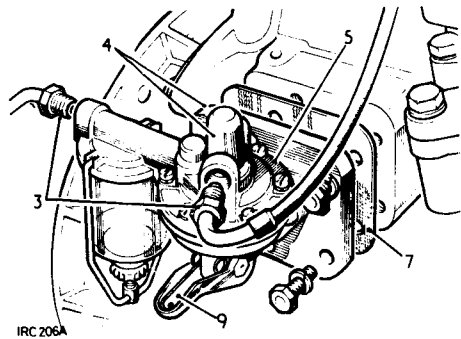


## FUEL LIFT PUMP, 2¼ litre models

Remove and refit 19.45.09

### Removing

- 1 Remove bonnet panel. 76.16.01
  - 2 Remove the air cleaner. 19.10.04.
  - 3 Disconnect fuel pipes at fuel pump.
- NOTE: The pump illustrated is for 2¼ litre Petrol models. The Diesel engine pump is similar except that no filter bowl is required.
- 4 Remove the fixings and withdraw the pump and side cover complete.
  - 5 Remove the fuel pump from the side cover.



IRC 206A

### Refitting

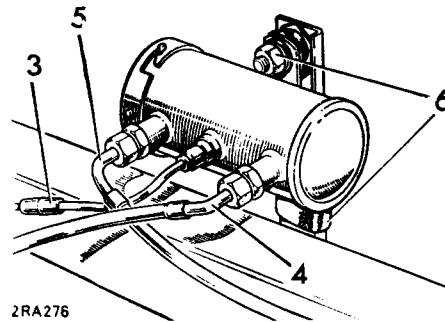
- 6 Refit pump to cover.
- 7 Smear general purpose grease on both sides of the joint washer.
- 8 Refit the fuel pump and joint washer and connect the fuel pipes.
- 9 Prime the fuel pump by operating the hand prime lever until no resistance is felt.
- 10 Diesel models. Release the air vent screws on the fuel distributor casing (19.50.01 refers) and operate the pump hand prime lever until the fuel flow from the vent screws is free of air. Close the vent screws.
- 11 Reverse instructions 1 and 2.

## FUEL LIFT PUMP, 2.6 litre models

Remove and refit 19.45.09

### Removing

- 1 Disconnect the battery leads.
- 2 Lift the seat (RH side) and remove the seat box panel to expose the fuel pump.
- 3 Disconnect the wiring at the snap connector.
- 4 Disconnect the fuel outlet pipe.
- 5 Disconnect the fuel inlet pipes.
- 6 Remove the clamp fixings.



2RA276

- 7 Withdraw the pump and mounting rubbers.

### Refitting

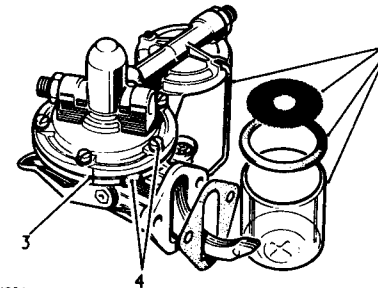
- 8 Reverse instructions 1 to 7.

## FUEL LIFT PUMP, 2¼ litre models

Overhaul 19.45.16

### Dismantling

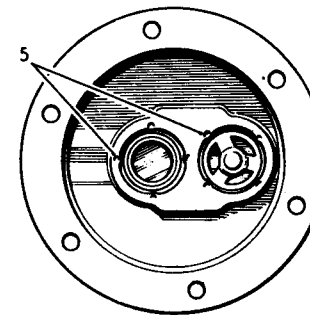
- 1 Remove the lift pump. 19.45.09
- 2 2¼ litre Petrol. Unscrew the nut at base of sediment bowl, move the retainer aside, and withdraw the bowl, sealing washer and filter gauze. Care should be taken to avoid damage to filter gauze.
- 3 Mark the upper and lower halves of pump casing to ensure correct alignment on reassembly.
- 4 Remove top cover fixing screws, and while pressing diaphragm tab against pump body, lift top cover clear.



IRC 1024

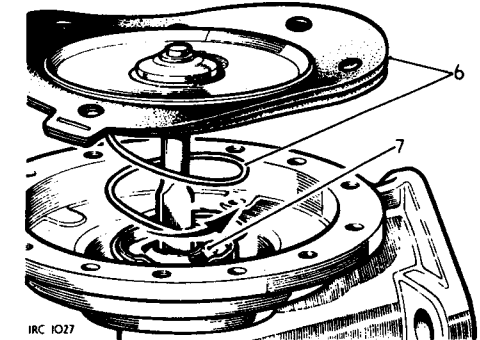
- 5 If required, remove the valves retaining staking using a scraper, warm the top cover and withdraw the valves.

NOTE: Note the valves fitted position before removing.



IRC 1026

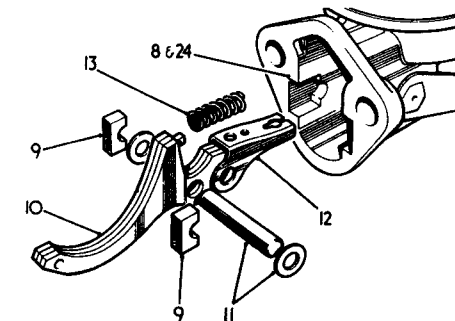
- 6 Ease the diaphragm from pump body, slightly depress metal part of diaphragm and turn through 90° in either direction, whereon the diaphragm spring will push diaphragm clear.
- 7 File the peening marks from the oil seal housing and lever out oil seal and retainer.



IRC 1027

- 8 Using a small chisel, remove the staking from the rocker arm retainers.
- 9 Withdraw the retainers.
- 10 Withdraw the rocker arm.
- 11 Withdraw the rocker arm pin and washers.
- 12 Detach the operating link.
- 13 Withdraw the rocker arm spring.

continued



IRC 1028

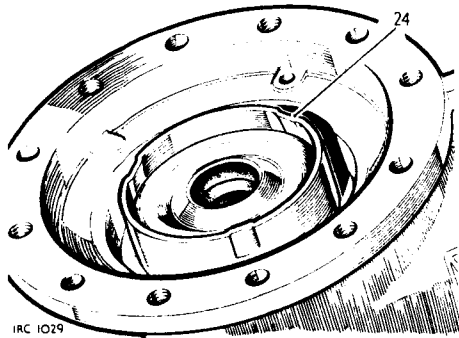
- 14 It is extremely unlikely that the hand priming mechanism will ever require replacement, but may be removed by filing the hexagon each side of the operating lever and springing the hand lever clear, withdraw the cork washers and hand rocker.

#### Inspecting

- 15 Clean all parts thoroughly in paraffin.  
 16 Examine all parts for wear and replace as necessary.  
 17 Replace all gaskets.  
 18 Sediment bowl filter disc must be free of damage and fit tightly around inlet neck of upper casing. (2¼ Petrol models).  
 19 Renew diaphragm assembly if any sign of hardening, cracking or porosity is present.  
 20 Only very slight wear should be tolerated at the rocker arm contact face, pivot pin, operating link and diaphragm pull rod slots.  
 21 Springs should be replaced, ensure correct type are used.  
 22 Test valves for air tightness, by suction.  
 23 Check upper and lower casing flanges for distortion, using a straight edge.

#### Reassembling

- 24 Reverse 7 to 13. Re-stake to secure the rocker lever retainers and the oil seal retainer.



IRC 1029

- 25 To refit the diaphragm assembly, hold the pump body with the diaphragm return spring in position, and the rocker arm held outwards. Position the diaphragm over the spring with the flattened end of the pull rod in line with the slot in the operating link. Push the diaphragm inwards and turn to lock.  
 26 Fit the valve gaskets into the top cover.  
 27 Fit the inlet and outlet valves and secure by staking.  
 28 Place top cover assembly in position, aligning the marks made before dismantling. Fit securing screws, but do not tighten at this stage; using hand priming lever, fully depress diaphragm and fully tighten securing screws.

**NOTE:** The diaphragm outer edges should be approximately flush with the outer edge of the pump joint faces when fitted, any appreciable protrusion of the diaphragm beyond the joint face edges indicates improper fitment and necessitates the release of the securing screws and refitment in accordance with item 28.

- 29 2¼ litre Petrol. Replace filter gauze and neoprene sealing ring, refit retaining clip and position sediment bowl centrally and secure the retaining clip.

**NOTE:** Do not overtighten securing nut, to prevent cracking of sediment bowl.

**Fuel pump test:** without special equipment

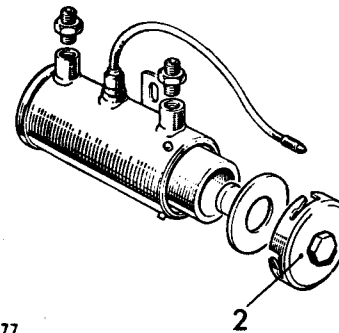
- 30 Immerse pump in a bath of paraffin and operate rocker arm several times to flush.  
 31 Hold the pump clear of the bath and continue to operate the rocker arm until the pump is empty, then place a finger over the inlet port and operate rocker arm several times. A distinct suction should be heard when the finger is removed from the inlet port, denoting that a reasonable degree of suction has been developed.

- 32 Place a finger over the outlet port and again operate the rocker arm. Air pressure should be felt for two to three seconds after rocker movement has ceased. Build up the air pressure in the pump again, and with the finger held firmly over the outlet, submerge the pump completely in the paraffin bath, then observe the joint face edges for signs of air leakage.  
 33 Fit the lift pump. 19.45.09.

#### FUEL LIFT PUMP 2.6 litre models

Overhaul 19.45.16

- 1 Remove the pump. 19.45.09.
- 2 Release the end cap and withdraw the gasket and filter.
- 3 Renew the gasket and filter if necessary.
- 4 Reverse instructions 1 and 2



2RA277

#### FUEL SYSTEM, 2¼ litre Diesel models

Priming 19.50.01

**Procedure after dismantling filter/sedimentor, items 1 to 6.**  
**Procedure after emptying fuel system, items 7 to 12.**  
**Procedure after emptying distributor pump, item 13.**

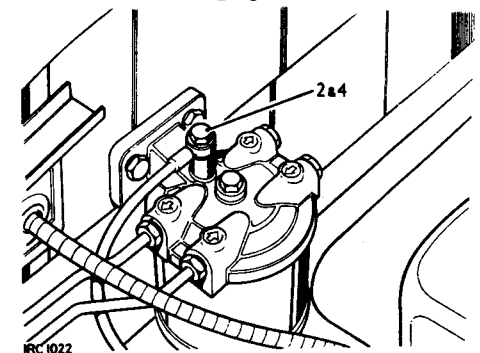
**Procedure after fuel filter/sedimentor dismantling**

**NOTE:** When models fitted with a sedimentor have had the water drained only from the sedimentor bowl, no priming is necessary as the water is replaced by fuel automatically syphoned from the tank. However, if the sedimentor has been dismantled or air has entered the body, or where the fuel filter element has been replaced or the filter bowl cleaned, then the system must be primed as follows:

- 1 Do not attempt to start the engine hoping to draw the fuel through in this way, otherwise the full priming procedure will be necessary.
- 2 Slacken the bleed pipe banjo bolt on the top of the main fuel filter.
- 3 Operate the hand priming lever on the mechanical pump, until fuel free from bubbles emerges.

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

- 4 Tighten the bleed pipe banjo bolt with fuel still emerging.

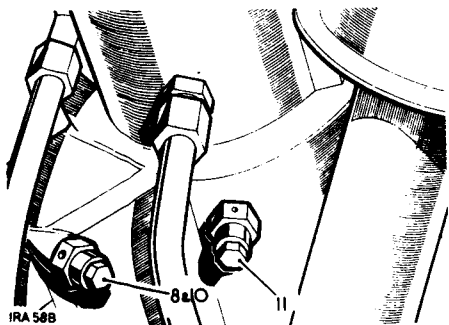


IRC 1022

- 5 Operate the hand priming lever once or twice to clear the last bubbles of air into the filter bleed pipe.
- 6 Start engine in normal way and check for leaks.

**Procedure when fuel system has been emptied**

- 7 Carry out operations above, 1 to 5 inclusive.
- 8 Release air vent screw on distributor body.



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

**Procedure when distributor pump only has been drained**

- 13 Carry out instructions 8 to 12 inclusive.

## FUEL TANK DRAINING

**WARNING:** Petrol (gasoline) must not be extracted or drained from a vehicle standing over a pit.

Petroleum or 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 an ignitable mixture. The vapour is heavier than air, and will always fall to the lowest level and it can readily be distributed throughout a workshop by air currents. Even a small spillage of petrol or gasoline is potentially very dangerous.

Extracting or draining petrol (gasoline) from a vehicle fuel tank, must be carried out in a well ventilated area, preferably outside the workshop. All forms of ignition must be extinguished or removed, any hand lamps must be flameproof and kept clear of any spillage. The receptacle used to contain the petrol drained or extracted must be more than adequate to receive the full amount to be drained.

## FUEL TANK, side mounted (as applicable)

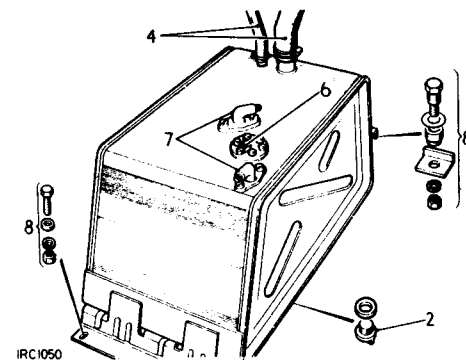
**Remove and refit 19.55.01**

### Removing

- 1 Disconnect the battery earth lead.
- 2 Drain fuel into a clean container.
- 3 Remove RH seat cushion and fold seat squab forward.
- 4 Disconnect hoses, tank to filler tube and breather hose.
- 5 Remove cover panel for fuel tank.
- 6 Disconnect wires at gauge unit.
- 7 Disconnect fuel supply pipe and for Diesel models spill return pipes.
- 8 Support tank and remove tank securing bolts.
- 9 Lower tank and remove from under the vehicle.

### Refitting

- 10 Reverse instructions 1 to 9.
- 11 If the vehicle is a Diesel model, prime the fuel system. 19.50.01.



## FUEL TANK, rear mounted (as applicable)

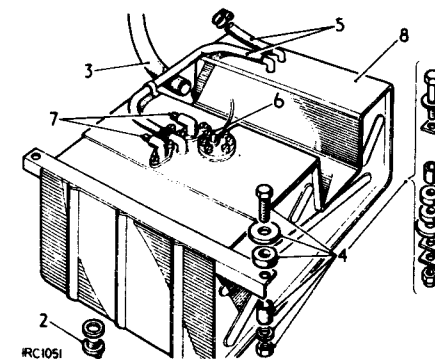
**Remove and refit 19.55.01**

### Removing

- 1 Disconnect the battery.
- 2 Drain the fuel into a clean container.
- 3 Release the clip securing the filler tube hose to the tank.
- 4 Support the tank and remove the tank securing bolts, then lower the tank sufficient only to give access to the pipes and leads at the tank top.
- 5 Disconnect the breather and air balance pipes.
- 6 Disconnect wires at gauge unit.
- 7 Disconnect the fuel supply pipe, and for Diesel models, the spill return pipe.
- 8 Lower the tank and remove from under the vehicle.

### Refitting

- 9 Reverse instructions 1 to 8.
- 10 If the vehicle is a Diesel model, prime the fuel system. 19.50.01.



## FUEL INJECTORS

Remove and refit

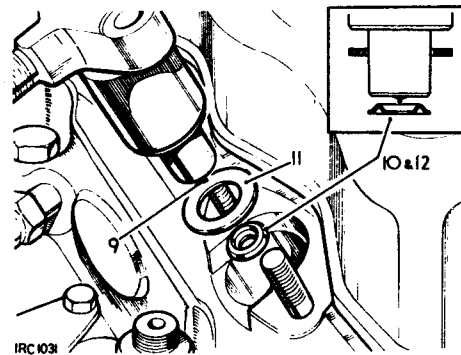
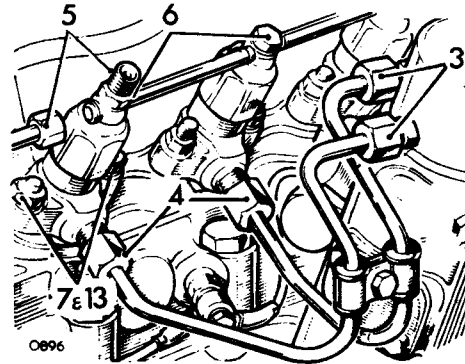
19.60.01

### Removing

- 1 Remove the bonnet panel. 76.16.01.
- 2 Remove the air cleaner. 19.10.04.
- 3 Slacken the injector feed pipes at the distributor pump.
- 4 Disconnect the injector feed pipes at the injectors.
- 5 Disconnect the fuel spill pipes at No. 4 injector.
- 6 Slacken the spill rail fixings at the injectors.
- 7 Remove the injector fixings.
- 8 Withdraw the injectors complete with spill rail.
- 9 Take care to avoid damage to the needle valves which protrude from the injector faces. Immerse the components in clean fuel pending overhaul or refitting.
- 10 Remove the steel sealing washers from the injector housing bores.
- 11 The remaining sealing washers (copper) are normally withdrawn with the injectors, ensure that they are not left behind in the bores.

### Refitting

- 12 Refit the new steel sealing washers into the injector bores, with the raised corrugation uppermost.
- 13 Reverse 7 and 8, using new copper sealing washers. Injector fixings torque 0,8 to 1,0 kgf. m (6 to 8 lbf. ft.). Tighten alternate fixings by equal amounts to ensure injector is seated squarely.
- 14 Reverse 3 to 6.
- 15 Prime the fuel system. 19.50.01.
- 16 Reverse instructions 1 and 2.



## FUEL INJECTORS

Spray, check on vehicle

19.60.02

### General

#### Injector nozzle type

'Pintaux' nozzles are used, these being a development of the 'Pintle' type nozzle.

In a 'Pintle' nozzle, the valve stem provides a pin or pintle which protrudes through the nozzle body orifice to form the correct fuel spray angle.

In a 'Pintaux' nozzle, an auxiliary spray hole is also provided for easy starting.

The 'Pintaux' type nozzle has been developed by CAV for use with the type of cylinder head chosen for Rover CI engines. This type of nozzle has been found most satisfactory for starting and general running and must be replaced by the same type only.

#### Checking nozzle assemblies

**WARNING:** Do not allow the fuel spray to contact the person otherwise injury may result from skin penetration.

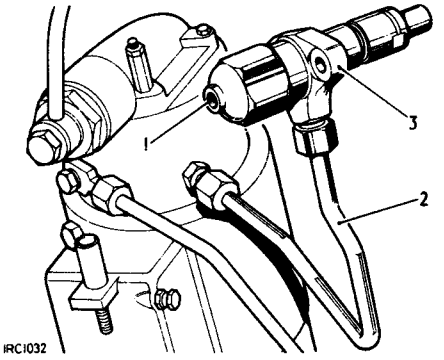
When an injection nozzle is considered to be the cause of irregular running and loss of power, a quick check may be made by loosening the fuel feed pipe union nut on each nozzle in turn, whilst the engine is idling and again at approximately 1,000 rev/min.

If the injection nozzle assembly being checked has been operating properly, there will be a distinct reduction in engine speed accompanied by obvious roughness, but a faulty injection nozzle may make little or no difference to the engine note when its fuel feed pipe is loosened.

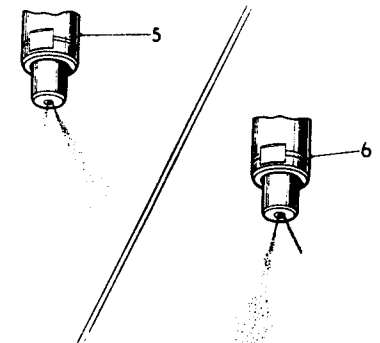
#### Checking spray

- 1 Remove the fuel spill gallery pipe complete from the injection nozzles.
- 2 Disconnect the fuel feed pipe (injection pump to nozzle) from the nozzle to be tested and from the injection pump.
- 3 Release the fixings and withdraw the suspected injection nozzle assembly;

reconnect the pipe and nozzle assembly to the injection pump in a position whereby fuel ejection may be observed.



- 4 Loosen the union nuts securing the remaining fuel pipes to injection nozzles.
- 5 Whilst the starter turns the engine over, observe the manner in which fuel issues from the nozzle and compare the spray form with the correct form as illustrated.
- 6 Very little fuel should issue from the main spray hole with the engine turning over at starter speed but a fine spray comparable to that illustrated should be ejected from the auxiliary spray hole.
- 7 If the ejected fuel is more in the form of a liquid jet or issues from the main pintle hole, then the nozzle and holder assembly should be removed for overhaul and a replacement unit fitted.
- 7 Reverse instructions 1 to 4.



## FUEL INJECTORS

Overhaul 19.60.08

Dismantling and assembling, items 1 to 26.  
Bench testing procedure, items 27 to 41.

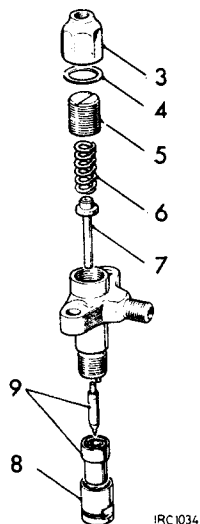
### Service tools:

- 271482 Spanner for nozzle cap
- 271483 Injector nozzle testing and setting kit
- 278181 Tool for flushing injector nozzles
- 278182 Adaptor for Pintaux injector
- 605002 Injector nozzle cleaning kit
- 605003 Injector nozzle cleaning wire (0,2 mm diameter)

**NOTE:** Where a number of tools are supplied in kit form, the manufacturer's identification number is quoted in the text referring to the specific tool. The individual tools which make up a kit are not available separately.

### Dismantling

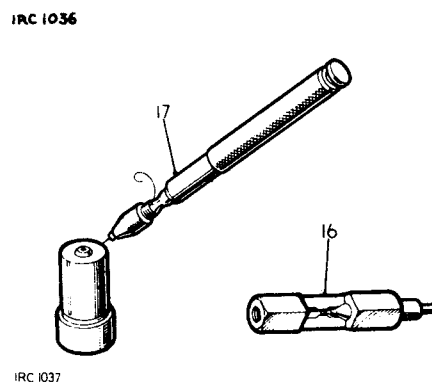
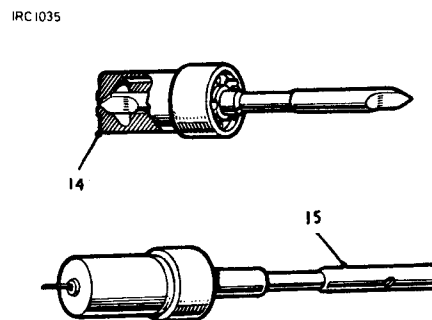
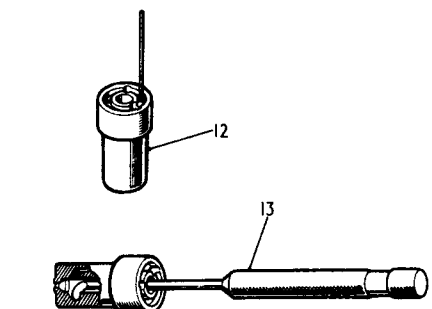
- 1 Remove the injectors. 19.60.01.
- 2 Disconnect the injectors from the fuel spill rail.
- 3 Remove the combined locknut and end cap.
- 4 Withdraw the sealing washer.



- 5 Unscrew the pressure adjusting screw.
- 6 Withdraw the pressure spring.
- 7 Withdraw the valve spindle.
- 8 Unscrew the cap nut.
- 9 Withdraw the nozzle valve and body.

### Cleaning and inspecting

- 10 Soak the component parts of the assembly in Shell Calibration Fluid to loosen carbon deposits, but do not allow parts of any one assembly to be interchanged with those of another.
- 11 Brush away all external carbon deposits from component parts with a brass wire brush ET068 (or 7044/68) and replace them in the oil bath. Particular care must be exercised when cleaning the pintle and seat of nozzle valve to avoid scratching or scoring, which may result in spray distortion.
- 12 Clean the three oil feed passages in the nozzle body with a wire or drill of 1,5 mm (0.062 in.) diameter.
- 13 Remove the carbon from the annular recess with tool ET071 (or 7044/71).
- 14 Remove the carbon from the valve seat, using tool ET070 (or 7044/70) with a rotary motion.
- 15 Select the appropriate size probe from the pocket of cleaning kit and secure it in the pintle hole cleaner ET069 (or 7044/69). Insert the probe into the bore of nozzle valve body and allow the end to extend through the main fuel outlet, then turn in a rotary manner to remove carbon.
- 16 Carbon may be removed from the nozzle valve cone by inserting the valve into tool ET072 (or 7044/72) and then rotating it alternately in a clockwise then anti-clockwise manner whilst pressing the valve inward. If the nozzle is blued or the seating has a dull circumferential ring indicating pitting or wear, the nozzle body and valve should be returned to a CAV Service Agent and replacement parts fitted. Do not attempt to lap the nozzle valve to body. This process requires special equipment and training.

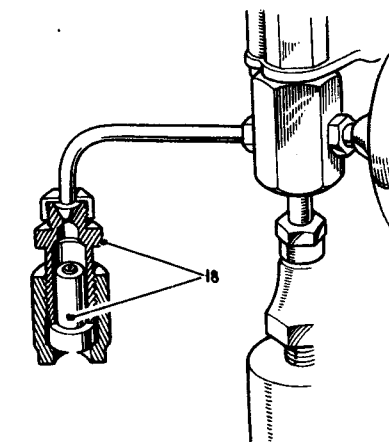


- 17 Clean the auxiliary spray hole using tool ET120 (or 7044/120) fitted with probing wire 0,20 mm (0.008 in.) diameter. Wire 605003.

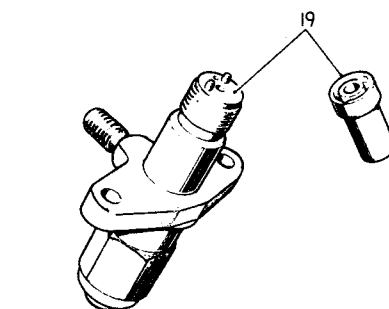
**NOTE:** Allow 1,5 mm (0.062 in.) only to extend from the chuck and thus minimise the possibility of the wire bending or breaking while probing. Great care must be taken to prevent breakage of the wire in the hole.

- 18 With flushing tool ET427 (or 278181) secured to the nozzle testing outfit, fit the nozzle body (spray holes uppermost) to the flushing tool and pump test oil through vigorously. This flushing process is necessary for the removal of any tiny carbon particles which may have become lodged in the body after scraping and probing.
- 19 Examine the pressure faces of nozzle body and nozzle holder to ascertain their freedom from scoring and scratches. These surfaces must be perfectly smooth.

continued



IRC 1039



IRC 1038

**Reassembling**

- 20 Fit the nozzle valve to nozzle and check for freedom of movement.
- 21 Immerse the nozzle body and valve in the fluid bath and assemble whilst submerged.
- 22 Wash the remaining components thoroughly and reverse dismantling procedure, items 1 to 8.
- 23 Set the injection nozzle assembly in accordance with the following test procedure.

**Bench testing of injection nozzle and holder assembly****General information, items 24 to 26**

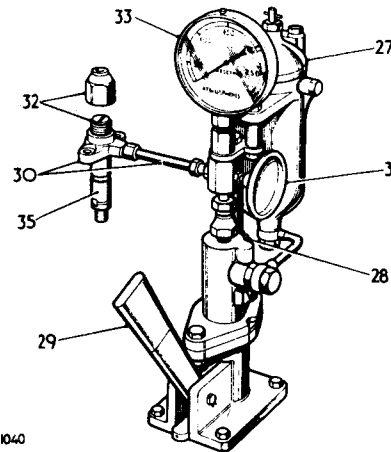
- 24 To check a nozzle assembly and ensure that it is functioning correctly, a setting outfit (as illustrated in 'Procedure') is essential. A bench covered with linoleum or non-ferrous sheet metal is most suitable for mounting the outfit; such a surface facilitates the cleanliness essential when checking nozzle parts. Between the bench and setting outfit, a tray, also of non-ferrous metal, should be positioned to prevent spilt fuel spreading. Small containers may be attached to the bench to isolate the component parts of each assembly; these parts are carefully mated by the manufacturers and must not be interchanged. Lastly, a small bath with cover, containing Shell Calibration Fluid for washing components, should be kept conveniently near.
- 25 The efficient operation of the injection nozzle assembly is dependent on four main conditions, as follows:
  - a The nozzle valve must open at 135 Ats.
  - b The rate of back leakage must be within 150 to 100 Ats.
  - c Seat tightness must be sufficient to prevent leakage.
  - d Spray form must compare favourably with the illustrations.

- 26 Pressure setting, back leakage and seat tightness tests may be made by coupling the injection nozzle and holder assembly direct to the pressure feed pipe on setting outfit, but an adaptor must be fitted between the pipe and injection nozzle and holder assembly when testing spray form. This adaptor, see item 38, increases the pressure of fuel to the injection nozzle and holder assembly sufficiently for the main and auxiliary spray form to be determined.

**Testing procedure**

**WARNING:** The injection nozzle must not be allowed to point towards the operator when spraying and the hands must never be allowed to contact the spray which has great penetrating force.

- 27 Remove the cap from oil container and fill with 0.8 litre (1.5 pints) of Shell Calibration Fluid.
- 28 Air vent the system by removing the vent screw, allow oil to flow freely for a few seconds and replace the screw whilst the flow continues.
- 29 Operate the pump handle until oil flows from pipe.



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- 30 Connect the injector and holder assembly to the pressure feed pipe with the nozzle pointing downwards. The length and bore of this pipe is important and replacement pipes must be approximately 75 mm (2.8 in.) between the union nuts and of 3 mm (0.118 in.) bore.
- 31 Close the check valve to keep the pressure gauge out of circuit and smartly operate the hand lever several times to expel all air from the system.

**Back leakage test**

- 32 Adjustment is made by removing the combined end cap and locknut from the nozzle holder, and turning the adjusting screw clockwise to increase and anti-clockwise to decrease the opening pressure.
- 33 Fit assembled injector to nozzle setting outfit and adjust to open at 160 to 170 atmospheres then pump up to just below this figure, release handle to allow the needle of gauge to fall naturally. Time the pressure drop from 150 atmospheres down to 100 atmospheres.
- 34 This should be not less than 5 seconds for the original nozzle and not less than 7 seconds if a new one is to be fitted, and not more than 36 seconds for either with oil temperature 10° to 21° C (50° to 70° F).
- 35 Check externally the top and bottom of nozzle cap nut and pressure pipe union nuts for signs of oil leakage. If leakage occurs at the nozzle cap nut, remove the nut and examine the pressure faces of nozzle holders and nozzle body (see item 19) for presence of foreign matter or surface scoring, before tightening further. A leakproof nozzle assembly with an excessive rate of pressure drop indicates a worn nozzle valve; the nozzle valve and nozzle body should be renewed.

**Pressure setting**

- 36 The selected operational opening pressure of the nozzle valve is 135 atmospheres. Readjust to this setting in the manner described in item 32.

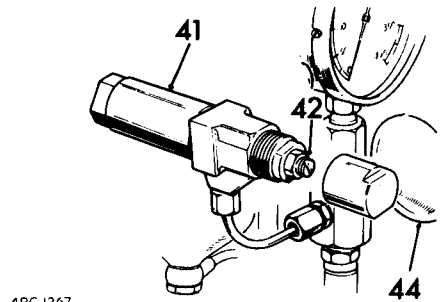
**Seat tightness**

- 37 Wipe the bottom face of the injection nozzle dry and raise the pressure in the system to 125 atmospheres. A slight dampness on the bottom face is permissible, but blob formation or dripping indicates a badly seating valve in which case the assembly should be dismantled for further examination.

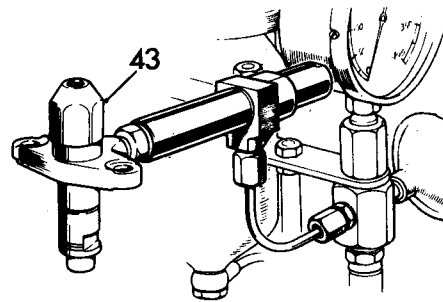
**Spray form**

- 38 Fuel delivery to the injection nozzle assembly when testing spray form must be characteristically similar to fuel delivery under normal operating conditions and to effect these conditions an adaptor (CAV Y7044872) must be fitted between the injection nozzle assembly and the pressure pipe.
- 39 The adaptor differs mainly in the cap nut and nozzle valve from the ordinary type of injection nozzle and holder assembly as fitted to the engine; the nozzle valve has no pintle.
- 40 The cap nut is extended, bored and threaded to receive nozzles for testing.

- 41 Connect the adaptor assembly to the pressure pipe.
  - 42 Remove the end cap and adjust the opening pressure of the nozzle valve to 220 atmospheres.
  - 43 Screw the injection nozzle and holder assembly to be tested, into the adaptor.
  - 44 With the check valve closed, operate the handle smartly to expel air from the system. The auxiliary spray form may be tested at 60 strokes per minute and the main spray at 140. Spray development from starting to running speeds is illustrated, this illustration should be referred to and compared with the spray form of nozzles under test.
- Spray formation should be well formed and free from splits or distortion. A slight centre 'core' can be disregarded. Observe the main spray through 360 degrees to ensure a uniform spray.
- 45 When satisfactory, reverse instructions 1 to 3.

