

LAND ROVER

Series III

**FIVE MAIN BEARING ENGINE
SUPPLEMENT**

INTRODUCTION

This supplement must be used in conjunction with the current Land Rover Series III Repair Operation Manual.

The introduction of a five main bearing crankshaft to the 2½ litre petrol and diesel engine has caused changes to some repair operations. The operations concerned have been revised and are included in this publication together with details of the differences between the new engines and the existing three bearing units.

Since the new petrol engine is manufactured at different plants, some variations exist and for purposes of identification two commencing serial numbers have been allocated namely 36100001A and 99100001A. The diesel engine commencing number is 36600001A.

Set out below are the principal differences between the three and five main bearing petrol engines and the variations between the two five main bearing units. Parts common to diesel engine serial number range 36600001A are also mentioned.

Crankshaft

Redesigned to include five main bearings. The main bearing journal and crankpin dimensions remain the same as for the three bearing shaft. The five bearing shaft fitted to commencing serial number range 36100001A is a casting whereas a forged shaft is used in serial number range 99100001A and the diesel engine. Whilst a cast crankshaft must not be fitted to engines in serial range 99100001A and the diesel version a forged may be used in serial number range 36100001A. Forged crankshafts, however, will only be supplied for spares.

Cylinder Block

Redesigned to accommodate five main bearings. Sealing of the rear main bearing changed to a lip type seal pressed into the flywheel housing. The outside diameter of the crankshaft flange runs in the seal. The relevant repair operations have been revised and included in this supplement.

Camshaft

The valve timing of the camshaft fitted to the engine serial number range 36100001A is as follows.

Inlet opens	6° BTDC
Inlet closes	52° ABDC
Inlet peak	113° ATDC
Exhaust opens	34° BBDC
Exhaust closes	24° ATDC
Exhaust peak	95° BTDC

Number one exhaust cam peak is on the centre line of camshaft keyway.

The camshaft sprocket retaining bolt has a UNF thread.

Valve timing for the camshaft fitted to serial number range 99100001A and diesel engine number range 36600001A is:

Inlet opens	16° BTDC
Inlet closes	42° ABDC
Inlet peak	103° ATDC
Exhaust opens	51° BBDC
Exhaust closes	13° ATDC
Exhaust peak	109° BTDC

Number one exhaust cam peak on the camshaft fitted to serial number range 99100001A is 7° to the right of the keyway centre line viewed from the keyway end.

The camshaft sprocket retaining bolt has a metric thread.

Oil Pump

Interchangeable as an assembly between serial number range 36100001A and 99100001A. The pump gears, although different, are interchangeable with either assembly provided the gears are fitted as a matched set. The pump is interchangeable on serial number range 36100001A. The idler gear and the driver are both steel on serial number range 99100001A. On serial number range 36100001A the idler is aluminium and the driver steel.

INTRODUCTION

Flywheel

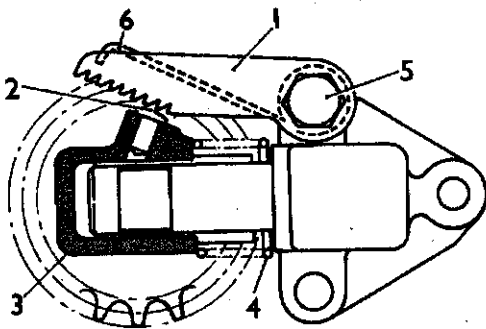
Design change to fit five main bearing crankshaft flange. Interchangeable between serial number ranges 36100001A and 99100001A but not with diesel engine range 36600001A.

Flywheel Housing

Design change to accommodate new crankshaft and rear main bearing oil seal arrangement. Interchangeable between serial number ranges 36100001A and 99100001A but not with diesel engine range 36600001A.

Timing Chain Tensioner

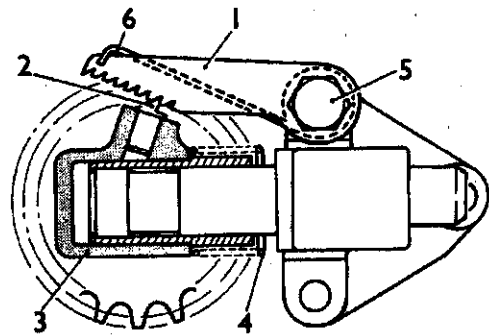
The timing chain tensioner assembly is the same as used on the three main bearing versions. The assembly fitted to serial number range 99100001A is the same as that used on diesel engine range 36600001A. The tensioner fitted to early petrol engine range 36100001A has a different piston assembly incorporating a relief valve. This has now been discontinued and all three engines now have the same tensioner. The ratchet on serial number range 99100001A is different in appearance and method of manufacture but dimensionally the same.



LR 667

99100001A and 36600001A
engine serial no. range

1. Ratchet
2. Pawl
3. Cylinder
4. Spring
5. Ratchet pivot and retaining bolt
6. Ratchet return spring
7. Jockey sprocket
8. Retaining clip for ball
9. Ball



LR 666

36100001A engine serial no. range
(Early engines only)

1. Ratchet
2. Pawl
3. Cylinder
4. Spring
5. Ratchet pivot and retaining bolt
6. Ratchet return spring
7. Jockey sprocket
8. Relief valve spring
9. Relief valve ball
10. Relief valve plug
11. Piston assembly

Ignition Distributor

A Lucas type 45D4 with sliding contacts is fitted to engine serial number range 99100001A. Serial number range 36100001A is fitted with a Ducellier distributor.

Differences between the existing three main bearing diesel engine and the new five bearing unit serial number commencing 36600001A.

Cylinder Block

Crankcase redesigned to accommodate the five main bearing crankshaft. Sealing of the rear main bearing changed to a lip type seal pressed into the flywheel housing. The outer diameter of the crankshaft flange runs in the seal.

Crankshaft

Redesigned to include five main bearings. The main bearing journal and crankpin dimensions remain the same as the three bearing shaft.

Flywheel

Modified to fit redesigned crankshaft flange.

Flywheel Housing

Redesigned to accommodate new crankshaft rear main bearing oil seal arrangement.

Crankshaft Pulley

Changed to a damper type pulley incorporating a band of rubber between the hub and pulley sections. Also dimensional changes.

Starter Dog

Changed to that used on the five bearing petrol engines. Not interchangeable with the starter dog on the existing three bearing diesel engine.

