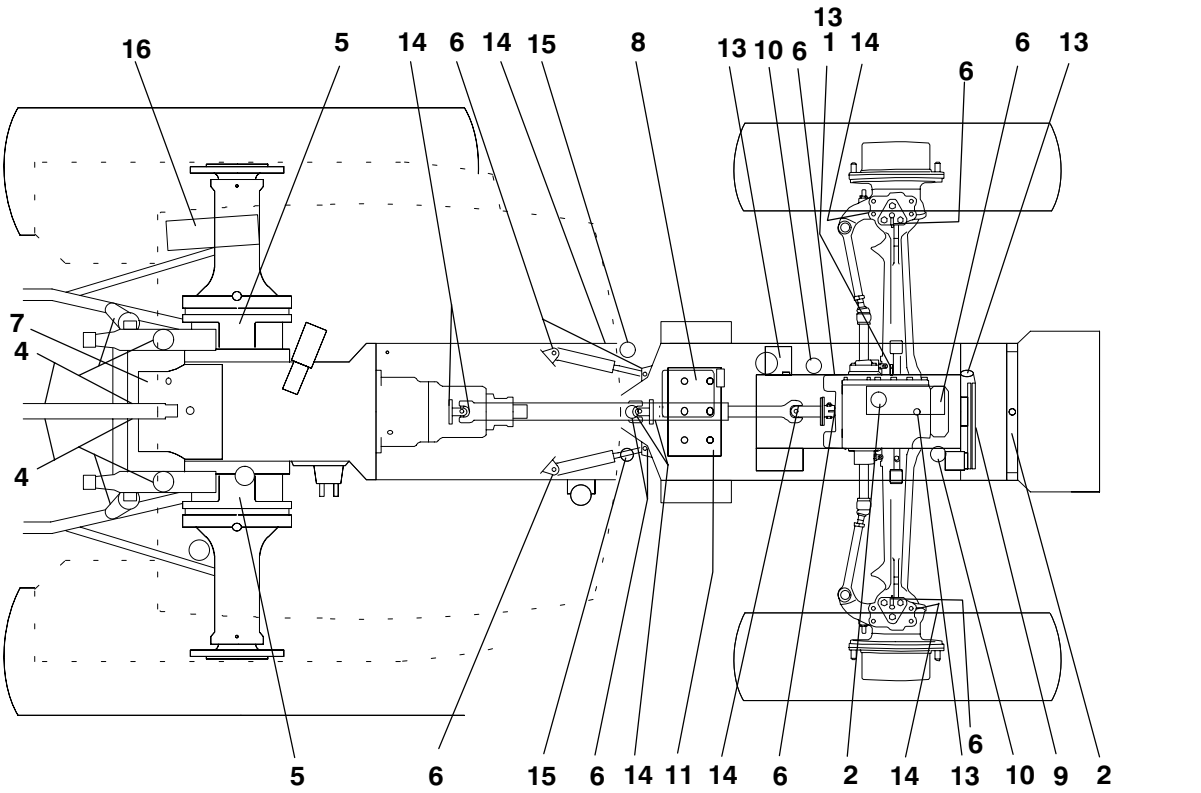
VALTRA

95
105
115
X100
X110
X120

Service Manual

Maintenance schedule



60A–10,5

Daily/every 10 hours

1. Check engine oil level
2. Check coolant level and radiator fins
3. Check for leakage

Weekly/every 50 hours

4. Grease three–point linkage and trailer hitch, option
5. Grease brake mechanism (high pressure grease)
6. Grease the following points:
   – bearings of front axle mounting (2 nipples)
   – front axle king pins (4 nipples), Carraro axle only
   – frame steering bearings (2 nipples)
   – steering cylinders bearings (4 nipples)
7. Check oil level in transmission and hydraulics
8. Clean the prefilter of the engine air intake
9. Check belt/belts tightness
10. Check fuel system pre–filter (X100–X120) /check/ empty water trap (95–115)
11. Check electrolyte level in battery

Every 250 hours

12. Grease door and window hinges and locks
13. Change engine oil and filter
14. Grease the following parts:
    – joints of powered front axle (2 nipples)
    – power transmission shaft of the front axle (4 nipples)
    – shaft between transmission and motor (4 nipples)
15. Check brake fluid level and clutch fluid level (95, 105 and 115)
16. Clean cab ventilation air filter
17. Check wheel nuts and bolts and tyre pressures

Cylinder head and valve mechanism (Op no 212)

1. Cylinder head

A. Removing cylinder head

1. Remove the engine hood plates. Clean the engine externally and drain the coolant. Disconnect the coolant hoses from the cylinder head and the thermostat housing.

2. Remove the suction hoses between the turbocharger and the air filter and between the turbocharger and the inlet manifold).

3. Disconnect the turbocharger pressure and return oil pipes.

4. Remove the pipes to the thermostart fuel reservoir.

5. Remove the injector leak–off fuel pipes and the delivery pipes. Remove the injectors. Fit blanking–off caps on all open connections.

6. Remove the inlet and exhaust manifolds and the thermostat housing.

Note! It is possible to remove the cylinder head even thought these parts are attached to the head.

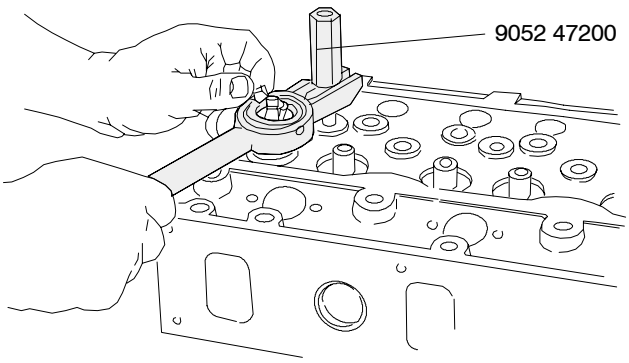
7. Remove the valve cover and the breather hose.

8. Remove the rocker arm mechanism and the push rods.

9. Loosen all the cylinder head bolts first by a 1/4 turn and then remove them. Remove the cylinder head.

B. Removing valves

Ensure that valves which are to be re–used are marked, so that they are fitted in their original locations.



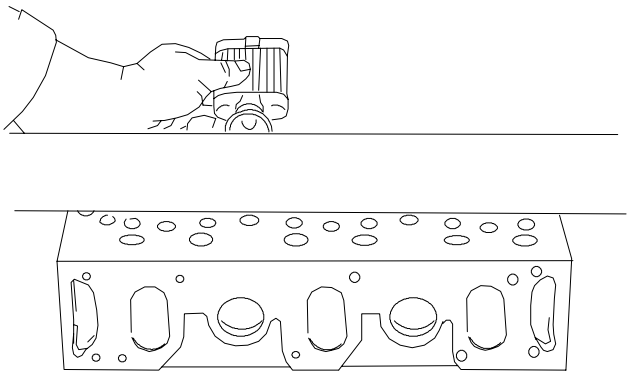
1. Thread the counterhold nuts 9052 47200 onto a screw stud for the rocker arm mechanism. On the 320–, and 620–engines there is not a screw stud at the valves for the centre cylinder. A bolt of suitable length should be used instead.

2. Compress the valve springs using lever 9101 66200. Remove the valve cotters, spring guide and spring. Remove the valves.

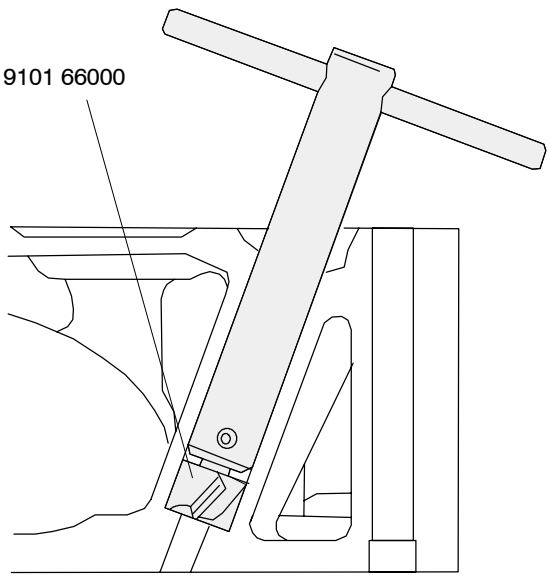
C. Checking cylinder head

1. Remove carbon deposits from the exhaust ports, clean the sealing surfaces and wash the cylinder head.

2. Check for cracks and other damage.



3. Check the flatness of the cylinder head by using a straight edge. An uneven or warped surface should be surface ground. The height of the cylinder head, after grinding, should not be less than **104,00 mm**. The valve disc depth from the cylinder head surface should be **0,60 mm** for the exhaust valves and **0,70 mm** for the inlet valves.