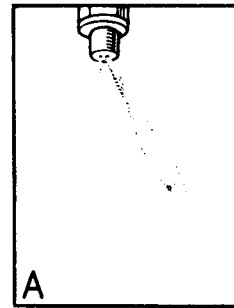


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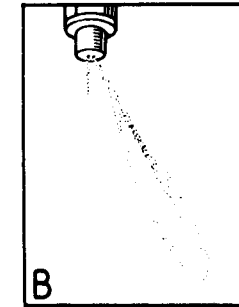


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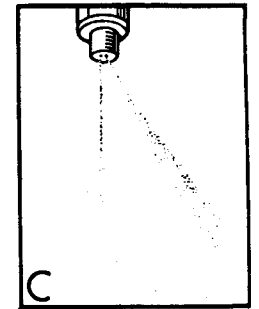
Injector nozzle spray form, starting to running conditions.



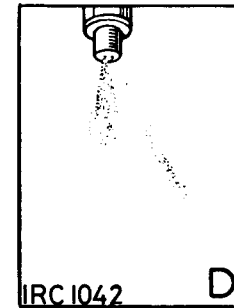
A



B

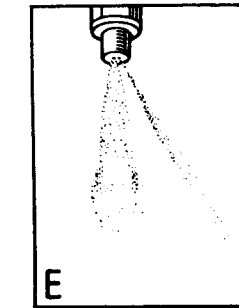


C

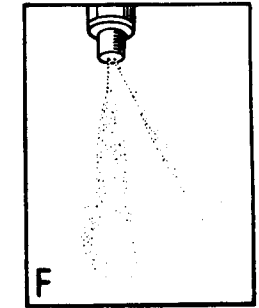


IRC1042

D



E



F





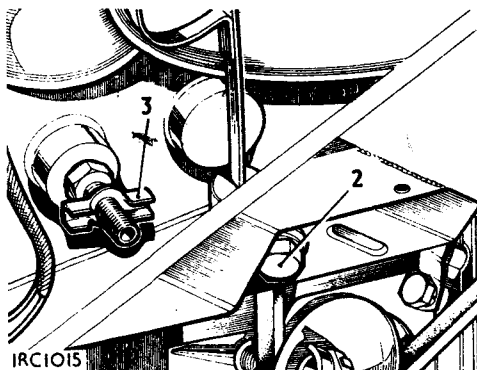
## COOLANT

Drain and refill

26.10.01

### Draining

- 1 Remove the radiator filler cap.
- 2 Remove the radiator drain plug situated on the right hand side.
- 3 Open the cylinder block drain tap located as follows:  
2¼ litre — at left hand side adjacent to the dipstick. (Plug on later engines).  
2.6 litre — at right hand side adjacent to the engine breather.



### Refilling

- 4 Reverse 2 and 3. If antifreeze solution is to be added, first pour 4.5 litres (8 pints) of water into the system then add the required quantity of the recommended solution (see Section 09).
- 5 Top up with water to between 12 mm and 19 mm (0.5 in. and 0.75 in.) below the bottom of the radiator filler neck.
- 6 Check and top up after the initial short engine run.
- 7 Ensure that the expansion tank coolant is maintained at approximately one-quarter full.

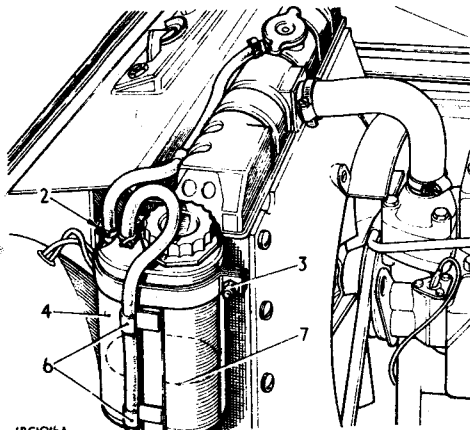
## EXPANSION TANK

Remove and refit

26.15.01

### Removing

- 1 Open and prop the bonnet.
- 2 Disconnect the radiator overflow hose at the expansion tank.
- 3 Slacken the pinch bolt on the securing bracket.
- 4 Withdraw the expansion tank.



### Refitting

- 5 Reverse 3 and 4.
- 6 Refit the vent hose into the clips on the tank retainer.
- 7 Fill the expansion tank approximately one-quarter full with coolant.
- 8 Reconnect the overflow hose.
- 9 Close the bonnet.

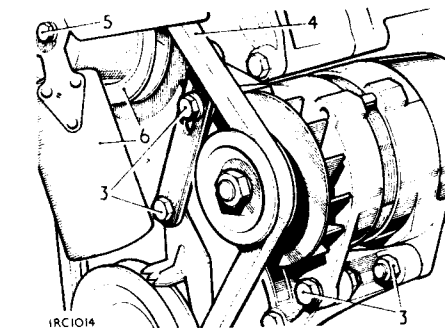
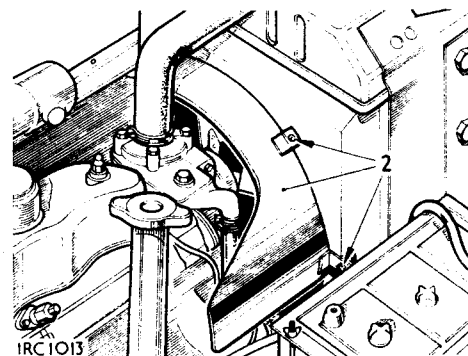
## FAN BLADES AND PULLEY – 2¼ LITRE MODELS

Remove and refit

26.25.01

### Removing

- 1 Open and prop the bonnet.
- 2 Remove the shroud from the radiator fan cowl.
- 3 Remove the cowl fixings and hold the cowl against the engine.
- 4 Slacken the alternator fixings
- 5 Remove the fan belt.
- 6 Remove the fan blade fixings.
- 7 Withdraw the fan blades and pulley.



### Refitting

- 8 Reverse 2 to 7. Adjust the fan belt tension to 6.3 mm to 9.5 mm (0.25 in. to 0.375 in.) checked by thumb pressure between the fan and crankshaft pulleys.
- 9 Refit the fan shroud.
- 10 Close the bonnet.

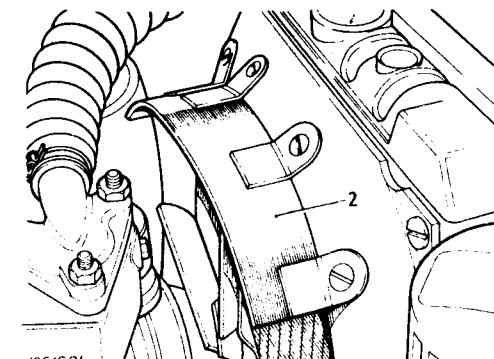
## FAN BLADES AND PULLEY – 2.6 LITRE MODELS

Remove and refit

26.25.01

### Removing

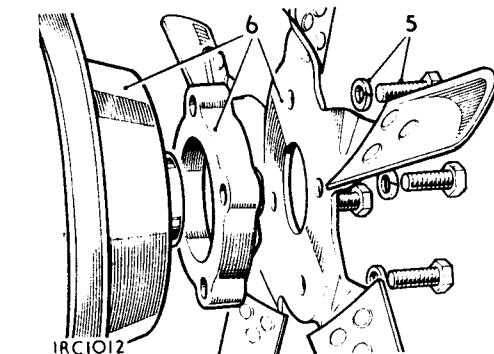
- 1 Open and prop the bonnet.
- 2 Where a steel bladed fan is fitted:- remove the shroud from the radiator fan cowl.
- 3 Slacken the alternator fixings.
- 4 Remove the fan belt.
- 5 Remove the fan blade fixings.



- 6 Withdraw the fan blades, packing piece and pulley.

### Refitting

- 7 Reverse 3 to 6. Adjust the fan belt tension to 8 mm to 11 mm (0.312 in. to 0.437 in.) checked by thumb pressure between the fan and crankshaft pulleys.



- 8 Refit the fan shroud.
- 9 Close the bonnet.

Where a viscous fan with plastic blades is fitted:-

- 1 Remove the radiator – 26.40.04.
- 2 Remove the four fixings to remove the plastic fan.
- 3 If necessary, remove the central nut and washer to extract the viscous coupling from the water pump/pulley.

### Refitting

- 4 Reverse 1 to 3.

## RADIATOR AND FRONT PANEL ASSEMBLY

Remove and refit

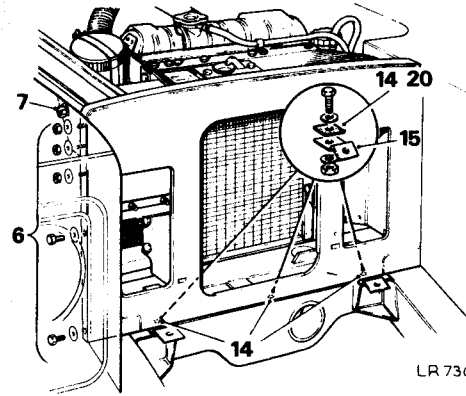
26.40.01

### Removing

- 1 Remove the bonnet.
- 2 Disconnect and remove the battery.
- 3 Drain the radiator and cylinder block.
- 4 Remove five self-tapping screws and remove the radiator grille.
- 5 Remove four screws and the front valance.
- 6 Working from the wheel arch, remove the five nuts and bolts securing the front panel to the right-hand front wing. This will include the two nuts and bolts retaining the bonnet prop bracket.
- 7 Slacken the third nut and bolt retaining the bonnet prop bracket to facilitate alignment of holes when refitting.
- 8 Remove the five nuts securing the front panel to the left-hand wing and remove the studs.
- 9 Release the top hose from the radiator connection.
- 10 Remove the nut securing the fan cowl to the battery tray.

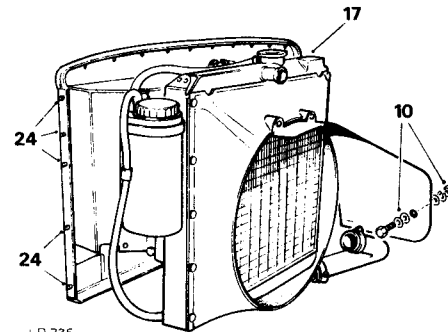
**NOTE:** Before carrying out instructions 11 and 12 make a note of the colour codes to facilitate re-connection.

- 11 Release the headlamp and auxiliary harness from the 'P' clips from the centre of the front panel and disconnect the earth lead secured by the centre bolt.
- 12 Disconnect the auxiliary harness from the left-hand side and withdraw the harness from the right-hand side.
- 13 Disconnect the right-hand headlamp harness from the left-hand section at the centre of the radiator aperture and withdraw the cables through the grommets.
- 14 Remove the three nuts and bolts securing the front panel to the cross-member. To ensure correct alignment of the front panel on reassembly make a note of the number and position of the rubber packing pieces.



LR 736

- 15 Retrieve the two brackets for securing the front valance.
- 16 Pull the front panel and radiator assembly forward to enable the radiator bottom hose to be released from the water pump connection.
- 17 Withdraw the front panel and radiator assembly complete.
- 18 Fit and tighten the radiator drain plug (if fitted) or close the drain top.

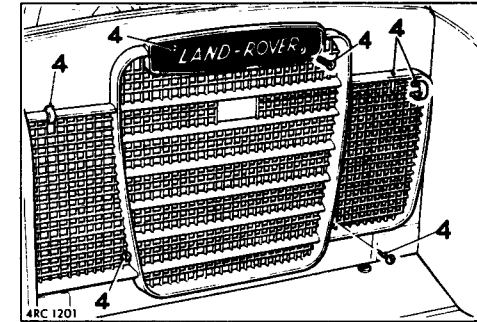


LR 735

### Refitting

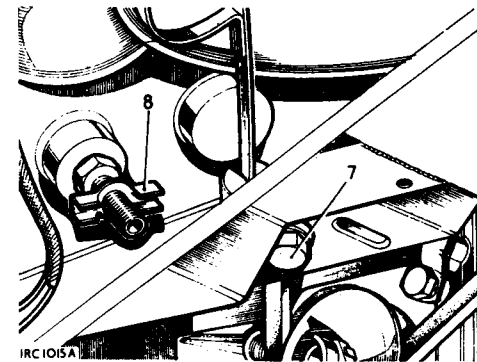
- 19 Lift the front panel and radiator into position and connect the bottom hose to the water pump.

- 20 Refit the rubber packing pieces in the same positions as originally fitted to ensure correct alignment of the radiator.
- 21 Fit the three nuts and bolts securing the front panel to the chassis cross-member and attach the two brackets for retaining the front valance to the two end bolts.
- 22 Secure the front panel to the right-hand wing and tighten the third nut and bolt retaining the bonnet stay bracket.
- 23 Fit the five nuts and bolts.
- 24 Fit the two strips of captive studs to the left-hand side of the front panel and secure with the five nuts and washers.
- 25 Pass the left-hand and right-hand headlamp leads through the grommets and fasten together with the bullet connectors.
- 26 Pass the right-hand harness through the grommets and connect to the leads on the left-hand side with bullet fasteners.
- 27 Secure the harness with the 'P' clips and connect the earth wire to the centre bolt in the top of the front panel.
- 28 Connect the top hose to the radiator.
- 29 Secure the fan cowl to the battery tray.
- 30 Fit the front valance.
- 31 Fill the cooling system in accordance with instructions in operation 26.10.01.
- 32 Fit the bonnet.



JRC 1201

- 5 Remove the radiator grille.
- 6 Remove the radiator cap.
- 7 Remove the radiator drain plug.
- 8 Open the drain tap at the cylinder



JRC 1015A

## RADIATOR

Remove and refit

26.40.04

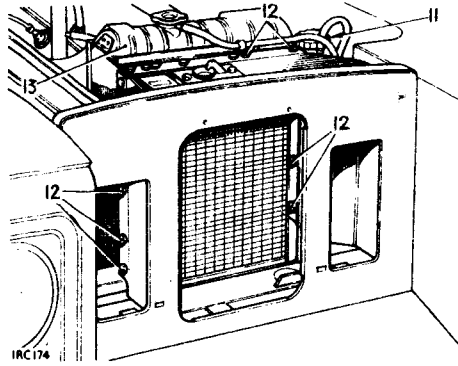
### Removing

- 1 Open and support the bonnet.
- 2 Disconnect the battery earth lead.
- 3 2.6 models – remove the air cleaner – 19.10.01.
- 4 Remove the four screws and two anti-rattle clips securing the radiator grille.

block right hand side (2.6 litre) or left hand side (2¼ litre) models.

- 9 Disconnect the radiator top and bottom hoses.
- 10 Remove the fan cowl and shroud from the radiator and displace rearwards clear of the radiator.

- 11 Remove the expansion tank.
- 12 Remove the fixings, radiator to grille panel.
- 13 Carefully lift out the radiator avoiding the fan blades and shroud.



- 14 Where required, lift out the fan cowl.

#### Refitting

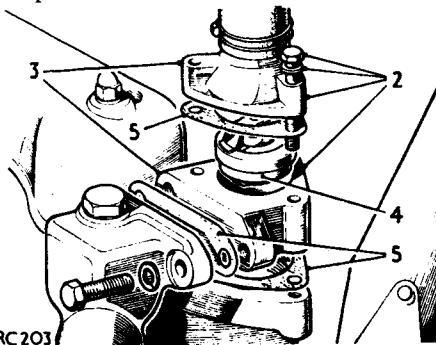
- 15 Reverse 1 to 14.
- 16 Run the engine and check all hose connections for leakages.

### THERMOSTAT – 2½ LITRE MODELS

Remove and refit 26.45.01

#### Removing

- 1 Remove the radiator cap and partially drain the coolant.
- 2 Remove the outlet pipe and thermostat housing fixings.
- 3 Withdraw the pipe and housing complete.



IRC203

- 4 Separate the pipe from the housing and withdraw the thermostat and 'O' ring seal.
- 5 Withdraw and discard the joint washers.

#### Refitting

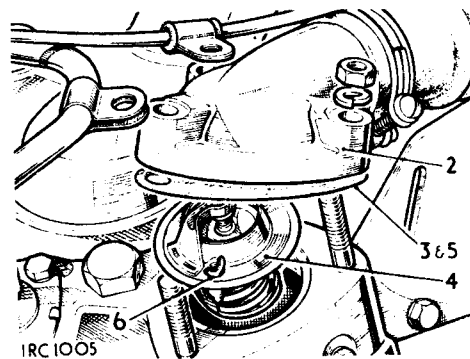
- 6 Smear both sides of the new joint washers with a small quantity of general purpose grease.
- 7 Ensure that the thermostat bleed hole is clear to prevent air locks when refilling.
- 8 Reverse 1 to 5.

### THERMOSTAT – 2.6 LITRE MODELS

Remove and refit 26.45.01

#### Removing

- 1 Drain off coolant at the engine sufficient to drain the thermostat housing.
- 2 Remove the fixings and lift aside the outlet pipe.
- 3 Withdraw the joint washer.
- 4 Withdraw the thermostat.



IRC1005

#### Refitting

- 5 Smear both sides of the new joint washer with a small quantity of general purpose grease.
- 6 Ensure that the thermostat bleed hole is clear to prevent air locks when refilling.
- 7 Reverse 1 to 4.

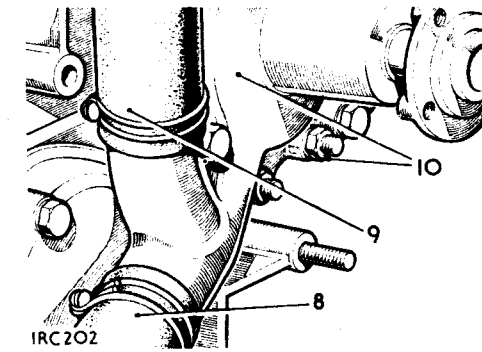
### THERMOSTAT

Test 26.45.09

#### Testing

- 1 Remove the thermostat. 26.45.01.
- 2 Immerse the thermostat in water in a suitable container.
- 3 Heat the water and note the temperature at which the thermostat commences to open; this should be within the range as follows:  
2½ litre engines – 70.5°C to 75.5°C.  
2.6 litre engines – 75°C to 80°C.
- 4 The thermostat is not adjustable or serviceable; repair is by replacement.
- 5 Reverse 1.

- 8 Disconnect the radiator bottom hose at the water pump.
- 9 Disconnect the by-pass hose.
- 10 Remove the water pump.
- 11 Withdraw the joint washer.



IRC202

#### Refitting

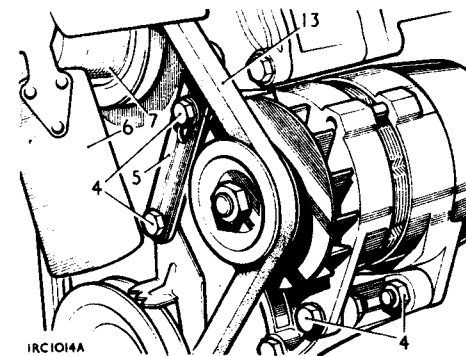
- 12 Smear both sides of a new joint washer with general purpose grease.
- 13 Reverse 4 to 11. Adjust the fan belt to give 6.3 to 9.5 mm (0.25 to 0.375 in.) free movement when checked midway between the fan and crankshaft pulleys.
- 14 Reverse 1 to 3.

### WATER PUMP – 2½ LITRE MODELS

Remove and refit 26.50.01

#### Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Drain the cooling system. 26.10.01.
- 3 Remove the shroud from the radiator fan cowl.
- 4 Slacken the alternator fixings and remove the fan belt.
- 5 Remove the alternator adjusting link.
- 6 Remove the fan blades.
- 7 Withdraw the fan pulley.



IRC1014A

### WATER PUMP – 2.6 LITRE MODELS

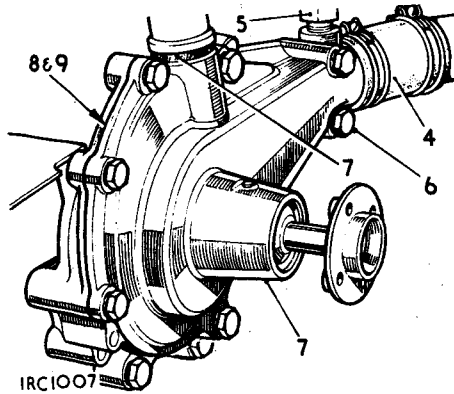
Remove and refit 26.50.01

#### Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Drain the cooling system. 26.10.01.
- 3 Where a viscous fan with plastic fan blades is fitted, remove the radiator, 26.40.04., before removing the fan belt, fan blades and pulley/viscous coupling. 26.25.01.
- 4 Disconnect the radiator bottom hose from the water pump.

continued

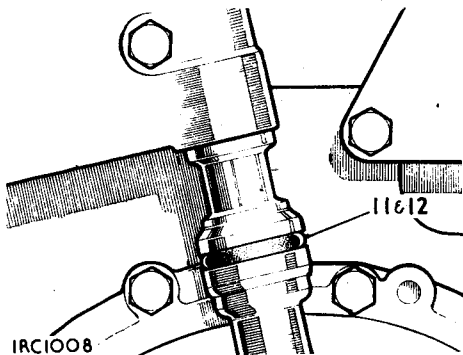
- 5 Where a heater is fitted, remove the water valve. 80.10.16.
- 6 Remove the water pump fixings; note the fitted positions of the varying length bolts.



- 7 Withdraw the water pump, tilting upwards to clear the locating dowels and compress the 'O' ring seal on the by-pass outlet.
- 8 Withdraw the joint washer from the adaptor joint face.

**Refitting**

- 9 Smear both sides of the new joint washer with a minimum of general purpose grease.
- 10 Position the joint washer onto the pump adaptor face.
- 11 Lubricate a new 'O' ring seal with Silicone Compound MS4 and position the seal on the pump by-pass outlet.



- 12 Reverse 7. Ensure that the 'O' ring does not become dislodged.
- 13 Reverse 1 to 6.

**WATER PUMP**

**Overhaul**

26.50.06

**Dismantling**

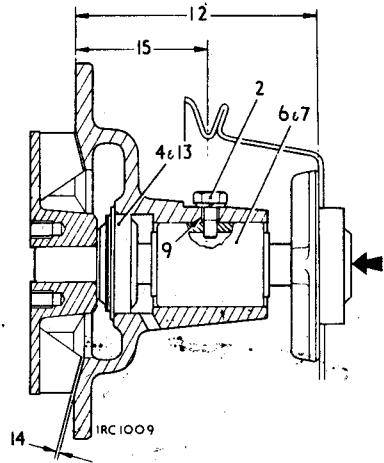
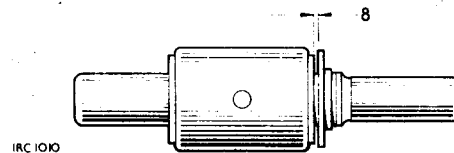
- 1 Remove the water pump. 26.50.01.
- 2 Remove the bearing location bolt.
- 3 Drift out the impeller, bearing and spindle as an assembly from the pump body and hub.
- 4 Cut through and remove the seal assembly from the spindle.
- 5 Insert the spindle into the water pump body, so that the impeller is in the position of the fan pulley.
- 6 Drift the spindle and bearing assembly from the impeller.

**Inspecting**

- 7 Examine the spindle and bearing assembly; it need not be renewed if the bearing is satisfactory and the spindle is free from excessive corrosion.  
Clean any corroded portion of the spindle and paint with a suitable chlorinated rubber primer or, alternatively, with a good quality aluminium paint or other anti-corrosive paint.  
The impeller must be a press fit on the spindle. If the impeller is loose on the spindle, replace either part as necessary.

**Re-assembling**

- 8 Where a steel deflector washer is fitted to the pump spindle, check that there is a minimum clearance of 0.46 mm (0.018 in.) between the washer and the bearing housing face.



- 9 Insert a few drops of thick oil in the location hole in the bearing.
- 10 Suitably mark the spindle bearing housing and the pump body so that the bearing locating screw holes may be easily aligned during assembly.
- 11 Fit the spindle and bearing to the pump body and fit the locating screw.

- 12 Press the fan pulley hub on to the spindle to a set dimension measured between the front face of the pulley hub and the mounting face of the water pump body as follows:  
2 1/4 litre models - 89,48 mm ± 0,25 mm (3.523 in. ± 0.010 in.).  
2.6 litre models - 97,00 mm ± 0,25 mm (3.819 in. ± 0.010 in.).  
When pressing on the hub, support the spindle to avoid load falling on the bearing location bolt.
- 13 Fit the carbon ring and seal assembly to the pump body with the carbon ring outwards.
- 14 Press the impeller onto the spindle until there is 0,50 mm to 0,63 mm (0.020 in. to 0.025 in.) clearance between the impeller vanes and the pump body. Check using feeler gauges.
- 15 Offer the fan pulley to the assembly and check the fan belt groove position relative to the pump mounting face which must be as follows:-  
2 1/4 litre models - 49,4 mm ± 0,25 mm (1.945 in. ± 0.010 in.).  
2.6 litre models - 46,2 mm ± 0,25 mm (1.819 in. ± 0.010 in.).
- 16 Reverse 1.

**DATA**

Dimension from front face of hub to rear (mounting) face of water pump

|                    |   |
|--------------------|---|
| 2 1/4 litre models | 89,48 mm ± 0,25 mm<br>(3.523 in. ± 0.010 in.) |
| 2.6 litre models   | 97,00 mm ± 0,25 mm<br>(3.819 in. ± 0.010 in.) |

Clearance between impeller vanes and pump body

0,50 mm to 0,63 mm (0.020 in. to 0.025 in.)

Dimension from fan belt groove in pulley to rear (mounting) face of water pump

|                    |  |
|--------------------|--|
| 2 1/4 litre models | 49,4 mm ± 0,25 mm<br>(1.945 in. ± 0.010 in.) |
| 2.6 litre models   | 46,2 mm ± 0,25 mm<br>(1.819 in. ± 0.010 in.) |

## EXHAUST SYSTEM – 2.6 LITRE MODELS

**NOTE:** Different Market requirements necessitate the fitting of various exhaust systems to the 88" and 109" vehicles. These systems are detailed in the illustrations which are designed to make any exhaust system operation self-explanatory. The written text regarding the exhaust systems apply to the basic vehicles.

### Remove and refit

|                                 |          |
|---------------------------------|----------|
| Front pipe, items 1 to 6        | 30.10.09 |
| Intermediate pipe, items 7 to 9 | 30.10.11 |
| Silencer, items 10, 11 and 13   | 30.10.14 |
| Tail pipe, items 10 to 13       | 30.10.19 |

### Front exhaust pipe

#### Removing

- 1 Remove the securing bolts at the front exhaust pipe and intermediate pipe joint.
- 2 Remove the securing bolts fixing the front exhaust pipe to the flexible mounting.
- 3 Remove nuts and spring washers securing pipe at exhaust manifold.
- 4 Withdraw the exhaust pipe.
- 5 If required, remove the bolts securing the heat shield to the front exhaust pipe and withdraw the two halves of the shield

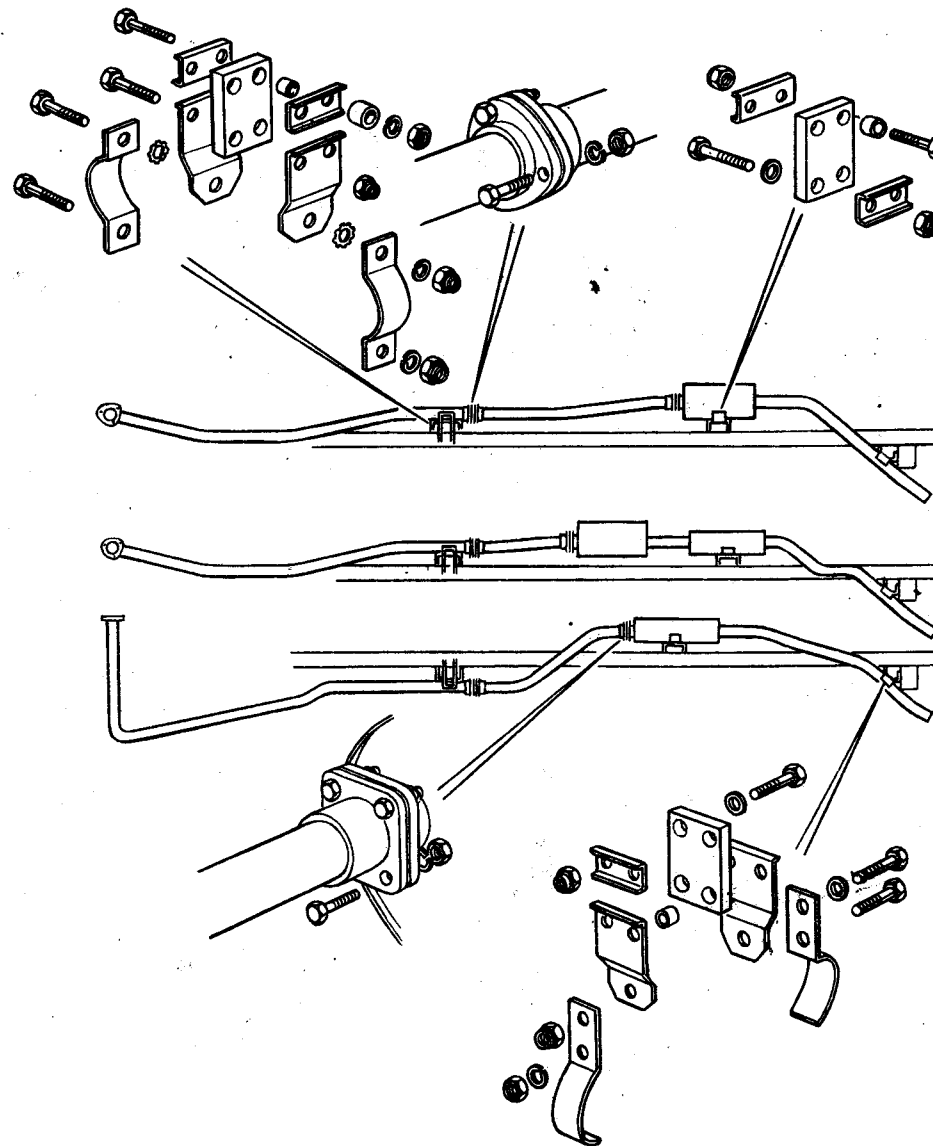
#### Refitting

- 6 Reverse 1 to 5, leaving the flexible mounting loose until the pipe has been firmly secured to the manifold and intermediate pipe.

### Intermediate exhaust pipe

#### Removing

- 7 Remove securing bolts at front exhaust pipe and silencer.
- 8 Remove the securing bolts fixing the intermediate pipe to the flexible mounting and withdraw the intermediate pipe.



#### Refitting

- 9 Reverse 7 and 8, leaving the flexible mounting loose until the pipe has been firmly secured to front exhaust pipe and silencer.

### Exhaust silencer and tail pipe

#### Removing

- 10 Remove the bolts securing the intermediate pipe to the silencer and the bolts securing the tail pipe to the flexible mounting, keeping the silencer supported by hand.
- 11 Withdraw the silencer assembly.
- 12 If required, remove the bolts securing the tail pipe to the silencer and withdraw the tail pipe.

#### Refitting

- 13 Reverse 10 to 12, ensuring that the bolts securing intermediate pipe to silencer are fully tightened before finally clamping the tail pipe support.

## EXHAUST SYSTEM - 2¼ LITRE MODELS

**NOTE:** Different Market requirements necessitate the fitting of various exhaust systems to the 88" and 109" vehicles. These systems are detailed in the illustrations which are designed to make any exhaust system operation self-explanatory. The written text regarding the exhaust systems apply to the basic vehicles.

### Remove and refit

|                        |          |
|------------------------|----------|
| Front pipe             | 30.10.09 |
| Intermediate pipe      | 30.10.11 |
| Silencer and tail pipe | 30.10.22 |

### Front exhaust pipe

#### Removing

- 1 Remove securing bolts at front exhaust pipe and intermediate pipe joint.
- 2 Remove nuts and spring washers securing pipe at exhaust manifold.
- 3 Withdraw the exhaust pipe and joint washer.

#### Refitting

- 4 Reverse 1 to 3.

### Intermediate exhaust pipe

#### Removing

- 5 Remove securing bolts at front exhaust pipe and silencer.
- 6 Remove supporting clamp and withdraw intermediate exhaust pipe.

