

CRANKSHAFT REAR OIL SEAL

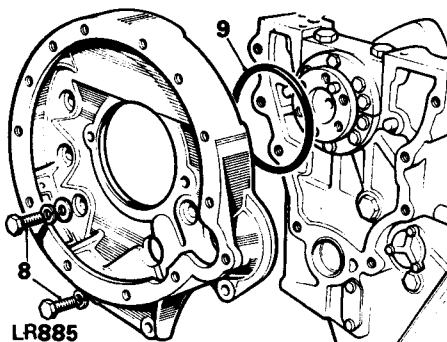
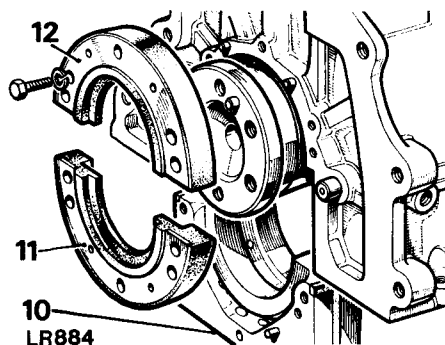
Remove and refit

12.21.20

Service tool: 270304 Guides for oil seal
600963 Engine lifting sling

Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Remove the front floor. 76.10.12.
- 3 Remove the engine assembly. 12.41.01.
- 4 Remove the starter motor. 86.60.01.
- 5 Remove the oil sump. 12.60.44.
- 6 Remove the clutch assembly. 33.10.01.
- 7 Remove the flywheel. 12.53.07.
- 8 Remove the flywheel housing.
- 9 Remove the oil seal ring.
- 10 Remove the rear main bearing cap.
- 11 Remove the dowel located lower half of the oil seal retainer from the rear main bearing cap.
- 12 Remove the dowel located upper half of the oil seal retainer from the cylinder block.



- 13 Remove the oil seal from the crankshaft.

Refitting

- 14 Assemble the garter spring on the crankshaft journal by engaging the hook and eye. Do not stretch the spring.
- 15 Move the assembled spring along the journal until it is against the thrower flange.
- 16 Apply Silicone Grease MS4 to the crankshaft oil seal journal and to both end faces of the split oil seal.
- 17 Open the split seal sufficiently to allow it to be fitted over the crankshaft oil seal journal. The recess in the oil seal must be towards the thrower flange and the garter spring.

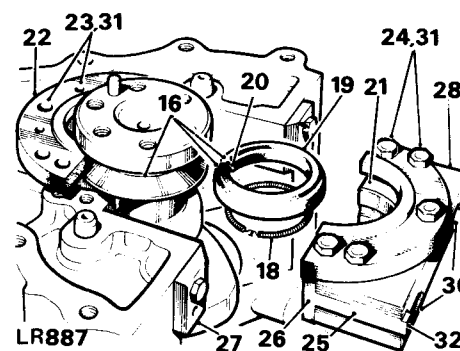
NOTE: The oil seal must not be repeatedly fitted and removed from the crankshaft, as this can damage the sealing lip.

- 18 Position the garter spring so that the hook and eye is located mid-way between the split and hinge of the oil seal.

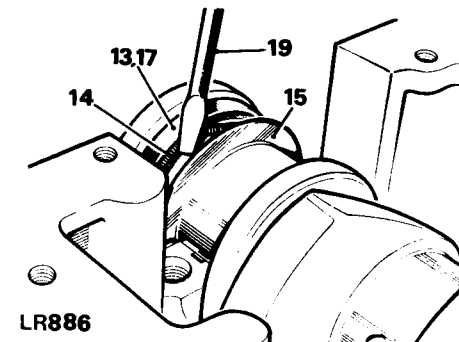
- 19 Using a small screwdriver, ease the spring into the recess in the oil seal.
- 20 Rotate the oil seal until the split is on the vertical axis pointing towards the cylinder head and in its approximate running position on the journal; this position is important.

NOTE: Do not degrease the seal retainer halves with trichlorethylene, but wipe clean with a dry cloth prior to applying Hylomar.

- 21 Apply Hylomar PL 32/M jointing compound, to the seal location diameter of both retainer halves.
- 22 Locate one half of the oil seal retainer onto the cylinder block dowels. The oil seal should be compressed to assist assembly, also ensure that it is correctly located in the retainer recess.



- 23 Secure the upper half of the oil seal retainer with the three inner bolts, leaving the outer bolts at each end finger tight at this stage.



- 24 Secure the lower half of the oil seal retainer to the rear main bearing cap in the same manner as described for the upper half.
- 25 Apply Silicone Grease MS4 to the 'T' seals and fit them to the rear main bearing cap.
- 26 Trim the top edges of the 'T' seals to prevent them from fouling the cylinder block when being fitted.
- 27 Fit the seal guides to the crankcase. 270304.
- 28 Fit the rear main bearing cap complete with the seal retainer, 'T' seals and bearing shell to the crankcase until there is an 0,8 mm (0.030 in.) gap between the cap and the crankcase.
- 29 Check that the seal is correctly located in the retainer recess.
- 30 Tighten the bearing cap bolts ensuring that there is no buckling of the split seal or misalignment of the butt joint; Torque: 10 kgf. m (75 lbf. ft.).
- 31 Fully tighten all the bolts securing the retainer halves. Turn the bolt heads so that the hexagon corners will not foul the flywheel housing seal when fitting.
- 32 Trim the ends of the 'T' seals to leave 0,8 mm (0.030 in.) protruding from the bearing cap.
- 33 Reverse 1 to 19.

CRANKSHAFT

Remove and refit

12.21.33

Removing

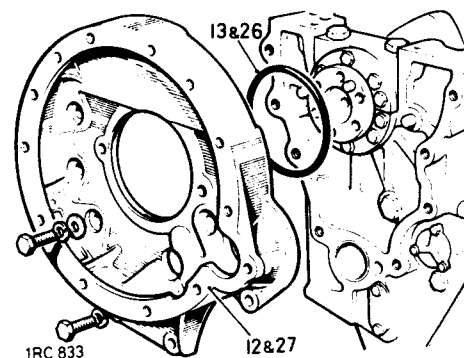
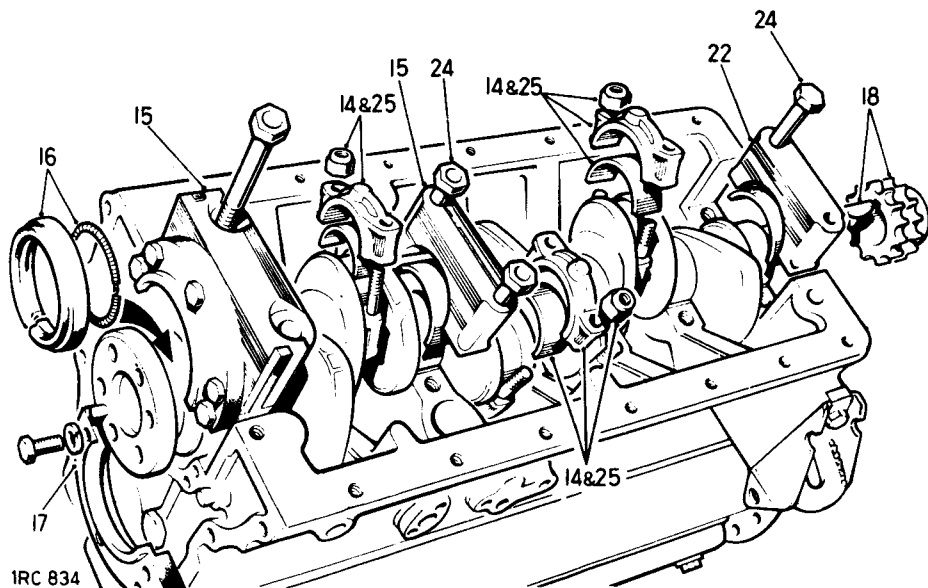
- 1 Remove the bonnet. 76.16.01.
- 2 Remove the air cleaner. 19.10.04.
- 3 Remove the radiator and front panel assembly. 26.40.01.
- 4 Remove the front floor. 76.10.12.
- 5 Remove the engine assembly. 12.41.01.
- 6 Remove the oil sump. 12.60.44.
- 7 Remove the oil pump. 12.60.26.
- 8 Remove the timing gear cover. 12.65.01.
- 9 Remove the timing chain and tensioner. 12.65.28.
- 10 Remove the clutch assembly. 33.10.01.
- 11 Remove the flywheel. 12.53.07.

- 12 Remove the flywheel housing.
- 13 Remove the oil seal.
- 14 Remove the connecting rod caps and bearing lower halves. Retain in related sets.
- 15 Remove the main bearing caps and lift the crankshaft clear. Retain the bearing halves and caps in related sets.
- 16 Remove the oil seal from the crankshaft.
- 17 Remove the upper half of the oil seal retainer from the cylinder block.
- 18 If required, remove the chainwheel and key from the crankshaft.

Refitting

NOTE: If replacement components are to be fitted, the checks detailed in 12.21.46 must be carried out.

- 19 Locate the upper main bearing halves into the cylinder block.
- 20 Lubricate the bearings and crankshaft journals with clean engine oil, and place the crankshaft in position.



- 26 Fit the oil seal ring to the flywheel housing.
- 27 Refit the flywheel housing.
- 28 Refit the flywheel. 12.53.07.
- 29 Refit the clutch assembly. 33.10.01.
- 30 Reset the valve timing. 12.65.22.
- 31 Reverse 1 to 9.

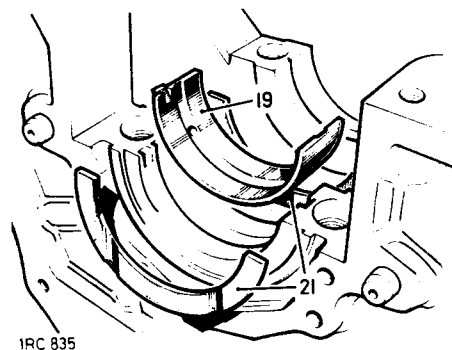
CRANKSHAFT

Overhaul

12.21.46

Inspecting

- 1 Remove the crankshaft. 12.21.33.
- 2 Check each crankshaft journal for ovality. If ovality exceeds 0,040 mm (0.0015 in.), a reground or new crankshaft should be fitted.
- 3 Bearings for the crankshaft main journals and the connecting rod journals are available in the following undersizes:
 - 0,25 mm (0.010 in.)
 - 0,50 mm (0.020 in.)
 - 0,76 mm (0.030 in.)
 - 0,01 mm (0.040 in.)
- 4 Thrust washers for the crankshaft rear main journal, to control the crankshaft end float, are available in the following oversizes:
 - 0,06 mm (0.0025 in.)
 - 0,12 mm (0.005 in.)
 - 0,18 mm (0.0075 in.)
 - 0,25 mm (0.010 in.)
 - 0,31 mm (0.0125 in.)
- 5 Fit the front main bearing cap, less bearing halves, to the cylinder block. Torque 10,4 kgf. m (75 lbf. ft.).
- 6 Slacken the fixing on one side of the cap only and check that there is no clearance at the joint face. If there is clearance, a complete new cylinder block must be fitted.

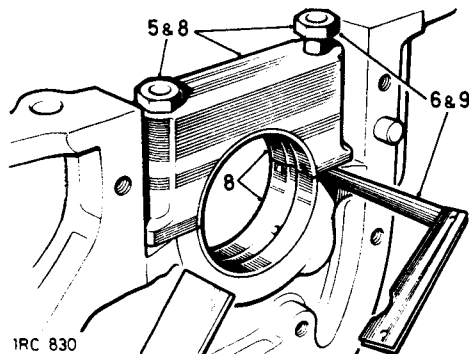


- 7 Repeat 5 and 6 for the remaining main bearing caps.

Main bearing nip and clearance

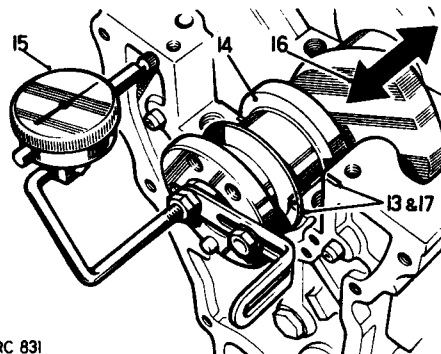
NOTE: New bearing halves are supplied with a protective coating and must be degreased prior to fitting, to remove the coating.

- 8 Locate the bearing halves into the front main bearing cap and the cylinder block, and fit the cap to the block. Torque: 10,4 kgf. m (75 lbf. ft.).
- 9 Slacken the fixing on one side of the cap only and check the clearance between the joint faces. The clearance must be 0,10 mm to 0,15 mm (0.004 in. to 0.006 in.).



- 10 The bearing nip can be corrected by selective assembly of the bearing halves; these are available in slightly varying thicknesses. Do not file or machine the caps or cylinder block to vary the bearing nip.
- 11 Repeat 8 to 10 for the remaining main bearings.
- 12 When the bearing nip has been checked, remove the caps and bearing shell bottom halves.
- 13 Position a standard size thrust washer each side of the rear main bearing shell, top half, with the grooved faces away from the cylinder block. The thrust washer thicknesses must agree within 0,08 mm (0.003 in.).

- 14 Place the crankshaft in position on the cylinder block.
- 15 Mount a dial test indicator to read off the end of the crankshaft.
- 16 Check the crankshaft end float. The correct end float limits are 0,05 mm to 0,15 mm (0.002 in. to 0.006 in.).
- 17 The crankshaft end float can be adjusted by fitting oversize thrust washers. The variation of thrust washer thickness at each side must not exceed 0,08 mm (0.003 in.) to ensure that the crankshaft remains centralised.

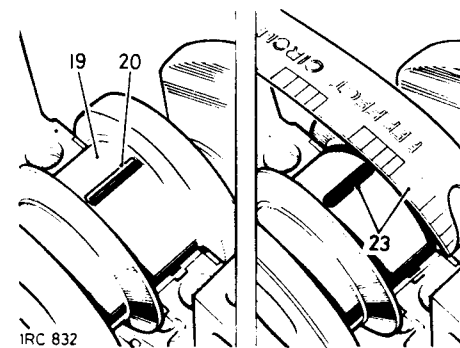


1RC 831

- 18 Make a final check to prove the main bearing clearance, using a 0,063 mm (0.0025 in.) shim paper. Check each bearing in turn by fitting both bearing halves and the bearing cap, with the shim paper between the crankshaft and one half of the bearing. The crankshaft should resist rotation with the shim paper fitted, and move freely by hand with the shim paper removed.

NOTE: As an alternative, Plastigauge may be used to check the main bearing clearance, 19 to 26. Do not rotate the crankshaft while the Plastigauge is fitted, or the reading will be impaired.

- 19 Locate the crankshaft in position on the upper bearing halves in the cylinder block.
- 20 Place a piece of Plastigauge across the centre of the lower half of the crankshaft journal. 605238.



1RC 832

- 21 Fit the bearing cap complete with the lower bearing half. Torque: 10,5 kgf. m (75 lbf. ft.).
- 22 Remove the bearing cap and lower half bearing.
- 23 Using the scale printed on the 'Plastigauge' packet, measure the flattened 'Plastigauge' at its widest point. The graduation that most closely corresponds to the width of the 'Plastigauge' indicates the bearing clearance.
- 24 The correct clearance with new or overhauled components is 0,015 mm to 0,050 mm (0.0006 in. to 0.002 in.).
- 25 If a new bearing is being fitted, use selective assembly to obtain the correct clearance.
- 26 Wipe off the 'Plastigauge' with an oily rag. DO NOT scrape it off.
- 27 Retain all components in related sets.
- 28 Refit the crankshaft. 12.21.33.

DATA

Crankshaft

Journal diameter	67,0 mm – 0,0127 mm (2.6245 in. – 0.0005 in.)
Crankpin diameter	47,63 mm + 0,018 mm (1.875 in. + 0.00075 in.)
End float (controlled by thrust washers at rear bearing)	0,05 mm to 0,15 mm (.002 in. to .006 in.)
Regrind permissible by 0,25 mm (0.010 in.) stages to:	
Main bearing running clearance	0,015 mm to 0,050 mm (0.0006 in. to 0.002 in.)
Connecting rod bearing running clearance	0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.)

67,0 mm – 0,0127 mm (2.6245 in. – 0.0005 in.)
47,63 mm + 0,018 mm (1.875 in. + 0.00075 in.)

0,05 mm to 0,15 mm (.002 in. to .006 in.)

Undersize	Journal dia.	Crankpin dia.
1,01 mm (0.040 in.)	65,63 mm (2.584 in.)	46,6 mm (1.835 in.)

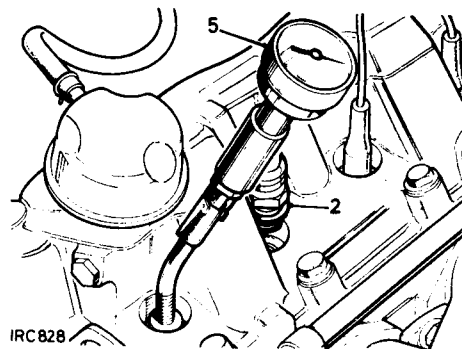
0,015 mm to 0,050 mm (0.0006 in. to 0.002 in.)
0,0114 mm to 0,043 mm (0.00045 in. to 0.0017 in.)

CYLINDER PRESSURES

Check 12.25.01

Checking

- 1 Run the engine until it attains normal operating temperature.
- 2 Remove the sparking plugs.
- 3 Secure the throttle in the fully open position.
- 4 Check each cylinder in turn as follows:
- 5 Insert a suitable pressure gauge into the sparking plug hole.
- 6 Crank the engine with the starter motor for several revolutions and note the highest pressure reading obtainable.
- 7 If the pressure is appreciably less than the correct figure, the piston rings or valves may be faulty.
- 8 Low pressure in adjoining cylinders may be due to a faulty cylinder head gasket.



DATA

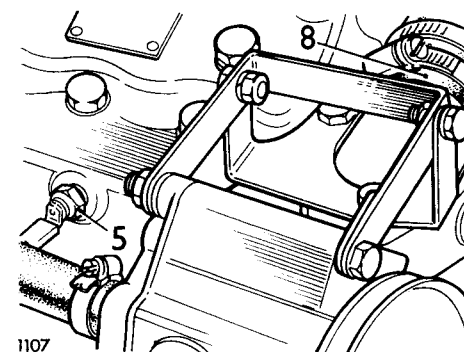
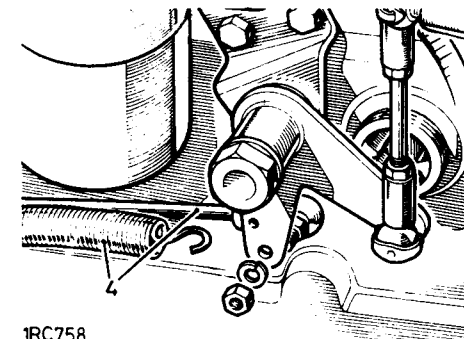
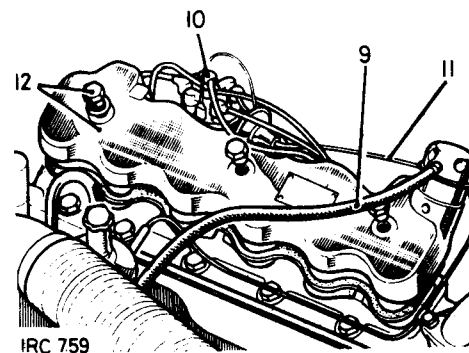
Compression ratio	7.8 : 1	7.0 : 1
Compression pressure	11,95 kgf. cm ² (170 lbf. in. ²)	9,84 kgf. cm ² (140 lbf. in. ²)
Cranking speed	300 rev/min	300 rev/min

CYLINDER HEAD

Remove and refit 12.29.10

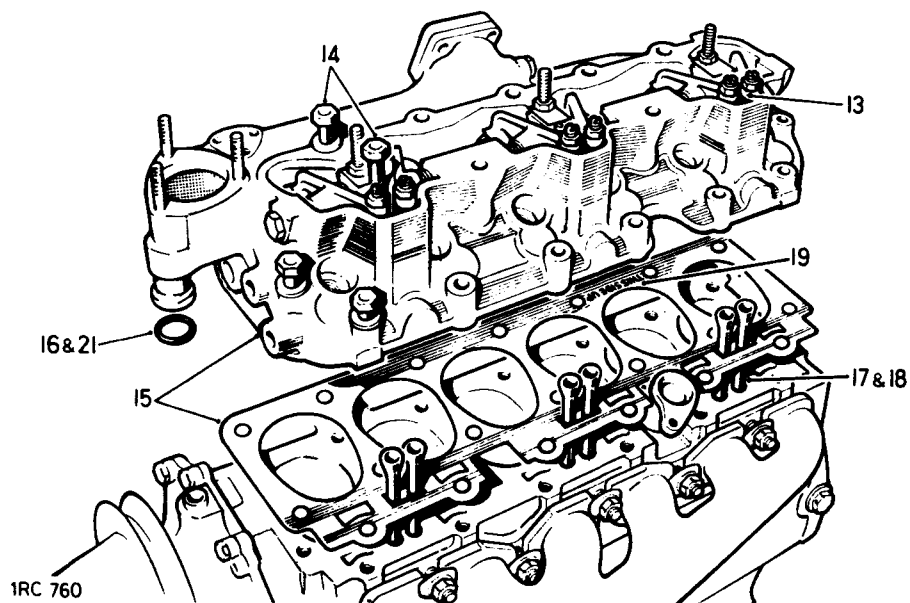
Removing

- 1 Drain the coolant at the radiator and engine block.
- 2 Disconnect the brake servo pipe from the inlet manifold.
- 3 Remove the carburetter. 19.15.09.
- 4 Disconnect the accelerator control rod and return spring at the bell crank lever.
- 5 Disconnect the two temperature transmitter leads from the cylinder head.
- 6 Disconnect the rocker oil feed pipe at the rear of the cylinder head.
- 7 Remove the sparking plugs.
- 8 Disconnect the radiator top hose.
- 9 Disconnect the hose from the engine breather cap.
- 10 Remove the distributor. 86.35.20.
- 11 Remove the distributor vacuum pipe and retaining clip from the thermostat outlet pipe fixing.
- 12 Remove the special nuts and sealing washers and lift off the top rocker cover and joint washer.

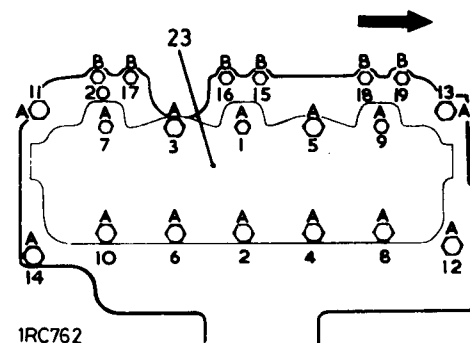


-
- Diagram showing the removal of the timing belt. A hand is shown pulling the timing belt off the camshaft pulley. The pulley is labeled with the number 18.

- 18 Remove the side rocker cover and fit the tappet push rods in their original positions.
- 19 Smear a new cylinder head gasket with oil and place on the face of the cylinder block, with the side marked 'this side up' uppermost.



- a. Bolts 'A' 7 kgf. m (50 lbf. ft.)
- b. Bolts 'B' 4 kgf. m (30 lbf. ft.)



- 12-45**

CYLINDER HEAD

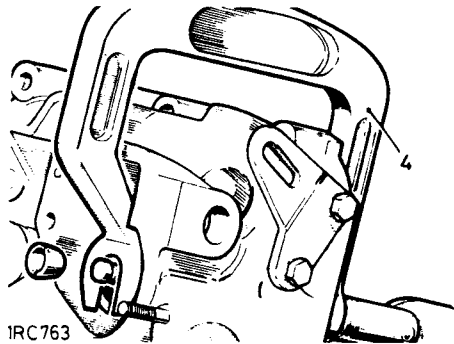
Decarbonise and top overhaul 12.29.21

Service tools: 262749 Rocker shaft extractor
276102 Valve Spring compressor
274401 Exhaust valve guide remover
274400 Inlet valve guide remover
600959 Exhaust valve guide replacer
601508 Inlet valve guide replacer
263050 Protection plate, insert removal
530625 Exhaust valve seat replacer

Cylinder head and inlet valves

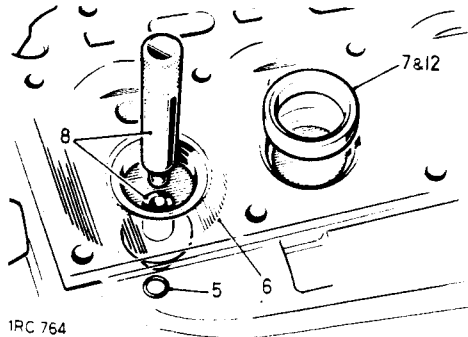
Dismantling

- 1 Remove the cylinder head. 12.29.10.
- 2 Remove the thermostat housing and thermostat.
- 3 Remove the inlet valve rockers and shafts. 12.29.35.
- 4 Remove the inlet valve assemblies, using spring compressor 276102, and retain the components in sets related to their parent cylinder.



1RC763

- 5 Withdraw the oil seals from the valve guides.
- 6 Remove combustion deposits from the cylinder head, valve ports and piston crowns, using only soft metal tools.
- 7 If necessary, remove the inlet valve seat inserts by grinding sufficient to weaken the insert, then prising out.
- 8 Drive out the inlet valve guides from the combustion chamber side, using remover 274400.



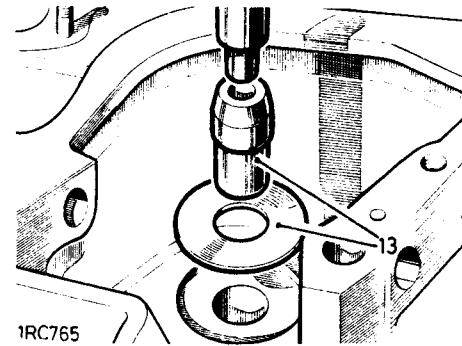
1RC764

- 9 Inspect the valve spring pairs which must be an interference fit with each other.
- 10 Inspect the valve split cones and spring caps for general condition.
- 11 Inspect the cylinder head for general condition and for damage to threads.

Assembling

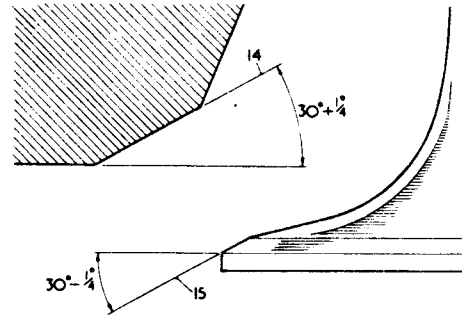
- 12 If replacement inlet valve seat inserts are to be fitted, warm the head evenly for a few minutes at 66°C (150°F) approximately (the normal operating temperature of a degreaser), enter the seat squarely into the cylinder head recess and press into position.

- 13 Lubricate and fit the inlet valve guides, together with the valve spring seating washers, using replacer 601508.



1RC765

- 14 Face the inlet valve seats, both original and replacements, to $30^\circ + \frac{1}{4}$, using the valve guides as pilots.
- 15 Check, and if necessary, reface the inlet valve faces to $30^\circ - \frac{1}{4}$.

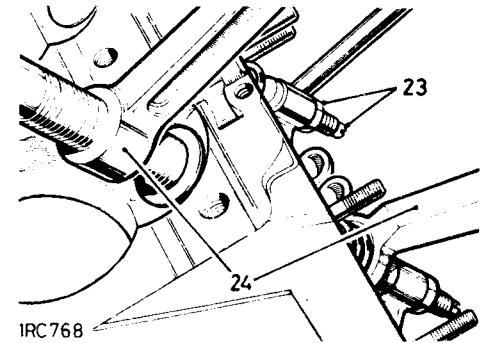


1RC766A

- 16 Lap each valve into its respective seat then thoroughly wash the assembly.
- 17 Lubricate the valve stems and reverse 4.
- 18 Reverse 2 and 3.
- 19 Place the cylinder head assembly aside pending refitting.