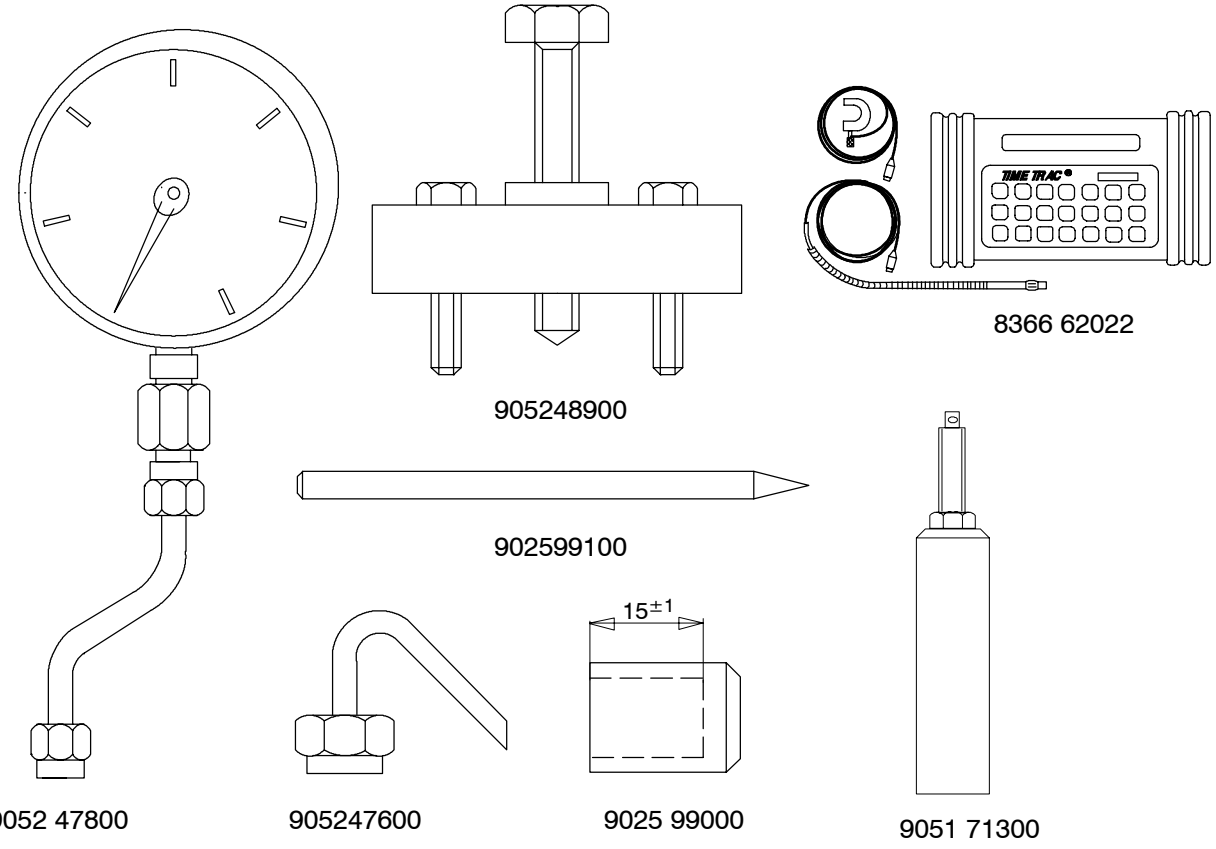


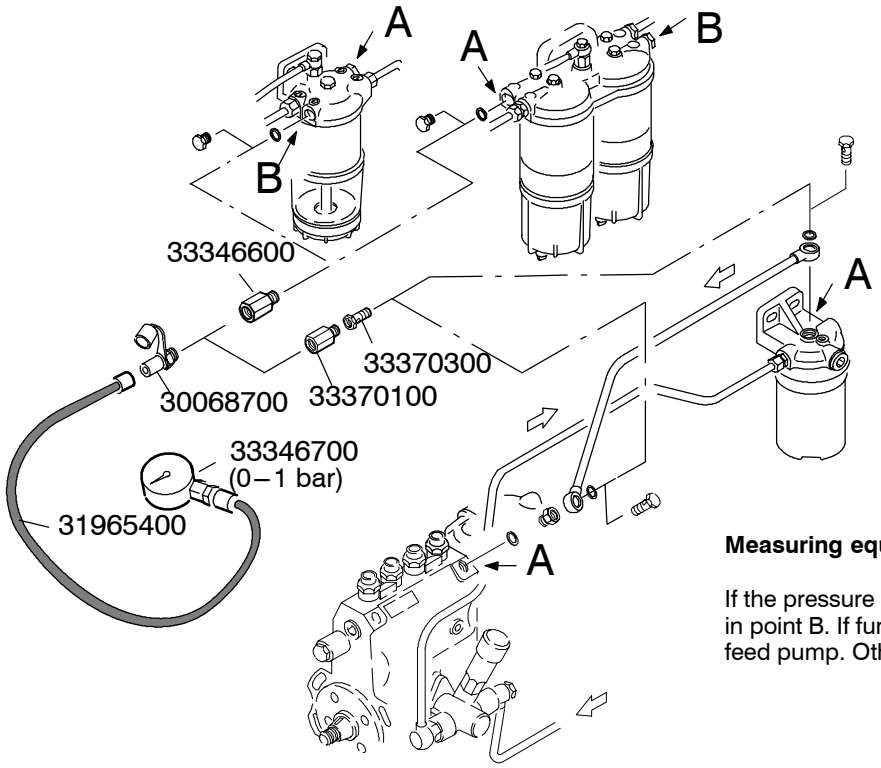
4. Straighten and clean the injector location seat in the cylinder head with cutter 9101 66000.

Special tools

9052 47800 *)	Pressure gauge for checking delivery valve
9052 48900 *)	Puller for injection pump drive gear
9025 99100 *)	Locator for timing mark on the flywheel
9052 47600 *)	Control pipe for injection timing
9052 99000 *)	Sleeve for limiting control rod travel
9051 71300 *)	Extractor for injectors
8366 62022	Electronic device (TimeTrac) for checking injection timing (E–engines)

*) Same tool as for fuel system on 505–905 tractors.