Special Note

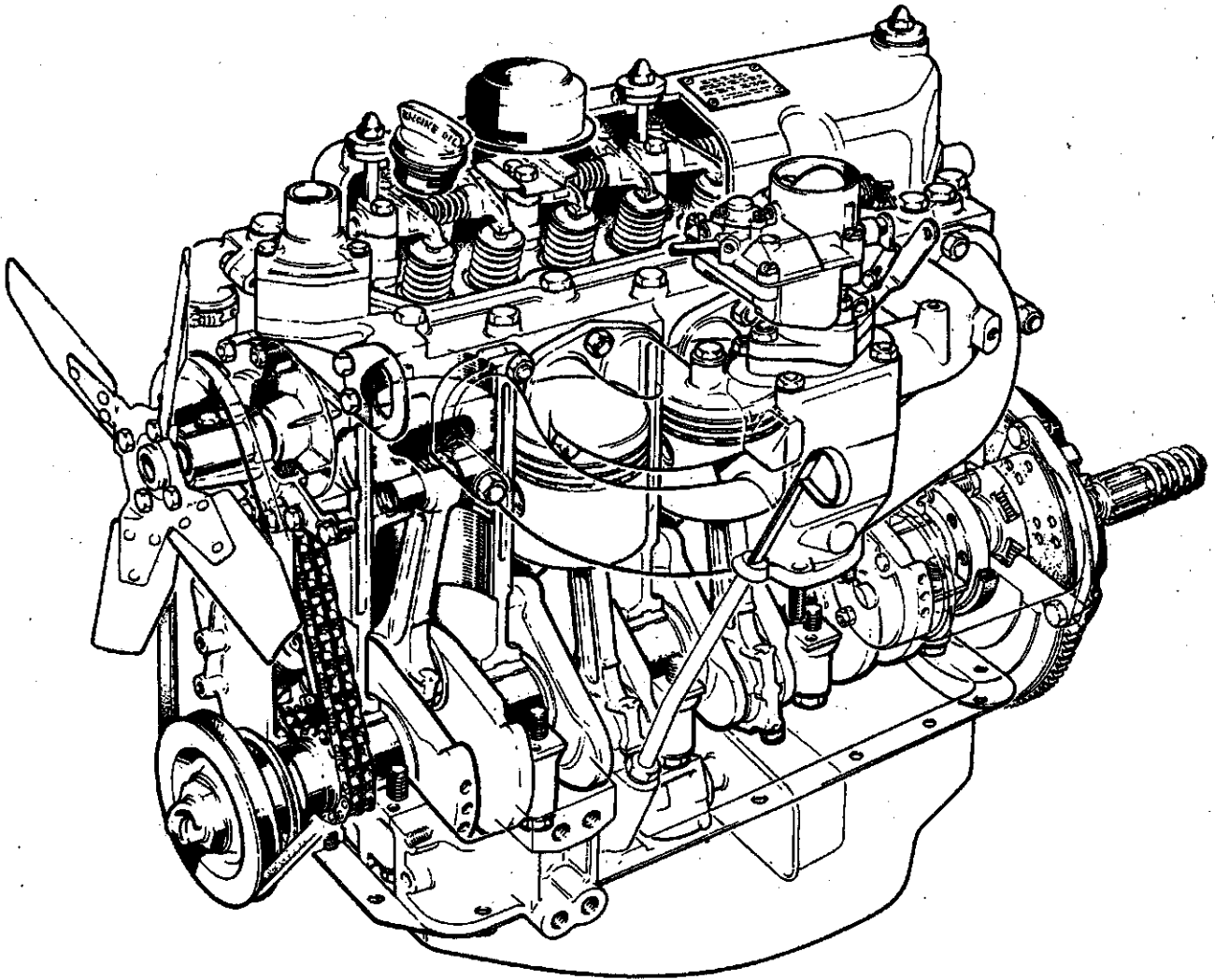
When fitting a five main bearing engine as a replacement for a three bearing unit a new flywheel housing and seal must also be ordered.

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ENGINE

OPERATIONS



Land Rover 2 1/4 litre five main bearing Petrol Engine

CRANKSHAFT REAR OIL SEAL

—Remove and refit

12.21.20

Service tool 18G1344 Seal guide

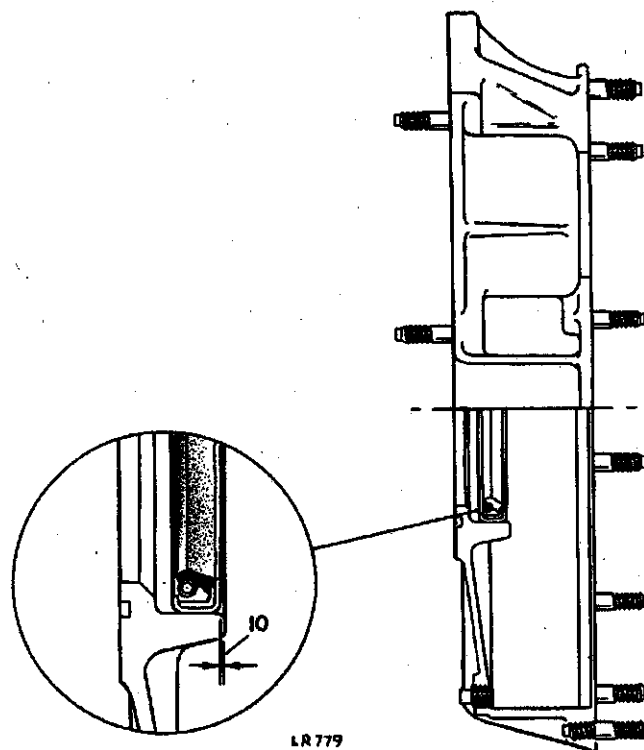
Removing

1. Remove the engine from the vehicle leaving the gearbox in position in the chassis 12.41.01.
2. Remove the clutch assembly, instructions 4 to 7 33.10.01.
3. Remove the retaining bolts and withdraw the flywheel.
4. Remove the flywheel housing complete with rear main oil seal.
5. Remove and discard the flywheel housing 'O' ring.
6. Carefully remove and discard the oil seal.

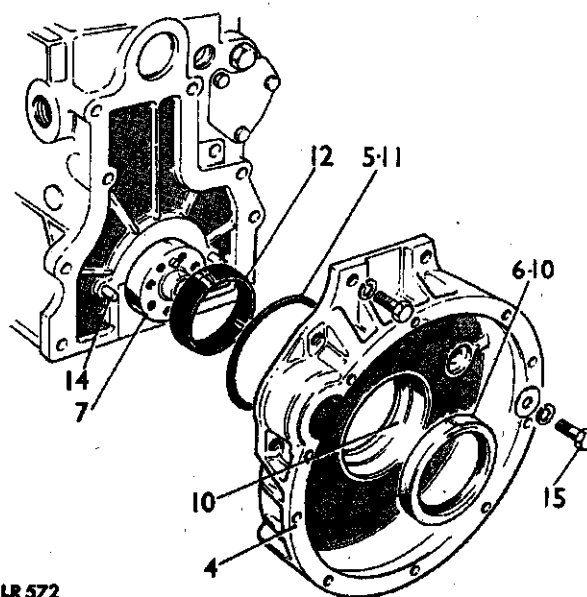
Refitting

NOTE: The satisfactory operation of the rear main oil seal in service depends upon the care and cleanliness exercised during the following instructions.

7. Check that the crankshaft oil seal journal is not damaged and is clean.
8. Make sure the seal housing is clean and dry and free from burrs.
9. Taking care not to touch the seal lip ensure that the outside diameter is clean and dry.
10. With the lip side leading, slowly press in the seal, square to the bore of the seal housing, until the seal is flush or a maximum of 0.50mm (0.020 in) below the outer face of the flywheel housing.
11. Fit the 'O' ring seal to the flywheel housing.
12. Examine the seal guide number 18G1344 and repair any damage that could destroy the seal lip.
13. Lubricate the outside diameter of the seal guide and the seal journal with concentrated "Oildag" in a 25% solution with clean engine oil.
14. Place the seal guide on the crankshaft flange and, using the two dowels protruding from the cylinder block rear face, as a guide to ensure initial squareness, fit the flywheel housing and remove the seal guide.
15. Secure the flywheel housing evenly tightening the retaining bolts.
16. Fit the flywheel, following instructions 5 to 8 in operation 12.53.07 of this supplement.
17. Fit the clutch, instructions 8 and 9 33.10.01.
18. Smear the splines of the primary shaft, the clutch centre splines and the withdrawal unit abutment faces, with molybdenum disulphide grease, such as 'Rocol' MTS 1000.
19. Refit the engine.