Dismantling the exhaust valves arrangement

- 20 Remove the exhaust manifold. 30.15.10.
- 21 Remove the side rocker cover and joint washer.
- 22 Mark the exhaust valves for refitting in correct sequence.
- 23 Slacken the tappet adjusting screws right off and set each rocker back on its cam.
- 24 Remove the exhaust valve assemblies, using spring compressor 276102, and retain the components in sets related to their parent cylinder.



1RC768

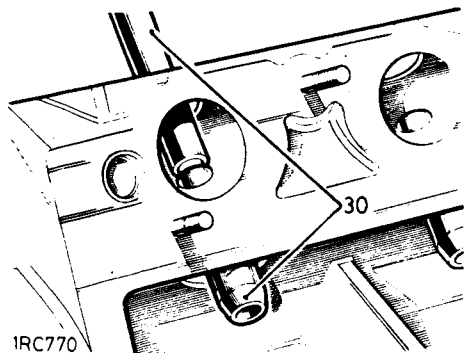
- 25 Remove the combustion deposits from the valves and ports.
- 26 Examine the valve seat inserts and valve guides. If replacement is necessary, first remove the exhaust valve rockers and shafts. 12.29.36.

NOTE: In installations where access is restricted, to replace valve guides on No. 5 or No. 6 cylinders may first require engine removal.

- 27 If necessary, remove the valve seat inserts, 28 and 29.

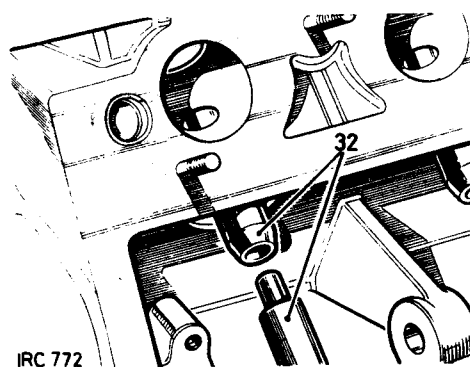
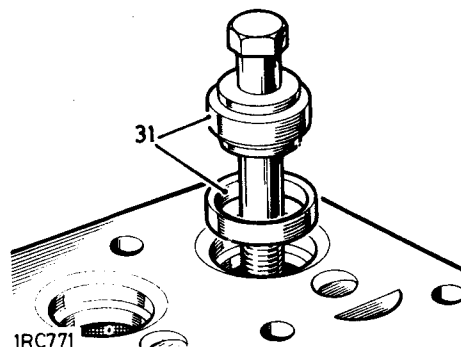
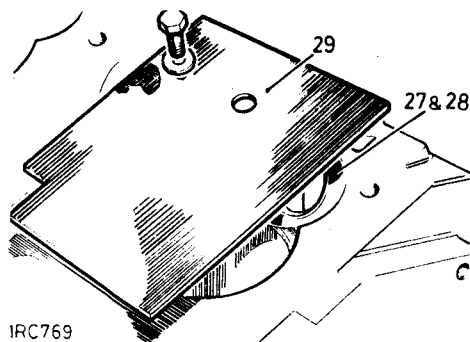
WARNING: Due to the extreme hardness of the seat inserts, take great care to avoid possible injury due to fragmentation.

- 28 Reduce the insert to a minimum thickness by grinding.
29 Secure the protection plate 263050 over the cylinder block face and break the seat insert, using a suitable chisel applied through the hole in the plate.
30 If necessary, drift out the exhaust valve guides, using remover 274401.

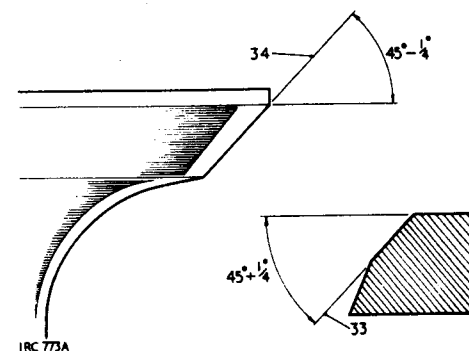


Exhaust valves, seats and guides, refitting

- 31 If next exhaust seat inserts are to be fitted, clean the seat recess and pull the new insert into position, using special tool 530625. It is not necessary to heat the block or freeze the insert, but light taps on the tool may be required to ensure that the insert enters smoothly. Continue precautions against fragmentation, by fitting the protection plate 263050 and leaving it in position for a few minutes.
32 Lubricate the exhaust valve guides and carefully drift them into position, using replacer 600959.



- 33 Use the valve guide as a pilot and cut the valve seat to $45^\circ + \frac{1}{4}^\circ$.
34 Face the exhaust valves to 45° and lap each valve into its respective seat, using suitable equipment.



- 35 Wash each valve, seat, port and guide in clean paraffin.
36 Lightly oil the valve stems and reverse 24.
37 If removed, reverse item 26, during which the valve timing must be re-set as necessary.
38 Reverse 20 and 21.
39 Refit the cylinder head. 12.29.10.

INLET VALVE ROCKERS AND SHAFTS

Remove and refit

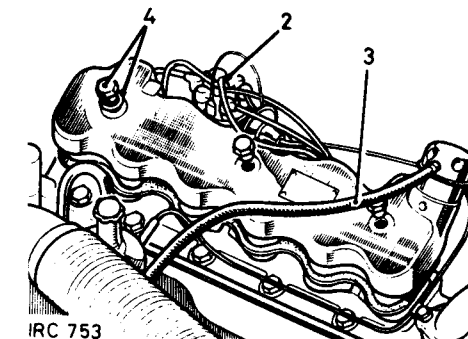
12.29.35

Service tool: 262749 Extractor for rocker shafts

Removing

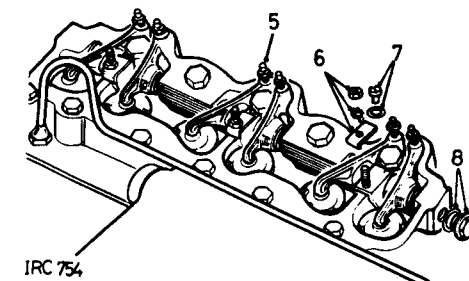
- 1 Remove the radiator and grille panel. 26.40.01.
- 2 Disconnect the sparking plugs leads and remove the distributor cap.
- 3 Disconnect the hose at the engine breather cap.

- 4 Remove the special nuts and sealing washers and lift off the top rocker cover and joint washer.



- 5 Slacken the locknuts and screw back the tappet adjusting screws.
6 Remove the nuts, washers and screw retainer plates from the rocker spacers.
7 Remove the special set screws and washers securing the rocker shafts.
8 Remove the end plug and sealing washer from the front of the cylinder head.

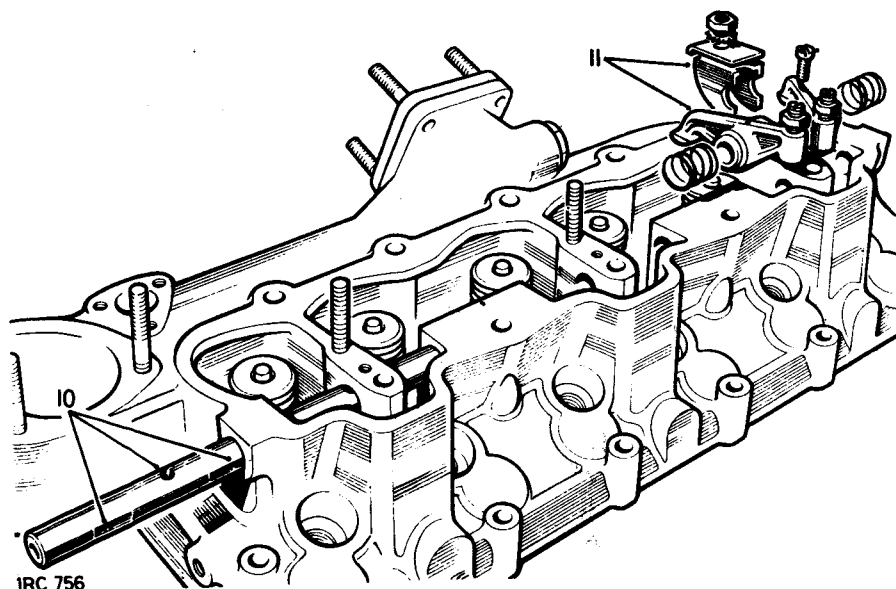
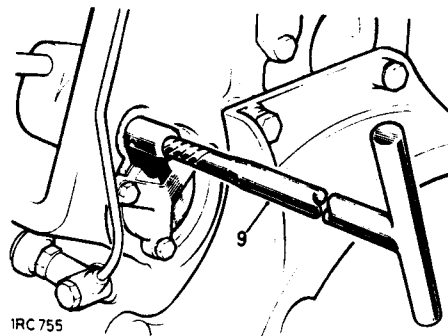
continued



- 9 Extract the front and rear rocker shafts and withdraw the valve rockers, springs and spacers as they are released. Extractor 262749.

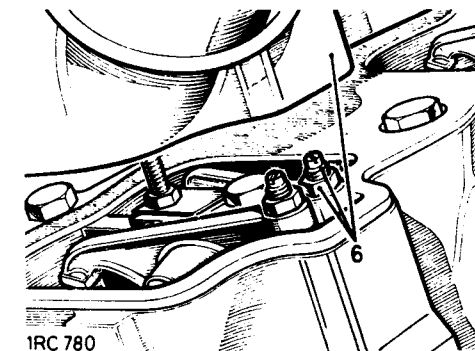
Refitting

- 10 Enter the rear (longer) shaft into the head, with the tapped holes aligned with the set screw holes in the housing webs, and with the oil holes facing away from the valves.
- 11 Push the shaft rearwards, fitting a spring, valve rocker, spacer, valve rocker and spring for each cylinder.

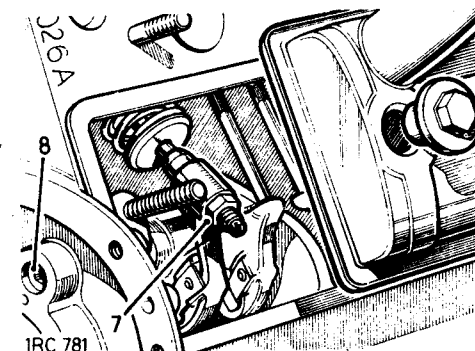


- 12 Reverse 6 and 7 for the rear shaft.
- 13 Repeat 10 and 11 for the front (shorter) shaft.
- 14 Reverse 6 and 7 for the front shaft.
- 15 Set the tappet clearances to 0,15 mm (0.006 in.) in the following order:
Set No. 1 tappet with No. 6 valve fully open.
Set No. 2 tappet with No. 5 valve fully open.
Set No. 3 tappet with No. 4 valve fully open.
Set No. 4 tappet with No. 3 valve fully open.
Set No. 5 tappet with No. 2 valve fully open.
Set No. 6 tappet with No. 1 valve fully open.
- 16 Reverse 1 to 4.
- 17 Check the inlet valve tappet clearances with the engine at normal running temperature. Reset to 0,15 mm (0.006 in.) as necessary.

- 6 Remove the top rocker cover and slacken the inlet tappet adjusting screws.



- 7 Remove the side rocker cover and slacken the exhaust tappet adjusting screws.
- 8 Remove the camshaft retaining plate and remove the end plug from the front end of the rocker shaft.



EXHAUST VALVE ROCKERS AND SHAFTS

Remove and refit

12.29.36

Service tool: 262749 Extractor for rocker shafts

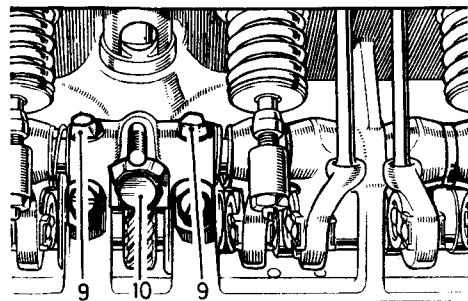
Removing

- 1 Remove the radiator and grille panel. 26.40.01.
- 2 Remove the exhaust manifold. 30.15.10.
- 3 Remove the timing gear cover. 12.65.01.
- 4 Remove the timing chain tensioner. 12.65.28.
- 5 Remove the timing chain and gears. 12.65.12.

DATA

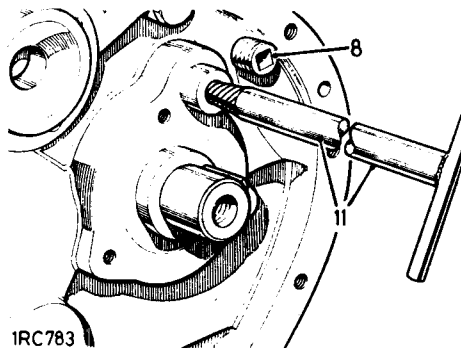
Inlet valve tappet clearance 0,15 mm (0.006 in.) with engine at normal running temperature.

- 9 Remove the two locating screws securing front and rear rocker shafts.
- 10 Remove the oil feed bolt locating the distributor housing.



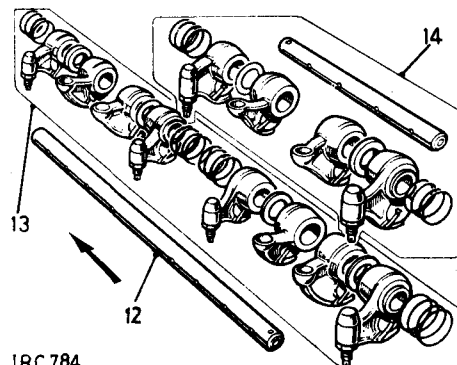
1RC782

- 11 Engage the extractor 262749 into the front rocker shaft.



1RC783

- 12 Withdraw the rocker shaft.
- 13 Lift out the exhaust valve rockers, inlet cam followers, springs and spacers. Note the sequence of assembly.
- 14 Repeat 11 and 12 on the rear rocker shaft arrangement.

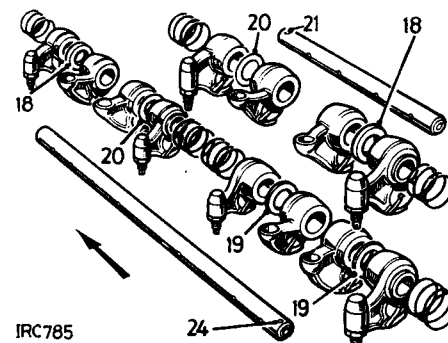


1RC784

Refitting

- 15 Fit a suitable slave bolt and packing washer into the tapped hole at front end of camshaft. This will enable the camshaft to be rotated as required to position the cam lobes away from the rocker assembly being fitted.
- 16 To aid reassembly, lay out the six spacer washers to be fitted between the inlet cam followers and exhaust valve rockers as follows:
Thick, thin, medium, medium, thin, thick.
- 17 Reverse 14 in the order removed, noting the fitted positions of the spacing washers. Items 18 to 20.
- 18 Thick washers.
- 19 Medium washers.
- 20 Thin washers.

- 21 Feed in the rear rocker shaft. Ensure that the locating screw hole in the shaft is to the front; use the extractor tool to align the hole with the hole in the block.
- 22 Secure the shaft with the locating screw and lock washer.
- 23 Reverse 12 and 13 in the order removed.
- 24 Feed in the front rocker shaft. Ensure the locating screw hole in the shaft is to the rear and in line with the hole in the block.



1RC785

- 25 Reverse 8 and 9.
- 26 Reverse 3, 4 and 5 setting the valve timing as described.
- 27 Set the tappet clearances to 0,15 mm (0.006 in.) for inlet valves and 0,25 mm (0.010 in.) for exhaust valves in the following order:
Set No. 1 tappet with No. 6 valve fully open.
Set No. 2 tappet with No. 5 valve fully open.
Set No. 3 tappet with No. 4 valve fully open.
Set No. 4 tappet with No. 3 valve fully open.
Set No. 5 tappet with No. 2 valve fully open.
Set No. 6 tappet with No. 1 valve fully open.
- 28 Reverse 1 and 2 and fit the rocker covers.
- 29 Check, and if necessary, reset the inlet valves tappet clearances with the engine at normal running temperature.

DATA

Tappet clearances:

Inlet	0,15 mm (0.006 in.).
Exhaust	0.25 mm (0.010 in.).

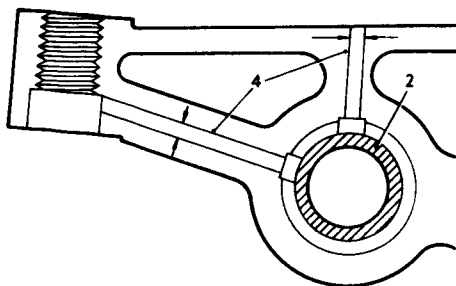
INLET VALVE ROCKERS

Replace Bush

12.29.55

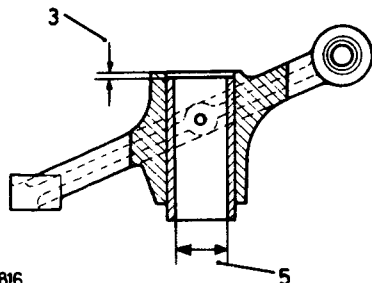
Replacing bush

- 1 Remove the rockers and shafts. 12.29.35.
- 2 Press out the bush from the rocker.



IRC 222B

- 3 Press in the replacement bush to 0,25 mm to 0,50 mm (0.010 in. to 0.020 in.) below the thrust face of the rocker.



IRC 816

- 4 Using the holes in the rocker as guides, drill oil holes 1,58 mm (0.062 in.) and 2,77 mm (0.109 in.) diameter in the bush.
- 5 Ream the bush to 12,5 mm + 0,025 mm (0.500 in. + 0.001 in.).
- 6 Reverse 1.

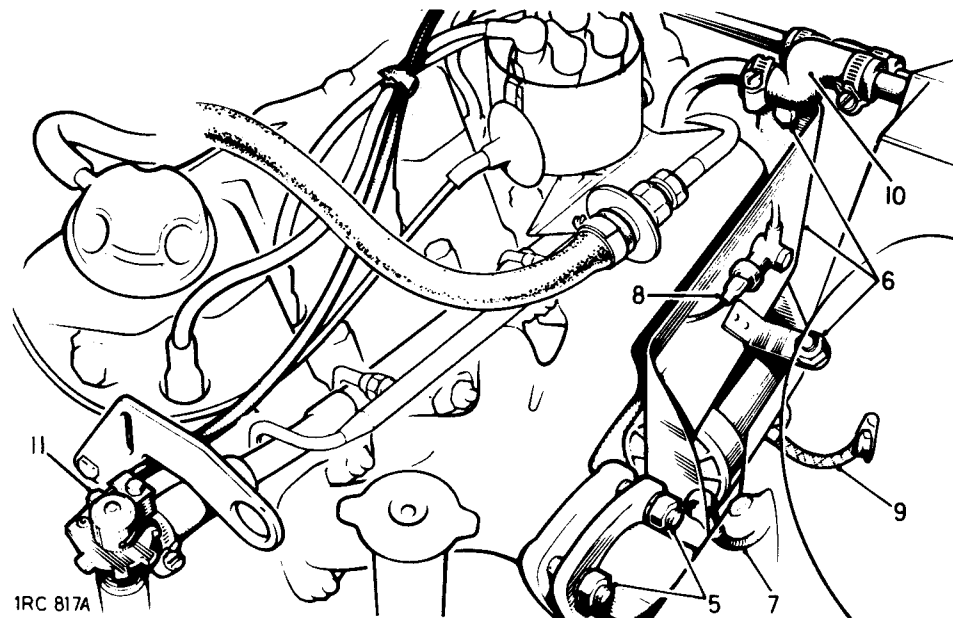
ENGINE ASSEMBLY

Remove and refit

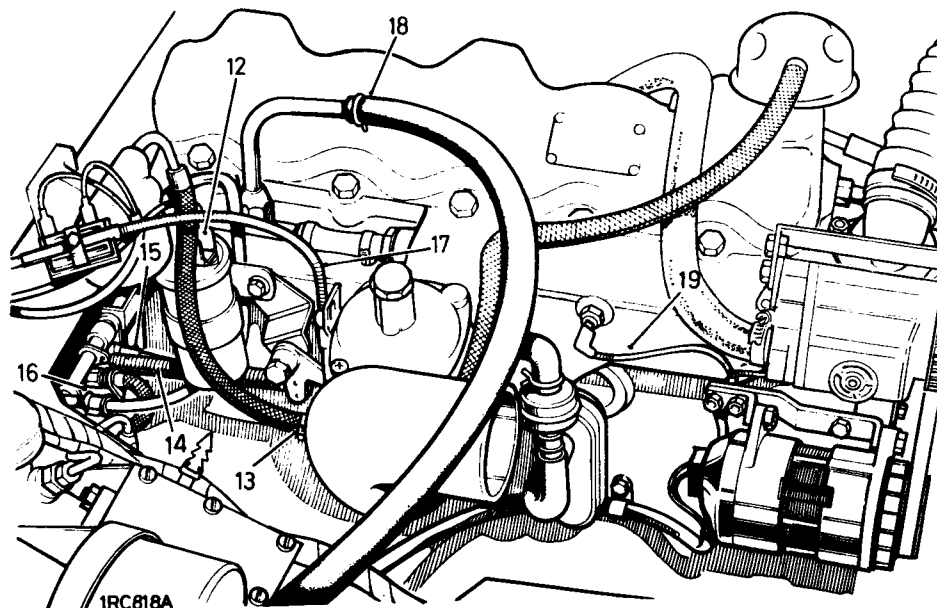
12.41.01

Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Disconnect the battery earth lead.
- 3 Remove the radiator and grille panel. 26.40.01.
- 4 Remove the gearbox tunnel cover. 76.25.07.
- 5 Disconnect the front exhaust pipe from the manifold.
- 6 Remove the exhaust heat shield.
- 7 Disconnect the starter lead at the solenoid.
- 8 Disconnect the oil pressure and water temperature wires from the multi-plug on the main harness by the clutch pedal box, remove from the clip and release the harness clip from the air pipe.
- 9 Disconnect the engine earth cable at the chassis side-member.
- 10 Where fitted, disconnect the heater hoses.
- 11 Where fitted, disconnect the control cable at the heater water valve.
- 12 Disconnect the switch lead and HT lead at the ignition coil.
- 13 Disconnect the fuel feed at the filter.
- 14 Release the accelerator return spring.
- 15 Disconnect the accelerator linkage at the spring loaded bell crank lever.
- 16 Remove the fixings securing the clutch hose and speedometer cable bracket at the flywheel housing.
- 17 Disconnect the cold start control cables at the carburettor.
- 18 Detach the servo hose at the manifold pipe.
- 19 Remove the alternator lead from the solenoid.
- 20 Untape and remove the white wire from the throttle jack.
- 21 Remove the ignition coil from the bulkhead.

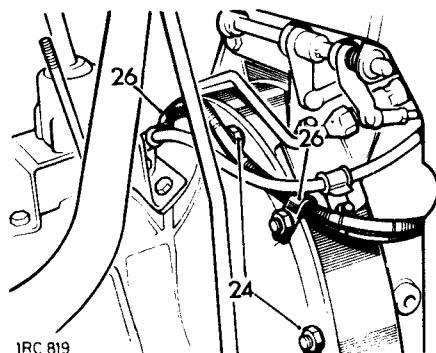


IRC 817A



IRC 818A

- 22 Support the engine weight, using a suitable lifting sling.
- 23 Remove the engine front mountings upper and lower fixings.
- 24 Support the gearbox, using suitable packing blocks or a jack, and remove the bell housing to flywheel housing fixings.
- 25 Pull the engine forward sufficient to disengage the drive from the gearbox.



- 26 Ensure that all cables, pipes etc. are clear then hoist the engine from the vehicle.

Refitting

- 27 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.
- 28 Engage a gear to prevent gearshaft rotation and offer the engine to the gearbox. If necessary, rotate the engine sufficient to align the gearbox primary pinion with the clutch plate splines.
- 29 When aligned, push the engine fully to the rear and secure the bell housing to the flywheel housing, tightening the fixings evenly.
- 30 Lift the engine sufficient to remove the packing or jack from beneath the gearbox and insert the engine front mounting rubbers.
- 31 Reverse 1 to 23.

FLYWHEEL

Remove and refit

12.53.07

Removing

- 1 Remove the front floor. 76.10.12.
- 2 Remove the seat base. 76.70.06.
- 3 Remove the engine assembly. 12.41.01.
- 4 Remove the clutch assembly. 33.10.01.
- 5 Remove the flywheel.

Refitting

- 6 Fit the flywheel to the crankshaft and tighten the securing bolts. Torque: 8,5 to 9,0 kgf. m (60 to 65 lbf. ft.).
- 7 Mount a dial test indicator to read off the flywheel face.
- 8 Check the run-out on the flywheel face, this must not exceed 0,05 mm (0.002 in.).
- 9 If the run-out is excessive, remove the flywheel and investigate the cause.
- 10 Reverse 1 to 4.

FLYWHEEL

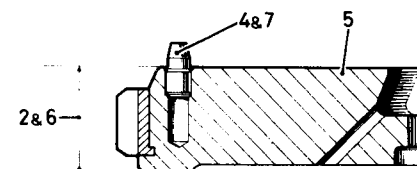
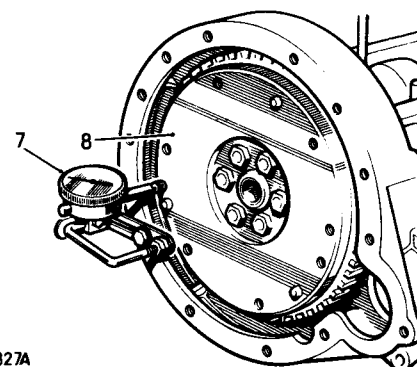
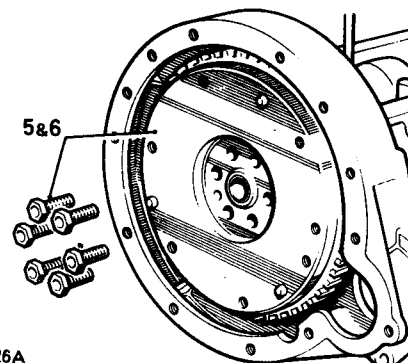
Overhaul

12.53.10

Procedure

Wear or scoring on the flywheel pressure face may be corrected by machining, providing that the overall thickness of the flywheel is not reduced below 30,5 mm (1.204 in.).

- 1 Remove the flywheel. 12.53.07.
- 2 Check the overall thickness of the flywheel, as it may have been previously machined.
- 3 If the flywheel is above the minimum thickness, the clutch face can be refaced as follows:
- 4 Remove the dowels.
- 5 Reface the flywheel over the complete surface.
- 6 Check the overall thickness of the flywheel to ensure that it is still above the minimum thickness.
- 7 Fit the dowels.
- 8 Refit the flywheel. 12.53.07.



1RC 829

STARTER RING GEAR

Remove and refit

12.53.19

Removing

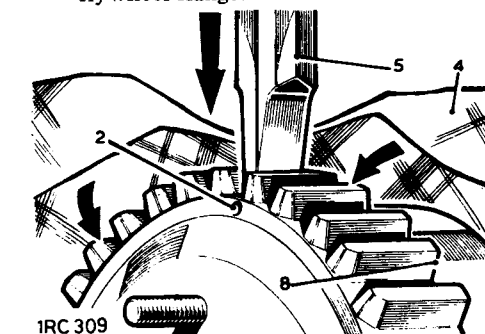
- 1 Remove the flywheel. 12.53.07.
- 2 Drill an 8 mm (0.312 in.) diameter hole axially between the root of any tooth and the inner diameter of the starter ring sufficiently deep to weaken the ring. DO NOT allow the drill to enter the flywheel.
- 3 Secure the flywheel in a vice fitted with soft jaws.
- 4 Place a cloth over the flywheel to protect the operator from fragments.

