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INTRODUCTION

This Workshop Manual covers the Land Rover Ninety and One Ten range of vehicles. It is primarily designed to assist skilled technicians in the efficient repair and maintenance of Land Rover vehicles.

Using the appropriate service tools and carrying out the procedures as detailed will enable the operations to be completed within the time stated in the 'Repair Operation Times'.

The Manual has been produced in separate books; this allows the information to be distributed throughout the specialist areas of the modern service facility.

A table of contents in Book 1 lists the major components and systems together with the section and book numbers. The cover of each book details the sections contained within that book.

The title page of each book carries the part numbers required to order replacement books, binders or complete Service Manuals. This can be done through the normal channels.

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 Land Rover parts 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 Land Rover parts are fitted. In certain territories, legislation prohibits the fitting of parts not to the vehicle manufacturer's specification. Torque wrench setting figures given in the Repair Operation Manual must bc 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 Land Rover parts.

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

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

POISONOUS SUBSTANCES

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 CO_2 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 head-lamps 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.

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:

STEAMING: With the filler cap and tank unit removed, empty the tank. Steam the tank for at least two hours with low pressure steam. Position the tank so that condensation can drain away freely, ensuring that any sediment and sludge not volatised by the steam, is washed out during the steaming process.

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 two hours.

After steaming or boiling a signed and dated label to this effect should be attached to the tank

SPECIFICATION

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

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

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

COPYRIGHT

Special Service Tools

The use of approved special service tools is important. They are essential if service operations are to be carried out efficiently, and safely. The amount of time which they save can be considerable.

Every special tool is designed with the close co-operation of Land Rover Ltd., and no tool is put into production which has not been tested and approved by us. New tools are only introduced where an operation cannot be satisfactorily carried out using existing tools or standard equipment. The user is therefore assured that the tool is necessary and that it will perform accurately, efficiently and safely.

Special tools bulletins will be issued periodically giving details of new tools as they are introduced.

All orders and enquiries from the United Kingdom should be sent direct to V. L. Churchill. Overseas orders should be placed with the local V. L. Churchill distributor, where one exists. Countries where there is no distributor may order direct from **V.** L. Churchill Limited. P.O. Box **3,** Daventry, Northamptonshire, England NN11 4NF.

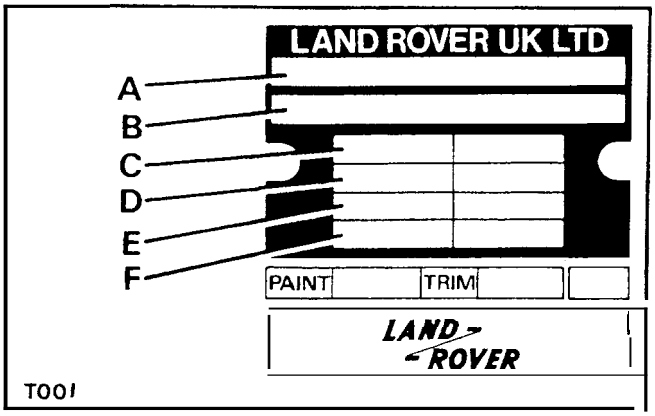
The tools recommended in this Workshop Manual are listed in a multi-language, illustrated catalogue obtainable from Messrs. V. L. Churchill at the above address under publication number 2217/2/84 or from Land Rover Ltd., under part number LSM0052TC from the following address, Land Rover Limited, Service Department, Lode Lane, Solihull, West Midlands, England B92 8NW.

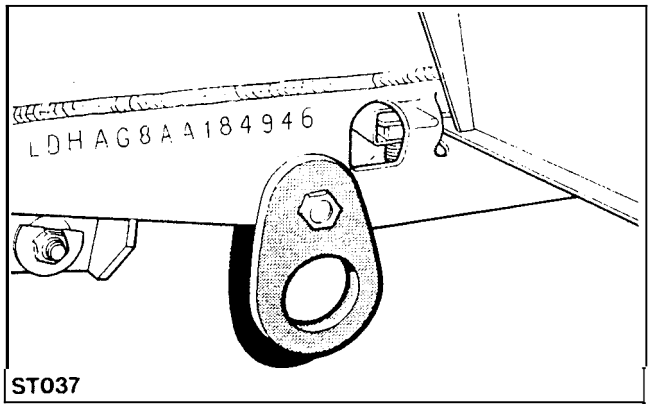
VEHICLE IDENTIFICATION NUMBER (VIN)

The Vehicle Identification Number and the recommended maximum vehicle weights are stamped on a plate riveted to the top of the brake pedal box in the engine compartment.
The number is also stamped on the right-hand side of the chassis forward of the spring mounting turret.
Always quote this number when writing to Land Rover Limited.

Key to Vehicle Identification Number Plate

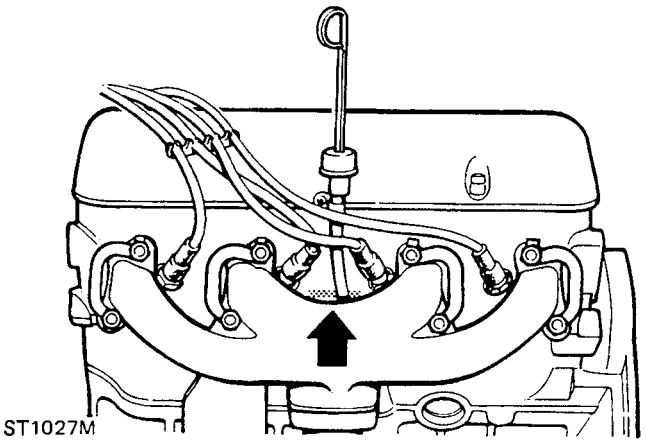
A Type approval
B VIN (minimum of 17 digits)
C Maximum permitted laden weight for vehicle
D Maximum vehicle and trailer weight
E Maximum road weight — front axle
F Maximum road weight — rear axle





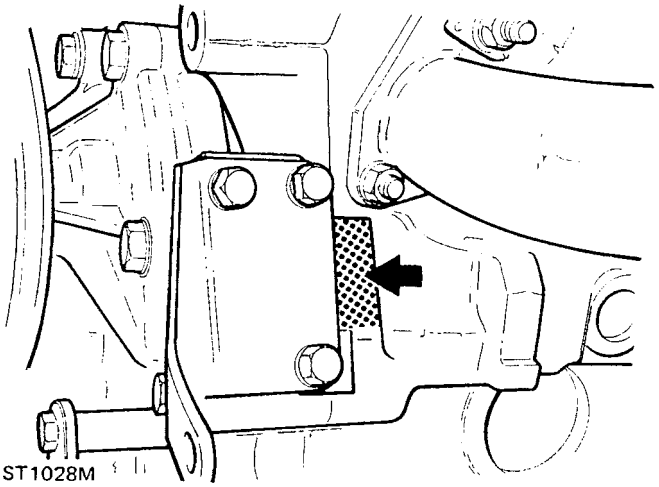
ENGINE SERIAL NUMBER — V8 ENGINE

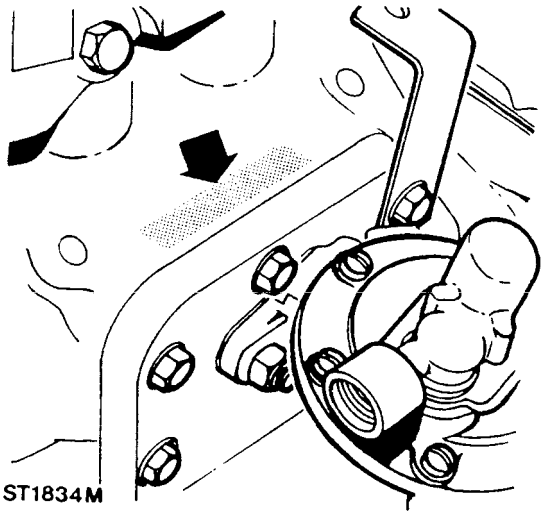
The V8 engine serial number is stamped on a cast pad on the cylinder block between numbers **3** and **5** cylinders.

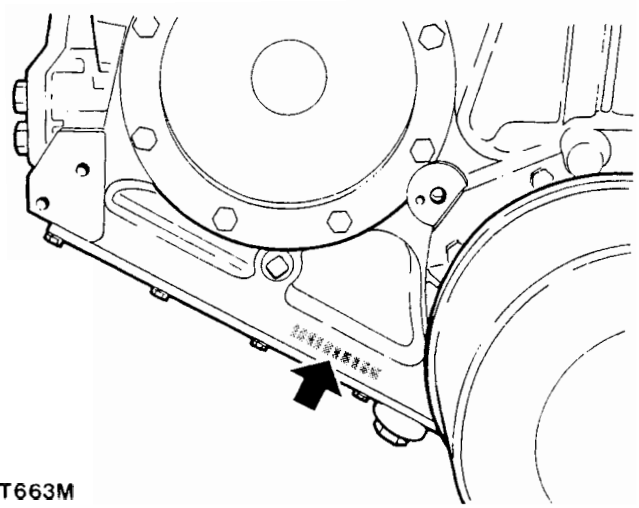


ENGINE SERIAL NUMBER — 4 CYLINDER ENGINES

The 4 cylinder engine number is stamped on a machined surface at the front left-hand side of the engine adjacent to the exhaust manifold front flange. On later engines the number is stamped above the rear side cover, as the second illustration shows.






ST663M

FRONT AXLE

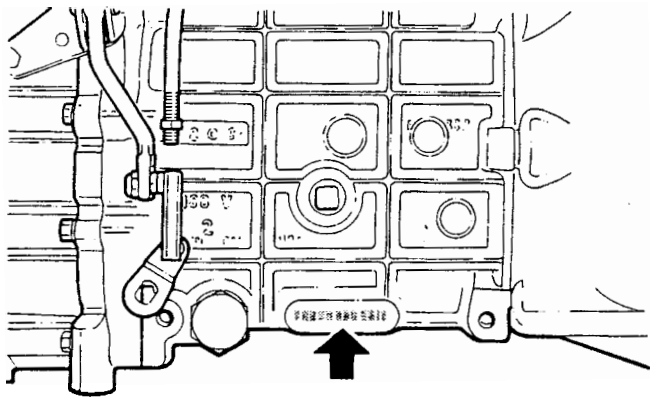
Stamped on top of the left-hand axle tube.

REAR AXLE

Stamped on rear of left-hand axle tube.

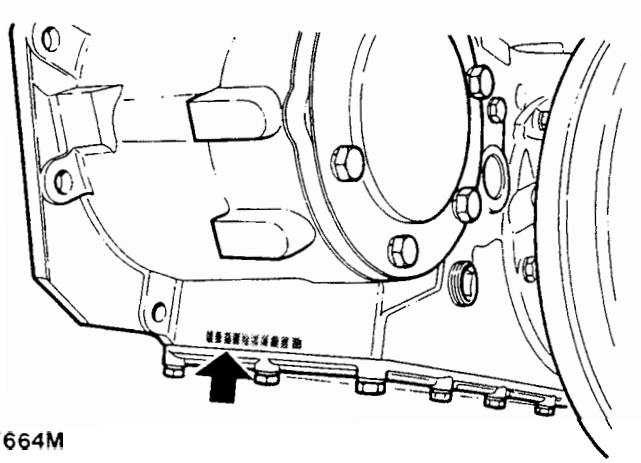
MAIN GEARBOX LT77 —4 CYLINDER VEHICLES

Stamped on a pad on the right-hand side of the gearbox immediately below the oil filler level plug.

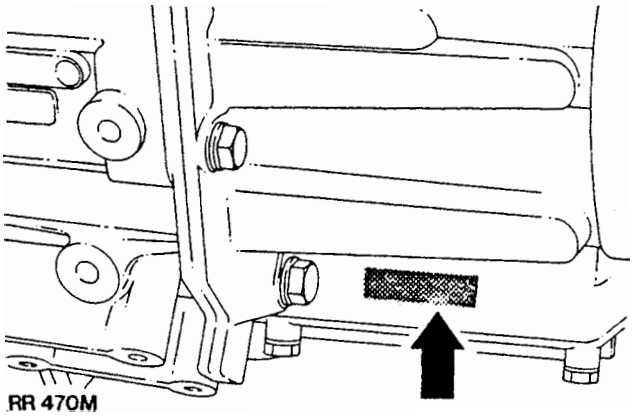

ST665M

TRANSFER GEARBOX LT230R — 4 CYLINDER VEHICLES

Stamped on the casing on the left-hand side of the gearbox below the mainshaft rear bearing housing adjacent to the bottom cover.

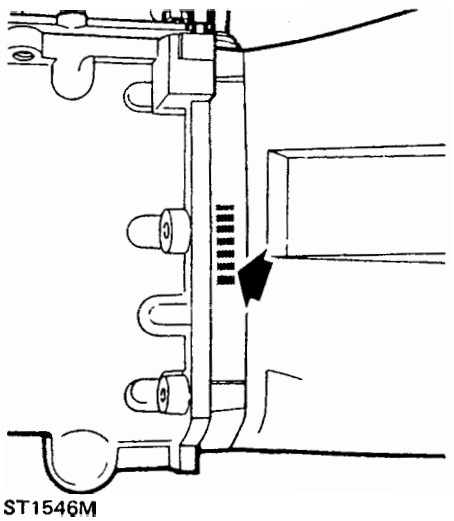

ST664M

TRANSFER GEARBOX LT230T — 4 CYLINDER AND V8 VEHICLES FROM SERIAL NUMBER SUFFIX 'B' ONWARD


RR 470M

MAIN GEARBOX LT85 FIVE SPEED — V8 VEHICLES

Stamped on the right-hand side of the front bearing plate.


