Service Manual

Wheel loaders

750 / 850

Machine model	**346-03/346-04**
Starting serial no.	**346 03 0001/346 04 0001**
Edition	**2.0**
Order number	**1000183988**
Language	**EN**

kramerALLRAD®

Cab overview, labels, options

Machine inspections

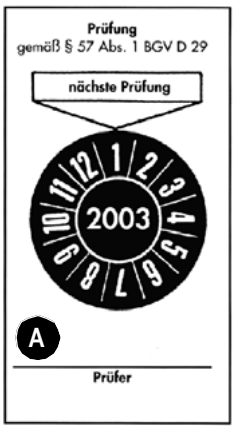


Fig. 1: Inspection tag

When operating the machines, the national safety regulations must be followed as well, for instance in Germany, the regulations for accident prevention "Deutsche Prüfstelle für Land- und Forsttechnik" (DPLF German inspection and certification body for agriculture and forestry) and the accident prevention regulation
"Fahrzeuge (vehicles)" (BGV D29 § 57 clause 1).

In Germany, legislation requires all machine operators to have all machines and equipment inspected regularly.

Inspections must be carried out as required, but at least once a year, by an expert and must be documented in written form. Subsequent inspections of detected defects must be carried out, too.

The competent inspection authority may require the inspection report to be available at the place where the machine is used.

☞ *Fasten inspection tag **A** for evidence*

Bear in mind that all work equipment is inspected, i.e. not only the machine but also all technical auxiliary means, tools and attachments. (Work equipment is defined as all tools, attachments, machines or systems.)

This requirement is met, for instance, if the results are documented in a test logbook, a test log file or in a test report; see also policy of German employers' liability insurance association for construction engineering "Inspection of vehicles by experts" (BGG 916)

Get informed on and follow the legal regulations of your country.

Documents

German traffic regulations require to have the following documentation on board, e.g.:

- General Certification for Vehicles (Germany) or data confirmation (Germany)
- Driving licence
- Test report according to BGV D29 § 57 clause 2 (safety and health regulations of German employer's liability insurance association)
- Operator's Manual

Get informed on and follow the legal regulations of your country.

Machine warning identification (option)

From 01.10.1998 onwards, § 52 clause 4.1 of StVZO German road traffic regulations require wheel loaders that are used on public roads for the construction and maintenance of roads, and for the cleaning of roads or facilities, to be fitted with the red and white warning identification as per DIN 30 710 in connection with a yellow rotating beacon (option).

Get informed on and follow the legal regulations of your country.

Disabling the drive interlock

☞ *Enter the personal code or main code (6 digits).*

☞ *Press the **(*)*** key.

➥ Confirmation: 2 long acoustic signals and long LED flashing

➥ LED OFF = drive interlock is disabled

➥ Diesel engine can be started

The diesel engine will not start if a wrong code has been entered

➥ Confirmation: 4 short acoustic signals, flashing LED = wrong code

➥ Re-enter the code

☞ *Turn the ignition key and switch on the engine before the LED flashes again (30 seconds)*

Caution!

The keypad is blocked for 5 minutes and no codes can be entered if the wrong code is entered four times consecutively.

☞ *Enter the code after 5 minutes*

- *The keypad does not come on as long as it is blocked. It comes on briefly every 4 seconds and an acoustic signal sounds*

☞ *Press the **(*)** key after every code*

☞ *The LED comes on briefly when turning the ignition key to the engine start position*

1.26 Towing the machine

Safety instructions for towing away

If the diesel engine and/or the hydraulic drive breaks down, the machine can be towed under the following conditions.

- The towing vehicle must have enough tractive power and be fitted with a safe brake system!
- The machine may only be towed using suitable towing equipment (towing bar) in connection with suitable towing facilities, such as a towing coupling, hooks and eyes!
- Make sure no-one is between the vehicles!
- The machine may be towed with a cable if the service brakes and steering are fully operational!

Getting ready for towing

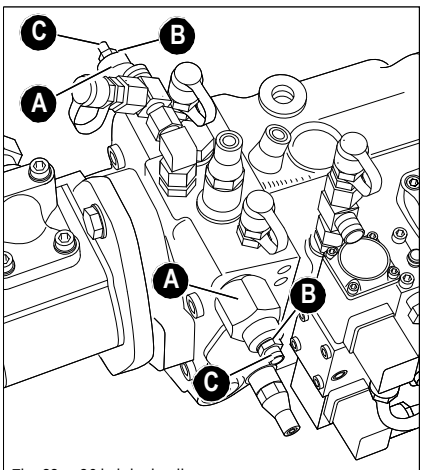


Fig. 33: 20 kph hydraulic pump

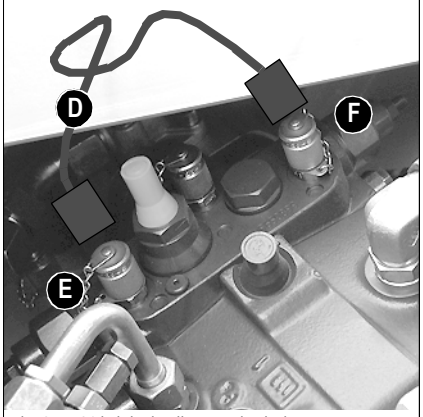


Fig. 34: 30 kph hydraulic pump (option)

Disabling the variable displacement drive pump

Caution!

The hydrostatic power train can be damaged when towing the machine!

☞ *Tow away the machine from the danger area only after you have opened the HP pressure relief valves*

☞ **Tow the machine out of the danger area only at walking pace and only over short distances**

☞ *Switch off the diesel engine*

☞ *Switch off ignition and remove the ignition key*

Variable displacement drive pump (20 kph)

☞ *Switch over the HP pressure relief valves **A** on the variable displacement pump. To do this:*

- Slacken hexagon lock nuts **B** on both HP valves **A**
- Screw in hexagon socket head screws **C** on both HP valves **A** until they are flush with lock nuts **B**
- Secure hexagon socket head screws **C** on both HP valves **A** with lock nuts **B**

Variable displacement drive pump 30 kph (option)

☞ *Mount hose **D** between test ports **E** and **F***

➥ The hose is included in the tool kit

☞ *If possible, run the diesel engine at idling speed when towing the machine*

2.12 Noise levels

Sound power level, wheel loader models 346-03/346-04	dB(A)
Measured value	99.8
Guaranteed value	101
Noise level in the cab	78

Important!

Measurement of sound power level according to
EC Directive 2000/14 EC. Noise level at the driver's ear measured according to EC Directives 84/532/EEC, 89/514/EEC and 95/27/EEC.
Measurements carried out on asphalted surface.