WARNING: Take adequate precautions against fragments as the starter ring may break asunder when being split.

- 5 Place a chisel immediately above the drilled hole and strike it sharply to split the starter ring.

Refitting

- 6 Heat the starter ring gear uniformly to between 225°C and 250°C (437°F and 482°F) but do not exceed the higher temperature.
- 7 Place the flywheel, flanged side down, on a flat surface.
- 8 Locate the heated starter ring gear in position on the flywheel with the square edge of the teeth against the flywheel flange.



1RC 309

- 9 Press the starter ring gear firmly against the flange until the ring contracts sufficiently to grip the flywheel.
- 10 Allow the flywheel to cool gradually. DO NOT hasten cooling in any way.
- 11 Refit the flywheel. 12.53.07.

SPIGOT BEARING

Remove and refit 12.53.20

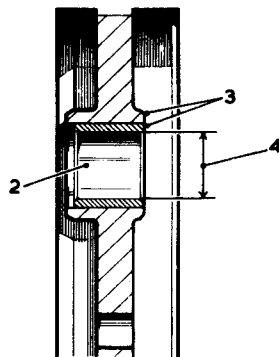
Removing

- 1 Remove the flywheel. 12.53.07
- 2 Press the spigot bearing from the flywheel.

Refitting

- 3 Press in the new spigot bearing flush with the clutch side of the flywheel.
- 4 Ream the spigot bearing to 22,237 mm to 22,242 mm (0.8755 in. to 0.8757 in.).
- 5 Refit the flywheel. 12.53.07.

IRC 311

**OIL FILTER ASSEMBLY, EXTERNAL**

Remove and refit 12.60.01

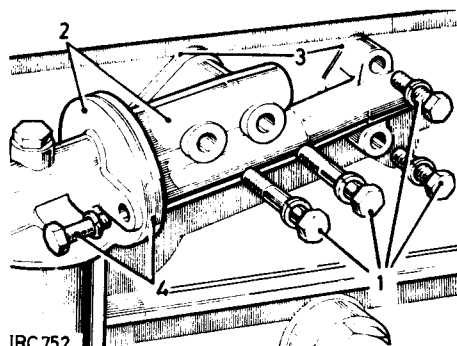
Removing

- 1 Remove the fixings, oil filter adaptor to cylinder block.
- 2 Withdraw the oil filter assembly complete with adaptor.
- 3 Withdraw the front and rear joint washers.
- 4 If required, remove the fixings and detach the filter body from the adaptor; withdraw the joint washer.

Refitting

- 5 Reverse 4 as necessary. Torque 3,45 kgf m (25 lbf ft).
- 6 Reverse 1 to 3.
- 7 Replenish the lubricating oil as necessary.

IRC 752

**OIL STRAINER**

Remove and refit 12.60.20

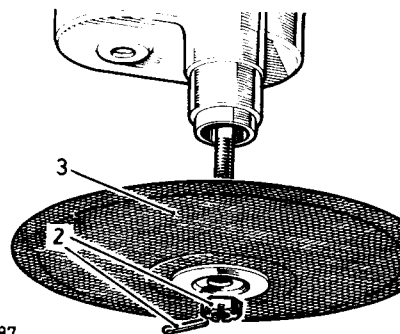
Removing

- 1 Remove the oil sump. 12.60.44.
- 2 Remove the strainer fixings.
- 3 Withdraw the strainer from the oil pump.

Refitting

- 4 Wash the strainer, using clean fuel.
- 5 Reverse 1 to 3.

IRC 787

**OIL PUMP**

Remove and refit 12.60.26

Removing

- 1 Remove the oil sump. 12.60.44.
- 2 Remove the relief valve retainer and joint washer.

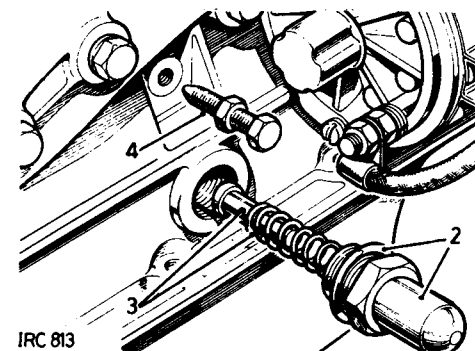
NOTE: Take care to retain the steel ball which is freed from the oil pump relief outlet.

- 3 Withdraw the spring and plunger.
- 4 Remove the oil pump locating screw.
- 5 Withdraw the oil pump and strainer assembly from the engine.

Refitting

- 6 Offer the oil pump assembly to the engine and align the pressure relief valve housing and the locating screw bore with the respective tappings in the engine block.
- 7 Reverse 1 to 5.

IRC 813

**OIL PUMP**

Overhaul 12.60.32

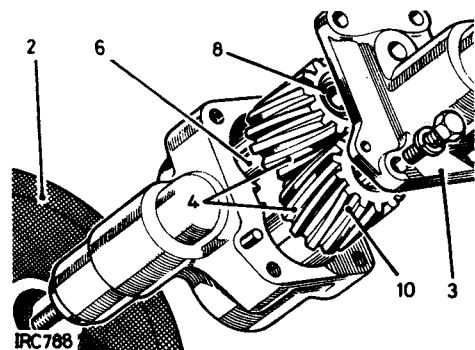
Dismantling

- 1 Remove the oil pump. 12.60.26.
- 2 Remove the oil pump strainer.
- 3 Remove the oil pump body.
- 4 Lift out the pump gears.

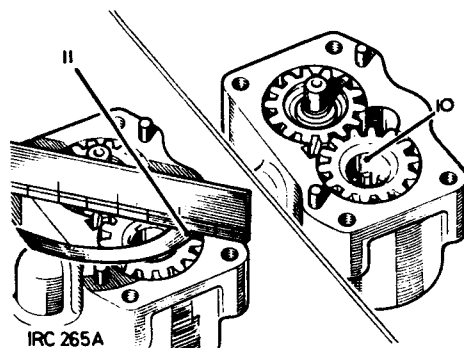
Inspecting and replacement

- 5 Clean all parts and examine for wear.
- 6 If required, unscrew and replace the idler gear spindle in the pump cover.
- 7 If required, replace the drive shaft bush at the top of the pump body. Press the replacement bush into the body and ream in position to 14,28 mm + 0,02 mm (0.5625 in. + 0.001 in.). Ensure correct alignment with the bore at the bottom end of the pump body; the bush should be a light drive fit.

IRC 814



- 8 If required, replace the bush in the idler gear. Drill the oilway 3,0 mm (0.125 in.) diameter then ream the bush, in position, to 12,7 mm + 0,02 mm (0.500 in. + 0.001 in.) in diameter.
- 9 Fit the idler gear to the spindle.
- 10 Fit the driving gear with the plain part of the gear bore uppermost.
- 11 Using a straight edge and feeler gauges, check the gears end-float which should be:
 - Driving gear: 0,05 to 0,12 mm (0.002 to 0.005 in.).
 - Idler gear: 0,07 to 0,15 mm (0.003 to 0.006 in.).
- 12 Reverse 1 to 3.



TIMING GEAR COVER AND OIL SEAL

Remove and refit	
Gear cover 1 to 9	12.65.01
Oil seal	12.65.05

Service tool: 530102 Spanner for starter dog

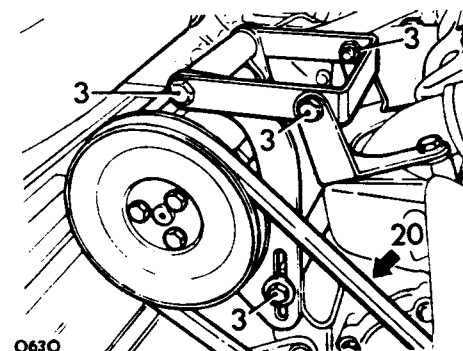
NOTE: On initial assembly of the engine, the mud shield around the oil seal is rivetted in position but after removal in service the rivets are substituted with self tapping drive screws. Where drive screws are fitted, it may be possible to renew the seal without removing the timing gear cover.

AT 7, if the mud shield is fitted with drive screws, the screws may be removed and the oil seal extracted.

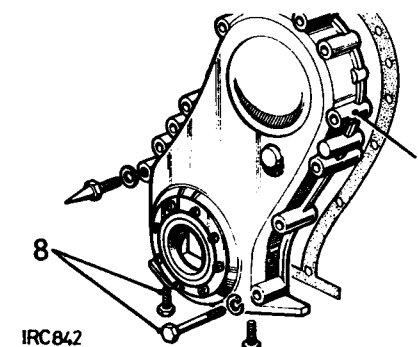
On fitting a new seal, the mud shield should be allowed to finally pull the seal into position to ensure a positive location.

Removing

- 1 Remove the bonnet. 76.16.01.
- 2 Remove the fan blades and radiator front panel assembly. 26.40.01.
- 3 Slacken the air pump fixings and remove the drive belt.
- 4 Slacken the alternator fixings and remove the fan belt.



- 5 Remove the alternator adjusting link.
- 6 Remove the starter dog using 530102.
- 7 Withdraw the crankshaft pulley. At this point, see note above and if the mud shield is rivetted:
- 8 Remove the timing cover fixings, including those at the sump front face.
- 9 Taking care not to damage the sump joint, carefully withdraw the timing cover and gasket.

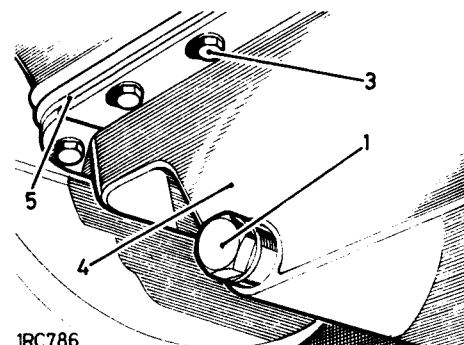


OIL SUMP

Remove and refit 12.60.44

Removing

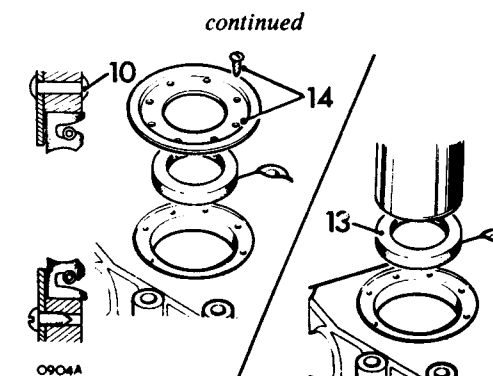
- 1 Remove the sump plug and drain off the lubricating oil.
- 2 Withdraw the dipstick.
- 3 Remove the fixings at the sump flange.
- 4 Lower the sump to clear the oil strainer and withdraw.
- 5 Withdraw the sump joint washer.



Refitting

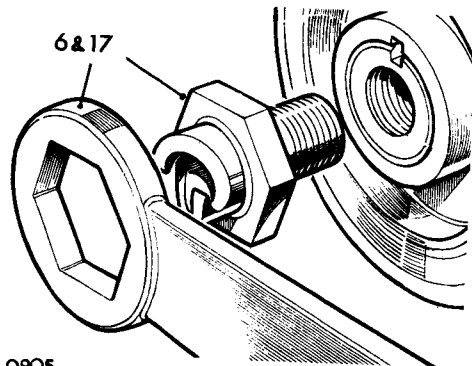
- 6 Reverse 4 and 5, using a new sump joint washer.
- 7 Reverse 3, fitting the two 5/16 in. UNC bolts into the timing gear cover tappings.
- 8 Reverse 1 and 2.
- 9 After 1600 km (1000 miles) running, recheck sump bolts for correct torque as follows:
- 10 Slacken each bolt in turn approximately one flat, then retighten to 1,65 kgf m (12 lbf ft).

- 10 Drill out the rivets securing the oil seal mud shield.
- 11 Press out the oil seal and clean the mating surfaces.
- 12 Smear the outside diameter of a new oil seal with Hylomar Pl 32/M jointing compound.
- 13 Press the oil seal into the timing cover.
- 14 Coat the drive screws with Hylomar and fit and secure the mud shield.



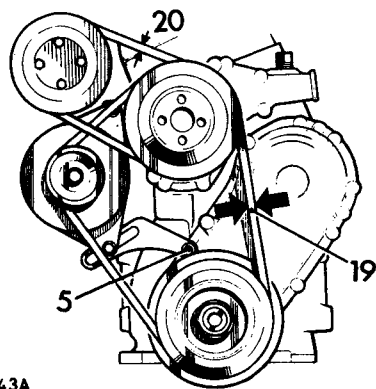
Refitting

- 15 Smear general purpose grease on both sides of the cover joint washer.
- 16 Reposition the cover on the engine and refit the fixings.
- 17 Fit the starter dog. Torque: 27,65 kgf. m (200 lbf. ft.).



0905

- 18 Fit the alternator adjusting link.
- 19 Refit the fan belt and adjust.
- 20 Refit the air pump drive belt and adjust.
- 21 Reverse 1 to 3.



IRC 843A

TIMING CHAIN GEARS**Remove and refit**

12.65.12

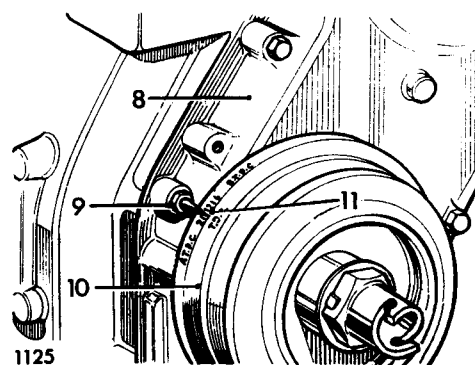
Service tool: 507231 Extractor for chain-wheel

Removing

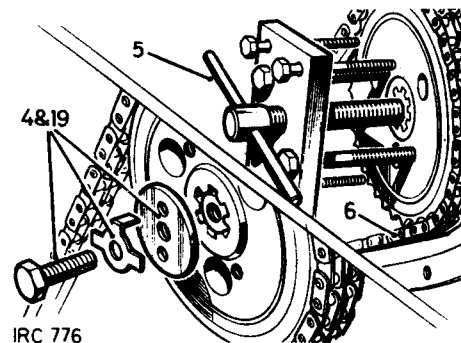
- 1 Remove the radiator and front panel. 26.40.01.
- 2 Remove the timing gear cover. 12.65.01.
- 3 Remove the timing chain tensioner. 12.65.28.
- 4 Remove the camshaft chainwheel fixings.
- 5 Extract the camshaft chainwheel, using 507231, together with the crankshaft chainwheel.
- 6 Withdraw the chain from the chainwheels.
- 7 Replace the chain vibration damper if the rubber facing is worn.

Refitting, including valve timing procedure

- 8 Temporarily fit the timing gear cover, using fixings sufficient to retain it on the dowels.
- 9 Fit the timing pointer to the cover.
- 10 Temporarily fit the pulley to the crankshaft, engaging the keyway and key.
- 11 Rotate the crankshaft to align the TDC mark on the pulley with the timing pointer.

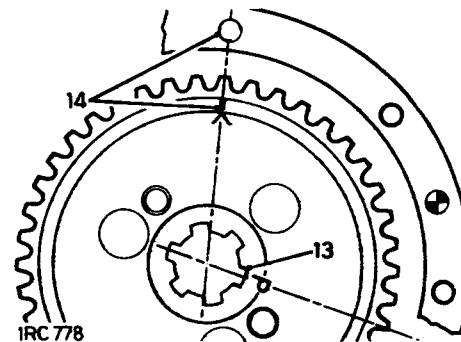


1125



IRC 776

- 12 Remove the crankshaft pulley and timing gear cover without disturbing the crankshaft position.
- 13 Temporarily fit the camshaft chainwheel, engaging the keyway marked 'P'.
- 14 Rotate the camshaft to position the groove marked 'A' in line with the centre line of the top fixing hole for the gear cover. Remove the chainwheel without disturbing the camshaft position.
- 15 Fit the crankshaft chainwheel, chamfered bore first, to just engage the crankshaft inner key.



IRC 778

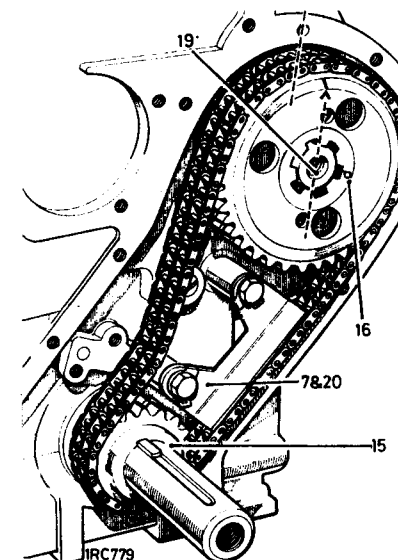
DATA

Clearance, timing chain to chain vibration damper

- 16 Position the chain on the chainwheels, aligning the keyway 'P' with the camshaft key and with 'no slack' at the driving side of the chain.
- 17 Fit the camshaft chainwheel and chain.
- 18 Lightly tap home the chainwheels.

NOTE: It is important that the timing chain has no slack at the driving side. Slightly offset keyways are provided in the camshaft chainwheel to enable adjustment to be made, if required, provided that the crankshaft and camshaft relationship is not disturbed.

- 19 Fit and lock the camshaft chainwheel fixings.
- 20 If required, adjust the chain vibration damper position to allow 0,05 mm to 0,25 mm (0.002 in. to 0.010 in.) clearance with the chain.
- 21 Reverse 2 and 3. Torque load for starting dog fixing is 27,5 kgf. m (200 lbf. ft.).
- 22 Reverse 1.



IRC 779

0,05 mm to 0,25 mm (0.002 in. to 0.010 in.)

TIMING CHAIN TENSIONER

Remove and refit

12.65.28

Removing

- 1 Remove the radiator and front panel. 26.40.01.
- 2 Remove the timing gear cover. 12.65.01.
- 3 Remove the tensioner retaining bolts and spring washers.
- 4 Remove the tensioner and backplate between the tensioner body and cylinder block.

Dismantling

- 5 Press in the slipper and remove it from the tensioner body.
- 6 Remove the ratchet and spring.

Examination

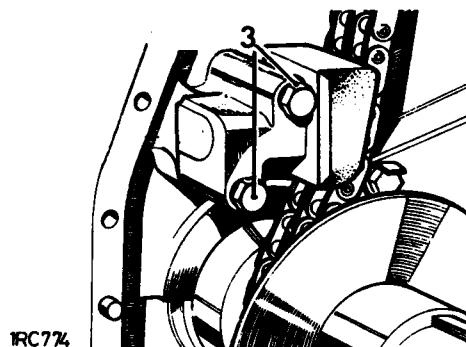
- 7 Check the slipper pad for wear, and renew if necessary.
- 8 Examine the ratchet for wear and renew if suspect.
- 9 Check the spring and renew if broken or suspect.
- 10 Examine the tensioner body and check that the oil inlet hole is clear.

Reassembling

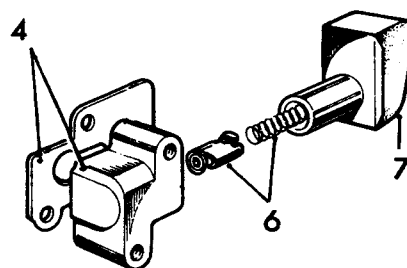
- 11 Insert the spring into the slipper bore.
- 12 Fit the ratchet into the bore and turn clockwise with an Allen Key to lock it in a retracted position.
- 13 Fit the slipper assembly to the tensioner body.

NOTE: To prevent the tensioner releasing while fitting, insert a spacer between the tensioner body and the back of the slipper.

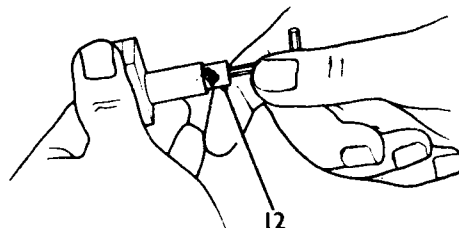
- 14 Fit the tensioner assembly and backplate to the cylinder block taking care not to allow the tensioner to release. Secure with the two bolts and spring washers.
- 15 Ensure correct location of the chain guide.
- 16 Reverse 1 and 2.



1RC74



1RC775



PT2 301

EMISSION AND EVAPORATION CONTROL SYSTEM

Introduction

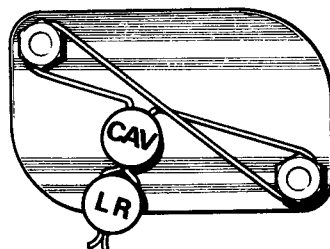
17.00.00

Land Rover models are equipped with emission control features designed to comply with all current regulations for the particular sales market; however, due to varying regulations between different countries all of the features described may not be applicable to or incorporated on a particular model.

Three independent and separate systems are employed for emission control, namely crankcase emission control, evaporative loss control and exhaust emission control as described subsequently.

2½ litre Diesel

In certain countries, the exhaust gas emitted from Diesel engine vehicles must conform with smoke density regulations. Land Rover models supplied for these countries are tested during manufacture to ensure conformity with these regulations and, when satisfactory, a seal is attached to the fuel injection pump adjacent to the pump manufacturer's seal. In countries where the exhaust smoke density regulations apply, any work undertaken on Diesel engines or Diesel fuel systems which might influence the smoke density must be followed by the required tests in accordance with the current regulations.



1RC 974

EMISSION SYSTEMS—FAULT DIAGNOSIS

The following symptoms indicate possible malfunction of the emission control devices fitted to the Land Rover:

- Violent backfire in exhaust system.
- Hesitation to accelerate on re-opening the throttle after throttle closure.
- Engine idles erratically or stalls.
- Engine misfire.
- Engine stops after short running periods (fuel starvation).
- Lack of power.
- High fuel consumption.
- Ignition warning light on above idle speed (slack or broken fan belt).
- Smell of fuel vapours.
- High temperature indicated (overheating of coolant).

Four basic visual checks, listed below, should be made initially.

- Drive belt condition and adjustment.
- All hoses for security, damage or deterioration.
- Fuel leakage and fuel filler cap for sealing.
- Oil filler cap for sealing.

If the symptom(s) persist(s), refer to the charts on the following pages for possible causes, checks and remedies.

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
A—Difficult starting engine cold	Fuel starvation	
	1. Float chamber fuel level too low.	(a) Check needle valve for sticking in seat. Clean as necessary to remove any deposits, using methylated spirits. (b) Check float level setting. Reset as necessary. (c) Blocked fuel filter. Renew as necessary. (d) Air leakage in crankcase emission control system.
	2. Choke butterfly not fully closing.	(a) Check for broken or detached spring on choke operating lever. Renew as necessary. (b) Friction between choke spindle bearings due to carbon deposits, or choke spindle distortion. Clean or renew as necessary. (c) Choke butterfly fouling in carburetter due to misalignment. Adjust as necessary. (d) Choke cable securing screw on lever swivel loose. Tighten securing screw with the choke control pushed fully in and the choke butterfly open.
	3. Throttle closed against throttle stop screw with choke butterfly closed.	(a) With the choke butterfly closed, the throttle should be open slightly beyond the normal slow run position. Check for distortion of the interconnecting link between choke and throttle linkage. Adjust or renew as necessary.
	4. Crankcase ventilation system. 5. Carburetter throttle prop lever jammed open.	(a) Check as in H 1 (a). (b) Check as in E 5 (a).
B—Difficult starting engine hot	Mixture over-rich	
	1. Float chamber fuel level too high.	(a) Check float level setting. Reset as necessary. (b) Check for leakage past needle valve and seating. Check-tighten seating housing. (c) Check needle valve and seat size. Renew as necessary.
	2. Internal leakage	(a) Check that sealing 'O' ring is present around venturi spigot and is sound. Renew as necessary.
	3. Adsorption canister flooded.	(a) Check air inlet for blockage. Renew adsorption canister.
	4. Distributor. 5. Distributor condenser and ignition coil.	(a) Check as in C 6 (a). (a) Check as in J 5 (a).
C—Engine will not idle or run smoothly	1. Manifold bolts.	(a) Check inlet and exhaust manifold bolts for security. Tighten as necessary. (b) Check carburetter to manifold joint for air leaks. Renew gaskets and tighten carburetter fixings as necessary.
	2. Cylinder head bolts.	(a) Check tightness of cylinder head bolts to specified torque figures.
	3. Carburetter adjustment.	(a) Check carburetter slow running adjustment. Adjust as necessary.

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
C — cont.	4. Carburetter solenoid valve sticking closed.	(a) Check electrical feed lead is sound and terminals clean and secure. Renew lead as necessary. (b) Remove electrical lead at solenoid. With ignition switch 'ON', touch solenoid lead against the solenoid terminal connection. A 'click' will indicate that the valve is operating. If in doubt, proceed to (c) below. (c) Remove solenoid valve from carburetter. Switch ignition 'ON' and earth the solenoid valve body at a convenient point on the engine block. The solenoid valve spindle should withdraw into the valve body when energised. Where solenoid renewal is required, fit a new solenoid valve assembly complete.
	5. Adsorption canister flooded.	(a) Check air inlet for blockage. Renew adsorption canister.
	6. Distributor.	(a) Check condition of contact points. Reset gap to 0,35 to 0,40 mm. (0.014 to 0.016 in.). Renew contact points if badly burnt or pitted. (b) Check condition of distributor vacuum pipe and connections for leaks. Rectify as necessary.
	7. Ignition leads and wiring.	(a) Inspect ignition leads for fraying, chafing or deterioration. Check Lucar connections and fixings for security. (b) Check high tension leads for security and corrosion. Renew as necessary.
	8. Spark plugs.	(a) Check condition of spark plugs. If satisfactory reset gap to 0,75 to 0,80 mm (0.029 to 0.032 in.).
	9. Crankcase ventilation system.	(a) Check as in H 1 (a).
	D—Engine 'runs on' after ignition switched 'OFF'	(a) Check as in C 4 (b). (b) Remove solenoid valve from carburetter. Check valve is free to return under its spring loading with the solenoid de-energised. Where solenoid renewal is required, fit a new solenoid valve assembly complete.
		(c) If the solenoid valve functions correctly, check valve seat in carburetter for foreign matter which could prevent the valve from seating correctly.
	2. Ignition timing.	(a) Check in E3 (a).
E—Erratic slow running and stalling	Partial fuel starvation	(a) Check as in A 1 (a). (b) Check slow-run jet, slow-run fuel passages and slow-run air intake orifice for obstruction. Clean as necessary, take care not to alter jet or orifice sizes. (c) Check idle volume control outlet hole for obstruction. Clean as in (b) above. (d) Check volume control (mixture) screw conical end is not worn or malformed. Check screw locknut is sound and effectively retains screw in position when fitted. Renew as necessary.
	1. Fuel passages or jets obstructed.	(a) Check as in C 3 (a).
	2. Carburetter adjustment.	

