Lubrication circuit, Fig. 1.

The oil pump draws oil via a strainer from the oil sump and feeds it into the full-flow oil filter. The filtered oil, passing along the central axis of the oil filter cartridge, reaches the oil pressure switch via a short drilling (on the right hand side of the engine) and the main oil gallery (on the left hand side of the engine) via a transverse drilling. The main bearings have direct connections to the main oil gallery and the camshaft bearings in their turn have connections to the front, centre and rear main bearings. The big-end journals are supplied with oil through diagonal drillings from the nearest main bearing. An oil bore in the big-end ensures splash lubrication of the piston pins and the trailing side of cylinders. The timing chain and sprockets are also lubricated via a splash oil drilling. The front bearing journal of the crankshaft has a pad at its centre from which the pressurised oil is supplied intermittently to the rocker shaft (via a drilling in the cylinder block and cylinder head).

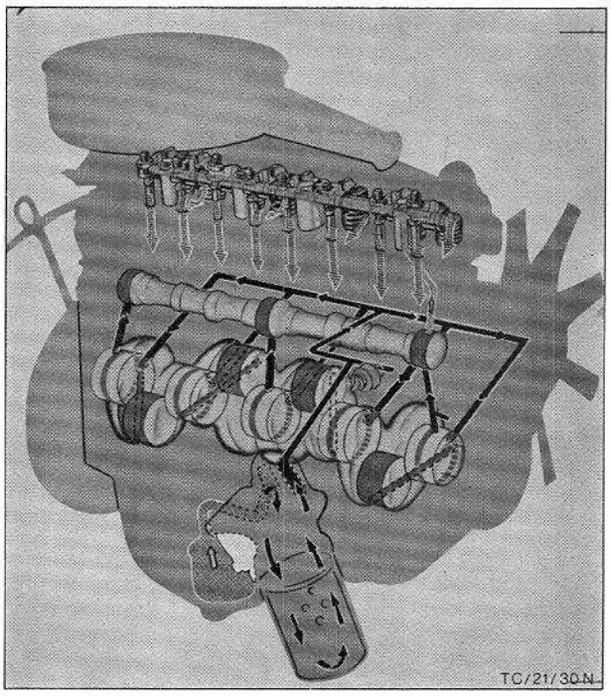


Fig. 1. Oil flow.

Closed ventilation system, Fig. 2.

The ventilation of the crankcase depends on the amount of air drawn by the engine when it is running and on the throughput of the vent valve. Fresh air enters at the rocker cover via the oil filler neck, flows through the crankcase and is drawn in by the running engine through the vent valve on the right hand side of the engine and burnt with the carburettor mixture. The vent valve controls the rate of air flow as a function of the engine load.

The vent valve must be cleaned at intervals (20,000 km) by means of a cleaning agent, and after being dried with compressed air be replaced in the oil separator.

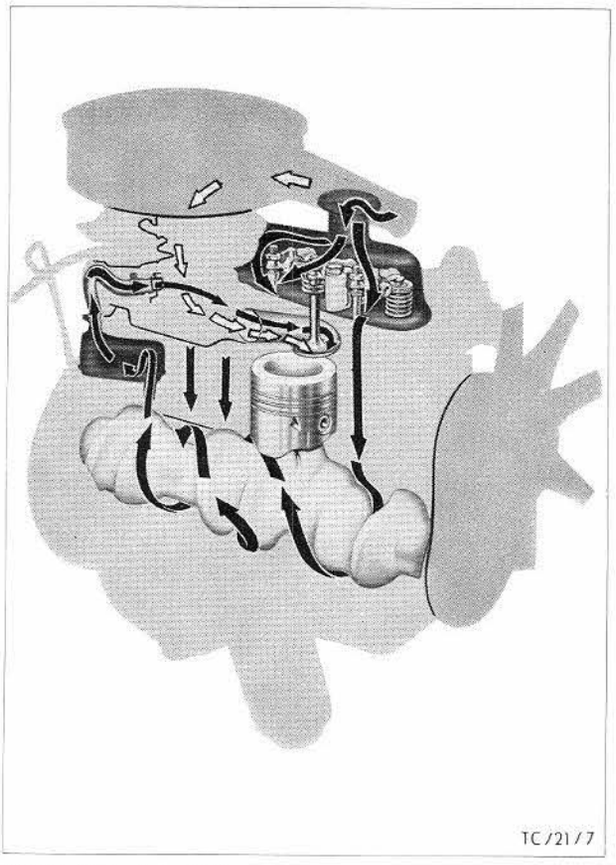


Fig. 2. Closed ventilation system.

SERVICE ADJUSTMENTS AND CHECKS

To check the engine oil level the vehicle should stand on level ground and the engine should be at normal operating temperature. Before carrying out the check, wait a short time to allow all oil to drain back into the sump.

Withdraw the dipstick, wipe it clean with a rag, replace and withdraw it again. The oil on the dipstick indicates the oil level in the sump, it should lie between the two marks. The quantity of oil required to top up from the bottom mark to the top mark is 0,75 to 1,0 litre (1.3 to 1.75 pints) approximately regardless of the engine capacity.

If necessary, top up through the filler neck with engine oil to the recommended FORD specification. (Refer Technical Data).

Topping up is not necessary until the oil level drops to the bottom mark. Do not allow the oil level to drop any further. Never top up to above the top mark since the excess oil is wasted, i.e. the oil consumption is increased.

The engine oil should be changed and the oil filter renewed at least every six months. If conditions of use are severe, e.g. short trips, frequent starts from cold, dusty roads etc. the oil should be changed and the oil filter renewed at shorter intervals.

If the specified engine oil is not used the inevitable consequence will be excessive wear or damage to the engine. The oil film becomes discontinuous and engine components under high thermal stresses are subjected to increased wear. Residues collect in the sump and block the oil passages. In addition, poor quality oil does not protect against corrosion so that rust forms on the cylinder walls. After a relatively short time the efficiency of the engine will decrease and there will be increased fuel and oil consumption. Always use a branded oil complying with our recommendation.

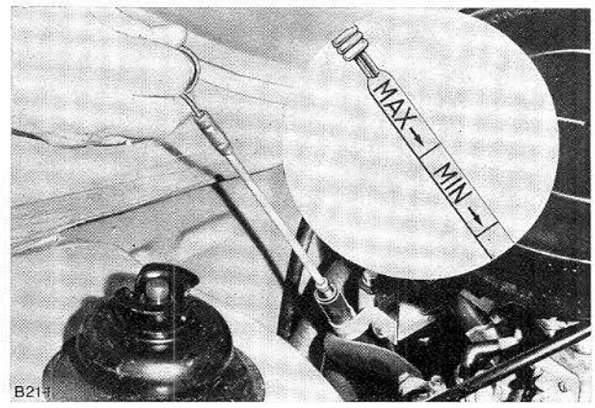
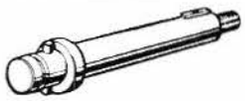
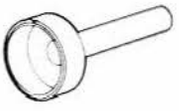
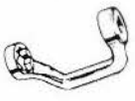
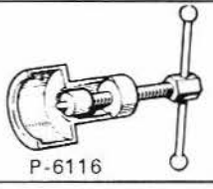
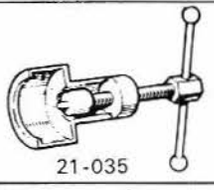
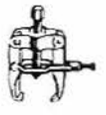
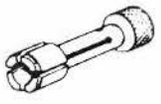
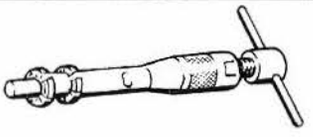
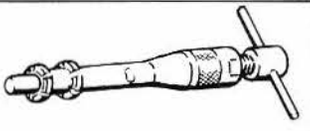
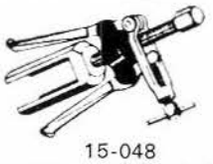
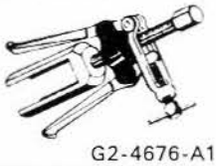


Fig. 3. Dipstick.

SPECIAL SERVICE TOOL RECOGNITION

British Sourced	European Sourced	German Sourced	Tool Name
	 21-023		Universal spindle
	 21-024		Valve spring compressor (Main tool)
	 21-024-02		Valve spring compressor (Adaptor used with 21-024)
	 21-029		Crankshaft rear oil seal installer
	 21-030		Crankshaft rear oil seal replacer
 P-6129	 21-034	 G2-6065	Cylinder head bolt wrench
 P-6116	 21-035	 G2-6306	Crankshaft sprocket remover
 CP-7600-7	 21-036	 G3-7600-A	Flywheel bearing remover
	 15-048	 G2-4676-A1	Oil seal remover
 15-048-51	 15-048-01	 15-048-01	Adaptor (Use with 15-048)

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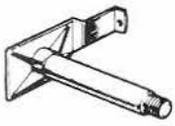
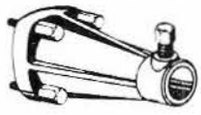
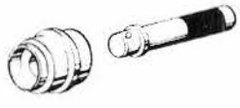
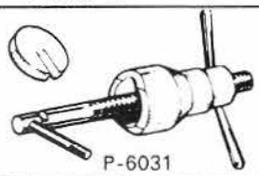
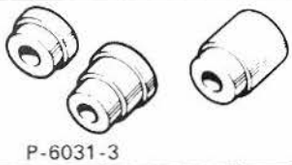
SPECIAL SERVICE TOOL RECOGNITION (cont'd)

British Sourced	European Sourced	German Sourced	Tool Name
		 G2-6000	Engine lifting bracket
 P-6107	 21-031	 G2-6010	Engine mounting bracket
		 G2-6513-A	Valve spring compressor
		 G2-6513-B	Valve spring retainer
 P-6161-A		 G2-6362	Crankshaft front oil seal remover/replacer
		 GV-6883-A	Oil filter wrench
 CP-7112A	 21-044	 G1-7600-B	Flywheel bearing replacer and clutch plate locator
 P-4063-A			Cylinder head locating studs
 P-6031			Camshaft bearing remover/installer (Main tool)
 P-6031-3			Camshaft bearing remover/installer (Adaptor used with P-6031)

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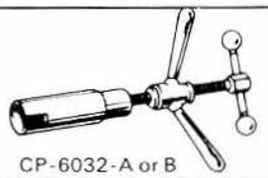
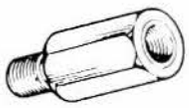
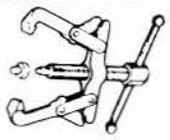
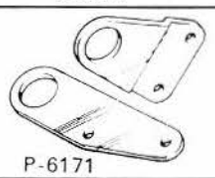
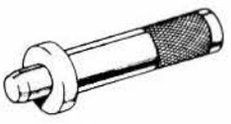
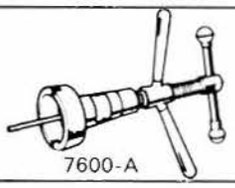
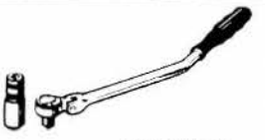
SPECIAL SERVICE TOOL RECOGNITION (cont'd)

British Sourced	European Sourced	German Sourced	Tool Name
 CP-6032-A or B			Crankshaft sprocket replacer
 P-6056 0.015"			Valve guide reamer 0.015 in. oversize
 P-6056 0.030"			Valve guide reamer 0.030 in. oversize
 P-6118-3A			Valve spring compressor (Adaptor used with 21-024)
 6132A			Crankshaft pulley remover
 P-6171			Engine lifting eyes
 512			Piston pull gauge
 550			Handle
 7600-A			Flywheel bearing remover (Main tool)
		 GV-127-C	Spark plug wrench

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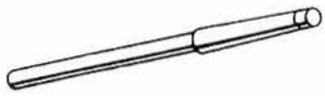
SPECIAL SERVICE TOOL RECOGNITION (cont'd)

British Sourced	European Sourced	German Sourced	Tool Name
 316-X			Valve seat cutter holder (Main tool)
 316-10			Valve seat cutter pilot
 F1-316-10			Valve seat cutter pilot, 0.015 in. oversize
 F2-316-10			Valve seat cutter pilot, 0.030 in. oversize
 317-20			Valve seat cutter exhaust, 45°
 317-P20			Valve seat cutter exhaust, 75°
 317-G22			Valve seat glace breaker exhaust, 45°
 317-P22			Valve seat cutter inlet, 75°
 317-T20			Valve seat cutter exhaust, 15°
 317-25			Valve seat cutter inlet, 45°

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SPECIAL SERVICE TOOL RECOGNITION (cont'd)

British Sourced	European Sourced	German Sourced	Tool Name
 317-G25			Valve seat glace breaker inlet, 45°
 317-T25			Valve seat cutter inlet 15°
	 21-046		Crankshaft front oil seal installer

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ENGINE		Described in this publication	Contained in operation	Refer to manuals indicated below for operations not included in this publication			
				Escort	Capri II	Taunus Cortina	Consul Granada
21 111	Engine – check compressions	X					
21 112	Oil pressure – check	X					
21 134	Engine assembly – remove and install	X					
21 134 8	Engine assembly – dismantle and reassemble (engine removed)	X					
21 148 4	Cover – front – remove and install (engine removed)		21 134 8				
21 154 4	Sump – remove and install (engine removed)		21 134 8				
21 163	Cylinder head – remove and install (one)	X					
21 165 5	Cylinder head – replace (cylinder head removed)	X					
21 183	Inlet manifold assembly – remove and install		21 165 5				
21 213	Valve clearances – adjust (all)	X					
21 215 4	Valve – remove and install (one) (cylinder head removed)		21 233 9				
21 231 9	Valve seat – cut (one) (valve removed)		21 233 9				
21 233 9	Valve guide – ream (one) (valve removed)	X					
21 238	Seals – valve stem – replace (all)	X					
21 243	Valve spring – remove and install (one)		21 238				
21 244 4	Valve springs – remove and install (all – one cylinder head) (Cylinder head removed)		21 165 5				
21 283 4	Camshaft – remove and install (engine removed)		21 134 8				
21 332 4	Timing gears – remove and install (all) (engine removed)		21 134 8				

ENGINE		Described in this publication	Contained in operation	Refer to manuals indicated below for operations not included in this publication			
				Escort	Capri II	Taunus Cortina	Consul Granada
21 467	Seal – crankshaft front – replace	X					
21 483 4	Liners – main bearing – replace (engine removed)		21 134 8				
21 493 4	Piston and connecting rod assembly – remove and install (one) (engine removed)		21 134 8				
21 505 5	Piston – replace (one) (piston and connecting rod assembly removed)	X					
21 513 4	Liners – connecting rod – replace (all) (engine removed)		21 134 8				
21 582 4	Flywheel – remove and install (engine or transmission removed)		21 134 8				
21 584 5	Ring gear – flywheel – replace (flywheel removed)	X					
21 586 4	Drive plate – remove and install (transmission removed)		21 582 4				
21 714	Oil pump – remove and install						
21 724	Oil filter – replace		21 134 8				
21 875	Engine rubber mounting – front – replace (one)		21 134				

21 111

21 111 ENGINE – CHECK COMPRESSIONS (All engines)

The majority of test instruments usually only enable the compression to be checked in individual cylinders. A measurement of the actual compression is dependant on several factors. One condition at least should be met, namely that the engine should be at its normal operating temperature.

To Check

1. Disconnect HT leads and remove spark plugs. Insert graph paper into tester. Press tester with its rubber seal tightly into spark plug orifice, Fig. 4. With throttle fully open, crank engine with starter motor until pointer of tester rises no further.

Fig. 4. Compression tester.

2. Vent tester, adjust graph paper for next cylinder and repeat procedure described in sub-operation 1 for each of other cylinders. Replace spark plugs and reconnect HT leads, Fig. 5.

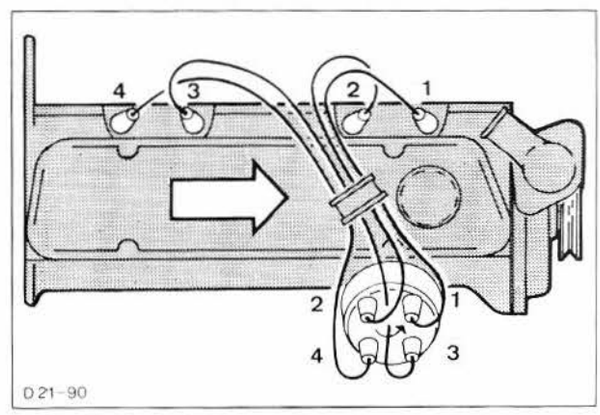

Fig. 5. H.T. leads (Firing order).

21 112 OIL PRESSURE – CHECK (All engines)

The oil pressure depends on various factors (engine speed, temperature, rotor clearance, etc.). When idling it should be not less than 0,7 kg.cm^2. The maximum pressure at speeds above 2000 rpm should not exceed 3 kg.cm^2.

If the pressures are outside these limits first eliminate the oil pump, Fig. 6, as the source of the fault. The following faults can occur, e.g.:

Pressure too high at speeds over 2000 rpm;

Failure of relief valve to open because of fouling.

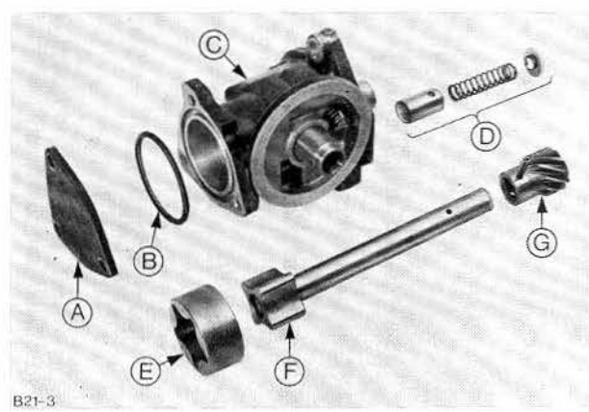

Fig. 6. Dismantled oil pump.
A – Cover.
B – Gasket.
C – Oil pump body.
D – Relief valve.
E – Outer rotor.
F – Inner rotor.
G – Driven gear.

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Pressure too low at all engine speeds : clogged intake strainer, intake pipe broken or loose, oil pump worn, etc. ;

Pressure too low at low engine speeds. ;

Relief valve jammed in the open position due to dirt.

To measure the oil pressure

1. Remove oil pressure switch lead connector and remove oil pressure switch, Fig. 7. In case of pressure gauge, remove pressure line and connector, Fig. 8.
2. Connect test pressure gauge to engine block, using adaptors if necessary.
3. Start engine and check oil pressure at idling speed and at over 1800 rpm.
4. Remove test pressure gauge and adaptor. Replace oil pressure switch or pressure gauge and connect up.

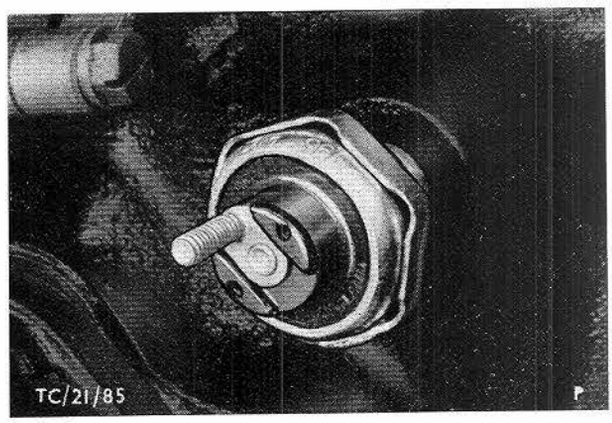

Fig. 7. Oil pressure switch.

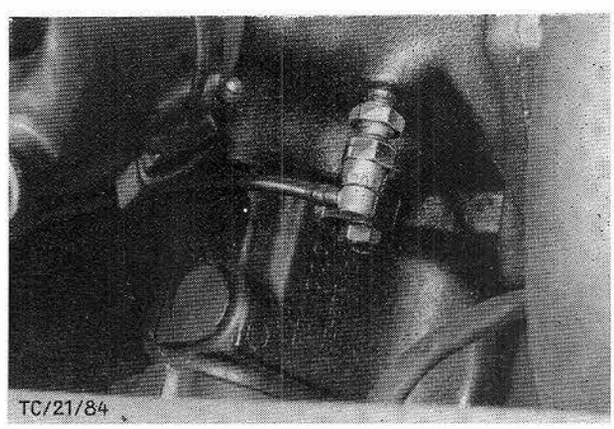

Fig. 8. Oil pressure line connection.
A – Oil pressure line.
B – Connector.

21 134 ENGINE ASSEMBLY – REMOVE AND INSTALL (All engines)

Special Service Tools Required:

Engine lifting bracket	G2-6000
Engine lifting eye	P-6171

To Remove

1. Remove bonnet (4 screws) and disconnect earth straps from battery and engine. Remove air cleaner.
2. Remove sump shield (4 bolts, 4 clips). Drain coolant by disconnecting radiator hoses from water pump neck and lower radiator neck.

   Remove radiator.

