

OIL SUMP

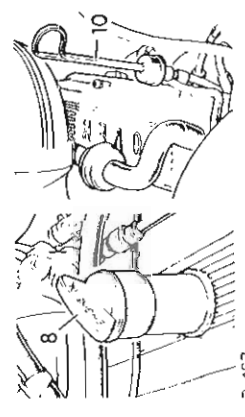
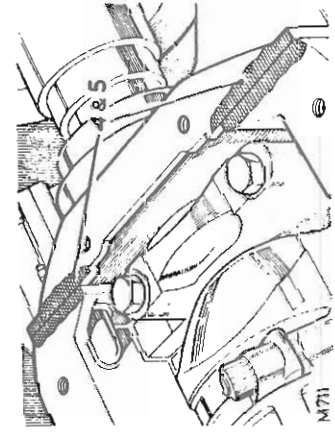
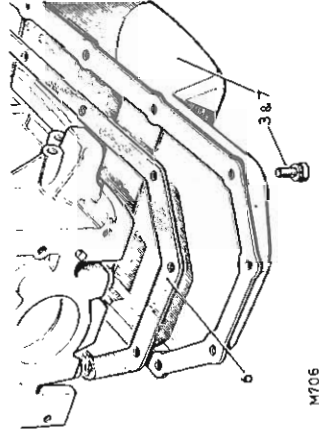
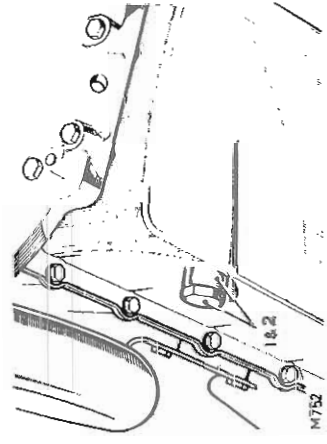
— Remove and refit 12.60.44

Removing

1. Remove the sump drain plug.
2. Allow all the oil to drain, then refit the plug and sealing washer.
3. Remove the sump.

Refitting

4. Clean the sump mating surfaces at the join between the timing chain cover and the cylinder block.
5. Apply a coating of Hylomer SQ32M sealing compound across the join.
6. Place the sump gasket in position.
7. Fill the sump.
8. Unscrew the oil filler cap.
9. Using the correct grade oil, see 'LUBRICATION'.
10. Use the sump dipstick to set the final level. Do NOT fill above the 'HIGH' mark.
11. Start the engine and check that the oil pressure warning light goes out. If the light remains on, the engine must be stopped and the oil pump dismantled and primed, see 12.60.26.
12. Run the engine and check the sump joint for leaks.
13. Check the sump oil level after the engine has been stopped for a few minutes, and replenish if necessary.



R.497

TIMING GEAR COVER

— Remove and refit 12.65.01

Includes

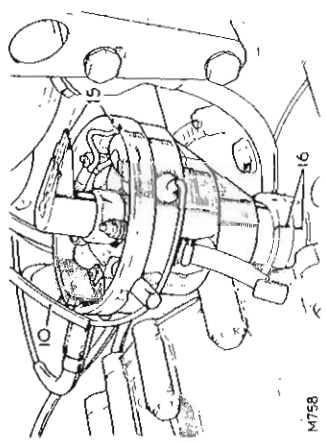
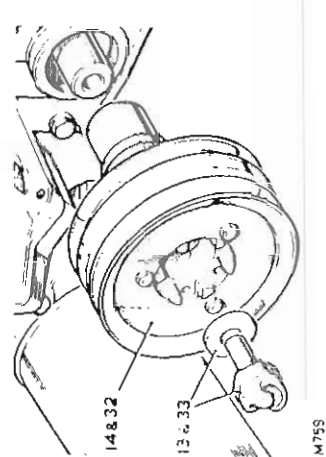
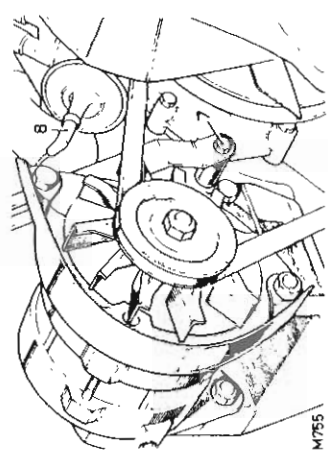
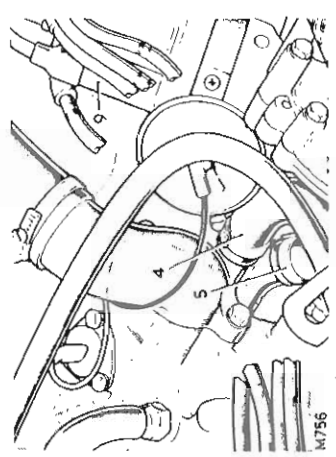
GEAR COVER OIL SEAL

— Remove and refit 12.65.05

Removing

1. Drain the cooling system, see 26.10.01.
2. Remove the fan blades and pulley, see 26.25.01.
3. Remove the fan cowl, see 26.25.11.
4. Disconnect the by-pass hose from the thermostat.
5. Disconnect the heater return hose from the water pump.
6. Disconnect the inlet hose from the water pump.
7. Release the alternator adjusting link from the water pump housing.
8. Disconnect the vacuum pipe from the distributor.
9. Release the distributor cap, unclip the leads and move the cap to one side.
10. Disconnect the low tension lead from the ignition coil.
11. Disconnect the lead from the oil pressure switch.
12. Engage gear to prevent engine rotation.
13. Remove the starter dog.
14. Withdraw the crankshaft pulley and mud deflector.
15. Mark the distributor body relative to the centre line of the rotor arm.
16. If the distributor is to be removed, make corresponding marks on the distributor and timing cover.

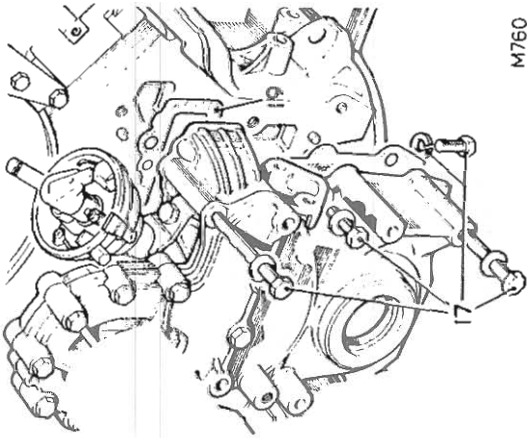
continued



M758

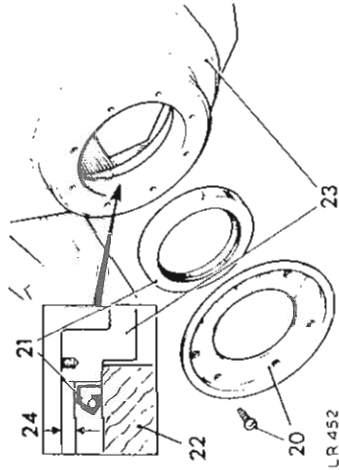
M759

- 17 Remove the timing cover fixings, including two from the sump.
18. Withdraw the timing cover complete.
19. Remove the joint washer.



M760

- Oil seal, remove and refit, instructions 20 to 24
20. Remove the fixings and withdraw the mudshield.
 21. Remove the oil seal.
 22. Position the gear cover with the front face uppermost and the underside supported across the oil seal housing bore on a suitable wooden block.
 23. Enter the oil seal, open side first, into the housing bore.
 24. Press in the oil seal until the plain face is 1.5 mm (0.062 in) approximately below the gear cover face. Reverse instruction 20.

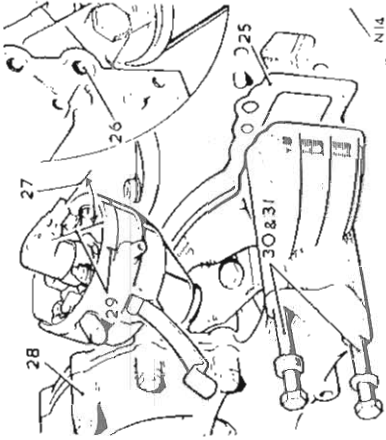


L.R. 452

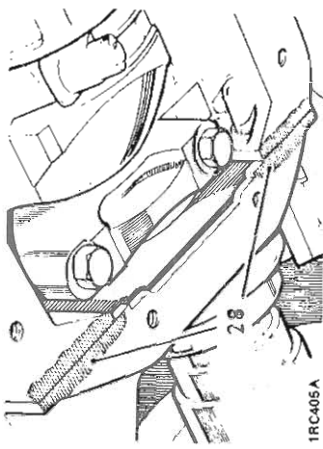
continued

Refitting

- 25 Place a new timing cover joint washer in position.
26. Prime the oil pump by injecting engine oil through the suction port.
27. Set the distributor rotor arm approximately 30 degrees before the final positioning mark, to compensate for the skew gear engagement.
28. Locate the timing cover in position, applying a coating of Hylomar PL32M about 13 to 19 mm (½ to ¾ in) wide in the area shown.
29. Check that the distributor marking alignment is correct.
30. Clean the threads of the timing cover securing bolts, then coat them with Thread Lubricant-Sealant 3M EC776.
31. Fit the timing cover securing bolts. Torque: 2.8 to 3.5 kgf m (20 to 25 lbf ft).
32. Fit the crankshaft pulley.
33. Fit the starter dog. Torque: 19.3 to 22.3 kgf m (140 to 160 lbf ft).
34. Reverse instructions 1 to 14.
35. Check, and if necessary adjust, the ignition timing. see 86.35.20.



N14



1RC405A

TIMING CHAIN AND GEARS

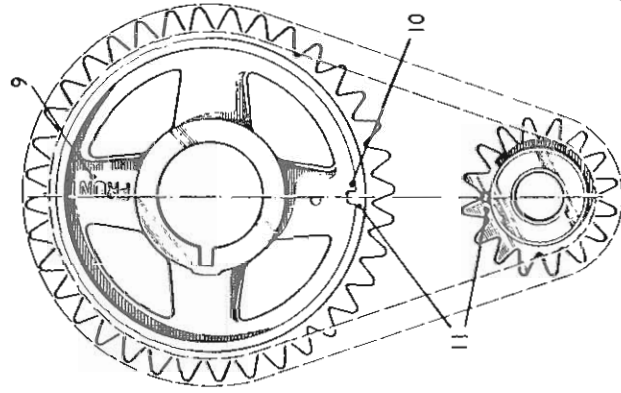
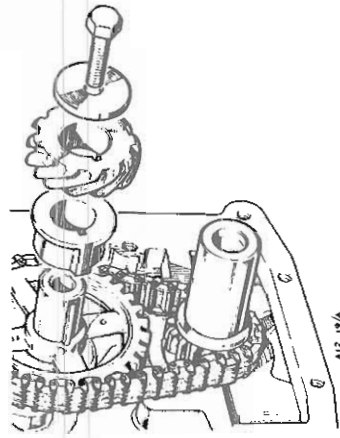
— Remove and refit

12.65.12

Removing

1. Set the engine—No. 1 piston at T.D.C.
2. Remove the timing chain cover, see 12.65.01.
3. Check that No. 1 piston is still at T.D.C.
4. Remove the distributor drive gear.
5. Withdraw the spacer.
6. Withdraw the chain wheels complete with the chain.

CAUTION: Do NOT rotate the engine if the rocker shafts are fitted, otherwise the valve gear and pistons will be damaged.

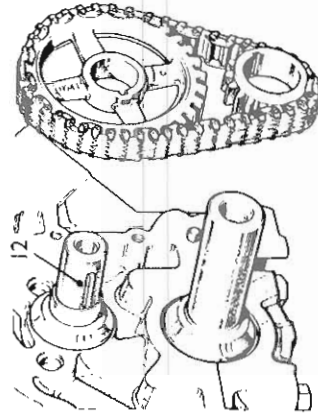


Refitting

NOTE: If the crankshaft and/or camshaft have not been rotated, commence at item 7. If they have been rotated, commence at item 7.

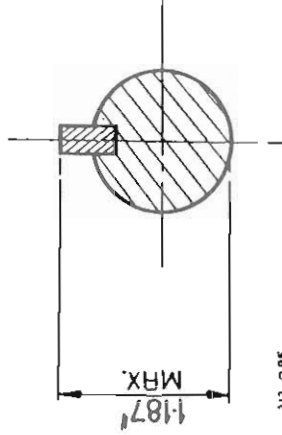
7. Remove the rocker shafts, see 12.29.54.
8. Set the engine—No. 1 piston at T.D.C.
9. Temporarily fit the camshaft chain wheel with the marking 'FRONT' outward.
10. Turn the camshaft until the mark on the camshaft chain wheel is at the six o'clock position, then remove the chain wheel without disturbing the camshaft.
11. Locate the chain wheels to the chain with the timing marks aligned.

continued



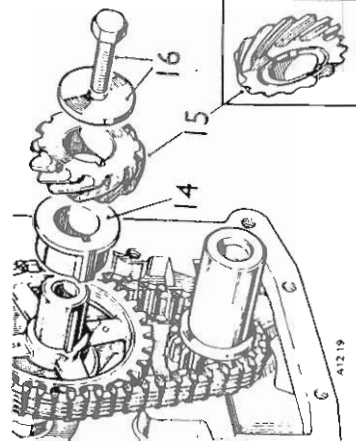
12. Engage the chain wheel assembly on the camshaft and crankshaft key locations and check that the camshaft key is parallel to the shaft axis to ensure adequate lubrication of the distributor drive gear.

A12.46



A12.085

CAUTION: The space between the key and keyway acts as an oilway for lubrication of the drive gear. Ensure that the key is seated to the full depth of the keyway. The overall dimension of shaft and key must not exceed 30,15 mm (1.187 in).



13. Check that the timing marks line-up.
14. Fit the spacer with the flange to the front.
15. Fit the distributor drive gear, ensuring that the ANNULAR GROOVED SIDE is fitted TO THE REAR, that is, towards the spacer.
16. Secure the drive gear with the washer and bolt. Torque to 5.5 to 6.2 kgf.m (40 to 45 lbf.ft).
17. Fit the timing chain cover, see 12.65.01.

continued

A12.43

EMISSION AND EVAPORATIVE LOSS CONTROL EQUIPMENT

Land-Rover V8 vehicles are fitted during manufacture with various items of emission and evaporative loss control equipment to meet individual territory requirements. Therefore some operations listed in this section of the manual may not be applicable to all vehicles.

DATA

Timing chain and wheels:

Timing chain type	Inverted tooth
No. of links	54
Width	22.22 mm (0.875 in)
Pitch	9.52 mm (0.375 in)
Crankshaft chain wheel	Sintered iron
Camshaft chain wheel	Aluminium alloy, teeth covered with nylon
Valve timing:	Inlet
Opens	30 degrees B.T.D.C.
Closes	75 degrees A.B.D.C.
Duration	285 degrees
Valve peak	112.5 degrees A.T.D.C.
	Exhaust
	68 degrees B.B.D.C.
	37 degrees A.T.D.C.
	285 degrees
	105.5 degrees B.T.D.C.

CRANKCASE EMISSION CONTROL

— Description 17.1.00

The crankcase emission control system prevents leakage from the crankcase of combustion blow-by gases by maintaining a depression in the crankcase under all operating conditions.

The source of this depression is the 'constant' depression zone between the throttle plate and the piston within the carburetters. This depression rises with increasing engine load and speed, as does the quantity of crankcase emissions to be handled.

The crankcase is purged by air drawn from the air cleaner through an in-line filter into the crankcase. The crankcase fumes are piped from each rocker cover through a flame trap into the respective left- or right-hand carburetter intakes.

The blow-by gases are then burnt within the engine in the normal combustion process.

Australian Market vehicles purge the evaporative loss control system by linking it into the crankcase ventilation purge pipe.

ENGINE BREATHER FILTER

—Remove and refit

17.10.02

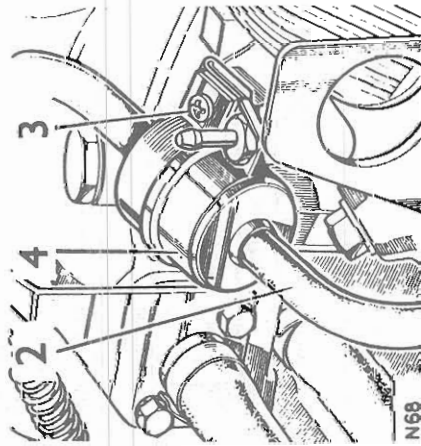
NOTE: Filters may have alternative locations according to territory build specification.

Removing

1. Remove the air cleaner, see 19.10.01.
2. Withdraw the filter top hose.
3. Slacken the filter clip.
4. Withdraw the filter from the bottom hose.

Refitting

5. Fit the filter with the end marked 'IN' or the arrows, relative to the direction of gas flow.
6. Connect the filter bottom hose.
7. Connect the filter top hose.
8. Secure the filter retaining clip.
9. Fit the air cleaner, see 19.10.02.



N68

ENGINE FLAME TRAPS

—Remove and refit

17.10.03

NOTE: Flame traps may have alternative locations according to territory build specification.

Removing

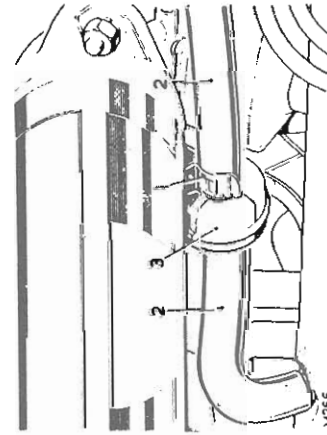
1. Pull the flame trap clip clear of the carburetter/air cleaner.
2. Remove the hoses from the flame traps.
3. Withdraw the flame traps.

Cleaning

4. Wash the flame traps in clean petrol and allow to dry.

Refitting

5. Reverse instructions 1 to 3.



N766

EVAPORATIVE EMISSION CONTROL SYSTEM

—Description

17.15.00

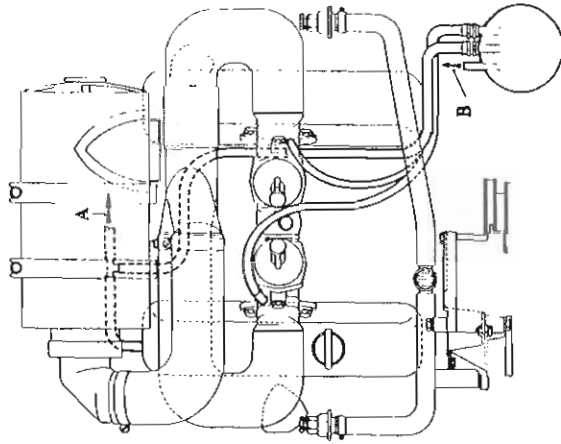
Evaporative emission control is achieved by venting the carburetter float chambers and the fuel tank through a charcoal adsorption canister to atmosphere. Refer to the schematic illustration.

The charcoal adsorption canister is mounted in the engine compartment and consists of a filter bed of activated charcoal with an enclosed space above and below. The carburetter, fuel tank and purge lines are connected to the upper space. The lower space is vented to atmosphere.

Vapour vented to the canister is adsorbed by the charcoal when the engine is not running. When the engine is running carburetter depression purges the canister by drawing filtered air through the charcoal bed of the canister into the crankcase ventilation system resulting in evaporative emissions being disposed of by the engine's normal combustion process.

An expansion tank ensures that thermal expansion of the fuel from the main tank cannot result in a surge of fuel reaching the canister and saturating the system. The function of the expansion tank is also to provide an overflow reservoir from the main tank as it is possible when the main tank is completely filled during high ambient temperature conditions for the fuel to expand, any thermal expansion occurring will be accommodated by the fuel travelling up the breather pipe into the expansion tank. The size of the expansion tank allows maximum fuel expansion, evaporative emissions being controlled by the expansion tank vent pipe, the pipe being connected between the charcoal canister and the tank vent positioned at the top of the expansion tank. The overflow fuel will eventually be drawn back into the tank as the expansion declines or the fuel is used.

The fuel tank filler cap is sealed to prevent evaporative loss.



A To air cleaner
B From petrol tank

ADSORPTION CANISTER

— Remove and refit

17.15.13

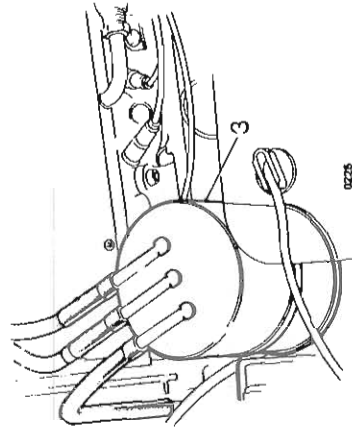
Removing

1. Disconnect from the canister:
 - i. Canister line to fuel tank.
 - ii. Canister purge line.
 - iii. Carburettor vent pipe.
2. Slacken the clamp nut screw.
3. Remove the canister.

Refitting

4. Secure the canister in the clamp.
5. Reverse instructions 1 and 2 above.

WARNING: The use of compressed air to clean an adsorption canister or clear a blockage in the evaporative system is very dangerous. An explosive gas present in a fully saturated canister may be ignited by the heat generated when compressed air passes through the canister.



AIR INJECTION SYSTEM

— Description

17.20.00

An engine-driven, vane-type air pump draws air from within the engine compartment through a centrifugal filter and delivers it through a pressure relief valve and through one-way check valves to the air manifolds on each cylinder head and thence to the injectors in the individual exhaust ports just downstream of the exhaust valves. The injectors are directed towards the valve head and face upstream. The injected air mixes with the exhaust gas leaving each cylinder and promotes secondary combustion within the exhaust ports, manifolds and exhaust system.

The air pump output is primarily controlled by engine speed/pulley ratio and pump capacity. Air delivery to the injectors is further controlled by exhaust back pressure and pressure relief valve setting.

The relief valve is mounted between the air pump and check valves, and dumps part of the air at high pump speeds to prevent pump damage.

