Chapter 2  Part A:
1.8 & 2.0 litre SOHC engines

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Degrees of difficulty

<table>
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<th>Easy, suitable for novice with little experience</th>
<th>Fairly easy, suitable for beginner with some experience</th>
<th>Fairly difficult, suitable for competent DIY mechanic</th>
<th>Difficult, suitable for experienced DIY mechanic</th>
<th>Very difficult, suitable for expert DIY or professional</th>
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Specifications

General
Manufacturer’s code ....................................................... REC NEL NRA
Bore - mm (in) ............................................................. 86.20 (3.39) 90.82 (3.58) 90.82 (3.58)
Stroke - mm (in) .......................................................... 76.95 (3.03) 76.95 (3.03) 76.95 (3.03)
Cubic capacity - cc (cu in) ............................................ 1796 (109.6) 1993 (121.6) 1993 (121.6)
Compression ratio ...................................................... 9.5:1 9.2:1 9.2:1
Compression pressure at cranking speed (all models) .............. 11 to 13 bar (160 to 189 lb/in²)
Maximum power (DIN, kW @ rpm) ..................................... 66 @ 5400 77 @ 5200 85 @ 5500
Maximum torque (DIN, Nm @ rpm) ................................... 140 @ 3500 157 @ 4000 160 @ 4000

Lubrication system
Oil type ................................................................. See “Lubricants and fluids”
Oil capacity (drain and refill, including filter) ....................... 3.75 litres (6.6 pints) approx
Oil pressure (SAE 10W/30 oil at 80°C/176°F): At 750 rpm ........ 2.1 bar
At 2000 rpm .......................................................... 2.5 bar
Oil pressure relief valve opening pressure .......................... 4.0 to 4.7 bar
Oil pressure warning light switch setting ............................ 0.3 to 0.5 bar
### Oil pump
- **Type:** Bi-rotor
- **Drive:** From auxiliary shaft
- **Operating clearances:**
  - Outer rotor-to-housing: 0.15 to 0.30 mm
  - Inner-to-outer rotor: 0.05 to 0.20 mm
  - Rotor endfloat: 0.04 to 0.10 mm

### Cylinder block
- **Cast identification mark:** 18S
- **Bore diameter:**
  - 1.8 (REC) to 2.0 (NEL and NRA)
  - Standard grade 1: 86.180 to 86.190 mm
  - Standard grade 2: 86.190 to 86.200 mm
  - Standard grade 3: 86.200 to 86.210 mm
  - Standard grade 4: 86.210 to 86.220 mm
  - Oversize grade 5: 86.690 to 86.700 mm
  - Oversize grade B: 86.700 to 86.710 mm
  - Oversize grade C: 86.710 to 86.720 mm
  - Standard service grade: Not stated
  - Oversize 0.5: Not stated
  - Oversize 1.0: Not stated

### Crankshaft
- **Number of main bearings:** 5
- **Main bearing journal diameter:**
  - Standard: 56.970 to 56.990 mm
  - Undersize 0.25: 56.720 to 56.740 mm
  - Undersize 0.50: 56.470 to 56.490 mm
  - Undersize 0.75: 56.220 to 56.240 mm
  - Undersize 1.00: 55.970 to 55.990 mm
- **Main bearing running clearance:** 0.010 to 0.064 mm
- **Big-end bearing journal diameter:**
  - Standard: 51.980 to 52.000 mm
  - Undersize 0.25: 51.730 to 51.750 mm
  - Undersize 0.50: 51.480 to 51.500 mm
  - Undersize 0.75: 51.230 to 51.250 mm
  - Undersize 1.00: 50.980 to 51.000 mm
- **Big-end bearing running clearance:** 0.006 to 0.060 mm
- **Thrustwasher thickness:**
  - Standard: 2.30 to 2.35 mm
  - Oversize: 2.50 to 2.55 mm
  - Crankshaft endfloat: 0.08 to 0.28 mm

### Connecting rods
- **Big-end parent bore diameter:** 55.000 to 55.020 mm
- **Small-end bush internal diameter:** 23.964 to 23.976 mm

### Pistons
- **Diameter:**
  - 1.8 (REC) to 2.0 (NEL and NRA)
  - Standard grade 1: 86.145 to 86.155 mm
  - Standard grade 2: 86.155 to 86.165 mm
  - Standard grade 3: 86.165 to 86.175 mm
  - Standard grade 4: 86.175 to 86.185 mm
  - Service standard: 86.170 to 86.195 mm
  - Oversize 0.5: 86.670 to 86.695 mm
  - Oversize 1.0: 87.170 to 87.195 mm
- **Clearance in bore:** 0.015 to 0.050 mm
- **Piston ring end gaps:**
  - Top and centre: 0.3 to 0.5 mm
  - Bottom: 0.4 to 1.4 mm

### Gudgeon pins
- **Length:** 68.0 to 68.8 mm
- **Diameter:**
  - Red: 23.994 to 23.997 mm
  - Blue: 23.997 to 24.000 mm
  - Yellow: 24.000 to 24.003 mm
- **Clearance in piston:** 0.008 to 0.014 mm
- **Interference in connecting rod:** 0.018 to 0.039 mm
### Cylinder head

**Identification mark:**
- 1.8 (REC) .................................................. 85
- 2.0 (NEL and NRA) ........................................... 0

**Valve seat angle**
- 44° 30’ to 45° 00’

**Valve seat width**
- 1.5 to 2.0 mm

**Valve guide bore:**
- Standard .......................................................... 8.063 to 8.088 mm
- Oversize 0.2 .................................................... 8.263 to 8.288 mm
- Oversize 0.4 .................................................... 8.463 to 8.488 mm

**Camshaft bearing parent bores:**
- Front .......................................................... 45.072 to 45.102 mm
- Centre ........................................................ 47.692 to 47.722 mm
- Rear .......................................................... 48.072 to 48.102 mm

### Auxiliary shaft

**Endfloat** .................................................. 0.050 to 0.204 mm

### Camshaft

**Drive** .......................................................... Toothed belt
**Thrust plate thickness** ...................................... 3.98 to 4.01 mm
**Endfloat** .................................................... 0.104 to 0.204 mm
**Cam length** .................................................. 6.332 mm
**Cam length** .................................................. 36.26 to 36.60 mm

**Valve timing:**
- Inlet opens ................................................... 24° BTDC
- Inlet closes .................................................... 64° ABDC
- Exhaust opens ................................................ 70° BBDC
- Exhaust closes ............................................... 18° ATDC

