

INTRODUCTION

The purpose of this manual is to assist skilled mechanics in the efficient repair and maintenance of the range of vehicles given on the title-page. The procedures detailed, carried out in the sequence given and using the appropriate service tools, will enable the operations to be completed in the time stated in the Repair Operation Times.

Indexing

The content pages list the titles and reference numbers of the divisions in alphabetical order.

Operation Numbering

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

The master index of operations has been compiled for universal application to vehicles manufactured by British Leyland Motor Corporation and therefore continuity of the numbering sequence is not maintained throughout the manual.

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

Where performance of an operation requires the use of a service tool, the tool number is quoted under the operation heading and is repeated in, or following, the instruction involving its use.

An illustrated list of all service tools necessary to complete the operations described in the manual is also included.

References

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

To reduce repetition, operations covered in this manual do not include reference to testing the vehicle after repair. It is essential that work is inspected and tested after completion and if necessary a road test of the vehicle is carried out particularly where safety related items are concerned.

Dimensions

The dimensions quoted are to design engineering specification. Alternative unit equivalents, shown in brackets following the dimensions, have been converted from the original specification.

During the period of running-in from new, certain adjustments may vary from the specification figures given in this Manual. These adjustments will be re-set by the Distributor or Dealer at the After Sales Service, and thereafter should be maintained at the figures specified in the Manual.

REPAIRS AND REPLACEMENTS

When replacement parts are required it is essential that only genuine Land Rover replacements are used.

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

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

All genuine Land Rover replacements have the full backing of the Owners Service Statement.

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

POISONOUS SUBSTANCES

WARNING

Many liquids and other substances used in motor vehicles are poisonous and should under no circumstances be consumed and should as far as possible be kept away from open wounds. These substances among others include antifreeze, brake fluid, fuel, windscreen washer additives, lubricants and various adhesives.

FUEL HANDLING PRECAUTIONS

The following information provides basic precautions which must be observed if petrol (gasoline) is to be handled safely. It also outlines the other areas of risk which must not be ignored.

This information is issued for basic guidance only, and in any case of doubt appropriate enquiries should be made of your local Fire Officer.

General

Petrol/gasoline vapour is highly flammable and in confined spaces is also very explosive and toxic.

When petrol/gasoline evaporates it produces 150 times its own volume in vapour, which when diluted with air becomes a readily ignitable mixture. The vapour is heavier than air and will always fall to the lowest level. It can readily be distributed throughout a workshop by air current, consequently, even a small spillage of petrol/gasoline is potentially very dangerous.

Always have a fire extinguisher containing FOAM CO₂ GAS, or POWDER close at hand when handling or draining fuel, or when dismantling fuel systems and in areas where fuel containers are stored.

Always disconnect the vehicle battery BEFORE carrying out dismantling or draining work on a fuel system.

Whenever petrol/gasoline is being handled, drained or stored, or when fuel systems are being dismantled all forms of ignition must be extinguished or removed, any headlamps used must be flameproof and kept clear of spillage.

NO ONE SHOULD BE PERMITTED TO REPAIR COMPONENTS ASSOCIATED WITH PETROL/GASOLINE WITHOUT FIRST HAVING HAD SPECIALIST TRAINING.

Fuel Tank Draining

WARNING: PETROL/GASOLINE MUST NOT BE EXTRACTED OR DRAINED FROM ANY VEHICLE WHILST IT IS STANDING OVER A PIT.

Draining or extracting petrol/gasoline from vehicle fuel tank must be carried out in a well ventilated area.

The receptacle used to contain the petrol/gasoline must be more than adequate for the full amount of fuel to be extracted or drained. The receptacle should be clearly marked with its contents, and placed in a safe storage area which meets the requirements of local authority regulations.

WHEN PETROL/GASOLINE HAS BEEN EXTRACTED OR DRAINED FROM A FUEL TANK THE PRECAUTIONS GOVERNING NAKED LIGHTS AND IGNITION SOURCES SHOULD BE MAINTAINED.

Fuel Tank Removal

On vehicles where the fuel line is secured to the fuel tank outlet by a spring steel clip, it is recommended that such clips are released before the fuel line is disconnected or the fuel tank unit is removed. This procedure will avoid the possibility of residual petrol fumes in the fuel tank being ignited when the clips are released.

As an added precaution fuel tanks should have a PETROL/GASOLINE VAPOUR warning label attached to them as soon as they are removed from the vehicle.

continued

Fuel Tank Repair

Under no circumstances should a repair to any tank involving heat treatment be carried out without first rendering the tank SAFE, by using one of the following methods:

- a STEAMING: With the filler cap and tank unit removed, empty the tank. Steam the tank for at least 2 hours with low pressure steam. Position the tank so that condensation can drain away freely, ensuring that any sediment and sludge not volatilised by the steam, is washed out during the steaming process.
- b BOILING: With the filler cap and tank unit removed, empty the tank. Immerse the tank completely in boiling water containing an effective alkaline degreasing agent or a detergent, with the water filling and also surrounding the tank for at least 2 hours. After steaming or boiling a signed and dated label to this effect should be attached to the tank.

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SERVICE TOOLS 99

ABBREVIATIONS AND SYMBOLS

Across flats (bolt size)	A.F.	Negative (electrical)	—
After bottom dead centre	A.B.D.C.	Newton metre	Nm
After top dead centre	A.T.D.C.	Number	No.
Alternating current	a.c.		
Amperes	A	Ounces (force)	ozf
Ampere-hour	Ah	Ounces (mass)	oz
Atmospheres	Atm	Ounce inch (torque)	ozf in
		Outside diameter	o.dia
		Overdrive	O/D
Before bottom dead centre	B.B.D.C.	Paragraphs	para.
Before top dead centre	B.T.D.C.	Part Number	Part No.
Bottom dead centre	B.D.C.	Percentage	%
Brake horse power	b.h.p.	Pints (Imperial)	pt
Brake mean effective pressure	b.m.e.p.	Pints (U.S.)	U.S. pt
British Standards	B.S.	Plus or minus	±
		Plus (tolerance)	+
Carbon monoxide	CO	Positive (electrical)	+
Centigrade (Celsius)	C	Pounds (force)	lbf
Centimetres	cm	Pounds (mass)	lb
Cubic centimetres	cm ³	Pounds feet (torque)	lbf ft
Cubic inches	in ³	Pounds inches (torque)	lbf in
Cycles per minute	c/min	Pounds per square inch	lbf/in ²
Degree (angle)	deg. or °	Radius	r
Degree (temperature)	deg. or °	Ratio	:
Diameter	dia.	Reference	ref.
Direct current	d.c.	Revolutions per minute	rev/min
		Right-hand	R.H.
Fahrenheit	F	Right-hand steering	R.H.Stg.
Feet	ft		
Feet per minute	ft/min		
Fifth	5th		
Figure (illustration)	Fig.	Second (angle)	"
First	1st	Second (numerical order)	2nd
Fourth	4th	Single carburetter	SC
		Society of Automobile Engineers	S.A.E.
Gallons (Imperial)	gal	Specific gravity	sp. gr.
Gallons (U.S.)	U.S. gal	Square centimetres	cm ²
Grammes (force)	gf	Square inches	in ²
Grammes (mass)	g	Standard	std.
		Standard wire gauge	s.w.g.
High compression	h.c.	Synchronizer/synchromesh	synchro.
High tension (electrical)	h.t.		
Horse-power	hp		
Hundredweight	cwt	Third	3rd
		Top dead centre	T.D.C.
Inches	in	Twin carburetters	TC
Inches of mercury	inHg		
Independent front suspension	i.f.s.	United Kingdom	UK
Internal diameter	i.dia.		
		Volts	V
Kilogrammes (force)	kgf		
Kilogrammes (mass)	kg	Watts	W
Kilogramme centimetre	kgf cm		
Kilogramme metres	kgf m		
Kilogrammes per square centimetre	kgf/cm ²	Screw threads	
Kilometres	km	American Standard Taper Pipe	N.P.T.F.
Kilometres per hour	km/h	British Association	B.A.
Kilovolts	kV	British Standard Fine	B.S.F.
King pin inclination	k.p.i.	British Standard Pipe	B.S.P.
		British Standard Whitworth	B.S.W.
Left-hand	L.H.	Unified Coarse	U.N.C.
Left-hand steering	L.H.Stg.	Unified Fine	U.N.F.
Left-hand thread	L.H.Thd.		
Low compression	l.c.		
Low tension	l.t.		
Maximum	max.		
Metres	m		
Miniature Edison Screw	MES		
Miles per gallon	m.p.g.		
Miles per hour	m.p.h.		
Millimetres	mm		
Millimetres	mm		
Millimetres of mercury	mmHg		
Minimum	min.		
Minus (of tolerance)	—		
Minute (of angle)	'		

GENERAL SPECIFICATION DATA

ENGINE — 2½ LITRE PETROL

Type	4 cylinder
Bore	90,47 mm (3.562 in.)
Stroke	88,9 mm (3.500 in.)
Capacity	2286 cm ³ (139.500 in. ³)
Valve operation	Overhead by pushrod
Crankshaft	
Main journal diameter	63,487 mm to 63,500 mm (2.4995 in. to 2.500 in.)
Minimum regrind diameter	62,48 mm (2.460 in.)
Crankpin journal diameter	58,72 mm to 58,733 mm (2.312 in. to 2.31275 in.)
Minimum regrind diameter	57,70 mm (2.272 in.)
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end float	0,05 mm to 0,15 mm (0.002 in. to 0.006 in.)
Main bearings	
Number and type	3 halved shells
Material	Steel shell, tin-aluminium lined
Diametrical clearance	0,020 mm to 0,072 mm (0.0008 in. to 0.00285 in.)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in., 0.020 in., 0.030 in., 0.040 in.)
Connecting rods	
Type	Horizontally split big end, plain small end
Length between centres	175,36 mm to 175,46 mm (6.904 in. to 6.908 in.)
Big end bearings	
Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,019 mm to 0,068 mm (0.00075 in. to 0.0027 in.)
End float on crankpin	0,02 mm to 0,03 mm (0.007 in. to 0.012 in.)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 0,01 mm (0.010 in., 0.020 in., 0.030 in., 0.040 in.)
Gudgeon pins	
Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,007 mm to 0,015 mm (0.0003 in. to 0.0006 in.)
Pistons	
Type	Aluminium alloy, flat top
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin	
Standard size pistons	0,0479 mm to 0,0612 mm (0.0019 in. to 0.0024 in.)
Oversize pistons	0,043 mm to 0,055 mm (0.0017 in. to 0.0022 in.)

Piston rings

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

Camshaft

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

Valves

Length	
Inlet	111,25 mm to 111,60 mm (4.380 in. to 4.394 in.)
Exhaust	111,22 mm to 111,58 mm (4.379 in. to 4.393 in.)
Seat angle	
Inlet	30°
Exhaust	45°
Head diameter	
Inlet	44,45 mm to 44,57 mm (1.750 in. to 1.755 in.)
Exhaust	35,02 mm to 35,05 mm (1.375 in. to 1.380 in.)
Stem diameter	
Inlet	7,891 mm to 7,904 mm (0.3107 in. to 0.3112 in.)
Exhaust	8,661 mm to 8,674 mm (0.3410 in. to 0.3415 in.)
Stem to guide clearance	
Inlet	0,033 mm to 0,048 mm (0.0013 in. to 0.0019 in.)
Exhaust	0,058 mm to 0,073 mm (0.0023 in. to 0.0029 in.)
Valve lift	
Inlet	10,236 mm (0.403 in.)
Exhaust	9,85 mm (0.388 in.)

continued

Valve springs

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

Valve timing

Inlet opens	6° B.T.D.C.
Inlet closes	52° A.B.D.C.
Inlet peak	113° A.T.D.C.
Exhaust opens	34° B.B.D.C.
Exhaust closes	24° A.T.D.C.
Exhaust peak	95° B.T.D.C.

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rev/min	2,45 to 4,5 kgf/cm ² (35 to 65 lbf/in. ²)
Oil pump	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End float of gears	
Steel gear	0,05 mm to 0,12 mm (0.002 in. to 0.005 in.)
Aluminium gear	0,07 mm to 0,15 mm (0.003 in. to 0.006 in.)
Radial clearance of gears	0,02 mm to 0,10 mm (0.001 in. to 0.004 in.)
Backlash of gears	0,15 mm to 0,28 mm (0.006 in. to 0.012 in.)

Oil pressure relief valve

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

ENGINE — 2¼ LITRE DIESEL

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

Crankshaft

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

Main bearings

Number and type	3 halved shells
Material	Steel shell, copper-lead lined, tin plated
Diametrical clearance	0,020 mm to 0,063 mm (0.0008 in. to 0.0025 in.)

Connecting rods

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

Big end bearings

Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,019 mm to 0,068 mm (0.00075 in. to 0.0027 in.)
End float on crankpin	0,20 mm to 0,30 mm (0.007 in. to 0.012 in.)

Gudgeon pins

Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,0076 mm to 0,0178 mm (0.0003 in. to 0.0007 in.)

Pistons

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

Piston rings**Compression No. 1 (top)**

Type	Square friction edge, chrome plated
Gap in bore	0,35 mm to 0,50 mm (0.014 in. to 0.019 in.)
Clearance in groove	0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.)

Compression Nos. 2 and 3

Type	Bevelled friction edge. Marked 'T' or 'TOP' on upper side
Gap in bore	0,25 mm to 0,38 mm (0.010 in. to 0.015 in.)
Clearance in groove	0,06 mm to 0,11 mm (0.0025 in. to 0.0045 in.)

Oil control No. 4

Type	Expander and rails
Gap in bore	0,38 mm to 1,14 mm (0.015 in. to 0.045 in.)
Clearance in groove	0,038 mm to 0,064 mm (0.0015 in. to 0.0025 in.)

Camshaft

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

Valves

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

Valve springs

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

Valve timing

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

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rev/min	2,5 to 4,57 kgf/cm ² (35 to 65 lbf/in. ²)
Oil pump	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End float of gears	
Steel gear	0,05 mm to 0,12 mm (0.002 in. to 0.005 in.)
Aluminium gear	0,07 mm to 0,15 mm (0.003 in. to 0.006 in.)
Radial clearance of gears	0,02 mm to 0,10 mm (0.001 in. to 0.004 in.)
Backlash of gears	0,15 mm to 0,28 mm (0.006 in. to 0.012 in.)

Oil pressure relief valve

Type	Non-adjustable
Relief valve spring	
Free length	67,82 mm (2.670 in.)
Compressed length at 2.58 kg (5.7 lb.) load	61,23 mm (2.450 in.)

