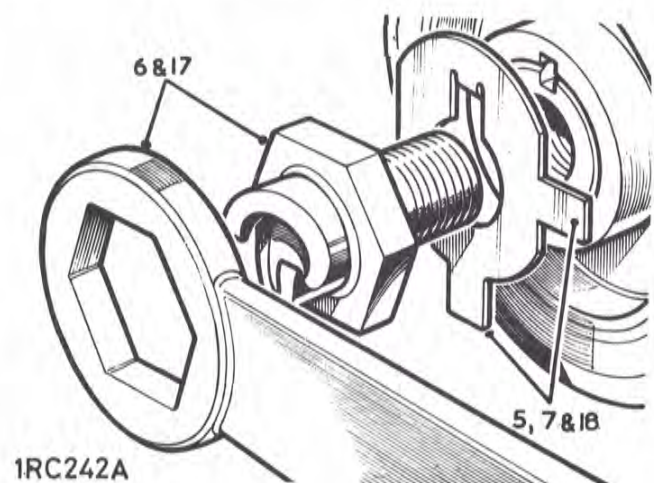
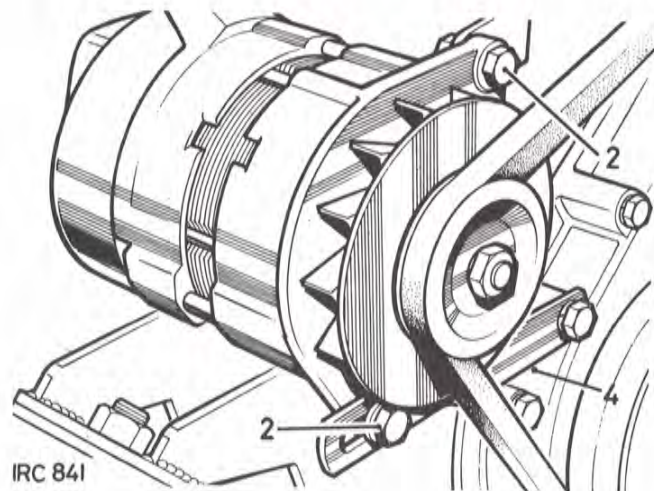
— Remove and refit

Gear cover 1 to 11 and 15 to 21 12.65.01  
Oil seal 1 to 21 12.65.05

Service tool: 530102 Spanner for starter dog

## Removing

1. Remove the bonnet. 76.16.01.
2. Slacken the alternator fixings and remove the fan belt.
3. Remove the fan blades and radiator assembly. 26.40.01.
4. Remove the alternator adjusting link.
5. Disengage the lockplate from the starter dog.
6. Remove the starter dog, using 530102.
7. Withdraw the lockplate.
8. Withdraw the crankshaft pulley.

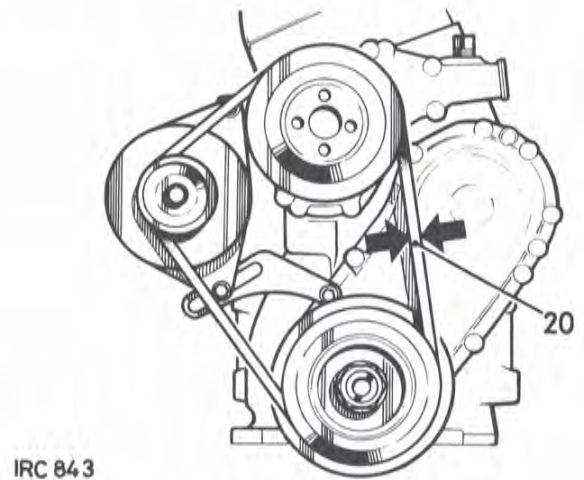
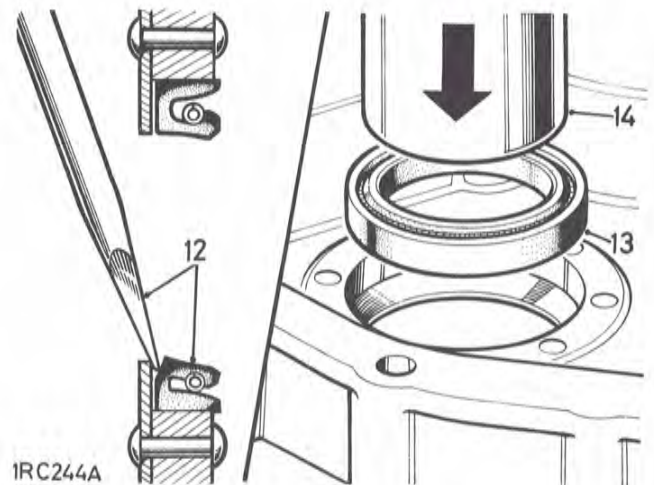
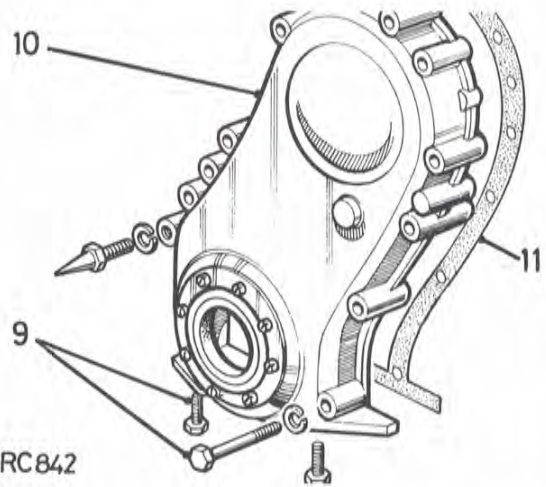


*continued*

9. Remove the timing cover fixings, including those at the sump front flange.
10. Withdraw the timing cover.
11. Withdraw the joint washer from the timing cover.
12. Drive the oil seal from the timing cover.
13. Smear the outside diameter of a new oil seal with Hylomar PL 32/M jointing compound, Rover Part No. 534244.
14. Press the oil seal into the timing cover.

### Refitting

15. Smear general purpose grease on both sides of the cover joint washer.
16. Reverse 7 to 10.
17. Fit the starter dog. Torque: 27,65kgf.m (200 lbf. ft.).
18. Engage the lockplate over the starter dog.
19. Fit the alternator adjusting link.
20. Adjust the fan belt to give 6,3 to 9,5 mm (0.250 to 0.375 in.) free movement when checked midway between the fan and crankshaft pulleys.
21. Reverse 1 and 2.



## TIMING CHAIN AND GEARS

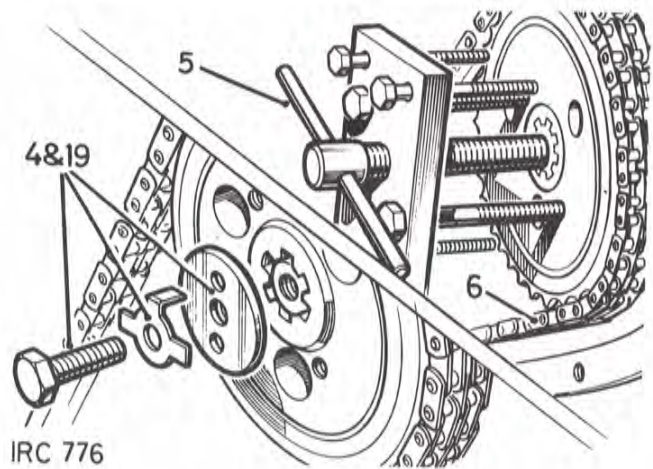
—Remove and refit

12.65.12

Service tool: 507231 Extractor for chainwheel

## Removing

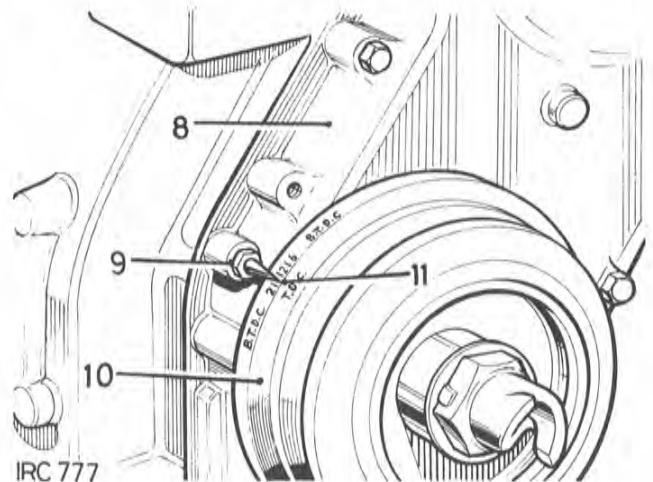
1. Remove the radiator and grille panel. 26.40.01.
2. Remove the timing gear cover. 12.65.01.
3. Remove the timing chain tensioner. 12.65.28.
4. Remove the camshaft chainwheel fixings.
5. Extract the camshaft chainwheel, using 507231, together with the crankshaft chainwheel.
6. Withdraw the chain from the chainwheels.
7. Replace the chain vibration damper if the rubber facing is worn.



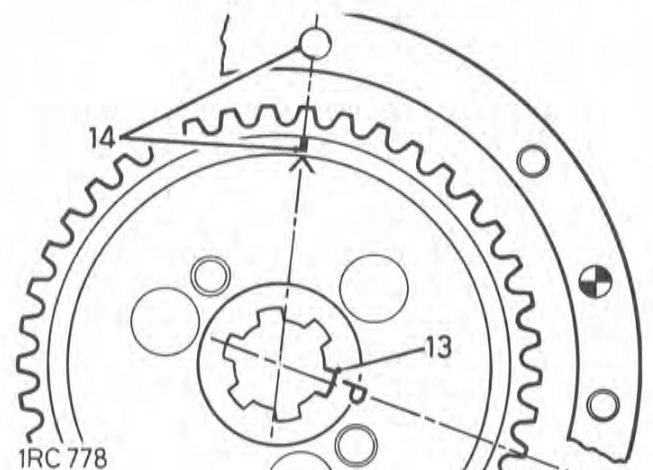
IRC 776

## Refitting, including valve timing procedure

8. Temporarily fit the timing gear cover, using fixings sufficient to retain it on the dowels.
9. Fit the timing pointer to the cover.
10. Temporarily fit the pulley to the crankshaft, engaging the keyway and key.
11. Rotate the crankshaft to align the TDC mark on the pulley with the timing pointer.
12. Remove the crankshaft pulley and timing gear cover without disturbing the crankshaft position.
13. Temporarily fit the camshaft chainwheel, engaging the key-way marked 'P'.
14. Rotate the camshaft to position the groove marked 'A' in line with the centre line of the top fixing hole for the gear cover. Remove the chainwheel without disturbing the camshaft position.



IRC 777

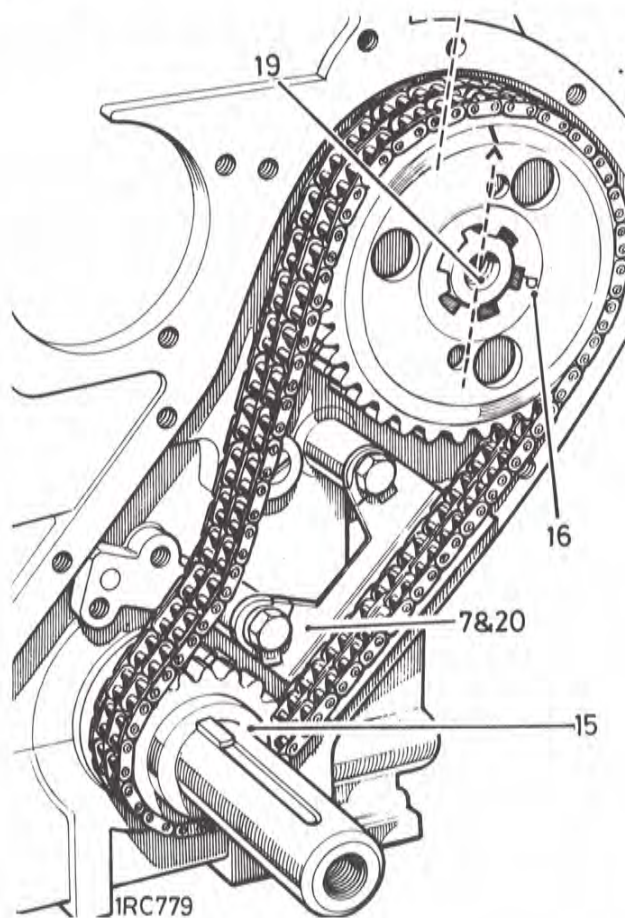
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IRC 778

15. Fit the crankshaft chainwheel, chamfered bore first, to just engage the crankshaft inner key.
16. Position the chain on the chainwheels, aligning the keyway 'P' with the camshaft key and with 'no slack' at the driving side of the chain.
17. Fit the camshaft chainwheel and chain.
18. Lightly tap home the chainwheels.

**NOTE:** It is important that the timing chain has no slack at the driving side. Slightly offset keyways are provided in the camshaft chainwheel to enable adjustment to be made, if required, provided that the crankshaft and camshaft relationship is not disturbed.

19. Fit and lock the camshaft chainwheel fixings.
20. If required, adjust the chain vibration damper position to allow 0,05 mm to 0,25 mm (0.002 in. to 0.010 in.) clearance with the chain.
21. Reverse 2 and 3. Torque load for starting dog fixing is 27,5 kgf.m (200 lbf. ft.).
22. Reverse 1.



#### DATA

Clearance, timing chain to chain vibration damper.

0,05 mm to 0,25 mm (0.002 in. to 0.010 in.).

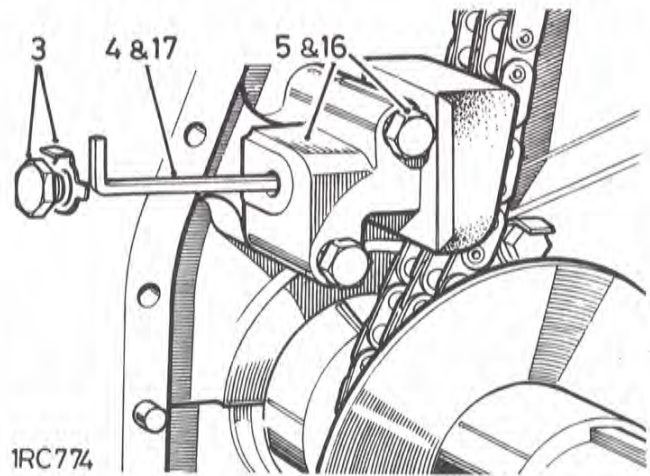


## TIMING CHAIN TENSIONER

- Remove and refit 1 to 7, 15 to 18 12.65.28
- Overhaul 7 to 14 12.65.36

## Removing

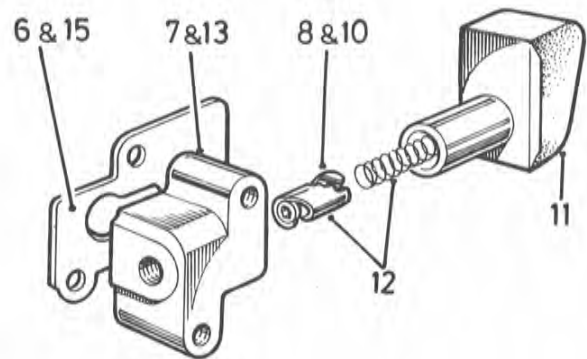
1. Remove the radiator and grille panel. 26.40.01.
2. Remove the timing gear cover. 12.65.01.
3. Remove the tensioner adjuster plug.
4. Using a 3 mm (1/8 in.) Allen key, turn the adjuster clockwise until the adjuster retracts into the body, thus relieving the spring loading on the tensioner.
5. Remove the fixings and withdraw the tensioner assembly from the engine.
6. Withdraw the mounting plate.



1RC774

## Overhaul

7. Withdraw the tensioner body from the pad assembly.
8. Turn the adjuster anti-clockwise and allow to withdraw under spring pressure.
9. Clean and examine the components for wear.
10. Examine the adjuster cylinder for uneven wear in the peg locating serrations.
11. Examine the chain bearing face on the tensioner pad which must not be scored or deeply indented.
12. Fit the spring and adjuster to the tensioner pad bore. Turn in fully until retained by the peg in the bore.
13. Fit the tensioner body to the assembled pad, spring and adjuster.
14. Lubricate the assembly using engine oil.



1RC775

## Refitting

15. Position the mounting plate on the assembly and offer the assembly to the engine, locating on the dowel.
16. Secure with the fixings.
17. Turn the adjuster in a clockwise direction until the rubber head of the tensioner moves forward under spring pressure against the timing chain. Do not attempt to force the rubber head on to the chain by external pressure and do not turn the adjuster anti-clockwise.
18. Reverse 1 to 3.

## EMISSION CONTROL SYSTEM DESCRIPTION AND OPERATIONS

Crankcase emission control													
–crankcase emission valve	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.10.09
	–overhaul	..	..	..	..	..	..	..	..	..	..	..	17.10.15
–description of system	..	..	..	..	..	..	..	..	..	..	..	..	17.10.00
Emission and evaporative loss control system													
–introduction and fault diagnosis	..	..	..	..	..	..	..	..	..	..	..	..	17.00.00
Evaporative loss control system													
–charcoal container	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.15.13
–charcoal container air filter	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.15.07
–description of system	..	..	..	..	..	..	..	..	..	..	..	..	17.15.00
Exhaust emission control system													
–accelerator pump linkage setting	..	..	..	..	..	..	..	..	..	..	..	..	17.20.00
–carburettor adjustments	..	..	..	..	..	..	..	..	..	..	..	..	17.20.00
–carburettor throttle prop	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.20.35
–description of system	..	..	..	..	..	..	..	..	..	..	..	..	17.20.00
–fuel filter	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.20.38
–ignition system description and ignition timing	..	..	..	..	..	..	..	..	..	..	..	..	17.20.00
–throttle controlled vacuum switch	–check and adjust	..	..	..	..	..	..	..	..	..	..	..	17.20.24
	–remove and refit	..	..	..	..	..	..	..	..	..	..	..	17.20.25



## EMISSION CONTROL

### EMISSION AND EVAPORATION CONTROL SYSTEM

#### Introduction

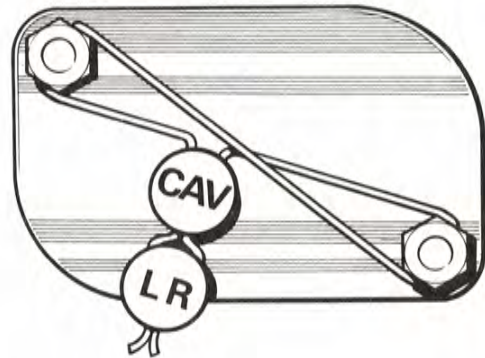
17.00.00

Land Rover models are equipped with emission control features designed to comply with all current regulations for the particular sales market; however, due to varying regulations between different countries all of the features described may not be applicable to or incorporated on a particular model.

Three independent and separate systems are employed for emission control, namely crankcase emission control, evaporative loss control and exhaust emission control as described subsequently.

#### 2¼ litre Diesel

In certain countries, the exhaust smoke emitted from Diesel engine vehicles must conform with smoke density regulations. Land Rover models supplied for these countries are tested during manufacture to ensure conformity with these regulations and, when satisfactory, a Rover Company seal is attached to the fuel injection pump adjacent to the pump manufacturer's seal. In countries where the exhaust smoke density regulations apply, any work undertaken on Diesel engines or Diesel fuel systems which might influence the smoke density must be followed by the required tests in accordance with the current regulations.



1RC 974

## FAULT DIAGNOSIS

## 2¼ litre petrol engine

SYMPTOM	CAUSE	CURE
<b>A—Difficult starting engine cold</b>	<b>Fuel starvation</b>	
	1. Float chamber fuel level too low	(a) Check needle valve for sticking in seat. Clean as necessary to remove any deposits, using methylated spirits. (b) Check float level setting. Reset as necessary. (c) Blocked fuel filter. (d) Air leakage in crankcase emission control system, that is oil filler cap or pipes.
	2. Choke butterfly not fully closing	(a) Check for broken or detached spring on choke operating lever. Replace as necessary. (b) Friction between choke spindle bearings due to carbon deposits, or choke spindle distortion. Clean or replace as necessary. (c) Choke butterfly fouling in carburetter due to misalignment. Adjust as necessary. (d) Choke cable securing screw on lever swivel loose. Tighten securing screw with the choke control pushed fully in and the choke butterfly open.
	3. Throttle closed against throttle stop screw with choke butterfly closed.	(a) With the choke butterfly closed, the throttle should be open slightly beyond the normal slow run position. Check for distortion of the interconnecting link between choke and throttle linkage. Adjust or replace as necessary.
	4. Crankcase ventilation system 5. Carburetter throttle prop lever jammed open.	(a) Check as in H 1 (a). (a) Check as in E 5 (a).
<b>B—Difficult starting engine hot</b>	<b>Mixture over-rich</b>	
	1. Float chamber fuel level too high.	(a) Check float level setting. Reset as necessary. (b) Check for leakage past needle valve and seating. Check-tighten seating housing. (c) Check needle valve and seat size. Replace as necessary.
	2. Internal leakage	(a) Check that sealing 'O' ring is present around venturi spigot and is sound. Replace as necessary.
	3. Charcoal container flooded 4. Distributor 5. Distributor condenser and ignition coil.	(a) Check air inlet for blockage. Replace charcoal container. (a) Check as in C 6 (a). (a) Check as in J 5 (a).
	<b>C—Engine will not idle or run smoothly</b>	1. Manifold bolts
2. Cylinder head bolts		(a) Check tightness of cylinder head bolts to specified torque figures.
3. Carburetter adjustment		(a) Check carburetter slow running adjustment. Adjust as necessary.
4. Carburetter solenoid valve sticking closed		(a) Check electrical feed lead is sound and terminals clean and secure. Replace lead as necessary. (b) Remove electrical lead at solenoid. With ignition switch 'ON', touch solenoid lead against the solenoid terminal connection. A 'click' will indicate that the valve is operating. If in doubt, proceed to (c) below. (c) Remove solenoid valve from carburetter. Switch ignition 'ON' and earth the solenoid valve body at a convenient point on the engine block. The solenoid valve spindle should withdraw into the valve body when energised. Where solenoid replacement is required, fit a new solenoid valve assembly complete.
5. Charcoal container flooded 6. Distributor		(a) Check air inlet for blockage. Replace charcoal container. (a) Check condition of contact points. Reset gap to 0,35 to 0,40 mm (0.014 to 0.016 in.). Renew contact points if badly burnt or pitted. (b) Check condition of distributor vacuum pipe and connections for leaks. Rectify as necessary.
7. Ignition leads and wiring		(a) Inspect ignition leads for fraying, chafing or deterioration. Check Lucas connections and fixings for security. (b) Check high tension leads for security and corrosion. Replace as necessary.
8. Sparking plugs		(a) Check condition of sparking plugs. If satisfactory reset gap to 0,75 to 0,80 mm (0.029 to 0.032 in.).
9. Crankcase ventilation system		(a) Check as in H 1 (a).

*continued*

## EMISSION CONTROL

SYMPTOM	CAUSE	CURE
D—Engine 'runs on' after ignition switched 'OFF'	1. Carburetter solenoid valve sticking open	(a) Check as in C 4 (b). (b) Remove solenoid valve from carburetter. Check valve is free to return under its spring loading with the solenoid de-energised. Where solenoid replacement is required, fit a new solenoid valve assembly complete. (c) If the solenoid valve functions correctly, check valve seat in carburetter for foreign matter which could prevent the valve from seating correctly. (a) Check as in E 3 (a).
	2. Ignition timing	
E—Erratic slow running and stalling	<b>Partial fuel starvation</b>	(a) Check as in A1 (a).
	1. Fuel passages or jets obstructed	(b) Check slow-run jet, slow-run fuel passages and slow-run air intake orifice for obstruction. Clean as necessary, take care not to alter jet or orifice sizes. (c) Check idle volume control outlet hole for obstruction. Clean as in (b) above. (d) Check volume control (mixture) screw conical end is not worn or malformed. Check screw locknut is sound and effectively retains screw in position when fitted. Replace as necessary.
	2. Carburetter adjustment	(a) Check as in C 3 (a).
	3. Distributor	(a) Check ignition timing using electronic equipment. Adjust if necessary. (b) Check as in C 6 (b). (c) Check distributor advance and retard mechanism using electronic equipment. Rectify as necessary.
	4. Crankcase ventilation system Sudden increase in engine idling speed	(a) Check as in H 1 (a).
	5. Carburetter throttle prop lever	(a) Check that the carburetter throttle prop lever has not jammed in the open position due to foreign matter on the lever spindle. Clean off foreign matter and check operation.
	6. Carburetter vacuum unit or	(a) Disconnect the pipe between the trigger valve and carburetter vacuum unit. If engine idle speed does not decrease immediately, the vacuum unit is faulty. Replace the vacuum unit. (b) Check inlet and exhaust tappet clearances. Set to 0,25 mm (0.010 in.), engine hot. Recheck engine idling speed. If idling speed has not decreased, fault lies within the trigger valve. Replace trigger valve.
F—Excessive fuel consumption (Smell of fuel vapours)	1. Choke butterfly not in fully open position during normal running	(a) Check linkage from dash panel control to carburetter. Re-set choke cable as necessary.
	2. Economy device not functioning correctly	(a) Check-tighten diaphragm cover fixing screws. (b) Check condition of diaphragm and gaskets. Replace as necessary. If replacing diaphragm, also fit new diaphragm spring.
	3. Needle valve and seating leaking or oversize	(a) Check and remedy as under B 1 (b) and (c).
	4. Plunger sticking in on throttle controlled vacuum switch	(a) Replace switch.
	5. Float chamber leaking	(a) Check for fuel leakage from float chamber. Renew gasket if necessary.
	6. Fuel system	(a) Check all fuel pipes, joints and connections for leaks. Rectify as necessary.
	7. Charcoal container flooded	(a) Check air inlet for blockage. Replace charcoal container.

*continued*



SYMPTOM	CAUSE	CURE
G—Poor acceleration	1. Accelerator linkage	(a) Check for correct operation of accelerator linkage between pedal and carburetter. Lubricate and rectify as necessary.
	<b>Partial fuel starvation</b>	
	2. Accelerator pump sticking	(a) Check piston assembly moves freely in its housing bore and will fully return under the spring loading. Clean piston bore also clean non-return valve and seating at base of pump housing bore.
	3. Accelerator pump jet and orifice blockage	(a) Check pump jet is not obstructed. Clean as necessary. (b) Ensure 'progression' holes in throttle bore adjacent to throttle edge are clear and not obstructed. Clean as necessary, <b>do not enlarge holes.</b> (c) Ensure economy diaphragm assembly is sound. Replace as necessary. (a) Replace switch.
	4. Plunger sticking in on throttle-controlled vacuum switch	(a) Check as in E 1 (a), (b), (c), and (d).
	5. Fuel passages or jets obstructed	(a) Check fuel filter for blockage. Renew as necessary.
	6. Fuel filter	(a) Check as in C 6 (b).
	7. Distributor	(b) Check as in E 3 (a). (c) Check as in E 3 (c). (a) Check as in C 8 (a).
	8. Sparking plugs	(a) Check each cylinder for pressure leakage using suitable leak testing equipment. If necessary correct valves and valve seat conditions on cylinders affected.
9. Inlet and exhaust valves	(a) Check each cylinder for pressure leakage using suitable leak testing equipment. If necessary correct valves and valve seat conditions on cylinders affected.	
H—Loss of power	1. Crankcase ventilation system	(a) Check for blockage or deterioration and security of hoses and oil filler cap, also hoses on the carburetter throttle prop system. Replace any hose as necessary.
	2. Air cleaner	(a) Check air cleaner filter for blockage. Clean the filter in petrol and renew the oil in the bowl.
	3. Carburetter fuel passages obstructed	(a) Check emulsion block jets and passages for obstruction. Clean as necessary. <b>Note:</b> Do not fit larger jets to this carburetter otherwise exhaust emission regulations will be contravened.
	4. Throttle not fully opening	(a) Check linkage from accelerator to carburetter.
	5. Distributor	(a) Check as in C 6 (a) and (b). (b) Check as in E 3 (a) and (c).
	6. Sparking plugs	(a) Check as in C 8 (a).
	7. Inlet and exhaust valves	(a) Check as in G 9 (a)
J— Engine misfire	<b>Partial fuel starvation</b>	
	1. Float chamber fuel level too low	Check as in A 1 (a), (b), (c) and (d)
	2. Fuel passages or jets obstructed	(a) Check as in E 1 (b), (c) and (d).
	3. Sparking plugs	(a) Check as in C 8 (a).
	4. Distributor	(a) Check as in C 6 (a).
	5. Distributor condenser and coil	(a) Check with suitable electronic equipment for an electrical break-down on either the ignition coil or condenser. Replace as necessary.
	6. Ignition wiring	(a) Check as in C 7 (a) and (b).
7. Inlet and exhaust valves	(a) Check as in G 9 (a).	
K—Backfire in exhaust system	1. Weak mixture	(a) Check inlet manifold bolts for security. Tighten as necessary. (b) Check carburetter to manifold joint for air leaks. Replace gaskets and tighten carburetter fixings as necessary
	2. Crankcase ventilation system	(a) Check as in H 1 (a)
	3. Carburetter mixture	(a) Check as in C 3 (a).
	4. Exhaust system	(a) Check exhaust system for leaks. Replace components as necessary.
	5. Ignition timing	(a) Check as in E 3 (a), (b) and (c).



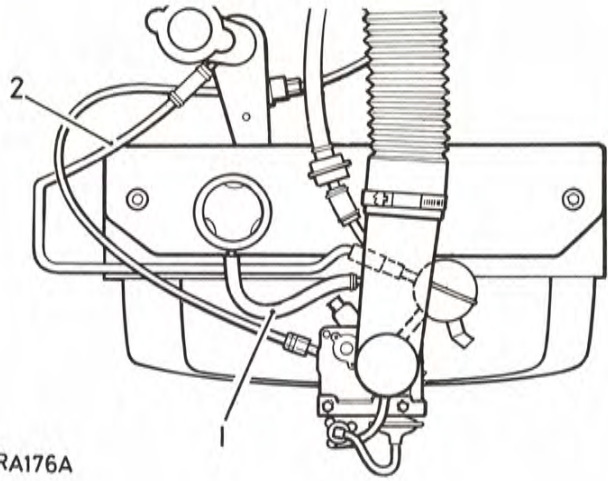
### CRANKCASE EMISSION CONTROL

—Description

17.10.00

Crankcase emissions are vented into the combustion system to be burnt with the fuel/air mixture, as follows:

1. A hose connects the top cover breather to the air cleaner elbow.
2. On 2¼ litre petrol engines, a further hose is connected between the sealed crankcase oil filler tube and the carburettor adaptor, via a non-return valve.
3. During engine running, fumes which collect in the crankcase are vented to the combustion chambers and clean air is admitted through the top cover to assist in purging.



IRA176A

**CRANKCASE EMISSION VALVE**

–Remove and refit

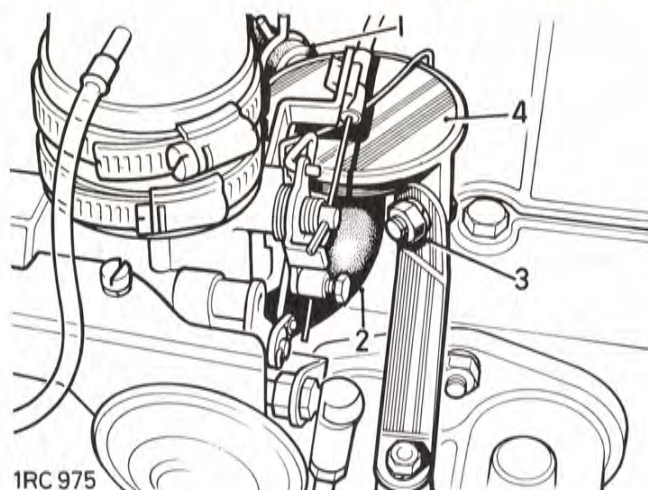
17.10.09

**Removing**

1. Disconnect the inlet hose.
2. Disconnect the outlet hose.
3. Remove the fixings.
4. Withdraw the valve unit.

**Refitting**

5. Reverse 1 to 4.



1RC 975

**CRANKCASE EMISSION VALVE**

–Overhaul

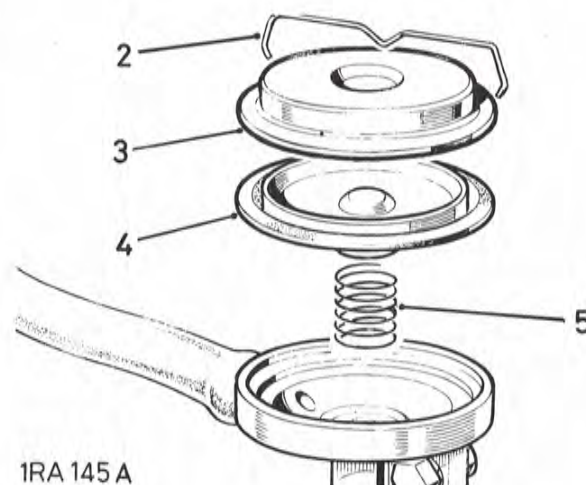
17.10.15

**Dismantling**

1. Remove the valve. 17.10.09.
2. Remove the spring clip retaining the cover.
3. Remove the cover
4. Remove the diaphragm unit complete with orifice plunger.
5. Remove the diaphragm spring.
6. Clean orifices, control body and the cover in methylated spirits. (Ethanol).  
**NOTE:** The diaphragm must not be cleaned with methylated spirits.
7. Check all components for damage or deterioration.

**Reassembling**

8. Replace the spring, locating it in the body.
9. Locate the diaphragm in the body and on to the spring.
10. Replace the cover and refit the spring clip. Ensure diaphragm is seating properly and the cover fits evenly to the body.
11. Warm up engine and adjust carburetter if necessary.



1RA 145 A





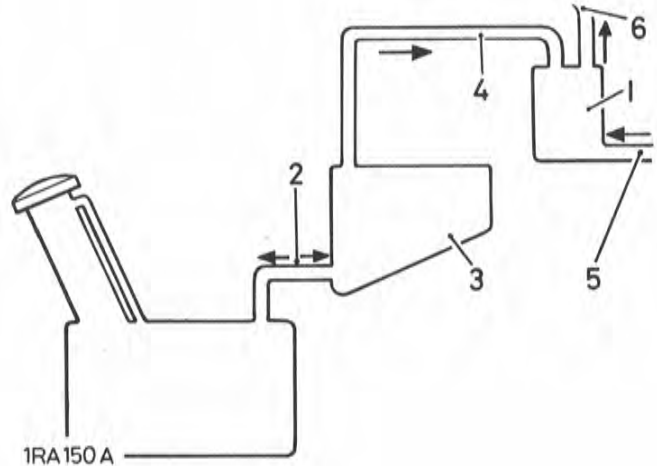
## EVAPORATIVE LOSS CONTROL

## -Description

17.15.00

Fuel tank evaporative emissions are vented to an activated charcoal filled container where they are adsorbed, then vented through a flame trap to the combustion air intake system during engine running as follows:

1. A charcoal-filled adsorption container is situated in the engine compartment, to deal with evaporative emissions from the fuel tank.
2. From the main fuel tank there is a main tank breather pipe.
3. This is fed into a separate expansion tank.
4. From the expansion tank a further breather pipe leads to the charcoal container.
5. At the side of the container, an air inlet pipe is open to atmosphere.
6. From the top, a pipe leads to the carburettor air cleaner elbow.
7. Normal fuel tank breathing is through the air inlet pipe on the charcoal container and then through the two breather pipes via the expansion tank.
8. Any vapours from the fuel in the main or expansion tanks are fed via the main breather and expansion tank breather pipes into the charcoal container, where they are adsorbed on the charcoal and do not escape to atmosphere.
9. During engine accelerating conditions air is drawn in through the air inlet pipe at the side of the container, purging the trapped emissions into the engine through the carburettor air cleaner elbow.
10. The function of the expansion tank is to provide an overflow reservoir for the main tank, as it is possible when the main tank is completely filled in high ambient temperature conditions for the fuel to expand and force a large quantity along the breather pipe. The size of the expansion tank allows for maximum fuel expansion; under such conditions evaporative emissions are still controlled by the charcoal and, due to the location of the breather pipe at the bottom of the expansion tank, the overflow fuel will eventually be drawn back into the main tank as fuel is used.



**CHARCOAL CONTAINER AIR FILTER**

–Remove and refit

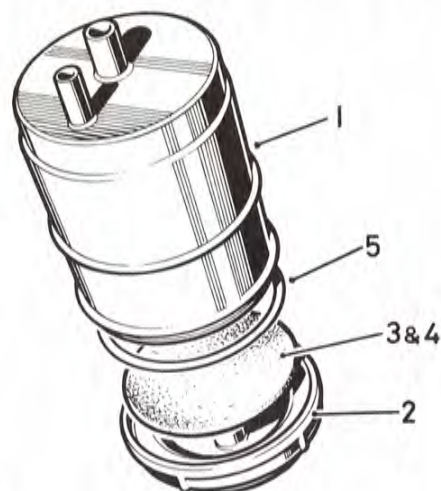
17.15.07

**Removing**

1. Remove the container. 17.15.13
2. Unscrew the end cap from the container base.
3. Withdraw the filter.

**Refitting**

4. Reverse 3 with smooth side inward.
5. Reverse 1 and 2, using a new end cap seal.



IRA179A

**CHARCOAL CONTAINER**

–Remove and refit

17.15.13

**Removing**

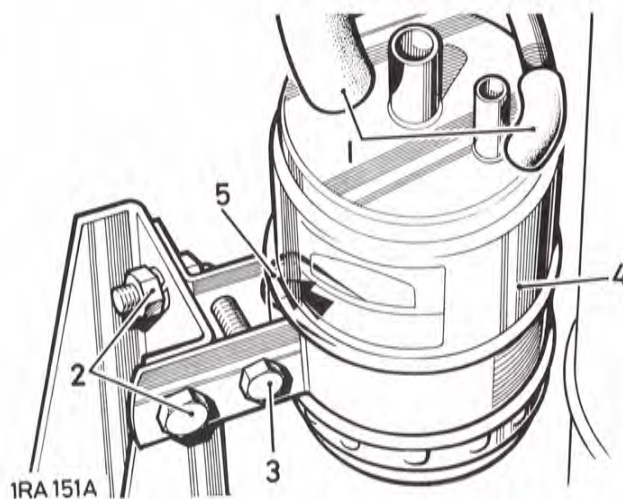
**NOTE:** Under normal operating conditions the charcoal container, situated at the right-hand rear of the engine compartment, should require replacement only at the specified maintenance intervals. If for any reason liquid fuel should find its way into the charcoal container, indicated by fuel weeping at the air inlet pipe, replace the container immediately regardless of mileage.

**WARNING:** No attempt should be made to cleanse the container. The use of compressed air could cause the activated charcoal filling to ignite.

1. Note the hose positions and disconnect at container.
2. Remove the fixings, container strap to mounting bracket.
3. Slacken the pinch bolt on the strap.
4. Withdraw the container.

**Refitting**

5. Reverse 1 to 4. Position the container such that the 'open-to-atmosphere' pipe faces inboard and toward the rear of the engine compartment.



1RA151A



## EXHAUST EMISSION CONTROL

### -Description

17.20.00

Exhaust emission control is achieved by alterations to carburation and combustion characteristics, together with modifications to the distributor vacuum supply line and ignition timing procedure, as follows:

### Carburation, 2¼ litre petrol engine, Zenith type 36IVE carburetter

#### Carburetter jets

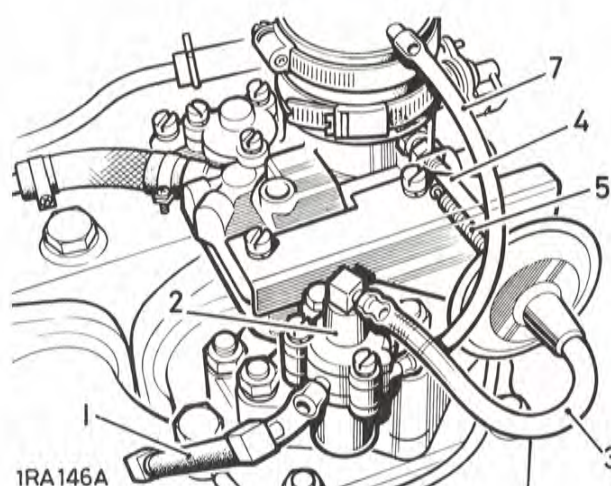
The carburetter is provided with main and enrichment jets having special flow characteristics. The jets are identifiable by their cadmium plated finish and they are not interchangeable with similar size jets with a natural finish.

#### Carburetter throttle-prop system

Under high manifold depression, that is, on engine overrun with rapid throttle closure, wet fuel is drawn off the inlet manifold walls and gives a rich air/fuel ratio and poor combustion. To compensate for this condition a system is employed of propping open the carburetter throttle butterfly to reduce the manifold depression and admit sufficient volume of the correct air/fuel mixture to give good combustion.

1. A trigger valve is connected to the inlet manifold via a pipe.
  - 2.\*\* Under high manifold depression a vacuum is formed in the trigger valve lifting a diaphragm from its seat which is pre-set to lift at 20.5 to 21.5 in. Hg.\*\*
  3. The depression is relayed via a pipe to a vacuum servo unit.
  4. Attached to the vacuum unit is an adjusting rod.
  5. A spring push/pull link is attached to the vacuum diaphragm.
  6. The depression moves the vacuum unit diaphragm with subsequent movement of the spring link and throttle-prop lever which opens the throttle butterfly a small amount.
- \*\*This position is maintained until the vacuum in the inlet manifold drops with the decrease in engine speed to approximately 19 in. Hg when the trigger valve diaphragm closes and movement of the vacuum unit closes the throttle butterfly.\*\*
7. An atmospheric bleed pipe from the air cleaner elbow to the trigger valve allows clean air at atmospheric pressure to replace the vacuum after closure of the trigger valve diaphragm.

*continued*



### Accelerator pump linkage setting

1. The accelerator pump linkage is set in the position to give maximum pump stroke by connecting the throttle relay lever to the hole in the pump spindle lever which is nearest to the pump spindle.

### Solenoid operated fuel cut-off valve

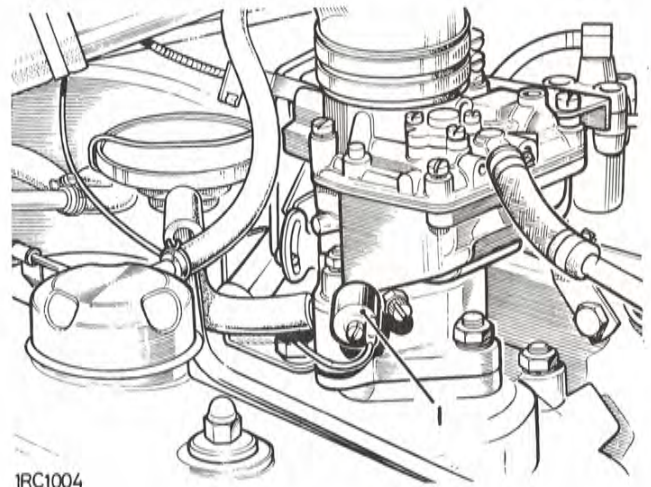
The idle speed of the 2¼-litre engine has been increased to 750-800 revs/min. This has been done to increase the air-flow past the throttle butterfly under closed throttle conditions.

1. To prevent running-on due to the high idle speed, a solenoid operated fuel cut-off valve has been incorporated in the carburetter.
2. This takes the form of a solenoid operated needle valve operating to cut-off the idle by-pass drilling and progression chambers when the ignition is switched off.
3. The solenoid is located externally on the carburetter body casting adjacent to the idling volume control screw and is electrically connected to the switch side (+) of the ignition coil.
4. The fuel cut-off valve is pre-set and must not be adjusted.

### Fuel filter

The filter assembly, located between the carburetter and the fuel pump at the right-hand side of the engine, provides additional filtration to the fuel system. The filter mesh is sealed inside the filter body and no servicing is possible on the assembly; the filter assembly complete must be discarded at the stipulated maintenance intervals, or before if the presence of foreign matter is suspected in the fuel system, and a new assembly fitted.

*continued*



### Carburettor adjustments

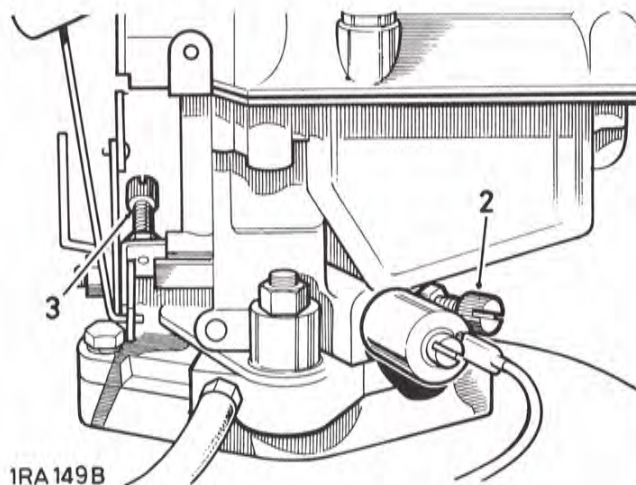
#### Slow-running adjustment

**NOTE:** The carburettor settings and adjustments must be made only when the ignition timing is correct as described subsequently.

Before any attempt is made to set the idling speed, a thorough check should be made to ensure the throttle linkage between the pedal and the carburettor is free and has no tendency to stick.

1. Start engine and run until warm, denoted by thermostat outlet pipe becoming warm to the touch. Continue running for a further five minutes to stabilise engine temperature.
2. Unlock mixture screw and turn gently clockwise by hand until it is fully in. Then screw out three quarters of a turn.
3. Adjust the throttle stop screw to obtain an idling speed of 800 revs/min measured using a suitable stroboscopic tachometer.
4. Reset mixture screw to get the highest idling speed at this throttle setting.
5. Readjust throttle stop screw to give an idling speed of 800 revs/min. Secure the throttle stop screw, using the locknut.
6. Weaken the mixture by turning the mixture screw clockwise until an idling speed of 750 revs/min is obtained. Then richen the mixture by turning the screw a quarter of a turn anti-clockwise. Secure the mixture screw, using the locknut.
7. Adjust the throttle stop screw to increase engine idling speed to as close as possible to 800 revs/min without exceeding this figure.
8. Secure the throttle stop screw, using the locknut.
9. When engine idling speed is correct, remove tachometer and switch off engine.

*continued*

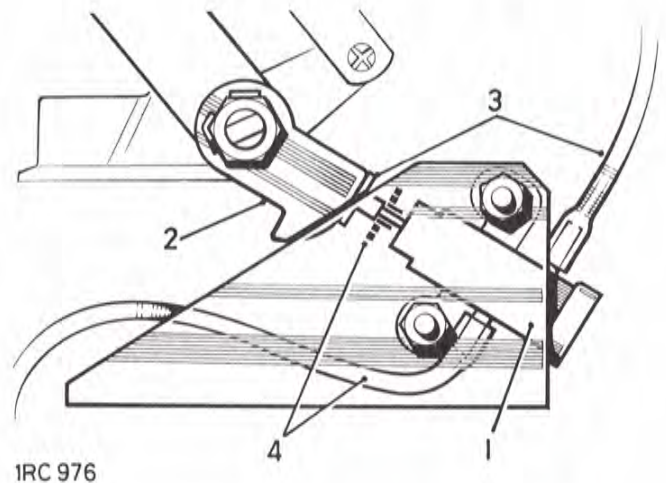


### Ignition system

A special ignition distributor provides a retarded ignition setting at the lower speed range whilst maintaining the normal advance characteristics at higher engine speeds. However, when the throttle is closed at higher engine speeds a retarded ignition is required, and is achieved by fitting a throttle controlled vacuum switch.

The switch is interposed in the vacuum line between the inlet manifold banjo connection and the distributor vacuum retard capsule. A throttle-operated cam governs the switch position progressively from open to closed. At the open position (switch plunger out) the switch closes off the vacuum line and opens the distributor capsule to atmosphere which allows ignition to advance. At the closed position (switch plunger in) the switch opens the vacuum line to the distributor capsule, which retards the ignition.

1. The switch is interposed in the vacuum line between the inlet manifold banjo connection and the distributor vacuum retard capsule.
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4. At the closed position (switch plunger in) the switch opens the vacuum line to the distributor capsule, which retards the ignition.



### Ignition timing

To ensure correct combustion, and therefore compliance with the exhaust emission regulations, it is essential that the ignition timing is dynamically set with the engine at idling speed. This requires the use of a suitable tachometer, for determining the engine speed, and a stroboscopic lamp for determining the points in the engine cycle at which the ignition sparks occur.

Static ignition timing, TDC, may be used as an initial setting procedure after distributor remove and refit, but this must not be accepted as a final setting. The timing mark for the engine appears on the crankshaft pulley.

*continued*

## EMISSION CONTROL

### Procedure for dynamic ignition timing

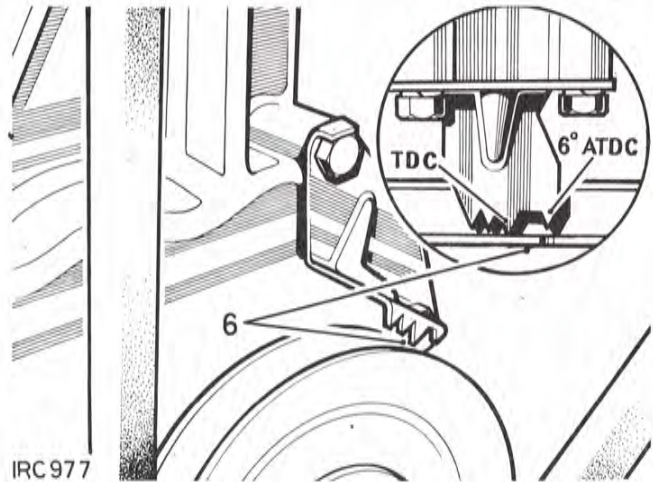
1. Ensure that the throttle-controlled vacuum switch is correctly set and that all pipes to the switch are sound and correctly fitted.
2. Connect a stroboscopic timing light to the engine in accordance with the manufacturer's instructions. The HT connection should be made on No. 1 cylinder sparking plug.
3. Connect suitable electronic checking equipment following the manufacturer's instructions.
4. Set the engine idling speed to between 750 and 800 revs/min and as close to 800 revs/min as possible without exceeding this speed. This speed setting is extremely important and any deviation, particularly in an upwards direction, will cause incorrect timing and subsequent failure to pass the emission requirements.
5. Set the vernier advance and retard adjustment on the distributor to the extreme advance position. (The purpose of this operation is to minimise the possibility of subsequent advancing of the ignition point indiscriminately).
6. Slacken the distributor clamping plate bolt and rotate the distributor until the stroboscopic light synchronises the timing pointer and the timing mark at 6° after top dead centre (ATDC).
7. Retighten the distributor clamping bolt securely and recheck timing.
8. Check distributor centrifugal advance curve to the following:

Distributor speed revs/min	Distributor degrees advance
1000	9–11
1600	14–16
2000	17–19

9. Check distributor vacuum retard curve:

Vacuum Inches Hg	Distributor degrees retard
1	0 –0.5
2	0.5–3.0
3	2.5–3.5

10. Disconnect the stroboscopic timing light and electronic equipment.



**THROTTLE CONTROLLED VACUUM SWITCH**

- Check and adjust items 4 to 7 17.20.24
- Remove and refit items 1 to 3 17.20.25

**Removing**

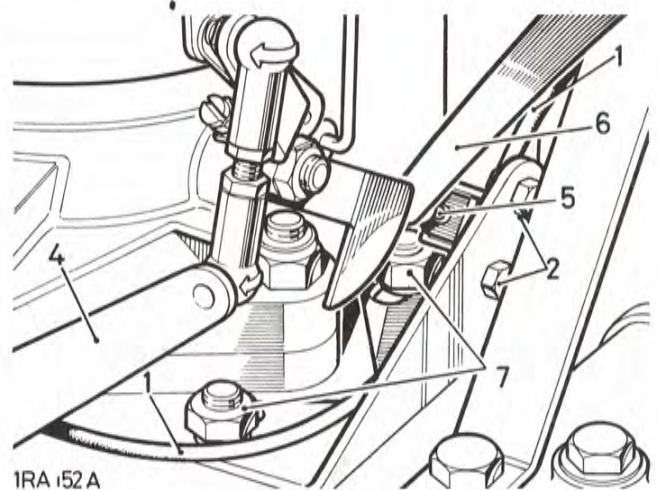
1. Disconnect the vacuum pipes.
2. Remove the fixings and withdraw the switch.

**Refitting**

3. Reverse 1 and 2.

**To check and adjust switch position**

4. Ensure that the throttle linkage is fully in the idle position.
5. Push the plunger fully into the switch and hold in this position.
6. Measure the clearance between the plunger and the cam on the throttle linkage. This must be 0,76 mm (0.030 in.).
7. Adjust as necessary by slackening the fixings, mounting bracket to inlet manifold, and moving the switch and bracket complete in the required direction.





## CARBURETTER THROTTLE PROP

—Remove and refit

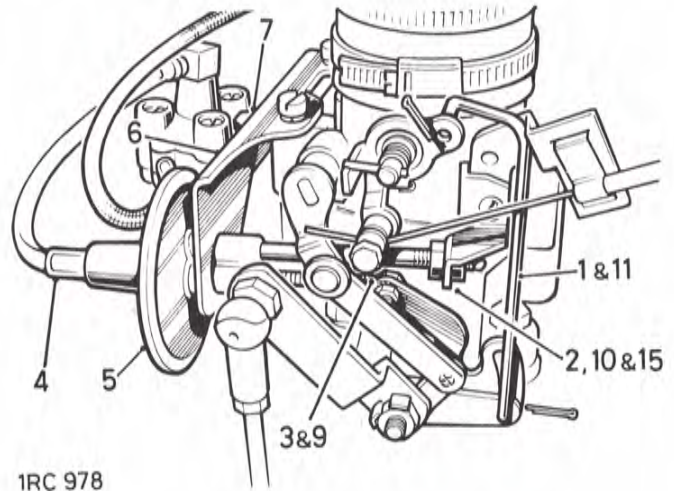
17.20.35

### Removing

1. Remove the interconnecting link.
2. Remove the locknut from the diaphragm unit positioning rod.
3. Disconnect the spring link at the cranked lever on the throttle spindle.
4. Disconnect the vacuum pipe.
5. Withdraw the diaphragm unit from the bracket.
6. Remove the trigger valve unit and bracket complete from the carburetter.

### Refitting

7. Reverse 6, positioning the spacer for the front fixing.
8. Reverse 4 and 5.
9. Reverse 3 with the spring link eye and the shoulder-bolt head positioned at the carburetter side of the throttle prop lever.
10. Reverse 2. Do not tighten the locknut at this stage and ensure that the throttle prop lever is clear of the slow run stop lever.



*continued*

11. Fit the interconnecting link.
12. Set the carburetter throttle-prop as follows, items 13 to 20.

#### Setting the carburetter throttle-prop lever

13. Run the Land-Rover for a minimum of 4 km (3 miles) to ensure that the engine is at normal running temperature.
14. Connect an accurate stroboscopic tachometer to the engine and ensure that it is idling at 750 to 800 revs/min.
15. Slacken the locknuts securing the vacuum unit adjusting rod at the carburetter bracket.
16. Operate the accelerator linkage to increase the engine speed to approximately 2,500 revs/min.
17. At the same time disconnect the atmospheric bleed pipe from the air cleaner elbow and block off the end of the pipe by the thumb or finger. This retains the vacuum supply from the trigger valve and ensures that the throttle butterfly remains propped.
18. Release the accelerator linkage, engine speed will fall to accelerator propped position. Rotate the adjusting rod locknuts by equal amounts to increase or decrease the engine speed as necessary until 1300 to 1400 revs/min is obtained.
19. Tighten the locknuts against the bracket and replace the vacuum balance pipe on to the air cleaner elbow. Ensure that the engine returns to its normal idling speed.
20. Switch off the engine and remove the tachometer.
21. The trigger valve is pre-set and must not be adjusted.



### FUEL FILTER

– Remove and refit

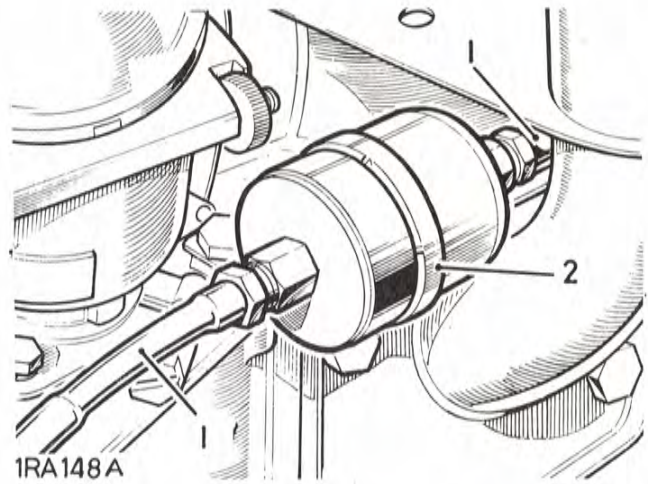
17.20.38

#### Removing

1. Disconnect fuel pipes from each end of filter.
2. Slacken clip securing filter and withdraw unit.

#### Refitting

3. Fit the new filter with the end marked 'IN' towards the fuel pump, using the nuts and olives supplied. If the filter is marked with an arrow, this indicates fuel flow direction and the filter must then be fitted with the arrow pointing away from the fuel pump.



FUEL SYSTEM OPERATIONS

NOTE: Where fuel system equipment has emission control features, refer to Division 17 of this Manual.

Accelerator throttle controls arrangements .. .. .	19.00.00
Air cleaner	
— remove and refit ... .. .	19.10.04
— clean and refill ... .. .	19.10.16
Carburetter	
— remove and refit ... .. .	19.15.09
— overhaul and adjust ... .. .	19.15.17
Cold start control cable	
— remove and refit ... .. .	19.20.26
Diesel fuel system	
— general notes and arrangement ... .. .	19.00.00
Engine stop control cable	
— remove and refit ... .. .	19.20.32
Fuel distributor/injection pump	
— remove, set timing and refit ... .. .	19.30.07
Fuel injectors	
— remove and refit ... .. .	19.60.01
— spray check ... .. .	19.60.02
— overhaul ... .. .	19.60.08

*Continued*



Fuel lift pump												
— remove and refit	...	...	...	...	...	...	...	...	...	...	...	19.45.09
— overhaul	...	...	...	...	...	...	...	...	...	...	...	19.45.16
Fuel filters	...	...	...	...	...	...	...	...	...	...	...	Refer to Maintenance Division 10
Fuel system												
— priming	...	...	...	...	...	...	...	...	...	...	...	19.50.01
Fuel tank												
— remove and refit	...	...	...	...	...	...	...	...	...	...	...	19.55.01
Fuel tank gauge unit	...	...	...	...	...	...	...	...	...	...	...	Refer to Division 88 (Controls)
Hand control, engine speed												
— remove and refit	...	...	...	...	...	...	...	...	...	...	...	19.20.29
Thermostat switch												
— remove and refit	...	...	...	...	...	...	...	...	...	...	...	19.15.50
Throttle linkage												
— remove and refit	...	...	...	...	...	...	...	...	...	...	...	19.20.07



## FUEL SYSTEM

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### DIESEL FUEL SYSTEM

#### General notes

1. Observe strict cleanliness precautions when servicing Diesel fuel system components.
2. If the distributor/injection pump is drained of fuel it **must** be fully primed before attempting to start the engine.

#### Fuel filtration

3. A minimum of three filters are fitted as follows:
  - a. Fuel tank filter.
  - b. Sedimentor bowl filter mounted on the R.H. chassis side member. This filter is fitted to all Export models and is optional on U.K. market models.
  - c. Element type filter mounted on the engine bulkhead.
  - d. Tubular gauze filter in the distributor/injection pump inlet connection.

#### Distributor pump

4. No attempt should be made to overhaul the distributor pump, as this requires specialised knowledge and equipment outside the scope of this Manual. If a distributor pump gives trouble, a new replacement should be fitted.

#### Fuel injectors

5. Injectors have 'Pintaux' type nozzle which has been developed by CAV for use with the design of cylinder head used on Rover compression ignition engines. This type of nozzle has been found most satisfactory for starting and general running and must be replaced by the same type only.

#### Fuel lift pump

6. The fuel lift pump is secured directly to the right-hand side of the engine, and is mechanically operated from the engine camshaft. The pump is similar to that used on 2¼ litre Petrol models.

**Fuel system arrangement**

**Low pressure system**

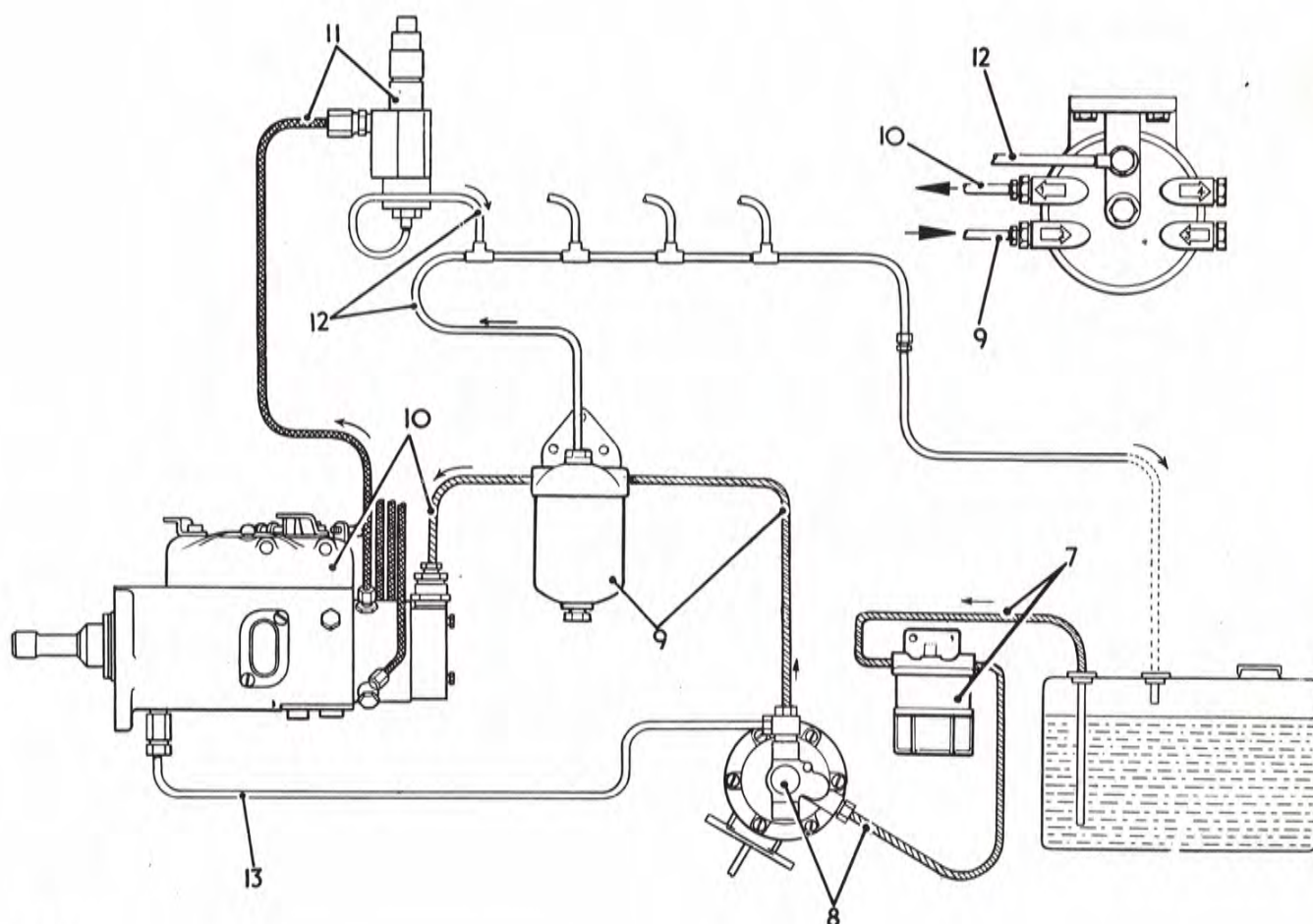
7. Fuel is drawn from the fuel tank into the sedimentor, where fitted.
8. From the sedimentor, or tank, to the fuel lift pump.
9. From the lift pump to the main fuel filter.
10. From the filter to the distributor/injection pump.

**High pressure system**

11. Fuel passes from the distributor/injection pump to the fuel injectors.

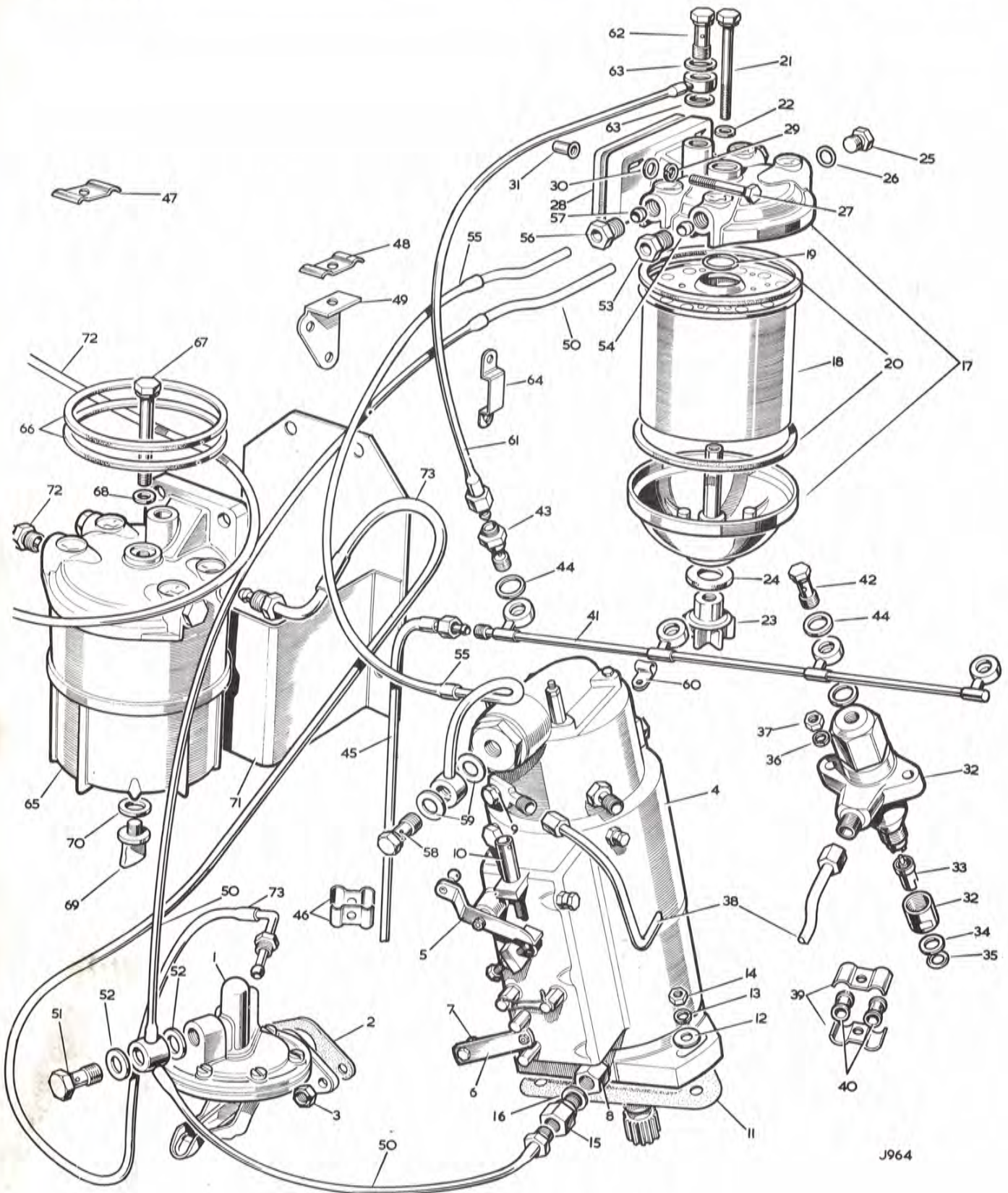
**Spill return system**

12. Excess fuel spills back from the injectors and main filter to the tank.
13. Excess fuel spills back from the distributor/injection pump to the fuel lift pump outlet line.



2RC 170





J964

General layout of Diesel injection system.



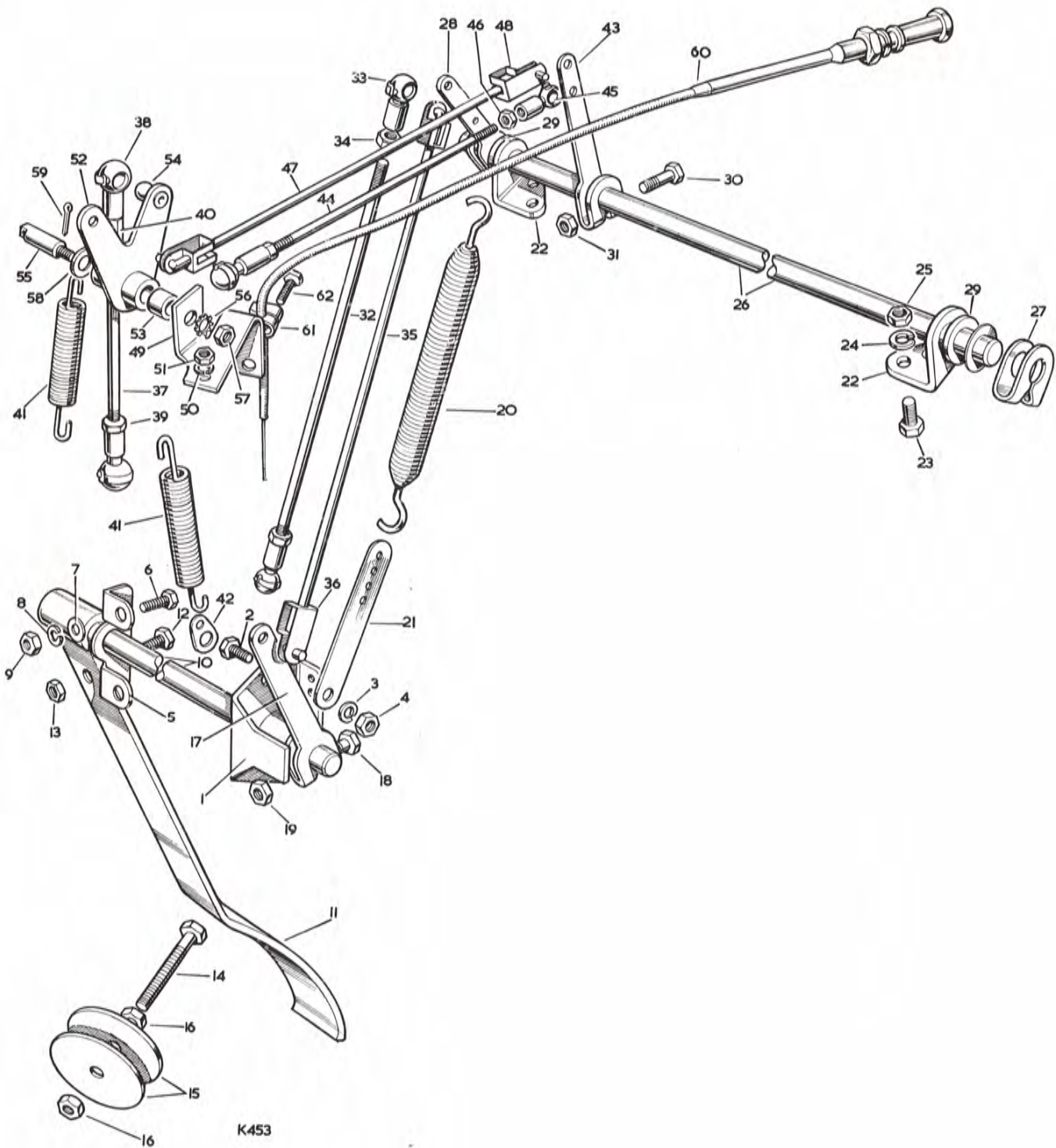


Key to General layout of Diesel injection system

- |  |                       |   |
|--|-----------------------|---|
| 1. Fuel pump, mechanical                                     |                       |   |
| 2. Joint washer, fuel pump to cylinder block                 |                       |   |
| 3. Self-locking nut, fixing fuel pump                        |                       |   |
| 4. Distributor pump  |                       |   |
| 5. Accelerator control lever                                 | } For distributor     |   |
| 6. Stop lever  |                       | pump  |
| 7. Swivel clamp for stop lever                               |                       |   |
| 8. Union, fuel pipe connection                               |                       |   |
| 9. Joint washer for injection pipe, distributor pump end     |                       |   |
| 10. Sleeve for control lever stop screw                      |                       |   |
| 11. Joint washer for distributor pump                        |                       |   |
| 12. Plain washer   | } Fixing distributor  |   |
| 13. Spring washer  |                       | pump to   |
| 14. Nut ( $\frac{1}{8}$ in. UNF)                             |                       | cylinder block  |
| 15. Non-return valve for distributor pump                    |                       |   |
| 16. Joint washer for non-return valve                        |                       |   |
| 17. Fuel filter  |                       |   |
| 18. Element for fuel filter                                  |                       |   |
| 19. Seal for element, small                                  |                       |   |
| 20. Seal for element, large                                  |                       |   |
| 21. Special centre bolt for filter                           |                       |   |
| 22. Washer for centre bolt                                   |                       |   |
| 23. Nylon drain plug for filter                              |                       |   |
| 24. Rubber seal for drain plug                               |                       |   |
| 25. Plug for filter  |                       |   |
| 26. Joint washer for plug                                    |                       |   |
| 27. Bolt ( $\frac{1}{8}$ in. UNF x 1 $\frac{1}{8}$ in. long) | } Fixing              |   |
| 28. Distance plate   |                       | filter  |
| 29. Spring washer  |                       | to dash   |
| 30. Plain washer   |                       |   |
| 31. Rivnut ( $\frac{1}{8}$ in. UNF)                          |                       |   |
| 32. Injector complete  |                       |   |
| 33. Nozzle for injector                                      |                       |   |
| 34. Joint washer for injector, copper                        |                       |   |
| 35. Joint washer for injector, steel                         |                       |   |
| 36. Spring washer  | } Fixing injectors to |   |
| 37. Nut ( $\frac{1}{8}$ in. UNF)                             |                       | cylinder head studs   |
| 38. Injector pipe to No. 2 cylinder                          |                       |   |
|  |                       | 39. Clamping plate for injector pipe grommet                        |
|  |                       | 40. Grommet for injector pipe                                       |
|  |                       | 41. Spill rail pipe complete  |
|  |                       | 42. Banjo bolt for No. 1, 2 and 3                                   |
|  |                       | 43. Banjo union for No. 4 injector                                  |
|  |                       | 44. Joint washer for banjo bolt                                     |
|  |                       | 45. Fuel pipe, spill return to tank                                 |
|  |                       | 46. Double clip, clamping feed and return pipes together            |
|  |                       | 47. Double clip, fixing feed and return pipes to chassis sidemember |
|  |                       | 48. Double clip for feed and return pipes                           |
|  |                       | 49. Bracket for clip  |
|  |                       | 50. Fuel pipe, mechanical pump and distributor pump to filter       |
|  |                       | 51. Banjo bolt  |
|  |                       | 52. Joint washer  |
|  |                       | 53. Nut   |
|  |                       | 54. Olive   |
|  |                       | 55. Fuel pipe, filter to distributor pump                           |
|  |                       | 56. Nut   |
|  |                       | 57. Olive   |
|  |                       | 58. Banjo bolt  |
|  |                       | 59. Joint washer  |
|  |                       | 60. Clip, fixing fuel pipe to distributor pump                      |
|  |                       | 61. Fuel pipe filter to spill rail at No. 4 injector                |
|  |                       | 62. Banjo bolt  |
|  |                       | 63. Joint washer  |
|  |                       | 64. Double clip, fixing fuel pipes to bulkhead                      |
|  |                       | 65. Sedimentor  |
|  |                       | 66. Seal for sedimentor   |
|  |                       | 67. Special centre bolt for sedimentor                              |
|  |                       | 68. Washer for centre bolt  |
|  |                       | 69. Drain plug for sedimentor                                       |
|  |                       | 70. Rubber seal for drain plug                                      |
|  |                       | 71. Mounting bracket for sedimentor                                 |
|  |                       | 72. Fuel pipe, tank to sedimentor                                   |
|  |                       | 73. Fuel pipe, sedimentor to mechanical pump                        |



# FUEL SYSTEM



Accelerator controls, 2 1/4 litre Diesel models

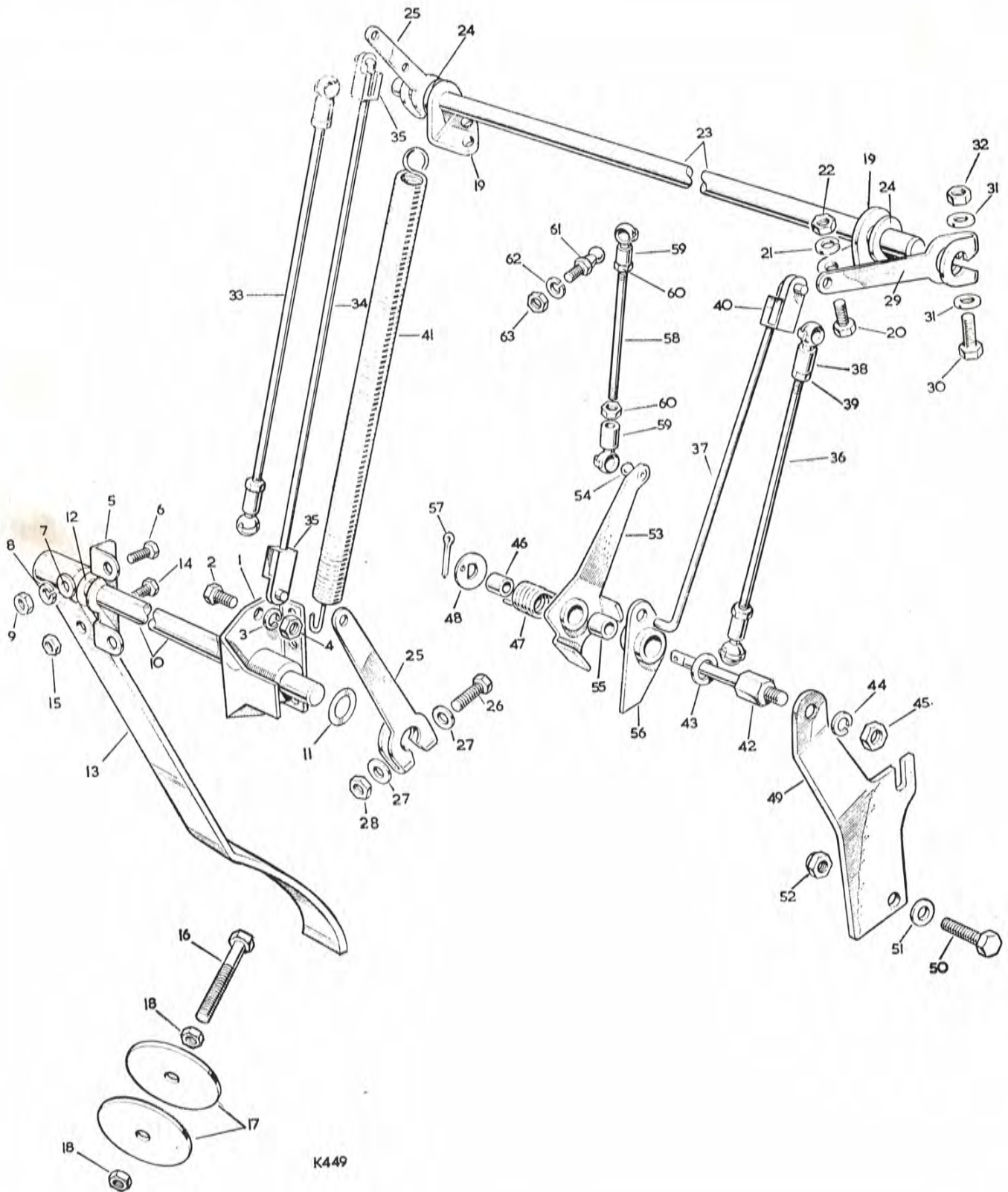


Key to illustration of accelerator controls, 2¼ litre Diesel models

- |     |   |  |
|-----|---|--|
| 1.  | Housing for accelerator shaft and pedal stop                      |  |
| 2.  | Bolt (¼in. UNF x ½in. long)                                       | } Fixing housing<br>and pedal stop<br>to dash                              |
| 3.  | Spring washer   |  |
| 4.  | Nut (¼in. UNF)  |  |
| 5.  | Bracket for accelerator pedal shaft                               |  |
| 6.  | Bolt (¼in. UNF x ⅝ in. long)                                      | } Fixing bracket<br>to dash  |
| 7.  | Plain washer  |  |
| 8.  | Spring washer   |  |
| 9.  | Nut (¼in. UNF)  |  |
| 10. | Shaft for accelerator pedal                                       |  |
| 11. | Accelerator pedal   |  |
| 12. | Bolt (⅝ in. UNF x ⅝ in. long)                                     | } Fixing pedal<br>to shaft   |
| 13. | Nut (⅝ in. UNF)   |  |
| 14. | Bolt (⅝ in. UNF x 2½in. long)                                     | } Pedal<br>stop in<br>floor  |
| 15. | Plain washer  |  |
| 16. | Nut (⅝ in. UNF)   |  |
| 17. | Lever for accelerator on pedal shaft                              |  |
| 18. | Bolt (¼in. UNF x 1¼in. long)                                      | } Fixing lever<br>to shaft   |
| 19. | Nut (¼in. UNF)  |  |
| 20. | Return spring for pedal   |  |
| 21. | Anchor for return spring  |  |
| 22. | Bracket for accelerator cross-shaft                               |  |
| 23. | Bolt (¼in. UNF x ⅝ in. long)                                      | } Fixing<br>brackets<br>to dash  |
| 24. | Spring washer   |  |
| 25. | Nut (¼in. UNF)  |  |
| 26. | Accelerator cross-shaft   |  |
| 27. | Stop clip for cross-shaft   |  |
| 28. | Accelerator lever on cross-shaft from pedal                       |  |
| 29. | Distance washer for cross-shaft                                   |  |
| 30. | Bolt (¼in. UNF x 1¼in long)                                       | } Fixing levers<br>and stop clip<br>to cross-shaft                         |
| 31. | Nut (¼in. UNF)  |  |
| 32. | Control rod, pedal shaft to cross-shaft                           |  |
| 33. | Ball joint socket   | } For<br>rod   |
| 34. | Locknut (2 BA)  |  |
| 35. | Control rod, pedal shaft to cross shaft                           |  |
| 36. | Linkage clip for control rod                                      |  |
| 37. | Control rod, bell crank to accelerator lever                      |  |
| 38. | Ball socket   | } For bell crank control rod   |
| 39. | Nut (2 BA)  |  |
| 40. | Adjuster nut  |  |
| 41. | Return spring for accelerator and stop levers on distributor pump |  |
| 42. | Anchor for return spring  |  |
| 43. | Accelerator lever on cross-shaft to engine                        |  |
| 44. | Control rod, cross-shaft to bell crank                            |  |
| 45. | Ball joint  | } For<br>control rod   |
| 46. | Locknut (2 BA)  |  |
| 47. | Control rod, cross-shaft to bell crank                            |  |
| 48. | Linkage clip for control rod                                      |  |
| 49. | Bracket for bell crank on distributor pump                        |  |
| 50. | Spring washer   | } Fixing bracket to<br>distributor pump                                    |
| 51. | Nut (10 UNF)  |  |
| 52. | Bell crank complete on distributor pump                           |  |
| 53. | Bush for bell crank   |  |
| 54. | Ball end for bell crank   |  |
| 55. | Pin for bell crank  |  |
| 56. | Shakeproof washer   | } Fixing pin to bell<br>crank bracket                                      |
| 57. | Nut (¼in. UNF)  |  |
| 58. | Plain washer  | } Fixing bell crank<br>lever to pin  |
| 59. | Split pin   |  |
| 60. | 'Engine stop' control   |  |
| 61. | Clip  | } Fixing control outer cable<br>to abutment bracket<br>on distributor pump |
| 62. | Screw (2 BA x ⅝ in. long)   |  |

# FUEL SYSTEM

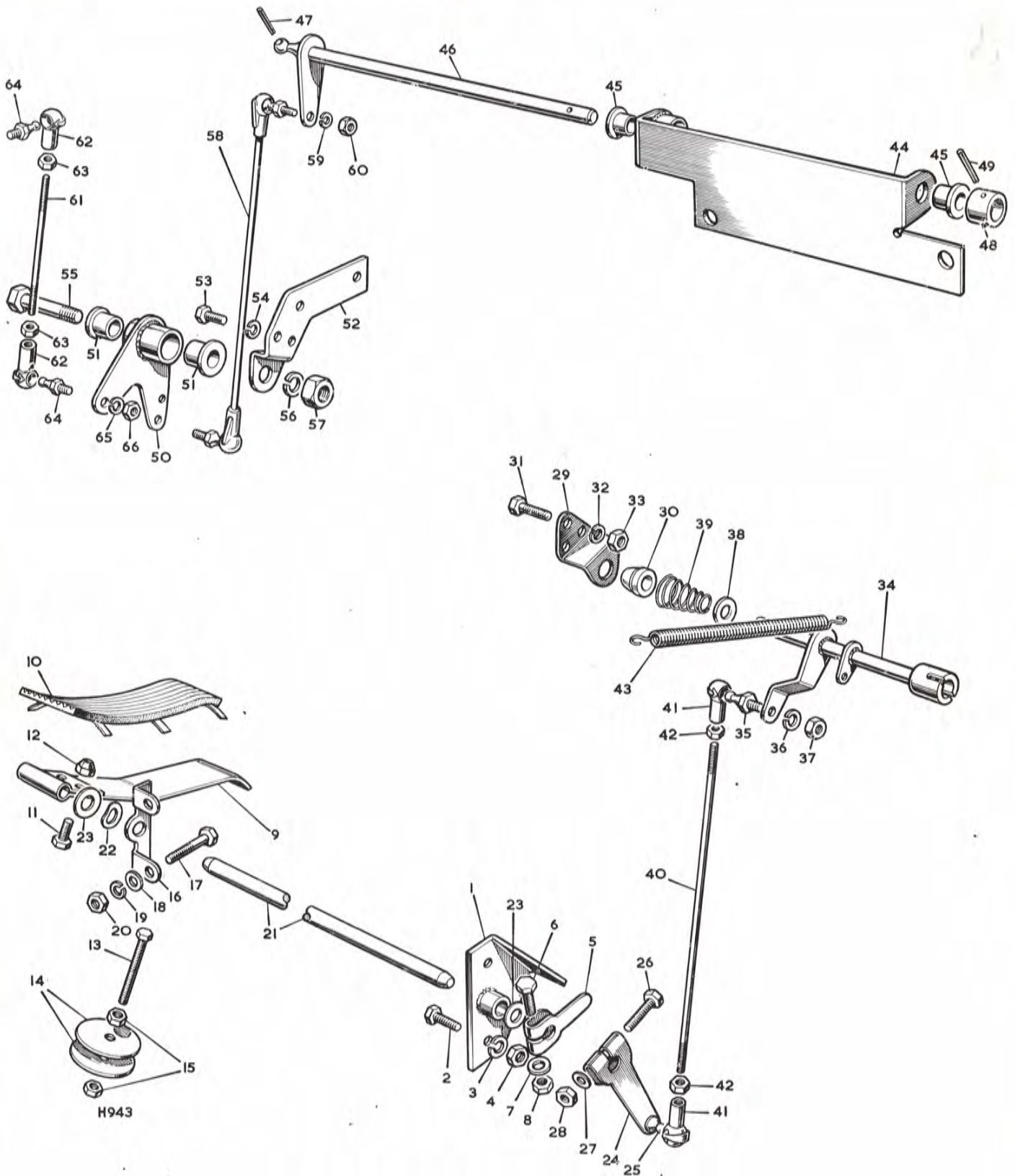
## Accelerator controls, 2 1/4 litre Petrol models



Key to illustration of accelerator controls, 2¼ litre Petrol models

- |     |   |   |
|-----|---|---|
| 1.  | Housing for accelerator shaft and pedal stop        |   |
| 2.  | Bolt (¼in. UNF x ½in. long)                         | } Fixing housing and pedal stop to dash             |
| 3.  | Spring washer                                       |   |
| 4.  | Nut (¼in. UNF)                                      |   |
| 5.  | Bracket for accelerator pedal shaft                 |   |
| 6.  | Bolt (¼in. UNF x ⅝ in. long)                        | } Fixing bracket to dash                            |
| 7.  | Plain washer  |   |
| 8.  | Spring washer                                       |   |
| 9.  | Nut (¼in. UNF)                                      |   |
| 10. | Shaft for accelerator pedal                         |   |
| 11. | Special washer                                      | } On accelerator shaft                              |
| 12. | Plain washer  |   |
| 13. | Accelerator pedal                                   |   |
| 14. | Bolt (⅝ in. UNF x ⅞ in. long)                       | } Fixing pedal to shaft                             |
| 15. | Nut (⅝ in. UNF)                                     |   |
| 16. | Bolt (⅝ in. UNF x 1⅞ in. long)                      | } Pedal stop in floor                               |
| 17. | Plain washer  |   |
| 18. | Nut (⅝in. UNF)                                      |   |
| 19. | Bracket for accelerator cross-shaft, 'L' shaped     |   |
| 20. | Bolt (¼in. UNF x ⅝ in. long)                        | } Fixing bracket to dash                            |
| 21. | Spring washer                                       |   |
| 22. | Nut (¼in. UNF)                                      |   |
| 23. | Cross-shaft for accelerator                         |   |
| 24. | Distance washer for lever                           |   |
| 25. | Lever for accelerator                               |   |
| 26. | Bolt (¼in. UNF x 1¼in. long)                        | } Fixing levers to shaft                            |
| 27. | Plain washer  |   |
| 28. | Nut (¼in. UNF)                                      |   |
| 29. | Lever for cross-shaft                               |   |
| 30. | Bolt (¼in. UNF x 1¼in. long)                        | } Fixing lever to cross-shaft                       |
| 31. | Plain washer  |   |
| 32. | Nut (¼in. UNF)                                      |   |
| 33. | Control rod, pedal shaft to cross-shaft             |   |
| 34. | Control rod, pedal shaft to cross-shaft             |   |
| 35. | Linkage clip for control rod                        |   |
| 36. | Control rod, cross-shaft to engine                  |   |
| 37. | Control rod, cross-shaft to engine                  |   |
| 38. | Ball joint socket for rods                          |   |
| 39. | Locknut for socket                                  |   |
| 40. | Linkage clip for control rod, cross-shaft to engine |   |
| 41. | Return spring for pedal                             |   |
| 42. | Spindle for carburetter bell crank                  |   |
| 43. | Plain washer  | } Fixing spindle                                    |
| 44. | Spring washer                                       |   |
| 45. | Nut (⅜ in. UNF)                                     |   |
| 46. | Spacer for spindle                                  |   |
| 47. | Torsion spring for bell crank                       |   |
| 48. | Special washer for torsion spring                   |   |
| 49. | Bracket for accelerator controls                    |   |
| 50. | Bolt (⅜ in. UNF x 1in. long)                        | } Fixing bracket to steering column support bracket |
| 51. | Plain washer  |   |
| 52. | Self-locking nut (⅜ in. UNF)                        |   |
| 53. | Carburetter bell crank lever assembly               |   |
| 54. | Ball end for lever                                  |   |
| 55. | Bush for bell crank                                 |   |
| 56. | Carburetter relay lever                             |   |
| 57. | Split pin fixing levers to spindle                  |   |
| 58. | Control rod, bell crank to carburetter              |   |
| 59. | Ball joint  | } For control rod                                   |
| 60. | Locknut (2 BA)                                      |   |
| 61. | Ball end for carburetter lever                      |   |
| 62. | Spring washer                                       | } Fixing ball end to carburetter lever              |
| 63. | Nut (¼in. UNF)                                      |   |





Accelerator levers and rods, 2.6 litre, 6 cylinder models



Key to illustration of accelerator levers and rods, 2.6 litre, 6 cylinder models

- |  |  |                       |
|--|--|-----------------------|
| 1. Bracket for accelerator pedal and stop        |  |                       |
| 2. Bolt (1/4in. UNF x 1/2in. long)               | } Fixing bracket and pedal stop to dash                  |                       |
| 3. Spring washer                                 |  |                       |
| 4. Nut (1/4in. UNF)                              |  |                       |
| 5. Pedal stop lever                              |  |                       |
| 6. Bolt (1/4in. UNF x 1 1/4in. long)             | } Fixing lever to pedal shaft                            |                       |
| 7. Plain washer                                  |  |                       |
| 8. Nut (1/4in. UNF)                              |  |                       |
| 9. Accelerator pedal                             |  |                       |
| 10. Pad for accelerator pedal                    |  |                       |
| 11. Bolt (5/16 in. UNF x 7/8 in. long)           | } Fixing pedal to shaft                                  |                       |
| 12. Nut (5/16 in. UNF)                           |  |                       |
| 13. Bolt (5/16 in. UNF x 1 1/8 in. long)         | } Pedal stop in floor                                    |                       |
| 14. Plain Washer                                 |  |                       |
| 15. Nut (5/16 in. UNF)                           |  |                       |
| 16. Bracket for accelerator pedal shaft          |  |                       |
| 17. Bolt (1/4in. UNF x 5/8 in. long)             | } Fixing bracket to dash                                 |                       |
| 18. Plain washer                                 |  |                       |
| 19. Spring washer                                |  |                       |
| 20. Nut (1/4in. UNF)                             |  |                       |
| 21. Shaft for accelerator pedal                  |  |                       |
| 22. Special washer                               | } On accelerator shaft                                   |                       |
| 23. Plain washer                                 |  |                       |
| 24. Lever assembly for accelerator               |  |                       |
| 25. Ball end for lever                           |  |                       |
| 26. Bolt (1/4in. UNF x 1 1/4in. long)            | } Fixing lever to shaft                                  |                       |
| 27. Plain washer                                 |  |                       |
| 28. Nut (1/4in. UNF)                             |  |                       |
| 29. Mounting bracket for extension shaft         |  |                       |
| 30. Bearing in mounting bracket for shaft        |  |                       |
| 31. Bolt (1/4in. UNF x 5/8 in. long)             | } Fixing mounting bracket to dash                        |                       |
| 32. Spring washer                                |  |                       |
| 33. Nut (1/4in. UNF)                             |  |                       |
| 34. Extension shaft and lever                    |  |                       |
| 35. Ball end for extension shaft lever           |  |                       |
| 36. Spring washer                                | } Fixing ball end to lever                               |                       |
| 37. Nut (2 BA)                                   |  |                       |
| 38. Plain washer                                 |  | } For extension shaft |
| 39. Conical spring for extension shaft           |  |                       |
| 40. Control rod, pedal shaft to extension shaft  |  |                       |
| 41. Ball joint socket for control rod            |  |                       |
| 42. Locknut (2 BA) fixing socket to control rod  |  |                       |
| 43. Return spring, bell crank to extension shaft |  |                       |
| 44. Bracket assembly for accelerator cross-shaft |  |                       |
| 45. Bearing for cross-shaft                      |  |                       |
| 46. Accelerator cross-shaft and lever            |  |                       |
| 47. Spiral pin for cross-shaft                   |  |                       |
| 48. Boss for cross-shaft                         |  |                       |
| 49. Spring dowel fixing boss to shaft            |  |                       |
| 50. Bell crank lever and bearings assembly       |  |                       |
| 51. Bearing for bell crank                       |  |                       |
| 52. Support bracket for bell crank               |  |                       |
| 53. Set bolt (1/4in. UNC x 5/8 in. long)         | } Fixing support bracket to cylinder head                |                       |
| 54. Spring washer                                |  |                       |
| 55. Centre pin                                   | } Fixing bell crank to support bracket                   |                       |
| 56. Spring washer                                |  |                       |
| 57. Nut (5/16 in. UNC)                           |  |                       |
| 58. Control rod, cross-shaft to bell crank       |  |                       |
| 59. Spring washer                                | } Fixing control rod to levers                           |                       |
| 60. Nut (10 UNF)                                 |  |                       |
| 61. Control rod, bell crank to carburetter       |  |                       |
| 62. Ball joint                                   | } For control rod  |                       |
| 63. Locknut (2 BA)                               |  |                       |
| 64. Ball end                                     | } Fixing control rod to bell crank lever and carburetter |                       |
| 65. Spring washer                                |  |                       |
| 66. Nut (2 BA)                                   |  |                       |



## FUEL SYSTEM

### AIR CLEANER, 2¼ litre models

– Remove and refit 19.10.04

#### Removing

1. Lift and prop the bonnet panel.

#### Petrol models, item 2

2. Disconnect the air intake elbow from the carburetter.

#### Diesel models, items 3 and 4

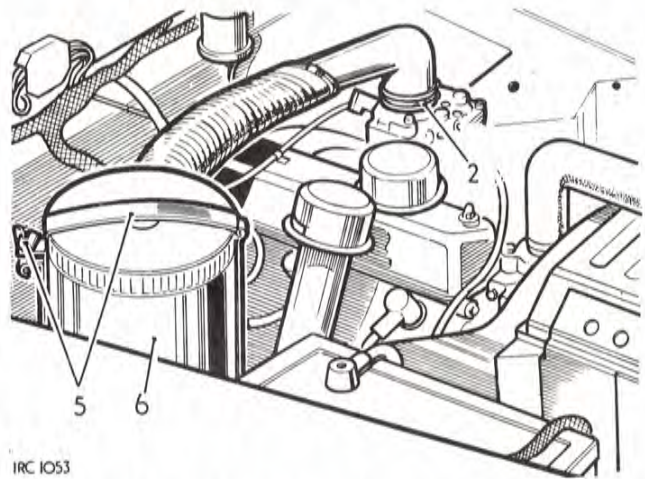
3. Disconnect the air inlet hose from the inlet manifold.
4. Free the hose from the engine clip.

#### Petrol and Diesel models, items 5 and 6

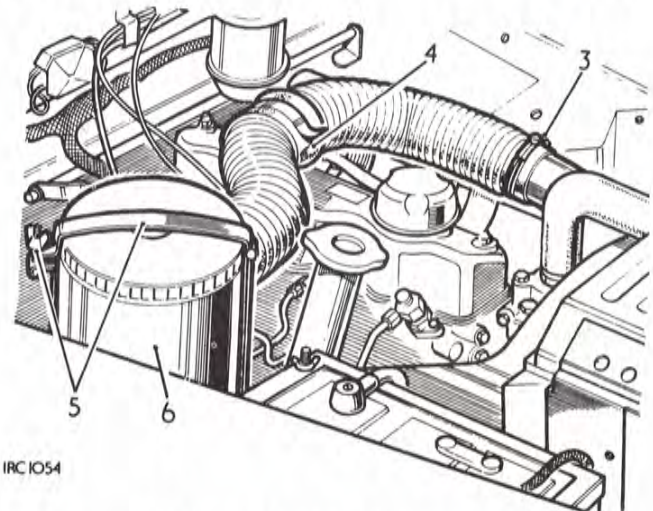
5. Slacken the fixings and move aside the retaining strap.
6. Remove air cleaner complete with hose.

#### Refitting

7. Reverse 1 to 6 as applicable. Ensure that the oil container hinged clips are clear of the retaining strap supports when fitted.



IRC 1053



IRC 1054

### AIR CLEANER, 2.6 litre models

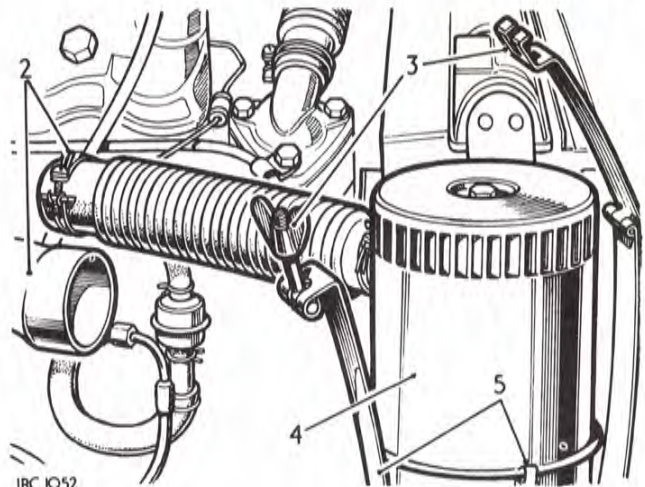
– Remove and refit 19.10.04

#### Removing

1. Lift and prop the bonnet.
2. Disconnect the air intake hose from the carburetter inlet.
3. Slacken the fixings and move aside the retaining strap.
4. Remove the air cleaner complete with hose.

#### Refitting

5. Reverse 1 to 4. Ensure that the oil container hinged clips are clear of the retaining strap supports when fitted.



IRC 1052



## AIR CLEANER

—Clean and refill

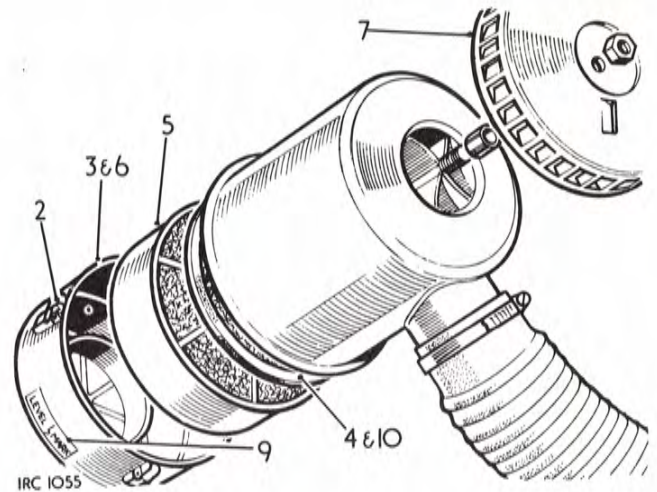
19.10.16

## Dismantling

1. Remove the air cleaner. 19.10.04.
2. Release the hinged clips.
3. Withdraw the oil container.
4. Withdraw the sealing washer.
5. Lift out the wire mesh element.
6. Drain the oil container.
7. Remove the air intake cap.
8. Wash the metal parts in clean fuel.

## Assembling

9. Add clean engine oil to the oil container (Division 09 refers), fill to the oil level mark.
10. Reverse 1 to 5 and 7, using a new sealing washer.



## CARBURETTER, Zenith type 36IV

—Remove and refit

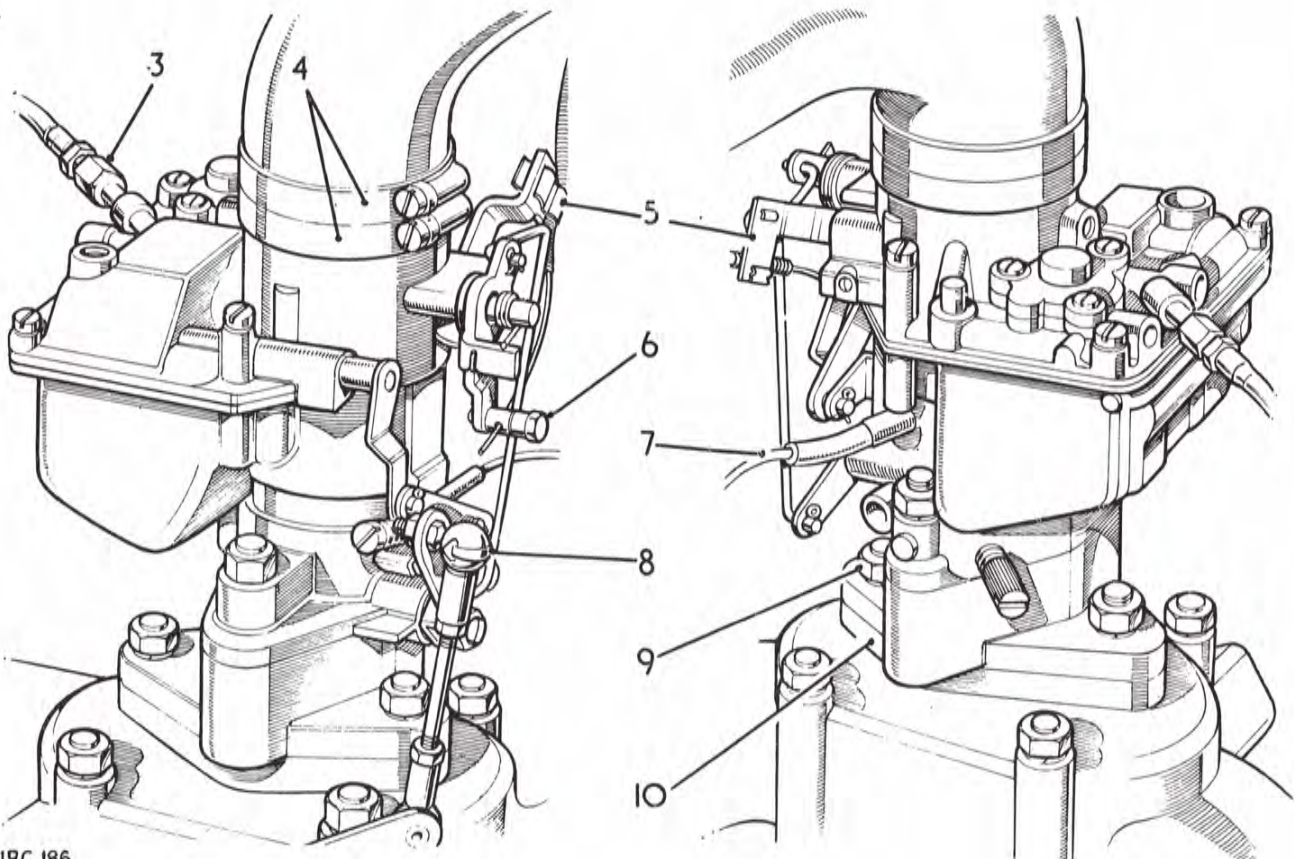
19.15.09

### Removing

1. Prop open the bonnet.
2. Disconnect the battery earth lead.
3. Disconnect the fuel inlet pipe.
4. Disconnect the air inlet hose.
5. Release the cold start outer cable.
6. Disconnect the cold start inner cable.
7. Disconnect the vacuum pipe.
8. Disconnect the throttle linkage.
9. Remove the carburetter.
10. Lift off the adaptor piece and joint washers.

### Refitting

11. Reverse 2 to 10. When the cold start cable is connected, check that the maximum travel on the carburetter linkage is obtainable in both directions.
12. Close the bonnet.



IRC 186

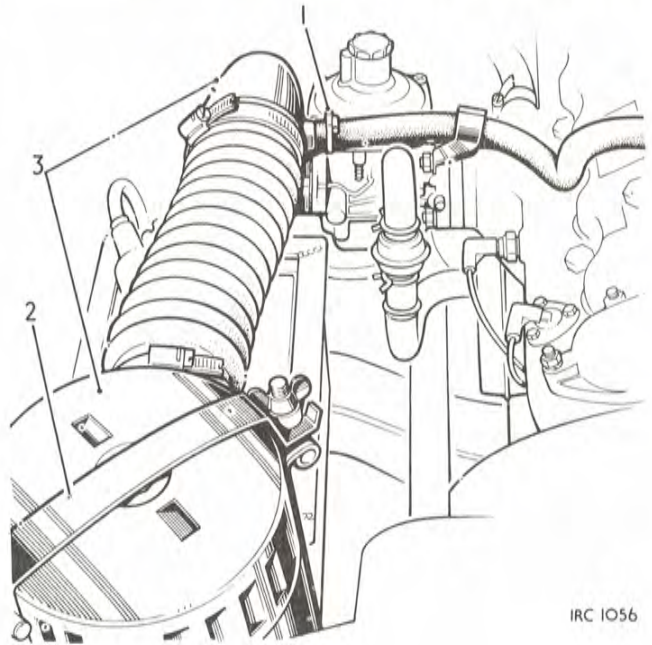
CARBURETTOR, Zenith type 175 CD2S

—Remove and refit

19.15.09

Removing

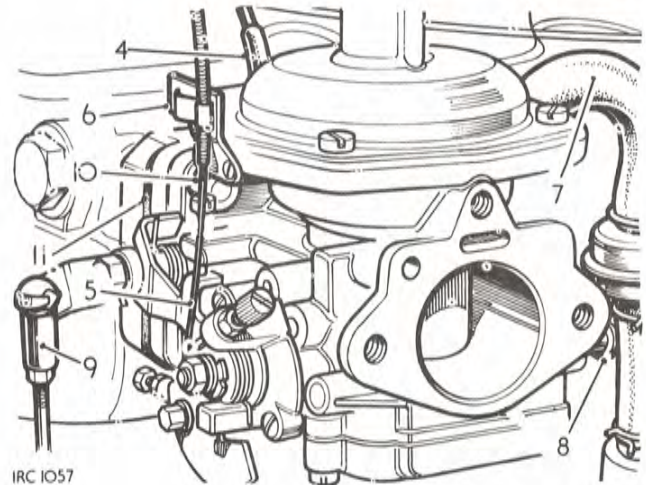
1. Disconnect the top cover breather hose at the carburettor elbow.
2. Release the air cleaner retainer strap.
3. Withdraw the air cleaner complete with hose, carburettor elbow and joint washer.
4. Disconnect the distributor vacuum pipe.
5. Release the cold start control inner cable.
6. Withdraw the cold start outer cable from the spring clip.
7. Disconnect the crankcase breather hose.
8. Disconnect the fuel inlet pipe.
9. Disconnect the accelerator linkage.
10. Remove the fixings and withdraw the carburettor.
11. Withdraw the carburettor adaptor and joint washer.



IRC 1056

Refitting

12. Reverse 1 to 10. When the cold start cable is connected, ensure that full travel on the carburettor linkage is obtainable in both directions.



IRC 1057

### CARBURETTER, Zenith type 36IV

—Overhaul and adjust 19.15.17

#### Dismantling

1. Remove the carburetter. 19.15.09

#### Linkages, removing

2. Disconnect the interconnecting link.
3. Disconnect the accelerator pump spindle lever from throttle relay lever.

#### Top cover and emulsion block, separating

4. Remove the top cover from the carburetter body.
5. Withdraw the float assembly.
6. Remove the needle valve housing and needle.
7. Remove emulsion block from carburetter top cover, taking care not to drop the accelerator pump assembly which is now freed.
8. Withdraw the gasket from top cover.

#### Emulsion block, dismantling

9. Lift out the accelerator pump piston.
  10. Remove all jets in the emulsion block.
- NOTE:** At the base of the accelerator pump housing bore is a ball inlet valve retained by a circlip, there is no need to remove the valve for overhaul purposes.

#### Carburetter body, dismantling

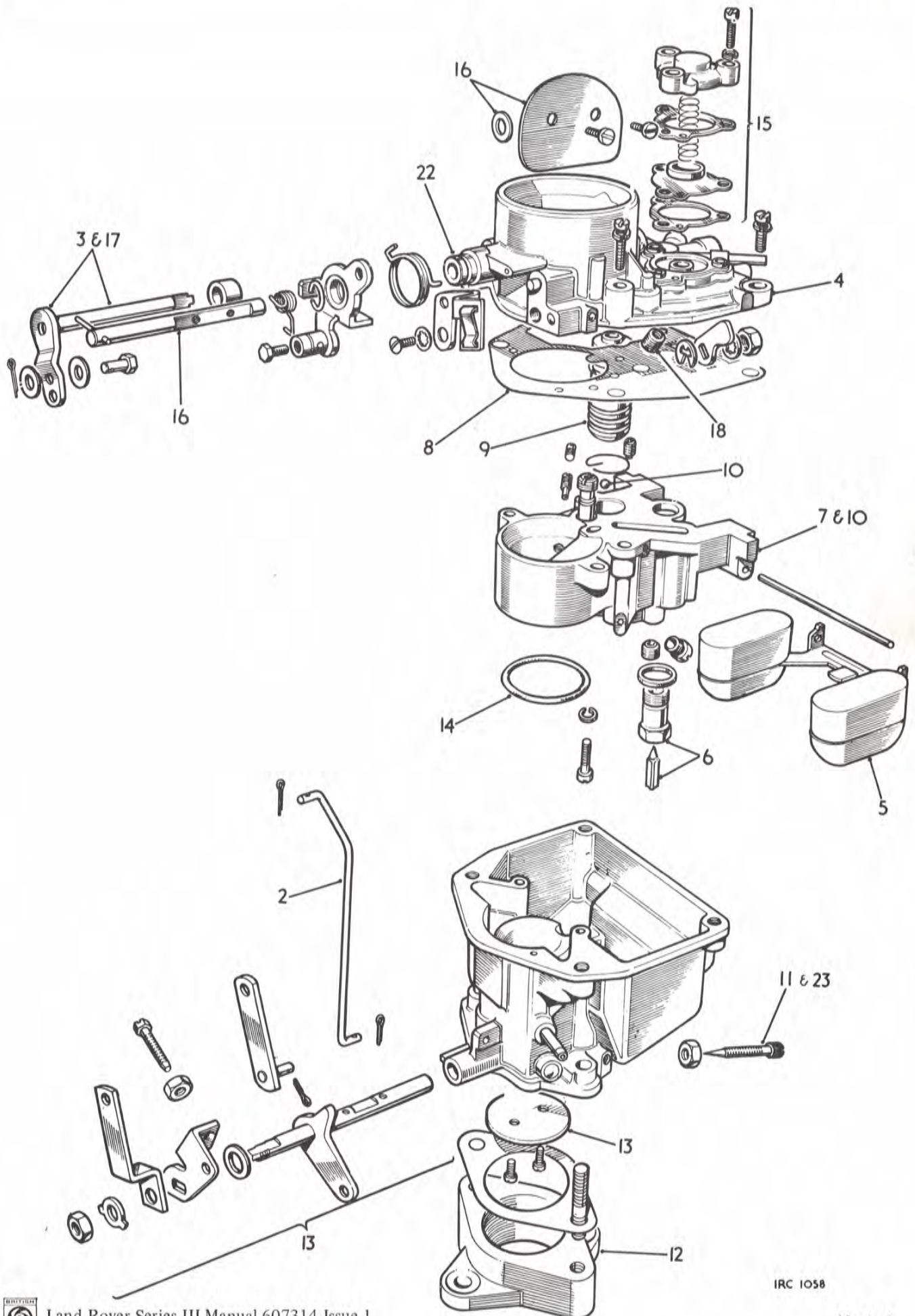
11. Remove the idling volume control screw.
12. Detach the adaptor from the carburetter body.
13. Mark up for re-assembly purposes then remove the throttle butterfly disc followed by the throttle spindle and linkage if required.
14. Remove the 'O' ring seal from the choke venturi tube.

#### Carburetter top cover, dismantling

15. Dismantle the economy valve assembly, taking care to retain the diaphragm spring.
16. If required remove the choke butterfly (after marking up) followed by the choke spindle, taking care to retain the thin washer.
17. Remove the spindle and lever for the accelerator pump.
18. Remove the ventilation screw for the choke.

*Continued*





## FUEL SYSTEM

### Inspecting and cleaning

#### Special Notes

#### 19. Carburettor cleaning

When cleaning fuel passages do not use metal tools (files, scrapers, drills, etc.) which could cause dimensional changes in the drillings or jets. Cleaning should be effected using clean fuel and, where necessary, a moisture-free air blast.

#### 20. Joint faces

If the joint faces on the emulsion block, top cover or carburettor body show any signs of distortion or the edges are burred, these faces may be reclaimed by flattening, using fine grade abrasive cloth and a surface plate. Examine the faces for deep scores which would lead to leakage taking place when assembled.

#### 21. Joint gasket and seals

New gaskets and seals should be used throughout carburettor rebuild. A complete set of gaskets is available for replacement purposes.

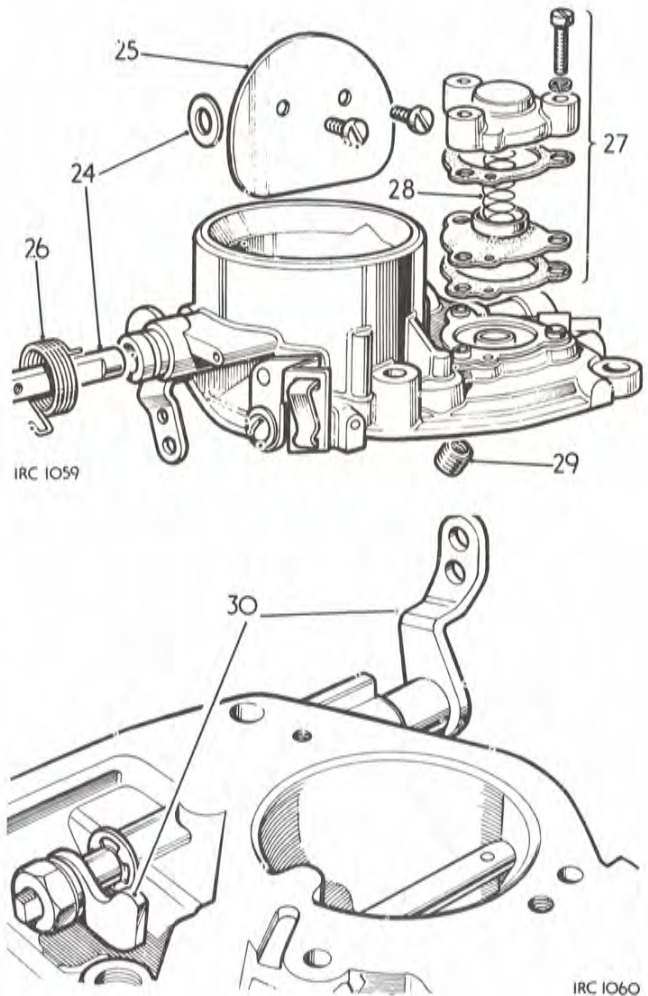
#### 22. Examine the throttle spindle bushes for wear, if oval or badly worn replace the carburettor body.

#### 23. Examine the tapered end of the idling volume screw for wear and damage, replace as required.

### Re-assembling

#### Carburettor top cover

24. If previously dismantled, insert the choke spindle into its housing and at the same time refit the thin washer.
25. Locate the choke butterfly on the spindle and loosely retain with the two special screws. Operate the butterfly to centralise it on the spindle, then secure the screws and lock them by peening.
26. Engage the spring end on to the choke swivel lever.
27. Fit the economy valve gasket, diaphragm assembly and a further gasket to the top cover upper face, aligning the holes in the gaskets and diaphragm with the drilling in the top cover face.
28. Locate the spring in the seating on the diaphragm assembly, locate the valve cover spigot on the spring free end and align the drilling in the cover casting with the hole in the gasket. Push down on the cover, keeping it square to the diaphragm, then secure.
29. Fit the ventilation screw to the angled tapping in the top cover lower face.
30. Fit the spindle and lever for accelerator pump as illustrated.

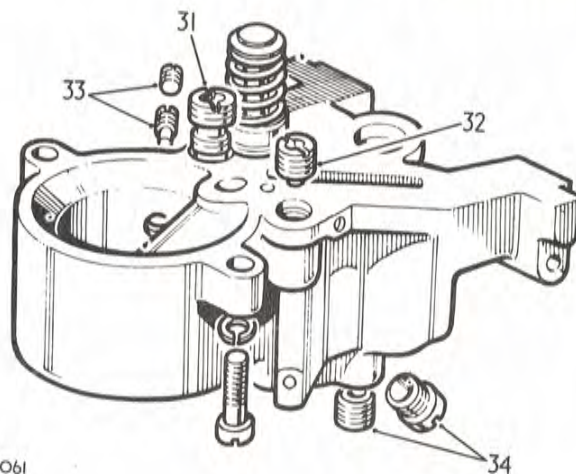


*Continued*

Zenith type 36IV

Emulsion block, assembling

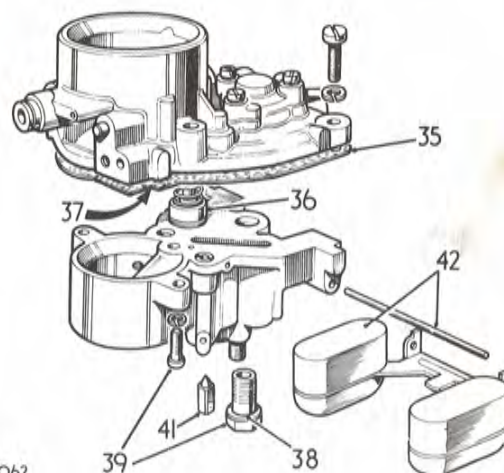
31. Fit the blanked off jet.
32. Fit the slow running jet.
33. Fit the pump jet, followed by the pump jet tapping plug, to the tapping in the side of the emulsion block.
34. Fit the main jet and the enrichment jet to the emulsion block, the enrichment jet into the vertical tapping and the main jet into the angled tapping.



IRC 1061

Fitting the emulsion block to the carburettor top cover

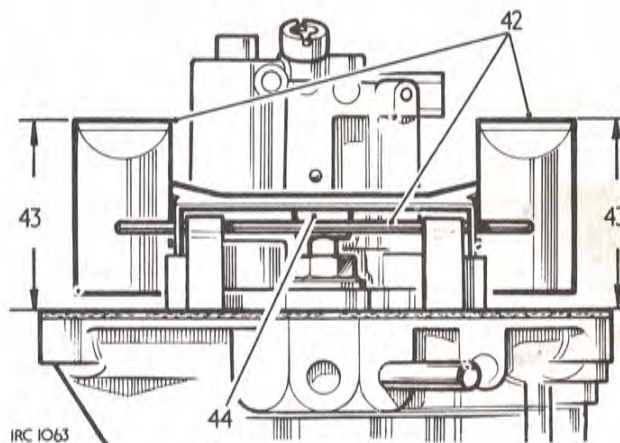
35. Position the gasket on top cover joint face.
36. Apply a thin smear of clean lubricating oil to the accelerator pump piston and assemble, piston first, into its housing bore in the emulsion block.
37. Ensure that the accelerator pump spindle lever is positioned inboard to align with accelerator pump plunger, position emulsion block and accelerator pump assembly on top cover joint face.
38. Ensure that the sealing washer for the needle valve housing is in good condition and fit the washer.
39. Fit the needle valve housing and the securing screws in the emulsion block. Do not fully tighten at this stage.
40. Check that the fuel passage drillings in the top cover are clear and not masked by misalignment of the gasket. Now fully tighten the emulsion block securing screws and needle housing.
41. Fit the needle valve into its seating in the needle valve housing. Check for leakage past the assembly by holding the needle valve on to its seating and blowing air into the fuel inlet pipe.



IRC 1062

Fitting the float assembly

42. Position float assembly on to top cover, align pin holes in float carrier and emulsion block flange lugs and secure float carrier with hinge pin.
43. With the needle valve on its seating and the central tongue on the float carrier contacting on the needle valve, measure the distance between the gasket upper face and the highest point on the floats as illustrated.
44. The dimension required is 33mm (1.3in.). Any adjustment must be made by deflecting the central tongue which abuts the needle valve; adjustment must not be made by bending the float carrier arms.



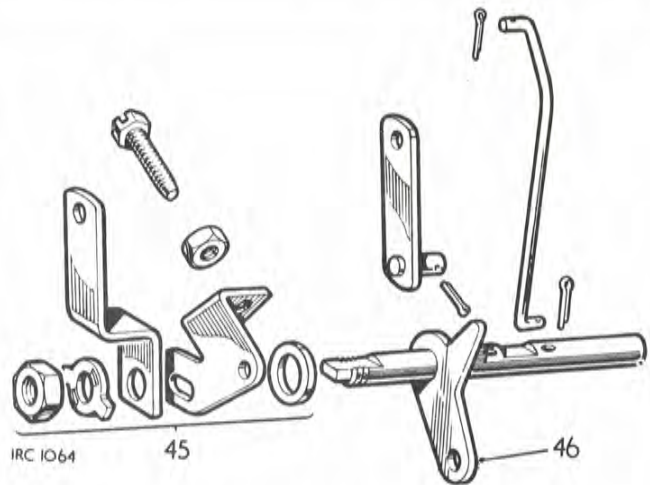
IRC 1063

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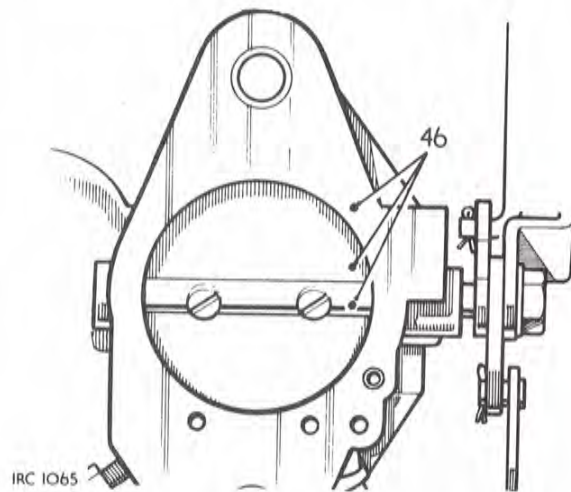
Zenith type 36IV

45. Assemble the throttle linkage to the spindle, insert the floating lever, plain washer, throttle stop, throttle lever, lock tab and securing nut as illustrated.
46. Fit the throttle spindle assembly to the carburettor then insert the butterfly into the spindle, aligning marks previously made, and loosely retain with the two special screws. Operate the butterfly to centralise it on the spindle, then secure the screws and lock them by peening.
47. Fit the carburettor adaptor to the carburettor body using a new gasket and tighten evenly.



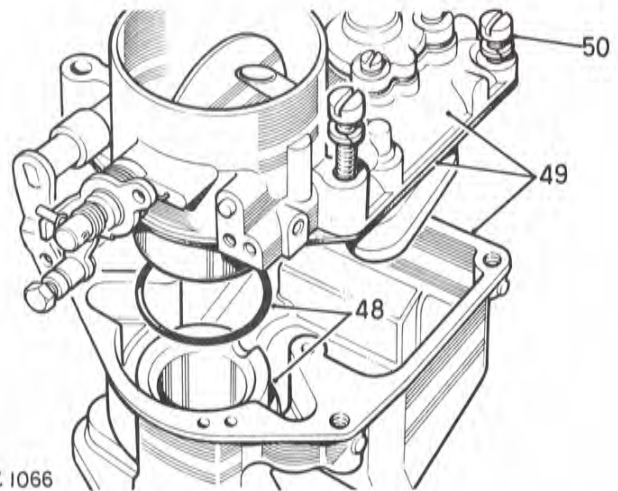
Fitting top cover and emulsion block to carburettor body

48. Fit the 'O' ring seal to the seating around the top end of the venturi barrel. Ensure that the 'O' ring is correctly seated. THIS IS VERY IMPORTANT AS POOR JOINTING WOULD CREATE POOR FUEL CONSUMPTION.
49. Offer up the cover and emulsion block assembly to the carburettor body. Check that the 'O' ring seal around the venturi barrel is holding off the emulsion block, indicated by a small gap between the top cover gasket and carburettor body joint faces. This will ensure a compression seal on the 'O' ring when assembled.
50. Secure the assembly, evenly, to the carburettor body. Then replace the idling volume control screw.



Carburettor linkage, reconnect

51. Connect the throttle relay lever to the hole furthest from the fulcrum on the accelerator pump spindle lever, using clevis pin, two plain washers and split pin.
- NOTE:** In cold ambient conditions use the hole nearest the fulcrum.



*Continued*



Zenith type 36IV

52. Fit the interconnecting link between choke operating tab and the floating lever on the throttle spindle and secure with split pins.

Fast-idle setting

53. Fully close choke butterfly by actuating choke operating tab. It should be possible to slide a 1,40mm (0.055in.) diameter drill between throttle butterfly edge and the carburetter body. If necessary, bend interconnection link to achieve this condition.
54. Refit the carburetter. 19.15.09.

Carburetter, to set and adjust

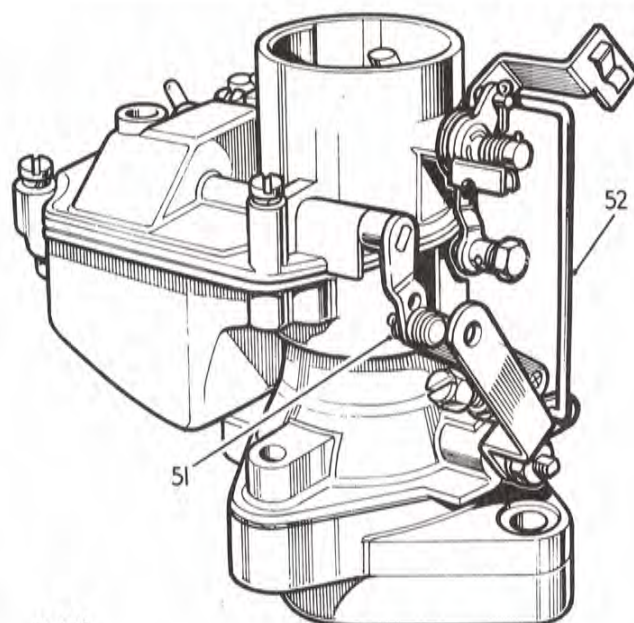
55. Before any attempt is made to set the idling speed, a thorough check should be made to ensure that the throttle linkage between the pedal and the carburetter is free and has no tendency to stick, also ensure full throttle operation.
56. Start engine and run until warm, denoted by thermostat outlet pipe becoming warm to the touch. Continue running for a further five minutes to thoroughly stabilise engine temperature.
57. Adjust the throttle stop screw to obtain engine idling speed of 500 rev./min.
58. Adjust the idling volume control screw until the engine runs smoothly and evenly. Recheck idle speed and correct as necessary. Recheck idling stability. It may be necessary to alternate adjustments between idling volume control screw and throttle stop screw to obtain the required idling setting. The idling volume control screw is then at the setting position required for all engine operating conditions.

To confirm that the setting position selected is correct, turn the volume control screw in and out respectively from the setting position by approximately one-half turn; at these checking positions the engine note will alter and the engine running will become uneven. After checking, return the volume control screw to the correct setting position selected midway between the checking positions.

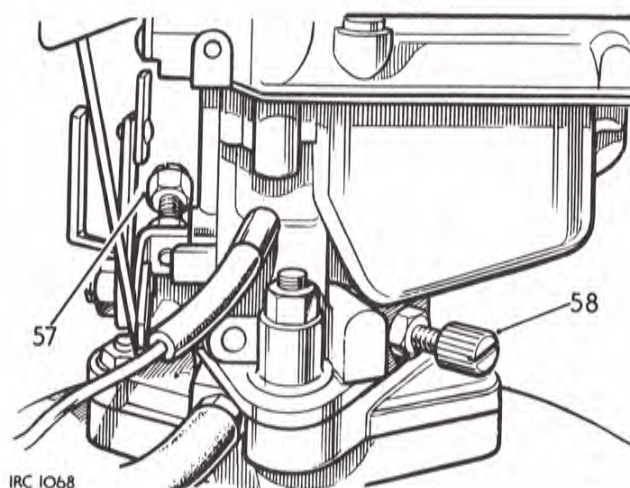
DATA

Float height setting  
Fast-idle setting

Idling speed



IRC 1067



IRC 1068

33mm (1.300in.)  
1,40mm (0.055in.) between throttle butterfly edge and carburetter barrel.  
500 rev./min.



## FUEL SYSTEM

### CARBURETTER, Zenith type 175CD 2S

#### Overhaul and adjust

19.15.17

#### Dismantling

1. Remove the carburetter. 19.15.09

#### Removing the piston assembly

2. Remove the oil cap and damper.
3. Remove the top cover and spring.
4. Withdraw the air valve, shaft and diaphragm assembly.
5. Remove the metering needle, retained by a locking screw.
6. Remove the diaphragm from the air valve.

#### Removing the float chamber

7. Remove and dismantle the jet assembly.
8. Remove the float chamber and gasket.
9. Unclip the float and arm complete with the spindle.
10. Remove the needle valve and washer from the carburetter body.

#### Dismantling the carburetter body

11. Add location marks to the throttle butterfly and spindle.
12. Remove the throttle butterfly.
13. Remove the throttle lever.
14. Withdraw the throttle spindle.
15. If required, remove the throttle stop and fast idle lever.
16. Remove the cold start assembly.
17. Dismantle the cold start assembly, but DO NOT remove the discs from the spindle.

#### Cleaning and inspecting

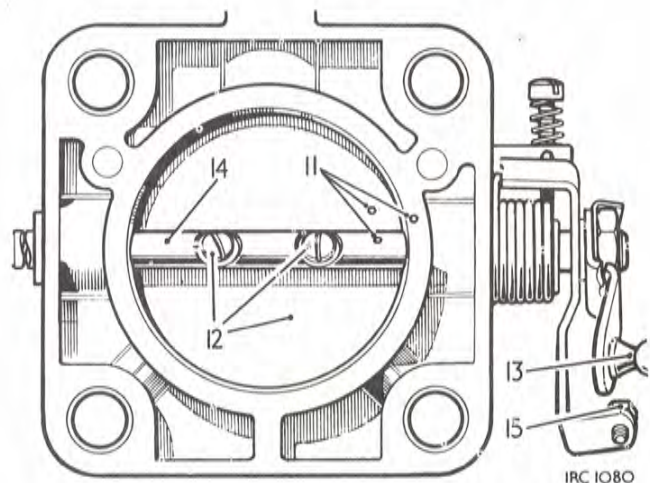
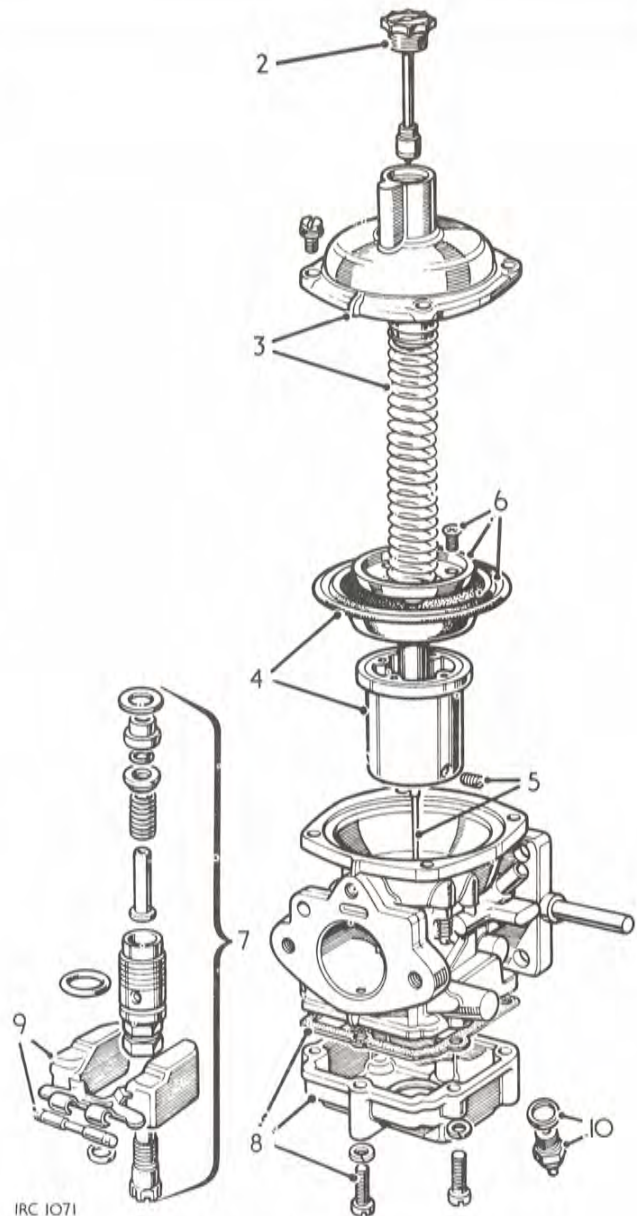
##### Carburetter cleaning

18. When cleaning fuel passages do not use metal tools (files, scrapers, drills, etc.) which could cause dimensional changes in the drillings or jets. Cleaning should be effected using clean fuel and where necessary a moisture-free air blast.

##### Joint Faces

19. Examine the faces for deep scores which would lead to leakage taking place when assembled.

*Continued*



## Zenith type 175CD 2S

## Joint gasket and seals

20. New gaskets and seals should be used throughout carburettor rebuild. A complete set of gaskets is available for replacement purposes.
21. Inspect metering needle, it is machined to very close limits and should be handled with care. Examine for wear, bend and twist, replace if necessary.

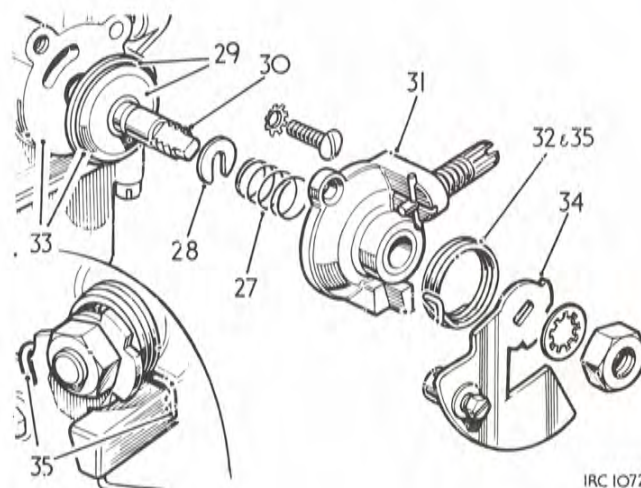
## Diaphragm

22. In common with other products made from rubber compounds, any contact of the diaphragm with volatile cleaners should be avoided, use only clean rag. Examine for damage and deterioration.
23. Examine float, for puncture or damage and chamber for corrosion, retaining clips for wear.
24. Examine cold start bushes for wear, renew starter cover as necessary.
25. Examine clamping screw for two positions, renew as necessary.
26. Check lifting pin for air valve for correct operation.

## Reassembling

## Cold start, control

27. Place the spring on the cold start spindle.
28. Fit the spring retaining clip.
29. Check that the discs slide easily on the spindle.
30. Place the cold start spindle on the starter face.
31. Place the starter cover in position.
32. Fit the return spring over the spindle.
33. Rotate the spindle until the oval port in the end disc is aligned with the oval port in the starter face.
34. Fit the cold start lever.
35. Engage the return spring over the lug on the starter cover and the back of the cold start lever.
36. Fit the cold start assembly to the carburettor body.
37. Check assembly for ease of operation.



IRC 1072

*Continued*

## FUEL SYSTEM

### Throttle spindle

38. Position the throttle spindle with the recessed end uppermost.
39. Position the screw head flats on the spindle toward the operator.

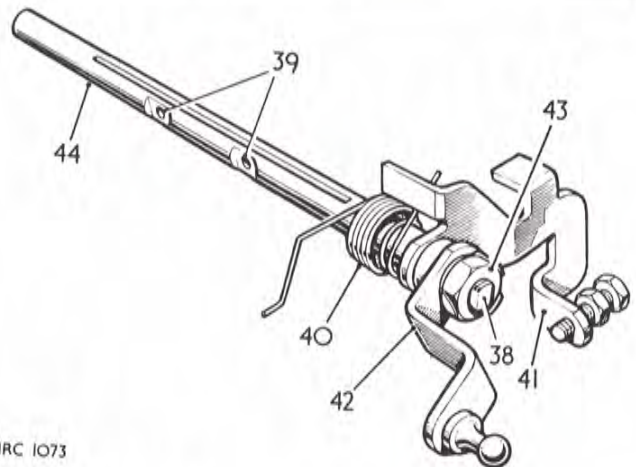
#### Zenith type 175 CD 2S

40. Place the return spring over the recessed end of the spindle.
41. Fit the throttle stop and fast idle lever.
42. Fit the throttle lever.
43. Secure the assembly with a bushed washer, tab washer and nut. Engage the tab washer.
44. Insert the throttle spindle from the cold start side of the carburettor body fitting the throttle return spring on the fast idle adjustment holder.
45. Tension the spring half a turn.
46. Fit the throttle butterfly, maintaining the previously marked alignment. Leave the retaining screws loose.
47. Actuate the throttle several times to centralise the butterfly, then tighten the retaining screws and lock by peening ends.
48. Fit the throttle stop adjusting screw until it touches the stop, then turn a further one and a half turns.

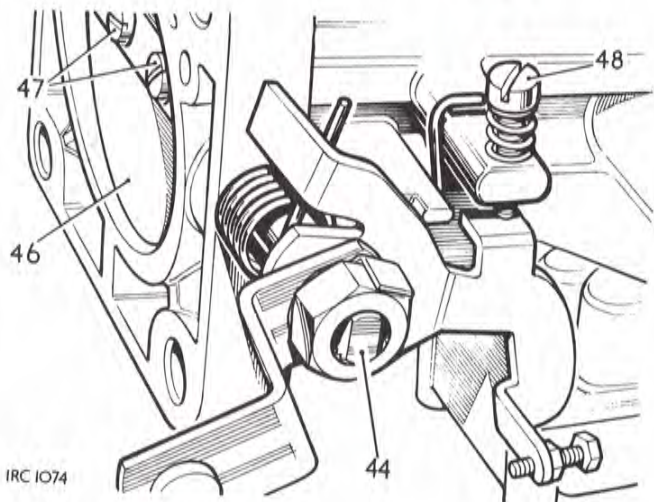
### Float chamber

49. Fit the needle valve and washer.
50. Locate the spindle into the float arm and engage the assembly in the retaining clips.
51. With the needle valve on its seating and the tab on the float carrier contacting the needle valve, measure the distance between the carburettor flange face and the highest point on the floats.
52. The dimension required for correct float level is 16 to 17mm (0.629 to 0.669in.). Adjust by bending the tab on the float carrier or fitting an additional washer under the needle seating.

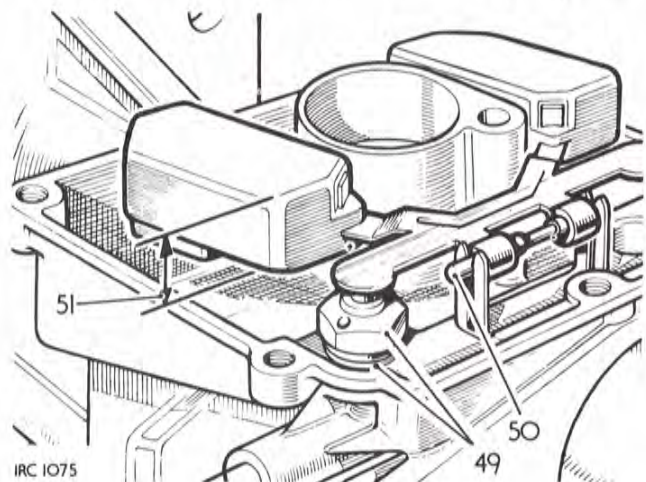
**NOTE:** The float carrier tab must be maintained at right angles to the needle in the closed position.



IRC 1073



IRC 1074



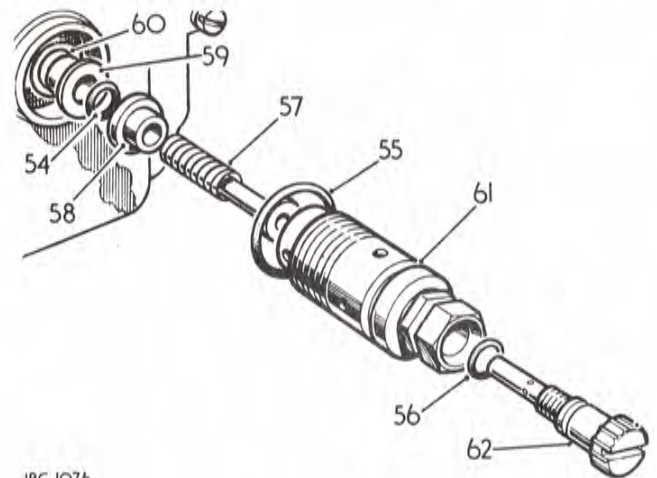
IRC 1075

53. Zenith type 175 CD 2S

52. Fit the float chamber and gasket but do not fully tighten the screws at this stage.

Jet assembly

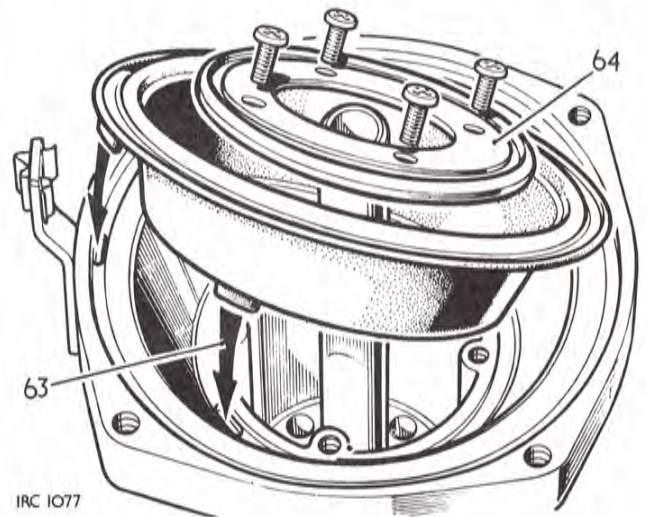
54. Fit the 'O' ring into the guide bush.  
 55. Fit the 'O' ring over the jet orifice carrier.  
 56. Fit the 'O' ring over the adjusting screw.  
 57. Place the spring over the jet orifice.  
 58. Fit the guide bush (thin flanged) onto the jet orifice.  
 59. Fit the top bush to the jet orifice.  
 60. Place a plain washer onto the top bush.  
 61. Place the jet orifice assembly into the carrier. Insert the assembly through the float chamber and fully tighten, then tighten the float chamber screws.  
 62. Fit the adjusting screw and adjust the jet orifice until it is in line with the top of the bushing.



IRC 1076

Air valve, shaft and diaphragm

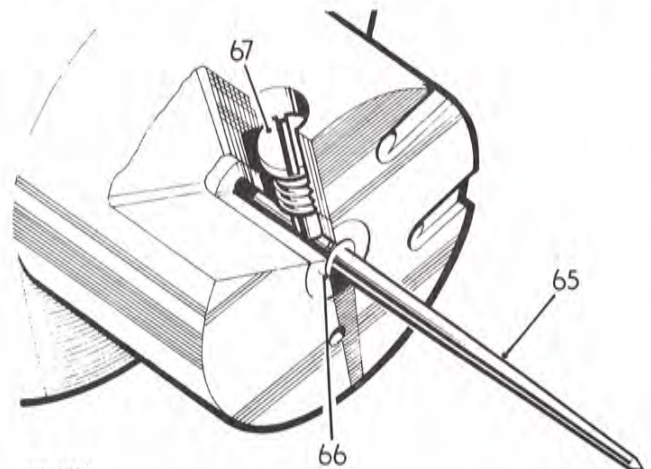
63. Locate the diaphragm onto the air valve with the tab engaged in the recess.  
 64. Fit the diaphragm retaining ring.  
 65. Locate the metering needle into the air valve.  
 66. Align the needle shoulder with the top surface of the air valve shaft.  
 67. Secure the needle in position.



IRC 1077

Jet centralisation

68. Locate the air valve and needle assembly into the carburettor and allow the air valve to bottom on the jet bridge. DO NOT push the valve down. If the valve does not bottom, unclamp the jet assembly sufficient to allow the valve to bottom. In this position, ensure that the locating tab on the diaphragm locates in the recess on the carburettor body.  
 69. Fit the air valve return spring and carburettor top cover.  
 70. Lift the air valve and tighten the jet assembly fully.  
 71. Slacken off the whole jet assembly approximately half a turn to release the orifice bush.



IRC 1078

Zenith type 175 CD 2S

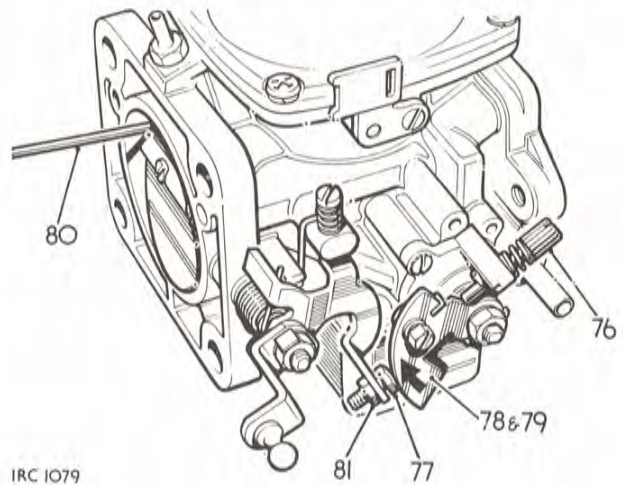
72. Allow the air valve to fall, if necessary assist by inserting a pencil in the dash pot. The needle will automatically centralise the jet orifice.
73. Slowly tighten the jet assembly, checking frequently that the needle remains free in the orifice. Check by raising the air valve approximately 6mm (0.250in) and allowing it to fall freely. The air valve should stop firmly on the bridge.
74. Fill the dashpot in the air valve to within 6mm (0.250in) of the top of the air valve shaft with SAE20 engine oil.
75. Fit the damper assembly to the dash pot and top cover.