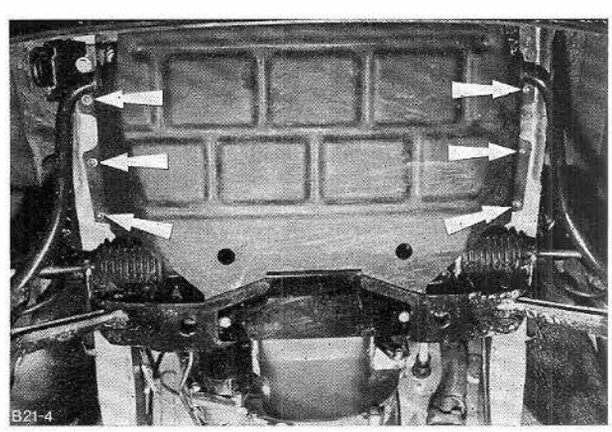

Fig. 9. Remove sump shield.

21 134

3. Disconnect heater hoses from water pump and automatic choke.
4. Disconnect leads from alternator, temperature sender unit, ignition coil and starter motor.
5. Disconnect throttle cable at throttle linkage, Fig. 10, and remove from bracket. Remove choke cable, where fitted, from carburettor.
6. Disconnect fuel line from fuel pump, servo vacuum hose from intake manifold and oil pressure line from connector and/or lead from oil pressure switch. Withdraw dipstick and dipstick extension tube from steel tube.

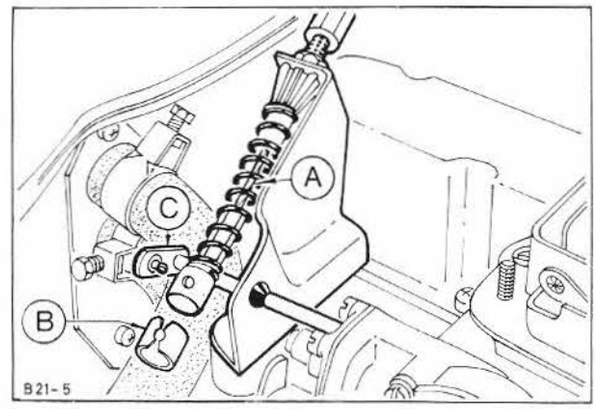

Fig. 10. Disconnect throttle cable at throttle linkage.
A – Throttle cable.
B – Retaining clip.
C – Throttle linkage.

7. Remove starter motor (3 bolts).

   Disconnect rubber insulator, Fig. 11, from engine mounting (2 nuts) and exhaust down-pipe from exhaust manifold.
8. Remove clutch housing cover (3 bolts), and bell housing bolts. (6 bolts).

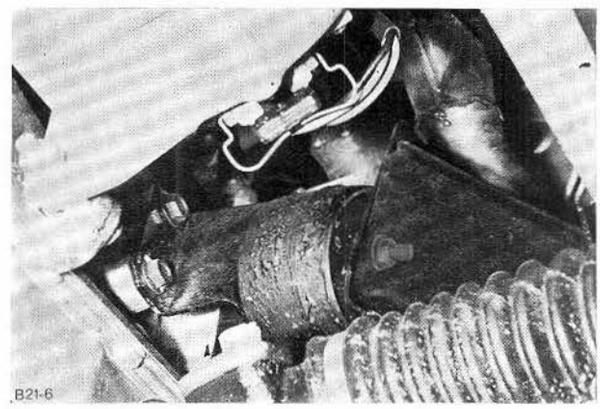

Fig. 11. Rubber insulator – engine mounting.

9. Support gearbox and lift engine out of vehicle with Special Tool G2-6000, Fig. 12, and P-6171.

To Install

10. If necessary, remove dowel bushes from clutch housing and install in cylinder block. Fit adaptor plate and secure, Fig. 13. Install engine, using special tool. Before installing engine slightly grease input shaft. **Ensure correct position of clutch release lever.**
11. Refit bell housing and engine mounting bolts. Tighten bolts uniformly.
    Remove engine lifting equipment.

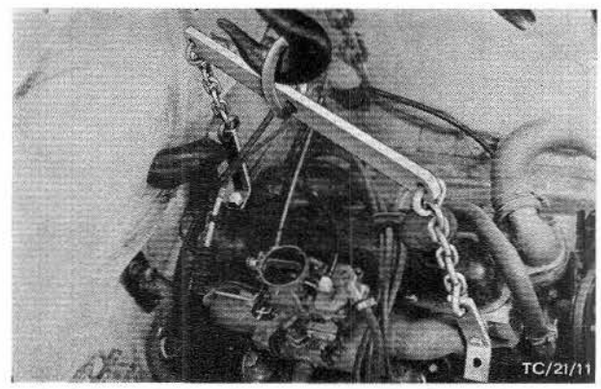

Fig. 12. Remove engine using lifting Tool G2-6000.

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12. Refit clutch housing cover.
13. Fit exhaust pipe to exhaust manifold. Install starter motor and connect starter motor lead.

    Slide dipstick extension tube onto steel tube and insert dipstick.
14. Check clutch play. Connect fuel line to fuel pump, servo vacuum hose to intake manifold and oil pipe to connector or lead to oil pressure switch.

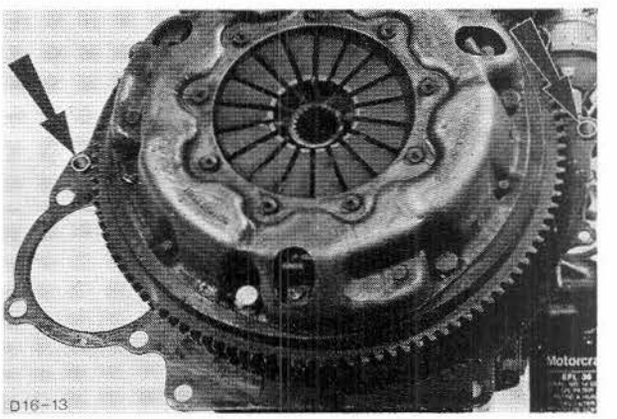

Fig. 13. Engine intermediate plate retainer.

15. Attach throttle cable to bracket and hook cable into throttle linkage, Fig. 14. Reconnect and adjust choke cable, where fitted.
16. Reconnect heater hoses to water pump and automatic choke.
17. Reconnect leads to alternator, temperature sender unit and ignition coil.
18. Refit radiator and radiator hoses. Fit sump shield and fill with coolant. (See Technical Data.)
19. Fill with engine oil, replace bonnet and adjust. Reconnect earth straps to engine and battery.

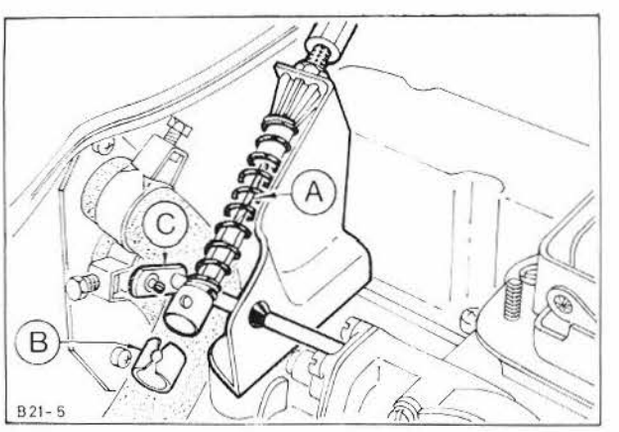

Fig. 14. Accelerator cable to throttle linkage fixing.
A – Throttle cable.
B – Retaining clip.
C – Throttle linkage.

20. 'Tune' engine as specified in Section 23 with engine at operating temperature. Adjust dwell angle ignition timing. Fig. 15. Replace air cleaner and adjust idle speed and CO content.

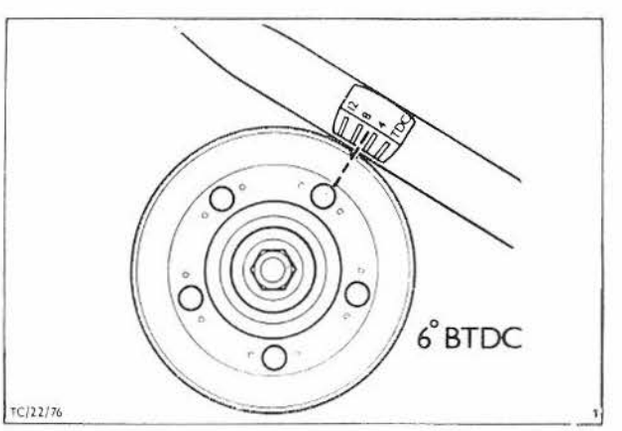

Fig. 15. Ignition timing marks, 1,1 litre LC to 1,3 litre 2V.

'A' Engine

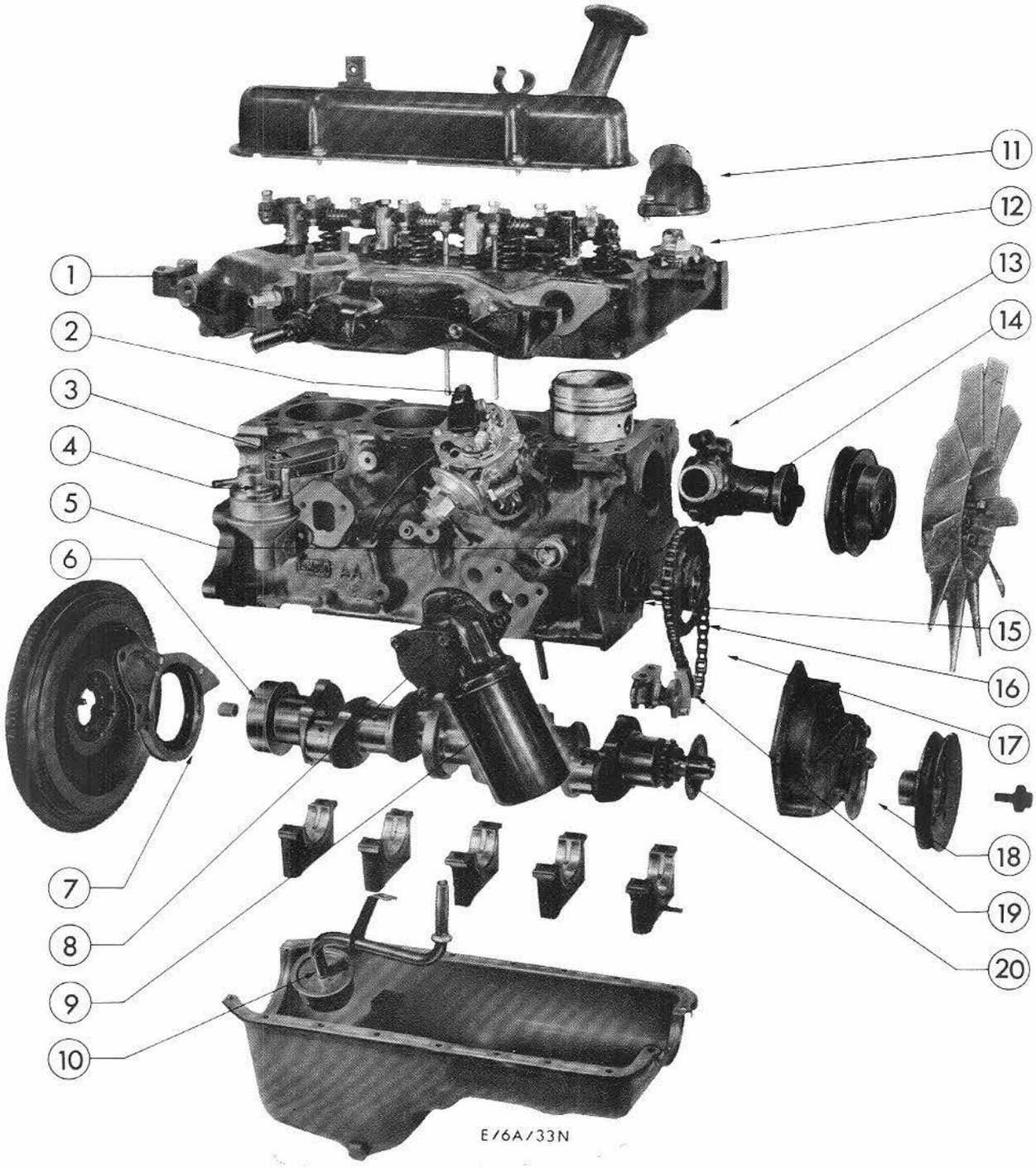

Fig. 16. 'A' engine, exploded view.

1. Inlet manifold.
2. Distributor.
3. Oil separator.
4. Fuel pump.
5. Oil pressure switch.
6. Crankshaft.
7. Crankshaft oil seal carrier.
8. Oil pump.
9. Oil filter.
10. Suction strainer and pipe.
11. Water outlet connection.
12. Thermostat.
13. Water pump.
14. Camshaft.
15. Camshaft thrust plate.
16. Camshaft sprocket.
17. Timing chain.
18. Timing cover with gasket.
19. Chain tensioner.
20. Oil slinger.

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21 134 8 ENGINE ASSEMBLY – DISMANTLE AND REASSEMBLE (Engine removed)

Special Service Tools Required:

Universal spindle	21-023
Oil seal installer	21-029
Oil seal replacer	21-030
Engine mounting bracket ..	21-031
Crankshaft sprocket remover ..	21-035
Flywheel bearing remover ..	21-036
Locator	G2-7600B/ P-7137
Oil filter wrench	GV-6883-A
Locating studs	P-4063-A
Oil seal replacer	G2-6362/ P-6161-A
Crankshaft pulley remover ..	6132-A

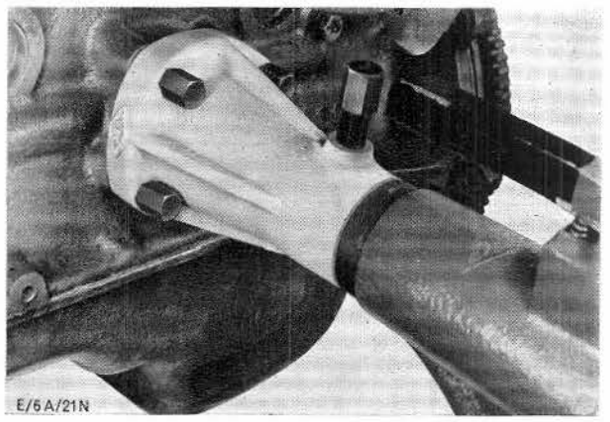

Fig. 17. Engine mounting bracket.

To Dismantle

1. Secure engine to stand by means of engine mounting bracket 21-023/21-031, Fig. 17.
2. Remove clutch pressure plate (6 bolts) and clutch disc, Fig. 18.

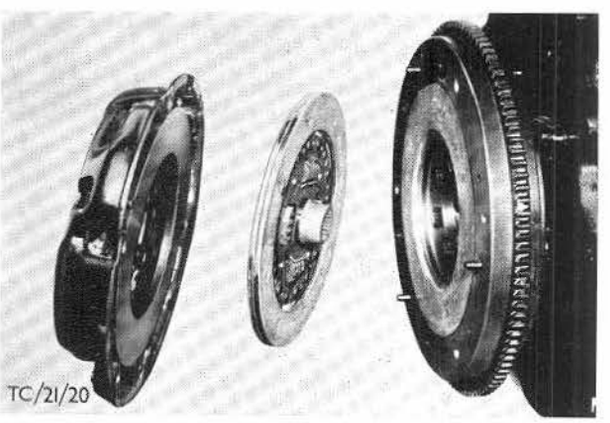

Fig. 18. Clutch pressure plate with clutch disc and flywheel.

3. Drain engine oil and remove oil filter using oil filter wrench GV-6883-A, Fig. 19.
4. Disconnect HT leads and remove distributor cap and leads. Remove spark plugs.
5. Disconnect vacuum advance line from carburettor.

Fig. 19. Remove oil filter.

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6. Disconnect fuel line from carburettor and withdraw breather hose together with vent valve from oil separator.
7. Slacken alternator bracket. Take off V-belt and remove alternator with its bracket (3 bolts), Fig. 20. Remove fan and pulley (4 bolts).

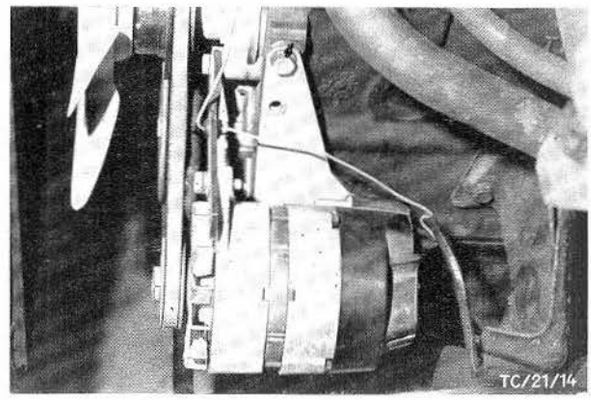

Fig. 20. Alternator mounting.

8. Remove crankshaft pulley (1 bolt), Fig. 21, and rocker cover (4 screws).
9. Remove water connection (2 bolts). Remove gasket and take thermostat out of cylinder head. Check thermostat. Section 24.

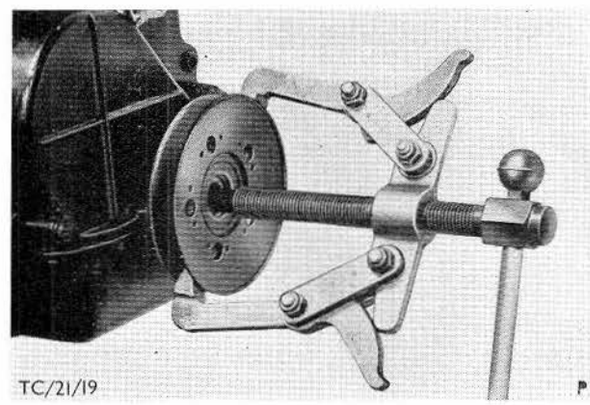

Fig. 21. Pull off crankshaft pulley using Special Tool 6132-A.

10. Detach rocker shaft (4 bolts), Fig. 22, and remove push rods. **Do not interchange push rods when reinstalling.**
11. Remove cylinder head bolts (10 bolts), unscrewing them in reverse order from that in which they were tightened.

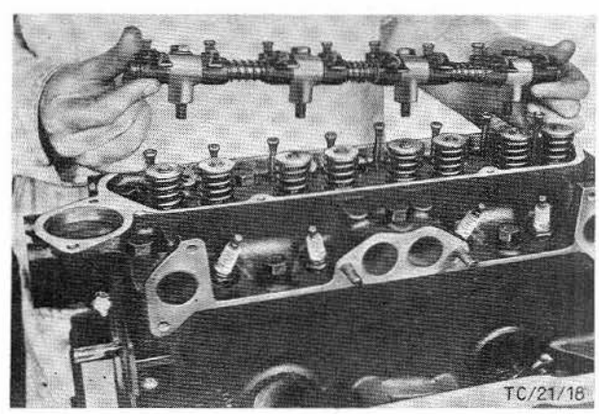

Fig. 22. Remove rocker shaft.

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12. Lift off cylinder head complete with inlet and exhaust manifolds.
13. Detach fuel pump (2 bolts) together with spacer, Fig. 23.

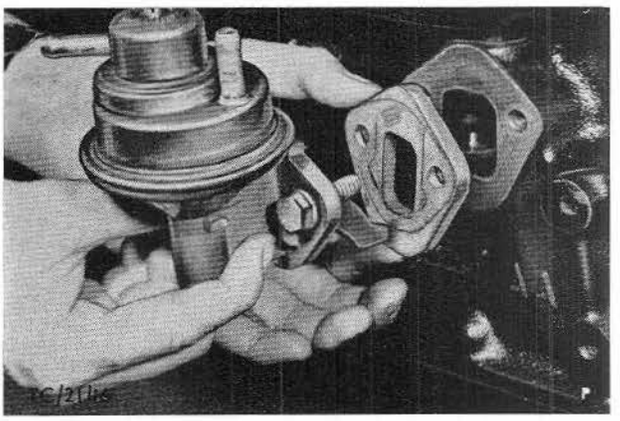

Fig. 23. Remove fuel pump.

14. Withdraw bolt from oil separator. Prise oil separator out of engine block, using a screwdriver, Fig. 24.
15. Remove distributor (1 bolt) and detach oil pump (3 bolts). Remove oil pressure switch.

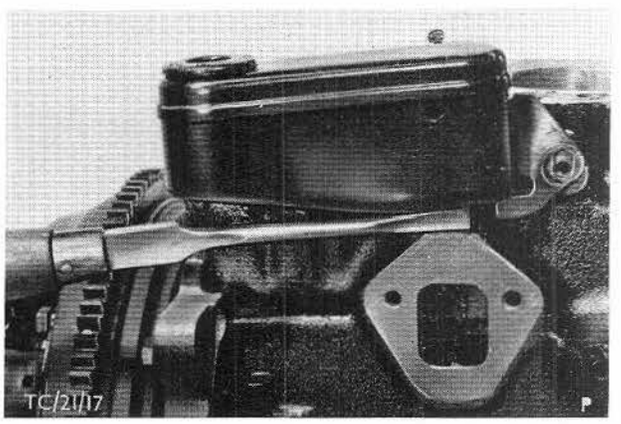

Fig. 24. Remove oil separator using a screwdriver.