The check valves, which are simple one-way flap valves, prevent exhaust gas from passing back through the air pump under adverse pressure conditions, and protect the pump in the event of pump drive failure.

17—4

AIR PUMP

— Description

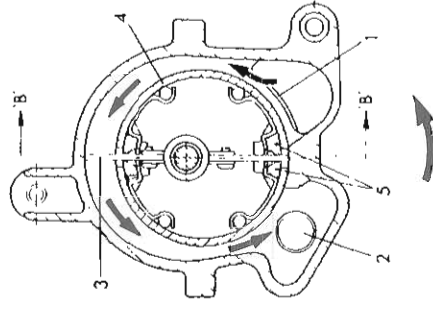
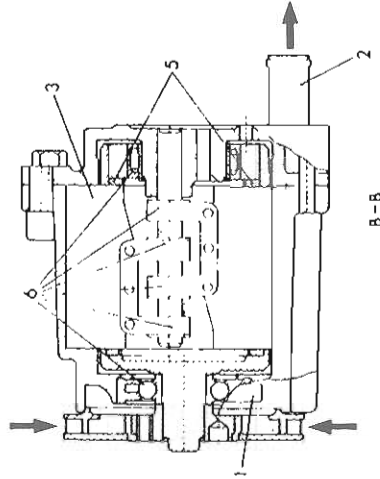
17.25.00

The rotary, vane-type air pump is fitted at the front of the engine and driven by a belt from a crankshaft pulley.

The pump delivers air under pressure to each of the four exhaust ports via a diverter valve (where fitted) a relief valve, check valve and air inlet manifold.

The pressurized air combines with the exhaust gases to continue and assist in making more complete the oxidation process in the exhaust system.

1. Inlet port
2. Exhaust port
3. Vanes
4. Rotor
5. Carbon sealing shoes
6. Bearings



Airflow (arrowed)

1. Air pump
2. Relief valve
3. Check valves
4. Air manifolds

17—5

AIR PUMP

Remove and refit

17.25.07

Removing

1. Release the air hoses from the pump.
2. Slacken the idler pulley mountings and lift the drive belt from the air pump pulley.
3. Loosen but do not remove the air pump mounting bolts.
4. Take the weight of the air pump and remove the mounting bolts.
5. Lift the pump from the engine.

Refitting

6. Reverse instructions 1 to 5.
7. Check and adjust the drive belt tension, see 17.25.13.

RELIEF VALVE

—Check operation

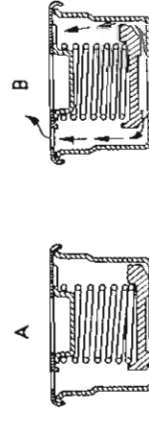
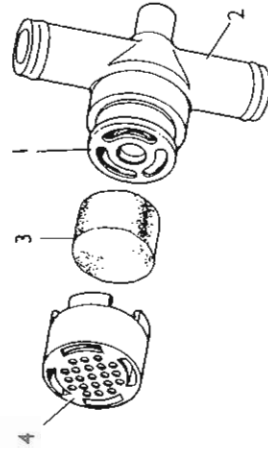
17.25.10

1. The relief valve allows excessive air pressure at high engine speed to discharge to the atmosphere.
2. Run the engine at high speeds and check the valve operation.
3. The valve cannot be adjusted and a defective unit should be replaced.

- 1 Relief valve
- 2 Relief valve body
- 3 Silencer
- 4 Cap

Valve closed A

Valve open B



LR 552

RELIEF VALVE

—Remove and refit

17.25.11

Removing

1. Disconnect the hoses from the valve.
2. Remove the valve.

Refitting

3. Reverse instructions 1 and 2.

17—6

AIR MANIFOLD

—Remove and refit

17.25.17

Removing

1. Remove the carburettor air cleaners, see 19.10.01.
 2. Release the manifold from the check valve.
 3. Release the manifold from the cylinder head.
- NOTE: It may be more convenient to release the centre branches at the manifold junction.
4. Lift off the manifold.

Refitting

5. Reverse instructions 1 to 4.
6. Run the engine and check for air leaks at the manifold.

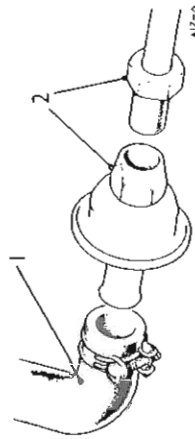
CHECK VALVE

—Remove and refit

17.25.21

Removing

1. Disconnect the air hose from the check valve.
 2. Use two open-ended spanners, one on the air distribution manifold hexagon to support the manifold, and the other to remove the check valve anticlockwise.
- CAUTION: Do not impose any strain on the air manifold.



Refitting

3. Reverse instructions 1 and 2.

CHECK VALVE

Check operation

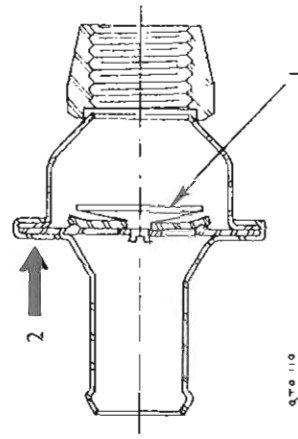
17.25.22

The check valve is a one-way valve positioned to protect the pump from back-flow of exhaust gases. The valve closes if the pump pressure falls while the engine is running, should, for example, the drive belt brake.

Testing

CAUTION: Do not use a pressure air supply for this test.

1. Remove the check valve, see 17.25.21.
2. Blow through the valve orally in both directions in turn. Air should only pass through the valve when blown from the hose connection end. Should air pass through the valve when blown from the air manifold end, renew the valve.
3. Refit the check valve, see 17.25.21.



1. Valve diaphragm
2. Direction of flow

17—7

AIR INTAKE TEMPERATURE CONTROL SYSTEM

—Description 17.30.00

The carburetors are tuned to function most efficiently at an air intake temperature of 100° F (38° C).

The temperature is maintained by a sensing device incorporated in the air cleaner intake. The sensor allows inlet manifold vacuum to operate a flap valve in the air cleaner intake. The valve controls the entry of cold air at under bonnet temperature and hot air drawn from a duct on the exhaust manifold.

The duct on the exhaust manifold is gasket sealed to the manifold and has a water tight hose connection to the valve, together with a raised air intake to the duct, to permit the vehicle to wade in water.

In order to maintain full vacuum influence on the flap valve when the manifold depression is temporarily destroyed during sudden throttle openings, a one-way valve is fitted in the vacuum line from the inlet manifold to the temperature sensor.

AIR INTAKE TEMPERATURE CONTROL VALVE

—Remove and refit 17.30.15

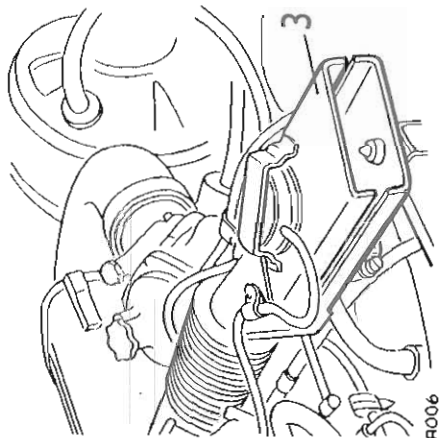
NOTE: Alternative valves may be fitted according to relevant build specification.

Removing

1. Disconnect the pipes and leads from the valve unit, noting their position for refitting.
2. Disconnect the hose to the air cleaner.
3. Disconnect the hot air box clamp (where fitted) and release the valve from the hot air box.
4. Release the valve from its support and lift it from the engine compartment.

Refitting

5. Reverse instructions 1 to 4.



AIR INTAKE TEMPERATURE CONTROL VALVE

—Check operation 17.30.01

1. Check operation of the mixing flap valves in the air cleaners by starting the engine from cold and observing the flap valves as the engine temperature rises.
2. The valves should start to open slowly within a few minutes of starting and continue to open until a stabilized position is achieved. This position and the speed of operation will be entirely dependent on prevailing ambient conditions.
3. Failure to operate indicates failure of either or both flap valve vacuum capsules or failure of the thermostatically controlled vacuum switch or both.
4. Check by connecting a pipe directly to the flap valves, thus by-passing the temperature sensor.
5. If movement of either flap valve is evident the temperature sensor is faulty. If no movement is detected, the vacuum capsule is faulty.
6. Fit new parts where necessary.

17—8

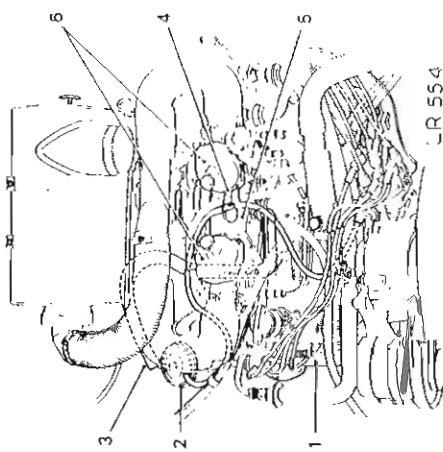
EXHAUST GAS RECIRCULATION

—Description 17.45.00

To reduce the nitric oxide content in the exhaust, the peak combustion temperatures are lowered by recirculating a controlled quantity of the exhaust gases through the combustion process.

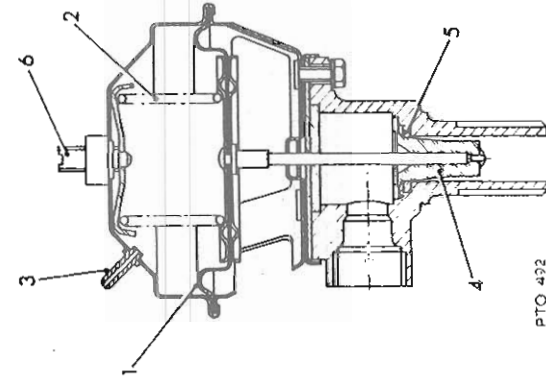
The E.G.R. valve is mounted on the right-hand exhaust manifold. A control signal, taken from a throttle edge tapping in the carburetter, gives no recirculation at idle or full load, but does allow an amount of recirculation, dependent on the vacuum signal and a metering profile of the valve, under part load conditions.

continued



1. Exhaust manifold
2. E.G.R. valve
3. E.G.R. pipe (asbestos lagged)
4. Vacuum from carburetter
5. Inlet manifold
6. Carburetters

17—9



1. Diaphragm
2. Spring
3. To vacuum source
4. Metering pin
5. Valve seat
6. Production adjustment—sealed after setting

EXHAUST GAS RECIRCULATION VALVE

—Remove and refit

17.45.01

Removing

1. Disconnect the vacuum pipe from the valve.
2. Disconnect the asbestos lagged pipe from the valve.
3. Unscrew the valve from the manifold.

Refitting

4. Reverse instructions 1 to 3, ensuring that the valve is securely sealed to the manifold.

EXHAUST GAS RECIRCULATION VALVE

—Check operation

17.45.20

1. Warm the engine to normal running temperature.
2. Ensure that the airchoke control is fully off.
3. Open and close the throttle several times (beware hot E.G.R. valve) and observe or feel the E.G.R. valve, which should:
 - a. open and close with changes in engine speed.
 - b. close instantly when the throttle is closed.

FUEL SYSTEM INTRODUCTION

Some components in the Land Rover V8 fuel system are similar to those used on existing Land Rover models. For fuel tank operations, the instructions given in the Land Rover Repair Operation Manual for Series III Vehicles should be followed.

The Stromberg CDSE type carburettors are fitted with needles to suit the territories in which the vehicles are to operate. The fuel temperature compensating device and the butterfly poppet valve are omitted for some territories. Whilst the internal drillings and dimensions of this carburetter type vary according to territory requirements, the following repair operations cover all carburetters.

It is very important that only carburetters to the exact specification and part number for the territory concerned should be used as replacements. Failure to use the correct carburetter may lead to engine malfunction and significant changes to exhaust emission levels.

Two types of air cleaner may be fitted according to market specification, and these are detailed in the following operations. Where emission or evaporative loss control equipment is fitted, reference should be made to Section 17 of this publication.

FUEL SYSTEM

FAULT DIAGNOSIS

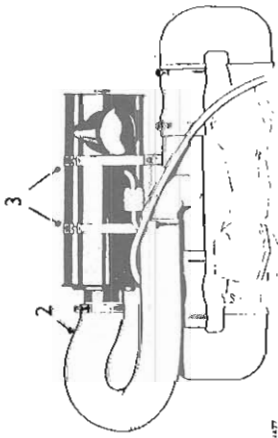
SYMPTOM	POSSIBLE CAUSE	CURE	SYMPTOM	POSSIBLE CAUSE	CURE
DIFFICULT STARTING WHEN COLD	Insufficient choke action	Check action of cold start unit to ensure that the choke is being applied fully—adjust choke cable. Check position of cold start adjuster—move outward.	ERRATIC SLOW-RUNNING OR STALLING ON DECELERATION	Float level too low	Check float-chamber level. Check for needle valve sticking.
	Fast idle adjustment incorrect	Check and adjust fast idle setting. Check linkage between choke and throttle for distortion.		Incorrect jet setting	Check and reset jet settings in accordance with carburettor overhaul instructions.
	Float chamber level too low	Check needle valve for sticking—(closed). Check float level setting. Check inlet connection filter for blockage. Check external fuel system in accordance with fuel system fault diagnosis.		Carburettor air leaks	Check throttle spindle and bearings for wear.
	Carburettor flooding	Check needle valve for sticking—(open). Fit new pump. Reset pump pressure too high. Float level too high.		Manifold air leaks	Check inlet manifold gasket for leakage. Check inlet manifold for cracks and distortion of mating faces. Check gasket between carburettor and manifold. Check condition of vacuum advance pipe and connections. Check vacuum servo pipes and connections.
	No fuel supply to carburettor	Check filters and pump for blockage. Check fuel tank breather and fuel lines for blockage. Remove fuel pump and check operation. Overhaul or fit new pump.		Damper oil too thick. No oil in damper	Check and refill to correct level with oil specified.
DIFFICULT STARTING WHEN HOT	Choke sticking 'on'	Check to ensure choke is returning to fully 'off' position; reset as necessary.	EXCESSIVE FUEL CONSUMPTION	Blocked air cleaner	Fit new air cleaner elements.
	Blocked air cleaner	Fit new air cleaner elements.		Damper oil too thick	Replace with correct grade.
	Float chamber level too high	Check float level setting. Check float arms for distortion. Check needle valve for sticking. Punctured float, fuel pump pressure too high.		Incorrectly adjusted carburettor	Check and reset slow running in accordance with carburettor tune and adjust instructions.
LACK OF ENGINE POWER	No oil in damper or oil too thin	Check level of oil in damper, and fill to correct level with oil of a viscosity of S.A.E. 20.	Float level too high	Check and reset float level.	
	Piston sticking	Check piston assembly moves freely and returns under spring load—centre jet assembly. Check diaphragm for cracks or porosity.	Worn jets and needle	Check and replace as necessary.	
	Water in fuel	If water is present in float chamber, the complete fuel system should be drained, fuel components should be dismantled, inspected for contamination, paying particular attention to filters.	Incorrect needle	Check needle type.	
			Choke sticking 'on'	Check to ensure choke is returning to fully 'off' position; reset as necessary.	
			Engine fault	See Section 12.	

continued

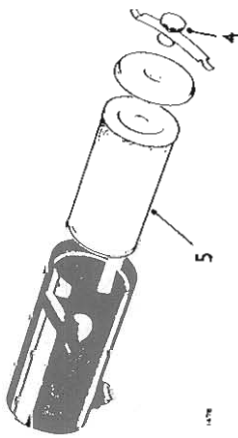
AIR CLEANER

- Remove and refit 1, 2, 3 and 6 19.10.01
- Renew elements 1 to 6 19.10.08

- Removing**
1. Disconnect engine breather filter.
 2. Release air hose from air cleaner.
 3. Release securing straps and lift air cleaner from engine compartment.
 4. Release end clamp and remove the end plate from the air cleaner.
 5. Withdraw the filter element from the air cleaner body.
 6. Fit a new filter element and reverse instructions 1 to 4.



M77



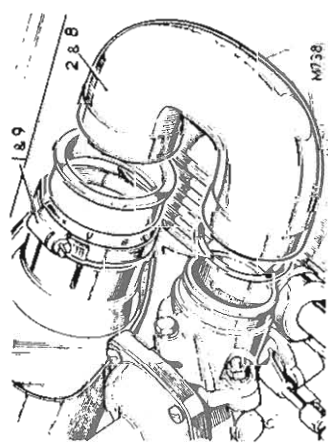
M78

AIR CLEANER

- Remove and refit 19.10.01

Removing

1. Release the hose clips each side of the air cleaner.
2. Withdraw the air cleaner elbows.
3. Detach the vacuum pipes and air intake temperature control hose.
4. Withdraw the air cleaner from the retaining posts, at the same time disconnecting the hose from the engine breather filter.



M738

Refitting

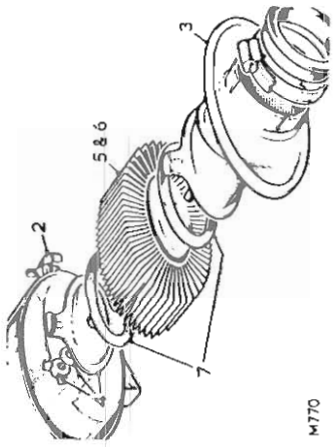
5. Fit the air cleaner, locating the rubber mountings over the retaining posts.
6. Connect the engine breather hose at the underside of the air cleaner.
7. Smear the 'O' rings at the carburetter intakes with MS4 grease.
8. Fit the air cleaner elbows.
9. Secure the hose clips.
10. Refit the vacuum pipes and temperature control valve hose.

AIR CLEANER

- Renew elements 19.10.08

Removing

1. Remove the air cleaner, see 19.10.01.
2. Release the end plate clips.
3. Withdraw the end plates.
4. Remove the wing nut, washer and retaining plate.
5. Withdraw the air cleaner elements.



M770

Fitting

6. Fit new air cleaner elements.
7. Fit new sealing washers.
8. Reverse instructions 1 to 4.

CARBURETTERS

- Description 19.15.00

Variations in carburetters may be fitted to meet local territory legislation.

Tamperproofing

These carburetters may be externally identified by a tamperproof sealing tube fitted around the slow running adjustment screw.

The purpose of these carburetters is to more stringently control the air fuel mixture entering the engine combustion chambers and, in consequence, the exhaust gas emissions leaving the engine.

For this reason the only readily accessible external adjustment on these carburetters is to the throttle settings for fast idle speed and, on some later carburetters, this may require the use of a special tool to adjust the settings.

Emission Specifications

All carburetters fitted to the Land-Rover conform at the time of manufacture to particular territory requirements in respect of exhaust and evaporative emissions control. However, in some cases changes to the basic carburetters themselves have been necessary to achieve this, for example, the replacing of a manual choke with a temperature-actuated auto choke. Therefore some operations included in this section of the manual may not be applicable to all carburetters fitted to the model.

continued

FUEL SYSTEM

CAUTION: Unauthorized breaking of tamperproofing devices, adjustment of carburetter settings or the fitting of incorrectly related parts may render the vehicle user liable to legal penalties according to local territory legislation. Whenever adjustments are made to the settings of tamperproof or emission-specification carburetters an approved type CO meter must be used to ensure that the final exhaust gas analysis meets with local territory requirements.

CARBURETTERS

— Tune and adjust

19.15.02

Service tools: 605330 carburetter balancer, MS80 mixture adjusting tool (Zenith No. B25860).

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

1. Check that the throttle control between the pedal and the carburetters is free and has no tendency to stick.
2. Check the throttle cable setting with the throttle pedal in the released position. The throttle linkage must not have commenced movement, but commences with the minimum depression of the pedal.
3. Run the engine until it attains normal operating temperature; that is, thermostat open.
4. Remove the air cleaner, see 19.10.01.
5. Slacken the screws securing the throttle adjusting levers on both carburetters.
6. Start the engine and check the idle speed.
7. If necessary, adjust the throttle stop screws to give the correct idle speed, refer to Section 05. If a tamper-proof sleeve is fitted over this screw, the slow running speed can only be adjusted using special tool B25243 supplied to authorized service outlets.
8. Remove the piston damper plug, and using special tool MS80 adjust the mixture. Locate the outer sleeve of the tool to engage a machined slot to prevent the air valve twisting. Turn the inner tool clockwise to enrich the mixture and anti-clockwise to weaken it.

continued

19—6

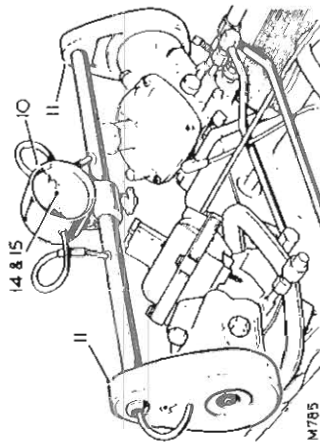
9. When the mixture is correctly adjusted, the engine speed will remain constant or may fall slowly a slight amount as the air valve is lifted.
10. Check, and if necessary, zero the gauge on tool 605330.
11. Place tool 605330 onto the carburetter adaptors, ensuring that there are no air leaks. If the engine stalls or decreases considerably in speed, the mixture is too rich. If the engine speed increases, the mixture is too weak.
12. If necessary, remove tool 605330 and readjust the mixture, then refit the tool.
13. Check tool 605330 gauge reading.
14. If the gauge pointer is in the 'zero' sector, no adjustment is required.
15. If the gauge pointer moves to the right, decrease the air-flow through the left-hand carburetter by unscrewing the throttle stop screw or increase the air-flow through the right-hand carburetter by screwing in the throttle stop screw. Reverse the procedure if the pointer moves to the left.
16. If the engine idle speed rises too high or drops too low during balancing, adjust to the correct idle speed, maintaining the gauge pointer in the 'zero' sector.
17. Remove tool 605330. With the mixture setting and carburetter balance correctly adjusted, the difference in engine rev/min with the tool 605330 on or off will be negligible, approximately plus or minus 25 rev/min.

