

# Chapter 2 Part A:

## TU series engine in-car repair procedures

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### Degrees of difficulty

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

#### Engine (general)

Designation:

1124 cc engine. . . . .	TU1
1360 cc engine. . . . .	.TU3

Engine codes:\*

1124 cc carburettor engine. . . . .	H1A (RJ1 K)
1124 cc fuel injection engine. . . . .	HDZ (TU1M L/Z)
1360 cc carburettor engine. . . . .	K2D (TU3 2K)
1360 cc fuel injection engine with a distributor. . . . .	KDY (TU3M Z)
1360 cc fuel-injected engine with a static ignition system. . . . .	KDX (TU3MC L/Z)

Bore:

1124 cc engine. . . . .	.72.00 mm
1360 cc engine. . . . .	.75.00 mm

Stroke:

1124 cc engine. . . . .	.69.00 mm
1360 cc engine. . . . .	.77.00 mm

Direction of crankshaft rotation. . . . . Clockwise (viewed from right-hand side of vehicle)

No 1 cylinder location. . . . . At transmission end of block

Compression ratio:

1124 cc engine. . . . .	.9.4 :1
1360 cc engine. . . . .	.9.3 :1

Maximum power:

1124 cc engine. . . . .	.60 bhp (44.1 kW) @ 5800 rpm
1360 cc engine. . . . .	.75 bhp (55 kW) @ 5800 rpm

Maximum torque:

1124 cc engine. . . . .	.89.7 Nm (66.2 lbf ft) @ 3200 rpm
1360 cc engine. . . . .	.116.9 Nm (86.3 lbf ft) @ 3800 rpm

\*The engine code is stamped on a plate attached to the front left-hand end of the cylinder block; this is the code most often used by Citroen. The full code given in brackets is the factory identification number, and is not often referred to by Citroen or this manual.

#### Lubrication system

Oil pump type. . . . .	Gear-type, chain-driven off the crankshaft
Minimum oil pressure at 90°C. . . . .	4 bars at 4000 rpm
Oil pressure warning switch operating pressure. . . . .	.05 bars

**Camshaft**

Drive.....	Toothed belt
Number of bearings.....	5
Cam lift:	
1124 cc engine.....	.8.2 mm
1360 cc engine.....	.9.4 mm
Camshaft bearing journal diameter (outside diameter):	
No 1.....	.36.950 to .36.925 mm
No 2.....	.40.650 to .40.625 mm
No 3.....	.41.250 to .41.225 mm
No 4.....	.41.850 to .41.825 mm
No 5.....	.42.450 to .42.425 mm

Cylinder head bearing journal diameter (inside diameter):	
No 1.....	.37.000 to .37.039 mm
No 2.....	.40.700 to .47.739 mm
No 3.....	.41.300 to .41.339 mm
No 4.....	.41.900 to .41.939 mm
No 5.....	.42.500 to .42.539 mm

**Torque wrench settings**

	Nm	ibf ft
Cylinder head cover nuts.....	.16	12
Timing belt cover bolts.....	.8	6
Crankshaft pulley retaining bolts.....	.8	6
Timing belt tensioner pulley nut.....	.23	17
Camshaft sprocket retaining bolt.....	.80	59
Crankshaft sprocket retaining bolt.....	.110	81
Camshaft thrust fork retaining bolt.....	.16	12
Cylinder head bolts:		
Stage 1.....	.20	15
Stage 2.....	Angle-tighten through 240°	Angle-tighten through 240°
Sump drain plug.....	.30	22
Sump retaining nuts and bolts.....	.8	6
Oil pump retaining bolts.....	.8	6
Flywheel retaining bolts.....	.65	48
Big-end bearing cap nuts.....	.40	30
Main bearing ladder casting:		
11 mm bolts:		
Stage 1.....	.20	15
Stage 2.....	Angle-tighten through 45°	Angle-tighten through 45°
6 mm bolts.....	.8	6
Engine/transmission right-hand mounting:		
Mounting bracket retaining nuts.....	.45	33
Engine/transmission left-hand mounting:		
Mounting bracket-to-transmission nuts.....	.18	13
Mounting bracket-to-body bolts.....	.25	18
Centre nut.....	.38	28
Engine/transmission rear mounting:		
Mounting assembly-to-block bolts.....	.40	30
Mounting bracket-to-mounting bolt.....	.70	52
Mounting bracket-to-subframe bolt.....	.95	70

**1 General information****How to use this Chapter**

This Part of Chapter 2 describes those repair procedures that can reasonably be carried out on the TU series engine (1124 cc and 1360 cc models) while it remains in the car. If the engine has been removed from the car and is being dismantled as described in Part C, any preliminary dismantling procedures can be ignored. Refer to Part B for information on the XU series engine (1580 cc and larger-engined models).

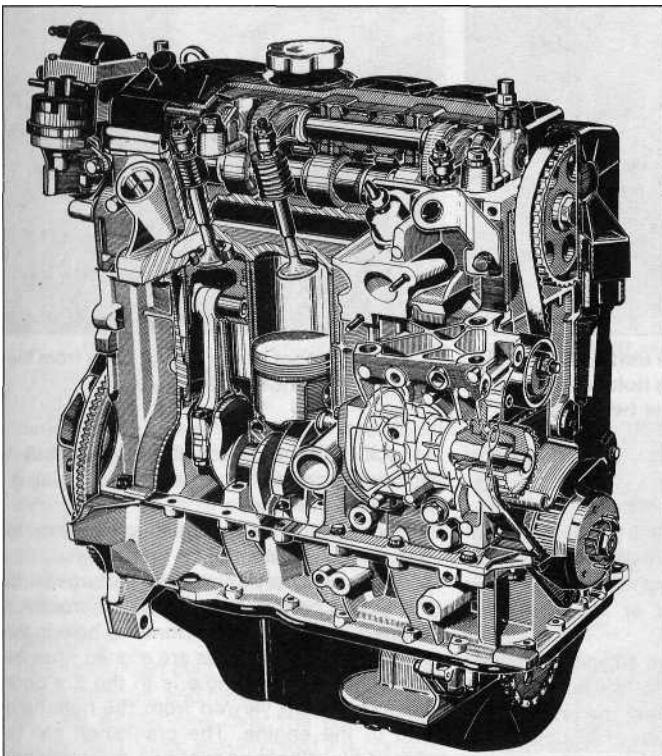
Note that, while it may be possible physically to overhaul items such as the piston/connecting rod assemblies while the engine is in the car, such tasks are not normally carried out as separate operations. Usually, several additional procedures (not to mention the cleaning of components and of oilways) have to be carried out. For this reason, all such tasks are classed as major overhaul procedures, and are described in Part C of this Chapter.

Part C describes the removal of the engine/transmission unit from the vehicle, and the full overhaul procedures that can then be carried out.

**TU series engine description**

The TU series engine is a well-proven engine which has been fitted to many previous Citroen and Peugeot vehicles. The engine is of the in-line four-cylinder, overhead camshaft (OHC) type, mounted transversely at the front of the car (**see illustration**). The clutch and transmission are attached to its left-hand end. The ZX range is fitted with both 1124 cc (not available in the UK) and 1360 cc versions of the engine; carburettor and fuel-injected versions are available.

The crankshaft runs in five main bearings. Thrustwashers are fitted to No 2 main bearing (upper half) to control crankshaft endfloat.



1.4 Cutaway view of the TU series engine

The connecting rods rotate on horizontally-split bearing shells at their big-ends. The pistons are attached to the connecting rods by gudgeon pins, which are an interference fit in the connecting rod small-end eyes. The aluminium-alloy pistons are fitted with three piston rings - two compression rings and an oil control ring.

The cylinder bores have replaceable wet liners. Sealing O-rings are fitted at the base of each liner, to prevent the escape of coolant into the sump.

The inlet and exhaust valves are each closed by coil springs, and operate in guides pressed into the cylinder head; the valve seat inserts are also pressed into the cylinder head, and can be renewed separately if worn.

The camshaft is driven by a toothed timing belt, and operates the eight valves via rocker arms. Valve clearances are adjusted by a screw-and-locknut arrangement. The cam-shaft rotates in bearings that are line-bored through the cylinder head. The timing belt also drives the coolant pump.

Lubrication is by means of an oil pump, which is driven (via a chain and sprocket) off the right-hand end of the crankshaft. It draws oil through a strainer located in the sump, and then forces it through an externally-mounted filter into galleries in the cylinder block/crankcase. From there, the oil is distributed to the crankshaft (main bearings) and camshaft. The big-end bearings are supplied with oil via internal drillings in the crankshaft, while the camshaft bearings also receive a pressurised

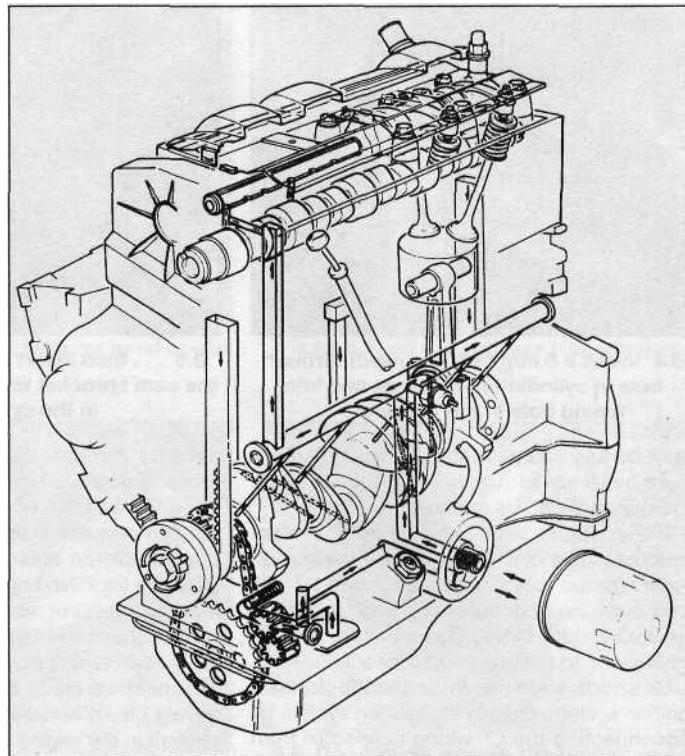
supply. The camshaft lobes and valves are lubricated by splash, as are all other engine components (see illustration).