**Bearing journal diameter:**
- Front .......................................................... 41.987 to 42.013 mm
- Centre ........................................................ 44.607 to 44.633 mm
- Rear .......................................................... 44.987 to 45.013 mm

**Bearing bush internal diameter:**
- Front .......................................................... 42.035 to 42.055 mm
- Centre ........................................................ 44.655 to 44.675 mm
- Rear .......................................................... 45.035 to 45.055 mm

### Valve clearances (cold)

**Inlet** .................................................. 0.20 ± 0.03 mm (0.008 ± 0.001 in)
**Exhaust** .................................................. 0.25 ± 0.03 mm (0.010 ± 0.001 in)

### Inlet valves

**Length:**
- 1.8 (REC) ................................................ 111.75 to 112.75 mm
- 2.0 (NEL and NRA) ........................................ 110.65 to 111.65 mm

**Head diameter** .............................................. 41.80 to 42.20 mm

**Stem diameter:**
- Standard ..................................................... 8.025 to 8.043 mm
- Oversizes ...................................................... +0.2, 0.4, 0.6 and 0.8 mm

**Stem-to-guide clearance** .................................. 0.020 to 0.063 mm

### Exhaust valves

**Length:**
- 1.8 (REC) ................................................ 111.15 to 112.15 mm
- 2.0 (NEL) .................................................. 110.05 to 111.05 mm
- 2.0 (NRA) .................................................. 110.75 to 111.75 mm

**Head diameter** .............................................. 34.00 to 34.40 mm

**Stem diameter:**
- Standard ..................................................... 7.999 to 8.017 mm
- Oversizes ...................................................... +0.2, 0.4, 0.6 and 0.8 mm

**Stem-to-guide clearance** .................................. 0.046 to 0.089 mm

### Valve springs

**Free length** ............................................... 47.0 mm
**Inside diameter** .......................................... 23.45 to 23.95 mm
**Wire diameter** ........................................... 3.87 to 3.93 mm
**Number of turns** ........................................... 4.7
The engine is of four-cylinder, in-line, single overhead camshaft type (see illustration). It is mounted longitudinally at the front of the car. Three versions are available: 1.8 litre carburettor, 2.0 litre carburettor and 2.0 litre fuel-injection.

The crankshaft incorporates five main bearings. Thrustwashers are fitted to the centre main bearing in order to control crankshaft endfloat.

The camshaft is driven by a toothed belt and operates the slightly angled valve via cam followers which pivot on ball-pins.

The auxiliary shaft, which is also driven by the toothed belt, drives the distributor, oil pump and on some models the fuel pump.

### 1 General information

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#### 1.1 Exploded view of the SOHC engine

1. Timing cover
2. Cam follower
3. Retaining spring clip
4. Crankshaft front oil seal housing
5. Auxiliary shaft front cover
6. Thrust plate
7. Auxiliary shaft
8. Thrust plate
9. Vent valve
10. Oil separator
11. Crankshaft rear oil seal
12. Thrust washer
The cylinder head is of crossflow design with the inlet manifold mounted on the left-hand side and the exhaust manifold mounted on the right-hand side.

Lubrication is by means of a bi-rotor pump which draws oil through a strainer located inside the sump, and forces it through a full-flow filter into the engine oil galleries where it is distributed to the crankshaft, camshaft and auxiliary shaft. The big-end bearings are supplied with oil via internal drillings in the crankshaft. The undersides of the pistons are supplied with oil from drillings in the big-ends. The distributor shaft is intermittently supplied with oil from the drilled auxiliary shaft. The camshaft and cam followers are supplied with oil via a drilled spray tube from the centre camshaft bearing.

A semi-closed crankcase ventilation system is employed whereby piston blow-by gases are drawn into the inlet manifold via an oil separator and on carburettor models a control valve.

### 2 Major operations possible with the engine in the vehicle

The following operations can be carried out without removing the engine, although the work may be easier and quicker with the engine removed:

- a) Removal and refitting of the cylinder head
- b) Removal and refitting of the camshaft (after removing the cylinder head)
- c) Removal and refitting of the timing belt and sprockets
- d) Removal and refitting of the sump and oil pump
- e) Removal and refitting of the pistons, connecting rods and big-end bearings
- f) Renewal of the engine mountings
- g) Renewal of the crankshaft oil seals
- h) Removal and refitting of the auxiliary shaft
- j) Removal and refitting of the flywheel

### 3 Major operations requiring engine removal

The engine must be removed from the vehicle for the following operations:

- a) Renewal of the crankshaft main bearings
- b) Removal and refitting of the crankshaft

### 4 Methods of engine removal

The engine may be lifted out either on its own or together with the gearbox. Unless work is also necessary on the gearbox it is recommended that the engine is removed on its own. Where automatic transmission is fitted, the engine should be removed on its own owing to the additional weight. If the engine and gearbox are removed together, they will have to be tilted at a very steep angle; make sure that the range of the lifting tackle is adequate.

5 Engine - removal leaving gearbox/transmission in vehicle

1. Disconnect the battery negative lead.
2. Remove the bonnet.
3. On carburettor models, remove the air cleaner. On fuel-injection models, remove the air cleaner cover, vane airflow meter and air inlet trunking.
4. If a splash guard is fitted, remove it.
5. Release the securing clips and bolts and remove the upper half of the fan shroud. On carburettor models remove the lower half of the shroud too.
6. Drain the cooling system.
7. Disconnect the radiator top and bottom hoses from the thermostat housing and water pump. Disconnect the top hose spur from the expansion tank and unclip it.
8. Disconnect the heater hoses from the water pump and from the inlet manifold or automatic choke housing. Unclip the hoses.
9. On models with power steering, remove the steering pump.
10. Disconnect the vacuum pipe(s) from the inlet manifold, labelling them if there is any possibility of confusion.
11. Disconnect the following wiring, as applicable:
   a) Alternator
   b) Temperature gauge sender
   c) Engine management temperature sensor
   d) Distributor
   e) Oil pressure switch
   f) Automatic choke and thermo-switch
   g) Carburettor stepper motor
   h) Fuel-injection system sub-harness
   j) Inlet manifold heater
12. Disconnect the HT lead from the coil.
13. If an oil level sensor is fitted, remove it (see illustration).
14. Unbolt the throttle cable bracket, disconnect the inner cable and move the cable and bracket aside. Also disconnect the downshift cable on automatic transmission models.
15. On carburettor models, disconnect the fuel lines from the fuel pump (mechanised type) and from the carburettor. Be prepared for fuel spillage.
16. On fuel-injection models, disconnect the fuel supply union from the injector rail, and the fuel return pipe from the fuel pressure regulator. Be prepared for fuel spillage, and for some spray if the supply side is still under pressure.
17. Unbolt the exhaust downpipe from the manifold.
18. On models with air conditioning, unbolt the compressor and move it aside without straining the flexible hoses.
19. Remove the starter motor.
20. Although not specified by the manufacturers, the author advises that either the radiator or the cooling fan be removed, to reduce the risk of damage.
21. Attach the lifting tackle to the two lifting eyes on the engine, so that when suspended the engine will be roughly horizontal. Take the weight of the engine.
22. Remove the single nut on each side which secures each engine bearer to its mounting.
23. Working under the vehicle, remove the braking strap which connects the engine and transmission. Unbolt the adapter plate from the bottom of the transmission bellhousing.
24. On automatic transmission models, unbolt the torque converter from the driveplate.
25. Remove the engine-to-belhousing bolts. Note the location of the battery earth strap.
26. Support the transmission, preferably with a trolley jack.
27. Check that nothing has been overlooked, then raise the engine and draw it forwards clear of the transmission input shaft. Do not allow the weight of the engine to hang on the shaft, and do not lift the transmission by it.
28. On automatic transmission models, make sure that the torque converter stays engaged with the oil pump in the transmission as the engine is withdrawn.
29. Lift the engine out of the engine bay and take it to the bench.