Fast idle adjustment, carburettor removed

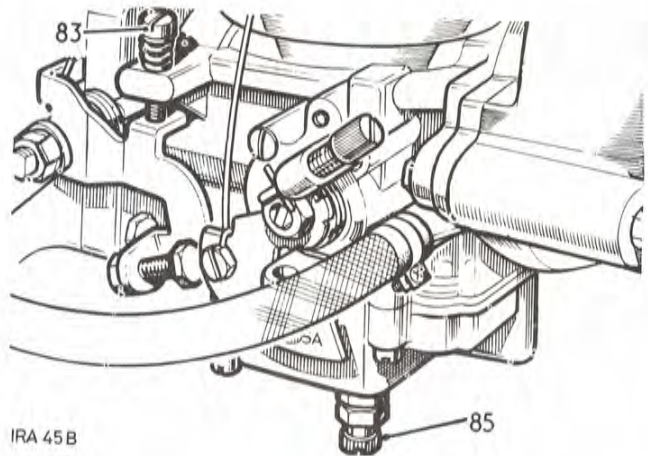
76. Set the cold start adjuster fully outward.
77. Slacken the fast idle adjusting screw.
78. Hold the cold start cam lever in the maximum position.
79. Adjust the fast idle adjusting screw against the cam lever to obtain a 1,0 to 1,1mm (0.039 to 0.043in) clearance between the top edge of the throttle butterfly and the carburettor barrel wall.
80. Measure the clearance using feeler gauges or a 1,1mm (No. 57) diameter drill shank.
81. Secure the fast idle adjusting screw locknut without disturbing the adjustment.
82. Refit the carburettor 19.15.09.

Slow running adjustment

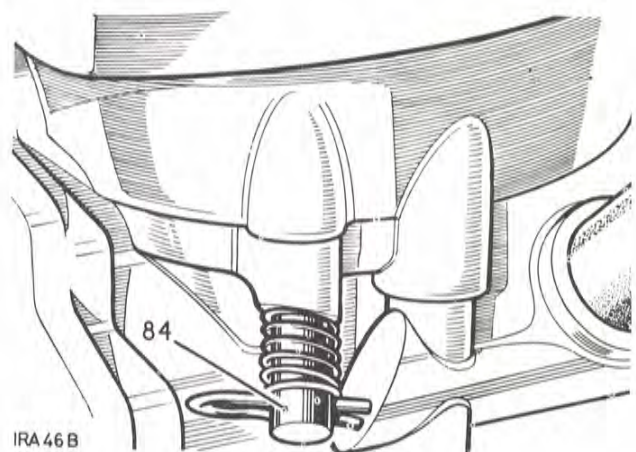
83. Run the engine until normal operating temperature is obtained. If necessary adjust slow-run screw to give the correct idling speed.
84. Lift the carburettor piston approximately 1 mm (0.031 in) by means of the lift pin situated on the right of the carburettor body (early models). There is approximately 5mm (0.187in) free movement of the lift pin before it contacts the piston. On later models, remove the air cleaner to gain access to the carburettor piston.
85. If the engine speeds up immediately the mixture is too rich and the jet adjustment screw must be turned anti-clockwise, thus weakening the mixture; if the engine stops immediately, the mixture is too weak and the jet adjustment screw should be turned clockwise to enrich the mixture.  
If the engine just falters and continues to run unevenly the adjustment is correct.
86. Finally adjust the slow-run screw to get a smooth idling speed.



IRC 1079



IRA 45B



IRA 46B

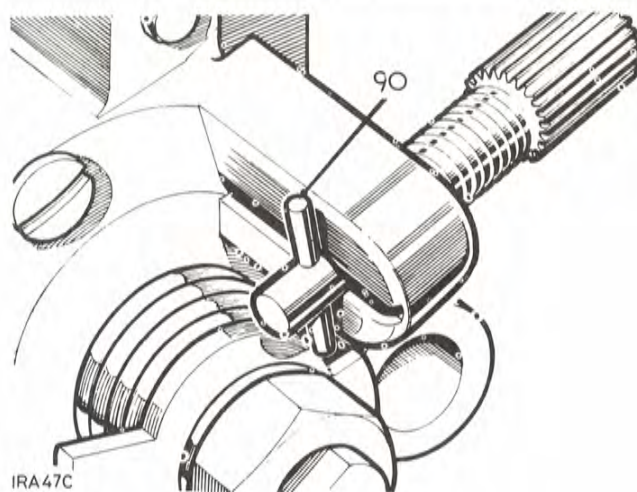
Zenith type 175 CD 2S

Fast-idle adjustment, carburettor fitted

87. Operate fully the cold start control
88. Adjust the fast-idle stop screw to obtain an engine speed of 1,000 to 1,200 rev./min.
89. Return the cold start control and ensure that the fast-idle stop screw is clear of the cam lever.

Low temperature starting

90. For starting at temperatures down to -18°C (0°F) push and turn the spring-loaded choke adjustment screw so that the peg is at right-angles to the slot as illustrated. Leave in this position.  
When starting at temperatures below -18°C (0°F) turn the screw until peg is recessed in slot.



DATA

Float height

Fast-idle setting, carburettor removed

Fast-idle setting, carburettor fitted

Idling speed

16 to 17 mm (0.629 to 0.669 in)

1,0 to 1,1 mm (0.039 to 0.043 in) clearance between throttle butterfly top edge and carburettor barrel.

1000 to 1,200 rev./min.

500 rev./min.

## FUEL SYSTEM

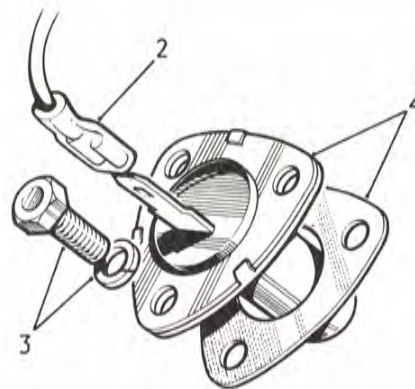
### THERMOSTAT SWITCH for cold start warning

light, Petrol models

—Remove and refit 19.15.50

#### Removing

1. Locate the switch at the front of the cylinder head, RH side for 2.6 litre models and LH side for 2¼ litre models.
2. Disconnect the electrical lead.
3. Remove the fixings.
4. Withdraw the switch and joint washer. If necessary, disconnect and move aside the crankcase breather pipe to obtain clearance for removal.



2RC 41

#### Refitting

5. Reverse 1 to 4.

## THROTTLE LINKAGE

—Remove and refit 19.20.07

#### General

The accelerator controls vary between different models; the following instructions are generally applicable but reference should be made to the exploded views and descriptions of accelerator controls for detail variations, refer to 19.00.00.

**NOTE:** On 2.6 litre models, access to the throttle linkage at the rear of the engine is best obtained by removing the gearbox tunnel cover. 76.25.07.

#### Removing

1. Disconnect the linkage return springs.
2. Disconnect the linkage adjacent to the pedal box.
3. Disconnect the linkage at the carburetter or fuel distributor pump.
4. Remove the RH retaining bracket from the engine compartment dash.
5. Withdraw the throttle linkage complete.

#### Refitting

6. Reverse 1 to 6 leaving the pinch bolts loose at this stage.
7. Depress the throttle pedal onto the stop on the toe box floor.
8. Hold the throttle linkage in the fully open position.
9. Tighten the linkage pinch bolts and release the pedal and linkage.
10. If necessary adjust the throttle pedal stop on the toe box floor and the return stop at the toe box to permit full and unrestricted throttle opening.

*Continued*



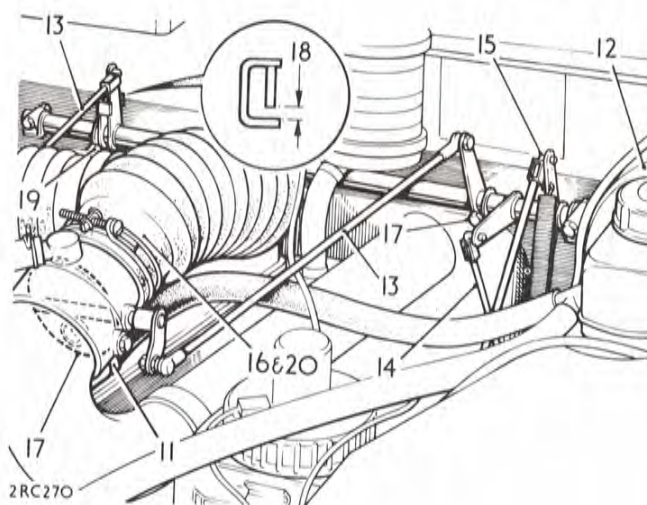


**Diesel models with servo-assisted brakes**

11. The vacuum supply for servo assistance is obtained via a non-return valve positioned downstream of a butterfly valve fitted to the induction manifold.
12. A vacuum supply is built up in the vacuum reservoir tank and servo unit during engine over-run conditions, that is with the accelerator linkage quickly closed on deceleration.
13. The linkages must be set such that the manifold butterfly will open slightly in advance of the fuel distributor pump linkage during acceleration, otherwise overfueling will result.

**Linkage setting**

14. Move the engine speed hand control fully to the idle position.
15. Ensure that the accelerator linkage is fully in the idle position.
16. Remove the air inlet hose from the induction manifold to obtain access to the manifold butterfly valve.
17. Ensure that the butterfly valve is fully closed, if necessary, adjust at the valve linkage pinch bolt at the cross shaft.
18. Ensure that clearance exists between the front arm of the cross shaft lever and the fuel distributor pump link.
19. Adjust at the lever pinch bolt as required to obtain the clearance.
20. Refit the air inlet hose.



## FUEL SYSTEM

### COLD START CONTROL CABLE, vehicles without steering column lock

—Remove and refit

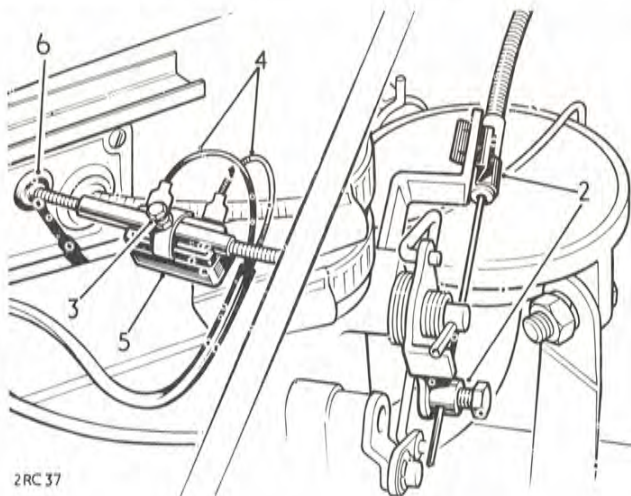
19.20.26

#### Removing

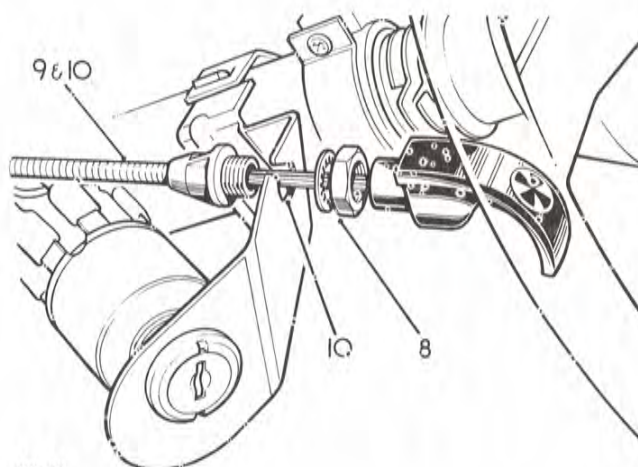
1. Disconnect the battery earth lead.
2. Disconnect the inner and outer control cables at the carburetter.
3. Slacken the locknut and release the retainer screw fixing the switch unit to the control cable.
4. Disconnect the white/blue lead from the front connector blade and the white/yellow lead from the rear blade.
5. Withdraw the switch unit.
6. Withdraw the cable grommet at the engine compartment dash.
7. Remove the fixings and withdraw the steering column switch shrouds to gain access to the control cable.
8. Remove the locknut and shakeproof washer fixing the outer cable to the mounting bracket.
9. Push the control forward to clear the hole in the mounting bracket.
10. Lift the control and pass the inner cable through the slot provided in the bracket.
11. Withdraw the control cable assembly complete.

#### Refitting

12. Reverse 1 to 11; ensure that the control knob is fully forward and the choke mechanism is fully open before clamping the inner cable at the carburetter.



2RC 37



2RC 38

### COLD START CONTROL CABLE, vehicles fitted with steering column lock

—Remove and refit

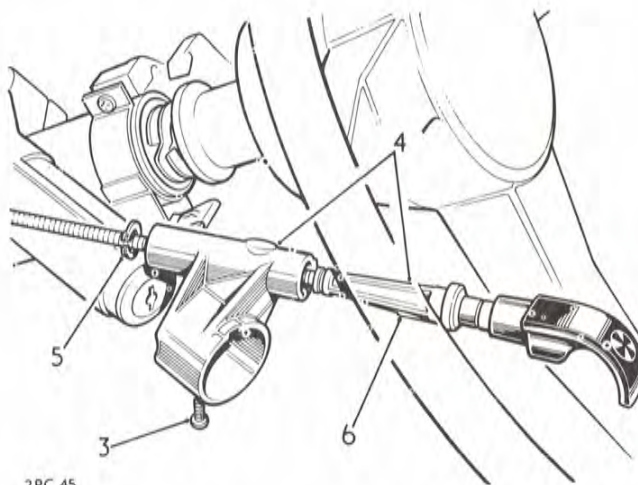
19.20.26

#### Removing

1. Carry out items 1 to 6 of the preceding operation as described for vehicles without steering column lock.
2. Remove the fixings and withdraw the steering column upper and lower shrouds.
3. Remove the cable housing locating screw.
4. Withdraw the control cable and housing complete from the steering column lock.
5. Remove the retaining circlip.
6. Withdraw the control cable assembly complete.

#### Refitting

7. Reverse 1 to 6 and check the control operation.



2RC 45

**HAND CONTROL, ENGINE SPEED, 2¼ litre Diesel models**

—Remove and refit

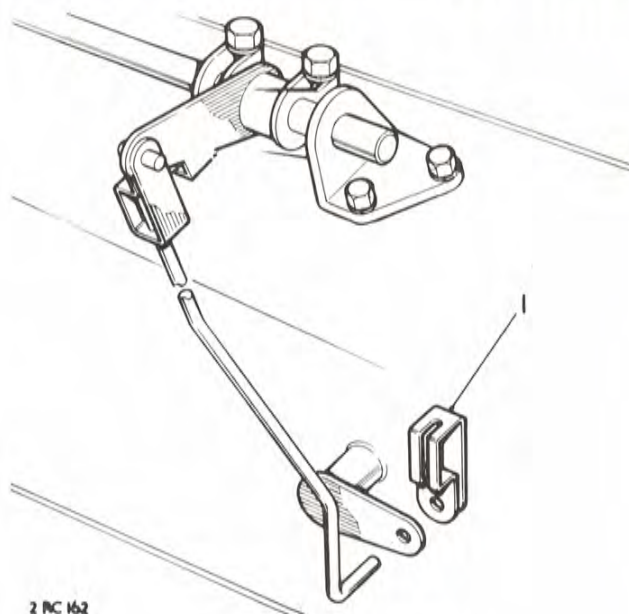
19.20.29

**Removing**

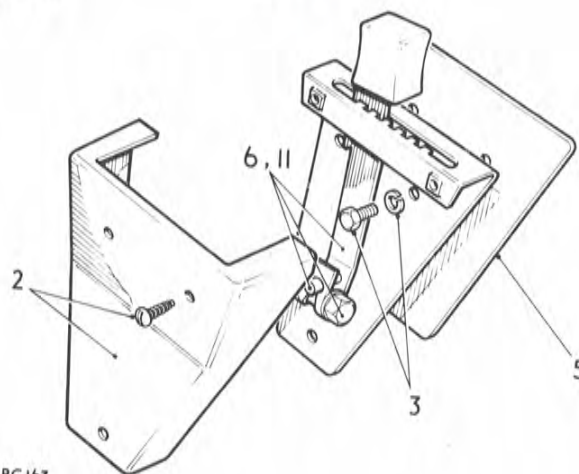
1. Disconnect the control rod lower end from the pivot lever in the engine compartment.
2. Remove the trim cover from the quadrant plate.
3. Remove the fixings, quadrant plate to dash.
4. Withdraw the quadrant plate and hand control lever.
5. Withdraw the sealing pad.
6. If required, make alignment marks for reassembly purposes, slacken the pinch bolt and withdraw the hand lever from the pivot lever and quadrant plate.

**Refitting**

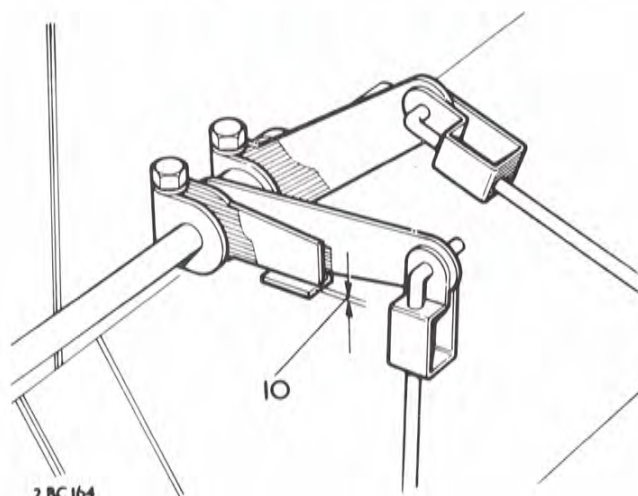
7. Reverse 1 to 6. If adjustment is required, proceed as items 8 to 11.
8. Move the hand control lever to the minimum speed position (LH side of the quadrant).
9. Ensure that the fuel distributor pump linkage is in the idle speed position.
10. Check for a minimum clearance between the lift arm on the actuator lever and the cross shaft relay lever.
11. To adjust, slacken the hand control lever pinch bolt and rotate the pivot lever in the required direction. Tighten the pinch bolt.



2 RC 162



2 RC 163



2 RC 164



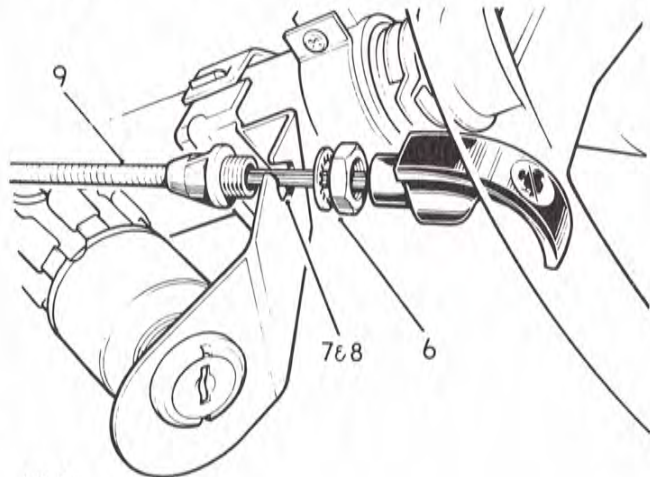
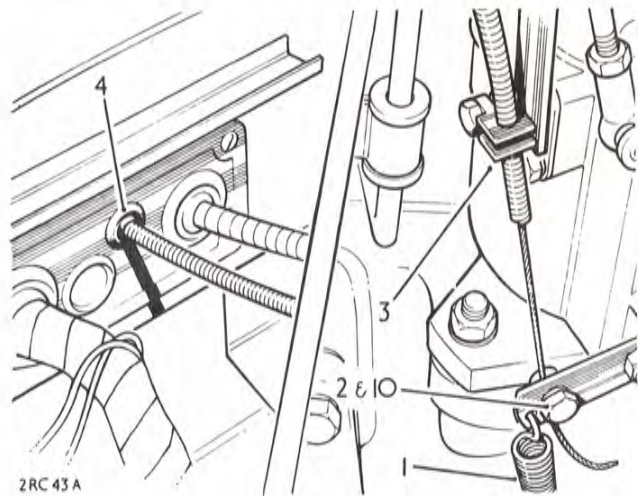
### ENGINE STOP CONTROL CABLE, vehicles without steering column lock

—Remove and refit

19.20.32

#### Removing

1. Disconnect the injection pump cut-off lever return spring.
2. Disconnect the control inner cable at the cut-off lever.
3. Disconnect the control outer cable at the support bracket.
4. Withdraw the cable grommet at the engine compartment dash.
5. Remove the fixings and move aside the steering column upper and lower shrouds to gain access to the control cable.
6. Remove the locknut and shakeproof washer fixing the outer cable to the mounting bracket.
7. Push the control forward to clear the hole in the mounting bracket.
8. Lift the control and pass the inner cable through the slot provided in the bracket.
9. Withdraw the control cable assembly complete.



#### Refitting

10. Reverse 1 to 9; ensure that when the control is operated, full movement is obtained at the injection pump cut-off lever.

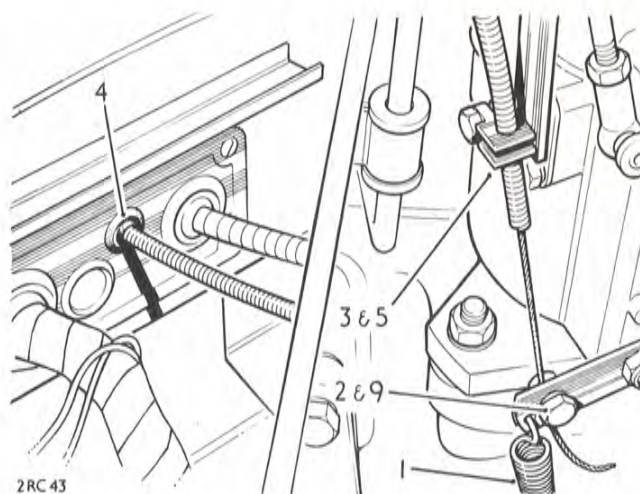
**ENGINE STOP CONTROL CABLE, vehicles fitted with steering column lock**

—Remove and refit

19.20.32

**Removing**

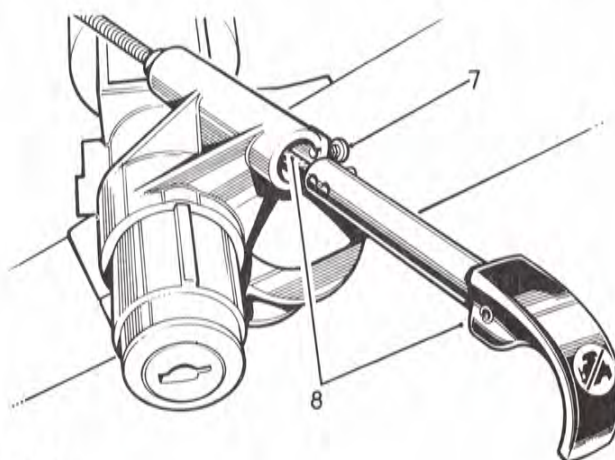
1. Disconnect the injection pump cut-off lever return spring.
2. Disconnect the control inner cable at the cut-off lever.
3. Disconnect the control outer cable at the support bracket.
4. Withdraw the cable grommet at the engine compartment dash.
5. Withdraw the control outer cable from the inner cable.
6. Remove the steering column upper and lower shroud fixings and move aside the shrouds.
7. Slacken the control rear stop screw sufficient to allow the internal stop pin to clear the screw end.
8. Withdraw the control knob and inner cable assembly.



2RC 43

**Refitting**

9. Reverse 2 to 8 but do not secure the control inner cable at this stage.
10. Move the control knob to the 'engine stop' position, that is with the cable ferrule abutting the internal stop lever in the control housing.
11. Move the injection pump cut-off lever fully into the fuel cut-off position.
12. Secure the control inner cable to the fuel cut-off lever.
13. Reverse 1. Ensure that the stop control moves fully forward into the 'engine start' position when the electrical services and starter key is inserted and turned clockwise to the II position.
14. Ensure that with the stop control pulled fully rearwards and the starter key removed, the stop control remains engaged in the 'engine stop' position.



2RC 44



## FUEL SYSTEM

### FUEL DISTRIBUTOR/INJECTION PUMP

—Remove and refit

19.30.07

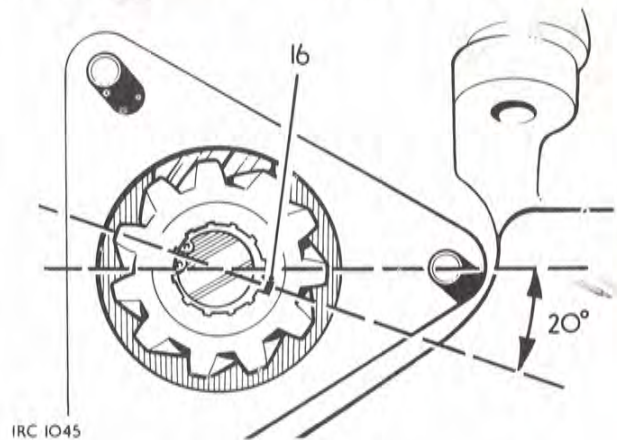
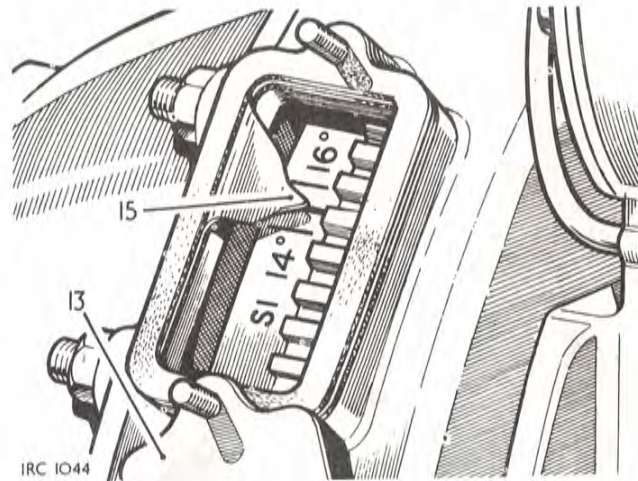
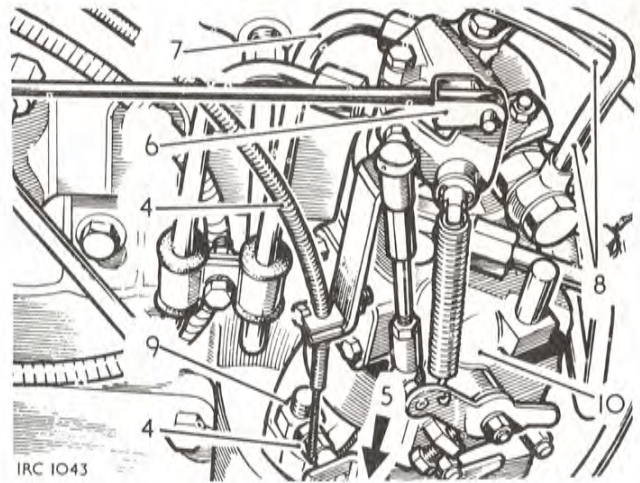
Service tool            605863, Timing gauge

#### Removing

1. Remove the bonnet panel, 76.16.01.
2. Remove the air cleaner, 19.10.01.
3. Disconnect the battery earth lead.
4. Disconnect the engine stop cable.
5. Disconnect the stop lever return spring.
6. Disconnect the accelerator linkage at the securing clip.
7. Remove the fuel pipes, distributor pump to injectors.
8. Disconnect the inlet and outlet fuel pipes from the distributor.
9. Remove the distributor pump fixings.
10. Withdraw the distributor pump.
11. Withdraw the distributor pump drive shaft.

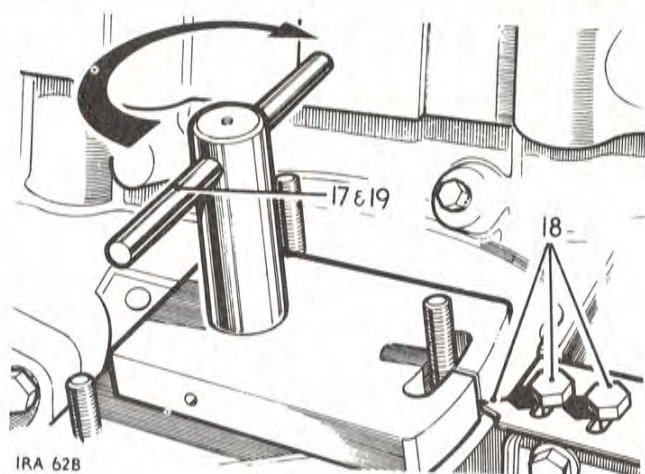
#### Refitting and timing procedure

12. Remove the engine rocker cover.
13. Slacken the fixings and move aside the inspection cover on the flywheel housing to expose the timing pointer adjacent to the flywheel.
14. Turn the crankshaft in the direction of rotation until both valves of number one cylinder are closed and the piston is ascending the bore on the compression stroke.
15. Continue to turn the crankshaft until the timing pointer is midway between the 14° and 16° marks on the flywheel, that is 15° BTDC. This must be done carefully. If the flywheel is inadvertently turned too far and the timing mark goes past the pointer, do not turn the flywheel back, but repeat the operation. Ensure that a correct line of vision is taken when lining up the timing marks. An incorrect line of vision can result in the timing being 1° to 2° out.
16. The master spline on the driving gear should now be approximately 20° from the centre line of engine measured from the front end, that is, at the 4 o'clock position.



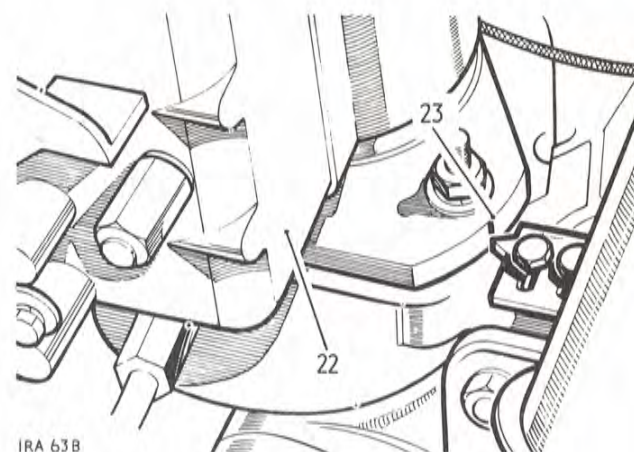
*Continued*

17. Insert the timing gauge, 605863, into the driving gear, then twist gauge in a clockwise direction to take up backlash and any wear in the gears.
18. Hold in this position, then, if necessary, slacken off bolts retaining timing pointer on side of cylinder block. Adjust pointer so that it coincides with the line on timing gauge, as illustrated, then retighten the bolts.
19. Remove timing gauge.
20. Rotate driving gear on distributor pump so that master spline lines up with master spline on engine driving gear.
21. Fit the pump drive shaft, longer splines last, to the engine driving gear, engaging the master spline.
22. Fit the distributor pump to the engine engaging the master splines on the pump and the drive shaft. Do not tighten the fixings at this stage.
23. Align the vertical mark on the pump flange with the pump timing pointer, then tighten the pump fixings.
24. Reverse 3 to 8 and 12 and 13.
25. Prime the fuel system. 19.50.01.



**Setting the distributor pump control screws**

26. On distributor pumps with the maximum output control screw sealed, the control screw setting must not be altered. Adjustment is allowed to the slow-running control screw only.
27. However, when a new or reconditioned distributor pump is to be fitted, it will be found that the slow-running control screw is loosely attached to the distributor pump and that the maximum output control screw is not sealed.
28. It is necessary, therefore, after the distributor pump has been assembled to the engine, first to fit the slow-running control screw and then adjust both screws as detailed in items 29 to 34.



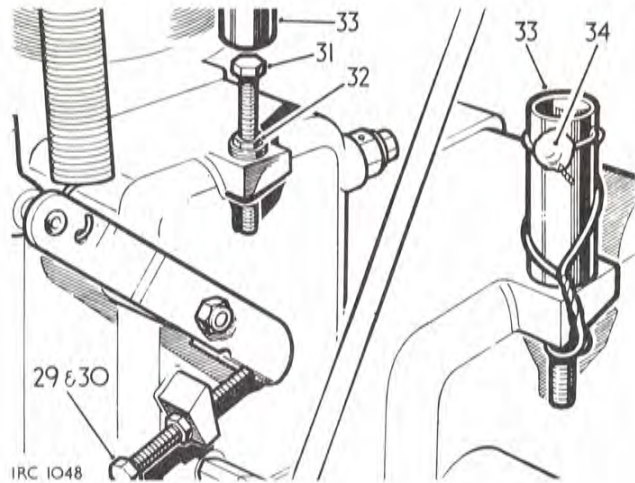
*Continued*



## FUEL SYSTEM

### Slow-running control screw adjusting

29. Adjust the control screw until the engine slow-running speed is  $590 \pm 20$  rev./min. This may be checked using a suitable revolution counter, or by adjusting the control screw until the lowest engine speed consistent with smooth, even running is achieved.
30. To adjust the slow-running control screw, proceed as follows:
  - a. Check engine speed with revolution counter.
  - b. Slacken adjusting screw locknut and screw inwards to increase speed and outwards to decrease.
  - c. When a slow-running speed of  $590 \pm 20$  rev./min. has been obtained, tighten locknut.
  - d. Remove revolution counter.



### Maximum output control screw adjusting

31. Adjust the control screw, where necessary, until the engine maximum speed is  $4200 \pm 20$  rev./min. This may be checked using a suitable revolution counter, or by road test; the road speed equivalent of 4200 rev./min. being 48 mph (77 kph) in third gear.
32. When maximum engine speed of  $4200 \pm 20$  rev./min. has been obtained, tighten locknut.
33. Fit the adjusting screw collar.
34. Wire lock and seal the screw collar.
35. Reverse 1 and 2.

### DATA

Injection timing setting  
Idling speed  
Maximum speed setting (sealed)

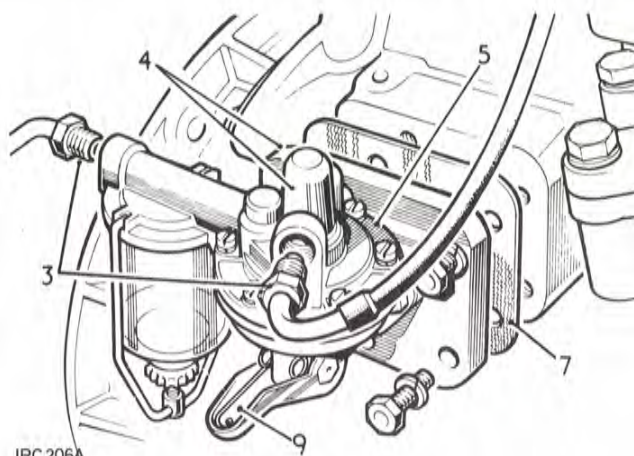
$15^\circ$  BTDC  
 $590 \pm 20$  rev./min.  
 $4,200 \pm 20$  rev./min.



**FUEL LIFT PUMP, 2½ litre models**

—Remove and refit 19.45.09

1. Remove bonnet panel. 76.16.01.
2. Remove air cleaner. 19.10.01.
3. Disconnect fuel pipes at fuel pump.  
**NOTE:** The pump illustrated is for 2½ litre Petrol models. The Diesel engine pump is similar except that no filter bowl is required.
4. Remove the fixings and withdraw the pump and side cover complete.
5. Remove the fuel pump from the side cover.



**Refitting**

6. Refit pump to cover.
7. Smear general purpose grease on both sides of the joint washer.
8. Refit the fuel pump and joint washer and connect the fuel pipes.
9. Prime the fuel pump by operating the hand prime lever until no resistance is felt.
10. Diesel models. Release the air vent screws on the fuel distributor casing (19.50.01 refers) and operate the pump hand prime lever until the fuel flow from the vent screws is free of air. Close the vent screws.
11. Reverse 1 and 2.

**FUEL LIFT PUMP, 2.6 litre models**

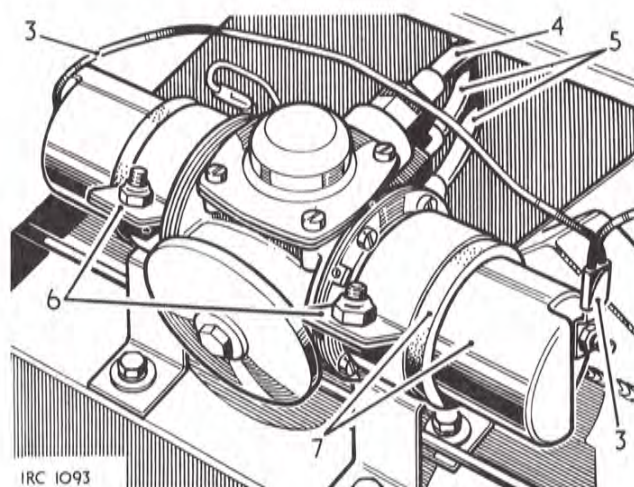
—Remove and refit 19.45.09

**Removing**

1. Disconnect the battery leads.
2. Lift the seat (RH side) and remove the seat box panel to expose the fuel pump.
3. Disconnect the wiring at the 'Lucar' connectors.
4. Disconnect the fuel outlet pipe.
5. Disconnect the fuel inlet pipes.
6. Remove the clamp fixings.
7. Withdraw the pump and mounting rubbers.

**Refitting**

8. Reverse 1 to 7.



## FUEL SYSTEM

### FUEL LIFT PUMP, 2¼ litre models

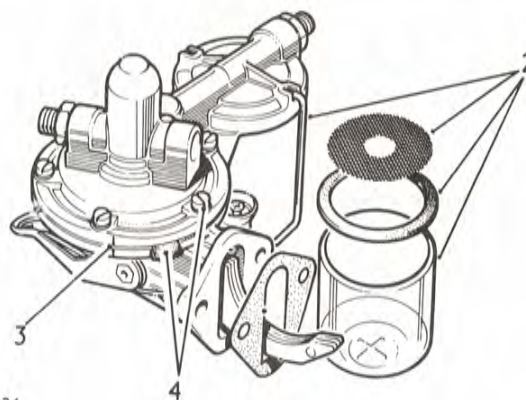
—Overhaul

19.45.16

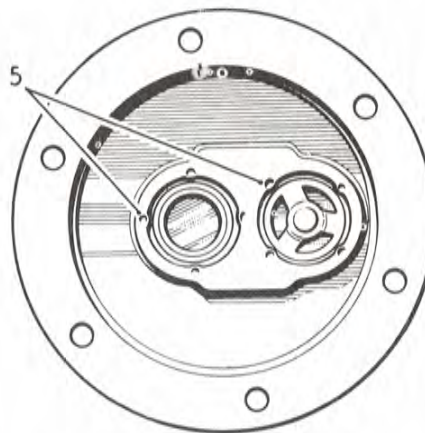
#### Dismantling

1. Remove the lift pump. 19.45.09
  2. 2¼ litre Petrol. Unscrew the nut at base of sediment bowl, move the retainer aside, and withdraw the bowl, sealing washer and filter gauze. Care should be taken to avoid damage to filter gauze.
  3. Mark the upper and lower halves of pump casing to ensure correct alignment on reassembly.
  4. Remove top cover fixing screws, and while pressing diaphragm tab against pump body, lift top cover clear.
  5. If required, remove the valves retaining staking using a scraper, warm the top cover and withdraw the valves.
- NOTE:** Note the valves fitted position before removing.
6. Ease the diaphragm from pump body, slightly depress metal part of diaphragm and turn through 90° in either direction, whereon the diaphragm spring will push diaphragm clear.
  7. File the peening marks from the oil seal housing and lever out oil seal and retainer.

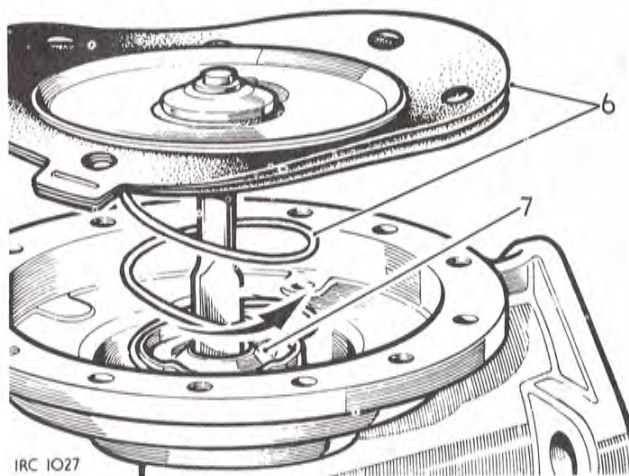
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IRC 1024



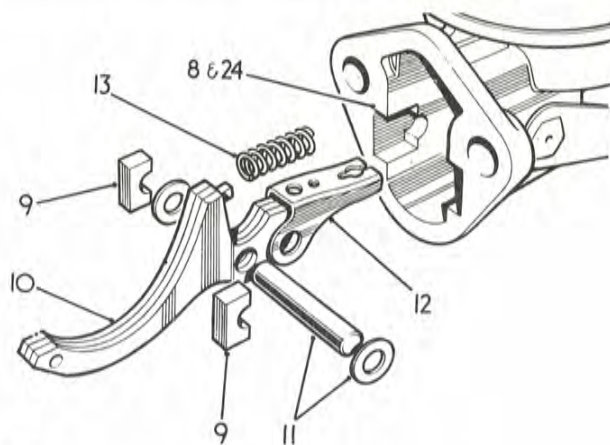
IRC 1026



IRC 1027

(2¼ litre models)

8. Using a small chisel, remove the staking from the rocker arm retainers.
9. Withdraw the retainers.
10. Withdraw the rocker arm.
11. Withdraw the rocker arm pin and washers.
12. Detach the operating link.
13. Withdraw the rocker arm spring.
14. It is extremely unlikely that the hand priming mechanism will ever require replacement, but may be removed by filing the hexagon each side of the operating lever and springing the hand lever clear, withdraw the cork washers and hand rocker.



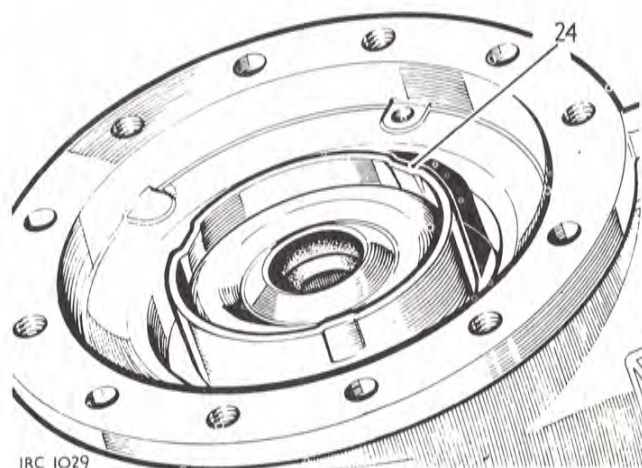
IRC 1028

**Inspecting**

15. Clean all parts thoroughly in paraffin.
16. Examine all parts for wear and replace as necessary.
17. Replace all gaskets.
18. Sediment bowl filter disc must be free of damage and fit tightly round inlet neck of upper casing. (2¼ Petrol models).
19. Renew diaphragm assembly if any sign of hardening, cracking or porosity is present.
20. Only very slight wear should be tolerated at the rocker arm contact face, pivot pin, operating link and diaphragm pull rod slots.
21. Springs should be replaced, ensure correct type are used.
22. Test valves for air tightness, by suction.
23. Check upper and lower casing flanges for distortion, using a straight edge.

**Reassembling**

24. Reverse 7 to 13. Re-stake to secure the rocker lever retainers and the oil seal retainer.



IRC 1029

*Continued*

### (2½ litre models)

25. To refit the diaphragm assembly, hold the pump body with the diaphragm return spring in position, and the rocker arm held outwards. Position the diaphragm over the spring with the flattened end of the pull rod in line with the slot in the operating link. Push the diaphragm inwards and turn to lock.
26. Fit the valve gaskets into the top cover.
27. Fit the inlet and outlet valves and secure by staking.
28. Place top cover assembly in position, aligning the marks made before dismantling. Fit securing screws, but do not tighten at this stage; using hand priming lever, fully depress diaphragm and fully tighten securing screws.

**NOTE:** The diaphragm outer edges should be approximately flush with the outer edge of the pump joint faces when fitted, any appreciable protrusion of the diaphragm beyond the joint face edges indicates improper fitment and necessitates the release of the securing screws and refitment in accordance with item 28.

29. 2½ litre Petrol. Replace filter gauze and neoprene sealing ring, refit retaining clip and position sediment bowl centrally and secure with retaining clip.

**NOT NOTE:** Do not overtighten securing nut, to prevent cracking of sediment bowl.

### Fuel pump test: without special equipment

30. Immerse pump in a bath of paraffin and operate rocker arm several times to flush.
31. Hold the pump clear of the bath and continue to operate the rocker arm until the pump is empty, then place a finger over the inlet port and operate rocker arm several times. A distinct suction should be heard when the finger is removed from the inlet port, denoting that a reasonable degree of suction has been developed.
32. Place a finger over the outlet port and again operate the rocker arm. Air pressure should be felt for two to three seconds after rocker movement has ceased. Build up the air pressure in the pump again, and with the finger held firmly over the outlet, submerge the pump completely in the paraffin bath, then observe the joint face edges for signs of air leakage.
33. Reverse 1.



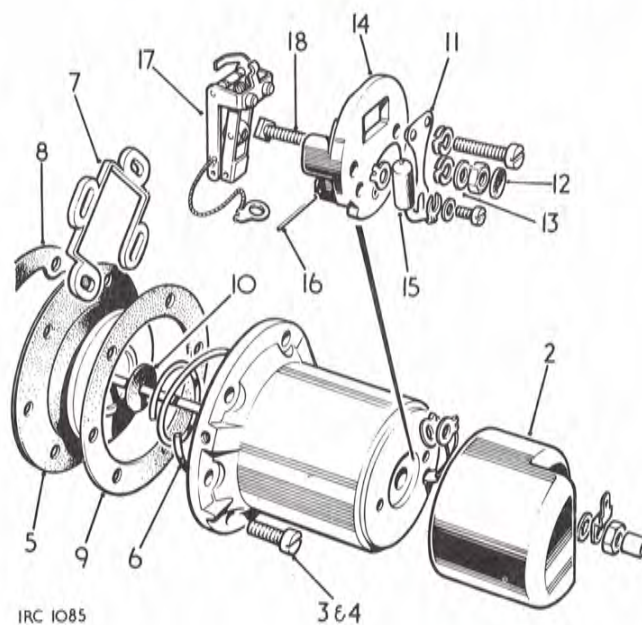
FUEL LIFT PUMP 2.6 litre models

—Overhaul

19.45.16

Dismantling

1. Remove the fuel pump. 19.45.09.
2. Remove the end cover.
3. Make alignment marks on the coil housing and pump body for reassembly purposes.
4. Remove the coil housing from the pump body.
5. Ease the diaphragm assembly away from the coil housing joint face, then unscrew anti-clockwise and withdraw the diaphragm.
6. Withdraw the armature spring.
7. Withdraw the armature centralizer clip.
8. Withdraw the diaphragm joint washer.
9. Withdraw the pump body joint washer.
10. Withdraw the impact washer from the armature spindle.



Dismantling the contact breaker assembly

11. Remove the spring blade contact.

2.6 litre models

12. Lift off the seating washer.
13. Prevent the electrical lead eyelet from rotating and remove the terminal screw nut and lead washer.
14. Make alignment marks for reassembly purposes and remove the end plate.
15. Lift off the condenser.
16. Remove the contacts pivot pin.
17. Withdraw the contacts assembly.
18. Withdraw the terminal screw from the end cover.
19. Repeat 2 to 18 to dismantle the second pump unit.

*Continued*



## 2.6 litre models

### Dismantling the pump body

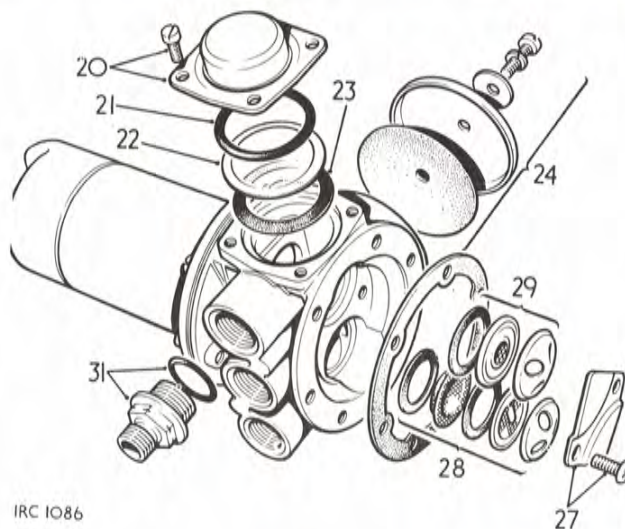
20. Remove the air bottle dome.
21. Withdraw the 'O' ring seal.
22. Lift out the plastic diaphragm.
23. Withdraw the diaphragm joint washer.
24. Remove the dished cover and joint washer.

### Removing the valve assemblies

**NOTE:** The outlet valve assembly comprises a Melinex valve disc within a pressed steel cage.

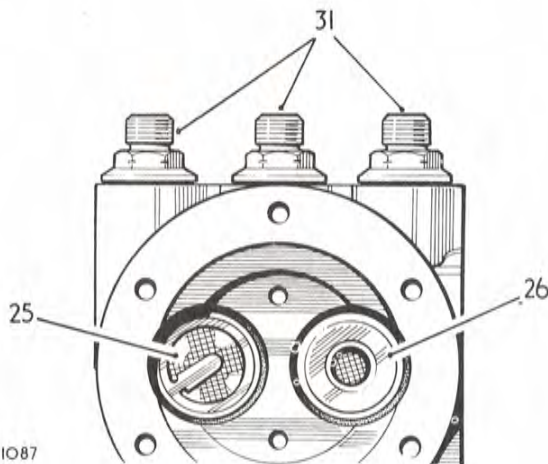
The inlet valve assembly comprises an identical valve which is assembled in the reverse direction.

Note the fitted position of the valves as follows: 25 and 26.



IRC 1086

25. The inlet valves (with the cruciform disc visible through the holes in the valve covers) are located in line with the two inlet tappings.
26. The outlet valves (with the valve plain side visible through the holes in the valve covers) are located adjacent to the air diaphragm housing.
27. Remove the clamping plate at one side of the pump body.
28. Withdraw the inlet valve cover, inlet valve, sealing washer, filter and further sealing washer.
29. Withdraw the outlet valve cover, outlet valve and sealing washer.
30. Repeat items 27 to 29 at the other side of the pump body to remove the remaining valves.
31. Remove the three pipe unions and 'O' ring seals.



IRC 1087

*Continued*

2.6 litre models

Inspection and cleaning

Pump body cleaning

- 32. Thoroughly clean all internal passageways and chambers with clean fuel.
- 33. Check all flanges for distortion, using a straight edge.
- 34. Renew diaphragm gaskets and examine all components for wear and damage and renew as necessary.

Electric pump inspection

- 35. Renew diaphragm if any signs of deterioration, damage or wear are present.
- 36. Inspect contact points and renew as necessary.
- 37. Continuity test magnet assembly.
- 38. The purpose of the condenser is to prevent arcing of the contact breaker points; if the points are badly burnt, the condenser should be tested and renewed if faulty.
- 39. Check all electrical wiring for serviceability.

Assembling

Pump body

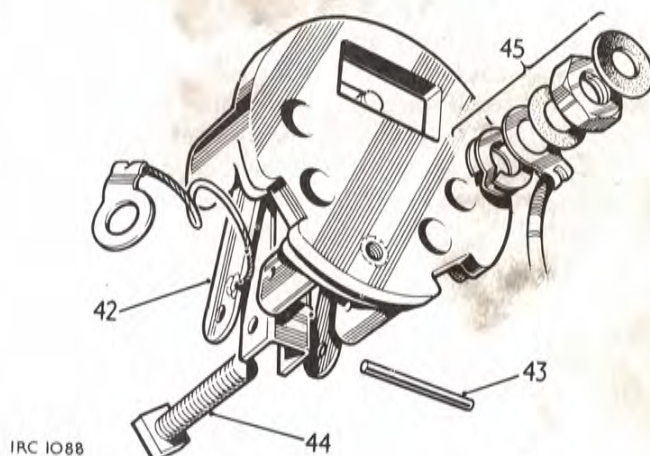
- 40. Reverse 27 to 31 to fit the valves and unions.
- 41. Reverse 20 to 24, fitting the plastic diaphragm with the convex face facing inwards.

Contacts assembly

- 42. Place the lower contacts assembly in position on the end plate with the contact pads facing the aperture in the plate.
- 43. Align the holes and insert the pivot pin.
- 44. Fit the terminal screw to the end plate.

2.6 litre models

- 45. Fit the spring washer, feed lead terminal, lead washer countersunk nut and rubber seating washer to the terminal screw.



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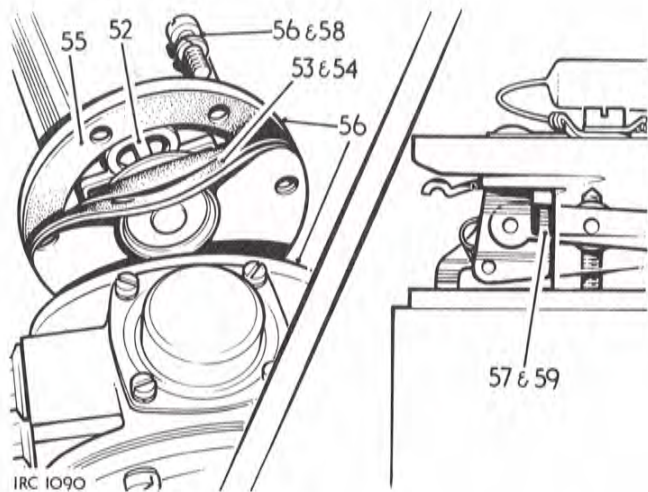
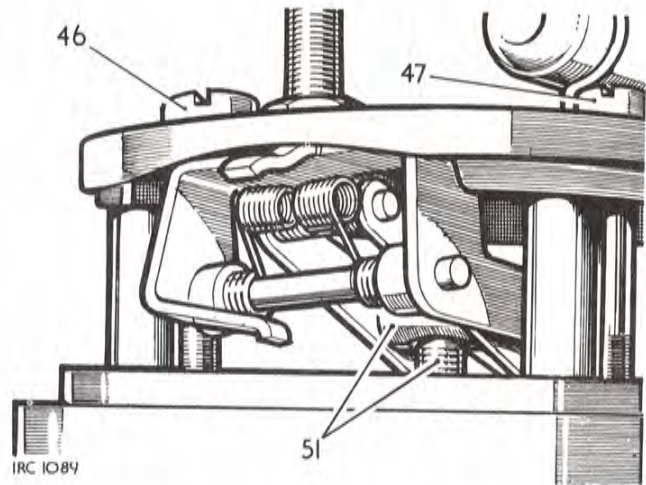
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46. Position the end plate assembly on the coil housing; fit the retaining screw and spring washer nearest to the terminal screw.
47. Position the condenser eyelet and earth lead eyelet on the end plate and secure with the remaining end plate fixing.

**Diaphragm assembly**

48. Fit the armature return spring with the larger diameter toward the coil.
49. Fit the impact washer to the recess in the armature face.
50. Position the joint washer on the coil housing.
51. Screw the diaphragm rod in through the coil housing to engage the nut retained in the lower contact assembly.
52. Fit the centraliser clip to the armature. Actuate the diaphragm by hand and centralise the armature clip with the housing.
53. Hold the magnet assembly in the left hand in an approximately horizontal position. Push the armature in firmly but steadily, with the thumb of the right hand.
54. If the contact breaker throws over, the armature should be screwed in further until it ceases to do so. It should then be unscrewed one-sixth of a turn at a time until a position is found at which the contact breaker just throws over, care being taken to avoid jerking the armature. The armature should then be unscrewed for two-thirds of a turn, i.e. four holes; the setting is then correct.
55. Position the joint washer on the pump body.
56. Fit the coil housing to the pump body with the drain hole 180° away from the air bottle cover on the pump body. Do not tighten the fixings at this stage.
57. Lift evenly and fully the inner contact arms which carry the diaphragm rod nut and retain the arms in this position.
58. With the diaphragm thus stretched to its outermost position, tighten the coil housing fixings.
59. Release the inner contact arms.



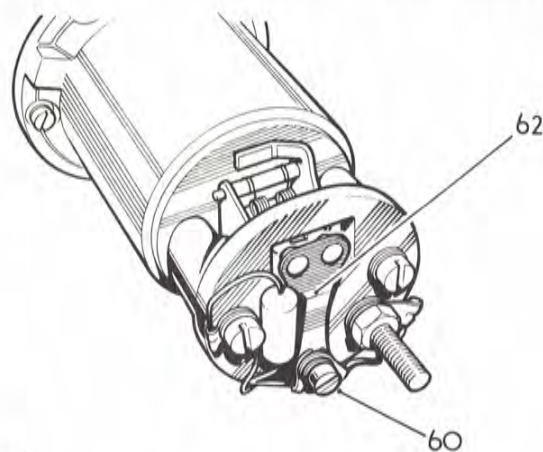


2.6 litre models

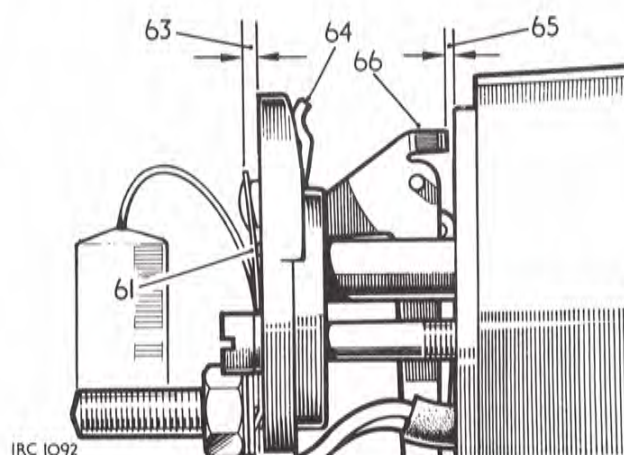
60. Fit the spring blade contact and secure with a screw, together with the condenser and feed leads. The slotted anchor hole in the blade allows the contacts to be positioned so that a wiping action over the centre line of the contact faces takes place when the pump is operating.

Contact point adjustment

61. Check that with the inner contact pads pulled away from the outer pads, the spring blade rests on the narrow rib which projects slightly above the end plate face.
62. To adjust, remove the spring blade and bend it sufficiently so that when refitted it rests against the rib. Do not over-tension the spring blade.
63. With the contact points engaged, check the lift of the spring blade tip above the end plate, using a feeler. This must be 0,76 to 1,01mm (0.030 to 0.040in).
64. Adjustment is made by bending the stop finger beneath the end plate.
65. Check the dimension between the lower stop finger and the coil housing. This must be 1,65 to 1,90mm (0.065 to 0.075in).
66. Adjustment is made by bending the lower stop finger.
67. Repeat items 42 to 66 to assemble second pump unit.



IRC 1091



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Functional test

68. Test fuel pump. It is best to use a cut-away cover while testing the pump, as this prevents the hinge pin from falling out, and at the same time makes it possible to observe the action of the contact breaker. The pump should be mounted three feet above the supply tank for testing; either paraffin or petrol may be used. When switched on, the pump should prime itself promptly, and fluid should flow from the outlet union. If the pump outlet is restricted, the pump should slow down gradually, and if completely cut off it should stop for at least 15 seconds.
69. After test procedure refit top cover, Lucar blade and securing nut.
70. Refit the pump. 19.45.09.

DATA

Contact levers settings

Clearance of spring blade tip above end plate  
Dimension between lower stop finger and coil housing

0,76 to 1,01mm (0.030 to 0.040in)  
1,65 to 1,90mm (0.065 to 0.075in)



## FUEL SYSTEM

### FUEL SYSTEM, 2¼ litre Diesel models

#### —Priming

19.50.01

- Procedure after dismantling filter/sedimentor, items 1 to 6.
- Procedure after emptying fuel system, items 7 to 12.
- Procedure after emptying distributor pump, item 13.

#### Procedure after fuel filter/sedimentor dismantling

**NOTE:** When models fitted with a sedimentor have had the water drained only from the sedimentor bowl, no priming is necessary as the water is replaced by fuel automatically syphoned from the tank. However, if the sedimentor has been dismantled or air has entered the body, or where the fuel filter element has been replaced or the filter bowl cleaned, then the system must be primed as follows:

1. Do not attempt to start the engine hoping to draw the fuel through in this way, otherwise the full priming procedure will be necessary.
2. Slacken the bleed pipe banjo bolt on the top of the main fuel filter.
3. Operate the hand priming lever on the mechanical pump, until fuel free from bubbles emerges.

**NOTE:** Always ensure that fuel pump lever is on the bottom of the operating cam when priming the fuel system, otherwise maximum movement of the priming lever will not be obtained.

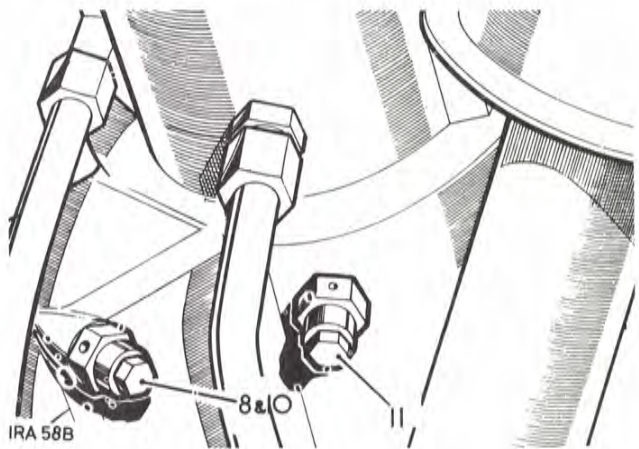
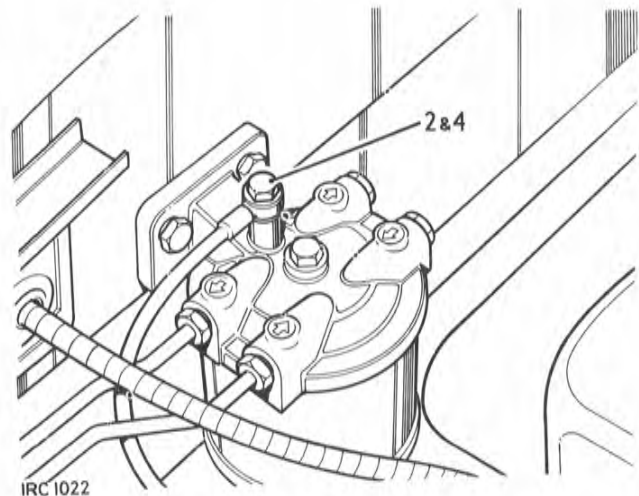
4. Tighten the bleed pipe banjo bolt with fuel still emerging.
5. Operate the hand priming lever once or twice to clear the last bubbles of air into the filter bleed pipe.
6. Start engine in normal way and check for leaks.

#### Procedure when fuel system has been emptied

7. Carry out operations above, 1 to 5 inclusive.
8. Release air vent screw on distributor body.
9. Operate the fuel pump hand priming lever until fuel free of air emerges.
10. Retighten the air vent screw.
11. To ensure that all air is exhausted from the pump it may also be necessary to slacken air vent screw in the distributor control cover and repeat items 9 and 10.
12. Start the engine in the normal way and check for leaks.

#### Procedure when distributor pump only has been drained.

13. Carry out items 8 to 12 inclusive.

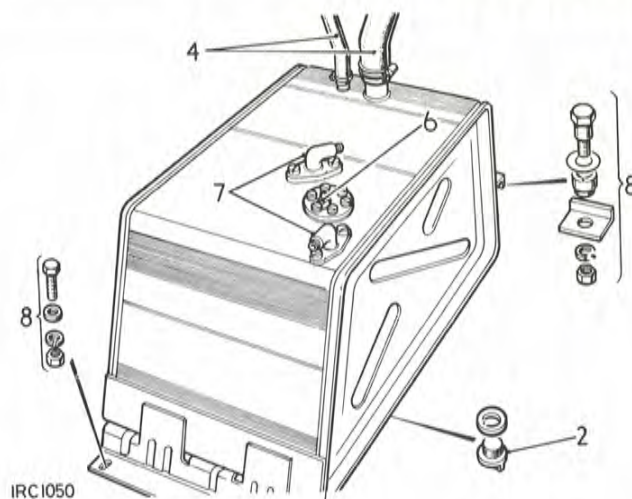


**FUEL TANK, side mounted (as applicable)**

—Remove and refit 19.55.01

**Removing**

1. Disconnect the battery earth lead.
2. Drain fuel into a clean container.
3. Remove RH seat cushion and fold seat squab forward.
4. Disconnect hoses, tank to filler tube and breather hose.
5. Remove cover panel for fuel tank.
6. Disconnect wires at gauge unit.
7. Disconnect fuel supply pipe and for Diesel models spill return pipes.
8. Support tank and remove tank securing bolts.
9. Lower tank and remove from under the vehicle.



**Refitting**

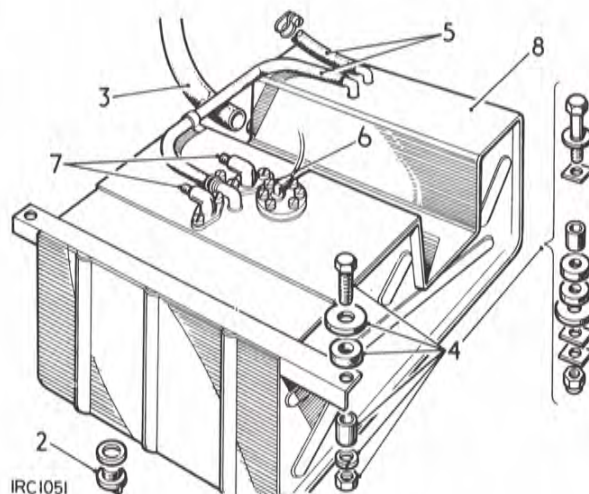
10. Reverse 1 to 9.
11. If the vehicle is a Diesel model, prime the fuel system. 19.50.01.

**FUEL TANK, rear mounted (as applicable)**

—Remove and refit 19.55.01

**Removing**

1. Disconnect the battery.
2. Drain the fuel into a clean container.
3. Release the clip securing the filler tube hose to the tank.
4. Support the tank and remove the tank securing bolts, then lower the tank sufficient only to give access to the pipes and leads at the tank top.
5. Disconnect the breather and air balance pipes.
6. Disconnect wires at gauge unit.
7. Disconnect the fuel supply pipe, and for Diesel models, the spill return pipe.
8. Lower the tank and remove from under the vehicle.



**Refitting**

9. Reverse 1 to 8.
10. If the vehicle is a Diesel model, prime the fuel system. 19.50.01.



## FUEL SYSTEM

### FUEL INJECTORS

—Remove and refit

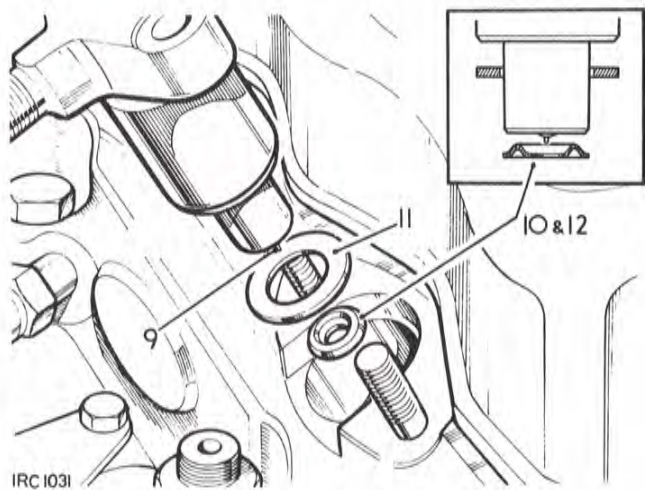
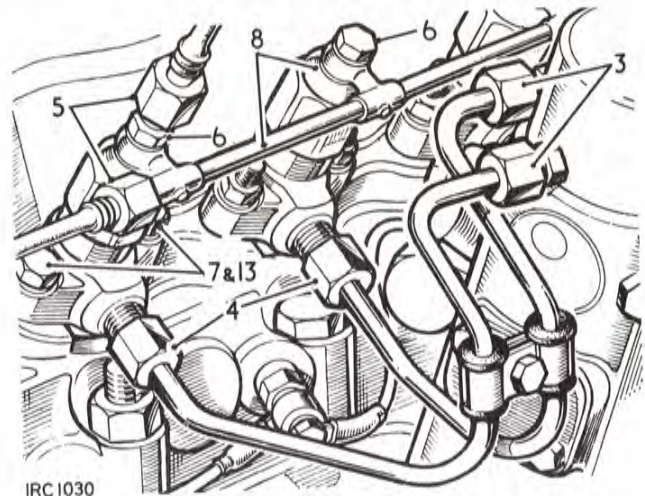
19.60.01

#### Removing

1. Remove the bonnet panel. 76.16.01.
2. Remove the air cleaner. 19.10.01.
3. Slacken the injector feed pipes at the distributor pump.
4. Disconnect the injector feed pipes at the injectors.
5. Disconnect the fuel spill pipes at No. 4 injector.
6. Slacken the spill rail fixings at the injectors.
7. Remove the injector fixings.
8. Withdraw the injectors complete with spill rail.
9. Take care to avoid damage to the needle valves which protrude from the injector faces. Immerse the components in clean fuel pending overhaul or refitting.
10. Remove the steel sealing washers from the injector housing bores.
11. The remaining sealing washers (copper) are normally withdrawn with the injectors, ensure that they are not left behind in the bores.

#### Refitting

12. Refit the new steel sealing washers into the injector bores, with the raised corrugation uppermost.
13. Reverse 7 and 8, using new copper sealing washers. Injector fixings torque 0,8 to 1,0 kgf.m (6 to 8 lbf.ft). Tighten alternate fixings by equal amounts to ensure injector is seated squarely.
14. Reverse 3 to 6.
15. Prime the fuel system. 19.50.01.
16. Reverse 1 and 2.



### FUEL INJECTORS

—Spray, check on vehicle

19.60.02

#### General

##### Injector nozzle type

'Pintaux' nozzles are used, these being a development of the 'Pintle' type nozzle.

In a 'Pintle' nozzle, the valve stem provides a pin or pintle which protrudes through the nozzle body orifice to form the correct fuel spray angle.

In a 'Pintaux' nozzle, an auxiliary spray hole is also provided for easy starting.

*Continued*

The 'Pintaux' type nozzle has been developed by CAV for use with the type of cylinder head chosen for Rover CI engines. This type of nozzle has been found most satisfactory for starting and general running and must be replaced by the same type only.

**Checking nozzle assemblies**

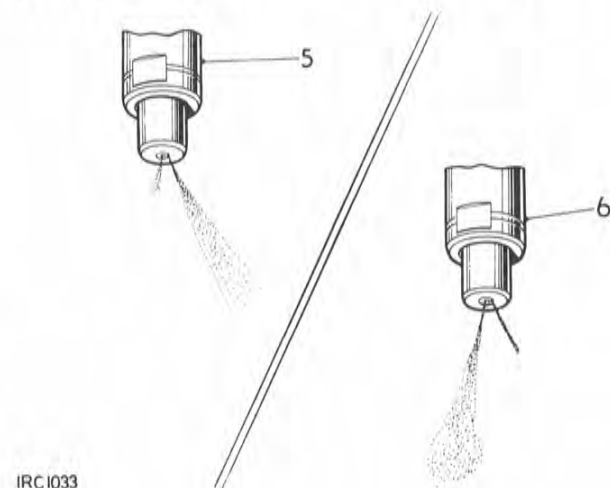
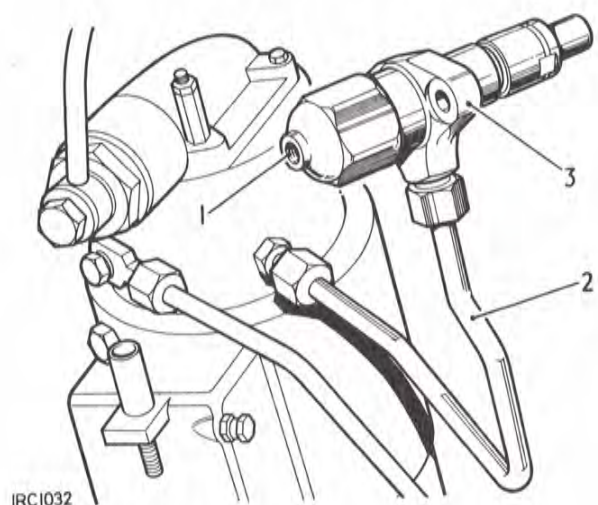
**WARNING:** Do not allow the fuel spray to contact the person otherwise injury may result from skin penetration.

When an injection nozzle is considered to be the cause of irregular running and loss of power, a quick check may be made by loosening the fuel feed pipe union nut on each nozzle in turn, whilst the engine is idling and again at approximately 1,000 rev./min.

If the injection nozzle assembly being checked has been operating properly, there will be a distinct reduction in engine speed accompanied by obvious roughness, but a faulty injection nozzle may make little or no difference to the engine note when its fuel feed pipe is loosened.

**Checking spray**

1. Remove the fuel spill gallery pipe complete from the injection nozzles.
2. Disconnect the fuel feed pipe (injection pump to nozzle) from the nozzle to be tested and from the injection pump.
3. Release the fixings and withdraw the suspected injection nozzle assembly; reconnect the pipe and nozzle assembly to the injection pump in a position whereby fuel ejection may be observed.
4. Loosen the union nuts securing the remaining fuel pipes to injection nozzles.
5. Whilst the starter turns the engine over, observe the manner in which fuel issues from the nozzle and compare the spray form with the correct form as illustrated.
6. If the ejected fuel is more in the form of a liquid jet or issues from the main pintle hole, then the nozzle and holder assembly should be removed for overhaul and a replacement unit fitted.
7. Reverse 1 to 4.



## FUEL SYSTEM

### FUEL INJECTORS

–Overhaul

19.60.08

Dismantling and assembling, items 1 to 26.

Bench testing procedure, items 27 to 41.

Service tools:

271482	Spanner for nozzle cap
271483	Injector nozzle testing and setting kit
278181	Tool for flushing injector nozzles
278182	Adaptor for Pintaux injector
605002	Injector nozzle cleaning kit
605003	Injector nozzle cleaning wire (0,2 mm diameter)

**NOTE:** Where a number of tools are supplied in kit form, the manufacturer's identification number is quoted in the text referring to the specific tool.

The individual tools which make up a kit are not available separately.

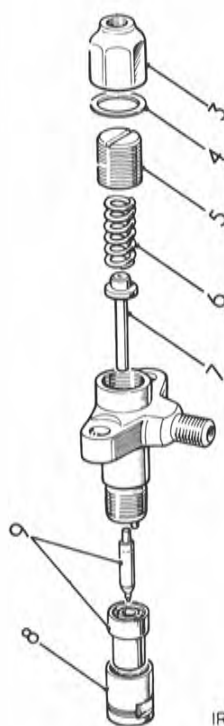
#### Dismantling

1. Remove the injectors. 19.60.01
2. Disconnect the injectors from the fuel spill rail.
3. Remove the combined locknut and end cap.
4. Withdraw the sealing washer.
5. Unscrew the pressure adjusting screw.
6. Withdraw the pressure spring
7. Withdraw the valve spindle .
8. Unscrew the cap nut.
9. Withdraw the nozzle valve and body.

#### Cleaning and inspecting

10. Soak the component parts of the assembly in Shell Calibration Fluid to loosen carbon deposits, but do not allow parts of any one assembly to be interchanged with those of another.

*Continued*



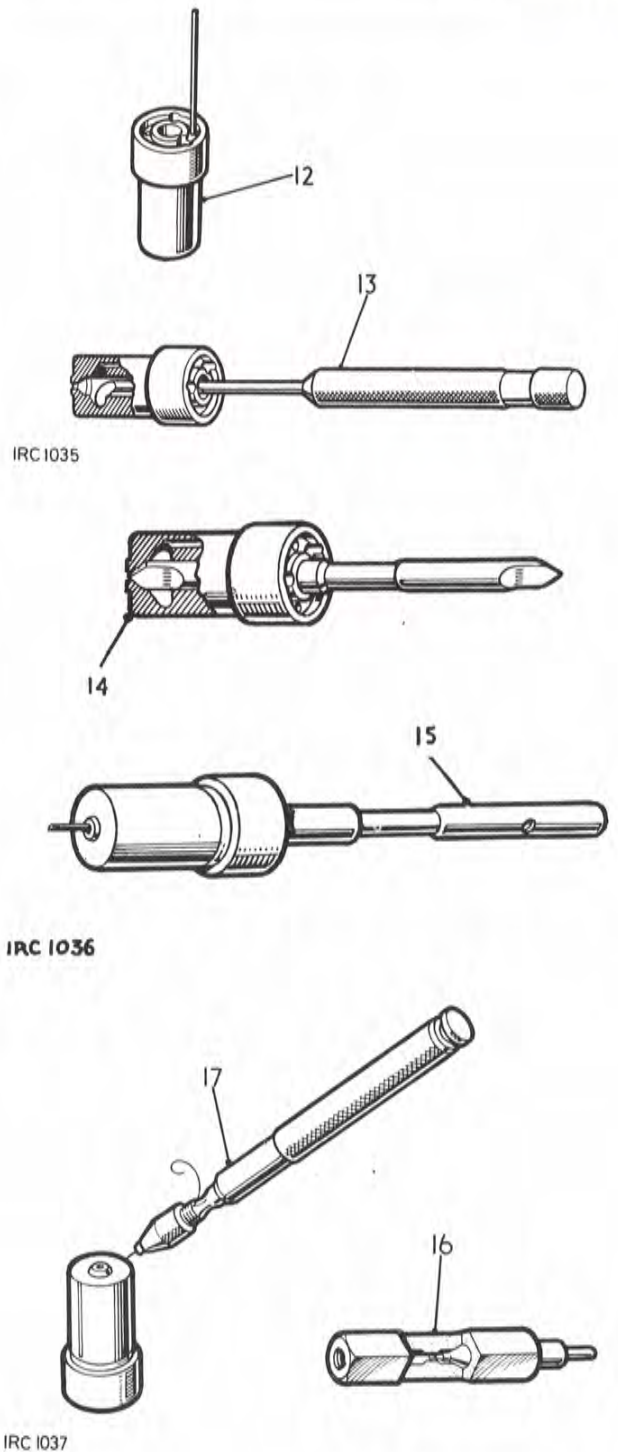
IRC1034



11. Brush away all external carbon deposits from component parts with a brass wire brush ET068 (or 7044/68) and replace them in the oil bath.  
Particular care must be exercised when cleaning the pintle and seat of nozzle valve to avoid scratching or scoring, which may result in spray distortion.
12. Clean the three oil feed passages in the nozzle body with a wire or drill of 1,5 mm (0.062 in) diameter.
13. Remove the carbon from the annular recess with tool ET071 (or 7044/71).
14. Remove the carbon from the valve seat, using tool ET070 (or 7044/70) with a rotary motion.
15. Select the appropriate size probe from the pocket of cleaning kit and secure it in the pintle hole cleaner ET069 (or 7044/69). Insert the probe into the bore of nozzle valve body and allow the end to extend through the main fuel outlet, then turn in a rotary manner to remove carbon.
16. Carbon may be removed from the nozzle valve cone by inserting the valve into tool ET072 (or 7044/72) and then rotating it alternately in a clockwise then anti-clockwise manner whilst pressing the valve inward. If the nozzle is blued or the seating has a dull circumferential ring indicating pitting or wear, the nozzle body and valve should be returned to a CAV Service Agent and replacement parts fitted.  
Do **not** attempt to lap the nozzle valve to body. This process requires special equipment and training.
17. Clean the auxiliary spray hole using tool ET120 (or 7044/120) fitted with probing wire 0,20 mm (0.008 in) diameter. Wire 605003.

**NOTE:** Allow 1,5 mm (0.062 in) only to extend from the chuck and thus minimise the possibility of the wire bending or breaking while probing. Great care must be taken to prevent breakage of the wire in the hole.

*Continued*



## FUEL SYSTEM

18. With flushing tool ET427 (or 278181) secured to the nozzle testing outfit, fit the nozzle body (spray holes uppermost) to the flushing tool and pump test oil through vigorously. This flushing process is necessary for the removal of any tiny carbon particles which may have become lodged in the body after scraping and probing.
19. Examine the pressure faces of nozzle body and nozzle holder to ascertain their freedom from scoring and scratches. These surfaces must be perfectly smooth.

### Reassembling

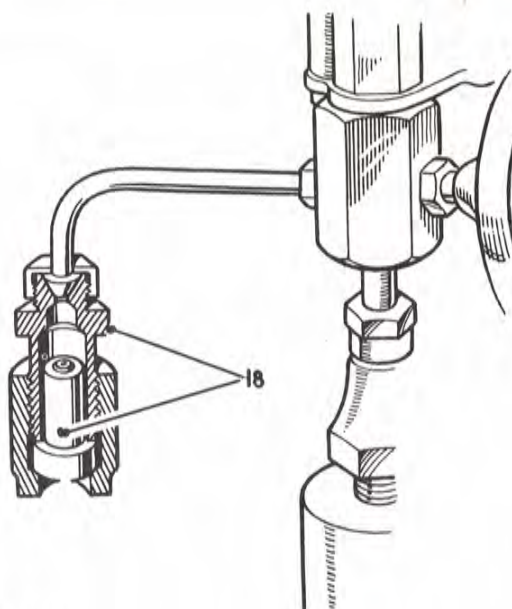
20. Fit the nozzle valve to nozzle body and check for freedom of movement.
21. Immerse the nozzle body and valve in the fluid bath and assemble whilst submerged.
22. Wash the remaining components thoroughly and reverse dismantling procedure, items 1 to 8.
23. Set the injection nozzle assembly in accordance with the following test procedure.

### Bench testing of injection nozzle and holder assembly

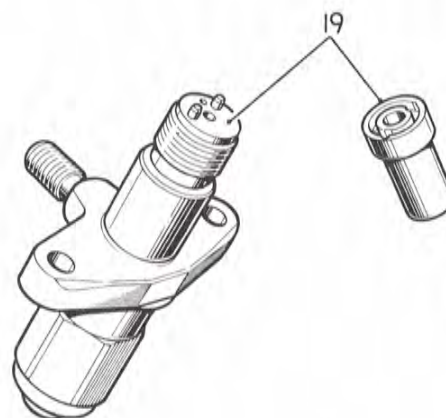
#### General information, items 24 to 26

24. To check a nozzle assembly and ensure that it is functioning correctly, a setting outfit (as illustrated in 'Procedure') is essential. A bench covered with linoleum or non-ferrous sheet metal is most suitable for mounting the outfit; such a surface facilitates the cleanliness essential when checking nozzle parts. Between the bench and setting outfit, a tray, also of non-ferrous metal, should be positioned to prevent spilt fuel spreading. Small containers may be attached to the bench to isolate the component parts of each assembly; these parts are carefully mated by the manufacturers and must **not** be interchanged. Lastly, a small bath with cover, containing Shell Calibration Fluid for washing components, should be kept conveniently near.

*Continued*



IRC 1039



IRC 1038



25. The efficient operation of the injection nozzle assembly is dependent on four main conditions, as follows:
  - a. The nozzle valve must open at 135 Ats.
  - b. The rate of back leakage must be within 150 to 100 Ats.
  - c. Seat tightness must be sufficient to prevent leakage.
  - d. Spray form must compare favourably with the illustrations.
26. Pressure setting, back leakage and seat tightness tests may be made by coupling the injection nozzle and holder assembly direct to the pressure feed pipe on setting outfit, but an adaptor must be fitted between the pipe and injection nozzle and holder assembly when testing spray form. This adaptor, see item 38, increases the pressure of fuel to the injection nozzle and holder assembly sufficiently for the main and auxiliary spray form to be determined.

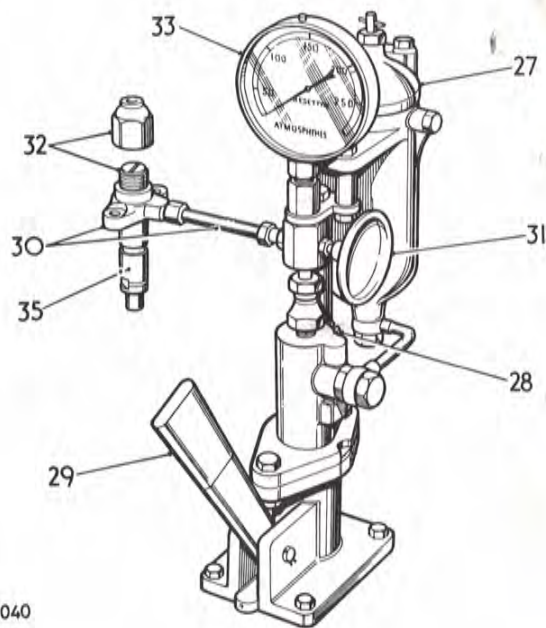
**Testing procedure**

**WARNING:** The injection nozzle must not be allowed to point towards the operator when spraying and the hands must never be allowed to contact the spray which has great penetrating force.

27. Remove the cap from oil container and fill with 0,8 litre (1.5 pints) of Shell Calibration Fluid.
28. Air vent the system by removing the vent screw, allow oil to flow freely for a few seconds and replace the screw whilst the flow continues.
29. Operate the pump handle until oil flows from pipe.
30. Connect the injector and holder assembly to the pressure feed pipe with the nozzle pointing downwards. The length and bore of this pipe is important and replacement pipes must be approximately 75 mm (2.8 in) between the union nuts and of 3 mm (0.118 in) bore.
31. Close the check valve to keep the pressure gauge out of circuit and smartly operate the hand lever several times to expel all air from the system.

**Back leakage test**

32. Adjustment is made by removing the combined end cap and locknut from the nozzle holder, and turning the adjusting screw clockwise to increase and anti-clockwise to decrease the opening pressure.



*Continued*



33. Fit assembled injector to nozzle setting outfit and adjust to open at 160 to 170 atmospheres then pump up to just below this figure, release handle to allow the needle of gauge to fall naturally. Time the pressure drop from 150 atmospheres down to 100 atmospheres.
34. This should be not less than 5 seconds for the original nozzle and not less than 7 seconds if a new one is to be fitted, and not more than 36 seconds for either with oil temperature 10° to 21°C (50° to 70° F).
35. Check externally the top and bottom of nozzle cap nut and pressure pipe union nuts for signs of oil leakage. If leakage occurs at the nozzle cap nut, remove the nut and examine the pressure faces of nozzle holders and nozzle body (see item 19) for presence of foreign matter or surface scoring, before tightening further.  
A leakproof nozzle assembly with an excessive rate of pressure drop indicates a worn nozzle valve; the nozzle valve and nozzle body should be renewed.

### Pressure setting

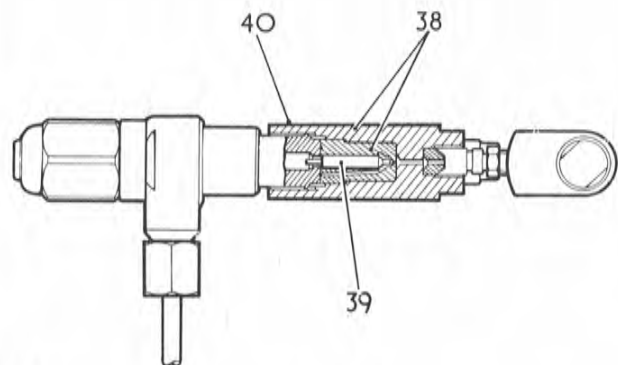
36. The selected **operational** opening pressure of the nozzle valve is 135 atmospheres. Readjust to this setting in the manner described in item 32.

### Seat tightness

37. Wipe the bottom face of the injection nozzle dry and raise the pressure in the system to 125 atmospheres. A slight dampness on the bottom face is permissible, but blob formation or dripping indicates a badly seating valve in which case the assembly should be dismantled for further examination.

### Spray form

38. Fuel delivery to the injection nozzle assembly when testing **spray form** must be characteristically similar to fuel delivery under normal operating conditions and to effect these conditions an adaptor (CAV Y7044872) must be fitted between the injection nozzle assembly and the pressure pipe.
39. The adaptor differs mainly in the cap nut and nozzle valve from the ordinary type of injection nozzle and holder assembly as fitted to the engine; the nozzle valve has no pintle.
40. The cap nut is extended, bored and threaded to receive nozzles for testing.



IRC 1041

*Continued*

41. Connect the adaptor assembly to the pressure pipe and adjust the opening pressure of the nozzle valve to 220 atmospheres. Screw the injection nozzle and holder assembly to be tested, into the adaptor and with the check valve closed, operate the handle smartly to expel air from the system.

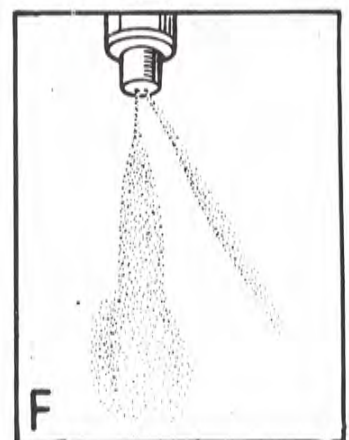
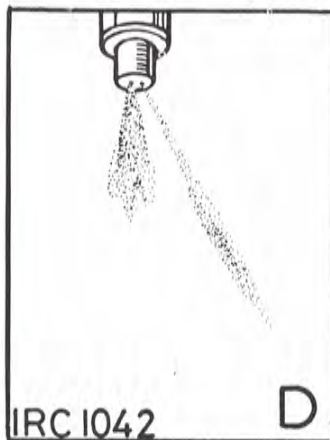
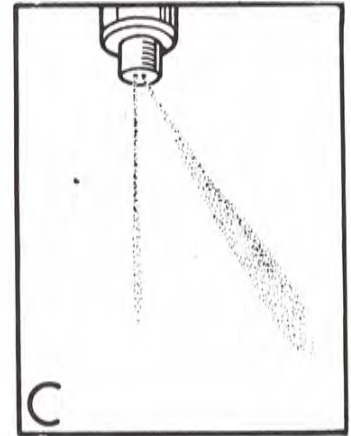
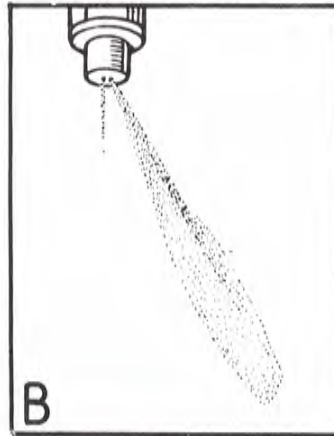
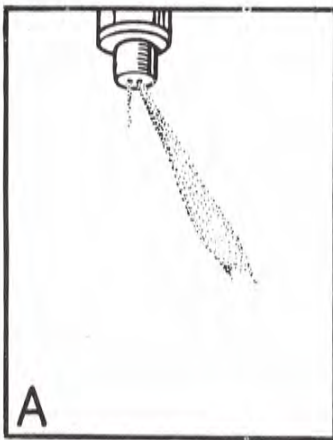
The auxiliary spray form may be tested at 60 strokes per minute and the main spray at 140. Spray development from starting to running speeds is illustrated, this illustration should be referred to and compared with the spray form of nozzles under test.

Spray formation should be well formed and free from splits or distortion. A slight centre 'core' can be disregarded.

Observe the main spray through 360 degrees to ensure a uniform spray.

42. When satisfactory, reverse 1 to 3.

Injector nozzle spray form, starting to running conditions.



COOLING SYSTEM OPERATIONS

Coolant												
—drain and refill	...	...	...	...	...	...	...	...	...	...	...	26.10.01
Expansion tank												
—remove and refit	...	...	...	...	...	...	...	...	...	...	...	26.15.01
Fan blades and pulley												
—remove and refit	...	...	...	...	...	...	...	...	...	...	...	26.25.01
Radiator block												
—remove and refit	...	...	...	...	...	...	...	...	...	...	...	26.40.04
Thermostat												
—remove and refit	...	...	...	...	...	...	...	...	...	...	...	26.45.01
—test	...	...	...	...	...	...	...	...	...	...	...	26.45.09
Water pump												
—remove and refit	...	...	...	...	...	...	...	...	...	...	...	26.50.01
—overhaul	...	...	...	...	...	...	...	...	...	...	...	26.50.06



**COOLANT**

**– Drain and refill**

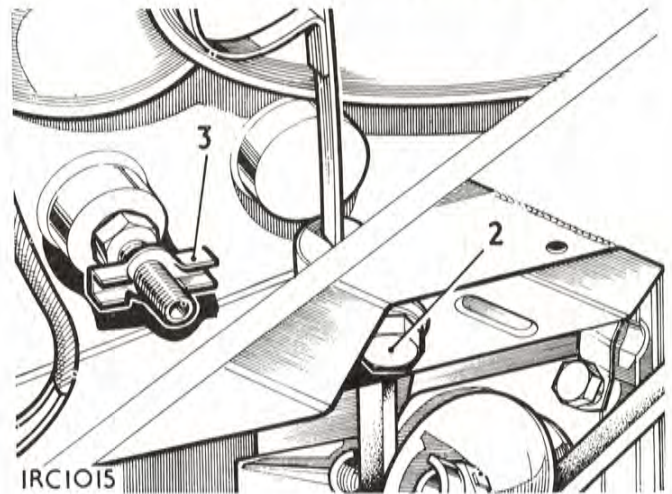
26.10.01

**Draining**

1. Remove the radiator filler cap.
2. Remove the radiator drain plug, RH side.
3. Open the cylinder block drain tap located as follows:  
2¼ litre – at LH side adjacent to dipstick.  
2.6 litre – at RH side adjacent to engine breather.

**Refilling**

4. Reverse 2 and 3. If antifreeze solution is to be added, first pour 4,5 litres (8 pints) of water into the system, then add the required quantity of the recommended solution (see Division 90).
5. Top up with water to between 12 mm and 19 mm (0.5 in and 0.75 in) below the bottom of the radiator filler neck.
6. Check and top up after the initial short engine run.
7. Ensure that the expansion tank coolant is maintained at one-quarter full approximately.



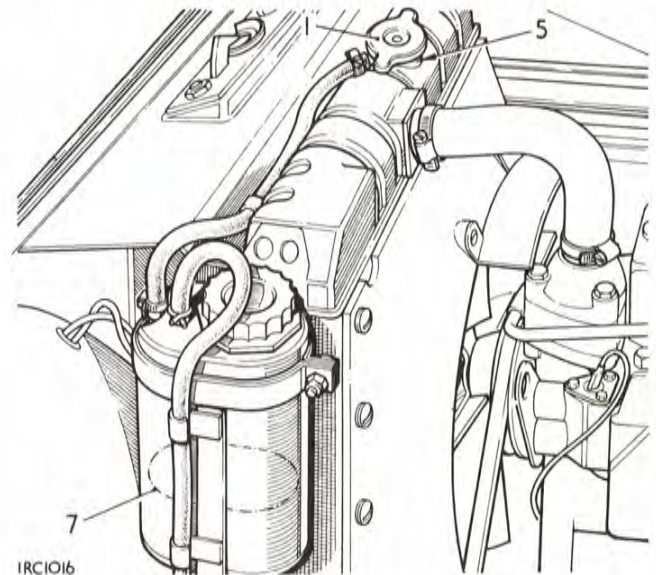
**EXPANSION TANK**

**– Remove and refit**

26.15.01

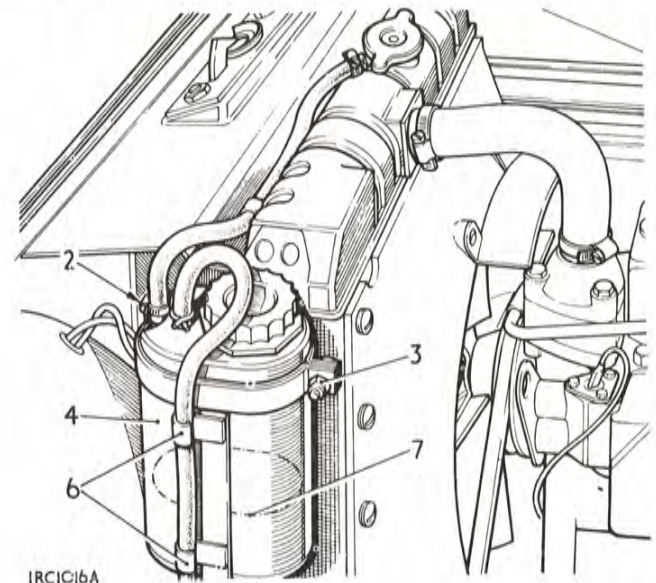
**Removing**

1. Open and prop the bonnet.
2. Disconnect the radiator overflow hose at the tank.
3. Slacken the tank retainer pinch bolt.
4. Withdraw the expansion tank.



**Refitting**

5. Reverse 3 and 4.
6. Refit the vent hose into the clips on the tank retainer.
7. Fill the expansion tank one quarter full approximately with coolant.
8. Reverse 1 and 2.



## COOLING SYSTEM

### FAN BLADES AND PULLEY, 2¼ litre models

—Remove and refit

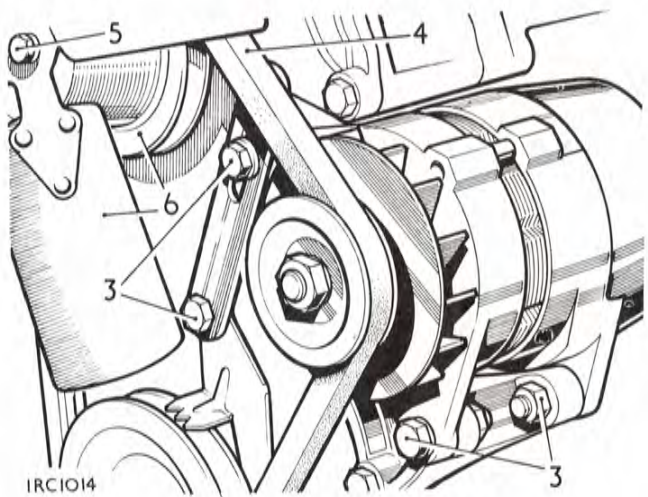
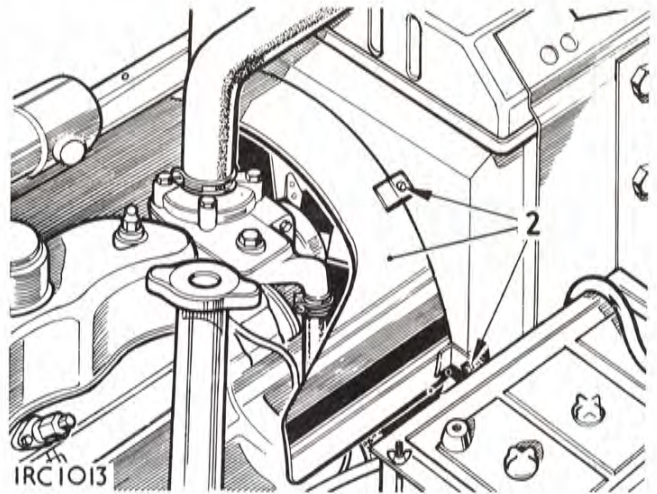
26.25.01

#### Removing

1. Open and prop the bonnet.
2. Remove the shroud from the radiator fan cowl.
3. Slacken the alternator fixings.
4. Remove the fan belt.
5. Remove the fixings.
6. Withdraw the fan blades and pulley.

#### Refitting

7. Reverse 3 to 6. Adjust the fan belt tension to 6,3 mm to 9,5 mm (0.25 in to 0.375 in) checked by thumb pressure between the fan and crankshaft pulleys.
8. Reverse 1 and 2.



FAN BLADES AND PULLEY, 2.6 litre models

—Remove and refit

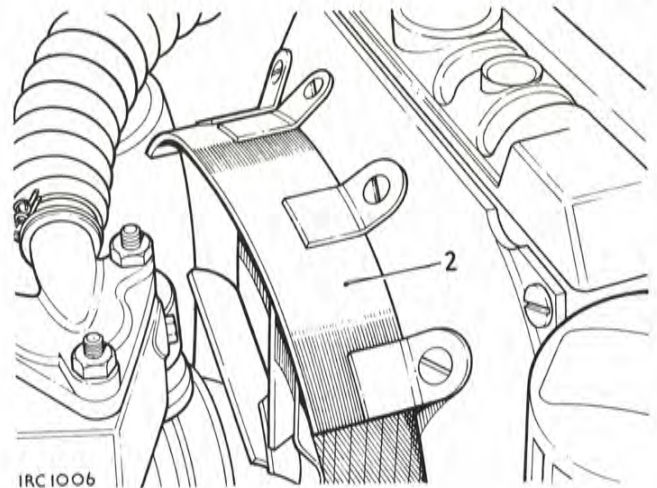
26.25.01

Removing

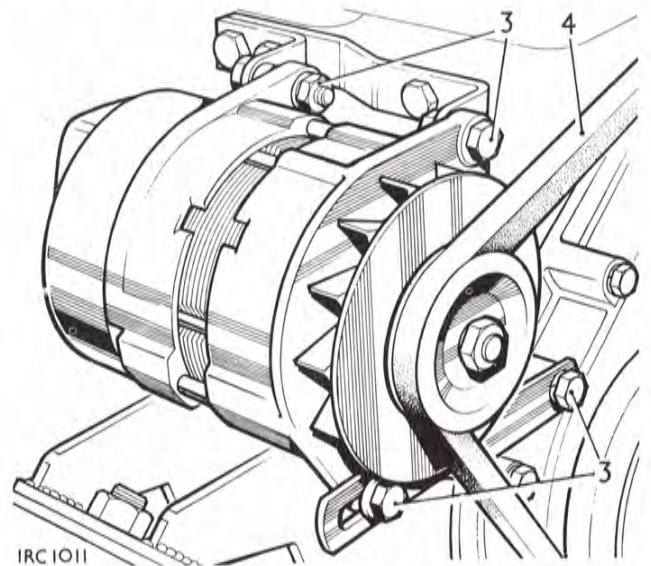
1. Open and prop the bonnet.
2. Remove the shroud from the radiator fan cowl.
3. Slacken the alternator fixings.
4. Remove the fan belt.
5. Remove the fixings.
6. Withdraw the fan blades, packing piece and pulley.

Refitting

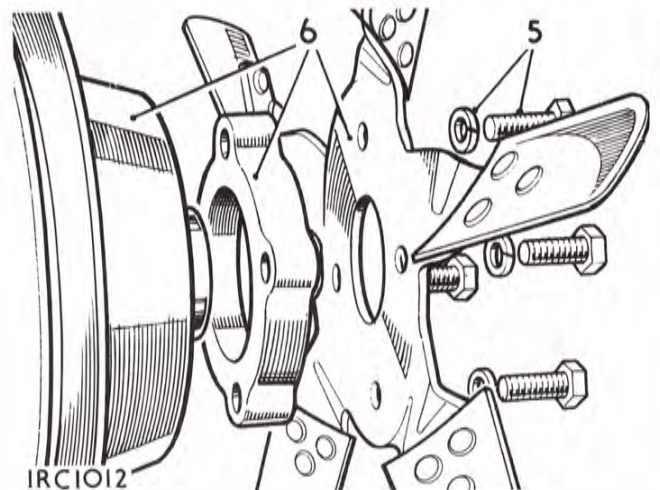
7. Reverse 3 to 6. Adjust the fan belt tension to 8 mm to 11 mm (0.312 in to 0.437 in) checked by thumb pressure between the fan and crankshaft pulleys.
8. Reverse 1 and 2.



IRC 1006



IRC 1011



IRC 1012

RADIATOR BLOCK

—Remove and refit

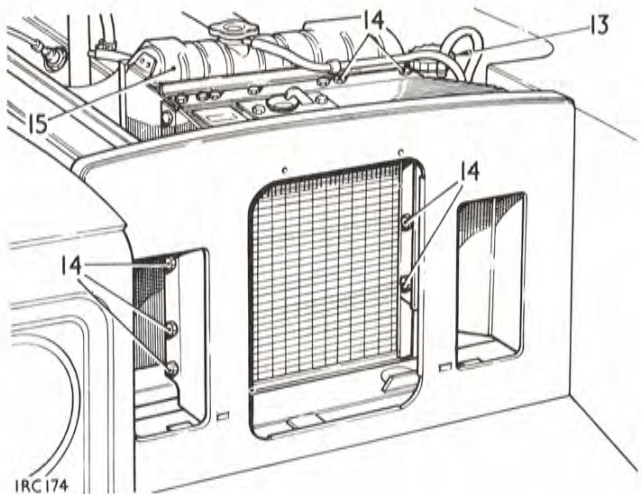
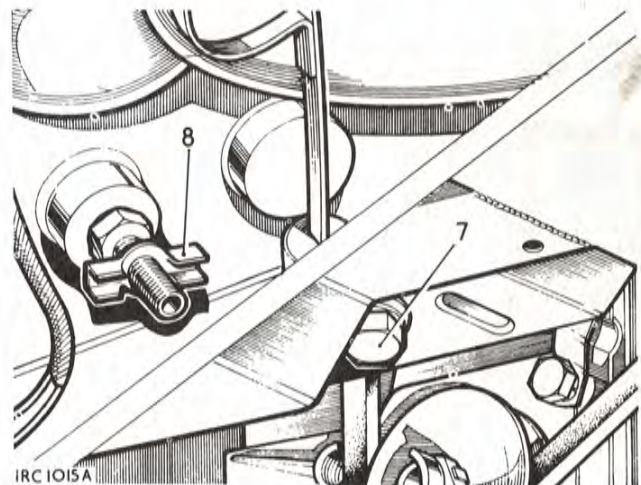
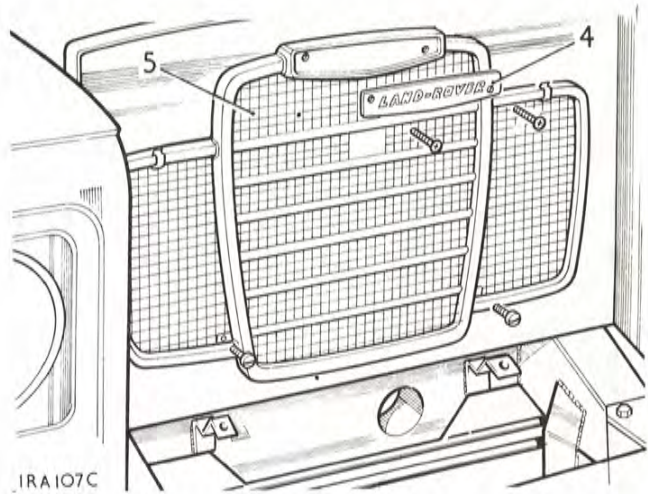
26.40.04

Removing

1. Remove bonnet panel. 76.16.01.
2. Disconnect the battery earth lead.
3. 2.6 litre models — Remove the air cleaner. 19.10.01.
4. Remove the name plate.
5. Remove the radiator grille.
6. Remove the radiator cap.
7. Remove the radiator drain plug.
8. Open the drain tap at the cylinder block RH side (2.6 litre) or LH side (2½ litre) models.
9. Disconnect the radiator top and bottom hoses.
10. Remove the fan cowl shroud.
11. Slacken the alternator fixings and withdraw the fan belt.
12. Remove the fan blades and fan pulley.
13. Remove the expansion tank.
14. Remove the fixings, radiator to grille panel.
15. Withdraw the radiator and fan cowl assembly.
16. Remove the fan cowl.

Refitting

17. Reverse 1 to 16, setting the fan belt tension as follows:  
 2½ litre models — 6,3 to 9,5 mm (0.25 to 0.375 in)  
 2.6 litre models — 8 to 11 mm (0.312 to 0.437 in)  
 checked by thumb pressure between the fan and crankshaft pulleys.
18. Run the engine and check for leakages.





**THERMOSTAT, 2¼ litre models**

—Remove and refit

26.45.01

**Removing**

1. Remove the radiator cap and partially drain the coolant.
2. Remove the outlet pipe and thermostat housing fixings.
3. Withdraw the pipe and housing complete.
4. Separate the pipe from the housing and withdraw the thermostat and 'O' ring seal.
5. Withdraw and discard the joint washers.

**Refitting**

6. Smear both sides of the new joint washers with a small quantity of general purpose grease.
7. Ensure that the thermostat bleed hole is clear to prevent air locks when refilling.
8. Reverse 1 to 5.

**DATA**

Thermostat opening temperature 70.5°C to 75.5°C

**THERMOSTAT, 2.6 litre models**

—Remove and refit

26.45.01

**Removing**

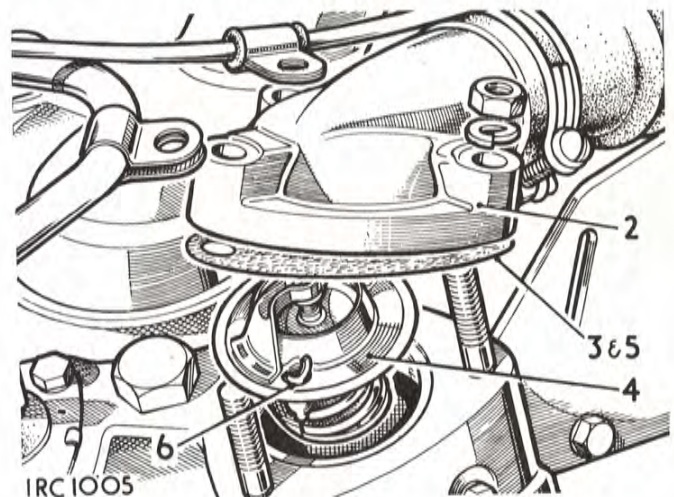
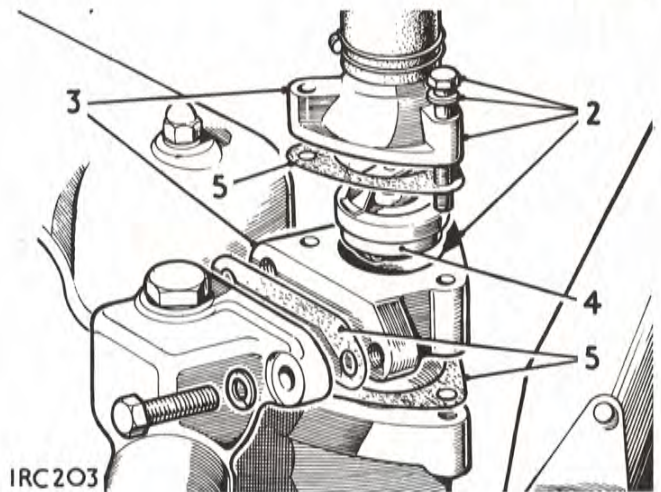
1. Drain off coolant at the engine sufficient to drain the thermostat housing.
2. Remove the fixings and lift aside the outlet pipe.
3. Withdraw the joint washer.
4. Withdraw the thermostat.

**Refitting**

5. Smear both sides of the new joint washer with a small quantity of general purpose grease.
6. Ensure that the thermostat bleed hole is clear to prevent air locks when refilling.
7. Reverse 1 to 4.

**DATA**

Thermostat opening temperature 75°C to 80°C



## COOLING SYSTEM

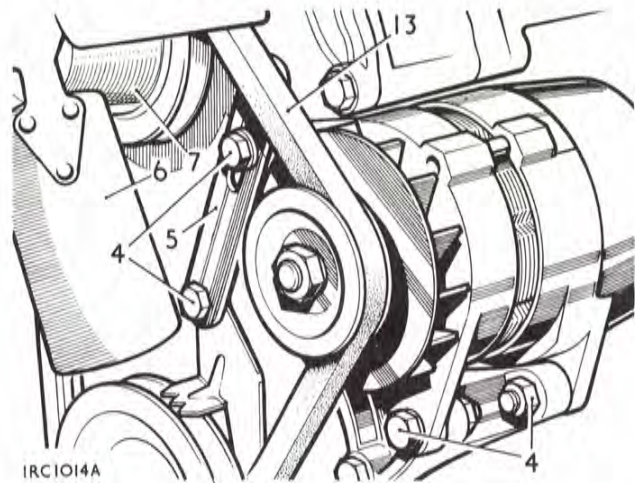
### THERMOSTAT

–Test

26.45.09

#### Testing

1. Remove the thermostat. 26.45.01.
2. Immerse the thermostat in water in a suitable container.
3. Heat the water and note the temperature at which the thermostat commences to open; this should be within the range as follows:  
2¼ litre engines – 70.5°C to 75.5°C.  
2.6 litre engines – 75°C to 80°C.
4. The thermostat is not adjustable or serviceable; repair is by replacement.
5. Reverse 1.



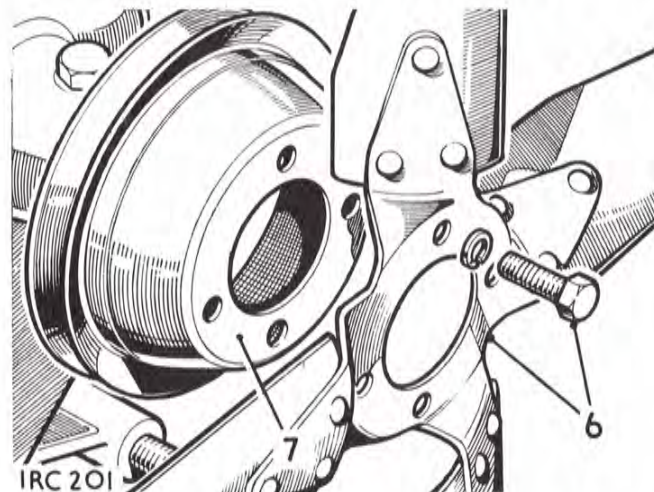
### WATER PUMP, 2¼ litre models

–Remove and refit

26.50.01

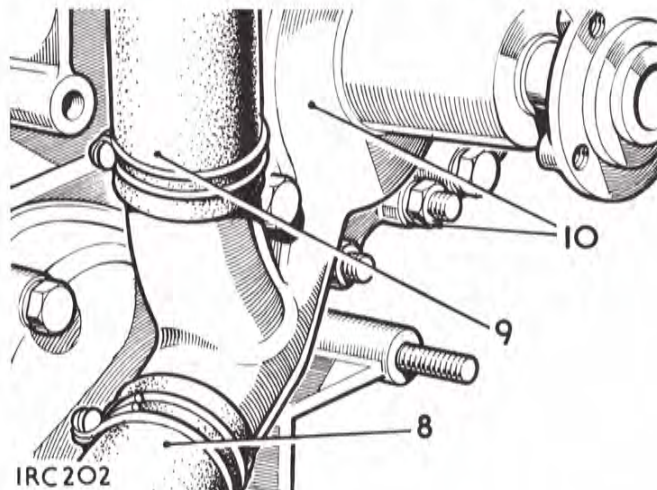
#### Removing

1. Remove the bonnet. 76.16.01.
2. Drain the cooling system. 26.10.01.
3. Remove the shroud from the radiator fan cowl.
4. Slacken the alternator fixings and remove the fan belt.
5. Remove the alternator adjusting link.
6. Remove the fan blades.
7. Withdraw the fan pulley.
8. Disconnect the radiator bottom hose at the water pump.
9. Disconnect the by-pass hose.
10. Remove the water pump.
11. Withdraw the joint washer.



#### Refitting

12. Smear both sides of a new joint washer with general purpose grease.
13. Reverse 4 to 11. Adjust the fan belt to give 8 to 11 mm (0.312 to 0.437 in) free movement when checked midway between the fan and crankshaft pulleys.
14. Reverse 1 to 3.



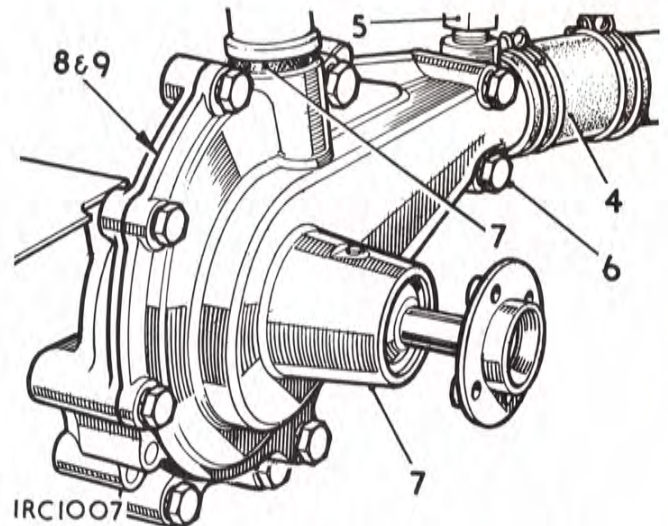
**WATER PUMP, 2.6 litre models**

—Remove and refit

26.50.01

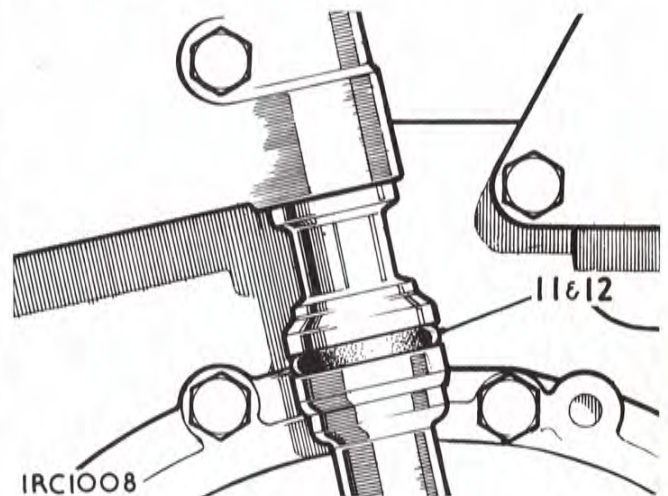
**Removing**

1. Remove the bonnet. 76.16.01.
2. Drain the cooling system. 26.10.01.
3. Remove the fan belt, fan blades and pulley. 26.25.01.
4. Disconnect the radiator bottom hose at the pump.
5. Where a heater is fitted, remove the water valve. 80.10.16.
6. Remove the water pump fixings; note the fitted positions of the varying length bolts.
7. Withdraw the water pump, tilting upwards to clear the locating dowels and compress the 'O' ring seal on the by-pass outlet.
8. Withdraw the joint washer from the adaptor joint face.



**Refitting**

9. Smear both sides of the new joint washer with a minimum of general purpose grease.
10. Position the joint washer onto the pump adaptor face.
11. Lubricate a new 'O' ring seal with Silicone Compound MS4 and position the seal on the pump by-pass outlet.
12. Reverse 7. Ensure that the 'O' ring seal does not become dislodged.
13. Reverse 1 to 6.



## COOLING SYSTEM

### WATER PUMP

—Overhaul

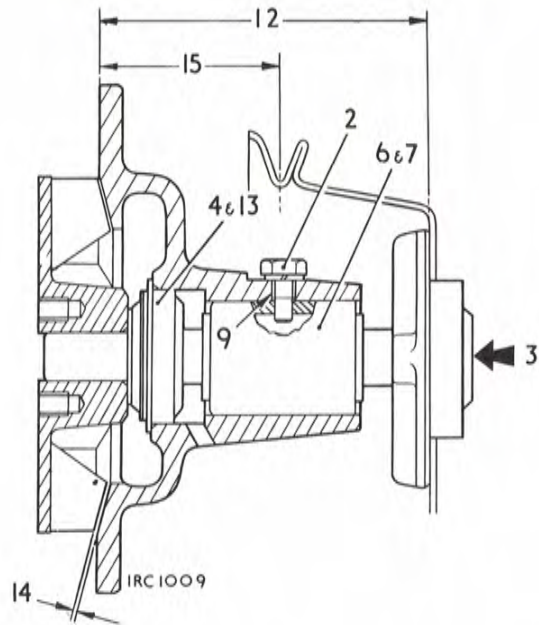
26.50.06

#### Dismantling

1. Remove the water pump. 26.50.01.
2. Remove the bearing location bolt.
3. Drift out the impeller, bearing and spindle as an assembly from the pump body and hub.
4. Cut through and remove the seal assembly from the spindle.
5. Insert the spindle into the water pump body, so that the impeller is in the position of the fan pulley.
6. Drift the spindle and bearing assembly from the impeller.

#### Inspecting

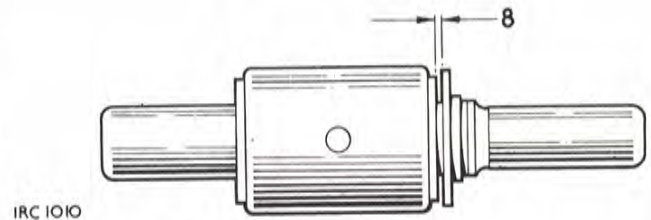
7. Examine the spindle and bearing assembly; it need not be renewed if the bearing is satisfactory and the spindle is free from excessive corrosion.  
Clean any corroded portion of the spindle and paint with a suitable chlorinated rubber primer or, alternatively, with a good quality aluminium paint or other anti-corrosive paint.  
The impeller must be a press fit on the spindle. If the impeller is loose on the spindle, replace either part as necessary.



*Continued*

**Re-assembling**

8. Where a steel deflector washer is fitted to the pump spindle, check that there is a minimum clearance of 0,46 mm (0.018 in) between the washer and the bearing housing face.
9. Insert a few drops of thick oil in the location hole in the bearing.
10. Suitably mark the spindle bearing housing and the pump body so that the bearing locating screw holes may be easily aligned during assembly.
11. Fit the spindle and bearing to the pump body and fit the locating screw.
12. Press the fan pulley hub on to the spindle to a set dimension measured between the front face of the pulley hub and the mounting face of the water pump body as follows:  
 2¼ litre models – 89,48 mm  $\pm$  0,25 mm (3.523 in  $\pm$  0.010 in).  
 2.6 litre models – 97,00 mm  $\pm$  0,25 mm (3.819 in  $\pm$  0.010 in).  
 When pressing on the hub, support the spindle to avoid load falling on the bearing location bolt.
13. Fit the carbon ring and seal assembly to the pump body with the carbon ring outwards.
14. Press the impeller onto the spindle until there is 0,50 mm to 0,63 mm (0.020 in to 0.025 in) clearance between the impeller vanes and the pump body. Check using feeler gauges.
15. Offer the fan pulley to the assembly and check the fan belt groove position relative to the pump mounting face which must be as follows:–  
 2¼ litre models – 49,4 mm  $\pm$  0,25 mm (1.945 in  $\pm$  0.010 in)  
 2.6 litre models – 46,2 mm  $\pm$  0,25 mm (1.819 in  $\pm$  0.010 in)
16. Reverse 1.



**DATA**

Dimension from front face of hub to rear (mounting) face of water pump

2¼ litre models  
 2.6 litre models

89,48 mm  $\pm$  0,25 mm (3.523 in  $\pm$  0.010 in)  
 97,00 mm  $\pm$  0,25 mm (3.819 in  $\pm$  0.010 in)

Clearance between impeller vanes and pump body

0,50 mm to 0,63 mm (0.020 in to 0.025 in)

Dimension from fan belt groove in pulley to rear (mounting) face of water pump

2¼ litre models  
 2.6 litre models

49,4 mm  $\pm$  0,25 mm (1.945 in  $\pm$  0.010 in)  
 46,2 mm  $\pm$  0,25 mm (1.819 in  $\pm$  0.010 in)





## CLUTCH ASSEMBLY

-Remove and refit

33.10.01

Service tool 605022 Clutch plate alignment gauge.

**NOTE:** If it is required to remove the clutch only, it is not necessary to remove the seat base nor completely remove the gearbox. Proceed with the gearbox removal 37.20.01, but only withdraw the gearbox rearward approximately 130 mm (5 in.), to give access to the clutch fixings.

## Removing

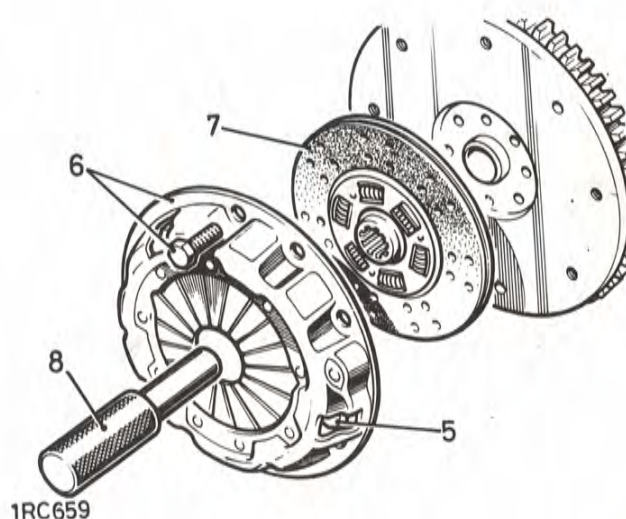
1. Remove the front floor. 76.10.12.
2. Remove the front seat base. 76.70.06.
3. Remove the gearbox assembly. 37.20.01.
4. Mark the clutch cover fitted position relative to the flywheel.
5. Do not disturb the three bolts located in the apertures in the clutch cover.
6. Remove the clutch assembly.
7. Withdraw the clutch driven plate.

## Refitting

8. Reverse 6 and 7 locating the driven plate with the side marked 'Flywheel side' towards the flywheel, and ensure that the clutch cover and flywheel assembly marks are aligned. Centralising tool 605022.
9. Secure the cover fixings evenly, using diagonal selection. Torque 3,0 to 3,5 kgf. m (22 to 25 lbf. ft.).
10. Reverse j to 3.

## DATA

Clutch driven plate diameter  
 Damper springs colour identification



241,3 mm (9.500 in.).  
 Dark green.



## CLUTCH

---

### CLUTCH ASSEMBLY

—Overhaul 33.10.08

#### Clutch assembly

The clutch assembly is of the diaphragm spring type and no overhaul procedures are applicable. Repair is by replacement only.

#### Clutch driven plate

Examine clutch driven plate for wear and signs of oil contamination. Examine all rivets for pulling and distortion, rivets must be below the friction surface. If oil contamination is present on the friction linings or if they are appreciably worn, replace the clutch driven plate assembly complete or alternatively, replace the friction linings following standard workshop practices.

#### DATA

Clutch driven plate diameter	241,3 mm (9.5 in.).
Damper springs colour identification	Dark green.





## HYDRAULIC SYSTEM

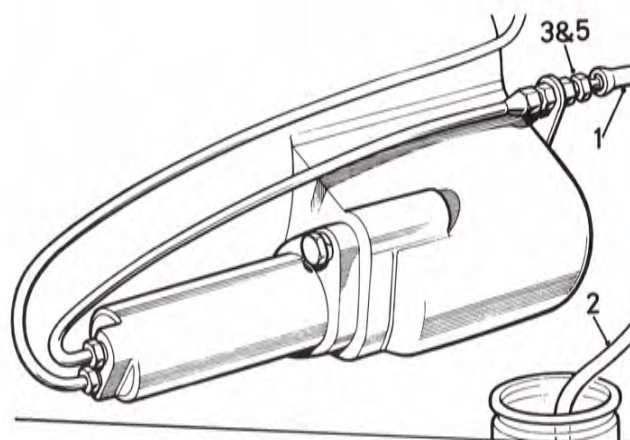
-Bleed

33.15.01

## Procedure

**NOTE:** During the procedure, keep the fluid reservoir topped up to avoid introducing further air into the system. Use only the recommended type of hydraulic fluid. Division 09 refers.

1. Attach a length of suitable tubing to the slave cylinder bleed screw.
2. Place the free end of the tube in a glass jar containing clutch fluid.
3. Slacken the bleed screw.
4. Pump the clutch pedal, pausing at the end of each stroke, until the fluid issuing from the tubing is free of air with the tube free end below the surface of the fluid in the container.
5. Hold the tube free end immersed and tighten the bleed screw when commencing a pedal down stroke.



IRC667



# CLUTCH

## MASTER CYLINDER

—Remove and refit

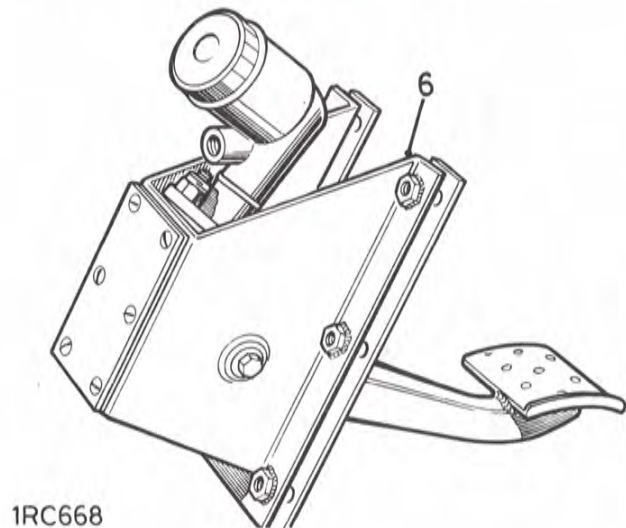
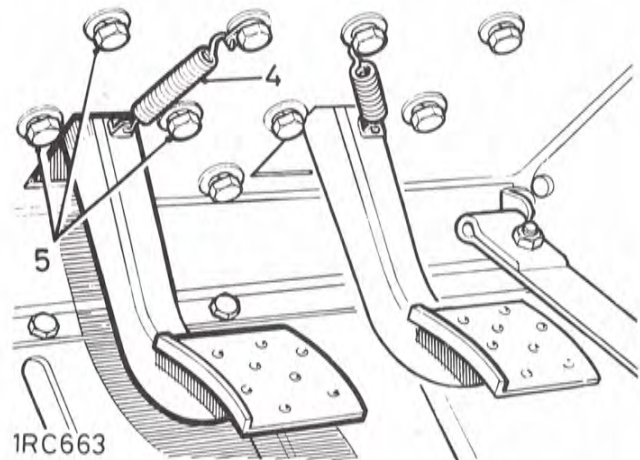
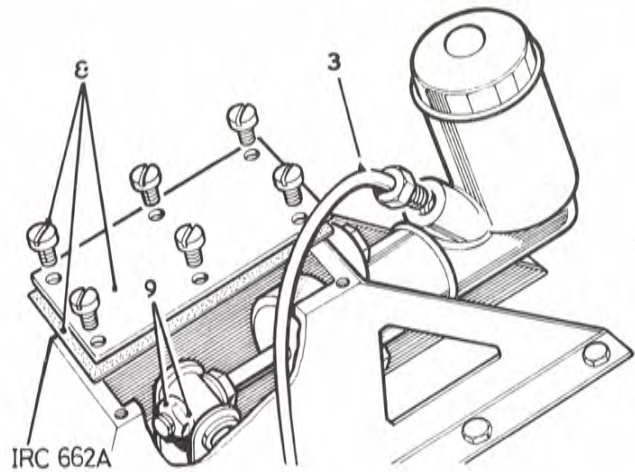
33.20.01

### Removing

1. Remove the bonnet. 76.16.01.

### L.H. Stg. Models 2 to 6

2. Remove the L.H. front ring 76.10.26.
3. Disconnect the fluid pipe from the clutch master cylinder.
4. Disconnect the return spring from the clutch pedal.
5. Remove the fixings securing the clutch pedal bracket from inside the vehicle cab.
6. Withdraw the bracket complete with pedal and master cylinder.



*continued*



7. **R.H. Stg. models.** Disconnect the fluid pipe from the master cylinder.

**All models**

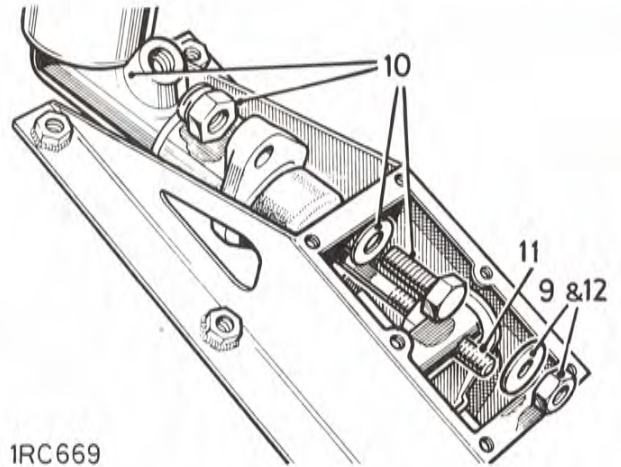
8. Remove the top cover and gasket from the clutch pedal bracket.
9. Remove the fixings from the end of the master cylinder push rod.
10. Remove the master cylinder from the pedal bracket.

**Refitting**

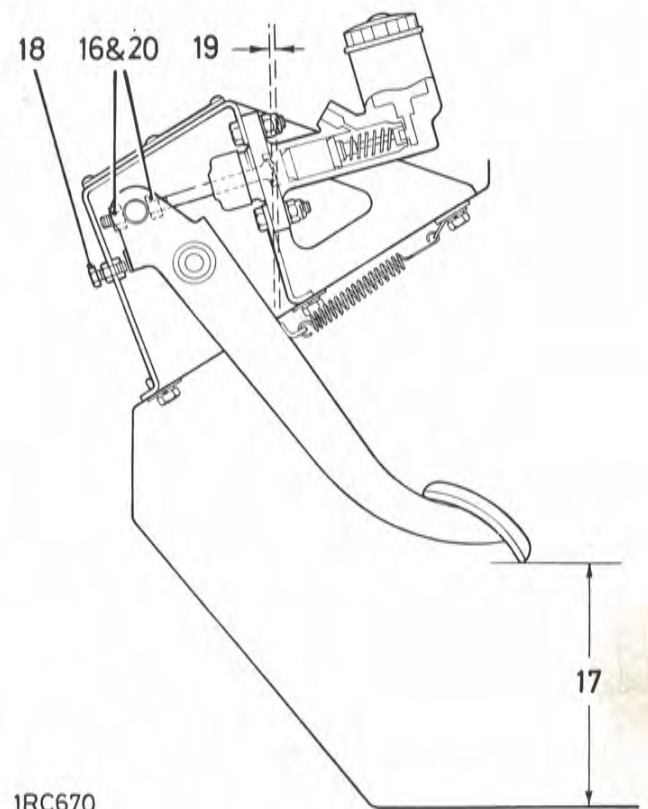
11. Fit the master cylinder to the pedal bracket, engaging the cylinder push rod through the pedal trunnion.
12. Fit the plain washer and nut to the end of the push rod.
13. **R.H. Stg. models.** Connect the fluid pipe to the master cylinder.
14. **L.H. Stg. model.s.** Reverse 3 to 6.
15. Bleed the clutch hydraulic system. 33.15.01.

**Clutch pedal and master cylinder setting**

16. Slacken both locknuts on the master cylinder push rod.
17. Check the distance from the lower edge of the clutch pedal to the floor. The correct distance is 140 mm (5.500 in.).
18. Adjust the pedal stop, as required, to obtain the correct distance.
19. Adjust the master cylinder push rod until there is approximately 1,5 mm (0.062 in.) free play between the push rod and the master cylinder piston.
20. Tighten both locknuts.
21. Check the operation of the clutch pedal and ensure that there is a minimum of 6 mm (0.250 in.) free movement of the pedal before pressure is felt. If necessary, readjust the master cylinder push rod.
22. Fit the gasket and top cover to the clutch pedal bracket.
23. Reverse 1 and 2.



1RC669



1RC670

# CLUTCH

## MASTER CYLINDER

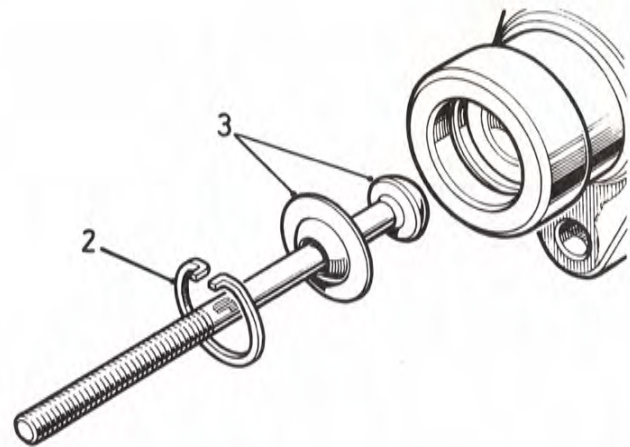
—Overhaul

33.20.07

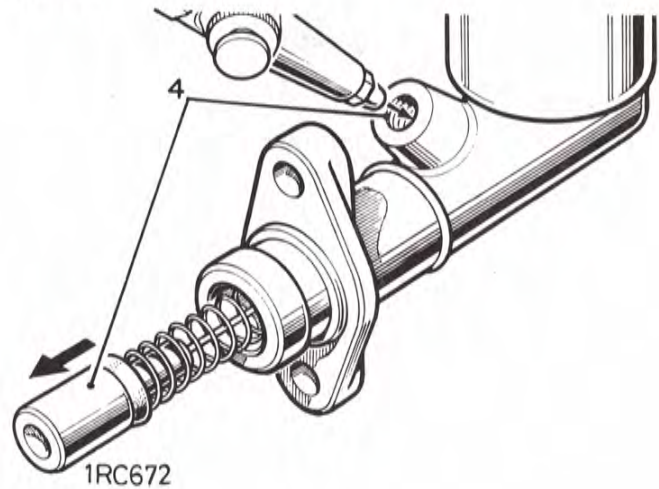
### Dismantling

1. Remove the master cylinder. 33.20.01.
2. Remove the circlip.
3. Withdraw the push rod and retaining washer.
4. Withdraw the piston assembly. If necessary, apply a low air pressure to the outlet port to expel the piston.
5. Prise the locking prong of the spring retainer clear of the piston shoulder and withdraw the piston.
6. Withdraw the piston seal.

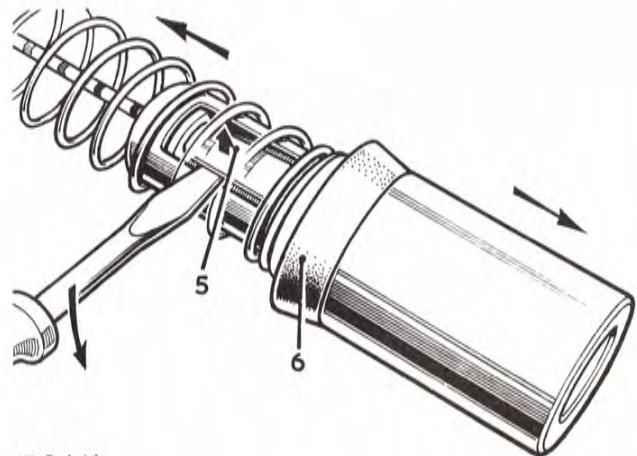
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1RC671



1RC672



1RC441

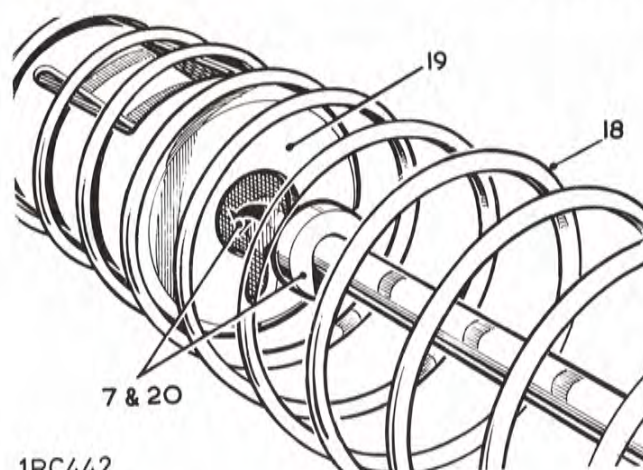
7. Compress the spring and position the valve stem to align with the larger hole in the spring retainer.
8. Withdraw the spring and retainer.
9. Withdraw the valve spacer and spring washer from the valve stem.
10. Remove the valve seal.

### Inspecting

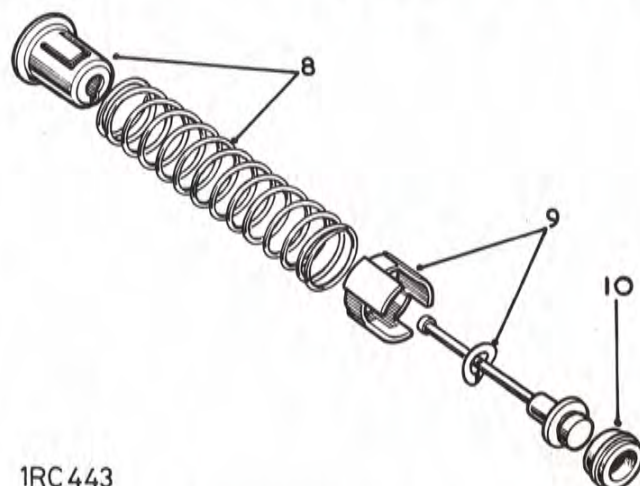
11. Clean all components in Girling cleaning fluid and allow to dry.
12. Examine the cylinder bore and piston, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacements.
13. The seals should be replaced with new components.

### Assembling

14. Smear the seals with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.
15. Fit the valve seal, flat side first, on to the end of the valve stem.
16. Place the spring washer, domed side first, over the small end of the valve stem.
17. Fit the spacer, legs first.
18. Place the coil spring over the valve stem.
19. Insert the retainer into the spring.
20. Compress the spring and engage the valve stem in the keyhole slot in the retainer.

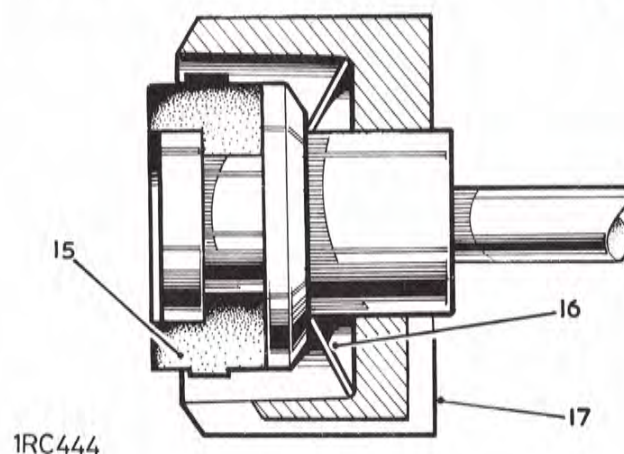


1RC442



1RC443

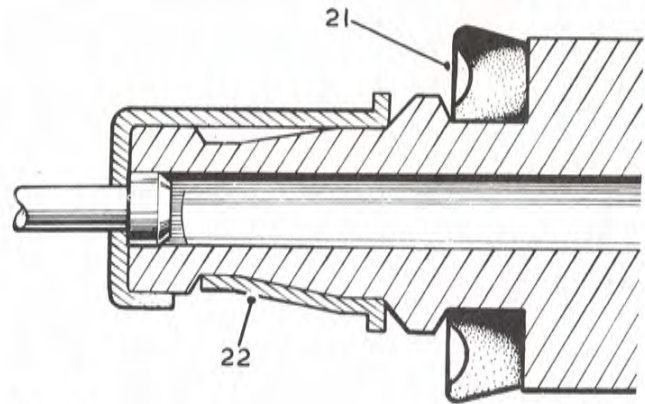
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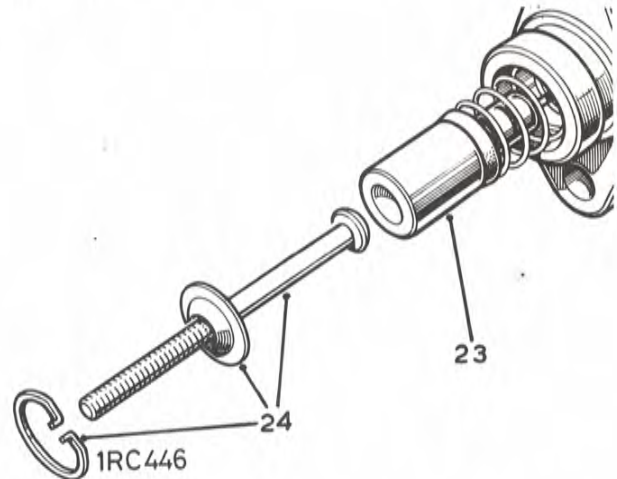
1RC444

## CLUTCH

21. Fit the seal, large diameter last, to the piston.
22. Insert the piston into the spring retainer and engage the locking prong.
23. Smear the piston with Castrol-Girling rubber grease and insert the assembly, valve end first, into the cylinder.
24. Fit the push rod, retaining washer and circlip.
25. Refit the master cylinder, 33.20.01.



1RC445



## CLUTCH RELEASE ASSEMBLY

—Remove and refit

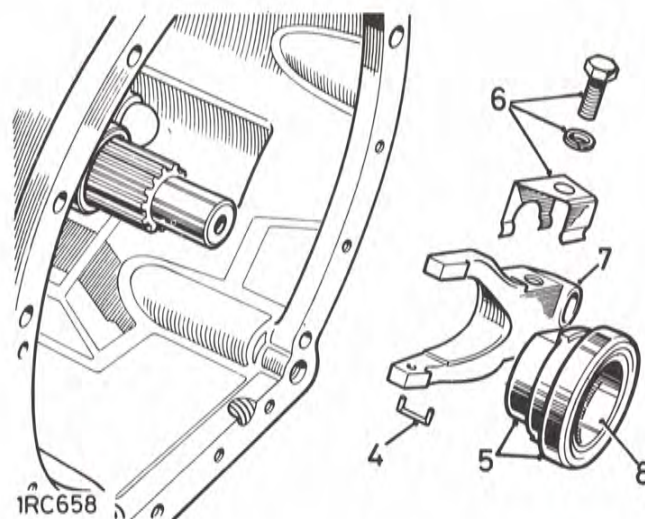
33.25.12

## Removing

1. Remove the front floor. 76.10.12.
2. Remove the front seat base. 76.70.06
3. Remove the gearbox. 37.20.01.
4. Withdraw the retainer staple.
5. Withdraw the bearing and sleeve. If required, press the bearing off the sleeve. Fit the replacement bearing with the domed face outwards from sleeve.
6. Remove the spring clip and fixings.
7. Withdraw the release lever assembly.

## Refitting

8. Reverse 1 to 7. Lubricate the bearing sleeve inner diameter with PBC (Poly Butyl Cuprysil) grease.



# CLUTCH

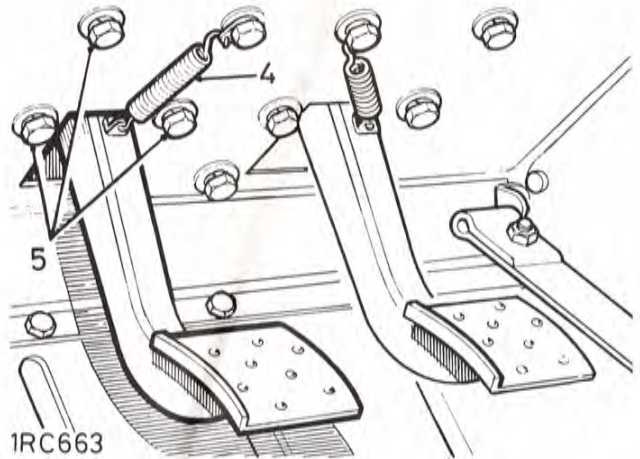
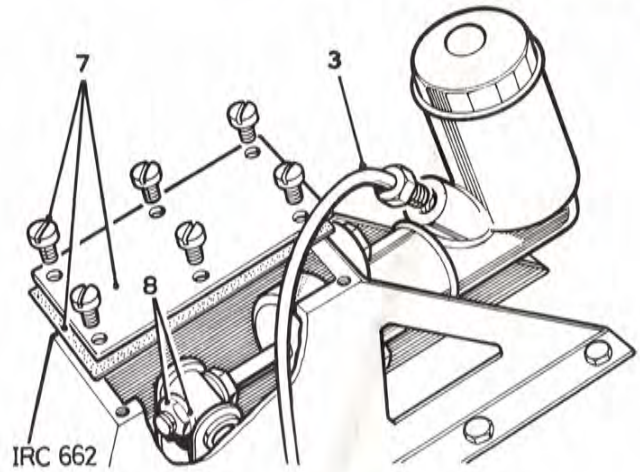
## CLUTCH PEDAL

—Remove and refit

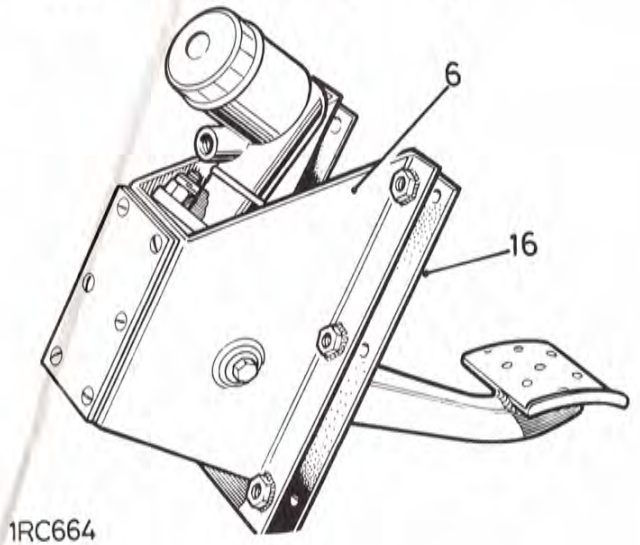
33.30.02

### Removing

1. Remove the bonnet, 76.16.01.
2. L.H. Stg. models. Remove the L.H. front wing, 76.10.26.
3. Disconnect the fluid pipe from the clutch master cylinder.
4. Disconnect the return spring from the clutch pedal.
5. Remove the fixings securing the clutch pedal bracket from inside the vehicle cab.
6. Withdraw the bracket complete with pedal and master cylinder.
7. Remove the top cover and gasket from the clutch pedal bracket.
8. Remove the fixings from the end of the master cylinder push rod and push the rod into the master cylinder to clear the pedal trunnion.