LR 779



LR 572

ENGINE

CRANKSHAFT

-Remove and refit.

12.21.33

Special tools 270304 Cork seal guides
530102 Starter dog spanner

Removing

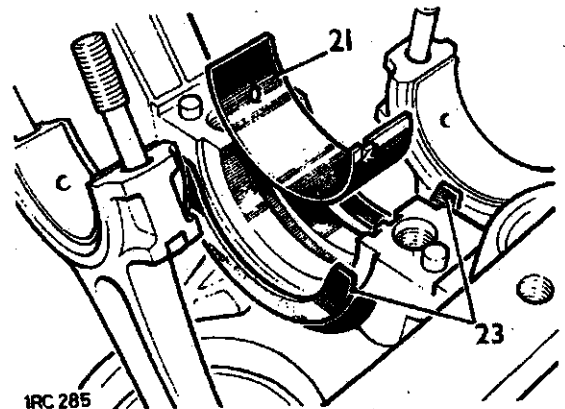
1. Remove the bonnet, 76.16.01.
2. Remove the air cleaner, 19.10.04.
3. Remove the radiator and front panel assembly complete.
4. Remove the front floor, 76.10.12.
5. Drain the oil sump.
6. Remove the engine assembly leaving the gearbox in position 12.41.01.
7. Remove the sump.
8. Remove the oil pump and strainer assembly complete with drive shaft.
9. Using a suitable piece of timber jam the crankshaft and remove the starter dog with special spanner 530102.
10. Remove the timing chain cover following instructions 3, 4, 7 and 8 to 13 operation 12.65.01.
11. Remove the timing chain tensioner.
12. Remove the timing chain from the sprockets.
13. Remove the clutch assembly.
14. Remove the flywheel.
15. Remove the flywheel housing complete with rear main oil seal and 'O' ring.
16. Remove the connecting rod caps and lower bearing shells and push the connecting rods clear of the crankpins taking care not to damage the pistons and valves.
17. Cover the connecting rod bolt threads with thin plastic or rubber sleeves to prevent damage to the crankpins.
18. Remove the five main bearing caps and lower shells.
19. Lift out the crankshaft.
20. If required, remove the chainwheel and key from the crankshaft.

Refitting

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

21. Locate the main bearing halves in the crankcase and lubricate with engine oil.
22. Check the crankshaft end-float which should be 0,05mm to 0,15mm (0.002 to 0.006in.) by following instructions 23 to 26.
23. Position a standard size thrust washer each side of the centre main bearing saddle with the unplated faces towards the cylinder block.

Continued

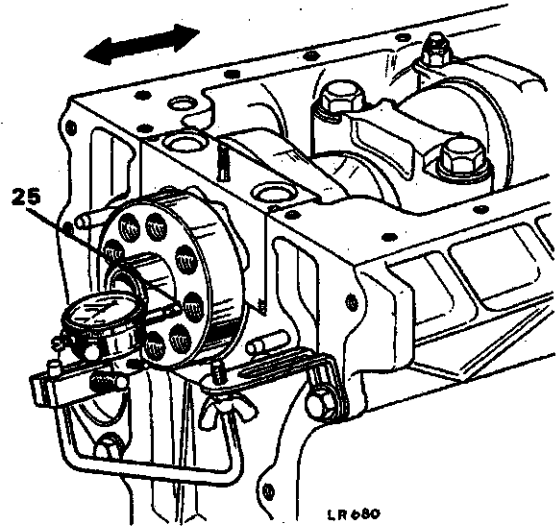


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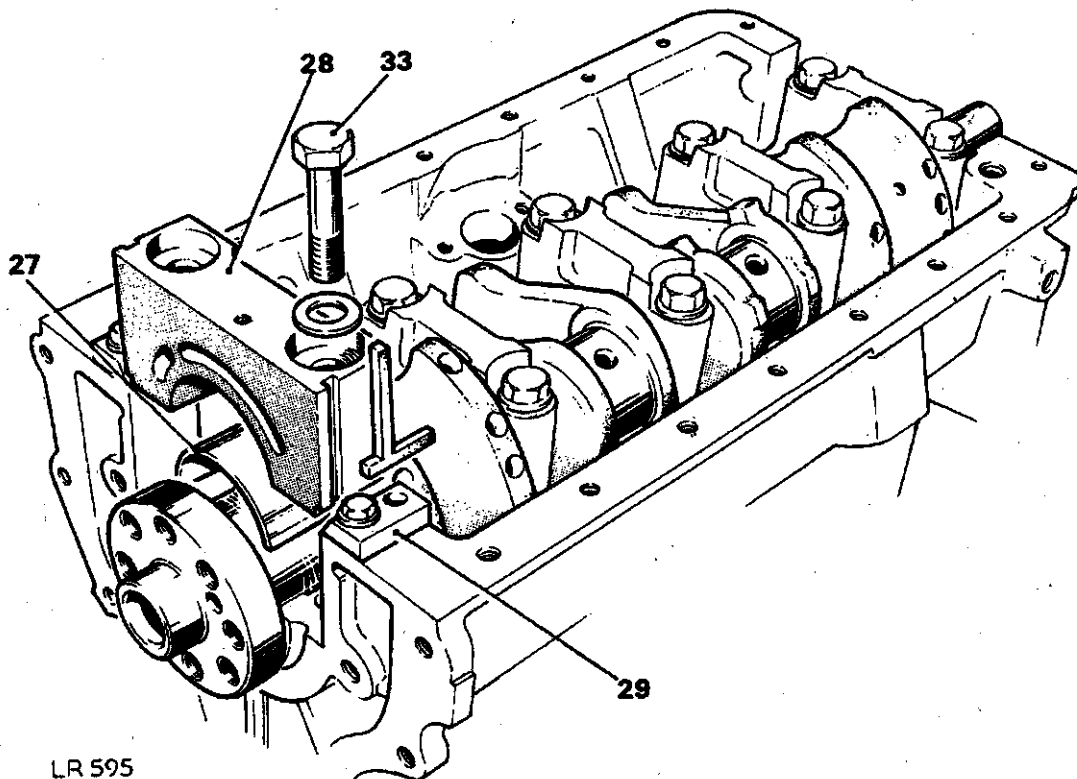
24. Rest the crankshaft in position in the crankcase.
25. Mount a dial test indicator to read-off the end of the crankshaft and check the end-float.
26. If adjustment is required, substitute with oversize thrust washers – see data to obtain the required end-float. The variation of thrust washer thickness at each side must not exceed 0,08mm (0.003in.) to ensure that the crankshaft remains centralised.
27. Locate the bearing halves in the main bearing caps and fit cap numbers 1 to 4 ensuring that they locate properly over the dowels. Loosely secure with new bolts.

NOTE: New bolts and washers must be fitted on petrol engine serial number range 36100001A, 99100001A and diesel engine range 36600001A. See note following instruction 32.

28. Ensure that number five main bearing cap is clean and free from old cork seal material.
29. Attach the cork seal guides number 270304 to the crankcase, as illustrated, and ensure that they are parallel to the crankcase edge.