16. Remove sump Fig. 25. Detach sump with engine mounted upright in the stand. This is to avoid sludge or swarf getting into engine.
17. Set pistons at centre of their stroke and remove carbon deposits from cylinder head faces using a suitable scraper, without touching piston bore.

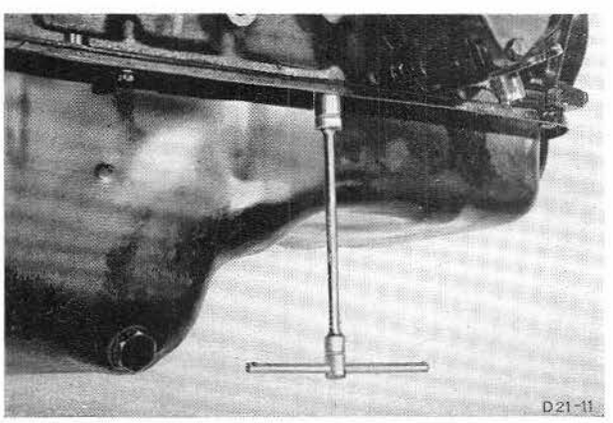

Fig. 25. Detach oil sump.

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18. Place a large tray under engine, invert engine and catch remaining oil, the carbon which has been detached and coolant.

19. Remove water pump (3 bolts), Fig. 26. Detach timing cover (4 bolts) and remove oil slinger from crankshaft, Fig. 27.

20. Detach oil pump suction pipe (1 bolt) and moving it to and fro, withdraw it from cylinder block.

21. Withdraw tensioner arm from pin of front main bearing cap and detach chain tensioner (2 bolts).

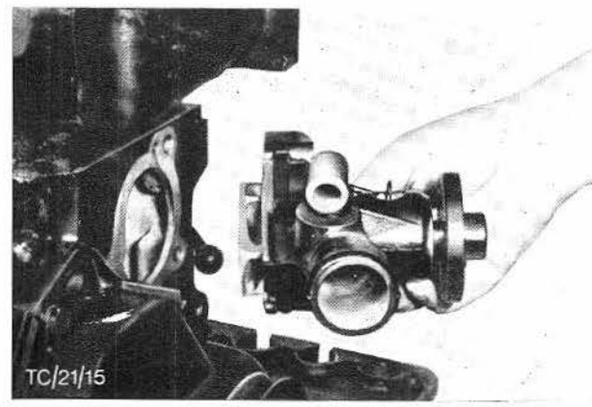

Fig. 26. Remove water pump.

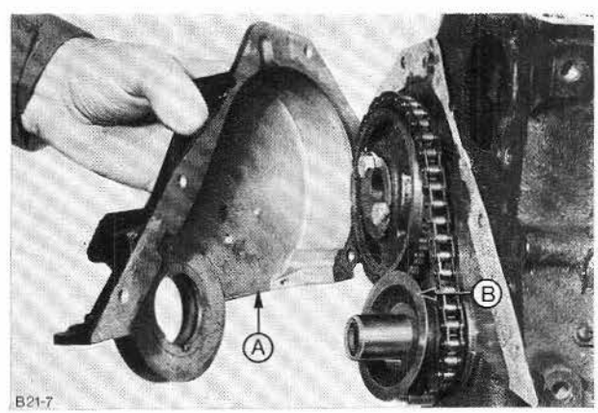

Fig. 27. Timing cover and oil slinger.

22. Bend over lock tabs, remove two bolts and detach camshaft gear complete with timing chain, Fig. 28.

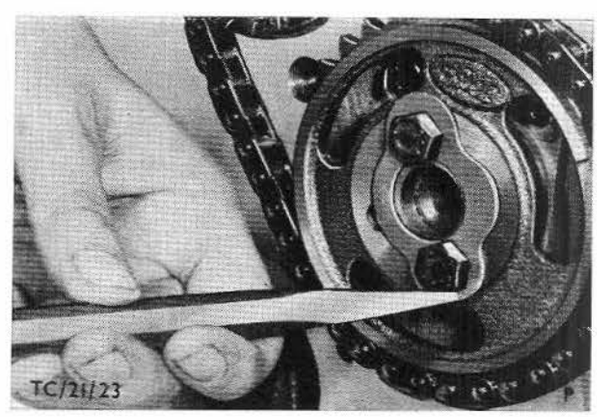

Fig. 28. Camshaft gear lock tab.

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23. Remove camshaft thrust plate (2 bolts), Fig. 29.

24. Withdraw camshaft towards front, having first turned camshaft through 360° to bring all tappets into TDC position. Remove tappets. **Do not interchange tappets when re-assembling.**

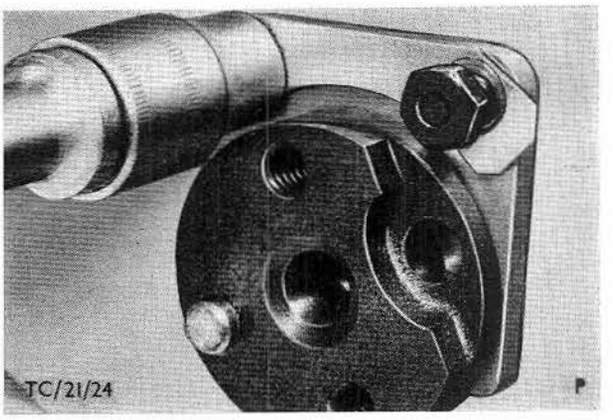

Fig. 29. Remove camshaft thrust plate.

25. Remove input shaft spigot bearing from crankshaft using Special Tool 21-036, Fig. 30.

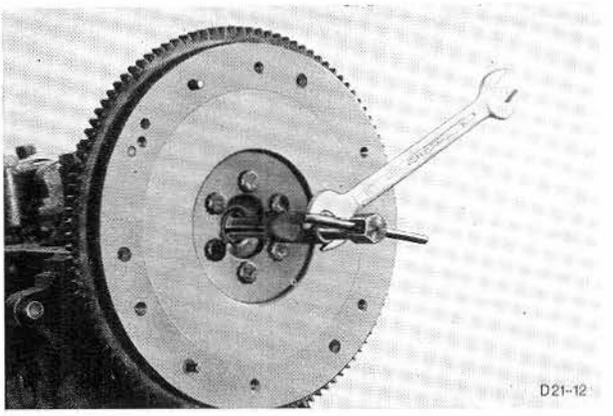

Fig. 30. Withdraw input shaft spigot bearing.

26. Pull off crankshaft gear using Special Tool 21-035, Fig. 31.

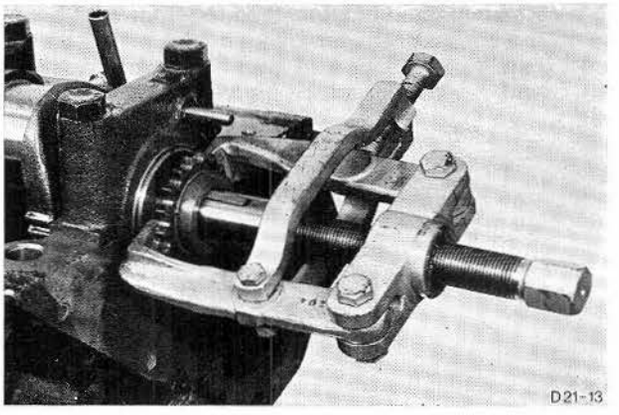

Fig. 31. Pull off crankshaft gear.

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27. Check markings of big end and main bearing caps, Fig. 32, for subsequent reassembly.
28. Remove big end bearing caps one by one, together with bearing shells. Push pistons complete with connecting rods and bearing shells out of engine. If big end bearing shells are removed before pistons are taken out, mark shells to correspond with connecting rods, for purposes of subsequent reassembly.
29. Detach flywheel (6 bolts) and rear cover plate.

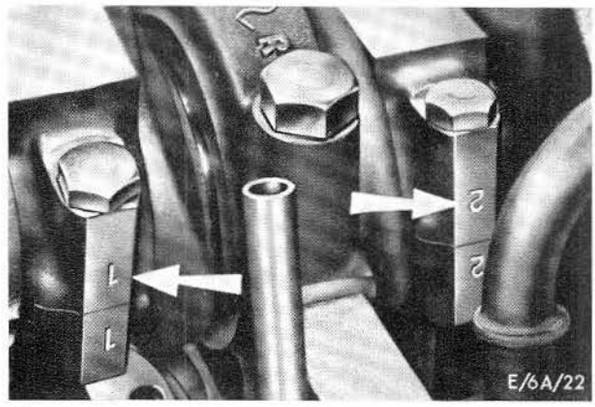

Fig. 32. Markings of big end and main bearing cap.

30. Remove rear oil seal carrier (4 bolts), Fig. 33.

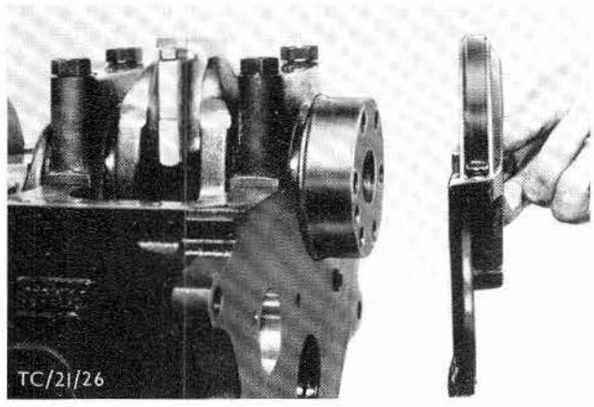

Fig. 33. Rear oil seal carrier.

31. Remove main bearing caps together with bearing shells. When removing centre main bearing cap, note position of two half thrust washers and mark them accordingly, Fig. 34.
32. Lift crankshaft out of cylinder block. Take out bearing shells and mark them.
33. Remove oil seals from timing cover and rear oil seal carrier.

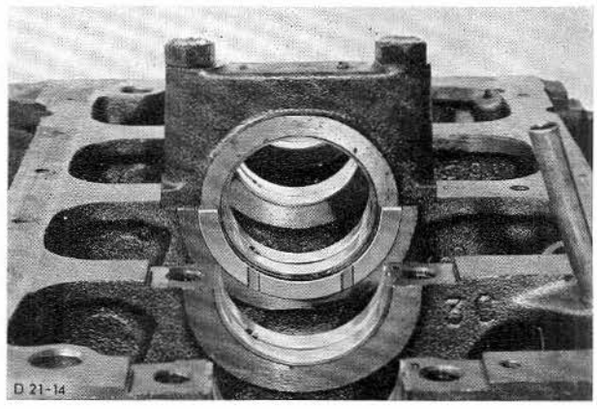

Fig. 34. Half thrust washer.

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To Reassemble

The type and degree of cleaning of a given part before reassembly must depend on the hours the engine has run, the extent of any damage and its possible re-use. This applies particularly to the cylinder block with its corners, angles and bores. If necessary, remove all plugs and covers and clean their seats, using suitable cleaning agents and tools (brushes, scrapers). The oil galleries in particular, e.g. in the cylinder block, cylinder head, etc. should be free from dirt and abrasive particles, Fig. 35. If press-fit plugs and screw plugs are removed, they, like all seals and gaskets, should be renewed. If the cylinder block is to be remeasured (bearing clearances, piston clearances), refer to page 24.

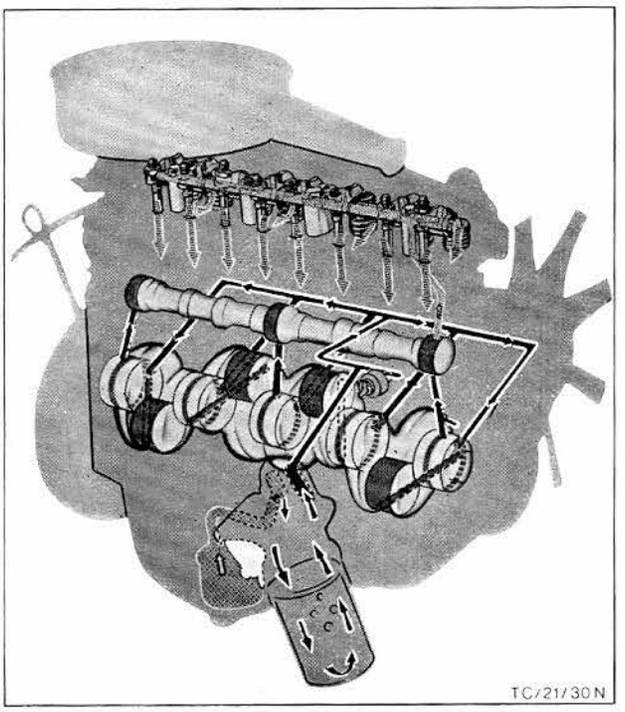

Fig. 35. Oil circuit.

Measuring bearing clearance

Measuring bearings (even with undersize crankshafts) can be eliminated and determination of required bearing shells can be considerably simplified by use of:
'PLASTIGAGE' (type PG 1) made by:
PERFECT CIRCLE CORPORATION,
HAGERSTOWN, INDIANA, USA.

UK Supplier:
WORLD RADIO,
950 North Circular Road,
Cricklewood, London, NW2.

West German supplier:
K. H. ERN,
Dusseldorf,
Schinkelstrasse 46–48.

'PLASTIGAGE' is the name of an accurately calibrated plastic filament.

Requirements for use of 'Plastigage'

1. Bearing should be dry and clean.
2. Crankshaft should not be turned during measuring operation.
3. Points of measurement should be close to top and bottom dead centre position.
4. Bearing caps should not be seated with hammer blows.

Procedure

Place length of Plastigage across width of bearing on crankshaft or big end journal. Fit main or big end bearing cap together with bearing shells and torque as specified. The plastic filament will be compressed more or less depending on bearing clearance. Remove bearing cap.

Each main bearing should be measured separately without other bearing caps being fitted.

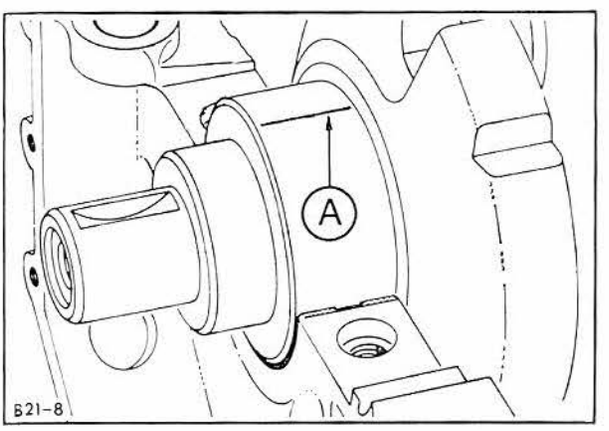

Fig. 36. Location of Plastigage thread.
A – Calibrated plastic thread.

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Width of compressed plastic filament can be measured by means of scale printed on PLASTI-GAGE pack, Fig. 37; reading shows bearing clearance.

Only bolts in good condition should be used for securing bearing caps on crankshaft and they should not be tightened in excess of specified torque.

Measuring Piston Clearance

Procedure

1. Fit main bearing caps without bearing shells and torque as specified.
2. Rotate cylinder block through 180° and measure cylinder bores with a standard measuring tool.
3. If diameter of cylinder bore is excessive in relation to piston grading, cylinder block should be overhauled or renewed. Fit new pistons in accordance with cylinder bore grading.
4. Before installing pistons check piston ring gaps.

Parent bore in cylinder block

The parent bore in the cylinder block may be either standard or 0,38 mm oversize. There is no marking for the standard parent bore, but with an oversize bore the bearing caps are marked with white paint, Fig. 38.

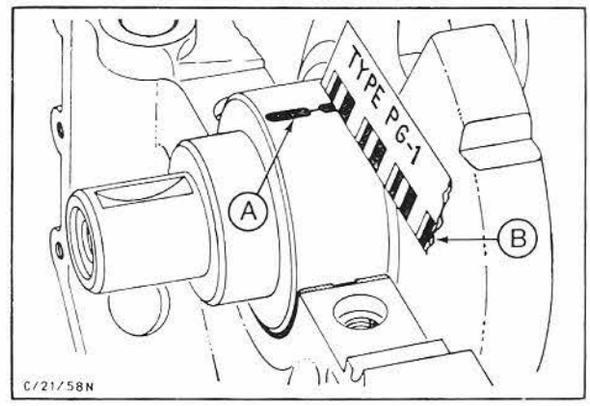

Fig. 37. Measuring bearing play.
A – Compressed plastic thread.
B – Measurement scale.

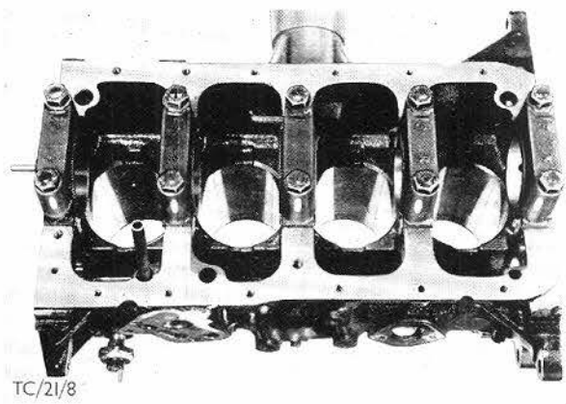

Fig. 38. Colour marking of bearing covers.

Main Bearings

Crankshaft main bearing journals

The crankshaft main bearing journals may be standard or (also in new engines) 0,25 mm undersize. Standard main bearing journals are not marked, while the crankshaft web adjacent to an undersize main journal is marked with a green stripe, Fig. 39.

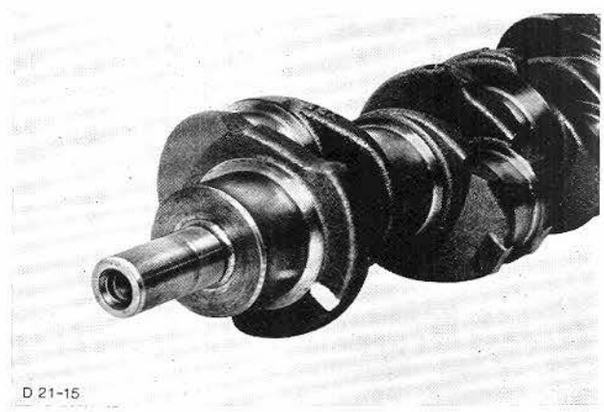

Fig. 39. Colour marking of main bearing journal.

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Big end bearing journals

The big end bearing journals may also be standard or (also in new engines) 0,25 mm (0.01 in.) undersize. Standard big end bearing journals are not marked, while the undersize is marked with green paint spot on the web next to the journal, Fig. 40.

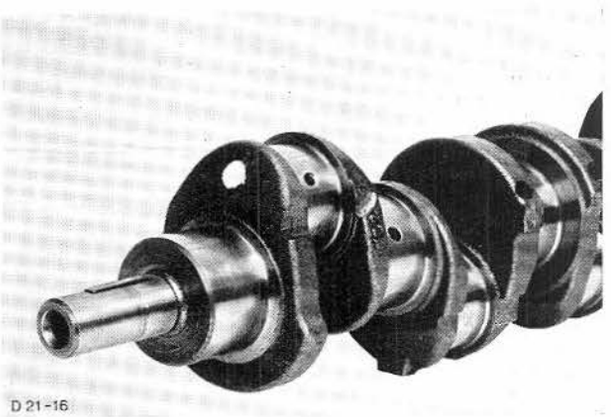

Fig. 40. Big end bearing journal colour marking.

Bearing shells

Standard main bearing and big end bearing shells are not colour marked. Oversize bearing shells have an appropriate inscription on the back (see Parts Catalogue). The green colour markings are on the outer edge at the side, Fig. 41.

When selecting new bearing shells, it should be verified against the Parts Catalogue that they are the appropriate ones and, in addition, they should be measured.

In order to remain within the specified tolerances (see Technical Data), the journals, parent bores and bearing shells should be measured individually.

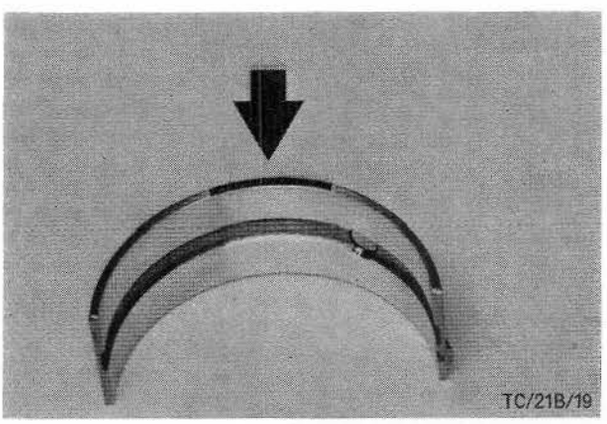

Fig. 41. Bearing shell with colour coding (over and undersize only).

Assembly

34. Press oil seal into oil seal carrier using Special Tool 21-030 and oil seal into timing cover using Special Tool G2-6362/P-6161-A, Fig. 42.

