



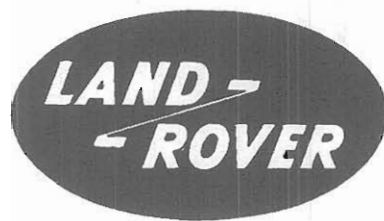
BY APPOINTMENT TO HER MAJESTY THE QUEEN  
B.L. CARS LIMITED - BIRMINGHAM  
MANUFACTURERS OF ROVER CARS, LAND-ROVERS  
RANGE ROVERS AND AUSTIN CARS



BY APPOINTMENT TO HER MAJESTY QUEEN ELIZABETH  
THE QUEEN MOTHER  
B.L. CARS LIMITED - COVENTRY AND BIRMINGHAM  
MANUFACTURERS OF DAIMLER, JAGUAR AND ROVER CARS  
AND LAND ROVERS



BY APPOINTMENT  
TO HRH THE PRINCE OF WALES  
LAND ROVER LIMITED - SOLIHULL  
MANUFACTURERS OF MOTOR VEHICLES



# LAND ROVER V8

## REPAIR OPERATION MANUAL SUPPLEMENT

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**INTRODUCTION**

This supplement details the specification and operations relating to Land-Rover V8 vehicles. It is intended to be used with the current edition of the Land-Rover Series III Repair Operation Manual. When seeking information, reference should first be made to this supplement—failure to find the details required indicates that the Repair Operation Manual content is relevant.

**SPECIFICATION**

Purchasers are advised that the specification details set out in this Manual apply to a range of vehicles and not to any one. For the specification of a particular vehicle, purchasers should consult their Distributor or Dealer. The manufacturers reserve the right to vary their specifications with or without notice, and at such times and in such manner as they think fit. Major as well as minor changes may be involved in accordance with the manufacturer's policy of constant product improvement.

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**LOCATION OF VEHICLE IDENTIFICATION AND UNIT NUMBER**

**Chassis serial number**

The chassis serial number, together with the maximum vehicle weights, will be found on the inside of the engine bulkhead.

The chassis number is also stamped on the right-hand side of the chassis, adjacent to the front shock absorber.

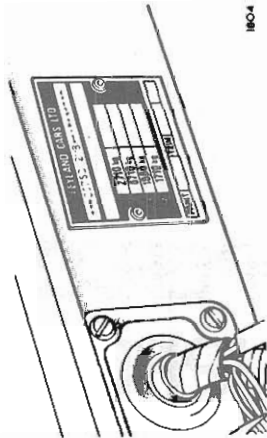
**Engine serial number**

The engine serial number is stamped on a cast pad on the cylinder block between numbers 3 and 5 cylinders.

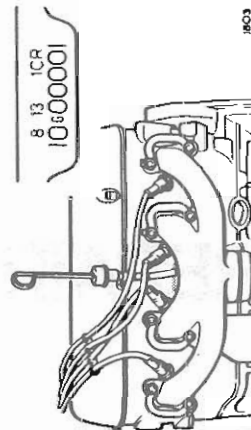
The gearbox serial number is stamped on the rear face of the transfer gearbox adjacent to the oil level filler plug.

The front axle serial number is stamped on the front face of the left-hand tube.

The rear axle serial number is stamped on the rear face of the left-hand tube.



1604



1603

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GENERAL SPECIFICATION DATA

<b>ENGINE</b>	V8
Type	Eight, two banks of four
Number of cylinders	88,90 mm (3.500 in)
Bore	71,12 mm (2.800 in)
Stroke	3528 cm <sup>3</sup> (215 in <sup>3</sup> )
Capacity	Overhead by push-rod
Valve operation	
<b>Crankshaft</b>	
Main journal diameter	58,400 to 58,413 mm (2.2992 to 2.2997 in)
Minimum regrind diameter	57,384 to 57,396 mm (2.2592 to 2.2597 in)
Crankpin journal diameter	50,800 to 50,812 mm (2.0000 to 2.0005 in)
Minimum regrind diameter	49,784 to 49,797 mm (1.9600 to 1.9605 in)
Crankshaft end thrust	Taken on thrust faces of centre main bearing
Crankshaft end-float	0,10 to 0,20 mm (0.004 to 0.008 in)
<b>Main bearings</b>	
Number and type	5, Vandervell shells
Material	Lead-indium
Diametrical clearance	0,023 to 0,065 mm (0.0009 to 0.0025 in)
Undersizes	0,254 mm, 0,508 mm (0.010 in, 0.020 in)
<b>Connecting rods</b>	
Type	Horizontally split, big-end, plain small-end
Length between centres	143,71 to 143,81 mm (5.658 to 5.662 in)
<b>Big-end bearings</b>	
Type and material	Vandervell VP lead-indium
Clearance on crankshaft	0,015 to 0,055 mm (0.0006 to 0.0022 in)
End-float on crankshaft	0,15 to 0,37 mm (0.006 to 0.014 in)
Undersizes	0,254 mm, 0,508 mm (0.010 in, 0.020 in)
<b>Gudgeon pins</b>	
Length	72,67 to 72,79 mm (2.861 to 2.866 in)
Diameter	22,215 to 22,222 mm (0.8746 to 0.8749 in)
Fit-in con rod	Press fit
Clearance in piston	0,002 to 0,007 mm (0.0001 to 0.0003 in)
<b>Pistons</b>	
Clearance in bore measured at bottom of skirt at right angles to gudgeon pin	0,018 to 0,033 mm (0.0007 to 0.0013 in)
<b>Piston rings</b>	
Number of compression	2
Number of oil	1
No. 1 compression ring	Chrome parallel faced
No. 2 compression ring	Stepped to 'L' shape and marked 'T' or 'TOP'
Width of compression rings	1,56 to 1,59 mm (0.0615 to 0.0625 in)
Compression ring gap	0,44 to 0,57 mm (0.017 to 0.022 in)
Oil ring type	Perfect circle, type 98-6
Oil ring width	4,811 mm (0.1894 in) max.
Oil ring gap	0,38 to 1,40 mm (0.015 to 0.055 in)

continued

<b>Camsshaft</b>	
Location	Central
Bearings	Non-serviceable
Timing chain	9,52 mm (0.375 in) pitch × 54 pitches
<b>Valves</b>	
Inlet:	
Overall length	116,58 to 117,34 mm (4.590 to 4.620 in)
Head diameter	39,75 to 40,00 mm (1.565 to 1.575 in)
Angle of face	45°
Stem diameter	8,640 to 8,666 mm (0.3402 to 0.3412 in) at the head and increasing to 8,653 to 8,679 mm (0.3407 to 0.3417 in)
Stem to guide clearance: Top	0,02 to 0,07 mm (0.001 to 0.003 in)
Bottom	0,013 to 0,063 mm (0.0005 to 0.0025 in)
Exhaust:	
Overall length	116,58 to 117,34 mm (4.590 to 4.620 in)
Head diameter	34,226 to 34,480 mm (1.3475 to 1.3575 in)
Angle of face	45°
Stem diameter	8,628 to 8,654 mm (0.3397 to 0.3407 in) at the head and increasing to 8,640 to 8,666 mm (0.3402 to 0.3412 in)
Stem to guide clearance: Top	0,038 to 0,088 mm (0.0015 to 0.0035 in)
Bottom	0,05 to 0,10 mm (0.002 to 0.004 in)
Valve lift (both valves)	9,9 mm (0.39 in)
Valve spring length	40,0 mm (1.577 in) at pressure of 30.16 to 33.34 kg (66.5 to 73.5 lb)
<b>Valve timing</b>	
Inlet opens	30° B.T.D.C.
Inlet closes	75° A.B.D.C.
Inlet duration	285°
Inlet peak	112.5° A.T.D.C.
Exhaust opens	68° B.B.D.C.
Exhaust closes	37° A.T.D.C.
Exhaust duration	285°
Exhaust peak	105.5° B.T.D.C.
<b>Lubrication</b>	
System	Wet sump, pressure fed
System pressure, engine warm at 2400 rev/min	2.1 to 2.8 kgf/cm <sup>2</sup> (30 to 40 lbf/in <sup>2</sup> )
Oil filter	Full-flow, self-contained cartridge
Oil pump type	Gear
Oil pressure relief valve:	
Type	Non-adjustable
Relief valve spring:	
Free length	81.2 mm (3.200 in)
Compressed length at 4.2 kg (9.3 lb) load	45.7 mm (1.800 in)
Oil filter by-pass valve:	
Type	Non-adjustable
By-pass valve spring:	
Free length	37.5 mm (1.48 in)
Compressed length at 0.34 kg (0.75 lb)	22.6 mm (0.89 in)

GENERAL SPECIFICATION DATA

FUEL SYSTEM

Fuel pump ..... Facet electrical 31 KNm<sup>2</sup> Press (static)  
 Carburettor: Type ..... Two Zenith Stromberg European and Australian markets: CDSSE

Needle

Air cleaner ..... Other markets: CDSI  
 Needle ..... Australian market: B/DW  
 with replaceable paper

Idle speed (engine hot) ..... European market: A.C.-Delco with replaceable paper element

Fast idle speed (engine cold) ..... Other markets: A.C.-Delco cyclone type with replaceable element  
 Mixture setting: CO level at idle ..... Australian market: 750 to 850 rev/min  
 Other markets: 725 ± 25 rev/min  
 1100 to 1300 rev/min  
 Australian market: 6% ± 1%  
 Other markets: 44%

CLUTCH

Make/type ..... Borg & Beck diaphragm type  
 Clutch plate diameter ..... 267.0 mm (10.5 in)  
 Facing material ..... H. K. Porter Thermoid 11046  
 Number of damper springs ..... 6  
 Damper spring colour ..... Light-grey/green  
 Clutch release bearing ..... Ball journal  
 Clutch fluid ..... Refer to Division 09

GEARBOX

Main gearbo<sup>x</sup> ..... Single helical constant mesh with synchromesh on all forward gears  
 Type ..... gears

Transfer box

Type ..... Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential

Gear ratios

Main gearbox: Top ..... Direct  
 Third ..... 1.505:1  
 Second ..... 2.448:1  
 First ..... 4.069:1  
 Reverse ..... 3.664:1  
 Transfer gearbox: High ..... 1.336:1  
 Low ..... 3.321:1  
 Overall ratio (final drive):  
 Top ..... In high transfer  
 Third ..... 4.73:1  
 Second ..... 7.12:1  
 First ..... 11.58:1  
 Reverse ..... 19.24:1  
 In low transfer  
 Third ..... 11.76:1  
 Second ..... 17.69:1  
 First ..... 28.78:1  
 Reverse ..... 47.81:1  
 43.05:1

PROPELLER SHAFTS

Type: Front ..... Saginaw joint (Double Hookes) plus Single Hookes joint each with 1310-type universal joints  
 Rear ..... Open type, 51 mm (2 in) diameter with 1310-type universal joint. Gaiter fitted to sliding coupling

GENERAL SPECIFICATION DATA

REAR AXLE

Type ..... Salisbury 8HA  
 Ratio ..... 3.54:1

FRONT AXLE

Type ..... Spiral bevel, enclosed constant velocity joints  
 Angularity of constant velocity joints on full lock ..... 32°  
 Ratio ..... 3.54:1

SUSPENSION

Type ..... Rigid axles, semi-elliptic springs

Springs

Front (Driver):  
 Length ..... 920.7 mm (36.25 in)  
 Width ..... 63.5 mm (2.5 in)  
 No. of leaves ..... 11  
 Thickness ..... 1 at 5.15 mm (0.203 in)  
 10 at 4.36 mm (0.172 in)  
 31.4 kg/cm (273 lb/in)  
 142.8 mm (5.625 in)  
 Rate .....  
 Free camber .....  
 Front (Passenger):  
 Length ..... 920.7 mm (36.25 in)  
 Width ..... 63.5 mm (2.5 in)  
 No. of leaves ..... 11  
 Thickness ..... 1 at 5.15 mm (0.203 in)  
 10 at 4.36 mm (0.172 in)  
 31.4 kg/cm (273 lb/in)  
 130.1 mm (5.125 in)  
 Rate .....  
 Free camber .....  
 Rear (Driver):  
 Length ..... 1219 mm (48 in)  
 Width ..... 63.5 mm (2.5 in)  
 No. of leaves ..... 10  
 Thickness ..... 1 at 6.3 mm (0.250 in.)  
 2 at 9.5 mm (0.375 in)  
 7 at 3.9 mm (0.156 in)  
 31.0 kg/cm (270 lb/in)  
 134.9 mm (5.310 in)  
 Rate .....  
 Free camber .....  
 Rear (Passenger):  
 Length ..... 1219 mm (48 in)  
 Width ..... 63.5 mm (2.5 in)  
 No. of leaves ..... 10  
 Thickness ..... 1 at 6.3 mm (0.250 in)  
 2 at 9.5 mm (0.375 in)  
 7 at 3.9 mm (0.156 in)  
 31.0 kg/cm (270 lb/in)  
 208.2 mm (8.200 in)  
 Rate .....  
 Free camber .....



**STEERING**

- Type ..... Burman recirculating ball, worm and nut
- Ratio ..... 15.6 : 1 straight ahead, 23.8 : 1 full lock
- Steering wheel diameter ..... 17 in
- Number of turns lock to lock ..... 3.3
- Wheel camber ..... 1° 30' Positive
- Wheel castor ..... 3°
- Swivel pin inclination ..... 7°
- Front wheel toe-out ..... 0.046 to 0.093 in (1.2 to 2.4 mm)
- Steering damper ..... Fitted to drag-link

**BRAKES**

- Type ..... Girling
- Footbrake ..... Hydraulic, servo assisted
- Brake drum diameter ..... 11 in (279.4 mm)
- Brake shoe width ..... Front 3 in (76.2 mm)  
Rear 2.25 in (57.1 mm)
- Frictional lining area ..... 222 in<sup>2</sup> (1432 cm<sup>2</sup>)
- Handbrake ..... Mechanical, Lockheed 7.25 in (184 mm) diameter, 3 in (76 mm) width, duo-servo drum brake on rear of transfer box

**APPROXIMATE DIMENSIONS and WEIGHTS**

	V8 Station Wagon		V8 Cab Truck	
	Metric	Imperial	Metric	Imperial
Overall length	4.58 m	180.3 in	4.44 m	174.8
Overall width	1.68 m	66.1 in	1.68 m	66.1
Overall height	2.0 m	78.7 in	1.99 m	78.3
Wheelbase	2.77 m	109.0 in	2.77 m	109.0
Track front and rear	1.33 m	52.3 in	1.33 m	52.3
Ground clearance under differential	209 mm	8.25 in	209 mm	8.25 in
Turning circle	14.3 m	47 ft	14.3 m	47 ft
Loading height — approximate	736 mm	29.5 in	812 mm	32 in
Maximum cargo height	1.9 m	74.8 in		
Kerb weight, with water, oil and 22.5 litres (5 gallons) of fuel				
10 seater	1809 kg	3988.12 lb	1601 kg	3529.5 lb
12 seater	1828 kg	4030 lb		
Gross vehicle weight	2710 kg	5974.5 lb	2710 kg	5974.5 lb
Gross combination weight	6710 kg	14792.2 lb	6710 kg	14792.2 lb
Permissible trailer loads:				
Fully braked	4000 kg	8818.4 lb	4000 kg	8818.4 lb
With over-run brakes	2000 kg	4409.2 lb	2000 kg	4409.2 lb
Without brakes	500 kg	1102.3 lb	500 kg	1102.3 lb
Maximum weight on towing attachment	75 kg	165.3 lb	75 kg	165.3 lb
Maximum roof rack load	50 kg	112 lb		

**WHEELS AND TYRES**

- Type of wheel ..... Ventilated disc
- Wheel size ..... 5.50 in F X 16 in
- No. of fixing studs ..... 5 per wheel — M16 X 1.5
- Tyre size ..... 7.50 X 16 in

**Tyre pressures**

CONDITIONS	Pressure Unit	LADEN		UNLADEN	
		Front	Rear	Front	Rear
Below 112 km/h (70 m.p.h.)	kgf/cm <sup>2</sup>	1.8	2.5	1.8	1.8
	lbf/in <sup>2</sup>	25	36	25	25
	bar	1.72	2.48	1.72	1.72
Over 112 km/h (70 m.p.h.)	kgf/cm <sup>2</sup>	2.24	3.02	2.24	2.24
	lbf/in <sup>2</sup>	32	42	32	32
	bar	2.2	3.0	2.2	2.2
Towing	kgf/cm <sup>2</sup>	2.24	3.02	2.24	2.24
	lbf/in <sup>2</sup>	32	42	32	32
	bar	2.2	3.0	2.2	2.2
Cross-country	kgf/cm <sup>2</sup>	1.1	1.8	1.1	1.8
	lbf/in <sup>2</sup>	15	26	15	26
	bar	1.03	1.79	1.03	1.79

NOTE: For mixed running conditions where 112 km/h (70 m.p.h.) may be exceeded, use higher tyre pressures

**Recommended tyres:**

SIZE	MAKE	TYPE
7.50 X 16	GOODYEAR HI-MILER	6 PLY RATING
7.50 X 16	AVON RANGER Mk II HS. NYLON	6 PLY RATING
7.50 X 16	MICHELIN XCM + S4	RADIAL PLY
7.50 X 16	MICHELIN XS	RADIAL PLY

GENERAL SPECIFICATION DATA

ELECTRICAL EQUIPMENT

System	12 volt, negative earth
<b>Battery</b>	
Make/type	Lucas C9
Capacity	60 A at 20-hour rate
Weight	Wet 52 lb, dry 40 lb (charged)
<b>Alternator</b>	
Type	Lucas 18ACR battery sensed
Nominal output	45 amps at 6000 alternator rev/min
Field resistance	3.2 ohms @ 20°C (68°F)
Brush spring pressure	255 to 368 gf (9 to 13 ozf)
Brush minimum length	8 mm (0.312 in)
Regulating voltage	13.6 to 14.4 volts
<b>Starter motor</b>	
Petrol models	
Make/type	Lucas 3M100 pre-engaged
Brush spring tension	1020 gf (36 ozf)
Brush minimum length	9.5 mm (0.375 in)
<b>Wiper motor</b>	
Make/type	Lucas 14W two-speed
Armature end-flot	0.05 to 0.25 mm (0.002 to 0.010 in)
Brush minimum length	4.8 mm (0.190 in)
Brush spring tension	150 to 250 gf (5.3 to 8 ozf)
Resistance of armature winding at 16°C (60°F)	0.23 to 0.35 ohms
measured between adjacent commutator segments	1.4 amps max.
Light running, rack disconnected, current at 13.5 V	
<b>Distributor</b>	For details refer to 'ENGINE TUNING DATA' 05-1
<b>Ignition system</b>	Ballasted coil, 7 volt, BA16C6
<b>Fuses</b>	2 X 35 amp, 2 X 17 amp, 2 spares
<b>Replacements bulbs and units</b>	Lucas 411, 12V 45/40W, Clear
Headlamps with bulbs	Lucas 54521872 60/45W
Headlamps with sealed beam units:	Lucas 54523079 60/50W
R. H. Sig.	Lucas 54522231 50/40W
L. H. Sig. Europe except France	Lucas 207, 12V 4W
L. H. Sig. except Europe	Lucas 380, 12V 21/5W
Sidelamps	Lucas 382, 12V 21W
Stop, tail lamps	Lucas 233, 12V 4W
Flasher lamps	Lucas 587, 12V 2.2W M.E.S.
Rear number plate lamp	Lucas 987, 12V 2.2W M.E.S.
Instrument panel lights	Lucas 280, 12V 1.5W
Warning lights	Lucas 281, 12V 2W
Warning light brakes	Lucas 382, 12V 21W
Warning light flashers	
Interior light	

ENGINE TUNING DATA

ENGINE

Type	V8
Capacity	3528 cm <sup>3</sup> (215 in <sup>3</sup> )
Compression ratio	8.13 : 1
Firing order	1—8—4—3—6—5—7—2
Cylinder numbering system, front to rear:	
Left bank	1—3—5—7
Right bank	2—4—6—8
Compression pressure (minimum)	9.5 kgf/cm <sup>2</sup> (135 lbf/in <sup>2</sup> )
Timing marks	On crankshaft pulley
Valve clearance	Not adjustable

CARBURETTORS

Type	Two Zenith Stromberg
European Australian	CDSE
Other markets	CDS3
Needle:	
Australian	BIDW
Other markets	BIEW
Idle speed (engine hot):	
Australian	750 to 850 rev/min
Other markets	725 ± 25 rev/min
Fast idle speed (engine cold)	1100 to 1300 rev/min
Mixture setting — CO at idle:	
Australian	6% ± 1%
Other markets	4.5%

IGNITION

Coil make/type	Lucas BA16 Cs with ballast resistor
Primary resistance at 20°C (68°F)	1.2 to 1.4 ohms
Consumption, ignition on, at 2000 rev/min	1 amp
Spark plug type	Champion N12Y or Unipart GSP 131
Spark plug gap	0.80 mm (0.030 in)
Distributor contact breaker gap	0.35 mm to 0.40 mm (0.014 to 0.016 in)
Dwell angle	26° to 28° at 550 to 650 rev/min
Ignition timing, dynamic: models with emission control	1° B.T.D.C. mark on crankshaft pulley — using 91 to 93 octane fuel — 2 star rating in U.K.
Ignition timing, dynamic: non-emission engines	6° B.T.D.C. at 650 rev/min maximum
Ignition timing, static: all models	T.D.C.
Maximum power—B.H.P.	90.7
Maximum power—PS	92
Maximum power—kW	67.7
Maximum torque	166.4 lbf ft (23 mkg) @ 2000 rev/min



**TORQUE WRENCH SETTINGS**

**REAR AXLE AND FINAL DRIVE**

	kgf cm	lbf ft
Hub driving flange bolts	4.2 to 5.2	30 to 38
Differential case bolts	9.1 to 10.4	66 to 75
Crown wheel 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
Stub axle bolts	4.2 to 5.2	30 to 38

**FRONT AXLE AND FINAL DRIVE**

Hub driving flange bolts	4.2 to 5.2	30 to 38
Bevel pinion driving flange nut	11.75	85
Crown wheel bolts	6.3 to 7.6	45 to 55
Differential bearing cap bolts	7.0 to 8.9	50 to 65
Upper swivel pin bolts	7.0 to 8.9	50 to 65
Lower swivel pin nuts	7.0 to 8.9	50 to 65
Swivel seal retaining ring bolts	1.0 to 1.2	7 to 9
Stub axle bolts	4.2 to 5.2	30 to 38

**STEERING**

Steering wheel nut	5.4	40
Ball joint nuts	4.0	30
Ball joint clamp bolts	1.1 to 1.5	8.5 to 10.5
Relay end cover bolts	0.6 to 0.8	5.0 to 6.0
Relay lever pinch bolts	7.6	55
Steering box to support bracket bolts	7.0 to 8.5	50 to 60
Steering box to support bracket to chassis bolts	2.0	15
Steering box drop-arm nut	8.5 to 11.0	60 to 80
Road wheel nuts	10.3 to 11.7	75 to 85

**SUSPENSION**

Road spring 'U' bolts and nuts	9.5 to 11.0	70 to 80
Road spring shackle bolts and nuts	8.3 to 9.5	60 to 70

**BRAKES**

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 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
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
Brake anchor plate bolts	4.2 to 5.2	30 to 38

**ELECTRICAL EQUIPMENT**

Starter motor to engine bolts	4.0 to 4.9	30 to 35
Alternator shaft nut	3.5 to 4.0	25 to 30
Starter motor:		
Through-bolts	1.1	8.0
Solenoid fixing stud nut	0.6	4.5
Solenoid upper terminal nut	0.4	3.0
Reverse light switch	1.4 to 2.0	15 to 20

**WINDSCREEN WIPERS AND WASHERS**

Wiper blade drive adaptor bolts	0.34 (3.4 kgf cm)	2.5 (30 lbf in)
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**RECOMMENDED LUBRICANTS**

**RECOMMENDED SERVICE LUBRICANTS AND FLUIDS**

**RECOMMENDED LUBRICANTS AND FLUIDS — U.K.**

Capacities are specified separately, following these charts.