NOTE: Using a recognised type CO meter, the exhaust gas analysis reading should not exceed 4% carbon monoxide or any other levels fixed by local territory legislation.

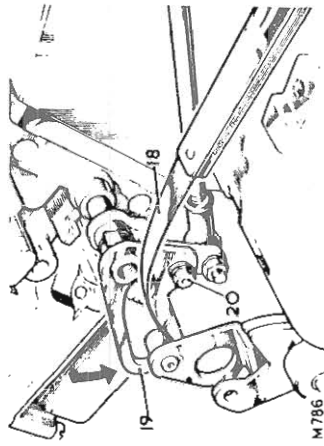
18. On the left-hand carburetter, place a 0.15 mm (0.006 in) feeler between the underside of the roller on the countershaft lever and the throttle lever.
19. Apply pressure to the throttle lever to hold the feeler.
20. Tighten the screw to secure the throttle adjusting lever, then withdraw the feeler.
21. On the right hand carburetter, place a 0.15 mm (0.006 in) feeler between the left leg of the fork on the adjusting lever and the pin on the throttle lever.
22. Apply light pressure to the linkage to hold the feeler.
23. Tighten the screw to secure the throttle adjusting lever, then withdraw the feeler.
24. Refit the air cleaner, see 19.10.01.

continued

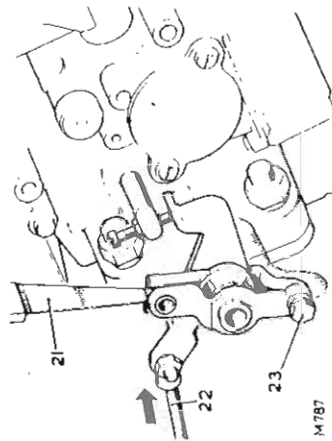
19—7



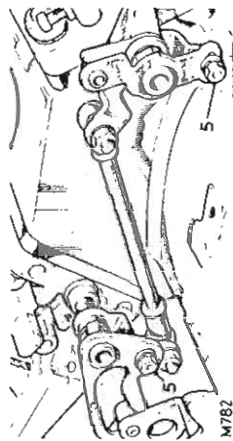
M785



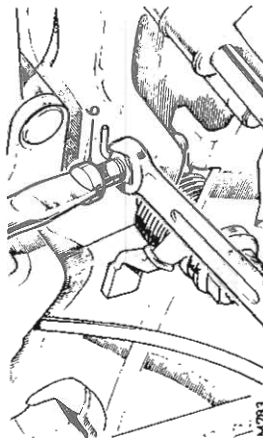
M786



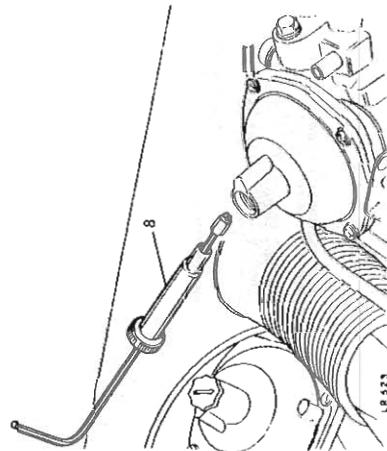
M787



M782



M783



LR 523

FUEL SYSTEM

Fast idle adjustment

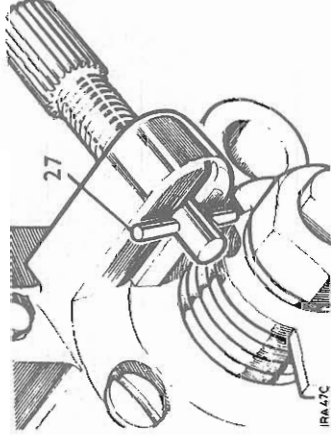
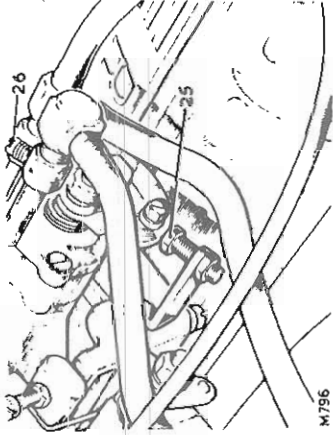
The fast idle adjustment is pre-set on the left-hand carburettor and should not normally require adjustment. If adjustment is required, the correct procedure is to remove the left-hand carburettor and carry out items 82 to 87 detailed in 19.15.18. Alternatively, the fast idle can be approximately set as follows, but this alternative method is not recommended for ambient temperatures below -8°C (10°F).

25. Set the fast idle adjustment screw against the cam to give an engine speed of 1000 to 1200 rev/min when the choke warning light just goes out.

NOTE: On some later carburettors a special tool, supplied to authorized service outlets, may be necessary to adjust the fast idle speed setting.

Cold start unit

26. Set the cold start adjuster as necessary.
27. For starting at temperatures down to -18°C (0°F) push and turn the spring-loaded choke adjustment screw so that the peg is at right angles to the slot as illustrated. Leave in this position. When starting at temperatures below -18°C (0°F) turn the screw until peg is recessed in slot.



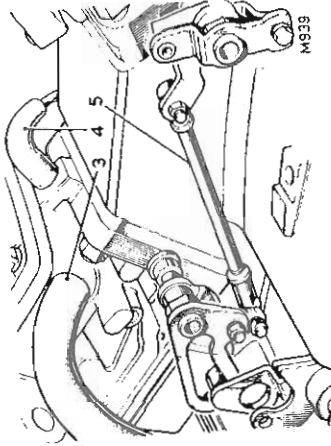
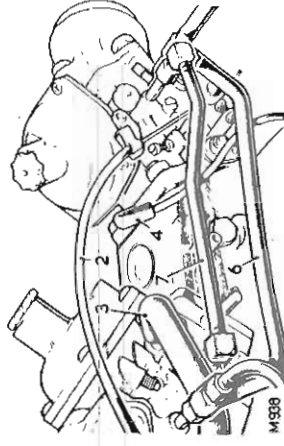
CARBURETTERS

—Remove and refit

19.15.01

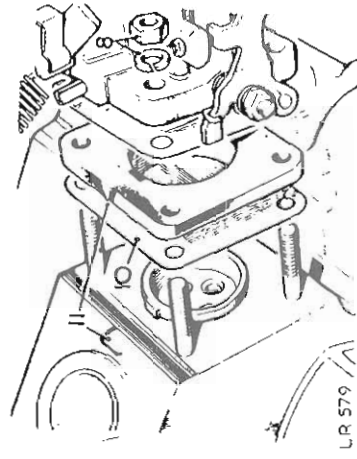
Removing

1. Remove the air cleaner, see 19.10.01.
2. Disconnect the choke cable.
3. Disconnect the emission control pipes.
4. Disconnect the distributor vacuum pipe.
5. Disconnect the throttle linkage.
6. Disconnect the main fuel supply pipe.
7. Disconnect the choke fuel supply pipe.
8. Remove the carburetters.
9. If required withdraw the joint washers, insulator and liner.



Refitting

10. Locate a joint washer on the inlet manifold.
11. Fit the insulator, aligning the arrows.
12. Locate a joint washer on the insulator.
13. Reverse instructions 1 to 8.
14. Fit the air cleaner, see 19.10.01.
15. Tune and adjust the carburetters, see 19.15.02.



CARBURETTORS

19.15.18

—Overhaul

1. Remove the carburetors, see 19.15.11.

Dismantling

- Removing the piston assembly**
2. Remove the oil cap and damper.
 3. Remove the top cover and spring.
 4. Withdraw the air valve, shaft and diaphragm assembly.
 5. Remove the metering needle, retained by a locking screw.
 6. Remove the diaphragm from the air valve.

Removing the float chamber

7. The jet is a one-piece unit pressed into the carburettor body.
8. Remove the float chamber and gasket.
9. Uncnip the float and arm complete with the spindle.
10. Remove the needle valve and washer from the carburettor body.

Dismantling the carburettor body

11. Add location marks to the throttle butterfly and spindle.
12. Remove the throttle butterfly, taking care not to damage the poppet valve.
13. Left-hand carburettor: Remove the throttle levers.
14. Withdraw the throttle spindle.
15. If required, remove the throttle stop and fast idle lever.
16. Remove the cold start assembly.
17. Dismantle the cold start assembly, but **DO NOT** remove the discs from the spindle.

Cleaning and inspection

- Carburettor cleaning**
18. When cleaning fuel passages do not use metal tools (files, scrapers, drills, etc.) which could cause dimensional changes in the drillings or jets. Cleaning should be effected using clean fuel and, where necessary, a moisture-free air blast.

Joint faces

19. Examine the faces for deep scores which would lead to leakage taking place when assembled.

Joint gasket and seals

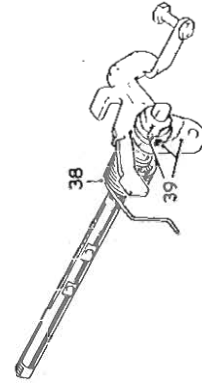
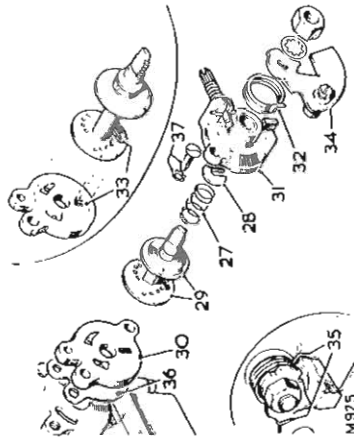
20. New gaskets and seals should be used throughout carburettor rebuild. A complete set of gaskets is available for replacement purposes.
21. Inspect metering needle; it is machined to very close limits and should be handled with care. Examine for wear, bend and twist; renew if necessary.

Diaphragm

22. In common with other products made from rubber compounds, any contact of the diaphragm with volatile cleaners should be avoided; use only **CLEAN RAG**. Examine for damage and deterioration.
23. Examine float for puncture or damage, chamber for corrosion, and retaining clips for wear.
24. Examine cold start bushes for wear; renew starter cover as necessary.
25. Examine clamping screw for two positions; renew as necessary.
26. Examine lifting pin for air valve for correct operation.

Reassembling

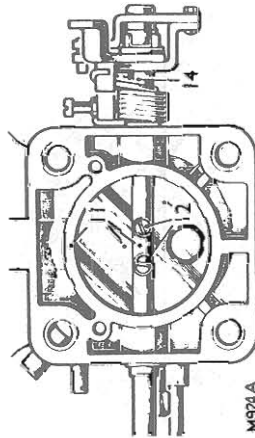
- Assembling the cold start, L.H. carburettor**
27. Place the spring on the cold start spindle.
 28. Fit the spring retaining clip.
 29. Check that the discs slide easily on the spindle.
 30. Place the cold start spindle on the starter face.
 31. Place the starter cover in position.
 32. Fit the return spring over the spindle.
 33. Rotate the spindle until the oval port in the end disc is aligned with the oval port in the starter face.
 34. Fit the cold start lever.
 35. Engage the return spring over the lug on the starter cover and the back of the cold start lever.
 36. Place the cold start gasket onto the carburettor body.
 37. Fit the cold start assembly to the carburettor body, then check for ease of operation.



Assembling the throttle spindles

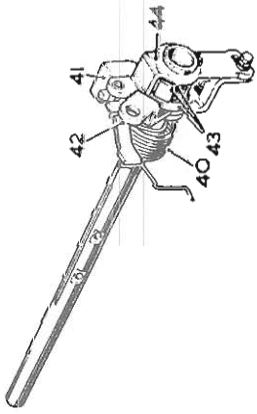
- Left-hand carburettor 38 and 39
38. Place the return spring over either end of the spindle.
 39. Fit the throttle stop and fast idle lever.

M926



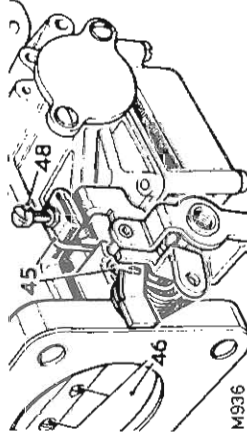
Right-hand carburetter 40 to 44

40. Place the return spring over the recessed end of the spindle
41. Fit the throttle stop and fast idle lever.
42. Fit the throttle lever.
43. Secure the assembly with a bushed washer, tab washer and nut. Engage the tab washer.
44. Fit the throttle adjusting lever.



M927

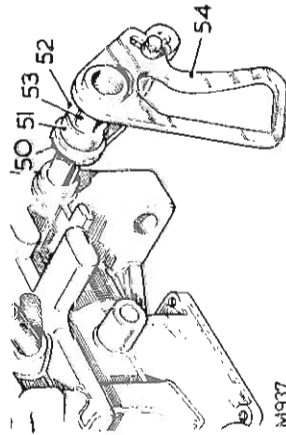
45. Insert the throttle spindle from the cold start side of the carburetter body (blank plate side on R.H. carburetter) fitting the throttle return spring on the fast idle adjustment holder, tension the spring half a turn.
46. Fit the throttle butterfly, maintaining the previously marked alignment. Leave the retaining screws loose.
47. Actuate the throttle several times to centralize the butterfly, then tighten the retaining screws and lock by peening ends.
48. Fit the throttle stop adjusting screw until it touches the stop, then turn a further one and a half turns and secure the locknut.



M936

Left-hand carburetters

49. Fit the fast idle adjustment screw and adjust to give slight clearance from the cold start lever, then secure the locknut.
50. Fit the throttle lever to the spindle.
51. Place the spacer on the spindle.
52. Place the tab washer on the spindle.
53. Fit the sleeve nut, sleeve end last, and engage the tab washer.
54. Fit the throttle adjusting lever.

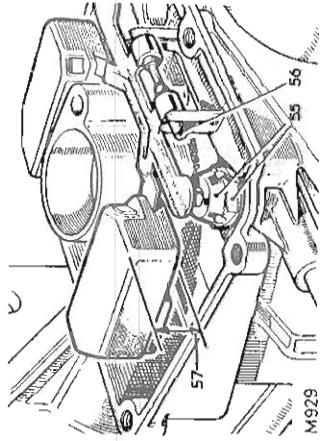


M937

continued

Assembling the float chamber

55. Fit the needle valve and washer
56. Locate the spindle into the float arm and engage the assembly in the retaining clips.
57. With the needle valve on its seating and the tab on the float contacting the needle valve, measure the distance between the carburetter flange face and the highest point on the floats.
58. The dimension required for correct float level is 17 to 18 mm (0.67 to 0.71 in). Adjust by bending the tab on the float carrier or fitting an additional washer under the needle seating.



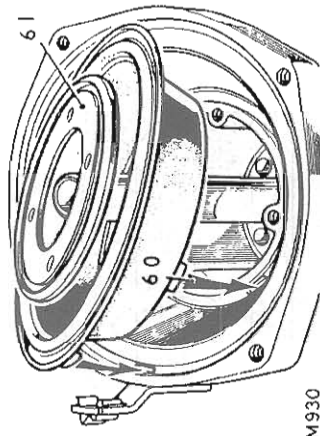
M929

NOTE: The float carrier tab must be maintained at right angles to the needle in the closed position.

59. Fit the float chamber and gasket, but do not fully tighten the screws at this stage.

Assembling air valve, shaft and diaphragm

60. Locate the diaphragm onto air valve with the tab engaged in the recess.
61. Fit the diaphragm retaining ring.
62. Locate the metering needle into the air valve.
63. Secure the needle in position and fit the damper.



M930

Fast idle adjustment — as applicable

NOTE: On some later carburetters a special tool is required for this adjustment.

64. Set the cold start adjuster fully outward.
65. Slacken the fast idle adjusting screw.
66. Hold the cold start cam lever in the maximum position.
67. Adjust the fast idle adjusting screw against the cam lever until there is 0.61 to 0.66 mm (0.024 in to 0.026 in) gap between the top edge of the throttle butterfly and the carburetter barrel wall.
68. Use feeler gauges or a 0.65 mm diameter (No. 72) drill to measure the gap at the top edge of the throttle butterfly.
69. Secure the locknut on the fast idle adjusting screw without disturbing the adjustment.
70. Refit the carburetters, see 19.15.1.1.
71. Tune and adjust the carburetters, see 19.15.02.



M35

For Data, refer to section 05.

FLOAT CHAMBER NEEDLE VALVE

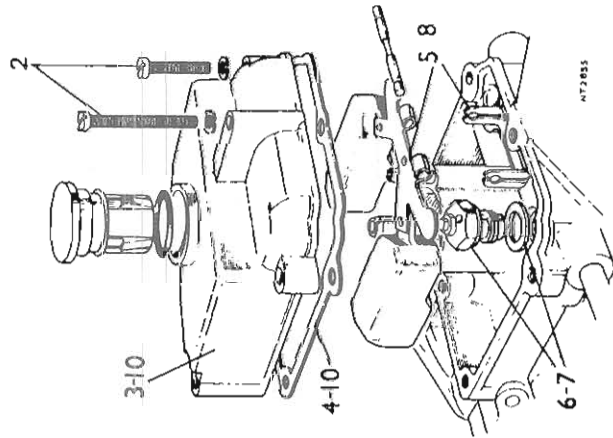
—Remove and refit 19.15.24

Removing

1. Remove the carburetters, see 19.15.11 or
2. Remove the six screws securing the float chamber to the body.
3. Remove the float chamber.
4. Remove the gasket.
5. Remove the float assembly by gently prising the spindle from the locating clips.
6. Remove the needle valve and washer.

Refitting

7. Fit the needle valve and renew the washer.
8. Fit the float assembly.
9. Check, and if necessary, adjust the height of both floats, see 19.15.32, instruction 6.
10. Renew the gasket and refit the float chamber.
11. Refit the carburetters, see 19.15.11.



FLOAT CHAMBER LEVELS

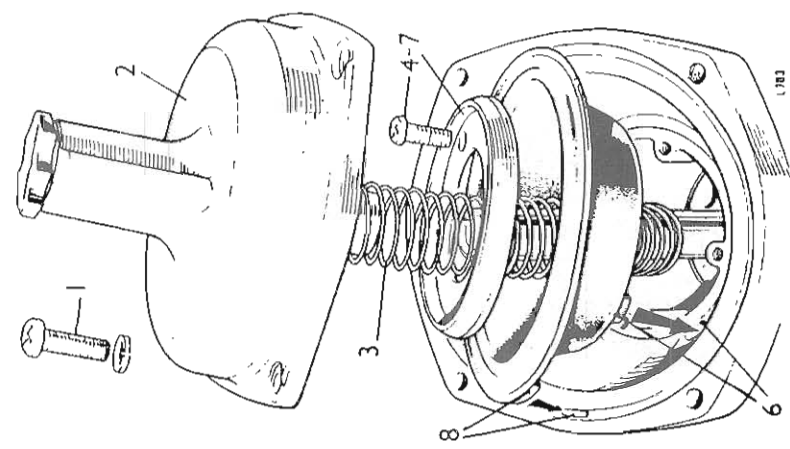
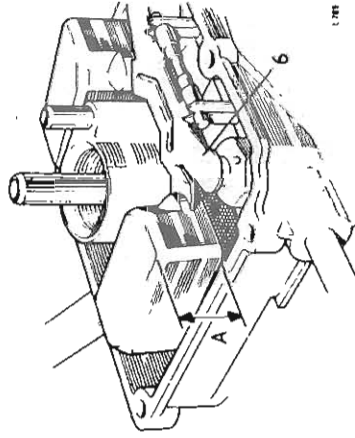
—Check and adjust 19.15.32

Checking

1. Remove the carburetters, see 19.15.11.
 2. Remove the six screws securing the float chamber to the body.
 3. Remove the float chamber.
 4. Remove the gasket.
 5. With the carburetter in the inverted position check the distance between the gasket face on the carburetter body to the highest point of each float 'A'.
- NOTE: The height of both floats must be the same, i.e. 0.625 to 0.627 in (16 to 17 mm).

Adjusting

6. Bend the tab that contacts the needle valve but ensure that it sits at right angles to the valve to prevent the possibility of sticking.
7. Fit a new gasket and reverse instructions 1 to 3.



DIAPHRAGM

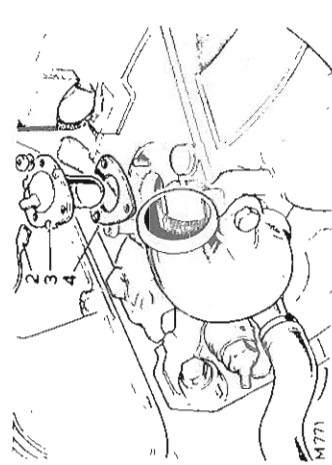
—Remove and refit 19.15.35

Removing

1. Remove the four screws securing the top cover to the carburetter body.
2. Lift off the top cover.
3. Remove the diaphragm spring.
4. Remove the diaphragm retaining plate.
5. Remove the diaphragm.

Refitting

6. Fit the diaphragm, locating the inner tag in the air valve recess.
7. Fit the retaining plate and ensure the correct diaphragm seating and tighten the screws.
8. Locate the diaphragm outer tag in the recess in the carburetter body.
9. Fit the top cover and evenly tighten the screw.
10. Check, and if necessary top-up the damper, see special instructions, Section 10.



THERMOSTAT SWITCH, CHOKE WARNING LIGHT

—Remove and refit 19.15.50

Removing

1. Disconnect the battery earth lead.
2. Disconnect the lead from the switch.
3. Remove the three bolts securing the switch to the thermostat housing.
4. Remove the thermostat switch and joint washer.

Refitting

5. Using a new joint washer, reverse instructions 1 to 4.

TEMPERATURE COMPENSATOR

—Remove and refit 19.15.59

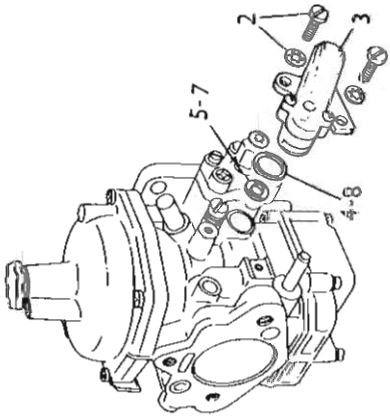
CAUTION: This component must only be renewed as a complete new unit.