ST1546M

ENGINE

Type	V8
Number of cylinders	Eight, two banks of four
Bore	88,90 mm (3.500 in)
Stroke	71,12 mm (2.800 in)
Capacity	3528 cc (215 in^3)
Valve operation	Overhead by push-rod
Maximum power — B.H.P	113 } at 4000 rpm
Maximum power — KW	84.6 } at 4000 rpm
Maximum torque	251 Nm (185 lb ft) at 2500 rpm

Crankshaft

Main journal diameter	58,409 - 58,422 mm (2.2996 - 2.3001 in)
Minimum regrind diameter	57,393 - 57,406 mm (2.2596 - 2.2601 in)
Crankpin journal diameter	50,800 - 50,812 mm (2.0000 - 2.0005 in)
Minimum regrind diameter	49,784 - 49,797 mm (1.9600 - 1.9605in)
Crankshaft end thrust	Taken on thrust washers of centre main bearing
Crankshaft end-float	0,10 - 0,20 mm (0.004 - 0.008 in)

Main bearings

Number and type	5, Vandervell shells
Material	Lead-indium
Diametrical clearance	0,010 - 0,048 mm (0.0004 - 0.0019 in)
Undersizes	0,254 mm, 0,508 mm (0.010 in, 0.020 in)

Connecting rods

Type	Horizontally split big end, plain small end
Length between centres	143,81 - 143,71 mm (5.662 - 5.658 in)

Big end bearings

Type and material	Vandervell VP lead-indium
Diametrical clearance	0,015 - 0,055 mm (0.0006 - 0.0022 in)
End-float on crankpin	0,15 - 0,36 mm (0.006 - 0.014 in)
Undersizes	0,254 mm, 0,508 mm (0.010 in, 0.020 in)

Gudgeon pins

Length	72,67 - 72,79 mm (2.861 - 2.866 in)
Diameter	22,215 - 22,22 mm (0.8746 - 0.8749 **in)**
Fit-in connecting rod	Press fit
Clearance in piston	0,002 - 0,007 mm (0.0001 - 0.0003 in)

Pistons

Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin	0,018 - 0,033 mm (0.0007 - 0.0013 in)

Piston rings

Number of compression	2
Number of oil	1
No. 1 compression ring	Chrome parallel faced
No. 2 compression ring..	Stepped to 'L' shape and marked 'T' or 'TOP'
Width of compression rings	1,56 - 1,59 mm (0.0615 - 0.0625 in)
Compression ring gap	0,44 - 0,57 mm (0.017 - 0.022 in)
Oil ring type	Perfect circle, type 98-6
Oil ring width.	4,811 mm (0.1894 in) max
Oil ring gap	0,38 - 1,40 mm (0.015 - 0.055 in)

Camshaft

Location	Central
Bearings	Non-serviceable
Number of bearings	5
Drive	Chain 9,52 mm (0.375 in) pitch x 54 pitches

Valves

Length:	
Inlet	116,59 - 117,35 mm (4.590 - 4.620 in)
Exhaust..	116,59 - 117,35 mm (4.590 - 4.620 in)
Seat angle:	
Inlet	45° - 45½°
Exhaust..	45° - 45½°
Head diameter:	
Inlet	39,75 - 40,00 mm (1.565 - 1.575 in)
Exhaust..	34,226 - 34,480 mm (1.3475 - 1.3575 in)
Stem diameter:	
inlet	8,664 - 8,679 mm (0.3411 - 0.3417 in)
Exhaust	8,651 - 8,666 mm (0.3406 - 0.3412 in)
Stem to guide clearance:	
Inlet	0,025 - 0,066 mm (0.0010 - 0.0026 in)
Exhaust	0,038 - 0,078 mm (0.0015 - 0.0031 in)
Valve lift (inlet and exhaust).	9,49 mm (0.374 in)
Valve spring length fitted	40,4 mm (1.590 in) at pressure of 29,5 kg (65 lbs)

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2400 rpm	2,1 - 2,8 kgf cm^2 (30 - 40 lbf in^2)
Oil filter (external).	Full-flow, self-contained cartridge
Oil filter (internal)	Gauze. Pump intake filter
Oii pump type	Gear

Oil pressure relief valve

Type	Non-adjustable
Relief valve spring:	
Free length	81,2 mm (3.200 in)
Compressed length at 4,2 kg (9.3 lb) load	45,7 mm (1.800 in)

Oil filter by-pass valve

Type	Non-adjustable
By-pass valve spring:	
Free length	37,5 mm (1.48 in)
Compressed length at 0,34 kg (0.75 lb).	22,6 mm (0.89 in)

2.25 LITRE PETROL ENGINE

ENGINE

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 push-rod
Compression ratio	8.0: 1
Maximum power @ 4000 rpm	55.2 Kw (74 bhp)
Maximum torque @ 2000 rpm	163 Nm (120 lbf ft)

Crankshaft

Main journal diameter	63,487 - 63.500 mm (2.4995 - 2.500 in)
Minimum regrind diameter	63,246 - 63,2333 mm (2.4900 - 2.4895 in)
Crankpin journal diameter	58,725 - 58,744 mm (2.312 - 2.31275 in)
Minimum regrind diameter	58,48985 - 58,47080 mm (2.30275 - 2.30200 in)
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end-float	0,05 - 0,15 mm (0.002 - 0.006 in)

Main bearings

Number and type	5 halved shells
Material	Steel shell, tin-aluminium lined
Diametrical clearance	0,020 - 0,063 mm (0.0008 - 0.0025 in)
Undersizes	0,25 mm (0.010 in)

Connecting rods

Type	Horizontally split big end, plain small end
Length between centres	175,36 - 175,46 mm (6.904 - 6.908 in)

Big end bearings

Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,019 - 0,068 mm (0.00075 - 0.0027 in)
End-float on crankpin	0,20 - 0,30 mm (0.007 - 0.012 in)
Undersizes	0,25 mm (0.010 in)

Gudgeon pins

Type	Floating
Fit in piston	**Push** fit by hand
Clearance in connecting rod	0,007 - 0,015 mm (0.0003 - 0.0006 in)

Pistons

Type 8.0:1 compression ratio	Aluminium alloy, flat top
Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin:	
Standard size pistons	0,06 - 0,07 mm (0.0023 - 0.0027 in)
Oversize pistons	0,043 - 0,055 mm (0 0017 - 0 0022 **in)**

Piston rings

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

Camshaft

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

Valves

Length:	
Inlet	111,20 - 111,66 mm (4.378 - 4.396 in)
Exhaust..	111,22 - 111,58 mm (4.388 - 4.412 in)
Seat angle:	
Inlet	30"
Exhaust	45"
Head diameter:	
Inlet	44,32 - 44,57 mm (1.744 - 1.755 in)
Exhaust	34,93 - 35,18 mm (1.378 - 1.380 in)
Stem diameter:	
Inlet	7,899 - 7,912 mm (0.3109 - 0.3115 in)
Exhaust..	8,682 - 8,694 mm (0.3418 - 0.3422 in)
Stem to guide clearance:	
Inlet	0,033 - 0,048 mm (0.0013 - 0.0019 in)
Exhaust..	0,058 - 0,073 mm (0.0023 - 0.0029 in)
Valve lift:	
Inlet	10,236mm (0.403 in)
Exhaust..	9,85 mm (0.388 in)

Valve springs

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

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rpm	2,45 - 4,50 kgf cm^2 (35 - 65 lbf in^2)
Oil pump: Early type	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End-float of gears:	
Steel gear	0,05 - 0,12 mm (0.002 - 0.005 in)
Aluminium gear	0,07 - 0,15 mm (0.003 - 0.006 in)
Radial clearance of gears	0,02 - 0,10 mm (0.001 - 0.004 in)
Backlash of gears..	0,15 - 0,28 mm (0.006 - 0.012 in)

Lubrication (continued)

Oil pump: Latest type	
Type	Double gear, 10 teeth, sintered iron gears
Drive	Splined shaft from camshaft skew gear
End-float of both gears	0,026 - 0,135 mm (0.0009 - 0.0045 in)
Radial clearance of gears	0,025 - 0,075 mm (0.0008 - 0.0025 in)
Backlash of gears..	0,1 - 0,2 mm (0.0034 - 0.0067 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)

2.5 LITRE PETROL ENGINE

ENGINE

Type	4 cylinder
Bore	90,47 mm (3.562 in)
Stroke	97 mm (3.82 in)
Capacity	2495 cm^3 (152.25 in^3)
Valve operation..	Overhead by push-rod
Compression ratio..	8.0: 1
Maximum power @ 4000 rpm	59.5 Kw (80 bhp)
Maximum torque @ 2000 rpm..	175 Nm (129 lbf ft)
Commencing serial no..	17H00011C

Crankshaft

Main journal diameter	63,487 - 63,500 mm (2.4995 - 2.500 in)
Minimum regrind diameter	63,246 - 63,2333 mm (2.4900 - 2.4895 in)
Crankpin journal diameter	58,725 - 58,744 mm (2.312 - 2.31275 in)
Minimum regrind diameter	58,48985 - 58,47080 mm (2.30275 - 2.30200 in)
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end-float..	0,05 - 0,15 mm (0.002 - 0.006 in)

Main bearings

Number and type	5 halved shells
Material	Copper-lead lined
Diametrical clearance	0,018 - 0,06 mm (0.0007 - 0.0026 in)
Undersizes	0,25 mm (0.010 in)

Connecting rods

Type	Horizontally split big end, plain small end
Length between centres	175,36 - 175,46 mm (6.904 - 6.908 in)

Connecting rod bearings

Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,025 - 0,075 mm (0.001 - 0.003 in)
End-float on crankpin	0,20 - 0,30 mm (0.007 - 0.012 in)
Undersizes	0,25 mm (0.010 in)

Gudgeon pins

Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,007 - 0,015 mm (0.0003 - 0.0006 in)

Pistons

Type 8.0:1 compression ratio	Aluminium alloy. Recessed crown.
Clearance in bore measured @ 17mm from bottom of skirt at right angles to gudgeon pin:	
Standard and oversize pistons	0,043 - 0,067 mm (0.0017 - 0.0026 in)

Piston rings

Compression	2
Gap in bore	0,40 - 0,65 mm (0.016 - 0.026 in)
Clearance in groove	0,046 - 0,097 mm (0.0018 - 0.0038 in)
Oil control	1
Gap in bore	0,30 - 0,55 mm (0.012 - 0.022 in)
Clearance in groove	0,026 - 0,076 mm (0.0012 - 0.003 in)

Camshaft

Location	Right-hand side (thrust side) of engine
End-float	0,06 - 0,13 mm (0.0025 - 0.0055 in)
Number of bearings	4
Material	Steel shell, white metal lined
Drive	76 link chain

Valves

Length :	
Inlet	111,20 - 111,66 mm (4.377 - 4.396 in)
Exhaust..	111,12 - 111,59 mm (4.374 - 4.393 in)
Seat angle:	
Inlet	30"
Exhaust..	45"
Head diameter:	
Inlet	44,32 - 44,58 mm (1.744 - 1.755 in)
Exhaust..	34,43 - 34,18 mm (1.355 - 1.345 in)
Stem diameter:	
Inlet	7,899 - 7,912 mm (0.3109 - 0.3115 in)
Exhaust,.	8,697 - 8,679 mm (0.3424 - 0.3416 in)
Stem to guide clearance:	
Inlet	0,033 - 0,048 mm (0.0013 - 0.0019 in)
Exhaust	0,035 - 0,076 mm (0.0014 - 0.0022 in)
Valve lift:	
Inlet	10,236mm (0.403 in)
Exhaust	9,85 mm (0.388 in)
Exhaust valve seat insert:	
External diameter..	36,576 - 36,601 (1.440 - 1.441 in)
Internal diameter..	28,448 - 28,702 mm (1.120 - 1.130 in)
Width	5,055 - 5,105 mm (0.199 - 0.201 in)
Seat angle and depth	45". 0,635 - 0,889 mm (0.025 - 0.035 in)

Valve springs

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

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rpm	2,45 - 4,50 kgf cm^2 (35 - 65 lbf in^2)
Oil pump:	
Type	Double gear, 10 teeth, sintered iron gears
Drive	Splined shaft from camshaft skew gear
End-float of both gears..	0,026 - 0,135 mm (0.0009 - 0.0045 in)
Radial clearance of gears	0,025 - 0,075 mm (0.0008 - 0.0025 in)
Backlash of gears	0,1 - 0,2 mm (0.0034 - 0.0067 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)

2.25 LITRE DIESEL ENGINE

ENGINE

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
Compression ratio..	23:1
Maximum power	44Kw (59 bhp) at 4000 rpm
Maximum torque	136 Nm (100 lbf ft) at 1800 rpm

Crankshaft

Main bearing journal diameter..	63,487 - 63,500 mm (2.4995 - 2.500 in)
Regrind dimensions:	
63,246 - 63,2333 mm (2.490 - 2.4895 in)	Use 0.010 in U/S bearings
Crankpin journal diameter	58,725 - 58,744 mm (2.312 - 2.31275 in)
Regrind dimensions:	
58,48985 - 58,4708 mm (2.30275 - 2.30200 in).	Use 0.010 in U/S bearings
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end-float	0,05 - 0,15 mm (0.002 - 0.006 in)

Main bearings

Number and type	5 halved shells
Material	Steel shell, copper-lead lined, tin plated
Diametrical clearance	0,020 - 0,063 mm (0.0008 - 0.0025 in)

Connecting rods

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

Big end bearings

Type and material	Steel shell, copper-lead lined
Diametrical clearance	0,020 - 0,0635 mm (0.0008 - 0.0025 in)
End-float on crankpin.	0,15 - 0,356 mm (0.006 - 0.014 in)

Gudgeon pins

Type	Floating
Fit in piston	Push fit by hand
Clearance in connecting rod	0,0196 - 0,0036 mm (0.0007 - 0.00014 in)
Diameter	30,1564 - 30,1625 mm (1.18726 - 1.1875 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 - 0,134 mm (0.0044 -0.0053 in)
Oversize pistons	0,111 - 0,157 mm (0.0044 - 0.0062 in)

Piston rings

Compression No. 1 (top):	
Type	Square friction edge, chrome plated
Gap in bore	0,35 - 0,50 mm (0.014 - 0.019 in)
Clearance in groove..	0,06 - 0,11 mm (0.0025 - 0.0045 in)
Compression Nos. 2 and 3:	
Type	Bevelled friction edge. Marked 'T' or 'TOP' on upper side
Gap in bore	0,25 - 0,38 mm (0.010 - 0.015 in)
Clearance in groove	0,06 - 0,11 mm (0.0025 - 0.0045 in)
Oil control No. 4:	
Type	Ring and spring
Gap in bore	0,279 - 0,406 mm (0.011 - 0.016 in)
Clearance in groove	0,038 - 0,064 mm (0.0015 - 0.0025 in)

Valves

Length:	
Inlet	116,26 - 116,51 mm (4.377 - 4.587 in)
Exhaust..	116,79 - 117,25 mm (4.598 - 4.616 in)
Seat angle:	
Inlet	45"
Exhaust	45"
Head diameter:	
Inlet	39,12 - 39,37 mm (1.540 - 1.550 in)
Exhaust..	33,25 - 33,50 mm (1.309 - 1.318 in)
Stem diameter:	
Inlet	7,912 - 7,899 mm (0.3114 - 0.3109 in)
Exhaust	8,682 - 8,694 mm (0.3418 - 0.3422 in)
Stem to guide clearance:	
Inlet	0,033 - 0,048 mm (0.0013 - 0.0019 in)
Exhaust..	0,058 - 0,073 mm (0.0023 - 0.0029 in)
Valve lift:	
Inlet	9,85 mm (0.388 in)
Exhaust	10,26 mm (0.404 in)

Camshaft

Location	Right-hand side (thrust side) of engine
End-float	0,1 - 0,2 mm (0.004 - 0.008 in)
Number of bearings	4
Material	Steel shell, white metal lined
Drive	Chain

Valve springs

Type	Duplex Interference double 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)