ENGINE — 2.6 LITRE PETROL

Type	6-cylinder
Bore	77,8 mm (3.063 in.)
Stroke	92,075 mm (3.625 in.)
Capacity	2625 cm ³ (160.3 in. ³)
Valve operation	Inlet — overhead by push rod Exhaust — side by cam follower
Crankshaft	
Main journal diameter	66,64 mm to 66,66 mm (2.624 in. to 2.6245 in.)
Minimum regrind diameter	65,63 mm (2.584 in.)
Crankpin journal diameter	47,62 mm to 47,64 mm (1.875 in. to 1.87575 in.)
Minimum regrind diameter	46,60 (1.835 in.)
Crankshaft end thrust	Taken on thrust washers at rear main bearing
Crankshaft end float	0,05 mm to 0,15 mm (0.002 in. to 0.006 in.)
Main bearings	
Number and type	7 halved shells
Material	Steel shell, copper-lead lined, tin plated
Diametrical clearance	0,015 mm to 0,050 mm (0.0006 in. to 0.002 in.)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in., 0.020 in., 0.030 in., 0.040 in.)
Connecting rods	
Type	Horizontally split big end, plain small end
Length between centres	206,463 mm (8.1285 in.)
Big end bearings	
Type and material	Steel shell, copper-lead, tin plated
Diametrical clearance	0,019 mm to 0,063 mm (0.00075 in. to 0.0025 in.)
End float on crankpin	0,15 mm to 0,38 mm (0.006 in. to 0.015 in.)
Undersizes	0,25 mm, 0,50 mm, 0,76 mm, 1,01 mm (0.010 in., 0.020 in., 0.030 in., 0.040 in.)
Gudgeon pins	
Type	Fully floating
Fit in piston	Push fit by hand
Clearance in connecting rod	Zero to 0,0241 mm (0.00095 in.)
Pistons	
Type	Aluminium alloy, ridged top
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin.	
Standard size and oversize pistons	0,048 mm to 0,060 mm (0.0019 in. to 0.0024 in.)

Piston rings	
Compression	2
Gap in bore	0,38 mm to 0,50 mm (0.015 in. to 0.020 in.)
Clearance in groove	0,046 mm to 0,097 mm (0.0018 in. to 0.0038 in.)
Oil control	1
Gap in bore	0,38 mm to 0,80 mm (0.015 in. to 0.033 in.)
Clearance in groove	0,05 mm to 0,10 mm (0.002 in. to 0.004 in.)
Camshaft	
Location	Left-hand side of engine
End float	0,11 mm to 0,16 mm (0.0045 in. to 0.0065 in.)
Number of bearings	1
Material	Split 'Mazak' castings
Valves	
Length	
Inlet	96,57 mm to 96,77 mm (3.802 in. to 3.810 in.)
Exhaust	116,07 mm to 116,28 mm (4.570 in. to 4.578 in.)
Seat angle	
Inlet	30°
Exhaust	45°
Head diameter	
Inlet	45,54 mm to 45,64 mm (1.793 in. to 1.797 in.)
Exhaust	32,02 mm to 32,13 mm (1.261 in. to 1.265 in.)
Stem diameter	
Inlet	8,68 mm to 8,69 mm (0.342 in. to 0.3425 in.)
Exhaust	8,66 mm to 8,67 mm (0.341 in. to 0.3415 in.)
Stem to guide clearance	
Inlet	0,033 mm to 0,048 mm (0.0013 in. to 0.0019 in.)
Exhaust	0,058 mm to 0,073 mm (0.0023 in. to 0.0029 in.)
Valve lift	
Inlet	9,49 mm (0.374 in.)
Exhaust	10,23 mm (0.403 in.)

continued

Valve springs

Type	Duplex. Interference coil
Inlet	
Inner	
Length, free	43,26 mm (1.703 in.)
Length under 9,7 kg (21.5 lb.) load ..	36,49 mm (1.437 in.)
Outer	
Length, free	49,80 mm (1.960 in.)
Length under 31,5 kg (69.5 lb.) load ..	41,27 mm (1.625 in.)
Exhaust	
Inner	
Length, free	43,26 mm (1.703 in.)
Length under 9,1 kg (16.4 lb.) load ..	38,10 mm (1.500 in.)
Outer	
Length, free	47,26 mm (1.861 in.)
Length under 18,9 kg (41.8 lb.) load ..	41,27 mm (1.625 in.)

Valve timing

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

Lubrication

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

Oil pump

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

Oil pressure relief valve

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

CLUTCH

Make	Borg and Beck
Type	Diaphragm spring
Drive plate diameter	241 mm (9.500 in.)
Damper spring colour	Dark green (Petrol)
	Dark grey/Light green (Diesel)
Facing material	FERODO RYZ

TRANSMISSION

Main gearbox	
Type	Single helical constant mesh with synchro-mesh on all forward speeds

Ratios:

Top	Direct
Third	1.50:1
Second	2.22:1
First	3.68:1
Reverse: Suffix 'A' gearbox	3.887:1
Suffix 'B' gearbox	4.021:1

Transfer gearbox

Type	Two speed reduction on main gearbox output
Front wheel drive	Two/four wheel drive control on transfer, box output

Ratios:

	High transfer	Low transfer
Helical and spur gear transfer gearbox ..	1.15:1	2.35:1
All helical transfer gearbox	1.53:1	3.27:1
Overall ratios (final drive) with helical and spur gear transfer gearbox.		
Top	5.4:1	11.1:1
Third	8.05:1	16.5:1
Second	12.0:1	24.6:1
First	19.88:1	40.7:1
Reverse: Suffix 'A' gearbox	20.47:1	42.87:1
Suffix 'B' gearbox	21.6:1	44.31:1
Overall ratios (final drive) with all helical transfer gearbox.		
Top	7.19:1	15.4:1
Third	10.81:1	23.1:1
Second	15.96:1	34.1:1
First	26.46:1	56.56:1
Reverse: Suffix 'A' gearbox	27.87:1	59.76:1
Suffix 'B' gearbox	28.91:1	61.78:1

REAR AXLE

Type	Spiral bevel	fully floating
Ratio	4.7:1	
	109 in W/B 4.7:1 Hypoid	

continued

FRONT AXLE

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

PROPELLER SHAFTS

Type	Hardy-Spicer, needle bearing
Diameter of tubular shaft	50,8 mm (2.000 in.)
Overall length (face to face in midway position)	
Front shaft — 4-cylinder models ..	604,8 mm (23.812 in.)
Front shaft — 6-cylinder models ..	693,7 mm (27.312 in.)
Rear shaft — 88 models	554,00 mm (21.812 in.)
Rear shaft — 109 4-cylinder models .	1042,9 mm (41.062 in.)
Rear shaft — 109 6-cylinder models .	955,7 mm (37.625 in.)

COOLING SYSTEM

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

FUEL SYSTEM

Carburettor	see 'ENGINE TUNING DATA'
Air Cleaner	Oil bath with built in centrifugal pre-cleaner
Fuel pump	
2¼ litre 4-cylinder Petrol	
Type	Mechanical
Pressure range	0,10 to 0,17 kgf cm ² (1.5 to 2.5 lbf in. ²)
2¼ litre 4-cylinder Diesel	
Type	Mechanical
Pressure range	0,35 to 0,56 kgf cm ² (5 to 8 lbf in. ²)
2.6 litre 6-cylinder Petrol	
Type	Electrical — Dual inlet
Pressure range	0,15 to 0,26 kgf cm ² (2.25 to 3.75 lbf in. ²)
Injection system 2¼ litre Diesel	
Injection pump	CAV mechanically-governed distributor type
Injectors	CAV Pintaux
Nozzle size	BDNO/SPC 6209
Operating pressure of nozzle valve ..	135 atm
Back leakage rate 150 to 100 atm ..	
New nozzle	7 seconds
Original nozzle	5 seconds
Start of injection	13° BTDC

SUSPENSION

Type.....	Rigid axles, semi-elliptic springs					
Springs	88-Petrol	88-Diesel	109-Petrol	109-Diesel	Heavy Duty	Extra Heavy Duty
Front (Driver)						
Length	36.25 in.	36.25 in.	36.25 in.	36.25 in.	36.25 in.	36.25 in.
Width	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.
No. of leaves.....	9	11	11	11	11	11
Thickness						
1 at.....	0.203 in.	0.203 in.	0.203 in.	0.203 in.	0.203 in.	0.203 in.
8 at.....	0.165 in.					
10 at.....		0.172 in.	0.172 in.	0.172 in.	0.172 in.	0.172 in.
Rate	203 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.
Free camber	6.080 in.	5.625 in.	5.625 in.	6.125 in.	6.125 in.	6.25 in.
Front (Passenger)						
Length	36.25 in.	36.25 in.	36.25 in.	36.25 in.,	36.25 in.	36.25 in.
Width	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.2 in.	2.5 in.
No. of leaves.....	9	11	11	11	11	11
Thickness						
1 at.....	0.203 in.	0.203 in.	0.203 in.	0.203 in.	0.203 in.	0.203 in.
8 at.....	0.165 in.					
10 at.....		0.172 in.	0.172 in.	0.172 in.	0.172 in.	0.172 in.
Rate	203 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.	273 lb. in.
Free camber	5.330 in.	5.125 in.	5.125 in.	5.625 in.	5.625 in.	5.625 in.
Rear (Driver)						
Length	48 in.	48 in.	48 in.	48 in.	48 in.	48 in.
Width	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.
No. of leaves.....	11	11	10	10	8	9
Thickness						
1 at.....	0.250 in.	0.250 in.	0.250 in.	0.250 in.		
2 at.....			0.375 in.	0.375 in.		
7 at.....			0.156 in.	0.156 in.		
8 at.....					0.281 in.	
9 at.....						0.281 in.
10 at.....	0.187 in.	0.187 in.				
Rate	166 lb. in.	166 lb. in.	270 lb. in.	270 lb. in.	368 lb. in.	415 lb. in.
Free camber	7.420 in.	7.420 in.	9.250 in.	9.250 in.	5.187 in.	6.187 in.
Rear (Passenger)						
Length	48 in.	48 in.	48 in.	48 in.	48 in.	48 in.
Width	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.	2.5 in.
No. of leaves.....	11	11	10	10	8	9
Thickness						
1 at.....	0.250 in.	0.250 in.	0.250 in.	0.250 in.		
2 at.....			0.375 in.	0.375 in.		
7 at.....			0.156 in.	0.156 in.		
8 at.....					0.281 in.	
9 at.....						0.281 in.
10 at.....	0.187 in.	0.187 in.				
Rate	166 lb. in.	166 lb. in.	270 lb. in.	270 lb. in.	368 lb. in.	415 lb. in.
Free camber	6.750 in.	6.750 in.	8.200 in.	8.200 in.	4.750 in.	6.187 in.

Hydraulic dampers	Telescopic: non-adjustable	
Piston diameter		
88 models	25,4 mm (1.000 in.)	
109 models	34,6 mm (1.375 in.)	
STEERING		
Type	Recirculating ball	
Ratio: Straight ahead	15.6:1	
Full lock	23.8:1	
Low ratio (109 one-ton model):		
Straight ahead	19.6:1	
Full lock	29.9:1	
Front wheel toe-in	1,2 mm to 2,4 mm (0.046 in. to 0.093 in.)	
Camber angle	1½°	
Castor angle	3°	
Swivel pin inclination	7°	
BRAKES		
System	Single line, non servo } Single line with servo } Dual line }	According to requirements
Front		
Drum diameter		
88 models	254 mm (10 in.)	
109 models	279,4 mm (11 in.)	
Reclamation limit	0,75 mm (0.030 in.) oversize	
Wheel cylinder bore diameter		
88 models	31,75 mm (1.250 in.) Single leading shoe	
109 models	27,57 mm (1.125 in.) Twin leading shoe	
Lining dimensions		
88 models	220,98 mm × 38,1 mm × 4,75 mm (8.700 in. × 1.500 in. × 0.187 in.)	
109 models		
2710 Gross Vehicle weight	264,66 mm × 57,15 mm × 4,74 mm (10.42 in. × 2.25 in. × 0.187 in.)	
3020 Gross Vehicle weight	279,4 mm × 76,2 mm × 4,74 mm (11.0 in. × 3.0 in. × 0.187 in.)	
Lining material	Don 269 All Models from June 77	
Rear		
Drum diameter		
88 models	254 mm (10 in.)	
109 models	279,4 mm (11 in.)	
Reclamation limit	See page 70—2	
Wheel cylinder bore diameter	31,75 mm (1.250 in.) single shoe	
Lining dimensions		
88 models	220,98 mm × 38,1 mm × 4,74 mm (8.700 in. × 1.500 in. × 0.18 in.)	
109 models	264,66 mm × 57,15 mm × 4,74 mm (10.42 in. × 2.25 in. × 0.18 in.)	
Lining material	Don 269 All Models from June 77	

Hand brake	
Drum diameter	228,6 mm (9.000 ins.)
Lining dimensions	209,55 mm × 44,45 mm × 4,74 mm (8.250 in. × 1.750 in. × 0.187 in.)
Master cylinder bore diameter	
88 models, non servo	19,00 mm (0.750 in.)
88 models, with servo	22,2 mm (0.875 in.)
109 models, all	25,4 mm (1.000 in.)

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

TYRES**Type/Size**

88 models: Standard	Cross Ply 6.00-16
Optional	Cross Ply 6.50-16
	Cross Ply 7.00-16
	Cross Ply 7.50-16 with 5.50F × 16 wheel
109 models	Cross Ply 7.50-16
109 One ton model	Cross Ply 9.00-16

Tyre pressures

Model		Normal Conditions		Emergency Soft	
		Front	Rear	Front	Rear
88 inch Wheelbase 6.00, 6.50 and 7.00 × 16	kg/cm ²	1.76	2.11	1.05	1.4
	lb/in ²	25	30	15	20
	bars	1.72	2.07	1.03	1.38
88 inch Wheelbase 7.50 × 16	kg/cm ²	1.76	2.11	0.84	1.4
	lb/in ²	25	30	12	20
	bars	1.72	2.07	0.83	1.38
88 inch Wheelbase 205 × 16	kg/cm ²	1.76	2.46	1.05	1.76
	lb/in ²	25	35	15	25
	bars	1.72	2.41	1.03	1.72
109 inch Wheelbase 7.50 × 16 For speeds up to 70mph	kg/cm ²	1.76	2.53	1.05	1.83
	lb/in ²	25	36	15	26
	bars	1.72	2.48	1.03	1.79
109 One Ton 9.00 × 16	kg/cm ²	1.4	1.4	0.7	0.7
	lb/in ²	20	20	10	10
	bars	1.38	1.38	0.7	0.7

General Notes

Emergency soft pressures should only be used in extreme conditions where loss of traction is likely to occur.
Return pressures to normal immediately the difficulties have been overcome.

The pressures quoted above are for laden and unladen conditions.
For extra ride comfort, the following can apply (road condition only)

88 models — less than 900kg on rear axle, lower tyre pressure to 1.76 kg/cm² — 25lb/in² — 1.72 bars
109 models — less than 1050kg on rear axle, lower tyre pressure to 1.76 kg/cm² — 25 lb/in² — 1.72 bars

Where special tyres or tyres other than the above are fitted to the vehicle, consult your Land Rover Distributor or Dealer or the tyre Manufacturer for correct tyre pressures.