Throughout this manual, it is often necessary to identify the engines not only by their capacity, but also by their engine code. The engine code, which consists of three letters (eg. KDY), is stamped on a plate attached to the front left-hand end of the cylinder block (see illustration).

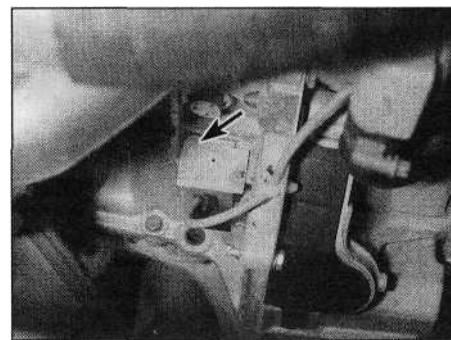
#### **Repair operations possible with the engine in the car**

The following work can be carried out with the engine in the car:

- (a) Compression pressure - testing.
- (b) Cylinder head cover - removal and refitting.
- (c) Timing belt covers - removal and refitting.
- (d) Timing belt - removal, refitting and adjustment.
- (e) Timing belt tensioner and sprockets - removal and refitting.
- (f) Camshaft oil seal(s) - renewal.
- (g) Camshaft and rocker arms - removal, inspection and refitting. \*
- (h) Cylinder head - removal and refitting.
- (i) Cylinder head and pistons - decarbonising.
- (j) Sump - removal and refitting.
- (k) Oil pump - removal, overhaul and refitting.
- (l) Crankshaft oil seals - renewal.
- (m) Engine/transmission mountings - inspection and renewal.
- (n) Flywheel - removal, inspection and refitting.



1.11 Lubrication system of the TU series engine



1.12 Engine code is stamped on a plate (arrowed) attached to the front of the cylinder block - viewed from above

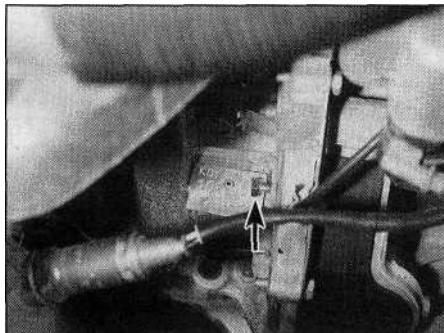
\*The cylinder head must be removed for the successful completion of this work. Refer to Section 9 for details.

#### **2 Compression test - description and interpretation**

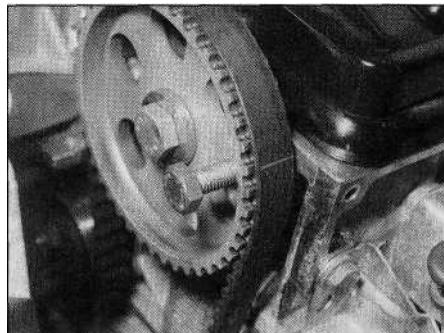
1 When engine performance is down, or if misfiring occurs which cannot be attributed to the ignition or fuel systems, a compression test can provide diagnostic clues as to the engine's condition. If the test is performed regularly, it can give warning of trouble before any other symptoms become apparent.

2 The engine must be fully warmed-up to normal operating temperature, the battery





**3.4 Insert a 6 mm bolt (arrowed) through hole in cylinder block flange and into timing hole in the flywheel...**



**3.5 ... then insert a 10 mm bolt through the cam sprocket timing hole, and locate it in the cylinder head**



**4.3 Disconnect the breather hose from the cylinder head cover ...**

must be fully charged, and all the spark plugs must be removed (Chapter 1). The aid of an assistant will also be required.

**3** On models with an ignition system incorporating a distributor, disable the ignition system by disconnecting the ignition HT coil lead from the distributor cap and earthing it on the cylinder block. Use a jumper lead or similar wire to make a good connection.

**4** On models with a static (distributorless) ignition system, disable the ignition system by disconnecting the LT wiring connector from the ignition HT coil(s), referring to Chapter 5 for further information.

**5** Fit a compression tester to the No 1 cylinder spark plug hole - the type of tester which screws into the plug thread is to be preferred.

**6** Have the assistant hold the throttle wide open, and crank the engine on the starter motor; after one or two revolutions, the compression pressure should build up to a maximum figure, and then stabilise. Record the highest reading obtained.

**7** Repeat the test on the remaining cylinders, recording the pressure in each.

**8** All cylinders should produce very similar pressures; a difference of more than 2 bars between any two cylinders indicates a fault. Note that the compression should build up quickly in a healthy engine; low compression on the first stroke, followed by gradually-increasing pressure on successive strokes, indicates worn piston rings. A low compression reading on the first stroke, which does not build up during successive strokes, indicates leaking valves or a blown head gasket (a cracked head could also be the cause). Deposits on the undersides of the valve heads can also cause low compression.

**9** Although Citroen do not specify exact compression pressures, as a guide, any cylinder pressure of below 10 bars can be considered as less than healthy. Refer to a Citroen dealer or other specialist if in doubt as to whether a particular pressure reading is acceptable.

**10** If the pressure in any cylinder is low, carry out the following test to isolate the cause. Introduce a teaspoonful of clean oil into that

cylinder through its spark plug hole, and repeat the test.

**11** If the addition of oil temporarily improves the compression pressure, this indicates that bore or piston wear is responsible for the pressure loss. No improvement suggests that leaking or burnt valves, or a blown head gasket, may be to blame.

**12** A low reading from two adjacent cylinders is almost certainly due to the head gasket having blown between them; the presence of coolant in the engine oil will confirm this.

**13** If one cylinder is about 20 percent lower than the others and the engine has a slightly rough idle, a worn camshaft lobe could be the cause.

**14** If the compression reading is unusually high, the combustion chambers are probably coated with carbon deposits. If this is the case, the cylinder head should be removed and decarbonised.

**15** On completion of the test, refit the spark plugs and reconnect the ignition system.

to lock both the camshaft and crankshaft in position, preventing them from rotating. Proceed as follows.

**2** Remove the timing belt upper cover as described in Section 5.

**3** The crankshaft must now be turned until the timing hole in the camshaft sprocket is aligned with the corresponding hole in the cylinder head. The holes are aligned when the camshaft sprocket hole is in the 2 o'clock position, when viewed from the right-hand end of the engine. The crankshaft can be turned by using a spanner on the crankshaft sprocket bolt, noting that it should always be rotated in a clockwise direction (viewed from the right-hand end of the engine).

**4** With the camshaft sprocket hole correctly positioned, insert a 6 mm diameter bolt or drill through the hole in the front, left-hand flange of the cylinder block, and locate it in the timing hole in the rear of the flywheel (see **illustration**). Note that it may be necessary to rotate the crankshaft slightly, to get the holes to align.

**5** With the flywheel correctly positioned, insert a 10 mm diameter bolt or a drill through the timing hole in the camshaft sprocket, and locate it in the hole in the cylinder head (see, **illustration**).

**6** The crankshaft and camshaft are now locked in position, preventing unnecessary rotation.

### 3 Engine assembly/valve timing holes - general information and usage



**Note:** Do not attempt to rotate the engine whilst the crankshaft/camshaft are locked in position. If the engine is to be left in this state for a long period of time, it is a good idea to place warning notices inside the vehicle, and in the engine compartment. This will reduce the possibility of the engine being accidentally cranked on the starter motor, which is likely to cause damage with the locking pins in place.

**1** On all models, timing holes are drilled in the camshaft sprocket and in the rear of the flywheel. The holes are used to ensure that the crankshaft and camshaft are correctly positioned when assembling the engine (to prevent the possibility of the valves contacting the pistons when refitting the cylinder head), or refitting the timing belt. When the timing holes are aligned with access holes in the cylinder head and the front of the cylinder block, suitable diameter pins can be inserted

### 4 Cylinder head cover - removal and refitting

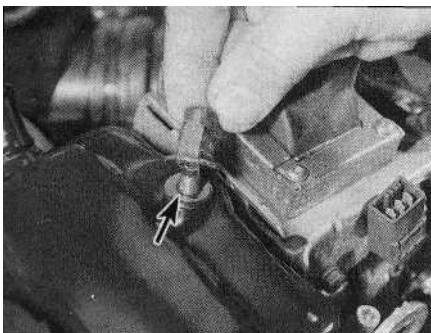
#### Removal

**1** Disconnect the battery negative lead.

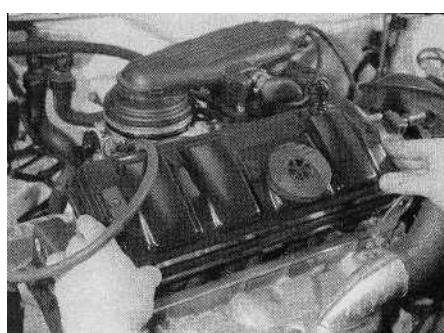
**2** Where necessary, undo the bolts securing the HT lead retaining clips to the rear of the cylinder head cover, and position the clips clear of the cover.

**3** Slacken the retaining clip, and disconnect the breather hose from the left-hand end of the cylinder head cover (**see illustration**). Where the original crimped-type Citroen hose clip is still fitted, cut it off and discard it. Use a standard worm-drive clip on refitting.

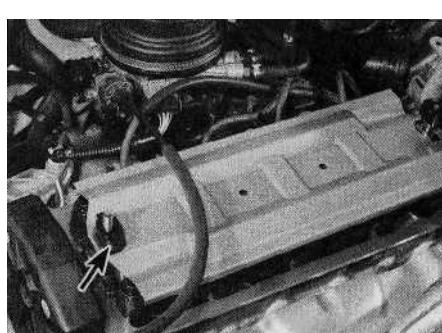
**4** Undo the two retaining nuts, and remove



**4.4 ... then slacken and remove the cover retaining nuts and washers (arrowed)...**



**4.5 ... and lift off the cylinder head cover**



**4.6a Lift off the spacers (second one arrowed)...**

the washer from each of the cylinder head cover studs (**see illustration**).