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
E — cont.	3. Distributor.	(a) Check ignition timing using electronic equipment. Adjust if necessary. (b) Check as in C 6 (b). (c) Check distributor advance and retard mechanism using electronic equipment. Rectify as necessary.
	4. Crankcase ventilation system. Sudden increase in engine idling speed	(a) Check as in H 1 (a).
	5. Carburetter throttle prop lever.	(a) Check that the carburetter throttle prop lever has not jammed in the open position due to foreign matter on the lever spindle. Clean off foreign matter and check operation.
	6. Carburetter vacuum unit or 7. Valve clearances or trigger valve (Excessive valve clearance will give increased idling vacuum).	(a) Disconnect the pipe between the trigger valve and carburetter vacuum unit. If engine idle speed does not decrease immediately, the vacuum unit is faulty. Renew the vacuum unit. (b) Check inlet and exhaust valve clearances. Set to 0,25 mm (0.010 in.), engine hot. Recheck engine idling speed. If idling speed has not decreased, fault lies within the trigger valve. Renew trigger valve.
F—Excessive fuel consumption (Smell of fuel vapours)	1. Choke butterfly not in fully open position during normal running.	(a) Check linkage from dash panel control to carburetter. Re-set choke cable as necessary.
	2. Economy device not functioning correctly.	(a) Check-tighten diaphragm cover fixing screws. (b) Check condition of diaphragm and gaskets. Renew as necessary. If renewing diaphragm, also fit new diaphragm spring.
	3. Needle valve and seating leaking or oversize.	(a) Check and remedy as under B 1 (b) and (c).
	4. Plunger sticking in on throttle controlled vacuum switch.	(a) Renew switch.
	5. Float chamber leaking.	(a) Check for fuel leakage from float chamber. Renew gasket if necessary.
	6. Fuel system.	(a) Check all fuel pipes, joints and connections for leaks. Rectify as necessary.
	7. Adsorption canister flooded.	(a) Check air inlet for blockage. Renew adsorption canister.
G—Poor acceleration	1. Accelerator linkage.	(a) Check for correct operation of accelerator linkage between pedal and carburetter. Lubricate and rectify as necessary.
	Partial fuel starvation	
	2. Accelerator pump sticking.	(a) Check piston assembly moves freely in its housing bore and will fully return under the spring loading. Clean piston bore also clean non-return valve and seating at base of pump housing bore.
	3. Accelerator pump jet and orifice blockage.	(a) Check pump jet is not obstructed. Clean as necessary. (b) Ensure 'progression' holes in throttle bore adjacent to throttle edge are clear and not obstructed. Clean as necessary, do not enlarge holes. (c) Ensure economy diaphragm assembly is sound. Renew as necessary.

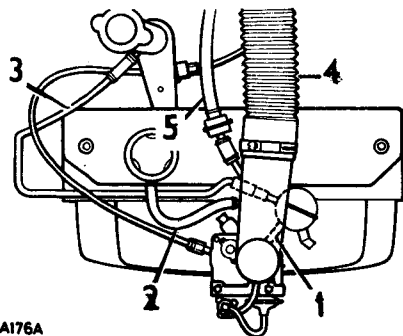
SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
G – cont.	4. Plunger sticking in on throttle-controlled vacuum switch. 5. Fuel passages or jets obstructed. 6. Fuel filter.	(a) Renew switch. (a) Check as in E 1 (a), (b), (c) and (d). (a) Check fuel filter for blockage. Renew as necessary.
H—Loss of power	1. Crankcase ventilation system. 2. Air cleaner. 3. Carburetter fuel passages obstructed. 4. Throttle not fully opening. 5. Distributor. 6. Spark plugs. 7. Inlet and exhaust valves.	(a) Check for blockage or deterioration and security of hoses and oil filler cap, also hoses on the carburetter throttle prop system. Renew any hose as necessary. (a) Check air cleaner filter for blockage. Clean the filter in petrol and renew the oil in the bowl. (a) Check emulsion block jets and passages for obstruction. Clean as necessary. Note: Do not fit larger jets to this carburetter otherwise exhaust emission regulations will be contravened. (a) Check linkage from accelerator to carburetter. (a) Check as in C 6 (a) and (b). (b) Check as in E 3 (a) and (c). (a) Check as in C 8 (a). (a) Check as in G 9 (a).
J—Engine misfire	Partial fuel starvation 1. Float chamber fuel level too low 2. Fuel passages or jets obstructed. 3. Spark plugs. 4. Distributor. 5. Distributor condenser and coil. 6. Ignition wiring. 7. Inlet and exhaust valves.	(a) Check as in A 1 (a), (b), (c) and (d). (a) Check as in E 1 (b), (c) and (d). (a) Check as in C 8 (a). (a) Check as in C 6 (a). (a) Check with suitable electronic equipment for an electrical break-down on either the ignition coil or condenser. Renew as necessary. (a) Check as in C 7 (a) and (b). (a) Check as in G 9 (a).
K—Backfire in exhaust system	1. Weak mixture. 2. Crankcase ventilation system. 3. Carburetter mixture 4. Exhaust system. 5. Ignition timing.	(a) Check inlet manifold bolts for security. Tighten as necessary. (b) Check carburetter to manifold joint for air leaks. Renew gaskets and tighten carburetter fixings as necessary. (a) Check as in H 1 (a). (a) Check as in C 3 (a). (a) Check exhaust system for leaks. Renew components as necessary. (a) Check as in E 3 (a), (b) and (c).

CRANKCASE BREATHING SYSTEMS

Description 17.10.00
2½ litre Europe (Prior to October 1977) Fig. 2
2½ litre Australia Fig. 1

Fig. 1 Crankcase Breathing System—Australia

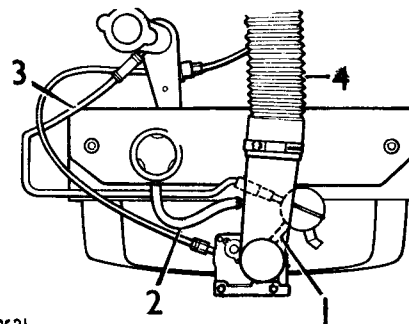
The 'blow-by' gases from the crankcase are vented into the combustion system to be burnt with the fuel/air mixture. This system provides positive emission control under all conditions. During engine running, crankcase fumes which may collect in the crankcase are vented to the carburettor and clean air is admitted through the top cover breather to assist in purging.



IRA176A

- 1 Hose—non return valve to carburettor.
- 2 Hose—top cover breather to air cleaner elbow.
- 3 Hose—oil filler to non return valve.
- 4 Hose—air cleaner to carburettor.
- 5 Hose—adsorption canister to air cleaner elbow.

Fig. 2 Crankcase Breathing System—Europe



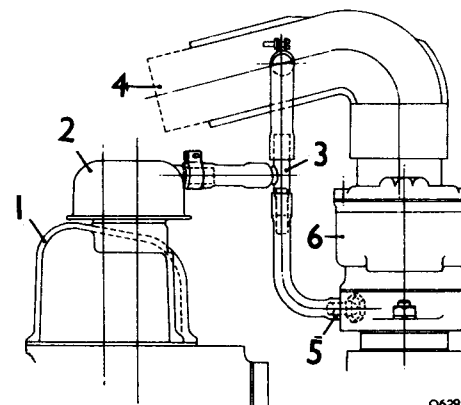
0631

- 1 Hose—non return valve to carburettor.
- 2 Hose—top cover breather to air cleaner elbow.
- 3 Hose—oil filler to non return valve.
- 4 Hose—air cleaner to carburettor.

Fig. 3 Crankcase Breathing System—Europe

2½ litre Europe (After October 1977)

Blow-by gases are vented to the intake system by connecting the top cover breather to the air intake elbow and carburettor adaptor.

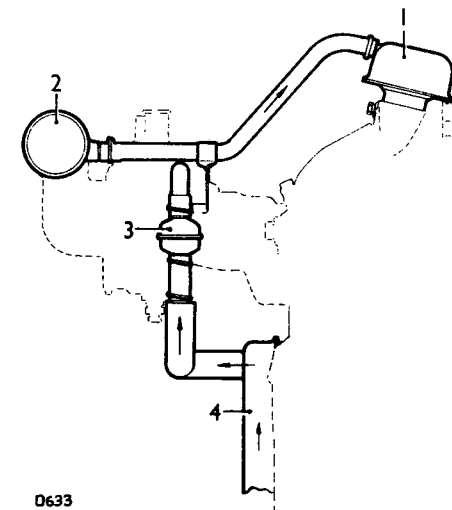


0629

- 1 Rocker cover.
- 2 Breather assembly.
- 3 Tee-piece.
- 4 Air intake.
- 5 Carburettor adaptor.
- 6 Carburettor.

Fig. 4 Crankcase Breathing System—2.6 litre Europe

Crankcase breathing and evacuation of 'blow-by' gases is achieved by utilizing the characteristic partial vacuum in the constant depression carburettor. By this method, crankcase emissions are burnt in the engine combustion process.



0633

- 1 Breather assembly.
- 2 Air intake.
- 3 Flame trap.
- 4 Crankcase breather cover.

ENGINE BREATHER FILTER

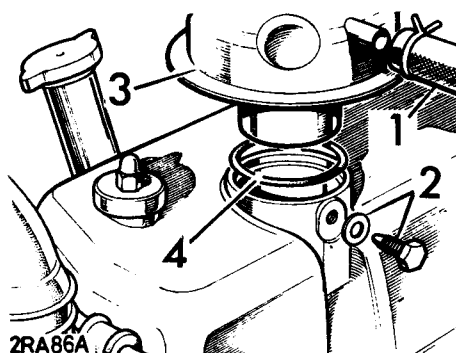
Remove and refit 17.10.02

Removing

- 1 Disconnect the breather hose.
- 2 Remove the securing bolt.
- 3 Remove the filter.
- 4 Remove the sealing ring.
- 5 Wash the gauze thoroughly by swilling the unit in petrol.
- 6 Re-wet the gauze by dipping it in clean oil and shake off the surplus.

Refitting

- 7 Reverse 1 to 4 above.

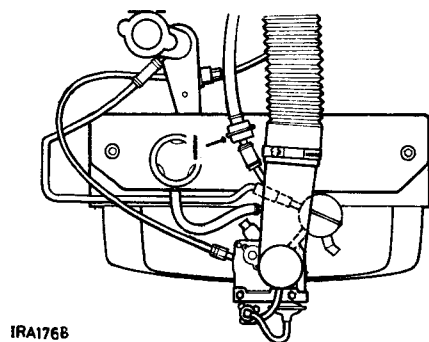


FLAME TRAP

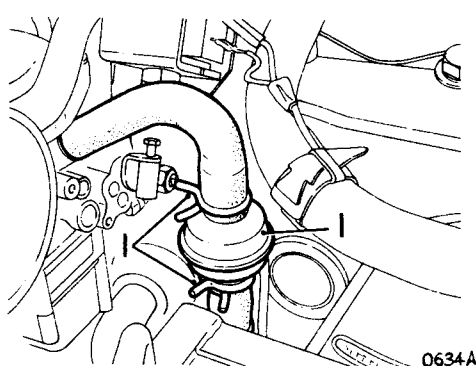
Remove and refit 17.10.03

- 1 Detach the rubber hose from each side of the flame trap by releasing the clips.
- 2 Withdraw the flame trap (1).
- 3 Fit a new flame trap and secure the clips.

Flame trap—2½ litre Australia



Flame trap—2.6 litre Europe



CRANKCASE EMISSION VALVE

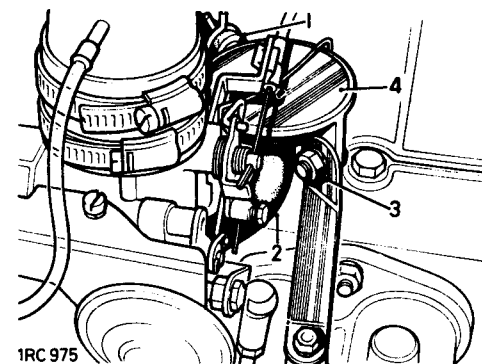
Remove and refit 17.10.09

Removing

- 1 Disconnect the inlet hose.
- 2 Disconnect the outlet hose.
- 3 Remove the fixings.
- 4 Withdraw the valve unit.

Refitting

- 5 Reverse 1 to 4.



CRANKCASE EMISSION VALVE

Overhaul 17.10.15

Dismantling

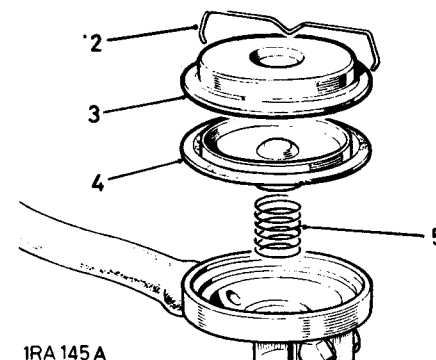
- 1 Remove the valve. 17.10.09.
- 2 Remove the spring clip retaining the cover.
- 3 Remove the cover.
- 4 Remove the diaphragm unit complete with orifice plunger.
- 5 Remove the diaphragm spring.
- 6 Clean orifices, control body and the cover in methylated spirits. (Ethanol).

NOTE: The diaphragm must not be cleaned with methylated spirits.

- 7 Check all components for damage or deterioration.

Reassembling

- 8 Replace the spring, locating it in the body.
- 9 Locate the diaphragm in the body and on to the spring.
- 10 Replace the cover and refit the spring clip. Ensure diaphragm is seating properly and the cover fits evenly to the body.
- 11 Warm up engine and adjust carburetter if necessary.

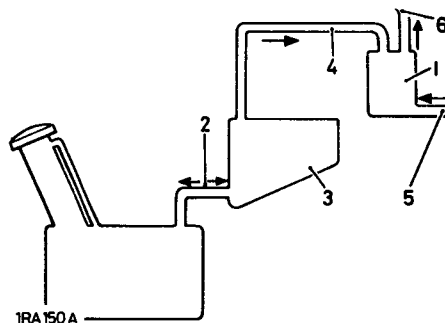


EVAPORATIVE LOSS CONTROL

Description 17.15.00

Fuel tank evaporative emissions are vented to an activated charcoal filled container where they are adsorbed, then vented through a flame trap to the combustion air intake system during engine running as follows:

- 1 A charcoal-filled adsorption container is situated in the engine compartment, to deal with evaporative emissions from the fuel tank.
- 2 From the main fuel tank there is a main tank breather pipe.
- 3 This is fed into a separate expansion tank.
- 4 From the expansion tank a further breather pipe leads to the charcoal container.
- 5 At the side of the container, an air inlet pipe is open to atmosphere.
- 6 From the top, a pipe leads to the carburettor air cleaner elbow.
- 7 Normal fuel tank breathing is through the air inlet pipe on the charcoal container and then through the two breather pipes via the expansion tank.
- 8 Any vapours from the fuel in the main or expansion tanks are fed via the main breather and expansion tank breather pipes into the charcoal container, where they are adsorbed on the charcoal and do not escape to atmosphere.
- 9 During engine accelerating conditions air is drawn in through the air inlet pipe at the side of the container, purging the trapped emissions into the engine through the carburettor air cleaner elbow.



1RA 150 A

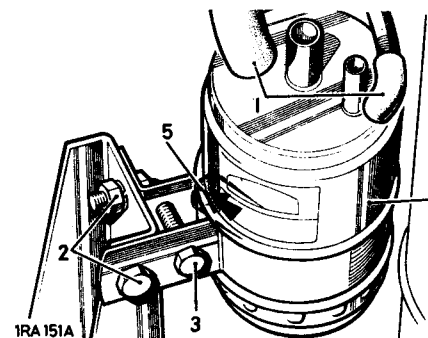
- 10 The function of the expansion tank is to provide an overflow reservoir for the main tank, as it is possible when the main tank is completely filled in high ambient temperature conditions for the fuel to expand and for a large quantity along the breather pipe. The size of the expansion tank allows for maximum fuel expansion; under such conditions evaporative emissions are still controlled by the charcoal and, due to the location of the breather pipe at the bottom of the expansion tank, the overflow fuel will eventually be drawn back into the main tank as fuel is used.

ADSORPTION CANISTER

Remove and refit 17.15.13

WARNING: No attempt should be made to cleanse the container. The use of compressed air could cause the activated charcoal filling to ignite.

- 1 Note the hose positions and disconnect at container.
- 2 Remove the fixings, container strap to mounting bracket.
- 3 Slacken the pinch bolt on the strap.
- 4 Withdraw and discard the canister.



Refitting

- 5 Reverse 1 to 4. Position the container such that the 'open-to-atmosphere' pipe faces inboard and toward the rear of the engine compartment.

EXHAUST EMISSION CONTROL

Description 17.20.00

Exhaust emission control is achieved by alterations to carburation and combustion characteristics, together with modifications to the distributor vacuum supply line and ignition timing procedure, as follows:

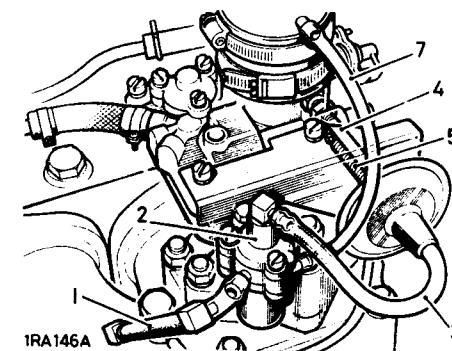
Carburettor jets

The carburettor is provided with main and enrichment jets having special flow characteristics. The jets are identifiable by their cadmium plated finish and they are not interchangeable with similar size jets with a natural finish.

Carburettor throttle-prop system

Under high manifold depression, that is, on engine overrun with rapid throttle closure, wet fuel is drawn off the inlet manifold walls and gives a rich air/fuel ratio and poor combustion. To compensate for this condition a system is employed of propping open the carburettor throttle butterfly to reduce the manifold depression and admit sufficient volume of the correct air/fuel mixture to give good combustion.

- 1 A trigger valve is connected to the inlet manifold via a pipe.
- 2 Under high manifold depression a vacuum is formed in the trigger valve lifting a diaphragm from its seat which is pre-set to lift at 20.5 to 21.5 in. Hg.
- 3 The depression is relayed via a pipe to a vacuum servo unit.



- 4 Attached to the vacuum unit is an adjusting rod.
- 5 A spring push/pull link is attached to the vacuum diaphragm.
- 6 The depression moves the vacuum unit diaphragm with subsequent movement of the spring link and throttle-prop lever which opens the throttle butterfly a small amount.
This position is maintained until the vacuum in the inlet manifold drops with the decrease in engine speed to approximately 19 in. Hg when the trigger valve diaphragm closes and movement of the vacuum unit closes the throttle butterfly.
- 7 An atmospheric bleed pipe from the air cleaner elbow to the trigger valve allows clean air at atmospheric pressure to replace the vacuum after closure of the trigger valve diaphragm.

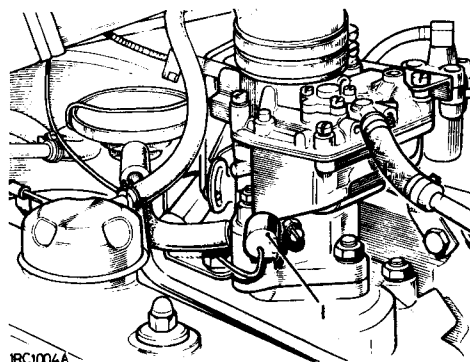
Accelerator pump linkage setting

- 1 The accelerator pump linkage is set in the position to give maximum pump stroke by connecting the throttle relay lever to the hole in the pump spindle lever which is nearest to the pump spindle.

Solenoid operated fuel cut-off valve

The idle speed of the 2¼ litre engine has been increased to 750-800 revs/min. This has been done to increase the air-flow past the throttle butterfly under closed throttle conditions.

- 1 To prevent running-on due to the high idle speed, a solenoid operated fuel cut-off valve has been incorporated in the carburettor.



- 2 This takes the form of a solenoid operated needle valve operating to cut-off the idle by-pass drilling and progression chambers when the ignition is switched off.
- 3 The solenoid is located externally on the carburettor body casting adjacent to the idling volume control screw and is electrically connected to the switch side (+) of the ignition coil.
- 4 The fuel cut-off valve is pre-set.

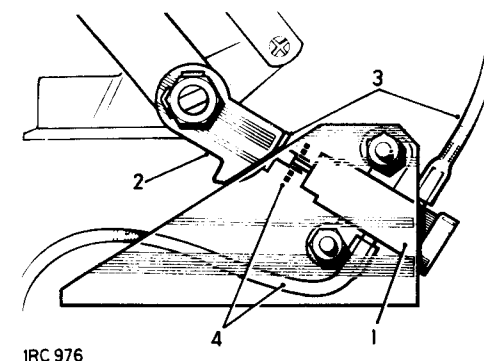
Fuel filter

The filter assembly, located between the carburettor and the fuel pump at the right-hand side of the engine, provides additional filtration to the fuel system. The filter mesh is sealed inside the filter body and no servicing is possible on the assembly; the filter assembly complete must be discarded at the stipulated maintenance intervals, or before if the presence of foreign matter is suspected in the fuel system, and a new assembly fitted.

Ignition system

A special ignition distributor provides a retarded ignition setting at the lower speed range whilst maintaining the normal advance characteristics at higher engine speeds. However, when the throttle is closed at higher engine speeds a retarded ignition is required, and is achieved by fitting a throttle controlled vacuum switch. The switch is interposed in the vacuum line between the inlet manifold banjo connection and the distributor vacuum retard capsule. A throttle-operated cam governs the switch position progressively from open to closed. At the open position (switch plunger out) the switch closes off the vacuum line and opens the distributor capsule to atmosphere which allows ignition to advance. At the closed position (switch plunger in) the switch opens the vacuum line to the distributor capsule, which retards the ignition.

- 1 The switch is interposed in the vacuum line between the inlet manifold banjo connection and the distributor vacuum retard capsule.
- 2 A throttle-operated cam governs the switch position progressively from open to closed.
- 3 At the open position (switch plunger out) the switch closes off the vacuum line and opens the distributor capsule to atmosphere which allows ignition to advance.
- 4 At the closed position (switch plunger in) the switch opens the vacuum line to the distributor capsule, which retards the ignition.



continued

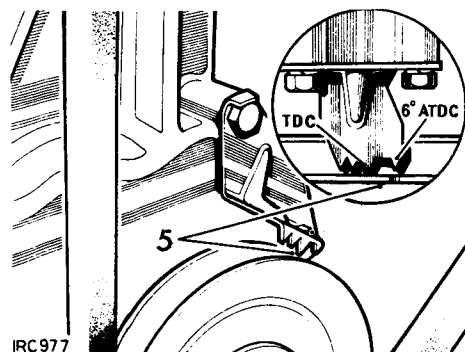
Ignition timing

To ensure correct combustion, and therefore compliance with the exhaust emission regulations, it is essential that the ignition timing is dynamically set with the engine at idling speed. This requires the use of a suitable tachometer, for determining the engine speed, and a stroboscopic lamp for determining the points in the engine cycle at which the ignition sparks occur.

Static ignition timing. TDC, may be used as an initial setting procedure after distributor remove and refit, but this must not be accepted as a final setting. The timing mark for the engine appears on the crankshaft pulley.

Procedure for dynamic ignition timing

- 1 Ensure that the throttle-controlled vacuum switch is correctly set and that all pipes to the switch are sound and correctly fitted.
- 2 Connect a stroboscopic timing light to the engine in accordance with the manufacturer's instructions. The HT connection should be made on No. 1 cylinder sparking plug.
- 3 Connect suitable electronic checking equipment following the manufacturer's instructions.
- 4 Set the engine idling speed to between 750 and 800 revs/min and as close to 800 revs/min as possible without exceeding this speed. This speed setting is extremely important and any deviation, particularly in an upwards direction, will cause incorrect timing and subsequent failure to pass the emission requirements.
- 5 Slacken the distributor clamping plate bolt and rotate the distributor until the stroboscopic light synchronises the timing pointer and the timing mark at 6° after top dead centre (ATDC).



- 6 Retighten the distributor clamping bolt securely and recheck timing.

- 7 Check distributor centrifugal advance curve to the following:

Distributor speed revs/min	Distributor degrees advance
1000	9-11
1600	14-16
2000	17-19

- 8 Check distributor vacuum retard curve:

Vacuum Inches Hg	Distributor degrees retard
1	0-0.5
2	0.5-3.0
3	2.5-3.5

- 9 Disconnect the stroboscopic timing light and electronic equipment.

THROTTLE CONTROLLED VACUUM SWITCH

Check and adjust items 4 to 7 17.20.24
Remove and refit items 1 to 3 17.20.25

Removing

- 1 Disconnect the vacuum pipes.
- 2 Remove the fixings and withdraw the switch.

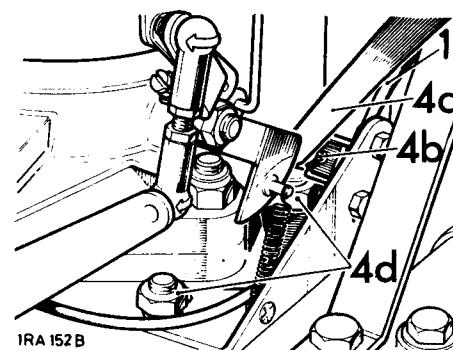
Refitting

- 3 Reverse instructions 1 and 2.

To check and adjust switch position

Check/adjust the throttle-controlled vacuum switch as follows:

- 4
 - a Ensure that the throttle linkage is fully returned to the idle position.
 - b Push the plunger fully into the switch and hold it in this position.
 - c Measure the clearance between the plunger and the cam on the throttle linkage. This must be 0.05 to 0.10 mm.
 - d Adjust as necessary by slackening the fixings, mounting bracket to inlet manifold, and moving the switch and bracket complete in the required direction.



- 5 Start the engine and warm it to normal running temperature.
- 6 When the engine is idling steadily, disconnect the retard pipe at the distributor. A noticeable rise in engine speed should be apparent if the system is functioning.
- 7 When satisfied that the facility is operating correctly, reconnect the vacuum pipe to the distributor, ensuring a secure connection.

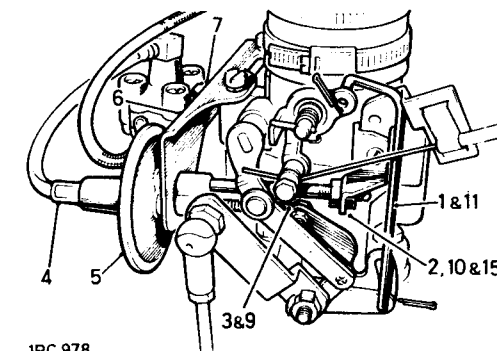
CARBURETTER THROTTLE PROP

Remove and refit

17.20.35

Removing

- 1 Remove the interconnecting link.
- 2 Remove the locknut from the diaphragm unit positioning rod.
- 3 Disconnect the spring link at the cranked lever on the throttle spindle.
- 4 Disconnect the vacuum pipe.
- 5 Withdraw the diaphragm unit from the bracket.
- 6 Remove the trigger valve unit and bracket complete from the carburetter.

**Refitting**

- 7 Reverse instruction 6, positioning the spacer for the front fixing.
- 8 Reverse 4 and 5.
- 9 Reverse 3 with the spring link eye and the shoulder-bolt head positioned at the carburetter side of the throttle prop lever.
- 10 Reverse 2. Do not tighten the locknut at this stage and ensure that the throttle prop lever is clear of the slow run stop lever.
- 11 Fit the interconnecting link.
- 12 Set the carburetter throttle-prop as follows, instructions 13 to 20.

Setting the carburetter throttle-prop lever

- 13 Run the Land Rover for a minimum of 4 km (3 miles) to ensure that the engine is at normal running temperature.