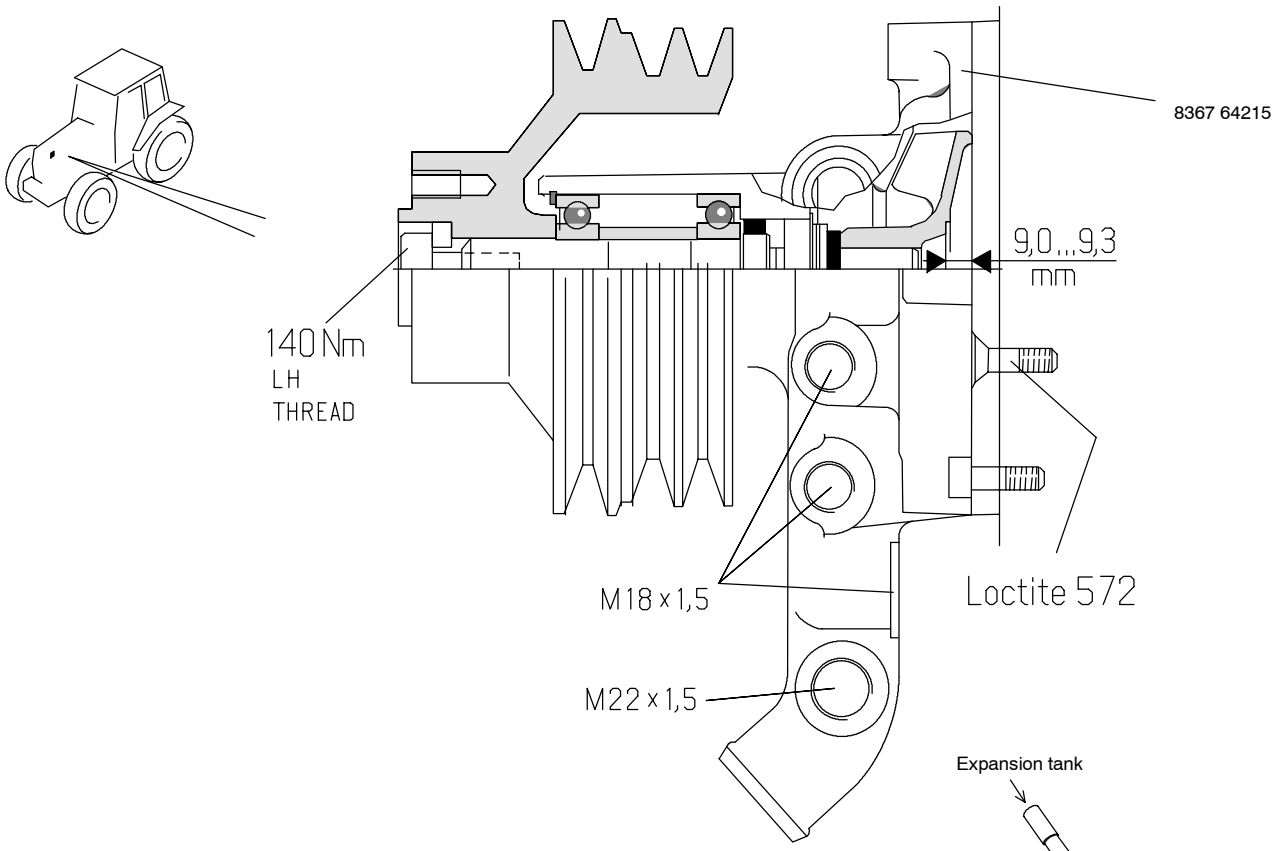


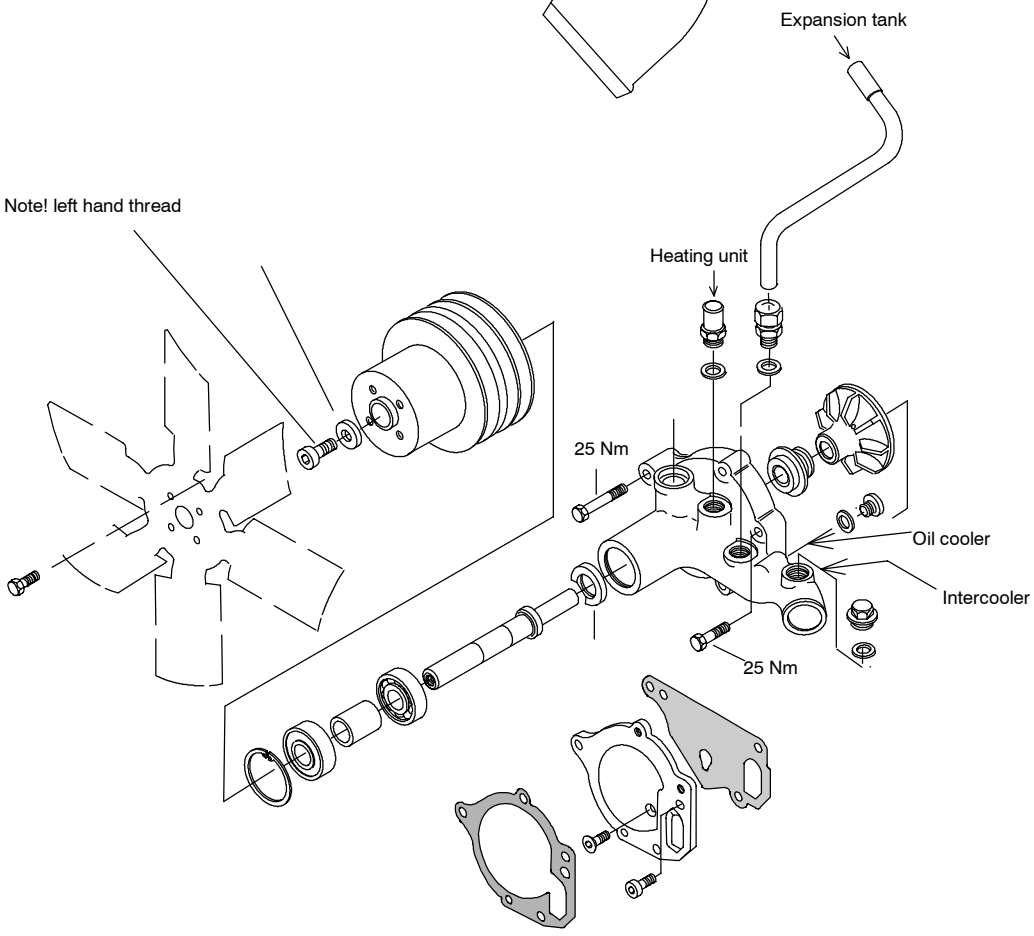
Measuring equipment for fuel feed pressure:

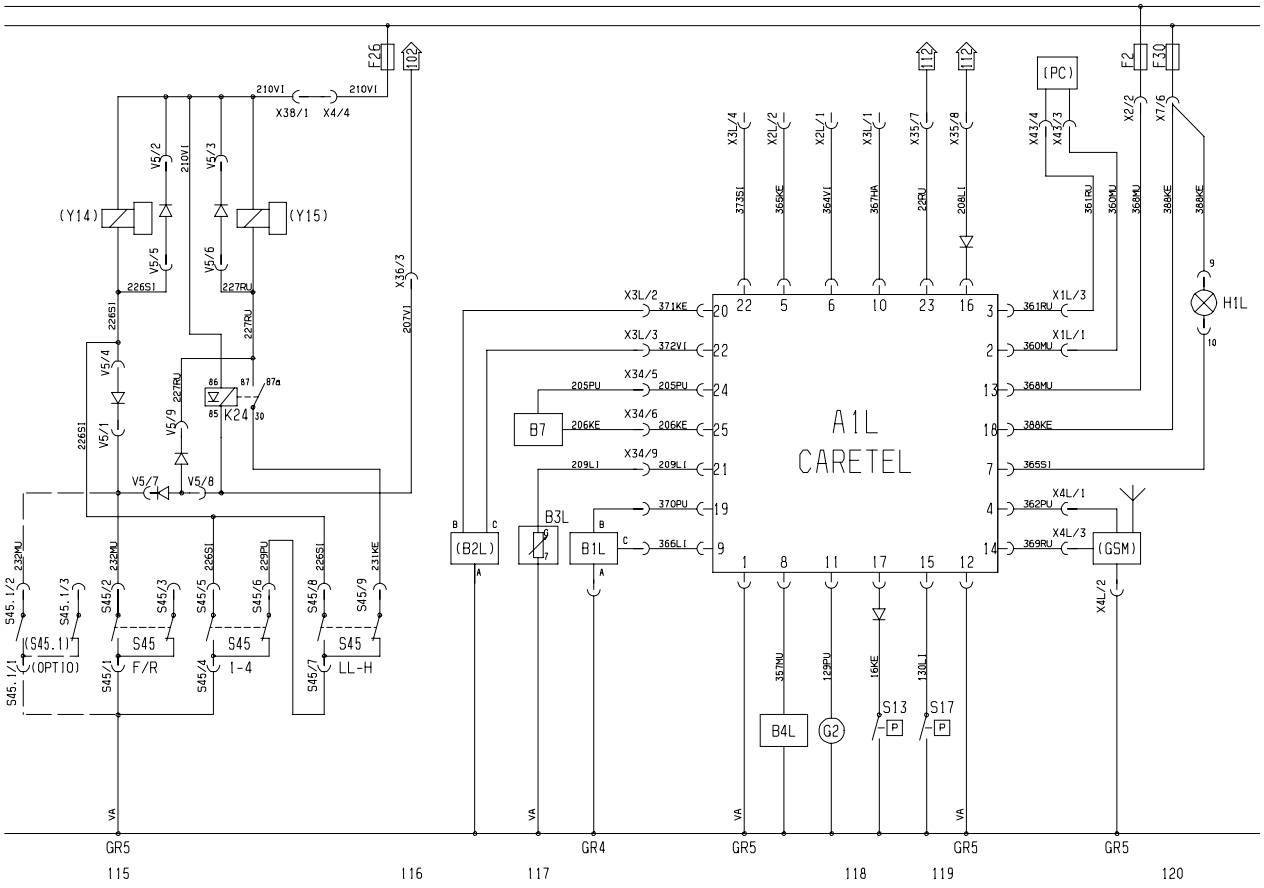
If the pressure is too low in point A, check the pressure in point B. If further too low, the fault lies in the fuel feed pump. Otherwise the filter is blocked.

