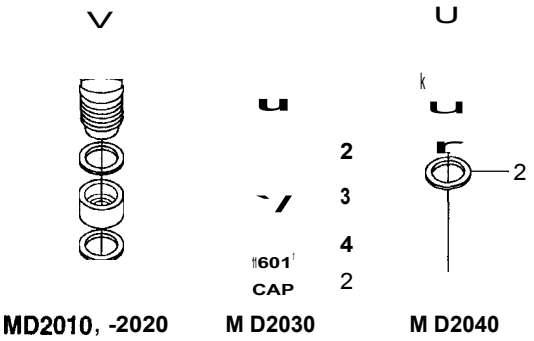


Fig. 10. Dismantling of injectors

1. Injector
2. Copper gasket
3. Heat shield (MD2030)
4. Insert (MD2010-2030)

13. Unscrew the injectors. Use a long socket, 80 mm.

MD2010, MD2020, MD2030 = 22 mm
MD2040 = 27 mm.

Remove the copper gaskets under the injectors.

MD2030: Remove the heat shields (3, Fig. 10).

MD2010, MD2020, MD2030: Remove the inserts (4) and the lower copper washers.

14. Release the electric cable to the glow plug. Remove the conductor rail and unscrew the glow plug.

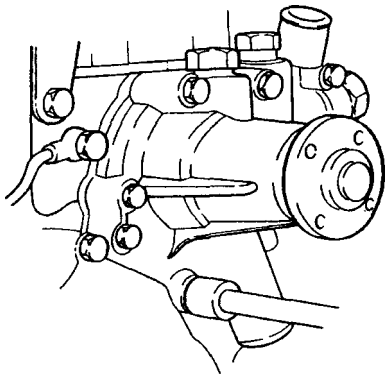


Fig. 11. Dismantling of circulation pump

15. MD2010, MD2020, MD2030: Remove the circulation pump.

MD2030: Note. The pump must be released/removed **before** the cylinder head is released. The pump can otherwise be broken. Remove the spring and thermostat.

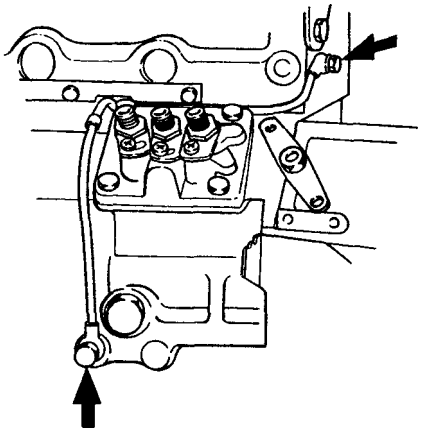


Fig. 12. Dismantling of oil pressure pipe (cylinder block - cylinder head/rocker mechanism)

16. Remove the oil pressure pipe between the cylinder block and cylinder head (rocker mechanism on MD2040).

17. Remove the valve cover (built together with the inlet pipe on MD2010, MD2020 and MD2030).

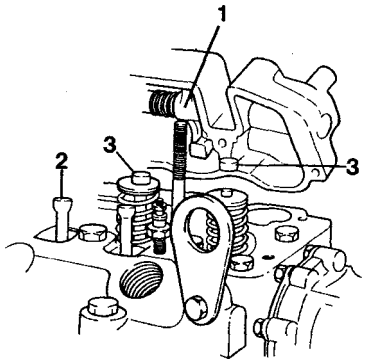


Fig. 13. Dismantling of rocker mechanism (MD2040)

1. Rocker mechanism
2. Pull rods
3. Valve caps

18. Release the nuts from the rockers' bearing brackets. Remove the rocker mechanism (1, Fig. 13) and pull rods (2). Remove the valve caps (3, MD2040) from the valve stem.

