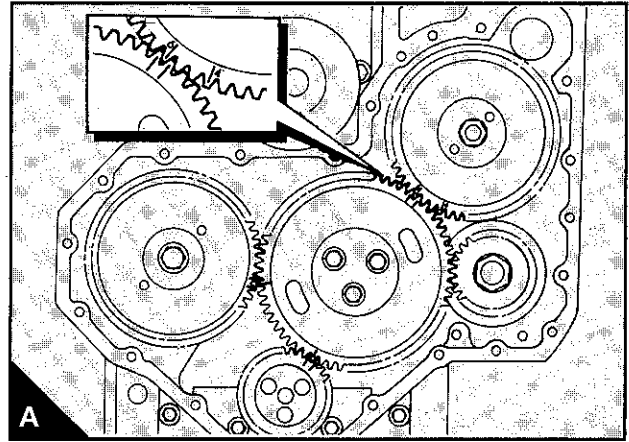


17B

General description

The timing gears are stamped with timing marks to ensure that they are assembled correctly (A). The stamped teeth of the crankshaft, camshaft and fuel pump gears will be in mesh with the idler gear when number 1 piston is at top dead centre (TDC) on the compression stroke. The marked teeth of the idler gear may not necessarily be in mesh, in this position, due to the different speeds at which the gears rotate.

The fuel pump gear has timing marks for four and six cylinder engines. Also the gear is stamped with the letter "C" where a CAV fuel pump is fitted. The letter "M" is stamped on the fuel pump gear to indicate that the threads for the screws of the gear puller are metric.



To set number 1 piston
to TDC on the compression stroke **17B-01**

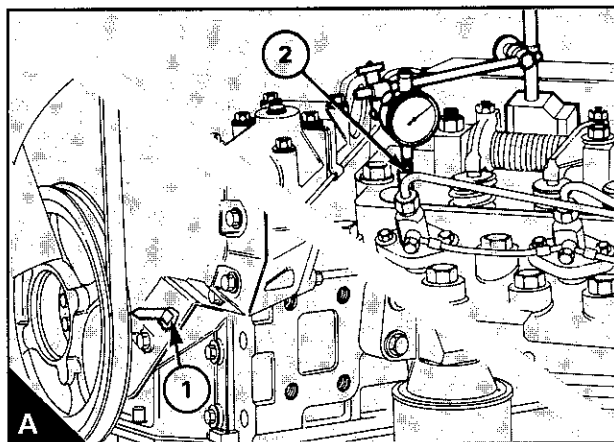
Special tools:

Valve spring compressor, PD.6118B

Stud adaptor for use with PD.6118B, PD.6118B-7

Setscrew adaptor for use with PD.6118B, PD.6118B-8

- 1 Fasten a temporary pointer to the timing case cover with its tip near to the outer edge of the crankshaft pulley or damper (A1).
- 2 Remove the rocker cover, operation 12A-01.
- 3 Turn the crankshaft, clockwise from the front, until the push rod for the inlet valve of the rear cylinder just tightens.
- 4 Remove the spring clip and the spacer from the front of the rocker shaft. Release the fasteners of the front two pedestals of the rocker shaft and remove the front rocker lever; tighten the fasteners of the rocker shaft pedestals.
- 5 Remove the valve springs from the front valve with the valve spring compressor 6118B and the adaptor PD6118-7, for pedestal studs, or the adaptor PD.6118-8, for pedestal setscrews.
- 6 Allow the valve to be held by the top of the piston. Fit a suitable collar near the top of the valve to hold the valve if the crankshaft is turned too far.
- 7 Fasten a dial test indicator with its plunger in contact with the top of the valve stem (A2) and with a reading shown on the gauge. Turn the crankshaft slowly, clockwise from the front, until the clockwise movement of the dial gauge pointer just stops. Make a suitable mark on the crankshaft pulley to align with the temporary pointer. Continue to turn the crankshaft, in the same direction, until the gauge pointer just begins to move in a counter-clockwise direction. Make another mark on the pulley to align with the pointer. Mark the centre point between the two marks on the pulley and remove the other two marks.
- 8 Turn the crankshaft approximately 45° counter-clockwise from the front and then clockwise until the mark on the pulley is aligned with the pointer. Number 1 piston is now at TDC on the compression stroke.