Coolant pump

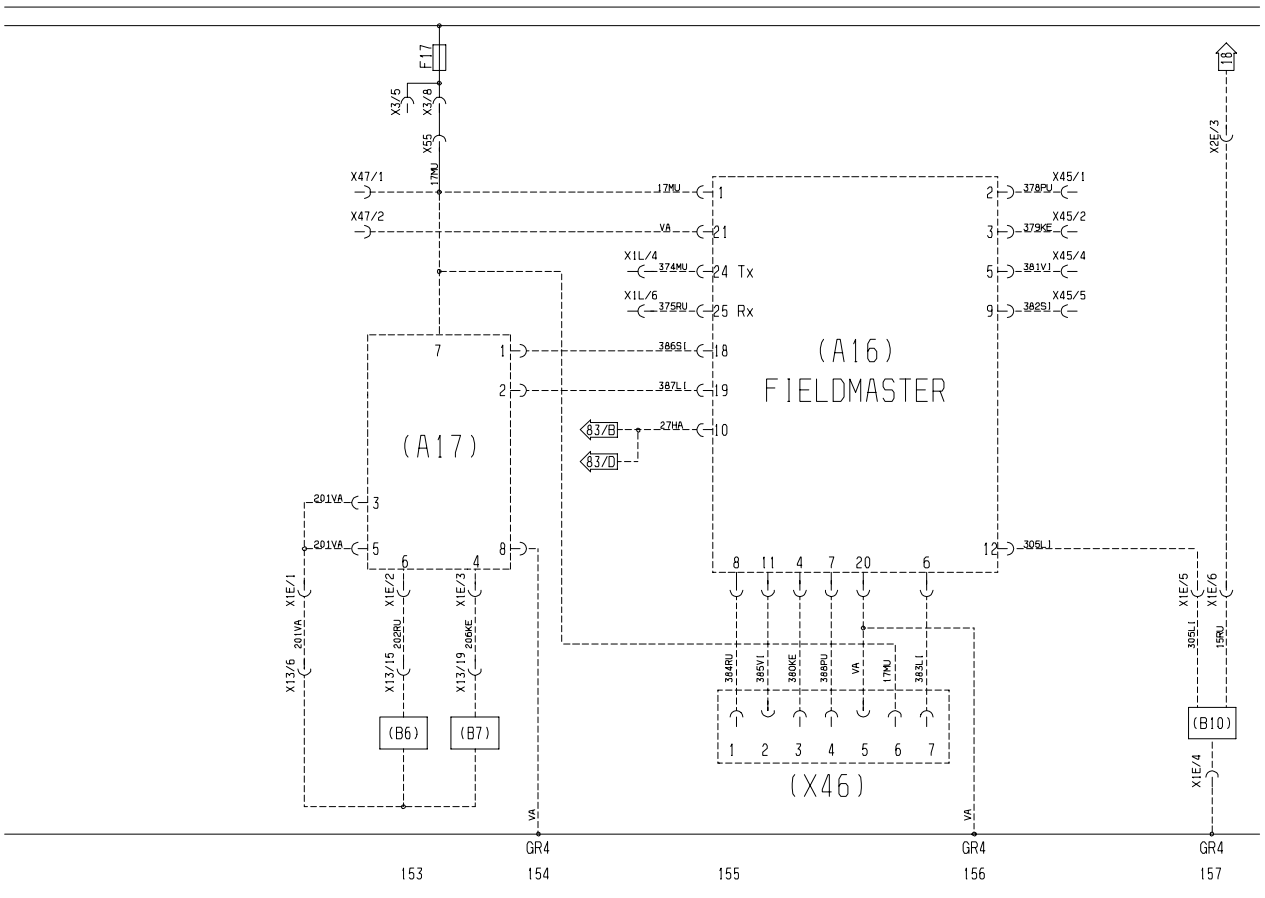
Valtra Valmet 100Hi–120Hi, from engine no. K6491 incl.







AC 2.3 9



AC 2.3 10

3. Power take—off

The PTO is controlled with a lever and a three—position rocker switch on the driver's right.

PTO **540** or **1000** (or **540E**) is selected mechanically with the lever at which time a pilot light comes on in the instrument panel.

The rocker switch front edge depressed (OFF)

— the PTO is disengaged

The rocker switch in the middle position (ON)

— after starting the PTO is engaged and the PTO shaft rotates as long as the switch is in the middle position and the supply line is not switched off.

The rocker switch rear edge depressed (START) (spring returned)

— When the rear edge is depressed, the PTO starts. After depressing, the switch is returned to the middle position by a spring.

PTO emergency stop

There is an emergency stop socket which has a plug at the rear of the cab. When the plug is removed, the PTO is disengaged and starts only when the rocker switch rear edge is depressed (the plug must be in the socket).

After an engine stop the PTO starts only when the rocker switch rear edge is depressed.

4. Delta Powershift (DPS)

The Delta Powershift is controlled with two push buttons in the speed gear lever knob.

A. The front push button is depressed.

— With each press the gear ratio is changed one step up.

B. The rear bush button is depressed.

— With each press the gear ratio is changed one step down.

In the dashboard there are pilot lights, that show which one of the DPS ratios is engaged:
I=slowest ratio
II=middle ratio
III =fastest ratio

Delta Powershift circuit card A10 has a buzzer, which warns parking brake functions and head lights functions.

After starting the engine the DPS is always in the slowest ratio **I**. When the clutch pedal is depressed, the DPS ratios are changed which can be verified from the pilot lights.

4. Checking AC 5 / 5.2 components

A. Control unit and display:

If the control unit is damaged, the conditions of other components do not affect the function of AC 5. In case of fault check that the unit connectors have not poor contacts by disconnecting them and reconnecting.

Note! If the control unit must be changed, the tractor model and ser. no. must be told to the factory. Also must be told, if the tractor has a turbine clutch (HiTrol). Fitting the control unit to tractor, see page **370**/**24A**.

The control unit has not a battery, but its memory is so designed that the programs remain in it, although should the tractor battery be removed. If necessary, voltage measurements can be done on the sides of the unit connectors (without detaching the connectors). Three different units have been used (33373000 and 33373010 in AC 5 and 33373020 in AC 5.2.

The diplay unit cannot be repaired but it is changed as a complete unit. If the diplay does not function, check first that the connector is correctly connected to the diplay unit. If the display has malfunctions, check that connector A1A2 of the control unit is correctly in place and that there is nothing extra between the connector parts. Check also the display unit supply voltage, fuse 24 (tractors J38343—)

B. Switches:

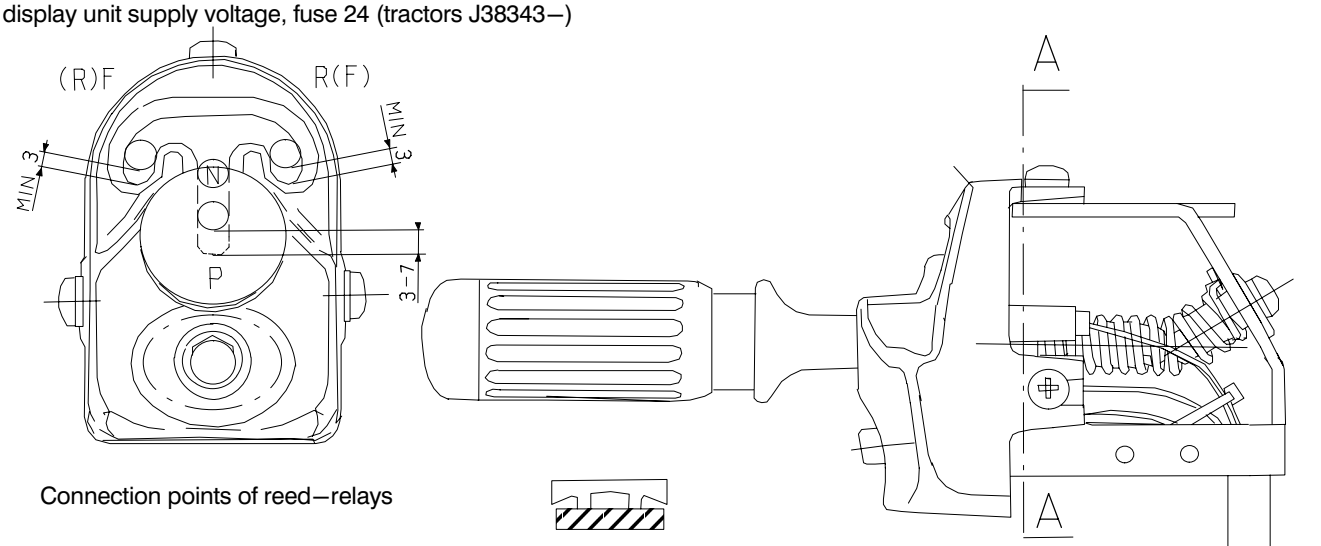
Note! The switches and their wires can be checked in the test mode FII, see table **a** on page **370**/**10** (AC 5) or page **371**/**8** (AC 5.2). Then the switch in question is activated and in the diplay can be seen the mode (0/1) of the switch, at which time the condition of the switch and its wires can be verified.
If needed, the faulty switch is changed and wires are checked/repaired.

The fault codes can show faults in different switches. Fault codes, see page **370**/**6** (AC 5) or page **371**/**5** and **6** (AC 5.2).

Note! If the switches and wires seem to be OK, but a malfunction exists, the fault may lie in the control unit.