6 Engine - removal with manual gearbox

1 Engine removal with automatic transmission is not recommended.
2 Proceed as in the previous Section, paragraphs 1 to 18.
3 Disconnect the wiring from the starter motor, and release the battery earth cable from its belhousing bolt.
4 Remove the radiator.
5 Remove the propeller shaft.
6 Disconnect and unclip the reversing light switch and speedometer sender unit wiring.
7 Disconnect the clutch cable.
8 Unbolt the anti-roll bar mounting brackets and lower the anti-roll bar as far as possible.
9 From inside the vehicle remove the gear lever.
10 Drain the engine oil.
11 Unhook the exhaust system from its mounting on the gearbox crossmember. Either support the system or remove it completely.
12 Support the gearbox, preferably with a trolley jack, then unbolt and remove the gearbox crossmember. Note the earth strap (if fitted) under one of the crossmember bolts.
13 Attach lifting tackle to the two lifting eyes on the engine so that when suspended it will be at an angle of approximately 45°.
14 Take the weight of the engine and remove the two engine bearer-to-mounting nuts.
15 Lift the engine/transmission, at the same time lowering the trolley jack. Draw the unit forwards and lift it out of the engine bay.
16 Temporarily refit the anti-roll bar if the vehicle is to be moved.

7 Engine - separation from manual gearbox
1 With the engine and gearbox on the bench, remove the starter motor.
2 Remove the bolt from the engine adapter plate.
3 Remove the bracing strap and the remaining engine-to-bellhousing bolts.
4 With the aid of an assistant draw the gearbox off the engine. Do not allow the weight of the gearbox to hang on the input shaft.

8 Engine dismantling - general information
1 It is best to mount the engine on a dismantling stand, but if this is not available, stand the engine on a strong bench at a comfortable working height. Failing this, it will have to be stripped down on the floor.
2 Cleanliness is most important, and if the engine is dirty, it should be cleaned with paraffin while keeping it in an upright position.
3 Avoid working with the engine on a concrete floor, as grit can be a real source of trouble.
4 As parts are removed, clean them in paraffin. However, do not immerse parts with internal oilways in paraffin as it is difficult to remove, usually requiring a high pressure hose.

5 It is advisable to have suitable containers to hold small items according to their use, as this will help when reassembling the engine and also prevent possible losses.
6 Always obtain complete sets of gaskets when the engine is being dismantled, but retain the old gaskets with a view of using them as a pattern to make a replacement if a new one is not available.

9 Ancillary components - removal
Before dismantling the engine into its main components, the following ancillary components can be removed. The actual items removed, and the sequence of removal, will depend on the work to be done:
Inlet manifold and associated items
Exhaust manifold
Fuel pump (mechanical type) and pushrod
Alternator
Distributor, HT leads and spark plugs
Fan, water pump and thermostat
Oil pressure switch (see illustration)
Temperature gauge sender

10 Cylinder head - removal
1 If the engine is still in the vehicle, carry out the following preliminary operations:
a) Disconnect the battery negative lead
b) Drain the cooling system
c) Remove the inlet and exhaust manifolds
d) Disconnect the radiator top hose from the thermostat housing, and the spur from the expansion tank
e) Disconnect the wiring from the temperature gauge sender
f) Remove the distributor cap, HT leads and spark plugs
2 Unscrew the bolts and withdraw the timing cover (see illustration). Note the location of the cover in the special bolt.
3 Using a socket on the crankshaft pulley bolt, turn the engine clockwise until the TDC (top dead centre) notch on the pulley is aligned with the pointer on the crankshaft front oil seal housing, and the pointer on the camshaft sprocket is aligned with the indentation on the cylinder head (see illustrations). Note the position of the distributor rotor arm, and mark its contact end in relation to the rim of the distributor body.
4 Slacken the timing belt tensioner bolts. Pivot
the tensioner to release the load on the belt and slip the belt off the camshaft sprocket. Do not kink the belt, or get oil or grease on it.

5 Remove the ten bolts which secure the rocker cover, noting the location of the different shapes of reinforcing plates. Remove the cover and gasket.

6 Using a Torx key, slacken the cylinder head bolts half a turn at a time in the reverse of the tightening sequence.

7 With the bolts removed, lift the cylinder head from the block. If it is stuck, tap it with a wooden or plastic mallet to free it. Do not lever between the head and block, or the mating surfaces may be damaged. Do not crank the engine to free the head, as the pistons may contact the valves.

8 Place the cylinder head on a couple of wooden blocks so that the protruding valves are not damaged.

11 Camshaft - removal

1 Remove the cylinder head as described in the previous Section.

2 Hold the camshaft with a spanner on the lug behind the sixth cam. Unscrew and remove the camshaft sprocket bolt (see illustration).

3 Remove the camshaft sprocket using a puller if necessary. Remove the backplate (see illustration).

4 Unscrew the bolts and remove the camshaft oil supply tube (see illustration).

5 Note how the cam follower retaining spring clips are fitted, then unhook them from the cam followers.

6 If the special tool 21-005-A is available, compress the valve springs in turn and remove the cam followers, keeping them identified for location. Alternatively loosen the locknuts and back off the ball-pins until the cam followers can be removed (see illustration).