19. Release the cylinder head screws in several stages.

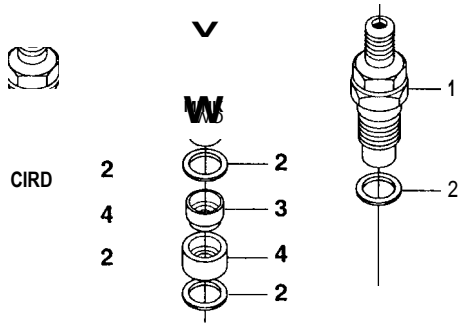
Note: Begin in the middle of the cylinder head and release the screws in a circle outwards.

Lift off the cylinder head.

9. MD2O10, MD2020: Fit the circulation pump.

   MD2030: Fit the circulation pump and thermostat and spring (see Fig. 35).

10. Fit the glow plug, Tightening torque: see Technical data. Fit the conductor rail and connect the electric cable.



MD2010, -2020 **MD2030** **M D2040**

Fig. 34. Fitting of injectors

1. Injector
2. Copper gasket
3. Heat shield (MD2030)
4. Insert (MD2O10-2030)

11. Fit the copper gaskets, heat shields (MD2030) and inserts (MD2O10-MD2030) to the injectors as per Fig. 34.

    Fit the injectors. Use socket L=80 mm (3.15 in), key width = 22 mm (MD2O10-MD2030), and 27 mm (MD2040).

    Tightening torque MD2O10, MD2030, MD2040: 60-70 Nm (44.3-51.7 ft.lbs)

    Tightening torque MD2030: 80-85 Nm (59.0-62.7 ft.lbs).

12. Put on new copper gasket and fit the fuel leak pipe. Tighten the nuts and connect the return pipe.

13. Fit the delivery pipe complete. Tightening torque 20-25 Nm (14.8-18.4 ft.lbs).

14. MD2O10, MD2020, MD2030: Fit the induction manifold.

    MD2040: Fit the inlet pipe complete with air filter.

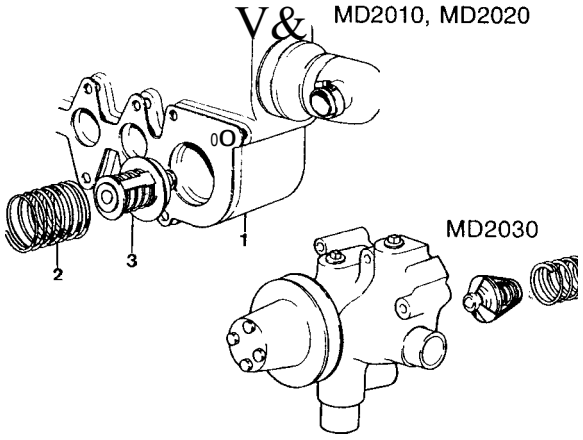


Fig. 35. Fitting of thermostat (MD2O10, MD2020, MD2030) and expansion tank.

15. MD2O10, MD2020: Fit the rubber seal, thermostat (3) and spring (2) in the heat exchanger housing (1)

16. Fit the expansion tank complete with heat exchanger. Connect the hoses to the heat exchanger housing and refrigerant pump. Tighten the hose clips.

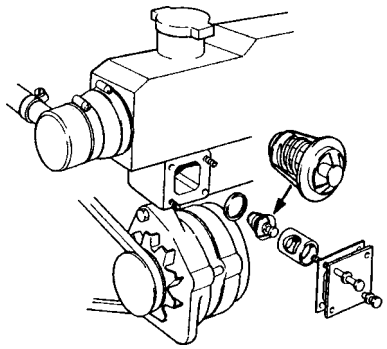


Fig. 36. Fitting of thermostat (MD2040)

17. MD2040: Fit the rubber seal, thermostat and spacer ring in the heat exchanger housing. Fit the cover over the thermostat.

18. Connect the electric cables to the oil pressure relay, and to the refrigerant temperature relay and sensor (where appropriate).

Fuel system

General

The fuel is induced by the feed pump from the fuel tank through a water separating pre-filter (accessory) and pressed through the fine filter to the injection pump (Fig. 85).

Return fuel from the injectors is led through the fuel leak pipe/return pipe back to the tank.