Removing

1. Remove the air cleaner, see 19.10.01.
2. Remove the two screws and shakeproof washers securing the temperature compensator to the carburetter.
3. Withdraw the compensator complete.
4. Remove and discard the outer rubber washer.
5. Remove the inner rubber washer from the carburetter body and discard.

Refitting

6. Clean the carburetter and temperature compensator mating faces.
7. Insert a new inner rubber washer into the bore in the carburetter body.
8. Fit a new outer rubber washer.
9. Fit the compensator to the carburetter and secure with the two screws and shakeproof washers.
10. Refit the air cleaner.



A19.55

DECELERATION AND BY-PASS VALVE (Where fitted)

—Remove and refit 19.15.64

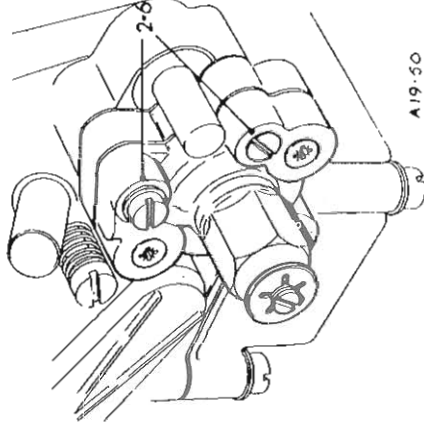
CAUTION: This component must only be renewed as a complete unit.

Removing

1. Remove the carburetters, see 19.15.11.
2. Remove the two cheesc-headed screws and the single countersunk slotted screw (not cross-slotted) securing the by-pass valve assembly to the carburetter.
3. Withdraw the valve assembly complete.
4. Remove the gasket.

Refitting

5. Clean the carburetter and valve assembly mating faces.
6. Using a new gasket fit the assembly to the carburetter with the three screws and washers.
7. Refit the carburetters to the engine.



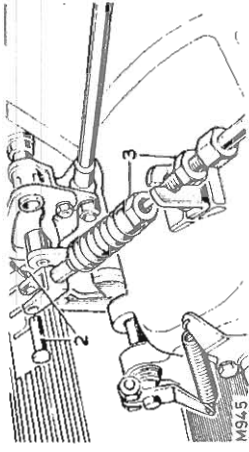
A19.50

THROTTLE CABLE

—Remove and refit 19.20.06

Removing

1. Remove the air cleaner, see 19.10.01.
2. Disconnect the cable from the carburetter.
3. Release the cable from the adjustment bracket.
4. Release the return spring.
5. Remove the clevis pin from the throttle pivot.
6. Release the cable from the bulkhead.
7. Withdraw the cable complete.



Refitting

8. Reverse instructions 2 to 7.
9. Adjust the cable with the throttle pivot in the released position. The throttle linkage must not have commenced movement, but commences with the minimum depression of the pedal.
10. Check the operation of the throttle mechanism. The pedal should touch the stop bolt without straining the cable and the carburetter must fully open and then close when the pedal is released.
11. Fit the air cleaner, see 19.10.01.

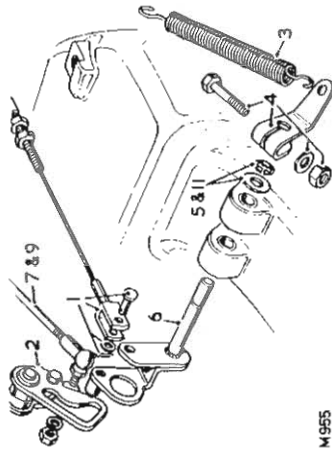
THROTTLE LINKAGE

—Remove and refit 19.20.07

Removing

1. Disconnect the throttle cable.
2. Remove the throttle adjusting lever.
3. Disconnect the throttle return spring.
4. Remove the return spring lever.
5. Remove the circlip and plain washer from the countershaft.
6. Withdraw the countershaft assembly.
7. Remove the throttle link from between the carburetters.

NOTE: For details of carburetter linkage 19.15.18 refers.



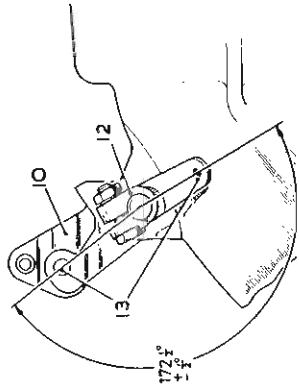
M955

Refitting

8. If the throttle link ball joints have been disturbed, they should be set at 122.55 mm (4.825 in) centres or 77.683 mm (3.0521 in) on later units.
9. Fit the throttle link.
10. Fit the countershaft assembly.
11. Secure the countershaft with a plain washer and circlip.

continued

12. Fit the lever for the throttle return spring to about the circlip.
13. Position the lever and countershaft assembly so that the holes for the throttle cable and return spring connection are at $172\frac{1}{2}^{\circ} \pm \frac{1}{2}^{\circ}$.
14. Reverse instructions 1 to 3.
15. Adjust the carburettor linkage, see 19.15.02.



M957

FUEL MAIN FILTER

— Remove and refit 19.25.02

Removing

1. Disconnect the fuel pipes.
2. Take precautions against fuel leaking from the tank.
3. Remove the two bolts, plain and spring washers securing filter to bulkhead.
4. Remove the filter complete.

Refitting

5. Reverse instructions 1, 3 and 4.

FUEL MAIN FILTER ELEMENT

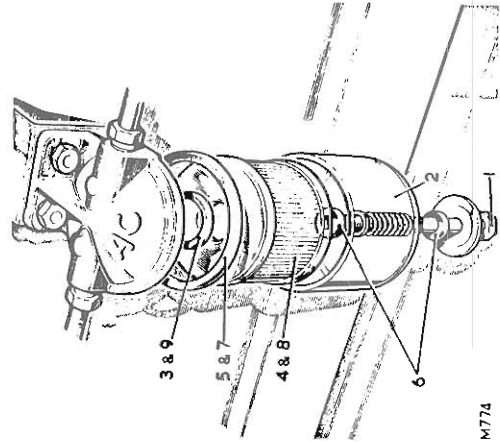
— Remove and refit 19.25.07

Removing

1. Unscrew the centre bolt.
2. Withdraw the filter bowl.
3. Remove the small sealing ring.
4. Remove the element.
5. Withdraw the large sealing ring from the underside of the filter body.

Refitting

6. Fit new centre sealing rings as necessary.
7. Fit new top sealing ring
8. Fit new element, small hole downward.
9. Fit new small sealing ring.
10. Reverse instructions 1 and 2.



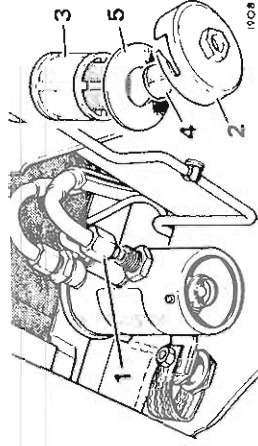
M774

FUEL PUMP FILTER

— Remove, clean and refit 19.45.05

The electric fuel pump is located on the chassis right-hand side member between the gearbox and rear axle. To remove the filter for cleaning proceed as follows:

1. From beneath the vehicle disconnect the fuel inlet pipe from the pump and blank the end of the pipe by suitable means to prevent fuel draining from the tank.
2. Release the end cover from the bayonet fixing using a 0.625 in. A.F. spanner
3. Withdraw the filter and clean by using a compressed air jet from the inside of the filter.
4. Remove the magnet from the end cover and clean. Replace the magnet in the centre of the end cover.
5. Reassemble the fuel pump and refit the fuel inlet pipe. Use a new gasket for the end cover if necessary.



M608

FUEL PUMP

— Remove and refit 19.45.08

Removing

1. Disconnect the fuel pump electric lead at the snap connector.
2. Disconnect the upper fuel pipe (outlet) from the pump.
3. Disconnect the lower pipe (inlet).
4. Cover the ends of the fuel pipes to prevent loss of fuel and ingress of dirt. Do NOT plug the pipe ends.
5. Remove the two nuts securing the pump and earth braid to the rubber mountings and remove the pump.

Refitting

6. Reverse instructions 1 to 5.

FUEL PUMP

19.45.15

—Overhaul

NOTE: The electrical components of the pump are sealed and cannot be repaired. Overhauling is therefore confined to the piston assembly.

Dismantling

1. Remove pump from the vehicle, see 19.45.08, and clean outside of pump before dismantling.
2. Release the end-cover from the bayonet fixing.
3. Withdraw the filter and rubber seal.
4. Carefully prise out the retaining clip.
5. The following parts will then be released:
 - a plain washer,
 - b rubber seal,
 - c one-way valve.
6. Withdraw the piston return spring with the piston. If the piston remains in the pump tube, hold the pump body vertically (in the fitted position) and tap the closed end until the piston is released from its magnetic hold and drops out.

NOTE: The piston is fitted with a one-way valve which should not be disturbed.

7. Remove the short rebound spring.
8. Clean all components in petrol.
9. Immerse pump body in petrol and use air-line inside pump tube.

Reassembling

10. Refit the rebound spring into the end of the piston.
11. Refit the return spring over the other end of the piston.
12. Slide the piston assembly into the pump tube.
13. Fit the one-way valve, rubber seal, and plain washer.
14. Retain the assembly with the spring clip.
15. Reverse instructions 2 and 3.

COOLING SYSTEM

FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CURE
A—EXTERNAL LEAKAGE	<ol style="list-style-type: none"> 1. Loose hose clips 2. Defective rubber hose 3. Damaged radiator seams 4. Excessive wear in the water pump 5. Loose core plugs 6. Damaged gaskets 7. Leaks at the heater connections or plugs 8. Leak at the water temperature gauge plug 	<ol style="list-style-type: none"> 1. Tighten 2. Renew 3. Rectify 4. Renew 5. Renew 6. Renew 7. Rectify 8. Tighten
B—INTERNAL LEAKAGE	<ol style="list-style-type: none"> 1. Defective cylinder head gasket 2. Cracked cylinder wall 3. Loose cylinder head bolts 	<ol style="list-style-type: none"> 1. Renew. Check engine oil for contamination and refill as necessary 2. Renew cylinder block 3. Tighten. Check engine for oil contamination and refill as necessary
C—WATER LOSS	<ol style="list-style-type: none"> 1. Boiling 2. Internal or external leakage 3. Restricted radiator or inoperative thermostat 	<ol style="list-style-type: none"> 1. Ascertain the cause of engine overheating and correct as necessary 2. See items A and B 3. Flush radiator or renew the thermostat as necessary
D—POOR CIRCULATION	<ol style="list-style-type: none"> 1. Restriction in system 2. Insufficient coolant 3. Inoperative water pump 4. Loose fan belt 5. Inoperative thermostat 	<ol style="list-style-type: none"> 1. Check hoses for crimps, reverse-flush the radiator, and clear the system of rust and sludge 2. Replenish 3. Renew 4. Adjust 5. Renew
E—CORROSION	<ol style="list-style-type: none"> 1. Excessive impurity in the water 2. Infrequent flushing and draining of system 3. Incorrect anti-freeze mixtures 	<ol style="list-style-type: none"> 1. Use only soft, clean water together with correct anti-freeze or inhibitor mixtures 2. Thoroughly flush system and drain and flushed thoroughly at least once a year 3. Certain anti-freeze solutions have corrosive effect on parts of the cooling system. Only recommended solutions should be used.
F—OVERHEATING	<ol style="list-style-type: none"> 1. Poor circulation 2. Dirty or damaged fan blades in engine 3. Radiator fins choked with chaff, mud, etc. 4. Incorrect ignition timing 5. Insufficient coolant 6. Low oil level 7. Tight engine 8. Choked or damaged exhaust pipe or silencer 9. Dragging brakes 10. Overloading vehicle 11. Driving in heavy sand or mud 12. Engine labouring on gradients 13. Low gear work 14. Excessive engine idling 15. Inaccurate temperature gauge 16. Defective thermostat 	<ol style="list-style-type: none"> 1. See item D 2. Rectify 3. Use air pressure from the engine side of the radiator and clean out passages thoroughly 4. See Group 86 5. See item D 6. Replenish 7. New engines are very tight during the running-in period and moderate speeds should be maintained for the first 1,000 miles (1,500 km) 8. Rectify or renew 9. See Group 70—adjust brakes in the hands of the operator 10. In the hands of the operator 11. In the hands of the operator 12. In the hands of the operator 13. In the hands of the operator 14. In the hands of the operator 15. Renew 16. Renew
G—OVERCOOLING	<ol style="list-style-type: none"> 1. Defective thermostat 2. Inaccurate temperature gauge 	<ol style="list-style-type: none"> 1. Renew 2. Renew

COOLANT

— Drain and refill

26.10.01

Draining

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

1. Remove the radiator filler cap.
2. Remove the plug and drain the radiator. As the system is filled with a solution of anti-freeze or inhibitor, use a clean container if the coolant is to be re-used.
3. Refit the drain plug and washer.
4. Remove the drain plugs, one each side of the cylinder block, (located between the exhaust pipes and the cylinder block), and drain the engine.
5. Refit drain plugs and washers.

Coolant requirements

Frost precautions and engine protection

To prevent corrosion of the aluminium alloy engine parts it is imperative that the cooling system is filled with a solution of clean water and the correct type of anti-freeze, winter and summer, or water and inhibitor if frost precautions are not required. Never fill or top-up with water only, always add an inhibitor (Marston's SQ36) if anti-freeze is not used. NEVER use salt water with an inhibitor otherwise corrosion will occur. In certain territories where the only available water supply may have some salt content, use only clean rainwater or distilled water.

Recommended solutions are:

Anti-freeze — Unipart Universal Anti-freeze or permanent type ethylene glycol base with suitable inhibitor for aluminium engines.

Inhibitor — Marston Lubricants SQ36 Coolant inhibitor concentrate.

Use one part of anti-freeze to one part of water.

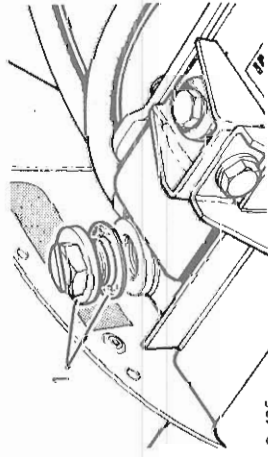
Use 50cc of inhibitor per litre of water.

Anti-freeze can remain in the cooling system and will provide adequate protection for two years provided that the specific gravity of the coolant is checked before the onset of the second winter and topped-up with new anti-freeze as required.

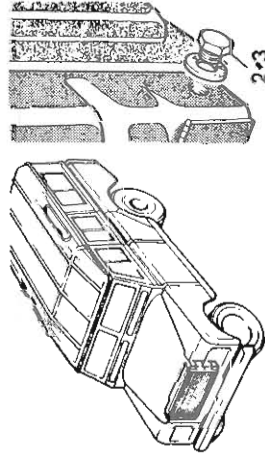
All Land Rovers leaving the Rover factory have the cooling system filled with 50% of anti-freeze mixture. This gives protection against frost down to minus 47°C (minus 53°F). Vehicles so filled can be identified by the blue label affixed to the right-hand side of the windscreen and a blue label tied to the engine.

After the second winter the system should be drained and thoroughly flushed by using a hose inserted in the radiator filler orifice. Before adding new anti-freeze examine all joints and renew defective hoses to make sure that the system is leakproof. Inhibitor solution should be drained and flushed out and new inhibitor solution introduced every two years, or sooner where the purity of the water is questionable.

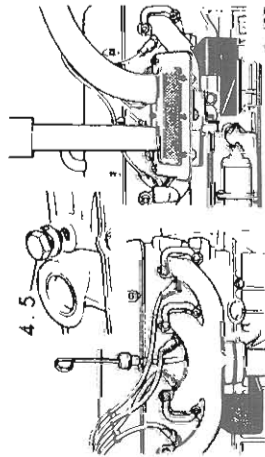
26—2



LR 435



LR 436



LR 437

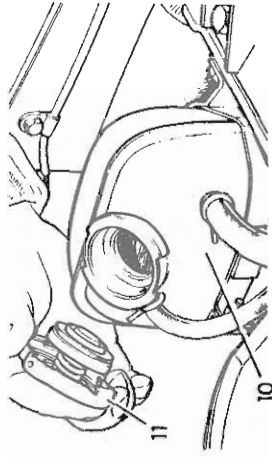
Use the correct anti-freeze mixture according to local climatic conditions, as follows:

Coolant system capacity	Frost precaution	Proportion of anti-freeze
9.66 litres	-16°C	4.83 litres
17 Imperial pints	(-11°F)	8.5 Imperial pints
20.4 U.S. pints	(-33°F)	10 U.S. pints

If frost precautions are not required, use 19cc of inhibitor per litre of water (3 fluid ounces of inhibitor per gallon of water).

Refilling

6. Pour 4½ litres (1 gallon) of water into the radiator.
7. Add the recommended quantity of anti-freeze or inhibitor.
8. Top-up radiator with water.
9. Fit the radiator filler plug and washer.
10. Add water to the expansion tank, up to half full.
11. Fit the expansion tank filler cap.
12. Run the engine until normal operating temperature is attained; that is, thermostat open.
13. Allow the engine to cool, then check the coolant level and top-up if necessary.



LR 438

EXPANSION TANK

— Remove and refit

26.15.01

Remounting

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

1. Remove the expansion tank filler cap by first turning it anti-clockwise a quarter of a turn to allow pressure to escape, then turn it further in the same direction and lift off.
2. Disconnect the hose to the radiator.
3. Disconnect the overflow pipe.
4. Remove the pinch bolt.
5. Lift out the expansion tank.

Refitting

6. Reverse instructions 2 to 5.
7. Replenish the cooling system, see 26.10.01.

26—3

FAN BELT

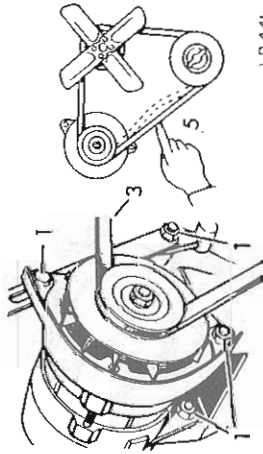
- Check and adjust tension 1 and 5 to 6 26.20.01
- Remove and refit 1 to 6 26.20.07

Removing

1. Slacken the alternator fixings.
2. Pivot the alternator inwards.
3. Lift off the fan belt.

Refitting

4. Locate the fan belt on the pulleys.
5. Using the alternator slotted fixing, adjust the fan belt tension to give 11 to 14 mm (0.437 to 0.562 in) free movement when checked midway between the alternator and crankshaft pulleys, by hand.
6. Secure the alternator fixings.



LR 441

FAN BLADES AND PULLEY

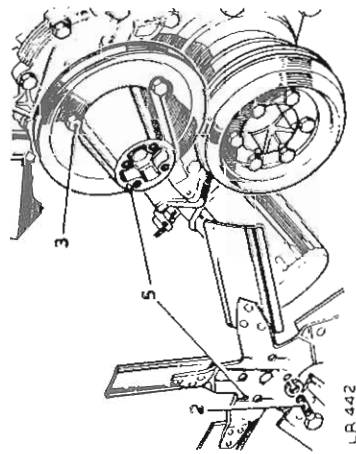
- Remove and refit 1 to 9 26.25.01
- See Operation 26.25.06.

FAN BLADES

- Remove and refit 1, 2 and 10 26.25.06

Removing

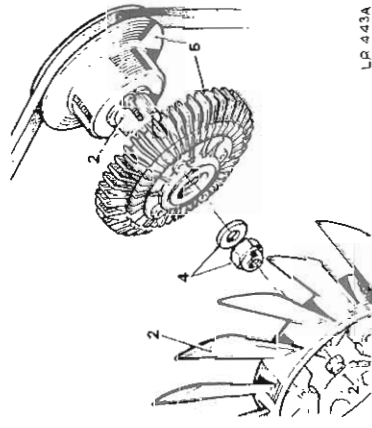
1. Release the fan cowl fixings and push the cowl towards the engine.
2. Remove the fan blades.
3. Standard type pulley: remove the pulley fixings.
4. Viscous coupling type pulley: remove the coupling fixings.
5. Slacken the alternator fixings, remove the fan belt and lift off the viscous coupling and/or the fan pulley.



LR 442

Refitting

6. Reverse instructions 1 to 5, noting the following.
7. Standard type pulley: an offset dowel location ensures that the fixing bolt holes only align when the blades are the correct way round.
8. Viscous coupling type pulley: fit the fan blades with the larger diameter fixing bosses to the front.
9. Adjust the fan belt, see 26.20.01.
10. Reverse instructions 1 and 2.



LP 443A

FAN COWL

- Remove and refit 26.25.11

Removing

1. Remove the fixings from the top of the fan cowl.
2. From inside the engine compartment remove the lower cowl fixings.
3. Remove the fan blades, see 26.25.06.
4. Lift out the fan cowl.

Refitting

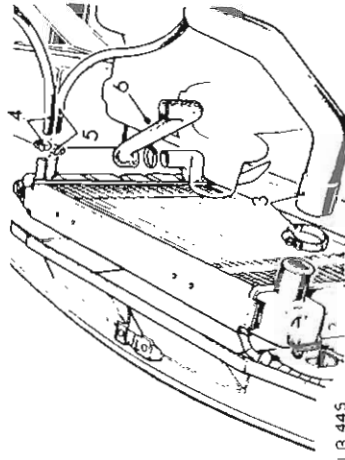
5. Reverse instructions 1 to 4.

RADIATOR BLOCK

- Remove and refit 26.40.04

Removing

1. Drain the cooling system, see 26.10.01.
2. Release the fan cowl fixings and push the cowl towards the engine.
3. Disconnect the top hose from the radiator.
4. Disconnect the hose to the expansion tank.
5. Disconnect the hose from the induction manifold.
6. Disconnect the hose from the bottom of the radiator.
7. Remove the fixings from the top of the radiator.
8. Withdraw the radiator from the rubber-mounted spigots.



