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<td></td>
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</tbody>
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GENERAL FITTING INSTRUCTIONS

- Precautions against damage
- Safety precautions
- Preparation and dismantling
- Inspection of components
- Ball and roller bearings
- Oil seals
- Joints and joint faces
- Flexible hydraulic pipes and hoses
- Metric bolt identification
- Metric nut identification
- Hydraulic fittings
- Keys and keyways
- Tab washers, split pins, nuts and locking wire
- Screw threads
- Unified thread identification

RECOMMENDED LUBRICANTS, FLUIDS AND CAPACITIES

- Recommended lubricants
- Anti-freeze proportions
- Corrosion inhibitor
- Capacities

MAINTENANCE

- Maintenance Schedules
- Maintenance — lubrication
- Maintenance — general maintenance and adjustments
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 be strictly adhered to. Locking devices, where specified, must be fitted. If the efficiency of a locking device is impaired during removal it must be renewed. Owners purchasing accessories while travelling abroad should ensure that the accessory and its fitted location on the vehicle conform to mandatory requirements existing in their country of origin. The terms of the Owners Service Statement may be invalidated by the fitting of other than 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, windscreens washer additives, lubricants and various adhesives.

FUEL HANDLING PRECAUTIONS

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

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

GENERAL

Petrol/gasoline vapour is highly flammable and in confined spaces is also very explosive and toxic. When petrol/gasoline evaporates it produces 150 times its own volume in vapour, which when diluted with air becomes a readily ignitable mixture. The vapour is heavier than air and will always fall to the lowest level. It can readily be distributed throughout a workshop by air current, consequently, even a small spillage of petrol/gasoline is potentially very dangerous.
Always have a fire extinguisher containing FOAM CO₂ GAS, or POWDER close at hand when handling or draining fuel, or when dismantling fuel systems and in areas where fuel containers are stored. Always disconnect the vehicle battery BEFORE carrying out dismantling or draining work on a fuel system. Whenever petrol/gasoline is being handled, drained or stored, or when fuel systems are being dismantled all forms of ignition must be extinguished or removed, any 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 are advised that the specification details set out in this Manual apply to a range of vehicles and not to any one. For the specification of a particular vehicle, purchasers should consult their Distributor or Dealer.

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

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.

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All rights reserved. No part of this publication may be produced, stored in a retrieval system or transmitted in any form, electronic, mechanical, photocopying, recording or other means without prior written permission of Land Rover Limited, Service Department, Solihull, England.
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.
LOCATION OF VEHICLE IDENTIFICATION AND UNIT NUMBERS

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.

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.

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

MAIN GEARBOX LT85 FIVE SPEED — V8 VEHICLES
Stamped on the right-hand side of the front bearing plate.
## ENGINE

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<thead>
<tr>
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<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>V8</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>Eight, two banks of four</td>
</tr>
<tr>
<td>Bore</td>
<td>88.90 mm (3.500 in)</td>
</tr>
<tr>
<td>Stroke</td>
<td>71.12 mm (2.800 in)</td>
</tr>
<tr>
<td>Capacity</td>
<td>3528 cc (215 in³)</td>
</tr>
<tr>
<td>Valve operation</td>
<td>Overhead by push-rod</td>
</tr>
<tr>
<td>Maximum power — B.H.P.</td>
<td>113 at 4000 rpm</td>
</tr>
<tr>
<td>Maximum power — KW.</td>
<td>84.6 at 2500 rpm</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>251 Nm (185 lb ft) at 2500 rpm</td>
</tr>
</tbody>
</table>

## Crankshaft

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main journal diameter</td>
<td>58,409 - 58,422 mm (2.2996 - 2.3001 in)</td>
</tr>
<tr>
<td>Minimum regrind diameter</td>
<td>57,393 - 57,406 mm (2.2596 - 2.2601 in)</td>
</tr>
<tr>
<td>Crankpin journal diameter</td>
<td>50,800 - 50,812 mm (2.0000 - 2.0005 in)</td>
</tr>
<tr>
<td>Minimum regrind diameter</td>
<td>49,784 - 49,797 mm (1.9600 - 1.9605 in)</td>
</tr>
<tr>
<td>Crankshaft end thrust</td>
<td>Taken on thrust washers of centre main bearing</td>
</tr>
<tr>
<td>Crankshaft end-float</td>
<td>0.10 - 0.20 mm (0.004 - 0.008 in)</td>
</tr>
</tbody>
</table>

## Main bearings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number and type</td>
<td>5, Vandervell shells</td>
</tr>
<tr>
<td>Material</td>
<td>Lead-indium</td>
</tr>
<tr>
<td>Diometrical clearance</td>
<td>0.010 - 0.048 mm (0.0004 - 0.0019 in)</td>
</tr>
<tr>
<td>Undersizes</td>
<td>0.254 mm, 0.508 mm (0.010 in, 0.020 in)</td>
</tr>
</tbody>
</table>

## Connecting rods

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<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Horizontally split big end, plain small end</td>
</tr>
<tr>
<td>Length between centres</td>
<td>143,81 - 143,71 mm (5.662 - 5.658 in)</td>
</tr>
</tbody>
</table>

## Big end bearings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type and material</td>
<td>Vandervell VP lead-indium</td>
</tr>
<tr>
<td>Diometrical clearance</td>
<td>0.015 - 0.055 mm (0.0006 - 0.0022 in)</td>
</tr>
<tr>
<td>End-float on crankpin</td>
<td>0.15 - 0.36 mm (0.006 - 0.014 in)</td>
</tr>
<tr>
<td>Undersizes</td>
<td>0.254 mm, 0.508 mm (0.010 in, 0.020 in)</td>
</tr>
</tbody>
</table>

## Gudgeone pins

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>72.67 - 72.79 mm (2.861 - 2.866 in)</td>
</tr>
<tr>
<td>Diameter</td>
<td>22.215 - 22.22 mm (0.8746 - 0.8749 in)</td>
</tr>
<tr>
<td>Fit-in connecting rod</td>
<td>Press fit</td>
</tr>
<tr>
<td>Clearance in piston</td>
<td>0.002 - 0.007 mm (0.0001 - 0.0003 in)</td>
</tr>
</tbody>
</table>

## Pistons

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<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin</td>
<td>0.018 - 0.033 mm (0.0007 - 0.0013 in)</td>
</tr>
</tbody>
</table>
### Piston rings

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

### Camshaft

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<th>Specification</th>
<th>Details</th>
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<tbody>
<tr>
<td>Location</td>
<td>Central</td>
</tr>
<tr>
<td>Bearings</td>
<td>Non-serviceable</td>
</tr>
<tr>
<td>Number of bearings</td>
<td>5</td>
</tr>
<tr>
<td>Drive</td>
<td>Chain 9.52 mm (0.375 in) pitch x 54 pitches</td>
</tr>
</tbody>
</table>

### Valves

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

### Lubrication

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>System</td>
<td>Wet sump, pressure fed</td>
</tr>
<tr>
<td>System pressure, engine warm at 2400 rpm</td>
<td>2,1 - 2,8 kgf cm² (30 - 40 lbf in²)</td>
</tr>
<tr>
<td>Oil filter (external)</td>
<td>Full-flow, self-contained cartridge</td>
</tr>
<tr>
<td>Oil filter (internal)</td>
<td>Gauze. Pump intake filter</td>
</tr>
<tr>
<td>Oil pump type</td>
<td>Gear</td>
</tr>
</tbody>
</table>

### Oil pressure relief valve

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Non-adjustable</td>
</tr>
<tr>
<td>Relief valve spring:</td>
<td></td>
</tr>
<tr>
<td>Free length</td>
<td>81,2 mm (3.200 in)</td>
</tr>
<tr>
<td>Compressed length at 4,2 kg (9.3 lb) load</td>
<td>45,7 mm (1.800 in)</td>
</tr>
</tbody>
</table>

### Oil filter by-pass valve

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Non-adjustable</td>
</tr>
<tr>
<td>By-pass valve spring:</td>
<td></td>
</tr>
<tr>
<td>Free length</td>
<td>37,5 mm (1.48 in)</td>
</tr>
<tr>
<td>Compressed length at 0,34 kg (0.75 lb)</td>
<td>22,6 mm (0.89 in)</td>
</tr>
</tbody>
</table>
## General Specification Data

### 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 cm³ (139.500 in³)
- **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 - 63.233 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
  - **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 8:1 compression ratio**: Aluminium alloy, flat top
- **Clearance in bore, measured at bottom of skirt at right angles to gudgeon pin**: 0.06 - 0.07 mm (0.0023 - 0.0027 in)
- **Standard size pistons**: 0.043 - 0.055 mm (0.0017 - 0.0022 in)
- **Oversize pistons**:
### Piston rings
- **Compression**
- **Gap in bore**
- **Clearance in groove.**
- **Oil control**
- **Gap in bore**
- **Clearance in groove.**

### Camshaft
- **Location**
- **End-float**
- **Number of bearings**
- **Material**
- **Drive**

### Valves
- **Length:**
  - **Inlet**
  - **Exhaust**
- **Seat angle:**
  - **Inlet**
  - **Exhaust**
- **Head diameter:**
  - **Inlet**
  - **Exhaust**
- **Stem diameter:**
  - **Inlet**
  - **Exhaust**
- **Stem to guide clearance:**
  - **Inlet**
  - **Exhaust**
- **Valve lift:**
  - **Inlet**
  - **Exhaust**

### Valve springs
- **Type**
  - **Inner:**
    - **Length, free**
    - **Length, under 8,0 kg (17.7 lb) load**
  - **Outer:**
    - **Length, free**
    - **Length, under 21 kg (46 lb) load**

### Lubrication
- **System**
- **System pressure, engine warm at 2000 rpm**
- **Oil pump:**
  - **Early type**
  - **Double gear**
- **End-float of gears:**
  - **Steel gear**
  - **Aluminium gear**
  - **Radial clearance of gears**
  - **Backlash of gears.**
### Lubrication (continued)

**Oil pump**
- Latest type
- Double gear, 10 teeth, sintered iron gears
- Splined shaft from camshaft skew gear

**End-float of both gears**
- $0.026 \pm 0.135 \text{ mm} (0.0009 \pm 0.0045 \text{ in})$

**Radial clearance of gears**
- $0.025 \pm 0.075 \text{ mm} (0.0008 \pm 0.0025 \text{ in})$

**Backlash of gears**
- $0.1 \pm 0.2 \text{ mm} (0.0034 \pm 0.0067 \text{ in})$

### Oil pressure relief valve
- Non-adjustable

**Type**
- Full length: $67.82 \text{ mm} (2.670 \text{ in})$
- Compressed length at 2.58 kg (5.7 lb) load: $61.23 \text{ mm} (2.450 \text{ in})$

### 2.5 LITRE PETROL ENGINE

**ENGINE**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>4 cylinder</td>
</tr>
<tr>
<td>Bore</td>
<td>$90.47 \text{ mm} (3.562 \text{ in})$</td>
</tr>
<tr>
<td>Stroke</td>
<td>$97 \text{ mm} (3.82 \text{ in})$</td>
</tr>
<tr>
<td>Capacity</td>
<td>$2495 \text{ cm}^3 (152.25 \text{ in}^3)$</td>
</tr>
<tr>
<td>Valve operation</td>
<td>Overhead by push-rod</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>8.0:1</td>
</tr>
</tbody>
</table>

**Maximum power @ 4000 rpm**
- 59.5 Kw (80 bhp)

**Maximum torque @ 2000 rpm**
- 175 Nm (129 lbf ft)

**Commencing serial no.**
- 17H00011C

### Crankshaft

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main journal diameter</td>
<td>$63.487 \div 63.500 \text{ mm} (2.4995 \div 2.500 \text{ in})$</td>
</tr>
<tr>
<td>Minimum regrind diameter</td>
<td>$63.246 \div 63.2333 \text{ mm} (2.4900 \div 2.4895 \text{ in})$</td>
</tr>
<tr>
<td>Crankpin journal diameter</td>
<td>$58.725 \div 58.744 \text{ mm} (2.312 \div 2.31275 \text{ in})$</td>
</tr>
<tr>
<td>Minimum regrind diameter</td>
<td>$58.48985 \div 58.47080 \text{ mm} (2.30275 \div 2.30200 \text{ in})$</td>
</tr>
</tbody>
</table>
| Crankshaft end thrust | Taken on thrust washers at centre main bearing
| Crankshaft end-float | $0.05 \div 0.15 \text{ mm} (0.002 \div 0.006 \text{ in})$ |

### Main bearings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number and type</td>
<td>5 halved shells</td>
</tr>
<tr>
<td>Material</td>
<td>Copper-lead lined</td>
</tr>
<tr>
<td>Diometrical clearance</td>
<td>$0.018 \div 0.06 \text{ mm} (0.0007 \div 0.0026 \text{ in})$</td>
</tr>
<tr>
<td>Undersizes</td>
<td>$0.25 \text{ mm} (0.010 \text{ in})$</td>
</tr>
</tbody>
</table>

### Connecting rods

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Horizontally split big end, plain small end</td>
</tr>
<tr>
<td>Length between centres</td>
<td>$175.36 \div 175.46 \text{ mm} (6.904 \div 6.908 \text{ in})$</td>
</tr>
</tbody>
</table>

### Connecting rod bearings

<table>
<thead>
<tr>
<th>Specification</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type and material</td>
<td>Steel shell, copper-lead lined</td>
</tr>
<tr>
<td>Diometrical clearance</td>
<td>$0.025 \div 0.075 \text{ mm} (0.001 \div 0.003 \text{ in})$</td>
</tr>
<tr>
<td>End-float on crankpin</td>
<td>$0.20 \div 0.30 \text{ mm} (0.007 \div 0.012 \text{ in})$</td>
</tr>
<tr>
<td>Undersizes</td>
<td>$0.25 \text{ mm} (0.010 \text{ in})$</td>
</tr>
</tbody>
</table>
Gudgeon pins
Type .............................................................. Floating
Fit in piston ..................................................... Push fit by hand
Clearance in connecting rod .............................. $0.007 - 0.015 \text{ mm} (0.0003 - 0.0006 \text{ in})$

Pistons
Type 8.0: 1 compression ratio ............................... Aluminium alloy. Recessed crown.
Clearance in bore measured @ 17\text{ mm} from bottom of skirt at right angles to gudgeon pin:
Standard and oversize pistons ........................... $0.043 - 0.067 \text{ mm} (0.0017 - 0.0026 \text{ in})$

Piston rings
Compression ..................................................... 2
Gap in bore ..................................................... $0.40 - 0.65 \text{ mm} (0.016 - 0.026 \text{ in})$
Clearance in groove .......................................... $0.046 - 0.097 \text{ mm} (0.0018 - 0.0038 \text{ in})$
Oil control ..................................................... 1
Gap in bore ..................................................... $0.30 - 0.55 \text{ mm} (0.012 - 0.022 \text{ in})$
Clearance in groove .......................................... $0.026 - 0.076 \text{ mm} (0.0012 - 0.003 \text{ in})$

Camshaft
Location .......................................................... Right-hand side (thrust side) of engine
End-float .......................................................... $0.06 - 0.13 \text{ mm} (0.0025 - 0.0055 \text{ in})$
Number of bearings ......................................... 4
Material .......................................................... Steel shell, white metal lined
Drive .............................................................. 76 link chain