**5** Lift off the cylinder head cover, and remove it along with its rubber seal (**see illustration**). Examine the seal for signs of damage and deterioration, and if necessary, renew it.

**6** Remove the spacer from each stud, and lift off the oil baffle plate (**see illustrations**).

#### Refitting

**7** Carefully clean the cylinder head and cover mating surfaces, and remove all traces of oil.

**8** Fit the rubber seal over the edge of the cylinder head cover, ensuring that it is correctly located along its entire length (**see illustration**).

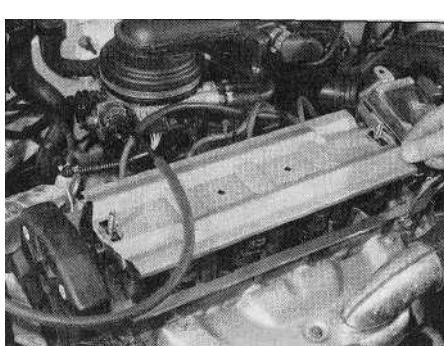
**9** Refit the oil baffle plate to the engine, and locate the spacers in their recesses in the baffle plate.

**10** Carefully refit the cylinder head cover to the engine, taking great care not to displace the rubber seal.

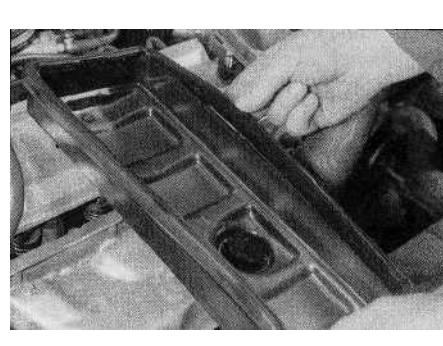
**11** Check that the seal is correctly located, then refit the washers and cover retaining nuts, and tighten them to the specified torque.

**12** Where necessary, refit the HT lead clips to the rear of the head cover, and securely tighten their retaining bolts.

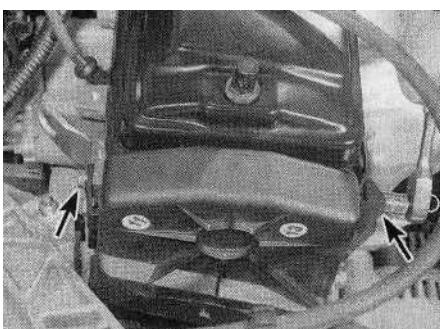
**13** Reconnect the breather hose to the cylinder head cover, securely tightening its retaining clip, and reconnect the battery negative lead.



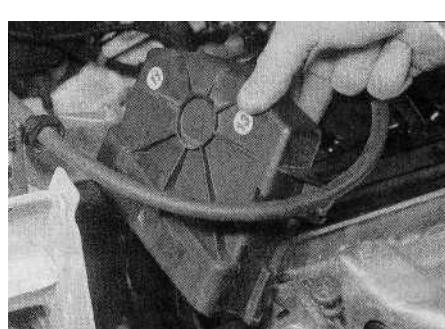
**4.6b ... and remove the oil baffle plate**



**4.8 On refitting, ensure the rubber seal is correctly located on the cylinder head cover**



**5.1a Undo the two retaining bolts (arrowed)...**



**5.1b ... and remove the upper timing belt cover**

## 5 Timing belt covers - removal and refitting



### Removal

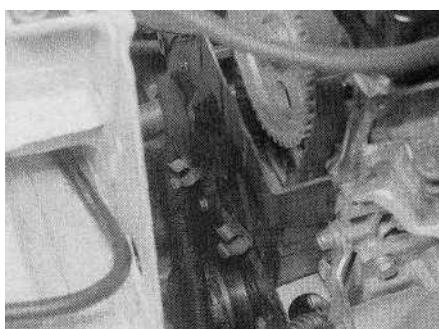
#### Upper cover

**1** Slacken and remove the two retaining bolts (one at the front and one at the rear), and remove the upper timing cover from the cylinder head (**see illustrations**).

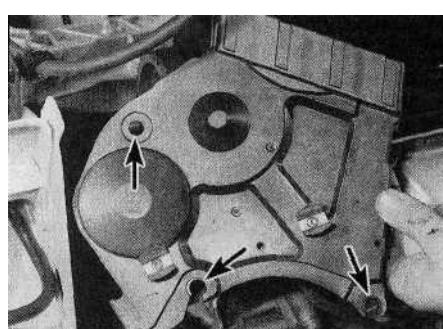
#### Centre cover

**2** Remove the upper cover as described in paragraph 1, then free the wiring from its retaining clips on the centre cover (**see illustration**).

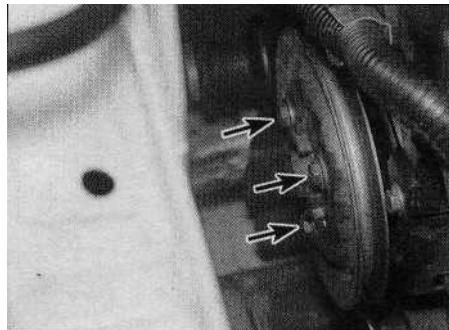
**3** Slacken and remove the three retaining bolts (one at the rear of the cover, beneath the engine mounting plate, and two directly above the crankshaft pulley), and manoeuvre the



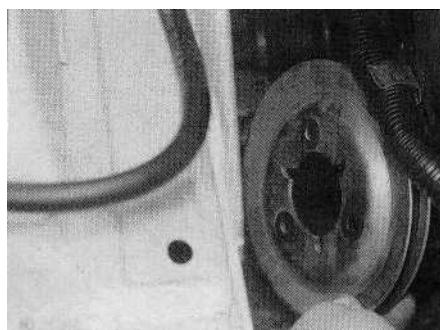
**5.2 Free the wiring loom from its retaining clip...**



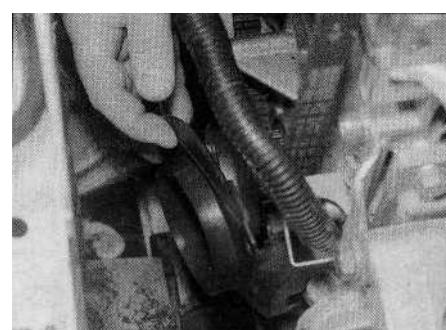
**5.3 ... then undo the three retaining bolts (locations arrowed) and remove the centre timing belt cover**



**5.6a** Undo the three retaining bolts (arrowed)...



**5.6b** ... and remove the crankshaft pulley



**5.7** Undo the retaining bolt and remove the lower timing belt cover

centre cover out from the engine compartment (see illustration).

#### Lower cover

**4** Remove the auxiliary drivebelt as described in Chapter 1.

**5** Remove the upper and centre covers as described in paragraphs 1 to 3.

**6** Undo the three crankshaft pulley retaining bolts and remove the pulley, noting which way round it is fitted (see illustrations).

**7** Slacken and remove the single retaining bolt, and slide the lower cover off the end of the crankshaft (see illustration).

#### Refitting

##### Upper cover

**8** Refit the cover, ensuring it is correctly located with the centre cover, and tighten its retaining bolts.

##### Centre cover

**9** Manoeuvre the centre cover back into position, ensuring it is correctly located with the lower cover, and tighten its retaining bolts.

**10** Clip the wiring loom into its retaining clips on the front of the centre cover, then refit the upper cover as described in paragraph 8.

##### Lower cover

**10** Locate the lower cover over the timing belt sprocket, and tighten its retaining bolt.

**11** Fit the pulley to the end of the crankshaft, ensuring it is fitted the correct way round, and tighten its retaining bolts to the specified torque.

**12** Refit the centre and upper covers as described above, then refit and tension the auxiliary drivebelt as described in Chapter 1.

**6 Timing belt - general information, removal and refitting**



#### General information

**1** The timing belt drives the camshaft and coolant pump from a toothed sprocket on the front of the crankshaft. If the belt breaks or slips in service, the pistons are likely to hit the valve heads, resulting in extensive (and expensive) damage.

**2** The timing belt should be renewed at the specified intervals (see Chapter 1), or earlier if it is contaminated with oil, or if it is at all noisy in operation (a "scraping" noise due to uneven wear).

**3** If the timing belt is being removed, it is a wise precaution to check the condition of the coolant pump at the same time (check for signs of coolant leakage). This may avoid the need to remove the timing belt again at a later stage, should the coolant pump fail.

#### Removal

**4** Disconnect the battery negative terminal.  
**5** Align the engine assembly/valve timing holes as described in Section 3, and lock both the camshaft sprocket and the flywheel in position. *Do not attempt to rotate the engine whilst the locking pins are in position.*

**6** Remove the timing belt centre and lower covers as described in Section 5.

**7** Loosen the timing belt tensioner pulley retaining nut. Pivot the pulley in a clockwise direction, using a square-section key fitted to the hole in the pulley hub, then retighten the retaining nut.

**8** If the timing belt is to be re-used, use white paint or similar to mark the direction of rotation on the belt (if markings do not already exist) (see illustration). Slip the belt off the sprockets.

**9** Check the timing belt carefully for any signs of uneven wear, splitting, or oil contamination. Pay particular attention to the roots of the



**6.8** Mark the direction of rotation on the belt, if it is to be re-used

teeth. Renew the belt if there is the slightest doubt about its condition. If the engine is undergoing an overhaul, and has covered more than 24 000 miles (40 000 km) with the existing belt fitted, renew the belt as a matter of course, regardless of its apparent condition. The cost of a new belt is nothing when compared to the cost of repairs, should the belt break in service. If signs of oil contamination are found, trace the source of the oil leak, and rectify it. Wash down the engine timing belt area and all related components, to remove all traces of oil.