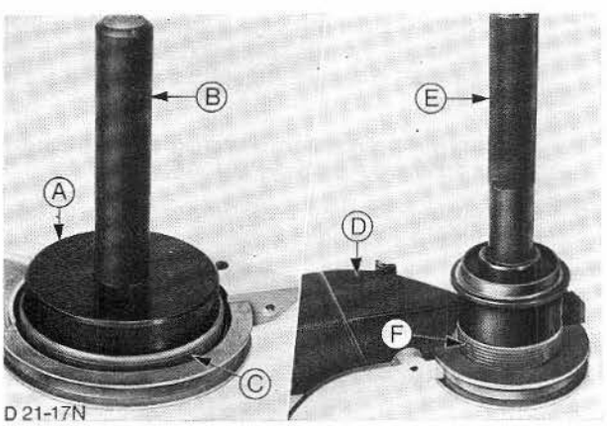

Fig. 42. Press in oil seals.
A – Oil seal installer.
B – Handle.
C – Oil seal.
D – Front cover.
E – Oil seal installer.
F – Oil seal.

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35. Insert a new input shaft spigot bearing into crankshaft using Special Tool G2-7600-B/P-7137, Fig. 43. Press on crankshaft gear.
36. Oil tappets and insert them into cylinder block.

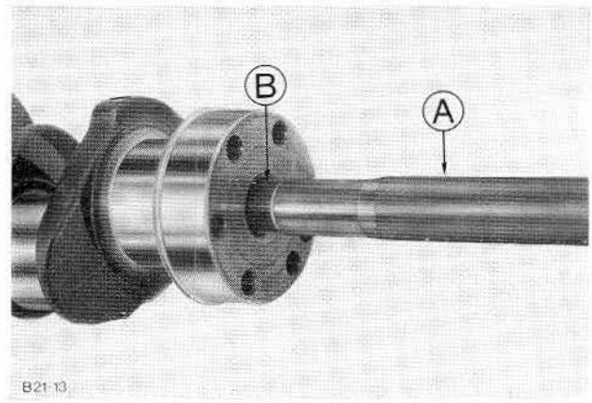

Fig. 43. Press input shaft spigot bearing into crankshaft.
A – Special Tool G2-7600-B/P-7137.
B – Spigot bearing.

37. Oil camshaft bearings, camshaft and thrust plate. Insert camshaft from front. Attach thrust plate and torque as specified and lock bolts with lock tabs, Fig. 44.
38. Insert main bearing shells dry into cylinder block, apply engine oil and place crankshaft in position.

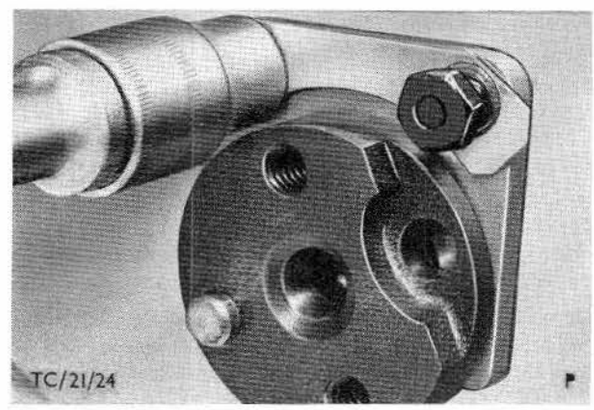

Fig. 44. Attach camshaft thrust plate.

39. Position main bearing caps complete with oiled bearing shells. Ensure that two thrust half-rings are inserted when fitting appropriate bearing cap.

    The arrows on main bearing caps should point towards pulley, Fig. 45.
40. Tighten bearing cap bolts uniformly to torque specified in Technical Data.

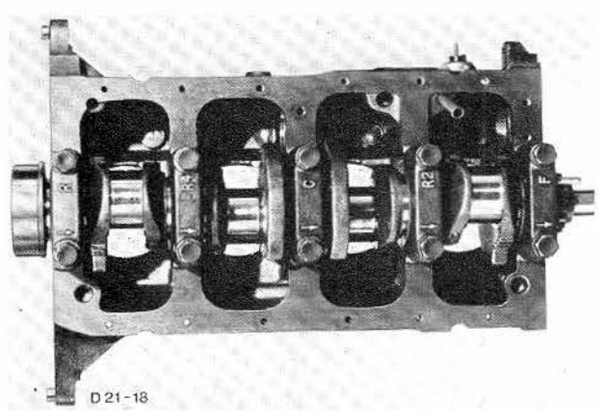

Fig. 45. Main bearing caps in position.

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41. Check end-float of the crankshaft and camshaft using a dial indicator, Fig. 46. See Technical Data for values.

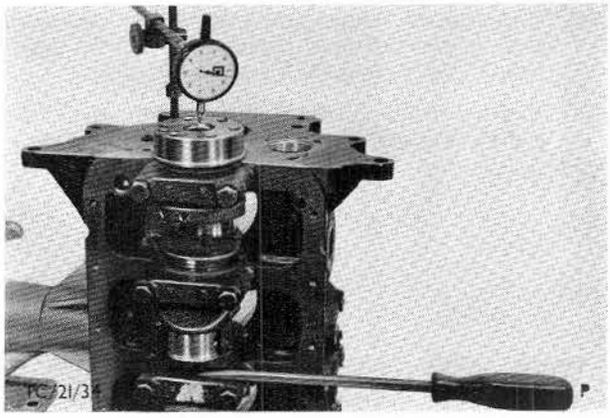

Fig. 46. Check end-float of crankshaft.

42. Fit camshaft gear together with timing chain, ensuring markings on gears align, Fig. 47. Torque bolts as specified in Technical Data and lock over tab.

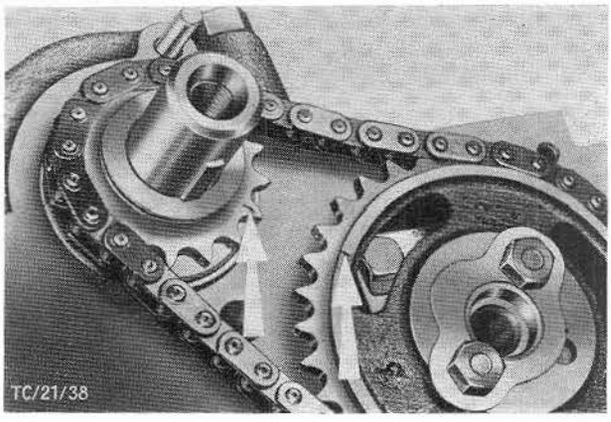

Fig. 47. Sprocket markings.

43. Fit timing chain tensioner and torque bolts as specified. Compress spring and slide tensioner arm on to pin on main bearing cap. Release chain tensioner spring, Fig. 48.

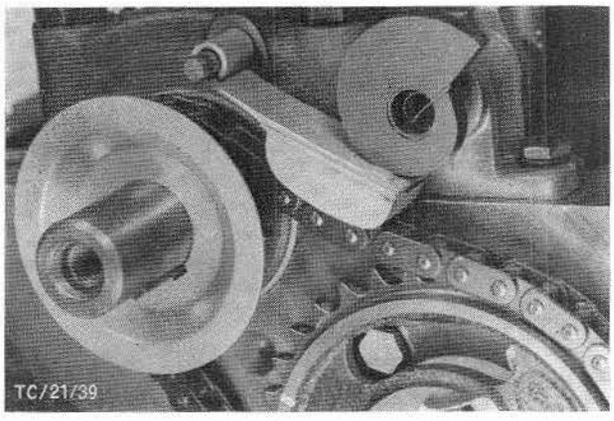

Fig. 48. Chain tensioner installed.

21 134 8

44. Slide on oil slinger and front cover equipped with a new oil seal (sealing lip lightly lubricated), with crankshaft pulley, Fig. 49.

45. Tighten bolts of front cover and crankshaft pulley to specified torque (see Technical Data).

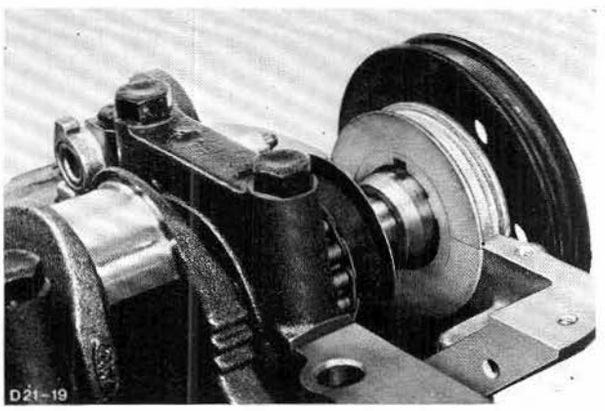

Fig. 49. Front cover with crankshaft pulley.

46. Refit rear oil seal carrier fitted with a new oil seal (sealing lip lightly lubricated), using Special Tool 21-029, Fig. 50.

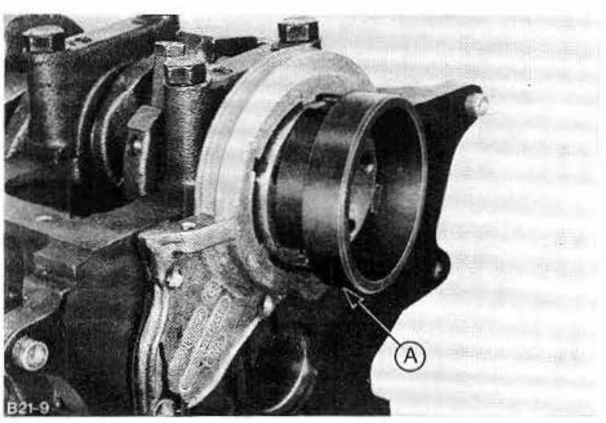

Fig. 50. Fit rear oil seal carrier.
A – Special Tool 21-029.

47. Invert engine and position rear cover. Fit flywheel, Fig. 51, and torque as specified in Technical Data.

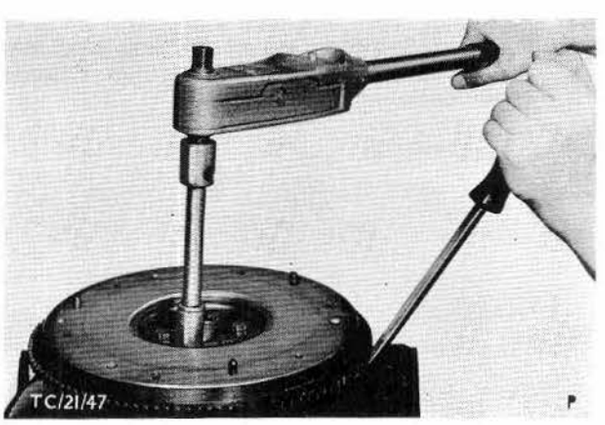

Fig. 51. Fit flywheel.

21 134 8

48. Position clutch disc using Special Tool G2-7600-B/P-7137, Fig. 52. Place pressure plate on dowels and torque as specified in Technical Data.

49. Apply engine oil to pistons and cylinder bores. Stagger piston ring gaps.

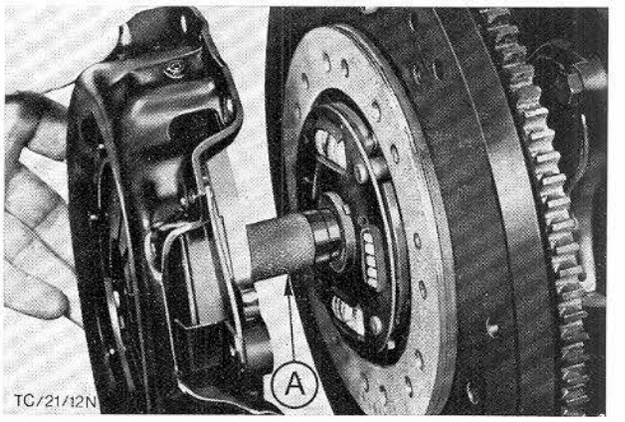

Fig. 52. Centre clutch disc and pressure plate.
A – Tool No. G2-7600B/P-7137.

50. Compress piston rings with a standard tool (ring compressor), Fig. 53. Slide piston into cylinder using a hammer handle, guiding connecting rod on to big end journal by hand.

The 'front' marking on piston (arrow, notches, etc.) should point towards front cover, Fig. 53.

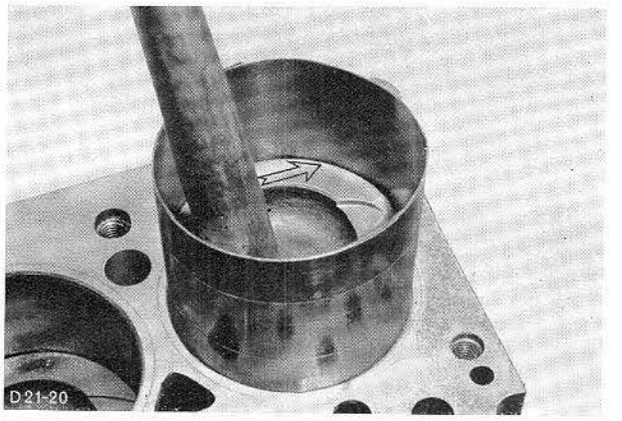

Fig. 53. Fit piston using a ring compressor.

51. Place big end bearing shell in position, apply oil and press connecting rod firmly against big end bearing journal.

52. Fit big end bearing cap complete with oiled bearing shell. Torque connecting rod bolts as specified in Technical Data, Fig. 54.

Check whether connecting rod has enough endfloat on journal.

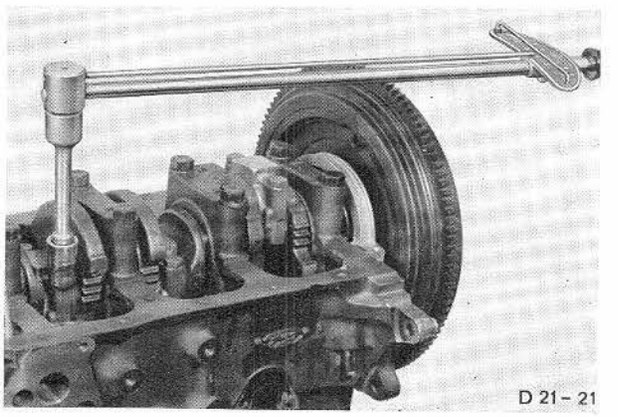

Fig. 54. Torque connecting rod bolts as specified in Technical Data.

21 134 8

53. Apply metal jointing compound (Loctite) to oil pump suction pipe and press in position. Torque bolt as specified in Technical Data.
54. Insert rubber seal in groove of rear seal carrier. Apply sealing compound to cylinder block mating surface at joint of cover and rear seal carrier. Place sump gasket in position and slide projections on cork gasket under cut-outs in rubber gasket, Fig. 55.
55. Place sump in position and torque bolts as specified, in two stages. (See Technical Data.)
56. Insert oil separator up to stop and secure with bolt.
57. Torque oil pressure switch as specified in Technical Data.

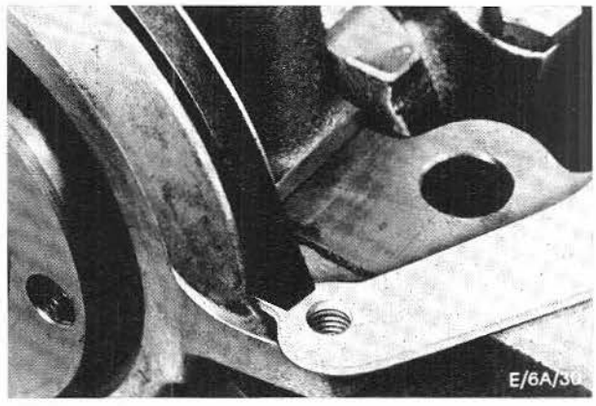

Fig. 55. Fitting sump gasket.

58. Fit water pump, Fig. 56. In doing so, tighten bolt of alternator bracket finger tight.
59. Crank engine to bring cylinder No. 1 to TDC and install distributor (see Section 22).

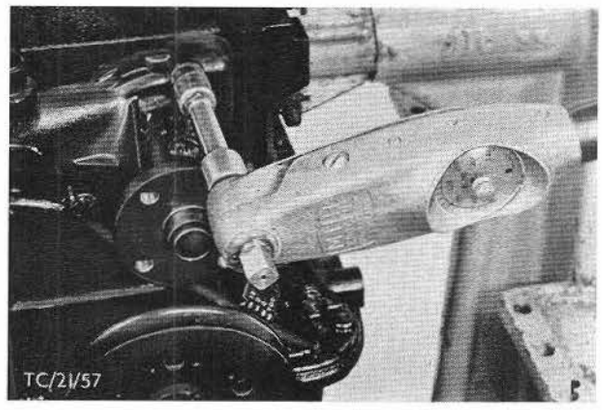

Fig. 56. Install water pump.

60. Fit oil pump complete with gasket and torque bolts as specified in Technical Data, Fig. 57.

When a new or overhauled oil pump is used, it should be turned by hand through a complete rotation and filled with engine oil prior to installation.

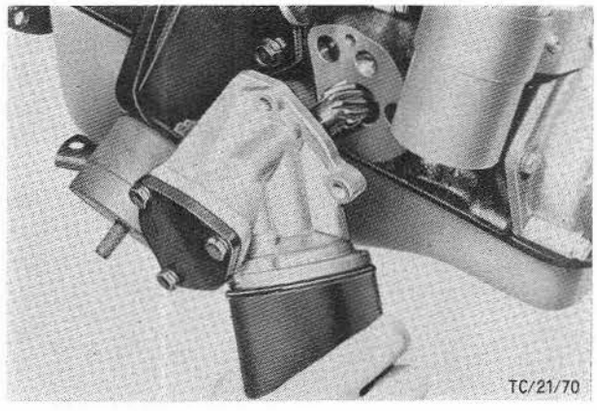

Fig. 57. Fit oil pump.

21 134 8

61. Screw in oil filter cartridge until rubber gasket makes contact with filter head, then tighten a further $\frac{3}{4}$ to 1 turn. Apply engine oil to rubber gasket and mating flange face before fitting.

62. Screw Special Tool P-4063-A in, and position cylinder head gasket correctly.

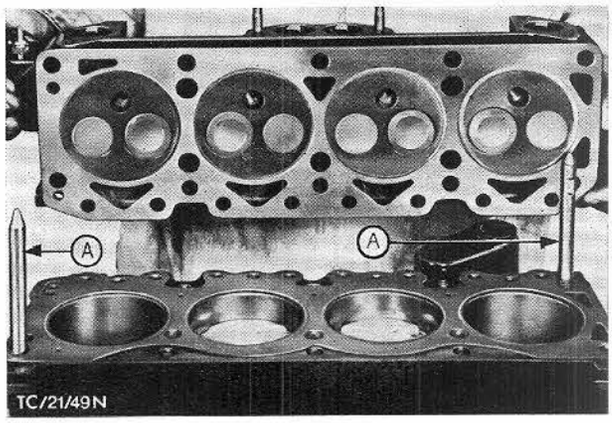

Fig. 58. Fit cylinder head with aid of locating studs.
A – Locating studs.

63. Fit cylinder head, Fig. 58 and tighten bolts finger tight. Replace the two locating studs by the last two bolts. Torque cylinder head bolts as specified in three stages proceeding in sequence shown in Fig. 59 (see Technical Data).

Bolts vary in length to suit thickness of cylinder head.

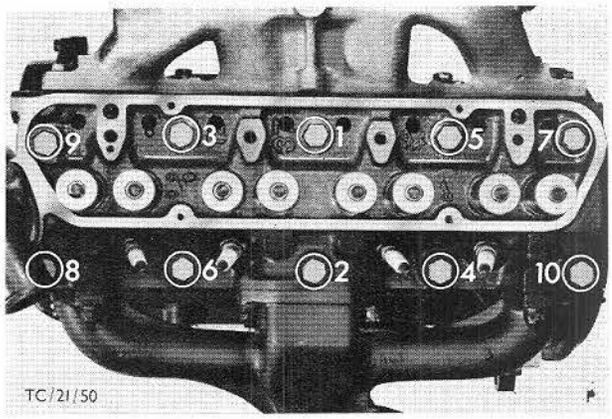

Fig. 59. Cylinder head bolt tightening sequence.

64. Apply engine oil to both ends of push rods and place them in push rod sockets. Place rocker shaft in position, guiding rocker lever adjusting screws into push rod sockets. Tighten rocker shaft bolts by hand, then torque them as specified in Technical Data, Fig. 60.

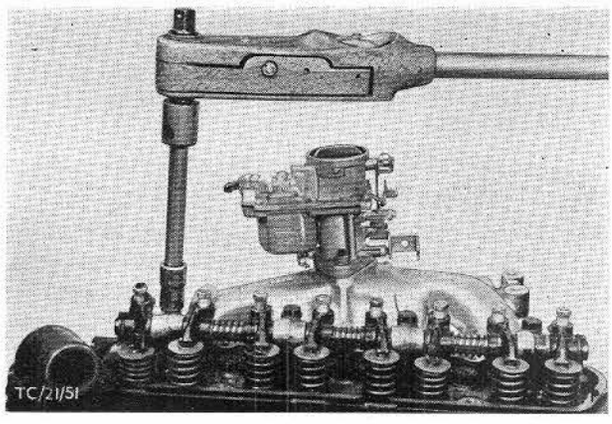

Fig. 60. Tighten rocker shaft bolts.