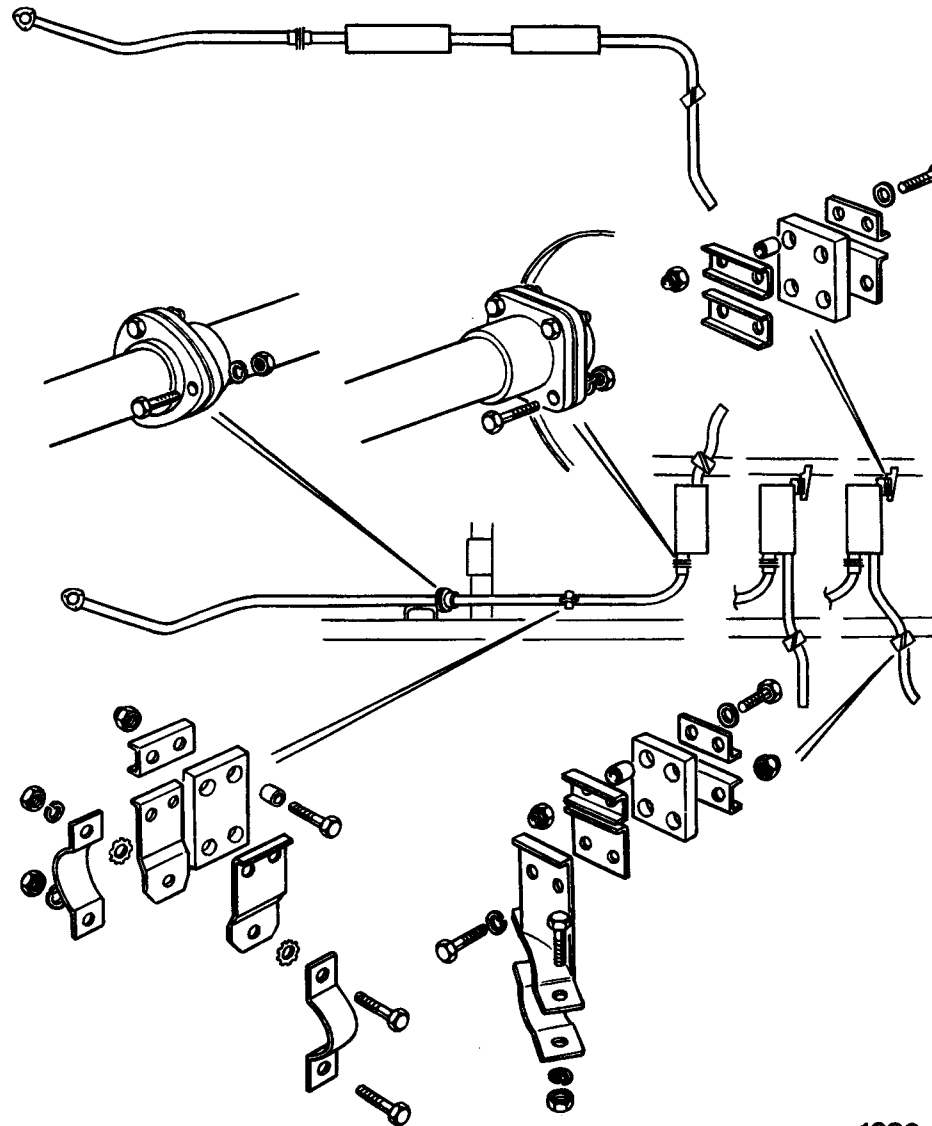
#### Refitting

- 7 Reverse 5 and 6, leaving the supporting clamps loose until the pipe has been secured firmly to front exhaust pipe and silencer.

### Exhaust silencer (Right hand steering models only)

#### Removing

- 8 Remove the bolts securing intermediate pipe to silencer and release support saddle from silencer tail pipe, keeping silencer supported by hand.
- 9 Withdraw silencer assembly.



#### Refitting

- 10 Reverse 8 and 9, ensuring that the bolts securing intermediate pipe to silencer are fully tightened before finally clamping the tail pipe support.

### Exhaust silencer (Left hand steering models)

#### Removing

- 11 Remove bolts securing intermediate pipe to silencer.
- 12 Keeping the silencer supported, release the supporting strap for silencer right hand side and saddle clamp on tail pipe, then withdraw silencer assembly.

#### Refitting

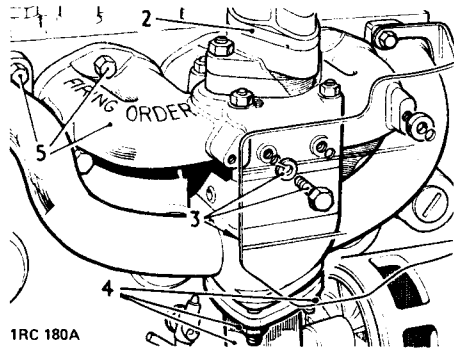
- 13 Fit the silencer in position and loosely support by means of supporting strap and saddle clamp.
- 14 Secure the intermediate pipe to silencer.
- 15 Finally tighten bolts securing support strap and saddle clamp.

## INDUCTION AND EXHAUST MANIFOLD ASSEMBLY – 2¼ LITRE PETROL MODELS

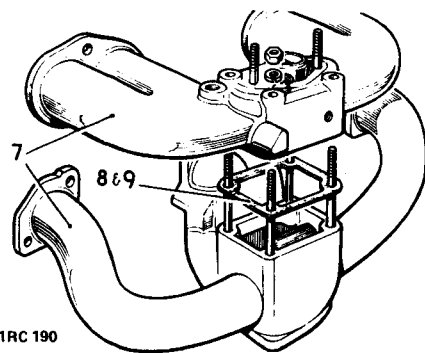
Remove and refit 30.15.01

### Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Remove the carburetter. 19.15.09.
- 3 Remove the exhaust heat shield.
- 4 Disconnect the front exhaust pipe from the manifold.
- 5 Remove the induction and exhaust manifold assembly.



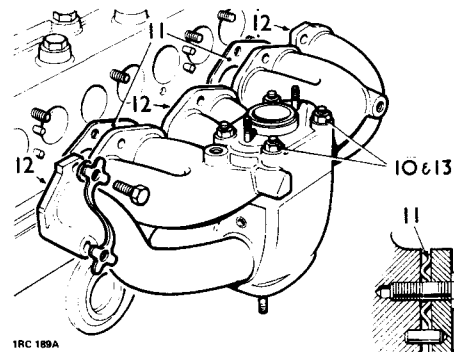
- 6 Withdraw the joint washers for the induction manifold.
- 7 Separate the induction manifold from the exhaust manifold.
- 8 Withdraw the joint washer.



1RC 190

### Refitting

- 9 Using a new joint washer, assemble the induction manifold to the exhaust manifold.
  - 10 Tighten the fixings, induction manifold to exhaust manifold, to a torque of 2,3 kgf. m (17 lbf. ft.), then slacken off slightly.
  - 11 Fit the joint washers for the induction manifold with the raised rings towards the cylinder head.
- NOTE:** Joint washers are not fitted to the exhaust manifold.
- 12 Coat the mating faces of the cylinder head and exhaust manifold with Rocol Anti-seize Compound Foliac J166 (paste).
  - 13 Fit the induction and exhaust manifold assembly. Tighten the exhaust manifold bolts to 1,3 kgf m (10 lbf ft) and engage the lock plates.
  - 14 Fit the induction and exhaust manifold assembly. Torque 2,3 kgf m (17 lbf ft).
  - 15 Tighten the fixings, induction manifold to exhaust manifold. Torque 2,3 kgf m (17 lbf ft).
  - 16 Reverse 1 to 4.



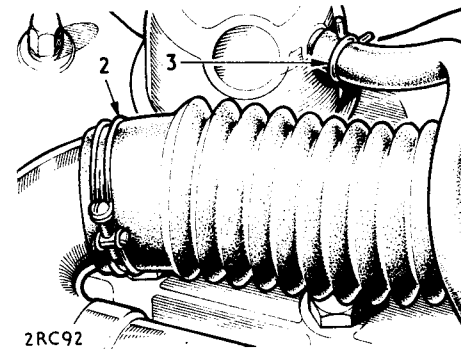
1RC 189A

## INDUCTION AND EXHAUST MANIFOLD – 2¼ LITRE DIESEL MODELS

Remove and refit 30.15.01

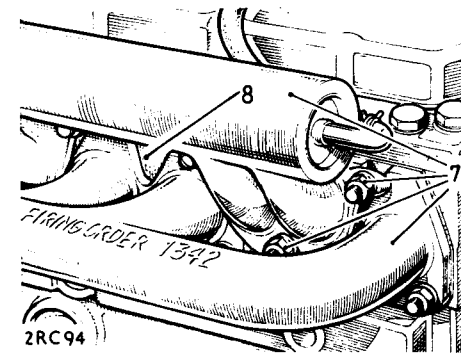
### Removing

- 1 Remove the bonnet panel. 76.16.01.
- 2 Disconnect the air cleaner hose.
- 3 Disconnect the engine breather hose.
- 4 Disconnect the front exhaust pipe at the manifold.
- 5 Withdraw the oil level dipstick.
- 6 Where a brake servo is fitted, disconnect the manifold throttle control rod and the vacuum supply hose.



2RC 92

- 7 Remove the four upper and five lower fixings and withdraw the manifolds.
- 8 Withdraw the manifolds joint washer.



2RC 94

### Refitting

- 9 Reverse 7 and 8; do not tighten any fixings until all are in place.
- 10 Where applicable, reverse 6. Ensure that the manifold throttle valve opens slightly in advance of the distributor/injection pump linkage. Adjust at the cross-shaft linkage as necessary.
- 11 Reverse 1 to 5.

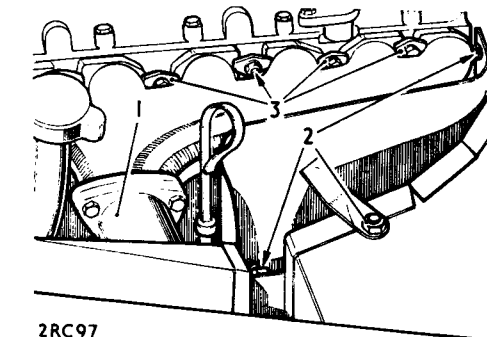
## EXHAUST MANIFOLD – 2.6 LITRE MODELS

Remove and refit 30.15.10

### Removing

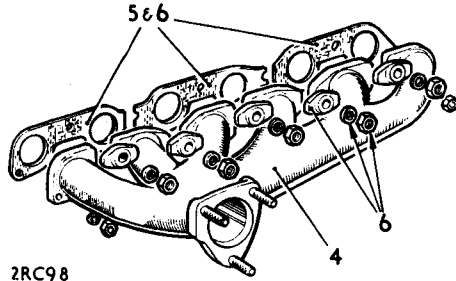
- 1 Disconnect the front exhaust pipe from the manifold.
- 2 Remove the fixings and withdraw the exhaust heat shield.
- 3 Remove the manifold fixings.

*continued*



2RC 97

- 4 Withdraw the manifold.
- 5 Withdraw the joint washers.



2RC98

**Refitting**

- 6 Reverse 3 to 5 with the joint washers plain faces toward the engine. Tighten the fixings evenly to avoid distortion.
- 7 Reverse 1 and 2.



## CLUTCH ASSEMBLY

Remove and refit 33.10.01

Service tool: 605022 Clutch plate alignment gauge

**NOTE:** If it is required to remove the clutch only, it is not necessary to remove the seat base nor completely remove the gearbox. Proceed with the gearbox removal 37.20.01, but only withdraw the gearbox rearward approximately 130 mm (5 in.), to give access to the clutch fixings.

### Removing

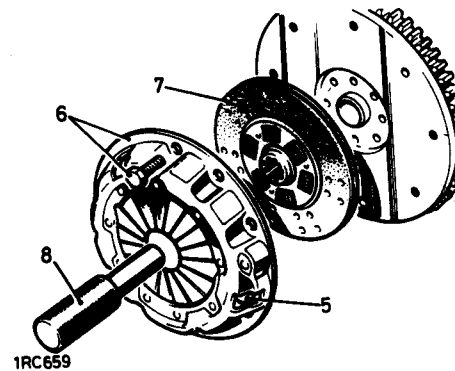
- 1 Remove the front floor. 76.10.12.
- 2 Remove the front seat base. 76.70.06.
- 3 Remove the gearbox assembly. 37.20.01.
- 4 Mark the clutch cover fitted position relative to the flywheel.
- 5 Do not disturb the three bolts located in the apertures in the clutch cover.
- 6 Remove the clutch assembly.
- 7 Withdraw the clutch driven plate.

### Refitting

- 8 Smear the splines of the primary pinion, the clutch centre and the withdrawal unit abutment faces with Molybdenum disulphide grease such as Rocol MTS 1000.
- 9 Reverse 6 and 7 locating the driven plate with the side marked 'Flywheel side' towards the flywheel, and ensure that the clutch cover and flywheel assembly marks are aligned. Centralising tool 605022.
- 10 secure the cover fixings evenly, using diagonal selection. Torque 3,0 to 3,5 kgf m (22 to 25 lbf ft).
- 11 Reverse 1 to 3.

### DATA

Clutch driven plate diameter . . . . .  
 Damper springs colour identification . . . . .



## CLUTCH ASSEMBLY

Overhaul 33.10.08

### Clutch assembly

The clutch assembly is of the diaphragm spring type and no overhaul procedures are applicable. Repair is by replacement only.

### Clutch driven plate

Examine clutch driven plate for wear and signs of oil contamination. Examine all rivets for pulling and distortion, rivets must be below the friction surface. If oil contamination is present on the friction linings or if they are appreciably worn, replace the clutch driven plate assembly complete or alternatively, replace the friction linings following standard workshop practices.

241,3 mm (9.5 in.).  
 Dark green.

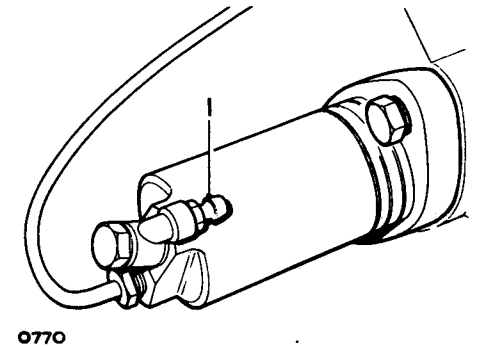
## HYDRAULIC SYSTEM

Bleed 33.15.01

### Procedure

**NOTE:** During the procedure, keep the fluid reservoir topped up to avoid introducing further air into the system. Use only the recommended type of hydraulic fluid. Division 09 refers.

- 1 Attach a length of suitable tubing to the slave cylinder bleed screw.
- 2 Place the free end of the tube in a glass jar containing clutch fluid.
- 3 Slacken the bleed screw.
- 4 Pump the clutch pedal, pausing at the end of each stroke, until the fluid issuing from the tubing is free of air with the tube free end below the surface of the fluid in the container.
- 5 Hold the tube free end immersed and tighten the bleed screw when commencing a pedal down stroke.

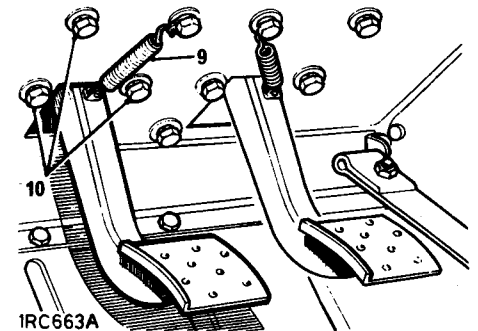


## MASTER CYLINDER

Remove and refit 33.20.01

### Removing

- 1 Remove the bonnet. 76.16.01.
- Left hand steering models 2-12.
- 2 Remove the left hand side front wing rear top section retaining bolt.
  - 3 Remove the two nuts/bolts securing the lower wing edge to the sill panel.
  - 4 Remove the four nuts/bolts securing the splash plate to the bulkhead.
  - 5 Remove the three bolts securing the splash plate to the wing.
  - 6 Remove the splash plate.
  - 7 Remove the four bolts securing the rear vertical wing edge to the 'A' post section.
  - 8 Disconnect the hydraulic pipe from the clutch master cylinder plug aperture to prevent leakage.
  - 9 Remove the brake pipe clip from the clutch pedal cover and disconnect the return spring.
  - 10 Remove the six bolts securing the clutch pedal box.



*continued*

- 11 Ease away the rear section of the wing panel.
- 12 Manoeuvre out the clutch pedal box assembly.

#### Right hand steering models.

- 13 Disconnect the fluid pipe from the master cylinder.

#### All models

- 14 Remove the top cover and gasket from the clutch pedal bracket.
- 15 Remove the fixings from the end of the master cylinder push rod.
- 16 Detach the master cylinder from the pedal bracket.
- 17 Drain the fluid from the cylinder.

#### Refitting

- 18 Secure the cylinder to the pedal bracket, adjust the push rod lever to give 1,55 mm (0.062 in.) free play between the push rod and the piston, 6 mm (0.25 in.) at the pedal. Tighten the locknuts. See clutch pedal and master cylinder setting. 33.20.02.
- 19 Fit the gasket to the top cover.

#### Right hand steering models

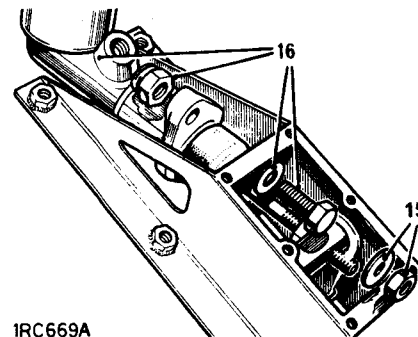
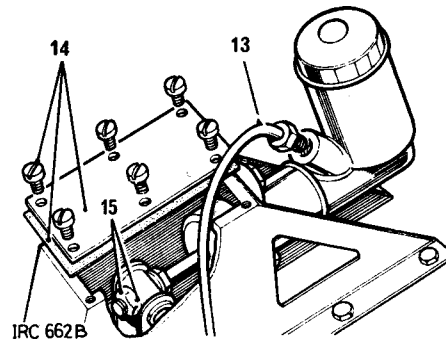
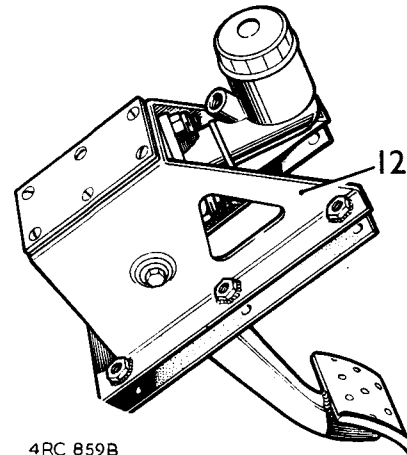
- 20 Connect the fluid pipe to the master cylinder.

#### Left hand steering models

- 21 Refit the clutch master cylinder assembly to the vehicle. Ensure that the pedal return spring is connected.
- 22 Connect the hydraulic pipe.
- 23 Secure the brake pipe clip.

#### All models

- 24 Bleed the clutch system. 33.15.01.
- 25 Check the pedal free play, 6 mm (0.25 in.). Check the pedal lever height from the floor, 140 mm (5.50 in.).
- 26 Reverse 1 to 7.



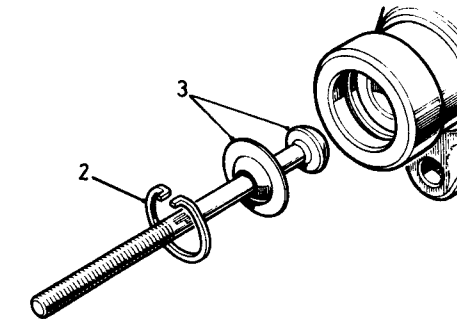
## MASTER CYLINDER

### Overhaul

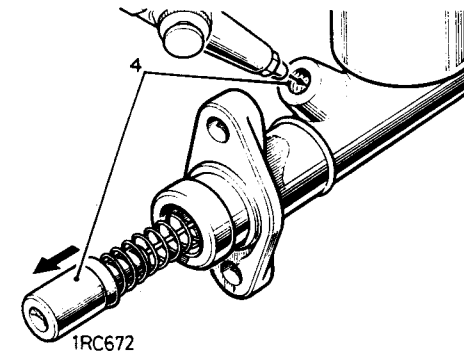
33.20.07

#### Dismantling

- 1 Remove the master cylinder. 33.20.01.
- 2 Remove the circlip.
- 3 Withdraw the push rod and retaining washer.
- 4 Withdraw the piston assembly. If necessary, apply a low air pressure to the outlet port to expel the piston.

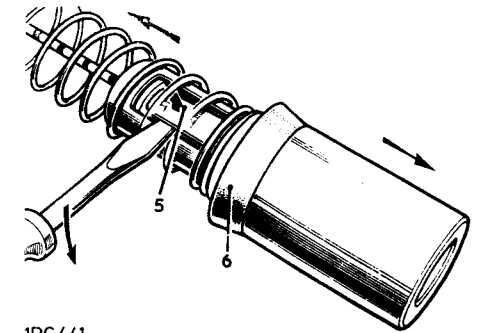


IRC 671



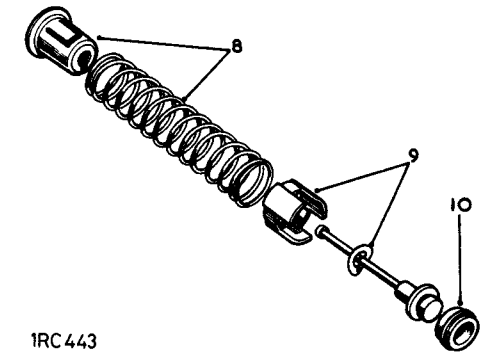
IRC 672

- 5 Prise the locking prong of the spring retainer clear of the piston shoulder and withdraw the piston.
- 6 Withdraw the piston seal.
- 7 Compress the spring and position the valve stem to align with the larger hole in the spring retainer.



IRC 441

- 8 Withdraw the spring and retainer.
- 9 Withdraw the valve spacer and spring washer from the valve stem.
- 10 Remove the valve seal.



IRC 443

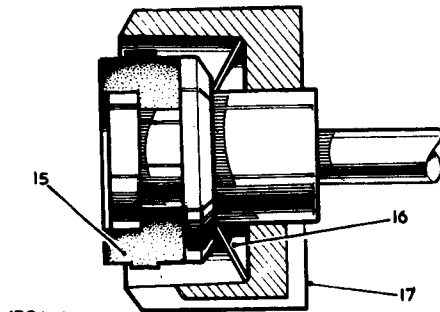
#### Inspecting

- 11 Clean all components in Girling cleaning fluid and allow to dry.
- 12 Examine the cylinder bore and piston, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacements.
- 13 The seals should be replaced with new components.

#### Assembling

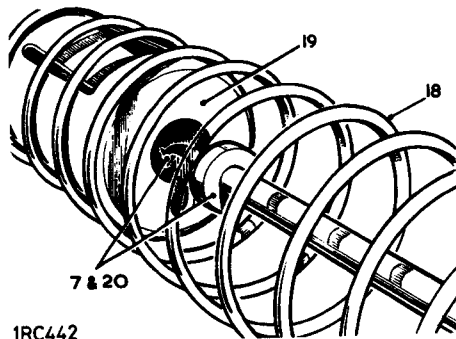
- 14 Smear the seals with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.

- 15 Fit the valve seal, flat side first, on to the end of the valve stem.
- 16 Place the spring washer, domed side first, over the small end of the valve stem.
- 17 Fit the spacer, legs first.



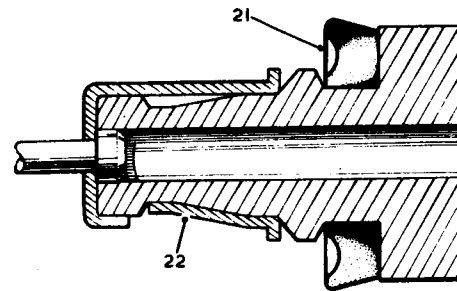
1RC444

- 18 Place the coil spring over the valve stem.
- 19 Insert the retainer into the spring.
- 20 Compress the spring and engage the valve stem in the keyhole slot in the retainer.



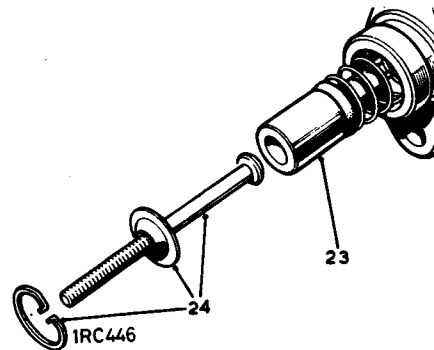
1RC442

- 21 Fit the seal, large diameter last, to the piston.
- 22 Insert the piston into the spring retainer and engage the locking prong.



1RC445

- 23 Smear the piston with Castrol-Girling rubber grease and insert the assembly, valve end first, into the cylinder.
- 24 Fit the push rod, retaining washer and circlip.
- 25 Refit the master cylinder. 33.20.01.

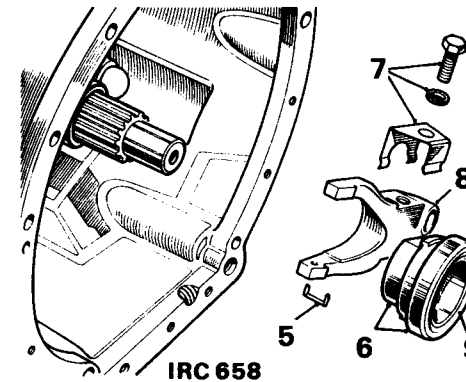


### CLUTCH RELEASE ASSEMBLY

Remove and refit 33.25.12

#### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the front seat base. 76.70.06.
- 3 Remove the gearbox. 37.20.01.
- 4 Remove the clutch slave cylinder
- 5 Withdraw the retainer staple.
- 6 Withdraw the bearing and sleeve. If required, press the bearing off the sleeve. Fit the replacement bearing with the domed face outwards from sleeve.



- 7 Remove the spring clip and fixings.
- 8 Withdraw the release lever assembly.

#### Refitting

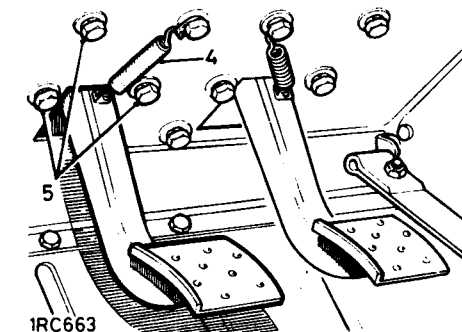
- 9 Reverse 1 to 8. Lubricate the bearing sleeve inner diameter with PBC (Poly Butyl Cuprysil) grease.

### CLUTCH PEDAL

Remove and refit 33.30.02

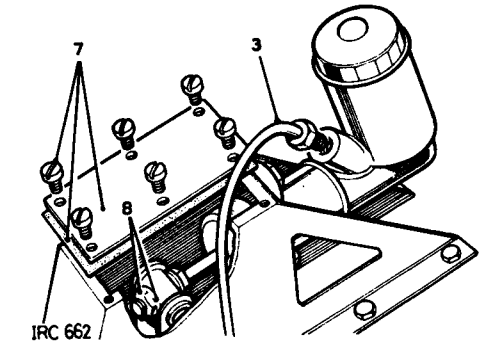
#### Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Left hand steering models. See 33.20.01.
- 3 Disconnect the fluid pipe from the clutch master cylinder.
- 4 Disconnect the return spring from the clutch pedal.
- 5 Remove the fixings securing the clutch pedal bracket from inside the vehicle cab.



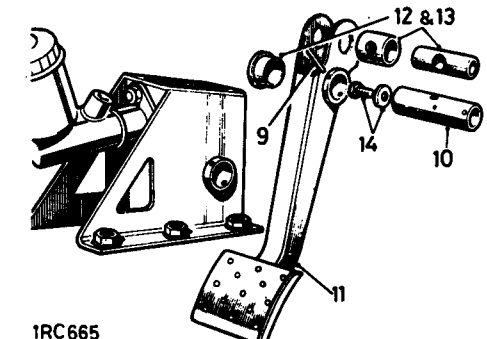
1RC663

- 6 Withdraw the bracket complete with pedal and master cylinder.
- 7 Remove the top cover and gasket from the clutch pedal bracket.
- 8 Remove the fixings from the end of the master cylinder push rod and push the rod into the master cylinder to clear the pedal trunnion.



1RC662

- 9 Using a suitable punch, drift out the pin from the pedal shaft.
- 10 Withdraw the pedal shaft.
- 11 Withdraw the clutch pedal complete with trunnion and bushes.
- 12 If required, remove the bushes, trunnion and distance piece from the clutch pedal.



1RC665

#### Refitting

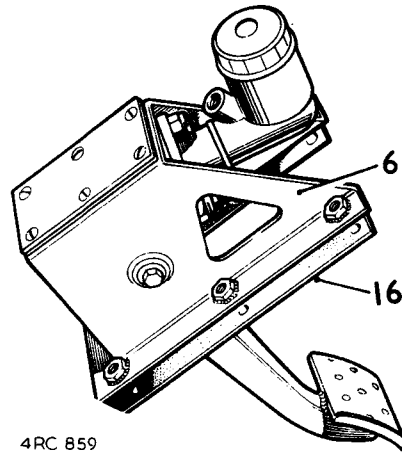
- 13 If removed, fit the distance piece, trunnion and bushes to the clutch pedal. Lubricate the trunnion and distance piece with general purpose grease on assembly. New pedal bushes must be reamed to 19,05 mm  $\pm$  0,02 mm (0.750 in  $\pm$  0.001 in).

continued

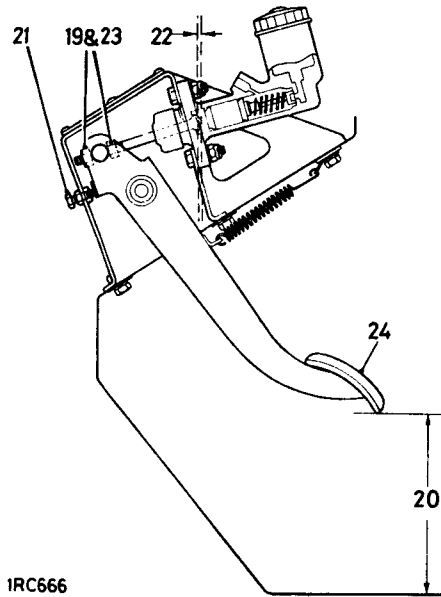
- 14 Remove the oil plug and washer from the pedal shaft. Fill the shaft bore with clean engine oil and refit the plug and washer.
- 15 Reverse 8 to 11.
- 16 Place the gasket in position on the securing flange of the brake pedal bracket. If necessary, use Bostik adhesive to retain the gasket.
- 17 Reverse 3 to 6.
- 18 Bleed the clutch hydraulic system. 33.15.01.

**Clutch pedal and master cylinder setting**

- 19 Remove the top cover and slacken both locknuts on the master cylinder push-rod.
- 20 Check the distance from the lower edge of the clutch pedal to the floor. The correct distance is 140 mm (5.5 in.).
- 21 Adjust the pedal stop, as required, to obtain the correct distance.
- 22 Adjust the master cylinder push rod until there is approximately 1,5 mm (0.062 in.) free play between the push rod and the master cylinder piston.
- 23 Tighten both locknuts.
- 24 Check the clutch pedal and ensure that there is a minimum of 6 mm (0.250 in.) free movement of the pedal before pressure is felt. If necessary, readjust the master cylinder push rod.
- 25 Fit the gasket and top cover to the clutch pedal bracket.
- 26 Reverse 1 and 2.



4RC 859



1RC666

**DATA**

|   |  |
|---|--|
| Clutch pedal pivot bushes, reamed diameter..... | 15,87 mm ± 0,02 mm (0.750 in. ± 0.001 in.) |
| Clutch pedal height setting.....                | 140 mm (5.500 in.)                         |
| Master cylinder push rod free play.....         | 1,5 mm (0.062 in.)                         |
| Clutch pedal free play (minimum).....           | 6,0 mm (0.250 in.)                         |

**SLAVE CYLINDER**

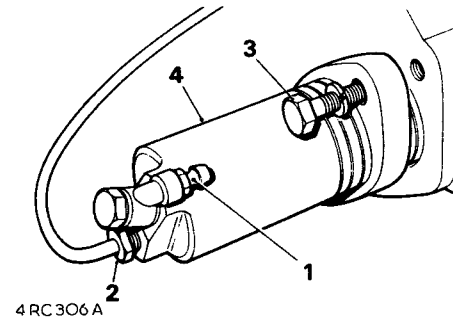
Remove and refit 33.35.01

**Removing**

- 1 Unscrew the bleed valve to release the hydraulic fluid.
- 2 Disconnect the fluid supply pipe from the slave cylinder.
- 3 Remove the two bolts securing the slave cylinder.
- 4 Withdraw the slave cylinder.

**Refitting**

- 5 Enter the push-rod through the hole in the rubber boots so that it locates correctly inside the cylinder.
- 6 Fit the slave cylinder bleed valve uppermost, and secure with the two bolts.
- 7 Fit the fluid supply pipe.
- 8 Bleed the clutch hydraulic system as described in operation 33.15.01.
- 9 Check the system for leaks with the brake pedal depressed and with the system at rest.
- 10 Fit the fluid pipe.



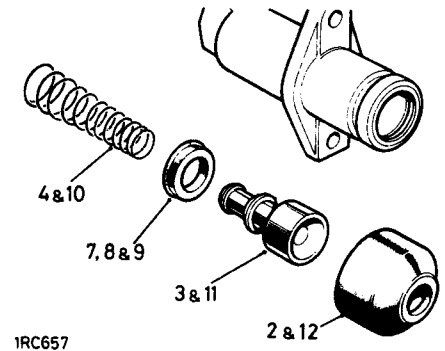
4RC306A

**SLAVE CYLINDER**

Overhaul 33.35.07

**Dismantling**

- 1 Remove the slave cylinder. 33.35.01.
- 2 Withdraw the dust cover.
- 3 Expel the piston assembly, applying low pressure air to the fluid inlet.
- 4 Withdraw the spring.



1RC657

**Inspecting**

- 5 Clean all components with Girling cleaning fluid and allow to dry.
- 6 Examine the cylinder bore and piston, ensure that they are smooth to the touch with no corrosion, score marks or ridges. If there is any doubt, fit new replacement.
- 7 The seal should be replaced with a new component.

**Assembling**

- 8 Smear the seal with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling brake and clutch fluid.
- 9 Fit the seal, large diameter last, to the piston.
- 10 Locate the conical spring, small diameter first, over the front end of the piston.
- 11 Smear the piston with Castrol-Girling rubber grease and insert the assembly, spring end first, into the cylinder.
- 12 Fill the dust cover with Castrol-Girling rubber grease and fit the cover to the cylinder.
- 13 Refit the slave cylinder. 33.35.01.