*continued*





## CLUTCH RELEASE ASSEMBLY

—Remove and refit

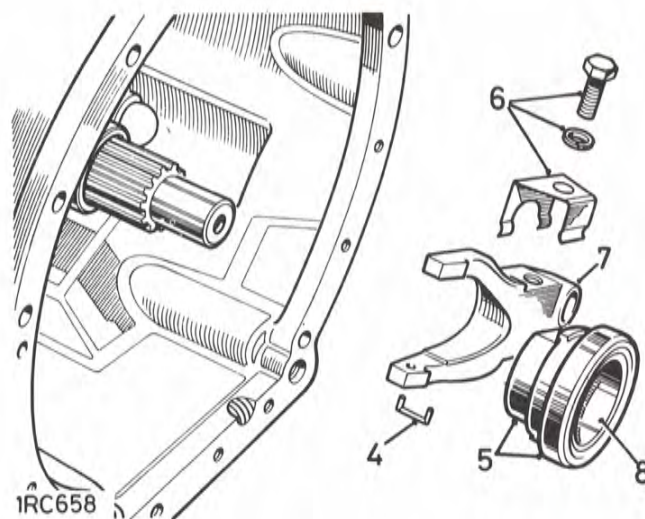
33.25.12

## Removing

1. Remove the front floor. 76.10.12.
2. Remove the front seat base. 76.70.06
3. Remove the gearbox. 37.20.01.
4. Withdraw the retainer staple.
5. Withdraw the bearing and sleeve. If required, press the bearing off the sleeve. Fit the replacement bearing with the domed face outwards from sleeve.
6. Remove the spring clip and fixings.
7. Withdraw the release lever assembly.

## Refitting

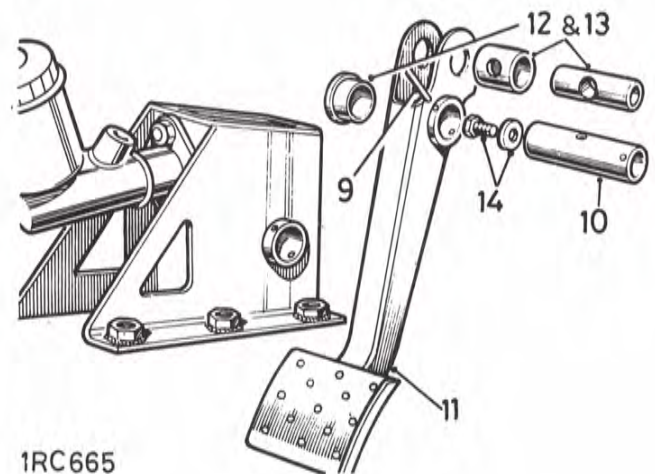
8. Reverse 1 to 7. Lubricate the bearing sleeve inner diameter with PBC (Poly Butyl Cuprysil) grease.



9. Using a suitable punch, drift out the pin from the pedal shaft.
10. Withdraw the pedal shaft.
11. Withdraw the clutch pedal complete with trunnion and bushes.
12. If required, remove the bushes, trunnion and distance piece from the clutch pedal.

#### Refitting

13. If removed, fit the distance piece, trunnion and bushes to the clutch pedal. Lubricate the trunnion and distance piece with general purpose grease on assembly. New pedal bushes must be reamed to 15,87 mm + 0,02 mm (0.750 in. + 0.001 in.).
14. Remove the oil plug and washer from the pedal shaft. Fill the shaft bore with clean engine oil and refit the plug and washer.
15. Reverse 8 to 11.
16. Place the gasket in position on the securing flange of the brake pedal bracket. If necessary, use Bostik adhesive to retain the gasket.
17. Reverse 3 to 6.
18. Bleed the clutch hydraulic system. 33.15.01.

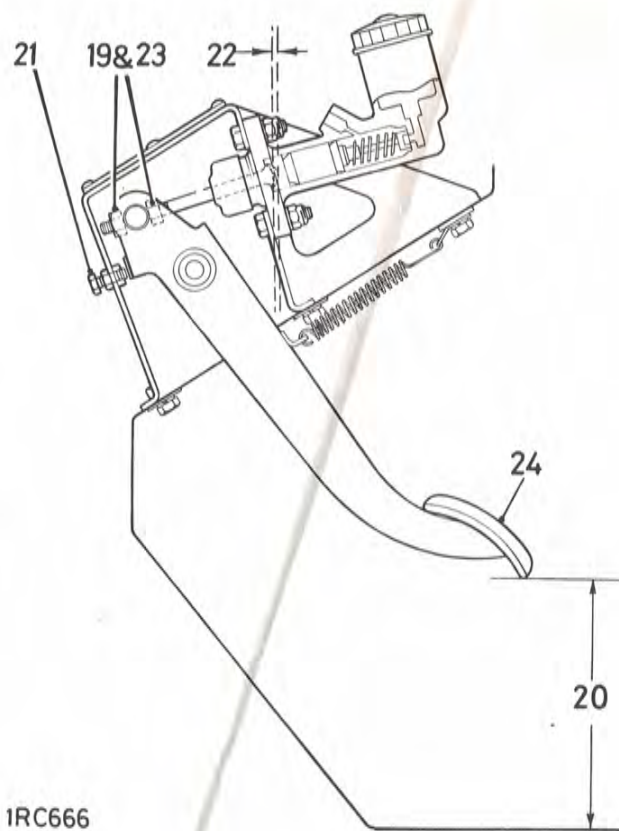


*continued*

## CLUTCH

### Clutch pedal and master cylinder setting

19. Slacken both locknuts on the master cylinder push rod.
20. Check the distance from the lower edge of the clutch pedal to the floor. The correct distance is 140 mm (5.500 in.).
21. Adjust the pedal stop, as required, to obtain the correct distance.
22. Adjust the master cylinder push rod until there is approximately 1,5 mm (0.062 in.) free play between the push rod and the master cylinder piston.
23. Tighten both locknuts.
24. Check the clutch pedal and ensure that there is a minimum of 6 mm (0.250 in.) free movement of the pedal before pressure is felt. If necessary, readjust the master cylinder push rod.
25. Fit the gasket and top cover to the clutch pedal bracket.
26. Reverse 1 and 2.



IRC666

### DATA

Clutch pedal pivot bushes, reamed diameter.  
Clutch pedal height setting  
Master cylinder push rod free play.  
Clutch pedal free play (minimum).

15,87 mm + 0,02 mm (0.750 in. + 0.001 in.).  
140 mm (5,500 in.).  
1,5 mm (0.062 in.).  
6,0 mm (0.250 in.).

## SLAVE CYLINDER

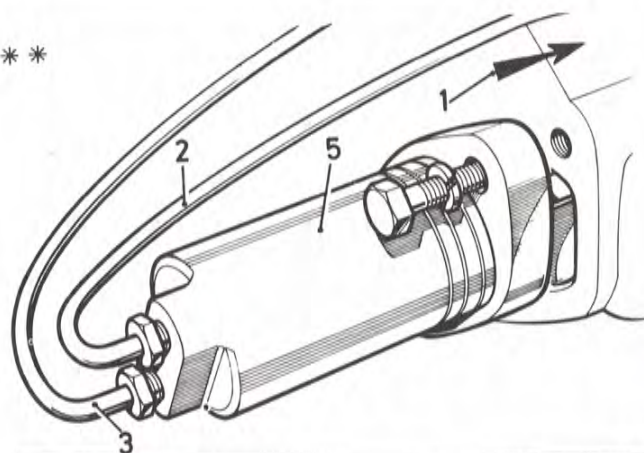
-Remove and refit

33.35.01

\*\*

## Removing

1. Evacuate the clutch system fluid at the slave cylinder bleed valve.
2. Disconnect the bleed pipe.
3. Disconnect the fluid pipe.
4. \*\*Release the plastic clip from the clutch release lever and slide the clip along the push rod.
5. Remove the slave cylinder.

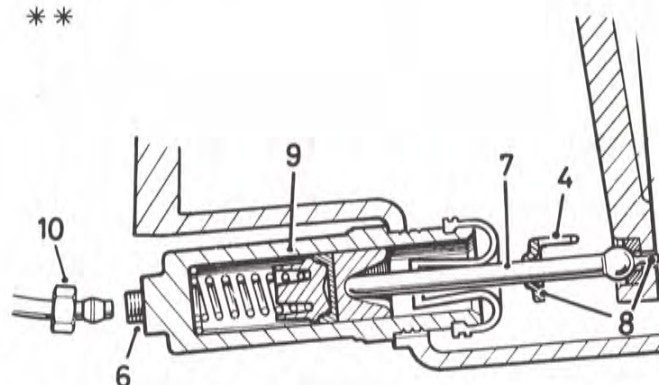


## Refitting

6. Partially extend the push rod by applying low pressure air to the fluid connector.
7. Position the push rod centrally to the body.
8. Locate the push rod end into the seating in the release lever, and retain with the plastic clip.
9. Fit the slave cylinder, bleed valve uppermost.
10. Fit the fluid pipe.
11. Fit the bleed pipe.
12. Bleed and replenish the hydraulic system.
13. Check for fluid leaks with the pedal depressed and also with the system at rest. \*\*

IRC660A

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IRC661A

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## CLUTCH

### SLAVE CYLINDER

—Overhaul

33.35.07

#### Dismantling

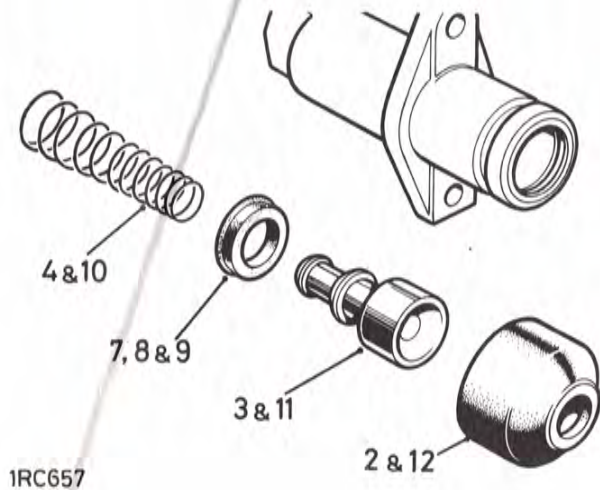
1. Remove the slave cylinder. 33.35.01.
2. Withdraw the dust cover.
3. Expel the piston assembly, applying low pressure air to the fluid inlet.
4. Withdraw the spring.

#### Inspecting

5. Clean all components in Girling cleaning fluid and allow to dry.
6. Examine the cylinder bore and piston, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacement.
7. The seal should be replaced with a new component.

#### Assembling

8. Smear the seal with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling brake and clutch fluid.
9. Fit the seal, large diameter last, to the piston.
10. Locate the conical spring, small diameter first, over the front end of the piston.
11. Smear the piston with Castrol-Girling rubber grease and insert the assembly, spring end first, into the cylinder.
12. Fill the dust cover with Castrol-Girling rubber grease and fit the cover to the cylinder.
13. Refit the slave cylinder. 33.35.01.



MANIFOLD AND EXHAUST SYSTEM OPERATIONS

Exhaust manifold, 2.6 litre models											
—remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.15.10
Exhaust system											
—front pipe —remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.10.09
—intermediate pipe —remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.10.11
—silencer —remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.10.14
—silencer and tail pipe —remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.10.22
—tail pipe —remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.10.19
Induction and exhaust manifold, 2¼ litre models											
—remove and refit	...	...	...	...	...	...	...	...	...	...	... 30.15.01



**EXHAUST SYSTEM, 2,6 litre models**

**– Remove and refit**

Front pipe, items 1 to 6	30.10.09
Intermediate pipe, items 7 to 9	30.10.11
Silencer, items 10, 11 and 13	30.10.14
Tail pipe, items 10 to 13	30.10.19

**Front exhaust pipe**

**Removing**

1. Remove the securing bolts at the front exhaust pipe and intermediate pipe joint.
2. Remove the securing bolts fixing the front exhaust pipe to the flexible mounting.
3. Remove nuts and spring washers securing pipe at exhaust manifold.
4. Withdraw the exhaust pipe.
5. If required, remove the bolts securing the heat shield to the front exhaust pipe and withdraw the two halves of the shield.

**Refitting**

6. Reverse 1 to 5, leaving the flexible mounting loose until the pipe has been firmly secured to the manifold and intermediate pipe.

**Intermediate exhaust pipe**

**Removing**

7. Remove securing bolts at front exhaust pipe and silencer.
8. Remove the securing bolts fixing the intermediate pipe to the flexible mounting and withdraw the intermediate pipe.

**Refitting**

9. Reverse 7 and 8, leaving the flexible mounting loose until the pipe has been firmly secured to front exhaust pipe and silencer.

**Exhaust silencer and tail pipe**

**Removing**

10. Remove the bolts securing the intermediate pipe to the silencer and the bolts securing the tail pipe to the flexible mounting, keeping the silencer supported by hand.
11. Withdraw the silencer assembly.
12. If required, remove the bolts securing the tail pipe to the silencer and withdraw tail pipe.

**Refitting**

13. Reverse 10 to 12, ensuring that the bolts securing intermediate pipe to silencer are fully tightened before finally clamping the tail pipe support.



## MANIFOLD AND EXHAUST SYSTEM

---

### EXHAUST SYSTEM, 2¼ litre models

#### –Remove and refit

Front pipe	30.10.09
Intermediate pipe	30.10.11
Silencer and tail pipe	30.10.22

#### Front exhaust pipe

##### Removing

1. Remove securing bolts at front exhaust pipe and intermediate pipe joint.
2. Remove nuts and spring washers securing pipe at exhaust manifold.
3. Withdraw the exhaust pipe and joint washer.

##### Refitting

4. Reverse 1 to 3.

#### Intermediate exhaust pipe

##### Removing

5. Remove securing bolts at front exhaust pipe and silencer.
6. Remove supporting clamp and withdraw intermediate exhaust pipe.

##### Refitting

7. Reverse 5 and 6, leaving the supporting clamps loose until the pipe has been secured firmly to front exhaust pipe and silencer.

#### Exhaust silencer (RHStg models only)

##### Removing

8. Remove the bolts securing intermediate pipe to silencer and release support saddle from silencer tail pipe, keeping silencer supported by hand.
9. Withdraw silencer assembly.

##### Refitting

10. Reverse 8 and 9, ensuring that the bolts securing intermediate pipe to silencer are fully tightened before finally clamping the tail pipe support.

#### Exhaust silencer (LHStg models only)

##### Removing

11. Remove bolts securing intermediate pipe to silencer.
12. Keeping the silencer supported, release the supporting strap for silencer right-hand side and saddle clamp on tail pipe, then withdraw silencer assembly.

##### Refitting

13. Fit the silencer in position and loosely support by means of supporting strap and saddle clamp.
14. Secure the intermediate pipe to silencer.
15. Finally tighten bolts securing support strap and saddle clamp.



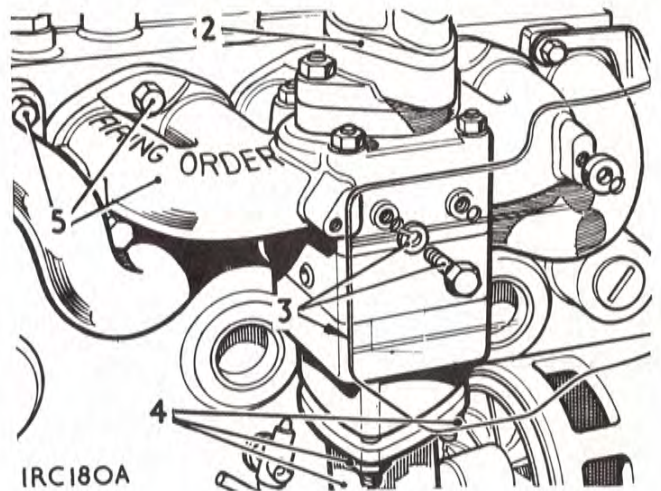
**INDUCTION AND EXHAUST MANIFOLD ASSEMBLY –  
2¼ litre Petrol models**

–Remove and refit

30.15.01

**Removing**

1. Remove the bonnet. 76.16.01.
2. Remove the carburetter. 19.15.11.
3. Remove the exhaust heat shield.
4. Disconnect the front exhaust pipe from the manifold.
5. Remove the induction and exhaust manifold assembly.
6. Withdraw the joint washers for the induction manifold.
7. Separate the induction manifold from the exhaust manifold.
8. Withdraw the joint washer.

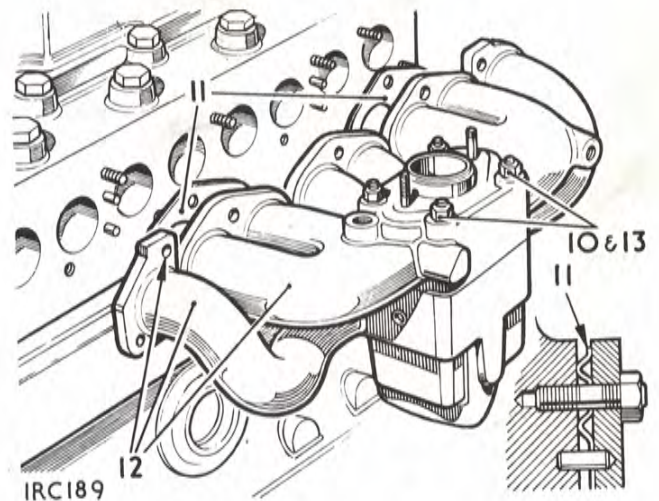
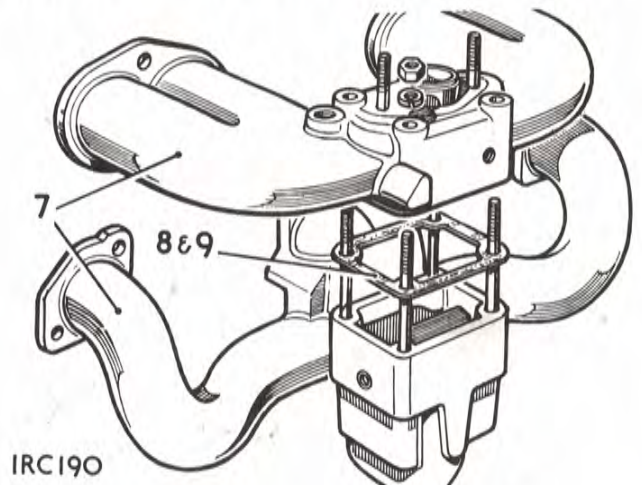


**Refitting**

9. Using a new joint washer, assemble the induction manifold to the exhaust manifold.
10. Tighten the fixings, induction manifold to exhaust manifold, to a torque of 2,3 kgf.m (17 lbf.ft), then slacken off slightly.
11. Fit the joint washers for the induction manifold with the raised rings towards the cylinder head.

**NOTE:** Joint washers are not fitted to the exhaust manifold.

12. Fit the induction and exhaust manifold assembly. Torque 2,3 kgf.m (17 lbf.ft).
13. Tighten the fixings, induction manifold to exhaust manifold. Torque 2,3 kgf.m (17 lbf.ft).
14. Reverse 1 to 4.



## MANIFOLD AND EXHAUST SYSTEM

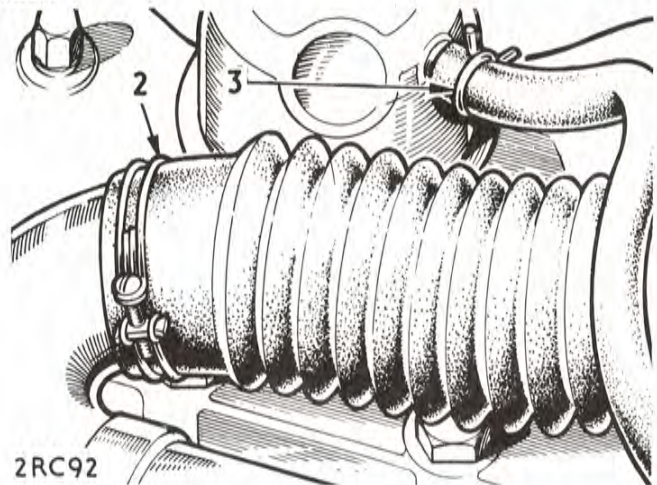
### INDUCTION AND EXHAUST MANIFOLD, 2¼ litre Diesel models

—Remove and refit

30.15.01

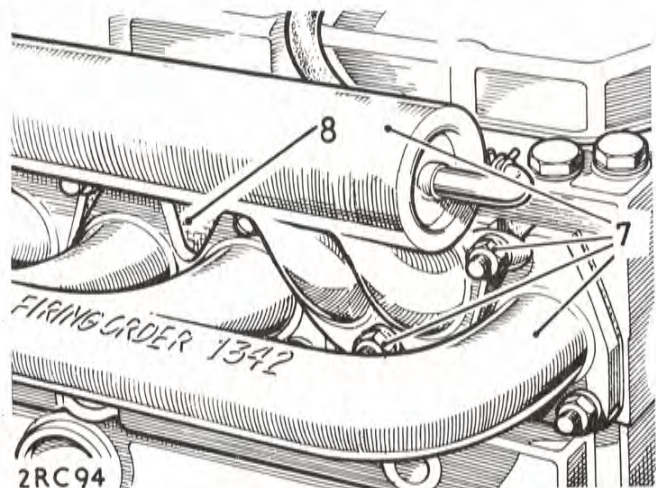
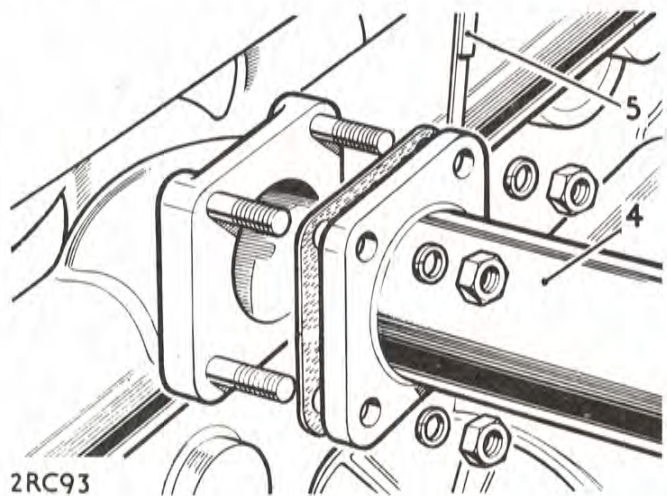
#### Removing

1. Remove the bonnet panel. 76.16.01.
2. Disconnect the air cleaner hose.
3. Disconnect the engine breather hose.
4. Disconnect the front exhaust pipe at the manifold.
5. Withdraw the oil level dipstick.
6. Where a brake servo is fitted, disconnect the manifold throttle control rod and the vacuum supply hose.
7. Remove the four upper and five lower fixings and withdraw the manifolds.
8. Withdraw the manifolds joint washer.



#### Refitting

9. Reverse 7 and 8; do not tighten any fixings until all are in place.
10. Where applicable, reverse 6. Ensure that the manifold throttle valve opens slightly in advance of the distributor/injection pump linkage. Adjust at the cross-shaft linkage as necessary.
11. Reverse 1 to 5.



EXHAUST MANIFOLD, 2.6 litre models

—Remove and refit

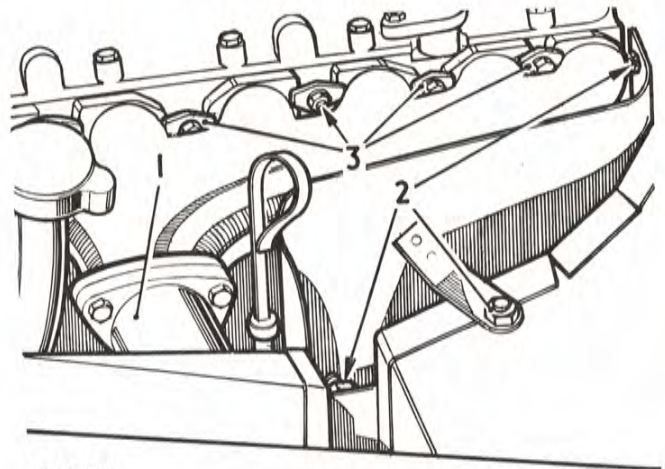
30.15.10

Removing

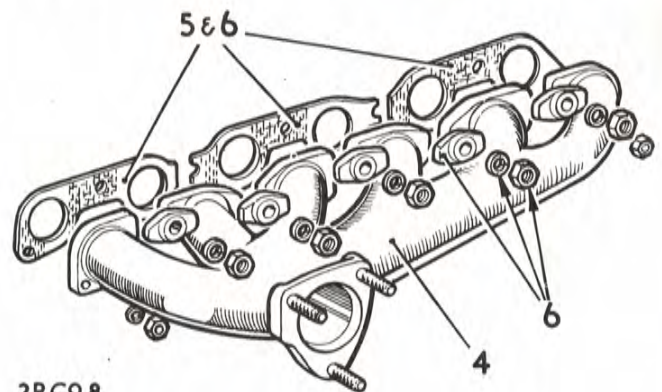
1. Disconnect the front exhaust pipe from the manifold.
2. Remove the fixings and withdraw the exhaust heat shield.
3. Remove the manifold fixings.
4. Withdraw the manifold.
5. Withdraw the joint washers.

Refitting

6. Reverse 3 to 5 with the joint washers plain faces toward the engine. Tighten the fixings evenly to avoid distortion.
7. Reverse 1 and 2.



2RC97



2RC98

PROPELLER SHAFT OPERATIONS

Description										Operation No.
Front propeller shaft										
—remove and refit	...	...	...	...	...	...	...	...	...	47.15.02
—overhaul	...	...	...	...	...	...	...	...	...	47.15.11
Rear propeller shaft										
—remove and refit	...	...	...	...	...	...	...	...	...	47.15.03
—overhaul	...	...	...	...	...	...	...	...	...	47.15.12



**PROPELLER SHAFT**

–Remove and refit

Front propeller shaft 47.15.02

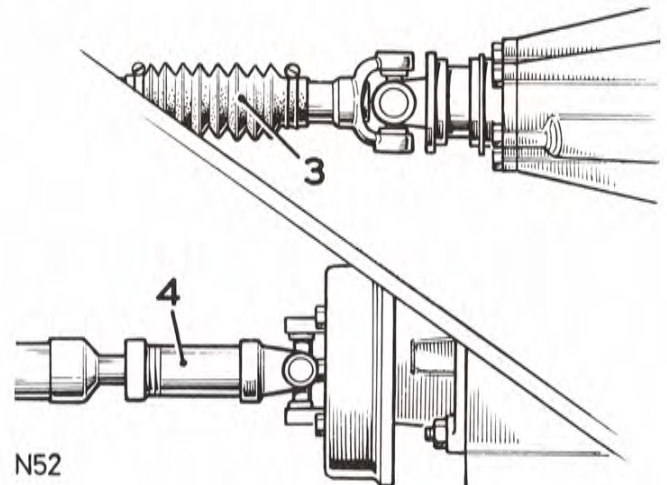
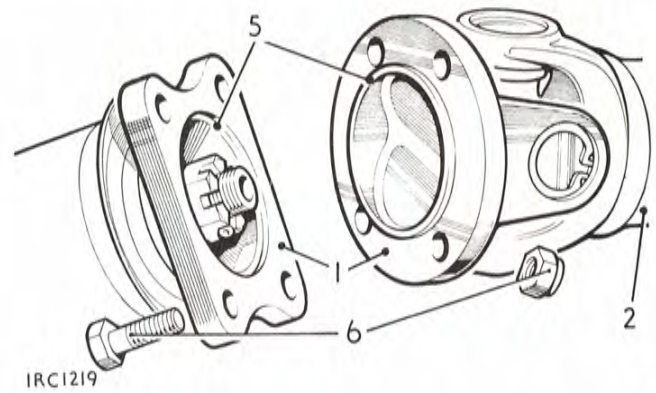
Rear propeller shaft 47.15.03

**Removing**

1. Disconnect the coupling flanges.
2. Withdraw the propeller shaft.

**Refitting**

3. Front propeller shaft – locate the shaft in position with the sleeve end towards the front axle.
4. Rear propeller shaft – locate the shaft in position with the sleeve end towards the gearbox.
5. Ensure that the registers on the coupling flanges engage.
6. Secure the coupling flange fixings.



# PROPELLER AND DRIVE SHAFTS

## PROPELLER SHAFT

### —Overhaul

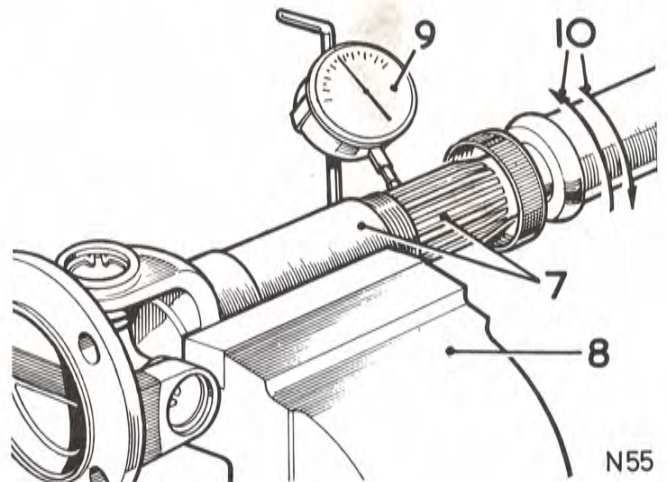
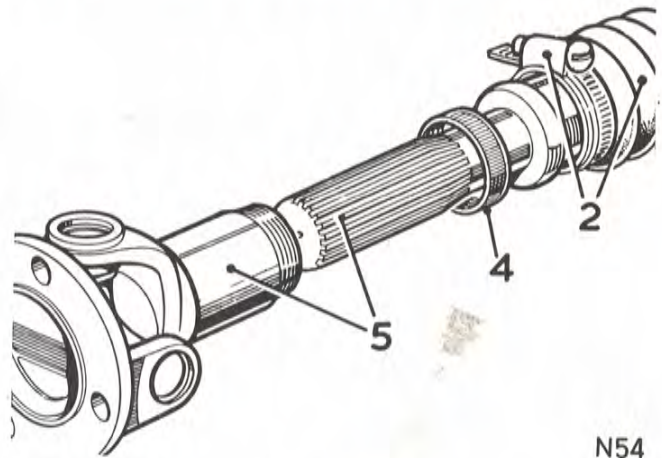
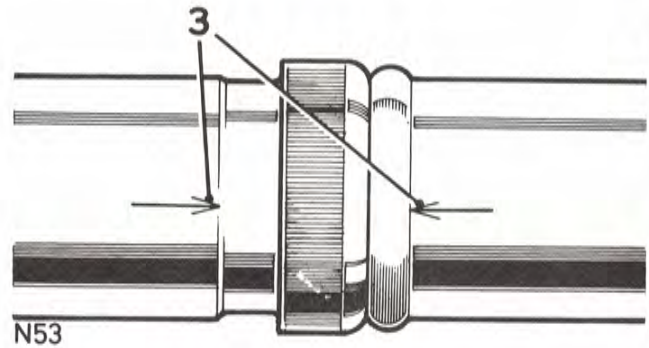
Front propeller shaft 47.15.11

Rear propeller shaft 47.15.12

### Dismantling

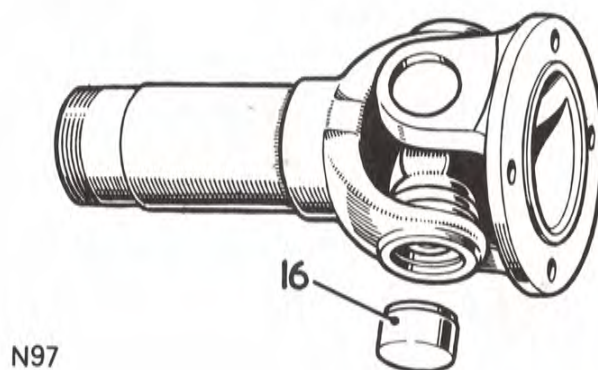
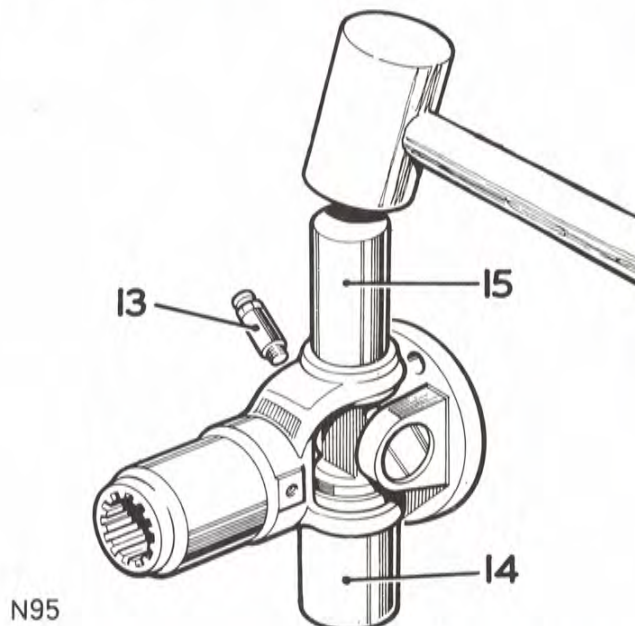
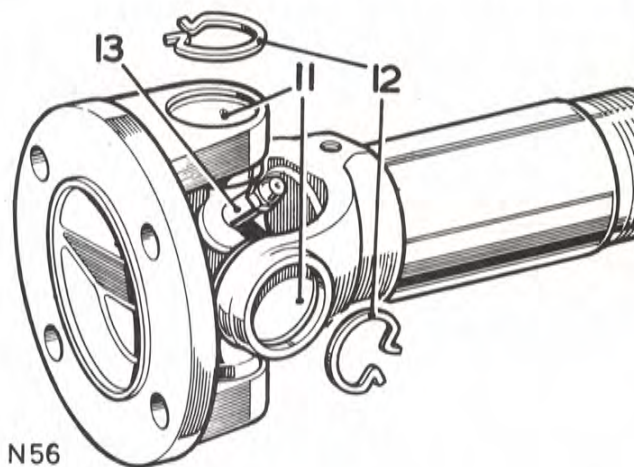
1. Remove the propeller shaft 47.15.02, 47.15.03.
2. Front propeller shaft — release the two hose clips and slide the rubber grommet along the shaft.
3. Check that the alignment marks on the splined sleeve and the splined shaft are clearly visible. If necessary, make new alignment marks.
4. Unscrew the dust cap.
5. Withdraw the sliding joint.
6. Clean the splined shaft and the splined sleeve.
7. Temporarily locate the splined shaft into the sleeve, maintaining the marked alignment.
8. Secure the shaft in a vice.
9. Mount a dial test indicator to read off the outside diameter of the shaft splines.
10. Check the circumferential movement between the sleeve and shaft. If the movement exceeds 0,1 mm (0.004 in) fit a new propeller shaft complete.

*Continued*



11. Clean any dirt and enamel from the circlips and the tops of the bearing races.
12. Remove the circlips.
13. Remove the grease nipple from the universal joint.
14. Locate the yoke of the splined sleeve onto a suitable piece of tube which has a slightly larger internal diameter than the journal bearing.
15. Using a brass drift, drive the universal joint downward until it is just clear of the lower yoke.
16. Lift the sleeve clear of the tube and withdraw the bearing downward to avoid dropping the needle rollers.
17. Repeat items 14 to 16 for the opposite bearing.

*Continued*



## PROPELLER AND DRIVE SHAFTS

18. Withdraw the splined sleeve from the flanged yoke.
19. Remove the bearings from the flanged yoke in the manner already described.
20. Repeat items 14 to 19 for the splined shaft.

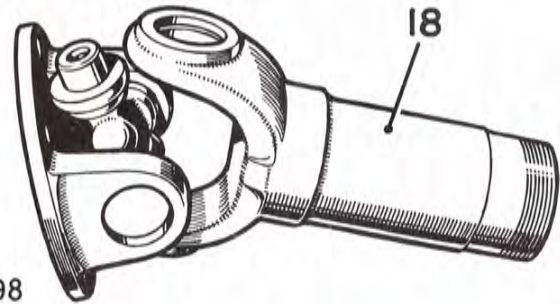
### Inspecting

21. Examine all components for obvious wear or damage.
22. If the journal or bearings for the universal joints show any signs of wear, load markings or distortion, they must be replaced complete. Replacement journal assemblies comprise a spider complete with oil seals and bearings.
23. In the event of wear in any of the eight yoke cross holes, rendering them oval, a new propeller shaft complete must be fitted.

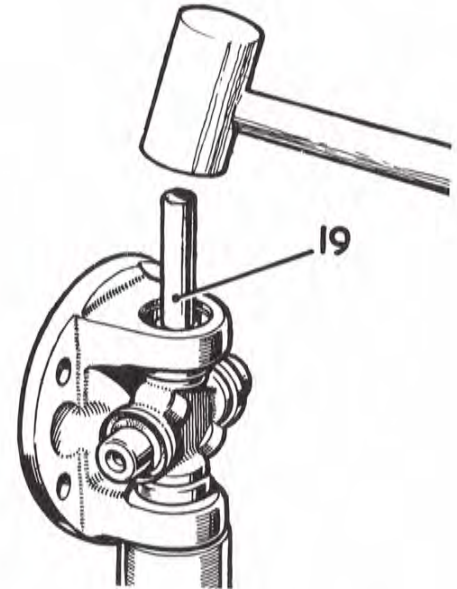
### Reassembling

24. Assemble the needle rollers in the bearing races, if necessary using a smear of vaseline to retain them in place. About half-fill the races with a recommended grease.
25. Insert the journal, complete with seals, into the flange yoke holes with the grease nipple tapping pointing away from the flange.
26. Place the flanged yoke on a suitable flat support.
27. Place the first bearing in position.
28. Using a brass drift, slightly smaller in diameter than the hole in the yoke, tap the bearing into position.

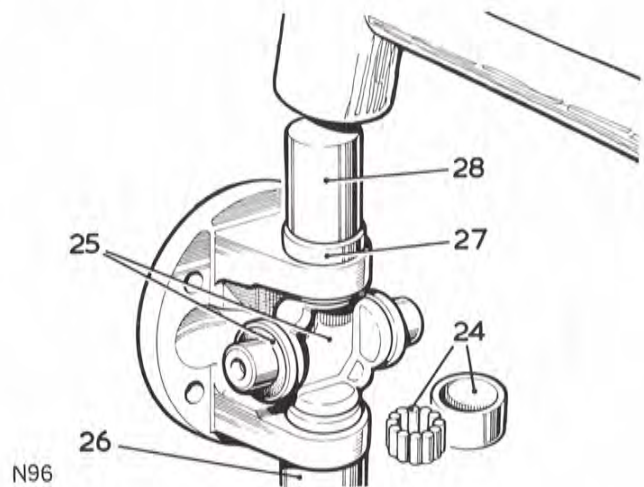
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N98



N99



N96



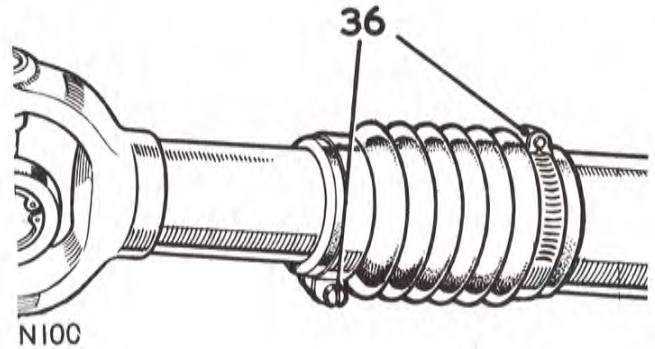
29. Fit the circlip to retain the bearing.

**NOTE:** The bearing outer races must be a drive fit, otherwise fit a new propeller shaft complete.

30. Repeat 26 to 29 for the other three bearings comprising the universal joint.
31. Ensure that all four circlips are firmly located in their grooves. If the joint appears to bind, tap the yoke ears lightly with a soft mallet.
32. Repeat 24 to 31 for the other universal joint.
33. Front propeller shaft – slide the rubber grommet and hose clips over the shaft.
34. Liberally smear the splines of the shaft and sleeve with the recommended grease.
35. Assemble the splined shaft and sleeve maintaining the marked alignment.
36. Front propeller shaft – place the rubber grommet in position and secure the hose clips 180° to each other to maintain balance.
37. Fit the grease nipple to the universal joint.
38. Lubricate the propeller shaft at the grease points.

**CAUTION:** Do not fill the sliding joint with grease, use sufficient to lubricate the splines only, otherwise hydraulicing will result.

39. Refit the propeller shaft. 47.15.02, 47.15.03.



N100

# GEARBOX

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## GEARBOX OPERATIONS

### Main Gearbox

#### Bell Housing

- remove and refit .. .. . 37.12.07
- overhaul (includes Primary Pinion remove and refit) .. .. . 37.12.08

Clutch release assembly—Refer to Division 33 (Clutch)

#### Gearbox complete

- remove and refit .. .. . 37.20.01

#### Gearbox main casing

- remove and refit .. .. . 37.12.40
- overhaul .. .. . 37.12.43

#### Gearchange lever

- remove and refit .. .. . 37.16.04
- overhaul .. .. . 37.16.10

#### Gearchange selectors

- remove and refit .. .. . 37.16.31
- overhaul .. .. . 37.16.34

#### Layshaft

- remove and refit .. .. . 37.20.19

#### Mainshaft

- remove and refit .. .. . 37.20.25
- overhaul .. .. . 37.20.31

*continued*





## FRONT OUTPUT SHAFT HOUSING

-Remove and refit

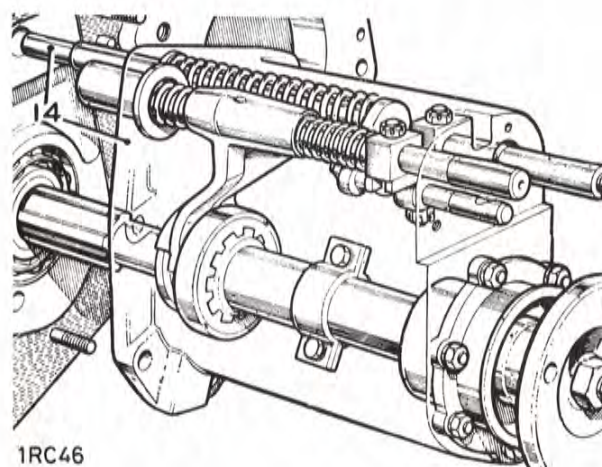
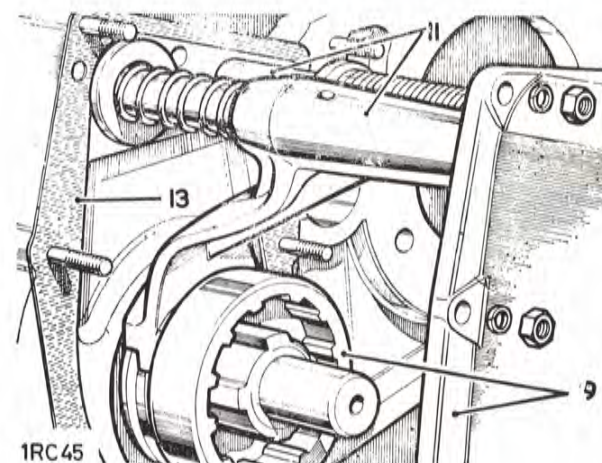
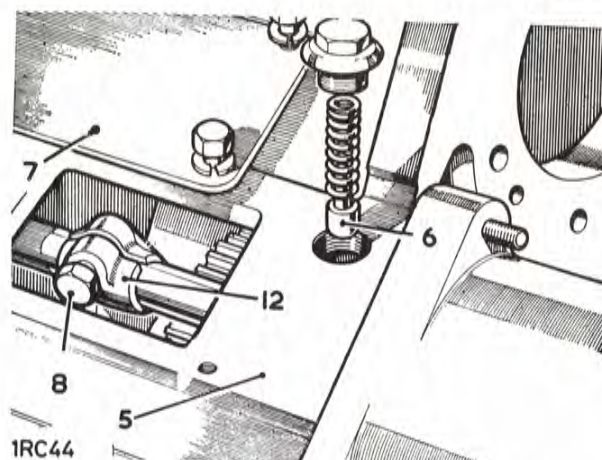
37.10.05

## Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the transmission brake. 70.45.16.
5. Remove the transfer box. 37.29.25.
6. Remove the transfer gear selector shaft plunger.
7. Remove the top cover from the transfer box.
8. Remove the pinch bolt from the transfer selector fork.
9. Remove the front output shaft housing from the transfer box, taking care to catch the four wheel drive locking dog which will be released.
10. Withdraw the loose selector fork from the transfer box.

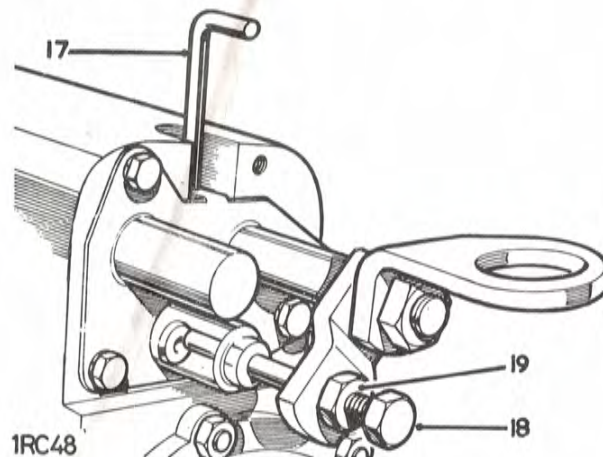
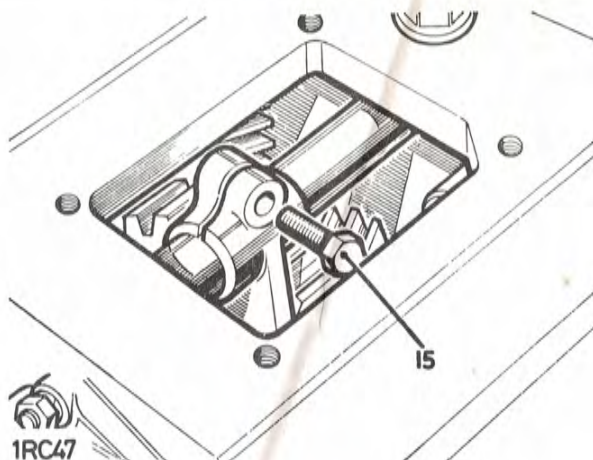
## Refitting

11. If the selector shafts have been removed, refer to 37.10.06 for refitting procedure.
12. Place the transfer gear selector fork in position, with the threaded side of the pinch bolt hole towards the centre of the transfer box.
13. Smear both sides of the joint washer with a general purpose grease and place in position on the transfer box.
14. Offer the output shaft housing to the transfer box, carefully locating the transfer gear selector shaft through the selector fork

*continued*

## GEARBOX

15. Complete the refitting by reversing the removal procedure. Ensure that the selector fork pinch bolt engages the groove in the selector shaft.
16. If the transfer box is of the all helical type, see 37.29.28, adjust the transfer travel stop as follows:
17. Engage four wheel drive, low ratio, and check the fit of the four wheel drive locking pin in the pivot shaft. The pin must be an easy slide fit.
18. If necessary, adjust the stop bolt to obtain this condition.
19. Tighten the locknut to secure the stop bolt.
20. Replenish the gearbox oil.



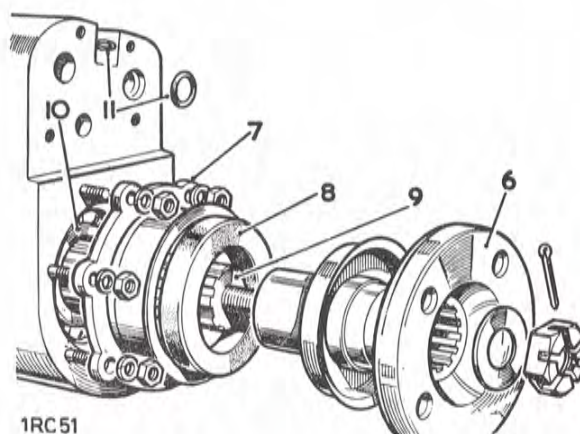
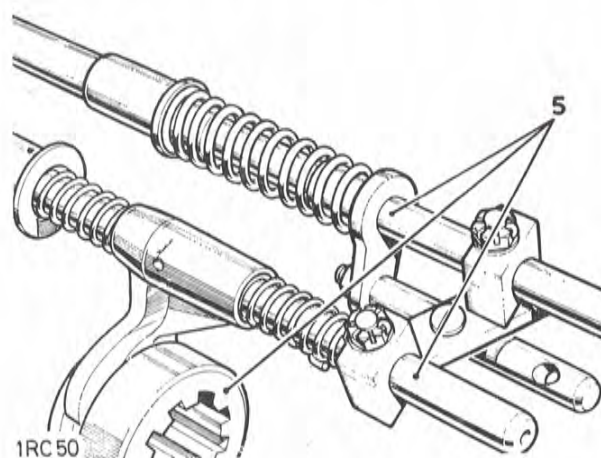
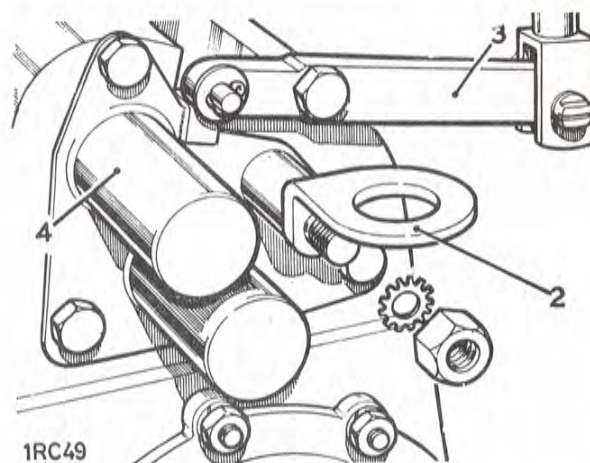
## FRONT OUTPUT SHAFT HOUSING

—Overhaul

37.10.06

## Dismantling the housing

1. Remove the front output shaft housing. 37.10.05.
2. Remove the link from the transfer gear selector shaft.
3. Remove the four wheel drive control lever.
4. Remove the selector shaft dust cover.
5. Withdraw the selector shaft assemblies and the four wheel drive locking dog from the housing.
6. Remove the flange from the front output shaft.
7. Remove the oil seal retainer and gasket.
8. Press out the oil seal.
9. Remove the front output shaft from the housing.
10. Press out the bearing from the housing.
11. Remove the sealing rings for the four wheel drive locking pin and the transfer gear shaft.

*continued*

## GEARBOX

### Dismantling the four wheel drive selector shaft

12. Remove the block from the selector shaft.
13. Withdraw the springs and selector fork from the shaft.

### Dismantling the transfer gear selector shaft

14. Slide the distance tube, bush, spring and pivot shaft assembly from the selector shaft.
15. Remove the block
16. Remove the connector from the pivot shaft.
17. Remove the coupling from the pivot shaft.

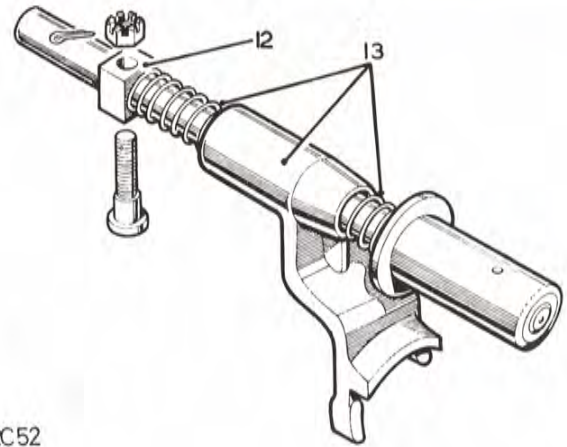
### Dismantling the front output shaft

18. Remove the fixings.
19. Lift the two halves of the oil thrower from the shaft.

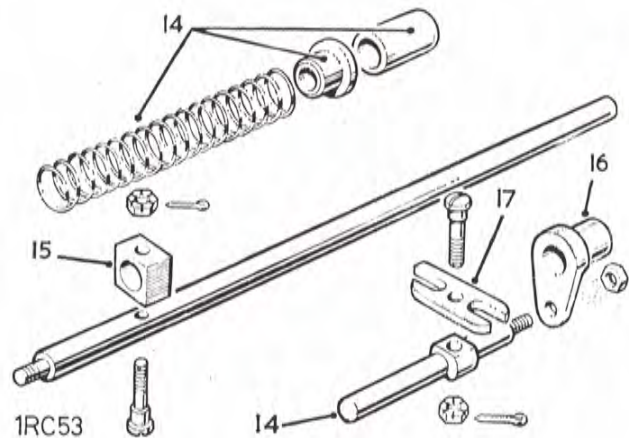
### Inspecting

20. Renew any components which show obvious wear or damage. Examine the bush in the four wheel drive control lever and replace if necessary.
21. Examine the four wheel drive selector fork and bushes, and renew as necessary. New bushes must be pressed flush with the end faces of the fork boss, and reamed in position to 15,887 mm + 0,012 mm (0.6255 in. + 0.0005 in.) diameter, and must be a sliding fit on the selector shaft.
22. Check the four wheel drive selector shaft springs, the free length should be 69,8 mm (2.75 in.).
23. Check the transfer selector shaft spring, the free length should be 181,76 mm (7.156 in.).
24. Examine the bush in the rear end of the front output shaft. The bush must be a sliding fit on the front end of the transfer box output shaft and must be firmly retained in its bore. If bush replacement is necessary, press the new bush flush with the end of the shaft and ream in position to 22,2 mm  $\pm$  0,013 mm (0.8755 in.  $\pm$  0.0005 in.) diameter.

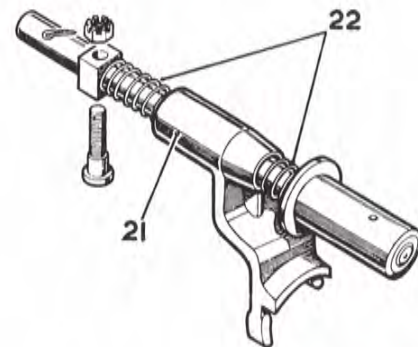
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1RC52



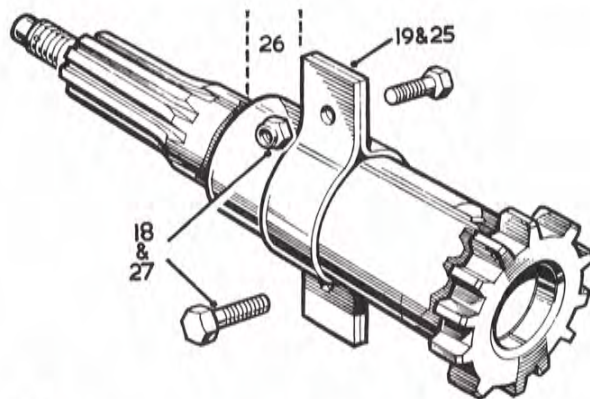
1RC53



1RC54

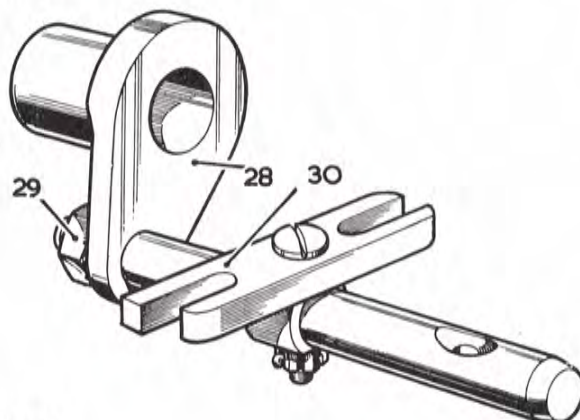
**Assembling the front output shaft**

25. Fit the oil thrower to the front output shaft, do not fully tighten the fixings at this stage.
26. Position the oil thrower 25 mm (1 in.) from the shoulder on the shaft, as illustrated.
27. Tighten the fixings.

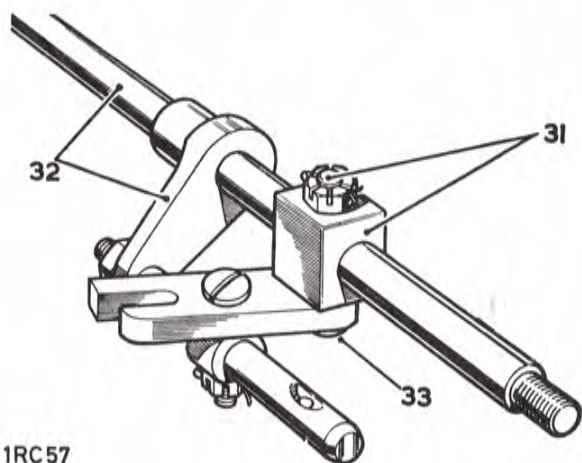
**Assembling the transfer gear selector shaft.**

28. Fit the connector to the pivot shaft noting the relationship of the countersink in the hole at the other end of the shaft.
29. Do not fully tighten the fixings at this stage.
30. Fit the coupling to the pivot shaft locating the extended arm correctly, as illustrated.
31. Fit the block to the transfer gear selector shaft, locating the fixings so that the nut and split pin are on the same side of the shaft as the plunger grooves.
32. Locate the pivot shaft assembly in position on the transfer gear selector shaft.
33. Engage the coupling with the special screw.

1RC55



1RC 56



1RC57

*continued*



## GEARBOX

34. Fit the spring, locating bush and distance tube on to the selector shaft.

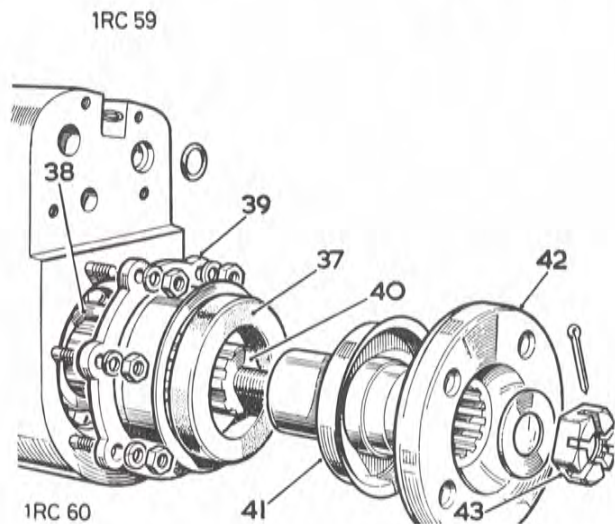
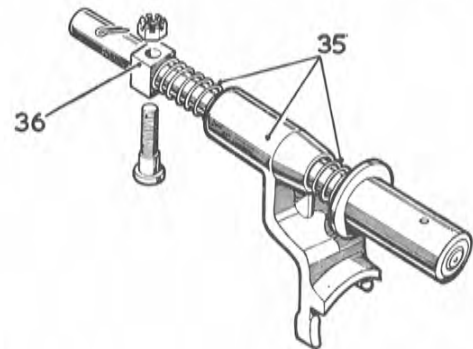
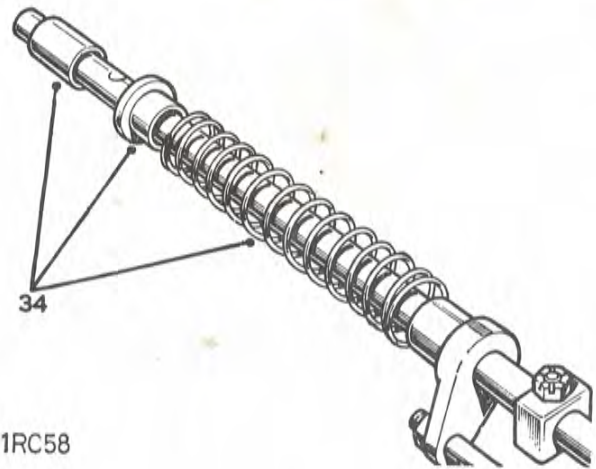
### Assembling the four wheel drive selector shaft

35. Fit the springs and selector fork to the shaft. Note that the two springs are identical and are interchangeable.
36. Fit the block to the selector shaft.

### Assembling the housing

37. Fit the oil seal for the front output shaft, lipped side inward, into the retainer, with a smear of sealant on the seal outside diameter.
38. Press the bearing into the housing.
39. Smear both sides of the joint washer with general purpose grease, and fit the oil seal retainer and joint washer to the housing.
40. Fit the front output shaft.
41. If the mud shield has been removed, refit it, dished side first, to the output flange.
42. Fit the flange to the output shaft.
43. Tighten the securing nut to a torque figure of 11,75 kgf.m (85 lbf. ft.).

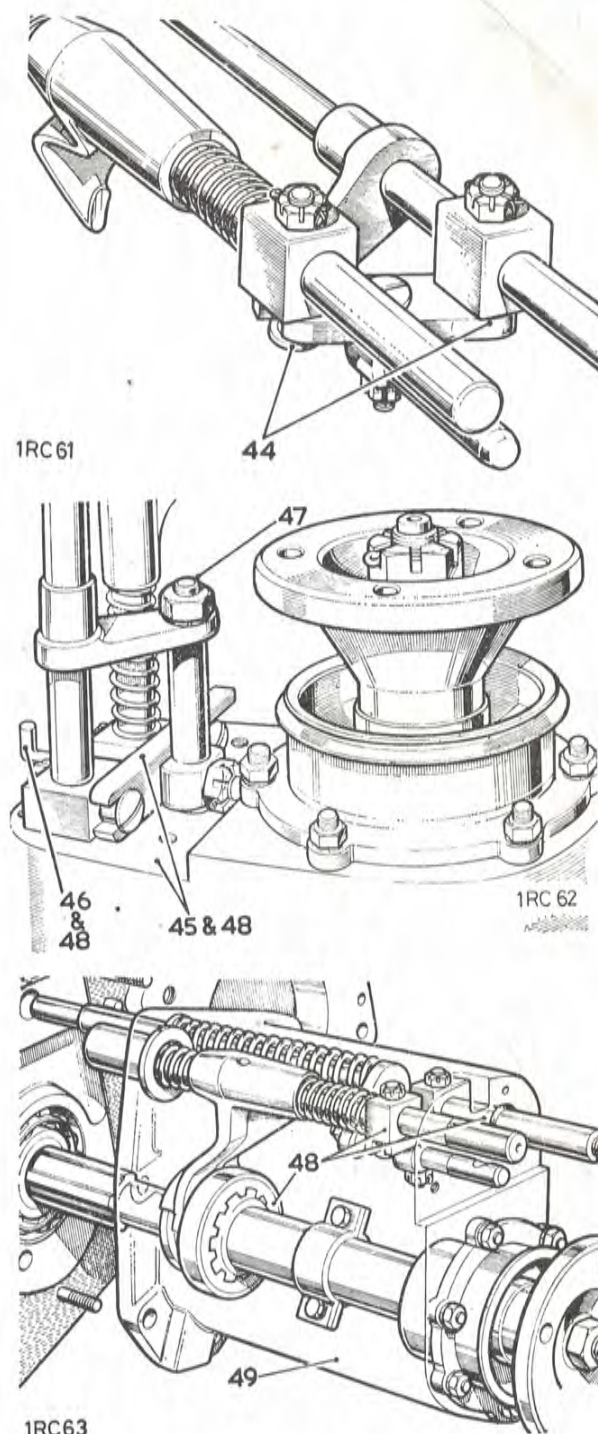
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## Pre-alignment of selector shafts

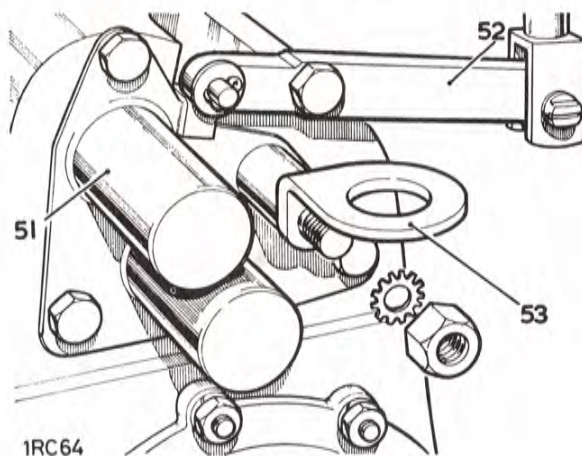
44. Locate the two selector shafts together by engaging the coupling with the special screws.
45. Locate the selector shaft assembly into the **front** face of the output shaft housing.
46. Fit the four wheel drive locking pin, engaging it in the countersunk hole in the pivot shaft. This will ensure correct radial alignment of the pivot shaft to the connector.
47. Fully tighten the nut to secure the connector to the pivot shaft.
48. Remove the locking pin and withdraw the selector shafts as one unit, then without disturbing their alignment, engage them into their correct location in the output shaft housing, while at the same time fitting the four wheel drive locking dog over the output shaft and into the selector fork.
49. If convenient, it will be advantageous at this stage to fit the front output shaft housing to the transfer box 37.10.05.
50. Fit the sealing rings for the transfer gear selector shaft and the four wheel drive locking pin.

*continued*



## GEARBOX

51. Fit the selector shaft dust cover, using Bostik sealant on the joint face.
52. Fit the lever to the selector shaft, but do not fully tighten the fixing, pending setting the four wheel drive lever during floor refitting.
53. Fit the transfer gearshaft link.
54. Fit the four wheel drive locking pin and control lever:
55. Refit the front output shaft housing. 37.10.05.



### DATA

Four wheel drive selector fork bush

15,887 to 15,899 mm (0.6255 to 0.6260 in.) reamed diameter

Four wheel drive selector shaft springs, free length

69,8 mm (2.75 in.)

Transfer selector shaft spring, free length

181,76 mm (7.156 in.)

Bush for output shaft

22,200 to 22,213 mm (0.8755 to 0.8760 in.) reamed diameter

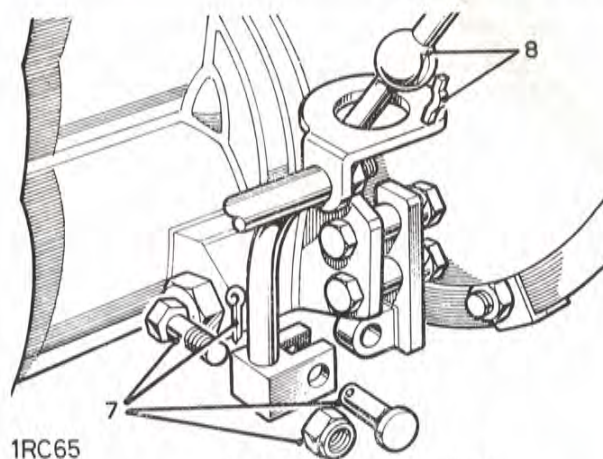
## BELL HOUSING

-Remove and refit

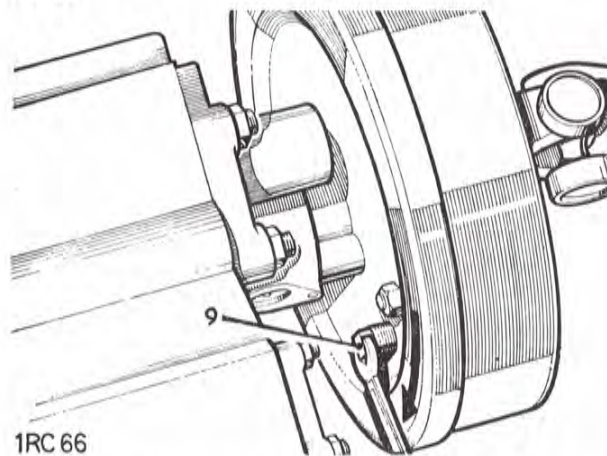
37.12.07

## Removing

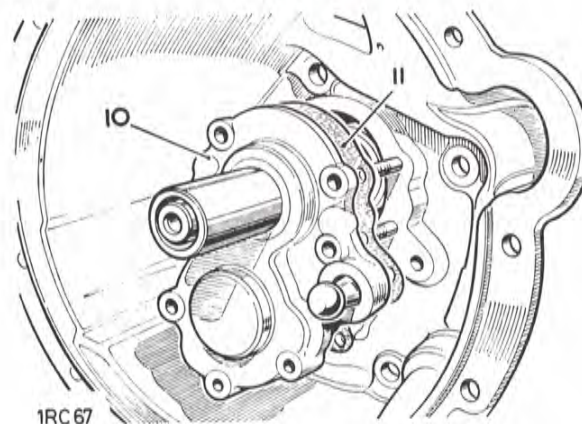
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
8. Withdraw the lever, taking care to retain the spring strip located between the lever ball and link.
9. Fully adjust the transmission brake to lock 'hard on'.
10. Remove the primary pinion cover and oil seal assembly.
11. Withdraw the joint washer.

*continued*

1RC65



1RC66



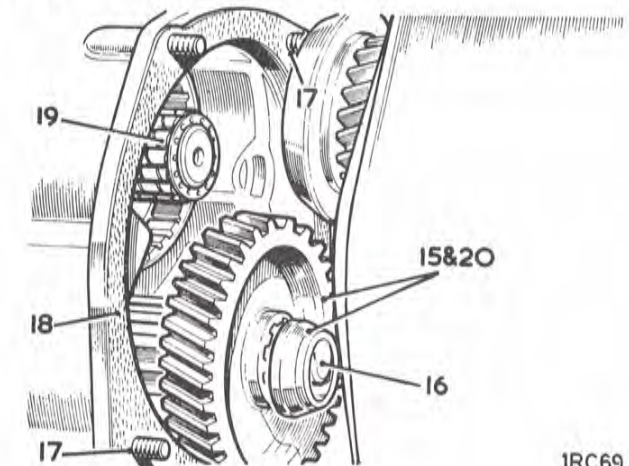
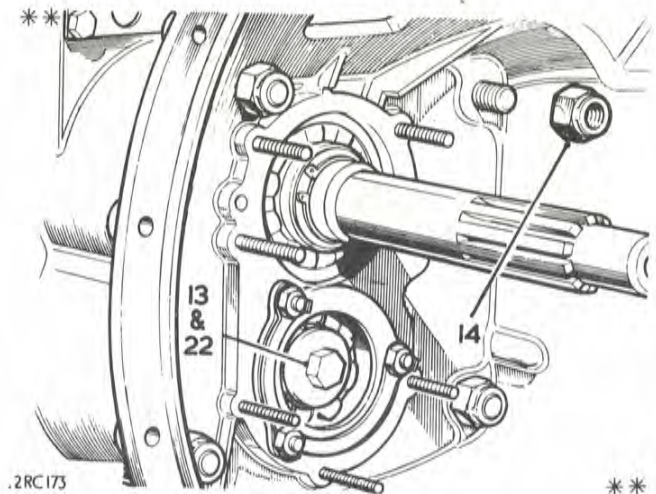
1RC67

## GEARBOX

12. Select any gear.
- 13.\*\* Remove the layshaft securing bolt and washer. DO NOT remove the circlip from the primary pinion.\*\*
14. Remove the bell housing fixings.
15. Retain the constant gear and conical distance piece which are released during the following procedure.
16. Hold the layshaft depressed fully rearwards and ease the housing from the gearbox.

### Refitting

17. Two of the bell housing to gearbox fixings are special fitted bolts, and must be positioned diagonally opposite each other.
18. Smear both sides of the joint washer with a general purpose grease and place in position on the gearbox.
19. Ensure that the roller bearing for the primary pinion is in position.
20. Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
21. Retain the constant gear and conical distance piece in position, by holding through the layshaft bearing, from the inside of the bell housing, then offer the bell housing to the gearbox, using special care to align the constant gear with the splines on the layshaft.
22. Complete the reassembly by reversing 1 to 14. The layshaft securing bolt must be tightened to a torque figure of 8,5 kgf.m (60 lb. ft.).
23. Check and replenish the gearbox lubricating oil.
24. Adjust the transmission brake. 70.45.09.



## BELL HOUSING

-Overhaul

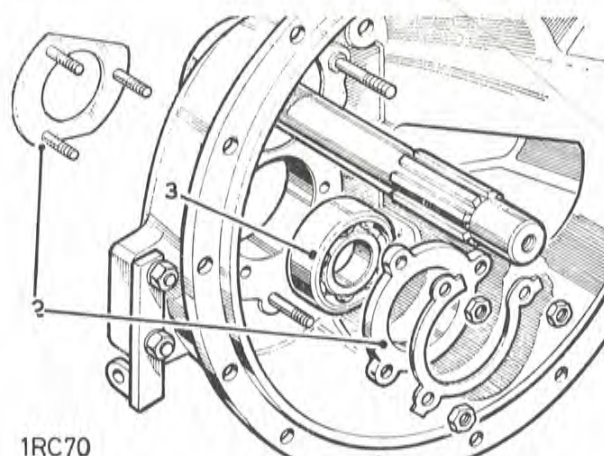
37.12.08

## Dismantling

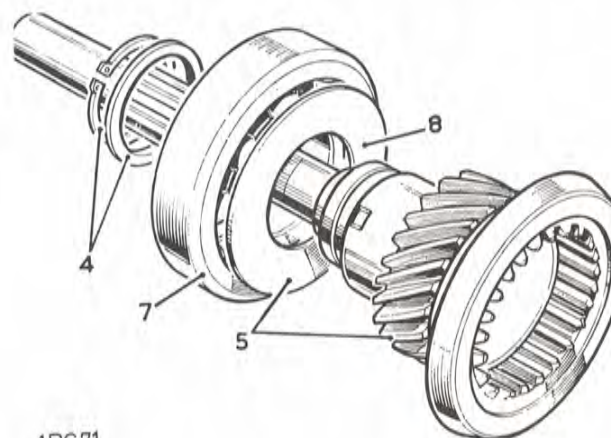
1. Remove the bell housing, 37.12.07.
2. Remove the layshaft bearing retainer and bearing plate.
3. Press the layshaft bearing from the bell housing.
4. Remove the circlip and distance washer.
5. Press out the primary pinion and shield.
6. Remove the bearing retaining plates.
7. Press out the primary pinion bearing.

## Assembling

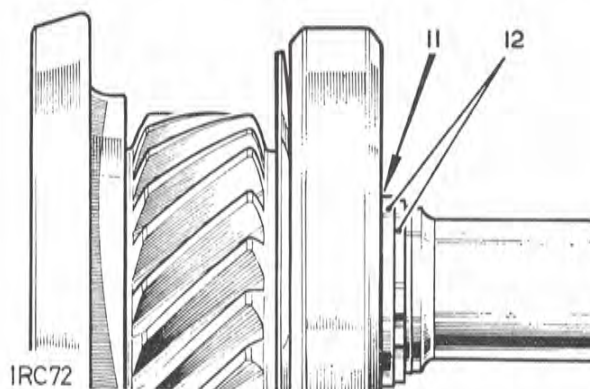
8. Fit the shield to the primary pinion, concave side toward the pinion teeth.
9. Reverse 5 to 7.
10. Fit the distance washer and position a new circlip in the retaining groove.
11. Check the end-float between the primary pinion and the distance washer. End-float must be the minimum obtainable, selecting a suitable distance washer from the range available.
12. Fit the selected distance washer and circlip.
13. Reverse 1 to 3.



1RC70



1RC71



1RC72

## GEARBOX

### GEARBOX MAIN CASING

—Remove and refit 37.12.40

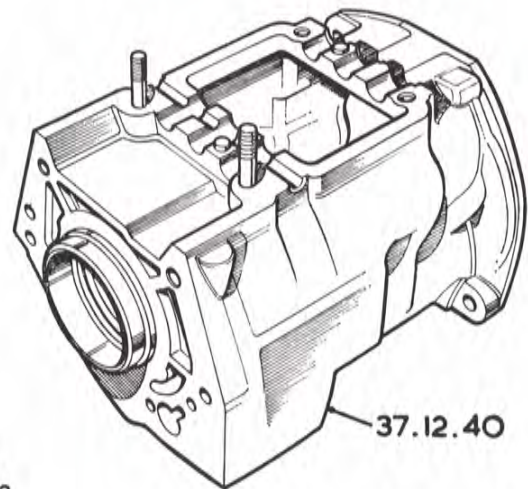
**NOTE:** If it is required to change the rear main oil seal only, it is not necessary to completely dismantle the gearbox. The oil seal is accessible after removing the intermediate gear and the mainshaft gear from the transfer box, see 37.29.10 and 37.20.25 for details.

#### Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the transmission brake. 70.45.16.
6. Remove the transfer box. 37.29.25.
7. Remove the main gear change lever. 37.16.04.
8. Remove the clutch withdrawal unit. 33.25.12.
9. Remove the bell housing. 37.12.07.
10. Remove the selector shafts. 37.16.31.
11. Remove the layshaft. 37.20.19.
12. Remove the mainshaft. 37.20.25.
13. When 1 to 12 are complete the gearbox main casing is released and can be dismantled as described under 'Overhaul', 37.12.43.

#### Refitting

14. Reverse 1 to 12.



1RC73

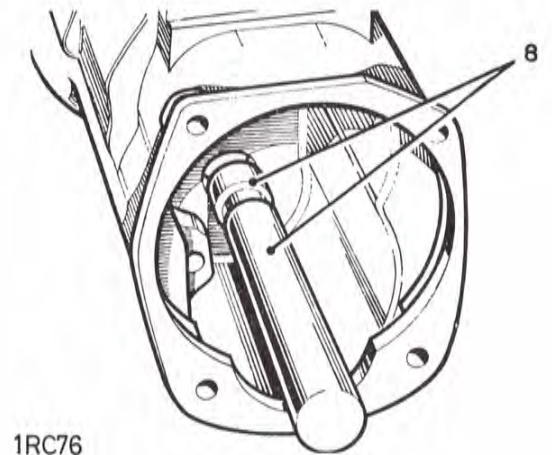
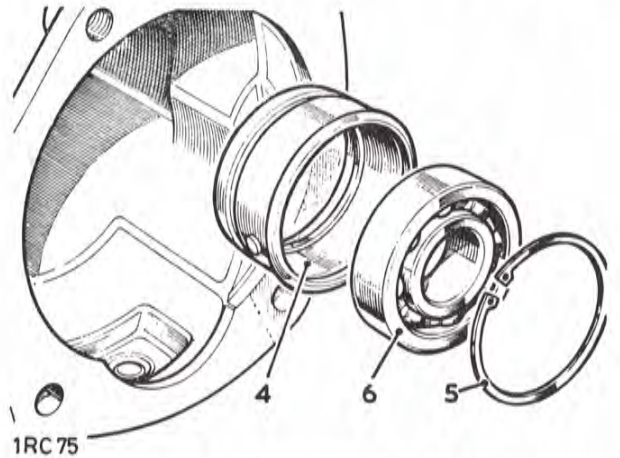
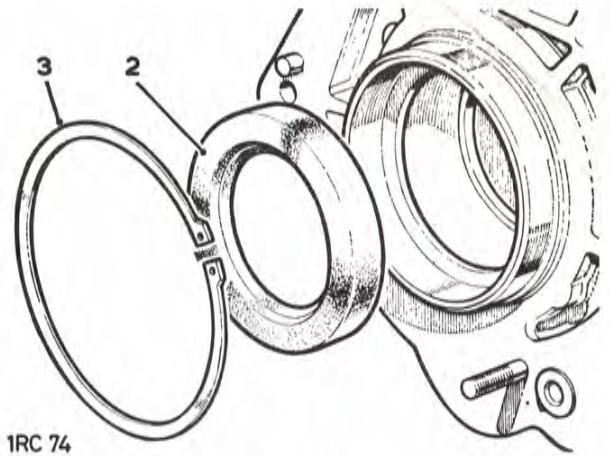
## GEARBOX MAIN CASE

—Overhaul

37.12.43

## Dismantling

1. Remove the gearbox main case. 37.12.40.
2. Prise the oil seal from the rear of the mainshaft bearing housing.
3. Remove the circlip retaining the bearing housing to the rear face of the gearbox.
4. Press out the housing, complete with bearing, in a forward direction.
5. Remove the circlip.
6. Press the mainshaft rear bearing from the housing.
7. With the case warm, drive out the layshaft bearing outer race, using a suitable drift applied through the two extractor holes provided in the case rear face. (See also item 8).
8. An alternative method is to use a mandrel, approximately 300 mm (12 in.) long by 43,50 mm (1.687 in.) diameter, so that it is a tight fit in the outer race. Warm the gearbox case and outer race, keep the mandrel as cool as possible. With the casing warm, insert the mandrel into the outer race which will shrink on to the mandrel and withdraw easily.
9. The remaining oil drain and filler plugs, studs, dowels and retaining plate for selector shaft oil seals, can be removed as required. See 37.20.13 for removal of reverse idler gear and shaft if required.

*continued*



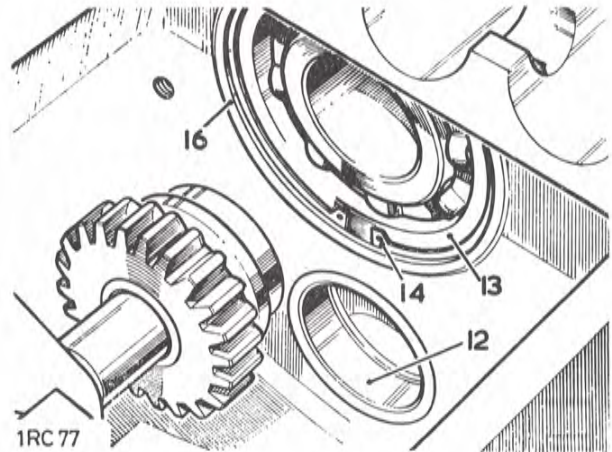
## GEARBOX

### Inspecting

10. Check all components for wear and damage.
11. Ensure that the two dowels in the gearbox top face, and the two dowels in the rear face, are secure.

### Assembling

12. Press the layshaft rear bearing outer race, lipped edge first, into the gearbox case.
13. Press the mainshaft rear bearing into the housing.
14. Retain with a circlip.
15. Fit the main shaft rear oil seal, lipped side first, into the bearing housing.
16. Smear the outside diameter of the bearing housing with Loctite Retaining Compound (Grade AVV), Part No. 600303 and press it into position.  
**NOTE:** The gearbox should not be filled with lubricating oil or used for twenty-four hours, to allow the Loctite to fully cure.
17. Fit the retaining circlip to the groove in the bearing housing where it protrudes through the rear face of the gearbox.
18. Refit the gearbox main case. 37.12.40.



## MAIN GEARCHANGE LEVER

-Remove and refit

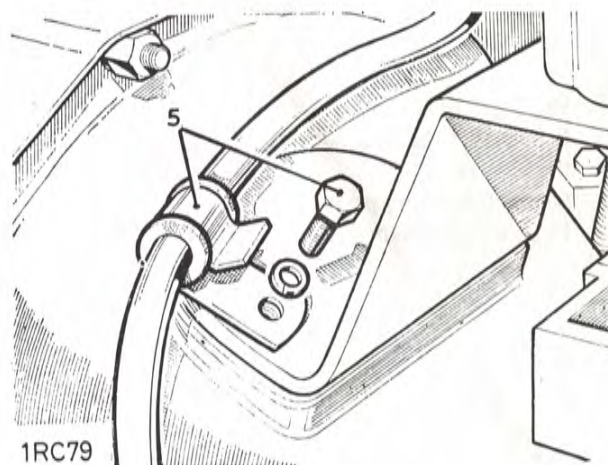
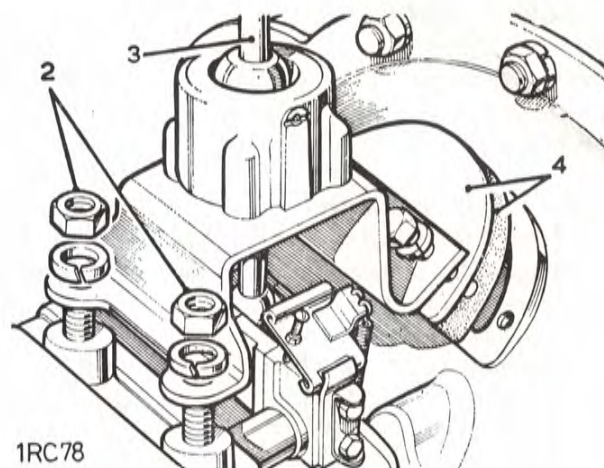
37.16.04

## Removing

1. Remove the front floor. 76.10.12.
2. Remove the fixings.
3. Remove the main gearchange lever complete.
4. To prevent loss, lift off the top cover plate and rubber seal from the bell housing.

## Refitting

5. Reverse 1 to 4, noting that a retaining clip for the speedometer cable locates under the head of the front left hand gearchange lever securing bolt.



# GEARBOX

## MAIN GEARCHANGE LEVER

—Overhaul

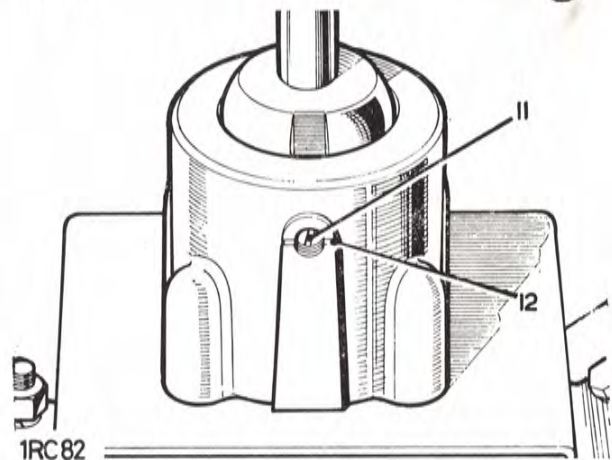
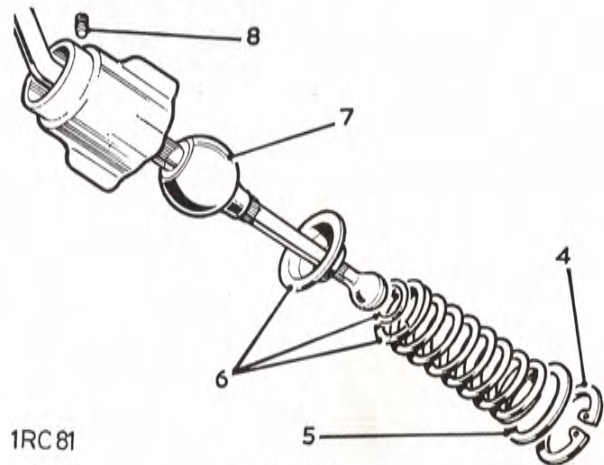
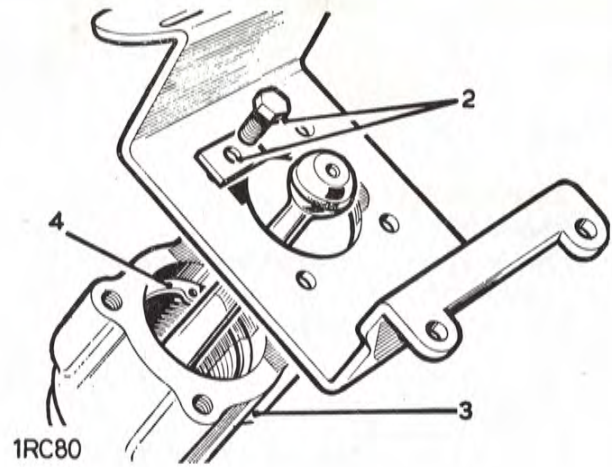
37.16.10

### Dismantling

1. Remove the gearchange lever. 37.16.04.
2. Remove the fixings at the mounting plate.
3. Remove the lever housing from the mounting plate.
4. Remove the lever housing circlip.
5. Withdraw the retaining plate.
- 6.\*\*Withdraw the spring, rubber 'O' ring (early models) and spherical seat.\*\*
7. Lift out the gearchange lever.
8. Withdraw the lever ball locating pin.
9. Examine the components visually and renew any that show obvious wear or damage.

### Assembling

10. Reverse 2 to 8.
11. Ensure that the lever locating pin engages the slot in the lever ball.
12. Secure the pin by peening.
13. Refit the gearchange lever. 37.16.04.



## REVERSE STOP FOR MAIN GEARCHANGE LEVER

-Remove, refit and adjust

37.16.28

## Removing

1. Remove the front floor. 76.10.12.
2. Remove the hinge adjuster.
3. Remove the hinge and bracket from the reverse selector shaft.
4. Detach the two springs.

## Refitting

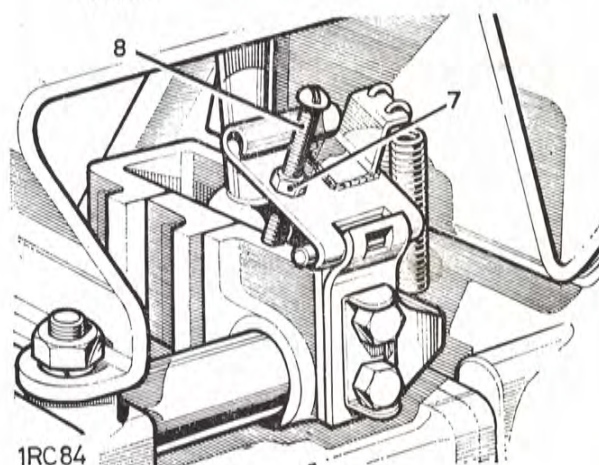
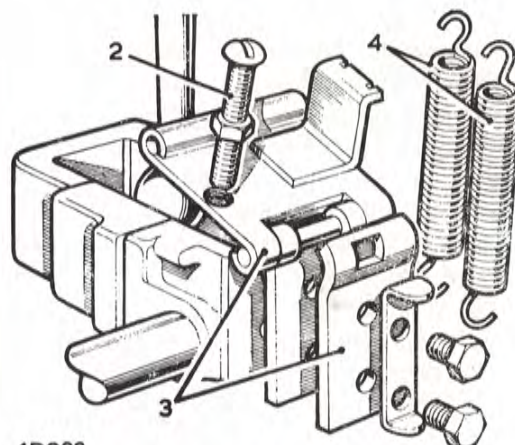
5. Reverse 1 to 4. Adjust the reverse stop before fitting the front floor, items 6 to 9.

## Adjusting

6. Release the fixings and slide the reverse stop inspection cover up the four wheel drive selector lever.

**NOTE:** If the gear box cover does not incorporate an inspection cover, then the adjustment must be carried out before the gearbox cover is fitted.

7. Slacken the adjusting screw locknut.
8. Adjust the screw so that the hinge rides easily up the gear lever when reverse gear is selected, while at the same time appreciable resistance is felt on moving the gear lever to the reverse position.
9. Ensure that 1st gear engages correctly, if there is any tendency to simultaneously engage reverse gear, re-adjust the reverse stop.



# GEARBOX

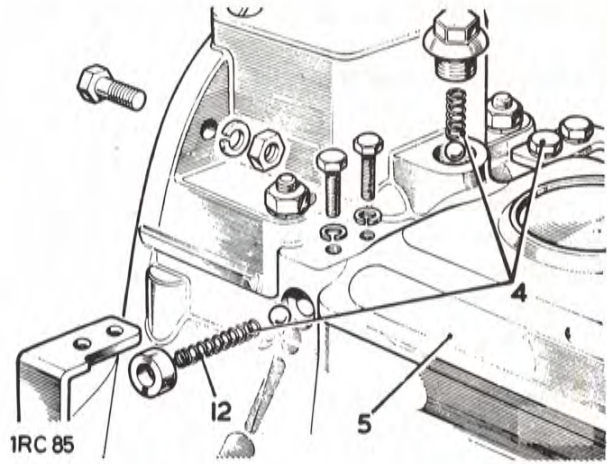
## MAIN GEARCHANGE SELECTORS

—Remove and refit

37.16.31

### Removing

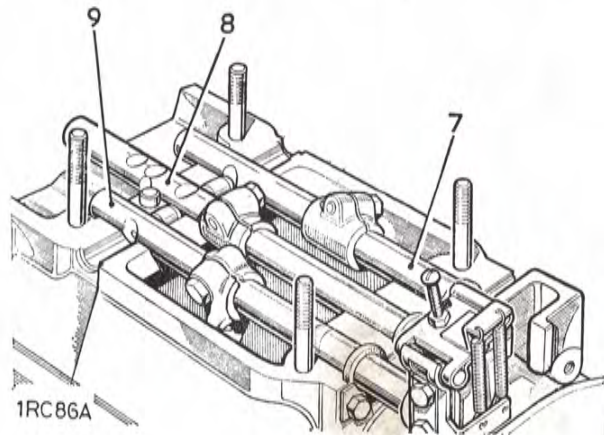
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Remove the main gearchange lever. 37.16.04.
4. Remove the three selector springs and pack the drillings in the top cover with grease, to retain the selector balls when the cover is removed.
5. Remove the top cover from the gearbox and collect the three selector balls.
6. Select third gear.
7. Lift, turn and withdraw the third/fourth selector shaft.
8. Withdraw the first/second selector shaft.
9. Withdraw the reverse selector shaft.



### Refitting

10. Reverse 3 to 9.

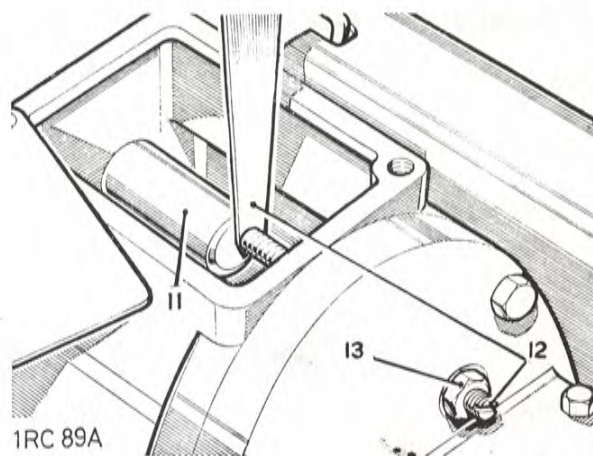
*continued*



11. Select reverse gear.
12. Adjust the reverse gear stop bolt so that there is 0,05 mm (0.002 in.) clearance between the selector shaft and the end of the bolt.
13. Tighten the locknut.

**NOTE:** If the transfer box has been removed from the main gearbox, the foregoing adjustment must be carried out after the transfer box has been refitted.

14. Reverse 1 and 2.



#### DATA

Reverse gear selector shaft stop setting.

0,05 mm (0.002 in.) clearance between shaft and stop.

MAIN GEARCHANGE SELECTORS

—Overhaul

37.16.34

Dismantling

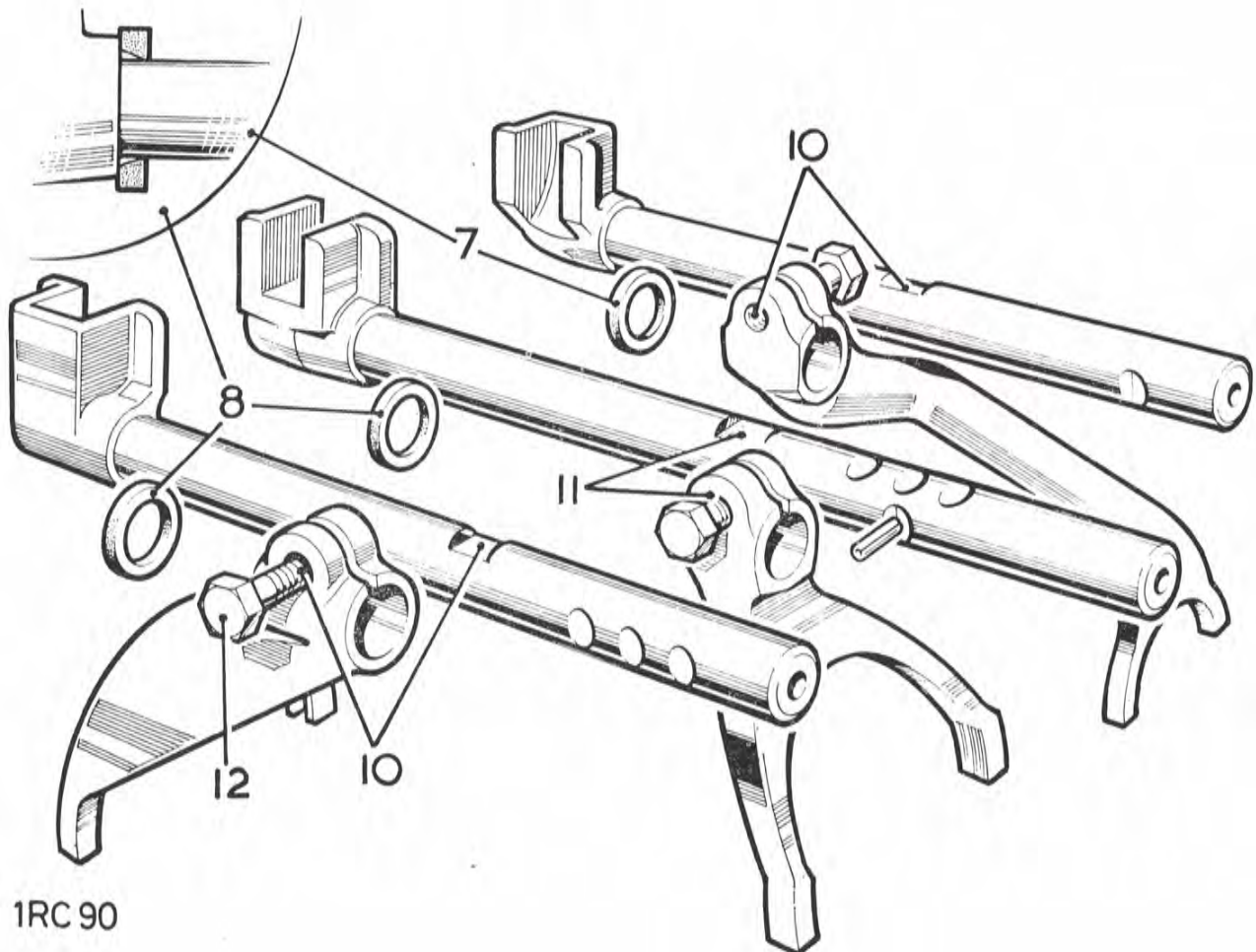
1. Remove the gearchange selectors. 37.16.31.
2. Remove the reverse selector stop. 37.16.28.
3. Remove the pinch bolts.
4. Withdraw the selector forks.
5. Withdraw the seals.

Inspecting

6. Examine the components visually and replace worn or damaged items.

Assembling

7. Fit the larger diameter tapered seal to the reverse shaft with the thinner edge of the seal toward the front of the shaft.
8. Fit the two remaining tapered seals, thinner edges toward the front of the shafts.
9. Position the selector forks on the shafts.
10. Align the pinch bolt holes with the grooves on top of the shafts.
11. On the first/second gear selector, the groove required is the one nearest to the front of the shaft.
12. Fit the pinch bolts. There is radial movement between the selector fork and shaft before the pinch bolt is tightened, and the fork should be secured in the mid-position.
13. Reverse 1 and 2.



1RC 90



## GEARBOX COMPLETE ASSEMBLY

-Remove and refit

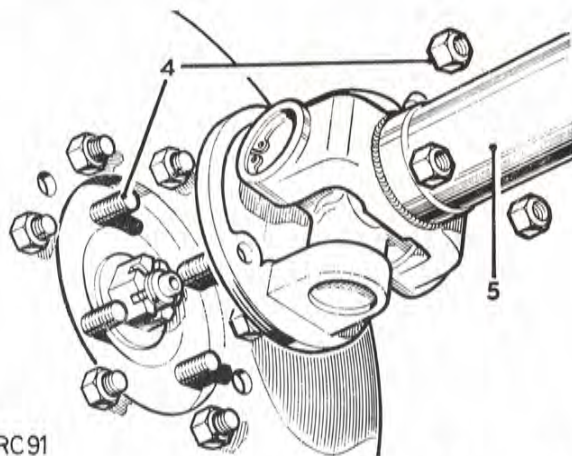
37.20.01

## Removing

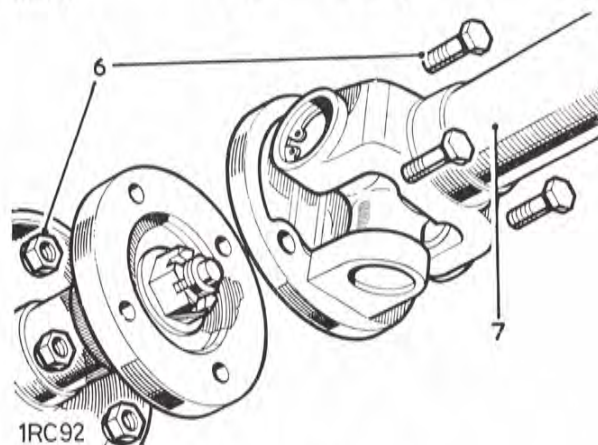
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil
4. Remove the rear propeller shaft fixings at the transmission brake.
5. Move aside the shaft.
6. Remove the front propeller shaft fixings at the front output coupling.
7. Move aside the shaft.

**NOTE:** If the vehicle is fitted with any optional equipment driven from the gearbox, it must be disconnected at the gearbox. Refer to separate publication for details of optional equipment.

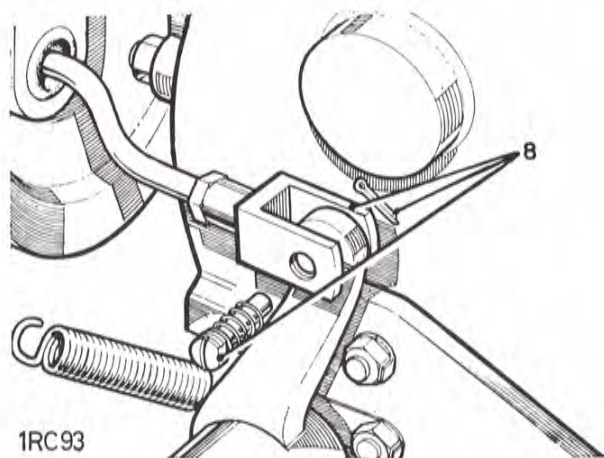
8. Disconnect the hand brake expander rod from the relay lever.

*continued*

1RC91



1RC92



1RC93





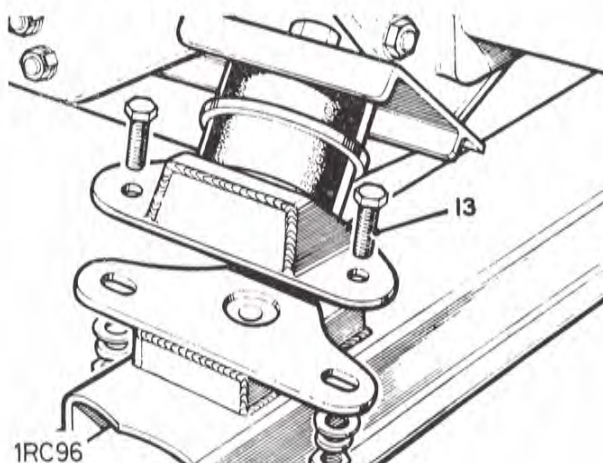
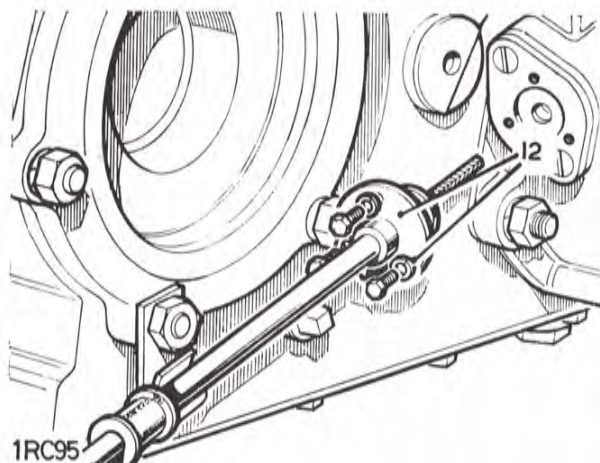
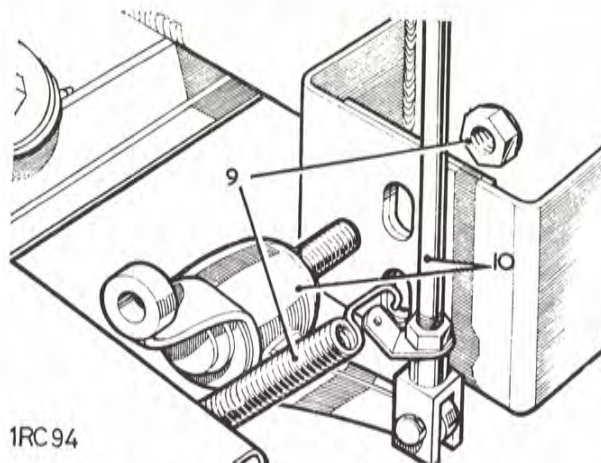
## GEARBOX

9. Remove the brake lever and relay fixings.
10. Remove the brake lever and relay mechanism.
11. LHStg models only. Remove the brake lever cross-shaft.
12. Disconnect the speedometer cable from the gearbox.

**NOTE:** On certain models, the engine exhaust pipe is located above the gearbox left hand rear mounting, and where applicable, the exhaust pipe must be moved clear. Also check the location of the engine earth strap, on certain models it is fitted between the gearbox and chassis and must therefore be disconnected.

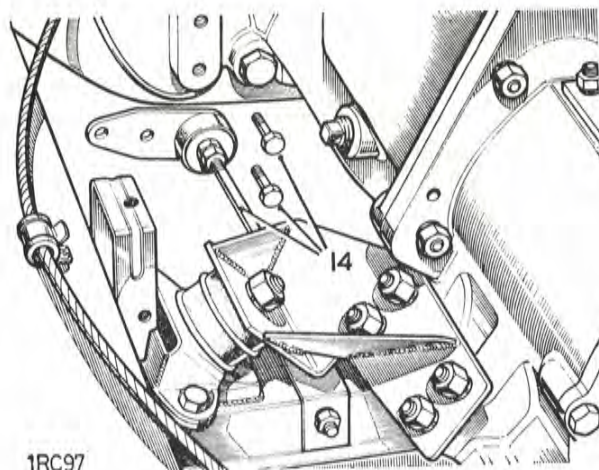
13. Remove the fixings from two rear mountings for the gearbox.

*continued*

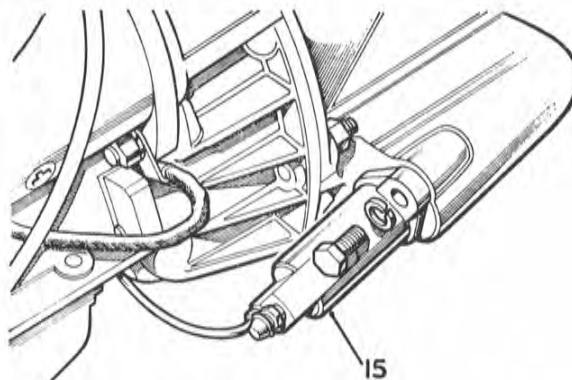


14. On certain models, a tie rod is fitted between the gear-box and chassis. Where applicable, release the bracket at the bell housing and move the tie rod clear.
15. Remove the clutch slave cylinder from the bell housing.
16. Jack up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the fly-wheel housing and chassis, to retain the engine position when the gearbox is removed.
17. Place a suitable sling around the gearbox and tension it sufficient to take the weight.
18. Remove the remaining fixings securing the bell housing to the flywheel housing.
19. Carefully withdraw the gearbox rearwards clear of the clutch and lift from the vehicle.

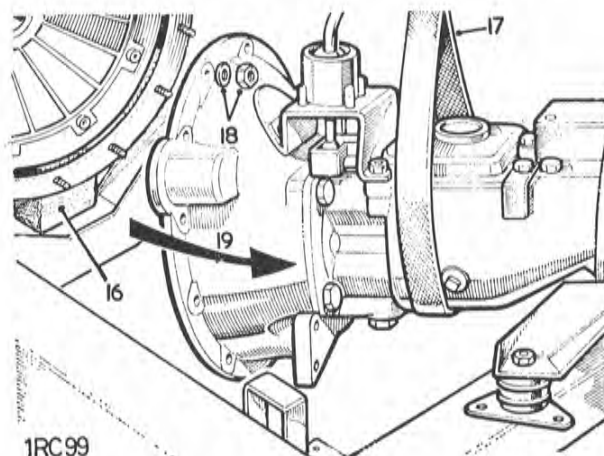
*continued*



1RC97



1RC98



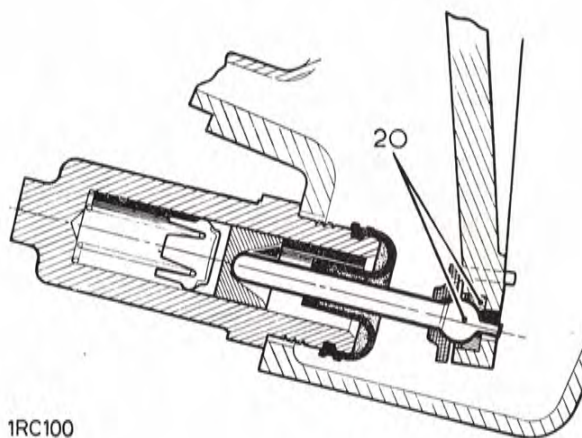
1RC99

## GEARBOX

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### Refitting

20. Reverse 1 to 19. When refitting the clutch slave cylinder, take care to ensure that the cylinder push rod engages in the seating in the clutch release lever.
21. Bleed the clutch hydraulic system as necessary. 33.15.01.



1RC100

**REVERSE IDLER GEAR AND SHAFT**

- Remove and refit, 1 to 3 and 6 to 8                   37.20.13
- Overhaul, 1 to 8   37.20.14

**Removing**

1. Remove the gearbox main case. 37.12.40.
2. Warm the gearbox case and drive out the reverse gear idler shaft from inside the case.
3. Lift out the reverse wheel assembly.

**Overhauling**

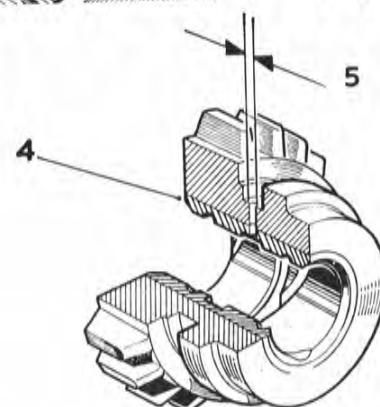
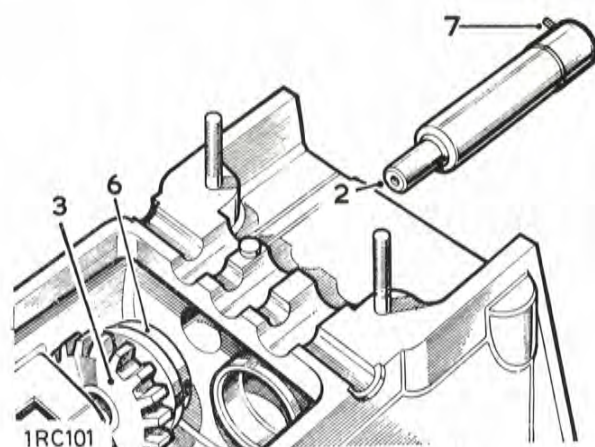
4. Check the bush in the reverse wheel assembly. If a new bush is required it must be secured by peening after being pressed into position, and then reamed to 20,637 mm + 0,025 mm (0.8125 in. + 0.001 in.) diameter.
5. After reaming and peening as already described, drill a 3,18 mm (0.125 in.) diameter hole through the bush, using the existing hole in the gear as a pilot. Afterwards remove all fraze from the bore.

**Refitting**

6. Fit the reverse wheel assembly with the plain side to the rear of the gearbox.
7. Press in the reverse shaft until flush with gearbox rear face, aligning the spring pin with the slot provided in the rear face.
8. Reverse 1.

**DATA**

Bush for reverse gear wheel  
Lubrication hole in bush



1RC102

20,637 to 20,662mm(0.8125 to 0.8135 in.)reamed diameter  
3,18 mm (0.125 in.) drilled diameter

## GEARBOX

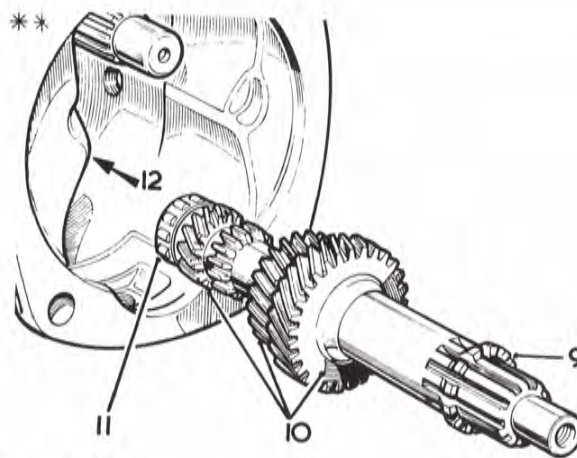
### LAYSHAFT

—Remove and refit

37.20.19

#### Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Remove the bell housing. 37.12.07.
8. \*\* Manoeuvre the layshaft forward and downwards to clear the mainshaft. \*\*
9. Withdraw the layshaft.
10. The first, second and third gears are integral with the layshaft and cannot be removed.
11. If required, press the rear bearing inner race from the layshaft.
12. If required, refer to 37.12.43 for removal of layshaft rear bearing outer race.



IRC IO3B

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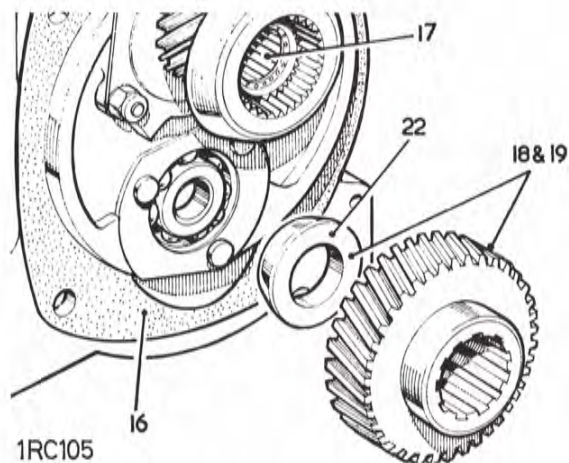
#### Refitting

13. \*\* Reverse 11 as necessary.
14. Reverse 12 as necessary.
15. Fit the layshaft and rear inner bearing member assembly. \*\*

\*\*

*continued*

16. Place the bell housing joint washer in position.
17. Ensure that the roller bearing for the primary pinion is in position.
18. Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
19. Retain the constant gear and conical distance piece in position, by holding from inside the bell housing, then offer the bell housing to the gearbox, aligning the constant gear with the splines on the layshaft.
20. Fit the bell housing fixings.
21. Loosely fit the layshaft securing bolt and washer and check that the layshaft has definite but minimum end-float.
22. To adjust, replace the conical distance piece, available in a range of thicknesses.
23. Tighten the layshaft securing bolt, torque loading 8,5 kgf.m (60 lbf. ft.).
24. Reverse 1 to 7.



# GEARBOX

## MAINSHAFT ASSEMBLY

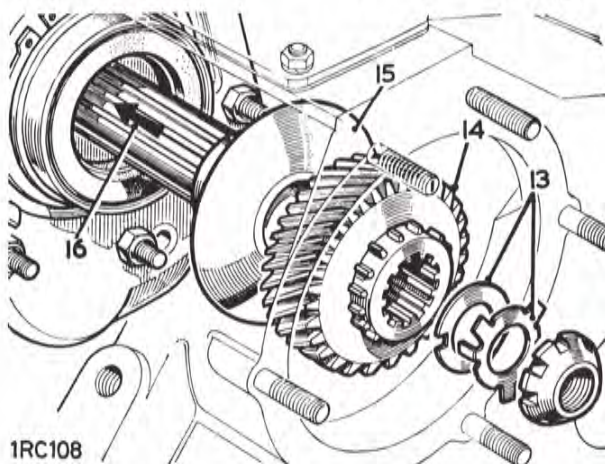
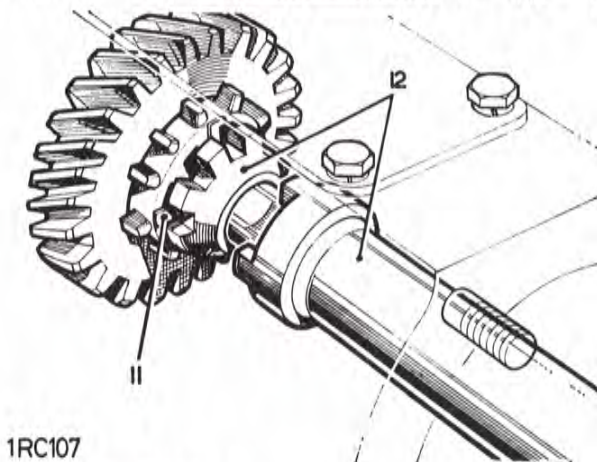
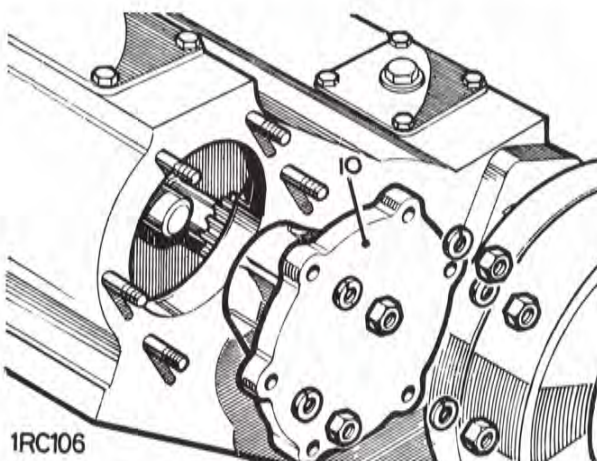
—Remove and refit

37.20.25

Service tool: 600300, tool for mainshaft nut

### Removing

1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the gearbox assembly complete. 37.20.01.
5. Remove the main gearchange lever. 37.16.04.
6. Remove the clutch withdrawal unit. 33.25.12.
7. Remove the bell housing. 37.12.07.
8. Remove the selector shafts. 37.16.31.
9. Remove the layshaft. 37.20.19.
10. Remove the rear bearing housing from the transfer box.
11. Open the tab washer.
12. Remove the mainshaft nut. 600300.
13. Withdraw the tab washer and shim washer.
14. Withdraw the mainshaft transfer gear.
15. Remove the oil thrower.
16. Drive out the mainshaft from the gearbox.



### Refitting

**NOTE:** If any mainshaft components have been renewed, the checks described under 'Mainshaft overhaul' 37.20.31 must be carried out.

17. Reverse 1 to 16.

## MAINSHAFT ASSEMBLY

—Overhaul

37.20.31

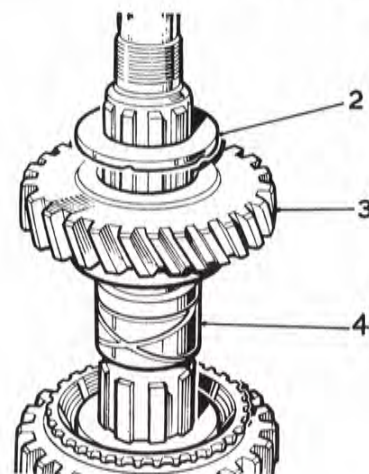
### Dismantling

1. Remove the mainshaft. 37.20.25.

### Mainshaft rear end

2. Withdraw the thrust washer.
3. Lift off the first speed gear.
4. Withdraw the bush for the first speed gear.
5. Withdraw the synchroniser rear cone.
6. Lift off complete the first/second speed synchroniser unit.
7. Withdraw the synchroniser front cone.

1RC 109

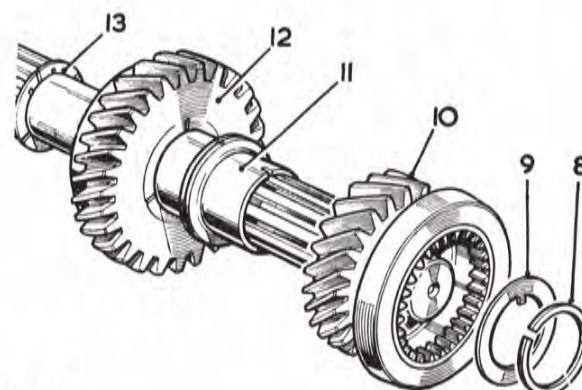
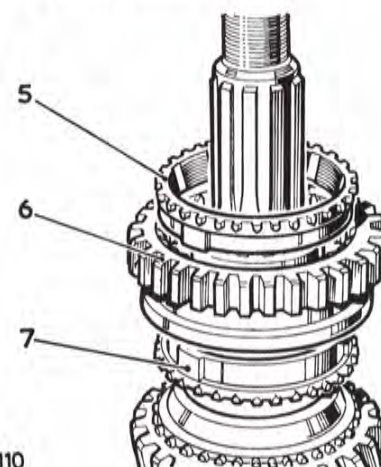


### Mainshaft front end

8. Remove the retainer ring from the groove in the mainshaft.
9. Withdraw the thrust washer, then the following items:
10. Third speed gear.
11. Distance sleeve.
12. Second speed gear.

*continued*

1RC 110



1RC 111



13. If it is required to remove the thrust washer for the second speed gear, first remove the locating peg for the distance sleeve; the peg is a press fit in the mainshaft.

### First/second speed synchroniser

14. Before dismantling, take precautions to avoid the loss of components as they are released. Three springs, balls and sliding blocks are retained in the unit under spring pressure.
15. Dismantle the synchroniser assembly, first pushing down the sliding blocks to free the balls from the retaining grooves in the outer member.

### Inspecting

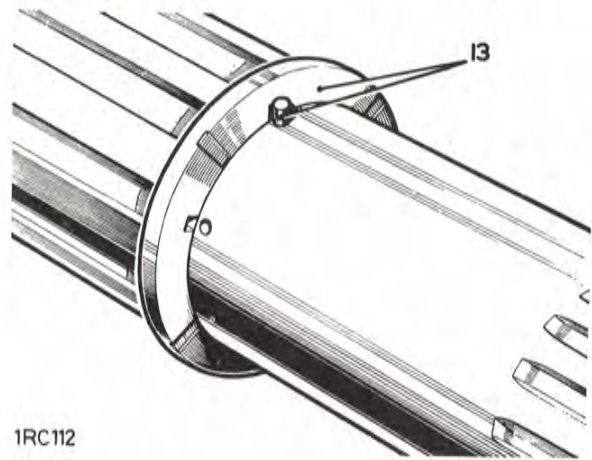
16. Examine all components for wear and damage.
17. Discard the mainshaft spring ring. Use a new replacement on assembly.
18. Check the synchronising clutch for third/fourth gears for wear, the detent springs can be replaced if required. A load of 6,5 to 9 kg (15 to 20 lb.) should be required to actuate the clutch against the combined detent springs pressure.

### Assembling

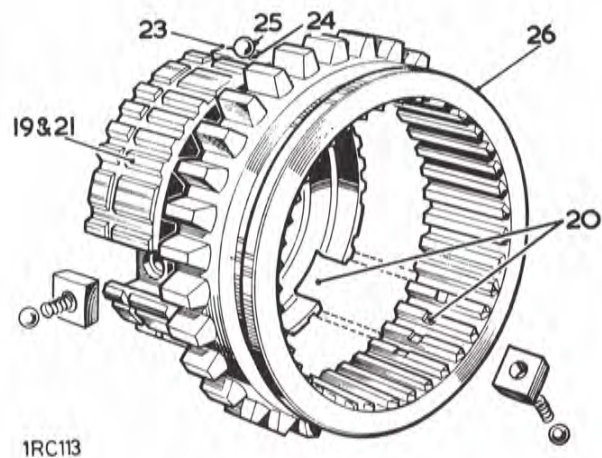
#### First/second speed synchroniser

19. Note the position of the longer splines on the inner member, formed by the offset groove.
20. Align the detent spring bores in the inner member with the ball retaining grooves in the outer member.
21. Fit the inner member to the outer member, entering the longer splines on the inner member at the gear teeth side of the outer member.
22. Repeat 20 and 21 in alternative positions and select the best position for easy slide fit.
23. Position the sliding blocks on the inner member, radiused faces outward.
24. Locate the springs through the sliding blocks and into the housing bores in the inner member.
25. Position the balls on the spring ends; press home in sequence and retain by hand.
26. Lift the outer member to retain the balls. Continue lifting until the balls spring home into the retainer grooves.

*continued*



1RC112

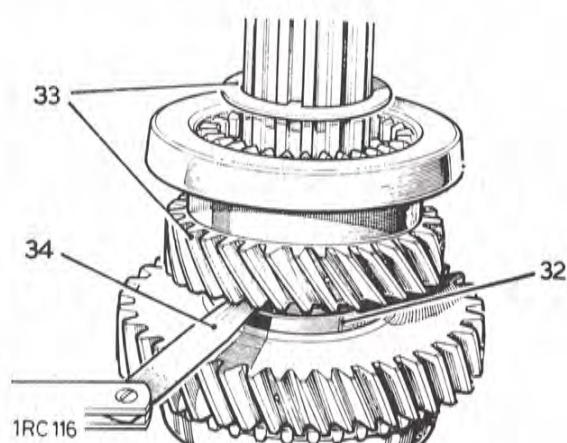
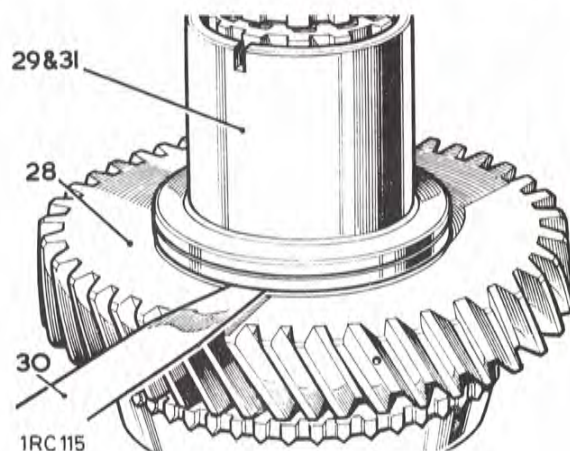


1RC113

## Mainshaft, front end

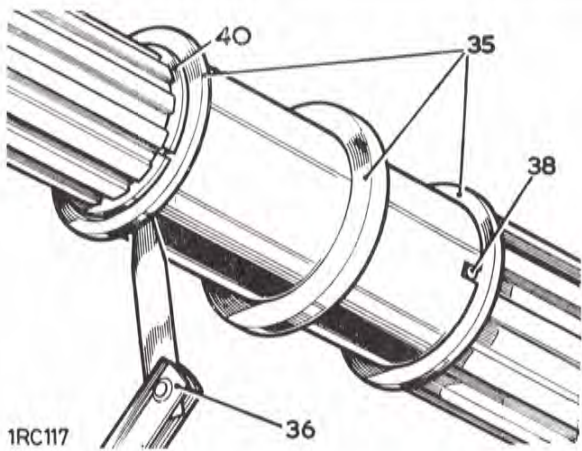
27. If the thrust washer for the second speed gear has been removed from the mainshaft, place the washer in position chamfered face first, engaging it over its locating peg. Do not fit the locating peg for the distance sleeve at this stage.
28. Fit the second speed gear, coned face last, to the end of the distance sleeve with the **larger** slot.
29. Slide the gear and sleeve assembly on to the mainshaft to abut with the thrust washer.
30. Holding the sleeve hard against the thrust washer, check the end float of the second speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).
31. The end-float of the second and the third speed gears is controlled by the length of the distance sleeve. With a new sleeve, the clearance may be excessive and can be corrected by rubbing down the applicable end face of the sleeve on a face plate and emery cloth. In the event of insufficient clearance, a new sleeve must be fitted.
32. Retain the second speed gear and distance sleeve on the mainshaft.
33. Fit the third speed gear and thrust washer.
34. Hold the thrust washer hard against the sleeve and check the end-float of the third speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).  
End-float adjustment is as already described in item 31.

*continued*



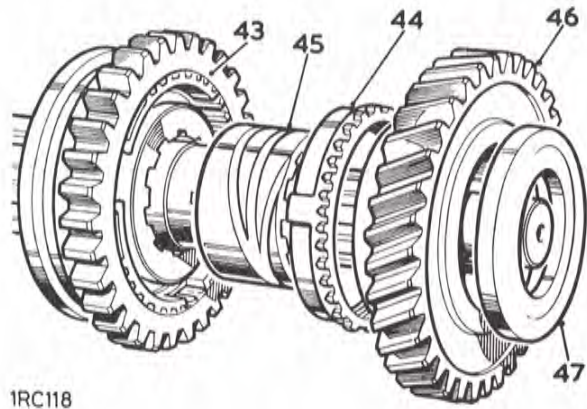
## GEARBOX

35. Remove the gears and distance sleeve from the mainshaft and refit the thrust washers and distance sleeve only, retain in position with the old spring ring.
36. Check the end-float of the distance sleeve, this must be 0,03 to 0,20 mm (0.001 to 0.008 in.). Adjustment is made by changing either of the thrust washers which are available in a range of thicknesses.
37. When the end-float of the mainshaft gears and distance piece are correct, remove the spring ring, thrust washer for third speed gear and the distance sleeve.
38. If removed, fit the distance sleeve locating peg to the mainshaft, ensuring that the thrust washer for the second speed gear is engaged on its locating peg.
39. Fit the second speed gear, distance sleeve, third speed gear and thrust washer to the mainshaft.
40. Retain with a new spring ring.



### Main shaft rear end

41. Position the main shaft with the rear end uppermost.
42. Position a synchroniser cone on to the second speed gear.
43. Fit the first/second synchroniser unit to the shaft, reverse gear side uppermost.
44. Position a synchroniser cone on to the synchroniser inner member.
- 45.\*\*Fit the bush for first speed gear with the circular oil groove end uppermost. Ensure that the bush rear face is 0,05 to 0,18 mm (0.002 to 0.007 in.) below the end of the mainshaft splines; check by temporarily fitting the thrust washer, stepped face uppermost, and measuring the clearance between the bush and the thrust washer.\*\*
46. Fit the first speed gear.
47. Fit the thrust washer, stepped face uppermost.
48. Refit the mainshaft assembly and third/fourth synchroniser unit as described in 37.20.25.



### DATA

Third/fourth gear synchronising clutch load

End float of second speed gear

End float of third speed gear

End float of distance sleeve

End float of first speed gear

\*\*Clearance between first gear bush rear face and thrust washer.

6,5 to 9 kg. (15 to 20 lb.).

0,10 to 0,18 mm (0.004 to 0.007 in.).

0,10 to 0,18 mm (0.004 to 0.007 in.).

0,03 to 0,20 mm (0.001 to 0.008 in.).

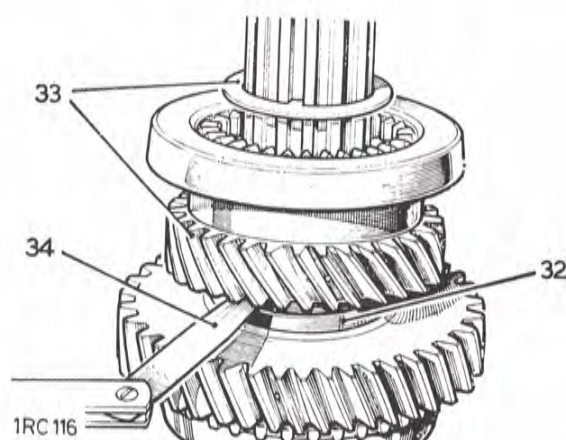
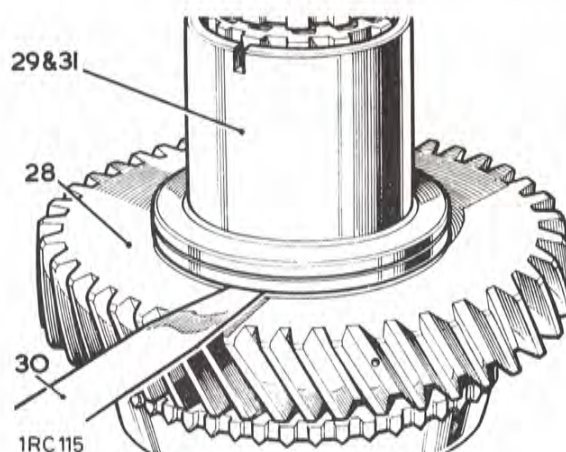
0,10 to 0,20 mm (0.004 to 0.008 in.).

0,05 to 0,18 mm (0.002 to 0.007 in.); adjust bush length to suit.\*\*

## Mainshaft, front end

27. If the thrust washer for the second speed gear has been removed from the mainshaft, place the washer in position chamfered face first, engaging it over its locating peg. Do not fit the locating peg for the distance sleeve at this stage.
28. Fit the second speed gear, coned face last, to the end of the distance sleeve with the **larger** slot.
29. Slide the gear and sleeve assembly on to the mainshaft to abut with the thrust washer.
30. Holding the sleeve hard against the thrust washer, check the end float of the second speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).
31. The end-float of the second and the third speed gears is controlled by the length of the distance sleeve. With a new sleeve, the clearance may be excessive and can be corrected by rubbing down the applicable end face of the sleeve on a face plate and emery cloth. In the event of insufficient clearance, a new sleeve must be fitted.
32. Retain the second speed gear and distance sleeve on the mainshaft.
33. Fit the third speed gear and thrust washer.
34. Hold the thrust washer hard against the sleeve and check the end-float of the third speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).  
End-float adjustment is as already described in item 31.

*continued*



## SPEEDOMETER DRIVE HOUSING

-Remove and refit

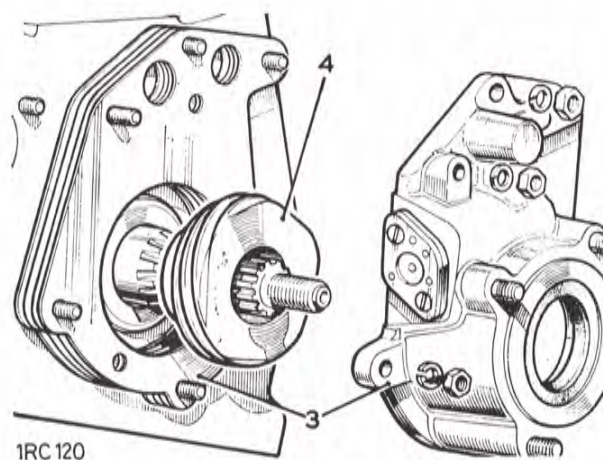
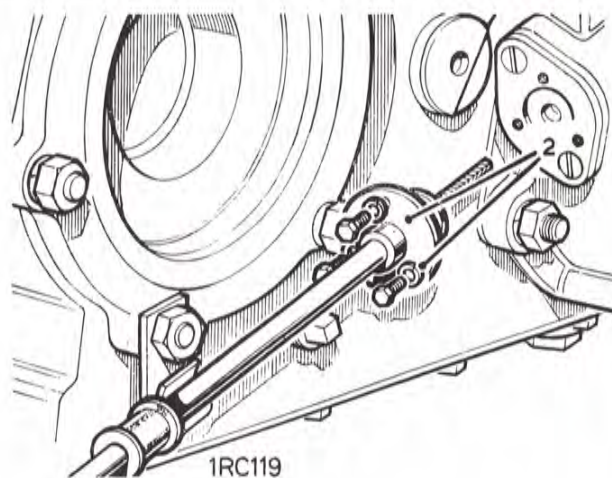
37.25.09

## Removing

1. Remove the transmission brake. 70.45.16.
2. Disconnect the speedometer cable from the gearbox.
3. Remove the speedometer drive housing complete with shims.
4. Withdraw the speedometer drive worm.

## Refitting

5. Reverse 1 to 4. If necessary, replenish the gearbox lubricating oil.



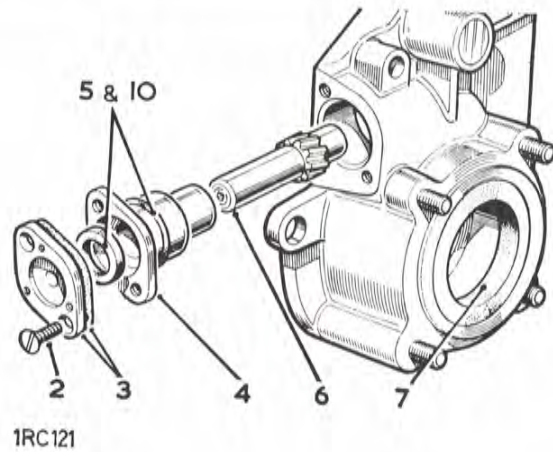
SPEEDOMETER DRIVE HOUSING

—Overhaul

37.25.13

Dismantling

1. Remove the speedometer drive housing, 37.25.09.
2. Remove the pinion retainer fixings.
3. Withdraw the retainer and gasket.
4. Withdraw the pinion sleeve.
5. Remove the oil seal and 'O' ring.
6. Withdraw the speedometer pinion.
7. Remove the output shaft oil seal from the speedometer housing.

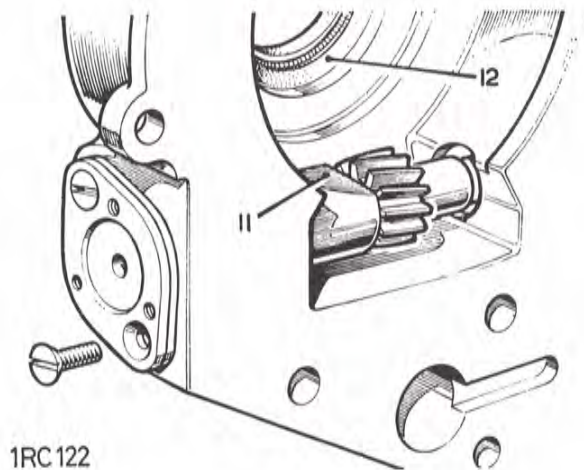


Inspecting

8. Examine the pinion teeth and the speedometer drive worm for wear.
9. Check the sleeve which should be a slide fit on the pinion.

Assembling

10. Fit the oil seal, lipped side inwards, and 'O' ring to the sleeve.
11. Fit the pinion and sleeve, ensuring that the relieved face on the sleeve will be towards the speedometer drive worm when assembled.
12. Fit the output shaft oil seal, lipped side inward, using jointing compound on the seal outer diameter. The housing may be warmed to facilitate assembly.
13. Refit the drive housing. 37.25.09.



## TRANSFER GEARBOX

-Remove and refit

37.29.25

Service tool: 605862, intermediate shaft extractor

## Removing

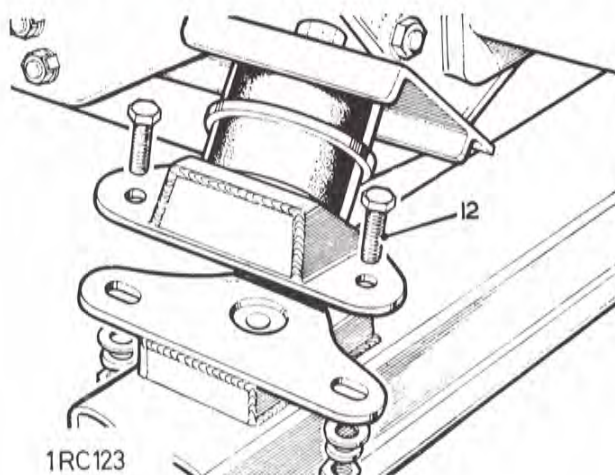
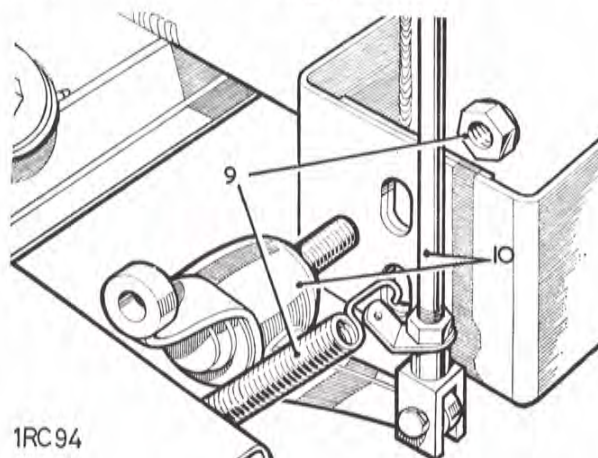
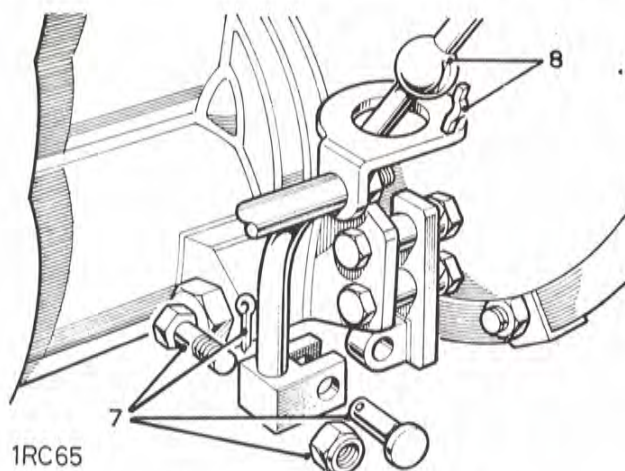
1. Remove the front floor. 76.10.12.
2. Remove the seat base. 76.70.06.
3. Drain the gearbox lubricating oil.
4. Remove the transmission brake. 70.45.16.
5. Disconnect the front propeller shaft from the gearbox.

**NOTE:** If the vehicle is fitted with any optional equipment driven from the transfer box, it must be disconnected at the transfer box. Refer to separate publication for details of optional equipment.

6. Disconnect the speedometer cable from the gearbox.
7. Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
8. Withdraw the lever, taking care to retain the spring strip, located between the lever ball and link.
9. Remove the brake lever and relay fixings.
10. Remove the hand brake lever and relay mechanism.
11. LHStg models only. Remove the hand brake cross-shaft.

**NOTE:** On certain models, the engine exhaust pipe is located above the gearbox, left hand rear mounting, and where applicable, the exhaust pipe must be moved clear. Also check the location of the engine earth strap, on certain models it is fitted between the gearbox and chassis and must therefore be disconnected.

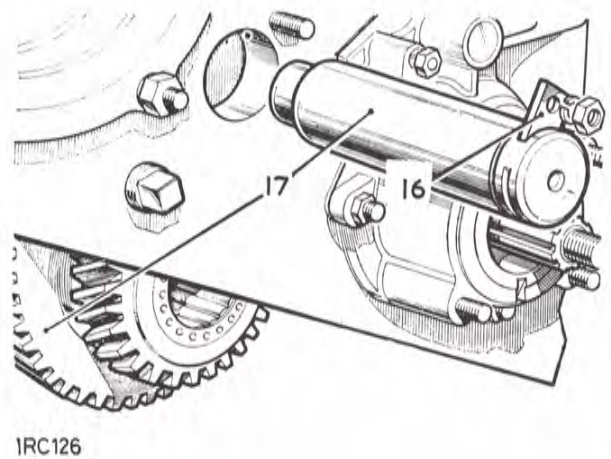
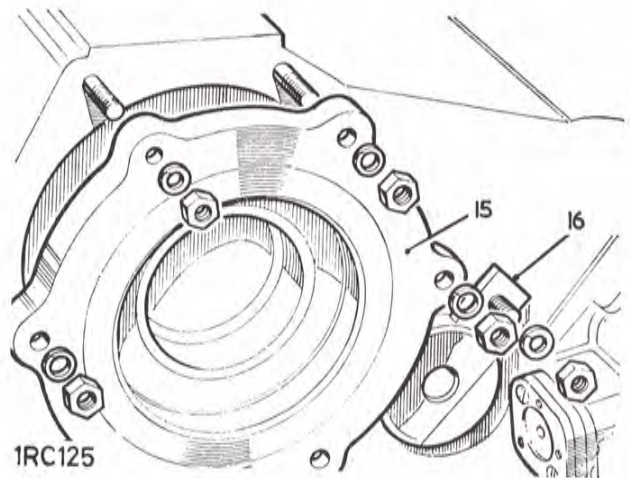
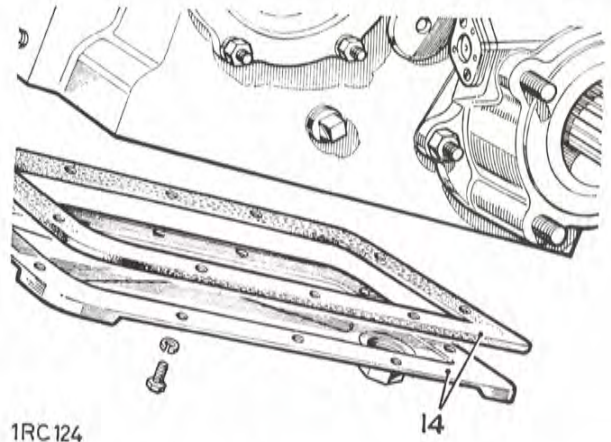
12. Remove the fixings from the two rear mountings for the gearbox.

*continued*

## GEARBOX

13. Jack-up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the fly-wheel housing and the chassis to support the gearbox.
14. Remove the bottom cover plate and gasket from the transfer box.
15. Remove the mainshaft rear bearing housing, or if fitted, the power take off drive unit.
16. Remove the fixings from the retaining plate for the intermediate shaft.
17. Support the intermediate gear by hand while using Service tool 605862 to withdraw the intermediate shaft complete with retaining plate and oil seal 'O' ring. Withdraw the intermediate gear and roller bearings through the bottom of the casing.

*continued*





18. Remove the thrust washers and if fitted, shims located between each end of the intermediate gear and casing.
19. Remove the internal fixings.
20. Remove the external fixings.
21. Withdraw the transfer gearbox and joint washer from the main gearbox.

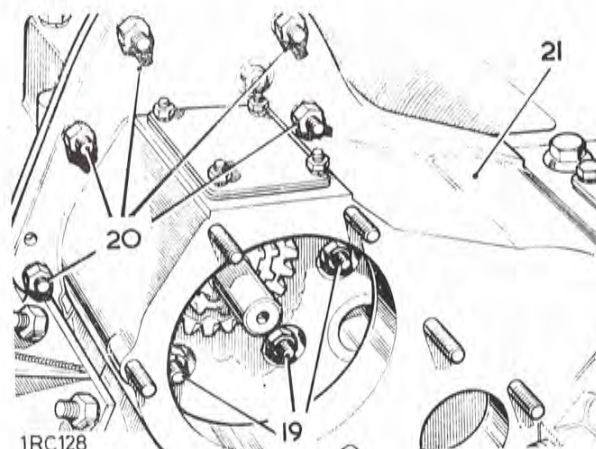
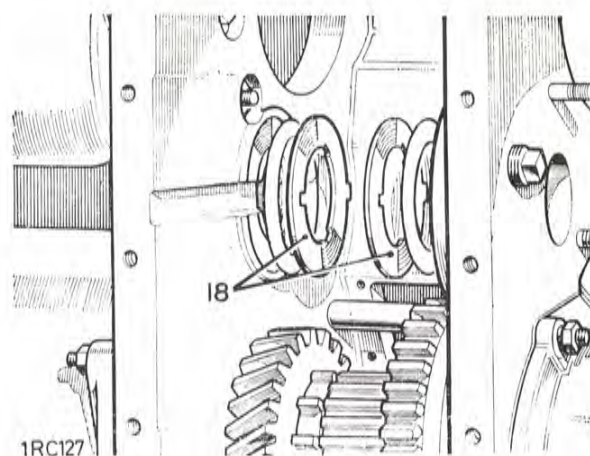
### Refitting

22. Smear both sides of the joint washer with general purpose grease and place it in position on the main gearbox.
23. Fit the transfer box to the main gearbox, engaging the dowel locations.
24. Fit any shims for the intermediate gear, between the thrust washers and the casing, ensuring that the thrust washer bronze faces are towards the intermediate gear. Use a little general purpose grease to retain in position.

**NOTE:** If the intermediate gear, bearings or thrust washers have been renewed, the gear end-float must be checked and adjusted, as described under 'Transfer box overhaul'. 37.29.28.

25. Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.
26. Fit the intermediate shaft, together with its oil seal 'O' ring and retaining plate, through the casing, shims, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft **must** be a light tap fit.
27. Reverse 1 to 16. When refitting the bottom cover plate gasket, smear both sides with jointing compound.