21 134 8

65. Insert thermostat into cylinder head, Fig. 61. Place gasket in position and fit water elbow.
66. Adjust valve clearances (see Operation 21 213) and refit rocker cover with a new gasket.
67. Fit alternator complete with bracket. Fit fan complete with pulley, to water pump.

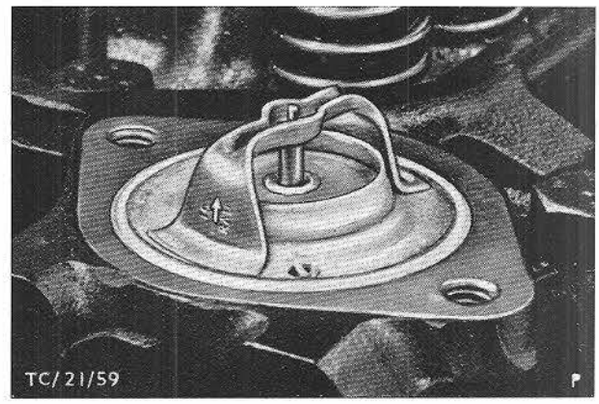

Fig. 61. Thermostat in position.

68. Refit fan belt adjust and tighten alternator mounting bolts. Adjust belt tension to achieve 13 mm (0.5 in.) free movement midway between the alternator and fan pulleys.
69. Refit fuel pump complete with spacer. Torque bolts as specified in Technical Data, Fig. 62.
70. Connect fuel line to carburettor and insert vent valve into oil separator.

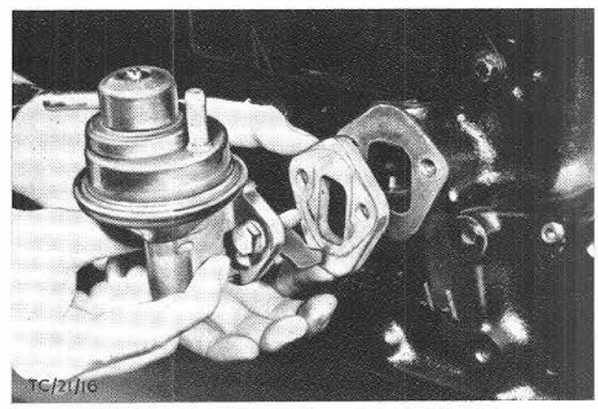

Fig. 62. Fit fuel pump.

71. Fit spark plugs and torque as specified in Technical Data. Refit distributor cap and connect HT leads to spark plugs, arranged as shown in Fig. 63. Connect vacuum line to carburettor.
72. Fit oil drain plug complete with new washer and torque as specified in Technical Data.

    Every time oil is changed and oil drain plug is removed a new washer should be fitted in accordance with service instructions.
73. Insert dipstick and remove engine from stand.

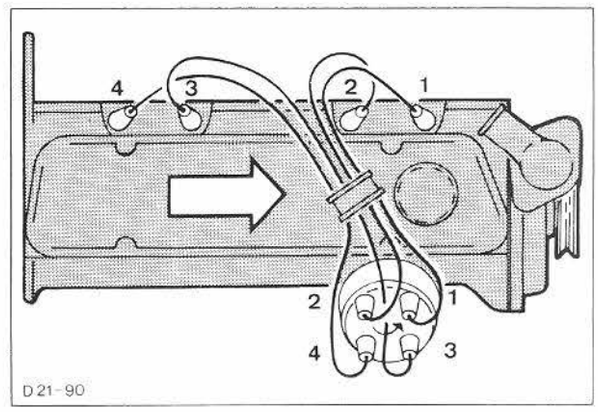

Fig. 63. Arrangement of HT leads (firing order).

21 163

21 163 CYLINDER HEAD – REMOVE AND INSTALL

Special Service Tools Required:

Cylinder head bolt wrench ..	21-034
Locating studs	P-4063-A

To Remove

1. Disconnect battery earth strap and remove oil sump shield (4 bolts, 4 clips), drain coolant, disconnecting radiator hose from radiator bottom neck and engine water outlet at top, Fig. 64.
2. Remove air cleaner and disconnect fuel line from carburettor and engine breather hose from oil separator.

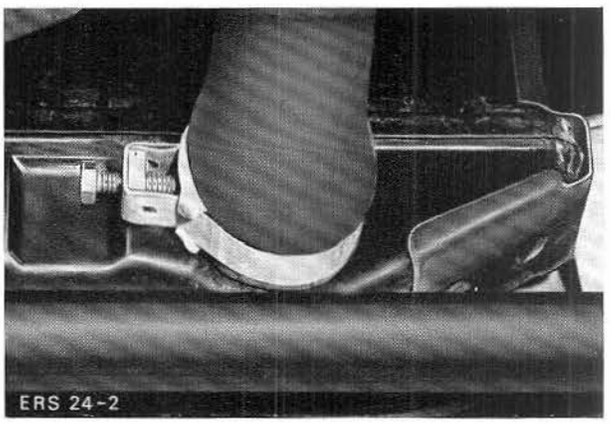

Fig. 64. Disconnect radiator hose from radiator.

3. Unhook throttle cable at throttle linkage, Fig. 65, and remove from bracket. Disconnect choke cable at carburettor.
4. Disconnect vacuum hose from carburettor. Disconnect heater hose and remove dipstick extension tube bracket from inlet manifold (1 bolt).
5. Disconnect lead from temperature sender unit and HT leads from spark plugs and ignition coil. Remove distributor cap and distributor rotor arm.

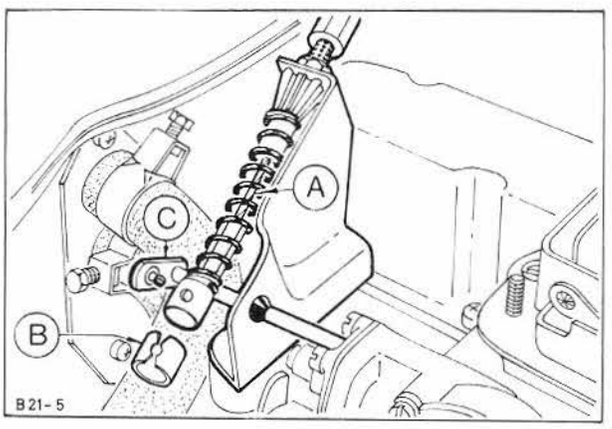

Fig. 65. Unhook throttle cable at throttle linkage.
A – Throttle cable.
B – Retaining clip.
C – Throttle linkage.

6. Detach cylinder head water elbow (2 bolts) and remove thermostat, Fig. 66. Disconnect exhaust pipe from exhaust manifold (2 nuts).

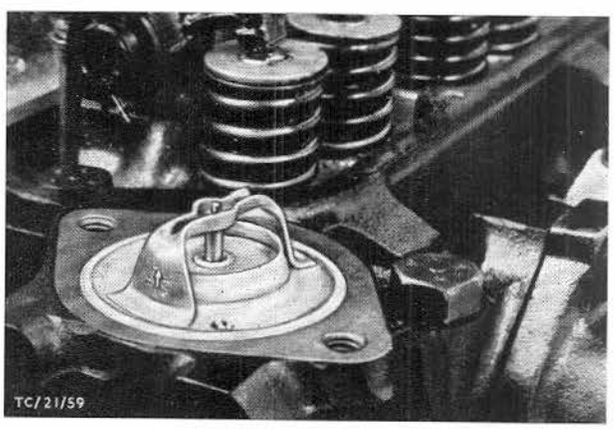

Fig. 66. Thermostat installed.

21 163

7. Remove rocker cover (4 screws) and spark plugs. Detach rocker shaft (4 bolts), Fig. 67. Take out push rods and remove cylinder head (10 bolts), slackening bolts in reverse order to tightening (see tightening sequence in Fig. 69)

   Do not interchange push rods when removing and reinstalling.

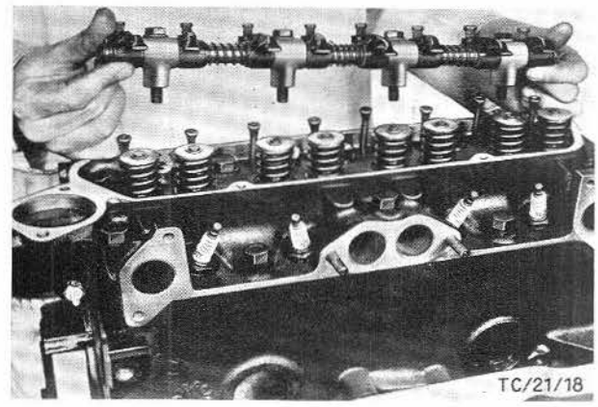

Fig. 67. Remove rocker shaft.

To Install

8. After cleaning mating faces (cylinder head, cylinder block), screw cylinder head locating studs into cylinder block and fit new cylinder head gasket.

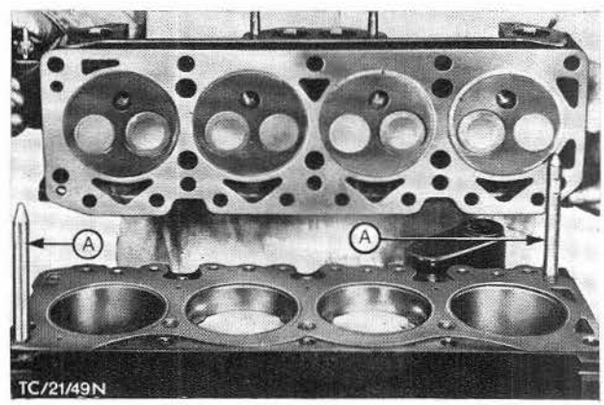

Fig. 68. Replace cylinder head.
A – Special Tool P-4063-A (locating studs).

9. Fit cylinder head, Fig. 68. Insert cylinder head bolts finger tight. Take out locating studs and replace them by the last two bolts. Cylinder head bolts should then be tightened to specified torque in three stages in order shown in Fig. 69.

   Bolts are of different lengths to suit different thicknesses of cylinder head. (See Technical Data.)

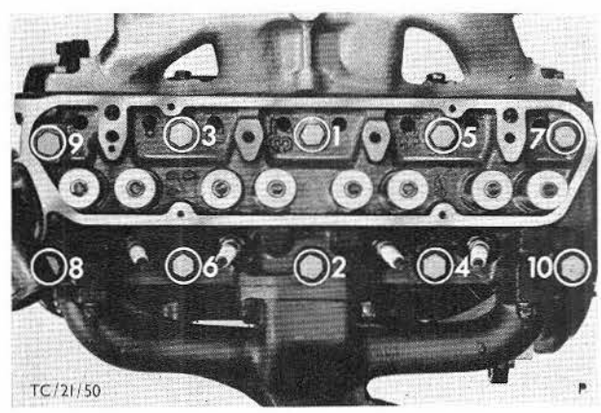

Fig. 69. Cylinder head bolts, tightening sequence.

21 163

10. Lubricate both ends of push rods and place them in push rod sockets. Fit rocker shaft, guiding rocker arm adjusting screws into push rod sockets. Insert rocker shaft bolts and torque them as specified in Technical Data, Fig. 70.
11. Adjust valve clearances (see Operation 21 213). Fit spark plugs and rocker cover.

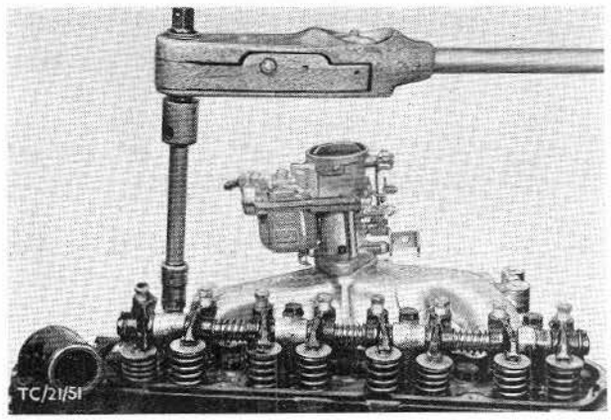

Fig. 70. Torque rocker shaft bolts as specified in Technical Data.

12. Position thermostat, Fig. 71, replace gasket and bolt on water outlet connection. Attach exhaust pipe to exhaust manifold.
13. Connect leads to temperature sender unit, spark plugs and ignition coil. Fit distributor rotor arm and cap.
14. Connect vacuum hose to carburettor and fit dipstick pipe extension bracket and hot water hose to inlet manifold.

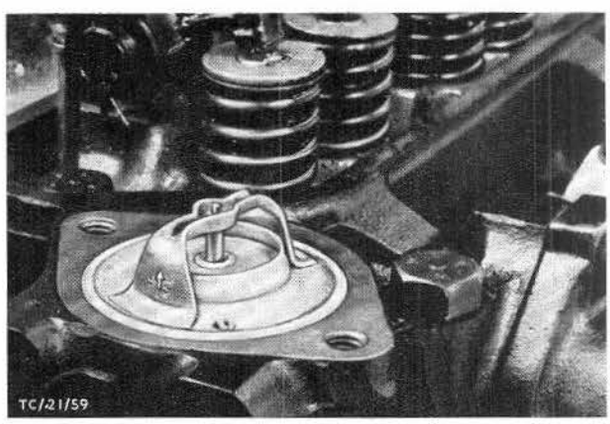

Fig. 71. Thermostat installed.

15. Attach throttle cable to bracket and hook into throttle linkage, Fig. 72. Reconnect and adjust choke cable, where fitted.
16. Connect engine breather hose to oil separator and fuel line to carburettor.

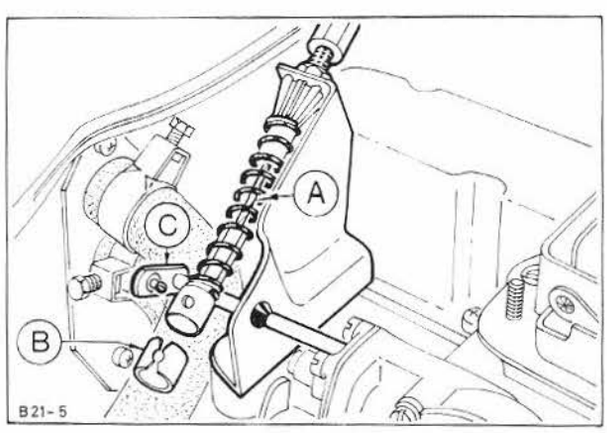

Fig. 72. Hook throttle cable to throttle linkage.
A – Throttle cable.
B – Retaining clip.
C – Throttle linkage.

21 163

17. Connect radiator hoses and top up with coolant.

    Connect earth strap to battery and fit oil sump shield.

18. With engine at normal running temperature, adjust dwell angle, timing, Fig. 73, idling speed and CO centent. (As detailed in sections 22 and 23).

19. After adjustments have been carried out with engine warmed up, disconnect HT leads from spark plugs and remove rocker cover.

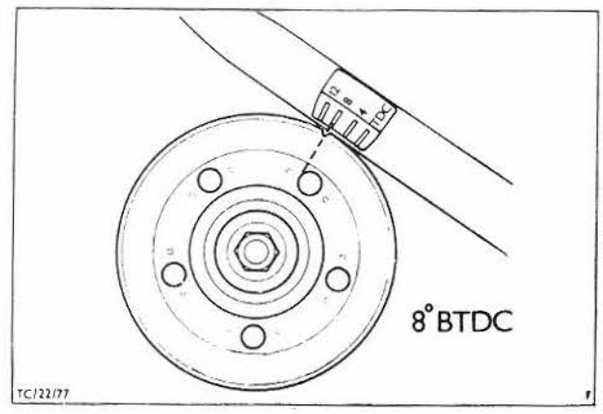

Fig. 73. Timing marks (1,6 2V engine).

20. Wait for 15 to 20 minutes and retighten cylinder head bolts to specified torque (see Technical Data) in the sequence shown in Fig. 74, using Special Tool 21-034. Retighten bolts securing rocker shaft and recheck valve clearances.

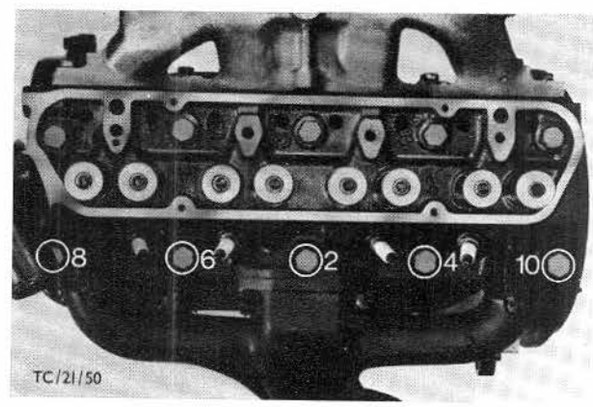

Fig. 74. Cylinder head bolt tightening sequence.

21. Refit rocker cover, fit HT leads, Fig. 75 and refit air cleaner.

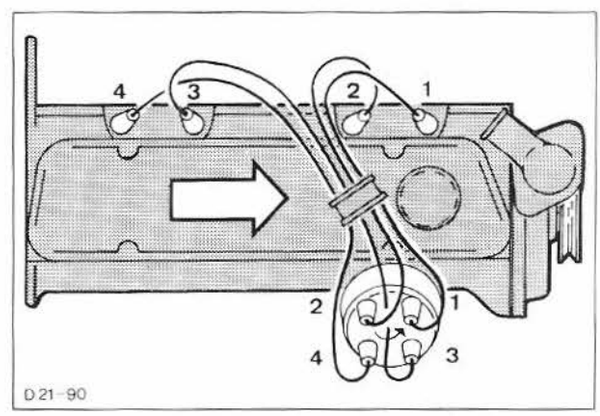

Fig. 75. Spark plug HT lead arrangement (firing order).

21 165 5

21 165 5 CYLINDER HEAD – REPLACE (Cylinder head removed)

Special Service Tools Required:

Valve spring compressor ..	21-024/ G2-6513-A
Valve spring compressor adaptor (for 21-024)	21-024-02/ P-6118-3A

To Dismantle

1. Remove inlet manifold (5 bolts) complete with carburettor and exhaust manifold (6 nuts) from cylinder head, Fig. 76.
2. Remove exhaust manifold studs (6) and temperature sender unit.

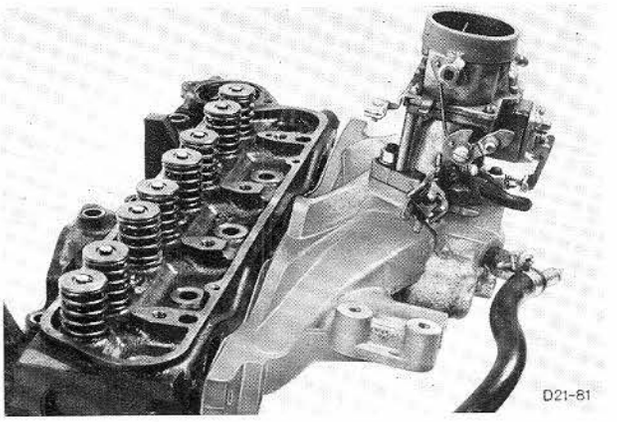

Fig. 76. Inlet manifold with carburettor.

3. Remove valve springs and retainers using Special Tool G2-6513-A, Fig. 77, or 21-024 (with adaptor).

   When removing and refitting valve springs it is essential to ensure that the valve stem is not damaged by valve spring retainer when it is pressed down in order to remove and refit collets. If stem is damaged there is no guarantee that sealing is adequate. The result is excessive oil consumption and wear in the valve guides.

4. Take off valve stem seals and take out valves.

   Every time valves are taken out and refitted, new valve stem seals should be used.

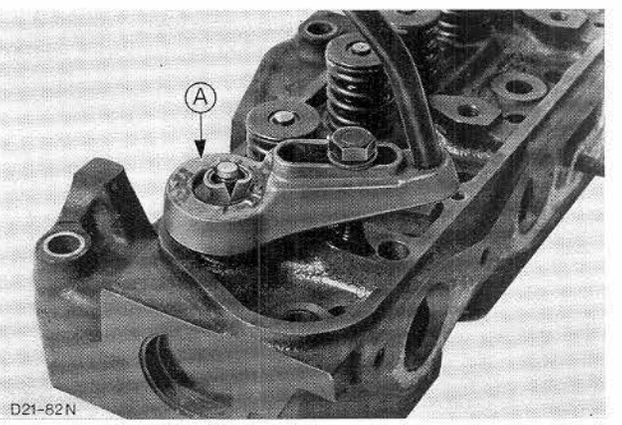

Fig. 77. Removal of valve springs.
A – Special Tool G2-6513-A.

To Assemble

Before assembling new cylinder head, check re-used parts of old cylinder for wear and serviceability.