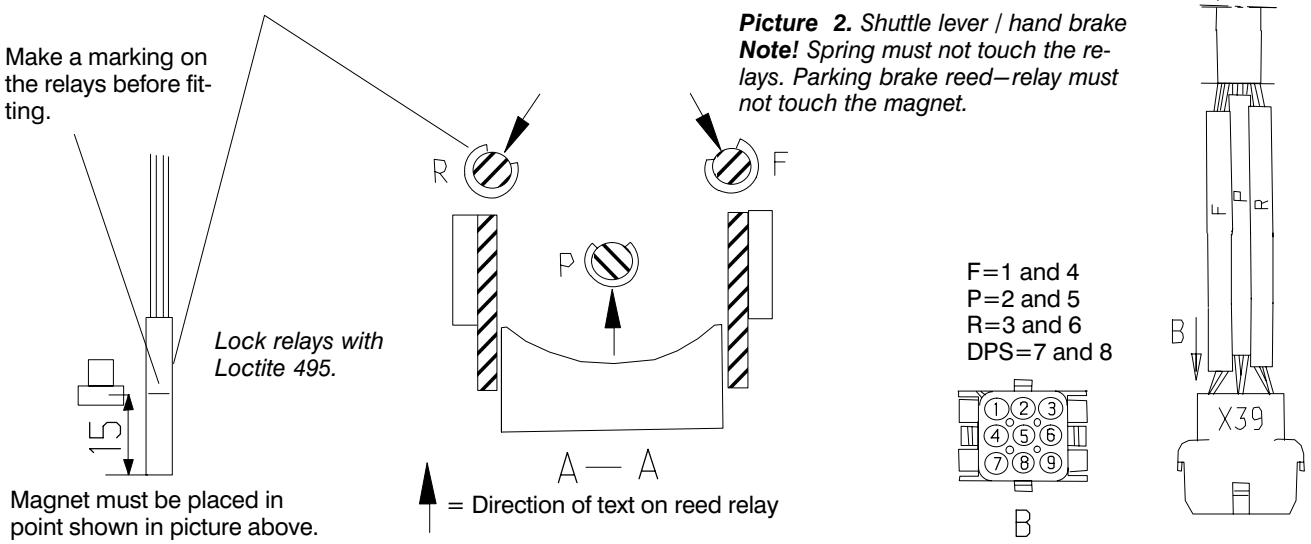
Note! The shuttle lever/hand brake lever is a special switch. When the lever is moved, the magnet in the inner end of the lever moves onto the corresponding reed relay and the desired function is engaged. The DPS pre—programming button is similar to the DPS and HiShift push buttons. The reverse drive controls (TwinTrac) have the corresponding switches).

Note! Check the function of the lever with a multi—meter or in the test—mode **FII** in connection with repairs.

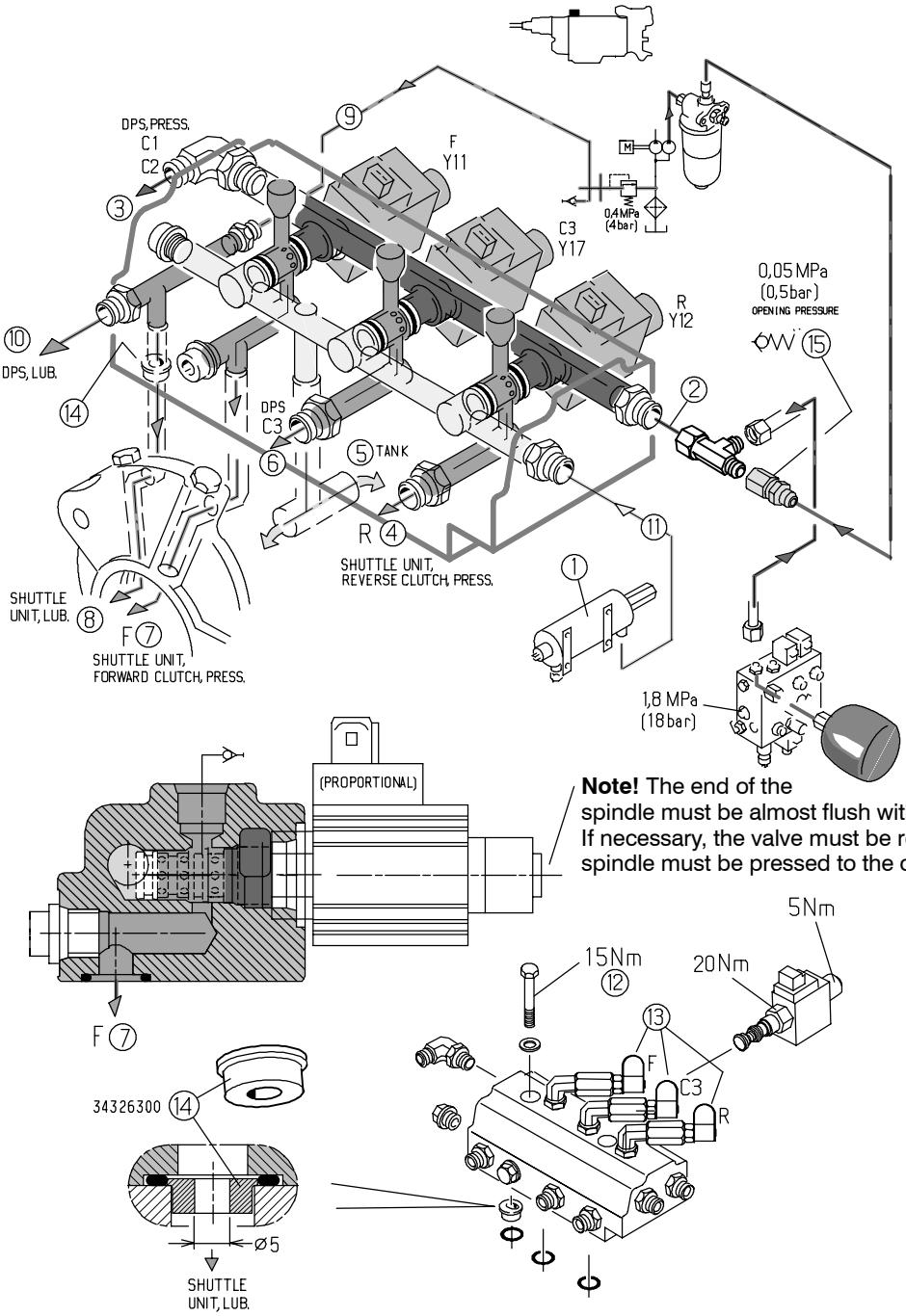


Connection points of reed—relays

Picture 2. *Shuttle lever / hand brake*
Note! *Spring must not touch the relays. Parking brake reed—relay must not touch the magnet.*



Magnet must be placed in point shown in picture above.



Note! The end of the spindle must be almost flush with the valve body. If necessary, the valve must be removed and the spindle must be pressed to the outer position.

Picture 21D. *Valve block of HiTech – shuttle on the gearbox housing*

1. Valve block
2. Pressure oil, 1,8 MPa (18 bar), into the valve
3. Pressure oil into DPS clutches C1 and C2.
4. Pressure oil into the HiTech shuttle (rearward driving)
5. Tank passage (into the gearbox and shuttle housings).
6. Pressure oil into DPS clutch C3.
7. Pressure oil into the shuttle (forward driving)
8. Lubricating oil into the shuttle housing
9. Lubricating oil from filter distribution block
10. Lubricating oil into DPS
11. Tank passage from hand brake ram (leaks)
12. Tightening torque 15 Nm.
– Permatex Super 300 No 83 onto the threads
13. Proportional valve
14. Lubricating oil flow into the shuttle has been reduced with a restriction (diam. 5 mm). This restriction eliminates gear change problems (lubricating oil does no more revolve the multi – disc clutches). In connection with this modification the DPS and shuttle lubr. oil pressure has been improved.
15. A non – return valve has been fitted to prevent oil pressure escape from pressure accumulator into the hydraulic pump and the brake valve.
This ensures that the parking brake is not engaged too fast after engine stop. **Note!** This happens only in case that the engine stops itself (e.g. fuel runs out) when the driving speed is over 5 km/h. Does not affect the normal function of the parking brake.

3–step quick–shift gear, transmissions 300 (Op. no. 444)

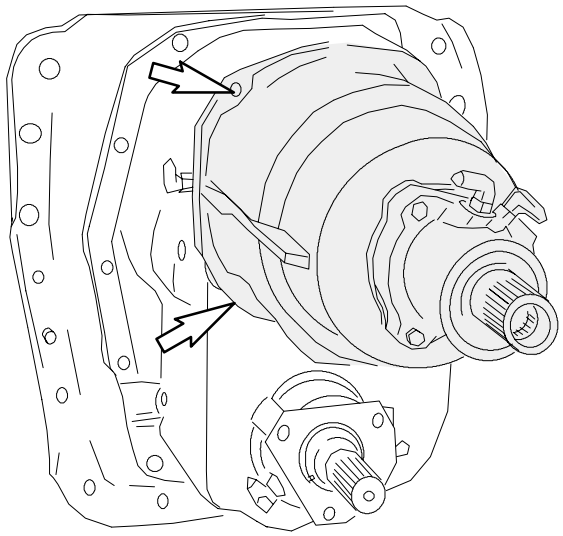
1. Reconditioning Delta Powershift

A. Reconditioning planetary gear and its multi–disc clutch

Dismantling:

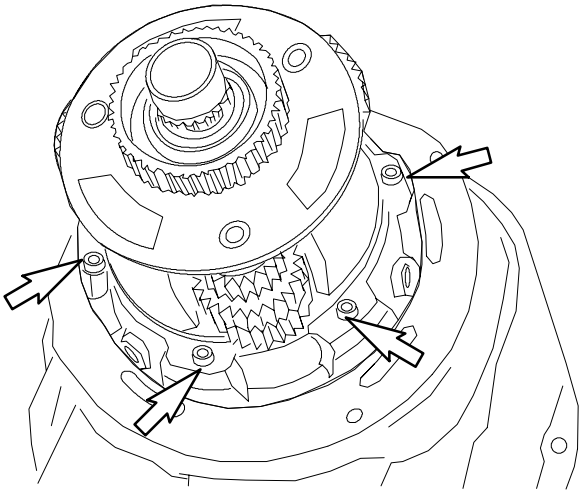
1. Split the tractor between gearbox – middle frame, see page **423/1**.