*continued*



# GEARBOX

## TRANSFER GEARBOX (ALL HELICAL GEAR TYPE)

—Overhaul

37.29.28

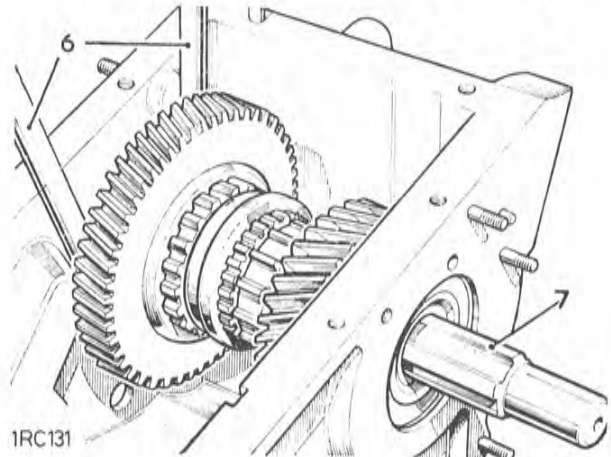
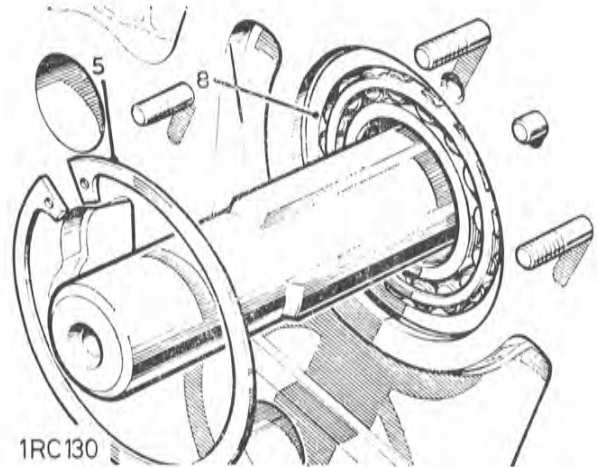
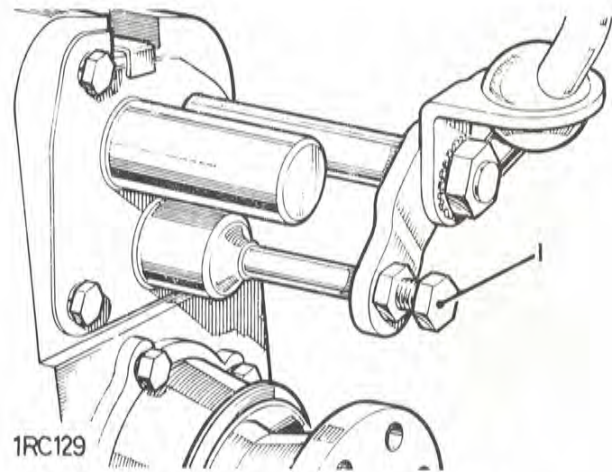
Service tool: 243241 thread protector

Dismantling

General

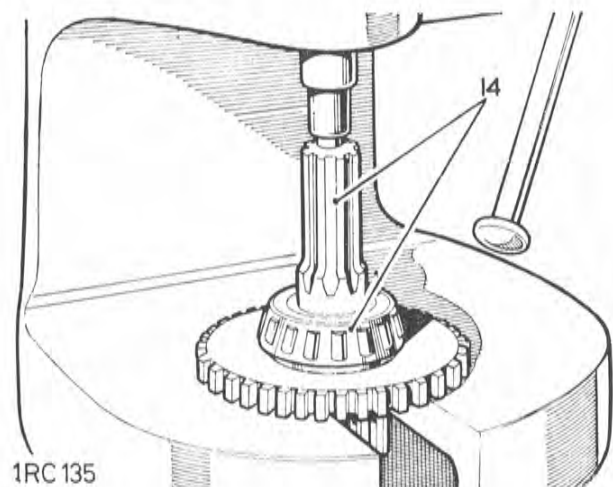
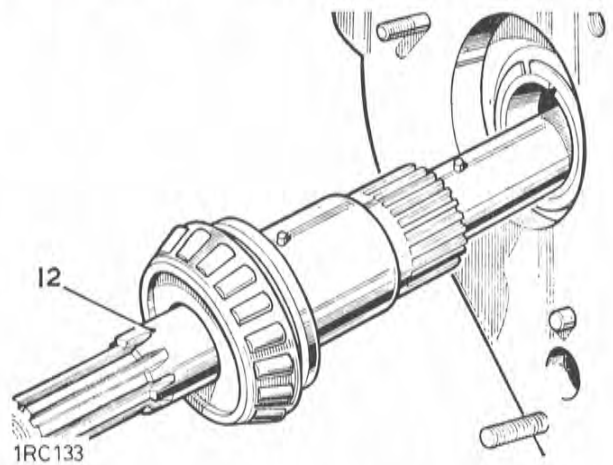
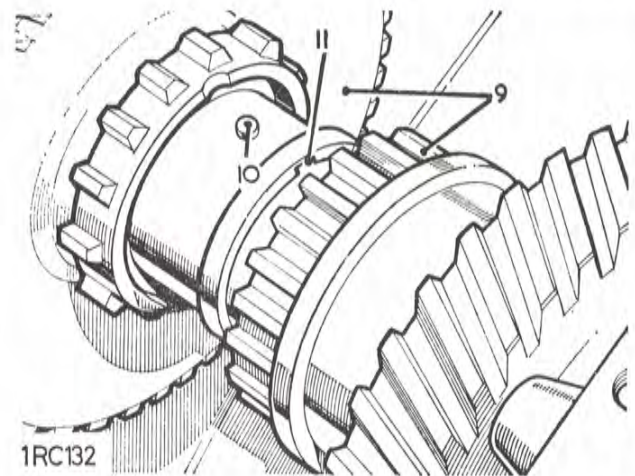
1. There are two types of transfer box in use, one utilises a helical and spur gear arrangement, while the other is of all helical design. The only visible external difference is a selector shaft adjuster, fitted to the front output shaft housing on the all helical box only. Identify the gearbox type before proceeding. Because the overhaul instructions for the two types carry the same operation number (37.29.28) but are printed separately, the applicable description is added to the operation title and to each continuing page.
2. Remove the transfer gearbox. 37.29.25.
3. Remove the front output shaft housing. 37.10.05.
4. Remove the speedometer drive housing. 37.25.09.
5. Remove the circlip retaining the front bearing outer race.
6. Place two 16 mm (0.625 in.) diameter distance pieces between the rear face of the low gear wheel and the transfer box.
7. Retaining the distance pieces in position, use a soft mallet to drive the shaft rearwards until the low gear wheel just abuts the distance pieces.
8. Insert a mild steel chisel between the bush for the high gear wheel and the front bearing and prise the bearing outward approximately 6 mm (0.250 in.).

*continued*



## (ALL HELICAL GEAR TYPE)

9. Part the change speed inner member and high gear wheel by hand.
10. Rotate the output shaft to locate the position of the shaft peg.
11. Using a suitable piece of wire, locate the slot in the high gear wheel thrust washer over the peg in the output shaft.
12. Retaining the distance pieces in position, use a soft-face mallet to drive the shaft rearwards until it can be withdrawn by hand complete with roller bearing, thrust washer and two locating pegs.
13. Withdraw the high and low speed gear assembly together with the front bearing from the transfer box.
14. Press the rear bearing and thrust washer from the output shaft. The low speed gear may be used as a press block for removal of the rear bearing.
15. Press the front bearing outer race from the transfer box.

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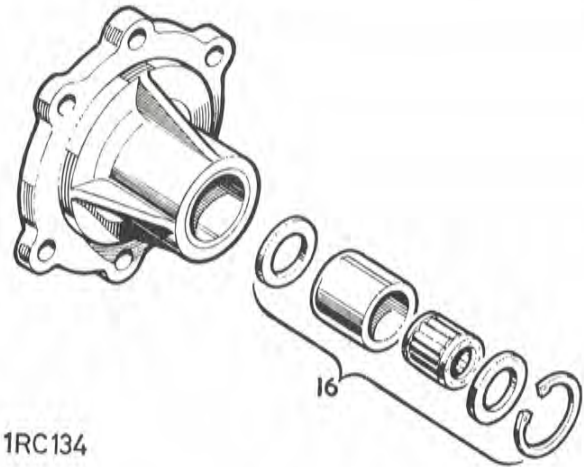
## GEARBOX

### (ALL HELICAL GEAR TYPE)

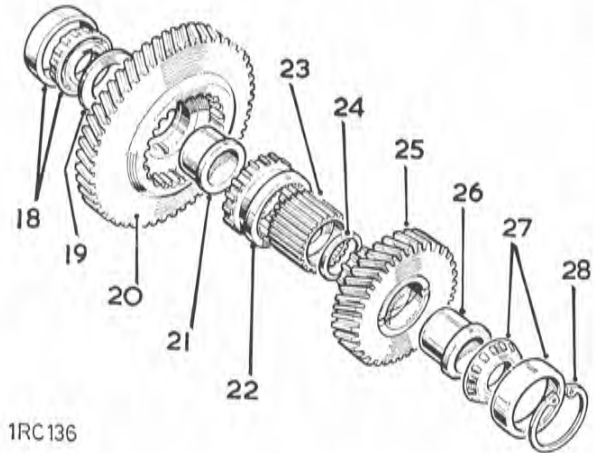
16. Remove the circlip, retaining plate and roller bearing from the mainshaft rear bearing housing.

#### Inspection

17. Inspect the following components and renew any which show obvious wear or damage. Refer to the illustration to aid identification.
18. Bearing for output shaft, rear.
19. Thrust washer for low gear wheel.
20. Low gear wheel.
21. Bush for low gear wheel.
22. Outer member for transfer change speed.
23. Inner member for transfer change speed.
24. Thrust washer for high gear wheel.
25. High gear wheel.
26. Bush for high gear wheel.
27. Bearing for output shaft, front.
28. Circlip fixing bearing.
29. The steel thrust washer for the high gear wheel and the two locating pegs in the output shaft must be in good condition.
30. If necessary renew the oilite bush in the transfer casing, which carries the transfer selector shaft. This bush is an interference fit in the casing, and must be reamed to 29,16 mm (1.148 in.) after fitting.



1RC134

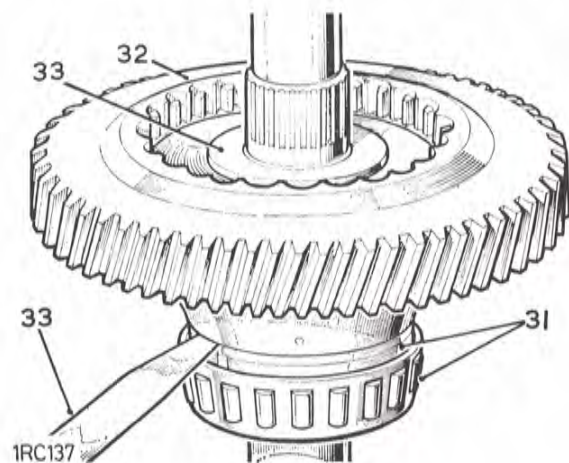


1RC136

#### Pre-assembly end-float checks, items 31 to 39

31. Fit the steel thrust washer and the rear bearing on to the rear of the output shaft.
32. Fit the low gear wheel complete with bush on to the output shaft to abut with the steel thrust washer.
33. Hold the bush in firm contact with the steel thrust washer and check the end-float of the low gear wheel, which must be 0.05 mm to 0.22 mm (0.002 in. to 0.009 in.).

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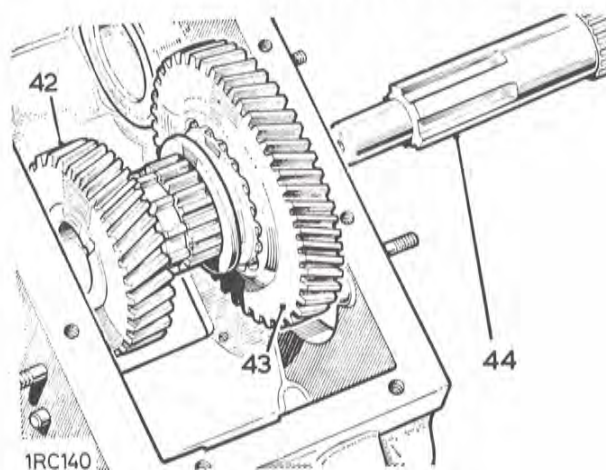
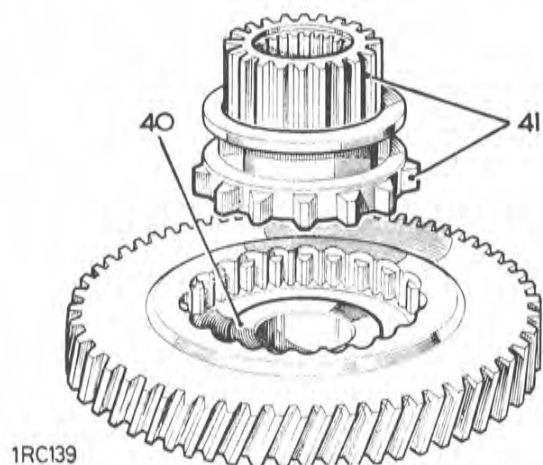
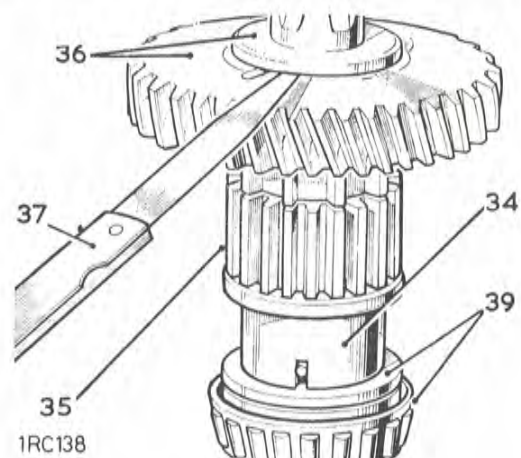
1RC137

**(ALL HELICAL GEAR TYPE)**

34. Remove the low gear wheel from the shaft, and replace the centre bush.
35. Fit the change speed inner member, and the thrust washer for the high gear wheel.
36. Fit the high gear wheel complete with bush.
37. Hold the bush for the high gear wheel in firm contact with the thrust washer and check the end-float of the high gear wheel, which must be 0,12 mm to 0,55 mm (0.005 in. to 0.022 in.).
38. Excessive end-float on either gear wheel may be rectified by carefully rubbing down the end of the respective bush, using fine emery cloth and a face place. Insufficient end-float can be rectified by fitting a new bush, followed by a further end-float check and rubbing down as necessary.
39. Remove all the components from the shaft except the steel thrust washer and rear bearing inner member, ready to proceed with the final assembly of the transfer box.

**Assembling**

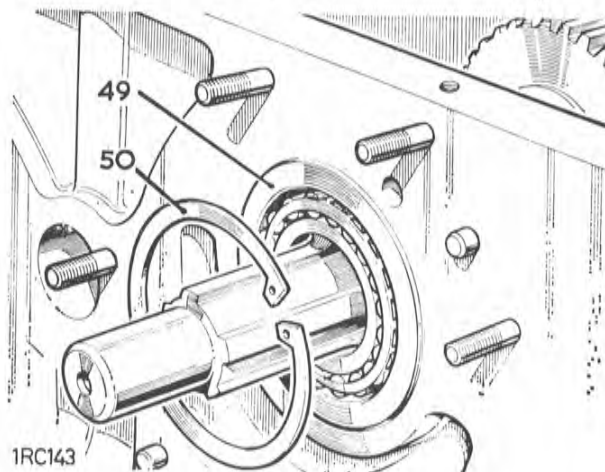
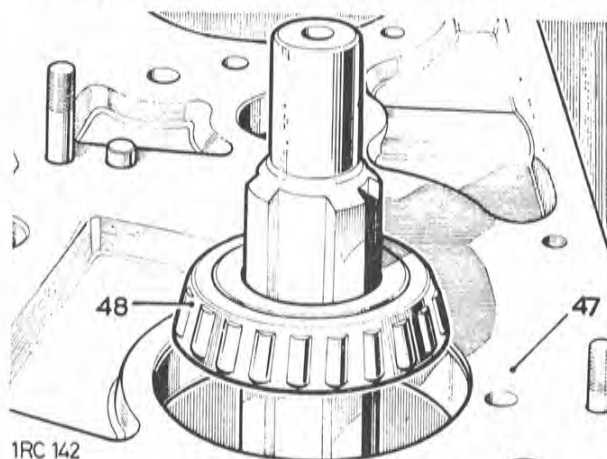
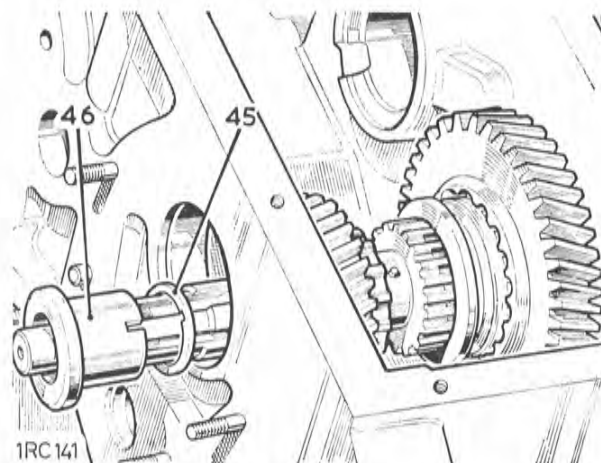
40. Fit the bush to the low gear wheel.
41. Place the change speed inner and outer members against the thrust side of the bush. The recessed side of the inner member should be towards the bush, and the teeth on the outer member should be in mesh with the internal teeth of the gear wheel.
42. Place the high gear wheel, minus its centre bush, in position on the assembly with the dog teeth abutting the change speed outer member.
43. Lower the complete assembly into position in the transfer box, with the low gear wheel to the rear.
44. Carefully push the output shaft through the assembly and into position, from the rear, ensuring that the low gear wheel bush locates on the peg in the shaft, and that the splines of the change speed inner member are located on the shaft splines.

*continued*

(ALL HELICAL GEAR TYPE)

45. Slide the thrust washer for the high gear wheel over the front of the shaft and through the centre of the high speed gear, taking care to ensure that the washer slides over the peg and is located in the recess on the gear change inner member.
46. Fit the bush through the high gear wheel and locate it also on the peg.
47. Turn the casing on its side with the rear face downwards.
48. With the output shaft threaded end resting on the bench, drift the front taper roller bearing on to the shaft. Protect the thread against damage and make sure that the gears do not separate while the roller bearing is being fitted otherwise the bushes may become dislodged from the pegs on the shaft.
49. With the assembly held in the same position, drive the front bearing outer race into the housing.
50. Fit the circlip.
51. Fit the rear bearing outer race, do not fit fully in at this stage.
52. Using the protection cap 243241 over the threaded end of the output shaft, drive the shaft forward until the front bearing is hard against the circlip.
53. Then lightly tap the rear bearing outer race further in to remove all end-float from the output shaft without introducing pre-load.

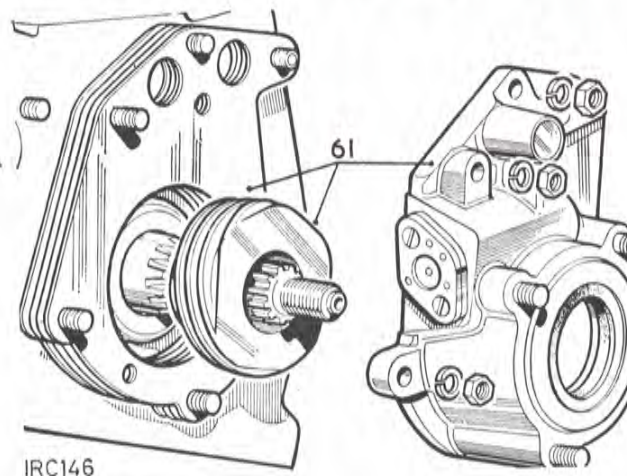
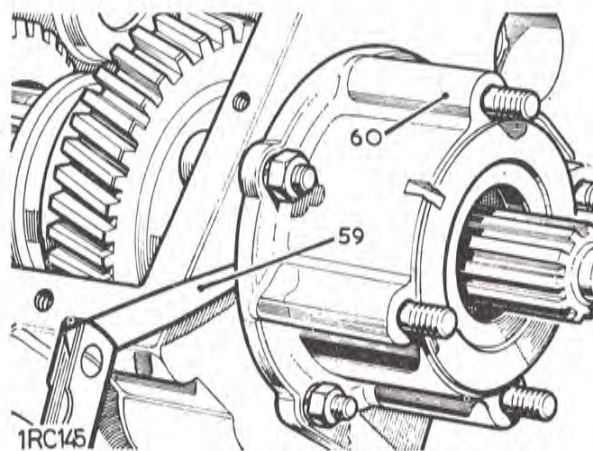
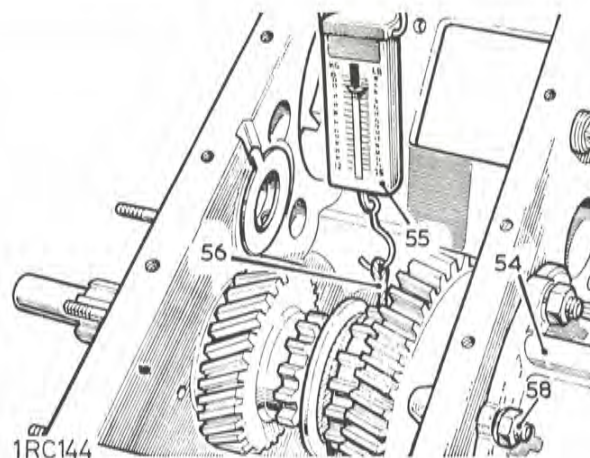
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## (ALL HELICAL GEAR TYPE)

## Setting the output shaft bearing pre-load, items 54 to 61

54. Fit the speedometer housing, without any shims, and loosely retain with nuts and spring washers.
55. Measure the rolling resistance of the output shaft, using a nylon cord attached to a spring balance. Coil the cord around the low gear wheel selector groove and note the measurement recorded on the spring balance required to rotate the output shaft after having overcome inertia.
56. Ensure that the cord does not slip, giving a false reading.
57. Bearing pre-load is correct when a figure of 0,9 kg to 1,8 kg (2 lbs. to 4 lbs.) is recorded on the spring balance.
58. Adjustment is made by tightening the speedometer housing securing nuts, progressively and evenly.
59. When the bearing pre-load is correct, ensure that the clearance between the speedometer housing and the transfer box is evenly disposed, using feeler gauges. The measured clearance obtained is equal to the thickness of shims required for subsequent assembly between the speedometer housing and transfer box to maintain correct bearing pre-load.
60. Withdraw the spring balance and nylon cord from the low gear wheel, and remove the speedometer housing from the transfer box.
61. Using the determined thickness of shims, fit the speedometer drive worm and housing.

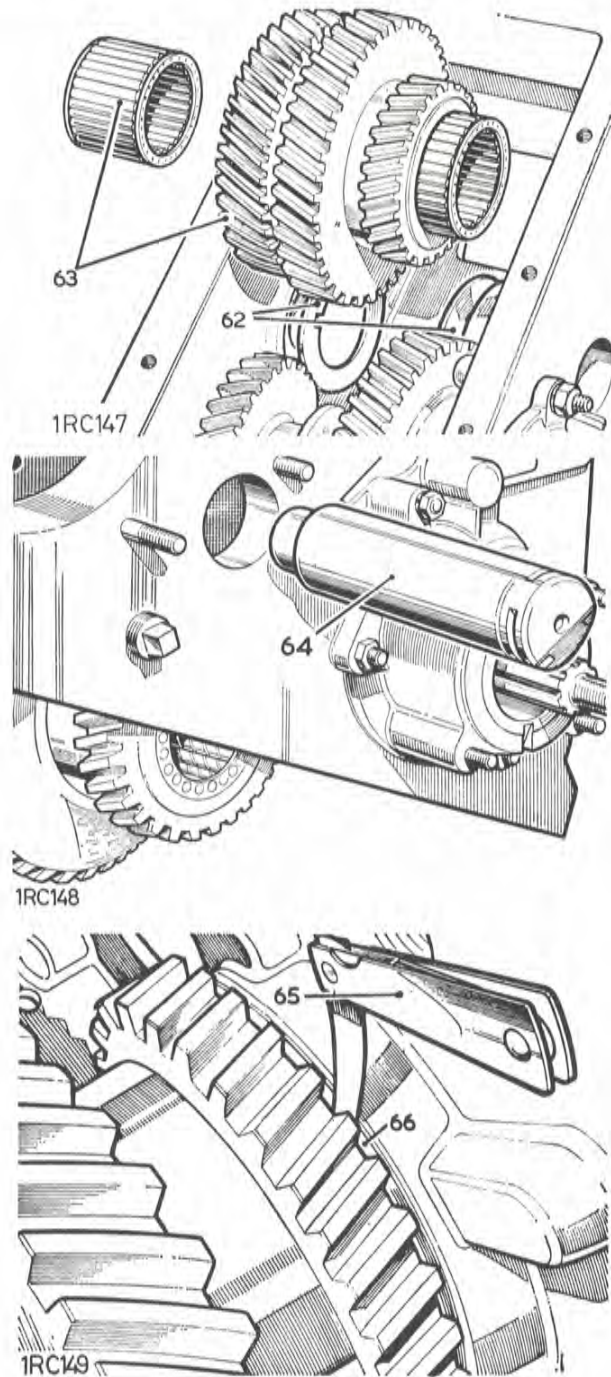
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## GEARBOX

### (ALL HELICAL GEAR TYPE)

#### Determining the intermediate gear end-float, items 62 to 66

62. Place the two thrust washers for the intermediate gear in position in the transfer box and retain with a film of grease. The washers must be fitted with the bronze faces inward and located in the casing by their tabs.
63. Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.
64. Fit the intermediate shaft through the casing, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
65. Using feeler gauges, check the end-float of the intermediate gear, this must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.).
66. Adjustment is made by grinding the steel face of the thrust washers to increase end-float, or by fitting shims, available in 0,25 mm (0.010 in.) thickness, between the thrust washers and the casing to reduce end-float.
67. When the intermediate gear end-float is correct, remove the intermediate shaft and gear, and place aside for subsequent assembly after the transfer box has been fitted to the main gearbox.
68. Reassemble the rear bearing housing and the output drive flange by reversing the removal procedure.
69. Adjust the transfer travel stop after fitting the front output shaft housing to the transfer box, see 37.10.05.
70. Refit the transfer gearbox 37.29.25.



#### DATA

Bush for transfer selector shaft  
End-float of low gear wheel  
End-float of high gear wheel  
Output shaft bearing pre-load  
  
End-float of intermediate gear

29,16 mm (1.148 in.) reamed diameter  
0,05 to 0,22 mm (0.002 to 0.009 in.).  
0,12 to 0,55 mm (0.005 to 0.022 in.).  
0,9 to 1,8 kg. (2 to 4lb.) measured with spring balance cord  
coiled around the low gear-wheel selector groove.  
0,10 to 0,20 mm (0.004 to 0.008 in.).



**TRANSFER GEARBOX  
(HELICAL AND SPUR GEAR TYPE)**

—Overhaul 37.29.28

Service tool: 243241, thread protector

**Dismantling**

**General**

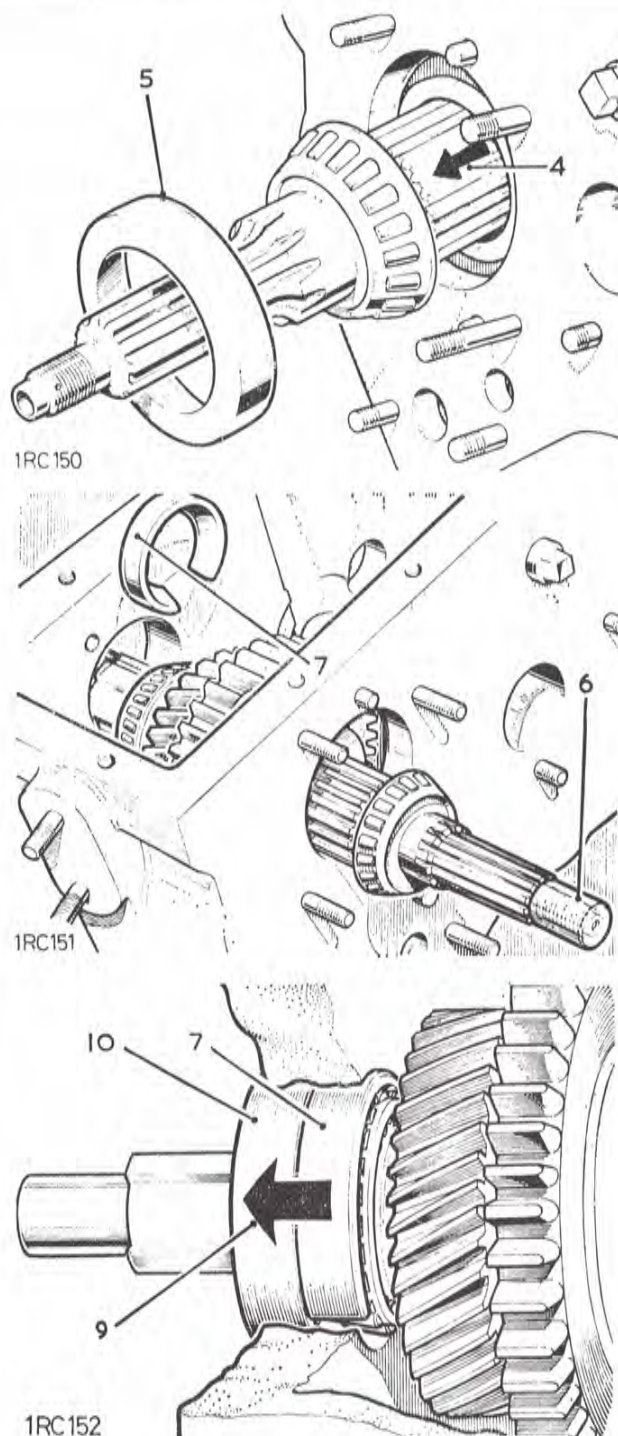
There are two types of transfer box in use, one with helical and spur gears and the other with all helical gears. The only visible external difference between the two is a selector shaft adjuster fitted to the front out-put shaft housing on the all helical box only. Identify the gearbox type before proceeding. Because the overhaul instructions for the two types carry the same operation number (37.29.28) but are printed separately, the applicable description is added to the operation title and to each continuing page.

- to the operation title and to each continuing page.
1. Remove the transfer gearbox. 37.29.25.
  2. Remove the front output shaft housing. 37.10.05.
  3. Remove the speedometer drive housing. 37.25.09.
  4. Using a mallet, drive the output shaft rearwards.
  5. Withdraw the rear bearing outer race when released from the casing.
  6. Fit protection cap 243241, over the threaded end of the output shaft, and drive the shaft forward as far as possible.
  7. Slide the shaft to the rear and insert a suitable packing piece between the rollers of the front bearing and the outer race.

**NOTE:** A packing piece can be made from a scrap bearing outer race, with the outer diameter reduced to give clearance in the transfer box and suitably slotted to fit over the shaft.

8. Remove the circlip retaining the front bearing outer race.
9. With the packing piece in position, drive the shaft forward.
10. Withdraw the front bearing outer race.

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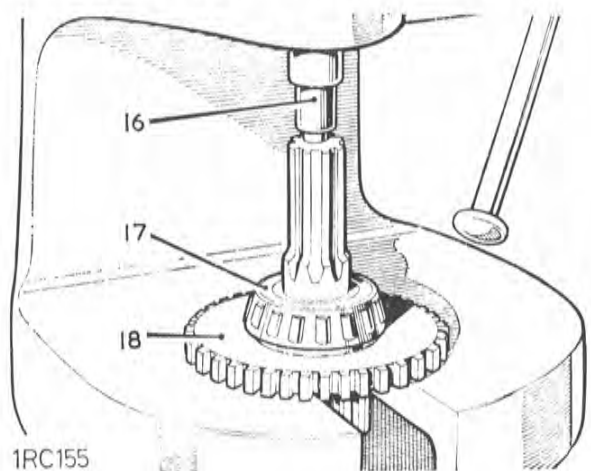
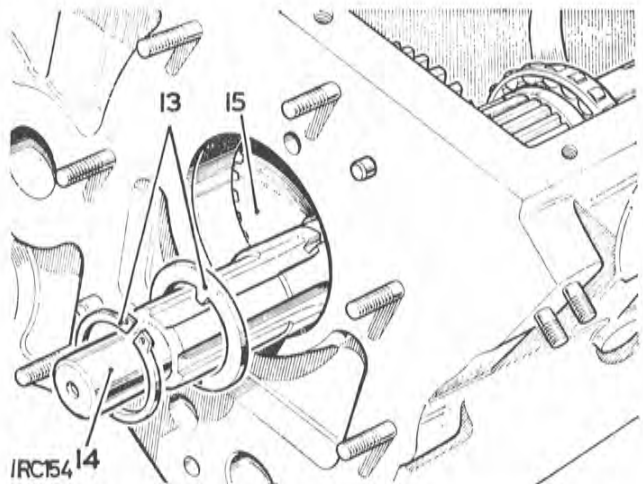
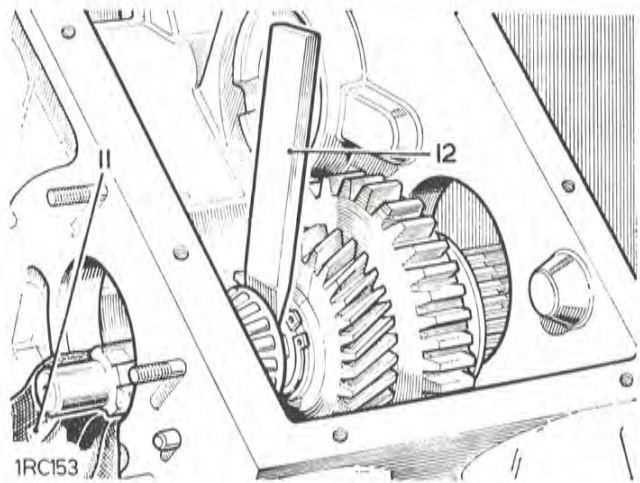


## GEARBOX

### (HELICAL AND SPUR GEAR TYPE)

11. Place pads of rag in position to protect the transfer box bearing bores during the following operations.
12. Using a suitable mild steel bar with a chisel end, drive the front bearing from the output shaft.
13. Remove the circlip and thrust washer from the output shaft.
14. Withdraw the shaft through the gears.
15. Remove the gears through the bottom of the casing.
16. Retain the protector 243241 on the shaft threads.
17. Extract or press the rear bearing from the output shaft.
18. As illustrated, the low speed gear may be used as a press block for the removal of the rear bearing.

*continued*



**(HELICAL AND SPUR GEAR TYPE)**

19. Remove the circlip, retaining plate and roller bearing from the mainshaft rear bearing housing.
20. Remove the fixings, flange to brake drum.
21. Withdraw the coupling flange.
22. Prise off the mud shield.
23. Remove the retaining circlip from the propeller shaft bolts.
24. Withdraw the bolts and retainer plate.

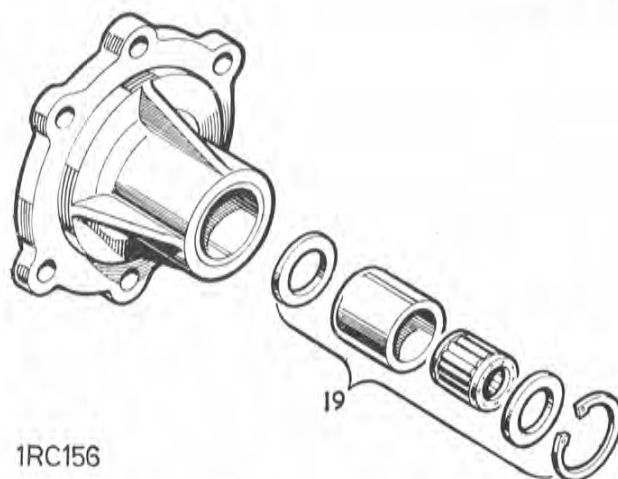
**Inspecting**

25. Renew any components which show obvious wear or damage. Check the condition of the shaft splines for the low gear wheel, it is important that the spline corners are not worn.  
 Note that the low gear wheel is a loose fit on the shaft, this allows the gear to tilt in operation, causing the spline edges at the annular groove to bite on the splines of the low speed gear, locking it in position. Examine the sleeve of the output flange for damage which could cause failure of the oil seal.

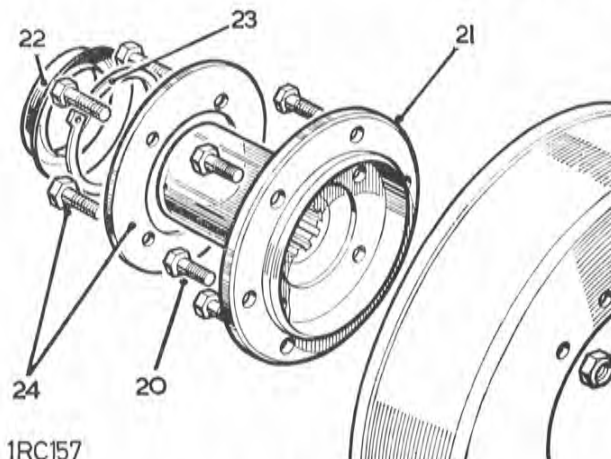
**Pre-assembly check, items 26 to 31.**

26. Fit the high gear wheel on to the output shaft.
27. Fit the thrust washer.
28. Fit the circlip.
29. Place a suitable piece of tube over the shaft and push the circlip towards the gear to produce minimum gear end-float.
30. Maintaining this condition, check the end-float between the gear and the shaft, this must be 0,15 mm to 0,20 mm (0.006 in. to 0.008 in.) under these conditions.
31. Adjustment of the high gear wheel end-float is made by reducing the thickness of the thrust washer, or fitting a new thrust washer, as required. If fitting a new thrust washer fails to reduce the end-float to the required limits, replace the shaft and/or gear.

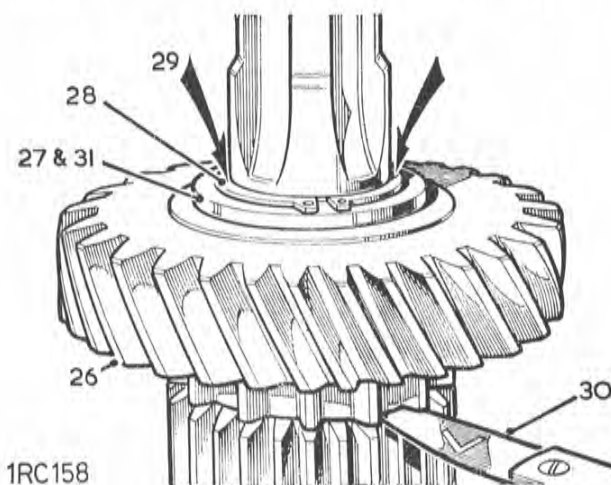
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1RC156



1RC157



1RC158

## GEARBOX

### (HELICAL AND SPUR GEAR TYPE)

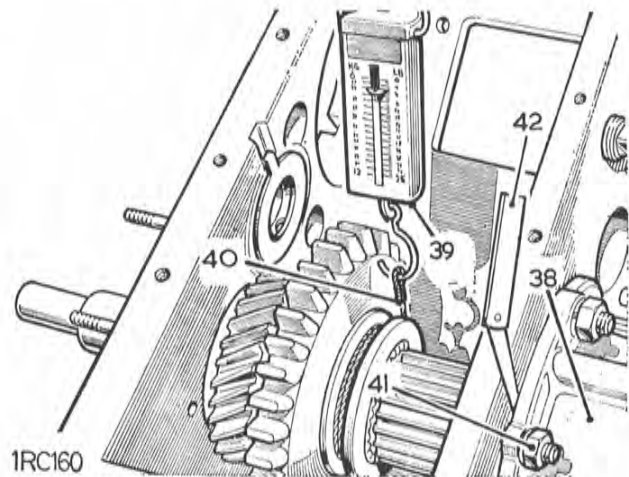
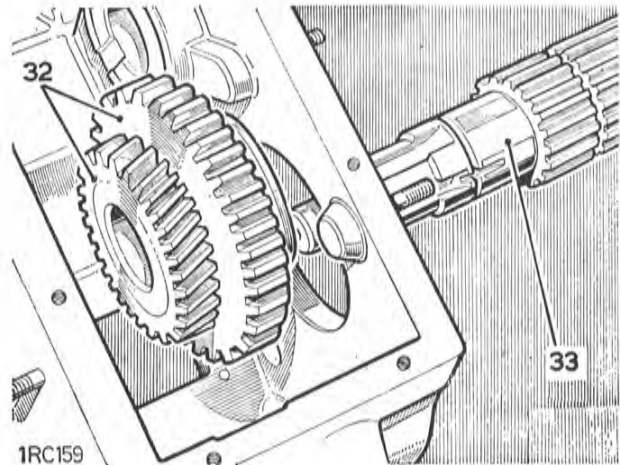
#### Assembling

32. Position the high and low gears in the transfer box.
33. Fit the output shaft, from the rear of the box, to engage the gears.
34. Fit the thrust washer, determined during the pre-assembly check, to the output shaft and secure, using a new circlip.
35. Use pads of rag to protect the transfer box bearing bores, and drive the two roller bearings on to the output shaft. Fit the front bearing outer race and secure with a circlip.
36. Fit the rear bearing outer race.
37. Using the protection cap 243241 over the threaded end of the output shaft, drive the shaft forward until the front bearing is hard against the circlip. Then lightly tap the rear bearing outer race further in to remove all end-float from the output shaft without introducing pre-load.

#### Setting the output shaft bearing pre-load, items 38 to 44

38. Fit the speedometer housing, without any shims, and loosely retain with nuts and spring washers.
39. Measure the rolling resistance of the output shaft, using a nylon cord attached to a spring balance. Coil the cord around the low gear wheel selector groove and note the measurement recorded on the spring balance required to rotate the output shaft after having overcome inertia.
40. Ensure that the cord does not slip, giving a false reading.
41. Bearing pre-load is correct when a figure of 0,9 to 1,8 kg. (2 to 4 lbs.) is recorded on the spring balance. Adjustment is made by tightening the speedometer housing securing nuts, progressively and evenly.
42. When the bearing pre-load is correct, ensure that the clearance between the speedometer housing and the transfer box is evenly disposed, using feeler gauges. The measured clearance obtained is equal to the thickness of shims required for subsequent assembly between the speedometer housing and transfer box to maintain correct bearing pre-load.

*continued*



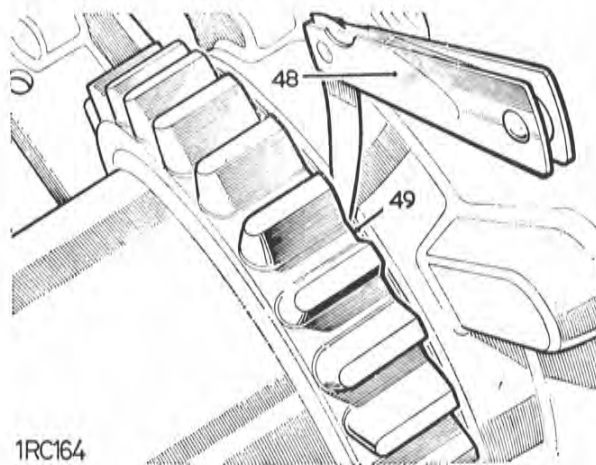
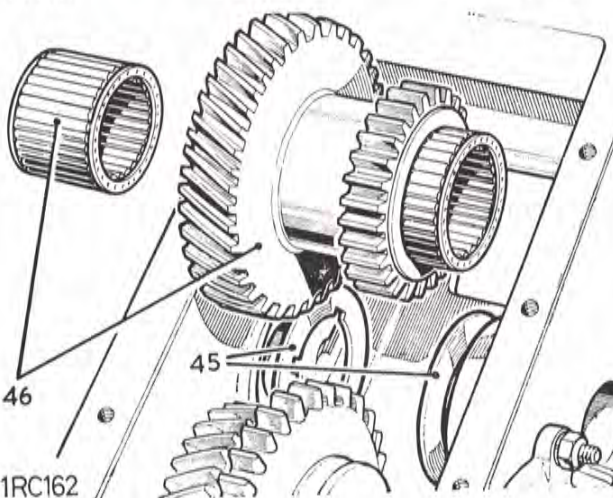
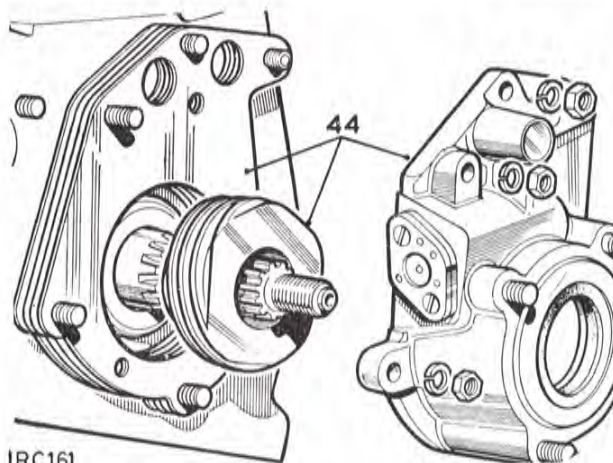
(HELICAL AND SPUR GEAR TYPE)

- 43. Withdraw the spring balance and nylon cord from the low gear wheel, and remove the speedometer housing from the transfer box.
- 44. Using the determined thickness of shims, fit the speedometer drive worm and housing.

Determining the intermediate gear end-float, items 45 to 49

- 45. Place the two thrust washers for the intermediate gear in position in the transfer box and retain with a film of grease. The washers must be fitted with the bronze faces inward and located in the casing by their tabs.
- 46. Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels
- 47. Fit the intermediate shaft through the casing, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
- 48. Using feeler gauges, check the end-float of the intermediate gear, this must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.).
- 49. Adjustment is made by grinding the steel face of the thrust washers to increase end-float, or by fitting shims, available in 0,25 mm (0.010 in.) thickness, between the thrust washers and the casing to reduce end-float.

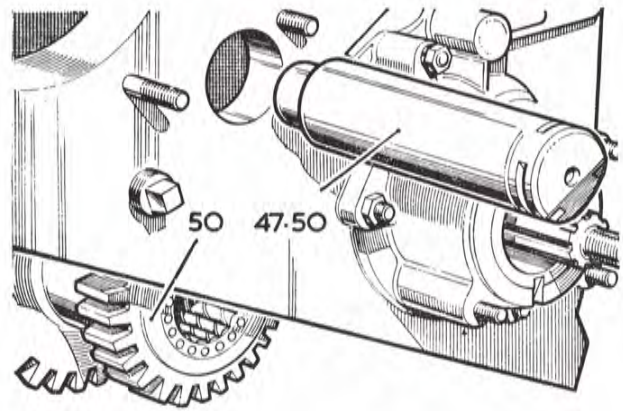
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## GEARBOX

### (HELICAL AND SPUR GEAR TYPE)

50. When the intermediate gear end-float is correct, remove the intermediate shaft and gear, and place aside for subsequent assembly after the transfer box has been fitted to the main gearbox.
51. Re-assemble the rear bearing housing and the output drive flange by reversing the removal procedure.
52. Refit the transfer gearbox. 37.29.25.



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### DATA

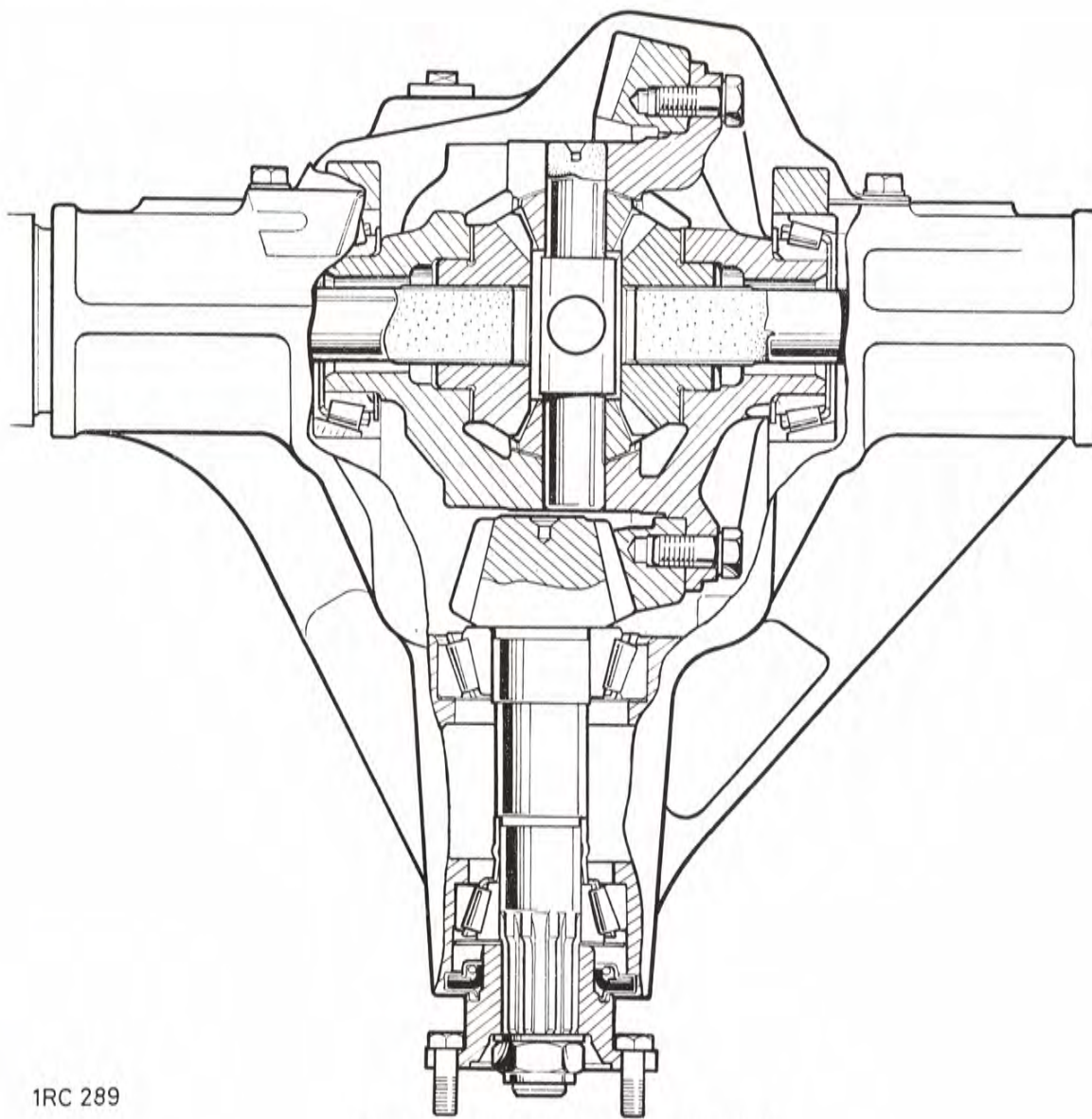
High gear end-float  
Intermediate gear end-float  
Output shaft bearing pre-load

0,15 to 0,20 mm (0.006 to 0.008 in.).

0,10 to 0,20 mm (0.004 to 0.008 in.).

0,9 to 1,8 kg. (2 to 4 lb.) measured with spring balance cord coiled around the low gear-wheel selector groove.





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Sectioned view of final drive arrangement





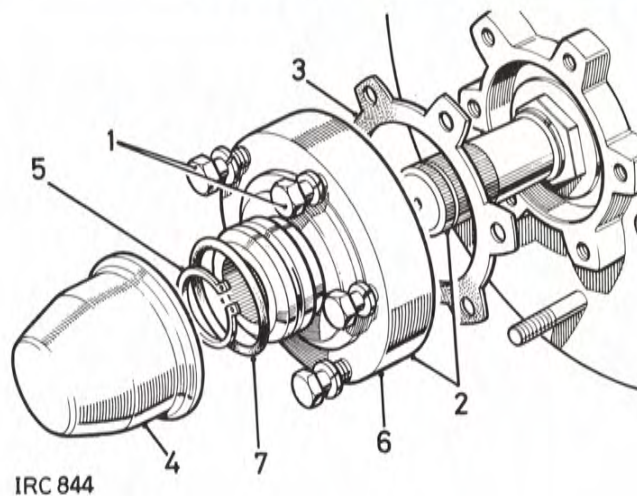
**AXLE SHAFT**

—Remove and refit

51.10.01

**Removing**

1. Remove the hub driving member fixings.
2. Withdraw the driving member and axle shaft complete.
3. Withdraw the joint washer.
4. Prise off the hub cap.
5. Remove the circlip.
6. Withdraw the driving member from the shaft.
7. Withdraw the 'O' ring seal.



**Refitting**

8. Reverse 1 to 7.

# REAR AXLE AND FINAL DRIVE

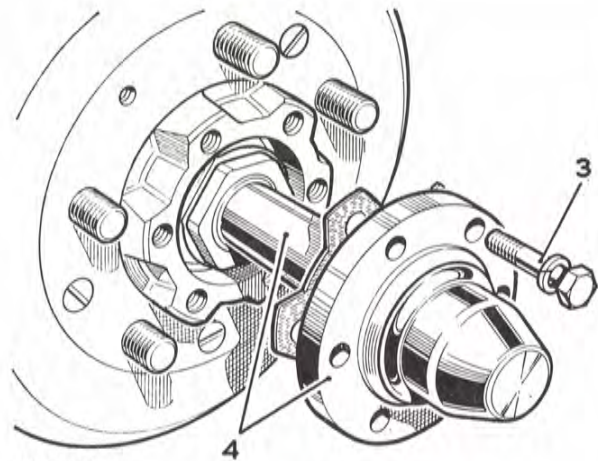
## DIFFERENTIAL ASSEMBLY

—Remove and refit 51.15.01

—Overhaul 51.15.07

### Service tools

18G47C	Screw press
18G131C	Axle spreader
18G191	Dial gauge, bracket and base
18G1122	Screw press
18G1205	Spanner for drive coupling
S123A	Pinion bearing cup remover
18G47BK	Pinion bearing cone remover/replacer
18G47BL	Differential bearing remover
18G1122G	Pinion bearing cup replacer
18G134DP	Differential bearing replacer
18G191P	Setting gauge for pinion height
18G131F	Pegs for axle spreader
RO1008	Oil Seal replacer

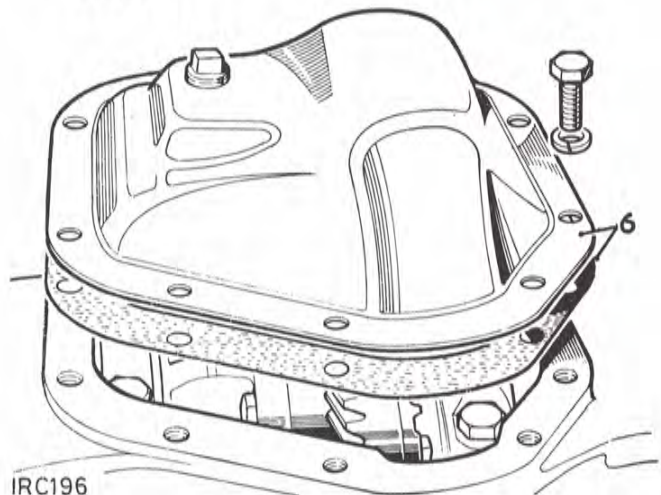


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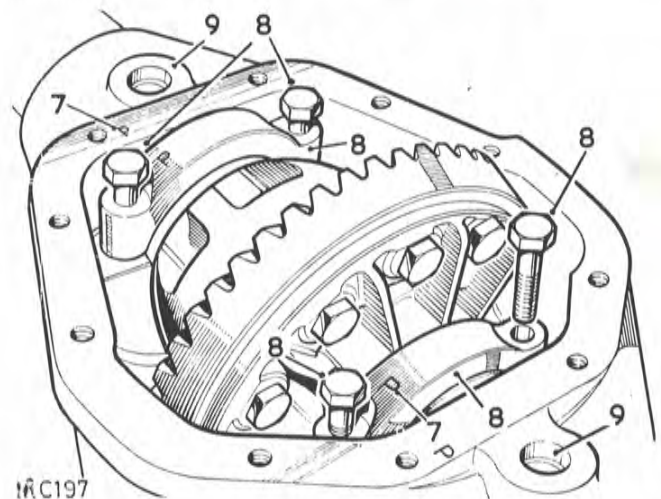
### Removing the differential unit

**NOTE:** All fixing bolts used on the differential assembly and differential cover have metric threads.

1. Drain off the differential lubricating oil.
2. Remove the rear axle assembly. 51.25.01.
3. Remove the hub driving member fixings.
4. Withdraw the driving member and attached halfshaft sufficient to disengage the differential.
5. Repeat 4 for other halfshaft.
6. Remove the fixings at the differential cover and withdraw the cover and joint washer.
7. Note the relationship marking on the bearing caps and axle casing to ensure correct refitting.
8. Remove the fixings and withdraw the differential bearing caps.
9. Clean out and examine the spreader tool pegholes provided in the gear casing face; ensure that the holes are free from dirt and burrs and damage.



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*continued*

10. Ensure that the turnbuckle adjuster is free to turn.
11. Fit the axle spreader to engage the peg holes. Spreader 18G131C, Adaptor pegs 18G131F.
12. Turn the adjuster until all free play between the spreader and casing is taken up, denoted by the adjuster becoming stiff to turn, using a spanner on the adjuster.
13. Check that the side members of the spreader are clear of the casing.
14. Stretch the casing, rotating the adjuster by one flat at a time, until the differential assembly can be levered out. Do not lever against the spreader; use suitable packing under the levers to avoid damage to the casing.

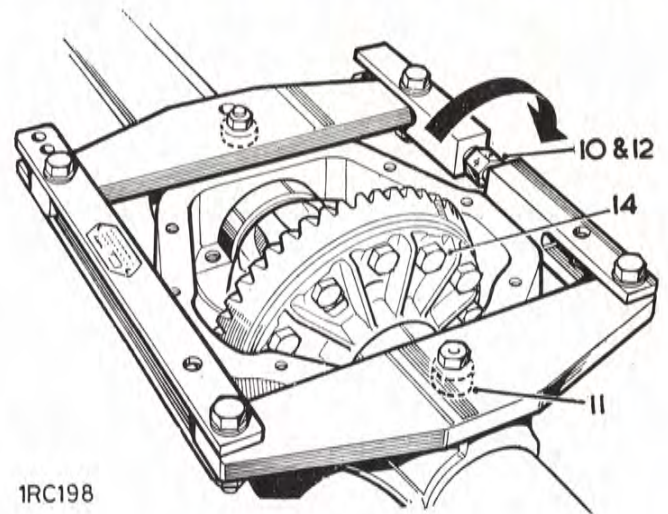
**CAUTION:** To prevent permanent damage to the gear carrier case it must not be over-stretched. Each flat on the turnbuckle is numbered to enable a check to be made on the amount turned. The maximum stretch permitted is 0,30 mm (0.012 in.), equivalent to three flats.

15. Ease off the adjuster and remove the spreader.

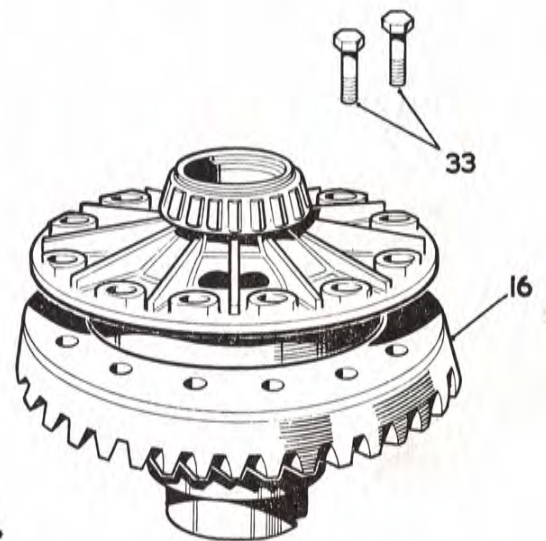
**Dismantling the differential unit**

16. Remove the fixings and withdraw the crownwheel.
17. Note the alignment markings on the two differential casings to ensure correct refitting, then remove the fixings.
18. Lift off the upper case.
19. Withdraw the upper differential wheel and thrust washer.

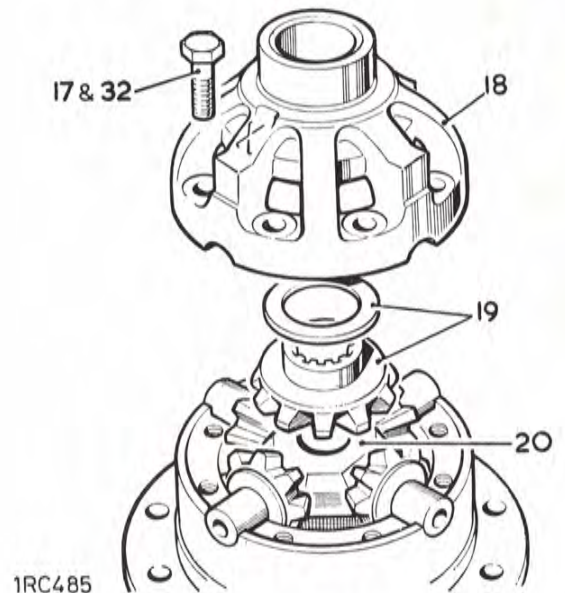
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## REAR AXLE AND FINAL DRIVE

20. Lift out the cross shaft and pinions.
21. Withdraw the dished thrust washers.
22. Withdraw the lower differential wheel and thrust washer.
23. Remove the differential bearing cones. Remover 18G47BL details 1 and 2, Press 18G47C.
24. Withdraw the shim washers fitted between the bearing cones and the differential casings.

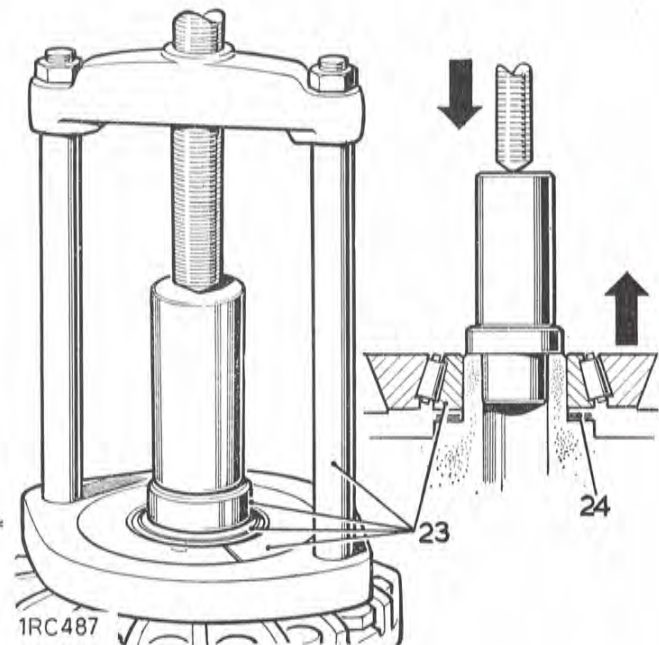
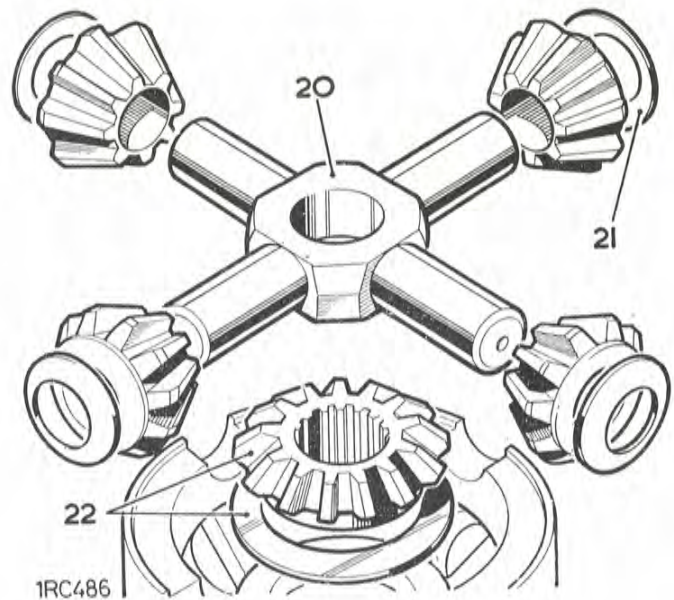
### Inspecting

25. Examine all components for obvious wear and damage.
26. The bearing cones must be a press fit on their locations.
27. The crownwheel and pinion are supplied as a matched pair and must not be interchanged separately.  
A new crownwheel and pinion matched pair may be fitted to an original gear carrier casing if sound. The original crownwheel and pinion, if sound, may be fitted into a replacement casing.
28. The two parts of the differential unit casing are matched and must not be replaced separately.
29. Discard and replace all thrust washers.
30. Differential housings with worn thrust washer seatings must be replaced as a pair.
31. Examine the differential case to crownwheel joint face for burrs and damage which could lead to crownwheel run-out when fitted.

### Assembling the differential unit

32. Reverse the items 17 to 22 aligning the marks on the differential casings. Casings fixings torque load is 9,1 to 10,4 kgf.m (66 to 75 lbf. ft.). The fixings tightening should be carried out at opposite sides of the casings and not by following the diameter. Use Loctite 'Studlock' grade on the fixing bolt threads.
33. \*\*Fit the crownwheel to the differential casing. Fixings torque is 13 to 14,5 kgf.m (95 to 105 lbf.ft.). Use Loctite 'Studlock' grade on the fixing bolt threads.\*\*
34. Check the total indicated run-out on the crownwheel back face. This must not exceed 0,05 mm (0.002 in.). If run-out is excessive, check the mating faces for dirt and damage; if necessary select a new radial position for the crownwheel.
35. Place the differential unit and the bearing cups and cones aside pending the subsequent 'Differential bearing adjustment' checks, items 45 to 54.

*continued*



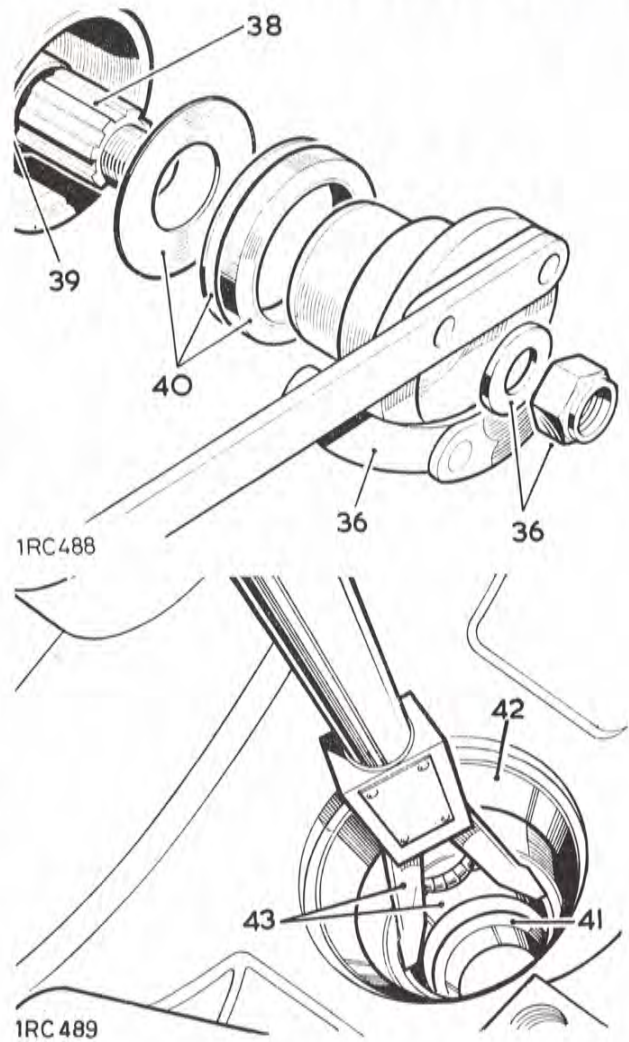
**Removing the final drive pinion**

36. Prevent the coupling flange from rotating and remove the flange locknut and plain washer. Spanner 18G1205.
37. Support the drive pinion and remove the coupling flange by tapping with a hide hammer.
38. Withdraw the drive pinion together with the inner bearing cone.
39. Withdraw and discard the collapsible bearing spacer.
40. Withdraw the oil seal, gasket and oil thrower.
41. Withdraw the outer bearing cone.
42. Extract the pinion inner bearing cup and shim washers from the casing. Note the shim washer thickness. Remover S123A.
43. Extract the pinion outer bearing cup from the casing and, if fitted, the make-up washer (early models). Remover S123A.
44. Remove the inner bearing cone from the pinion. Remover 18G47BK and Press 18G47C.

**Differential bearing adjustment**

This procedure is to establish the correct value of shim washers to be fitted to pre-load the differential bearings. The fitted disposition of the shims, at each side of the differential, is decided during the subsequent 'Differential backlash' checks, items 88 to 94.

*continued*



1RC490

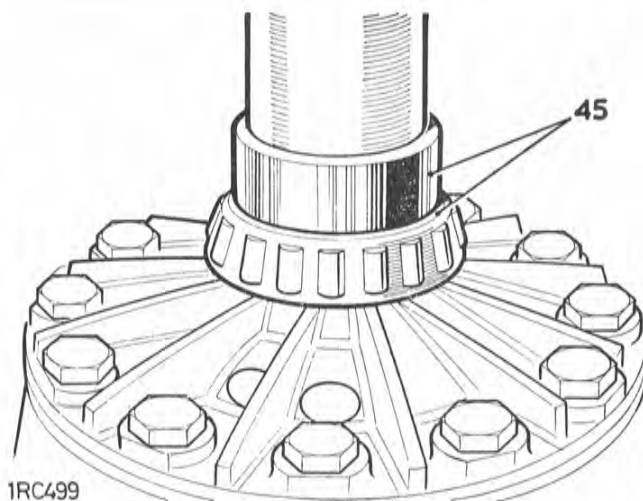
## REAR AXLE AND FINAL DRIVE

45. Press on the differential bearing cones less shim washers, using 18G134DP.
46. Fit the bearing cups to the differential.
47. Fit the differential unit and bearings to the gear carrier casing. Do not fit the bearing caps.
48. Position a suitable dial gauge indicator on the casing with the stylus registering on the back face of the crownwheel.
49. Insert two levers between the casing and the differential unit at one side.
50. Move the differential unit fully to one side of the casing; do not tilt the unit.
51. Rotate the differential unit to settle the bearings, continue to lever the differential to the side then zero the dial gauge indicator.
52. Lever the assembly fully to the other side of the casing, rotate the unit to settle the bearings, then note the total indicator reading.
53. Add 0.127 mm (0.005 in.), for bearing pre-load, to the total noted in 52. The sum is then equal to the nominal value of shims required for the differential bearings.  
Shims are available in the range 0,07 mm (0.003 in.), 0,12 mm (0.005 in.), 0,25 mm (0.010 in.) and 0,76 mm (0.030 in.). Select the total value of shims required.
54. Remove the differential unit and bearings and place aside. Do not fit the shim washers until the subsequent 'Differential backlash' checks have been made, items 88 to 94.

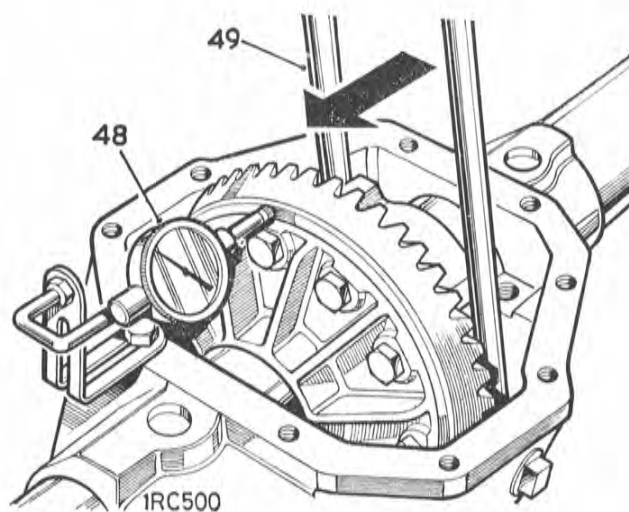
### Drive Pinion fitting

55. Select shim washers of the same thickness value as those removed from under the pinion inner cup, item 42, and place ready for fitting.
56. Position the outer bearing replacer 18G1122G detail 2, the outer bearing cup and, where fitted, the bearing make-up washer (early models) on the press tool 18G1122.
57. Locate the assembly into the pinion housing nose.

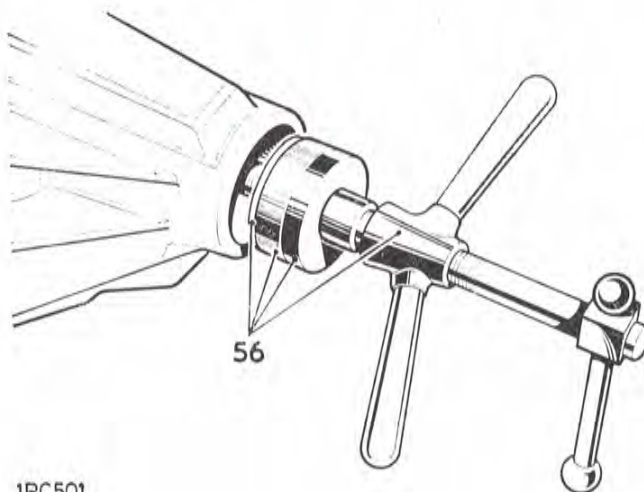
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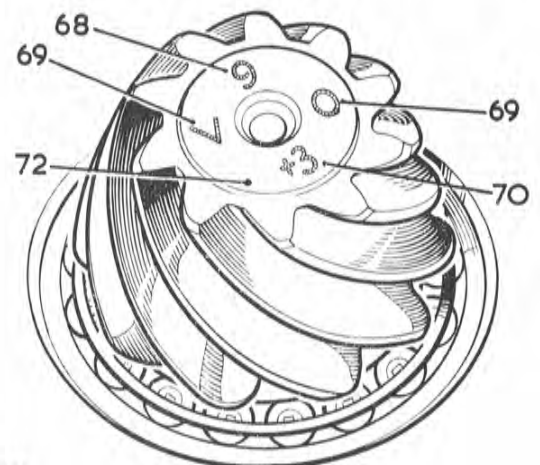
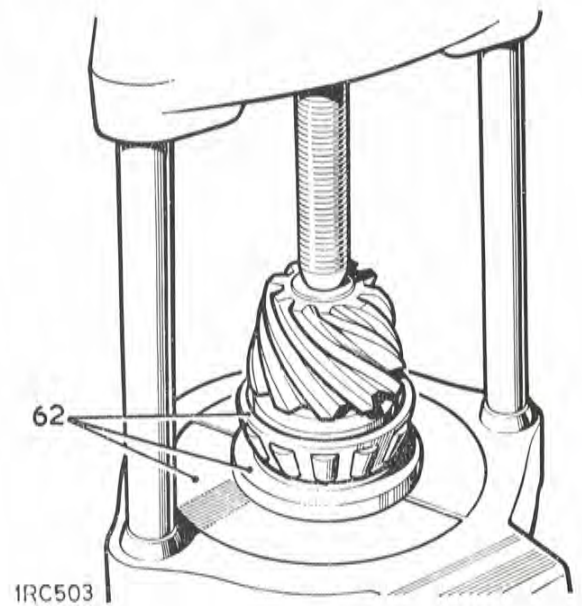
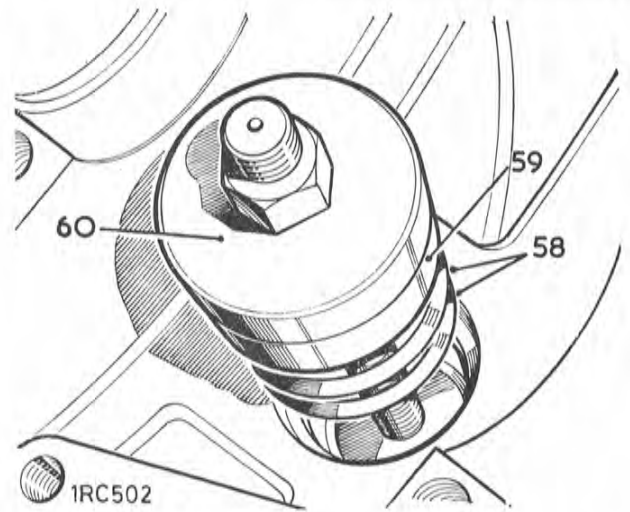
1RC501

58. Place the selected shim washers on to the inner bearing cup seating.
59. Position the inner bearing cup in the casing.
60. Position the inner bearing replacer 18G1122G detail 1 on to 18G1122 and secure with the fixing nut.
61. Hold still the centre screw and turn the butterfly lever to draw in the bearing cups.
62. Press the inner bearing cone on to the drive pinion. 18G47BK details 1 and 2 and 18G47C.
63. Position the pinion and bearing in the casing; omit the collapsible spacer at this stage.
64. Fit the outer bearing cone on to the pinion.
65. Fit the coupling flange and plain washer and loosely fit the flange nut.
66. Tighten the coupling flange locknut sufficient to remove end-float from the pinion.
67. Rotate the pinion to settle the bearings and slowly tighten the flange locknut until a torque resistance of 9,25 to 13,8 kgf.cm (8 to 12 lbf. in.) is required to rotate the pinion

**Drive pinion markings**

68. Check that the serial number marked on the pinion end face matches that marked on the crownwheel.
69. The markings on the end face adjacent to the serial number are of no significance during servicing.
70. The figure marked on the end face opposite to the serial number indicates, in thousandths of an inch, the deviation from nominal required to correctly set the pinion. A pinion marked plus (+) must be deeper than nominal, a minus (-) pinion must be set shallower than nominal.
71. The nominal setting dimension is represented by the setting gauge block 18G191P, which is referenced from the pinion end face to the bottom radius of the differential bearing bore.

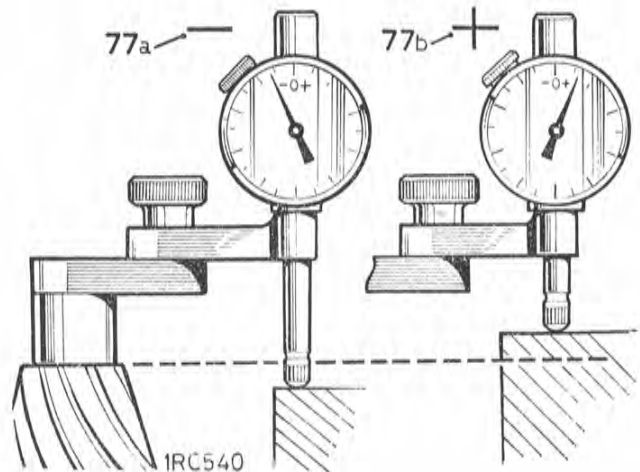
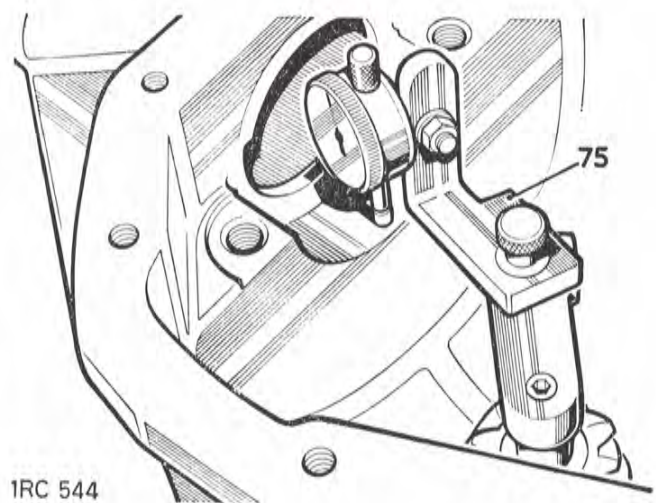
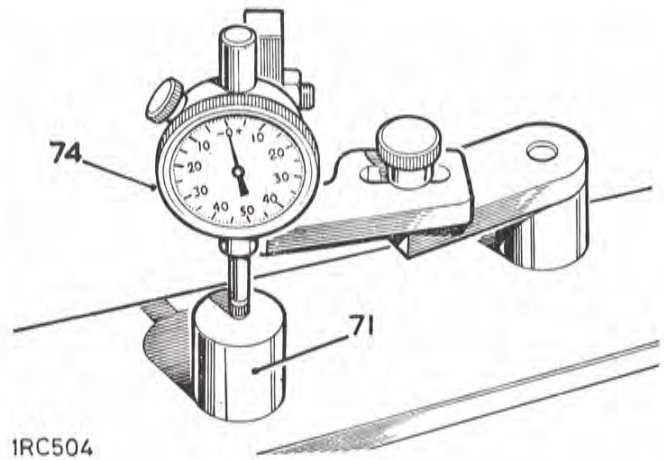
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## Drive pinion adjustment

72. Ensure that the pinion end face is free of raised burrs around the etched markings.
73. Remove the keep disc from the magnetised base of dial gauge tool 18G191.
74. Place the dial gauge and setting gauge 18G191P on a flat surface and zero the dial gauge stylus on to the setting gauge.
75. Position the dial gauge centrally on the pinion end face with the stylus registering on the lowest point on one differential bearing bore. Note the dial gauge deviation from the zeroed setting.
76. Repeat on the other bearing bore. Add together the readings then halve the sum to obtain the mean reading. Note whether the stylus has moved up or down from the zeroed setting.
77.
  - a Where the stylus has moved *down* (indicating that the pinion is too high) record as a minus (-) figure.
  - b Where the stylus has moved *up* (indicating pinion too low) record as a plus (+) figure.
78. For an ideal pinion height setting, the reading on the dial gauge should agree with the figure marked on the end face, item 70. For example, with an end face marking of +3, the dial gauge reading should indicate that the pinion is 0.003 in. lower than nominal (recorded as a plus (+) figure).
79. Where the figures do not agree, subtract the end face figure from the dial gauge reading; the result is the adjustment required to the thickness of shim washers fitted under the pinion inner bearing cup. For example: with an end face figure of -3 and a gauge reading of +0.010 in., the adjustment required is +0.010 in. minus -3 = +0.013 in., therefore add shims to this value to raise the pinion; and with an end face figure of +2 and a gauge reading of -0.005 in., the adjustment required is -0.005 in. minus +2 = -0.007 in., therefore subtract shims to this value to lower the pinion.
80. If necessary, adjust the shim thickness under the pinion inner cup as determined in item 79.

*continued*





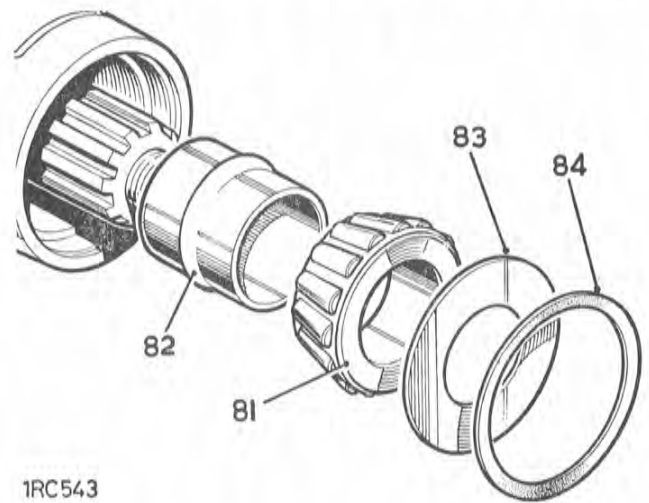
81. When the pinion setting is satisfactory, temporarily remove the pinion outer bearing cone.
82. Fit a new collapsible bearing spacer, flared end outward, to the drive pinion and refit the outer bearing cone.
83. Fit the pinion oil slinger.
84. Fit the oil seal gasket.
85. Fit the pinion oil seal, lipped side first, using general purpose grease or, where available, a molybdenum disulphide based grease on the seal lip, using RO1008 to drift in the seal.
86. Fit the coupling flange and plain washer and loosely fit a new flange nut. Secure 18G1205 to the coupling flange, using slave fixings.
87. Alternately tighten the flange nut and check the drive pinion resistance to rotation until the following figures are achieved, as applicable:
  - a. Assemblies re-using original pinion bearings: 17,2 to 34,5 kg cm (15 to 30 lb. in.); or
  - b. Assemblies with replacement pinion bearings: 34,5 to 46,0 kg cm (30 to 40 lb. in.).

**NOTE:** A torque load of 34,5 kgf.m (250 lbf. ft.) approximately is required on the coupling flange nut to commence collapsing the bearing spacer. Thereafter, torque resistance build-up is rapid, therefore check frequently to ensure the correct figures are not exceeded, otherwise a new collapsible bearing spacer will be required.

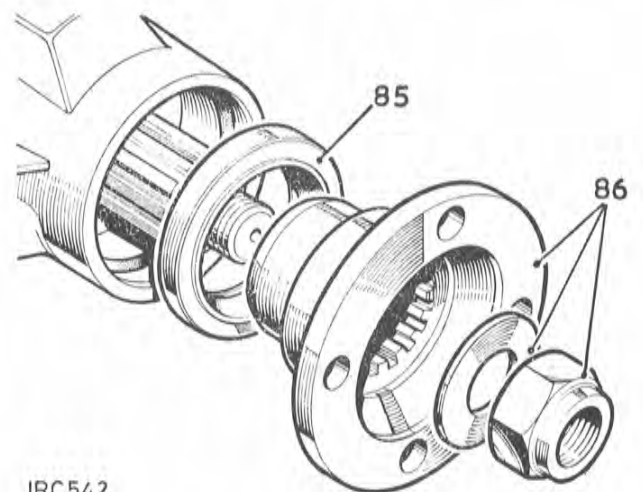
**Differential backlash checks**

88. Fit the differential unit bearings but omit the shim washers. 18G134DP.
89. Fit the differential unit and lever the unit away from the drive pinion until the opposite bearing cup is seated against the housing. Do not tilt the unit.
90. Install a dial gauge on the casing with its stylus resting on the back face of the crownwheel. Zero the gauge.
91. Lever the differential unit to engage the crownwheel teeth in full mesh with the drive pinion teeth. Do not tilt the unit.
92. Note the total reading obtained on the dial gauge.

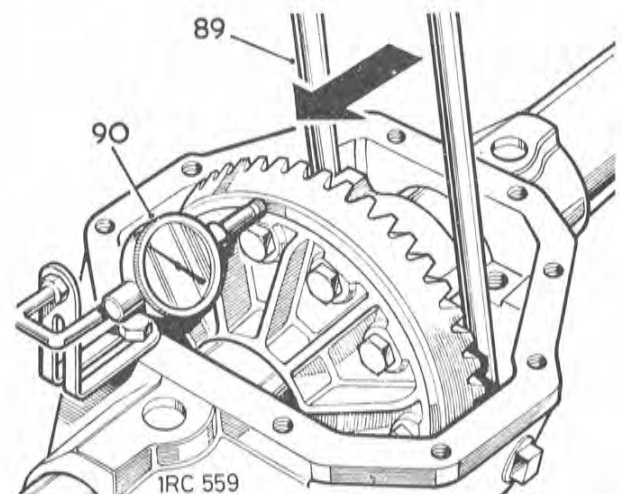
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IRC543



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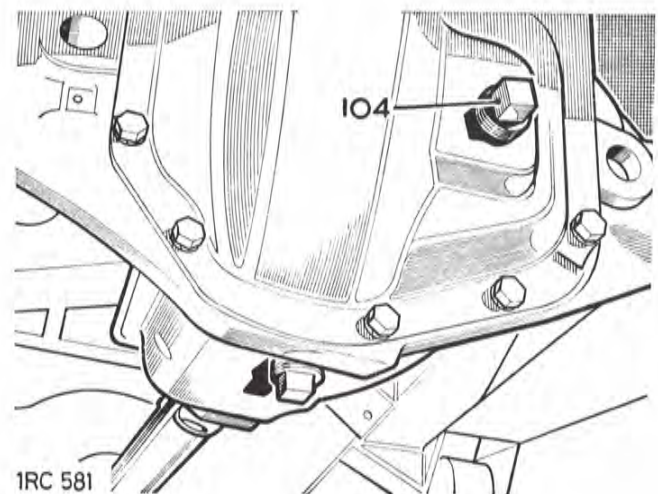
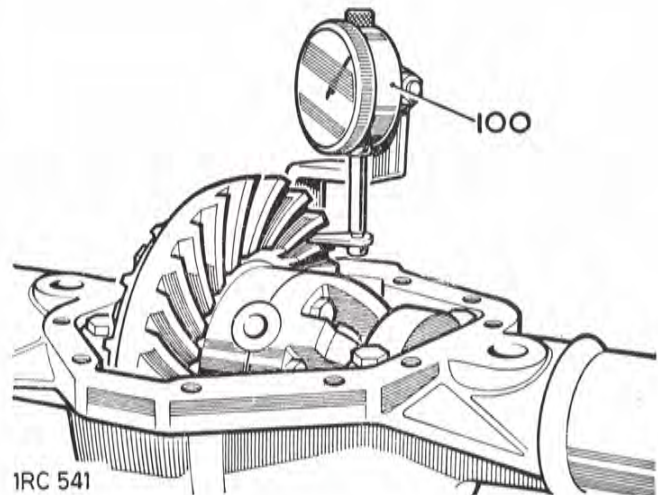
IRC 559



## REAR AXLE AND FINAL DRIVE

93. From this figure subtract 0,25 mm (0.010 in.) to obtain the correct crownwheel backlash when fitted. The result indicates the value of shimming to be fitted between the differential case and the bearing cone at the crownwheel side of the differential.
94. Fit the shim value determined in 93, taking the shims from the pack previously determined during 'Differential bearing adjustment' checks, items 45 to 54. 18G47BL details 1 and 2, press 18G47C. 18G134DP.
95. Fit the remaining shims from item 93 to the opposite side of the differential. 18G47BL details 1 and 2, press 18G47C. 18G134DP.
96. Fit the differential unit with shims and bearings to the axle casing, using the axle spreader 18G131C with pegs 18G131F.
97. Remove the axle spreader.
98. Fit the bearing caps in their correct position, referring to the relationship markings on the caps and on the axle casing.
99. Tighten the bearing caps fixings to 12,9 to 14,5 kgm (93 to 105 lb. ft.).
100. Mount a dial gauge on the axle casing with the stylus resting on a crownwheel tooth.
101. Prevent the drive pinion from rotating and check the crownwheel backlash which must be 0,15 to 0,27 mm (0.006 to 0.011 in.).
102. Fit the differential cover and new gasket. Torque load for fixings is 2,8 to 3,5 kgf.m (20 to 25 lbf. ft.).
103. Fit the rear axle assembly, 51.25.01.
104. Replenish the differential lubricating oil, capacity 2.5 litres 4.5 pints, (5.4 US pints), using oil to specification SAE 90 EP. After the initial axle run, check the oil level and replenish as necessary to the filler/level plug hole.
105. Where major running parts have been replaced during servicing, it is a recommended practice to allow the axle assembly to 'run in' by avoiding, where possible, heavy loads and high speeds during initial running;

*continued*



**DATA**

Crownwheel backlash	0,17 to 0,27 mm (0.006 to 0.011 in.).
Differential bearings pre-load	0,127 mm (0.005 in.).
Pinion height setting	Set using gauge 18G191P. Gauge length 30,912 mm (1.2177 in.).

**Torque resistance initial setting figures**

Torque to turn drive pinion and new pinion bearings	34,5 to 46 kg cm (30 to 40 lb. in.).
Torque to turn drive pinion re-using the original bearings	17,3 to 34,5 kg cm (15 to 30 lb. in.).



## PINION OIL SEAL

—Remove and refit

51.20.01

Service tool: 18G1205, spanner for drive coupling  
RO1008, oil seal replacer

### Removing

1. Drain the rear axle.
2. Raise and support the rear of the vehicle.
3. Remove the hub driving member fixings and disengage the axle shafts from the differential.
4. Disconnect the propellor shaft.
5. Measure and record the torque required to rotate the pinion.
6. Using 18G1205 to prevent the pinion from rotating, remove the flange retaining nut and washer, and withdraw the pinion flange.
7. Extract and discard the oil seal and gasket.

### Inspection

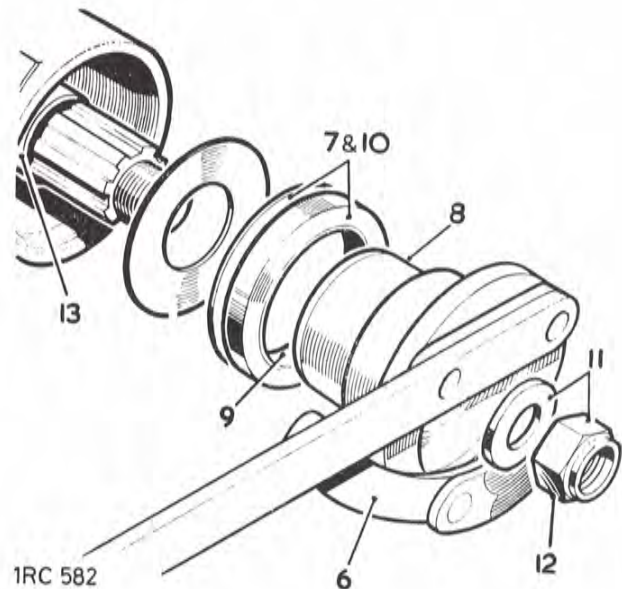
8. Examine the pinion flange for damage, paying particular attention to the oil seal track area.

### Refitting

9. Grease the sealing lip of the new oil seal, using general purpose grease or, if available, grease with a molybdenum disulphide base.

**NOTE:** Where oil leakage past the seal outer diameter has occurred, coat the metal circumference with Pettman's cement, avoiding contact with the seal rubber.

10. Fit the gasket and oil seal, lipped side first, using RO1008 to drift in the seal.
11. Refit the pinion flange and washer.
12. Screw on the retaining nut, tightening the nut gradually until resistance is felt.

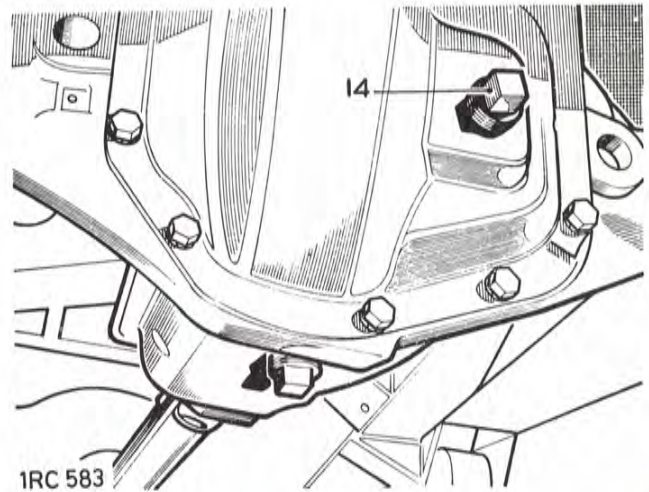


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13. Rotate the pinion to settle the bearings and measure the torque to rotate the pinion. If the reading obtained is less than that recorded in item 5, before the seal was removed, tighten the nut a very small amount, re-settle the bearings and recheck the torque reading. Repeat this procedure until a reading equal to that recorded in item 5, or between 17,2 to 23,0 kg cm (15 to 20 lb. in.), whichever is the greater, is obtained.

**NOTE:** Preload build up is rapid, tighten the nut with extreme care. If the required torque reading is exceeded, the axle must be dismantled and a new collapsible spacer fitted as described in 51.15.07.

14. Reverse 1 to 4.  
Lubricant capacity 2,5 litres, 4.5 pints (5.4 US pints); oil to specification SAE 90EP.  
Check and replenish as necessary to filler/level plug hole after initial axle run.



## REAR AXLE AND FINAL DRIVE

### REAR AXLE ASSEMBLY

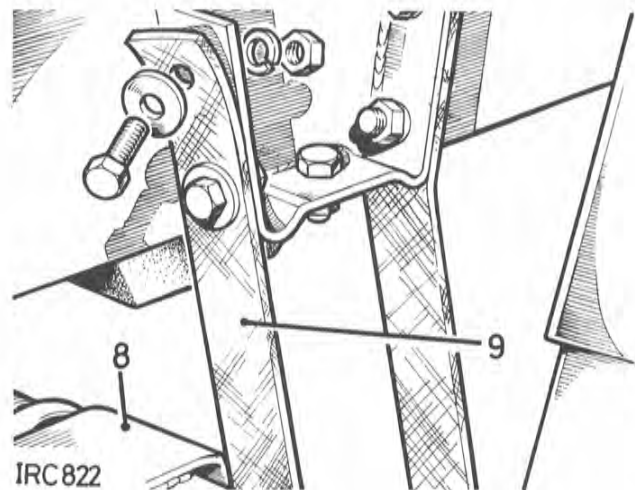
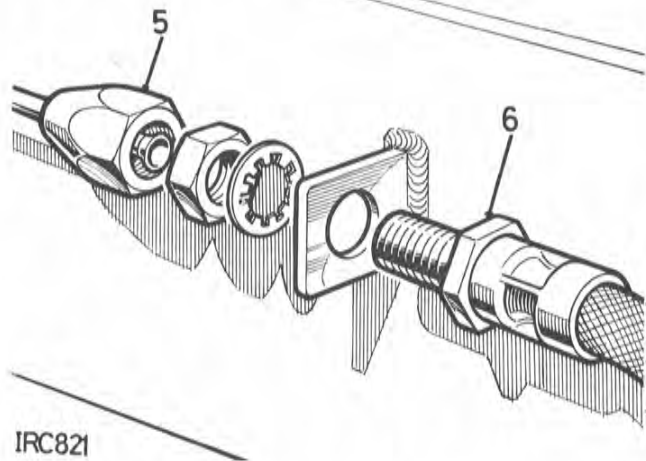
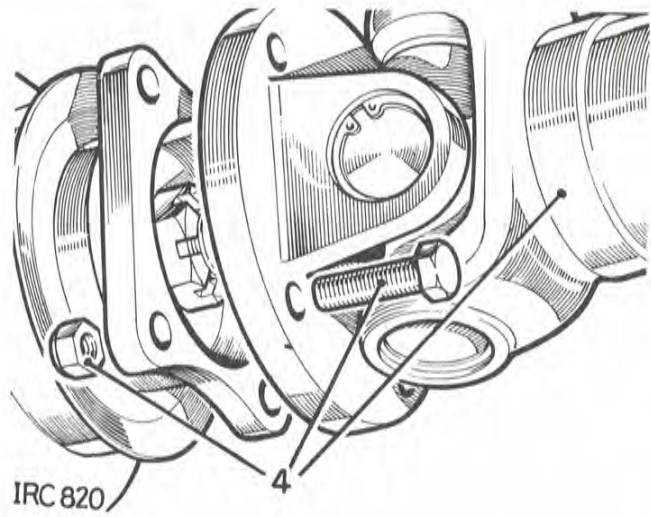
—Remove and refit

51.25.01

#### Removing

1. Slacken the fixings at both rear road wheels.
2. Jack up the rear of the vehicle and support on stands.
3. Remove both rear road wheels.
4. Disconnect the rear propeller shaft and move it clear of the final drive unit.
5. Disconnect the rear brake pipe at the connection with the flexible hose.
6. Withdraw the flexible hose from the chassis bracket.
7. Depress the brake pedal and wedge in that condition to minimise brake fluid loss.
8. Support the axle, using a jack.
9. Disconnect one end of each axle check strap.

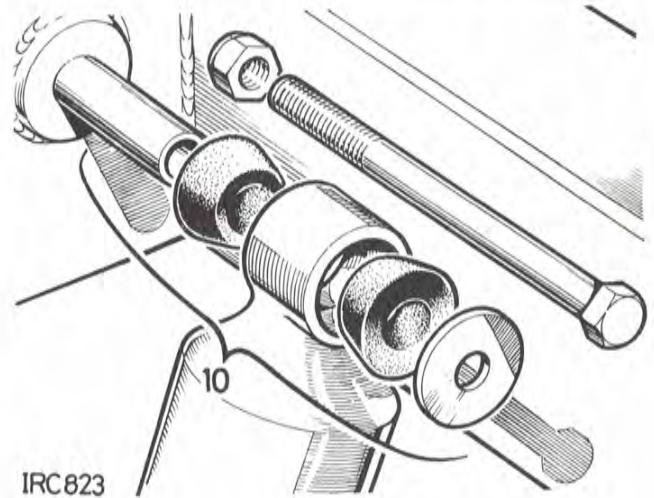
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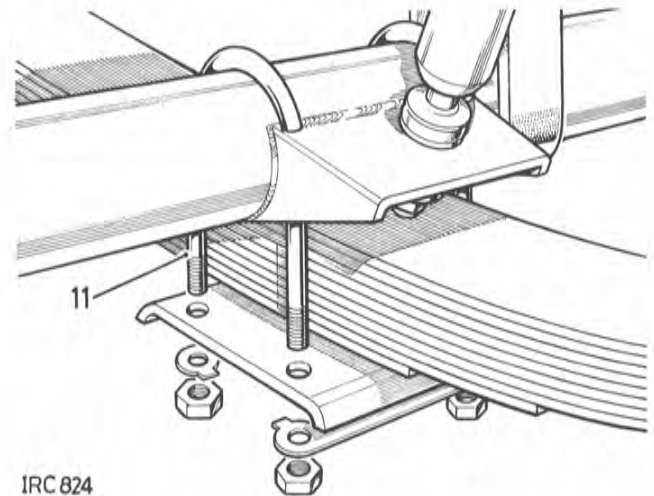
10. Disconnect the shock absorbers at the upper fixings.
11. Remove the four 'U' bolts from the axle.
12. Slacken the six shackle pins at the rear road springs, then remove the two rearmost shackle pins.
13. Lower and withdraw the rear axle.

**Refitting**

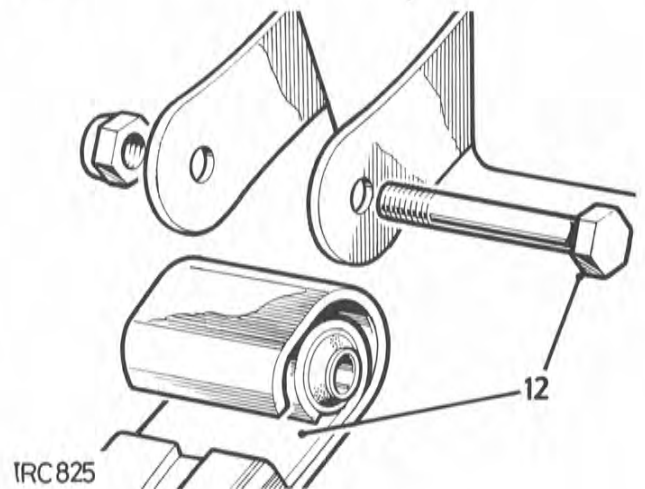
14. Reverse 12 and 13. Do not tighten the shackle pins at this stage.
15. Reverse 1 to 11.
16. Lower the vehicle to the ground and move vehicle bodily backward and forward to settle the springs. Tighten all six shackle pins and locknuts.



IRC823



IRC824

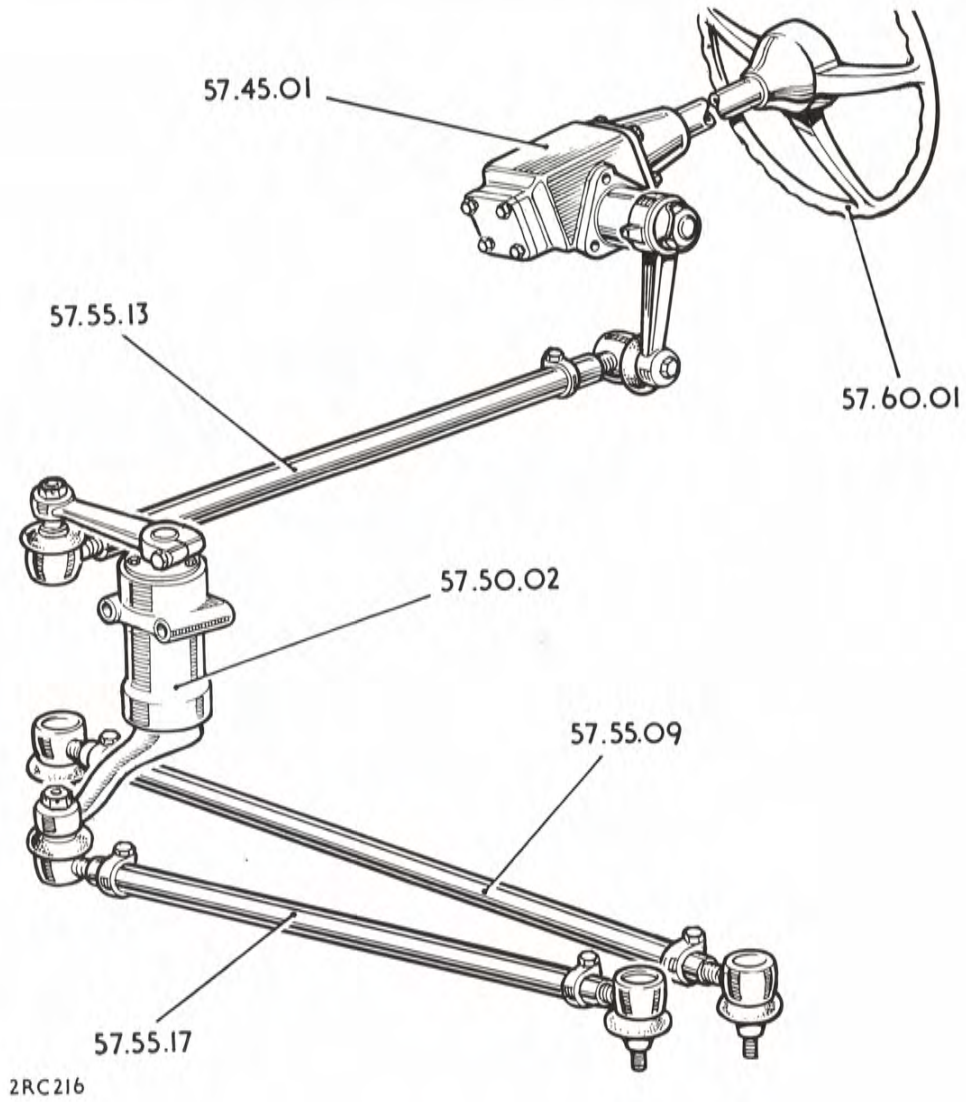


IRC825









## STEERING

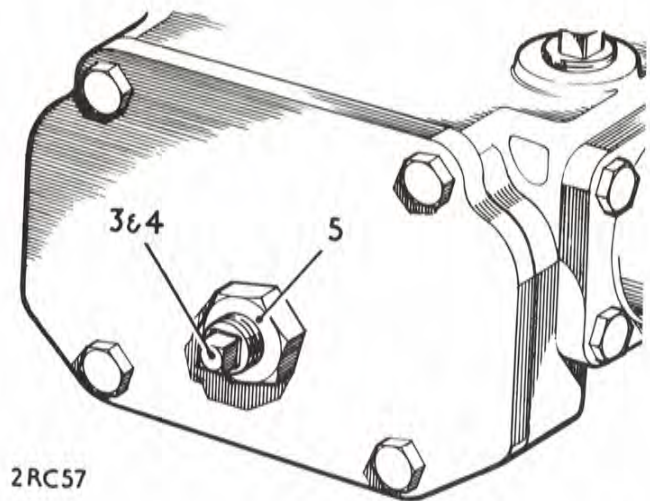
### STEERING BOX

—Adjust

57.35.01

#### Procedure

1. Set the steering in the straight ahead position.
2. Slacken the locknut and adjuster.
3. Screw in the adjuster until steering wheel backlash is taken up.
4. Screw in a further one-half flat maximum to allow for locknut tightening.
5. Tighten the locknut without disturbing the adjuster.



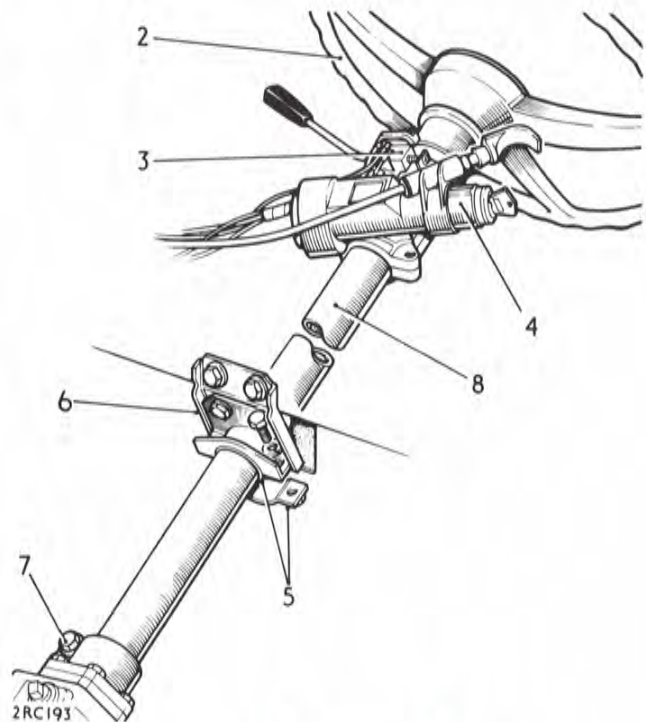
### STEERING COLUMN TOP BEARING

—Remove and refit

57.40.19

#### Removing

1. Disconnect the battery earth lead.
2. Remove the steering wheel. 57.60.01.
3. Release the combined switch from the steering column. 86.65.55.
4. On vehicles without a steering column lock, unscrew the lock ring and move aside the ignition/starter switch from the mounting bracket.
5. Remove the column clamp bracket and seal.
6. Remove the column support bracket.
7. Slacken the pinch bolt, outer column to steering box.
8. Withdraw the outer column from the inner column and steering box.

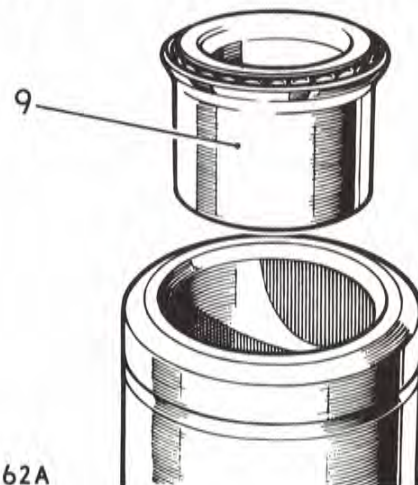


**NOTE:** On vehicles fitted with a steering column lock, disconnect the cold start or engine stop control in the engine compartment and disconnect the leads from the ignition/starter switch (57.40.31 refers); turn the ignition/starter key to unlock the steering.

9. Remove the column top bearing.

#### Refitting

10. Reverse 1 to 9.



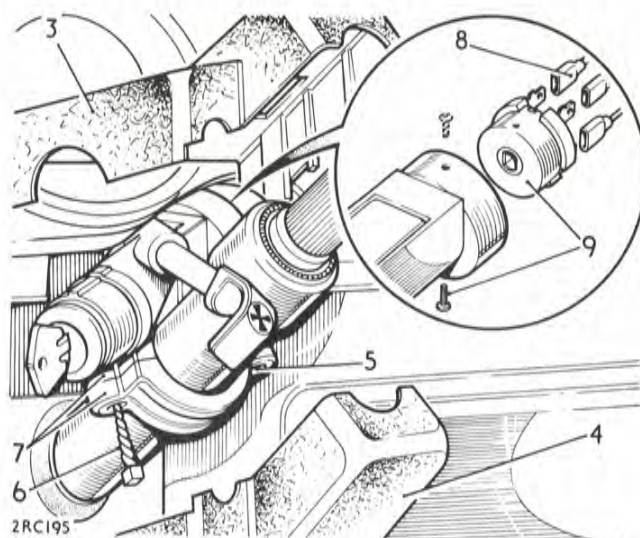
## STEERING COLUMN LOCK AND IGNITION/STARTER SWITCH

—Remove and refit

57.40.31

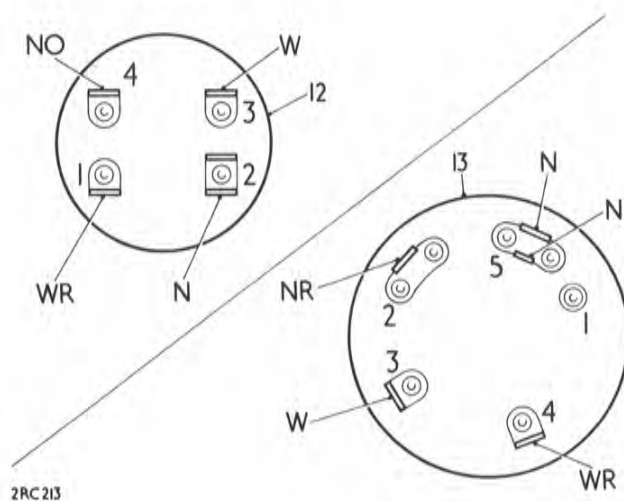
### Removing

1. Disconnect the battery earth lead.
2. Disconnect the cold start control or engine stop control, as applicable, in the engine compartment. 19.20.26 and 19.20.32 refer.
3. Remove the fixings and withdraw the steering column upper shroud.
4. Remove the fixings and move aside the lower shroud.
5. Centre punch and drill a hole in each sheared bolt to accept an extractor.
6. Remove the sheared bolts, using a suitable 'Easy-out' extractor.
7. Withdraw the steering column lock and retainer saddle.
8. Disconnect the electrical leads at the ignition/starter switch.
9. If required, remove the fixing screws and withdraw the switch and the cold start or engine stop control as applicable.



### Refitting

10. Reverse 9 as required.
11. Reconnect the electrical leads at the ignition/starter switch as follows; 12 and 13.
12. Petrol models as illustrated.
13. Diesel models as illustrated.  
Lead colour code N—Brown, R—Red, W—White, O—Orange.
14. Reverse 1 to 7.
15. Check the steering lock operation as follows, 16 and 17.
16. Petrol models—the steering column should be unlocked when the ignition/starter key is at the 'Services' position, and locked when the key is withdrawn.
17. Diesel models—the engine stop control should be automatically locked out in the 'engine stop' condition when the steering column is locked, and free to return when the 'II' position is selected on the ignition/starter switch.



# STEERING

## STEERING COLUMN AND BOX ASSEMBLY

—Remove and refit

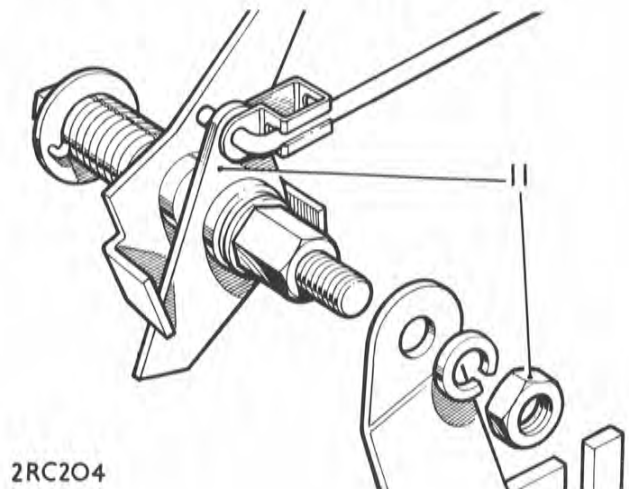
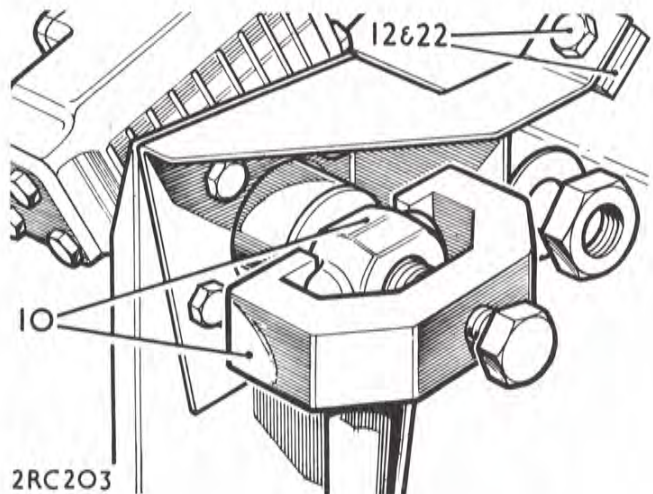
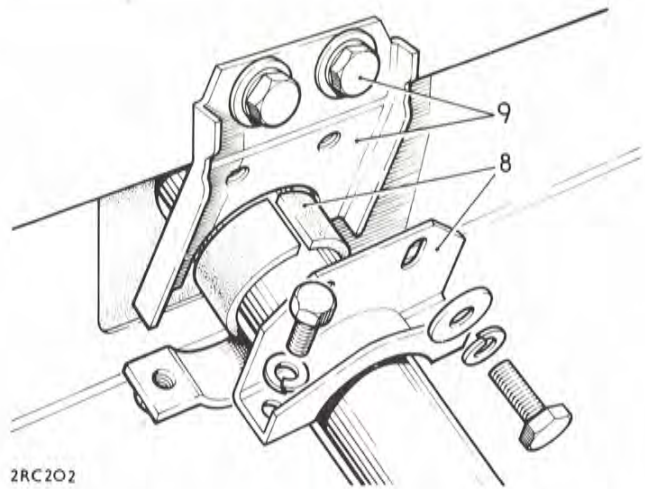
57.45.01

Service tool    600000 Drop arm remover  
                  601763 Ball joint extractor

### Removing

1. Fully open or remove the bonnet panel.
2. Disconnect the battery earth lead.
3. R.H. Stg. models, remove the air cleaner.
4. Remove the steering wheel. 57.60.01.
5. Remove the combined switch from the steering column. 86.65.55.
6. Where fitted, remove the steering column lock. 57.40.31.
7. On vehicles without a steering column lock, unscrew the lock ring and move aside the ignition/starter switch from the mounting bracket.
8. Remove the lower clamp bracket and rubber sleeve from the outer column.
9. Remove the upper clamp bracket and support bracket from the bulkhead.
10. Disconnect the steering drop arm and the attached longitudinal steering tube from the steering box, using 600000.
11. L.H. Stg., 2¼ litre Petrol models—disconnect the throttle linkage at the bracket attached to the steering box support bracket.
12. Remove the fixings, steering box stiffener bracket to toe box.
13. Raise the front of the vehicle and support on stands.
14. Remove the drivers' side front road wheel.

*Continued*



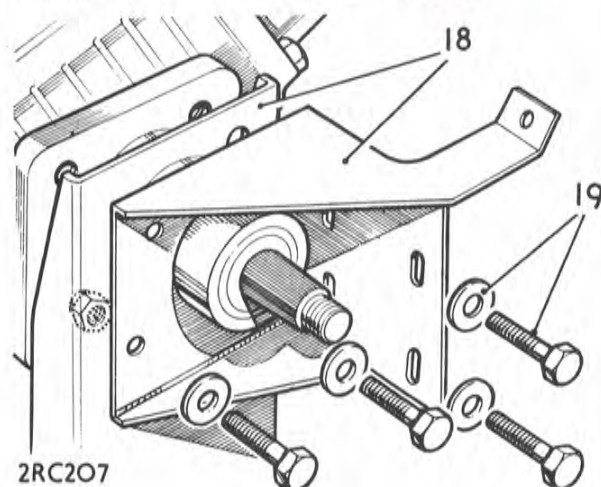
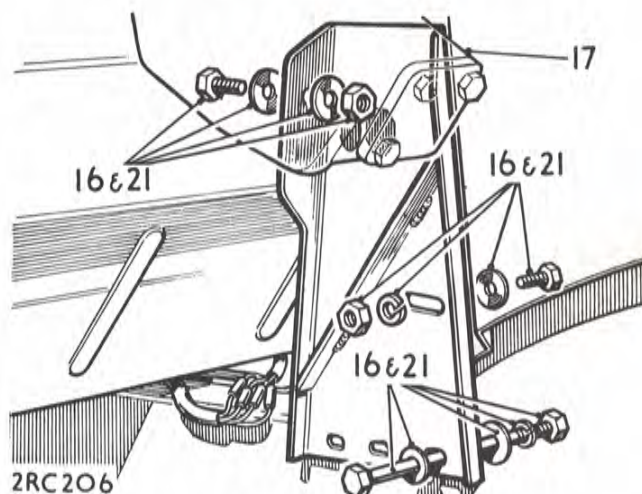
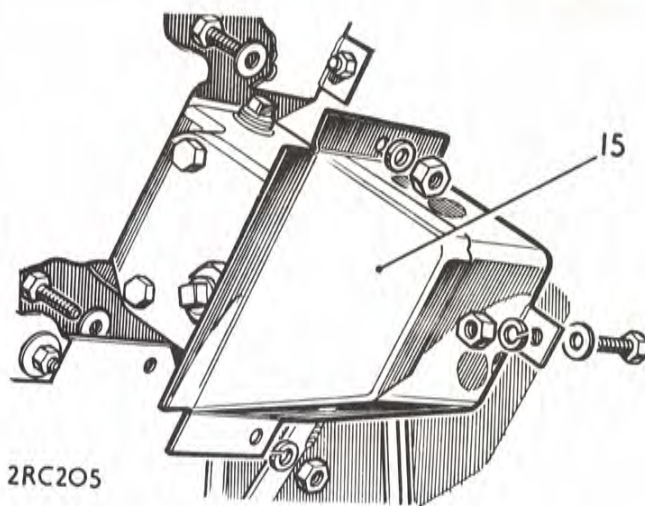
15. Remove the steering unit cover box from the wheel arch.
16. Remove the fixings, steering box support bracket to toe box, wing valance and chassis.
17. Withdraw the steering column and box assembly complete with attached brackets from beneath the front wing.
18. If required, remove the stiffener bracket and support bracket from the steering box.

**NOTE:** The steering box can be overhauled without removing the brackets.

**Refitting**

19. If removed, fit the support bracket and stiffener brackets to the steering box. Torque 7,0 to 8,5 kgf.m (50 to 60 lbf.ft.).

*Continued*



## STEERING

**NOTE:** During fitting the following items 20 to 26, refer to the appropriate illustration for LH and RH applications.

20. Locate the steering box and bracket assembly, less drop arm, in position on the vehicle.
21. Retain the support bracket to the chassis, wing valance and toe box, but do not fully tighten the fixings at this stage.
22. Retain the steering box stiffener bracket to the toe box, but do not fully tighten the fixings at this stage. If necessary, fit shim washers between the stiffener bracket and the toe box to prevent distorting the toe box or bracket.

**CAUTION:** During the next item, DO NOT strain the steering column. If necessary, adjust the steering box position, using the slotted fixing holes in the support and stiffener brackets, to obtain a snug fit between the clamp upper half and the steering column, before securing the clamp halves.

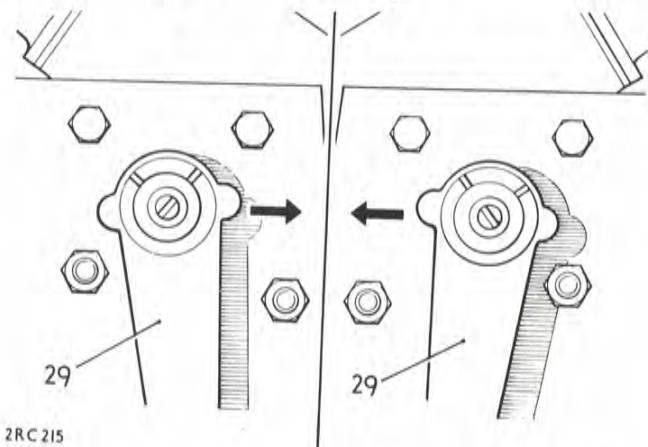
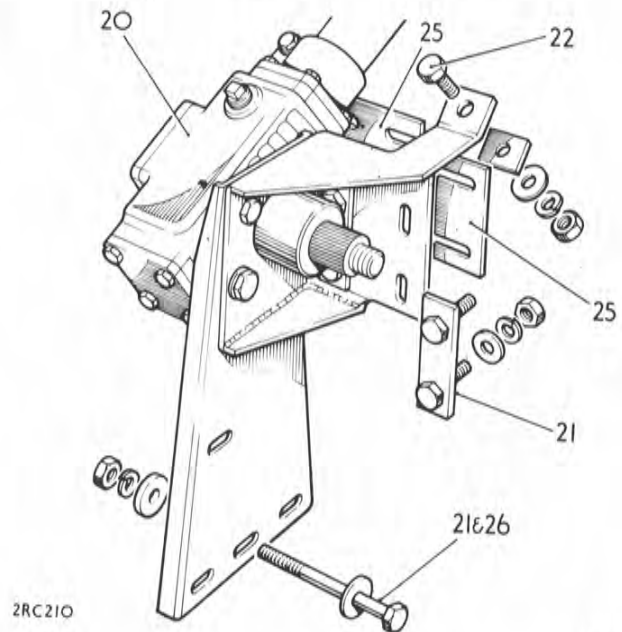
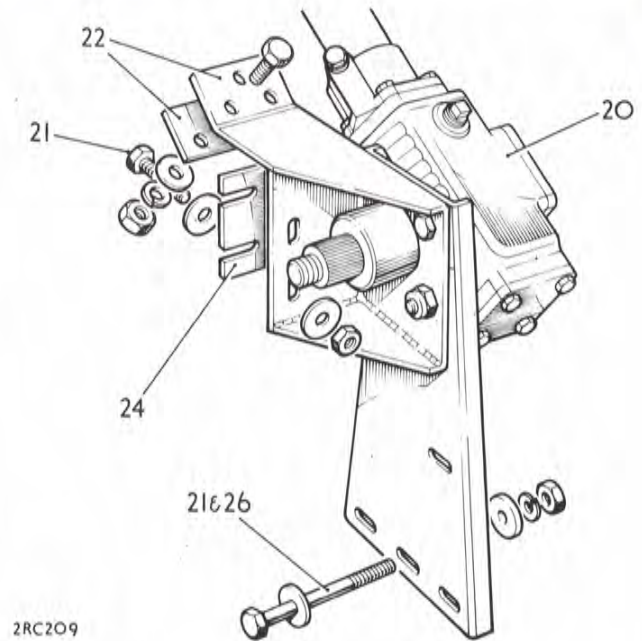
23. Reverse 8 and 9.
24. L.H. Stg. models—insert slotted packing pieces, as required, to take up clearance between the support bracket and the toe box.
25. R.H. Stg. models—insert slotted packing pieces, as required, to take up clearance between the support bracket and stiffener bracket and the toe box.
26. Secure the support bracket and stiffener bracket fixings. Torque load for support bracket to chassis fixings is 2,0 kgf.m (15 lbf.ft.).
27. Reverse 13 to 5.
28. Reverse 11 as required.
29. Fit the drop arm to the steering box, aligning the mark on the steering rocker arm with the forward mark of the two on the drop arm. (LH and RH Steering are illustrated, the arrows point toward the front of the vehicle).

**NOTE:** Where a replacement steering box and drop arm complete is being fitted, remove and discard the original drop arm from the longitudinal steering tube, using 601763, and fit the new drop arm. Torque load for ball joint fixings is 4,0 kgf.m (30 lbf.ft.).

30. Tighten the drop arm fixings to 8,5 to 11,0 kgf.m (60 to 80 lbf.ft.).
31. Reverse 1 to 7.

## DATA

Drop arm alignment with steering box



Align the mark on the steering rocker arm with the forward mark of the two on the drop arm.

STEERING COLUMN AND BOX ASSEMBLY

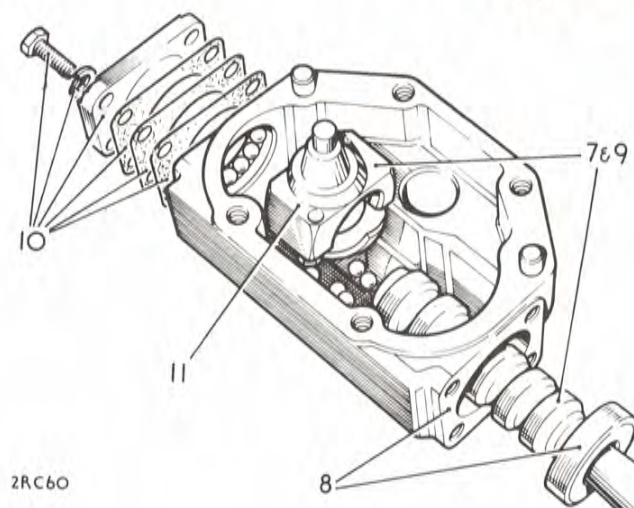
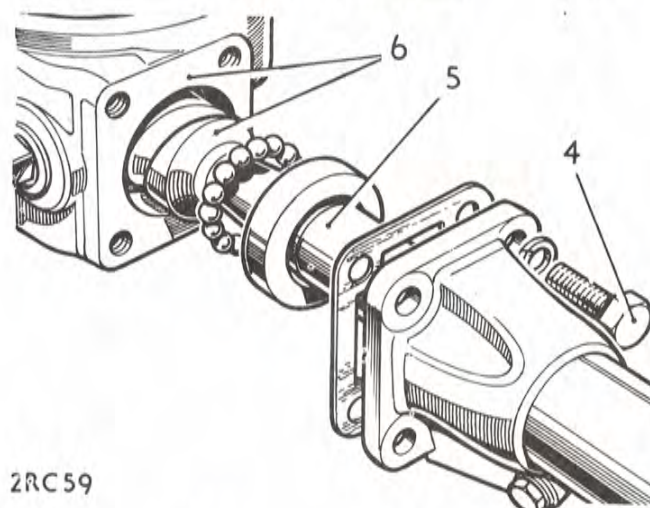
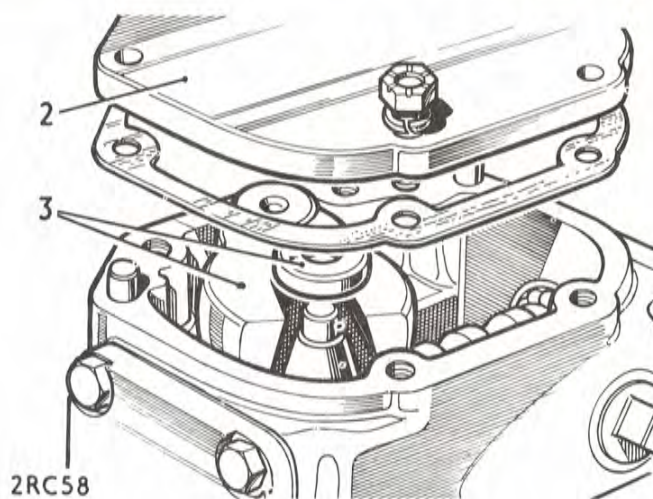
—Overhaul

57.45.07

Dismantling

1. Remove the steering column and box assembly. 57.45.01.
2. Remove the side cover and drain the oil from the steering box.
3. Lift out the roller for the main nut, and withdraw the rocker shaft.
4. Hold the outer column in a vice and remove the fixings securing the steering box.
5. Using a mallet, tap the inner column at the steering wheel end to partially remove the box.
6. Withdraw the box and inner column complete. Take care not to loose any of the steel balls from the steering box bearings.
7. Rotate the inner column to locate the main nut in the mid-way position on the worm shaft.
8. Using a mallet, gently tap the box away from the inner column sufficient to remove the upper ball race. Take care not to loose the steel balls which will be released from the bearings.
9. Wind the worm shaft through the main nut and remove the shaft, main nut and any loose steel balls.
10. Remove the end cover, shims and lower ball race.
11. Dislodge and remove the twelve 9,52mm (0.375 in.) diameter ball bearings from the main nut and re-circulating tube.

*Continued*



## STEERING

12. Remove the retaining washer and oil seal.
13. If required, press out the rocker shaft bush.
14. If required, remove the outer column top bearing.

### Inspecting

15. Examine all components for obvious signs of wear or damage.

**NOTE:** Some early models are fitted with a short outer column identified with a spot of yellow paint on the column upper end and used in conjunction with a 2,8mm (0.155 in.) thick spacer fitted between the column lower end and the steering box face.

Later columns are 2,8mm (0.155 in.) longer and measure  $587,73 \pm 0,38\text{mm}$  ( $23.139 \pm 0.015$  in.) from the column lower end face to the top face of the sleeve attached to the column.

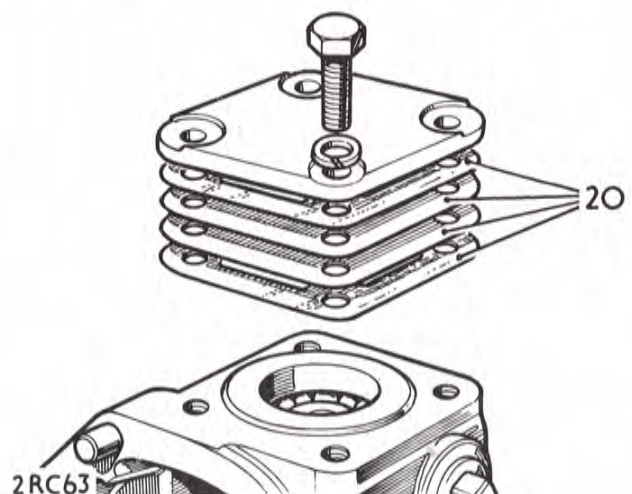
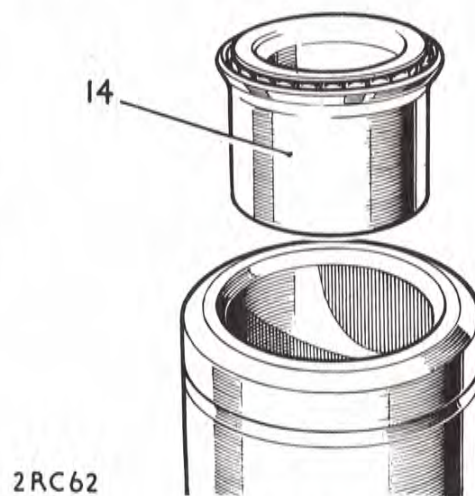
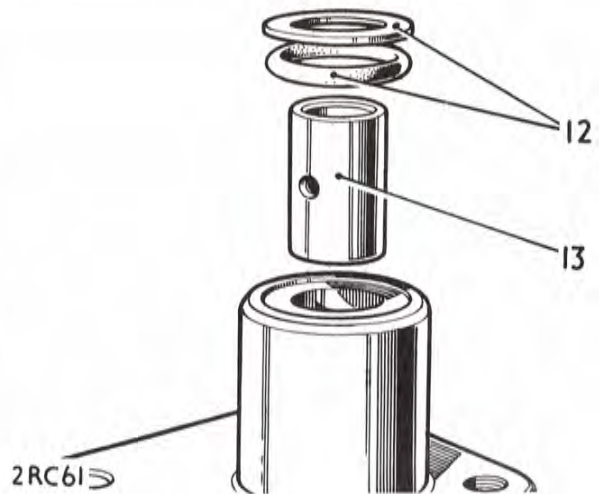
The early column and spacer may be replaced with the later column, if required, and the spacer discarded.

16. Examine the main nut ball bearing track for evidence of indentations or scaling.
17. Examine the worm shaft for similar markings. Slight indentations at the extreme end of the shaft can be disregarded as this is a normal wear condition, but if indentations have spread to the middle of the shaft, a replacement must be fitted.

### Re-assembling (refer also to 'NOTE', item 15)

18. Reverse 12 to 14, using a press as required.
19. Reverse 2 to 11, using general purpose grease to retain the ball bearings and to coat the joint washers. Coat all cover plate fixing bolt threads with 'Wellseal' or a suitable equivalent sealing compound and tighten to 2,3 to 2,8 kgf.m (17 to 20 lbf.ft.).
20. Check for end float on the inner steering column. Adjust the shim washer thickness between the end cover and the steering box to obtain a 'free-to-rotate-but-no-end-float' condition on the inner column.

*Continued*





21. Set the steering in the straight ahead position (mid-way lock-to-lock).
22. Screw the steering box adjuster by hand until there is just no end-float between the adjuster and the rocker shaft.
23. Tighten the adjuster locknut ensuring that the adjuster does not move.
24. Fill the steering box with the correct grade of lubricating oil. Division 09 refers.
25. Reverse 1.

**DATA**

Inner column end-float.

Column to be free to rotate with no end-float.

Outer column overall dimension.

Early, shorter column measuring  $584,9 \pm 0,38\text{mm}$  ( $22,99 \pm 0,015$  in.) used with 2,8mm (0.155 in.) thick spacer.  
Later, longer column measuring  $587,73 \pm 0,38\text{mm}$  ( $23,139 \pm 0,015$  in.) no spacer required.



## STEERING

### STEERING RELAY

— Remove and refit

57.50.02

#### Removing

1. Remove the name plate and withdraw the radiator grille.
2. Remove the fixings securing the upper and lower relay levers to the relay unit.
3. Prise the levers clear, avoiding damage to the oil seals.
4. Remove the fixings between the relay housing and the chassis top face.
5. Remove the relay mounting flange plate from the underside of the chassis.

**NOTE:** Before attempting to remove the relay unit, remove any equipment that is mounted directly above and would obstruct relay unit removal.

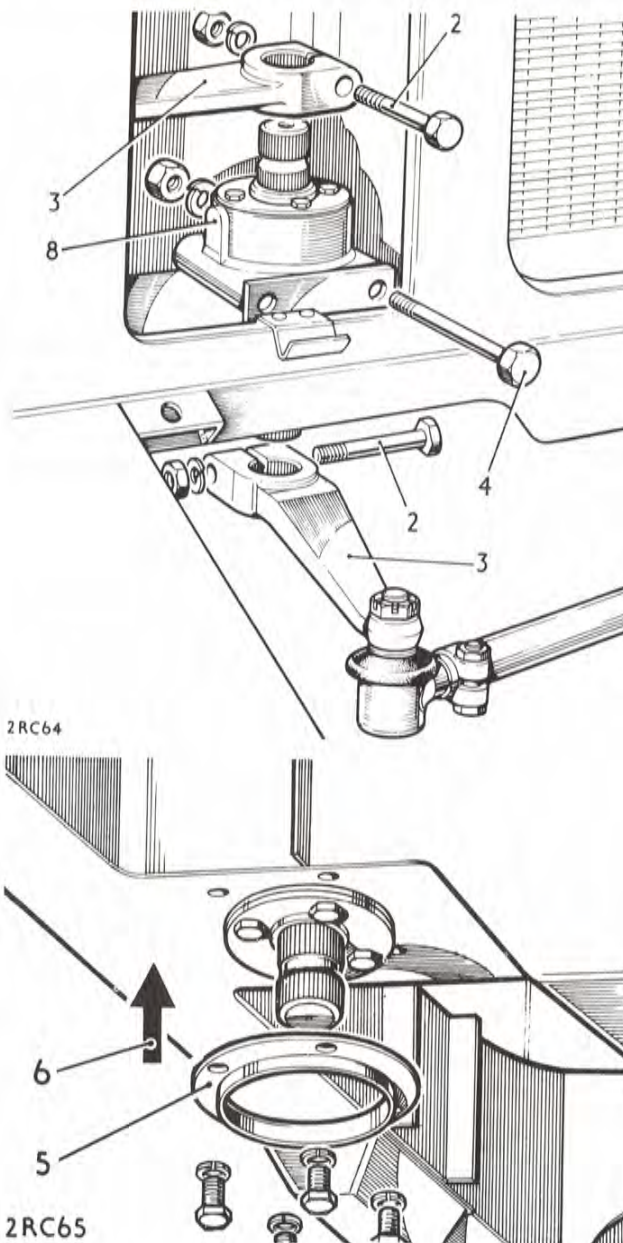
6. Using a brass drift and mallet, drive the relay unit upward to free it from the chassis. If necessary, use penetrating oil between the unit and the chassis.

#### Refitting

7. Before fitting the relay unit, ensure that it is filled with oil. Division 10 refers.
8. Reverse 4 to 6, fitting the relay unit to the chassis with the filler plug boss towards the driver's side of the vehicle. The relay unit must be a drive fit in the chassis.
9. Reverse 2 and 3, tighten the relay levers pinch bolts to 7,6 kgf.m (55 lbf.ft.). The angular relationship between the upper and lower relay levers must be within  $81^{\circ}$  to  $90^{\circ}$  when fitted.
10. Reverse 1.

#### DATA

Angular relationship between relay levers



## STEERING RELAY

-Overhaul

57.50.08

Service tool: 600536, spring compressor

## Dismantling

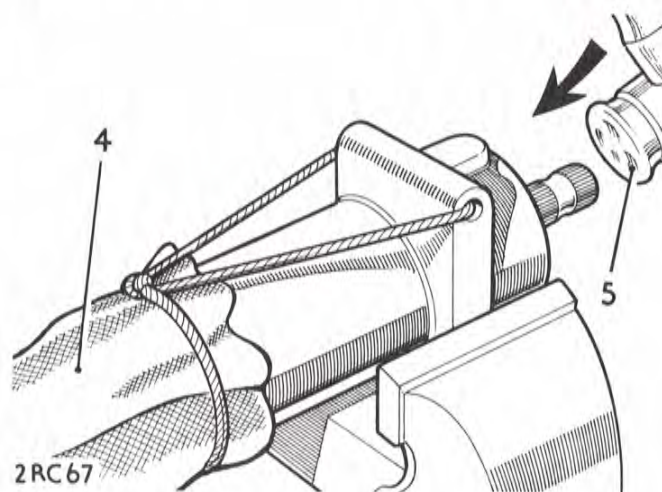
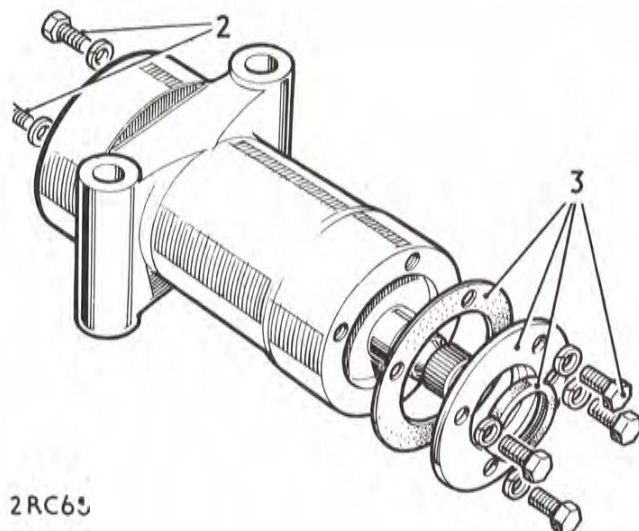
1. Remove the steering relay, 57.50.02.
2. Remove two of the fixing bolts from the relay top cover, invert the relay and allow the oil to drain.
3. Remove the bottom oil seal retainer complete with seal and joint washer.

**WARNING:** During the following procedure use extreme care, the relay housing contains a large compressed spring which is automatically released during dismantling.

4. Cover the bottom end of the shaft, using a suitable cover, secured as illustrated.
5. Using a mallet, tap out the shaft, thrust washer, spring, fibre bush and plain washer into the cover.
6. Remove the cover and lift out the relay shaft and fittings.
7. Remove the top oil seal retainer complete with seal and joint washer.

## Inspecting

8. Examine all components for obvious signs of wear or damage and fit replacements as required.
9. Check the relay shaft at the diameters which form the tracks for the oil seals. Any damage or score marks would cause failure of the oil seals, and a replacement shaft must be fitted.
10. The free length of the spring should be 184mm (7.250 in.).

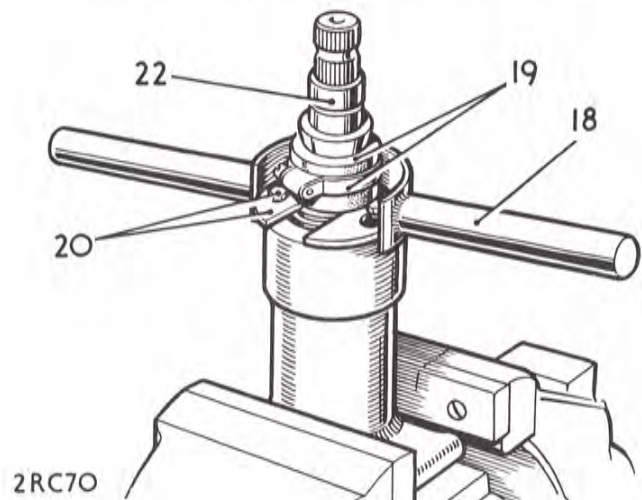
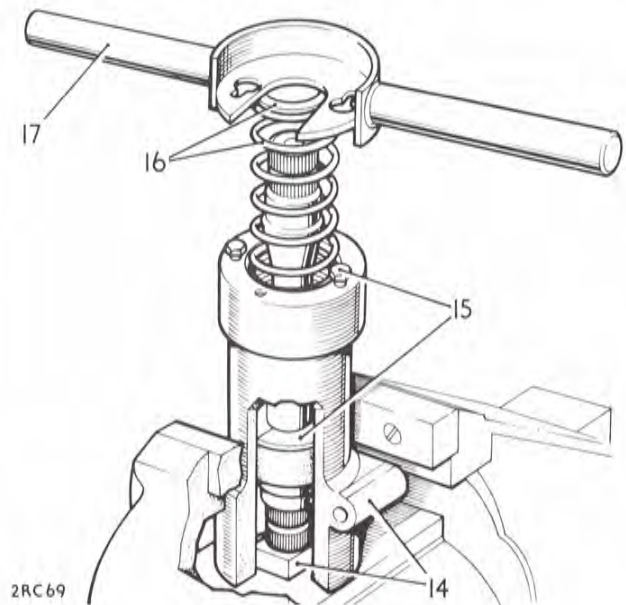
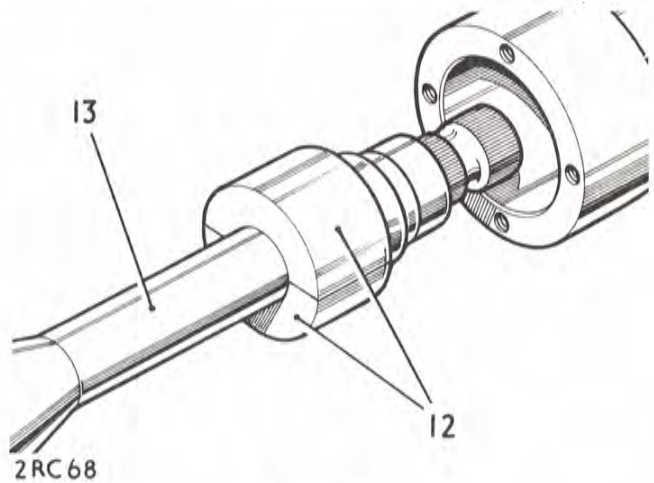
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## STEERING

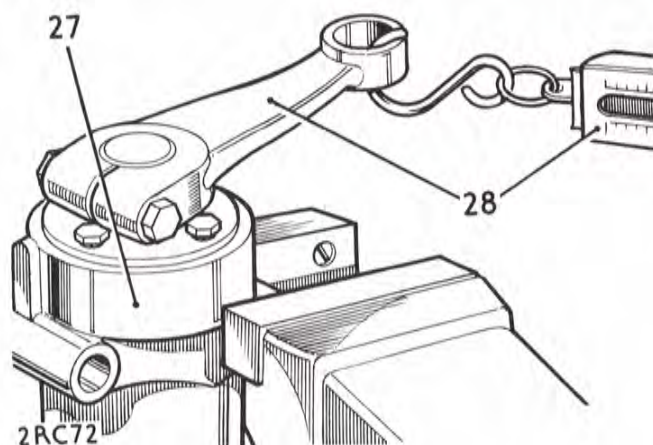
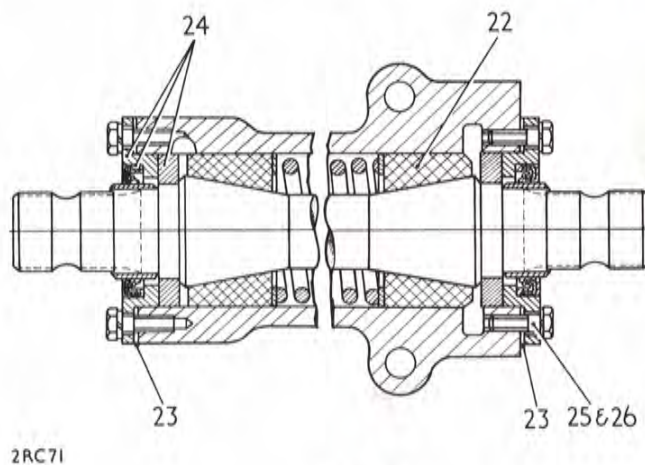
### Reassembling

11. If removed, fit the oil seals, lipped side inward, to their retainers, using jointing compound on the outside diameter of the seals.
12. Locate two halves of the split bush on the top cone of the shaft.
13. Insert the assembly of shaft and bush into the housing from the bottom.
14. Secure the housing and shaft assembly, bottom end uppermost, in a vice with a 19mm (0.750 in.) support block under the bottom end of the shaft.
15. Insert washer for spring into housing and fit two of the oil seal retainer fixing bolts into the housing diametrically opposite each other.
16. Fit the spring and washer.
17. Using service tool 600536, carefully compress the spring.
18. Turn the tool to lock in position with the keyhole slots under the heads of the bolts.
19. Locate the other split bush in position on the bottom cone of the shaft and secure with a 50mm (2 in.) hose clip.
20. Remove the service tool and the seal retainer fixing bolts.
21. Remove the assembly from the vice, gently tap shaft into position until the split bush has entered the housing for at least half its length.

*Continued*



22. Remove the hose clip and continue to tap the shaft into the housing until the bushes are correctly located in the housing.
23. Smear general purpose grease on both sides of the joint washers and fit one to each end of the housing.
24. Fit the thrust washer and oil seal retainer, complete with seal, to bottom end of the housing only. Use 'Wellseal' or suitable equivalent sealing compound on the threads of the bolt fitted to the breather hole.
25. Fill the housing with the correct grade oil, see Division 10 for the correct procedure.
26. Fit the thrust washer and oil seal retainer, complete with seal to the top of the housing, using sealing compound on the threads of the four securing bolts.
27. Hold the relay unit in a vice.
28. Temporarily attach the **upper** relay lever and use a suitable spring balance to check resistance to rotation of the relay shaft. The resistance, measured on the spring balance, must not be less than 5,4 kg. (12 lb.) and should not exceed 7,3 kg. (16 lb.).  
If the resistance is less than 5,4 kg. (12 lb.), fit a new replacement spring.  
If the resistance is excessive, remove the oil seal retainers and thrust washers, then use a suitable piece of tube to push each split bush in turn, clear of its cone and inject lubricating oil. Re-assemble and recheck.
29. Reverse 1.