5. Lubricate valves and valve guides. Insert valves. Slide valve stem seals on to valve stems, Fig. 78.

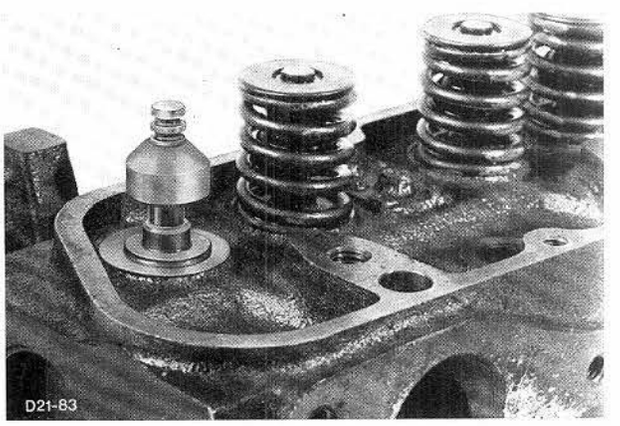

Fig. 78. Valve stem seal on valve stem.

21 165 5

6. Fit valve springs and valve spring retainers using Special Tool G2-6513-A or 21-024 (with adaptor). Pay attention to correct seating of collets.
7. Refit inlet and exhaust manifold studs and temperature under unit, Fig. 79.

   NOTE: Inlet manifold studs should be coated with sealing compound prior to installation.

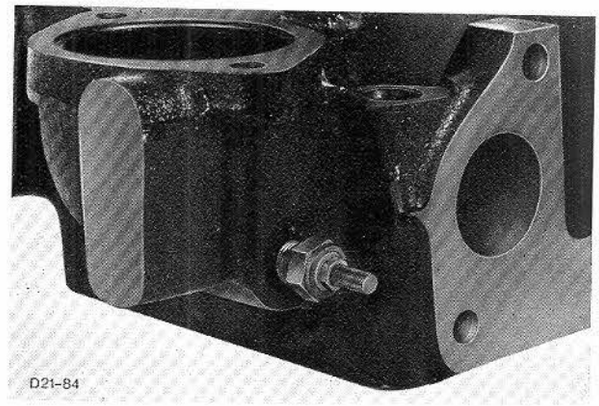

Fig. 79. Temperature sender unit.

8. Replace inlet manifold complete with carburettor, Fig. 80, and exhaust manifold, using new gaskets.

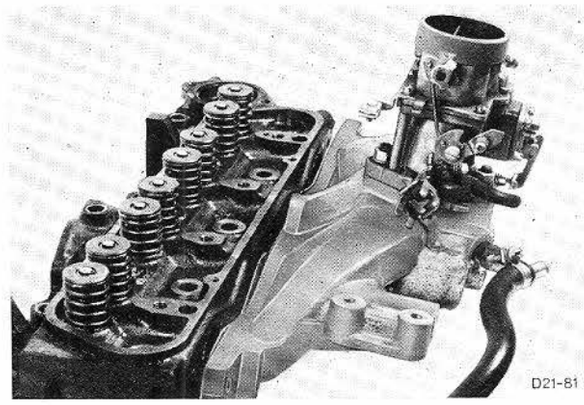

Fig. 80. Inlet manifold with carburettor.

When used valves are installed in a new cylinder head, it is essential before installing them to reface the valve head on a valve grinding machine and then to proceed as follows:

9. Grind in valves in cylinder head, Fig. 81. Clean all traces of grinding paste off valves and valve seats, oil valves, valve seats and inserts. Continue as described above, starting with step 5 (valve stem seals).

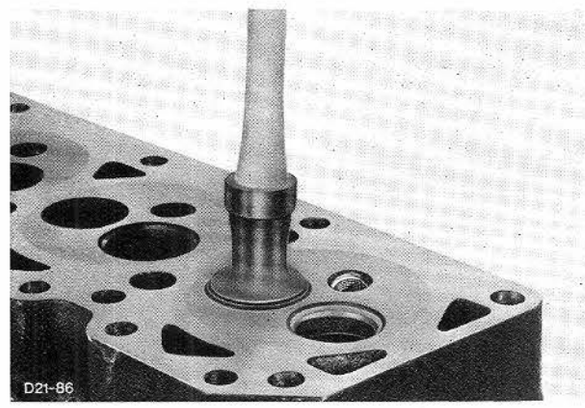

Fig. 81. Grind in valves.

21 213

21 213 VALVE CLEARANCES – ADJUST (ALL)

Special Service Tools Required: None

1. Remove air cleaner, disconnect HT leads from spark plugs and remove rocker cover.
2. During adjustment of valve clearances, crank engine only in direction of normal rotation. For first valve adjustment, align crankshaft pulley mark with 'O Mark' on timing cover, Fig. 82.

   To facilitate start of valve clearance adjustment, made a chalk line on pulley at 180°. Then proceed with the adjustment as follows. See Technical Data.

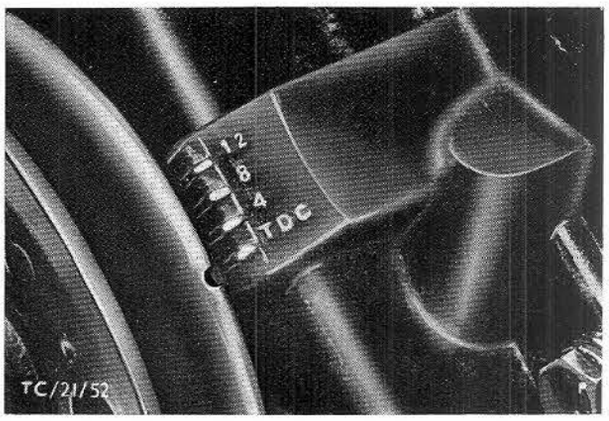

Fig. 82. Pulley on TDC mark.

If pulley is now turned to and fro a little the valves of cylinders No. 1 or 4 will be rocking, Fig. 83, i.e. the two rocker arms and push rods move in opposite directions. If the valves of cylinder No. 4 are rocking the valve clearances on No. 1 cylinder should be adjusted. If pulley is now turned through 180°, valve clearances on No. 2 or No. 3 cylinder can be adjusted as shown above.

Cylinder No. 4 rocking – Adjust cylinder No. 1.
Cylinder No. 3 rocking – Adjust cylinder No. 2.
Cylinder No. 1 rocking – Adjust cylinder No. 4.
Cylinder No. 2 rocking – Adjust cylinder No. 3.

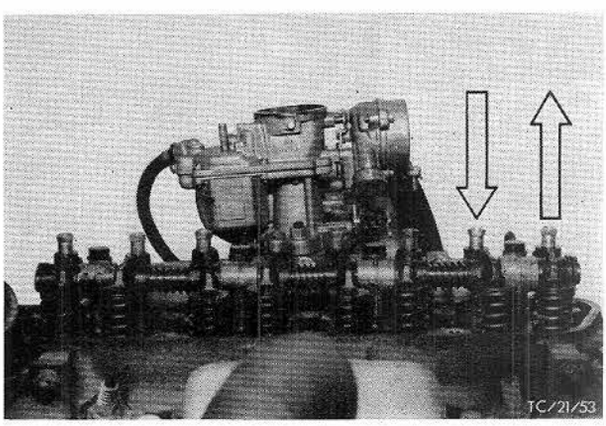

Fig. 83. Overlap of cylinder No. 4 valves.

3. Replace rocker cover and secure. Connect HT leads, Fig. 84, and fit air cleaner.

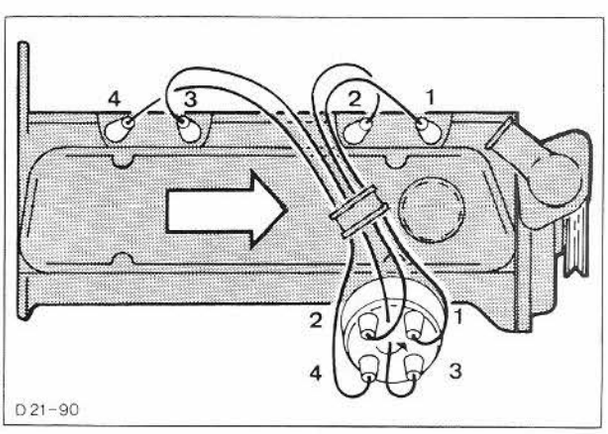

Fig. 84. HT lead arrangement (Firing order).

21 233 9

21 233 9 VALVE GUIDE – REAM (ONE) (Valve removed)

Special Service Tools Required:

See Tool Catalogue.

1. Insert existing valve in valve guide and determine play by pressing sideways, Fig. 85. After they have been used for a considerable time valve guides wear into an oval shape. When rectifying, reaming should always be carried out from the **valve seat end.** The size of bore chosen depends on the amount of wear of the guide bore and the valve oversizes available (see Parts Catalogue). When reaming, Fig. 86, the **smallest** reamer should always be used initially, since with the larger ones the depth of cut is too great.
2. Using the special tool, recut the valve seat as specified (see Technical Data).

   Before the valve seat is recut, it is essential that the valve guide be checked or reamed.

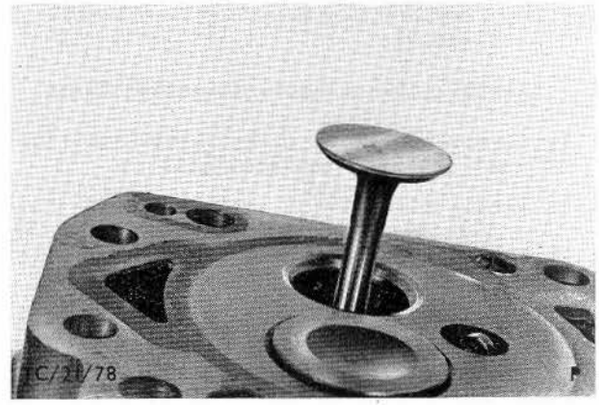

Fig. 85. Determine valve guide play by pressing sideways.

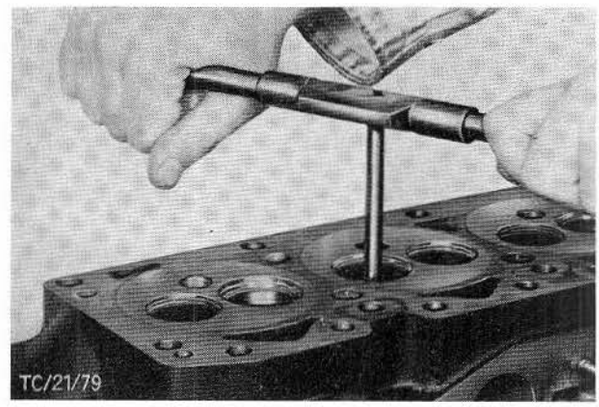

Fig. 86. Ream valve guide.

21 238 SEALS – VALVE STEM – REPLACE (ALL)

Special Service Tools Required:

Valve spring compressor ..	G2-6513-A/ 21-024
Valve spring compressor adaptor	21-024-02/ P-6118-3A
Valve holder	G2-6513-B

To Remove

1. Disconnect earth strap from battery and take off air cleaner.
2. Disconnect HT leads from spark plugs, Fig. 87, and remove rocker cover.

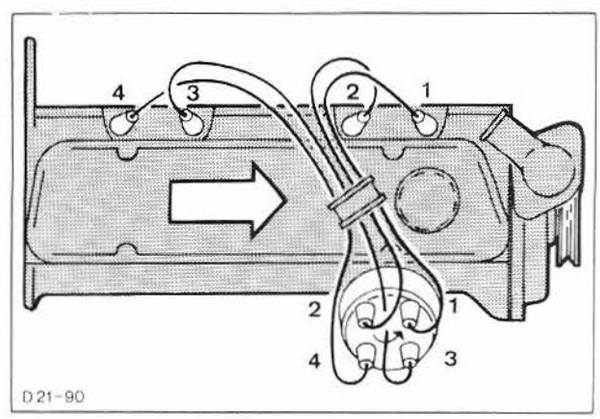

Fig. 87. Plug leads (Firing order).

21 238

3. Remove spark plugs and take off rocker shaft (4 bolts), Fig. 88.

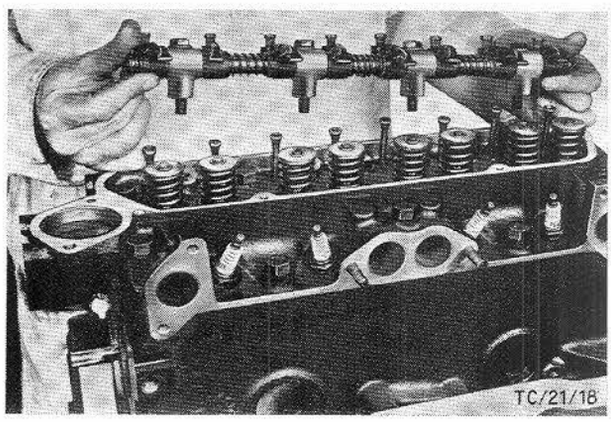

Fig. 88. Remove rocker shaft.

4. Screw valve retainer Tool G2-6513-B, Fig. 89, into spark plug hole, position it against valve and lock. Fit valve spring compressor G2-6513-A, Fig. 89 or 21-2104 plus adaptors 21-024-02 and P-6118-3A on cylinder head.

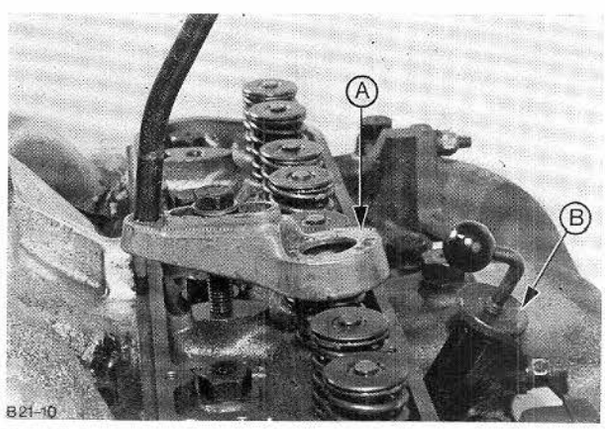

Fig. 89. Removing valve springs using Special Tool.
A – Special Tool G2-6513-A.
B – Special Tool G2-6513-B.

5. Press valve spring down, remove collets, Fig. 90, and release pressure on spring. Remove valve spring retainer, valve spring and valve stem seal.

When removing and replacing valve springs, it is essential to ensure that the valve stem is not damaged by the valve spring retainer when it is pressed down to allow the removal or replacement of the collets. If the valve stem is damaged there is no guarantee that there will be adequate sealing. The result is excessive oil consumption and wear in the valve guides.

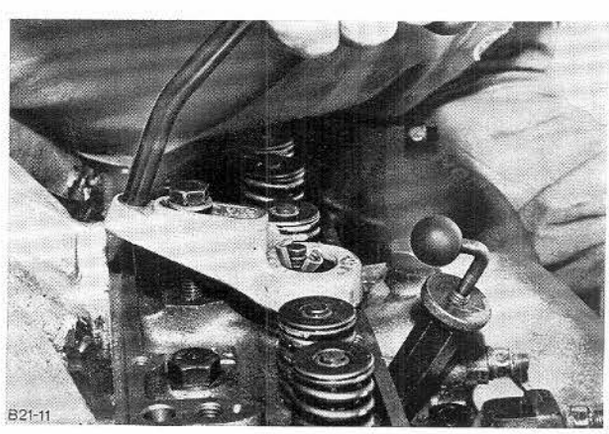

Fig. 90. Remove collets.

21 238

To Install

6. Fit a new seal to valve stem, Fig. 91. Install valve spring by proceeding in reverse order to that described in step 5. Remove Special Tool.

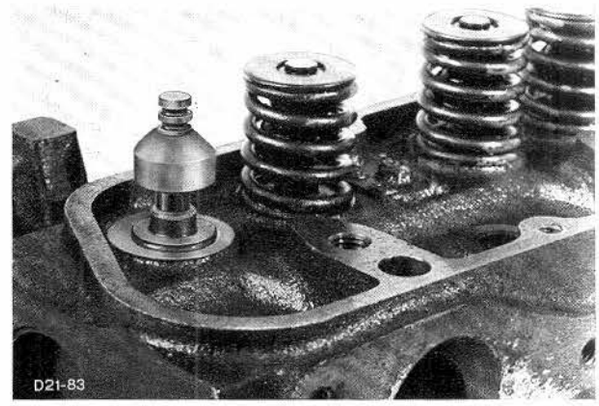

Fig. 91. Seal on valve stem.

7. Insert push rods into tappet sockets. Position rocker shaft, guiding rocker arm adjusting screws into push rod sockets. Replace rocker shaft bolts and torque as specified, Fig. 92. (See Technical Data.)

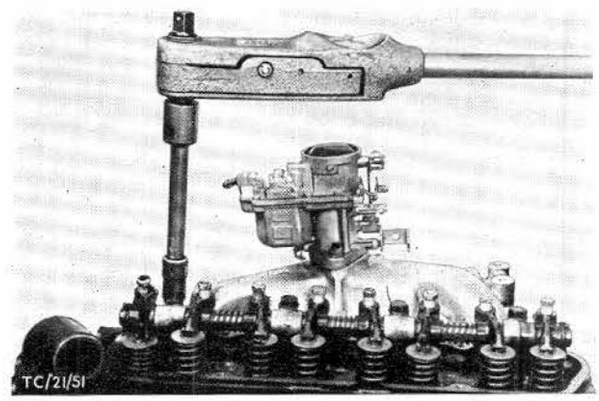

Fig. 92. Torque rocker shaft bolts as specified. (See Technical Data).

8. Adjust valve clearances (see Operation 21 213). Screw in spark plugs and replace rocker cover.
9. Connect HT leads to spark plugs, refit air cleaner and connect earth strap to battery, Fig. 93.

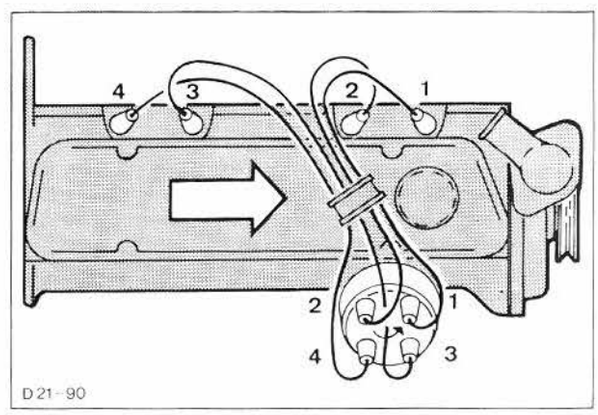

Fig. 93. Plug leads (Firing order).

21 467

21 467 SEAL – CRANKSHAFT FRONT – REPLACE

Special Service Tools Required:

Crankshaft oil seal remover ..	15-048
Adaptor	15-048-01
Crankshaft oil seal replacer ..	21-046
Crankshaft pulley remover ..	6132-A

To Remove

1. Disconnect earth strap from battery and remove oil sump shield (4 bolts). Drain coolant, by disconnecting radiator hoses from water pump and from engine water elbow at top.
2. Remove radiator (4 bolts). Slacken alternator bolts and pivot alternator. Take off V-belt. Remove fan (4 bolts) and crankshaft pulley (1 bolt), Fig. 94.

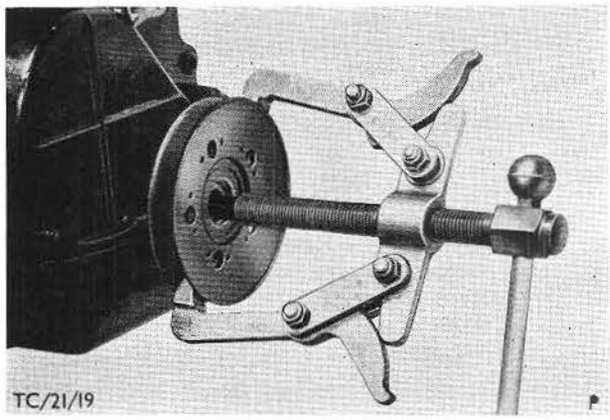

Fig. 94. Withdraw crankshaft pulley using Special Tool 6132-A.

3. Remove oil seal using Special Tool 15-048 with Adaptor 15-048-01, as shown in Fig. 95.

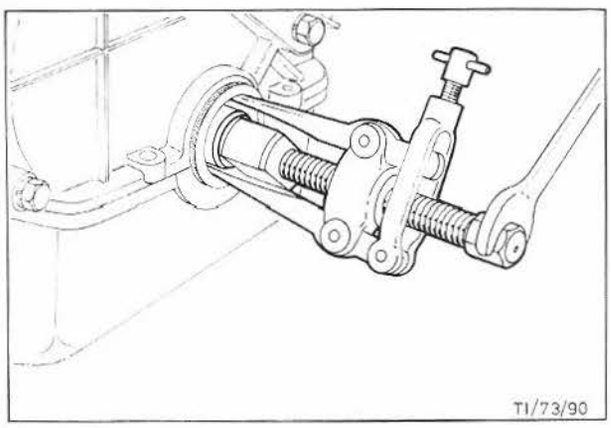

Fig. 95. Remove oil seal using Special Tool.

To Install

4. Press in a new oil seal (sealing lip lightly oiled or greased), using Special Tool 21-046 in conjunction with pulley and bolt, as shown in Fig. 96.
5. Remove special tool, fit fan and pulley, torquing bolts as specified in Technical Data. Replace V-belt and tension it by means of alternator. Secure alternator.
6. Install radiator. Connect radiator hoses and top up with coolant.
7. Fit oil sump shield and reconnect earth strap to battery. Check engine oil level and top up if necessary.