COMPONENT	UNIPART	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	SHELL	TEXACO
Engines and carburettor dashpots* Oil must meet B.C. Car specification CC/MC.	Unipart Super MultiGrade 15W/50	BP Super MultiGrade 20-50	Castrol GTX 15W/50	Duckhams Motor Oil 20W/50	Esso Motor Oil 10W/40	Mobil Super MultiGrade 15W/50	Finis Motor Oil 15W/40	Shell MultiGrade 15W/40	Texaco MultiGrade 15W/40
Water pumps, transfer pumps* Hydraulic wrench supply unit*	Unipart Super MultiGrade 15W/50	BP Super MultiGrade 20-50	Castrol GTX 15W/50	Duckhams Motor Oil 20W/50	Esso Motor Oil 10W/40	Mobil Super MultiGrade 15W/50	Finis Motor Oil 15W/40	Shell MultiGrade 15W/40	Texaco MultiGrade 15W/40
Final drive units Speed reducers Differential (Front and Rear) Rear power take-off Rear power take-off Hydraulic wrench gearbox	Unipart Super MultiGrade 15W/50	BP Super MultiGrade 20-50	Castrol GTX 15W/50	Duckhams Motor Oil 20W/50	Esso Motor Oil 10W/40	Mobil Super MultiGrade 15W/50	Finis Motor Oil 15W/40	Shell MultiGrade 15W/40	Texaco MultiGrade 15W/40
Substitution nipples (air ports, hub, propeller shaft)		BP Energy L3	Castrol LM/Grease	Duckhams L3 10	Esso Multi- Purpose Grease H	Mobilgrease VIP	Finis Nylon HTL 1	Shell Retrax-A	Mobil All-purpose Grease
<b>FUEL AND FLUIDS</b>	91 to 93 Research Octane Fuel, 2-star grade in the United Kingdom.								
Windscreen washers	Unipart All Seasons Screen Washer Fluid.								
Brake and clutch reservoir	Unipart Universal Brake Fluid or other brake fluids having a minimum boiling point of 230°C (437°F) and complying with FMVSS 116 DOT 4 or S.A.E. J 1703 specification.								
Anti-freeze solution for engine cooling system	Use Unipart Universal Anti-freeze. If this is not available use an ethylene glycol based anti-freeze (suitability for vehicles) with non-phosphate corrosion inhibitor suitable for use in aluminium engines to ensure the protection of the cooling system against flow and corrosion. <b>CAUTION:</b> No other 'Universal' anti-freeze should be used with Unipart Universal Anti-freeze.								
Inhibitor solution for engine cooling system	Maxima Lubricants SQ38 — Corrosion inhibitor concentrate. For summer use only when frost precautions are not necessary.								
	*Unipart Super MultiGrade Motor Oil is recommended for these applications.								

**RECOMMENDED LUBRICANTS AND FLUIDS OTHER THAN U.K.**

Capacities are specified separately, following this chart.

Component	Service Classification		Ambient Temperature °C						
	Performance Level	S.A.E. Viscosity	-30	-20	-10	0	10	20	30
ENGINE AND CARBURETTOR DASHPOTS	Unipart Super MultiGrade Motor Oil or other oils conforming to SPECIFICATION BLS 22-90-02 OR The requirements of CC/MC or S.F./CC. S.F. 100, S.F. 102, S.F. 104, S.F. 106, S.F. 108, S.F. 110, S.F. 112, S.F. 114, S.F. 116, S.F. 118, S.F. 120, S.F. 122, S.F. 124, S.F. 126, S.F. 128, S.F. 130, S.F. 132, S.F. 134, S.F. 136, S.F. 138, S.F. 140, S.F. 142, S.F. 144, S.F. 146, S.F. 148, S.F. 150, S.F. 152, S.F. 154, S.F. 156, S.F. 158, S.F. 160, S.F. 162, S.F. 164, S.F. 166, S.F. 168, S.F. 170, S.F. 172, S.F. 174, S.F. 176, S.F. 178, S.F. 180, S.F. 182, S.F. 184, S.F. 186, S.F. 188, S.F. 190, S.F. 192, S.F. 194, S.F. 196, S.F. 198, S.F. 200, S.F. 202, S.F. 204, S.F. 206, S.F. 208, S.F. 210, S.F. 212, S.F. 214, S.F. 216, S.F. 218, S.F. 220, S.F. 222, S.F. 224, S.F. 226, S.F. 228, S.F. 230, S.F. 232, S.F. 234, S.F. 236, S.F. 238, S.F. 240, S.F. 242, S.F. 244, S.F. 246, S.F. 248, S.F. 250, S.F. 252, S.F. 254, S.F. 256, S.F. 258, S.F. 260, S.F. 262, S.F. 264, S.F. 266, S.F. 268, S.F. 270, S.F. 272, S.F. 274, S.F. 276, S.F. 278, S.F. 280, S.F. 282, S.F. 284, S.F. 286, S.F. 288, S.F. 290, S.F. 292, S.F. 294, S.F. 296, S.F. 298, S.F. 300, S.F. 302, S.F. 304, S.F. 306, S.F. 308, S.F. 310, S.F. 312, S.F. 314, S.F. 316, S.F. 318, S.F. 320, S.F. 322, S.F. 324, S.F. 326, S.F. 328, S.F. 330, S.F. 332, S.F. 334, S.F. 336, S.F. 338, S.F. 340, S.F. 342, S.F. 344, S.F. 346, S.F. 348, S.F. 350, S.F. 352, S.F. 354, S.F. 356, S.F. 358, S.F. 360, S.F. 362, S.F. 364, S.F. 366, S.F. 368, S.F. 370, S.F. 372, S.F. 374, S.F. 376, S.F. 378, S.F. 380, S.F. 382, S.F. 384, S.F. 386, S.F. 388, S.F. 390, S.F. 392, S.F. 394, S.F. 396, S.F. 398, S.F. 400, S.F. 402, S.F. 404, S.F. 406, S.F. 408, S.F. 410, S.F. 412, S.F. 414, S.F. 416, S.F. 418, S.F. 420, S.F. 422, S.F. 424, S.F. 426, S.F. 428, S.F. 430, S.F. 432, S.F. 434, S.F. 436, S.F. 438, S.F. 440, S.F. 442, S.F. 444, S.F. 446, S.F. 448, S.F. 450, S.F. 452, S.F. 454, S.F. 456, S.F. 458, S.F. 460, S.F. 462, S.F. 464, S.F. 466, S.F. 468, S.F. 470, S.F. 472, S.F. 474, S.F. 476, S.F. 478, S.F. 480, S.F. 482, S.F. 484, S.F. 486, S.F. 488, S.F. 490, S.F. 492, S.F. 494, S.F. 496, S.F. 498, 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S.F. 700, S.F. 702, S.F. 704, S.F. 706, S.F. 708, S.F. 710, S.F. 712, S.F. 714, S.F. 716, S.F. 718, S.F. 720, S.F. 722, S.F. 724, S.F. 726, S.F. 728, S.F. 730, S.F. 732, S.F. 734, S.F. 736, S.F. 738, S.F. 740, S.F. 742, S.F. 744, S.F. 746, S.F. 748, S.F. 750, S.F. 752, S.F. 754, S.F. 756, S.F. 758, S.F. 760, S.F. 762, S.F. 764, S.F. 766, S.F. 768, S.F. 770, S.F. 772, S.F. 774, S.F. 776, S.F. 778, S.F. 780, S.F. 782, S.F. 784, S.F. 786, S.F. 788, S.F. 790, S.F. 792, S.F. 794, S.F. 796, S.F. 798, S.F. 800, S.F. 802, S.F. 804, S.F. 806, S.F. 808, S.F. 810, S.F. 812, S.F. 814, S.F. 816, S.F. 818, S.F. 820, S.F. 822, S.F. 824, S.F. 826, S.F. 828, S.F. 830, S.F. 832, S.F. 834, S.F. 836, S.F. 838, S.F. 840, S.F. 842, S.F. 844, S.F. 846, S.F. 848, S.F. 850, S.F. 852, S.F. 854, S.F. 856, S.F. 858, S.F. 860, S.F. 862, S.F. 864, S.F. 866, S.F. 868, S.F. 870, S.F. 872, S.F. 874, S.F. 876, S.F. 878, S.F. 880, S.F. 882, S.F. 884, S.F. 886, S.F. 888, S.F. 890, S.F. 892, S.F. 894, S.F. 896, S.F. 898, S.F. 900, S.F. 902, S.F. 904, S.F. 906, S.F. 908, S.F. 910, S.F. 912, S.F. 914, S.F. 916, S.F. 918, S.F. 920, S.F. 922, S.F. 924, S.F. 926, S.F. 928, S.F. 930, S.F. 932, S.F. 934, S.F. 936, S.F. 938, S.F. 940, S.F. 942, S.F. 944, S.F. 946, S.F. 948, S.F. 950, S.F. 952, S.F. 954, S.F. 956, S.F. 958, S.F. 960, S.F. 962, S.F. 964, S.F. 966, S.F. 968, S.F. 970, S.F. 972, S.F. 974, S.F. 976, S.F. 978, S.F. 980, S.F. 982, S.F. 984, S.F. 986, S.F. 988, S.F. 990, S.F. 992, S.F. 994, S.F. 996, S.F. 998, S.F. 1000, S.F. 1002, S.F. 1004, S.F. 1006, S.F. 1008, S.F. 1010, S.F. 1012, S.F. 1014, S.F. 1016, S.F. 1018, S.F. 1020, S.F. 1022, S.F. 1024, S.F. 1026, S.F. 1028, S.F. 1030, S.F. 1032, S.F. 1034, S.F. 1036, S.F. 1038, S.F. 1040, S.F. 1042, S.F. 1044, S.F. 1046, S.F. 1048, S.F. 1050, S.F. 1052, S.F. 1054, S.F. 1056, S.F. 1058, S.F. 1060, S.F. 1062, S.F. 1064, S.F. 1066, S.F. 1068, S.F. 1070, S.F. 1072, S.F. 1074, S.F. 1076, S.F. 1078, S.F. 1080, S.F. 1082, S.F. 1084, S.F. 1086, S.F. 1088, S.F. 1090, S.F. 1092, S.F. 1094, S.F. 1096, S.F. 1098, S.F. 1100, S.F. 1102, S.F. 1104, S.F. 1106, S.F. 1108, S.F. 1110, S.F. 1112, S.F. 1114, S.F. 1116, S.F. 1118, S.F. 1120, S.F. 1122, S.F. 1124, S.F. 1126, S.F. 1128, S.F. 1130, S.F. 1132, S.F. 1134, S.F. 1136, S.F. 1138, S.F. 1140, S.F. 1142, S.F. 1144, S.F. 1146, S.F. 1148, S.F. 1150, S.F. 1152, S.F. 1154, S.F. 1156, S.F. 1158, S.F. 1160, S.F. 1162, S.F. 1164, S.F. 1166, S.F. 1168, S.F. 1170, S.F. 1172, S.F. 1174, S.F. 1176, S.F. 1178, S.F. 1180, S.F. 1182, S.F. 1184, S.F. 1186, S.F. 1188, S.F. 1190, S.F. 1192, S.F. 1194, S.F. 1196, S.F. 1198, S.F. 1200, S.F. 1202, S.F. 1204, S.F. 1206, S.F. 1208, S.F. 1210, S.F. 1212, S.F. 1214, S.F. 1216, S.F. 1218, S.F. 1220, S.F. 1222, S.F. 1224, S.F. 1226, S.F. 1228, S.F. 1230, S.F. 1232, S.F. 1234, S.F. 1236, S.F. 1238, S.F. 1240, S.F. 1242, S.F. 1244, S.F. 1246, S.F. 1248, S.F. 1250, S.F. 1252, S.F. 1254, S.F. 1256, S.F. 1258, S.F. 1260, S.F. 1262, S.F. 1264, S.F. 1266, S.F. 1268, S.F. 1270, S.F. 1272, S.F. 1274, S.F. 1276, S.F. 1278, S.F. 1280, S.F. 1282, S.F. 1284, S.F. 1286, S.F. 1288, S.F. 1290, S.F. 1292, S.F. 1294, S.F. 1296, S.F. 1298, S.F. 1300, S.F. 1302, S.F. 1304, S.F. 1306, S.F. 1308, S.F. 1310, S.F. 1312, S.F. 1314, S.F. 1316, S.F. 1318, S.F. 1320, S.F. 1322, S.F. 1324, S.F. 1326, S.F. 1328, S.F. 1330, S.F. 1332, S.F. 1334, S.F. 1336, S.F. 1338, S.F. 1340, S.F. 1342, S.F. 1344, S.F. 1346, S.F. 1348, S.F. 1350, S.F. 1352, S.F. 1354, S.F. 1356, S.F. 1358, S.F. 1360, S.F. 1362, S.F. 1364, S.F. 1366, S.F. 1368, S.F. 1370, S.F. 1372, S.F. 1374, S.F. 1376, S.F. 1378, S.F. 1380, S.F. 1382, S.F. 1384, S.F. 1386, S.F. 1388, S.F. 1390, S.F. 1392, S.F. 1394, S.F. 1396, S.F. 1398, S.F. 1400, S.F. 1402, S.F. 1404, S.F. 1406, S.F. 1408, S.F. 1410, S.F. 1412, S.F. 1414, S.F. 1416, S.F. 1418, S.F. 1420, S.F. 1422, S.F. 1424, S.F. 1426, S.F. 1428, S.F. 1430, S.F. 1432, S.F. 1434, S.F. 1436, S.F. 1438, S.F. 1440, S.F. 1442, S.F. 1444, S.F. 1446, S.F. 1448, S.F. 1450, S.F. 1452, S.F. 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1818, S.F. 1820, S.F. 1822, S.F. 1824, S.F. 1826, S.F. 1828, S.F. 1830, S.F. 1832, S.F. 1834, S.F. 1836, S.F. 1838, S.F. 1840, S.F. 1842, S.F. 1844, S.F. 1846, S.F. 1848, S.F. 1850, S.F. 1852, S.F. 1854, S.F. 1856, S.F. 1858, S.F. 1860, S.F. 1862, S.F. 1864, S.F. 1866, S.F. 1868, S.F. 1870, S.F. 1872, S.F. 1874, S.F. 1876, S.F. 1878, S.F. 1880, S.F. 1882, S.F. 1884, S.F. 1886, S.F. 1888, S.F. 1890, S.F. 1892, S.F. 1894, S.F. 1896, S.F. 1898, S.F. 1900, S.F. 1902, S.F. 1904, S.F. 1906, S.F. 1908, S.F. 1910, S.F. 1912, S.F. 1914, S.F. 1916, S.F. 1918, S.F. 1920, S.F. 1922, S.F. 1924, S.F. 1926, S.F. 1928, S.F. 1930, S.F. 1932, S.F. 1934, S.F. 1936, S.F. 1938, S.F. 1940, S.F. 1942, S.F. 1944, S.F. 1946, S.F. 1948, S.F. 1950, S.F. 1952, S.F. 1954, S.F. 1956, S.F. 1958, S.F. 1960, S.F. 1962, S.F. 1964, S.F. 1966, S.F. 1968, S.F. 1970, S.F. 1972, S.F. 1974, S.F. 1976, S.F. 1978, S.F. 1980, S.F. 1982, S.F. 1984, S.F. 1986, S.F. 1988, S.F. 1990, S.F. 1992, S.F. 1994, S.F. 1996, S								

CAPACITIES (Approx)

	Litres	U.K. Unit	U.S. Unit
Engine sump oil	5.4 litres	9.5 pints	11.4 pints
Extra when refilling after fitting new filter	0.5 litre	1.0 pint	1.2 pints
Main gearbox oil	2.7 litres	4.7 pints	5.6 pints
Transfer gearbox oil	3.1 litres	5.5 pints	6.6 pints
Rear differential oil	2.5 litres	4.5 pints	5.4 pints
Front differential oil	1.7 litres	3.0 pints	3.6 pints
Swivel housing oil (each)	0.5 litre	1.0 pint	1.2 pints
Steering box oil	0.4 litre	0.75 pint	0.90 pint
Cooling system	9.66 litres	17.0 pints	20.4 pints
Fuel tank	68 litres	16 gallons	18 gallons
Windscreen washer reservoir	2.4 litres	4.2 pints	5.4 pints

RECOMMENDED FUEL

The Rover V8 engine is designed to operate on fuel having a minimum octane rating of 91 to 93 (Research Method); this is equivalent to the British 2-star rating.

Where such fuels are not available and it is necessary to use fuels of lower or unknown rating, the ignition timing must be retarded from the specified setting, just sufficiently to prevent audible detonation (pinging) under all operating conditions, otherwise damage to the engine may occur. Use exhaust gas analysis equipment to check the final engine exhaust emissions after resetting.

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

In the interests of public health, and to assist in keeping undesirable exhaust emissions as low as possible, fuels of an octane rating higher than that recommended should not be used.

MAINTENANCE

Vehicle maintenance for the Land-Rover V8, whilst following the general pattern of that for other Land-Rover models, is specific to the V8 model.

Two Maintenance Summaries are given, one applicable to all markets except Australia and the other relating to Australian Market vehicles only. These Summaries are identical to those printed in the Owner's Handbooks and comply with local territory requirements.

Following the Maintenance Summaries are details of additional preventive maintenance for the braking system and the recommended procedures for completing the maintenance operations.

Maintenance Information — All Markets

The following items should be checked by the driver weekly or before a long journey:

- Engine oil level
- Brake fluid level
- Clutch fluid level
- Radiator coolant level
- Battery electrolyte level
- All washers reservoir water levels
- All tyres for pressure and condition
- All lights for operation
- Horn for operation
- All wipers and washers for operation

Stationary Running

If the vehicle is used exclusively in LOW transfer ratio or for stationary work, maintenance intervals must be based on either fuel consumption or hours running time. The following chart gives an approximate relationship of distance covered to fuel consumption to hours running time.

Distance Covered	Fuel Consumption — Petrol			Hours Running Time
	Miles	Kilometres	Litres	
3,000	5,000	900	200	120
6,000	10,000	1,800	400	240
9,000	15,000	2,700	600	360
12,000	20,000	3,600	800	480
15,000	25,000	4,500	1,000	600
18,000	30,000	5,400	1,200	720
21,000	35,000	6,300	1,400	840
24,000	40,000	7,200	1,600	960

ENGINE COMPARTMENT

	First Service only 1600 km (1,000 miles)	Every 5000 km (3,000 miles) or 3 months	Every 10 000 km (6,000 miles) or 6 months	Every 20 000 km (12,000 miles) or 12 months
Check for oil leaks	X	X		X
Check/top-up steering box	X			X
Check/top-up steering relay		X		X
Check/top-up clutch fluid reservoir	X	X		X
Check/top-up brake fluid reservoir	X	X		X
Check brake servo hose(s) for security and condition	X	X		X
Renew fuel filter element		X		X
Lubricate accelerator control linkage and pedal pivot				
—Check operation	X		X	X
Top-up carburettor piston dampers	X		X	X
Check/adjust choke setting (Manual)		According to climate		
Check crankcase breathing system for leaks, hoses for security and condition	X		X	X
Renew engine flame trap				X
Renew engine breather filter				X
Check air intake temperature control system (where fitted)				X
Renew carburettor air intake cleaner element				X
Clean/adjust spark plugs			X	X
Renew spark plugs				X
Check ignition wiring for chafing, fraying and deterioration	X			X
Check security of distributor vacuum unit line	X			X
Clean distributor cap; check for cracks and tracking				X
Lubricate distributor				X
Check distributor points; adjust or renew	X		X	X
Check/adjust ignition timing, using electronic equipment	X		X	X
Check/top-up cooling system	X	X		X
Check cooling and heater systems for leaks and hoses for security and condition	X	X	X	X
Check/adjust operation of all washers and top-up reservoirs	X	X	X	X
Check driving belt; adjust or renew	X	X	X	X
Check/top-up engine oil level	X	X	X	X

continued

UNDERBODY

	First Service only 1600 km (1,000 miles)	Every 5000 km (2,999 miles) or 3 months	Every 10 000 km (6,000 miles) or 6 months	Every 20 000 km (12,000 miles) or 12 months
Check for oil leaks	X	X		X
Check security of engine mountings	X			X
Renew engine oil	X			X
Renew engine oil filter	X	X		X
Drain flywheel housing if drain plug is fitted for wading		X		X
Check condition and security of steering unit joints, relays and gaiters	X	X		X
Check/top-up front axle oil			X	X
Renew front axle oil	X			X
Check/top-up swivel pin housing oil				X
Renew swivel pin housing oil	X			X
Clean electric fuel pump element				X
Check/top-up main gear-box oil			80 000 km (48,000 miles)	X
Renew main gear-box oil	X			X
Check/top-up transfer gear-box oil	X			X
Renew transfer gear-box oil	X			X
Lubricate handbrake linkage and cable				X
Check handbrake operation, adjust to manufacturer's instructions (Manual)	X			X
Lubricate propeller shaft(s)	X			X
Check tightness of propeller shaft coupling bolts	X			X
Check/top-up rear axle oil	X			X
Renew rear axle oil	X			X
Check security of transmission mountings	X			X
Check exhaust system, fuel, clutch and brake pipes and unions for leaks, chafing and corrosion	X	X		X
Clean axle case breathers	X			X
Check security of suspension fixings	X			X

PASSENGER COMPARTMENT

Check/top-up battery electrolyte	X	X		X
Clean and grease battery connections			X	X
Check function of original equipment, i.e. interior and exterior lamps, horns, wipers and warning indicators	X	X		X
Check condition and security of seats and seat belts	X	X		X
Lubricate all locks and hinges (NOT steering lock)	X	X		X
Check operation of window controls	X			X
Ensure cleanliness of controls, door handles and steering wheel	X	X		X

GENERAL

Road/roller test and check function of all instrumentation	X			X
Report additional work required		X		X

WARNING: Two-wheel roller tests must be restricted to 5 km/h (3 m.p.h.) because the Land-Rover V8 is in constant four-wheel drive.

continued

MAINTENANCE SUMMARY—ALL MARKETS EXCEPT AUSTRALIA (Continued)

At 24,000 mile intervals, the following operations should be carried out:

- i Lubricate propeller shaft sealed sliding joints.
- ii Renew gearbox oil.
- iii Renew transfer box oil.
- iv Renew front and rear axle oil.
- v Renew swivel pin housing oil.