2. Disconnect the oil pipes from the DPS gear housing.



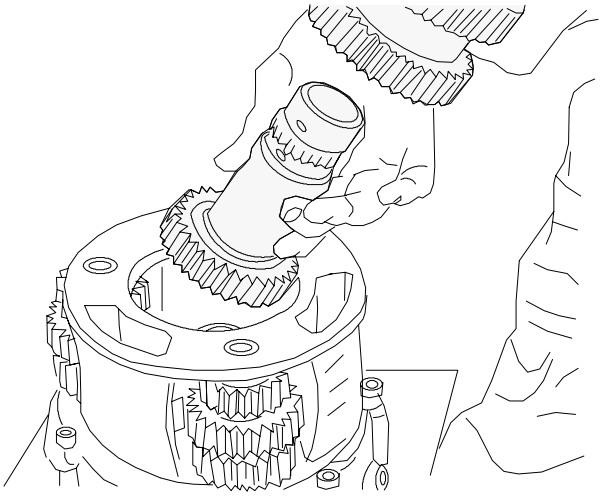
3. Unscrew four attaching bolts of the housing (see arrows) and carefully pull off the housing.

Note! The planetary gear and its multi – disc clutch remain on the front face of the reverse shuttle. Also the foremost and middle sun gear may remain inside the planet gears.



4. Unscrew the planetary carrier fixing bolts (see arrows) and remove the planetary gear. At the same time it is releasing the multi – disc clutch cup springs (2 pcs)

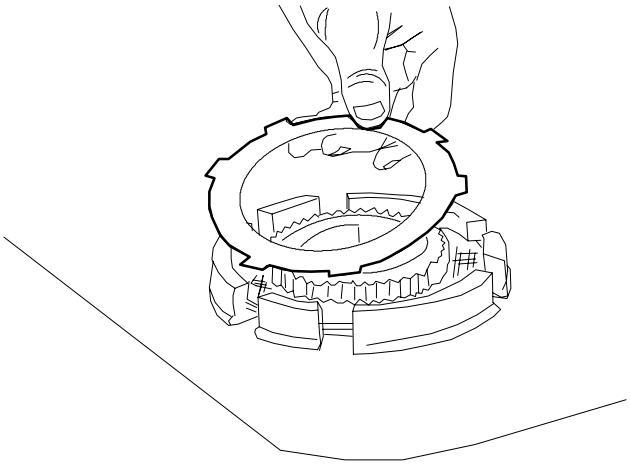
Note! If one of the planet gears prevents unscrewing of the carrier bolts, the planetary gear cannot be rotated but in this case, connect a hydraulic hand pump to the pipe connector on the reverse shuttle housing and pump up pressure into the clutch until the planetary gear can be rotated.



5. Remove the foremost and middle sun gears from the planetary gear, if they remained inside the planet gears.

6. Remove the planetary carrier rearmost ball bearing using two pinch bars. Remove the pressure plate on the clutch disc pack. Remove the discs and the hub.

7. Remove the foremost ball bearing circlip. Pull out the planetary gear attaching flange together with the bearing.

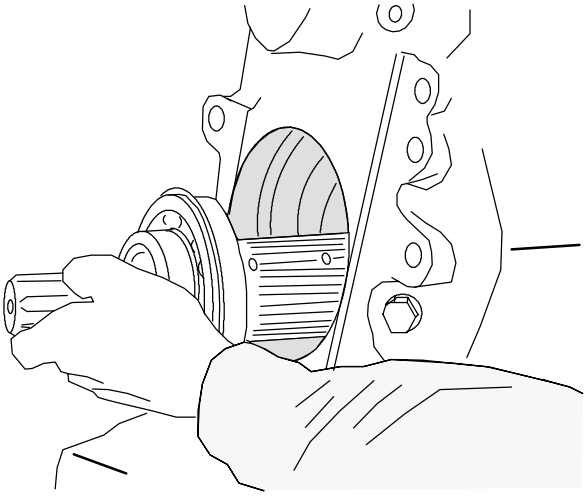


8. If the clutch discs are worn so much that the grooves on the friction discs have disappeared, change the complete disc pack at the same time.

the PTO shaft and remove the PTO shaft/hollow shaft. Remove the big gearwheel from the PTO housing.

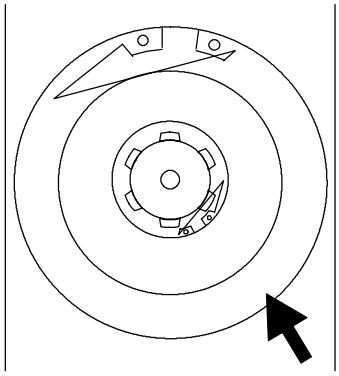
7. Check the PTO shaft seal and o–rings and change them if necessary. Check also the PTO shaft rear ball bearing.

F. Fitting gears and selector fork



1. Push the PTO shaft/hollow shaft/ball bearing as a complete unit into the housing. Place the impulse disc onto the hollow shaft splines and fit the spacer ring in front of the disc.

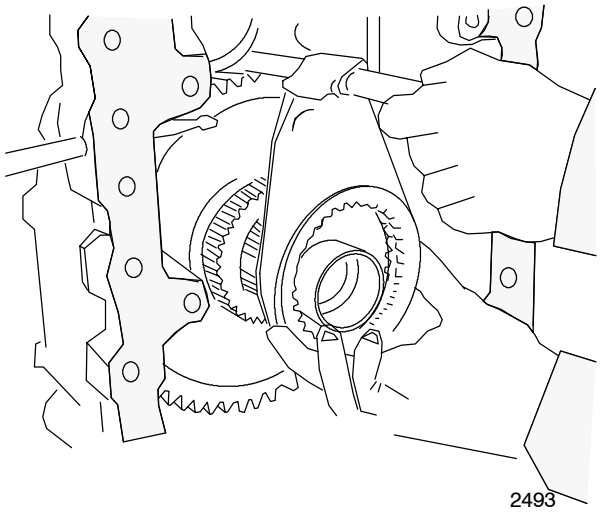
Note! The impulse disc is fitted only on E–models. On other models, there are two spacer rings.



2. Fit the big gearwheel onto the shaft before the shaft is fully home. Tap at the PTO shaft rear end until the rear ball bearing is in its location fully home. Fit the seal retainer and the larger circlip.

IMPORTANT! On the latest tractors (**H34332–**) there is fitted a new cassette seal for the PTO shaft, see picture on page **460**/**7** and fitting instruction of the cassette seal on page **462**/**8A**.

Note! There are shims between the seal retainer and the ball bearing. The clearance between these parts is adjusted to zero. Use old shims. If necessary, the clearance can be measured by placing a dial gauge stylus against the seal retainer. Available thickness of shims; 0,10 0,15 and 0,50 mm.



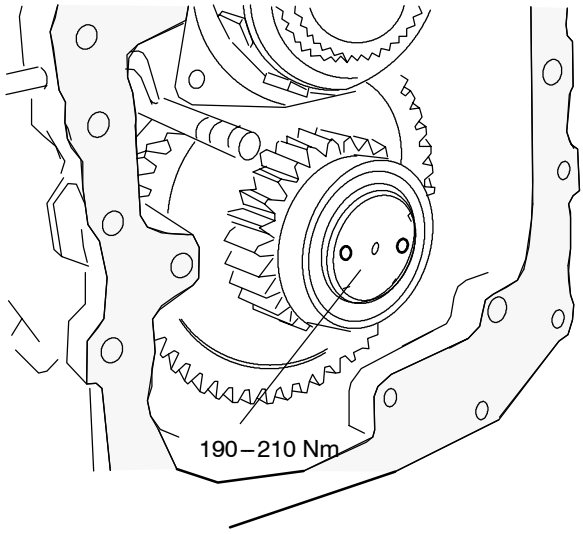
3. Fit the sliding coupler onto the fork and place the fork/rail into the housing so that the sliding coupler engages onto the teeth on the big gearwheel.

Note! Fit the selector lever round–shaped end into the hole on the rail.