## FRONT OUTPUT SHAFT HOUSING

Remove and refit

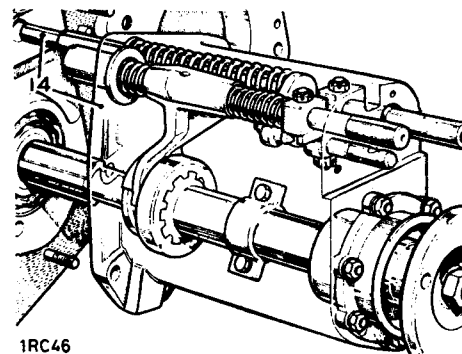
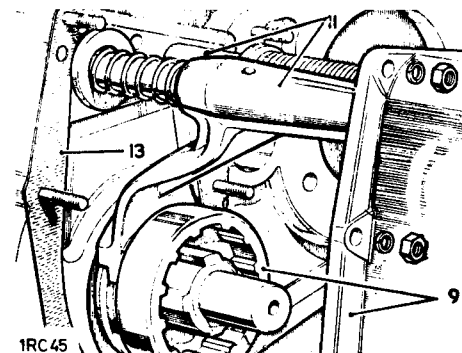
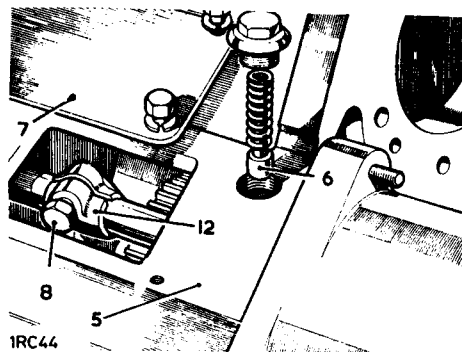
37.10.05

### Removing

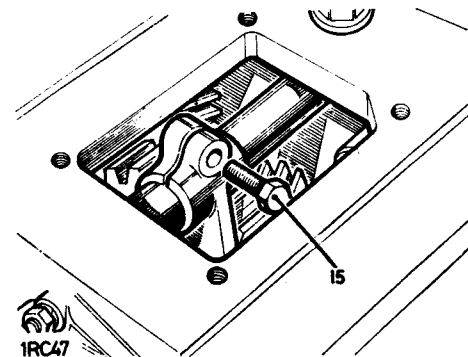
- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the transmission brake. 70.45.16.
- 5 Remove the transfer box. 37.29.25.
- 6 Remove the transfer gear selector shaft plunger.
- 7 Remove the top cover from the transfer box.
- 8 Remove the pinch bolt from the transfer selector fork.
- 9 Remove the front output shaft housing from the transfer box, taking care to catch the four wheel drive locking dog which will be released.
- 10 Withdraw the loose selector fork from the transfer box.

### Refitting

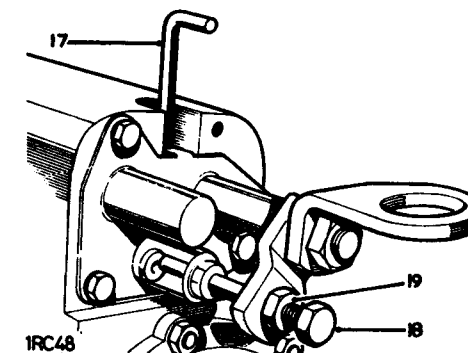
- 11 If the selector shafts have been removed, refer to 37.10.06 for refitting procedure.
- 12 Place the transfer gear selector fork in position, with the threaded side of the pinch bolt hole towards the centre of the transfer box.
- 13 Smear both sides of the joint washer with a general purpose grease and place in position on the transfer box.
- 14 Offer the output shaft housing to the transfer box, carefully locating the transfer gear selector shaft through the selector fork by turning the flange if necessary to engage the splines of the locking dog over the output shaft.



- 15 Complete the refitting by reversing the removal procedure. Ensure that the selector fork pinch bolt engages the groove in the selector shaft. This bolt will fit only one way.



- 16 If the transfer box is of the all helical type, see 37.29.28, adjust the transfer travel stop as follows.
- 17 Engage four wheel drive, low ratio, and check the fit of the four wheel drive locking pin in the pivot shaft. The pin must be an easy slide fit.
- 18 If necessary, adjust the stop bolt to obtain this condition.
- 19 Tighten the locknut to secure the stop bolt.
- 20 Replenish the gearbox oil.



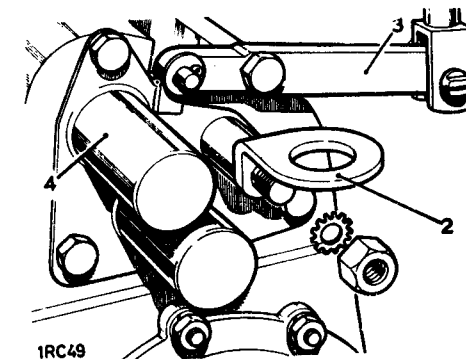
## FRONT OUTPUT SHAFT HOUSING

Overhaul

37.10.06

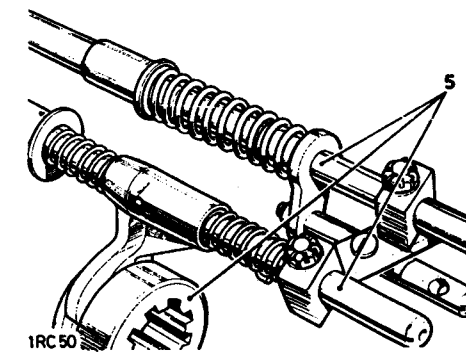
### Dismantling the housing

- 1 Remove the front output shaft housing. 37.10.05.
- 2 Remove the link from the transfer gear selector shaft.
- 3 Remove the four wheel drive control lever.

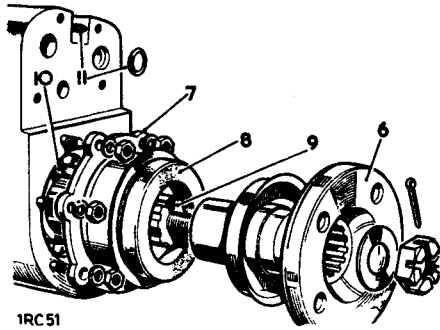


- 4 Remove the selector shaft dust cover.
- 5 Withdraw the selector shaft assemblies and the four wheel drive locking dog from the housing.

*continued*



- 6 Remove the flange from the front output shaft.
- 7 Remove the oil seal retainer and gasket.
- 8 Press out the oil seal.
- 9 Remove the front output shaft from the housing.

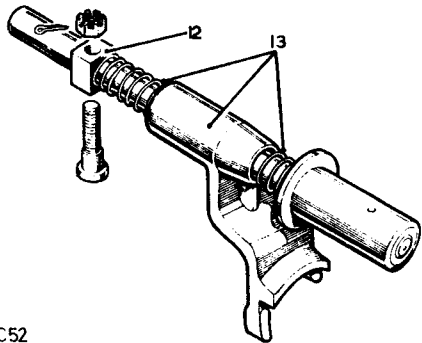


1RC51

- 10 Press out the bearing from the housing.
- 11 Remove the sealing rings for the four wheel drive locking pin and the transfer gear shaft.

#### Dismantling the four wheel drive selector shaft

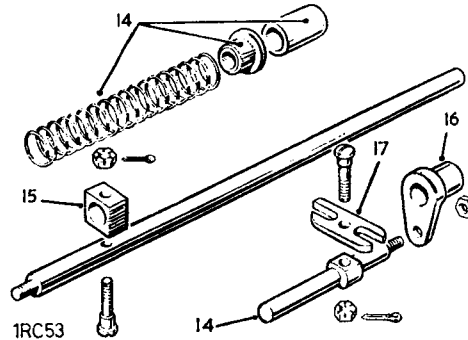
- 12 Remove the block from the selector shaft.
- 13 Withdraw the springs and selector fork from the shaft.



1RC52

#### Dismantling the transfer gear selector shaft

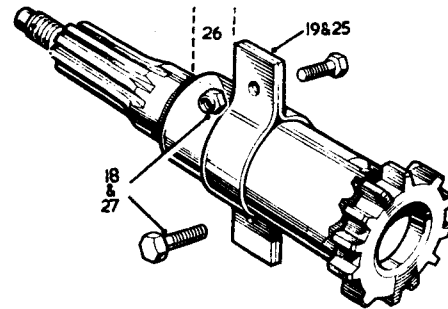
- 14 Slide the distance tube, bush, spring and pivot shaft assembly from the selector shaft.
- 15 Remove the block.
- 16 Remove the connector from the pivot shaft.
- 17 Remove the coupling from the pivot shaft.



1RC53

#### Dismantling the front output shaft

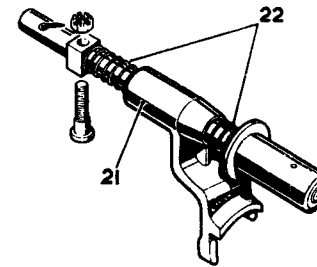
- 18 Remove the fixings.
- 19 Lift the two halves of the oil thrower from the shaft.



1RC55

#### Inspecting

- 20 Renew any components which show obvious wear or damage. Examine the bush in the four wheel drive control lever and renew if necessary.
- 21 Examine the four wheel drive selector fork and bushes, and renew as necessary. New bushes must be pressed flush with the end faces of the fork boss, and reamed in position to 15,887 mm + 0,012 mm (0.6255 in. + 0.0005 in.) diameter, and must be a sliding fit on the selector shaft.
- 22 Check the four wheel drive selector shaft springs, the free length should be 69,8 mm (2.75 in.).



1RC54

- 23 Check the transfer selector shaft spring, the free length should be 181,76 mm (7.156 in.).
- 24 Examine the bush in the rear end of the front output shaft. The bush must be a sliding fit on the front end of the transfer box output shaft and must be firmly retained in its bore. If bush replacement is necessary, press the new bush flush with the end of the shaft and ream in position to 22,2 mm ± 0,013 mm (0.8755 in. ± 0.0005 in.) diameter.

#### Assembling the front output shaft

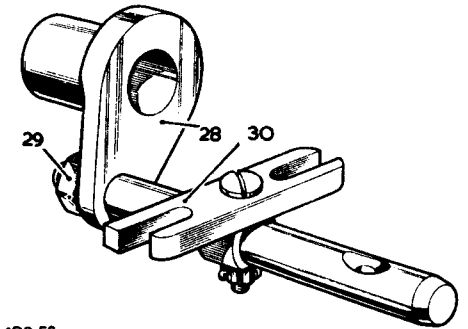
**NOTE:** If a new output shaft is being fitted try the bronze bush over the front end of the rear output shaft and ensure that it is not tight to prevent subsequent seizure.

- 25 Fit the oil thrower to the front output shaft, do not fully tighten the fixings at this stage.

- 26 Position the oil thrower 25 mm (1 in.) from the shoulder on the shaft, as illustrated.
- 27 Tighten the fixings.

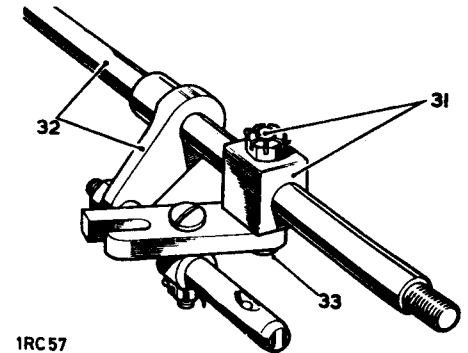
#### Assembling the transfer gear selector shaft

- 28 Fit the connector to the pivot shaft noting the relationship of the counter-sink in the hole at the other end of the shaft.
- 29 Do not fully tighten the fixings at this stage.
- 30 Fit the coupling to the pivot shaft locating the extended arm correctly, as illustrated.



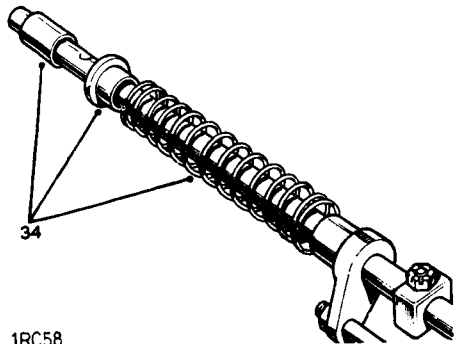
1RC56

- 31 Fit the block to the transfer gear selector shaft, locating the fixings so that the nut and split pin are on the same side of the shaft as the plunger grooves.
- 32 Locate the pivot shaft assembly in position on the transfer gear selector shaft.
- 33 Engage the coupling with the special screw.



1RC57

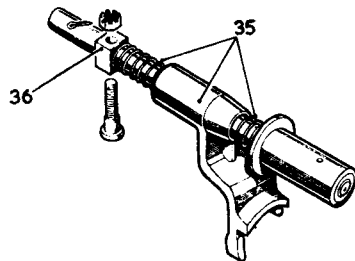
- 34 Fit the spring, locating bush and distance tube on to the selector shaft.



1RC58

**Assembling the four wheel drive selector shaft.**

- 35 Fit the springs and selector fork to the shaft. Note that the two springs are identical and are interchangeable.  
36 Fit the block to the selector shaft.

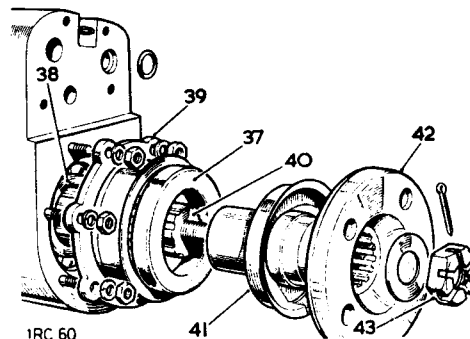


1RC59

**Assembling the housing**

- 37 Fit the oil seal for the front output shaft, lipped side inward, into the retainer, with a smear of sealant on the seal outside diameter.  
38 Press the bearing into the housing.  
39 Smear both sides of the joint washer with general purpose grease, and fit the oil seal retainer and joint washer to the housing.  
40 Fit the front output shaft.

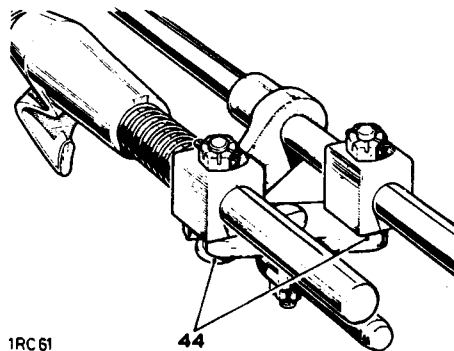
- 41 If the mud shield has been removed, refit it, dished side first, to the output flange.  
42 Fit the flange to the output shaft.  
43 Tighten the securing nut to a torque figure of 11,75 kgf. m (85 lbf. ft.).



1RC60

**Pre-alignment of selector shafts**

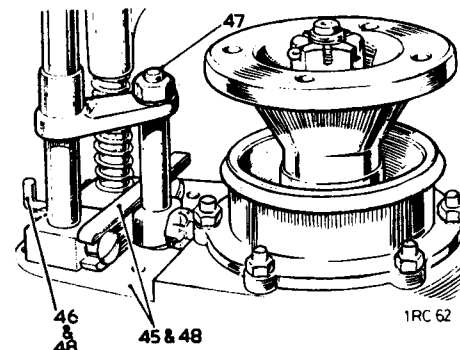
- 44 Locate the two selector shafts together by engaging the coupling with the special screws.



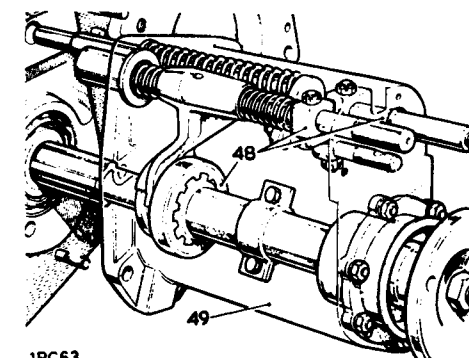
1RC61

- 45 Locate the selector shaft assembly into the front face of the output shaft housing.  
46 Fit the four wheel drive locking pin, engaging it in the countersunk hole in the pivot shaft. This will ensure correct radial alignment of the pivot shaft to the connector.  
47 Fully tighten the nut to secure the connector to the pivot shaft.

- 48 Remove the locking pin and withdraw the selector shafts as one unit, then without disturbing their alignment, engage them into their correct location in the output shaft housing, while at the same time fitting the four wheel drive locking dog over the output shaft and into the selector fork.  
49 If convenient, it will be advantageous at this stage to fit the front output shaft housing to the transfer box 37.10.05.

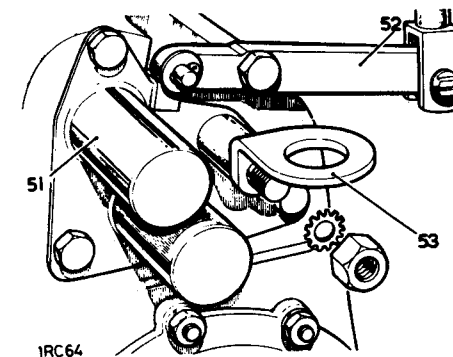


1RC62



1RC63

- 50 Fit the sealing rings for the transfer gear selector shaft and the four wheel drive locking pin.  
51 Grease the two shafts and fit the selector shaft dust cover, using Bostik sealant 772 on the joint face.  
52 Fit the lever to the selector shaft, but do not fully tighten the fixing pending setting the four wheel drive lever during floor refitting.  
53 Fit the transfer gearshaft link.  
54 Fit the four wheel drive locking pin and control lever.  
55 Refit the front output shaft housing. 37.10.05.



1RC64

**DATA**

|  |   |
|--|---|
| Four wheel drive selector fork bush . . . . .                  | 15,887 to 15,899 mm (0.6255 to 0.6260 in.) reamed diameter  |
| Four wheel drive selector shaft springs, free length . . . . . | 69,8 mm (2.75 in.).   |
| Transfer selector shaft spring, free length . . . . .          | 181,76 mm (7.156 in.).                                      |
| Bush for output shaft . . . . .                                | 22,200 to 22,213 mm (0.8755 to 0.8760 in.) reamed diameter. |

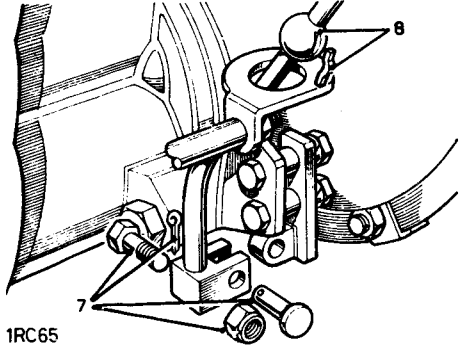
**BELL HOUSING**

Remove and refit

37.12.07

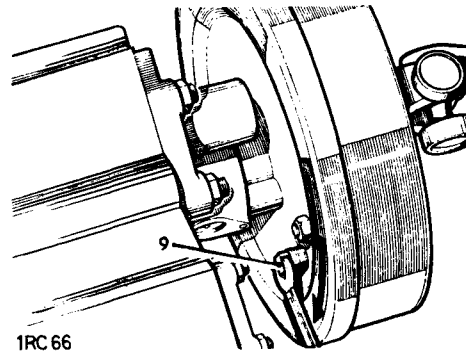
**Removing**

- 1 Remove the front floor. 76.10.12
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the gearbox assembly complete. 37.20.01.
- 5 Remove the main gearchange lever. 37.16.04.
- 6 Remove the clutch withdrawal unit. 33.25.12.
- 7 Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
- 8 Withdraw the lever, taking care to retain the spring strip located between the lever ball and link.

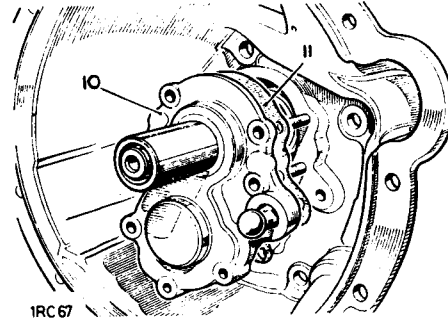


1RC65

- 9 Fully adjust the transmission brake to lock 'hard on'.
- 10 Remove the primary pinion cover and oil seal assembly.
- 11 Withdraw the joint washer.
- 12 Select any gear.
- 13 Remove the layshaft securing bolt and washer. DO NOT remove the circlip from the primary pinion.
- 14 Remove the bell housing fixings.
- 15 Retain the constant gear and conical distance piece which are released during the following procedure.
- 16 Hold the layshaft depressed fully rearwards and ease the housing from the gearbox.



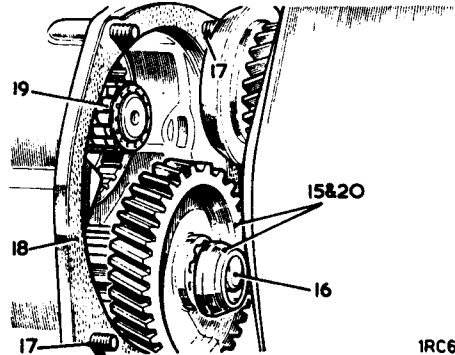
1RC66



1RC67

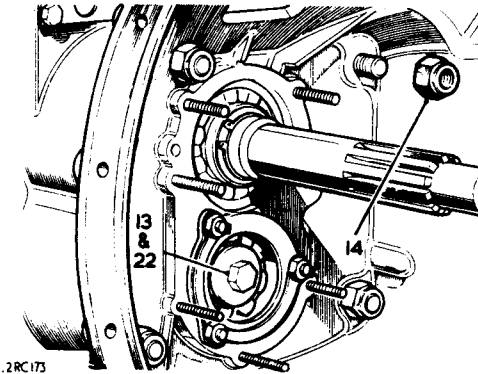
**Refitting**

- 17 Two of the bell housing to gearbox fixings are special fitted bolts, and must be positioned diagonally opposite each other.
- 18 Smear both sides of the joint washer with a general purpose grease and place in position on the gearbox.



1RC69

- 19 Ensure that the roller bearing for the primary pinion is in position.
- 20 Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
- 21 Retain the constant gear and conical distance piece in position, by holding through the layshaft bearing, from the inside of the bell housing, then offer the bell housing to the gearbox, using special care to align the constant gear with the splines on the layshaft.  
**NOTE:** If the layshaft securing bolt has a nylon locking patch it should be discarded in favour of the latest standard setbolt. Smear with Loctite 601 and tighten to 6,9 kgf m (50 lbf ft).
- 22 Complete the reassembly by reversing 1 to 14. Smear the layshaft securing bolt with Loctite 601 and tighten to a torque figure of 6,9 kgf m (50 lbf ft).



2RC173

- 23 Check and replenish the gearbox lubricating oil.
- 24 Adjust the transmission brake. 70.45.09.

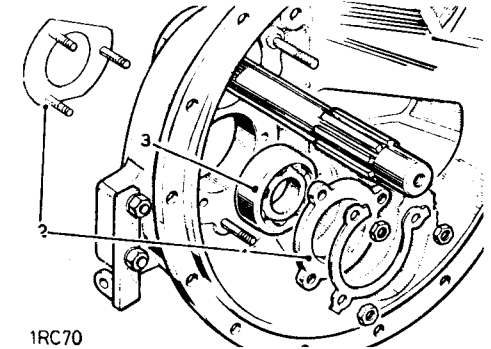
**BELL HOUSING**

Overhaul

37.12.08

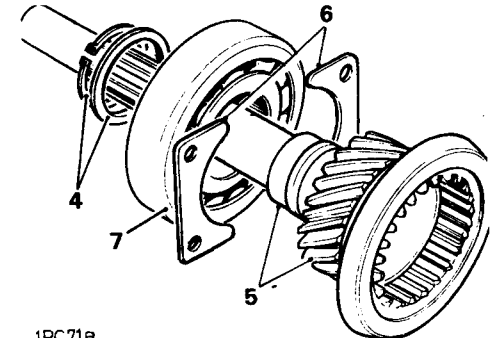
**Dismantling**

- 1 Remove the bell housing. 37.12.07.
- 2 Remove the layshaft bearing retainer and bearing plate.
- 3 Press the layshaft bearing from the bell housing.



1RC70

- 4 Remove the circlip and distance washer.
- 5 Press out the primary pinion.
- 6 Remove the bearing retaining plates.  
**NOTE:** These are handed plates.
- 7 Press out the primary pinion bearing.

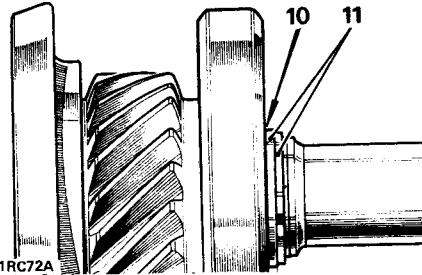


1RC71B



### Assembling

- 8 Reverse 5 to 7
- 9 Fit the distance washer and position a new circlip in the retaining groove.
- 10 Check the end-float between the primary pinion and the distance washer. End-float must be the minimum obtainable, selecting a suitable distance washer from the range available. It should be possible to turn the washer without feeling any end-float.
- 11 Fit the selected distance washer and circlip.



- 12 Reverse 1 to 3.

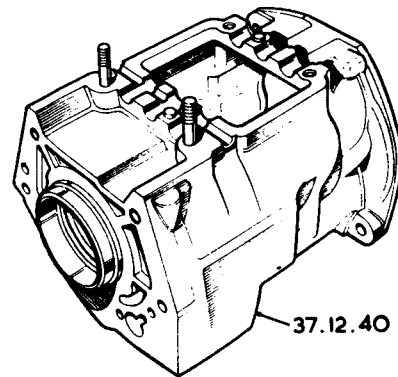
## GEARBOX MAIN CASING

Remove and refit 37.12.40

**NOTE:** If it is required to change the rear main oil seal only, it is not necessary to completely dismantle the gearbox. The oil seal is accessible after removing the intermediate gear and the mainshaft gear from the transfer box, see 37.29.25 and 37.20.25 for details.

### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the gearbox assembly complete. 37.20.01.
- 5 Remove the transmission brake. 70.45.16.
- 6 Remove the transfer box. 37.29.25.
- 7 Remove the main gear change lever. 37.16.04.
- 8 Remove the clutch withdrawal unit. 33.25.12.



1RC73

- 9 Remove the bell housing. 37.12.07.
- 10 Remove the selector shafts. 37.16.31.
- 11 Remove the layshaft. 37.20.19.
- 12 Remove the mainshaft. 37.20.25.
- 13 When 1 to 12 are completed the gearbox main casing is released and can be dismantled as described under 'Overhaul', 37.12.43.

### Refitting

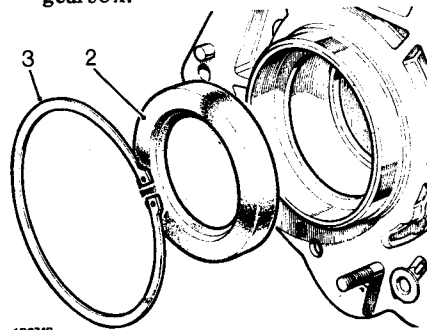
- 14 Reverse 1 to 12.

## GEARBOX MAIN CASE

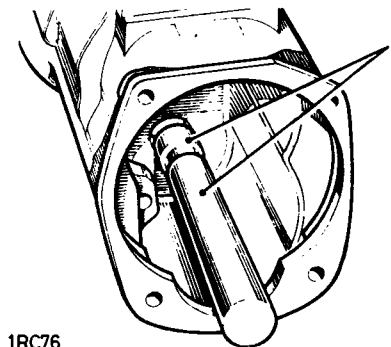
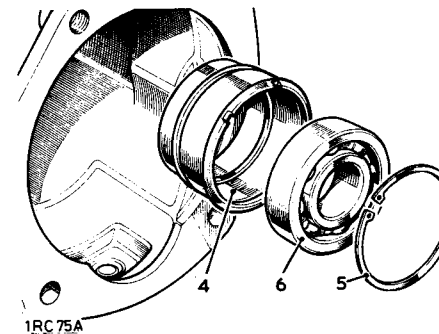
Overhaul 37.12.43

### Dismantling

- 1 Remove the gearbox main case. 37.12.40.
- 2 Prise the oil seal from the rear of the mainshaft bearing housing.
- 3 Remove the circlip retaining the bearing housing to the rear face of the gearbox.



- 4 Press out the housing, complete with bearing, in a forward direction.
- 5 Remove the circlip.
- 6 Press the mainshaft rear bearing from the housing.
- 7 With the case warm, drive out the layshaft bearing outer race, using a suitable drift applied through the two extractor holes provided in the case rear face. (See also item 8.)
- 8 An alternative method is to use a mandrel, approximately 300 mm (12 in.) long by 43,50 mm (1.687 in.) diameter, so that it is a tight fit in the outer race. Warm the gearbox case and outer race, keep the mandrel as cool as possible. With the casing warm, insert the mandrel into the outer race which will shrink on to the mandrel and withdraw easily.



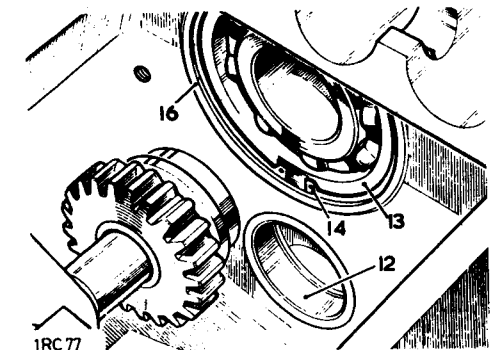
- 9 The remaining oil drain and filler plugs, studs, dowels and retaining plate for selector shaft oil seals, can be removed as required. See 37.20.13 for removal of reverse idler gear and shaft if required.

### Inspecting

- 10 Check all components for wear and damage.
- 11 Ensure that the two dowels in the gearbox top face, and the two dowels in the rear face, are secure.

### Assembling

- 12 Press the layshaft rear bearing outer race, lipped edge first, into the gearbox case.
- 13 Smear the outside diameter of the mainshaft rear bearing with Loctite Retaining Compound, Grade 601 and press the bearing into the housing.
- 14 Retain with a circlip.
- 15 Fit the main shaft rear oil seal, lipped side first, into the bearing housing.
- 16 Smear the outside diameter of the bearing housing with Loctite Retaining Compound (Grade 601), Part No. 600303 and press it into position.



**NOTE:** The gearbox should not be filled with lubricating oil or used for twenty-four hours, to allow the Loctite to fully cure.

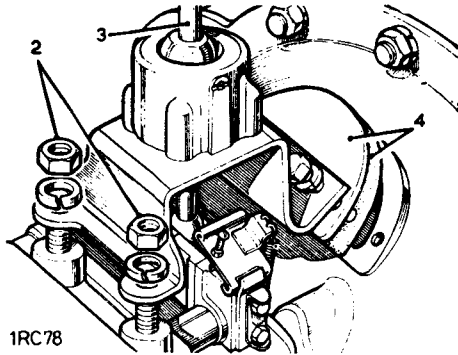
- 17 Fit the retaining circlip to the groove in the bearing housing where it protrudes through the rear face of the gearbox.
- 18 Refit the gearbox main case. 37.12.40.

**MAIN GEARCHANGE LEVER**

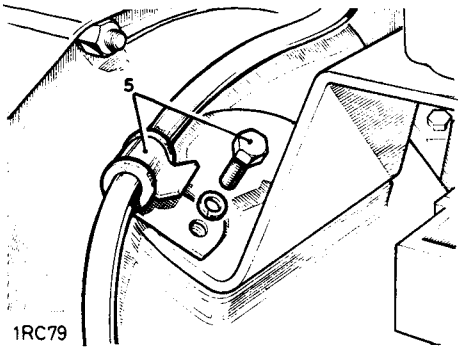
Remove and refit 37.16.04

**Removing**

- 1 Remove the front floor. 76.10.12.
- 2 Remove the fixings.
- 3 Remove the main gearchange lever complete.
- 4 To prevent loss, lift off the top cover plate and rubber seal from the bell housing.



1RC78



1RC79

**Refitting**

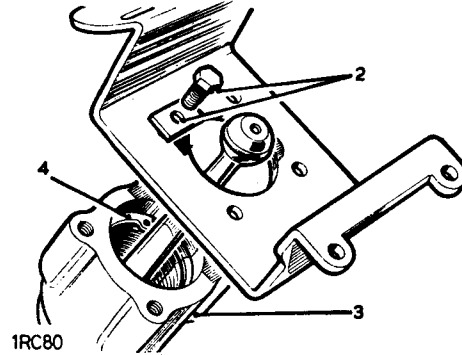
- 5 Reverse 1 to 4, noting that a retaining clip for the speedometer cable locates under the head of the front left hand gearchange lever securing bolt.

**MAIN GEARCHANGE LEVER**

Overhaul 37.16.10

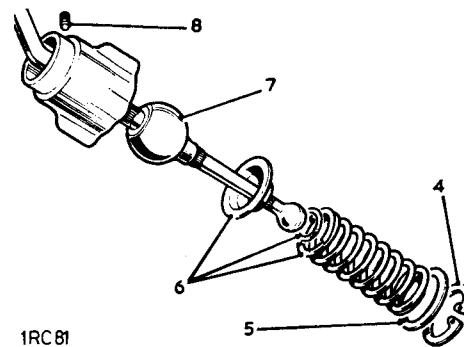
**Dismantling**

- 1 Remove the gearchange lever. 37.16.04.
- 2 Remove the fixings at the mounting plate.
- 3 Remove the lever housing from the mounting plate.
- 4 Remove the lever housing circlip.