Valves
Length :
Inlet ............................................................. $111,12 - 111,66 \text{ mm} (4.377 - 4.396 \text{ in})$
Exhaust .......................................................... $111,12 - 111,59 \text{ mm} (4.374 - 4.393 \text{ in})$
Seat angle:
Inlet ............................................................. $30^\circ$
Exhaust .......................................................... $45^\circ$
Head diameter:
Inlet ............................................................. $44,32 - 44,58 \text{ mm} (1.744 - 1.755 \text{ in})$
Exhaust .......................................................... $34,43 - 34,18 \text{ mm} (1.355 - 1.345 \text{ in})$
Stem diameter:
Inlet ............................................................. $7,899 - 7,912 \text{ mm} (0.3109 - 0.3115 \text{ in})$
Exhaust .......................................................... $8,679 - 8,679 \text{ mm} (0.3424 - 0.3416 \text{ in})$
Stem to guide clearance:
Inlet ............................................................. $0.033 - 0.048 \text{ mm} (0.0013 - 0.0019 \text{ in})$
Exhaust .......................................................... $0.035 - 0.076 \text{ mm} (0.0014 - 0.0022 \text{ in})$
Valve lift:
Inlet ............................................................. $10,236 \text{ mm} (0.403 \text{ in})$
Exhaust .......................................................... $9,85 \text{ mm} (0.388 \text{ in})$
Exhaust valve seat insert:
External diameter .............................................. $36,576 - 36,601 (1.440 - 1.441 \text{ in})$
Internal diameter .............................................. $28,448 - 28,702 \text{ mm} (1.120 - 1.130 \text{ in})$
Width .............................................................. $5,055 - 5,105 \text{ mm} (0.199 - 0.201 \text{ in})$
Seat angle and depth ........................................... $45^\circ, 0.635 - 0.889 \text{ mm} (0.025 - 0.035 \text{ in})$
**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 cm² (35 - 65 lbf in²)

**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 cm³ (139 in³)
**Valve operation** .............................................. Overhead by push-rod
**Compression ratio** ........................................ 23:1
**Maximum power** ........................................... 44Kw (59 bhp) at 4000 rpm
**Maximum torque** .......................................... 136Nm (100 lbf ft) at 1800rpm

**Crankshaft**

**Main bearing journal diameter** ...................... 63,487 - 63,500 mm (2.4995 - 2.500 in)
- **Rergrid 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)
- **Rergrid 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
**Diameetrical clearance** ............................ 0,020 - 0,063 mm (0.0008 - 0.0025 in)
**GENERAL SPECIFICATION DATA**

### 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**: 0.111 - 0.134 mm (0.0044 - 0.0053 in)
  - Standard size pistons: 0.111 - 0.157 mm (0.0044 - 0.0062 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 (4.577 - 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 cm² (35 - 65 lbf in²)
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)
Aluminum 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 7.58 kg (5.7 lb) load ........... 61.23 mm (2.450 in)

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 cm² (39.86 in²)
Maximum power at 4000 rpm ......................... 65.5 bhp
Maximum torque at 1800 rpm ......................... 113 lb ft

Crankshaft
Main bearing journal diameter ................................ 63.487 - 63.500 mm (2.4995 - 2.5000 in)
Regrind dimensions:
63.246 - 63.233 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 -float ....................................... 0.05 - 0.15 mm (0.002 - 0.006 in)
Taken on thrust washers at centre main bearing
### General Specification Data

#### Main bearings
- **Number and type:** ........................................ 5 halved shells
- **Diametrical clearance:** ..................................... 0,018 - 0,061 \( \text{mm} \) (0.0007 - 0.0024 in)

#### Connecting rods
- **Length between centres:** ........................................... 175,38 - 175,43 \( \text{mm} \) (6.905 - 6.907 in)
- **Diametrical clearance (big-end bearings):** ............... 0,025 - 0,075 \( \text{mm} \) (0.001 - 0.003 in)
- **End-float on crankpin:** ........................................ 0,15 - 0,356 \( \text{mm} \) (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 \( \text{mm} \) (0.001 - 0.002 in)

#### Gudgeon pins
- **Type:** .............................................................. Floating
- **Fit in piston:** ................................................ Hand push fit
- **Diameter:** .......................................................... 30,1564 - 30,1625 \( \text{mm} \) (1.18726 - 1.18750 in)
- **Clearance in connecting rod:** 0,0196 - 0,0036 \( \text{mm} \) (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 \( \text{mm} \) (0.1 in) wide dry toothed belt
- **Location:** .......................................................... Right-hand side (thrust side)
- **End-float:** ....................................................... 0,1 - 0,2 \( \text{mm} \) (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 \( \text{mm} \) (1.540 - 1.550 in)
  - **Exhaust:** ......................................................... 33,25 - 33,50 \( \text{mm} \) (1.309 - 1.319 in)
- **Valve lift:**
  - **Inlet:** .......................................................... 9,85 \( \text{mm} \) (0.388 in)
  - **Exhaust:** ......................................................... 10,28 \( \text{mm} \) (0.404 in)
- **Cam lift:**
  - **Inlet:** .......................................................... 6,83 \( \text{mm} \) (0.268 in)
  - **Exhaust:** ......................................................... 7,06 \( \text{mm} \) (0.278 in)
- **Stem diameter:**
  - **Inlet:** .......................................................... 7,912 - 7,899 \( \text{mm} \) (0.3114 - 0.3109 in)
  - **Exhaust:** ......................................................... 8,682 - 8,694 \( \text{mm} \) (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 cm² (35 - 65 lbf in²)
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 - 0.005 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)

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 cm² (5 - 8 lbf ft²)
**FUEL SYSTEM — V8 engine**
- Carburettor
- Fuel pump — Make, type
- Air cleaner
- See ‘ENGINE TUNING DATA’
  - Facet, electric mounted vertically on R.H. side of chassis
  - Cyclone, replaceable element

**COOLING SYSTEM — 2.25 Petrol, 2.25 and 2.5 Diesel**
- Type
- Thermostat
- Pressure cap
- Type of pump
- Pressurized spill return system with thermostat control, pump and fan assisted
  - 82°C
  - 0.6 kgf cm² (9 lbf in²)
  - Centrifugal

**COOLING SYSTEM — V8 engine**
- Type
- Thermostat
- Type of pump
- Pressurized spill return system with thermostat control
  - Emission and non-emission 82°C, Australia 88°C
  - Centrifugal

**CLUTCH — 2.25 Petrol**
- Type
- Centre plate diameter
- Facing material
- Facing material identification colour
- Number of damper springs
- Damper spring colour
- Clutch release bearing
- Borg and Beck diaphragm spring
  - 242.1 mm (9.500 in)
  - Raybestos 1488-05
  - White/violet on periphery
  - 6
  - Dark grey/light green
  - Ball journal

**CLUTCH — 2.25 and 2.5 Diesel engine — Early type**
- Type
- Centre plate diameter
- Facing material
- Number of damper springs
- Damper spring colour
- Clutch release bearing
- Verto diaphragm spring
  - 242.1 mm (9.500 in)
  - Raybestos 1488-05
  - 8
  - 2 off white/green
  - 2 off pigeon blue
  - 4 off ruby red
  - Ball journal

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

**CLUTCH — V8 engine**
- Type
- Centre plate diameter
- Facing material
- Damper spring colour
- Release bearing
- Number of damper springs
- Borg and Beck diaphragm spring
  - 267 mm (10.5 in)
  - Raybestos 1488-05
  - Grooved. White/violet
  - Light blue/dark blue
  - Ball journal
  - 6
### General Specification Data

#### Main Gearbox
**Type LT77**
- **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**
- **Ratios**:
  - High: 1.6670
  - Low: 3.3198
- **Overall Ratios (Final Drive)**:
  - Fifth: 4.9042:1
  - Fourth: 5.8987:1
  - Third: 8.8917:1
  - Second: 13.5715:1
  - First: 21.1472:1
  - Reverse: 21.8293:1
- **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**
- **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**
- **Ratios**:
  - High: 1.3362
  - Low: 3.3206
- **Overall Ratios (Final Drive)**:
  - Fourth: 4.7281:1
  - Third: 7.1154:1
  - Second: 11.5745:1
  - First: 19.2390:1
  - Reverse: 27.3250:1

---

*Two-speed reduction on main gearbox output. Front and rear drive permanently engaged via a lockable differential.*
**TRANSMISSION — Ninety and One Ten V8 with 5-speed gearbox**

**Main gearbox**
- Type — Manual

**Main gearbox ratios**
- LT85 5-speed helical constant mesh, with synchromesh on all forward gears
- Fifth (Cruising gear) 0.7951
- Fourth 1.0000
- Third 1.4362
- Second 2.1804
- First 3.6497
- Reverse 3.8242

**Transfer gearbox**
- Type
  - Ninety models
  - One Ten models

  **Overall ratio (including final drive) — Ninety models**
  - Fifth (Cruising gear) 3.3544
  - Fourth 4.2189
  - Third 6.0592
  - Second 9.1989
  - First 15.3977
  - Reverse 16.1339

  **Overall ratio (including final drive) — One Ten models**
  - Fifth (Cruising gear) 3.9695
  - Fourth 4.9925
  - Third 7.1702
  - Second 10.8856
  - First 18.2210
  - Reverse 19.0922

  **In high transfer**
  - Fifth (Cruising gear) 3.3544
  - Fourth 4.2189
  - Third 6.0592
  - Second 9.1989
  - First 15.3977
  - Reverse 16.1339

  **In low transfer**
  - Fifth (Cruising gear) 9.3401
  - Fourth 11.7471
  - Third 16.8712
  - Second 25.6134
  - First 42.8734
  - Reverse 44.9233

**REAR AXLE — One Ten only**
- Type
- Ratio 3.538
- Track 1485.90mm (58.50 in)

**FRONT AXLE — All models and Ninety rear**
- Type
- Ratio 3.538

**PROPELLER SHAFTS — All Models**
- Type: Front and rear
- Single Hookes universal needle roller joints. Sliding portion on front shaft gaietria, rear shaft open
GENERAL SPECIFICATION DATA

SUSPENSION — All Models

Type .................................................................
Front .................................................................
Rear .................................................................

Coil springs controlled by telescopic dampers front and rear
Transverse location of axle by Panard rod, and fore and aft location by two radius arms
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 .................................................................
Disc diameter .....................................................
Number of pistons per wheel .................................
Total lining area ...................................................
Lining material.....................................................
Rear .................................................................
Drum diameter .....................................................
Total lining area ...................................................
Brake drum width...................................................
Lining material.....................................................

Lockheed Disc
300 mm (11.81 in)
4
232 cm²
Don 230
Girling single cylinder drum brake
280 mm (11 in)
493 cm²
63.9 mm
Ferodo 2629

Handbrake — All Models

Type .................................................................
Drum diameter .....................................................
Lining material.....................................................

Transmission drum brake cable operated
254 mm (10 in)
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 .....................................................
Oil capacity ...........................................................

5000 rpm. Belt drive
40 cm³ (2.4 in³) SAE 15W-50

Evacuation pump — 2.5 litre Diesel

Maximum speed .....................................................
Lubrication ...........................................................
Minimum vacuum level at 2500 rpm ..........................

4000 rpm. Gear drive from camshaft
Oil feed via skew gear
0.8 bar
GENERAL SPECIFICATION DATA

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{23}{32} - \frac{3}{4} 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 litre 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 ......................... 0.38 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**: $0.1 - 0.2$ 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

<table>
<thead>
<tr>
<th>Tyres — size and type</th>
<th>Normal Front</th>
<th>Normal Rear</th>
<th>Unladen Front</th>
<th>Unladen Rear</th>
<th>Loaded Front</th>
<th>Loaded Rear</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00-16 CROSS-PLY</td>
<td>2.4 bar</td>
<td>3.25 kgf/cm²</td>
<td>2.4 bar</td>
<td>3.25 kgf/cm²</td>
<td>2.4 bar</td>
<td>3.25 kgf/cm²</td>
</tr>
<tr>
<td>7.50-16 CROSS-PLY</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
</tr>
<tr>
<td>205R16 RADIAL-PLY</td>
<td>1.9 bar</td>
<td>2.5 kgf/cm²</td>
<td>1.9 bar</td>
<td>2.5 kgf/cm²</td>
<td>1.9 bar</td>
<td>2.5 kgf/cm²</td>
</tr>
<tr>
<td>7.50R16 RADIAL-PLY</td>
<td>2.9 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.9 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.9 bar</td>
<td>4.0 kgf/cm²</td>
</tr>
<tr>
<td>7.50-16 CROSS-PLY</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
<td>2.8 bar</td>
<td>4.0 kgf/cm²</td>
</tr>
<tr>
<td>750R16 RADIAL-PLY</td>
<td>3.3 bar</td>
<td>4.0 kgf/cm²</td>
<td>3.3 bar</td>
<td>4.0 kgf/cm²</td>
<td>3.3 bar</td>
<td>4.0 kgf/cm²</td>
</tr>
</tbody>
</table>

### Replacement Bulbs and Units

- **Headlamps:**
  - UK and Europe (except France) ................. 60155 W Halogen bulb
  - France and Algeria .................................. 60155 W Halogen bulb, yellow
  - Rest of world, right-hand steering .......... 75150 W Sealed beam unit
  - Rest of world, left-hand steering .......... 60/50 W Sealed beam unit

- **Front side lamps** ........................................ 12V 5W
- **Side repeater lamps** ................................... 12V 4W
- **Stop/tail lamps** ......................................... 12V 21/5W
- **Flasher lamps** ........................................... 12V 21W
- **Number plate lamp** ...................................... 12V 4W
- **Reverse lamp** ............................................ 12V 21W
- **Rear fog guard lamp** .................................. 12V 21W
- **Interior lamp** ........................................... 12V 21W
- **Warning lights** .......................................... 12V 12W
- **Instrument illumination** ............................ 12V 3W
- **Hazard switch warning light** .................... 12V 0.6W
# 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

<table>
<thead>
<tr>
<th>Model</th>
<th>Petrol/Diesel</th>
<th>2.5P</th>
<th>2.5D</th>
<th>3.5P</th>
<th>3.5D</th>
<th>Pick-up</th>
<th>Hard Top</th>
<th>Station Wagon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Vehicle Weight</td>
<td>STANDARD SUSPENSION 2400kg</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>EEC Kerb Weight</td>
<td>kg</td>
<td>1606</td>
<td>1643</td>
<td>1602</td>
<td>1635</td>
<td>1672</td>
<td>1634</td>
<td>1648</td>
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<tr>
<td>EEC Payload</td>
<td>kg</td>
<td>794</td>
<td>757</td>
<td>798</td>
<td>765</td>
<td>728</td>
<td>769</td>
<td>752</td>
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<tr>
<td>Unladen Weight</td>
<td>kg</td>
<td>1487</td>
<td>1519</td>
<td>1483</td>
<td>1516</td>
<td>1548</td>
<td>1512</td>
<td>1529</td>
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<tr>
<td>Payload</td>
<td>kg</td>
<td>913</td>
<td>917</td>
<td>984</td>
<td>852</td>
<td>888</td>
<td>871</td>
<td>839</td>
</tr>
</tbody>
</table>