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ENGINE

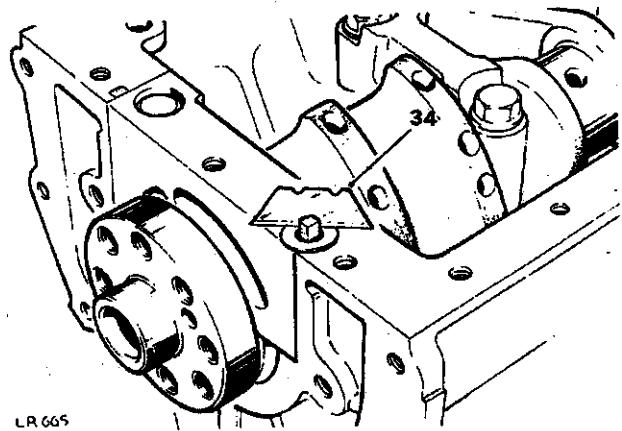
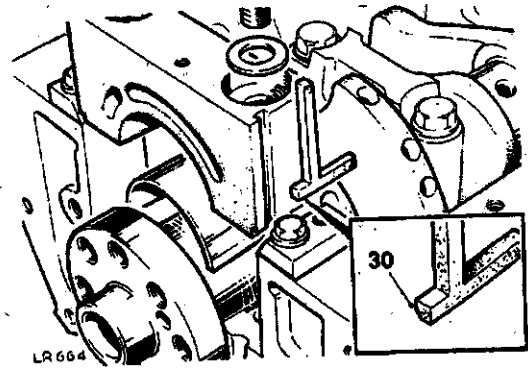
30. To prevent any cork seal material becoming trapped between the bearing cap and crankcase, chamfer the inner edge of the corks 0,40 to 0,80mm (1/64 to 1/32in.) wide as illustrated.
31. Immerse the cork seals in engine oil and fit them to the bearing cap.
32. Fit the cap to the cylinder block and loosely secure with new bolts. See note following instruction 27 above.

CAUTION: Petrol engine serial number range commencing 99100001A employ plain washers and diesel engine specifications bolts. These bolts are not interchangeable with those on serial number range 36100001A, where spring washers are used.

33. Commencing with the centre main bearing evenly tighten the bolts to 11,5kgf.m. (85lbf.ft.) for engine serial number range 36100001A and 13 to 14kgf.m. (100lbf.ft.) for serial range 99100001A and diesel engine range 36600001A.
34. To allow for shrinkage after fitting leave the cork seals standing proud of the crankcase-ump face. If possible delay the fitting of the sump for approximately twelve hours and leave the seal protruding 2,40mm (3/32in.) and then place a 6,350mm (¼in.) washer over the seal and cut off the surplus. If it is necessary to fit the sump immediately, trim the seals off leaving 0,80mm (1/32in.) proud, that is, the thickness of the above washer.
35. Apply Hylomar SQ32M to the protruding end of the seals.
36. Fit the appropriate bearing halves and caps to the connecting rods using new nuts and tighten to 3,5 kgf.m. (25lbf.ft.) for serial number range 36100001A and diesel engine range 36600001A. Tighten to 4,45kgf.m. (30 to 35lbf.ft.) for serial number range 99100001A.

CAUTION: The connecting rod bolts have eccentric heads which locate in slots in the connecting rod. It is essential that the bolt heads are properly located before tightening.

37. Fit the rear main oil seal and housing instructions 7 to 14 operation 12.21.20 of this supplement.
38. Fit the flywheel following instructions 5 to 8 operation 12.53.07 of this supplement.
39. Smear the splines of the primary shaft, the clutch centre splines and the withdrawal abutment faces with Molybdenum disulphide grease such as Rocol MTS1000.
40. Fit the clutch assembly 33.10.01.
41. Fit the timing chain tensioner.



Continued

42. Fit the timing chain cover and starter dog. Operation 12.65.01.
43. Fit the oil pump.
44. Fit the sump.
45. Fit the engine.
46. Fill the sump to the high mark on the dipstick with new oil of the recommended make and grade in accordance with the territory and temperature conditions under which the vehicle is operating.
47. Reverse instructions 1 to 4 of this operation.

DATA

Crankshaft

Journal diameter
 Crankpin diameter
 End-float (controlled by thrust washers at centre bearing)
 Thrust washers for the crankshaft centre main journal, to control the crankshaft end float, are available in the following oversizes:

Regrind sizes:— Petrol Engines only:

63,5mm — 0,012mm (2.5in. — 0.0005in.).
 58,7mm (2.312in.).
 0,05mm to 0,15mm (0.002 to 0.006in.).
 0,06mm (0.0025in.).
 0,12mm (0.005in.).
 0,18mm (0.0075in.).
 0,25mm (0.010in.).

Undersize	Journal dia.	Crankpin Dia.
0,25mm (0.010in.)	63,24mm (2.490in.)	58,47mm (2.302in.)
0,50mm (0.020in.)	62,99mm (2.480in.)	58,22mm (2.292in.)
0,76mm (0.300in.)	62,73mm (2.470in.)	57,96mm (2.282in.)
1,01mm (0.040in.)	62,48mm (2.460in.)	57,70mm (2.272in.)

Connecting rod bearing running clearance
 Main bearing running clearance

0,019mm to 0,063mm (0.0007in. to 0.0025in.).
 0,020mm to 0,055mm (0.0008in. to 0.0022in.).

ENGINE

FLYWHEEL

--Remove and refit

12.53.07

Removing

1. Remove the engine from the vehicle leaving the gearbox in position 12.41.01.
2. Remove the clutch assembly, instructions 4 to 7, 33.10.01.
3. Remove the eight retaining bolts and remove the reinforcing plate.
4. Withdraw the flywheel.

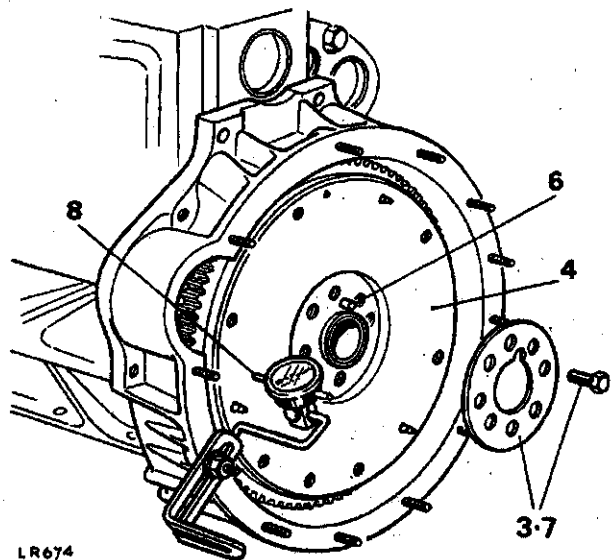
Inspection

5. Examine the flywheel pressure face for wear, cracks and scores. Provided that the width of the flywheel is not reduced beyond the following dimension it may be refaced if necessary.

Petrol engines	34,72mm (1.375in.)
Diesel engines	36,957mm (1.455in.)

Refitting

6. Clean the crankshaft and flywheel mating faces. Remove burrs and repair damage that could cause the flywheel to run-out. Ensure that the dowel fits correctly in the flywheel and crankshaft flange.
7. Fit the flywheel and reinforcing plate to the crankshaft and tighten the retaining bolts to 13,8kgf.m. (100lbf.ft.).
8. Mount a dial test indicator to the flywheel housing so that the stylus rests in a loaded condition on the pressure face at a radius of 114mm (4.5in.). Check the runout which must not exceed 0,05mm (0.002in.).
9. If the run-out is excessive repeat instruction 6. If the cause of the run-out cannot be found renew the flywheel.
10. Fit the clutch, instructions 8 and 9, 33.10.01.
11. Smear the splines of the primary shaft, the clutch centre splines and the withdrawal unit abutment faces with Molybdenum disulphide grease such as 'Rocol MTS 1000'.
12. Refit the engine to the vehicle.