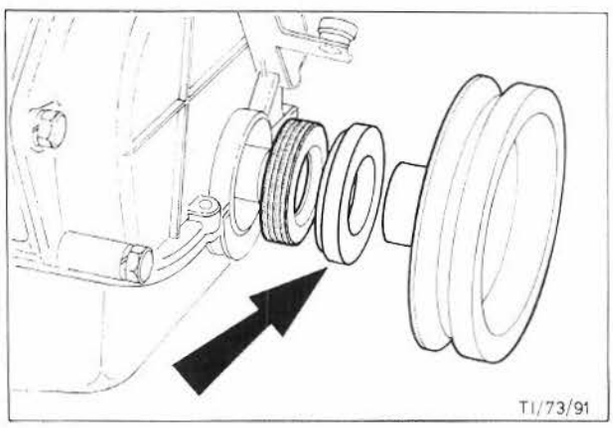

Fig. 96. Fit oil seal. Special Tool No. 21-046 arrowed.

21 505 5

21 505 5 PISTON – REPLACE (ONE) (Piston and connecting rod removed)

Special Service Tools Required: None

General

The piston and piston pin form a unit and may only be renewed together. The piston pin bores and piston pin diameters are graded, with corresponding paint marks and they must match one another. The paint marks are on the piston crown and the edge of the pin.

If a cylinder has to be bored out by 1,0 mm, it is necessary to bore out the other cylinders by the same amount. Unequal bores would cause trouble, since at 1,0 mm oversize, weight deviations of up to 10 g are possible.

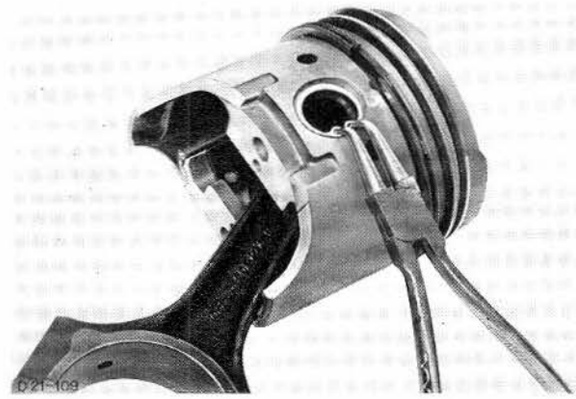

Fig. 97. Remove circlips.

To Remove

1. Remove circlips, Fig. 97 from piston pin bore.
2. Drive piston pin out of piston using a suitable drift, Fig. 98.

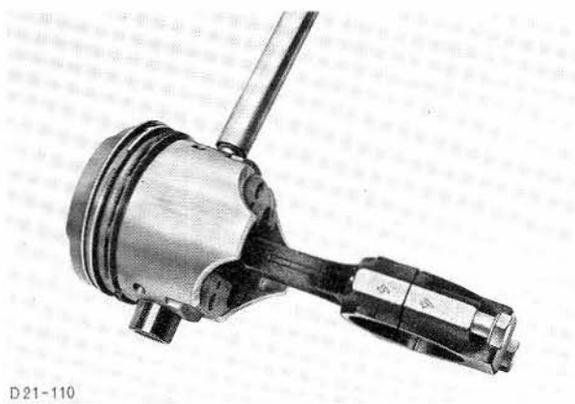

Fig. 98. Remove piston pin.

To Install

3. Fit a new circlip in piston ring bore on one side of piston, Fig. 99.

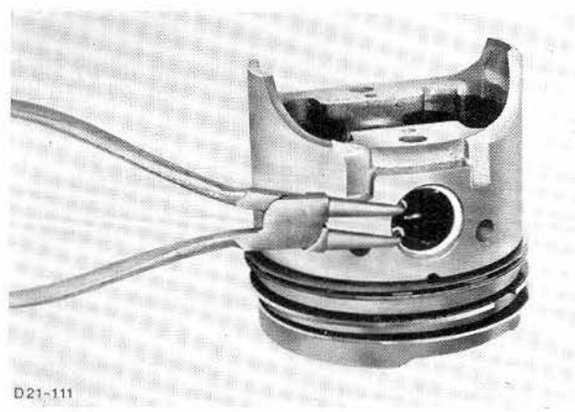

Fig. 99. Fit circlip.

21 505 5

4. Heat piston on a hot plate, Fig. 100.

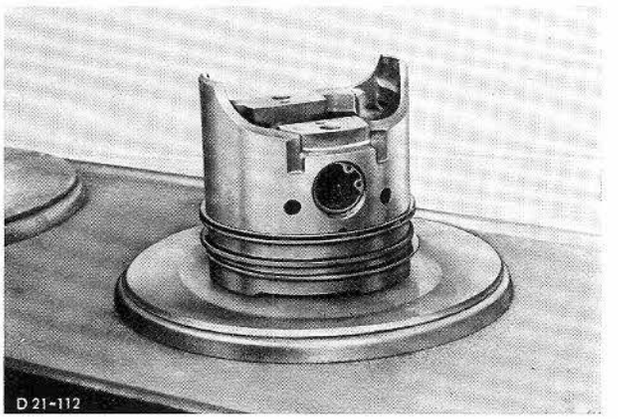

Fig. 100. Heat piston.

5. Apply oil to connecting rod small-end bore and insert it into heated piston so that small-end bore aligns with piston pin bore.

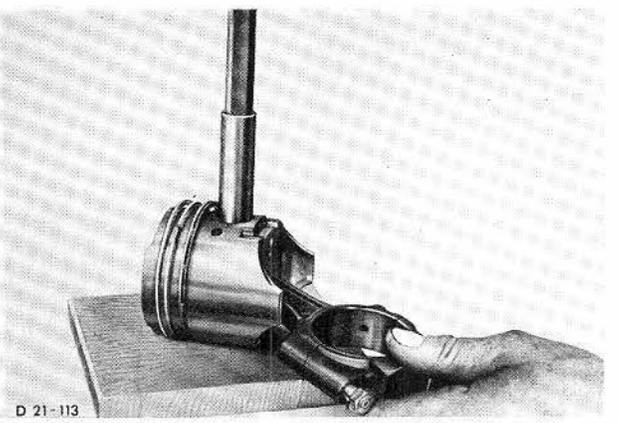

Fig. 101. Fit piston pin.

6. Slide piston pin in up to first circlip fitted earlier, Fig. 101. Fit second new circlip.

   During fitting the front marking on piston (arrow, notch, etc.) should point in same direction as front marking on connecting rod, Fig. 102.

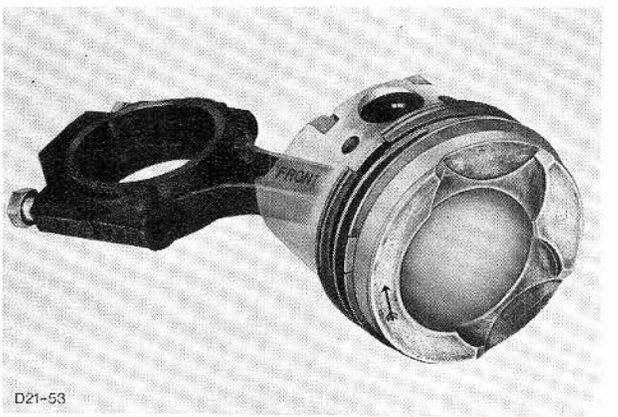

Fig. 102. Relationship of front markings.

21 584 5

21 584 4 RING GEAR – FLYWHEEL – REPLACE (Flywheel removed)

Special Service Tools Required: None

1. Centre-punch ring gear and drill two holes approximately 7 or 8 mm offset as illustrated, Fig. 103.

   In each case drill must only pass through ring gear and not flywheel.

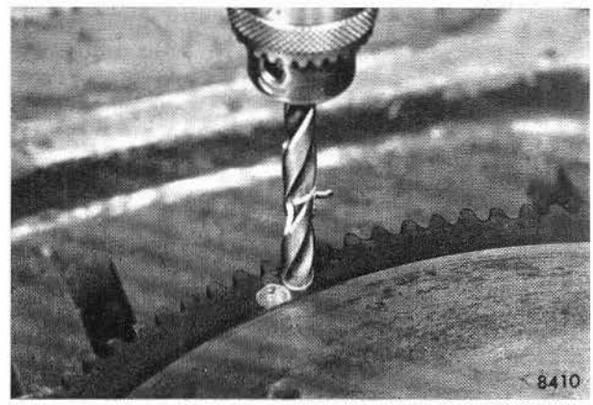

Fig. 103. Drill ring gear.

2. Remove ring gear by means of light blow with a hammer, Fig. 104.

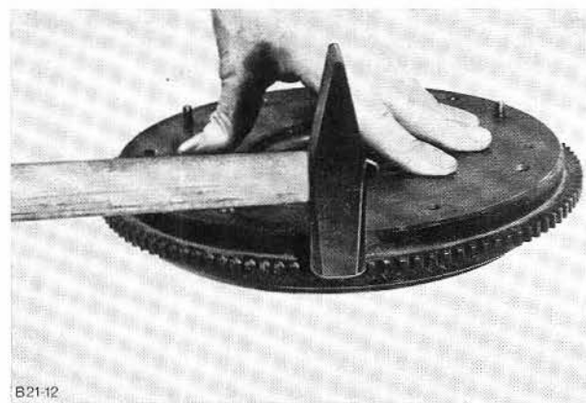

Fig. 104. Remove ring gear.

3. Lay new ring gear on a plate some 2 to 3 mm thick and heat up plate to 260° to 280° from below, in area of ring gear itself, using a welding torch to give uniform heating, Fig. 105.

   To monitor temperature, mark ring gear with a thermochromatic coloured pencil (Faber Castell 2815/300) before starting heating operation. On reaching temperature indicated on cover, colour marked on ring gear changes to colour of pencil cover.

   Example:

   If coloured pencil is green and cover black, indicated temperature of 260° to 280°C is reached when green coloured mark on ring gear goes black.

4. Slip ring gear over flywheel with tongs so that ring gear comes to rest on abutment rim. Allow to cool in this position.

NOTE: **Starter ring gear is induction-hardened and loses this hardness as soon as it is heated to over 290°C.**

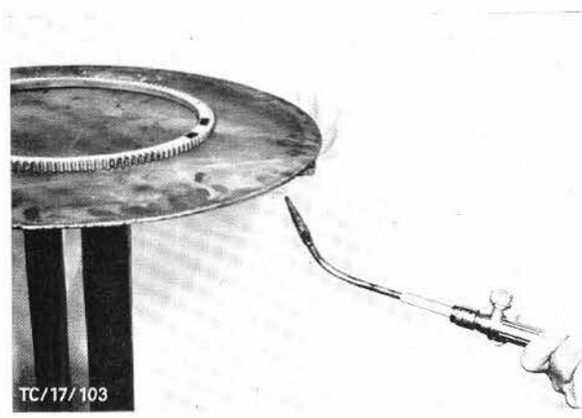

Fig. 105. Heat up ring gear.

TECHNICAL DATA

Engine

	All 1,1 litre engine variants
Camshaft position	In crankcase on right
Valve control	By rockers and pushrods
Firing order	1 - 2 - 4 - 3
Bore	80,98 mm (3.188 in.)
Stroke	53,29 mm (2.098 in.)
Swept volume	1071 cc
Idling speed	800 ± 25 rpm
Maximum continuous speed	5800 rpm

	1,1 LC	1,1 HC	1,1 2V
Engine coding	G1B	G2C	G3A
Compression ratio	8.0 : 1	9.0 : 1	9.0 : 1
Compression at starter speed	9 to 11 kp.cm² (128 to 156 lbf.in²)	10 to 12 kp.cm² (142 to 170 lbf.in²)	10 to 12 kp.cm² (142 to 170 lbf.in²)
Mean working pressure	8,23 kp.cm² (117 lbf.in²)	8,58 kp.cm² (122 lbf.in²)	8,58 kp,cm² (122 lbf.in²)
Engine output (DIN)	32 kW (44 HP) at 5500 rpm	35 kW (48 HP) at 5500 rpm	42 kW (57 HP) at 5500 rpm
Torque (DIN)	71 Nm (7,2 m.kp) at 3000 rpm	74 Nm (7,5 m.kp) at 3000 rpm	77 Nm (7,7 m.kp) at 4000 rpm

Cylinder Block

	All 1,1 litre engine variants
Cast cylinder block marking	711M-6015-A-A
Number of main bearings	5
Cylinder liner bore	84,112 to 84,175 mm (3.311 to 3.314 in.)
Cylinder bore diameter – Standard – A	80,947 to 80,957 mm (3.1869 to 3.1873 in.)
– B	80,957 to 80,967 mm (3.1873 to 3.1877 in.)
– C	80,967 to 80,977 mm (3.1877 to 3.1880 in.)
– D	80,977 to 80,987 mm (3.1880 to 3.1885 in.)
– E	80,987 to 80,997 mm (3.1885 to 3.1889 in.)
– F	80,997 to 81,007 mm (3.1889 to 3.1893 in.)
Bearing width	26,822 to 26,873 mm (1.056 to 1.058 in.)
Fitted main bearing shells, vertical interior diameter	54,013 to 54,044 mm (2.126 to 2.128 in.)
Undersize – 0,254 mm (0.010 in.)	53,759 to 53,790 mm (2.116 to 2.118 in.)
– 0,508 mm (0.020 in.)	53,505 to 53,536 mm (2.106 to 2.108 in.)
– 0,762 mm (0.030 in.)	53,251 to 53,282 mm (2.096 to 2.098 in.)
Main bearing bore (in block) – Standard	57,683 to 57,696 mm (2.271 to 2.272 in.)
– Oversize	58,064 to 58,077 mm (2.286 to 2.287 in.)
Camshaft bearing bore (in block) – Standard	42,888 to 42,913 mm (1.689 to 1.690 in.)
– Oversize	+0,508 mm (+0.020 in.)

Crankshaft

Main journal diameter – Standard	53,983 to 54,003 mm (2.125 to 2.126 in.)
Undersize – 0,254 mm (0.010 in.)	53,729 to 53,749 mm (2.115 to 2.116 in.)
– 0,508 mm (0.020 in.)	53,475 to 53,495 mm (2.105 to 2.106 in.)
– 0,762 mm (0.030 in.)	53,221 to 53,241 mm (2.095 to 2.096 in.)
Crankshaft end float	0,075 to 0,280 mm (0.003 to 0.011 in.)
Length of main bearing shell	25,273 to 25,527 mm (0.995 to 1.005 in.)
Play in main journal bearing shell	0,010 to 0,061 mm (0.0004 to 0.0024 in.)
Crank pin diameter – Standard	49,195 to 49,215 mm (1.937 to 1.938 in.)
Undersize – 0,05 mm (0.002 in.)	49,144 to 49,164 mm (1.935 to 1.936 in.)
– 0,25 mm (0.010 in.)	48,941 to 48,961 mm (1.927 to 1.928 in.)
– 0,51 mm (0.020 in.)	48,687 to 48,707 mm (1.917 to 1.918 in.)
– 0,76 mm (0.030 in.)	48,433 to 48,453 mm (1.907 to 1.908 in.)
– 1,02 mm (0.040 in.)	48,179 to 48,199 mm (1.897 to 1.898 in.)

TECHNICAL DATA (cont'd)

Camshaft

Coding (paint ring) – 1,1 LC	Yellow
– 1,1 HC	Yellow
– 1,1 2V	Red/white
Drive	By chain with tensioner
Thickness of camshaft retaining plate	4,470 to 4,520 mm (0.176 to 0.178 in.)
Cam lift – Inlet	5,985 to 5,866 mm (0.236 to 0.231 in.)
– Exhaust	5,894 mm (0.232 in.)
Length of cams (between heel and tip) – Inlet	33,417 to 33,298 mm (1.316 to 1.311 in.)
– Exhaust	33,326 mm (1.312 in.)
Camshaft bearing diameter – Front, centre, rear	39,616 to 39,637 mm (1.560 to 1.561 in.)
Bearing bush internal diameter – Front, centre, rear	39,662 to 39,675 mm (1.561 to 1.562 in.)
Camshaft end float	0,06 to 0,2 mm (0.002 to 0.008 in.)

Piston

Piston diameter – Standard – Grade E	80,954 to 80,964 mm (3.187 to 3.1875 in.)
– Grade F	80,964 to 80,974 mm (3.1875 to 3.188 in.)
Piston diameter – Oversize	0,064 mm (0.0025 in.)
Grade E	81,018 to 81,028 mm (3.1896 to 3.190 in.)
Grade F	81,028 to 81,038 mm (3.190 to 3.1904 in.)
Piston to bore clearance	0,023 to 0,043 mm (0.0009 to 0.0016 in.)
Ring gap (fitted in bore) – Top	0,23 to 0,36 mm (0.009 to 0.014 in.)
– Centre	0,23 to 0,36 mm (0.009 to 0.014 in.)
– Bottom	0,23 to 0,36 mm (0.009 to 0.014 in.)

Gudgeon Pin

Length of gudgeon pin	70,99 to 71,37 mm (2.795 to 2.810 in.)
Pin diameter – 1	20,622 to 20,625 mm (0.8119 to 0.8120 in.)
– 2	20,625 to 20,627 mm (0.8120 to 0.8121 in.)
– 3	20,627 to 20,630 mm (0.8121 to 0.8122 in.)
– 4	20,630 to 20,632 mm (0.8122 to 0.8123 in.)
Pin interference in piston at 21 °C	0,003 to 0,008 mm (0.0001 to 0.0003 in.)
Clearance in connecting rod at 21 °C	0,004 to 0,010 mm (0.0002 to 0.0004 in.)

Connecting Rod

Bore diameter of big end	52,89 to 52,91 mm (2.082 to 2.083 in.)
Bore diameter of small end – White	20,629 to 20,632 mm (0.8122 to 0.8123 in.)
– Red	20,632 to 20,634 mm (0.8123 to 0.8124 in.)
– Yellow	20,634 to 20,637 mm (0.8124 to 0.8125 in.)
– Blue	20,637 to 20,640 mm (0.8125 to 0.8126 in.)
Vertical internal diameter – Standard	49,221 to 49,260 mm (1.938 to 1.939 in.)
Undersize – 0,051 mm (0.002 in.)	49,170 to 49,208 mm (1.936 to 1.937 in.)
– 0,254 mm (0.010 in.)	48,967 to 49,005 mm (1.928 to 1.929 in.)
– 0,508 mm (0.020 in.)	48,713 to 48,751 mm (1.918 to 1.919 in.)
– 0,762 mm (0.030 in.)	48,491 to 48,592 mm (1.909 to 1.913 in.)
– 1,016 mm (0.040 in.)	48,205 to 48,243 mm (1.889 to 1.999 in.)
Clearance – Big end journal to bearing	0,006 to 0,064 mm (0.0002 to 0.0025 in.)

Cylinder Head

Cast marking on cylinder head	33
Valve seat angle in head	44° 30' to 45°
Stem bore, inlet and exhaust valve	7,907 to 7,937 mm (0.311 to 0.312 in.)
Bore for bushes	11.133 to 11.153 mm (0.438 to 0.439 in.)

TECHNICAL DATA (cont'd)

Valves	1,1 LC	1,1 HC	1,1 2V
Valve play – Inlet	0,20 mm (0.008 in.)	0,20 mm (0.008 in.)	0.25 mm (0.010 in.)
– Exhaust	0,55 mm (0.022 in.)	0,55 mm (0.022 in.)	0,55 mm (0.022 in.)
Inlet valve – Opens	21° BTDC	21° BTDC	29° BTDC
– Closes	55° ABDC	55° ABDC	63° ABDC
Exhaust valve – Opens	70° BBDC	70° BBDC	71° BBDC
– Closes	22° ATDC	22° ATDC	21° ATDC

	All 1,1 litre engine variants
Valve springs – Number of turns	3.75 or 5.75
Cam follower diameter	13,081 to 13,094 mm (0.515 to 0.516 in.)
Clearance – cam follower to block	0,013 to 0,05 mm (0.0005 to 0.002 in.)

Inlet Valve

Length	110,668 to 111,176 mm (4.357 to 4.377 in.)
Valve head diameter	35,94 to 36,19 mm (1.415 to 1.425 in.)
Valve stem diameter – Standard	7,868 to 7,886 mm (0.3098 to 0.3105 in.)
Oversize – 0,076 mm (0.003 in.)	7,945 to 7,962 mm (0.3127 to 0.3135 in.)
– 0,381 mm (0.015 in.)	8,249 to 8,267 mm (0.3247 to 0.3255 in.)
Valve stem play in guide	0,02 to 0,068 mm (0.0008 to 0.0027 in.)
Valve stroke – 1,1 LC	8,81 mm (0.347 in.)
– 1,1 HC	8,81 mm (0.347 in.)
– 1,1 2V	8,63 mm (0.340 in.)