ELECTRICAL EQUIPMENT

System	12 volt, negative earth
Battery	
Petrol models: Basic	Chloride (6TWL921) 291
	Lucas (OCP/9/11) 371
Heavy duty	Chloride (6TWZ13R) 369
	Lucas (OCP/13/11) 389
Diesel models—heavy duty	Chloride (6TW15L) 243
	Unipart GBY 2209
	Unipart GBY 2240
	Unipart GBY 2233
Alternator	
Type	16 ACR
Nominal output	34 amps at 6000 Alternator rev/min
Field resistance	4,33 ohms \pm 5%
Brush spring pressure	5 to 10 ozs
Brush minimum length	5,0 mm (0.2 in.) protruding beyond the brush box
Stator	0,138 ohms \pm 5% at 20°C
Rotor	3,27 ohms \pm 5% at 20°C
Starter Motor	
Petrol models	
Make/type	Lucas 2M100
Brush spring tension	1020 gms 36 ozs
Brush minimum length	9,5 mm (0.375 in.)
Diesel models	
Make/type	Lucas M45G Pre-engaged, oil and waterproof
Brush spring tension	1,2 kg. (42 oz)
Brush minimum length	8,0 mm (0.312 in.)
Wiper motor	
Make/type	Lucas 14W single speed
Armature end float	0,51 to 0,25 mm (0.002 in. to 0.010 in.)
Brush minimum length	4,8 mm (0.190 in.)
Brush spring tension	150g to 250g (5.3 ozs to 8 ozs)
Resistance of armature winding at 16°C (60°F) measured between adjacent commutator segments	0.23 to 0.35 ohms
Light running, rack disconnected	
Current at 13.5 V	1.4 amps max
Speed 30 to 60 seconds from cold	46 to 52 rev/min

GENERAL DIMENSIONS

	88		88 Station Wagon		109		109 Station Wagon		High Capacity Pick-up 2710 and 3020Kg Gross Vehicle Weight	
	Metric	British	Metric	British	Metric	British	Metric	British	Metric	British
Overall length	3,62 m	142.567 in.	3,62 m	142.56 in.	4,44 m	175 in.	4,44 m	175 in.	4,64 m	182.7 in.
Overall width (all models)	1,69 m	66.6 in.	—	—	—	—	—	—	1,72 m	67.7 in.
Overall unladen height, hood up	1,97 m	77.5 in.	—	—	—	—	—	—	2,03 m	80.0 in.
Overall unladen height, hood down, screen up	1,73 m	68 in.	—	—	—	—	—	—		
Overall unladen height, hood down, screen down	1,46 m	57.5 in.	—	—	—	—	—	—		
Overall unladen height, with cab or hard top	1,95 m	76.875 in.	1,98 m	77.875 in.	2,06 m	81 in.	2,07 m	81.375 in.	2,77 m	109 in.
Wheelbase	2,23 m	88 in.	2,23 m	88 in.	2,77 m	109 in.	2,77 m	109 in.		
Track	1,31 m	51.5 in.	1,31 m	51.5 in.	1,33 m	52.5 in.	1,53 m	52.5 in.		
Turning circle	11,6 m	38 ft.	11,6 m	38 ft.	14,3 m	47 ft.	14,3 m	47 ft.	14,3 m	47 ft.
Unladen ground clearance under differen- tials, 6.00 X 16 tyres	178 m	7 in.	178 m	7 in.	—	—	—	—		
Unladen ground clearance under differen- tials, 7.00 X 16 tyres	197 mm	7.75 in.	197 mm	7.75 in.	—	—	—	—		
Unladen ground clearance under differen- tials, 7.50 X 16 tyres	—	—	—	—	209 mm	8.25 in.	209 mm	8.25 in.	209 mm	8.25 in.
Internal body dimensions:										
Length (between cappings)	1,206 m	47.5 in.	—	—	1,85 m	72.75 in.	—	—		
Width (between cappings)	1,45 m	57 in.	—	—	1,45 m	57 in.	—	—		
Height of body sides	508 mm	20 in.	—	—	495 mm	19.5 in.	—	—		
Height of wheel arch	216 mm	8.5 in.	—	—	229 mm	9 in.	—	—		
Width of wheel arch (to body side)	292 mm	11.5 in.	—	—	349 mm	13.75 in.	—	—		
Width of floor (between wheel arches)	921 mm	36.25 in.	—	—	921 mm	36.25 in.	—	—		
Height, floor to roof (maximum)	1,23 mm	48.5 in.	—	—	1,22 m	48 in.	—	—		

WEIGHTS**Short-wheelbase weights**

	Full Length Canvas Hood				Truck Cab				Hard Top				Station Wagon			
	Petrol		Diesel		Petrol		Diesel		Petrol		Diesel		Petrol		Diesel	
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
UNLADEN WEIGHT																
Front axle	718	1583	747	1647	725	1599	754	1663	713	1572	742	1636	705	1555	734	1619
Rear axle	580	1279	589	1299	582	1283	591	1303	625	1378	634	1398	713	1572	722	1592
Total	1298	2862	1336	2946	1307	2882	1345	2966	1338	2950	1376	3034	1418	3127	1456	3211
EEC KERB WEIGHT																
Front axle	756	1667	786	1733	763	1682	793	1749	751	1656	781	1722	743	1638	773	1705
Rear axle	650	1433	661	1457	652	1438	663	1462	695	1532	706	1557	783	1727	794	1751
Total	1406	3100	1447	3190	1415	3120	1456	3211	1446	3188	1487	3279	1526	3365	1567	3456
GROSS VEHICLE WEIGHT	kg lb		kg lb		kg lb		kg lb		kg lb		kg lb		kg lb		kg lb	
Front axle	930 2051		930 2051		930 2051		930 2051		930 2050		930 2050		930 2050		930 2050	
Rear axle	1190 2624		1190 2624		1190 2624		1190 2624		1190 2624		1190 2624		1190 2624		1190 2624	
Total	2120 4675		2120 4675		2120 4675		2120 4675		2120 4674		2120 4674		2120 4674		2120 4674	

NOTE: Unladen weight is the minimum vehicle specification—excluding fuel and driver.

EEC kerb weight is the minimum vehicle specification—plus full fuel tank and 75 kg (165 lb) driver.

Gross vehicle weight is the maximum all-up weight including driver, passengers, payload and equipment.

NOTE: For sustained cross-country use the gross vehicle weight must be reduced by 90 kg (off the rear axle).

Maximum Permissible Towed Weights	On-road		Off-road	
	kg	lb	kg	lb
Trailers without brakes	500	1100	500	1100
Trailers with over-run brakes	2000	4400	1000	2200
4-wheel trailers with continuous or semi-continuous brakes, i.e. coupled brakes	3500	7700		
	(Petrol)		1000	2200
	3500 7700			
	(Diesel)			

NOTE: The weights above do not authorise use outside the legislation enforced by the territory in which the vehicle and trailer combination is being operated.

Long-wheelbase weights**High Capacity Pick-Up Weights**

	Full Length Canvas Hood				Truck Cab				Hard Top				12-seater Station Wagon				2710 kg Gross vehicle weight		3020 kg Gross vehicle weight	
	4-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol		4-cylinder Diesel		4-cylinder Petrol	4-cylinder Diesel	4-cylinder Petrol	4-cylinder Diesel
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	kg	kg	kg
UNLADEN WEIGHT																				
Front axle	785	1733	814	1795	794	1751	823	1815	786	1733	815	1797	788	1797	819	1806	799	812	818	831
Rear axle	700	1544	712	1570	694	1530	706	1557	744	1641	756	1667	891	1965	890	1962	720	732	744	756
Total	1485	3277	1526	3365	1488	3281	1529	3372	1530	3374	1571	3464	1679	3702	1709	3768	1519	1544	1562	1587
EEC KERB WEIGHT																				
Front axle	811	1788	839	1850	820	1808	848	1870	812	1790	840	1852	814	1795	844	1861	825	837	844	856
Rear axle	798	1760	819	1806	792	1746	813	1793	842	1857	863	1903	989	2181	997	2198	818	839	842	863
Total	1609	3548	1658	3656	1612	3554	1661	3663	1654	3647	1703	3755	1803	3976	1841	4059	1643	1676	1686	1719
GROSS VEHICLE WEIGHT	kg lb		kg lb		kg lb		kg lb		kg lb		kg lb		kg lb		kg lb		kg		kg	
Front axle	1000 2205		1000 2205		1000 2205		1000 2205		1000 2205		1000 2205		1000 2205		1000 2205		1000		1120	
Rear axle	1710 3771		1710 3771		1710 3771		1710 3771		1710 3771		1710 3771		1710 3771		1710 3771		1710		1900	
Total	2710 5976		2710 5976		2710 5976		2710 5976		2710 5976		2710 5976		2710 5976		2710 5976		2710		3020	

ENGINE TUNING DATA

ENGINE

2½ litre 4-cylinder Petrol models (Refer to Division 17 for emission controlled engines)

Type	In line four cylinder four stroke, overhead valves
Capacity	2286 cm ³ (139.5 in. ³).
Compression ratio	
Standard	8.0:1 (Engine number commencing 901....)
Optional	7.0:1 (Engine number commencing 904....)
Firing Order	1-3-4-2
Compression pressure	
8.0:1 compression ratio	11,2 kgf. cm ² (160 lbf. in. ²)
7.0:1 compression ratio	10,2 kgf. cm ² (145 lbf. in. ²)
Idling speed	500 rev/min
Fast idle setting	1,40 mm (0.055 in.) throttle butterfly clearance, 1200 ± 50 rev/min
Ignition timing, static	
8.0:1 compression ratio	TDC when using 90 octane fuel 3° ATDC when using 85 octane fuel
7.0:1 compression ratio	3° BTDC when using 83 octane fuel TDC when using 75 octane fuel
Timing marks	On crankshaft pulley
Valve clearance, inlet and exhaust	0,25 mm (0.010 in.)

DISTRIBUTOR

Make/type	Lucas 45D
Rotation of rotor	Anti-clockwise
Contact breaker gap	0,36 mm to 0,40 mm (0.014 in. to 0.016 in.)
Condenser capacity	0.2 microfarad
Serial number	5069

Centrifugal advance with TDC ignition timing

Decelerating check with vacuum unit disconnected

Crankshaft angle	Engine rev/min
38° to 42°	4500
30° to 34°	3500
22° to 26°	2500
12° to 16°	1200
4° to 12°	900
0° to 4°	600
No advance below	450

Vacuum advance

Starts	89 mm (3.5 in.) Hg.
Finishes	635 mm (25.0 in.) Hg.

SPARKING PLUGS

Make/type	
8.0:1 compression ratio	Champion N12Y or Unipart GSP 131
7.0:1 compression ratio	Champion N8 or Unipart GSP 130
Gap	0,75 to 0,80 mm (0.029 to 0.032 in.)

IGNITION COIL

Make/type	HA12
Primary resistance at 20°C (68°F)	3.0 to 3.5 ohms
Consumption—ignition on at engine idle speed	2.0 amps approx.

CARBURETTER

Make/type	Zenith 361V
Choke diameter	27 mm
Main jet	125
Compensating (enrichment) jet	150
Pump jet	65 (short stroke, outer hole)
Needle valve	1.75

High altitude carburetter

Main	(120)	Altitude: 1524 to 2133 m (5000 to 7000 ft)
	(117.5)	2133 to 2743 m (7000 to 9000 ft)
	(115)	2743 to 3657 m (9000 to 12000 ft)
	(112.5)	3657 to 4267 m (12000 to 14000 ft)
Slow running	(55)	2743 to 4267 m (9000 to 14000 ft)

ENGINE

2½ litre 4-cylinder Diesel models

Type	In line four cylinder four stroke, overhead valves
Capacity	2286 cm ³ (139.5 in. ³)
Compression ratio	23.0:1
Firing order	1-3-4-2
Idling speed	590 ± 20 rev/min
Injection timing setting	13° B.T.D.C.
Timing marks	
Valve timing — inlet and exhaust	
Injection timing	On engine flywheel and pump flange
Valve clearance — inlet and exhaust	0,25 mm (0,010 in)

INJECTORS

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

HEATER PLUGS

Make/type	KLG GF 210/T or Champion AG45
-----------------	-------------------------------

DISTRIBUTOR PUMP

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

ENGINE

2.6 litre 6-cylinder Petrol models

Type	In line six cylinder four stroke, inlet—overhead valves exhaust—side valves
Capacity	2625 cm ³ (160.3 in. ³)
Compression ratio	
Standard	7.8:1 (Engine number commencing 941....)
Optional	7.0:1 (Engine number commencing 944....)
Firing order	1—5—3—6—2—4
Compression pressure	
7.8:1 compression ratio	9,48 to 10,5 kgf/cm ² (135 to 150 lbf/in. ²) at 3000 rev/min crank speed
7.0:1 compression ratio	9,84 kgf/cm ² (140 lbf/in. ²)
Idling speed	500 rev/min
Fast idle setting	1000 to 1200 rev/min
Ignition timing, static and dynamic	
7.8:1 compression ratio	2° ATDC when using 90 octane fuel
7.0:1 compression ratio	6° ATDC when using 85 octane fuel
7.0:1 compression ratio	2° BTDC when using 83 octane fuel
7.0:1 compression ratio	TDC when using 80 octane fuel
7.0:1 compression ratio	On crankshaft pulley
Timing marks	
Valve clearance	
Inlet	0,15 mm (0.006 in.) engine hot
Exhaust	0,25 mm (0.010 in.) engine hot or cold

DISTRIBUTOR

Make/type	Lucas 25D6
Rotation of rotor	Anti-clockwise

Centrifugal advance

Decelerating check with vacuum unit disconnected

Crankshaft angle	Engine rev/min
30° to 34°	4000
26° to 28°	3000
18° to 24°	1800
10° to 16°	1400
4° to 8°	800
0° to 4°	600
No advance below	400

Vacuum advance

Starts	165 mm (6.5 in.) Hg.
Finishes	635 mm (25.0 in.) Hg.

SPARKING PLUGS

Make/type	Champion N5 or Unipart GSP 160 (7.8:1 and 7.0:1 compression ratio)
Gap	0,75 to 0,80 mm (0.029 to 0.032 in.)

IGNITION COIL

Make/type	Lucas HA12
Primary resistance at 20°C (68°F)	3.0 to 3.5 ohms
Consumption—ignition on at engine idle speed	1.5 amps

CARBURETTER

Choke diameter	Zenith-Stromberg 175CD-SE
Metering needle	41,275 mm (1.625 in.)
Air valve return spring	B18362.Z/4J
Needle valve	B18277.Z
Fast idle interconnection setting	B18353.Z 1,75 mm
Float height	1,1 mm or No. 57 drill at edge of throttle
	16 mm to 17 mm (0.629 in. to 0.669 in.)