2.13 Vibration

Vibration	
Effective acceleration value for the upper extremities of the body	$< 2.5 \frac{m}{s^2}$
Effective acceleration value for the body	$< 0.5 \frac{m}{s^2}$

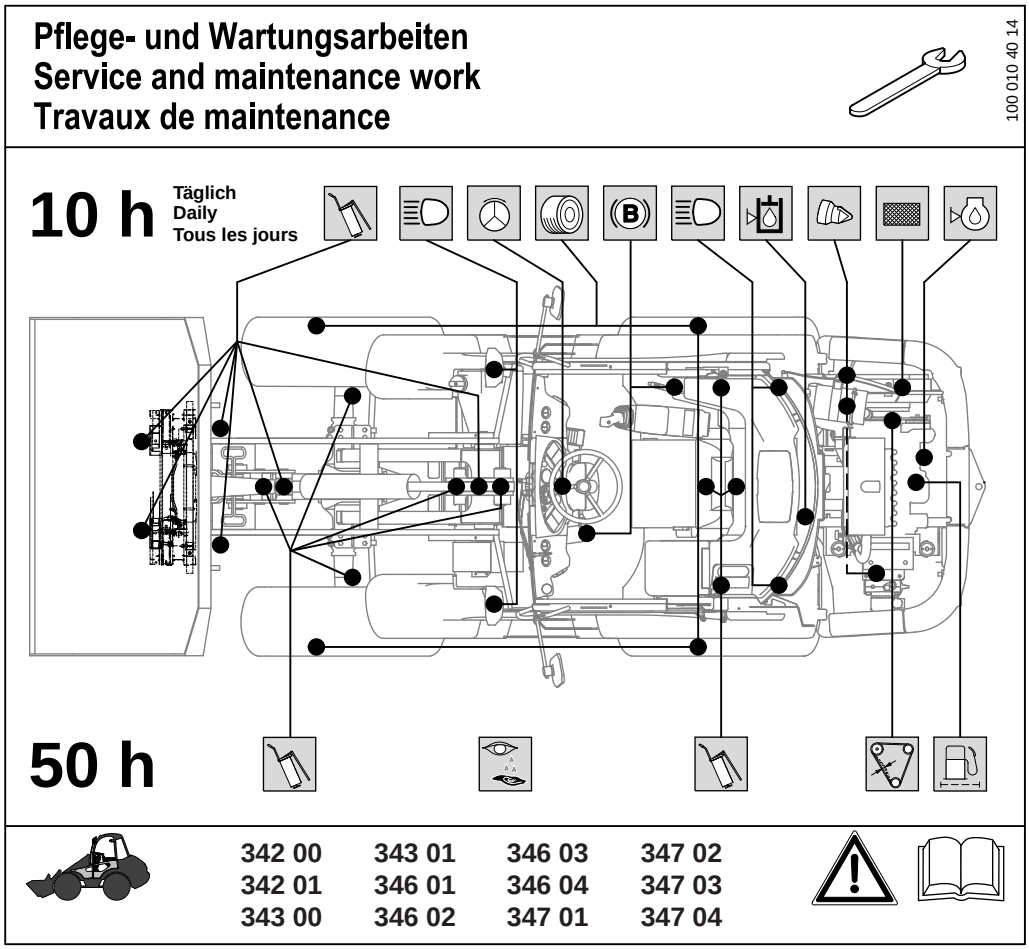
2.14 Coolant compound table

Outside temperature	Water[1]	Antifreeze
Up to °C	% by volume	% by volume
4	99	–
- 10	79	20
- 20	65	34
- 25	59	40
- 35	**55**	**45**
- 42	50	50

1. Water quality at 20 °C = 6.5 – 8.5 ph/overall hardness 3 – 20 °dGH

3.2 Maintenance label

Location: inside the cab on the rear window



3.9 Bleeding the fuel system

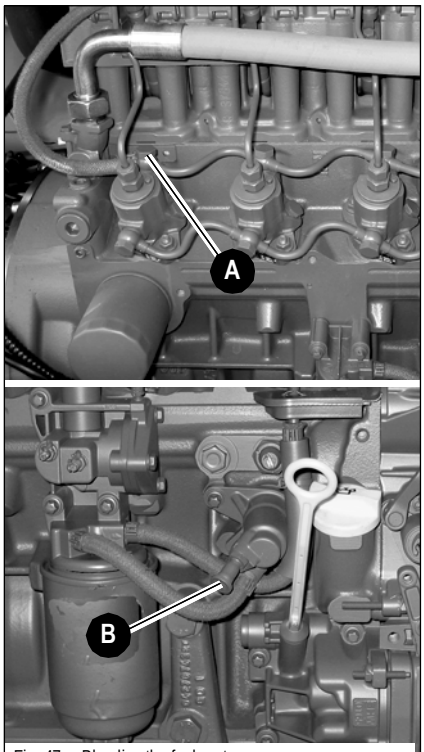


Fig. 47: Bleeding the fuel system

Danger!

If the fuel, as it drains, comes into contact with hot engine parts or the exhaust system, there is an increased

Danger of burns!

☞ *Never bleed the fuel system if the engine is hot!*

Environment!

Use a suitable container to collect the fuel as it drains and dispose of it in an environmentally friendly manner!

Bleed the fuel system in the following cases:

- After removing and fitting the fuel filter, prefilter or the fuel lines back on again
- After running the fuel tank empty
- After running the engine again, after it has been out of service for a longer period of time

☞ *Bleed the fuel system as follows:*

- Place the container under the engine
- Fill the fuel tank
- Slacken bleed screw **A** on the injection pump by a few turns
- Press button **B** on the fuel pump with your hand (pumping movement) until the fuel comes out free of air from the slackened bleed screw
- Tighten bleed screw **A**
- Start the engine

If the engine runs smoothly for a while, and then stops; or if it does not run smoothly:

- Stop the engine
- Check once again if there is any air in the fuel system
- Bleed the fuel system again as described above

3.19 Monitoring the hydraulic oil reflux filter

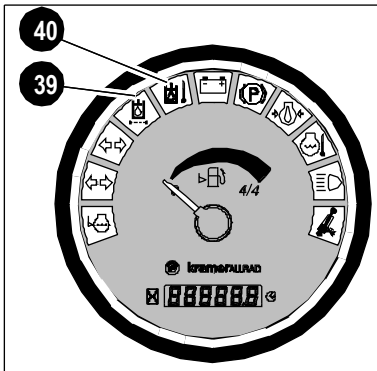


Fig. 60: Preheating start switch

On the instrument panel, the red telltale **39** monitors reflux pressure and the reflux filter, and telltale **40** monitors oil temperature.