Maximum Axle Weights, all Ninety models with Standard Suspension

- Front Axle 1200kg
- Rear Axle 1380kg

## Land Rover One Ten

<table>
<thead>
<tr>
<th>Model</th>
<th>Petrol/Diesel</th>
<th>2.5P</th>
<th>2.5D</th>
<th>3.5P</th>
<th>3.5D</th>
<th>Pick-up</th>
<th>Hard Top</th>
<th>Station Wagon</th>
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</thead>
<tbody>
<tr>
<td>Gross Vehicle Weight</td>
<td>HIGH LOAD SUSPENSION 2550kg</td>
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<tr>
<td>EEC Kerb Weight</td>
<td>kg</td>
<td>1633</td>
<td>1670</td>
<td>1629</td>
<td>1662</td>
<td>1699</td>
<td>1658</td>
<td>1675</td>
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<tr>
<td>EEC Payload</td>
<td>kg</td>
<td>917</td>
<td>880</td>
<td>921</td>
<td>888</td>
<td>851</td>
<td>892</td>
<td>875</td>
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<tr>
<td>Unladen Weight</td>
<td>kg</td>
<td>1514</td>
<td>1546</td>
<td>1510</td>
<td>1543</td>
<td>1575</td>
<td>1539</td>
<td>1596</td>
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<tr>
<td>Payload</td>
<td>kg</td>
<td>1036</td>
<td>1004</td>
<td>1040</td>
<td>1007</td>
<td>975</td>
<td>1021</td>
<td>994</td>
</tr>
</tbody>
</table>

Maximum Axle Weights, all Ninety models with High Load Suspension

- Front Axle 1200kg
- Rear Axle 1500kg

## Land Rover One Ten

<table>
<thead>
<tr>
<th>Model</th>
<th>Petrol/Diesel</th>
<th>2.5P</th>
<th>2.5D</th>
<th>3.5P</th>
<th>3.5D</th>
<th>Pick-up</th>
<th>Hard Top</th>
<th>Station Wagon</th>
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<tbody>
<tr>
<td>Gross Vehicle Weight</td>
<td>UNLEVELLED SUSPENSION 3200kg</td>
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<td>EEC Kerb Weight</td>
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<td>1723</td>
<td>1742</td>
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<td>EEC Payload</td>
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<td>1308</td>
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<tr>
<td>Unladen Weight</td>
<td>kg</td>
<td>1588</td>
<td>1599</td>
<td>1563</td>
<td>1589</td>
<td>1603</td>
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<tr>
<td>Payload</td>
<td>kg</td>
<td>1462</td>
<td>1451</td>
<td>1487</td>
<td>1461</td>
<td>1450</td>
<td>1486</td>
<td>1408</td>
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</tbody>
</table>

Maximum Axle Weights, all One Ten models with Unlevelled Suspension

- Front Axle 1200kg
- Rear Axle 1850kg

## Land Rover One Ten

<table>
<thead>
<tr>
<th>Model</th>
<th>Petrol/Diesel</th>
<th>2.5P</th>
<th>2.5D</th>
<th>3.5P</th>
<th>3.5D</th>
<th>Pick-up</th>
<th>Hard Top</th>
<th>Station Wagon</th>
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</thead>
<tbody>
<tr>
<td>Gross Vehicle Weight</td>
<td>LEVELLED SUSPENSION 2950kg</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>EEC Kerb Weight</td>
<td>kg</td>
<td>1733</td>
<td>1752</td>
<td>1708</td>
<td>1734</td>
<td>1753</td>
<td>1709</td>
<td>1787</td>
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<tr>
<td>EEC Payload</td>
<td>kg</td>
<td>1217</td>
<td>1198</td>
<td>1242</td>
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<td>1197</td>
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<td>Unladen Weight</td>
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<td>1603</td>
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<tr>
<td>Payload</td>
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<td>1341</td>
<td>1377</td>
<td>1351</td>
<td>1390</td>
<td>1376</td>
<td>1298</td>
</tr>
</tbody>
</table>

Maximum Axle Weights, all One Ten models with Levelled Suspension

- Front Axle 1200kg
- Rear Axle 1750kg
### ENGINE TUNING DATA

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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression ratio</td>
<td>9.35:1 or 8.13:1 Dependent upon market</td>
</tr>
<tr>
<td>Firing order</td>
<td>1-8-4-3-6-5-7</td>
</tr>
<tr>
<td>Cylinder numbering system, front to rear:</td>
<td></td>
</tr>
<tr>
<td>Left bank</td>
<td>1-3-5-7</td>
</tr>
<tr>
<td>Right bank</td>
<td>2-4-6-8</td>
</tr>
<tr>
<td>Compression pressure (minimum)</td>
<td>9.5 kgf cm² (135 lbf in')</td>
</tr>
<tr>
<td>Timing marks</td>
<td>On crankshaft pulley vibration damper</td>
</tr>
<tr>
<td>Valve clearance</td>
<td></td>
</tr>
<tr>
<td>Valve timing:</td>
<td></td>
</tr>
<tr>
<td>Inlet opens</td>
<td>36° B.T.D.C.</td>
</tr>
<tr>
<td>Inlet closes</td>
<td>64° A.B.D.C.</td>
</tr>
<tr>
<td>Inlet duration</td>
<td>280°</td>
</tr>
<tr>
<td>Inlet peak</td>
<td>99° A.T.D.C.</td>
</tr>
<tr>
<td>Exhaust opens</td>
<td>74° B.B.D.C.</td>
</tr>
<tr>
<td>Exhaust closes</td>
<td>26° A.T.D.C.</td>
</tr>
<tr>
<td>Exhaust duration</td>
<td>280°</td>
</tr>
<tr>
<td>Exhaust peak</td>
<td>119° B.T.D.C.</td>
</tr>
</tbody>
</table>

#### CARBURETTERS

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Type</td>
<td>Two Solex</td>
</tr>
<tr>
<td></td>
<td>175CDSE</td>
</tr>
<tr>
<td>Other markets</td>
<td>175CD3</td>
</tr>
<tr>
<td>Needle:</td>
<td></td>
</tr>
<tr>
<td>Australian</td>
<td>B1FH</td>
</tr>
<tr>
<td>Other markets - non-emission</td>
<td>B1FQ</td>
</tr>
<tr>
<td>- emission</td>
<td>B1FK</td>
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<tr>
<td>Idle speed (engine hot):</td>
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<tr>
<td>Australian</td>
<td>700 - 750 rpm (run-in) 550 - 650 rpm (new engine)</td>
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<tr>
<td>Other markets - non-emission</td>
<td>550 - 650rpm</td>
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<tr>
<td>- emission</td>
<td>700 - 750 rpm (run-in) 550 - 650 rpm (new engine)</td>
</tr>
<tr>
<td>Fast idle speed (engine hot)</td>
<td>1080 - 1150rpm</td>
</tr>
<tr>
<td>Mixture setting - CO at idle:</td>
<td></td>
</tr>
<tr>
<td>Australian</td>
<td>2% - 3.5% Pulsair connected</td>
</tr>
<tr>
<td>Other markets</td>
<td>1.5% - 3% Pulsair connected</td>
</tr>
</tbody>
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#### IGNITION

<table>
<thead>
<tr>
<th>Spec</th>
<th>Value</th>
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<tbody>
<tr>
<td>Coil make/type</td>
<td>AC Delco with ballast resistor</td>
</tr>
<tr>
<td>Primary resistance at 20°C (68°F)</td>
<td>1.2 - 1.4 ohms</td>
</tr>
<tr>
<td>Consumption, ignition on, at 2000 rpm</td>
<td>1 amp</td>
</tr>
<tr>
<td>Sparking plug type</td>
<td>Champion N12Y or Unipart GSP131</td>
</tr>
<tr>
<td>Sparking plug gap</td>
<td>0.71 - 0.84 mm (0.028 - 0.033 in)</td>
</tr>
<tr>
<td>Ignition timing, dynamic or static:</td>
<td>5° to 7° B.T.D.C.</td>
</tr>
<tr>
<td>Fuel octane rating</td>
<td>97 RON minimum</td>
</tr>
<tr>
<td>Engine idle speed</td>
<td>750 rpm maximum with vacuum pipe disconnected</td>
</tr>
</tbody>
</table>

CARBURETTERS

<table>
<thead>
<tr>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>175CDSE</td>
</tr>
<tr>
<td>Other markets</td>
<td>175CD3</td>
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<tr>
<td>Needle:</td>
<td></td>
</tr>
<tr>
<td>Australian</td>
<td>B1FH</td>
</tr>
<tr>
<td>Other markets - non-emission</td>
<td>B1FQ</td>
</tr>
<tr>
<td>- emission</td>
<td>B1FK</td>
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<tr>
<td>Idle speed (engine hot):</td>
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</tr>
<tr>
<td>Australian</td>
<td>700 - 750 rpm (run-in) 550 - 650 rpm (new engine)</td>
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<tr>
<td>Other markets - non-emission</td>
<td>550 - 650rpm</td>
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<tr>
<td>- emission</td>
<td>700 - 750 rpm (run-in) 550 - 650 rpm (new engine)</td>
</tr>
<tr>
<td>Fast idle speed (engine hot)</td>
<td>1080 - 1150rpm</td>
</tr>
<tr>
<td>Mixture setting - CO at idle:</td>
<td></td>
</tr>
<tr>
<td>Australian</td>
<td>2% - 3.5% Pulsair connected</td>
</tr>
<tr>
<td>Other markets</td>
<td>1.5% - 3% Pulsair connected</td>
</tr>
</tbody>
</table>

IGNITION

<table>
<thead>
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<th>Spec</th>
<th>Value</th>
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<tbody>
<tr>
<td>Coil make/type</td>
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<td>1 amp</td>
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<tr>
<td>Sparking plug type</td>
<td>Champion N12Y or Unipart GSP131</td>
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<tr>
<td>Sparking plug gap</td>
<td>0.71 - 0.84 mm (0.028 - 0.033 in)</td>
</tr>
<tr>
<td>Ignition timing, dynamic or static:</td>
<td>5° to 7° B.T.D.C.</td>
</tr>
<tr>
<td>Fuel octane rating</td>
<td>97 RON minimum</td>
</tr>
<tr>
<td>Engine idle speed</td>
<td>750 rpm maximum with vacuum pipe disconnected</td>
</tr>
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</table>
**ENGINE TUNING DATA**

**DISTRIBUTOR**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makehype</td>
<td>Lucas 35D8</td>
</tr>
<tr>
<td>Rotation of rotor</td>
<td>Anti-clockwise</td>
</tr>
<tr>
<td>Dwell angle</td>
<td>26° - 28°</td>
</tr>
<tr>
<td>Contact breaker gap</td>
<td>0,35 - 0,40 mm (0.014 - 0.016 in)</td>
</tr>
<tr>
<td>Condenser capacity</td>
<td>0.18 - 0.25 microfarad</td>
</tr>
<tr>
<td>Centrifugal advance range and capsule</td>
<td>2° - 4° at 750 rpm</td>
</tr>
<tr>
<td></td>
<td>12° - 14° at 2300 rpm</td>
</tr>
<tr>
<td></td>
<td>10°-4/5° at 10 in Hg</td>
</tr>
<tr>
<td></td>
<td>5° - 7° at 20 in Hg</td>
</tr>
<tr>
<td></td>
<td>5° - 7° at 14 in Hg</td>
</tr>
<tr>
<td>Vacuum advance capsule range</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum retard capsule range</td>
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</tr>
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</table>

**V8 ENGINE TUNING DATA**

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

**EUROPE**

**ENGINE**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Compression ratio</td>
<td>8.13:1</td>
</tr>
<tr>
<td>Valve timing</td>
<td></td>
</tr>
<tr>
<td>Opens</td>
<td>30° B.T.D.C.</td>
</tr>
<tr>
<td>Closes</td>
<td>75° A.B.D.C.</td>
</tr>
<tr>
<td>Duration</td>
<td>285°</td>
</tr>
<tr>
<td>Valve peak</td>
<td>112.5° A.T.D.C.</td>
</tr>
</tbody>
</table>

**CARBURETTERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>2 x Solex 175 CDSE</td>
</tr>
<tr>
<td>Solex specification number</td>
<td>3994</td>
</tr>
<tr>
<td>Needle</td>
<td>BIFK</td>
</tr>
<tr>
<td>Idle speed (engine hot)</td>
<td>700 to 750 rev/min (run-in engine)</td>
</tr>
<tr>
<td></td>
<td>550 to 650 rev/min (new engine)</td>
</tr>
<tr>
<td>Fast idle speed (engine hot)</td>
<td>1050 to 1150 rev/min</td>
</tr>
<tr>
<td>Mixture setting — CO at idle</td>
<td>1.5 to 3% Pulsair connected</td>
</tr>
</tbody>
</table>

**IGNITION**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributor make/type</td>
<td>Lucas 35 DM8 Electronic</td>
</tr>
<tr>
<td></td>
<td>Lucas 35 DLM8 Electronic</td>
</tr>
<tr>
<td></td>
<td>Clockwise</td>
</tr>
<tr>
<td>Direction of rotation</td>
<td></td>
</tr>
<tr>
<td>Centrifugal advance</td>
<td></td>
</tr>
<tr>
<td>Decelerating check with vacuum retard pipe disconnected</td>
<td>Crankshaft angle</td>
</tr>
<tr>
<td>Engine rev/min</td>
<td></td>
</tr>
<tr>
<td>3600</td>
<td>22° to 28°</td>
</tr>
<tr>
<td>2400</td>
<td>13° to 21°</td>
</tr>
<tr>
<td>1600</td>
<td>5° to 9°</td>
</tr>
<tr>
<td>1000</td>
<td>0° to 3°</td>
</tr>
<tr>
<td>No advance below 500 rev/min</td>
<td></td>
</tr>
<tr>
<td>Ignition timing, dynamic;</td>
<td></td>
</tr>
<tr>
<td>models with emission control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6° B.T.D.C. with vacuum pipes disconnected using 90-93 octane fuel — 2star rating in UK</td>
</tr>
</tbody>
</table>
### AUSTRALIA

**ENGINE**

V8 cylinder

**Compression ratio** .............................................. 9.35: 1

**Valve timing**

- **Inlet**
  - Opens ............................................................ 30" B.T.D.C.
  - Closes ........................................................... 75" A.B.D.C.
  - Duration .......................................................... 285"
  - Valve peak ...................................................... 112.5" A.T.D.C.

- **Exhaust**
  - 68" B.B.D.C.
  - 37" A.T.D.C.
  - 285"
  - 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)

Fast idle speed (engine hot) ........................................ 1050 to 1150 rev/min

**Mixture setting** — CO at idle ................................. 2% to 3.5% Pulsair connected

**IGNITION**

- **Distributor make/type** .......................................... Lucas 35 DM8 Electronic (Early Models)
- **Direction of rotation** ........................................... Lucas 35 DLM8 Electronic (Later Models)
- **Centrifugal advance**
  - **Crankshaft angle** ............................................. Clockwise
  - **Engine rev/min**
    - 2900 .............................................................. 12" to 16"
    - 2400 .............................................................. 8" to 12"
    - 1600 .............................................................. 2" to 6"

**Decelerating check with vacuum retard pipe disconnected**

- **Engine rev/min**
  - No advance below 800 rev/min
  - **Ignition timing** ................................................. 6" B.T.D.C. with vacuum pipes disconnected using 96 octane fuel

### SAUDI ARABIA

**ENGINE**

V8 cylinder

**Compression ratio** .............................................. 8.13: 1

**Valve timing (low lift camshaft)**

- **Inlet**
  - Opens ............................................................ 36" B.T.D.C.
  - Closes ........................................................... 64" A.B.D.C.
  - Duration .......................................................... 280°
  - Valve peak ...................................................... 99° A.T.D.C.