Lubrication

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

2.5 LITRE DIESEL ENGINE

ENGINE

Number of cylinders	4
Bore	90,47 mm (3.562 in)
Stroke	97,00 mm (3.819 in)
Capacity	2495 cc
Compression ratio	21:1
Piston area (total)	257,1 cm^3 (39.86 in^3)
Maximum power at 4000 rpm	65.5 bhp
Maximum torque at 1800 rpm	113 lbf ft

Crankshaft

Main bearing journal diameter	63,487 - 63,500 mm (2.4995 - 2.5000 in)
Regrind dimensions:	
63,246 - 63,2333 mm (2.490 - 2.4895 in)	Use 0.010 in U/S bearings
Crankpin journal diameter	58,725 - 58,744 mm (2.312 - 2.31275 in)
Regrind dimensions:	
58,48985 - 58,4708 mm (2.30275 - 2.30200 in)	Use 0.010 in U/S bearings
Crankshaft end thrust	Taken on thrust washers at centre main bearing
Crankshaft end-float	0,05 - 0,15 mm (0.002 - 0.006 in)

Main bearings

Number and type	5 halved shells
Diametrical clearance	0,018 - 0,061 mm (0.0007 - 0.0024 in)

Connecting rods

Length between centres	175,38 - 175,43 mm (6.905 - 6.907 in)
Diametrical clearance (big-end bearings)	0,025 - 0,075 mm (0.001 - **0.003** in)
End-float on crankpin	0,15 - 0,356 mm (0.006 - 0.014 in)

Pistons

Type	Aluminium alloy '**V**' shaped valve recess **in** crown
Skirt diametrical clearance (at right angle to gudgeon pin)	0,025 - 0,05 mm (0.001 - **0.002** in)

Gudgeon pins

Type	Floating
Fit in piston	Hand **push** fit
Diameter	30,1564 - 30,1625 mm (1.18726 - 1.18750 in)
Clearance in connecting rod	0,0196 - 0,0036 mm (0.00077 - 0.00014 in)

Piston rings

Type:	Top	Square friction edge, chrome plated
	Second	Taper faced
	Oil control	Expander and rails

Camshaft

Drive	25,4 mm (0.1 in) wide dry toothed belt
Location	Right-hand side (thrust side)
End-float	0,1 - 0,2 mm (0.004 - 0.008 in)
Number of bearings	4
Material	Steel shell, white metal lined

Valves

Seat angle:	
Inlet	45"
Exhaust	45"
Head diameter:	
Inlet	39,12 - 39,37 mm (1.540 - 1.550 in)
Exhaust	33,25 - 33,50 mm (1.309 - 1.319 in)
Valve lift:	
Inlet	9,85 mm (0.388 in)
Exhaust	10,26 mm (0.404 in)
Cam lift:	
Inlet	6,81 mm (0.268 in)
Exhaust	7,06 mm (0.278 in)
Stem diameter:	
Inlet	7,912 - 7,899 mm (0.3114 - 0.3109 in)
Exhaust	8,682 - 8,694 mm (0.3418 - 0.3422 in)

Valve springs

Type	Duplex Interference double 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)

Lubrication

System	Wet sump, pressure fed
System pressure, engine warm at 2000 rpm	2,5 - 4,57 kgf cm^2 (35 - 65 Ibf in^2)
Oil pump: Early type	
Type	Double gear
Drive	Splined shaft from camshaft skew gear
End-float of gears:	
Steel gear	0,05 - 0,12 mm (0.002 - 0.005 in)
Aluminium gear	0,07 - 0,15 mm (0.003 - 0.006 in)
Radial clearance of gears	0,02 - 0,10 mm (0.001 - 0.004 in)
Backlash of gears..	0,15 - 0,28 mm (0.006 - 0.012 in)
Oil pump: Latest type	
Type	Double gear, 10 teeth, sintered iron gears
Drive	Splined shaft from camshaft skew gear
End-float of both gears..	0,026 - 0,135 mm (0.0009 - 0.0045 in)
Radial clearance of gears	0,025 - 0,075 mm (0.0008 - 0.0025 in)
Backlash of gears	0,1 - 0,2 mm (0.0034 - 0.0067 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 Ib) load	61,23 mm (2.450 in)

GENERAL DATA

FUEL SYSTEM — 2.25 Petrol

Carburetter	See **'ENGINE TUNING DATA'**
Air cleaner..	Oil bath with built-in centrifugal pre-cleaner

Fuel pump — Early Models

Type	Mechanical with sediment bowl and hand primer
Pressure range	3 - 5 psi

Fuel pump — Latest Models

Make and Type	Facet, electric. Mounted on R.H. side of chassis
Pressure range	3 - 5 psi

FUEL SYSTEM — 2.25 and 2.5 Diesel

Injection pump..	See **'ENGINE TUNING DATA'**
Fuel lift pump type	Mechanical, with hand primer
Pressure range	0,35 - 0,56 kgf cm^2 (5 - 8 Ibf ft^2)

FUEL SYSTEM — V8 engine

Carburetter	See **'ENGINE TUNING DATA'**
Fuel pump — Make,type	Facet, electric mounted vertically on R.H. side of chassis
Air cleaner	Cyclone, replaceable element

COOLING SYSTEM — 2.25 Petrol, 2.25 and 2.5 Diesel

Type	Pressurized spill return system with thermostat control, pump and fan assisted
Thermostat	82°C
Pressure cap	0,6 kgf cm² (9 lbf in²)
Type of pump	Centrifugal

COOLING SYSTEM — V8 engine

Type	Pressurized spill return system with thermostat control, pump and fan assisted
Thermostat	Emission and non-emission 82°C, Australia 88°C
Type of pump	Centrifugal

CLUTCH — 2.25 Petrol

Type	Borg and Beck diaphragm spring
Centre plate diameter	242,1 mm (9.500 in)
Facing material	Raybestos 1488-05
Facing material identification colour	White/violet on pcriphary
Number of damper springs	**6**
Damper spring colour	Dark grey/light green
Clutch release bearing	Ball journal

CLUTCH — 2.25 and 2.5 Diesel engine — Early type

Type	Verto diaphragm spring
Centre plate diameter	242,1 mm (9.500 in)
Facing material	Raybestos 1488-05
Number of damper springs	8
Damper spring colour	2 off white/green 2 off pigeon blue 4 off ruby red
Clutch release bearing	Ball journal

CLUTCH — Later type

Type	Verto diaphragm spring
Centre plate diameter (friction plate)	235 mm (9.25 in)
Facing material	Verto 791
Number of damper springs	8
Damper spring colour	2 off white/green — suffix 'C' 2 off pigeon blue — suffix **'A'** 4 off ruby red — suffix 'B'
Clutch release bearing	Ball journal

CLUTCH — V8 engine

Type	Borg and Beck diaphragm spring
Centre plate diameter	**267** mm (10.5 in)
Facing material	Raybestos 1488-05. Grooved. White/violet
Damper spring colour	Light blue/dark blue
Release bearing	Ball journal
Number of damper springs	*6*

Main gearbox

Type LT77	Single helical constant mesh
Speeds	5 forward 1 reverse
Synchromesh	**All** forward speeds
Ratios:	
Fifth	0.8314:1
Fourth (direct)	1.0000:1
Third	1.5074:1
Second	2.3008:1
First.	3.5850:1
Reverse	3.7007:1

Transfer box

Type LT230R	Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential
Ratios:	
High	1.6670
Low	3.3198

Overall ratios (final drive):	**In high transfer**	**In low transfer**
Fifth	4.9042: 1	9.7666:1
Fourth..	5.8987:1	11.7471:1
Third	8.8917: 1	17.7075:1
Second	13.5715:1	27.0272: 1
First,.	21.1472:1	42.1138: 1
Reverse	21.8293:1	43.4723:1

Input gear	26 Teeth
Intermediate gear	19 x 41 x 35 Teeth
Output gear..	40 x 37 Teeth

TRANSMISSION — V8 Engine

Main gearbox

Type LT95	Single helical constant mesh
Speeds	4 forward 1 reverse
Synchromesh	All forward speeds
Ratios:	
Fourth (direct)	1.0000:1
Third	1.5049:1
Second	2.4480: 1
First	4.0691:1
Reverse	3.6643:1

Transfer box

Type LT95	Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential
Ratios:	
High	1.3362
Low	3.3206

Overall ratios (final drive):	**In high transfer**	**In low transfer**
Fourth..	4.7281:1	11.7497:1
Third	7.1154:1	17.6822:1
Second	11.5745:1	28.7634:1
First..	19.2390:1	47.8101:1
Reverse	27.3250:1	43.0538:1

TRANSMISSION — Ninety and One Ten V8 with 5-speed gearbox

Main gearbox

Type — Manual.. ..... LT85 5-speed helical constant mesh, with synchromesh on all forward gears

Main gearbox ratios.. .....

Fifth (Cruising gear)	0.7951
Fourth	1.0000
Third	1.4362
Second	2.1804
First	3.6497
Reverse	3.8242

Transfer gearbox

Type.. ..... LT230T. Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential.

— Ninety models ..... High	1.1923
Low	3.3198
— One Ten models ..... High	1.410
Low	3.3198

Overall ratio (including final drive) — Ninety models

	In high transfer	**In low transfer**
Fifth (Cruising gear)	3.3544	9.3401
Fourth	4.2189	11.7471
Third	6.0592	16.8712
Second	9.1989	25.6134
First	15.3977	42.8734
Reverse	16.1339	44.9233

Overall ratio (including final drive) — One Ten models

	In high transfer	**In low transfer**
Fifth (Cruising gear)	3.9695	9.3401
Fourth	4.9925	11.7471
Third	7.1702	16.8712
Second	10.8856	25.6134
First	18.2210	42.8734
Reverse	19.0922	44.9233

REAR AXLE — One Ten only

Type ..... Salisbury 8HA

Ratio 3.538

Track ..... 1485,90 mm (58.50 in)

FRONT AXLE — All models and Ninety rear

Type.. ..... Spiral bevel, enclosed constant velocity joints

Ratio 3.538

PROPELLER SHAFTS — All Models

Type: Front and rear ..... Single Hookes universal needle roller joints. Sliding portion on front shaft gaiierea, rear shaft open

SUSPENSION — All Models

Type	Coil springs controlled by telescopic dampers front and rear
Front	Transverse location of axle by Panard rod, and fore and aft location by two radius arms
Rear	Fore and aft movement inhibited by two tubular trailing links. Lateral location of axle by a centrally positioned 'A' bracket bolted at the apex to a ball joint mounting. An optional levelling unit is positioned between the ball joint and upper cross member

BRAKES 2.25 Petrol and V8 Engine

System	Direct acting servo assisted dual braking system with Girling tandem master cylinder and pressure differential warning actuator, combination valve, or G. valve

Footbrake — All Models

Front	Lockheed Disc
Disc diameter	300 mm (11.81 in)
Number of pistons per wheel	4
Total lining area	232 cm^2
Lining material..	Don 230
Rear	Girling single cylinder drum brake
Drum diameter	280 mm (11 in)
Total lining area	493 cm^2
Brake drum width..	63.9 mm
Lining material..	Ferodo 2629

Handbrake — All Models

Type	Transmission drum brake cable operated
Drum diameter	254 mm (10 in)
Lining material..	Don 269

BRAKES — 2.25 and 2.5 litre Diesel engine

System	Direct acting servo assisted dual braking system with Girling tandem master cylinder and pressure differential warning actuator, combination valve, or G. valve. Servo assistance initiated by an engine driven air evacuation pump and sustained by a vacuum tank (vacuum tank deleted on 2.5)

Evacuation pump — 2.25 litre Diesel

Maximum speed	5000 rpm. Belt drive
Oil capacity	40 cm^3 (2.4 in^3) SAE 15W-50

Evacuation pump — 2.5 litre Diesel

Maximum speed	4000 rpm. Gear drive from camshaft
Lubrication	Oil feed via skew gear
.Minimum vacuum !eve! *at* 2500 rpm	0,8 bar

STEERING — All Models

Type:	
Manual — Early Models only	Burman recirculating ball
Manual..	Gemmer Hour-glass worm and wheel
Optional power assisted — Early Models..	Adwest Varamatic
Optional power assisted — Later Models..	Adwest Lightweight or Gemmer
Ratios:	
Manual Burman straight ahead	20,55: 1
Manual Gemmer	20,2: Constant
Power assisted straight ahead.	17.5:1
Number of turns lock to lock:	
Manual..	4.75
Power assisted	3.49
Camber angle	Zero
Castor angle	3"
Swivel pin inclination..	7"
Front wheel toe-out — permanent 4-wheel drive	1,19 - 2,38 mm ($\frac{3}{64}$ - $\frac{3}{32}$ in)
Turning circle between kerbs:	
Right-hand drive	14,0 m (45.67 ft)
Left-hand drive	13,28 m (43.58 ft)
Steering wheel diameter..	420 mm (16.5 in)
Steering damper	Fitted to drag link
Track	1485,90 mm (58.50 in)
Steering column type	Collapsible coupling

WHEELS AND TYRES — All Models

Type of wheel	Ventilated disc
Wheel size.	5.50 in F x 16 in
Number of studs	5
Tyre size	7.50 x 16

ELECTRICAL EQUIPMENT — All Models

System	12 volt, negative earth

Battery — 2.25 litre Petrol and V8 engine

Type:		
Lucas — standard 9 plate	B.B.M.S. No. 371	Designation
Chloride — standard 9 plate	B.B.M.S. No. 291	190/84/90
Lucas — cold climate 13 plate	B.B.M.S. No. 389	Designation
Chloride — cold climate 13 plate	B.B.M.S. No. 369	315/120/92

Battery — 2.25 and 2.5 Eitre Diesel engine

Type	Chloride B.B.M.S. No. 243 15 plate designation 395/175/90

Alternator — 2.25 litre Petrol and Diesel and 2.5 Diesel

Type	Lucas A115-34
Maximum D.C. output at 6000 rpm	34 amps
Rotor — winding resistance	3.27 ohms at 20°C ± 5%
Stator — winding resistance per phase	0.138 ohms at 20°C ± 5%
New brush length	20 mm
Renew brush at	10 mm
Brush spring pressure	1.3 - 2.7 N (4.7 - 9.8 oz)
Regulator controlled voltage	13.6 - 14.4 volts measured across battery

Note: From the following engine numbers a 45 amp output alternator is fitted.