TORQUE WRENCH SETTINGS

	kgf. m.	lbf. ft.
ENGINE—2½ litre 4-cylinder		
Connecting rod cap nuts	3,5	25
Main bearing cap bolts:		
Petrol engines—3 bearing	11,5	85
Diesel engines	13,8	100
Cylinder head bolts:		
Petrol engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	8,9	65
Diesel engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	12,5	90
Rocker shaft bolts		
Petrol engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	8,9	65
Diesel engines		
5/16 in. UNF	2,4	18
1/2 in. UNF	12,5	90
Starter dog:		
Petrol engines	27,6	200
Diesel engines	27,6	200
Flywheel bolts	8,5 to 9,0	60 to 65
Oil filter bolts:		
Canister to housing	1,66	12
Housing to cylinder block	3,45	25
Engine sump bolts	1,65	12
ENGINE—2.6 litre 6-cylinder Petrol		
Connecting rod cap nuts	2,8	20
Main bearing cap bolts	10,4	75
Cylinder head bolts		
3/8 in. (9,5 mm approximately) dia-		
meter	4,0	30
7/16 in. (11 mm approximately) dia-		
meter	7,0	50
Starter dog:	27,65	200
Flywheel bolts	8,5 to 9,0	60 to 65
Sump bolts	1,65	12
Fuel system		
2½ litre 4-cylinder Diesel		
Injector nuts	0,8 to 1,0	6 to 8
Manifold and exhaust system		
2½ litre 4-cylinder Petrol		
Induction manifold to exhaust manifold		
nuts	2,3	17
Clutch		
Clutch cover bolts	2,48 to 3,04	18 to 25

	kgf. m.	lbf. ft.
Gearbox		
Output drive flange nut	11,75	85
Layshaft bolt	7,00	50 (apply Loctite 601)
Rear axle and final drive		
Hub driving flange bolts	4,2 to 5,2	30 to 38
Salisbury type axles:		
Differential case bolts	9,1 to 10,4	66 to 75
Crownwheel bolts	15,3 to 17,3	111 to 125
Differential bearing cap bolts	12,9 to 14,5	93 to 105
Differential cover bolts	2,8 to 3,5	20 to 25
Rover type axles		
Bevel pinion driving flange nut	11,75	85
Crown wheel bolts	5,5 to 6,2	40 to 45
Differential bearing cap bolts	7,0 to 8,9	50 to 65
Hub driving flange nut	1,4 to 2,0	10 to 15
Front axle and final drive		
Hub driving flange bolts	4,2 to 5,2	30 to 38
Hub driving flange nut	2,0 to 2,7	15 to 20
Bevel pinion driving flange nut	11,75	85
Crown wheel bolts	5,5 to 6,2	40 to 45
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
Steering		
Steering wheel nut	5,4	40
Ball joint nuts	4,0	30
Relay lever pinch bolts	7,6	55
Steering box to support bracket bolts ..	7,0 to 8,5	50 to 60
Steering box support bracket to chassis		
bolts	2,0	15
Steering box drop arm nut	8,5 to 11,0	60 to 80
Road wheel nuts	10,3 to 11,7	75 to 85
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 (Dual system		
master cylinder)	4,9 to 6,2	35 to 45
Brake failure switch end pipe union ...	2,2	16
Brake failure switch unit to housing ...	2,2	16
Fluid reservoir to master cylinder bolt		
(single line servo)	2,8 to 3,5	20 to 25
Fluid reservoir to master cylinder screws		
(dual line servo models)	0,3 to 0,4	2 to 3
Servo assembly securing nuts	1,2	9

continued

Suspension—all models		
Leaf spring 'U' bolts front and rear	kgf. m. 8,0	lbf. ft. 58
Shackle nuts and bolts	8,3 to 9,7	60 to 70
Windscreen wipers and washers		
Wiper blade drive adaptor bolts	0,34 (34 kgf. cm)	2.5 (30 lbf. in.)
Electrical equipment		
Alternator shaft nut	3,5 to 4,2	25 to 30
Heater plugs (diesel)	3,4	25
Starter motor		
Petrol models		
Starter through bolts	1,0	8
Diesel models		
Solenoid to starter nuts	0,62	4.5
Solenoid outer terminal nuts	0,41	3
Starter yoke terminal outer nut ..	0,2	1.5
Starter through bolts	1,1	8
Starter earth stud nut	0,82	6
Eccentric pivot pin locknut	2,2	16

GENERAL FITTING INSTRUCTIONS

Precautions against damage

- 1 Always fit covers to protect wings before commencing work in engine compartment.
- 2 Cover seats and carpets, wear clean overalls and wash hands or wear gloves before working inside car.
- 3 Avoid spilling hydraulic fluid or battery acid on paint work. Wash off with water immediately if this occurs. Use Polythene sheets in boot to protect carpets.
- 4 Always use a recommended Service Tool, or a satisfactory equivalent, where specified.
- 5 Protect temporarily exposed screw threads by replacing nuts or fitting plastic caps.

Safety Precautions

- 1 Whenever possible use a ramp or pit when working beneath car, in preference to jacking. Chock wheels as well as applying hand brake.
- 2 Never rely on a jack alone to support car. Use axle stands or blocks carefully placed at jacking points to provide rigid location.
- 3 Ensure that a suitable form of fire extinguisher is conveniently located.
- 4 Check that any lifting equipment used has adequate capacity and is fully serviceable.
- 5 Inspect power leads of any mains electrical equipment for damage and check that it is properly earthed.
- 6 Disconnect earth (grounded) terminal of car battery.
- 7 Do not disconnect any pipes in air conditioning refrigeration system, if fitted, unless trained and instructed to do so. A refrigerant is used which can cause blindness if allowed to contact eyes.
- 8 Ensure that adequate ventilation is provided when volatile de-greasing agents are being used.

CAUTION: Fume extraction equipment must be in operation when trichloride, methylene chloride, chloroform, or perchlorethylene are used for cleaning purposes.

- 9 Do not apply heat in an attempt to free stiff nuts or fittings; as well as causing damage to protective coatings, there is a risk of damage to electronic equipment and brake lines from stray heat.
- 10 Do not leave tools, equipment, spilt oil etc., around or on work area.
- 11 Wear protective overalls and use barrier creams when necessary.

Preparation

- 1 Before removing a component, clean it and its surrounding areas as thoroughly as possible.
- 2 Blank off any openings exposed by component removal, using greaseproof paper and masking tape.

- 3 Immediately seal fuel, oil or hydraulic lines when separated, using plastic caps or plugs, to prevent loss of fluid and entry of dirt.
- 4 Close open ends of oilways, exposed by component removal, with tapered hardwood plugs or readily visible plastic plugs.
- 5 Immediately a component is removed, place it in a suitable container; use a separate container for each component and its associated parts.
- 6 Before dismantling a component, clean it thoroughly with a recommended cleaning agent; check that agent is suitable for all materials of component.
- 7 Clean bench and provide marking materials, labels, containers and locking wire before dismantling a component.

Dismantling

- 1 Observe scrupulous cleanliness when dismantling components, particularly when brake, fuel or hydraulic system parts are being worked on. A particle of dirt or a cloth fragment could cause a dangerous malfunction if trapped in these systems.
- 2 Blow out all tapped holes, crevices, oilways and fluid passages with an air line. Ensure that any O-rings used for sealing are correctly replaced or renewed, if disturbed.
- 3 Mark mating parts to ensure that they are replaced as dismantled. Whenever possible use marking ink, which avoids possibilities of distortion or initiation of cracks, liable if centre punch or scriber are used.
- 4 Wire together mating parts where necessary to prevent accidental interchange (e.g. roller bearing components).
- 5 Wire labels on to all parts which are to be renewed, and to parts requiring further inspection before being passed for reassembly; place these parts in separate containers from those containing parts for rebuild.
- 6 Do not discard a part due for renewal until after comparing it with a new part, to ensure that its correct replacement has been obtained.

Inspection—General

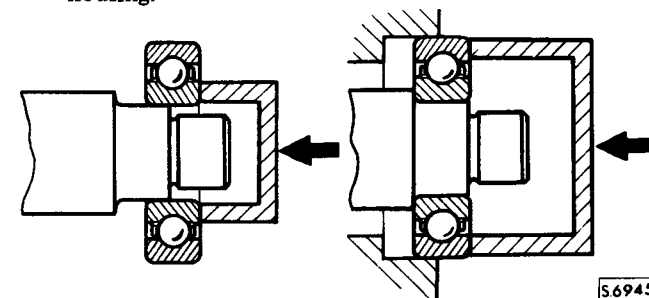
- 1 Never inspect a component for wear or dimensional check unless it is absolutely clean; a slight smear of grease can conceal an incipient failure.
- 2 When a component is to be checked dimensionally against figures quoted for it, use correct equipment (surface plates, micrometers, dial gauges, etc.) in serviceable condition. Makeshift checking equipment can be dangerous.
- 3 Reject a component if its dimensions are outside limits quoted, or if damage is apparent. A part may, however, be refitted if its critical dimension is exactly limit size, and is otherwise satisfactory.

- 4 Use 'Plastigauge' 12 Type PG-1 for checking bearing surface clearances; directions for its use, and a scale giving bearing clearances in 0.0001 in. (0.0025 mm.) steps are provided with it.

Ball and Roller Bearings

NEVER REPLACE A BALL OR ROLLER BEARING WITHOUT FIRST ENSURING THAT IT IS IN AS-NEW CONDITION.

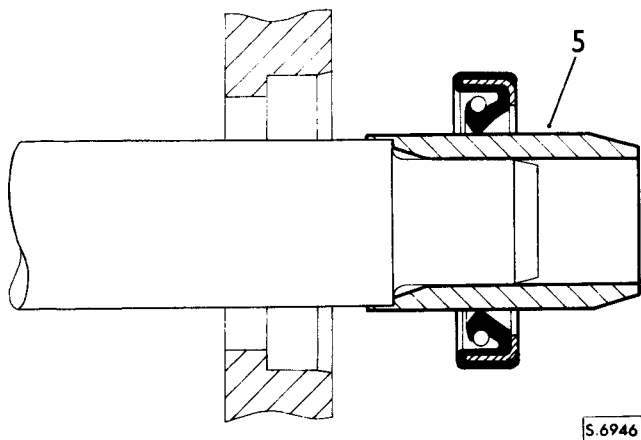
- 1 Remove all traces of lubricant from bearing under inspection by washing in petrol or a suitable de-greaser; maintain absolute cleanliness throughout operations.
- 2 Inspect visually for markings of any form on rolling elements, raceways, outer surface of outer rings or inner surface of inner rings. Reject any bearings found to be marked, since any marking in these areas indicates onset of wear.
- 3 Holding inner race between finger and thumb of one hand, spin outer race and check that it revolves absolutely smoothly. Repeat, holding outer race and spinning inner race.
- 4 Rotate outer ring gently with a reciprocating motion, while holding inner ring; feel for any check or obstruction to rotation, and reject bearing if action is not perfectly smooth.
- 5 Lubricate bearing generously with lubricant appropriate to installation.
- 6 Inspect shaft and bearing housing for discoloration or other marking suggesting that movement has taken place between bearing and seatings. (This is particularly to be expected if related markings were found in operation 2.) If markings are found, use 'Loctite' in installation of replacement bearing.
- 7 Ensure that shaft and housing are clean and free from burrs before fitting bearing.
- 8 If one bearing of a pair shows an imperfection it is generally advisable to renew both bearings: an exception could be made if the faulty bearing had covered a low mileage, and it could be established that damage was confined to it only.
- 9 When fitting bearing to shaft, apply force only to inner ring of bearing, and only to outer ring when fitting into housing.



- 10 In the case of grease-lubricated bearings (e.g. hub bearings) fill space between bearing and outer seal with recommended grade of grease before fitting seal.
- 11 Always mark components of separable bearings (e.g. taper roller bearings) in dismantling, to ensure correct reassembly. Never fit new rollers in a used cup.

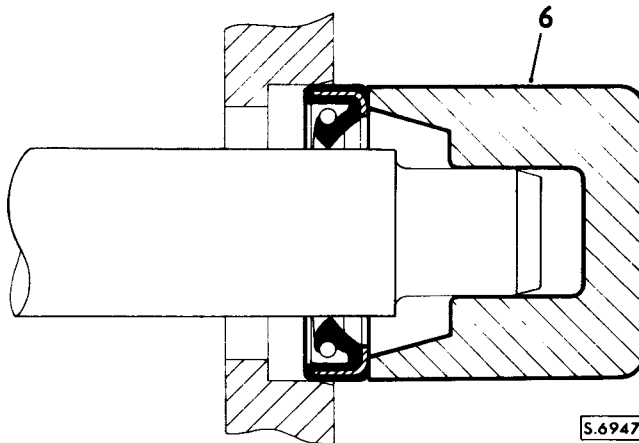
Oil Seals

- 1 Always fit new oil seals when rebuilding an assembly. It is not physically possible to replace a seal exactly when it has bedded down.
- 2 Carefully examine seal before fitting to ensure that it is clean and undamaged.
- 3 Smear sealing lips with clean grease; pack dust excluder seals with grease, and heavily grease duplex seals in cavity between sealing lips.
- 4 Ensure that seal spring, if provided, is correctly fitted.
- 5 Place lip of seal towards fluid to be sealed and slide into position on shaft, using fitting sleeve when possible to protect sealing lip from damage by sharp corners, threads or splines. If fitting sleeve is not available, use plastic tube or adhesive tape to prevent damage to sealing lip.



S.6946

- 6 Grease outside diameter of seal, place square to housing recess and press into position, using great care and if possible a 'bell piece' to ensure that seal is not tilted. (In some cases it may be preferable to fit seal to housing before fitting to shaft.) Never let weight of unsupported shaft rest in seal.



S.6947

- 7 If correct service tool is not available, use a suitable drift approximately 0.015 in. (0,4 mm) smaller than outside diameter of seal. Use a hammer VERY GENTLY on drift if a press is not suitable.
 - 8 Press or drift seal in to depth of housing if housing is shouldered, or flush with face of housing where no shoulder is provided.
- NOTE:** Most cases of failure or leakage of oil seals are due to careless fitting, and resulting damage to both seals and sealing surfaces. Care in fitting is essential if good results are to be obtained.

Joints and Joint Faces

- 1 Always use correct gaskets where they are specified.
- 2 Use jointing compound only when recommended. Otherwise fit joints dry.
- 3 When jointing compound is used, apply in a thin uniform film to metal surfaces; take great care to prevent it from entering oilways, pipes or blind tapped holes.
- 4 Remove all traces of old jointing materials prior to reassembly. Do not use a tool which could damage joint faces.
- 5 Inspect joint faces for scratches or burrs and remove with a fine file or oil stone; do not allow swarf or dirt to enter tapped holes or enclosed parts.
- 6 Blow out any pipes, channels or crevices with compressed air, renewing any O-rings or seals displaced by air blast.