- **Exhaust**
  - 74" B.B.D.C.
  - 26° A.T.D.C.
  - 280°
  - 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)
Fast idle speed (engine hot) .................. 550 to 650 rev/min (new engine)
Mixture setting — CO at idle ............... 1050 to 1150 rev/min
1.5% to 3% Pulsair connected

IGNITION
Distributor make/type .......................... Lucas 35 DM8 Electronic (Early Models)
Direction of rotation ......................... Lucas 35 DLM8 Electronic (Later Models)
Centrifugal advance ......................... Clockwise
Decelerating check with vacuum retard pipe disconnected
Engine rev/min
4600.................................................. Crankshaft angle
3600.................................................. 21° to 25°
3000.................................................. 16° to 20°
2400.................................................. 12° to 16°
1600.................................................. 7° to 11°
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
Compression ratio, .................................... 8.13:1
Valve timing (low lift camshaft)
Opens .................................................. Inlet
36° B. T. D. C. 74° B. B. D. C.
Closes .................................................. 64° A. B. D. C. 26° A. T. D. C.
Duration .............................................. 280° 280°

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)
Fast idle speed (engine hot) .................. 550 to 650 rev/min (new engine)
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
4200
3500
3000
2000
1200
23° to 27°
20° to 24°
16° to 20°
8° to 12°
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 with vacuum
3° A.T.D.C. when using 85 octane fuel 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.

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° - 1/2° 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° - 1/2° at 3.5 Hg
11° - 13° at 25 Hg
ENGINE TUNING DATA

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
Make/hype.......................................................... 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
Venturi .............................................................. 24
Auxiliary Venturi ............................................... 25
Main jet ............................................................. 4
Air correction jet ................................................ 4
Emulsion tube .................................................... 110
Idle jet ............................................................... 115
Idle CO% ........................................................... 160
Idle speed — hot ................................................ 1% - 2.5%

CARBURETTER
Make/type.......................................................... Weber 32/34 DMTL

<table>
<thead>
<tr>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
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<tr>
<td>110</td>
<td>115</td>
</tr>
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<td>160</td>
<td>160</td>
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<tr>
<td>F30</td>
<td>F30</td>
</tr>
<tr>
<td>55</td>
<td>60</td>
</tr>
</tbody>
</table>

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
Static, if no dynamic equipment available .......... T.D.C.
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.
Inlet peak ..................................................... 108° A.T.D.C.
Exhaust opens ................................................ 46° B.B.D.C.
Exhaust closes ............................................... 18° A.T.D.C.
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
Vacuum advance capsule range .......................... With a 0,38 mm (0.015 in) valve clearance.
Nominal setting for checking only.
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

| Venturi | 24 |
| Auxiliay Venturi | 4 |
| Main jet | 112 |
| Air correction jet | 160 |
| Emulsion tube | F30 |
| Idle jet | 52 |
| 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) |

Primary | Secondary
---|---
24 | 25
4 | 4
112 | 112
160 | 190
F30 | F39
52 | 60

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:
Injection timing .................................................. On engine flywheel and pump flange
Valve timing ......................................................... On engine flywheel and damper on 2.5 Diesel
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° B.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
Make/type ...................................................... CAV DPA-2.25 DPS-2.50 type with mechanical governor
Direction of rotation ........................................... and auto advance and solenoid electrical shut-off
Max speed setting (sealed) 2.25 engine ............. Clockwise, viewed from drive end
Max speed setting (sealed) 2.50 engine ............. 4200 engine rpm
Back leakage rate 150-100 Atm:
    New nozzle .............................................. 4400 ± 8 rpm
    Original nozzle ....................................... 7 seconds
    5 seconds
<table>
<thead>
<tr>
<th>ENGINE</th>
<th>Torque Wrench Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing in water pump casing</td>
<td>7.10</td>
</tr>
<tr>
<td>Breather filter to top cover</td>
<td>7.10</td>
</tr>
<tr>
<td>By-pass housing to thermostat housing</td>
<td>22.28</td>
</tr>
<tr>
<td>Carburettor to inlet manifold</td>
<td>22.28</td>
</tr>
<tr>
<td>Chainwheel pulley to camshaft</td>
<td>40.50</td>
</tr>
<tr>
<td>Clutch cover plate to flywheel</td>
<td>30.38</td>
</tr>
<tr>
<td>Connecting rod to cap</td>
<td>37.41</td>
</tr>
<tr>
<td>Fan assembly to water pump hub</td>
<td>22.28</td>
</tr>
<tr>
<td>Flywheel to crankshaft</td>
<td>130.143</td>
</tr>
<tr>
<td>Fuel pump to side cover</td>
<td>20.28</td>
</tr>
<tr>
<td>Heat shield bracket to manifold</td>
<td>22.28</td>
</tr>
<tr>
<td>Heat shield to bracket</td>
<td>22.28</td>
</tr>
<tr>
<td>Oil strainer to mounting bracket</td>
<td>22.28</td>
</tr>
<tr>
<td>Oil pump to cylinder block</td>
<td>20.28</td>
</tr>
<tr>
<td>Rocker shaft to pedestal</td>
<td>20.27</td>
</tr>
<tr>
<td>Solenoid heat shield to manifold heat shield</td>
<td>22.28</td>
</tr>
<tr>
<td>Starter motor to housing</td>
<td>40.50</td>
</tr>
<tr>
<td>Sump plug to sump</td>
<td>30.40</td>
</tr>
<tr>
<td>Distributor clamp</td>
<td>13.19</td>
</tr>
<tr>
<td>Distributor to adaptor</td>
<td>7.10</td>
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<tr>
<td>Pulley to crankshaft</td>
<td>260.280</td>
</tr>
<tr>
<td>Water temperature to cylinder head adaptor</td>
<td>14.18</td>
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<tr>
<td>Spark plug</td>
<td>14.19</td>
</tr>
<tr>
<td>Adaptor for water temperature transmitter to cylinder head</td>
<td>22.28</td>
</tr>
<tr>
<td>Cover thermostat housing to cylinder head</td>
<td>7.10</td>
</tr>
<tr>
<td>Lifting bracket to cylinder head</td>
<td>27.40</td>
</tr>
<tr>
<td>Rocker pedestal to cylinder head</td>
<td>22.28</td>
</tr>
<tr>
<td>Top cover to cylinder head</td>
<td>8.11</td>
</tr>
<tr>
<td>Alternator adjusting link to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Alternator mounting bracket to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Camshaft thrust plate to cylinder block</td>
<td>7.10</td>
</tr>
<tr>
<td>Chain damper to cylinder block</td>
<td>7.10</td>
</tr>
<tr>
<td>Cylinder head (Diesel) to cylinder block</td>
<td>115.130</td>
</tr>
<tr>
<td>Cylinder head (Petrol) to cylinder block</td>
<td>91.113</td>
</tr>
<tr>
<td>DPA injector pump (Diesel) to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Distributor housing (Petrol) to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Drive shaft/gear to cylinder block</td>
<td>10.17</td>
</tr>
<tr>
<td>Engine mounting foot to cylinder block</td>
<td>80.95</td>
</tr>
<tr>
<td>Flywheel housing to cylinder block</td>
<td>40.50</td>
</tr>
<tr>
<td>Front cover to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Main bearing cap (Diesel) to cylinder block</td>
<td>130.136</td>
</tr>
<tr>
<td>Main bearing cap (Petrol) to cylinder block</td>
<td>130.136</td>
</tr>
<tr>
<td>Oil feed pipe to cylinder block</td>
<td>20.25</td>
</tr>
<tr>
<td>Oil filter to cylinder block</td>
<td>40.50</td>
</tr>
<tr>
<td>Oil pump to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Oil pump to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Plug oil gallery front to cylinder block</td>
<td>30.40</td>
</tr>
<tr>
<td>Plug oil gallery rear to cylinder block</td>
<td>30.40</td>
</tr>
<tr>
<td>Side cover to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Side cover FP mounting to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Sump to cylinder block (bolts and nuts)</td>
<td>15.20</td>
</tr>
<tr>
<td>Water pump to cylinder block</td>
<td>22.28</td>
</tr>
<tr>
<td>Dipstick tube assembly to cylinder block</td>
<td>22.28</td>
</tr>
</tbody>
</table>
### ENGINE 2.5 litre Diesel

<table>
<thead>
<tr>
<th>Description</th>
<th>Nm</th>
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<tbody>
<tr>
<td>DPS pump studs to front cover</td>
<td>6-10</td>
<td>4.5-7.3</td>
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<tr>
<td>DPS pump to front cover</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>DPS pump to support bracket</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Pulley to DPS pump</td>
<td>42.48</td>
<td>31.35.4</td>
</tr>
<tr>
<td>Distributor pipe banjo bolts</td>
<td>14.20</td>
<td>10.3-15</td>
</tr>
<tr>
<td>Tensioner assembly</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Vacuum pump</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Oil squirt to cylinder block</td>
<td>14.20</td>
<td>10.3-15</td>
</tr>
<tr>
<td>Throttle linkage to DPS pump</td>
<td>5-7</td>
<td>4-5</td>
</tr>
<tr>
<td>Throttle bracket to DPS pump</td>
<td>5-7</td>
<td>4-5</td>
</tr>
<tr>
<td>Front cover to cylinder block</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Front cover plate to cylinder block</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Cover plate to front cover plate</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Cowl mounting bracket to front cover</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Timing pointer to front cover</td>
<td>22.28</td>
<td>16.20.6</td>
</tr>
<tr>
<td>Drain plate to front cover</td>
<td>7-10</td>
<td>5.7.3</td>
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### ENGINE V8 Petrol engine

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Air intake adaptor to carbs</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Alternator mounting bracket to cylinder head</td>
<td>34</td>
<td>25</td>
</tr>
<tr>
<td>Alternator to mounting bracket</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Alternator to adjusting link</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Chainwheel to camshaft</td>
<td>54.61</td>
<td>40.45</td>
</tr>
<tr>
<td>Connecting rod bolt</td>
<td>47.54</td>
<td>35.40</td>
</tr>
<tr>
<td>Clutch attachment to flywheel</td>
<td>24.30</td>
<td>18.22</td>
</tr>
<tr>
<td>Cylinder head:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer row</td>
<td>54.61</td>
<td>40.45</td>
</tr>
<tr>
<td>Centre row</td>
<td>88.95</td>
<td>65.70</td>
</tr>
<tr>
<td>Inner row</td>
<td>88.95</td>
<td>65.70</td>
</tr>
<tr>
<td>Distributor clamp bolt</td>
<td>19.22</td>
<td>14-16</td>
</tr>
<tr>
<td>Exhaust manifold to cylinder heads</td>
<td>19.22</td>
<td>14-16</td>
</tr>
<tr>
<td>Fan attachment</td>
<td>11.5</td>
<td>9</td>
</tr>
<tr>
<td>Flywheel to crankshaft</td>
<td>74.81</td>
<td>55.60</td>
</tr>
<tr>
<td>Inlet manifold to cylinder heads</td>
<td>47.54</td>
<td>35.40</td>
</tr>
<tr>
<td>Lifting eye to cylinder heads</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Main bearing cap bolts</td>
<td>68.75</td>
<td>50.55</td>
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<tr>
<td>Main bearing cap rear bolts</td>
<td>88.95</td>
<td>65.70</td>
</tr>
<tr>
<td>Manifold gasket clamp bolt</td>
<td>13.5.20</td>
<td>10.15</td>
</tr>
<tr>
<td>Oil pump cover to timing cover</td>
<td>11.14</td>
<td>8-10</td>
</tr>
<tr>
<td>Oil plug</td>
<td>25.30</td>
<td>18.22</td>
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<tr>
<td>Oil relief valve cap</td>
<td>40</td>
<td>30</td>
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<tr>
<td>Oil sump drain plug</td>
<td>40.6.47</td>
<td>30.35</td>
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<tr>
<td>Oil sump to cylinder block</td>
<td>8-11</td>
<td>5-8</td>
</tr>
<tr>
<td>Oil sump rear to cylinder block</td>
<td>17.6.20.3</td>
<td>13.15</td>
</tr>
<tr>
<td>Rocker cover to cylinder head</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Rocker shaft bracket to cylinder head</td>
<td>34.40</td>
<td>25.30</td>
</tr>
<tr>
<td>Spark plug</td>
<td>13.8.16.2</td>
<td>10-12</td>
</tr>
<tr>
<td>Starter motor attachment</td>
<td>40.6.47.4</td>
<td>30.35</td>
</tr>
<tr>
<td>Damper to crankshaft</td>
<td>257.285</td>
<td>190.210</td>
</tr>
<tr>
<td>Timing cover to cylinder block</td>
<td>24.30</td>
<td>18.22</td>
</tr>
<tr>
<td>Tempatrol unit to water pump</td>
<td>36.40</td>
<td>27.30</td>
</tr>
<tr>
<td>Water pump pulley to water pump hub</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td><strong>Water pump timing cover to cylinder block</strong></td>
<td>24.30</td>
<td>18.22</td>
</tr>
</tbody>
</table>

### CLUTCH V8 Petrol engine

<table>
<thead>
<tr>
<th>Description</th>
<th>Nm</th>
<th>lbf ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch cover bolts</td>
<td>27.5</td>
<td>20</td>
</tr>
<tr>
<td>Slave cylinder bolts</td>
<td>27.5</td>
<td>20</td>
</tr>
<tr>
<td>Component</td>
<td>Nm</td>
<td>lbf ft</td>
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<tr>
<td>-----------</td>
<td>-----</td>
<td>--------</td>
</tr>
<tr>
<td>Clutch cover bolts</td>
<td>30 .38</td>
<td>22 .28</td>
</tr>
</tbody>
</table>

### 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 gearbox: 7 -10 5 -7
- Attachment plate to remote housing: 7 .10 5 -7
- Extension case to gearbox: 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 gearbox: 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

### MAIN GEARBOX (FIVE-SPEED) LT 85 — 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: 135 .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): 135 .20 10 .15
## TRANSFER BOX LT230R

### 4-cylinder Petrol and Diesel engine

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

**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

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Nm</th>
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<tbody>
<tr>
<td>Fixings securing mounting brackets to gearbox</td>
<td>80 .100</td>
<td>59 .73</td>
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<tr>
<td>Pinch bolt operating arm</td>
<td>7 - 10</td>
<td>5 - 7</td>
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<tr>
<td>Gate plate to grommet plate</td>
<td>7 - 10</td>
<td>5 - 7</td>
</tr>
<tr>
<td>Bearing housing to transfer case</td>
<td>7 - 10</td>
<td>5 - 7</td>
</tr>
<tr>
<td>Speedometer cable retainer</td>
<td>7 - 10</td>
<td>5 - 7</td>
</tr>
<tr>
<td>speedometerhousing</td>
<td>See note</td>
<td></td>
</tr>
<tr>
<td>Locating plate to gear change</td>
<td>5 - 7</td>
<td>4 - 5</td>
</tr>
<tr>
<td>Bottom cover to transfer</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Front output housing to transfer</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Front output housing to transfer</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
</tbody>
</table>
### TRANSFER GEARBOX LT230T —