☞ *If telltale* **39** *comes on*

➥ the reflux pressure in the filter is too high or

☞ *If telltale* **40** *comes on*

➥ the hydraulic oil temperature is too high

☞ *At the latest after 1500 service hours (once a year)*

Telltale **39** on the instrument panel can come on in cold weather immediately after starting the engine. This is caused by increased oil viscosity. In this case:

☞ *Set engine speed so that telltale* **39** on the instrument panel *goes out*

☞ *Bear in mind the instructions concerning warmup*

Important information for the use of biodegradable oil

- Use only the biodegradable hydraulic fluids which have been tested and approved by Kramer-Werke GmbH *Fluids and lubricants* on page 3-3. Always contact Kramer-Werke GmbH for the use of other products which have not been recommended. In addition, ask the oil supplier for a written declaration of guarantee. This guarantee is applicable to damage occurring on the hydraulic components, which can be proved to be due to the hydraulic fluid
- Use only biodegradable oil of the same type for filling up. In order to avoid misunderstandings, a label providing clear information is located on the hydraulic oil tank (next to the filler inlet) regarding the type of oil currently used! Replace missing labels!
  The joint use of two different biodegradable oils can affect the quality of one of the oil types. Therefore, make sure the remaining amount of initial hydraulic fluid in the hydraulic system does not exceed 8 % when changing biodegradable oil (manufacturer indications)
- Do not fill up with mineral oil – the content of mineral oil should not exceed 2 % in order to avoid foaming problems and to ensure biological degradability
- When running the machine with biodegradable oil, the same oil and filter replacement intervals are valid as for mineral oil – see maintenance plans in the appendix
- Have the condensation water in the hydraulic oil tank drained by an authorised workshop every 500 service hours, in any case before the cold season. The water content must not exceed 0.1 % by weight
- The instructions in this Operator's Manual concerning environmental protection are also valid for the use of biodegradable oil
- If additional hydraulic attachments are mounted or operated, use the same type of biodegradable oil for these attachments to avoid mixtures in the hydraulic system.
  Subsequent change from mineral oil to biodegradable oil must be carried out by an authorised workshop or by your KRAMER-ALLRAD dealer

3.30 Lubrication work

Caution!

In order to avoid damage to the lubrication points, lubricate with lithium-saponified brand-name grease

☞ – *see Fluids and lubricants on page 3-3*

Lubricating the rear axle oscillation-type bearing

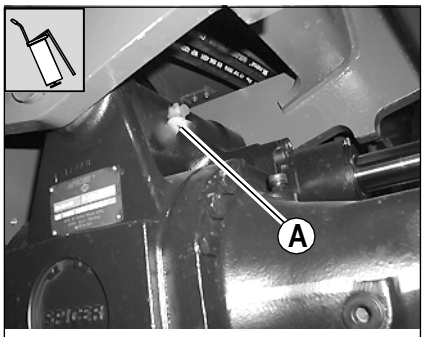


Fig. 79: Grease nipples for oscillation-type bearing

Important!

The machine has an oscillation-type rear axle. Grease the bearing at the latest after **every 50 service hours** or once a week.

☞ *Lubricate grease nipple **A** of the oscillation-type bearing*

Lubricating the front and rear axle planetary drive bearings

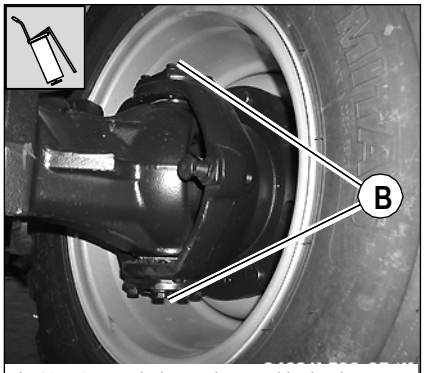


Fig. 80: Grease nipples on planetary drive bearings

☞ *Lubricate grease nipples **B** (2x) on each planetary drive bearing **every 50 service hours** or once a week*

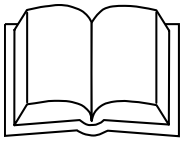
3.35 Tyre maintenance

Danger!

Improper tyre repairs –

Danger of accidents!

☞ *All repair work on tyres and rims may only be carried out by authorised workshops*

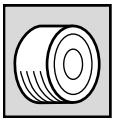


Important!

Regular inspections of the tyres

- Improve operating safety
- Increase the service life of the tyres
- Reduce machine downtimes
- Refer to the table in chapter “Specifications” on page 2-7 for the authorised tyre types and the correct tyre pressures. A tyre table sticker is also affixed on the front window of the machine.

Daily tyre checks



☞ *Carry out the following maintenance work once a day:*

- Check tyre pressure
  – see chapter “Specifications” on page 2-7
- Check tyres and rims for damage (cracks, ageing etc.) – also on the inside
- Remove foreign bodies from the tyre tread
- Remove traces of oil and grease from the tyres

3.45 Cleaning the engine compartment

Danger!

Clean the engine at engine standstill only –

Danger of personal injury!

☞ *Stop the engine before cleaning*

☞ *Remove the ignition key*

☞ *Apply the parking brake*

☞ *Switch off ignition and remove the ignition key*

Caution!

The humidity penetrating the electronics causes it to fail and leads to engine damage!
When cleaning the engine with a water or steam jet

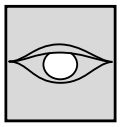
☞ *The engine must be cold*

☞ *Do not point the jet directly at any of the electric sensors such as temperature and oil pressure switches or control valves.*

☞ *Protect all electric parts, such as the alternator, connectors etc. from humidity*

☞ *If the water jet is unintentionally pointed at electric components, dry them with compressed air and apply contact spray to them.*