- 14 Connect an accurate stroboscopic tachometer to the engine and ensure that it is idling at 750 to 800 revs/min.
- 15 Slacken the locknuts securing the vacuum unit adjusting rod at the carburettor bracket.
- 16 Operate the accelerator linkage to increase the engine speed to approximately 2,500 revs/min.
- 17 At the same time disconnect the atmospheric bleed pipe from the air cleaner elbow and block off the end of the pipe by the thumb or finger. This retains the vacuum supply from the trigger valve and ensures that the throttle butterfly remains propped.
- 18 Release the accelerator linkage, engine speed will fall to accelerator propped position. Rotate the adjusting rod locknuts by equal amounts to increase or decrease the engine speed as necessary until 1300 to 1400 revs/min is obtained.
- 19 Tighten the locknuts against the bracket and replace the vacuum balance pipe on to the air cleaner elbow. Ensure that the engine returns to its normal idling speed.
- 20 Switch off the engine and remove the tachometer.
- 21 The trigger valve is pre-set and must not be adjusted.

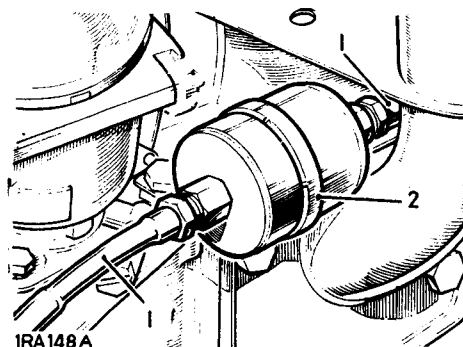
FUEL FILTER

Remove and refit

17.20.38

Removing

- 1 Disconnect fuel pipes from each end of filter.
- 2 Slacken clip securing filter and withdraw unit.



Refitting

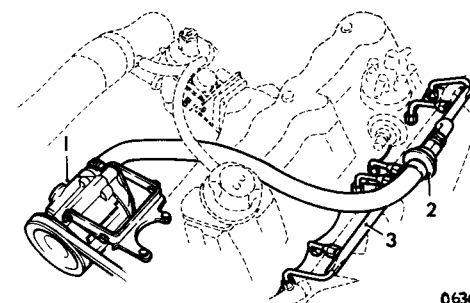
- 3 Fit the new filter with the end marked 'IN' towards the fuel pump, using the nuts and olives supplied. If the filter is marked with an arrow, this indicates fuel flow direction and the filter must then be fitted with the arrow pointing away from the fuel pump.

AIR INJECTION SYSTEM

Description

17.25.00

The air pump driven by the engine, delivers air to the exhaust valves via the air rail/manifold (3). A check valve (2) prevents damage to the pump should back-fire or belt breakage occur. A relief valve, located in the air pump (1) is required to dump part of the air at high speed to prevent pump damage.



AIR PUMP

Remove and refit

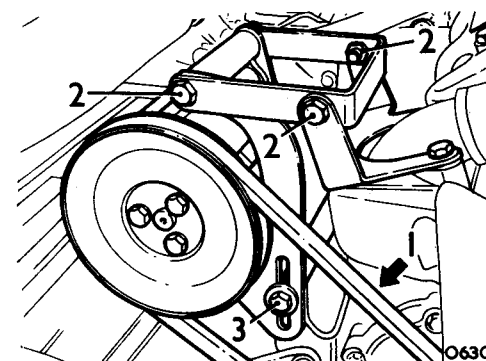
17.25.07

Removing

- 1 Slacken the adjustment bolts and remove the drive belt from the air pump pulley.
- 2 Remove the two bolts securing the pump on its mounting brackets.
- 3 Lift out the air pump from the brackets.

Refitting

- 4 Reverse 2-3 above.
- 5 Refit the drive belt and adjust.
- 6 Tighten the three adjustment bolts



AIR PUMP DRIVE BELT

Remove and refit

17.25.15

- 1 Refer to 17.25.07 for illustration.
- 2 Slacken the four securing bolts.
- 3 Push the air pump downwards and remove the belt.

Refitting

- 4 Fit new belt and tension to the figure given in 17.25.13.
- 5 Ensure all securing bolts are light.

AIR PUMP DRIVE BELT

Tensioning

17.25.13

The correct tension for the air pump drive belt is 6.3 mm (0.25 in.) total lateral movement at the mid point of its run between the air pump and water pump pulleys:

AIR RAIL/MANIFOLD**Remove and refit** 17.25.19

- 1 Remove the exhaust manifold 30.15.10.
- 2 Remove the heater rail (if fitted).
- 3 Disconnect the air hose from the injection rail.
- 4 Remove the side rocker cover.
- 5 Lift off the injection rail/manifold assembly.
- 6 Where required remove the six union nuts securing the injection rail to the manifold.

Refitting

- 7 Reverse 1–6 above.

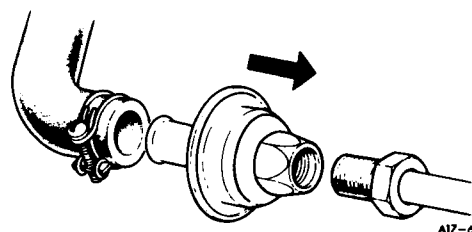
CHECK VALVE**Remove and refit** 17.25.21**Removing**

- 1 Disconnect the air hose from the diverter and relief valve to the check valve.
- 2 Using two open-ended spanners – one on the air distribution manifold hexagon, to support the manifold, and the other to remove the check valve anti-clockwise.

CAUTION: Do not impose any strain on the air manifold.

Refitting

- 3 Reverse instructions 1 and 2.

**CHECK VALVE****Test** 17.25.22**Testing**

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

- 1 Remove the check valve. 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 in direction of arrow. Should air pass through the valve when blown from the air manifold end, renew the valve.
- 3 Refit the check valve. 17.25.21.

ANTI-RUN-ON VALVE**Remove and refit** 17.40.01

- 1 Disconnect the electrical leads.
- 2 Remove the two screws securing the valve to the bracket.
- 3 Remove the valve.

Refitting

- 4 Reverse instructions 1 to 3 above.
- 5 If the valve adjustment is correct the engine idle speed should be 500–600 r.p.m.

NOTE: If the mounting bracket has to be renewed, the carburettor must be removed 19.15.09.

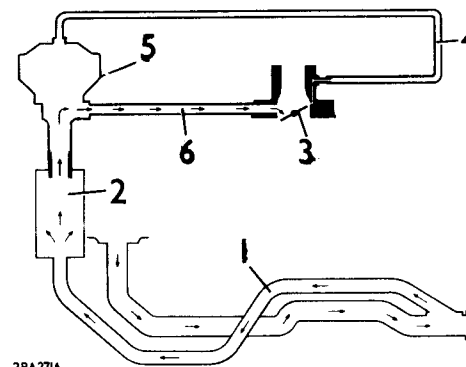
Check 17.40.14

With the engine running at idle (500–600 r.p.m.) disconnect the electrical lead at the valve and note that the engine stalls. If this does not happen the idle speed is incorrect. Reconnect the electrical connection and reset the idle speed using the correct method of adjustment at the base of the anti-run-on valve only.

EXHAUST GAS RECIRCULATION (E.G.R.) – 2½ litre Australia 17.45.00

To reduce the oxides of nitrogen 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 an expansion chamber. A control signal, taken from a throttle edge tapping in the carburettor, gives no recirculation at idle or full load, but does allow an amount of recirculation, dependent on the vacuum signal and a metering profile on the valve, under part load conditions.



- 1 Exhaust feed back
- 2 Expansion chamber
- 3 Carburettor butterfly
- 4 E.G.R. control line
- 5 E.G.R. valve
- 6 E.G.R. feed line

E.G.R. VALVE**Remove and refit** 17.45.01**Removing**

- 1 Disconnect the vacuum control pipe from the top of the E.G.R. valve.
- 2 Disconnect the union at the base of the E.G.R. valve assembly.
- 3 Release the pipe from the trigger valve to allow clearance when removing the E.G.R. valve assembly.
- 4 Remove the nut and washer securing the bracket to the top of the manifold.
- 5 Remove the bolt securing the bracket to the side of the manifold.
- 6 Lift and withdraw the E.G.R. valve assembly from the carburettor.

Refitting

- 7 Change all relevant brackets and reverse instructions 1 to 6.

E.G.R. VALVE**Overhaul** 17.45.02

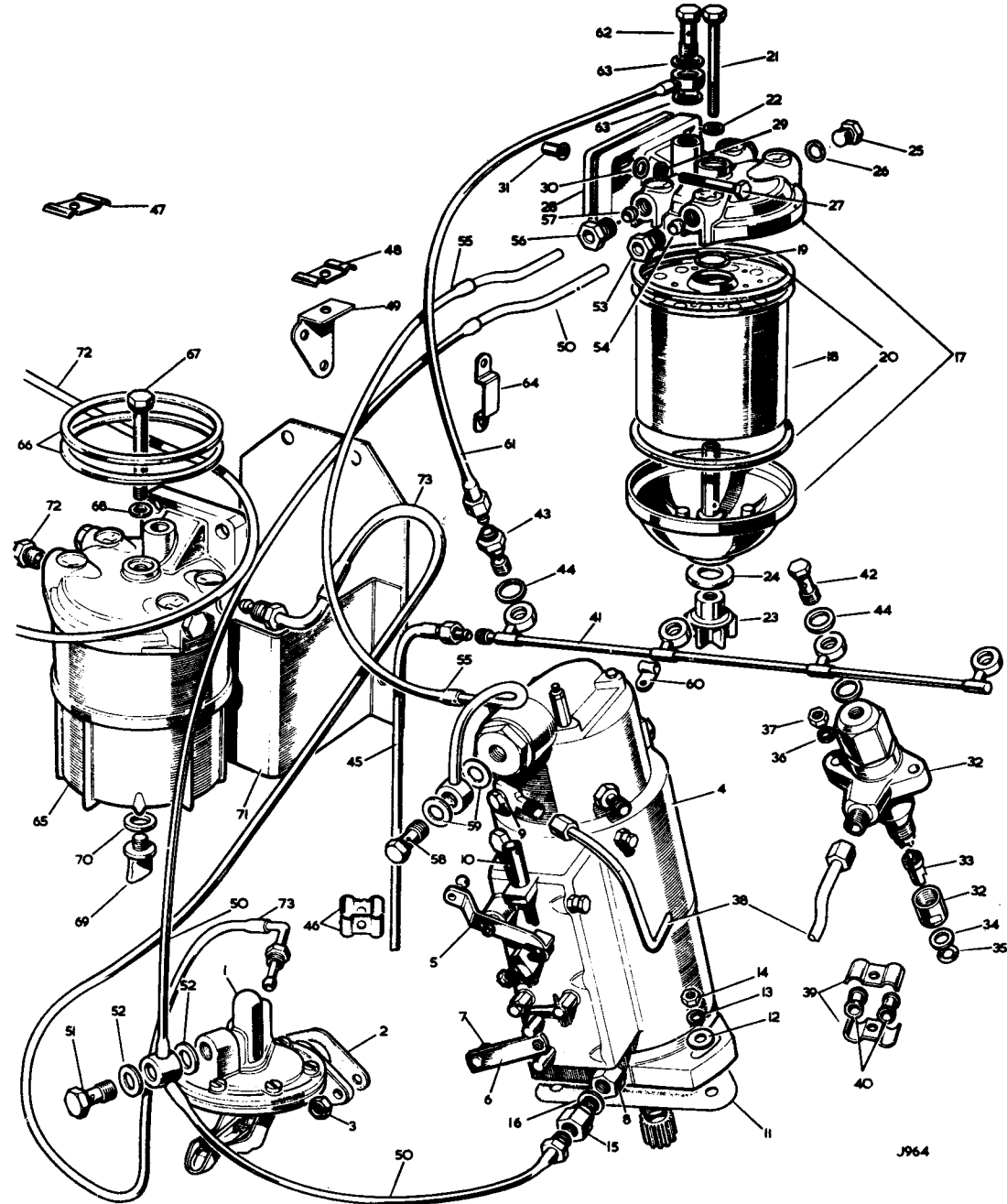
- 1 Remove the valve. 17.45.01.
- 2 Clean the assembly area of the valve with a wire brush. Use a standard spark plug machine to clean the valve and seat. Ensure that the E.G.R. valve outlet is securely plugged to prevent injury from the sand blast. Insert the valve opening into the machine and lift the diaphragm evenly.
- 3 Blast the valve for approximately 30 seconds then remove and inspect it. If necessary repeat until all carbon deposits are removed. Unplug the valve outlet and use compressed air to remove all traces of carbon grit from the valve.
- 4 Refit the E.G.R. valve.

E.G.R. SYSTEM

Check

17.45.20

- 1 Check function of E.G.R. valve as follows:
Warm the engine to normal running temperature and ensure that the choke control is fully off.
Open and close the throttle several times and observe or feel the E.G.R. valve, which should open and close with the changes in engine speed.
The valve should close instantly when the throttle is closed.
- 2 If the operation of the valve does not appear completely satisfactory, make a full check on the operation of the valve by connecting the vacuum pipe of a distributor vacuum test unit to the valve.
Ensure that the valve is actuated, held fully open at an applied vacuum of 10 in. Hg. and that there is no leak of vacuum.
- 3 If valve is unsatisfactory fit a new valve.



KEY TO GENERAL LAYOUT OF DIESEL INJECTION SYSTEM

- | | |
|--|--|
| <p>1 Fuel pump, mechanical</p> <p>2 Joint washer, fuel pump to cylinder block</p> <p>3 Self-locking nut, fixing fuel pump</p> <p>4 Distributor pump</p> <p>5 Accelerator control lever</p> <p>6 Stop lever</p> <p>7 Swivel clamp for stop lever</p> <p>8 Union, fuel pipe connection</p> <p>9 Joint washer for injection pipe, distributor pump end</p> <p>10 Sleeve for control lever stop screw</p> <p>11 Joint washer for distributor pump</p> <p>12 Plain washer</p> <p>13 Spring washer</p> <p>14 Nut $\frac{5}{16}$ in. UNF)</p> <p>15 Non-return valve for distributor pump</p> <p>16 Joint washer for non-return valve</p> <p>17 Fuel filter</p> <p>18 Element for fuel filter</p> <p>19 Seal for element, small</p> <p>20 Seal for element, large</p> <p>21 Special centre bolt for filter</p> <p>22 Washer for centre bolt</p> <p>23 Nylon drain plug for filter</p> <p>24 Rubber seal for drain plug</p> <p>25 Plug for filter</p> <p>26 Joint washer for plug</p> <p>27 Bolt ($\frac{5}{16}$ in. UNF \times $1\frac{1}{8}$ in. long)</p> <p>28 Distance plate</p> <p>29 Spring washer</p> <p>30 Plain washer</p> <p>31 Rivnut ($\frac{5}{16}$ in. UNF)</p> <p>32 Injector complete</p> <p>33 Nozzle for injector</p> <p>34 Joint washer for injector, copper</p> <p>35 Joint washer for injector, steel</p> <p>36 Spring washer</p> <p>37 Nut ($\frac{5}{16}$ in. UNF)</p> <p>38 Injector pipe to No. 2 cylinder</p> | <p>39 Clamping plate for injector pipe grommet</p> <p>40 Grommet for injector pipe</p> <p>41 Spill rail pipe complete</p> <p>42 Banjo bolt for No. 1, 2 and 3 injectors</p> <p>43 Banjo union for No. 4 injector</p> <p>44 Joint washer for banjo bolt</p> <p>45 Fuel pipe, spill return to tank</p> <p>46 Double clip, clamping feed and return pipes together</p> <p>47 Double clip, fixing feed and return pipes to chassis sidemember</p> <p>48 Double clip for feed and return pipes</p> <p>49 Bracket for clip</p> <p>50 Fuel pipe, mechanical pump and distributor pump to filter</p> <p>51 Banjo bolt</p> <p>52 Joint washer</p> <p>53 Nut</p> <p>54 Olive</p> <p>55 Fuel pipe, filter to distributor pump</p> <p>56 Nut</p> <p>57 Olive</p> <p>58 Banjo bolt</p> <p>59 Joint washer</p> <p>60 Clip, fixing fuel pipe to distributor pump</p> <p>61 Fuel pipe filter to spill rail at No. 4 injector</p> <p>62 Banjo bolt</p> <p>63 Joint washer</p> <p>64 Double clip, fixing fuel pipes to bulkhead</p> <p>65 Sedimentor</p> <p>66 Seal for sedimentor</p> <p>67 Special centre bolt for sedimentor</p> <p>68 Washer for centre bolt</p> <p>69 Drain plug for sedimentor</p> <p>70 Rubber seal for drain plug</p> <p>71 Mounting bracket for sedimentor</p> <p>72 Fuel pipe, tank to sedimentor</p> <p>73 Fuel pipe, sedimentor to mechanical pump</p> |
|--|--|
- } For distributor pump

} Fixing distributor pump to cylinder block

} Fixing spill rail pipe to injectors

} Fixing fuel pipe to mechanical pump

} Fixing pipe to filter

} Fixing pipe to distributor pump

} Fixing pipe to distributor pump

} Fixing fuel pipe to filter

} Fixing fuel pipe to filter

} Fixing injectors to cylinder head studs

DIESEL FUEL SYSTEM

General notes

- 1 Observe strict cleanliness precautions when servicing Diesel fuel system components.
- 2 If the distributor/injection pump is drained of fuel it must be fully primed before attempting to start the engine.

Fuel filtration

- 3 A minimum of three filters are fitted as follows:
 - a Fuel tank filter.
 - b Sedimentor bowl filter mounted on the R.H. chassis side member. This filter is fitted to all Export models and is optional on U.K. market models.
 - c Element type filter mounted on the engine bulkhead.
 - d Tubular gauze filter in the distributor/injection pump inlet connection.

Distributor pump

- 4 No attempt should be made to overhaul the distributor pump, as this requires specialised knowledge and equipment outside the scope of this Manual. If a distributor pump gives trouble, a new replacement should be fitted.

Fuel injectors

- 5 Injectors have a 'Pintaux' type nozzle which has been developed by CAV for use with the design of cylinder head used on Rover compression ignition engines. This type of nozzle has been found most satisfactory for starting and general running and must be replaced by the same type only.

Fuel lift pump

- 6 The fuel lift pump is secured directly to the right hand side of the engine, and is mechanically operated from the engine camshaft. The pump is similar to that used on 2½ litre Petrol models.

Fuel system arrangement

Low pressure system

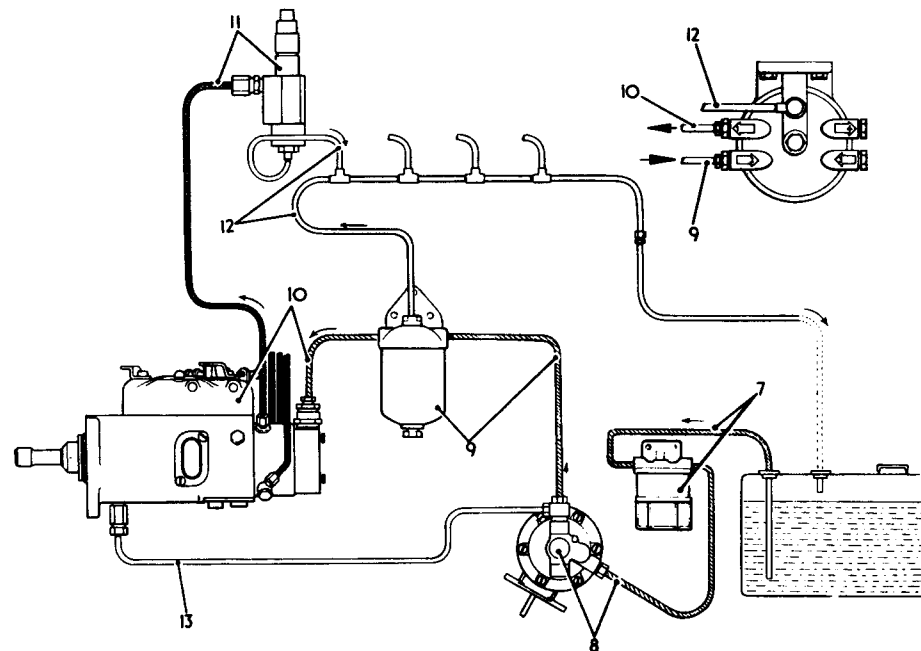
- 7 Fuel is drawn from the fuel tank into the sedimentor, where fitted.
- 8 From the sedimentor, or tank, to the fuel lift pump.
- 9 From the lift pump to the main fuel filter.
- 10 From the filter to the distributor/injection pump.

High Pressure system

- 11 Fuel passes from the distributor/injection pump to the fuel injectors.

Spill return system

- 12 Excess fuel spills back from the injectors and main filter to the tank.
- 13 Excess fuel spills back from the distributor/injection pump to the fuel lift pump outlet line.

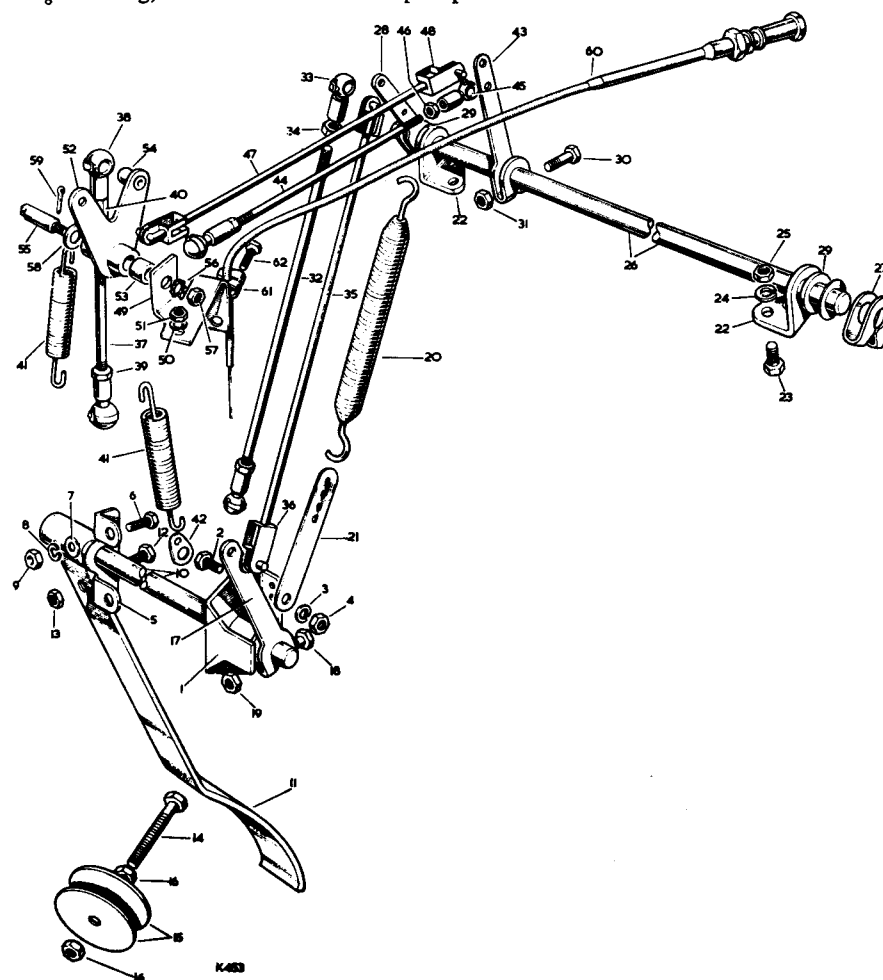


2RC 170

KEY TO ILLUSTRATION OF ACCELERATOR CONTROLS, 2¼ LITRE DIESEL MODELS

- 1 Housing for accelerator shaft and pedal stop
- 2 Bolt (¼ in. UNF X ½ in. long) Fixing housing
- 3 Spring washer and pedal stop
- 4 Nut (¼ in. UNF) to dash
- 5 Bracket for accelerator pedal shaft
- 6 Bolt (¼ in. UNF X ⅝ in. long)
- 7 Plain washer Fixing bracket
- 8 Spring washer to dash
- 9 Nut (¼ in. UNF)
- 10 Shaft for accelerator pedal
- 11 Accelerator pedal
- 12 Bolt (⅝ in. UNF X ⅞ in. long) Fixing pedal
- 13 Nut (⅝ in. UNF) to shaft
- 14 Bolt (⅝ in. UNF X 2½ in. long) Pedal
- 15 Plain washer stop in
- 16 Nut (⅝ in. UNF) floor
- 17 Lever for accelerator on pedal shaft
- 18 Bolt (¼ in. UNF X 1¼ in. long) Fixing lever
- 19 Nut (¼ in. UNF) to shaft
- 20 Return spring for pedal
- 21 Anchor for return spring
- 22 Bracket for accelerator cross-shaft
- 23 Bolt (¼ in. UNF X ⅝ in. long) Fixing
- 24 Spring washer brackets
- 25 Nut (¼ in. UNF) to dash
- 26 Accelerator cross-shaft
- 27 Stop clip for cross-shaft
- 28 Accelerator lever on cross-shaft from pedal
- 29 Distance washer for cross-shaft
- 30 Bolt (¼ in. UNF X 1¼ in. long) Fixing levers and
- 31 Nut (¼ in. UNF) stop clip to cross-shaft
- 32 Control rod, pedal shaft to cross-shaft
- 33 Ball joint socket For
- 34 Locknut (2 BA) rod
- 35 Control rod, pedal shaft to cross shaft
- 36 Linkage clip for control rod
- 37 Control rod, bell crank to accelerator lever
- 38 Ball socket
- 39 Nut (2 BA) For bell crank control rod
- 40 Adjuster nut
- 41 Return spring for accelerator and stop levers on distributor pump
- 42 Anchor for return spring
- 43 Accelerator lever on cross-shaft to engine
- 44 Control rod, cross-shaft to bell crank
- 45 Ball joint For
- 46 Locknut (2 BA) control rod
- 47 Control rod, cross-shaft to bell crank
- 48 Linkage clip for control rod
- 49 Bracket for bell crank on distributor pump
- 50 Spring washer Fixing bracket to
- 51 Nut (10 UNF) distributor pump

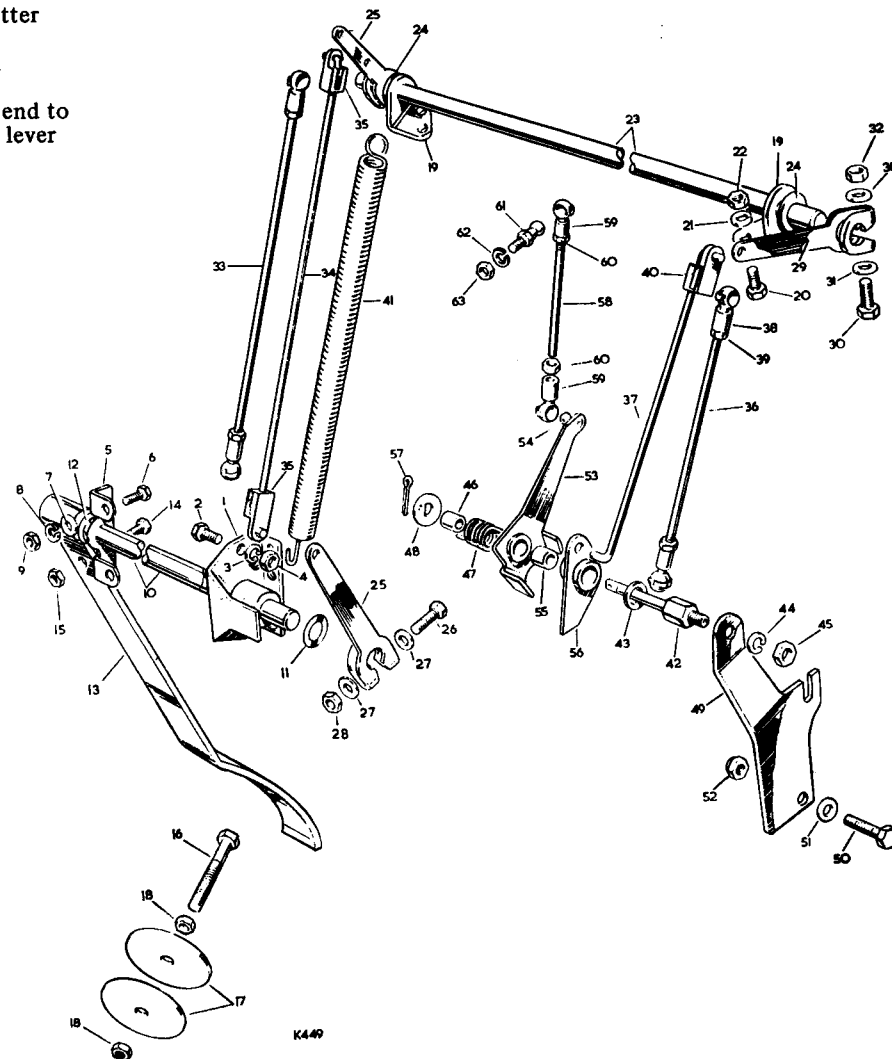
- 52 Bell crank complete on distributor pump
- 53 Bush for bell crank
- 54 Ball end for bell crank
- 55 Pin for bell crank
- 56 Shakeproof washer Fixing pin to bell
- 57 Nut (¼ in. UNF) crank bracket
- 58 Plain washer Fixing bell crank
- 59 Split pin lever to pin
- 60 'Engine stop' control
- 61 Clip Fixing control outer cable
- 62 Screw (2 BA X ⅝ in. long) to abutment bracket on distributor pump