1RC80

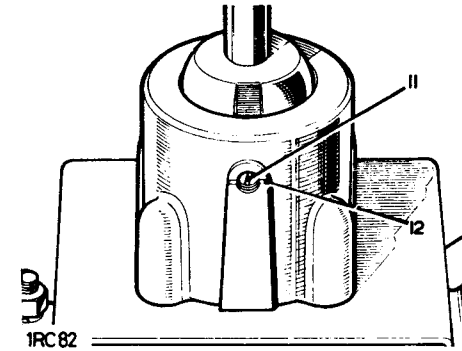
- 5 Withdraw the spring, rubber 'O' ring (later models) and spherical seat.
- 7 Lift out the gearchange lever.
- 8 Withdraw the lever ball locating pin.
- 9 Examine the components visually and renew any that show obvious wear or damage.



1RC81

**Assembling**

- 10 Reverse 2 to 8.
- 11 Ensure that the lever locating pin engages the slot in the lever ball.
- 12 Secure the pin by peening.
- 13 Refit the gearchange lever. 37.16.04.



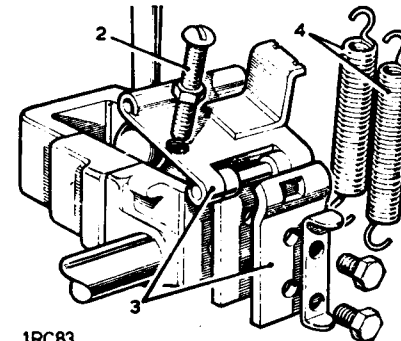
1RC82

**REVERSE STOP FOR MAIN GEARCHANGE LEVER**

Remove, refit and adjust 37.16.28

**Removing**

- 1 Remove the front floor. 76.10.12.
- 2 Remove the hinge adjuster.
- 3 Remove the hinge and bracket from the reverse selector shaft.
- 4 Detach the two springs.



1RC83

**Refitting**

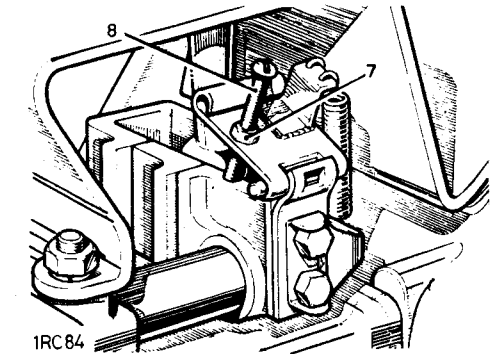
- 5 Reverse 1 to 4. Adjust the reverse stop before fitting the front floor, items 6 to 9.

**Adjusting**

- 6 Release the fixings and slide the reverse stop inspection cover up the four wheel drive selector lever.

**NOTE:** If the gearbox cover does not incorporate an inspection cover, then the adjustment must be carried out before the gearbox cover is fitted.

- 7 Slacken the adjusting screw locknut.
- 8 Adjust the screw so that the hinge rides easily up the gear lever when reverse gear is selected, while at the same time appreciable resistance is felt on moving the gear lever to the reverse position.



1RC84

- 9 Ensure that 1st gear engages correctly, if there is any tendency to simultaneously engage reverse gear, readjust the reverse stop.

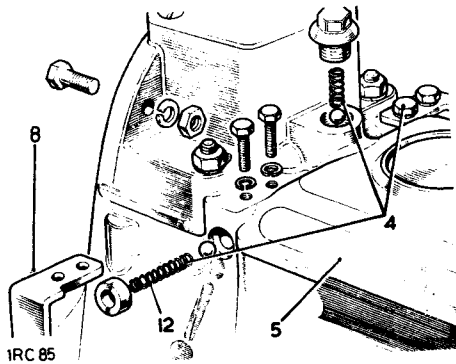
## MAIN GEARCHANGE SELECTORS

Remove and refit

37.16.31

### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Remove the main gearchange lever. 37.16.04.
- 4 Remove the three selector springs and pack the drillings in the top cover with grease, to retain the selector balls when the cover is removed.
- 5 Remove the top cover and joint washer from the gearbox and collect the three selector balls.

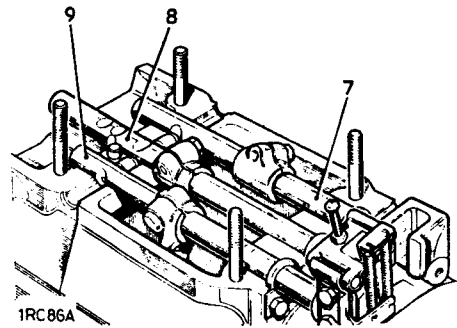


- 6 Select third gear.
- 7 Lift the first/second selector shaft, do not attempt to remove but lift and withdraw the third/fourth selector shaft.
- 8 Lift, twist and remove the first/second selector shaft.
- 9 Lift, turn and withdraw the reverse selector shaft.

NOTE: No force is required to withdraw any of the selector shafts.

### DATA

Reverse gear selector shaft stop setting . . . .

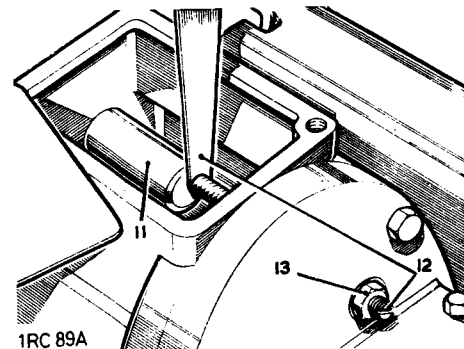


### Refitting

- 10 Reverse 3 to 9.

NOTE: If a joint washer was not previously fitted to the top cover, then a joint washer should now be fitted.

- 11 Select reverse gear.
- 12 Adjust the reverse gear stop bolt so that there is 0,05 mm (0.002 in.) minimum clearance between the selector shaft and the end of the bolt.
- 13 Tighten the locknut.



NOTE: If the transfer box has been removed from the main gearbox, the foregoing adjustment must be carried out after the transfer box has been refitted.

- 14 Reverse 1 and 2.

0,05 mm (0.002 in) minimum clearance between shaft and stop

## MAIN GEARCHANGE SELECTORS

Overhaul

37.16.34

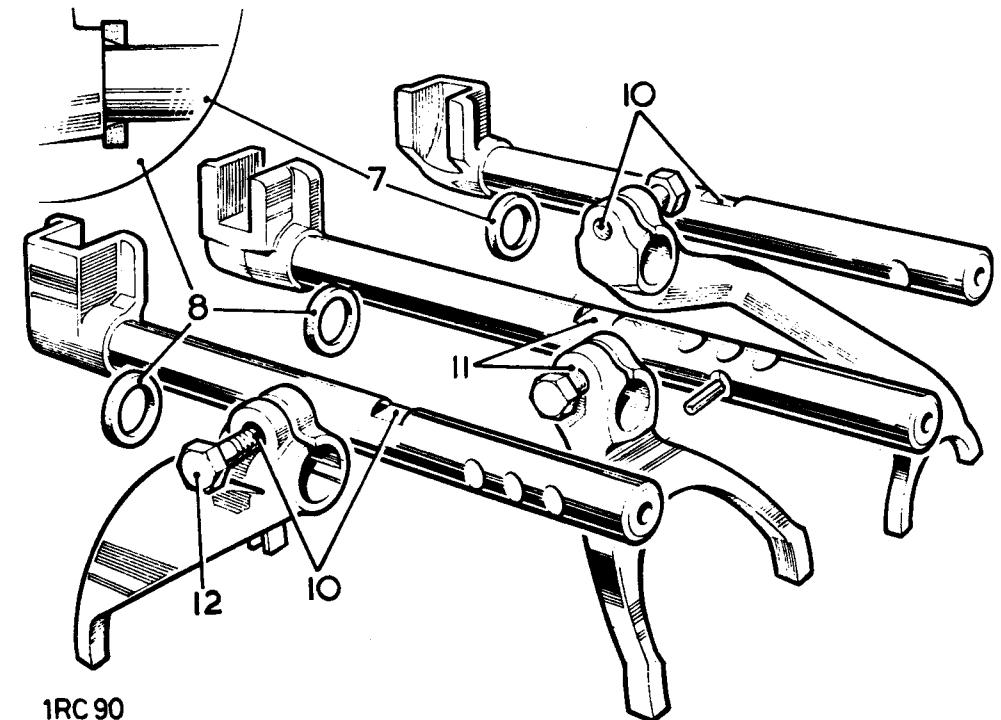
NOTE: See the Note on page 37—20 at the end of Section 37.

### Dismantling

- 1 Remove the gearchange selectors. 37.16.31.
- 2 Remove the reverse selector stop. 37.16.28.
- 3 Remove the pinch bolts.
- 4 Withdraw the selector forks.
- 5 Withdraw the seals.

### Inspecting

- 6 Examine the components visually and replace worn or damaged items.



### Assembling

- 7 Fit the larger diameter tapered seal to the reverse shaft, with the thinner edge of the seal toward the front of the shaft.
- 8 Fit the two remaining tapered seals, thinner edges toward the front of the shafts.
- 9 Position the selector forks on the shafts.
- 10 Align the pinch bolt holes with the grooves on top of the shafts.
- 11 On the first/second gear selector, the groove required is the one nearest to the front of the shaft.
- 12 Fit the pinch bolts. There is radial movement between the selector fork and shaft before the pinch bolt is tightened, and the fork should be secured in the mid position and the bolts tightened to 2,7 kgf m (20 lbf ft).
- 13 Reverse 1 and 2.

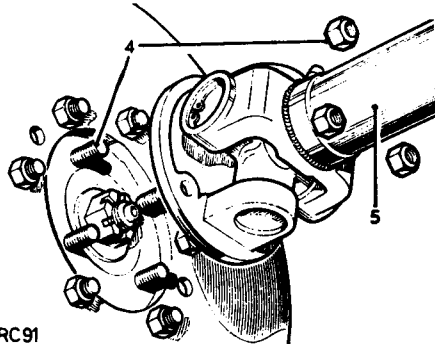
## GEARBOX ASSEMBLY

Remove and refit

37.20.01

### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the rear propeller shaft fixings at the transmission brake.
- 5 Move aside the shaft.

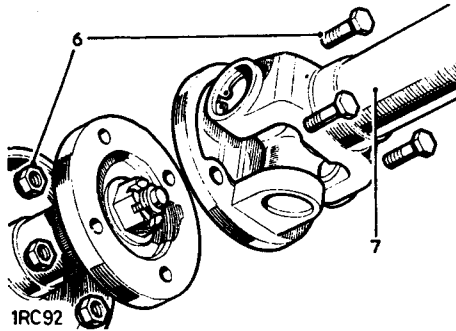


1RC91

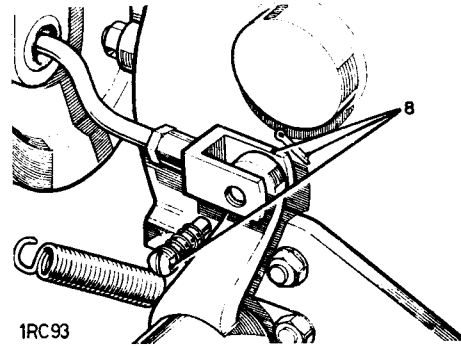
- 6 Remove the front propeller shaft fixings at the front output coupling.
- 7 Move aside the shaft.

**NOTE:** If the vehicle is fitted with any optional equipment driven from the gearbox, it must be disconnected at the gearbox. Refer to separate publication for details of optional equipment.

- 8 Disconnect the hand brake expander rod from the relay lever.

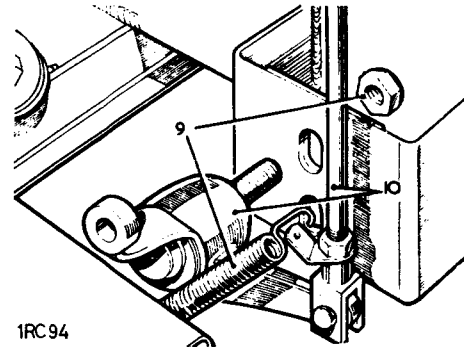


1RC92



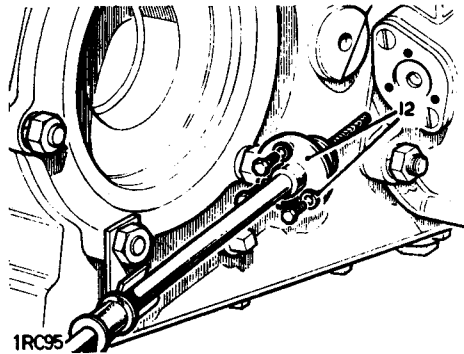
1RC93

- 9 Remove the brake lever and relay fixings.
- 10 Remove the brake lever and relay mechanism.



1RC94

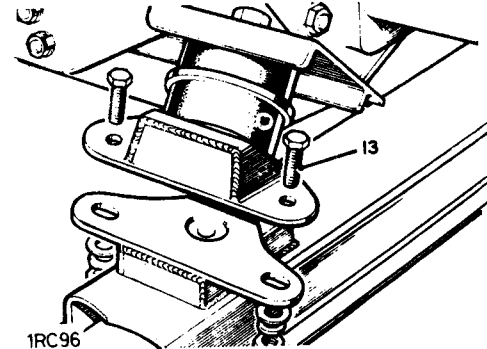
- 11 Left hand steering models only. Remove the brake lever cross-shaft.
- 12 Disconnect the speedometer cable from the gearbox.



1RC95

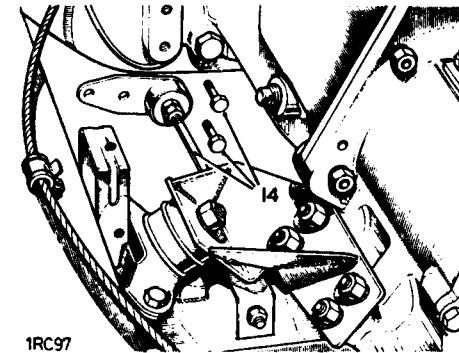
**NOTE:** On certain models, the engine exhaust pipe is located above the gearbox left hand rear mounting, and where applicable, the exhaust pipe must be moved clear. Also check the location of the engine earth strap, on certain models it is fitted between the gearbox and chassis and must therefore be disconnected.

- 13 Remove the fixings from two rear mountings for the gearbox.



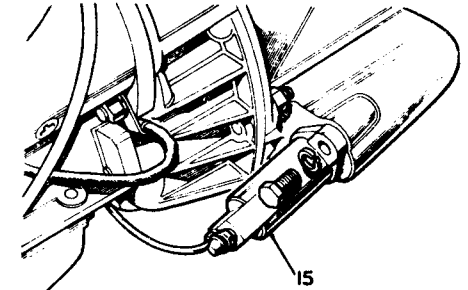
1RC96

- 14 On certain models, a tie rod is fitted between the gearbox and chassis. Where applicable, release the bracket at the bell housing and move the tie rod clear.
- 15 Remove the clutch slave cylinder from the bell housing.



1RC97

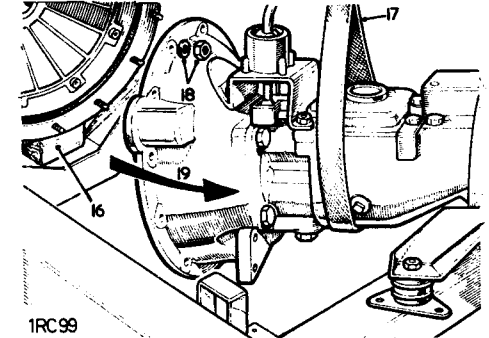
- 16 Jack up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the flywheel housing and chassis, to retain the



1RC98

engine position when the gearbox is removed.

- 17 Place a suitable sling around the gearbox and tension it sufficient to take the weight.



1RC99

- 18 Remove the remaining fixings securing the bell housing to the flywheel housing.
- 19 Carefully withdraw the gearbox rearwards clear of the clutch and lift from the vehicle.

### Refitting

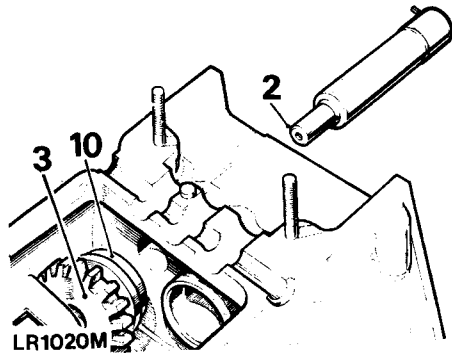
- 20 Smear the splines of the primary pinion, the clutch centre and the withdrawal unit abutment faces with Molybdenum disulphide grease such as Rocol MTS 1000.
- 21 Check that the push-rod for the clutch slave cylinder is fitted to the release lever in the bell housing, then complete the refitting by reversing instructions 1 to 19.
- 22 Bleed the clutch hydraulic system as necessary. 33.15.01.

## REVERSE IDLER GEAR AND SHAFT

Remove and refit, 1 to 3 and 10 to 12 37.20.13  
Overhaul 1 to 12 37.20.14

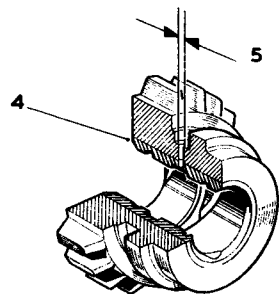
### Removing

- 1 Remove the gearbox main case. 37.12.40
- 2 Warm the gearbox case and drive out the reverse gear idler shaft from inside the case.
- 3 Lift out the reverse wheel assembly and collect the thrust washer and spacer on later assemblies with needle bearing.



### Overhauling Early type with brush

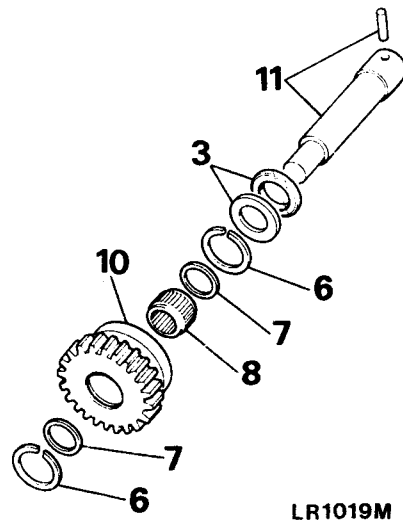
- 4 Check the bush in the reverse wheel assembly. If a new bush is required it must be secured by peening after being pressed into position, and then reamed to 20,637 mm +0.025 mm (0.8125 in. +0.001 in.) diameter.



- 5 After reaming and peening as already described, drill a 3,18 mm (0.125 in.) diameter hole through the bush, using the existing hole in the gear as a pilot. Afterwards remove all fraze from the bore.

### Later type with needle bearing

- 6 Remove the two circlips.
- 7 Remove the two washers.
- 8 Withdraw the needle bearing.
- 9 Examine gear and bearing and reassemble securing with the two circlips.



### Refitting

- 10 Fit the reverse wheel assembly with the selector groove to the rear of the gearbox.
- 11 Press in the reverse shaft until flush with gearbox rear face and with the needle bearing type insert the spacer and thrust washer. Align the spring pin with the slot provided in the rear face.
- 12 Reverse instruction 1.

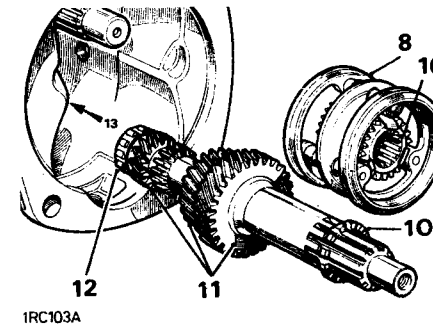
## LAYSHAFT

Remove and refit 37.20.19

NOTE: See the Important Note on page 37—20 at the end of Section 37.

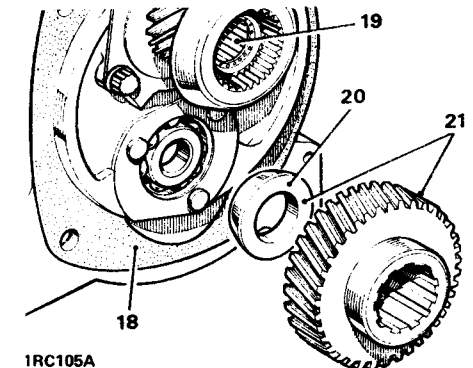
### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the gearbox assembly complete. 37.20.01.
- 5 Remove the main gearchange lever. 37.16.04.
- 6 Remove the clutch withdrawal unit. 33.25.12.
- 7 Remove the bell housing. 37.12.07.
- 8 Withdraw the third/fourth gear synchroniser from the mainshaft.
- 9 Manoeuvre the layshaft forward and downwards to clear the mainshaft.
- 10 Withdraw the layshaft.
- 11 The first, second and third gears are integral with the layshaft and cannot be removed.
- 12 If required, press the rear bearing inner race from the layshaft.
- 13 If required, refer to 37.12.43 for removal of layshaft rear bearing outer race.



### Refitting

- 14 Reverse 11 as necessary.
- 15 Reverse 12 as necessary.
- 16 Fit the third/fourth synchroniser to the main shaft with the recessed end of the inner member towards the third speed gear.
- 17 Fit the layshaft and rear inner bearing member assembly.
- 18 Place the bell housing joint washer in position.
- 19 Ensure that the roller bearing for the primary pinion is in position.
- 20 Locate the conical distance piece and constant gear in place, in mesh with the primary pinion, on the rear face of the bell housing.
- 21 Retain the constant gear and conical distance piece in position, by holding from inside the bell housing, then offer the bell housing to the gearbox, aligning the constant gear with the splines on the layshaft.
- 22 Fit the bell housing fixings.
- 23 Loosely fit the layshaft securing bolt and washer and check that the layshaft has definite but minimum end-float.
- 24 To adjust, replace the conical distance piece, available in a range of three thicknesses.
- 25 Tighten the layshaft securing bolt, torque loading 8,5 kgf m (60 lbf ft).
- 26 Reverse 1 to 7.



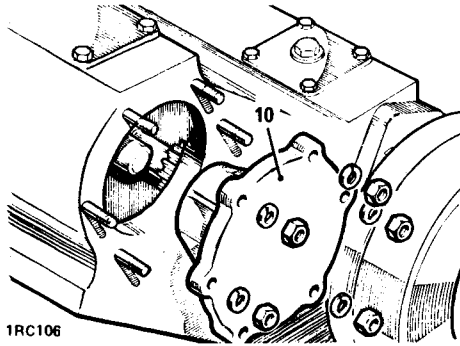
**MAINSHAFT ASSEMBLY**

**Remove and refit** 37.20.25

Service tool: 600300, tool for mainshaft nut

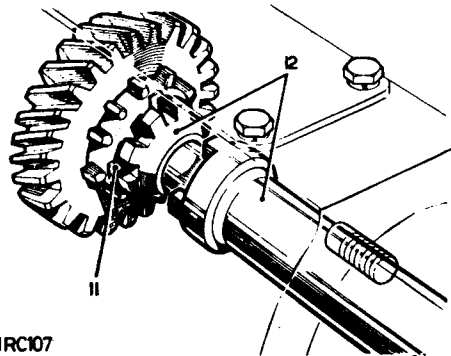
**Removing**

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Remove the gearbox assembly complete. 37.20.01.
- 5 Remove the main gearchange lever. 37.16.04
- 6 Remove the clutch withdrawal unit. 33.25.12.
- 7 Remove the bell housing. 37.12.07.
- 8 Remove the selector shafts. 37.16.31.
- 9 Remove the layshaft. 37.20.19.
- 10 Remove the rear bearing housing from the transfer box.



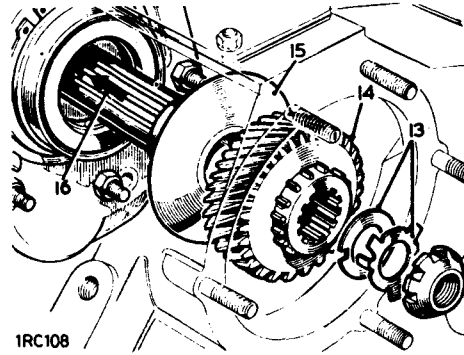
1RC106

- 11 Open the tab washer.
- 12 Remove the mainshaft nut. 600300.



1RC107

- 13 Withdraw the tab washer and shim washer.
- 14 Withdraw the mainshaft transfer gear.
- 15 Remove the oil thrower.
- 16 Drive out the mainshaft from the gearbox.



1RC108

**Refitting**

**NOTE:** If any mainshaft components have been renewed, the checks described under 'Mainshaft overhaul' 37.20.31 must be carried out.

- 17 Reverse 1 to 16.

**MAINSHAFT ASSEMBLY**

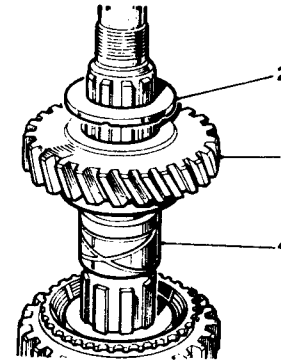
**Overhaul** 37.20.31

**Dismantling**

- 1 Remove the mainshaft. 37.20.25.

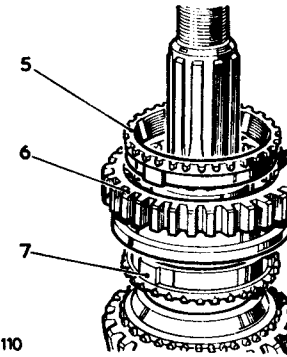
**Mainshaft rear end**

- 2 Withdraw the thrust washer.
- 3 Lift off the first speed gear.
- 4 Withdraw the bush for the first speed gear.



1RC109

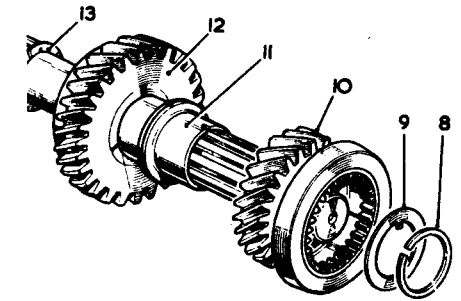
- 5 Withdraw the synchroniser rear cone.
- 6 Lift off complete the first/second speed synchroniser unit.
- 7 Withdraw the synchroniser front cone.



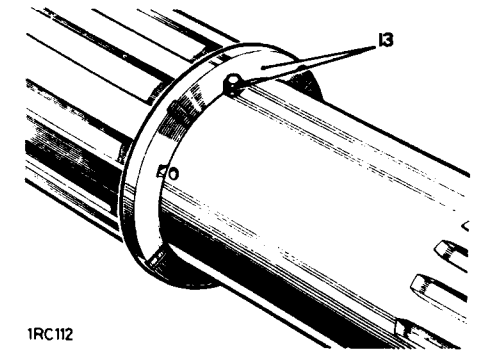
1RC110

**Mainshaft front end**

- 8 Remove the retainer ring from the groove in the mainshaft.
- 9 Withdraw the thrust washer, then the following items:
  - 10 Third speed gear.
  - 11 Distance sleeve.
  - 12 Second speed gear.
- 13 If it is required to remove the thrust washer for the second speed gear, first remove the locating peg for the distance sleeve; the peg is a press fit in the mainshaft.



1RC111



1RC112

**First/second speed synchroniser**

- 14 Before dismantling, take precautions to avoid the loss of components as they are released. Three springs, balls and sliding blocks are retained in the unit under spring pressure.
- 15 Dismantle the synchroniser assembly, first pushing down the sliding blocks to free the balls from the retaining grooves in the outer member.

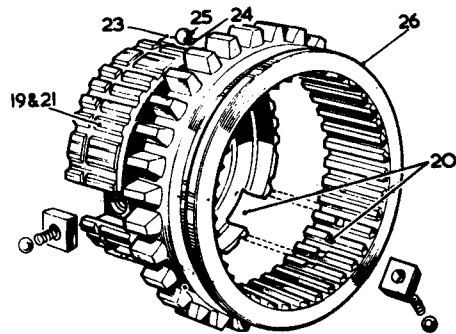
**Inspecting**

- 16 Examine all components for wear and damage.
- 17 Discard the mainshaft spring ring. Use a new replacement on assembly.
- 18 Check the synchronising clutch for third/fourth gears for wear, the detent springs can be replaced if required. A load of 6,5 to 9 kg. (15 to 20 lb.) should be required to actuate the clutch against the combined detent springs pressure.

## Assembling

### First/second speed synchroniser

- 19 Note the position of the longer splines on the inner member, formed by the offset groove.
- 20 Align the detent spring bores in the inner member with the ball retaining grooves in the outer member.
- 21 Fit the inner member to the outer member, entering the longer splines on the inner member at the gear teeth side of the outer member.
- 22 Repeat 20 and 21 in alternative positions and select the best position for easy slide fit.
- 23 Position the sliding blocks on the inner member, radiused faces outwards.
- 24 Locate the springs through the sliding blocks and into the housing bores in the inner member.
- 25 Position the balls on the spring ends; press home in sequence and retain by hand.
- 26 Lift the outer member to retain the balls. Continue lifting until the balls spring home into the retainer grooves.

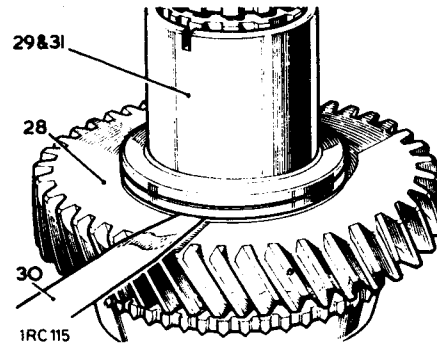


1RC13

### Mainshaft, front end

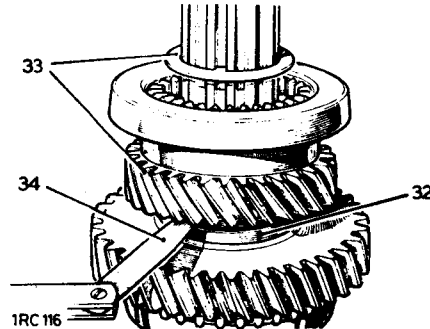
- 27 If the thrust washer for the second speed gear has been removed from the mainshaft, place the washer in position chamfered face first, engaging it over its locating peg. Do not fit the locating peg for the distance sleeve at this stage.
- 28 Fit the second speed gear, coned face last, to the end of the distance sleeve with the larger slot.

- 29 Slide the gear and sleeve assembly on to the mainshaft to abut with the thrust washer.
- 30 Holding the sleeve hard against the thrust washer, check the end-float of the second speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.).



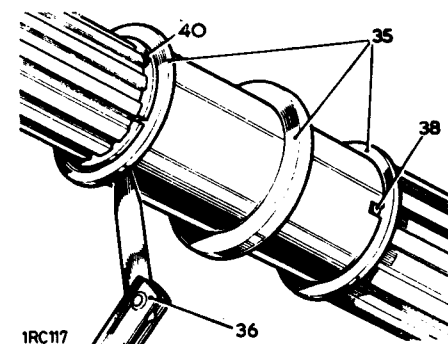
1RC15

- 31 The end-float of the second and third speed gears is controlled by the length of the distance sleeve. With a new sleeve, the clearance may be excessive and can be corrected by rubbing down the applicable end face of the sleeve on a face plate and emery cloth. In the event of insufficient clearance, a new sleeve must be fitted.
- 32 Retain the second speed gear and distance sleeve on the mainshaft.
- 33 Fit the third speed gear and thrust washer.
- 34 Hold the thrust washer hard against the sleeve and check the end-float of the third speed gear, this must be 0,10 to 0,18 mm (0.004 to 0.007 in.). End-float adjustment is as already described in item 31.



1RC16

- 35 Remove the gears and distance sleeve from the mainshaft and refit the thrust washers and distance sleeve only, retain in position with the old spring ring.
- 36 Check the end float of the distance sleeve, this must be 0,03 to 0,20 mm (0.001 to 0.008 in.). Adjustment is made by changing either of the thrust washers which are available in a range of thicknesses.
- 37 When the end-float of the mainshaft gears and distance piece are correct, remove the spring ring, thrust washer for third speed gear and the distance sleeve.
- 38 If removed, fit the distance sleeve locating peg to the mainshaft, ensuring that the thrust washer for the second speed gear is engaged on its locating peg.
- 39 Fit the second speed gear, distance sleeve, third speed gear and thrust washer to the mainshaft.
- 40 Retain with a new spring ring.

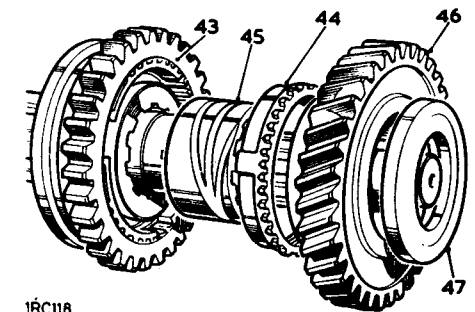


1RC17

### Mainshaft rear end

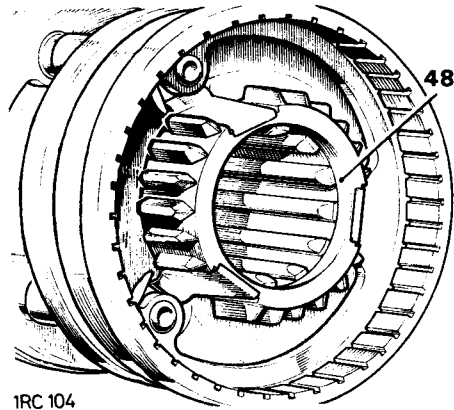
- 41 Position the mainshaft with the rear end uppermost.
- 42 Position a synchroniser cone on to the second speed gear.
- 43 Fit the first/second synchroniser unit to the shaft, reverse gear side uppermost.
- 44 Position a synchroniser cone on to the synchroniser inner member.
- 45 Fit the bush for first speed gear with the circular oil groove end uppermost. Ensure that the bush rear face is 0,05 to 0,18 mm (0.002 to 0.007 in.) below the end of the mainshaft splines; check by temporarily fitting the thrust washer, stepped face uppermost, and measuring the clearance between the bush and the thrust washer.
- 46 Fit the first speed gear.
- 47 Fit the thrust washer, stepped face uppermost.