**DATA**

Relay spring free length  
Resistance to rotation, relay shaft

184mm (7.250 in.)  
5,4 to 7,3 kg. (12 to 16 lb.) measured using a spring balance



## STEERING

### TRACK ROD BALL JOINTS

—Remove and refit, items 6 to 9 57.55.08

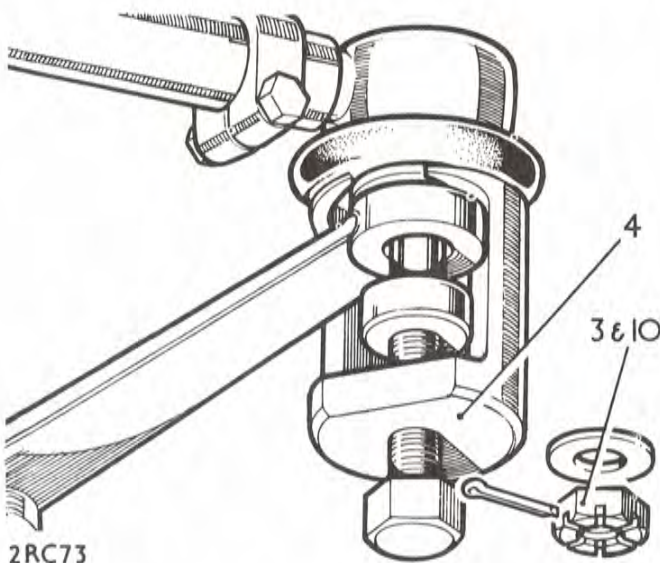
### TRACK ROD

—Remove and refit, items 1 to 5 and 10 to 14 57.55.09

Service tool: 601763, Ball joint extractor

#### Removing, track rod

1. Jack up the vehicle front end and support on stands.
2. Remove the front road wheels.
3. Remove the fixings from both ball joints.
4. Extract the ball joints, using 601763.
5. Withdraw the track rod and ball joints.

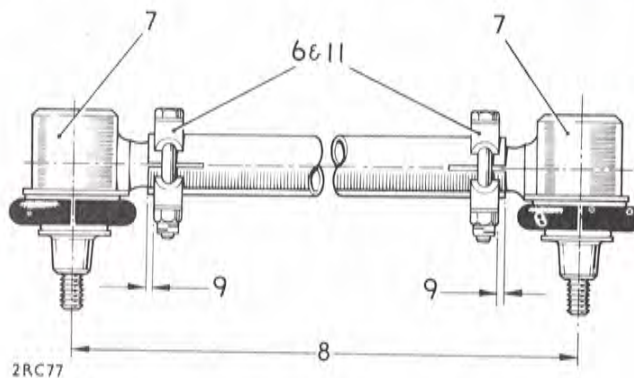


#### Removing, ball joints

6. Slacken the ball joints clamp fixings.
7. Unscrew the ball joints, L.H. and R.H. thread.

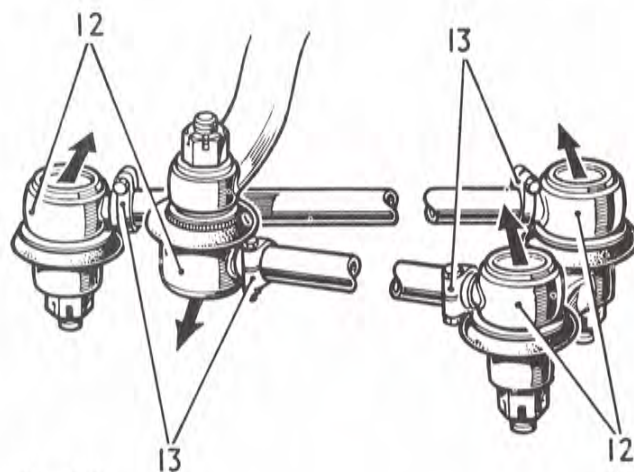
#### Refitting, ball joints

8. Screw in the ball joints equally until the overall dimension between the ball joint centres is 1030,3 to 1033,4mm (45.56 to 45.68 in.).
9. Position the ball joint clamps 1,58 to 3,17mm (0.062 to 0.125 in.) from the track rod ends with the clamp jaws situated over the slot in the tube; do not tighten the fixings at this stage.



#### Refitting, track rod

10. Reverse 3 to 5. Torque for ball joint fixings 4,0 kgf.m (30 lbf.ft.).
11. Check and if necessary adjust the wheel alignment, 57.65.01, leaving the clamp fixings slackened.
12. Lightly tap the ball joint cups in the directions illustrated to the maximum of their travel to ensure full, unrestricted movement of the track rod.
13. Tighten the ball joint clamps. Torque load 1,1 to 1,5 kgf.m. (8,5 to 10,5 lbf.ft.).
14. Reverse 1 and 2.



## DATA

Initial setting dimension for track rod and ball joints

1030,3 to 1033,4mm (45.56 to 45.68 in.) measured between ball joint centres.

Position of ball joint clamps

1,58 to 3,17mm (0.062 to 0.125 in.) from track rod ends

## LONGITUDINAL STEERING TUBE BALL JOINTS

– Remove and refit, items 9 to 12 57.55.12

## LONGITUDINAL STEERING TUBE

– Remove and refit, items 1 to 8 and 13 to 19 57.55.13

Service tool: 601763, Ball joint extractor

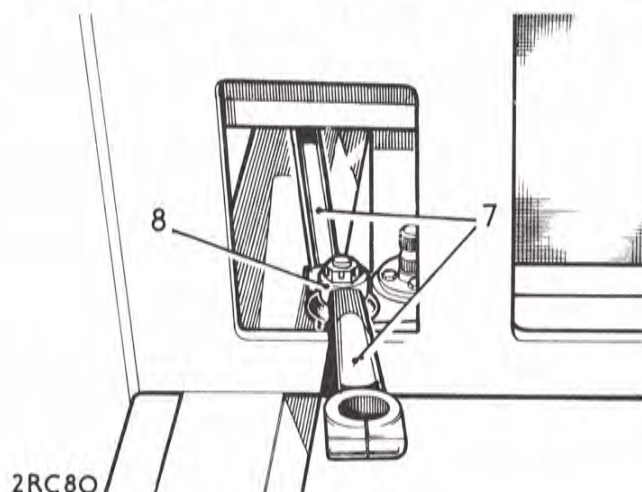
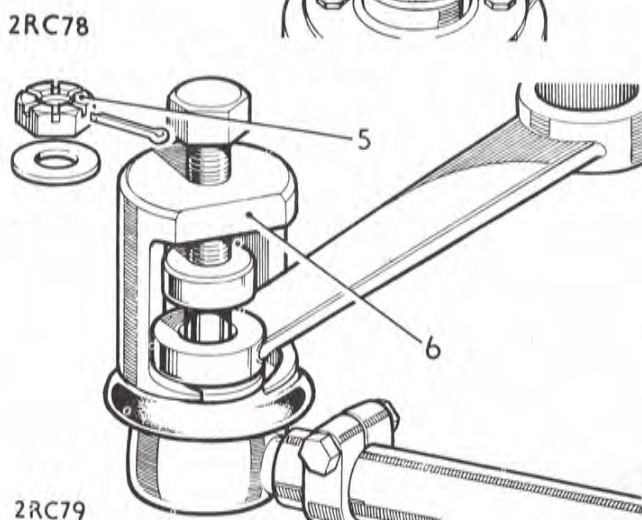
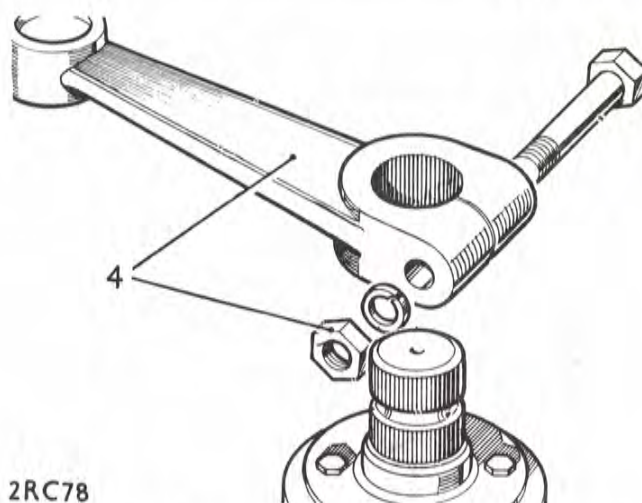
## Removing

1. Remove the bonnet panel.
2. If required for access, remove the air cleaner.
3. Remove the name plate and withdraw the radiator grille.
4. Remove the fixings securing the upper relay lever to the relay unit and prise the lever clear.
5. Remove the fixings from the ball joint connecting the longitudinal arm to the steering box drop arm.
6. Using service tool 601763 extract the ball joint from the steering box drop arm.

**NOTE:** LHStg models—It may be necessary to remove the exhaust manifold to provide access for the ball joint extractor.

7. Manoeuvre the end of the upper relay lever through the aperture in the grille panel, then moving the steering box drop arm fully forward, carefully withdraw the upper relay lever and longitudinal arm assembly.
8. Remove the fixings and extract the ball joint from the upper relay lever, using 601763.

*Continued*



## STEERING

### Removing ball joints

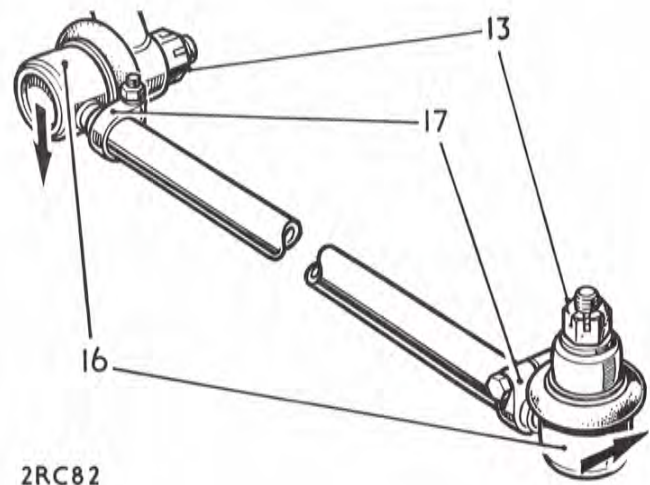
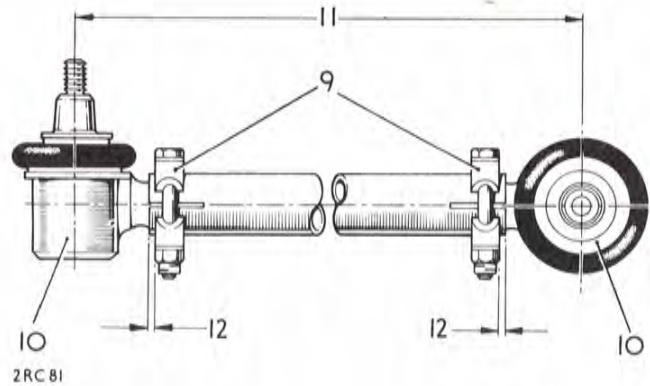
9. Slacken the ball joint clamp fixings.
10. Unscrew the ball joints, LH and RH thread.

### Refitting ball joints

11. Screw in the ball joints equally until the overall dimension between ball joint centres is 621,4 to 624,6mm (24.46 to 24.59 in.).
12. Position the clamps 1,58 to 3,17mm (0.062 to 0.125 in.) from the longitudinal tube ends with the clamp jaws situated over the slot in the tube; do not tighten the clamp fixings at this stage.

### Refitting the longitudinal tube

13. Reverse 5 to 8. Torque load for ball joint fixings is 4,0 kgf.m (30 lbf.ft.).
14. Place the front wheels in the straight ahead position and the steering wheel in the intermediate position, then connect the upper relay lever to the relay unit, the longitudinal arm may require adjusting slightly to align the splines of the relay lever and unit.
15. Tighten the lever pinch bolt. Torque 7,6 kgf.m (55 lbf.ft.).
16. Using a mallet, lightly tap the ball joint cups in the direction indicated to the maximum of their travel, to ensure full unrestricted movement of the longitudinal arm.
17. Secure both ball joint clamps. Torque load 1,1 to 1,5 kgf.m (8.5 to 10.5 lbf.ft.).
18. Check the steering lock stops setting. 57.65.03.
19. Check the steering, lock-to-lock, for correct functioning. If necessary, adjust the overall length of the longitudinal arm by slackening the ball joint clamps and screwing the arm in or out, as required, then re-secure the clamps.



### DATA

Initial setting dimension for longitudinal tube and ball joints

621,4 to 624,6mm (24.46 to 24.59 in.) measured between ball joint centres.

Position of ball joint clamps

1,58 to 3,17 mm (0.062 to 0.125 in.) from tube ends.



**DRAG LINK BALL JOINTS**

–Remove and refit, items 6 to 9 57.55.16

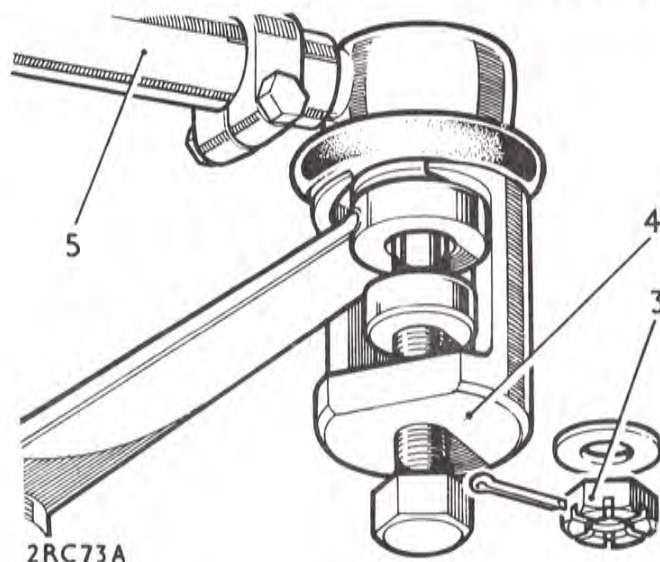
**DRAG LINK**

–Remove and refit, items 1 to 5 and 10 to 13 57.55.17

Service tool 601763, Ball joint extractor

**Removing, drag link**

1. Jack up the vehicle front end.
2. Remove the front road wheel from the side where the drag link is connected to the swivel pin steering lever.
3. Remove both of the ball joints fixings.
4. Extract the ball joints, using 601763.
5. Withdraw the drag link and ball joints.

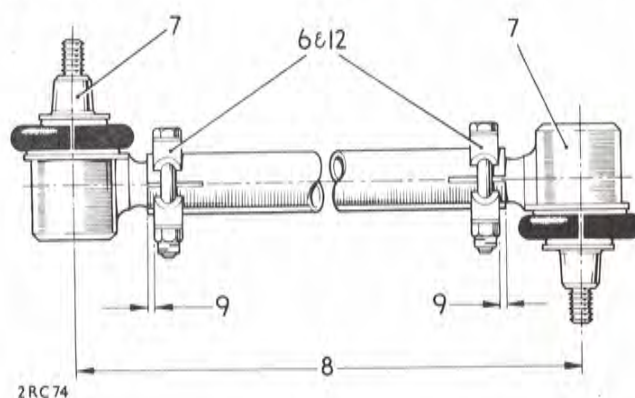


**Ball joints, removing**

6. Slacken the clamp fixings.
7. Unscrew the ball joints, LH and RH thread.

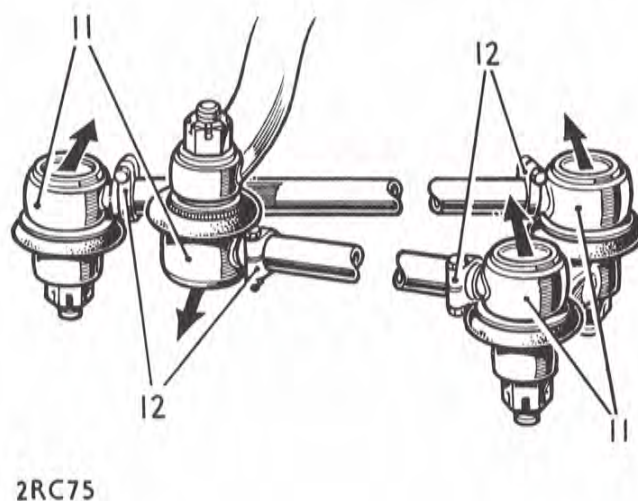
**Ball joints, refitting**

8. Screw in the ball joints equally until the overall dimension between ball joint centres is 782,62 to 785,79mm (30.812 to 30.937 in.).
9. Position the clamps 1,58 to 3,17mm (0.062 to 0.125 in.) from the drag link ends with the clamp jaws situated over the slot in the tube; the relay lever ball joint is in the pendant position when fitted. Do not tighten the clamp fixings at this stage.



**Refitting, drag link**

10. Reverse 3 to 5. Torque for ball joint fixings 4,0 kgf.m (30 lbf.ft.).
11. If the clamps were previously slackened, lightly tap the ball joint cups in the direction indicated to the maximum of their travel, to ensure full unrestricted movement of the drag link using a mallet.
12. Tighten the ball joint clamps. Torque load 1,1 to 1,5 kgf.m (8.5 to 10.5 lbf.ft.).
13. Reverse 1 and 2.



**DATA**

Initial setting dimension for drag link and ball joints

782,62 to 785,79mm (30.812 to 30.937 in.) measured between ball joint centres.

Position of ball joint clamps

1,58 to 3,17mm (0.062 to 0.125 in.) from drag link ends



## STEERING

### STEERING BALL JOINTS

—Clean, inspect and regrease

57.55.24

#### General

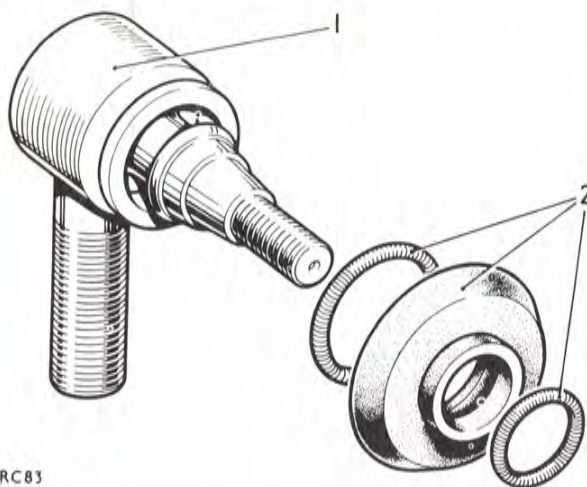
The steering ball joints have been designed in such a way as to retain the initial filling of grease for the normal life of the ball joint; however, this applies only if the rubber boot remains in position on the joint. The rubber boots should be checked at the maintenance intervals specified in Division 10 to ensure that they have not become dislodged or the joint damaged. Should any of the rubber boots be dislodged, proceed as follows:

#### Procedure

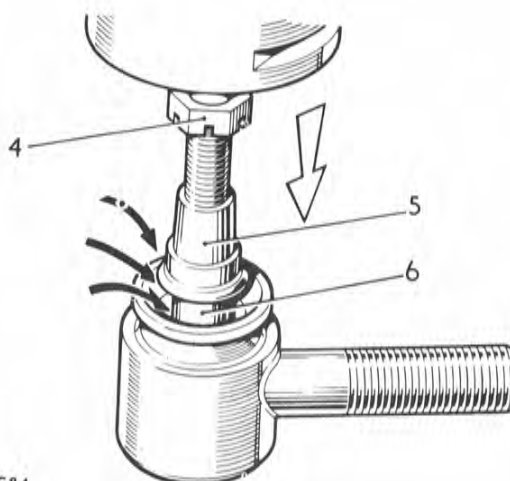
1. Remove the ball joints from the longitudinal arm, track rod and drag link, as required. 57.55.12, 57.55.08, 57.55.16.

**NOTE:** If only one ball joint requires attention, it is only necessary to disconnect the applicable end of the steering arm.

2. Remove the rubber cover and spring rings.
3. Thoroughly clean all parts.
4. Place the castle nut upside down on the pin and screw on a few threads.
5. Place the ball joint under a press or between the jaws of a vice and carefully force the pin and ball down against the spring. In this position the interior of the ball joint can be cleaned and lubricated.
6. Apply grease around the taper, and fill the replacement rubber boot.
7. Reassemble, using replacement spring rings.
8. Reverse 1.
9. If necessary, check and adjust the wheel alignment. 57.65.01.



2RC83



2RC84

## STEERING WHEEL

-Remove and refit

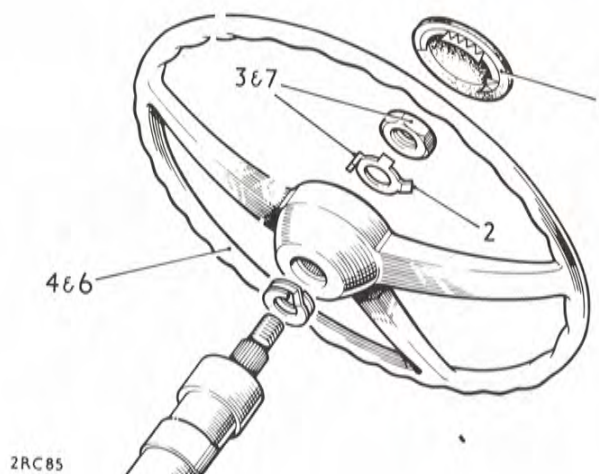
57.60.01

## Removing

1. Prise off the wheel centre cover.
2. Release the locking tab.
3. Remove the tab washer and fixing nut.
4. Withdraw the steering wheel.

## Refitting

5. Position the road wheels in the straight ahead position.
6. Fit the steering wheel with the centre spoke pointing downwards.
7. Reverse 1 to 3. Torque load for steering wheel securing nut is 5,4 kgf.m (40 lbf.ft.).



# STEERING

## FRONT WHEEL ALIGNMENT

—Check and adjust

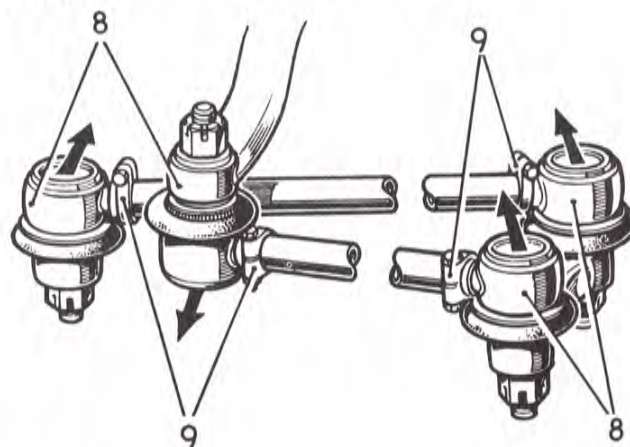
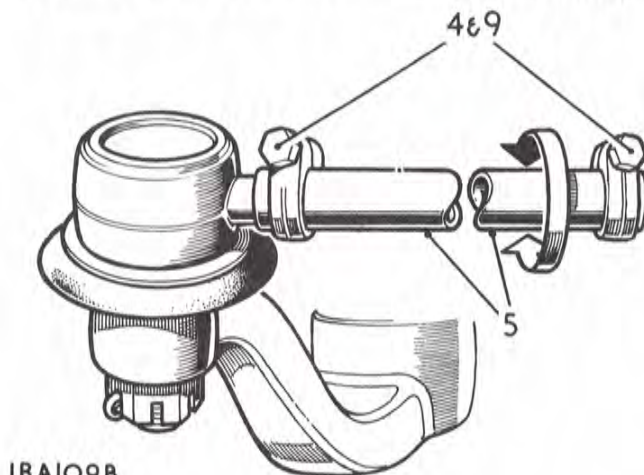
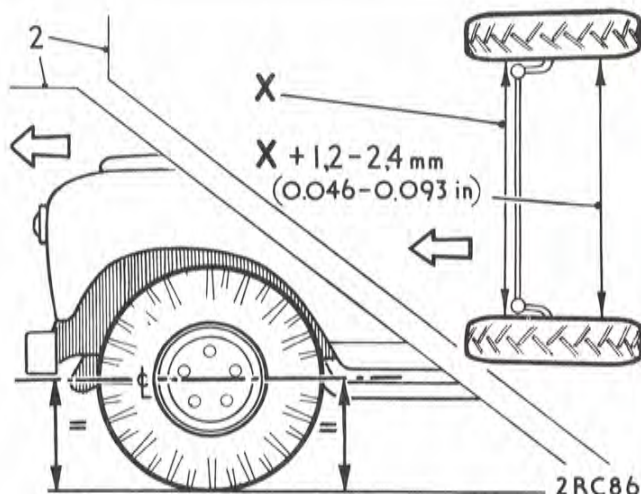
57.65.01

### Checking

1. Set the vehicle on level ground with the road wheels in the straight ahead position, and push it forward a short distance.
2. Measure the toe-in with the aid of a tracking stick or suitable proprietary equipment; it should be 1,2mm to 2,4mm (0.046 to 0.093 in.) measured at the horizontal centre-line of the road wheels.
3. If necessary, adjust the toe in as follows:

### Adjusting

4. Slacken the clamps securing the ball joints at each end of the track rod.
5. Turn the track rod to decrease or increase its effective length as necessary, until the toe in is correct.
6. Push the vehicle rearwards turning the steering wheel from side to side to settle the ball joints. Then, with the road wheels in the straight ahead position, push the vehicle forward a short distance.
7. Recheck the toe in. If necessary carry out further adjustment.
8. When the toe in is correct, lightly tap the track rod ball joints in the direction indicated to the maximum of their travel, to ensure full unrestricted movement of the track rod.
9. Secure the ball joint clamps. Torque load 1,1 to 1,5 kgf.m (8.5 to 10.5 lbf.ft.).



## DATA

Front wheel toe-in

1,2 to 2,4mm (0.046 to 0.093 in.) measured at the horizontal centre line of the road wheels.



**STEERING GEOMETRY**

–Check

57.65.02

**General**

No adjustment is provided for castor, camber or swivel pin inclination; 57.65.01 refers for wheel alignment setting.

**DATA** – vehicle in static unladen condition with coolant, oils and 22,7 litres (5 gallons UK) of fuel; tyres at recommended pressures.

Wheel castor angle

3°

Wheel camber angle

1°30'

Swivel pin inclination

7°

Front wheel toe-in

1,2 to 2,4mm (0.046 to 0.093 in.)

**LOCK STOPS**

–Check and adjust

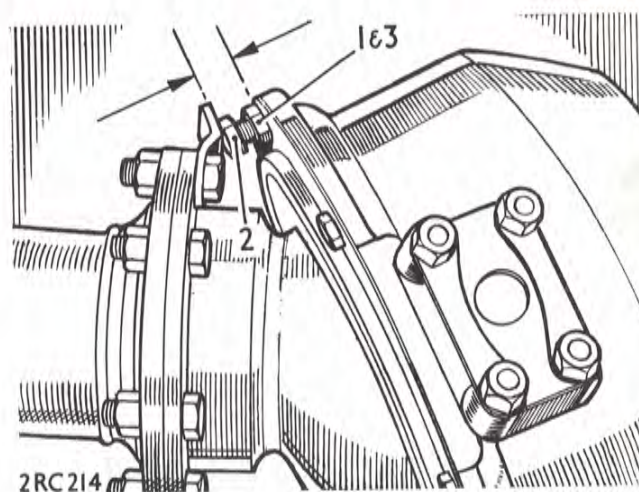
57.65.03

**Procedure**

1. Slacken the locknuts.
2. Adjust the stop bolts to obtain 12,5mm (0.500 in.) between the bolt head top face and the oil seal retainer face.
3. Tighten the locknuts.
4. Check the steering at full lock and ensure clearance between the tyres and chassis components.

**DATA**

Lock stop setting



12,5mm (0.500 in.) from bolt top face to oil seal retainer.





## SWIVEL PIN HOUSING ASSEMBLY

- Remove and refit

60.15.20

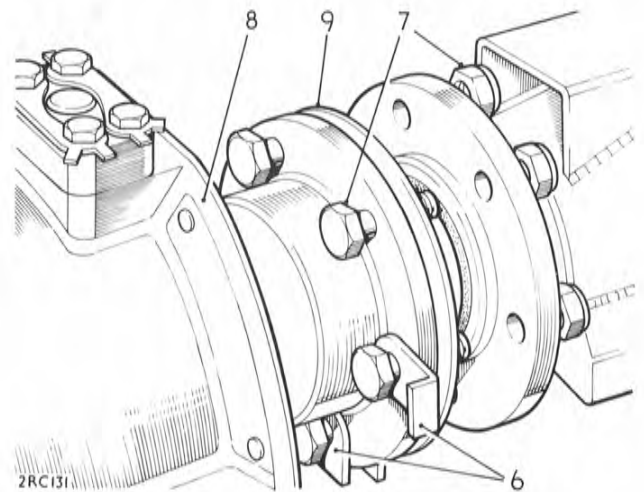
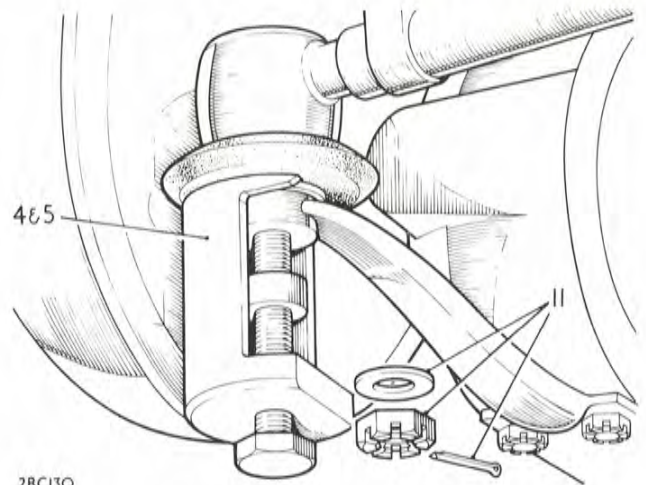
Service tool: 601763, Ball joint extractor

## Removing

1. Remove the front hub assembly. 60.25.01.
2. Remove the hub stub axle. 60.25.22.
3. Withdraw the axle half shaft complete.
4. Disconnect the track rod at the ball joint, using 601763.
5. If required, disconnect the drag link at the ball joint, using 601763.
6. Note the fitted position of the steering lock stop plate and, on the RH side only, the jack location stop plate.
7. Remove the fixings, swivel pin housing to axle case.
8. Withdraw the swivel pin housing.
9. Withdraw the joint washer.

## Refitting

10. Reverse 6 and 7.
11. Reverse 4 and 5. Torque load 4,0 kgf.m (30 lbf.ft.).
12. Reverse 1 to 3.



## FRONT SUSPENSION

### SWIVEL PIN HOUSING ASSEMBLY

—Overhaul

60.15.23

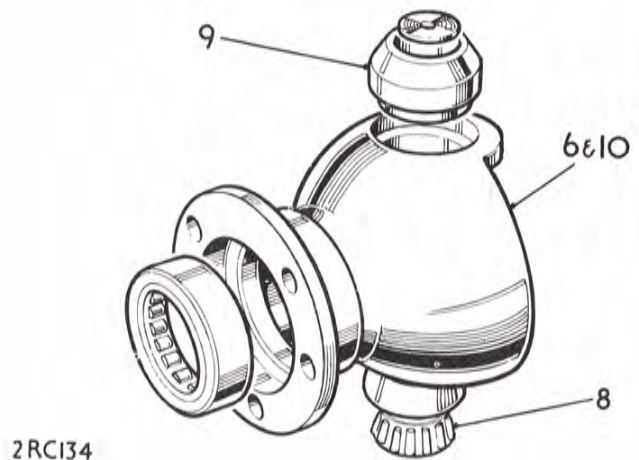
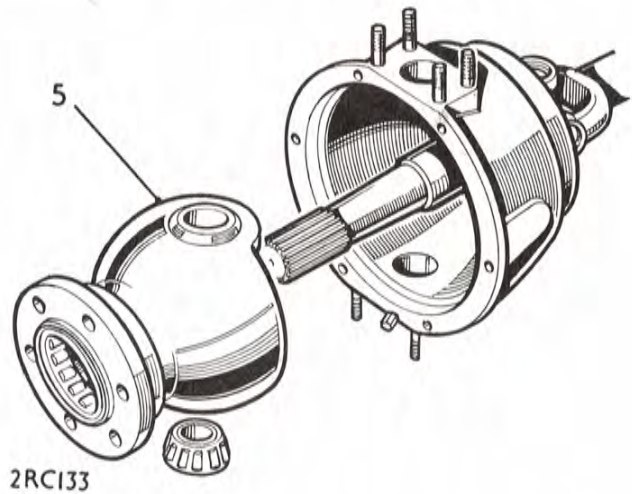
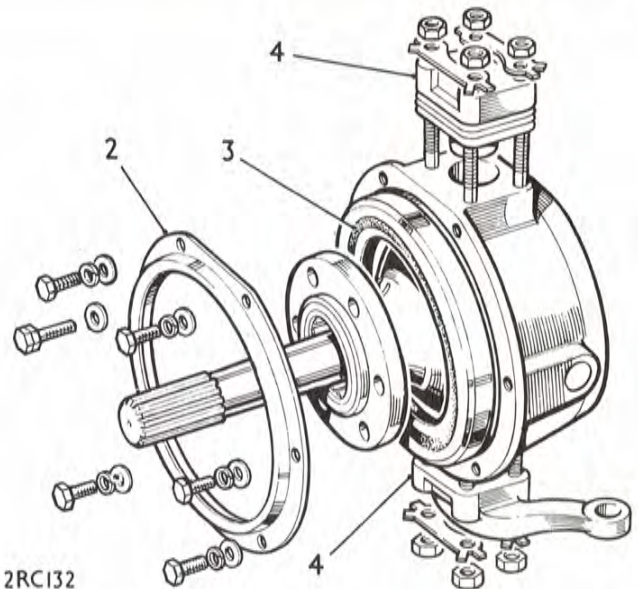
#### Dismantling

1. Carry out items 1 to 9 of operation 54.10.01 to separate the hub assembly, half shaft and swivel pin housing complete from the axle case.
2. Remove the oil seal retainer.
3. Prise out the bearing housing oil seal.
4. Remove the upper and lower swivels.
5. Withdraw the bearing housing and bearings.
6. Press the bush and bearings from the swivel pin bearing housing, as required.

#### Inspecting

7. Examine all components for obvious wear or damage.
8. The taper roller bearing must be a light push fit on the bottom swivel pin, if a new bearing is a loose fit, the swivel pin assembly must be renewed.
9. The Railko bush must be a light push fit on the top swivel pin, if a new bush is a loose fit, the swivel pin assembly must be renewed. It is important to note that these bushes and thrust washers should not be washed in any type of cleaning fluid, otherwise there is a danger that the damping characteristics of the material will be adversely affected.
10. Examine the surface of the swivel pin bearing housing for signs of corrosion or damage; replace the housing if necessary.

*Continued*

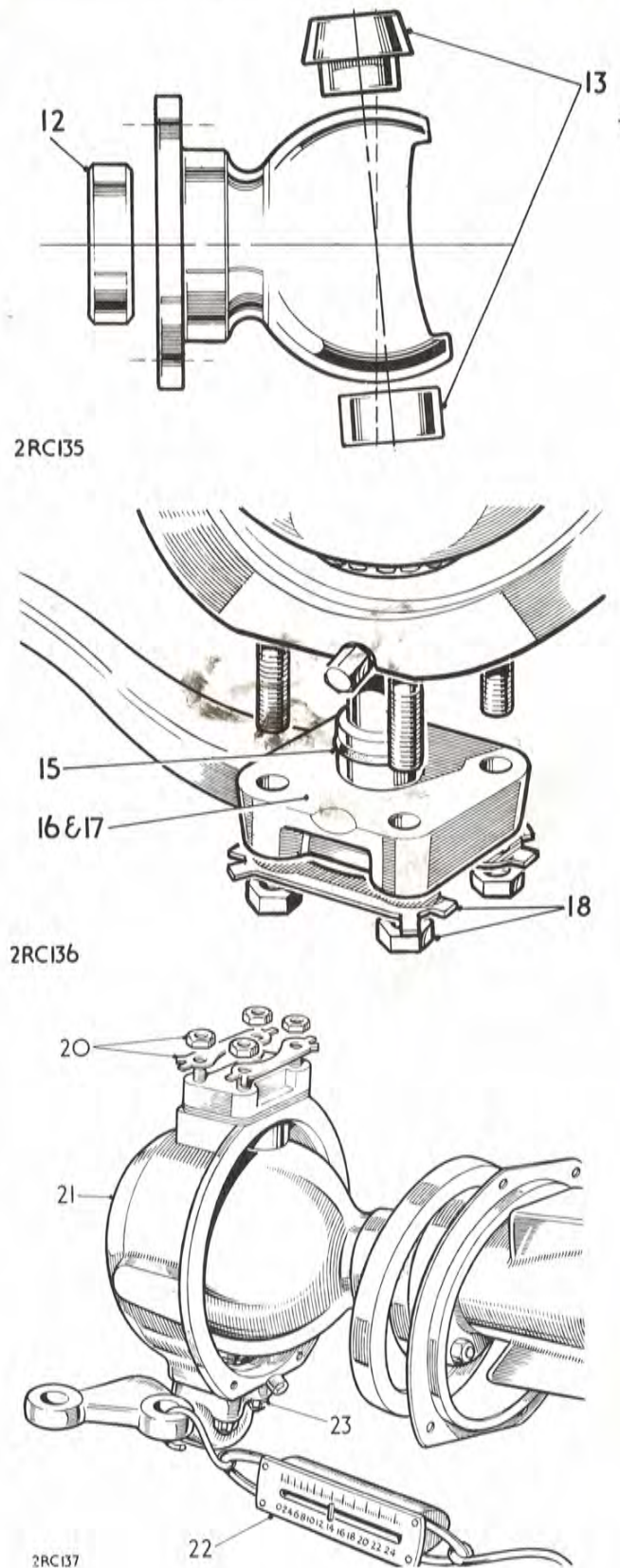




## Reassembling

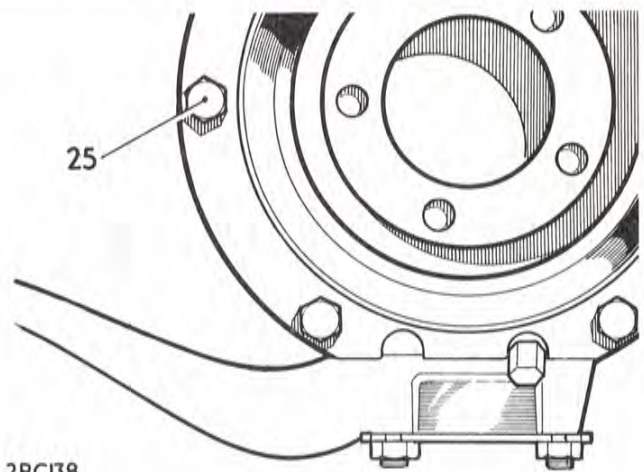
11. Using the same oil as recommended for the swivel pin housing (see Division 09) thoroughly lubricate the internal diameter of the Railko bush.
12. Press the roller bearing for the axle half shaft into the swivel pin bearing housing.
13. Press the Railko bush into the top of the bearing housing, and the taper bearing outer race, wide edge first, into the bottom of the housing. Take care to correctly identify the bush and bearing locations, noting that the top of the housing is narrower, as illustrated.
14. Place the taper roller bearing in position in the bottom of the swivel pin bearing housing, and locate the bearing housing into the swivel pin housing.
15. Fit a rubber 'O' ring to the steering lever and swivel pin assembly.
16. Smear the mating surfaces of the swivel pin and housing with jointing compound.
17. Fit the steering lever (using new replacement nuts) ensuring that it faces forward (away from the oil filler/level plug).
18. Secure the fixings, torque load 7,0 kgf.m (50 lbf.ft.) and engage the lock plates.
19. Fit the swivel pin and bracket assembly to the top of the swivel pin housing, fitting the shims removed during dismantling to the value of 1,0mm (0.040 in.)
20. Tighten the fixings bolts evenly and securely, but do not engage the lock plates at this stage.
21. Hold the swivel pin bearing housing by clamping the flange in a vice fitted with soft jaws, or temporarily fit the swivel pin housing to the axle case.
22. Using a spring balance attached to the steering lever at the track rod connecting eye, measure the resistance to rotation of the swivel pin housing, which must be 5,4 kg. to 6,3 kg. (12 lb. to 14 lb.) after having overcome inertia. Adjust as necessary by adding or subtracting shims under the swivel pin bracket until the correct resistance figure is obtained.
23. Engage the lockplates at the swivel pin fixing nuts.

*Continued*



## FRONT SUSPENSION

24. Pack the swivel pin housing oil seal with heavy grease.
25. Fit the seal and its retainer to the swivel pin housing, locating the steering stop adjustment bolt in the forwardmost hole.
26. Check that the oil seal wipes the full surface of the bearing housing and adjust the position, if necessary, by slackening off the retainer bolts and resetting the seal.
27. Reverse 1.



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5,4 to 6,3 kg. (12 to 14 lb.)

### DATA

Swivel pin housing resistance to rotation

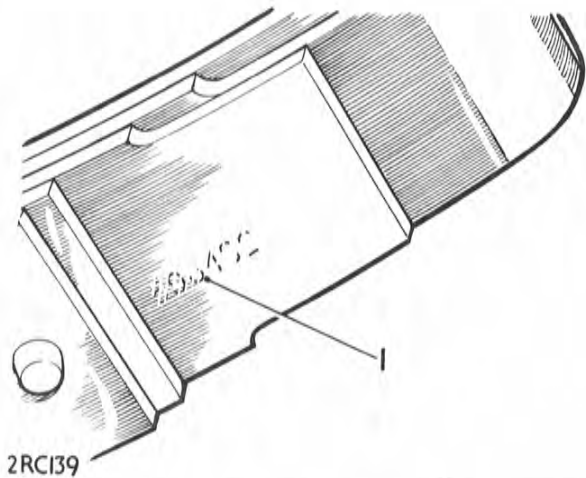
### FRONT ROAD SPRING

—Remove and refit

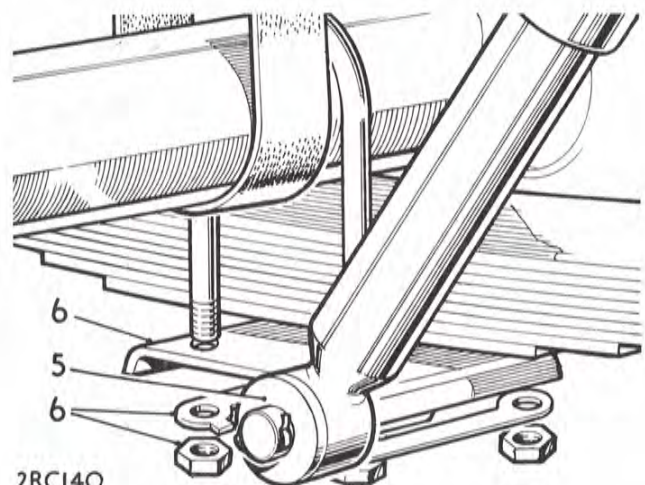
60.20.01

#### Removing

1. The driver side and passenger side road springs are not interchangeable, the free camber of the driver's side spring being greater to compensate for the extra weight (driver, etc.) carried on that side of the vehicle. Springs are identified with the part number which is marked on the top face and on the under face of one of the leaves.
2. Jack up the vehicle and support on stands.
3. Remove the road wheel.
4. Support the axle with a jack.
5. Disconnect the shock absorber at the lower fixings.
6. Remove the fixings and withdraw the spring support plate.



2RC139



2RC140

*Continued*

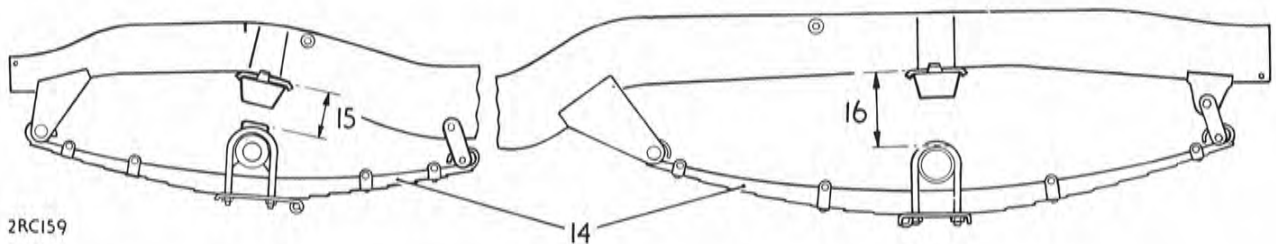
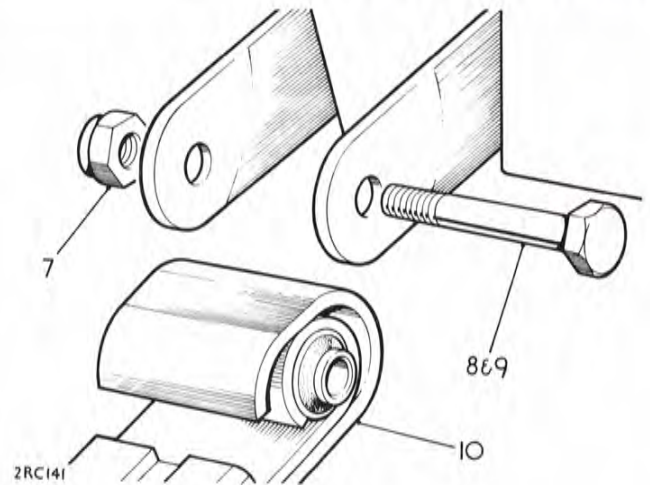
7. Remove the self-locking nut from the shackle pin in each spring eye.
8. Remove the shackle pin from the rear end of the spring, the pin is threaded into the inner shackle plate.
9. Remove the shackle pin from the front end of the spring.
10. Remove the road spring complete.

**Refitting**

11. Slacken the shackle pin securing the shackle plates to the chassis.
12. Reverse 6 to 10; do not tighten the shackle pins and locking nuts at this stage.

**Spring setting procedure**

13. In the following procedure, the spring shackles are tightened onto the shackle bushes whilst in their approximate working positions, thus minimising the torque load on the shackle bush rubbers when the vehicle weight is taken on the springs and so prolonging the bush working life.
14. Deflect the spring toward the chassis, using a suitable chain and lever, until the following dimensions (measured as illustrated) are obtained; items 15 and 16.
15. Front springs:  
88 in models – 89mm (3.50 in.).  
109 in models – 95mm (3.75 in.).
16. Rear springs:  
88 in models – 127mm (5.00 in.).  
109 in models – 151mm (6.00 in.).
17. With the springs held in position, tighten first the shackle pin then the locknut. Torque 9,6 kgf.m (70 lbf. ft.).
18. Reverse 2 to 5.
19. Check the vehicle trim height. 60.45.01.



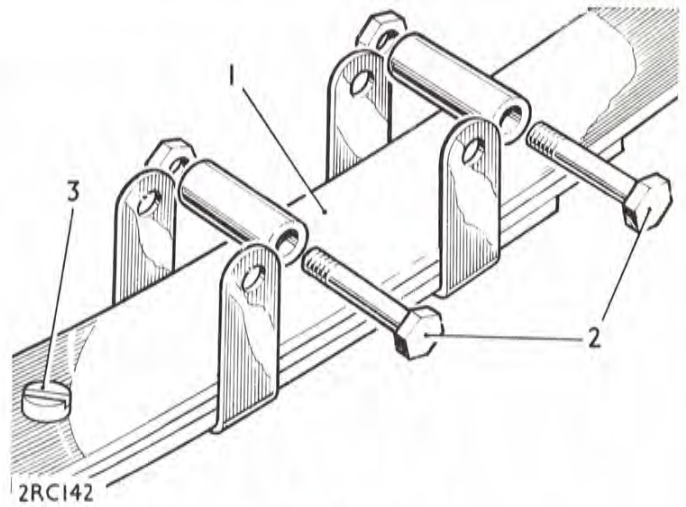
FRONT ROAD SPRING

—Overhaul

60.20.07

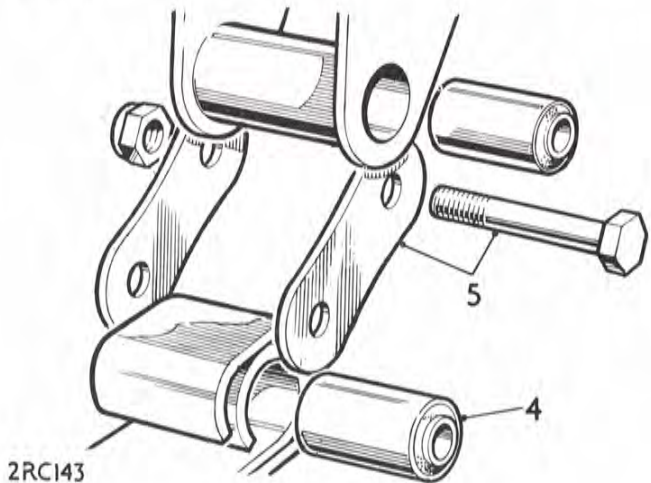
Dismantling

1. Remove the road spring. 60.20.01
2. Remove the fixings from the leaf clips, which may be bolts and nuts, and/or long screws threaded into the leaf clips.
3. Remove the centre bolt and nut to release the spring leaves.
4. Press out the bushes from each end of the spring.
5. Remove the fixings and withdraw the shackle plates from the chassis frame.
6. If necessary, remove the shackle bush from the chassis frame bracket with the aid of a tubular drift or suitable extractor; if the bush disintegrates, leaving the outer casing in the chassis frame bracket, it should be carefully sawn through with a hack-saw to facilitate removal. DO NOT saw the chassis bracket.



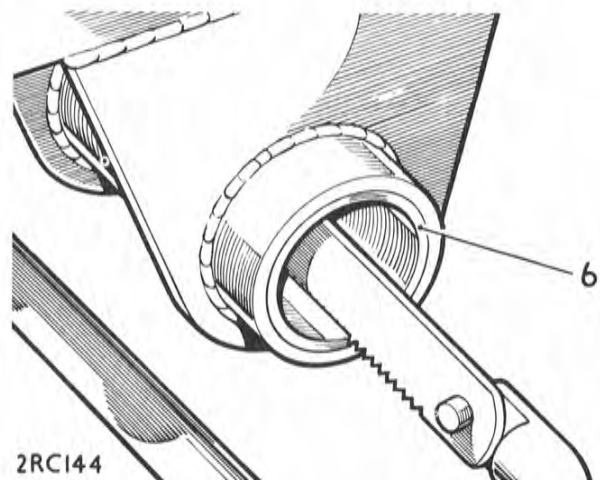
Inspecting

7. Clean the leaves and examine for cracks. Only the main and second leaves and the spring assembly complete are supplied as replacement.
8. The recambering of road springs is not advised, but if no alternative is possible, the spring should be reset, if necessary, either to a new spring or to the dimensions included in General Specification Data, 04.



Reassembling

9. If removed, fit the shackle bush to the chassis frame bracket. The bush must be a drive fit.
10. Grease each leaf with graphite grease and reassemble the spring by fitting the centre bolt and leaf clips; fit the spring bushes, which must be a press fit.
11. Fit the shackle plates to the chassis frame, but do not fully tighten the fixings until the spring is refitted to the vehicle.
12. Reverse 1.



## FRONT HUB ASSEMBLY

—Remove and refit 60.25.01

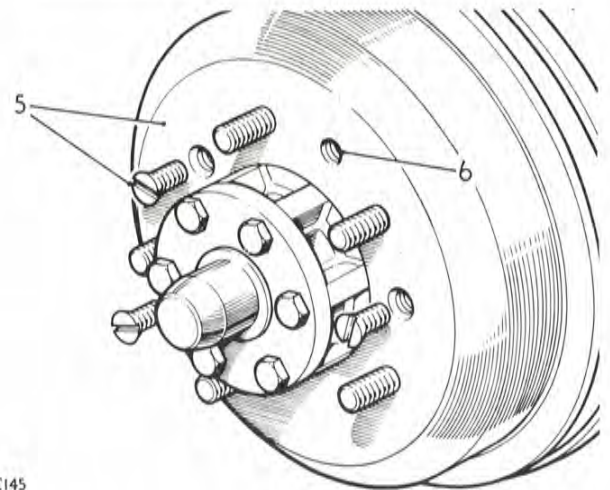
Service tool: R01010, Spanner for driving member nut,  
109 models.

## Removing

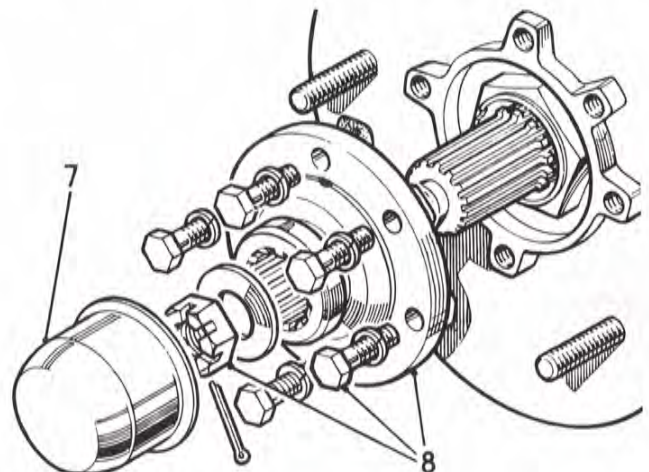
1. Drain the swivel housing lubricating oil.
2. Jack up the front of the vehicle.
3. Remove the road wheel.
4. Slack off the brake shoe adjuster/s.
5. Remove the brake drum, noting the provision of an extractor tapping, item 6.
6. If difficulty is experienced in removing the drum, fit one of the drum fixing screws into the extractor tapping provided and turn in the screw whilst using a mallet to dislodge the drum.
7. Prise off the hub cap.
8. Remove the driving member from the axle stub shaft and hub.
9. Remove the hub fixings.
10. Hold in position the outer roller bearing.
11. Withdraw the hub and bearing.

## Refitting

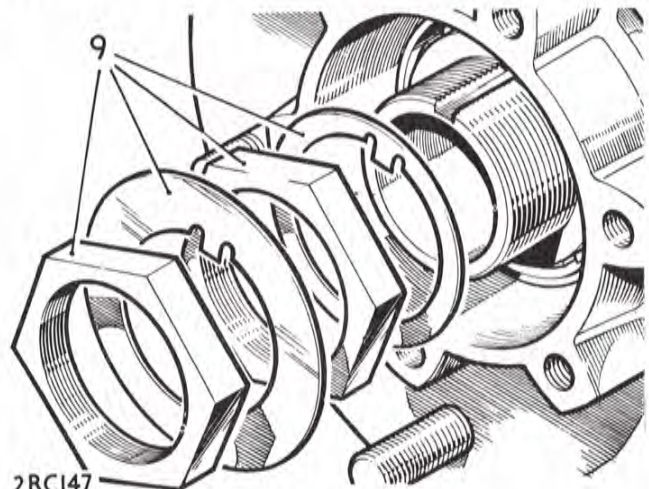
12. Lubricate the bearings, using the recommended grease—Division 09 refers. Do not pack the hubs with grease.
13. Reverse 9 to 11 and adjust the hub bearing end float. 60.25.13 refers.
14. Fit the driving member with the felt and rubber oil seal fitted with the rubber side facing outwards. Torque load for driving member fixing bolts is 3,9 kgf.m (28 lbf.ft.). Torque load for stub shaft to driving member nut is 1,4 to 2,0 kgf.m (10 to 15 lbf.ft.) using R01010 on 109 models with the circular castellated nut.
15. Reverse 4 to 7 and adjust the brakes.
16. Reverse 1 to 3.



2RC145



2RC146



2RC147

## FRONT SUSPENSION

### FRONT HUB ASSEMBLY

#### —Overhaul

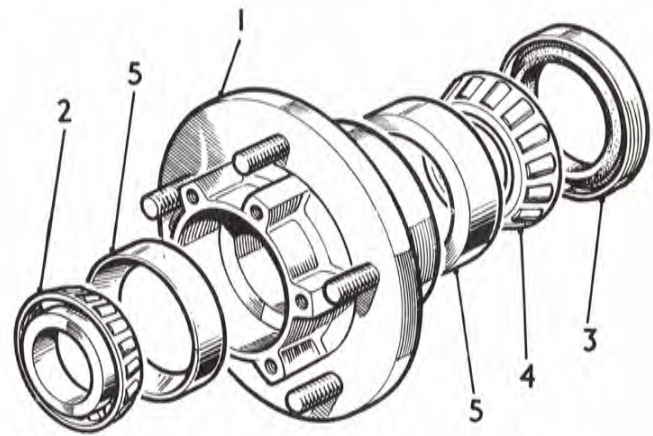
60.25.07

#### Dismantling

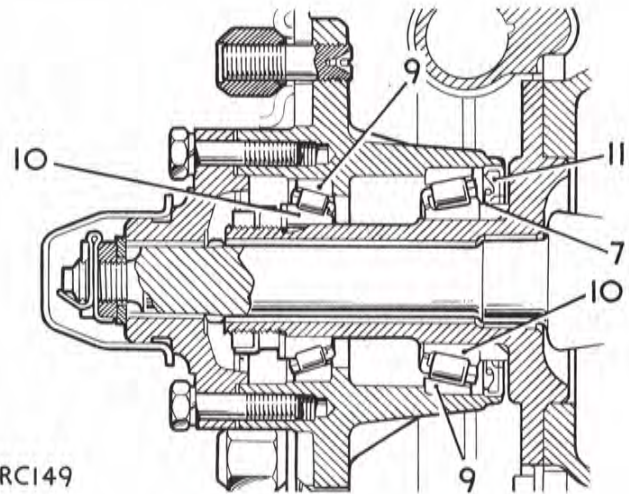
1. Remove the front hub. 60.25.01.
2. Withdraw the outer roller bearing.
3. Prise out the oil seal.
4. Withdraw the inner roller bearing.
5. Press the bearing outer races from the hub.

#### Inspecting

6. Examine all components for obvious wear or damage.
7. Examine the outside diameter of the inner bearing distance piece which is pressed on to the exposed stub axle. The diameter forms the inner seat for the hub oil seal and must be free from scores, damage and roughness. To replace the distance piece, 60.25.24 refers.
8. The hub bearings must be a sliding fit on the stub axle and a press fit in the hub.



2RC148



2RC149

#### Reassembling

9. Press the bearing outer races, wide side first, into the hub, ensuring that they abut the locating shoulders.
10. Grease and fit the inner roller bearings. Do not pack the hub centre with grease.
11. Reverse 3, using jointing compound, and fitting the seal flush with and not below the rear face of the hub.
12. Reverse 1 and 2.

## FRONT HUB BEARINGS END FLOAT

—Check and adjust 60.25.13

Service tool: 606435, Spanner for hub bearing nuts.

## Procedure

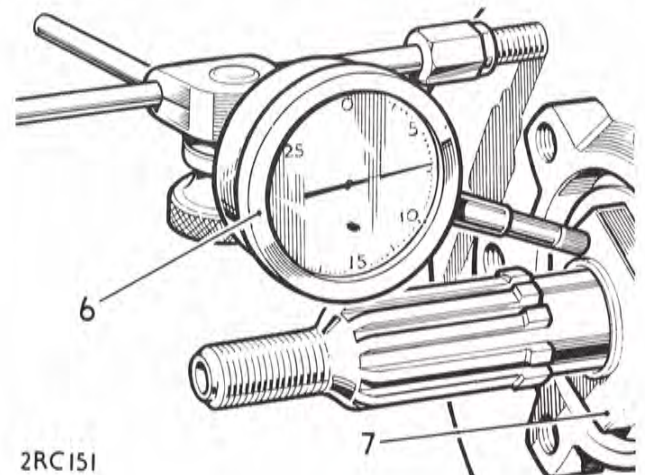
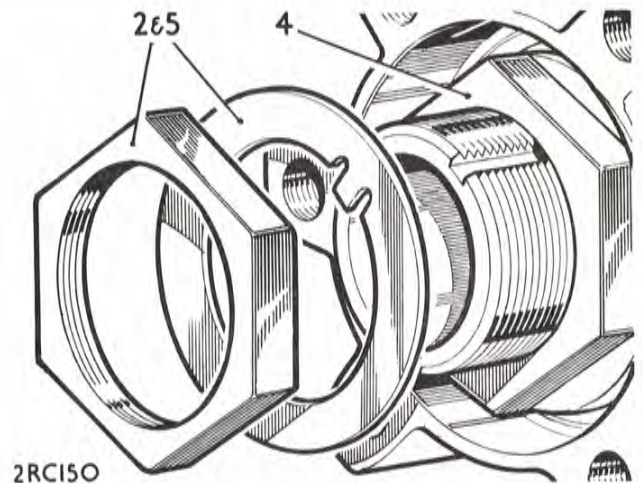
1. Carry out items 1 to 8 of operation 60.25.01 to remove the brake drum and hub driving member.
2. Remove the locknut and lockwasher from the hub.
3. Spin the hub vigorously, causing the bearing rollers to settle in the tapered races, producing maximum end-float conditions.
4. Tighten the adjuster nut sufficient only to take up any obvious end-float.

**NOTE:** It is necessary to spin the hub every time before checking the end-float, as moving the hub laterally will resettle the rollers, affecting the measurable end-float.

5. Fit the lockwasher and nut, tighten the nut but do not engage the lockwasher.
6. Using a dial test indicator, check the end-float of the hub, which must be 0,05 to 0,10mm (0.002 to 0.004 in.)
7. If the hub end-float is not within the permitted limits, remove the locknut and washer, and readjust the inner nut. Fit the lockwasher, tighten the locknut and recheck the end-float.
8. When the end-float is correct, engage the lockwasher.
9. Reverse 1.

## DATA

Bearing end-float	..	..	0,05 to 0,10mm (0.002 to 0.004 in.)
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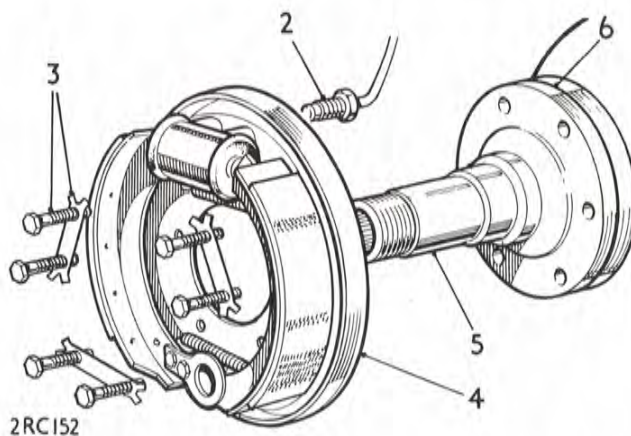
## FRONT SUSPENSION

### FRONT HUB STUB AXLE

- Remove and refit 60.25.22
- Overhaul 60.25.24

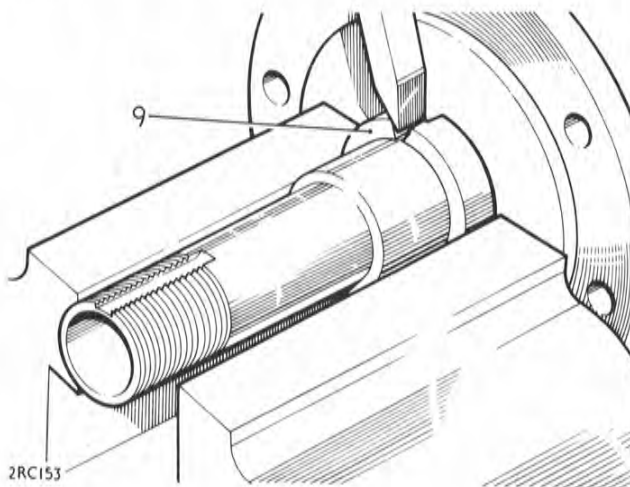
#### Removing

1. Remove the front hub. 60.25.01.
2. Release the brake pipe from the retaining bracket at the upper swivel pin.
3. Remove the brake anchor plate and stub axle fixings.
4. Suspend aside the anchor plate assembly.
5. Withdraw the stub axle.
6. Withdraw the joint washer.



#### Overhauling

7. Examine for obvious wear or damage.
8. Check the outside diameter of the inner bearing distance piece, this must not show any signs of damage or roughness as it forms the inner seat for the oil seal. The distance piece should be a *press fit* on the stub axle. Any clearance between these two parts will allow oil to leak past on to the brake linings.
9. If it is required to remove the inner bearing distance piece from the stub axle, it must be shattered, using extreme care to avoid damaging the axle.
10. Press on the replacement distance piece.



#### Refitting

11. Grease and fit the joint washer.
12. Reverse 1 to 5.



**FRONT SHOCK ABSORBER**

–Remove and refit

60.30.02

**Removing**

1. Slacken the fixings at the road wheel.
2. Jack up the front of the vehicle and support on stands.
3. Remove the road wheel.
4. Remove the shock absorber top fixings.
5. Remove the lower fixings.

**Checking the shock absorber operation**

6. Secure the shock absorber vertically in a vice by holding the bottom fixing between the jaws.
7. The shock absorber incorporates differential damping, having greater resistance on the extension stroke. Check the operation by extending and compressing the shock absorber, there must be a uniform resistance throughout the length of the stroke. If the resistance is erratic or weak, fit a new shock absorber.

**Refitting**

8. Reverse 1 to 5.

**TRIM HEIGHT**

–Check and adjust

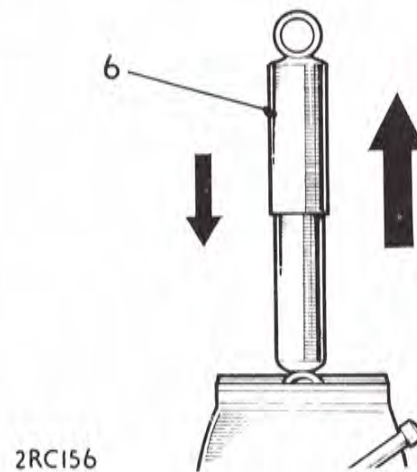
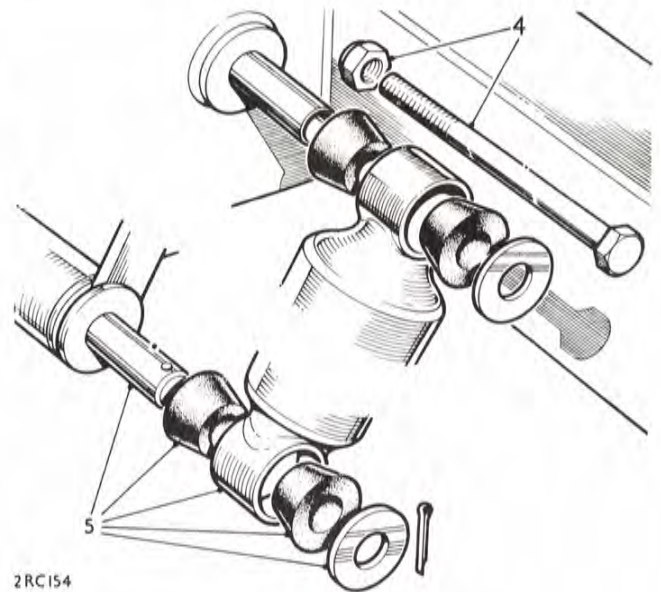
60.45.01

**General**

The road springs differ in spring rating according to their fitting position (see General Specification data, 04) and no adjustment is provided. An incorrect replacement spring or incorrect fitting procedure can adversely affect the vehicle trim; check before replacing parts.

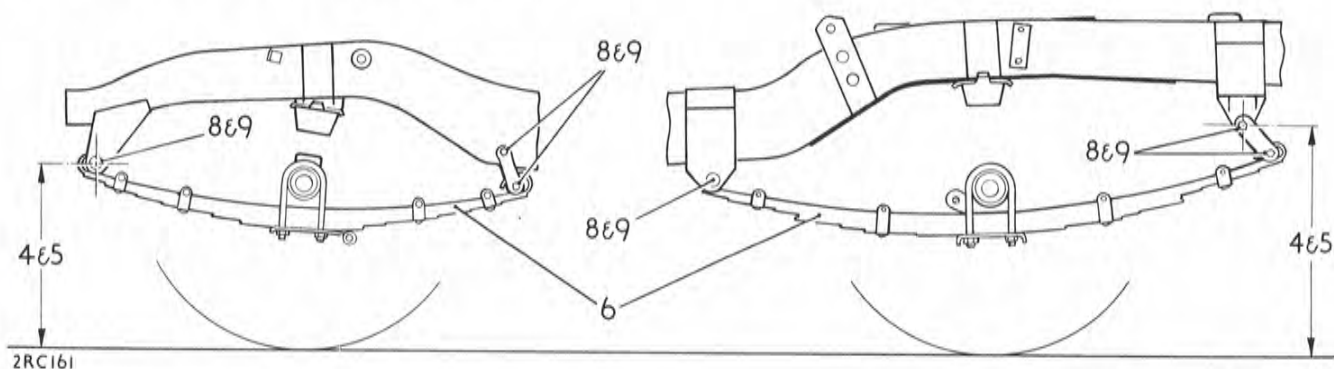
**Checking procedure**

1. Position the vehicle on firm level ground.
2. Ensure that the vehicle is in the static unladen weight condition, that is with a full coolant and lubrication system and 22,5 litres (5 UK gallons) of fuel.

*Continued*

## FRONT SUSPENSION

3. Check and if necessary adjust tyres to recommended pressures.
4. Measure the distance from the ground to the shackle pin centres as illustrated on both sides of the vehicle.
5. The measurements at the front should agree within 25mm (1.0 in.), as should those at the rear.
6. Where measurements are not within limits, first check that the correct springs are fitted. The spring part number is marked on the spring top face and also on the underside of one of the leaves.
7. If the springs are correct, jack up the vehicle and take the weight off the road springs.
8. Remove the shackle pins and ensure that they are a free fit in the shackle plate threads and not binding in the shackle pin bushes. Lubricate or polish to achieve this condition.
9. Deflect the springs and torque load the pins as detailed in operation 60.20.01.
10. Lower the vehicle and recheck the trim height.



REAR SUSPENSION OPERATIONS

**NOTE:** The procedures for Rear Suspension items are similar to those for the Front Suspension items, therefore refer to Division 60 for particulars. For reference, the applicable Front Suspension operation number is listed below in parentheses after the Rear Suspension operation number.

Rear hub assembly										
– remove and refit	...	...	...	...	...	...	...	...	...	64.15.01 (60.25.01)
– overhaul	...	...	...	...	...	...	...	...	...	64.15.07 (60.25.07)
Rear hub bearing end-float										
– check and adjust	...	...	...	...	...	...	...	...	...	64.15.13 (60.25.13)
Rear hub stub axle										
– remove and refit	...	...	...	...	...	...	...	...	...	64.15.20 (60.25.22)
– overhaul	...	...	...	...	...	...	...	...	...	64.15.21 (60.25.24)
Rear road spring										
– remove and refit	...	...	...	...	...	...	...	...	...	64.20.01 (60.20.01)
– overhaul	...	...	...	...	...	...	...	...	...	64.20.04 (60.20.07)
Rear shock absorber										
– remove and refit	...	...	...	...	...	...	...	...	...	64.30.01 (60.30.02)



## BRAKE OPERATIONS

Brakes																		.. 70.25.03
-adjust	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.25.02
-bleed	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.25.02
Brake failure switch																		.. 70.15.36
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.41
-overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.41
Drums																		.. 70.10.02
-front—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.10.03
-rear —remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.10.03
Fluid reservoir																		.. 70.30.15
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.15
Four way connector																		.. 70.15.35
-remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.35
Hoses—remove and refit																		.. 70.15.02
-front L.H.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.03
-front R.H.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.04
-intermediate	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.15.04
Master cylinder—single																		.. 70.30.01
—with servo assistance																		.. 70.30.02
—remove and refit..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.01
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.02
—without servo assistance																		.. 70.30.01
—remove and refit..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.02
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.02
Master cylinder—tandem																		.. 70.30.08
—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.09
—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.30.09
Pedal assembly																		.. 70.35.01
—non-servo systems—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.35.01
—servo systems—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.. 70.35.01

*continued*



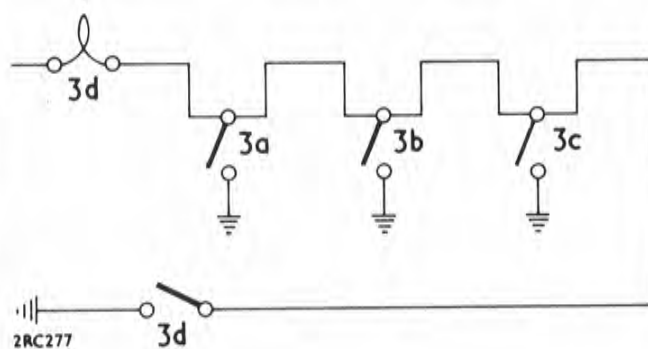
## BRAKE WARNING LIGHT

—General information

70.00.00

## Warning light function

1. An amber warning light marked 'BRAKE' is provided on the instrument panel on models for certain territories only.
2. The following brief description of the warning light function is intended as a guide to aid in brake system fault diagnosis.
3. The warning light is in series circuit with one or more of the following warning indicator switches to provide a visual indication of brake lining wear, hydraulic fluid leakage or servo vacuum loss, depending on the particular equipment provided on the vehicle:—
  - a. A servo mounted vacuum switch which indicates lack of vacuum assistance at the brake servo.
  - b. A pedal-box mounted pedal travel switch to give an indication of excess pedal travel caused by brake shoe wear or minor hydraulic leakage.
  - c. A chassis mounted pressure differential switch which indicates fluid leakage in the front or rear brake hydraulic systems.
  - d. A dash mounted test switch which is push button operated. Failure of the bulb to illuminate on being tested could indicate a faulty bulb or earth connection.



## Fault diagnosis—Brake warning light 'ON'

## General

4. The brake warning light circuit is energised with the ignition switched 'ON' only.
5. The warning indicator switches are normally on open circuit and short the circuit to earth, to illuminate the brake warning light, when the switches are closed (refer to the accompanying schematic circuit diagram).

## Procedure—Ignition switched 'ON'—test button fully out from dash.

6. Servo vacuum switch—Petrol models (for Diesel models, see item 7).
  - a. Ensure vacuum is available at the switch by checking the hose connections for soundness, then running the engine for a short period during which engine overrun conditions are obtained, that is, throttle opened then allowed to quickly close.
  - b. With vacuum available, if the brake warning light remains 'ON', disconnect the electrical leads at the vacuum switch and connect together the leads, using a slave Lucar male connector blade.
  - c. If the light is extinguished, the vacuum switch is faulty and must be replaced. If the warning light remains 'ON', leave the leads connected together and proceed to the next switch in the circuit.

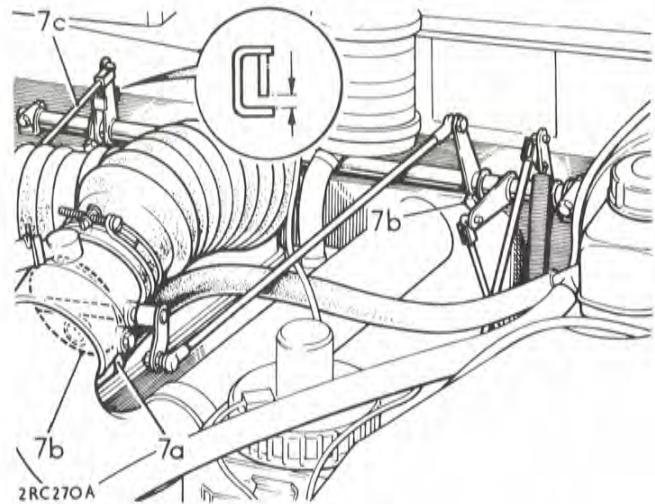


## 7. Servo vacuum switch—Diesel models

### General

Before faulting the servo vacuum switch on diesel models, check the following items a. to c. for correct operation:—

- a. Remove the hose and unscrew the non-return valve from the underside of the inlet manifold. Check for the valve sticking closed by blowing with the mouth into the hose connector end of the valve (do not use high pressure air); the air should pass through freely. Replace the valve to rectify.
  - b. Remove the air inlet hose from the inlet manifold and check that the manifold butterfly valve is fully closed with the accelerator linkage in the idle position. Adjustment is made at the pinch bolt which secures the butterfly valve linkage to the accelerator cross-shaft.
  - c. If adjustment is required, observe that the space between the front and rear arms of the forked shaft, which actuates the distributor pump linkage, provides a 'lost motion' period during which the accelerator cross-shaft rotates but the pump linkage does not. Set the pump linkage at the cross-shaft pinch bolt such that the butterfly valve will open in advance of the pump linkage.
  - d. When the foregoing items are satisfactory, carry out the switch checking sequence described in item 6. If a replacement switch does not effect a cure for the warning light 'ON' condition, check the actual depression present in the inlet manifold at overrun conditions, using a suitable gauge interposed between the inlet manifold and the vacuum reservoir tee-piece. Opening and closing the throttle sharply several times with the engine running should enable a depression of at least 15 in Hg. to be registered on the gauge, this being sufficient to actuate the servo vacuum switch.
8. **Brake pressure differential switch**
- a. Disconnect the switch leads and interconnect them to remake the circuit.
  - b. If the warning light remains 'ON', proceed to check the next switch in the circuit; if the light is extinguished, check for hydraulic system leakage which would cause the differential switch plunger to displace to one end.



**NOTE:** On dual braking systems, the hydraulic fluid reservoir is divided into two compartments. On 88 models, the front compartment supplies the rear brakes and the rear compartment the front brakes; on 109 models, however, the reverse applies and the front compartment supplies the front brakes, the rear compartment supplies the rear brakes. A difference in fluid levels may indicate which system is leaking.

- c. To centralise the differential switch plunger, bleed a brake line in the pressurised system (front or rear as applicable) using very slow pedal travel and observing the brake warning light. Immediately the warning light is extinguished, keep a light pressure only on the pedal and close off the bleed nipple.
9. **Pedal travel switch**
- a. Check that the switch is set (by means of the locknut on the mounting bracket) to operate within 111 to 117mm (4.37 to 4.60 in.) pedal travel movement towards the floor.
  - b. Disconnect the switch leads and interconnect them to remake the circuit.
  - c. If the warning light remains on, replace the switch.

**BRAKE DRUMS****—Remove and refit**

Front drums

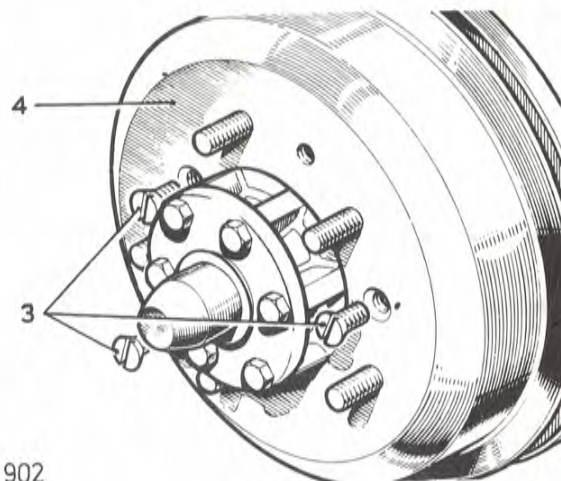
70.10.02

Rear drums

70.10.03

**Removing**

1. Remove the road wheel.
2. Slacken off the brake adjuster/s at the brake anchor plate.
3. Remove the brake drum fixings.
4. Withdraw the brake drum.



IRC 902

**Refitting**

5. Reverse 1 to 4.

**DATA****Brake drums****Diameter:**

88 models, front and rear

254 mm (10 in.).

109 models, front and rear

279,4 mm (11.0 in.).

Reclamation limit:

0,75 mm (0.030 in.) oversize on both models.





# BRAKES

## BRAKE HOSES AND PIPES

Single system, non-servo models

### HOSES

—Remove and refit

Front left hand

70.15.02

Front right hand

70.15.03

Intermediate

70.15.04

### PIPES

—Remove and refit

Feed to front multi-way connector

70.20.01

Feed to front left hand hose connector

70.20.02

Feed to front right hand hose connector

70.20.03

Feed to front left hand cylinder

70.20.04

Feed to front right hand cylinder

70.20.05

Feed to master cylinder

70.20.10

Feed to rear left hand cylinder

70.20.17

Feed to rear right hand cylinder

70.20.18

Feed to intermediate hose

70.20.28

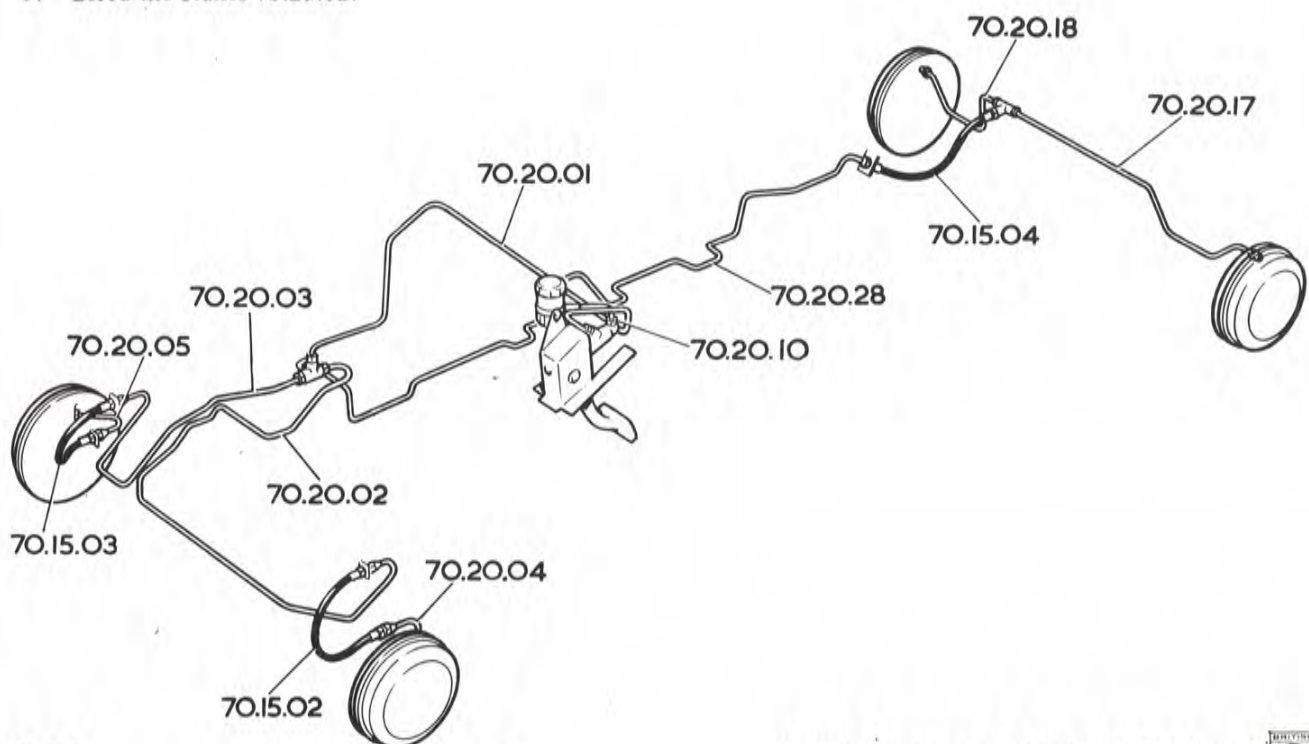
**NOTE:** The operation numbers are included on the brake system illustration to facilitate identification of the individual pipes.

### Removing

1. Disconnect the hose or pipe at both connections.
2. Release the clipping.
3. Withdraw the hose or pipe.

### Refitting

4. Reverse 1 to 3.
5. Bleed the brakes 70.25.02.



## BRAKE HOSES AND PIPES

Single system models with servo

## HOSES

—Remove and refit

Front left hand	70.15.02
Front right hand	70.15.03
Intermediate	70.15.04

## PIPES

—Remove and refit

Feed to front multi-way connector	70.20.01
Feed to front left hand hose connector	70.20.02
Feed to front right hand hose connector	70.20.03
Feed to front left hand cylinder	70.20.04
Feed to front right hand cylinder	70.20.05
Feed to rear left hand cylinder	70.20.17
Feed to rear right hand cylinder	70.20.18
Feed to intermediate hose	70.20.28

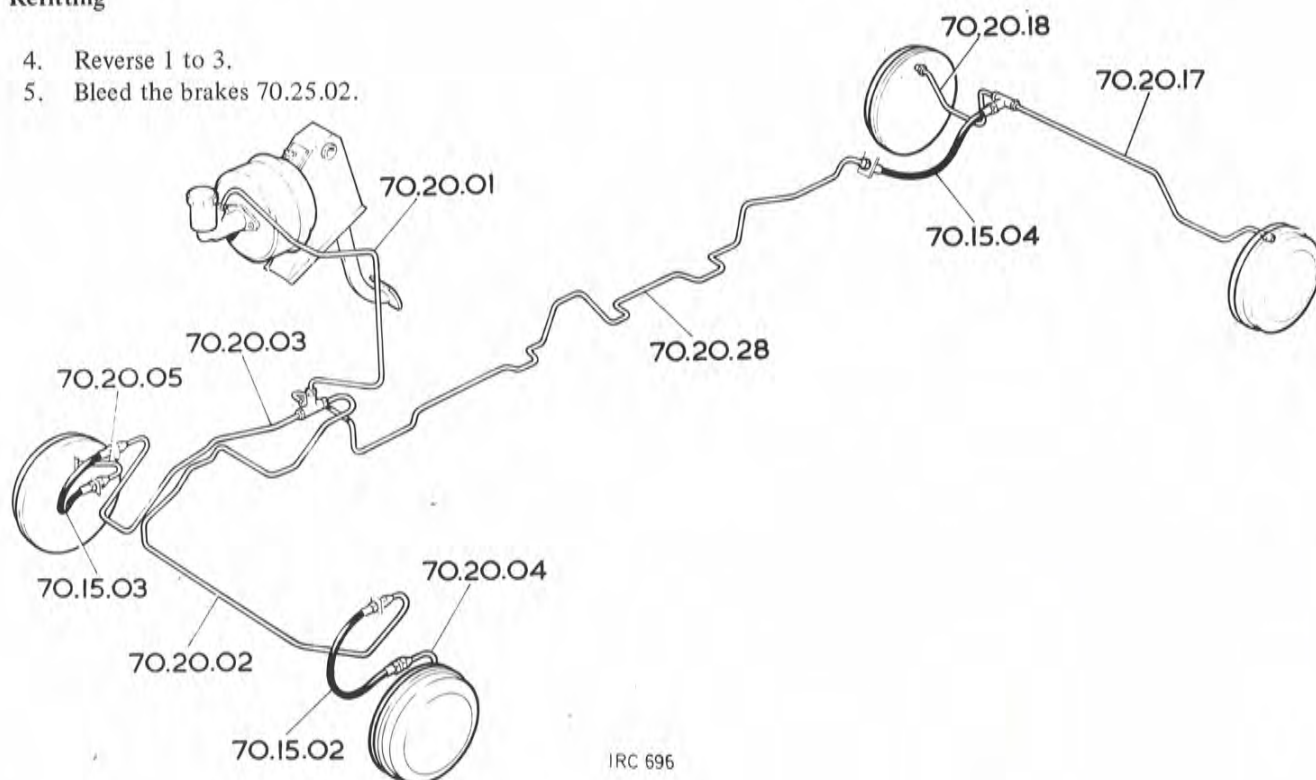
**NOTE:** The operation numbers are included on the brake system illustration to facilitate identification of the individual pipes.

## Removing

1. Disconnect the hose or pipe at both connections.
2. Release the clipping.
3. Withdraw the hose or pipe.

## Refitting

4. Reverse 1 to 3.
5. Bleed the brakes 70.25.02.



IRC 696



# BRAKES

## BRAKE HOSES AND PIPES

### Dual system models

#### HOSES

–Remove and refit

Front left hand

70.15.02

Front right hand

70.15.03

Intermediate

70.15.04

#### PIPES

–Remove and refit

Feed to front left hand hose connector

70.20.02

Feed to front right hand hose connector

70.20.03

Feed to front left hand cylinder

70.20.04

Feed to front right hand cylinder

70.20.05

Feed to rear left hand cylinder

70.20.17

Feed to rear right hand cylinder

70.20.18

Feed to intermediate hose

70.20.28

Feed to brake failure switch, front system

70.20.46

Feed to brake failure switch, rear system

70.20.47

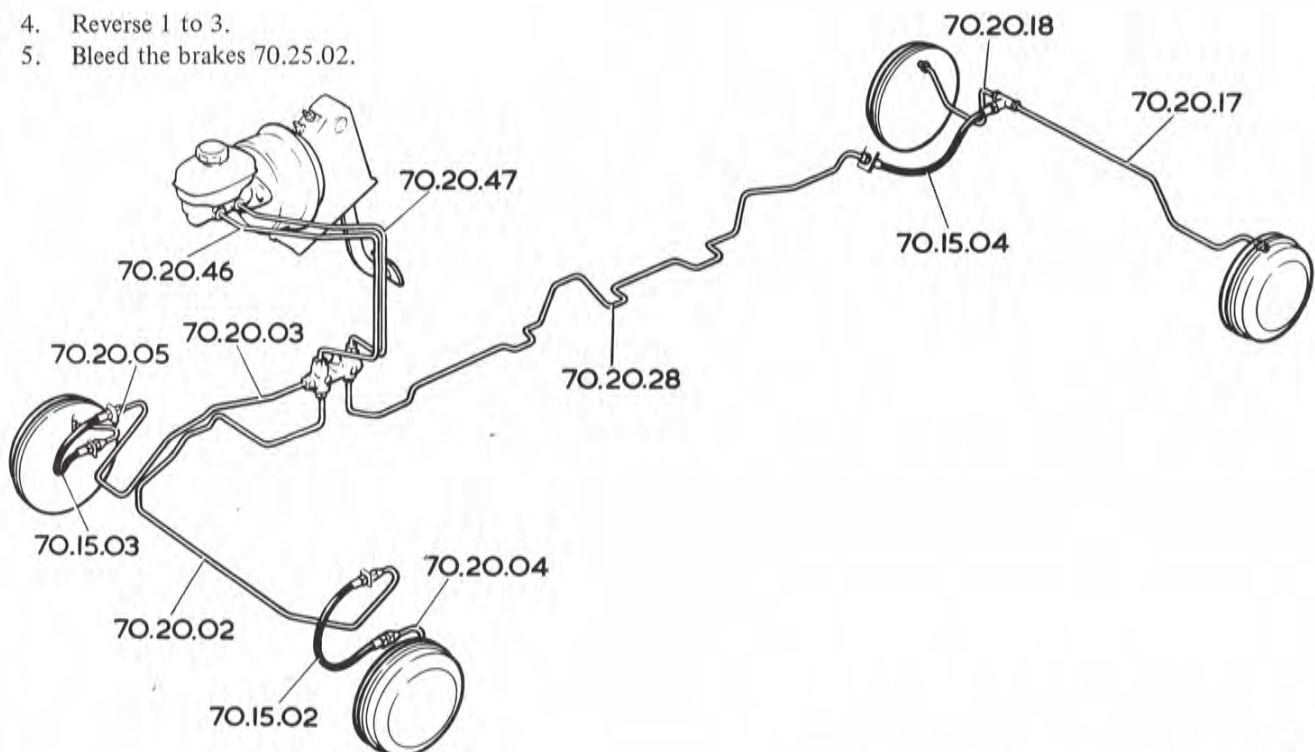
NOTE: The operation numbers are included on the brake system illustration to facilitate identification of the individual pipes.

#### Removing

1. Disconnect the hose or pipe at both connections.
2. Release the clipping.
3. Withdraw the hose or pipe.

#### Refitting

4. Reverse 1 to 3.
5. Bleed the brakes 70.25.02.



**FOUR-WAY CONNECTOR, Single systems**

- Remove and refit

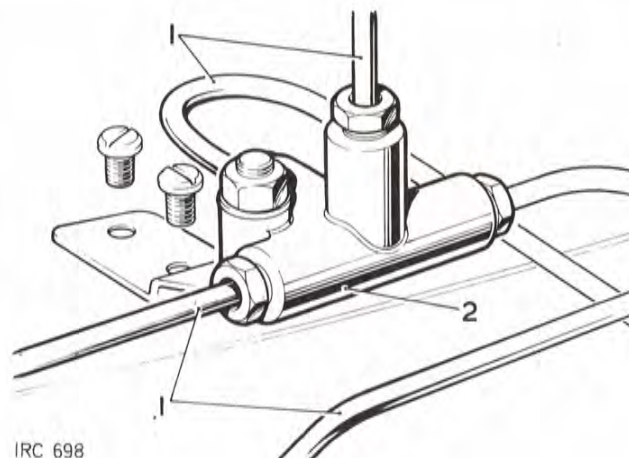
70.15.35

**Removing**

1. Disconnect and blank off the four fluid pipes.
2. Remove the four-way connector and bracket, located in the engine compartment on top of the chassis R.H. side member.

**Refitting**

3. Fit the four-way connector with the connection for the rear brakes pipe facing outboard.
4. Bleed the brakes. 70.25.02.



IRC 698

**BRAKE FAILURE SWITCH, Dual systems**

- Remove and refit

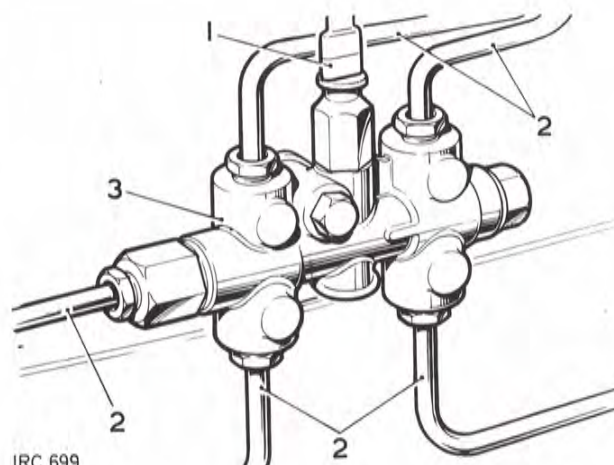
70.15.36

**Removing**

1. Disconnect the electrical leads from the brake failure switch, located in the engine compartment at the chassis R.H. side member.
2. Disconnect and blank off the five fluid pipes.
3. Remove the brake failure switch.

**Refitting**

4. Secure the brake failure switch in position, with the electrical leads socket uppermost.
5. Reverse 1 and 2.
6. Bleed the brakes. 70.25.02.



IRC 699

## BRAKES

### BRAKE FAILURE SWITCH, Dual systems

—Overhaul

70.15.41

#### Dismantling

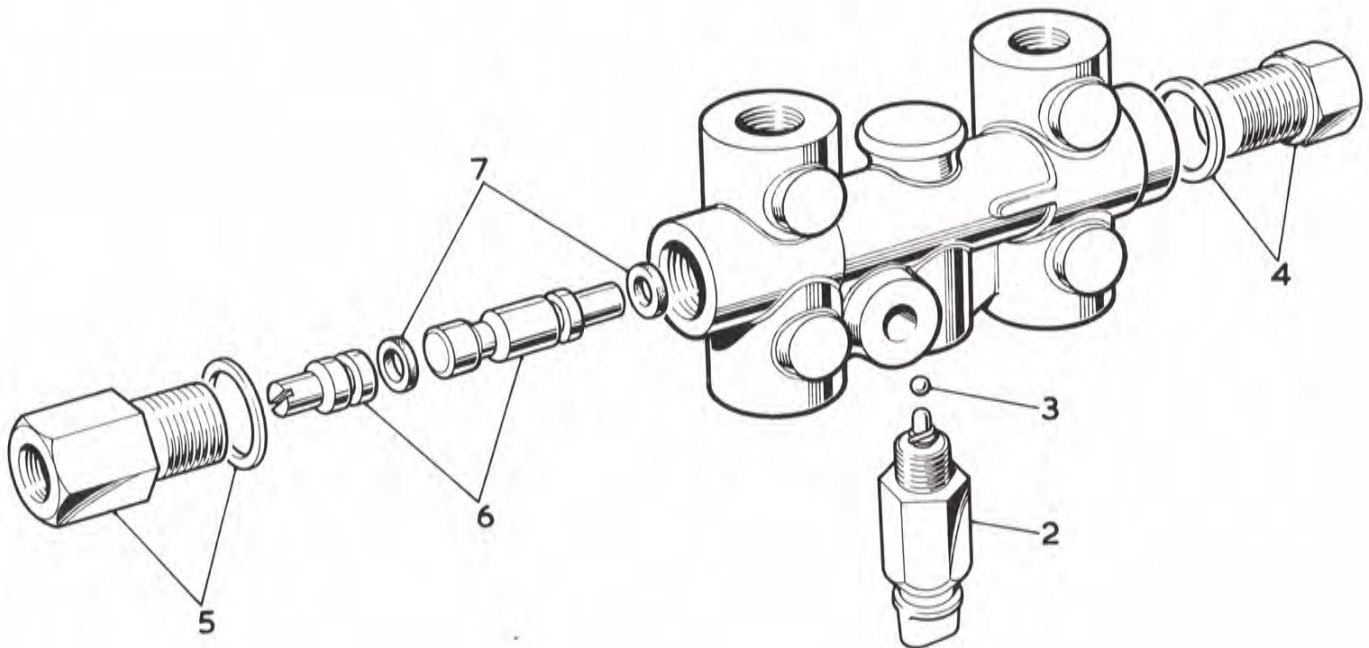
1. Remove the switch assembly. 70.15.36.
2. Remove the switch unit from the housing.
3. Withdraw the plunger ball.
4. Remove the end plug and sealing washer.
5. Remove the pipe connector union and sealing washer.
6. Push out the two-part shuttle valve, using a soft drift.
7. Remove and discard the shuttle valve oil seals.

#### Inspecting

8. Clean the shuttle valve, end plug, pipe union and five-way connector, using new brake fluid or ethyl alcohol.
9. Examine the shuttle valve and its bore in the five-way connector, they must be in perfect condition with no signs of scratches or corrosion, otherwise fit a new switch complete.
10. To test the electrical switch, reconnect the leads and actuate the switch plunger by pressing it against an earthing point on the vehicle.

*continued*

\* \*

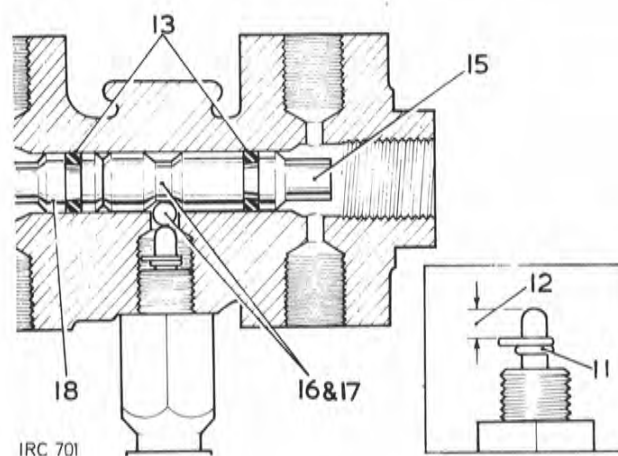


IRC 700A

\* \*

## Assembling

11. If the plunger spring is dislodged, refit with the small coil of the spring toward the switch unit threads.
12. Position the plunger spring 4,06 mm (0.160 in.) approximately from the plunger end.
13. Fit new shuttle valve seals.
14. Coat the seals with Girling brake lubricant or clean brake fluid.
- 15.\*\* Fit the longer shuttle valve, slotted end last, to the end plug end of the housing bore.\*\*
16. Position the shuttle valve to align the groove for the plunger ball with the drilling for the ball.
17. Fit the ball and switch unit. Torque loading 17,28 kgf.cm (15 lbf. in.).
- 18.\*\* Fit the shorter shuttle valve, slotted end last, to the pipe connector end of the housing bore.\*\*
19. Reverse 4 and 5, using new sealing washers. Torque loading 2,2 kgf. m (16 lbf. ft.).
20. Fit the switch assembly. 70.15.36.



## BRAKES

### BRAKES

—Bleed

70.25.02

#### General

1. Observe strict cleanliness precautions to prevent foreign matter from entering the hydraulic system.
2. Use only new supplies of the recommended brake hydraulic fluid (see 09—Lubricants and Fluids).
3. Keep the fluid reservoir 'topped up' during bleeding.
4. Where the complete hydraulic system is to be refilled, it is advantageous to first charge the system, to each bleed point in turn, before attempting to expel all air from the system.

#### Isolating local air pockets

5. Use of Girling Brake Service Hose Clamp considerably facilitates the location of air in the system, therefore saving time by locating the hydraulic fault, and saving fluid when servicing the wheel cylinders.

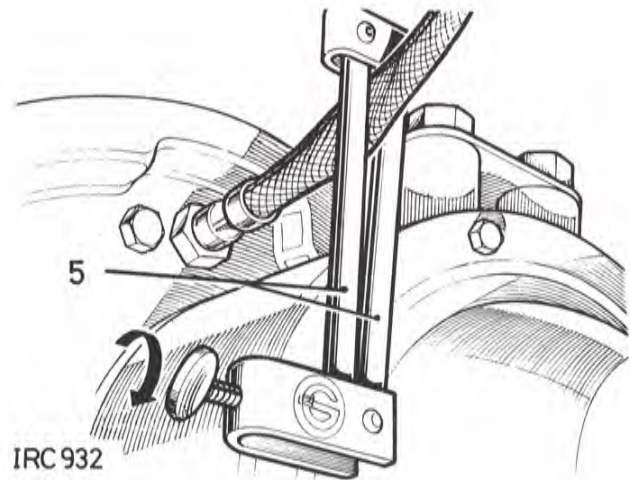
Providing the brake hose is in reasonable condition, damage cannot be caused using the hose clamp, but the use of other tools to clamp the hoses is not recommended as damage may be caused internally to the hose without it being noticed externally.

6. With clamps fitted on the two front and one rear hose the pedal action should be perfect with no indication of 'sponginess'. If under these circumstances a spongy pedal is apparent, a new or overhauled master cylinder assembly must be fitted and bled and the test repeated.
7. If perfect pedal action is obtained with the three hose clamps in position, remove the rear clamp and if the pedal is spongy, the air must be in the rear cylinders. However, if the pedal action is good, remove first one then the other of the two front clamps, repeating the test until the air is located.

#### Wheel cylinder—servicing

8. For wheel cylinder servicing only the appropriate hose need be clamped. This keeps the loss of fluid to a minimum and after the service is satisfactorily completed, only the affected parts require bleeding.

*continued*



**Brake bleeding procedure**

9. Slacken off the brake shoe adjusters on each wheel to minimise wheel cylinder volume.
10. Attach a bleed tube to the bleed nipple farthest from the master cylinder. Submerge the tube free end in brake fluid in a transparent container.
11. Slacken the bleed nipple a half-turn.
12. Push down the brake pedal through the full stroke; follow with three short rapid strokes then allow the pedal to fully return.  
Pause for four or five seconds before commencing the next pedal stroke.

**NOTE:** On dual braking systems only, do not use full pedal travel as this may decentralise the shuttle valve plunger in the brake failure switch. Operate the pedal slowly. If during the bleeding procedure the plunger operates the switch and the warning light is on, the bleedscrew must be closed and the bleedscrew at the other end of the car opened (if bleeding the front brakes, open a bleedscrew on a rear brake and vice versa).

A steady pressure must then be applied to the pedal until the light goes out, when the pressure must be released immediately and the bleedscrew closed. Otherwise the piston will move too far in the opposite direction and require resetting again.

13. Repeat the procedure until fluid discharged from the bleed tube is free of air, then tighten the bleed nipple during a pedal downstroke.
14. Repeat the procedure on the remaining wheels, commencing and continuing at the next wheel farthest from the master cylinder.
15. Adjust the brakes. 70.25.03.
16. If the system is fitted with servo assistance:  
Hold foot pressure on the brake pedal and start the engine. If the vacuum system is functioning correctly, the pedal will move towards the board. If no movement is felt, the vacuum system is not operating.



## BRAKES

### WHEEL BRAKES

—Adjust

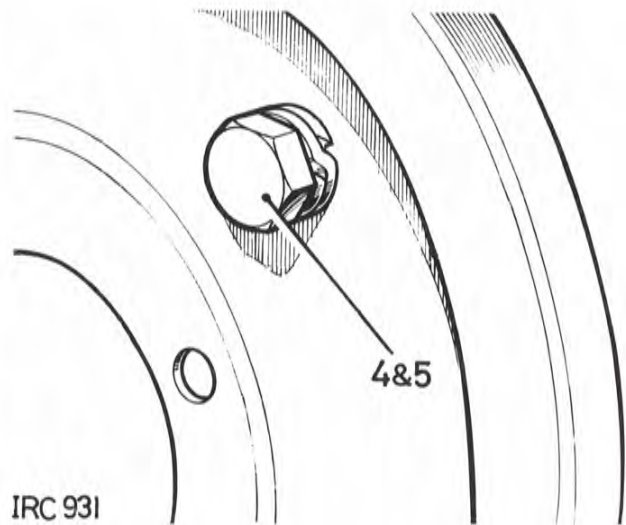
70.25.03

#### General

Two adjusters are provided on each road wheel on 109 models and one adjuster on each wheel on 88 models.

#### Adjusting procedure

1. Apply the transmission brake.
2. Raise the applicable wheel.
3. Ensure that the wheel is free to rotate, back-off the adjuster/s as necessary.
4. Turn in the adjuster/s until the brake shoe/s contacts the wheel drum.
5. Back-off two serrations on the adjuster/s.
6. Lower the wheel.



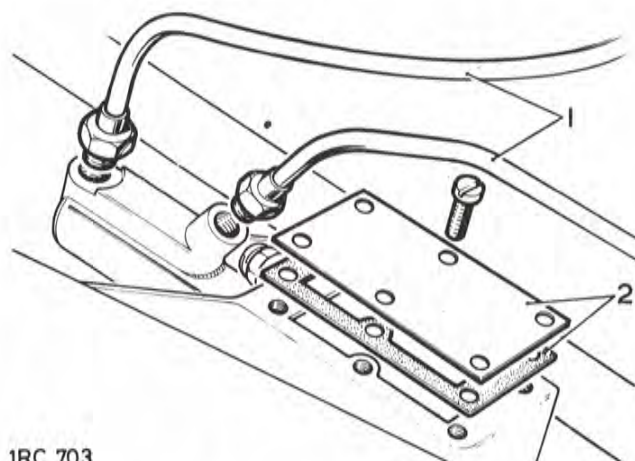
## MASTER CYLINDER, Non-servo systems

-Remove and refit

70.30.01

## Removing

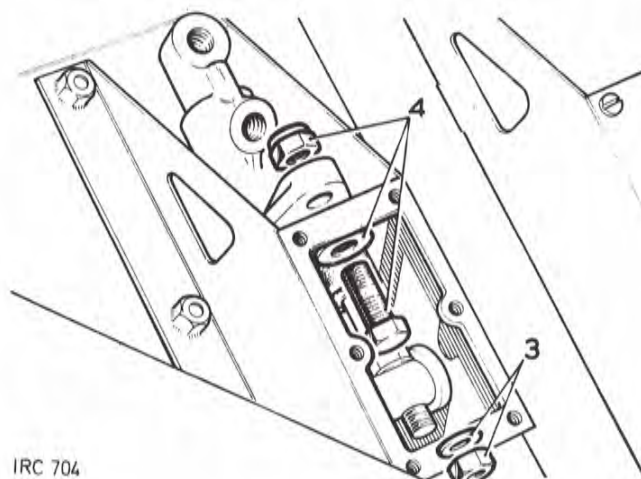
1. Disconnect the inlet and outlet pipes from the brake master cylinder.
2. Remove the top cover and gasket from the brake pedal bracket.
3. Remove the nut and plain washer securing the master cylinder push rod to the brake pedal trunnion.
4. Remove the fixings and withdraw the master cylinder from the brake pedal bracket.



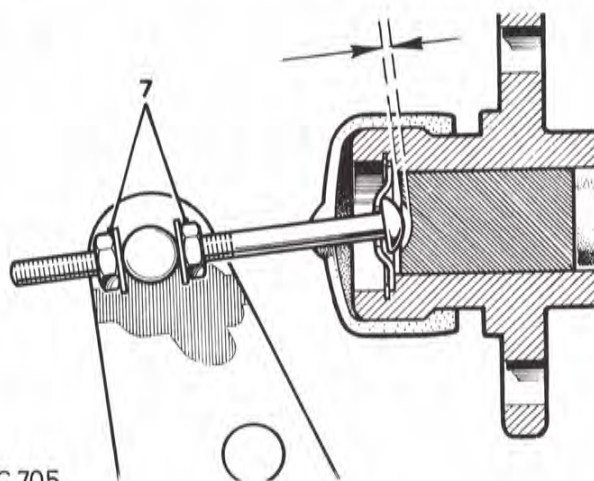
IRC 703

## Refitting

5. Reverse 3 and 4, loosely securing the push rod to the trunnion.
6. Adjust the push rod, by rotating, to obtain 1,5 mm (0.062 in.) free play between the push rod and the master cylinder piston.
7. Tighten the locknuts.
8. Reverse 1 and 2.
9. Bleed the brake system. 70.25.02.



IRC 704



IRC 705



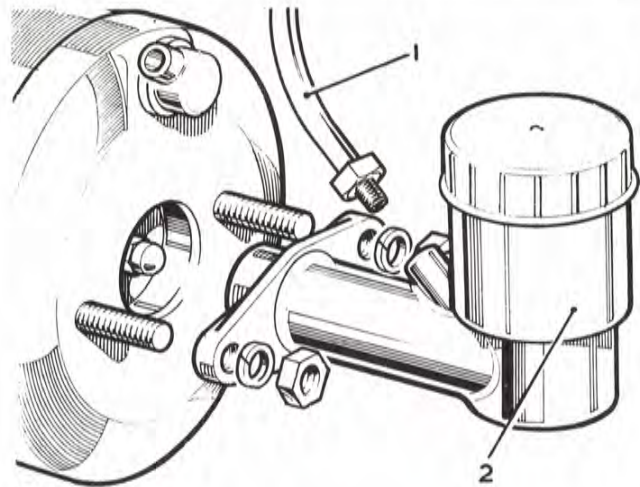
## BRAKES

### MASTER CYLINDER, Servo systems

#### —Remove and refit

70.30.01

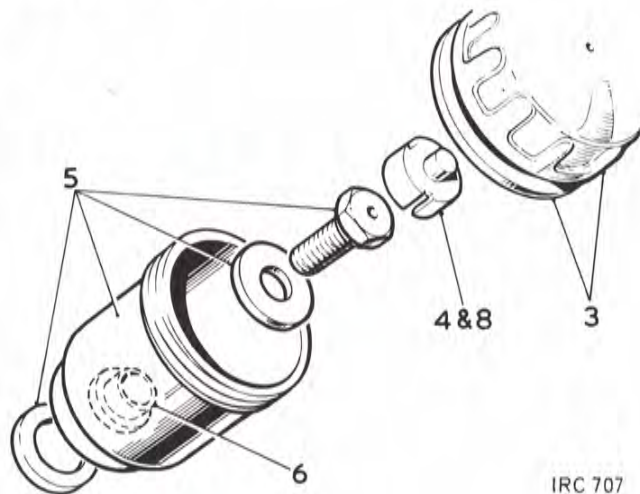
1. Disconnect the outlet pipe from the brake master cylinder.
2. Remove the fixings and withdraw the master cylinder complete with reservoir.
3. Remove the filler cap and filter, where fitted, from the reservoir and drain all the fluid.
4. Using long-nosed pliers, withdraw the plastic cover from the reservoir adaptor bolt.
5. Remove the adaptor bolt and withdraw the plain washer, reservoir body, and seal.
6. DO NOT attempt to remove the distance piece from the base of the reservoir.



IRC 706

#### Refitting

7. Smear the seal for the reservoir base with Castrol-Girling rubber grease and place it in position.
8. Locate the fluid reservoir in position on the master cylinder, and secure with the plain washer and adaptor bolt. Tighten the adaptor bolt to a torque figure of 2,8 to 3,5 kgf.m. (20 to 25 lbf.ft.).
9. Reverse 3 and 4.
10. Reverse 1 and 2; master cylinder fixings torque load is 2,2 to 2,6 kgf.m. (16 to 19 lbf.ft.).
11. Bleed the brake hydraulic system. 70.25.02.



IRC 707



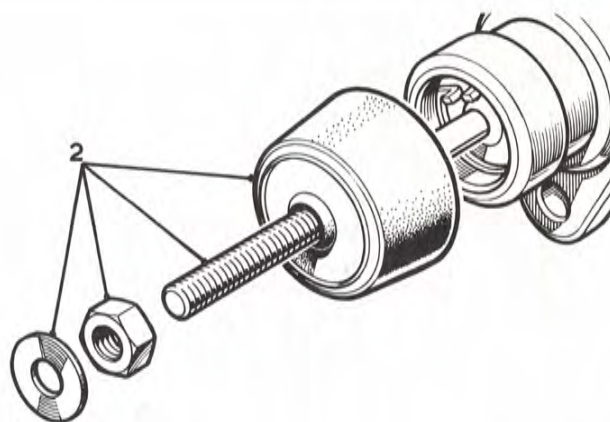
## MASTER CYLINDER, Non-servo systems

-Overhaul

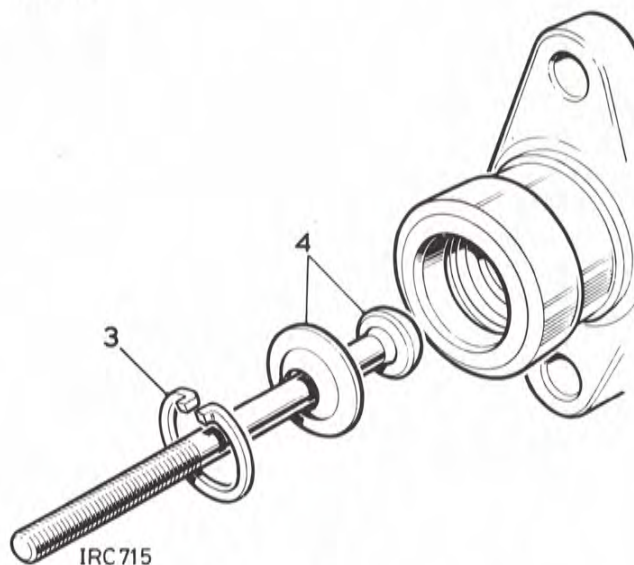
70.30.02

## Dismantling

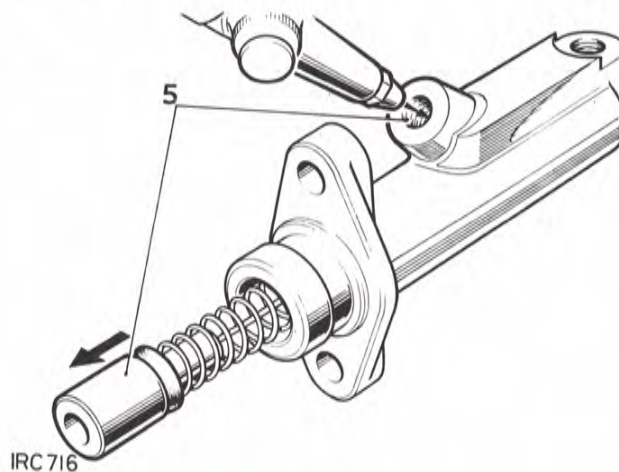
1. Remove the master cylinder. 70.30.01
2. Remove the plain washer, nut and rubber cover from the push rod..
3. Remove the circlip.
4. Withdraw the push rod and retaining washer.
5. Withdraw the piston assembly from the master cylinder. If necessary, apply a low air pressure to the outlet port to expel the piston.

*continued*

IRC 714



IRC 715



IRC 716



## BRAKES

6. Prise the locking prong of the spring retainer clear of the piston shoulder.
7. Withdraw the piston.
8. Remove the piston seal.

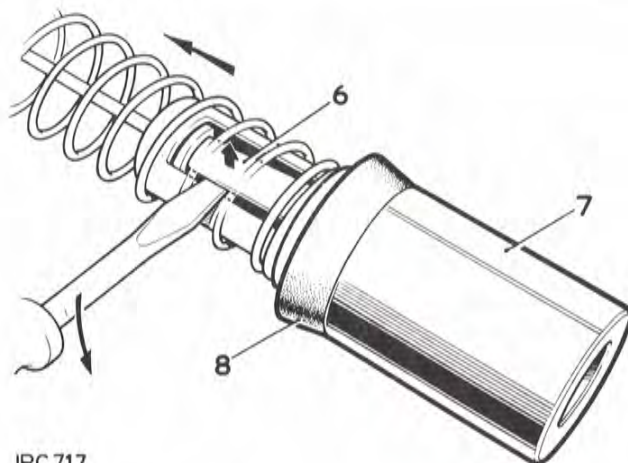
### (Non-servo Systems)

9. Compress the spring and position the valve stem to align with the larger hole in the spring retainer.
10. Withdraw the spring and retainer.
11. Slide the valve spool over the valve stem.
12. Remove the spring washer and valve seal from the stem.

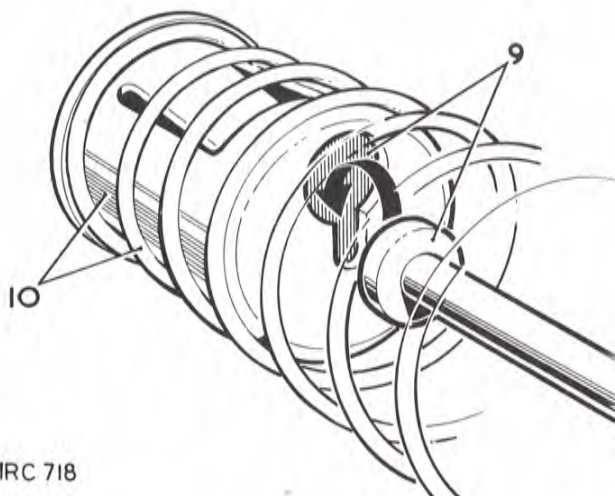
### Inspecting

13. Clean all components in Girling cleaning fluid and allow to dry.
14. Examine the cylinder bore and piston, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacements.
15. The seals should be replaced with new components. These items are included in the master cylinder overhaul kit.

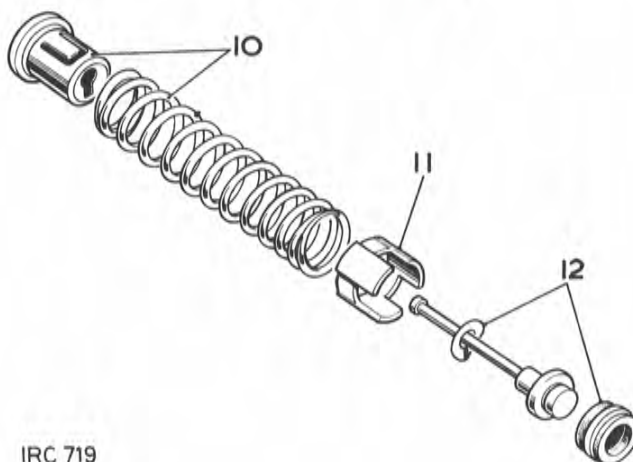
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IRC 717



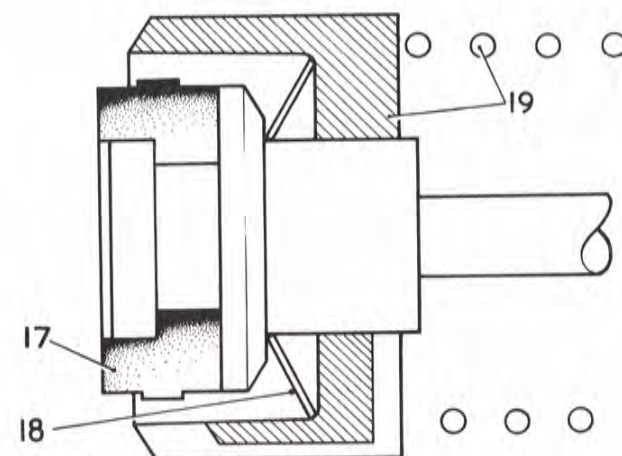
IRC 718



IRC 719

## Assembling

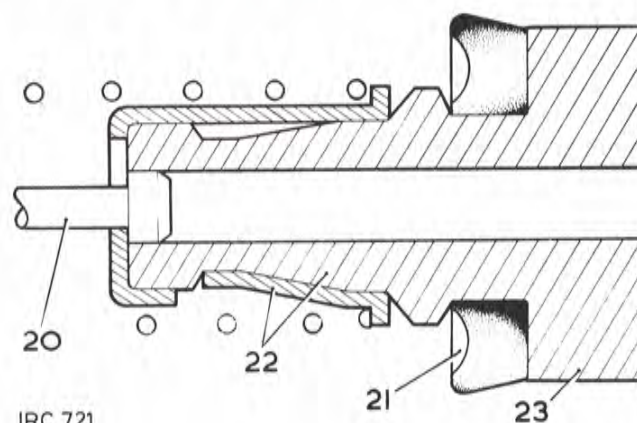
16. Smear the seals with Castrol-Girling rubber grease and and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.
17. Fit the valve seal, flat side first, to the end of the valve stem.
18. Place the spring washer, domed side first, over the small end of the valve stem.
19. Fit the valve spacer, legs first, and the coil spring.
20. Insert the retainer into the spring and compress until the stem passes through the keyhole and is engaged in the centre.



IRC 720

## (Non-Servo Systems)

21. Fit the seal, large diameter last, to the piston.
22. Insert the piston into the spring retainer and engage the locking prong.
23. Smear the piston with Castrol-Girling rubber grease and insert the assembly, valve end first, into the cylinder.
24. Fit the push rod, retaining washer and circlip.
25. Smear liberally the inside of the dust cover with Castrol-Girling rubber grease and fit the cover over the push rod and cylinder.
26. Fit the locknut and washer to the push rod.
27. Refit the master cylinder. 70.30.01.



IRC 721

## DATA

Master cylinder bore size:

- 88 models
- 109 models

19,05 mm (0.750 in.) diameter.  
25,4 mm (1.0 in.) diameter.



## BRAKES

### MASTER CYLINDER, Servo systems

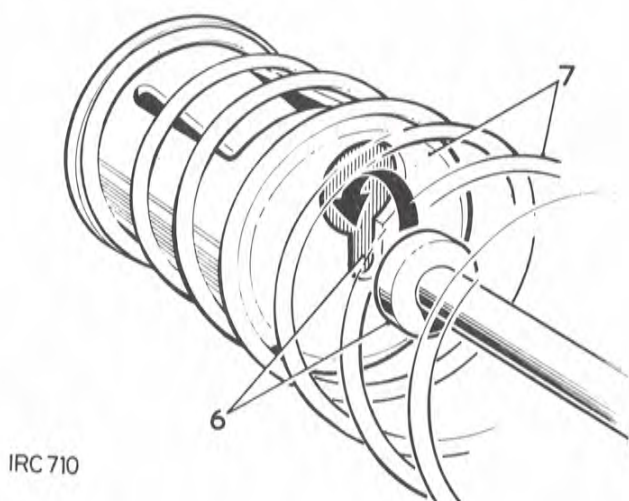
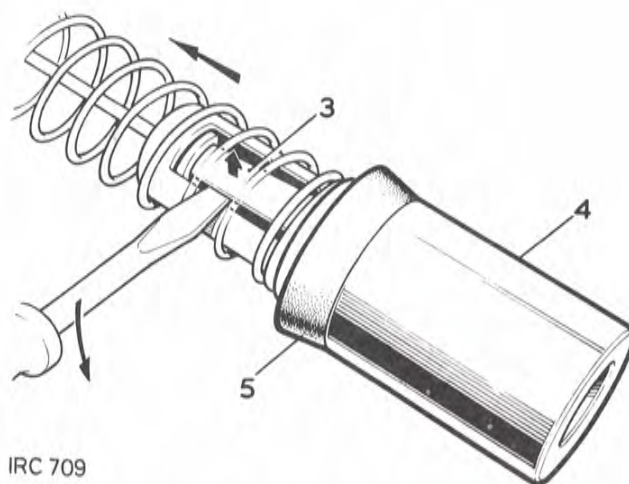
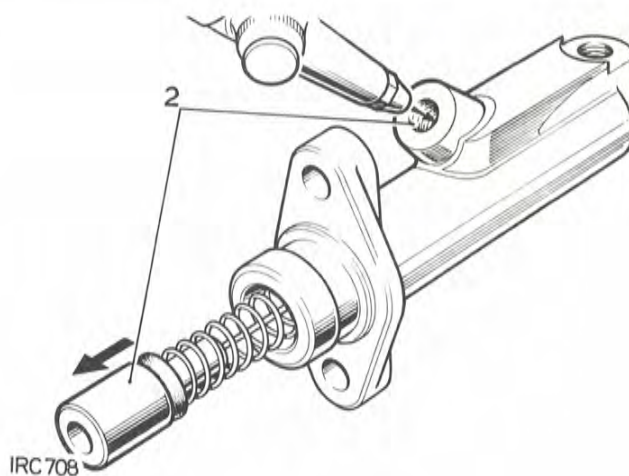
—Overhaul

70.30.02

#### Dismantling

1. Remove the master cylinder. 70.30.01
2. Withdraw the piston assembly from the master cylinder. If necessary, apply a low air pressure to the outlet port to expel the piston.
3. Prise the locking prong of the spring retainer clear of the piston shoulder.
4. Withdraw the piston.
5. Remove the piston seal.
6. Compress the spring and position the valve stem to align with the larger hole in the spring retainer.

*continued*



7. Withdraw the spring and retainer.
8. Slide the valve spacer over the valve stem.
9. Remove the spring washer and valve seal from the stem.

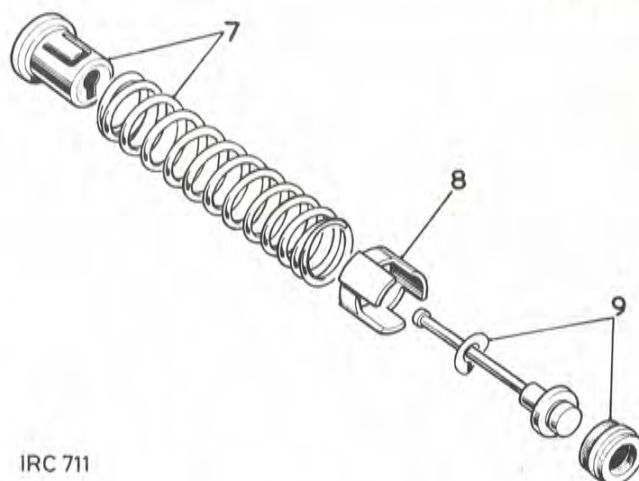
### Inspecting

10. Clean all components in Girling cleaning fluid and allow to dry.
11. Examine the cylinder bore and piston. Ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacements.
12. The seals should be replaced with new components. These items are included in the master cylinder overhaul kit.

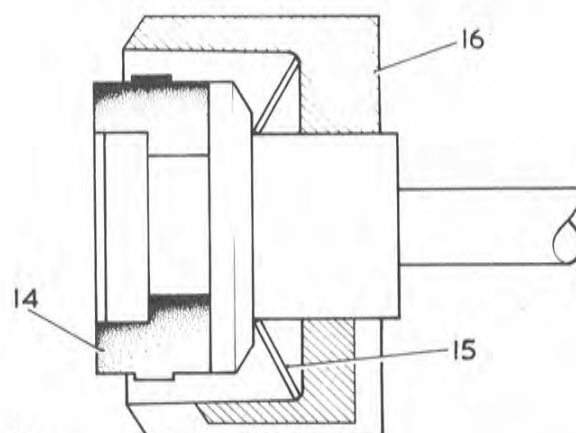
### (Servo systems)

### Assembling

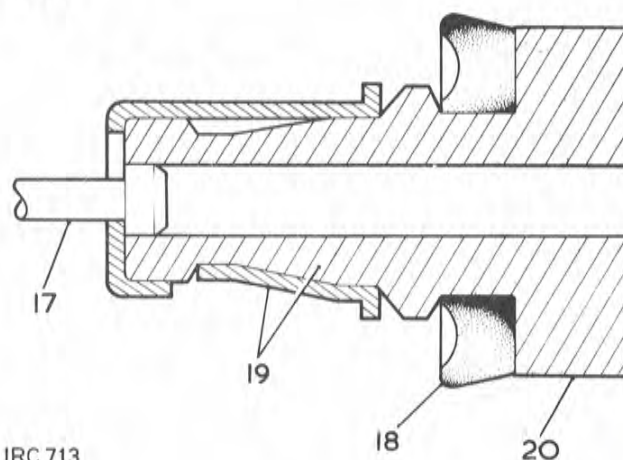
13. Smear the seals with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.
14. Fit the valve seal, flat side first, to the end of the valve stem.
15. Place the spring washer, domed side first, over the small end of the valve stem.
16. Fit the valve spacer, legs first, then the coil spring.
17. Insert the retainer into the spring and compress until the stem passes through the keyhole and is engaged in the centre.
18. Fit the seal, large diameter last, to the piston.
19. Insert the piston into the spring retainer and engage the locking prong.
20. Smear the piston with Castrol-Girling rubber grease and insert the assembly, valve end first, into the cylinder.
21. Liberally smear Castrol-Girling rubber grease inside the piston end of the master cylinder.
22. Refit the master cylinder. 70.30.01.



IRC 711



IRC 712



IRC 713

### DATA

Master cylinder bore size:  
109 models

25,4 mm (1.0 in.) diameter.





## BRAKES

### MASTER CYLINDER, Dual systems

—Remove and refit

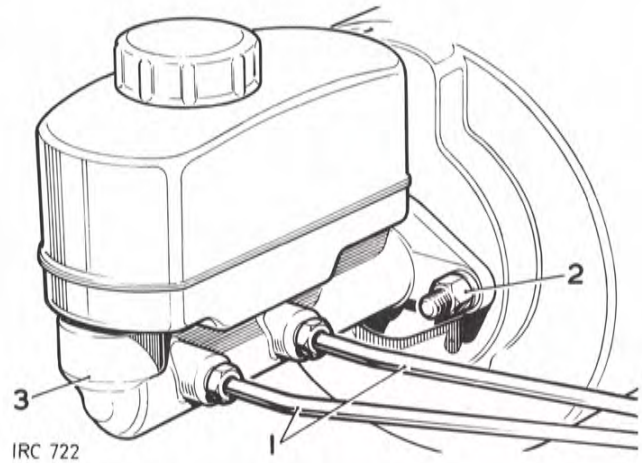
70.30.08

#### Removing

1. Disconnect the brake pipes.
2. Remove the fixings at the flange.
3. Withdraw the master cylinder and fluid reservoir complete.

#### Refitting

4. Reverse 2 and 3. Torque loading 2,2 to 2,6 kgf. m. (16 to 19 lbf.ft.).
5. Reverse 1.
6. Bleed the brakes. 70.25.02.



## MASTER CYLINDER, Dual systems

—Overhaul

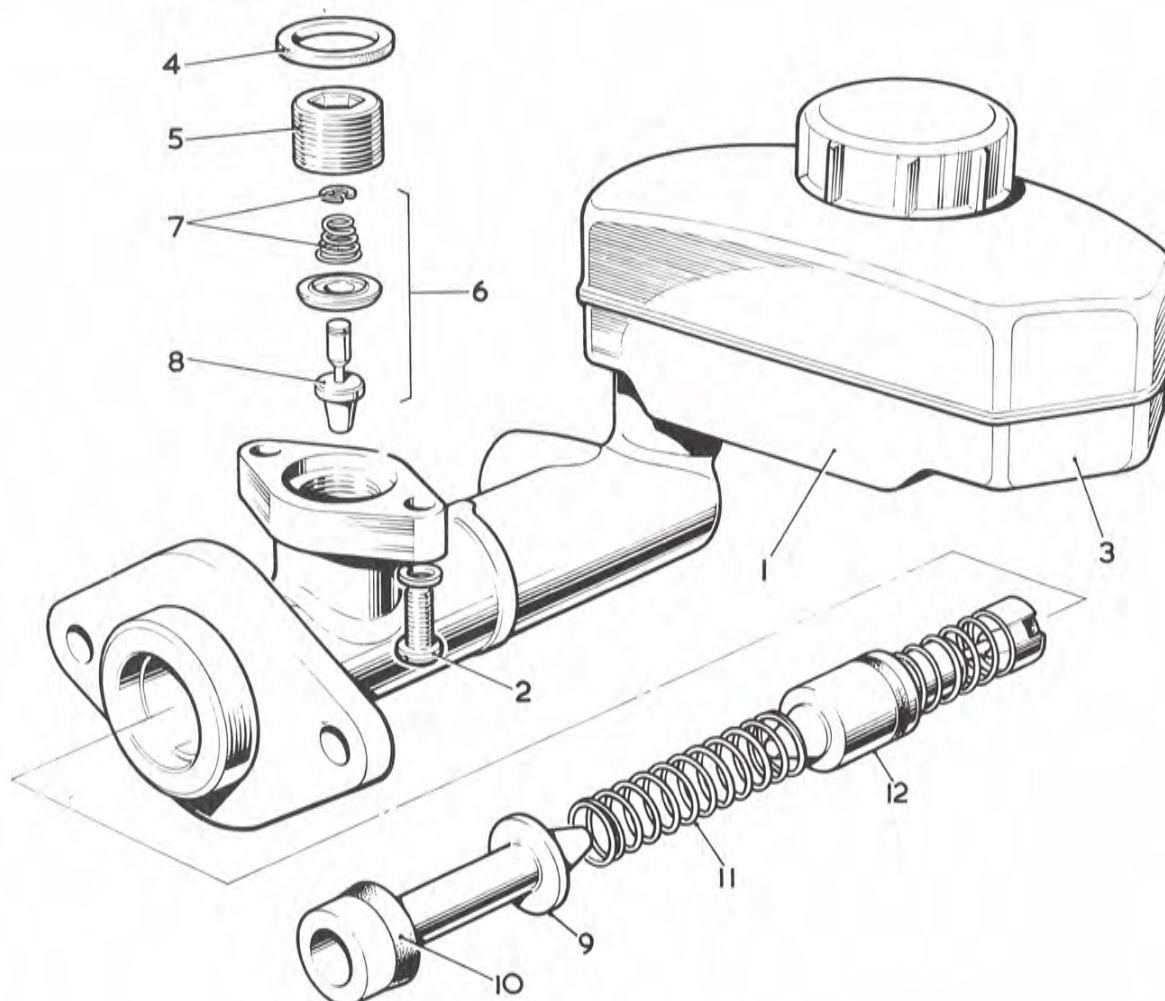
70.30.09

## Dismantling

1. Remove the master cylinder and fluid reservoir complete. 70.30.08.
2. Remove the reservoir fixing screws
3. Pivot the reservoir front end aside to expose the master cylinder front inlet bore.

**NOTE:** Do not attempt to remove completely the reservoir which is retained by an internal fixing at the rear inlet bore.

4. Withdraw the oil seal ring.
5. Unscrew the tipping valve assembly retainer.
6. Lift out the tipping valve assembly.
7. Remove the retaining circlip and withdraw the spring.
8. Withdraw the tipping valve from the seal plate.
9. Withdraw the outer piston.
10. Remove and discard the oil seal.
11. Withdraw the piston spring.
12. Withdraw the inner piston and valve assembly.

*continued*

IRC 723



## BRAKES

13. Prise the spring retainer locking prong clear of the piston shoulder and withdraw the piston and spring.
14. Remove and discard the oil seal.
15. Position the valve stem to align with the larger hole in the valve retainer. Withdraw the retainer.
16. Slide the valve spacer over the valve stem. Remove the wave washer and valve seal from the stem.

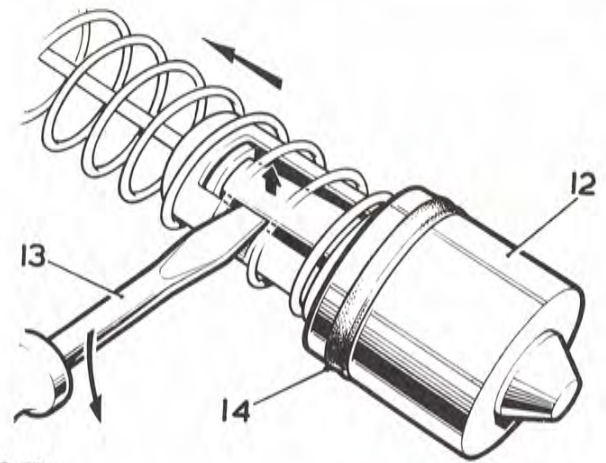
### Inspecting

17. Clean all components in Girling cleaning fluid and allow to dry.
18. Examine the cylinder bore and pistons, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacements.
19. The seals should be replaced. These items are included in the master cylinder overhaul kit.

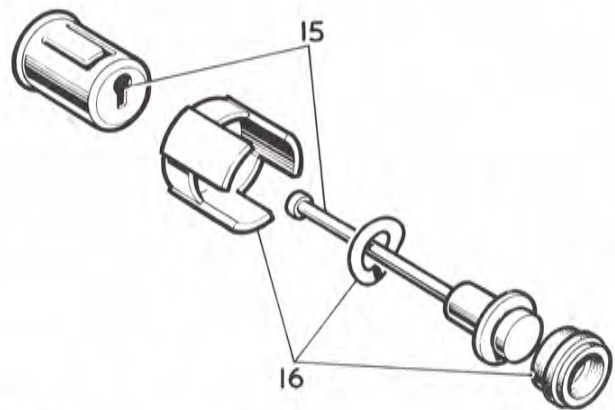
### Assembling

20. During assembly, smear the seals with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.
21. Fit the valve seal, flat side first, to the end of the valve stem.
22. Fit the wave washer, domed side toward the valve head.
23. Fit the valve spacer, legs first.
24. Fit the valve retainer.

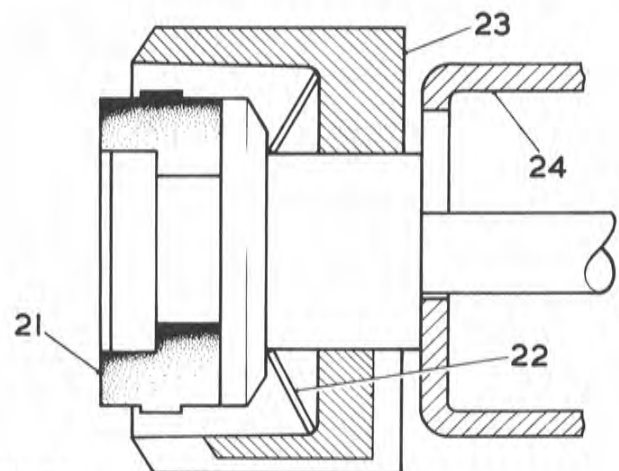
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IRC 724

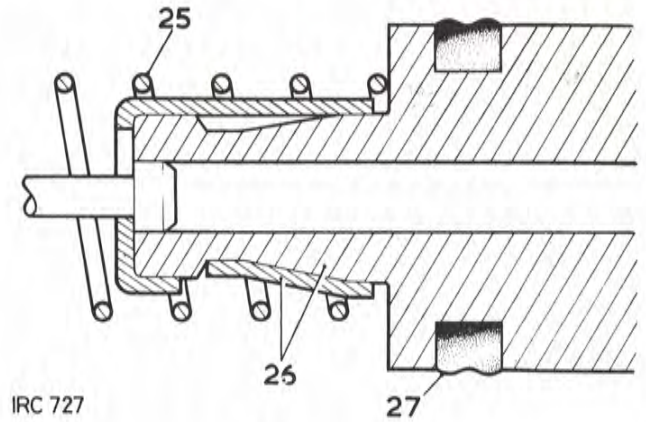


IRC 725



IRC 726

25. Locate the spring over the retainer and squarely seat on the valve spacer.
26. Insert the inner piston into the spring and compress until the locking prong on the valve retainer engages in the groove in the piston. If necessary, depress the locking prong to ensure that the free end is fully engaged with the groove shoulder.
27. Fit the piston seal.
28. Insert the inner piston and valve assembly, valve end first, into the cylinder.
29. Reverse 5 to 9. Torque loading for tipping valve retainer is 4,9 to 6,2 kgf.m. (35 to 45 lbf.ft.).
30. Reverse 2 to 4. Do not overtighten the reservoir fixings. Torque load 0,3 to 0,4 kgf.m. (2 to 3 lbf.ft.).
31. Refit the master cylinder. 70.30.08



**DATA**

Master cylinder bore size:  
 88 models  
 109 models

22,2 mm (0.875 in.) diameter.  
 25,4 mm (1.0 in.) diameter.

**FLUID RESERVOIR Non-Servo Systems**

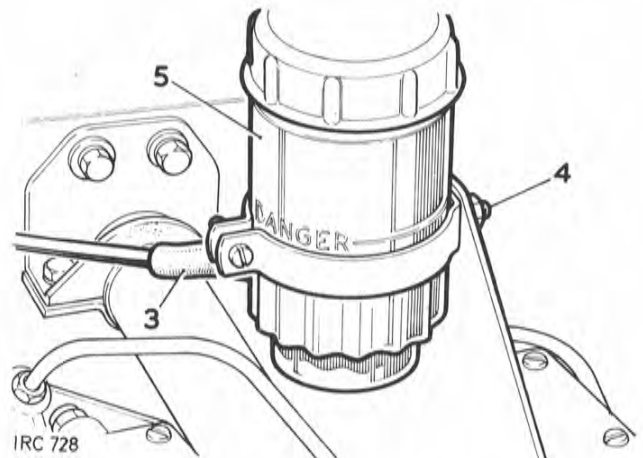
–Remove and refit 70.30.15

**Removing**

1. Lift the bonnet and prop open.
2. Make provision to catch the fluid which will be released.
3. Disconnect the fluid outlet pipe.
4. Remove the clamp fixings.
5. Withdraw the reservoir.

**Refitting**

6. Reverse 2 to 5.
7. Bleed the hydraulic system. 70.25.02.
8. Close the bonnet.



## BRAKES

### BRAKE PEDAL, Non-servo systems

—Remove and refit

70.35.01

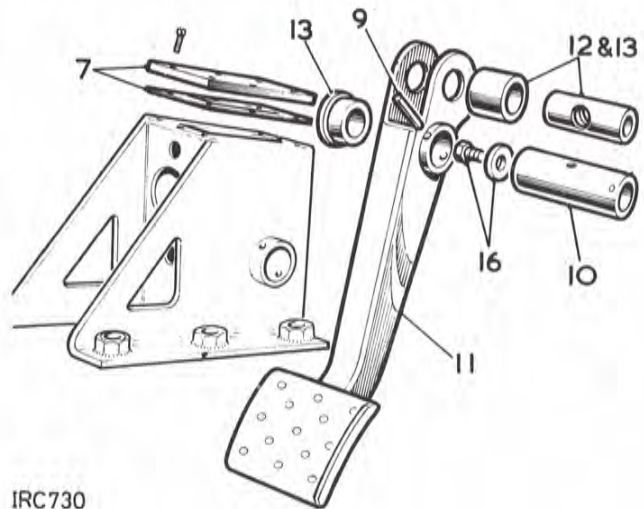
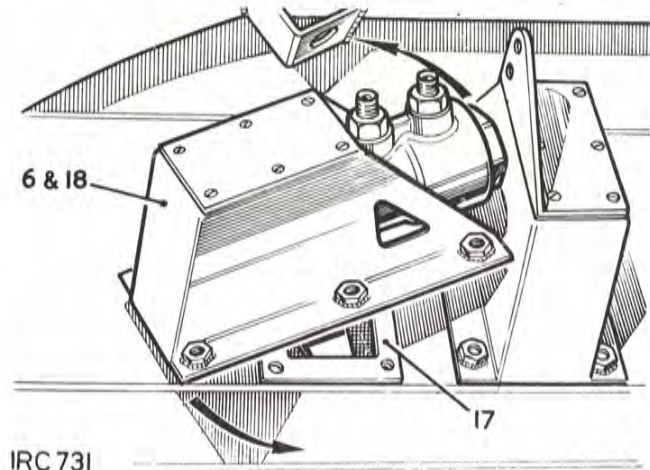
#### Removing

1. Lift and prop the bonnet.
2. Disconnect the inlet pipe at the master cylinder.
3. Disconnect the outlet pipe.
4. Disconnect the return spring from the brake pedal.
5. Remove the fixings securing the brake pedal bracket to the toe box.
6. Carefully withdraw the brake pedal and bracket assembly from the engine compartment, manoeuvring the pedal through the aperture in the toe box.
7. Remove the top cover and gasket from the brake pedal bracket.
8. Remove the nut and plain washer retaining the master cylinder push rod to the brake pedal trunnion, and push the rod into the master cylinder to clear the trunnion.
9. Using a suitable punch, drift out pin, from the pedal shaft.
10. Remove pedal shaft.
11. Withdraw the brake pedal complete with bushes and trunnion.
12. If required, remove the bushes, trunnion and distance piece from the brake pedal.

#### Refitting

13. If removed, fit the distance piece, trunnion and bushes to the brake pedal. Lubricate the trunnion and distance piece with general purpose grease on assembly. New pedal bushes must be reamed to 15,875 mm + 0,0254 mm (0.750 in. + 0.001 in.).
14. Smear the pedal bushes and shaft with general purpose grease; locate the pedal in position in the bracket and secure with the shaft and pin.
15. Locate the master cylinder push rod through the pedal trunnion and fit the locknut and washer.
16. Remove the oil plug from the pedal shaft; fill the shaft bore with SAE 20 oil, then replace the plug and joint washer.

*continued*

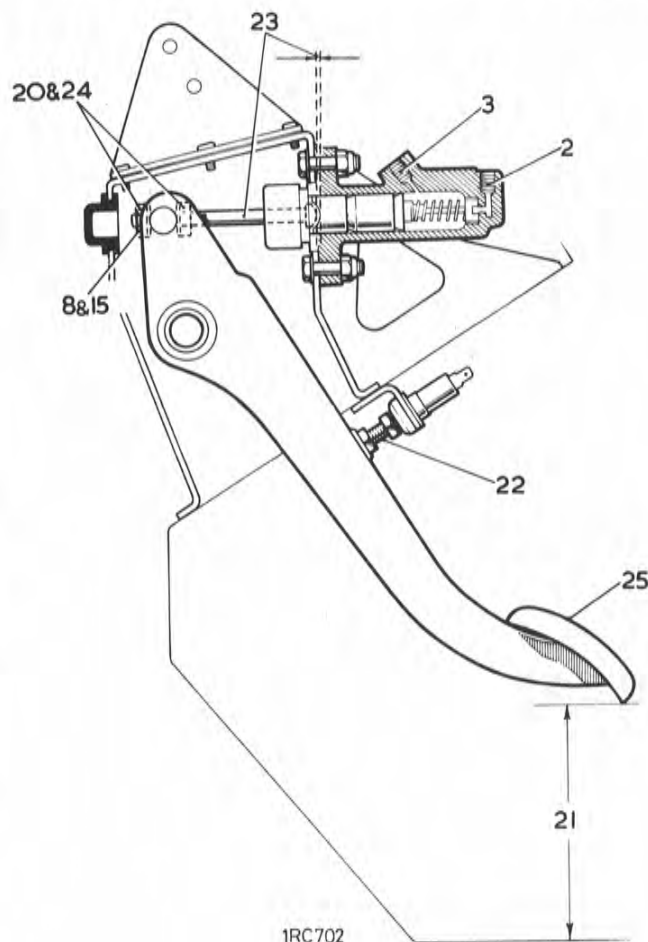


**(Non-Servo systems)**

17. Place the gasket in position on the securing flange of the brake pedal bracket. If necessary, use a little Bostik adhesive to retain the gasket.
18. Carefully locate the brake pedal and bracket assembly in position on the toe box, manoeuvring the pedal through the aperture in the toe box.
19. Secure the brake pedal and bracket assembly to the toe box, ensuring that the gasket remains in position.

**Master cylinder and pedal setting, items 20 to 25.**

20. Slacken both nuts on the master cylinder push rod.
21. Check the pedal setting which should be 158 mm (6.250 in.) with the stop light switch depressed to the 'off' position.
22. Adjust the pedal stop, as required, to obtain the correct distance.
23. Adjust the master cylinder push rod until there is 1,5 mm (0.062 in.) approximately free play between the push rod and the master cylinder piston.
24. Tighten both locknuts.
25. Ensure there is 3,17 mm (0.125 in.) minimum free movement at the pedal before pressure is felt. If necessary, re-adjust the master cylinder push rod to obtain the movement.
26. Fit the pedal bracket cover and gasket.
27. Reverse 1 to 4.



# BRAKES

## BRAKE PEDAL, Servo Systems

—Remove and refit

70.35.01

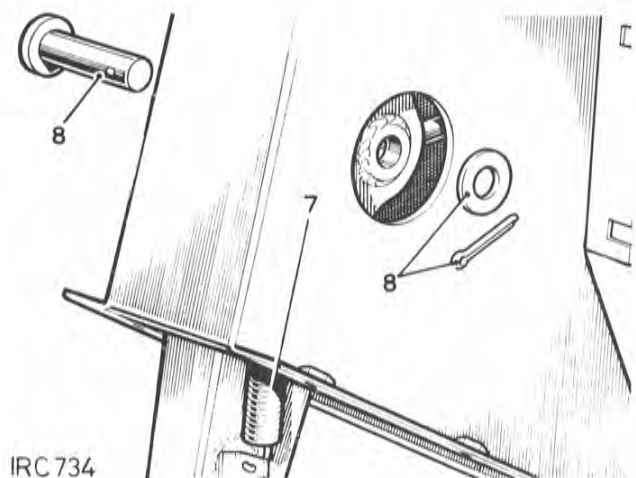
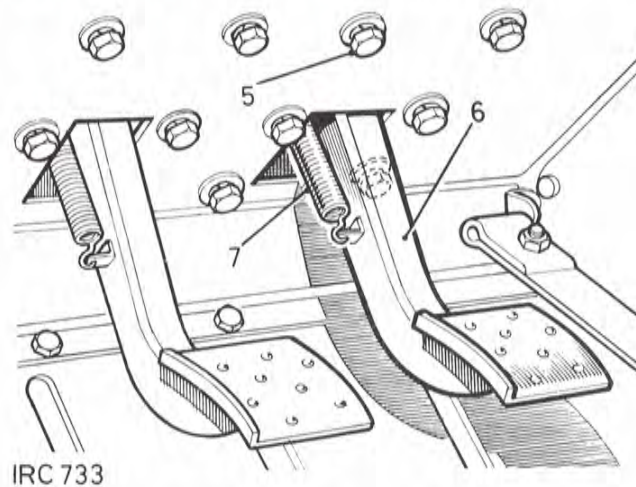
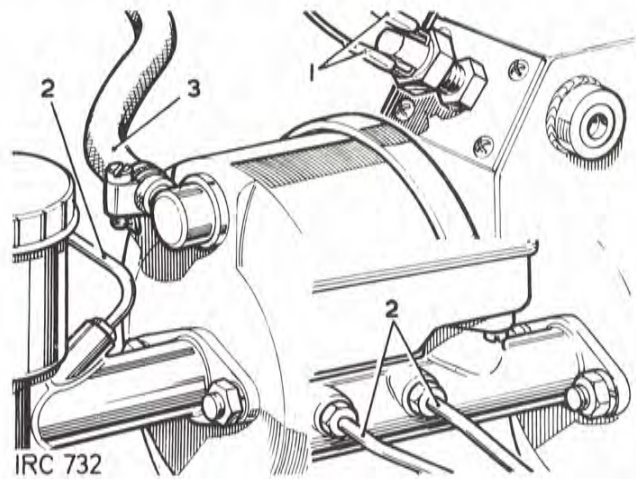
### Removing

1. Disconnect the electrical lead from the stop light switch.
2. Disconnect the outlet pipe/s from the master cylinder. Fit a blanking plug to the outlet aperture/s or drain the fluid reservoir, to prevent fluid spillage.