12J05497C	Land Rover 90/110 2.5 litre Diesel
11H05639C	Land Rover 90 2.3 litre Petrol
11H05629C	Land Rover 110 2.3 litre Petrol

Alternator — V8 engine

Type	Lucas A115-45
Maximum D.C. output at 6000 rpm	45 amps
Rotor — winding resistance..	3.2 ohms at 20°C ± 5%
Stator — winding resistance per phase	0.092 ohms at 20°C ± 5%
New brush length.	20 mm
Renew brush at	10 mm
Brush spring pressure	1.3 - 2.7 N (4.7 - 9.8 oz)
Regulator controlled voltage	13.6 - 14.4 volts measured across battery

Starter motor — 2.25 Petrol engine

Type	Lucas 2M100
Brush spring tension	1020 gms (36 ozs)
Minimum brush length	9,5 mm (0.375 in)

Starter motor — 2.25 and 2.5 Diesel engine

Type	Lucas 2M113
New brush length	22.2 mm (0.875 in)
Renew brush at	8 mm (0.312 in)
Armature end-float —	
Cast aluminium intermediate bracket	0,03 - 1,4 mm (0.001 - 0.056 in)
Pressed steel intermediate bracket	0,03 - 1,55 mm (0.001 - 0.061 in)
Commutator minimum diameter	38 mm (1.5 in)

Starter motor — V8 engine

Type	Lucas 3M100 pre-engaged
Brush spring tension	1020 gms (36 ozs)
Brush minimum length	9,5 mm (0.375 ins)

Wiper motor — All Models

Type	Lucas 14W uprated two-speed
Armature end-float	0,1 - 0,20 mm (0.004 - 0.008 in)
Minimum brush length..	4,8 mm (0.190 in)

Distributor — All Petrol engines ..... } See '**ENGINE TUNING DATA**'

Coil — All Petrol engines ..... }

Fuses — All Models

Type ..... 12 cartridge fuses of the following values:
Three 10 amp
Six 8 amp
One 12 amp
Two 2.5 amp

Starter motor — 2.5 litre Diesel — Later Models

Type ..... Paris Rhone D9R91 12 volt

TYRE PRESSURES

Tyres — size and type		Normal All load conditions		Emergency soft Unladen		Emergency soft Laden	
		Front	Rear	**Front**	Rear	**Front**	**Rear**
6.00-16	**bar**	2,4	3,25	1,1	1,1	1,1	1,6
CROSS-PLY	lbf/in²	35	47	16	16	**16**	23
	kgf/cm²	2,5	3,3	1,1	1,1	1,1	1,6
7.50-16	**bar**	1,9	2,4	1,1	1,1	1,1	1,6
CROSS-PLY	lbf/in²	28	35	16	16	16	23
	kgf/cm²	2,0	2,5	1,1	1.1	1,1	1,6
205R16	**bar**	1,9	2,4	1,1	1,1	1,1	1,6
RADIAL-PLY	lbf/in²	28	35	16	16	16	23
	kgf/cm²	2,0	2,5	1,1	1,1	1,1	1,6
7.50R16	**bar**	1,9	2,75	1,1	1,1	1,1	1,6
RADIAL-PLY	lbf/in²	28	40	16	16	16	23
	kgf/cm²	2,0	2,8	1,1	1,1	1,1	1,6
7.50-16	**bar**	1,9	2,9	1,1	1,1	1,1	1,8
CROSS-PLY	lbf/in²	28	42	16	16	16	26
	kgf/cm²	2,0	3,0	1,1	1,1	1,1	1,8
750R16	bar	1,9	3,3	1,1	1,1	1,1	1,8
RADIAL-PLY	lbf/in²	28	48	16	16	16	26
	kgf/cm²	2,0	3,4	1,1	1,1	1,1	1,8

REPLACEMENT BULBS AND UNITS

Headlamps:

— **UK** and Europe (except France)	60155 W Halogen bulb
— Franceand Algeria	60155 W Halogen bulb, yellow
— Restof world, right-hand steering	*75150* W Sealed beam unit
— Rest of world, left-hand steering	60/50 W Sealed beam unit
Front side **lamps**	12v5W
Side repeater lamps	12v4 w
Stop/tail lamps	12v21/5W
Flasher lamps.	12v21w
Number plate lamp	12v4 w
Reverse lamp	12v21w
Rear fog guard lamp	12v21w
Interior lamp	12v21w
Warning lights	12v12w
Instrument illumination.	12v3w
Hazard switch warning light	12V0.6W

VEHICLE WEIGHTS AND PAYLOAD

Payload figures quoted in the accompanying table are nominal values for a base specification vehicle and will in general represent the maximum, as any options or extras fitted to the vehicle will increase its unladen weight and hence decrease its allowable payload.

When loading a vehicle to its maximum (Gross Vehicle Weight), consideration must be taken of the unladen vehicle weight and the distribution of the payload *to* ensure that axle loadings do not exceed the permitted maximum values. It is the customer's responsibility to limit the vehicle's payload in an appropriate manner such that neither maximum axle loads nor Gross Vehicle Weight are exceeded.

Land Rover Ninety

Model — Petrol/Diesel		Soft Top			Pick-up			Hard Top			Station Wagon		
		2.5P	2.5D	3.5P	2.5P	2.5D	3.5P	2.5P	2.5D	3.5P	2.5P	2.5D	3.5P
Gross Vehicle Weight	STANDARD SUSPENSION 2400 kg												
EEC Kerb Weight	kg	1606	1643	1602	1635	1672	1631	1648	1685	1644	1690	1727	1686
EEC Payload	kg	794	757	798	765	728	769	752	715	756	710	673	714
Unladen Weight	kg	1487	1519	1483	1516	1548	1512	1529	1561	1525	1571	1603	1567
Payload	kg	913	881	917	884	852	888	871	839	875	829	797	833
Maximum Axle Weights, all Ninety models with Standard Suspension Front Axle 1200 kg Rear Axle 1380 kg													
Gross Vehicle Weight	HIGH LOAD SUSPENSION 2550 kg												
EEC Kerb Weight	kg	1633	1670	1629	1662	1699	1658	1675	1712	1671	1717	1754	1713
EEC Payload	kg	917	880	921	888	851	892	875	838	879	833	796	837
Unladen Weight	kg	1514	1546	1510	1543	1575	1539	1556	1588	1522	1598	1630	1594
Payload	kg	1036	1004	1040	1007	975	1011	994	962	998	952	920	956
Maximum Axle Weights, all Ninety models with High Load Suspension Front Axle 1200 kg Rear Axle 1500 kg													

Land Rover One Ten

Model — Petrol/Diesel		Soft Top			Pick-up			Hard Top			Station Wagon			High Capacity Pick-up		
		2.5P	2.5D	3.5P	2.5P	2.5D	3.5P	2.5P	2.5D	3.5P	2.5P	2.5D	351'	2.5P	2.5D	3.5P
Gross Vehicle Weight	UNLEVELLED SUSPENSION 3050 kg															
EEC Kerb Weight	kg	1723	1742	1698	1724	1743	1699	1777	1796	1752	1887	1906	1862	1813	1859	1778
EEC Payload	kg	1327	1308	1352	1326	1307	1351	1273	1254	1298	1163	1144	1188	1237	1191	1272
Unladen Weight	kg	1588	1599	1563	1589	1600	1564	1642	1653	1617	1752	1763	1727	1678	1716	1643
Payload	kg	1462	1451	1487	1461	1450	1486	1408	1397	1433	1298	1287	1323	1372	1334	1407
Maximum Axle Weights, all One Ten models with Unlevelled Suspension Front Axle 1200 kg Rear Axle 1850 kg																
Gross Vehicle Weight	LEVELLED SUSPENSION 2950 kg															
EEC Kerb Weight	kg	1733	1752	1708	1734	1753	1709	1787	1806	1762	1897	1916	1872	1823	1869	1788
EEC Payload	kg	1217	1198	1242	1216	1197	1241	1163	1144	1188	1053	1034	1078	1127	1081	1162
Unladen Weight	kg	1598	1609	1573	1599	1610	1574	1652	1663	1627	1762	1773	1737	1688	1726	1653
Payload	kg	1352	1341	1377	1351	1340	1376	1298	1287	1323	1188	1177	1213	1262	1224	1297
Maximum Axle Weights. all One Ten models with Levelled Suspension Front Axle 1200 kg Rear Axle 1750 kg																

V8 PETROL ENGINE TUNING DATA
(with 4-speed gearbox and without electronic ignition)

ENGINE	
Compression ratio..	9.35:1 or 8.13:1 Dependent upon market
Firing order	1—8—4—3—6—5—7—2
Cylinder numbering system, front to rear:	
Left bank	1-3-5-7
Right bank	2—4—6—8
Compression pressure (minimum)	9,5 kgf cm² (135 lbf in²)
Timing marks.	On crankshaft pulley vibration damper
Valve clearance..	Not adjustable
Valve timing:	
Inlet opens	36" B.T.D.C.
Inlet closes	64" A.B.D.C.
Inlet duration..	280°
Inlet peak	99" A.T.D.C.
Exhaust opens..	74" B.B.D.C.
Exhaust closes..	**26**" A.T.D.C.
Exhaust duration	280"
Exhaust peak	119° B.T.D.C.

CARBURETTERS	
Type	Two Solex
European Australian	175CDSE
Other markets — non-emission	175CD3
Needle:	
Australian	BIFH
Other markets — non-emission	BIFQ
— emission	BIFK
Idle speed (engine hot):	
Australian	700 - 750 rpm (run-in) *550* - 650 rpm (new engine)
Other markets — non-emission	*550* - 650 rpm
— emission	700 - 750 rpm (run-in) *550* - 650 rpm (new engine)
Fast idle speed (engine hot)	1050 - 1150 rpm
Mixture setting — CO at idle:	
Australian	2% - 3.5% Pulsair connected
Other markets	1.5% - 3% Pulsair connected

IGNITION	
Coil make/type	AC Delco with ballast resistor
Primary resistance at 20°C (68°F)	1.2 - 1.4 ohms
Consumption, ignition on, at 2000 rpm	1 amp
Sparking plug type	Champion N12Y or Unipart GSP131
Sparking plug gap	0,71 - 0,84 mm (0.028 - 0.033 in)
Ignition timing, dynamic or static..	5° to 7° B.T.D.C.
Fuel octane rating Australia..	97 RON minimum
Non-emission	97 RON minimum
Emission	90 RON minimum
Engine idle speed..	750 rpm maximum with vacuum pipe disconnected

DISTRIBUTOR

Makehype	Lucas 35D8			
Rotation of rotor	Anti-clockwise			
Dwell angle	26" - 28"			
Contact breaker gap	0,35 - 0,40 mm (0.014 - 0.016 in)			
Condenser capacity	0.18 - 0.25 microfarad			
Centrifugal advance range and capsule	2" - 4" at 750 rpm		1° - 3" at 800 rpm	
	12° - 14° at 2300 rpm	15.03	7° - 9° at 1800 rpm	ADR
Vacuum advance capsule range	1/20 - 4½° at 10 in Hg	Emission	2½° - 4W at 10 in Hg	*36*
	5" - 7° at 20 in Hg	Engines	7" - 9" at 20 in Hg	Emission
Vacuum retard capsule range	5" - 7" at 9 in Hg		5" - 7" at 9 in Hg	Engines
	5° - 7" at 14 in Hg		5" - 7° at 14 in Hg	

V8 ENGINE TUNING DATA
(Ninety and One Ten V8 with 5-speed gearbox and electronic ignition)

EUROPE

ENGINE	V8 cylinder	
Compression ratio	8.13:1	
Valve timing	Inlet	Exhaust
Opens	30" B.T.D.C.	68" B.B.D.C.
Closes	75" A.B.D.C.	37" A.T.D.C.
Duration	285°	285"
Valve peak	112.5" A.T.D.C.	105.5" B.T.D.C.

CARBURETTERS

Type	2 x Solex 175 CDSE
Solex specification number	3994
Needle	BIFK
Idle speed (engine hot)	700 to 750 rev/min (run-in engine)
	550 to 650 rev/min (new engine)
Fast idle speed (engine hot)	1050 to 1150 rev/min
Mixture setting — CO at idle	1.5 *to* 3% Pulsair connected

IGNITION

Distributor make/type	Lucas 35 DM8 Electronic (Early Models)
	Lucas 35 DLM8 Electronic (Later Models)
Direction of rotation	Clockwise
Centrifugal advance	
Decelerating check with vacuum retard pipe disconnected	
Engine rev/min	Crankshaft angle
3600	22" to 28"
2400	13" to 21"
1600	5" to 9"
1000	0" to 3"
No advance below 500 rev/min	
Ignition timing, dynamic;	
models with emission control	6" B.T.D.C. with vacuum pipes disconnected using 90-93 octane fuel — 2 star rating in UK

V8 ENGINE TUNING DATA
(Ninety and One Ten V8 with 5-speed gearbox and electronic ignition)

AUSTRALIA

ENGINE	V8 cylinder	
Compression ratio..	9.35:1	
Valve timing	Inlet	Exhaust
Opens	30" B.T.D.C.	68" B.B.D.C.
Closes	75" A.B.D.C.	37" A.T.D.C.
Duration	285"	285"
Valve peak	112.5"A.T.D.C.	105.5"B.T.D.C.

CARBURETTERS	
Type	2 x Solex 175 CDSE
Solex specification number..	4104
Needle	BIFH
Idle speed (engine hot)..	700 to 750 rev/min (run-in engine) 550 to 650 rev/min (new engine)
Fast idle speed (engine hot)	1050 to 1150 rev/min
Mixture setting — CO at idle	2% to 3.5% Pulsair connected

IGNITION	
Distributor makehype..	Lucas 35 DM8 Electronic (Early Models) Lucas 35 DLM8 Electronic (Later Models)
Direction of rotation.	Clockwise
Centrifugal advance	
Decelerating check with vacuum retard pipe disconnected	
Engine rev/min	Crankshaft angle
2900..	12"to 16"
2400.	8" to 12"
1600.	2" to 6"
No advance below 800 rev/min	
Ignition timing	6" B.T.D.C. with vacuum pipes disconnected using 96 octane fuel

V8 ENGINE TUNING DATA
(Ninety and One Ten V8 with 5-speed gearbox and electronic ignition)

SAUDI ARABIA

ENGINE	V8 cylinder	
Compression ratio..	8.13:1	
Valve timing (low lift camshaft)	Inlet	Exhaust
Opens	36" B.T.D.C.	74" B.B.D.C.
Closes	64" A.B.D.C.	26° A.T.D.C.
Duration	280°	280°
Valve peak	99" A.T.D.C.	119° B.T.D.C.

CARBURETTERS

Type	2 x Solex 175 CDSE
Solex specification number	3999
Needle	BIFC
Idle speed (engine hot)	700 to 750 rev/min (run-in engine) 550 to 650 rev/min (new engine)
Fast idle speed (engine hot)	1050 to 1150 rev/min
Mixture setting — CO at idle	1.5% to 3% Pulsair connected

IGNITION

Distributor make/type	Lucas 35 DM8 Electronic (Early Models) Lucas 35 DLM8 Electronic (Later Models)
Direction of rotation	Clockwise
Centrifugal advance	
Decelerating check with vacuum retard pipe disconnected	
Engine rev/min	Crankshaft angle
4600	21" to 25"
3600	16" to 20°
3000	12" to 16"
2400	7" to 11"
1600	1" to 3"
No advance below 900 rev/min	
Ignition timing, dynamic; models with emission control	6" B.T.D.C. with vacuum pipes disconnected using 90-93 octane fuel

V8 ENGINE TUNING DATA
(Ninety and One Ten V8 with 5-speed gearbox and electronic ignition)

ALL COUNTRIES EXCEPT EUROPE, SAUDI ARABIA AND AUSTRALIA

ENGINE	V8 cylinder	
Compression ratio	8.13:1	
Valve timing (low lift camshaft)	Inlet	Exhaust
Opens	36" B.T.D.C.	74" B.B.D.C.
Closes	64" A.B.D.C.	26" A.T.D.C.
Duration	280"	280"
Valve peak	99" A.T.D.C.	119" B.T.D.C.