7 Unscrew the bolts and remove the camshaft thrust plate (see illustration).

8 Carefully withdraw the camshaft from the rear of the cylinder head, taking care not to damage the bearings (see illustration).

9 Prise the oil seal from the front bearing (see illustration).
12 Cylinder head - dismantling

1. Remove the camshaft as described in the previous Section. (If tool 21-005-A is available, leave the camshaft in place until the valves have been removed).
2. Using a valve spring compressor, compress each valve spring in turn until the split collets can be removed. Release the compressor and remove the cap and spring, keeping them identified for location (see illustrations).

3. Remove each valve from the cylinder head, but identify them for location (see illustration).
4. Prise the valve stem oil seals from the tops of the valve guides (see illustration).
5. If necessary unscrew the cam follower ball-pins from the cylinder head, keeping them identified for location.
6. If necessary unscrew the bolts and remove the timing belt tensioner.
7. Remove the thermostat and housing.
8. Remove the temperature gauge sender unit.
9. Remove the manifold studs if wished by locking two nuts onto each stud in turn and unscrewing it.

13 Timing belt and sprockets - removal

1. If the engine is still in the vehicle, carry out the following preliminary operations:
   a) Disconnect the battery negative lead
   b) Remove the radiator and disconnect the hose from the thermostat housing
   c) Remove the accessory drivebelt(s)
2. Unscrew the bolts and withdraw the timing cover. Note the location of the cover in the special bolt.
3. Using a socket on the crankshaft pulley bolt, turn the engine clockwise until the TDC (top dead centre) notch on the pulley is aligned with the pointer on the crankshaft front oil seal housing, and the pointer on the camshaft sprocket is aligned with the indentation on the cylinder head. Note the position of the distributor rotor arm. Mark the contact end of the rotor in relation to the rim of the distributor body.
4. Slacken the timing belt tensioner retaining bolts then pivot the tensioner pulley away from the belt, to obtain maximum drivebelt free play (see illustration). Hold the tensioner pulley in this position and securely retighten the retaining bolts.
5. Mark the running direction of the belt if it is to be re-used, then slip it off the camshaft sprocket.
6. Slacken the crankshaft pulley bolt. Prevent the crankshaft from turning by engaging 5th gear (manual gearbox), or by removing the starter motor and jamming the ring gear teeth. Alternatively, if the pulley has peripheral bolt holes, screw in a couple of bolts and use a lever between them to jam it. Do not allow the crankshaft to turn very far, or piston/valve contact may occur.
7. Remove the bolt and washer and withdraw the pulley. If the pulley will not come off easily, refit the bolt part way and use a puller (see illustration). A puller will almost certainly be required on fuel-injection models.
8. Remove the guide washer from in front of the crankshaft sprocket, then remove the timing belt (see illustration). Do not kink it or get oil on it if it is to be re-used.
9. Remove the crankshaft sprocket using a puller if necessary (see illustration).
10 Unscrew the auxiliary shaft sprocket bolt while holding the sprocket stationary with a screwdriver inserted through one of the holes.

11 Remove the auxiliary shaft sprocket using a puller if necessary (see illustration).

12 Unscrew the camshaft sprocket bolt while holding the sprocket stationary with a screwdriver engaged in one of the grooves. Alternatively remove the rocker cover and use a spanner on the camshaft lug.

13 Remove the camshaft sprocket using a puller if necessary, then remove the backplate. Note that the oil seal can be removed using a special removal tool or by using self-tapping screws and a pair of grips.

14 Auxiliary shaft - removal

1 Remove the timing belt and the auxiliary shaft sprocket (only) (Section 13).
2 Remove the distributor.
3 Remove the fuel pump and pushrod (not applicable to models with an electric pump).
4 Unscrew the bolts and remove the auxiliary shaft front cover (see illustration).
5 Unscrew the cross-head screws, using an impact screwdriver if necessary, remove the thrust plate and withdraw the auxiliary shaft from the block (see illustrations).
6 Cut the front cover gasket along the top of the crankshaft front oil seal housing and scrape off the gasket.

15 Flywheel/driveplate and adapter plate - removal

1 If the engine is still in the vehicle, remove the clutch or automatic transmission.
2 Prevent the flywheel or driveplate rotating by jamming the ring gear teeth, or by bolting a strap to it.
3 Remove the securing bolts and withdraw the flywheel or driveplate. Do not drop it, it is heavy.
4 The engine adapter plate (backplate) may now be withdrawn from the dowels if required (see illustration).

9 Support the engine, either with conventional lifting tackle or with a bar positioned across the engine bay and resting on two wooden blocks drilled to fit securely on the suspension turrets. Make sure the support arrangements are satisfactory, as you will be working underneath the suspended engine.

10 Take the weight of the engine. Place a jack under the front crossmember, remove the crossmember mounting bolts and carefully lower the jack. Only lower the crossmember far enough to permit removal of the sump.

11 Remove the 23 bolts retaining the sump.

12 Remove the sump from the cylinder block (see illustration). If it is stuck, hit it with a soft-faced mallet, or prise it sideways (not between the mating faces) with a large screwdriver or bar.

13 Recover the gaskets and sealing strips.
17 Crankshaft front oil seal - renewal

1. Remove the timing belt and the crankshaft sprocket (only).
2. If an oil seal removal tool is available, the oil seal can be removed at this stage. It may also be possible to remove the oil seal by drilling the outer face and using self-tapping screws and a pair of grips.
3. If the oil seal cannot be removed as described in paragraph 2, remove the sump. Also remove the auxiliary shaft sprocket. Unbolt the oil seal housing and auxiliary shaft front cover and remove the gasket. The oil seal can then be driven out from the inside (see illustrations).
4. Clean the oil seal seating, then drive in a new seal using metal tubing or a suitable socket (see illustration). Make sure that the sealing lip faces into the engine, and lightly oil the lip.
5. If applicable fit the oil seal housing and auxiliary shaft front cover to the block together with a new gasket and tighten the bolts. Make sure that the bottom face of the housing is aligned with the bottom face of the block (see illustrations). Fit the sump.
6. Refit the timing belt and sprockets.

19 Oil pump - removal

1. Remove the sump.
2. Unscrew the bolt securing the pick-up tube and strainer to the block (see illustration).
3. Using a special splined key, unscrew the bolts and withdraw the oil pump and strainer (see illustration).
4. Withdraw the hexagon shaped driveshaft which engages the bottom of the distributor, noting which way round it is fitted (see illustration).
20 Oil filter - renewal

See Chapter 1, Section 8.