**NOTE:** The illustration inset shows a tandem master cylinder, where fitted.

3. Disconnect the vacuum pipe from the servo unit.
4. Remove the toe-board finisher panel.
5. Remove the fixings securing the brake pedal bracket to the toe box.
6. Withdraw the brake pedal and bracket assembly from the engine compartment, manoeuvring the pedal through the aperture in the toe box.
7. Disconnect the brake pedal return spring.
8. Remove the split pin and pivot pin from the brake pedal to servo coupling.

*continued*



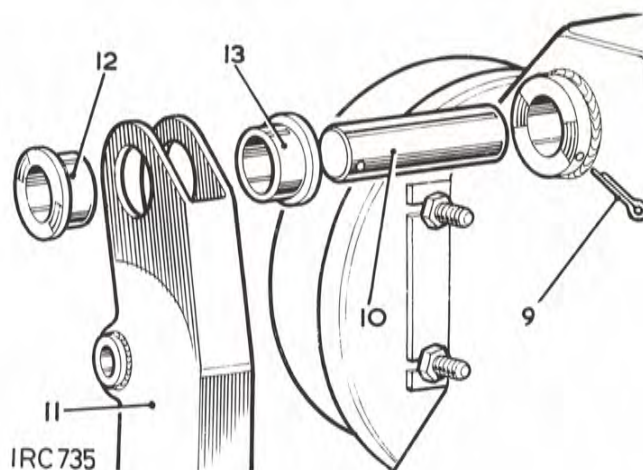
9. Using a suitable punch, drift out pin from the pedal shaft.
10. Remove pedal shaft.

**(Servo Systems)**

11. Withdraw the brake pedal complete with bushes.
12. If required, remove the bushes from the pedal.

**Refitting**

13. If removed, fit the bushes to the brake pedal. New bushes must be reamed to 15,875 mm + 0,025 mm (0.750 in. + 0.001 in.).
14. Reverse 7 to 10, using general purpose grease to lubricate moving parts.
15. Apply a waterproof sealant between the joint flanges of the pedal bracket and the tow box.
16. Reverse 1 to 6.
17. Check, and if necessary, adjust the brake pedal switch located on the pedal box top cover to operate at 19 mm to 25 mm (0.750 in. to 1 in.) of pedal movement.
18. Bleed the complete braking system. 70.25.02.





## BRAKES

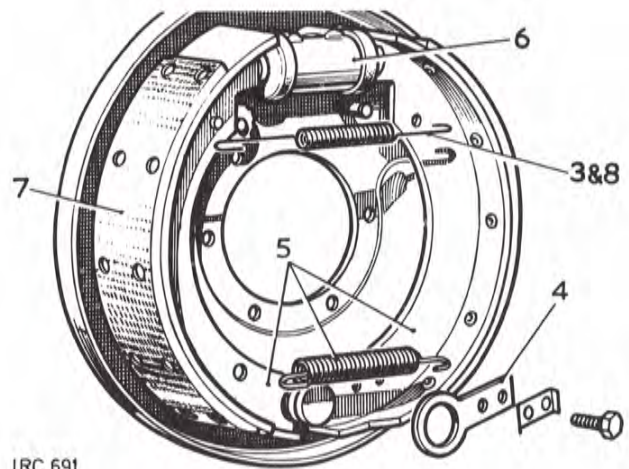
### BRAKE SHOES – 88 models

#### –Remove and refit

Front shoes	70.40.02
Rear shoes	70.40.03

#### Removing

1. Remove the road wheel.
2. Remove the brake drum. 70.10.02 or 70.10.03 as applicable.
3. Remove the leading shoe pull-off spring.
4. Remove the trailing shoe anchor plate.
5. Withdraw the brake shoes together from the pivot end first; part them by disconnecting the return spring;
6. Retain the pistons in the wheel cylinder, using a rubber band.
7. If required, re-line the brakes. 70.40.10



IRC 691

#### Refitting

8. Reverse 2 to 6, refitting the leading shoe pull-off spring with its longest extremity hooked over the post on the shoe web.
9. Adjust the brakes fully on, then back off two serrations on the adjuster.
10. Reverse 1.

#### DATA

Brake shoe width

38 mm (1.5 in.).

## FRONT BRAKE SHOES – 109 models

–Remove and refit

70.40.02

## Removing

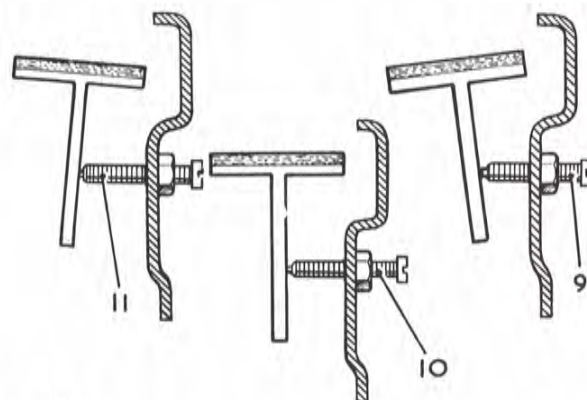
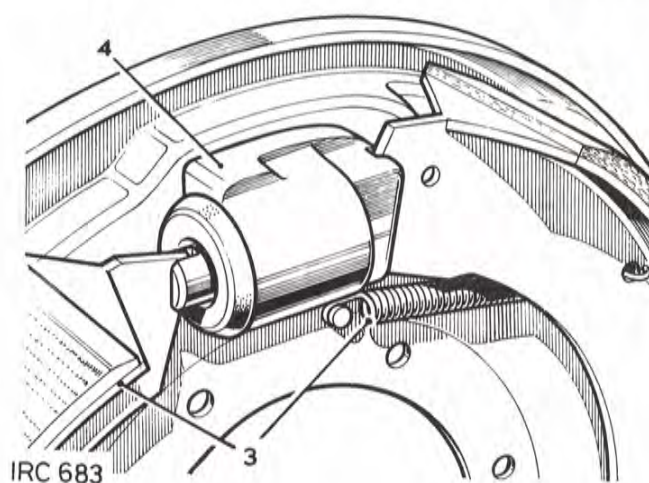
1. Remove the road wheel.
2. Remove the brake drum. 70.10.02.
3. Release the brake shoes and pull-off springs by levering the trailing edges away from the wheel cylinders.
4. Retain the pistons in the wheel cylinders, using a rubber band.
5. If required, re-line the brake shoes. 70.40.10.

## Refitting

**NOTE:** Ensure that the correct width of brake shoe is fitted as follows:

109 models with 4-cylinder engines – 57 mm (2.250 in.) wide; 109 models with 6-cylinder engines – 76 mm (3.0 in.) wide.

6. Reverse 2 to 4.
7. Adjust the brakes fully on, then back-off two serrations on the adjusters.
8. If the brake shoe steady posts have been disturbed, reset as follows, items 9 to 11.
9. Screw back the steady posts clear of the brake shoes and apply the brakes.
10. Screw in the steady posts to contact the brake shoes and then secure.
11. Do not tilt the brake shoes by screwing in the steady posts too far.
12. Reverse 1.



## DATA

Brake shoe width

4 cylinder engine models  
6 cylinder engine models

57 mm (2.250 in.).  
76 mm (3.0 in.).



## BRAKES

### REAR BRAKE SHOES – 109 models

–Remove and refit

70.40.03

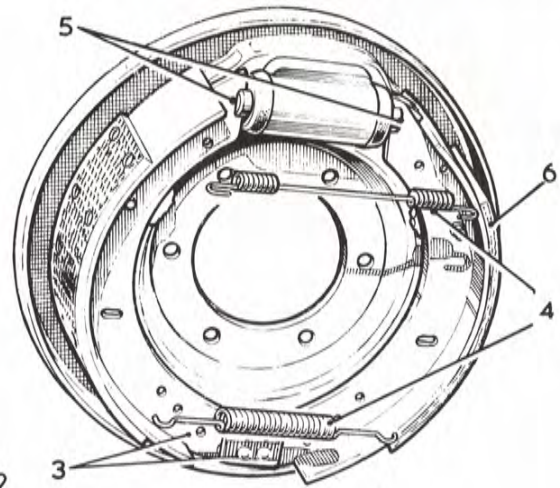
#### Removing

1. Remove the road wheel.
2. Remove the brake drum. 70.10.03.
3. Release the brake shoes by levering the shoes away from the pivot.
4. Disconnect the springs.
5. Retain the pistons in the wheel cylinder, using a rubber band.
6. If required, re-line the brake shoes 70.40.10.

#### Refitting

7. Reverse 2 to 4.
8. Adjust the brakes fully on, then back-off two serrations on the adjuster.
9. Reverse 1.

IRC 692



## BRAKE LININGS

–Remove and refit

70.40.10

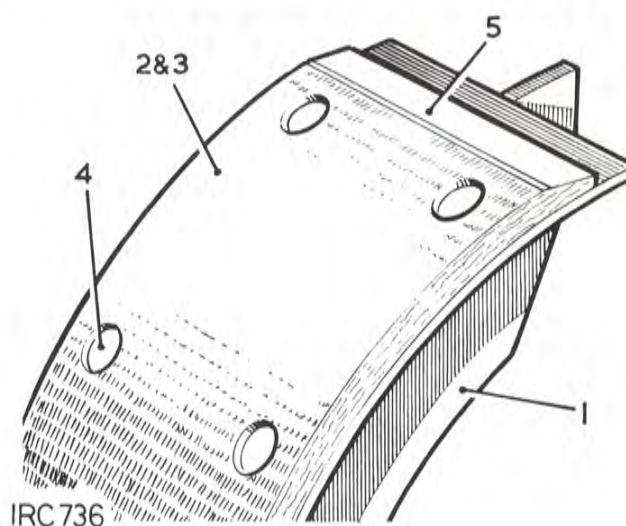
## Removing

1. Remove the brake shoes. 70.10.25 and 70.10.26.
2. Remove the old linings from the shoes by shearing the rivets.

**NOTE:** Brake shoes fitted with bonded linings: If the shoes incorporate rivet holes, the bonded linings can be removed and rivetted linings can be fitted in their place. If the shoes are not pre-drilled, replacement shoe and lining assemblies must be fitted.

## Refitting

3. Attach the new linings to the shoes, commencing at the centre and working outwards, but only peen the rivets sufficient to locate the linings.
4. Then with all the rivets loosely fitted, fully secure, commencing from the centre again.
5. Chamfer both ends of each lining.
6. Reverse 1.



# BRAKES

## TRANSMISSION BRAKE, HAND LEVER AND LINKAGE

—Remove and refit

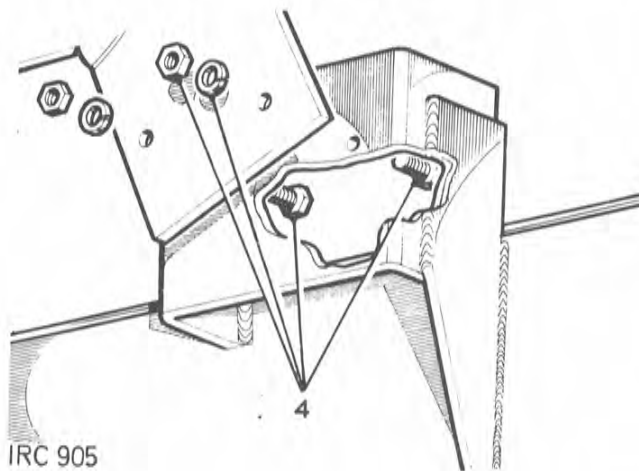
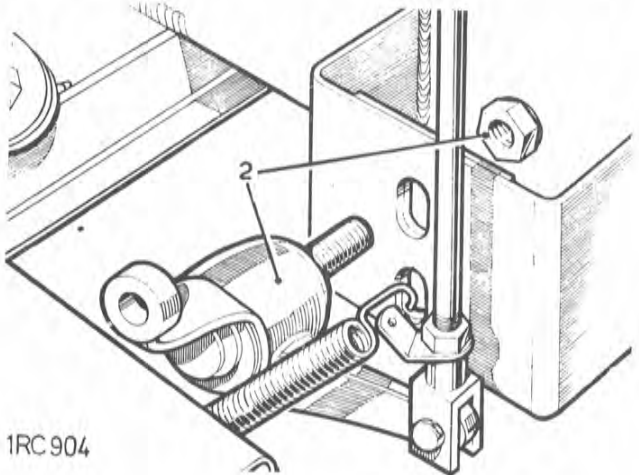
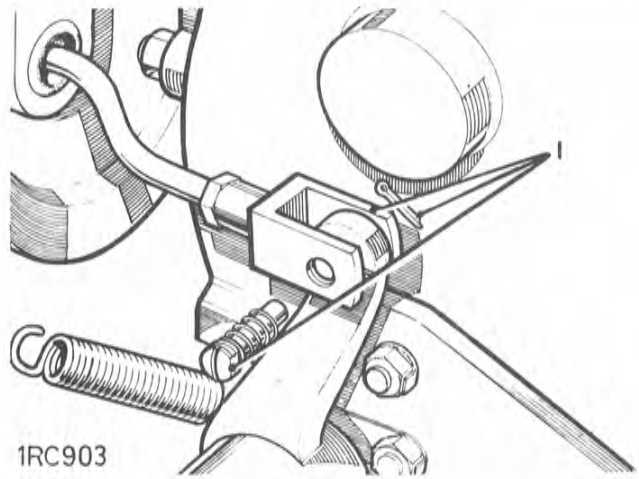
70.45.01

### Removing

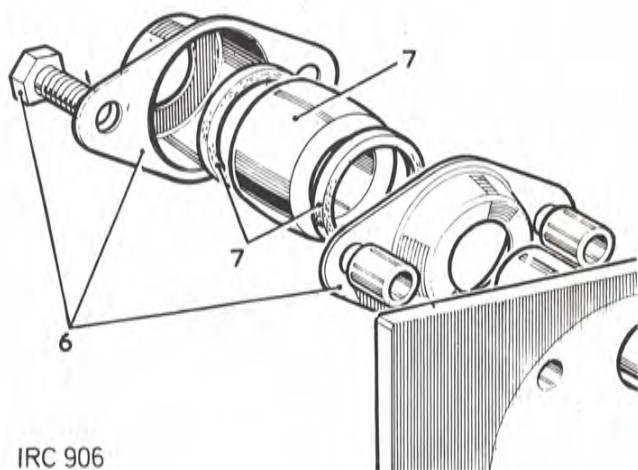
**CAUTION:** Before commencing work on the hand brake mechanism, chock the road wheels to prevent the vehicle moving.

1. From under the vehicle, disconnect the hand brake expander rod from the relay lever.
2. Remove the relay lever fixings.
3. LHStg models—Remove the fixings between the hand brake cross-shaft and the R.H. chassis member.
4. Remove the fixings securing the hand brake lever to the chassis.

*continued*



5. Remove the hand brake assembly complete from the vehicle, withdrawing the lever grip carefully through the rubber draught excluder in the front of the seat box.  
LHStg models—To facilitate removal, release the hand brake lever to ratchet fixings and withdraw the cross-shaft and lever separately.
6. LHStg models—If required, remove the split housings from the cross-shaft support brackets;
7. Remove the felt dust seals and self-lubricating bushes supporting the hand brake cross-shaft.
8. Remove the brake catch pin, catch and distance pieces.
9. RHStg models—Remove the fulcrum pin, ratchet fixings and ratchet from the hand brake lever.
10. Unscrew the plunger and withdraw the spring, washer and the plunger rods.
11. If required, remove the relay lever and spindle. If necessary, press the bush from the lever.



IRC 906

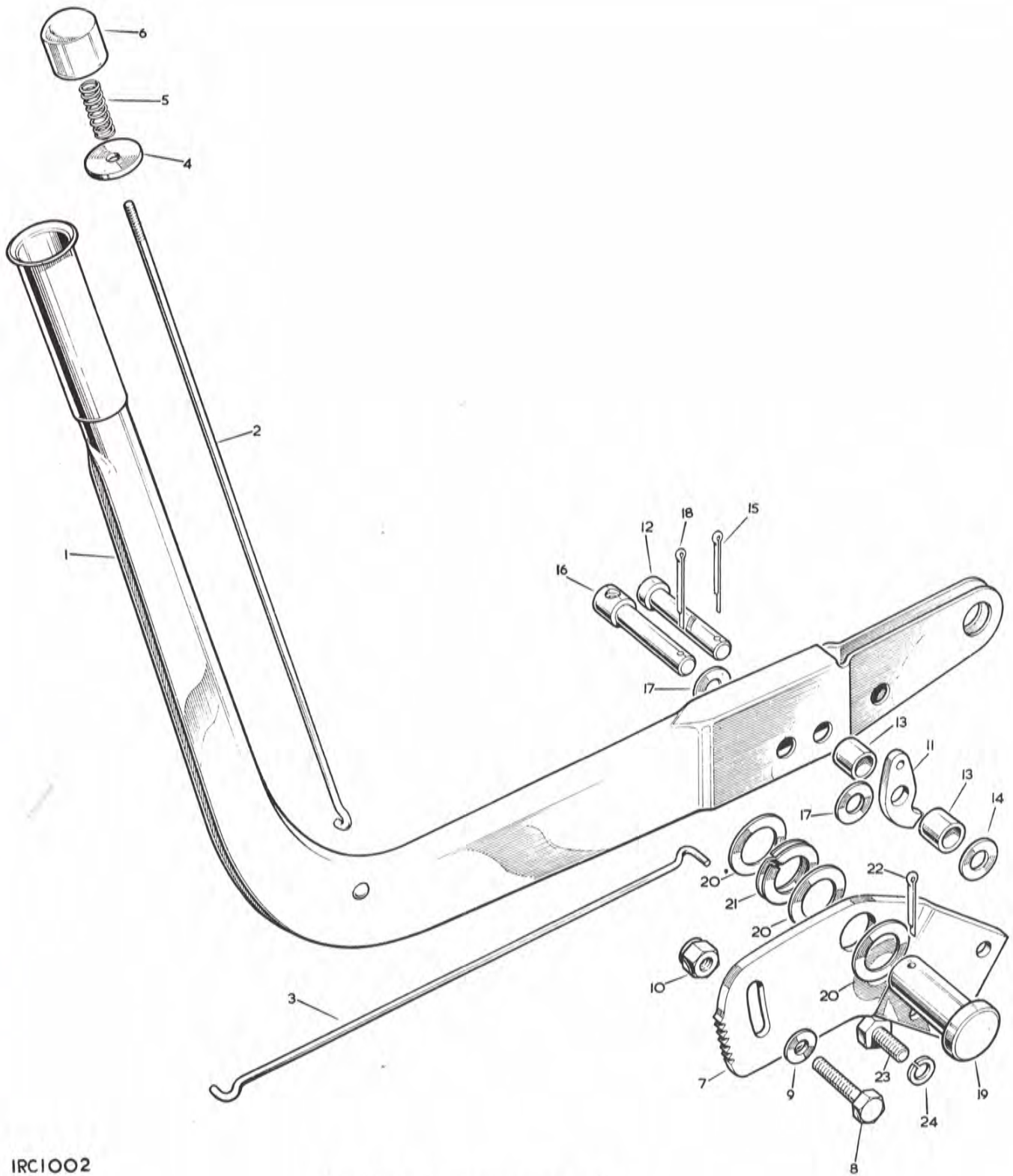
### Refitting

12. If removed, fit the bush to the relay lever and fit the relay lever and spindle to the chassis.

**NOTE:** The bore size of a new relay lever bush is 19,088 mm  $-0,0254$  mm (0.7515 in.  $-0.001$  in.).

13. Reverse 1 to 11; lubricate the cross shaft bearings with general purpose grease.
14. Set the hand brake linkage at the vertical adjuster rod, so that the hand brake has one or two clicks free movement in the 'off' position.

*continued*



IRC1002

Hand brake lever arrangement, RHStg.

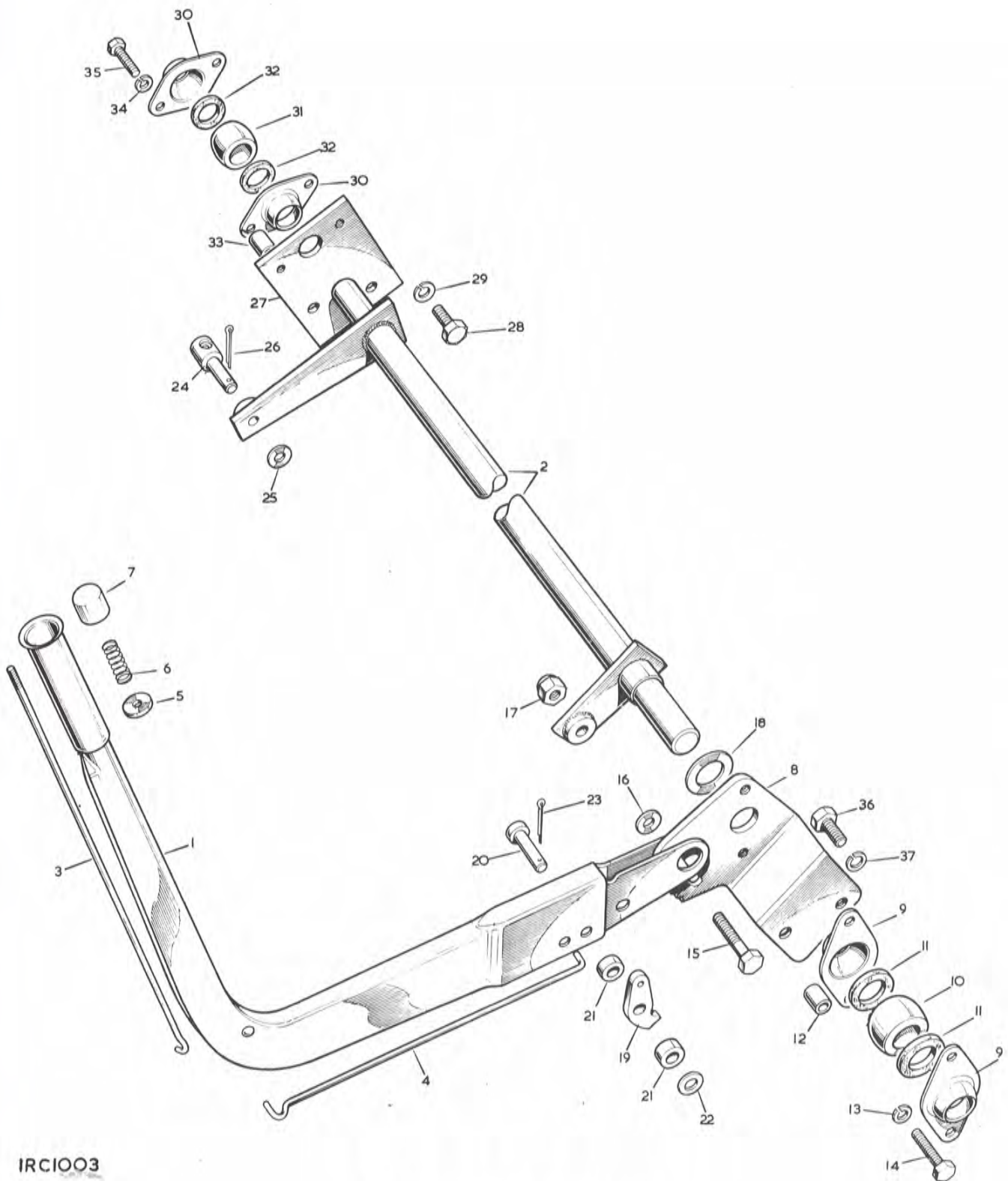


## Key to handbrake lever arrangement, RHStg

- |     |                                     |  |
|-----|-------------------------------------|--|
| 1.  | Hand brake lever                    |  |
| 2.  | Plunger rod, upper                  |  |
| 3.  | Plunger rod, lower                  |  |
| 4.  | Washer for plunger spring           |  |
| 5.  | Spring for plunger rod              |  |
| 6.  | Plunger                             |  |
| 7.  | Ratchet for hand brake              |  |
| 8.  | Bolt (3/8 in. UNF x 1.1/4 in. long) | } Fixing<br>lever to<br>ratchet                  |
| 9.  | Plain washer                        |  |
| 10. | Self-locking nut (3/8 in. UNF)      |  |
| 11. | Brake catch                         |  |
| 12. | Pin                                 | } Fixing catch                                   |
| 13. | Distance piece                      |  |
| 14. | Plain washer                        |  |
| 15. | Split pin                           |  |
| 16. | Pin for hand brake adjuster rod     |  |
| 17. | Plain washer                        | } Fixing pin to<br>hand brake lever              |
| 18. | Split pin                           |  |
| 19. | Fulcrum pin for hand brake lever    |  |
| 20. | Plain washer                        | } Fixing pin<br>to ratchet<br>and lever          |
| 21. | Spring washer                       |  |
| 22. | Split pin                           |  |
| 23. | Bolt (3/8 in. UNF x 7/8 in. long)   | } Fixing hand brake<br>lever to<br>chassis frame |
| 24. | Spring washer<br>Nut (3/8 in. UNF)  |  |







IRC1003

Hand brake lever arrangement, LHStg



## Key to handbrake lever arrangement, LHStg

- |     |  |   |
|-----|--|---|
| 1.  | Hand brake lever                             |   |
| 2.  | Cross-shaft for hand brake                   |   |
| 3.  | Plunger rod, upper                           |   |
| 4.  | Plunger rod, lower                           |   |
| 5.  | Washer for plunger spring                    |   |
| 6.  | Spring for plunger rod                       |   |
| 7.  | Plunger                                      |   |
| 8.  | Ratchet for hand brake                       |   |
| 9.  | Housing for cross-shaft bearing              |   |
| 10. | Spherical bearing for cross-shaft            |   |
| 11. | Felt ring for bearing                        |   |
| 12. | Distance piece                               | } Fixing bearing<br>and housing                     |
| 13. | Spring washer                                |   |
| 14. | Set bolt (5/16 in. UNF x 1.1/8 in. long)     | } to ratchet  |
| 15. | Bolt (3/8 in. UNF x 1.3/4 in. long)          |   |
| 16. | Plain washer                                 | } Fixing lever<br>to ratchet                        |
| 17. | Self-locking nut (3/8 in. UNF)               |   |
| 18. | Plain washer between lever and ratchet       |   |
| 19. | Brake catch                                  |   |
| 20. | Pin  |   |
| 21. | Distance Piece                               | } Fixing catch<br>to lever                          |
| 22. | Plain washer                                 |   |
| 23. | Split pin                                    |   |
| 24. | Pin for hand brake adjuster rod              |   |
| 25. | Plain washer                                 | } Fixing pin to<br>cross-shaft lever                |
| 26. | Split pin                                    |   |
| 27. | Support plate for hand brake bearing housing |   |
| 28. | Bolt (3/8 in. UNF x 7/8 in. long)            | } Fixing support<br>plate to<br>chassis frame       |
| 29. | Spring washer                                |   |
| 29. | Nut (3/8 in. UNF)                            |   |
| 30. | Housing for cross-shaft bearing              |   |
| 31. | Spherical bearing for cross-shaft            |   |
| 32. | Felt ring for bearing.                       |   |
| 33. | Distance piece                               | } Fixing housing<br>and bearing to<br>support plate |
| 34. | Spring washer                                |   |
| 35. | Set bolt (5/16 in. BSF x 7/8 in. long)       |   |
| 36. | Bolt (3/8 in. UNF x 7/8 in. long)            |   |
| 37. | Spring washer                                | } Fixing hand brake<br>lever to<br>chassis frame    |
|     | Nut (3/8 in. UNF)                            |   |

## BRAKES

### TRANSMISSION BRAKE ASSEMBLY

- Adjust 36 to 39 70.45.09
- Remove and refit 1 to 39 70.45.16

### TRANSMISSION BRAKE SHOES

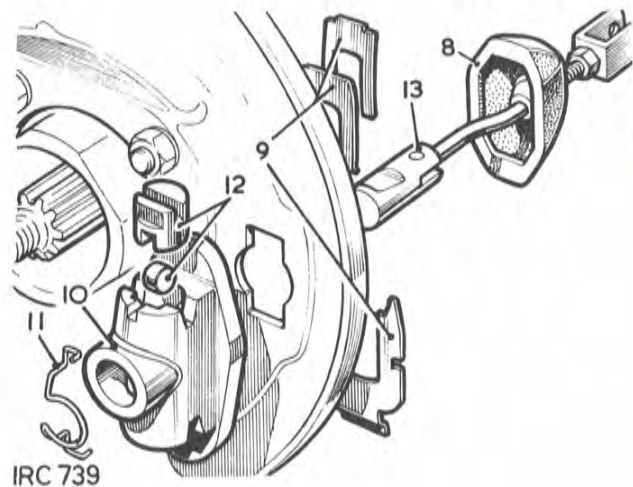
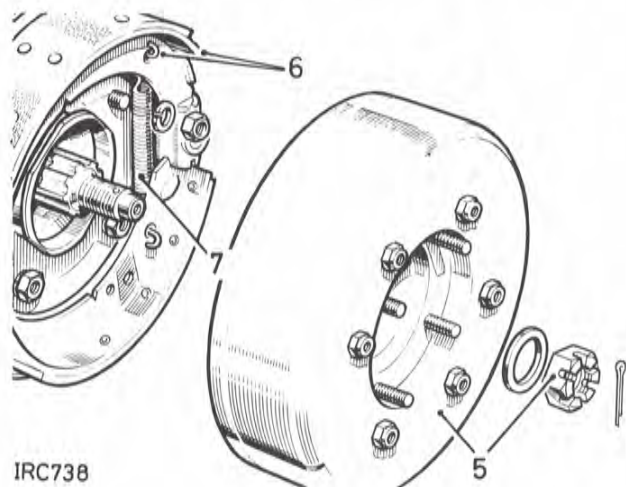
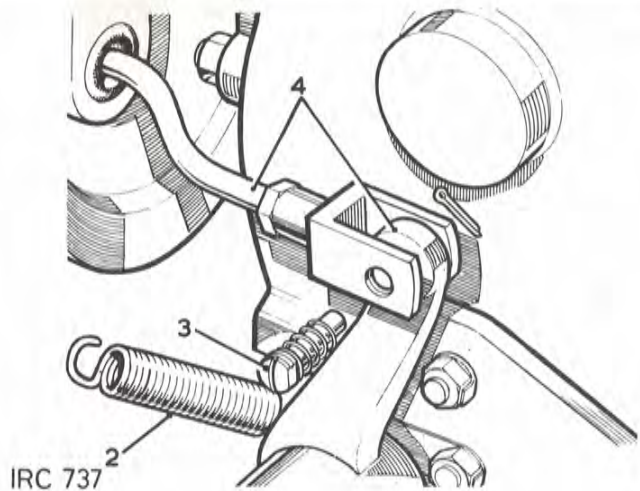
- Remove and refit 1 to 7, 32 to 39 70.45.18

#### Removing

**NOTE:** It is not essential to remove the transmission brake from the vehicle, the brake shoe components are accessible after removing the brake drum, which can be detached from the gearbox output flange and pushed back over the propeller shaft.

1. Chock the road wheels.
2. Disconnect the brake return spring.
3. Remove the expander rod fork fixings.
4. Disconnect the expander rod from the relay lever.
5. Remove the fixings and withdraw the brake drum.
6. Remove the brake shoes together with the pull-off springs.
7. Separate the shoes by detaching the springs.
8. Withdraw the dust excluder.
9. Remove the expander unit fixing plates.
10. Withdraw the expander unit.
11. Remove the spring clip from the expander unit.
12. Withdraw the plungers and rollers.
13. Withdraw the operating rod.

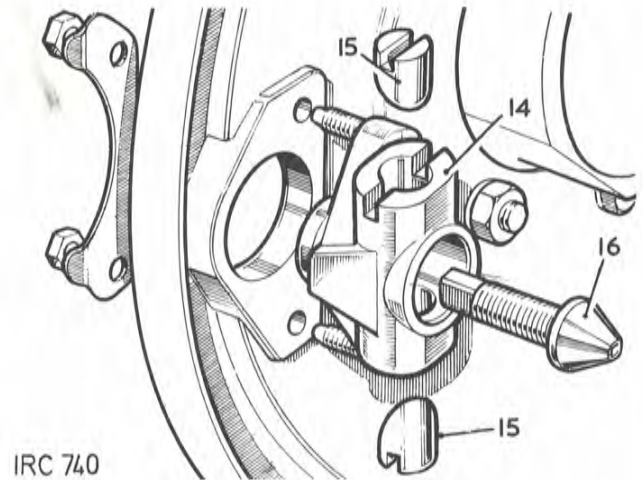
*continued*



14. Remove the adjuster unit assembly.
15. Pull out the adjuster plungers.
16. Unscrew the adjuster cone.

**Inspecting**

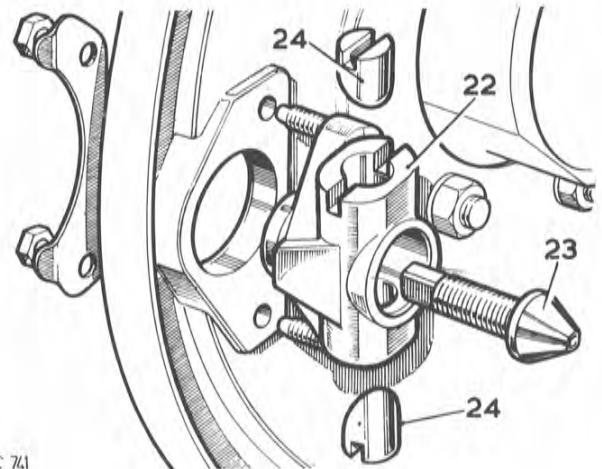
17. Clean all components in Girling cleaning fluid and allow to dry.
18. Examine all items for obvious wear and replace as necessary.
19. Examine the brake drum for scoring and ovality and skim if required.  
Standard diameter is 228,6 mm (9.0 in.); reclamation limit is 0,75 mm (0.030 in.) oversize.
20. If the brake linings are oily, check and if necessary replace the output shaft oil seal, Division 37
21. If required, reline the brake shoes. 70.40.10.



**Assembling**

22. Fit the adjuster unit housing, do not tighten the fixings at this stage.
23. Screw in the adjuster cone.
24. Grease and refit the adjuster plungers.

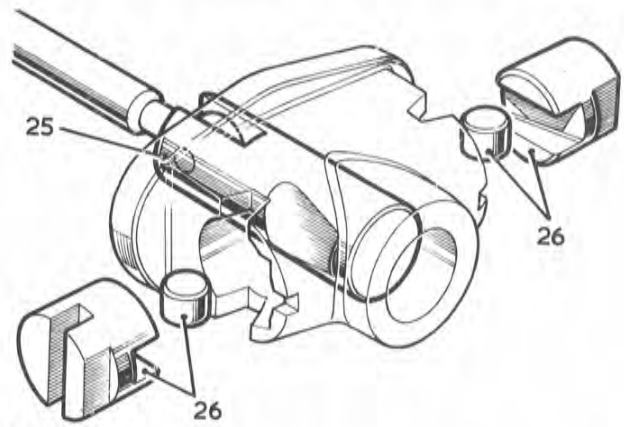
**NOTE:** The two plungers are identical and may be fitted to either bore. Align the chamfered ends of the plungers with the cone on the adjuster.



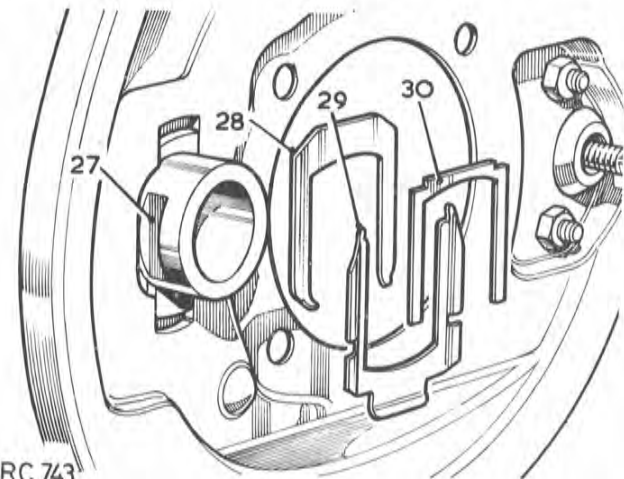
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## BRAKES

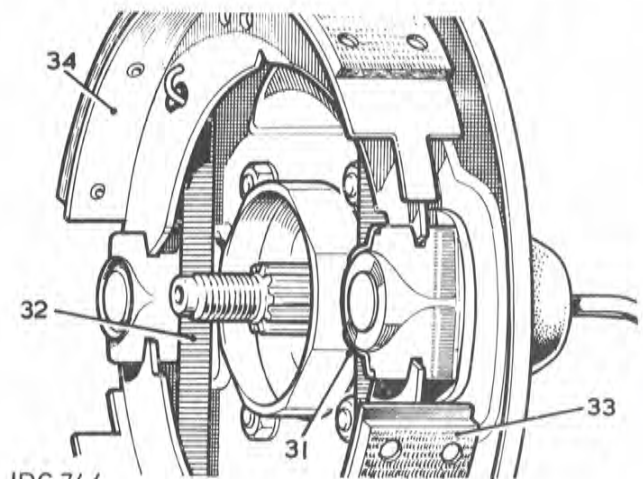
25. Grease and fit the expander rod.
26. Grease and fit the plungers and rollers.
27. Position the adjuster housing on the back plate.
28. Fit the packing piece.
29. Fit the locking plate.
30. Fit the retainer spring.
31. Fit the spring clip to the expander unit.
32. Fit the brake shoes and pull-off springs together.
33. The fully lined end of the lower shoe must be toward the expander housing.
34. The fully lined end of the upper shoe must be toward the adjuster housing.
35. Reverse 2 to 5.
36. Turn the adjuster cone fully in and tighten the fixings.
37. Slacken off the adjuster cone two 'clicks'; give the brake a firm application to ensure that the shoes have centralised at the expander end. The brake drum should now be free to rotate.
38. Set the hand brake linkage at the vertical adjuster rod, so that the hand brake has one or two clicks free movement in the 'off' position.
39. Remove the road wheel chocks.



IRC 742



IRC 743



IRC 744

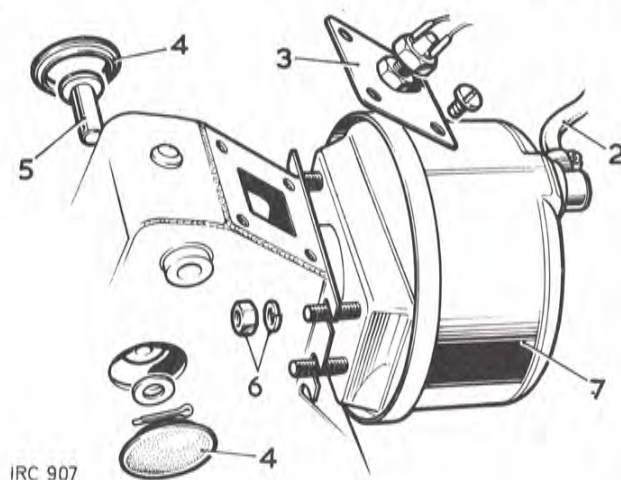
**SERVO ASSEMBLY**

–Remove and refit

70.50.01

**Removing**

1. Remove the brake master cylinder. 70.30.01 or 70.30.08 as applicable.
2. Disconnect the vacuum hose from the servo assembly.
3. Remove the switch plate.
4. Remove the rubber plugs from the pedal box.
5. Remove the split pin and withdraw the clevis pin securing the servo rod to the pedal.
6. Remove the fixings.
7. Withdraw the servo assembly.

**Refitting**

8. Reverse 1 to 7. Torque load for servo fixings is 1,2 kgf.m. (9 lbf.ft.).

**VACUUM RESERVOIR TANK – Diesel models with Servo**

–Remove and refit

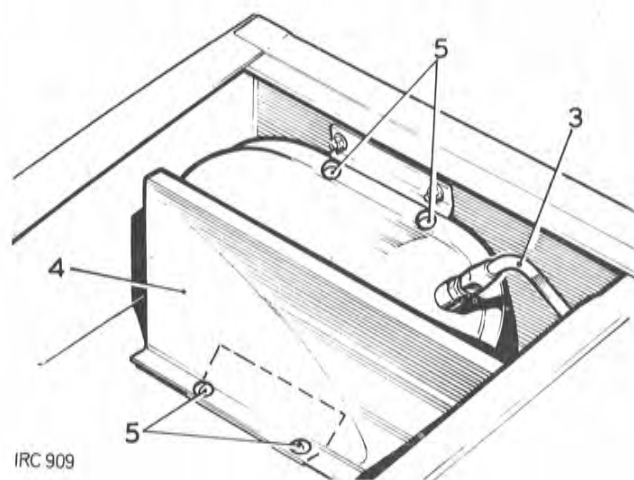
70.50.04

**Removing**

1. Remove the L.H. seat cushion.
2. Remove the cover panel.
3. Disconnect the vacuum pipe.
4. Remove the separator plate.
5. Remove the fixings and withdraw the reservoir tank.

**Refitting.**

6. Reverse 1 to 5.



## BRAKES

### SERVO ASSEMBLY

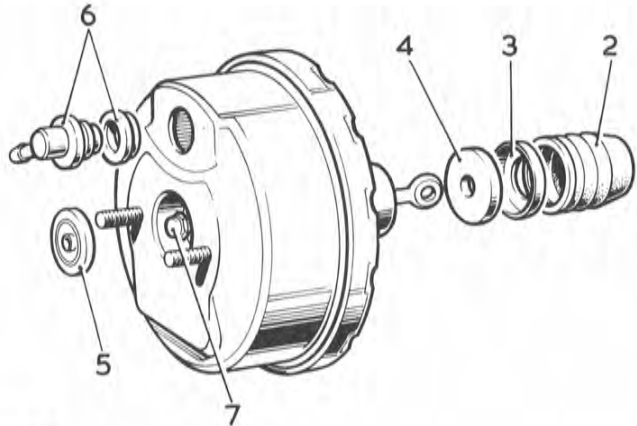
—Overhaul

70.50.06

**NOTE:** The Supervac servo unit can be serviced, with a kit that is available, without completely dismantling the servo. In the event of the servo developing a major fault, the unit must be renewed.

#### Dismantling

1. Remove the servo. 70.50.01.
2. Pull back the dust cover.
3. Remove the end cap.
4. Withdraw the filter.
5. Remove the seal and plate assembly from the front shell recess.
6. Remove the non-return valve and grommet.
7. **CAUTION:** Do not attempt to remove or adjust the operating rod which is pre-set and locked at the manufacturers.



IRC 908

#### Reassembling (using the service kit)

8. Lubricate the non-return valve grommet with Girling Grease (64949009), and fit to the front shell.
9. Fit the new non-return valve into the grommet.
10. Smear the new seal and plate assembly with Girling Grease (64949008), and press into the front shell, ensuring the plate faces inwards.
11. Fit the new filter into the neck of the diaphragm plate.
12. Fit the new end cap.
13. Locate the new dust cover over the lugs of the rear shell.
14. Fit the servo. 70.50.01.

## FRONT WHEEL CYLINDERS – 109 models

- Remove and refit, 1 to 5 and 16 and 17      70.60.03
- Overhaul                      6 to 15                      70.60.11

## Removing

1. Remove the road wheel.
2. Remove the brake drum. 70.10.02
3. Remove the brake shoes. 70.40.02.
4. Disconnect and seal off the brake fluid pipe.
- 5.\*\* Remove the bleed screw (lower cylinder only).
6. Remove the wheel cylinder.

## Dismantling

7. Withdraw the dust cover.
8. Withdraw the piston and seal.
9. Withdraw the spring.\*\*

## Inspecting

10. Clean all components, using Girling cleaning fluid, and allow to dry.
11. Inspect the cylinder bore and piston for corrosion, scores and wear. If any component is unsatisfactory, replace the wheel cylinder assembly complete.

## (109 models)

12. Provide new seals and dust covers from the wheel cylinder overhaul kit.

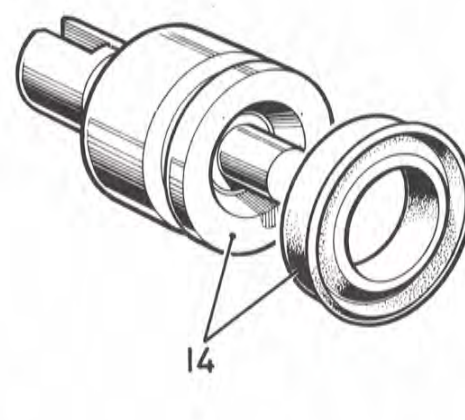
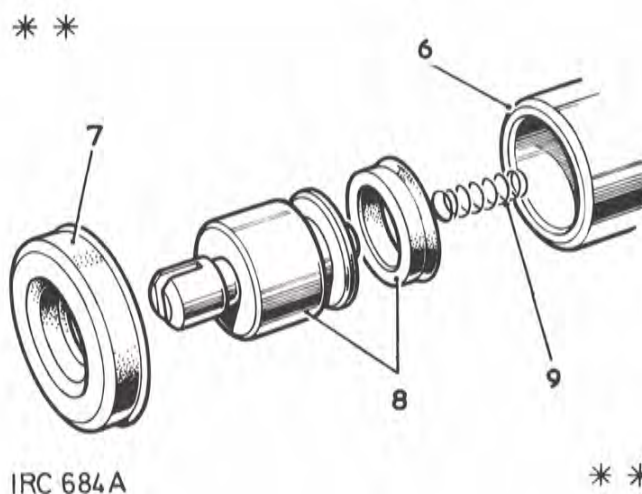
## Assembling

13. Lubricate the components, using the recommended Girling brake fluid.
14. Reverse 6 to 8. Fit the piston seal with the lipped side away from the slotted end.
15. Fit the bleed screw, do not overtighten. Torque 0,5 to 0,8 kgf.m (4 to 6 lbf.ft.).

## Refitting

16. Reverse 1 to 5.
17. Bleed the brakes. 70.25.02.

*continued*





## BRAKES

### WHEEL CYLINDER, 88 models

#### Front wheel cylinder

- Remove and refit, 1 to 5 and 14 to 18 70.60.03
- Overhaul, 6 to 13 70.60.11

#### Rear wheel cylinder

- Remove and refit 1 to 5 and 14 to 18 70.60.18
- Overhaul, 6 to 13 70.60.26

#### Removing

1. Remove the road wheel.
2. Remove the brake drum. 70.10.02.
3. Remove the brake shoes. 70.40.02
4. Disconnect and seal the brake fluid pipe.
5. Remove the wheel cylinder.

#### Dismantling

6. Withdraw the dust covers.
7. Withdraw the pistons and seals.
8. Withdraw the seal supports.
9. Withdraw the spring.
10. Remove the bleed screw.

#### Inspecting

11. Clean all components, using Girling cleaning fluid, and allow to dry.
12. Inspect the cylinder bore and pistons for corrosion, scores and wear. If any component is not satisfactory, replace the complete wheel cylinder assembly.

#### (88 models)

13. Provide new seals and dust covers from the wheel cylinder overhaul kit.

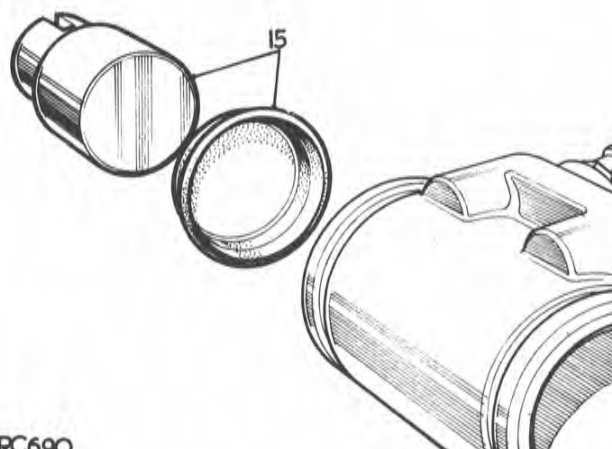
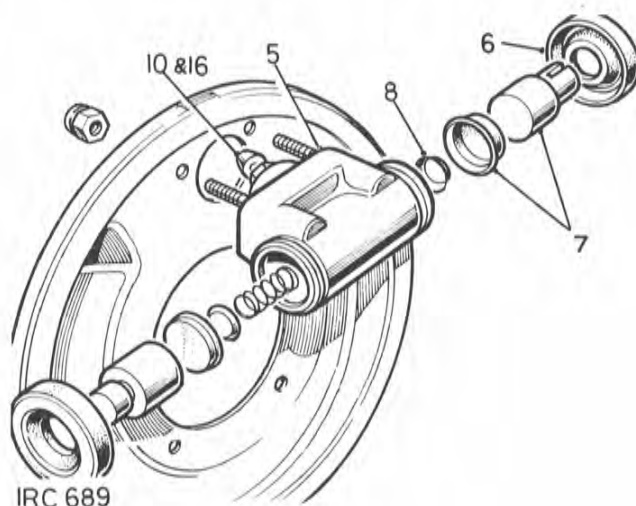
#### Assembly

14. Lubricate the components, using the recommended Girling brake fluid.
15. Reverse 6 to 9. Fit the piston seal with the flat face toward the piston.
16. Fit the bleed screw, do not overtighten. Torque 0,5 to 0,8 kgf.m (4 to 6 lbf.ft.).

#### Refitting

17. Reverse 1 to 5.
18. Bleed the brakes. 70.25.02.

*continued*



## REAR WHEEL CYLINDER – 109 models

–Remove and refit 1 to 5 and 16 and 17 70.60.18

–Overhaul 6 to 15 70.60.26

## Removing

1. Remove the road wheel.
2. Remove the brake drum. 70.10.03.
3. Remove the brake shoes. 70.40.03.
4. Disconnect and seal off the brake fluid pipe.
5. Remove the wheel cylinder.

## Dismantling

6. Withdraw the dust covers.
7. Withdraw the pistons and seals.
8. Withdraw the spring and seal supports.
9. Remove the bleed screw.

## Inspecting

10. Clean all components, using Girling cleaning fluid, and allow to dry.
11. Inspect the cylinder bore and piston for corrosion, scores and wear. If any component is unsatisfactory, replace the wheel cylinder assembly complete.

## (109 models)

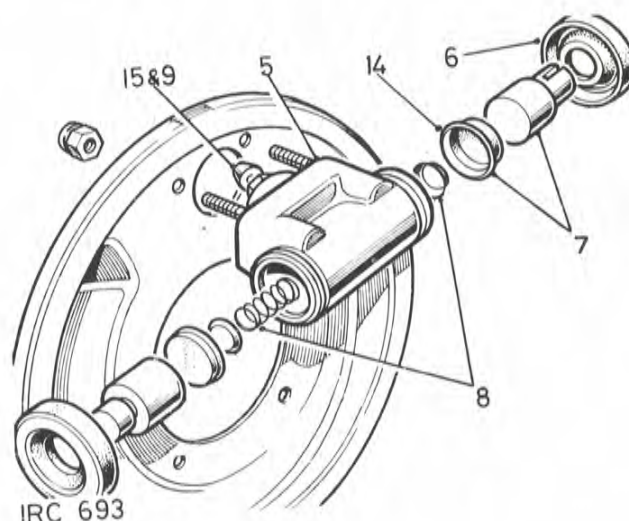
12. Provide new seals and dust covers from the wheel cylinder overhaul kit.

## Assembling

13. Lubricate the components, using the recommended Girling brake fluid.
14. Reverse 6 to 8. Fit the piston seal with the lipped side away from the slotted end.
15. Fit the bleed screw, do not overtighten. Torque 0,5 to 0,8 kgf.m (4 to 6 lbf.ft.).

## Refitting

16. Reverse 1 to 5.
17. Bleed the brakes. 70.25.02.



WHEELS AND TYRES OPERATIONS

General Information	...	...	...	...	...	...	...	...	...	74.10.00
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## WHEELS AND TYRES

## -General information

74.10.00

1. Removing and refitting procedures follow normal practices. Note that when refitting tyres, the two black spots on the inner tube should coincide with the two white spots on the cover adjacent to the beading.
2. As the vehicle is fitted with a transmission hand-brake, it is necessary before removing a road wheel to apply the hand-brake and engage four-wheel drive. This will ensure that the hand-brake is operative on all four wheels.
3. Recommended tyre pressures for all operating conditions, tyre maintenance details and wheel position changing information is detailed in Maintenance, Division 10.
4. Local requirements for tyre tread depth and general cover condition must be observed where applicable.
5. Do not fit tyres with different circumference dimensions between front and rear axles otherwise transmission 'wind-up' will occur after hard pulling in four wheel drive. A 'wind-up' condition is rectified by raising the axle on which is fitted the tyres with the smaller circumference and allowing the transmission to 'unwind'.
6. Where 'V' tread tyres are fitted, the point of the 'V' must point forward when the tyre is viewed from the top.
7. Tyre size Data is provided in Division 04 of this Manual.



## BODY

### BODY OPERATIONS

Bonnet – remove and refit	...	...	...	...	...	...	...	...	...	...	76.16.01
Body repairs – general information and exploded views	...	...	...	...	...	...	...	...	...	...	76.00.00
Body side assembly – remove and refit											
– left hand side	...	...	...	...	...	...	...	...	...	...	76.10.08
– right hand side	...	...	...	...	...	...	...	...	...	...	76.10.09
Cab – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.10
Cab backlight – remove and refit	...	...	...	...	...	...	...	...	...	...	76.81.33
Cab tropical roof – remove and refit	...	...	...	...	...	...	...	...	...	...	76.61.03
Chassis frame – alignment check	...	...	...	...	...	...	...	...	...	...	76.10.02
Dash panel assembly – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.36
Door locks – remove and refit											
– side door, front	...	...	...	...	...	...	...	...	...	...	76.37.12
– side door, rear	...	...	...	...	...	...	...	...	...	...	76.37.13
– tail door	...	...	...	...	...	...	...	...	...	...	76.37.16
Doors – remove and refit											
– side door, front	...	...	...	...	...	...	...	...	...	...	76.28.01
– side door, rear	...	...	...	...	...	...	...	...	...	...	76.28.02
– tail door	...	...	...	...	...	...	...	...	...	...	76.28.21
Facia lower panel – remove and refit	...	...	...	...	...	...	...	...	...	...	76.46.05
Facia support panel – remove and refit	...	...	...	...	...	...	...	...	...	...	76.46.06
Facia top rail – remove and refit	...	...	...	...	...	...	...	...	...	...	76.46.04
Front floor – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.12
Front seat base – remove and refit	...	...	...	...	...	...	...	...	...	...	76.70.06
Front seat belt – remove and refit	...	...	...	...	...	...	...	...	...	...	76.73.02



Front wing – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.26
Hard top – remove and refit	...	...	...	...	...	...	...	...	...	...	76.61.01
Hard top tropical roof – remove and refit	...	...	...	...	...	...	...	...	...	...	76.61.02
Quarter light, fixed – remove and refit	...	...	...	...	...	...	...	...	...	...	76.81.20
Radiator grille panel – remove and refit	...	...	...	...	...	...	...	...	...	...	76.55.06
Rear body – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.11
Roof panel – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.13
Side door glass – remove and refit											
– side door front	...	...	...	...	...	...	...	...	...	...	76.31.01
– side door rear	...	...	...	...	...	...	...	...	...	...	76.31.02
Tail door folding step – remove and refit	...	...	...	...	...	...	...	...	...	...	76.10.41
Tail door glass – remove and refit	...	...	...	...	...	...	...	...	...	...	76.31.21
Tailgate, lower – remove and refit	...	...	...	...	...	...	...	...	...	...	76.28.30
Tailgate upper (rear lid) – remove and refit	...	...	...	...	...	...	...	...	...	...	76.28.29
Windscreen and frame – remove and refit	...	...	...	...	...	...	...	...	...	...	76.81.02
Windscreen glass – remove and refit	...	...	...	...	...	...	...	...	...	...	76.81.03



BODY REPAIRS

—General information

76.00.00

Body panels

1. Land Rover body panels are manufactured from a special aluminium-alloy known as 'Birmabright'.
2. 'Birmabright' melts at a slightly lower temperature than pure aluminium and will not rust nor corrode under normal circumstances. It is work-hardening, but is easily annealed. Exposed to the atmosphere, a hard oxide skin forms on the surface.

Panel beating 'Birmabright'

3. 'Birmabright' panels and wings can be beaten out after accidental damage then must be annealed, by the application of heat, followed by slow air-cooling; as the melting point is low, heat must be applied slowly and carefully. A practical temperature control is to apply oil to the cleaned surface to be annealed. Play the welding torch on the underside of the cleaned surface and watch for the oil to clear, leaving the surface clean and unmarked; then allow to cool naturally in the air, when the area so treated will again be soft and workable. Do not quench with oil or water. Another method is to clean the surface to be annealed and then rub it with a piece of soap. Apply heat beneath the area, as described above, and watch for the soap stain to clear. Then allow to cool, as for the oil method. When applying the heat for annealing, always hold the torch some little distance from the metal, and move it about, so as to avoid any risk of melting it locally.

4. Gas welding 'Birmabright'

A small jet must be used, one or two sizes smaller than would be used for welding sheet steel of comparable thickness. For instance, use a No. 2 nozzle for welding 18 swg (0.048 in.) sheet, and a No. 3 for 16 swg (0.064 in.) sheet.

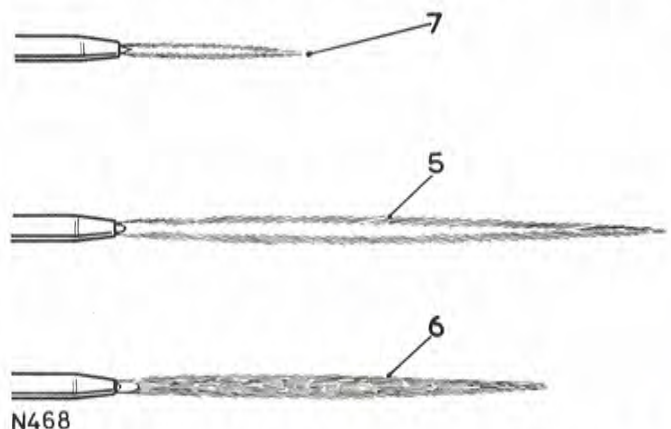
5. The flame should be smooth, quiet and neutral and have a brilliant inner core with a well defined, rounded end. The hottest point of the flame is close to the jet, and the flame should have a blue to orange envelope becoming nearly colourless at the end.
6. A slightly reducing flame may also be used, that is, there may be a slight excess of acetylene. Such a flame will have a brilliant inner core with a feathery white flame and a blue to orange envelope.
7. Do not use an oxydising flame, which has a short pointed inner core bluish white with a bluish envelope.
8. Use only 5 per cent magnesium/aluminium welding rod (5 Mg/A). Sifalumin No. 27 (MG.5 Alloy) (Use Sifbronze Special flux with this rod) or a 'Birmabright' offcut sheet. Do not use too wide or thick an offcut or trouble may be experienced in making it melt before the material which is being welded.

9. Clean off all grease and paint, dry thoroughly then clean the edges to be welded, and an area at least half an inch on either side of the weld, with a stiff wire scratch-brush or wire wool. Cleanliness is essential. Also clean the welding rod or strip with wire wool.
10. A special acid flux must be used, and we recommend 'Hari-Kari' which is obtainable from:  
The Midland Welding Supply Co. Ltd.,  
105 Lakey Lane,  
Birmingham 28, England.

or  
Sifbronze Special Flux, which is obtainable from:

Suffolk Iron Foundry (1920) Ltd.,  
Sifbronze Works,  
Stowmarket, England.

11. A small quantity of 'Hari-Kari' may be made into a paste with water, following the directions on the tin, and the paste must be applied to both surfaces to be welded and also to the rod. In the case of Sifbronze Special Flux, use in powder form as directed. Remember that aluminium and its alloys do not show 'red-hot' before melting, and so there is nothing about the appearance of the metal to indicate that it has reached welding temperature. A little experience will enable the operator to gauge this point, but a useful guide is to sprinkle a little sawdust over the work; this will sparkle and char when the right temperature is approached; a piece of dry wood rubbed over the hot metal will sparkle at the point of contact.
12. As the flux used is highly acid, it is essential to wash it off thoroughly immediately after a weld is completed. The hottest possible water should be used, with wire wool or a scratch-brush. Very hot soapy water is good, because of the alkaline nature of the soap, which will tend to 'kill' the acid.



13. It is strongly recommended that a few welds are made on scrap metal before the actual repair is undertaken if the operator is not already experienced in welding aluminium and its alloys.
14. The heat of welding will have softened the metal in the area of the repair, and it may be hardened again by peening with a light hammer. Many light blows are preferable to fewer heavy ones. Use a 'dolly' or anvil behind the work to avoid denting and deformation, and to make the hammering more effective. Filing of surplus metal from the weld will also help to harden the work again.

#### Welding tears and patching

15. If a tear extends to the edge of a panel, start the weld from the end away from the edge and also at this point drill a small hole to prevent the crack spreading, then work towards the edge.
16. When welding a long tear, or making a long welded joint, tack the edges to be welded at intervals of from 50 to 100mm (2 in. to 4 in.) with spots. This is done by melting the metal at the starting end and fusing into it a small amount of the filler rod, repeating the process at the suggested intervals. After this, weld continuously along the joint from right to left, increasing the speed of the weld as the material heats up.
17. After the work has cooled, wash off all traces of flux as described previously, and file off any excess of build-up metal.
18. When patching, cut the patch to the correct shape for the hole to be filled, but of such size as to leave a gap of 0,8mm (0.030 in.) between it and the panel, and then weld as described above. Never apply an 'overlay' patch.

#### Electric welding

19. **CAUTION:** The battery earth lead must be disconnected before commencing electric welding, otherwise the alternator will be damaged.
20. At the Rover Factory the 'Argon-Arc' process is used, all atmospheric oxygen being excluded from the weld by the Argon gas shield. For all body repair work normally undertaken by a Distributor's or Dealer's service department, the gas welding method is sufficient and quite satisfactory.

#### Spot-welding

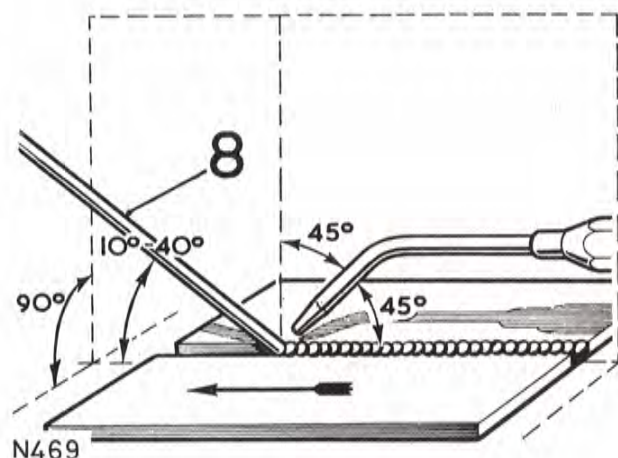
21. Spot-welding is largely used in the manufacture of Land-Rover bodies, but this is a process which can only be carried out satisfactorily by the use of the proper apparatus. Aluminium and its alloys are very good conductors of heat and electricity, and thus it is most important to maintain the right conditions for successful spot-welding. The correct current density must be maintained, and so must the 'dwell' of the electrodes. Special spot-welding machines have been developed, but they are expensive, and though the actual work can be carried out by comparatively unskilled labour, supervision and machine maintenance must be in the hands of properly qualified persons.

#### Riveting

22. Where both sides of the metal are accessible and it is possible to use an anvil or 'dolly', solid aluminium rivets may be used, with a suitable punch or 'pop' to ensure clean, rounded heads on the work. For riveting blind holes, 'pop-rivets' must be used. These are inserted and closed by special 'Lazy-Tong' 'pop-rivet' pliers.

#### Painting 'Birmabright'

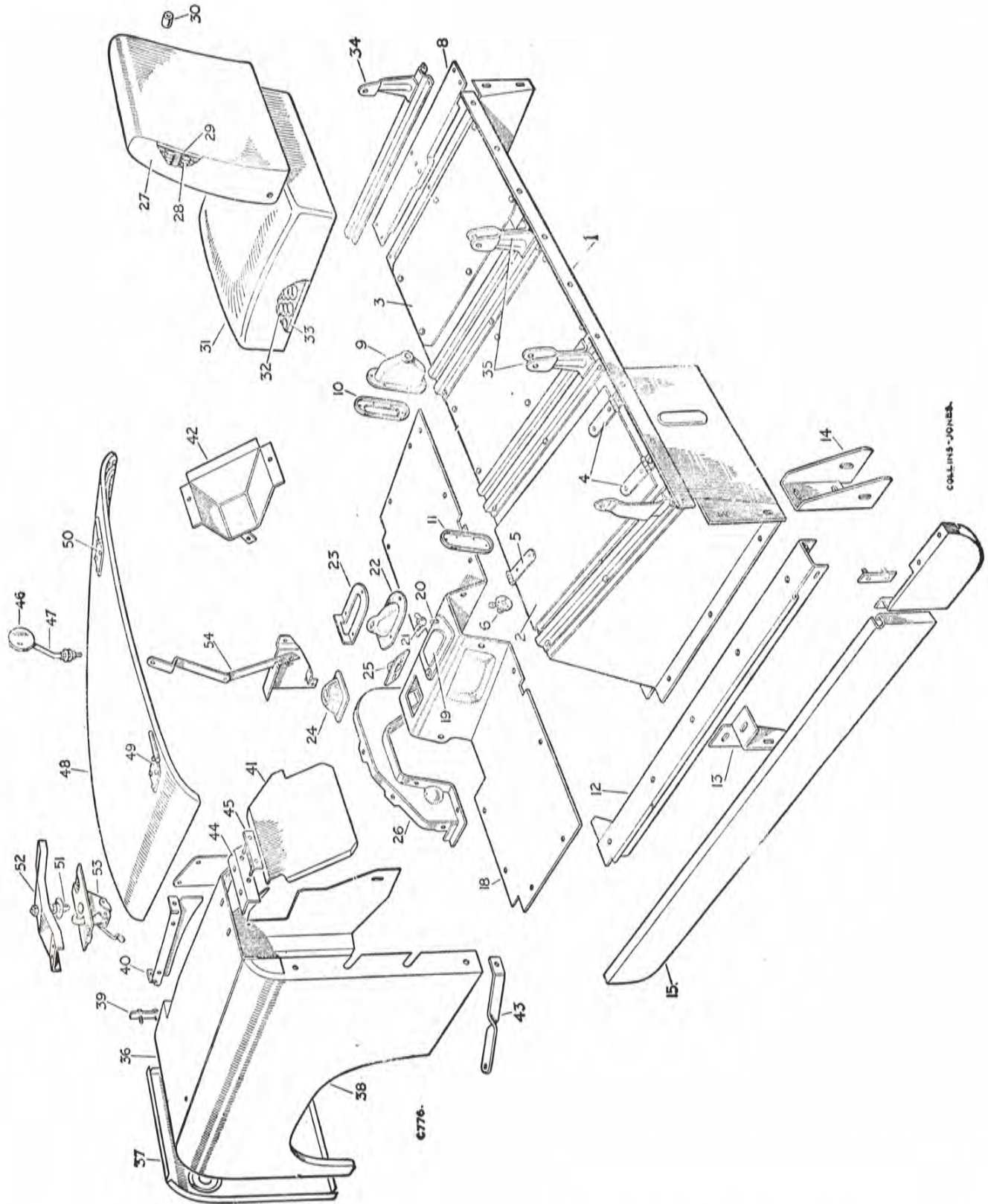
23. Refer to the procedure detailed in Division 78 (Paintwork) of this Manual.





# BODY

## Layout of seat base, seats, front floor, wings and bonnet

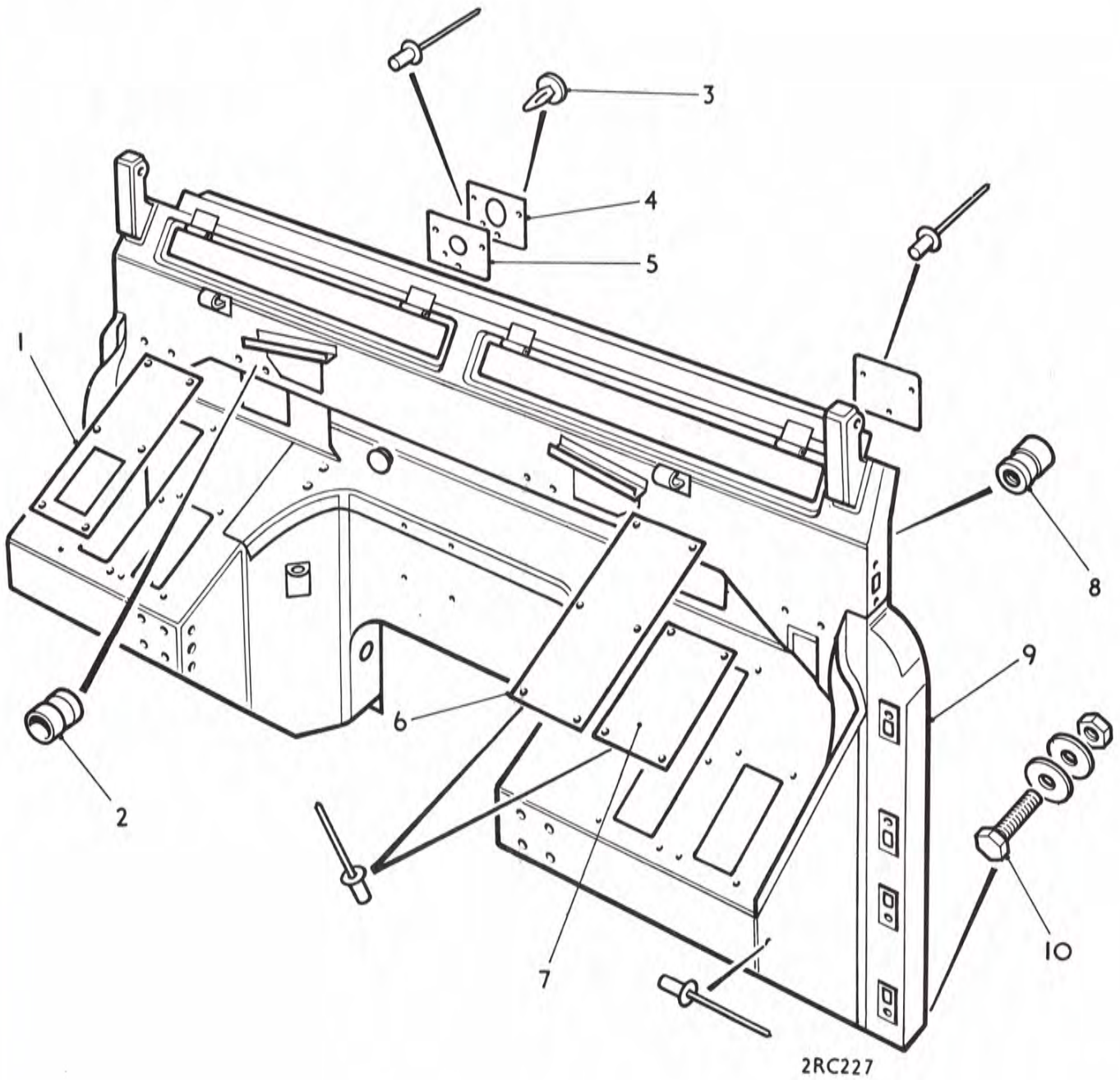


## Key to illustration of seat base, seats, front floor, wings and bonnet

1. Seat base and floor assembly
2. Tool locker lid
3. Fuel tank cover panel
4. Lid hinge
5. Locker lid hasp
6. Locker lid turnbuckle
7. Centre cover panel
8. Extension panel, at seat base ends
9. Handbrake rubber cover
10. Retainer for rubber cover
11. Handbrake slot cover plate
12. Sill channel LH front
13. Sill channel securing bracket
14. Sill channel mounting bracket, to rear body
15. Front sill panel
16. Rear sill panel
17. Fixing plate for sill panels
18. Front floor complete
19. Inspection cover, for front floor
20. Stud plate for inspection cover wing nut
21. Wing nut, fixing inspection cover
22. Transfer gear lever seal
23. Transfer lever seal retainer
24. Gear lever rubber seal
25. Operating rod cover plate
26. Gearbox cover complete
27. Seat squab
28. Squab spring case
29. Squab frame
30. Buffer, for seat back rest on bracket
31. Seat cushion
32. Cushion spring case
33. Cushion frame
34. Cushion support, outer
35. Seat support, centre
36. Front wing
37. Front panel and registration plate
38. Front wing outer panel
39. Fixing plate, wings to grille panel
40. Wing valance bottom panel
41. Mudshield, front wing
42. Steering unit cover box
43. Front wing stay
44. Bracket, for rear of wing
45. Fixing plate—brackets to dash
46. Mirror
47. Arm for mirror
48. Bonnet top panel
- 49-50. Bonnet hinges
51. Bonnet catch striker pin
52. Bonnet striker bracket
53. Bonnet control
54. Bonnet prop rod

# BODY

## Layout of dash panel, windscreen and ventilators



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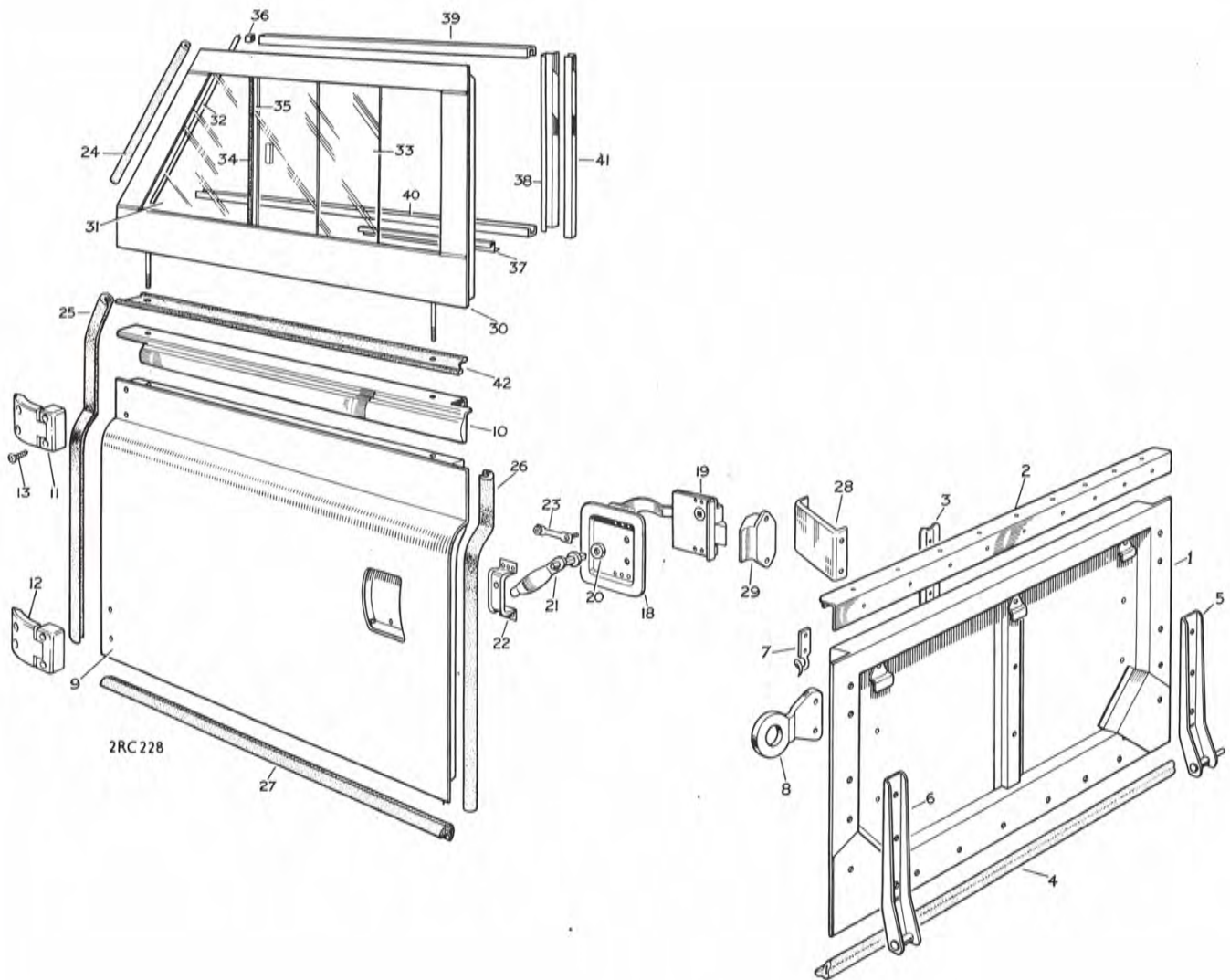
Key to illustration of dash panel, windscreen and ventilators

1. Pedal hole cover plate
2. Nutserts, 5/16in. UNF
3. Drive fasteners
4. Backing plate for seal
5. Seal
6. Cover plate for pedal hole
7. Blanking plate for heater hole
8. Nutserts, 1/4in. UNF
9. Dash panel
10. Tie bolts, dash to chassis.



# BODY

## Layout of tailgate, lower, side doors and side screen



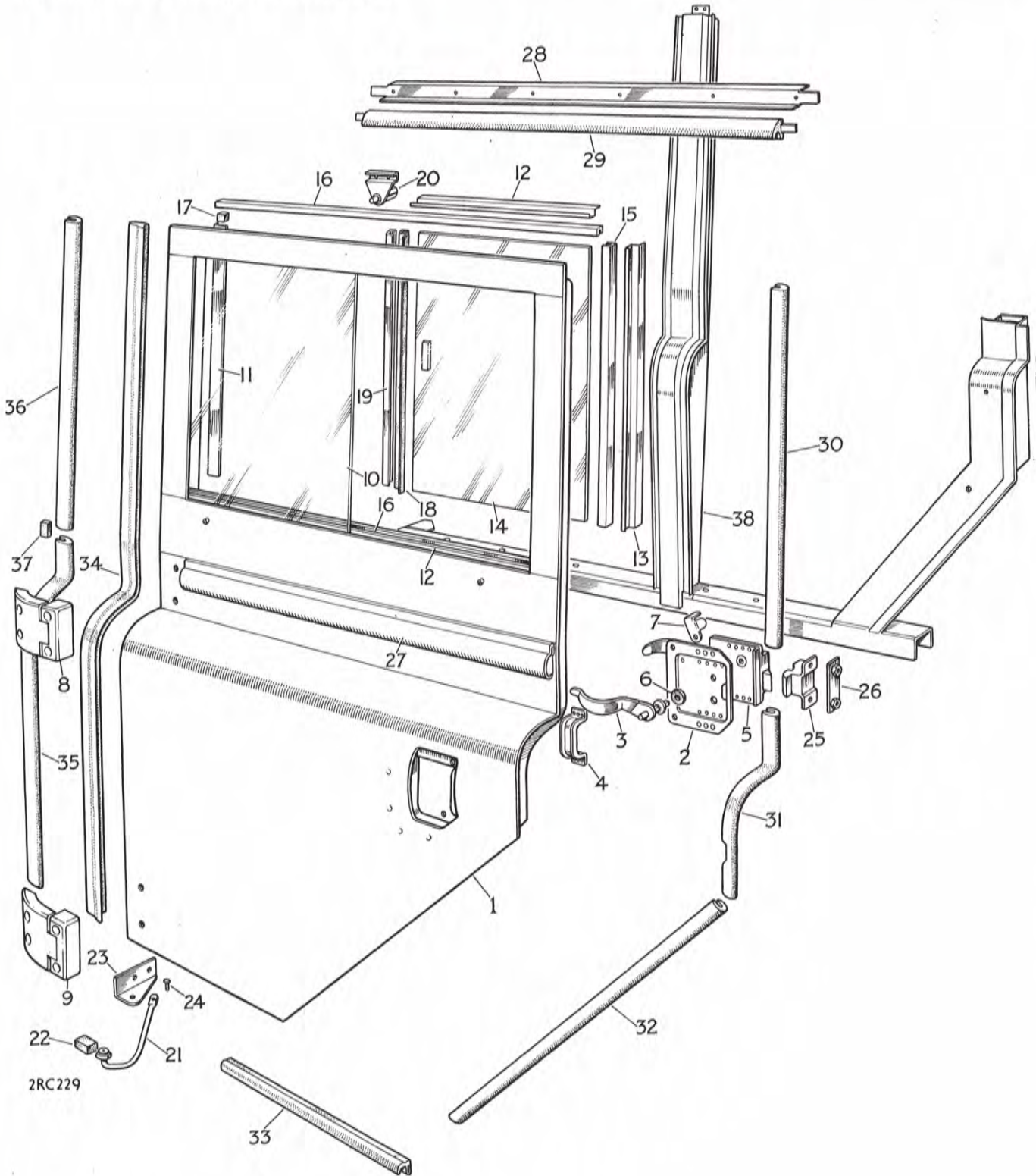
## Key to illustration of tailgate, lower, side doors and side screens

1. Tailboard assembly
2. Tailboard top capping
3. Tailboard tread plate
4. Tailboard sealing rubber, bottom
5. Tailboard hinge, RH
6. Tailboard hinge, LH
7. Tailboard chain hook
8. Tailboard locking plate
9. Front door assembly
10. Door top capping
11. Hinge complete, upper
12. Hinge complete, lower
- 13-17. Fixings for door hinge
18. Door lock mounting plate
19. Door lock
20. Washer, handle to cover
21. Handle
22. Door handle bracket
23. Captive plate, door lock mounting to door
24. Seal for door, front upper
25. Seal for door, front lower, dash
26. Seal for door, rear lower
27. Seal for door, bottom, sill
28. Support bracket at door striker
29. Door lock striking plate
30. Side screen assembly
31. Front fixed window
32. Window retainer
33. Rear sliding window
34. Sealing rubber for front edge of sliding window
35. Sealing rubber channel
36. Buffer for sliding window, at top
- 37-38. Filler strip for windows
39. Top channel
40. Bottom channel
41. Rear channel
42. Sidescreen sealing strip



# BODY

## Layout of rear side doors, 109 Station Wagon



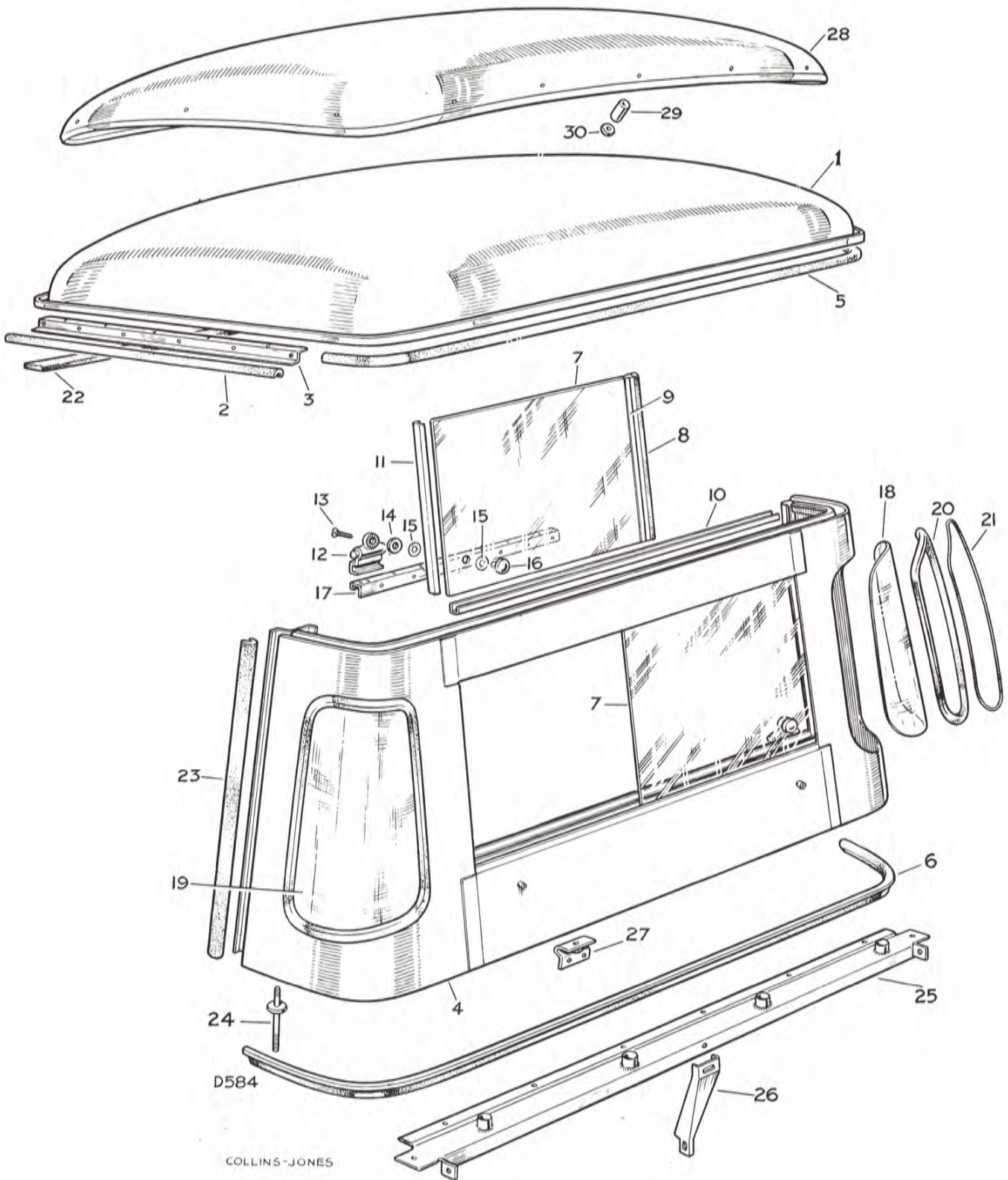
## Key to illustration of rear side doors, 109 Station Wagon

1. Rear side door assembly, LH
2. Mounting plate for door lock
3. Door handle complete, LH
4. Bracket for door handle, outer mounting
5. Door lock complete, LH
6. Sealing washer, handle to cover
7. Locking catch, LH
8. Door hinge, upper LH
9. Door hinge, lower LH
10. Fixed window for sidescreen
11. Retainer for sidescreen, fixed window
12. Filler, top and bottom, for side screen
13. Filler, rear, for sidescreen
14. Sliding window with knob for sidescreen
15. Sliding light channel, rear
16. Sliding light channel, top and bottom
17. Buffer for sidescreen sliding window at top
18. Sealing rubber for sliding glass
19. Retainer for sliding glass sealing rubber
20. Sliding window catch
21. Rod for check strap, LH
22. Buffer for check strap, short
23. Door check bracket, LH, for rear side door
24. Clevis pin
25. Striking plate for rear side door locks
26. Nut plate
27. Waist moulding, rear side door, LH
28. Seal retainer for rear side door, LH top
29. Rubber seal for retainer
30. Door sealing rubber for upper vertical 'D' post
31. Door sealing rubber for lower vertical 'D' post, LH
32. Door sealing rubber for sloping 'D' post
33. Door sealing rubber at rear side sills, bottom
34. Door sealing rubber at 'C' post
35. Door sealing rubber at 'B' post, lower LH
36. Door sealing rubber at 'B' post, upper
37. Filler piece for 'B' post seal
38. Frame for front and rear side doors, LH



# BODY

## Layout of cab and tropical roof



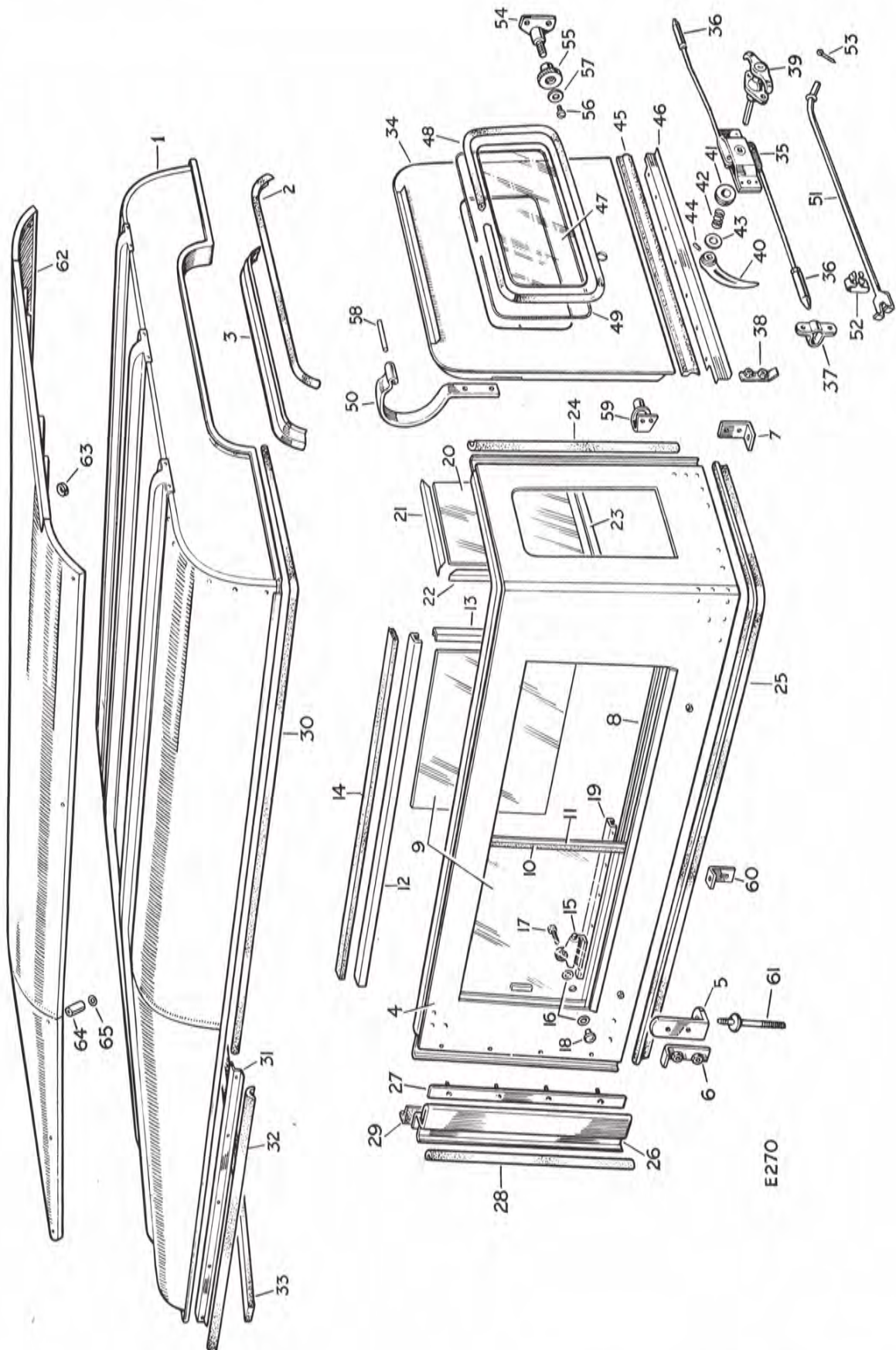
Key to illustration of cab and tropical roof

- |   |  |
|---|--|
| 1. Cab roof                             | 18. Cab quarter light, RH              |
| 2. Sealing rubber, door top             | 19. Cab quarter light, LH              |
| 3. Retainer for seal                    | 20. Weather strip                      |
| 4. Cab rear panel assembly              | 21. Sealing strip                      |
| 5. Rubber seal, roof to back panel, top | 22. Sealing rubber, windscreen to roof |
| 6. Rubber seal back panel to rear body  | 23. Sealing rubber, door side          |
| 7. Sliding back light                   | 24. Mounting stud                      |
| 8. Sealing rubber for back light        | 25. Mounting rail for cab              |
| 9. Channel for rubber                   | 26. Mounting rail support bracket      |
| 10. Channel, top and bottom             | 27. Cab mounting distance piece        |
| 11. Channel, sides                      | 28. Cab tropical roof panel            |
| 12. Back light catch                    | 29. Distance piece                     |
| 13-16. Fixings for catches              | 30. Rubber                             |
| 17. Runner for sliding back light catch |  |



# BODY

## Layout of hard top with sliding windows

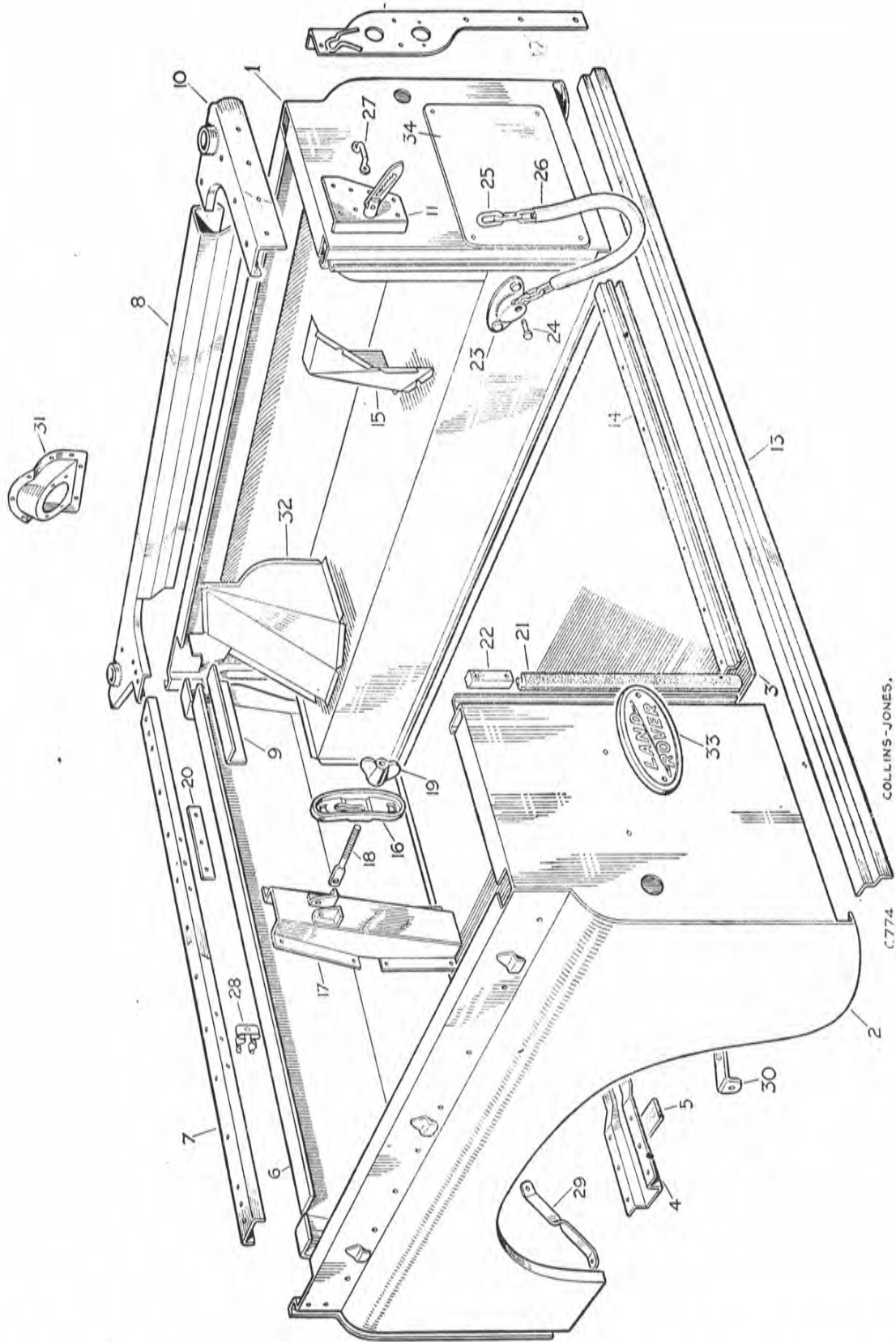


## Key to illustration of hard top with sliding windows

- |   |  |                                 |
|---|--|---------------------------------|
| 1. Cab roof assembly                            | 34. Rear lid assembly                                      |                                 |
| 2. Rubber seal for roof, rear                   | 35. Lock complete for rear lid                             |                                 |
| 3. Seal retainer for roof, rear                 | 36. Bolt end for lock                                      |                                 |
| 4. Side panel assembly, LH                      | 37. Guide for rear lid lock                                |                                 |
| 5. Mounting bracket front                       | 38. Nut plate  |                                 |
| 6. Nut plate—fixing mounting bracket to body    | 39. Handle for rear lid, outer, locking                    |                                 |
| 7. Support bracket at tailboard                 | 40. Handle for rear lid, inner                             |                                 |
| 8. Drain channel complete for side windows      | 41. Boss   |                                 |
| 9. Glass for side window, sliding               | 42. Coil spring  | } Fixing handle                 |
| 10. Sealing rubber for sliding light            | 43. Cup for coil spring                                    |                                 |
| 11. Channel for sliding light rubber            | 44. Locking pin  |                                 |
| 12. Channel for sliding light, top              | 45. Rubber seal for rear lid, bottom                       |                                 |
| 13. Channel for sliding light, sides            | 46. Retainer for bottom seal                               |                                 |
| 14. Packing strip for top channel               | 47. Glass for rear lid                                     |                                 |
| 15. Catch for sliding glass, front              | 48. Weather strip for back light                           |                                 |
| 16. Washer for catch                            | 49. Seal strip for weather strip                           |                                 |
| 17. Screw fixing front catch                    | 50. Hinge leaf for rear lid                                |                                 |
| 18. Tapped plate for catch                      | 51. Stay for rear lid, RH                                  |                                 |
| 19. Runner for sliding catch                    | 52. Spring clip for rear lid stay                          |                                 |
| 20. Glass for rear end window                   | 53. Split pin fixing rear lid stay to support              |                                 |
| 21. Retainer for rear end glass upper LH        | 54. Mounting bracket for stay support                      |                                 |
| 22. Retainer for rear end glass inner and outer | 55. Locking nut for mounting bracket                       |                                 |
| 23. Retainer for rear end glass lower LH        | 56. Screw  | } Retaining locking nut         |
| 24. Rubber seal for rear lid, side              | 57. Plain washer   |                                 |
| 25. Rubber sealing strip, lower edge to body    | 58. Pin for rear lid hinge                                 |                                 |
| 26. Capping for front door rear seal, LH        | 59. Socket for rear lid lock bolt, LH                      |                                 |
| 27. Stud plate—fixing cappings to side panel    | 60. Support bracket, centre, body side                     |                                 |
| 28. Seal for front door, upper, side            | 61. Mounting stud—fixing hard top to body                  |                                 |
| 29. Rubber seal at door pillar top and bottom   | 62. Tropical roof panel                                    |                                 |
| 30. Rubber seal, roof to side                   | 63. Rubber washer—fixing panel to roof at end of stiffener |                                 |
| 31. Seal retainer for door top, LH              | 64. Distance piece   | } Fixing roof to panel at sides |
| 32. Sealing rubber for door top                 | 65. Rubber washer  |                                 |
| 33. Sealing rubber, windscreen to roof          |  |                                 |

# BODY

## Layout of rear body unit, 88 models



COLLINS-JONES.

C.774



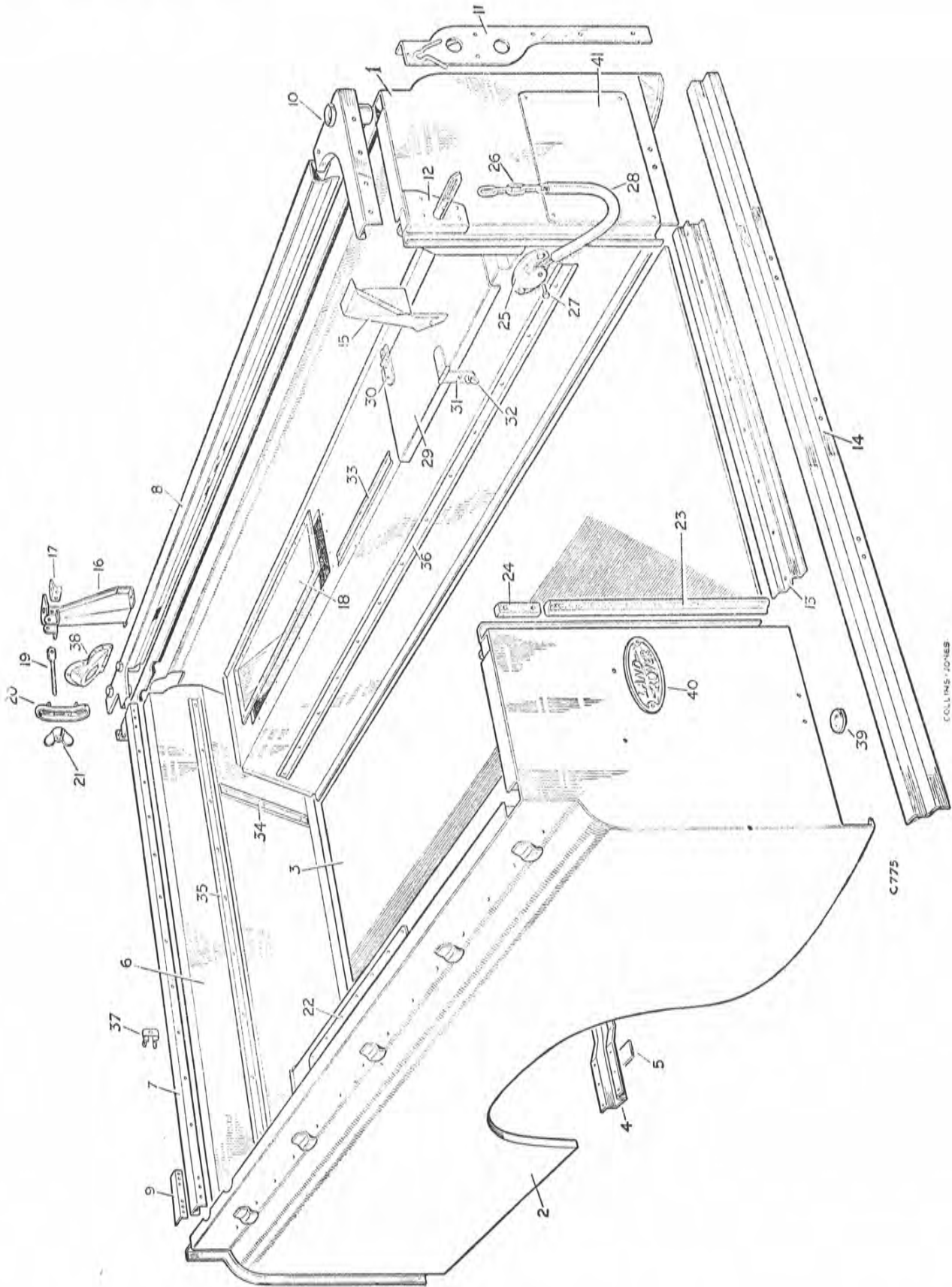
## Key to illustration of rear body unit, 88 models

1. Side and wheelarch complete RH
2. Side and wheelarch complete LH
3. Rear floor complete
4. Rear floor cross-member and pads
5. Rear floor cross-member mounting pad
6. Rear body front panel
7. Body front panel capping
8. Body top side capping
9. Corner strengthening angle
10. Hood socket complete, rear corner
11. Corner bracket and tailboard cotter
12. Rear protection angle
13. Rear mounting angle
14. Protecting strip at rear of floor
15. Cover panel for rear lamps
16. Spare wheel clamp
17. Clamp reinforcement bracket
18. Spare wheel clamp tie bar
19. Wing nut, fixing spare wheel clamp
20. Spare wheel rubbing strip
21. Tailboard sealing rubber
22. Tailboard rubber buffer
23. Tailboard chain bracket
24. Pin, fixing tailboard chain to bracket
25. Tailboard chain
26. Sleeve for chain
27. Hood strap staple
28. Starting handle and jack handle clip
29. Rear wing stay, front
30. Rear wing stay, rear
31. Fuel filler cowl
32. Fuel filler cover plate
33. 'Land-Rover' name plate
34. Registration plate



# BODY

## Layout of rear body unit, 109 models



## Key to illustration of rear body unit, 109 models

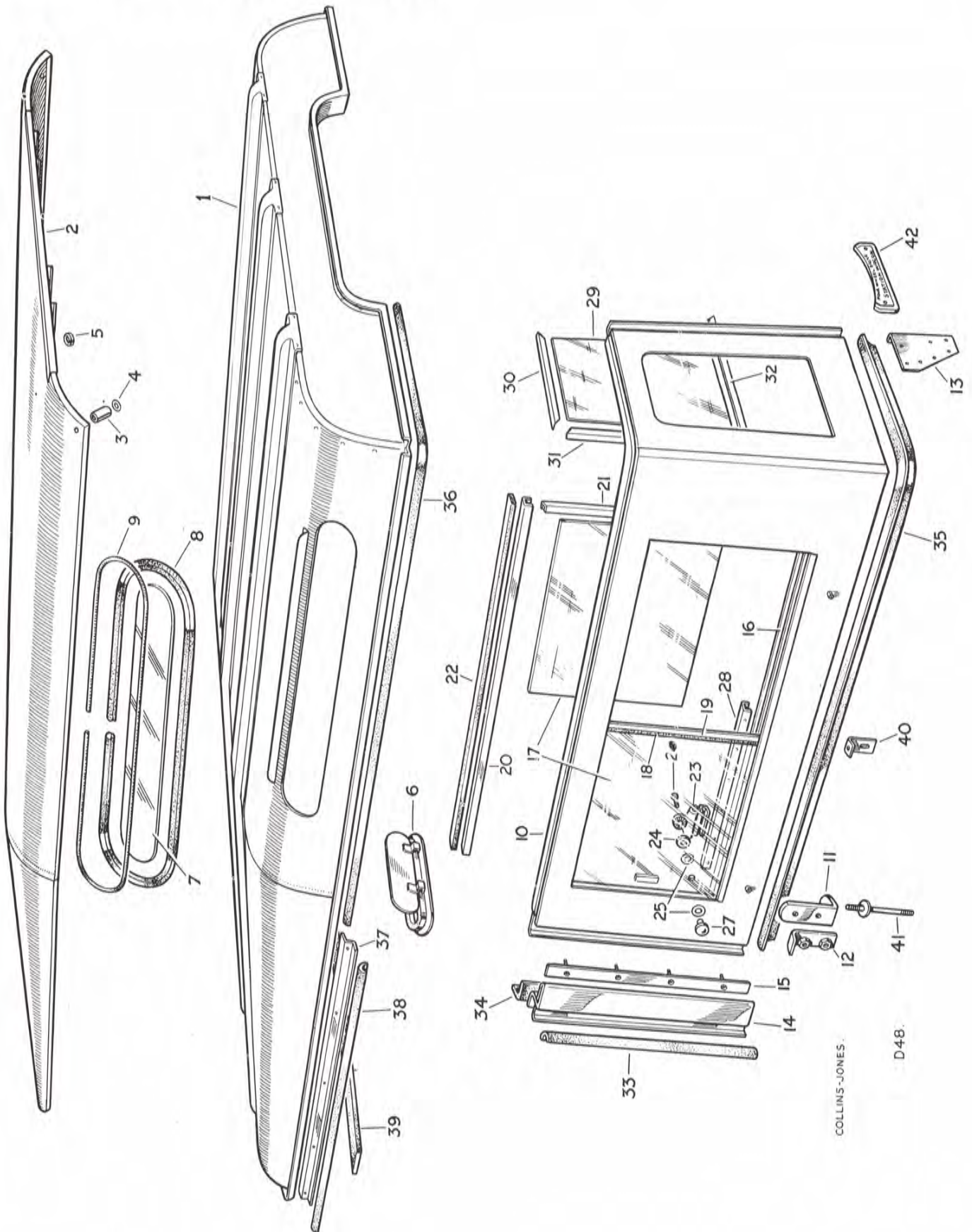
1. Side and wheelarch complete RH
2. Side and wheelarch complete LH
3. Rear floor complete
4. Rear floor cross-member and pads
5. Rear floor cross-member mounting pad
6. Rear body front panel
7. Rear body front panel capping
8. Body top side capping
9. Corner strengthening angle
10. Hood socket complete, rear corner
11. Rear protection angle
12. Corner bracket and tailboard cotter
13. Protecting strip at rear of floor
14. Rear mounting angle
15. Rear lamp cover panel
16. Spare wheel mounting strengthening member
17. Nut plate
18. Spare wheel housing
19. Spare wheel clamp tie bar
20. Spare wheel clamp
21. Wing nut, fixing spare wheel clamp
22. Cover plate
23. Tailboard sealing rubber
24. Tailboard rubber buffer
25. Tailboard chain bracket
26. Tailboard chain
27. Clevis pin, fixing chain to bracket
28. Sleeve for chain
29. Wheelarch box locker lid
30. Locker lid hinge
31. Locker lid hasp
32. Locker lid turnbuckle
33. Tread plate, wheelarch box top
34. Tread plate, vertical, front panel
35. Tread plate, horizontal, front panel
36. Tread plate for rear floor and wheelarch box sides
37. Starting handle and jack handle clip
38. Fuel filler cover plate
39. Rubber grommet, wheelarch, locker access hole
40. 'Land-Rover' nameplate
41. Registration plate





# BODY

## Layout of roof and body side panels, 88 Station Wagon



COLLINS-JONES.

D48.



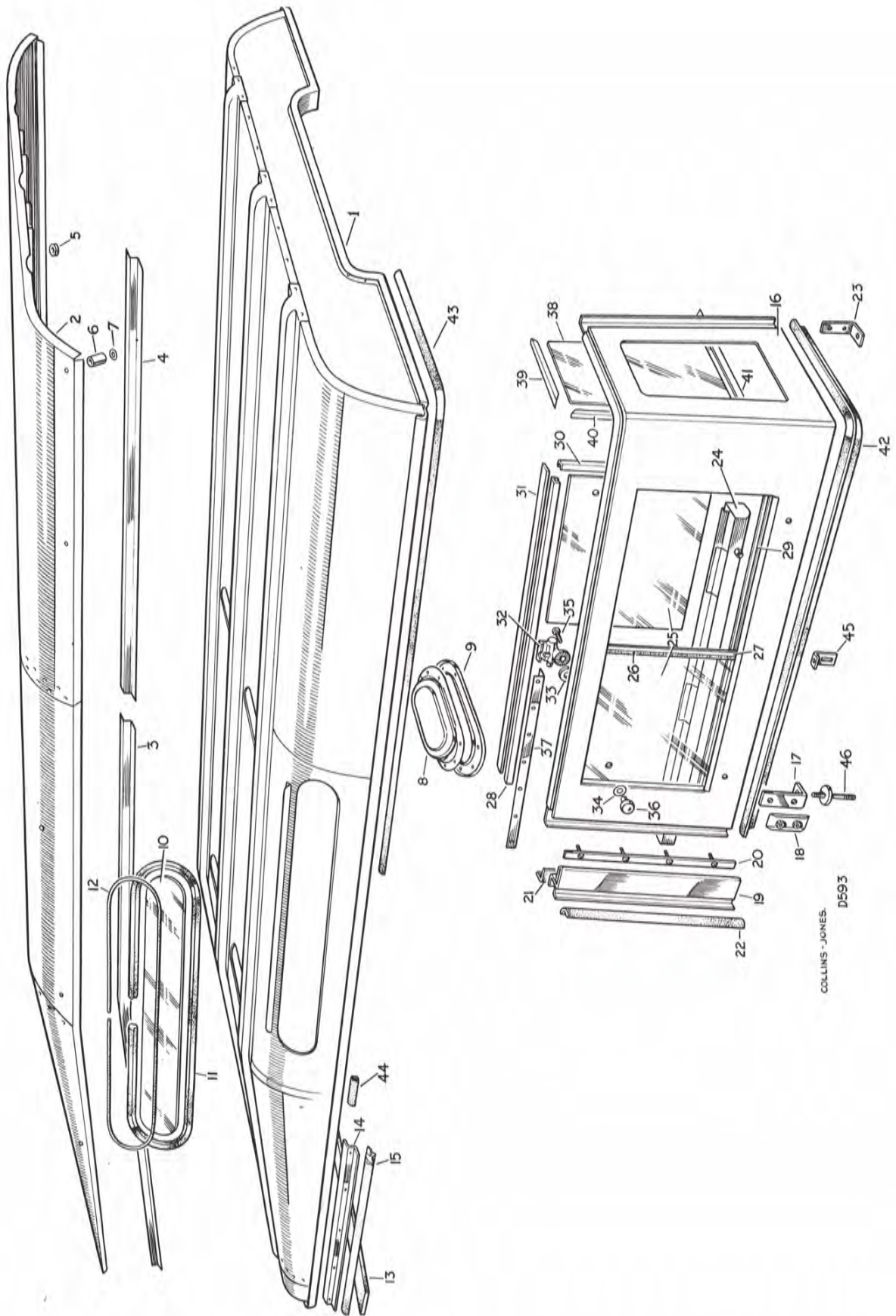
## Key to illustration of roof and body side panels, 88 Station Wagon

1. Roof and tropical roof panel assembly
2. Tropical roof panel
3. Distance piece
4. Rubber washer
5. Rubber washer
6. Roof ventilator, front
7. Side light for roof
8. Weather strip for side light
9. Filler strip for weather strip
10. Side panel assembly, LH
11. Mounting bracket front
12. Nut plate
13. Support bracket of tailboard
14. Capping for front door rear seal LH
15. Stud plate
16. Drain channel complete for side windows
17. Glass for side window, sliding
18. Sealing rubber for sliding light
19. Channel for sliding light rubber
20. Channel for sliding light—top
21. Channel for sliding light—sides
22. Packing strip for top channel
23. Catch for sliding glass, front, overall length 1½ in.
24. Distance piece for catch
25. Washer for catch
26. Screw (2BA x ¾ in. long)
27. Tapped plate for catch
28. Runner for sliding catch
29. Glass for rear end window
30. Retainer for rear end glass upper LH
31. Retainer for rear end glass inner and outer
32. Retainer for rear end glass lower LH
33. Seal for front door, upper side
34. Seal at top and bottom for front door, upper side
35. Sealing rubber, lower edge to body
36. Sealing rubber, RH
37. Retainer for front door seal top LH
38. Seal for front door top
39. Rubber seal for canopy
40. Support bracket, centre, body side
41. Mounting stud
42. 'Station Wagon' name plate, front and rear



# BODY

## Layout of roof and body side panels, 109 Station Wagon



COLLINS-JONES.  
D593

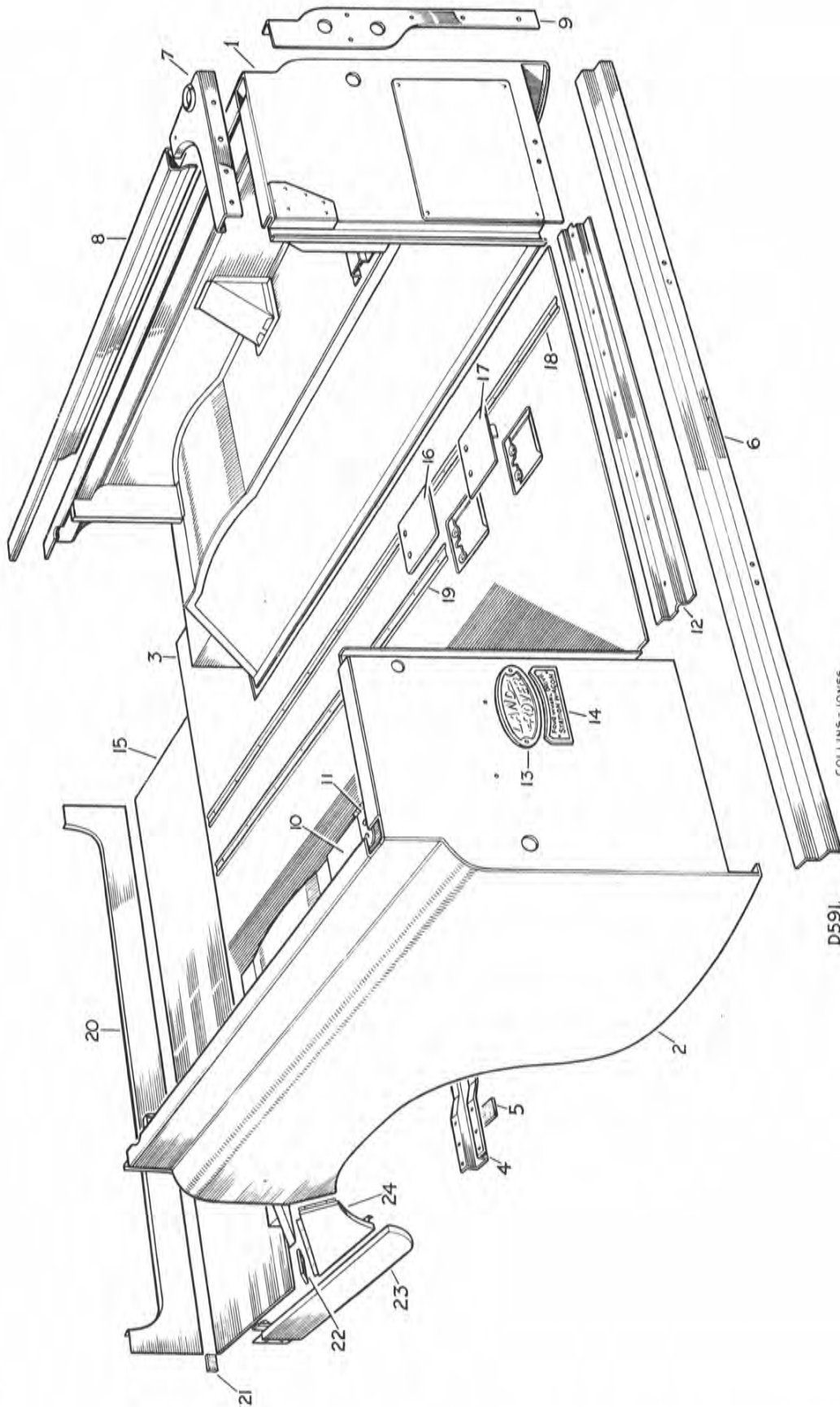


## Key to illustration of roof and body side panels, 109 Station Wagon

- |   |  |
|---|--|
| 1. Roof complete  | 24. Drain channel complete for side window               |
| 2. Tropical roof panel assembly                                   | 25. Glass for side window, sliding                       |
| 3. Stiffener, front   | 26. Sealing rubber for sliding light                     |
| 4. Stiffener, rear  | 27. Retainer for sliding light rubber                    |
| 5. Rubber washer  | 28. Channel for sliding light, top                       |
| 6. Distance piece   | 29. Channel for sliding light, bottom outer              |
| 7. Rubber washer  | 30. Channel for sliding light, side                      |
| 8. Roof ventilator  | 31. Packing strip for top channel                        |
| 9. Retainer for roof trim at ventilator                           | 32. Catch for sliding glass, front overall length 1½ in. |
| 10. Roof side light glass   | 33. Distance piece for catch                             |
| 11. Weather strip for glass                                       | 34. Washer for catch                                     |
| 12. Filler strip for weather strip                                | 35. Screw (2BA x ⅝ in. long)                             |
| 13. Sealing rubber for roof to windscreen                         | 36. Tapped plate for catch                               |
| 14. Seal retainer for door top, LH front                          | 37. Runner for sliding catch                             |
| 15. Seal for retainer   | 38. Glass for rear end window                            |
| 16. Side panel assembly, LH                                       | 39. Retainer for rear end glass, upper LH                |
| 17. Mounting bracket front  | 40. Retainer for rear end glass, inner and outer         |
| 18. Nut plate   | 41. Retainer for rear end glass, lower LH                |
| 19. Capping for 'D' post, LH                                      | 42. Sealing rubber, upper to lower body side             |
| 20. Stud plate  | 43. Sealing rubber, RH                                   |
| 21. Sealing rubber at top and bottom, upper side, 'D' post pillar | 44. Rubber seal, 'BC' post to roof                       |
| 22. Door sealing rubber at 'D' post, upper side                   | 45. Support bracket, centre body side                    |
| 23. Support bracket at tailboard                                  | 46. Mounting stud ( ⅝ UNF)                               |

BODY

Layout of rear body, 109 Station Wagon



COLLINS-JONES

D591.



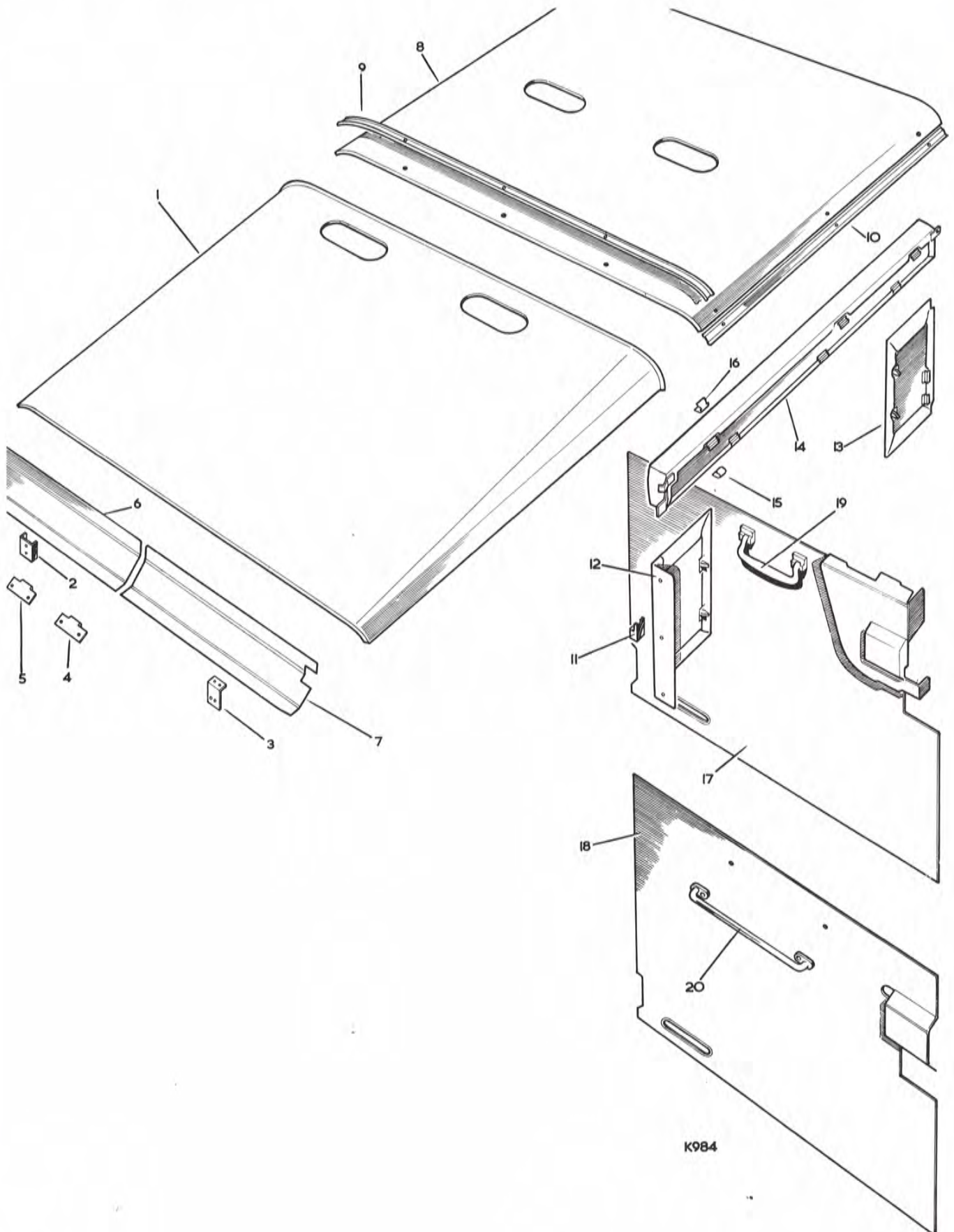
## Key to illustration of rear body for 109 Station Wagon

1. Body side and wheelarch complete, RH
2. Body side and wheelarch complete, LH
3. Rear floor
4. Cross member and pads for rear floor
5. Mounting pad for rear floor cross member
6. Rear mounting angle
7. Rear corner capping, RH
8. Capping for body top side, RH
9. Rear corner protection angle, RH
10. Lid for rear tool locker
11. Hinge complete
12. Retainer for floor mat, rear end
13. 'Land-Rover' nameplate
14. 'Station Wagon' nameplate
15. Intermediate floor for rear body
16. Cover plate for fuel tank, front
17. Cover plate for fuel tank, rear
18. Tread plate
20. Toepanel complete
21. Sealing rubber, 'BC' post to toe panel
22. Sealing rubber, 'D' post to wheelarch front flange
23. Sill panel, rear, LH
24. Body side lower front extension, LH



# BODY

## Layout of trim for 88 Station Wagon



K984



Key to illustration of trim for 88 Station Wagon

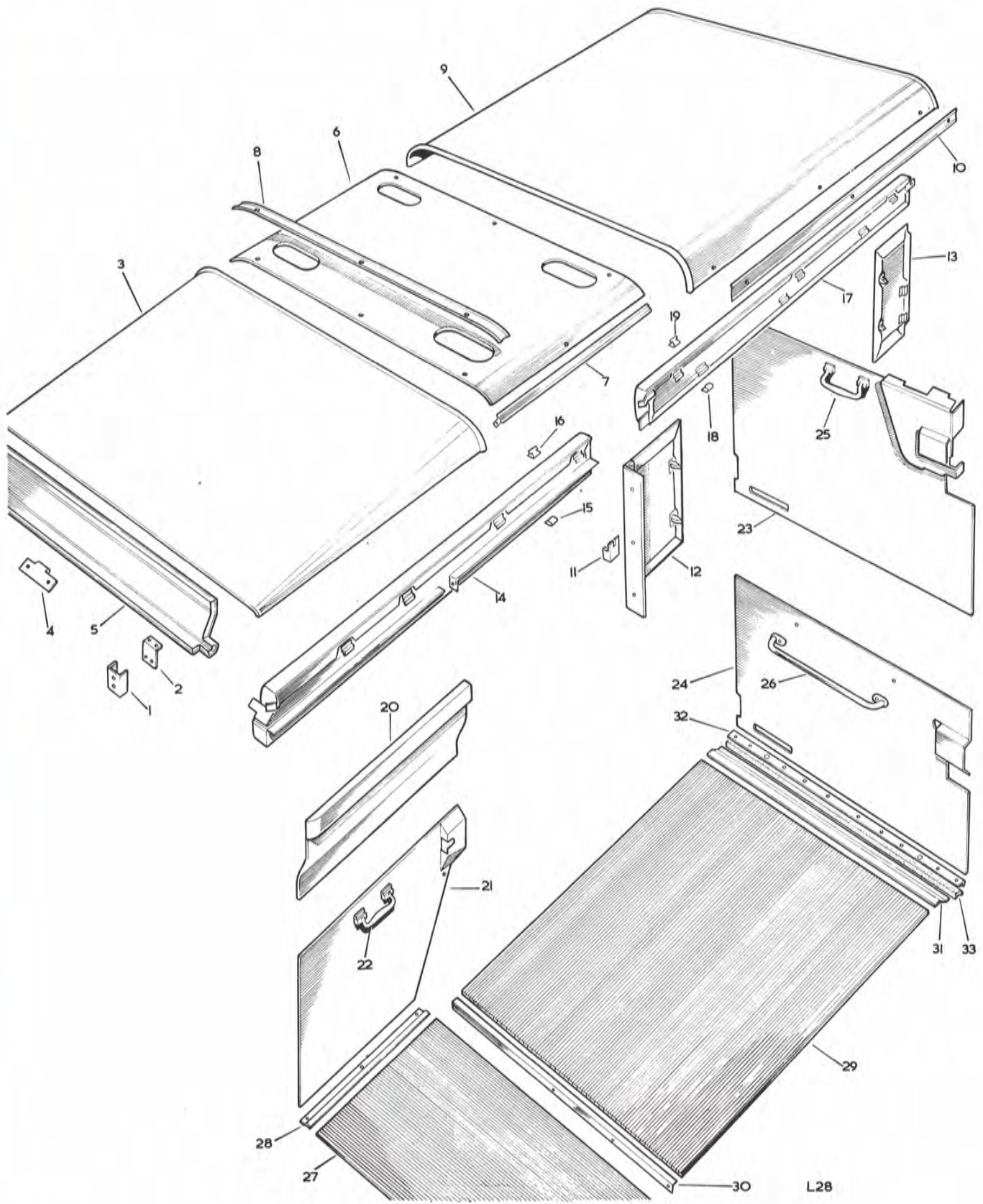
- |   |   |
|---|---|
| 1. Roof trim, front portion                 | 11. Fixing bracket, RH, sidelight casing, front |
| 2. Bracket, cant rail to roof frame         | 12. Sidelight casing, trimmed LH, front         |
| 3. Bracket for roof trim, front portion     | 13. Sidelight casing, trimmed LH, rear          |
| 4. Centre bracket, canopy panel             | 14. Roll trim for cant rail, LH                 |
| 5. Outer bracket, canopy panel              | 15. Retaining clip } Fixing                     |
| 6. Canopy trim panel, RH                    | 16. Edge clip } roll trim                       |
| 7. Canopy trim panel, LH                    | 17. Rear door trim casing.                      |
| 8. Head cloth, rear portion                 | 18. Rear door trim casing.                      |
| 9. Fixing strip, head cloth, front and rear | 19. Door pull handle                            |
| 10. Side rail, head cloth, rear portion     | 20. Door grab handle                            |





# BODY

## Layout of trim for 109 Station Wagon

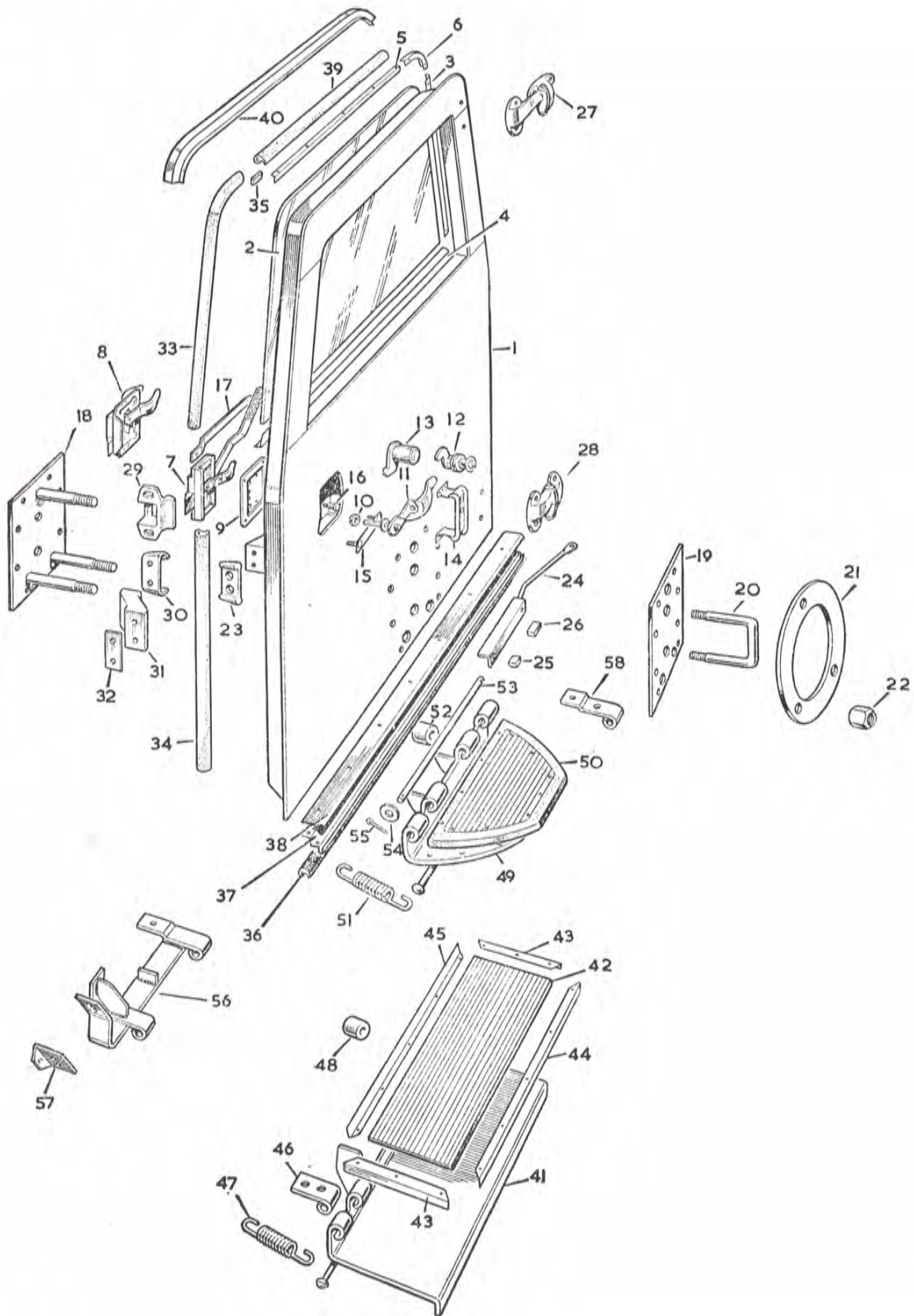


## Key to illustration of trim for 109 Station Wagon

- |  |  |                       |
|--|--|-----------------------|
| 1. Bracket, cant rail to roof frame            | 18. Retaining clip                                 | } Fixing roll<br>trim |
| 2. Bracket for roof trim, front portion        | 19. Edge clip                                      |                       |
| 3. Roof trim, front portion                    | 20. Door trim upper, centre, RH                    |                       |
| 4. Centre bracket for canopy trim panel        | 21. Door trim lower, centre, RH                    |                       |
| 5. Canopy trim panel                           | 22. Door pull handle for rear side door            |                       |
| 6. Headcloth, intermediate                     | 23. Rear door trim casing                          |                       |
| 7. Side rail for intermediate headcloth        | 24. Rear door trim casing                          |                       |
| 8. Fixing strip for intermediate headcloth     | 25. Door pull handle for rear door                 |                       |
| 9. Headcloth, rear                             | 26. Door grab handle                               |                       |
| 10. Side strip for rear headcloth              | 27. Intermediate floor rubber mat                  |                       |
| 11. Fixing bracket, RH sidelight casing, front | 28. Retainer for floor mat, intermediate           |                       |
| 12. Sidelight casing, front, LH                | 29. Rear floor rubber mat                          |                       |
| 13. Sidelight casing, rear, LH                 | 30. Retainer for rear floor mat, front end         |                       |
| 14. Roll trim, cant rail, LH front             | 31. Retainer for seal and rear floor mat, rear end |                       |
| 15. Retaining clip                             | } Fixing roll<br>trim                              |                       |
| 16. Edge clip                                  |  |                       |
| 17. Roll trim, cant rail, LH rear              | 32. Protection strip for rear door, bottom         |                       |
|  | 33. Sealing rubber for rear door, bottom           |                       |

# BODY

## Layout of rear door, 88 and 109 models



K983



## Key to illustration of rear door, 88 and 109 models

- |  |   |
|--|---|
| 1. Rear door   | 30. Female dovetail                           |
| 2. Glass for rear door                                   | 31. Spacer                                    |
| 3. Retainer for glass, vertical                          | 32. Shim                                      |
| 4. Retainer for glass, bottom                            | 33. Seal for door sides                       |
| 5. Retainer for glass, top                               | 34. Seal for door side, LH bottom             |
| 6. Retainer for glass, corners                           | 35. End filler for seals                      |
| 7. Door lock, mounting and handle assembly               | 36. Seal for rear door, bottom                |
| 8. Door lock, mounting and handle assembly               | 37. Retainer fixing seal to rear door, bottom |
| 9. Mounting plate for door lock                          | 38. Protection strip for rear door, bottom    |
| 10. Washer, handle to cover                              | 39. Seal for rear door, top                   |
| 11. Door handle with lock                                | 40. Retainer for rear door seal, top          |
| 12. Barrel lock  | 41. Rear step                                 |
| 13. Barrel lock  | 42. Rubber mat for step                       |
| 14. Bracket for door handle                              | 43. Retainer for rear step, side              |
| 15. Stud plate, door lock, bottom                        | 44. Retainer for rear step mat, front         |
| 16. Locking pillar for catch                             | 45. Retainer for rear step mat, rear          |
| 17. Waist rail lock handle protection strip              | 46. Hinge, centre for rear step               |
| 18. Wheel stud plate                                     | 47. Spring for rear step                      |
| 19. Clamp plate for spare wheel stud plate               | 48. Buffer for rear step                      |
| 20. 'U' bolt for spare wheel support                     | 49. Rear step                                 |
| 21. Retaining plate for spare wheel                      | 50. Rubber mat for rear step                  |
| 22. Hub nut fixing wheel and retaining plate to 'U' bolt | 51. Spring for rear step                      |
| 23. Male dovetail  | 52. Buffer for rear step                      |
| 24. Rod for check strap                                  | 53. Hinge pin for rear step                   |
| 25. Buffer for check strap, short                        | 54. Plain washer                              |
| 26. Buffer for check strap, long                         | 55. Split pin                                 |
| 27. Hinge for rear door, upper                           | 56. Support bracket and hinge centre, LH      |
| 28. Hinge for rear door, lower                           | 57. Anchor bracket for spring                 |
| 29. Striking plate                                       | 58. Hinge, centre RH                          |

## BODY

### CHASSIS FRAME

—Alignment check

76.10.02

#### Procedure

With the vehicle assembled, a check for chassis 'squareness' can be made as follows, 1 to 7:

1. Place the vehicle on a level floor.
2. Hold a plumb line against one of the measuring points as illustrated. (The measuring points are the fixed spring shackle locations).
3. Mark the floor directly beneath the plumb-bob.
4. Repeat items 2 and 3 at the remaining measuring points.

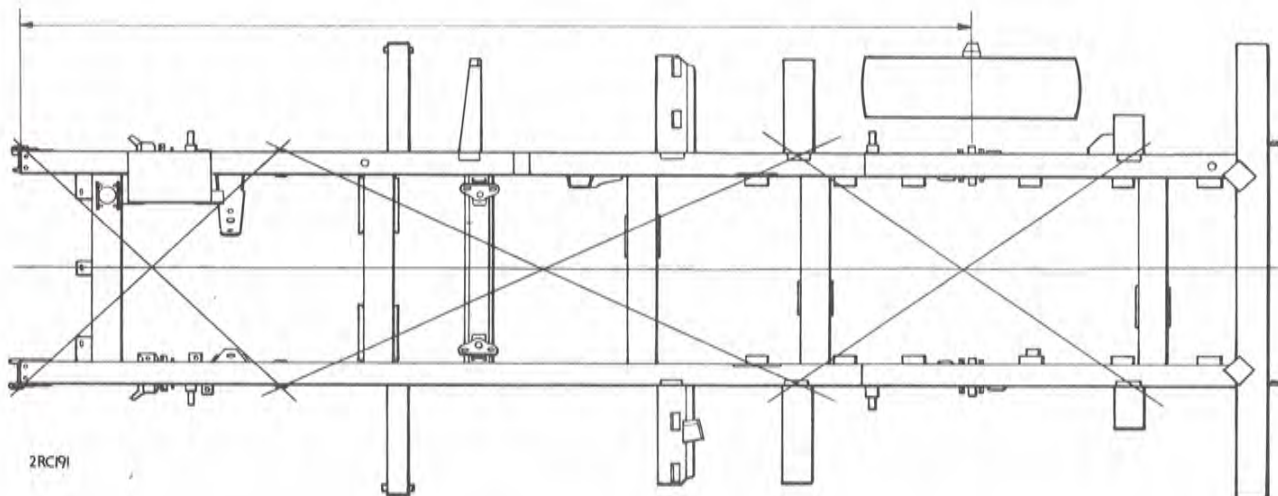
**NOTE:** When measuring diagonals, ensure that exactly corresponding points are used on each side of the chassis frame.

5. Move the vehicle and measure between the chalk marks.
6. The diagonals between the related measuring points should agree within 9,5mm (0.375 in.).
7. Using a suitable trammel, make comparative side-to-side checks between the front suspension front shackle pin and the rear wheel hub centre.
8. With the vehicle upper structure removed, comparative side-to-side checks for chassis frame malalignment can be made, using as datums the 9,5mm (0.375 in.) diameter holes provided in the No. 2 and also in the rearmost cross-member.

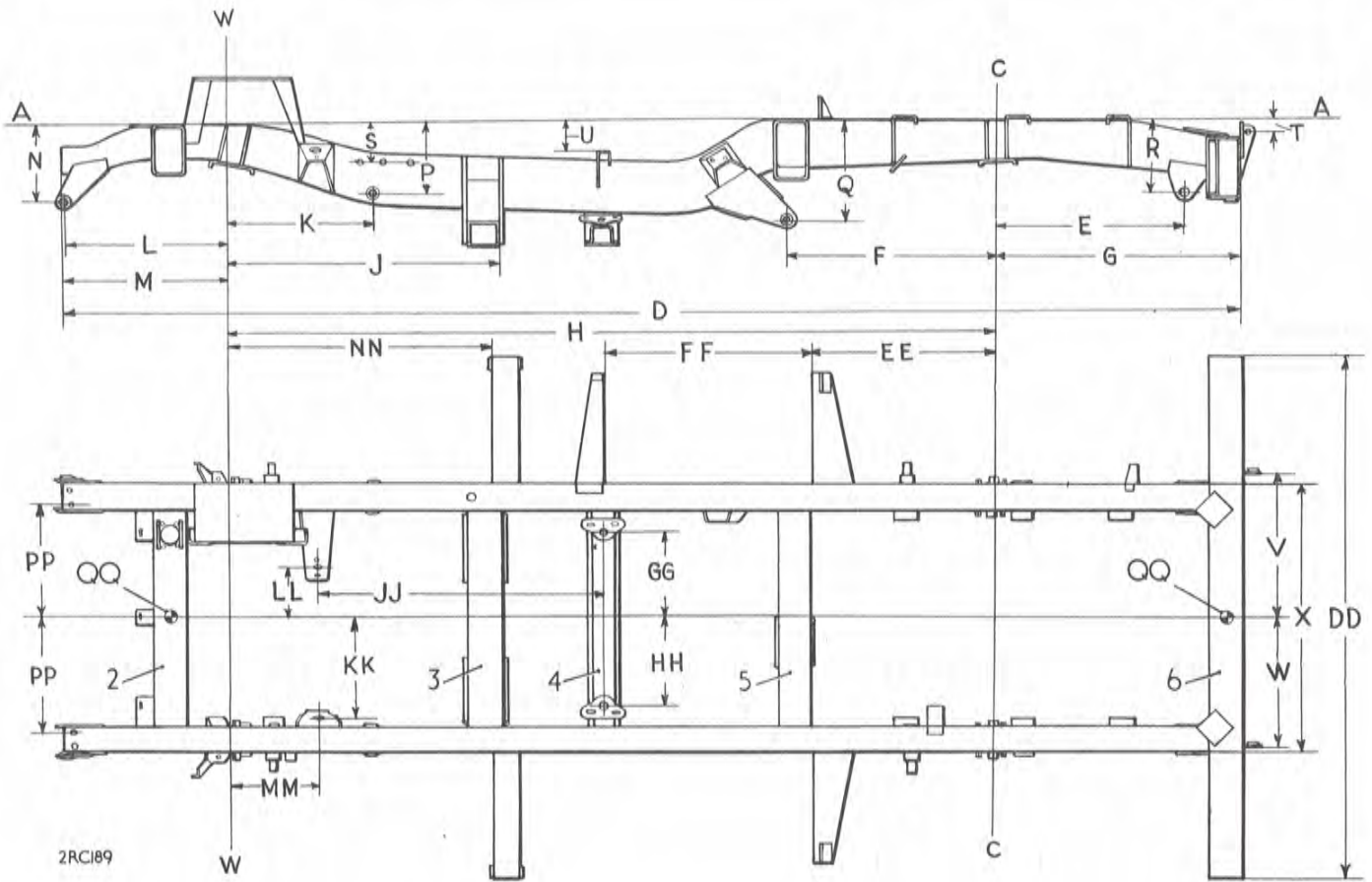
**NOTE:** The vehicle front bumper is regarded as the No. 1 cross-member.

9. Chassis frame dimensional checks can be made referring to the applicable illustration and key on the following pages.

*Continued*



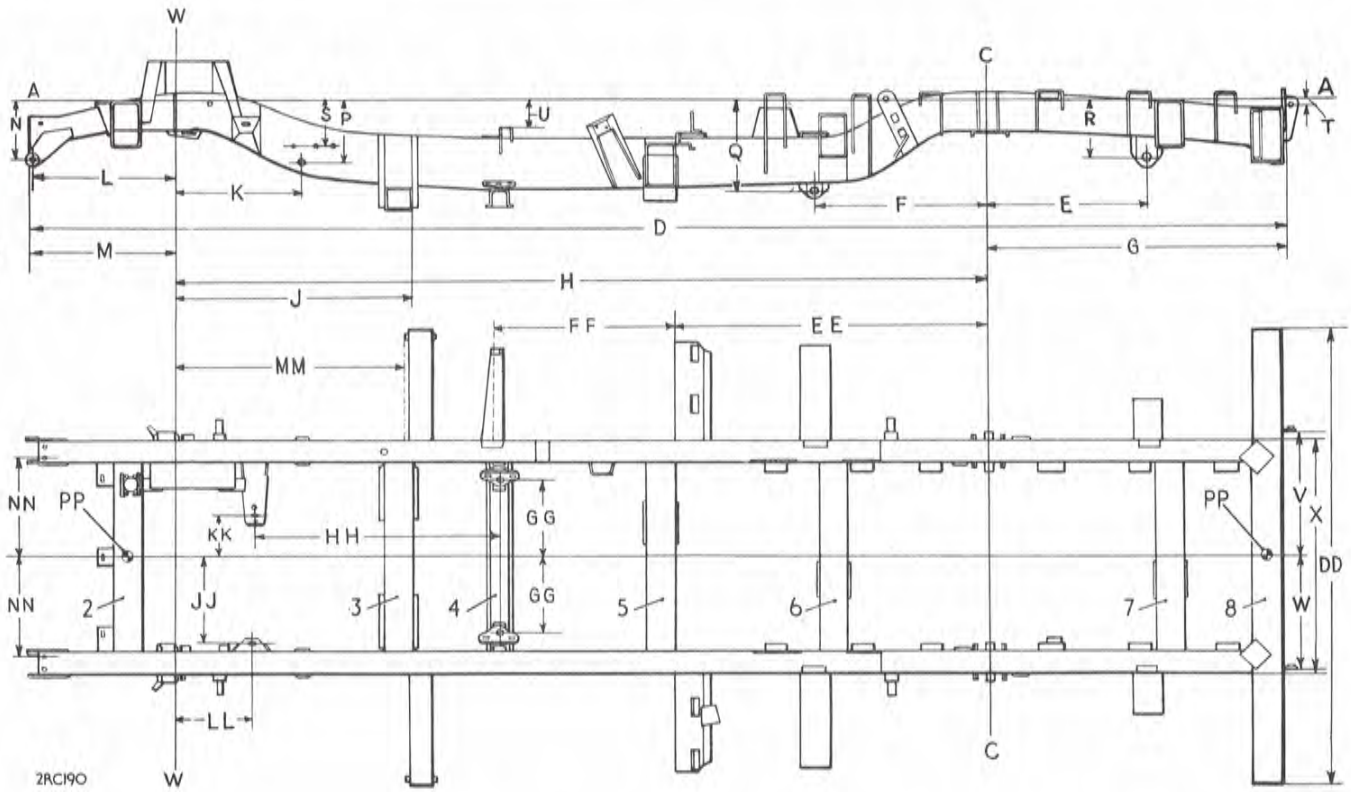
2RC91



Chassis frame dimensions, 88 models

AA	- Datum line	T	- 29,3mm (1.15in.)
WW	- Centre line of front axle	U	- 82,5mm (3.25in.)
CC	- Centre line of rear axle	V	- 432mm (17.0in.)
D	- 3420mm (134.6in.)	W	- 387,3mm (15.25in.)
E	- 539,7mm (21.25in.)	X	- 787mm (31.0in.)
F	- 610mm (24.0in.)	DD	- 1536mm (60.5in.)
G	- 713,2mm (28.08in.)	EE	- 539,7mm (21.25in.)
H	- 2235mm (88.0in.)	FF	- 610mm (24.0in.)
J	- 793,7mm (31.25in.)	GG	- $257 \pm 0,8\text{mm}$ ( $10.12 \pm 0.030\text{in.}$ )
K	- 422,3mm (16.625in.)	HH	- $254 \pm 0,8\text{mm}$ ( $10.00 \pm 0.030\text{in.}$ )
L	- 457mm (18.0in.)	JJ	- $835 \pm 0,8\text{mm}$ ( $32.87 \pm 0.030\text{in.}$ )
M	- 472,2mm (18.58in.)	KK	- 289,7mm (11.40in.)
N	- 229mm (9.0in.)	LL	- 166,7mm (6.56in.)
P	- 212,7mm (8.37in.)	MM	- $250,8 \pm 1,5\text{mm}$ ( $9.875 \pm 0.060\text{in.}$ )
Q	- 290,5mm (11.44in.)	NN	- 768,3mm (30.25in.)
R	- 198,4mm (7.81in.)	PP	- $331,78 \pm 0,5\text{mm}$ ( $13.062 \pm 0.020\text{in.}$ )
S	- 120,6mm (4.75in.)	QQ	- 9,52mm (0.375in.) diameter holes

# BODY



Chassis frame dimensions, 109 models

AA	– Datum line	U	– 82,5mm (3.25in.)
WW	– Centre line of front axle	V	– 432mm (17.0in.)
CC	– Centre line of rear axle	W	– 387,3mm (15.25in.)
D	– 4240mm (166.9in.)	X	– 787mm (31.0in.)
E	– 539,7mm (21.25in.)	DD	– 1536mm (60.5in.)
F	– 610mm (24.0in.)	EE	– 1070mm (42.12in.)
G	– 1000mm (39.375in.)	FF	– 641mm (25.2in.)
H	– 2770mm (109in.)	GG	– $257 \pm 0,8\text{mm}$ ( $10.125 \pm 0.030\text{in.}$ ) 2.6 & 2¼ litre
J	– 793,7mm (31.25in.)	HH	– $835 \pm 0,8\text{mm}$ ( $32.87 \pm 0.030\text{in.}$ ) 2¼ litre
K	– 422,3mm (16.625in.)		– $984 \pm 0,8\text{mm}$ ( $38.74 \pm 0.030\text{in.}$ ) 2.6 litre
L	– 457mm (18.0in.)	JJ	– 289,71mm (11.406in.) 2¼ litre
M	– 472,2mm (18.58in.)		– 290,51mm (11.437in.) 2.6 litre
N	– 229mm (9.0in.)	KK	– 166,7mm (6.56in.)
P	– 212,7mm (8.37in.)	LL	– 250,7mm (9.87in.) 2¼ litre
Q	– 296,8mm (11.68in.)		– 193,7mm (7.62in.) 2.6 litre
R	– 204,7mm (8.06in.)	MM	– 763mm (30in.) 2¼ & 2.6 litre
S	– 120,6mm (4.75in.)	NN	– $331,8 \pm 0,5\text{mm}$ ( $13.06 \pm 0.062\text{in.}$ )
T	– 29,3mm (1.15in.)	PP	– 9,52mm (0.375in.) diameter holes

**BODY SIDE ASSEMBLY**

**–Remove and refit**

- Left hand 76.10.08
- Right hand 76.10.09

**Removing**

1. Remove the hard top complete. 76.61.01.
2. Remove the fixings, roof panel to body sides.
3. Withdraw the body sides.

**Refitting**

4. Replace the rubber seal, roof panel to body sides.
5. Reverse 1 to 3.

**CAB**

**–Remove and refit 76.10.10**

**Removing**

1. Remove the nuts and bolts securing the cab at the windscreen and the nuts securing the cab at the hood sockets.
2. 88 models: remove the bolts, nuts and washers securing the cab to the cab mounting rail, at the rear body.  
109 models: remove the set bolts and washers securing the cab to the cab mounting brackets, at the rear body.
3. Lift off the cab complete.
4. Remove the roof panel and sealing rubber from the rear panel.
5. Remove the draught excluders and retaining strips from the top of the front door apertures.
6. Remove the rear upper front door seals.
7. Remove the draught pads from the front edge of the side panels.
8. If necessary, remove the rear bottom sealing strip from the back rest panel capping.
9. If necessary, remove the sealing rubber from the front edge of the roof.
10. If necessary, remove all mounting brackets.