At 36,000 mile intervals: Renew air filter in brake servo unit.

At 48,000 mile intervals: Clean fuel pump filter.

MAINTENANCE SUMMARY—AUSTRALIAN MARKET VEHICLES ONLY

Service Code Letter	Distance Kilometres x 1000										Monthly Intervals
	1.5	5	15	25	35	45	55	65	75		
A											1
B											3
C		10			30		50		70		6
D			20			60					12
E					40					80	24

These service intervals are based on an annual distance covered of approximately 20 000 kilometres.

Should the vehicle complete substantially less distance than this, be used on a high proportion of short journeys or be operated in severe conditions, for example; dusty, wet or muddy terrain, frequent wading; it may require more frequent servicing or particular attention to specific items. A Leyland Dealer will be pleased to offer advice regarding particular service requirements under severe operating conditions.

In any event the period between services should NOT EXCEED THREE MONTHS.

Operation	Service				
	A	B	C	D	E
<b>ENGINE</b>					
Check for engine oil leaks	X	X	X	X	X
Check/top-up engine oil	X	X	X	X	X
Renew engine oil	X	X	X	X	X
Renew engine oil filter	X	X	X	X	X
Lubricate accelerator control linkage and pedal pivot—check operation	X	X	X	X	X
Top-up carburetter piston dampers	X	X	X	X	X
Renew carburetter/air intake air cleaner element	X	X	X	X	X
Check/adjust choke settings	X	X	X	X	X
Check/adjust carburetter idle settings	X	X	X	X	X
Clean electric fuel pump filter	X	X	80 000 km	X	X
Renew engine flame trap	X	X	X	X	X
Clean engine breather filter	X	X	X	X	X
Renew engine breather filter and fuel filter element	X	X	X	X	X
Check driving belts; adjust or renew	X	X	X	X	X
Check security of engine mountings	X	X	X	X	X
Check cooling and heater systems for leaks and hoses for security and condition	X	X	X	X	X
Check/top-up cooling system	X	X	X	X	X
Check/adjust operation of all washers and top-up reservoir(s)	X	X	X	X	X
Check crankcase breathing and evaporative loss systems hoses for security	X	X	X	X	X
Check crankcase breathing and evaporative loss systems. Check hoses/pipes and restrictors for blockage, security and condition	X	X	X	X	X
Check security of E.G.R. valve operating lines	X	X	X	X	X
Check E.G.R. system	X	X	X	X	X
Check air injection system hoses/pipes for security	X	X	X	X	X
Check air injection system hoses/pipes for condition and security	X	X	X	X	X
Check operation of the check valve	X	X	X	X	X
Renew adsorption canister	X	X	80 000 km	X	X

continued

MAINTENANCE SUMMARY — AUSTRALIAN MARKET VEHICLES ONLY  
(Continued)

Operation	Service				
	A	B	C	D	E
<b>IGNITION</b>					
Check ignition wiring for fraying, chafing and deterioration	X			X	X
Check security of distributor vacuum unit line and operation of vacuum unit	X			X	X
Lubricate distributor				X	X
Clean distributor cap; check for cracks and tracking				X	X
Renew distributor points				X	X
Renew spark plugs				X	X
Check coil performance on oscilloscope	X			X	X
Check/adjust ignition timing, using electronic equipment				X	X
<b>TRANSMISSION</b>					
Check/top-up clutch fluid reservoir	X	X	X	X	X
Check clutch pipes/hydraulic hoses visually for cracks, leaks and chafing	X	X	X	X	X
Lubricate clutch pedal pivot				X	X
Check for transmission oil leaks	X			X	X
Check/top-up gearbox oil	X			X	X
Renew gearbox oil				X	X
Check/top-up transfer box oil	X			X	X
Renew transfer box oil				X	X
Check/top-up front and rear axle oil	X			X	X
Renew front and rear axle oil	X			X	X
Check tightness of propeller shaft coupling bolts	X			X	X
Lubricate propeller shaft	X			X	X
Lubricate propeller shaft sealed sliding joint	X			X	X
Drain flywheel housing if drain plug is fitted for wading				X	X
<b>STEERING AND SUSPENSION</b>					
Check security/condition of suspension fixings	X			X	X
Check security and condition of steering unit, joints, relays and gaiters	X	X		X	X
Check steering rack/gear for oil/fluid leaks	X	X		X	X
Check shock absorbers for fluid leaks	X	X		X	X
Check/top-up steering box	X			X	X
Check/adjust steering box	X			X	X
Check/top-up steering relay unit	X			X	X
Check/top-up swivel pin housing oil	X			X	X
Renew swivel pin housing oil	X			X	X
Check/adjust front wheel alignment	X			X	X

continued

MAINTENANCE SUMMARY — AUSTRALIAN MARKET VEHICLES ONLY  
(Continued)

Operation	Service				
	A	B	C	D	E
<b>BRAKES</b>					
Check visually brake hydraulic hoses, pipes and unions for chafing, cracks, leaks and corrosion	X	X	X	X	X
Check/top-up brake fluid reservoir	X	X	X	X	X
Inspect brake linings for wear, drums for condition				X	X
Lubricate brake pedal pivot				X	X
Check footbrake operation; adjust to manufacturer's instructions	X	X	X	X	X
Lubricate handbrake mechanical linkage and cable guides (lever pivot)	X	X	X	X	X
Check handbrake security and operation; adjust to manufacturer's instructions	X	X	X	X	X
Check brake servo hose(s) for security and condition	X	X	X	X	X
Renew servo filter element			60 000 km		
<b>ELECTRICAL</b>					
Check function of original equipment, i.e. interior and exterior lamps, horns, wipers and warning indicators	X	X	X	X	X
Check/top-up battery electrolyte	X	X	X	X	X
Clean and grease battery connections				X	X
Check/adjust headlamp alignment	X	X	X	X	X
Check, if necessary renew, wiper blades	X	X	X	X	X
Check output of charging system	X	X	X	X	X
Check brake system warning lights	X	X	X	X	X
<b>FUEL AND EXHAUST PIPES</b>					
Check fuel system for leaks, pipes and unions for chafing and corrosion	X	X	X	X	X
Check exhaust system for leaks and security	X	X	X	X	X
Check condition of fuel filler cap seal				X	X
<b>WHEELS AND TYRES</b>					
Check that tyres comply with manufacturer's specification				X	X
Check tyres for external cuts in tyre fabric, exposure of ply or cord structure, lumps, bulges or uneven wear	X	X	X	X	X
Check tyres for tread depth and visually for external cuts in fabric, exposure of ply or cord structure, lumps, bulges or uneven wear	X	X	X	X	X
Interchange road wheels				X	X
Check tightness of road wheel fastenings	X	X	X	X	X
Check/adjust tyre pressures including spare	X	X	X	X	X
<b>IMPORTANT:</b> If tyres do not conform with legal requirements, report to owner.					

continued



MAINTENANCE SUMMARY—AUSTRALIAN MARKET VEHICLES ONLY  
(Continued)

Operation	Service				
	A	B	C	D	E
<b>BODY</b>					
Check rear view mirror(s) for security, cracks and crazing		X	X	X	X
Lubricate all locks, hinges and door check mechanism (not steering lock)	X	X	X	X	X
Check operation of all door, bonnet and tailgate locks	X	X	X	X	X
Check operation of all window controls	X	X	X	X	X
Check condition and security of seats and seat belts	X	X	X	X	X
Check operation of seat belt warning system	X	X	X	X	X
Check operation of seat belt inertia reel mechanism	X	X	X	X	X
Ensure cleanliness of controls, door handles and steering wheel	X	X	X	X	X
<b>GENERAL</b>					
Road/roller test and check function of all instrumentation	X	X	X	X	X
Report additional work required					

**WARNING: Two-wheel roller tests must be restricted to 5 km/h (3 m.p.h.) because the Land Rover V8 is in constant four-wheel drive.**

**ADDITIONAL PREVENTIVE MAINTENANCE—ALL MARKETS**

In addition to the recommended periodical inspection of brake components it is advisable as the car ages, and as a precaution against the effects of wear and deterioration, to make a more searching inspection and renew parts as necessary.

It is recommended that:

1. Disc brake pads, drum brake linings, hoses and pipes should be examined at intervals no greater than those laid down in the Maintenance Summary.
2. Brake fluid should be changed completely every 18 months or 30 000 kilometres whichever is the sooner.
3. All fluid seals in the hydraulic system and all flexible hoses should be renewed every 3 years or 60 000 kilometres whichever is the sooner. At the same time the working surfaces of the piston and of the bores in the master cylinder, wheel cylinders and other slave cylinders should be examined and new parts fitted where necessary.

Care must be taken always to observe the following points:

- a. At all times use the recommended brake fluid.
- b. Never leave fluid in unsealed containers. It absorbs moisture quickly and can be dangerous if used in the braking system in this condition.
- c. Fluid drained from the system or used for bleeding is best discarded.
- d. The necessity for absolute cleanliness throughout cannot be over-emphasized.

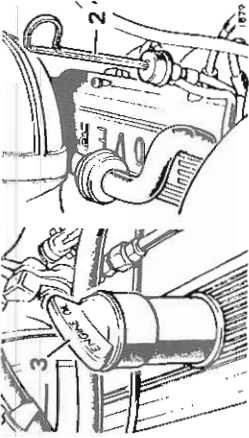
**REPLACEMENT BRAKE PADS AND SHOES**

When it becomes necessary to renew the brake pads and shoes, it is essential that only genuine components with the correct grade of lining are used.

Always fit new pads or shoes as complete axle sets, never individually or as a single wheel set. Serious consequences could result from out-of-balance braking due to mixing of linings.

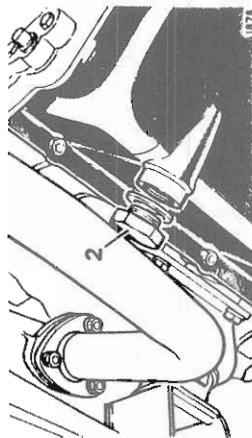
Replacement brake pads and shoes are obtainable from a Leyland Dealer.

For details of emission and evaporative loss control equipment refer to Section 17 of this publication.



**Check/top-up engine oil**

1. Stand the car on level ground and allow the oil to drain back into the sump.
2. Withdraw the dipstick at left-hand side of engine; wipe it clean, re-insert to its full depth and remove a second time to take the reading.
3. Add oil as necessary through the screw-on filler cap marked 'ENGINE OIL' on the right-hand front rocker cover. Never fill above the 'High' mark on the dipstick.



**Renew engine oil**

1. Run the engine to warm-up the oil; switch off the ignition.
2. Place an oil tray under the drain plug.
3. Remove the drain plug in the bottom of the sump at left-hand side. Allow oil to drain away completely and replace the plug.
4. Refill the engine sump with the correct quantity and grade of oil.
5. Run the engine to check for oil leaks at the drain plug.

**Renew engine oil filter**

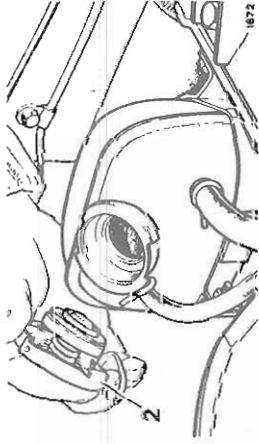
1. Place an oil tray under the engine.
2. Unscrew the filter anti-clockwise, using a strap spanner as necessary.
3. Smear a little clean engine oil on the rubber washer of the new filter, then screw the filter on clockwise until the rubber sealing ring touches of the oil pump cover face; then tighten a further half turn by hand only.
4. Do not overtighten.
5. Check/top-up the engine oil level.

Run the engine to check for oil leaks at the filter.



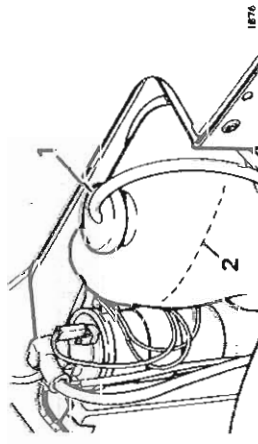
Check/top-up cooling system

1. Locate the cooling system expansion tank at the left-hand front of the engine compartment.
  2. Remove the expansion tank filler cap.  
**WARNING:** Do not remove the filler cap when the engine is hot because the cooling system is pressurized and personal scalding could result.
  3. Maintain the coolant level in the expansion tank at approximately half full.
- NOTE:** To prevent corrosion of the aluminium alloy engine parts it is imperative that the cooling system is filled with a solution of water and anti-freeze, winter or summer, or water and inhibitor during the summer only. Never fill or top-up with plain water.



Check/adjust operation of washers and top-up reservoir(s)

1. Remove reservoir caps by turning anti-clockwise or prising upwards.
2. Top-up reservoir to within approximately 25 mm (1 in) below bottom of filler neck.  
Use Clearalex windscreens washer powder in the bottle. This will remove mud, flies and road film. In cold weather, to prevent freezing of the water, add isopropyl alcohol. Do NOT use methylated spirits, which has a detrimental effect on the screen washer impeller.



Check driving belts; adjust or renew

1. Examine the following belts for wear and condition, and renew if necessary.
  - i. Crankshaft — water pump — alternator.
  - ii. Crankshaft — jockey pulley — air pump.
2. Each belt should be sufficiently tight to drive the appropriate auxiliary without undue load on the bearings.  
Correct tension: This is measured by allowing 0.4 mm movement on the slack side of the belt per 25.4 mm between pulley centres.  
E.g. Distance between pulley centres = 254 mm  
Tension =  $\frac{25.4}{254 \times 0.4}$  mm  
= 4.00 mm.
3. Slacken the bolts securing the unit to its mounting bracket.
4. Slacken appropriate pivot bolt and the fixing at the adjustment link.
5. Pivot the unit inwards or outwards as necessary and adjust until the correct belt tension is obtained.
6. Tighten unit adjusting bolts.

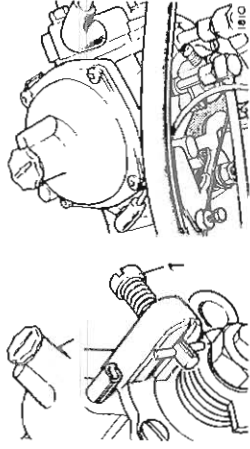
Check adjustment again, when a new belt is fitted, after approximately 1500 km running.

Renew carburettor/air intake air cleaner elements

Refer to Operation 19.10.08 in this publication.

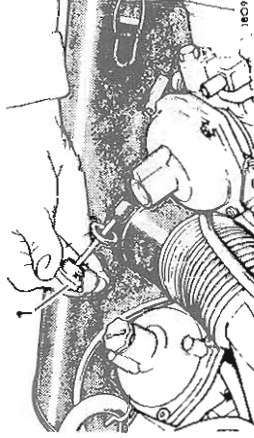
Carburettor choke adjuster

1. 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.



Top-up carburettor piston dampers

1. Unscrew the cap on top of each suction chamber; withdraw cap and hydraulic damper. Replenish the damper reservoir as necessary with engine oil to within about 12 mm (0.5 in) from the top of the tube.
2. Replace the cap and hydraulic damper.



Check/adjust carburettor idle settings

Recommended idle and fast idle speeds are given in the General Specification and Tuning Data sections of this publication.

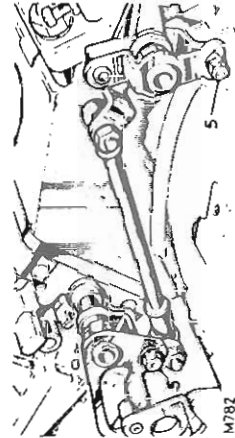
Idle speed and mixture adjustment

All markets except Australia

Service tool: 605330 carburettor balancer

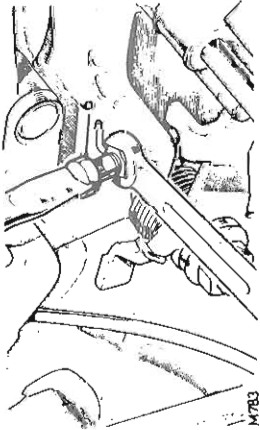
The service tool 605330 carburettor balancer must be used to adjust the carburettors. Primarily this instrument is for balancing the air flow through the carburettors, but it also gives a good indication of the mixture setting. Investigation has shown that incorrect mixture setting causes either stalling of the engine or a considerable drop in engine rev/min if the balancer is fitted when the mixture is too rich or a considerable increase in rev/min when used with the mixture setting too weak. Before balancing the carburettors it is most important therefore that the following procedure be carried out:

1. Check that the throttle control between the pedal and the carburettors is free and has no tendency to stick.
2. Check the throttle cable setting with the throttle pedal in the released position. The throttle linkage must not have commenced movement, but commences with the minimum depression of the pedal.
3. Run the engine until it attains normal operating temperature; that is, thermostat open.
4. Remove the air cleaner, see 19.10.01.
5. Slacken the screws securing the throttle adjusting levers on both carburettors.

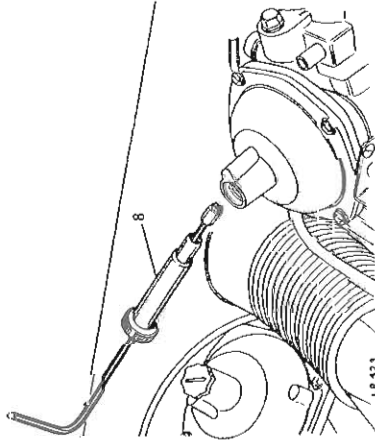


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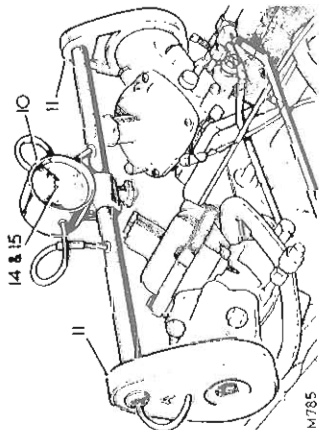
6. Start the engine and check the idle speed. If necessary, adjust the throttle stop screws to give the correct idle speed. If a tamper-proof sleeve is fitted over this screw, the slow running speed can only be adjusted using a special tool supplied to authorized service outlets.



7. Where applicable, check the mixture on each carburettor separately, by lifting the air valve 0.8 mm (.031 in). If the engine increases immediately, the mixture is too rich. If the engine speed decreases immediately, the mixture is too weak.
8. Remove the piston damper plug and using special tool MS80, adjust the mixture. Locate the outer sleeve of the tool to engage a machined slot to prevent the air valve twisting. Turn the inner tool clockwise to enrich the mixture and anti-clockwise to weaken it.

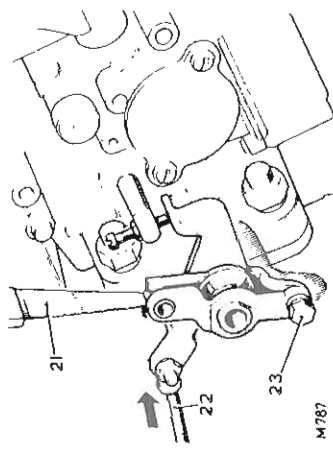
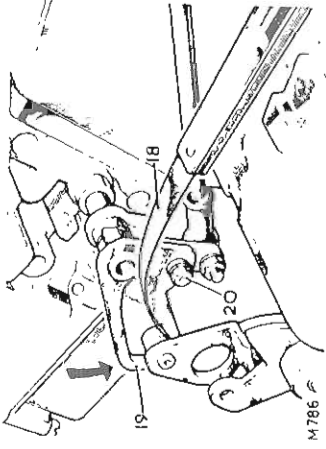


9. When the mixture is correctly adjusted, the engine speed will remain constant or may fall slightly as the air valve is lifted.
10. Check, and if necessary, zero the gauge on tool 605330.
11. Place tool 605330 onto the carburettor adaptors, ensuring that there are no air leaks. If the engine stalls or decreases considerably in speed, the mixture is too rich. If the engine speed increases, the mixture is too weak.
12. If necessary, remove tool 605330 and readjust the mixture, then refit the tool.
13. Check tool 605330 gauge reading.
14. If the gauge pointer is in the 'zero' sector, no adjustment is required.
15. If the gauge pointer moves to the right, decrease the air flow through the left-hand carburettor by unscrewing the throttle stop screw or increase the air flow through the right-hand carburettor by screwing in the throttle stop screw. Reverse the procedure if the pointer moves to the left.



continued

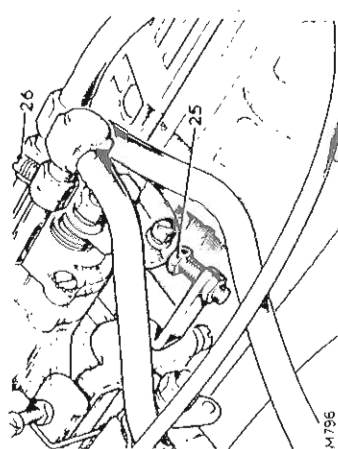
16. If the engine idle speed rises too high or drops too low during balancing, adjust to the correct idle speed, maintaining the gauge pointer in the 'zero' sector.
  17. Remove tool 605330. With the mixture setting and carburettor balance correctly adjusted, the difference in engine rev/min with the tool 605330 on or off will be negligible, approximately plus or minus 25 rev/min.
- NOTE:** Using a recognised type CO meter, the exhaust gas analysis reading should not exceed 4% carbon monoxide or any other levels fixed by local territory legislation.
18. On the left-hand carburettor, place a 0.15 mm (0.006 in) feeler between the underside of the roller on the countershaft lever and the throttle lever.
  19. Apply pressure to the throttle lever to hold the feeler.
  20. Tighten the screw to secure the throttle adjusting lever, then withdraw the feeler.
  21. On the right-hand carburettor, place a 0.15 mm (0.006 in) feeler between the left leg of the fork on the adjusting lever and the pin on the throttle lever.
  22. Apply light pressure to the linkage to hold the feeler.
  23. Tighten the screw to secure the throttle adjusting lever, then withdraw the feeler.
  24. Refit the air cleaner, see 19.10.01.



**Fast idle adjustment**

The fast idle adjustment is pre-set on the left-hand carburettor and should not normally require adjustment. If adjustment is required, the fast idle can be approximately set as follows, but this method is not recommended for ambient temperatures below 8°C (10°F).