#### Refitting

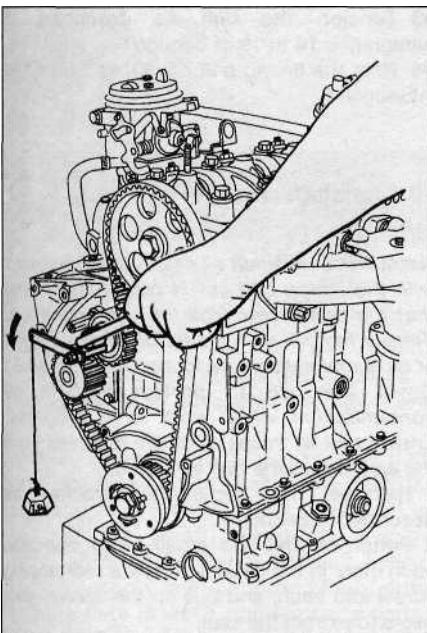
**10** Prior to refitting, thoroughly clean the timing belt sprockets. Check that the tensioner pulley rotates freely, without any sign of roughness. If necessary, renew the tensioner pulley as described in Section 7. Make sure that the locking pins are still in place, as described in Section 3.

**11** Manoeuvre the timing belt into position, ensuring that the arrows on the belt are pointing in the direction of rotation (clockwise when viewed from the right-hand end of the engine).

**12** Do not twist the timing belt sharply while refitting it. Fit the belt over the crankshaft and camshaft sprockets. Make sure that the "front run" of the belt is taut - ie, ensure that any slack is on the tensioner pulley side of the belt. Fit the belt over the water pump sprocket and tensioner pulley. Ensure that the belt teeth are seated centrally in the sprockets.

**13** Loosen the tensioner pulley retaining nut. Pivot the pulley anti-clockwise to remove all free play from the timing belt, then retighten the nut.

**14** Citroen dealers use a special tool to tension the timing belt (see illustration). A similar tool may be fabricated using a suitable square-section bar attached to an arm; a hole should be drilled in the arm at a distance of 80 mm from the centre of the square-section bar. Fit the tool to the hole in the tensioner pulley, keeping the tool arm as close to the horizontal as possible, and hang a 1.5 kg (3.3 lb) weight from the hole in the tool. In the absence of an object of the specified weight, a spring balance can be used to exert the required



**6.14 Using the Citroen special tool to tension the timing belt**

force, ensuring that the spring balance is held at 90° to the tool arm. Slacken the pulley retaining nut, allowing the weight or force exerted (as applicable) to push the tensioner pulley against the belt, then retighten the pulley nut.

**15** If the special tool is not available, an approximate setting may be achieved as follows. Slacken the pulley retaining nut, and pivot the tensioner pulley anti-clockwise until it is just possible to turn the timing belt through 90° by finger and thumb, midway between the crankshaft and camshaft sprockets. The square hole in the tensioner pulley hub should be directly below the retaining nut, and the deflection of the belt at the mid-point between the sprockets should be approximately 6.0 mm. If this method is used, the belt tension should be checked by a Citroen dealer at the earliest possible opportunity.

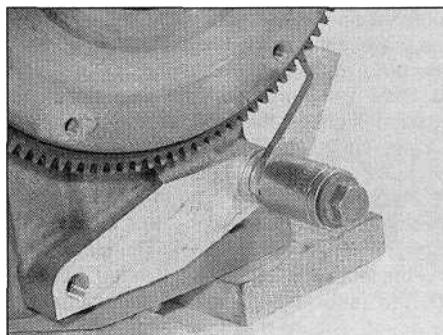
**16** Remove the locking pins from the camshaft sprocket and flywheel.

**17** Using a suitable socket and extension bar on the crankshaft sprocket bolt, rotate the crankshaft through four complete rotations in a clockwise direction (viewed from the right-hand end of the engine). *Do not* at any time rotate the crankshaft anti-clockwise.

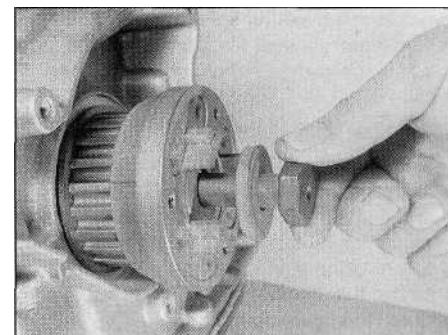
**18** Slacken the tensioner pulley nut, re-tension the belt using one of the methods just described, then tighten the tensioner pulley nut to the specified torque.

**19** Rotate the crankshaft through a further two turns clockwise, and check that both the camshaft sprocket and flywheel timing holes are still correctly aligned.

**20** If all is well, refit the timing belt covers as described in Section 5, and reconnect the battery negative terminal.



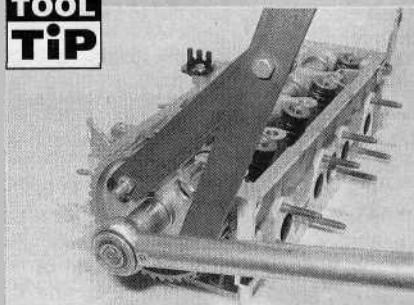
**7.10 Use the fabricated tool shown to lock flywheel ring gear and prevent the crankshaft rotating**



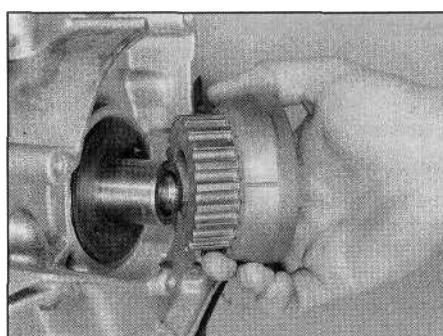
**7.11a Remove the crankshaft sprocket retaining bolt...**

**6** Slacken the camshaft sprocket retaining bolt and remove it, along with its washer. To prevent the camshaft rotating as the bolt is slackened, a sprocket-holding tool will be required. *Do not* attempt to use the sprocket locking pin to prevent the sprocket from rotating whilst the bolt is slackened.

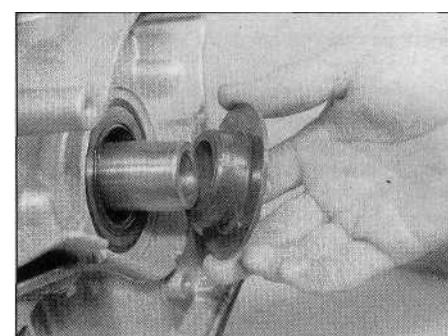
### TOOL TIP



*To prevent the camshaft sprocket from rotating, use two lengths of steel strip (one long, the other short), and three nuts and bolts; one nut and bolt forms the pivot of a forked tool, with the remaining two nuts and bolts at the tips of the "forks" to engage with the sprocket spokes.*



**7.11b ... then slide off the sprocket**



**7.12 Remove the flanged spacer if necessary**

sprocket, remove it for safe-keeping. Examine the camshaft oil seal for signs of oil leakage and, if necessary, renew it as described in Section 8.

### Crankshaft sprocket

**8** Remove the centre and lower timing belt covers as described in Section 5.

**9** Loosen the timing belt tensioner pulley retaining nut. Rotate the pulley in a clockwise direction, using a suitable square-section key fitted to the hole in the pulley hub, then retighten the retaining nut.

**10** To prevent crankshaft rotation whilst the sprocket retaining bolt is slackened, select top gear, and have an assistant apply the brakes firmly. If the engine has been removed from the vehicle, lock the flywheel ring gear, using an arrangement similar to that shown (**see illustration**). *Do not* be tempted to use the flywheel locking pin to prevent the crankshaft from rotating; temporarily remove the locking pin from the rear of the flywheel prior to slackening the pulley bolt, then refit it once the bolt has been slackened. Disengage the timing belt from the sprocket, and move the belt clear, taking care not to bend or twist it sharply.

**11** Unscrew the retaining bolt and washer, then slide the sprocket off the end of the crankshaft (**see illustrations**). Refit the locating pin to the rear of the timing hole in the rear of the flywheel.

**12** If the Woodruff key is a loose fit in the crankshaft, remove it and store it with the sprocket for safe-keeping. If necessary, also slide the flanged spacer off the end of the crankshaft (**see illustration**). Examine the crankshaft oil seal for signs of oil leakage and, if necessary, renew as described in Section 13.

### Tensioner pulley

**13** Remove the centre timing belt cover as described in Section 5.

**14** Slacken and remove the timing belt tensioner pulley retaining nut, and slide the pulley off its mounting stud. Examine the mounting stud for signs of damage and, if necessary, renew it.

### Inspection

**15** Clean the sprockets thoroughly, and renew any that show signs of wear, damage or cracks.

**16** Clean the tensioner assembly, but do not use any strong solvent which may enter the pulley bearing. Check that the pulley rotates freely about its hub, with no sign of stiffness or of free play. Renew the tensioner pulley if there is any doubt about its condition, or if there are any obvious signs of wear or damage.

### Refitting

#### Camshaft sprocket

**17** Refit the locating peg (where removed) to the rear of the sprocket, then locate the

sprocket on the end of the camshaft. Ensure that the locating peg is correctly engaged with the cutout in the camshaft end.

**18** Refit the sprocket retaining bolt and washer. Tighten the bolt to the specified torque, whilst retaining the sprocket with the tool used on removal.

**19** Realign the timing hole in the camshaft sprocket (see Section 3) with the corresponding hole in the cylinder head, and refit the locking pin.

**20** Refit the timing belt to the camshaft sprocket. Ensure that the "front run" of the belt is taut - ie, ensure that any slack is on the tensioner pulley side of the belt. Do not twist the belt sharply while refitting it, and ensure that the belt teeth are seated centrally in the sprockets.

**21** Loosen the tensioner pulley retaining nut. Rotate the pulley anti-clockwise to remove all free play from the timing belt, then retighten the nut.

**22** Tension the belt as described in paragraphs 14 to 19 of Section 6.

**23** Refit the timing belt covers as described in Section 5.

### Crankshaft sprocket

**24** Where removed, locate the Woodruff key in the crankshaft end, then slide on the flanged spacer, aligning its slot with the Woodruff key.

**25** Align the crankshaft sprocket slot with the Woodruff key, and slide it onto the end of the crankshaft.

**26** Temporarily remove the locking pin from the rear of the flywheel, then refit the crankshaft sprocket retaining bolt and washer. Tighten the bolt to the specified torque, whilst preventing crankshaft rotation using the method employed on removal. Refit the locking pin to the rear of the flywheel.