**Refitting**

11. Reverse 1 to 10 as applicable.





## BODY

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### REAR BODY

—Remove and refit

76.10.11

#### Removing

1. Remove the hood and hood frame or the hard top as applicable. 76.61.12 or 76.61.01.
2. Remove the spare wheel if fitted in the rear body.
3. **88 models:** remove the seat cushions.
4. **109 models:** tilt forward the squabs.
5. Disconnect the fuel filler and breather hoses.
6. Remove the bolts, washers and nuts securing the rear body to the seat base.
7. Remove the bolts securing the sill channel mounting bracket to the seat base and rear body.
8. Detach the nuts and bolts securing the rear sill panel to the body.
9. **88 models:** detach the wing stays from the chassis members.
10. Remove the nuts and bolts securing the body to the rear cross-member mounting brackets.
11. Remove the rear body complete.
12. If necessary, remove all serviceable parts for fitment to new body.

#### Refitting

13. Reverse 1 to 12.



**FRONT FLOOR**

– Remove and refit

76.10.12

2¼ litre models, items 1 to 7 and 11 to 13  
 2.6 litre models, items 1 to 4 and 8 to 13

**Removing**

1. Unscrew the knob and locknut from the transfer gear lever.
2. Remove the fixings and withdraw the dust cover from the transfer gear lever.
3. Unscrew the knob and locknut from the four-wheel drive lever.
4. Withdraw the spring and ferrule.

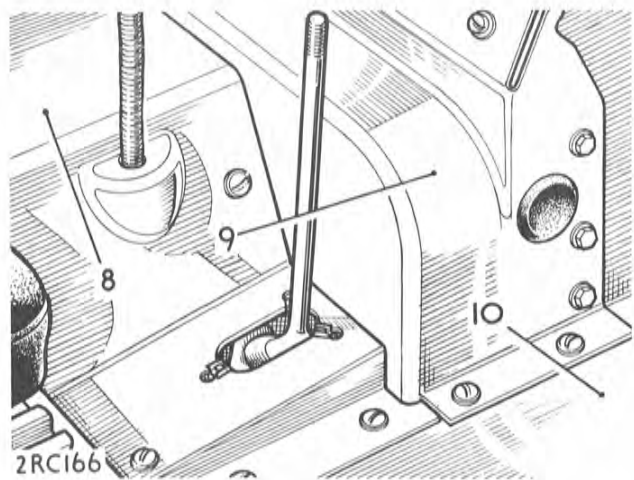
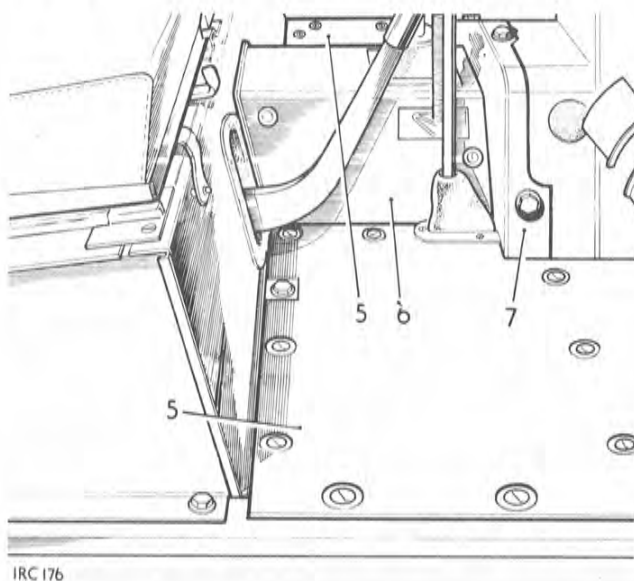
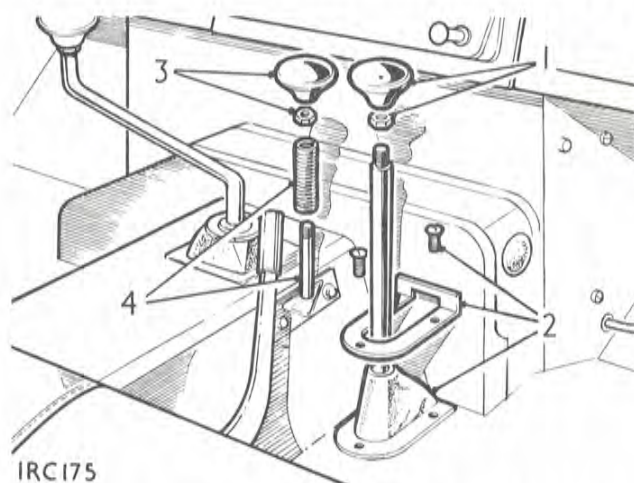
2¼ litre models, items 5 to 7

5. Remove both halves of the front floor.
6. Remove the gearbox tunnel cover.
7. Remove the gearbox tunnel front panel.

2.6 litre models, items 8 to 10

8. Remove the gearbox tunnel cover.
9. Remove the gearbox tunnel front panel.
10. Remove both halves of the front floor.

*Continued*

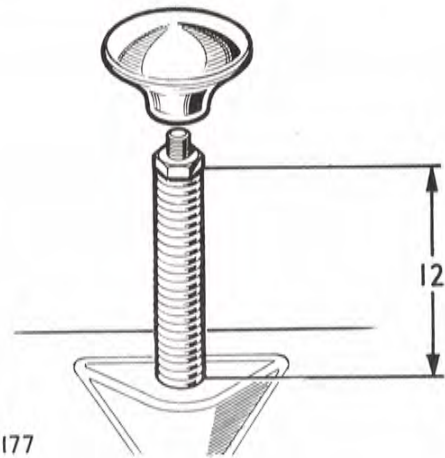


## BODY

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### Refitting, both models

11. Reverse 8 to 10 or 5 to 7 as applicable.  
Use waterproof sealant between the joint flanges.  
A suitable sealant is 'Sealastrip', manufactured by Expandite Ltd., Chase Road, London NW10, England.
12. Adjust the four-wheel drive lever during assembly, as follows: Fit the ferrule, spring and locknut to the lever, depress the lever and adjust the locknut until the compressed spring length is 58mm (2.312 in.), then fit the knob and tighten the locknut.
13. Reverse 1 and 2.



**ROOF PANEL****—Remove and refit** 76.10.13**Removing**

1. Remove the fixings, roof panel to body sides.
2. Withdraw the roof panel.

**Refitting**

3. Replace the rubber seal, roof panel to body sides.
4. Reverse 1 and 2.

**FRONT WING****—Remove and refit** 76.10.26**Removing**

1. Remove the bonnet panel. 76.16.01.
2. Disconnect the side lamp leads at the snap connectors adjacent to the radiator.
3. Remove the radiator grille.
4. Disconnect the headlamp leads at the snap connectors and earth terminal beneath the bonnet catch platform and withdraw the leads from the grille panel.
5. Drivers side: Remove the steering box mudshield.
6. Remove the securing bolts and lift the mudshield out from under the wing.
7. Remove the bolts securing the wing to the scuttle pillar.
8. Remove the bolts securing the wing stay and the wing to the sill panel.
9. Remove the bolts securing the wing to the rear wing upper mounting bracket.
10. Remove the bolt securing the wing to the steering column support plate.
11. Remove the bolts securing the wing to the grille panel (on RH wings, this action also releases the bonnet prop bracket) and withdraw the wing.
12. If required, remove the head, side and flasher lamps.

**Refitting**

13. Reverse 1 to 12.

## BODY

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### DASH PANEL ASSEMBLY

—Remove and refit 76.10.36

Service tool 601763, Ball joint extractor

#### General

The following instructions are generally applicable to all models, but individual models may vary slightly, particularly with regard to equipment attached to the dash panel.

#### Removing

1. Disconnect the battery earth lead.
2. Remove the bonnet. 76.16.01.
3. Remove the front wings. 76.10.26.
4. Remove the windscreen. 76.81.02.
5. Remove the front doors. 76.28.01.
6. Remove the front floor. 76.10.12.
7. Remove the facia top rail. 76.46.04.
8. Remove the facia support panel. 76.46.06.
9. Disconnect the longitudinal steering arm at the steering box drop arm, using ball joint extractor 601763.
10. Remove or release, as applicable, all components fitted or attached to the dash panel assembly.
11. Remove the fixings, steering box support bracket to chassis.
12. Remove the tie bolts and fixings, dash assembly to chassis.
13. Remove the fixings, sill panel extremities to dash.
14. Withdraw the dash panel complete.

#### Refitting

15. Reverse 12 to 14, using a waterproof sealant between the joint faces.
16. Reverse 11, torque loading 2,0 kgf.m (15 lbf.ft.).
17. Reverse 10, referring to the appropriate Divisions of the Manual for linkage and control settings and wiring connections.
18. Reverse 9, torque loading 4,0 kgf.m (30 lbf.ft.).
19. Reverse 1 to 8.



**TAIL DOOR FOLDING STEP**

– Remove and refit 76.10.41

**Removing**

1. Disconnect the return spring from the step.
2. Remove the washer and split pin from one end of the hinge pin.
3. Withdraw the hinge pin and step.

**Refitting**

4. Reverse 1 to 3

**BONNET**

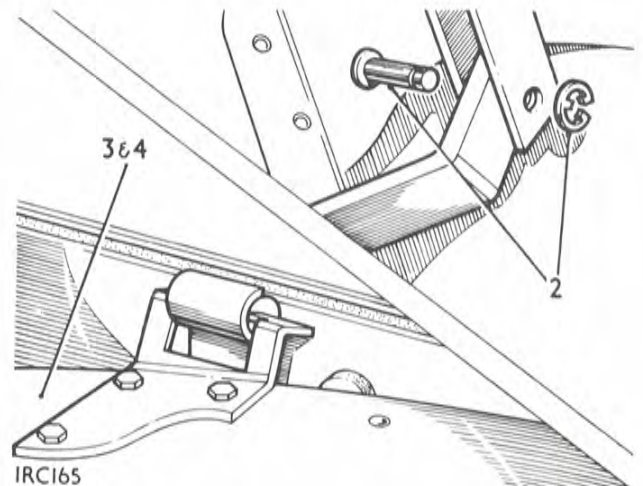
– Remove and refit 76.16.01

**Removing**

1. Remove the spare wheel, if fitted on the bonnet.
2. Disconnect the prop rod.
3. Raise the bonnet to the vertical position.
4. Lift the bonnet clear from the hinges.

**Refitting**

5. Reverse 1 to 4.



## BODY

---

### DOORS

#### –Remove and refit

–Side door, front	76.28.01
–Side door, rear	76.28.02
–Tail door	76.28.21

#### Removing

1. Tail door only—remove the spare wheel if fitted.
2. Disconnect the door check strap.
3. Remove the fixings securing the hinges to the door.
4. Withdraw the door.

#### Refitting

5. Reverse 1 to 4, replacing weather seals as necessary.

### TAILGATE, UPPER (REAR LID)

–Remove and refit	76.28.29
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#### Removing

1. Withdraw the hinge pins and withdraw the tailgate.
2. If required, remove the split pins and withdraw the stays.
3. If necessary, remove the stay support mounting brackets from the side panels.
4. To remove the lid lock, remove the inner handle by depressing the spring-loaded boss and push out the locking pin.
5. Remove the handle, boss, cap and spring.
6. Withdraw the screws, spring and plain washers and nuts securing the lock to the lid panel.
7. Remove the bolts and plain washers securing the bolt guides to the lid panel.
8. Remove the outer handle and lift off the lock complete.

#### Refitting

9. Reverse 1 to 8.



**TAILGATE, LOWER**

–Remove and refit 76.28.30

**Removing**

1. Withdraw the tailgate retaining keys.
2. Lower the tailgate.
3. Unhook the chains.
4. Remove the retaining fixings at the RH hinge pin.
5. Slide out the tailgate.
6. If required, remove the hinges and chain hooks.

**Refitting**

7. Reverse 1 to 6.

**DOOR HINGE**

–Remove and refit

- Side door hinge, items 1 to 3 76.28.42
- Tail door hinge, items 1 to 5 76.28.65

**Removing**

1. Remove the applicable door 76.28.01 (front, side), 76.28.02 (rear, side) or 76.28.21 (tail).
2. Remove the hinge from the body.

**Refitting**

3. Reverse 1 and 2.
4. Tail door hinge only—if required, release the lock tab and turn the special nut to adjust hinge spring tension.
5. When 4 is satisfactory, secure the nut with the lock tab.





## BODY

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### SIDE DOOR GLASS

#### –Remove and refit

- Front door 76.31.01
- Rear door 76.31.02

#### Removing

##### Sliding glass

1. Move the sliding window to allow access to the screws securing glass run channel—top and bottom--then remove the screws from inside the channel.
2. Withdraw the top run channel and sliding window.
3. Renew the bottom run channel if necessary.

##### Fixed glass

4. Remove the sliding window.
5. Remove the screws securing front retainer and ease the fixed glass clear of frame.

#### Refitting, both glasses

6. Apply new Prestik sealing strip to window frame
7. Reverse 1 to 3 or 4 and 5 as applicable.

### TAIL DOOR GLASS

#### –Remove and refit 76.31.21

The procedure for the tail door glass is similar to that for the cab glass. Refer to Operation 76.81.33



**DOOR LOCKS****–Remove and refit**

–Side door, front	76.37.12
–Side door, rear	76.37.13
–Tail door	76.37.16

**Removing**

1. Remove the door trim, where fitted.
2. Remove the fixings and withdraw the door lock.
3. If required, remove the striker plate from its support bracket.

**Refitting**

4. Reverse 1 and 2.
5. Adjust the striker plate position as necessary such that the door draught excluders are slightly compressed with the door closed.



## BODY

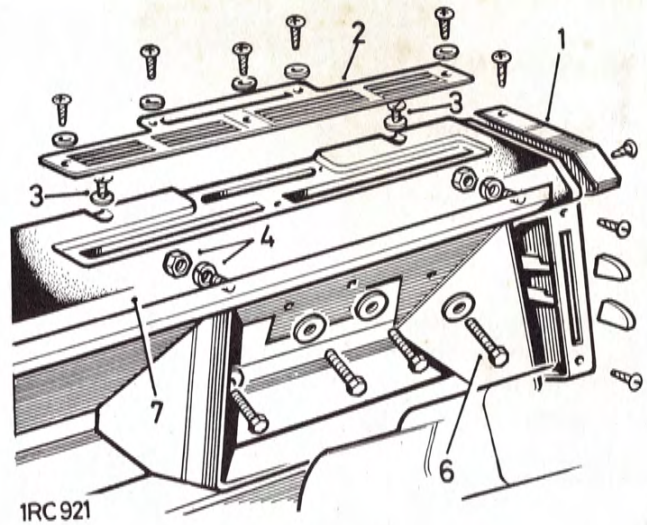
### FACIA TOP RAIL

—Remove and refit

76.46.04

#### Removing

1. Remove the cover from each end of the top rail.
2. Remove the fresh air grilles.
3. Remove the fixings from the front edge of the top rail.
4. Remove the fixings securing the top rail to the facia support panel.
5. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
6. Slacken the four bolts securing the instrument housing to the facia support panel.
7. Withdraw the facia top rail.



#### Refitting

8. Reverse 1 to 7.

**LOWER FACIA**

—Remove and refit

76.46.05

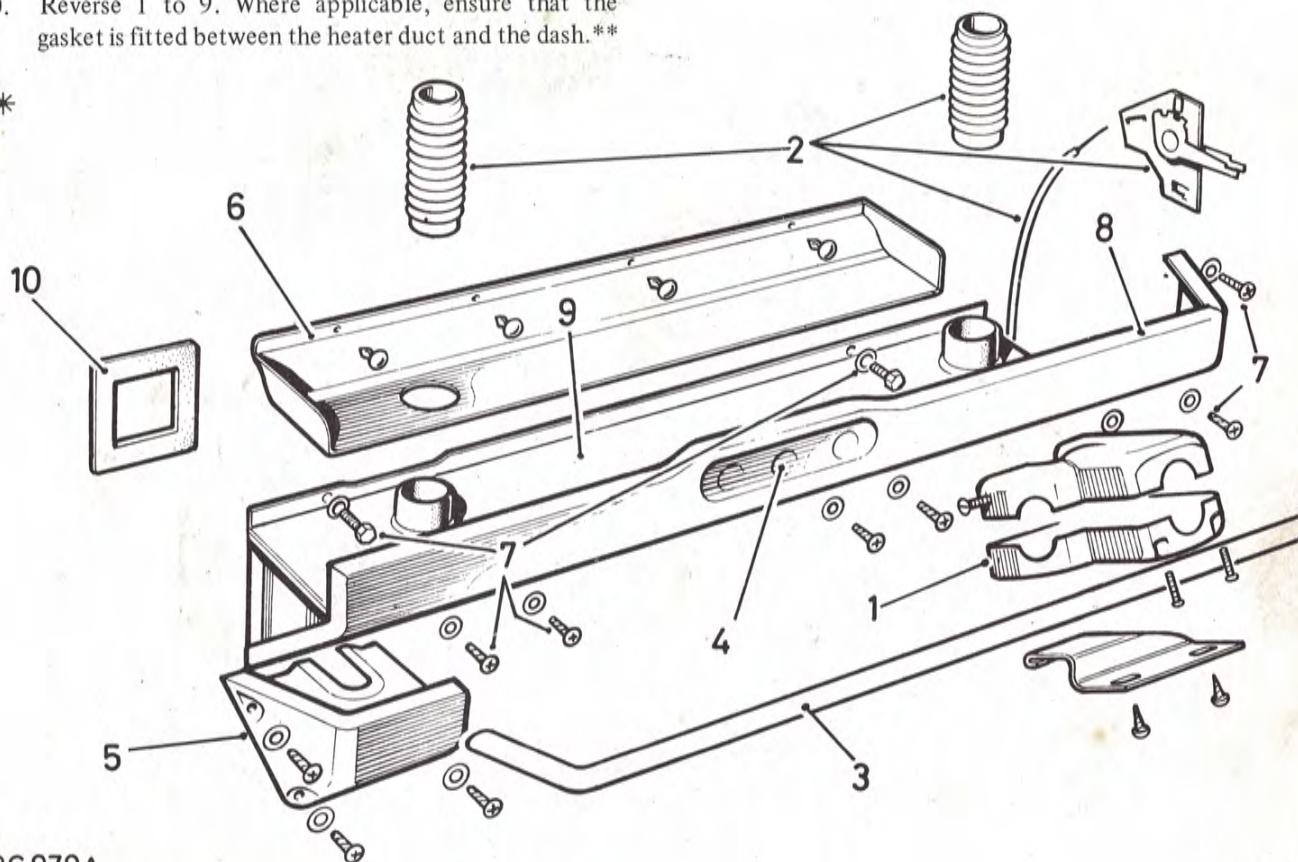
**Removing**

1. Release the switch shroud from the steering column and the lower facia.
2. If the vehicle is fitted with a heater, proceed as follows:
  - a. Remove the heater control panel from the drivers end of the facia and disconnect the distribution control cable.
  - b. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
  - c. Withdraw the demister hoses.
- 3.\*\*Withdraw the finisher strip from the top edge of the lower facia.
4. If the vehicle is fitted with auxiliary instruments at the centre of the lower facia, remove as applicable.
5. Remove the end cover from the lower facia.
6. Remove the parcel tray.
7. Remove the fixings securing the lower facia to the dash.
8. Withdraw the lower facia.
9. If required, remove the heater duct cover and the distribution flap valves, as applicable.

**Refitting**

10. Reverse 1 to 9. Where applicable, ensure that the gasket is fitted between the heater duct and the dash.\*\*

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IRC979A

\*\*



FACIA SUPPORT PANEL

—Remove and refit

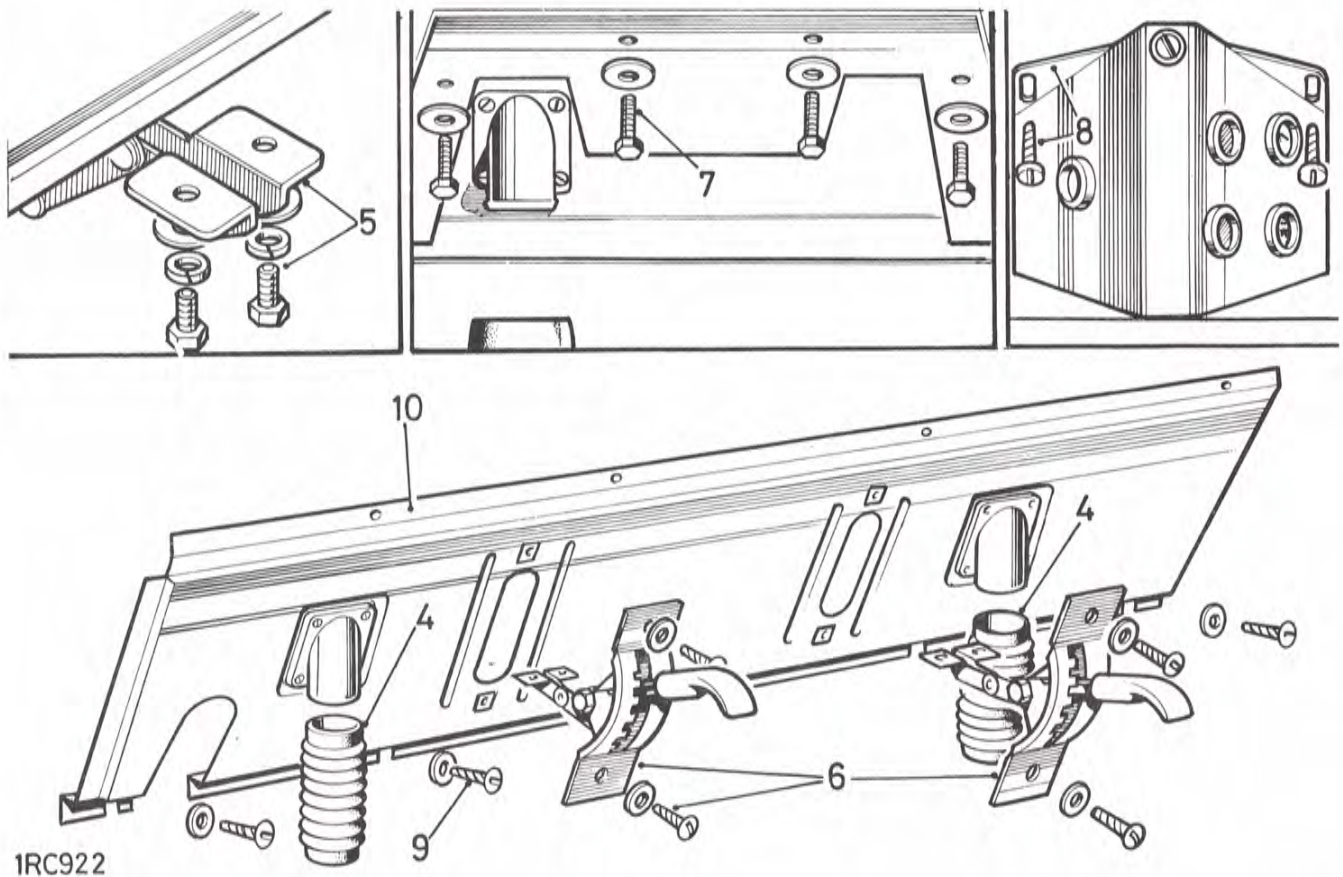
76.46.06

Removing

1. Disconnect the battery earth lead.
2. Remove the fascia top rail. 76.46.04.
3. Remove the instrument panel. 88.20.01.
4. If the vehicle is fitted with a heater, disconnect the hoses from the demister nozzles.
5. Remove the instrument housing.
6. Remove the fixings securing the ventilator control levers to the lids.
7. Remove the ventilator controls complete.
8. If the vehicle is fitted with an auxiliary instrument panel, remove the fixings securing it to the fascia support panel.
9. Remove the fixings securing the fascia support panel to the dash.
10. Withdraw the fascia support panel.
11. If applicable, remove the heater demister nozzles as required.

Refitting

12. Reverse 1 to 11.



1RC922



RADIATOR GRILLE PANEL

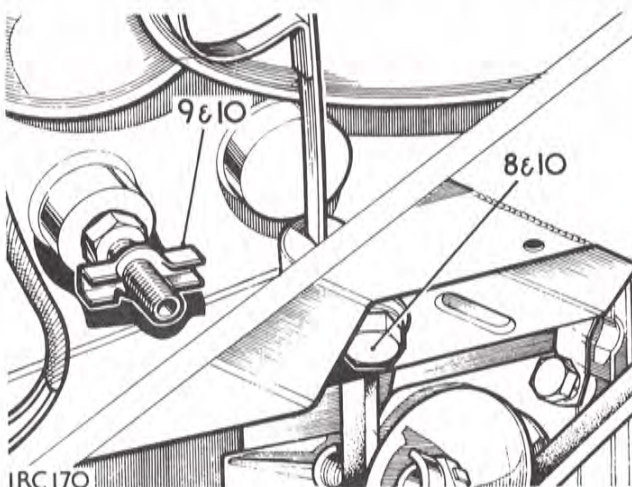
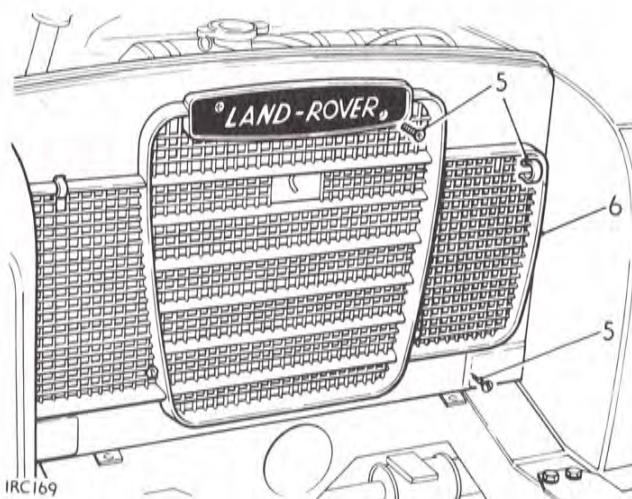
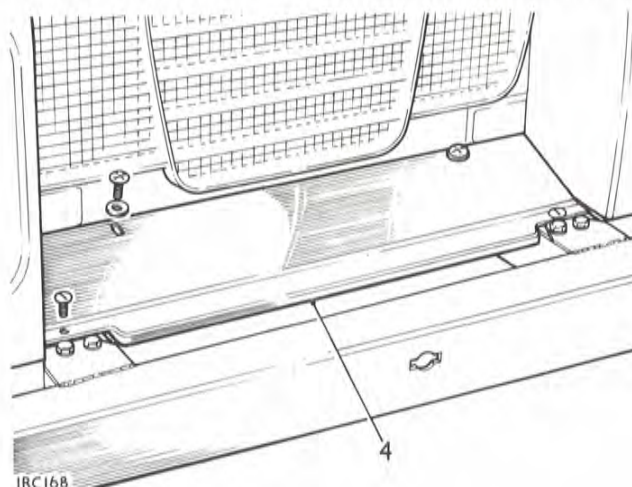
– Remove and refit

76.55.06

Removing

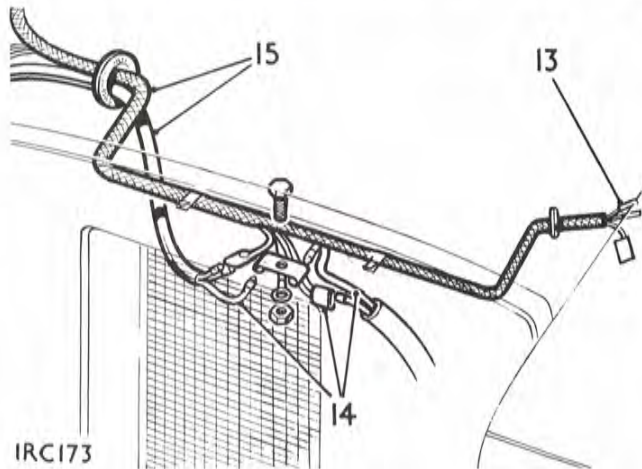
1. Remove the bonnet. 76.16.01.
2. Disconnect the battery earth lead.
3. 2.6 litre. Remove the air cleaner. 19.10.01.
4. Remove the front apron panel.
5. Remove the name plate.
6. Withdraw the radiator grille.
7. Remove the radiator cap.
8. Remove the radiator drain plug.
9. Open the drain tap at the cylinder block, RH side (2.6 litre) or LH side (2¼ litre).
10. Allow all coolant to drain, then reverse 8 and 9.
11. Disconnect the top hose from the radiator.
12. Disconnect the bottom hose from the radiator.

*Continued*



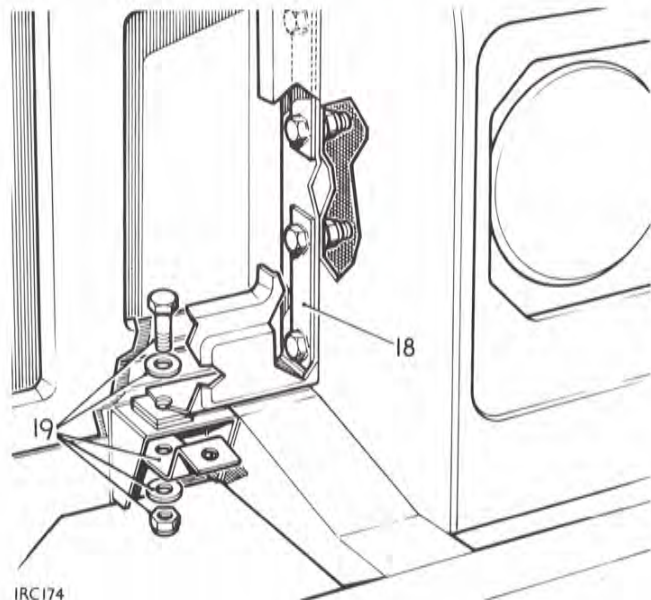
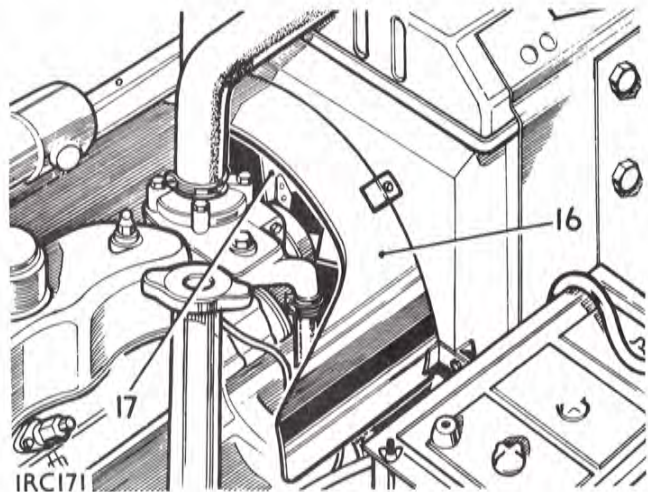
## BODY

13. Disconnect the front lamps electrical leads at the snap connectors, LH side.
14. Disconnect the harness earth leads at the underside of the panel top cover.
15. Withdraw the headlamp harness from the grille panel.
16. 2¼ litre. Remove the shroud from the radiator fan cowl.
17. 2¼ litre. Remove the fan blades fixings and rest the blades on the lower part of the fan cowl.
18. Remove the grille panel to front wing fixings.
19. Remove the grille panel fixings at the chassis and withdraw the assembly complete.
20. Remove the radiator from the grille panel.



### Refitting

21. Reverse 20.
22. Locate the radiator and grille panel assembly in position. On 2¼ litre models, fit the fan blades before engaging the grille panel fixings.
23. Reverse 1 to 19.



**HARD TOP**

—Remove and refit 76.61.01

**Removing**

1. Remove the nuts, bolts and washers securing the hard top to the windscreen.
2. Remove the set bolts securing the hard top to the front mounting bracket.
3. Remove the nuts, bolts and washers securing the hard top to the centre mounting brackets.
4. Remove the nuts and washers securing the hard top to the rear hood sockets.
5. Remove the nuts, bolts and washers securing the rear mounting brackets to the body.
6. Lift off the hard top complete.

**Refitting**

7. Reverse 1 to 6.

**HARD TOP TROPICAL ROOF**

—Remove and refit 76.61.02

**Removing**

1. Remove the screws, spring and plain washers, nuts distance pieces and rubber washers securing each side of the panel to the roof.
2. Remove the screws, spring, plain and rubber washers and nuts securing the tropical panel stiffeners to the hard top roof, both at the front and at the back.
3. Remove the drive screws or shear the pop rivets securing the panel to the hard top stiffeners.
4. Lift off the tropical roof panel.

**Refitting**

5. Reverse 1 to 4.





## BODY

### CAB TROPICAL ROOF

—Remove and refit

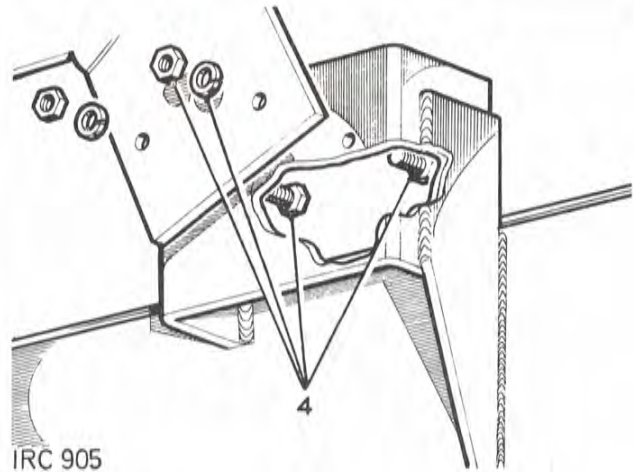
76.61.03

#### Removing

1. Remove the screws, spring and plain washers, nuts, distance pieces and rubber washers securing each side of the panel to the roof.
2. Remove the screws, spring, plain and rubber washers and nuts securing the tropical panel stiffeners to the cab roof both at the front and at the back.
3. Lift off the tropical roof panel.

#### Refitting

4. Reverse 1 to 3.



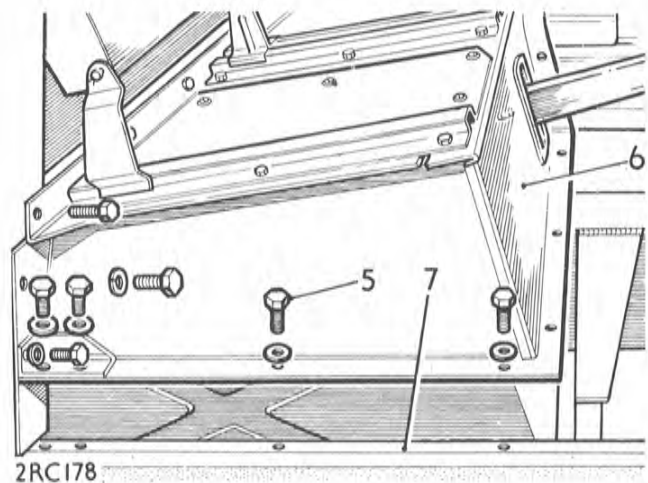
### FRONT SEAT BASE

—Remove and refit

76.70.06

#### Removing

1. Remove the front floor. 76.10.12.
2. Lift out the seat cushions.
3. Release the seat squab retaining straps from the support rail.
4. From under the vehicle, remove the handbrake mounting bracket to chassis fixings.
5. Remove the seat base fixings.
6. Lift out the seat base complete, manoeuvring the handbrake lever through the aperture in the seat base front.



#### Refitting

7. Reverse 1 to 6, using a suitable waterproof sealant between the seat base and body joint flanges.

**FRONT SEAT BELT**

–Remove and refit

76.73.02

**Removing**

**NOTE:** Ensure hands are clean before handling seat belts.

1. Remove the bolt and washer securing the harness at the sill bracket.
2. Remove the nuts and bolts from the harness shackles at the bulkhead.
3. 109 Station wagon—Remove the nuts and bolt from the harness shackle at the 'BC' post.
4. Withdraw the safety harness from the vehicle.

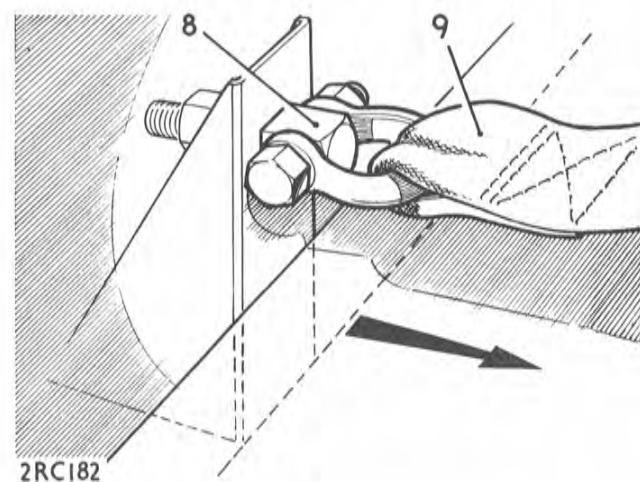
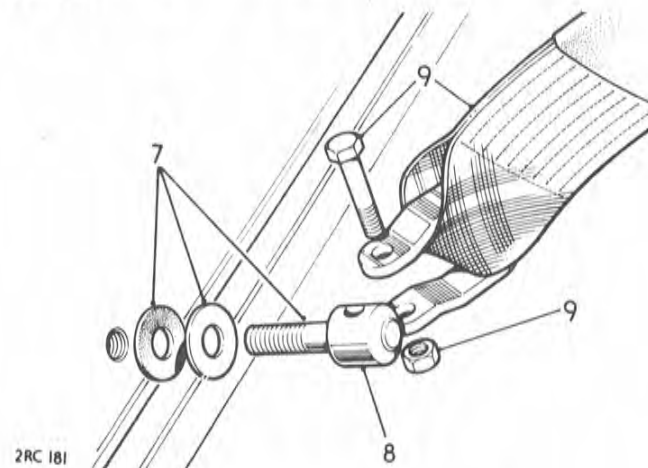
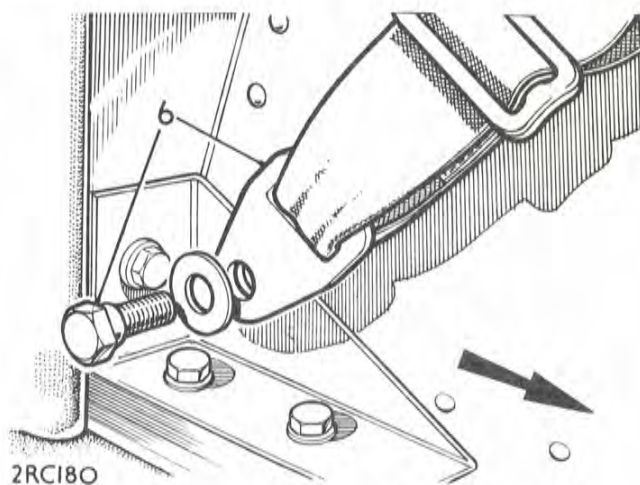
**Refitting**

**Outer buckle**

5. Release the two outer front seat squabs and pull forward for access to the harness fixing points.
6. Fit the outer buckle to the sill bracket. Do not overtighten the fixings. The arrow points toward the front of the vehicle.

**Inner shackle**

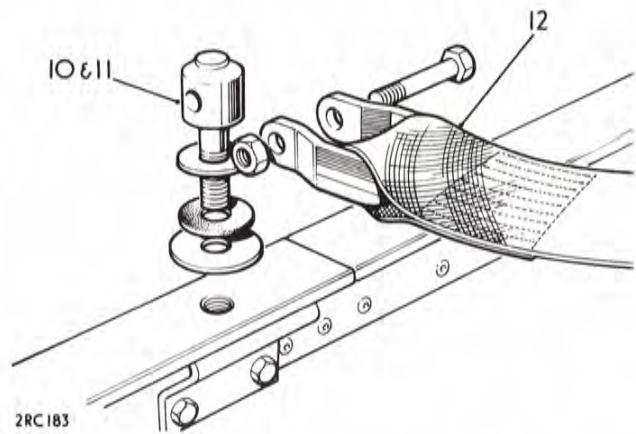
7. Screw the shackle anchor bolt into the tapped hole in the lower bulkhead panel, using a rubber washer and plain washer. The arrow points toward the front of the vehicle.
8. Tighten the anchor bolt against the rubber washer to align the shackle bolt hole as illustrated. Do not overtighten the fixing.
9. Fit the tongue strap shackle to the anchor bolt and secure with bolt and nut.



## BODY

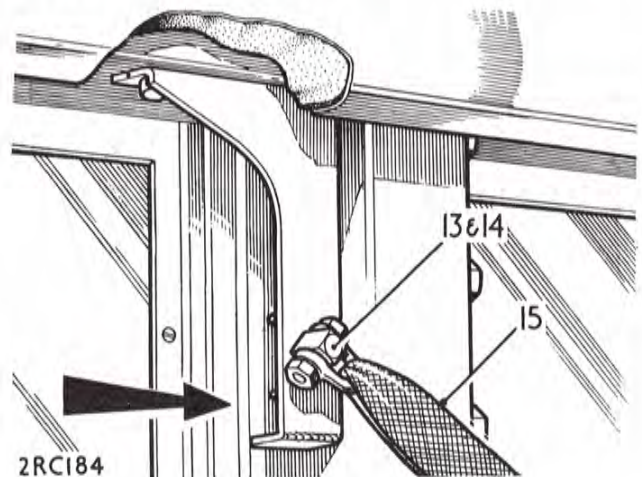
### Upper shackle, except 109 Station Wagon

10. Screw the shackle anchor bolt into the tapped hole in the seat panel top capping, using a rubber washer and plain washer.
11. Tighten the anchor bolt against the rubber washer to align the shackle bolt hole as illustrated. Do not over-tighten the fixing.
12. Fit the diagonal strap shackle to the anchor bolt and secure with bolt and nut.



### Upper shackle, 109 Station Wagon

13. Screw the shackle anchor bolt into the tapped hole in the upper 'BC' post mounting bracket using a rubber washer and plain washer.
14. Tighten the anchor bolt against the rubber washer to align the shackle bolt hole as illustrated. Do not overtighten the fixing.
15. Fit the diagonal strap shackle to the anchor bolt and secure with bolt and nut.



**WINDSCREEN AND FRAME**

—Remove and refit 76.81.02

**Removing**

1. Remove the cab or hard top. If a soft hood is fitted, release the front straps from the support stays at the top of the windscreen and disconnect the top drain channels from the windscreens.
2. Slacken the nuts at the bottom corners of the windscreen.
3. Remove the windscreen pivot bolts and remove the windscreen complete.

**Refitting**

4. Reverse the removal procedure, renewing the windscreen sealing strip as necessary.

**WINDSCREEN GLASS**

—Remove and refit 76.81.03

**Removing**

1. Remove the windscreen wiper blade.
2. Remove the retainers drive screws.
3. Prise away the retainers.
4. Withdraw the windscreen glass.

**Refitting**

5. Apply sealing strip 12mm (0.500 in.) wide around the outsides on both faces of the replacement glass.
6. Reverse 1 to 4.



## BODY

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### QUARTER LIGHT, FIXED

– Remove and refit 76.81.20

Service tool: 262771, Filler strip replacer

#### Removing

1. Prise out the rubber filler strip from the glass weather strip.
2. Push the glass and weather strip from the panel aperture.

#### Refitting

3. Square off one end of the rubber weather strip, and, starting at the bottom centre, fit the narrow groove of the strip to the panel aperture with the locking groove to the weather side.
4. Force the strip well into the aperture corners, and, allowing about 25mm (1.0 in.) overlap, square off the other end of the moulding. Compress the moulding around its length until the ends can be joined. (This overlap is important, as otherwise a gap will appear between the moulding ends when the glass is fitted).
5. Fit the glass into the moulding, using a flat piece of metal to pull the lip over the glass.
6. Square off one end of the filler strip, and, starting opposite the joint in the moulding, insert the filler strip in the groove in the weather strip using 262771.
7. Allowing about 6mm (0.250 in.) overlap, square off the end of the filler strip, and force the overlap into the weather strip groove.

**CAB BACK LIGHT**

-Remove and refit

76.81.33

**Removing**

1. Withdraw the drive screws securing the bottom channel to the cab rear panel (the drive screws are inside the channel).
2. Remove the screw, distance piece (two on RH light), special washers and tapped plate securing the catch to the back light.
3. Remove the bottom run channel and sliding back lights.
4. If necessary, remove the top run channel.
5. If necessary, remove the catches from the back lights.

**Refitting**

6. Replace the rubber sealing strips and fittings as necessary.
7. Reverse 1 to 5.





## HEATER CONTROL S

– Remove and refit

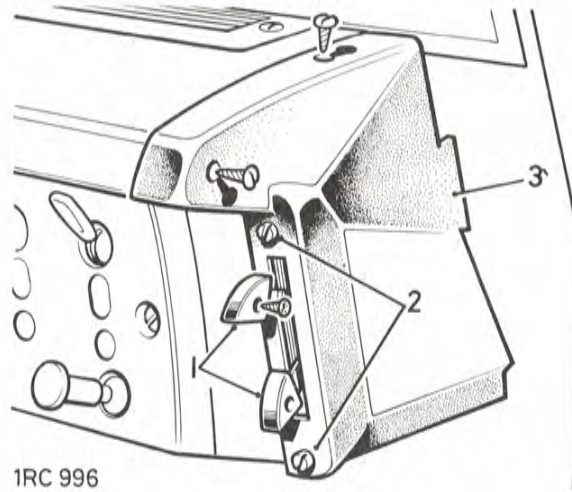
80.10.02

### Removing

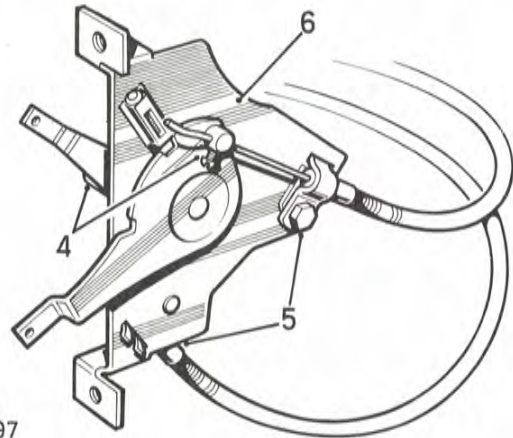
1. Remove the fixings and withdraw the finger grips.
2. Remove the fixings, control lever assembly to end panel.
3. Remove the end panel.
4. Slacken the inner cables grub screws.
5. Slacken the outer cables clamp screws.
6. Withdraw the heater control lever assembly.

### Refitting

7. Reverse 1 to 6; adjust the cables to operate the water valve and air distribution flaps before fitting the control levers and end panel assembly to the dash.



1RC 996



1RC 997



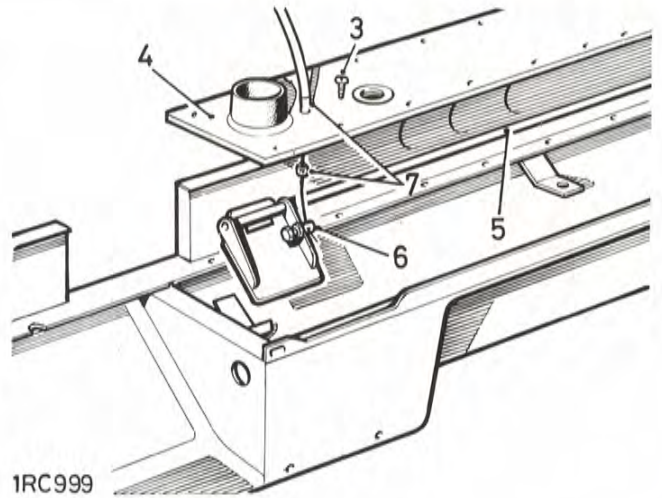
## HEATER/VENTILATOR AIR

## FLOW CONTROL CABLE

– Remove and refit 80.10.06

## Removing

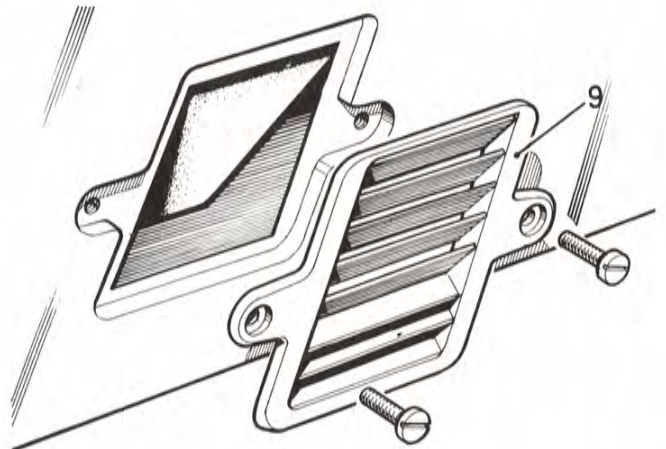
1. Remove the heater controls 80.10.02 items 1 to 3 and disconnect the air flow control cable.
2. Remove the lower facia 76.46.05.
3. Remove the heater ducting cover fixings.
4. Withdraw the ducting cover to gain access to the air distribution flaps.
5. Withdraw the distribution flaps from the facia.
6. Disconnect the inner cable at the flaps.
7. Withdraw the outer cable, retained at the ducting cover by a tubular clip.



1RC999

## Refitting

8. Reverse 2 to 7.
9. Refit the heater controls and air flow control cable ensuring full air distributor flap operation. The flaps are easily checked after removing the air outlet grilles in the lower facia.



IRC 1000

## HEATING AND VENTILATION

### HEATER WATER VALVE CONTROL CABLE

– Remove and refit

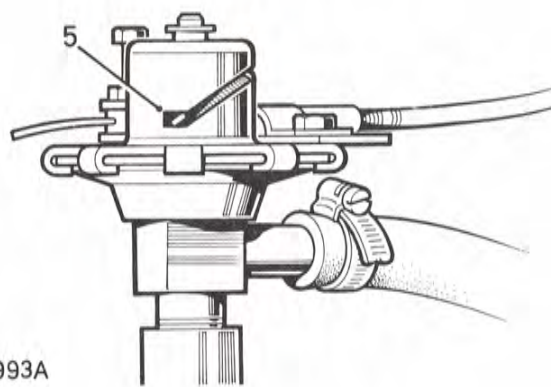
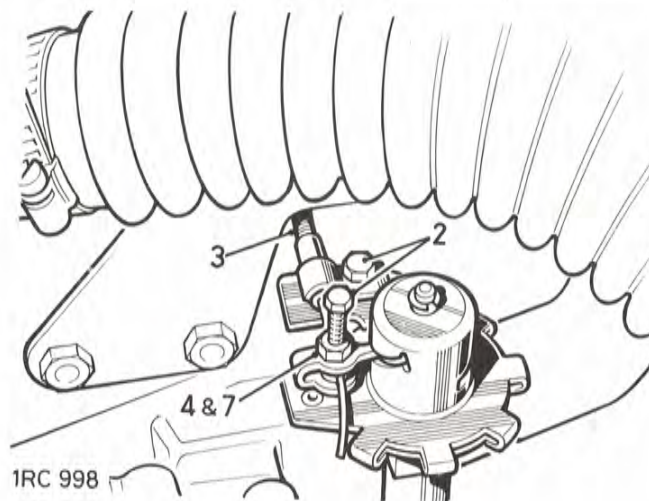
80.10.07

#### Removing

1. Remove the heater controls assembly 80.10.02.
2. Disconnect the inner and outer cables at the water valve.
3. Withdraw the cable through the dash grommet.

#### Refitting

4. Reverse 1 to 3; do not tighten the cable fixings at the water valve at this stage.
5. Set the water valve in the closed position.
6. Set the cable control lever in the fully up 'cold' position.
7. Take up all slack in the inner cable then tighten the inner cable fixing.

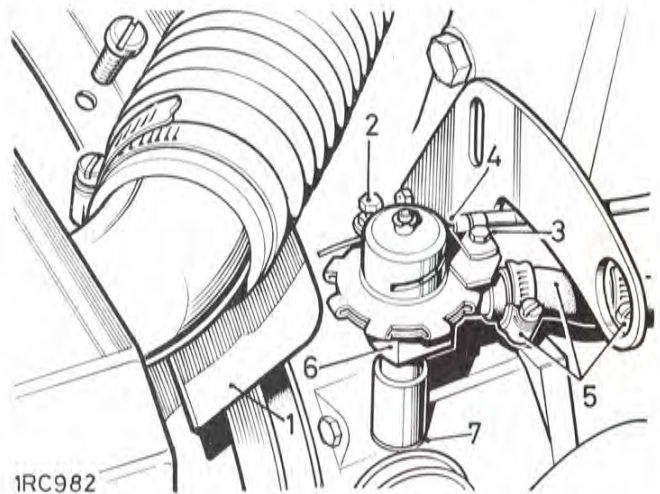


**HEATER WATER VALVE**– Remove and refit **80.10.16****Removing**

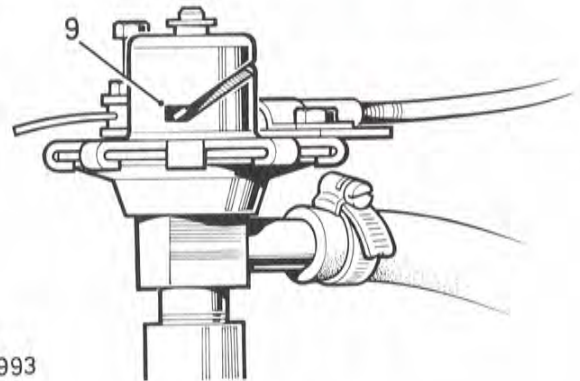
1. \*\*Partially drain the coolant from the radiator.\*\*
2. Slacken the inner cable fixing.
3. Slacken the outer cable clamp fixing.
4. Free the inner cable and withdraw from the valve.
5. Release the heater hose clips and slide the hose away from the water valve.
6. Unscrew and withdraw the heater water valve complete with adaptor.
7. Withdraw the adaptor sealing washer.

**Refitting**

8. Reverse 3 to 7; do not tighten the inner cable fixing at this stage.
9. Set the water valve in the closed position.
10. Set the cable control lever in the fully up 'cold' position.
11. Take up all slack in the inner cable then secure the cable to the water valve.
12. Reverse 1.



1RC982



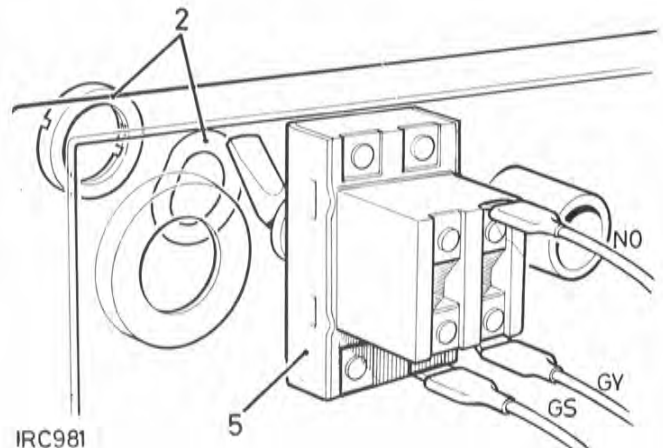
1RC 993

**HEATER FAN SWITCH**– Remove and refit **80.10.22****Removing**

1. Disconnect the battery earth lead.
2. Unscrew the lockring and withdraw the wave washer from the switch knob.
3. Withdraw the instrument panel clear of the dash. 88.20.01, items 1 to 5.
4. Disconnect the leads from the switch.
5. Withdraw the switch.

**Refitting**

6. Reverse 4 and 5; connect the leads as illustrated.  
Lead colours: N – Brown  
O – Orange  
G – Green  
Y – Yellow  
S – Slate
7. Reverse 1 to 3.



1RC981



### DE-MISTER HOSES

– Remove and refit **80.15.01**

Passenger's side hose, items 1 to 3

Driver's side hose, items 4 to 7

#### Removing, passenger's side hose

1. Disengage the hose upper end from the nozzle adaptor.
2. Withdraw the hose from the rubber connector.

#### Refitting

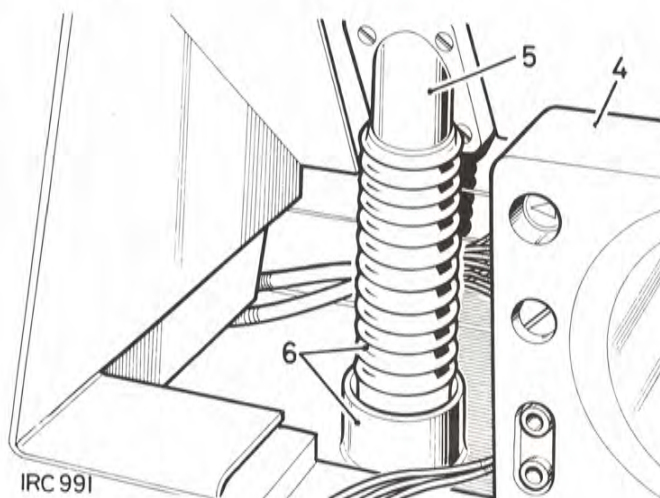
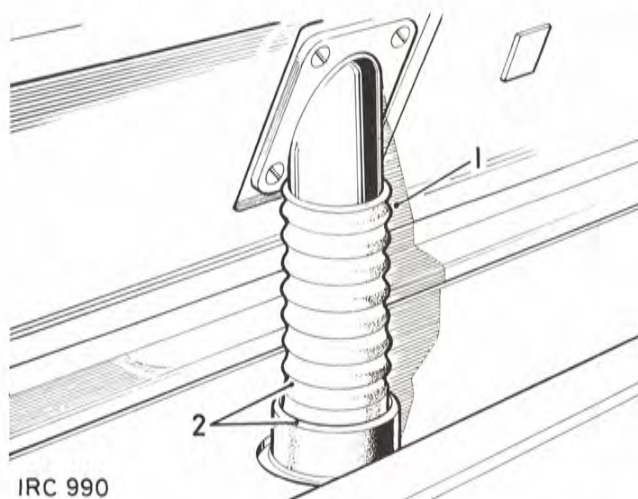
3. Reverse 1 and 2.

#### Removing, driver's side hose

4. Withdraw the instrument panel sufficient to gain access to the hose 88.20.01, items 1 to 5.
5. Disengage the hose upper end from the nozzle adaptor.
6. Withdraw the hose from the rubber connector.

#### Refitting

7. Reverse 4 to 6.



**DEMISTER NOZZLES**

Remove and refit 80.15.03

Passenger's side, items 1 to 4  
Driver's side, items 6 to 13

**Removing, passenger's side nozzle**

1. Remove the demister hose. 80.15.01
2. Remove the fresh air grille.
- 3.\*\* Remove the nozzle adaptor.
4. Manoeuvre the nozzle out through the fresh air grille aperture.\*\*

**Refitting**

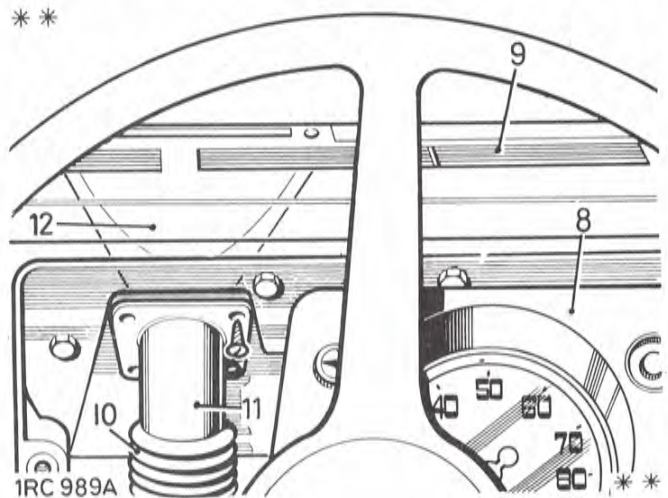
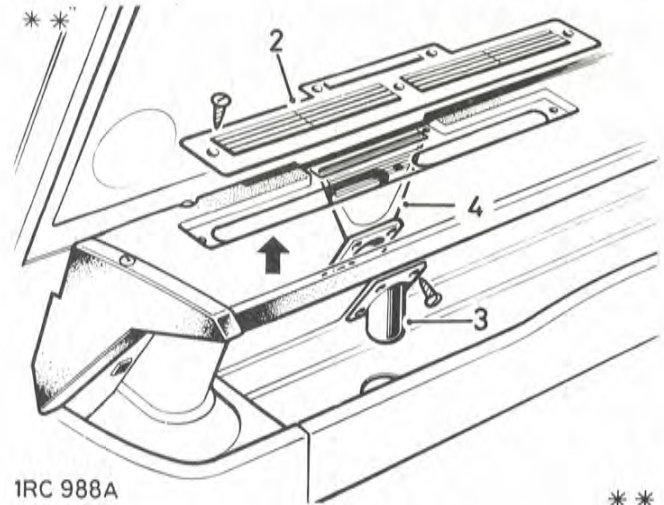
- 5.\*\* Reverse 1 to 4.\*\*

**Removing, driver's side nozzle**

- 6.\*\* Disconnect the battery earth lead.
7. Remove the switch shrouds from the steering column.
8. Withdraw the instrument panel clear of the dash, 88.20.01 items 1 to 5.
9. Remove the fresh air grille.
10. Withdraw the demister hose.
11. Remove the nozzle adaptor.
12. Manoeuvre the nozzle out through the fresh air grille aperture.

**Refitting**

13. Reverse 6 to 12.\*\*



**AIR DISTRIBUTION FLAPS**

—Remove and refit 80.15.09

This operation is described in 80.10.06.

## HEATING AND VENTILATION

### VENTILATOR GRILLE PANEL

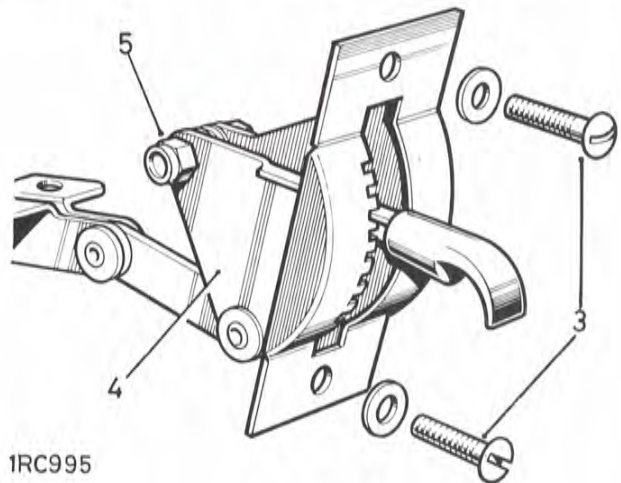
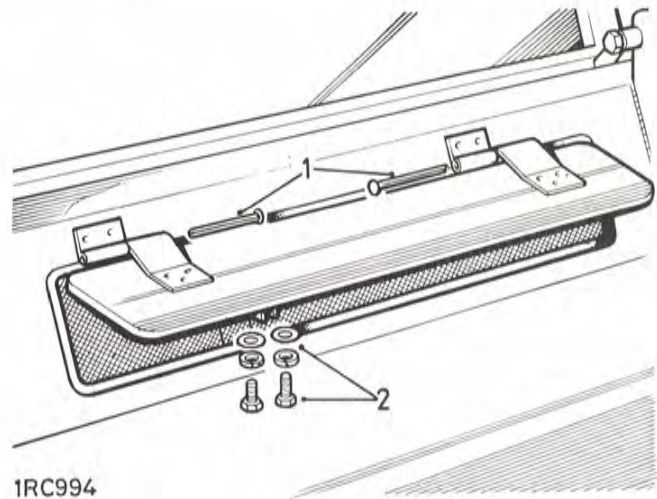
– Remove and refit 80.15.16

#### Removing

1. Remove the hinge pins.
2. Remove the control lever fixings.
3. Remove the ventilator control to dash fixings.
4. Withdraw the ventilator control and quadrant assembly.

#### Refitting

5. Check the lever operation in the quadrant. If required, adjust the special locknut to alter the spring loading on the lever.
6. Reverse 1 to 4.



### FRESH AIR INTAKE

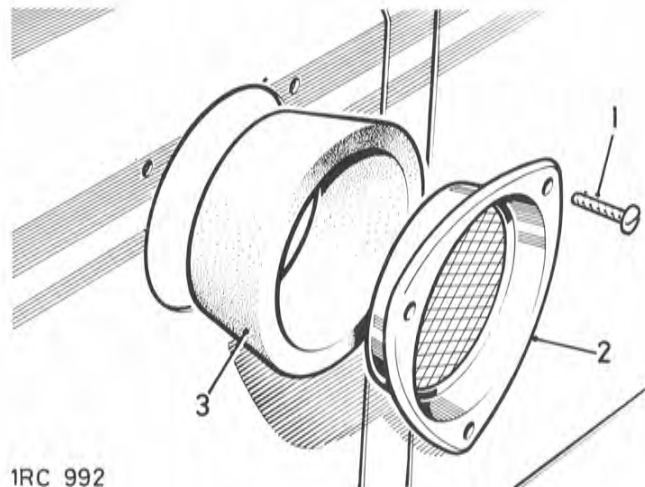
– Remove and refit 80.15.29

#### Removing

1. Remove the fixings.
2. Withdraw the intake grille assembly.
3. If required, withdraw the air inlet seal.

#### Refitting

4. Reverse 1 to 3.



**HEATER BOX COMPLETE**

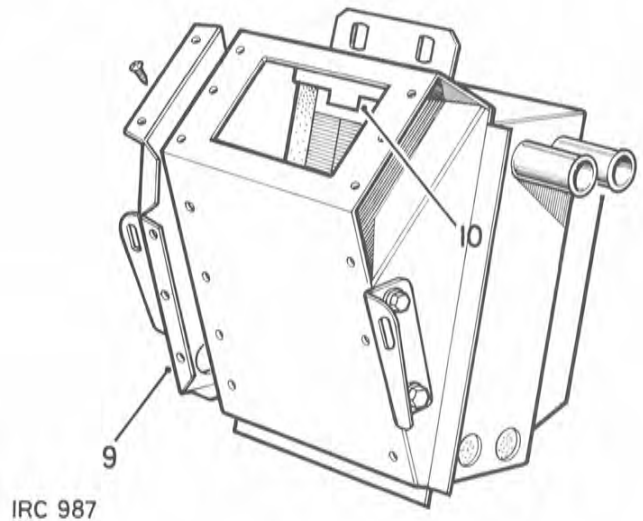
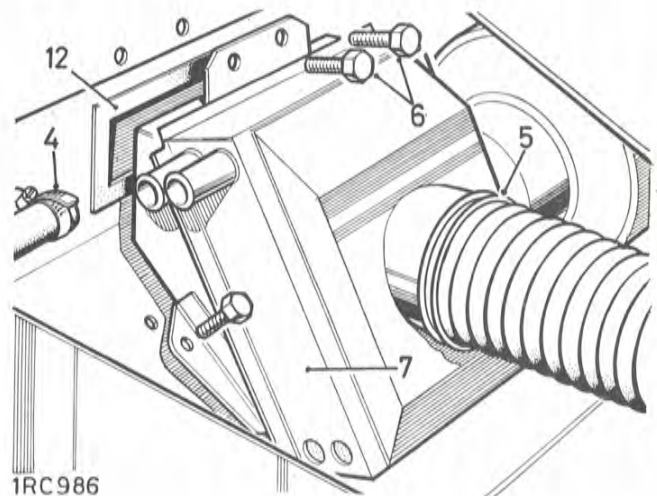
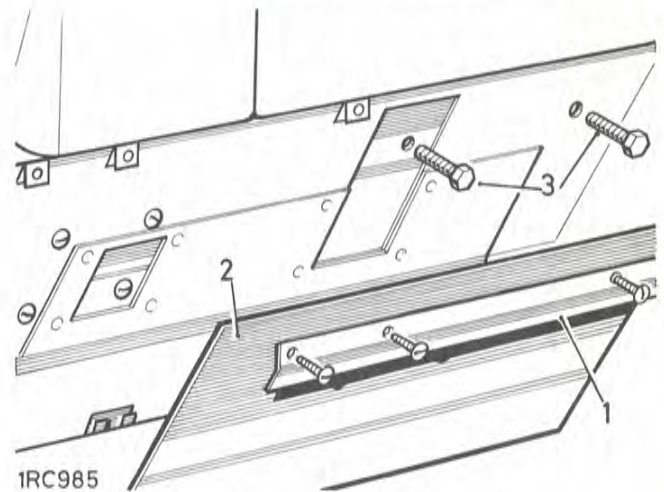
– Remove and refit **80.20.01**

**Removing**

1. From inside the cab remove the trim board rail.
2. Withdraw the trim board from the clip.
3. Remove the heater box lower fixings.
4. Disconnect the heater water hoses.
5. Disconnect the air inlet hose.
6. Remove the heater box upper fixings.
7. Withdraw the heater box.
8. If radiator removal is required, for inspection purposes, proceed as follows, items 9 to 11.
9. Remove the fixings and withdraw the detachable side panel.
10. Withdraw the radiator and pipes assembly.

**Refitting**

11. If removed, reverse 9 and 10.
12. Ensure that the joint seal is present and sound.
13. Reverse 1 to 7.



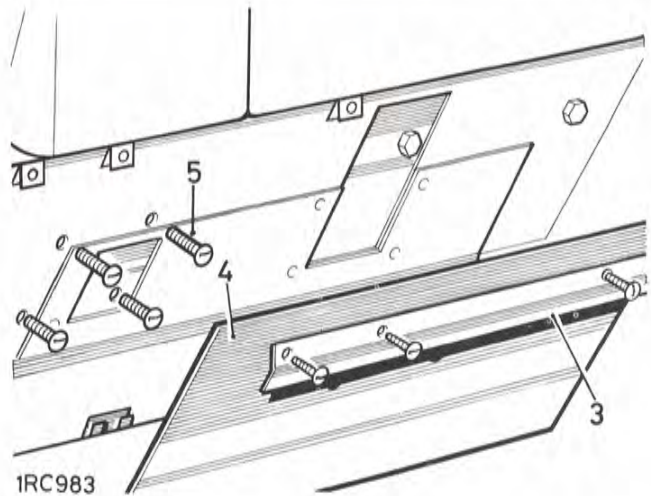
## HEATING AND VENTILATION

### HEATER/BLOWER FAN MOTOR

– Remove and refit 80.20.15

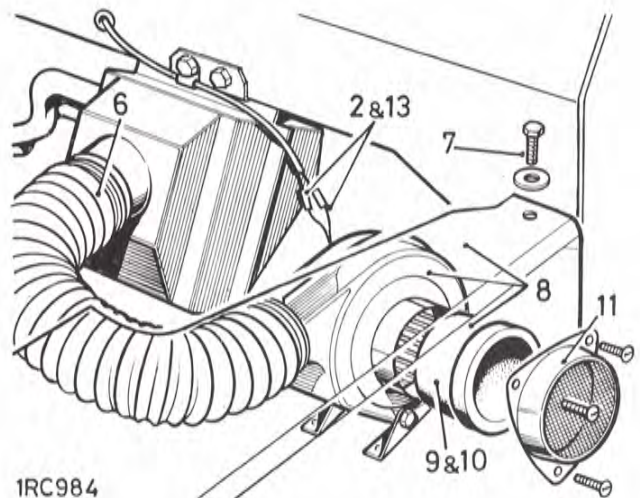
#### Removing

1. Disconnect the battery earth lead.
2. Disconnect the blower motor leads.
3. From inside the cab remove the trim board rail.
4. Withdraw the trim board from the clip.
5. Remove the blower motor fixings.
6. Disconnect the air hose at the matrix inlet.
7. Remove the wing panel rear top fixing bolt.
8. Manoeuvre the blower motor assembly clear, lifting the wing panel sufficient to allow passage.
9. Withdraw the air inlet seal.



#### Refitting

10. Fit the blower motor but omit the air inlet seal at this stage.
11. Remove the air intake grille.
12. Fit the air inlet seal and replace the intake grille.
13. Reverse 2 to 7. Connect the electrical leads from the blower motor at the snap connectors as follows: Brown lead with green marker band – to green/slate lead, Green lead – to Green/yellow lead.



### HEATER PIPES

– Remove and refit

Feed to heater 80.25.15

Return from heater 80.25.16

#### Removing

1. Partly drain the coolant.
2. Disconnect the hoses.
3. Remove the fixings and withdraw the pipe.

#### Refitting

4. Reverse 1 to 3.



WINDSCREEN WASHER AND WIPER OPERATIONS

Windscreen washer

Jets—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.10.09
Pump—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.10.21
Reservoir—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.10.01
Tubes—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.10.15

Windscreen wiper

Arms—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.15.01
Motor and drive—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.15.09
Motor, drive and wheel boxes—remove and refit	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.15.10
Motor—overhaul	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..84.15.18



**WASHER RESERVOIR**

—Remove and refit

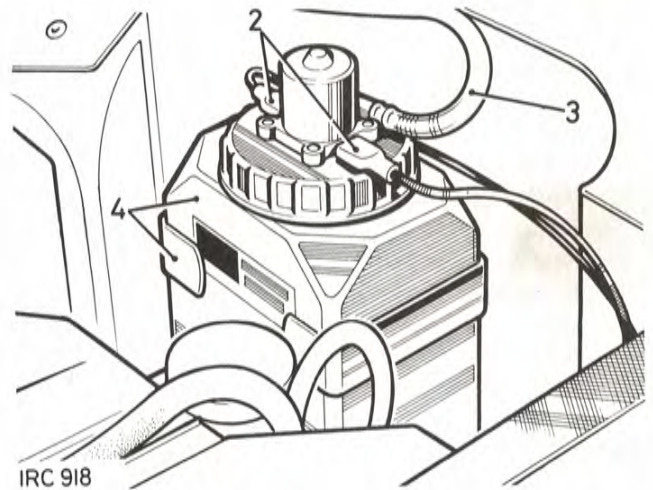
84.10.01

**Removing**

1. Disconnect the battery earth lead.
2. Disconnect the electrical leads from the pump.
3. Disconnect the tubing from the reservoir.
4. Slide the reservoir upwards out of its retaining bracket.

**Refitting**

5. Reverse 1 to 4.



IRC 918

**WASHER JETS**

—Remove and refit

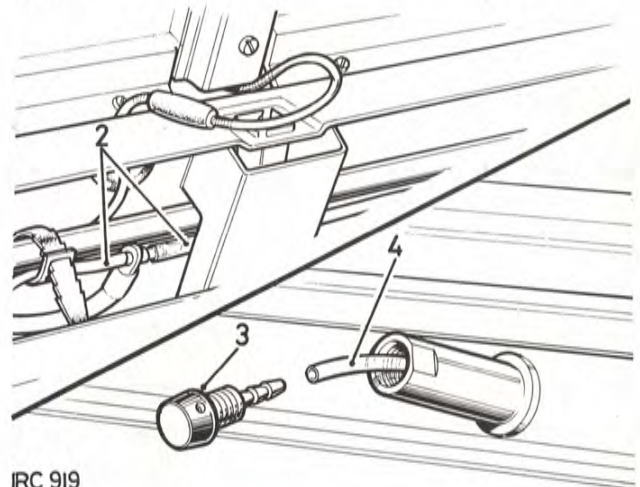
84.10.09

**Removing**

1. Remove the facia top rail. 76.46.04.
2. Disconnect the jet feed tubes from the "T"-piece.
3. Unscrew the washer jets.
4. Disconnect the feed tubes from the jets.

**Refitting**

5. Reverse 1 to 4.



IRC 919

## WINDSCREEN WIPERS AND WASHERS

### WASHER TUBES

—Remove and refit

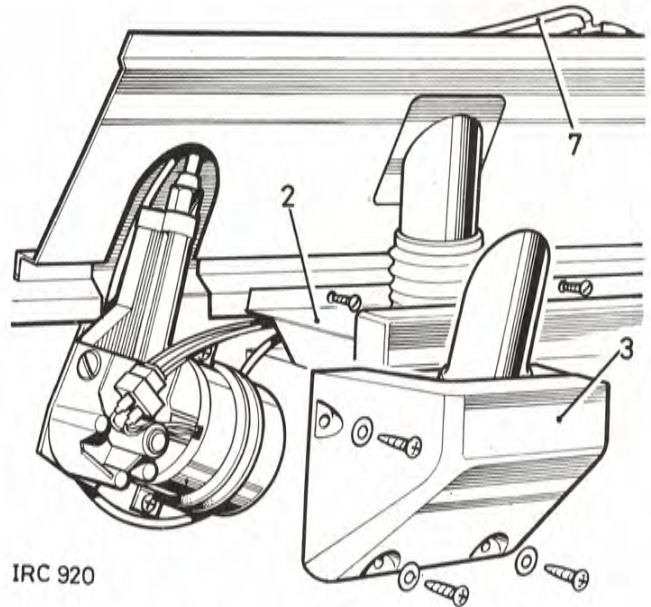
84.10.15

#### Removing

1. Remove the fascia top rail, 76.46.04.
2. Remove the parcel tray.
3. Remove the end cover from the lower fascia.
4. Remove the washer jets, 84.10.09.
5. Disconnect the washer tube from the reservoir.
6. Release the washer tube from the retaining clips.
7. Withdraw the washer tubes.

#### Refitting

8. Reverse 1 to 7.



IRC 920

### WASHER PUMP

—Remove and refit

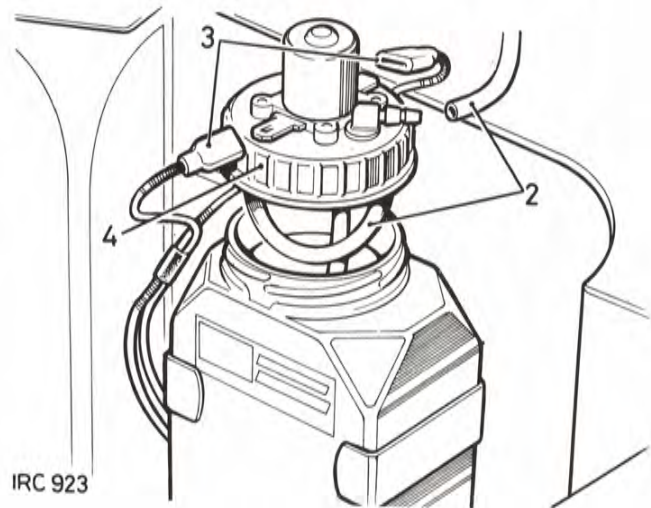
84.10.21

#### Removing

1. Disconnect the battery earth lead.
2. Disconnect the tubing from the reservoir pump and cap.
3. Disconnect the electrical leads from the reservoir cap.
4. Unscrew the pump unit from the reservoir.

#### Refitting

5. Reverse 1 to 4.



IRC 923

**WIPER ARMS**

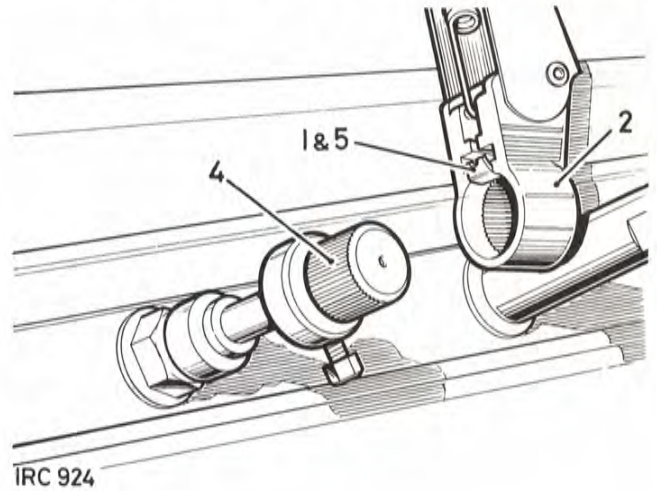
—Remove and refit 84.15.01

**Removing**

1. Using a small screwdriver, hold back the spring clip which retains the wiper arm on the spindle.
2. Withdraw the wiper arm from the spindle boss.

**Refitting**

3. Allow the motor to move to the 'park' position.
4. Push the arm onto the boss, locating it on the splines so that the wiper blade is just clear of the screen rail.
5. Ensure that the spring retaining clip is located in the retaining groove on the boss.



IRC 924

**WIPER MOTOR AND DRIVE**

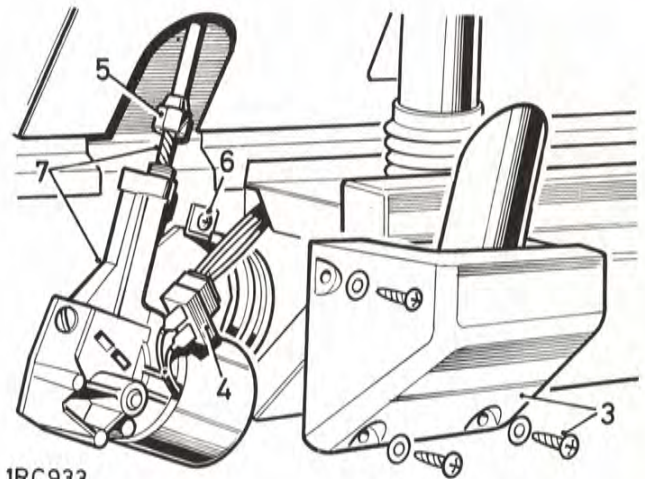
—Remove and refit 84.15.09

**Removing**

1. Disconnect the battery earth lead.
2. Remove the wiper arms. 84.15.01.
3. Remove the end cover from the lower facia.
4. Disconnect the electrical leads from the wiper motor.
5. Disconnect the drive cover tube from the wiper motor.
6. Slacken the clamp securing the wiper motor.
7. Remove the wiper motor, withdrawing the drive from the cover tube.

**Refitting**

8. Reverse 1 to 7. Rotate the wheel box spindle to assist feeding the drive through the cover tube.
9. Connect the leads between the wiper motor and the limit switch as follows.  
 Blue lead to No. 1 terminal.  
 Red lead to No. 5 terminal.



IRC933

## WIPER MOTOR, DRIVE AND WHEEL BOXES

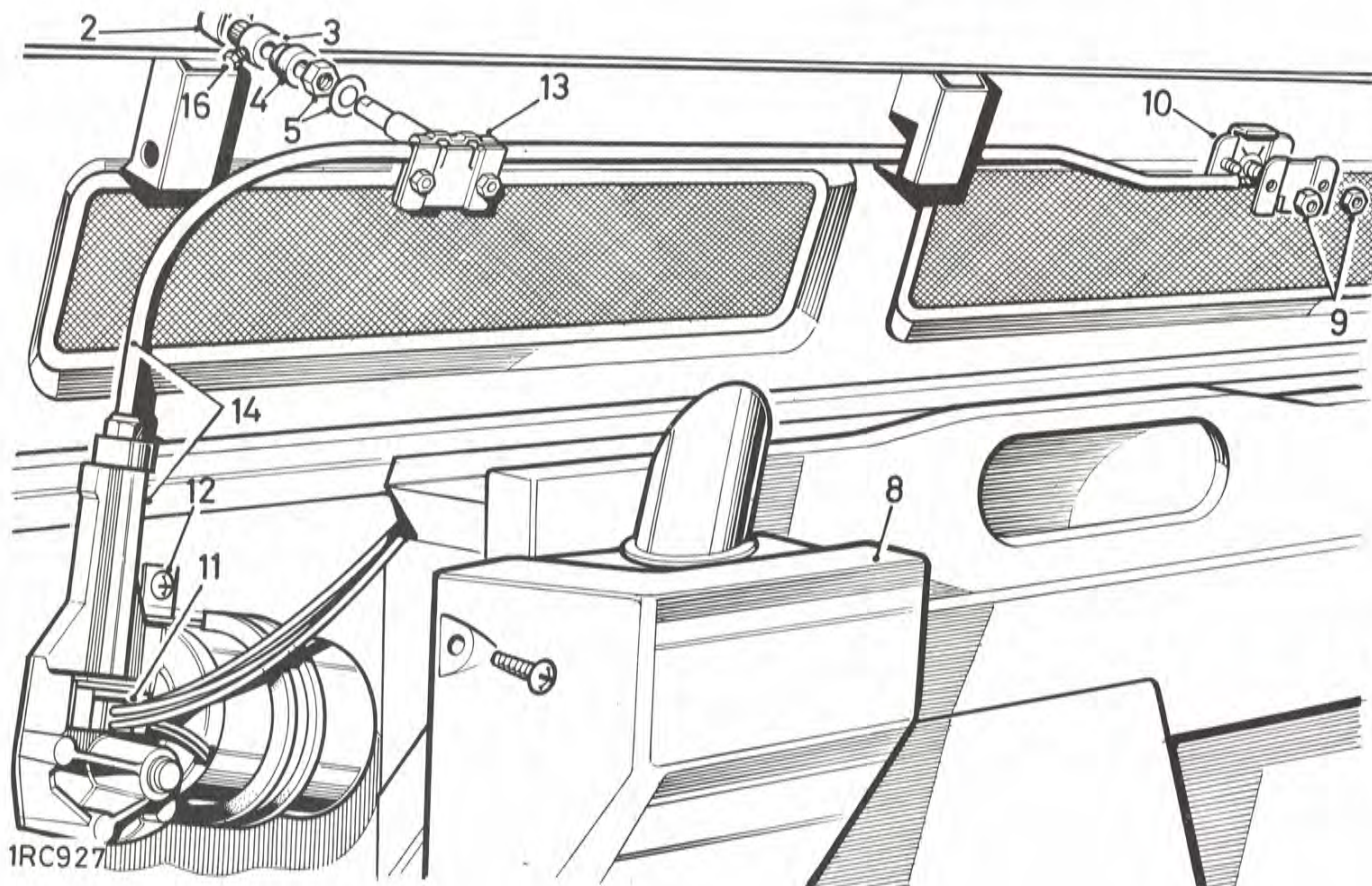
—Remove and refit

84.15.10

### Removing

1. Disconnect the battery earth lead.
2. Remove the wiper arms. 84.15.01.
3. Remove the drive adaptor from the wheel box spindles.
4. Withdraw the grommet from the wheel box spindles.
5. Remove the locknuts from the wheel boxes.
6. Remove the fascia top rail. 76.46.04.
7. Remove the fascia support panel. 76.46.06.
8. Remove the end cover from the lower fascia.
9. Remove the backplate from the R.H. wheel box.
10. Withdraw the R.H. wheel box.

*continued*



11. Disconnect the electrical leads from the wiper motor.
12. Slacken the clamp securing the wiper motor.
13. Withdraw the L.H. wheel box clear of the dash.
14. Withdraw the wiper motor complete with drive cable and L.H. wheel box.

### Refitting

15. Reverse 1 to 14. Connect the leads between the wiper motor and the limit switch as follows,
  - Blue lead to No. 1 terminal.
  - Red lead to No. 5 terminal.
16. Tighten the screws securing the drive adaptors to the wheel box spindles. Torque 34,5 kgf.cm (30 lbf. in.).



WIPER MOTOR

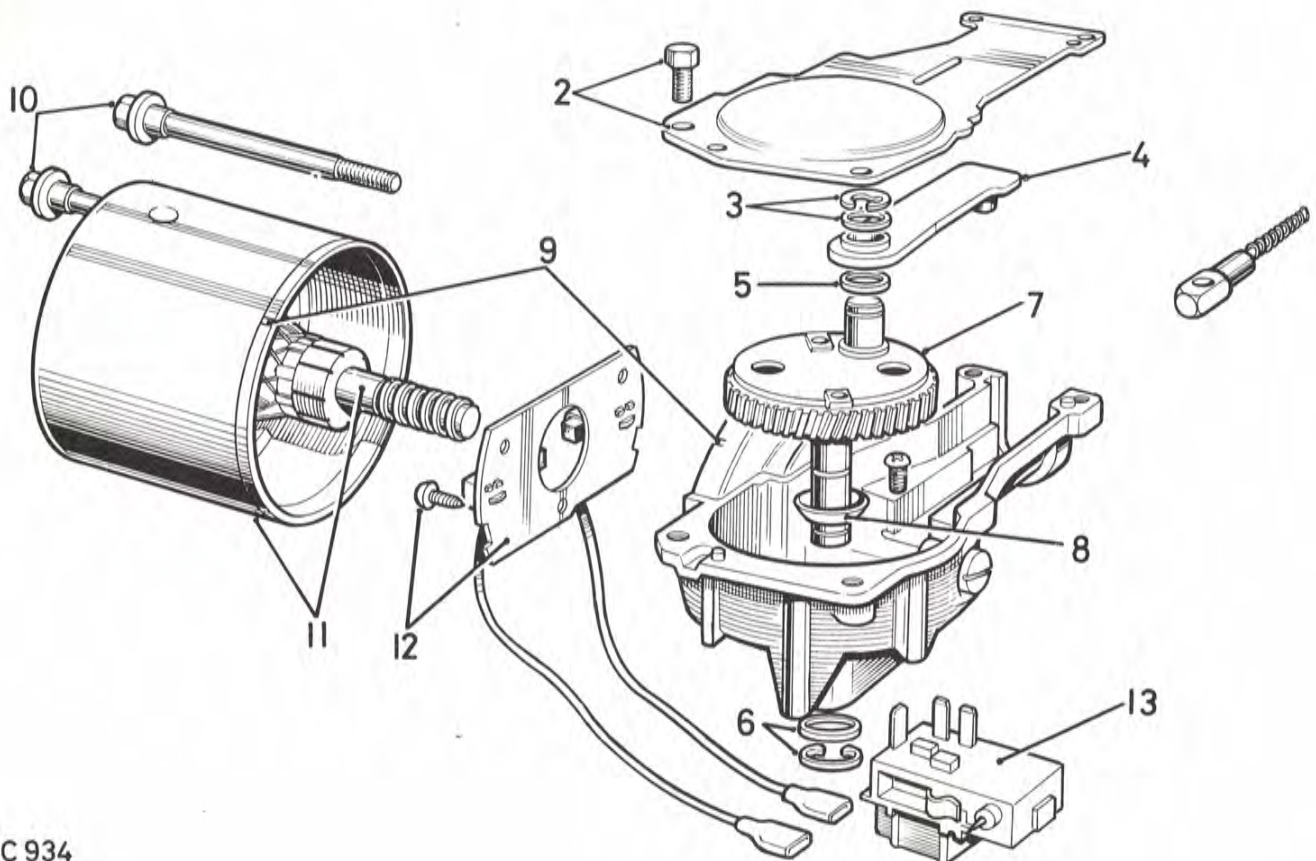
—Overhaul

84.15.18

Dismantling

1. Remove the wiper motor and drive. 84.15.09.
2. Remove the gearbox cover.
3. Remove the circlip and plain washer securing the connecting rod.
4. Withdraw the connecting rod.
5. Withdraw the flat washer.
6. Remove the circlip and washer securing the shaft and gear.
7. Clean any burrs from the gear shaft and withdraw the gear.
8. Withdraw the dished washer.
9. Add alignment marks to the yoke and gearbox for reassembly.
10. Remove the yoke securing bolts.
11. Withdraw the yoke and armature.
12. Remove the brush gear assembly.
13. Remove the limig switch.

*continued*



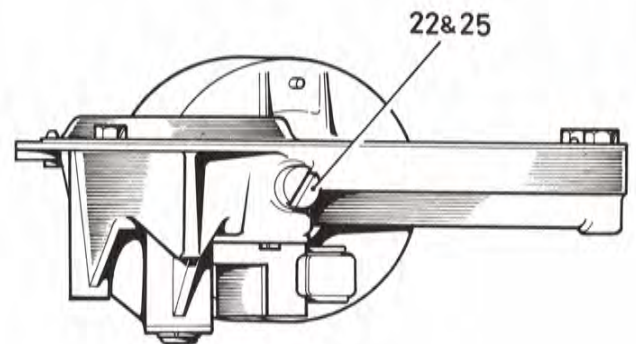
IRC 934

**Inspecting**

14. Check the brushes for excessive wear, if they are worn to 4,8 mm (0.190 in.) in length, fit a new brush gear assembly.
15. Using a push type gauge, check that the brush spring pressure is 140 to 200g (5 to 7 oz.) when the bottom of the brush is level with the bottom of the slot in the brush box. Fit a new brush gear assembly if the springs are not satisfactory.
16. Test the armature for insulation and open-or short-circuits. Use a test lamp (110V, 15W). Fit a new armature if faulty.
17. Examine the gear wheel for damage or excessive wear.

**Assembling**

18. Reverse 1 to 13, noting 19 to 26
19. Use Ragsine Listate Grease to lubricate the gear wheel teeth, armature shaft worm gear, connecting rod and pin, cable rack and wheel box gear wheels.
20. Use Shell Turbo 41 oil sparingly to lubricate the bearing bushes, armature shaft bearing journals, gear wheel shaft and wheel box spindles. Thoroughly soak the felt washer in the yoke bearing with oil.
21. Tighten the yoke fixing bolts. Torque 23 kgf.cm. (20 lbf. in.).
22. If a replacement armature is being fitted, slacken the thrust screw to provide end-float for fitting the yoke.
23. Fit the dished washer beneath the gear wheel with its concave side towards the gear wheel.
24. Ensure that the larger of the two washers is fitted to the crankpin beneath the connecting rod.
25. Armature end-float: Hold the yoke vertical with the adjuster screw uppermost. Carefully screw in the adjuster until resistance is felt then, screw back a quarter turn. This will give the required end float.
26. Connect the leads between the wiper motor and the limit switch as follows
  - Blue lead to No. 1 terminal.
  - Red lead to No. 5 terminal.

*continued*

IRC 935



## WINDSCREEN WIPERS AND WASHERS

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### DATA

#### Windscreen wiper motor

Armature end float	0,1 mm to 0,2 mm (0.004 in. to 0.008 in.).
Brush length, minimum	4,8 mm (0.190 in.).
Brush spring tension	140 to 200g (5 to 7 oz.).
Resistance of armature winding at 16°C (60°F) measured between adjacent commutator segments.	0.23 to 0.35 ohms.
Light running, rack disconnected:	
Current at 13.5V	2.0 amps.
Speed, 60 seconds from cold	60 to 70 rev./min.





**ELECTRICAL EQUIPMENT****IMPORTANT**

The electrical system is Negative earth, and it is most important to ensure correct polarity of the electrical connections at all times. Any incorrect connections made when reconnecting cables may cause irreparable damage to the semiconductor devices used in the alternator and regulator. Incorrect polarity would also seriously damage any transistorised equipment such as radio and tachometer etc.

Before carrying out any repairs or maintenance to an electrical component, always disconnect the battery.

The V-drive fan belt used with alternators is not the same as that used with d.c. machines. Only use the correct Rover replacement fan belt. Occasionally check that the engine and alternator pulleys are accurately aligned.

It is essential that good electrical connections are maintained at all times. Of particular importance are those in the charging circuit (including those at the battery) which should be occasionally inspected to see that they are clean and tight. In this way any significant increase in circuit resistance can be prevented.

Do not disconnect battery cables while the engine is running or damage to the semi-conductor devices may occur. It is also inadvisable to break or make any connections in the alternator charging and control circuits while the engine is running.

The electronic voltage regulator employs micro-circuit techniques resulting in improved performance under difficult service conditions. The whole assembly is encapsulated in silicone rubber and housed in an aluminium heat sink, ensuring complete protection against the adverse affects of temperature, dust, and moisture etc.

The regulating voltage is set during manufacture to give the required regulating voltage range of 14.1 to 14.5 volts, and no adjustment is necessary. The only maintenance needed is the occasional check on terminal connections and wiping with a clean dry cloth.

The alternator system provides for direct connection of a charge (ignition) indicator warning light, and eliminates the need for a field switching relay or warning light control unit. As the warning lamp is connected in the charging circuit, lamp failure will cause loss of charge. Lamp should be checked regularly and a spare carried.

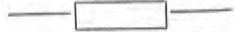



When using rapid charge equipment to re-charge the battery, the battery must be disconnected from the vehicle.





## Key to circuit diagram 2¼ and 2.6 litre, Petrol models, 'Regular' and 'Long' RH, LH steering. Negative earth

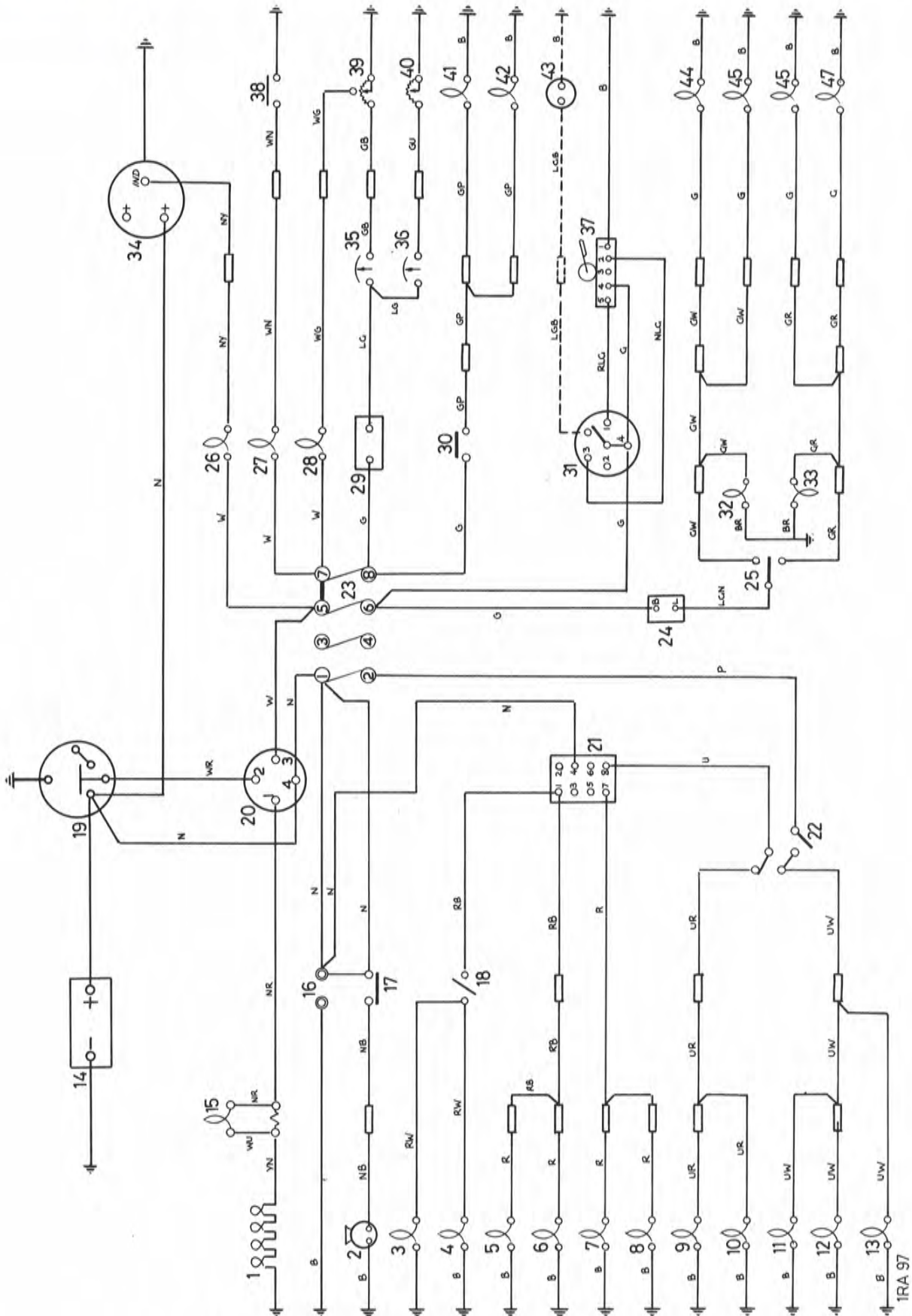
1 Starter motor	20 Direction indicator lamp, front LH	38 Switch, windscreen wiper
2 Solenoid, starter motor	21 Direction indicator lamp, rear LH	39 Dual fuel pump, 6-cylinder models only
3 Switch for horns	22 Battery	40 Switch, cold start warning light
4 Horn	23 Switch, ignition and starter	41 Fuel gauge
5 Inspection sockets	24 Switch, lights	42 Water temperature gauge
6 Instrument panel illumination	25 Switch, headlamp flash and dip	43 Screenwiper motor
7 Instrument panel illumination	26 Warning light, indicator RH	44 Distributor
8 Switch, panel lights	27 Warning light, indicator LH	45 Switch, oil pressure
9 Tail lamp, LH	28 Fuses, 1 to 8, 35 amp	46 Switch, cold start thermostat
10 Tail lamp, RH	29 Indicator unit, flasher	47 Fuel tank unit
11 Side lamp, LH	30 Switch, direction indicators	48 Water temperature transmitter unit
12 Side lamp, RH	31 Alternator, Lucas 16 ACR	49 Stop lamp, LH
13 Headlamp, LH dipped beam	32 Warning light, ignition	50 Stop lamp, RH
14 Headlamp, RH dipped beam	33 Ignition coil	51 Screenwasher motor (when fitted)
15 Warning light, headlamp main beam	34 Warning light, oil pressure	
16 Headlamp, LH main beam	35 Warning light, choke	
17 Headlamp, RH main beam	36 Voltage stabiliser, fuel gauge and water temperature gauge.	
18 Direction indicator lamp, rear RH	37 Switch, stop lamp	
19 Direction indicator lamp, front RH		

	Snap connections and/or plugs and sockets
	Earth connections via cables
	Earth connections via terminals or fixing bolts
	6-cylinder models only

## Key to cable colours

B—Black	G—Green	L—Light	N—Brown	P—Purple	R—Red	U—Blue	W—White	Y—Yellow
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The last letter of a colour code denotes the tracer colour





Circuit diagram 2 1/4 litre Diesel models 'Regular' and 'Long'  
RH, LH steering. Negative earth




## Key to circuit Diagram 2½ litre Diesel models 'Regular' and 'Long' RH, LH steering. Negative earth.

1 Heater plugs	17 Switch, horn	32 Warning light, RH indicator
2 Horn	18 Switch, panel light	33 Warning light, LH indicator
3 Instrument panel illumination	19 Solenoid, starter motor	34 Alternator, 16 ACR
4 Instrument panel illumination	20 Switch, starter-heater plugs	35 Fuel gauge
5 Tail lamp, LH	21 Switch, lights	36 Water temperature gauge
6 Tail lamp, RH	22 Switch, headlamp dip and flash	37 Wiper motor
7 Side lamp, RH	23 Fuses, 1 to 8, 35 amp	38 Switch, oil pressure
8 Side lamp, LH	24 Indicator unit, flasher	39 Fuel tank unit
9 Headlamp, RH dipped beam	25 Switch, indicators	40 Transmitter, water temperature
10 Headlamp, LH dipped beam	26 Warning light, charge	41 Stop lamp, LH
11 Headlamp, LH main beam	27 Warning light, oil pressure	42 Stop lamp, RH
12 Headlamp, RH main beam	28 Warning light, low fuel level	43 Windscreen washer motor (when fitted)
13 Warning light, headlamp main beam	29 Voltage stabiliser unit, fuel gauge and water temperature gauge	44 Indicator, front RH
14 Battery	30 Switch, stop lamps	45 Indicator, rear RH
15 Warning light and resistor, heater plugs	31 Switch, windscreen wiper	46 Indicator, rear LH
16 Inspection sockets		47 Indicator, front LH

 Snap connectors or plugs and sockets

 Earth connections via fixing bolts

 Earth connections via cables

## Key to cable colours

B—Black    G—Green    L—Light    N—Brown    P—Purple    R—Red    U—Blue    W—White    Y—Yellow

The last letter of a colour code denotes the tracer colour

## ALTERNATOR

—Remove and refit

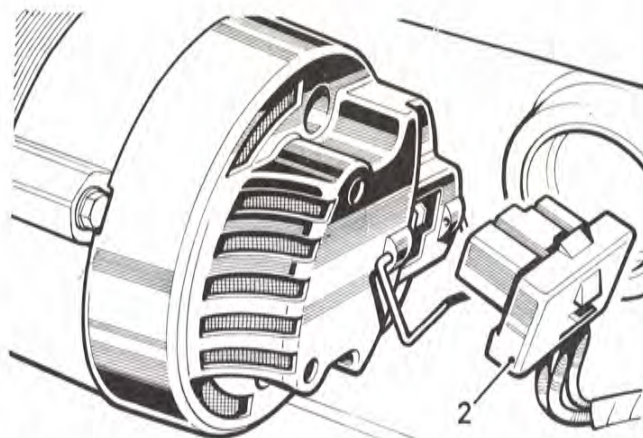
86.10.02

## Removing

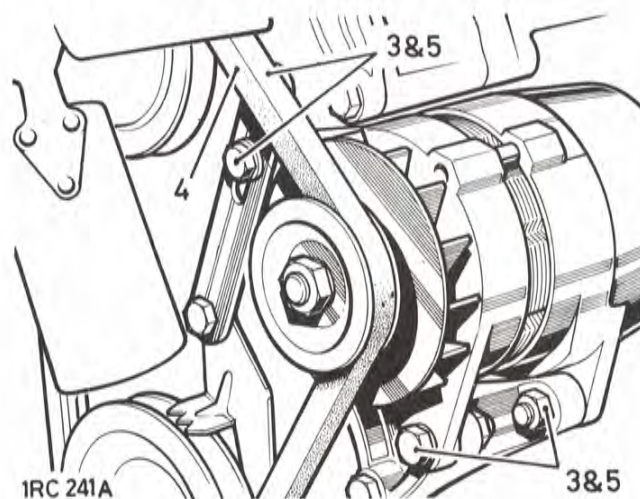
1. Disconnect the battery earth lead
2. Disconnect the electrical leads from the alternator.
3. Slacken the alternator fixings.
4. Pivot the alternator inwards and release the fan belt from the pulley
5. Remove the alternator

## Refitting

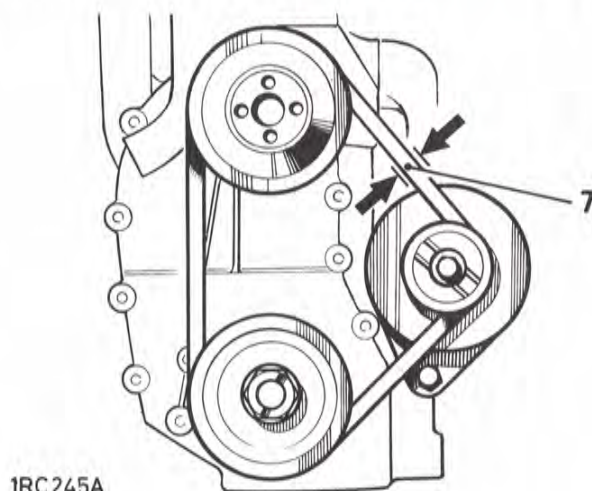
6. Fit the alternator, locating the fan belt over the pulley, but do not tighten the fixings at this stage.
7. **2¼ litre 4 cylinder Petrol and Diesel engines.** Adjust the fan belt to give 6,5mm to 9,5mm (0.250 in. to 0.375 in.) free movement when checked midway between the fan and alternator pulleys.

*continued*

1RC 318A



1RC 241A



1RC 245A



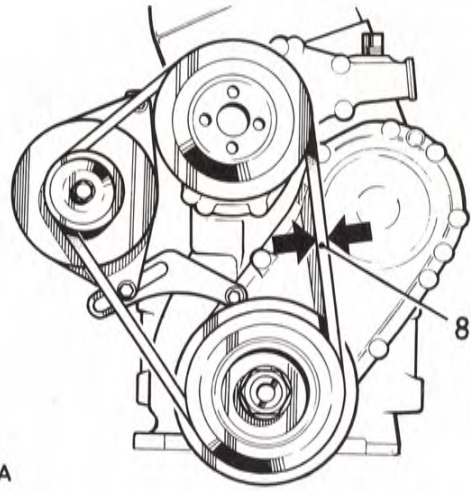
## ELECTRICAL EQUIPMENT

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8. **2.6 litre 6 cylinder Petrol engines.**

Adjust the fan belt to give 8,0mm to 11,0mm (0.312 in. to 0.437 in.) free movement when checked midway between the fan and crankshaft pulleys.

9. Reverse 1 and 2.



IRC 843A

**ALTERNATOR**

– overhaul

86.10.08.

**Note. Alternator charging circuit.**

The ignition warning light is connected in series with the alternator field circuit. Bulb failure would prevent the alternator charging, except at very high engine speeds, therefore, the bulb should be checked before suspecting an alternator fault.

**Precautions**

Battery polarity is **NEGATIVE EARTH**, which must be maintained at all times.

No separate control unit is fitted; instead a voltage regulator of micro-circuit construction is incorporated on the slip-ring end bracket, inside the alternator cover.

Battery voltage is applied to the alternator output cable even when the ignition is switched off, the battery must be disconnected before commencing any work on the alternator. The battery must also be disconnected when repairs to the body structure are being done by arc welding.

*continued*



## Testing in position

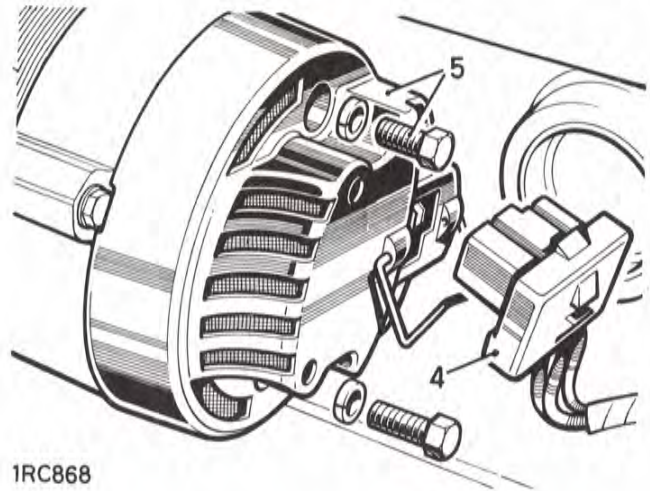
### Output test

1. Check that the fan belt is correctly tensioned and that all charging circuit connections are secure.
2. Run the engine at fast idle until normal operating temperature is attained.
3. Stop the engine.
4. Withdraw the connector from the alternator.
5. Remove the alternator rear cover.
6. Link together regulator terminals 'F' and '-'
7. Connect a 0-40 ammeter between the alternator and the battery.
8. Connect a 0-20 voltmeter across the battery terminals
9. Connect a 15 ohm 35 amp. variable resistor across the battery terminals.

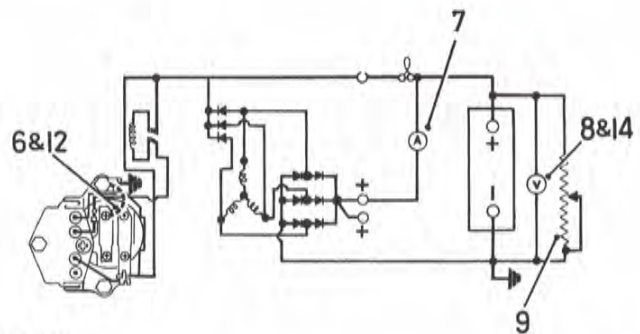
**CAUTION** Do not leave the variable resistor connected across the battery terminals for longer than is necessary to carry out the following test, items 10 and 11.

10. Start the engine and run at 750 rev/min. The warning light bulb should be extinguished.
11. Increase the engine speed to 3000 rev/min, and adjust the variable resistance until the voltmeter reads 14.0 volts. The ammeter reading should then be approximately 34 amps. Any appreciable deviation from this figure will necessitate removing and dismantling the alternator. If the output test is satisfactory, proceed with the regulator test.

*continued*



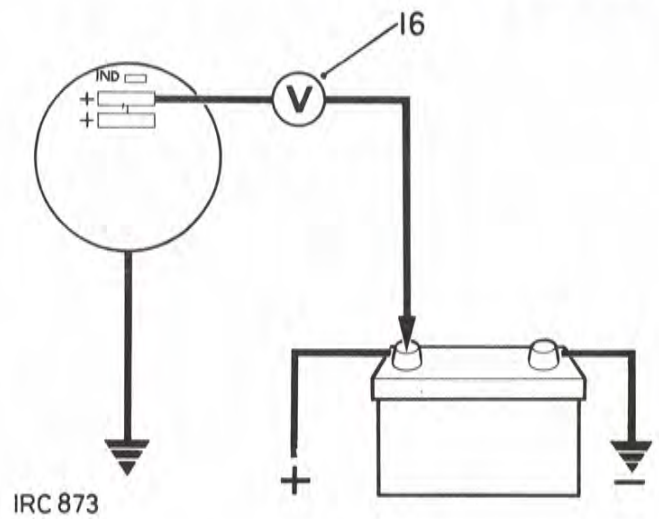
1RC868



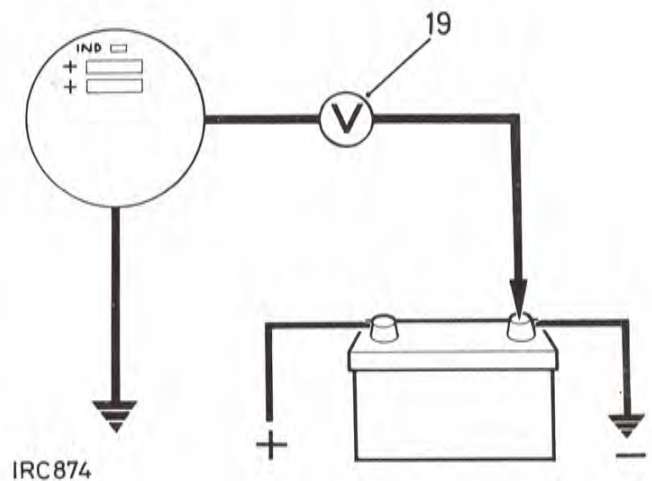
1RC869

**Regulator test**

12. Disconnect the variable resistor and remove the link bridging regulator terminals 'F' and '-'.
13. With the remainder of the circuit connected as for the alternator output test, start the engine and run at 3,000 rev/min, until the ammeter shows an output current of less than 10 amperes.
14. The voltmeter should now give a reading of 14.0 to 14.4 volts. Any appreciable deviation from this (regulating) voltage indicates a faulty regulator which must be replaced.
15. If the foregoing output and regulator tests show the alternator and regulator to be performing satisfactorily, disconnect the test circuit, reconnect the alternator terminal connector and proceed with the charging circuit resistance test.

**Charging circuit resistance test**

16. Connect a low-range voltmeter between either of the alternator terminals marked + and the positive terminal of the battery.
17. Switch on the headlamps.
18. Start the engine and run at approximately 3,000 rev/min. Note the voltmeter reading.
19. Transfer the voltmeter connections to the frame of the alternator and the negative terminal of the battery, and again note the voltmeter reading.
20. If the reading exceeds 0.5 volt on the positive side or 0.25 volt on the negative side, there is a high resistance in the charging circuit which must be traced and remedied.

*continued*

Testing—alternator removed

21. Remove the alternator. 86.10.02.
22. Remove the alternator rear cover
23. Unsolder stator connections from rectifier pack, noting connection positions.

**CAUTION** When soldering or unsoldering connections to diodes take care not to over-heat the diodes or bend the pins. During soldering operations, diode pins should be gripped lightly with a pair of long nosed pliers which will act as a thermal shunt.

24. Unscrew brush moulding securing screws and if necessary, lower regulator pack securing screw.
25. Slacken rectifier pack retaining nuts and withdraw both brush moulding, with or without regulator pack, and rectifier pack.

**Brushes**

26. Check brushes for wear by measuring length of brush protruding beyond brush box moulding. If length is 5 mm (0.2 in.) or less, brush must be renewed.
27. Check that brushes move freely in holders. If brush is sticking, clean with petrol moistened cloth or polish sides of brush with fine file.
28. Check brush spring pressure using push-type spring gauge. Gauge should register 255 to 368g (9 to 13 oz) when brush is pushed back until face is flush with housing. If reading is outside these limits, renew brush assembly.

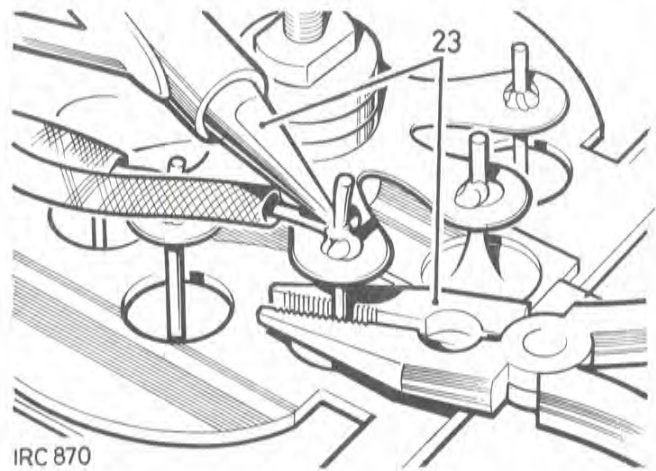
**Slip rings**

29. Clean surfaces of slip-rings using petrol moistened cloth.
30. Inspect slip-ring surfaces for signs of burning; remove burn marks using very fine sand-paper. On no account should emery-cloth or similar abrasives be used, or any attempt made to machine the slip-rings.

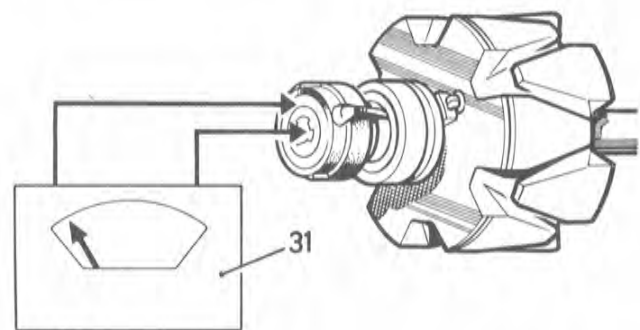
**Rotor**

31. Connect an ohmmeter or a 12-volt battery and an ammeter to the slip-rings. An ohmmeter reading of 4.3 ohms or an ammeter reading of 3 amps should be recorded.
32. Using a 110-volt a.c. supply and a 15-watt test lamp, test for insulation between one of the slip-rings and one of the rotor poles. If the test lamp lights, the rotor must be renewed.

*continued*



1RC 870

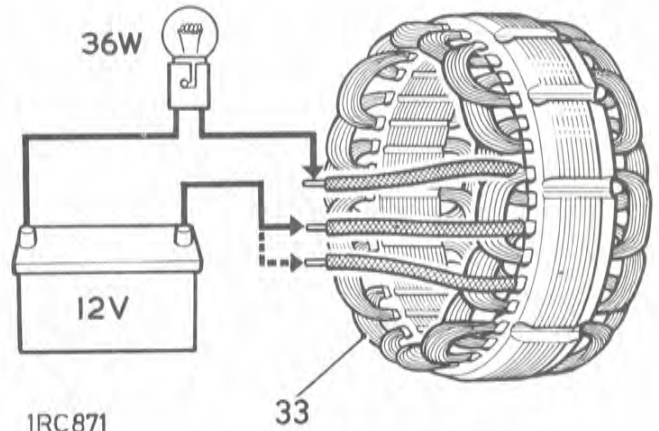


1RC 875



**Stator**

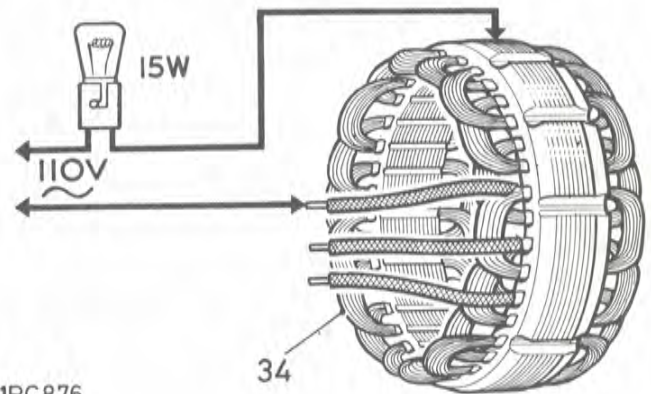
33. Connect a 12-volt battery and a 36-watt test lamp to two of the stator connections. Repeat the test replacing one of the two stator connections with the third. If test lamp fails to light in either test, stator must be renewed.
34. Using a 110-volt a.c. supply and a 15-watt test lamp, test for insulation between any one of the three stator connections and stator laminations. If test lamp lights, stator must be renewed.



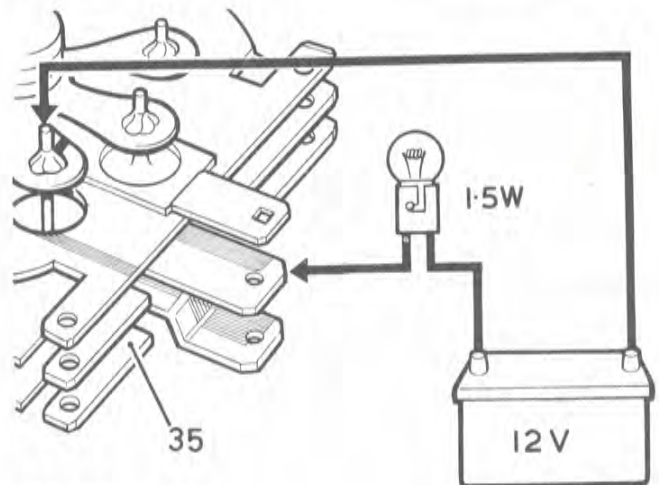
1RC871

**Diodes**

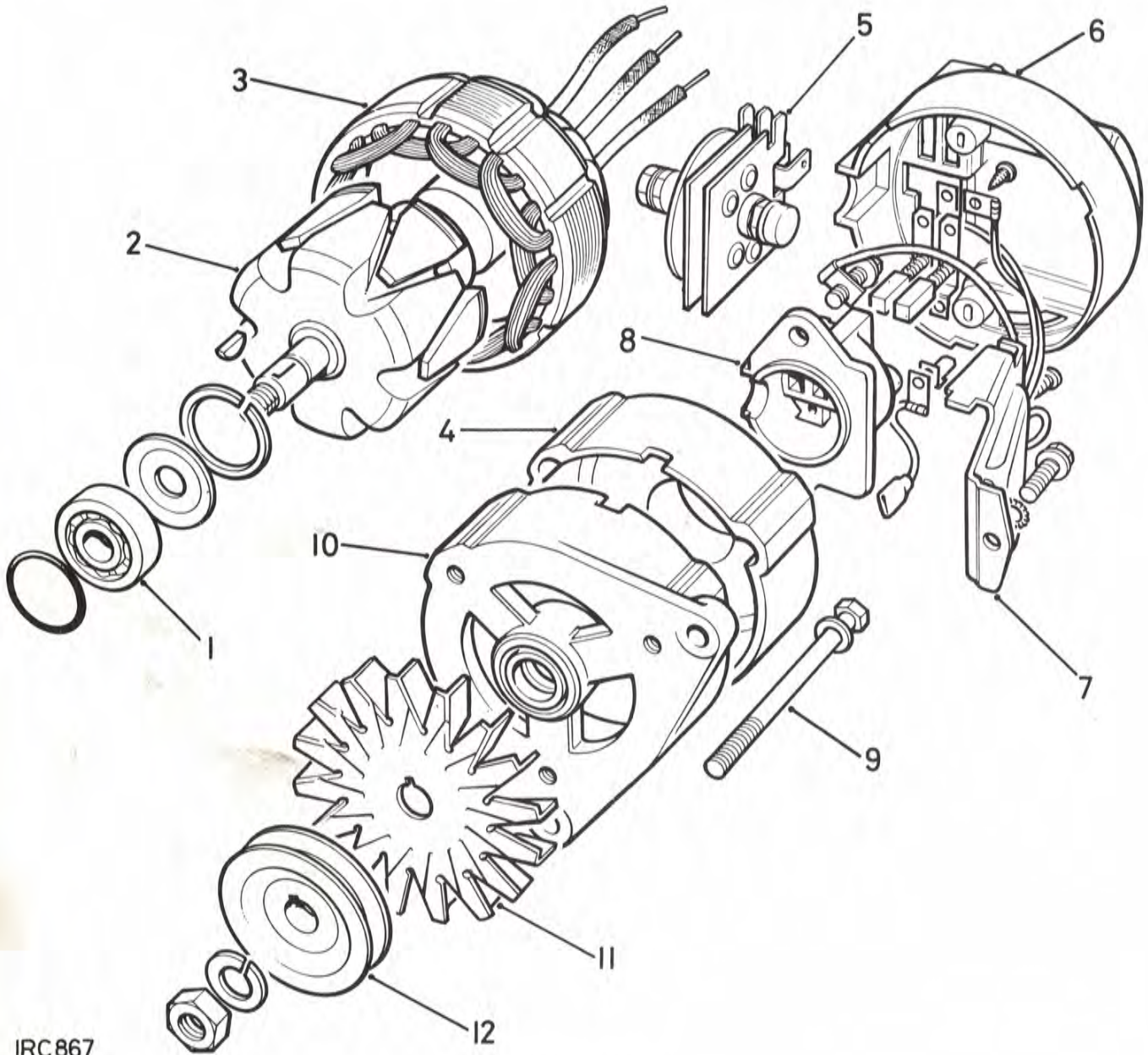
35. Connect a 12-volt battery and a 1.5-watt test lamp in turn to each of the nine diode pins and corresponding heat sink on the rectifier pack, then reverse the connections. Lamp should light with current flowing in one direction only. If lamp lights in both directions or fails to light in either, rectifier pack must be renewed.

*continued*

1RC876



1RC872



IRC867

ALTERNATOR

- |                        |                   |                       |
|------------------------|-------------------|-----------------------|
| 1— Drive end bearing   | 5— Rectifier      | 9— Through bolt       |
| 2— Rotor and slip-ring | 6— End cover      | 10— Drive end bracket |
| 3— Stator              | 7— Regulator unit | 11— Fan               |
| 4— Slip-ring bracket   | 8— Brush box      | 12— Pulley            |

*continued*



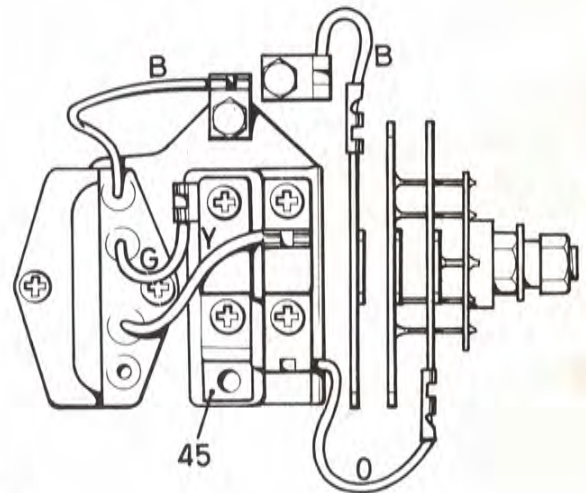
**Dismantling**

36. If not already completed, carry out items 21 to 25.
37. Remove the three through bolts.
38. Fit a tube over the slip-ring moulding so that it registers against outer track of slip-ring end bearing and carefully drive bearing from its housing.
39. Remove shaft nut, washer, pulley, fan and shaft key.
40. Press rotor from drive end bracket.
41. Remove circlip retaining drive end bearing and remove bearing.
42. Unsolder field connections from slip-ring assembly and withdraw assembly from rotor shaft.
43. Remove slip-ring end bearing.

**Reassembling**

44. Reverse the dismantling procedure, noting following points.
  - (a) Use Shell Alvania 'RA' to lubricate bearings.
  - (b) When refitting slip-ring end bearing, ensure it is fitted with open side facing rotor.
  - (c) Use Fry's H.T.3. solder on slip-ring field connections.
  - (d) When refitting rotor to drive end bracket, support inner track of bearing. Do not use drive end bracket to support bearing when fitting rotor.
  - (e) Tighten through-bolts evenly.
  - (f) Fit brushes into housings before fitting brush moulding.
  - (g) Tighten shaft nut to correct torque figure 3,5 to 4,2 .Kgf.m (25 to 30 lbf ft.).
  - (h) Refit regulator pack to brush moulding.
45. Reconnect the leads between the regulator, brush box and rectifier, as illustrated.
 

Lead colours    B – Black  
                   G – Green  
                   O – Orange  
                   Y – Yellow
46. Refit the alternator 86.10.02.



IRC 878

**DATA****Alternator**

Nominal output  
 Field resistance  
 Brush spring pressure  
 Brush minimum length

**Regulating voltage**

Lucas 16ACR, machine sensed,  
 European termination.

34 amps at 6000 alternator rev/min  
 4.33 ohms  $\pm$  5%  
 255 to 368g (9 to 13 oz.)  
 5 mm (0.2 in.) protrusion beyond  
 brush box.

14.0 to 14.4 volts





## ELECTRICAL EQUIPMENT

### BATTERY

– Remove and refit

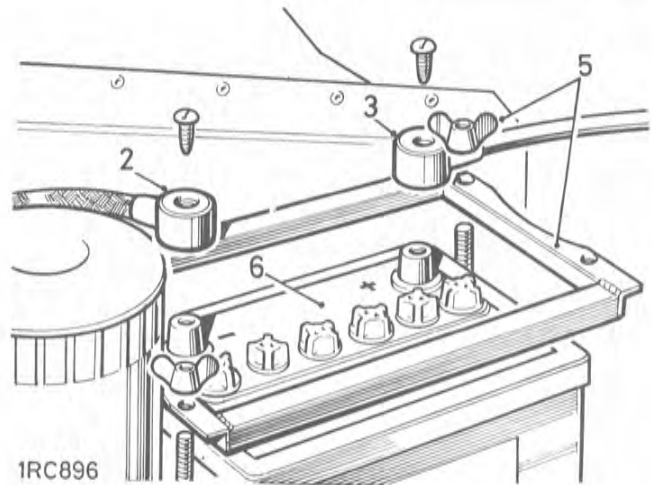
86.15.01

#### Removing

1. Prop open the bonnet.
2. Disconnect the battery earth lead.
3. Disconnect the battery main lead.
4. 2.6 litre 6-cylinder petrol models—  
Remove the air cleaner. 19.10.08
5. Remove the wing nuts and battery retaining frame.
6. Remove the battery.

#### Refitting

7. Reverse 1 to 6. Ensure that the battery is connected  
NEGATIVE EARTH



### HORN

– Remove and refit

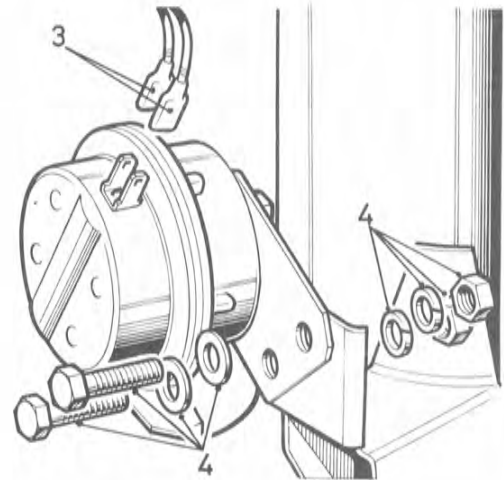
86.30.09

#### Removing

1. Disconnect the battery earth lead.
2. Remove the radiator grille.
3. Disconnect the leads from the horn.
4. Remove the horn.

#### Refitting

5. Reverse 1 to 4.



## HEATER PLUGS

-Remove, clean and refit

86.35.08

## Removing

1. Disconnect the battery earth lead.
2. Disconnect the leads from the heater plugs, avoiding distortion of the central rod.
3. Remove the heater plugs.

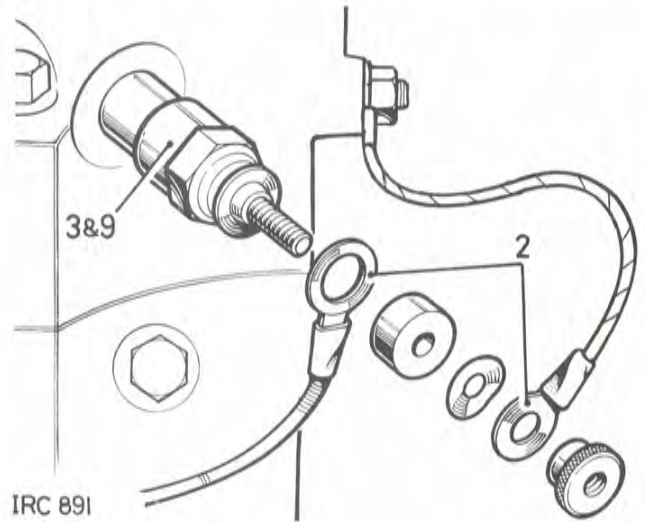
## Cleaning

4. Remove carbon from base of heater plug to avoid possible short circuiting of the element. Do **not** sandblast.
5. Examine the element for signs of fracture or severe heat attack and the seating for scores. Plugs with fractured elements must be replaced. Where scoring of the seating is sufficient to allow gas leakage or erosion of the element such that a fracture is likely to occur, then a replacement plug must be fitted.
6. Test the plug internal circuit for continuity, by connecting it **and** a 12 volt side lamp bulb in circuit, to a 12 volt battery.

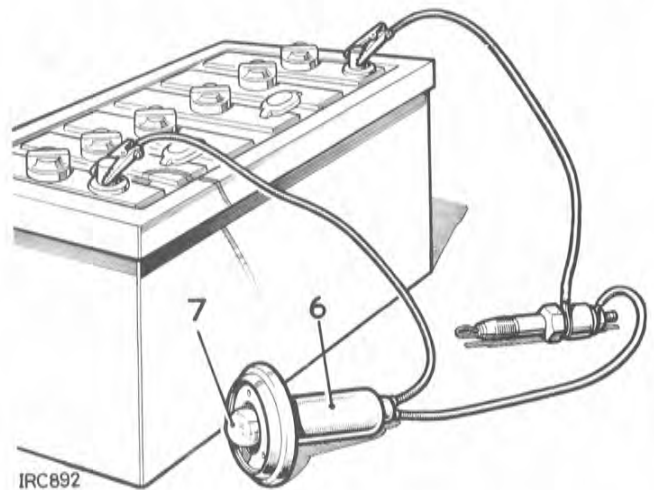
The inclusion of a bulb in circuit is **essential**.

7. If the bulb does not light an open circuit is indicated and the heater plug should be replaced with new.

*continued*



IRC 891



IRC 892

### Refitting

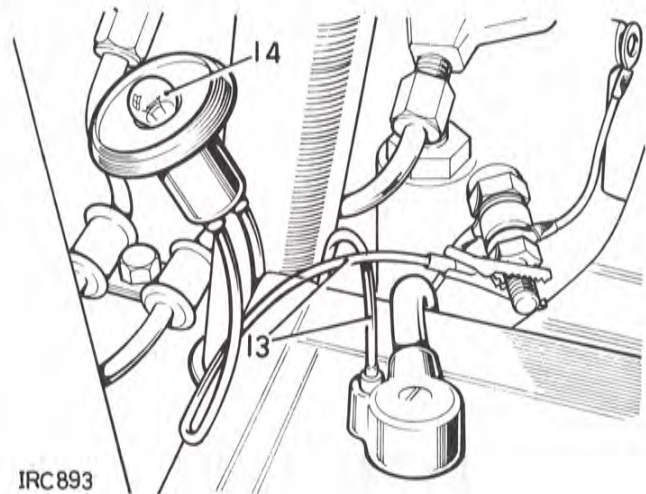
8. Ensure that the terminal nuts and threads are clean and that the thread at base of plug is free of carbon.
9. Fit the heater plugs. Torque 3,4 kgf.m (25 lbf ft.)
10. Reverse 1 and 2.

### Fault location on heater plug circuit, plugs in situ

The heater plugs do not require any maintenance. However, if at any time when the heater plugs are in use, the warning light glows very brightly, a short circuit in the system is indicated. No light will indicate an open circuit.

Great care must be taken not to twist the centre terminal when removing heater plug leads.

11. Examine the fuse in the fuse box and fit a new replacement if necessary. Refer to the applicable circuit diagram for fuse location.
12. Failure of the warning light bulb will not affect the heater plug circuit, but the bulb should be replaced when conveniently possible.
13. Connect one lead of a 12 volt test lamp to the earth lead terminal on No. 1 heater plug and the other lead to the positive terminal of the battery.
14. If the test lamp does not light, a faulty earth lead is indicated.
15. Move the test lamp lead from the heater plug earth lead terminal to the interconnecting lead terminal. If the test lamp remains unlighted, a broken heater plug filament is indicated.
16. Check the remaining plugs in the same manner until the fault is located.
17. If the plugs are proved serviceable, check each terminal of the resistance in the same manner. If the resistance and the output lead are proved to be serviceable, check the input lead and starter switch itself.



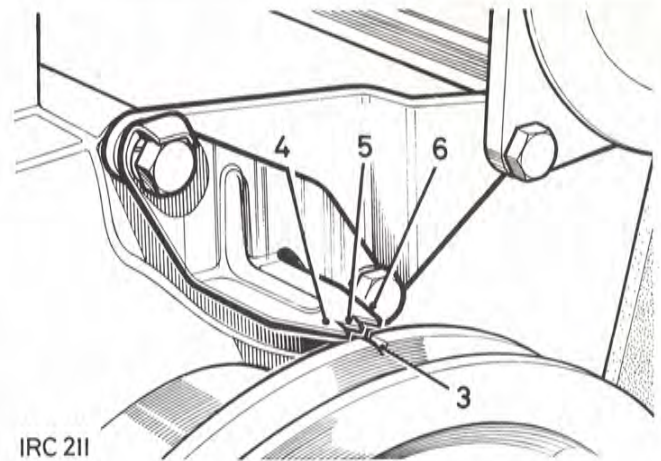
## DISTRIBUTOR – 2¼ litre 4-cylinder Petrol Engines

–Remove and refit

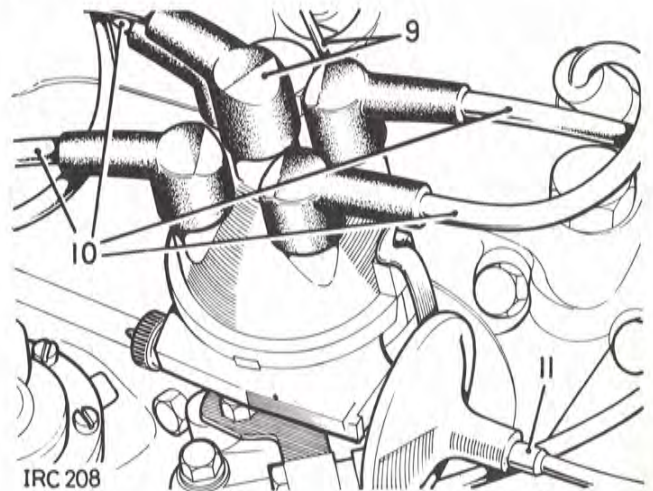
86.35.20

## Removing

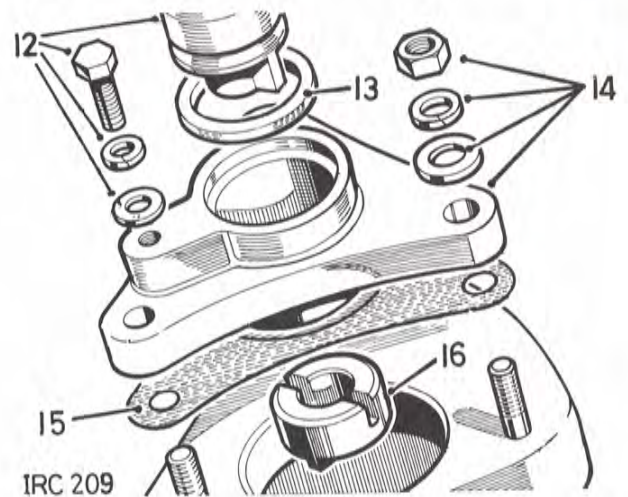
1. Prop open the bonnet.
2. Rotate the crankshaft until both valves on No. 1 cylinder are fully closed.
3. Check the position of the timing mark on the crankshaft pulley, and align it with the appropriate tongue on the timing pointer, as follows 4 to 6.
4. 6° Mark. Align when using 90 octane fuel – 7.0:1 compression ratio only.
5. 3° Mark. Align when using 83 to 89 octane fuel – 7.0:1 compression ratio only.
6. TDC mark when using:  
75 to 82 octane fuel – 7.0:1 compression ratio  
90 octane fuel – 8.0:1 compression ratio
7. Disconnect the battery earth lead.
8. Remove the air cleaner. 19.10.01
9. Disconnect the distributor leads from the coil.
10. Withdraw the leads from the sparking plugs.
11. Disconnect the vacuum pipe.
12. Remove the distributor.
13. Withdraw the cork washer.

*continued*

IRC 211



IRC 208



IRC 209

If required, remove the distributor drive gear 14 to 19.

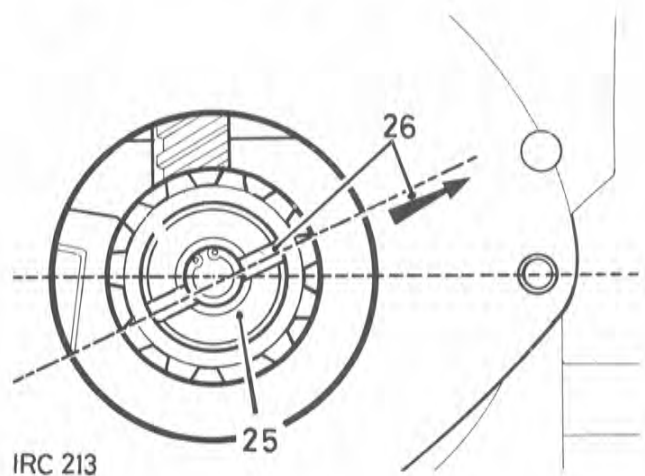
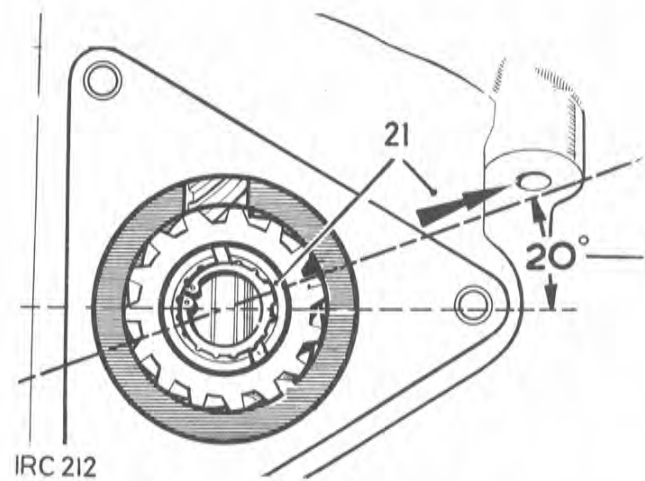
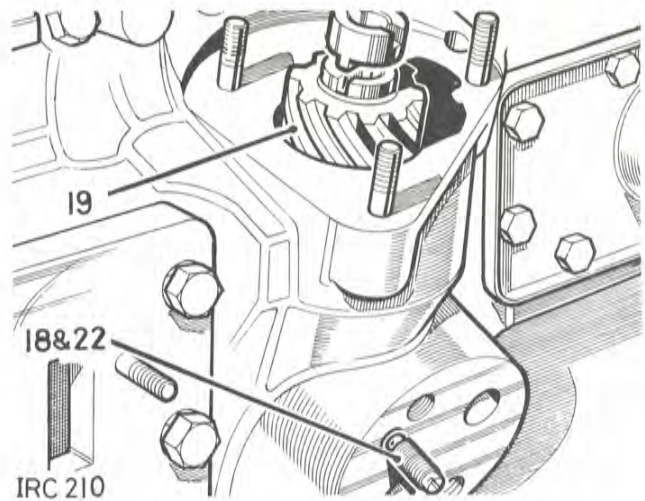
14. Remove the adaptor plate.
15. Withdraw the joint washer.
16. Withdraw the drive shaft coupling.
17. Remove the external oil filter. 12.60.01.
18. Remove the grub screw from the oil filter location face.
19. Withdraw the distributor drive gear.

## Refitting

If the distributor drive gear has been removed proceed from item 20. If the distributor only has been removed carry out item 20 and then proceed from item 28.

20. Ensure that the engine setting is correct, as described in items 2 to 6.
21. Insert the distributor drive gear so that when fully engaged, the master spline is pointing towards No. 1 cylinder.
22. Locate the small hole in the distributor drive gear bush through the oil filter location face, and fit the grub screw.
23. Fit the external oil filter. 12.60.01.
24. Fit the drive shaft coupling to the drive gear as follows. 25 and 26.
25. The narrow segment towards the RH side of the engine,
26. The slot towards No. 1 cylinder.
27. Reverse 14 and 15.