**4 cylinder Petrol and Diesel engine and V8 (cont.)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Nm</th>
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</thead>
<tbody>
<tr>
<td>Cross shaft housing to front output housing</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Gear change</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Gear change</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Cross shaft to high/low lever</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Pivot shaft to link arm</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Connecting rod</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Anti-rotation plate intermediate shaft</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Front output housing cover</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Pivot bracket to extension housing</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Finger housing to front output housing</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Mainshaft bearing housing to transfer case</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Brake drum to coupling flange</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Gearbox to transfer case</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>Gearbox to transfer case</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>End cover bearing housing to transfer case</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>Speedometer housing to transfer</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>Speedometer housing to transfer</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>Selector finger to cross shaft (high/low)</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Selector fork high/low to shaft</td>
<td>22 .28</td>
<td>16 .21</td>
</tr>
<tr>
<td>Transmission brake to speedometer housing</td>
<td>65 .80</td>
<td>48 .59</td>
</tr>
<tr>
<td>Gearbox to transfer case</td>
<td>40 .50</td>
<td>29 .37</td>
</tr>
<tr>
<td>Transfer case assembly</td>
<td></td>
<td>See note</td>
</tr>
<tr>
<td>Oil drain plug</td>
<td>25 .35</td>
<td>19 .26</td>
</tr>
<tr>
<td>Detent plug</td>
<td></td>
<td>Plug to be coated with Hylomar and peened. Screw plug fully in (spring solid) then turn two complete turns back.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>Nm</th>
<th>lbf ft</th>
</tr>
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<tbody>
<tr>
<td>Differential casings</td>
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<td>40 .47</td>
</tr>
<tr>
<td>Front and rear out flange</td>
<td>146 .179</td>
<td>108 .132</td>
</tr>
<tr>
<td>Differential case rear</td>
<td>66 .80</td>
<td>50 .59</td>
</tr>
<tr>
<td>Oil filler and level plug transfer</td>
<td>25 .35</td>
<td>19 .26</td>
</tr>
<tr>
<td>Transfer breather</td>
<td>7 - 11</td>
<td>5 - 8</td>
</tr>
<tr>
<td>Inter shaft stake nut</td>
<td>130 .140</td>
<td>96 .104</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Description</th>
<th>Nm</th>
<th>lbf ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bell housing to cylinder block bolts</td>
<td>36.6 .44,8</td>
<td>27 .33</td>
</tr>
<tr>
<td>Gearbox casing to bell housing 2 off</td>
<td>146.5 .179</td>
<td>108 .132</td>
</tr>
<tr>
<td>Gearbox casing to bell housing 2 off</td>
<td>85.4 .104,4</td>
<td>63 .77</td>
</tr>
<tr>
<td>Gearbox casing to bell housing nuts</td>
<td>85.4 .104,4</td>
<td>63 .77</td>
</tr>
<tr>
<td>Gearbox casing to [C1] housing stud and nuts</td>
<td>146.5 .179</td>
<td>108 .132</td>
</tr>
<tr>
<td>Output flange — rear — nut and bolts</td>
<td>43.4 .51,5</td>
<td>32 .38</td>
</tr>
<tr>
<td>Output shaft — rear — nut</td>
<td>146.5 .179</td>
<td>108 .132</td>
</tr>
<tr>
<td>Output shaft — front — nut</td>
<td>146.5 .179</td>
<td>108 .132</td>
</tr>
<tr>
<td>Gear selector spherical scat bolts</td>
<td>13.6 .16,3</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Propeller shaft to flange bolts</td>
<td>43.4 .51,5</td>
<td>32 .38</td>
</tr>
<tr>
<td>All other nuts and bolts:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M6</td>
<td>9.9 .11,9</td>
<td>7.3 .8,7</td>
</tr>
<tr>
<td>M8</td>
<td>23.7 .29,7</td>
<td>17.5 .21,3</td>
</tr>
<tr>
<td>M10</td>
<td>48 .58</td>
<td>35.4 .42,8</td>
</tr>
</tbody>
</table>
TORQUE WRENCH SETTINGS

FRONT AXLE
- Hub driving member to hub: 60-70 Nm / 44.52 lbf ft
- Brake disc to hub: 65 .80 Nm / 48.59 lbf ft
- Stub axle to swivel pin housing: 60 .70 Nm / 44.52 lbf ft
- Brake caliper to swivel pin housing: 120 .150 Nm / 88 .111 lbf ft
- Upper swivel pin to swivel pin housing: 60 .70 Nm / 44.52 lbf ft
- Lower swivel pin to swivel pin housing: 22 .28 Nm / 16.21 lbf ft
- Oil seal retainer to swivel pin housing: 7 - 10 Nm / 5 - 7 lbf ft
- Swivel bearing housing to axle case: 65 .80 Nm / 48.59 lbf ft
- Pinion housing to axle case: 36 .46 Nm / 26 .34 lbf ft
- Crown wheel to differential case: 55 .61 Nm / 40 .45 lbf ft
- Differential bearing cap to pinion housing: 80 .100 Nm / 54 .74 lbf ft
- U/J flange to prop shaft: 41 .52 Nm / 30 .38 lbf ft
- Mudshield to swivel pin housing: 7 - 10 Nm / 5 - 7 lbf ft
- Bevel pinion nut: 95 .163 Nm / 70 .120 lbf ft

REAR AXLE AND FINAL DRIVE
- Crown wheel to differential case: 150 .170 Nm / 111.125 lbf ft
- Rear cover to axle case: 20 .27 Nm / 15 .20 lbf ft
- Ball joint mounting bracket to axle case: 125 .142 Nm / 92 .105 lbf ft
- U/J flange to prop shaft: 41 .52 Nm / 30 .38 lbf ft
- Drum to hub: 15 .20 Nm / 11 .15 lbf ft
- Rear brake assembly and stub axle rear to axle case: 60 .70 Nm / 44.52 lbf ft
- Hub driving member to hub: 60 .70 Nm / 44.52 lbf ft

PROPELLER SHAFTS
- Coupling flange bolts: 43 - 51 Nm / 32 .38 lbf ft

REAR SUSPENSION
- Bottom link to chassis nut: 176 Nm / 130 lbf ft
- Bottom link to mounting rubber nuts: 64 Nm / 47 lbf ft
- Top link bracket to chassis nuts: 47 Nm / 35 lbf ft
- Bump stop rubber bracket nuts: 32 Nm / 24 lbf ft
- Shock absorber bracket to chassis nuts: 64 Nm / 47 lbf ft
- Shock absorber upper attachment to bracket: 82 Nm / 60 lbf ft
- Anti roll bar bush to chassis nuts: 24 Nm / 18 lbf ft
- Upper link ball joint to axle castle nut: 176 Nm / 130 lbf ft
- Anti roll bar ball joint castle nut: 40 Nm / 30 lbf ft
- Shock absorber lower attachment nuts: 75 Nm / 55 lbf ft

STEERING AND FRONT SUSPENSION
- Tie bar to mounting arm nut: 81 Nm / 60 lbf ft
- Mounting arm to chassis nuts: 176 Nm / 130 lbf ft
- Tie bar to steering box nuts: 81 Nm / 60 lbf ft
- Panard rod to mounting arm nut: 176 Nm / 130 lbf ft
- Panard rod to anchor bracket nut: 176 Nm / 130 lbf ft
- Panard rod mounting bracket to chassis bolts: 115 .130 Nm / 85 .96 lbf ft
- Drop arm to drag link castle nut: 81 Nm / 60 lbf ft
- Steering damper to drag link nut: 50 Nm / 37 lbf ft
- Drop arm to steering box nut: 176 Nm / 130 lbf ft
- Radius arm to axles: 176 Nm / 130 lbf ft
- Steering box to chassis nuts: 81 Nm / 60 lbf ft
- Radius arms to chassis nuts: 176 Nm / 130 lbf ft
- Track rod clamp bolt nuts: 14 Nm / 10 lbf ft
- Drag link clamp bolt nuts: 14 Nm / 10 lbf ft
- Steering wheel retaining nut: 38 Nm / 28 lbf ft
- Road wheel nuts: 108 Nm / 80 lbf ft
- Ball joint nuts: 41 Nm / 30 lbf ft
- collapsible coupling nuts: 45 Nm / 33 lbf ft
TORQUE WRENCH SETTINGS

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 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.

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

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

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.
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.

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.

HYDRAULIC FITTINGS — Metrication

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

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

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

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

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

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 1/8 in, 1/4 in and 1/2 in outside diameter.

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

4.75 mm pipe is exactly the same as 1/8 in pipe.
6 mm pipe is 0.014 in smaller than 1/4 in pipe. 8 mm pipe is 0.002 in larger than 1/2 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.
The greatest danger lies with the confusion of 10 mm and \( \frac{3}{8} \) in UNF pipe nuts used for 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.

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 assemblies incorporating it.

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.
# RECOMMENDED LUBRICANTS AND FLUIDS

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

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>BP</th>
<th>CASTROL</th>
<th>DUCKHAMS</th>
<th>ESSE</th>
<th>MOBIL</th>
<th>PETROFINA</th>
<th>SHELL</th>
<th>TEXACO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine V8</td>
<td>BP Visco 2000 (15W/40) or BP Visco Nova (10W/40)</td>
<td>Castrol GTX (15W/50) or Castrolite (10W/40)</td>
<td>Duckhams 15W/50</td>
<td>Esso Superlube (15W/45)</td>
<td>Mobil Super 10W/40 or Mobil 1 Rally Formula 15W/50</td>
<td>Fina Supergrade Motor Oil 10W/40 or 15W/40</td>
<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 15W/30</td>
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<td>Carburettor</td>
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<tr>
<td>Datsypots</td>
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<td>Castrol GTX (15W/50) or Castrolite (10W/40)</td>
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<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 15W/30</td>
</tr>
<tr>
<td>4-cyl. diesel</td>
<td>BP Visco 2000 (15W/40) or BP Visco Nova (10W/40)</td>
<td>Castrol GTX (15W/50) or Castrolite (10W/40)</td>
<td>Duckhams 15W/50</td>
<td>Esso Superlube (15W/45)</td>
<td>Mobil Super 10W/40 or Mobil 1 Rally Formula 15W/50</td>
<td>Fina Supergrade Motor Oil 10W/40 or 15W/40</td>
<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 15W/30</td>
</tr>
<tr>
<td>+*177 — five-speed gearbox</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BP Austran G</td>
<td>Castrol TOF</td>
<td>Duckhams Q-Matic</td>
<td>Esso Type G</td>
<td>Mobil ATF 210</td>
<td>Fina Purmatic 33G</td>
<td>Shell Donex 1F</td>
<td>Texaco Multigrade Type G</td>
<td></td>
</tr>
<tr>
<td>*179 — four-speed gearbox including transfer box</td>
<td>BP Visco 2000 (15W/40) or BP Visco Nova 10W/40</td>
<td>Castrol GTX (15W/50)</td>
<td>Duckhams 15W/50</td>
<td>Esso Superlube (15W/45)</td>
<td>Mobil Super 10W/40</td>
<td>Fina Supergrade Motor Oil 10W/40 or 15W/40</td>
<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 15W/30</td>
</tr>
<tr>
<td>Rear differential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rear steering (swing arm)</td>
<td>BP Steerol (Manual)</td>
<td>Castrol LM Grease</td>
<td>Duckhams LB 10</td>
<td>Esso Multi- purpose Grease H</td>
<td>Mobil grease MP</td>
<td>Fina Murson HTL 2</td>
<td>Shell Retinax A</td>
<td>Marfak All purpose Grease</td>
</tr>
<tr>
<td>Prop. shaft</td>
<td>BP Emgeogrease C2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Marfak All purpose Grease</td>
</tr>
<tr>
<td>Steering box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power steering fluid reservoirs as applicable</td>
<td>BP Austran DX 2D</td>
<td>Castrol TQ Dexron IID</td>
<td>Duckhams Rieamatic CD or Duckhams D-Matic</td>
<td>Esso ATF Dexron IID</td>
<td>Mobil ATF 220 D</td>
<td>Shell ATF Dexron IID</td>
<td>Texacol Fluid 922G</td>
<td></td>
</tr>
<tr>
<td>Air cleaner 4-cyl. petrol</td>
<td>BP Visco 15W/40 or BP Visco 10W/30</td>
<td>Castrol GTX (15W/50) or Castrolite (10W/40)</td>
<td>Duckhams 15W/50</td>
<td>Esso Superlube (15W/45)</td>
<td>Mobil Super 10W/40 or 15W/40</td>
<td>Fina Supergrade Motor Oil 10W/40 or 15W/40</td>
<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 15W/30</td>
</tr>
<tr>
<td>Air cleaner 4-cyl. diesel</td>
<td>BP Visco 15W/40 or BP Visco Nova 10W/30</td>
<td>Castrol GTX (15W/50) or Castrolite (10W/40)</td>
<td>Duckhams 15W/50</td>
<td>Esso Superlube (15W/45)</td>
<td>Mobil Super 10W/40 or 15W/40</td>
<td>Fina Supergrade Motor Oil 10W/40 or 15W/40</td>
<td>Shell Super Motor Oil 15W/40 or 10W/40</td>
<td>Havoline Motor Oil 15W/40 or Eurotex HD 10W/30</td>
</tr>
<tr>
<td>Brake and clutch reservoirs</td>
<td>Universal Brake Fluid or other brake fluids having a minimum boiling point of 260°C (500°F) and complying with FMVSS109 (DOT 3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Lubrication nipples (hubs, ball joints, etc.)</td>
<td>BP Emgeogrease L2</td>
<td>Castrol LM Grease</td>
<td>Duckhams LU 10</td>
<td>Esso Multi-purpose Grease H</td>
<td>Mobil grease MP</td>
<td>Fina Marson HTL 2</td>
<td>Shell Retinax A</td>
<td>Marfak All purpose Grease</td>
</tr>
<tr>
<td>Ball joint assembly</td>
<td>Dextragrease Super GP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top link</td>
<td>Universal Anti-freeze</td>
<td>See under Anti-freeze section 09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### RECOMMENDED LUBRICANTS AND FLUIDS