21 Pistons and connecting rods - removal

1. Remove the sump and cylinder head.
2. Check the big-end caps for identification marks and if necessary use a centre-punch to identify the caps and connecting rods (see illustration).
3. Turn the crankshaft so that No 1 crankpin is at its lowest point, then unscrew the nuts and tap off the cap. Keep the bearing shells in the cap and connecting rod.

21.2 Big-end cap and connecting rod identification numbers

21.4 Piston, connecting rod, cap and bearing shells

4. Using the handle of a hammer, push the piston and connecting rod up the bore and withdraw from the top of the cylinder block. Loosely refit the cap to the connecting rod (see illustration).
5. Repeat the procedure in paragraphs 3 and 4 on the No 4 piston and connecting rod, then turn the crankshaft through half a turn and repeat the procedure on Nos 2 and 3 pistons and connecting rods.

21.5 Main bearing cap identification marks

The arrow points to the front of the engine

1. With the engine removed from the vehicle, remove the pistons and connecting rods as described in the previous Section. (In fact it is not necessary to push the pistons out of the bores if no work is to be done on them.)

2. Remove the timing belt and crankshaft sprocket, and the flywheel or driveplate. Also remove the auxiliary shaft sprocket.
3. Unbolt the crankshaft front oil seal housing and auxiliary shaft front cover and remove the gasket.
4. Remove the oil pump and strainer.
5. Check the main bearing caps for identification marks and if necessary use a centre-punch to identify them (see illustration).
6. Before removing the crankshaft check that the endfloat is within the specified limits by inserting a feeler blade between the centre crankshaft web and the thrustwashers (see illustration). This will indicate whether new thrustwashers are required or not.
7. Unscrew the bolts and tap off the main bearing caps complete with bearing shells (see illustration). If the thrustwashers are to be re-used identify them for location.
8. Lift the crankshaft from the crankcase and remove the rear oil seal. Remove the remaining thrustwashers (see illustrations).
9. Extract the bearing shells keeping them identified for location (see illustration).

22 Crankshaft and main bearings - removal

22.6 Checking crankshaft endfloat

22.7 Removing the rear main bearing cap

1. With the engine removed from the vehicle, remove the pistons and connecting rods as described in the previous Section.

2. Raise and support the front of the vehicle. Remove the two nuts which secure the...
mountings to the front crossmember. Recover the washers.
3 Raise the engine with a hoist or a suitable protected jack until the mountings are free, then remove them.
4 Fit the new mountings and lower the engine onto them.
5 Fit the nuts and washers and tighten the nuts.
6 Lower the vehicle.

24 Crankcase ventilation system - general information

Carburettor models

The crankcase ventilation system consists of the special oil filter cap (containing a steel wool filter) and an oil separator and vent valve on the left-hand side of the engine. This is connected by hose to the inlet manifold. The system operates according to the vacuum in the inlet manifold. Air is drawn through the filler cap, through the crankcase, and then together with piston blow-by gasses through the oil separator and vent valve to the inlet manifold. The blow-by gases are then drawn into the engine together with the fuel/air mixture. Refer to Chapter 1 for maintenance of the system.

Fuel-injection models

This system is closed, consisting of an oil separator on the left-hand side of the engine and a hose connecting it to the inlet air trunking. Because the trunking is not subject to manifold vacuum, no vent valve is needed.

25 Examination and renovation - general information

1 With the engine completely stripped, clean all the components and examine them for wear. Each part should be checked, and where necessary renewed or renovated as described in the following Sections. Renew main and big end shell bearings as a matter of course, unless you know that they have had little wear and are in perfect condition.
2 If in doubt as to whether to renew a component which is still just serviceable, consider the time and effort which will be incurred should it fail at an early date. Obviously the age and expected life of the vehicle must influence the standards applied.
3 Gaskets, oil seals and O-rings must all be renewed as a matter of routine. Flywheel and cylinder head bolts must be renewed because of the high stresses to which they are subjected.
4 Take the opportunity to renew the engine core plugs while they are easily accessible. Knock out the old plugs with a hammer and chisel or punch. Clean the plug seats, smear the new plugs with sealant and tap them squarely into position.

26 Oil pump - examination and renovation

1 Unscrew the bolts and remove the oil pump cover (see illustration).
2 Using feeler blades check that the rotor clearances are within the limits given in Specifications (see illustrations). If not, unbolt the pick-up tube and strainer and obtain a new unit (see illustration). Fit the pick-up tube and strainer to the new pump using a new gasket, and tighten the bolts.
3 If the oil pump is serviceable refit the cover and tighten the bolts.

27 Crankshaft and bearings - examination and renovation

1 Examine the bearing surfaces of the crankshaft for scratches or scoring and, using a micrometer, check each journal and crankpin for ovality. Where this is found to be in excess of 0.0254 mm (0.001 in) the crankshaft will have to be reground and undersize bearings fitted.
2 Crankshaft regrounding should be carried out by a suitable engineering works, who will normally supply the matching undersize main and big-end shell bearings.
Production undersizes are also illustrations. Take them along when buying new ones backs of the old bearing shells, and if in doubt previous repairer. Check the markings on the have been fitted, either in production or by a 3 Note that undersize bearings may already clearance is then compared with that given in filaments is checked against a scale which and the new bearing into the crankshaft with a soft grease and use a close fitting metal dowel driven into the centre of the bearing. Drive the new bearing into the crankshaft with a soft metal drift.

28 Cylinder block and bores - examination and renovation

1 The cylinder bores must be examined for taper, ovality, scoring and scratches. Start by examining the top of the bores; if these are worn, a slight ridge will be found which marks the top of the piston ring travel. If the wear is excessive, the engine will have had a high oil consumption rate accompanied by blue smoke from the exhaust.

2 If available, use an inside dial gauge to measure the bore diameter just below the ridge and compare it with the diameter at the bottom of the bore, which is not subject to wear. If the difference is more than 0.152 mm (0.006 in), the cylinders will normally require reboring with new oversize pistons fitted.

3 Proprietary oil control rings can be obtained for fitting to the existing pistons if it is felt that the degree of wear does not justify a rebore. However, any improvement brought about by such rings may be short-lived.

4 If new pistons or piston rings are to be fitted to old bores, deglaze the bores with abrasive paper or a “glaze buster” tool. The object is to produce a light cross-hatch pattern to assist the new rings to bed in.