FUEL SYSTEM

OPERATIONS

FUEL SYSTEM

FUEL INJECTION PUMP

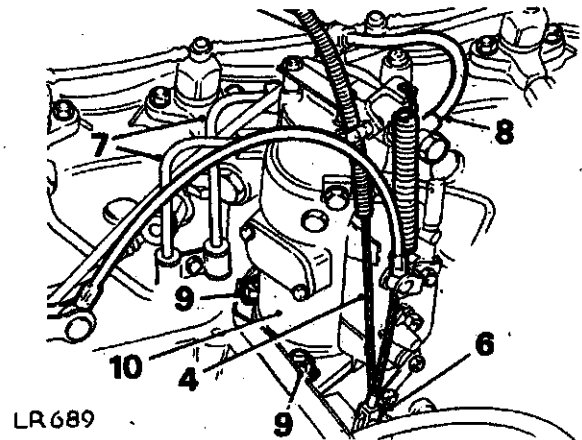
—Remove and refit

19.30.07

Service tool Timing gauge MS67B

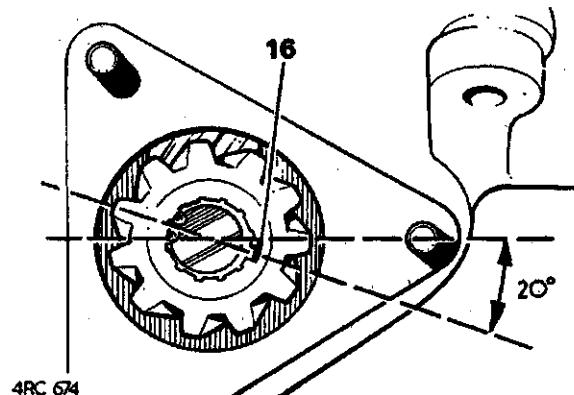
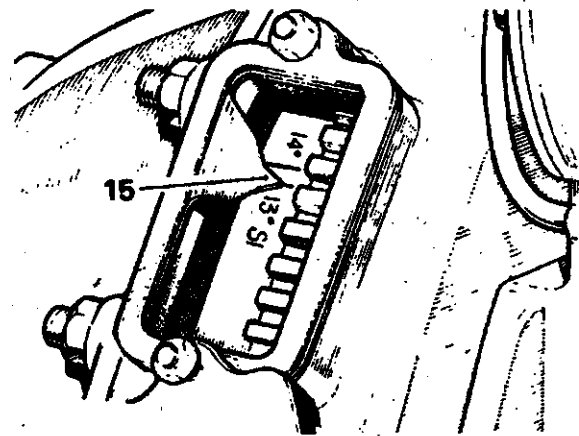
Removing

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. Remove the clevis pin and disconnect the accelerator cable.
7. Remove the fuel pipes, distributor pump to injectors.
8. Disconnect the inlet and outlet fuel pipes from the distributor.
9. Remove the distributor pump fixings.
10. Withdraw the distributor pump.
11. Withdraw the distributor pump drive shaft.



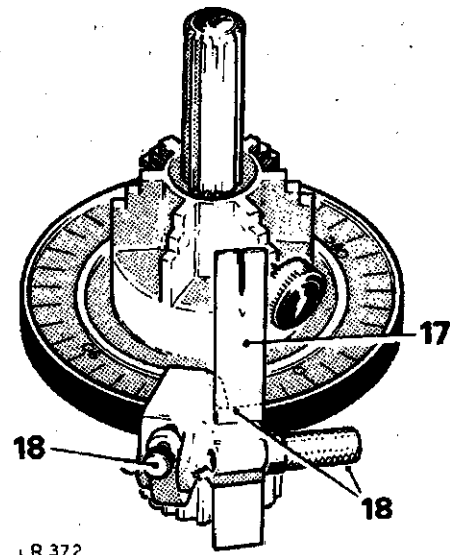
Refitting and timing procedure

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.



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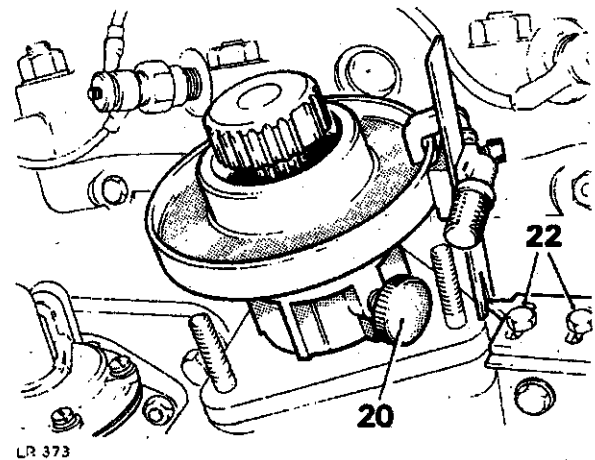
17. Using Service tool MS67B, assemble the scribing arm of the tool to the tool body.
18. Set gauge by loosening knurled screws and sliding bracket around until chamfered edge aligns with the required angle of 22°, tighten knurled screw in this position.
19. Insert tool MS67B into vacant injection pump position and engage tool gear into injection pump drive splines.
20. Release centre shaft retaining screw and slide tool body along centre shaft until body engages injection pump drive gear hub. Lock shaft retaining screw.
21. Apply gentle clockwise pressure to take up backlash or wear in gears, retain in this position.
22. Slacken off timing pointer bolts. Adjust timing pointer so that it aligns with scribing arm on tool. Tighten timing pointer bolts.
23. Remove tool MS67B.
24. Rotate driving gear on distributor pump so that master spline lines up with master spline on driving gear.
25. Then offer pump to engine, ensuring that the timing mark on the pump flange coincides with the timing pointer.
26. Tighten the injection pump retaining nuts.



LR 372

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.

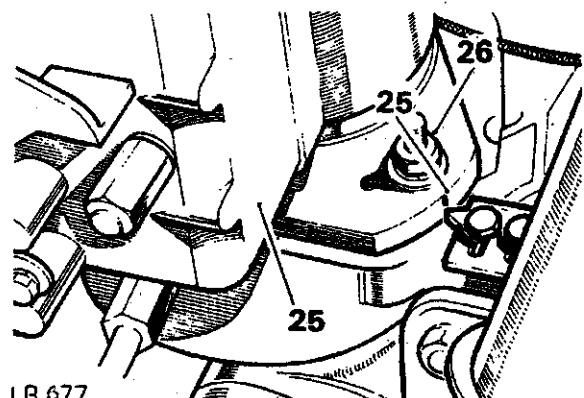
27. Reverse instructions 3 to 8 and 12 to 13.
28. Prime the fuel system 19.50.01.



LR 373

Setting the distributor pump control screws

29. 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. 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.
30. 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 items 31 to 36.



LR 677

Continued

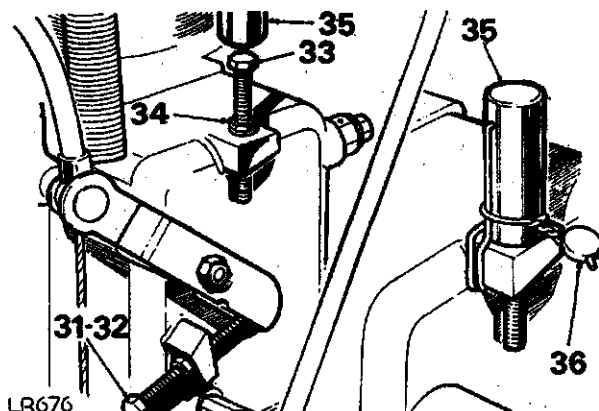
FUEL SYSTEM

Slow running control screw adjusting

31. 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.
32. To adjust the slow running control screw, proceed as follows:
 - a. Check engine speed with revolution counter.
 - b. Slacken adjusting screw locknut and screw inwards to increase speed and outwards to decrease.
 - c. When a slow running speed of 590 ± 20 rev/min has been obtained, tighten locknut.
 - d. Remove revolution counter.