*continued*



1RC18

- 48 Fit the third/fourth synchroniser unit to the main shaft; noting that it must be fitted with the recessed end of the inner member towards the third gear.



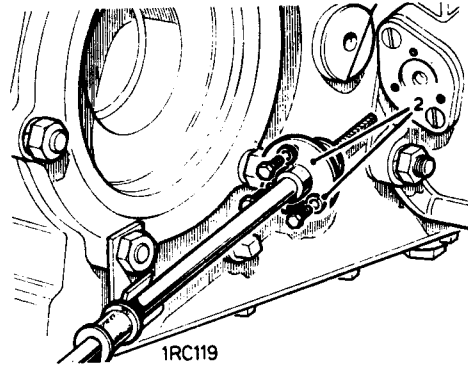
1RC 104

### SPEEDOMETER DRIVE HOUSING

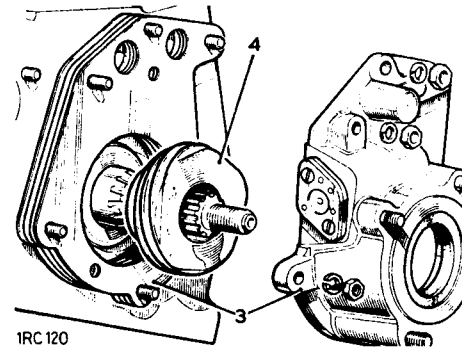
Remove and refit 37.25.09

#### Removing

- 1 Remove the transmission brake. 70.45.16.
- 2 Disconnect the speedometer cable from the gearbox.



1RC 119



1RC 120

- 3 Remove the speedometer drive housing complete with shims.
- 4 Withdraw the speedometer drive worm.

#### Refitting

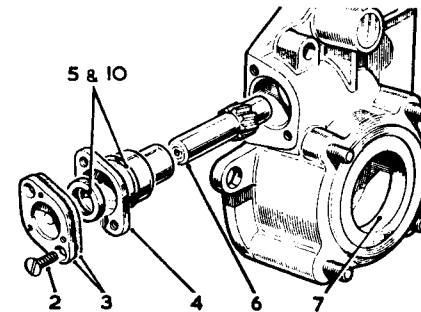
- 5 Reverse 1 to 4. If necessary, replenish the gearbox lubricating oil.

### SPEEDOMETER DRIVE HOUSING

Overhaul 37.25.13

#### Dismantling

- 1 Remove the speedometer drive housing. 37.25.09.
- 2 Remove the pinion retainer fixings.
- 3 Withdraw the retainer and gasket.
- 4 Withdraw the pinion sleeve.
- 5 Remove the oil seal and 'O' ring.
- 6 Withdraw the speedometer pinion.
- 7 Remove the output shaft oil seal from the speedometer housing.



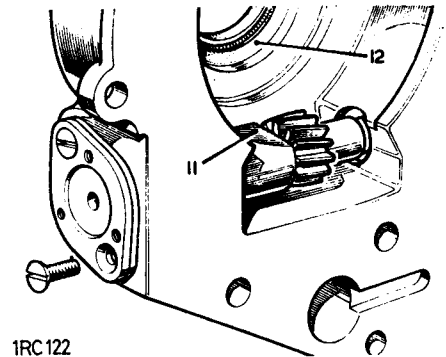
1RC 121

#### Inspecting

- 8 Examine the pinion teeth and the speedometer drive worm for wear.
- 9 Check the sleeve which should be a slide fit on the pinion.

#### Assembling

- 10 Fit the oil seal, lipped side inwards, and 'O' ring to the sleeve.
- 11 Fit the pinion and sleeve, ensuring that the relieved face on the sleeve will be towards the speedometer drive worm when assembled.
- 12 Fit the output shaft oil seal, lipped side inward, using jointing compound on the seal outer diameter. The housing may be warmed to facilitate assembly.
- 13 Refit the drive housing. 37.25.09.



1RC 122

### DATA

|   |   |
|---|---|
| Third/fourth gear synchronising clutch load                   | 6,5 to 9 kg. (15 to 20 lb.).                                      |
| End float of second speed gear                                | 0,10 to 0,18 mm (0.004 to 0.007 in.)                              |
| End float of third speed gear                                 | 0,10 to 0,18 mm (0.004 to 0.007 in.)                              |
| End float of distance sleeve                                  | 0,03 to 0,20 mm (0.001 to 0.008 in.)                              |
| End float of first speed gear                                 | 0,10 mm to 0,20 mm (0.004 to 0.008 in.)                           |
| Clearance between first gear bush rear face and thrust washer | 0,05 to 0,18 mm (0.002 to 0.007 in.); adjust bush length to suit. |

### INTERMEDIATE GEAR ASSEMBLY

Remove and refit 37.29.25

See 37.29.28.

Operations 1-18 and 24-27.



## TRANSFER GEARBOX

Remove and refit

37.29.25

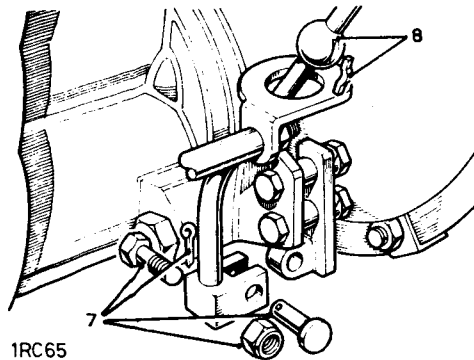
Service tool: 605862, intermediate shaft extractor

### Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Drain the gearbox lubricating oil.
- 4 Disconnect the front propeller shaft from the gearbox.
- 5 Remove the transmission brake. 70.45.16.

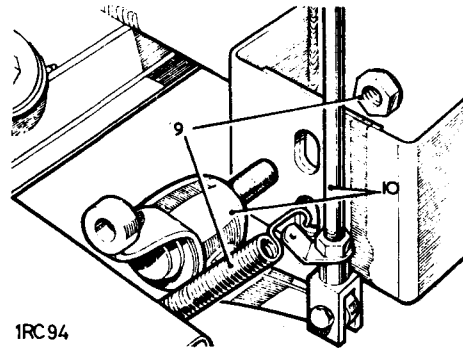
**NOTE:** If the vehicle is fitted with any optional equipment driven from the transfer box, it must be disconnected at the transfer box. Refer to separate publication for details of optional equipment.

- 6 Disconnect the speedometer cable from the gearbox.
- 7 Disconnect the transfer gear lever from the bracket at the bell housing. The fixings illustrated are alternatives.
- 8 Withdraw the lever, taking care to retain the spring strip, located between the lever ball and link.



1RC65

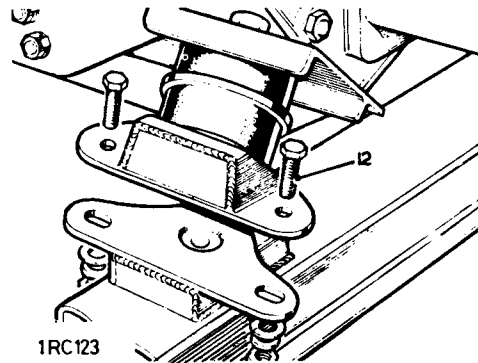
- 9 Remove the brake lever and relay fixings.
- 10 Remove the hand brake lever and relay mechanism.
- 11 Left hand steering models only. Remove the hand brake cross-shaft.



1RC94

**NOTE:** On certain models, the engine exhaust pipe is located above the gearbox, left hand rear mounting, and where applicable, the exhaust pipe must be moved clear. Also check the location of the engine earth strap, on certain models it is fitted between the gearbox and chassis and must, therefore, be disconnected.

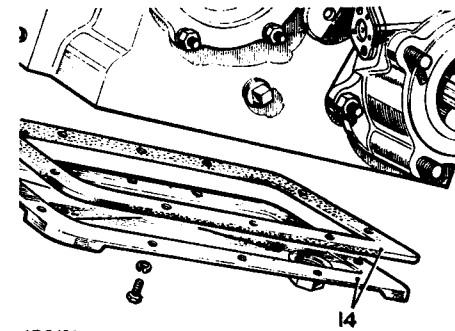
- 12 Remove the fixings from the two rear mountings for the gearbox.



1RC123

- 13 Jack up the rear of the engine sufficient to insert a 25 mm (1 in.) thick block of wood between the flywheel housing and the chassis to support the gearbox.

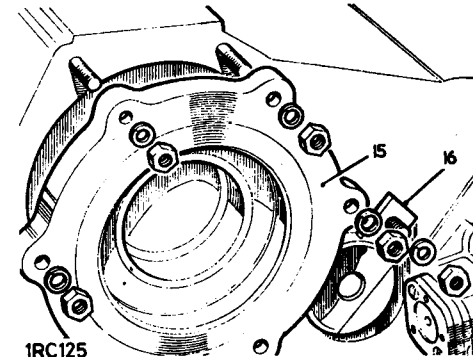
- 14 Remove the bottom cover plate and gasket from the transfer box.



1RC124

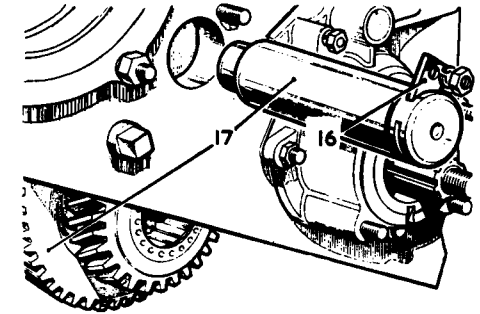
- 15 Remove the mainshaft rear bearing housing, or if fitted, the power take off drive unit.

- 16 Remove the fixings from the retaining plate for the intermediate shaft.



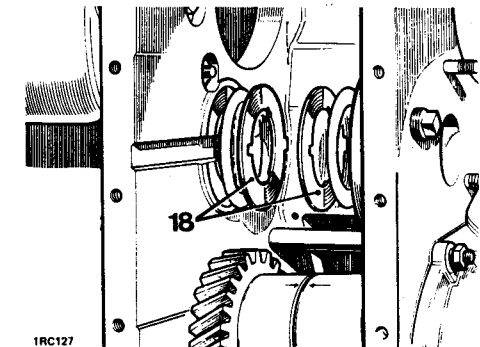
1RC125

- 17 Support the intermediate gear by hand while using Service Tool 605862 to withdraw the intermediate shaft complete with retaining plate and oil seal 'O' ring. Withdraw the intermediate gear and roller bearings through the bottom of the casing.



1RC126

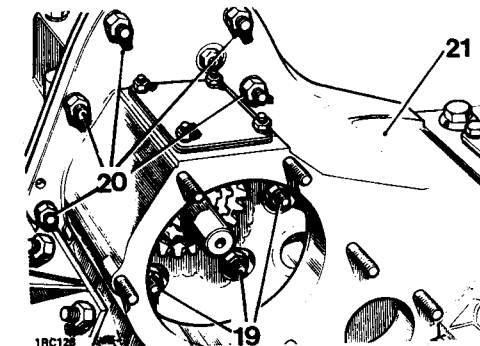
- 18 Remove the thrust washers and if fitted, shims located between each end of the intermediate gear and casing.



1RC127

- 19 Remove the internal fixings.
- 20 Remove the external fixings.
- 21 Withdraw the transfer gearbox and joint washer from the main gearbox.

*continued*



1RC128

**Refitting**

- 22 Smear both sides of the joint washer with general purpose grease and place it in position on the main gearbox.
- 23 Fit the transfer box to the main gearbox, engaging the dowel locations.
- 24 Refit the roller bearings to the intermediate gear and fit any shims for the intermediate gear, between the thrust washers and the casing, ensuring that the thrust washer bronze faces are towards the intermediate gear. Use a little general purpose grease to retain in position.

**NOTE:** If the intermediate gear, bearings or thrust washers have been renewed, the gear end-float must be checked and adjusted, as described under 'Transfer box overhaul' 37.29.28.

- 25 Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.
- 26 Fit the intermediate shaft, together with its oil seal 'O' ring and retaining plate through the casing, shims, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
- 27 Reverse 1 to 16. When refitting the bottom cover plate gasket, smear both sides with jointing compound.

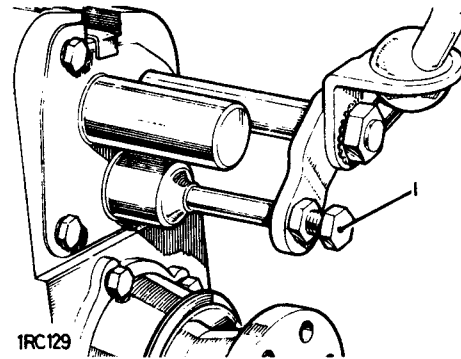
**TRANSFER GEARBOX (ALL HELICAL GEAR TYPE)****Overhaul**

37.29.28

Service tool: 243241 thread protector

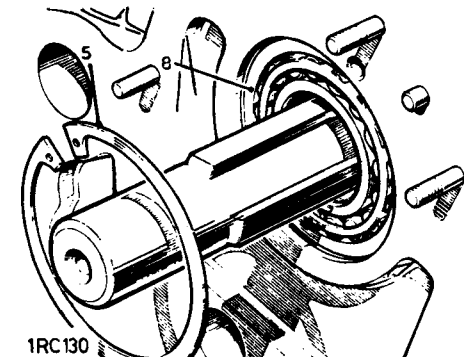
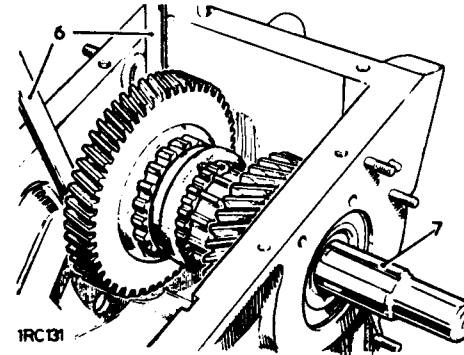
**Dismantling****General**

- 1 There are two types of transfer box in use, one utilises a helical and spur gear arrangement, while the other is of all helical design. The only visible external difference is a selector shaft adjuster, fitted to the front output shaft housing on the all helical box only. Identify the gearbox type before proceeding. Because the overhaul instructions for the two types carry the same operation number (37.29.28) but are printed separately, the applicable description is added to the operation title and to each continuing page.

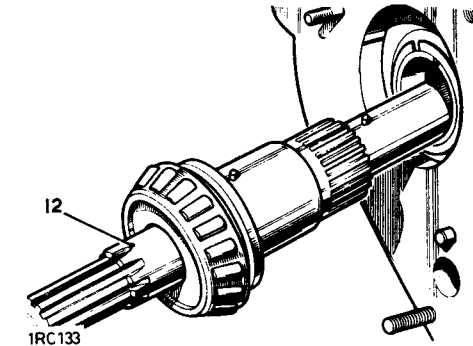
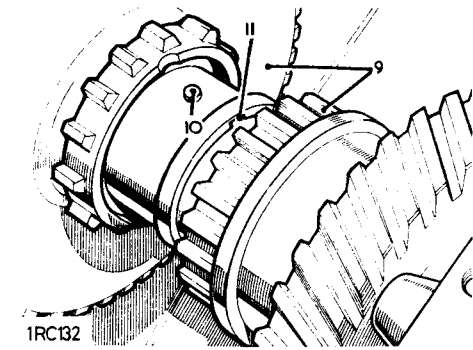


- 2 Remove the transfer gearbox. 37.29.25.
- 3 Remove the front output shaft housing. 37.10.05.
- 4 Remove the speedometer drive housing. 37.25.09.
- 5 Remove the circlip retaining the front bearing outer race.
- 6 Place two 16 mm (0.625 in.) diameter distance pieces between the rear face of the low gear wheel and the transfer box.

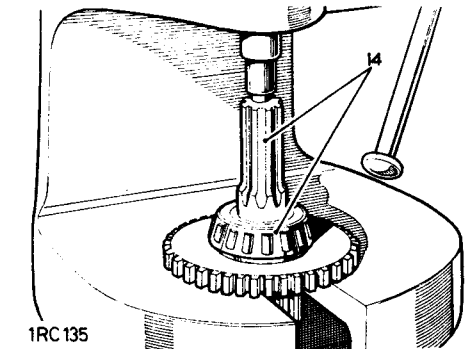
- 7 Retaining the distance pieces in position, use a soft mallet to drive the shaft rearwards until the low gear wheel just abuts the distance pieces.
- 8 Insert a mild steel chisel between the bush for the high gear wheel and the front bearing and prise the bearing outward approximately 6 mm (0.250 in.).



- 9 Part the change speed inner member and high gear wheel by hand.
- 10 Rotate the output shaft to locate the position of the shaft peg.
- 11 Using a suitable piece of wire, locate the slot in the high gear wheel thrust washer over the peg in the output shaft.
- 12 Retaining the distance pieces in position, use a soft-face mallet to drive the shaft rearwards until it can be withdrawn by hand complete with roller bearing, thrust washer and two locating pegs.

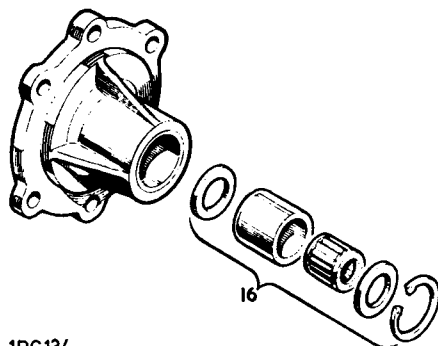


- 13 Withdraw the high and low speed gear assembly together with the front bearing from the transfer box.
- 14 Press the rear bearing and thrust washer from the output shaft. The low speed gear may be used as a press block for removal of the rear bearing.



**(ALL HELICAL GEAR TYPE)**

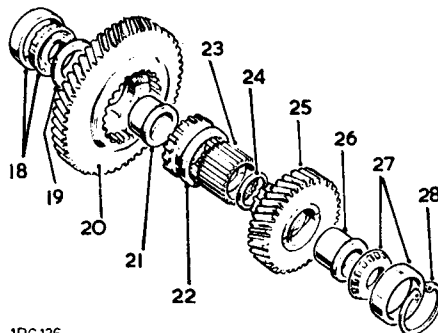
- 15 Press the front bearing outer race from the transfer box.
- 16 Remove the circlip, retaining plate and roller bearing from the mainshaft rear bearing housing.



1RC134

**Inspection**

- 17 Inspect the following components and renew any which show obvious wear or damage. Refer to the illustration for aid to identification.
- 18 Bearing for output shaft, rear.
- 19 Thrust washer for low gear wheel.
- 20 Low gear wheel.
- 21 Bush for low gear wheel.
- 22 Outer member for transfer change speed.
- 23 Inner member for transfer change speed.
- 24 Thrust washer for high gear wheel.

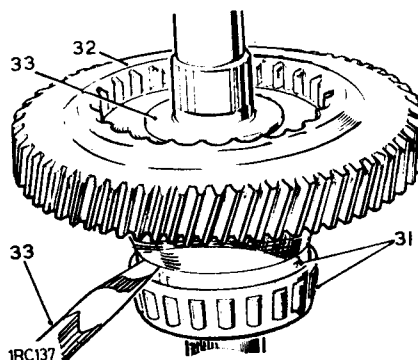


1RC136

- 25 High gear wheel.
- 26 Bush for high gear wheel.
- 27 Bearing for output shaft, front.
- 28 Circlip fixing bearing.
- 29 The steel thrust washer for the high gear wheel and the two locating pegs in the output shaft must be in good condition.
- 30 If necessary, renew the oilite bush in the transfer casing, which carries the transfer selector shaft. This bush is an interference fit in the casing, and must be reamed to 28,16 mm (1.148 in.) after fitting.

**Pre-assembly end-float checks, items 31 to 39**

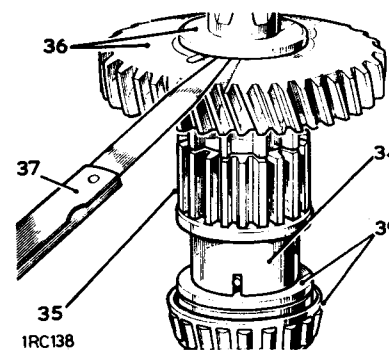
- 31 Fit the steel thrust washer and the rear bearing on to the rear of the output shaft.
- 32 Fit the low gear wheel complete with bush on to the output shaft to abut with the steel thrust washer.
- 33 Hold the bush in firm contact with the steel thrust washer and check the end-float of the low gear wheel, which must be 0.05 mm to 0.22 mm (0.002 in. to 0.009 in.).



1RC137

- 34 Remove the low gear wheel from the shaft, and replace the centre bush.
- 35 Fit the change speed inner member, and the thrust washer for the high gear wheel.
- 36 Fit the high gear wheel complete with bush.

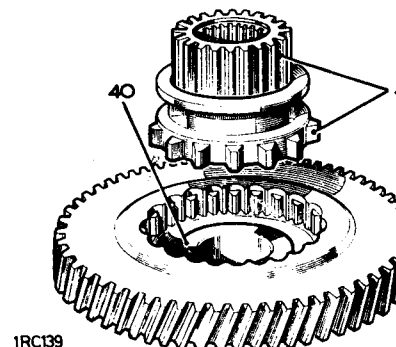
- 37 Hold the bush for the high gear wheel in firm contact with the thrust washer and check the end-float of the high gear wheel, which must be 0,12 mm to 0,55 mm (0.005 in. to 0.022 in.).
- 38 Excessive end-float on either gear wheel may be rectified by carefully rubbing down the end of the respective bush, using fine emery cloth and a face plate. Insufficient end-float can be rectified by fitting a new bush, followed by a further end-float check and rubbing down as necessary.
- 39 Remove all the components from the shaft except the steel thrust washer and rear bearing inner member, ready to proceed with the final assembly of the transfer box.



1RC138

**Assembling**

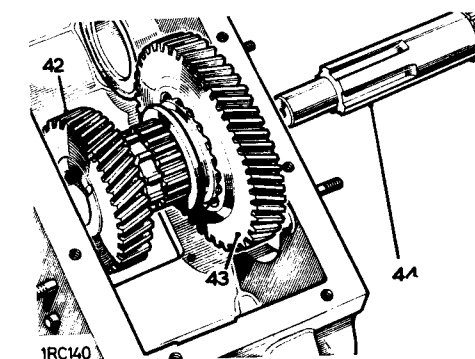
- 40 Fit the bush to the low gear wheel.



1RC139

- 41 Place the change speed inner and outer members against the thrust side of the bush. The recessed side of the inner member should be towards the bush, and the teeth on the outer member should be in mesh with the internal teeth of the gear wheel.
- 42 Place the high gear wheel, minus its centre bush, in position on the assembly with the dog teeth abutting the change speed outer member.
- 43 Lower the complete assembly into position in the transfer box, with the low gear wheel to the rear.
- 44 Carefully push the output shaft through the assembly and into position, from the rear, ensuring that the low gear wheel bush locates on the peg in the shaft, and that the splines of the change speed inner member are located on the shaft splines.

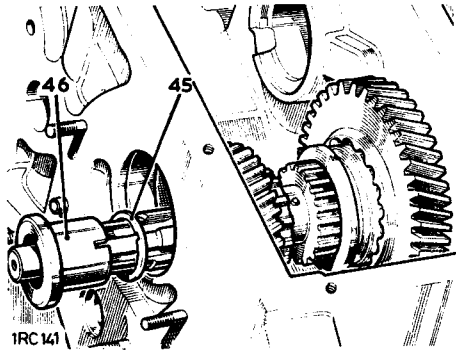
*continued*



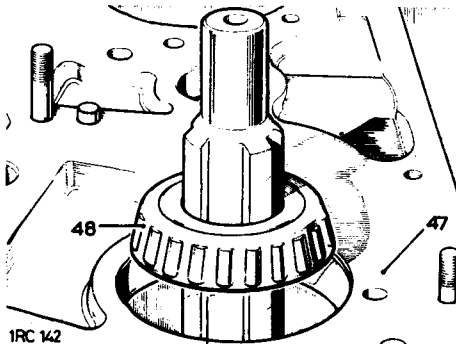
1RC140

**(ALL HELICAL GEAR TYPE)**

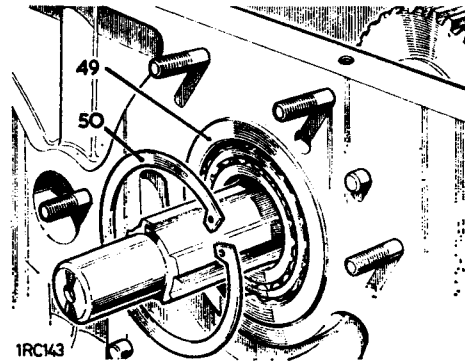
- 45 Slide the thrust washer for the high gear wheel over the front of the shaft and through the centre of the high speed gear, taking care to ensure that the washer slides over the peg and is located in the recess on the gear change inner member.
- 46 Fit the bush through the high gear wheel and locate it also on the peg.



- 47 Turn the casing on its side with the rear face downwards.
- 48 With the output shaft threaded end resting on the bench, drift the front taper roller bearing on to the shaft. Protect the thread against damage and make sure that the gears do not separate while the roller bearing is being fitted otherwise the bushes may become dislodged from the pegs on the shaft.



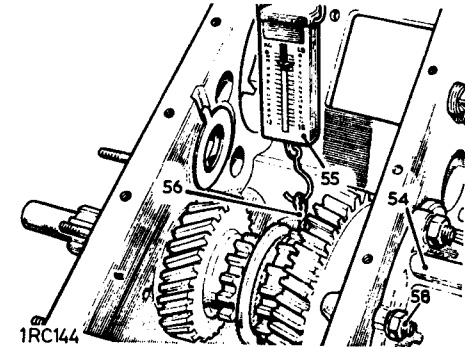
- 49 With the assembly held in the same position, drive the front bearing outer race into the housing.
- 50 Fit the circlip.



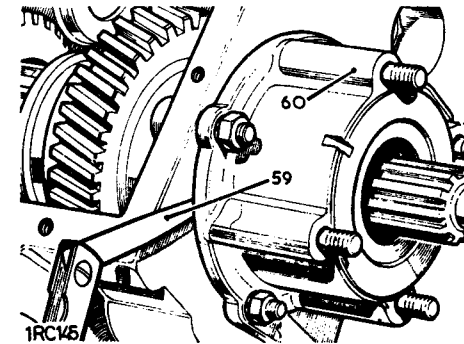
- 51 Fit the rear bearing outer race, do not fit fully in at this stage.
- 52 Using the protection cap 243241 over the threaded end of the output shaft, drive the shaft forward until the front bearing is hard against the circlip.
- 53 Then lightly tap the rear bearing outer race further in to remove all end-float from the output shaft without introducing pre-load.

**Setting the output shaft bearing pre-load, items 54 to 61**

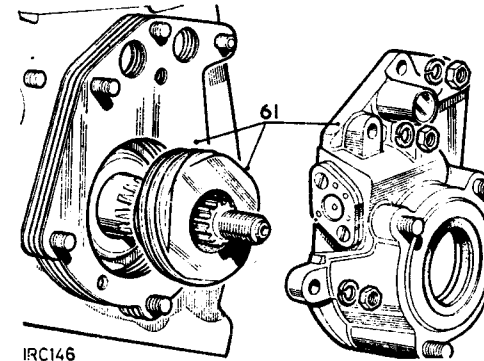
- 54 Fit the speedometer housing, without any shims, and loosely retain with nuts and spring washers.



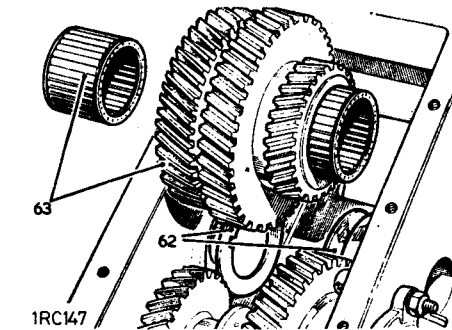
- 55 Measure the rolling resistance of the output shaft, using a nylon cord attached to a spring balance. Coil the cord around the low gear wheel selector groove and note the measurement recorded on the spring balance required to rotate the output shaft after having overcome inertia.
- 56 Ensure that the cord does not slip, giving a false reading.
- 57 Bearing pre-load is correct when a figure of 0,9 kg. to 1,8 kg. (2 lbs to 4 lbs.) is recorded on the spring balance.
- 58 Adjustment is made by tightening the speedometer housing securing nuts, progressively and evenly.
- 59 When the bearing pre-load is correct, ensure that the clearance between the speedometer housing and the transfer box is evenly disposed, using feeler gauges. The measured clearance obtained is equal to the thickness of shims required for subsequent assembly between the speedometer housing and transfer box to maintain correct bearing pre-load.
- 60 Withdraw the spring balance and nylon cord from the low gear wheel, and remove the speedometer housing from the transfer box.



- 61 Using a determined thickness of shims, fit the speedometer drive worm and housing.

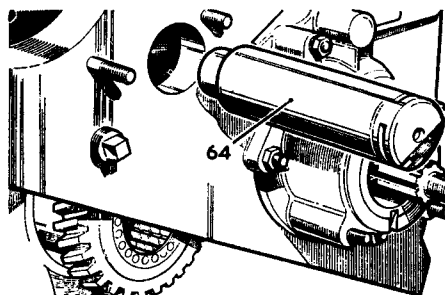
**Determining the intermediate gear end-float, items 62 to 66**

- 62 Place the two thrust washers for the intermediate gear in position in the transfer box and retain with a film of grease. The washers must be fitted with the bronze faces inward and located in the casing by their tabs.
- 63 Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.

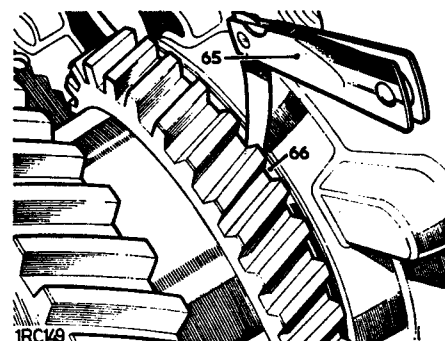


**(ALL HELICAL GEAR TYPE)**

- 64 Fit the intermediate shaft through the casing, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
- 65 Using feeler gauges, check the end-float of the intermediate gear, this must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.).
- 66 Adjustment is made by grinding the steel face of the thrust washers to increase end-float, or by fitting shims, available in 0,25 mm (0.010 in.) thickness, between the thrust washers and the casing to reduce end-float.
- 67 When the intermediate gear end-float is correct, remove the intermediate shaft and gear, and place aside for subsequent assembly after the transfer box has been fitted to the main gearbox.
- 68 Reassemble the rear bearing housing and the output drive flange by reversing the removal procedure.
- 69 Adjust the transfer travel stop after fitting the front output shaft housing to the transfer box, see 37.10.05.
- 70 Refit the transfer gearbox. 37.29.25.



1RC148



**DATA**

|  |   |
|--|---|
| Bush for transfer selector shaft ..... | 29,16 mm (1.148 in.) reamed diameter  |
| End-float of low gear wheel .....      | 0,05 to 0,22 mm (0.002 to 0.009 in.)  |
| End-float of high gear wheel .....     | 0,12 to 0,55 mm (0.005 to 0.022 in.)  |
| Output shaft bearing pre-load .....    | 0,9 to 1,8 kg. (2 to 4 lb.) measured with<br>spring balance cord coiled around the<br>low gear wheel selector groove. |
| End-float of intermediate gear .....   | 0,10 to 0,20 mm (0.004 to 0.008 in.)  |

## TRANSFER GEARBOX (HELICAL AND SPUR GEAR TYPE)

Overhaul 37.29.28

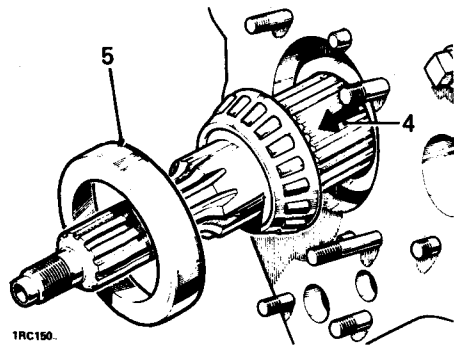
Service tool: 243241, thread protector

### Dismantling

#### General

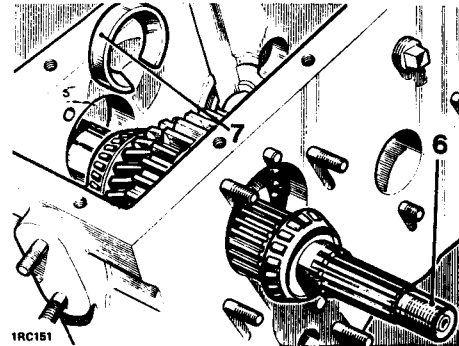
There are two types of transfer box in use, one with helical and spur gears and the other with all helical gears. The only visible external difference between the two is a selector shaft adjuster fitted to the front output shaft housing on the all helical box only. Identify the gearbox type before proceeding. Because the overhaul instructions for the two types carry the same operation number (37.29.28) but are printed separately, the applicable description is added to the operation title and to each continuing page.