25. Set the fast idle adjustment screw against the cam to give the required engine speed.
- NOTE:** On some carburettors a special tool, supplied to authorized service outlets, may be necessary to adjust the fast idle speed setting.



**Idle speed and mixture adjustment  
Australian marker vehicles**

1. Run the engine until normal operating temperature is reached.
2. Remove the air cleaner, see 19.10.01.
3. Disconnect the throttle linkage so that each carburettor operates independently.

continued

## MAINTENANCE

### Adjusting idle speed and air-flow for balance

4. Ensure that the fast idle screw is clear of the fast idle cam.
5. Using an air-flow meter check that the air-flow through both carburettors is the same. If not, adjust as necessary.
6. If necessary, turn the throttle adjusting screws on both carburetors an equal amount to maintain the correct idle speed.
7. Increase the engine speed to 1600 rev/min and check the balance with the air-flow meter. If necessary, turn the throttle adjusting screws by equal amounts to achieve a balance.
8. Re-check the air-flow balance at idle speed.

### Checking and adjusting CO level at idle

9. Disconnect and plug the outlet hose from the air pump.
10. Maintain the engine at normal operating temperature and check that the idle speed is correct.
11. Check, and if necessary, adjust the ignition timing.
12. Re-check the idle speed.
13. Insert the gas analyser probe as far as possible into the exhaust pipe.
14. Check the CO reading.
15. Adjust the mixture if necessary—see 'Mixture adjustment'.
16. Check, and if necessary, adjust the idle speed.
17. Withdraw the analyser probe.
18. Switch off the ignition.
19. Unplug air injection hose and reconnect to the pump.

### Mixture adjustment

**CAUTION:** The setting **MUST ALWAYS** be checked by means of a non-dispersive infra-red exhaust gas analyser. For significant deviation outside the specified CO limits the mixture should be adjusted as follows.

20. Remove the piston damper from both carburetors.
21. Carefully insert special tool S 353 into the dashpot until the outer tool engages in the air valve and the inner tool engages the hexagon in the needle adjuster plug.  
**CAUTION:** The outer tool must be correctly engaged and held in position otherwise damage to the diaphragm may result.
22. Holding the outer tool, turn the inner tool:
  - a Clockwise to enrich the mixture.
  - b Anti-clockwise to weaken.

continued

23. Repeat instructions 21 and 22 on the remaining carburetter, ensuring that the adjustment made is by the same amount.
24. Top-up the carburetter dampers—refer to Section 10.
25. Re-check the CO reading—adjust until the CO reading is within the specified limits.
26. Set the fast idle as follows:
  - a. Slacken choke cable clamping screw at carburetter.
  - b. Pull choke control knob out and push in to a distance of approximately 0.5 in and lock in position.
  - c. Turn starter cam, allowing choke cable to slide through the trunnion until the punched mark on the cam flank aligns with the centre of the domed screw on the starter/throttle lever, and tighten clamping screw.
  - d. With the cam held in this position adjust the fast idle screws to obtain a speed of  $1100 \pm 50$  rev/min and re-tighten locknut.
  - e. Push choke cable fully home and check that normal idle speed is regained.

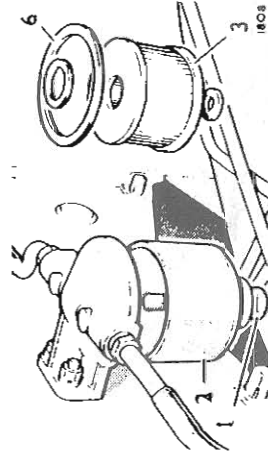
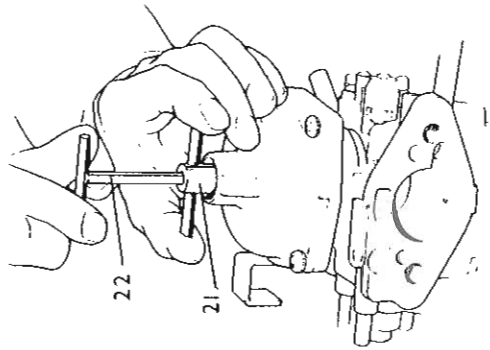
### RENEW FUEL FILTER ELEMENT

The element provides a filter between the pump and carburetter and is located on the rear engine compartment bulkhead.

**NOTE:** On all but U.K. European cars it will be necessary to remove the carburetter air cleaner to gain access to the fuel filter.

Replace the element as follows:

1. Unscrew the centre bolt.
2. Withdraw the filter bowl.
3. Remove the small sealing ring and remove the element.
4. Withdraw the large sealing ring from the underside of the filter body.
5. Discard the old element and replace with a new unit.
6. Ensure that the centre and top sealing rings are in good condition and replace as necessary.
7. Fit new element, small hole downwards.
8. Refit sealing rings.
9. Replace filter bowl and tighten the centre bolt.

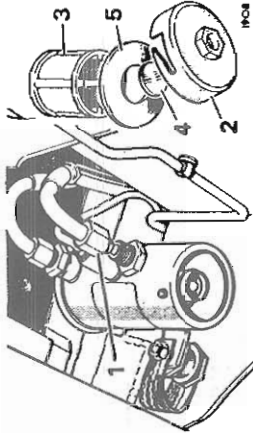


**Clean electric fuel pump filter**

The fuel pump is located on the right-hand chassis member approximately mid-way on the wheelbase.

To renew the pump filter:

1. From beneath the vehicle disconnect the fuel inlet pipe from the pump and blank the end of the pipe by suitable means to prevent fuel draining from the tank.
2. Release the end cover from the bayonet fixing.
3. Withdraw the filter and clean by using a compressed air jet from the inside of the filter.
4. Remove the magnet (where fitted) from the end cover and clean. Replace the magnet in the centre of the end cover.
5. Reassemble the fuel pump and refit the fuel inlet pipe. Use a new gasket for the end cover if necessary.



10604

**Check/adjust ignition timing, using electronic equipment**

A pointer on the timing cover and marks on the crankshaft pulley indicate positions around T.D.C. on No. 1 cylinder (i.e. front cylinder on left-hand bank).

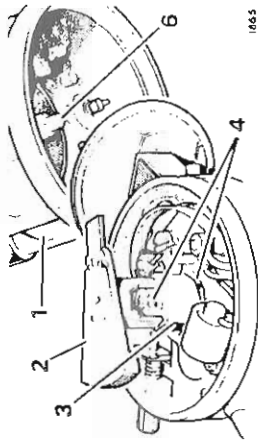
Refer to Tuning Data section of this publication for ignition timing values.

1. Connect a stroboscopic timing light as instructed by the manufacturer. The engine is timed on No. 1 cylinder.
2. Run the engine at idle speed.
3. Position the timing light to illuminate the crankshaft pulley and scale.

**WARNING:** Ensure that personnel and equipment are kept clear of the rotating cooling fan while using the timing light.

4. If the timing is correct the pulley mark indicated in the Tuning Data will show. If correct, instruction 5 may be ignored.
5. With the engine still running at idle speed, slacken the clamp bolt and carefully rotate the distributor body as required until the correct pulley mark shows. Tighten the clamp bolt with the unit in this position.

**NOTE:** Engine speed accuracy during ignition timing is of paramount importance. Any variation from the required idle speed, particularly in an upward direction, will lead to wrongly set ignition timing.



10605

**Lubricate distributor**

1. Remove distributor cap.
2. Remove rotor arm.
3. Lightly smear the cam with clean engine oil.
4. Add a few drops of thin machine oil to lubricate the cam bearing and distributor shaft.
5. Wipe the inside and outside of the distributor cap with a soft, dry cloth.
6. Ensure that the carbon brush works freely in its holder.
7. Replace rotor arm and distributor cap.

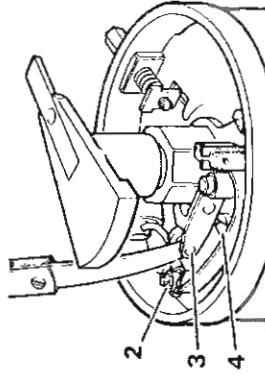
**Check/adjust or renew distributor points**

1. Remove distributor cap.
2. Remove the nut on the terminal block.
3. Lift off the spring and moving contact.
4. Remove adjustable contact, secured with a screw.
5. Add a smear of grease to contact pivot before fitting new contact points. Then carry out distributor maintenance, followed by setting the ignition timing and dwell angle. However, when it becomes necessary to change the contact points and specialized checking equipment is not available, they may be adjusted either by the feeler gauge or, alternatively, the timing lamp method. Proceed as follows:

**Checking contact points — feeler gauge method**

6. Turn the engine in direction of rotation until the contacts are fully open.
7. 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.
8. Adjust by turning the adjusting nut clockwise to increase gap and anti-clockwise to reduce gap. When an adjusting nut facility is not provided, position the adjustable contact using a screwdriver in the slot provided.
9. Tighten the adjustable contact securing screw.
10. Replace the distributor cap. At the first available opportunity after the contact points have been adjusted as detailed above they must be finally set to the dwell angle using specialized equipment.

**NOTE:** When new contact points have been fitted the dwell angle must be checked after a further 1500 km (1,000 miles) running.



10603

## MAINTENANCE

To remove, clean, adjust and refit spark plugs

### Removing

1. Withdraw leads by gripping end shrouds. **DO NOT** pull leads alone.  
**NOTE:** Remove the hot air pipe for access to the R.H. plugs as necessary.
2. Using special spanner and tommy bar supplied in vehicle tool kit, remove spark plugs and washers.

### Cleaning

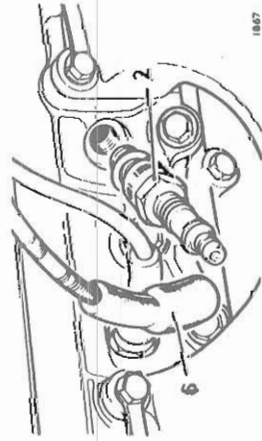
3. Fit plug in plug cleaning machine.
4. Wobble plug with circular motion while operating abrasive blast for a maximum of four seconds.  
**CAUTION: Excessive abrasive blasting will erode insulator nose.**
5. Change to air blast only and continue to wobble plug for a minimum of thirty seconds to remove abrasive grit from plug cavity.
6. Wire-brush plug threads, open gap slightly.
7. Using point file, square off electrode surfaces.
8. Set electrode gap, see Tuning Data section of this publication.
9. Test plugs in accordance with cleaning machine manufacturer's instructions. If satisfactory, refit plugs in engine.

**IMPORTANT: If new plugs are necessary, refer to Section 04.**

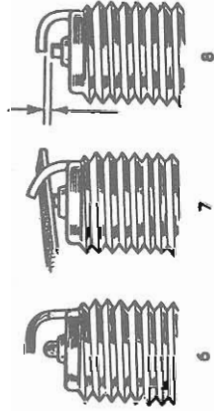
10. Examine high tension leads, including coil to distributor lead, for insulation cracking or corrosion at end contacts. Fit new leads as necessary.
11. In addition to correct firing order, high tension leads must be fitted in correct relation to each other to avoid cross firing, as illustrated.
12. When pushing leads on plugs ensure ferrules within shrouds are firmly seated on plugs. A guide is that shroud ends are within 6 mm (0.250 in) of metal body of plugs.

### Check coil performance on oscilloscope

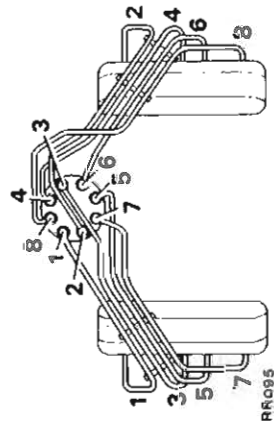
The Lucas 16C6 ignition coil fitted to this model has a primary winding resistance of 1.2 to 1.4 ohms at 20°C (68°F).



1667

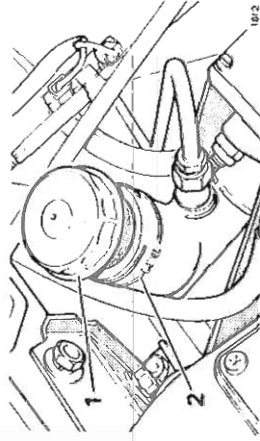


N379



PR095

## MAINTENANCE



1662

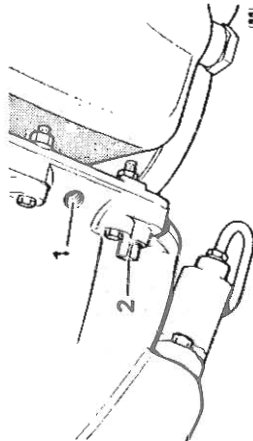
### Check/top-up clutch fluid reservoir

1. Wipe clean the surrounding area before removing the reservoir cap.
2. Top-up the reservoir as necessary, to the bottom of the filler neck.

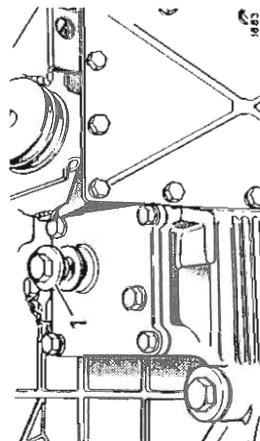
### Drain flywheel housing if drain plug is fitted for wading

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 the housing adjacent to the drain hole, and should only be fitted when the vehicle is expected to do wading or very muddy work. When the plug is in use it must be removed periodically and all oil allowed to drain off before the plug is replaced.



1661



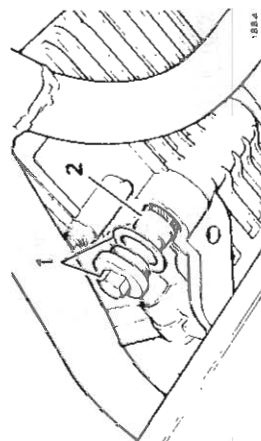
1665

### Check/top-up gearbox oil

1. From beneath the vehicle remove the filler/level plug at the side of the gearbox.
2. Add oil to the bottom of the filler plug orifice.
3. Wipe away surplus oil and refit the plug.

### Renew gearbox oil

1. Immediately after a run when the oil is warm, drain off the oil by removing the drain plug and washer from the bottom of the gearbox casing.
2. Remove the oil filter.
3. Wash the filter in clean fuel; allow to dry and replace. Refit drain plug and refill gearbox through the oil filler cap with the correct grade of oil to the 'H' level mark on the dipstick.
- 4.



1664

## MAINTENANCE

### Check/top-up transfer box oil level

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

1. To check oil level: remove the oil level plug, located on the rear of the transfer box casing. Oil should be level with the bottom of the hole.
2. To top-up: remove the centre seat cushion and the seat base cover-plate.
3. Remove the oil filler plug from the transfer box, and top-up as necessary. If significant topping-up is required, check for oil leaks at drain and filler plugs.

### Renew transfer gearbox oil

Drain and refill monthly when operating under severe wading conditions.

To change the transfer box oil, proceed as follows:

1. Immediately after a run when the oil is warm, drain off the oil by removing the drain plug and washer from the bottom of the transfer box.
2. Replace the drain plug and washer and refill the transfer box through the oil filler plug, with the correct grade of oil, to the bottom of the oil level plug hole.

Refer to Data for capacity.

**IMPORTANT:** Do not overfill otherwise leakage may occur.

### Check/top-up front and rear axle oil

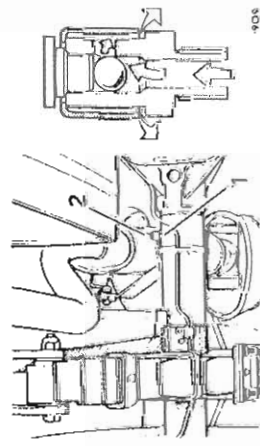
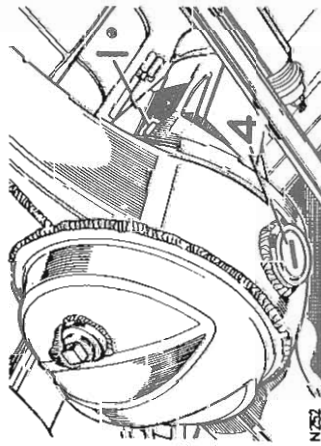
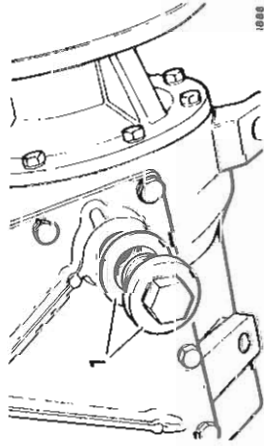
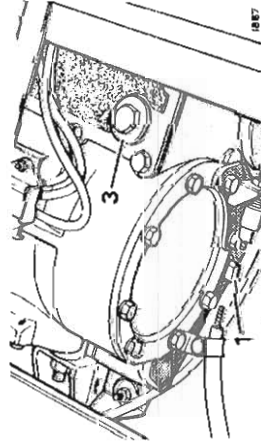
1. From beneath the vehicle, remove the filler/level plug on the respective axle cover-plate.
2. Add oil to the bottom of the filler plug orifice.
3. Wipe away surplus oil and refit the plug.

### Renew front and rear axle oil

1. Drain the oil by removing the drain plug below the axle differential case.
2. Replace the plug and fill the axle to the level of the filler plug orifice.

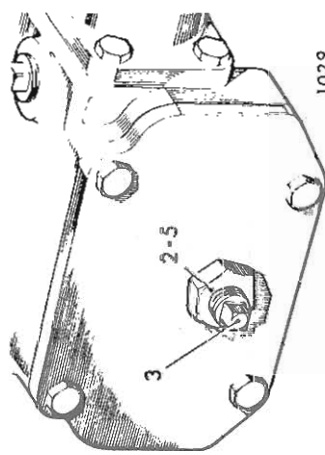
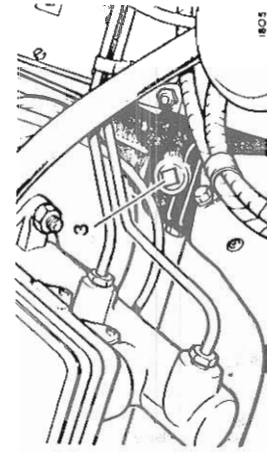
At 12,000 miles (20,000 km) intervals clean the axle case breathers, which are located on top of the axle case between the differential housing and the suspension spring, as follows:

1. Clean off the axle breathers and the surrounding surfaces of the axle cases, taking care to remove any gritty foreign matter.
2. Unscrew the axle breathers from their tapered threads in the axle tubes and soak in petrol or a suitable cleaning solvent for several minutes and clean with a soft brush.
3. Shake each breather to ensure the ball valve is free. If it is not, the breather valve must be renewed.
4. Lubricate the balls lightly with engine oil before replacing the breathers.



### Check/top up steering box

1. Wipe clean the area around the filler plug before removing the plug.
2. Top up the oil level to the bottom of the filler plug hole.
3. Refit the filler plug.



### Check/adjust steering box

The adjuster is accessible after removing a cover inside the front wheel arch.

The procedure for adjusting the steering box is as follows:

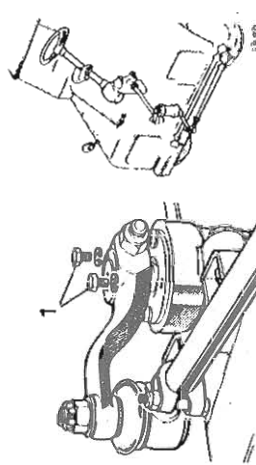
1. Set the road wheels in the straight ahead position.
2. Slacken the adjuster locknut.
3. Tighten the adjuster to reduce steering wheel backlash.
4. Tighten the locknut.

### Check/top up steering relay unit

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 two of the bolts securing the relay top cover.
2. 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.
3. 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.
4. 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.
5. Replace the two top cover bolts.

Refit the radiator grille and name plate.



**Check/top-up swivel pin housing oil level**

1. The front-wheel-drive universal joints and swivel pins receive their lubrication from the swivel pin housing.
2. Check oil level by removing the square-headed plug at the rear of the swivel pin housing; oil should be level with the bottom of the hole.
3. Top-up if necessary through the filler plug hole. If significant topping-up is required, check for oil leaks at plugs, joint faces, and oil seals.

**Renew swivel pin housing oil**

Drain and refill monthly operating under severe wading conditions.

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

4. Immediately after a run, when the oil is warm, remove the drain plug from the bottom of each housing.
5. Allow the oil to drain away completely and replace drain plugs.
6. Refill with oil of the correct grade through the oil level filler plug hole. Refer to Data for the capacity.

**Lubricate propeller shaft**

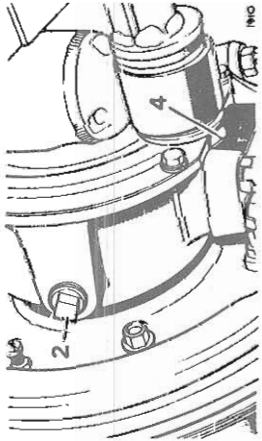
1. Apply one of the recommended greases at the lubrication nipple on the sliding portion of the rear propeller shaft.
2. To the lubrication nipples fitted to the universal joints of both front and rear shafts, except the double joint at the rear end of the front shaft which is lubricated for life.

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

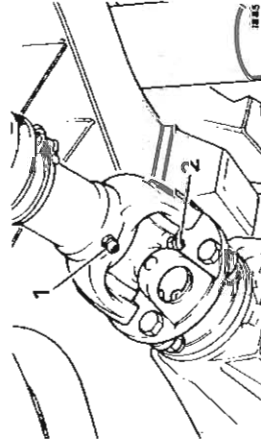
3. Disconnect one end of the propeller shaft.
4. Remove plug in sliding spline and fit a suitable grease nipple.

**IMPORTANT:** Compress propeller shaft at sliding joint to avoid over-filling, then apply grease.

5. Replace grease nipple with plug and reconnect propeller shaft.



1904



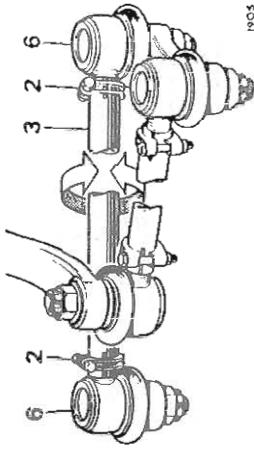
1905

**Check/adjust front wheel alignment**

The alignment should be 1.2 to 2.5 mm (0.046 to 0.093 in) toe-out.