KEY TO ILLUSTRATION OF ACCELERATOR CONTROLS, 2¼ LITRE PETROL MODELS

- 1 Housing for accelerator shaft and pedal stop
- 2 Bolt ($\frac{1}{4}$ in. UNF \times $\frac{1}{2}$ in. long) Fixing housing
- 3 Spring washer and pedal stop
- 4 Nut ($\frac{1}{4}$ in. UNF) to dash
- 5 Bracket for accelerator pedal shaft
- 6 Bolt ($\frac{1}{4}$ in. UNF \times $\frac{5}{8}$ in. long)
- 7 Plain washer Fixing bracket
- 8 Spring washer to dash
- 9 Nut ($\frac{1}{4}$ in. UNF)
- 10 Shaft for accelerator pedal
- 11 Special washer On accelerator
- 12 Plain washer shaft
- 13 Accelerator pedal
- 14 Bolt ($\frac{5}{16}$ in. UNF \times $\frac{7}{8}$ in. long) Fixing pedal
- 15 Nut ($\frac{5}{16}$ in. UNF) to shaft
- 16 Bolt ($\frac{5}{16}$ in. UNF \times $1\frac{1}{8}$ in. long) Pedal
- 17 Plain washer stop in
- 18 Nut ($\frac{5}{16}$ in. UNF) floor
- 19 Bracket for accelerator cross-shaft, 'L' shaped
- 20 Bolt ($\frac{1}{4}$ in. UNF \times $\frac{5}{8}$ in. long) Fixing
- 21 Spring washer bracket
- 22 Nut ($\frac{1}{4}$ in. UNF) to dash
- 23 Cross-shaft for accelerator
- 24 Distance washer for lever
- 25 Lever for accelerator
- 26 Bolt ($\frac{1}{4}$ in. UNF \times $1\frac{1}{4}$ in. long) Fixing
- 27 Plain washer levers
- 28 Nut ($\frac{1}{4}$ in. UNF) to shaft
- 29 Lever for cross-shaft
- 30 Bolt ($\frac{1}{4}$ in. UNF \times $1\frac{1}{4}$ in. long) Fixing
- 31 Plain washer lever to
- 32 Nut ($\frac{1}{4}$ in. UNF) cross-shaft
- 33 Control rod, pedal shaft to cross-shaft
- 34 Control rod, pedal shaft to cross-shaft
- 35 Linkage clip for control rod
- 36 Control rod, cross-shaft to engine
- 37 Control rod, cross-shaft to engine
- 38 Ball joint socket for rods
- 39 Locknut for socket
- 40 Linkage clip for control rod, cross-shaft to engine
- 41 Return spring for pedal
- 42 Spindle for carburetter bell crank
- 43 Plain washer
- 44 Spring washer Fixing spindle
- 45 Nut ($\frac{3}{8}$ in. UNF)
- 46 Space for spindle
- 47 Torsion spring for bell crank
- 48 Special washer for torsion spring
- 49 Bracket for accelerator controls
- 50 Bolt ($\frac{3}{8}$ in. UNF \times 1 in. long) Fixing bracket to
- 51 Plain washer steering column
- 52 Self-locking nut ($\frac{3}{8}$ in. UNF) support bracket

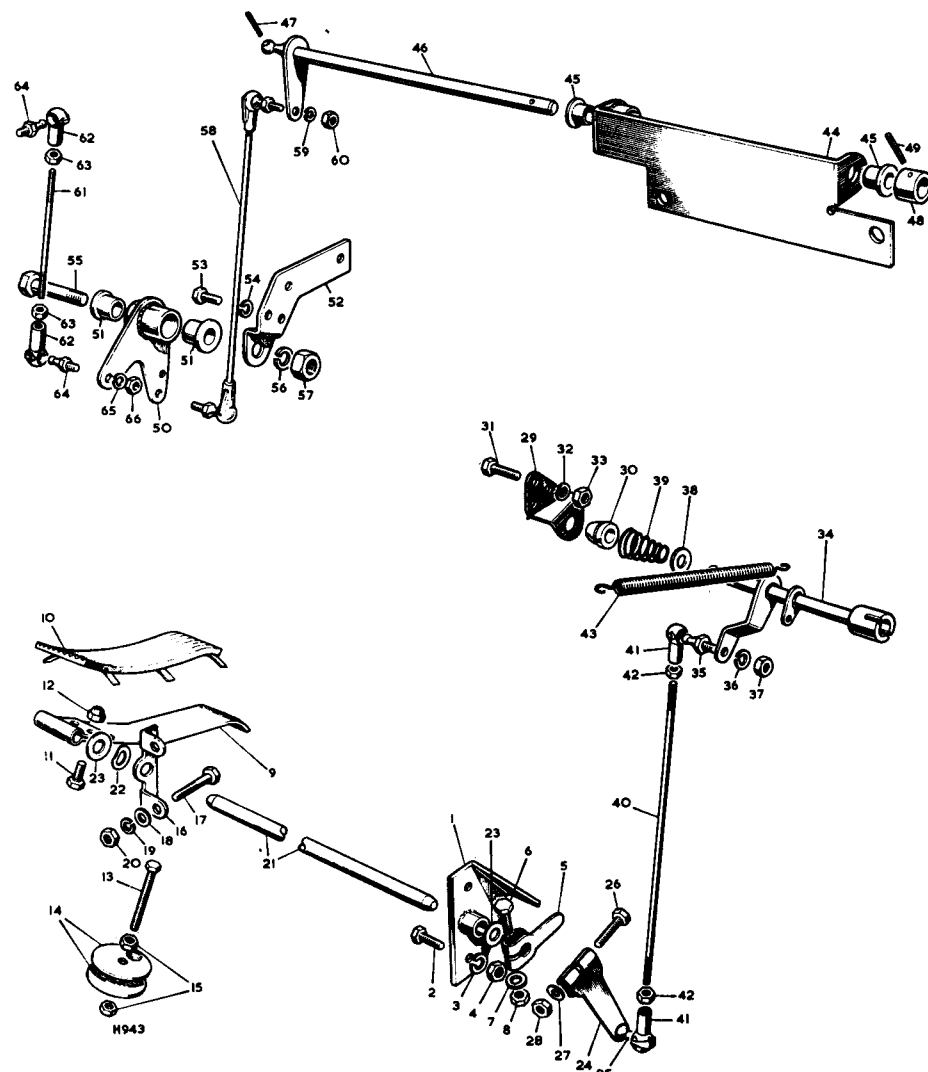
- 53 Carburetter bell crank lever assembly
- 54 Ball end for lever
- 55 Bush for bell crank
- 56 Carburetter relay lever
- 57 Split pin fixing levers to spindle
- 58 Control rod, bell crank to carburetter
- 59 Ball joint For
- 60 Locknut (2 BA) control rod
- 61 Ball end for carburetter lever
- 62 Spring washer Fixing ball end to
- 63 Nut ($\frac{1}{4}$ in. UNF) carburetter lever



KEY TO ILLUSTRATION OF ACCELERATOR LEVERS AND RODS, 2.6 LITRE, 6 CYLINDER MODELS

- 1 Bracket for accelerator pedal and stop
- 2 Bolt (¼ in. UNF X ½ in. long) Fixing bracket and pedal stop to dash
- 3 Spring washer
- 4 Nut (¼ in. UNF)
- 5 Pedal stop lever
- 6 Bolt (¼ in. UNF X 1 ¼ in. long) Fixing lever to pedal shaft
- 7 Plain washer
- 8 Nut (¼ in. UNF)
- 9 Accelerator pedal
- 10 Pad for accelerator pedal
- 11 Bolt (⅝ in. UNF X ⅞ in. long) Fixing pedal to shaft
- 12 Nut (⅞ in. UNF)
- 13 Bolt (⅝ in. UNF X 1 ⅛ in. long) Pedal stop in floor
- 14 Plain washer
- 15 Nut (⅝ in. UNF)
- 16 Bracket for accelerator pedal shaft
- 17 Bolt (¼ in. UNF X ⅝ in. long)
- 18 Plain washer Fixing bracket to dash
- 19 Spring washer
- 20 Nut (¼ in. UNF)
- 21 Shaft for accelerator pedal
- 22 Special washer On accelerator shaft
- 23 Plain washer
- 24 Lever assembly for accelerator
- 25 Ball end for lever
- 26 Bolt (¼ in. UNF X 1 ¼ in. long)
- 27 Plain washer Fixing lever to shaft
- 28 Nut (¼ in. UNF)
- 29 Mounting bracket for extension shaft
- 30 Bearing in mounting bracket for shaft
- 31 Bolt (¼ in. UNF X ⅝ in. long) Fixing mounting bracket to dash
- 32 Spring washer
- 33 Nut (¼ in. UNF)
- 34 Extension shaft and lever
- 35 Ball end for extension shaft lever
- 36 Spring washer Fixing ball end to lever
- 37 Nut (2 BA)
- 38 Plain washer For extension shaft
- 39 Conical spring for extension shaft
- 40 Control rod, pedal shaft to extension shaft
- 41 Ball joint socket for control rod
- 42 Locknut (2 BA) fixing socket to control rod
- 43 Return spring, bell crank to extension shaft
- 44 Bracket assembly for accelerator cross-shaft
- 45 Bearing for cross-shaft
- 46 Accelerator cross-shaft and lever
- 47 Spiral pin for cross-shaft
- 48 Boss for cross-shaft
- 49 Spring dowel fixing boss to shaft
- 50 Bell crank lever and bearings assembly
- 51 Bearing for bell crank
- 52 Support bracket for bell crank

- 53 Set bolt (¼ in. UNC X ⅜ in. long) Fixing support bracket to cylinder head
- 54 Spring washer
- 55 Centre pin
- 56 Spring washer
- 57 Nut (⅝ in. UNC) Fixing bell crank to support bracket
- 58 Control rod, cross-shaft to bell crank
- 59 Spring washer
- 60 Nut (10 UNF) Fixing control rod to levers
- 61 Control rod, bell crank to carburettor
- 62 Ball joint For control rod
- 63 Locknut (2 BA)
- 64 Ball end
- 65 Spring washer
- 66 Nut (2 BA) Fixing control rod to bell crank lever and carburettor



AIR CLEANER, 2¼ litre models

Remove and refit 19.10.04

Removing

- 1 Lift and prop the bonnet.

Petrol models, item 2

- 2 Disconnect the air intake elbow from the carburetter.

Diesel models, items 3 and 4

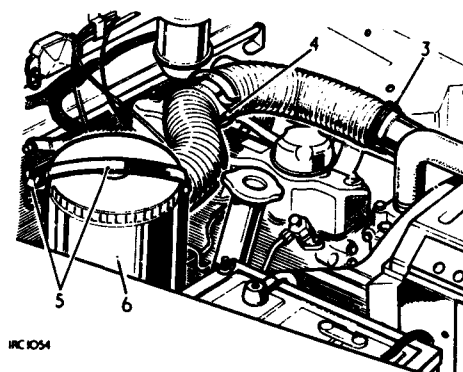
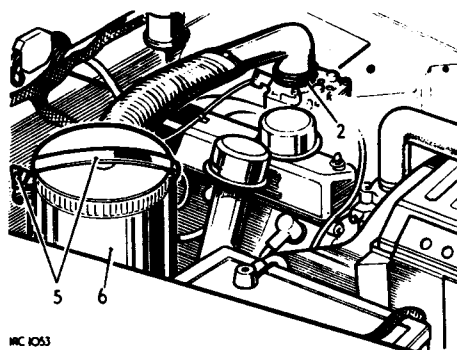
- 3 Disconnect the air inlet hose from the inlet manifold.
- 4 Free the hose from the engine clip.

Petrol and Diesel models, items 5 and 6

- 5 Slacken the fixings and move aside the retaining strap.
- 6 Remove air cleaner complete with hose.

Refitting

- 7 Reverse instructions 1 to 6 as applicable. Ensure that the oil container hinged clips are clear of the retaining strap supports when fitted.



AIR CLEANER, 2.6 litre models

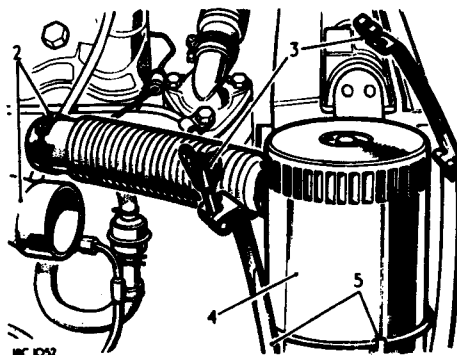
Remove and refit 19.10.04

Removing

- 1 Lift and prop the bonnet.
- 2 Disconnect the air intake hose from the carburetter inlet.
- 3 Slacken the fixings and move aside the retaining strap.
- 4 Remove the air cleaner complete with hose.

Refitting

- 5 Reverse instructions 1 to 4. Ensure that the oil container hinged clips are clear of the retaining strap supports when fitted.



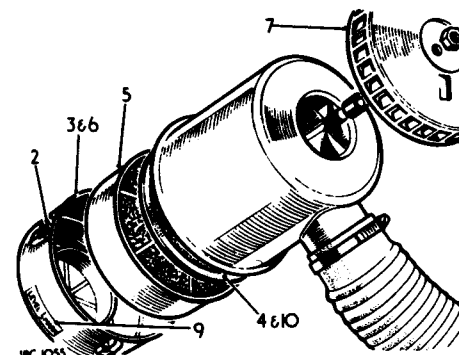
AIR CLEANER

Clean and refill

19.10.16

Dismantling

- 1 Remove the air cleaner. 19.10.04.
- 2 Release the hinged clips.
- 3 Withdraw the oil container.
- 4 Withdraw the sealing washer.
- 5 Lift out the wire mesh element.
- 6 Drain the oil container.
- 7 Remove the air intake cap.
- 8 Wash the metal parts in clean fuel.



Assembling

- 9 Add clean engine oil to the oil container (Division 09 refers), fill to the oil level mark.
- 10 Reverse instructions 1 to 5 and 7, using a new sealing washer.

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.

CAUTION: Unauthorised 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 tamperproofed or emission specification carburetters an approved type CO meter must be used to ensure that the final exhaust gas analysis meets with local territory legislation

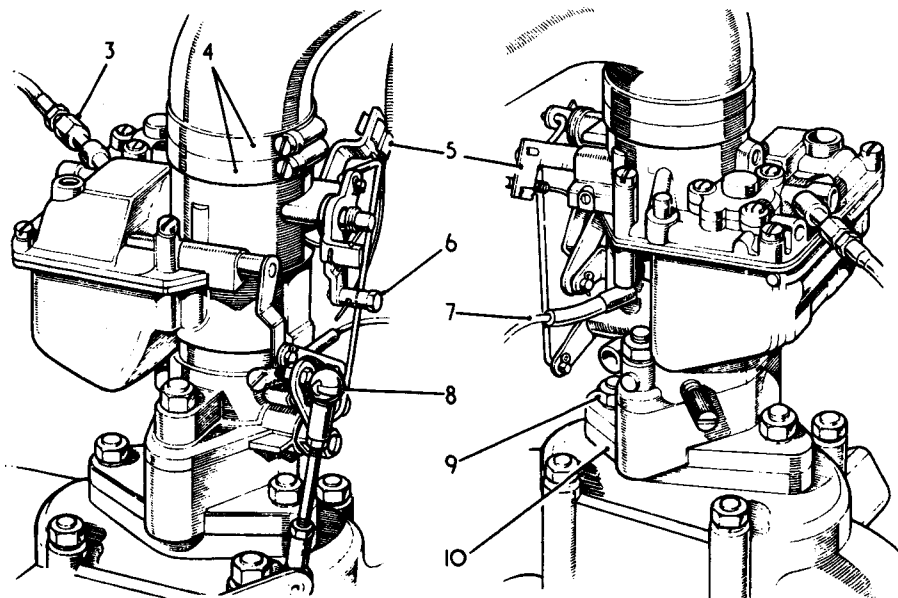
CARBURETTER, Zenith type 36IV

NOTE: Where the vehicle is fitted with emission control, refer to Section 17 for variations from the basic carburetter.

Remove and refit 19.15.09

Removing

- 1 Prop open the bonnet.
- 2 Disconnect the battery earth lead.
- 3 Disconnect the fuel inlet pipe.
- 4 Disconnect the air inlet hose.
- 5 Release the cold start outer cable.
- 6 Disconnect the cold start inner cable.
- 7 Disconnect the vacuum pipe.
- 8 Disconnect the throttle linkage.
- 9 Remove the carburetter.
- 10 Lift off the adaptor piece and joint washers.



IRC 1086

Refitting

- 11 Reverse instructions 2 to 10. When the cold start cable is connected, check that the maximum travel on the carburetter linkage is obtainable in both directions.
- 12 Close the bonnet.

CARBURETTER, Zenith type 175 CD2S

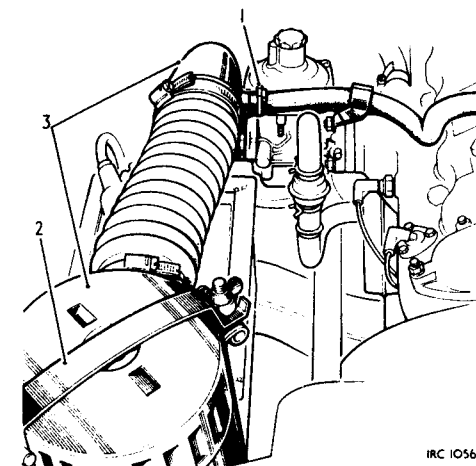
Remove and refit 19.15.09

Removing

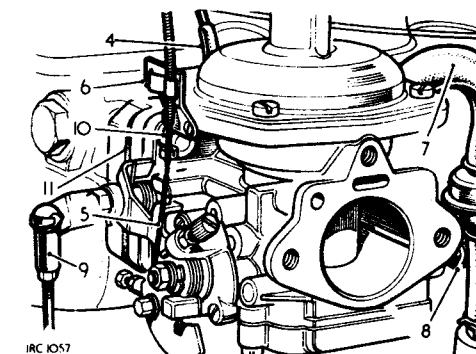
- 1 Disconnect the top cover breather hose at the carburetter elbow.
- 2 Release the air cleaner retainer strap.
- 3 Withdraw the air cleaner complete with hose, carburetter elbow and joint washer.
- 4 Disconnect the distributor vacuum pipe(s).
- 5 Release the cold start control inner cable.
- 6 Withdraw the cold start outer cable from the spring clip.
- 7 Disconnect the crankcase breather hose.
- 8 Disconnect the fuel inlet pipe.
- 9 Disconnect the accelerator linkage.
- 10 Remove the fixings and withdraw the carburetter.
- 11 Withdraw the carburetter adaptor and joint washer.

Refitting

- 12 Reverse instructions 1 to 10. When the cold start cable is connected, ensure that full travel on the carburetter linkage is obtainable in both directions.



IRC 1056



IRC 1057

CARBURETTER, Zenith type 36IV

NOTE: Refer to Section 17 for variations from the basic carburetter in respect of emission control requirements.

Overhaul and adjust 19.15.17

Dismantling

- 1 Remove the carburetter. 19.15.09

Linkages, removing

- 2 Disconnect the interconnecting link.
- 3 Disconnect the accelerator pump spindle lever from throttle relay lever.

Top cover and emulsion block, separating

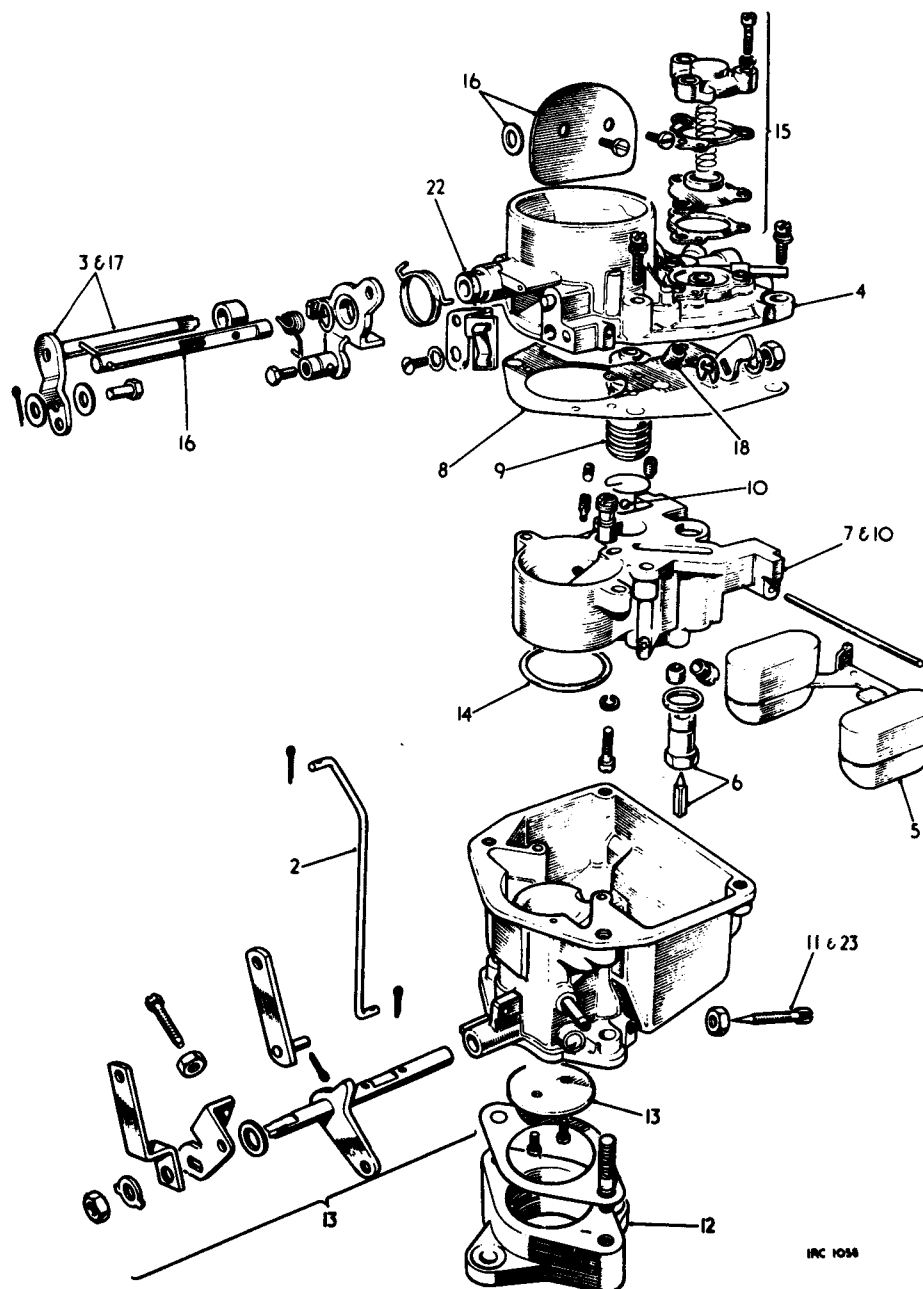
- 4 Remove the top cover from the carburetter body.
- 5 Withdraw the float assembly.
- 6 Remove the needle valve housing and needle.
- 7 Remove emulsion block from carburetter top cover, taking care not to drop the accelerator pump assembly which is now freed.
- 8 Withdraw the gasket from top cover.

Emulsion block, dismantling

- 9 Lift out the accelerator pump piston.
 - 10 Remove all jets in the emulsion block.
- NOTE:** At the base of the accelerator pump housing bore is a ball inlet valve retained by a circlip, there is no need to remove the valve for overhaul purposes.

Carburetter body, dismantling

- 11 Remove the idling volume control screw. When the adjustment is tamper-proofed the tamperproofing cap must be removed to expose the screw.
- 12 Detach the adaptor from the carburetter body.
- 13 Mark up for re-assembly purposes then remove the throttle butterfly disc followed by the throttle spindle and linkage if required.
- 14 Remove the 'O' ring seal from the choke venturi tube.



Carburetter top cover, dismantling

- 15 Dismantle the economy valve assembly, taking care to retain the diaphragm spring.
- 16 If required remove the choke butterfly (after making up) followed by the choke spindle, taking care to retain the thin washer.
- 17 Remove the spindle and lever for the accelerator pump.
- 18 Remove the ventilation screw for the choke.

Inspecting and cleaning

Special Notes

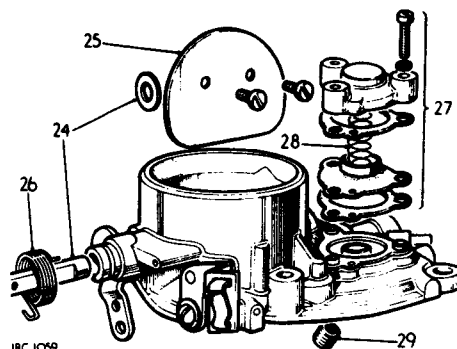
- 19 Carburetter cleaning.
When cleaning fuel passages do not use metal tools (files, scrapers, drills, etc.) which could cause dimensional changes in the drillings or jets. Cleaning should be effected using clean fuel and, where necessary, a moisture-free air blast.
- 20 Joint faces.
If the joint faces on the emulsion block, top cover or carburetter body show any signs of distortion or the edges are burred, these faces may be reclaimed by flattening, using fine grade abrasive cloth and a surface plate. Examine the faces for deep scores which would lead to leakage taking place when assembled.
- 21 Joint gasket and seals.
New gaskets and seals should be used throughout carburetter rebuild. A complete set of gaskets is available for replacement purposes.
- 22 Examine the throttle spindle bushes for wear, if oval or badly worn replace the carburetter body.
- 23 Examine the tapered end of the idling volume screw for wear and damage, replace as required.

continued

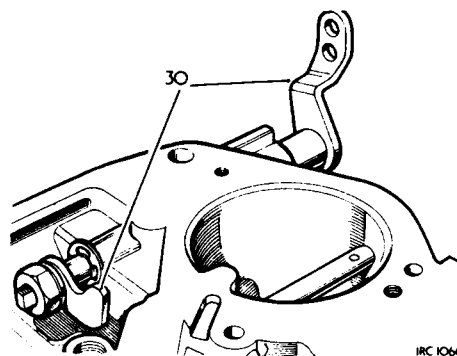
Reassembling

Carburettor top cover

- 24 If previously dismantled, insert the choke spindle into its housing and at the same time refit the thin washer.
- 25 Locate the choke butterfly on the spindle and loosely retain with the two special screws. Operate the butterfly to centralise it on the spindle, then secure the screws and lock them by peening.
- 26 Engage the spring end on to the choke swivel lever.
- 27 Fit the economy valve gasket, diaphragm assembly and a further gasket to the top cover upper face, aligning the holes in the gaskets and diaphragm with the drilling in the top cover face.
- 28 Locate the spring in the seating on the diaphragm assembly, locate the valve cover spigot on the spring free end and align the drilling in the cover casting with the hole in the gasket. Push down on the cover, keeping it square to the diaphragm, then secure.
- 29 Fit the ventilation screw to the angled tapping in the top cover lower face.
- 30 Fit the spindle and lever for accelerator pump as illustrated.