- 1 Remove the transfer gearbox. 37.29.25.
- 2 Remove the front output shaft housing. 37.10.05.
- 3 Remove the speedometer drive housing. 37.25.09.
- 4 Using a mallet, drive the output shaft rearwards.
- 5 Withdraw the rear bearing outer race when released from the casing.

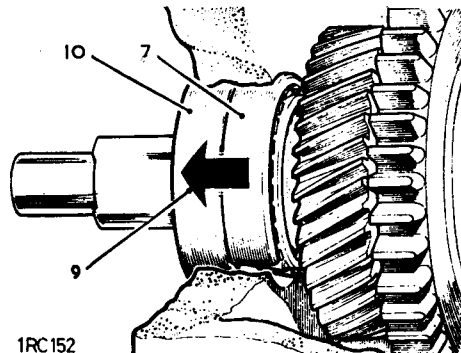


- 6 Fit protection cap 243241, over the threaded end of the output shaft, and drive the shaft forward as far as possible.
- 7 Slide the shaft to the rear and insert a suitable packing piece between the rollers of the front bearing and the outer race.

**NOTE:** A packing piece can be made from a scrap bearing outer race, with the outer diameter reduced to give clearance in the transfer box and suitably slotted to fit over the shaft.

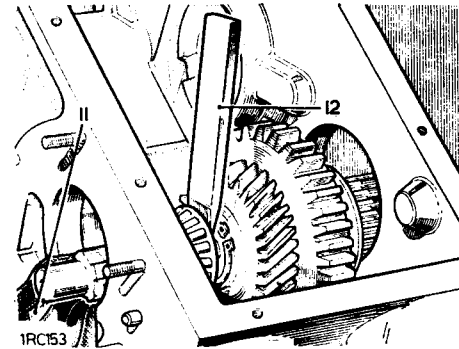


- 8 Remove the circlip retaining the front bearing outer race.
- 9 With the packing piece in position, drive the shaft forward.
- 10 Withdraw the front bearing outer race.

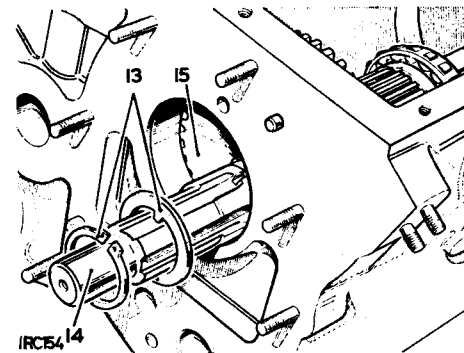


- 11 Place pads of rag in position to protect the transfer box bearing bores during the following operations.

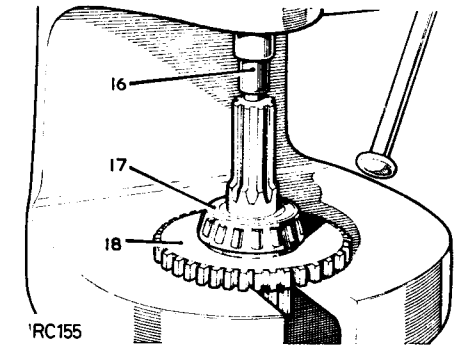
- 12 Using a suitable mild steel bar with a chisel end, drive the front bearing from the output shaft.



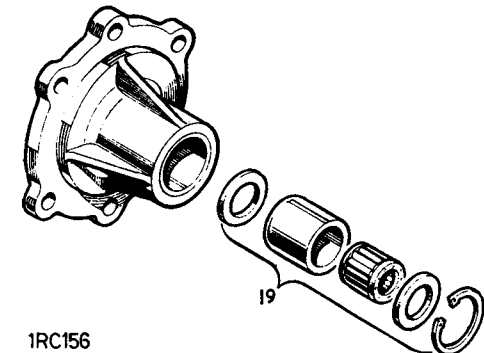
- 13 Remove the circlip and thrust washer from the output shaft.
- 14 Withdraw the shaft through the gears.
- 15 Remove the gears through the bottom of the casing.



- 16 Retain the protector 243241 on the shaft threads.
- 17 Extract or press the rear bearing from the output shaft.
- 18 As illustrated, the low speed gear may be used as a press block for the removal of the rear bearing.

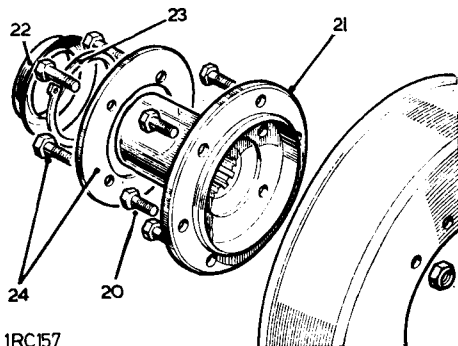


- 19 Remove the circlip, retaining plate and roller bearing from the mainshaft rear bearing housing.



**(HELICAL AND SPUR GEAR TYPE)**

- 20 Remove the fixings, flange to brake drum.
- 21 Withdraw the coupling flange.
- 22 Prise off the mud shield.
- 23 Remove the retaining circlip from the propeller shaft bolts.
- 24 Withdraw the bolts and retainer plate.



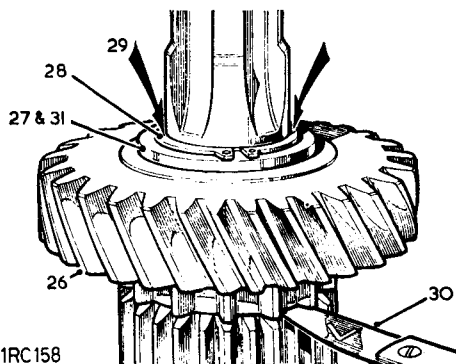
**Inspecting**

- 25 Renew any components which show obvious wear or damage. Check the condition of the shaft splines for the low gear wheel, it is important that the spline corners are not worn. Note that the low gear wheel is a loose fit on the shaft, this allows the gear to tilt in operation, causing the spline edges at the annular groove to bite on the splines of the low speed gear, locking it in position. Examine the sleeve of the output flange for damage which could cause failure of the oil seal.

**Pre-assembly check, items 26 to 31**

- 26 Fit the high gear wheel on to the output shaft.
- 27 Fit the thrust washer.
- 28 Fit the circlip.
- 29 Place a suitable piece of tube over the shaft and push the circlip towards the gear to produce minimum gear end-float.

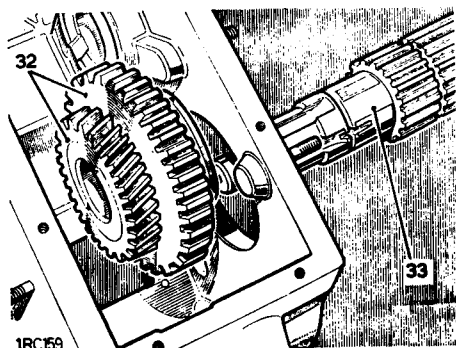
- 30 Maintaining this condition, check the end-float between the gear and the shaft, this must be 0,15 mm to 0,20 mm (0.006 in. to 0.008 in.) under these conditions.
- 31 Adjustment of the high gear wheel end-float is made by reducing the thickness of the thrust washer, or fitting a new thrust washer, as required. If fitting a new thrust washer fails to reduce the end-float to the required limits, replace the shaft and/or gear.



1RC158

**Assembling**

- 32 Position the high and low gears in the transfer box.
- 33 Fit the output shaft, from the rear of the box, to engage the gears.



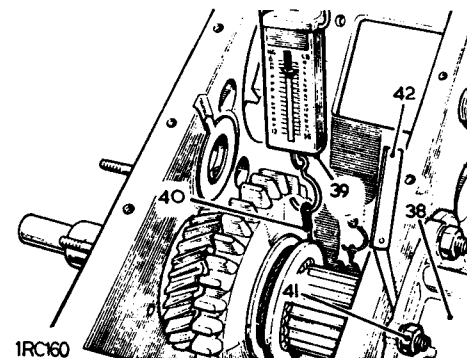
1RC159

- 34 Fit the thrust washer, determined during the pre-assembly check, to the output shaft and secure, using a new circlip.

- 35 Use pads of rag to protect the transfer box bearing bores, and drive the two roller bearings on to the output shaft. Fit the front bearing outer race and secure with a circlip.
- 36 Fit the rear bearing outer race.
- 37 Using the protection cap 243241 over the threaded end of the output shaft, drive the shaft forward until the front bearing is hard against the circlip. Then lightly tap the rear bearing outer race further in to remove all end-float from the output shaft without introducing pre-load.

**Setting the output shaft bearing pre-load, items 38 to 44**

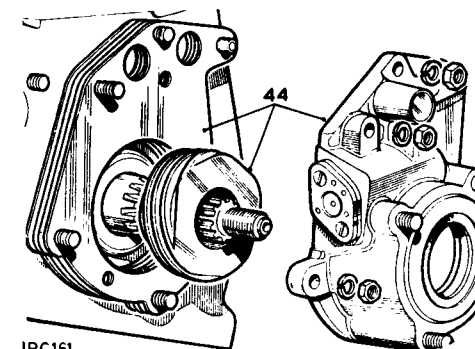
- 38 Fit the speedometer housing, without any shims, and loosely retain with nuts and spring washers.
- 39 Measure the rolling resistance of the output shaft, using a nylon cord attached to a spring balance. Coil the cord around the low gear wheel selector groove and note the measurement recorded on the spring balance required to rotate the output shaft after having overcome inertia.
- 40 Ensure that the cord does not slip, giving a false reading.
- 41 Bearing pre-load is correct when a figure of 0,9 to 1.8 kg. (2 to 4 lbs.) is recorded on the spring balance. Adjustment is made by tightening the speedometer housing securing nuts, progressively and evenly.



1RC160

- 42 When the bearing pre-load is correct, ensure that the clearance between the speedometer housing and the transfer box is evenly disposed, using feeler gauges. The measured clearance obtained is equal to the thickness of shims required for subsequent assembly between the speedometer housing and transfer box to maintain correct bearing pre-load.
- 43 Withdraw the spring balance and nylon cord from the low gear wheel, and remove the speedometer housing from the transfer box.
- 44 Using the determined thickness of shims, fit the speedometer drive worm and housing.

*continued*

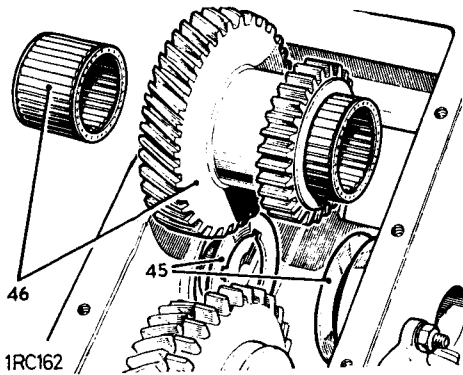


1RC161

**(HELICAL AND SPUR GEAR TYPE)**

Determining the intermediate gear end-float, items 45 to 49

- 45 Place the two thrust washers for the intermediate gear in position in the transfer box and retain with a film of grease. The washers must be fitted with the bronze faces inward and located in the casing by their tabs.
- 46 Locate the intermediate gear, complete with roller bearings, in position in mesh with the high and low gear wheels.

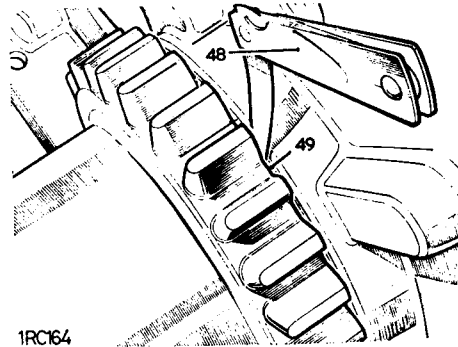


- 47 Fit the intermediate shaft through the casing, thrust washers and intermediate gear, tapping it lightly home when the spigotted end of the shaft engages its location in the front of the casing. The shaft must be a light tap fit.
- 48 Using feeler gauges, check the end-float of the intermediate gear, this must be 0,10 mm to 0,20 mm (0.004 in. to 0.008 in.).

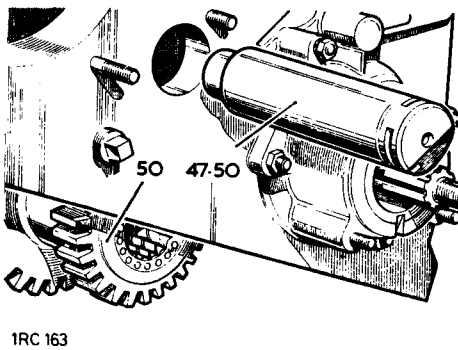
**DATA**

High gear end-float .....  
 Intermediate gear end-float .....  
 Output shaft bearing pre-load .....

- 49 Adjustment is made by grinding the steel face of the thrust washers to increase end-float, or by fitting shims, available in 0,25 mm (0.010 in.) thickness, between the thrust washers and the casing to reduce end-float.



- 50 When the intermediate gear end-float is correct, remove the intermediate shaft and gear, and place aside for subsequent assembly after the transfer box has been fitted to the main gearbox.



0,15 to 0,20 mm (0.006 in. to 0.008 in.)  
 0,10 to 0,20 mm (0.004 in. to 0.008 in.)  
 0,9 to 1,8 kg. (2 to 4 lb.) measured with spring balance cord coiled around the low gear-wheel selector groove.

- 51 Re-assemble the rear bearing housing and the output drive flange by reversing the removal procedure.
- 52 Refit the transfer gearbox. 37.29.25.

**IMPORTANT NOTE**

**Main Gearbox**

A new layshaft was introduced on Suffix 'C' gearboxes commencing at the following serial numbers:

- 90420785 C
- 95133940 C
- 89503913 C
- 90116000 C

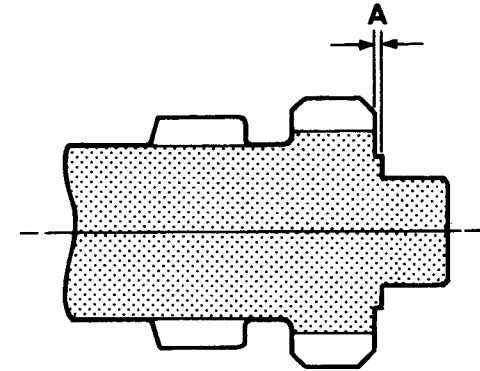
The new layshaft, which has the same part number as its predecessor, can be identified by the reduced length of the step between the rear bearing and back face of the first speed layshaft. The step length was 1,5 mm (0.060 in) and is now 0,45 mm (0.018 in), dimension 'A'.

In addition to the layshaft change, gearboxes with Suffix letter 'D' contain gears manufactured to a process known as Electro-Chemically Machined (E.C.M.). The gears concerned are as follows:

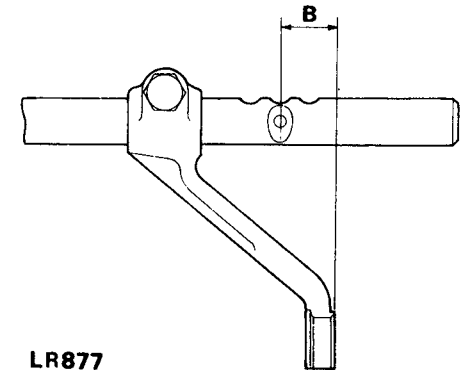
| Description                      | Part No. |
|----------------------------------|----------|
| Primary pinion and constant gear | RTC 2684 |
| 3rd/4th synchro clutch           | FRC 2765 |
| 1st speed mainshaft gear         | FRC 3201 |
| 2nd speed mainshaft gear         | FRC 2673 |
| 3rd speed mainshaft gear         | FRC 2720 |
| 1st/2nd inner/outer member       | RTC 2685 |
| 1st/2nd selector shaft           | FRC 5897 |

E.C.M. gears **must not** be fitted with the early type layshaft. Therefore when fitting E.C.M. gears to a Suffix 'C' gearbox, before the above serial numbers, the layshaft must be replaced by the latest type.

Also, when fitting E.C.M. gears to a pre-Suffix 'D' gearbox, the 1st/2nd selector shaft must be changed for latest modified shaft FRC 5897. Whilst the fork is the same, it would be preferable to renew it at the same time. It is important that the fork is assembled to the shaft to dimension 'B' 18,28 mm to 18,16 mm (0.720 in to 0.715 in).



LR876



LR877



## PROPELLER SHAFT

### Remove and refit

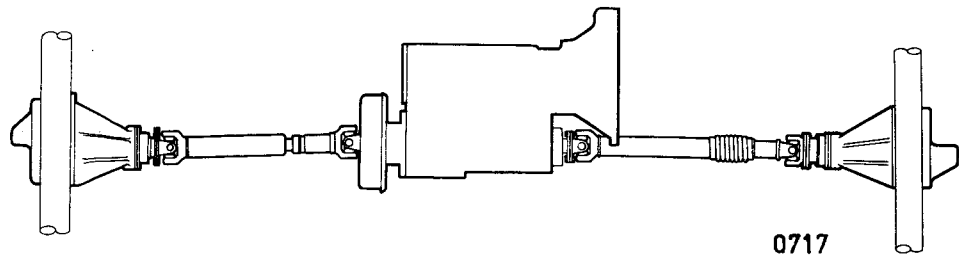
|                       |          |
|-----------------------|----------|
| Front propeller shaft | 47.15.02 |
| Rear propeller shaft  | 47.15.03 |

### Removing

- 1 Disconnect the propeller shaft from the axle and gearbox.
- 2 Withdraw the propeller shaft.

### Refitting

- 3 Locate the propeller shaft in position ensuring that the sliding member is fitted towards the front of the vehicle.
- 4 Fit the securing nuts and bolts to the axle and gearbox flanges. Torque 4,2 to 5,2 kgf. m (30 to 38 lbf. ft.)



## PROPELLER SHAFT

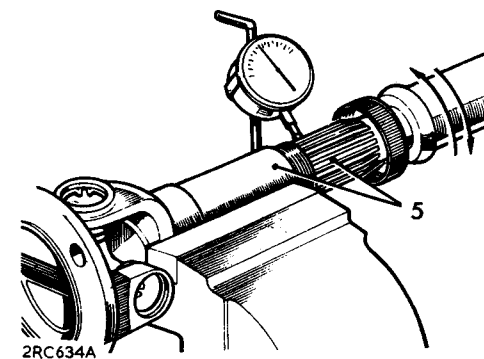
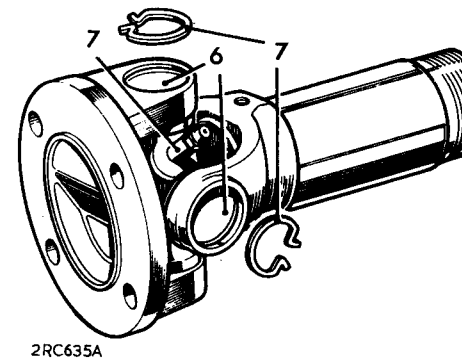
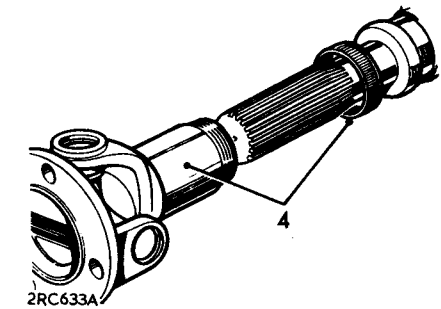
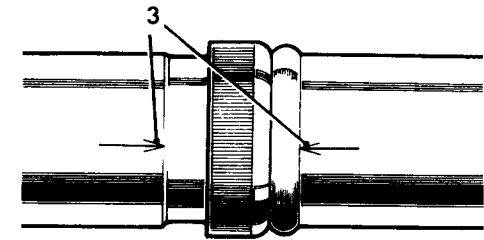
### Overhaul

|                       |          |
|-----------------------|----------|
| Front propeller shaft | 47.15.11 |
| Rear propeller shaft  | 47.15.12 |

### Dismantling

- 1 Remove the propeller shaft from the vehicle.
- 2 If a gaiter encloses the sliding member release the two securing clips. Slide the gaiter along the shaft to expose the sliding member.
- 3 Note the alignment markings on the sliding member and the propeller shaft.
- 4 Unscrew the dust cap and withdraw the sliding member.
- 5 Clean and examine the splines for wear. Worn splines or excessive backlash will necessitate propeller shaft renewal.
- 6 Remove paint, rust, etc. from the vicinity of the universal joint bearing cups and circlips.
- 7 Remove the circlips, and grease nipple.

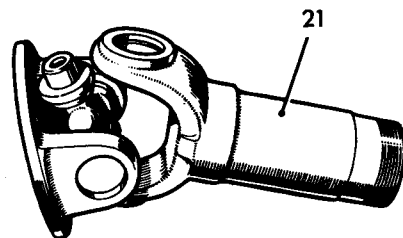
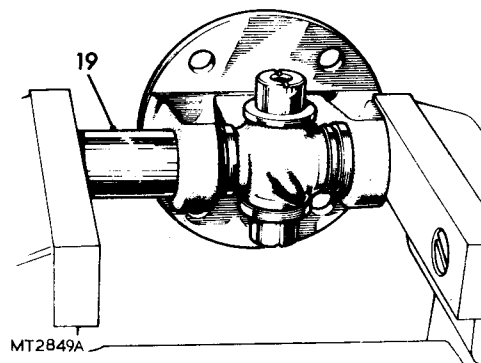
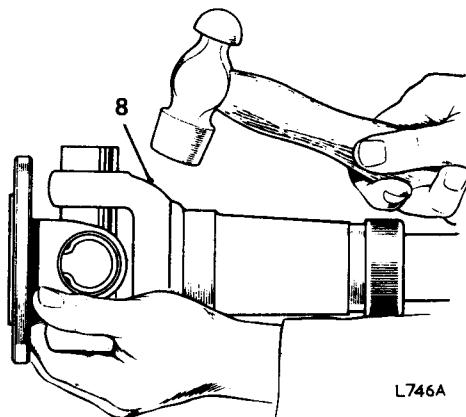
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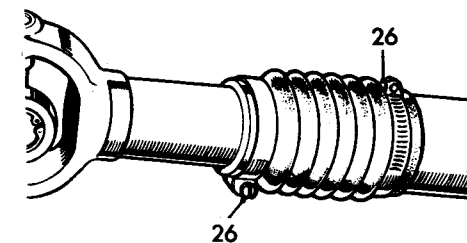
- 8 Tap the yokes to eject the bearing cups.
- 9 Withdraw the bearing cups and spider and discard.
- 10 Repeat instructions 5 to 8 at opposite end of propeller shaft.
- 11 Thoroughly clean the yokes and bearing cup locations.

#### Assembling

- 12 Remove the bearing cups from the new spider.
- 13 Check that all needle rollers are present and are properly positioned in the bearing cups.
- 14 Ensure bearing cups are one third full of fresh lubricant.
- 15 Enter the new spider complete with seals into the yokes of the sliding member flange. Ensure that the grease nipple hole faces away from the flange.
- 16 Partially insert one bearing cup into a flange yoke and enter the spider trunnion into the bearing cup taking care not to dislodge the needle rollers.
- 17 Insert the opposite bearing cup into the flange yoke. Using a vice, carefully press both cups into place taking care to engage the spider trunnion without dislodging the needle rollers.
- 18 Remove the flange and spider from the vice.
- 19 Using a flat faced adaptor of slightly smaller diameter than the bearing cups press each cup into its respective yoke until they reach the lower land of the circlip grooves. Do not press the bearing cups below this point or damage may be caused to the cups and seals.
- 20 Fit the circlips.
- 21 Engage the spider in the yokes of the sliding member. Fit the bearing cups and circlips as described in instructions 15 to 20.
- 22 Lubricate the sliding member spines and fit the sliding member to the propeller shaft ensuring that the markings on both the sliding member and propeller shaft align.



- 23 Fit and tighten the dust cap.
- 24 Fit the grease nipples to the spider and the sliding member and lubricate.
- 25 Slide the gaiter (if fitted) over the sliding member.
- 26 Locate the sliding member in the mid-position of its travel and secure the gaiter clips. Note that the gaiter clips must be positioned at 180° to each other so that they will not influence propeller shaft balance.
- 27 Apply instructions 15 to 20 to the opposite end of the propeller shaft.
- 28 Fit the grease nipple and lubricate.
- 29 Fit the propeller shaft to the vehicle.



## HALF SHAFT (88 models)

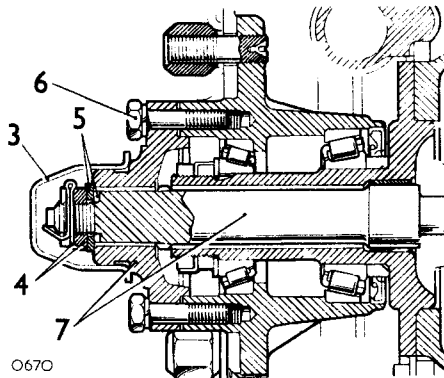
Remove and refit 51.10.01

### Removing

- 1 Jack up the rear of the vehicle and support securely.
- 2 Remove the road wheels.
- 3 Rotate and slide off the hub cap.
- 4 Remove the split pin and nut securing the half shaft to the driving flange.
- 5 Remove the washer and seal.
- 6 Remove the bolts and washers securing the driving flange to the hub.
- 7 Withdraw the half shaft complete with driving flange and gasket.
- 8 Remove the driving flange from the half shaft.

### Refitting

- 9 Reverse instructions 1 to 8.
- 10 Torque: Half shaft nut. 1,4 to 2,0 kgf. m (10 to 15 lbf. ft.)  
Drive flange bolt. 4,2 to 5,2 kgf. m (30 to 38 lbf. ft.)



## HALF SHAFT (109 models)

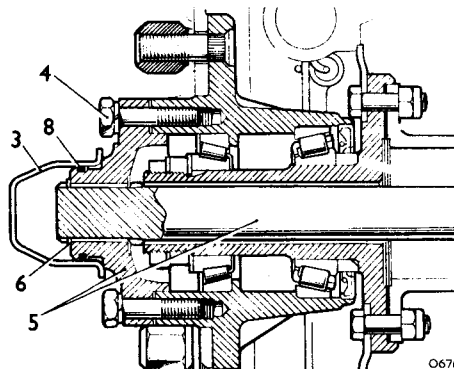
Remove and refit 51.10.01

### Removing

- 1 Jack up the rear of the vehicle and support securely.
- 2 Remove the road wheel.
- 3 Rotate and slide off the hub cap.
- 4 Remove the bolts and spring washers securing the driving flange to the hub.
- 5 Withdraw the driving flange and half shaft and gasket.
- 6 Remove the circlip from the half shaft.
- 7 Withdraw the driving flange.
- 8 Remove the 'O' ring.

### Refitting

- 9 Reverse instructions 1 to 8
- Torque: Drive flange bolts 4,2 to 5,2 kgf. m (30 to 38 lbf. ft.)



## HUB BEARINGS

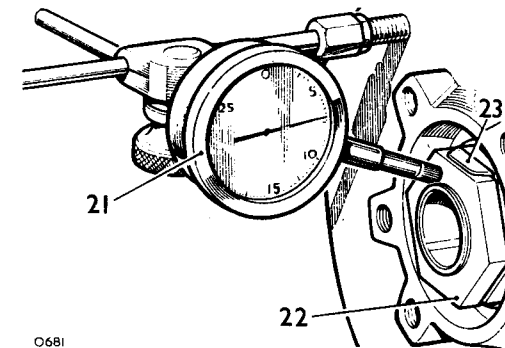
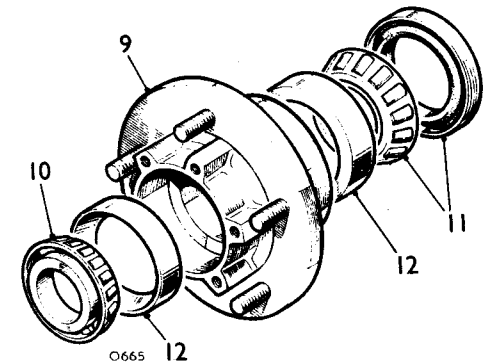
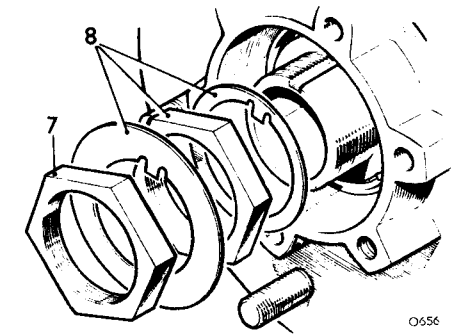
Remove and refit 51.10.28

### Removing

- 1 Jack up the rear of the vehicle and support securely.
- 2 Remove the road wheels.
- 3 Remove the bolts and spring washers securing the driving flange to the hub.
- 4 Withdraw the driving flange and half shaft.
- 5 Remove the brake drum retaining screws and withdraw the brake drum.
- 6 Straighten the tabs on the hub nut lock washer.
- 7 Unscrew and remove the locknut.
- 8 Remove the lock washer, adjusting nut and thrust washer.
- 9 Withdraw the hub complete with bearings and oil seal.
- 10 Remove the outer bearing.
- 11 Remove the oil seal and inner bearing.
- 12 Remove the outer and inner bearing tracks from the hub.
- 13 Thoroughly clean all components.

### Refitting

- 14 Fit the outer and inner bearing tracks to the hub.
- 15 Pack the hub with fresh grease.
- 16 Insert the inner bearing in the hub.
- 17 Fit new oil seal to the hub. Lips of seal towards the inner bearing.
- 18 Insert the outer bearing on the hub and slide hub and bearings into position on the stub axle.
- 19 Fit the thrust washer and adjusting nut.
- 20 Tighten the adjusting nut to obtain zero hub end-float.
- 21 Using a dial gauge to check end-float slacken the adjusting nut sufficient to obtain end-float of 0,05 to 0,10 mm (0.002 to 0.004 in.).
- 22 Fit the lock washer and lock nut. Tighten the locknut.
- 23 Bend the lock washer to secure the adjusting nut and lock nut.
- 24 Fit a new driving flange gasket.



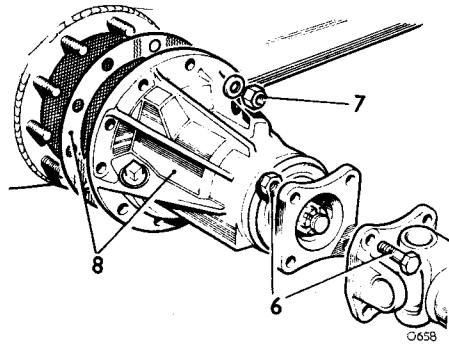
- 25 Fit the half shaft and driving flange assembly. Torque the bolts to 4,2 to 5,2 kgf. m (30 to 38 lbf. ft.)
- 26 Fit the brake drum and road wheel.
- 27 Lower the vehicle.

## DIFFERENTIAL ASSEMBLY (88 models)

Remove and refit 51.15.01

### Removing

- 1 Jack up the rear of the vehicle and support on stands.
- 2 Remove the road wheels.
- 3 Drain the oil from the rear axle.
- 4 Remove the bolts and spring washers securing the half shaft flanges to the rear hubs.
- 5 Withdraw the half shafts and drive flanges.



- 6 Disconnect the propeller shaft at the rear axle.
- 7 Remove the nuts and spring washers securing the differential assembly to the axle casing.
- 8 Withdraw the differential assembly and gasket

### Refitting

- 9 Reverse instructions 1 to 8.

## DIFFERENTIAL ASSEMBLY (Salisbury type 109 models)

Remove and refit 51.15.01

Overhaul 51.15.07

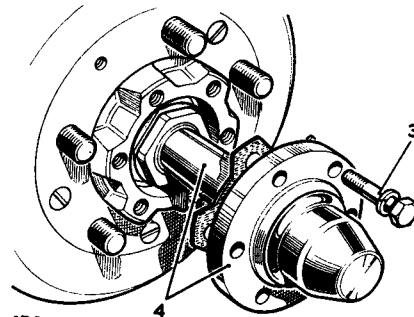
### Service tools:

|            |                                      |
|------------|--------------------------------------|
| 47         | Screw press                          |
| 18G 131 C  | Axle spreader                        |
| 18G 191    | Dial gauge, bracket and base         |
| 18G 1122   | Screw press                          |
| 18G 1205   | Spanner for drive coupling           |
| S 123 A    | Pinion bearing cup remover           |
| 18G 47 BK  | Pinion bearing cone remover/replacer |
| 18G 47 BL  | Differential bearing remover         |
| 18G 1122 G | Pinion bearing cup replacer          |
| 18G 134 DP | Differential bearing replacer        |
| 18G 191 P  | Setting gauge for pinion height      |
| 18G 131 F  | Pegs for axle spreader               |
| RO 1008    | Oil seal replacer                    |
| 530106     | Dial gauge bracket                   |

### Removing the differential unit

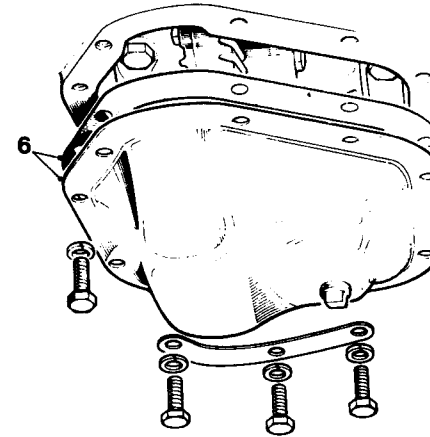
**NOTE:** All fixing bolts used on the differential assembly and differential cover have metric threads.