Exhaust Valve

Length	110,363 to 110,871 mm (4.345 to 4.365 in.)
Valve cup diameter	31,34 to 31,59 mm (1.234 to 1.244 in.)
Valve stem diameter – Standard	7,846 to 7,863 mm (0.3089 to 0.3096 in.)
Oversize – 0,076 mm (0.003 in.)	7,922 to 7,939 mm (0.3119 to 0.3126 in.)
– 0,381 mm (0.015 in.)	8,227 to 8 243 mm (0.3239 to 0.3245 in.)
Valve stem play in guide	0,043 to 0,091 mm (0.0017 to 0.0036 in.)
Valve stroke	8,67 mm (0.341 in.)

Engine Lubrication

Oil type	HD oil
Viscosity – under −12°C	SAE 5W/20
– under 0°C	SAE 5W/30
– −23° to +32°C	SAE 10W/30, SAE 10W/40 or SAE 10W/50
– Over −12°C	SAE 20W/40 or SAE 20W/50
Ford specification	SS-M2C-9001AA
Initial capacity with filter	3,67 litres (6.5 pints)
Oil change without filter change	2,75 litres (4.8 pints)
Oil change with filter change	3,25 litres (5.7 pints)
Minimum oil pressure at – 700 rpm and 80°C	0,6 kp/cm² (8.5 lbf/in²)
– 2000 rpm and 80°C	1,5 kp/cm² (21 lbf/in²)
Oil pressure warning light come on at	0,4 ± 0,1 kp/cm² (6 ± 1.5 lbf/in²)
Excess pressure valve opens at	2,46 to 2,81 kp/cm² (35 to 40 lbf/in²)
Oil pump play in outer rotor casing	0,1397 to 0,2667 mm (0.0055 to 0.0105 in.)
Gap between internal and outer rotor	0,0508 to 0,1270 mm (0.002 to 0.005 in.)
Axial play of outer and internal rotor in relation to oil pump cover	0,0254 to 0,0635 mm (0.001 to 0.0025 in.)

TECHNICAL DATA (cont'd)

Tightening Torque Values		All 1,1 litre engine variants Nm	kp.m	lbf.ft
Main bearing cover		75 to 82	7,5 to 8,2	55 to 60
Connecting rod bolts		42 to 48	4,2 to 4,8	31 to 35
Crankshaft belt pulley		33 to 38	3,3 to 3,8	24 to 28
Camshaft chain sprocket		17 to 21	1,7 to 2,1	13 to 15
Rear sealing ring carrier		17 to 21	1,7 to 2,1	13 to 15
Flywheel		68 to 76	6,8 to 7,6	50 to 56
Clutch thrust plate to flywheel		17 to 21	1,7 to 2,1	13 to 15
Front crankcase cover		7 to 10	0,7 to 1,0	5 to 7
Oil pump		17 to 21	1,7 to 2,1	13 to 15
Inlet line		17 to 21	1,7 to 2,1	13 to 15
Oil pump cover		7 to 10	0,7 to 1,0	5 to 7
Rocker shaft		24 to 30	2,4 to 3,0	18 to 22
Cylinder head	(1)	7	0,7	5
	(2)	28 to 42	2,8 to 4,2	21 to 31
	(3)	70 to 76	7,0 to 7,6	52 to 56
After 10 to 20 minutes wait	(4)	90 to 97	9,0 to 9,7	66 to 71
After engine has warmed up (15 minutes at 1000 rpm) tighten up	(5)	90 to 97	9,0 to 9,7	66 to 71
Cylinder head cover		3,5 to 5	0,35 to 0,5	3 to 4
Sump	(1)	4 to 7	0,4 to 0,7	3 to 5
	(2)	8 to 11	0,8 to 1,1	6 to 8
Oil drain screw		27 to 34	2,7 to 3,4	20 to 25
Oil pressure switch		13 to 15	1,3 to 1,5	10 to 11
Spark plugs		30 to 39	3,0 to 3,9	22 to 29
Inlet manifold		17 to 21	1,7 to 2,1	13 to 15
Exhaust manifold		21 to 25	2,1 to 2,5	15 to 18
Fuel pump		16,3 to 20,3	1,63 to 2,03	12 to 15
Water pump		7 to 10	0,7 to 1,0	5 to 7
Thermostat housing		17 to 21	1,7 to 2,1	13 to 15
Fan to water pump flange		7 to 10	0,7 to 1,0	5 to 7
Timing chain tensioner		7 to 10	0,7 to 1,0	5 to 7

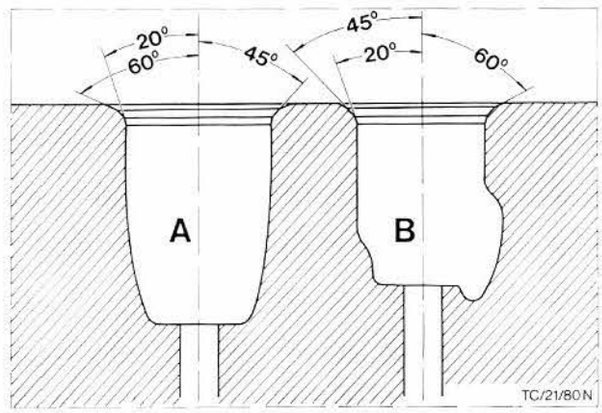

Fig. 106. Valve seat angle.
A – Inlet valve seat.
B – Exhaust valve seat.

TECHNICAL DATA (cont'd)

Engine	All 1,3 and 1,6 litre engine variants
Position of camshaft	In crankcase on right hand side
Valve control	By pushrods and rocker levers
Firing order	1 - 2 - 4 - 3
Bore	80,98 mm (3.188 in.)

	1,3 LC	1,3 HC	1,3 2V	1,6 2V
Engine coding	J1F	J2H	J3D	L3A
Stroke	62,99 mm (2,478 in.)	62,99 mm (2,478 in.)	62,99 mm (2.478 in.)	77,62 mm (3.056 in.)
Swept volume	1263 cc	1263 cc	1263 cc	1588 cc
Compression ratio	8.0 : 1	9.0 : 1	9.0 : 1	9.0 : 1
Pressure at starter speed	9 to 11 kp.cm² (128 to 156 lbf.in²)	10 to 12 kp.cm² (142 to 170 lbf.in²)	10 to 12 kp.cm² (142 to 170 lbf.in²)	11 to 13 kp.cm² (156 to 184 lbf.in²)
Mean working pressure	8,43 kp.cm² (120 lbf.in²)	9,0 kp.cm² (128 lbf.in²)	9,0 kp.cm² (128 lbf.in²)	10,0 kp.cm² (142 lbf.in²)
Idling speed	800 ± 25 rpm	800 ± 25 rpm	800 ± 25 rpm	800 ± 25 rpm
Maximum continuous speed	5800 rpm	5800 rpm	5800 rpm	6000 rpm
Engine output (DIN)	40 kW (54 HP) at 5500 rpm	42 kW (57 HP) at 5500 rpm	51 kW (70 HP) at 5500 rpm	62 kW (84 HP) at 5500 rpm
Torque (DIN)	85 Nm (8,7 m.kp) at 3000 rpm	91 Nm (9,3 m.kp) at 3000 rpm	92 Nm (9,4 m.kp) at 4000 rpm	125 Nm (12.7 m.kp) at 4000 rpm

Cylinder Block	All 1,3 and 1,6 litre engine variants
Cast marking on cylinder block – 1,3 litre	711M-6015-A-A
– 1,6 litre	711M-6015-B-A
Number of main bearings	5
Cylinder liner bore	84,112 to 84,175 mm (3.311 to 3.314 in.)
Cylinder bore diameter – Standard – A	80,947 to 80,957 mm (3,1869 to 3.1873 in.)
– B	80,957 to 80,967 mm (3.1873 to 3.1877 in.)
– C	80,967 to 80,977 mm (3,1877 to 3,1881 in.)
– D	80,977 to 80,987 mm (3,1881 to 3,1885 in.)
– E	80,987 to 80,997 mm (3.1885 to 3.1889 in.)
– F	80,997 to 81,007 mm (3,1889 to 3,1893 in.)
Bearing width	26,822 to 26,873 mm (1.056 to 1.058 in.)
Fitted main bearing shells, vertical internal diameter	54,013 to 54,044 mm (2.126 to 2.128 in.)
Undersize – 0,254 mm (0.010 in.)	53,759 to 53,790 mm (2.116 to 2.118 in.)
– 0,508 mm (0.020 in.)	53,505 to 53,536 mm (2.106 to 2.108 in.)
– 0,762 mm (0.030 in.)	53,251 to 53,282 mm (2.096 to 2.098 in.)
Main bearing bore (in block) – Standard	57,683 to 57,696 mm (2.271 to 2.2715 in.)
– Oversize	58,064 to 58,077 mm (2.286 to 2.2865 in.)
Camshaft bearing bore (in block) – Standard	42,888 to 42,913 mm (1.6885 to 1.6894 in.)
– Oversize	+0,508 mm (+0.020 in.)

Crankshaft

Main bearing journal diameter – Standard	53,983 to 54,003 mm (2.125 to 2.126 in.)
Undersize – 0,254 mm (0.010 in.)	53,729 to 53,749 mm (2.115 to 2.116 in.)
– 0,508 mm (0.020 in.)	53,475 to 53,495 mm (2.105 to 2.106 in.)
– 0,762 mm (0.030 in.)	53,221 to 53,241 mm (2.095 to 2.096 in.)
Crankshaft end float	0,075 to 0,280 mm (0.003 to 0.011 in.)
Length of main bearing shell	25,273 to 25,527 mm (0.995 to 1.005 in.)
Play in main journal bearing shell	0,010 to 0,061 mm (0.0004 to 0.0024 in.)
Crank pin diameter – Standard	49,195 to 49,215 mm (1.937 to 1.938 in.)
Undersize – 0,05 mm (0.002 in.)	49,144 to 49,164 mm (1.935 to 1.936 in.)
– 0,25 mm (0.010 in.)	48,941 to 48,961 mm (1.927 to 1.928 in.)
– 0,51 mm (0.020 in.)	48,687 to 48,707 mm (1.917 to 1.918 in.)
– 0,76 mm (0.030 in.)	48,433 to 48,453 mm (1.907 to 1.908 in.)
– 1,02 mm (0.040 in.)	48,179 to 48,199 mm (1.897 to 1.898 in.)

TECHNICAL DATA (cont'd)

Camshaft

Coding (paint ring) – 1,3 LC	Yellow
– 1,3 HC	Yellow
– 1,3 2V	Red/white
– 1,6 2V	Red

	1,3 litre	1,6 litre
Thickness of camshaft retaining plate	4,470 mm (0.1760 in.)	4,520 mm (0.178 in.)
Cam lift – Inlet	5,985 mm (0.236 in.)	5,865 mm (0.231 in.)
– Exhaust	5,894 mm (0.232 in.)	5,895 mm (0.2321 in.)
Length of cams (between heel and tip) – Inlet	33,087 mm (1.303 in.)	33,357 mm (1.313 in.)
– Exhaust	33,326 mm (1.312 in.)	33,267 mm (1.310 in.)

All 1,3 and 1,6 litre engine variants

Drive	By chain with tensioning device
Camshaft bearing diameter – Front, centre, rear	39,616 to 39,637 mm (1.560 to 1.561 in.)
Internal diameter of bearing bush – Front, centre, rear	39,662 to 39,675 mm (1.561 to 1.562 in.)
Camshaft end float	0,06 to 0,2 mm (0.002 to 0.008 in.)

Piston

Piston diameter – Standard – Grade E	80,954 to 80,964 mm (3.1872 to 3.1876 in.)
– Grade F	80,964 to 80,974 mm (3.1876 to 3.1880 in.)
Piston diameter – Oversize	0,064 mm (0.003 in.)
Grade E	81,018 to 81,028 mm (3.1890 to 3.1901 in.)
Grade F	81,028 to 81,038 mm (3.1901 to 3.1904 in.)
Piston to bore clearance	0,023 to 0,043 mm (0.0009 to 0.0010 in.)
Ring gap (fitted in block) – Top	0,23 to 0,36 mm (0.009 to 0.014 in.)
– Centre	0,23 to 0,36 mm (0.009 to 0.014 in.)
– Bottom	0,23 to 0 36 mm (0.009 to 0.014 in.)

Gudgeon Pin

Length of gudgeon pin	70,99 to 71,37 mm (2.795 to 2.810 in.)
Pin diameter – 1	20,622 to 20,625 mm (0.8119 to 0.8120 in.)
– 2	20,625 to 20,627 mm (0.8120 to 0.8121 in.)
– 3	20,627 to 20,630 mm (0.8121 to 0.8122 in.)
– 4	20,630 to 20,632 mm (0.8122 to 0.8123 in.)
Pin interferance in piston at 21 °C	0,003 to 0,008 mm (0.0001 to 0.0003 in.)
Clearance in connecting rod at 21 °C	0,004 to 0,010 mm (0.00015 to 0.0004 in.)

Connecting Rod

Bore diameter of big end	52,89 to 52,91 mm (2.0823 to 2.0831 in.)
Bore diameter of small end – White	20,629 to 20,632 mm (0.8122 to 0.8123 in.)
– Red	20,632 to 20,634 mm (0.8123 to 0.8124 in.)
– Yellow	20,634 to 20,637 mm (0.8124 to 0.8125 in.)
– Blue	20,637 to 20,640 mm (0.8125 to 0.8126 in.)
Vertical internal diameter – Standard	49,221 to 49,260 mm (1.938 to 1.939 in.)
Undersize – 0,051 mm (0.002 in.)	49,170 to 49,208 mm (1.936 to 1.937 in.)
– 0,254 mm (0.010 in.)	48,967 to 49,005 mm (1.928 to 1.929 in.)
– 0,508 mm (0.020 in.)	48,713 to 48,751 mm (1.918 to 1.919 in.)
– 0,762 mm (0.030 in.)	48,491 to 48,592 mm (1.909 to 1.913 in.)
– 1,016 mm (0.040 in.)	48,205 to 48,243 mm (1.898 to 1.899 in.)
Clearance – Big end journal to bearing	0,006 to 0,064 mm (0.0002 to 0.003 in.)

Cylinder Head

Cast marking on cylinder head – 1,3 litre	33
– 1,6 litre	37
Valve seat angle in head	44° 30' to 45°
Stem bore, inlet and exhaust valves	7,907 to 7,937 mm (0.311 to 0.312 in.)
Bore for bushes	11.133 to 11.153 mm (0.438 to 0.439 in.)

TECHNICAL DATA (cont'd)

Valves	1,3 LC and 1,3 HC	1,3 2V and 1,6 2V
Valve play – Inlet	0,20 mm (0.008 in.)	0,25 mm (0.010 in.)
– Exhaust	0,55 mm (0.022 in.)	0,55 mm (0.022 in.)
Inlet valve – Opens	21° BTDC	27° BTDC
– Closes	55° ABDC	65° ABDC
Exhaust valve – Opens	70° BBDC	65° BBDC
– Closes	22° ATDC	27° ATDC

	All 1,3 and 1,6 litre engine variants
Valve springs – Number of turns	3.75 or 5.75
Cam follower diameter	13,081 to 13,094 mm (0.515 to 0.516 in.)
Clearance – cam follower to block	0,013 to 0,05 mm (0.0005 to 0.0019 in.)

Inlet Valve

Length	110,67 to 111,67 mm (4.357 to 4.396 in.)
Valve head diameter – 1,3 litre	38,02 to 38,28 mm (1.497 to 1.507 in.)
– 1,6 litre	39,2 to 39,6 mm (1.543 to 1.559 in.)
Valve stem diameter – Standard	7,868 to 7,886 mm (0.3097 to 0.3104 in.)
Oversize – 0,076 mm (0.003 in.)	7,945 to 7,962 mm (0.3128 to 0.3135 in.)
– 0,381 mm (0.015 in.)	8,249 to 8,267 mm (0.3248 to 0.3255 in.)
Valve stem play in guide	0,02 to 0,068 mm (0.0008 to 0.0027 in.)
Valve stroke	8,81 mm (0.347 in.)

Exhaust Valve

Length	110,36 to 110,87 mm (4.345 to 4.365 in.)
Valve cup diameter – 1,3 litre	31,34 to 31,59 mm (1.234 to 1.244 in.)
– 1,6 litre	33,8 to 34,0 mm (1.331 to 1.339 in.)
Valve stem diameter – Standard	7,846 to 7,863 mm (0.3089 to 0.3096 in.)
Oversize – 0,076 mm (0.003 in.)	7,922 to 7,939 mm (0.3119 to 0.3126 in.)
– 0,381 mm (0.015 in.)	8,227 to 8,243 mm (0.3239 to 0.3245 in.)
Valve stem play in guide	0,043 to 0,091 mm (0.0017 to 0.0036 in.)
Valve stroke	8,67 mm (0.341 in.)

Engine Lubrication

Oil type	HD oil
Viscosity – under −12°C	SAE 5W/20
– under 0°C	SAE 5W/30
– −23°C to +32°C	SAE 10W/30, SAE 10W/40 or SAE 10W/50
– Over −12°C	SAE 20W/40 or SAE 20W/50
Ford specification	SS-M2C-9001AA
Initial capacity with filter	3,67 litres (6.5 pints)
Oil change without filter change	2,75 litres (4.8 pints)
Oil change with filter change	3,25 litres (5.7 pints)
Minimum oil pressure at – 700 rpm and 80°C	0,6 kp/cm² (8.5 lbf/in²)
– 2000 rpm and 80°C	1,5 kp/cm² (21 lbf/in²)
Oil pressure warning light glows at	0,4 ± 0,1 kp/cm² (6 ± 1.5 lbf/in²)
Excess pressure valve opens at	2,46 to 2,81 kp/cm² (35 to 40 lbf/in²)
Oil pump play with external rotor casing	0,1397 to 0,2667 mm (0.0055 to 0.0105 in.)
Gap internal/external rotor	0,0508 to 0,1270 mm (0.002 to 0.005 in.)
Axial play of external and internal rotor in relation to oil pump cover	0,0254 to 0,0635 mm (0.001 to 0.0025 in.)

TECHNICAL DATA (cont'd)

Tightening Torque Values		All 1,3 and 1,6 litre engine variants Nm	kp.m	lbf.ft
Main bearing cover		75 to 82	7,5 to 8,2	55 to 60
Connecting rod bolts		42 to 48	4,2 to 4,8	31 to 35
Crankshaft belt pulley		33 to 38	3,3 to 3,8	24 to 28
Camshaft chain sprocket		17 to 21	1,7 to 2,1	13 to 15
Rear sealing ring carrier		17 to 21	1,7 to 2,1	13 to 15
Flywheel		68 to 76	6,8 to 7,6	50 to 56
Clutch thrust plate to flywheel		17 to 21	1,7 to 2,1	13 to 15
Front crankcase cover		7 to 10	0,7 to 1,0	5 to 7
Oil pump		17 to 21	1,7 to 2,1	13 to 15
Oil pump inlet pipe		17 to 21	1,7 to 2,1	13 to 15
Oil pump cover		7 to 10	0,7 to 1,0	5 to 7
Rocket shaft		24 to 30	2,4 to 3,0	18 to 22
Cylinder head	(1)	7	0,7	5
	(2)	28 to 42	2,8 to 4,2	20 to 31
	(3)	70 to 76	7,0 to 7,6	52 to 56
After 10 to 20 minutes wait	(4)	90 to 97	9,0 to 9,7	66 to 71
After engine has warmed up (15 minutes at 1000 rpm) tighten up	(5)	90 to 97	9,0 to 9,7	66 to 71
Cylinder head cover		3,5 to 5	0,35 to 0,5	3 to 4
Sump	(1)	4 to 7	0,4 to 0,7	3 to 5
	(2)	8 to 11	0,8 to 1,1	6 to 8
Oil drain screw		27 to 34	2,7 to 3,4	20 to 25
Oil pressure switch		13 to 15	1,3 to 1,5	10 to 11
Spark plugs		30 to 39	3,0 to 3,9	22 to 29
Inlet manifold		17 to 21	1,7 to 2,1	13 to 15
Exhaust manifold		21 to 25	2,1 to 2,5	15 to 18
Fuel pump		16,3 to 20,3	1,63 to 2,03	12 to 15
Water pump		7 to 10	0,7 to 1,0	5 to 7
Thermostat housing		17 to 21	1,7 to 2,1	13 to 15
Fan to water pump flange		7 to 10	0,7 to 1,0	5 to 7
Timing chain tensioner		7 to 10	0,7 to 1,0	5 to 7

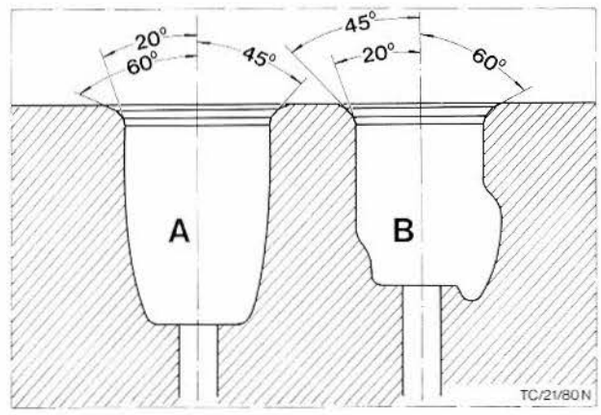

Fig. 107. Valve seat angle.
A – Inlet valve seat.
B – Exhaust valve seat.