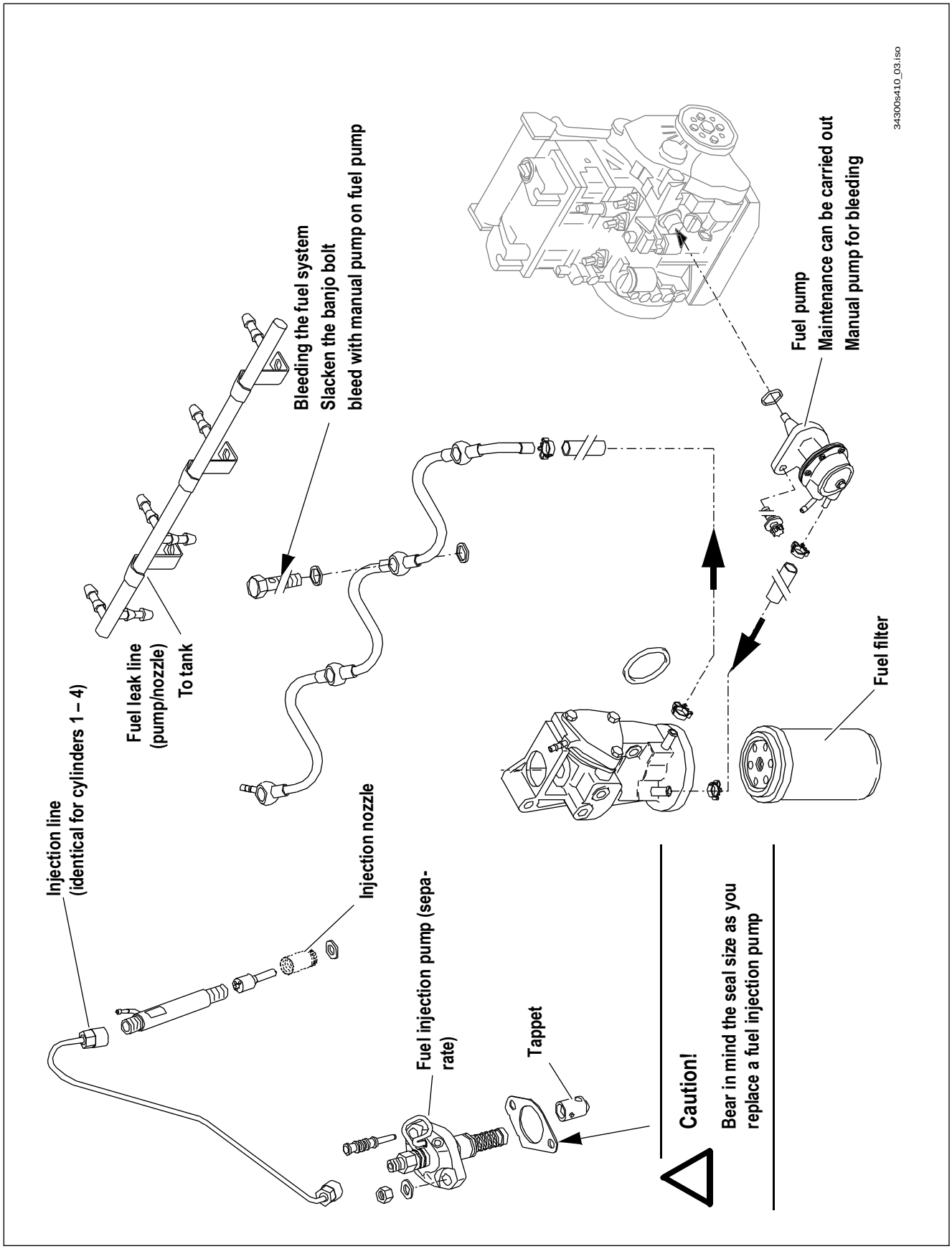
3.46 Screw connections, hinges



All screw connections must be checked regularly, even if they are not listed in the maintenance plans.
Tighten loose connections immediately. Refer to chapter “Specifications” for the tightening torques.

All mechanical pivot points on the machine (e.g. door hinges, joints) and fittings (e.g. door arresters) must be lubricated regularly, even if they are not listed in the lubrication plan.

4.8 Fuel system



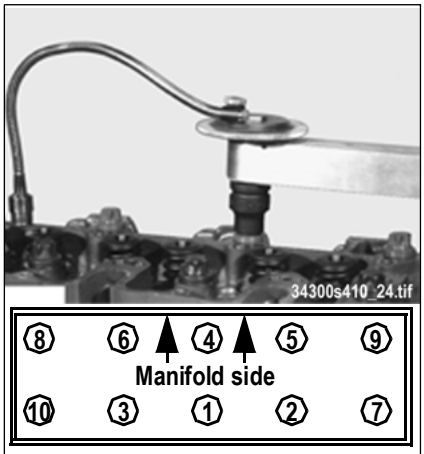


Fig. 120: Mounting the cylinder-head bolts

☞ *Mount the cylinder-head bolts*

➥ Tightening torque:

- 1st pass **30 Nm**
- 2nd pass **80 Nm**
- 3rd pass **160 Nm**
- Angle for retightening: **90°**

Caution!

Bear in the mind the order for tightening the cylinder-head bolts!

☞ *See figure*

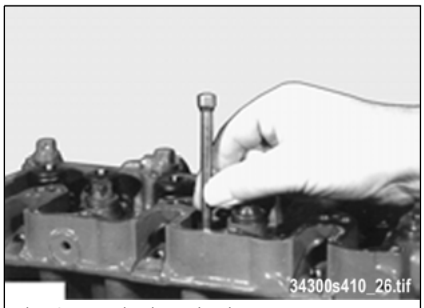


Fig. 121: Inserting the push rods

☞ *Insert the push rods*

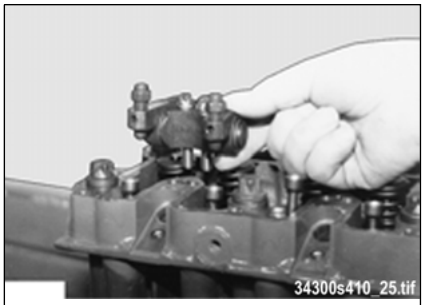


Fig. 122: Mounting the rocker arm bracket

☞ *Mount the rocker arm bracket and align it with the push rods*

➥ Tightening torque: **21 Nm**

☞ *Set the valve clearance*

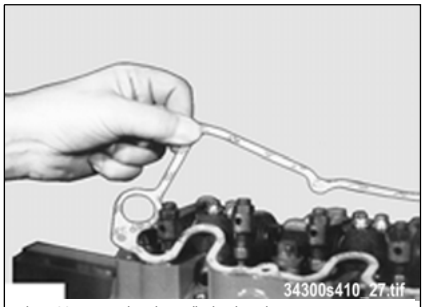
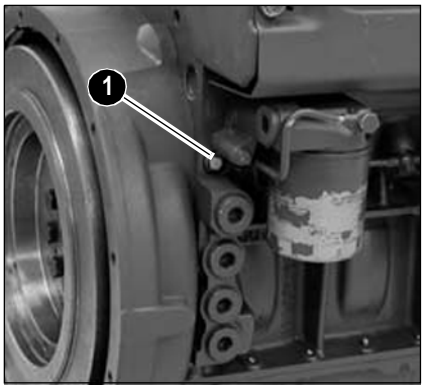


Fig. 123: Mounting the cylinder-head cover

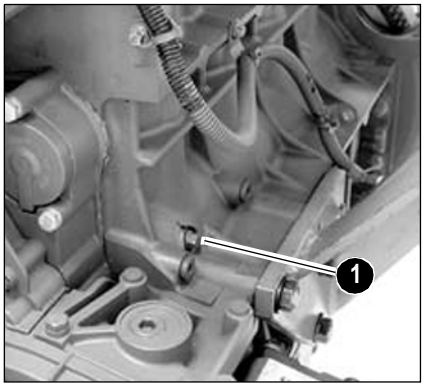
☞ *Place the gasket for the cylinder-head cover*