Maximum output control screw adjusting

33. 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.
34. When maximum engine speed of $4,200 \pm 20$ rev/min has been obtained, tighten locknut.
35. Fit the adjusting screw collar.
36. Wire lock and seal the screw collar.
37. 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

Idling speed

Maximum speed setting (sealed)

13° BTDC

590 ± 20 rev/min

$4,200 \pm 20$ rev/min

ELECTRICAL

OPERATIONS

ELECTRICAL

CONTACT BREAKER POINTS (Ducellier)

—Remove and refit

86.35.13

Special tool 18G1308

Removing

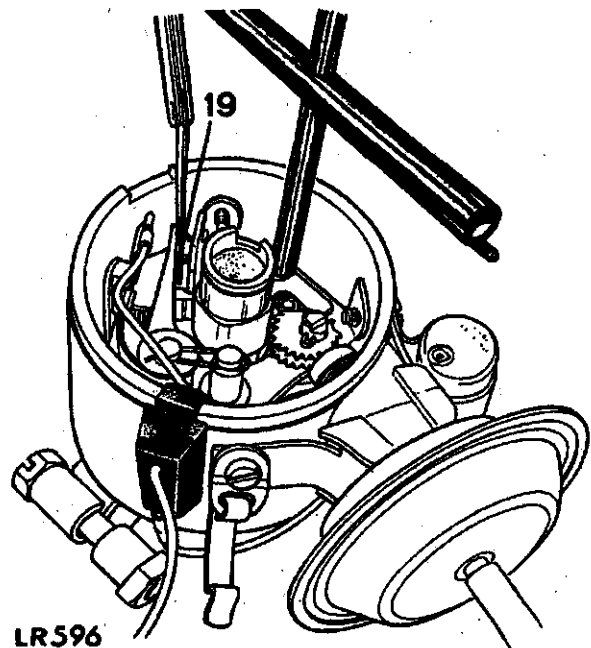
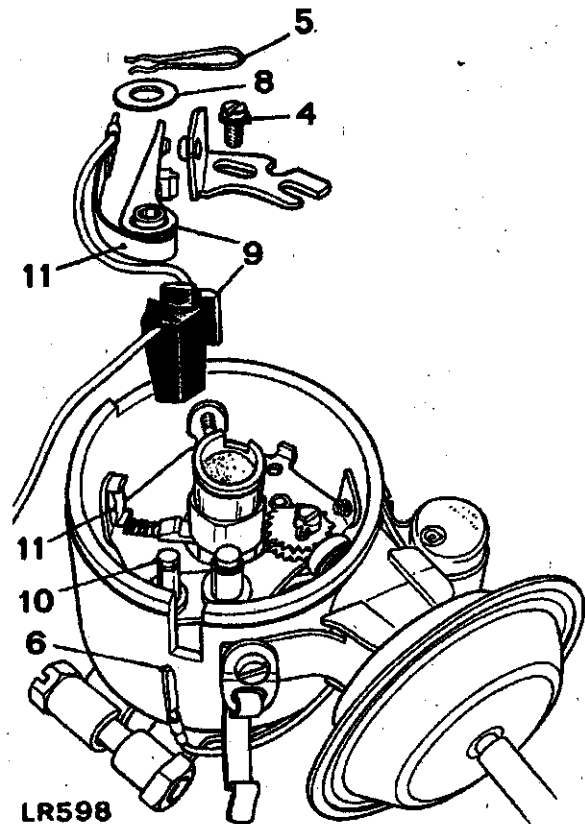
1. Release the spring clips and remove the distributor cap.
2. Pull off the rotor arm.
3. Remove the dust shield.
4. Remove the retaining screw and remove the fixed contact point.
5. Slide the spring clip rearwards.
6. Disconnect the suppressor lead from the connector block.
7. Disconnect the lead from ignition coil.
8. Remove insulation washer from the moving contact point.
9. Lift off the moving contact point complete with leads and connector block from the distributor body.

Refitting

10. Fit the new moving point over post.
11. Locate the leaf spring in the plastic guide.
12. Fit the insulation washer.
13. Secure the assembly with the spring clip.
14. Fit the connector block to the distributor body.
15. Connect ignition coil lead.
16. Fit suppressor lead to connector block.
17. Fit the fixed contact point and loosely retain with the screw.

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

18. Rotate the engine until a cam of the rotor fully opens the points.
19. Using a feeler, adjust the position of the fixed contact point to the datum setting and tighten the retaining screw.
20. Check and adjust the dwell angle, dwell variation and vacuum advance, see instructions 38 to 43 operation 86.35.26.



CONTACT BREAKER POINTS (Lucas Sliding Contact)

-Remove and refit

86.35.13

Removing

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

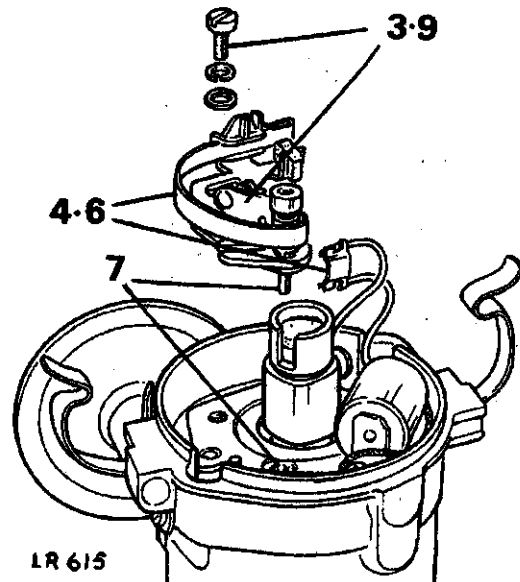
1. Remove the distributor cap.
2. Remove the rotor arm.
3. Remove the retaining screw and lift the contact set complete from the plate.
4. Press the contact set spring and release the terminal plate and leads from the spring.

Refitting

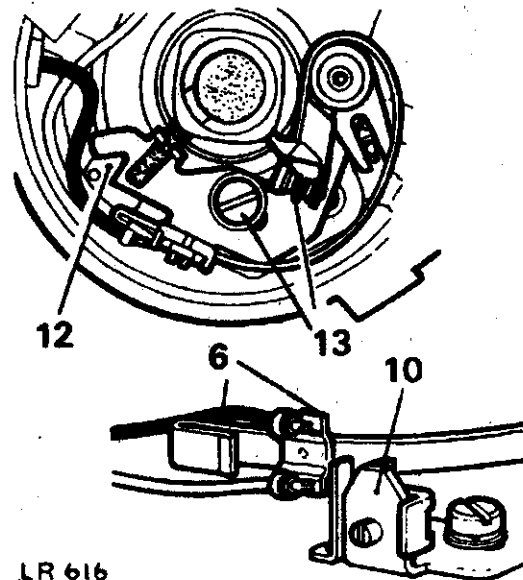
5. Clean the points with petrol to remove the protective coating.
6. Press the contact spring and fit the terminal plate with the black lead uppermost.
7. Fit the contact set to the moving plate, ensuring that the peg, underneath the contact pivot, locates in the hole in the moving plate.
8. The sliding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

Adjusting the points gap

11. Rotate the crankshaft with the starting handle until the contact heel is on the highest point of a cam.
12. Adjust the gap by inserting a screwdriver blade between the "V" shaped notch and pip and twist the screwdriver.
13. Insert a 0,35 to 0,40mm (0,014 to 0,016in.) feeler gauge between the points and adjust to a sliding fit and tighten the retaining screw.
14. Fit the rotor arm.