**SERVICE INSTRUCTIONS ALL MARKETS**

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>BP</th>
<th>CASTROL</th>
<th>DUCKHAMS</th>
<th>ESSO</th>
<th>MOBIL</th>
<th>PETROFINA</th>
<th>SHELL</th>
<th>TEXACO</th>
<th>SPEC. REF. ALL BRANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windscreen hinges</td>
<td>BP Energrease L2</td>
<td>Control LM Grease</td>
<td>Duckhams LB 10</td>
<td>Esso Multi-purpose Grease H</td>
<td>Mobil Mobil-grease MP</td>
<td>Fina Marson HTL2</td>
<td>Shell Retinax A</td>
<td>Merlak All purpose Grease</td>
<td>NGLI-2 Multi-purpose Lithium-based Grease</td>
</tr>
<tr>
<td>Ventilator hinge</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Ventilator control</td>
<td></td>
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<tr>
<td>Seat slides. Hood retention clips</td>
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<tr>
<td>Door lock striker</td>
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<td></td>
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<tr>
<td>Door washers</td>
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<td></td>
<td></td>
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<tr>
<td>Bonnet pintle</td>
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<td></td>
<td></td>
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<tr>
<td>Door locks (anti-burst)</td>
<td></td>
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<td></td>
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<tr>
<td>Inertia reels</td>
<td></td>
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<td></td>
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<tr>
<td>Battery lugs</td>
<td>Petroleum jelly.</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Earthing surfaces</td>
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<td></td>
<td></td>
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<tr>
<td>Where paint has been removed</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Conditioning System</td>
<td>METHYLCHLORIDE REFRIGERANTS MUST NOT BE USED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Refrigerant Compressor Oil</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>SERVICE CLASSIFICATION WORLDWIDE</th>
<th>PERFORMANCE LEVEL</th>
<th>SAE VISCOSITY</th>
<th>AMBIENT TEMPERATURE °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine</td>
<td>Oils must meet BL, Cars spec.</td>
<td>Diesel</td>
<td>5W/20/5W/30</td>
<td>-30° -20° -10° 0° 10° 20° 30° 40° 50°</td>
</tr>
<tr>
<td>Carburettor</td>
<td>Oil can</td>
<td>Oils have spec.</td>
<td>90W/EP</td>
<td></td>
</tr>
<tr>
<td>Oil can</td>
<td></td>
<td></td>
<td>90W/EP</td>
<td></td>
</tr>
<tr>
<td>Oil bath air cleaners</td>
<td>API GL4</td>
<td></td>
<td>80W EP</td>
<td></td>
</tr>
<tr>
<td>Oil bath air cleaners</td>
<td>MIL-L-2105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power steering reservoir</td>
<td>ATF M2C 33 For G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front and rear Axle differential</td>
<td>ATF M2C 33 For G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swivel pin housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steering box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT77 gearbox</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT79 gearbox including</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transfer box</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT85 gearbox</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>including v8 cylinder</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brake and clutch reservoirs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lubrication nipples, hubs, ball joints, etc.</td>
<td>VGLI-2 multipurpose lithium based grease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Engine</th>
<th>Mixture</th>
<th>Percentage Concentration</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-cyl. Engines (cast iron)</td>
<td>One part anti-freeze two parts water</td>
<td>33%</td>
<td>Down to -20°C</td>
</tr>
<tr>
<td>V8 Engine (aluminium)</td>
<td>One part anti-freeze one part water</td>
<td>50%</td>
<td>Below -20°C to -36°C</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Component</th>
<th>Litres</th>
<th>Imperial unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine sump oil, 4-cylinder</td>
<td>6.00</td>
<td>11.00 pints</td>
</tr>
<tr>
<td>Extra when refilling after fitting new filter, 4-cylinder</td>
<td>0.85</td>
<td>1.50 pints</td>
</tr>
<tr>
<td>Air cleaner oil, 4-cylinder</td>
<td>0.85</td>
<td>1.50 pints</td>
</tr>
<tr>
<td>Engine sump oil, V8 cylinder</td>
<td>5.10</td>
<td>9.00 pints</td>
</tr>
<tr>
<td>Extra when refilling after fitting new filter, V8 cylinder</td>
<td>0.56</td>
<td>1.00 pint</td>
</tr>
<tr>
<td>Main gearbox oil, five-speed</td>
<td>2.20</td>
<td>3.90 pints</td>
</tr>
<tr>
<td>Transfer box oil, LT230R five-speed main gearbox</td>
<td>2.80</td>
<td>4.90 pints</td>
</tr>
<tr>
<td>LT85 five-speed gearbox</td>
<td>3.00</td>
<td>5.25 pints</td>
</tr>
<tr>
<td>Main gearbox oil, four-speed</td>
<td>2.60</td>
<td>4.70 pints</td>
</tr>
<tr>
<td>Transfer gearbox oil, four-speed main gearbox</td>
<td>3.16</td>
<td>5.50 pints</td>
</tr>
<tr>
<td>Front differential</td>
<td>1.70</td>
<td>3.00 pints</td>
</tr>
<tr>
<td>Rear differential: Salisbury 8HA</td>
<td>2.30</td>
<td>4.00 pints</td>
</tr>
<tr>
<td>Swivel pin housing oil (each)</td>
<td>0.35</td>
<td>0.60 pint</td>
</tr>
<tr>
<td>Fuel tank, rear</td>
<td>79.50</td>
<td>17.50 gallons</td>
</tr>
<tr>
<td>Fuel tank, side (except Station wagon)</td>
<td>68.20</td>
<td>15.00 gallons</td>
</tr>
<tr>
<td>Fuel tank, side (Station wagon only)</td>
<td>45.50</td>
<td>10.00 gallons</td>
</tr>
<tr>
<td>Cooling system, 4-cylinder petrol models (standard)</td>
<td>10.30</td>
<td>18.00 pints</td>
</tr>
<tr>
<td>Cooling system, 4-cylinder diesel models and heavy duty petrol models</td>
<td>11.00</td>
<td>19.00 pints</td>
</tr>
<tr>
<td>Cooling system, V8 cylinder models</td>
<td>12.80</td>
<td>22.50 pints</td>
</tr>
<tr>
<td>Steering box manual</td>
<td>0.43</td>
<td>0.75 pints</td>
</tr>
<tr>
<td>Power steering box and reservoir fluid</td>
<td>2.90</td>
<td>5.0 pints</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Every 10,000 km (6,000 miles) or 6 months</th>
<th>Every 20,000 km (12,000 miles) or 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Check condition and security of seats, seat belt mountings, seat belts and buckles</td>
<td>31. Check/top-up gearbox oil</td>
</tr>
<tr>
<td>2. Check operation of all lamps</td>
<td>32. Renew transfer box oil</td>
</tr>
<tr>
<td>3. Check operation of horns</td>
<td>33. Check/top-up transfer box oil</td>
</tr>
<tr>
<td>4. Check operation of warning indicators</td>
<td>34. Renew front axle oil</td>
</tr>
<tr>
<td>5. Check operation of windscreen and rear wipers and washers</td>
<td>35. Check/Wop-up front axle oil</td>
</tr>
<tr>
<td>6. Check condition of wiper blades</td>
<td>36. Check/Wop-up front axle oil</td>
</tr>
<tr>
<td>7. Check security and operation of handbrake</td>
<td>37. RenNew swivel pin housing oil</td>
</tr>
<tr>
<td>8. Check rear view mirror(s) for security, cracks and crazing</td>
<td>38. Check rear axle oil</td>
</tr>
<tr>
<td>9. Check operation of all doors, bonnet and tailgate locks</td>
<td>39. Check/Wop-up rear axle oil</td>
</tr>
<tr>
<td>10. Check operation of window controls</td>
<td>40. Lubricate rear suspension upper link ball joint</td>
</tr>
<tr>
<td>11. Lubricate all locks (not steering lock)</td>
<td>41. Lubricate propeller shaft sealed sliding joints</td>
</tr>
<tr>
<td>12. Lubricate accelerator control linkage and pedal pivot</td>
<td>42. Lubricate propeller shaft universal joints</td>
</tr>
<tr>
<td>13. Check/Wadjust tyre pressures including spare</td>
<td>43. Lubricate handbrake mechanical linkage</td>
</tr>
<tr>
<td>14. Check/Wadjust handbrake</td>
<td>44. Check visually brake, fuel, clutch pipes/ unions for chafing, leaks and corrosion</td>
</tr>
<tr>
<td>15. Check front wheel alignment</td>
<td>45. Check exhaust system for leakage and security</td>
</tr>
<tr>
<td>16. Check/Wop-up battery electrolyte</td>
<td>46. Check for oil leaks from engine and transmission</td>
</tr>
<tr>
<td>17. Remove battery connections, clean and grease (refit)</td>
<td>47. Check for oil/fluid leaks from steering and suspension systems</td>
</tr>
<tr>
<td>18. Removeroadwheels</td>
<td>48. Check axle breather pipes, ensure they are not blocked, pinched or split</td>
</tr>
<tr>
<td>19. Check tyres comply with Manufacturer's specification</td>
<td>49. Check security and condition of suspension fixings</td>
</tr>
<tr>
<td>20. Check tyres visually for cuts, lumps, bulges, uneven wear and tread depth</td>
<td>50. Check condition and security of steering unit, joints and gaiters</td>
</tr>
<tr>
<td>21. Remove road wheel brake drums, wash out dust, inspect shoes for wear and drums for condition</td>
<td>51. Check tightness of propeller shaft coupling bolts</td>
</tr>
<tr>
<td>22. Inspect wheel cylinders for fluid leaks</td>
<td>52. Clean fuel sedimentae (Diesel only)</td>
</tr>
<tr>
<td>23. Inspect brake pads for wear, calipers for leaks, and discs for condition</td>
<td>53. Clean electric fuel pump filter</td>
</tr>
<tr>
<td>24. Refit road wheel brake drums</td>
<td>54. Renew fuel filter element (Petrol)</td>
</tr>
<tr>
<td>25. Adjust road wheel brakes</td>
<td>55. Drain flywheel housing if drain plug is fitted for wading (refit)</td>
</tr>
<tr>
<td>26. Adjust handbrake if required</td>
<td>56. Clean camshaft drive belt housing filter (Diesel)</td>
</tr>
<tr>
<td>27. Refit road wheels to original position</td>
<td>57. Check condition of heater plug wiring for fraying, chafing and deterioration (diesel only)</td>
</tr>
<tr>
<td>28. Renew engine oil</td>
<td>58. Remove heater plugs, clean, test and refit (diesel only)</td>
</tr>
<tr>
<td>29. Renew engine oil filter</td>
<td>59. Renew injectors, clean, test and refit</td>
</tr>
</tbody>
</table>
**MAINTENANCE**

<table>
<thead>
<tr>
<th>Mileage Interval</th>
<th>Maintenance Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every 10,000 km (6,000 miles) or 6 months</td>
<td>Renew fuel filter element (Diesel)</td>
</tr>
<tr>
<td>Every 10,000 km (6,000 miles) or 6 months</td>
<td>Check/adjust valve clearance (all models except V8)</td>
</tr>
<tr>
<td>Every 40,000 km (25,000 miles)</td>
<td>Check/adjust spark plugs</td>
</tr>
<tr>
<td>Every 60,000 km (37,000 miles) or 12 months</td>
<td>Renew engine breather filter (V8)</td>
</tr>
<tr>
<td>Every 80,000 km (49,000 miles) or 18 months</td>
<td>Check crankcase breathing system for leaks, hoses for security and condition</td>
</tr>
<tr>
<td>Every 100,000 km (62,000 miles) or 24 months</td>
<td>Check power steering system for leaks, hydraulic pipes and unions for chafing and corrosion</td>
</tr>
<tr>
<td>Every 120,000 km (74,000 miles)</td>
<td>Check condition of driving belts — adjust if required (not camshaft drive belt — diesel)</td>
</tr>
<tr>
<td>Every 200,000 km (124,000 miles)</td>
<td>Check ignition wiring and HT leads for fraying, chafing and deterioration</td>
</tr>
<tr>
<td>Every 240,000 km (148,000 miles)</td>
<td>Clean distributor cap, check for cracks and tracking</td>
</tr>
<tr>
<td>Every 360,000 km (222,000 miles) or 36 months</td>
<td>Check cooling and heater system for leaks, hoses for security and condition</td>
</tr>
</tbody>
</table>

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.
LUBRICATION

This first part of the maintenance section covers renewal of lubricating oils for the major units of the vehicle and other components that require lubrication, as detailed in the ‘Maintenance schedules’. Refer to the ‘General specification data’ for capacities and recommended lubricants.

Vehicles operating under severe conditions of dust, sand, mud and water should have the oils changed and lubrication carried out at more frequent intervals than that recommended in the maintenance schedules.

Draining of used oil should take place after a run when the oil is warm. Always clean the drain and filler-level plugs before removing. In the interests of safety disconnect the vehicle battery to prevent the engine being started and the vehicle moved inadvertently, while oil changing is taking place.

Allow as much time as possible for the oil to drain completely except where blown sand or dirt can enter the drain holes. In these conditions clean and refit the drain plugs immediately the main bulk of oil has drained.

Where possible, always refill with oil of the make and specification recommended in the lubrication charts and from sealed containers.

RENEW ENGINE OIL AND FILTER

DRAIN THE OIL — All engines

1. Drive vehicle to level ground.
2. Run the engine to warm the oil; switch off the ignition and disconnect the battery for safety.
3. Place an oil tray under the drain plug.
4. Remove the drain plug in the bottom of the sump at the left-hand side — V8 and right-hand side 4-cylinder engines. Allow oil to drain away completely and replace the plug and tighten to the correct torque.

NOTE: The example shown below is a 4 cylinder engine sump.

Renew oil filter — V8 and 2.5 Diesel engines

5. Place an oil tray under the engine.
6. Unscrew the filter anti-clockwise, using a strap spanner as necessary.
7. Smear a little clean engine oil on the rubber washer of the new filter, then screw the filter on clockwise until the rubber sealing ring touches the machined face, then tighten a further half turn by hand only. Do not overtighten.

Illustration A. V8 engine.

Illustration B. 2.5 Diesel engine.
Renew oil filter — 2.25 petrol and diesel engine

8. Place oil tray under engine.
9. Unscrew filter retaining bolt.
10. Remove the container.
11. Remove the element.
12. Discard the used filter element and large rubber washer.
13. Wash the container in kerosene.
14. Place the new filter element in the container and reassemble the unit, using the new large rubber washer supplied with the element.
15. Ensure that all the sealing washers are in position and intact, and that the container is correctly located in the adaptor.
16. Tighten the filter retaining bolt to the correct torque. Do not overtighten.

3. Remove the oil filler-level plug and inject the approximate quantity of new oil of the correct make and grade until it begins to run out of the filler-level hole. Fit the plug and tighten to the correct torque. Since the plug has a tapered thread it must not be overtightened. Wipe away any surplus oil.

RENEW MAIN AND TRANSFER GEARBOX OILS
DRAIN AND REFILL LT77mm MAIN GEARBOX

4-cylinder engines

1. Drive the vehicle to level ground and place a suitable container under the gearbox to catch the old oil.
2. Remove the gearbox and extension case drain plugs and allow the oil to drain completely. Wash the extension case filter in kerosene and refit the plugs using new washers, if necessary, and tighten to the correct torque.

Refill sump with oil — all models

17. Check that the drain plug is tight.
18. Clean the outside of the oil filler cap, remove it from the rocker cover and clean the inside.
19. Pour in the correct quantity of new oil of the correct grade from a sealed container to the high mark on the dipstick and firmly replace the filler cap.
20. Run the engine and check for leaks from the filter. Stop the engine, allow the oil to run back into the sump for a few minutes, then check the oil level again and top up if necessary.
DRAIN AND RENEW 230R AND 230T TRANSFER GEARBOX (4-cylinder engine)

1. Drive the vehicle to level ground and place a container under the gearbox to catch the old oil.
2. Remove the drain plug and allow the oil to drain. Fit the plug using a new washer, if necessary, and tighten to the correct torque.
3. Remove the filler-level plug and inject the approximate quantity of the recommended oil until it begins to run from the plug hole. Fit the level plug and tighten only to the correct torque, do not overtighten, wipe away any surplus oil.

DRAIN AND RENEW LT95 TRANSFER GEARBOX OIL

1. Drive vehicle to level ground and place a container beneath the gearbox to catch the old oil.
2. Remove the drain plug and allow time for the oil to drain completely.
3. Clean and refit the drain plug using a new washer, if necessary and tighten to the correct torque.
4. Remove the oil filler-level plug and inject the approximate quantity of a recommended oil until it begins to run from the hole. Clean and fit the plug and tighten to the correct torque. Do not overtighten. Wipe away any surplus oil.

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DRAIN AND RENEW LT95 MAIN GEARBOX (V8 engines)

1. Drive the vehicle to level ground and place a container under the gearbox to catch the old oil.
2. Remove the drain plug, washer and filter from the bottom of the gearbox casing and allow the oil to drain completely.
3. Wash the filter in petrol, allow to dry and fit to the casing. Using a new washer, if necessary, fit the plug and tighten to the correct torque.
4. Remove the oil filler-level plug from the side of the gearbox and inject the approximate quantity of the correct oil until it begins to run from the filler-level hole. Clean and refit the plug using a new washer and tighten to the correct torque. Wipe away any surplus oil.

RENEW FRONT AND REAR AXLE OIL

1. Drive the vehicle to level ground and place a container under the axle to be drained.
2. Using a spanner with a 13 mm (0.5 in) square drive remove the drain plug and allow the oil to drain completely. Clean and refit the drain plug.
3. Remove the oil filler-level plug and inject new oil of a recommended make and grade until it begins to run from the hole. Clean and fit the filler-level plug and wipe away any surplus oil.