☞ *Mount the cylinder-head cover*

➥ Tightening torque **8.5 Nm**

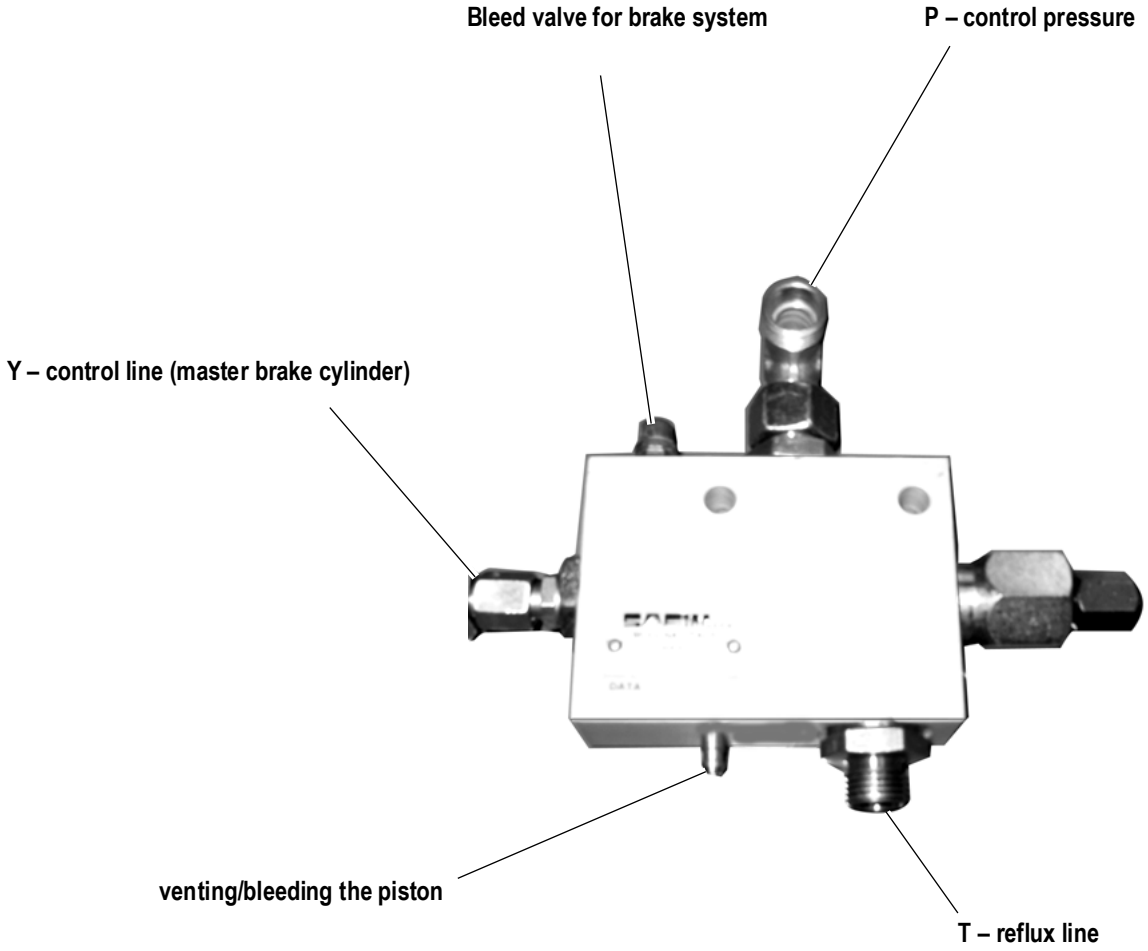


☞ *Tighten screw plug (1) with a new copper sealing ring.*



☞ *Tighten screw plug (1) with a new copper sealing ring.*

5.6 Inching valve overview



Description of inching valve

Actuating the brake pedal applies pressure to the inching valve and the service brake.

The machine is first braked by means of the hydraulic drive, and then with the service brake.

Functional description

Actuating the master brake cylinder applies brake pressure to port **Y** of the inching valve, which in turn controls the control spool in the inching valve and establishes a connection between port **P** and port **T**.

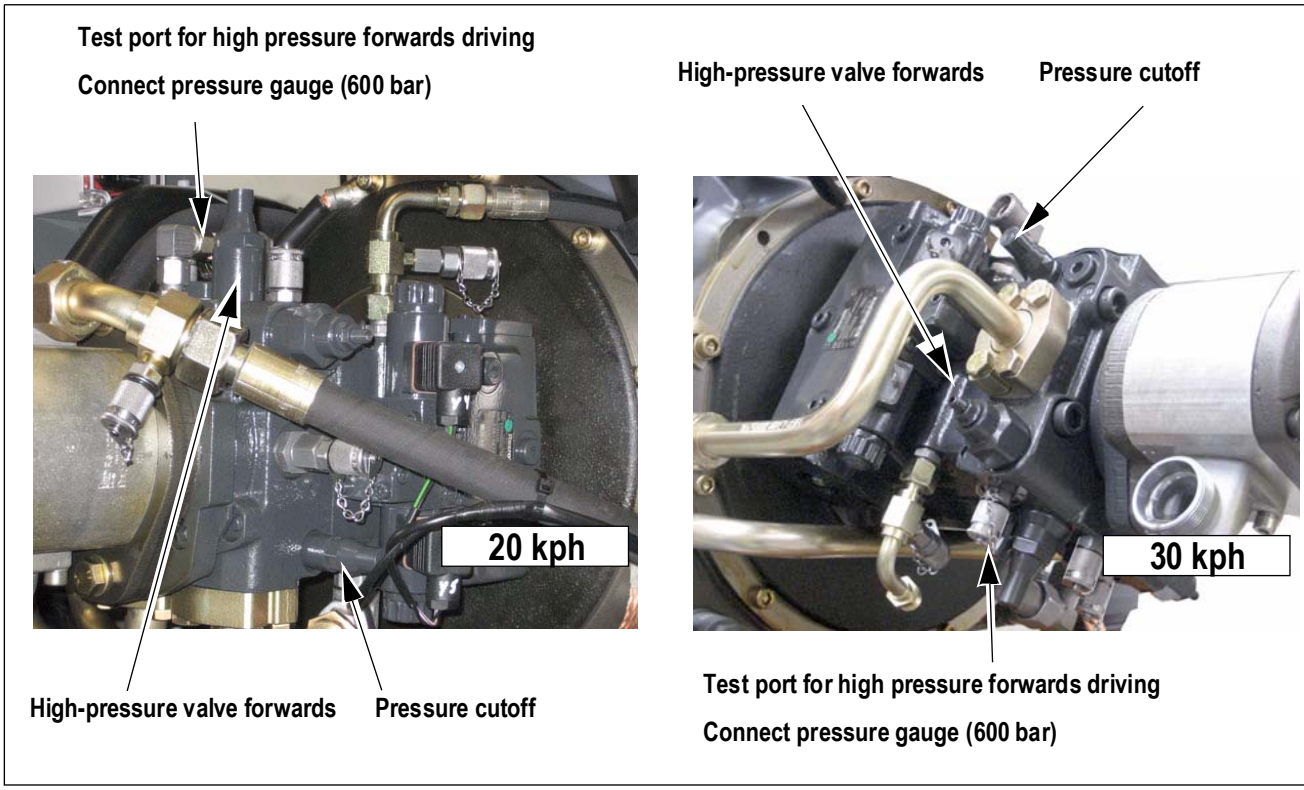
The control pressure of the variable displacement pump is reduced, and hence the flow rate of the variable displacement pump is reduced.