CARBURETTERS

Type	2 x **Solex** 175 CDSE
Solex specification number	4000
Needle	BIFQ
Idle speed (engine hot)	700 to 750 rev/min (run-in engine) 550 to 650 rev/min (new engine)
Fast idle speed (engine hot)	1050 to 1150 rev/min

IGNITION

Distributor make/type	Lucas 35 DM8 Electronic (Early Models) Lucas 35 DLM8 Electronic (Later Models)
Direction of rotation	Clockwise
Centrifugal advance	
Decelerating check with vacuum retard pipe disconnected	
Engine rev/min	Crankshaft angle
4200	23° to 27°
3500	20° to 24°
3000	16° to 20°
2000	8° to 12°
1200	2° to 6°
No advance below 400 rev/min	
Ignition timing, dynamic	6° B.T.D.C. with vacuum pipes disconnected using 90 octane fuel

2.25 LITRE PETROL ENGINE TUNING DATA

ENGINE

Firing order	1—3—4—2
Compression pressure (approximately):	
8.0:1 compression ratio	11,2 kgf cm² (160 lbf in²) @ 300 rpm cranking speed
Ignition timing, static and dynamic up to 600 rpm:	
8.0:1 compression ratio	T.D.C. when using 90 octane fuel 3° A.T.D.C. when using 85 octane fuel } with vacuum pipe connected
Timing marks	On crankshaft pulley
Valve clearance, inlet and exhaust	0,25 mm (0.010 in) Engine hot
Valve timing:	
Inlet opens	16° B.T.D.C.
Inlet closes	42° A.B.D.C.
Inlet peak	103° A.T.D.C.
Exhaust opens	51° B.B.D.C.
Exhaust closes	13° A.T.D.C.
Exhaust peak	109° B.T.D.C.

With a 0,38 mm (0.015 in) valve clearance. Nominal setting for checking only.

DISTRIBUTOR — LUCAS

Type	Lucas 45D
Rotation of rotor	Anti-clockwise
Contact breaker gap	0,35 - 0,40 mm (0.014 - 0.018 in)
Dwell angle	46° - 56°
Centrifugal advance range	1° - 1° at 300 Distributor 19° - 21° at 2250 rpm
Vacuum advance capsule range	0° - ½° at 3.5 Hg 11° - 13° at 25 Hg

DISTRIBUTOR — DUCELLIER

Type	Ducellier Sliding Contact
Rotation	Anti-clockwise
Contact breaker gap	0,35 - 0,40 mm (0.014 - 0.016 in)
Dwell angle	57°
Centrifugal advance range	0° - 1° at 300 Distributor 19° - 21° at 2250 rpm
Vacuum advance capsule range	0° - ½° at 3.5 Hg 11° - 13° at 25 Hg

SPARKING PLUGS

8.0:1 compression ratio	Champion N12Y or Unipart **GSP** 131
Gap	0,75 - 0,80 mm (0.029 - 0.032 in)

IGNITION COIL

Makehype..	AC Delco 7992188
Primary resistance at 20°C (68°F)	3.0 - 3.5 ohms
Consumption —ignition on at engine idle speed	2.0 amps approx.

CARBURETTER

Make/type.. Weber 32/34 DMTL

	Primary	Secondary
Venturi	24	25
Auxiliary Venturi	4	4
Main jet	110	115
Air correction jet	160	160
Emulsion tube..	F30	F30
Idle jet	55	60

Idle CO%	1% - 2.5%
Idle speed —hot..	600 - 700 rpm

2.5 LITRE PETROL ENGINE TUNING DATA

ENGINE

Firing order	1—3—4—2	
Compression pressure (approximately):	11,2 **kgf** cm² (160 lbf in²) @ 300 rpm cranking speed	
Ignition timing dynamic @ 2000 rpm	16"B.T.D.C. using 90 octane fuel	with vacuum pipe
Static, if no dynamic equipment available	T.D.C.	disconnected
Timing marks.	On crankshaft pulley	
Valve clearance, inlet and exhaust	0,25 mm (0.010 in) Engine hot	
Valve timing:		
Inlet opens	11° B.T.D.C.	
Inlet closes	47° A.B.D.C.	With a 0,38 mm (0.015 in)
Inlet peak	108"A.T.D.C.	valve clearance.
Exhaust opens..	46" B.B.D.C.	Nominal setting for
Exhaust closes..	18"A.T.D.C.	checking only.
Exhaust peak	104"B.T.D.C.	

DISTRIBUTOR —LUCAS

Type	Lucas 45D4
Rotation of rotor	Anti-clockwise
Contact breaker gap	0,35 - 0,40 mm (0.014 - 0.016 in)
Dwell angle	49" - 59"
Centrifugal advance range	0° - 1" at 500 Distributor rpm
	18"- 20" at 2250 Distributor rpm
Vacuum advance capsuie range	0° - ½° at 3.5 Hg
	11"- 13" at 25 Hg

SPARKING PLUGS

8.0:1 compression ratio	Champion N9YC
Gap	0,72 - 0,88 mm (0.028 - 0.035 in)

IGNITION COIL

Make/type	Bosch 0221 119 368
Primary resistance at 20°C (68°F)	2.9 ohms
Consumption — ignition on at engine idle speed	2.0 amps approx.

CARBURETTER

Makehype.	Weber 32/34 DMTL
Needle valve..	175

	Primary	Secondary
Venturi	24	25
Auxiliary Venturi	4	4
Main jet	112	112
Air correction jet	160	190
Emulsion tube	F30	F39
Idle jet	52	60

Idle CO%	1.5% ± 1%
Idle speed — hot — Non Air Conditioning..	700 rpm
Idle speed — hot — Air Conditioning..	800 rpm ± 50 rpm
Float level	7 ± 0,5 mm (0.275 ± 0.019 in)

2.25 and 2.5 LITRE DIESEL ENGINE TUNING DATA

ENGINE

Firing order	1—3—4—2
Injection timing..	13" B.T.D.C. (2.25 litre Diesel)
Timing marks:	
Valve timing	On engine flywheel and damper on 2.5 Diesel
Injection timing.	On engine flywheel and pump flange
Valve clearance inlet and exhaust	0,25 mm (0.010 in)
Valve timing:	
Inlet opens	16° B.T.D.C.
Inlet closes	42° A.B.D.C.
Inlet peak	103° A.T.D.C.
Exhaust opens..	51° B.B.D.C.
Exhaust closes..	13° A.T.D.C.
Exhaust peak	109° B.T.D.C.
Low idle speed	650 ± 20 rpm
High idle speed	4200 ± 20 rpm

INJECTORS

Makehype..	CAV Pintaux
Nozzle size	BDNO/SPC 6209 or BDNO/SP 6209
Opening pressure..	135 Atm

HEATER PLUGS

Make/type	Probe type, Champion CH 63 12 volt

DISTRIBUTOR PUMP

Makehype.	**CAV** DPA-2.25 DPS-2.50 type with mechanical governor and auto advance and solenoid electrical shut-off
Direction of rotation.	Clockwise, viewed from drive end
Maximum speed setting (sealed) 2.25 engine	4200 engine rpm
Maximum speed setting (sealed) 2.50 engine	4400 ± 8 rpm
Back leakage rate 150 - 100 Atm:	
New nozzle	7 seconds
Original nozzle.	5 seconds

TORQUE WRENCH SETTINGS

ENGINE 2.25 litre Petrol and Diesel	Nm	lbf ft
Bearing in water pump casing	7 -10	5 -7.3
Breather filter to top cover	7 -10	5 -7.3
By-pass housing to thermostat housing	22 -28	16 -20.6
Carburetter to inlet manifold	22 -28	16 -20.6
Chainwheel pulley to camshaft	40 -50	30 -36.8
Clutch cover plate to flywheel	30 -38	22 -28
Connecting rod to cap	37 -41	27 -30
Fan assembly to water pump hub	22 -28	16 -20.6
Fly wheel to crankshaft	130 -143	96 -105
Fuel pump to side cover	20 -28	14.7 -20.6
Heat shield bracket to manifold	22 -28	16 -20.6
Heat shield to bracket	22 -28	16 -20.6
Oil strainer to mounting bracket	22 -28	16 -20.6
P. clip to lifting bracket	7 -10	5 -7.3
Plug to immersion heater tapping	20 -28	14.7 -20.6
Oil pump cover to pump body	20 -28	14.7 -20.6
Rocker shaft to pedestal	20 -27	14.7 -20
Solenoid heat shield to manifold heat shield	22 -28	16 -20.6
Starter motor to housing	40 -50	30 -36.8
Sump plug to sump	30 -40	22 -29.5
Distributor clamp	13 -19	9.5 -14
Distributor to adaptor	7 -10	5 -7.3
Pulley to crankshaft	260 -280	192 -206
Water temperature to cylinder head adaptor	14 -18	10.3 -13.2
Spark plug	14 -19	10.3 -14
Adaptor for water temperature transmitter to cylinder head	22 -28	16 -20.6
Cover thermostat housing to cylinder head	7 -10	5 -7.3
Lifting bracket to cylinder head	27 -40	20 -29.5
Rocker pedestal to cylinder head	22 -28	16 -20.6
Top cover to cylinder head	8 -11	6 - 8
Alternator adjusting link to cylinder block	22 -28	16 -20.6
Alternator mounting bracket to cylinder block	22 -28	16 -20.6
Camshaft thrust plate to cylinder block	7 -10	5 -7.3
Chain damper to cylinder block	7 -10	5 -7.3
Cylinder head (Diesel) to cylinder block	115 -130	84.8 -95.8
Cylinder head (Petrol) to cylinder block	91 -113	67 -83
DPA injector pump (Diesel) to cylinder block	22 -28	16 -20.6
Distributor housing (Petrol) to cylinder block	22 -28	16 -20.6
Drive shaft/gear to cylinder block	10 -17	7.4 -12.5
Engine mounting foot to cylinder block	80 -95	59 -70
Flywheel housing to cylinder block	40 -50	30 -36.8
Front cover to cylinder block	22 -28	16 -20.6
Main bearing cap (Diesel) to cylinder block	130 -136	96 -100
Main bearing cap (Petrol) to cylinder block	130 -136	96 -100
Oil feed pipe to cylinder block	20 -25	14.7 -18.4
Oil filter to cylinder block	40 -50	30 -36.8
Oil pump to cylinder block	22 -28	16 -20.6
Plug oil gallery front to cylinder block	30 -40	22 -30
Plug oil gallery rear to cylinder block	30 -40	22 -30
Side cover to cylinder block	22 -28	16 -20.6
Side cover FP mounting to cylinder block	22 -28	16 -20.6
Sump to cylinder block (bolts and nuts)	15 -20	11 -14.7
Water pump to cylinder block	22 -28	16 -20.6
Dipstick tube assembly to cylinder block	22 -28	16 -20.6

ENGINE 2.5 litre Diesel	Nm	lbf ft
DPS pump studs to front cover	6-10	4.5 -7.3
DPS pump to front cover	22 -28	16 -20.6
DPS pump to support bracket	22 -28	16 -20.6
Pulley to **DPS** pump	42 -48	31 -35.4
Distributor pipe banjo bolts	14 -20	10.3 -15
Tensioner assembly	22 -28	16 -20.6
Vacuum pump	22 -28	16 -20.6
Oil squirt to cylinder block	14 -20	10.3 -15
Throttle linkage to DPS pump	5 - 7	4 - 5
Throttle bracket to DPS pump	5 - 7	4 - 5
Front cover to cylinder block	22 -28	16 -20.6
Front cover plate to cylinder block	22 -28	16 -20.6
Cover plate to front cover plate	22 -28	16 -20.6
Cowl mounting bracket to front cover	22 -28	16 -20.6
Timing pointer to front cover	22 -28	16 -20.6
Drain plate to front cover	7 - 10	5 -7.3

ENGINE V8 Petrol engine		
Air intake adaptor to carbs	24	17
Alternator mounting bracket o cylinder head	34	25
Alternator to mounting bracket	24	17
Alternator to adjusting link	24	17
Chainwheel to camshaft	54 -61	40 -45
Connecting rod bolt	47 -54	35 -40
Clutch attachment to flywheel	24 -30	18 -22
Cylinder head:		
Outer row	54 -61	40 -45
Centre row	88 -95	65 -70
Inner row	88 -95	65 -70
Distributor clamp bolt	19 -22	14 - 16
Exhaust manifold to cylinder heads	19 -22	14 - 16
Fan attachment	11,5	9
Flywheel to crankshaft	74 -81	55 -60
Inlet manifold to cylinder heads	47 -54	35 -40
Lifting eye to cylinder heads.,	24	17
Main bearing cap bolts	68 -75	50 -55
Main bearing cap rear bolts	88 -95	65 -70
Manifold gasket clamp bolt	13,5 -20	10 -15
Oil pump cover to timing cover	11 -14	8 - 10
Oil plug	25 -30	18 -22
Oil relief valve cap	40	30
Oil sump drain plug	40,6 -47	30 -35
Oil sump to cylinder block	8 - 11	5 - 8
Oil sump rear to cylinder block	17,6 -20.3	13 -15
Rocker cover to cylinder head	7	5
Rocker shaft bracket to cylinder head	34 -40	25 -30
Spark plug	13,8 -16.2	10 - 12
Starter motor attachment	40,6 -47,4	30 -35
Damper to crankshaft	257 -285	190 -210
Timing cover to cylinder block	24 -30	18 -22
Tempatrol unit to water pump	36 -40	27 -30
Water pump pulley to water pump hub	23	17
Water pump timing cover to cylinder block	24 -30	18 -22

CLUTCH V8 Petrol engine	Nm	lbf ft
Clutch cover bolts	27.5	20
Slave cylinder bolts	27.5	20

CLUTCH — 4-cylinder Petrol and Diesel engine	Nm	lbf ft
Clutch cover bolts	30 -38	22 -28