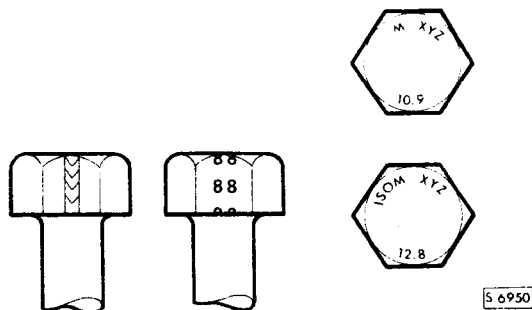
Flexible Hydraulic Pipes, Hoses

- 1 Before removing any brake or power steering hose, clean end fittings and area surrounding them as thoroughly as possible.
- 2 Obtain appropriate blanking caps before detaching hose end fittings, so that ports can be immediately covered to exclude dirt.
- 3 Clean hose externally and blow through with airline. Examine carefully for cracks, separation of plies, security of end fittings and external damage. Reject any hose found faulty.
- 4 When refitting hose, ensure that no unnecessary bends are introduced, and that hose is not twisted before or during tightening of union nuts.
- 5 Containers for hydraulic fluid must be kept absolutely clean.
- 6 Do not store hydraulic fluid in an unsealed container. It will absorb water, and fluid in this condition would be dangerous to use due to a lowering of its boiling point.
- 7 Do not allow hydraulic fluid to be contaminated with mineral oil, or use a container which has previously contained mineral oil.
- 8 Do not re-use fluid bled from system.
- 9 Always use clean brake fluid to clean hydraulic components.
- 10 Fit a blanking cap to a hydraulic union and a plug to its socket after removal to prevent ingress of dirt.
- 11 Absolute cleanliness must be observed with hydraulic components at all times.
- 12 After any work on hydraulic systems, inspect carefully for leaks underneath the car while a second operator applies maximum pressure to the brakes (engine running) and operates the steering.

continued

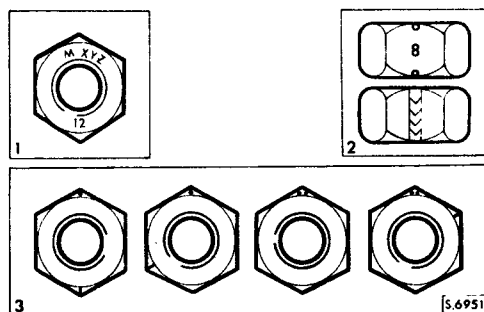
Metric Bolt Identification

- 1 An ISO metric bolt or screw, made of steel and larger than 6 mm in diameter can be identified by either of the symbols ISO M or M embossed or indented on top of the head.
- 2 In addition to marks to identify the manufacture, the head is also marked with symbols to indicate the strength grade e.g. 8.8, 10.9, 12.9 or 14.9, where the first figure gives the minimum tensile strength of the bolt material in tens of kg/sq. mm.
- 3 Zinc plated ISO metric bolts and nuts are chromate passivated, a greenish-khaki to gold-bronze colour.



Metric Nut Identification

- 1 A nut with an ISO metric thread is marked on one face or on one of the flats of the hexagon with the strength grade symbol 8, 12 or 14. Some nuts with a strength 4, 5 or 6 are also marked and some have the metric symbol M on the flat opposite the strength grade marking.
- 2 A clock face system is used as an alternative method of indicating the strength grade. The external chamfers or a face of the nut is marked in a position relative to the appropriate hour mark on a clock face to indicate the strength grade.
- 3 A dot is used to locate the 12 o'clock position and a dash to indicate the strength grade. If the grade is above 12, two dots identify the 12 o'clock position.



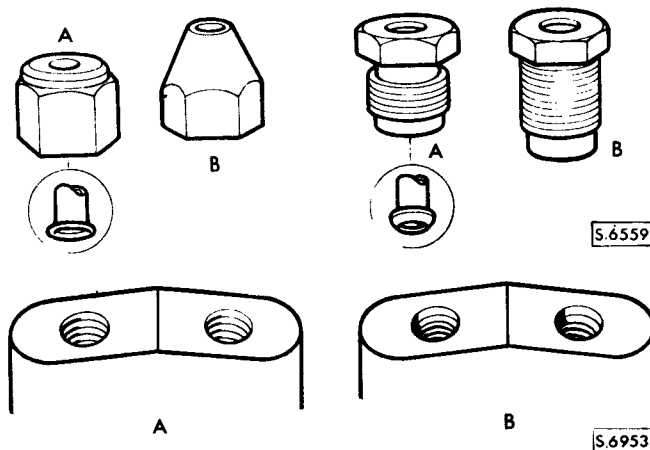
Hydraulic Fittings – Metrication

WARNING: Metric and Unified threaded hydraulic parts. Although pipe connections to brake system units incorporate threads of metric form, those for power assisted steering are of UNF type. It is vitally important that these two thread forms are not confused, and careful study should be made of the following notes.

Metric threads and metric sizes are being introduced into motor vehicle manufacture and some duplication of parts must be expected. Although standardisation must in the long run be good, it would be wrong not to give warning of the dangers that exist while UNF and metric threaded hydraulic parts continue together in service. Fitting UNF pipe nuts into metric ports and vice-versa should not happen, but experience of the change from BSF to UNF indicated that there is no certainty in relying upon the difference in thread size when safety is involved.

To provide permanent identification of metric parts is not easy but recognition has been assisted by the following means. (Illustration A Metric, B Unified.)

- 1 All metric pipe nuts, hose ends, unions and bleed screws are coloured black.
- 2 The hexagon area of pipe nuts is indented with the letter 'M'.
- 3 Metric and UNF pipe nuts are slightly different in shape.



The metric female nut is always used with a trumpet flared pipe and the metric male nut is always used with a convex flared pipe.

- 4 All metric ports in cylinders and calipers have no counterbores, but unfortunately a few cylinders with UNF threads also have no counterbore. The situation is, all ports with counterbores are UNF, but ports not counterbored are most likely to be metric.

- 5 The colour of the protective plugs in hydraulic ports indicates the size and the type of the threads, but the function of the plugs is protective and not designed as positive identification. In production it is difficult to use the wrong plug but human error must be taken into account.

The Plug colours and thread sizes are:

	UNF
RED	$\frac{3}{8}$ " x 24 UNF
GREEN	$\frac{1}{2}$ " x 20 UNF
YELLOW	$\frac{1}{2}$ " x 20 UNF
PINK	$\frac{7}{8}$ " x 18 UNF
	METRIC
BLACK	10 x 1 mm
GREY	12 x 1 mm
BROWN	14 x 1.5 mm

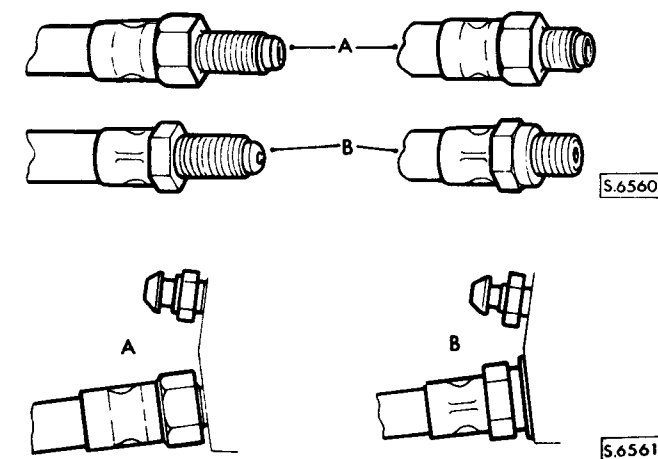
- 6 Hose ends differ slightly between metric and UNF.

Gaskets are not used with metric hoses. The UNF hose is sealed on the cylinder or caliper face by a copper gasket by the metric hose seals against the bottom of the port and there is a gap between faces of the hose and cylinder. Pipe sizes for UNF are $\frac{3}{16}$ in., $\frac{1}{4}$ in., and $\frac{5}{16}$ in. outside diameter.

Metric pipe sizes are 4.75 mm, 6 mm and 8 mm.

4.75 mm pipe is exactly the same as $\frac{3}{16}$ in. pipe. 6 mm pipe is .014 in. smaller than $\frac{1}{4}$ in. pipe. 8 mm pipe is .002 in. larger than $\frac{5}{16}$ in. pipe.

Convex pipe flares are shaped differently for metric sizes and when making pipes for metric equipment, metric pipe flaring tools must be used.



continued

The greatest danger lies with the confusion of 10 mm and in. UNF pipe nuts used for $\frac{3}{16}$ in. (or 4.75 mm) pipe. The in. UNF pipe nut or hose can be screwed into a 10 mm port but is very slack and easily stripped. The thread engagement is very weak and cannot provide an adequate seal.

The opposite condition, a 10 mm nut in a $\frac{3}{8}$ in. port, is difficult and unlikely to cause trouble. The 10 mm nut will screw in $1\frac{1}{2}$ or two turns and seize. It has a crossed thread 'feel' and it is impossible to force the nut far enough to seal the pipe. With female pipe nuts the position is of course reversed.

The other combinations are so different that there is no danger of confusion.

Keys and Keyways

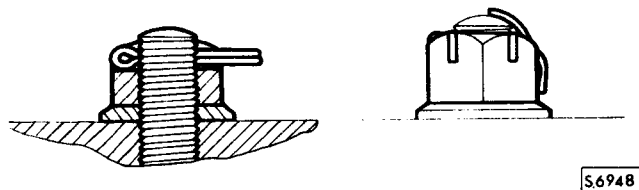
- 1 Remove burrs from edges of keyways with a fine file and clean thoroughly before attempting to refit key.
- 2 Clean and inspect key closely; keys are suitable for refitting only if indistinguishable from new, as any indentation may indicate the onset of wear.

Tab Washers

- 1 Fit new washers in all places where they are used. Always renew a used tab washer.
- 2 Ensure that the new tab washer is of the same design as that replaced.

Split Pins

- 1 Fit new split pins throughout when replacing any unit.
- 2 Always fit split pins where split pins were originally used. Do not substitute spring washers: there is always a good reason for the use of a split pin.
- 3 All split pins should be fitted as shown unless otherwise stated.



Nuts

- 1 When tightening a slotted or castellated nut never slacken it back to insert split pin or locking wire except in those recommended cases where this forms part of an adjustment. If difficulty is experienced, alternative washers or nuts should be selected, or washer thickness reduced.
- 2 Where self-locking nuts have been removed it is advisable to replace them with new ones of the same type.

NOTE: Where bearing pre-load is involved nuts should be tightened in accordance with special instructions.

Locking Wire

- 1 Fit new locking wire of the correct type for all assemblies incorporating it.
- 2 Arrange wire so that its tension tends to tighten the bolt heads, or nuts, to which it is fitted.

Screw Threads

- 1 Both UNF and Metric threads to ISO standards are used. See below for thread identification.
- 2 Damaged threads must always be discarded. Cleaning up threads with a die or tap impairs the strength and closeness of fit of the threads and is not recommended.
- 3 Always ensure that replacement bolts are at least equal in strength to those replaced.
- 4 Do not allow oil, grease or jointing compound to enter blind threaded holes. The hydraulic action on screwing in the bolt or stud could split the housing.
- 5 Always tighten a nut or bolt to the recommended torque figure. Damaged or corroded threads can affect the torque reading.
- 6 To check or re-tighten a bolt or screw to a specified torque figure, first slacken a quarter of a turn, then re-tighten to the correct figure.
- 7 Always oil thread lightly before tightening to ensure a free running thread, except in the case of self-locking nuts.

Unified Thread Identification

1 Bolts

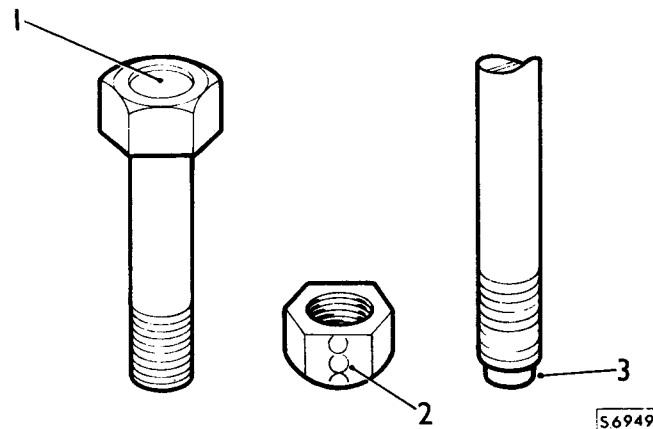
A circular recess is stamped in the upper surface of the bolt head.

2 Nuts

A continuous line of circles is indented on one of the flats of the hexagon, parallel to the axis of the nut.

3 Studs, Brake Rods, etc.

The component is reduced to the core diameter for a short length at its extremity.