The machine slows down. At the same time, the brakes become active, proportionally to the brake pressure.

Danger!

The inching valve is a **safety component**! Do not carry out any modifications!

5.17 Setting high pressure/drive pressure



Important!

The pressure cutoff corresponds to the hydraulic pressure measured at the forwards and reverse driving HP test ports

☞ Select the 2nd speed range

☞ Drive the machine against "hydraulic resistance"
(wheels not allowed to spin at full thrust)

☞ Read off the pressure on the forwards driving HP gauge

Set the pressure at the pressure cutoff (w/f 13 – allen key 4)

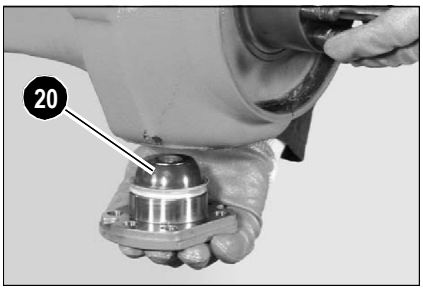
☞ Screw in the pressure cutoff

➥ **Pressure increase**

☞ Unscrew the pressure cutoff

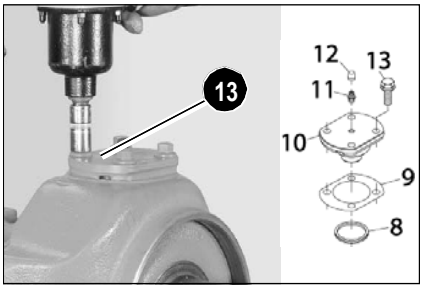
➥ **Pressure reduction for 20 kph machine = 370 – 380 bar**

➥ **Pressure reduction for 30 kph machine = 465 – 480 bar**

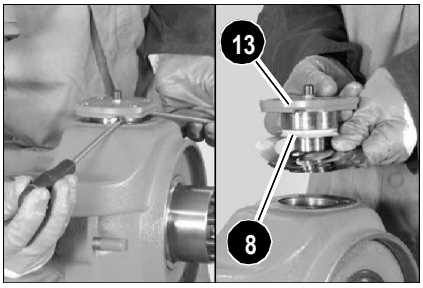


☞ *Remove bearing pin* **20**

➥ Lower pin with ball half

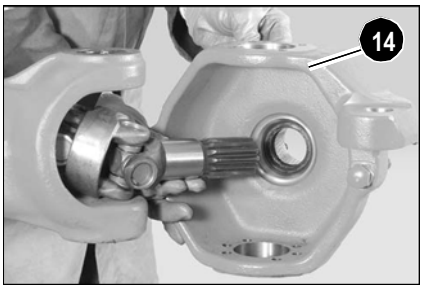


☞ *Unscrew fastening screw* **13** *from the upper bearing pin (w/f 15)*

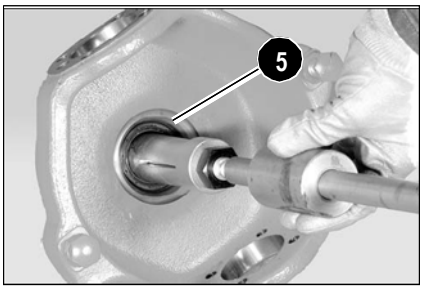


☞ *Remove bearing pin* **10** *by applying pressure with two mounting levers*

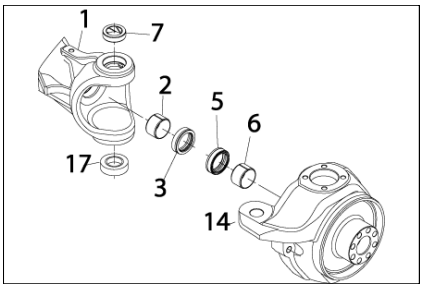
☞ *Remove sealing ring* **8**



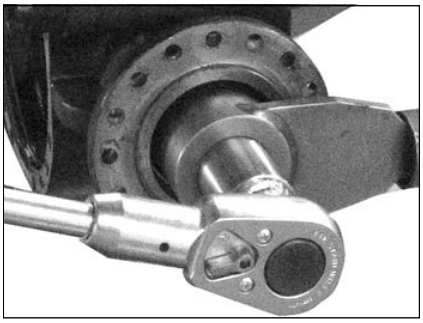
☞ *Remove the complete joint housing* **14**



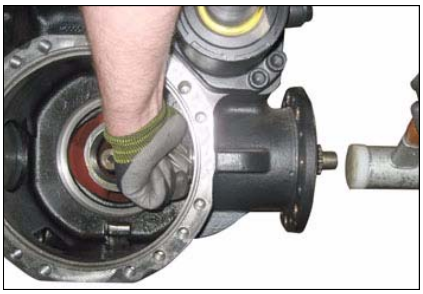
☞ Remove sealing ring **5**



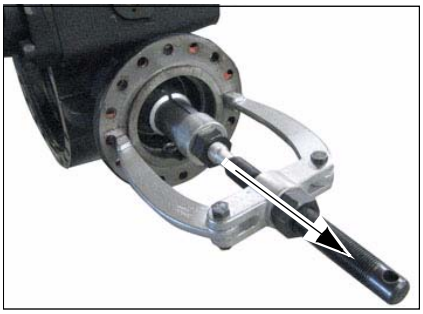
☞ *Joint housing* **5** *and axle carrier* **3** sealing



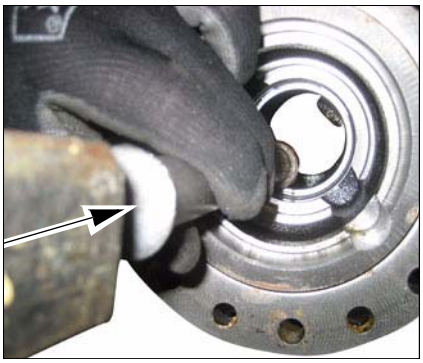
☞ *Remove the nut from the pinion shaft with special tool “A”* *on page 6-14*



☞ *Expel the pinion shaft backwards into the housing with a plastic hammer*



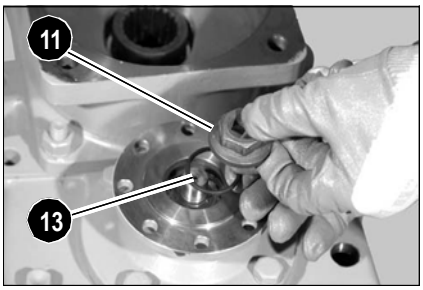
☞ *Remove the outer bearing shell with an inside extractor*