**27** Relocate the timing belt on the crankshaft sprocket. Ensure that the "front run" of the belt is taut - ie, ensure that any slack is on the tensioner pulley side of the belt. Do not twist the belt sharply while refitting it, and ensure that the belt teeth are seated centrally in the sprockets.

**28** Loosen the tensioner pulley retaining nut. Rotate the pulley anti-clockwise to remove all free play from the timing belt, then retighten the nut.

**29** Tension the belt as described in paragraphs 14 to 19 of Section 6.

**30** Refit the timing belt covers as described in Section 5.

### Tensioner pulley

**31** Refit the tensioner pulley to its mounting stud, and fit the retaining nut.

**32** Ensure that the "front run" of the belt is taut - ie, ensure that any slack is on the pulley side of the belt. Check that the belt is centrally located on all its sprockets. Rotate the pulley anti-clockwise to remove all free play from the timing belt, then tighten the pulley retaining nut securely.

**33** Tension the belt as described in paragraphs 14 to 19 of Section 6.

**34** Refit the timing belt covers as described in Section 5.

### 8 Camshaft oil seal - renewal



**Note:** If the camshaft oil seal is to be renewed with the timing belt still in place, check first that the belt is free from oil contamination. (Renew the belt as a matter of course if signs of oil contamination are found; see Section 6.) Cover the belt to protect it from oil contamination while work is in progress. Ensure that all traces of oil are removed from the area before the belt is refitted.

**1** Remove the camshaft sprocket as described in Section 7.

**2** Punch or drill two small holes opposite each other in the oil seal. Screw a self-tapping screw into each, and pull on the screws with pliers to extract the seal.

**3** Clean the seal housing, and polish off any burrs or raised edges, which may have caused the seal to fail in the first place.

**4** Lubricate the lips of the new seal with clean engine oil, and drive it into position until it seats on its locating shoulder. Use a suitable tubular drift, such as a socket, which bears only on the hard outer edge of the seal. Take care not to damage the seal lips during fitting. Note that the seal lips should face inwards.

**5** Refit the camshaft sprocket as described in Section 7.

### 9 Camshaft and rocker arms - removal, inspection and refitting



#### General information

**1** The rocker arm assembly is secured to the top of the cylinder head by the cylinder head bolts. Although in theory it is possible to undo the head bolts and remove the rocker arm assembly without removing the head, in practice, this is not recommended. Once the bolts have been removed, the head gasket will be disturbed, and the gasket will almost certainly leak or blow after refitting. For this reason, removal of the rocker arm assembly cannot be done without removing the cylinder head and renewing the head gasket.

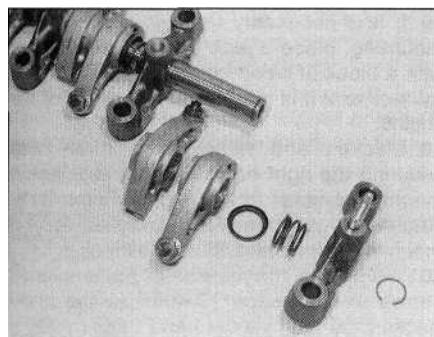
**2** The camshaft is slid out of the right-hand end of the cylinder head, and therefore cannot be removed without first removing the cylinder head, due to a lack of clearance.

#### Removal

##### Rocker arm assembly

**3** Remove the cylinder head as described in Section 10.

**4** To dismantle the rocker arm assembly,



**9.4 Remove the circlip, and slide the components off the end of the rocker arm**

carefully prise off the circlip from the right-hand end of the rocker shaft; retain the rocker pedestal, to prevent it being sprung off the end of the shaft. Slide the various components off the end of the shaft, keeping all components in their correct fitted order. Make a note of each component's correct fitted position/orientation as it is removed, to ensure it is fitted correctly on reassembly (**see illustration**).

**5** To separate the left-hand pedestal and shaft, first unscrew the cylinder head cover retaining stud from the top of the pedestal; this can be achieved using a stud extractor, or two nuts locked together. With the stud removed, unscrew the grub screw from the top of the pedestal, and withdraw the rocker shaft (**see illustrations**).

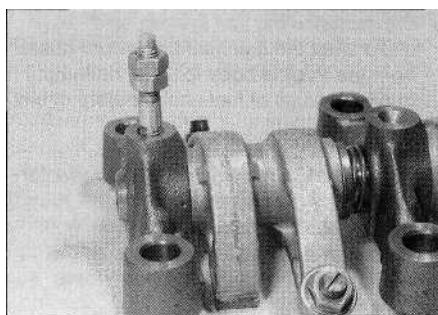
#### Camshaft

**6** Remove the cylinder head as described in Section 10.

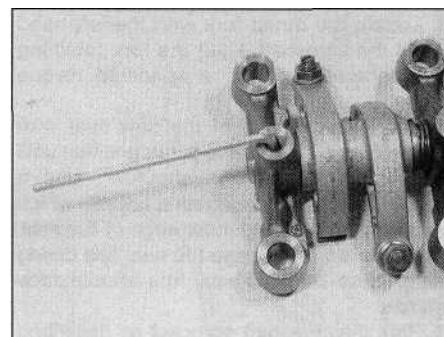
**7** With the head on a bench, remove the locating pin, then remove the camshaft sprocket as described in paragraphs 6 and 7 of Section 7.

**8** Undo the retaining bolt, and remove the camshaft thrust fork from the left-hand end of the cylinder head (**see illustration**).

**9** Using a large flat-bladed screwdriver, carefully prise the oil seal out of the right-hand end of the cylinder head, then slide out the camshaft (**see illustrations**). Discard the seal – a new one must be used on refitting.



**9.5a To remove the left-hand pedestal, lock two nuts together and unscrew the stud ...**



**9.5b ... then remove the grub screw**

#### Inspection

##### Rocker arm assembly

**10** Examine the rocker arm bearing surfaces which contact the camshaft lobes for wear ridges and scoring. Renew any rocker arms on which these conditions are apparent. If a rocker arm bearing surface is badly scored, also examine the corresponding lobe on the camshaft for wear, as it is likely that both will be worn. Renew worn components as necessary. The rocker arm assembly can be dismantled as described in paragraphs 4 and 5.

**11** Inspect the ends of the (valve clearance) adjusting screws for signs of wear or damage, and renew as required.

**12** If the rocker arm assembly has been dismantled, examine the rocker arm and shaft bearing surfaces for wear ridges and scoring. If there are obvious signs of wear, the relevant rocker arm(s) and/or the shaft must be renewed.

##### Camshaft

**13** Examine the camshaft bearing surfaces and cam lobes for signs of wear ridges and scoring. Renew the camshaft if any of these conditions are apparent. Examine the condition of the bearing surfaces, both on the camshaft journals and in the cylinder head. If the head bearing surfaces are worn excessively, the cylinder head will need to be renewed. If the necessary measuring equipment is available, camshaft bearing

journal wear can be checked by direct measurement, noting that No 1 journal is at the transmission end of the head.

**14** Examine the thrust fork for signs of wear or scoring, and renew as necessary.

#### Refitting

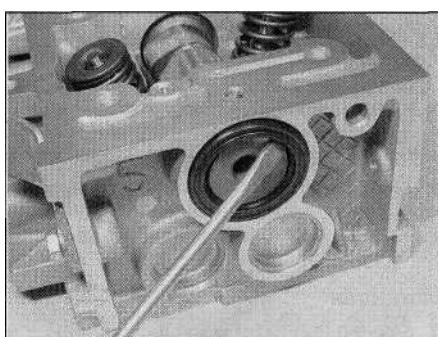
##### Rocker arm assembly

**15** If the rocker arm assembly was dismantled, refit the rocker shaft to the left-hand pedestal, aligning its locating hole with the pedestal threaded hole. Refit the grub screw, and tighten it securely. With the grub screw in position, refit the cylinder head cover mounting stud to the pedestal, and tighten it securely. Apply a smear of clean engine oil to the shaft, then slide on all removed components, ensuring each is correctly fitted in its original position. Once all components are in position on the shaft, compress the right-hand pedestal and refit the circlip. Ensure that the circlip is correctly located in its groove on the shaft.

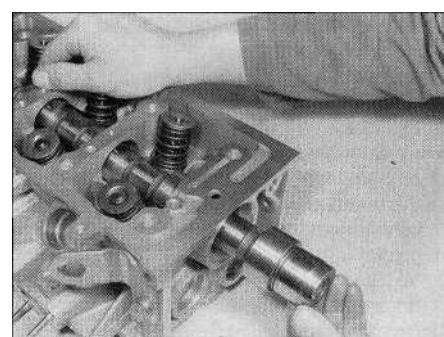
**16** Refit the cylinder head and rocker arm assembly as described in Section 10.

##### Camshaft

**17** Ensure that the cylinder head and camshaft bearing surfaces are clean, then liberally oil the camshaft bearings and lobes. Slide the camshaft back into position in the cylinder head. On carburettor engines, take care that the fuel pump operating lever is not trapped by the camshaft as it is slid into position.



**9.9a ... prise out the oil seal...**



**9.9b ... and slide out the camshaft**

**9.8 Undo the retaining bolt, and remove the camshaft thrust fork (arrowed)...**

**18** Locate the thrust fork with the left-hand end of the camshaft. Refit the fork retaining bolt, tightening it to the specified torque setting.

**19** Lubricate the lips of the new seal with clean engine oil, then drive it into position until it seats on its locating shoulder. Use a suitable tubular drift, such as a socket, which bears only on the hard outer edge of the seal. Take care not to damage the seal lips during fitting. Note that the seal lips should face inwards.

**20** Refit the camshaft sprocket as described in paragraphs 17 to 19 of Section 7.

**21** Refit the cylinder head as described in Section 10.

### 10 Cylinder head - removal and refitting



#### Removal

1 Disconnect the battery negative lead.

2 Drain the cooling system as described in Chapter 1.

3 Remove the cylinder head cover as described in Section 4.

4 Align the engine assembly/valve timing holes as described in Section 3, and lock both the camshaft sprocket and flywheel in position. *Do not attempt to rotate the engine whilst the pins are in position.*

5 Note that the following text assumes that the cylinder head will be removed with both inlet and exhaust manifolds attached; this is easier, but makes it a bulky and heavy assembly to handle. If it is wished to remove the manifolds first, proceed as described in Chapter 4.