MAIN GEARBOX (FIVE-SPEED)LT 77 mm — 4-cylinder Petrol and Diesel engine		
Oil pump body to extension case	7 -10	5 - 7
Clip to clutch release lever	7 - 10	5 - 7
Attachment plate to gearcase	7 - 10	5 - 7
Attachment plate to remote housing	7 -10	5 - 7
Extension case to gearcase	22 -28	16 - 21
Pivot plate	22 -28	16 - 21
Remote selector housing to extension case	22 -28	16 - 21
Gear lever housing to remote housing	22 -28	16 - 21
Guide clutch release sleeve	22 -28	16 - 21
Slave cylinder to clutch housing	22 -28	16 - 21
Front cover to gearcase	22 -28	16 - 21
5th support bracket	22 -28	16 - 21
Plunger housing to remote housing	22 -28	16 - 21
Blanking plug extension case	7 - 10	5 - 7
Gear lever retainer	7 - 10	5 - 7
Yoke to selector shaft	22 -28	16 - 21
Fixing gear lever assembly nut	40 -47	30 - 35
Reverse pin to centre plate nut	47 -54	35 - 40
Clutch housing to gearbox bolt.	65 -80	48 - 59
Plug — detent spring	22 -28	16 - 21
Oil drain plug	25 -35	19 - 26
Oil filter plug	25 -35	19 - 26
Plug oil filler — remote housing	25 -35	19 - 26
Breather	7 - 11	5 - 8
Oil level plug	25 -35	19 - 26
Blanking plug — reverse switch hole	20 -27	15 - 20
Fifth gear layshaft nut	204 -231	130 - 170

MAIN GEARBOX (FIVE-SPEED)LT85 — V8 engine		
Stop 4th speed adjustment	7 - 10	5 - 7
Clip to clutch release lever	7 - 10	5 - 7
Spring housing to top cover	7 - 10	5 - 7
Plate lower (retained with Loctite 270)	22 -28	16 - 21
Slave cylinder to clutch housing	22 -28	16 - 21
5th fork bracket	22 -28	16 - 21
Front cover to bearing plate	22 -28	16 -21
Plate — Lower (upper fixings)	22 -28	16 -21
Selector fork to shaft and reverse beam to shaft	22 -28	16 -21
Top cover to gearbox	22 -28	16 -21
1st/2nd selector fork to shaft	30 -40	22 -30
Extension case to gearbox	47 -54	35 -40
Extension case to gearbox	47 -54	35 -40
Extension case to gearbox	47 -54	35 -40
Extension case to gearbox	47 -54	35 -40
Clutch housing/bearing plate/gearbox	65 -80	48 -59
Layshaft	204 -231	150 - 170
Reverse lever pivot	65 -80	48 -59
Gross hole/gearbox casing	13,5 -20	10 -15
Filler/top cover	25 -35	19 -26
Oil level/gear case	25 -35	19 -26
Filter plug	65 -80	48 -59
Drain plug	25 -35	19 -26
Reverse light switch hole-blanking plug	13,5 -20	10 - 15
Switch reverse light (optional)	13,5 -20	10 - 15

TRANSFER BOX LT230R

4-cylinder Petrol and Diesel engine	**Nm**	**lbf ft**
Pinch bolt, operating arm	7 - 10	5 - 7
Gate plate to grommet plate	7 - 10	5 - 7
End cover	7 - 10	5 - 7
Speedometer cable retainer	7 - 10	5 - 7
Speedometer housing/rear output	See note	
Locating plate to gear change housing	5 - 7	4 - 5
Bottom cover to transfer case	22 -28	16 -21
Front output housing to transfer case	22 -28	16 -21
Cross shaft housing to front output housing	22 -28	16- 21
Gear change housing	22 -28	16 -21
Pivot shaft	22 -28	16 -21
Connecting rod	22 -28	16 -21
Retaining plate intermediate shaft	22 -28	16 -21
Front output housing cover	22 -28	16 -21
Gear change housing	22 -28	16 -21
Bracket to extension housing	22 -28	16 -21
Finger housing to front output housing	22 -28	16 -21
Mainshaft bearing housing	22 -28	16 -21
Brake drum	22 -28	16 -21
Gearbox to transfer box	40 -50	29 -37
Bearing housing to transfer gearbox	40 -50	29 -37
Speedometer housing to transfer gearbox	40 -50	29 -37
Selector fork to cross shaft	22 -28	16 -21
Yoke to selector shaft high/low	22 -28	16 -21
Selector fork high/low to shaft	22 -28	16 -21
Operating arm high/low	22 -28	16 -21
Transmission brake	65 -80	48 -59
Gearbox to transfer case	40 -50	29 -37
Gearbox to transfer case	See note	
Oil drain plug	25 -35	19 -26
Differential case	55 -64	40 -47
Output flange	146 -179	108 -132
Differential case rear and shaft main drive 214-wheel drive	66 -80	50 -60
Link arm and cross shaft lever to ball joint	8 - 12	6 - 9
Oil filler/level plug	25 -35	19 -26
Transfer breather	7 - 11	5 - 8

NOTE:- Studs to be assembled into casings with sufficient torque to wind them fully home. but this torque must not exceed the maximum figure quoted for the associated nut on final assembly.

TRANSFER GEARBOX LT230T

4 cylinder Petrol and Diesel engine and V8		
Fixings securing mounting brackets to gearbox	80 -100	59 -73
Pinch bolt operating arm	7 - 10	5 - 7
Gate plate to grommet plate	7 - 10	5 - 7
Bearing housing to transfer case	7 - 10	5 - 7
Speedometer cable retainer	7 - 10	5 - 7
speedometer housing	See note	
Locating plate to gear change	5 - 7	4 - 5
Bottom cover to transfer	22 -28	16 -21
Front output housing to transfer	22 -28	16 -21
Front output housing to transfer	22 -28	16 -21

TRANSFER GEARBOX LT230T — 4 cylinder Petrol and Diesel engine and V8 (cont.)	Nm	lbf ft
Cross shaft housing to front output housing	22 -28	16 -21
Gear change	22 -28	16 -21
Gear change	22 -28	16 -21
Cross shaft to high/low lever	22 -28	16 -21
Pivot shaft to link arm	22 -28	16 -21
Connecting rod	22 -28	16 -21
Anti-rotation plate intermediate shaft	22 -28	16 -21
Front output housing cover	22 -28	16 -21
Pivot bracket to extension housing	22 -28	16 -21
Finger housing to front output housing	22 -28	16 -21
Mainshaft bearing housing to transfer case	22 -28	16 -21
Brake drum to coupling flange	22 -28	16 -21
Gearbox to transfer case	40 -50	29 -37
Gearbox to transfer case	40 -50	29 -37
End cover bearing housing to transfer case	40 -50	29 -37
Speedometer housing to transfer	40 -50	29 -37
Speedometer housing to transfer	40 -50	29 -37
Selector finger to cross shaft (high/low)	22 -28	16 -21
Selector fork high/low to shaft	22 -28	16 -21
Transmission brake to speedometer housing	65 -80	48 -59
Gearbox to transfer case	40 -50	29 -37
Transfer case assembly	See note	
Oil drain plug	25 -35	19 -26
Detent plug	Plug to be coated with Hylomar and peened. Screw plug fully in (spring solid) then turn two complete turns back.	
Differential casings	55 -64	40 -47
Front and rear out flange	146 -179	108 -132
Differential case rear	66 -80	50 -59
Oil filler and level plug transfer	25 -35	19 -26
Transfer breather	7 - 11	5 - 8
Inter shaft stake nut	130 -140	96 -104

NOTE:- Studs to be assembled into casings with sufficient torque to wind them fully home. but this torque must **not** exceed the maximum figure quoted for the associated nut on final assembly.

GEARBOX AND TRANSFER BOX LT95 -V8 Petrol engine		
Bell housing to cylinder block bolts	36,6 -44,8	27 -33
Gearbox casing to bell housing 2 off	146,5 -179	108 -132
Gearbox casing to bell housing 2 off	85,4 -104,4	63 -77
Gearbox casing to bell housing nuts	85,4 -104,4	63 -77
Gearbox casing to bell housing stud and nuts	146,5 -179	108 -132
Output flange — rear — nut and bolts	43,4 -51,5	32 -38
Output shaft — rear — nut	146,5 -179	108 -132
Output shaft — front — nut	146,5 -179	108 -132
Gear selector spherical scat bolts	13,6 -16,3	10 - 12
Propeller shaft to flange bolts	43,4 -51,5	32 -38
All other nuts and bolts:		
M6	9,9 -11,9	7.3 -8.7
M8	23,7 -29.7	17.5 -21.3
M10	48 -58	35.4 -42.8

	Nm	lbf ft
FRONT AXLE		
Hub driving member to hub	60-70	44 -52
Brake disc to hub	65 -80	48 -59
Stub axle to swivel pin housing	60 -70	44-52
Brake caliper to swivel pin housing	120 -150	88 -111
Upper swivel pin to swivel pin housing	60 -70	44 -52
Lower swivel pin to swivel **pin** housing	22 -28	16 -21
Oil seal retainer to swivel pin housing	7 - 10	5 - 7
Swivel bearing housing to axle case	65 -80	48 -59
Pinion housing to axle case	36 -46	26 -34
Crown wheel to differential case	55 -61	40 -45
Differential bearing cap to pinion housing	80 -100	54 -74
U/J flange to prop shaft	41 -52	30 -38
Mudshield to swivel pin housing	7 - 10	5 - 7
Bevel pinion nut	95 -163	70 -120
REAR AXLE AND FINAL DRIVE		
Crown wheel to differential case	150 -170	111 -125
Rear cover to axle case	20 -27	15 -20
Ball joint mounting bracket to axle case	125 -142	92 -105
U/J flange to prop shaft	41 -52	30 -38
Drum to hub	15 -20	11 -15
Rear brake assembly and stub axle rear to axle case	60 -70	44-52
Hub driving member to hub	60 -70	44 -52
PROPELLER SHAFTS		
Coupling flange bolts	43 - 51	32 -38
REAR SUSPENSION		
Bottom link to chassis nut	176	130
Bottom link to mounting rubber nuts	64	47
Top link bracket to chassis nuts	47	35
Bump stop rubber bracket nuts	32	24
Shock absorber bracket to chassis nuts	64	47
Shock absorber upper attachment to bracket	82	60
Anti roll bar bush to chassis nuts	24	18
Upper link ball joint to axle castle nut	176	130
Anti roll bar ball joint castle nut	**40**	30
Shock absorber lower attachment nuts	75	55
STEERING AND FRONT SUSPENSION		
Tie bar to mounting arm nut	81	60
Mounting arm to chassis nuts	176	130
Tie bar to steering box nuts	81	60
Panard rod to mounting arm nut	176	130
Panard rod to anchor bracket nut	176	130
Panard rod mounting bracket to chassis bolts	115 -130	85 -96
Drop arm to drag link castle nut	81	60
Steering damper to drag link nut	50	37
Drop arm to steering box nut	176	130
Radius arm to **axle** nuts	176	130
Steering box to chassis nuts	81	60
Radius arms to chassis nuts	176	130
Track rod ciamp boit nuts	14	10
Drag link clamp bolt nuts	14	10
Steering wheel retaining nut	38	28
Road wheel nuts	108	80
Ball joint nuts	41	**30**
Collapsible coupling nuts	**45**	33

BRAKES		
Brake disc to hub	65 -80	**48** -59
Brake caliper to swivel housing	120 -150	88 -111
Brake pipe connections to:		
P.D.W.A. valve	9 - 11	7 - 8
Servo, primary port	9 -11	7 - 8
Servo, secondary port	20 -24	15 -18
Jump hose — female.,	11 -13,5	8-10
Wheel cylinders	6.8 -9.5	5 - 7
ELECTRICAL EQUIPMENT V8 engine		
Alternator:		
Shaft nut	27.2 -47,5	20 -35
Through bolts	4.5 -6.2	3.3 -4.6
Rectifier bolts	3.4 -3.96	2.5 -2.9
Starter motor to engine bolts	**40.**6 -47.**4**	30 -35
Starter motor:		
Through bolts	10.8	8.0
Solenoid fixing stud nut	6	4.5
Solenoid upper terminal nut	4	**3.0**
Reverse light switch	20 -27	15 -20
Lucas 35 DM8 Electronic ignition distributor V8 engine		
Pick up bearing plate support pillars	1.0 -1.2	9-11
Pickupbarrelnuts	1.1-1.5	10 -12
ELECTRICAL EQUIPMENT 4-cylinder Petrol and Diesel engine		
Alternator:		
Shaft nut	27.2 -47.5	20 -35
Through bolts	**4.**5 -6.2	3.3 -4.6
Rectifier bolts	3.**4** -3.96	2.5 -2.9
Heater plugs — Diesel	15 -30	11-22
Starter motor to engine	40 -50	30 -36.8
Petrol models:		
Starter through bolts	10.8	8
Diesel models:		
Solenoid to starter nuts	6	4.5
Solenoid outer terminal nuts	4	3
Starter yoke terminal outer nut	2	1.5
Starter through bolts	10.8	8
Starter earth stud nut	8	6
Eccentric pivot pin locknut	21	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 vehicle, in preference to jacking. Chock wheels as well as applying hand brake.
2. Never rely on a jack alone to support vehicle. 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 vehicle 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 degreasing agents are being used.

   WARNING: Fume extraction equipment must be in operation when trachloride, 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 0-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.

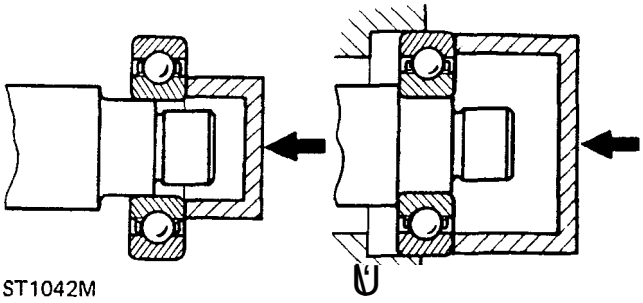
INSPECTION — GENERAL

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 0,0025 mm (0.0001 in) 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.

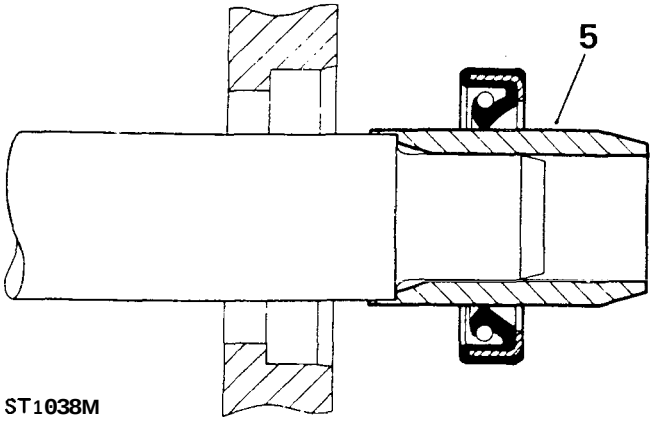
1. Remove all traces of lubricant from bearing under inspection by washing in petrol or a suitable degreaser; maintain absolute cleanliness throughout operations.
2. Inspect visually for markings of any form on rolling elements, raceways, outer surface of outer rings or inner surface of inner rings. 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 discolouration 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.