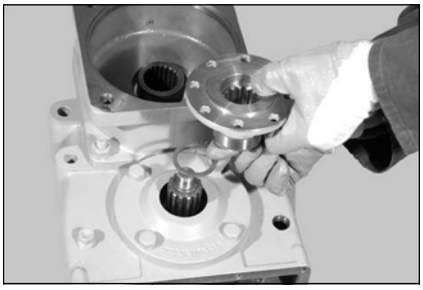
☞ *Remove the rotary shaft lip seal*

☞ *Drive out the inner bearing shell towards the housing by means of a soft drift*

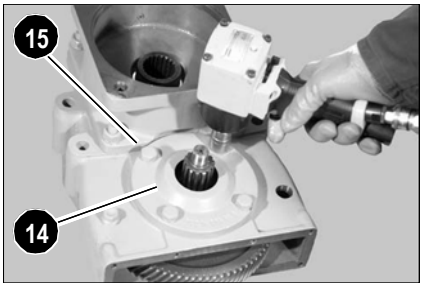
➥ Take care not to damage the spacers



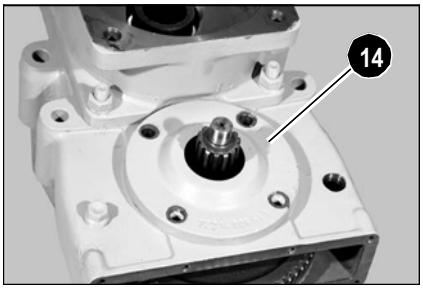
☞ *Remove nut* **11** *and O-ring* **12**



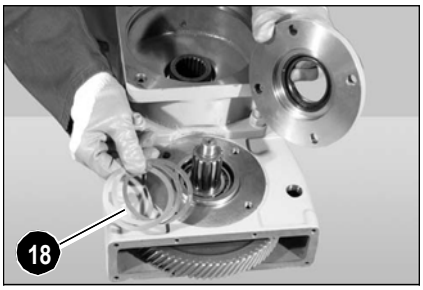
☞ *Remove the flange*



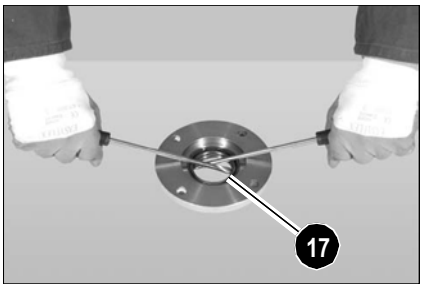
☞ *Remove fastening screws* **15** *from cover* **14**



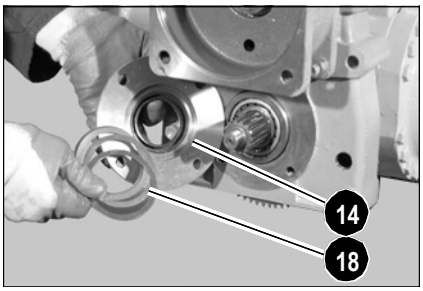
☞ *Remove cover* **14**



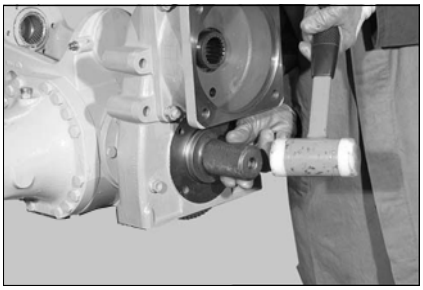
☞ *Remove spacers* **18**



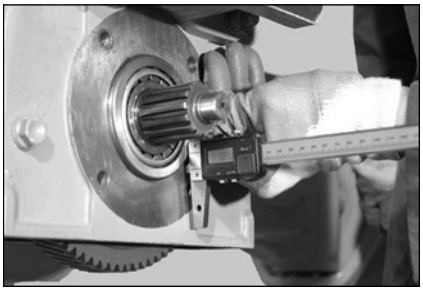
☞ *Remove sealing ring* ***17***



☞ *Remove washers* **18** *and cover* **14**

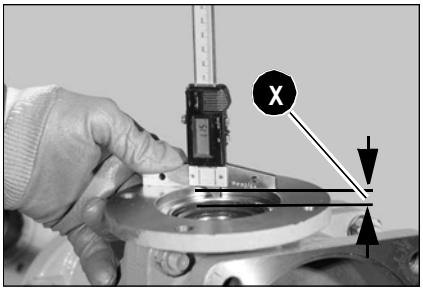


☞ *Drive in the bearing again*



☞ *Determine the bearing projection*

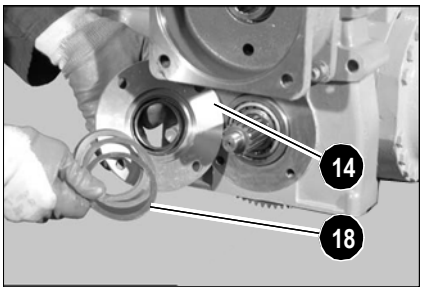
➥ The dimension is referred to as **Y**



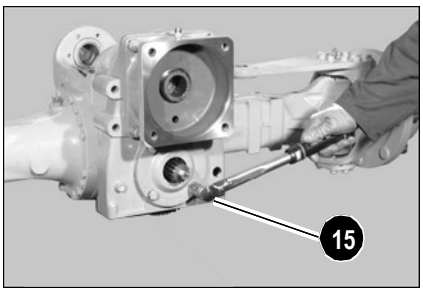
☞ *Measure the dimension on the cover between the contact surface and the upper edge of the bearing*

➥ Determine the spacers

➥ X -Y – 0.05 mm (initial stress) = thickness of spacers



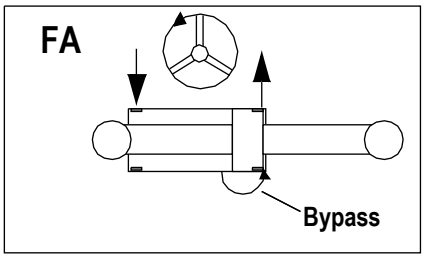
☞ *Mount washers* **18** *and cover* **14**



☞ *Tighten screws* **15** *to 90 Nm*

Steering system

Bleeding the steering rams



☞ *Start the engine*

☞ *Turn the steering wheel to the left* until a resistance can be felt

☞ *Continue turning the steering wheel 5 to 10 revolutions until the resistance no longer changes*

☞ *Turn the steering wheel to the right until a resistance can be felt*

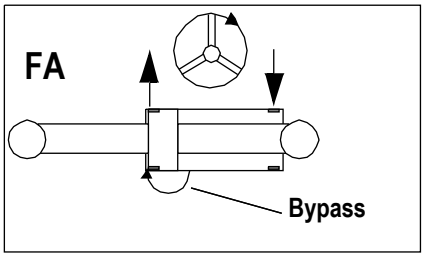
☞ *Continue turning the steering wheel 5 to 10 revolutions until the resistance no longer changes*

If there is no more air in the steering circuit, then ...