6 Working as described in Chapter 4, disconnect the exhaust system front pipe from the manifold. Where fitted, disconnect or release the lambda sensor wiring, so that it is not strained by the weight of the exhaust.

7 Remove the air cleaner housing and intake duct assembly as described in Chapter 4.

8 On carburettor engines, disconnect the following from the carburettor and inlet manifold as described in Chapter 4:

(a) Fuel feed hose from the pump and the return hose from the anti-percolation chamber (plug all openings, to prevent loss of fuel and the entry of dirt into the system).

(b) Accelerator cable.

(c) Choke cable.

(d) Carburettor coolant hoses - 1124 cc models.

(e) Carburettor heating element and idle cutoff solenoid wiring connector(s) - 1360 cc models.

(f) Vacuum servo unit vacuum hose, coolant hose and all other relevant breather/vacuum hoses from the manifold.

9 On fuel injection engines, carry out the following operations as described in Chapter 4:

(a) Depressurise the fuel system, and disconnect the fuel feed and return hoses from the throttle body (plug all openings, to prevent loss of fuel and the entry of dirt into the system).

(b) Disconnect the accelerator cable.

(c) Disconnect the three electrical connector plugs from the throttle body.

(d) Disconnect the vacuum servo unit vacuum hose, coolant hose and all the other relevant vacuum/breather hoses from the inlet manifold.

**10** Remove the centre timing belt cover as described in Section 5.

**11** Loosen the timing belt tensioner pulley retaining nut. Pivot the pulley in a clockwise direction, using a suitable square-section key fitted to the hole in the pulley hub, then retighten the retaining nut.

**12** Disengage the timing belt from the camshaft sprocket, and position the belt clear of the sprocket. Ensure that the belt is not too bent or twisted sharply.

**13** Slacken the retaining clips, and disconnect the coolant hoses from the thermostat housing (on the left-hand end of the cylinder head).

**14** Depress the retaining clip(s), and disconnect the wiring connector(s) from the electrical switch and/or sensor(s) which are screwed into the thermostat housing (as appropriate).

#### Models with a distributor

**15** Disconnect the LT wiring connectors from the distributor and HT coil. Release the TDC sensor wiring connector from the side of the coil mounting bracket, and disconnect the vacuum pipe from the distributor vacuum diaphragm unit. If the cylinder head is to be dismantled for overhaul, remove the distributor and ignition HT coil as described in Chapter 5; disconnect the HT leads from the spark plugs, and remove the distributor cap and lead assembly. If the cylinder numbers are not already marked on the HT leads, number each lead, to avoid the possibility of the leads being incorrectly connected on refitting.

#### Models with a distributorless ignition system

**16** Disconnect the wiring connector from the ignition HT coil. If the cylinder head is to be dismantled for overhaul, remove the ignition HT coil as described in Chapter 5. Note that the HT leads should be disconnected from the spark plugs instead of the coil, and the coil and leads removed as an assembly. If the cylinder numbers are not already marked on the HT leads, number each lead, to avoid the possibility of the leads being incorrectly connected on refitting.

#### All models

**17** Slacken and remove the bolt securing the engine oil dipstick tube to the cylinder head, and withdraw the tube from the cylinder block.

**18** If it is necessary to remove the engine mounting, place a jack beneath the engine, with a block of wood on the jack head. Raise the jack until it is supporting the weight of the engine.

**19** Slacken and remove the three nuts securing the right-hand engine/transmission mounting bracket to the engine. Remove the single nut securing the bracket to the mounting rubber, and lift off the bracket.

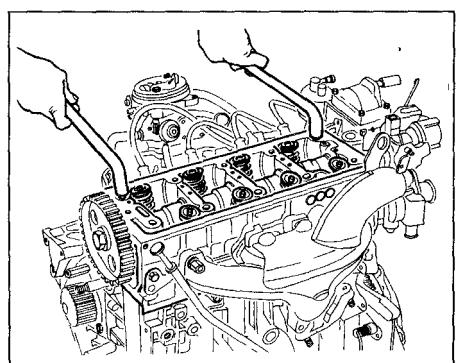
**20** Working in the reverse of the sequence shown in illustration 10.40a, progressively slacken the ten cylinder head bolts by half a turn at a time, until all bolts can be unscrewed by hand.

**21** With all the cylinder head bolts removed, lift the rocker arm assembly off the cylinder head. Note the locating pins which are fitted to the base of each rocker arm pedestal. If any pin is a loose fit in the head or pedestal, remove it for safe-keeping.

**22** The joint between the cylinder head and gasket and the cylinder block/crankcase must now be broken without disturbing the wet liners. Although these liners are better-located and sealed than on some other wet-liner engines, there is still a risk of coolant and foreign matter leaking into the sump if the cylinder head is lifted carelessly. If care is not taken and the liners are moved, there is also a possibility of the bottom seals being disturbed, causing leakage after refitting the head.

**23** To break the joint, obtain two L-shaped metal bars which fit into the cylinder head bolt holes. Gently "rock" the cylinder head free towards the front of the car (see illustration). Do not try to swivel the head on the cylinder block/crankcase; it is located by dowels, as well as by the tops of the liners.

**24** When the joint is broken, lift the cylinder head away; seek assistance if possible, as it is a heavy assembly, especially if it is complete with the manifolds. Remove the gasket from the top of the block, noting the two locating dowels. If the locating dowels are a loose fit, remove them and store them with the head for safe-keeping. Do not discard the gasket - it will be needed for identification purposes (see paragraphs 30 and 31).



**10.23** Using two angled metal rods to free the cylinder head from the block

**25** Do not attempt to rotate the crankshaft with the cylinder head removed, otherwise the wet liners may be displaced. Operations that require the rotation of the crankshaft (eg cleaning the piston crowns), should only be carried out once the cylinder liners are firmly clamped in position.

**HAYNES**  
**HiNT** *Cylinder liners can be clamped in position using large flat washers positioned underneath suitable-length bolts. Alternatively, the original head bolts could be temporarily refitted, with suitable spacers fitted to their shanks.*

**26** If the cylinder head is to be dismantled for overhaul, remove the camshaft as described in Section 9, then refer to Part C of this Chapter.

### Preparation for refitting

**27** The mating faces of the cylinder head and cylinder block/crankcase must be perfectly clean before refitting the head. Use a hard plastic or wood scraper to remove all traces of gasket and carbon; also clean the piston crowns. Refer to paragraph 25 before turning the engine. Take particular care during the cleaning operations, as the soft aluminium alloy is damaged easily. Also, make sure that the carbon is not allowed to enter the oil and water passages - this is particularly important for the lubrication system, as carbon could block the oil supply to the engine's components. Using adhesive tape and paper, seal the water, oil and bolt holes in the cylinder block/crankcase. To prevent carbon entering the gap between the pistons and bores, smear a little grease in the gap. After cleaning each piston, use a small brush to remove all traces of grease and carbon from the gap, then wipe away the remainder with a clean rag. Clean all the pistons in the same way.

**28** Check the mating surfaces of the cylinder block/crankcase and the cylinder head for nicks, deep scratches and other damage. If slight, they may be removed carefully with a file, but if excessive, machining may be the only alternative to renewal.

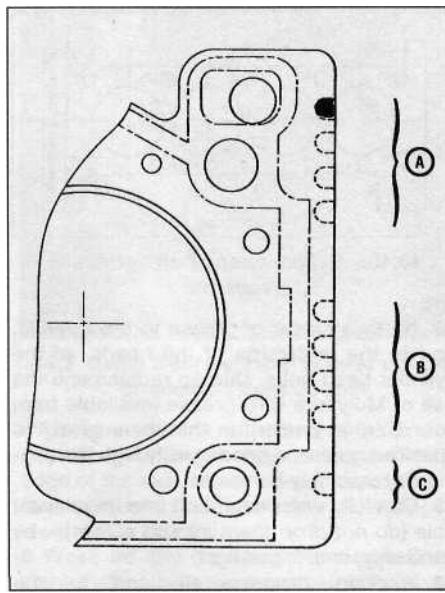
**29** If warpage of the cylinder head gasket surface is suspected, use a straight-edge to check it for distortion. Refer to Part C of this Chapter if necessary.

**30** When purchasing a new cylinder head gasket, it is essential that a gasket of the correct thickness is obtained. There are two different thicknesses available - the standard gasket which is fitted at the factory, and a slightly thicker gasket (+ 0.2 mm), for use once the head gasket face has been machined. The two gaskets can be identified as follows, using the cutouts on the left-hand end of the gasket (see illustration).

**31** With the gasket fitted the correct way up on the cylinder block, there will be a single cutout at the rear of the left-hand side of the gasket identifying the engine type (eg TU engine). In the centre of the gasket, there may be another series of up to four cutouts identifying the manufacturer of the gasket, and whether or not it contains asbestos (these cutouts are of little importance). The important cutout location is at the front of the gasket. On the standard-thickness gasket, there will be no cutout in this position; on the thicker, "repair" gasket, there will be a single cutout. Identify the gasket type, and ensure the new gasket obtained is of the correct thickness. If there is any doubt as to which gasket is fitted, take the old gasket along to your Citroen dealer, and have the dealer confirm the gasket type.

**32** Check the condition of the cylinder head bolts, and particularly their threads, whenever they are removed. Wash the bolts in suitable solvent, and wipe them dry. Check each for any sign of visible wear or damage, renewing any bolt if necessary. Measure the length of each bolt, to check for stretching (although this is not a conclusive test, in the event that all ten bolts have stretched by the same amount). Although Citroen do not actually specify that the bolts must be renewed, it is strongly recommended that the bolts should be renewed as a complete set whenever they are disturbed.