4. Fit the middle gearwheel and then the small gearwheel.

Note! Tractors without the ground speed PTO: fit the spacer ring and the sleeve in front of the small gearwheel.

5. Fit the roller bearing inner race onto the shaft in front of the small gearwheel and fit the roller bearing onto the race.

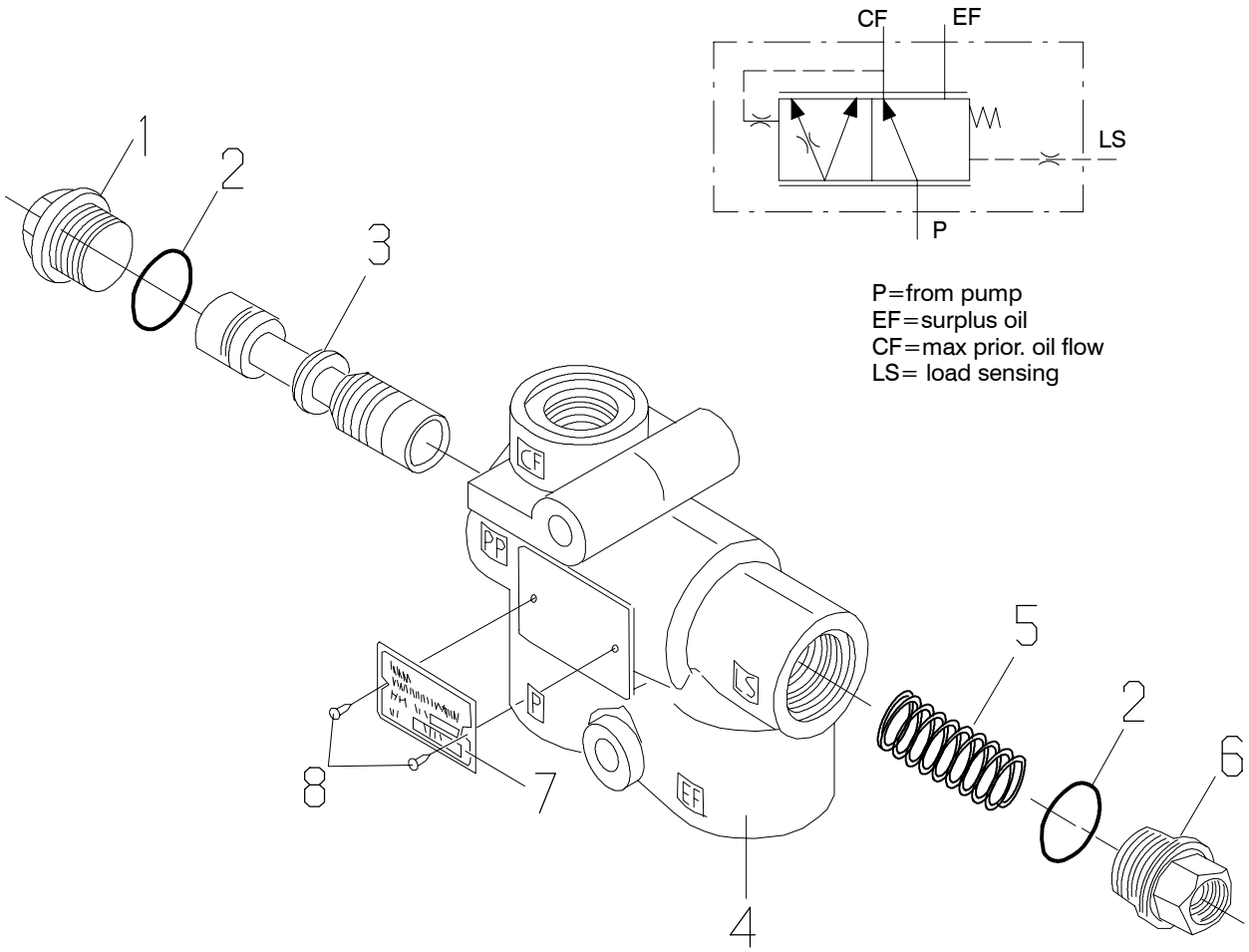


6. Fit the flange and tighten the locking bolt to **225 Nm** and lock it with the locking washer. Note that in the picture above there is the earlier attaching flange at the end of the PTO shaft.

Note! Tractors without the ground speed PTO: Fit the ball bearing and then the locking flange or locking bolt.

6. Carry out measures shown in instruction **1D.**

7. Fit the PTO unit (**see instr. 1 G**).



Priority valve OLS 120

1. Cleaning priority valve

A. Disassembling

1. Detach the priority valve which is fitted beside the pressure filter under the cab floor on the RH side.

2. Open plug (1) and remove the sealing ring (2).

3. Unscrew the connection (6) and remove the sealing ring (2) and the spring (5).

4. Push out the valve slide (3) by using e.g. a pencil. Do not damage contact surfaces on the slide and the housing.

5. Check and clean the parts. Replace the sealing rings with new ones. Lubricate the parts with oil before fitting.

B. Assembling

1. Push the slide (3) into the housing. Fit a new sealing ring on the plug (1).

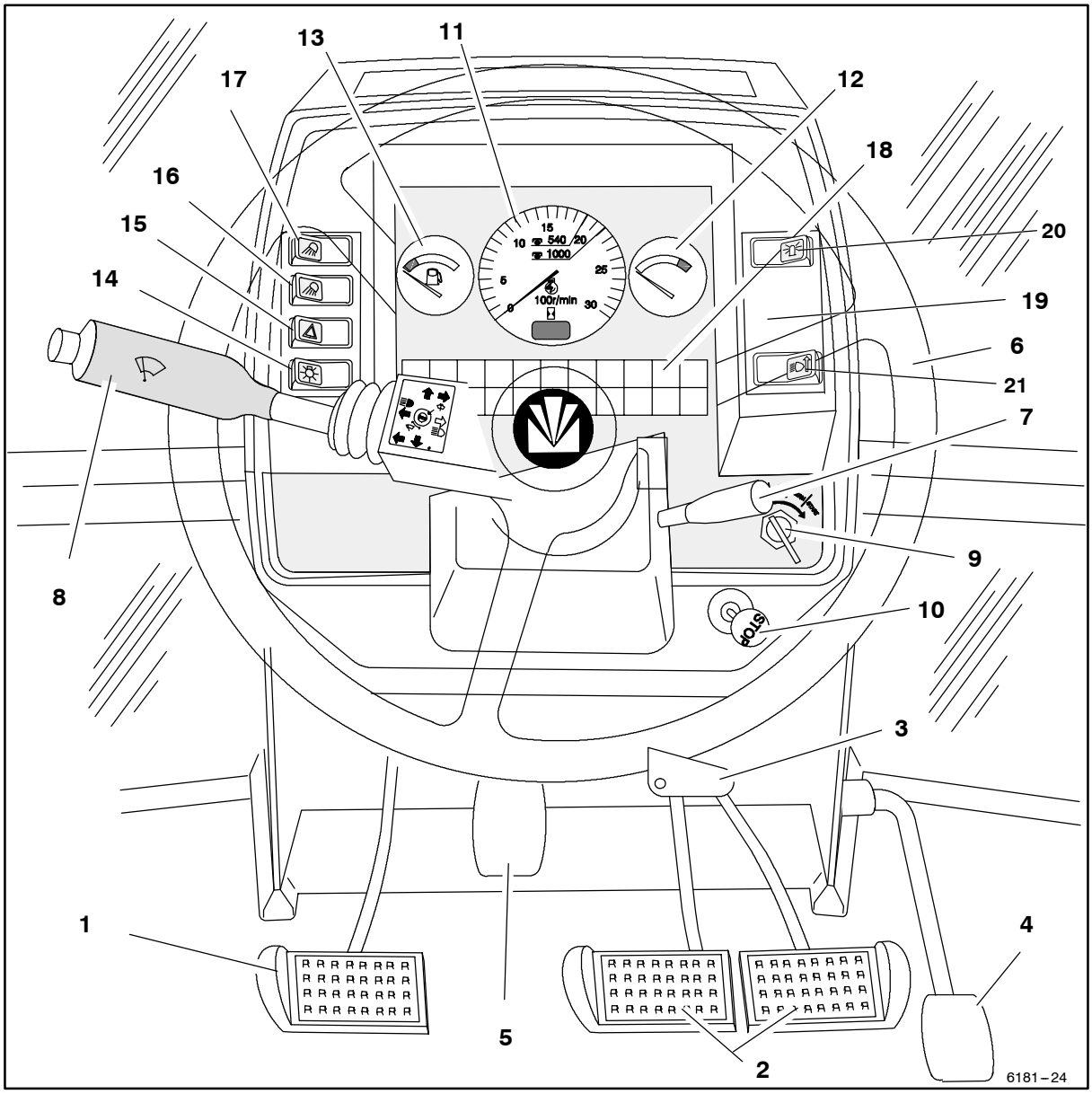
2. Place the spring (5) into the housing. Fit a new sealing ring and the connection (6). Tighten the connection to **40–60 Nm**.