LR 445

Refitting

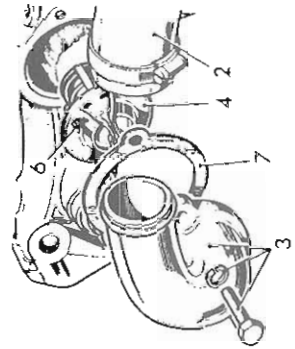
10. Reverse instructions 1 to 8.

THERMOSTAT

- Remove and refit 26.45.01

Removing

1. Drain the cooling system, see 26.10.01, sufficient to drain the induction manifold.
NOTE: If the engine is fitted with an air intake temperature control, release the air intake and move it to one side.
2. Disconnect the hose to the radiator.
3. Remove the outlet elbow and joint washer.
4. Withdraw the thermostat.



LR 446

continued

COOLING SYSTEM

Testing

- When immersed in hot water, the thermostat should commence opening between 78 to 83°C (173 to 182°F).

Refitting

- Insert the thermostat with the jiggle pin uppermost (12 o'clock).
- Using a new joint washer, fit the outlet elbow. Reverse instructions 1 to 2.

WATER PUMP

—Remove and refit **26.50.01**

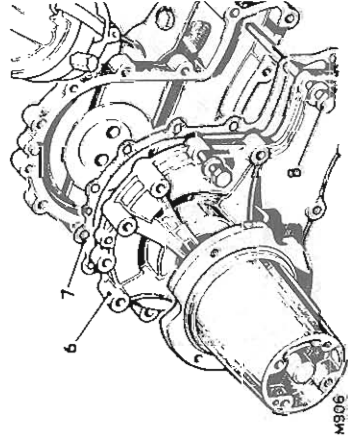
Removing

NOTE: This operation applies to engines fitted with the basic or viscous-type fan pulley, but only the basic type is illustrated.

- Drain the engine cooling system, see 26.10.01.
- Remove the fan belt, see 26.20.07.
- Remove the fan blades and pulley, see 26.25.01.
- Release the alternator adjusting link from the water pump.
- Disconnect the inlet hose from the water pump.
- Remove the water pump.

Refitting

- Lightly grease a new joint washer and place it in position on the timing cover.
- Clean the threads of the four long bolts and smear them with 3M-EC776 thread lubricant-sealant.
- Locate the water pump in position.
- Locate the alternator adjusting link on the water pump.
- Leave the alternator adjusting link loose and tighten the remaining water pump housing bolts gradually. Torque: $\frac{3}{4}$ in A.F. bolts, 0.8 to 1.0 kgf m (6 to 8 lbf ft). $\frac{1}{2}$ in A.F. bolts, 2.8 to 3.5 kgf m (20 to 25 lbf ft).
- Connect the inlet hose to the water pump.
- Fit the fan pulley.
- Fit and adjust the fan belt, see 26.20.07.
- Fit the fan blades, see 26.25.06.
- Refill the cooling system, see 26.10.01.



INDUCTION MANIFOLD

—Remove and refit **30.15.02**

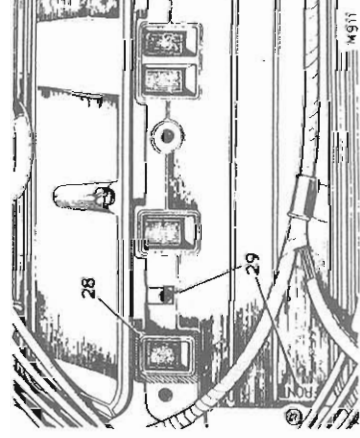
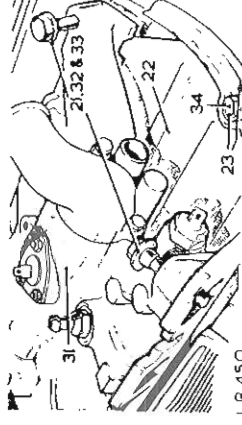
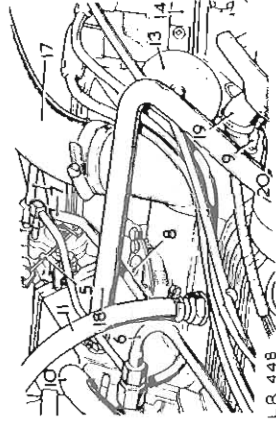
Removing

- Drain the cooling system, see 26.10.01.
- Remove the air cleaner, see 19.10.01.
- Remove the engine breather filter, see 17.10.02.
- Disconnect the throttle cable from the carburetter and manifold.
- Disconnect the choke cable from the carburetter.
- Disconnect the fuel spill return pipe from the R.H. carburetter.
- Remove the fuel supply pipe from the carburetters.
- Disconnect the lead from the choke thermostat switch and, where fitted, the E.G.R. valve connections.
- Disconnect the lead from the water temperature transmitter.
- Disconnect the flame trap hoses from the carburetters.
- Disconnect the vacuum pipe for the brake servo.
- Disconnect the vacuum pipe for the gearbox.
- Disconnect the vacuum pipe from the distributor.
- Release the distributor cap.
- Disconnect the inlet hose to the heater.
- Disconnect the return hose from the heater.
- Disconnect the return hose to the radiator.
- Disconnect the return hose from the top of the induction manifold.
- Disconnect the thermostat by-pass hose.
- Disconnect the heater return pipe from the manifold.
- Remove the induction manifold.
- Wipe away any coolant lying on the manifold gasket.
- Remove the gasket clamps.
- Lift off the gasket.
- Withdraw the gasket seals.

Refitting

- Using new seals, smear them on both sides with silicon grease.
- Locate the seals in position with their ends engaged in the notches formed between the cylinder head and block.
- Apply Hylomar[®] sealing compound SQ32M on the corners of the cylinder head, manifold gasket and manifold, around the water passage joints.
- Fit the manifold gasket with the word 'FRONT' to the front and the open bolt hole at the front R.H. side.
- Fit the gasket clamps but do not fully tighten the bolts at this stage.

continued



31. Locate the manifold onto the cylinder head.
32. Clean the threads of the manifold securing bolts and then coat them with thread lubricant-sealant 3M EC776.
33. Fit all the manifold bolts and tighten them a little at a time, evenly, alternate sides working from the centre to each end. Torque: 3.5 to 4.0 kgf m (25 to 30 lbf ft).
34. Tighten the gasket clamp bolts. Torque: 1.4 to 2.0 kgf m (10 to 15 lbf ft).
35. Reverse instructions 1 to 20.
36. Where fitted, reconnect the E.G.R. valve.
37. Run the engine and check for water leaks.

EXHAUST MANIFOLD

- Remove and refit
- | | |
|------------|----------|
| Left-hand | 30.15.10 |
| Right-hand | 30.15.11 |

Removing

1. Disconnect the front exhaust pipe from the manifold and (where fitted) remove the hot air box.
2. Tap back the bolt locking tabs and remove eight bolts with lock taps and washers (later models).
3. Remove the manifold.

Refitting

4. Ensure that the mating surfaces of the cylinder head and exhaust manifold are clean and smooth.
5. Coat the exhaust manifold (cylinder head mating faces) with Foliac J 166 or Moly Paul anti-seize compound.
Foliac J 166 is manufactured by Rocol Ltd., Rocol House, Swillington, Leeds, England.
Moly Paul is manufactured by K. S. Paul Products Ltd., Nobel Road, London N18.
6. Place the manifold in position on the cylinder head and fit the securing bolts, lockplates and plain washers. The plain washers are fitted between the manifold and lockplates.
7. Tighten the manifold bolts evenly to 1.4 to 2.0 kgf m (10 to 15 lbf ft).
8. Bend over the lockplate tabs.

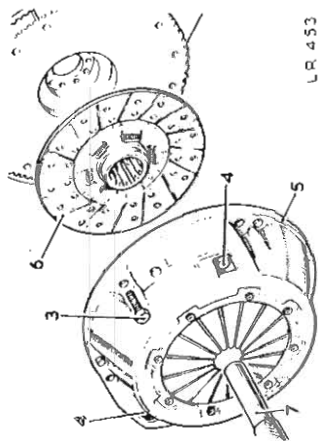
CLUTCH ASSEMBLY

— Remove and refit 33.10.01

Service tool: 18G 79 Clutch centralizing tool

Removing

1. Remove the engine, see 12.41.01.
2. Mark the clutch cover fitted position relative to the flywheel.
3. Where clutch cover fixing bolt heads vary obviously in thickness, note their fitted positions for reference during refitting.
4. Do not disturb the three bolts located in the apertures in the clutch cover.
5. Remove the clutch assembly.
6. Withdraw the clutch driven plate.



L.R. 453

Refitting

7. Reverse instructions 5 and 6, aligning the assembly marks, centralizing tool 18G 79.
8. Secure the cover fixings evenly, using diagonal selection. Torque load 4.9 to 5.0 kgf m (35 to 38 lbf ft). Fit the engine, see 12.41.01.
9. **NOTE:** As a precaution against the clutch plate sticking, lubricate the splines using Rocol MV 3 or Rocol MTS 1000 grease.

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 the 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, renew the clutch driven plate assembly complete or, alternatively, renew the friction linings following standard workshop practices.

DATA

Clutch driven plate diameter 267.0 mm (10.5 in).

HYDRAULIC SYSTEM

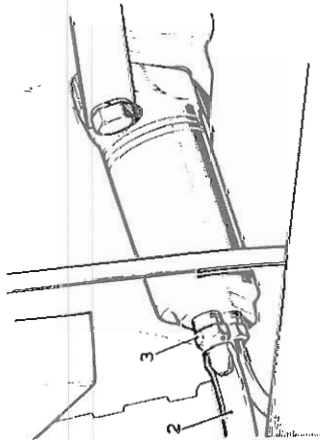
—Bleed

33.15.01

Procedure

NOTE: During the following procedure, keep the fluid reservoir topped-up to avoid introducing air into the system. Use only the recommended hydraulic fluid, refer to Group 09.

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.



LR 454

SLAVE CYLINDER

—Remove and refit

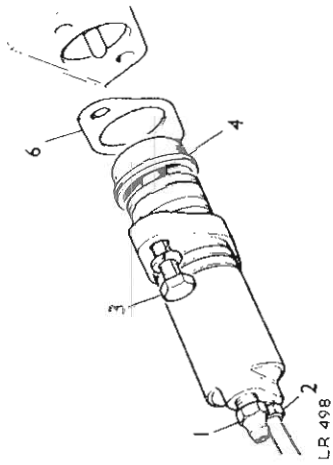
33.35.01

Removing

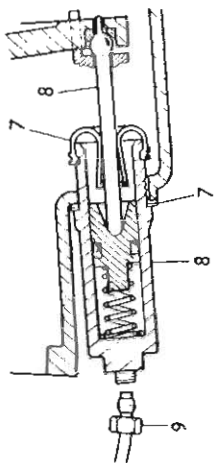
1. Evacuate the clutch system fluid at the slave cylinder bleed screw.
2. Disconnect the fluid pipe.
3. Remove the slave cylinder together with the backing plate.
4. If the dust cover is not withdrawn with the slave cylinder, withdraw it from the bell housing.

Refitting

5. Withdraw the dust cover and backing plate from the slave cylinder.
6. Coat both sides of the backing plate with a waterproof jointing compound, such as Hylomar PL 32M.
7. Locate the backing plate and dust cover in position on the slave cylinder.
8. Fit the slave cylinder, engaging the push-rod through the centre of the dust cover and with the bleed screw uppermost. Tightening torque for securing bolts: 2.75 kgf m (20 lbf ft).
9. Re-connect the fluid pipe.
10. Replenish and bleed the clutch hydraulic system, see 33.15.01.
11. Check for fluid leaks with the pedal depressed and with the system at rest.



LR 498



LR 501

RELEASE BEARING ASSEMBLY

—Remove and refit

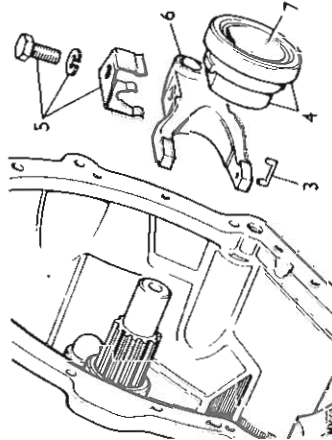
33.45.12

Removing

1. Remove the engine, see 12.41.01.
2. Remove the clutch slave cylinder, see 33.35.01.
3. Withdraw the retainer staple.
4. Withdraw the bearing and sleeve. If required, press the bearing off the sleeve. Fit the replacement bearing with the domed face outwards from sleeve.
5. Remove the spring clip and fixings.
6. Withdraw the release lever assembly.

Refitting

7. Reverse instructions 1 to 6. Lubricate the bearing sleeve inner diameter with a thin film of molybdenum disulphide base grease.



Dismantling

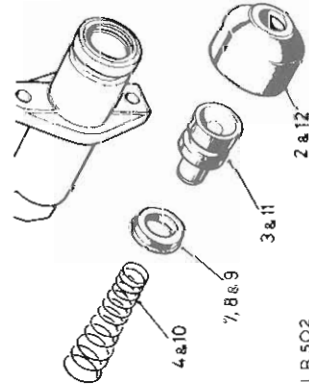
1. Remove the slave cylinder, 33.35.01.
2. Withdraw the dust cover.
3. Expel the piston assembly, applying low pressure air to the fluid inlet.
4. Withdraw the spring.

Inspecting

5. Clean all components in clean clutch 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.

Reassembling

8. Smear the seal and internal items with clean 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 clean clutch fluid and insert the assembly, spring end first, into the cylinder.
12. Smear the inside of the dust cover with clean clutch fluid and fit the cover to the cylinder.
13. Refit the slave cylinder, see 33.35.01.



L.R. 502

FAULT DIAGNOSIS—MAIN GEARBOX

SYMPTOM	POSSIBLE CAUSE	CURE
Gearbox noisy in neutral	Insufficient oil in gearbox Incorrect grade of oil Primary pinion bearing worn Constant mesh gears worn Layshaft bearings worn	Top-up as necessary Drain and replenish Renew bearing Renew primary pinion and layshaft Renew bearings
Gearbox noisy in all gears except top	Layshaft, mainshaft or primary pinion bearing worn	Renew bearings
Gearbox noisy in one gear only	Constant mesh gears worn	Renew primary pinion and layshaft
Gearbox noisy in all gears	Worn or damaged gears or bearings Worn bearings on primary pinion, mainshaft or layshaft	Renew gears and/or bearings Renew bearings
Oil leaks from gearbox	Gearbox over-filled with lubricating oil Loose or damaged drain or level plugs Obstructed breather Joint washers damaged, incorrectly fitted or missing Oil seals damaged or incorrectly fitted	Rectify oil level with vehicle standing on level floor Tighten plugs. If damaged, fit new plugs and joint washer as required Clean breather Fit new joint washer with general purpose grease smeared on both sides Fit new oil seal with Hylomar SQ 32M sealing compound smeared on the outside diameter
Difficulty in engaging forward gears	Cracked or broken gearbox castings Weak springs or worn parts in synchronising units Worn selector forks and/or interlock pins	Fit new castings Renew faulty parts Renew components as necessary
Difficulty in disengaging reverse gear	Faulty clutch operation, clutch fluid leakage Reverse gear bearings worn or damaged	Check clutch master and slave cylinders. Renew clutch components as necessary Renew bearings and shaft as necessary
Difficulty in disengaging forward gears	Faulty clutch operation, clutch fluid leakage Synchronised cones worn, damaged gear dogs	Check clutch master and slave cylinders. Renew clutch components as necessary Renew faulty parts
Difficulty in disengaging reverse gear	Distorted or damaged splines Reverse gear seized on shaft	Renew components as necessary Renew parts as necessary
Gear lever going into reverse incorrectly and not into first	Weak reverse stop bunge plate spring	Renew the spring

FAULT DIAGNOSIS--TRANSFER GEARBOX

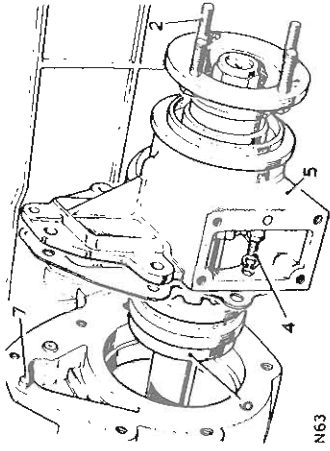
SYMPTOM	POSSIBLE CAUSE	CURE
Transfer of oil between main gearbox and transfer gearbox	Faulty 'O' ring seal on reverse idler shaft	Renew seal
	Faulty mainshaft oil seal	Renew seal
Oil leakage from gearbox to bell housing	Obstructed main gearbox breather	Clean breather
	Faulty joint washer(s) on gearbox front cover and oil pump	Renew joint washer(s)
	Faulty oil seal, primary pinion to front cover	Renew oil seal
	Damaged or porous gearbox front cover	Renew front cover
	Insufficient oil in transfer box	Replenish
Transfer gearbox noisy	Incorrect grade of lubricating oil	Drain and replenish with the correct grade oil. Refer to Recommended Lubricants, Group 09
	Excessive end-float on intermediate gears assembly	Adjust as required.
	Worn components in gearbox differential unit	Renew components
	Worn bearings in intermediate gears assembly	Renew bearings
Differential lock warning switch bulb fails to light up	Switch bulb failure	Renew bulb
	Air leakage in vacuum circuit	Renew leaking components
	Actuator housing not seated square on front output shaft housing	Shacken fittings, reset housing, hold in position and tighten fittings

FRONT OUTPUT SHAFT AND HOUSING

—Remove and refit 37.10.05

Removing

1. Remove the front floor, see 76.10.12.
2. Drain off the transfer gearbox oil. See 'MAINTENANCE', Group 10.
3. Disconnect the front propeller shaft at the gearbox, see 37.29.19.
4. Remove the six fixings.
5. Withdraw the output shaft and housing complete.
6. Lift out the lock-up dog clutch.



N63

Refitting

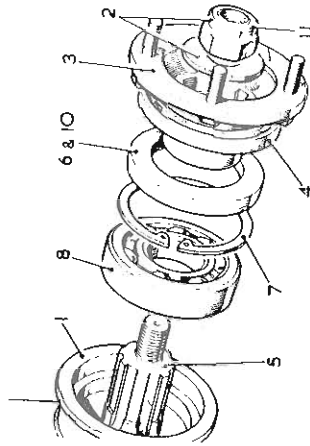
7. Reverse instructions 1 to 6; note that the housing is dowel located. Refit the front floor, see 76.10.12.

FRONT OUTPUT SHAFT AND HOUSING

—Overhaul 37.10.06

Dismantling

1. Remove the front output shaft and housing, see 37.10.05.
2. Remove the locking nut and washer.
3. Withdraw the coupling flange complete with mudshield.
4. If required, press off the mudshield.
5. Press out the shaft toward the rear.
6. Withdraw the oil seal.
7. Remove the circlip.
8. Withdraw the output shaft bearing.



N111

Reassembling

9. Reverse instructions 7 and 8.
10. Fit the oil seal, with the open side toward the bearing.
11. Reverse instructions 2 to 5. Torque loading for locking nut is 11.75 kgf m (85 lbf ft).
12. Refit the front output shaft and housing, see 37.10.05.

BELL HOUSING

—Remove and refit

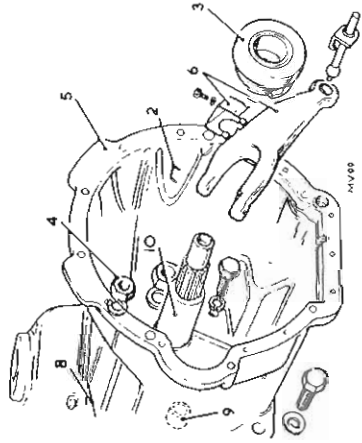
37.12.07

Removing

1. Remove the gearbox, see 37.20.01
2. Withdraw the locating staple from the clutch release sleeve and release lever.
3. Lift out the release sleeve and bearing assembly.
4. Remove the bell housing fixings.
5. Withdraw the bell housing complete with clutch release lever.
6. If required, remove the push rod clip and the spring clip and withdraw the clutch release lever.

Refitting

7. If removed, refit the clutch release lever and spring clip.
8. Apply a thin film of Hylomar PL 32M or other suitable jointing compound around the three selector shaft holes in the bell housing rear face.
9. Fit the bell housing, locating on the dowels.
10. Apply a thin film of molybdenum disulphide grease on to the front cover extension sleeve.
11. Reverse instructions 1 to 3.



BEARING PLATE ASSEMBLY

—Remove and refit

37.12.22

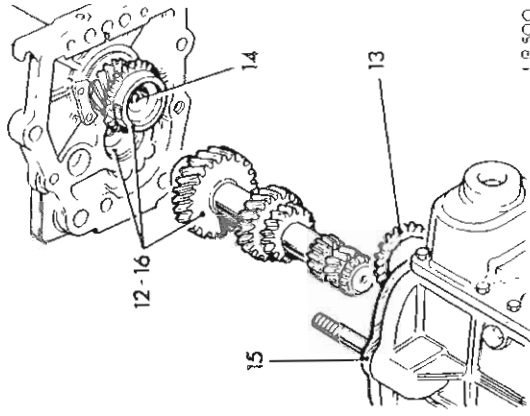
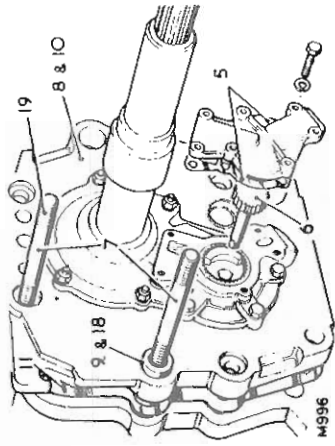
Removing

1. Drain the gearbox oil.
2. Remove the gearbox, see 37.20.01.
3. Remove the bell housing, see 37.12.07.
4. Position the gearbox with the front end uppermost.
5. Remove the oil pump gears cover and joint washer.
6. Withdraw the oil pump drive gear.
7. Temporarily remove the four fixing studs from the gearbox front face.
8. Ease the bearing plate away from the gearbox.
9. Withdraw the two dowel sleeves which locate the bearing plate.
10. Withdraw the bearing plate assembly complete with primary pinion and layshaft.
11. Withdraw the joint washer.
12. Withdraw the layshaft.