**33** Prior to refitting the cylinder head, check the cylinder liner protrusion as described in Part C of this Chapter.



**10.30 TU engine series gasket markings**

- A Engine type identification cutouts
- B Gasket manufacturer identification cutouts
- C Gasket thickness identification cutout

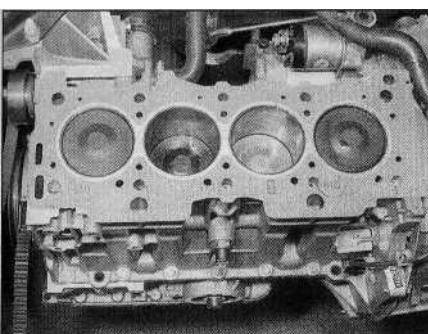
### Refitting

**34** Wipe clean the mating surfaces of the cylinder head and cylinder block/crankcase. Check that the two locating dowels are in position at each end of the cylinder block/crankcase surface and, if necessary, remove the cylinder liner clamps.

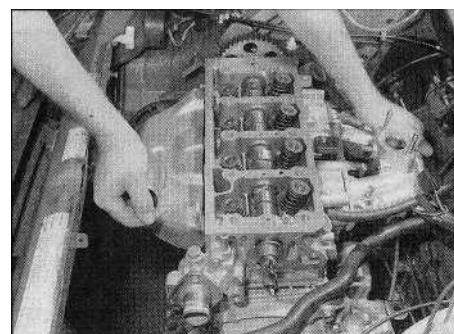
**35** Position a new gasket on the cylinder block/crankcase surface, ensuring that its identification cutouts are at the left-hand end of the gasket (see illustration).

**36** Check that the flywheel and camshaft sprocket are still correctly locked in position with their respective pins. With the aid of an assistant, carefully refit the cylinder head assembly to the block, aligning it with the locating dowels (see illustration).

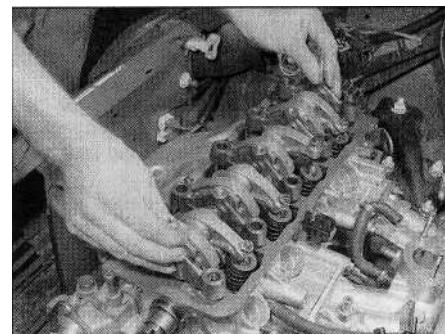
**37** Ensure that the locating pins are in position in the base of each rocker pedestal, then refit the rocker arm assembly to the cylinder head (see illustration).



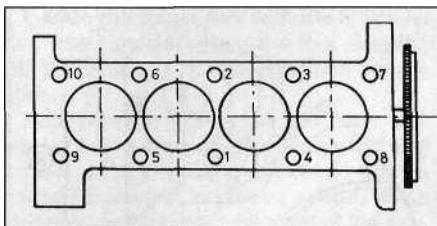
**10.35** Locate the cylinder head gasket on the block ...



**10.36** ... then lower the cylinder head into position ...



**10.37** ... and refit the rocker arm assembly



**10.40a Cylinder head bolt tightening sequence**

**38** Apply a smear of grease to the threads, and to the underside of the heads, of the cylinder head bolts. Citroen recommend the use of Molykote G10 grease (available from your Citroen dealer); in the absence of the specified grease, a good-quality high-melting-point grease may be used.

**39** Carefully enter each bolt into its relevant hole (*do not drop them in*) and screw in, by hand only, until finger-tight.

**40** Working progressively and in the sequence shown, tighten the cylinder head bolts to their stage 1 torque setting, using a torque wrench and suitable socket (**see illustrations**).

**41** Once all the bolts have been tightened to their stage 1 setting, working again in the given sequence, angle-tighten the bolts through the specified stage 2 angle, using a socket and extension bar. It is recommended that an angle-measuring gauge is used during this stage of the tightening, to ensure accuracy (**see illustration**). If a gauge is not available, use white paint to make alignment marks between the bolt head and cylinder head prior to tightening; the marks can then be used to check that the bolt has been rotated through the correct angle during tightening.

**42** With the cylinder head bolts correctly tightened, refit the right-hand engine mounting bracket, and tighten its retaining nuts to the specified torque. The jack can then be removed from underneath the engine.

**43** Refit the dipstick tube to the engine, and securely tighten its retaining bolt.

**44** Refit the timing belt to the camshaft sprocket. Ensure that the "front run" of the belt is taut - ie, ensure that any slack is on the tensioner pulley side of the belt. Do not twist the belt sharply while refitting it, and ensure that the belt teeth are correctly seated centrally in the sprockets.

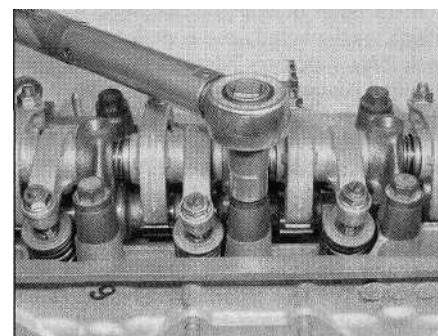
**45** Loosen the tensioner pulley retaining nut. Pivot the pulley anti-clockwise to remove all free play from the timing belt, then retighten the nut.

**46** Tension the belt as described in paragraphs 14 to 19 of Section 6.

**47** Refit the centre and upper timing belt covers as described in Section 5.

#### Models with a distributor

**48** If the head was stripped for overhaul, refit the distributor and HT coil as described in Chapter 5, ensuring that the HT leads are



**10.40b Working in the sequence shown, tighten the head bolts first to the stage 1 torque setting ...**

correctly reconnected. If the head was not stripped, reconnect the wiring connector and vacuum pipe to the distributor, and the HT lead to the coil; clip the TDC sensor wiring connector onto the coil bracket.

#### Models with a distributorless ignition system

**49** If the head was stripped for overhaul, refit the ignition HT coil and leads as described in Chapter 5, ensuring that the leads are correctly reconnected. If the head was not stripped, simply reconnect the wiring connector to the HT coil.

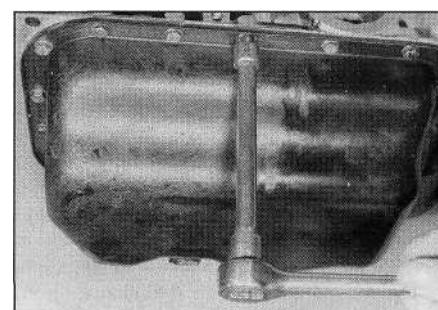
#### All models

**50** Reconnect the wiring connector(s) to the coolant switch/sensor(s) on the left-hand end of the head.

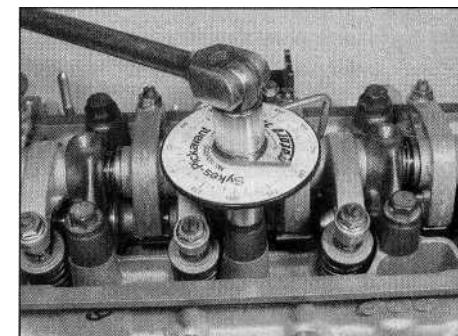
**51** Reconnect the coolant hoses to the thermostat housing, securely tightening their retaining clips.

**52** Working as described in the relevant Part of Chapter 4, carry out the following tasks:

- Refit all disturbed wiring, hoses and control cable(s) to the inlet manifold and fuel system components.
- On carburettor models, reconnect and adjust the choke and accelerator cables.
- On fuel injection models, reconnect and adjust the accelerator cable.
- Reconnect the exhaust system front pipe to the manifold. Where applicable, reconnect the lambda sensor wiring connector.



**11.4 Slacken and remove the sump retaining nuts and bolts ...**



**10.41 ... then through the angle specified for stage 2**

(e) Refit the air cleaner housing and intake duct.

**53** Check and, if necessary, adjust the valve clearances as described in Chapter 1, then refit the cylinder head cover as described in Section 4.

**54** On completion, reconnect the battery, and refill the cooling system as described in Chapter 1.

## 11 Sump - removal and refitting

#### Removal

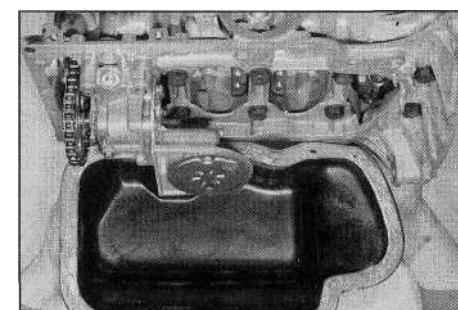
**1** Firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands. Disconnect the battery negative lead.

**2** Drain the engine oil, then clean and refit the engine oil drain plug, tightening it to the specified torque. If the engine is nearing its service interval when the oil and filter are due for renewal, it is recommended that the filter is also removed, and a new one fitted. After reassembly, the engine can then be refilled with fresh oil. Refer to Chapter 1 for further information.

**3** Remove the exhaust system front pipe as described in Chapter 4.

**4** Progressively slacken and remove all the sump retaining nuts and bolts (**see illustration**).

**5** Break the joint by striking the sump with the palm of your hand, then lower the sump and withdraw it from underneath the vehicle (**see illustration**).



**11.5 ... then remove the sump from the engine**

**6** While the sump is removed, take the opportunity to check the oil pump pick-up strainer for signs of clogging or splitting. If necessary, remove the pump as described in Section 12, and clean or renew the strainer.

### Refitting

**7** Clean all traces of sealant from the mating surfaces of the cylinder block/crankcase and sump, then use a clean rag to wipe out the sump and the engine's interior.

**8** Ensure that the sump and cylinder block/crankcase mating surfaces are clean and dry, then apply a coating of suitable sealant to the sump mating surface. Citroen recommend the use of Auto-Joint E10 sealant (available from your Citroen dealer); in the absence of the specified sealant, any good-quality sealant may be used.

**9** Offer up the sump, locating it on its retaining studs, and refit its retaining nuts and bolts. Tighten the nuts and bolts evenly and progressively to the specified torque.

**10** Refit the exhaust front pipe as described in Chapter 4.

**11** Replenish the engine oil as described in Chapter 1.

## 12 Oil pump - removal, inspection and refitting



**12.2** Oil pump is retained by three bolts

measured by comparing it with a new one; if there is any doubt about its condition, it should also be renewed. Both the piston and spring are available individually.

**7** Thoroughly clean the oil pump strainer with a suitable solvent, and check it for signs of clogging or splitting. If the strainer is damaged, the strainer and cover assembly must be renewed.

**8** Locate the relief valve spring and piston in the strainer cover, then refit the cover to the pump body. Align the relief valve piston with its bore in the pump. Refit the five cover retaining bolts, tightening them securely.