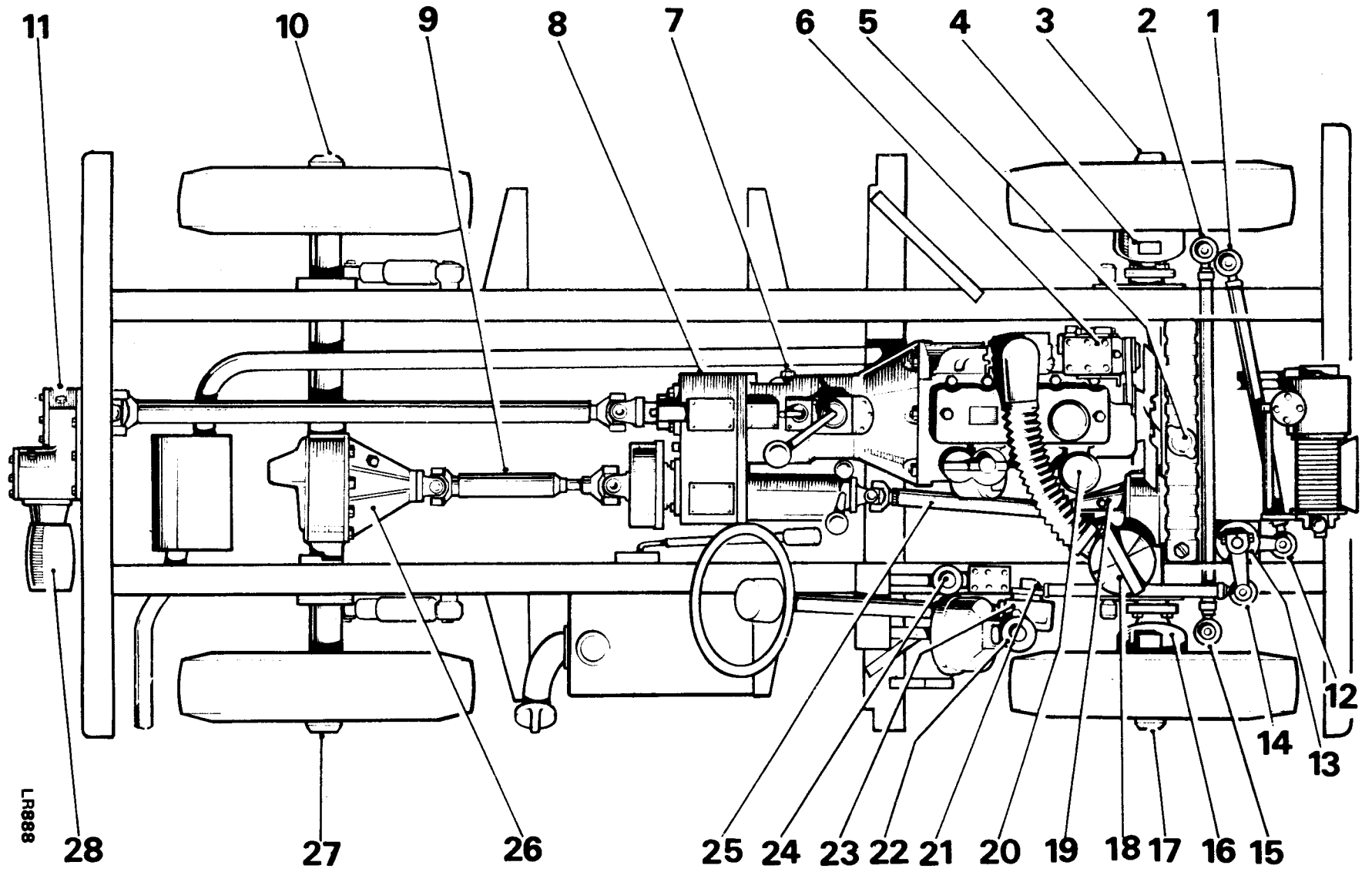
SERVICE LUBRICANTS, FUEL, FLUIDS AND CAPACITIES

CAPACITIES

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

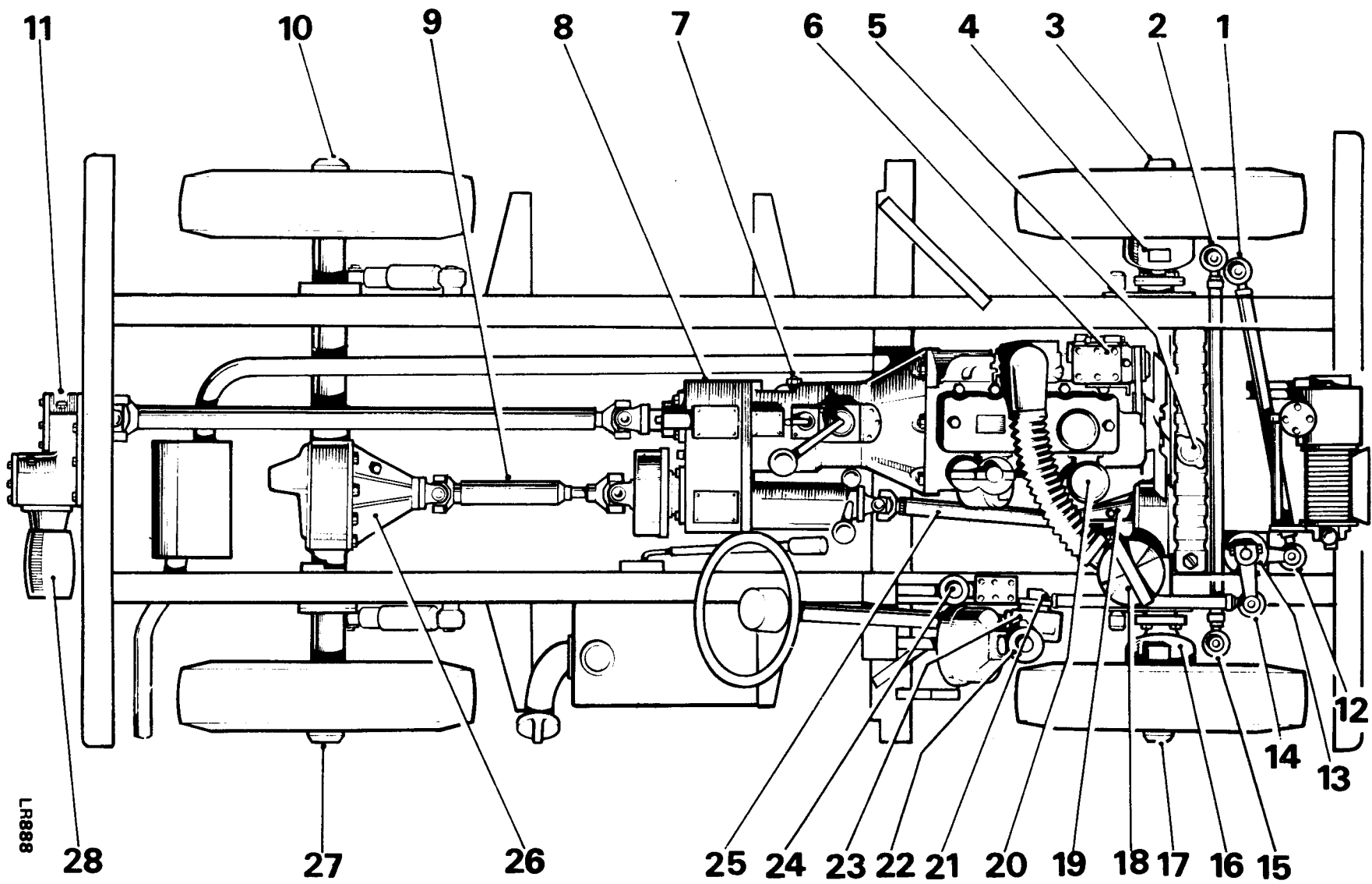
	Litres	Imperial unit	US unit
Engine sump oil, 4-cylinder	6,0	11 pints	13 pints
Engine sump oil, 6-cylinder	6,8	12 pints	14 pints
Extra when refilling after fitting new filter, 4-cylinder	0,85	1.5 pints	1.8 pints
Extra when refilling after fitting new filter, 6-cylinder	0,5	1 pint	1.2 pints
Air cleaner oil, 4-cylinder	0,85	1.5 pints	1.8 pints
Air cleaner oil, 6-cylinder	0,5	1 pint	1.2 pints
Main gearbox oil	1,5	2.5 pints	3 pints
Transfer box oil	2,5	4.5 pints	5.5 pints
Rear differential)	1,75	3 pints	3.5 pints
Front differential) Rover	1,75	3 pints	3.5 pints
Rear differential: Salisbury 8HA	2,5	4.5 pints	5.5 pints
Swivel pin housing oil (each)	0,5	1 pint	1.2 pints
Fuel tank, 4-cylinder models except Station Wagon	45	10 gallons	12 gallons
Fuel tank, 6-cylinder models except Station Wagon	50	11 gallons	13 gallons
Fuel tank, 4-cylinder and 6-cylinder Station Wagon models	68	15 gallons	18 gallons
Cooling system, 4-cylinder Petrol models	8,1	14.25 pints	17.1 pints
Cooling system, 6-cylinder Petrol models	11,2	20 pints	24 pints
Cooling system, Diesel models	7,8	13.75 pints	16.5 pints
Hydraulic front winch, supply tank	20,0	4.5 gallons	7.5 gallons
Hydraulic front winch, gearbox	1,0	2 pints	2.4 pints

COMPONENT	SERVICE CLASSIFICATION
Fuel Tank	2½ litre Petrol models 7.0:1 compression ratio: 90 octane with 6° BTDC ignition timing 83 octane with 3° BTDC ignition timing 75 octane with TDC ignition timing 8.0:1 compression ratio: 90 octane with TDC ignition timing 85 octane with 3° ATDC ignition timing
	2.6 litre Petrol models 7.0:1 compression ratio: 83 octane with 2° BTDC ignition timing 80 octane with TDC ignition timing 78 octane with 2° ATDC ignition timing 7.8:1 compression ratio: 90 octane with 2° ATDC ignition timing 85 octane with 6° ATDC ignition timing
	2½ litre Diesel models Diesel fuel (D.E.R.V.)



RECOMMENDED LUBRICANTS AND FLUIDS FOR BRITISH ISLES ALL YEAR ROUND USE

DIAGRAM NUMBER	COMPONENT	BP	DUCKHAMS	CASTROL	ESSO	MOBIL	PETROFINA	SHELL	TEXACO
20 18 6	Engine. Petrol Air cleaner Governor Hydraulic winch supply tank	BP Super Viscostatic 20—50 BP VF7	Duckhams Hypergrade Motor Oil (15W/50)	Castrol GTX (15W/50)	Esso Superlube (10W/40)	Mobil Super 15W/40 Mobil 1 (10W/30)	Fina Supergrade Motor Oil 15W/40 or 20W/50	Shell Super Motor Oil (15W/40)	Havoline Motor Oil 15W/40
20 18	Engine. Diesel Hydraulic winch supply tank Air cleaner	BP Super Viscostatic 20—50 or BP Vanellus C3 Multigrade 20W/50 BP VF7	Duckhams Hypergrade Motor Oil (15W/50)	Castrol GTX (15W/50) or Deusol RX Super 15W/40	Esso Superlube (10W/40) or Essolube HDX 20W/50	Mobil Super 15W/40 or Mobil 1 (10W/30) or Delvac Super 15W/40 or Delvac Special 20W/50	Fina Supergrade Motor Oil 15W/40 or Fina Delta Multigrade 20W/50	Shell Super Motor Oil (15W/40) or Shell Rotella SX 20W/40 or Rimulax 15W/40	Havoline Motor Oil 15W/40 or Ursa Oil LA 15W/40 or Eurotex Motor Oil HD 20W/50
7 8 19 26 16 4 23 13 11 28	Main gearbox Transfer box Front differential Rear differential Swivel housing, R.H. Swivel housing, L.H. Steering box Steering relay Rear power take-off Pulley unit Hydraulic winch gearbox	BP Gear Oil S.A.E. 90 EP	Duckhams Hypoid 90	Castrol Hypoy S.A.E. 90 EP	Esso Gear Oil GX 85W/90	Mobil Mobilube HD 90	Fina Pontonic MP S.A.E. 90	Shell Spirax 90 EP	Texaco Multigear Lubricant S.A.E. 90 EP
12 1 15 2 14 21 17 3 27 10 25 9	Drag-link ball joint, R.H. Drag-link ball joint, L.H. Track-rod ball joint, R.H. Track-rod ball joint, L.H. Longitudinal arm ball joint, front Longitudinal arm ball joint, rear Front hub, R.H. Front hub, L.H. Rear hub, R.H. Rear hub, L.H. Front propeller shaft Rear propeller shaft	BP Energrease L2	Duckhams LB 10	Castrol LM Grease	Esso Multipurpose Grease H	Mobil Mobilgrease MP	Fina Marson HTL 2	Shell Retinax A	Marfak All Purpose Grease
	Windscreen washers	UNIPART SCREEN WASHER FLUID—ALL SEASONS							
24 22	Clutch fluid reservoir Brake fluid reservoir	UNIPART UNIVERSAL BRAKE FLUID or other brake fluids having a minimum boiling point of 260°C (500°F) and complying with FMVSS 116 DOT 3.							
5	Engine cooling system	UNIPART UNIVERSAL ANTI-FREEZE. If this is not available use an ethylene glycol based anti-freeze (containing no methanol) with non-phosphate corrosion inhibitors suitable for use in cast iron engines to ensure the protection of the cooling system against frost and corrosion.							



LR888

RECOMMENDED LUBRICANTS AND FLUIDS FOR OVERSEAS AND EXTREME TEMPERATURE CONDITIONS

DIAGRAM NUMBER	COMPONENT	SERVICE CLASSIFICATION		AMBIENT TEMPERATURE °C						
		PERFORMANCE LEVEL	S.A.E. VISCOSITY	-30	-20	-10	0	+10	+20	+30
20 6 18	Engine Governor Air cleaner Oil can Hydraulic winch supply tank	Oils must meet BL Cars Specifica- tion BLS.22.OL.02 or The CCMC Requirements or A.P.I. Service Rating Petrol Diesel SE or SF CC or CD or SE/CC or SE/CC or SF/CC or SE/CD or SE/CD or SF/CC or SF/CD or SF/CD	5W/20, 5W/30, 5W/40 10W/30 10W/40, 10W/50 15W/40, 15W/50 20W/40, 20W/50							
7 8 19 26 16 4 23 13 11 28	Main gearbox Transfer box Front differential Rear differential Swivel housing, R.H. Swivel housing, L.H. Steering box Steering relay Rear power take-off Pulley unit Hydraulic winch gearbox	A.P.I. GL4 or MIL-L-2105	90 EP 80W EP	 						
12 1 15 2 14 21 17 3 27 10 25 9	Drag-link ball joint, R.H. Drag-link ball joint, L.H. Track-rod ball joint, R.H. Track-rod ball joint, L.H. Longitudinal arm ball joint, front Longitudinal arm ball joint, rear Front hub, R.H. Front hub, L.H. Rear hub, R.H. Rear hub, L.H. Front propeller shaft Rear propeller shaft	NLGI-2 Multi-purpose lithium based grease								
	Windscreen washers	UNIPART SCREEN WASHER FLUID—ALL SEASONS, or other proprietary screen washer fluids.								
24 22	Clutch fluid reservoir Brake fluid reservoir	UNIPART UNIVERSAL BRAKE FLUID or other brake fluids having a minimum boiling point of 260°C (500°F) and comply- ing with FMVSS 116 DOT 3.								
5	Engine cooling system	UNIPART UNIVERSAL ANTI-FREEZE. If this is not available use an ethylene glycol based anti-freeze (containing no meth- anol) with non-phosphate corrosion inhibitors suitable for use in cast iron engines to ensure the protection of the cooling system against frost and corrosion. When frost protection is not required use a non-phosphate corrosion inhibitor.								

MAINTENANCE SUMMARY CHART—EXCLUDING AUSTRALIA

KEY: MILEAGE × 1,000 MILES

Operation No.	Mileage
10.10.03	1
10.10.06	3, 9, 15, 21, 27, 33, 39, 45
10.10.12	6, 18, 30, 42
10.10.24	12, 24, 36, 48

Operation Number Intervals in Miles × 1000 Intervals in Kilometres × 1000	10.10.12 6 10	10.10.24 12 20
ENGINE		
1 Check for oil leaks	x	x
2 Renew engine oil filter	x	x
3 Renew engine oil	x	x
4 Check crankcase breathing system for leaks, hoses for security and condition	x	x
5 Top-up carburettor piston damper(s) (2.6 only)	x	x
6 Check/adjust carburettor idle settings	x	x
7 Clean fuel pump sediment bowl (2¼ petrol only)		x
8 Check/adjust valve clearances		x
9 Check cooling and heater systems for leaks, and hoses for security and condition	x	x
10 Check/top-up cooling system	x	x
11 Check/adjust operation of all washers and top-up reservoirs	x	x
12 Check driving belts; adjust or renew	x	x
13 Lubricate accelerator control linkage and pedal pivot—check operation	x	x
14 Check security of engine mountings		x
15 Clean engine breather filter		x
16 Renew engine flame trap		x
17 Renew fuel filter element (2.6 only)		x
18 Clean fuel sediment (diesel)		x
19 Check air injection system hoses/pipes for security and condition (2.6 only)		x
20 Empty, clean and refill air cleaner oil bath	x	x
21 Drain flywheel housing if drain plug is fitted for wading		x
22 Check fuel injectors for burst pressure and test for spray		
IGNITION		
23 Clean/adjust spark plugs	x	x
24 Renew spark plugs		x
25 Check distributor points, adjust or renew	x	x
26 Lubricate distributor	x	x
27 Check/adjust ignition timing, using electronic equipment	x	x