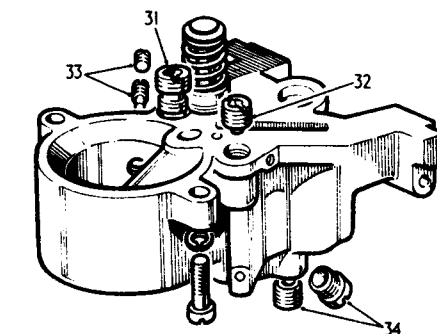
IRC 1059



IRC 1060

Emulsion block, assembling

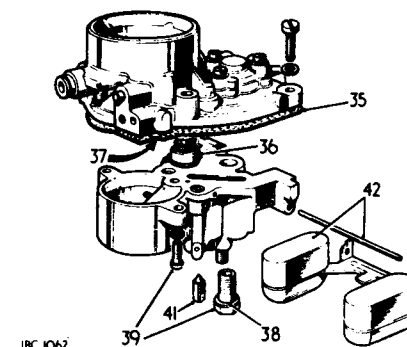
- 31 Fit the blanked off jet.
- 32 Fit the slow running jet.
- 33 Fit the pump jet, followed by the pump jet tapping plug, to the tapping in the side of the emulsion block.
- 34 Fit the main jet and the enrichment jet to the emulsion block, the enrichment jet into the vertical tapping and the main jet into the angled tapping.



IRC 1061

Fitting the emulsion block to the carburettor top cover

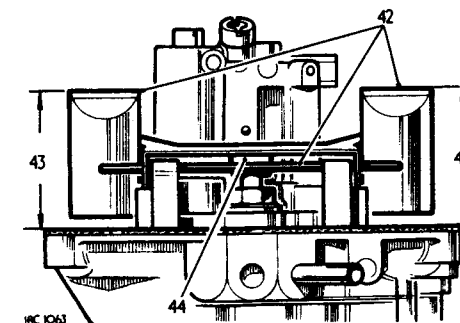
- 35 Position the gasket on the top cover joint face.
- 36 Apply a thin smear of clean lubricating oil to the accelerator pump piston and assemble, piston first, into its housing bore in the emulsion block.
- 37 Ensure that the accelerator pump spindle lever is positioned inboard to align with the accelerator pump plunger, position the emulsion block and accelerator pump assembly on the top cover joint face.
- 38 Ensure that the sealing washer for the needle valve housing is in good condition and fit the washer.
- 39 Fit the needle valve housing and the securing screws in the emulsion block. Do not fully tighten at this stage.
- 40 Check that the fuel passage drillings in the top cover are clear and not masked by misalignment of the gasket. Now fully tighten the emulsion block securing screws and needle housing.
- 41 Fit the needle valve into its seating in the needle valve housing. Check for leakage past the assembly by holding the needle valve on to its seating and blowing air into the fuel inlet pipe.



IRC 1062

Fitting the float assembly

- 42 Position the float assembly on to the top cover, align the pin holes in the float carrier and emulsion block flange lugs and secure the float carrier with the hinge pin.
- 43 With the needle valve on its seating and the central tongue on the float carrier contacting on the needle valve, measure the distance between the gasket upper face and the highest point on the floats as illustrated.
- 44 The dimension required is 33 mm (1.3 in.). Any adjustment must be made by deflecting the central tongue which abuts the needle valve; adjustment must not be made by bending the float carrier arms.

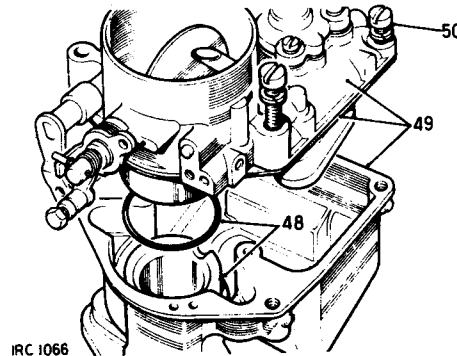
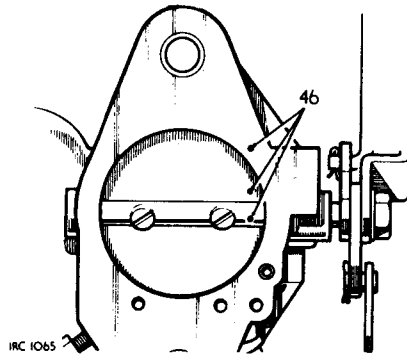
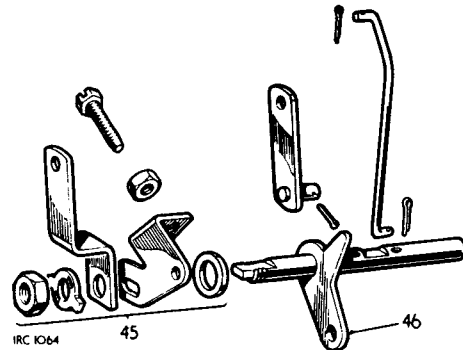


IRC 1063

- 45 Assemble the throttle linkage to the spindle, insert the floating lever, plain washer, throttle stop, throttle lever, lock tab and securing nut as illustrated.
- 46 Fit the throttle spindle assembly to the carburettor then insert the butterfly into the spindle, aligning marks previously made, and loosely retain with the two special screws. Operate the butterfly to centralise it on the spindle, then secure the screws and lock them by peening.
- 47 Fit the carburetter adaptor to the carburetter body using a new gasket and tighten evenly.

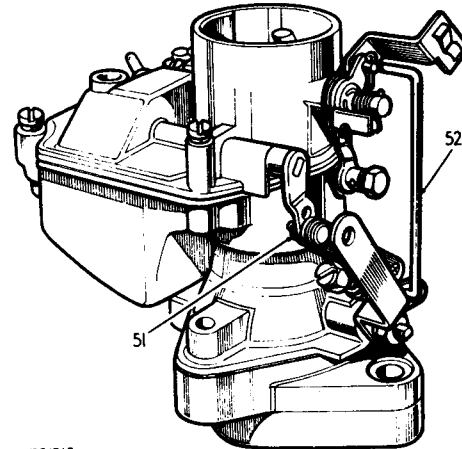
Fitting top cover and emulsion block to carburetter body

- 48 Fit the 'O' ring seal to the seating around the top end of the venturi barrel. Ensure that the 'O' ring is correctly seated. **THIS IS VERY IMPORTANT AS POOR JOINTING WOULD CREATE POOR FUEL CONSUMPTION**
- 49 Offer up the cover and emulsion block assembly to the carburetter body. Check that the 'O' ring seal around the venturi barrel is holding off the emulsion block, indicated by a small gap between the top cover gasket and carburetter body joint faces. This will ensure a compression seal on the 'O' ring when assembled.
- 50 Secure the assembly, evenly, to the carburetter body. Then replace the idling volume control screw.



Carburetter linkage, reconnect

- 51 Connect the throttle relay lever to the hole furthest from the fulcrum on the accelerator pump spindle lever, using clevis pin, two plain washers and split pin.
- NOTE:** In cold ambient conditions use the hole nearest the fulcrum.
- 52 Fit the interconnecting link between choke operating tab and the floating lever on the throttle spindle and secure with split pins.



Fast-idle setting

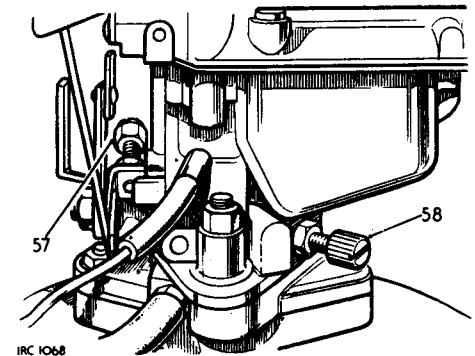
- 53 Fully close the choke butterfly by actuating the choke operating tab. It should be possible to slide a 1,40 mm (0.055 in.) diameter drill between throttle butterfly edge and the carburetter body. If necessary, bend the interconnection link to achieve this condition.
- 54 Refit the carburetter. 19.15.09.

Carburetter, to set and adjust (See Note on Tamperproofing)

- 55 Before any attempt is made to set the idling speed the ignition timing must be correct and a thorough check should be made to ensure that the throttle linkage between the pedal and the carburetter is free and has no tendency to stick, also ensure full throttle operation.

- 56 Start the engine and run until warm, denoted by thermostat outlet pipe becoming warm to the touch. Continue running for a further five minutes to thoroughly stabilise engine temperature.
- 57 Adjust the throttle stop screw to obtain the correct engine idling speed of 500–550 rev/min.
- 58 Adjust the idling volume control screw until the engine runs smoothly and evenly. Recheck idle speed and correct as necessary. Recheck idling stability. It may be necessary to alternate adjustments between idling volume control screw and throttle stop screw to obtain the required idling setting. The idling volume control screw is then at the setting position required for all engine operating conditions. To confirm that the setting position selected is correct, turn the volume control screw in and out respectively from the setting position by approximately one-half turn; at these checking positions the engine note will alter and the engine running will become uneven. After checking, return the volume control screw to the correct setting position selected midway between the checking positions.

continued



DATA

Float height setting
 Fast-idle setting
 Idling speed
 Idling speed (with emission control)

33 mm (1.300 in.)
 1,40 mm (0.055 in.) between throttle butterfly
 edge and carburetter barrel
 500-550 rev/min
 750-800 rev/min

2.6 litre 6-cylinder engines

Special Tools: ERC 3692
 ERC 3786
 S 353

Any adjustments must be carried out as follows with the engine in a fully installed condition at normal operating temperature with the ignition timing correct.

NOTE**Tamperproof Carburetters**

Where tamperproofing or emission control equipment is fitted, any adjustment to carburetter mixture and/or slow running control must conform to local territory exhaust emission legislation.

2½ litre Petrol

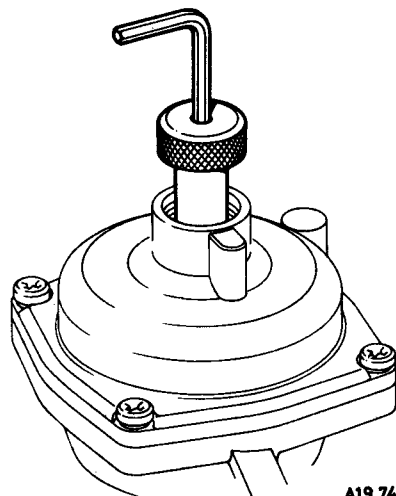
Special tools required: ERC 3696
 ERC 3786

Should adjustment be required, this must only be carried out with the engine in a fully installed condition as follows.

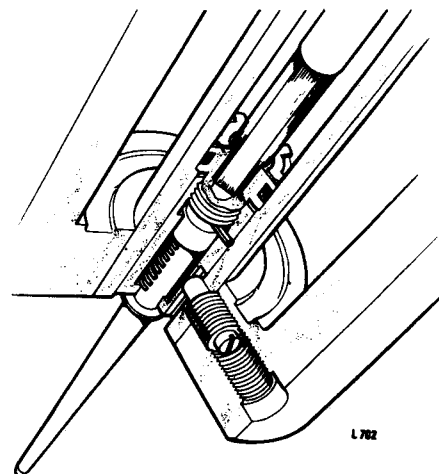
- 1 Ensure that the engine is to normal operating temperature with correct ignition timing.
- 2 Pierce and prise out the cap and using tool ERC 3692, slacken the locknut on the idle screw. Set to the correct idle speed and just nip the locknut.
- 3 Recheck the ignition timing if dynamic tuning is used.
- 4 Using tool ERC 3692, slacken the locknut on the mixture screw and adjust to obtain the correct exhaust C.O. readings and just nip the locknut.
- 5 Recheck the idle speed.
- 6 When the idle speed and CO readings are correct to specification, tighten the locknuts on both the idle speed and mixture screws. Recheck speed and CO after tightening.
- 7 Fit the correct cap to the shrouds surrounding the adjustment screws using tool ERC 3786.

Idle mixture adjustment

- 1 Remove the piston damper.
- 2 Insert tool S 353 into the piston guide rod, ensuring that the peg on the outer barrel of the tool is located in the slot to prevent the piston twisting with consequent damage to the diaphragm.
- 3 Push down the allen key to locate in the hexagon of the metering needle housing.
- 4 Turn the tool in a clockwise direction to richen the mixture, and anti-clockwise to weaken.



A19 74



NOTE: The adjusting tool should be removed from the guide rod after every adjustment to allow the engine to recover stability which is upset due to the piston being depressed during adjustment. Running the engine at 2000 rev/min for a few seconds will aid this recovery.

- 5 Refit the piston damper. Run the engine at 2000 rev/min for about 20 secs before taking the final speed and exhaust CO readings. Slight adjustment to mixture and/or speed may be required after this operation.

The metering needle, will normally be set with the shoulder of the needle flush with the face of the piston, this is termed the datum position. If difficulty is experienced with carburation the needle should be set to this datum for investigation. When using the adjusting tool, a positive stop will be evident when the needle is in the fully rich position. In the anti-clockwise direction there is no stop, and it is possible to disengage the needle from the adjusting screw, if more than two turns are made from the datum position.

Should this occur, the needle can be re-engaged by applying light pressure in the upward direction, to the shoulder of the needle at the piston face, while turning the adjusting tool in a clockwise direction.

Idle speed adjustment

To adjust the idle speed the following procedure must be followed.

- 1 Ensure that the throttle jack solenoid is operative with the engine running.
- 2 Pierce and remove the cap and slacken the locknut on the round head screw, located on the lever actuated by the solenoid plunger (using tool ERC 3692).
- 3 Using the screwdriver incorporated in the tool, engage end of the screw and adjust against the solenoid plunger until the correct idle speed is obtained.

IMPORTANT

Under no circumstances can the normal idle speed screw on the carburetter casting be used for this operation.

- 4 Tighten the locknut, recheck exhaust CO and speed settings.
- 5 Fit the correct cap to the nylon shroud surrounding the adjusting screw using tool ERC 3786.

Fast Idle

Operation of the choke from on to off should result in a fast idle speed of 1200 r.p.m. \pm 50 when the choke control is approximately 0.5 in. from the fully in position.

Should adjustment be required the following procedures must be used.

- 1 Remove the carburetter from the engine. 19.15.09.
- 2 Put the starter unit adjusting pin in the full choke position (pin in the groove).
- 3 With the starter unit held in the full choke position, it should be just possible to insert a 1,0 mm (No. 61) drill between the top edge of the throttle plate and the throttle barrel wall.
- 4 To adjust the setting, release the locknut on the dome head screw fitting in the throttle lever that contacts the starter unit cam, adjust the screw to obtain the required setting, tighten the locknut, and recheck the gap.
- 5 Replace the adjusting pin in the reduced choke position.

Poppet Valve

This assembly is preset and non adjustable if malfunction is suspected the carburetter must be changed.

CARBURETTER, Zenith type 175CD 2S

Overhaul and adjust

19.15.17

Dismantling

- 1 Remove the carburetter. 19.15.09.

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 (where applicable use Tool S 353 anti-clockwise to remove needle).
- 6 Remove the diaphragm from the air valve.

Removing the float chamber

- 7 Remove and dismantle the jet assembly (basic carb. only).
- 8 Remove the float chamber and gasket.
- 9 Unclip the float and arm complete with the spindle.
- 10 Remove the needle valve and washer from the carburetter body.

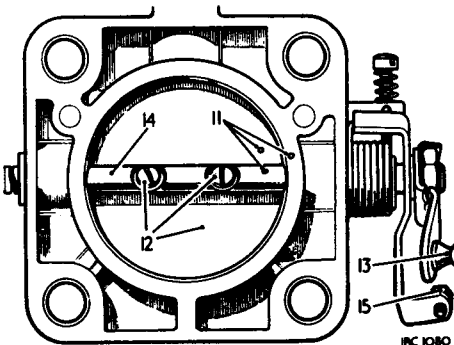
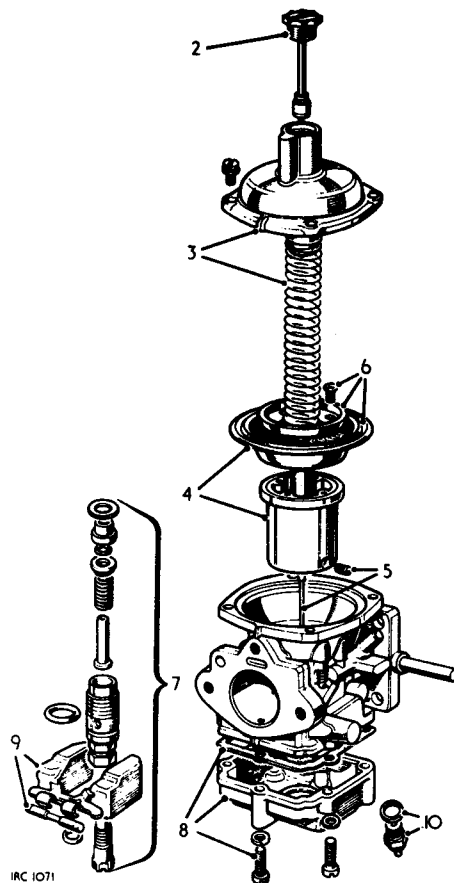
Dismantling the carburetter body

- 11 Add location marks to the throttle butterfly and spindle.
- 12 Remove the throttle butterfly.
- 13 Remove the throttle lever.
- 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 inspecting

Carburetter 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 carburetter 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, replace if necessary.

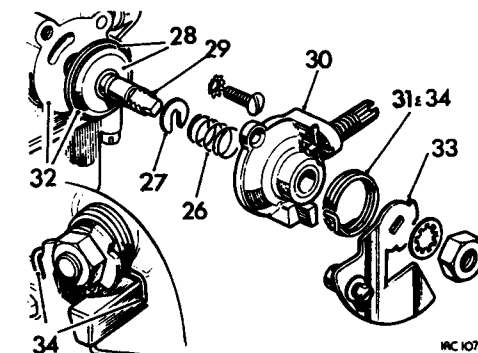
Diaphragm

- 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 and chamber for corrosion, 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.

Reassembling

Cold start, control

- 26 Place the spring on the cold start spindle.
- 27 Fit the spring retaining clip.

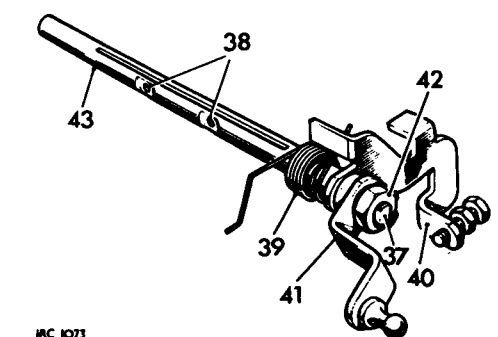


- 28 Check that the discs slide easily on the spindle.
- 29 Place the cold start spindle on the starter face.
- 30 Place the starter cover in position.
- 31 Fit the return spring over the spindle.
- 32 Rotate the spindle until the oval port in the end disc is aligned with the oval port in the starter face.
- 33 Fit the cold start lever.
- 34 Engage the return spring over the lug on the starter cover and the back of the cold start lever.
- 35 Fit the cold start assembly to the carburetter body.
- 36 Check assembly for ease of operation.

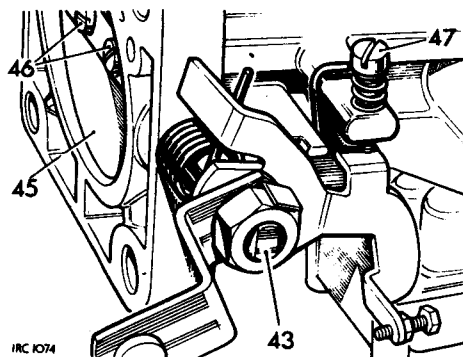
Throttle spindle

- 37 Position the throttle spindle with the recessed end uppermost.
- 38 Position the screw head flats on the spindle toward the operator.
- 39 Place the return spring over the recessed end of the spindle.
- 40 Fit the throttle stop and fast idle lever.
- 41 Fit the throttle lever.
- 42 Secure the assembly with a bushed washer, tab washer and nut. Engage the tab washer.
- 43 Insert the throttle spindle from the cold start side of the carburetter body fitting the throttle return spring on the fast idle adjustment holder.

continued



- 44 Tension the spring half a turn.
- 45 Fit the throttle butterfly, maintaining the previously marked alignment. Leave the retaining screws loose.
- 46 Actuate the throttle several times to centralise the butterfly, then tighten the retaining screws and lock by peening ends.
- 47 Fit the throttle stop adjusting screw until it touches the stop, then turn a further one and a half turns (where the throttle stop screw is tamperproofed, and a throttle jack is used, this screw should remain unaltered and the butterfly completely closed).

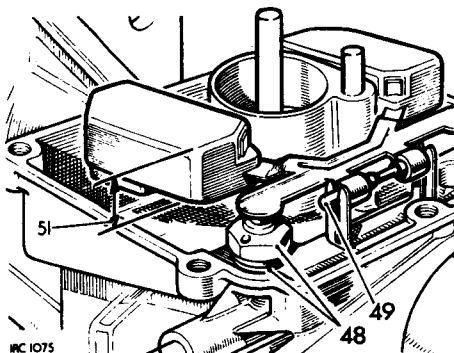


Float chamber

- 48 Fit the needle valve and washer.
- 49 Locate the spindle into the float arm and engage the assembly in the retaining clips.
- 50 With the needle valve on its seating and the tab on the float carrier contacting the needle valve, measure the distance between the carburetter flange face and the highest point on the floats.
- 51 The dimension required for correct float level is 16 to 17 mm (0.629 to 0.669 in.). Adjust by bending the tab on the float carrier or fitting an additional washer under the needle seating.

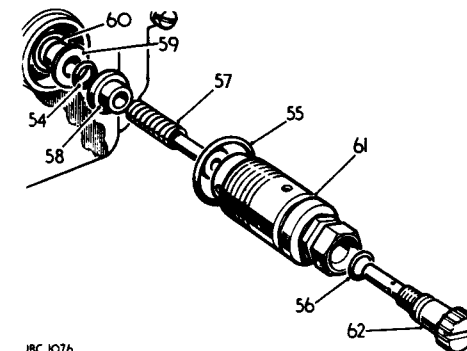
NOTE: The float carrier tab must be maintained at right angles to the needle in the closed position.

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



Jet assembly (Basic Carburetter)

- 53 Fit the 'O' ring into the guide bush.
- 54 Fit the 'O' ring over the jet orifice carrier.
- 55 Fit the 'O' ring over the adjusting screw.
- 56 Place the spring over the jet orifice.
- 57 Fit the guide bush (thin flanged) onto the jet orifice.
- 58 Fit the top bush to the jet orifice.
- 59 Place a plain washer onto the top bush.
- 60 Place the jet orifice assembly into the carrier. Insert the assembly through the float chamber and fully tighten, then tighten the float chamber screws.
- 61 Fit the adjusting screw and adjust the jet orifice until it is in line with the top of the bushing.

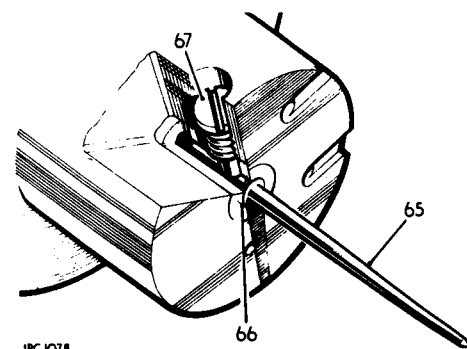
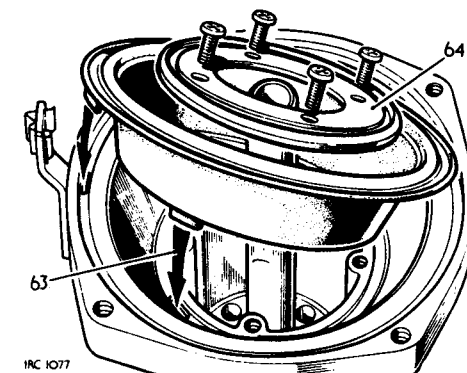


Air valve, shaft and diaphragm

- 62 Where applicable insert needle housing assembly into the bottom of the air valve.
- Fit tool S 353, turning clockwise to engage threads of needle valve assembly with adjusting screw; continue turning until slot in needle housing is aligned with grub screw.
- Tighten grub screw.

NOTE: The grub screw does not tighten on the needle housing but locates into the slot. This ensures that, during adjustment, the needle will remain in its operating position, i.e. biased, by a spring in the needle housing, towards the air cleaner side of the carburetter.

- 63 Locate the diaphragm onto the air valve with the tab engaged in the recess.
- 64 Fit the diaphragm retaining ring.
- 65 Locate the metering needle into the air valve.
- 66 Align the needle shoulder with the top surface of the air valve shaft.
- 67 Secure the needle in position.



Jet centralisation (basic carburettor)

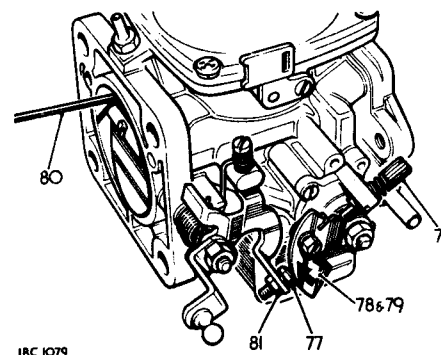
- 68 Locate the air valve and needle assembly into the carburettor and allow the air valve to bottom on the jet bridge. DO NOT push the valve down. If the valve does not bottom, unclamp the jet assembly sufficient to allow the valve to bottom. In this position, ensure that the locating tab on the diaphragm locates in the recess on the carburettor body.
- 69 Fit the air valve return spring and carburettor top cover.
- 70 Lift the air valve and tighten the jet assembly fully.
- 71 Slacken off the whole jet assembly approximately half a turn to release the orifice bush.
- 72 Allow the air valve to fall, if necessary assist by inserting a pencil in the dashpot. The needle will automatically centralise the jet orifice.
- 73 Slowly tighten the jet assembly, checking frequently that the needle remains free in the orifice. Check by raising the air valve approximately 6 mm (0.250 in.) and allowing it to fall freely. The air valve should stop firmly on the bridge.
- 74 Fill the dashpot in the air valve to within 6 mm (0.250 in.) of the top of the air valve shaft with SAE 20 engine oil.
- 75 Fit the damper assembly to the dashpot and top cover.

Fast idle adjustment, carburettor removed

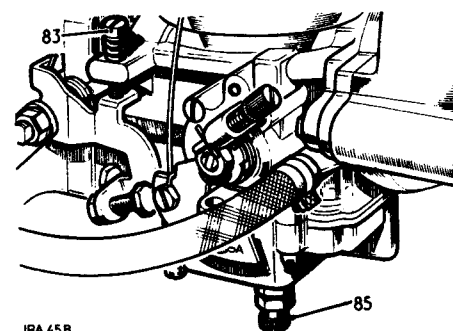
- 76 Set the cold start adjuster fully outward.
- 77 Slacken the fast idle adjusting screw.
- 78 Hold the cold start cam lever in the maximum position.
- 79 Adjust the fast idle adjusting screw against the cam lever to obtain a 1,0 to 1,1 mm (0.039 to 0.043 in.) clearance between the top edge of the throttle butterfly and the carburettor barrel wall.
- 80 Measure the clearance using feeler gauges or a 1,1 mm (No. 57) diameter drill shank.
- 81 Secure the fast idle adjusting screw locknut without disturbing the adjustment.
- 82 Refit the carburettor 19.15.09.