LR 615



LR 616

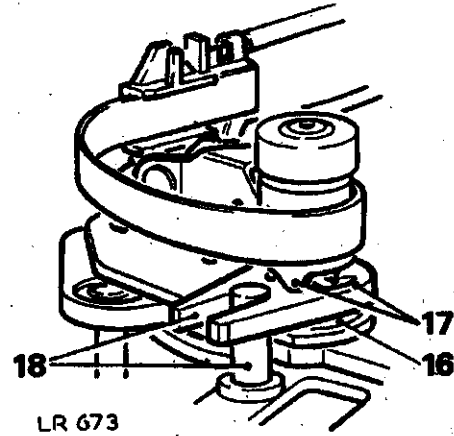
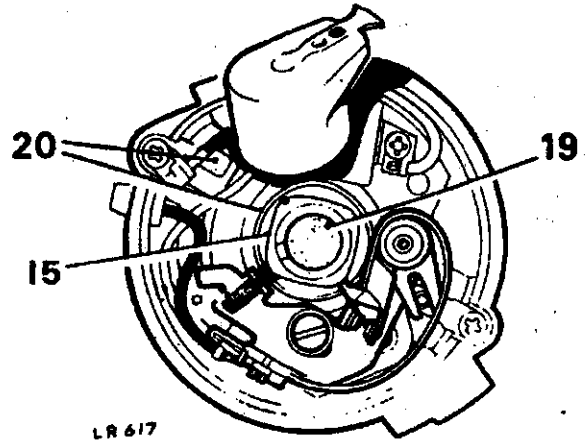
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ELECTRICAL

Lubrication

NOTE: The following instructions should be carried out every 20,000km (12,000 miles) except instruction 20.

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



DISTRIBUTOR (Ducellier)

-Overhaul

86.35.26

Special tool 18G1308

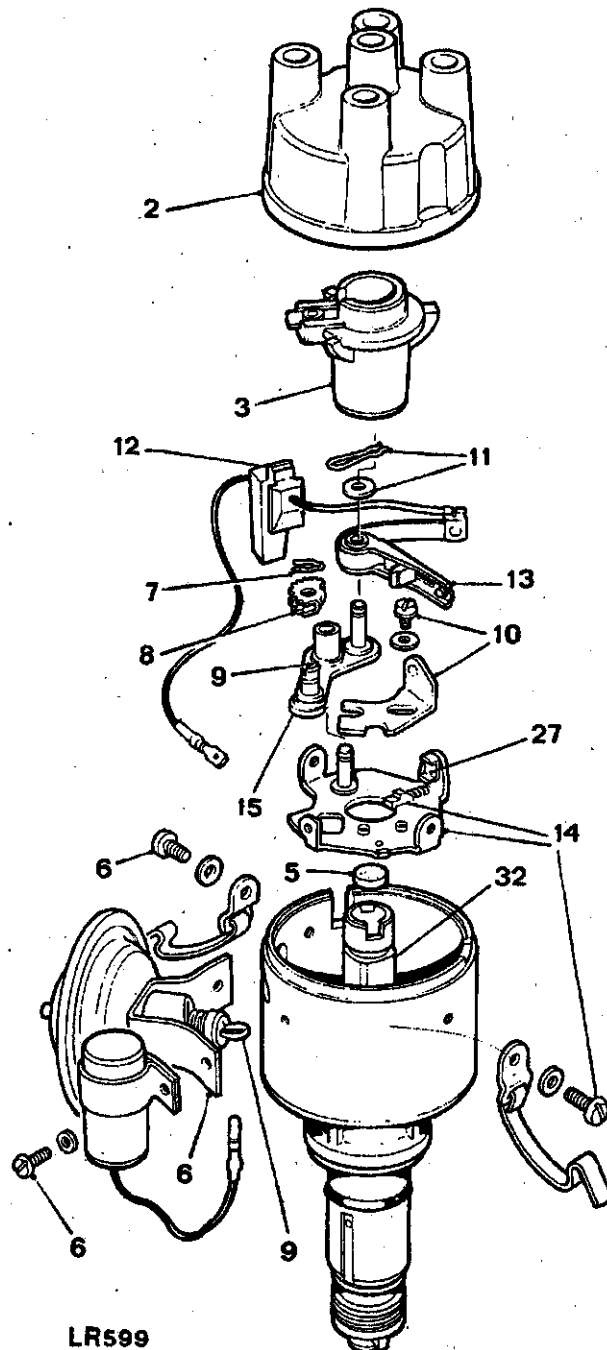
Dismantling

1. Remove the distributor from the engine 86.35.20.
2. Remove the distributor cap.
3. Remove the rotor arm.
4. Remove the dust cover.
5. Remove the felt pad from the top of the rotor.
6. Remove the two screws retaining the condenser and vacuum unit and remove the condenser lead from the connector block.
7. Remove the retaining clip from the eccentric 'D' post.
8. Mark the position of the serrated cam in relation to the spring seat of the vacuum operating link.
9. Disengage the vacuum operating link and serrated cam from the eccentric 'D' post and remove the vacuum unit.
10. Remove the retaining screw and withdraw the fixed contact plate.
11. Remove the retaining clip and insulation washer.
12. Release the connector block from the distributor body.
13. Lift out the moving contact complete with connector block and leads.
14. Mark the relationship of the base plate to the body and remove the retaining screw. Whilst holding the pressure pad clear of the rotor, withdraw the base plate.
15. Remove the moving contact post-plate.

Inspection

NOTE: The distributor drive dog is loosely retained on the drive shaft, the "float" allows for any misalignment.

16. Examine the advance mechanism of the cam, check the shaft for excessive side play. If any of these parts are damaged or worn renew the complete distributor.
17. Examine all other components for damage or excessive wear and renew where necessary.
18. Check the distributor cover for signs of tracking or cracks and check that the pick-up brush moves freely in its holder.
19. Check the rotor arm for damage, electrode security, burning and tracking.