29 Pistons and connecting rods - examination and renovation

1 Examine the pistons for ovality, scoring and scratches. Check the connecting rods for wear and damage. The connecting rods carry a letter indicating their weight class; all the rods fitted to one engine must be of the same class see illustration.

2 The gudgeon pins are an interference fit in the connecting rods, and if new pistons are to be fitted to the existing connecting rods the work should be carried out by a Ford garage who will have the necessary tooling. Note that the oil splash hole on the connecting rod must be located on the right-hand side of the piston (the arrow on the piston crown faces forwards) see illustration.

3 If new rings are to be fitted to the existing pistons, expand the old rings over the top of the pistons. The use of two or three old feeler blades will be helpful in preventing the rings dropping into empty grooves. Note that the oil control ring is in three sections.

4 Before fitting the new rings to the pistons, insert them into the cylinder bore and use a feeler blade to check that the end gaps are within the specified limits see illustrations.

5 Clean out the piston ring grooves using a piece of old piston ring as a scraper. Be careful not to scratch the aluminium surface of the pistons. Protect your fingers - piston ring edges are sharp. Also probe the groove oil return holes.

6 Fit the oil control ring sections with the spreader ends abutted opposite the front of the piston. The side ring gaps should be 25 mm

27.3a Undersize crankshaft bearings are indicated by a spot and/or line on the front counterweight

27.3b Main bearing cap marks (arrowed) denote oversize parent bore

27.5 Checking the width of the Plastigage filament against the scale on the packet

29.1 Weight class mark (arrowed) on connecting rod

29.2 Relationship of piston crown arrow and connecting rod oil splash hole (arrowed)
the valves. The timing belt can cause the pistons to foul on the 2.0 litre engine where stripped teeth on covered a high mileage. This is more important for 20 000 miles (32 000 km) or more, renew the valve heads. Renew any valve which is badly burnt.

If the auxiliary shaft endfloat is outside the limits given in the Specifications fit a new thrust plate. If this does not bring the endfloat within limits, renew the shaft.

Whenever the timing belt is removed it is worthwhile renewing it, especially if it has covered a high mileage. This is more important on the 2.0 litre engine where stripped teeth on the timing belt can cause the pistons to foul the valves.

30 Camshaft and cam followers - examination and renovation

Examine the surface of the camshaft journals and lobes and the cam followers for wear. If excessive, considerable noise would have been noticed from the top of the engine and a new camshaft and followers must be fitted.

Check the camshaft bearings for wear and if necessary have them renewed by a Ford garage.

Check the camshaft lubrication tube for obstructions and make sure that the jet holes are clear. Obstruction of the holes can be due to sludge build-up which occurs when regular oil changes have been neglected.

31 Auxiliary shaft - examination and renovation

Examine the auxiliary shaft for wear and damage and renew it if necessary.

If the auxiliary shaft endfloat is outside the limits given in the Specifications fit a new thrust plate. If this does not bring the endfloat within limits, renew the shaft.

32 Timing belt - examination and renovation

Whenever the timing belt is removed it is worthwhile renewing it, especially if it has covered a high mileage. This is more important on the 2.0 litre engine where stripped teeth on the timing belt can cause the pistons to foul the valves. 5 Examine the heads of the valves for pitting and burning, especially the exhaust valve heads. Renew any valve which is badly burnt. Examine the valve seats at the same time. If the pitting is very slight, it can be removed by grinding the valve heads and seats together with coarse, then fine, grinding paste.

6 Where excessive pitting has occurred, the valve seats must be recut or renewed by a suitably equipped engineering works.

7 Valve grinding is carried out as follows. Place the cylinder head upside down on a bench on blocks of wood.

8 Smear a trace of coarse carborundum paste on the seat face and press a suction grinding tool onto the valve head. With a semi-rotary action, grind the valve head to its seat, lifting the valve occasionally to redistribute the grinding paste. When a dull matt even surface is produced on both the valve seat and the valve, wipe off the paste and repeat the process with fine carborundum paste as before. A light spring placed under the valve head will greatly ease this operation. When a smooth unbroken ring of light grey matt finish is produced on both the valve and seat, the grinding operation is complete.

9 Scrape away all carbon from the valve head and stem, and clean away all traces of grinding compound. Clean the valves and seats with a paraffin soaked rag, then wipe with a clean rag.

10 If the guides are worn they will need reboring for oversize valves or for fitting guide inserts. The valve seats will also need recutting to ensure that they are concentric with the stems. This work should be given to your Ford dealer or local engineering works.

11 If the valve springs have been in use for 20 000 miles (32 000 km) or more, renew them. Always renew the valve stem oil seals when the valves are removed.
Wipe the bearing shell locations in the crankcase with a soft, non-fluffy rag.

Wipe the crankshaft journals with a soft, non-fluffy rag.

Fit the five upper half main bearing shells to their locations in the crankcase. If the old shells are being re-used, make sure they are refitted to their old locations.

Identify each main bearing cap and place in order. The number is cast onto the cap and on intermediate caps an arrow is also marked which should point towards front of engine.

Wipe the cap bearing shell location with a soft non-fluffy rag.

Fit the bearing half shell onto each main bearing cap.

Apply a little grease to each side of the centre main bearing so as to retain the thrustwasher.

Fit the upper halves of the thrustwashers into their grooves either side of the main bearing. The slots must face outwards.

Lubricate the crankshaft journals and the upper and lower main bearing shells with engine oil and locate the rear oil seal (with lip lubricated) on the rear of the crankshaft.

Carefully lower the crankshaft into the crankcase.

Lubricate the crankshaft main bearing journals again and then fit No 1 bearing cap. Fit the two securing bolts but do not tighten yet.

Make sure that the mating faces are clean, then apply sealant (Loctite 518 or equivalent) to the areas on the rear main bearing cap (see illustration).

Fit the rear main bearing cap. Fit the two securing bolts, but as before do not tighten yet.

Apply a little grease to either side of the centre main bearing cap so as to retain the thrustwashers. Fit the thrustwashers with the tag located in the groove and the slots facing outwards (see illustration).

Fit the centre main bearing cap and the two securing bolts, then refit the intermediate main bearing caps. Make sure that the arrows point towards the front of the engine.

Lightly tighten all main cap securing bolts and then fully tighten in a progressive manner to the specified torque wrench setting.

Check that the crankshaft rotates freely. Some stiffness is to be expected with new components, but there must be no tight spots or binding.

Check that the crankshaft endfloat is within the specified limits by inserting a feeler blade between the centre crankshaft web and the thrustwashers.