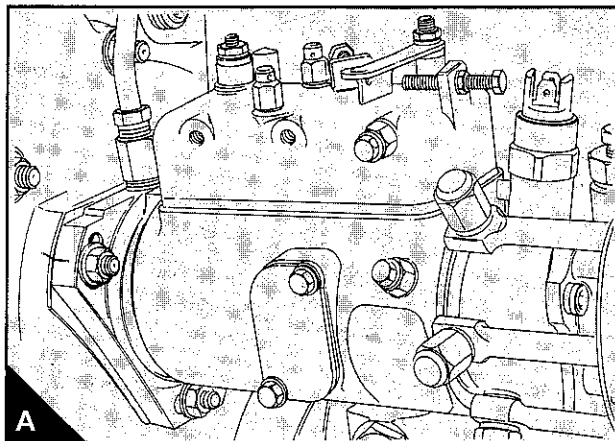


17B

To check the valve timing

17B-02

- 1 Set the piston of number 1 cylinder to TDC compression stroke, operation 17B-01.
 - 2 Remove the dial test indicator from number 1 inlet valve and fit the valve springs and the rocker lever. Ensure that the fasteners for the rocker shaft pedestals are to the correct torque.
 - 3 Turn the crankshaft, clockwise from the front, until the inlet valve of the rear cylinder is fully open.
 - 4 Set the valve tip clearance of number 1 cylinder inlet valve to 1,5 mm (0.059 in).
 - 5 Turn the crankshaft, clockwise from the front, until the push rod of number 1 cylinder inlet valve just tightens. In this position, check if the mark on the crankshaft pulley is within $2\ 1/2^\circ$ of the pointer.
2 $1/2^\circ$ is 4,5 mm (0.18 in) at the circumference of the standard pulley, which has a diameter of 203 mm (8 in).
 - 6 If the timing is more than $2\ 1/2^\circ$ out of position, the timing gears are probably not in correct mesh.
- Attention:** One tooth on the camshaft gear is equivalent to 23,0 mm (0.90 in) of pulley circumference.
- 7 Turn the crankshaft, clockwise from the front, until the inlet valve of the rear cylinder is fully open. Set the valve tip clearance of the inlet valve of number 1 cylinder to 0,20 mm (0.008 in).
 - 8 Fit the rocker cover, operation 12A-01.
 - 9 Remove the temporary pointer from the timing case and the timing mark from the pulley.



To check the timing of the fuel injection pump

17B-03

If the mark on the flange of the fuel injection pump is in line with the mark on the timing case (A), the timing of the fuel injection pump should be correct. If the timing marks are in line and the engine performance indicates that the timing is not correct, check that the marks on the flange and on the timing case are in their correct positions, operations 17B-04 and 17B-05.

To check the timing mark
of the fuel injection pump

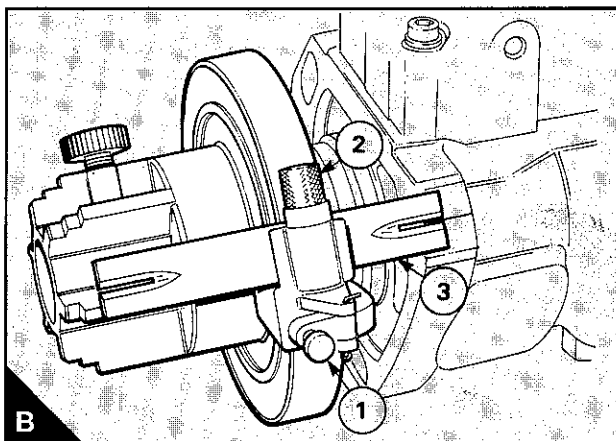
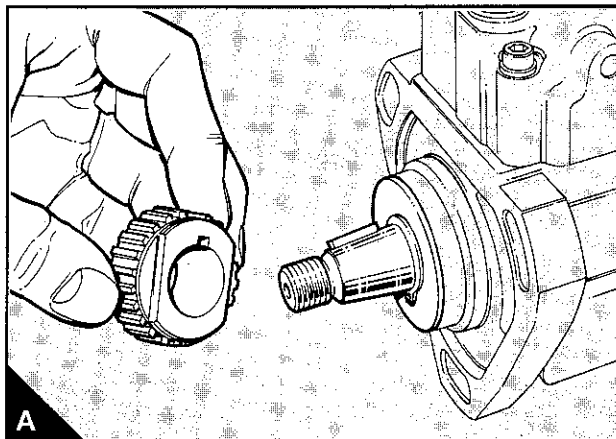
17B-04