- 1 Drain off the differential lubricating oil.
- 2 Remove the rear axle assembly. 51.25.01.
- 3 Remove the hub driving member fixings.



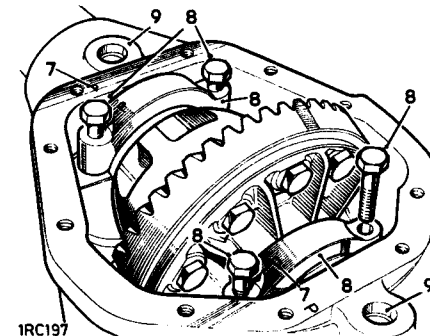
1RC195

- 4 Withdraw the driving member and attached axle shaft sufficient to disengage the differential.
- 5 Repeat 4 for other axle shaft.
- 6 Remove the fixings and support strip at the differential cover and withdraw the cover and joint washer.



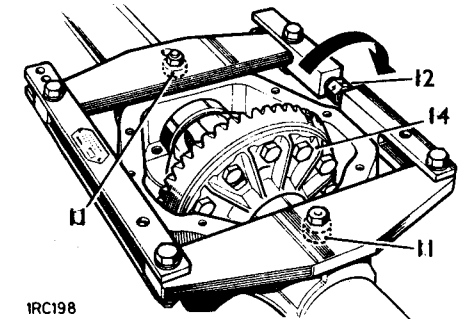
1RC196A

- 7 Note the relationship marking on the bearing caps and axle casing to ensure correct refitting.
- 8 Remove the fixings and withdraw the differential bearing caps.



1RC197

- 9 Clean out and examine the spreader tool pegholes provided in the gear casing face; ensure that the holes are free from dirt and burrs and damage.
- 10 Ensure that the turnbuckle adjuster is free to turn.
- 11 Fit the axle spreader to engage the peg holes. Spreader 18G 131 C, Adaptor pegs 18G 131 F.



1RC198

- 12 Turn the adjuster until all free play between the spreader and casing is taken up, denoted by the adjuster becoming stiff to turn, using a spanner on the adjuster.
- 13 Check that the side members of the spreader are clear of the casing.
- 14 Stretch the casing, rotating the adjuster by one flat at a time, until the differential assembly can be levered out. Do not lever against the spreader; use suitable packing under the levers to avoid damage to the casing.

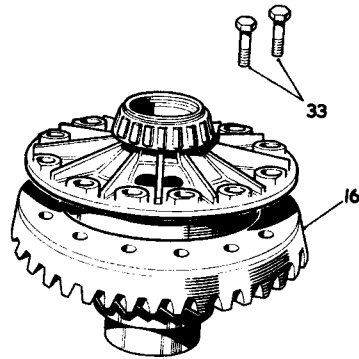
**CAUTION:** To prevent permanent damage to the gear carrier case, it must not be over-stretched. Each flat on the turnbuckle is numbered to enable a check to be made on the amount turned. The maximum stretch permitted is 0,30 mm (0.012 in), equivalent to three flats.

- 15 Ease off the adjuster and remove the spreader.

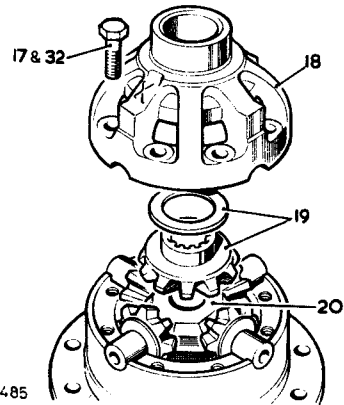
*continued*

**Dismantling the differential unit**

16 Add alignment marks between the crown wheel and the differential case for reassembly purposes, then remove the fixings and withdraw the crown wheel.



1RC484

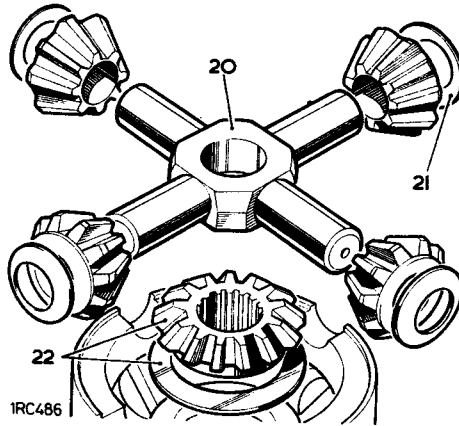


1RC485

17 Note the alignment markings on the two differential casings to ensure correct refitting, then remove the fixings.  
18 Lift off the upper case.

19 Withdraw the upper differential wheel and thrust washer.

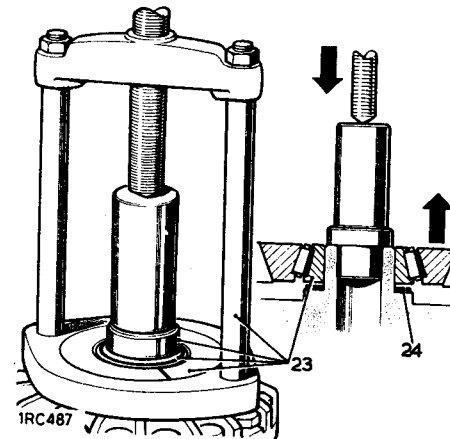
20 Lift out the cross-shaft and pinions.



1RC486

21 Withdraw the dished thrust washers.

22 Withdraw the lower differential wheel and thrust washer.



1RC487

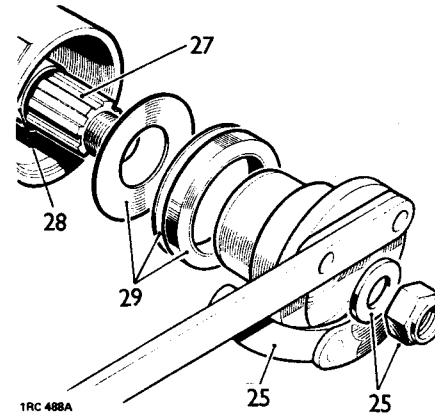
23 Remove the differential bearing cones. Remover 18G 47 BL details 1 and 2, Press 47.

24 Withdraw the shim washers fitted between the bearing cones and the differential casings.

**Removing the final drive pinion**

25 Prevent the coupling flange from rotating and remove the flange locknut and plain washer. Spanner 18G 1205.

26 Support the drive pinion and remove the coupling flange by tapping with a hide hammer.



1RC488A

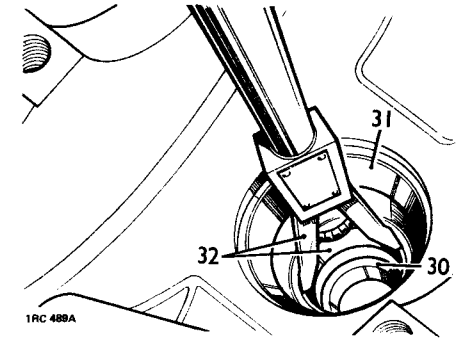
27 Withdraw the drive pinion together with the inner bearing cone.

28 Withdraw and discard the collapsible bearing spacer.

29 Withdraw the oil seal, gasket and oil thrower.

30 Withdraw the outer bearing cone.

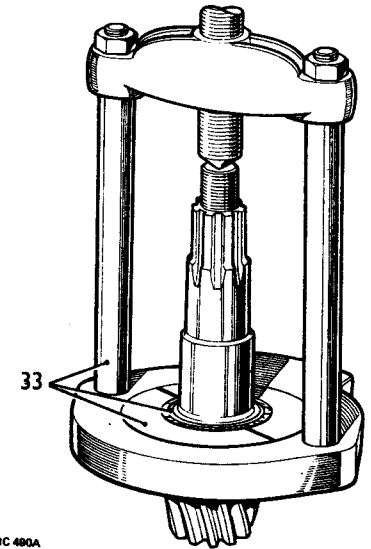
31 Extract the pinion inner bearing cup and shim washers from the casing. Note the shim washer thickness. Remover S 123 A.



1RC488A

32 Extract the pinion outer bearing cup from the casing. Remover S 123 A.

33 Remove the inner bearing cone from the pinion. Remover 18G 47 BK and Press 47.



1RC489A

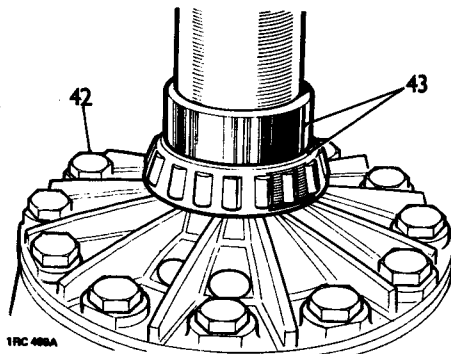
*continued*

**Inspecting**

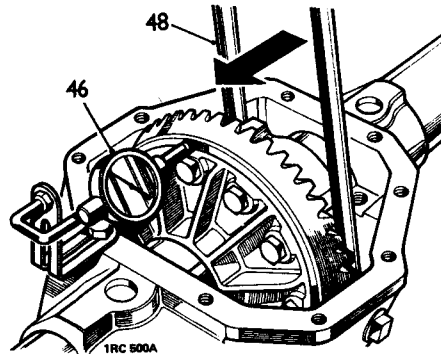
- 34 Examine all components for obvious wear or damage.
- 35 The bearing cones must be a press fit on their locations, except the drive pinion flange and bearing which is a slide fit.
- 36 The crown wheel and pinion are supplied as a matched pair and must not be interchanged separately.  
A new crown wheel and pinion matched pair may be fitted to an original gear carrier casing if sound. The original crown wheel and pinion, if sound, may be fitted into a replacement casing.
- 37 The two parts of the differential unit casing are matched and must not be replaced separately.
- 38 Discard and renew all thrust washers.
- 39 Differential housings with worn thrust washer seatings must be replaced as a pair.
- 40 Examine the differential case to crown wheel joint face for burrs and damage which could lead to crown wheel run-out when fitted.

**Reassembling****Assembling the differential unit**

- 41 Reverse the items 17 to 22 aligning the marks on the differential casings. Casings fixings torque load is 9,1 to 10,4 kgf m (66 to 75 lbf ft). The fixings tightening should be carried out at opposite sides of the casings and not by following the diameter. Use Loctite 'Studlock' grade on the fixing bolt threads.



- 42 Fit the crown wheel to the differential casing. Fixings torque is 15,3 to 17,3 kgf/m (111 to 125 lbf ft). Use Loctite 'Studlock' grade CVX on the fixing bolt threads.
- 43 Press on the differential roller bearing cones less shim washers, using 18G 134 DP, and leave to one side until required for instruction 87.
- 44 Fit the bearing cups to the differential.
- 45 Fit the differential unit and bearings to the gear carrier casing, and rotate unit to centralize the bearings. Do not fit the bearing caps.
- 46 Position a suitable dial gauge indicator on the casing with the stylus registering on the back face of the crown wheel.



- 47 Rotate the differential and check the total indicated run-out on the crown wheel back face. This must not exceed 0,05 mm (0,002 in). If run-out is excessive, check the mating faces for dirt and damage; if necessary, select a new radial position for the crown wheel. When satisfactory, continue with the following check.

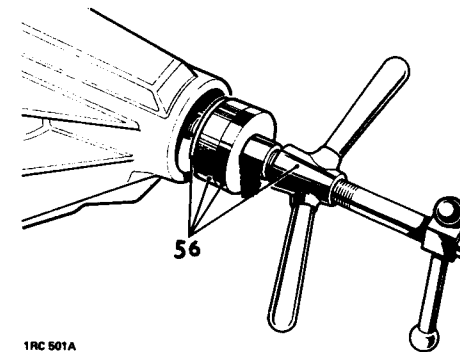
**Differential bearing adjustment**

- 48 Insert two levers between the casing and the differential unit at one side.

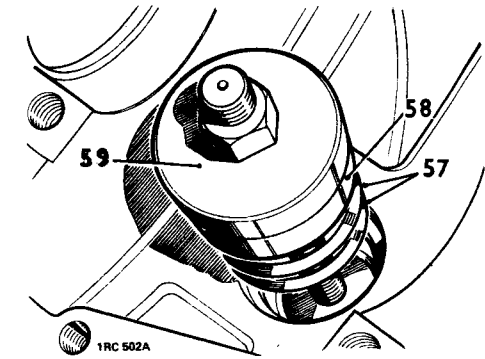
- 49 Move the differential unit fully to one side of the casing; do not tilt the unit.
- 50 Rotate the differential unit to settle the bearings, continue to lever the differential to the side, then zero the dial gauge indicator.
- 51 Lever the assembly fully to the other side of the casing, rotate the unit to settle the bearings, then note the total indicator reading.
- 52 Add 0,127 mm (0.005 in), for bearing pre-load, to the total noted in the preceding item. The sum is then equal to the nominal value of shims required for the differential bearings.  
Shims are available in the range 0,07 mm (0.003 in), 0,12 mm (0.005 in), 0,25 mm (0.010 in) and 0,76 mm (0.030 in). Select the total value of shims required.
- 53 Remove the differential unit and bearings and place aside. Do not fit the shim washers until the subsequent 'Differential backlash' checks have been made, items 87 to 93.

**Fitting drive pinion**

- 54 Select shim washers of the same thickness value as those removed from under the pinion inner cup, item 31, and place ready for fitting.

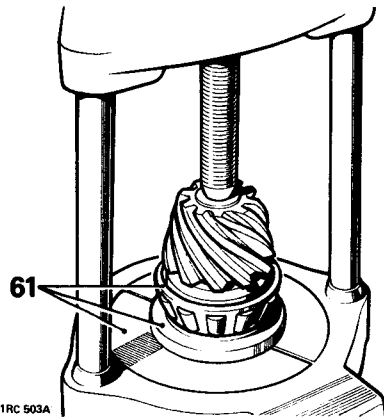


- 55 Position the outer bearing replacer 18G 1122 G detail 2, and the outer bearing cup on the press tool 18G 1122.
- 56 Locate the assembly into the pinion housing nose.



- 57 Place the selected shim washers on to the inner bearing cup seating.
- 58 Position the inner bearing cup in the casing.
- 59 Position the inner bearing replacer 18G 1122 G detail 1, onto 18G 1122 and secure with the fixing nut.
- 60 Hold still the centre screw and turn the butterfly lever to draw in the bearing cups.

*continued*

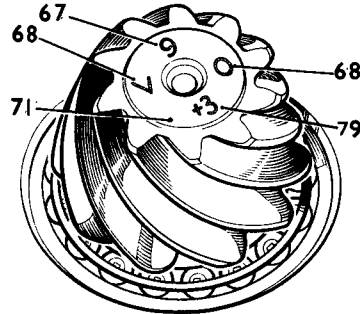


1RC 503A

- 61 Press the inner bearing cone onto the drive pinion. 18G 47 BK, details 1 and 2 and 47.
- 62 Position the pinion and bearing in the casing; omit the collapsible spacer at this stage.
- 63 Fit the outer bearing cone onto the pinion.
- 64 Fit the coupling flange and plain washer and loosely fit the flange nut.
- 65 Tighten the coupling flange locknut sufficient to remove end-float from the pinion.
- 66 Rotate the pinion to settle the bearings and slowly tighten the flange locknut. Whilst using a spring balance to obtain a torque resistance of 9,25 to 13,8 kgf cm (8 to 12 lbf in) to rotate the pinion.

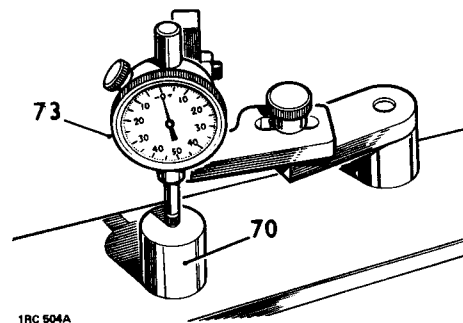
**Drive pinion markings**

- 67 Check that the serial number marked on the pinion end face matches that marked on the crown wheel.
- 68 The markings on the end face adjacent to the serial number are of no significance during servicing.



1RC 199A

- 69 The figure marked on the end face opposite to the serial number indicates, in thousandths of an inch, the deviation from nominal required to correctly set the pinion. A pinion marked plus (+) must be set below nominal, a minus (-) pinion must be set above nominal. An unmarked pinion must be set at nominal.

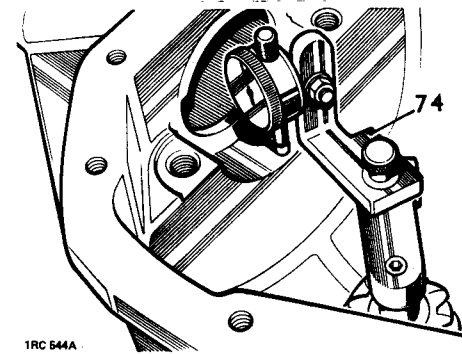


1RC 504A

- 70 The nominal setting dimension is represented by the setting gauge block 18G 191 P, which is referenced from the pinion end face to the bottom radius of the differential bearing bore.

**Drive pinion adjustment**

- 71 Ensure that the pinion end face is free of raised burrs around the etched markings.
- 72 Remove the keep disc from the magnetized base of dial gauge tool 18G 191.
- 73 Place the dial gauge and setting gauge 18G 191 P on a flat surface and zero the dial gauge stylus on to the setting gauge 18G 191 P.
- 74 Position the dial gauge centrally on the pinion end face with the stylus registering on the lowest point on one differential bearing bore. Note the dial gauge deviation from the zeroed setting.
- 75 Repeat on the other bearing bore. Add together the readings, then halve the sum to obtain the mean reading. Note whether the stylus has moved up or down from the zeroed setting.



1RC 544A

**Example 1**

|                            |         |
|----------------------------|---------|
| Reading obtained L.H. side | + 0.006 |
| Reading obtained R.H. side | - 0.003 |
| Add + 0.006                |         |
| - 0.003                    |         |
| = + 0.003                  |         |

Divide by 2 =  $\frac{+ 0.003}{2} = + 0.0015$  in

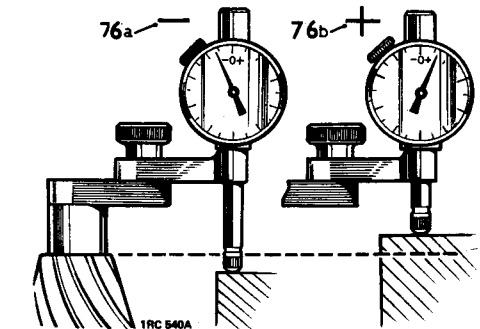
Therefore **subtract** 0.0015 in from the shim thickness behind the pinion inner bearing track.

**Example 2**

|                            |         |
|----------------------------|---------|
| Reading obtained L.H. side | + 0.006 |
| Reading obtained R.H. side | - 0.008 |
| Add + 0.006 in             |         |
| - 0.008 in                 |         |
| = - 0.002 in               |         |

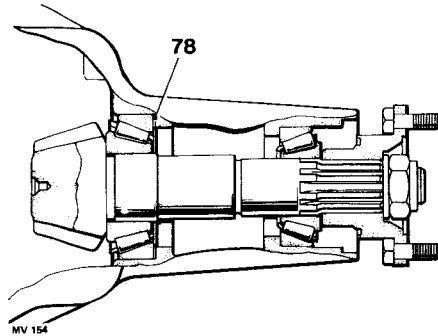
Divide by 2 =  $\frac{- 0.002}{2} = + 0.001$  in

- 76 a. Where the stylus has moved down, the amount is equivalent to the thickness of shims that must be removed from under the pinion inner cup to bring the pinion down to the nominal position.
- b. Where the stylus has moved up, the amount is equivalent to the additional thickness of shims required to bring the pinion up to the nominal position.

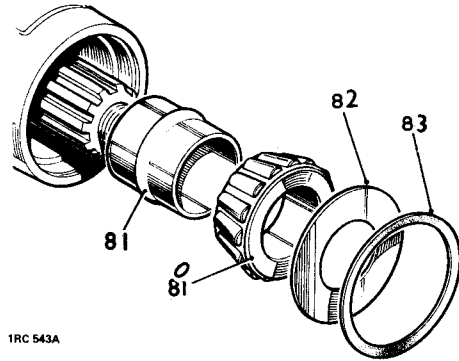


continued

- 77 Before adjusting the shim thickness, check the pinion face marking and if it has a plus (+) figure, subtract that amount in thousands of inch from the shim thickness figure obtained in the previous item. Alternatively if the pinion has a minus (-) figure, add the amount to the shim thickness figure.

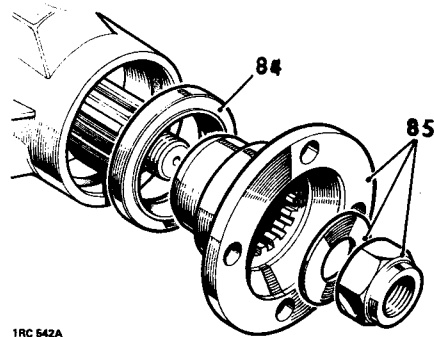


- 78 Adjust the shim thickness under the pinion inner cup as necessary, by the amount determined in items 76 and 77.
- 79 Recheck the pinion height setting 73 to 75. If the setting is correct, the mean reading on the dial gauge will agree with the figure marked on the pinion end face. For example, with an end face marking of +3, the dial gauge reading should indicate that the pinion is 0.003 in below nominal.



1RC 543A

- 80 When the pinion setting is satisfactory, temporarily remove the pinion outer bearing cone.
- 81 Fit a new collapsible bearing spacer, flared end outward, to the drive pinion and refit the outer bearing cone.
82. Fit the pinion oil slinger.
- 83 Fit the oil seal gasket.
- 84 Fit the pinion oil seal, lipped side first, using general purpose grease or, where available, a molybdenum disulphide based grease on the seal lip, using RO 1008 to drift in the seal.
- 85 Fit the coupling flange and plain washer and loosely fit a new flange nut. Secure 18G 1205 to the coupling flange, using slave fixings.



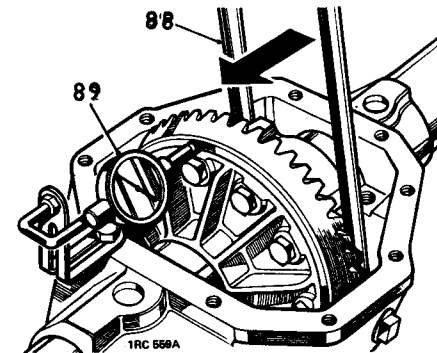
1RC 542A

- 86 Alternately tighten the flange nut and check the drive pinion resistance to rotation until the following figures are achieved, as applicable:
- Assemblies re-using original pinion bearings: 17,3 to 34,5 kgf cm (15 to 30 lbf in).
  - Assemblies with new pinion bearings: 34,5 to 46,0 kgf cm (30 to 40 lbf in).

**NOTE:** A torque load of 34,5 kgf cm (250 lbf ft) approximately is required on the coupling flange nut to commence collapsing the bearing spacer. Thereafter, torque resistance build-up is rapid, therefore check frequently, using a spring balance, to ensure the correct figures are not exceeded, otherwise a new collapsible bearing spacer will be required.

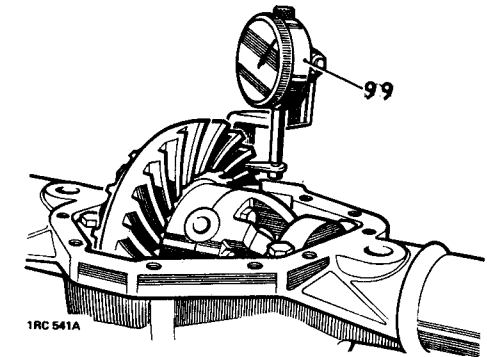
#### Differential backlash checks

- 87 Pick up the differential unit as left after instruction 43.
- 88 Fit the differential unit and lever the unit away from the drive pinion until the opposite bearing cup is seated against the housing. Do not tilt the unit.
- 89 Install a dial gauge on the casing with its stylus resting on the back face of the crown wheel. Zero the gauge.



1RC 558A

- 90 Lever the differential unit to engage the crown wheel teeth in full mesh with the drive pinion teeth. Do not tilt the unit.
- 91 Note the total reading obtained on the dial gauge.
- 92 From this figure subtract 0,25 mm (0.010 in) to obtain the correct crown wheel backlash when fitted. The result indicates the value of shimming to be fitted between the differential case and the bearing cone at the crown wheel side of the differential.
- 93 Fit the shim value determined in 92, taking the shims from the pack previously determined during 'Differential bearing adjustment' checks, items 48 to 53. 18G 47 BL details 1 and 2, Press 47. 18G 134 DP.
- 94 Fit the remaining shims from item 92 to the opposite side of the differential. 18G 47 BL details 1 and 2, press 47. 18G 134 DP.
- 95 Fit the differential unit with shims and bearings to the axle casing, using the axle spreader 18G 131 C with pegs 18G 131 F.
- 96 Remove the axle spreader.
- 97 Fit the bearing caps in their correct position, referring to the relationship markings on the caps and on the axle casing.
- 98 Tighten the bearing caps fixings to 12,9 to 14,5 kg m (93 to 105 lb ft).
- 99 Mount a dial gauge on the axle casing with the stylus resting on a crown wheel tooth.

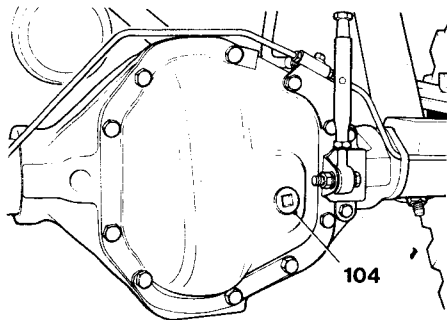


1RC 541A

continued



- 100 Prevent the drive pinion from rotating and check the crown wheel backlash which must be 0,15 to 0,27 mm (0.006 to 0.011 in). If the backlash is not within the specified limits, repeat the differential backlash checks, 87 to 93, looking for possible errors.
- 101 Fit the differential cover and new gasket, coating both sides of the gasket with Hylomar PL 32M or an equivalent non-setting sealant.  
Torque load for fixings is 2,8 to 3,5 kgf m (20 to 25 lbf ft).
- 102 Reverse 3 to 5. Coat the threads of the hub driving member bolts with Loctite Studlock grade CVX and fit and tighten the bolts evenly. Torque: 10,0 kgf m (73 lbf ft).
- 103 Fit the rear axle assembly. 51.25.01.
- 104 Replenish the differential lubricating oil. After the initial axle run, check the oil level and replenish as necessary to the filler/level plug hole.



IRC 581A

#### DATA

|                                      |   |
|--------------------------------------|---|
| Crown wheel backlash .....           | 0,15 to 0,27 mm (0.006 to 0.011 in)                             |
| Differential bearings pre-load ..... | 0,127 mm (0.005 in)   |
| Pinion height setting .....          | Set using gauge 18G 191 P<br>Gauge length 30,912 mm (1.2177 in) |

#### Torque resistance initial setting figures

|  |                                      |
|--|--------------------------------------|
| Torque to turn drive pinion and new pinion bearings .....        | 34,5 to 46 kgf cm (30 to 40 lb in)   |
| Torque to turn drive pinion re-using the original bearings ..... | 17,3 to 34,5 kgf cm (15 to 30 lb in) |

- 105 Where major running parts have been replaced during servicing, it is a recommended practice to allow the axle assembly to 'run in' by avoiding, where possible, heavy loads and high speeds during initial running.

#### PINION OIL SEAL (ROVER TYPE – 88 MODELS)

Remove and refit 51.20.01

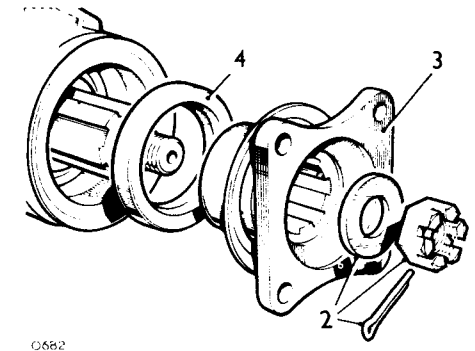
Service tool: 18G 1205 Flange holder.

#### Removing

- 1 Disconnect the propeller shaft at the rear axle.
- 2 Remove the split pin, nut and washer securing the pinion flange.
- 3 Withdraw the pinion flange.
- 4 Remove the oil seal.

#### Refitting

- 5 Lubricate the lips of the new seal, smear the outer periphery with jointing compound and reverse instructions 1 to 4.



O682

#### PINION OIL SEAL (SALISBURY TYPE – 109 MODELS)

Remove and refit 51.20.01

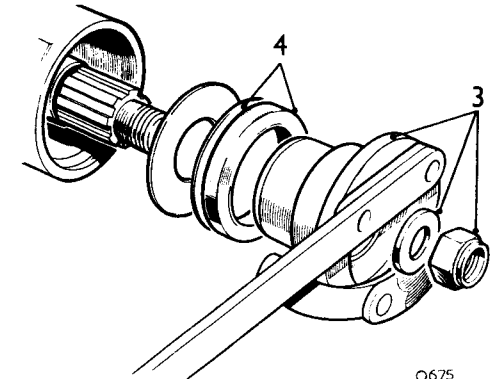
Service tool: 18G 1205. Flange holder.  
RO 1008. Oil seal replacer.

#### Removing

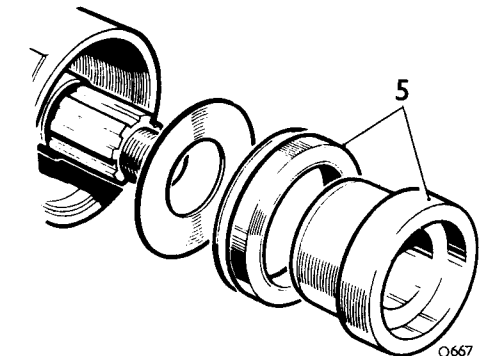
- 1 Disconnect the propeller shaft at the rear axle.
- 2 Carefully mark the relationship of the differential pinion shaft, the flange nut and the flange. This is important to ensure reassembly in original locations to maintain the loading of the collapsible spacer.
- 3 Remove the flange nut and washer and withdraw the flange.
- 4 Remove the pinion oil seal and gasket. Discard and renew.

#### Refitting

- 5 Lubricate the lips of the new seal and install using tool RO 1008. Note the pinion shaft nut must not be tightened beyond the original alignment marks (Instruction 2).
- 6 Fit the flange, washer and nut. Ensure that the marks made on the pinion shaft, flange and nut align. Do not tighten the flange nut beyond its original location.



O675



O667

**HUB OIL SEAL**

Remove and refit 51.20.17

As operation 51.10.28 instructions 1 to 11.

**REAR AXLE ASSEMBLY**

Remove and refit 51.25.01

**Removing**

- 1 Slacken the rear road wheel nuts.
- 2 Raise rear of vehicle and support the chassis securely on stands.
- 3 Remove the rear road wheels.
- 4 Disconnect the rear propeller shaft from the rear axle.
- 5 Raise the axle as required to release the axle check straps of all tension. Release one end of the check straps from the chassis brackets.
- 6 **88 inch chassis.** Disconnect the lower end of the shock absorbers from the road spring bottom plates.

- 7 Slacken all rear shackle bolts.
- 8 Lower the axle and allow its weight to be supported on the road springs.
- 9 Remove the 'U' bolts and spring bottom plates.
- 10 Disconnect the brake pipe union from the rear brake hose.
- 11 Release the brake hose from the chassis.
- 12 Seal the disconnected brake pipe and the brake hose to prevent entry of foreign matter and loss of fluid.
- 13 Take the weight of the axle on the jack and with an assistant to steady the axle remove the shackle bolts from the rear of the springs. Lower the springs to the ground.
- 14 Withdraw the axle clear of the vehicle.
- 15 **109 inch chassis.** Disconnect the lower end of the shock absorbers from the axle.

**Refitting**

- 16 **109 inch chassis.** Fit the lower end of the shock absorbers to the spring bottom plate.
- 17 Using a jack and an assistant locate the axle in its approximate position under the vehicle.
- 18 Raise both rear springs and fit the rear shacklebolts and nuts. DO NOT tighten the shackle bolts, front or rear, at this stage.
- 19 Lower the axle on top of the road springs ensuring that the spring centre bolts properly engage the axle.
- 20 Fit the 'U' bolts and spring bottom plates. Evenly tighten the 'U' bolt nuts to 10,4 kgf m (75 lbf ft).
- 21 **88 inch chassis.** Fit the lower end of the shock absorbers to the spring bottom plates.  
**109 inch chassis.** Fit the upper end of the shock absorbers to the chassis.

- 22 Fit the brake hose to the chassis ensuring it is not twisted in the process.
- 23 Connect the brake pipe to the brake hose.
- 24 Secure the end of the check straps to the chassis brackets.
- 25 Connect the rear propeller shaft to the axle.
- 26 Adjust the rear brakes as necessary.
- 27 Bleed the brakes. 70.25.02.
- 28 Fit the road wheels.
- 29 Remove the chassis stands and lower the vehicle to the ground.
- 30 Tighten all rear shackle bolts. Refer 64.20.01.
- 31 Check axle oil level and top up as required.