3

6

Fig. 85. Fuel system, principle drawing

1. Fuel tank
2. Pre-filter
3. Feed pump
4. Fine fuel filter
5. Injection pump
6. Injector

Injection pump

The injection pump is a flange-mounted in-line pump placed on the right-hand side of the engine. The pump is driven via cams on the engine's camshaft which directly activate the pump element.

Centrifugal regulator

The regulator is mechanical and works with speed sensing regulator weights. It is fitted at the front on the camshaft gear from where it is also driven.

The regulator weights activate the injection pump's control rod via the regulator sleeve, a lever and a regulator arm. The speed is regulated over the entire engine speed range, from low idling speed to high speed (universal type).

Feed pump

The feed pump is also positioned on the right-hand of the engine and is driven via a cam on the engine's camshaft.

Injectors

The engines are fitted with injectors (Fig. 86). Each injector basically consists of a nozzle holder and a nozzle.

When the fuel pressure has increased to the set value (opening pressure) the nozzle needle (pin) (5) lifts which is held pressed against its seat by the thrust washer (6) and atomised fuel is injected into the engine's precombustion chamber.

The injector's opening pressure is determined by the tension of the thrust washer, which in turn is adjusted with adjuster washers (7).

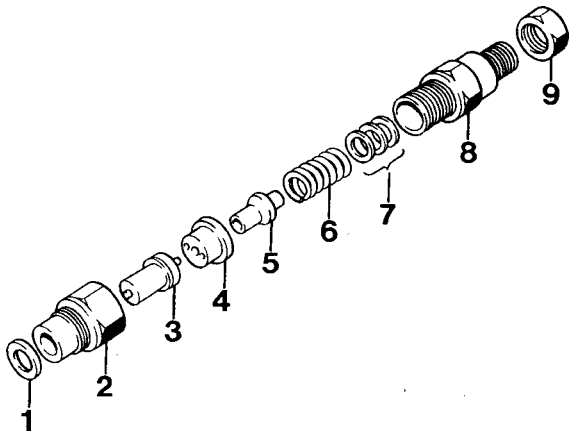


Fig. 86. Injector, complete

1. Packing
2. Nozzle nut
3. Nozzle sleeve
4. Spacer
5. Nozzle needle (pin)
6. Thrust washer
7. Adjusterwashers
8. Nozzle holder
9. Nut

Fuel filter

The fuel filter is of the disposable type. The filter insert consists of a specially wound paper filter.

Injectors

Replacement of injectors

1. Wash clean round the injectors.
2. Release the delivery pipes at the injection pump and at the injectors. Lift off the delivery pipes together.
3. Remove the nut on the top of each injector and lift off the fuel leak pipe.

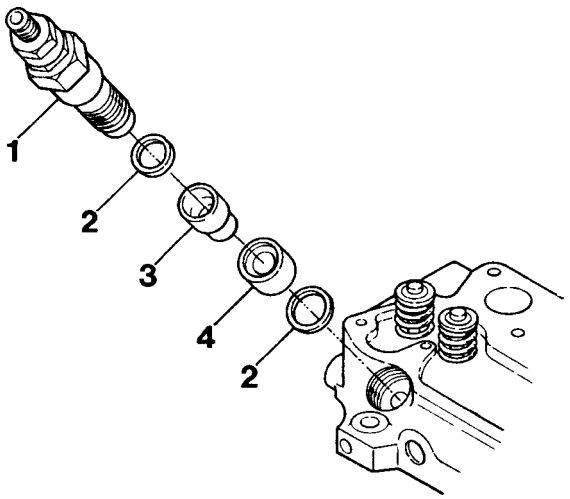


Fig.102. Dismantling of injector

1. Injector
2. Copper packing
3. Heat shield (MD2030)
4. Insert (MD2O10-2030)

4. Unscrew the injectors. Use socket, L = 80 mm.

   Socket width = 22 mm (MD2O10, 2020, 2040), socket width = 27 mm (MD2030)

   Remove the copper packings under the injectors.

   MD2030: Remove the heat shields (3, Fig. 102).

   MD2O10, MD2020, MD2030: Remove the inserts (4) and the inner copper washers.