Special tools:

Universal timing tool, MS.67B

Gear adaptor for use with MS.67B, PD.67-3

- 1 Remove the fuel injection pump, operation 20A-06B.
- 2 Fit the adaptor PD.67-3 (A) to the drive shaft of the fuel pump and fasten it with the nut of the fuel pump gear.
- 3 Remove the banjo bolt from number 1 high pressure outlet - outlet "W" for four cylinder engines, outlet "Y" for six cylinder engines - and fit a banjo bolt which does not contain a pressure valve.
- 4 Connect number 1 outlet to an atomiser tester. Operate the hand pump until a pressure of 30 atm (440 lbf.in²) 31 kgf/cm² is indicated on the gauge.
- 5 Loosen the screw (B1) on the timing tool MS.67B and set the timing tool to the correct angle, see section 11C. Tighten the screw.
- 6 Fit the timing tool to the adaptor on the fuel pump drive shaft. Turn the drive shaft of the fuel pump by hand in the normal direction of rotation - see arrow on pump data plate - until the fuel pressure prevents movement. In this position, the fuel pump is set at the start of injection for number 1 outlet.
- 7 Loosen the screw (B2). Slide the pointer (B3) forward until it is over the centre of the pump flange and check that the mark on the flange is in the centre of the slot in the pointer.
- 8 If the mark is not correct, remove the timing tool and eliminate the mark. Fit the timing tool and ensure that the fuel pump is at the start of injection for number 1 cylinder. Loosen the screw (B2). Slide the pointer forward to the complete width of the flange and tighten the screw. Make a new mark on the flange of the pump through the slot in the pointer.
- 9 Remove the timing tool and the adaptor.
- 10 Disconnect the atomiser tester and fit the original banjo bolt to number 1 high pressure outlet.
- 11 Fit the fuel injection pump, operation 20A-06B.
- 12 Eliminate air from the fuel system, operation 20A-08B.



17B

To check the engine timing mark

17B-05

Special tools:

Universal timing tool, MS.67B

Adaptor for use with MS.67B, PD.67-2

Pointer for use with MS.67B, PD.67-4

Distance piece for use with MS.67B, PD.67-5

- 1 Set the piston of number 1 cylinder to TDC on the compression stroke, operation 17B-01.
- 2 Remove the fuel injection pump and its joint, operation 20A-06B.
- 3 Align the key in the adaptor PD.67-2 (A) with the keyway in the gear of the fuel injection pump and fit the adaptor to the gear. Ensure that the adaptor is against the rear face of the timing case. Secure the adaptor to the gear with the nut supplied with the adaptor.
- 4 Loosen the screw (B1) on the timing tool MS67B. Set the timing tool to the correct engine check angle, see section 11C, and tighten the screw. Loosen the screw (B2) and fit the splined shaft (B5) into the timing tool (B). Loosen the screw (B4). Fit the 90° pointer PD67-4 (B3) and tighten the screw.
- 5 Fit the splined shaft of the timing tool to the adaptor. Slide the timing tool along the splined shaft until it is against the adaptor and tighten the screw (B2).
- 6 Loosen the lock screw (B4). Slide the pointer forward until the flat face is against the rear face of the timing case and tighten the screw. If the mark on the timing case is correct, the mark will align with the top edge of the pointer (B3). If the mark is not correct, remove the timing tool and eliminate the mark on the timing case. Fit the timing tool. Ensure that the pointer is against the timing case and make a new mark on the timing case along the top straight edge of the pointer.
- 7 Remove the timing tool and the adaptor.
- 8 Fit the fuel injection pump and a new joint, operation 20A-06B.
- 9 Remove the dial gauge from number 1 cylinder inlet valve and fit the valve springs and the rocker lever. Set the valve tip clearance of number 1 cylinder inlet valve to 0,20 mm (0.008 in). Fit the rocker cover, operation 12A-01.
- 10 Eliminate air from the fuel system, operation 20A-08B.