Operation Number Intervals in Miles × 1000 Intervals in Kilometres × 1000	10.10.12 6 10	10.10.24 12 20
TRANSMISSION		
28 Check for oil leaks	x	x
29 Check/top-up clutch fluid reservoir	x	x
30 Check tightness of prop. shaft coupling bolts		x
31 Lubricate propshaft(s)	x	x
32 Check/top-up gearbox oil	x	x
33 Check/top-up transfer box oil	x	x
34 Check/top-up front axle oil	x	x
35 Check/top-up rear axle/final drive oil	x	x
36 Check hydraulic clutch pipes and hoses visually for cracks, leaks and chafing	x	x
37 Clean axle breathers		x
STEERING AND SUSPENSION		
38 Check condition and security of steering unit joints, relays and gaiters	x	x
39 Check security of suspension fixings		x
40 Check/adjust front and rear wheel alignment	x	x
41 Check steering rack/gear for oil/fluid leaks	x	x
42 Check shock absorbers for fluid leaks	x	x
43 Check/top-up steering relay unit		x
44 Check/top-up steering box		x
45 Check/adjust steering box	x	x
46 Check/top-up swivel pin housing oil	x	x
BRAKES		
47 Check visually hydraulic pipes and unions for chafing, leaks and corrosion	x	x
48 Check/top-up brake fluid reservoir(s)	x	x
49 Check handbrake operation; adjust to manufacturer's instructions	x	x
50 Check footbrake operation; adjust to manufacturer's instructions (manual)	x	x
51 Inspect brake linings for wear, drums for condition	x	x
52 Lubricate handbrake mechanical linkage and cable guides (lever pivot)	x	x
53 Check brake servo hose(s) for security and condition	x	x
ELECTRICAL		
54 Check function of original equipment, i.e. interior and exterior lamps, horns, wipers and warning indicators	x	x
55 Check/top-up battery electrolyte	x	x
56 Clean and grease battery connections	x	x
57 Check/adjust headlamp alignment	x	x
58 Check, if necessary renew wiper blades	x	x
EXHAUST AND FUEL PIPES		
59 Check fuel system for leaks, pipes and unions for chafing and corrosion	x	x
60 Check exhaust system for leaks and security	x	x

MAINTENANCE SUMMARY CHART—EXCLUDING AUSTRALIA

Operation Number Intervals in Miles × 1000 Intervals in Kilometres × 1000	10.10.12 6 10	10.10.24 12 20
WHEELS AND TYRES		
61 Check that tyres comply with manufacturer's specification	X	X
62 Check/adjust tyre pressures including spare	X	X
63 Check tyres for tread depth and visually for external cuts in fabric, exposure of ply or cord structure, lumps or bulges	X	X
64 Check tightness of road wheel fastenings	X	X
65 Check tyres for external cuts in tyre fabric, exposure of ply cord structure, lumps or bulges		
IMPORTANT: If tyres do not conform with legal requirements, report to owner.		
66 Interchange roadwheels (including spare)	X	X
BODY		
67 Lubricate all locks and hinges (NOT steering lock)	X	X
68 Check condition and security of seats and seat belts	X	X
69 Check rear view mirror(s) for cracks and crazing	X	X
70 Check operation of all door and bonnet locks		X
71 Check operation of window controls		X
72 Check operation of seat belt inertia reel mechanism	X	X
73 Ensure cleanliness of controls, door handles and steering wheel	X	X
GENERAL		
74 Road/Roller test and check function of all instrumentation	X	X
75 Report additional work required	X	X

At 24,000 mile (40,000 km) 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 final drive unit(s) 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 (2.6 only)

BRAKES — PREVENTIVE MAINTENANCE

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. See page 10—18 for details.

MAINTENANCE SUMMARY CHART – AUSTRALIA ONLY – ADR27A – 2½ PETROL

Detailed maintenance operations for specific emission control items are contained within section 17 of this manual.

MAINTENANCE INTERVALS

Service	Km x 1000	OPERATION NO.
A	1.6	10.10.03
B	5.15, 25, 35, 45, 55, 65, 75	10.10.06
C	10, 30, 50, 70	10.10.12
D	20, 60	10.10.24
E	40, 70	10.10.50

NOTE: The service schedules are based on an annual total of approximately 20,000 km. Should the vehicle complete substantially less kilometres than this per annum, it is recommended that a 'C' service is completed at six month intervals and a 'D' service at twelve month intervals.

Key to operation numbers and mileage intervals	10. 10. 03	10. 10. 06	10. 10. 12	10. 10. 24	10. 10. 50
Operation Description					
Clean and test crankcase breather valve				X	
ENGINE					
Renew engine flame trap				X	X
Check/top up engine oil level		X			
Check/top up cooling system	X	X	X	X	X
Check/adjust operation of all washers and top up reservoirs	X	X	X	X	X
Renew engine oil	X		X	X	X
Renew engine oil filter			X	X	X
Lubricate accelerator control linkage (and pedal pivot) – check operation	X		X	X	X
Check cooling/heater system for leaks and hoses for security and condition	X	X	X	X	X
Check for oil leaks	X	X	X	X	X
Check/adjust torque of cylinder head nuts/bolts	X				
Check driving belts, adjust or renew	X			X	X
Check security of engine mountings	X			X	X
Check/adjust carburettor idle settings	X				
Drain flywheel housing, if drain plug is fitted (for wading)		X	X	X	X
Check security of EGR valve operating lines	X				
Check EGR system				X	X
Check/adjust choke settings (Manual chokes)	X			X	X
Check crankcase breathing system for leaks hoses/pipes for security and condition	X				

Key to operation numbers and mileage intervals	A 10. 10. 03	B 10. 10. 06	C 10. 10. 12	D 10. 10. 24	E 10. 10. 50
Check crankcase breathing and evaporative loss systems; check hoses/pipes and restrictors for blockages, security and condition				X	X
Check/adjust valve clearances	X			X	X
Clean fuel pump sediment bowl	X			X	X
Check/adjust carburettor throttle prop	X			X	X
Empty, clean element, and refill air cleaner oil bath				X	X
Clean engine breather filter				X	
Renew engine breather filter				X	X
IGNITION					
Renew spark plugs				X	X
Lubricate distributor				X	X
Check/adjust ignition timing using electronic equipment	X			X	X
Check security of distributor vacuum unit line and operation of vacuum unit	X			X	X
Check ignition wiring for fraying, chafing and deterioration	X			X	X
Clean distributor cap, check for cracks and tracking				X	X
Check coil performance on oscilloscope				X	X
Renew distributor points				X	X
TRANSMISSION					
Check for oil leaks	X	X	X	X	X
Check/top up gearbox oil			X	X	
Check/top up rear axle/final drive oil			X	X	
Check tightness of propeller shaft coupling bolts	X			X	X
Lubricate propshaft(s)	X		X	X	X
Lubricate propshaft sealed sliding joint	X				X
Renew final drive unit(s) oil	X				X
Check/top up transfer box oil			X	X	
Check/top up front axle oil			X	X	
Renew transfer box oil	X				X
Check clutch pipes for leaks and chafing	X	X	X	X	X
Check/top up clutch fluid reservoir	X	X	X	X	X
Renew gearbox oil	X				X
Clean axle breathers					X

continued

MAINTENANCE SUMMARY CHART – AUSTRALIA ONLY

Key to operation numbers and mileage intervals	A 10. 10. 03	B 10. 10. 06	C 10. 10. 12	D 10. 10. 24	E 10. 10. 50
STEERING AND SUSPENSION					
Check/top up swivel pin housing oil			X	X	
Check/adjust steering box	X	X	X	X	X
Check condition and security of steering unit joints relays and gaiters	X	X	X	X	X
Check security of suspension fixings	X			X	X
Check/adjust front and rear wheel alignment	X		X	X	X
Renew swivel pin housing oil	X				X
Check/top up steering relay unit				X	X
Check shock absorbers for fluid leaks	X	X	X	X	X
Check/top up steering box	X			X	X
Check steering rack/gear for oil/fluid leaks	X	X	X	X	X
BRAKES					
Inspect brake linings for wear and drums for condition			X	X	X
Check/top up brake fluid reservoirs	X	X	X	X	X
Check footbrake operations/adjust to manufacturer's instructions (Manual)	X		X	X	X
Check hand brake operation, adjust to manufacturer's instructions	X		X	X	X
Check brake servo hose(s) for security and condition	X	X	X	X	X
Lubricate hand brake mechanical linkage and cable guides			X	X	X
Check visually hydraulic pipes and unions for chafing, leaks and corrosion	X	X	X	X	X
ELECTRICAL					
Check function of original equipment, i.e. interior and exterior lamps, horns, wipers, and washers 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	X
Check/adjust headlamp alignment	X	X	X	X	X
Check, if necessary renew, wiper blades		X	X	X	X
Check output of charging system	X		X	X	X

Key to operation numbers and mileage intervals	A 10. 10. 03	B 10. 10. 06	C 10. 10. 12	D 10. 10. 24	E 10. 10. 50
FUEL AND EXHAUST PIPES					
Check exhaust system for leaks and security	X	X	X	X	X
Check fuel system for leaks, pipes and unions for chafing and corrosion	X	X	X	X	X
Check condition of fuel filler cap seal				X	X
Renew fuel line filter				X	X
WHEELS AND TYRES					
Interchange road wheels (including spare)				X	X
Check/adjust tyre pressure including spare	X	X	X	X	X
Check that tyres comply with manufacturers specification			X	X	X
Check tightness of road wheel fastenings	X	X	X	X	X
Check tyres for external cuts in the fabric, exposure of ply or cord structure, lumps or bulges	X				
Check tyres for tread depth, visually for external cuts in fabric, exposure of ply or cord structure, lumps or bulges		X	X	X	X
*IMPORTANT – if tyres do not conform with legal requirements report to the owner					
BODY					
Lubricate all locks and hinges (not steering lock)	X		X	X	X
Check condition and security of seats and seat belts	X	X	X	X	X
Check rear view mirror for cracks and crazing		X	X	X	X
Check operation of all door, bonnet and boot locks	X			X	X
Check operation of window controls	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
ROAD TEST					
Road/roller test and check function of all instrumentation	X		X	X	X
Report additional work required		X	X	X	X

Additional work

At 60,000 km/3 year intervals which ever
is the sooner:-

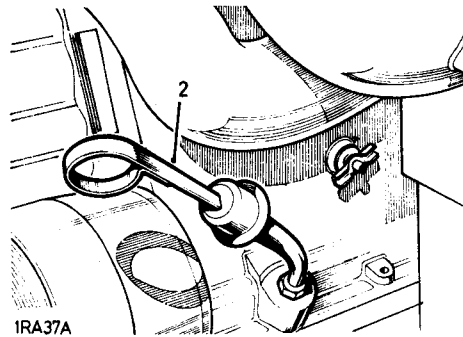
Renew the air filter in the brake servo unit.

Engine oil level—All models

In addition to changing the oil and filter at the mileage intervals stated in the Maintenance Summary Chart, the oil level in the sump should be checked daily or weekly depending upon the conditions under which the vehicle is operating.

Proceed as follows:

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



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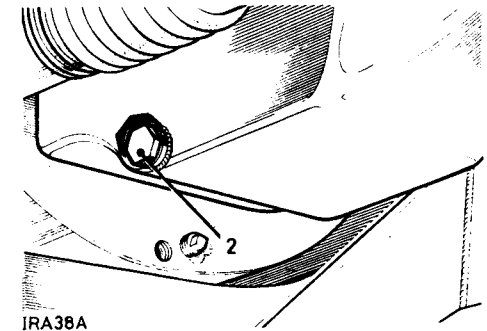
ENGINE

(1) Check for oil leaks in engine compartment; rectify as necessary

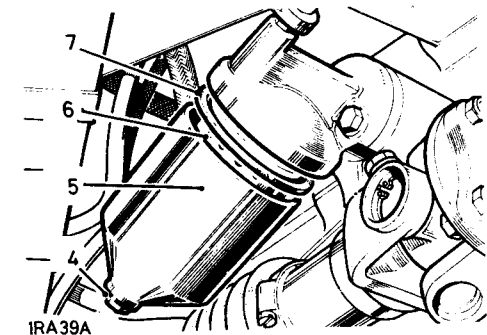
(2) & (3) Engine oil changes and filter replacement. Oil changes

To change the engine oil:

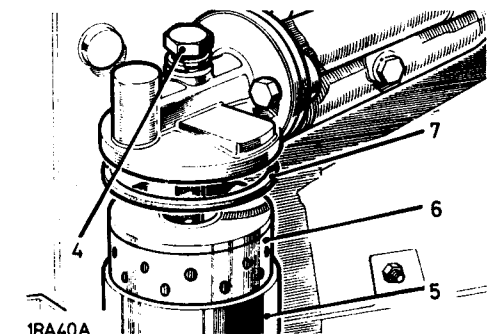
- 1 Run the engine to warm up the oil, then stop.
- 2 Remove the drain plug in the right-hand side of the sump. Allow oil to drain away completely and replace the plug.
To change filter located at right-hand side of engine on 4-cylinder models, left-hand side on 6-cylinder models.
- 3 Place oil tray under engine.
- 4 Unscrew the bolt from the filter adaptor.
- 5 Remove the container.
- 6 Remove the element.
- 7 Discard the used filter element and large rubber washer.
- 8 Wash the container in petrol.
- 9 Place the new filter element in the container and reassemble the unit, using the new large rubber washer supplied with the element.
- 10 Ensure that all the sealing washers are in position and intact, and that the container is correctly located in the adaptor.
Tighten the filter retaining bolt to 1,66 kgf m (12 lbf ft).
- 11 Refill with oil of the correct grade through the filler at the front of the engine; the total capacity including filter is: 4-cylinder models: 6,0 litres (11 Imperial pints) 12 US pints; 6-cylinder models: 5,5 litres (10 Imperial pints) 11 US pints.
- 12 Run engine and check for oil leaks at filter and drain plug.



1RA38A



1RA39A



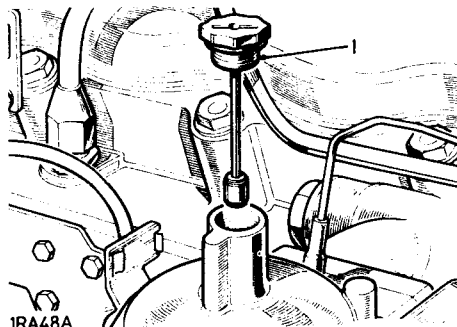
1RA40A

(4) Crankcase breathing system

Examine for leaks and change pipes or clips where necessary.

(5) Carburettor hydraulic damper—6-cylinder Petrol models

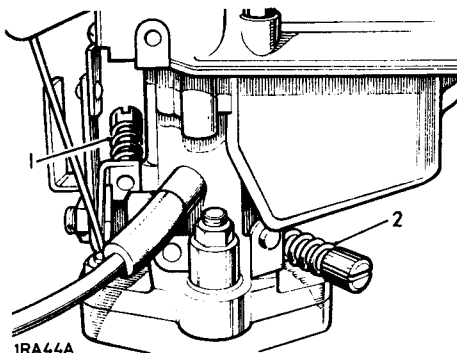
- 1 Unscrew the cap on top of the suction chamber, withdraw cap and hydraulic damper, replenish the damper reservoir as necessary with SAE 20 oil to within about 12 mm (0.5 in.) from the top of the tube. Then replace cap and hydraulic damper.

**(6) Carburettor slow-running adjustment—4-cylinder Petrol models. (Basic Carburetters only)**

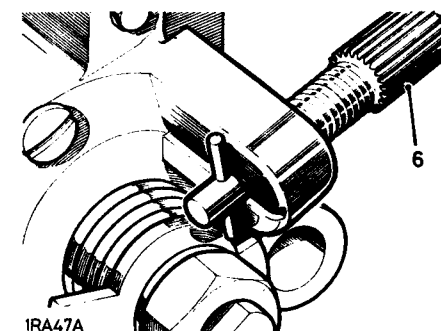
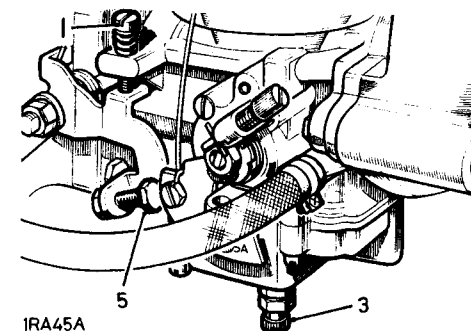
The only adjustments provided at the carburettor are a throttle stop screw and a volume control screw.