Refitting

NOTE: To replace a bearing plate, a bearing plate and gearbox casing mated assembly must be fitted.

13. Locate the cone into the third/fourth-speed synchromesh unit.
14. Lubricate the oil tube, using clean gearbox oil.
15. Position the joint washer.
16. Engage the layshaft with the primary pinion and front bearing outer member.
17. Fit the bearing plate and layshaft.
18. Align the bearing plate with the gearbox casing and slide home the dowel sleeves.
19. Refit the studs. Smear Loctite Studlock grade CVX, Rover Part No. 601168, on the two upper stud securing threads before fitting.
20. Reverse instructions 1 to 6.



FRONT COVER AND OIL PUMP ASSEMBLY

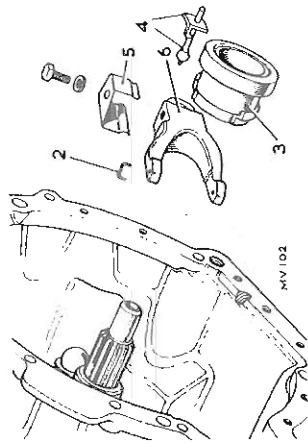
—Remove and refit 37.12.34
 Service tools: RO 1005 centralizing tool for primary pinion

Removing

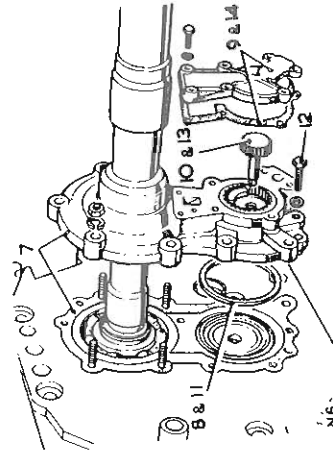
1. Remove the gearbox, see 37.20.01.
2. Lift out the retainer staple from the clutch release bearing assembly and the release lever.
3. Withdraw the release bearing assembly.
4. Remove the slave cylinder push-rod.
5. Remove the spring clip.
6. Withdraw the clutch release lever.
7. Remove the front cover assembly, complete with oil pump, and joint washer.
8. Remove the shim washer located between the front cover and the layshaft front bearing.

Refitting

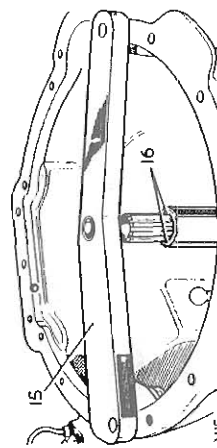
9. Remove the oil pump cover.
10. Withdraw the oil pump drive gear.
11. Position the layshaft bearing shim washer.
12. Position the front cover assembly and loosely fit the fixings.
13. Fit the oil pump drive gear to engage the drive square in the layshaft.
14. Fit the oil pump cover and joint washer.
15. Fit the gauge RO 1005 to align the primary pinion with the bell housing.
16. Visually check that the front cover is concentric about the primary pinion. Adjust the front cover position about its fixings to suit.
17. When satisfactory, tighten the front cover fixings.
18. Reverse instructions 1 to 6.



NAV 104



N6



N15

FRONT COVER AND OIL PUMP ASSEMBLY

—Overhaul 37.12.37
 Service tools: 18G 134 guide and 18G 134 DG adaptor—assembly tool for fitting oil seal and oil feed ring

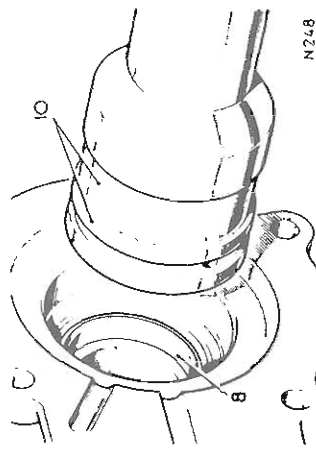
Dismantling

1. Remove the front cover and oil pump, see 37.12.34.
2. Remove the pump cover and gasket.
3. Withdraw the pump gears.
4. Remove the oil feed ring.
5. Withdraw the oil seal.
6. Remove the plug and withdraw the ball and spring from the relief valve housing.
7. If required, drift off the extension sleeve. Fit a replacement using Loctite 'AVV' grade, Rover Part No. 600303.

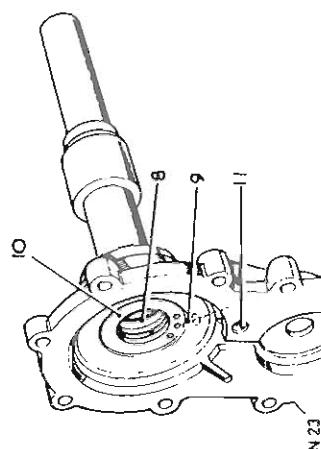
M999

Reassembling

8. Press in the oil seal, plain face first, using 18G 134 guide and 18G 134 DG adaptor.
9. Align the centre hole of three in the oil feed ring with the oil delivery hole in the front cover.
10. Press in the oil feed ring, using 18G 134 guide and 18G 134 DG adaptor.
11. Fit the ball, spring and plug. When fitted, the plug must be flush with, or not more than, 0.25 mm (0.010 in) below the front cover rear face.
12. Fit the oil pump ring gear.
13. Fit the front cover and oil pump, see 37.12.34. During this operation the pump drive gear, cover and joint washer are fitted.



N248



N23

GEAR-CHANGE SELECTORS, MAIN GEARBOX

—Remove and refit 37,16,31

Removing

1. Remove the gearbox, see 37.20.01.
2. Remove the bell housing, see 37.12.07.
3. Select neutral, remove the reverse light switch and remove the gearbox top cover and joint washer.
4. Lift out the detent springs.
5. Withdraw the detent balls, using a small magnet or an air blast.
6. Slacken the pinch bolt securing the reverse selector finger.
7. Drive out the four retaining pins until the shafts are free in the selectors.
8. Tap out the selector shafts.
9. Withdraw the selector jaws and forks.
10. Withdraw the two interlock plungers from the cross-drilling.
11. Remove the lock-wired pivot bolt.
12. Lift out the reverse cross-over lever.

Refitting

NOTE: During refitting, ensure that the retaining pins are an interference fit. Fit new pins as necessary.

13. Withdraw the retaining pins from the selector jaws.
14. Position the reverse cross-over lever in the gearbox and locate the lever foot in the groove in the reverse idler gear.
15. Fit the pivot bolt and engage the cross-over lever tapping. Apply Loctite Studlock grade CVX, Rover Part No. 601168, to the bolt threads before screwing fully in. The Loctite must not enter the casing or run on the exposed bolt threads.
16. Locate the first/second gear selector fork in the groove in the outer member, with the boss on the fork to the rear. Position the boss to the R.H. side of the box.
17. Locate the third/fourth gear selector fork in the groove in the outer member. Position the fork with the retaining pin entry hole at the top R.H. side.
18. Fit the third/fourth gear selector shaft and interlock pin assembly and secure to the selector fork with a retaining pin.
19. Fit the two interlock pins to engage in the grooves each side of the third/fourth gear selector shaft.
20. Position the reverse stop hinge-plate and selector jaw in the gearbox, adjacent to the third/fourth gear selector jaw.
21. Fit the reverse gear selector shaft and engage the selector jaw and hinge spring.
22. Push the shaft, home and engage the reverse cross-over lever selector finger. Do not secure the pinch bolt at this stage.

continued

37—8

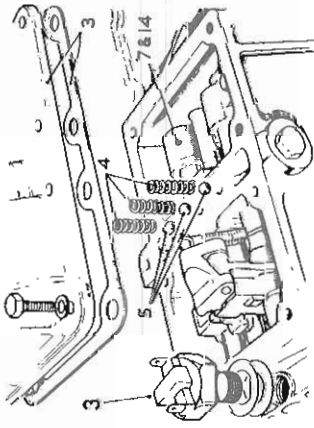
23. Secure the reverse gear selector jaw to the shaft with a retaining pin.
24. Position the first/second gear selector jaw in the gearbox.
25. Fit the first/second gear selector shaft; engage the selector jaw and selector fork as the shaft is pushed home.
26. Fit the retaining pins, fitting the rear pin first.
27. Move the reverse shaft forward until the selector jaw abuts the casing.
28. Holding the reverse shaft as described in the previous item, move the reverse selector finger forward on the shaft until it abuts the casing, then move it rearward until it is just clear of the casing.
29. Place a 0.25 mm (0.010 in) feeler gauge between the upper edges of the reverse and third/fourth selector jaws.

NOTE: The edges of the selector jaws taper slightly, therefore, it is important that the feeler gauge is positioned between the upper edges.

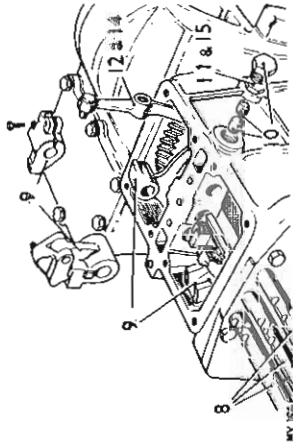
30. Hold the reverse and third/fourth selector jaws together to retain the feeler gauge, then rotate the reverse selector finger until it abuts the third/fourth selector shaft and tighten the pinch bolt.
31. Check the operation of the reverse gear selectors assembly. Ensure there is clearance between the cross-over lever and selector finger sufficient to prevent fouling during operation. If necessary, the 0.25 mm (0.010 in) clearance obtained in instruction 30 can be increased up to 0.5 mm (0.020 in) to produce a smooth gear-change.
32. Wire lock the cross-over lever pivot bolt.
33. When fitting the hinge spring to the reverse stop hinge, first engage the large book around the selector shaft, as illustrated, before fitting the small book to the reverse stop hinge pin.

NOTE: A stronger spring, identified by a yellow paint mark, has been introduced to prevent the reverse selector detent ball sticking. The stronger spring can be fitted in place of the original on earlier gearboxes.

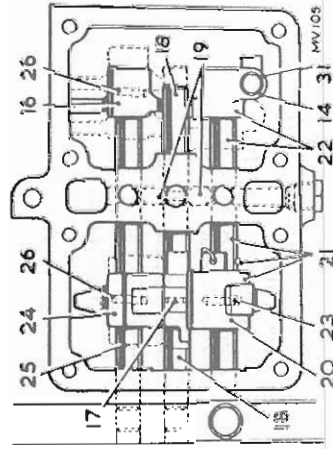
34. Reverse instructions 1 to 5.



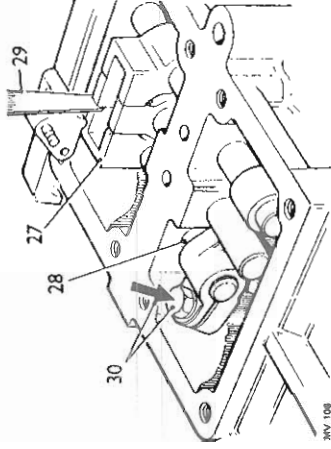
LR 506



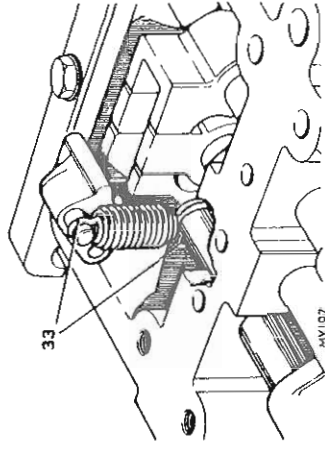
MV 105



MV 105



MV 108



MV 107

GEARBOX ASSEMBLY

—Remove and refit 37.20.01

The following procedure describes removing the gearbox from beneath the vehicle. The gearbox assembly is heavy and it is essential that a suitable cradle and lifting gear is used.

Removing**From inside the vehicle:**

1. Disconnect the battery earth lead.
2. Remove the carpet and grommets to expose the gear-lever fixings, remove the fixing bolts and lift out the gear-lever.
3. Remove the centre panel from the seat base.
4. Ensure that the handbrake is off.

From under the bonnet:

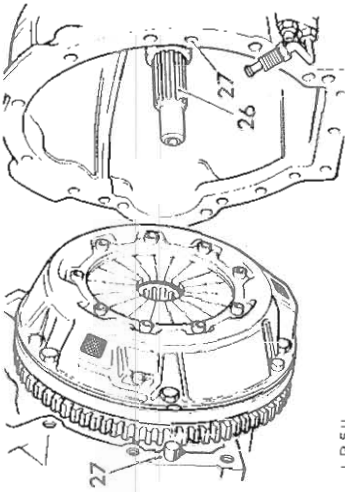
5. Where necessary, remove the air cleaner to give access to the bell housing top fixings.
6. Disconnect the 'P' clip and release the gearbox breather pipes.
7. Remove all accessible bell housing bolts and displace the speedometer cable and clutch pipes on their respective brackets.

From beneath the vehicle (raised on a hydraulic lift):

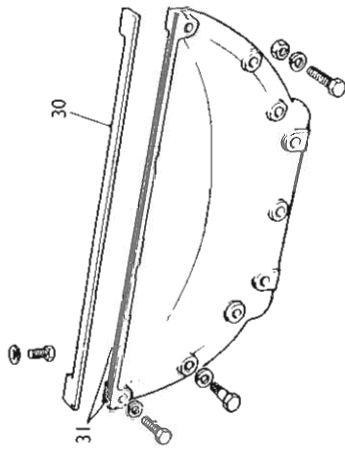
8. If required, drain the lubricating oil from the main and transfer gearboxes.
9. Remove the four bolts and withdraw the detachable cross-member from the chassis.
10. Remove both front exhaust pipes and the branch pipe.
11. Disconnect the rear propeller shaft from the gearbox and displace to one side.
12. Disconnect the front propeller shaft from the gearbox and displace to one side.
13. Remove the clamp bolt and 'P' clip and disconnect the speedometer cable from the gearbox.
14. Disconnect the handbrake cable at the transmission brake clevis pin, 'P' clip and remove the bolts securing the adjuster bracket to the gearbox.
15. Remove the clamp bolt and disconnect the transfer gear-lever linkage.
16. Remove the two bolts and displace the clutch slave cylinder clear of the gearbox.
17. Remove the cover-plate from the front of the bell housing.
18. Place a suitable cradle and hydraulic lift under the gearbox.
19. Remove the three bolts securing each gearbox mounting to the chassis.
20. Disconnect the electrical leads from the gearbox differential actuator.
21. Disconnect the vacuum pipes from the gearbox differential actuator.
22. Check and release any remaining pipes, cables, wires.
23. Remove all remaining bell housing bolts.
24. Support the engine sump on a jack or stand.
25. Push the gearbox rearward to disengage it from the engine, then lower the gearbox and move it clear.

Refitting

26. 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. Smear the engine to gearbox joint flanges with Unipart Universal jointing compound.
27. Mount the gearbox on a suitable cradle and lift and raise the gearbox into position, locating the primary pinion into the clutch and engage the bell housing dowels.
28. Secure the bell housing to the engine. Torque: 3.5 kgf m (25 lbf ft).
29. Reverse instructions 18 to 24.
30. If necessary, fit a new seal to the bell housing cover plate, using a cement such as Holdite 88.
31. Apply Unipart Universal jointing compound to the cover plate and seal, for the joints between the bell housing, cylinder block and rear main bearing cap. Torque: 1.0 kgf m (8 lbf ft).
33. Reverse instructions 1 to 16.
34. Check the oil level in the main and transfer gearboxes and replenish as necessary.



LR 511



MV 97

continued

REVERSE IDLER GEAR AND SHAFT

— Remove and refit 37.20.13

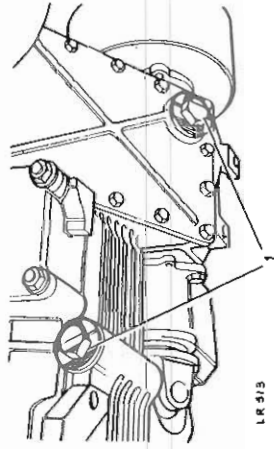
Service tool: 18G 1335 extractor for reverse shaft

Removing

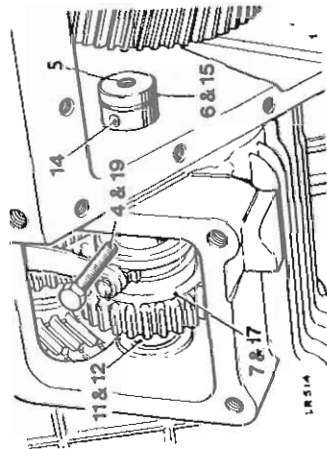
1. Drain the main and transfer gearbox oils.
2. Remove the gearbox side cover.
3. Remove the gearbox bottom cover.
4. Remove the bolt securing the idler gear shaft in the gearbox casing.
5. Withdraw the idler gear shaft, utilizing extractor 18G 1335.
6. Remove the 'O' ring seal.
7. Lift out the reverse idler gear assembly.
8. Remove the circlip and plain washer.
9. Lift out the needle roller bearings and further plain washer.
10. Withdraw the remaining circlip.
11. If required, withdraw the shaft support bush.

Refitting

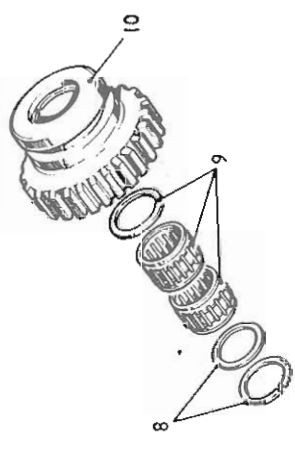
12. If removed, fit the shaft support bush, using Loctite primer grade 'T' and 'AVV' grade.
13. Reverse instructions 6 to 11.
14. Offer the idler shaft to the gearbox and align the retaining bolt holes.
15. Smear clean gearbox oil onto the 'O' ring seal.
16. Position the reverse idler assembly in the casing.
17. Engage the selector foot in the idler gear groove.
18. Drive in the idler gear shaft until the retaining bolt holes are aligned.
19. Before fitting the retaining bolt, treat the threads with Loctite primer grade 'T' and allow to dry. Then, fit the bolt using Loctite Studlock grade.
20. Reverse instructions 1 to 3.



1 R 513



1 R 514



MV 110

PRIMARY PINION

— Remove and refit 37.20.16

Removing

1. Drain the gearbox.
2. Remove the gearbox, see 37.20.01.
3. Remove the bell housing, see 37.12.07.
4. Remove the front cover and oil pump assembly, see 37.12.34.
5. Remove the bearing plate assembly, 37.12.22.
6. Remove the circlip.
7. Lift off the shim washer.
8. Press out the primary pinion.
9. Withdraw the bearing retaining plates and serrated bolts.
10. Press out the primary pinion bearing.

Refitting

11. Check that the orifice drilled in the oil tube is clear. During refitting, take care to avoid damage to the oil tube. Rotate the shaft in the bearing to ensure that the oil tube is straight.
12. Support the bearing plate using suitable wooden blocks. Position the blocks across the bearing housing aperture to act as assembly stops.
13. Press in the bearing until flush with the bearing plate.
14. Press in the primary pinion. Check that the bearing remains flush with the bearing plate.
15. Fit the retaining plates and serrated bolts.
16. Fit the shim washer and circlip.
17. Measure the clearance between the circlip and the shim washer. There must be a clearance of 0,05 mm (0,002 in) maximum.
18. If required, adjust the clearance by fitting a replacement shim washer. Shim range is 2,0 to 2,15 mm (0,079 to 0,085 in) in 0,05 mm (0,002 in) stages.
19. Reverse instructions 1 to 5.

DATA

End-float, primary pinion to bearing 0,05 mm (0,002 in) maximum

LAYSHAFT

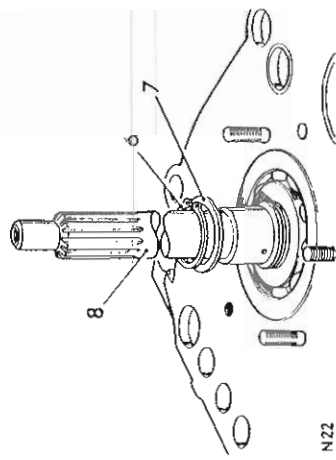
— Remove and refit 37.20.19

Removing

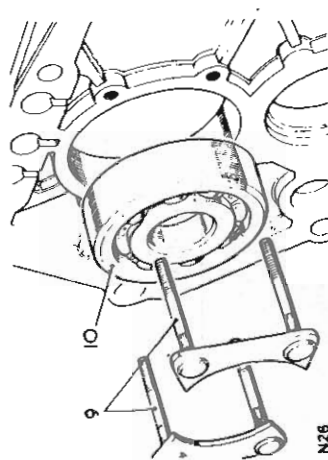
1. Remove the bearing plate assembly, see 37.12.22.
2. Withdraw the layshaft.

Refitting

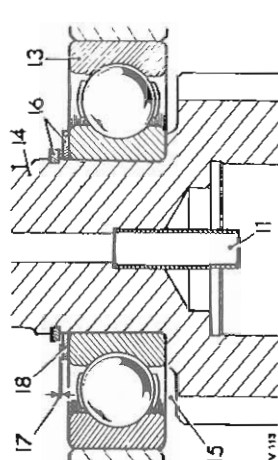
3. Reverse instructions 1 and 2.