NOTE: Whilst the illustration shows a ‘90’ model front differential, the procedure is the same for all axles.
MAINTENANCE

RENEW SWIVEL PIN HOUSING OIL

1. Drive the vehicle to level ground and place a container under each swivel housing to catch the used oil.
2. Remove the drain plug and allow the oil to drain completely and clean and refit the plugs.
3. Remove the oil filler-level plug and inject the recommended make and grade of oil until oil begins to run from the level hole. Clean and fit the level plugs and wipe away any surplus oil.

LUBRICATE PROPELLER SHAFTS

1. Clean all the grease nipples on the front and rear propshaft universal joints, and sliding portion of the rear shaft.
2. Charge a low pressure hand grease gun with grease of a recommended make and grade and apply to the grease nipples.
3. Remove the screwed plug from the front shaft and fit a suitable grease nipple.
4. Disconnect one end of the front propeller shaft and compress the sliding portion whilst applying grease. It is necessary to compress the shaft to prevent over filling with grease. It should be noted that this sliding portion must only be lubricated at 40,000 km (24,000 mile) intervals.
5. Reconnect the propeller shaft, remove the grease nipple and fit the screwed plug.

TOP-UP MANUAL STEERING BOX

1. Remove the oil filler plug and observe the oil level which should be 25 mm (1.0 in) below the top of the filler hole.
2. If necessary top-up to the correct level with a recommended oil. Clean and refit the plug and wipe away any surplus oil.

RENEW AIR CLEANER OIL — 2.25 litre engines (early models)

1. Slacken wing nut and release the clamping strap securing the complete air cleaner.
2. Disconnect the outlet elbow from the intake pipe and remove the cleaner from the vehicle.
3. Remove the oil bowl from the bottom of the cleaner by releasing the three securing clips.
4. Clean all dirty oil and sludge from the bowl and refill with fresh engine oil to the level indicated by a ring formed in the pressing; the capacity is approximately 0.85 litre (1.5 imperial pints).
5. Clean the spiral in the cleaner body by swilling the complete body in paraffin and shake off the surplus.
6. Remove and clean the air intake cap.
7. Clean the wire mesh filter.
8. Reassemble filter using a new scaling ring.
9. Refit the complete unit into the vehicle.
**TOP-UP BRAKE VACUUM PUMP OIL — 2.25 litre**

**Diesel engine**

1. Slacken the drive belt, and the pump pivot bolts and nuts and slip the belt from the pulley.
2. Move the pump to an upright position and temporarily tighten the nuts and bolts to maintain this position.
3. Turn the pump pulley so that the indicating marks on the pulley hub and pump body line up.

4. Remove the oil level plug at the rear of the pump and if necessary inject a recommended SAE 15W-50 oil up to the level of the hole.
5. Refit the level plug, and fit and tension the drive belt.

**TOP-UP CARBURETTER PISTON DAMPER — V8 only**

1. Unscrew the cap on top of both suction chambers and withdraw the damper.
2. Top-up the reservoir with engine oil to within 12 mm (0.5 in) from the top of the hollow piston rod. Refit the damper and secure the cap.

**RENEW LT85 MAIN GEARBOX OIL**

Drain and refill monthly when operating under severe wading conditions.

To change the gearbox oil proceed as follows:

1. Immediately after a run when the oil is warm, drain off the oil into a container by removing the drain plug and washer from the bottom of the gearbox casing.
2. Remove the oil filter.
3. Wash the filter in clean fuel; allow to dry and replace.
4. Clean and refit drain plug and washer and refill gearbox through the oil level/filler plug, with the correct grade of oil, to the bottom of the oil level/filler hole. For capacity see Data Section.
GENERAL MAINTENANCE AND ADJUSTMENT

This second part of the maintenance section covers adjustments and items of general maintenance as dictated by the ‘Maintenance Schedules’. However, only maintenance operations that are not included in the Overhaul Sections of the manual appear in this section.

EXAMINE AND RENEW FRONT BRAKE FRICTION PADS

Examine the friction pads for wear and if less than 3 mm (0.125 in) thick or oil contaminated, they must be renewed on both wheels at the same time, as follows:

NOTE: See Book 4 Section 70 for latest method of friction pad retension.

1. Slacken both front wheel nuts and jack-up the vehicle and lower onto axle stands, and remove wheels.
2. Clean the exterior of the calipers.
3. Remove the split pins from the brake caliper.
4. Remove the retaining springs.
5. Withdraw the friction pads.
6. Clean the exposed parts of the pistons, using only new brake fluid.
7. Using piston clamp 186672 press each piston back into its bore, whilst ensuring that the displaced brake fluid does not overflow from the reservoir.
8. Smear the faces of the pistons with Lockheed disc brake lubricant taking care not to let any reach the lining material.
9. Insert the new friction pads.
10. Place the friction pad retaining springs in position and fit new split pins and splay the ends.
11. Apply the footbrake several times to locate the pads.
12. Check the fluid reservoir and top-up if necessary.
13. Fit the road wheels, lower the vehicle and finally tighten the wheel retaining nuts.

CLEAN AND CHECK AXLE BREATHERS — ball valve type (where fitted)

1. Clean the outside of the breather and unscrew from the axle tube.
2. Wash the breather in petrol and shake to ensure that the ball valve is free.
3. Lubricate the ball with engine oil and refit to axle tube.

Remote axle breathers — wherefitted

Pipes attached to the breathers on the axles terminate at points inside the chassis members on early models and into the engine compartment on later vehicles. This allows the axles to breath whilst the vehicle is traversing mud and water. No maintenance is required except to ensure that the pipe: do not become blocked, kinked, or split, or damaged in any other way to prevent proper breathing.
CHECK STEERING BALL JOINTS

Ball joints are lubricated for the normal life of ball joints during manufacture and require no further lubrication. This applies only if the rubber gaiter has not become dislodged or damaged. The joints should be checked at the specified mileage intervals but more frequently if the vehicle is used under arduous conditions.

1. Check for wear in the joints by moving the ball joint up and down vigorously. If free movement is apparent renew the complete joint assembly.

CHECK FRONT WHEEL ALIGNMENT

Use recognised wheel alignment equipment to perform this check and adjustment. See 'General Specification and Data' section for the correct alignment. Check and adjust with the vehicle on level ground.

1. Set the road wheels to the straight ahead position and push the vehicle forward a short distance.
2. Slacken the clamp bolts securing the ball joints at both ends of the track rod.
3. Twist the track-rod to decrease or increase its effective length as required to achieve the correct alignment.
4. Push the vehicle rearwards whilst moving the steering wheel from side to side to settle the ball joints. Then with the wheels in the straight ahead position push the vehicle forward a short distance and recheck the alignment. If necessary make further adjustments. When the alignment is correct tighten the ball joint clamp bolts.

The ball joint pins must be central in their housing and not inclined to one side. See section 57.

ADJUST REAR BRAKES

Land Rover One Ten Vehicles

1. Raise up vehicle and lower onto axle stands.
2. Each shoe is independently set by means of a hexagon adjuster. Check that the wheel turns freely and turn one adjuster until the shoe is locked against the drum. Slacken off the adjuster sufficiently for the wheel to turn freely — approximately two serrations on the snail cam.
3. Repeat the above procedure for the second brake shoe and the opposite wheel.
4. Remove the axle stands and road test the vehicle brakes.

Land Rover Ninety Vehicles

The shoes are set by a single hexagon adjustment bolt operating through a serrated snail cam enabling both shoes to be adjusted to obtain the best results.

1. Raise-up the vehicle on to axle stands.
2. Check that the wheel rotates freely then turn the adjuster until the brake shoes are in firm contact with the drum.
3. Slacken off the adjuster just sufficiently for the drum to rotate freely.
4. Repeat the procedure for the other wheel.
5. Remove the axle stands and road test the vehicle.
MAINTENANCE

ADJUST TRANSMISSION BRAKE (Handbrake)

1. Set the vehicle on level ground and chock the wheels.
2. Release the handbrake fully.
3. Remove the clevis pin connecting the handbrake lever to the relay at the gearbox end.

4. Turn the adjuster on the back plate clockwise until the shoes are fully expanded against the drum.

5. Adjust the outer sheath of the handbrake cable by means of the two locknuts at the gearbox end until the holes in the clevis on the inner cable line up with the hole in the relay lever.

6. Fit the clevis pin, washer and a NEW split pin.
7. Slacken the adjuster 1 or 2 notches until handbrake shoes just clear the drum.
8. Apply the handbrake gradually. The drum should still rotate on the first ratchet and start to come on at the second ratchet.

CAUTION: DO NOT over adjust the handbrake, the drum must be free to rotate when the handbrake is released, otherwise serious damage will result.

DRAIN FLYWHEEL HOUSING

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

Illustration A. 4-cylinder vehicles.

4. When plug is not in use it should be stowed as follows:
   4-cylinder models — in tool kit
   V8 — screwed into housing near drain hole.

Illustration B. V8 vehicles.
DRAIN ENGINE TIMING COVER — 2.5 Diesel only

1. The timing cover can be completely sealed to exclude mud and water under severe wading conditions, by fitting a plug in the drain hole at the bottom of the cover.
2. The plug should only be fitted when the vehicle is expected to do wading or very muddy work.
3. When the plug is in use it must be removed periodically and any oil present allowed to drain off before the plug is replaced.

NOTE: There should not be any oil in the timing cover, but if there is, the cause should be investigated as soon as possible, as the timing belt will deteriorate if it becomes contaminated with oil.

4. When the plug is not in use it should be stowed in the tapped hole adjacent to the drain hole.

CLEAN ENGINE TIMING COVER FILTER — 2.5 Diesel only

A gauze filter is fitted at the bottom of the engine timing cover to help prevent mud and other debris entering the drain hole, when the wading plug is not in use. The filter must be removed and cleaned periodically, to ensure that it does not become blocked and prevent the timing cover draining properly. Under normal circumstances, the filter should be cleaned at the intervals specified in the Maintenance Schedule or, more frequently if the vehicle operates regularly in wet or dusty conditions.

1. From underneath the vehicle, remove the four bolts and plain washers and, withdraw the wading plug plate from the bottom of the timing cover.
2. Wash the filter in kerosene or clean fuel. Brush off any mud or other debris and ensure that the whole filter is quite clean.
3. Check the condition of the gasket for the wading plug plate. If necessary, fit a new gasket.
4. Refit the wading plug plate. Tighten the securing bolts.

RENEW AIR CLEANER ELEMENT — 2.5 Diesel and 2.25 Petrol engines

1. Disconnect the air cleaner hose.
2. Pull up the three clips and lift out the air cleaner canister.
3. Unscrew element wing nut and sealing washer.
4. Remove and discard the element. DO NOT attempt to clean the element, fit a new one during reassembly.
5. Clean interior of canister.
6. Fit a new element and sealing washer.

continued
Check air cleaner dump valve

The dump valve provides an automatic drain for the air cleaner and is fitted in the base of the air cleaner support bracket.

7. Squeeze open the dump valve and check that the interior is clean. Also check that the rubber is flexible and in a good condition.
8. If necessary, remove the dump valve to clean the interior. Fit a new valve if the original is in a poor condition.

Fit air cleaner

9. Fit air cleaner canister and secure with the clips.
10. Connect the air cleaner hose.

RENEW AIR CLEANER ELEMENT — V8 engine

1. Unscrew the two air cleaner strap retaining nuts.
2. Disconnect the air cleaner hose.
3. Remove the engine breather hose.
4. Withdraw air cleaner canister.
5. Unscrew element wing nut and washer and remove filter seal.
6. Remove and discard the element. DO NOT attempt to clean the element, fit a new one during reassembly and secure with the wing nut.

CLEAN FUEL LIFT PUMP SEDIMENT BOWL — Petrol engine — early vehicles

1. Remove the bowl by slackening the thumb screw and swinging the retainer to one side.
2. Remove and clean the filter gauze in clean petrol.
3. Ensure that the sealing washer is in good condition.
4. Replace gauze and refit the bowl.
5. Prime the pump by operating the hand lever.
CLEAN ELECTRIC FUEL PUMP FILTER — V8 and later 2.25 Petrol engine vehicles

The pump is located mid-way along the right hand side of the chassis.
1. Release the three bolts and remove the protective cover — except ‘90’ models.

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

RENEW FUEL FILTER ELEMENT — Petrol engines 4-cylinder and V8

The element provides a filter between the pump and carburettor and is located adjacent to fuel pump on the right hand side of the chassis.
1. Release the three bolts and remove the protective cover. See ‘Clean electric fuel pump filter’.
2. Unscrew the centre bolt.
3. Withdraw the filter bowl.
4. Remove the small sealing ring and remove the element.
5. Withdraw the large sealing ring from the underside of the filter body.
6. Discard the old element and replace with a new unit.
7. Ensure that the centre and top sealing rings are in good condition and replace as necessary.
8. Fit new element, small hole downwards.
9. Refit sealing rings (small and large).
10. Replace filter bowl and tighten the centre bolt.
RENEW **FUEL FILTER ELEMENT** — Diesel engines

**Drain off Water**

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

---

**FUEL SEDIMENTER** — Diesel engines (where fitted)

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

**Drain off water as follows:**

**Drain off Water**

1. Slacken off drain plug to allow water to run out.
2. When pure diesel fuel is emitted, tighten drain plug. Dismantle and clean as detailed below.

---

**Renew filter**

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

---

**Clean element**

3. Disconnect fuel inlet pipe at sedimenter and raise pipe above level of fuel tank to prevent draining from tank. Support in this position.
4. Support sedimenter bowl and unscrew bolt on top of unit and remove bowl.
5. Remove the sedimenter element.
6. Clean all parts in kerosene.
7. Fit new seals and reverse removal procedure.
8. Slacken off the drain plug, when pure diesel fuel runs out tighten plug.
9. If necessary, prime the system.
10. Start engine and check for leaks from sedimenter.
RENEW DUCELLIER DISTRIBUTOR POINTS — 4-cylinder engines

Renew Points

1. Release the spring clips and remove the distributor cap.
2. Pull off the rotor arm.
3. Remove the dust shield.
4. Remove the retaining screw and remove the fixed contact point.
5. Slide the spring clip rearwards.
6. Disconnect the suppressor lead from the connector block.
7. Disconnect the lead from ignition coil.
8. Remove insulation washer from the moving contact point.
9. Lift off the moving contact point complete with leads and connector block from the distributor body.
10. Fit the new moving point over post.
11. Locate the leaf spring in the plastic guide.
12. Fit the insulation washer.
13. Secure the assembly with the spring clip.
14. Fit the connector block to the distributor body.
15. Connect ignition coil lead.
16. Fit suppressor lead to connector block.
17. Fit the fixed contact point and loosely retain with the screw.

Adjust points

NOTE: The following two instructions describe the adjustment of the contact points. The accompanying illustration shows it being done with the aid of special tool 18G1308. Whilst the points can be adjusted to the datum setting only (see data) without the tool full distributor adjustment, i.e. dwell angle, dwell variation and vacuum advance can only be achieved by using this tool in conjunction with engine diagnostic equipment. It is essential that the above adjustments are carried out in order to maintain correct emission levels and maximum engine efficiency.

18. Rotate the engine until a cam of the rotor fully opens the points.
19. Using a feeler, adjust the position of the fixed contact point to the datum setting and tighten the retaining screw.
20. Check and adjust the dwell angle, dwell variation and vacuum advance.
ADJUST DUCELLIER DISTRIBUTOR — 4-cylinder Petrol engine

Service tool:
1861308

Check and Adjust Dwell Angle

NOTE: The following six instructions can only be carried out using engine diagnostic equipment and special tool 18G1308.