Slow running adjustment

- 83 Run the engine until normal operating temperature is obtained. If necessary adjust slow-run screw to give the correct idling speed.
- 84 Lift the carburettor piston approximately 1 mm (0.031 in.) by removing the air cleaner to gain access to the carburettor piston.
- 85 If the engine speeds up immediately the mixture is too rich and the jet adjustment screw must be turned anti-clockwise, thus weakening the mixture; if the engine stops immediately, the mixture is too weak and the jet adjustment screw should be turned clockwise to enrich the mixture. If the engine just falters and continues to run unevenly the adjustment is correct.
- 86 Finally adjust the slow-run screw to get a smooth idling speed.



IRC 1079



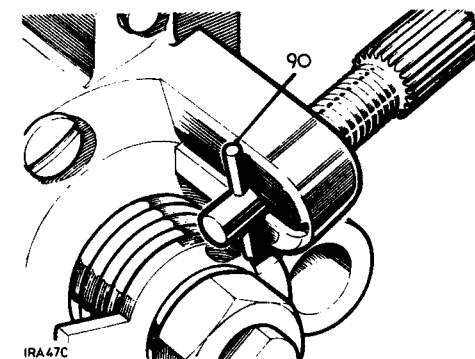
IRA 45 B

Fast-idle adjustment, carburettor fitted

- 87 Operate fully the cold start control.
- 88 Adjust the fast-idle stop screw to obtain an engine speed of 1,000 to 1,200 rev/min.
- 89 Return the cold start control and ensure that the fast-idle stop screw is clear of the cam lever.

Low temperature starting

- 90 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.



IRA 47C

DATA

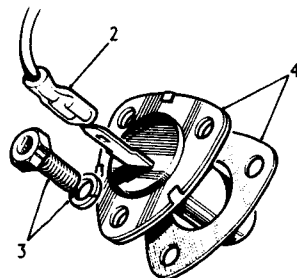
Float height	16 to 17 mm (0.629 to 0.669 in.)
Fast-idle setting, carburettor removed	1,0 to 1,1 mm (0.039 to 0.043 in.)
Fast-idle setting, carburettor fitted	clearance between throttle butterfly top edge and carburettor barrel
Idling speed	1,000 to 1,200 rev/min
	500 rev/min

THERMOSTAT SWITCH for cold start warning light, Petrol models

Remove and refit 19.15.50

Removing

- 1 Locate the switch at the front of the cylinder head, RH side for 2.6 litre models and LH side for 2¼ litre models.
- 2 Disconnect the electrical lead.
- 3 Remove the fixings.
- 4 Withdraw the switch and joint washer. If necessary, disconnect and move aside the crankcase breather pipe to obtain clearance for removal.



2RC 41

Refitting

- 5 Reverse instructions 1 to 4.

THROTTLE LINKAGE

Remove and refit 19.20.07

General

The accelerator controls vary between different models; the following instructions are generally applicable but reference should be made to the exploded views and descriptions of accelerator controls for detail variations, refer to 19.00.00.

NOTE: On 2.6 litre models, access to the throttle linkage at the rear of the engine is best obtained by removing the gearbox tunnel cover. 76.25.07.

Removing

- 1 Disconnect the linkage return springs.
- 2 Disconnect the linkage adjacent to the pedal box.
- 3 Disconnect the linkage at the carburettor or fuel distributor pump.
- 4 Remove the RH retaining bracket from the engine compartment dash.
- 5 Withdraw the throttle linkage complete.

Refitting

- 6 Reverse 1 to 6 leaving the pinch bolts loose at this stage.
- 7 Depress the throttle pedal onto the stop on the toe box floor.
- 8 Hold the throttle linkage in the fully open position.
- 9 Tighten the linkage pinch bolts and release the pedal and linkage.
- 10 If necessary adjust the throttle pedal stop on the toe box floor and the return stop at the toe box to permit full and unrestricted throttle opening.

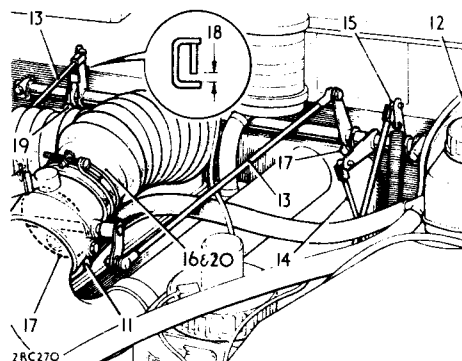
NOTE: When replacing or refitting the accelerator cable to the pedal assembly, care must be taken to ensure that the yoke end of the cable assembly pivots freely about the clevis pin and accelerator pedal. A tight fitting accelerator cable/pedal assembly will cause the cable to flex about the point where it is joined to the yoke and could adversely effect the life of the cable.

Diesel models with servo-assisted brakes

- 11 The vacuum supply for servo assistance is obtained via a non-return valve positioned downstream of a butterfly valve fitted to the induction manifold.
- 12 A vacuum supply is built up in the vacuum reservoir tank and servo unit during engine over-run conditions, that is with the accelerator linkage quickly closed on deceleration.
- 13 The linkages must be set such that the manifold butterfly will open slightly in advance of the fuel distributor pump linkage during acceleration, otherwise overfueling will result.

Linkage setting

- 14 Move the engine speed hand control fully to the idle position.
- 15 Ensure that the accelerator linkage is fully in the idle position.
- 16 Remove the air inlet hose from the induction manifold to obtain access to the manifold butterfly valve.
- 17 Ensure that the butterfly valve is fully closed, if necessary, adjust at the valve linkage pinch bolt at the cross shaft.
- 18 Ensure that clearance exists between the front arm of the cross shaft lever and the fuel distributor pump link.
- 19 Adjust at the lever pinch bolt as required to obtain the clearance.
- 20 Refit the air inlet hose.



2RC 270

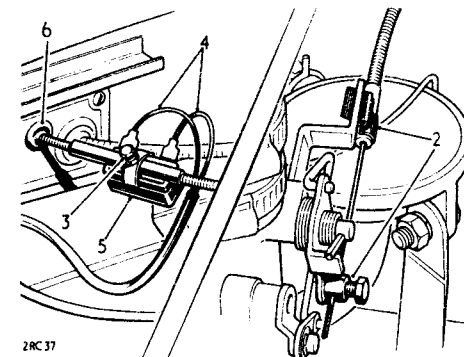
COLD START CONTROL CABLE, vehicles without steering column lock

Remove and refit 19.20.26

Removing

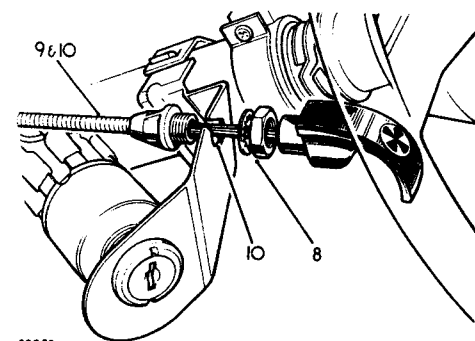
- 1 Disconnect the battery earth lead.
- 2 Disconnect the inner and outer control cables at the carburettor.
- 3 Slacken the locknut and release the retainer screw fixing the switch unit to the control cable.
- 4 Disconnect the white/blue lead from the front connector blade and the white/yellow lead from the rear blade.

- 5 Withdraw the switch unit.
- 6 Withdraw the cable grommet at the engine compartment dash.



2RC 37

- 7 Remove the fixings and withdraw the steering column switch shrouds to gain access to the control cable.
- 8 Remove the locknut and shakeproof washer fixing the outer cable to the mounting bracket.
- 9 Push the control forward to clear the hole in the mounting bracket.
- 10 Lift the control and pass the inner cable through the slot provided in the bracket.



2RC 38

- 11 Withdraw the control cable assembly complete.

Refitting

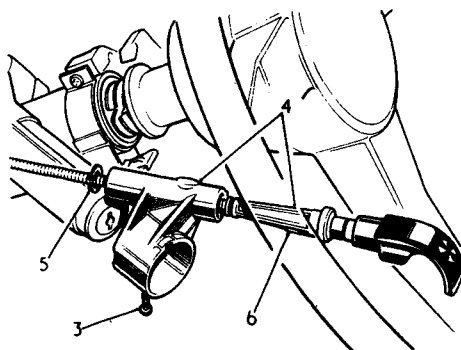
- 12 Reverse instructions 1 to 11; ensure that the control knob is fully forward and the choke mechanism is fully open before clamping the inner cable at the carburettor.

COLD START CONTROL CABLE, for vehicles fitted with steering column lock

Remove and refit 19.20.26

Removing

- 1 Carry out items 1 to 6 of the preceding operation as described for vehicles without steering column lock.
- 2 Remove the fixings and withdraw the steering column upper and lower shrouds.
- 3 Remove the cable housing locating screw,
- 4 Withdraw the control cable and housing complete from the steering column lock.
- 5 Remove the retaining circlip.
- 6 Withdraw the control cable assembly complete.



Refitting

- 7 Reverse instructions 1 to 6 and check the control operation.

HAND CONTROL, ENGINE SPEED, 2 1/4 litre Diesel models

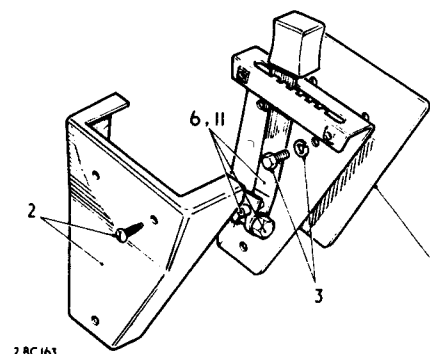
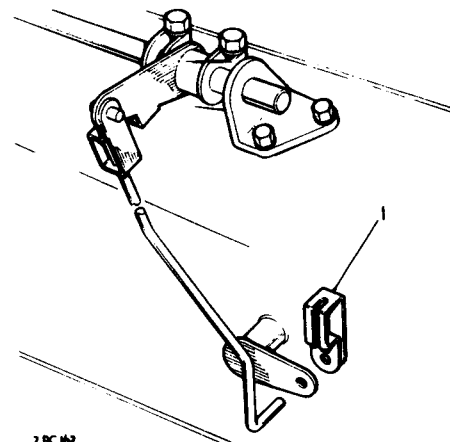
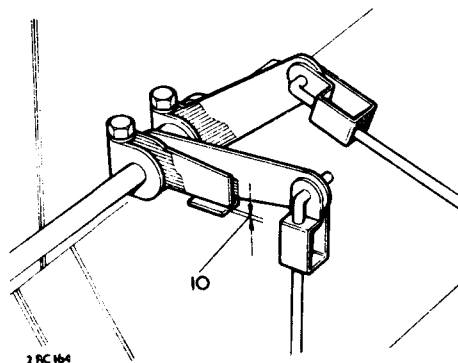
Remove and refit 19.20.29

Removing

- 1 Disconnect the control rod lower end from the pivot lever in the engine compartment.
- 2 Remove the trim cover from the quadrant plate.
- 3 Remove the fixings, quadrant plate to dash.
- 4 Withdraw the quadrant plate and hand control lever.
- 5 Withdraw the sealing pad.
- 6 If required, make alignment marks for reassembly purposes, slacken the pinch bolt and withdraw the hand lever from the pivot lever and quadrant plate.

Refitting

- 7 Reverse instructions 1 to 6. If adjustment is required, proceed as instructions 8 to 11.
- 8 Move the hand control lever to the minimum speed position (LH side of the quadrant).
- 9 Ensure that the fuel distributor pump linkage is in the idle speed position.
- 10 Check for a minimum clearance between the lift arm on the actuator lever and the cross shaft relay lever.
- 11 To adjust, slacken the hand control lever pinch bolt and rotate the pivot lever in the required direction. Tighten the pinch bolt.



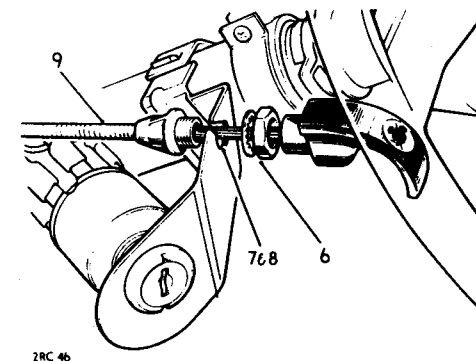
ENGINE STOP CONTROL CABLE, vehicles without steering column lock.

Remove and refit 19.20.32

Removing

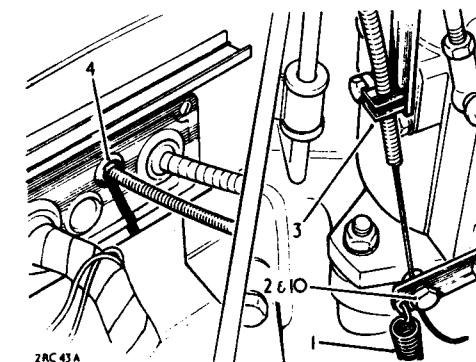
- 1 Disconnect the injection pump cut-off lever return spring.
- 2 Disconnect the control inner cable at the cut-off lever.
- 3 Disconnect the control outer cable at the support bracket.
- 4 Withdraw the cable grommet at the engine compartment dash.

- 5 Remove the fixings and move aside the steering column upper and lower shrouds to gain access to the control cable.
- 6 Remove the locknut and shakeproof washer fixing the outer cable to the mounting bracket.
- 7 Push the control forward to clear the hole in the mounting bracket.
- 8 Lift the control and pass the inner cable through the slot provided in the bracket.
- 9 Withdraw the control cable assembly complete.



Refitting

- 10 Reverse instructions 1 to 9; ensure that when the control is operated, full movement is obtained at the injection pump cut-off lever.



ENGINE STOP CONTROL CABLE, vehicles fitted with steering column lock

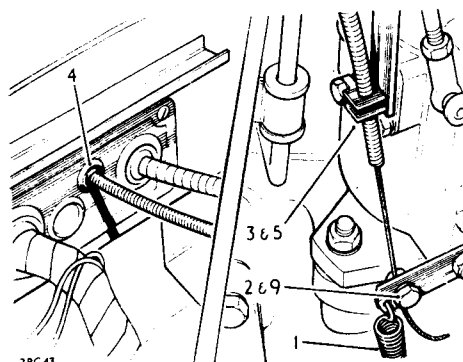
Remove and refit 19.20.32

Removing

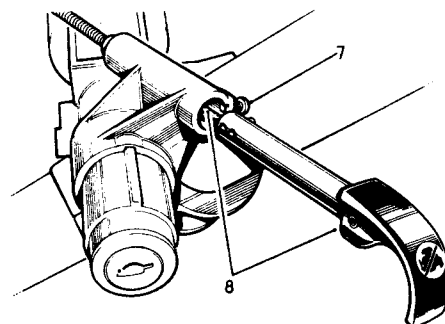
- 1 Disconnect the injection pump cut-off lever return spring.
- 2 Disconnect the control inner cable at the cut-off lever.
- 3 Disconnect the control outer cable at the support bracket.
- 4 Withdraw the cable grommet at the engine compartment dash.
- 5 Withdraw the control outer cable from the inner cable.
- 6 Remove the steering column upper and lower shroud fixings and move aside the shrouds.
- 7 Slacken the control rear stop screw sufficient to allow the internal stop pin to clear the screw end.
- 8 Withdraw the control knob and inner cable assembly.

Refitting

- 9 Reverse 2 to 8 but do not secure the control inner cable at this stage.
- 10 Move the control knob to the 'engine stop' position, that is with the cable ferrule abutting the internal stop lever in the control housing.
- 11 Move the injection pump cut-off lever fully into the fuel cut-off position.
- 12 Secure the control inner cable to the fuel cut-off lever.
- 13 Reverse 1. Ensure that the stop control moves fully forward into the 'engine start' position when the electrical services and starter key is inserted and turned clockwise to the II position.
- 14 Ensure that with the stop control pulled fully rearwards and the starter key removed, the stop control remains engaged in the 'engine stop' position.



2RC 43



2RC 44

FUEL DISTRIBUTOR/INJECTION PUMP

Remove and refit 19.30.07

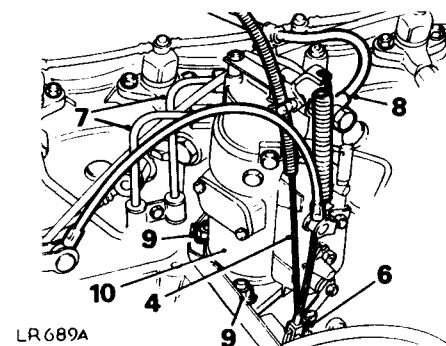
Service tool: 605863, Timing gauge

Removing

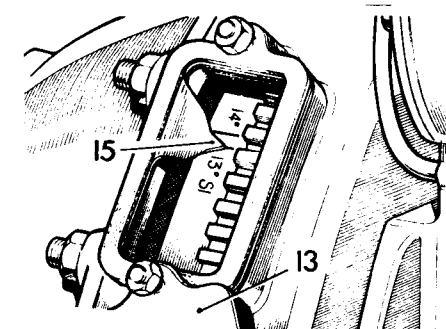
- 1 Remove the bonnet panel. 76.16.01.
- 2 Remove the air cleaner. 19.10.04.
- 3 Disconnect the battery earth lead.
- 4 Disconnect the engine stop cable.
- 5 Disconnect the stop lever return spring.
- 6 Disconnect the accelerator linkage at the securing clip.
- 7 Remove the fuel pipes, distributor pump to injectors.
- 8 Disconnect the remaining fuel pipes from the distributor.
- 9 Remove the distributor pump fixings.
- 10 Withdraw the distributor pump.
- 11 Withdraw the distributor pump drive shaft.

Refitting and timing procedure

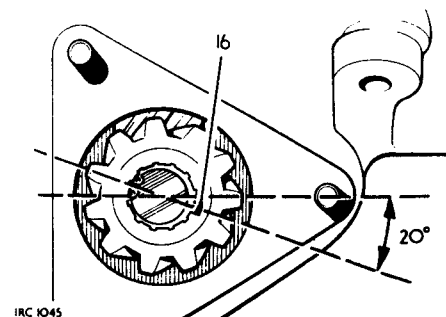
- 12 Remove the engine rocker cover.
- 13 Slacken the fixings and move aside the inspection cover on the flywheel housing to expose the timing pointer adjacent to the flywheel.
- 14 Turn the crankshaft in the direction of rotation until both valves of number one cylinder are closed and the piston is ascending the bore on the compression stroke.
- 15 Continue to turn the crankshaft until the timing pointer aligns with the 13° mark on the flywheel, that is 13° BTDC. This must be done carefully. If the flywheel is inadvertently turned too far and the timing mark goes past the pointer, do not turn the flywheel back, but repeat the operation. Ensure that a correct line of vision is taken when lining up the timing marks. An incorrect line of vision can result in the timing being 1° to 2° out.
- 16 The master spline on the driving gear should now be approximately 20° from the centre line of engine measured from the front end, that is, at the 4 o'clock position.



LR 689A

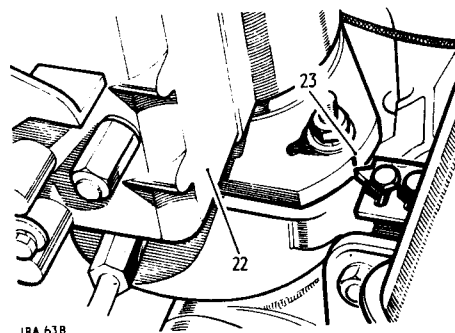
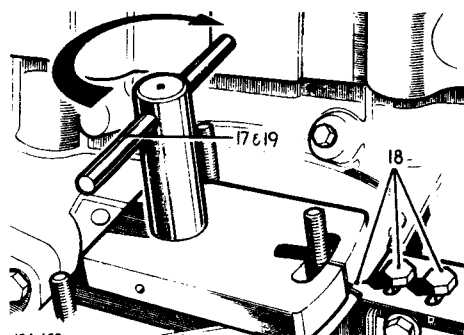


1123



IRC 1045

- 17 Insert the timing gauge, 605863, into the driving gear, then twist gauge in a clockwise direction to take up backlash and any wear in the gears.
- 18 Hold in this position, then, if necessary, slacken off bolts retaining the timing pointer on the side of the cylinder block. Adjust pointer so that it coincides with the line on the timing gauge, as illustrated, then retighten the bolts.
- 19 Remove timing gauge.
- 20 Rotate the driving gear on the distributor pump so that the master spline lines up with the master spline on the engine driving gear.
- 21 Fit the pump drive shaft, longer splines last, to the engine driving gear, engaging the master spline.
- 22 Fit the distributor pump to the engine engaging the master splines on the pump and the drive shaft. Do not tighten the fixings at this stage.
- 23 Align the vertical mark on the pump flange with the pump timing pointer, then tighten the pump fixings.
- 24 Reverse 3 to 8 and 12 and 13.
- 25 Prime the fuel system. 19.50.01.



The following instructions, 26 to 36, describe an alternative method of timing the fuel injection pump using service timing gauge MS 67 B.

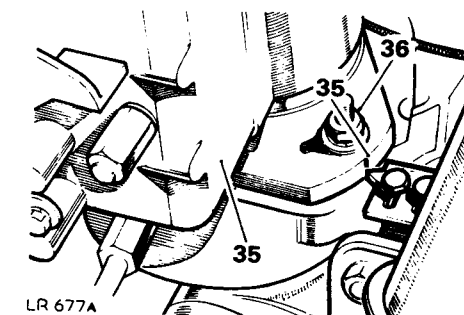
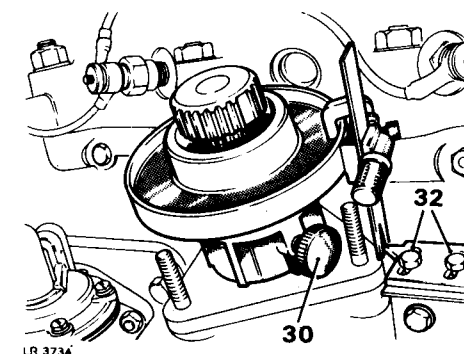
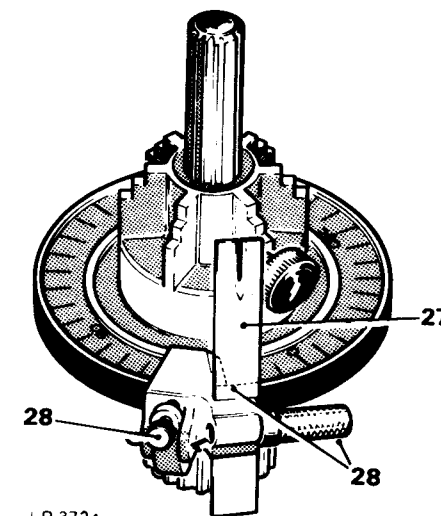
- 26 Follow instructions 1 to 16 above.
- 27 Using Service tool MS 67 B, assemble the scribing arm of the tool to the tool body.
- 28 Set gauge by loosening knurled screws and sliding bracket around until chamfered edge aligns with the required angle of 22° ; tighten knurled screw in this position.
- 29 Insert tool MS 67 B into vacant injection pump position and engage tool gear into injection pump drive splines.
- 30 Release centre shaft retaining screw and slide tool body along centre shaft until body engages injection pump drive gear hub. Lock shaft retaining screw.
- 31 Apply gentle clockwise pressure to take up backlash or wear in gears; retain in this position.
- 32 Slacken off timing pointer bolts. Adjust timing pointer so that it aligns with scribing arm on tool. Tighten timing pointer bolts.
- 33 Remove tool MS 67 B.
- 34 Rotate driving gear on distributor pump so that master spline lines up with master spline on driving gear.
- 35 Offer pump to engine, ensuring that the timing mark on the pump flange coincides with the timing pointer.
- 36 Tighten the injection pump retaining nuts.

NOTE: When the distributor pump is timed as detailed above, that is, with the timing pointer on the engine altered to take up backlash and wear on the gears, it ensures that optimum distributor pump timing is achieved.

Should there be any fall-off of power during the life of the engine, retiming the distributor pump to take up gear wear could well make a significant improvement to engine performance, provided the engine is generally in good condition.

- 37 Reverse instructions 3 to 8 and 12 to 13.
- 38 Prime the fuel system. 19.50.01.

continued



Setting the distributor pump control screws

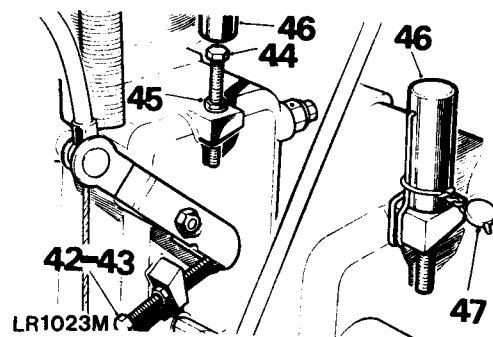
- 39 On distributor pumps with the maximum output control screw sealed, the control screw setting must not be altered. Adjustment is allowed to the slow running control screw only.
- 40 However, when a new or reconditioned distributor pump is to be fitted, it will be found that the slow running control screw is loosely attached to the distributor pump and that the maximum output control screw is not sealed.
- 41 It is necessary, therefore, after the distributor pump has been assembled to the engine, first to fit the slow running control screw and then adjust both screws as detailed in instructions 42 to 47.

Slow running control screw adjusting

- 42 Adjust the control screw until the engine slow running speed is 590 ± 20 rev/min. This may be checked using a suitable revolution counter, or by adjusting the control screw until the lowest engine speed consistent with smooth, even running is achieved.
- 43 To adjust the slow running control screw, proceed as follows:
- Check engine speed with revolution counter.
 - Slacken adjusting screw locknut and screw inwards to increase speed and outwards to decrease.
 - When a slow running speed of 590 ± 20 rev/min has been obtained, tighten locknut.
 - Remove revolution counter.

Maximum output control screw adjusting

- 44 Adjust the control screw, where necessary, until the engine maximum speed is 4200 ± 20 rev/min. This may be checked using a suitable revolution counter, or by road test; the road speed equivalent of 4,200 rev/min being 48 mph (77 kph) in third gear.
- 45 When maximum engine speed of $4,200 \pm 20$ rev/min has been obtained, tighten locknut.



- 46 Fit the adjusting screw collar.
- 47 Wire lock and seal the screw collar.
- 48 Reverse instructions 1 and 2.

FUEL INJECTION PUMP**Altitude compensation for fuel injection pump**

When vehicles equipped with diesel engines are operated at high altitude it is recognised that the reduced air density causes a reduction in the weight of air drawn into the engine cylinders, which results in incomplete combustion of the injected fuel at full throttle, unless this is reduced in proportion to the reduction in air density.

To compensate for these variations and to avoid excessive fuel consumption, accompanied by excessive exhaust smoke, the amount of fuel delivered to the cylinders must be reduced to suit the conditions under which the engine is required to operate, by de-rating the fuel pump delivery at a value of 3% per 330 metres (1,000 feet) of altitude operation.

It is recommended that vehicles intended for operation in high altitudes should have the injection pump adjusted by a C.A.V. dealer.

DATA

Injection timing setting	13° BTDC
Idling speed	590 ± 20 rev/min
Maximum speed setting (sealed)	$4,200 \pm 20$ rev/min