Make sure that the rear oil seal is fully located onto its seating. Coat the rear main bearing cap wedges with sealing compound, then press them into position with the rounded red face towards the cap (see illustration).

Refit the oil pump and strainer.

Refit the crankshaft front oil seal housing, and auxiliary shaft front cover, if applicable, together with a new gasket and tighten the bolts.

Refit the flywheel or driveplate and the pistons and connecting rods.

Refit the cylinder head and sump.
38 Oil pump - refitting

1. Insert the oil pump driveshaft into the block in its previously noted position.
2. Prime the pump by injecting oil into it and turning it by hand (see illustration).
3. Fit the pump, insert the bolts and tighten them to the specified torque with the splined key.
4. Insert the pick-up tube securing bolt and tighten it.
5. Where applicable refit the crankshaft front oil seal housing together with a new gasket and tighten the bolts. Make sure that the bottom face of the housing is aligned with the bottom face of the block.
6. Refit the sump.

39 Sump - refitting

1. Apply sealing compound to the corners of the front and rear rubber sealing strap locations, then press the strips into the grooves of the rear main bearing cap and crankshaft front oil seal housing (see illustrations).
2. Apply a little sealing compound to the bottom face of the cylinder block, then fit the sump gaskets in position and locate the end tabs beneath the rubber sealing strips (see illustration).
3. Locate the sump on the gaskets and insert the bolts loosely.
4. Tighten the bolts to the specified torques in the two stages given in the Specifications (see illustration). Tighten to the first stage in circular sequence starting at point A, then tighten to the second stage starting at point B. Tighten to the third stage after the engine has been running for twenty minutes.
5. If the engine is in the vehicle, reverse the steps taken to gain access to the sump.

40 Flywheel/driveplate and adapter plate - refitting

1. If it was removed, refit the adapter plate (backplate) over the dowels on the rear of the block.

41 Auxiliary shaft - refitting

1. Oil the auxiliary shaft journals, then insert the shaft into the cylinder block.
2. Locate the thrust plate in the shaft groove, then insert the crosshead screws and tighten them with an impact screwdriver.
3. Support the front cover on blocks of wood and drive out the old oil seal. Drive in the new seal using a metal tube or socket (see illustrations). Make sure that the sealing lip faces toward the engine. Smear a little oil on the lip.
4. If applicable cut the unwanted top half of a new gasket and locate it on the cylinder block, then fit the front cover and tighten the bolts.
5. Refit the fuel pump and operating rod (when applicable).
6. Refit the distributor.
7. Refit the auxiliary shaft sprocket and timing belt.
1. Refit the thermostat and housing.
2. Refit the timing belt tensioner if it was removed, but do not tighten the bolts yet.
3. If applicable, screw the cam follower ball-pins in their correct locations (see illustration).
4. Oil the valve stems and insert the valves in their correct guides.
5. Wrap some adhesive tape over the collet groove of each valve, then oil the oil seals and slide them over the valve onto the guides. Use a suitable metal tube if necessary to press them onto the guides. Remove the adhesive tape.
6. Working on each valve in turn, fit the valve spring and cap, then compress the spring with the compressor and insert the split collets. Release the compressor and remove it. Tap the end of the valve stem with a non-metallic mallet to settle the collets. If tool 21-005-A is being used, first locate the camshaft in its bearings.

42 Cylinder head - reassembly

1. Drive the new oil seal into the camshaft front bearing location on the cylinder head using a suitable metal tube or socket (see illustration). Smear the lip with engine oil.
2. Lubricate the bearings with hypoid SAE 80/90 oil, then carefully insert the camshaft.
3. Locate the thrust plate in the camshaft groove, then insert and tighten the bolts.
4. Using feeler blades check that the endfloat is as given in the Specifications.
5. Lubricate the ball-pins with hypoid SAE 80/90 oil, then fit the cam followers in their correct locations and retain with the spring clips. It will be necessary to rotate the camshaft during this operation.
6. Fit the oil supply tube and tighten the bolts.
7. Fit the camshaft sprocket backplate and sprocket. Insert and tighten the bolt while holding the camshaft stationary with a spanner on the lug (see illustration).
8. Refit the cylinder head.

43 Camshaft - refitting

1. Adjust the valve clearances. This work is easier to carry out on the bench rather than in the car.
2. Turn the engine so that No 1 piston is approximately 2 cm (0.8 in) before top dead centre. This precaution will prevent any damage to open valves.
3. Make sure that the faces of the cylinder block and cylinder head are perfectly clean, then locate the new gasket on the block making sure that all the internal holes are aligned (see illustration). Do not use jointing compound.
4. Turn the camshaft so that the TDC pointer is aligned with the indentation on the front of the cylinder head.
5. Lower the cylinder head onto the gasket. The help of an assistant will ensure that the gasket is not dislodged. Alternatively, make a couple of guide studs by sawing the heads off two old cylinder head bolts; remove the studs when the head is in position.
6. Lightly oil the heads and threads of the new head bolts and insert them into their holes.
7. Using the Torx key, tighten the bolts progressively to the Stage 1 specified torque in the indicated sequence (see illustration).
8. In the same sequence tighten the bolts to the Stage 2 specified torque.
9. Wait five minutes, then tighten the bolts through the angle specified for Stage 3, still following the same sequence. (If the engine is on the bench, it may be preferable to leave this final stage until after refitting the engine, when the problem of holding it still will not arise.)
10. Refit the rocker cover, using a new gasket. Make sure that the dovetail sections of the gasket engage correctly (see illustration).
11. Fit the rocker cover bolts and reinforcing plates. Tighten the bolts as follows, referring to...
44.7 Cylinder head bolt tightening sequence

the Specifications and to illustration 44.11:
Stage 1 - Bolts 1 to 6
Stage 2 - Bolts 7 and 8
Stage 3 - Bolts 9 and 10
Stage 4 - Bolts 7 and 8 (again)

12 No further tightening of the cylinder head bolts is required.
13 Refit and tension the timing belt as described in the next Section.

45 Timing belt and sprockets - refitting

1 Fit the camshaft sprocket backplate and sprocket. Insert the bolt, hold the camshaft or sprocket and tighten the bolt to the specified torque.

44.10 Dovetail section of rocker cover gasket

2 Fit the auxiliary shaft sprocket with the ribs towards the engine. Fit the sprocket bolt and tighten it to the specified torque, counterholding the sprocket with a bar through one of the holes.

3 Fit the camshaft sprocket, chamfered side inwards.

4 Fit the timing belt over the camshaft sprocket, but do not engage it with the other sprockets yet. Be careful not to kink the belt. If the old belt is being refitted, observe the previously noted running direction (see illustration).