5. Fit a protective cap on the pipe connections on the injectors over the nozzle if the injector is not to be fitted immediately.

6. Fit the new injector.

   Tightening torque: see Technical data.

7. Fit the fuel leak pipe.

8. Fit the delivery pipes. Check that they do not come skew, and tighten the nuts.

   Tightening torque: 20-25 Nm (14.7-18.4 ft.lbs).

9. Start the engine and check that no leakage occurs.

Renovating injectors

1. Clean the injector internally.
2. Place the injector (holder) in a vice. Unscrew the nozzle nut and take the injector apart.

   Note: Observe care when taking it apart so that the nozzle needle does not drop out.

3. Pull out the nozzle needle from the nozzle sleeve and place the parts in cleaning petrol.

Note: Make sure that the nozzle needles and nozzle sleeves which belong together and are adjusted to each other are not mixed up if several nozzles are cleaned together. To avoid confusion the nozzles . should be placed in a nozzle rack or in different compartments.

4. Check the nozzle carefully with a lamp magnifier or in a microscope. Check the other parts also.
5. When fitting a **new nozzle** it is important that preserving oil is washed off the nozzle needle and sleeve before the injector is assembled (avoid skin contact with needle's slide surface).

   Clean the parts in pure alcohol. Check that the nozzle needle slides in the sleeve without sticking.

6. Dip the nozzle parts in pure diesel or testing oil and put the injector together. Use the original thickness of adjuster washer(s) to set the opening pressure.
7. Check the opening pressure, jet pattern and tightness in a nozzle testing device.

Testing of injectors

Testing is carried out in a nozzle testing device. The opening pressure and tightness are the most important part of the test. The jet pattern is more difficult to evaluate and does not give a reliable indication of the condition of the nozzle.

A **WARNING!** Observe care when testing the injectors so that unprotected parts of the body are not hit by the fuel jet from a nozzle. The jet has such a powerful impact that it can penetrate into the skin and cause blood poisoning.

Adjusting the opening pressure, injector

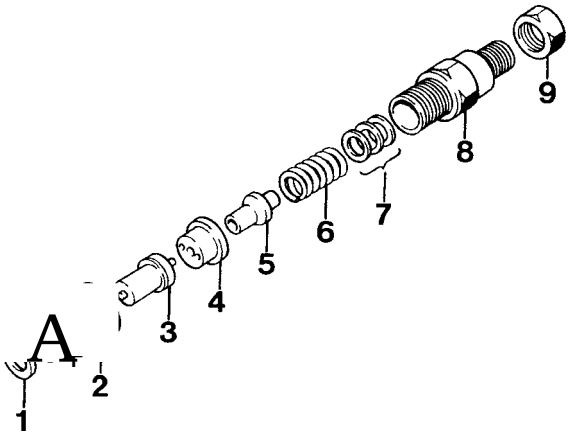


Fig. 103. Adjuster washers (7), injector

Press the nozzle testing device's lever slowly down with the manometer connected until the nozzle opens and releases the fuel. Read off at that precise moment the opening pressure.

If the value read off does not correspond with the prescribed value the setting must be changed. This is done with adjuster washers (Fig. 103).

Note: The opening pressure increases or diminishes with approx. 1 MPa (10 kp/cm^2, 142.2 lbf/int) with a change in the thickness of the adjuster washer by 0.1 mm (.0039 in).

Checking of injectors

Jet pattern

1. Pump with the nozzle testing device and check the jet pattern. The fuel jet should be conformed and in line with the centre line of the nozzle.
2. Check that the fuel jet has a circular cross section.

Tightness

Tightness testing examines potential leakage between the seat of the nozzle needle and the conical sealing surface of the nozzle sleeve.

1. Wipe off the nozzle pin so that it is dry.
2. Pump up the pressure to approx. 2 MPa (20 kp/cm^2, 284.4 lbf/int) under the injector's opening pressure (see Technical data). Hold the pressure constant for 10 seconds and check if any fuel drips from the nozzle pin. Wet nozzles can be approved.

Fit protective caps on the injector's pipe connections and over the nozzle heads if the injectors are not to be fitted immediately.