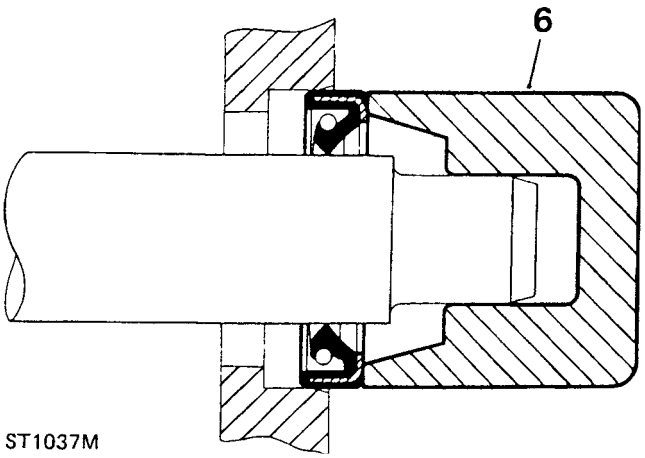
10. In the case of grease-lubricated bearings (e.g. hub bearings) fill space between bearing and outer seal with recommended grade of grease before fitting seal.
11. Always mark components of separable bearings (e.g. taper roller bearings) in dismantling, to ensure correct reassembly. Never fit new rollers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



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.



7. If correct service tool is not available, use a suitable drift approximately 0,4 mm (0.015 in) 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. Ensure that the seal does not enter the housing in a tilted position.

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

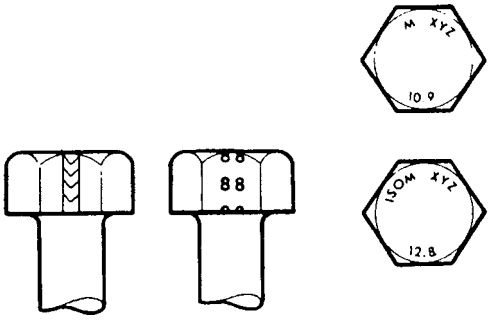
1. Always use correct gaskets where they are specified.
2. Use jointing compound only when recommended. Otherwise fit joints dry.
3. When jointing compound is used, apply in a thin uniform film to metal surfaces; take great care to prevent it from entering oilways, pipes or blind tapped holes.
4. Remove 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 0-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 vehicle while a second operator applies maximum pressure to the brakes (engine running) and operates the steering.

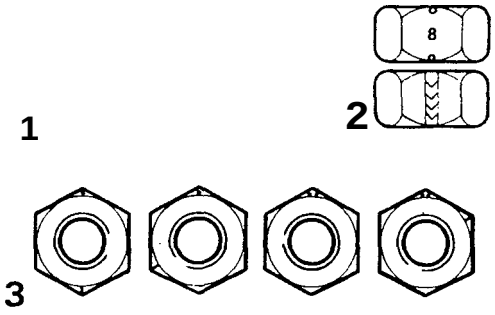
METRIC BOLT IDENTIFICATION

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.



ST1036M

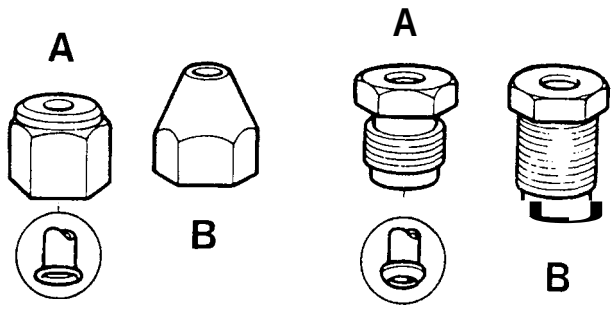
HYDRAULIC FITTINGS — Metrication

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.

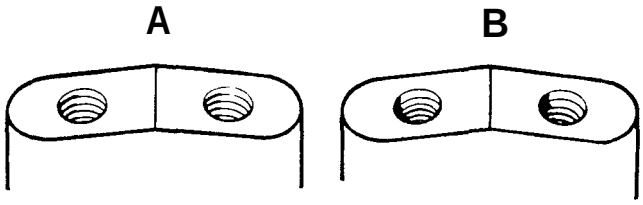
Metric threads and metric sizes are being introduced into motor vehicle manufacture and some duplication of parts must be expected. Although standardisation must in the long run be good, it would be wrong not to give warning of the dangers that exist while UNF and metric threaded hydraulic parts continue 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.



ST1033M



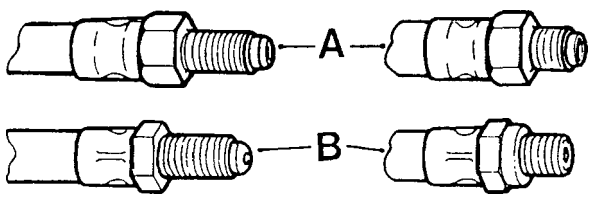
ST1034M

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.

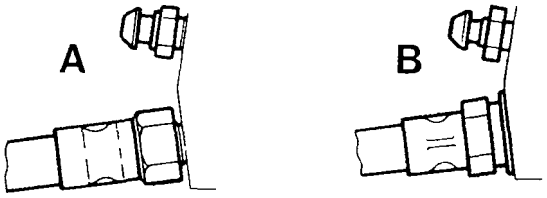
4. All metric ports in cylinders and calipers have no counterbores, but unfortunately a few cylinders with UNF threads also have no counterbore. The situation is, all ports with counterbores are UNF, but ports not counterbored are most likely to be metric.
5. The colour of the protective plugs in hydraulic 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	$\frac{3}{8}$ in x 24 UNF
GREEN	$\frac{7}{16}$ in x 20 UNF
YELLOW	$\frac{1}{2}$ in x 20 UNF
PINK	$\frac{7}{8}$ in 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 0.014 in smaller than $\frac{1}{4}$ in pipe. 8 mm pipe is 0.002 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.



ST1031M



ST1032M

The greatest danger lies with the confusion of 10 mm and $\frac{3}{8}$ in UNF pipe nuts used for $\frac{3}{16}$ in (or 4,75 mm) pipe. The $\frac{3}{8}$ 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 2 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

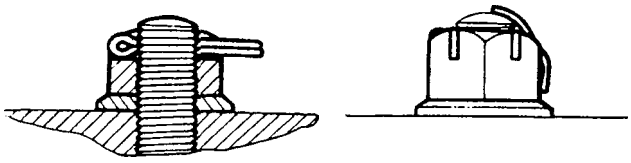
1. Remove burrs from edges of keyways with a fine file and clean thoroughly before attempting to refit key.
2. Clean and inspect key closely; keys are suitable for refitting only if indistinguishable from new, as any indentation may indicate the onset of wear.

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.



ST1030M

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

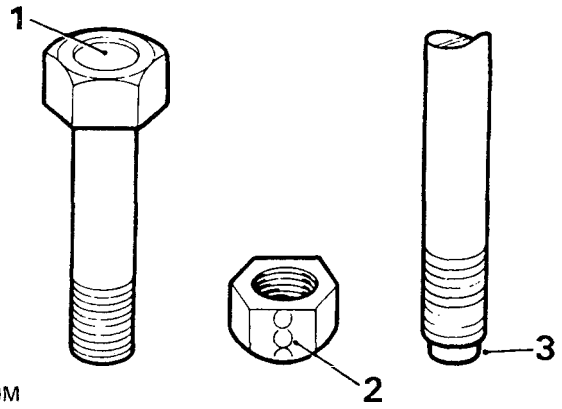
1. Fit new locking wire of the correct type for all assemblies incorporating it.
2. Arrange wire so that its tension tends to tighten the bolt heads, or nuts, to which it is fitted.

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.



ST1039M

RECOMMENDED LUBRICANTS AND FLUIDS

Service instructions for temperate climates — ambient temperature range –10°C to 35°C

COMPONENTS	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	SHELL	TEXACO
Engine V8 Carburetter Dashpots	BP Visco 2000 (15W/40) or BP Visco Nova (10W/40)	Castrol GTX (15W/50) or Castrolite (10W/40)	Duckhams 15W/50 Hypergrade Motor Oil	Esso Superlube (15W/40)	Mobil Super 10W/40 or Rally Formula 15W/50	Fina Supergradc Motor Oil 10W/40 or 15W/40	Shell Super Motor Oil 15W/40 or 10W/40	Havoline Motor Oil 15W/40 or Eurotex HD 10W/30
Engine 4-cyl. petrol	BP Visco 2000 (15W/40) or BP Visco Nova (10W/40)	Castrol GTX (15W/50) or Castrolite (10W/40)	Duckhams 15W/50 Hypergrade Motor Oil	Esso Superlube (15W/40)	Mobil Super 10W/40 or Mobil 1 Rally Formula 15W/40	Fina Supergrade Motor Oil 10W/40 or 15W/40	Shell Super Motor Oil 15W/40 or 10W/40	Havoline Motor Oil 15W/40 or Eurotex HD 10W/30
Engine 4-cyl. diesel	BP Visco 2000 (15W/40) BP Vanellus C3 Multigradc 15W/40 or BP Visco Nova (10W/40)	Castrol GTX (15W/50) or Castrol Deusol RX Super 15W/40 or Castrolite (10W/40)	Duckhams 15W/50 Hypergrade Motor Oil or Duckhams Fleetol Multi-V 20W/50 or Duckhams Fleet Master 15W/40	Esso Superlube (15W/40) or XD-3 15W/40 Essolube	Mobil Super 15W/40 or Mobil Delvac Super 15W/40 or Mobil 1 Rally Formula 15W/50	Fina Supergrade Motor Oil 10W/40 or 15W/40	Shell Super Motor Oil 15W/40 or Shell Rimula X 15W/40	Havoline Motor Oil 15W/40 or URSA Super Plus 15W/40 or Eurotex Motor Oil 10W/30
*LT77 — five-speed gearbox	BP Autran G	Castrol TQF	Duckhams Q-Matic	Esso Type G	Mobil ATF 210	Fina Purimatic 33G	Shell Donax TF	Texamatic Type G
*LT95 — four-speedgearbox including transfer box	BP Visco 2000 (15W/40) or Visco Nova 10W/40	Castrol GTX (15W/50)	Duckhams 15W/50 Hypergrade Motor Oil	Esso Superlube (15W/40)	Mobil Super 10W/40	Fina Supergrade Motor Oil 10W/40 or 15W/40	Shell Super Motor Oil 15W/40 or 10W/40	Havoline Motor Oil 15W/40 or Eurotex HD 10W/30
Front differential Rear differential Swivel pin housings and LT230R & LT230T Transfer box	BP Gear Oil SAE 90EP	Castrol Hypoy SAE 90EP	Duckhams Hypoid 90	Esso Gear Oil GX 85W/90	Mobil Mobilube HD 90	Fina Pontonic MP SAE 80W/90	Shell Spirax 90 EP	Texaco Multigear Lubricant EP 85W/90
	Oils listed on lines marked (*) may so be used in LTZ! transfer box.							
LT85 — five-speed gearbox — V8 cylinder	BP Visco 2000 (15W/40) or BP Visco Nova (10W/40)	Castrol GTX (15W/50)	Duckhams Hypergrade 15W/50	Esso Superlube 15W/40	Mobil Super 10W/40	Fina Supergrade Motor Oil 10W/40 or 15W/40	Shell Supergrade 15W/40 or 10W/40	Havoline Motor Oil 15W/40 or Eurotex HD 10W/30
Prop. shaft Front and rear	BP Energrease L2	Castrol LM Grease	Duckhams LB 10	Esso Multi-purpose Grease H	Mobil-grease MP	Fina Marson HTL 2	Shell Retinax A	Marfak All purpose Grease
Steering box (Manual)	BP Gear Oil SAE 90EP	Castrol Hypoy SAE 90EP	Duckhams Hypoid 90	Esso Gear Oil GX 85W/90	Mobil Mobilube HD 90	Fina Pontonic MP SAE 80W/90	Shell Spirax 90EP	Texaco Multigear Lubricant EP 85W/90
Power steering fluid reservoir as applicable	BP Autran DX 2D	Castrol TQ Dexron IID	Duckhams Fleetmatic CD or Duckhams D-Matic	Esso ATF Dexron IID	Mobil ATF 220 D	Fina Dexron IID	Shell ATF Dexron IID	Texamatic Fluid 922G
Air cleaner 4-cyl. petrol	BP Visco (15W/40) or BP Visco (10W/30)	Castrol GTX (15W/50) or Castrolite (10W/40)	Duckhams 15W/50 Hypergrade Motor Oil	Esso Superlube (15W/40)	Mobil Super 15W/40 or 10W/40	Fina Supergrade Motor Oil 15W/40 or 10W/40	Shell Super Motor Oil 15W/40 or 10W/40	Havoline Motor Oil 10W/30 or Eurotex HD 10W/30
Air cleaner 4-cyl. diesel	BP Visco (15W/40) or BP Visco Nova (10W/30)	Castrol GTX (15W/50) or Castrolite (10W/40)	Duckhams 15W/50 Hypergradc Motor Oil	Esso Superlube (15W/40)	Mobil Super 15W/40 or 10W/40	Fina Supergrade Motor Oil 10W/40	Shell Super Motor Oil 15W/40 or 10W/40	Havoline Motor Oil 15W/40 or 10W/30 or Eurotex HD 10W/30
Brake and clutch reservoirs	Universal Brake Fluid or other brake fluids having a minimum boiling point of 260°C (500°F) and complying with FMVSS116 DOT 3							
Lubrication nipples (hubs, ball joints, etc.)	BP Energrease L2	Castrol LM Grease	Duckhams LU 10	Esso Multi-purpose Grease H	Mobil-grease MP	Fina Marson HTL 2	Shell Retinax A	Marfak All purpose Grease
Ball joint assembly Top link	Dextragrease Super GP							
Cooling system Anti-freeze	Universal Anti-freeze See under Anti-freeze section 09.							