**To adjust**

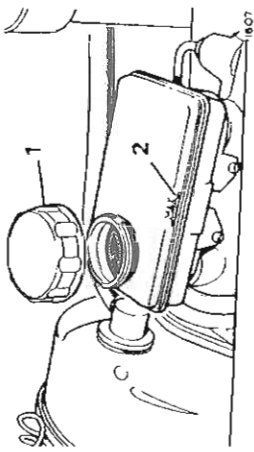
1. Set the vehicle on level ground with the road wheels in the straight-ahead position and push it forward a short distance.
2. Slacken the clamps securing the ball joints at each end of the track-rod.
3. Turn the track-rod to decrease or increase its effective length as necessary until the toe-out is correct.
4. Push the vehicle rearwards, turning the steering wheel from side to side to settle the ball joints, then the road wheels in the straight-ahead position, push the vehicle forward a short distance.
5. Re-check the toe-out; if necessary, carry out further adjustment.
6. When the toe-out 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.



1906

**Check/top-up brake fluid reservoir**

1. Inspect the brake fluid level against the mark on the side of the translucent reservoir.
2. If necessary, add new fluid via the filler cap on top of the reservoir.



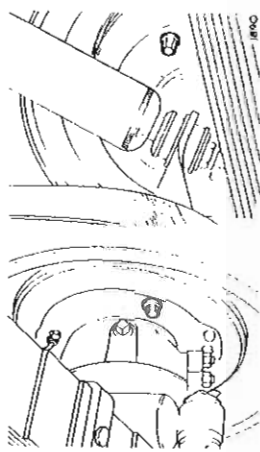
1907

**Check footbrake operation; adjust to manufacturer's instructions**

Each shoe is independently set by means of a hexagon adjustment bolt. Two adjusters are provided on each road

**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 the adjuster(s) until the brake shoe(s) contact(s) the wheel drum.
5. Slacken off each adjuster just sufficiently for the drum to rotate freely.
6. Lower the wheel.
7. Repeat for the other wheels in turn.



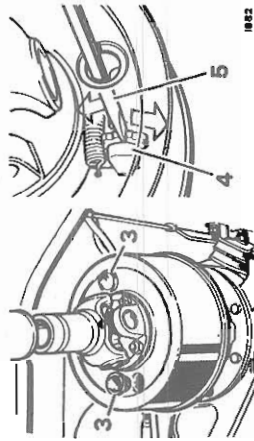
1908



Check handbrake security and operation; adjust to manufacturer's instructions

If the handbrake movement is excessive, adjust as follows:

1. Set the vehicle on level ground.
2. Release the handbrake fully.
3. From beneath the vehicle, remove the rubber blanking plugs from the brake drum.
4. Move the vehicle either forwards or backwards until the adjuster can be seen through one of the apertures.
5. With a screwdriver turn the adjuster wheel until the brake shoes come into contact with the brake drum.
6. Turn the adjuster back two 'clicks' and replace blanking plugs.
7. Check that the handbrake operates correctly and holds the vehicle.

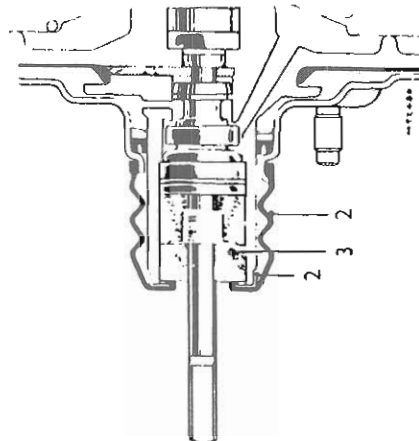


1882

**Renew servo filter element**

1. Remove the servo from the vehicle.
2. Slide the rubber boot and end-cap along the push-rod.
3. Remove the old filter from the neck of the diaphragm housing.
4. Sever the new filter obliquely from the periphery to the centre hole.
5. Fit the filter into the neck of the diaphragm housing.
6. Fit the end cap and rubber boot.

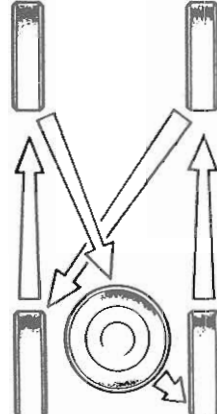
Alternatively, on some models it is possible to gain access to the filter cover (2) from inside the car. When fitting new filter, slice it diagonally to fit around the brake pedal operating rod before locating the filter in the servo and replacing the cover.



1883

**Interchange road wheels**

1. Apply the handbrake and engage four-wheel-drive before jacking-up the vehicle and placing it safely on to stands.
2. Interchange the road wheels as illustrated, ensuring that if cross-country-type tyres are in use, the 'V' tread is directed to the front of the vehicle.



1893

**Check tightness of road wheel fastenings**

If correct, these will be tightened to a torque of 10.3 to 11.7 kgf m.

**Check/adjust tyre pressures including spare**

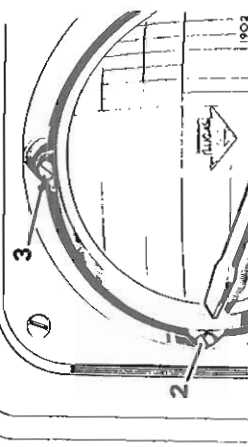
The correct tyre pressures (cold) for this model are:

	LADEN		UNLADEN	
Speeds up to 112 km/h (70 mph)	Front	1.8 kgf/cm <sup>2</sup>	25 lbf/in <sup>2</sup>	1.8 kgf/cm <sup>2</sup>
	Rear	2.3 kgf/cm <sup>2</sup>	25 lbf/in <sup>2</sup>	1.8 kgf/cm <sup>2</sup>
Speeds over 112 km/h (70 mph)	Front	2.24 kgf/cm <sup>2</sup>	32 lbf/in <sup>2</sup>	2.24 kgf/cm <sup>2</sup>
	Rear	3.02 kgf/cm <sup>2</sup>	32 lbf/in <sup>2</sup>	2.24 kgf/cm <sup>2</sup>
Towing	Front	2.24 kgf/cm <sup>2</sup>	32 lbf/in <sup>2</sup>	2.24 kgf/cm <sup>2</sup>
	Rear	3.02 kgf/cm <sup>2</sup>	32 lbf/in <sup>2</sup>	2.24 kgf/cm <sup>2</sup>
Cross-country	Front	1.1 kgf/cm <sup>2</sup>	15 lbf/in <sup>2</sup>	1.1 kgf/cm <sup>2</sup>
	Rear	1.8 kgf/cm <sup>2</sup>	26 lbf/in <sup>2</sup>	1.8 kgf/cm <sup>2</sup>

**Check/top-up battery electrolyte**

Remove the battery lid or plugs and add sufficient distilled water to raise the level to the top of the separators.

DO NOT OVERFILL



1902

**Check/adjust headlamp alignment**

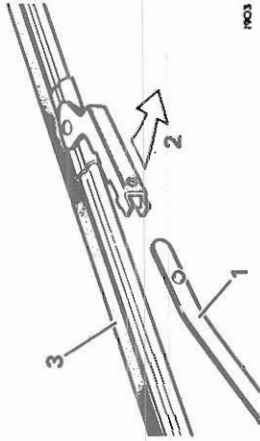
1. This operation requires special equipment and should be carried out by a Rover Distributor or Dealer.
2. In an emergency each headlamp can be adjusted by means of a headlamp horizontal adjusting screw and the headlamp vertical adjusting screw.
3. The adjusting screws are accessible through slots in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

Check, if necessary renew, wiper blades

1. Check each wiper blade for damage.
2. Wet the glass and operate the wipers.
3. Renew any blade that is damaged or is smearing the glass as follows.

Examine condition of wiper blades, replace as necessary

1. Lift the wiper arm forwards, away from the windscreen.
2. Twist the wiper fixing bracket in the direction arrowed and disengage it from the wiper arm.
3. To fit a new blade locate its fixing bracket over the end of the wiper arm and push on until the retaining dowel is engaged.



MO3

Check operation of seat belt inertia reel mechanism

The following road test should only be carried out under maximum safe road conditions, i.e. on a dry straight, traffic-free road.

With the safety harness fitted to the driver and front seat passenger, drive the vehicle at 8 km/h, and ensuring that it is safe to do so, brake sharply.

The safety harness should lock automatically, holding both driver and front seat passenger securely in position. **NOTE:** It is important that when braking the reactions of the seat belt wearers are normal, i.e. the body must not be thrown forward in anticipation, thus causing a 'snatching' action of the belt which might lock it.

Snatch test: Whilst seated, fasten the seat belt and grip the shoulder belt at approximately shoulder level with the opposite hand. Pull the belt sharply in a downwards direction. The belt should lock.

Replace any belt that fails to function satisfactorily.

ENGINE

FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
ENGINE FAILS TO START	<ol style="list-style-type: none"> <li>1. Incorrect starting procedure</li> <li>2. Starter motor speed too slow</li> <li>3. Faulty ignition system...</li> <li>4. Water or dirt in fuel system</li> <li>5. Carburettor(s) flooding</li> <li>6. Defective fuel pump system</li> <li>7. Air in fuel lines</li> <li>8. Starter pinion not engaging</li> </ol>	<ol style="list-style-type: none"> <li>1. See Instruction Manual</li> <li>2. Check battery and connections</li> <li>3. See Group 86</li> <li>4. See Group 19</li> <li>5. See Group 19</li> <li>6. See Group 86</li> <li>7. See Group 86</li> <li>8. Remove starter motor and investigate</li> </ol>
ENGINE STALLS	<ol style="list-style-type: none"> <li>1. Low idling speed</li> <li>2. Faulty sparking plugs</li> <li>3. Faulty coil or condenser</li> <li>4. Faulty distributor points</li> <li>5. Incorrect mixture</li> <li>6. Foreign matter in fuel system</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust carburettor. See Group 19</li> <li>2. Clean and test; renew if necessary</li> <li>3. Renew</li> <li>4. Rectify or renew. See Group 86</li> <li>5. Adjust carburettor. See Group 19</li> <li>6. See Group 19</li> </ol>
LACK OF POWER	<ol style="list-style-type: none"> <li>1. Poor compression</li> <li>2. Badly seating valves</li> <li>3. Faulty exhaust silencer</li> <li>4. Incorrect ignition timing</li> <li>5. Leaks or restriction in fuel system</li> <li>6. Excessive carbon deposit</li> <li>7. Brakes binding</li> <li>8. Faulty coil, condenser or battery</li> <li>9. Faulty fuel pump</li> </ol>	<ol style="list-style-type: none"> <li>1. If the compression is appreciably less than the correct figure, the piston rings or valves are faulty. Low pressure in adjoining cylinders indicates a faulty cylinder head gasket</li> <li>2. Rectify or renew</li> <li>3. Renew</li> <li>4. Rectify</li> <li>5. See Group 19</li> <li>6. Rectify</li> <li>7. Decarbonize</li> <li>8. See Group 70</li> <li>9. See Group 86</li> </ol>
ENGINE RUNS ERRATICALLY	<ol style="list-style-type: none"> <li>1. Faulty electrical connections</li> <li>2. Defective sparking plugs</li> <li>3. Defective distributor</li> <li>4. Defective carburettor</li> <li>5. Foreign matter in fuel system</li> <li>6. Faulty fuel pump</li> <li>7. Sticking valves</li> <li>8. Defective valve springs</li> <li>9. Incorrect ignition timing</li> <li>10. Worn valve guides or valves</li> <li>11. Faulty cylinder head gaskets</li> <li>12. Damaged exhaust system</li> <li>13. Vacuum hoses disconnected at inlet manifold, distributor or gearbox</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify or rectify</li> <li>2. Renew or rectify</li> <li>3. Rectify</li> <li>4. Rectify</li> <li>5. See Group 19</li> <li>6. See Group 19</li> <li>7. Rectify or renew</li> <li>8. Renew</li> <li>9. Rectify</li> <li>10. Rectify</li> <li>11. Renew</li> <li>12. Rectify or renew</li> <li>13. Retri pipes</li> </ol>
ENGINE STARTS, BUT STOPS IMMEDIATELY	<ol style="list-style-type: none"> <li>1. Faulty electrical connections</li> <li>2. Foreign matter in fuel system</li> <li>3. Faulty fuel pump</li> <li>4. Low fuel level in tank</li> </ol>	<ol style="list-style-type: none"> <li>1. Check HT leads for cracked insulation; check low tension circuit</li> <li>2. See Group 19</li> <li>3. See Group 19</li> <li>4. Replenish</li> </ol>
ENGINE FAILS TO IDLE	<ol style="list-style-type: none"> <li>1. Incorrect carburettor setting</li> <li>2. Faulty fuel pump</li> <li>3. Sticking valves</li> <li>4. Faulty cylinder head gasket(s)</li> </ol>	<ol style="list-style-type: none"> <li>1. See Group 19</li> <li>2. See Group 19</li> <li>3. Rectify or renew</li> <li>4. Renew</li> </ol>
ENGINE MISFIRES ON ACCELERATION	<ol style="list-style-type: none"> <li>1. Distributor points incorrectly set</li> <li>2. Faulty coil or condenser</li> <li>3. Faulty sparking plugs</li> <li>4. Faulty carburettor</li> <li>5. Vacuum pipes disconnected at inlet manifold</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify. See Group 86</li> <li>2. Renew</li> <li>3. Rectify</li> <li>4. See Group 19</li> <li>5. Check all vacuum connections</li> </ol>
ENGINE KNOCKS	<ol style="list-style-type: none"> <li>1. Ignition timing advanced</li> <li>2. Excessive carbon deposit</li> <li>3. Incorrect carburettor setting</li> <li>4. Unusable fuel</li> <li>5. Worn pistons or bearings</li> <li>6. Distributor advance mechanism faulty</li> <li>7. Defective sparking plugs</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust</li> <li>2. Decarbonise</li> <li>3. See Group 19</li> <li>4. Adjust ignition timing. See Group 86</li> <li>5. Renew</li> <li>6. Rectify. See Group 86</li> <li>7. Rectify or renew</li> </ol>

Continued

SYMPTOM	POSSIBLE CAUSE	CURE
ENGINE BACKFIRES	<ol style="list-style-type: none"> <li>Ignition defect</li> <li>Carburetor defect</li> <li>Sticking valve</li> <li>Weak valve springs</li> <li>Ridily seating valves</li> <li>Excessively worn valve stems and guides</li> <li>Excessive carbon deposit</li> <li>Incorrect sparking plug gap</li> <li>Air leak in induction or exhaust systems</li> </ol>	<ol style="list-style-type: none"> <li>See Group 86</li> <li>See Group 19</li> <li>Rectify</li> <li>Rectify</li> <li>Rectify or renew</li> <li>Rectify</li> <li>Decarbonize</li> <li>Reset</li> <li>Renew faulty gaskets or components</li> </ol>
BURNED VALVES	<ol style="list-style-type: none"> <li>Sticking valves</li> <li>Weak valve springs</li> <li>Excessive deposit on valve seats</li> <li>Distorted valves</li> <li>Excessive mileage between overhauls</li> </ol>	<ol style="list-style-type: none"> <li>Rectify</li> <li>Renew</li> <li>Re-cut</li> <li>Renew</li> <li>Decarbonize</li> </ol>
NOISY VALVE MECHANISM	<ol style="list-style-type: none"> <li>Excessive oil in sump, causing air bubbles</li> <li>Worn tapered parts in valve operating mechanism</li> <li>Valves and seats out down excessively, raising end of valve stem 1.27 mm (0.050 in) above normal position</li> <li>Sticking valves</li> <li>Weak valve springs</li> <li>Worn timing chain or chain wheels</li> </ol>	<ol style="list-style-type: none"> <li>Drain and refill to correct level</li> <li>Replace faulty parts</li> <li>Grind off end of valve stem or replace parts</li> <li>Rectify</li> <li>Renew</li> <li>Renew worn parts</li> </ol>
NOISE FROM HYDRAULIC TAPPETS	<ol style="list-style-type: none"> <li>Oil too heavy for prevailing temperature.</li> <li>Excessive varnish in tappet</li> <li>Leakage at check ball</li> <li>Excessive leakdown</li> <li>High oil level in sump</li> <li>Leakage at check ball</li> <li>Worn tappet body</li> <li>Worn camshaft</li> <li>Excessive leak-down rate or scored lifter/plunger</li> </ol>	<ol style="list-style-type: none"> <li>Drain and refill with correct grade</li> <li>Replace tappet</li> <li>Replace tappet</li> <li>Drain and refill to correct level</li> <li>Replace tappet</li> <li>Replace tappet</li> <li>Replace camshaft</li> <li>Replace tappet</li> </ol>
MAIN BEARING RATTLE	<ol style="list-style-type: none"> <li>Low oil level</li> <li>Low oil pressure</li> <li>Excessive bearing clearance</li> <li>Burnt-out bearings</li> <li>Loose bearing caps</li> </ol>	<ol style="list-style-type: none"> <li>Replenish as necessary</li> <li>See next symptom</li> <li>Renew bearings, grind crankshaft</li> <li>Renew</li> <li>Tighten</li> </ol>
LOW OIL PRESSURE WARNING LIGHT REMAINS ON ENGINE RUNNING	<ol style="list-style-type: none"> <li>Thin or diluted oil</li> <li>Low oil level</li> <li>Low oil pressure</li> <li>Faulty oil pressure gauge</li> <li>Faulty release valve</li> <li>Excessive bearing clearance</li> <li>Oil pressure switch unserviceable</li> <li>Electrical fault</li> <li>Relief valve/plunger sticking</li> <li>Weak relief valve spring</li> <li>Pump rotors excessively worn</li> <li>Excessively worn bearings: main, connecting rod, big end, camshaft, etc.</li> </ol>	<ol style="list-style-type: none"> <li>Drain and refill with correct oil</li> <li>Replenish</li> <li>Rectify</li> <li>Rectify</li> <li>Rectify</li> <li>Renew</li> <li>Check circuit</li> <li>Remove and ascertain cause</li> <li>Renew</li> <li>Renew</li> <li>Ascertains which bearings and rectify</li> </ol>
RATTLE IN LUBRICATION SYSTEM	<ol style="list-style-type: none"> <li>Oil pressure relief valve plunger sticking</li> </ol>	<ol style="list-style-type: none"> <li>Remove and clean</li> </ol>
ENGINE OVERHEATING	<ol style="list-style-type: none"> <li>Low coolant level</li> <li>Faulty cooling system</li> <li>Faulty thermostat</li> <li>Incorrect timing</li> <li>Defective lubrication system</li> </ol>	<ol style="list-style-type: none"> <li>Check for leaks</li> <li>See Group 26</li> <li>Renew</li> <li>Rectify</li> <li>See Group 12</li> </ol>

## CAMSHAFT

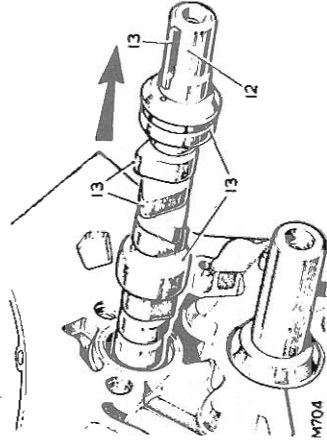
## — Remove and refit 12.13.01

## Removing

- Drain the cooling system, see 26.10.01.
- Remove the fan blades and pulley, see 26.25.01.
- Remove the fan cowl, see 26.25.11.
- Remove the radiator block, see 26.40.04.
- Remove the radiator grille, see 76.55.03.
- Remove the alternator, see 86.10.02.
- Remove the air cleaner, see 19.10.01.
- Remove the induction manifold, see 30.15.02.
- Remove the valve gear, see 1.2.29.34.
- Remove the timing chain cover, see 12.65.01.
- Remove the timing chain, see 1.2.65.12.

**CAUTION: Do not damage the bearings when withdrawing the camshaft.**

- Withdraw the camshaft.



M704

## Inspecting

- Check all bearing surfaces for excessive wear and score marks. Also check cam lobes for excessive wear. Check key and keyway.

## Refitting

- Reverse instructions 1 to 12.

**CAUTION: During reassembly, it is essential that the camshaft key, spacer and distributor drive gear are all refitted as described in operation 1.2.65.12. Failure to observe these requirements may result in restriction or total blockage of oil passage to the timing gear.**

CONNECTING RODS AND PISTONS

12.17.01

Remove and refit

Service tool: 605351—Guide bolts for connecting rods

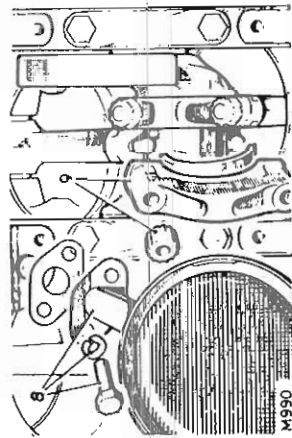
Removing

1. Drain the cooling system, see 26.10.01.
2. Remove the air cleaner, see 19.10.01.
3. Remove the alternator, see 86.10.02.
4. Remove the induction manifold, see 30.15.02.
5. Remove the valve gear, see 12.29.34.
6. Remove the cylinder heads, see 12.29.10.
7. Remove the oil sump, see 12.60.44.
8. Remove the sump oil strainer.
9. Remove the connecting rod caps and retain them in sequence for reassembly.
10. Screw the guide bolts 605351 onto the connecting rods.
11. Push the connecting rod and piston assembly up the cylinder bore and withdraw it from the top. Retain the connecting rod and piston assemblies in sequence with their respective caps.
12. Remove the guide bolts 605351 from the connecting rod.

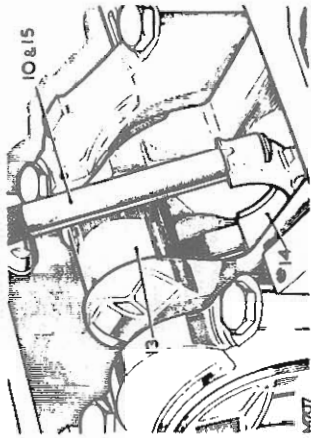
Refitting

13. Locate the applicable crankshaft journal at B.D.C.
14. Place the bearing upper shell in the connecting rod.
15. Retain the upper shell by screwing the guide bolts 605351 onto the connecting rods.
16. Insert the connecting rod and piston assembly into its respective bore, noting that the domed shape boss on the connecting rod must face towards the front of the engine on the right-hand bank of cylinders and towards the rear on the left-hand bank. When both connecting rods are fitted, the bosses will face inwards towards each other.
17. Position the oil control piston rings so that the ring gaps are all at one side, between the gudgeon pin and piston thrust face. Space the gaps in the ring rails approximately 25 mm (1 in) each side of the expansion ring joint.
18. Position the compression rings so that their gaps are on opposite sides of the piston between the gudgeon pin and piston thrust face.
19. Using a piston ring compressor, locate the piston into the cylinder bore.