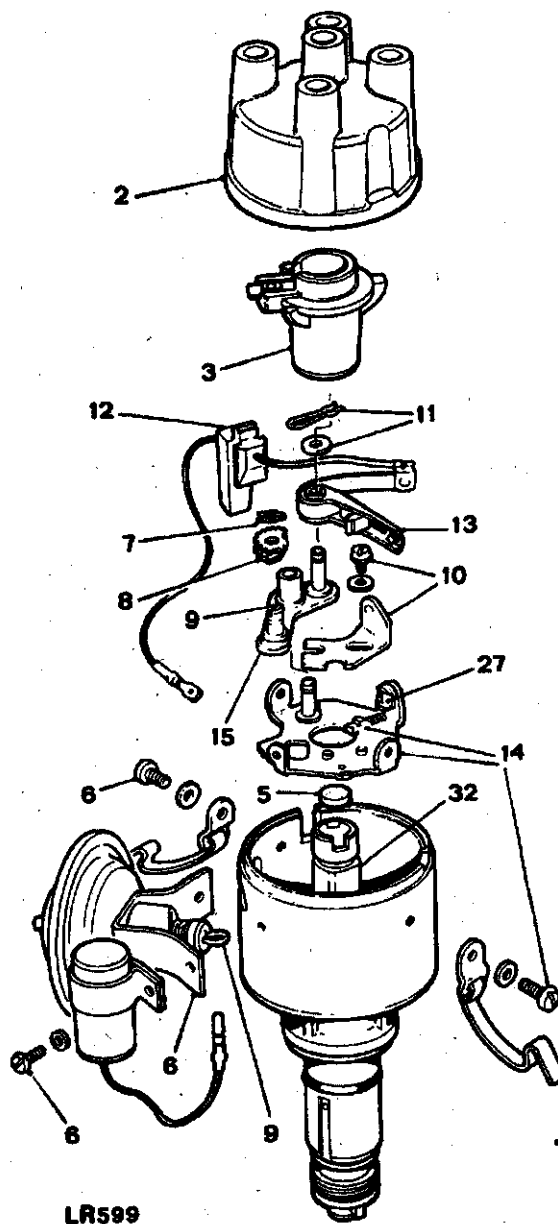
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Continued

ELECTRICAL

Reassembling

20. Using Retinax 'A' or equivalent grease lubricate the centrifugal weight pivot posts and lightly smear the cam pressure pad and contact pivot post.
21. Fit the pressure pad and spring to the base plate.
22. Fit the base plate to the body, lining up the marks, and secure with the retaining screw and clip on the opposite side to the vacuum unit.
23. Smear a little grease on the post and fit the moving contact post-plate to the base plate.
24. Offer up the vacuum unit to the body and fit the operating link and serrated cam to the 'D' post. Ensure that the identification marks line up - see instruction 8. Secure the assembly with the spring clip.
25. Secure the vacuum unit and condenser to the body with the remaining screw and clip.
26. Fit the fixed contact and loosely retain with the screw.
27. Fit the moving contact ensuring that the leaf spring locates in the nylon guide.
28. Fit the connector block to the body.
29. Fit the insulation washer and retain assembly with the spring clip.
30. Fit condenser lead to connector block.
31. Place the felt pad in the top of the rotor and add a few drops of oil.
32. Smear a small quantity of grease on the rotor cam.
33. Adjust the contact point gap to a datum setting of 0,43mm (0.017in.) with a feeler gauge by turning the rotor spindle until a cam fully opens the points. Move the fixed contact plate to obtain the required gap and tighten the retaining screw.
34. Fit the distributor to the engine, see operation 86.35.20.
35. Fit the dust cover.
36. Fit the rotor arm and distributor cap.
37. Connect the H.T. leads to the appropriate spark plugs.



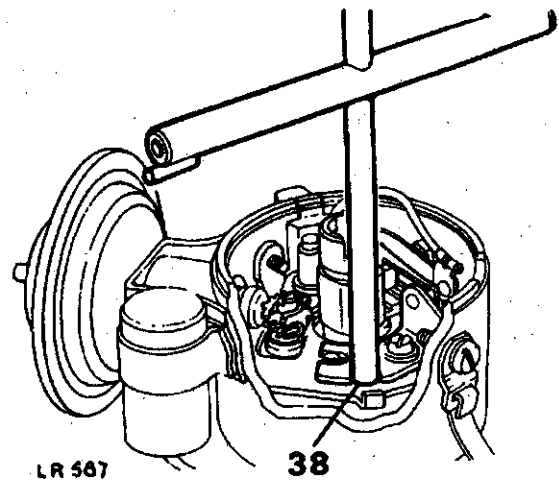
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Check and adjust dwell angle

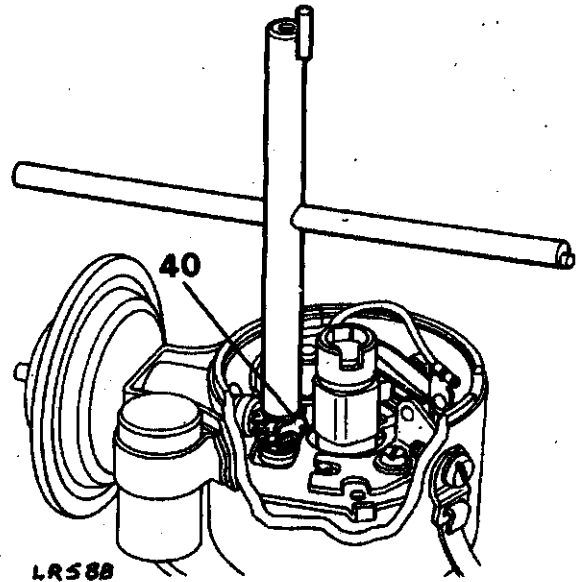
NOTE: The following six instructions can only be carried out using engine diagnostic equipment and special tool 18G1308.

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

**Check and adjust dwell variation**

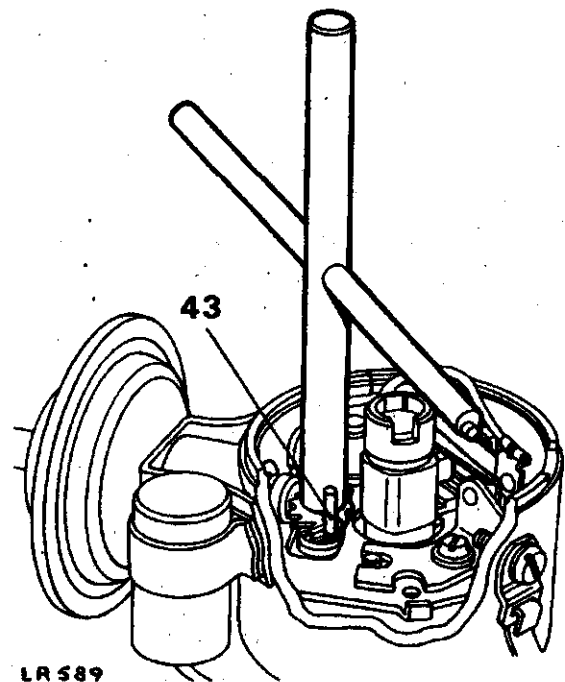
NOTE: A dwell variation outside the accepted tolerance — see data can be caused by a mechanical fault or wear within the distributor. This may be checked as follows:

39. Disconnect the vacuum advance, start the engine and increase the speed to 2000 r.p.m. A variation outside the tolerance given in data indicates that the distributor has a mechanical fault which cannot be rectified by adjustment.
40. If the variation is acceptable, reconnect the vacuum pipe, start the engine and increase the engine speed to 2,000 rpm and release the throttle. Check the dwell variation and if necessary adjust by turning the eccentric 'D' post with the special tool (female 'D' end). Setting the dwell for minimum variation may alter the basic setting and this must be rechecked at idle speed.

**Check the vacuum advance**

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

41. Disconnect the vacuum pipe and connect a vacuum pump to the unit.
42. Start and run the engine at idle speed and using a timing light, slowly increase the vacuum and note the point at which vacuum advance starts and compare the figure with that given in data.
43. Adjustment of the serrated cam, with the special tool, one tooth at a time, will alter the point at which vacuum advance starts.



Continued

ELECTRICAL

DATA

Rotation	Anti-clockwise at rotor end
Contact points gap (datum figure only)	0,43mm (0.017in.)
Dwell angle	57°
Dwell variation	± 2° 30'
Vacuum advance starts	102mm (4in.) HG
Vacuum advance max.	12° at 457mm (18in.) HG
No centrifugal advance below	900 rev/min