5 Refit the guide washer and the crankshaft pulley. Fit the bolt and washer and tighten just enough to seat the pulley, being careful not to turn the crankshaft (see illustrations).

6 Make sure that the TDC pointer on the camshaft sprocket backplate is still aligned with the indentation on the cylinder head.

7 Turn the crankshaft by the shortest route to align the TDC notch in the pulley with the pointer on the oil seal housing.

8 If the distributor is fitted, turn the auxiliary shaft sprocket so that the rotor arm points to the No 1 HT segment position.

9 Fit the timing belt over the sprockets and round the tensioner. Move the tensioner to tension the belt roughly and nip up the tensioner bolts.

10 Turn the crankshaft through two full turns clockwise, then 60° anti-clockwise (so it is now at 60° BTDC)

11 The belt tension should now ideally be checked by applying Ford tension gauge 21-113 to the longest run. Desired gauge readings are:
   Used belt - 4 to 5
   New belt - 10 to 11

12 If the tension gauge is not available, a rough guide is that belt tension is correct when the belt can be twisted 90° in the middle of the longest run with the fingers (see illustration).

13 If adjustment of belt tension is necessary, turn the crankshaft clockwise to bring No 1 cylinder to TDC (see illustration) then slacken the tensioner bolts and move the tensioner to increase or decrease belt tension. Tighten the tensioner bolts.

14 Turn the crankshaft 90° clockwise past TDC, then anti-clockwise back to the 60° BTDC position. Check the belt tension again.

15 Repeat the above procedure until the belt tension is correct.

16 Tighten the tensioner bolts and the crankshaft pulley bolt to the specified torques (see illustration).

17 Refit the belt cover and tighten its bolts.

18 If the engine is in the vehicle, reverse the preliminary steps given in Section 13.

19 Check the ignition timing when the engine is next run.

46 Ancillary components - refitting

Refer to Section 9 and refit the components listed. Delicate items such as the alternator and distributor may be left until after the engine has been refitted, if preferred.
If the crankcase ventilation oil separator was removed, apply a liquid locking agent to its tube before pressing it into the cylinder block.

1. Make sure that the clutch is centred.
2. Apply a smear of grease or anti-seize compound to the gearbox input shaft splines.
3. With the aid of an assistant, offer the gearbox to the engine. If the input shaft is reluctant to enter the clutch, rock the gearbox slightly or turn the crankshaft back and forth. Support the gearbox until it is engaged with the dowels on the engine - do not leave it hanging on the input shaft.
4. Refit the engine-to-bellhousing bolts, the bracing strap and the starter motor.

### 48 Engine - refitting with manual gearbox

1. Sling the engine/gearbox unit so that it hangs at an angle of approximately 45°.
2. Lower the unit into the engine bay, at the same time moving it towards the rear of the vehicle. Have an assistant watch as the unit is lowered to check that no pipes, wires etc are fouled or trapped.
3. Raise the gearbox as the engine is lowered until the unit takes up its correct position. Secure the engine bearers to the mountings and refit the gearbox crossmember.
4. The remainder of refitting is a reversal of the removal procedure. Refer to Section 6. Also refer to Section 49, paragraph 9.
5. Before starting the engine, refer to Section 51.

### 49 Engine - refitting without gearbox/transmission

1. On manual gearbox models, check that the clutch is centred correctly. Apply a smear of grease or anti-seize compound to the gearbox input shaft.
2. On automatic transmission models, check that the torque converter is fully engaged with the transmission oil pump.
3. Sling the engine so that it is roughly horizontal.
4. Lift it and position it over the engine bay.
5. Lower the engine into place. Have an assistant watch as the unit is lowered to check that no pipes, wires etc are fouled or trapped.
6. Guide the engine onto the transmission, raising or lowering the transmission slightly if necessary. Do not place any weight on the transmission input shaft. With manual gearbox models, rock the engine gently from side to side to encourage the input shaft to enter the clutch.
7. When the engine and transmission are fully engaged, refit the engine-to-bellhousing bolts. Do not overlook the earth strap.
8. Lower the engine so that the engine bearers engage with the mountings. Fit the mounting nuts and remove the lifting tackle.
9. On automatic transmission models, bolt the torque converter to the driveplate.
10. The remainder of refitting is a reversal of the removal procedure. Note the following additional points:
   a) Refill the engine with oil
   b) Check the transmission oil level if necessary
   c) Adjust the tension of the accessory drivebelts
   d) Adjust the throttle cable
   e) Adjust the downshift cable when applicable
   f) Refill the cooling system
11. Before starting the engine, see Section 51.
50 Valve clearances - checking and adjustment

See Chapter 1, Section 23.

51 Initial start-up after overhaul or major repair

1. Make a final check to ensure that everything has been reconnected to the engine and that no rags or tools have been left in the engine bay.
2. Check that oil and coolant levels are correct.
3. Start the engine. This may take a little longer than usual as fuel is pumped up to the engine.
4. Check that the oil pressure light goes out when the engine starts.
5. Run the engine at a fast tickover and check for leaks of oil, fuel and coolant. Also check power steering and transmission fluid cooler unions, when applicable. Some smoke and odd smells may be experienced as assembly lubricant burns off the exhaust manifold and other components.

52 Compression test - description and interpretation

1. When engine performance is down, or if misfiring occurs which cannot be attributed to the ignition or fuel system, a compression test can provide diagnostic clues. If the test is performed regularly it can give warning of trouble before any other symptoms become apparent.
2. The engine must be at operating temperature, the battery must be fully charged and the spark plugs must be removed. The services of an assistant will also be required.
3. Disable the ignition system by dismantling the coil LT feed. Fit the compression tester to No 1 spark plug hole. (The type of tester which screws into the spark plug hole is to be preferred.)
4. Have the assistant hold the throttle wide open and crank the engine on the starter. Record the highest reading obtained on the compression tester.
5. Repeat the test on the remaining cylinders, recording the pressure developed in each.
6. Desired pressures are given in the Specifications. If the pressure in any cylinder is low, introduce a teaspoonful of clean engine oil into the spark plug hole and repeat the test.
7. If the addition of oil temporarily improves the compression pressure, this indicates that bore or piston wear was responsible for the pressure loss. No improvement suggests that leaking or burnt valves, or a blown head gasket, may be to blame.
8. A low reading from two adjacent cylinders is almost certainly due to the head gasket between them having blown.
9. On completion of the test, refit the spark plugs and reconnect the coil LT feed.