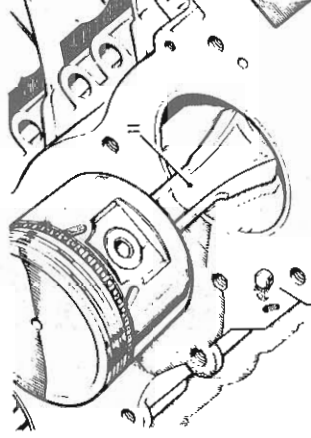
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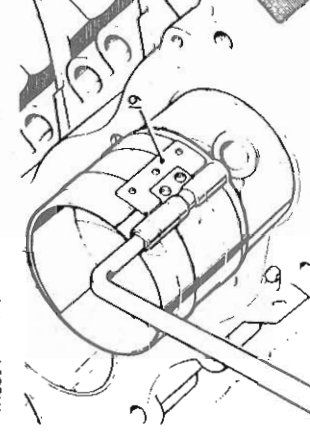
M950



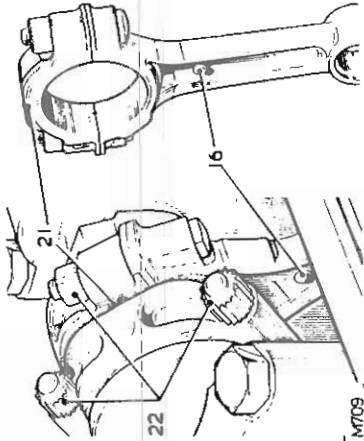
M707



1RC394



1RC395



M709

20. Place the bearing lower shell in the connecting rod cap.
21. Locate the cap and shell on to the connecting rod, noting that the rib on the edge of the cap must be towards the front of the engine on the right-hand bank of cylinders and towards the rear on the left-hand bank.
22. Secure the connecting rod cap. Torque 4.0 to 4.9 kgf m (30 to 35 lbf ft).
23. Reverse instructions 1 to 8.

DATA

Standard size cylinder bore diameter . . . . . 88.861 to 88.900 mm (3.4985 to 3.5000 in)

Connecting rod:

Length between centres . . . . . 143.71 to 143.81 mm (5.658 to 5.662 in)  
 Bearings:  
 Clearance on crankshaft . . . . . 0.015 to 0.055 mm (0.0006 to 0.0022 in)  
 End-float on crankshaft . . . . . 0.15 to 0.37 mm (0.006 to 0.014 in)

Pistons and gudgeon pins:

Pistons:

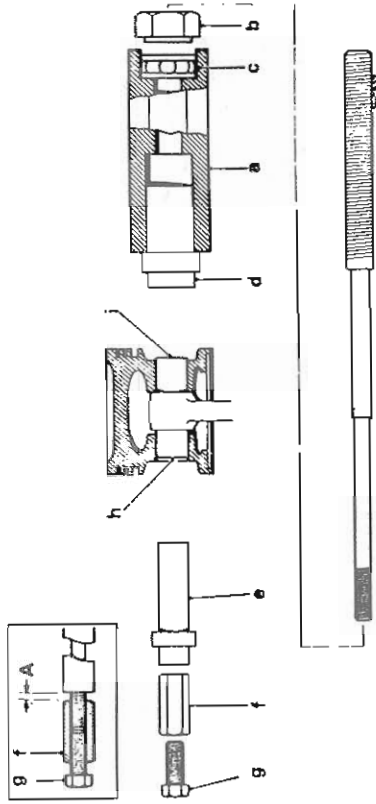
Type . . . . . Aluminium alloy, concave topped  
 Depth of concave . . . . . 5.21 to 5.31 mm (0.205 to 0.209 in)  
 Clearance at skirt bottom . . . . . 0.018 to 0.033 mm (0.0007 to 0.0013 in)

Piston rings:

No. 1 compression ring . . . . . Chrome faced  
 No. 2 compression ring . . . . . Stepped to 'L' shape and marked 'TOP'  
 Compression ring height . . . . . 1.71 to 1.73 mm (0.0615 to 0.0625 in)  
 Compression ring clearance in piston groove . . . . . 0.05 to 0.10 mm (0.002 to 0.004 in)  
 Compression ring gap . . . . . 0.44 to 0.56 mm (0.017 to 0.022 in)  
 Oil control ring . . . . . Two oil rings with separate spacer  
 Rail oil rings . . . . . Perfect circle 110-15  
 Spacer . . . . . Perfect circle 110-37

Gudgeon pins:

Length . . . . . 72.67 to 72.79 mm (2.861 to 2.866 in)  
 Diameter . . . . . 22.215 to 22.22 mm (0.8746 to 0.8748 in)  
 Fit in con rod . . . . . Press fit  
 Clearance in piston . . . . . 0.005 to 0.007 mm (0.0002 to 0.0003 in)



## CONNECTING RODS AND PISTONS

## ---Overhaul

## 12.17.10

Service tools: 18G 537, 18G 587, 18G 1150, 18G 1150 E or 605350

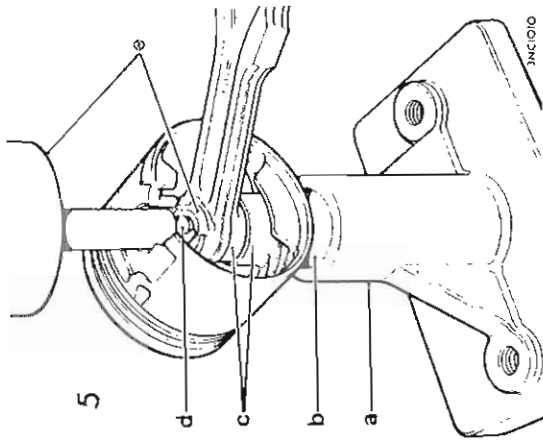
## Dismantling

1. Remove the connecting rods and pistons, see 12.17.01.  
NOTE: The connecting rods, caps and bearing shells must be retained in sets, and in the correct sequence.
2. Remove the piston rings over the crown of the piston.
3. If the same piston is to be refitted, mark it relative to its connecting rod to ensure that the original assembly is maintained.
4. Withdraw the gudgeon pin, using tool 18G 1150 as follows:
  - a. Clamp the hexagon body of 18G 1150 in a vice.
  - b. Position the large nut flush with the end of the centre screw.

continued

- c. Push the screw forward until the nut contacts the thrust race.
- d. Locate the piston adaptor 18G 1150 E with its long spigot inside the bore of the hexagon body.
- e. Fit the remover/replacer bush of 18G 1150 on the centre screw with the flanged end away from the gudgeon pin.
- f. Screw the stop-nut about half-way onto the smaller threaded end of the centre screw, leaving a gap 'A' of 3 mm (1/8 in) between this nut and the remover/replacer bush.
- g. Lock the stop-nut securely with the lock screw.
- h. Check that the remover/replacer bush is correctly positioned in the bore of the piston.
- i. Push the connecting rod to the right to expose the end of the gudgeon pin, which must be located in the end of the adaptor 'd'.
- j. Screw the large nut up to the thrust race.
- k. Hold the lock screw and turn the large nut until the gudgeon pin has been withdrawn from the piston. Dismantle the tool.

continued



5. As an alternative to tool 18G 1150, press the gudgeon pin from the piston using a hydraulic press and the components which comprise tool 605350 as follows:
  - a. Place the base of tool 605350 on the bed of an hydraulic press which has a capacity of 8 tons (8 tonnes).
  - b. Fit the guide tube into the bore of the base with its countersunk face uppermost.
  - c. Push the piston to one side so as to expose one end of the gudgeon pin and locate this end in the guide tube.
  - d. Fit the spigot end of the small diameter mandrel into the gudgeon pin.
  - e. Press out the gudgeon pin, using the hydraulic press.

## Overhauling pistons

## Original pistons

6. Remove the carbon deposits, particularly from the ring grooves.
7. Examine the pistons for signs of damage or excessive wear: refer to 'new pistons' for the method of checking the running clearance. Fit new pistons if necessary.

## New pistons

Pistons are available in service standard size and in oversizes of 0.25 mm (0.010 in) and 0.50 mm (0.020 in). Service standard size pistons are supplied 0.0254 mm (0.001 in) oversize. When fitting new service standard size pistons to a cylinder block, check for correct piston to bore clearance, honing the bore if necessary. Bottom of piston skirt/bore clearance should be 0.018 to 0.033 mm (0.0007 to 0.0013 in).

NOTE: The temperature of the piston and cylinder block must be the same to ensure accurate measurement. When reboring the cylinder block, the crankshaft main bearing caps must be fitted and tightened to the correct torque.

continued

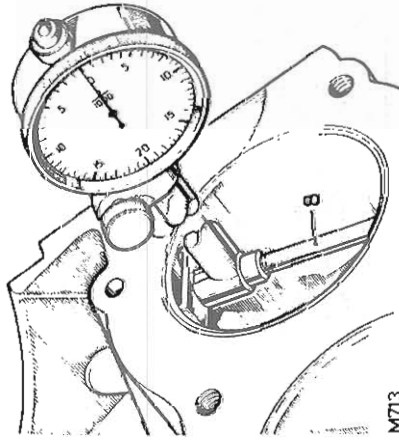
8. Check the cylinder bore dimension at right angles to the gudgeon pin. 40 to 50 mm (1 1/4 to 2 in) from the top.
9. Check the piston dimension at right angles to the gudgeon pin, at the bottom of the skirt.
10. The piston dimension must be 0.018 to 0.033 mm (0.0007 to 0.0013) smaller than the cylinder.
11. If new piston rings are to be fitted without reborring, deglaze the cylinder walls with a hone, without increasing the bore diameter.

**IMPORTANT:** A deglazed bore must have a cross-hatch finish.

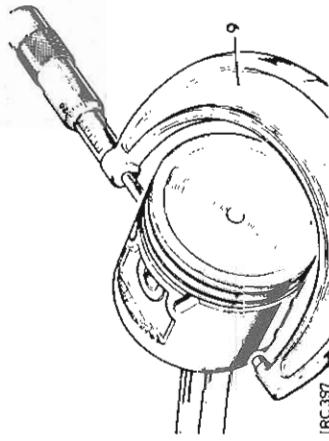
12. Check the compression ring gaps in the applicable cylinder, held square to the bore with the piston. Gap limits: 0.44 to 0.56 mm (0.017 to 0.022 in). Use a fine-cut flat file to increase the gap if required. Select a new piston ring if the gap exceeds the limit.

**NOTE:** Gapping does not apply to oil control rings.

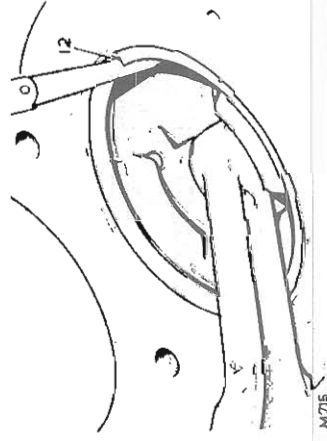
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M713



IRC397

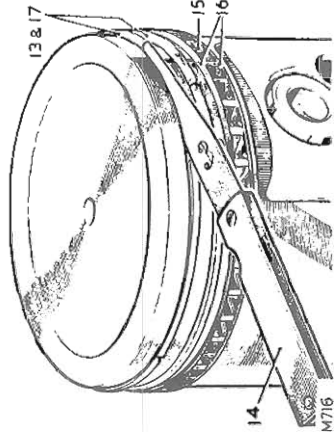


M715

13. Temporarily fit the compression rings to the piston. The ring marked 'TOP' must be fitted with the marking uppermost and into the second groove. The chrome ring is for the top groove and can be fitted either way round.
14. Check the compression ring clearance in the piston groove. Clearance limits: 0.05 to 0.10 mm (0.002 to 0.004 in).

#### Fitting piston rings

15. Fit the expander ring into the bottom groove making sure that the ends abut and do not overlap.
16. Fit two ring rails to the bottom groove, one above and one below the expander ring.
17. Fit the second compression ring with the marking 'TOP' uppermost and the chrome compression ring in the top groove, either way round.



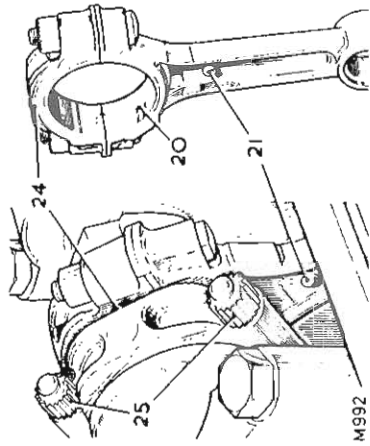
M716

#### Connecting rods

18. Check the alignment of the connecting rod.
19. Check the connecting rod small end, the gudgeon pin must be an interference fit.

#### Big-end bearings

20. Locate the bearing upper shell into the connecting rod.
21. Locate the connecting rod and bearing on to the applicable crankshaft journal, noting that the domed shape boss on the connecting rod must face towards the front of the engine on the right-hand bank of cylinders and towards the rear on the left-hand bank. When both connecting rods are fitted, the bosses will face inwards towards each other.
22. Place a piece of Plastigauge 605238, across the centre of the lower half of the crankshaft journal.
23. Locate the bearing lower shell into the connecting rod cap.
24. Locate the cap and shell on to the connecting rod. Note that the rib on the edge of the cap must be the same side as the domed shape boss on the connecting rod.
25. Secure the connecting rod cap. Torque 4.0 to 4.9 kgf m (30 to 35 lbf ft).



M992

continued

**IMPORTANT:** Do not rotate the crankshaft while the Plastigauge is fitted.

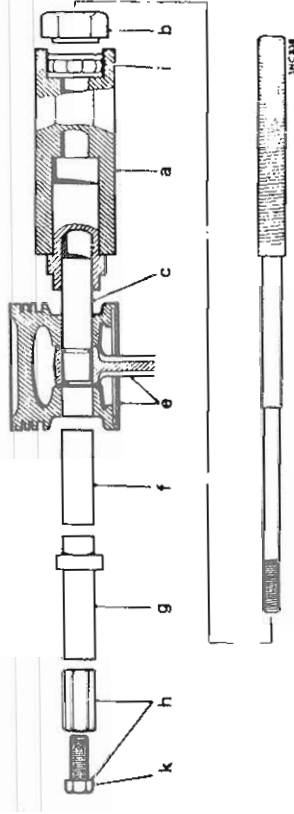
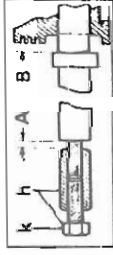
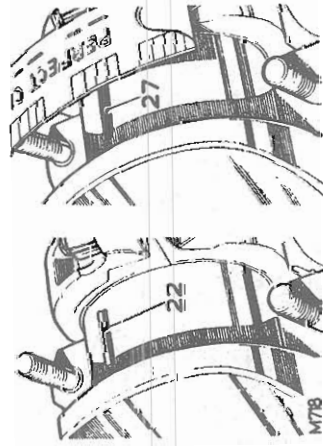
26. Remove the connecting rod cap and shell.
27. Using the scale printed on the Plastigauge packet, measure the flattened Plastigauge at its widest point. The graduation that most closely corresponds to the width of the Plastigauge indicates the bearing clearance.
28. The correct bearing clearance with new or overhauled components is 0.013 to 0.06 mm (0.0006 to 0.0022 in).
29. If a bearing has been in service, it is advisable to fit a new bearing if the clearance exceeds 0.08 mm (0.003 in).
30. If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
31. Wipe off the Plastigauge with an oily rag. **DO NOT** scrape it off.

**IMPORTANT:** The connecting rods, caps and bearing shells must be retained in sets, and in the correct sequence.

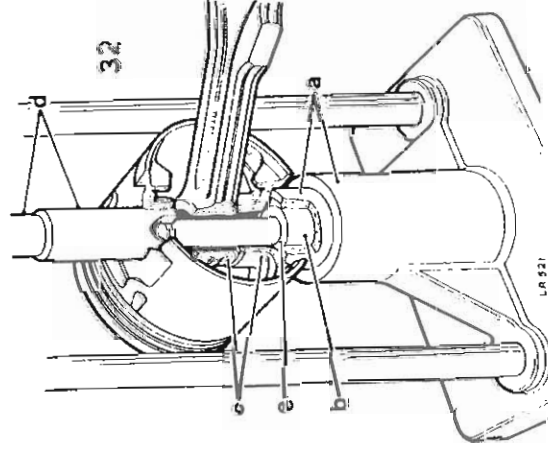
#### Reassembling

32. If an hydraulic press and tool 605350 were used for dismantling, refit each piston to its connecting rod as follows:
  - a. Check that the base of tool 605350 and the guide tube are fitted as in 5a and 5b.
  - b. Fit the long mandrel inside the piston with the markings together if the original pair are being used, then place the piston and connecting rod assembly over the long mandrel until the gudgeon pin boss rests on the guide tube.
  - c. Fit the gudgeon pin into the piston up to the connecting rod, and the spigot end of the small diameter mandrel into the gudgeon pin.
  - d. Press in the gudgeon pin until it abuts the shoulder of the long mandrel.

continued



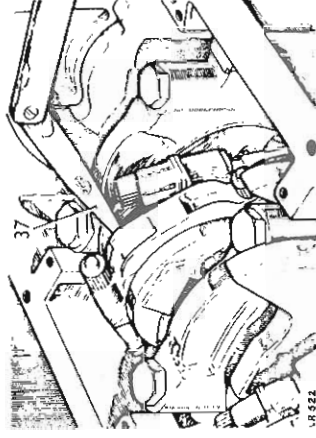
33. If tool 18G 1150 was used for dismantling, refit each piston to its connecting rod as follows:
  - a. Clamp the hexagon body of 18G 1150 in a vice, with the adaptor 18G 1150 E positioned as in 44.
  - b. Remove the large nut of 18G 1150 and push the centre screw approximately 2 in (50 mm) into the body until the shoulder is exposed.
  - c. Slide the parallel guide sleeve, grooved end last, onto the centre screw and up to the shoulder.
  - d. Lubricate the gudgeon pin and bores of the connecting rod and piston with graphited oil (Acheson's Colloids 'Oldtag'). Also lubricate the ball race and centre screw of 18G 1150.
  - e. Fit the connecting rod and the piston together onto the tool with the markings together if the original pair are being used and with the connecting rod around the sleeve up to the groove.
  - f. Fit the gudgeon pin into the piston bore up to the connecting rod.
  - g. Fit the remover/replacer bush 18G 1150/3 with its flanged end towards the gudgeon pin.
  - h. Screw the stop-nut onto the centre screw and adjust this nut to obtain a 1 mm (1/16 in) end-float 'A' on the whole assembly, and lock the nut securely with the screw.
  - i. Slide the assembly back into the hexagon body and screw on the large nut up to the thrust race.
  - j. Set the torque wrench 18G 537 to 12 lbf ft. This represents the minimum load for an acceptable interference fit of the gudgeon pin in the connecting rod.
  - k. Using the torque wrench and socket 18G 587 on the large nut, and holding the lock screw, pull the gudgeon pin in until the flange of the remover/replacer bush is 4 mm (0.160 in) 'B'



from the face of the piston. Under no circumstances must this flange be allowed to contact the piston.

**CAUTION:** If the torque wrench has not broken throughout the pull, the fit of the gudgeon pin to the connecting rod is not acceptable and necessitates the renewal of components. The large nut and centre screw of the tool must be kept well-oiled.

- l. Remove the tool.



34. Check that the piston moves freely on the gudgeon pin and that no damage has occurred during pressing.
35. Fit the connecting rods and pistons, see [2.17.01], carrying out the following checks during fitting.
36. Check that the connecting rods move freely sideways on the crankshaft. Tightness indicates insufficient bearing clearance or a misaligned connecting rod.
37. Check the end-float between the connecting rods on each crankshaft journal. Clearance limits: 0.15 to 0.37 mm (0.006 to 0.014 in).

## ENGINE

### CRANKSHAFT

— Remove and refit 12.21.33

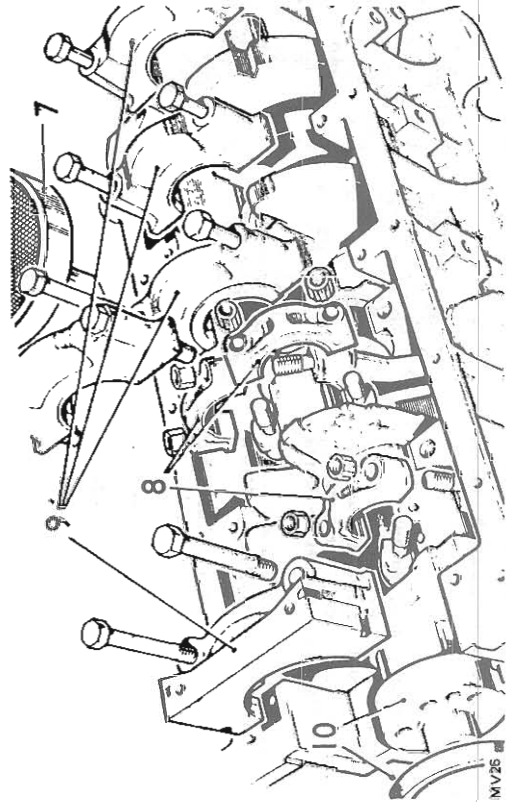
Service tools: 605351 Guide bolts for connecting rods, RO 1014 Seal guide

#### Removing

1. Remove the engine assembly, see 12.41.01.
2. Remove the timing gear cover, see 12.65.01.
3. Remove the timing chain and gears, see 12.6.5.12.
4. Remove the clutch, see 33.10.01.
5. Remove the flywheel, see 12.53.07.
6. Remove the oil sump, see 12.60.44.
7. Remove the sump oil strainer.
8. Remove the connecting rod caps and lower bearing shells and retain in sequence.
9. Remove the main bearing caps and lower bearing shells and retain in sequence. (On later engines the bearing caps may be visually different to those shown.)

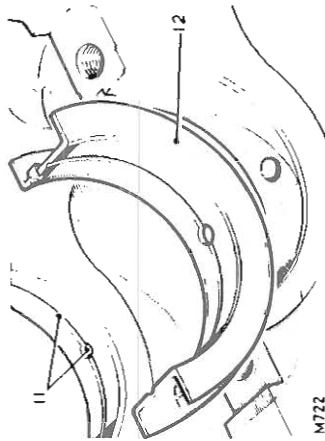
**IMPORTANT:** If the same bearing shells are to be refitted, retain them in pairs and mark them with the number of the respective journal.

10. Withdraw the crankshaft and the rear oil seal.



MV26

12-12



M722

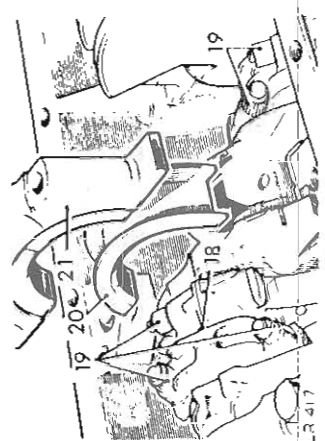
#### Refitting

11. Locate the upper main bearing shells into the cylinder block; these must be the shells with the oil drilling and oil grooves.
12. Locate the flanged upper main bearing shell in the centre position.