N22



N26



MV 113

GEARBOX

LAYSHAFT BEARINGS

— Remove and refit 37.20.22

Service tools: RO 1004 extractor for mainshaft spacer; 18G 284 extractor and 18G 284 AR adaptor, extractor; layshaft rear bearing outer member; 18G 47 press and 18G 47 BA collars, extractor for layshaft bearing inner members

Removing

1. Drain the gearbox.
2. Remove the gearbox, 37.20.01.
3. Remove the bell housing, see 37.12.07.
4. Remove the front cover and oil pump assembly, see 37.12.34.
5. Remove the main gears selectors, see 37.16.31.
6. Remove the front bearing plate assembly, see 37.12.22.
7. Remove the mainshaft assembly, see 37.20.25.
8. Press out the layshaft front bearing outer member from the front bearing plate.
9. Extract the layshaft rear bearing outer member from the gearbox casing, extractor 18G 284 and adaptor 18G 284 AR.
10. Withdraw the bearing inner members from the layshaft. Extractor 18G 47 press and 18G 47 BA collars.

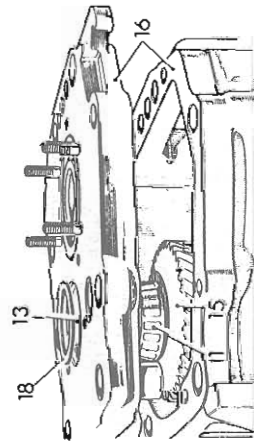
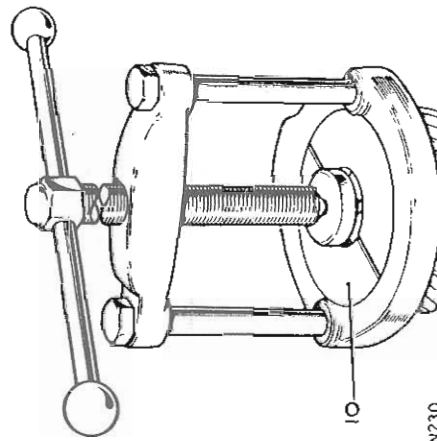
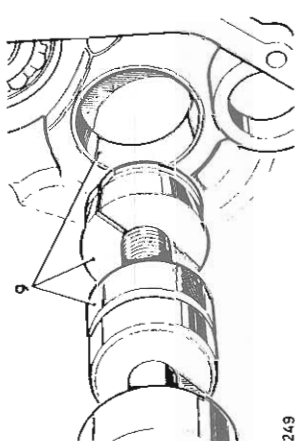
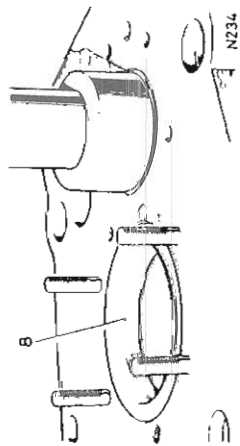
Checking the bearing pre-load

Replacement bearings inner and outer members are supplied as matched pairs and not as separate items.

The replacement bearings must not be degreased. Before fitting, lubricate with correct grade gearbox oil. Refer to Group 09.

11. Press the bearing inner members onto the layshaft.
12. Press the rear bearing outer member into the gearbox casing.
13. Enter the front bearing outer member into the front bearing plate. Do not fit fully in at this stage.
14. Remove the primary pinion from the bearing plate, see 37.20.16.
15. Position the layshaft in the gearbox casing.
16. Temporarily fit the front bearing plate and joint washer.
17. Press in the front bearing outer member until there is no end-float on the layshaft and no end-load on the bearings.
18. On the bearing outer member position a shim washer of a thickness suitable to stand 0.25 mm (0.010 in) approximately proud of the front bearing plate. This shim thickness may be subsequently adjusted depending on the amount of bearing pre-load it affords.

continued



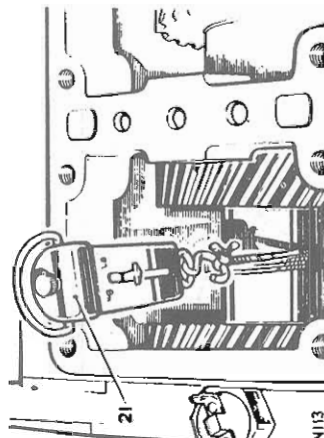
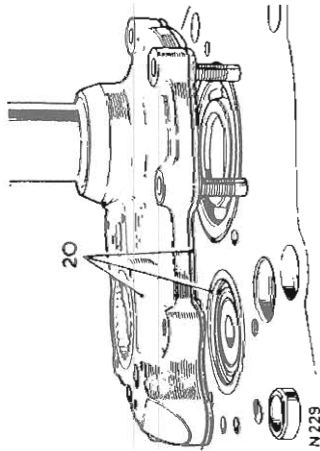
19. Temporarily remove the oil pump top cover and withdraw the pump drive gear.
20. Temporarily fit the front cover and new joint washer to the bearing plate. Ensure that the shim washer remains in position.
21. Measure the rolling resistance of the layshaft, using a spring balance and a cord coiled around the layshaft larger diameter.
22. The rolling resistance must be 7 to 10 kgf (6 to 8.5 lbf).
23. To adjust the pre-load, fit a replacement shim of suitable thickness to the front bearing outer member. Shim range is from 1.55 mm (0.059 in) to 2.50 mm (0.098 in) in 0.05 mm (0.002 in) increments.
24. When the pre-load is satisfactory, remove the front cover assembly.
25. Remove the front bearing plate.
26. Fit the primary pinion, see 37.20.16.
27. Fit the oil pump cover and drive gear.

Refitting

28. Reverse 1 to 6.

DATA

Layshaft rolling resistance 7 to 10 kgf (6 to 8.5 lbf)



MAINSHAFT ASSEMBLY

—Remove and refit 37.20.25

Service tool: RO 1004, extractor for mainshaft spacer

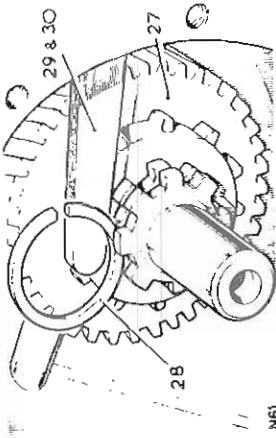
Removing

1. Drain the gearbox.
2. Remove the gearbox, see 37.20.01.
3. Remove the bell housing, see 37.12.07.
4. Remove the front bearing plate, see 37.12.22.
5. Remove the main gearchange selectors, see 37.16.31.
6. Remove the mainshaft rear bearing housing and roller bearing.
7. Remove the bottom cover from the transfer gearbox.
8. Remove the snap-ring, shim washer and mainshaft transfer gear.
9. Fit extractor RO 1004 to transfer gear spacer.
10. Withdraw the spacer along the mainshaft until the larger diameter on the spacer reaches the transfer gear lever cross-shaft.
11. Alternately tap the mainshaft forward and withdraw the spacer.
12. When the spacer is free on the mainshaft remove the extractor.
13. Withdraw the mainshaft assembly, allowing the first-speed gear to remain behind to avoid fouling on the casing.
14. Lift out the first-speed gear.
15. Refit the first-speed gear, scalloped thrust washer, thrust needle bearing and stepped thrust washer, stepped face outwards.
16. Withdraw the mainshaft spacer.

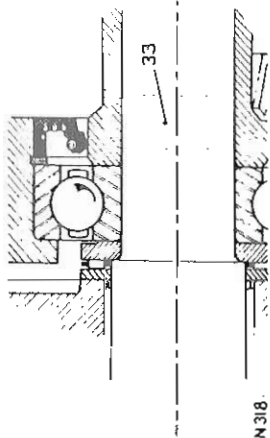
Refitting

17. Position the gearbox with the R. H. side downwards to aid refitting.
18. Remove the gear-box side cover.
19. Temporarily move the first-speed gear toward the rear of the shaft.
20. Offer the assembled mainshaft to the gearbox and manoeuvre the first-speed gear past the reverse idler gear.
21. Engage the shaft into the main bearing.
22. Engage the first/second gear synchromesh outer member and the reverse idler gear.
23. Push the mainshaft home sufficient to allow the mainshaft spacer to be located on the rear end, with the spacer larger diameter forward of the transfer gear lever cross-shaft.
24. Re-position the first-speed gear, thrust washers and thrust needle bearing correctly on the mainshaft.
25. Push the mainshaft fully home, ensuring that the thrust washers and needle bearing remain correctly located against the first-speed gear.

continued



N61



N318

26. Move the mainshaft spacer along the shaft, and into the oil seal, to abut the main bearing.
27. Temporarily fit the mainshaft transfer gear.
28. Position the snap-ring in the groove in the mainshaft.
29. Hold the mainshaft fully to the rear and measure the clearance between the snap-ring and the transfer gear.
30. Select a shim washer to allow 0,050 mm (0,002 in) max. clearance between the snap-ring and transfer gear when fitted. Shim range 1,8 to 2,0 mm (0,071 to 0,079 in) in 0,05 mm (0,002 in) increments.
31. Temporarily remove the snap-ring and the mainshaft transfer gear.
32. Slide back the mainshaft spacer as far as the transfer gear lever cross-shaft will allow.
33. Apply a thin coating of Loctite AVV grade, Rover Part No. 600303, to the exposed area of the mainshaft.
34. Push home the mainshaft spacer.
35. Fit the mainshaft transfer gear.
36. Fit the previously selected shim washer and secure with the snap-ring.
37. Reverse instructions 1 to 7.

DATA

Transfer gear end-float 0,05 mm (0,002 in) max.

MAINSHAFT TRANSFER GEAR

—Remove and refit 37.20.28

Removing

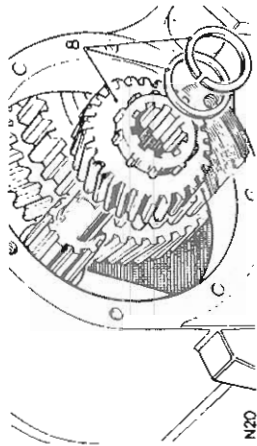
1. Remove the mainshaft rear bearing housing.
2. Lift out the roller bearing.
3. Remove the snap-ring.
4. Withdraw the shim washer.
5. Lift out the transfer gear.

Refitting

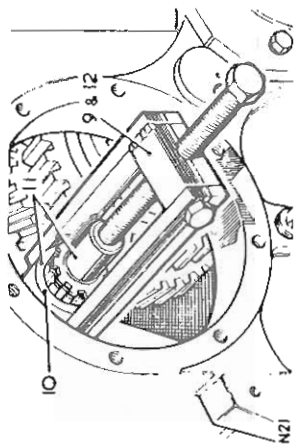
6. Fit the transfer gear to the mainshaft.
7. Fit the shim washer and snap-ring.
8. Check the end-float between the shim washer and snap-ring. End-float to be 0,050 mm (0,002 in) max. Shim washer range 1,8 to 2,0 mm (0,071 to 0,079 in) in 0,05 mm (0,002 in) stages.
9. Fit the roller bearing and rear bearing housing.

DATA

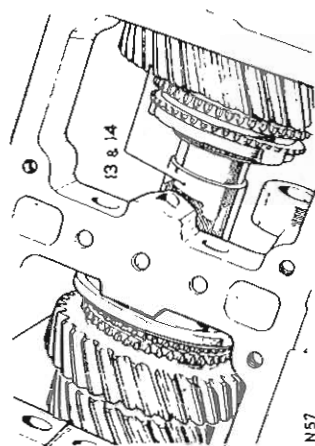
Transfer gear end-float 0,05 mm (0,002 in) max.



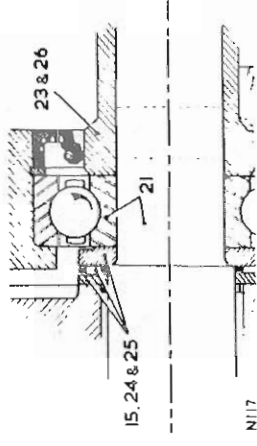
N20



N21



N57



N117

MAINSHAFT ASSEMBLY

—Overhaul 37.20.31

1. Remove the mainshaft assembly, see 37.20.25.
- Dismantling**
2. Withdraw the first-speed gear, thrust washers and roller bearings from the rear of the shaft.
 3. Remove the snap-ring and shim washer from the front of the shaft.
 4. Lift off the third/fourth gears synchronesh assembly.
 5. Withdraw the third and second-speed gears and the associated thrust washers and needle-roller bearings.
 6. Dismantle the third/fourth gears synchronesh assembly, first pushing down the sliding blocks to free the synchronesh balls from the retaining groove in the outer member.
 7. Dismantle the first/second gears synchronesh assembly in a similar manner, particularly noting their position for refitting.
 8. Withdraw the oil seal from the bore in the mainshaft front end.

Assembling

9. Replacement thrust washers and roller bearings must not be degreased.
10. Lubricate all items before assembly, using clean main gearbox oil. Group 09 refers.
11. Fit the oil seal to the mainshaft front end.

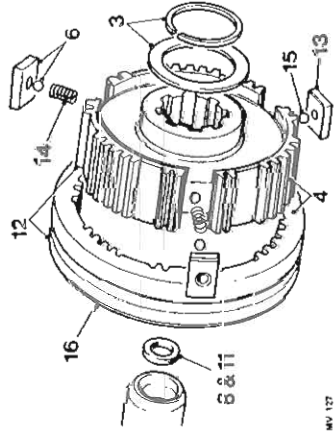
Assembling the synchronesh units

12. Fit together the third/fourth gear synchronesh outer and inner members, outer member coned face toward inner member plain face.
13. Fit the sliding blocks, radiused face outward.
14. Locate the springs through the sliding blocks into the housing bores in the inner member.
15. Position the balls on the spring ends; press home in sequence and retain by hand.
16. Lift the outer member to retain the balls. Continue lifting until the balls spring home into the annular groove in the outer member.
17. Assemble the first/second gear synchronesh unit in the manner described for third/fourth gear unit. Fit the outer member coned face toward the front end of the mainshaft.

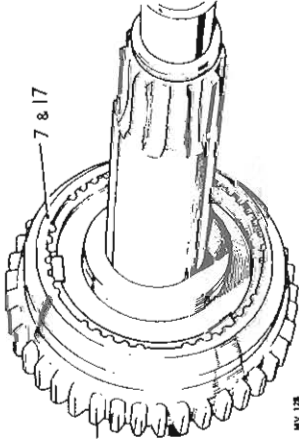
Assembling the mainshaft front end

18. Fit a synchronesh cone to the first/second gear synchronesh outer member.
19. Position a chamfered thrust washer, a thrust needle bearing and a scalloped thrust washer on the mainshaft.
20. Fit a radial needle bearing and the second-speed gear.

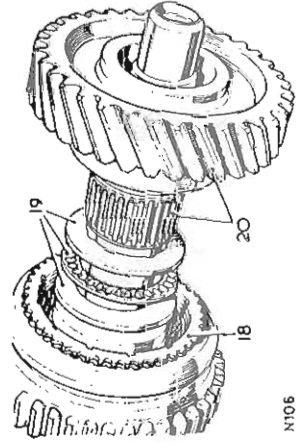
37—18



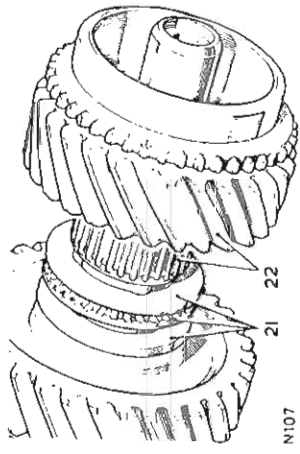
N107



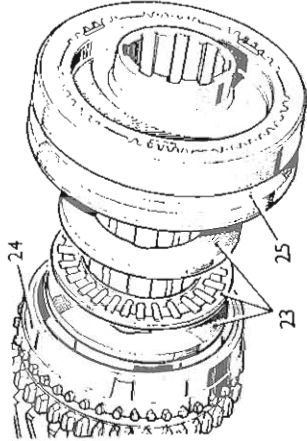
NV 128



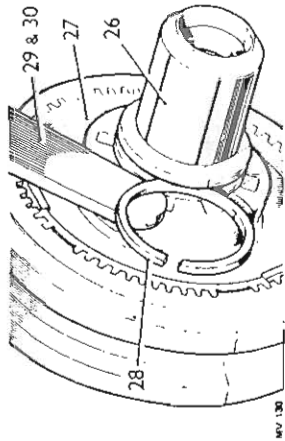
N106



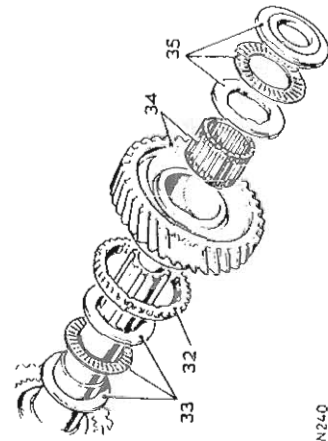
N107



NV 128



NV 130



N240

21. Fit a scalloped thrust washer, a thrust needle bearing and a further scalloped thrust washer.
22. Fit a radial needle bearing and the third-speed gear.
23. Fit a scalloped thrust washer, a thrust needle bearing and a further scalloped thrust washer.
24. Position a synchronesh cone on to the third-speed gear.
25. Fit the synchronesh unit, coned face to rear.

Setting the gears end-float

26. Position the mainshaft assembly vertical, front end uppermost.
27. Apply a light loading on the gears to remove end-float.
28. Position the snap-ring in the mainshaft groove.
29. Measure the distance between the snap-ring lower edge and the synchronesh unit inner member.
30. Select a shim to reduce the measured clearance to 0.025 to 0.150 mm (0.001 to 0.006 in) when fitted. Shim range is 1.85 to 2.45 mm (0.073 to 0.096 in) in 0.15 mm (0.006 in) increments.
31. Fit the selected shim washer and the snap-ring.

Assembling the mainshaft rear end

32. Fit a synchronesh cone to the first/second gear synchronesh outer member.
33. Position a chamfered thrust washer, a thrust needle bearing and a scalloped thrust washer on the mainshaft.
34. Fit the first-speed gear and bearing.
35. Fit a scalloped thrust washer, a thrust needle bearing and the stepped thrust washer, stepped face outwards.
36. The mainshaft spacer, transfer gear, shim washer and snap-ring are fitted during mainshaft refitting.
37. Refit the mainshaft, see 37.20.25.

DATA

End float on gears 0.025 to 0.150 mm.
(0.001 to 0.006 in)

REAR OUTPUT SHAFT OIL SEAL

—Remove and refit

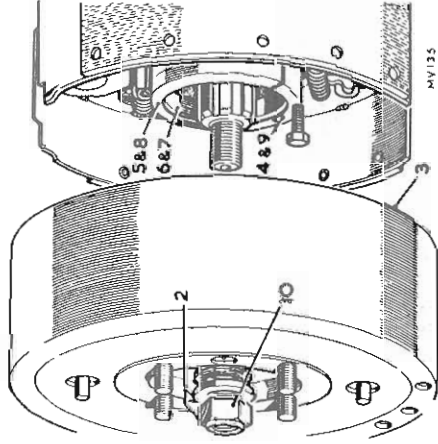
37.23.01

Removing

1. Disconnect the rear propeller shaft at the transmission brake.
2. Remove the locking nut, washer and (later models) the felt rubber oil seal.
3. Withdraw the transmission brake drum complete with rear coupling flange.
4. Remove the oil catcher.
5. Prise off the oil shield.
6. Withdraw the oil seal.

Refitting

7. Press in the oil seal, open face first, until the seal plain face just clears the chamfer on the seal housing bore.
8. Fit the oil shield, which must be a close fit on the speedometer housing.
9. Fit the oil catcher, applying Bostik compound 771 to seal the oil catcher against the brake back plate.
10. Reverse instructions 1 to 3. Torque loading for locking nut: 11,75 kgf m (85 lbf ft).



FRONT OUTPUT SHAFT OIL SEAL

—Remove and refit

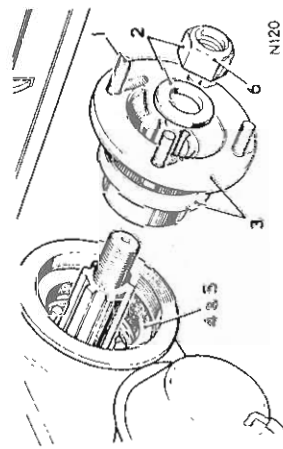
37.23.06

Removing

1. Disconnect the front propeller shaft.
2. Remove the coupling flange locknut and washer.
3. Withdraw the coupling flange complete with mudshield.
4. Withdraw the oil seal.

Refitting

5. Fit the oil seal, open side first.
6. Reverse items 1 to 3. Torque load for locknut: 11,75 kgf m (85 lbf ft).



SPEEDOMETER DRIVE HOUSING

—Remove and refit

37.25.09

Removing

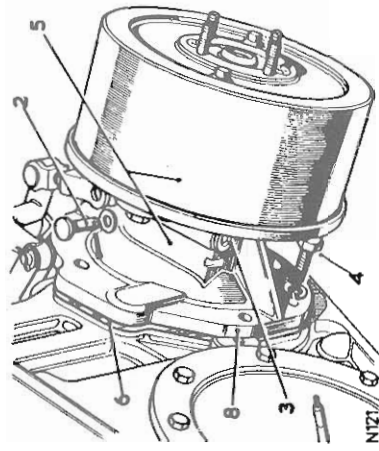
CAUTION: Check the vehicle wheels before commencing this operation as it is necessary to release the parking brake during the following procedure.

1. Disconnect the rear propeller shaft at the transmission brake.
2. Remove the clevis pin to disconnect the handbrake linkage.
3. Disconnect the speedometer drive cable.
4. Remove the fixings, speedometer drive housing to gearbox casing.
5. Withdraw the speedometer drive housing complete with transmission.

Refitting

NOTE: If a replacement speedometer drive housing is being fitted, carry out the 'Differential bearings pre-load check' in 'Speedometer drive housing—overhaul', 37.25.13.