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

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

**Carburettor slow-running adjustment—6-cylinder models. (Basic Carburettor only)**

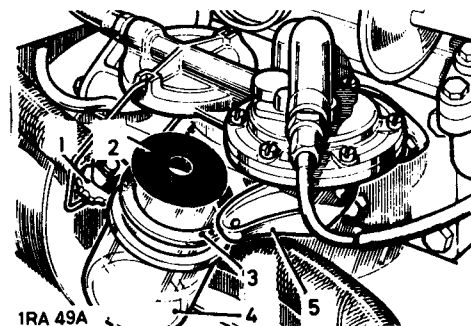
- 1 Run the engine until normal operating temperature is obtained. If necessary adjust slow-run screw to give the correct idling speed.
- 2 Lift the carburettor piston approximately 1 mm (0.031 in.)
- 3 If the engine speeds up immediately the mixture is too rich and the jet adjustment screw must be turned anti-clockwise, thus weakening the mixture; if the engine stops immediately, the mixture is too weak and the jet adjustment screw should be turned clockwise to enrich the mixture. If the engine just falters and then continues to run evenly the adjustment is correct.
- 4 Finally adjust the slow-run screw to get a smooth idling speed.
- 5 The fast idle screw should not require adjustment.
- 6 For starting at temperatures down to -18°C (0°F) push and turn the spring-loaded choke adjustment screw so that the peg is at right-angles to the slot as illustrated. Leave in this position. When starting at temperatures below -18°C (0°F) turn the screw until peg is recessed in slot.

**(7) Fuel sediment bowl—4-cylinder petrol models**

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

Clean as follows:

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

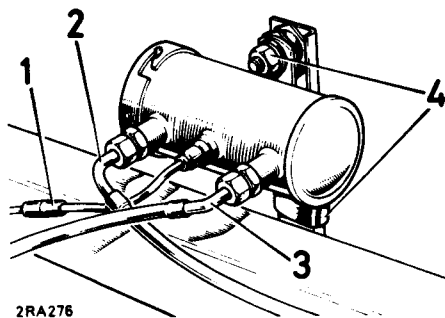


Fuel pump 6-cylinder petrol models—Clean filter

A single type electric fuel pump is fitted and is located above the right hand chassis member midway along the vehicle.

To remove the pump for filter cleaning, proceed as follows:

- 1 Disconnect the fuel pump feed lead at the snap connector.
- 2 Disconnect the fuel inlet pipe from the pump and block the end of the pipe by suitable means to prevent fuel draining from the tank.
- 3 Disconnect the outlet pipe.
- 4 Remove the two nuts securing the pump, earth braid and rubber mountings to the support bracket and remove the pump.

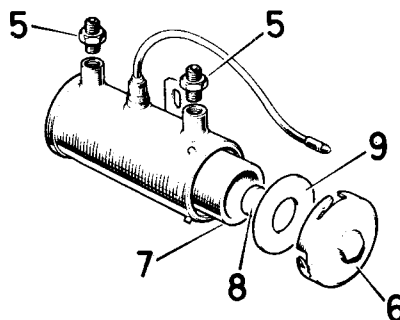


2RA276

Filter cleaning

- 5 Remove the inlet and outlet unions.
- 6 Release the end cover from the bayonet fixing.
- 7 Withdraw the filter and clean using a compressed air jet from the inside of the filter.
- 8 Remove the magnet from the end cover and clean. Replace the magnet in the centre of the end cover.
- 9 Reassemble the fuel pump and refit to the vehicle by reversing the removal procedure. Use a new gasket for the end cover if necessary. Ensure that the feed lead is reconnected and the earth braid fitted securely to the fixing points.

The inlet and outlet unions are at unequal distances from the feed lead. To ensure correct fuel pipe connections when refitting the pump, position the union nearest the feed lead connection towards the front of the vehicle.



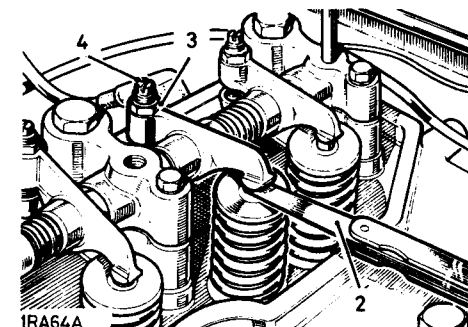
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(8) Tappet adjustment

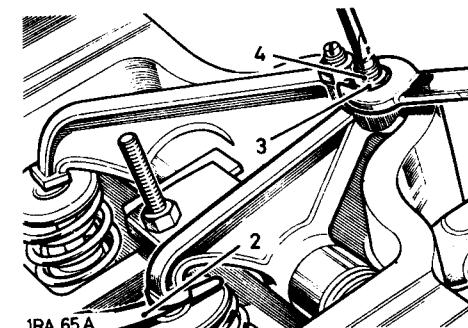
The correct clearance is: 4-cylinder models, inlet and exhaust, 0,25 mm (0.010 in.) engine hot. 6-cylinder models, inlet 0,15 mm (0.006 in.) engine hot and exhaust 0,25 mm (0.010 in.) with the engine hot or cold.

To carry out tappet adjustment, proceed as follows:

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



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1RA 65 A

(9) Cooling system

Examine the cooling system for leaks and rectify as necessary. Renew hoses every 80,000 km (48,000 miles).

Frost precautions

In cold weather, when the temperature may drop to or below freezing point, precautions must be taken to prevent freezing of the water in the cooling system. As a thermostat is fitted in the system, it is possible for the radiator block to freeze in cold weather even though the engine running temperature is quite high; for this reason, the use of an anti-freezing mixture is essential.

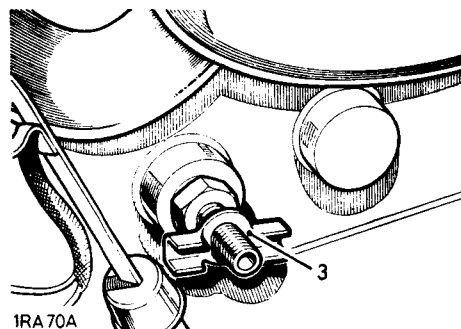
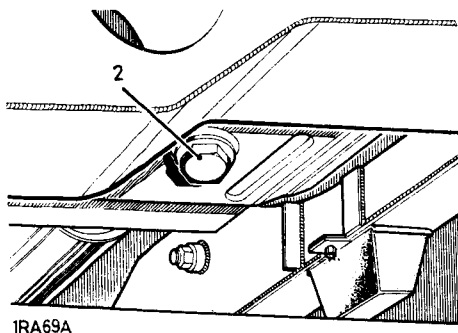
Only anti-freeze solutions recommended in Section 09 should be used.

Land-Rovers leaving the factory have the cooling system filled with 50% mixture of anti-freeze and water. This gives protection down to -20°C to -36°C .

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

Proceed as follows:

- 1 Ensure that the cooling system is leak-proof; anti-freeze solutions are far more 'searching' at joints than water.
- 2 Drain and flush the system. Drain plug under radiator at right-hand side.



- 3 Drain tap or plug for cylinder block 4-cylinder at left-hand side of engine adjacent to dipstick. 6-cylinder at right-hand side of engine adjacent to engine breather.
- 4 Pour in approximately 4.5 litres (one gallon) of water, add solution, then top up with water to within 12 to 19 mm (0.5 to 0.75 in.) below bottom of filler neck.
- 5 Run the engine to ensure a good circulation of the mixture.

NOTE: When anti-freeze is not required the cooling system must be flushed out with clean water and refilled with a mixture one part Marston's SQ36 inhibitor to nine parts of water.

(10) Radiator water level

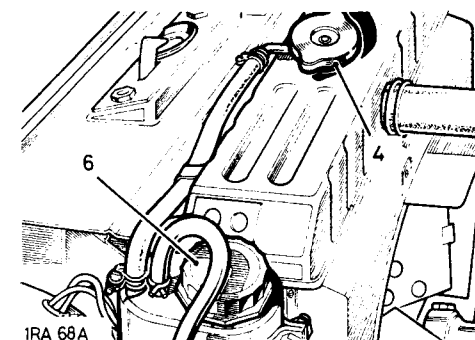
- 1 The radiator filler cap is under the bonnet panel.

Diesel models

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

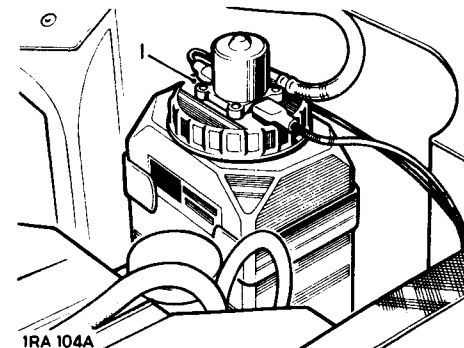
All models

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

**(11) Water level, windscreen washer as applicable**

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

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



(12) Fan belt adjustment

4 cylinder models:

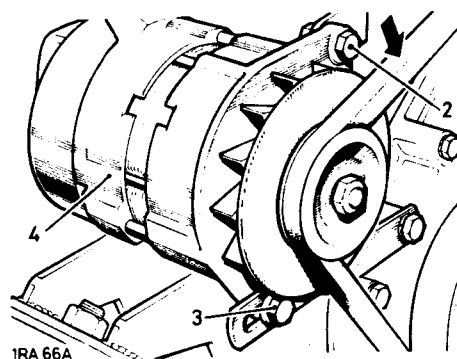
- 1 Check by thumb pressure between the fan and crankshaft pulleys. Movement should be 6,3 to 9,5 mm (0.25 to 0.375 in.)

If necessary adjust as follows:

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

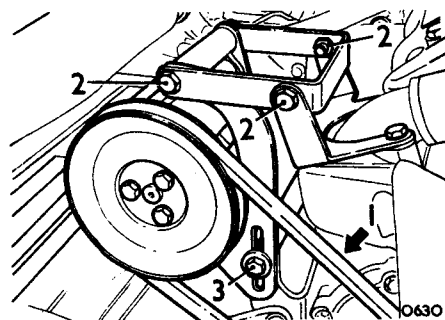
6-cylinder models:

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



Air pump drive belt adjustment, 6-cylinder models

- 1 Check by thumb pressure midway between the air pump and water pump pulleys. Movement should be 6,3 mm (0.25 in.). If necessary, adjust as follows:
- 2 Slacken the pivot bolts securing the air pump to the top mounting bracket.
- 3 Slacken the nut and bolt securing the air pump to the adjustment bracket.
- 4 Pivot the air pump as necessary and adjust until the correct belt tension is obtained.
- 5 Tighten the adjusting and pivot bolts and nuts.



(13) Accelerator linkage—all Models

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

(14) Engine mountings

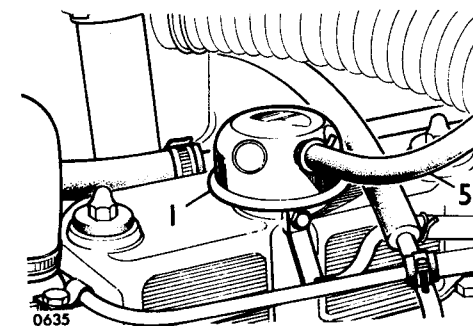
Check security of engine mountings; rectify as necessary.

Engine sump bolts, see operation 12.60.44.

(15) Engine breather filters—all Models

Clean as follows:

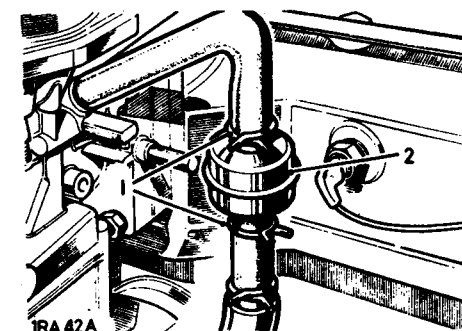
- 1 Remove the filters.
- 2 Wash the gauze thoroughly by swilling the units in petrol.
- 3 Re-wet the gauzes by dipping in clean engine oil and shake off the surplus; 4-cylinder models, replace the engine breather filter with the slot facing forward and the oil filler filter with the slot facing the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



(16) Crankcase emission control, flame-trap type (as applicable)

Replace as follows:

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



(17) Fuel filter, paper element type—Diesel models

Drain off water as follows:

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

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

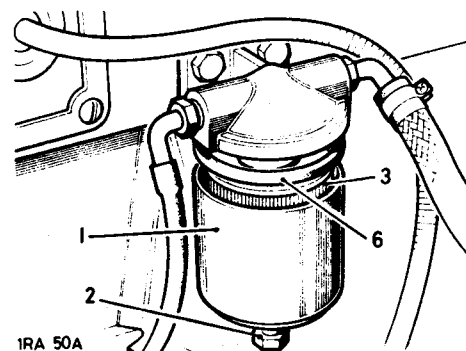
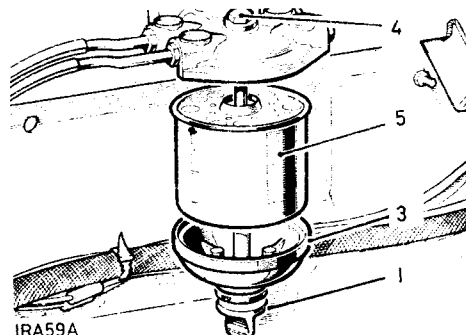
- 3 Support element holder.
- 4 Unscrew the special bolt on the top of the filter, the element holder can now be removed.
- 5 Remove and discard the used element.
- 6 Wash the element holder in petrol or fuel oil.
- 7 If necessary renew both the large rubber washer and the small rubber washer in the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

Fuel filter element, 6-cylinder models

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

Replace element as follows:

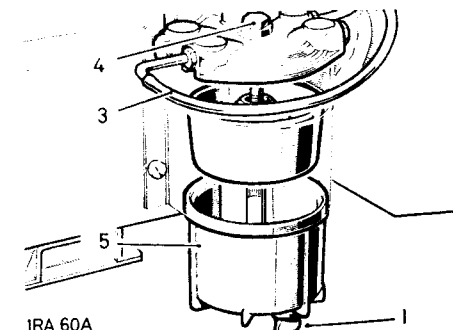
- 1 Support element holder.
- 2 Unscrew the special bolt at bottom of filter. The element holder can now be removed.
- 3 Remove and discard the used element.
- 4 Thoroughly clean the element holder in petrol.
- 5 If necessary renew the upper and lower centre seals and also the seal for the centre bolt.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

**(18) Fuel sedimenter—Diesel models**

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

Drain off water as follows:

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

**(19) Air injection system—6-cylinder models**

The air pump driven by the engine, delivers air to the exhaust valves via the air rail. A check valve prevents damage to the pump should backfire or belt breakage occur. A relief valve, located in the air pump, is required to dump part of the air at high speeds to prevent pump damage.