LR 416

13. Place suitable blocks, approximately 12.5 mm (0.500 in) thick, on to each end of the cylinder block so that they cover the front and rear upper main bearing shells.
14. Lift the crankshaft into position with the ends supported on the blocks.
15. Lubricate the crankshaft journals and bearing shells with engine oil.
16. Holding the connecting rods in position, remove one of the blocks and lower the crankshaft on to the connecting rod bearings. Repeat for the opposite end.
17. Where necessary, use the guide bolt 605351 to draw the connecting rods up to the crankshaft journal.



CR 417

18. Locate the bearing caps and lower shells on to the connecting rods, noting that the rib on the edge of the cap must be towards the front of the engine on the right-hand bank of cylinders, and towards the rear on the left-hand bank.
19. Secure the connecting rod caps. Torque: 4.0 to 4.9 kgf m (30 to 35 lbf ft).
20. Lubricate the lower main bearing shells with engine oil.
21. Fit numbers one to four main bearing caps and shells, leaving the fixing bolts finger tight at this stage.

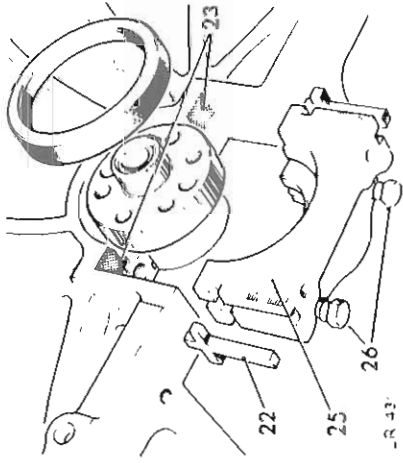
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12-13



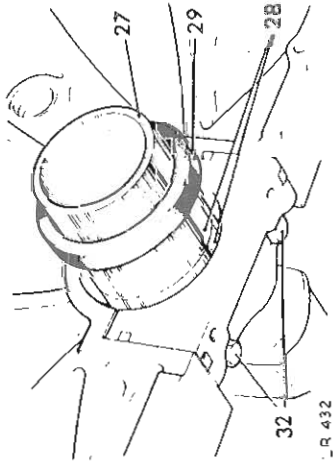
**CAUTION:** Do not handle the seal lip, visually check that it is not damaged and ensure that the outside diameter remains clean and dry.

22. Fit the cruciform side seals to the grooves each side of the rear main bearing cap. Do not cut the side seals to length, they must protrude 1,5 mm (0.062 in) approximately above the bearing cap parting face.
23. Apply Hylomar PL32M jointing compound to the rear-most half of the rear main bearing cap parting face or, if preferred, to the equivalent area on the cylinder block as illustrated.
24. Lubricate the bearing half and bearing cap side seals with clean engine oil.
25. Fit the bearing cap assembly to the engine. Do not tighten the fixings at this stage but ensure that the cap is fully home and squarely seated on the cylinder block.
26. Tension the cap bolts equally by one-quarter turn approximately, then back off one complete turn on each fixing bolt.



27. Position the seal guide RO 1014 on the crankshaft flange.
28. Ensure that the oil seal guide and the crankshaft journal are scrupulously clean, then coat the seal guide and oil seal journal with clean engine oil.

- NOTE:** The lubricant coating must cover the seal guide outer surface completely to ensure that the oil seal lip is not turned back during assembly.
29. Position the oil seal, lipped side towards the engine, onto the seal guide. The seal outside diameter must be clean and dry.
  30. Push home the oil seal fully and squarely by hand into the recess formed in the cap and block until it abuts against the machined step in the recess.
  31. Withdraw the seal guide.
  32. Tighten the rear main bearing cap fixings fully and evenly. Torque loading: 9.0 to 9.6 kgf m (6.5 to 7.0 lbf ft).
  33. Check the crankshaft end-float. Limits: 0.10 to 0.20 mm (0.004 to 0.008 in).  
Reverse instructions 1 to 7.



## CRANKSHAFT

--Overhaul

12.21.46

Service tools: 605238 Plastigauge

1. Remove the crankshaft, see 12.21.33.

## Inspecting

2. Rest the crankshaft on vee-blocks at numbers one and five main bearing journals.
3. Using a dial test indicator, check the run-out at numbers two, three and four main bearing journals. The total indicator readings at each journal should not exceed 0.08 mm (0.003 in).
4. While checking the run-out at each journal, note the relation of maximum eccentricity on each journal to the others. The maximum on all journals should come at very near the same angular location.
5. If the crankshaft fails to meet the foregoing checks it is bent and is unsatisfactory for service.
6. Check each crankshaft journal for ovality. If ovality exceeds 0.040 mm (0.0015 in), a regrind or new crankshaft should be fitted.
7. 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)
8. The centre main bearing shell, which controls crankshaft thrust, has the thrust faces increased in thickness when more than 0.25 mm (0.010 in) undersize, as shown on the following chart.
9. When a crankshaft is to be regrind, the thrust faces on either side of the centre main journal must be machined in accordance with the dimensions on the following charts.

Main bearing journal size	Thrust face width
Standard	Standard
0.25 mm (0.010 in) undersize	Standard
0.50 mm (0.020 in) undersize	0.25 mm (0.010 in) oversize

For example: If a 0.50 mm (0.020 in) undersize bearing is to be fitted, then 0.12 mm (0.005 in) must be machined off each thrust face of the centre journal, maintaining the correct radius.

continued

Crankshaft dimensions 10 to 14

10. The radius for all journals except the rear main bearing is 1.90 to 2.28 mm (0.075 to 0.090 in).
11. The radius for the rear main bearing journal is 3.04 mm (0.120 in).
12. Main bearing journal diameter, see the following charts.
13. Thrust face width, see the following charts.
14. Connecting rod journal diameter, see the following charts.

Crankshaft dimensions — millimetres

Crankshaft Grade	Diameter '12'	Width '11'	Diameter '14'
Standard	58.400-58.413	26.975-27.026	50.800-50.812
0.254 U/S	58.146-58.158	26.975-27.026	50.546-50.559
0.508 U/S	57.892-57.904	27.229-27.280	50.292-50.305

Crankshaft dimensions — inches

Crankshaft grade	Diameter '12'	Width '13'	Diameter '14'
Standard	2.2992-2.2997	1.062-1.064	2.0000-2.0005
0.010 U/S	2.2892-2.2897	1.062-1.064	1.9900-1.9905
0.020 U/S	2.2792-2.2797	1.072-1.074	1.9800-1.9805

Checking the main bearing clearance

15. Remove the oil seals from the cylinder block and the rear main bearing cap.
16. Locate the upper main bearing shells into the cylinder block. These must be the shells with the oil drilling and oil grooves.
17. Locate the flanged upper main bearing shell in the centre position.
18. Place the crankshaft in position on the bearings.

continued

19. Place a piece of Plastigauge 605238 across the centre of the crankshaft main bearing journals.
20. Locate the bearing lower shell into the main bearing cap.
21. Fit numbers one to four main bearing caps and shells. Torque: 7.0 to 7.6 kgf m (50 to 55 lbf ft).
22. Fit the rear main bearing cap and shell. Torque: 9.0 to 9.6 kgf m (65 to 70 lbf ft).

**IMPORTANT:** Do not rotate the crankshaft while the Plastigauge is fitted.

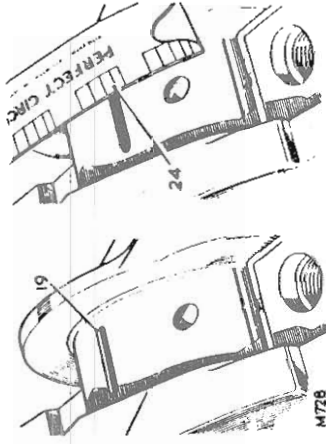
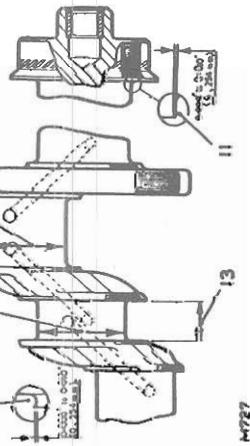
23. Remove the main bearing caps and shells.
24. Using the scale printed on the Plastigauge packet, measure the flattened Plastigauge at its widest point. The graduation that most closely corresponds to the width of the Plastigauge indicates the bearing clearance.
25. The correct bearing clearance with new or overhauled components is 0.023 to 0.065 mm (0.0009 to 0.0025 in.).
26. If the correct clearance is not obtained initially, use selective bearing assembly.
27. Wipe off the Plastigauge with an oily rag. Do NOT scrape it off.

**IMPORTANT:** The bearing shells must be retained in sets and in the correct sequence.

28. If required, check the connecting rod big-end bearing clearance, see 12.17.10.
29. Refit the crankshaft, see 12.21.33.

DATA

Crankshaft	
Material	Iron, spheroidal graphite
No. of main journals	5
End-thrust	Taken on No. 3
End-float	0.10 to 0.20 mm (0.004 to 0.008 in)
Crankpin journal diameter (standard)	50.800 to 50.812 mm (2.0000 to 2.0005 in)
Main bearing:	
Material and type	Vandervell lead-indium
Clearance	0.023 to 0.061 mm (0.0009 to 0.0024 in)
Journal diameter (standard)	58.400 to 58.413 mm (2.2992 to 2.2997 in)
Bearing overall length	20.24 to 20.49 mm (0.797 to 0.807 in) Nos. 1, 2, 4 and 5
	26.82 to 26.87 mm (1.056 to 1.058 in) No. 3
Crankshaft vibration damper type	Torsional

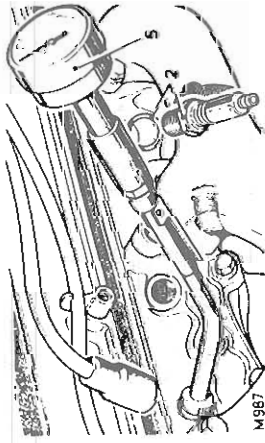


CYLINDER PRESSURES

—Check 12.25.01

Checking

1. Run the engine until it attains normal operating temperature.
2. Remove all 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 compression is appreciably less than the correct figure or varies greater than 10% between cylinders, the piston rings or valves may be faulty.
8. Low pressure in adjoining cylinders may be due to a faulty cylinder head gasket.



M987

DATA

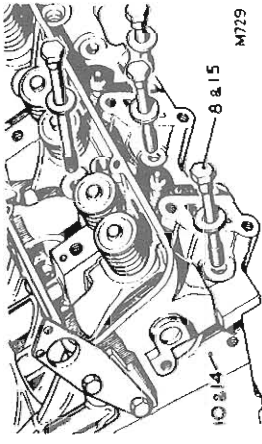
Starter motor cranking speed at 15°C (60°F) approximate ambient temperature ..... 150 to 200 engine rev/min  
 Compression ratio ..... 8.25:1 or 8.13:1  
 Compression pressure (minimum) ..... 9.5 kg/cm<sup>2</sup> (1.35 lbf/in<sup>2</sup>)

CYLINDER HEADS

—Remove and refit 12.29.10  
 Left-hand cylinder head 12.29.11  
 Right-hand cylinder head 12.29.12

Removing

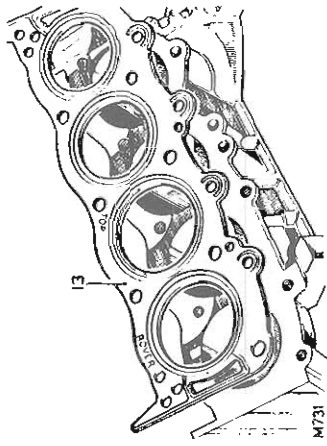
1. Drain the cooling system, see 26.10.01.
2. Remove the air cleaner, see 19.10.01.
3. Remove the induction manifold, see 30.15.02.
4. Remove the rocker covers.
5. Remove the valve gear, see 12.29.34.
6. Disconnect the front exhaust pipes from the manifolds.
7. R.H. cylinder head: Remove the alternator, see 86.10.02.
8. Slacken the cylinder head bolts evenly.
9. If both cylinder heads are being removed, mark them relative to L.H. and R.H. sides of the engine.
10. Remove the cylinder heads and discard the gaskets.
11. If required, remove the exhaust manifolds, see 30.15.10, 30.15.11.



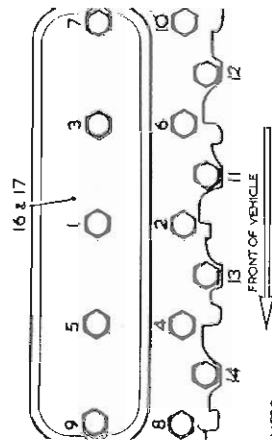
M729

Refitting

12. If removed, fit the exhaust manifolds, see 30.15.10, 30.15.11.
13. Fit new cylinder head gaskets with the word 'TOP' uppermost. Do NOT use sealant.
14. Locate the cylinder heads on the block dowel pins.
15. Clean the threads of the cylinder head bolts then coat them with Thread Lubricant-Sealant 3M EC776, Rover Part No. 605764.
16. Locate the cylinder head bolts in position:  
 Long bolts—1, 3 and 5.  
 Medium bolts—2, 4, 6, 7, 8, 9 and 10.  
 Short bolts—11, 12, 13 and 14.
17. Tighten the cylinder head bolts a little at a time in the sequence shown. Final torque:  
 Bolts 1 to 10, 9.0 to 9.6 kgf m (65 to 70 lbf ft).  
 Bolts 11 to 14, 5.6 to 6.2 kgf m (40 to 45 lbf ft).
18. When all bolts have been tightened, re-check the torque settings.
19. Reverse instructions 1 to 7.



M731



M730

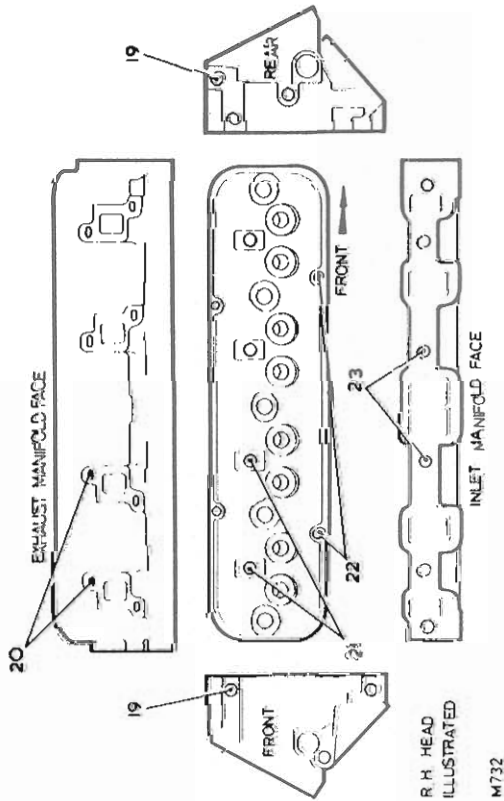
continued

## Cylinder head thread insert salvage instructions

19. These three holes may be drilled 0.3906 in dia.  $\times$  0.937 + 40 deep. Tapped with Helicoil Tap No. 6 CPB or 6CS  $\times$  0.875 in (min.) deep (3/8 U.N.C. 1½D insert).
20. These eight holes may be drilled—0.3006 in dia.  $\times$  0.812 + 40 deep. Tapped with Helicoil Tap No. 6 CBB 0.749 (min.) deep (3/8 U.N.C. 1½D insert).
21. These four holes may be drilled 0.3906 in dia.  $\times$  0.937 + 40 deep. Tapped with Helicoil Tap No. 6 CPB or 6CS  $\times$  0.875 (min.) deep (3/8 U.N.C. 1½D insert).
22. These four holes may be drilled 0.261 in dia.  $\times$  0.675 + 40 deep. Tapped with Helicoil Tap No. 4CPB or 4CS  $\times$  0.625 (min.) deep (¼ U.N.C. 1½D insert).
23. These six holes may be drilled 0.3906 in dia.  $\times$  0.937 + 40 deep. Tapped with Helicoil Tap No. 6 CPB or 6CS  $\times$  0.875 (min.) deep (3/8 U.N.C. 1½D insert).

**CAUTION:** Any attempt to salvage the sparking plug threads in the cylinder head may result in breaking thru the water jacket, rendering the head scrap.

continued



R. H. HEAD  
ILLUSTRATED  
M732

## DATA

Cylinder heads:	Aluminium alloy
Material	Two heads with separate alloy inlet manifold
Type	Piston ring iron
Inlet and exhaust valve seat material	46+½ degrees
Inlet and exhaust valve seat angle	
Valves:	
Valves, inlet:	
Overall length	116.58 to 117.34 mm (4.590 to 4.620 in)
Actual overall head diameter	39.75 to 40.00 mm (1.565 to 1.575 in)
Angle of face	45 degrees
Stem diameter	8.640 to 8.666 mm (0.3402 to 0.3412 in) at the head and increasing to 8.653 to 8.679 mm (0.3407 to 0.3417 in) 0.02 to 0.07 mm (0.001 to 0.003 in)
Stem clearance in guide: Top	0.013 to 0.063 mm (0.0005 to 0.0025 in)
Bottom	
Valves, exhaust:	
Overall length	116.58 to 117.34 mm (4.590 to 4.620 in)
Actual overall head diameter	34.226 to 34.480 mm (1.3475 to 1.3575 in)
Angle of face	45 degrees
Stem diameter	8.628 to 8.654 mm (0.3397 to 0.3407 in) at the head and increasing to 8.640 to 8.666 mm (0.3402 to 0.3412 in) 0.038 to 0.088 mm (0.0015 to 0.0035 in)
Stem clearance in guide: Top	0.05 to 0.10 mm (0.002 to 0.004 in)
Bottom	9.9 mm (0.39 in) both valves
Valve lift	40.0 mm (1.577 in) at pressure of 30.16 to 33.34 kg (66.5 to 73.5 lb)
Valve spring length	

## CYLINDER HEADS

- Overhaul
- 12.29.18
- 12.29.19
- 12.29.30

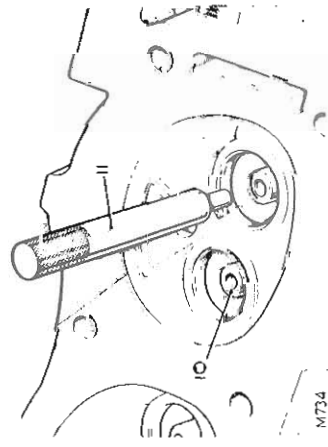
Service tools: 276102 Valve spring compressor, 274401 Valve guide remover, 600959 Valve guide drift

1. Remove the cylinder heads, see 12.29.10.

## Dismantling

2. Using the valve spring compressor 276102, remove the valves and springs and retain in sequence for refitting.
3. Clean the combustion chambers with a soft wire brush.
4. Clean the valves.
5. Clean the valve guide bores.
6. Regrind or fit new valves as necessary.
7. If a valve must be ground to a knife-edge to obtain a true seat, fit a new valve.
8. The correct angle for the valve face is 45 degrees.
9. The correct angle for the seat is 46 + 1/4 degrees, and the seat witness should be towards the outer edge.
10. Check the valve guides and fit replacements as necessary, see instructions 11 to 15.
11. Using the valve guide remover 274401, drive out the old guides from the combustion chamber side.
12. Clean the valve seat inserts to ensure freedom from burrs.

continued

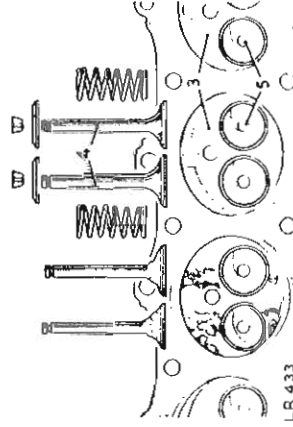


M734

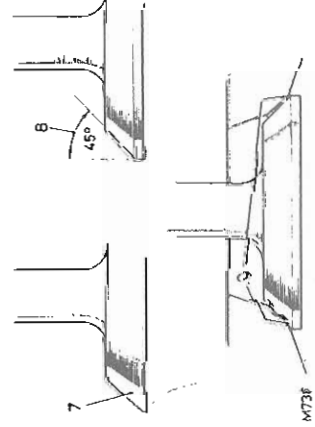
12—22



M733



M735



M736

13. Lubricate the new valve guide.
14. Using the valve guide drift 600959, drive the valve guide into the cylinder head.
15. The fitted guide should stand 1.9 mm (3/16 in.) above the step surrounding the valve guide boss in the cylinder head.

NOTE: Service valve guides are 0.02 mm (0.001 in.) larger on the outside diameter than the original equipment to ensure interference fit.

16. Check the valve seats and fit replacements as necessary, see instructions 17 to 19.
17. Remove the old seat inserts by grinding them away until they are thin enough to be cracked and prised out.
18. Heat the cylinder head evenly to approximately 65°C (150°F).
19. Press the new insert into the recess in the cylinder head.

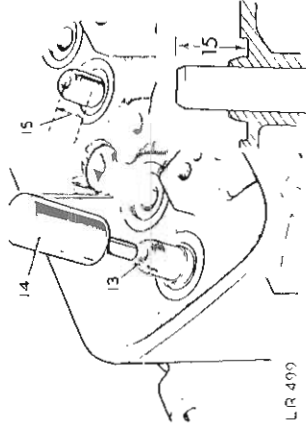
NOTE: Service valve seat inserts are available in two oversizes: 0.25 and 0.50 mm (0.010 and 0.020 in.) larger on the outside diameter to ensure interference fit.

20. If necessary, cut the valve seats to 46 + 1/4 degrees.
21. The nominal seat width is 1.5 mm (0.031 in.). If the seat exceeds 2.0 mm (0.078 in.) it should be reduced to the specified width by the use of 20 and 70 degree stones.
22. The inlet valve seat is 37.03 mm (1.458 in.) diameter and 31.50 mm (1.240 in.) diameter.
23. Check the height of the valve stems above the valve spring seat surface of the cylinder head. This MUST NOT exceed 47.63 mm (1.875 in.). If necessary, grind the end of the valve stem or fit new parts.
24. Lubricate the valve stems and guides with engine oil and fit each valve as follows:
25. Insert the valve into its guide.
26. Place the valve spring in position.

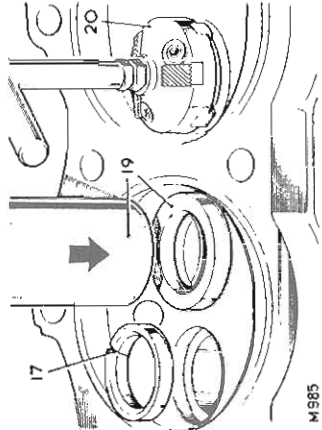
CAUTION: It is essential that the bottom of the valve spring is correctly located in the cylinder head recess.

27. Locate the cap on the spring.
28. Using the valve spring compressor 276102, fit the valve collets.
29. Refit the cylinder heads, see 12.29.10.