6. Position the joint washer.
7. Offer the drive housing to the gearbox and engage the rear output shaft splines in the differential unit.
8. Position the flat on the drive housing adjacent to the flat on the intermediate shaft.
9. Reverse instructions 1 to 4. Torque load for the propeller shaft fixings is 4,8 kgf m (35 lbf ft). Torque load for speedometer drive housing fixings is 3,1 kgf m (22 lbf ft).



SPEEDOMETER DRIVE HOUSING

—Overhaul 37.25.13

Dismantling

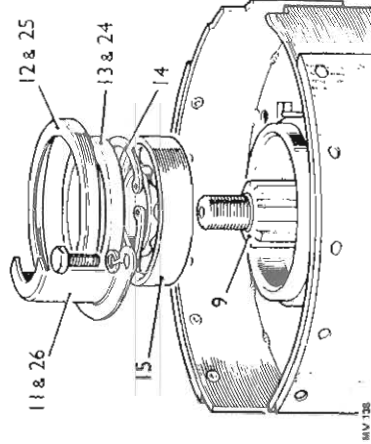
1. Remove the speedometer drive housing, see 37.25.09.
2. Remove the speedometer spindle housing.
3. Lift out the driven gear and spindle.
4. Take off the 'O' ring seal.
5. Remove the thrust washer.
6. Withdraw the oil seal.
7. Remove the locking nut, washer and felt seal, output coupling flange to output shaft.
8. Withdraw the brake drum and coupling flange complete.
9. Drive out the rear output shaft, using a hide mallet on the threaded end.
10. Slide off the spacer and speedometer worm.
11. Remove the oil catcher.
12. Withdraw the oil shield.
13. Withdraw the oil seal.
14. Remove the circlip.
15. Tap out the ball bearing.

Differential bearing pre-load check, instructions 16 to 22 inclusive

This check must be carried out if a replacement speedometer drive housing is to be fitted. The check is also required if a replacement gearbox, differential unit or differential unit bearing is being fitted.

16. Measure and record the thickness of the new joint washer for the speedometer drive housing.
17. Offer the speedometer housing, less joint washer, to the gearbox.
18. Engage the differential unit bearing inner member with the outer member in the drive housing.
19. Measure the clearance between the drive housing and gearbox joint faces. This must be 0.05 mm (0.002 in) more than the recorded thickness of the new joint washer.
20. To adjust the joint face clearance, adjust the thickness of shimming fitted behind the rear bearing outer face as follows: instructions 21 and 22.
21. Drive out the bearing outer race.
22. Withdraw the shim washer and select a replacement of the required thickness. Shim thickness range is 1.65 to 2.80 mm (0.065 to 0.110 in) in 0.05 mm (0.002 in) stages.

continued



Reassembling

23. Reverse instructions 14 and 15.
24. Press in the output coupling flange oil seal, open face first, until the seal plain face just clears the chamfer on the seal housing bore.
25. Fit the oil shield, which must be a close fit on the speedometer housing.
26. Fit the oil catcher, applying Bostik compound 771 to seal the oil catcher against the brake backplate.
27. Reverse instructions 8, 9 and 10.
28. Fit the felt seal, plain washer and locking nut to secure the output flange. Torque: 16.5 kgf m (120 lbf ft).
29. Reverse instructions 1 to 6.

REVERSE LIGHT SWITCH

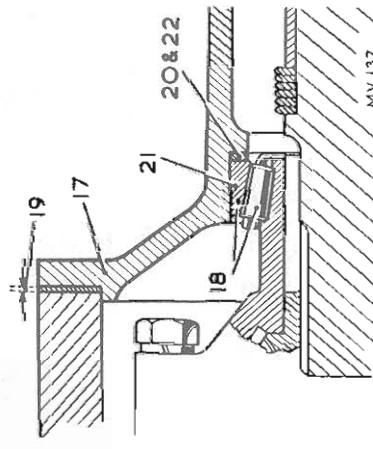
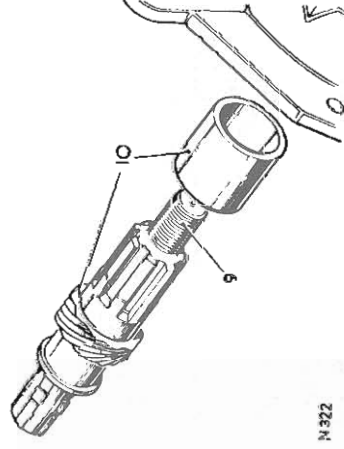
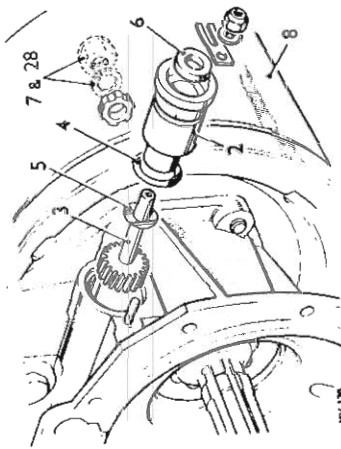
—Remove and refit 37.27.01

Removing

1. Lift aside the main gear lever grommet.
2. Disconnect the electrical leads.
3. Unscrew the reverse light switch.

Refitting

4. Engage reverse gear.
5. Connect the electrical leads to the switch.
6. Switch the ignition 'ON'.
7. Screw in the switch, less shim washers, until the switch contacts are made.
8. Screw in a further half turn.
9. Measure the clearance between the switch lower face and the gearbox.
10. Select shim washers to suit the clearance. Shim thicknesses are 0.5 mm (0.020 in) and 0.127 mm (0.005 in).
11. Fit the selected shim washer/s and switch. Tighten to a torque of 1.4 to 2.0 kgf m (15 to 20 lbf ft).
12. Fit the main gear lever grommet.



DIFFERENTIAL LOCK ACTUATOR SWITCH

—Remove and refit 37.27.05

Removing

1. Disconnect the electrical leads at the switch.
2. Unscrew the switch.

Refitting

3. Start the engine.
4. Move the differential lock vacuum control valve to the 'up' position.
5. Connect the electrical leads to the actuator switch.
6. Screw in the switch, less shim washers, until the switch contacts are made.
7. Screw in a further half turn.
8. Measure the clearance between the switch lower face and the housing.
9. Select shim washers to suit the clearance. Shim thicknesses are 0.5 mm (0.020 in) and 0.127 mm (0.005 in).
10. Fit the selected shim washer/s and the switch.
11. Reverse instructions 3 and 4.

GEAR LEVER AND CROSS-SHAFT, TRANSFER GEARBOX

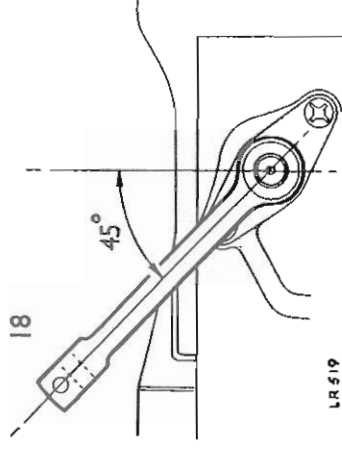
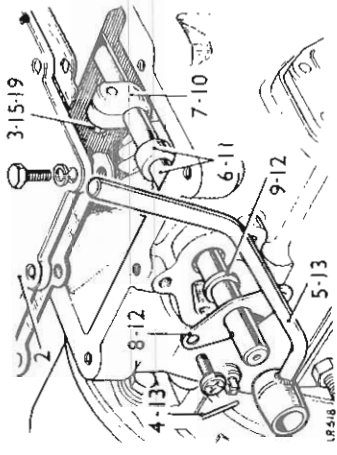
—Remove and refit 37.29.01

Removing

1. Remove the gearbox, see 37.20.01.
2. Remove the top cover.
3. Slacken the selector finger pinch bolt.
4. Drive out the retaining pin, gear lever to cross-shaft.
5. Withdraw the gear lever.
6. Withdraw the cross-shaft and distance collar.
7. Lift out the selector finger.
8. Remove the retaining plates.
9. Withdraw the sealing rings.

Refitting

10. Position the selector finger in the gearbox.
11. Fit the cross-shaft and spacing collar and engage the selector finger.
12. Fit the sealing ring and retaining plate at the R.H. side of the gearbox.
13. Fit the gear lever and retaining pin.
14. Fit the remaining sealing ring and retaining plate.
15. Tighten the selector finger pinch bolt.
16. Select 'High' transfer range, that is, the larger intermediate gear engaged.
17. Slacken the selector finger bolt.
18. Rotate the cross-shaft until the gear lever is inclined 45 degrees rearward of the vertical position.
19. Tighten the selector finger pinch bolt.
20. Reverse instructions 1 and 2.



GEAR SELECTORS AND SHAFT,
TRANSFER GEARBOX

—Remove and refit 37.29.04

Removing

1. Remove the gearbox tunnel cover and the centre panel from the seat base.
2. Remove the speedometer drive housing, see 37.25.09.
3. Remove the transfer gearbox top cover.
4. Select 'Low' range transfer gear.
5. Drive out the retaining pin from the front selector fork sufficient to free the fork.
6. Ease the differential unit to the rear.
7. Push the forward selector fork forward on the shaft.
8. Pull to the rear on the rear selector fork to move the selector shaft out of engagement with the detent balls in the casing rear face.
9. Remove the pinch bolt on the rear fork.
10. Partially withdraw the selector shaft and lift out the selector forks.
11. Remove the retaining pin from the front fork.
12. Withdraw the selector shaft, closing the shaft housing by hand to prevent the detent balls from dropping into the casing.
13. Withdraw the two detent balls.
14. Lift out the spacing rod and spring.
15. Remove the closing plug.
16. Withdraw the detent spring from the cross drilling.

Refitting

17. Position the detent spring in the inner bore in the cross drilling.
18. Locate the detent ball on the spring.
19. Enter the selector shaft, push the ball against the spring and push in the shaft.
20. Fit the detent ball, spring and spacing rod to the vertical drilling.
21. Position the rear selector fork, plain face to rear, in the gearbox.
22. Position the front selector fork, extended boss to the rear, in the gearbox.
23. Align the retaining pin holes and engage the selector shaft in the selector forks.
24. Fit the retaining pin, front fork to shaft.
25. Set transfer gears in 'Neutral' position.
26. Adjust the rear fork position until there is 0.12 to 0.25 mm (0.005 to 0.010 in) clearance between the front face of the rear fork and the rear face of the input gear inner member.
27. Tighten the rear fork pinch bolt.
28. Fit the closing plug to the cross drilling.
29. Reverse instructions 1 to 3.

DATA

Clearance for selectors 0.12 to 0.25 mm
(0.005 to 0.010 in)

INTERMEDIATE GEARS ASSEMBLY

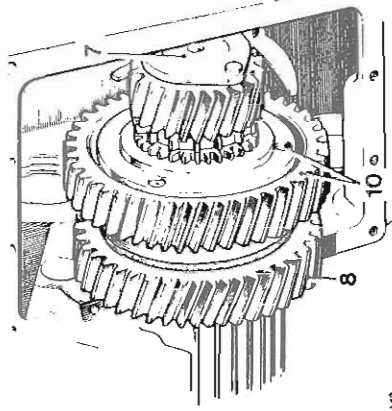
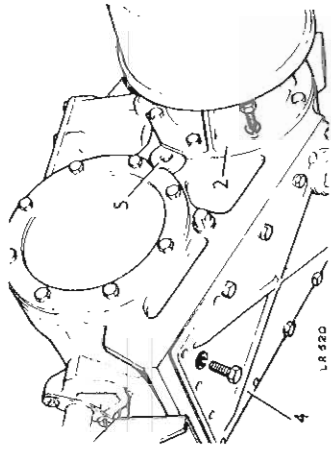
—Remove and refit 37.29.10

Service tool: RO 1003 slave intermediate shaft

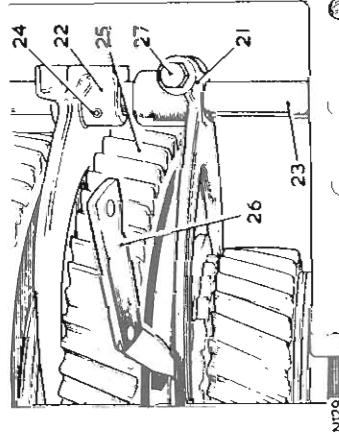
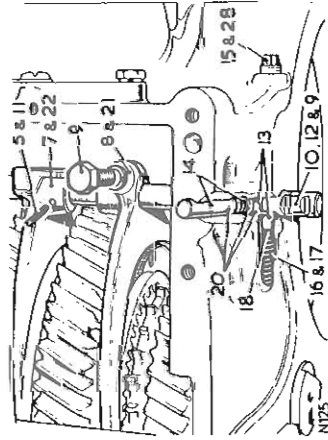
Removing

1. Drain the transfer gearbox oil.
2. Remove the speedometer drive housing, see 37.25.09.
3. If necessary, remove the intermediate exhaust pipe.
4. Remove the gearbox bottom cover.
5. Screw a suitable extractor into the 8 mm threaded hole provided in the intermediate gear shaft.
6. Hold the intermediate gear cluster in position and withdraw the shaft.
7. Insert the slave shaft, RO 1003 to retain together the gears assembly.
8. Withdraw the intermediate gears assembly.
9. Slide the thrust washers, bearings and gears from the slave shaft.
10. The input gear and outer member is a riveted assembly and no dismantling is permitted.
11. Remove the 'O' ring seal from the intermediate gear shaft.

continued



MV 143



N729

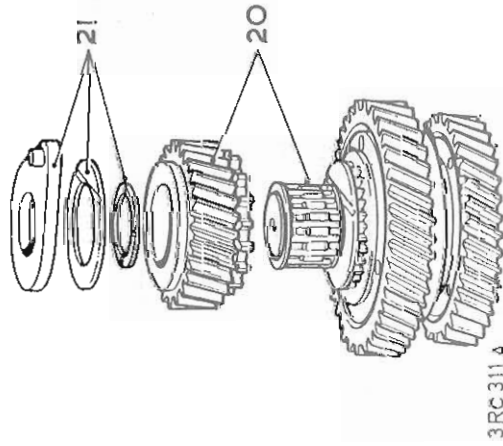
Inspecting

- Examine all parts for wear, damage and general condition. Renew as necessary.

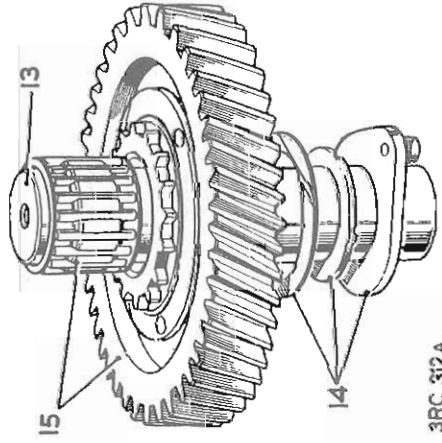
Refitting

- Place the slave shaft on the bench, extractor thread end uppermost.
- Fit a gear-shaped thrust washer, inner ring and a thrust bearing washer to the shaft (ring grooved face downwards).
- Fit a needle-roller bearing and the 'high' gear (plain face first) to the shaft.
- Position a thrust bearing washer on the 'high' gear.
- Fit a spacer, needle-roller bearing and a further spacer to the input gear inner member.
- Position the assembled input gear on the shaft and engage the lower spacer in the previously positioned thrust bearing washer.
- Locate a thrust bearing washer over the upper spacer.
- Fit a needle roller bearing and the 'low' gear (plain side last) to the shaft.
- Fit the remaining thrust needle bearing, inner ring and thrust washer (ring grooved face upwards).

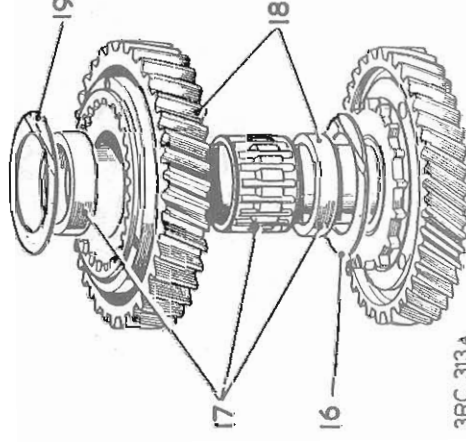
continued



3RC 311 A



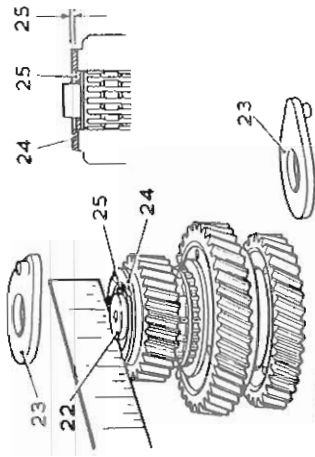
3RC 312 A



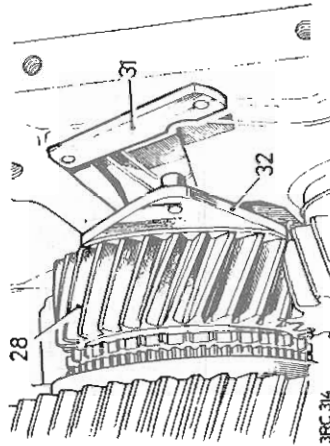
3RC 313 A

The following procedure, instructions 22 to 27, must be completed before refitting the intermediate gears into the transfer gearbox, to ensure that there is sufficient running clearance for the bearings.

- With the intermediate gear assembly located on the slave shaft RO 1003, place the complete assembly on a surface plate with the low gear uppermost.
 - Remove the two gear-shaped thrust washers, one situated at each end of the gear assembly.
 - Place a suitable straight-edge across the thrust bearing washer.
 - Check that a clearance (end-float) exists between the straight-edge and the inner ring, to ensure a running clearance when the assembly is installed.
- CAUTION: DO NOT** refit the assembly with the needle-roller bearings in a pre-load condition.
- If there is no clearance between the straight-edge and the inner ring, use selective assembly of alternative components to obtain the required condition.
 - In event of selective assembly not giving clearance, it is permissible to face down each spacer on a surface plate to a maximum of 0.13 mm (0.005 in).
 - When the foregoing bearing clearance check has been completed, slide the gears and slave shaft assembly into the transfer gearbox and engage the selector forks.
 - Withdraw the slave shaft and lubricate the bearings through the shaft aperture.
 - Fit the intermediate shaft and 'O' ring seal with the flat on the shaft toward the differential unit.
 - Measure the clearance between the rear thrust washer and the gear casing. This must be 0.15 to 0.23 mm (0.006 to 0.009 in).
 - Adjustment is carried out by substituting one or both of the thrust washers. The washers are available in 3.55 mm (0.139 in), 3.65 mm (0.143 in) and 3.74 mm (0.147 in) thicknesses.
 - Refit the gearbox bottom cover.
 - Refit the speedometer drive housing, see 37.25.09.
 - Refit the intermediate exhaust pipe.
 - Refill the transfer gearbox to the correct level.



3RC 310 B



3RC 314

DATA

Gears end-float	0.15 to 0.23 mm (0.006 to 0.09 in)
-----------------	---------------------------------------

DIFFERENTIAL UNIT

—Remove and refit 37.29.13

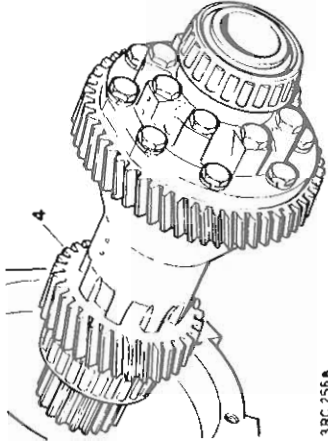
Removing

1. Remove the differential lock actuator assembly, see 37.29.19.
2. Remove the front output shaft and housing, see 37.10.05.
3. Remove the speedometer drive housing, see 37.25.09.
4. Withdraw the differential unit.

Refitting

5. Refit the differential unit.
6. Refit the speedometer drive housing, see 37.25.09.
7. Refit the front output shaft and housing, see 37.10.05.
8. Refit the differential lock actuator assembly, see 37.29.19.

NOTE: If a replacement differential unit is being fitted, carry out the 'Differential bearing pre-load check', described in 'Speedometer drive housing—overhaul', 37.25.13.



3 RC 256 B

DIFFERENTIAL UNIT

—Overhaul 37.29.16

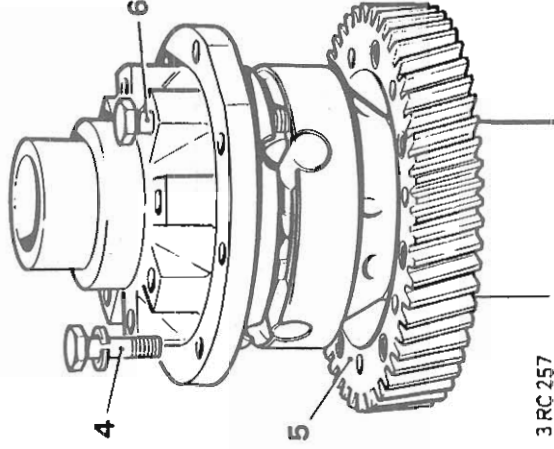
Service tool: 18G 47 BB bearing extractor

Dismantling

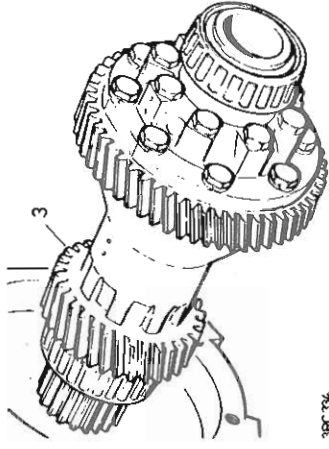
NOTE: During dismantling it is essential that all components are marked in their original position and relative to other components, so that if original components are refitted, their initial setting is maintained.

1. Remove the differential unit, see 37.29.13.
2. Press off the roller bearings using tool 18G 47 BB.
3. Withdraw the high-speed gear.
4. Remove the fixings, low-speed gear to casing.
5. Withdraw the gear.
6. Remove the casing securing bolts.

continued



3 RC 257



3 RC 254