3. Tighten the plug (1) to **40–60 Nm**.

4. Fit the priority valve.

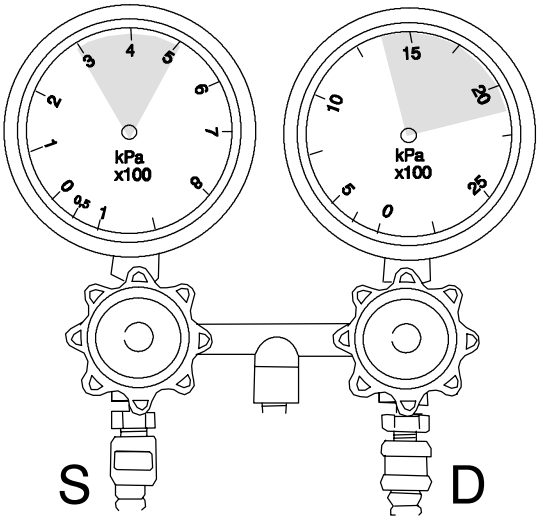
Instruments and controls

Instrument panel and pedals, 95–115



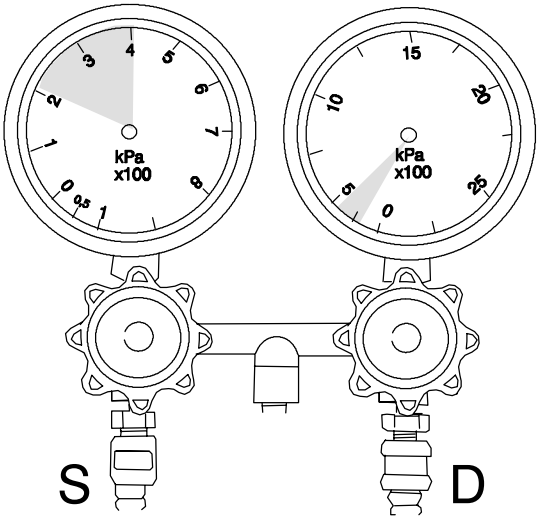
1.Clutch pedal
2.Brake pedals
3.Latch for brake pedals
4.Accelerator pedal
5.Lock for steering wheel inclination
6.Steering wheel
7.Lever for adjusting steering wheel height
8.Control for:
– main/dipped headlights
– direction indicators
– horn
– windscreen wiper
– windscreen washer
– headlight flasher
9.Ignition switch
10. Stop control
11.Rev. counter and hour recorder
12.Coolant thermometer
13.Fuel gauge
14.Light switch
15 .Hazard warning flasher switch
16.Switch, rear working lights
17.Switch, front working lights
18.Indicator lights on instrument panel
19. Places for switches for optional equipment
20. Switch for rotating warnng lights
21. Switch for upper head lights

Low pressure high **High pressure high**



Possible fault	Remedy
1. Condenser is dirty (insects etc.)	1. Clean condenser
2. Too much refrigerant in system.	2. Empty and refill system with refrigerant (1,4 kg).

Both gauges show same pressure



Possible fault	Remedy
1. Compressor magnetic clutch does not function.	1. Change compressor
2. Compressor is faulty	2. Change compressor
3. Electric system faulty (temperature switch, pressure switch, fuse etc.)	3. Check electrical system (see page 831/3 instr. C).

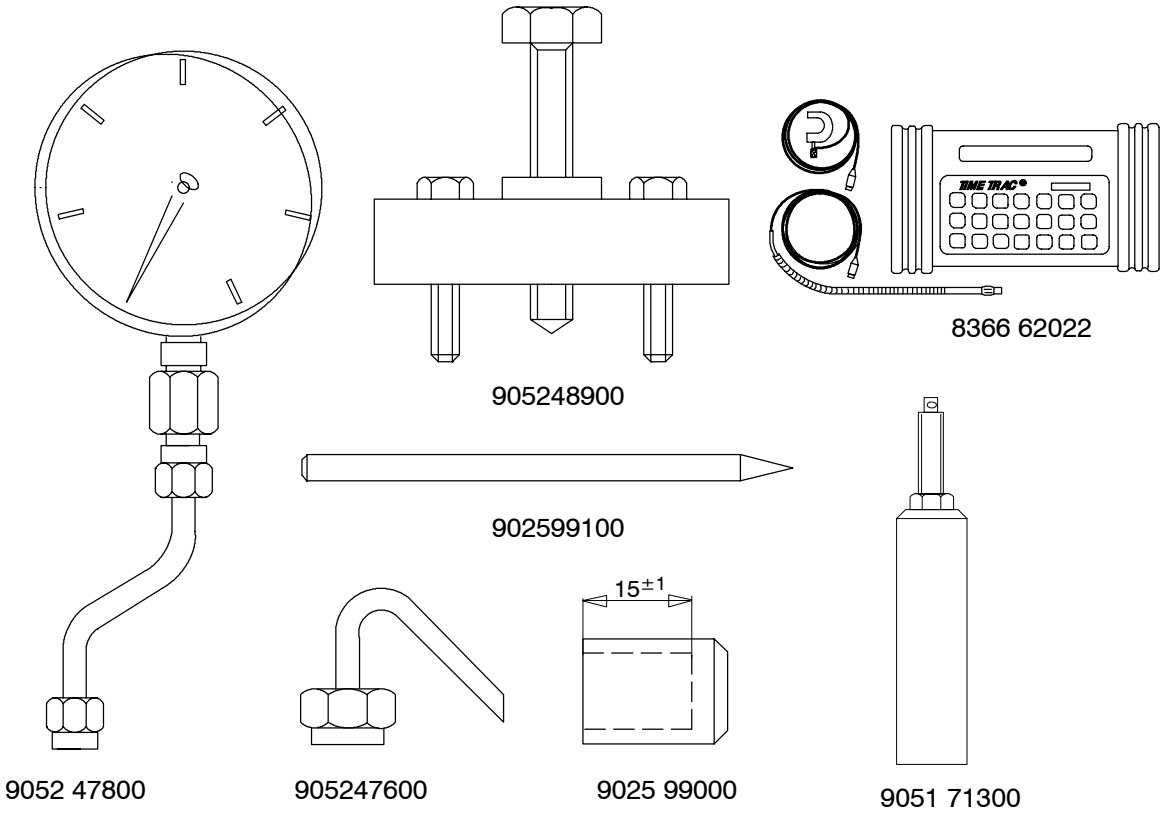
22. Fuel system

9052 47800	Pressure gauge for checking delivery valve
9052 48900	Puller for injection pump drive gear
9025 99100	Locator for timing mark on the flywheel
9052 47600	Control pipe for injection timing
9052 99000	Sleeve for limiting control rod travel
9051 71300	Extractor for injectors
8366 62022	Electronic device (TimeTrac) for checking injection timing (E–engines), which incl. parts 1–3 below:

1. 836662121 Magnetic detector
2. 836662122 Cable
3. 836662123 Fastening device

Parts 4–10 below are available, but not needed for Valtra–engines (not illustrated):

4. 836662120 Timing light
5. 836859466 TimeTrac in–line sensor
6. 836662124 Clamp–on Transducer, 4,5 mm
7. 836662125 –"–, 5,0 mm
8. 836662126 –"– ,6,0 mm
9. 836662127 –"– ,8,0 mm
10. 836662128 –"– ,1/4 inches

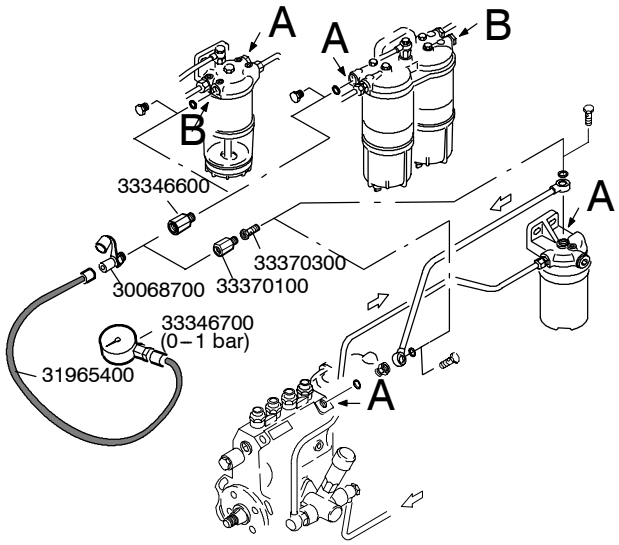


9052 47800 905247600 9025 99000 9051 71300

8366 62022

905248900

902599100



Measuring equipment for fuel feed pressure:

If the pressure is too low in point A, check the pressure in point B. If further too low, the fault lies in the fuel feed pump. Otherwise the filter is blocked.