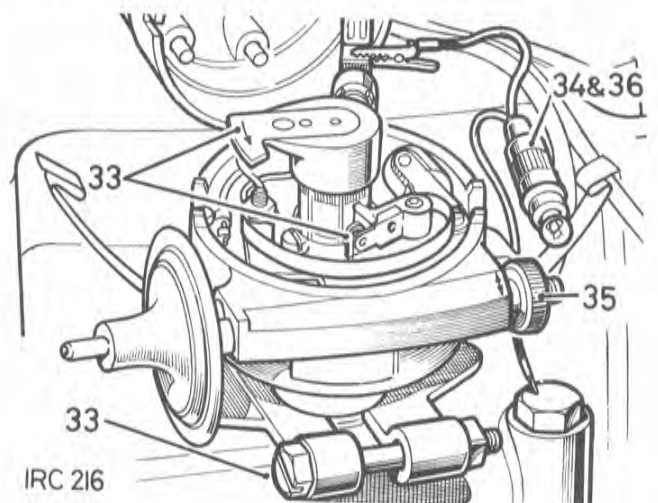
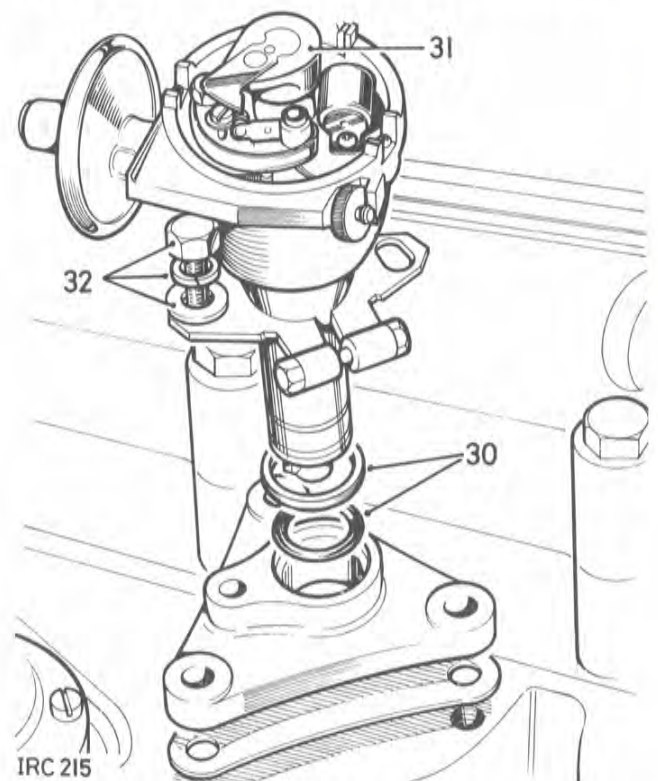
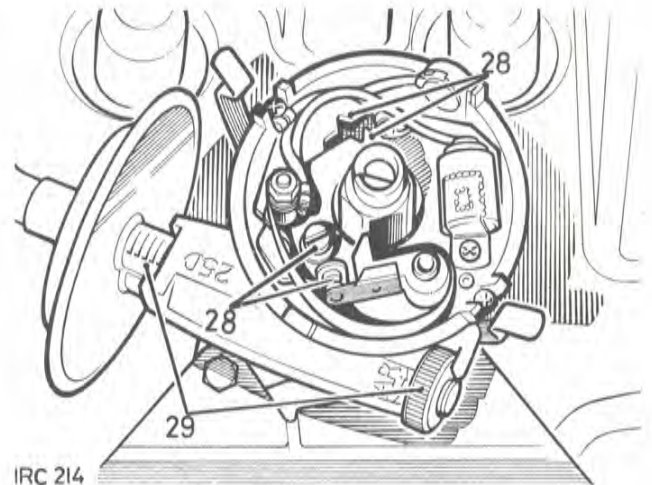
*continued*



28. Adjust the distributor contact breaker gap to 0,35 mm to 0,40 mm (0.014 in. to 0.016 in.).
29. Set the octane selector so that the fourth line on the calibrated slide is against the face of the distributor body casing.
30. Fit a new cork washer and 'O' ring seal to the distributor drive shaft.
31. Offer up the distributor to the engine with the rotor arm in the No. 1 cylinder firing position. With the vacuum unit facing rearward, the narrow segment of the distributor shaft should be toward the RH side of the vehicle and the dog pointing toward No. 1 cylinder. The drive shaft will then engage correctly with the drive shaft coupling at engine.
32. Secure the distributor retaining bolt.
33. Slacken the pinch bolt in base of distributor body and rotate the distributor in opposite direction to arrow on rotor arm until the contact breaker points are just opening with the cam follower on the leading side of the cam. Re-tighten the pinch bolt.
34. Connect one lead of a 12 volt test lamp to the distributor LT terminal and the other one to a good earth on engine. Switch ignition 'on' and turn the crankshaft two revolutions in direction of rotation. The bulb should light as the timing pointer comes into alignment with the appropriate mark. See items 4 to 6.
35. Adjust as required by slackening the pinch bolt and turning the distributor bodily, or for fine adjustment by means of the vernier screw.
36. When satisfactory, remove the test lamp and leads.
37. Fit the distributor cap.
38. Reverse 7 to 11.
39. Close the bonnet.
40. If the external oil filter has been removed, check the engine sump oil level after a short run and top up as necessary to the 'high' mark on the oil level dipstick.

#### DATA

Distributor	
Contact breaker gap	0,35 mm to 0,40 mm (0.014 in. to 0.016 in.)



## ELECTRICAL EQUIPMENT

### DISTRIBUTOR 2.6 litre 6-cylinder Petrol engines

—Remove and refit 86.35.20

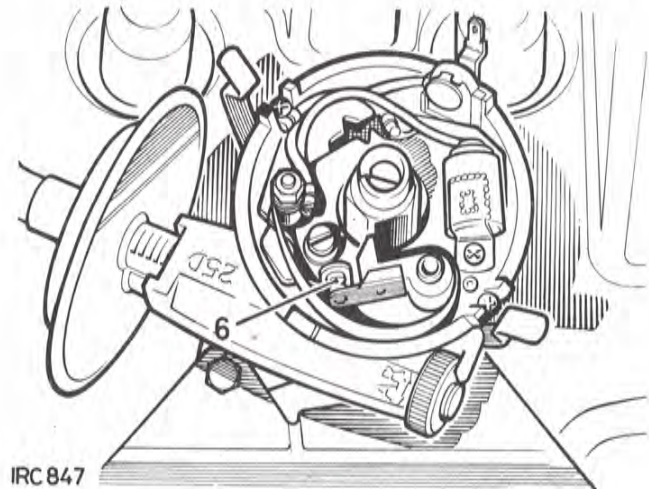
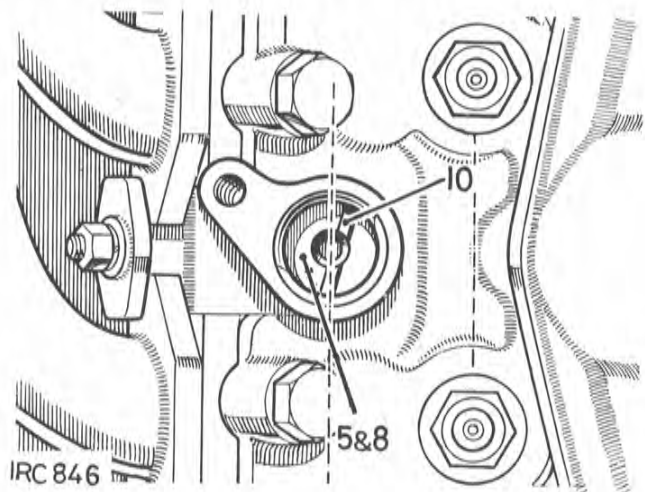
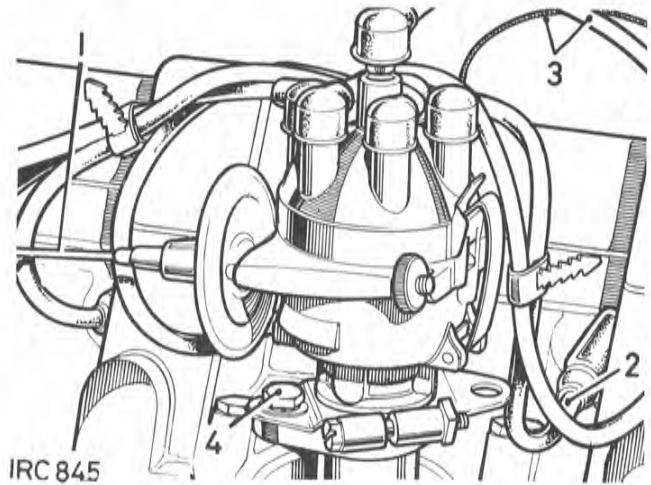
#### Removing

1. Disconnect the vacuum pipe at the distributor.
2. Disconnect the leads at the sparking plugs.
3. Disconnect the h.t. and l.t. leads at the distributor.
4. Remove the fixings and withdraw the distributor from the drive housing.
5. If required, lift out the short drive shaft from the drive housing.

#### Refitting

6. Where a replacement distributor is to be fitted, check the contact breaker gap, 0,35 to 0,40 mm (0.014 to 0.016 in.).
7. Set the octane selector, using the knurled adjuster, so that the fourth line on the calibrated slide is against the distributor body casing.
8. If removed, refit the short drive shaft to engage the offset drive.
9. Remove the side and top rocker covers.
10. Rotate the engine until the offset slot in the short drive shaft is positioned as illustrated and with both valves closed on No. 1 (front) cylinder, (that is, with No. 1 cylinder on firing stroke).

*continued*







## DISTRIBUTOR

—Overhaul

86.35.26

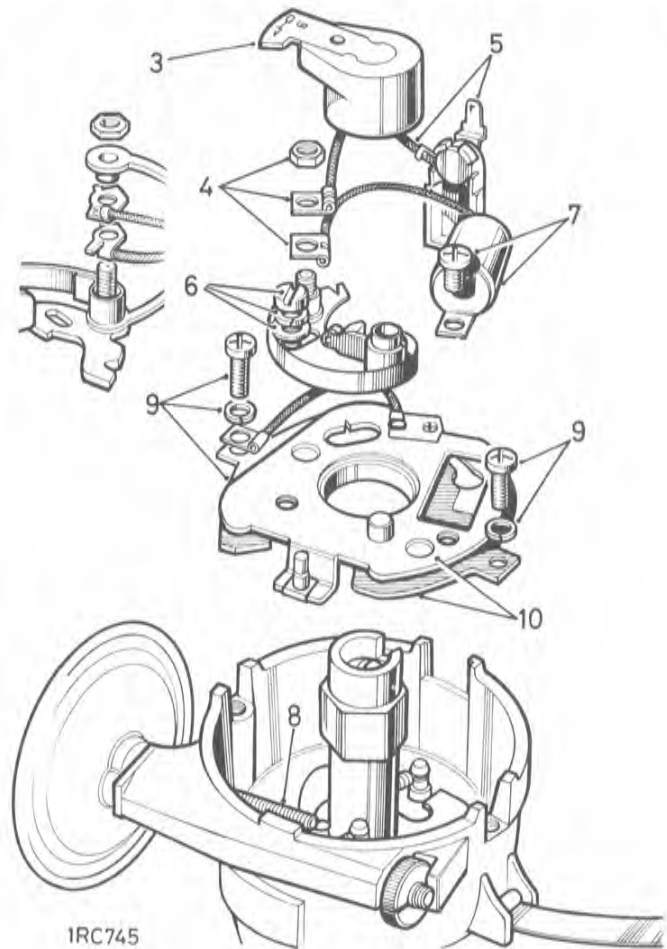
**NOTE:** The distributors fitted to the 2¼ litre four cylinder engine and the 2.6 litre six cylinder engine, are of the same basic type, with only minor differences such as the cam and distributor cap. The following instructions apply to both four cylinder and six cylinder type distributors.

## Dismantling

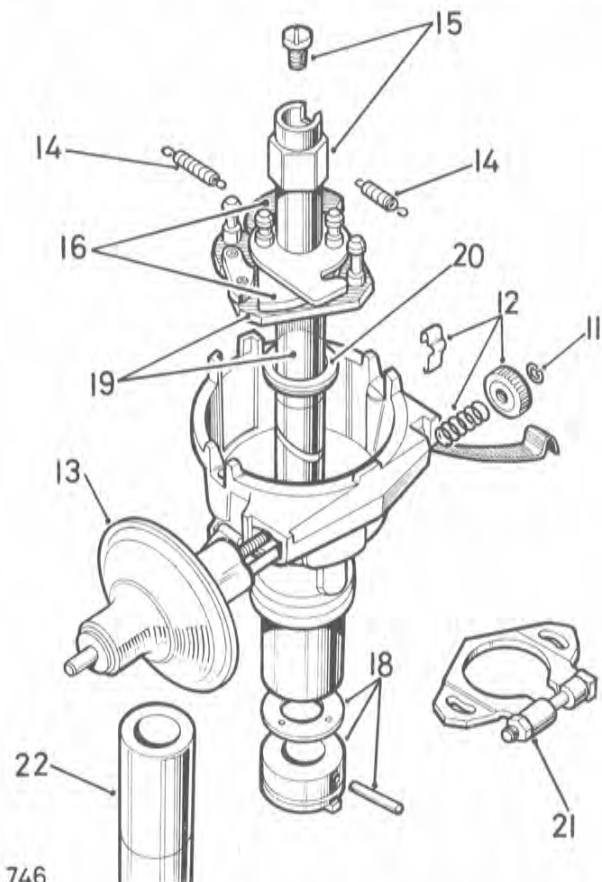
1. Remove the distributor. 86.35.20.
2. Remove the distributor cap.
3. Withdraw the rotor arm.
4. Disconnect the low tension and capacitor leads.

**NOTE:** There are two alternative terminal post arrangements in use, as illustrated.

5. Withdraw the low tension lead complete with terminal block.
6. Remove the contact breaker set complete.
7. Remove the capacitor.
8. Disconnect the spring between the vacuum unit and the base plate.
9. Remove the base plate.
10. Rotate the contact breaker moving plate clockwise to its full extent and withdraw it from the base plate.
11. Remove the circlip from the micrometer adjusting nut.
12. Remove the micrometer adjusting nut, coil spring and ratchet.
13. Withdraw the vacuum unit.
14. Withdraw the springs from the centrifugal advance unit.
15. Remove the screw from inside the cam and withdraw the cam and cam foot, noting the position of the rotor arm slot in relation to the distributor driving dog for assembly purposes.
16. Remove the two weights.
17. Withdraw the 'O' ring seal and cork washer from the underside of the distributor.
18. Drive out the pin securing the driving dog and withdraw the dog and thrust washer.
19. Remove the action plate and shaft.
20. Withdraw the distance collar.
21. Remove the clamping plate.
22. If required, press out the bush from the body end.
23. Check all parts for wear or damage, and replace as necessary.

*continued*

IRC745



IRC 746



**Assembling**

24. Reverse 3 to 22 noting the following.
25. If a new bush is required it must be completely immersed in engine oil for 24 hours prior to fitting.
26. Using the hole in the distributor shank as a guide, drill the bush on one side and remove the frazing.
27. Ensure that the drive shaft rotates freely in the bush.
28. When fitting the centrifugal governor springs, care must be taken not to stretch them.
29. When fully assembled, adjust the contact points gap to 0,35 mm to 0,40 mm (0.014 in. to 0.016 in.).
30. Reverse 1 and 2.

**DATA**

Distributor

Contact breaker gap

0,35 mm to 0,40 mm (0.014 in. to 0.016 in.)



### IGNITION COIL

—Remove and refit

86.35.32

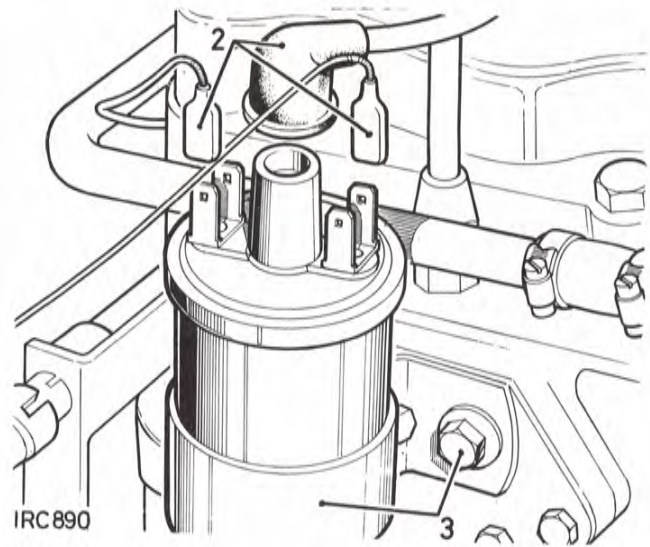
#### Removing

1. Disconnect the battery earth lead.
2. Disconnect the leads from the ignition coil.
3. Remove the ignition coil.

#### Refitting

4. Reverse 1 to 3.

**NOTE:** The electrical leads are fitted with male and female connectors, ensure that they are fitted to the corresponding blade on the ignition coil.



## HEADLAMP ASSEMBLY

- Remove and refit

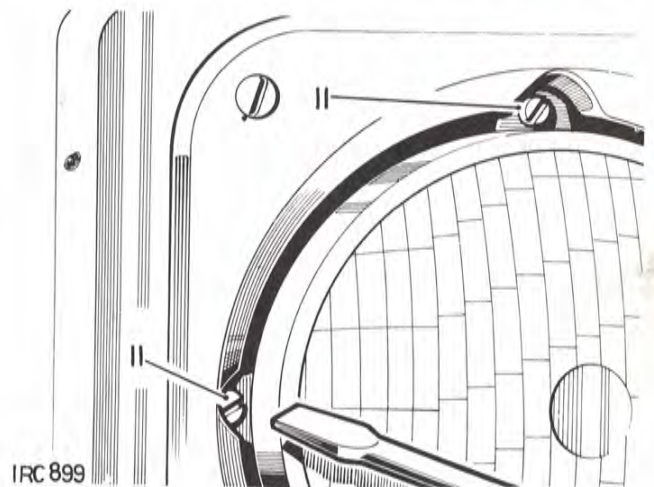
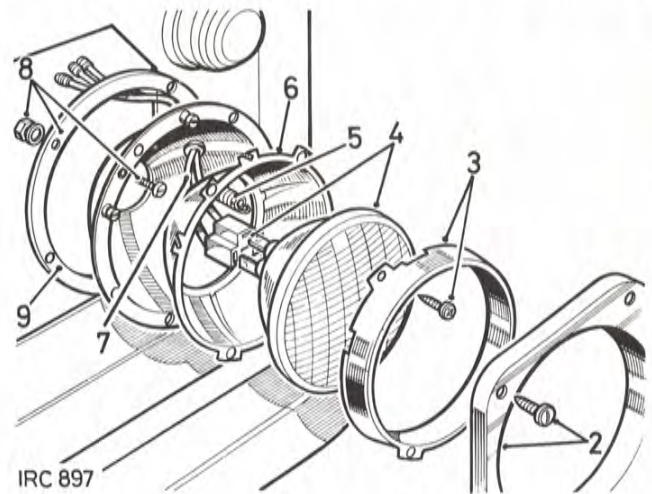
86.40.02

## Removing

1. Disconnect the battery earth lead.
2. Remove the headlamp bezel.
3. Remove the headlamp rim.
4. Disconnect the headlamp leads at the plug connector and withdraw the light unit.
5. Disconnect the spring from the headlamp shell.
6. Withdraw the headlamp shell by rotating it clear of the slotted locations.
- 7.\*\* Disconnect the headlamp leads at the snap connectors behind the radiator grille.\*\*
8. Remove the headlamp mounting shell.
9. Withdraw the gasket.

## Refitting

10. Reverse 1 to 9.
11. Check, and if necessary adjust, the headlamp, using suitable beam setting equipment.



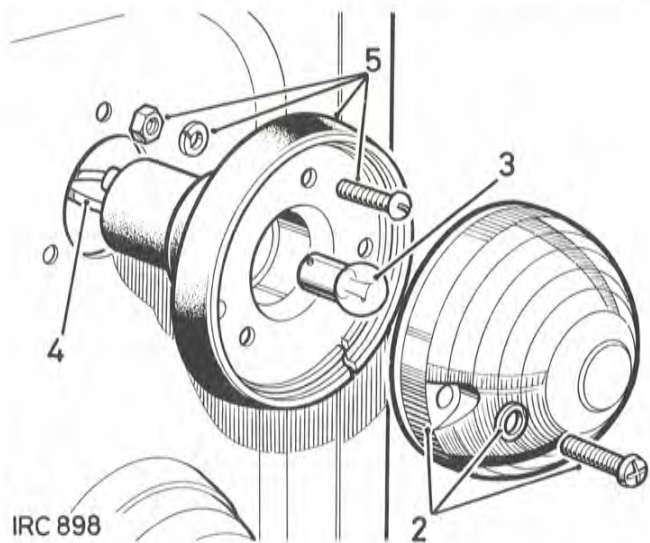
**FRONT SIDE AND FLASHER LAMPS**

—Remove and refit

Front side lamp	86.40.34
Front flasher lamp	86.40.42

**Removing**

1. Disconnect the battery earth lead.
2. Remove the lamp lens.
3. If required, remove the bulb.
4. Disconnect the lamp leads at the snap connectors in the engine compartment.
5. Remove the lamp body.



**Refitting**

6. Reverse 1 to 5.

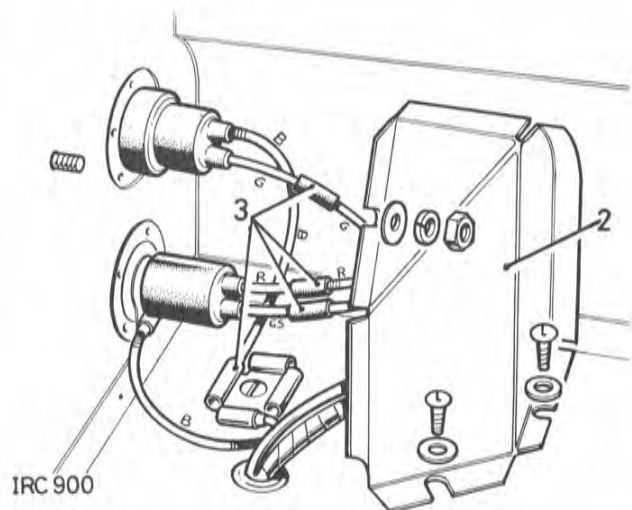
**REAR FLASHER AND TAIL LAMPS**

—Remove and refit

Rear flasher lamp	86.40.45
Tail lamp	86.40.79

**Removing**

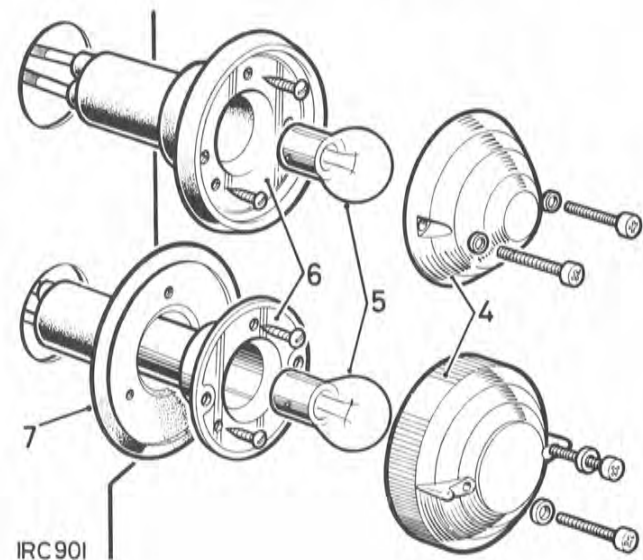
1. Disconnect the battery earth lead.
2. Remove the rear lamp cover plate from inside the vehicle.
3. Disconnect the lamp leads.
4. Remove the lamp lens.
5. If required, remove the bulb.
6. Remove the lamp body.
7. Withdraw the rubber mounting for the tail lamp.



**Refitting**

8. Reverse 1 to 7.

Lead colours	B—Black
	G—Green
	R—Red
	S—Slate

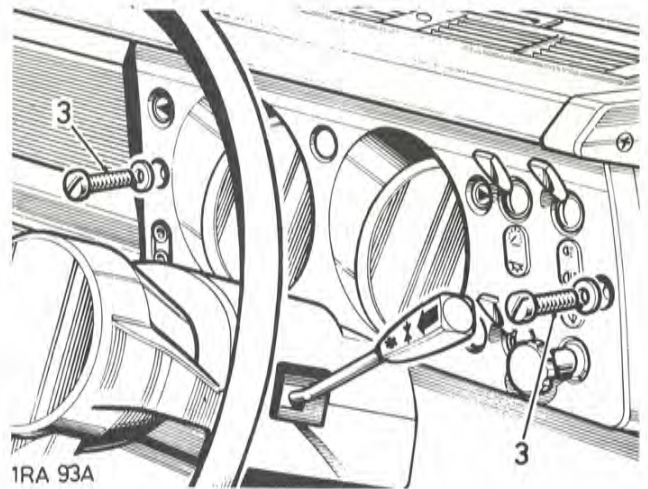


## PANEL ILLUMINATION LAMP OR WARNING LAMP BULB

—Remove and refit 86.45.31

### Removing

1. Disconnect the battery earth lead.
2. Release the speedometer cable from the clip attached to the engine rear side cover, 4-cylinder models; ignition coil mounting bracket on 6-cylinder models.
3. Remove the two screws retaining the instrument panel.
4. Withdraw the instrument panel clear of the dash.
5. Withdraw the bulb holder and change the bulb as necessary.



### Refitting

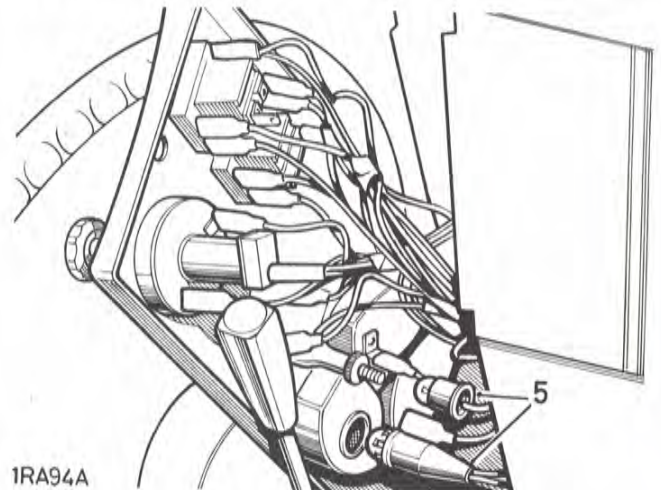
6. Reverse 1 to 5.

## INSPECTION SOCKETS

—Remove and refit 86.45.33

### Removing

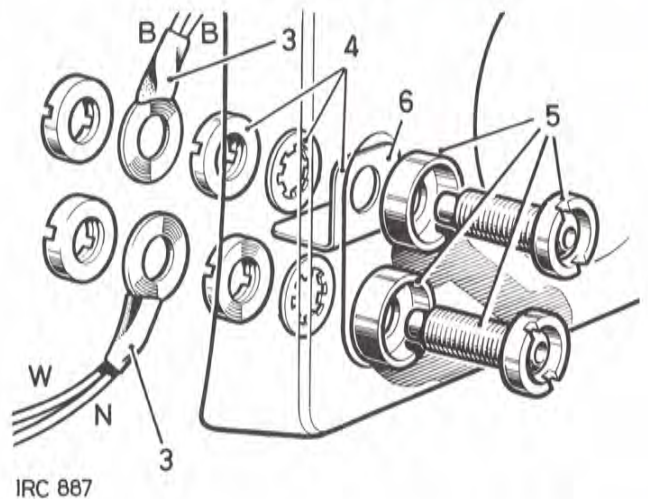
1. Disconnect the battery earth lead.
2. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
3. Disconnect the electrical leads from the sockets.
4. Remove the screw lock rings, shakeproof washers and insulation tab.
5. Withdraw the sockets.



### Refitting

6. Reverse 1 to 5, ensuring that the insulation tab is central between the two sockets.

Lead colours B — Black  
N — Brown  
W — White



## FLASHER UNIT

—Remove and refit

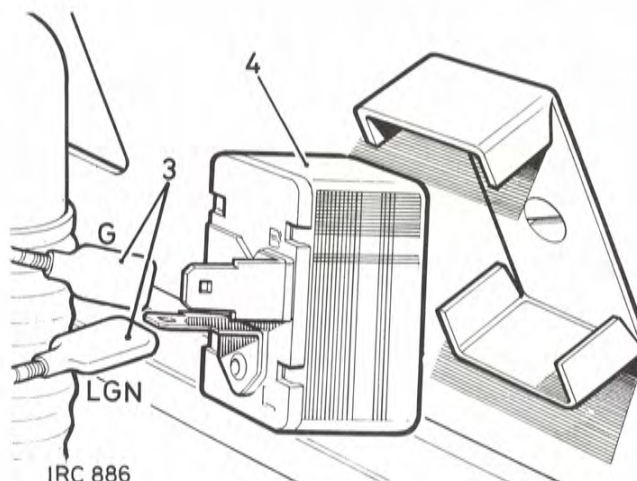
86.55.11

### Removing

1. Disconnect the battery earth lead.
2. Withdraw the instrument panel clear of the dash.  
88.20.01 (items 1 to 5).
3. Disconnect the leads from the flasher unit.
4. Remove the flasher unit.

### Refitting

5. Reverse 1 to 4.  
Lead colours    G—Green  
                     L—Light  
                     N—Brown



**STARTER MOTOR**

–Remove and refit

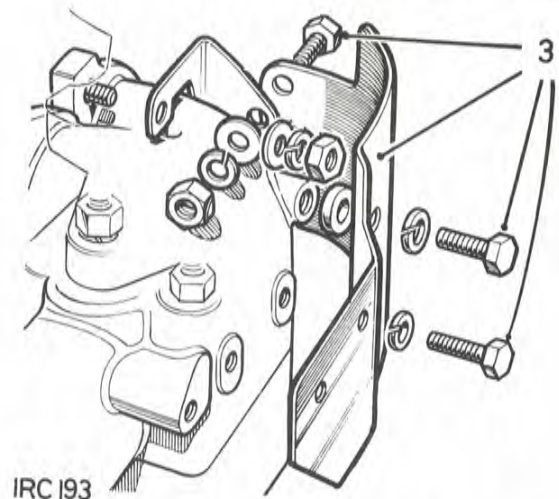
86.60.01

**Removing**

1. Remove the bonnet. 76.16.01.
2. Disconnect the battery earth lead.
3. **Petrol engines.** Remove the exhaust heat shield.
4. **2½ litre Petrol engines.** Disconnect the front exhaust pipe at the manifold.
5. Disconnect the electrical leads from the starter motor.
6. Remove the starter motor.

**Refitting**

7. Reverse 1 to 6.

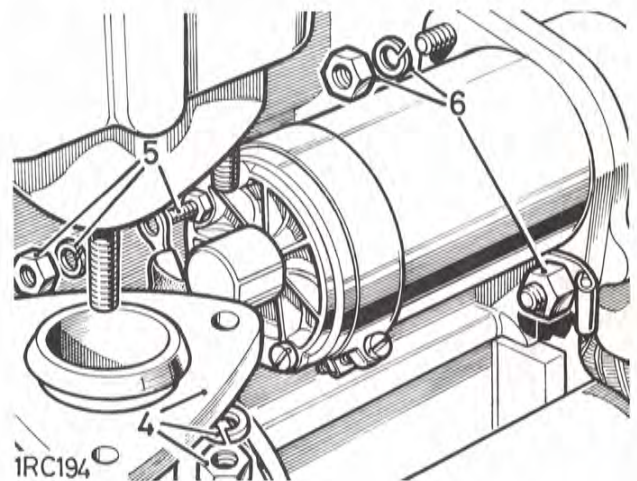
**STARTER SOLENOID 2½ litre and 2.6 litre Petrol engines**

–Remove and refit

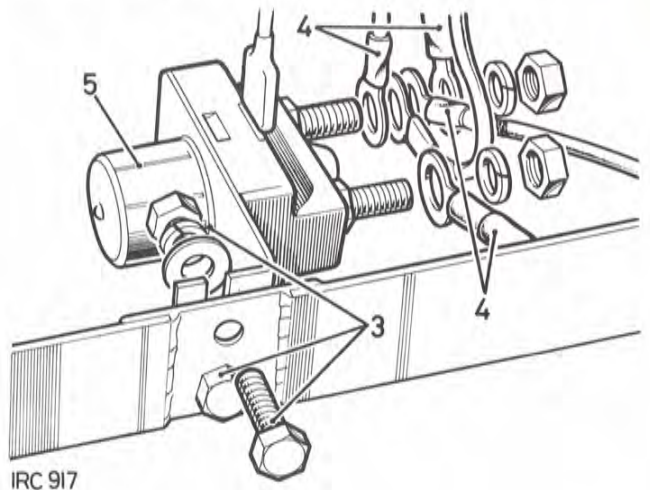
86.60.08

**Removing**

1. Disconnect the battery earth lead.
2. **2.6 litre engines**—Remove the battery. 86.15.11.
3. Remove one of the solenoid fixings and slacken the other.
4. Withdraw the solenoid from its mounting and disconnect the electrical leads.
5. Lift the solenoid clear.

**Refitting**

6. Reverse 1 to 5. Connect the electrical leads in accordance with the circuit diagram.





## ELECTRICAL EQUIPMENT

### STARTER MOTOR – 2½ litre and 2.6 litre Petrol models

–Overhaul

86.60.13

#### Dismantling

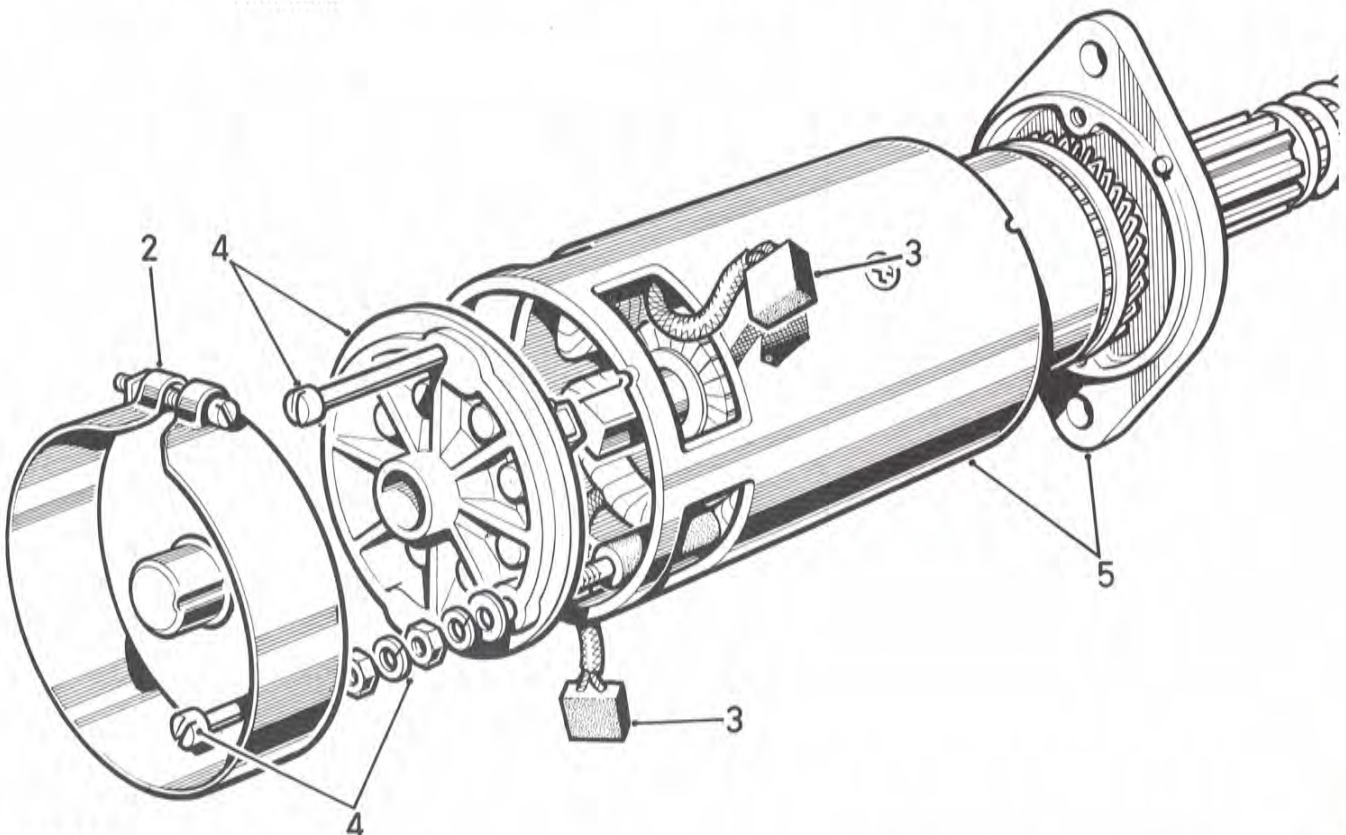
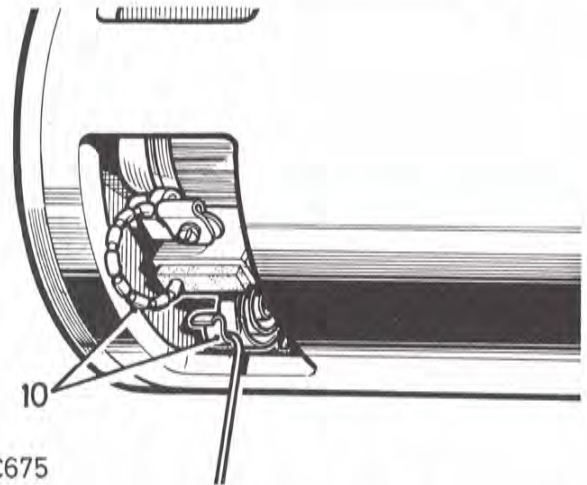
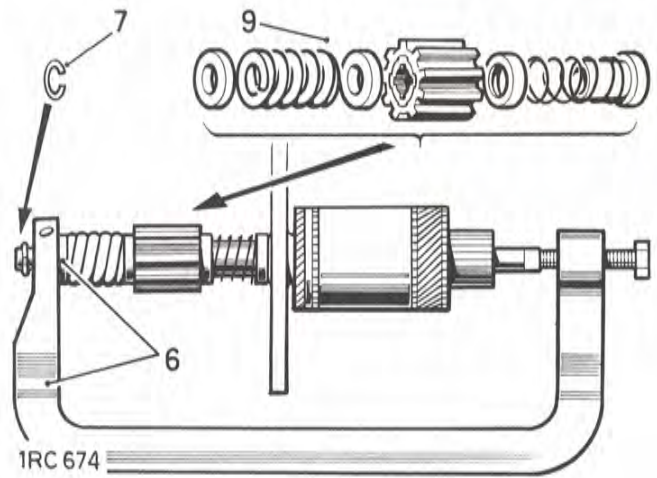
1. Remove the starter motor. 86.60.08.
2. Remove the cover band.
3. Withdraw the field bushes from the guides.
4. Remove the commutator end cover.
5. Withdraw the starter yoke from the armature assembly.
6. Using a suitable clamp, clamp the end collar and compress the main spring.
7. Remove the circlip from the armature shaft.
8. Remove the clamp.
9. Withdraw the end collar, main spring, washer, screwed sleeve and pinion collar, pinion retaining spring and spring retaining sleeve.

#### Inspection

##### Brushes

10. Check that the brushes move freely in their holders by holding back the brush spring and pulling gently on the flexible connectors. Any tendency to stick should be corrected by cleaning with a petrol-moistened cloth, or in extreme cases by the light use of a smooth file. If a brush is damaged or worn so that it does not make good contact on the commutator, all the brushes must be renewed.

*continued*



1RC 673

11. Check the tension of the brush springs with a spring balance. The correct tension is 850 to 1134 g (30 to 40 oz.) and new springs must be fitted if the tension is low.
12. When brushes are worn to 8,0 mm (0.312 in.) in length, new replacements must be fitted.

The flexible connectors are soldered or crimped to terminal tags; two are connected to brush boxes, and two are connected to the free ends of the field coils. These flexible connectors must be removed by unsoldering, and the flexible connectors of the new brushes secured in their places by soldering.

The new brushes being pre-formed, 'bedding' to the commutator is unnecessary.

#### Commutator

13. Clean the commutator with a petrol-moistened cloth. If necessary, rotate the armature and, using fine glass-cloth, remove pits and burned spots from commutator; remove abrasive dust with a dry air blast. If the commutator is badly worn, mount in a lathe, and, using a very sharp tool, take a light cut, taking care not to remove any more metal than necessary. The insulators between the commutator segments **must not be undercut**. Finally, polish with a very fine glass paper.

#### Armature

14. If the armature is damaged, i.e. 'lifted' conductors, or distorted shaft, a new replacement must be fitted. Never attempt to machine the armature core, or true a distorted armature shaft.

#### Bearing bushes

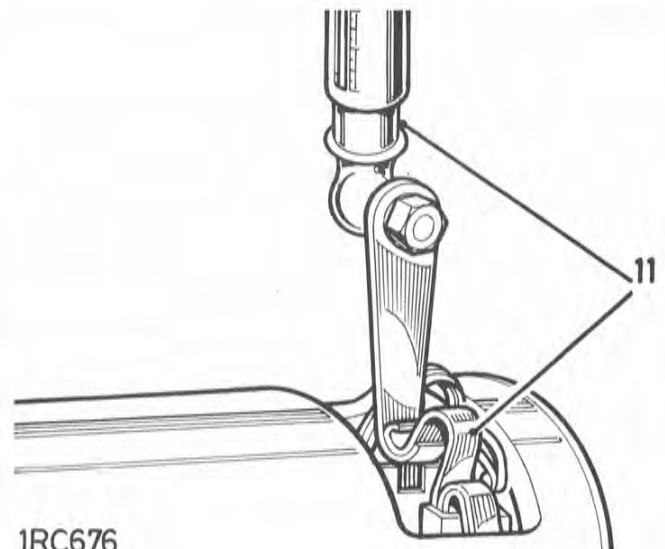
If the bearing bushes are worn and allow excessive side play of the armature shaft, new replacements must be fitted.

15. Commutator end bracket bush—Remove brake shoes, thrust washer and Tufnol washer from the end bracket. Screw in a 9/16 in. tap and withdraw complete with bush.
16. Drive end bracket bush and intermediate bracket bush can be pressed out.
17. New bushes can be fitted using a shouldered mandrel of the same diameter as the shaft.

**NOTE:** Before fitting a new porous bronze bush, it should be completely immersed for 24 hours in clean SAE 30-40 engine oil.

Porous bronze bushes must **not** be reamed after fitting.

*continued*

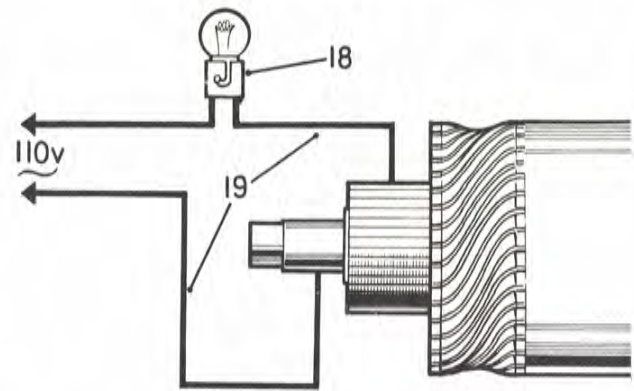


## Insulation and continuity checks

If inspection of the armature and field coils of the starter motor do not reveal any faults, it is recommended that the following checks are carried out.

### Armature insulation

18. Attach an ohm meter or a 110 volt AC test lamp in series with a 110 volt supply.
19. With two probes attached to the leads check the armature insulation by touching each commutator segment in turn with the other probe attached to the armature shaft.
20. The test lamp should not light up, or if an ohm meter is used, a high reading should be recorded. Should this not be the case, the armature insulation is faulty and a new replacement armature should be fitted.



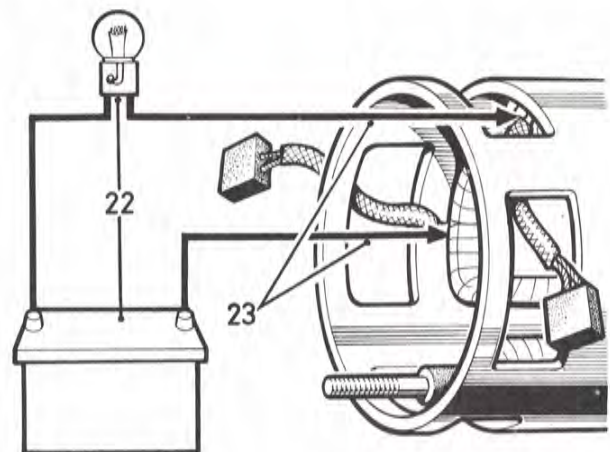
1RC 679

### Armature continuity

21. Indication of an open circuited armature winding will be given by burned commutator segments, this can be confirmed by substitution.

### Field coil continuity

22. Connect a battery and suitable bulb in series with two pointed probes.
23. Place the probes on the field coil brush tappings.
24. The test bulb should light, if not an open circuit is indicated and new replacement field coils should be fitted.
25. If the test bulb does light, proceed with the field coil insulation test.

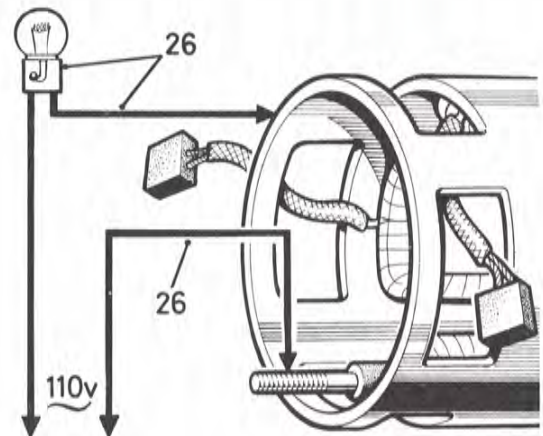


1RC 677

### Field coil insulation

26. Connect an ohm meter or a 110 volt AC test lamp between the terminal post and a clean part of the yoke.
27. Lighting of the test lamp or a low ohmic reading indicates that the field coils are earthed to the yoke and new replacements must be fitted.

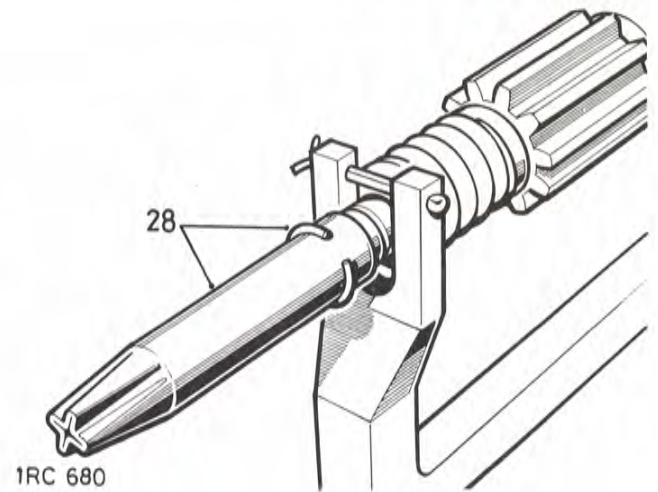
*continued*



1RC 678

**Assembling**

28. Reverse 6 to 9. Use a suitable piece of steel tube with a tapered end to fit the circlip to the armature shaft.
29. Fit the starter yoke to the armature assembly, ensuring that the location peg on the drive end bracket fits into the recess on the yoke.
30. Lift the earth brushes up into the guides and retain with the spring.
31. Fit the commutator end cover, ensuring that the earth brush leads do not become trapped between the end cover and the yoke.
32. Fit the two through bolts and spring washers. Torque 1,0 kgf.m (8 lbf. ft.).
33. Push the earth brushes down onto the commutator. The brush spring should act centrally on the brushes.
34. Lift the field brush springs with a suitable tool, insert the field brushes into the guides, and allow the springs to act centrally on the brushes.
35. Fit the cover band and tighten the screw.
36. Fit the insulating washer, plain washer, spring washer and nut to the field coil input post.
37. Fit the cover to the square ended nut on the armature shaft.
38. Refit the starter motor. 86.60.08.

**DATA****Starter motor**

Brush spring pressure  
Brush minimum length

850 to 1134g (30 to 40 oz.)  
8,0 mm (0.312 in.)

### STARTER MOTOR—2¼ litre Diesel engines

—Overhaul

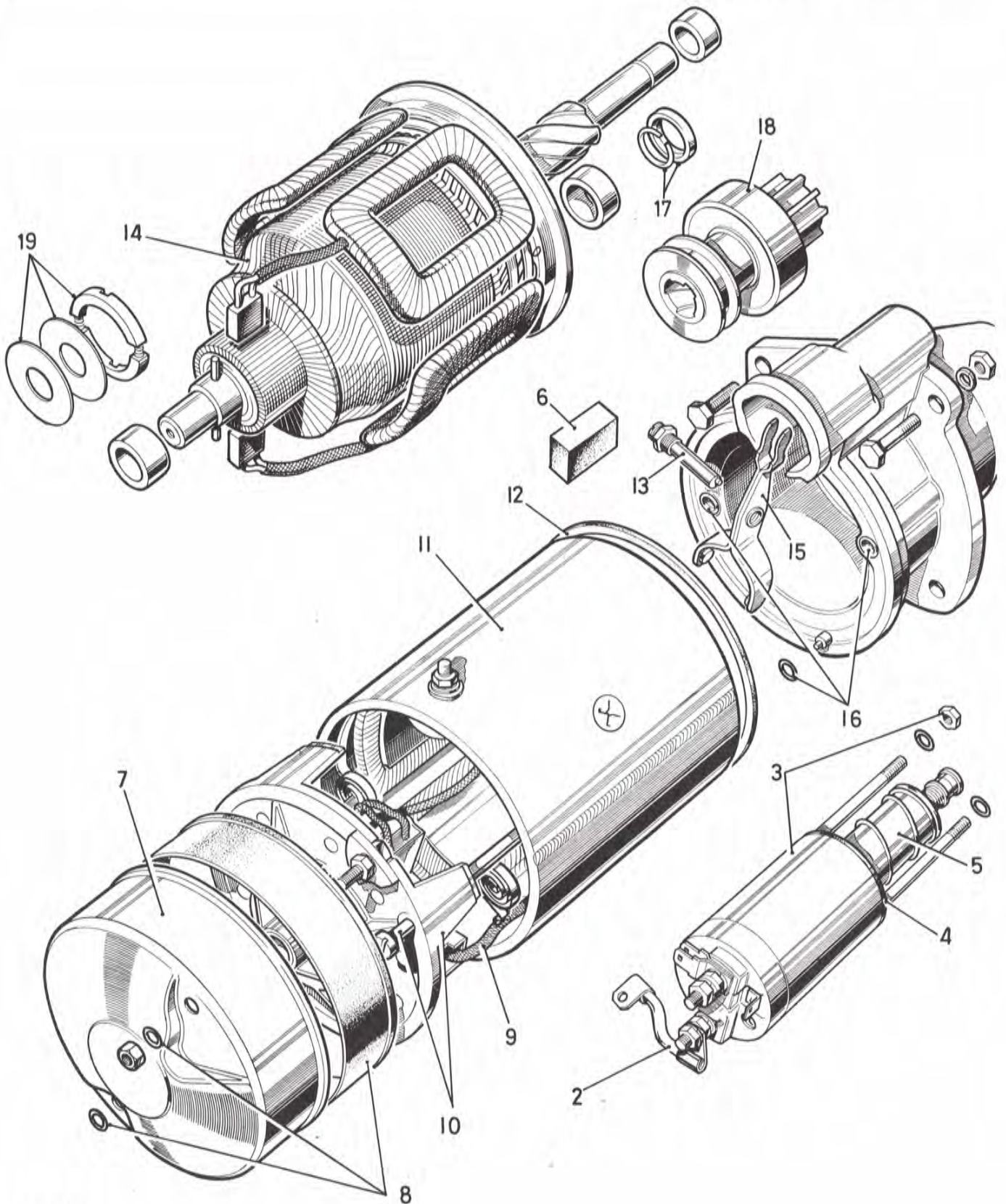
86.60.13

#### Dismantling

1. Remove the starter motor. 86.60.08.
2. Remove the link connecting the solenoid to the starter motor yoke terminal.
3. Remove the solenoid from the drive end bracket.
4. Withdraw the gasket.
5. Grasp the solenoid plunger and lift the front end to release it from the top of the drive engagement lever.
6. Remove the block shaped sealing grommet wedged between the solenoid fixing part of the drive end bracket and the yoke.
7. Remove the commutator-end sealing cover.
8. Withdraw the seals.
9. Withdraw the field coil brushes from their holders.
10. Remove the commutator end bracket from the starter yoke.
11. Withdraw the yoke and field coil assembly.
12. Withdraw the sealing ring.
13. Remove the eccentric pin.
14. Withdraw the armature.
15. Withdraw the engagement lever.
16. Withdraw the seals for the through bolts.
17. Using a suitable tube, remove the collar and jump ring from the armature shaft.
18. Withdraw the drive assembly and intermediate bracket.
19. Remove the brake ring, steel washer and tufnol washer from the commutator end bracket.

*continued*





IRC 851



## ELECTRICAL EQUIPMENT

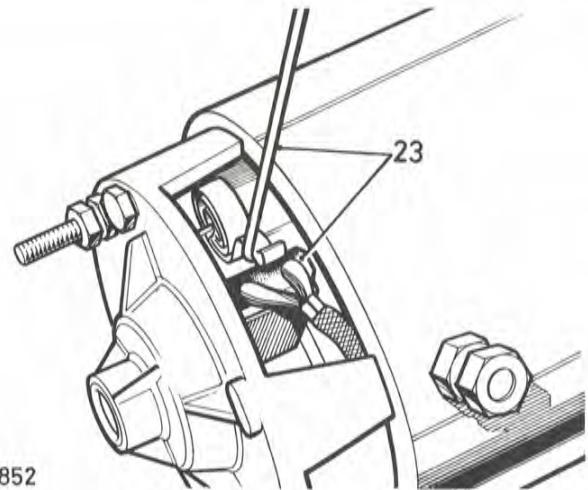
### Inspecting

#### Clutch

20. Check that the clutch gives instantaneous take up of the drive in one direction and rotates easily and smoothly in the other direction.
21. Ensure that the clutch is free to move round and along the shaft splines without any tendency to bind.

**NOTE:** The roller clutch drive is sealed in a rolled steel outer cover and cannot be dismantled.

22. Lubricate all clutch moving parts with Shell SB 2628 grease for cold and temperate climates or Shell Retinax 'A' for hot climates.



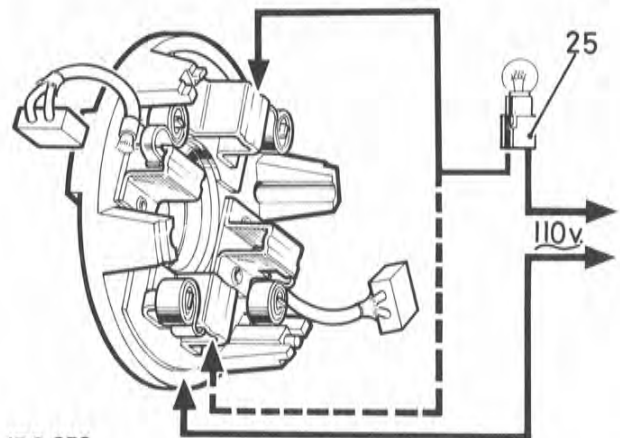
IRC 852

#### Brushes

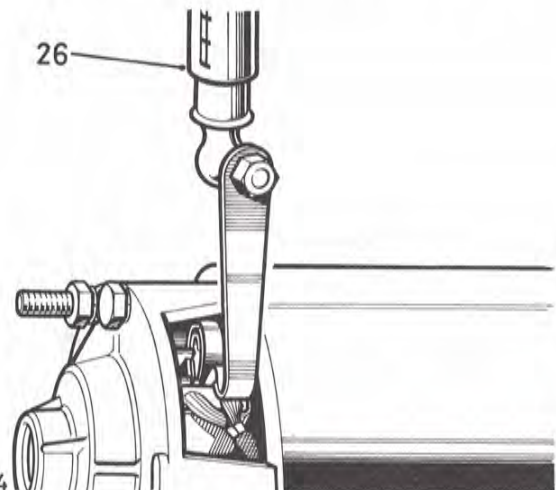
23. Check that the brushes move freely in their holders while holding back the brush springs. Rectify sticking brushes by wiping with a petrol moistened cloth.
24. Fit new brushes if they are damaged or worn to approximately 8 mm (0.312 in.) in length.

**NOTE:** New brushes are pre-formed and do not require bedding to the commutator.

25. Check the brush box insulation by connecting a 110V a.c. 15W test lamp between a clean part of the bracket and each of the two insulated brushboxes in turn. If the lamp lights, renew the commutator end bracket assembly.
26. Using a spring balance, check the brush spring pressure. With new brushes assembled in the bracket and the brushes contacting the commutator, the pressure should be approximately 1,2 kgf. (42 ozf.). If the pressure is low, fit new springs.
27. Check the commutator. If cleaning only is necessary, use very fine glass paper or emery cloth, and then wipe the commutator surface with a petrol moistened cloth. If necessary, the commutator may be machined, providing a finished surface can be obtained without reducing the diameter below 38,0 mm (1.500 in.), otherwise a new armature must be fitted.



IRC 853



IRC 854

*continued*

**Armature insulation**

28. Connect a 110V a.c. 15W test lamp between any one of the commutator segments and the shaft.
29. The lamp should not light, if it does light, fit a new armature.

**Field coil insulation**

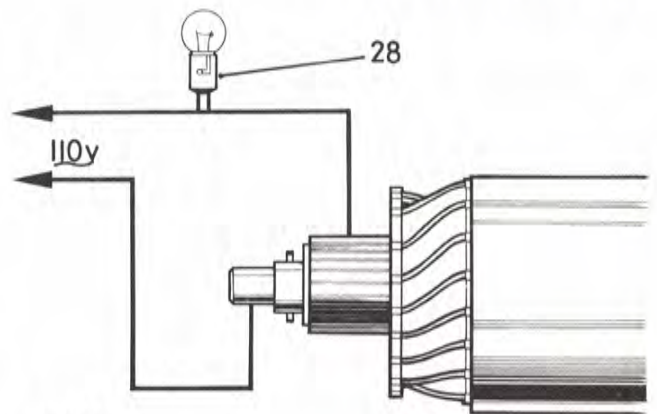
30. Connect a 110V a.c. 15W test lamp between the yoke terminal and the yoke.
31. Ensure that the brushes are not touching the yoke during the test.
32. The lamp should not light, if it does light, fit a new field coil assembly.

**Field coil continuity**

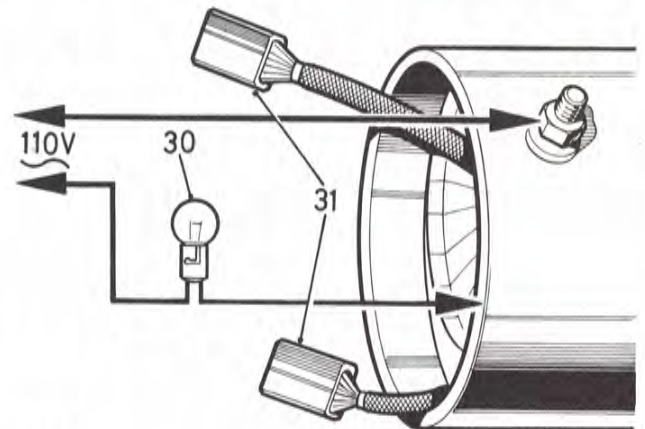
33. Connect a 110V a.c. 15W test lamp between the two field coil brushes.
34. The lamp should light, if it does not light, fit a new field coil assembly.

**Solenoid**

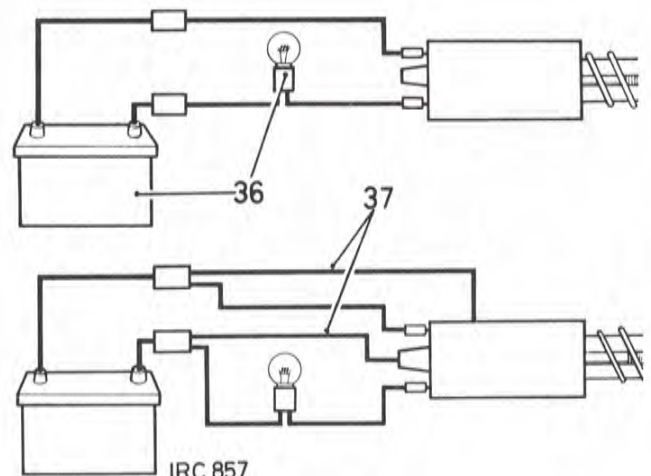
35. Disconnect all cables from the solenoid terminals and connectors.
36. Connect a 12V battery and a 12V 60W test lamp between the solenoid main terminals. The lamp should not light, if it does light, fit new solenoid contacts or a new solenoid complete.
37. Leave the test lamp connected and, using the same 12V battery supply, energise the solenoid by connecting 12V between the small solenoid operating 'Lucar' terminal blade and a good earth point on the solenoid body.
38. The solenoid should be heard to operate and the test lamp should light with full brilliance, otherwise fit new solenoid contacts or a new solenoid complete.

*continued*

IRC 855



IRC 856



IRC 857

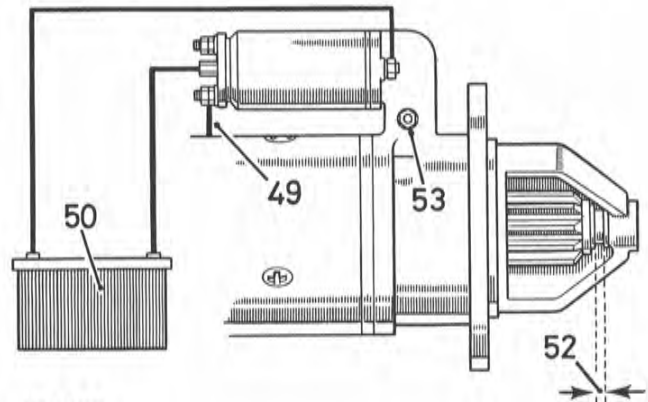


## Assembling

39. Reverse the dismantling procedure, noting the following.
40. Fit the drive engagement lever with the flatter edge towards the solenoid.
41. Leave the locknut for the eccentric pivot pin loose until the drive pinion setting has been adjusted.
42. Fit new seals and gasket.
43. Torque tighten the solenoid fixing nuts. 0,62 kgf.m (4.5 lbf.ft.).
44. Torque tighten the solenoid outer terminal nuts 0,41 kgf.m (3.0 lbf.ft.).
45. Torque tighten the yoke terminal outer nut 0,2 kgf.m (1.5 lbf. ft.).
46. Torque tighten the starter through bolts 1,1 kgf.m (8.0 lbf.ft.).
47. Torque tighten the earth stud nut 0,82 kgf.m (6.0 lbf. ft.).

## Setting drive pinion

48. If fitted, remove the link connecting the solenoid to the starter motor yoke terminal.
49. Connect the solenoid terminal 'STA' to the starter yoke case (not to the starter terminals).
50. Connect a 6V supply between the solenoid-operating 'Lucar' terminal and the starter yoke case (not the starter terminals).
51. With the solenoid energised and the drive assembly in the engaged position, hold the pinion pressed lightly towards the armature to take up any free play in the engagement linkage.
52. Measure the clearance between the pinion and the thrust collar on the armature shaft. The correct clearance is 0,12 mm to 0,38 mm (0.005 in. to 0.015 in.).
53. If necessary, adjust the clearance by rotating the eccentric pivot pin.
54. Remove the connections from the solenoid and the starter yoke case.
55. Apply sealing compound to the threads of the eccentric pivot pin and secure the locknut. Torque 2,2 kgf.m (16.0 lbf.ft.).
56. Reverse 1 and 2.



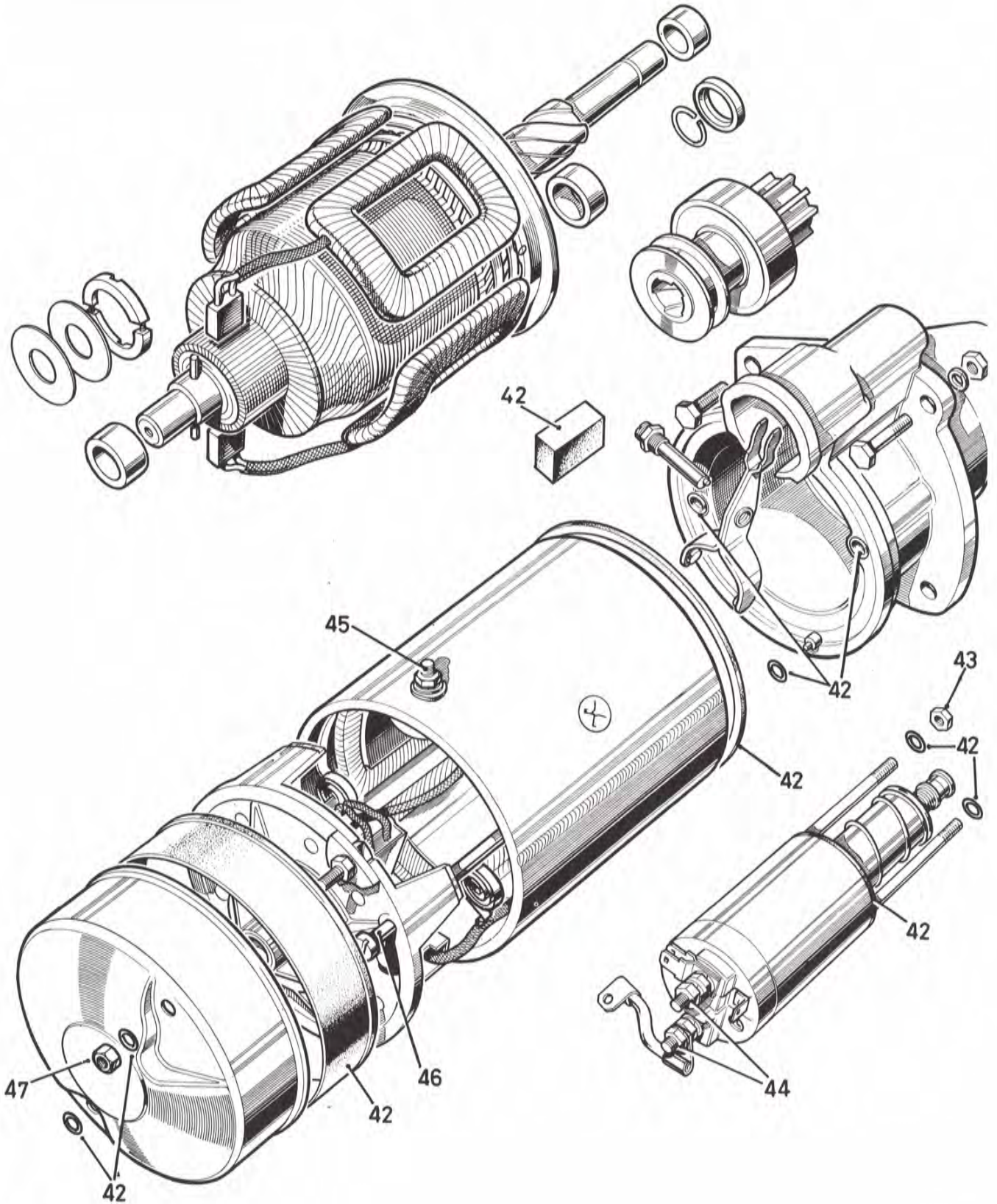
1RC859

## DATA

### Starter motor

Brush spring pressure  
Brush minimum length

1,2 kg (42 oz.)  
8,0 mm (0.312)



IRC 858



## ELECTRICAL EQUIPMENT

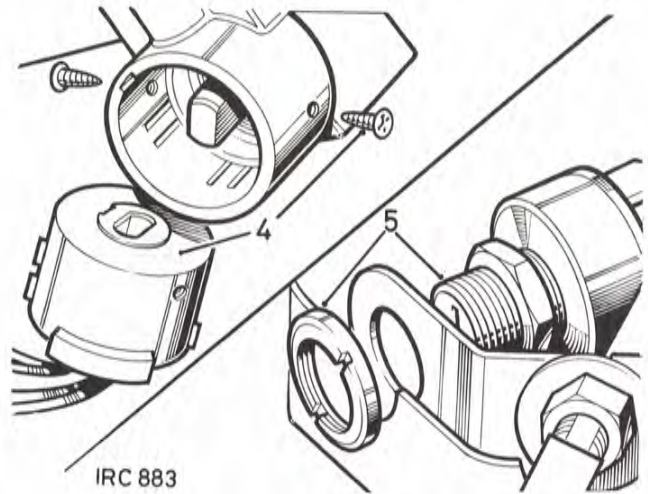
### IGNITION STARTER SWITCH

—Remove and refit

86.65.02

#### Removing

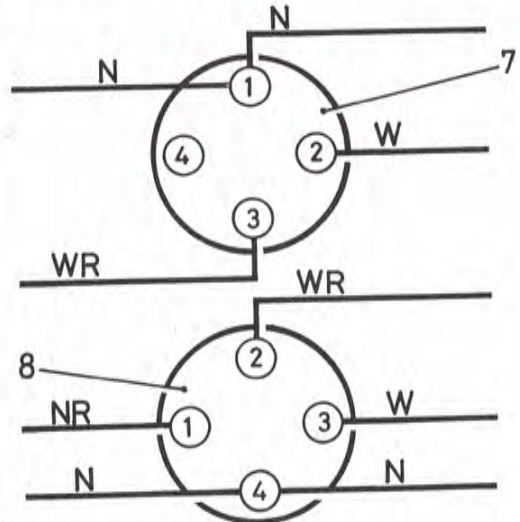
1. Disconnect the battery earth lead.
2. Remove The upper half of the switch shroud from the steering column.
3. Disconnect the leads from the ignition switch.
4. Models fitted with a steering column lock—Remove the screw locating the switch in the housing and withdraw the switch.
5. Models not fitted with a steering column lock—Unscrew the locking ring and withdraw the switch.



IRC 883

#### Refitting

6. Reverse 1 to 5, connecting the switch leads as follows.
  7. Petrol engines as illustrated.
  8. Diesel engines as illustrated.
- Lead colours    N—Brown  
                  R—Red  
                  W—White



### LIGHTING SWITCH

—Remove and refit

86.65.10

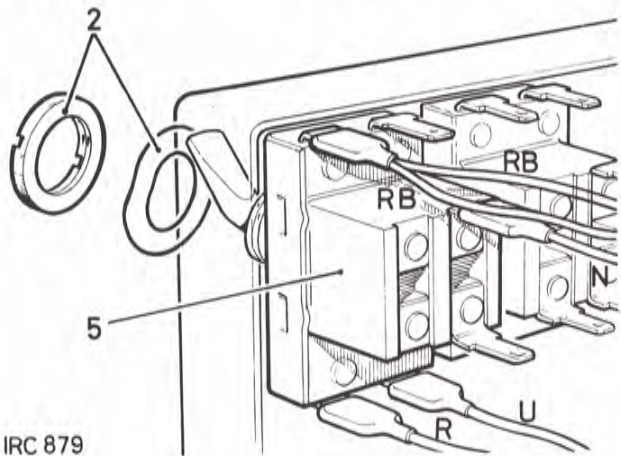
#### Removing

1. Disconnect the battery earth lead.
2. Unscrew the locking and wave washer from the switch knob.
3. Withdraw the instrument panel clear of the dash. 88.20.01. (items 1 to 5).
4. Disconnect the leads from the back of the switch.
5. Withdraw the lighting switch.

#### Refitting

6. Reverse 1 to 5
- Lead colours    R—Red  
                  B—Black  
                  N—Brown  
                  U—Blue

IRC 884



IRC 879

## PANEL LIGHT SWITCH

-Remove and refit

86.65.12

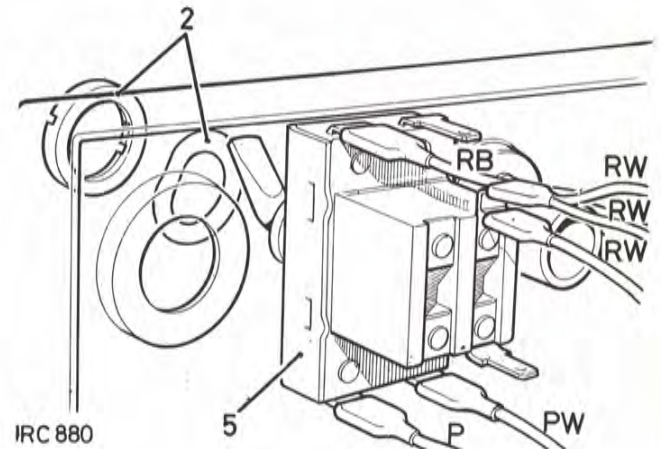
**NOTE:** The following instructions also apply to models fitted with a combined panel and interior light switch.

## Removing

1. Disconnect the battery earth lead.
2. Unscrew the locking ring and wave washer from the switch knob.
3. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
4. Disconnect the leads from the back of the switch.
5. Withdraw the panel light switch.

## Refitting

6. Reverse 1 to 5.  
Lead colours  
B-Black  
P-Purple  
R-Red  
W-White



**NOTE:** Panel and interior light connections are illustrated.

## WINDSCREEN WIPER/WASHER SWITCH

-Remove and refit

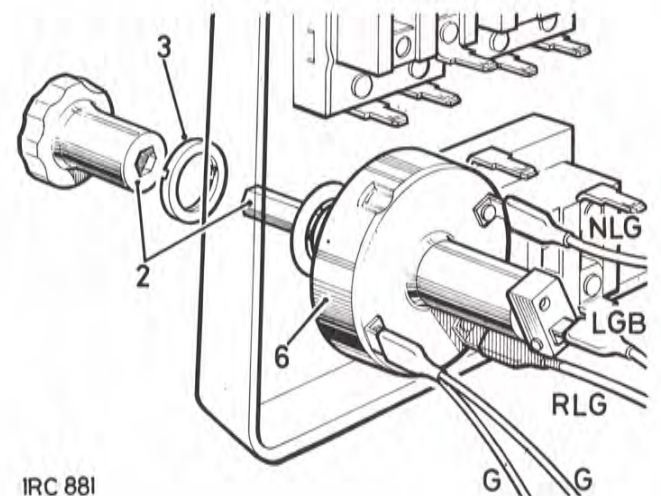
86.65.38

## Removing

1. Disconnect the battery earth lead.
2. Depress the plunger and withdraw the switch knob.
3. Unscrew the locking ring.
4. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
5. Disconnect the leads from the back of the switch.
6. Withdraw the windscreen wiper/washer switch.

## Refitting

7. Reverse 1 to 6.  
Lead colours  
G-Green  
R-Red  
B-Black  
N-Brown  
L-Light



## STOP LIGHT SWITCH

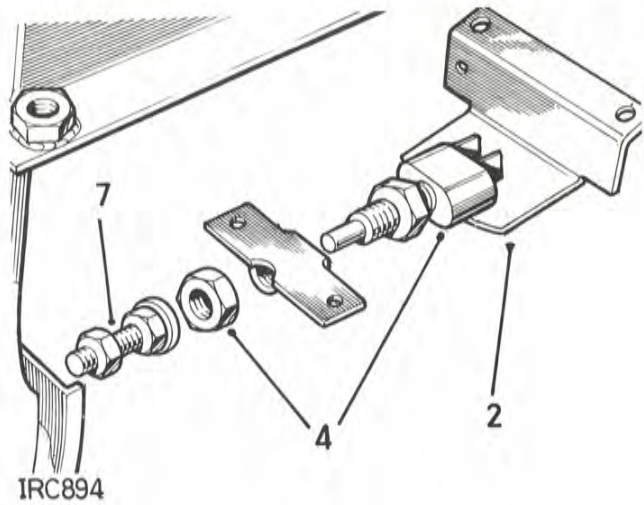
—Remove and refit

86.65.51

Non-servo models 1 to 7

### Removing

1. Disconnect the battery earth lead.
2. Remove the switch protection plate from the brake pedal bracket.
3. Disconnect the electrical leads from the switch.
4. Depress the brake pedal and remove the end stop from the switch and withdraw the switch from the mounting bracket.



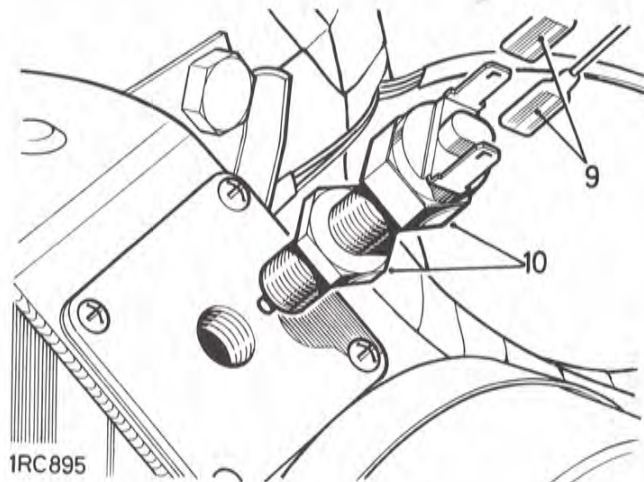
### Refitting

5. Reverse 1 to 4
6. Check the dimension between the lower edge of the brake pedal and the floor. The correct dimension is 158 mm (6.250 in.).
7. If necessary, set the brake pedal adjuster to give the correct dimension.

Servo-assisted models 8 to 12

### Removing

8. Disconnect the battery earth lead.
9. Disconnect the leads from the stop lamp switch.
10. Release the locknut and unscrew the switch from the brake pedal bracket.



### Refitting

11. Reverse 8 to 10.
12. Check, and if necessary adjust, the stop lamp switch to operate at 19 to 25 mm (0.750 to 1.000 in.) of pedal movement.

**CHOKE WARNING LIGHT SWITCH**

—Remove and refit

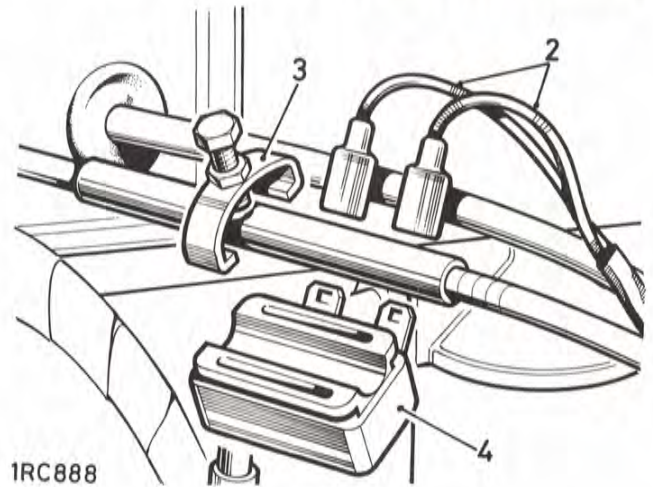
86.65.53

**Removing**

1. Disconnect the battery earth lead.
2. Disconnect the electrical leads from the switch.
3. Remove the clip securing the switch to the choke cable.
4. Remove the switch.

**Refitting**

5. Reverse 1 to 4.



1RC888

**COMBINED DIRECTION INDICATOR, HEADLIGHT AND HORN SWITCH**

—Remove and refit

86.65.55

**Removing**

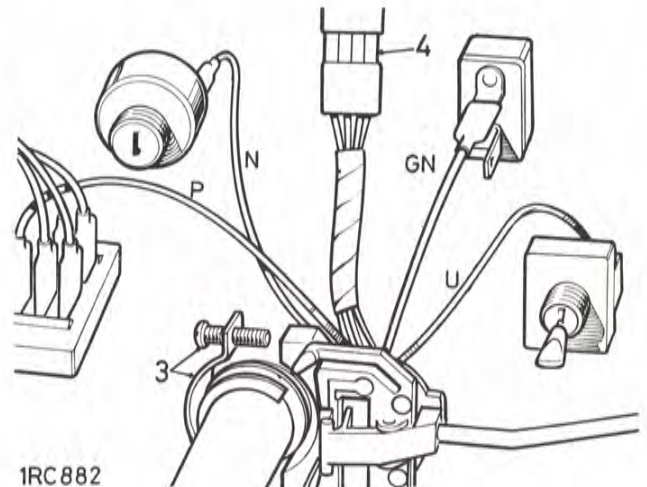
1. Disconnect the battery earth lead.
- 2.\*\* Remove the both halves of the switch shroud from the steering column.\*\*
3. Release the combined switch from the steering column.
4. Withdraw the combined switch sufficient to disconnect the main harness at the plug connector.
5. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5).
6. Disconnect the switch leads from the flasher unit, lighting switch, fuse box and ignition switch.
7. Withdraw the combined switch.

**Refitting**

8. Reverse 1 to 7.

Lead colours

G—Green
N—Brown
P—Purple
U—Blue



1RC882

## ELECTRICAL EQUIPMENT

### FUSE BOX

—Remove and refit

86.70.01

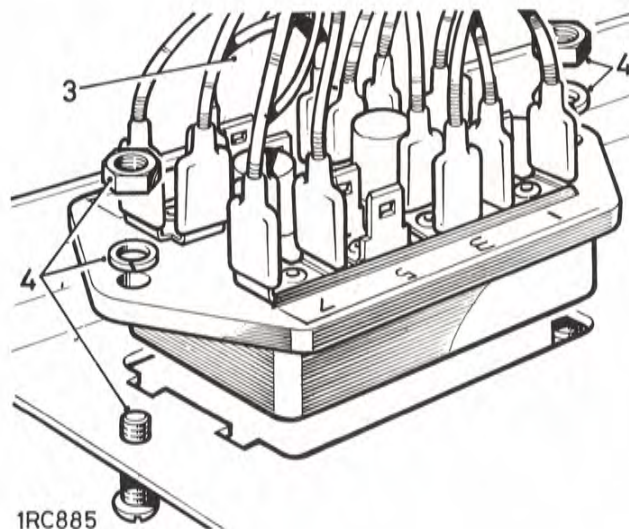
#### Removing

1. Disconnect the battery earth lead.
2. Remove the upper half of the switch shroud from the steering column.
3. Disconnect the leads from the fuse box.
4. Remove the fuse box.

#### Refitting

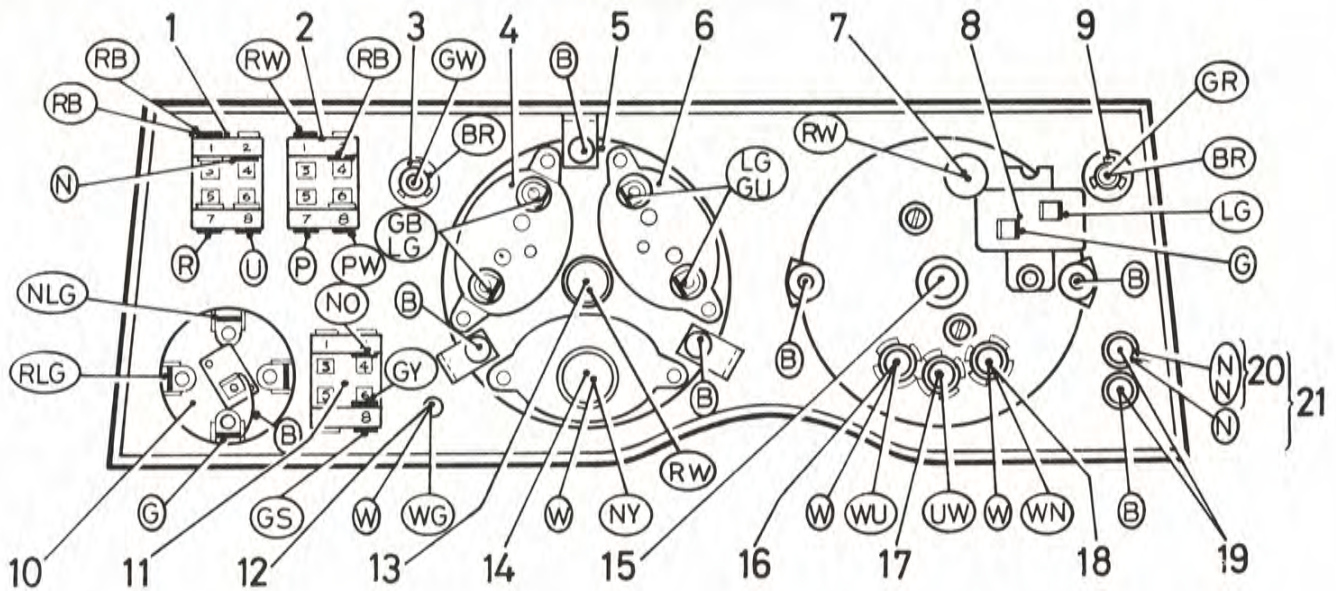
5. Reverse 1 to 4 connecting the leads in accordance with the applicable circuit diagram.

**NOTE:** The fuses should all be 35 amp.









1RC 860

**Key to view of instrument panel and wiring**

- |  |   |
|--|---|
| 1. Lighting switch.  | 11. Heater switch (where fitted).             |
| 2. Panel light switch, also interior light switch on Station Wagon models. | 12. Fuel level warning light (Diesel models). |
| 3. R.H. turn indicator warning light.                                      | 13. Panel illumination light.                 |
| 4. Fuel contents gauge.  | 14. Battery charge warning light.             |
| 5. Grouped instruments.  | 15. Speedometer drive head.                   |
| 6. Coolant temperature gauge.  | 16. Cold start warning light.                 |
| 7. Panel illumination light.   | 17. Headlamp mainbeam warning light.          |
| 8. Instruments voltage stabilizer.   | 18. Oil pressure warning light.               |
| 9. L.H. turn indicator warning light.                                      | 19. Inspection lamp sockets.                  |
| 10. Wiper/washer switch.   | 20. Leads for Petrol models.                  |
|  | 21. Leads for Diesel models.                  |

**Key to electrical cable colours**

Where cables have two colour code letters, the first denotes the main colour and the latter denotes the tracer colour.

- |          |          |         |
|----------|----------|---------|
| B Black  | G Green  | R Red   |
| U Blue   | O Orange | S Slate |
| N Brown  | P Purple | W White |
| Y Yellow | D Dark   | L Light |



## INSTRUMENT PANEL

-Remove and refit

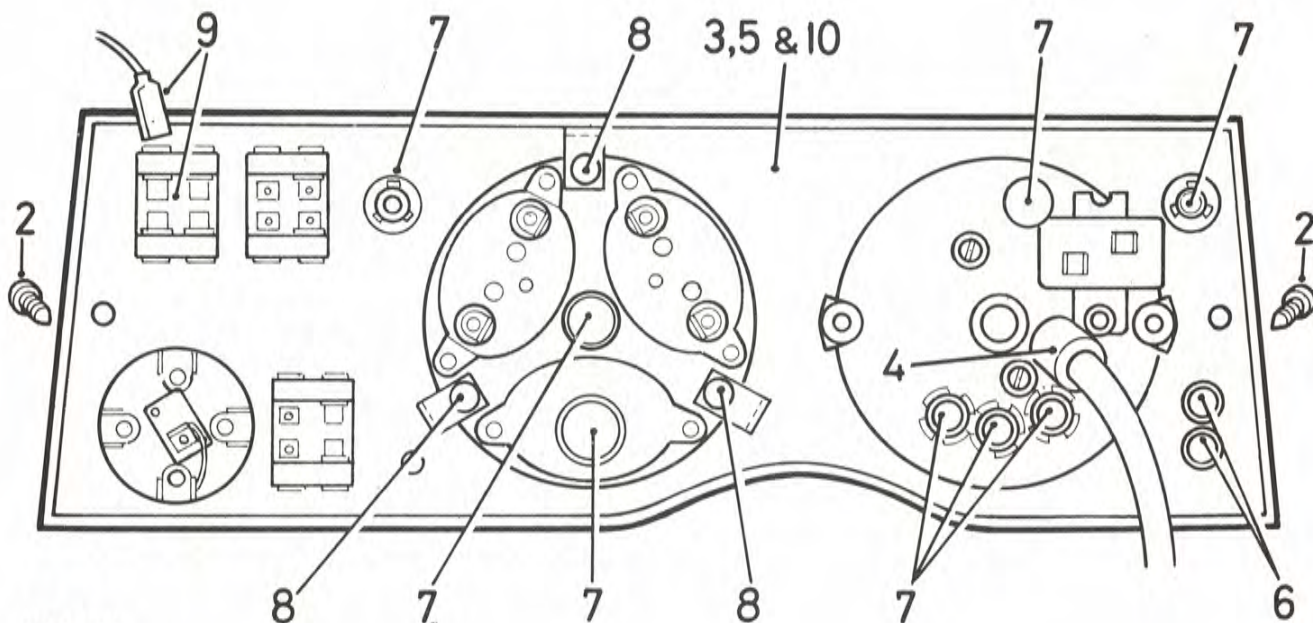
88.20.01

## Removing

1. Disconnect the battery earth lead.
2. Remove the instrument panel fixings.
3. Withdraw the instrument panel clear of the dash. If necessary, remove the steering wheel.
4. Depress the spring clip and withdraw the cable assembly from the speedometer.
5. Withdraw the instrument panel sufficient to gain access to the wiring connections.
6. Remove the inspection lamp socket leads.
7. Withdraw all warning and illumination lamp leads and bulbs complete with holders.
8. Disconnect the earth lead terminals at the knurled nuts on the grouped instrument.
9. Disconnect all 'Lucar' connectors.
10. Withdraw the instrument panel and instruments complete.

## Refitting

11. Reverse 1 to 10, refer as necessary to the wiring diagram on page 88.2



1RC863



## INSTRUMENTS

### VOLTAGE STABILIZER

—Remove and refit

88.20.26

#### Removing

1. Withdraw the instrument panel clear of the dash. 88.20.01 (items 1 to 5) and locate the voltage stabilizer (illustrated on page 88.2).
2. Disconnect the two 'Lucar' connectors.
3. Remove the fixing.
4. Withdraw the voltage stabilizer.

#### Refitting

5. Connect the electrical leads to the voltage stabilizer as follows:  
Green lead to terminal 'B'.  
Light green lead to terminal 'T'.
6. Reverse 1 to 4.

### OIL PRESSURE WARNING SWITCH

—Remove and refit

88.25.08

2.6 litre engine, 1 and 3 to 6

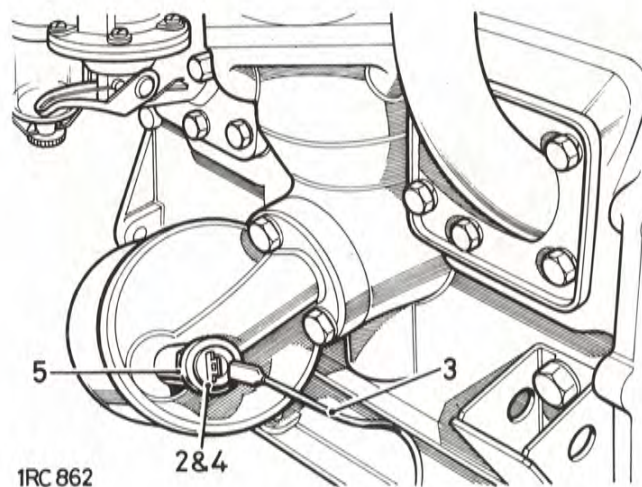
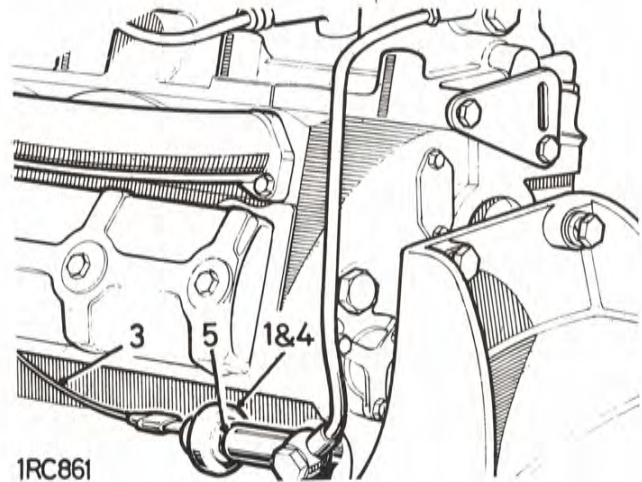
2¼ litre engine, 2 to 6

#### Removing

1. **2.6 litre engine.** Locate the switch at the lower end of the rocker oil feed pipe, rear L.H. side of the engine.
2. **2¼ litre engine.** Locate the switch at the oil filter, R.H. side of the engine.
3. Disconnect the electrical lead.
4. Unscrew the switch.
5. Withdraw the joint washer.

#### Refitting

6. Reverse 1 to 5 as applicable.



**COOLANT TEMPERATURE GAUGE**

—Remove and refit 88.25.14

**Removing**

1. Withdraw the instrument panel. 88.20.01. (Items 1 to 5) and locate the coolant temperature gauge (illustrated on page 88.2).
2. Remove the three knurled nuts at the grouped instrument clamp brackets.
3. Withdraw the three earth lead eyelets and shakeproof washers from the clamp studs.
4. Withdraw the grouped instrument clear of the instrument panel.
5. Disconnect the 'Lucar' connectors.
6. Remove the fixing screws and withdraw the coolant temperature gauge.

**Refitting**

7. Reverse 1 to 6. Fit the 'Lucar' connectors either way round.

**COOLANT TEMPERATURE TRANSMITTER**

—Remove and refit 88.25.20

**Removing**

1. Partly drain the engine coolant. 26.10.01.
2. Locate the transmitter at the cylinder head as follows:  
2.6 litre Petrol—at R.H. side forward of carburetter;  
2¼ litre Diesel—in adaptor at L.H. side rear, top;  
2¼ litre Petrol—in adaptor at R.H. side beneath thermostat housing.
3. Disconnect the electrical lead.
4. Remove the temperature transmitter.

**Refitting**

5. Reverse 1 to 4. Do not overtighten; check for coolant leakage after initial engine run.



## INSTRUMENTS

### FUEL CONTENTS GAUGE

—Remove and refit 88.25.26

#### Removing

1. Withdraw the instrument panel. 88.20.01. (items 1 to 5) and locate the fuel contents gauge (illustrated on page 88.2).
2. Remove the three knurled nuts at the grouped instrument clamp brackets.
3. Withdraw the three earth lead eyelets and shakeproof washers.
4. Withdraw the grouped instrument clear of the instrument panel.
5. Disconnect the 'Lucar' connectors.
6. Remove the fixing screws and withdraw the fuel contents gauge.

#### Refitting

7. Reverse 1 to 6. Fit the 'Lucar' connectors either way round.

### FUEL TANK GAUGE UNIT Rear mounted tank

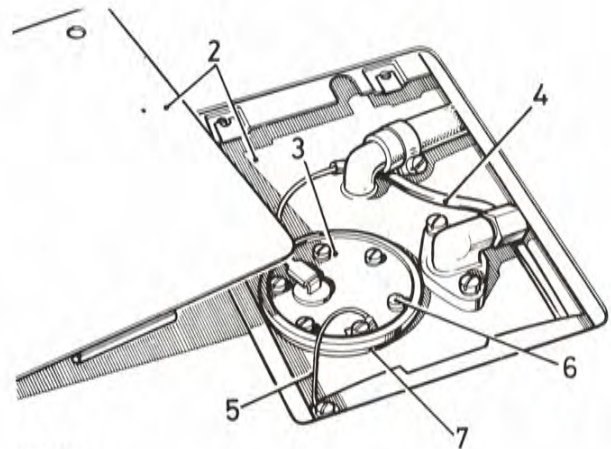
—Remove and refit 88.25.32

#### Removing

1. Disconnect the battery earth lead.
2. Remove the inspection cover in the rear floor.
3. Mark the gauge unit position in relation to the tank.
4. Disconnect the electrical feed lead.
5. Disconnect the earth lead at the gauge fixing.
6. Remove the remaining fixings and withdraw the gauge unit.

#### Refitting

7. Fit the gauge unit, using a suitable fuel resistant jointing compound ('Osotite' or similar) on the new joint washer.
8. Reverse 1 to 5.



IRC 864

## FUEL TANK GAUGE UNIT (Side mounted tank)

—Remove and refit

88.25.32.

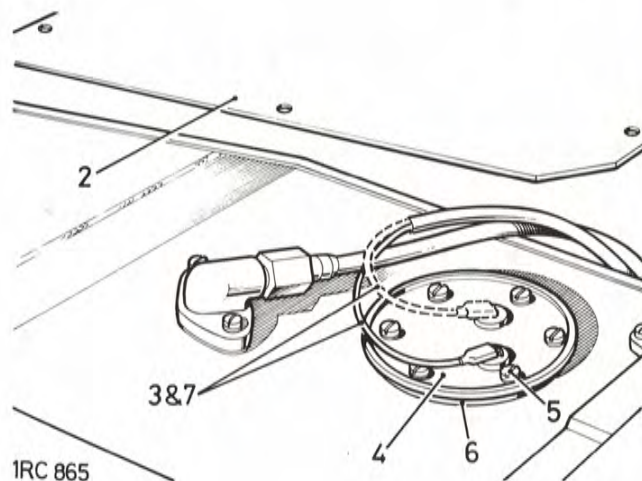
## Removing

1. Disconnect the battery earth lead.
2. Remove the R.H. seat cushion and tank cover panel.
3. Disconnect the electrical lead/s at the gauge unit.
4. Mark the gauge unit position in relation to the tank.
5. Remove the fixings and withdraw the gauge unit.

## (Side Mounted Tank)

## Refitting

6. Fit the gauge unit, using a suitable fuel resistant jointing compound ('Osotite' or similar) on the new joint washer.
7. Connect the electrical lead/s as follows:  
Green/black lead to connector T;  
White/green lead (vehicles with fuel level warning light only) to connector W;  
The gauge unit is earthed through the tank-to-chassis fixings.
8. Reverse 1 to 3.



## INSTRUMENTS

### SPEEDOMETER

—Remove and refit 88.30.01

#### Removing

1. Withdraw the instrument panel. 88.20.01 (items 1 to 5).
2. Remove the knurled nuts at the speedometer clamp brackets.
3. Withdraw the earth lead eyelets and shakeproof washers from the clamp studs.
4. Withdraw the speedometer clear of the instrument panel.
5. Withdraw the warning lamps and illumination lamp bulb holders and withdraw the speedometer.
6. Remove the voltage stabilizer from the speedometer.

#### Refitting

7. Reverse 1 to 6, referring to the illustration, page 88.2, if necessary, for warning lamp bulbs correct location.

### SPEEDOMETER CABLE

—Remove and refit

Cable complete, items 1, 2, 4, 5 and 6 88.30.06

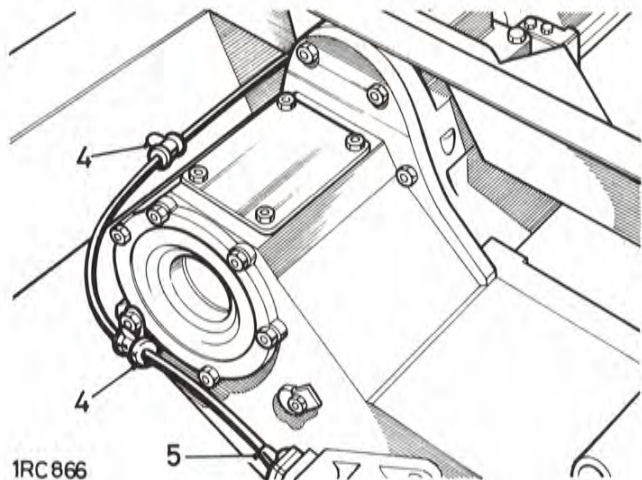
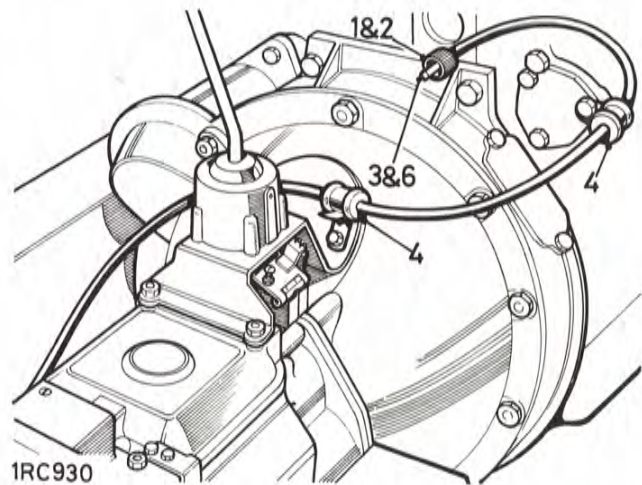
Inner cable, items 1, 2, 3 and 6 88.30.07

#### Removing

1. Withdraw the instrument panel and disconnect the speedometer cable. 88.20.01. (items 1 to 4).
2. Withdraw the speedometer cable end into the engine compartment.
3. Withdraw the inner cable from the outer.
4. Detach the speedometer cable grommets from the securing clips at the engine, flywheel housing, chassis sidemember and transfer gearbox.
5. Disconnect the cable at the gearbox.

#### Refitting

6. Reverse items 1 to 5 as applicable. When replacing the inner cable, grease sparingly with general purpose grease. Ensure that the inner cable is engaged in the drive slot at the gearbox.



All Service Tools mentioned in this  
Manual must be obtained direct from  
the tool manufacturers:

Messrs. V. L. Churchill & Co. Ltd.  
P.O. Box No. 3  
London Road,  
Daventry,  
Northants,  
England.





## SERVICE TOOLS LIST

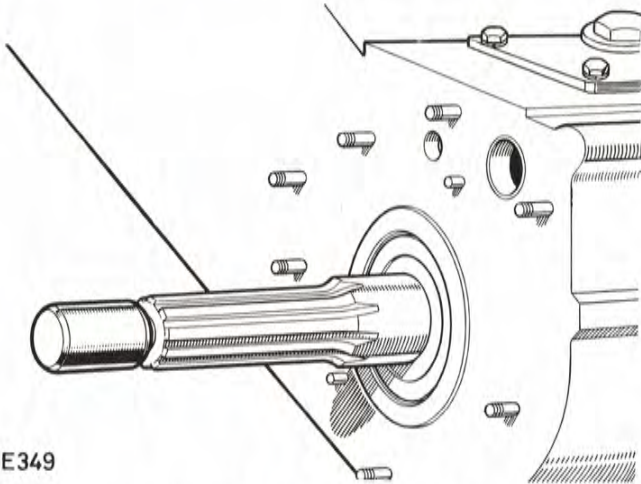
Tool Number	Description
243241	Protection cap for output shaft thread.
246650	Press block for cylinder liner.
261288	Jig block for cylinder boring.
262749	Extractor for rocker shafts.
262757	Extractor for differential pinion rear bearing (Rover type axles).
262758	Press block for pinion bearing (Rover type axles).
262771	Insertion tool for window filler strip.
270304	Guides for rear main bearing cap seals.
271482	Spanner for nozzle cap.
271483	Injector nozzle testing and setting outfit.
274389	Reamer for camshaft bearings.
274399	Extractor/replacer, injector shroud and push rod tube.
274400	Drift for inlet valve guide removal.
274401	Drift for exhaust valve guide removal.
275870	Remover/replacer, axle shaft retainer collar.
276102	Valve spring compressor.
278181	Tool for flushing injector nozzles.
278182	Adaptor for Pintaux injector.
507231	Extractor for chain wheel.
530101	Extractor for camshaft, gudgeon pin and tappet guide; puller for connecting rod bolts.
530102	Spanner for starter dog.
530105	Spanner for crownwheel locking nuts and differential pinion driving flange (Rover type axles).
530106	Multi-purpose bracket for dial gauge.
530625	Fitting tool for exhaust valve seat.
600000	Extractor for drop arm.
600300	Spanner for gearbox mainshaft nut.
600536	Compressing tool, relay spring.
600959	Fitting tool, exhaust valve guides.
600963	Engine lifting sling.
601508	Fitting tool, inlet valve guide.

*Continued -*



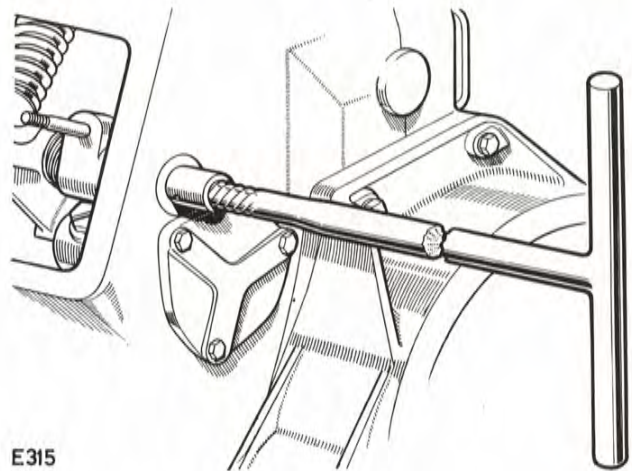
601763	Extractor for ball joints.
605002	Injector nozzle cleaning kit (less cleaning wire)
605003	Injector nozzle cleaning wire.
605004	Gauge for differential pinion setting (Rover type axles).
605022	Clutch plate alignment tool.
605052	Remover for engine plug, used when fitting an immersion heater.
605238	'Plastigage' for measuring bearing clearance.
605862	Extractor for intermediate shaft.
605863	Timing gauge for fuel distributor pump.
605975	Tool for camshaft bearing remove/refit (2¼ litre engines).
606435	Spanner for hub bearing nuts.
606445	Spanner for cylinder head bolts (Diesel engines)
18G47C	Screw press for bearing removal.
18G131C	Axle spreader.
18G191	Dial gauge, bracket and base.
18G1122	Screw press.
18G1205	Spanner for drive coupling.
S123A	Pinion bearing cup remover.
18G47BK	Pinion bearing cone remover/replacer.
18G47BL	Differential bearing remover.
18G1122G	Pinion bearing cup replacer.
18G134DP	Differential bearing replacer.
18G191P	Setting gauge for pinion height.
18G131F	Pegs for axle spreader.
R01008	Oil seal replacer.





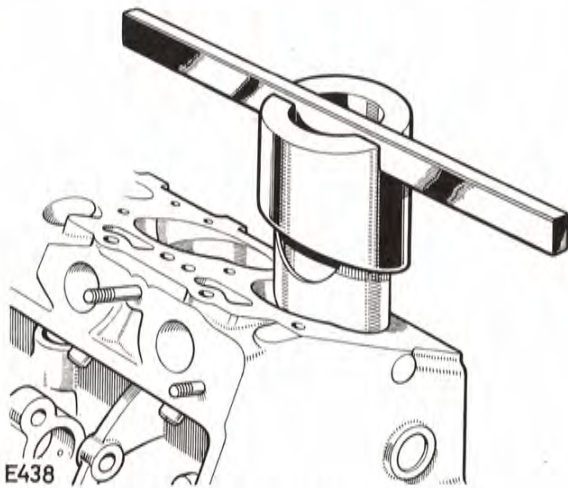
E349

243241 Protection cap, for gearbox output shaft



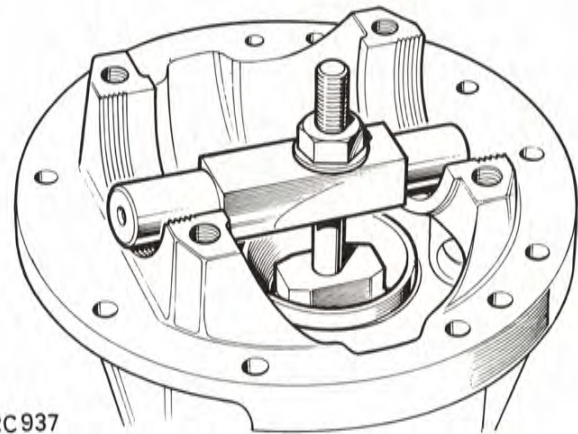
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262749 Extractor, rocker shafts



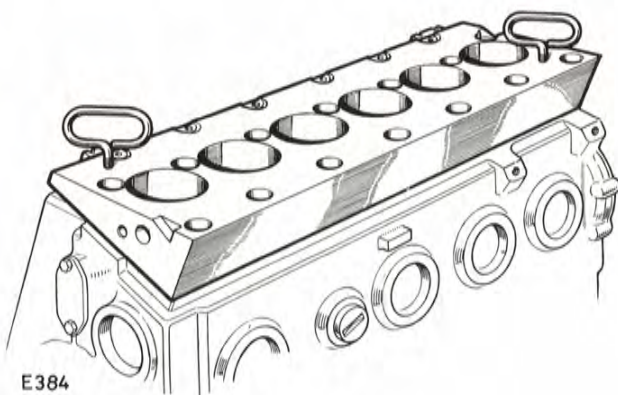
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246650 Cylinder liner press block



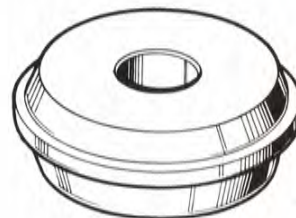
IRC937

262757 Pinion bearing extractor (Rover type axles)



E384

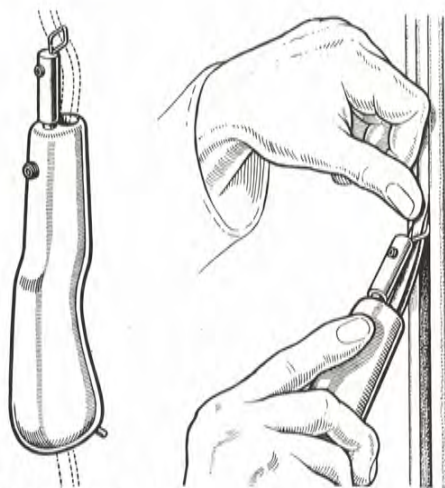
261288 Reboring jig block



IRC 939

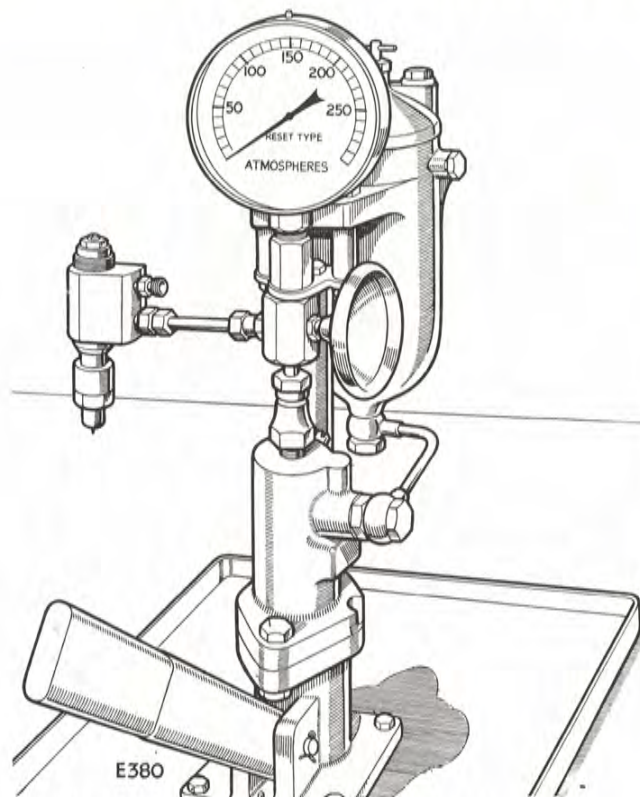
262758 Pinion bearing press block (Rover type axles)





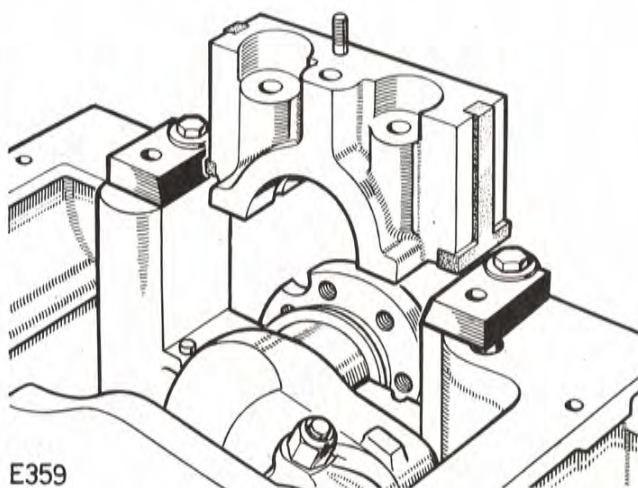
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262771 Filler strip tool



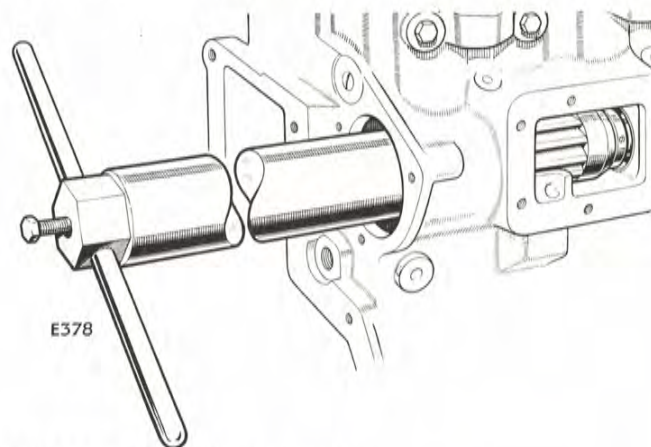
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271483 Injector nozzle testing and setting outfit



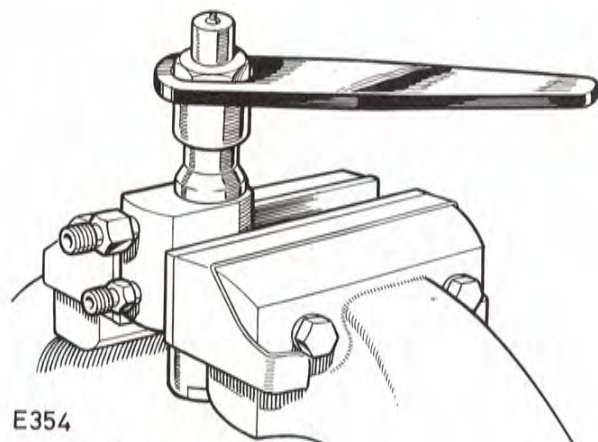
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270304 Guides for rear main bearing cap seals



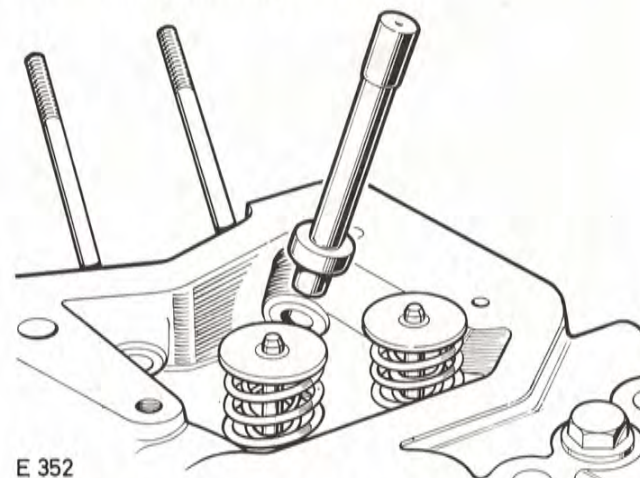
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274389 Camshaft bearing reamer



E354

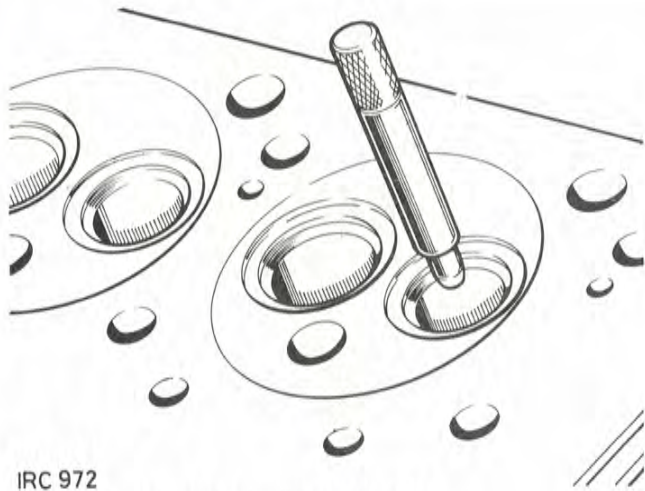
271482 Nozzle cap spanner



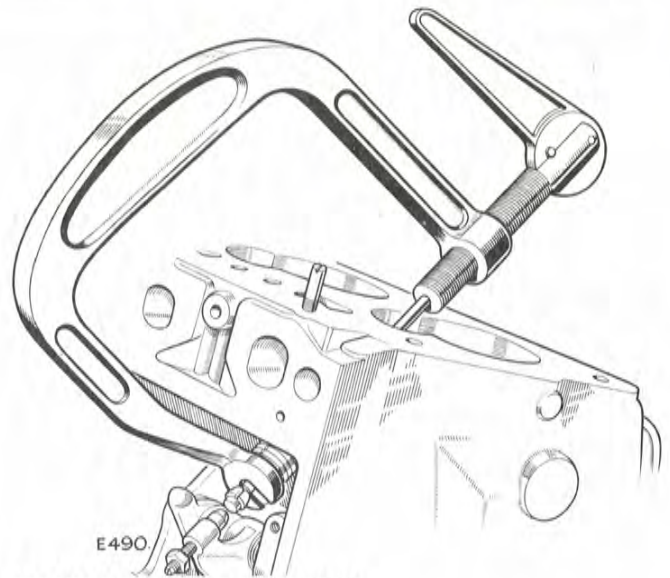
E 352

274399 Push rod tube extractor and injector shroud fitting tool

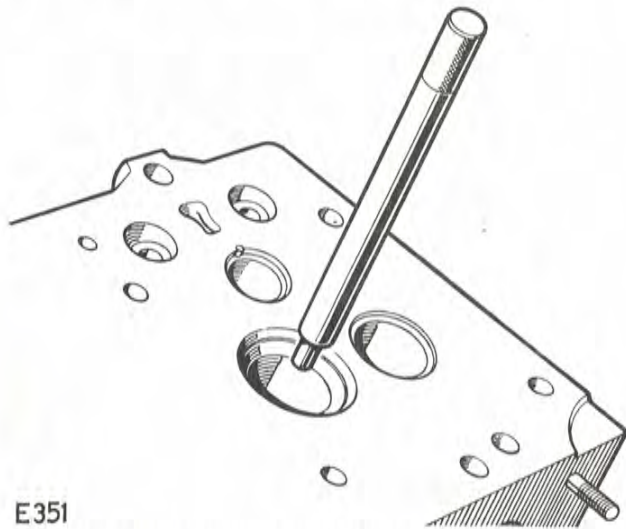




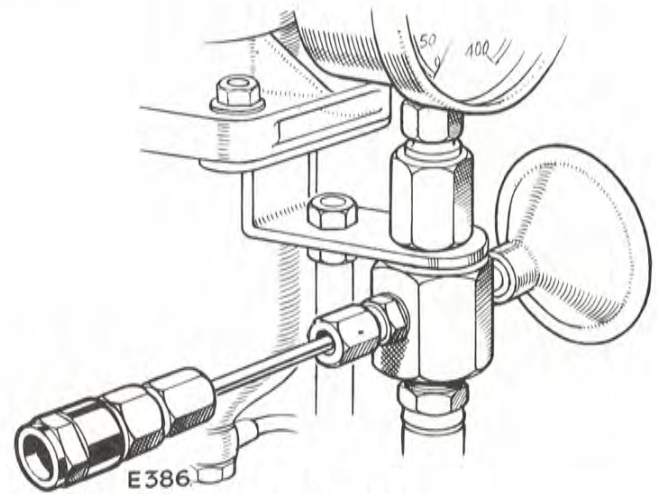
IRC 972  
274400 Valve guide removal drift, inlet



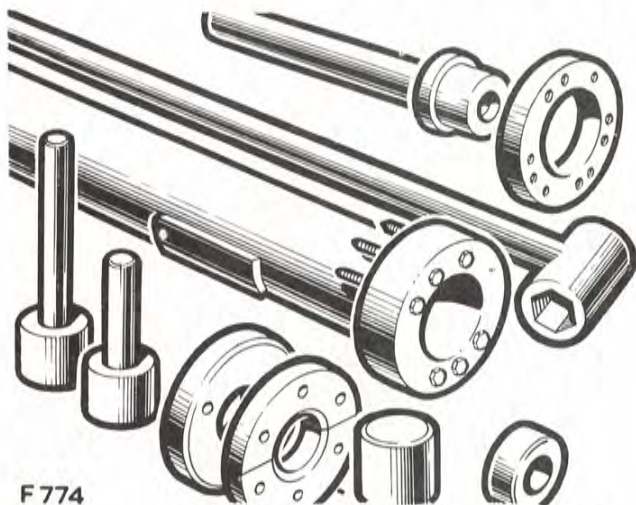
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276102 Valve spring compressor



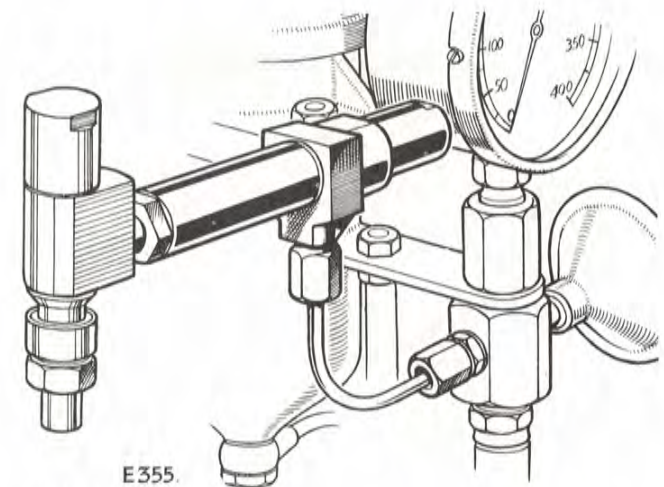
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274401 Valve guide removal drift, exhaust



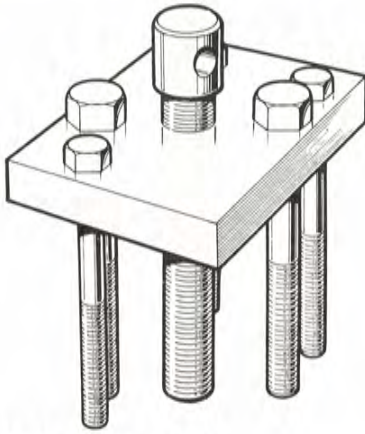
E386  
278181 Injector nozzle flushing tool



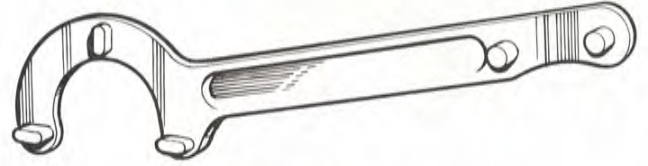
F 774  
275870 Axle shaft retaining collar removal and replacer tools



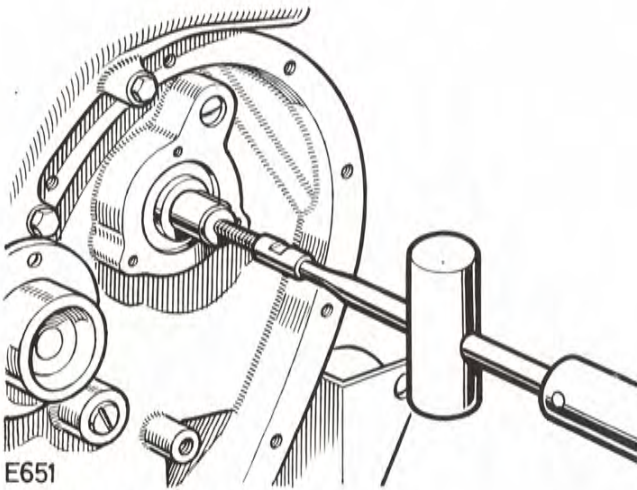
E355  
278182 Injector adaptor



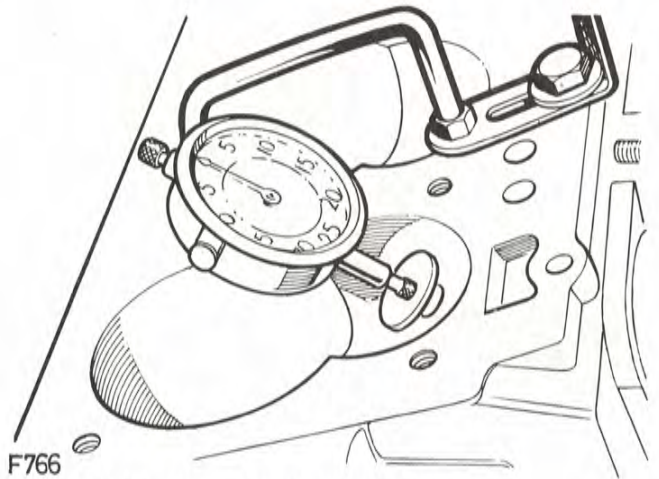
IRC 940  
507231 Extractor, chain wheel



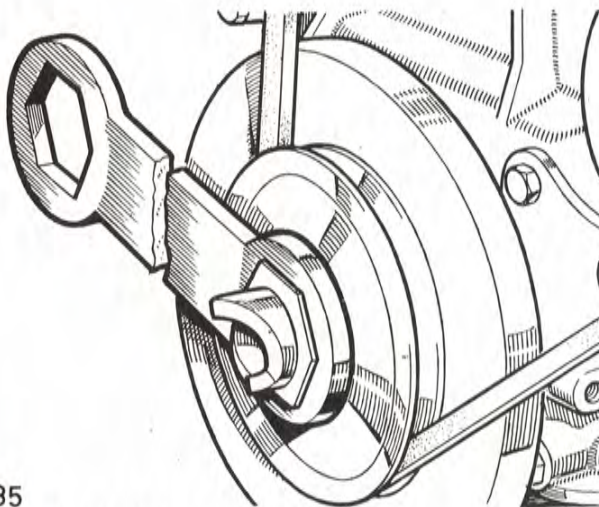
IRC 941  
530105 Spanner, crownwheel locking nuts  
(Rover type axles)



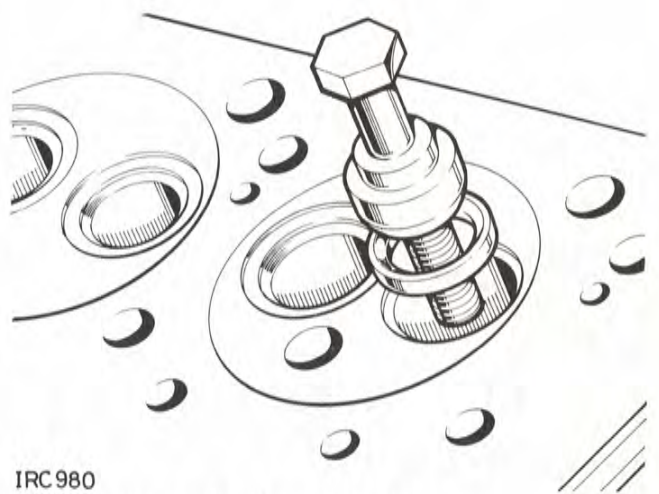
E651  
530101 Extractor and puller



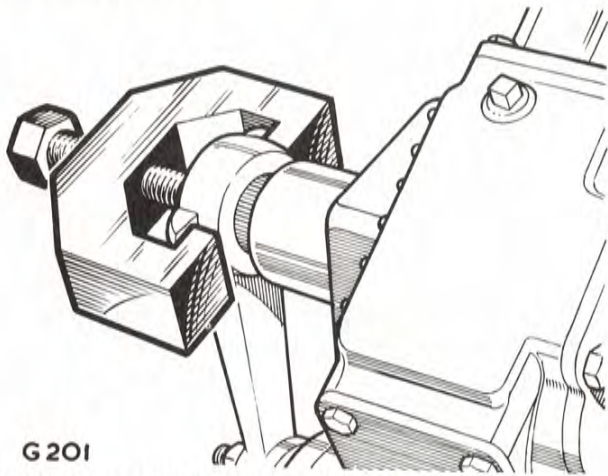
F766  
530106 Multi-purpose bracket for dial gauge.



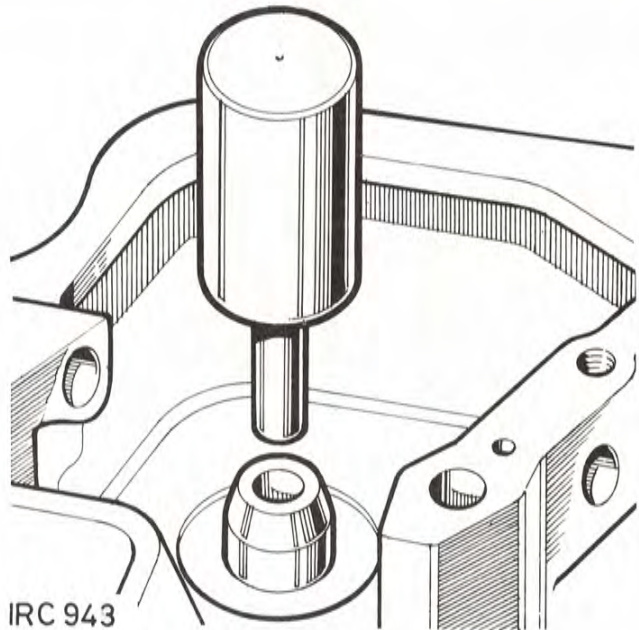
E635  
530102 Starter dog spanner



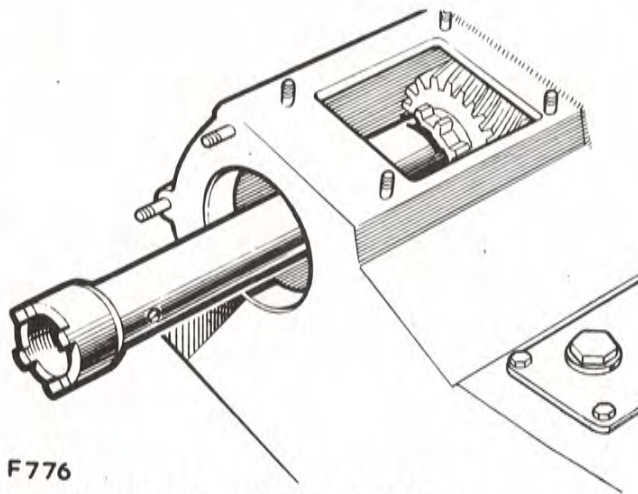
IRC980  
530625 Fitting tool, exhaust valve seat



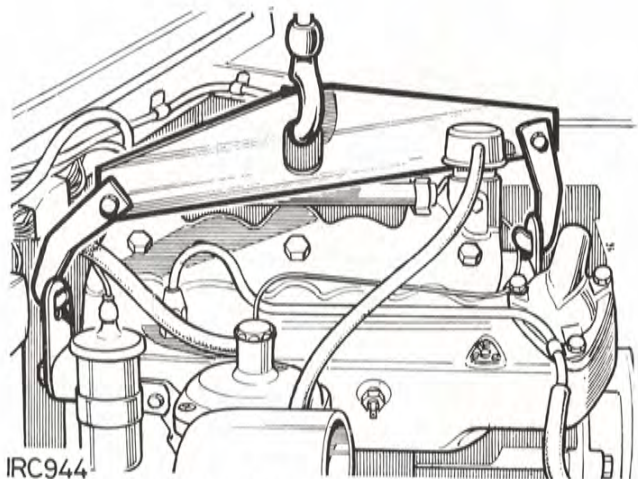
G 201  
600000 Extractor for steering drop arm



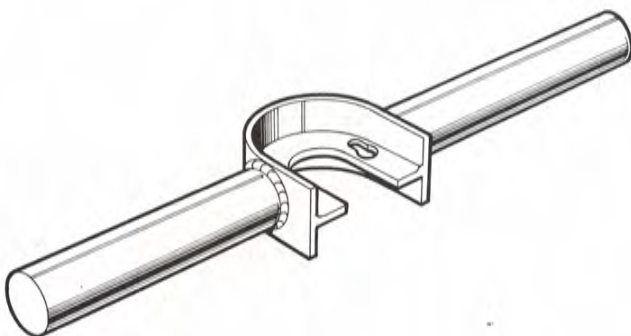
IRC 943  
600959 Fitting tool for exhaust valve guide



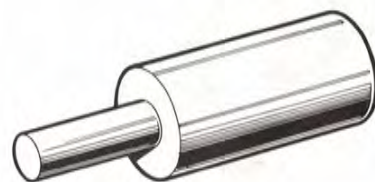
F 776  
600300 Spanner for gearbox mainshaft nut



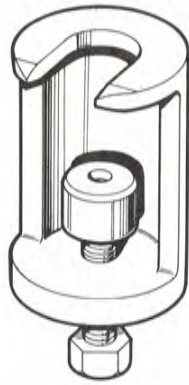
IRC 944  
600963 Engine lifting sling



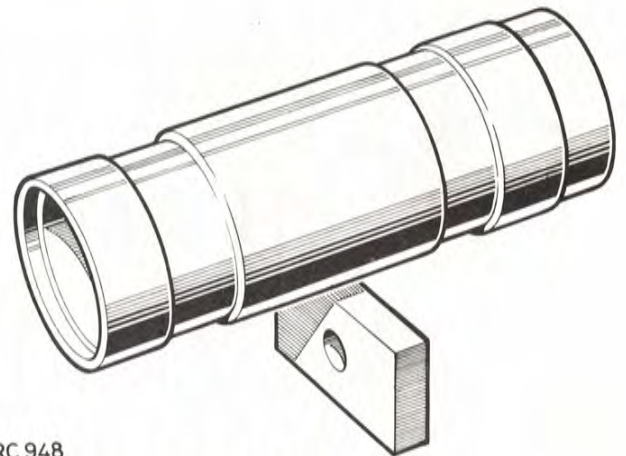
IRC 942  
600536 Tool for compressing steering relay spring



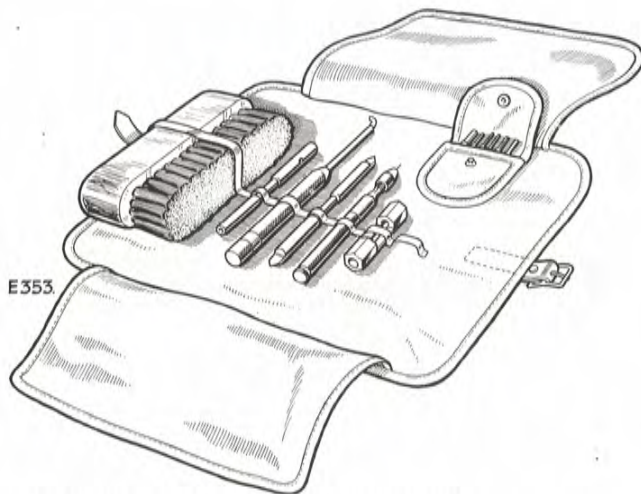
IRC 945  
601508 Fitting tool for inlet valve guides



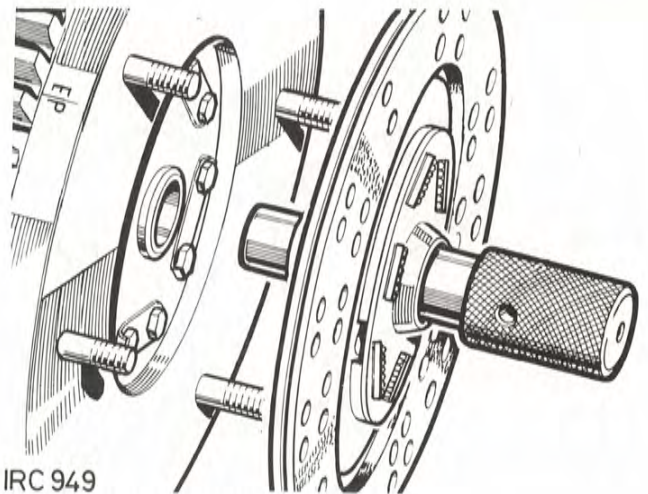
IRC 946  
601763 Extractor, steering ball joints



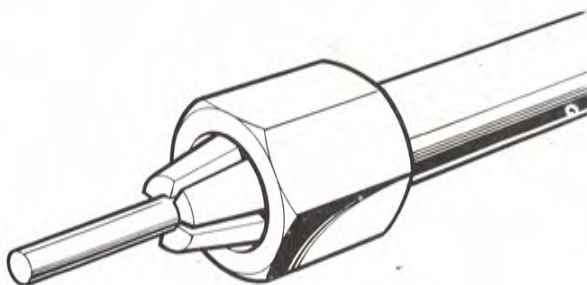
IRC 948  
605004 Gauge, differential pinion setting  
(Rover type axles)



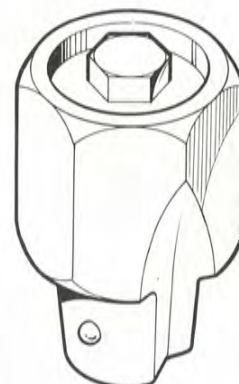
E353  
605002 Injector and nozzle cleaning outfit



IRC 949  
605022 Clutch plate alignment tool



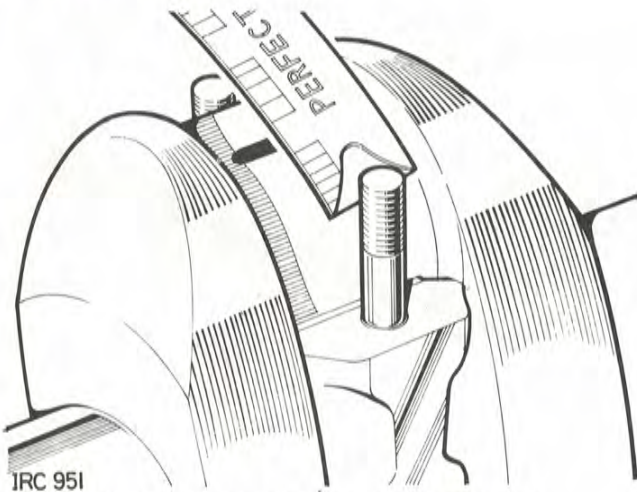
IRC 947  
605003 Injector nozzle cleaning wire



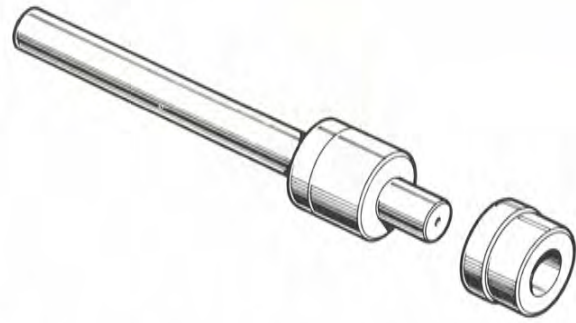
IRC 950  
605052 Removal tool for cylinder block plug (used when  
fitting immersion heater)



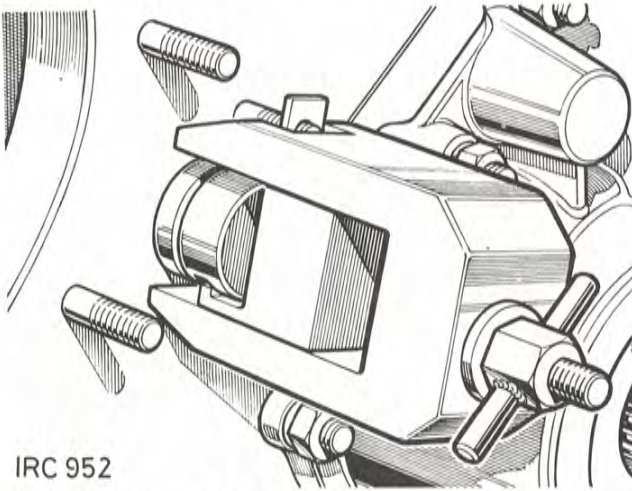
SERVICE TOOLS



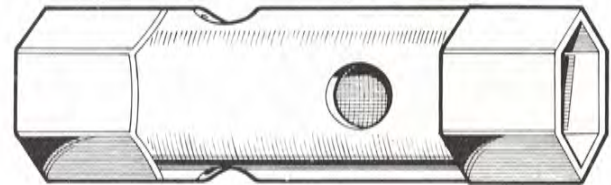
IRC 951  
605238 Plastigage for measuring bearing clearance



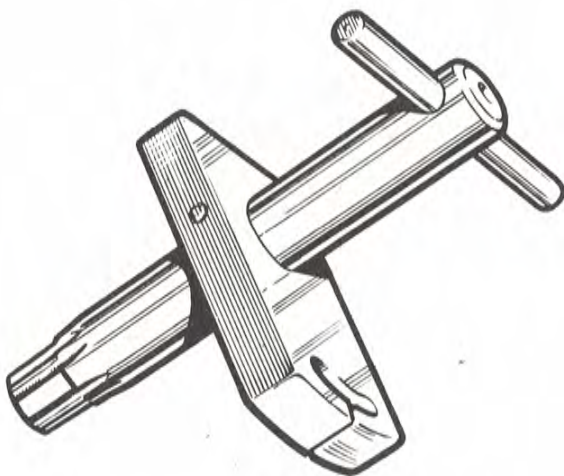
IRC 954  
605975 Tool for camshaft bearing remove/refit  
(2¼ litre engines)



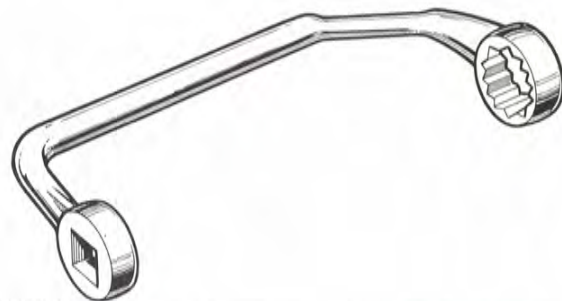
IRC 952  
605862 Extractor for transfer box intermediate shaft



IRC 956  
606435 Hub nut spanner

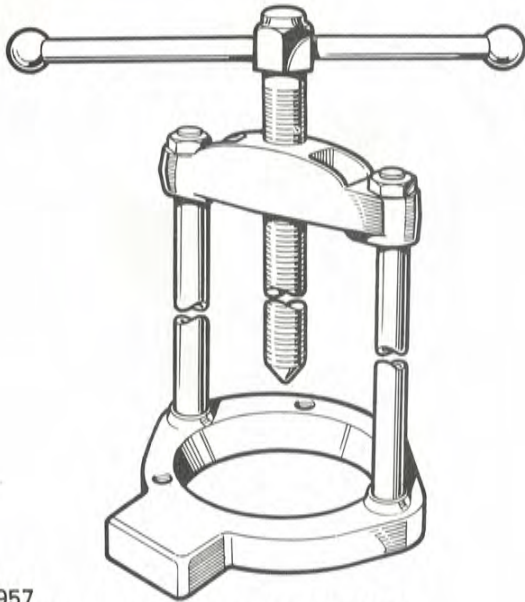


IRC 953  
605863 Timing gauge for distributor pump

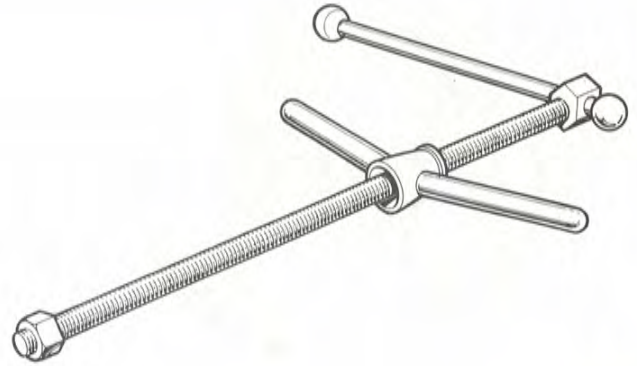


IRC 955  
606445 Spanner for Diesel engine cylinder head bolts

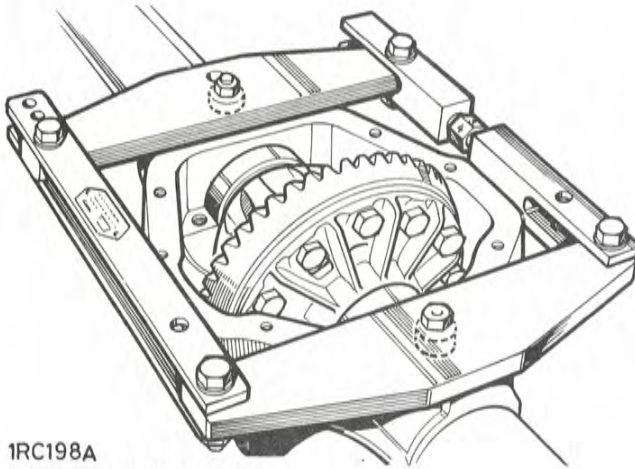




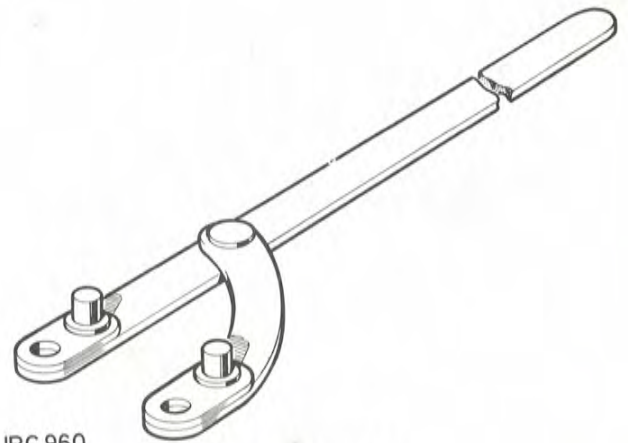
IRC 957  
18G47C Screw press for bearing extraction



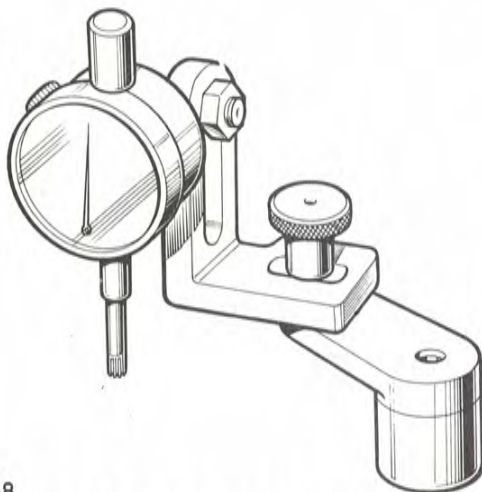
IRC 959  
18G1122 Screw press



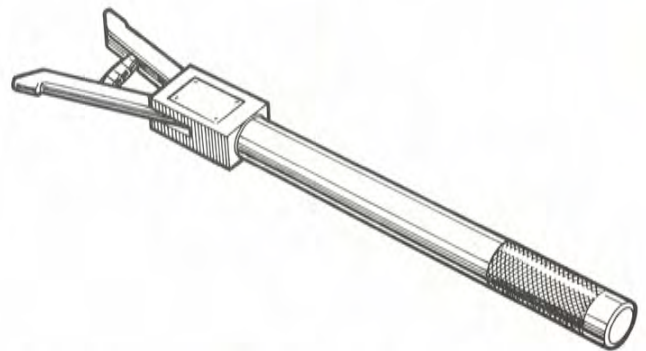
IRC198A  
18G131C Axle spreader



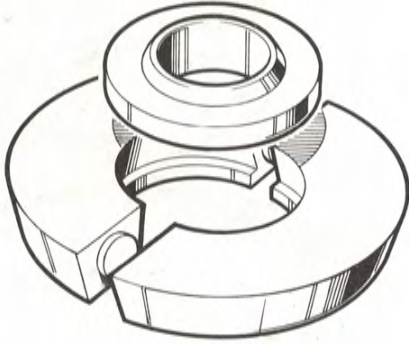
IRC 960  
18G1205 Spanner for drive coupling



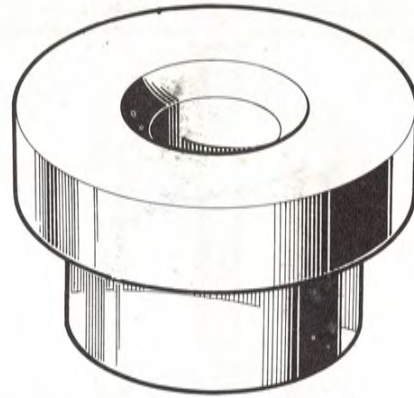
IRC 958  
18G191 Dial gauge, bracket and magnetized base



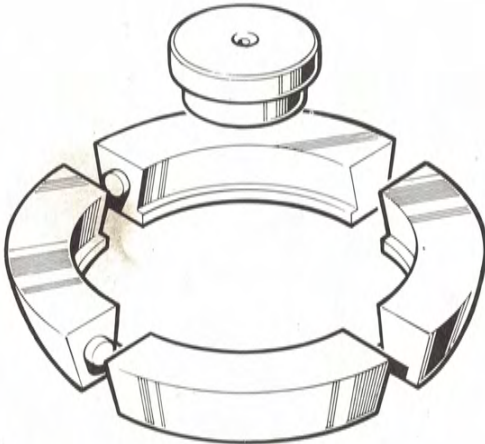
IRC 961  
S123A Pinion bearing cup remover



IRC 962  
18G47BK Pinion bearing remover/replacer



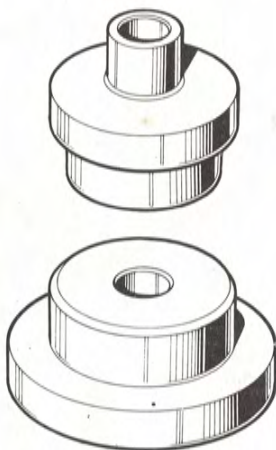
IRC 965  
18G134DP Differential bearing replacer



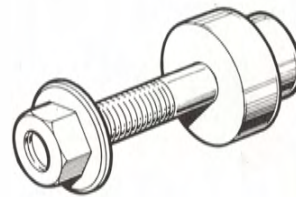
IRC 963  
18G47BL Differential bearing remover



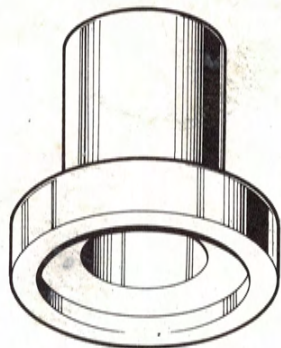
IRC 966  
18G191P Pinion height setting gauge



IRC 964  
18G1122G Pinion bearing cups replacer



IRC 967  
18G131F Pegs for axle spreader 18G131C



IRC 968

R01008 Oil seal replacer

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Operation Repair Manual  
Part No. 607314  
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