RECOMMENDED LUBRICANTS AND FLUIDS SERVICE INSTRUCTIONS ALL MARKETS

COMPONENTS	BP	CASTROL	DUCKHAMS	ESSO	MOBIL	PETROFINA	SHELL	TEXACO	SPEC. REF. ALL BRANDS
Windscreen hinges Ventilator hinges Ventilator control Seat slides. Hood retention clips **Door** lock striker	BP Energrcase L2	Castrol LM Grease	Duckhams LB 10	Esso Multi-purpose Grease H	Mobil Mobil-grease MP	Fina Marson HTL2	Shell Retinax A	**Marfak** All purpose Grease	**NGLI-2 Multi-**purpose Lithium-based Grease
Windscreen washers	**All** Seasons Screen Washer Fluid								
Bonnet pintle	Graohite Lock Grease Tvoe 'B'								
Door locks (anti-burst) Inertia reels	**DO** NOT **LUBRICATE.** These components are 'life' lubricated at the manufacturing stage								
Battery lugs Earthing surfaces Where paint has been removed	Petroleum jelly. **NOTE:** Do not use Silicone Grease								
Air Conditioning System Refrigerant Compressor Oil	METHYLCHLORIDE REFRIGERANTS MUST NOT BE USED Use only refrigerant 12. This includes 'Freon 12' and Arcton 12' Shell Clavus 68 BP Energol LPT 68 Sunisco 4GS Texaco Capella E Wax Free 68								

RECOMMENDED LUBRICANTS AND FLUIDS
SERVICE INSTRUCTIONS FOR AMBIENT CONDITIONS OUTSIDE TEMPERATE CLIMATE LIMITS OR FOR MARKETS WHERE THE PRODUCTS LISTED ARE NOT AVAILABLE

COMPONENTS	SERVICE CLASSIFICATION WORLDWIDE			AMBIENT TEMPERATURE °C
	PERFORMANCE LEVEL		SAE VISCOSITY	–30" –20" –10" 0" 10° 20° 30° 40" 50"
Engine Carburetterdashpots Oil can Oils Oil bath air cleaners	Petrol Oils must meet BL Cars spec. BLS.22.OL.02 or API service levels SE or SF or SE/CC or SFICC or SE/CD or SF/CD or the CCMC requirements	Diesel Oils must meet BI. Cars spec. BLS.22.OL.02 anc MIL-L-46152A or API service levels CC or CD or SEICC or SE/CD or SFICC or SF/CD or the CCMC requirements	5W/20 5W/30 5W/40 10W/30 10W/40 10W/50 15W/40 15W/50 20W/40 20W/50	
Power steering reservoir	ATF M2C 33 F or G			
Front and rear Axle differential Swivel pin housing LT230 transfer box Steering box	API GL4 or MIL-L-2105		90 EP 80W EP	
LT77 eearbox	**ATF** M2C 33 F or G			
LT95 gearbox including :ransfer box	Oils must meet BL Cars spec. BLS.22.OL.02 or API service levels SE or SF or SE/CC or SE/CD or SF/CC or SF/CD or the CCMC requirements		10W/30 10W/40 10W/50 10W/40 10W/50 15W/40 15W/50 20W/40 20W/50	
LT85 gearbox — V8 cylinder	Oils must meet ß L Cars spec. BLS.22.OL.02 or API service levels SE or SF or SEICC or SE/CD or SE/CC or SE/CD or the CCMC requirements		10W/30 10W/40 10W/50 10W/40 10W/50 15W/40 15W/50 20W/40 20W/50	
Brake and clutch eservoirs	Brake fluid must have a minimum boiling point of 260°C (500°F)and comply with FMVSS 116 DOT 3			
Lubrication nipples hubs, ball joints, etc)	VLGI-2 multipurpose lithium based grease			

ANTI-FREEZE

Use only UNIVERSAL Anti-freeze or an Ethylene Glycol based anti-freeze, containing no methanol, with non-Phosphate corrosion inhibitors suitable for use in cast iron and aluminium alloy engines to ensure protection of the cooling system against frost and corrosion.

Engine	Mixture	Percentage Concentration	Protection
4-cyl. Engines (cast iron)	One part anti-freeze two parts water	33%	Down to –20°C
	One part anti-freeze one part water	50%°	Below –20°C to –36°C
V8 Engine (aluminium)	One part anti-freeze one part water	50%°	Down to —36°C

IMPORTANT: Coolant solution must not fall below proportions of one part anti-freeze to three parts water, i.e. min. 25" anti-freeze in coolant, otherwise damage to engine is liable to occur.

CORROSION INHIBITOR

When anti-freeze is not required the cooling system must be flushed out with clean water and filled with a solution of ONE PART MARSTONS SQ 36 inhibitor to NINE parts water to provide a 10" mixture concentration.

CAPACITIES

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

Component	Litres	Imperial unit
Engine sump oil, 4-cylinder..	6,00	11.00 pints
Extra when refilling after fitting new filter, 4-cylinder..	0,85	1.50 pints
Air cleaner oil, 4-cylinder	0,85	1.50 pints
Engine sump oil, V8 cylinder	5,10	9.00 pints
Extra when refilling after fitting new filter, V8 cylinder..	0,56	1.00 pint
Main gearbox oil, five-speed	2,20	3.90 pints
Transfer box oil, LT230R five-speed main gearbox	2,80	4.90 pints
LT85 five-speed gearbox	3,00	5.25 pints
LT230T transfer gearbox	2,80	4.9 pints
Main gearbox oil, four-speed	2,60	4.70 pints
Transfer gearbox oil, four-speed main gearbox	3,16	5.50 pints
Front differential	1,70	3.00 pints
Rear differential: Salisbury 8HA	2,30	4.00 pints
Swivel pin housing oil (each)	0,35	0.60 pint
Fuel tank, rear	79,50	17.50 gallons
Fuel tank, side (except Station wagon)	68,20	15.00 gallons
Fuel tank, side (Station wagon only)	45,50	10.00 gallons
Cooling system, 4-cylinder petrol models (standard)	10,30	18.00 pints
Cooling system, 4-cylinder diesel models and heavy duty petrol models	11,00	19.00 pints
Cooling system, V8 cylinder models..	12,80	22.50 pints
Steering box manual..	0,43	0.75 **pints**
Power steering box and reservoir fluid	2,90	5.0 pints

MAINTENANCE SCHEDULES

Revised Maintenance Schedules are introduced with the commencement of the Land Rover Ninety V8 model range. The new schedules also apply to four-cylinder, petrol and diesel models, and feature a reduced 10.000 km (6,000 miles) service. The new schedules supersede previous issues.

Efficient maintenance is one of the biggest factors in ensuring continuing reliability and efficiency. For this reason the following detailed schedules are included so that at the appropriate intervals owners and operators may know what is required. The Maintenance Schedules are based upon intervals of 10.000 km (6,000 miles) or 6 months unless otherwise stated.

Note: The 10.000 km service must be repeated every 10.000 km (6,000 miles) or six months, whichever is first.

The 20.000 km service must be repeated every 20.000 km (12.000 miles) or 12 months, whichever is first, with additional maintenance at the intervals specified in the schedule.

	Every 10.000 km (6,000 miles) or 6 months	Every 20.000 km (12,000 miles) or 12 months	
1		☐	Check condition and security of seats, seat belt mountings, seat belts and buckles
2		☐	Check operation of all lamps
3		☐	Check operation of horns
4		☐	Check operation of warning indicators
5		☐	Check operation of windscreen and rear wipers and washers
6		☐	Check condition of wiper blades
7		☐	Check security and operation of handbrake
8		☐	Check rear view mirror(s) for security, cracks and crazing
9		☐	Check operation of all doors, bonnet and tailgate locks
10		☐	Check operation of window controls
11	☐	☐	Lubricate all locks (not steering lock) hinges and door — check mechanisms
12		☐	Lubricate accelerator control linkage and pedal pivot
13		☐	ChecWadjust tyre pressures including spare
14		☐	ChecWadjust headlamp alignment
15		☐	Check front wheel alignment
16	☐	☐	ChecWtop-up battery electrolyte
17		☐	Remove battery connections, clean and grease (refit)
18	☐	☐	Removeroadwheels
19		☐	Check tyres comply with Manufacturer's specification
20		☐	Check tyres visually for cuts, lumps, bulges, uneven wear and tread depth
21	☐	☐	Remove road wheel brake drums, wash out dust, inspect shoes for wear and drums for condition
22	☐	☐	Inspect wheel cylinders for fluid leaks
23	☐	☐	Inspect brake pads for wear, calipers for leaks, and discs for condition
24	☐	☐	Refit road wheel brake drums
25	☐	☐	Adjust road wheel brakes
26	☐	☐	Adjust handbrake if required
27	☐	☐	Refit road wheels to original position
28	☐	☐	Renew engine oil
29	☐	☐	Renew engine oil filter
30	Every 40.000 km 24,000 ml		Renew gearbox oil

	Every 10.000 km (6,000 miles) or 6 months	Every 20.000 km (12,000 miles) or 12 months	
31	☐	☐	Check/top-up gearbox oil
32	Every 40.000 km 24,000 ml		Renew transfer box oil
33	☐	☐	Check/top-up transfer box oil
34	Every 40.000 km 24,000 ml		Renew front axle oil
35	☐	☐	ChecWtop-up front axlc oil
36	Every 40.000 km 24,000 ml		Renew swivel pin housing oil
37	☐	☐	ChecWtop-up swivel pin housing oil
38	Every 40.000 km 24,000 ml		Renew rear axle oil
39	☐	☐	ChecWtop-up rear axle oil
40	☐	☐	Lubricate rear suspension upper link ball joint
41	Every 40.000 km 24,000 ml		Lubricate propeller shaft sealed sliding joints
42	☐	☐	Lubricate propeller shaft universal joints
43	☐	☐	Lubricate handbrake mechanical linkage
44		☐	Check visually brake, fuel, clutch pipes/unions for chafing, leaks and corrosion
45		☐	Check exhaust system for leakage and security
46		☐	Check for oil leaks from engine and transmission
47	☐	☐	Check for oil/fluid leaks from steering and suspension systems
48		☐	Check axlc breather pipes, ensure they arc not blocked, pinched or split
49		☐	Check security and condition of suspension fixings
50		☐	Check condition and security of steering unit, joints and gaiters
51		☐	Check tightness of propeller shaft coupling bolts
52		☐	Clean fuel sedimenter (Diesel only)
53	Every 80.000 km 48,000 ml		Clean electric fuel pump filter
54		☐	Renew fuel filter element (Petrol)
55		☐	Drain flywheel housing if drain plug is fitted for wading (refit)
56		☐	Clean camshaft drive belt housing filter (Diesel)
57		☐	Check condition of heater plug wiring for fraying, chafing and deterioration (diesel only)
58		☐	Remove heater plugs, clean, test and refit (diesel only)
59	Every 40.000 km 24,000 ml		Remove diesel injectors, clean, test and refit

	Every 10,000 km (6,000 miles) or 6 months	Every 20,000 km (12,000 miles) or 12 months	
60		☐	Renew fuel filter element (Diesel)
61		☐	Check/adjust valve clearance (all models except V8)
62	☐		Clean/adjust spark plugs
63		☐	Renew spark plugs
64		☐	Renew air cleaner elements
65		☐	Check air cleaner dump valve, clean or renew
	Every 40,000 km 24,000 ml		
66			Renew engine breather filter (V8)
67		☐	Clean engine breather filter (all models except V8)
68		☐	Renew engine flame trap(s) (V8)
	Every 60,000 km 36,000 ml		
69			Renew brake servo filter
70		☐	Check brake servo hose for security and condition
71		☐	Check air injection/pulsair system hoses/pipes for security and condition
72		☐	Check operation of pulsair check valves
73	☐	☐	Check crankcase breathing system for leaks, hoses for security and condition
74	☐	☐	Top-up carburetter piston dampers
75		☐	Check/top-up cooling system
76	☐	☐	Checktop-up fluid in power steering reservoir
77		☐	Checktop-up steering box (manual steering)
78		☐	ChecWadjust steering box
79	☐	☐	Check/top-up clutch fluid reservoir
80	☐	☐	Checktop-up brake fluid reservoir
81	☐	☐	Check/top-up windscreen and rear washer reservoir
82		☐	Check cooling and heater system for leaks, hoses for security and condition
83	☐	☐	Check power steering system for leaks, hydraulic pipes and unions for chafing and corrosion
84	☐	☐	Check condition of driving belts — adjust if required (not camshaft drive belt - diesel)
85		☐	Check ignition wiring and HT leads for fraying, chafing and deterioration
86		☐	Clean distributor cap, check for cracks and tracking

	Every 10,000 km (6,000 miles) or 6 months	Every 20,000 km (12,000 miles) or 12 months	
87		☐	Clean/adjust distributor points (not V8)
	Every 40,000 km 24,000 ml		
88			Renew distributor points (not V8)
89	☐	☐	Lubricate distributor (not V8)
90		☐	**Check** voltage drop between coil CB and earth
91	☐	☐	Check dwell angle — adjustas necessary (not V8)
92	☐	☐	ChecWadjust ignition timing
			Note: It is important that the ignition timing, dwell angle and carburetter adjustments are set in accordance with the vehicle engine specification and fuel Octane rating. Refer to the relevant repair operation manual for details
93		☐	Check throttle operation
94	☐	☐	ChecWadjust engine idle speed, and carburetter mixture settings with engine at normal running temperature
95	☐	☐	Check operation of air intake temperature control system (V8)
			Carry out road or roller test — Check:
96	☐	☐	For excessive engine noise
97	☐	☐	Clutch for slipping/judder/spinning
98	☐	☐	Gear selection/noise — high and low range
99	☐	☐	Steering for noise/abnormal effort required
100	☐	☐	All instruments, pressure, fuel and temperature gauges, warning indicators
101	☐	☐	Heater and air conditioning systems
102	☐	☐	Heatedrearscreen
103	☐	☐	Shock absorbers (irregularities in ride)
104	☐	☐	Foot brake, **on** emergency stop, pulling to one side, binding, pedal effort
105	☐	☐	Handbrakeefficiency
106	☐	☐	Operation of inertia seat belts
107	☐	☐	Roadwheel balance
108	☐	☐	Transmission for vibrations
109	☐	☐	For body noises (squeaks and rattles)
110	☐	☐	Fuel governor cut-off point
111	☐	☐	For excessive exhaust smoke
112	☐	☐	Engineidlespecd
113	☐	☐	Endorse service record
114	☐	☐	Report any additional work required

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

At 100.000 km (60,000 mile) intervals it is imperative that the camshaft drive belt be renewed, failure *to* do so could result in serious engine damage.

RECOMMENDATIONS

At 30.000 km (18,000 mile) intervals or every 18 months, whichever is the sooner, the hydraulic brake fluid should be completely renewed.

At 40.000 km (24,000 mile) intervals remove the Pulsair injection manifold and connecting pipes, ensure that the internal bores and the cylinder head drillings are clean and free from obstructions, clean as necessary and refit. (Emission control V8 petrol engines)

At 60.000 km (36,000 mile) intervals or every 3 years, whichever is the sooner, all hydraulic brake fluid, seals and flexible hoses should be renewed. all working surfaces **of** the master cylinder, wheel cylinders and caliper cylinders should be examined and renewed where necessary.

At 60.000 km (36,000 mile) intervals remove all suspension dampers, test for correct operation, refit or renew as necessary.

Vehicles fitted with free wheeling front hubs

The hubs require no routine maintenance. When the hub bearings are adjusted, or any time the vehicle has been used for wading, the moving parts of the free wheel hubs should be lightly smeared with Rocol 1000 grease or a similar molybdenum disulphide bearing grease.