1. Start the engine, disconnect the vacuum pipe from the vacuum unit and with the engine idling check the dwell angle — see data. If adjustment is required stop the engine, remove the distributor cap, rotor arm and dust cover, slacken the fixed contact retaining screw and using the eccentric-post end of the special tool, as illustrated, make an appropriate adjustment. Tighten the retaining screw, reassemble the distributor and recheck the dwell angle.

Check and adjust dwell variation

NOTE: A dwell variation outside the accepted tolerance — see data — can be caused by a mechanical fault or wear within the distributor. This may be checked as follows:

2. Disconnect the vacuum advance, start the engine and increase the speed to 2000 r.p.m. A variation outside the tolerance given in data indicates that the distributor has a mechanical fault which cannot be rectified by adjustment.

3. If the variation is acceptable, reconnect the vacuum pipe, start the engine and increase the engine speed to 2,000 r.p.m. and release the throttle. Check the dwell variation and if necessary adjust by turning the eccentric ‘D’ post with the special tool (female ‘D’ end). Setting the dwell for minimum variation may alter the basic setting and this must be rechecked at idle speed.

Check vacuum advance

NOTE: If the vacuum unit has been removed or the distributor dismantled, the vacuum advance must be checked and if necessary adjusted.

4. Disconnect the vacuum pipe and connect a vacuum pump to the unit.
5. Start and run the engine at idle speed and using a timing light, slowly increase the vacuum and note the point at which vacuum advance starts and compare the figure with that given in data.
6. Adjustment of the serrated cam, with the special tool, one tooth at a time, will alter the point at which vacuum advance starts.
RENEW LUCAS CONTACT BREAKER SLIDING CONTACTS — 4-cylinder petrol engine

The contact set should be renewed every 40,000 km (25,000 miles).

Remove the old contacts

1. Remove the distributor cap.
2. Remove the rotor arm.
3. Remove the retaining screw and lift the contact set complete from the plate.
4. Press the contact set spring and release the terminal plate and leads from the spring.

Fit new contacts

5. Clean the points with petrol to remove the protective coating.
6. Press the contact spring and fit the terminal plate with the black lead uppermost.
7. Fit the contact set to the moving plate, ensuring that the peg, underneath the contact pivot, locates in the hole in the moving plate.
8. The sliding contact actuating fork must also locate over the fixed peg.
9. Loosely secure the assembly with the screw, plain and spring washer.
10. Check that the contact leaf spring locates properly in the insulation shoe.

Adjust gap

11. Rotate the crankshaft until the contact heel is on the highest point of a cam.
12. Adjust the gap by inserting a screwdriver blade between the 'V' shaped notch and pip and twist the screwdriver.
13. Insert a 0.35 to 0.40 mm (0.014 to 0.016 in) feeler gauge between the points and adjust to a sliding fit and tighten the retaining screw.
14. Fit the rotor arm.

RENEW DISTRIBUTOR CONTACT SET — V8 engine

Fixed contact type

1. Unclip and remove the distributor cap.
2. Withdraw the rotor arm.
3. Remove the contact breaker spring anchor nut and lift off:
   (a) the top-half of insulation bush
   (b) the low tension lead (black)
   (c) the capacitor lead (orange)
4. Remove the contact breaker retaining screw, plain and spring washer and remove contact set assembly.
5. Remove the complete insulation bush.
6. Fit the contact breaker set ensuring that the small post protruding from below the contact set locates through the hole in the cover plate into the hole in the end of the vacuum unit actuating lever, secure with the screw, plain and spring washers.

continued
7. Assemble the contact breaker spring insulating bushes and electrical leads, as illustrated, in the following sequence:
   (a) lower bush
   (b) spring
   (c) low tension lead
   (d) capacitor lead
   (e) top bush
   and secure with the anchor spring nut.
8. Apply a few drops of engine oil to the distributor cam lubrication pad.

Adjust points — both types
9. Turn the engine in the direction of rotation until the contacts are fully open or the heel of the contact set is on the highest point of the cam.
10. Using a feeler gauge and the dwell angle adjuster on the side of the distributor, set the points to a nominal gap of 0.35 to 0.40 mm (0.014 to 0.016 in).
11. At the earliest opportunity check and adjust the dwell angle — see data — using special turning equipment.
12. Fit the rotor arm and distributor cap ensuring that the H.T. pick-up brush moves freely.

Sliding contact type

1. Release the clips and remove the distributor cap.
2. Remove the rotor arm from the cam spindle.
3. Remove the retaining screw and washers and lift the complete contact breaker assembly from the moveable plate.
4. Remove the nut and plastic bushes from the terminal post to release the leads and spring.
5. Discard the old contact breaker assembly.
6. Clean the new points with petrol to remove the protective coating.
7. Connect the leads to the terminal post in the following sequence:
   (a) lower plastic bush
   (b) red lead tab
   (c) contact breaker spring eye
   (d) black lead tab
   (e) upper plastic bush
   (f) retaining nut.
8. Fit the contact set to the moving plate ensuring that the two pegs locate in the holes.
CLEAN AND LUBRICATE V8 ENGINE DISTRIBUTOR

Fixed contact type

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

Sliding contact type

1. Remove distributor cap.
2. Remove rotor arm.
3. Lightly smear the cam with clean engine oil.
4. Add a few drops of thin machine oil to lubricate the cam bearing and distributor shaft.
5. Wipe the inside and outside of the distributor cap with a soft dry cloth.
6. Ensure that the carbon brush works freely in its holder.
7. Lubricate the actuator ramps and contact breaker heel ribs with Shell Retinax or equivalent grease.
8. Grease the underside of the heel actuator.
9. Apply grease to the fixed pin and actuator fork.
10. Refit rotor arm and distributor cap.

CLEAN AND LUBRICATE DUCHELLIER DISTRIBUTOR

1. Remove the distributor cover and lift off the rotor arm and anti-dust shield.
2. Inspect the contact breaker points; if burnt or worn they should be renewed.
3. Very lightly smear the cam with grease — Shell Retinax.
4. Lubricate the pressure pad with grease — Shell Retinax.
5. Add a few drops of oil to the felt pad in the top of the cam spindle.
6. Turn the engine until the distributor centrifugal weight pivot post is visible through the cut-out in the base plate and lubricate the pivot post with a drop of oil. Repeat for the opposite pivot post.
7. Carefully wipe away all surplus lubricant; and ensure that the contact breaker points are clean and dry.
8. Fit the anti-dust shield.
9. Refit the rotor arm, engage the slot in the spindle and push down firmly.
10. Wipe clean with dry nap-free cloth, the inside and outside of the distributor cover, particularly between the electrodes, and fit the distributor cover.

CLEAN V8 ENGINE ELECTRONIC IGNITION DISTRIBUTOR

80,000 km (48,000 miles)

Remove the distributor cap and rotor arm and wipe inside with a nap-free cloth.
DO NOT DISTURB the clear plastic insulating cover which protects the magnetic pick-up module.
MAINTENANCE

CLEAN AND LUBRICATE LUCAS DISTRIBUTOR

1. Clean and lightly grease the cam with Shell Retinax or equivalent and remove any surplus lubricant.
2. Using the same grease lubricate the underside of the heel actuator.
3. Grease the actuator ramps and contact breaker heel ribs.
4. Apply grease to the fixed pin and the actuator fork.
5. Apply a drop of clean engine oil to the felt pad underneath the rotor arm.
6. Every 40,000 km (25,000 miles) lubricate the automatic advance mechanism by injecting one or two drops of engine oil through the aperture in the base plate.
7. Wipe the internal and external surfaces of the distributor cap with clean dry nap-free cloth and fit the cap to the distributor body.

CHECK AND ADJUST V8 ENGINE DISTRIBUTOR TIMING

Using Electronic Timing Equipment

A pointer on the timing cover and marks on the crankshaft pulley indicate positions around T.D.C. on No. 1 cylinder (i.e. front cylinder on left-hand bank). Refer to 'Engine Tuning data' for appropriate ignition timing.

Engine speed accuracy during ignition timing is important. Any variation from the required idle speed, particularly in an upward direction, will lead to wrongly set ignition timing.

1. Connect a stroboscopic timing light as instructed by the manufacturer. The engine is timed on No. 1 cylinder.
2. Run the engine at idle speed.
3. Position the timing light to illuminate the crankshaft pulley and scale.
   WARNING: Ensure that personnel and equipment are kept clear of the rotating cooling fan while using the timing light.

4. If the timing is correct the pulley mark indicated in the Tuning Data will show. If correct, instruction 5 may be ignored.
5. With the engine still running at idle speed, slacken the clamp bolt and carefully rotate the distributor body as required until the correct pulley mark shows. Turn anticlockwise to advance and clockwise to retard.
6. Tighten the clamp bolt with the unit in this position.
CLEAN, ADJUST OR RENEW SPARK PLUGS

1. Withdraw the H.T. leads from the spark plugs by gripping the shrouds, do not pull on the leads.
2. Using an appropriate plug spanner, remove the spark plugs.

Clean and set gaps

3. Fit plug in plug cleaning machine.
4. Wobble plug with circular motion while operating abrasive blast for a maximum of four seconds.

CAUTION: Excessive abrasive blasting will erode insulator nose.

5. Change to air blast only and continue to wobble plug for a minimum of thirty seconds to remove abrasive grit from plug cavity.
6. Wire-brush plug threads, open gap slightly.
7. Using point file, square off electrode surfaces.
8. Set electrode gap, see ‘Engine Tuning data’.
9. Test plugs in accordance with cleaning machine manufacturer’s instructions. If satisfactory, refit plugs in engine.
10. If no machine is available carefully wire brush electrodes and blow or wash away carbon particles.

Illustration shows:
A. Dirty or unsatisfactory electrode
B. Filing plug electrodes
C. A clean plug correctly set

Refit or renew spark plugs

11. Check that the washers are fitted to the plugs.
12. It is important that only spark plugs specified in Data section are used for replacements.
13. Incorrect grades of plug may lead to piston overheating and engine failure.
14. Wash new plugs in petrol to remove the protective coating, then set the electrode gaps to the appropriate figures given in ‘Engine Tuning data’.
15. Fit the plugs and washers to the engine but do not overtighten.
16. Examine high tension leads, including the coil to distributor lead, for insulation cracking or corrosion at end contacts. Fit new leads as necessary.
17. In addition to correct firing order, high tension leads must be fitted in correct relation to each other to avoid cross firing, as illustrated. This is particularly important on the V8 engine.

First illustration. 4-cylinder engine.
Second illustration. V8 engine.

18. When pushing leads on plugs ensure ferrules within shrouds are firmly seated on plugs.
CLEAN AND TEST HEATER PLUGS — Diesel engines

REMOVE THE PLUGS

1. Disconnect the battery.
2. Remove the terminal nut from each heater plug.
3. Detach the heater plug lead and washer from each plug.
4. Remove the heater plugs.

Clean and inspect

5. Remove carbon from base of heater plugs to avoid the possibility of short circuiting of the element. Do not sandblast.
6. Examine the element for signs of fracture and deterioration and the seating for scores. Plugs with fractures or doubtful elements must be renewed. Where scoring of the seating may impair the sealing, the plug should be renewed.

Test and refit

7. Test the plug internal circuit for continuity by connecting it in circuit with a 12 volt side lamp bulb and a 12 volt supply. If the bulb does not light an open circuit is indicated and the heater plug must be renewed.

CHECK BRAKE FLUID RESERVOIR

1. Check the fluid level in the fluid reservoir by observing the level in relation to the ‘MIN’ or ‘MAX’ marks on the side of the translucent reservoir.
2. If the level is below the ‘MAX’ mark clean the outside of the filler cap and top-up with new, clean fluid from a sealed container. Use only fluid recommended in the ‘General specification data’ section. Refit the cap.

CHECK CLUTCH FLUID RESERVOIR

1. Clean and remove the reservoir cap and observe the fluid level in relation to the marks on the side of the reservoir.
2. Top-up if necessary with new, clean fluid from a sealed container and of a recommended specification — see ‘General specification data’ section. Refit the cap.

8. Ensure that the terminals are clean and that the thread at the base of the plug is free from carbon.
9. Fit the heater plugs to the engine. Do not overtighten.
10. Fit the heater plug lead and washer to each plug.
11. Connect the battery.
CHECK POWER STEERING FLUID RESERVOIR

1. Clean and remove the reservoir cap and observe the fluid level in relation to the mark on the side of the reservoir.
2. If necessary top-up with a recommended fluid — see ‘General specification data’ section — until the fluid is 12 mm (½ in) above the filter. Refit the cap.

CHECK COOLING SYSTEM COOLANT

Refer to the ‘Cooling system’ section for details of anti-freeze and inhibitors and to the ‘General specification data’ section for anti-freeze protection quantities.

With a cold engine, the expansion tank should be approximately half full.

WARNING: Do not remove the filler cap when the engine is hot because the cooling system is pressurised and personal scalding could result.

To remove the filler cap, first turn it anti-clockwise a quarter of a turn and allow all pressure to escape, before turning further in the same direction to lift it off.

When replacing the filler cap it is important that it is tightened down fully, not just to the first stop. Failure to tighten the filler cap properly may result in water loss, with possible damage to the engine through overheating.

BATTERY

Check Specific Gravity
The specific gravity of the electrolyte should be checked using a battery hydrometer. The readings should be as follows:

- Temperate climate below 26.5°C (80°F) as commissioned for service, fully charged 1.270 to 1.290 specific gravity.
- As expected during normal service, three-quarter charged 1.230 to 1.250 specific gravity.
- Tropical climate above 26.5°C (80°F) as commissioned for service, fully charged 1.210 to 1.230 specific gravity.
- As expected during normal service, three-quarter charge 1.170 to 1.190 specific gravity.
- If the specific gravity should read between 1.130 to 1.150, half-charged, the battery must be bench charged and the electrical equipment on the car should be checked.

Check and Top-Up Electrolyte Level

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

Battery terminals

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

IMPORTANT NOTE: If a new battery is fitted to the vehicle, it should be the same type as fitted to the vehicle when new. Alternative batteries may vary in size and terminal positions and this could be a possible fire hazard if the terminals or leads come into contact with the battery clamp assembly. When fitting a new battery ensure that the terminals and leads are clear of the battery clamp assembly.
**RENEW BRAKE SERVO FILTER**

1. Remove the nuts securing the master cylinder to the servo.
2. Release the clip retaining the brake pipe to the clutch pipe.
3. Separate the master cylinder from the servo.
4. Disconnect the vacuum hose from the servo.
5. Disconnect the Lucars from the stop lamp switch at the rear of the pedal box.
6. Remove the blanking grommets from the pedal box.
7. Remove the split pin from the clevis and withdraw the clevis pin and washer.
8. Remove the four nuts securing the servo to the pedal box and remove the servo.
9. Pull back the dust cover.
10. Release the end-cap.
11. Cut the filters to remove them from the shaft.
12. Clean the filter seating and fit the new filters noting that they must be cut to fit over the shaft.
13. Fit the end-cap and dust cover and refit the servo and master cylinder to the vehicle reversing the removal procedure. Use a new split pin to secure the clevis.
14. Test the brakes.
ENGINE SLOW RUNNING — 2.5 Diesel

1. Using a suitable tachometer, check the engine slow running adjustment 'see Engine tuning data'. If adjustment is necessary slacken the locknut and turn the control screw clockwise to increase the revolutions and anti-clockwise to decrease the engine speed. Tighten the locknut, increase the engine speed for a few seconds then re-check the slow running.

2. If a tachometer is not available adjust the control screw until the slowest speed is obtained consistent with smooth and even running.

NOTE: The slow running control is the only permitted adjustment in service. Any additional adjustments required must only be carried out by authorised C.A.V. agents.