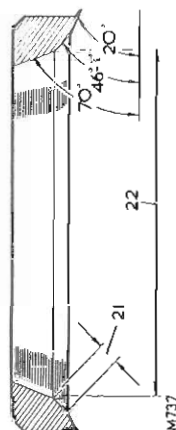
For Data refer to operation 12.29.10.



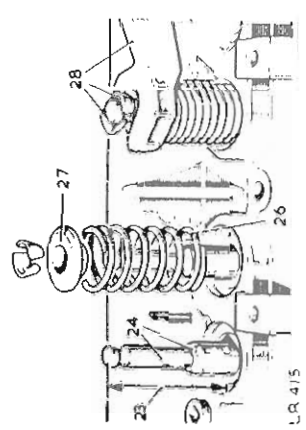
L.R. 499



M985



M737



L.R. 415

12—23

## VALVE GEAR

—Remove and refit 12.29.34

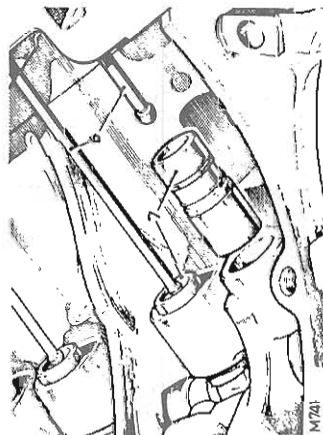
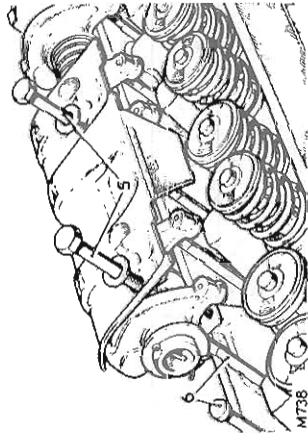
## ROCKER SHAFTS

—Remove and refit 2, 4, 5 and 30 to 37 12.29.54

## Removing

1. Drain the cooling system, see 26.10.01.
2. Remove the air cleaner, see 19.10.01.
3. Remove the induction manifold, see 30.15.02.
4. Remove the rocker covers.
5. Remove the rocker shaft assemblies.
6. Withdraw the push-rods and retain in the sequence removed.
7. Withdraw the tappets and retain with respective push-rods.

**NOTE:** If a tappet cannot be withdrawn, remove the camshaft and withdraw the tappet from the bottom.



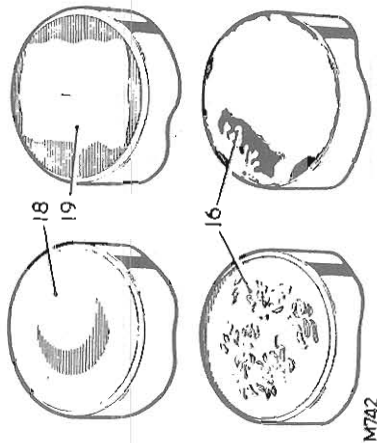
## Dismantling rocker shafts

8. Remove the split pin from one end of the rocker shaft.  
Withdraw the following components and retain them in the correct sequence for reassembly:
  9. A plain washer.
  10. A wave washer.
  11. Rocker arms.
  12. Brackets.
  13. Springs.

## Inspection of hydraulic tappets and push-rods

14. Hydraulic tappet: inspect inner and outer surfaces of body for blow-holes and scoring. Replace hydraulic tappet if body is roughly scored or grooved, or has a blow-hole extending through the wall in a position to permit oil leakage from lower chamber.
15. The prominent wear pattern just above lower end of body should not be considered a defect unless it is definitely grooved or scored; it is caused by side thrust of cam against body while tappet is moving vertically in its guide.

continued



16. Inspect the cam contact surface of the tappets. Fit new tappets if the surface is excessively worn or damaged.
17. A hydraulic tappet body that has been rotating will have a round wear pattern and a non-rotating tappet body will have a square wear pattern with a very slight depression near the centre.
18. Tappets **MUST** rotate and a circular wear condition is normal, and such bodies may be continued in use if the surface is free of defects.
19. In the case of a non-rotating tappet, fit a new replacement and check camshaft lobes for wear; also ensure new tappet rotates freely in the cylinder block.
20. Fit a new hydraulic tappet if the area where the push-rod contacts is rough or otherwise damaged.
21. Push-rod: Replace with new, any push-rod having a rough or damaged ball-end or seat.

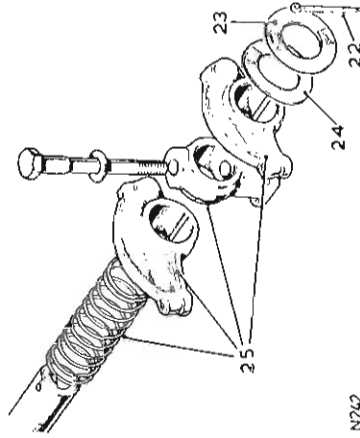
## Refitting

## Assembling rocker shafts instructions 22 to 28

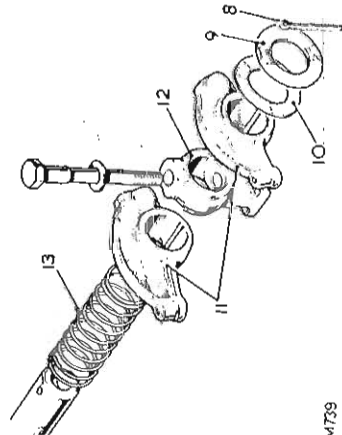
22. Fit a split pin to one end of the rocker shaft.
23. Slide a plain washer over the long end of the shaft to abut the split pin.
24. Fit a wave washer to abut the plain washer.

**NOTE:** Two different rocker arms are used and must be fitted so that the valve ends of the arms slope away from the brackets.

25. Assemble the rocker arms, brackets and springs to the rocker shaft.
26. Compress the springs, brackets and rockers, and fit a wave washer, plain washer and split pin to the end of the rocker shaft.
27. Locate the oil baffle plates in place over the rockers furthest from the notched end of the rocker shaft.
28. Fit the bolts through the brackets and shaft so that the notch on the one end of the shaft is uppermost and towards the front of the engine on the right-hand side, and towards the rear on the left-hand side.



continued



29. Fit the tappets and push-rods in the original sequence.

**IMPORTANT:** The rocker shafts are handed and must be fitted correctly to align the oilways.

30. Each rocker shaft is notched at one end and on one side only. The notch must be uppermost and towards the front of the engine on the right-hand side, and towards the rear on the left-hand side.

31. Fit the rocker shaft assemblies. Ensure that the push-rods engage the rocker cups and that the baffle plates are fitted to the front on the left-hand side, and to the rear on the right-hand side. Tighten the bolts evenly. Torque: 3.5 to 4.0 kgf m (25 to 30 lbf ft).

If it is necessary to fit a new rocker cover gasket, proceed as follows, instructions 32 to 36.

32. Clean and dry the gasket mounting surface, using Bostik cleaner 6001.

33. Apply Bostik 1775 impact adhesive, Rover Part No. 601736 to the seal face and the gasket, using a brush to ensure an even film.

34. Allow the adhesive to become touch-dry, approximately fifteen minutes.

**NOTE:** The gasket fits one way round only and must be fitted accurately first time; any subsequent movement would destroy the bond.

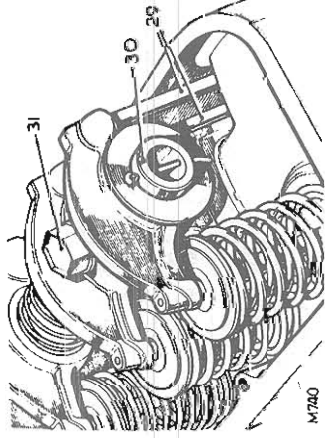
35. Place one end of the gasket into the cover recess with the edge firmly against the recess wall; at the same time hold the remainder of the gasket clear; then work around the cover, pressing the gasket into place ensuring that the outer edge firmly abuts the recess wall.

36. Allow the cover to stand for thirty minutes before fitting it to the engine.

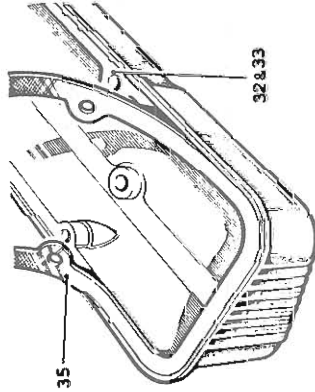
37. Reverse instructions 1 to 4.

**NOTE: Tappet noise**

It should be noted that tappet noise can be expected on initial start-up after an overhaul due to oil drainage from the tappet assemblies or indeed if the vehicle has been standing over a very long period. If excessive noise should be apparent after an overhaul, the engine should be run at approximately 2,500 rev/min for a few minutes, when the noise should be eliminated.



M780



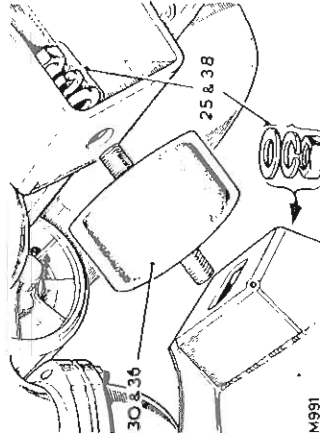
N15

## ENGINE ASSEMBLY

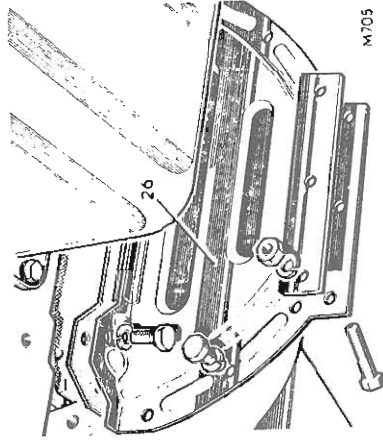
— Remove and refit 12.41.01

## Removing

1. Remove the bonnet, see 76.16.01.
2. Disconnect the battery earth lead.
3. Drain the cooling system, see 26.10.01.
4. Remove the fan blades, see 26.23.06.
5. Remove the fan cowl, see 26.25.11.
6. Remove the radiator block, see 26.40.04.
7. Remove the air cleaner, see 19.10.01.
8. Disconnect the inlet hose to the heater.
9. Disconnect the return hose from the heater.
10. Disconnect the throttle cable from the L.H. carburetter and induction manifold.
11. Disconnect the vacuum pipe to the gearbox.
12. Disconnect the choke cable from the L.H. carburetter.
13. Disconnect the fuel spill return pipe from the R.H. carburetter.
14. Disconnect the vacuum pipe for the brake servo.
15. Disconnect the leads from the alternator.
16. Disconnect the lead from the choke thermostat switch.
17. Disconnect the lead from the water temperature transmitter.
18. Disconnect the leads from the ignition coil.
19. Unclip the engine harness and draw it clear.
20. Disconnect the lead from the oil pressure switch.
21. Disconnect the leads from the starter motor.
22. Disconnect the earth strap from the engine.
23. Disconnect the fuel supply pipe from the fuel pump.
24. Disconnect the exhaust pipes from the manifolds.
25. Remove all the fixings from the engine front mounting rubbers.
26. Remove the cover-plate from the bell housing.



M991



M705

continued

## ENGINE

27. Remove the fixings securing the bell housing to the engine. The lower fixings are accessible from under the vehicle, and the upper fixings are accessible from the engine compartment.

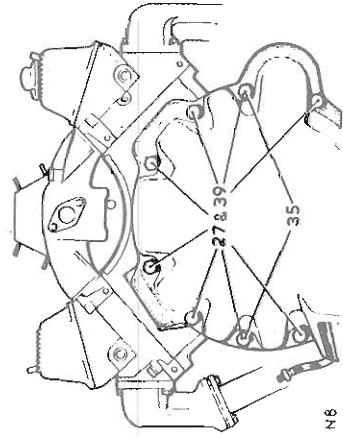
**CAUTION:** To overcome variations in installation, ensure that any ancillary items are disconnected before proceeding to lift engine.

28. Attach a suitable lifting chain and hoist to the engine lifting hooks.
29. Tension the hoist sufficient to lift the engine just clear of the front mounting rubbers.
30. Withdraw the engine front mounting rubbers.
31. Draw the engine forward to release it from the dowelled location to the bell housing, and to clear the primary pinion from the clutch.
32. Lift the engine clear.

### Refitting

Before refitting the engine smear the splines of the primary pinion, the clutch centre and the withdrawal unit abutment faces with molybdenum disulphide grease, Rocol MTS 1000. Smear the engine to gearbox joint faces with Unipart Universal jointing compound.

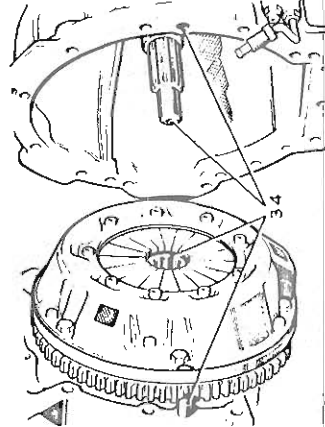
33. Attach a lifting chain and hoist to the engine lifting hooks.
34. Lower the engine into position, locating the primary pinion into the clutch and engage the bell housing dowels.
35. Secure the engine to the bell housing with at least two bolts.
36. Locate the engine front mounting rubbers in position.
37. Lower the engine on to the mountings and remove the lifting chain.
38. Secure the fixings at the engine front mounting rubbers.
39. Fit the remaining engine to bell housing fixings.
40. Apply a coating of Unipart Universal jointing compound to the vertical joint face of the bell housing cover-plate.
41. Locate the seal on to the bell housing cover-plate.
42. Fit the bell housing cover-plate and seal ensuring that the fillet is filled with jointing compound.
43. Reverse instructions 1 to 24.



N6



N7



N9

## FLYWHEEL

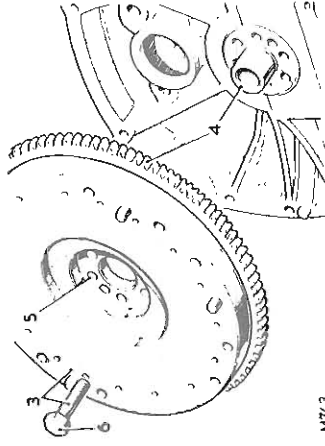
— Remove and refit 12.53.07

### Removing

1. Remove the engine assembly, see 12.41.01.
2. Remove the clutch assembly, see 33.10.01.
3. Remove the flywheel.

### Refitting

4. Locate the flywheel in position on the crankshaft spigot, with the ring gear towards the engine.
5. Align the flywheel fixing bolt holes which are off-set to prevent incorrect assembly.
6. Fit the flywheel fixing bolts and before finally tightening, take up any clearance by rotating the flywheel against the direction of engine rotation. Torque: 7.0 to 8.5 kgf m (50 to 60 lbf ft).
7. Reverse instructions 1 and 2.



M7A3

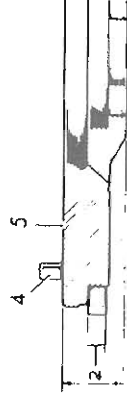
## FLYWHEEL

— Overhaul 12.53.10

1. Remove the flywheel, see 12.53.07.

### Procedure

2. Measure the overall thickness of the flywheel. Fit a new flywheel if it is less than the minimum overall thickness of 39.93 mm (1.572 in).
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. Refit the flywheel, see 12.53.07.



LR 439



## STARTER RING GEAR

—Remove and refit 12.53.19

## Removing

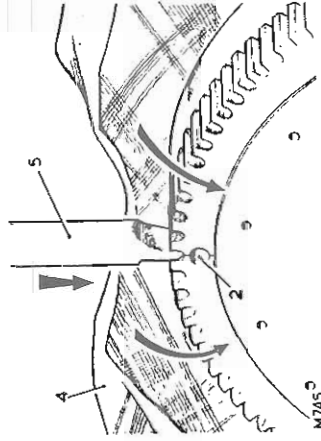
1. Remove the flywheel, 12.53.07.
2. Drill a 10 mm (0.375 in) diameter hole axially between the root of any tooth and the inner diameter of the starter ring sufficiently deep to weaken the ring. Do NOT allow the drill to enter the flywheel.
3. Secure the flywheel in a vice fitted with soft jaws.
4. Place a cloth over the flywheel to protect the operator from flying fragments.

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

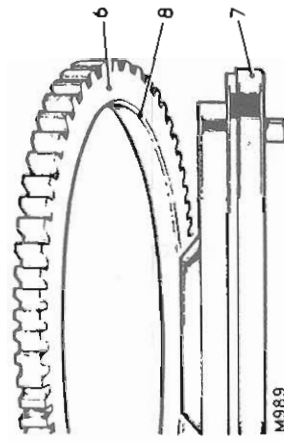
5. Place a chisel immediately above the drilled hole and strike it sharply to split the starter ring gear.

## Refitting

6. Heat the starter ring gear uniformly to between 170° and 175°C (338° to 347°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 chamfered inner diameter towards the flywheel flange. If the starter ring gear is chamfered both sides, it can be fitted either way round.
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 and thereby avoid the setting up of internal stresses in the ring gear which may cause fracture or failure, in some respect.
11. Fit the flywheel, see 12.53.07.



M745



M989

## SPIGOT BEARING

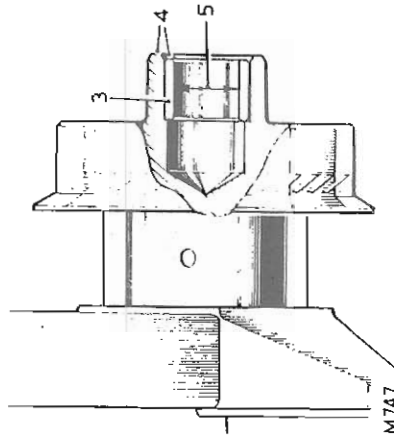
—Remove and refit 12.53.20

## Removing

1. Remove the engine assembly, see 12.41.01.
2. Remove the clutch assembly, see 33.10.01
3. Remove the spigot bearing.

## Refitting

4. Fit the spigot bearing flush with, or to a maximum of 1.6 mm (0.063 in) below the end face of the crankshaft.
5. Ream the spigot bearing to 19.177 + 0.025 mm (0.7504 + 0.001 in) inside diameter. Ensure all swarf is removed.
6. Reverse instructions 1 and 2.



M747

## OIL FILTER ASSEMBLY — EXTERNAL

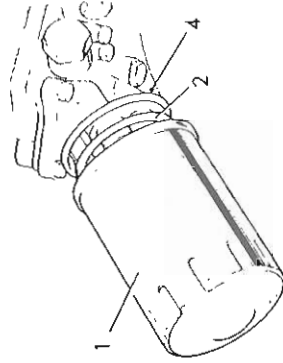
—Remove and refit 12.60.01

## Removing

1. Unscrew the filter and discard.
- NOTE:** If the filter is difficult to remove, use a strap spanner.
2. Withdraw the sealing washer and discard.
- CAUTION:** Do NOT delay fitting a new filter, otherwise the oil pump may drain and require priming (see 12.60.26) before running the engine.

## Refitting

3. Place a new sealing washer on to a new filter.
4. Fit the filter BY HAND until the sealing washer touches the oil pump cover face, then give a further half turn—do NOT overtighten.
5. Check, and if necessary replenish, the engine oil sump.
6. Run the engine and check the filter joint for leaks.
7. Check the oil sump level after the engine has been stopped for a few minutes, and replenish if necessary.



L.R. 434

## ENGINE

### OIL PUMP

—Remove and refit

12.60.26

#### Removing

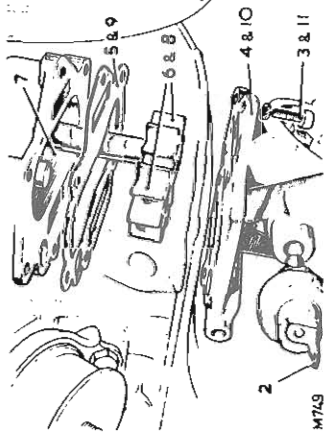
1. Remove the oil filter assembly, see 12.60.01.
2. Disconnect the electrical leads from the switches.
3. Remove the bolts from the oil pump cover.
4. Withdraw the oil pump cover.
5. Lift off the cover gasket.
6. Withdraw the oil pump gears

#### Refitting

7. Fully pack the oil pump gear housing with petroleum jelly. Use only petroleum jelly; no other grease is suitable.
8. Fit the oil pump gears so that the petroleum jelly is forced into every cavity between the teeth of the gears.

**IMPORTANT:** Unless the pump is fully packed with petroleum jelly it may not prime itself when the engine is started.

9. Place a new gasket on the oil pump cover.
10. Locate the oil pump cover in position.
11. Fit the special fixing bolts and tighten alternately and evenly. Torque: 1,4 to 2,0 kgf m (10 to 15 lbf ft).
12. Reverse instructions 1 and 2.
13. Check the oil level in the engine sump, and replenish as necessary.



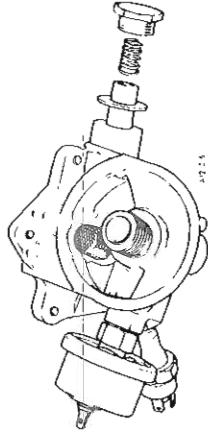
### OIL PUMP

—Overhaul

12.60.32

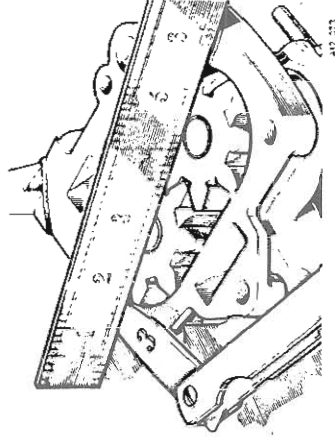
#### Dismantling

1. Remove the oil pump, see 12.60.26.
2. Unscrew the plug from the pressure relief valve.
3. Lift off the joint washer for the plug.
4. Withdraw the spring from the relief valve.
5. Withdraw the pressure relief valve.



#### Inspecting

6. Check the oil pump gears for wear or scores.
7. Fit the oil pump gears and shaft into the front cover.
8. Place a straight-edge across the gears.
9. Check the clearance between the straight-edge and the front cover. If less than 0,05 mm (0,0018 in), check the front cover gear pocket for wear.
10. Check the oil pressure relief valve for wear or scores. Check the relief valve spring for wear at the sides or signs of collapse.
11. Clean the gauze filter for the relief valve.
12. Check the fit of the relief valve in its bore. The valve must be an easy slide fit with no perceptible side movement.



#### Reassembling

13. Insert the relief valve spring.
14. Locate the sealing washer on to the relief valve plug.
15. Fit the relief valve plug. Torque: 4,0 to 4,9 kgf m (30 to 35 lbf ft).
16. Refit the oil pump, see 12.60.26.