☞ *Turn the wheels to the left as far as they will go*

☞ *Continue turning the steering wheel against the limit*

➥ You must be able to feel a certain resistance (oil flows through the bypass)



☞ *Turn the wheels to the right as far as they will go*

☞ *Continue turning the steering wheel against the limit*

➥ You must be able to feel the same resistance here, too, as on the other side

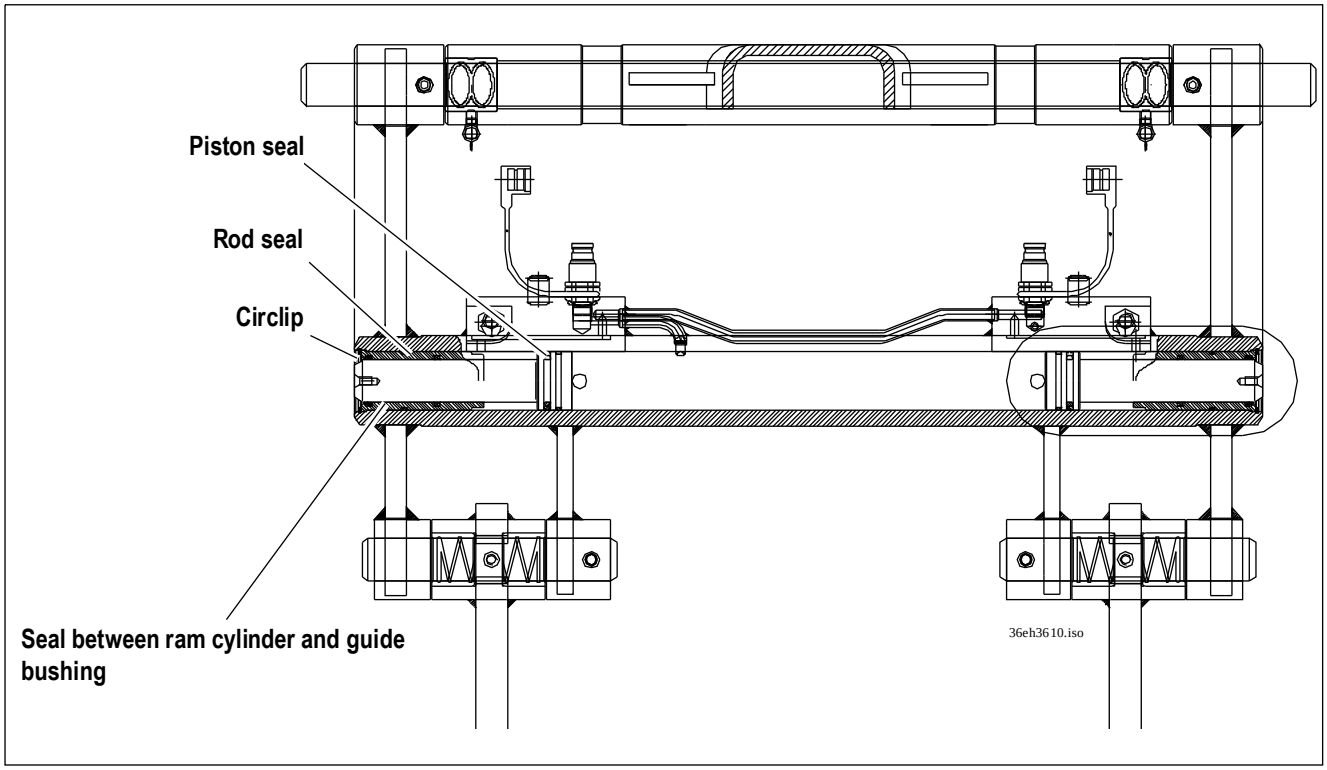
➥ If the resistance is stronger (at the same speed with which the steering wheel is turned), move the piston of the piston rod to the left until reaching the same resistance

☞ *See "Setting steering synchronisation (5)"* *on page 8-11*

Caution!

The steering rams of the front and rear axles are checked in the same way!

9.11 Control ram (quickhitch frame): sealing work



Disassembly/assembly

☞ *Release the pressure in the quickhitch ram control circuit*

☞ *Remove the circlip*

☞ *Drive out the piston with an impact extractor M 8*

☞ *Renew the seal between piston rod and guide bushing*

➥ Replace complete sealing kit

☞ *Assembly in the reverse order*

Caution!

Special tools required for sealing the ram

10.4 Colour coding of electric lines

The cables are colour-coded according to DIN 72551 Part 4. Refer to the 21 pin cab/frame interface or the explanation in the wiring harness drawings for other colours not listed in this DIN standard.

Extract from DIN 72551, sheet 4

Line		Basic colour	Identification colour
From	to		
Ignition coil I	Ignition distributor (low-voltage ignition lead)	Green	-
Ignition coil II	Ignition distributor (low-voltage ignition lead)	Green	Red
Battery	Starter	Black	-
Battery	Earth (if bare earth lead is not used)	Black	-
Starter	Alternator	Red	-
Starter	Control panel (30)	Red	-
Light switch (30)	Ignition switch (30)	Red	-
Control panel (30) or light switch (30)	Fuse	Red	-
Fuse	Hand lamp, radio, clock etc.	Red	-
Control panel (15/54)	Heater plug and starter switch; heater-plug telltale	Black	-
Heater plug and starter switch; heater-plug telltale	Glow plugs	Black	-
Ignition switch (15/54)	Ignition coil	Black	-
Ignition switch or control panel (54/15/61a)	Telltales	Black	-
Control panel or ignition switch (15/54)	Fuse	Black	-
Fuse box	Brake light	Black	Red
Fuse box	Turn indicator switch	Black	White-green
Turn indicator switch	Turn indicators, left	Black	White
Turn indicator switch	Turn indicators, right	Black	Green
Telltale	Turn indicators	Light blue	-
Fuse	Cigarette lighter	Black	-
Fuse	Heated window	Black	Yellow-red
Fuse	1st horn	Black	Yellow
Fuse	2nd and 3rd horn	Black	Yellow-light blue
Horns	1 pole horn pushbutton (earth)	Brown	-
Fuse	Wipers	Black	Purple
Battery charge telltale	Terminal 61 of alternator or reverse current cutout	Light blue	-
Fuse	Main beam telltale	Light blue	White
Oil pressure gauge (indicator)	Oil pressure switch	Light blue	Green
Fuel level indicator	Fuel tank	Light blue	Black
Tyre-pressure warning device	Tyre-pressure drop indicator	Light blue	Yellow
Control panel bzw. Lichtschalter	Low beam switch	White	Black
Low beam switch (a)	Fuse	White	-