### Refitting

**9** Ensure that the locating dowel is in position, then locate the pump sprocket with its drive chain. Seat the pump on the main bearing ladder. Refit the pump retaining bolts, and tighten them to the specified torque setting.

**10** Refit the sump as described in Section 11.

## 13 Crankshaft oil seals - renewal



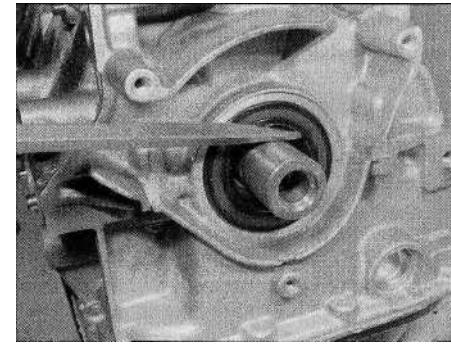
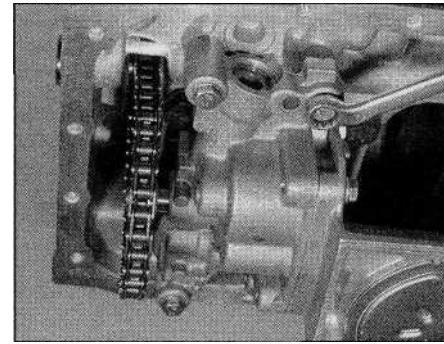
### Right-hand oil seal

**1** Remove the crankshaft sprocket and flanged spacer as described in Section 7. Secure the timing belt clear of the working area, so that it cannot be contaminated with oil. Make a note of the correct fitted depth of the seal in its housing.

**2** Punch or drill two small holes opposite each other in the seal. Screw a self-tapping screw into each, and pull on the screws with pliers to extract the seal. Alternatively, the seal can be levered out of position using a suitable flat-bladed screwdriver, taking great care not to damage the crankshaft shoulder or seal housing (see illustration).

**3** Clean the seal housing, and polish off any burrs or raised edges, which may have caused the seal to fail in the first place.

**4** Lubricate the lips of the new seal with clean engine oil, and carefully locate the seal on the end of crankshaft. Note that its sealing lip must face inwards. Take care not to damage the seal lips during fitting.



**13.2** Using a screwdriver to lever out the crankshaft front oil seal

**5** Using a suitable tubular drift (such as a socket) which bears only on the hard outer edge of the seal, tap the seal into position, to the same depth in the housing as the original was prior to removal.

**6** Wash off any traces of oil, then refit the crankshaft sprocket as described in Section 7.

### Left-hand oil seal

**7** Remove the flywheel as described in Section 14.

**8** Make a note of the correct fitted depth of the seal in its housing. Punch or drill two small holes opposite each other in the seal. Screw a self-tapping screw into each, and pull on the screws with pliers to extract the seal.

**9** Clean the seal housing, and polish off any burrs or raised edges, which may have caused the seal to fail in the first place.

**10** Lubricate the lips of the new seal with clean engine oil, and carefully locate the seal on the end of the crankshaft.

**11** Using a suitable tubular drift, which bears only on the hard outer edge of the seal, drive the seal into position, to the same depth in the housing as the original was prior to removal.

**12** Wash off any traces of oil, then refit the flywheel as described in Section 14.

## 14 Flywheel - removal, inspection and refitting



### Removal

**1** Remove the transmission as described in Chapter 7, then remove the clutch assembly as described in Chapter 6.

**2** Prevent the flywheel from turning by locking the ring gear teeth with a similar arrangement to that shown in illustration 7.10 (Section 7). Alternatively, bolt a strap between the flywheel and the cylinder block/crankcase. Do not attempt to lock the flywheel in position using the locking pin described in Section 3.

**3** Slacken and remove the flywheel retaining bolts, and discard them; they must be renewed whenever they are disturbed.

**4** Remove the flywheel. Do not drop it, as it is very heavy. If the locating dowel is a loose fit in the crankshaft end, remove and store it with the flywheel for safe-keeping.

### Inspection

**3** Examine the oil pump sprocket for signs of damage and wear, such as chipped or missing teeth. If the sprocket is worn, the pump assembly must be renewed, since the sprocket is not available separately. It is also recommended that the chain and drive sprocket, fitted to the crankshaft, be renewed at the same time. Renewal of the chain and drive sprocket is an operation requiring the removal of the main bearing ladder, and cannot therefore be carried out with the engine still fitted to the vehicle. Refer to Part C for further information.

**4** Slacken and remove the five bolts securing the strainer cover to the pump body, then lift off the strainer cover. Remove the relief valve piston and spring, noting which way round they are fitted.

**5** Examine the pump rotors and body for signs of wear ridges and scoring. If worn, the complete pump assembly must be renewed.

**6** Examine the relief valve piston for signs of wear or damage, and renew if necessary. The condition of the relief valve spring can only be

## Inspection

**5** If the flywheel's clutch mating surface is deeply scored, cracked or otherwise damaged, the flywheel must be renewed. However, it may be possible to have it surface-ground; seek the advice of a Citroen dealer or engine reconditioning specialist.

**6** If the ring gear is badly worn or has missing teeth, it must be renewed. This job is best left to a Citroen dealer or engine reconditioning specialist. The temperature to which the new ring gear must be heated for installation is critical and, if not done accurately, the hardness of the teeth will be destroyed.

## Refitting

**7** Clean the mating surfaces of the flywheel and crankshaft. Remove any remaining locking compound from the threads of the crankshaft holes, using the correct-size tap, if available.

**8** If the new flywheel retaining bolts are not supplied with their threads already pre-coated, apply a suitable thread-locking compound to the threads of each bolt. Citroen recommend the use of Frenetanch E3 (available from your Citroen dealer); in the absence of this, ensure that a good-quality locking compound is used.

**9** Ensure that the locating dowel is in position. Offer up the flywheel, locating it on the dowel, and fit the new retaining bolts.

**10** Lock the flywheel using the method employed on dismantling, and tighten the retaining bolts to the specified torque.

**11** Refit the clutch as described in Chapter 6. Remove the locking tool, and refit the transmission as described in Chapter 7.

## 15 Engine/transmission mountings - inspection and renewal



## Inspection

**1** If improved access is required, raise the front of the car and support it securely on axle stands.

**2** Check the mounting rubber to see if it is cracked, hardened or separated from the metal at any point; renew the mounting if any such damage or deterioration is evident.

**3** Check that all the mounting's fasteners are securely tightened; use a torque wrench to check if possible.

**4** Using a large screwdriver or a crowbar,

check for wear in the mounting by carefully levering against it to check for free play. Where this is not possible, enlist the aid of an assistant to move the engine/transmission unit back and forth, or from side to side, while you watch the mounting. While some free play is to be expected even from new components, excessive wear should be obvious. If excessive free play is found, check first that the fasteners are correctly secured, then renew any worn components as described below.

## Renewal

### Right-hand mounting

**5** Disconnect the battery negative lead.

**6** Place a jack beneath the engine, with a block of wood on the jack head. Raise the jack until it is supporting the weight of the engine.

**7** Slacken and remove the three nuts securing the right-hand engine/transmission mounting bracket to the engine. Remove the single nut securing the bracket to the mounting rubber, and lift off the bracket.

**8** Lift the rubber buffer plate off the mounting rubber stud, then unscrew the mounting rubber from the body and remove it from the vehicle.

**9** Check carefully for signs of wear or damage on all components, and renew them where necessary.

**10** On reassembly, screw the mounting rubber into the vehicle body, and tighten it securely.

**11** Refit the rubber buffer plate to the mounting rubber stud, and install the mounting bracket.

**12** Tighten the mounting bracket retaining nuts to the specified torque setting.

**13** Remove the jack from underneath the engine, and reconnect the battery negative terminal.

### Left-hand mounting

**14** Remove the battery and the battery tray, as described in Chapter 5. Slacken and remove the battery support plate mounting bolts. Release the wiring from its retaining clip on the plate, and remove the plate from the engine compartment.

**15** Place a jack beneath the transmission, with a block of wood on the jack head. Raise the jack until it is supporting the weight of the transmission.

**16** Slacken and remove the mounting rubber centre nut, and the two nuts securing it to the

bracket. Lift the mounting rubber off its centre stud.

**17** Where necessary, slacken and remove the two mounting bolts (situated underneath the bracket) securing the mounting bracket to the body, and remove the bracket from the engine compartment. The transmission bracket can then be removed, once its three mounting nuts have been undone.

**18** Check carefully for signs of wear or damage on all components, and renew them where necessary.

**19** Where necessary, refit the bracket to the top of the transmission housing, tightening its mounting nuts to the specified torque. Refit the bracket to the body, and tighten its retaining bolts to the specified torque.

**20** Locate the mounting rubber on the mounting stud, and refit its two mounting nuts, tightening them securely. Refit the mounting centre nut and tighten to the specified torque. Remove the jack from underneath the transmission.

**21** Refit the battery support plate, tightening its retaining bolts securely. Refit the battery and its tray as described in Chapter 5.

## Rear mounting

**22** If not already done, firmly apply the handbrake, then jack up the front of the vehicle and support it securely on axle stands.

**23** Slacken and remove the nuts and bolts securing the mounting bracket to the rear mounting assembly and the subframe, and manoeuvre the bracket out of position.

**24** To remove the rear mounting assembly, it is first necessary to remove the right-hand driveshaft as described in Chapter 8.

**25** With the driveshaft removed, undo the four bolts securing the mounting assembly to the rear of the cylinder block, and remove it from underneath the vehicle.

**26** Check carefully for signs of wear or damage on all components, and renew them where necessary. Note that it is not possible to renew the mounting rubber separately, if the rubber is damaged, the complete rear mounting assembly must be renewed.

**27** On reassembly, fit the rear mounting assembly to the rear of the cylinder block, and tighten its retaining bolts to the specified torque. Refit the driveshaft as described in Chapter 8.

**28** Manoeuvre the mounting bracket into position, and refit the bolts securing it to the mounting and subframe. Tighten each bolt to its respective torque setting, then lower the vehicle to the ground.